



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



**ISRP 2010-7
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ISRP Initial Review of BiOp Fast Track Research, Monitoring, and Evaluation Proposals

I. Table of proposals and recommendations

Click page numbers to jump to proposal reviews.

ID	Title	Proponent	Province	Subbasin	FY10	FY11	FY12	Meets Criteria?	Page
198909800	Idaho Supplementation Studies	IDFG / NPT / SBT	Mountain Snake	Salmon	\$1,990,884	\$1,992,328	\$2,041,844	In Part/Response requested	27
199005500	Idaho Steelhead Monitoring and Evaluation Studies	IDFG	Mountain Snake	Clearwater	\$807,012	\$808,944	\$828,301	Response requested	36
199107300	Idaho Natural Production Monitoring	IDFG	Mountain Snake	Salmon	\$880,401	\$869,622	\$891,919	Response requested	40
199305600	Research to advance hatchery reform	NW Fisheries Science	Mainstem/Systemwide	Methow	\$510,000	\$587,559	\$597,707	Yes	6
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	7
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	In Part/Response requested	32
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)	18
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	Response requested	42
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)	22
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	Response requested	45

ID	Title	Proponent	Province	Subbasin	FY10	FY11	FY12	Meets Criteria?	Page
201003000	Estimate viable salmon population (VSP) parameters for Yakima steelhead major population group (MPG)	Yakama Nation, WDFW	Columbia Plateau	Yakima	\$644,271	\$639,960	\$655,958	Response requested	49
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)	24
201003200	Imnaha River Steelhead Status Monitoring (was 200205600)	Nez Perce Tribe	Blue Mountain	Imnaha	\$648,269	\$419,370	\$430,086	Response requested	51
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	Response requested	55
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)	15
201003500	Abundance, productivity and life history of Fifteenmile Creek Steelhead	ODFW			\$403,200	\$559,450	\$309,700	Yes	11
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	Response requested	58
201003800	Lolo Creek Permanent Weir Construction	Nez Perce Tribe	Mountain Snake	Clearwater	\$200,000	\$1,100,000		Yes (Qualified)	13
201004200	Tucannon Expanded Pit Tagging		Blue Mountain	Tucannon	\$15,010	\$15,509	\$16,035	Yes	9

II. Background and next steps

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.

The eight ongoing proposals were intended to justify continuation of existing work plus implementation of fast-track actions. Foremost, this review should immediately inform decisions on fast-track work elements and tasks. The review of these proposals is also intended to serve as the review for the larger RM&E categorical review anticipated to begin in June 2010. Depending on the outcome of the ISRP review, BPA may limit funding decisions to only address the specific fast-track actions. Regardless of BPA's funding decisions, the ISRP understands that the proposal and the ISRP review will be included for context to inform review of similar projects in the RM&E category review and to facilitate coordinated and efficient implementation of RM&E across the program. The project proponent will not be required to submit another full proposal for that review, but 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.

The ISRP found that 9 proposals met scientific review criteria; 5 of these had qualifications that the ISRP recommended could be considered by the Council and addressed by the proponent and BPA during contracting. These 9 proposals are ready for immediate Council and BPA decisions. In response to the Council and BPA's stated desire to implement the fast track action in 2010, we considered the option to specifically identify if a fast track work element is justified independently of other project actions. We found that 2 proposals justified the fast track component of their project but the complete project needed a response. These 2 proposals received an "in part/response requested" recommendation. The ISRP also requested a response on the remaining 8 proposals.

Next steps:

- February 25: Proponent response and public comment period begins
- March 25 - Proponent responses and public comment due
- April 13 and 14 - Council deliberation and decision on subset of proposals that met scientific review criteria
- April 15 - ISRP response review due
- Late April, early May - Possible special Council meeting to approve final fast-track set

For the 10 projects that the ISRP requested a response, the project proponents should:

- develop a point by point response to the ISRP's concerns, unless otherwise requested in the review (e.g., in addition, a request for a revised narrative)
- by Thursday, March 25, e-mail that response and any supporting materials to Lynn Palensky, Council staff, Program Development Manager, lpalensky@nwcouncil.org (1-800-452-5161)
- the e-mail subject line should read "Fast-track response - [your project number and title]"
- attachment file names should begin with your BPA project number, e.g., "2010YYYYZZ"

Proposals that received "meets scientific review criteria" or "meets scientific review criteria (qualified)" recommendations do not need to submit additional material to the ISRP.

III. Programmatic comments

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 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 been established as a reasonable 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 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.

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. As members of project staff, Council, and reviewers 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. The ISRP recommends that in fast-track responses and in the summer 2010 RME review 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 starting with proposals that met scientific review criteria, followed by met criteria (qualified), in part/response requested, and response requested. Within those groupings, reviews are sequenced by proposal number.

A. Proposals that meet scientific review criteria

199305600 - Research to advance hatchery reform

Project proponent: NW Fisheries Science

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

Budgets: FY10: \$510,000 FY11: \$587,559 FY12: \$597,707

Short description: This project evaluates the effectiveness of hatchery reform measures being implemented in the Methow River and provides scientifically based guidance on the development of integrated hatchery programs for steelhead throughout the Basin.

ISRP recommendation: Meets Scientific Review Criteria

ISRP comments: The project would no longer address captive broodstocks of endangered Chinook, and the ISRP assumes that the earlier work of the project has been wound down or wound up—but it's not explicit in the proposal. The previous work has had a considerable influence on hatchery management due to the project's timely, rigorous record of reporting results. By investigating a radical change in historical salmon hatchery practice—production of older, age 2 smolts—in an effort to integrate hatchery populations with natural populations in a way that minimizes effects on natural populations this research would make a useful contribution to hatchery reform. However, as the ISRP noted in its 2007 review, an array of incrementally achievable improvements of fitness over traditional hatchery methods may not add up to a workable strategy for restoration through integrated hatchery programs. The proposed research would not be a holistic examination of hatchery reform. Such incremental improvements of fitness in hatchery-origin salmon might not ameliorate, and indeed might exacerbate, detrimental effects on naturally reproducing populations, such as the effects described on coastal Oregon coho in Biol. Conserv. 142:2249. What would be the improvement in survival likely to be realized from this reformed practice? Would it have practical benefit?

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

The project's components are being proposed within the context of hatchery reform. The project's three primary objectives are focused on research aimed at comparing the efficacy and effectiveness of steelhead smolts released in their second year (S2) as opposed to current approaches that release smolts in their first year (S1). The objectives focus on relative fitness responses, domestication, and physiology. The proposed work is at an operational scale will benefit from collaboration and cost-sharing with USFWS (WNFH), USGS, and NOAA (NWFSC/MS). The coordination, collaboration, and cost-sharing with other agencies and participants are an important requirement for the success of this project's broader goals and

individual work elements. For example, a key part of evaluating the relative performance of the S2 v. S1 strategies is the mark and recapture monitoring by collaborators. As the proponents note coordination with Project 201003300 in particular will be crucial to the success of this research.

2. Project History and Results

Previous work undertaken within the project has had considerable influence on hatchery management due to its strong record of reporting results. The project reports consistent annual accomplishments providing information aimed at the key uncertainties identified for the project. The proposed work would change the project to focus on hatchery culture of steelhead, under a new team of researchers.

3. Objectives, Work Elements, and Methods

The project identifies three primary objectives 1) testing the efficacy/effectiveness of S2 smolts for increasing population fitness; 2) evaluating suites of behavioral traits altered by domestication; and 3) evaluating physiological indicators for abundances of precocial males. Each of the three have been often identified as important and are consistent with identified RPAs; however, the proposers do not make the case that these are the only or most important uncertainties for the role of integrated supplementation in UCB steelhead conservation, restoration, and management.

Omitted in the design is the inclusion of some kind of "wild" production reference. The ISRP recognizes the complexity and technical challenges such inclusion would require, yet for some of the data sets including such a reference set would be appropriate (e.g., age-dependent growth, residualism rates, smolt age patterns, jacking rates, and such).

199703000 - Chinook Salmon Adult Abundance Monitoring [Includes fast track Joseph Creek Steelhead Escapement project]

Project proponent: Nez Perce Tribe

Province: Mountain Snake **Subbasin:** Salmon

Budgets: FY10: \$448,061 FY11: \$438,367 FY12: \$448,680

Short description: This project collects data for status monitoring of natural origin adult salmon abundance and productivity in a reference stream, the Secesh River. The fast track project proposes to collect natural origin adult steelhead escapement data in Joseph Creek

ISRP recommendation: Meets Scientific Review Criteria

ISRP comments: In general, this proposal demonstrates good fisheries science. However, parts of this project are difficult to assess. In particular, it's a combination of two projects with little in common (different species, equipment, even subbasins), and the relation between them was unclear.

The need for continued Chinook monitoring at Secesh was well documented, and the addition of steelhead trout monitoring at Joseph Creek is justified as a benefit to the Fish and Wildlife Program, but it is not clear why the new steelhead program is to be combined with the Chinook

program. Why is the proposed steelhead weir in this proposal and not in Integrated Status and Effectiveness Monitoring project (ISEMP; BPA Project No. 200301700I) that has a fast-track proposal “to install two PIT tag arrays in lower Joseph Creek and two arrays in the lower Grande Ronde River?”

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

The proposal has two parts:

1) The Secesh River is an unsupplemented stream, in the South Fork Salmon River drainage in Idaho, which acts as a reference stream for three ongoing Chinook supplementation evaluation programs. It is the only stream in the Snake River Basin where monitoring of natural origin salmon escapement occurs absent a hatchery supplementation program. Salmon escapement monitoring will be continued using dual frequency identification sonar (DIDSON). It was begun in 2004.

2) This project also includes the new fast track Joseph Creek steelhead escapement monitoring project. It would use a floating weir to provide status monitoring of adult steelhead in Joseph Creek in the lower Grande Ronde River in Washington.

The Secesh DIDSON monitoring is effective. It is operational a high percentage of the time, produces a good count, and has been in operation for a number of years. The program is consistent with BiOp goals, etc.

2. Project History and Results

The Secesh component has a long history. It has been yielding good results for at least 5 years from DIDSON technology. The Johnson Creek steelhead project is in early development—it's not even clear where an adult counting weir structure can be emplaced.

3. Objectives, Work Elements, and Methods

PIT tag arrays have been installed in the lower Secesh River to quantify both natural origin adult salmon and steelhead escapement. A comparison of PIT tag array escapement data with DIDSON salmon escapement information collected by this proposal will be performed over a period of years. The objectives and methods proposed for use in Joseph Creek seem reasonable and appropriate.

A detailed explanation of methods including statistical methods is provided.

201004200 - Tucannon Expanded PIT Tagging

Project proponent: WDFW

Province: Blue Mountain **Subbasin:** Tucannon

Budgets: FY10: \$15,010 FY11: \$15,509 FY12: \$16,035

Short description: Purchase of pit-tags and operation of a remote PIT detector array to expand current WDFW monitoring of natural steelhead VSP metrics, and to better describe adult stray behavior, survival and spatial distribution into the Snake basin.

ISRP recommendation: Meets Scientific Review Criteria

ISRP comments: This is a well-justified project that will help to fill important data gaps for natural origin summer steelhead in the Tucannon River. If critical assumptions are met and objectives are successfully achieved, information will be available to improve management decisions for recovering Tucannon steelhead.

The ISRP cautions that analysis and interpretation of straying and migration data may prove difficult because (1) a certain % of straying for steelhead is common/normal, and (2) not all detected cases of unexpected migration may be attributed to hydrosystem effects. (See comments in Section 3, below.)

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

This project proposes to PIT tag emigrating natural origin summer steelhead collected from the Tucannon smolt trap and utilize an existing PIT tag detection array to estimate smolt to adult (SAR) of summer steelhead and thus escapement as a measure of population status. As this is a critically depressed population and accurate estimates are not available, this appears to be a high priority and well justified project. The data collected by this project are also expected to contribute to a better understanding of the relationship between hatchery and natural fish abundance in the Tucannon. The proponents note that past smolt monitoring results have been effective in obtaining a relative measure of natural origin steelhead production from the Tucannon River. Part of the justification is that adult numbers are needed to meet management and population VSP monitoring criteria. An additional justification is that these data will contribute to continued monitoring of unexpected migration patterns to aid in understanding hydrosystem effects on the Tucannon River steelhead population for management decisions in the future.

This project appears consistent with the 2008 Washington State Steelhead Management Plan, the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) (RPAs 50.6, 50.7, and 62.4), and the Snake River Salmon Recovery Plan for Southeast Washington (2006).

Only one project (#201002800 currently proposed) is specifically stated as related to this one in the narrative, but the Administrative Form lists four other projects that this project is related to. The relationships of how this coordination and data sharing with these projects will be done are adequately described.

2. Project History and Results

This is a new project but will use an existing PIT tag array installed in the Tucannon River by the USFWS for monitoring bull trout behavior. The array was given to WDFW because the bull trout work has been completed. Efficiency of detections by array (for bull trout if available) would be helpful to compare with steelhead detection data.

3. Objectives, Work Elements, and Methods

The primary objective of the proposed project is to estimate the annual abundance of natural origin summer steelhead returning to the Tucannon River. The objective is clearly stated and measurable, the methods brief, but adequate, and the ISRP liked to see that the critical assumptions were included.

Secondary objectives are:

(1) monitor the straying of natural origin Tucannon steelhead within the Snake River and its tributaries;

Comment: However, a certain percent of straying for steelhead is common/normal so interpretation may be difficult.

(2) describe and quantify the hydrosystem effects on this population;

Comment: For this secondary objective it seems that all detected cases of unexpected migration may be attributed to hydrosystem effects, and this may not be a valid interpretation.

(3) monitor the proportion of hatchery and wild steelhead returning to the river to assess the potential affects of the hatchery program on the natural spawning population structure (pHOS).

Comment: The length of the project is stated as 8 to 10 years, to cover two generations—why not three generations? At least three generations may be needed to assess full potential effects of hatchery fish on wild fish.

In sum, the monitoring of migration paths of adults at dams and PIT tag detectors in the Tucannon and other locations with subsequent evaluation appears to be well planned.

The project personnel appear highly qualified to carry out this project, and if critical assumptions are met, the project has a good likelihood for success.

201003500 - Abundance, productivity and life history of Fifteenmile Creek Steelhead

Project proponent: ODFW

Province: Subbasin:

Budgets: FY10: \$403,200 FY11: \$559,450 FY12: \$309,700

Short description: This project will determine the abundance, survival, life history, productivity and distribution of steelhead in the Fifteenmile Creek subbasin.

ISRP recommendation: Meets Scientific Review Criteria

ISRP comments: This is essential work that is fundamental to stock management and monitoring. The ISRP comments are intended to improve on this already promising approach. In summary:

- Consider alternative smolt and adult capture and sampling techniques following a thorough review of the history
- Use the recruitment results that will be generated to evaluate previous habitat work and also test some hypotheses related to the biology—several options are suggested.
- Eventually include AHA/EDT and recruitment simulation model testing and ground-truthing and begin planning for this early in the project.

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

The proponents have done a good job at establishing clear justification for this project. The linkage with RPAs was well documented. The project will significantly improve the basic understanding of this easternmost run of winter steelhead, now on the endangered species list. ODFW is also conducting many other studies in the vicinity, and knowledge sharing will be taking place.

The proposed data acquisition is essential for comprehensive population monitoring and management of this unique winter-run steelhead population, and, eventually, for evaluation of extensive watershed improvements already completed and planned. The program is entirely consistent with a well-designed population and watershed monitoring program, and will serve as an intensively monitored watershed and index site for Oregon and the Columbia Basin. The results will serve several watershed and Basin projects, as listed, and assist in stock status determinations over the broad area, as well as ground truthing of habitat and population dynamics models, in the future. Some suggestions, recommendations, and considerations as the project moves forward are included below.

2. Project History and Results

This is a new project, but earlier work has been conducted in the area (including 15 years of habitat restoration work). It will be very useful to compare results of adult returns over the weir with redd counts and assess how accurately past (pre-project) redd counts may have actually

indexed adult abundance. A summary of current knowledge of stock status and abundance (smolts and adults) would have benefited reviewers and planners, and should prove useful to future plans and comparisons.

3. Objectives, Work Elements, and Methods

There were two basic objectives: (1) determine life cycle survival and performance metric (smolt abundance, smolts/redd, SAR), and (2) determine spawner abundance and spawner distribution (now have 60 miles of known spawning habitat). The work elements and methods seemed fairly complete, and protocols were adequately outlined. It was clear to the reviewers what major activities will be undertaken. In gaining the most benefit of this information for management purposes, it would be useful to specifically consider the following issues:

1. In most cases, it will be adequate to estimate screw trap efficiencies once per week. However, during times of high flows (depending on general watershed runoff characteristics and interannual flow variations), it may not be adequate. Peak smolt emigrations often coincide with high water periods, and inappropriate estimates of trap efficiency applied to catches at those critical times may generate much greater overall errors in some abundance estimates than at other times. It is safe to say that poor efficiency estimates during two days at the peak of the outmigration may be worse than two weeks during a slow time. For that reason, it would be worth developing a general protocol for estimating trap efficiencies that is at a minimum once per week but that is at shorter intervals for high flow/peak migration times. This should not be too difficult to do. It may require a bit more personnel at the peak times.
2. Although the proponents did not discuss the value of any hypothesis testing and the smolt run, they may have thought about the desirability of evaluating some specific aspects of the run itself and effects on SARs. For example, they might hypothesize that larger or older smolts might return at higher rates than smaller smolts or that smolts in the middle portion of the run might perform better than those near the beginning and end. It would necessitate measuring and weighing PIT tagged smolts. Smolt condition might also play a role, not just Fulton's condition index but fat reserves. It might be useful to evaluate if the non-invasive "fat meter" (from work in Ireland) now available for use can be sensitive enough to detect the fat reserves of smolts, which might be linked to their survival.
3. Similarly, it is possible to develop several testable hypotheses about factors affecting the timing of the smolt emigration, including discharge, turbidity, lunar cycle, water temperature, and such. USGS gauging stations are in the basin and this data (water discharge, turbidity, etc.) could be used to relate to smolt emigrations, adult counts at the weir, and redd counts.

Several other suggestions or alternatives should be considered. Researchers have considered nearly all aspects of parr, smolt, and adult steelhead monitoring but hopefully have also considered alternative techniques for several aspects, and should be encouraged to review/visit sites with similar experiences (e.g., Keogh River, B.C., Snow Ck. WA). Adult monitoring by video alone will not permit sufficient biological sampling (e.g., scales, weight, condition, fecundity, etc. would not be available).

An alternative may be partial live capture (traps) supplemented by resistivity or video counter(s). Radio tagging may be preferred to PIT tagging of adults to determine watershed distribution, proportionate composition within tributaries (given the overall estimate or count), and migratory behavior, which would also elucidate more on discreet habitat utilization and importance. Note that marked adults may be recaptured as kelts in their downstream migration, further confirming population estimates and/or counts. Likewise, full smolt enumeration and sampling (~15%, checked regularly) is preferably to RSTs. The latter provide unreliable M-R estimates with broad confidence levels. Steelhead trout, like Atlantic salmon smolts, are known to exhibit trap avoidance behavior as well as residualism, confounding M-R estimates. If using RSTs, separate mark and recapture sites are recommended, with minimal handling at the marking site, biological sampling at the recovery site. Sampling for age structure must be stratified by age and migration timing. There was little or no discussion of steelhead recruitment analyses, but the reference list indicated some awareness, although some key references on winter steelhead recruitment were missing.

EDT and AHA models (which utilize EDT) may eventually be testable at this site as data accumulates. Preparations for these and related analyses (e.g., recruitment models) should begin as operation and maintenance of field work and trapping evolves.

4. M&E

The M & E component was paramount and well defined; however, an attempt to evaluate habitat improvement activities conducted over the last 15 years should be considered (e.g., EDT model predictions and smolt yield, or smolts per spawner), and in relation to locations of redds, or habitat parameters.

B. Proposals that meet scientific review criteria (qualified)

201003800 - Lolo Creek Permanent Weir Construction

Project proponent: Nez Perce Tribe

Province: Mountain Snake **Subbasin:** Clearwater

Budgets: FY10: \$200,000 FY11: \$1,100,000 FY12:

Short description: This Fast Track BiOp project is for the design, permitting and construction of a permanent adult weir on Lolo Creek (Clearwater River). This weir will be operated to fill listed steelhead RPA gap 50.6 and to improve M&E efforts of spring Chinook for NPTH

ISRP recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): The Council, BPA, and the proponent should be aware (and likely are) that there is a risk, due to environmental conditions, that the weir will not operate properly during enough of the return period to yield an adequate proportion of the run (and if data on individual fish are needed, an unbiased sample).

ISRP comment: This is a fast-track proposal to design and construct a permanent weir in Lolo Creek, tributary to the Clearwater River in north-central Idaho. The weir will be used as a monitoring and evaluation tool to collect adult return information on B-run steelhead (*Oncorhynchus mykiss*) and spring Chinook salmon (*O. tshawytscha*). Snake River B-Run steelhead population status and trend data are required under RPA 50.6.

The proposal deals only with design and construction of the weir, which will be done by a subcontractor. After construction, weir operation and data collection will occur under the existing NPTH M&E project (198835003), for which a categorical review proposal for assessing steelhead supplementation effectiveness is pending.

Over the past seven years the Nez Perce Tribal Hatchery Monitoring & Evaluation project has operated a temporary weir in Lolo Creek. It is intended to serve three primary functions for the Nez Perce Tribal Hatchery program (NPTH; 1983-350-000): broodstock collection, adult monitoring and evaluation, and manipulation/control of hatchery and natural composition of spawners, i.e., exclusion of strays. Current results with the temporary weir, however, seem probably not worth the resources devoted to it. In each of the last several years, it has captured just a few dozen late-moving Chinook and no steelhead. Recently, it has been installed in June and sometimes not until July.

The need for a permanent, properly operating weir is clear. The proposal makes the point that Lolo Creek has one of the smaller B run steelhead populations and is therefore more feasible to weir than other situations. Also, there is need to monitor Chinook salmon as part of the supplementation program's evaluation.

Some doubt exists, however, about whether even the proposed permanent weir can function well enough. The proposal states that "given high spring flows and debris load, we anticipate continuous operation of the permanent weir will not be possible over the return period of steelhead." Presumably, this might apply to Chinook, as well. Given that, the proposal could be improved by presenting evidence, such as history of flood timing and duration, about expected disruption of weir operation. Will it, at least in most years, operate properly during enough of the return period to yield an adequate proportion of the run (and if data on individual fish are needed, an unbiased sample), or will it often only catch the tail end of the Chinook run and few if any steelhead, like the temporary weir now does?

What has been the success (and failings) of permanent weirs constructed similarly to the proposed weir and installed in similar streams?

Will the proposed weir be able to be used to sample out-migrating juvenile steelhead and Chinook? If not, why?

201003400 - Upper Columbia Spring Chinook and Steelhead Juvenile and Adult Abundance, Productivity, and Spatial Structure Monitoring.

Project proponent: WDFW

Province: Columbia Cascade **Subbasin:** Wenatchee

Budgets: FY10: \$702,643 FY11: \$719,646 FY12: \$737,638

Short description: This is a comprehensive project with many components. Of which, the primary goal is to increase the accuracy and precision juvenile and adult abundance estimates of spring Chinook salmon and steelhead for all populations in the Upper Columbia River.

ISRP recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): Enlisting a well-qualified statistician and other quantitative expertise as well as other experts in PIT tag applications will be necessary. It did not seem that this expertise had yet been identified.

ISRP Comments: This proposal describes work that will be very useful in characterizing the population status of upper Columbia Chinook and steelhead. It seems well integrated into the ISEMP M&E effort, and it will also help describe the status of wild production and hatchery survival. The work is consistent with efforts of the UCRTT to improve RM&E methodologies and outputs. A few more details about the quantitative and statistical methods for some work elements would have been helpful, but overall the project is scientifically justified.

The needs as outlined in the existing objectives are well articulated in clear language by the proponents. Many aspects of this project, however, seem to require well-developed quantitative skills, statistical skills, and other specialized skills related to PIT tagging arrays. Overall, the resumes of the personnel do not seem to indicate the necessary quantitative and statistical backgrounds to adequately implement, or even necessarily evaluate efforts on, some of the more quantitative objectives. The enlisting of a well-qualified statistician and other quantitative expertise as well as other experts in PIT tag applications will be necessary. It did not seem that this expertise had yet been identified. It might have been beneficial to have such expertise in on the proposal itself. This expertise should be enlisted at the earliest possible time, e.g., to critically evaluate past studies that lead to the need for this effort and to complete a design for locating the arrays. Is the statistician a WDFW statistician or an outside contract person? The proposal is unclear on this point.

Similarly, the roles of NMFS and other specialist in the development of an “automated analytical tool for data collected at in-stream PIT tag interrogation systems” (Objective 3) are not clear. There does not seem to be the expertise listed in the proposal to deal with this objective. Should the PIT tag analytical tool be developed by PITAGIS, i.e., at a more centralized site (than in this regional proposal) and coordinated more broadly in the basin.

The objective related to spawning ground surveys will fill an identified gap in the Okanogan Basin.

The proposal is directed toward several specific objectives necessary for improving precision and accuracy of estimates. However the proponents are also aiming at RPAs 56.1, 57.1, 57.4 - "tributary or in some cases reach specific migration patterns, survival rates, residence time, and limiting factors could be assessed in relationship to habitat restoration actions." The proposal would be improved by more coordination with habitat restoration projects in the subbasins they propose to work in. The installation of all this technology could be helpful to habitat restoration evaluation.

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

The proposal is technically well justified, adequately linked to the BiOp's RPAs for the upper Columbia, subbasin plans, and well integrated into existing Chinook and steelhead monitoring efforts in the eastern Cascade Mountains. The close connection to ISEMP (some parts of this project were actually designed by ISEMP staff) is beneficial. The proposed work is significant because of the proponents' need to understand the variance of smolt trap population estimates, improve spawning ground population estimates and document migration routes of steelhead and Chinook.

Working relationships are stated to be good, and the proponents claim there is good coordination already. The Colville Confederated Tribes will be the lead agency in the Okanogan. Does that mean that WDFW will be the lead agency for the other three basins—the Wenatchee, Entiat, and Methow?

There does seem to be overlap between this project and 201002800 (Rotating Panel) and possibly others in this package. It would be helpful to clarify that such overlaps do not exist. Is there adequate communication and working relationships among the various proponents in various sub-basins testing the use of “rotating panels” (i.e., a design of trapping smaller tributaries on a rotational basis) to improve steelhead escapement estimates?

This is a new project, but it obviously builds on previous work.

2. Objectives, Work Elements, and Methods

The objectives and work elements seemed reasonable and none involved untried technologies or untested field methods. Work elements for each of the seven objectives are summarized in a series of tables. While these tables and the supporting text do a good job of describing what would be done, in some cases few details were given regarding how the work would be done, by whom, and over what periods in the field. The tasks in support of Objective 5 (estimate observer efficiency...) were adequately described, however.

Objective 1 Develop variance estimates for smolt abundance estimates

This objective is narrowly defined around variance estimates for individual abundance estimates. This is a valid, important objective to meet. Although there is no component of this study aimed at assessing whether the smolt sampling arrays in the various rivers adequately cover the basins,

this is also an important aspect affecting the overall abundance estimates and the usefulness of the data. It might be, as a minimum, worthwhile for the statistician to look at how adequacies or inadequacies in the overall array might affect overall abundance estimates in the Upper Columbia in relation to variance of individual estimates investigated in this proposed work.

The proposal would be improved by more details on the existing smolt abundance estimates and how they are determined and compared. What is "our current method" (3rd line from bottom, page 2)? "The current method to calculate variance produces high variance estimates, despite good results for (e.g., $r^2 > 0.7$) estimates of trap efficiency" (mid page 2). What is being correlated? More background information on the specifics of statistical adequacies and inadequacies would make the proposal more convincing.

Objective 2 Estimate the proportion of hatchery steelhead on the spawning grounds

The abstract mentions that this project will build on recent advances in PIT tag technology. The proposal would be improved by inclusion of details on what these advances are. Additional details on where the "additional PIT temporary and permanent arrays" are to be located would also be helpful. How many arrays are needed to complete coverage? Is this a statistical question or is it simply a matter of having an array at the mouth of every tributary where steelhead spawn? Or are they the designated minor spawning aggregations, as mentioned in 201002800?

On page 3, relative to this objective, the following statement is made: "*While radio telemetry may provide information on distribution and origin composition in the short term (RPA 50.4), it can also be used to verify PIT tag estimates will be used in the long term.*" This sentence should be re-worded for clarity.

The proposed work should assist resolution of the major issue of multiple counts of the same spawner, i.e. "As a result, both wild and hatchery steelhead may be counted in one of more non-natal tributaries prior to spawning which would introduce a positive bias in abundance estimates." On page 13, the text should presumably read "in one *or* more non-natal..."

Objective 3 Develop an automated analytical tool for data collected at in-stream PIT tag interrogation systems.

It is not clear why this tool is not being developed by PTAGIS directly as it clearly has application beyond the boundaries and scope of the present proponents. There may be some definite advantages in having this objective addressed at a more centralized site and coordinated broadly in the basin rather than in this proposal. It would be worthwhile for the proponents to explain the rationale for retaining this particular objective in this proposal.

Objective 4. Estimate the accuracy of steelhead spawning grounds surveys in the Upper Columbia Basin

There is significant overlap between this proposal and 201002800 (Rotating panel on small tributaries of the Tucannon and Snake Rivers.) Has there been communication between the proponents? Or is the work so habitat specific that it has to be done independently in the various sub-basins?

Objectives 5 Estimate observer efficiency in conducting redd surveys and calculate a variance estimate for selected tributaries

Again, there is significant overlap between this proposal and 201002800 (Rotating panel on small tributaries of the Tucannon and Snake Rivers). Has there been communication between the proponents? Or is the work so habitat specific that it has to be done independently in the various sub-basins?

Objective 7 Estimate the annual abundance and age composition of wild and hatchery steelhead upstream of Priest Rapids Dam

In the proposal, “systematic sampling of the steelhead migrating pass Priest Rapids Dam would be conducted on a weekly basis (Tuesday and Thursday) throughout the run (July – October). The results would then be expanded. Overall, this proposal deals with issues of accuracy and precision. However, this sampling design (two days in seven, and only one day apart (Tuesday and Thursday)) for this last objective gives the appearance of being designed more for sampling convenience than for accuracy and precision. What information is available that the proposed sampling design is the best choice and that it will yield the desired accuracy and precision?

Results will feed into ISEMP and other regional data bases. The proponents do not promise annual reporting or journal papers but presumably data obtained in the study will be generally accessible.

199801600 - Salmonid Productivity, Escapement, Trend, and Habitat Monitoring in the John Day River Subbasin

Project proponent: ODFW

Province: Columbia Plateau **Subbasin:** John Day

Budgets: FY10: \$200,571 FY11: \$1,165,975 FY12: \$1,223,075

Short description: Research monitoring and evaluation project that monitors anadromous salmonid population status and trends in life-stage abundance, survival, and distribution and status and trend in their habitats.

ISRP recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): There are several questions that the proponents need to address as they finalize their statement of work (the ISRP does not need a response). Most notably, the following need to be clarified: the procedure for sample site selection, whether analyses of habitat data will distinguish sites where habitat enhancement has occurred from those where it has not, and analytical issues related to pool visibility ranking.

ISRP comments: This project has a good track record and is managed by qualified scientists. It will contribute useful information for managing adaptively within the John Day subbasin.

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

The technical justification and scientific background was reasonably thorough. There appear to be two major topic areas in this work. First, there is evidence that straying of hatchery Chinook salmon and steelhead into the John Day River system is adding to the difficulty of determining the status and trends of naturally produced fish in this (primarily) wild fish production subbasin, and there is the possibility that interbreeding of wild and hatchery fish may be contributing to a loss of fitness among naturally spawning and rearing stocks. This project proposes to extend the existing genetic monitoring program to further assess the significance of straying of Chinook and steelhead from hatcheries in other subbasins into the John Day River's natural production areas. Second, the project proposes to expand the aquatic and riparian habitat status and trend monitoring efforts. This is of interest because of the strong emphasis on habitat restoration in the John Day subbasin.

The project is consistent with a number of RPAs in the BiOp and with other programmatic emphasis areas in the region. The approach is clearly spelled out, and the ISRP appreciates that the project proponents have responded directly to our suggestions from previous reviews and incorporated them into this plan. The proposal references specific recommendations from the RPA workshop and identifies the RPAs in the BiOp that the work will address. Additional linkages are given to the John Day subbasin plan and to the Council's Fish & Wildlife Program.

The 2008 FCRPS BiOp identified the Upper John Day as a priority subbasin for recovery of the Mid-Columbia steelhead DPS. The John Day River is an important reference subbasin for comparisons to other anadromous stocks in more highly impacted subbasins of the Columbia River. Further, the John Day is unique among Columbia River subbasins because its Chinook and steelhead populations have had little influence from hatchery introductions. The project, initiated in 1998, is one of the more extensive monitoring and evaluation programs in the Columbia River Basin. The proposed work is consistent with the monitoring needs identified by the Columbia River Basin Fish and Wildlife Program, the BiOp, and the Oregon Plan for Salmon and Watersheds. The project also directly addresses several important needs specified in the John Day Subbasin Plan.

2. Project History and Results

The project's history is thoroughly described, including tables summarizing results of the previous nine years of work in this project. The maps were very helpful, although most of the material referred to existing redd count, adult holding areas, and genetic sampling. It would also have been useful to have included maps or tables describing the locations of significant habitat restoration projects (perhaps by category, if available) and sites where there are records of juvenile salmonid presence-absence or abundance, because these are included in this project's objectives.

The project has generated much information on smolt production and adult escapement. The discussion of results could have been improved if the proponents would have discussed how the results to date have influenced management decisions. For example, what useful information was derived from the stock-recruitment relationship?

3. Objectives, Work Elements, and Methods

The objectives and work elements are generally complete and appropriate. Several questions did arise in reviewing this section:

- 1) Obj. 1 Are 4000 PIT tags enough to estimate SAR given the relatively few adults that will be produced from this number of smolts?
- 2) Obj. 1 Is a 100% detection of PIT tagged adults at the FCRPS PIT tag facilities a reasonable assumption?
- 3) Obj. 2 How does one obtain cost-free flight time for redd surveys?
- 4) Obj. 4 If habitat assessments are conducted only on channels 5th order and smaller, will some areas potentially used by Chinook for spawning or rearing be excluded?
- 5) Obj. 4 Ignoring fast-water habitat when snorkeling could lead to some error in estimating abundance if a substantial proportion of the populations using fast-water habitat. This is not likely to be a problem for Chinook but could be for steelhead. Could several fast-water habitats in each sample area be electro-fished to address this problem?

The two elements for which Fast-Track review were requested (Chinook portion of Obj. 2 and Obj. 6) were very complete.

Three of the five work objectives apply to ongoing efforts by the project's proponents, and two objectives (habitat status and trends, juvenile salmonid monitoring) have been called for by the ISRP but not yet funded. The objective of operating the rotary screw traps from October 1 to May 31 is admirable, but mechanical problems, weather-related issues, and other unforeseen problems will inevitably occur. It would be useful to state what back-up equipment and procedures are in place to deal with such events.

The spawner escapement estimation procedures were thoroughly described, and the project proponents have a lot of experience in this aspect of the work effort. It was nice to see that the proposed 2010 surveys will include some randomly selected reaches to check for Chinook salmon spawning range expansions. The ISRP wonders if any research has been done to determine the error rate for identifying hatchery fish based on adipose fin clipping in the John Day or nearby subbasins. What is the probability of mis-identifying a hatchery fish with an imperfect adipose clip, or a wild fish that has lost part of its adipose fin?

The location of the habitat survey sites will be determined by a GRTS (EMAP-type) randomized design. While there will be some inevitable compromises due to landowner access issues, we wonder if there is any value in intentionally locating some of the habitat survey sites at (1) the same locations as the spawning index sites or the juvenile survey reaches, or (2) within or near

riparian or channel restoration projects. We agree that the GRTS approach is appropriate for assessing overall habitat status and trends within the subbasin, but additional and very useful information might be gained by co-locating the habitat survey sites with sites where fish will be censused either as spawners or juveniles.

Within the list of habitat attributes, we recommend expanding the surveys of large trees (>0.5 m DBH) to all species, not just conifers. Owing to past logging practices and wildfire history there are very few conifers of this size within 30 m of the stream channel throughout much of the John Day subbasin, but there are other species (in particular, black cottonwood) that meet this size criterion. While it is true that cottonwood will not persist as long in the streams, it is currently the best candidate for LWD recruitment.

To estimate escapement of Chinook and steelhead from redd counts, the proponents propose to use data on fish/redd from another subbasin. This approach seems reasonable given that weirs are not present in the John Day to enumerate the number of adults potentially spawning above the weirs. Why are there no weirs in John Day tributaries?

Steelhead redds will be enumerated in five tributaries thought to support independent populations. From this information subbasin escapement will be estimated. Why not estimate redd densities and escapement for each of the five tributaries (populations) rather than just for the subbasin as a whole? This approach could provide greater resolution and information about redd and escapement levels especially if the tributaries differ significantly in quality and quantity of spawning habitat.

For Objective 3, pertaining to habitat status and trend monitoring, are any of the sample sites likely to be in reaches where restoration activities have taken place? How will data analysis deal with information from both sites where habitat enhancement has been implemented and sites that have not been treated? Will there be an attempt to distinguish between the two in analyses? Water temperature and thermal refugia are not being monitored. Is availability of cool water during summer not a limiting factor in the John Day basin?

For Objective 4, will juvenile sampling be concurrent with habitat sampling? Estimation of juvenile abundance will be based upon snorkel counts of juveniles in pools. Pools will be ranked according to a visibility rating. Pools ranked 0 or 1 (poor visibility, high amount of hiding cover) will not be used in data analysis if the reach also contains pools ranked 2 and/or 3 (moderate to little hiding cover, good visibility). However, if all pools within a reach are ranked < 2, then the pools will be electrofished rather than snorkeled. This could introduce bias because for some reaches pools ranked 0 or 1 (probably the best fish habitat) will be excluded from analysis while in others (electrofished reaches) they will be included and, further, the reach data may not be comparable because two different methods of estimating fish density were employed (snorkel and electrofish). Density estimates of electrofished reaches may be greater than those of snorkeled reaches both because better quality habitat is being sampled and electrofishing may be a more effective way of counting fish. Why not electrofish all reaches and eliminate the potential problem?

4. M&E

The M&E program proposed by this project has been carefully planned and well conducted to this point. The proposed additions to the ongoing M&E effort (Chinook and steelhead escapement, habitat and juvenile monitoring, genetic characterizations) would round out the program and provide much needed additional information. As in the past, the ISRP supports both juvenile and habitat monitoring to identify productive rearing habitats, establish quantitative relationships between habitat quantity and quality and juvenile abundance and distribution, quantify limiting factors for juvenile survival, and guide habitat enhancement actions.

201002600 - Chinook and Steelhead Genotyping for Genetic Stock Identification (GSI) at Lower Granite Dam

Project proponent: IDFG

Province: Mainstem on the ground/Multiprovince **Subbasin:** Mainstem on the ground/Multiprovince

Budgets: FY10: \$865,858 FY11: \$669,448 FY12: \$669,448

Short description: This proposal seeks funding to continue the development and implementation of GSI methodologies within the Snake River basin for wild Chinook salmon and steelhead passing Lower Granite Dam.

ISRP recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): Several qualifications are identified that can be addressed in contracting and future proposals.

1. While the general methodology for GSI is established and applicable to analyzing the mixture of salmon and steelhead that cross Lower Granite Dam, the analytical framework for including this information in status and trends analysis and reporting for steelhead and Chinook salmon are not provided.

From the ISS, ISMES, and Idaho Natural Production proposals it is clear that monitoring abundance and productivity for populations, MPGs, and the ESU will involve intensive fish-in/fish-out assessment, extensive assessment (by snorkel survey for steelhead), and the GSI information from Lower Granite Dam. What is not yet summarized is how these different sorts of data will be combined to perform a viability assessment to evaluate improvements required by the BiOp and for ESA delisting.

The rationale for sampling 2000 individuals at LGD needs to be justified.

2. This project depends on 201003100 being funded, and SNP development by 200890700—it's essentially a sub-objective of proposal 201003100. There are an increasing number of proposals to estimate important population metrics using genetic methodologies. It would be useful to consider ways to integrate and coordinate these projects in the future. Council and BPA should

consider developing an umbrella proposal covering the full set of similar genetics projects that clearly identifies the responsibilities of the individual projects.

ISRP comments: The proponent proposes to use single nucleotide polymorphism (SNPs) based genetic stock identification (GSI) for establishing the composition of various Snake River salmon and steelhead populations passing the Lower Granite Dam (LGD). Based on suites of genetic characters, GSI models the most likely composition of populations contributing to the fish passing. The modeling methods have a long history and this proposal builds on these to fit an advertised need to better estimate salmon populations in the Snake River basin. This methodology can be applied at Lower Granite Dam to evaluate populations that may not be amendable to analysis by PIT tagging.

The proposed project has the potential to provide important data to understand the life-history and population dynamics of Snake River steelhead and Chinook salmon.

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

This project will develop (and test) standardized SNP baselines for fine-scale GSI of Snake R. Basin stocks as adults migrate past Lower Granite Dam (LGD).

The general explanation of life history variation in steelhead in the Snake River basin, and justification that a GSI approach can contribute to estimating abundance of MPGs and reporting groups (aggregates of spawning tributaries) is well summarized. Estimates of population components crossing LGD for one year are included in the problem statement.

The project is greatly interdependent, in part, on project #201003100 which creates the reference baseline used to decompose the population mixture.

The proposed project is consistent with BiOp RPAs, the regional monitoring strategy, and recommendations in the ISRP/AB tagging report. This and related projects provide an alternative tool for mark and recapture (referenced in our tagging report Section A.6 pp. 67-73).

The project relationships are summarized and appear extensive. This project will use fish collected by other projects, and these are adequately summarized. At least a portion of the SNP development effort will involve collaboration with the Hagerman Laboratory operated by CRITFC, specifically project 200890700 *Genetic Assessment of Columbia River Stocks*, that will be using GSI to estimate stock proportions at Bonneville Dam. Section I. Key Personnel indicates that the CRITFC lab will be a subcontractor to develop SNPs and genotype fish. Geneticists throughout the Pacific Northwest have collaborated on development of microsatellite gene markers and standardized genes, alleles, and methods of analysis. The collaboration on SNP development and standardization of genotyping and analysis platforms is appropriate. The ISRP does believe a more thorough clarification of the roles of the different projects in the field, laboratory, and analysis is needed.

2. Objectives, Work Elements, and Methods

The objectives are straight forward and build on previous or currently proposed work. The methods for developing SNP assays, evaluating the distribution of SNP alleles in Snake basin populations, and establishing the utility of a set of SNPs for both GSI of wild steelhead and Chinook at LGD and Parental Based Tagging of hatchery steelhead are consistent with practices and methods in the discipline.

It is less clear that methodologies for using abundance estimates from LGD, partitioned into reporting groups in VSP analysis for BiOp monitoring and ESA delisting, etc are developed. The rationale for sampling and genotyping 2000 fish at LGD needs to be justified.

201003100 - Snake River Chinook and Steelhead Parental Based Tagging

Project proponent: IDFG / NPT / SBT

Province: Mainstem on the ground/Multiprovince **Subbasin:** Mainstem on the ground/Multiprovince

Budgets: FY10: \$1,702,206 FY11: \$1,701,034 FY12: \$1,058,029

Short description: This proposal requests funds to evaluate a new, dynamic genetic technology (Parentage Based Tagging-PBT) that should be cheaper and more efficient than coded-wire tags for mass marking hatchery steelhead and Chinook salmon in the Snake River basin.

ISRP recommendation: Meets Scientific Review Criteria (Qualified)

Qualification(s): This proposal meets scientific review criteria with three qualifications that can be addressed during contracting:

1. Another “fast track” proposal, BPA # 201002600 “Chinook and steelhead genotyping for genetic stock identification (GSI) at Lower Granite Dam,” is essentially a sub-objective of this proposal. In addition, there is overlap in work elements of both proposals with other ongoing projects involving coordination, development, and application of genetic marker sets in the Columbia/Snake basins (e.g., BPA projects #200890700 and #198909600). As the projects move forward, the Council and BPA should consider developing an umbrella proposal covering the full set of similar genetic work that clearly subdivides the objectives and work elements of individual projects. This would contribute to development of a regional approach to genetic monitoring, evaluation, research, and reporting strategies.
2. Testing of juveniles under objective 4 should be expanded to include an evaluation of juvenile fish from Snake River Basin populations that are likely genetically related to the hatchery stocks, but should not be assigned to hatchery parents. This will improve the proposed assessment of error rates.
3. The high throughputs requirements for analysis of the proposed 16.5K samples per year plus any future samples from fisheries, etc., may quickly overwhelm the system. Given the genetic laboratory's other demands, proponents need to verify that results can be provided in accordance with proposed schedules.

ISRP Comments:

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

The need for the monitoring of hatchery salmon and steelhead performance once released is an essential feature of management obligations to evaluate the efficacy of the artificial production programs in terms of their yields to fisheries and impacts to natural population. The ISAB/ISRP, as well as the Pacific Salmon Commission technical team, recently concluded that Parental Based Tagging (PBT) has the potential to provide important data for cohort analysis of salmon and steelhead populations. The project proponents (IDFG) propose to genotype the entirety of Chinook salmon and steelhead broodstock from 14 Snake River hatcheries to empirically test and validate whether PBT can be used to replace coded-wire tags (CWT) for estimating stock contributions of Snake River steelhead and Chinook salmon to fisheries, run-timing, straying, etc., of adult salmon in the Snake/Columbia River basins.

The technical justification of using PBT as a replacement for CWT-based assessment of hatchery production in harvest, straying, and returns to hatcheries (life-cycle survival) is adequately described. The ISRP notes, however, that successful implementation of PBT will not eliminate all problems associated with CWTs, mass marking, and selective fisheries. For example, there will still be a need to handle and mass mark juvenile hatchery fish with an adipose fin clip or some other highly-visible mark for selective fisheries.

The technological development to bring PBT to pilot scale trial is consistent with the BiOp, Fish and Wildlife Program, and Lower Snake River Compensation Plan. Relationships with other projects in the Basin are sufficiently described, and evidence is provided that the proponents are familiar with other PBT trials in Puget Sound, Washington and the Sacramento River, California. The proposed project involves coordination with the Columbia River Intertribal Fish Commission (CRITFIC) and other Genetics Analysis of Pacific Salmon (GAPS) and Stevan Phelps Allele Nomenclature (SPAN) laboratories to develop a coastwide Single-Nucleotide Polymorphism (SNPS) baseline.

One concern is that the ISRP could not determine whether this proposed project unnecessarily duplicates work already being performed or proposed by other BPA-funded projects. For example, the proposed work is contingent upon the success (efficiency, precision, and accuracy) of efforts associated with BPA Project #200890700, "Genetic Assessment of Columbia River Stocks." Moreover, the project will "identify SNP loci" for Chinook salmon and steelhead. Presumably, BPA Project #200890700 should be far enough along to inform these choices now without significant new work. Finally, the proposed project will not analyze future harvested or escaped (from fishery) Snake River salmon and steelhead except as a test (objective 5). The ISRP does not understand why BPA Proposal No. 201002600: "Chinook and steelhead genotyping for genetic stock identification (GSI) at Lower Granite Dam," which is contingent on the results of this proposed project, was submitted as a separate proposal. As a result, is there unnecessary overlap or duplication of some work elements between the two proposals?

2. Project History and Results

The proposed project is new, but efforts to begin collecting tissue for genetic analysis are already underway, e.g., samples from broodstock at most Snake River hatcheries were obtained in 2008 and 2009. Since this project is closely linked with the CRITFC project developing SNP assays for Columbia River salmon ESUs (BPA Project #200890700), a more detailed description of the number of SNPs identified to date and how many of those have been polymorphic in the populations of interest would have been useful.

3. Objectives, Work Elements, and Methods

The objectives are relatively straightforward. The overall work plan and strategy to collect tissue samples; develop SNPs; identify a SNP panel for both genetic stock identification (GSI) and PBT; and then test that panel using progeny from known populations; and finally cross check with harvested fish that carry CWTs is sound. One difficulty for ISRP reviewers not expert in the field of salmon genetics was that proponents used lots of technical jargon without defining their terminology. In addition, publications and computer software packages were frequently cited for methods without providing a concise summary or explanation of these methods in the proposal.

The ISRP suggests that for objective 4, 157...SNP Genotyping (juveniles) - a number of non-hatchery wild juveniles originating from major population groups (MPGs) or reporting groups should be tested against the parents used to establish the PBT baseline. They should not assign to any of the hatcheries. It was not apparent from the objectives and methods that this testing was included.

One final concern is that the high throughput requirements for analysis of 16.5K samples per year plus any future samples from fisheries, etc., may quickly overwhelm the system. Given the genetic laboratory's other demands, proponents need to verify in contracting that results can be provided in accordance with proposed schedules.

C. Proposals that the Fast-Track component meets criteria but the full proposal needs a response (two proposals)

198909800 - Idaho Supplementation Studies

Project 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 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 recommendation: Meets Scientific Review Criteria (In Part) - Response Requested

ISRP comments: 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 masters 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 (reference?) 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.

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

Project 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 implements the NEOH M&E plan.

ISRP recommendation: Meets Review Criteria (In Part) - Response Requested

ISRP comments: 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.

D. Proposals that need a response

199005500 - Idaho Steelhead Monitoring and Evaluation Studies

Project 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 recommendation: Response Requested

ISRP comments: 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 have 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, 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 (Thurow 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

Project 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 recommendation: Response Requested

ISRP comments: 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, 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.

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.

Project 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 CRB.

ISRP recommendation: Response Requested

ISRP Comments: 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

Project 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 recommendation: Response Requested

ISRP Comments: 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 indication 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)

Project 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 recommendation: Response Requested

ISRP comments: 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)

Project 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 recommendation: Response Requested

ISRP Comments: 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, 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 $V(N_{\text{total}})/(N_{\text{tag}})^2$ 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

Project 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 recommendation: Response Requested

ISRP comments: 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

Project 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 recommendation: Response Requested

ISRP comments: 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.

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