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for the Northwest Power & Conservation Council
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Preliminary Review of Proposals
Submitted for Fiscal Years 2007-2009 Funding through the
Columbia River Basin Fish and Wildlife Program

PART 1. Programmatic Comments

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ISRP Preliminary Review of FY 2007-2009 Proposals

Part 1: Programmatic Comments

Executive summary

This two-part report provides the preliminary comments and recommendations of the Independent Scientific Review Panel and Peer Review Groups (together referred to as ISRP) on 540 proposals submitted for Fiscal Years 2007-2009 funding through the Northwest Power and Conservation Council's Columbia River Basin Fish and Wildlife Program. Part 1 of this report provides comments and recommendations that cut across proposals and the program that were identified by the ISRP during the proposal reviews. Part 2 of the report includes the specific ISRP recommendation and comments on each proposal. The ISRP will provide a final report to the Council by August 31, 2006, following a review of responses to queries regarding certain proposals (see below). Thereafter, the Council will make its funding recommendations to BPA. It is anticipated that the Council's funding recommendations will be made to BPA by October 18, 2006. The ISRP does not make funding decisions; that is the responsibility of the Council and BPA.

In this preliminary review the ISRP, considering the technical merits and potential benefits of each proposal, finds that 218 proposals are fundable or fundable in part (41%), 210 proposals need a response before the ISRP can make its final recommendation (39%), 104 proposals are not fundable (19%), and eight proposals are primarily administrative in nature (1%). Overall, the ISRP continues to see a general improvement in the quality of the proposals and the scientific basis of the Fish and Wildlife Program. However, further directed effort is needed in certain areas especially prioritization of habitat actions, monitoring and evaluation, and reporting of results.

In this preliminary review the ISRP offers the following programmatic recommendations intended to improve the process, program, and projects:

Project and Program Review

- A sequential multi-year provincial review, with potential alterations to more efficiently address program needs through topical and targeted reviews, rather than an annual review, could provide a more meaningful review of individual projects.
 - The ISRP recommends that the Council request an ISRP and ISAB review of habitat restoration strategies and actions in major subbasins on a multi-year rotating basis.
 - The Council should rely on the Three-Step process for the substantive scientific review of artificial production projects.
 - The ISRP continues to recommend an annual innovative proposal solicitation. Special topic solicitations should be developed as targeted requests for proposals.

- o Smolt monitoring, PIT-tag, radio telemetry, coded wire tag, and sonic tag projects should undergo a comprehensive programmatic review that addresses the complex interactions between projects.
- To improve the scientific justification for proposals, education and outreach should be made available for proposal writers and sponsors.

Monitoring and Evaluation

- Projects should be required to report results at specific milestones as a condition for continued funding. Future proposals and the BPA database should be linked to enable reporting of biological results in addition to task completion.
- The ISRP suggests establishment of a statistical support facility to provide input for the projects that have limited statistical expertise. The facility would answer questions about design and analysis and provide workshops on statistical topics of common interest in the Program.

Artificial Production

- The ISRP recommends that the Council issue an RFP to develop methods to evaluate the effects of large-scale artificial production programs for harvest on the abundance, productivity, and diversity of naturally spawning salmon populations. Additionally, the ISRP recommends the Council issue an RFP to conduct an experiment on the effects of supplementation on long-term fitness.

Habitat

- The Habitat Evaluation Procedure (HEP) should be used only as an initial scoring system for the mitigation agreements that underlie the Wildlife Program.
- The ISRP recommends the Council pay close attention to the implementation of dam removals in the Columbia Basin and ensure, perhaps through targeted RFPs, that dam decommissioning and post-removal effects are properly monitored.
- The Council should consider using the Columbia Basin Water Transaction Program's criteria to evaluate proposals for improving irrigation system efficiency to preserve instream flow.
- The Council should encourage innovative ecosystem-based research and monitoring in the estuary, with emphasis on the effects of hydrosystem operations on all components of the estuarine ecosystem.

I. Introduction

The ISRP Review Process

The ISRP reviews are based on criteria provided in the 1996 amendment to the Northwest Power Act. The amended Act directs the ISRP to review projects for consistency with the Council's program and whether they:

1. are based on sound science principles;
2. benefit fish and wildlife;
3. have clearly defined objectives and outcomes; and
4. have provisions for monitoring and evaluation of results.

Pursuant to the 1996 amendment, the Council must fully consider ISRP recommendations when making its recommendations regarding funding, and provide an explanation in writing where its recommendations diverge from those of the ISRP.

The ISRP's preliminary and final reports provide written recommendations and comments reflecting the consensus of the ISRP on each proposal that is amenable to scientific review. To develop preliminary recommendations the ISRP uses a multi-step review process.

1. The ISRP was assisted in these reviews by the Peer Review Group (PRG), a team of equally qualified reviewers engaged as needed to complement the ISRP efforts. Many of the PRG members are former ISRP members. The ISRP organized review teams by topic (artificial production, wildlife, mainstem, etc.) and geography (province and subbasin). Three reviewers with appropriate expertise were assigned to independently review each proposal and provide written evaluation using the ISRP review criteria evaluation form. This form is based on the 1996 amendment criteria and was provided in the solicitation packet for sponsors to address the criteria as they developed their proposals.

2. Individual comments were compiled and review teams met to discuss individual reviews and develop a consensus recommendation for each proposal. Following the meeting, individual and meeting comments were synthesized into a consensus statement on each proposal, which was verified by each of the three reviewers. Individual review comments and records of discussions are confidential and not available outside the ISRP review teams.

3. When all proposals had been reviewed, the ISRP met to discuss programmatic issues and to ensure consistent reviews across teams. The full group of ISRP and PRG reviewers evaluated and edited draft recommendations to produce this preliminary report.

Release of Preliminary Report for Response Loop and Public Comment

This preliminary report is released and posted on the web for public comment. The ISRP subsequently reviews responses from sponsors of projects identified as eligible for the response review. Eligible projects include those projects that the ISRP recommended as "response requested" and that are prioritized by provincial and mainstem/systemwide

groups or specifically identified by the Council as part of the Council's project selection process. The Council is not asking sponsors of projects to use the general comment opportunity to respond to the ISRP's review of individual project(s). Rather, during the week of June 19th, 2006, the Council will post a notice identifying which projects may respond to the ISRP review as part of the project response phase. The Council will also provide guidance on the form of the project responses sought with that notice. For instructions on the response loop, the public comment period, and project selection process in general see www.nwcouncil.org/fw/budget/2007. The ISRP will follow the same review steps used for the preliminary review to complete the response review.

Recommendation Categories: Who Needs to Respond?

Preliminary recommendations and comments are provided for 540 proposals. These recommendations are split into three basic categories:

1. Fundable, including fundable (qualified) and fundable in part. Further ISRP response review is not needed (218 proposals);
2. A response is requested before the ISRP can make its final recommendation (210 proposals);
3. Not fundable, a response is not needed to make a final recommendation (104 proposals).

These categories are described in detail below.

1. Fundable is assigned to a proposal that substantially meets each of the ISRP criteria. Each proposal does not have to contain tasks that independently meet each of the criteria but can be an integral part of a program that provides the necessary elements. For example, a habitat restoration project may use data from a separate monitoring and evaluation project to measure results as long as such proposals clearly demonstrate this integration. Unless otherwise indicated, a "fundable" recommendation is not an indication of the ISRP's view on the priority of the proposal, nor an endorsement to fund the proposal, but rather reflects its scientific merit and compatibility with Program goals. Although the ISRP's comments may include suggestions to improve the proposal, *a response to the ISRP is not needed.*

Fundable (Qualified) is assigned to "fundable" proposals that require clarifications and adjustments to methods and objectives by the sponsor. Although some of the ISRP's comments may be similar to those found in proposals for which the ISRP requests a response, the ISRP finds that overall the proposal is sufficiently justified to not require a response review. The ISRP expects that required changes to a proposal will be determined by the Council and BPA in consultation with the project sponsor in the final project selection process. The ISRP also uses "fundable qualified" for proposals that are technically sound but appear to offer marginal or very uncertain benefits to fish and wildlife. The ISRP expects that, if a proposal is funded, in subsequent proposals the project sponsors will address the ISRP's comments. *A response to the ISRP is not needed.*

Fundable in Part is assigned to a proposal that includes both work that is scientifically supported and work that is not. The ISRP specifies which elements are not scientifically sound and recommends that these not be funded. Examples are proposals that include objectives that are not scientifically supported, for instance, a proposal for both background assessment work and concurrent major on-the-ground implementation that could not be supported before results of the assessment were known, or proposals that included use of unsound methods to meet a particular objective. “Fundable in part” is also used for proposals that are justified for a portion of the three years (FY07-09) but would benefit from an interim review within those years, for example, a proof of principle research project for which methods need to be tested at a pilot level before full implementation. *A response to the ISRP is not needed. Required changes to a proposal will be determined by the Council and BPA in consultation with the project sponsors in the final project selection process.*

2. Response Requested is used when a proposal requires a response on specific issues before the ISRP can make its final recommendation. Responses should focus on the technical comments, answer all review questions, and clarify requested information. Responses should be formatted to address ISRP comments point by point, clearly identifying or repeating each concern/question and providing a response. In some cases, project sponsors should revise their proposals. In this category, the ISRP assumes that if a local group does not prioritize the proposal, it will not be eligible for an ISRP response review unless specifically recommended by the Council. *Only proposals that are 1) labeled response requested and 2) are prioritized by a local/provincial group and/or are identified by the Council as eligible for a response need to respond to the ISRP. During the week of June 19th, 2006, the Council will post a notice identifying which projects may respond to the ISRP review as part of the project response phase.*

3. Not Fundable is assigned to proposals that are significantly deficient in one or more of the ISRP review criteria. One example is a proposal for an ongoing project that may offer benefits to fish but does not include provisions for monitoring and evaluation or report past results. Another example is a research proposal that is technically sound but does not offer benefits to fish and wildlife because it substantially duplicates past efforts or is not sufficiently linked to management actions. In most cases, proposals that receive “Not Fundable” recommendations lack detailed methods or provision for monitoring and evaluation, and some propose actions that have the potential for significant deleterious effects on fish or wildlife. In some cases, a proposal provides so little information that the ISRP cannot conduct a scientific review. To allow a response would be unfair to other proposals and would undermine the project selection process. The ISRP notes that numerous “not fundable” projects propose needed actions or are an integral part of a watershed effort, but the proposed means or approaches are not scientifically sound. In some cases, an RFP is warranted to address the needed action. *A response to the ISRP is not needed.*

4. Administrative is assigned to coordination proposals that are not amenable to scientific review but need to be grouped with other projects that require scientific review. The proposals should make clear how they relate to the on-the-ground projects. Such proposals are theoretically reviewable, but most do not provide adequate details on coordination methods or results. There is a need to clearly define outcomes for these projects to allow for an evaluation of their efforts. Atypical proposals, such as developing a subbasin plan in a currently unplanned subbasin, may also be categorized as administrative in that they require a policy decision from the Council as to their eligibility for funding. *A response to the ISRP is not needed.*

Final Report

The ISRP will review the responses using the same process as in the first review and provide a second and final report to the Council by August 31, 2006. Thereafter, the Council will make its funding recommendations to BPA. It is anticipated that the Council's funding recommendations will be made to BPA by October 18, 2006.

For final recommendations, the ISRP uses "fundable," "not fundable," and variations to summarize the extent to which a proposal meets the ISRP review criteria and to capture the level of ISRP confidence in a proposal. The ISRP does not make funding decisions. That is the responsibility of the Council and BPA.

II. ISRP Programmatic Comments

1. The Project Selection Process

The ISRP understands the rationale for undertaking this review of all new and ongoing projects in a solicitation for Fiscal Years 2007-09 funding. This solicitation allows the region to put the subbasin plans to immediate use, to review ongoing projects after several years without scientific review, and to enable a prioritization of all proposals across the basin at one time. This also provides the opportunity to look at the entire program, identify trends in strategies, gaps in implementation, and opportunities for efficiency. Despite these opportunities, the ISRP emphasizes the need to pursue alternative review paths in the future.

As noted in the Retrospective Report (excerpt below), review of such a large number of proposals in a short time precludes the more detailed review that is necessary if a substantive and formative scientific review is to be achieved. Reviewers expressed strong opposition to repeating a single basinwide solicitation resulting in simultaneous submission of all planned project proposals. The ISRP recommends devising a rolling review process that is staggered over several years, acknowledges the need to review ongoing and new work differently, and that includes opportunity for project sponsors and the ISRP to interact through site visits and presentations.

From the Retrospective Report:

In the FY 1999, FY 2000, and provincial reviews, the ISRP noted that it barely had time to adequately review proposals for technical quality and provide constructive comments and a consistent level of review across projects. Reviewing the approximately 400 proposals in both the FY 1999 and FY 2000 cycles ...left little time ...[for] review of proposals across topical areas, and identification and description of broader scale programmatic issues, emerging scientific issues, and strategic planning (ISRP 2005-14 Retro pp 17, 136).

The benefits of the 2001-2003 provincial review process were manifold and bear repeating: 1) the ISRP gained an unprecedented level of understanding of individual projects and of the Fish and Wildlife Program; and 2) project sponsors were supportive of the process, which they saw as fair and equitable as it gave them opportunities in the site visits and presentations to make certain that the ISRP accurately understood their projects and concerns. A consequence of this systematic and measured review approach was that project sponsors were generally accepting of the ISRP review results, even when proposals did not fare particularly well. Often project sponsors had the opportunity to address ISRP concerns through the “fix-it” loop process.

Recommendation: The ISRP recommends that future review processes be sequential multi-year provincial reviews, with potential alterations to more efficiently address program needs through topical (e.g., wildlife operations and maintenance, individual species) and targeted (innovative methods, research gaps, priority habitat actions) reviews.

Additional rationale for this recommendation is provided below regarding review of large projects/programs, Three-Step Reviews, and fairness.

1.1 Review Process for Large Projects/Programs

Some of the larger proposals like the Yakima Klickitat Fisheries Program (YKFP) are so complex that the present review process is not adequate. These programs often have complex cost/task sharing among sponsors such as the state and tribe, e.g., trying to separate the Klickitat and Yakima components and the Yakama Nation and Washington Department of Fish and Wildlife (WDFW) projects bogs down the scientific review. Another example is the Umatilla collection of proposals that contain an inter-dependent mix of instream flow, artificial production, and monitoring and evaluation activities by the Confederated Tribes of the Umatilla Indian Reservation, the Oregon Department of Fisheries and Wildlife (ODFW), and others. Explicit description of how the various projects share information and resources are needed. Are projects working together in the most efficient manner? Are overhead costs redundant? These difficulties obscure the scientific issues.

Projects/programs such as this should be separated from the standard proposal review process and reviewed in more depth, including site visits and presentations. The YKFP has an annual review meeting; attendance by reviewers at meetings such as these would benefit the review. The next Fish and Wildlife Program review process might be organized around sequential reviews of major programs with one of the end goals to see

how the projects in sum address an uncertainty or a subbasin plan. The ISRP can work with Council to identify appropriate groups of proposals to treat as a program. For habitat efforts, the review of programs should be linked to the intensively monitored watershed effort.

1.2 Three-Step Reviews and FY07-09 proposals

Reviewers had some questions dealing with the artificial production projects that are part of the FY07-09 review, but also subject to the Council's Three-Step review. There is a risk of inconsistency between Three-Step and proposal reviews. The Three-Step process is generally more comprehensive. Also, in practice, out-year funding is conditioned on the results of the Three-Step process.

Recommendation: The ISRP recommends that the Council rely on the Three-Step process for the ISRP's substantive scientific review of artificial production projects.

1.3 Innovative Projects Solicitation

The ISRP continues to recommend that the Council have a specific innovative projects solicitation. Innovative projects can address unexplored research uncertainties or unknown new technologies, possibly leading to future management applications. Past innovative projects such as the ocean-tracking proposal (POST), the habitat effectiveness evaluation project (ESSA), and nutrient supplementation efforts have benefited the program. Specifically, the retrospective review by ESSA Technologies (Marmorek et al. 2004; *Innovative Project 34008*) of past habitat improvement actions and their effect on salmon survival and abundance led directly to recommendations on data needs and to coordination among projects that are currently being addressed by the developing Research, Monitoring, and Evaluation plan.

Some proposals with innovative elements were submitted in this solicitation, but the ISRP does not yet know how these projects will fare in the management prioritization. The ISRP intends to evaluate this in the final report. An example of an innovative approach to addressing salmon survival is exploring the alteration of emergence time of fall Chinook by modifying egg pocket water temperature (proposal 200727300: *Evaluate the effects of hyporheic exchange on egg pocket water temperature in Snake River fall Chinook salmon spawning areas*) and an innovative technology is employing DNA micro arrays to evaluate differences in gene expression between hatchery and wild salmon (proposal 200711000: *Differences in functional genes between hatchery and wild Chinook salmon*)

Recommendation: The ISRP's Retrospective Report recommended budgeting for an annual innovative proposal solicitation. The ISRP also recommended that special topic solicitations, such as nutrient supplementation, should be developed as targeted requests for proposals. The ISRP continues to support this approach.

1.4 Fairness

The ISRP recognized several fairness issues when review of ongoing and new projects is mixed:

- Ongoing project sponsors use existing project funds to complete proposals, which are justified because ongoing projects need to describe the results of their funded activities. But a new project sponsor, especially those outside the agencies, must fund development of proposals with their own resources.
- Innovative projects methods are made public, potentially compromising intellectual property rights.
- The response loop can give advantages to proposals that weren't as strong at submittal.

These issues argue for the Council to pursue a multi-process/solicitation approach that includes separate review of ongoing/O&M/base programs and targeted competitive solicitations for new projects (or essentially new proposals in ongoing projects), including perhaps a confidential innovative solicitation.

1.5 Project Tracking: PISCES

The ISRP commends BPA and the Council for its work on developing a database (PISCES) and proposal form where work elements (tasks) can be tracked from proposal through BPA statement of work. This will facilitate a more effective comparison of what components of a proposal were found technically justified by the ISRP, prioritized by local groups, recommended by the Council, and funded by BPA. Some reviewers, however, found that projects' complicated organization of objectives and work elements resulted in proposals with confusing relationships between tasks for different objectives. The ISRP can work with BPA and the Council on further refining the proposal format for subsequent solicitations. The IEAB has reviewed the PISCES database for its potential contribution to cost-effectiveness analysis and cost-benchmarking, and has made recommendations to the Council on ways to improve its usefulness (IEAB Task 105).

Recommendation: The ISRP recommends that future proposals and BPA's database be linked to emphasize reporting of data and biological results, in addition to task completion. Projects should be required to report results at specific milestones as a condition for continued funding.

2.0 Proposal Quality and Content

The proposal form has two parts -- an administrative/budget form and a narrative. The narrative format was developed, with assistance from the ISRP, to provide the information needed to evaluate proposals by the ISRP review criteria. The instructions stated that the ISRP would review proposals as stand-alone documents. Relevance to a subbasin plan, results from annual reports and findings from peer-reviewed papers were

to be summarized and cited in the proposal. The ISRP was not expected to find justification for the proposal outside the proposal itself, e.g. by searching for papers on the Web.

2.1 Overall Proposal Quality and Content

Reviewers believe that the overall quality of the proposals is vastly improved from earlier solicitations. However, there remain significant problems in presentation of adequate detail for methods and for monitoring and evaluation (M&E). Many proposals still lack specific M&E plans, and many with stated ongoing M&E continue to exclude substantive results and data analysis by which progress could be judged. These deficiencies limit the scientific review that is possible and create significant accountability problems for ongoing projects and the Fish and Wildlife Program in general. The ISRP believes it is essential that projects be required to report evaluative data analysis to justify project continuation.

2.2 Relationship of the FWP, Subbasin Plan, or Recovery Plans/BiOp to Projects

In general, the scientific justification for proposals has improved from that of earlier proposals. Most made reference to subbasin plan assessments. This is an improvement over what was noted in the Retrospective Report.

***Justification.** Many project sponsors attempted to justify their projects by citing language in the Fish and Wildlife Program, CBFWA's AIWP, BiOps, or BPA planning documents rather than describing the actual problem or need the proposal would address. While the ISRP agreed it was important that proposed projects be linked to policy measures or directives in the Council's Fish and Wildlife Program, such linkages even when directly and explicitly stated, did not constitute scientific or technical justification for the proposed work. The sponsor's proposal needed to clearly describe the scientific or technical background, foundation, and justification for the proposed work. (ISRP 2005-14 Retro pp 15, 135)*

Occasionally, it appeared that the justification for a project was to meet legal or administrative requirements rather than limiting factors. This was particularly true of UPA projects that identified BiOp credits for fence miles, riparian enhancement, and similar activities.

The justification for the site of a project was often unclear. Some sponsors appear to be locating projects opportunistically and justifying them with broad strategies, rather than identifying strategies from the subbasin plan and seeking priority locations. This "reverse" approach may preclude benefits of a watershed process perspective. Sponsors need to justify actions based on the priority of their project to potentially benefit focal species and habitats.

Most proposals did not use the assessment portion of the subbasin plan or Ecosystem Diagnosis and Treatment (EDT) analyses to justify their project location. Although the ISRP has been critical of EDT, it does provide a means to link species to the habitat in a standardized manner. Very few proposals utilized results from EDT's scenario builder.

Recommendation: The ISRP recommends that, to facilitate additional progress in developing scientific justification for project site selection, education or outreach should be made available for proposal writers and project sponsors.

Justification for Research and Models

The connection between proposed research and management uncertainties was not always clear. Some proposals are to conduct basic research, which is needed for some topics like life histories of focal species. However, even for the basic research projects, a linkage can and should be made to a management application. An example of a good proposal that linked basic ecological processes with management actions was 20071800 – *Evaluating and prioritizing restoration of riparian habitat for improving in-stream conditions for anadromous salmonids in the Columbia River Basin*.

Also with this solicitation, the ISRP saw an increasing number of proposals that included tasks to develop and use mathematical models, but many didn't describe the model formulas, data sources, or validation of the model.

2.3 Objectives and Results of Ongoing Projects

There continues to be a lack of measurable objectives and adequate monitoring to determine if project objectives were achieved. Recent reports capture these ongoing concerns:

From the Retrospective Report:

Objectives

A common, but critical shortcoming of many proposals was, and continues to be, their failure to articulate objectives in the proper form. Project objectives should be stated in terms of desired outcomes, rather than as statements of methods and tasks. Tasks or strategies should be described in a way that clearly addresses the proposal's objectives. ... The problem is more than a semantic one; objectives give the program a biological benchmark against which to develop a monitoring and evaluation program to gauge the success of strategies.

Results

A proposal for an ongoing project should include a clear interpretive history of the project's past accomplishments, stated in terms of the benefit to fish and wildlife in the basin and the preservation or restoration of self-sustaining ecosystems that maintain fish and wildlife. Biological goals and evaluation criteria should be clearly given, and data and statistical analyses cited in support of results.

A list of tasks accomplished is one step in meeting the requirement for reporting of past accomplishments, but it does not allow evaluation of how well a project is progressing toward the ultimate goal of benefit to fish and wildlife or to the ecosystems that sustain them. Many tasks that are believed to benefit fish or wildlife do not, in fact, do so everywhere, and so some level of evaluation and reporting of outcomes remains necessary for each project. (ISRP 2005-14 Retro pp 15, 135-136)

The ISRP has the impression of a regional perspective of too much M&E, but the ISRP has difficulty evaluating this because so few results were reported, and in general proposals lacked detail on data and data analysis. The program seems to suffer from too many projects making the assumption “we know it’s going to work” when, in fact little is known about the effectiveness of many restoration activities.

Proposals varied widely in the degree of reporting of results, evaluating ongoing activities, and assessing the benefits from past work. An excellent proposal addressing all these elements was *199102900: Research, monitoring, and evaluation of emerging issues and measures to recover the Snake River fall Chinook salmon ESU*. The proposal sets a standard for a concise year-by-year summary along with reports, peer-reviewed publications, and statements of adaptive management implications of investigations. An admirable feature is clear identification of how data will be used to test prevailing assumptions about the state of the resource and of the implications for next steps in developing management options. Most proposals fail to make a clear connection between the studies or actions they propose and future management.

Recommendation: The ISRP strongly recommends that there be a requirement for ongoing projects to summarize results and provide links to annual reports. Emphasis should be on temporal trends for long-term projects. Without linking continued funding to reporting of results, the incentive for ongoing projects to monitor and evaluate is low.

2.4 Use and Dissemination of Information

Many proposals did not report any dissemination of information, and it appears that many or most project data remain only locally available. It would be very valuable for the Program to foster and reward the reporting of results, both positive and negative at a regional level. Establishment of the Columbia River Basin Journal (proposal 200728000) could facilitate this reporting. However, often it is very difficult to get negative results published in a peer review journal; consequently, something intermediate between the Columbia Basin Bulletin and the Columbia River Basin Journal may be needed.

2.5 Examples of Good Proposal Elements

The ISRP identifies the proposals below as containing exemplary elements as an aid to authors developing responses, revising current proposals, and drafting future proposals. Some of these proposals have areas that need improvement, but the elements highlighted are superior.

- *199102900 - Research, monitoring, and evaluation of emerging issues and measures to recover the Snake River fall Chinook salmon ESU*, is an example of a proposal with an appropriate amount of information, not too much or too little. The proposal is especially good at showing and utilizing a clear logic of learning in data collection and analysis of proposed management options. This was a well-prepared proposal to continue a project that has been exceptionally productive and well organized. In many respects it is a model proposal.

- **199603501 - Yakima Reservation Watersheds Project**, is an example of a good habitat proposal with clear links from objectives to methods to M&E. It includes good organization and presentation of past and proposed work. But the ISRP strongly recommends they publish their work.
- **199800200 - Snake River Native Salmonid Assessment**, is an excellent proposal that should serve as a model for proposal writing and reporting results for an ongoing proposal.
- **199404700 Lake Pend Oreille Fishery Recovery Project**, is an example of good proposal to continue an ongoing project. The proposal had good background for both the lake-level work on kokanee spawning and the proposed additional studies to balance kokanee with other species. The sponsors have gained understanding, published their work, and provided annual workshops to maintain good communications.
- **200203700 - Freshwater Mussel Research and Restoration Project**, is an example of a proposal that combines a good background with collated data from previous years and a good summary of past results.
- **199601900 - Technical Management Team (TMT)**, is an example of a good database proposal. This proposal had a strong project history section with an excellent narrative linking actions to results, stating the reasons for and process by which the project has evolved.
- **200715300 - Cardwell Hills Wildlife Mitigation and regional Biodiversity Protection Project**, is a new proposal that is an example of a well justified wildlife habitat acquisition proposal that includes adequate details on monitoring and evaluation.
- **200400200 - PNAMP Funding**, is a good example of a coordination proposal that explains its contribution to a larger effort and goal.

2.6 Improving the Proposal Form

The ISRP identified several ways in which the proposal form could be clarified or re-organized to facilitate a more accurate and efficient review.

- Project personnel should be listed with the percent FTE (Full Time Equivalent) they will commit to the project.
- The rationale section of all proposals should have a specific section that justifies benefits to focal fish, wildlife, and/or habitats.
- Ongoing projects should link directly to their Annual Reports, with a brief summary of biological results included in the proposal.

- There is a need to catalogue, if not submit, proposals with coding that would help reviewers, proponents, contract administrators, and others identify projects by type: for example, operation and maintenance, stock assessment for fisheries management, research, pilot studies, habitat assessment, routine monitoring. The USDA CRIS proposal format provides an example.
- The proposal form needs a separate section on M&E.

The ISRP looks forward to working with the Council and BPA to revise the form for future solicitations.

3.0 Monitoring, and Evaluation

The ISRP finds it difficult to assess the effectiveness of projects in the Fish and Wildlife Program because monitoring and evaluation either is not conducted or, if conducted, is not adequately reported. In general proposals for ongoing projects lacked detail on monitoring conducted, data obtained, results of data analyses, and evaluation. Adaptive management is not possible without sound information provided by effective monitoring and evaluation.

Without effective monitoring projects (and the programs they comprise) have no scientific accountability or credibility. Monitoring should provide data on populations of fish and wildlife, aquatic and terrestrial habitats, and watershed attributes. Data collection followed by mathematical and statistical analyses and careful evaluation and interpretation are required to demonstrate whether or not the Program is reaching its goals. For example, monitoring and evaluation may be used to demonstrate the success of various habitat strategies in order to justify investments and also to increase landowner participation in restoration activities.

The Fish and Wildlife Program is faced with a daunting spectrum of M&E tasks:

- measuring the survival of salmon smolts and adults through the hydrosystem and of wildlife throughout their ranges;
- evaluating whether hatcheries are achieving their stated goals;
- quantifying the effects of harvest and mitigation on natural salmon populations; and
- evaluating changes in the condition of upland and tributary habitats.

The ISRP has recommended that the Columbia River Basin Fish and Wildlife Program would benefit from an integrated monitoring program to address these evaluation needs. The ISRP and Independent Scientific Advisory Board (ISAB) are reviewing the Council's *Draft Guidance on Developing Monitoring and Evaluation as a Program Element of the Fish and Wildlife Program* concurrently with this FY 07-09 solicitation review. Based on the draft, it appears the Program is making progress on the monitoring and evaluation challenge by coordinating efforts within the basin using the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) and the Collaborative Systemwide

Monitoring and Evaluation Project (CSMEP). Other encouraging activities include discussions concerning intensively monitored watersheds (IMWs) to evaluate the effectiveness of habitat improvement actions (e.g. road decommissioning, culvert replacement, riparian fencing.), and employment of probabilistic sampling to obtain data on the status of wildlife and fish populations.

Because many ecosystem processes have large temporal variability, long-term monitoring is sometimes required to evaluate cause-effect relationships. Where this is the case, provision should be made for monitoring over the many years needed to fully understand causal factors. In so doing, the Program can provide the understanding of basin-wide effects and processes that are needed to assure perpetuation of species and habitats over time.

3.1 M&E for Individual Projects

Monitoring and evaluation addresses the essential management questions of how well the project was implemented and whether it succeeded in producing the desired biological response. The ISRP believes that every project should have a monitoring and evaluation component of some sort. However, the characteristics of the monitoring activity depend on the nature of the project. Projects should be designed to provide data to larger scale monitoring and evaluation projects that assess population effects at the watershed or basinwide scale.

Every project should include implementation monitoring of task completion. For example, implementation monitoring may report miles of stream fenced to exclude domestic livestock, number of culverts removed, acres of invasive plants removed, or numbers of fish tagged (see the 2005 Retrospective Report). The reporting of this monitoring activity should include an evaluation of how the tasks accomplished relate to those proposed, as well as an indication of lessons learned that will influence future activities.

All projects should also have some level of monitoring to indicate the biological effect of project activities. For example, how successful was the livestock exclusion, did culvert removal result in fish or redds being observed upstream where they had not been observed before, or what percentage of tagged fish were detected and where? In all cases, an evaluation of the management implications of these preliminary biological effects should be presented. Trend monitoring to determine changes in conditions over time provides an opportunity for very simple monitoring of obvious biological metrics such as spawner surveys or bird counts.

The ISRP strongly supports effectiveness monitoring to determine if the project activities actually resulted in the ultimate biological objectives. The strongest level of evidence for cause-and-effect relationships between management actions and fish, wildlife, or habitat responses comes from manipulative experiments (2005 Retrospective Report).

In summary, individual projects should include some level of physical and/or biological monitoring. A balance between program- and project-specific monitoring needs to be

established. Intensive program-level monitoring is not needed everywhere because efforts like IWM are intended to accomplish this function. Inference from intensive program-level monitoring will not be universally applicable, however. For example, actions such as culvert replacement may work in some areas but not in others, depending on the fish population and status of upstream habitat and ecosystems, so there is a need for some level of project-specific monitoring (short-term before/after census). Individual projects should be able to identify and describe project- and program-level means to evaluate their effectiveness. Proposals need to then identify which elements are being evaluated by the project itself and which elements are being evaluated by other efforts. Finally, results should be reported and, where relevant, compared against bio-standards as was done with the Yakima screens proposals (199503300 and 198506200).

Recommendation: The ISRP suggests establishment of a statistical design and analysis support facility to provide input for the projects that have limited statistical expertise. The facility would answer questions about design and analysis and provide workshops on statistical topics of common interest in the Program.

3.2 Power Analysis and Sample Size

Projects that propose data collection should include specification and justification of sample sizes (i.e., statistical power analysis). Presentation of the confidence level associated with specified size of effects to be detected and the level of confidence associated with estimates of response measures are required. Where insufficient data exist to establish estimates, procedures for determining preliminary values for population sizes, variability, etc. should be included. This is especially true for those projects whose experiments are dealing with extreme uncertainties in sampling, e.g., rare or hard-to-sample fish like cutthroat. One specific problem with many proposals is that there is no justification for the number of individuals to be tagged. This is another area where having a regional team of experts available for consultation could be useful to projects.

3.3 Databases and Data Reporting

There is a need for basic data that is readily accessible through a regional database. Of particular importance now that the subbasin plans form the foundation of the Fish and Wildlife Program is the need for readily accessible data on numbers of adults returning to the subbasins (i.e. escapement estimates). The ISRP emphasizes the importance of standardizing such data collection and storing data that support efforts such as subbasin planning. BPA funded projects should be required to generate data that meet some standard (e.g. PNAMP) and to make these data readily available to the public through the web. The ISRP encourages continued improvement of regional data sharing such as through the Northwest Environmental Data-network (NED).

Recommendation: The ISRP recommends that Council and BPA ensure that data generated by public funds is readily available thoroughly publicly accessible websites.

3.4 Tagging Programs

Coded-wire tag technology might become obsolete in the future, with the advent and success of genetic testing. The coded-wire tag proposal reflects some of this change. The recommendation from the ISRP's Retrospective Report still applies: there should be coordination of all the types of tagging.

A review of past and ongoing acoustic telemetry and PIT tagging projects in the Columbia River Basin would be useful to determine if there is unnecessary expense and duplication of research efforts as a result of competing tagging technologies. A number of projects are using, or have proposed to use, acoustic telemetry to track salmon movements and estimate survival in the Columbia River, estuary, and ocean. For example, Project 200311400 – *Acoustic Tracking for Survival*, which is part of the Pacific Ocean Salmon Tracking (POST) project, is using tags manufactured by VEMCO to track yearling Chinook salmon in the ocean. VEMCO tags were also used in a U.S. Army Corps of Engineers (USACE) study (C. Schreck) to evaluate the survival of barged Snake River salmon in the Columbia River estuary in 2004. Though no longer funded by USACE, Project 200311400 also proposes to continue Schreck's estuarine research as part of its ocean tracking study. JSATS (Juvenile Salmon Acoustic Telemetry System) technology is being used in recent USACE-funded projects (EST-P-02-01 and TPE-W-06-02) to study estuarine survival and alternative transportation of salmon. Project 200500100—*Pilot Study for Research, monitoring, and Evaluation of Subyearling Salmon in Tidal Freshwater of the Columbia River* proposed to use JSATS tags. HTI is another type of acoustic tag technology used by public utility districts to study movements of fish at dams in the Columbia River Basin.

Acoustic tagging technology is expensive, and tags and listening nodes produced by different manufacturers are not comparable or compatible (different tag sizes, signal frequencies/encoding, detection efficiencies, and battery life, etc.). A permanent PIT tag detection system, already in place at federal dams and other locations in the Columbia River Basin, is also being used to study movements and survival.

Recommendation: The ISRP has in the past recommended that Smolt Monitoring, PIT Tag, Radio Telemetry Technology, Coded Wire Tag, and Sonic Tag projects should undergo a comprehensive programmatic review that gives special consideration to the complex interactions between the projects. This review is critical because regulations requiring mass marking of hatchery fish and selective fisheries have significant impacts on the results of the projects. The Council concurred with the recommendation. The ISRP reviewed the set of projects in the Mainstem and Systemwide Reviews in 2002, and again in this FY07-09 solicitation. These broad reviews do not allow the ISRP the time required for a detailed review of individual topics. The ISRP envisions a more focused, comprehensive programmatic review to make progress toward ensuring these projects are executed in best service to the Fish and Wildlife Program.

3.5 Genetic Studies Including Parentage Analysis

There are a plethora of investigations of genetic variation in general, and a growing request for parentage and assignment analysis using genetic markers. These investigations are to support both artificial production programs and aid in the status evaluations of natural populations. There is a need for a review of these genetic investigations to see if there is redundancy in efforts. A review would also ensure that the designs of the investigations are adequate to answer management questions, that the data are being appropriately analyzed and centrally reported, and that the results are incorporated into management decisions.

3.6 Stock Assessments

Establishing how much stock assessment is needed and where counting of juvenile and adult salmon should occur requires coordination by NOAA Fisheries and its Technical Recovery Teams (TRTs), the Collaborative Systemwide Monitoring and Evaluation Program (CSMEP), and perhaps the Pacific Northwest Aquatic Monitoring Partnership (PNAMP). There are projects that appear to be counting the same fish using different techniques, and project proposals that require fish counting by some other BPA-funded project. Collecting these data is a necessary task because the data support a variety of analyses. However, it is difficult for reviewers to spot inefficiencies or redundancy in these efforts. A careful review of stock assessment activities is needed.

3.7 Monitoring and Evaluation Issues Specific to Wildlife

HEP and M&E

In the Retrospective Report, the ISRP “urged the Wildlife program away from a sole emphasis on Habitat Evaluation Procedure (HEP) evaluation and toward more accountability (M&E) for actual wildlife populations” (ISRP 2005-14 Retro). As in the past, reviewers commented that HEP did not provide an effective biological evaluation of project progress, and they continued to express concern that emphasis on HEP could compete with funds that could be better directed to activities with more clearly established benefit to fish and wildlife, such as acquisition of properties, easements, or other such direct conservation and mitigation actions. Techniques for evaluating quality of habitat and benefit to wildlife population have advanced significantly since HEP was developed, and many HEP models are significantly outdated or based on data and statistical methods that are no longer the best available. Some sponsors incorrectly see HEP analysis as baseline monitoring.

Recommendation: In the future, HEP should be used only as an initial scoring system for the mitigation agreements that underlie the Wildlife Program. We recommend that the Program recognize that HEP does not play any role in biological monitoring.

Wildlife Monitoring and Evaluation Plans

The ISRP has been critical of the monitoring and evaluation of results in ongoing wildlife projects and of the lack of clear and well-described plans for future monitoring and evaluation. Specifically the ISRP has stated, “Many proposals continued to lack clear

descriptions of sampling design or of procedures and criteria for assessing the outcomes of management plans” (ISRP 2005-14 Retro). These comments apply equally to many fishery projects.

The failure of projects to provide description, data, and interpretive analysis of information from a monitoring and evaluation (M&E) program continues to be a major failing of wildlife proposals, a failing that brings into question the credibility of the Wildlife Program. Many proposals seem to expect future funding to meet wildlife mitigation targets based on HEP, but the O&M for these projects is expensive and ongoing and the M&E is not in place to assure that the approaches used are successful.

It appears that each proposal has a line-item M&E, but very few of these report the results of their data gathering, analysis, and interpretation (evaluation). Reviewers stress that a project does not in fact have M&E unless the data are analyzed, interpreted, used, and reported. Reviewers further note that the absence of reported data and analysis implies that use of data from PISCES to evaluate levels of M&E in the basin (assuming activities budgeted as M&E are actual M&E) could give a misleading impression of the cost and the level of M&E in the basin.

There seems to be confusion about data analysis and reporting in some proposals. For instance, some state they only have qualitative data to report, but then list activities such as bird surveys that are underway, and these clearly could be reported numerically and would be useful in project evaluation. Only a few proposals showed actual project data, but some that did provided convincing evidence of project value, for instance proposal 199609401 - *Scotch Creek Wildlife Area* showed quite simple population census data for sharp-tailed grouse that were seen by reviewers as strong evidence of project progress and value and so, as effective monitoring. This proposal contained a good example of reporting results using photo-points combined with lek counts. It helped give the local data context by also showing a graph of statewide trends for comparison with trends on the property.

Choice of Species to Monitor

Many projects may benefit from more careful consideration of which species to monitor. Species should be selected that would be expected to show responses at the project scale, which most often means at a relatively small spatial scale and, initially, at a short time scale. Monitoring may often be somewhat limited for wildlife use because the parcels involved are often a relatively small part of focal species’ home or population ranges. Thus, effective monitoring requires careful selection of appropriate animals or indicators (e.g., amphibians, nesting sites, etc) that respond to the types of habitat created.

Much effective monitoring could be done with relatively simple, inexpensive techniques. For instance, use of lek counts for grouse, aerial census data for deer or other large wildlife that are regularly censused by game and wildlife agencies, and pit-trapping of amphibians can all be done at relatively low cost and might often provide adequate and effective monitoring data. Proposals can and should also monitor vegetation (habitat or focal plant species and communities). Use of low-cost techniques, such as targeted

census, aerial or other remote imagery, or photo-points, should often be capable of providing sufficient information.

Effective monitoring can be quite simple, and projects would benefit from clearly rationalizing the value of one or a few things that would give direct biological data that addresses the objectives of the proposal. In some cases, projects would benefit from re-defining their objectives. Projects need to formulate objectives that are readily subject to monitoring and evaluation, that is, objectives for which progress can reasonably be evaluated.

4.0 Artificial Production

Almost one-quarter of the proposals received in the FY 07-09 solicitation directly or indirectly involved the program's extensive use of artificial production to provide fish for harvest augmentation, mitigation for the hydrosystem, experimental wild fish conservation, and recreational resident fisheries in areas blocked from anadromous fish migration.

4.1 Anadromous Salmon and Steelhead Production

The Columbia River Basin hatcheries release nearly 200 million smolts annually, supporting tribal, commercial, and recreational fishing. At the same time there is a general consensus among scientists and managers that using artificial production to provide fishery benefits while simultaneously attempting to restore natural populations is experimental and fraught with difficulty. This consensus is reflected in the congressional mandate to Council to produce the *Artificial Production Review* (Council 99-15), the subsequent *Artificial Production Review Evaluation* (APRE; Council 2005), NOAA Fisheries Hatchery and Genetic Management Plans to review individual hatchery operations for impacts to ESA listed species, and the Puget Sound Hatchery program review under the Hatchery Scientific Review Group (HSRG).

The anadromous hatchery program creates three challenges for managing the recovery of natural populations. The first is a bookkeeping challenge. Mixing of hatchery fish and natural fish on the spawning grounds, when hatchery fish are unmarked, makes it difficult to determine the abundance and productivity of the natural populations. Second is a concern that large production programs for harvest will have ecological effects on natural stocks through the direct effects of competition and predation and the indirect effects of influencing the abundance of predator populations. Third is a concern that interbreeding in the wild between hatchery and natural salmon will lead to long-term reduction of fitness of the natural population.

Solving the first problem requires sufficient tagging of hatchery fish so they can be enumerated when mixed with a naturally spawning population, and knowing the relative natural spawning fitness of the hatchery fish. The need to evaluate the natural reproductive spawning fitness of hatchery fish was recognized in the 2000 BiOp (RPA 182), and several projects have been funded to resolve this uncertainty. This uncertainty should be reasonably quantified perhaps by the end of the FY 07-09 funding cycle,

certainly no later than another cycle. The ecological effects of the large-scale programs on natural production are not being addressed in any significant way. The long-term fitness consequences from interbreeding between hatchery and natural fish are beginning to be investigated.

Recommendation: The ISRP recommends that Council consider an RFP to develop methods to evaluate the effects of the large-scale production program for harvest on the abundance, productivity, and diversity of naturally spawning populations.

4.2 Supplementation

The ISRP and ISAB have been especially critical of the monitoring and evaluation of supplementation programs -- hatchery projects that are attempting to rebuild wild populations by stocking hatchery fish for natural spawning. The ISAB (2003) concluded that the BPA-funded supplementation projects were not measuring the correct parameters to evaluate a demographic benefit from supplementation or to quantify the long-term fitness effects of supplementation on the natural population. The ISRP and ISAB (2005) sent a jointly written memo to Council outlining the necessary metrics to evaluate supplementation. There was some incorporation of the suggestions from the memo in the M&E sections of the FY 07-09 supplementation project proposals, but further progress is needed. In April 2006, NOAA Fisheries and the Columbia River Inter-Tribal Fish Commission (CRITFC) sponsored a workshop on monitoring supplementation attended by ISAB and ISRP representatives. Discussions at the workshop confirmed for the ISRP that an evaluation of the demographic benefits of supplementation is possible, but is neither coordinated nor underway at this time. The Collaborative Systemwide Monitoring and Evaluation Program (CSMEP) is one option for coordinating the evaluation. At this time experiments to evaluate the long-term fitness effects of supplementation are still being designed hence there are no current projects to quantify this effect at this time. This may require a directed RFP.

At the Supplementation Workshop, participants discussed the challenges to obtaining appropriate monitoring data for supplementation projects and debated alternative approaches to designing a systemwide evaluation. Support was expressed for collection and analysis of data on a limited number of parameters from a large number of supplemented and reference streams from across the basin, with emphasis on streams for which a time series of data for previous years already exists. For this analysis, a substantial increase in the number of designated reference (non-supplemented) streams will be required. Participants are willing to meet again to further define the nature and design of a comprehensive assessment.

Because of the various institutional and geographic hurdles a coordinated evaluation faces, the ISRP believes the Council will need to be actively involved as an organizing center for the evaluation of supplementation.

The ISRP qualifies positive observations on the possibility of evaluating supplementation with the caveat that those projects providing prior results did not offer much encouragement on the efficacy of supplementation. While there is often an increase in the

spawning population from the presence of hatchery fish, there is little or no evidence of a response in the numbers of natural fish in the next generation.

Recommendation: The ISRP recommends the Council consider a follow-up workshop to conduct an adaptive environmental assessment modeling exercise to continue to formalize the design of a coordinated evaluation of supplementation.

Recommendation: The ISRP also recommends the Council considers an RFP to conduct an experiment on the long-term fitness effects of supplementation.

4.3 Captive Propagation

During the FY 07-09 solicitation review, the ISRP concluded that the captive breeding and release program for the Snake River Evolutionary Significant Unit (ESU) of sockeye salmon (*O. nerka*) was “Not Fundable” based on the criteria established in the 1996 amendment to the Pacific Northwest Electric Power Planning and Conservation Act. The ISRP anticipates that this conclusion will be difficult for the sponsors and regional stakeholders to understand. Thus the ISRP summarizes the basis of its decision.

Snake River (Idaho) Sockeye Salmon

The Snake River sockeye ESU has been identified as a unique and ecologically important distinct population segment of the species (Waples et al. 1991, Waples 1995, Good et al. 2005). Individuals in the ESU are distinctive because they spawn at a higher elevation (2,000m) and have a longer freshwater migration (1,500km) than any other sockeye salmon population (Waples et al. 1991). Investigations established that anadromous sockeye salmon, residual sockeye salmon, and resident kokanee are present in Redfish Lake, Idaho (Good et al. 2005). Anadromous sockeye salmon spawn within Redfish Lake in October and November. Juveniles out-migrate during the spring at age-1 or age-2 and remain in the ocean for one to three years before returning to their natal area to spawn. “Residual” sockeye spawn with anadromous sockeye within the lake. These residual sockeye salmon spend their entire life in Redfish Lake, but are believed to produce some progeny that emigrate from the lake.

A second resident life-history type – kokanee – also inhabits Redfish and other Stanley Basin lakes. In Redfish Lake, kokanee migrate from the lake and spawn in Fishhook Creek, a lake tributary, in August and September. This kokanee population is not considered to be native to Redfish Lake, but was stocked from non-indigenous hatchery sources (Good et al. 2005). Redfish Lake anadromous and residual sockeye salmon are genetically similar and are included in the Snake River Sockeye Evolutionarily Significant Unit (ESU), while the kokanee found in Redfish Lake (and other Stanley basin lakes) are genetically different and not included in the ESU (Good et al. 2005).

The Snake River sockeye salmon ESU was listed as an Endangered Species in 1991 under the US Endangered Species Act of 1973. In the six-year period prior to the listing (1985-1990), 11, 29, 16, 1, 1, and 0 anadromous adult sockeye returned to the Redfish Lake Creek trap or Sawtooth Fish Hatchery (Salmon River upstream from Redfish Lake

Creek). In 1990, the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation petitioned to have this population listed as endangered pursuant to the Endangered Species Act. Snake River sockeye were listed in 1991 (§§56 FR 58619).

In response to these dire returns of anadromous sockeye salmon to Redfish Lake, a full life-cycle captive propagation program was initiated in 1991 by collecting all 4 adult anadromous fish that returned that year and 759 smolts that were emigrating from the lake. In total, 16 anadromous adults, 26 residual adults, and 876 emigrating smolts were collected from 1991 through 1998 to populate the captive program. The program was intended to maintain the population for one or two generations (Good et al. 2005).

The Redfish Lake sockeye captive propagation program cultures the sockeye salmon for the entire life-cycle, and has split the broodstock into components maintained by Idaho Fish and Game at their Eagle Fish Hatchery and by NOAA Fisheries at Manchester, Washington. Beginning in 1993, the program started introducing these cultured sockeye into Redfish and other Stanley Basin lakes using releases of full-term hatchery adults, pre-smolt juveniles, smolts, and eyed egg plantings. IDFG and NOAA Fisheries report that they have produced 1,143,000 presmolts, 237,000 smolts, 1,600 adults, and 627,000 eyed-eggs for introduction to Stanley Basin lakes and tributary streams (IDFG 2005, NOAA 2005). They estimate that between 1991 and 2005, approximately 570,000 hatchery-produced sockeye salmon smolts emigrated from basin lakes.

In 1999, seven captively-propagated anadromous sockeye salmon returned to the Sawtooth Hatchery weir (6 jacks and 1 jill). In 2000, 257 captively-propagated anadromous adults returned to the Redfish Lake trap and the Sawtooth Hatchery weir. From 2001 through 2005, 26, 22, 3, 24, and 6 captively-propagated, anadromous adults have been trapped in the Stanley Basin, or upper Salmon River region of Idaho. Ten, 4, and 6, un-marked anadromous adults also returned to the Redfish Lake Creek weir or Sawtooth trap in 2000, 2001, and 2002 respectively (ISAB 2003). The origin of the un-marked adults is yet to be determined. From 1999 through 2002, 3, 214, 17, and 22 of the captive-propagated adults were released to spawn in Stanley Basin lakes, and the remainder was incorporated back into the captive-propagation program. Progeny from the approximately 200 adults that had the opportunity to spawn naturally should have returned as adults in 2005, if they had been successful at producing smolts capable of migrating to the marine environment and returning. Adult sockeye salmon returns to the Redfish Lake Creek weir and the Sawtooth trap in 2005 numbered 6 individuals.

ISRP review of the Redfish Lake Sockeye Salmon Captive Broodstock Project

Repeating points made earlier in this preliminary review, the ISRP's charge is to conduct a peer review of Fish and Wildlife Program projects to establish whether they:

1. are based on sound science principles;
2. benefit fish and wildlife;
3. have a clearly defined objective and outcome
4. with provisions for monitoring and evaluation of result; and
5. are consistent with the Council's fish and wildlife program.

The ISRP's review of the Redfish Lake Captive Broodstock Project (and other linked projects) concludes that the project has sufficiently clear objectives with provisions for monitoring and evaluation and is conceptually consistent with the Council's fish and wildlife program. Because of the minimal returns of anadromous adults from releasing millions of eggs, pre-smolts, smolts, and full-term hatchery adults, the ISRP concludes that the project is not based on sound scientific principles. That is, with the return rates that the project has experienced, it will not meaningfully affect the near-, medium-, or longer-term viability or recovery of a self-sustaining Snake River sockeye salmon ESU. With this conclusion, the ISRP also concludes that the project is not benefiting fish and wildlife.

For a captive propagation project to be successful in contributing to the restoration of a self-sustaining natural population, it must work successively through three tasks. First, it must be able to successfully culture the species. Next, captive individuals must successfully be reintroduced into the wild, and finally, these reintroduced individuals must breed in the wild and produce the next generation. In the case of the Redfish Lake Captive Broodstock Project only the first task was achieved. Juvenile life stages of captive individuals that were reintroduced did not successfully emigrate to the marine environment and return and reproduce in sufficient numbers to meaningfully affect the viability and aid in the recovery of a self-sustaining Snake River sockeye salmon ESU.

The ISRP believes that since there has been no sustained response by the populations to recovery efforts within the Basin, it is clear that conditions outside the basin determine the fate of these fish, and there is no evidence that these conditions are likely to improve significantly in the foreseeable future. Not only are these limiting conditions not likely to change, the fish themselves are likely to be changing as a result of intensive propagation and rearing procedures so that their viability even under restored conditions is increasingly in doubt. There is no scientific basis for continuing this program.

In recommending "Not Fundable" for the collection of proposals associated with Redfish Lake sockeye salmon captive propagation, the ISRP examined the history of management actions, patterns of abundance, the rate of adult sockeye return in the face of the full range of oceanic and down-river conditions that have occurred from 1991-2005, genetic diversity, and ongoing threats to viability within the basin. We also searched our own history for consistency of findings over the past 10+ years and the underlying science of this and similar programs with published records or otherwise accepted principles.

The history of management actions taken to address recovery of Snake River ESU sockeye salmon has focused almost entirely on extreme measures associated with captive breeding (but also included gamete preservation) and reintroduction of progeny from the captive program. That the captive breeding alone has not contributed to restoring a functionally self-sustainable and viable sockeye population in Redfish Lake after 13 years (3+ generations) will come as no surprise to anyone who has searched the literature for supporting examples of captive propagation's record of successes. Reintroductions and even, translocations, have had very limited success even in cases where stresses or limiting factors have been removed and there are available sufficiently intact habitats *in*

situ and for the entire set of a species' life history stages (fertilized eggs in nest through adult spawning). The longer-term persistence from the all too few examples of success remains uncertain (Minckley 1995, Philippart 1995, Harig et al. 2000).

By definition *mitigation* is the moderation of a quality or condition in force or intensity; alleviation. In resource policy, mitigation connotes "compensation." Our conclusion on the projects in question, in effect, announces that captive breeding in this specific case is an inadequate mitigation strategy to compensate for the Federal Columbia River Power System (FCRPS) effects on sockeye salmon survival.

What remains uncertain is whether we are too late or have sufficient *will* to directly address the specific threats to Snake River sockeye viability. We emphasize that our conclusion stops short of declaring the ESU extinct (not only in the wild, but irreversibly extinct in every meaningful sense - ecologically, evolutionarily, and viability-wise). This determination is, in fact, the province of the action agencies. We do suggest, however, that without immediate, sweeping, and effective measures to determine and address the "factors of decline" (see updated status review of west coast salmon and steelhead for a general discussion of threats and limiting factors; Good et al. 2005) within the next few sockeye generations, we likely will witness the final demographic demise of even the captive population for the Snake River sockeye.

We recognize also that ISRP has no policy or action agency authority to discontinue the "life support" for this unique and ecologically important ESU. Our judgment focuses solely on whether this action is justifiable within the Council's Fish and Wildlife Program based on the merits of the data and the science.

4.4 U.S. v Oregon as Project Justification

A number of fall Chinook and coho production programs justified their proposals as meeting the goals and obligations of U.S. v Oregon, in place of a strong scientific or technical case. It is not clear to the ISRP if and how these obligations factor into the ISRP's reviews, and we seek Council's guidance on this question.

4.5 Relationship between the Artificial Production Review Principles and Hatchery Science Review Group Guidelines

Many projects are using Hatchery Science Review Group (HSRG) guidelines as management procedures in artificial production. There is a need to review these guidelines for consistency with the Council's Artificial Production Review principles and ISAB and ISRP recommendations for the operation and evaluation of artificial production programs. Council's principles are more conceptual and the HSRG are more technical in nature. It is not clear whether adopting these guidelines gives projects different latitude than intended by the APR principles. At this time it is not known whether they are more or less effective, why sponsors are using these guidelines, or what the justification is for using them.

4.6 Resident Fish

The ISRP recommendations on several of the resident fish proposals reflect the belief that significant re-evaluation of the artificial production strategies in portions of the resident fish program is warranted. Overall, there is a lack of assessment of resident fish propagation activities, so the effectiveness in contributing to fisheries cannot be determined. Two situations, one for kokanee in larger lakes and reservoirs, and one for hatchery-reared trout, usually rainbow, in ponds and smaller lakes, are discussed below.

There are cases where reservoir kokanee propagation efforts are releasing millions of juveniles, but only a few thousand are subsequently being caught by anglers. These activities are limited by entrainment of juveniles at reservoir outlets and predation by piscivores. This predation is often not fully considered in the planning and assessment. These challenges are unresolved from previous review cycles, and attention is needed to craft effective solutions. Existing evidence, including results of Fish and Wildlife Program projects, does not show that kokanee populations can be successful under heavy predation. The efforts to produce viable kokanee programs have largely been unsuccessful for long periods of time. Thus, the ISRP is now recommending "not fundable" for projects or project elements directed to rearing and stocking, or habitat enhancement, for kokanee in communities including walleye, bass, northern pike, or lake trout unless populations of these predators can be reduced to and maintained at levels so low that they are compatible with adequate survival of hatchery-reared kokanee.

Programs to provide hatchery-based, put-and-take trout fisheries in ponds and smaller lakes and reservoirs throughout the Basin have evolved to include large M&E components that are much more costly than the expense of rearing and releasing the fish. In most, but not all, cases this M&E does not include an effective assessment of trout harvest, the fraction of the fish stocked that are actually returning to the creel (or are being caught and released). A reliable estimate of the annual harvest is vital in establishing whether the aquatic environment is suitable and there is a reasonable return being made on the stocking investment. The ISRP is recommending "not fundable" for M&E components that are not directly related to the assessment of that harvest and is urging the adoption of standard fishery survey methodology (see the reference book *Fisheries Techniques*, published by the American Fisheries Society; Murphy and Willis 1996) to estimate and report harvest data. Such surveys are not needed on a fishery annually but should be conducted every 3-5 years. Project sponsors are urged to consider adoption of a target performance standard for harvest similar to that of many management agencies, where a successful hatchery program will have at least 50% of the stocked fish being harvested.

5. Mainstem Passage

5.1 Use of Subbasin Plans for Selection of Projects

The mainstem proposals were not able to make effective use of information from the subbasin plan assessments because mainstem issues were rarely addressed in the subbasin plans (see comments from Retrospective Report below).

In the summer of 2004, the ISRP participated in review of draft subbasin plans. Few plans included adequate assessment of habitat in the mainstem Columbia and Snake River reaches, even though the boundaries defined by the Council clearly included them. Mainstem issues were generally treated by the sponsors as “out-of-subbasin” questions that affected stocks within tributary subbasins. The issue is subbasin stock-specific estimates of needed escapement and the impediments to those escapements arising in the mainstem. The subbasin planning exercise, therefore, did not adequately cover mainstem issues related to specific tributary fish stocks. This was a serious oversight, considering the significant mortalities imposed upon juvenile and adult salmonids in their migrations through the mainstem Columbia and Snake Rivers. The joint ISAB and ISRP reported this deficiency to the Council, with no specific Council action taken to date other than the Mainstem Amendment. (ISRP 2005-14 Retro).

This will remain a problem until the Council determines how to integrate the mainstem Columbia and Snake rivers into the subbasin plans. Current proposals primarily cited the Council’s Mainstem Amendments or the BiOp for justification.

5.2 Mainstem Passage Issues

Transportation/Spill

Recent events, such as the court-ordered summer spill of 2005, indicate that the persistent controversies over transportation and spill continue. The ISAB recently recommended that large scale experimental studies are still needed for determining the efficacy of summer spill for protecting and recovering Snake River fall Chinook (ISAB 2006-1).

However, no proposals were received that specifically addressed transportation or spill issues. Most often, the transportation and spill-related study proposals are developed, reviewed, and funded under the US Army Corps of Engineers Anadromous Fish Evaluation Program (AFEP), the so-called Reimbursable Program. In 2003, the ISRP reviewed the AFEP and recommended fostering of further integration and coordination of the mainstem projects under the Corps’ AFEP with the Council’s Fish and Wildlife Program, including scientific peer review. The ISRP continues to emphasize that coordination between the Fish and Wildlife Program and AFEP is especially important for large-scale studies related to spill or transportation issues and hopes to review proposals for such studies.

Load Following Studies

The ISRP is pleased to note that two proposals were received in response to recommendations in the Council’s Mainstem Amendments and the ISAB Report 2005-3 to study of the effects of load following (flow interruption) on behavior and survival of

outmigrant smolts in the Snake River and perhaps the lower Columbia River. The two proposals submitted (200733600 and 200736400) were well prepared by very qualified groups. The ISRP scored both proposals high for all review criteria and rated both fundable.

While the two proposals appear to duplicate one another, the duplication is slight to negligible. Proposal 200733600 proposes work only in Little Goose Reservoir and puts primary emphasis upon radio tracking of juvenile fish to record their behavior in response to load following episodes, with secondary emphasis upon monitoring of hydraulic conditions associated with those episodes. The other proposal, 200736400, encompasses the reservoirs of all four lower Snake River projects, puts primary emphasis upon hydraulic conditions as affected by load following, and would depend upon information on fish behavior that would be available from ongoing projects.

Both studies have merit because information on hydraulic conditions in all four reservoirs is certain to be useful in extrapolating the implications for fish behavior observations beyond Little Goose Dam. We recommend that the BPA contracting officer arrange for the two proponents to coordinate closely, share information, and avoid duplication of effort.

6.0 Unique species

6.1 Sturgeon

Ten proposals address a range of recovery actions and management options for white sturgeon in the Columbia River Basin. They include projects to conduct basic assessments of juvenile feeding ecology, adult abundance, reproduction, harvest, and genetic population structure; trap-and-haul to translocate individuals from productive reaches below Bonneville Dam to less productive reservoir reaches upriver; artificial production for conservation and harvest; experiments with artificial spawning substrates and channels; and models of management options and comparisons of productive and non-productive river reaches.

In the past, the ISRP has recommended that scientists and managers involved with white sturgeon needed to expand their cooperation so that a broader geographic perspective and greater range of environmental productivity might help to determine the underlying cause of poor recruitment of sturgeon in the impounded segments of the Columbia River.

Proposal 200721300 (*Assessing Recruitment Failure Across White Sturgeon Populations: Differences in Prey Availability and Physical Habitat Among Areas with Consistent, Inconsistent, and no Annual Recruitment to Age-1*) to evaluate and compare productive and non-productive river segments employs this comparative strategy, and provides an opportunity for improved coordination, should the project be funded. In general, however, while many of the white sturgeon proposals describe coordination among projects, they do not demonstrate real sharing of information or cite results from other studies. For example, the Lake Roosevelt white sturgeon recovery project proposal does not seem to take advantage of all the understanding and knowledge gained in the Kootenai system.

The dams and reservoirs in the Columbia River Basin have segmented the white sturgeon population. A number of the sturgeon proposals include objectives to determine the genetic structure within and among those reaches. The ISRP questions whether these different segments should be evaluated with the aim of establishing their distinctness as though they were independent populations, when the current view is that prior to dam construction most of the Columbia River sturgeon would have been a single contiguous population. It is not clear that management of reservoirs as independent populations for conservation purposes is appropriate given the historical connectivity. Consequently, the direct application of the genetic data for implementing management actions is not apparent to the ISRP.

There are also proposals to expand artificial propagation of sturgeon. Some of these do not clearly differentiate whether they are trying to establish self-sustaining populations for conservation or simply provide additional fish for harvest (essentially a put-and-take sturgeon fishery). They seem to imply they will address or achieve both. In any case, before the sturgeon artificial production or supplementation is expanded, the ISRP recommends additional effort should be focused on identifying the limiting factors to sturgeon reproduction. For example, the lack of a natural hydrograph and associated lack of turbidity could be a problem for sturgeon egg/juvenile survival. As an example, in the Powder River, a tributary to the Missouri River, flow with low turbidity (clear water) from the reservoir creates predation problems for paddlefish and shovelnose sturgeon eggs and juveniles.

After review of the FY 07-09 proposals, the ISRP finds that its comments and recommendations from the Retrospective Report still apply:

In the spirit of the Council's current Program, with its emphasis on natural processes and habitat restoration, automatic implementation of artificial white sturgeon production throughout the basin does not seem to the ISRP to be appropriate. Restoration of natural habitats and reproductive processes, especially as they affect the purported reproductive bottleneck, ought to be the preferred option. However, well-focused, comparative field research is needed on the reproductive stages in this bottleneck (e.g., egg dispersal, egg attachment and incubation, larval habitats and feeding, larval dispersal) in habitats with successful and unsuccessful reproduction. With this information, the mitigation measures most useful for enhancing wild populations can be selected, and artificial production can be implemented only where critical for maintaining the species presence.

Recommendation: The FWP should focus on understanding the apparent reproductive bottleneck at the egg and larval stages through well-focused, comparative field research in habitats with both successful and unsuccessful reproduction.

6.2 Lamprey

The number of projects proposing to study Pacific lamprey is continuing to increase. These are being justified on the basis that subbasin plans consistently identified a decline in lamprey numbers as a concern. However, the ISRP found significant overlaps in the lamprey projects submitted for various subbasins. The Lamprey Technical Workgroup

(LTWG, 2005) outlined a strategic plan for lamprey research and management in the Basin and identified six priorities -- status, passage, population delineation, restoration, biology/ecology, and population dynamics -- but did not rank them. The ISRP suggests that prioritization and coordination of lamprey work should be a high priority for the LTWG, given the degree of duplication in the various proposed studies. The ISRP sees no need to repeat similar work on lamprey in each of the subbasins. Rather, the focus of lamprey work should be upon discovery of general principles that can be extrapolated across the basin. The Council should describe within its Research Plan an approach to discovering the basic life history traits that might be relevant to an adaptive management approach to rebuilding lamprey populations.

Most of the proposals include the same type of basic enumeration and life history studies, in different watersheds, rather than focusing on solutions to lamprey decline. The subbasin studies' will likely include findings that lamprey migrations are inhibited in the tributaries, as they are in the mainstem, by inadequate passage facilities at irrigation dams, and the like. Several proposals request funds to continue outplanting work even though present results are not encouraging. There is very little focused work on hydro or water-use related problems in the tributaries (e.g. passage through small dams). Several studies proposed genetic work, but how the results would benefit lamprey restoration or management is not evident. Radiotracking lamprey has proven to be feasible. This method might make it possible to discover more directly whatever features of lamprey behavior might be revealed by genetic analysis and make clearer what the adaptive management approach ought to be.

Lamprey studies should also consider the influence of the estuarine and marine environment on survival; none of the proposals addressed this aspect. Limited information confirms lampreys have declined in several river systems from California to British Columbia, so effects on survival may be occurring coast-wide. The decline in Pacific lamprey was not sufficiently established to warrant listing under the Endangered Species Act (FR 69 (427):77158-77167).

6.3 Bull Trout

The lamprey programmatic comments can be generally applied to the bull trout proposals as well. The ISRP found that there is significant overlap among bull trout projects for many subbasins and it appears that the USFWS bull trout recovery team should be the focal group to enhance coordination of recovery activities.

Too much of the proposed work focuses on determining population characteristics and analyzing genetic attributes of isolated populations, and not enough of the proposals focus on addressing causal mechanisms of bull trout decline (e.g. barriers that limit access to prime habitat for spawning or rearing, hybridization with brook trout).

The bull trout proposals seem to draw mostly from the literature on *Oncorhynchus* species for recovery options and have not taken full advantage of the considerable literature on the more closely related Dolly Varden and arctic char (*Salvelinus* species) outside of the Columbia River Basin, which may offer better insight into population

viability factors of bull trout. The ISRP finds it to be remarkable that none of the proposals even mentions the Dolly Varden, even though the range of bull trout overlaps, and distinguishing between them is challenging.

6.4 Invasive Species

The ISRP noted an increase in the number of proposals related to the introduction, spread, and potential impact of non-native fishes and invertebrates in the Columbia River Basin. It is clear that controlling invasive species has become an issue that will attract further attention in the coming years, as their influence on native species and habitats are better appreciated. Developing effective control strategies for many aquatic invasive species, especially those with planktonic larval stages, will be extremely challenging. Creative research and management approaches are needed in this subject area to both understand adverse effects on native species and to discover weak points in invasive species life-cycles that could be used for control. While we were encouraged by an increase in the number of invasive species-related proposals, some of the proposals did not go far enough in examining the potential effects of the non-native organisms on target species. A notable exception was the proposal to examine the impacts of shad in the Columbia River (Proposal 200727500), which was comprehensive in its inclusion of both juvenile and adult shad and their role in the food web of the lower Columbia River, as well as being clearly linked to the potential effects of shad on native species such as fall Chinook that make extensive use of the estuary.

The ISRP also believes that high quality research proposals are needed on invasive aquatic and riparian plants. Although the colonization of streams, lakes, and riparian areas by unwanted non-native species is most often associated with small and mid-size watersheds, invasive plants occur throughout the drainage network and the estuary and have the potential to displace native species and many of the fish and wildlife habitat benefits they provide. In other areas of western North America, control of invasive plants has been very costly and disruptive to aquatic and riparian ecosystems. This is an emerging issue that is likely to require increased research attention in the Columbia River Basin. Only a single proposal dealing specifically with invasive riparian plants was submitted, and unfortunately it was not recommended for funding because it did not provide sufficient evidence that the non-native species in question posed a significant threat to aquatic and riparian ecosystems.

7 Wildlife and Fish Habitat Projects

7.1 In-depth Periodic Review Needed for Subbasin Habitat Programs

In the time period between the ISAB's 2003 report on tributary restoration strategies (ISAB 2003-2) and the present, subbasin assessments and plans have been completed. The use of habitat information from subbasin assessments to develop projects in the current round of proposals was inconsistent. Some proposals used subbasin assessments and limiting factor analyses thoughtfully; others did not make effective use of this information nor did they describe the kind of coordination needed for successful project implementation. Many proposals mentioned subbasin assessments and plans in passing, without a clear explanation of why their particular project filled a critical information

need, addressed an important limiting factor, or formed an essential link in a network of watershed restoration actions. Additionally, few proposals made use of the modeling tools that could be used to forecast the biological benefits resulting from the projects, even though these tools (e.g., EDT) were highlighted in the subbasin assessments.

Much as they have done for artificial production proposals, the Council may wish to have the ISRP and ISAB conduct an in-depth evaluation of habitat restoration projects in some of the subbasins. There is a need to review habitat projects, major program by major program, in the same way the ISAB and ISRP have examined supplementation. Subbasins could be reviewed every three or five years to identify elements that need to be met as a condition of future habitat project funding.

Recommendation: The ISRP recommends that Council request the ISRP and ISAB to review habitat restoration strategies and actions in major subbasins on a multi-year rotating basis.

7.2 Demonstrating Restoration at the Watershed Scale

One of the most pressing habitat restoration issues in the Columbia River Basin is to demonstrate that tributary habitat or estuary improvement projects, guided by watershed assessments and limiting factor analyses, actually increase the abundance, productivity, spatial structure and diversity of target species **at the watershed scale**. Rarely, if ever, are coordinated treatments based on limiting factor analysis applied to entire watersheds or throughout the Columbia River estuary and followed up with coordinated, watershed-level fish population assessments for a period of time sufficient to detect population change.

The ISRP believes that watershed-scale restoration effectiveness monitoring demonstration projects are needed. For a watershed-scale project to be effective, we need to:

- Identify a watershed-scale impairment or limiting factor that is amenable to restoration. For example, if instream flow is believed to be limiting there must be a clear restoration pathway to conserving water (e.g., purchase water rights). In the estuary, if a scarcity of tidal sloughs is believed to be limiting, there must be a clear mechanism for increasing this habitat type.
- Recognize that restoration actions must be institutionally supported at the watershed scale. This will require a level of coordination that is not often seen in the region, and, for this reason, the best opportunities will probably occur in watersheds with concentrated ownership or long-standing cooperative relationships such as a working Coordinated Resource Management (CRM) plan.
- Commit to long-term monitoring of, at a minimum, the number of adult fish returning to the watershed and the number of juveniles leaving the watershed, as well as the parameters intended to be modified by treatments.

The funding procedures that OWEB, SRFB, BPA/NPCC, and other organizations use are usually intended to spread restoration dollars and projects across the landscape fairly evenly, whereas a watershed scale approach may require that, in some cases, restoration dollars and research efforts are concentrated in a few places. Without proper tests of the efficacy of restoring ecosystem processes at whole watershed scales, we will be unable to answer the question “How many more adult fish have resulted?”

The program needs to extend the lessons of watershed successes such as the Fifteenmile and Asotin Model Watersheds. For example, the Asotin Model Watershed project includes good coordination among agencies, private landowners, the state, county, and others through a CRM plan. It is an important watershed for wild stock and the WDFW M&E project is effective.

Recommendation: The ISRP recommends that Council host a workshop to examine the lessons from successful Model Watershed projects that have been implemented in the Columbia Basin and elsewhere.

7.3 Education/Demonstration Projects

For some habitat restoration proposals, the primary selection criterion seemed to be the availability of a site or receptivity of a property owner to habitat restoration, rather than a clearly prioritized fish and wildlife need. One value of the opportunistic approach is “getting a foot in the door” of a watershed as an educational model for others to follow. However, there is a point at which education/demonstration needs are met and the emphasis must shift to a focus on priority benefits to fish and wildlife. Otherwise, habitat programs risk ineffective use of limited Program resources while losing support when no significant benefits to fish and wildlife are observed. The threshold at which public education/demonstration projects give way to high priority restoration actions will depend on the extent of habitat loss and the status of target species populations. Seriously at-risk populations in highly degraded habitat may demand priority attention even if this means not funding a demonstration opportunity. Without the benefit of a thorough watershed assessment and limiting factor analysis it will be difficult to determine when the value of demonstration projects must give way to more immediate habitat restoration needs, even where actions are politically contentious.

Restoration of severely altered streams with little chance of long-term recovery (e.g., Wilson Creek in the Yakima subbasin, Salmon Creek in the Okanogan subbasin, and many urban streams) tends to be extremely expensive relative to the biological benefit obtained. Demonstration habitat restoration projects in these areas often help to educate the public and engage landowners in implementing conservation practices, but spending the money required to restore streams in watersheds with lower levels of human impact would have much greater potential benefits to the species of interest. Urban and agricultural stream restoration projects do have value from an educational standpoint, but the goals of such projects should be explicit.

7.4 Dam Removals

Over the next 5-10 years there is a high likelihood that several dams in tributaries of the Columbia Basin will be removed. These include Marmot Dam, Condit Dam, and Hemlock Dam – all old structures that have outlived their management usefulness. The ISRP was encouraged to see proposals related to monitoring the ecological impacts of removing the dams and the recolonization of formerly unoccupied habitat by salmon and trout. These studies are important because dam decommissioning will continue to be an important issue in the next several decades and there are relatively few case studies upon which to base inferences about target species recovery.

Recommendation: The ISRP recommends the Council pay close attention to the implementation of dam removals in the Columbia Basin and ensure, perhaps through targeted research solicitations, that dam decommissioning and post-removal effects are properly monitored.

7.5 Incorporating Fluvial Geomorphology into Project Prioritization and Design

The ISRP often sees proposals that demonstrate a good understanding of fish ecology without a concurrent understanding of watershed processes that should guide decision-making over habitat restoration. Fish habitat is determined by the interaction between (geo-) hydrology, soils/geology, stream slope/topography and riparian vegetation -- implying land use. Prior to about 1990, fluvial geomorphology considered the interactions between soils/geology and water flows; it now includes vegetation as a vital component in all but high-altitude mountain streams. Stream geomorphology should now be included as a central topic with inputs from four “causal mechanisms” (land use, watershed and riparian land cover, geology and soils, climate).

Unfortunately, practitioners can shortcut understanding watershed processes by embracing a stream classification system that dictates what actions should be taken where. While in general, this may be a reflection of the quality of the subbasin plan, there are cases in which sound directions given in the subbasin plans are ignored in favor of engineering-biased actions that may be actually deleterious to fish habitat (e.g. Proposal 200713900: *Rock Creek Stabilization and Habitat Restoration*).

Proposing specific actions in a reach without reference to upstream conditions is inappropriate, as is proposing reach-based actions without consideration of alternatives elsewhere in the watershed. For a given reach, it is vital to know whether watershed processes (natural or artificial) are causing bed incision, aggradation, or relative stability. Most problems with bridge piers can be traced to a lack of appreciation of such dynamics. Few proposals reviewed by the ISRP contained any reference to morphological features that should guide restoration. It is symptomatic that culvert replacement is usually seen as necessary only to adjust to the current bed level and reduce internal velocities. The need to maintain the cross-sectional shape of the stream through the culvert (implying a clear-span bridge) is not often recognized.

It is important to distinguish between the structural use of large timber and rock and the structural use of live woody materials. Inert materials cannot be expected to remain stable indefinitely nor will they respond to being buried so as to protect the new surface. They can become “hardpoints”, eventually damaging downstream channel morphologies and fish habitat. In contrast, living materials such as willow branches, rooted trees, and shrubs, can be incorporated as structural elements of rapidly effective bioengineering techniques whose structural strength will grow with time and provide a “nursery” for other riparian species to take root in the accumulated sediments. If stream narrowing is the aim, using logs and rock will provide direction, but excessive use may cause the stream’s disconnection from its floodplain, while live structures may retain or reclaim floodplain connections.

The two approaches to stream and riparian bioengineering can be integrated, providing increased structural diversity that should translate into greater habitat diversity. However, the transition areas between living and inert structures need to be designed and built with great care and attention to detail, because these are the “weak” points that can cause unraveling of the whole, particularly in the first year of operation while the plants are becoming established.

As an incentive to include these considerations in project planning, the Council could consider including a set of criteria for ecologically successful stream habitat restoration within the ISRP review process. This would also help reviewers achieve greater consistency in their evaluations. One set of criteria with an ecological perspective has been introduced (Palmer et al. 2005):

1. The design should be based on a specified guiding image of a more dynamic, healthy river that could exist at the site.
2. The river’s ecological condition must be measurably improved.
3. The river system must be more self-sustaining and resilient to external perturbations so that only minimal follow-up maintenance is needed.
4. During the construction phase, no lasting harm should be inflicted on the ecosystem.
5. Both pre- and post-assessment must be completed and data made publicly available.

The goal of the restoration should be put in the context of benefits of the restored ecosystem to target species

Recommendation: Because review of so many Fish and Wildlife Program proposals would benefit from an in-depth technical understanding of watershed processes, the ISRP recommends bolstering the pool of Peer Review Groups with experts in geomorphology.

7.6 Implications of Climate Change for Tributary Habitat

While there were several proposals related to the effects of climate change on the flow characteristics of mainstem rivers, the ISRP believes there is a need to consider the likely effects of climate change on the habitat conditions in tributaries. Climate models suggest that the elevation of permanent winter snow pack in the Columbia Basin will rise 1,000 feet or more over the next few decades and spring runoff will occur sooner. One likely consequence of this change for spawning and rearing tributaries is that the period of summer low flows will be extended, summer water temperatures may rise, and some headwater streams that formerly were perennial will become ephemeral or intermittent. Such shifts in habitat conditions have important implications for restoration projects.

In some areas, deliberately increasing summer flows through reduced water withdrawals may be an effective restoration action where stream habitat is favorable, but in heavily degraded lowland tributaries the cumulative effects of reduced flows combined with other types of habitat loss may ameliorate the success of habitat improvement projects and restoration program funds may be more effectively spent elsewhere. Projects need to include a discussion of climate change impact in relation to their objectives. Events such as El Nino, the Pacific Decadal Oscillation, and overriding global climate change may profoundly affect whether projects can achieve their goals.

7.7 Irrigation Improvement and Water Banking

Proposals to improve irrigation efficiency raise often-neglected questions about water rights and in-stream flows. The destination of “saved” water should be specified, at least in part, to benefit fish. If savings only serve to meet the demands of junior water rights holders, no fish benefits are likely. Water-banking programs allow water rights to be retained for future beneficial use rather than legally protecting instream flow. There remain important questions about the impacts on return flow and downstream users when open ditches are enclosed. Particularly since some irrigation return systems have been shown to cool stream temperatures as well as purify water.

<p>Recommendation: The ISRP recommends Council consider using the Columbia Basin Water Transaction Program’s criteria to evaluate projects proposing improved irrigation system efficiency to preserve in-stream flow. Nearly all the instream flow projects could be evaluated and prioritized through the water transactions program (Project 200201301).</p>
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7.8 Conservation District Projects and Federal Farm Bill Programs

The ISRP has seen an increase in the number of Soil and Water Conservation District proposals submitted and funded. Such proposals are often intended to help coordinate and cost-share with USDA programs such as CREP and EQIP. Others help institute improved agricultural practices such as reduced tillage, and almost all leverage various funding sources extraordinarily well. The ISRP has been impressed with the collaboration and outreach characterizing many of these proposals and thinks the Program and region would benefit from analysis and reporting of the lessons learned from these projects.

Recommendation: The ISRP recommends funding Conservation District project sponsors to collaborate on a report on lessons learned, including experiences with USDA program development processes. This effort could then be reviewed jointly by the IEAB and ISRP to evaluate and highlight factors in their success.

Each state in the Basin has a State Association of Districts (e.g. WACD) and an associated State Conservation Commission. There is a national association as well (NACD). These groups would be logical partners in this process.

A continuing concern is that most ongoing projects do not report biological benefits in terms of the objectives of the Fish and Wildlife Program, and this need should be emphasized in project renewals and new project funding. Adding a biological monitoring element would strengthen these collaborative projects, if the biological monitoring was at a sufficiently large scale (see 7.2 above). In many cases, other larger scale existing monitoring projects might be capable of including this task. Many of the USDA programs involve multi-year contracts of up to 15 years, but rarely involve monitoring beyond the implementation level. Project reviews near the end of these terms would be effective points for evaluation of biological results.

One concern about the future prospects for such projects is their continuation if federal incentive funds are discontinued, as Farm Bill programs tend to shift significantly between authorizations, and, further, appropriations are not reliably tied to authorizations. Experience throughout the American west has shown that successful collaborative groups generate commitments that outlast both incentive funding and regulatory threats, creating sustainable long-term projects.

In some cases, collaboration with private landowners participating in USDA-funded programs raises confidentiality concerns about farm/personal finances and business practices. This issue is currently being addressed on a state-by-state basis as evidenced by new protections just instituted by the Washington State Legislature. As this issue develops, there may be implications for landowners' willingness to collaborate in Program-funded projects that include these federal Programs.

7.9 Capital Funding

The cost of property is often more closely tied to local real estate values than to ecological or biodiversity values. Some proposals specifically applied for capital funds for fish and wildlife mitigation. Fully aware that the ISRP charge is to evaluate whether projects are scientifically justified and that capital funding is a policy matter, the ISRP notes that the current policy restricting these funds to projects in excess of \$1,000,000 seems counter-productive. Projects requiring less than \$1 million may offer significant potential benefits to fish and wildlife, particularly if easements or developments rights are donated or discounted, as can happen in collaboration with non-profit conservation organizations.

Recommendation: The ISRP recommends that the Council and BPA consider eliminating a minimum dollar value for expenditure of Capital Funds.

7.10 Prioritize Acquisition and Restoration Projects

The objectives of many ongoing projects are consistent with the conservation biology literature in that larger or aggregated tracts of protected habitat often have more demonstrated benefit to wildlife than have smaller, isolated units. The ISRP believes special consideration should be given to acquisition of large or linked tracts of habitat next to protected properties that support existing populations. The subbasin plans provide a basis for more strategic acquisition proposals than have been previously possible. Similarly, some projects might benefit from the use of extended management buffers, rather than simple 50-foot buffers followed by no management or land use constraints. Projects that work with neighbors to manage land bordering managed habitats could leverage the effectiveness of habitat acquisitions, both ecologically and economically. These same landscape level considerations apply to selection of sites for habitat restoration.

7.11 Alternative Models for Acquisitions and O and M: Settlements, Trust Funds and Endowments

The ISRP has growing concern that active habitat acquisition and artificial production programs have, to date, entailed commitment of a growing proportion of Program funds for perpetual operation and maintenance. There are alternatives. Mitigation settlements, such as that with the Nez Perce Tribe, may offer cost-effective, long-term mitigation solutions that vest beneficiaries with the maximum management autonomy while funds otherwise consumed by BPA/Council administration and future O&M would be available for new opportunities to benefit fish and wildlife.

Establishment of O&M trust funds or endowments are another way to reduce ongoing funding commitments, increase overall program flexibility and still insure appropriate future management of acquisitions. ISRP reviewers suggested that a formal study of the uses, costs, and benefits of such approaches would be very valuable for both project proponents and reviewers, and ultimately for wildlife and fish. The ISRP appreciates that determining the appropriate mechanism to fund O&M is a policy matter. We comment on exploring alternatives to meeting this growing commitment because encumbering an ever greater share of the Program budget may erode the ability to maintain the scientific rigor of the Program.

<p>Recommendation: The ISRP recommends that the Council explore incentives to propose acquisitions with self-sustaining O&M components.</p>
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7.12 Integrated Pest Management

Reviewers expressed concern with the apparently extensive, continuing use of herbicides alone to manage weeds on habitat units. This raises concern that habitat managers may not be addressing this problem as aggressively as needed, not only to meet legal requirements, but to protect habitat values as well. With few exceptions, the species of “weed” is not even reported in the proposals. Integrated pest management (IPM) is the current standard for effective management of invasive species. The exact strategy is site-

and species-specific, but often includes introducing predatory insects, maintaining insect reservoirs, cultivation, grazing, controlled burning, or establishment of competing vegetation, all integrated into an ecologically-based, effectively monitored program that minimizes the need for continuing inputs and disturbance.

The role of herbicides in these programs is limited and strategic. Weedy species that are well established and abundant (such as reed canarygrass) are not likely to be eradicated, but should be contained to prevent infestation of un-invaded sites. This highlights the necessity of putting weed management into a landscape context through collaboration with neighboring landowners. Formal opportunities exist through Cooperative Weed Management Area programs (often funded by state departments of agriculture or a county weed board). The single most effective weed management strategy is surveillance to detect new invasions while they can still be eradicated with spot treatment (often with appropriate use of herbicides), followed by monitoring.

8 Ocean Estuary/Lower Columbia River

8.1 Coordination of Efforts in the Estuary and Lower Columbia

Work in the lower river, estuary, and ocean ("below Bonneville") is funded by numerous agencies, with most of the funding coming from BPA and the Corps. However, coordination and a general collective understanding of ongoing activities in the estuary are not always evident in the current proposals. Those Corps projects funded through BPA's direct program and the Corps' Anadromous Fish Evaluation Program (AFEP, a BPA reimbursable program) are subject to ISRP review and would benefit from a concurrent review to best view the scope of the effort below Bonneville and potential gaps in research and management actions. In the Retrospective Report and final review of the Corps' AFEP review (ISRP 2005-4), the ISRP recommended that coordination between the Fish and Wildlife Program and AFEP increase and include establishing work groups. The ISRP does note that there has been progress in terms of coordination as evidenced by a recently held symposium (Astoria, February 2006) with participation by the agencies that are active in the estuary.

8.2 Coordination of efforts between freshwater, estuarine, and ocean projects

The ISRP commends the coordinated freshwater and estuarine research in the Grays River area (200301000 and 200300600) and further suggests that this watershed might be added as an Intensively Monitored Watershed (IMW) as other IMWs do not have an estuary or tidal component. We encourage such a coordinated approach on the mainstem Columbia River wherever possible. It was also noted that the ocean and estuary research is relatively well coordinated compared to that between the estuary and freshwater components.

Awareness of how ocean and estuarine factors affect smolt to adult survival rates (SARs), and hence use of restored freshwater habitat and other habitat management procedures, should be increased. To improve our understanding of factors affecting salmon survival in the Columbia River Basin, it is important that the freshwater, estuarine, and ocean habitats not be treated as separate entities with boundaries because the fish are adapted to

move downstream to the ocean using a succession of habitats. In addition, the ecology of juvenile salmon in the estuary can be determined more effectively when downstream migration is tracked in the river. While this is a difficult task in the main river because so many populations are involved, studies on smaller systems can provide significant insights. Trawling in the tidal freshwater reaches and the estuary may be a technique for monitoring migrations, as the current beach seining programs may be missing some of the larger fish moving downstream in deeper water.

The ISRP is concerned that goals for habitat restoration projects proposed in the estuary may not be realistic given the highly modified nature of the system. Efforts to "rebuild" the estuary so it is similar to the pre-hydrosystem condition may not be possible. For example socio-economic factors may limit the areas where dikes can be breached. A more strategic approach with realistic objectives that recognize this difficulty is required.

8.3 Level of effort in the estuary and ocean

The ISRP noted that even though its Retrospective Report (ISRP 2005-14) recommended more work in the lower-river, estuary, and ocean ("below Bonneville"), there were few new proposals submitted for these areas. There is a particularly crucial need for work in the tidal freshwater part of the river and a RFP may be needed.

From the retrospective report:

"The mainstem Columbia River between Puget Island (upper estuary) and Bonneville Dam remains largely un-assessed even after the subbasin planning process. This limitation has been identified by the ISRP and ISAB numerous times"

"[O]ur understanding of these areas (estuary, nearshore, and plume environments) is in its infancy and the ability to manage inland habitat and fisheries programs based on variable climate, environment, and productivity cycles in the estuary and marine environments is distant and likely to remain so for some time"

Another critical need is information on survival of juvenile salmonids below Bonneville, as well life history variation. There have been significant advances in understanding of factors affecting survival in ocean habitats because of the intensive work done there in the past few years, including the work supported by BPA.

<p>Recommendation: The ISRP concurs with the recommendation of the Retrospective report that "... the Council should encourage innovative ecosystem-based research and monitoring in the estuary, with emphasis on the effects of the hydrosystem (altered flows, primarily) on all components of the ecosystem."</p>
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8.4 Effects of climate change in the ocean

In the face of increasing climate variation, it is not likely that remote sensing or computer modeling will ever be a useful substitute for direct sampling and monitoring of juvenile salmon in the ocean, where most Columbia River salmon species, lamprey, smelt, shad, and other anadromous species spend the majority of their life. In this regard, the

information resulting from the Columbia River plume and coastal studies (*199801400*) will be particularly valuable. This work has been underway for eight years and has developed a good baseline data set to evaluate future changes and regime shifts in the ocean. The significant increase in ocean survival correlated with increased productivity in the ocean, and subsequent increase adult returns observed in the Columbia River Basin in 1999, is an example of the variation.

Clearly, the ocean climate has a significant effect on the abundance of salmonids within the Columbia River Basin. The warm phase of the Pacific Decadal Oscillation shows reduction in most salmon stocks. The past evidence for climate influence on salmon and steelhead abundance, and predictions of future warming trends will influence the adaptive capacity, operations, long-term planning, and policy within the Columbia River Basin.

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