



Independent Scientific Review Panel
for the Northwest Power & Conservation Council
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Final Review of BiOp Fast Track Research, Monitoring, and Evaluation Proposals



**ISRP 2010-10
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ISRP Final Review of BiOp Fast Track Research, Monitoring, and Evaluation Proposals

I. Table of proposals and recommendations

Click page numbers to jump to proposal reviews. Click proposal IDs to access the proposals and earlier ISRP comments on proposals that did not need a response. These are identified as NA (not applicable) in the “Page” column.

ID	Title	Proponent	Province	Subbasin	FY10	FY11	FY12	Meets scientific criteria?	Page
198909800	Idaho Supplementation Studies	IDFG / NPT / SBT	Mountain Snake	Salmon	\$1,990,884	\$1,992,328	\$2,041,844	In Part (Qualified)	6
199005500	Idaho Steelhead Monitoring and Evaluation Studies	IDFG	Mountain Snake	Clearwater	\$807,012	\$808,944	\$828,301	Yes (Qualified)	11
199107300	Idaho Natural Production Monitoring	IDFG	Mountain Snake	Salmon	\$880,401	\$869,622	\$891,919	Yes	16
199305600	Research to advance hatchery reform	NW Fisheries Science	Mainstem/Systemwide	Methow	\$510,000	\$587,559	\$597,707	Yes	NA
199703000	Chinook Salmon Adult Abundance Monitoring [Includes fast track Joseph Creek Steelhead Escapement project]	Nez Perce Tribe	Mountain Snake	Salmon	\$448,061	\$438,367	\$448,680	Yes	NA
199800702	Grand Ronde Supplementation: Lostine River Operation and Maintenance and Monitoring and Evaluation	Nez Perce Tribe	Blue Mountain	Grande Ronde	\$597,795	\$771,299	\$790,582	Yes (Qualified)	18
199801600	Salmonid Productivity, Escapement, Trend, and Habitat Monitoring in the John Day River Subbasin	ODFW	Columbia Plateau	John Day	\$200,571	\$1,165,975	\$1,223,075	Yes (Qualified)	NA
200301700	Integrated Status and Effectiveness Monitoring Program (ISEMP): The design and evaluation of monitoring tools for salmon populations and habitat in the Interior Columbia River Basin.	NW Fisheries Science	Mainstem/Systemwide	Systemwide	\$1,561,176	\$1,614,788	\$755,401	In Part	23
201002600	Chinook and Steelhead Genotyping for Genetic Stock Identification (GSI) at Lower Granite Dam	IDFG	Mainstem on the ground/Multiprovince	Mainstem on the ground/Multiprovince	\$865,858	\$669,448	\$669,448	Yes (Qualified)	NA
201002800	Implement a Rotating Panel Sampling Adult Steelhead in Small Tributaries of the Tucannon and Snake rivers	WDFW, NOAA	Columbia Plateau	Snake Lower		\$66,441	\$52,381	Yes	27
201003000	Estimate viable salmon population	Yakama	Columbia Plateau	Yakima	\$644,271	\$639,960	\$655,958	Yes	31

ID	Title	Proponent	Province	Subbasin	FY10	FY11	FY12	Meets scientific criteria?	Page
	(VSP) parameters for Yakima steelhead major population group (MPG)	Nation, WDFW						(Qualified)	
201003100	Snake River Chinook and Steelhead Parental Based Tagging	IDFG / NPT / SBT	Mainstem on the ground/Multiprovince	Mainstem on the ground/Multiprovince	\$1,702,206	\$1,701,034	\$1,058,029	Yes (Qualified)	NA
201003200	Imnaha River Steelhead Status Monitoring (was 200205600)	Nez Perce Tribe	Blue Mountain	Imnaha	\$648,269	\$419,370	\$430,086	Yes	34
201003300	Estimate the Relative Reproductive Success of Hatchery and Natural Origin Steelhead in the Methow River Basin	WDFW	Columbia Cascade	Methow	\$225,801	\$231,446	\$237,234	No	38
201003400	Upper Columbia Spring Chinook and Steelhead Juvenile and Adult Abundance, Productivity, and Spatial Structure Monitoring.	WDFW	Columbia Cascade	Wenatchee	\$702,643	\$719,646	\$737,638	Yes (Qualified)	NA
201003500	Abundance, productivity and life history of Fifteenmile Creek Steelhead	ODFW	Columbia Gorge	Fifteenmile	\$403,200	\$559,450	\$309,700	Yes	NA
201003600	Expansion of Washington's Tag Recovery Program in the Lower Columbia Region to Improve Fisheries and Viable Salmonid Population Monitoring	WDFW	Lower Columbia	Columbia Lower	\$1,000,000	\$839,902	\$881,896	Yes	43
201003800	Lolo Creek Permanent Weir Construction	Nez Perce Tribe	Mountain Snake	Clearwater	\$200,000	\$1,100,000		Yes (Qualified)	NA
201004200	Tucannon Expanded Pit Tagging	WDFW, NOAA	Blue Mountain	Tucannon	\$15,010	\$15,509	\$16,035	Yes	NA

II. Background and summary

At the Northwest Power and Conservation Council and Bonneville Power Administration's request, the Independent Scientific Review Panel (ISRP) reviewed 19 proposals intended to address high priority research, monitoring and evaluation needs identified in the Biological Opinion (BiOp) for the Federal Columbia River Power System (FCRPS). These needs were identified for immediate action during the recent Columbia Basin Research, Monitoring and Evaluation (RM&E) Collaboration process and workshops in November 2009. These 19 [fast-track proposals](#) include 11 new projects and modifications to 8 ongoing projects.

We reviewed these proposals in two steps. On February 24, 2010, we released an initial review of the proposals identifying 9 proposals that met scientific review criteria and 10 proposals that needed a response to our scientific concerns before we could make a final recommendation ([ISRP 2010-7](#)). On April 14, the Council made recommendations to Bonneville Power Administration supporting the implementation of those 9 proposals that met criteria. This review contains our final recommendations on those remaining proposals that needed and were augmented with responses.

This review should not only inform decisions on fast-track work elements but for most proposals also serve as the review for the larger RM&E categorical review anticipated to begin in June 2010. The ISRP understands that the proposals and our accompanying review comments will be included for context to inform review of similar projects in the RM&E category review and to facilitate efficient implementation of RM&E across the program. Unless otherwise recommended, the project proponent will not be required to submit another full proposal for that review. However, if additional information is requested by the ISRP, Council, or BPA, the proponent may augment their fast-track proposal as it moves forward to the RM&E categorical review.

The ISRP reviewed the proposals using our standard criteria, i.e., that the project is based on sound science principles; benefits fish and wildlife; has clearly defined objectives and outcomes; has provisions for monitoring and evaluation of results; and is consistent with the Columbia River Fish and Wildlife Program. To complete the review, we followed our standard review process. At least three reviewers independently evaluated each proposal and provided comments. The ISRP held a teleconference and discussed the proposals and individual reviewer comments. Lead reviewers developed recommendations and comments and distributed a draft for comments and consensus. We followed these same steps for the response loop.

In sum, we found that proposals justified their primary Fast-Track work elements, although many of those proposals received "qualified" or "in part" recommendations with comments to improve their implementation. One proposal did not meet scientific review criteria.

III. Programmatic comments

The five programmatic issues below were raised in our initial report ([ISRP 2010-7](#)) and are updated to reflect discussions and additional materials received in response to our initial report.

A. Need for independent peer review of the coordinated monitoring strategy. These fast-track proposals are intended to fill critical “gaps” in the collection of data for estimating Viable Salmonid Population parameters for Evolutionarily Significant Units of salmon (abundance, productivity, spatial distribution, and diversity) to meet requirements of the 2008 Biological Opinion for the Federal Columbia River Power System. In 2009 there was an effort to match the requirements for collecting and analyzing population data with existing Fish and Wildlife Program projects. This initial effort was followed by workshops attended by most project proponents to “ground truth” the preliminary analyses and develop a coordinated M&E program for anadromous salmon in the Columbia River Basin. The fast-track projects and many other projects that will be reviewed during the summer of 2010 are intended to serve as essential components of the comprehensive M&E strategy. Many proposals provided a link to the current draft of the comprehensive strategy, but that draft has not yet been independently peer reviewed. Moreover, the timeframe for the fast track review did not permit thorough inspection of the linked document. Finally, without adequate review and linkage it is not possible to verify that the new tasks and work elements will provide the information desired. Before the Fish and Wildlife Program RME categorical review is initiated, the coordinated RME strategy should be peer reviewed by the ISRP (and perhaps ISAB).

B. Data precision and bias requirements for VSP parameter estimates. The ISRP understands that the initial screening of projects collecting data to fulfill RPA obligations primarily involved identifying which projects included PISCES work elements appropriate for estimating VSP parameters. This initial screening apparently did not involve confirmation of data quality. The 2009 fall workshops with project proponents were, in part, intended to confirm that the projects were collecting the appropriate data, and that data were gathered with sufficient precision. The methods for making this evaluation and the outcome have not yet been explicitly presented to the ISRP. This should be addressed by the completion of the Fish and Wildlife Program RME review during the summer/fall 2010. If deficiencies exist, it would be beneficial and timely to identify them before initiating another three to five year commitment for funding.

C. Data precision presentations in proposals. Many of the proposals identified the goal of estimating abundance with a 15% coefficient of variation (CV – the ratio of the standard deviation to the mean of a data set) basing that goal on ESA monitoring guidance for anadromous salmon and steelhead (Crawford and Rumsey 2009). The reference to a CV of 15% (Crawford and Rumsey 2009) has not yet been established as a reasonable regional data standard. The statistical and biological basis for the recommendation in Carlile et al. (2008) as cited by Crawford and Rumsey (2009) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year or one stock in six) of failing to label a stock of concern when warranted, may not be a useful standard in all circumstances. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that it is the appropriate data standard. Further justification for sample size targets is required.

There is a need for the region to develop a standard for data precision that achieves the certainty and risk tolerance needed for management decisions. Justification for the standard should be transparent for both scientific and policy applications. Projects should address the precision of the data and whether they

meet a regional standard. None of the proposals provided evidence that past data collection efforts met this standard, nor was any explicit evidence provided to demonstrate that this degree of precision could be achieved with the proposed level of sampling.

D. Comprehensive description of projects in proposals. Many of the projects have been ongoing for twenty or more years. The proposals for most of the long-standing projects did not provide a concise description of the project in terms of its purpose and objectives for the subbasin, province, and basin. For those reviewers unfamiliar with the projects, the proposals were sometimes overwhelming. The ISRP believes that clear but brief summaries of the purpose, goals, and history of the projects, in the technical background and project history sections of the proposal should document the evolution and value of these projects including progress toward a project's goals. As members of project staff, Council, and the ISRP change, maintaining the continuity of the project is important.

E. Identify Fast Track tasks and work elements. With notable exceptions, most projects were not explicit about which actions (and associated tasks and work elements) actually were the fast track components. Very few of the proposals indicated how past activities were insufficient and what additional tasks were included to remedy those deficiencies. For the summer 2010 RME review, the ISRP recommends that project proponents explicitly address tasks and work elements that are being expanded to address findings and recommendations from the comprehensive RME strategy.

IV. ISRP recommendations and comments on each proposal

ISRP reviews are presented below sequenced by proposal number.

198909800 - Idaho Supplementation Studies

Proponent: IDFG / NPT / SBT

Province: Mountain Snake **Subbasin:** Salmon

Budgets: FY10: \$1,990,884 FY11: \$1,992,328 FY12: \$2,041,844

Short description: The goal of the Idaho Supplementation Studies (ISS) is to evaluate supplementation as a recovery/restoration strategy for spring/summer Chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon and Clearwater subbasin.

ISRP final recommendation: Meets Scientific Review Criteria - In Part (Qualified)

In Part: The recommendation is "in part" to install the screw trap on Marsh Creek and continue with adult and juvenile evaluations in the ISS treatment and control streams. The proponents have removed the objective of evaluating the AHA model and HSRG assumptions from the proposal and a placeholder has been requested. If this objective is pursued in the future, the evaluation procedure should be reviewed before beginning.

Qualification(s): First, without more information the ISRP is unable to assess whether the ISS data meets the regional coordination standard. The ISS proponents can address the CV issue as an addendum in the upcoming RME Categorical Review. Second, the ISRP should review preliminary draft analyses of reports from the ISS project as they are developed in the next few years.

Final comment:

The response was straightforward and clear and added some valuable information; however, the proponents only partially answered the ISRP's queries. The revised proposal did not deliver the information we were interested in obtaining regarding two issues: the CV (coefficient of variation) issue and the derivation (natural origin vs. hatchery) of the adults contributing to the redd count trends given in Figures 1-7.

A list of the ISS streams x treatment and control was provided that indicated which streams were potential intensive and extensive monitoring sites for the coordinated anadromous salmon BiOp monitoring. However there was no explanation of the process or timeline for selection of which populations are actually going to be incorporated into the monitoring framework. The answer regarding the precision of the current estimates with reference to the 15% CV standard was not adequate. The ISRP was anticipating information on which locations actually met this standard using the current protocol, which could likely meet it with increased effort, and locations where the precision was not attainable. The precision of the existing data was not discussed. The ISS proponents can address the CV issue as an addendum in the upcoming RME Categorical Review. While the ISS study design was developed before the NOAA CV recommendation was made, the recommendation is an important step in helping to standardize methods and data collection within the region.

With regard to comparing natural and hatchery contributions, Table(s) 3 and 4 summarized the types of adult (Table 3) and juvenile (Table 4) data being collected at each location, but did not actually provide numbers or an indication that the information was suitable for analysis using the anticipated ISS analysis framework. Similarly, Figures 1 through 7 provide estimates of redds in various treatment and control streams, but do not partition the observations by adult source (natural/wild, supplementation adult,

conventional adult). Therefore, little could be learned from the tables and figures at this stage in terms of identifying differing performance among treatment and control groups. Consequently, any insights into the interpretation of the observations will need to wait until more thorough reports are prepared. The ISRP should review preliminary draft analyses of reports from the ISS project as they are developed in the next few years.

The ISS study has a long history of iterative reviews with the ISRP that include reviews of potential changes to the design. Thus, reviewers were concerned that two treatment streams (Lolo and Newsome Creeks) were removed from the Phase III treatment portion of the study and because outplantings are still occurring in these streams, they are now classified as being in the Phase I and II parts of the study. The study design previously reviewed by the ISRP called for all Phase II outplanting treatments to end and for all treatment streams to enter the Phase III treatment as a test of the supplementation model. The proponents note that the power analysis of the Phase III groups for detection power conducted as part of the 2002 proposal review process (Lutch et al 2003) showed that up to 25% of the treatment streams could be removed from the analysis without effecting detection power. On this basis, it would seem that the original study objectives can be met; however, no biological justification was provided for the change in the treatment status of Lolo and Newsome Creeks. The action is also not consistent with the stated goal (p. 6) of the proposal: “The primary focus of this proposal is to maintain the ISS study design and take the program to completion, test the hypotheses, and make supplementation recommendations.”

Finally, the proponents have removed the objective of evaluating the AHA model and HSRG assumptions from the proposal and a placeholder has been requested. If this objective is pursued in the future, the evaluation procedure should be reviewed before beginning.

Preliminary comment requesting a response:

The fast track element for Method #8 to install a second screw trap on Marsh Creek is sufficiently justified. For the remainder of the proposal, including the fast-track element to validate AHA modeling, a response is requested in the form of a revised narrative. The response should provide the following:

1. A table that outlines the ESU, MPG, Independent Populations, and streams in the Snake River system and identify which are potential high-precision and low-precision sites for RME.
2. A summary explanation of what process is underway (if any) to decide which component streams are part of the intensive and extensive sampling.
3. Greater detail of explanation for the precision/sampling intervals for intensive and extensive sites.
4. An overview-to-date of trends in ISS spring/summer Chinook abundance by location for all treatment and control (reference) streams. Include a summary table of the data collected for each of the sites by the ISS (or cooperators) since the last ISRP review.
5. Comparison of the precision and sampling intervals in the ISS streams with that desired by the BiOp RME and ISS statistical analysis.
6. Statements for the ISRP about any events or problems encountered since the last review that may compromise the analysis of the ISS.
7. Elaborate on the methods and approach to validate the assumptions and uncertainties in the AHA model

In concluding, the ISRP suggests that the final report should be independently peer reviewed when in draft form, much like what was done with the 10-year retrospective for the comparative survival studies (ISAB/ISRP 2007-6).

1. Technical Justification, Program Significance and Consistency, and Project Relationships

Justification for this project is well documented in the proposal and in the Council's current and past program language. The project has many links and relations—and large implications—for many other projects in the basin. The proposal clearly identifies relationships to the 2008 BiOp, TRTs recovery plan, Columbia Basin regional RM&E strategy, NPCC Fish and Wildlife Program, and WY-KAN-USH-MI WA-KISH-WIT.

As the proposal states, the Idaho Supplementation Studies (ISS) study design was intensively scrutinized and updated prior to the last funding cycle. This proposal "represents the ongoing efforts of the cooperating agencies in the ISS program to take that study design to completion without change" which is a significant and necessary pledge. The objectives of the program are to evaluate the effects of supplementation on juvenile and adult Chinook abundance; evaluate changes in natural productivity after supplementation is stopped; evaluate various supplementation strategies; and develop supplementation recommendations. These objectives seem important, relevant and consistent with policies and with biological and policy needs.

The key feature of this project is that it uses supplementation as a research treatment. Monitoring production and productivity responses for supplemented populations and unsupplemented reference populations could provide important insights into the effects of supplementation. Continued monitoring after supplementation ceases could contribute to a better understanding of the long-term effects of supplementation. At the completion of the project, status and trend monitoring currently provided by ISS will need to be incorporated into new or ongoing programs.

The program has large potential significance to the region. It is supported by the region's technical community as long as it reaches its objectives as planned and the results are unambiguous. If so, it should answer a number of long-standing and contentious issues about the impacts and efficacy of supplementation as a method of sustaining and providing long-term increases in depressed salmon populations' productivity. Data to allow such insights should start to come in over the next few years, thereby justifying this 20+ year investment.

2. Project History and Results

The proposal provides a lengthy and good review of the project's 20-year history. The ISS study design was first proposed in 1990, and has been executed within this framework with challenges owing to the unavailability of fish for stocking during the mid-1990s and owing to policy/political decisions by the Nez Perce Tribe to begin a supplementation program on Johnson Creek, one of the control (reference) streams. Because of these difficulties, the ISRP urged a review of the experimental and analysis design in 2001 to determine whether the effort had the potential to produce data that could be analyzed and used to answer uncertainties about supplementation. The ISRP has reviewed updated study designs in 2005 and again in 2006 during the 2007/2009 project solicitation. Because of this history of review and the depth of detail in the design, it is probably not necessary to revisit these topics. However, the proposal is insufficient to fully glean this background from the proposal. The project history presentation also describes the extensive resources (funds) dedicated to the project for the past two decades.

Treatment phase of this long-standing project ended in 2007, and the evaluation phase started in 2000. Thus limited data are available to represent the evaluation phase. However, virtually no results or data were presented in the project proposal other than the brief summary of Pahsimeroi Chinook genetic parentage studies. The lack of results, even at the minimum level of general trends and observations, was disappointing. The proponents should have provided more results on project performance to date. The proposal lists results as the development of protocols and the performance of annual data gathering (adult weirs, redd count and carcass surveys, emigrant traps, and snorkel estimates). While these steps were surely necessary to the project's implementation and M&E, they do not constitute data or results—they are process.

Only one peer-reviewed paper appears to have been produced through the project, and it is not focused on the primary objectives of project. There is a five-year-old master's thesis on parentage analysis in a study stream (Pahsimeroi) that has not been published in the open literature. This omission should be rectified, particularly given the reliance by the proposal proponents on the results of that study. Consequently, it should be validated through the peer review process.

As written, the proposal suggests that data analysis will only begin after the last fish has been processed in 2014 or thereabout. It is reasonable (at least from the ISRP's perspective) to expect that some preliminary analysis of data from the evaluation phase of this effort that began in 2008 start immediately.

Finally, as a result of actions taken in response to the 2001 ISRP Provincial Review, the project has been modified to better provide relevant data. Unfortunately, the important work proposed in Genetic Evaluation of Salmon Supplementation in Idaho Rivers 200725000 was not funded.

3. Objectives, Work Elements, and Methods

The proposal clearly states the objectives as research goals: 1) Assess the use of hatchery Chinook salmon to increase natural populations of spring and summer Chinook in the Salmon and Clearwater River drainages; and 2) Evaluate the genetic and ecological impacts of hatchery Chinook salmon on naturally reproducing Chinook populations. The proposal identifies the contribution that each task will make to program needs, though methods are not described by objective or work element

Methods were not included in the proposal, though references were made to methods and analysis procedures that are well documented elsewhere, often as a result of discussion or reviews by the ISRP. A reviewer new to this project would likely find the proposal inadequate in these areas, if they were not familiar with the earlier documents and discussion. For example, a brief explanation and justification of the standardized index of adult escapement and natural production used to compare across treatment and control streams should be provided in the proposal. Fortunately, the project appears to be remaining squarely on course with its schedule and methods as previously worked out with the ISRP through the extensive and intensive reviews done in 2001 and 2005.

Two new objectives appear to be the basis for the Fast Track proposal review: 1) Method #8 would install a second screw trap on Marsh Creek in order to provide additional data on juvenile outmigration from the Marsh Creek drainage; and 2) Method #9 would "verify AHA and AHSWG model assumptions and predictions using ISS data." Installation of the screw trap at Marsh Creek appears reasonable and justified. The second Fast Track element, AHA model validation, is not currently justified and does not look time sensitive (i.e., fast track), and therefore more justification is needed. The other project work elements seem well established now and relatively routine.

The proposed new task of using historical ISS juvenile release, survival, and adult return data to evaluate the AHA model by comparing actual adult returns to those predicted by AHA and AHSWG models is a useful component of the ongoing project; however, several issues are raised by this new task. First, ISS field activities are scheduled to end during this funding cycle, and appropriate plans will need to be developed if ISS infrastructure is to be maintained for intensive and extensive VSP status and trend monitoring (Appendix A). After 2012, ISS cooperators will no longer be evaluating adult returns to study streams (i.e., redd counts and carcass surveys), and juvenile migration evaluation will be complete after smolt trapping in 2014 (brood year 2012). In order to maintain current levels of intensive and extensive status and trend monitoring, ISS infrastructure and sampling duties will need to be incorporated into new or existing programs.

Second, select personnel from the ISS cooperating agencies will need to be funded for a period of time after 2014 to complete data analysis, a completion report, peer reviewed publications, and ensure ISS findings are communicated to and incorporated into other regional supplementation programs. As the project nears completion and personnel are shifted within the project and agency, we encourage key personnel to remain engaged in the project through its completion, in order to best realize the project's original objectives. Finally, AHA has been reviewed by the Puget Sound Technical Recovery Team (Review of the All-H analyzer model, March 18, 2005) and by the Recovery Implementation Science Team (April 9, 2009). There is no discussion of the past reviews of this model, how the ISS data will be used to address which assumptions and uncertainties, and how the analysis and assumption validation will be conducted.

4. M&E

This is one of the project's strong suits, though not enough detail is provided in this specific proposal for a new reviewer to determine that (or possibly to support the project). The strength of the methods comes from the work done by University of Idaho (at the request of the ISRP) to identify a statistical procedure that could answer the supplementation questions posed by the project and by the proponents commitment as stated in this proposal to maintain the study design unchanged through the sunset date for the project.

It is still not clear whether the ISS will yield data that can be analyzed to answer questions about the efficacy of supplementation. The primary challenge is the quality (precision) of adult abundance data that can be derived from redd count and carcass inspection in study streams that lack interrogation weirs. Even on streams that have weirs, estimating weir efficiency and adjusting data may be necessary.

In the last review, the ISRP was critical of the carcass data that was collected in conjunction with redd counts, which would be used to assign total adult counts (based on redds) proportionately to wild, supplementation, and conventional hatchery (strays) production. For several sample streams the carcass information came from limited sampling and had no associated estimates of precision. The ISRP recommended that the redd counting and carcass inspection be more rigorous.

The proposal cites that the goals and strategies for monitoring and evaluation of the status of Snake River Chinook salmon and steelhead identified in the fall 2009 RM&E workshop guide expansion of the ISS (Table 1, page 7). More information is needed for evaluation of whether the increased effort meets the RM&E goals. In particular, one goal is to "obtain high precision status and trend data for at least one population per adult life-history type per MPG (fish in, fish out monitoring)." One of the open questions is the selection of populations for this monitoring. The ISS proposal suggests that they may be collecting this information; however, the population is not yet selected. A succinct summary of the MPGs and

independent populations established by the TRT, which have high precision data, and which are associated with the ISS needs to be included in the proposal.

The high precision data type is not clear. The citation is to Crawford and Rumsey (2009) and reference is to data with a CV of 15% or less. CV (coefficient of variation) is not usually associated with precision of data, but with the variation associated with a state of nature. That is, salmon abundance across years has a CV; fall steelhead parr length has a CV. These are descriptions of the state of variation. They are not appropriate to determine confidence intervals. Crawford and Rumsey (2009) reference Carlile et al. (2008), which makes recommendations for coefficients of variation for estimates of total spawning escapement. The reference is to standard error of the estimate, not to variation in the population. More importantly, the statistical and biological basis for the recommendation in Carlile et al. (2008) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year of one stock in six) of failing to label a stock of concern when warranted appears to be arbitrary. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that this is the appropriate data standard.

Finally, the project proponents should continue to enlist the services of a statistician, such as they did with K. Steinhorst from the University of Idaho. It is hard to know from the information provided whether the final analysis after 2014 will be meaningful. As part of this review process, a solid reporting of the data already collected would help demonstrate project proponent's ability to conduct the analysis. It would also be good for the ISRP/ISAB to review a draft report before the final report is released, similar to independent reviews of the Select Area Fisheries Evaluation (ISRP/IEAB 2007-3), Comparative Survival Studies 10-year retrospective (ISAB/ISRP 2007-6), and Captive Propagation projects (ISRP 2004-14). This is a very important (and expensive) long running project which heightens the need to make certain the program comes to fruition successfully.

199005500 - Idaho Steelhead Monitoring and Evaluation Studies

Proponent: IDFG

Province: Mountain Snake **Subbasin:** Clearwater

Budgets: FY10: \$807,012 FY11: \$808,944 FY12: \$828,301

Short description: This project collects and monitors life history, genetic, and abundance data from wild steelhead populations in Idaho.

ISRP final recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): The proponents should submit an addendum in the RME Categorical review on whether their sampling design meets regional standards.

Final comment:

The response adequately addressed most ISRP concerns. The summary file made it easy to identify additions or changes to the original proposal. Presentation of results (pp. 13-17) was generally adequate and gave a good sense of the overall progress being made by the project.

Table 3 summarized the MPGs and independent populations where intensive sampling is possible. It is not clear whether this is an exhaustive list of the independent populations. There is only a general statement that extensive snorkel surveys could be conducted anywhere. The layout used in the ISS project provides a succinct and useful outline that is recommended for use by this project. Page 2 of the proposal identifies 2 MPGs, 17 populations, and multiple spawning aggregates for each independent

population other than Lolo Creek. Providing this detail in the proposal, and identifying those spawning aggregates that are suitable for snorkel surveys would improve the presentation and should be adopted in future results reporting and proposals.

Paragraph 2 on page five provided information known to the project proponents regarding the process to identify locations anticipated for intensive and extensive sampling. The proponents defer to the Snake River M&E strategy but did not provide details on the process to develop and complete this task. Until this strategy is completed, it is not possible for the ISRP to confirm that the activities and tasks executed by ISMES will achieve the data gathering necessary to fulfill the strategy.

The response to the ISRP request to provide greater detail of explanation for the precision/sampling intervals for intensive and extensive sites was inadequate. The second paragraph on page 5 simply references the NOAA standard but does not provide clarification about what the standard actually is, how achieving it will be measured, and how their past efforts have compared with the standard. Table 5 and 7 provide variances but do not indicate whether they achieved the required BiOp standard.

The proponents state that deficiencies in steelhead monitoring in Idaho were described in the BiOp and that RPA 50.5 is intended to remedy the deficiencies. The ISMES project has been modified to rectify these challenges; however, text is not provided that actually describes these limits and the expanded tasks to fill the gaps.

This project should be reviewed in more detail during the upcoming RME review to ensure it is going to meet the BiOp and Snake River M&E strategy needs.

Preliminary comment requesting a response:

The field data collected and then analyzed by the Idaho Steelhead Monitoring and Evaluation Studies (ISMES) is appropriate and used in management of steelhead populations. Because the proposal lacks a comprehensive explanation of steelhead monitoring in Idaho, the specific role ISMES contributes is difficult to ascertain. The ISRP has no reason to believe the monitoring is not essential, but the need for monitoring should be made clearer in the proposal. Consequently, a response is requested that provides the following in a revised narrative:

1. A table that outlines the ESU, MPG, Independent Populations, and streams in the Snake River system and that identifies which are potential high precision and low precision sites for RME.
2. A summary explanation of what process is underway (if any) to decide which component streams are part of the intensive and extensive sampling.
3. Greater detail of explanation for the precision/sampling intervals for intensive and extensive sites.
4. A summary table of the data collected for each of the sites by the ISMES (or cooperators) since the last ISRP review. Also include trend data that summarize steelhead abundance trends over the duration of the study period.
5. Comparison of the precision and sampling intervals in the ISMES streams with that desired by the BiOp RME statistical analysis.
6. Statements for the ISRP about any events or problems since the last review that may compromise the analysis of the ISMES.

7. Statements of whether any deficiencies in the data have been identified in BiOp, TRT, or CSMEP reports, and if so, description of how these deficiencies has been considered in the basinwide strategy and subsequent project modification.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The Idaho Steelhead Monitoring and Evaluation Study (ISMES) is another long-standing project that has benefited from previous ISRP reviews and interactions with the project proponents. The project has a long and developing history. It is well justified within the proposal and in the Council's Program. Relationships with other projects are extensive (Table 3 in proposal) and involve collaborations and efficiencies for data collection, data exchange, and coordination. The project appears consistent with the Fish and Wildlife Program and BiOp and ESA management needs. There is specific reference to increase B-run steelhead monitoring in RPA 50.5. The proponent states this project is the only one focused on wild steelhead in Idaho. This, however, does not address the question of whether the objectives of this study fulfill the RPA, or whether other projects also contribute.

The proposal references the Columbia Basin Regional RM&E Strategy and directs reviewers to a CBFWA website and table titled Critical Contracts and Identified Gaps, to justify continuing much of the past ISMES program. It would be helpful to the ISRP to summarize in a table in the proposal the essential monitoring that is needed for Idaho steelhead, and then identify which projects and proponents are suppose to complete these tasks. Ongoing and new tasks for ISEMS should be specifically identified. This project, together with others in the Snake River would benefit from an integrated review. Many projects overlap in duties, species addressed, and personnel.

The general explanation that data collected by this project are used to estimate VSP parameters for the Snake River Steelhead ESU (DPS) is well done; the VSP parameters are summarized, the hierarchy of spawning aggregates, independent populations, major population groups, and then the ESU is explained, and the general sorts of data used to estimate the parameters are referenced.

Specific information on the details of the hierarchical structure of Snake River steelhead ESU is incomplete in the technical background summary. Figure 1 (page 13) that identifies weir and screw-trap locations leads to the conclusion that there are two MPGs, and the appendix leads to the conclusion that there are a number of "populations" associated with individual tributaries. However, there is no statement as to the number of MPGs, the number of populations, and how many of these have multiple spawning aggregates. The recent steelhead genetic structure investigation that apparently forms the basis for anticipating delineation of adults and juveniles at Lower Granite Dam to MPG and perhaps population is not sufficiently summarized for reviewers to understand the state of development of this monitoring strategy. It is also not clear whether the precision of past data is sufficient for BiOp and recovery/delisting management decisions.

2. Project History and Results

The project history section is well done in terms of describing activities undertaken. Missing, however, are results in terms of what the project has found out about the "status and trends of wild steelhead populations" (the project purpose, as stated on page 1 of the proposal narrative). The project has evolved and become both more rigorous and comprehensive than its earlier versions. Some rudimentary (and intriguing) results were referred to on page 11 in the proposal, but not presented. Reviewers would like to see more findings presented, given the duration and ongoing nature of the project. The narrative on pages 11 and 12, together with the maps of snorkel sites, screw traps, and weirs are helpful; however, the project history and results are insufficient to inform a scientific review for ongoing efforts and to

establish that standards for quality assurance/quality control for the Columbia Basin Monitoring Strategy are being met.

A summary of the genetic analysis that concludes that sampling at Lower Granite Dam can be used to estimate the proportions of MPGs and some individual populations is necessary. Estimates of metrics under objectives 1 through 8 should be summarized in the proposal. There should be evidence included that the sampling protocols are rigorous enough to meet the guidelines for precision in the basinwide strategy.

The project accomplishments shown in the tabular outline and in the narrative consist only of actions performed, rather than biological results. What has been found out about what the narrative states as the project's purpose—to evaluate the status and trends of wild steelhead populations in Idaho? It is said: "We will assess abundance, productivity, spatial structure, and diversity at the population and major population group scales . . . also assess abundance, productivity, and diversity for the Snake River Distinct Population Segment." Project proponents should present the findings to date on these matters as part of the proposal and to help reviewers evaluate the project's progress.

Additionally, proponents should describe how this data fits and has fitted with TRT analysis of population viability and estimation of VSP parameters. Proponents should explicitly describe how their past data has been used and how the additions would inform future VSP analysis.

The high precision data type is not clear. The reference to a CV of 15% or less (Crawford and Rumsey 2009) has not been established as a reasonable data standard. CV (coefficient of variation) is not usually associated with precision of data, but with the variation associated with a state of nature. That is, salmon abundance across years has a CV, and fall steelhead parr length has a CV. These are descriptions of the state of variation. They are not appropriate to determine confidence intervals. Crawford and Rumsey (2009) reference Carlile et al. (2008), which makes recommendations for coefficients of variation for estimates of total spawning escapement. The reference is to standard error of the estimate, not to variation in the population. More importantly, the statistical and biological basis for the recommendation in Carlile et al. (2008) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year of one stock in six) of failing to label a stock of concern when warranted appears to be arbitrary. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that this is the appropriate data standard. Further justification for sample size targets is required.

3. Objectives, Work Elements, and Methods

Project work elements have been retained from the earlier (2007-2009) project to provide continuity; however, other elements have been added to expand the project in response to mandates in the Idaho Fish Accords.

The objectives and work elements are clearly stated in the proposal. The overall objective of estimating VSP parameters for Idaho Snake River steelhead is scientifically defensible. Methods are typically general, though supporting or source methods are noted (such as the modification of Thurow et al.'s 2006 snorkel survey methods for observation of marked juvenile steelhead). Other sections include detailed and specific descriptions of equipment and methods appropriate for the proposal and its objectives.

Questions regarding individual objectives follow:

Objective 1. Why is the minimum sample size 2,000 (page 15)? If the wild steelhead are sub-sampled to attain 2,000 fish, how can this be called a minimum sample? This seems more like a target sample.

Work element B. How are results from different scales from an individual fish reconciled (page 16)? Is there any effort to use PIT tagged fish to establish the "true" age so error rates can be estimated? How would this error affect population dynamic and viability assessments and management uncertainty?

Work element D. Why a sample size of 2000 smolts?

Objective 2. Identify the MPG and independent populations associated with Fish Creek, Rapid River, and Big Creek (The appendix tables are inconsistent with reference to MPGs. One table has 2 MPGs and a second table has 5).

Work element G. Why are hatchery adults being released into the Lochsa River? How does this influence the abundance and productivity estimates for VSP in the associated independent population, MPG, and DPS.

Work element H. It is not clear how population estimates are generated using the fish obtained through hook and line fishing. Please elaborate.

Work element I. Explain why wild steelhead are being enumerated using a fish hatchery ladder. Do all the steelhead in this stream enter the ladder? How are they passed upstream? How are unmarked hatchery fish assessed and differentiated from wild fish?

Objective 3, work element P. It is not clear if some of the field work associated with estimates of adult escapement above weirs in other rivers is conducted by personnel from ISMES, or if ISMES only conducts analysis.

Objective 4. Work element R. Please elaborate on the GRTS rotating panel used for this analysis. For snorkel surveys (and concomitant evaluation of "gross habitat characteristics") is the "desired average site length" of 100 m always long enough to adequately sample the habitat types mentioned (pool, pocket water, riffle, or run)—or at least one of them in its entirety per site, and is this important? Use of 100-m sites is apparently based on just a single reference (Thurrow et al, 2006).

Adequate site length may depend largely on channel width. Size and longitudinal spacing of habitat types are generally proportional to channel width. A stream 2 or 3 meters wide could be expected to include a series of several pools and riffles within a 100-meter reach (if it has pool-riffle structure), but a stream of about 20 meters wide or larger could happen to include just part of one pool or of one riffle within a 100-meter reach, thus not cover even one habitat unit. Would adjusting site length according to channel width better represent habitat conditions than arbitrarily setting 100 meters as the desired site length for all streams? Are channel widths of the study sites reported in the narrative?

The proposal could be improved by listing the project's streams and their study sites, showing characteristics, such as streamflow discharge (range of flows and those usually occurring at season of sampling), channel width, channel gradient, habitat features, and channel length sampled.

The proposal cites that the goals and strategies for monitoring and evaluation of the status of Snake River Chinook salmon and steelhead were identified in the fall 2009 RM&E workshop. It is not entirely clear how ISMES has been expanded or modified to meet the basinwide monitoring strategy. More information is needed for evaluation of whether the increased effort meets the RM&E goals. In particular, one goal is to "obtain high precision status and trend data for at least one population per adult life-history type per MPG (fish in, fish out monitoring). One of the open questions is the selection of populations for this monitoring. The ISMES suggests that they may be collecting this information; however, the population is not yet selected. A succinct summary of the MPGs and independent populations established by the TRT, which have high precision data, and which are associated with the ISS, needs to be included.

199107300 - Idaho Natural Production Monitoring

Proponent: IDFG

Province: Mountain Snake **Subbasin:** Salmon

Budgets: FY10: \$880,401 FY11: \$869,622 FY12: \$891,919

Short description: The purpose of this project is to conduct large-scale monitoring and evaluation of the status of wild Chinook spring/summer salmon and summer steelhead populations in Idaho.

ISRP final recommendation: Meets Scientific Review Criteria

Final comment:

A revised narrative and the response addressed issues raised by the ISRP.

The scope of the project has been modified to accomplish the basinwide strategy for monitoring as formulated in the fall 2009 RM&E workshop. Methods of assessing population viability are specified including increased surveys and sampling of Chinook salmon. Steelhead surveys are transferred to Idaho Steelhead Monitoring and Evaluation Studies (project 199005500).

The genetic component will be performed by the new genetic stock identification project at Lower Granite Dam (project 201002600), as recommended in an earlier ISRP review. INPMEP will coordinate summarization and reporting of redd count and carcass survey data, which supports the strategy for extensive monitoring of Chinook.

With regard to precision of estimates of abundance, the investigators indicate their familiarity with published standards for recovery monitoring and indicate that they "will use standardized protocols to minimize sampling variance and will measure and report the variance of ...estimates." The ISRP concern over the use of coefficients of variation is addressed in a recommendation for programmatic change (Section III. C).

They explain that their proposed objective, to "locate areas of high STHD fry density" was found to be impractical, that "Sampling crews cannot conduct fry collections using electrofishing gear in conjunction with snorkel surveys due to time and weight constraints. Sample methods and the study design for fry counts are incompatible with snorkel surveys."

They explain more fully how they would "achieve a mechanistic understanding of population dynamics." through "annually enumerating or describing individuals within the life stages" citing examples from earlier work.

Preliminary comment requesting a response:

A response is needed in the form of a revised narrative. It is not clear to the ISRP how INPMEP has been modified to accomplish the basinwide strategy for monitoring. Please make clear to the ISRP how INPMEP has been modified to meet the strategy formulated in the fall 09 RM&E workshop. In particular clarify how populations will be selected for high-precision (fish-in/fish/out) monitoring and summarize the populations in the MPGs that have high precision data. Explain the relevant pros and cons of transferring the snorkel survey monitoring to ISMES.

The ISRP notes that CV (coefficient of variation) is not usually associated with precision of data, but with the variation associated with a state of nature. That is, salmon abundance across years has a CV, and fall steelhead parr length has a CV. These are descriptions of the state of variation. They are not appropriate to determine confidence intervals. Crawford and Rumsey (2009) reference Carlile et al. (2008), which makes recommendations for coefficients of variation for estimates of total spawning escapement. The reference is to standard error of the estimate, not to variation in the population. More importantly, the statistical and biological basis for the recommendation in Carlile et al. (2008) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year of one stock in six) of failing to label a stock of concern when warranted appears to be arbitrary. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that this is the appropriate data standard. Further justification for sample size targets is required.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

Until now, the project has been intended to monitor and evaluate the status and trends of wild Chinook spring/summer salmon and summer steelhead populations in Idaho. According to the proposal, the Idaho Natural Production Monitoring and Evaluation Project (INPMEP) was designed to "provide information to managers and to regional decision-making processes. The Snake River stocks of steelhead and spring/summer Chinook salmon still have significant natural reproduction and thus are the focal species for this project's investigations. The overall project goal is to monitor the abundance, productivity, distribution, and stock-specific life history characteristics in order to assess and annually report the status of naturally-produced steelhead trout and Chinook salmon populations in Idaho." Project goals are clear and well-justified in the context of the BiOp, the pertinent subbasin plans, and other enabling agreements. A number of significant changes to the project are proposed in the current document that would modify the project's scope. Relationships with other projects are complex and are clearly presented in the proposal.

2. Project History and Results

The proposal describes project history in a helpful manner. It discusses how the snorkel survey program has undergone several changes and now will be transferred to another project. A discussion of the advantages and disadvantages of the transfer would be helpful. The ISRP commends the investigators for publishing their results in the open literature.

One task was not accomplished: "Sub-objective 3.2: Locate areas of high STHD fry density. This task was not completed due to logistical reasons." It would help the ISRP to understand the logistical problems.

3. Objectives, Work Elements, and Methods

Changes proposed for the project include that the genetic component will be performed by the new genetic stock identification project at Lower Granite Dam (project 201002600), as recommended in an

earlier ISRP review. Another proposed change is to “narrow the scope of INPMEP to focus on spring/summer Chinook and transfer steelhead monitoring elements to ISMES. Beginning in 2010, INPMEP will coordinate summarization and reporting of redd count and carcass survey data, which supports the strategy for extensive monitoring of Chinook. For extensive steelhead monitoring, the recommended option is genetic stock identification at Lower Granite Dam. However, the technique would take at least five years to develop the first productivity data point. IDFG recommends that snorkel surveys continue as another extensive monitoring technique for steelhead. We further recommend transferring this element to Idaho Steelhead Monitoring and Evaluation Studies (project 199005500).” They elaborate that because these projects also use the experimental design, INPMEP provides similar data from other watersheds that complements and extends the spatial coverage of data from these projects. Because data from snorkel surveys are most important for steelhead monitoring, investigators recommend transferring this element to Idaho Steelhead Monitoring and Evaluation Studies (project 199005500). The ISRP does not oppose this change but would like to see a more detailed discussion of the relevant pros and cons.

The proposal states "By understanding the transitions between stages and associated controlling factors, we hope to achieve a mechanistic understanding of population dynamics." The ISRP would be helped by a fuller explanation.

The project provides for annual VSP (abundance and productivity) monitoring and less frequent spatial structure monitoring based on spawning ground surveys and surrogates for them. Although a response is needed, the proposal employs competent methods, adequate metrics, and qualified people.

199800702 - Grand Ronde Supplementation: Lostine River Operation and Maintenance and Monitoring and Evaluation

Proponent: Nez Perce Tribe

Province: Blue Mountain **Subbasin:** Grande Ronde

Budgets: FY10: \$597,795 FY11: \$771,299 FY12: \$790,582

Short description: Supplementation and concurrent monitoring and evaluation of Lostine River spring Chinook salmon are accomplished by this project. O&M activities - acclimate smolts, trap adults, and spawn adults. M&E section implements the NEOH M&E plan.

ISRP final recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): The project evaluation needs to include an explicit measure of whether supplementation is leading to an increase in abundance of natural-origin female spawners.

Final comment:

General Comments

For the most part, the proponents have adequately addressed the ISRP's comments, providing comprehensive responses to some of them, most notably the discussion of “results.” The response was well organized and clearly presented. The proponents continue to take ISRP comments in a productive spirit to make their proposed work more transparent and subject to productive evaluation. We commend the proponents for also clearly identifying how and where the narrative was revised.

Comments on Responses to Specific ISRP Questions

1. “Clearly identify additions to this proposal from the basinwide RME strategy” - This ISRP comment was adequately addressed. The proponents identified and discussed two major additions to the project from the basinwide RME strategy. One of the additions, extended operation of the weir, is crucial for estimating hatchery and natural adult fish abundance and managing outplanting of hatchery fish above the weir. The other was an evaluation of details of the captive brood program.

2. “Provide in the proposal the goals and objectives for hatchery and natural production in the Lostine River that are components of the NEOH Master Plan. How do the objectives relate to AHA and the HSRG recommendations?” - Objectives for hatchery and natural production in the Lostine River that are components of the NEOH Master Plan are now more clearly identified (Table 1). The proponents evaluated HSRG recommendations based on AHA for the Wallowa/Lostine and concluded that NEOH goals for the Wallowa/Lostine, TRT abundance recommendations, and obligations of the LSRCP were inconsistent with the suggested goals of the HSRG. Thus, the proponents have not adopted those goals. They are, however, using AHA as a complementary tool to assess various management scenarios. This approach appears reasonable and the proponents are wisely keeping in mind the assumptions and limitations of AHA identified in RIST.

The proponents propose to "Manage population [presumably Wallowa/Lostine] for ... (PNI) of 0.67." and "Manage Lostine population for PNI of 0.5". These estimates need to be reconciled. Specifically, is the 0.67 level attainable if the PNI for Lostine only reaches 0.5?

3. “Present the results for each year of operation for each goal and objective related to natural and hatchery production, perhaps patterned after the NPT presentation at the supplementation workshop/symposium held in Orofino, ID. These results can be reported in a couple of pages with a table. We are not expecting an exhaustive report, but a manageable additions.” - Reporting of results was improved considerably over the original proposal. They were more detailed and included a better description of life history performance results and assessments of how well the project has met its goals to date. Management assumptions (Table 5), which in effect are objectives, could be more closely associated with defined project objectives (Table 4). How do the two relate? Can management assumptions be considered sub-objectives?

4. “Provide a self-assessment of meeting the goals. In particular, the proponents should rigorously evaluate and present convincing evidence that natural production could consistently meet or exceed escapement goals and in what time frame.” - The proponents provided a reasonable self-assessment of how well established project goals have been met. Some short-term goals have been met and other mid- or longer-term goals either have not yet been met or data is insufficient to determine whether they have been met. The proponents still did not define time frames for short, mid-, and long-term goals. Nor did they present evidence or a reasonable discussion of whether natural production could consistently meet or exceed escapement goals and in what time frame. This is admittedly difficult to assess, but it appears from the data presented that at this point in time, due to variability in population parameters, the likelihood that long-term goals can be met is unknown. The proponents definitely should provide time estimates for short, mid- and long-term goals. Otherwise they have little meaning and could be interpreted (or misinterpreted) in multiple ways.

It is worth pointing out that the fish production that this project is evaluating is conducted under the Lower Snake River Compensation Plan (LSRCP) and negotiated in the *US. v. Oregon* production and harvest. The LSRCP anticipates a step-wise review of spring Chinook in December 2010, and steelhead and fall Chinook in 2011 and 2012, respectively. The sufficiency of the data collection and further

evaluation of whether the overall effort is achieving the objectives of the subbasin plan and LSRCP will take place in that review. This project supports the NEOH monitoring design previously reviewed and supported by the ISRP. After the NEOH monitoring was designed the ISRP and ISAB further elaborated on monitoring supplementation projects, and the Ad Hoc Supplementation Workgroup has produced recommendations for standard monitoring of supplementation.

The proposal states that monitoring in the Lostine, using the NEOH design, is consistent with recommendations for monitoring supplementation. However, in the data and monitoring design information presented in the proposal, there was an absence of discussion of whether abundance of natural-origin adults in the supplemented streams was contrasted to reference streams. The 2007 LSRCP annual report states that evaluation of spring Chinook supplementation in the Grande Ronde was unable to demonstrate a benefit to natural-origin adults. This is a critical evaluation that needs to take place in the Lostine. Figure 16 shows a trend line for annual redd abundance in the Lostine in contrast to the Minam. This contrast appears to be total redds. The appropriate contrast needs to account for redds produced from hatchery and natural spawners.

5. “Clearly identify the BiOp VSP parameters that are to be determined by this project and how precision will be established for the methods to be employed to estimate the parameters.” - VSP parameters were identified. The proponents, however, did not adequately discuss how precision of the methods for evaluating VSP parameters will be established, but instead referred to other documents. Assuming this documents adequately address the precision issue a brief summary or synthesis would complement the response.

Preliminary comment requesting a response:

The project is important to efforts aimed at conserving/restoring spring Chinook salmon. It provides an opportunity to assess and evaluate how well artificial production succeeds/contributes to restoring a previously depressed local population. If successful, the population could be an important mid-basin component of the ESU. The project provides an M&E program that could be of both short term (prevent extirpation) and long-term (meet escapement goals for natural production) benefit to anadromous fishes in the Lostine basin.

The fast track portion to upgrade and operate the weir is justified. However, the remainder of the project needs a response in the form of a revised narrative. In the response the proponents should:

1. Clearly identify additions to this proposal from the basinwide RME strategy
2. Provide in the proposal the goals and objectives for hatchery and natural production in the Lostine River that are components of the NEOH Master Plan. How do the objectives relate to AHA and the HSRG recommendations?
3. Present the results for each year of operation for each goal and objective related to natural and hatchery production, perhaps patterned after the NPT presentation at the supplementation workshop/symposium held in Orofino, ID. These results can be reported in a couple of pages with a table. We are not expecting an exhaustive report, but a manageable addition.
4. Provide a self assessment of meeting the goals. In particular, the proponents should rigorously evaluate and present convincing evidence that natural production could consistently meet or exceed escapement goals and in what time frame.

5. Clearly identify the BiOp VSP parameters that are to be determined by this project and how precision will be established for the methods to be employed to estimate the parameters.

1. Technical Justification, Program Significance and Consistency, and Project Relationships Lostine River spring Chinook have declined significantly in recent decades and now are a component of the Snake River spring/summer Chinook ESU listed as Threatened in 1992. This project is directed at preventing extirpation and increasing abundance of Chinook salmon in the Lostine through supplementation and is deemed by NOAA-Fisheries to be important for recovery of Snake River and Grande Ronde River Chinook salmon. The project also proposes to monitor status and trends of steelhead and bull trout populations in the Lostine basin. Apparently, little information on steelhead abundance and productivity is available for the Lostine River. Specifically, the program is to operate an adult trapping weir, support juvenile rearing at Lookingglass Hatchery and a smolt acclimation and volitional release program on the Lostine.

The Grande Ronde Supplementation project (including Lostine O&M and M&E components) is an ongoing project that has been reviewed previously by the ISRP. The projects have received favorable reviews by the ISRP largely because they effectively integrate scientific monitoring directly into program designs. Recent "Qualifications" of the Grand Ronde project stated in the previous ISRP review are of particular relevance for the review of this proposal. These qualifications include: 1) need for enhanced (adequate) presentation of analyzed data and results (especially for adult return rates), 2) the need for the M&E portion of the project (project # 200713200) to be funded to justify the O&M portion, and 3) enhanced decision criteria that complement program assumptions in order to fully consider various potential management alternatives.

The proponents point out that the Lostine project is a component of the Northeast Oregon Hatchery program, established through US v. Oregon and the Lower Snake River Compensation Plan. NEOH has undergone an ISRP Three-Step Review under the Fish and Wildlife Program. As well as a component of NEOH, the project is related to many other ongoing projects in the Snake Basin. Because so many of the projects are closely related, a better approach than reviewing projects individually might be to review the whole set of interrelated projects.

The technical justification for the project could be improved. The problem description should have summarized the abundance of natural and hatchery fish in the watershed before the program began as well as trends to the present. The background section should clearly identify the new elements in the proposal that put it in the fast track portfolio.

The proposal identifies BiOp RPAs and other action agency documents that recommend implementation of an M&E program and expect the project, at a minimum, to reduce the risk of extirpation of the extant natural Chinook population. Although the proposal provides some data that documents the depressed status of Chinook salmon in the Lostine River basin, it should present more comprehensively the data and analyses that support this conclusion.

2. Project History and Results

The description of Project History is adequate. The project has been ongoing since 1994 and funded by BPA since 1998. To date, the project has been successful in achieving some of its objectives (Table 3 in proposal). The proponents state that NOAA-Fisheries concluded that the project prevented extirpation of the Lostine spring Chinook stock. It has met the short-term goal of maintaining escapement of combined hatchery and naturally spawning Chinook at above 250 fish. It has also enabled harvest by a tribal fishery. Its success at achieving the mid-term objective of maintaining an escapement of 500 naturally

produced fish is less certain. This level of escapement appears to have been achieved, but only marginally, in five of eight of the most recent years (2001-2009). There is no clear trend of a sustained increase in escapement toward the long-term goal of 1716 naturally spawning adult Chinook, although positive trends toward the long-term escapement objective may require a longer time to manifest. It would be helpful if the proponents provided the time frame since inception of the project for achieving short-, mid-, and long-term goals.

Given the above uncertainty, is it likely that the project is only going to be able to prevent extirpation through continued supplementation or is recovery of an unsupplemented naturally spawning population a real possibility? A useful exercise might be to determine whether the population would remain viable if current escapement trends (marginally meeting or below the goal) continue. The proponents should also seriously consider terminating planting of hatchery adults above the weir to determine if natural production can be sustained without augmentation or, alternatively, provide justification for continued augmentation

Presentation of results of the project should be improved. A primary "Qualification" of past ISRP reviews has been the evaluation of the program's success by robust data analysis and reporting of results (relative to biological objectives, work elements, and hypotheses). The current proposal gives a first level of these required/qualified analyses in that return rates, harvest rates, escapement, etc. are provided. However, the ISRP remains interested in deeper analyses that demonstrate how well the program is meeting its goals and expectations. Therefore, this remains a qualification. The project also should clearly state the objectives and goals as established in the NEOH Master Plan and the FY07 project proposal. It was sometimes difficult to distinguish NEOH M&E goals and objectives from the objectives of this proposal as, apparently, they overlap. Clarification of this distinction and relationship would be helpful.

Last January the ISRP attended a supplementation workshop/symposium held in Orofino, ID, sponsored by the NPT. In the symposium the presenters laid out the goals and objectives for fish culture (broodstock collection, spawning, egg hatch, etc) and post release goals. They then compared each of their projects to the program goals. The symposium included the Lostine project. The type of summary presented at that symposium needs to be included in the results section of this proposal. The ISRP also suggests looking at the presentation of results by the Warm Springs Tribe for Hood River steelhead and Chinook in their draft revised Master Plan. The presentation need not be ponderous, but it should be thorough.

3. Objectives, Work Elements, and Methods

The objectives, work elements, and methods have largely remained unchanged. This is appropriate at this point to avoid complicating the design until a thorough evaluation and robust analysis of the data are performed to warrant adapting the program.

The proposal would be strengthened considerably by a more comprehensive presentation of methods, particularly those related to collection of data on life history performances. More specifics are needed on how the proponents are going to achieve the data precision standards that are called for in the Comprehensive M&E strategy.

The proponents have made an effort to quantify out-of-basin effects on adult returns to the Lostine. They are currently developing a model that will incorporate ocean conditions. To help determine the impact of out-of-basin factors and assess efficacy of supplementation in the Lostine basin, the proponents should consider comparing patterns and trends in abundance of the Lostine stock to reference streams such as

the John Day which has been little influenced by hatchery introductions compared to other Columbia Basin rivers.

An element of the objectives focuses on extended weir operation for steelhead. Although it is a minor element (opportunistic because the weir is already operated and maintained), it will provide tangible and logical support for the proponent's objective of monitoring adult steelhead returns.

4. M&E

The program has a strong M&E component built into the O&M part of the project. The objectives for this project tie directly into broader GRESCSP and NEOH program objectives, as well. The M&E components of the proposal are critical to evaluating the Lostine portion of the Grande Ronde Chinook Supplementation program. The details regarding assurance that the methods will achieve BiOp RPAs and basinwide M&E for VSP parameters could be improved.

To date, the project has been successful in achieving some of its short- and mid-term objectives, which is encouraging. Nevertheless, continued monitoring is necessary, especially to assess adult returns of naturally spawning Chinook. The results of the supplementation effort in regard to natural Chinook production are mixed. In some years returns of natural spawners have marginally met the established escapement goal. In other years it has been well below the goal. Escapement is variable, as would be expected, but the concern is that even the best adult returns appear to have barely exceeded the escapement goal and no sustained increase in escapement is evident.

200301700 - Integrated Status and Effectiveness Monitoring Program (ISEMP): The design and evaluation of monitoring tools for salmon populations and habitat in the Interior Columbia River Basin.

Proponent: NW Fisheries Science

Province: Mainstem/Systemwide **Subbasin:** Systemwide

Budgets: FY10: \$1,561,176 FY11: \$1,614,788 FY12: \$755,401

Short description: ISEMP is a collaborative effort to design, implement and evaluate Status and Trends Monitoring for salmon and steelhead populations and habitat and watershed-scale Effectiveness Monitoring for restoration actions impacting salmon habitat in the Columbia River Basin.

ISRP final recommendation: Meets Scientific Review Criteria - In Part

In Part: The Fast Track component of the project meets criteria. The full ISEMP project will be reviewed over the next few months in advance of, and to inform, the RME categorical review.

Final comment:

The project proponents have done a thorough job of addressing, point-by-point, the questions and concerns in the previous version of their Fast Track proposal. The response dealt primarily with the rationale for expanding the PIT tag array infrastructure in the Salmon, Grand Ronde, and Imnaha River subbasins. The ISRP appreciates the clarity of the response. When data were not yet available to answer some of the ISRP inquiries, the response identified information that was not available.

With regard to the ISRP's question about why ISEMP was selected to act as the lead entity for the PIT tag array proposal, the response showed how ISEMP had already developed successful methods of obtaining, storing, retrieving, and analyzing data. Furthermore, they have developed good working relationships with other agencies/tribes in the area and were strongly supported by these organizations.

With regard to the concern about whether the arrays were intended to compare methods (weirs, rotary screw traps, DIDSON dual-frequency sonar, etc.) or to inform salmon and steelhead managers, the response suggested that the emphasis would be on evaluating the accuracy and precision of PIT tag arrays relative to other methods currently being employed and also on assisting managers. They indicated that the proposed locations for installation of the arrays were selected primarily to fill data gaps on adult escapement for priority populations in the Snake Basin, a management function. The work augments testing of arrays that is ongoing in other Snake River subbasins by expanding the range of watershed and stream conditions where arrays are located, thus enabling testing under a greater variety of biological and physical conditions. The proposed work will complement studies, currently in the early stages, for determining the efficacy of arrays in detecting PIT tagged downstream migrants, which would likely be an improvement over conventional methods. The response also pointed out that the expanded network of arrays, if implemented, would provide at least one interrogation point for adults and juveniles of each life history type of each major population group for stream-type Chinook and steelhead.

With regard to the question of whether all of the arrays could be installed prior to the 2010 field season, the response admitted that some of the proposed sites would have to be delayed until 2011, and that repairs to one of the existing arrays would also wait until next year.

With regard to the ISRP's question of how sites were selected, the response adequately detailed the rationale for each of the proposed locations. While the proposed expansion of the number of arrays addresses a number of data gaps in the Salmon, Grand Ronde, and Imnaha River subbasins, the response also admitted that monitoring would likely continue to be inadequate for the Selway and Lochsa Rivers owing to their remote location and wilderness designations. On the other hand, the response suggested that if the PIT tag array technology proved to be the preferred method for monitoring adult and juvenile passage in large, turbulent rivers, arrays could be added to these two important "reference" watersheds (no supplementation and minimal habitat restoration).

With regard to the question of whether the PIT tag arrays are capable of sufficient accuracy to calculate freshwater productivity, the response presented evidence - based on previous tagging and tracking research - that the approach appears to suffer from fewer problems than many of the other census methods currently in use. This conclusion applied to both adult and juvenile movement.

With regard to the question of whether data collected to date could identify where limitations to freshwater productivity, the response argues that the PIT tag array technology can provide the greatest gains in understanding survival in large rivers that have been traditionally hard to sample. For example, they state that the expanded array will help answer the question of where subyearling stream-type Chinook rear when they emigrate from headwaters (i.e., in the mainstem Salmon River or in the reservoirs). Findings such as this would represent an important contribution to knowledge, although the PIT tag technology will not be able to identify the mechanisms of productivity constraints, but rather the arrays would help identify general locations in the subbasin where significant mortality occurs.

In summary, the proponent has adequately addressed the ISRP's concerns and also indicated (although not in this response) that ISEMP will be available to present a summary of their findings to the ISRP/ISAB in late spring prior to the categorical RM&E solicitation. Because of the considerable importance of this project, we feel that ISEMP leaders should present periodic updates of key findings to the ISRP (e.g., every two years), including a summary of how the findings are being used in the management arena. We therefore look forward to ISEMP's presentation and anticipate we will be able to complete a scientific review of the ISEMP project prior to the categorical RME solicitation.

Preliminary comment requesting a response:

Additional justification for the fast track elements (PIT tag arrays) is requested as a response during the fast track response loop. A written response to ISRP questions and presentation on the core ISEMP project is requested before or during the categorical RME review during the summer of 2010.

This is an ambitious, broad-scale project that is producing useful information for managers on the status and trends of habitat and fish populations in the mid- and upper-Columbia. Additionally, the work is addressing general issues of basic importance, such as how many sites are needed in a watershed to track habitat improvements over time, and habitat restoration actions resulting in increased focal species populations.

The ISRP recommends that the fast track components of this project be completed during this fast track review, but we find the overall proposal requires a comprehensive evaluation before or during the RM&E Categorical Review, after the ISRP has seen the larger RME Regional Plan.

A response to justify the PIT tag arrays should provide evidence that they will provide data for estimating the intended response variables. PIT tag arrays may not provide the key response variable in habitat evaluations. Smolt recruitment per spawner as a function of the number of spawners is the key variable, pre and post, and compared to external controls. Will arrays provide this? If they do, will they provide this information with the accuracy required? How many sites are required? Are more needed? Does the data to date suggest the recruitment limitation is elsewhere? What does the data collected to date say about these questions?

The comprehensive review and evaluation of ISEMP should include a written response and presentation to the ISRP. The written response and presentation should include analyses of data collected to date on status and trends of fish and habitat, and effectiveness of restoration actions in the subbasins they have been studying; the locations of the proposed PIT tag array should be more completely explained and justified. Other objectives, methods, procedures, and results to date need to be more completely clarified. In presenting these results they should demonstrate, as thoroughly as possible, how the monitoring methods and analyses they are employing are superior to other, more conventional methods. This will be especially important for the IMW sites.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The project description adequately justifies the various elements of the work. A strong case is made for each of the efforts in the John Day, Salmon, Entiat, and Methow subbasins. Detailed descriptions of some of the approaches are repeated in Section F, making for a long proposal, but in general this project is well justified, important to the mid- and upper-Columbia, and well tied in (albeit complexly) with other restoration M&E efforts. The current proposal requests funding for installation of PIT-tag detection antenna arrays in Snake River tributaries and initiation of reach scale habitat monitoring in the Methow and Entiat River. The reach scale work is justified, but better justification for installation of the PIT-tag arrays is needed, as explained below.

The proposal addresses several RPAs in the BiOp. ISEMP is linked to many projects in the Columbia River Basin. It makes use of an extensive amount of data collected by agencies and tribes and works in close cooperation with co-managers in the Basin.

2. Project History and Results

Project results are summarized in a series of matrices for each fiscal year at each major watershed, including major accomplishments and links to progress reports. Although the ISRP prefers not to be referred to hyperlinked reports, the broad scope of this project and the large number of reports and papers justifies this approach. Most of the material is available on the ISEMP website. In general, the project has succeeded in achieving the majority of its objectives to date. The accomplishments listed in the proposal pertain primarily to monitoring protocol development and testing as well as other work related to ISEMP's goals. A summary should have been included.

A significant amount of data has been collected on status and trends of fish and habitat, and effectiveness of restoration actions in the course of protocol development and testing. Analysis of these data would be interesting and informative, and should be presented. One test of the effectiveness of ISEMP is whether its methods and means of data analysis prove superior to current methods for status and trend monitoring employed in the Basin with the understanding that there is overlap between the two. In addition to presenting results and analysis of data collected to this point, the proponents should compare their results to those obtained by other, more traditional, methods. For example, are ISEMP's escapement estimates for a particular river, for example using PIT-tag detector arrays, significantly more accurate than estimates obtained from weir or redd count data in the same river?

3. Objectives, Work Elements, and Methods

With regard to the expanded sites in the Entiat and Methow subbasins, the GRTS sites have not yet been selected. The approach to site selection is a proven one and should be successful; however, the proposal does not state what will happen if there are landowner access issues. The ISRP will be interested in the interpretation of the macroinvertebrate sampling results, as macroinvertebrates tend to be quite variable and difficult to relate to experimental restoration. Many of the field techniques are described in various ISEMP sampling protocol reports and were not repeated in the proposal.

The first objective pertains to installation of PIT-tag detector arrays in several tributaries of the Snake River. These arrays are in addition to numerous other arrays already present in Snake River tributaries. The proponents present a strong argument that arrays have many advantages in terms of accuracy and precision relative to more conventional techniques for assessing escapement and other adult parameters, and can be used to test many hypotheses and assumptions of interest to co-managers.

The question is whether the proposed set of arrays is necessary and that depends on the purpose of the installations. If the purpose is to further test arrays and improve methods for analysis and dissemination of array data, why aren't the currently operational arrays sufficient to accomplish these tasks? If, on the other hand, the purpose is to install arrays just to monitor MPGs or some other specific management function, then this should be better justified in relation to stated ISEMP goals which appear to be directed primarily toward establishing and testing monitoring methodologies. Although this is a fast-track proposal, it seems unlikely that the arrays will be in place and operational to monitor the 2010 run.

The second objective pertains to initiation of habitat status and trend monitoring in the Methow River and habitat and fish population status and trend monitoring in the Entiat River. The work in the Entiat would extend effort already ongoing in the IMW. The Methow work is well justified. It will determine whether the methods and metrics developed in the Entiat and Wenatchee Rivers are transferable to other rivers in the region. The effort to examine transferability is certainly worthwhile.

4. M&E

Because this is entirely an M&E project, the objectives, methods, and analytical techniques were adequately described in Section F, previously discussed.

In Table 1 on page 11, A core list of physical/environmental indicator variables to be monitored within subbasins in the Upper Columbia Basin is presented. There is a footnote indicating under water quality that other indicators can be measured, e.g., various metals and pollutants, herbicides and pesticides. It is gratifying to see this point made, but we wonder how and who makes these decisions and what are they based on? How were such indicators used in the past with respect to crop lands (certain pesticides, depending upon a particular crop), wastewater treatment plants (flame retardants, pharmaceuticals and personal care products), mining activity (selected heavy metals), or urban areas with low flow streams? Contaminants should be treated as a "wild card" that can confuse any salmon-habitat relationships, even on a large scale, including smolt survival many miles from the contaminant source.

This overall project and the second objective in this proposal (reach scale habitat monitoring in the Entiat and Methow) should directly contribute to improvements in protocols and methods of data analysis and dissemination for status and trend monitoring in the Columbia River Basin. Without additional justification, however, it was difficult to envision how the proposed additional sets of PIT-tag arrays would further the specific objectives of the ISEMP program at a broader scale.

201002800 - Implement a Rotating Panel Sampling Adult Steelhead in Small Tributaries of the Tucannon and Snake rivers

Proponent: WDFW, NOAA

Province: Columbia Plateau **Subbasin:** Snake Lower

Budgets: FY10: FY11: \$66,441 FY12: \$52,381

Short description: Estimate adult steelhead abundance in currently unsampled tributaries of the Snake and Tucannon rivers that have been grouped with the Asotin and Tucannon steelhead populations.

ISRP final recommendation: Meets Scientific Review Criteria

Final comment:

In their response, the proponents for the most part, provided the information requested in the initial review. The response included a much clearer description of the rotational sampling plan, including details of trap construction and locations. The photographs were beneficial in visualizing the potential sampling capabilities and limitations outlined in the text. Methods were also proposed to evaluate stratified survey designs for redds. They clearly know their streams and the limitations of sampling methods for them. They justify the need to investigate these populations.

The proponents have provided new data on fish densities and redd counts in their response. These data were informative, but it would have been helpful if the proponents had at least briefly interpreted these data. For example, it appears that Alkali Flats Creek had no observed redds and very few young salmonids. Is it on par with the others as a viable stream? It is not clear based on these data that it belongs in the sampling rotation.

It would be a benefit for these studies to attempt to add observations and investigations on population behavior related to seasonal and life stage migrations and ephemeral use of tributary streams. Investigation of spawners is only the beginning. It may be equally important or more important to determine not only the locations and utilization by spawning aggregates, but also to determine where

and when the juvenile fry and parr rear (summer and winter), and limits to their production. These streams do not appear to be productive rearing habitat in some years (or perhaps most or all years) due to low flow in summer (<1-5 cfs). This is also evident from the tables of fry and parr densities that were presented that fry densities seemed low, but parr were nearly nonexistent. The observed presence of resident rainbow trout, whether resident males or the progeny of hatchery strays (with possible negative impact to wild population genetics) also warrant further investigation.

In general, questions related to genetic sampling and analyses were addressed in the response. Evidently the samples below and above Lower Granite will be analysed by the same lab. As they further refine their sampling design, they should seek input from a statistician. In general, they should think of their investigation in ecological terms and consider various life histories.

Preliminary comment requesting a response:

Overall, this proposal outlines a worthwhile effort to obtain information on often-neglected small population units or minor spawning aggregations (mSAs). Most other projects have focused on rebuilding larger population units. Smaller tributaries and their contributions are sometimes inadequately understood or neglected.

In this proposal, it is important to have a clear plan of how the anticipated results for the mSAs will relate to the monitoring and ultimately management of the larger system as a whole. That is, what are the proponents expecting to find out in these smaller tributaries that will be important for the management of the larger Asotin and Tucannon steelhead populations? Because some of the mSAs flow directly into the Snake River, how will results from those tributaries be interpreted in relation to the actual Asotin and Tucannon steelhead? What are the actual relations between Asotin and Tucannon fish and these direct Snake tributaries? Is that issue addressed? To address these issues a response memo is requested.

The title of this proposal as worded does not clearly or effectively describe the proposal. It confused each of the reviewers until the proposal itself was read. Although the term “rotating panel sampling” has gained some acceptance, it sounds more like a device rather than a sampling design.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The proposal has presented adequate technical justification for investigating the contribution of small populations (mSAs) of Asotin or Tucannon tributary steelhead. The proponents also adequately made the case that the relative abundances of hatchery and wild steelhead need to be better understood in these mSAs.

The significance to the Fish and Wildlife Program and its need for escapement data to properly manage steelhead populations was clearly described, as were relationships to related projects. The project is consistent with BiOp, RPA, and subbasin plan requirements and should yield data on possible effects of hatchery fish interbreeding with wild individuals in small tributaries. Working relationships with other groups appear to be good.

For successfully achieving their objectives for the genetics component, it is not clear if the genetics sampling is solely opportunistic or if it has been well coordinated and linked with funded work from other agencies. It would be useful to present some evidence that the actual linkage has been established with the agencies that will analyze genetic samples, and that the need for them and importance of their analysis is recognized. Otherwise, the genetic samples may languish.

2. Project History and Results

According to the proposal, “This is a new project, however, exploratory steelhead spawning surveys were conducted several years ago in some of the tributaries included in this proposal. Steelhead spawning was documented in most of the tributaries, but a few surveys were inconclusive (Mendel et al. 2004, 2004b).” The results of all earlier work should be described. For example, what did those earlier surveys suggest as to actual or estimated abundances by creek/stream and how might those results affect the sampling design? Absolutely no numbers regarding expected or assumed sizes of steelhead populations are provided in the proposal based on those studies (i.e., Mendel et al. 2004, 2004b) so it is difficult for reviewers to gauge the level of understanding of the steelhead population trends or status in these streams. Is it possible that there are truly minimal numbers of fish in these streams? Or do they possibly have fish in some years but not others? It was difficult for reviewers to know the answers to such basic questions based on the lack of information presented. The optimal sampling design could depend on the anticipated and actual numbers of fish in the small tributaries, as discussed in Section 3 below.

2. Objectives, Work Elements, and Methods

The narrative provided a reasonable technical justification for the adult monitoring proposed, which involved the trapping and sampling of tributary streams for adult steelhead abundance on a rotational basis, with location emphasis changing approximately every three years.

There are some questions regarding justifying the best biological and statistical approach for meeting the monitoring objectives. As envisioned by the proponents, tributaries will be monitored for a few years, but the rotational approach will prevent the assembling of reliable long-term data series. It is questionable if this is the preferred approach, as opposed to, for example, maintaining some steady time series on the largest mSAs and just rotating sampling in what may turn out to be, based on preliminary analyses, the tributaries with the weakest runs? Some long-term index site sampling (including smolts out) with rotational random sampling may be a better strategy if viable mSAs exist. Which systems would these viable mSAs exist in? Or is that information not known? The concern is that under the proposed sampling design, no useful time series or patterns may emerge before in a particular stream before sampling rotates away from it. Have these alternative approaches (i.e., index or longer term versus rotational or mark/recapture snorkel surveys or aerial counts) been considered, and if so, what rationale was used for not recommending them? Some clarification would help here.

It is assumed in the proposal that sampling will present no major problems. Temporary fish traps can be difficult to operate effectively in snow-melt systems. Population estimates may not be reliably obtained unless sufficient numbers are captured, marked, and recaptured. Some pilot testing may be necessary. Trap operations in the first year will very likely provide an indication whether or not this technique will work, or even be necessary, in particular tributaries.

The proposed approach could be complemented by sampling for juveniles, via snorkeling or electrofishing. Are these approaches being considered?

Secondly, beyond the biological basis, is there a statistical basis detailed for the specific rotation scheme proposed, (i.e., at least three years over a six to ten year period at five streams plus their tributaries on the Asotin and seven streams plus their tributaries on the Tucannon)?

Because this approach is still experimental in nature on systems poorly studied, field results may influence the ultimate statistical design chosen. So for both reasons of sampling design and actual sampling, alternative methods should be carefully reviewed and considered.

Objective 1 - Estimate the adult abundance and distribution of natural origin summer steelhead, as well as the proportion of hatchery steelhead, in currently unsampled portions of the Tucannon and Asotin steelhead populations

The proponents indicate that that this approach “prioritizes the use of adult traps over spawning surveys.” This approach seems reasonable, but they should show that they have gone through an alternatives analysis and justified this approach. As the proposal is written, the proponents seem to want to do this as they go along. That is an acceptable approach, but some pre-design analysis would be helpful. In this regard, it would be helpful to have a description of the traps to be used as well as their documented successes and limitations from other applications. It would also be useful to have a better idea of the likelihood of washouts from high water, again based on other documented applications and comparisons of typical hydrographs.

Objective 2 - Collect tissue samples from adult steelhead for baseline genetic analyses

The approach outlines seems reasonable. Where and how will the data be stored? Is there a statistical basis for the number of samples to be collected? Has someone been identified and agreed to analyze the samples? What would be expected from the samples, and might it be of use in clarifying relationships among the Asotin, Tucannon, and direct-Snake tributaries being sampled, or just more broadly in relation to steelhead in other locations?

Objective 3 - Compare steelhead spawning survey estimates of escapement with trap estimates, and test and evaluate several different spawning survey designs and determine their precision and accuracy.

According to the proponents, the goal for testing different spawning survey sampling designs for estimating steelhead spawning escapement is to determine if spawning surveys could replace adult trap enumeration estimates in some Lower Snake River tributaries in the future and provide estimates of variance. Has there has been any juvenile assessment in the past that may be translated to adult escapement? Has mark-recapture with snorkeling been considered as an alternative? Have they considered this and other alternatives in any systematic way?

More information on the specifics of the methods to be used would be very helpful, with appropriate literature citations.

For this objective, the critical assumptions listed were:

- That we will be able to successfully complete spawning surveys and accurate enumeration of redds for the entire spawning area, and spawning season, in at least one tributary where concurrent trapping is successful
- That redds are accurately identified
- That we can successfully georeference each redd locations
- That enough redds will be documented to allow statistical analyses of several sampling designs
- That WDFW staff in our Fish Conservation Section can complete the statistical comparison of several spawning survey design methods from our data collection in small tributaries of the Snake River and provide a final report

"The probability of successfully addressing each of the critical assumptions associated with this objective is uncertain. However, we believe we have a good chance of success based on institutional

knowledge and experience within WDFW, but we acknowledge that this objective is a test and has some probability of failure for some aspects."

More could be done to address these critical assumptions in the proposal. For each assumption above, what are the factors that may or may not result in a given critical assumption being met? More detailed information on factors affecting redd counts in these systems would be useful. Some indications of the population sizes may clarify if enough redds are likely to be counted.

Do the proponents have any particular survey designs in mind for the random draws?

The proposal will contribute M&E data to regional data bases and is well positioned to do that. Annual technical reports are promised, to be subsidized by WDFW biologists' time.

Regarding personnel, it is unclear what role Research Scientist Peter Hahn has in the project.

201003000 - Estimate viable salmon population (VSP) parameters for Yakima steelhead major population group (MPG)

Proponent: Yakama Nation, WDFW

Province: Columbia Plateau **Subbasin:** Yakima

Budgets: FY10: \$644,271 FY11: \$639,960 FY12: \$655,958

Short description: This proposal expands 199506325 RM&E activities to address significant gaps in estimates of abundance, productivity, spatial structure, and diversity for Yakima steelhead populations.

ISRP final recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): The ISRP qualification is primarily based on two issues that we felt were not fully addressed in the response. First, the description of the linkages with other projects does not provide enough detail to fully justify the new project. The proposal has been modified to better identify those RPAs linked directly and indirectly to the proposed project. However, in placing this project within the context of other ongoing projects in the area, the narrative explains what the project will do but was not always clear about describing the knowledge gaps from the earlier and ongoing work, why they are important to fill, and how this project addresses them. In particular, results from project #19956325 should have been more thoroughly described. Although some details in Section E describe the type of information collected by project #19956325, no results or even links to reports detailing the results are provided. As a result, it is difficult to judge the significance of the data gaps to be addressed by the new project. The ISRP also wanted to know how this project will learn from the experience of the ISEMP intensively monitored efforts in the Wenatchee and Entiat Rivers, but the proposal gave a somewhat vague answer to the ISRP's question about data sharing with ISEMP. The second issue that prompted the "Qualified" ranking was the fact that some question apparently remains about whether there will be enough resources to complete the proposed work. This issue should be resolved before the study plan is finalized. The qualification can be addressed in contracting without further ISRP review.

Final comment:

Most of the other issues raised by the ISRP in the original review of this project appear to have been addressed, although locating this information in the revised proposal was a challenge. The project proponents provided a cover document summarizing the information added to the original proposal in response to the ISRP's review. However, the cover document did not include details of the additions nor

were page numbers where new material was added in this lengthy proposal provided. As a result, it was often quite difficult to know what exactly had been changed. In spite of this shortcoming, it appears that the proponent has given an adequate response to most of the critical issues identified by the ISRP in the original review. More details were given about the radio telemetry, PIT tag, and genetic stock identification protocols, as well as a justification of the sample sizes in the plan.

The proposal now contains a much more complete analysis of the number of samples needed for the telemetry, PIT tag, and GSI work. A few uncertainties remain for some project elements, (e.g., the installation of 19 additional fixed antenna sites or availability of sufficient numbers of PIT tags). There was one other sample size question: What was the justification for PIT-tagging 1,000 juveniles per selected tributary (work task 5A)? While this number apparently represents a significant expansion of the juvenile PIT-tagging effort in the Yakima River, will 1,000 fish be sufficient to address Objective 5 (Biological Objective 5: Evaluate sympatric population dynamics and the effects on population viability between resident and anadromous forms of *O. mykiss*)? These questions are partially answered on pages 59-60 of the revised proposal, but there should be some contingency planning in the event the numbers of tagged fish are insufficient.

Overall, however, the proponents have provided a thoughtful response to the ISRP's questions. Once the remaining questions on resource availability and linkages with other projects have been resolved, this ambitious project should provide very useful information about steelhead and resident rainbow trout populations in the Yakima River subbasin.

Preliminary comment requesting a response:

This proposal addresses several key uncertainties relative to population structure of Yakima River steelhead/rainbow population but this proposal lacked some details about methods - specifically, sample sizes, specific study locations, and the division of labor among cooperators. A revised proposal narrative providing this information is necessary to conduct a complete scientific review. The following modifications of the proposal are necessary for the ISRP to complete its review:

- 1) More information is required on the relationship of this project to ongoing efforts. A very clear description of how this project addresses specific RPA commitments is required. Some discussion of the relationship to the ISEMP work that is taking place in neighboring subbasins and to steelhead recovery efforts in the adjacent Wenatchee subbasin also should be added.
- 2) Information should be provided to specifically indicate how this project addresses gaps not addressed by project #19956325. Inclusion of a more detailed presentation of the results generated by project #19956325 to date would provide a much stronger justification for this project that is provided in the current proposal.
- 3) An indication of the number of samples to be collected for each work element, and some rationale as to why the project proponents feel this number of samples will be adequate, should be included in the proposal.
- 4) Provide more detail on the design and methods of the radio telemetry study for adult steelhead (Biological Objective 1).
- 5) Include more detail on the proposed GSI work including study design, number of samples and genetic markers types.
- 6) Provide a clear indication of the allocation of responsibilities among the organizations participating in this study.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The justification for this project is framed in terms of existing recovery programs for steelhead in the Yakima River subbasin, but it needs to be more tightly linked to RPAs in the BiOp. It appears that this project generally responds to BiOp RPA 50 and 62, but the description of how this project will contribute to these RPAs is insufficient.

Quite a few projects are listed as being related to this one but only in the most general way. A more thorough description of how this project will coordinate and share data, especially with project #199506325 should be included. The proposal also does not acknowledge the ISEMP work that is taking place in neighboring subbasins. It would have been helpful to discuss how this project relates to steelhead recovery efforts in the adjacent Wenatchee subbasin.

2. Project History and Results

This is a new project, but it proposes to build on work that has been previously conducted in the Yakima watershed or is ongoing, especially project #199506325. A more thorough review of the results from project #199506325 would have given a more complete indication of the “gaps” in the current effort and provided a more compelling justification for this project.

3. Objectives, Work Elements, and Methods

The proposal provides a reasonable description of the work that will be done for some of the objectives; however, there is insufficient information provided on a number of work elements to enable technical review. Failure to specify sampling effort for many of the work elements is a common issue. The number of fish to be fitted with radio transmitters, the numbers to be PIT-tagged, or the number of samples to be obtained for genetic analysis are often not provided in the proposal and when provided, little indication is given as to why this level of sampling effort is sufficient to answer the questions being asked. This deficiency makes it difficult for the ISRP to evaluate the adequacy of the sampling protocols. Obtaining adequate samples in a river system as large as the Yakima presents some daunting challenges. An indication of the number of samples to be collected for each work element, and some rationale as to why the project proponents feel this number of samples will be adequate, should be included in the proposal. For example, under work task 2B (calculate entrainment rates) it is stated that a pilot study will use acoustic tags and arrays to increase the precision of irrigation canal entrainment, but there are no details given regarding where this would take place or a ballpark figure of the number of acoustically tagged steelhead that will be needed.

The Work Elements in Biological Objective 1 (Determine spatial distribution and major (MSA) and minor (MiSA) spawning areas of steelhead spawning populations in the Yakima MPG (RPA 50.6, 62.5)) require some additional elaboration. The radio telemetry study design and specific methods to be used are not well described. For example the proponents state that "We propose to conduct a three year radio telemetry project in the Yakima River Basin (upstream of Prosser Dam). We will use methods similar to those described in Karp et al. (2009)." A thorough description of these methods in the proposal, or at least a link to this document, is needed. It also is not clear why it was decided that 450 - 500 adult steelhead would be tagged. As noted above, some rationale as to why this number of tags was considered appropriate for this task should have been presented. Also, given that the average number of adult steelhead returning to the Yakima in recent years is 1,764 fish, this number of tags represents a significant proportion of the total population. As these fish are part of an ESA-listed ESU, it seems that there might be some concern about handling this many fish. No indication was given as to whether or not the required permits had been obtained for this activity. Also, an indication of how frequently ground surveys for acoustic tags (Work Element 1a) will be conducted should be included.

The work proposed for GSI was also not described in sufficient detail to enable a thorough technical review. The discussion of GSI in the proposal is pretty generic. In addition to the problem noted above regarding a lack of specificity and justification on numbers of samples, more detail on marker types (microsats or SNPs) and details of the sampling design needs to be included in the proposal. Also, the Anderson et al (2008) and Kalanowski (2007) papers cited in the text are not included in the citations.

Finally, it was unclear which organization would have the responsibility for the various aspects of field data collection or data analyses. Section I (key personnel) gives a list of the project staff members but does not identify their involvement in the various work elements of this project. More detail should be included regarding the division of labor.

201003200 - Imnaha River Steelhead Status Monitoring (was 200205600)

Proponent: Nez Perce Tribe

Province: Blue Mountain **Subbasin:** Imnaha

Budgets: FY10: \$648,269 FY11: \$419,370 FY12: \$430,086

Short description: We propose to quantify adult steelhead escapement into the Imnaha River and describe the population's spatial distribution. A properly monitored Imnaha steelhead population will contribute towards understanding the status and viability of this DPS.

ISRP final recommendation: Meets Scientific Review Criteria

Final comment:

The proponents provided satisfactory explanations for some of the issues raised by the ISRP. They did not, however, address the important question of why a coefficient of variation (CV) is the appropriate way of determining precision of adult abundance estimates. It seems that the proponents are using CV as a precision estimate without questioning its validity. The issue is programmatic in that it applies to most of the Fast Track projects.

The response reiterated much of what was in the original proposal, but the proponents did add some helpful details. The proposal and response focus appropriately on obtaining accurate and precise numbers rather than testing hypotheses, say about the effects of habitat or temperature on juvenile survival. Perhaps that is all that should be expected. The high detection efficiency of the PIT tag arrays is beneficial to project data collection.

Comments on Response to Specific ISRP Questions

1. The proponents provided a detailed response to this question. They cited numerous studies to justify measurements of discharge and water temperature as important determinants of adult migration and spawning, and juvenile survival and growth. They did not, however, explain how the physical data would be analyzed and related to adult returns.

There is still some question about whether measurement of temperature and discharge is appropriate for a fast track proposal. The proponents assert that VSP parameters can only be interpreted in the context of the environment in which the fish exist. This may be true as a relative concept, but it is not the point of the fast-track proposals. They are intended to collect data in 2010 that is required to fulfill BiOp RPAs and that were vetted during the summer and fall 2009 regional and basinwide workshops.

2. The proponents reiterate much of the explanation and calculations provided in the proposal. The sample size for this project and the power analysis are appropriate.
3. The proponents provided a satisfactory justification for use of different types of weirs in different tributaries and the reasons for their locations. Their rationale is logical. The Imnaha Subbasin has diverse physical conditions (e.g., annual hydrograph) that require different types of weirs suitable for these conditions. Some of the weirs were in place prior to this project proposal and are being utilized opportunistically for the proposed work. Others will be installed, in conjunction with this project, in targeted areas of importance (e.g. Sheep Creek).
4. The proponents propose to estimate adult abundance at each weir or array location using mark-recapture techniques. Thus, they assert, adult return data will be comparable between tributaries with different types of weirs for sampling adults. There remains the question of accuracy of estimates for the different adult sampling methods and how this will influence data comparability between sampling locations. It would take a modeling exercise to determine the effect on viability analysis from error rates caused by different enumeration methods.

Juvenile production issue. Juvenile migrants will be monitored as part of separate projects, apparently with standard techniques. The proponents currently are evaluating PIT-tag arrays as a method for detecting migrants in Imnaha tributaries but are unable to provide results at this time because the evaluations were only begun last year.

Comparison of adult sampling methods. The proponents do not propose to test the efficacy of different types of sampling methods (PIT-tag arrays, floating, resistivity, fixed weirs) for estimating adult returns. They assert that the ISEMP project is undertaking this evaluation.

Preliminary comment requesting a response:

While the proposed work has the potential to provide useful information on an important anadromous population in the Snake River basin, information that may be transferable (in some way to other subbasins), there are several major issues that need clarification and expansion. These issues include:

1. Better justification for Objective 3
2. Better explanation of the power analysis and data analysis
3. Justification for using different types of adult sampling methods and the rationale for their locations
4. Issues relating to comparability of data between tributaries whose adults were sampled using different techniques.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The purpose of the proposed work is to quantify, with a "high degree of precision," escapement and spatial distribution of steelhead in the Imnaha River. The steelhead population in the Imnaha is part of the Snake River steelhead ESU declared Threatened under the Endangered Species Act.

The proponents state that the Regional RM&E Collaboration strategies for the Snake River called for high precision estimates of adult abundance, with a coefficient of variation of 15% or less, "in at least one population per life history type per Major Population Group." This CV apparently was based on a recommendation by NOAA-Fisheries for monitoring VSP parameters (Crawford and Rumsey 2009, draft). In accordance with this strategy, the Coordinated Anadromous Workshop identified Imnaha steelhead as a "high precision priority population" so accurate estimates of escapement are needed. This is one of the more compelling justifications for the proposed work, but the proponents need to explain how the determination that the Imnaha was a priority population was made.

However, the ISRP notes that CV (coefficient of variation) is not usually associated with precision of data, but with the variation associated with a state of nature. That is, salmon abundance across years has a CV, and fall steelhead parr length has a CV. These are descriptions of the state of variation. They are not appropriate to determine confidence intervals. Crawford and Rumsey (2009) reference Carlile et al. (2008), which makes recommendations for coefficients of variation for estimates of total spawning escapement. The reference is to standard error of the estimate, not to variation in the population. More importantly, the statistical and biological basis for the recommendation in Carlile et al. (2008) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year of one stock in six) of failing to label a stock of concern when warranted appears to be arbitrary. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that this is the appropriate data standard. Further justification for sample size targets is required.

Further justification for expanding monitoring of A-run steelhead in the Imnaha includes: "The Imnaha River steelhead population is unique in the Snake River DPS in that it: 1) is physically small enough to conduct sampling of steelhead (mainstem flow and manageable number of spawning/rearing aggregates), 2) has a dendritic structure of spawning areas occurring across the entire range of elevations available to Snake basin DPS steelhead (spawning in areas from 1,000 feet up to 6,000 feet), and 3) has a supplementation program occurring in just two of its spawning aggregates." Also, "Steelhead redd counts are not physically possible throughout most the Imnaha River drainage due to inaccessibility and high turbidity".

This justification appears meaningful. It seems consistent with the BiOp and the Imnaha Subbasin Plan. However, the justification could be stronger. The proposal makes the point that the work outlined is needed to fill a "critical data gap." A better justification would show how management of Imnaha steelhead could be improved if the new data were available.

The proponents assert that monitoring the status of steelhead in individual tributaries within the Imnaha basin provides more detailed information on the status of the species than does an aggregate measure of abundance. Tributary population monitoring is needed to more effectively evaluate the efficacy of the Imnaha steelhead production program and the status and trends of the naturally-spawning steelhead population in the subbasin. Additionally, most estimates of adult steelhead abundance in Snake River tributaries occur at Lower Granite dam with apparently little information on steelhead escapement for subbasins and tributaries upstream of Lower Granite. This project proposes to provide this kind of information for the Imnaha subbasin and several of its tributaries.

Considerable attention in the proposal is devoted to identifying general connections between this project and Columbia River Basin Fish and Wildlife Program, Imnaha Subbasin Plan, 2008 BiOp, PNAMP/CSMEP/AHSWG reports and recommendations by the ISRP, Council, NOAA- Fisheries and BPA. The project is consistent with RPAs in the BiOp, the Fish and Wildlife Program, and is complementary to other projects ongoing in the Snake River. It meets several needs identified in the Imnaha Subbasin Plan pertaining to adult summer steelhead escapement, distribution, and movement

The proposed work will be similar to that of two others: a) ISEMP in its fast-track proposal has requested funding to install two PIT tag arrays in the Lower Imnaha River to assist this project in quantification of the distribution and abundance of steelhead in the Imnaha River basin, and b) the Lower Snake River Compensation Plan monitoring through the NPT and ODFW. Is the proposed work fully compatible with these projects?

2. Project History and Results

This is new project. Information on Imnaha steelhead escapement and distribution gathered by previous projects is briefly summarized to provide background and context for this proposal. A version of this project was proposed as a new project in 2002 (#200205600) and received favorable reviews by the ISRP but was not funded.

3. Objectives, Work Elements, and Methods

Objectives were clearly described and seem appropriate. The goal of the project is to establish steelhead population status information in the Imnaha River Subbasin. More specific objectives were embedded in a series of questions with specific tasks identified as objectives such as 1) Installing and maintaining of floating weirs and PIT tag arrays, 2) Quantifying steelhead escapement and collecting fish condition, tag, and tissue data, and 3) Collection of annual stream temperature and discharge.

Objective 3 could be better justified. What is the benefit of measuring temperature and discharge relative to the proposals objectives? How will measurement of these parameters refine escapement estimates?

The proposal seems to concentrate mostly on monitoring adult returns. It appears that juvenile production will be monitored but that is not explained with any detail. The proponents should describe to what extent outmigrants will be monitored? Will the proposed work complete all that is needed for Imnaha steelhead monitoring?

The description of the power analysis [as recommended by NOAA-Fisheries (Crawford and Rumsey 2009, draft)] and methods of data analysis were provided in some detail, but were not entirely satisfactory. Better explanation of power analysis assumptions is necessary and the data analysis section needs to be clarified. References such as Thomson (2002) were not given, although relevant material can be found in Chapter 9 of Thompson, 1992 ("Sampling," Wiley Interscience). Some notation should be clarified. Note that $V(\text{Ratio})$ is simply $V(\text{Ntotal})/(\text{Ntag})^2$ and define $N_{\text{no-tag}}$, perhaps in terms of N_{tag} and N_{total} .

A major objective of the proposed work is to install floating weirs and PIT tag arrays to estimate adult escapement, gather life history data, and collect tissues for genetic analysis of population structure. One set of PIT tag arrays will be placed near the mouth of the Imnaha to estimate subbasin adult escapement and two others will be located on tributaries. Several weirs, including fixed and resistivity weirs are already in place on a number of Imnaha tributaries. The proponents contend that the suite of arrays and weirs (in place and proposed) will allow precise estimation of steelhead escapement.

Funding for the PIT tag arrays at the Imnaha mouth was not requested in this proposal. Rather, the proponents are depending on funding of ISEMP's fast-track proposal (proposal 2003-017-000) which proposes to install the arrays. The proponents of this proposal actually provide a better justification for installation of the arrays than the ISEMP proposal. It is of interest that the proponents did not request funding for the array at the Imnaha mouth in this proposal, but rather they trust that this apparently important part of their work would be funded through another proposal. Are there contingencies in the event that the ISEMP proposal for the Imnaha is not funded?

The proponents should justify why the work requires different types of weirs (floating, resistivity, fixed) as well as PIT tag arrays. They also should clearly present the rationale for location of the weirs and the tributary arrays.

Could the proposed work, in coordination with ISEMP, present an opportunity for testing the efficacy of different types of sampling methods (PIT-tag arrays, floating, resistivity, fixed weirs) for estimating adult returns? If so, it should be one of the objectives with corresponding methods for testing and analysis. Can basinwide adult estimates be derived from the set of upstream arrays and weirs and compared to estimates from the arrays at the river mouth?

A possible concern is comparability of data between tributaries when different methods, with different efficiencies for sampling returning adults (e.g., arrays, different types of weirs) are used. For example, some tests of resistivity weirs in Alaska have identified serious biases in detecting returning adults. How do the proponents plan to handle this potentially confounding issue? Will the efficiencies and biases of the different sampling techniques be directly evaluated in the proposed work?

The proposed M&E work could provide important information on status and trends of adult steelhead abundance in the Imnaha River. Its designation as a high precision population suggests the importance of the steelhead run, although justification for this designation was not clearly presented in the proposal. It seems that the intent is to use the Imnaha as a sort of index stream for other Snake River subbasins and tributaries, but the proponents are not explicit about this use.

201003300 - Estimate the Relative Reproductive Success of Hatchery and Natural Origin Steelhead in the Methow River Basin

Proponent: WDFW

Province: Columbia Cascade **Subbasin:** Methow

Budgets: FY10: \$225,801 FY11: \$231,446 FY12: \$237,234

Short description: We propose to quantitatively evaluate the relative reproductive success of naturally spawning hatchery and natural origin steelhead in the Methow River Basin over two generations.

ISRP final recommendation: Does Not Meet Scientific Review Criteria

Final comment:

The project proponents should submit a more developed proposal in the RME categorical review. A point-by-point response to the ISRP's concerns should accompany the proposal. The ISRP preliminary review requested a revised narrative with clarified and expanded information before making a final recommendation. The ISRP anticipated that the revised narrative would be accompanied by a "point-by-point" response to aid the ISRP in reaching a final recommendation. The ISRP acknowledges the receipt of a revised narrative, but the issues of concern to the ISRP are not satisfactorily addressed, nor sufficiently clarified. This leaves ambiguity with incomplete resolution of the issues.

Nonetheless, the ISRP believes this project is worth pursuing.

The first issue the ISRP raised was the contrast used to estimate Relative Reproductive Success (RSS). In the original narrative, on page 13 and 14 the proponent states, "We will compare four categories of parent-pairs: HfHm, HfNm, NfHm, and NfNm and calculate RRS at three different life stages (parr, smolt, adult)." On page 21 Task 4 Data Analysis Relative reproductive success analysis: proponent states "We will compare four categories of parent-pairs:....., using equation 14 from Araki and Blouin 2005."

The ISRP interpreted the statement in the proposal to indicate that the progeny that would be used in the analysis of relative reproductive success would be those in which both parents were identified. It also gave the ISRP the impression that somehow there was going to be a simultaneous analysis of relative production from four types of mating.

The Araki papers, and others, use parentage assignments from progeny where only one of the two parents has been identified, in addition to those progeny where both parents are identified. Using only triplets – both parents and offspring – reduces the data pool used to estimate RRS. The ISRP is requesting clarification on this point and suggesting that a less restrictive inclusion of progeny for the RRS contrast will improve the power of the analysis

Regarding the specific RRS contrast, the proponent indicates they will use Equation 14 from Araki and Blouin (2005) to produce an unbiased estimate of relative reproductive success between groups. Once again the ISRP is left with the impression that 4 groups will be contrasted in the F1 generation and 16 in the F2 (carryover analysis). Equation 14 in Araki and Blouin (2005) is for a contrast of two groups. Araki applied this formula in Araki 2007 and in Araki 2009. In both of those publications the application was to paired comparisons of fish with different ancestry, calculated separately for each sex. In Araki (2007) they compared hatchery relative to wild production for male parents and for female parents without respect to the other parent. In each contrast they were comparing two groups: wild males versus hatchery males and then wild females versus hatchery females. In Table 5 in the 2007 publication they extended the analysis to contrasts of mating types, but again restricted the contrast to two groups. In this case a parental genotype (wild versus hatchery) mated to hatchery fish is contrasted to that parental genotype mated to wild fish. In the 2009 carry-over paper they contrast two groups, arranged by sex, differing in the ancestry of a single parent (Table 1). The informative F2 parents, had both parents identified, but the F3 progeny that constituted the data pool are not limited to those where both parents were assigned by pedigree analysis.

The ISRP concern is that the method of estimation may not be applicable to establishing RRS for multiple groups; that this would require both parents and offspring to be identified in a triplet restricting the number of useful data points; and that the methods would be less powerful in establishing differences.

A second issue is the parr and smolt sample size. The proponents anticipate they will be able to capture nearly all the anadromous adults that will contribute to spawning and propose to systematically sample 1,250 parr and 750 smolts (we presume annually for each group of spawning parents). This raises questions for the ISRP of whether this is a sufficient number given genotyping errors, parentage assignment errors, and individuals that have no assigned parents (common in steelhead investigations). The ISRP believes that a thorough evaluation of the sample sizes required for detecting pre-defined (5, 10, 20%) differences in RSS using error rates derived from existing published reports should be presented in the proposal to justify the sampling plan.

Third, the suggestion for AHA modeling, and executing the investigation as an evaluation of the AHA assumptions, was not considered. Since supplementation of Upper Columbia steelhead is being proposed in the Methow and Okanogan subbasins and will use AHA in developing the program goals, the ISRP would like to see this addition considered by the proponents.

Finally, the carryover experiment may also be more difficult to interpret because the history of the stock under investigation is not well defined. In the case of the Hood River steelhead, the hatchery stocks were derived from wild fish with little history of hatchery steelhead introgression. In the case of the Methow

River, the steelhead in the wild and in the hatchery may be at genetic equilibrium and highly influenced by domestication selection. Under these circumstances the interpretation of any carryover effect will not be unambiguous. This should be discussed in the proposal narrative.

Araki, H., and M. S. Blouin. 2005. Unbiased estimation of relative reproductive success of different groups: evaluation and correction of bias caused by parentage assignment errors. *Molecular Ecology* 14:4097-4109.

Araki, H., W. Ardren, E. Olsen, B. Cooper and M. Blouin. 2007. Reproductive success of captive-bred steelhead trout in the wild: evaluation of three hatchery programs in the Hood River. *Conservation Biology* 21:181-190.

Araki, H., B. Cooper and M. Blouin 2009. Carry-over effect of captive breeding reduces reproductive fitness of wild-born descendants in the wild (*Biology Letters* doi:10.1098/rsbl.2009.0315)

Preliminary comment requesting a response:

The study of relative reproductive success of hatchery and natural steelhead in the Twisp River proposed is needed. The ISRP believes investigation of natural production by spawning hatchery steelhead in the tributaries above Wells Dam is essential for understanding the status and viability of the natural population.

The proposal included three primary objectives: 1. in a first generation compare the relative production from hatchery and natural fish spawning in the Twisp River, a tributary to the Methow River; 2. evaluate potential biological attributes of the fish and environmental attributes of the spawning site and time that might account for differences in the performance of hatchery and natural steelhead; and 3. in a second generation compare the success of natural spawning adults that had zero, one, or two hatchery-origin parents in the previous generation.

The ISRP raises questions about the field and analytical methods in section 3 below. A response is requested in the form of a revised proposal narrative that elaborates on the analysis anticipated for each objective. This investigation also becomes a test of the AHA model. AHA should be run on this population (if not done already by the HSRG) and this project used to test the assumptions in AHA. The ISRP is interested in how the environment—tributary habitat capacity, interannual variation—might affect the outcome. Could different environmental conditions be added to the study? This would add a dimension to objective 2 - correlation analysis.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The proponent proposes to examine Relative Reproductive Success (RRS) for Twisp River (Methow River subbasin) summer steelhead. The steelhead run is part of the upper Columbia River basin Evolutionarily Significant Unit (ESU) and is listed for Endangered Species Act (ESA) protections. This project is similar to ongoing RRS investigations in the Hood River, Oregon, that have provided evidence that multi-generation hatchery stocks of steelhead are less productive when spawning naturally than non-captive fish, that a single generation in the hatchery results in depressed performance in the wild, and that hatchery effects on natural production persist in wild-born individuals with hatchery-born parents.

The objectives, rationale, and approach are clearly presented and suggest a project that will provide another data set for comparing hatchery and natural steelhead reproductive performance that will complement the Hood River investigations.

Until initial evaluations of progeny production from natural and hatchery steelhead are completed it will not be known whether the Twisp River “case” is biologically similar to the Hood River “case.” In the Hood River many of the interesting results that have been published are based on comparing recently established hatchery stocks with natural fish. The hatchery stocks have been established from the local natural stock. In the Methow subbasin, the hatchery fish are a long-established (1969) composite stock with broodfish collected at Wells Dam and progeny historically scatter-planted throughout the Methow and Okanogan subbasins. Recently the juveniles released from the hatchery program have been hatchery x wild crosses. The proposal does not present information on the relationship of the natural and hatchery steelhead, but it is possible that the natural fish are descendents of wild-born hatchery fish.

This possibility is important to consider when interpreting the results of the investigation. For example, hatchery- and natural-origin coho salmon in Minter Creek, Washington have indistinguishable reproductive performance in the natural stream, and this is attributed to 60 years of hatchery production with the majority of natural spawning by hatchery-origin adults (Ford et al. 2006). It is noteworthy that in the Minter Creek coho situation the production of smolts has decreased from levels in the 1940s and run- and spawn-timing are earlier. Analysis suggests that optimum run-time is later than the present timing (Ford et al. 2006).

The important point is that likelihood of substantial past crossing of wild and hatchery fish will complicate using a difference in relative reproductive success between the hatchery- and natural-origin steelhead as a valid basis for drawing biological conclusions and useful management implications. Indeed, if the high proportion of hatchery-origin steelhead present in the past were reproductively successful at reasonable rates, smolt yields would have been much higher.

Even with these caveats, the investigation is important and will contribute to our understanding of the population status of upper Columbia River steelhead.

2. Project History and Results

This is a new project. Proponents indicate that methods to collect tissue samples, genotype fish, and operate the Twisp weir and juvenile trap have been tested.

3. Objectives, Work Elements, and Methods

The general outline of the proposed investigation employs established protocols for parentage assignment and assessment of relative reproductive performance of different categories of individuals. Most, or all, of the potential parents will be captured and genotyped; juveniles will be sampled, genotyped, and assigned to parents. The number of progeny produced by different categories of parents will be compared to establish their relative reproductive performance.

The ISRP has several concerns about individual methods that need to be addressed before initiating the investigations. Reliance on rotary smolt traps for smolt capture may not provide sufficient sample size to confidently determine the relative reproductive success of wild versus hatchery recruitment to the smolt stage—the key response variable. A full smolt enumeration and sub-sample routine should be explored and employed if feasible. Sample size requirements to detect differences in reproductive performance should be established a priori. This should consider the power and minimum effect size that is likely to be detectable.

For objective 1 and 3 the proponent outlines a comparison of production from parent pairs (4 for objective 1 and 16 for objective 3). In most investigations of RRS the contrast is among 4 categories –

hatchery males and females and natural males and females. Additionally, the Hood River investigators have completed and published an evaluation of “carryover effects” identical to that proposed in objective 3 (Araki et al. 2009). This study was not listed in the literature citations. The ISRP urges that a compatible study design be employed in the Twisp, so this study can serve as a replication/comparison.

The ISRP believes the proponents need to revisit the analysis design and ensure it is using contrasts compatible with other Pacific salmon and steelhead RRS investigations.

It is not clear to the ISRP that the assumptions for testing random mating will be met. This should be addressed in a response.

For objective 2 - determine the degree to which differences in fitness between hatchery and natural steelhead can be explained by measurable biological or life-history traits that differ between hatchery and natural fish the analytical approach to evaluating selection appears appropriate (using the methods from Lande and Arnold 1983), but the interpretation of whether the differences between hatchery and natural fish are genetic (from domestication selection) or from environmental effects of hatchery rearing is not clear. On page 8 the proponents conclude they will be able to determine not only if hatchery steelhead have lower relative reproductive success than natural steelhead, but also why. It is not evident that the design of the investigation can lead to interpretations of causation. In particular, on page 21, final paragraph, the proponents state “If there are differences in relative reproductive success between hatchery- and natural-origin spawners, it is possible that these differences are more a function of biological factors that are correlated with the origin of the spawners rather than any direct hatchery effect.” It is not clear to the ISRP what is intended by this distinction – which is the genetic effect, which is the environmental effect? And how will the design not confound these effects? This should be addressed in a response.

For objective 3, if the natural-origin steelhead in the Twisp are functionally the wild-born descendents of Wells hatchery steelhead, and the two components (hatchery and wild) are at genetic equilibrium because of past interbreeding, then one generation of wild parents may not yield an important production distinction between categories (wild with hatchery parents versus wild with wild parents). Both categories could have low productivity. The ISRP is under the impression that a longer term investigation of re-adaptation is underway with coho salmon at Minter Creek. The status of that investigation and approach should be confirmed. It would be worthwhile to have a longer term investigation of the re-adaptation of steelhead. This component should be added to the plan.

Araki, H., B. Cooper and M. Blouin 2009. Carry-over effect of captive breeding reduces reproductive fitness of wild-born descendants in the wild (Biology Letters doi:10.1098/rsbl.2009.0315)

Ford, MJ, H. Fuss, B. Boelts, E. LaHood, J. Hard, J. Miller. 2006. Changes in run timing and natural smolt production in a naturally spawning coho salmon (*Oncorhynchus kisutch*) stream after 60 years of intensive hatchery supplementation. Canadian Journal of Fisheries and Aquatic Sciences 63:2343-2355.

201003600 - Expansion of Washington's Tag Recovery Program in the Lower Columbia Region to Improve Fisheries and Viable Salmonid Population Monitoring

Proponent: WDFW

Province: Lower Columbia **Subbasin:** Columbia Lower

Budgets: FY10: \$1,000,000 FY11: \$839,902 FY12: \$881,896

Short description: This proposal expands the existing CWT recovery program to include PIT tag recoveries, and address deficiencies in the CWT to improve fisheries and VSP monitoring

ISRP final recommendation: Meets Scientific Review Criteria

Final comment:

The project proponents provided a response to ISRP's requests in the form of a revised proposal narrative. Changes to the original narrative were highlighted in blue font, which assisted the ISRP in completing our review in a timely manner. The ISRP found the revisions adequate in responding to our requests, including: (1) addition of links to many references and new references to support technical justification, (2) provision of new details on methods, sample sizes, and metrics, and (3) a discussion of how and why the NOAA regional guidance on the types, accuracy, and precision of VSP monitoring (Crawford and Rumsey 2009) will be used by WDFW.

With respect to these NOAA guidelines, the proponents provided a reasonable caveat "Although the NOAA standards have not been fully evaluated, WDFW has proposed to try to meet the NOAA standards to ensure that ESA listing and especially delisting decisions will not be compromised by not meeting the NOAA data quality standards. If the region can provide consensus for another standard, WDFW will evaluate this standard." Overall, the proponents have done a good job of addressing the ISRP's concerns regarding adequacy of sample size as it relates to the CV 15% criterion (Crawford and Rumsey 2009). However, the ISRP encourages WDFW and other involved parties in the region to investigate further the various recommendations for sample sizes and to develop useful information that would aid investigators in selecting sample size requirements and understanding the consequences of that selection.

Finally, the ISRP appreciates that the Pacific Salmon Commission (PSC) is contributing to WDFW's proposed expansion of Washington's tag recovery program in the lower Columbia region, and that the proposed work will address some of the limitations of the current CWT program, as highlighted by the PSC (2008) and recommended by the ISRP/ISAB (2009).

References

- (ISRP/ISAB) Independent Scientific Review Panel/Independent Scientific Advisory Board. 2009. Tagging Report: A comprehensive review of Columbia River Basin fish tagging technologies and programs. ISRP/ISAB 2009-1, Northwest Power and Conservation Council, Portland. 110 pp. (www.nwcouncil.org/library/isab/isabisrp2009-1.htm)
- (PSC) Pacific Salmon Commission Coded Wire Tag Workgroup. 2008. An action plan in response to Coded Wire Tag (CWT) Expert Panel Recommendations. Pacific Salmon Comm. Tech. Rep. No. 25: 170 p. (www.psc.org/publications_tech_psctechreport.htm)

Preliminary comment requesting a response:

This project has the potential to benefit Columbia River Basin fish and wildlife by filling important gaps in recovery of passive integrated transponder (PIT) and coded-wire tagged (CWT) for salmonids in the Lower Columbia Region (LCR). However, the proposal narrative often referenced unpublished reports for details of viable salmonid population (VSP) monitoring methods and software to be used for different estimates. The ISRP requests a response in the form of a revised narrative to provide augmented details on methodologies outlined below.

An adequate response should provide the following information: The metric numbers provided for tagging, RME designs, and analysis and interpretation of data need to be augmented with a description of the metrics. Similarly, the metric numbers provided for tagging, random sampling of CWT and PIT tags, and analysis and interpretation of data need to be augmented with a description of the metrics.

The first proposed test of the tag detection rates appears problematic due to small sample size. In the second test plans to conduct the test at a hatchery or commercial sampling site have not been confirmed. Evidence of confirmation is necessary and details showing that the number of tags will be adequate should be provided. Details of how this test will be extended to examine differences between individuals/detectors should be provided.

Details for the sampling design to sample CWT and PIT tags from Columbia River sport and commercial fisheries should be provided.

The reference to a CV of 15% (Crawford and Rumsey, 2009) has not been established as a reasonable data standard. Crawford and Rumsey (2009) reference Carlile et al. (2008), which makes recommendations for coefficients of variation for estimates of total spawning escapement. The statistical and biological basis for the recommendation in Carlile et al. (2008) has not been reviewed. The justification that the standard represents a realistic goal for planning because it corresponds to an acceptable risk (one year or one stock in six) of failing to label a stock of concern when warranted appears to be arbitrary. The observation that the standard has proven to be attainable for many escapement estimation studies does not mean that this is the appropriate data standard. Further justification for sample size targets is required.

1. Technical Justification, Program Significance and Consistency, and Project Relationships

The technical justification was straightforward and adequate for expanding the tag recovery program by adding PIT tagging. The proposed project will address several deficiencies (that are clearly stated) in the current CWT program. In particular, the project will fill significant fall Chinook and coho salmon monitoring gaps in the Lower Columbia River during the Columbia River Tributary Research, Monitoring, and Evaluation (RME) process.

The proponents provided very good detail on how this project will respond to the Lower Columbia River Subbasin plans (LCFRB 2004) and generally the BiOp, PSC recommendations, and other Fish and Wildlife Program elements.

The proponents listed many projects (CWT and PIT) as related to and sharing data with this one. Also, this project coordinates with and shares data with the Pacific Northwest Aquatic Monitoring Project's (PNAMP) Integrated Status and Trend Monitoring (ISTM) project (#200400200) by using the same spawning distribution models for CWT recoveries and escapement.

2. Project History and Results

This is a new project that builds on three previous BPA-funded CWT recovery projects (# 198201301, #2007236800, and #2007355000). A brief history of the current CWT program (# 198201301) was provided.

3. Objectives, Work Elements, and Methods

Objective 1. "Escapement Sampling for CWTs" is not a fully stated, measurable objective and not until paragraph two following this statement do we find the full objective 1, which is "In this CWT and VSP monitoring effort, we intend to recover CWTs on spawning ground surveys to estimate exploitation rates for hatchery Chinook and coho salmon and concurrently gather data for VSP metrics (productivity, abundance, diversity, and spatial structure) using methods and sampling designs to meet the NOAA monitoring guidance (Crawford and Rumsey 2009)." The proponents provided useful tables summarizing assumptions needed to calculate unbiased population estimates. The methods for this objective are described in good detail for the most part, but often we are referred to reports for details of VSP monitoring methods and software to be used for different estimates. Links to some/many of those would be useful for reviewers.

The proponents state that this project will provide "better managing and maintaining of existing databases" (WDFW's CWT, age, scales and biological data, and spawning ground survey databases in Olympia), but there is not a clear description of what this entails.

Objective 1 includes marking and tagging of salmon for mark-recapture studies, but no details are provided on tagging methods, numbers and species of fish tagged, or possible negative effects of tagging on fish.

The metric numbers provided for tagging, RME designs, and analysis and interpretation of data need to be augmented with a description of the metrics.

Objective 2. "Fisheries Sampling for PIT Tags" should expand to "Fisheries Will be Sampled and Reported for PIT Tags as well as CWTs". This effort will be shared with ODFW and both agencies will upgrade to new detectors and data loggers. Methods for this objective are also well detailed and appear to be adequate for both sport and commercial Columbia mainstem fisheries.

Carcasses will be PIT tagged to assess PIT tag detection rates, but a concise summary of experimental design and methods was not provided.

The proponents state that CWT and PIT tags will be randomly sampled from Columbia River sport and commercial fisheries, but no sampling design is provided.

The metric numbers provided for tagging, random sampling of CWT and PIT tags, and analysis and interpretation of data need to be augmented with a description of the metrics.