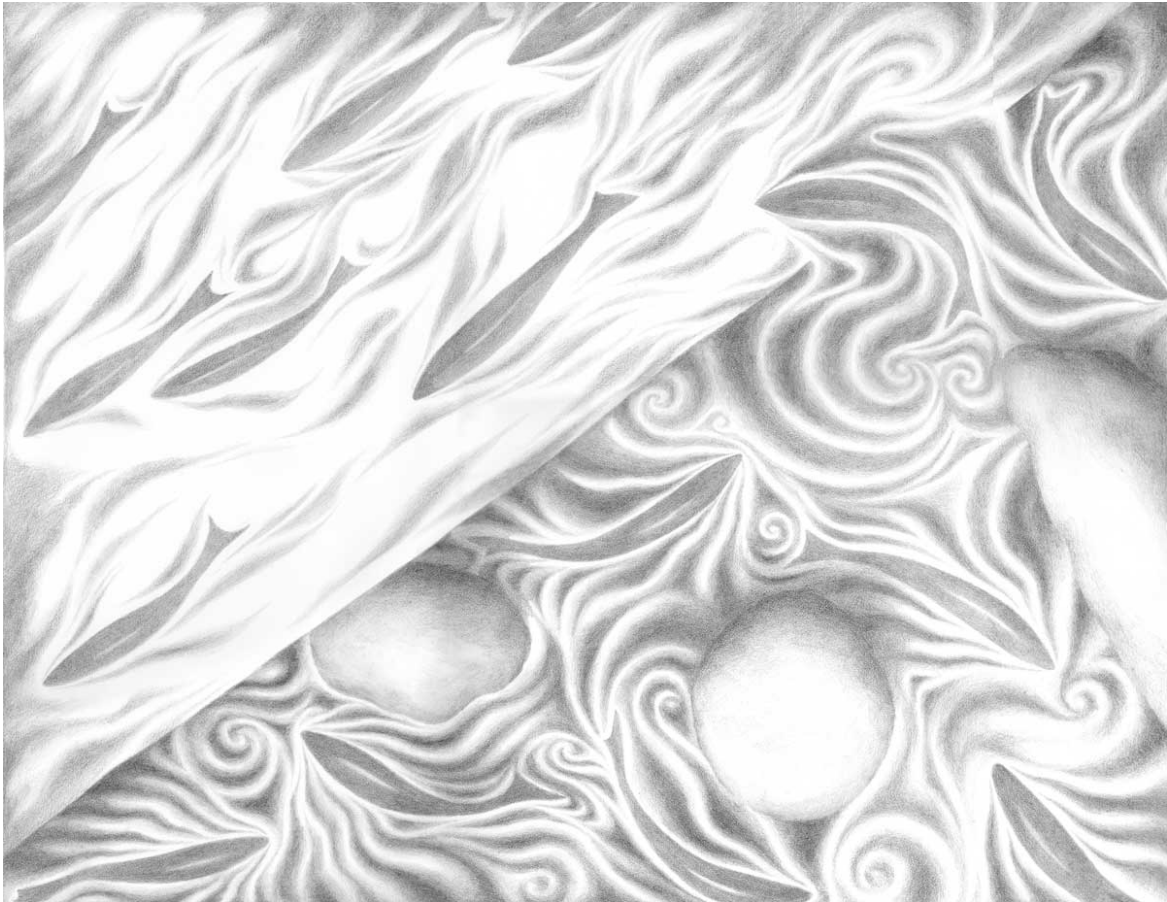




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2006 Retrospective Report



An analysis of results reporting in FY 2007-09 Columbia River Basin Fish and Wildlife Program project proposals, guidance to improve future reporting and program evaluation, and a summary comparison of FY 2007-09 project recommendations from the ISRP and Council with each other and past reviews

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ISRP 2006 Retrospective Report

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Executive Summary

Background

This Independent Scientific Review Panel (ISRP) report provides the retrospective evaluation of benefits to fish and wildlife from projects funded by Bonneville Power Administration to implement the Northwest Power and Conservation Council's Fish and Wildlife Program called for in the 1996 amendment to the Northwest Power Act and included in the 2000 Fish and Wildlife Program.

The Council, together with the ISRP, gathers information to determine the benefits of Fish and Wildlife Program projects by having project sponsors provide results and explain their progress in proposals submitted to implement the Council program and secure Bonneville funding. In 2006, the ISRP reviewed 540 new and ongoing proposals for the Council's FY 2007-09 project selection process. In June 2006, the ISRP completed that review and identified significant programmatic issues in the Fish and Wildlife Program along with the panel's preliminary proposal recommendations. This report extends the programmatic review, providing (1) an analysis of results reporting in FY 2007-09 project proposals, (2) guidance to improve future reporting and program evaluation, and (3) a comparison of FY 2007-09 project recommendations from the ISRP and Council with each other and 2001-03 Provincial Review recommendations.

In conducting this evaluation, the ISRP examined proposals for existing projects (262 of the 540 total) and sought evidence of reporting of tasks completed, physical habitat data, biological data, evaluation of data by sponsors, and application of data analyses to management activities. Based on the reporting, the ISRP assessed the adequacy of the reporting, but did not evaluate the merit, accuracy, or robustness of measurable benefits to fish and wildlife made through specific Bonneville-funded projects. The level of detail in the FY 2007-09 proposals is not sufficient to undertake such a rigorous evaluation at the program-wide or project-specific level.

Findings and Recommendations

The ISRP's primary observation from our evaluation of the FY 2007-09 proposals for existing projects is that over 40% of the projects need to improve their reporting of results. A variety of factors can help explain this deficiency in reporting. In the response loop 8% of the projects reported results at a sufficient level by adding information not provided in their initial proposals. This improved reporting indicates that in some cases the problem was inadequate summarizing, analyzing, and interpreting results in a project proposal rather than lack of data.

Recommendation: Although the current proposal form includes instruction and emphasis on results reporting, the Council and ISRP should develop proposal forms that more explicitly require the reporting of data on physical habitats, biological objectives, summaries of data analysis, and the application of analysis to fish and wildlife management.

For a large portion of projects, however, the problem with reporting likely extends beyond simply summarizing data or data analysis and indicates that a general lack of data collection from a rigorous monitoring and evaluation (M&E) program might be the issue. Specifically, our evaluation shows that this problem especially applies to proposals for habitat restoration in province-level submissions, of which 45% needed improvement and 17% were deemed in critical need of improved reporting. In contrast, for research-oriented projects in the mainstem/systemwide category nearly 75% of the proposals had adequate to mostly adequate reporting.

Recommendations: Monitoring and evaluation should accompany all fish and wildlife habitat restoration projects in order to demonstrate accountability and ecological effectiveness. Statistical and monitoring design support should be made available to sponsors with limited statistical expertise.

Alternative metrics for evaluation may be required for certain project categories such as administrative and educational projects. For example fish tagging projects could be measured by the utility of the data to be used to estimate the vital statistics used in harvest and escapement.

The Council and ISRP should develop proposal submission forms that include identifying which type(s) of monitoring will be undertaken for a project.

In the FY 2007-09 proposals, the level of monitoring and subsequent reporting of habitat project accomplishments was inconsistent. To provide guidance for establishing and reporting reasonable, effective monitoring procedures as part of the project planning process the ISRP suggests the following general framework for monitoring and evaluating Fish and Wildlife Program habitat projects. This hierarchical framework provides different levels of detail and sophistication in monitoring and evaluation guidelines for different types of projects. The ISRP appreciates that each project will not be held to a one-size-fits-all M&E standard.

Recommendations:

Implementation Monitoring

There are many types of habitat improvement projects currently being funded under the Fish and Wildlife Program. We believe all should be monitored for implementation success, and we support the need for accurate implementation metrics as a necessary first step in any M&E effort.

Effectiveness Monitoring

Some form of effectiveness monitoring should accompany any habitat project. The overall level of effectiveness monitoring that has accompanied many projects in the past has not been adequate to address the basic question – are they working? Project sponsors should collect and analyze data that document whether the project is achieving, or is failing to achieve, its stated objectives and is realizing desired habitat and/or target population and/or multi-species benefits.

The ISRP recognizes that habitat projects vary widely in scale and in type, and that elaborate effectiveness monitoring may not be required in every instance. Most of the effectiveness monitoring recommended for individual projects is focused on measuring long-term habitat changes that take place after a project is implemented. The ISRP continues to believe that population-level monitoring is essential to gaining a better understanding of restoration effectiveness. The ISRP recommends continuing with Intensively Monitored Watersheds.

Recommendation:

Intensively Monitored Watersheds

To properly address population-level response of fish species to habitat restoration, we recommend that a network of intensively monitored watersheds (IMWs) be maintained. Here restoration efforts can be coordinated in a way that will facilitate experimental learning by applying enough similar treatments to produce statistically robust results, coupled with thorough inventories of adult, juvenile, and smolt abundance.

In this retrospective evaluation, the ISRP found that 40% (85 proposals) of the ongoing proposals recommended by the Council for funding are deficient in results reporting, and 32% (70 proposals) of the proposals with fundable ISRP recommendations are deficient. Most of those proposals that were deficient received an ISRP fundable (qualified) recommendation, and subsequently the Council included conditions to address these deficiencies in their recommendation to Bonneville. In sum, most of the proposals that the ISRP found in critical need of improved reporting received Council funding recommendations that included conditions to address deficiencies identified by the ISRP before the next project selection process. However, for the proposals that the ISRP found fundable, the Council did not typically identify conditions for Bonneville funding, so those that appear deficient in reporting results are not currently under further review.

Recommendation: ISRP proposal reviews should explicitly address the level and quality of reporting so the Council can use this information more effectively in developing their recommendations to Bonneville. (This ISRP recommendation essentially applies to our internal ISRP review process rather than any potential Council action.)

I. Introduction

What benefits to fish and wildlife (and their habitats) result from the 260 plus projects implemented under the Columbia River Basin Fish and Wildlife Program? Pursuant to the 1996 Amendment to the Power Act, the ISRP is charged to answer this question, that is, to annually review the results achieved from prior year expenditures. The Council's 2000 Fish and Wildlife Program further defines the retrospective review charge, stating that the ISRP's report should focus on the measurable benefits to fish and wildlife made through projects funded by Bonneville and previously reviewed by the ISRP. The ISRP's findings should provide biological information for the Council's ongoing accounting and evaluation of Bonneville's expenditures and effectiveness in meeting the objectives of the program. The Program also states that the ISRP should summarize its province review findings and identify the major basinwide programmatic issues articulated within the province reviews. Ultimately, the ISRP identified the majority of these latter issues in the programmatic section of its FY 2007-09 project review report (ISRP 2006-4a¹) on top of those identified in the 1997-2005 Retrospective Report (ISRP 2005-14²), which summarizes almost a decade of project reviews and the programmatic issues identified within. Thus, the ISRP's FY 2007-09 programmatic comments combined with the 1997-2005 Retrospective Report constitute a thorough treatment of cross-cutting scientific issues that have arisen from the project reviews.

Consequently, this 2006 Retrospective Report focuses on the extent that 262 ongoing projects in FY 2007-09 reported physical habitat and biological results, summarized data analyses, and identified adaptive management actions in their initial proposals and responses to the ISRP's preliminary review comments. The 2006 Retrospective Report finalizes the results reporting evaluation begun in the ISRP Executive Committee's July 11, 2006 memo to the Council, *Draft Analysis -- Reporting of Results in FY07-09*. That memo was based on the ISRP's preliminary report and was generated in response to a long-standing ISRP criticism that Fish and Wildlife Program proposals lacked reporting of measurable biological or physical habitat results of past activities. Project sponsor responded to the ISRP's preliminary review of FY 2007-09 proposals after completion of the ISRP's July memo. Many of the ISRP's preliminary comments focused on the need for presentation of results; thus, many of the responses provided such results. Those responses were considered in the evaluation conducted for this report.

It is important to point out that this report does not evaluate the merit, accuracy, or robustness of measurable benefits to fish and wildlife made through specific Bonneville-funded projects. The level of detail in the FY 2007-09 proposals effectively precluded such a rigorous evaluation at a program-wide or a project-specific level. Instead, the ISRP takes the first step toward answering the question of measurable benefits. That is, did the proposals present results and to what level, such as task completion, data collection, data analysis, and/or adaptive management.

The ISRP's analysis below demonstrates that basic reporting of results was absent or inconsequential in over 40% of proposals. Based on this finding, following the analysis section, the ISRP provides guidance in three areas intended to improve data collection, evaluation, and

¹ www.nwcouncil.org/library/isrp/isrp2006-4a.pdf

² www.nwcouncil.org/library/isrp/isrp2005-14.htm

reporting of results. First, the ISRP describes the type of research, monitoring and evaluation (RM&E) needed for habitat restoration projects. Second, the ISRP specifically identifies some proposals for FY 2007-09 that reported results in such a way that success of the project (towards reaching measurable biological, physical, or management objectives) could be evaluated. Program and project sponsors can refer to this RM&E guidance and those exemplary proposals for direction in developing monitoring plans and future proposals. Third, the ISRP describes how its retrospective analysis might be improved by coordination with the Council on its Annual Fish and Wildlife Program Expenditures Report to the Governors and the Columbia Basin Fish and Wildlife Authority on its Status of the Resource Report (SOTR).

This retrospective report concludes with a summary of the numbers of proposals receiving each recommendation from the ISRP, and a comparison of those recommendations with those of the Council, and prior Fish and Wildlife Program solicitations. Such a comparison is intended to identify trends in proposal recommendations among new versus ongoing projects, the outcome of the response loop, and the number of proposals received and reviewed. This summary will assist the ISRP and Council in reviewing the proposal forms and the ISRP review template to ensure that the requirement for reporting results is sufficiently evaluated during the review process.

II. Analysis of the extent to which FY 2007-09 projects reported results

The FY 2007-09 proposal form instructions (included as part of the solicitation materials) gave explicit directions for project sponsors to report past accomplishments: *“If a project is a continuing one, a clear interpretive history of the project’s past accomplishments must be provided. This information will be used to assess project performance and to assist the ISRP in its retrospective review of prior year results. Special attention must be paid to reporting of results. Wherever possible, results should be stated in terms of the ultimate biological objectives of the Fish and Wildlife Program.”* ISRP review criteria (also available to sponsors) articulated that reported results would be used “to assess project performance and to assist the ISRP in its retrospective review of prior year results,” even though reporting of results was only one criterion used to evaluate a proposal’s scientific merit.

A. The Approach

For this retrospective evaluation of the reporting of results in FY 2007-09 Fish and Wildlife Program proposal and response-loop documents submitted by project sponsors, the ISRP sought evidence of reporting in five areas:

- 1) listing of tasks completed;
- 2) summary of physical habitat data;
- 3) summary of biological data;
- 4) evaluation of data and summary of data analyses; and,
- 5) application of data analyses to management activities (adaptive management).

Additionally, the ISRP sought evidence of publication or dissemination of data analyses beyond the in-house or local level, particularly in peer-reviewed, technical publications. The evaluation of these five criteria is provided in Appendix 2.

This was followed by a categorical assessment of the overall adequacy of results reporting in each proposal, assigning each to one of the following categories:

- Adequate -- Results are reported sufficiently for evaluation.
- Adequate for type -- Results are not reported, but the level of reporting is sufficient based on the project type or status; for example, a project may be so new that there are no results to report, but monitoring and evaluation were designed or appeared to be in place such that adequate reporting was likely in the future.
- Mostly adequate -- Results are reported, but some element or reporting could be improved. For example, a monitoring and evaluation project may have adequately summarized its analysis of biological and physical data, but not provided evidence that project findings were being applied to management. Improved reporting is expected in the next project review.
- Results needed -- Some element of reporting is unsatisfactory (task completion, biological and/or physical data reporting, summarization of data evaluation, and/or application of data). Improved reporting of data is expected in the next project review, and monitoring and evaluation plans need to be in place to ensure adequate reporting. Some well-prepared proposals with likely benefits to fish and wildlife may be deficient in reporting of past results but well positioned to report results in the future.
- Results needed (Critical) -- Lack of reporting is a long-standing and/or major problem. For these projects, the ISRP's final recommendation is focused on the need for immediate remedial action to improve reporting of results. Most of these proposals received a Fundable (qualified), Fundable in Part (qualified), or Not Fundable recommendation from the ISRP. Remedial action is needed before the next project solicitation.

The ISRP's retrospective evaluation of results reporting had two steps. First, the preliminary and final review comments on each proposal were revisited for statements on how well a project reported results. As such, these review comments served as the first screen to determine the level of reporting. Second, in cases where ISRP review comments did not specifically address reporting of results, evaluators inspected the project sponsors' original proposal and response loop submissions to facilitate the retrospective evaluation. The ISRP did not contact project sponsors, review annual reports, or search the peer-reviewed literature to judge level and adequacy of reporting. The ISRP recognizes, however, that reviewer knowledge of a project and its history of publication and contribution to Columbia River basin management affects the importance of the presentation of results in the proposal. In circumstances where the ISRP has been briefed on topics like spill and flow augmentation using data and papers from a project, very brief synopses in a project history achieved the threshold of being acceptable. In other circumstances the brevity of reporting results or only providing a list of tasks accomplished as

the project history were deemed insufficient. The ISRP and sponsors did not have an iterative exchange to address specific reporting deficiencies in every proposal, as, for example, occurs in Three-Step reviews.

In spite of those latter caveats, this analysis provides some useful general observations that can guide future reviews and, importantly, the direction of monitoring and evaluation in the program. Moreover, special care was taken to validate evaluations on those projects held out as model examples and those identified as needing immediate improvement.

B. Observations and Trends

This retrospective review of reporting results in proposals helps identify trends in the level of reporting from different types of proposals (e.g., artificial production, habitat restoration, RM&E, wildlife) and also what type of recommendation they received from the ISRP. We examine patterns that emerge for the type of reporting, task completion through project effectiveness, and which strategies need improvement (e.g., those in habitat projects, mainstem projects). This section's goal is to inform development of M&E guidance and the next round of proposal reviews (including clear guidance, construction of submission forms, expected guidance on results presentation, and so on).

Another value of our review of results reporting lies in identifying specific programs where much more reporting of results is needed and also in identifying areas, for example habitat restoration, where the expectations of what results need to be reported and how projects and strategies should be evaluated are not sufficiently developed. In both of these instances it is likely that a cycle of iteration will be needed, as has been the case with the Comparative Survival Study project (CSS) and the Idaho Supplementation Studies project (ISS).

The initial observation from this analysis of FY 2007-09 proposals and responses for ongoing projects is that over 40% of the projects need to improve their reporting of results (Figure 1). In the response loop about 8% of the projects responding were able to provide better reporting of results than in their initial proposal. This modest improvement signals that one problem with reporting may be a matter of summarizing, analyzing, and interpreting results rather than a lack of data. For future solicitations, the ISRP identifies, in Attachment 1 below, proposals that can be referred to as examples of adequate reporting. In addition, the ISRP intends to work with the Council and BPA on the proposal form and instructions to best facilitate and improve results reporting.

On a very case-by-case basis, review of the annual reports and publications would clarify the benefits to fish and wildlife and contributions to adaptive management within the Columbia River Basin. The ISRP continues to expect, however, that sponsors should be able to summarize their results in a proposal, especially because not all peer reviewers are experts on or familiar with the specific activities, subbasins, or other aspects of the proposed project. In an annual solicitation review it would be inefficient to have reviewers search annual reports for information.

Figure 1. Results Reporting in FY 2007-09 Ongoing Proposals

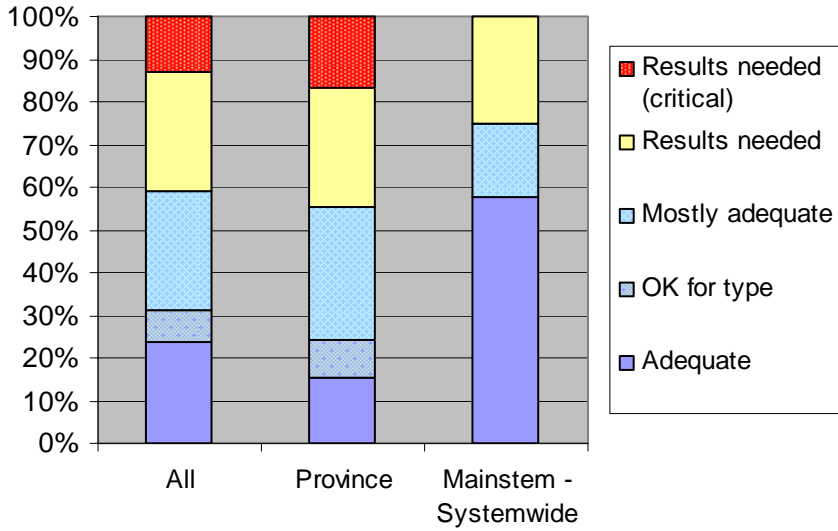
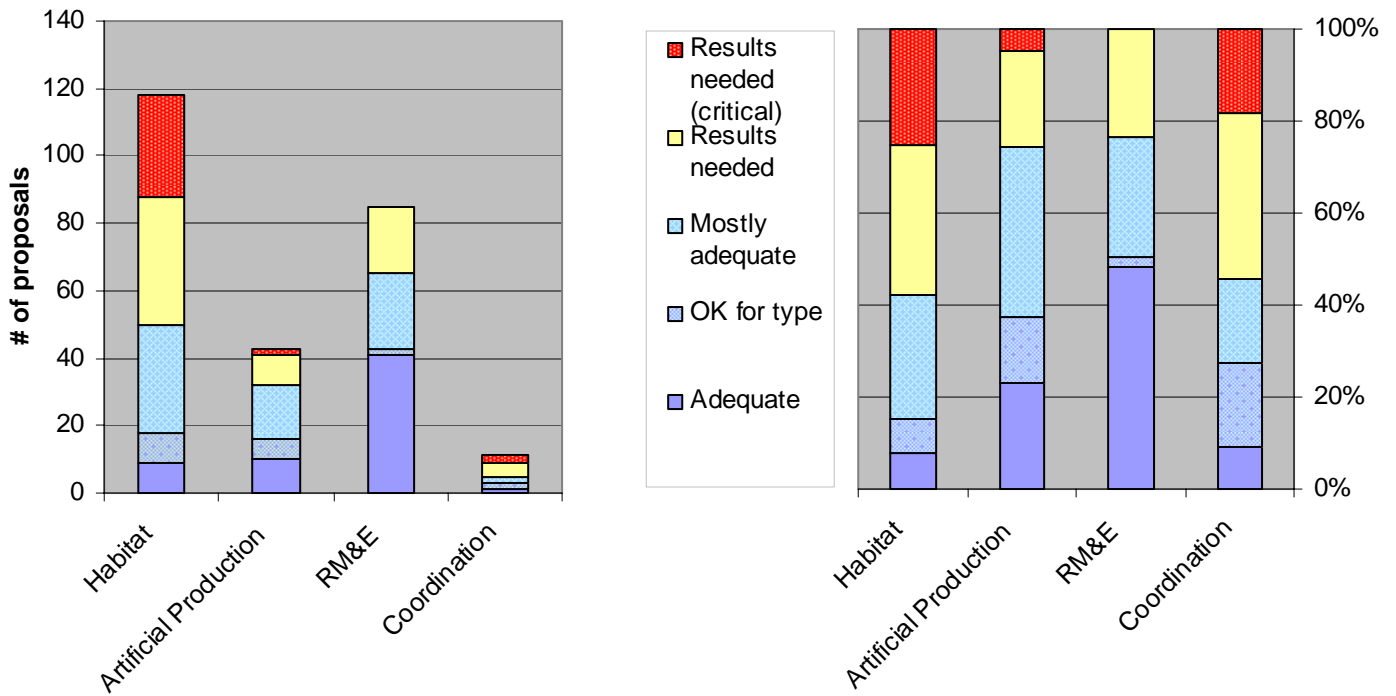


Figure 2 Results Reporting by Project Type



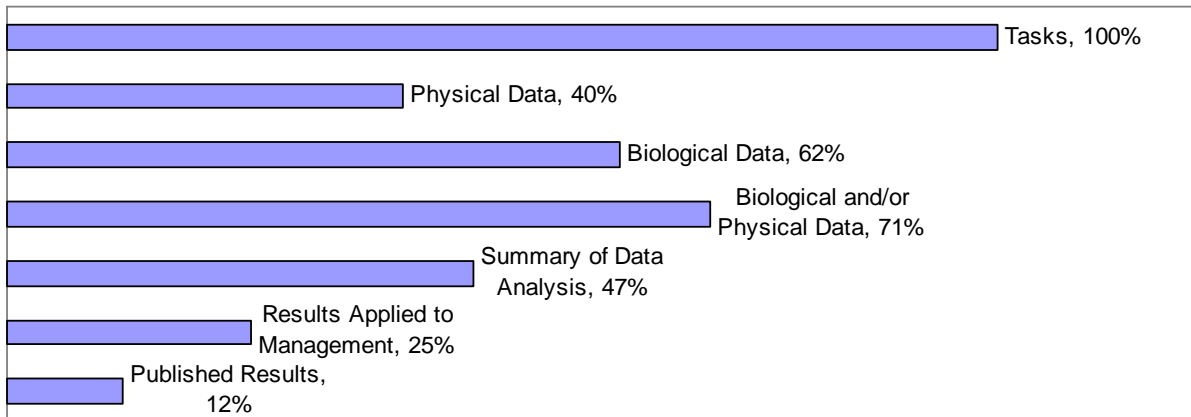
For a larger portion of the projects, the problem is likely deeper than reporting and resides in the level of monitoring and evaluation conducted. A general lack of data collected in a rigorous M&E program may be the issue. Specifically, mainstem/systemwide proposals, which are typically research-oriented projects, did fairly well on reporting of results. About 75% had adequate to mostly adequate reporting, and none received an ISRP evaluation of “results needed critical” (Figure 1). Whereas province level proposals, which are often habitat restoration projects, did not report results as well. Here, about 45% needed improvement, and 17% of those needed critical improvement (Figure 1; also see Figure 2).

This lower level of reporting by habitat projects is likely a product of multiple factors including:

- ambiguous expectations about the level of monitoring and subsequent reporting needed on habitat projects;
- a previous guideline with a publicized 5% of project-cost cap on monitoring;
- habitat restoration proposal objectives not being stated in measurable physical and biological terms;
- the inherent difficulty in evaluating habitat action effectiveness because of natural variability and the small scale of projects compared to the area occupied by other life history stages of the target species and populations;
- lack of expertise or funding needed at a local level to conduct the monitoring and analyze the results;
- lack of incentives to report results; and
- at times, a general assumption by project sponsors that, “we know it’s going to work.”

In the next section, the ISRP provides guidance on improving monitoring and evaluation, as a basis for reporting results of habitat restoration projects. The ISRP and ISAB have previously provided recommendations for monitoring artificial production projects (*Recommendations for the Design of Hatchery Monitoring Programs and the Organization of Data Systems* www.nwcouncil.org/library/isab/isab2000-4.htm, *Monitoring and Evaluation of Supplementation Projects* www.nwcouncil.org/library/isrp/isrp2005-15.htm), and evaluated designs for adaptive management of hydrosystem operations (e.g., *December 2006 Review of the COMPASS Model, Version 1.0* www.nwcouncil.org/library/isab/isab2006-7.htm).

There are numerous other Fish and Wildlife Program project types, and each needs to report results, but they require identifying the appropriate metrics. As an example, the ISRP identified a set of administrative projects and a set of educational projects that cannot be assessed effectively with standard scientific methods. These projects may be evaluated more appropriately with socio-economic methods and metrics. Some hydrology-focused projects report measured engineering objectives, but there are no translations to biological objectives. The assessment of success in these cases could be estimated if the proponents had extended the analysis to biological criteria. Finally, several tagging projects could be measured by the utility of the data for successful estimates of population dynamics, migration, and such – the vital statistics of species harvest and escapement that are key to management of the resource. These are just a few examples.

Figure 3. Percentage of Proposals Presenting Results by Level or Type of Reporting

All proposals reported completion of tasks (Figure 3; the proposal form had a specific section requiring this); however, proposal sponsors, in general, did not describe the goals and objectives of the project at its inception and whether the tasks completed met those objectives. With Bonneville Power Administration's Pisces contract tracking database and revisions to the proposal form, the ISRP expects this more results-oriented type of reporting in future reviews.

While 71% of the proposals reported biological and/or physical data, only 47% took the next step to provide a summary evaluation of those results. Furthermore, only 25% describe how the data informed adaptive management of their project or fish and wildlife restoration at the broader scale. Perhaps one of the problems leading to a lack of summary evaluation is that study areas are small and the activity's influence has a limited effect, which is difficult to document. An evaluation to document effects may need to be broader scale than the project level. Another problem might be lack of attention to quality assurance/quality control during the work, so the data are not worth analysis or reporting. Finally, there might be a lack of reporting culture within the sponsor organization. The reporting culture is strong within research organizations, but not as strong within some others. A possible solution is positive feedback for those that do report. Other approaches might include more tightly tying payment to reporting or precluding future project approval until reporting is completed.

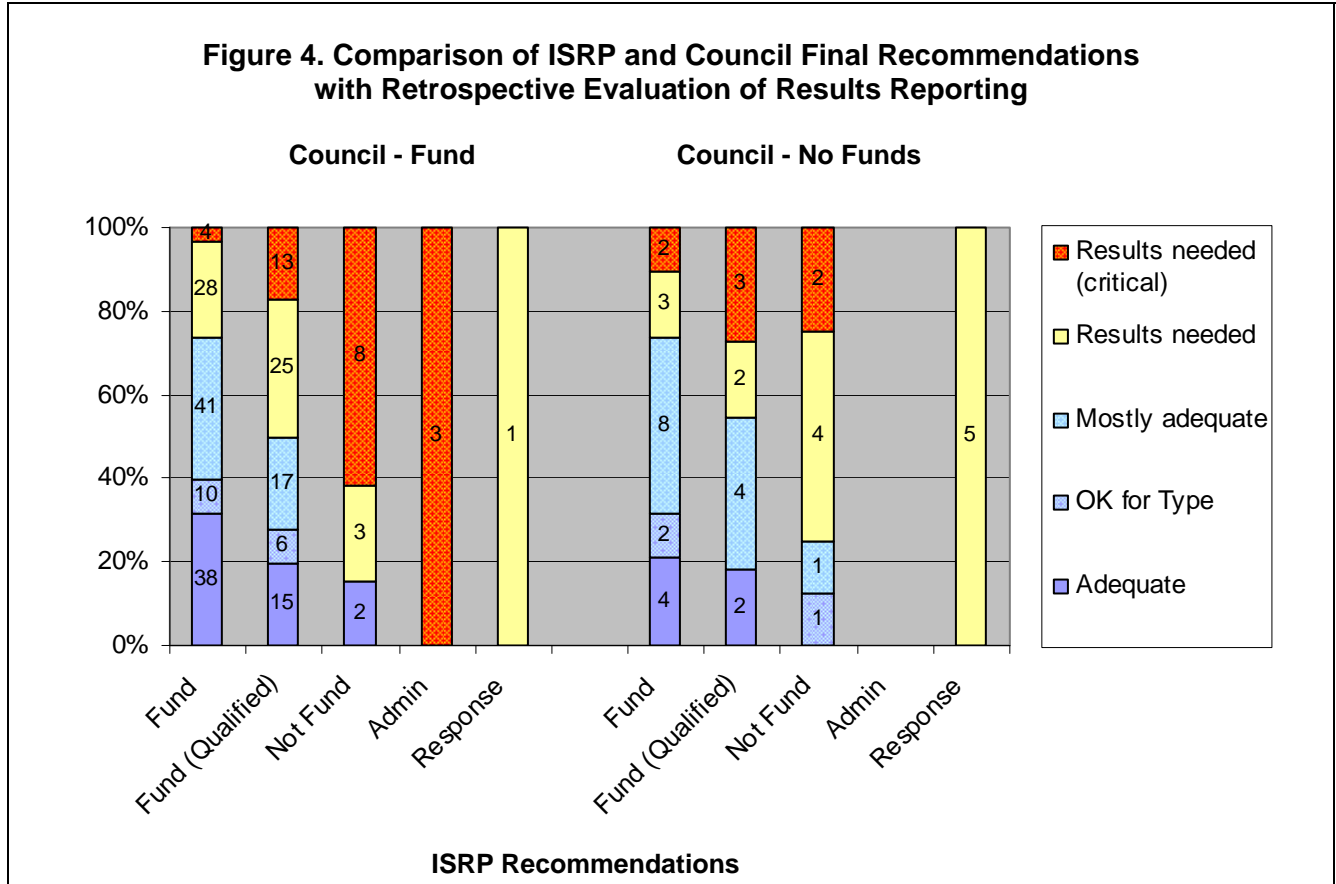


Figure 4 compares the reporting of results in projects recommended for funding by the Council with those not recommended by Council, organized by the ISRP final recommendations. The number of proposals in each category are included in the bar lines. These numbers show that a majority of ongoing proposals recommended for funding by the Council were found to be technically sound by the ISRP (94%, 197 of 211 (does not include 3 administrative proposals)).

Figure 4 also shows that a deficiency in reporting results (potentially indicating a lack of project effectiveness) was associated with ISRP determination of whether an ongoing project was technically sound and recommended for funding. Of the 27 ongoing projects that were either “not fundable” or “response requested” 23 were categorized as “results needed critical” or “results needed.”

Eighty-five ongoing proposals (about 40%) recommended by the Council for funding are deficient in results reporting (Figure 4). Similarly, 70 ongoing proposals (about 32%) with fundable recommendations (fundable, fundable-in-part, fundable (qualified)) from the ISRP were found deficient in reporting during this retrospective evaluation. So, although reporting results is important in an ISRP recommendation, it was not a sole determining factor that the ISRP based its recommendation on. Importantly, 38 of these 70 proposals (54%) received ISRP qualified recommendations. Many of these qualifications focused on ISRP recommendations that project

sponsors report results and the ISRP review these reports in the near future. Certainly these should be reviewed before the next project solicitation and selection process. Council recommendations on these ISRP qualified projects included direction to the sponsors and Bonneville Power Administration that the ISRP's concerns be addressed as a condition to funding; for example, numerous Council comments include statements similar to the "sponsor should complete accomplishments report as called for in ISRP recommendation."

Finally, 23 of the 28 proposals (82%) that the Council recommended for funding had received an ISRP "results needed (critical)" are slated for ISRP review or significant Council scrutiny. And about 40% of those projects receiving an ISRP evaluation of "results needed" have Council comments that specify ISRP concerns need to be addressed. An important observation for the ISRP and Council is that if a project had a "fundable" ISRP recommendation, the Council did not place specific conditions for increased reporting with their recommendation to Bonneville. Consequently, additional reporting for those Fundable proposals identified as needing improved reporting is not underway. In contrast, for most projects that received an ISRP "fundable (qualified)" recommendation, additional reporting was requested.

If improved reporting is needed, the ISRP should use the "fundable (qualified)" category more often to solve the problem. The Council recommended funding 86% of the ISRP "fundable" category and 87% of the "fundable (qualified)" category. Thus, the two separate ISRP recommendation categories appear to have no effect on whether the Council recommends funding for the project, but does effect whether the Council places conditions on its funding recommendation.

The figure also shows that about half the ongoing proposals not recommended by the Council for funding did at least a "mostly adequate" job of reporting results. In fact, 30 of the 47 (63%) ongoing projects not recommended for funding by the Council were recommended in a fundable category by the ISRP. For ongoing projects, the Council recommended funding for just over half the projects that the ISRP found not fundable. Council recommendations for funding do not appear to correlate with the ISRP's evaluation of reporting of results found in this report. Of course, the Council did not have this report when making its decisions. These comparisons suggest that the Council funding decisions took into account other considerations beyond the ISRP review such a local prioritizations, public comments, and information gained beyond the proposal review.

III. Suggested Guidelines for Monitoring and Evaluating Fish and Wildlife Program Projects

A. Background

Some type of monitoring and evaluation should accompany fish and wildlife restoration projects to demonstrate accountability as well as the ecological effectiveness of the restoration action(s). But should every project be held to the same level of monitoring and evaluation? In the most recent project solicitation (FY 2007-09), some project sponsors complained that being held to a 5% monitoring soft cap hindered their ability to learn about a habitat project's success or failure, and the 5% cap was occasionally blamed for implementing a limited monitoring effort. Lack of habitat restoration effectiveness documentation is often ascribed to a belief that "we know it works," and therefore, monitoring and evaluation are not necessary. This assumption is not scientifically supported. In a comprehensive review of 37,099 river restoration projects in the United States, Bernhardt et al. (2005) found the level of M&E to be generally inadequate, particularly for small-scale habitat improvement efforts. They stated "*We found that only 10% of project records indicated that any form of assessment or monitoring occurred. Most of these ~3700 projects were not designed to evaluate consequences of restoration activities or to disseminate monitoring results,*" and further "*Because most project records were inadequate to extract even the most rudimentary information on project actions and outcomes, it is apparent that many opportunities to learn from successes and failures, and thus to improve future practice, are being lost.*"

The ISRP agrees that habitat M&E should be strengthened in the Council's Fish and Wildlife Program. The ISRP and ISAB earlier reviewed a *Draft Monitoring and Evaluation Guidance Document* (March 2006 version) at the Council's request. The ISRP concluded that more specificity was needed in subsequent drafts, and the latest version (in progress) attempts to bring more detail to the Fish and Wildlife Program's M&E element for all aspects of the program. The latest version also relates BPA-supported habitat restoration projects to other region-wide M&E programs, such as the multi-agency Pacific Northwest Aquatic Monitoring Partnership (PNAMP), EPA's Environmental Monitoring and Assessment Program (EMAP), the Collaborative Systemwide Monitoring and Evaluation Project (CSMEP), and various state aquatic habitat monitoring programs. Coordinating different M&E projects, while a substantial challenge, is essential to prevent unnecessary duplication of effort, but specific questions of what to monitor, where and when to monitor it, and what monitoring protocols should be followed, deserve as much clarification and guidance for sponsors as possible. It is in this spirit that we offer some suggestions for monitoring and evaluating habitat projects.

Over the course of reviewing the FY 2007-09 proposals, the ISRP concluded that the level of monitoring and subsequent reporting of habitat project accomplishments was inconsistent. It was clear that guidance was needed with respect to our expectations for establishing and reporting reasonable, effective monitoring procedures as part of the project planning process. Therefore, we suggest the following general framework for monitoring and evaluating Fish and Wildlife Program habitat projects. This is a hierarchical framework that suggests different levels of detail and sophistication in monitoring and evaluation guidelines for different types of

projects. It also builds upon landscape-based monitoring and evaluation approaches advocated by the ISRP and ISAB in a number of previous reports. Determining an appropriate level and duration of monitoring will depend on the social and ecological context of the project area and what other monitoring efforts are taking place. We hope our recommendations will help project managers conduct M&E at the appropriate level, understand how their restoration efforts fit in a broader regional context, and appreciate that each project will not be held to a one-size-fits-all M&E standard.

B. Monitoring Terminology

A number of terms have been applied to different types of habitat monitoring, and it is useful to include a brief review of the terminology. The following table is adapted from a recent book on habitat restoration monitoring (Roni 2005, as modified from MacDonald et al. 1991).

Monitoring type	Description
Baseline	Characterizes the existing biota, chemical, or physical conditions for planning or future comparisons
Status	Characterizes the condition (spatial variability) of physical or biological attributes across a given area
Trend	Determines changes in biota or conditions over time
Implementation (administrative, compliance)	Determines if project was implemented as planned
Effectiveness	Determines if actions had desired effects on watershed, physical processes, or habitat
Validation (research, sometimes considered part of effectiveness)	Evaluates whether the hypothesized cause and effect relationship between restoration action and response (physical or biological) were correct

A given fish and wildlife project may incorporate several types of monitoring over the life of the project. For example, baseline, status and trend monitoring may be necessary to design monitoring and evaluation programs. Baseline and status monitoring may be useful for identifying potential mitigation gains (e.g., HEP). Trend monitoring may also be used after project completion as part of a long-term, regional survey of ecological resources (Urquhart and Kincaid 1999). Implementation monitoring should be a part of every project, and plans for some level of effectiveness monitoring should be included in most project proposals. Alternatively, there should be an explicit description in the proposal of the way in which effects of the restoration project could be monitored as part of an ongoing effectiveness monitoring program at the subbasin scale.

The ISRP acknowledges that some project sponsors may not have access to the resources necessary to conduct effectiveness monitoring; however, in those cases restoration project plans should include a description of desired physical and biological results and identification of subbasin effectiveness monitoring programs (if present) into which data from the project could be fed if appropriate responses were studied. Subbasin planners could then select a subset of

restoration projects for coordinated effectiveness monitoring where opportunities and resources are available.

Validation monitoring to test specific cause and effect relationships is expected to occur in fewer projects due to the complexity, difficulty, and cost of this type of monitoring. However, sufficient validation monitoring throughout the region is necessary to establish the effectiveness of the Fish and Wildlife Program in changing target populations.

In the following discussion we focus on suggested guidelines for the last three monitoring types in the table above: implementation, effectiveness, and validation. Because there has been so much overlap and confusion in the use of the terms effectiveness monitoring (which, *sensu stricto*, addresses the physical consequences of habitat restoration) and validation monitoring (which tracks the responses of biota to restoration), we combine the two types and use the more commonly-used term effectiveness monitoring with the understanding that it can, and often should, include both habitat and target population changes after restoration actions. Therefore, in the following discussion we suggest appropriate methods of monitoring and evaluating (1) project implementation, and (2) project effectiveness. This is consistent with terminology previously defined by the ISRP and fish and wildlife managers in the Columbia River Basin who have developed regional RM&E plans (ISRP 2005-14).

C. Implementation Monitoring

There are many types of habitat improvement projects currently being funded under the Fish and Wildlife Program. We believe all should be monitored for implementation success. Below are some of the most common types of projects and the implementation metrics used to measure their impact (adapted from Bonneville's Pisces project tracking database):

Type of Habitat Improvement	Implementation Metric
Develop Terrestrial Habitat Features	# of features
Install Fence	# of miles of fence
Plant Vegetation	# of acres of planted; # of riparian miles treated
Weed Control	# of acres treated
Practice No-till and Conservation Tillage Systems	# of acres treated
Upland Erosion and Sedimentation Control	# of acres treated
Increase Instream Habitat Complexity	# of stream miles treated; # of structures installed
Realign, Connect, and/or Create Channel	# of stream miles before treatment; # of stream miles treated, including off-channels, after realignment
Decommission Road	# of road miles decommissioned
Improve/Relocate Road	# of road miles improved, upgraded, or restored
Remove vegetation	# of acres treated
Create, Restore, and/or Enhance	# of acres treated

Type of Habitat Improvement	Implementation Metric
Wetland	
Install Fish Passage Structure	# of miles of habitat accessed
Install Well	Amount of unprotected water flow returned to the stream by conservation in cubic feet per second; estimated # of miles of primary stream reach improvement
Remove/Install Diversion	# of miles of habitat accessed
Lease Land	# of acres of new lease; # of riparian miles protected
Trap and Haul	# of fish
Install Fish Screen	Flow rate at the screen diversion allowed by the water right; quantity of water protected by screening, as determined by what is stated in the water right or calculated based on flow rate
Remove/Modify Dam	# of miles of habitat accessed
Install Pipeline	Amount of unprotected water flow returned to the stream by conservation in cubic feet per second; estimated # of miles of primary stream reach improvement
Upland Erosion and Sedimentation Control	# of acres treated
Install Sprinkler	Amount of unprotected water flow returned to the stream by conservation in cubic feet per second
Enhance Floodplain	# of acres treated
Acquire Water Instream	# of miles of primary stream reach improvement; # of miles of total stream reach improvement, including primary and secondary reaches; amount of water secured; flow of water returned to the stream as prescribed in the water acquisition
Remove Mine Tailings	# of acres treated; tons of tailings removed

The ease with which these implementation monitoring metrics can be measured varies. Of the habitat improvement project types, those involving stream protection or riparian vegetation are simplest to measure; miles of fence constructed or number of trees planted are relatively easy to report. Instream habitat improvement (e.g., number of habitat “structures” placed in a stream channel) is also easy to measure, although instream structures often suffer damage from high flows and must be periodically reassessed. Many of the terrestrial habitat improvement project types just call for measuring acres treated, although this metric by itself conveys little quantitative information about habitat conditions before or after the restoration action, or whether objectives for improved landscape conditions were reached.

There are, however, some implementation metrics that are difficult to determine. Removing migration barriers, such as poorly engineered road crossings and push-up dams, often calls for reporting the number of miles of newly accessible habitat. This figure will vary by species and also by stream discharge. Quite often the estimate of new habitat opened up by barrier removal represents a (sometimes optimistic) guess based on coarse landscape-scale features such as average channel gradient, and not on ground-truthed surveys of the distance from the barrier removal project to the next barrier upstream. For this reason, the amount of stream made

available by removal of a migration barrier is better left to effectiveness monitoring. Implementation monitoring can be limited to the physical aspects of barrier removal and channel modification. Likewise, estimates of water conservation not based on actual flow or discharge measures using calibrated flow meters often employ unverified hydrologic models and usually do not provide confidence intervals around the amount of water believed to be conserved. While streamflow models are a useful first step, quantitative measurements are usually needed to validate predictions of flow improvements. In both of these examples, accurate implementation metrics can be time-consuming and/or costly to produce but are still essential to documenting project benefits.

The ISRP therefore supports the need for accurate implementation metrics as a necessary first step in any M&E effort. We suggest the following guidelines for improving implementation monitoring within several general categories of habitat improvement projects:

Project Type	Implementation Monitoring Recommendations
Riparian fencing; riparian vegetation management	<ul style="list-style-type: none"> • Actual measurements of miles of fence installed or number of trees planted or reduced density of invasive plants. • Photo-documentation at pre-determined photo points to provide a basis for changes in the condition of the fence or riparian zone over time. Digital images are easy to obtain and archive.
Erosion control	<ul style="list-style-type: none"> • Actual measurements of the number of acres treated and the types of control measures employed. • Photo-documentation at pre-determined photo points of the erosion control treatments applied to a site. The photos should provide a representative sampling of the entire area treated and the range of conditions to which treatments were applied.
Stream habitat improvement; channel realignment; floodplain reconnection	<ul style="list-style-type: none"> • Actual number of rearing habitat structures installed. • Actual length of stream receiving habitat treatments or channel bioengineering. • Acres of floodplain reconnected with channel. • Square meters of spawning habitat created or rehabilitated. • Photo-documentation of the stream or floodplain before and after treatment.
Water conservation (including water right acquisition); no-till or conservation tillage; improved irrigation systems (wells, pipelines, drip irrigation, reduced water consumption sprinklers)	<ul style="list-style-type: none"> • Actual acres of land affected by the improved irrigation system. • Actual reduction in agricultural water withdrawals from streams or rivers – measured in cfs (cubic feet per second). • Actual amount of water conserved by installing well(s) – requires measurement of water yield from well in cfs. • Amount of water released to instream flow from water rights acquisition (while this is usually a theoretical figure, actual before and after stream discharge measurements are helpful). • Any evidence of reduced surface erosion resulting from no-till or conservation tillage practices.

Project Type	Implementation Monitoring Recommendations
Road improvement, relocation, or decommissioning	<ul style="list-style-type: none"> • Actual miles of road decommissioned. • Actual miles of road relocated away from a riparian zone, floodplain, or unstable slope. • Number of road improvements actually implemented, e.g., # of water bars, ditch relief culverts, improved road crowns, and other sediment control measures. • Number of direct entry sediment points (ditches, culverts) eliminated.
Fish passage improvement; road crossing replacement; dam removal; trap and haul	<ul style="list-style-type: none"> • Photo-documentation of the site before and after treatment. • Thorough description of steps taken to ensure that site is passable (include description of passability at different flows and by different species/life history stages). • In the case of trap and haul projects, the actual number of fish captured and relocated above a barrier.
Terrestrial habitat improvement; land leases	<ul style="list-style-type: none"> • Actual number of acres treated or leased. • Photo-documentation of the habitat features improved.

The table above emphasizes two general aspects of implementation monitoring: (1) actually measuring the realized improvements, whether miles of fence, amount of water conserved, acres treated, or other habitat improvement action, in commonly used units such as miles, cubic feet per second, or acres (dual English-metric units are okay), and (2) wherever possible, documenting a restoration action with digital photographs that can be archived in a publicly accessible data repository, preferably with dates and accurate geo-spatial coordinates of the photopoint (easily obtainable with GPS). There is one other point the ISRP wishes to make. Implementation monitoring should pay close attention to instances where part of a project, for whatever reason, was difficult or impossible to implement as planned. Although project sponsors may be reluctant to report such “failures” they are, in fact, valuable learning opportunities for future projects.

D. Effectiveness Monitoring

As a rule of thumb, some form of effectiveness monitoring should accompany any habitat project. That is, project sponsors should collect and analyze data that document whether the project is achieving, or is failing to achieve, its stated objectives and is realizing desired habitat and/or target population and/or multi-species benefits. The ISRP recognizes that habitat projects vary widely in scale and in type, and that elaborate effectiveness monitoring should not be required in every instance. However, we also recognize that the overall level of effectiveness monitoring by many projects in the past has not been adequate to address the basic question – are they working?

Several monitoring designs are discussed by Downes et al. (2002) and Roni et al. (2005). In addition to the commonly used before-after study design (BA) and the before-after-control impact design (BACI) there are several designs that may be more appropriately used, especially

if stronger inference about impacts is desired or if identifying cause-effect relationships is of interest. Downes et al. (2002) describe several modifications of the BACI design such as BACI with samples paired in time (BACIP) to allow estimation of the temporal variation in the differences between the control and impact sites. Another modification occurs when multiple locations are used, thus allowing examination of whether the population of treatment locations differs from the population of control locations in the same way before and after intervention (MBACI). In Roni et al. (2005) a control-impact (paired treatment and no-treatment) design with spatial replication is referred to as extensive post-treatment design (EPT). The difference between MBACI and EPT depends on whether the locations are considered to be randomly selected from a population of locations or are specially chosen locations, respectively. Other variants of the MBACI design occur when the control and impact locations consist of a series of matched pairs or when samples are paired in time.

Roni et al. (2005) provide a useful table that suggests appropriate monitoring designs for single and multiple habitat projects. This table is given below with some modification. Monitoring designs are as follows: BA = before-after study design; BACI = before-after-control-impact study design; BACIP = before-after-control-impact-paired in time; EPT = extensive post-treatment design; MBACI = multiple location-before-after-control-impact.

	<i>Small-scale</i>		<i>Large-scale</i>	
	Reach/local project objective	Recommended monitoring design	Watershed/population objective	Recommended monitoring design
Single projects	Improve local habitat and abundance of target species	BA, BACI, or BACIP	Improve watershed conditions and target populations	BA, BACI, or BACIP
Multiple projects	Taken together, improve local habitat and abundance or target species	EPT, MBACI, or replicated BA	Improve watershed conditions and target populations by combining projects of various types	BA, BACI, BACIP
			Improve watershed conditions and target populations by combining projects of a similar type	BA, BACI, BACIP or MBACI

The monitoring design implemented will determine the appropriate methods for statistical analysis of the data and the interpretation of the results. Each of the designs examines impacts in a different way and thus changes the questions being asked and the resulting answers. Some approaches to analyzing monitoring data are discussed by Boone et al. (2005), Cloutman and Jackson (2003), Downes et al. (2002), McDonald et al. (2000), Murtaugh (2000), Conquest (2000), Van den Brink (1999), and Carpenter et al. (1989).

Using the same project types as given in the implementation monitoring table, and assuming that the project sponsor employs appropriate sampling protocols, the ISRP suggests the following metrics for effectiveness monitoring, recognizing that methodologies continue to be improved:

Project Type	Effectiveness Monitoring Recommendations
Riparian fencing; riparian vegetation management	<ul style="list-style-type: none"> • Measurements of changes in ground cover over time (several years, if possible). This can be carried out by standard vegetation survey methods such as transects or regularly spaced vegetation plots. Sampling locations should include the outer riparian zone as well as the streambank. • Inventory of the developing riparian plant community as it recovers from grazing. It is important to track plant associations and monitor unwanted species. • Quantitative measurements of changes in riparian canopy density over time. This can be accomplished with canopy densimeters, fisheye photography coupled with computer analysis, or an array of light sensing devices (e.g., PAR sensors). Whatever the method, measurements should be taken throughout the project area and be replicated over time periods sufficient to capture trends. It is assumed most of the monitoring will occur in summer when shade is most important to aquatic ecosystems. Temperature measurements should accompany shade measurements. • Surveys of plant mortality due to browse pressure. This includes monitoring to determine livestock grazing as well as browsing by wildlife (ungulates, rodents, and beaver).
Erosion control	<ul style="list-style-type: none"> • Measurements of changes in ground cover over time (several years, if possible). This can be carried out by standard vegetation survey methods such as transects or regularly spaced vegetation plots. • Measurements of surface erosion over time using sediment collection trenches, erosion pins, or some other erosion study method. This is a difficult undertaking because it is often hard to sample enough sites to be fully representative of the project area, so it is unlikely to be carried out in most cases. It is, however, the most direct method of determining surface erosion. • Upstream-downstream and before-after comparisons of stream sedimentation at the project area. Turbidity measurements are much easier to analyze, but sufficient samples must be obtained to capture the range of turbidity variation, so automated samplers are usually needed. Deposited sediment is much harder to sample and analyze (e.g., freeze coring), but surrogate measures (e.g., embeddedness) may reveal trends if large changes occur. • Stream macroinvertebrates have sometimes been used to assess habitat degradation, and there are sediment-specific macroinvertebrate metrics (e.g., extent of gill fouling on mayflies), but great care must be used to partition the effects of a sediment control project from other factors that may influence sediment quantity in the stream channel.

Project Type	Effectiveness Monitoring Recommendations
Stream habitat improvement; channel realignment; floodplain reconnection	<ul style="list-style-type: none"> • Thorough inventory of stream habitat composition, preferably using a BACI design. Above and/or below stream reaches may serve as control sites if they possess similar gradients and other geomorphic features in common with the treated reach. To establish the longevity of instream structures inventories should be repeated over several years or until a major channel-forming flood occurs. • Where the goal is to increase channel sinuosity by realigning the channel, monitoring should track sinuosity over time to verify that desired changes have occurred and the stream will not revert back to its former alignment. This can be done remotely (e.g., air photos). • Where the goal is to reconnect the stream with its floodplain, measure the area of floodplain inundated at different flood stages and the duration flooded. • Periodic surveys of fish use of rehabilitated habitat in the project area, using techniques as quantitative as possible (this will range from electrofishing to snorkel counts, depending on conditions). Similar surveys should be carried out at control sites, again using a BACI design where possible. • Depending on the location and extent of the stream habitat improvement project, it might be possible to monitor the number of migrating adults and smolts, which can potentially provide a very powerful way of measuring productivity change. However, great care must be taken to ensure that adult spawning and smolt production occurred within the project reach, not somewhere else. In most cases, this can't be done unless the restoration treatment is applied to the entire available stream network. The alternative is to place permanent fish traps at the upstream and downstream boundary of the treated reach, but this often imposes maintenance problems and traps may occasionally fail.
Water conservation (including water right acquisition); no-till or conservation tillage; improved irrigation systems (wells, pipelines, drip irrigation, reduced water consumption sprinklers)	<ul style="list-style-type: none"> • Effectiveness monitoring should focus on two aspects of water conservation – the quantity of water added to instream flows as a result of the conservation action, and the quality of water returned to the stream, if this is part of the project. Water quantity should be measured as directly as possible (instream discharge and, where applicable, careful measurements of return water volume) and related to the natural hydrograph of the drainage system, e.g., does the project increase summer low flows? The quality of agricultural return water should be monitored, including sediment, temperature, and agriculturally-related chemical concentrations (particularly nutrients, hormones, herbicides, and pesticides). • Fish condition and abundance within and downstream from the reach receiving the additional water can be monitored and compared to control (usually upstream) sites. Fish abundance should be monitored using techniques as quantitative as possible. Fish condition – a ratio of weight to length – can provide a surrogate measure of trophic

Project Type	Effectiveness Monitoring Recommendations
	<p>conditions in the stream.</p> <ul style="list-style-type: none"> • Tissue samples of fish downstream from agricultural return water sites should be monitored for chemicals that might interfere with survival, growth, or reproduction.
Road improvement, relocation, or decommissioning	<ul style="list-style-type: none"> • Upstream-downstream and before-after comparisons of stream sedimentation at the project area. Turbidity measurements are much easier to analyze, but sufficient samples must be obtained to capture the range of turbidity variation, so automated samplers are usually needed. Deposited sediment is much harder to sample and analyze (e.g., freeze coring), but surrogate measures (e.g., embeddedness) may reveal trends if large changes occur. • Because many road relocation projects aim to get roads out of riparian zones, post-treatment effectiveness monitoring should include surveys of riparian vegetation condition, re-establishment of secondary channels that were cut off by the old road, and reconnection of the stream with off-channel wetlands and other floodplain features that were formerly isolated. Such surveys need not be repeated in multiple years as long as the riparian zone remains intact.
Fish passage improvement; road crossing replacement; dam removal; trap and haul	<ul style="list-style-type: none"> • Actual surveys of fish use of the newly accessible section of stream. At a minimum, two or more foot surveys, or other appropriate survey method, of the reach upstream from the former barrier (one early in the spawning season; one late) to determine how far up in the watershed adults migrate. This should be repeated for several years to capture a range of flow conditions and adult abundances. • Where feasible, determine smolt production from the newly available habitat. This will facilitate a much better understanding of the productivity of the upper watershed and the long-term benefits of the barrier removal project (dividing smolts going out by brood-year adults coming in gives a crude but valuable ratio of smolt production per adult). This should only be attempted where accurate estimates of adults and smolts are possible.
Terrestrial habitat improvement; land leases	<ul style="list-style-type: none"> • Effectiveness monitoring should include measures of the rate at which a site is returning to a desired condition. Quite often the focus will be on restoring a particular type of plant community, so survey techniques appropriate to plant assemblage succession should be used such as permanent vegetation plots. If the goal is to restore habitat for various wildlife species, direct census techniques (e.g., winter bird counts, pitfall traps for rodents, etc.) should be used. • Remote sensing can be used to track changes in canopy cover, forest composition, and other potentially useful measures of landscape change. Although these techniques can be expensive (e.g., LiDAR), the cost can often be spread among several projects if they are in close proximity.

E. Intensively Monitored Watersheds

The ISRP has examined various monitoring designs in its 2005 Retrospective Report and in a subsequent draft journal publication manuscript on research, monitoring, and evaluation in the Columbia River Basin (see pages 18-36 in *Independent Scientific Review Panel Retrospective Report 1997 - 2005* www.nwcouncil.org/library/isrp/isrp2005-14.htm and update www.nwcouncil.org/library/isrp/isrp2005-14a.htm). The discussion in those reports centers on an appropriate use of M&E terminology and on general guidance for designing monitoring efforts at large scales. In the guidelines presented here we use a somewhat simplified set of definitions relative to our earlier recommendations, but we believe the central need for thoughtfully controlled monitoring remains. Readers are referred to earlier reports for more details.

We note that almost all of the effectiveness monitoring recommendations in the table above do not require measuring population-level changes resulting from individual projects. As the ISRP and ISAB have stated before (see ISAB 2003-2 *A Review of Strategies for Recovering Tributary Habitat* www.nwcouncil.org/library/isab/isab2003-2.htm), the scale of most individual projects relative to the geographical size of breeding populations is usually too small to produce statistically detectable population changes (although barrier removal may be an exception), since other factors cannot be controlled. Instead, our recommendations for effectiveness monitoring of individual projects is strongly focused on measuring long-term habitat changes that take place after a project is implemented.

However, we continue to believe that population-level monitoring is essential to gaining a better understanding of restoration effectiveness. To properly address this issue, we believe that a network of intensively monitored watersheds (IMWs) is needed in which restoration efforts can be coordinated in a way that will facilitate experimental learning by applying enough similar treatments to produce statistically robust results, coupled with thorough inventories of adult, juvenile, and smolt abundance (for example, see ISRP 2006-1 *Review of Salmon Subbasin Pilot Projects Monitoring and Evaluation Plan* www.nwcouncil.org/library/isrp/isrp2006-1.htm). Such an effort is already underway in some watersheds, but there are many significant gaps among the Columbia Basin's regions. A more organized approach to monitoring the effects of different types of habitat projects is required to learn which actions and strategies yield improvements in abundance, productivity, diversity, and geographic distribution of salmon and steelhead at the population level. As subbasin planning moves forward, we encourage watershed planners to identify areas where clusters of similar projects can be studied in the aggregate, which should greatly improve our ability to detect habitat restoration effects at the population level.

The approach described above assumes that a sufficient number of intensively monitored watersheds are established to produce statistically valid conclusions that can be applied throughout the Columbia River Basin. However, there are a number of potential pitfalls with these large-scale experiments that make such an approach problematic. Expense is an obvious factor. It often costs \$1,000,000 or more per year to intensively monitor a watershed; therefore, not very many IMWs are likely to be designated. There are other issues as well. Treatments applied are usually ones that are felt to have a high probability of leading to a positive response

from the focal species. The suite of treatments is often determined using some type of limiting factor analysis, or a model such as EDT. Because watershed conditions and perceived habitat deficiencies are somewhat different at each location, the treatments vary among watersheds and IMWs cannot be considered true replicates. In effect, each becomes a case study. Recently, NOAA Fisheries NW Fisheries Science Center (C. Jordan) has been exploring the use of a watershed classification approach to address this issue. The hypothesis currently being tested is that watersheds with comparable environmental conditions should respond to the application of comparable habitat restoration projects in a like way; thus, a watershed with characteristics similar to an IMW should respond to treatments in a similar manner.

An interesting approach to intensively monitored watersheds has been used in the British Columbia Watershed Restoration Program. The program was designed to investigate the effectiveness of restoration treatments following logging in relatively small catchments (Keeley and Walters 1994; Mellina and Hinch 1995; Gaboury and Wong 1999) where it was possible to apply restoration treatments to entire watersheds. The basic study design involves intensively monitored clusters of treated watersheds scattered throughout the landscape. Each cluster consists of one or two treatment watersheds (watersheds with different restoration approaches) paired with an untreated control. Keeley and Walters (1994) originally suggested that 8-16 such clusters be monitored for 4-8 years. Subsequently, the study design was modified somewhat to 4-6 treatment-control pairs where the treatment was post-logging restoration (Mellina and Hinch 1995). It is important to point out that these were relatively small catchments with relatively simple types of restoration projects, as opposed to large watersheds where multiple types of land use create a wide variety of environmental stressors which require different restoration actions. However, where habitat damage has primarily been caused by a certain type of activity and it is possible to apply restoration treatments throughout the watershed (while not treating the control member of the pair); this approach is a statistically powerful way of assessing restoration effectiveness.

IV. Coordinating the ISRP Retrospective Review with Council and Columbia Fish and Wildlife Authority Reports

While the ISRP is charged with providing a retrospective report to the Northwest Power and Conservation Council on the results from prior year Fish and Wildlife Program expenditures, the Council in turn reports annually to the Northwest Governors details of Bonneville Power Administration expenditures to implement the Council's Fish and Wildlife Program, including a summary of the status of fish runs. The Council also reports to the United States Congress on developments in both the Fish and Wildlife Program and the Power Plan.

All of these reports can be more efficiently prepared when information is readily available for each project implemented under the Fish and Wildlife Program. In the past, the ISRP repeatedly concluded that it cannot ascertain whether projects are benefiting fish and wildlife, and whether the Fish and Wildlife Program is making progress in achieving its biological objectives, based on the information that is available. The ISRP concluded in the programmatic comments in past solicitation reviews and in the recent retrospective (ISRP 2005), that a lack of a designated party to assume responsibility for collecting and making available data from Fish and Wildlife Program projects was constraining the effectiveness of adaptive management of the program. In response to these needs the Columbia Fish and Wildlife Authority (CBFWA) has under development an interactive internet/Web based summary of fish and wildlife resources (Status of the Resource report) organized by Columbia River Fish and Wildlife Program provinces and subbasins.

The Status of the Resource report provides expenditures by Bonneville Power Administration, Pacific Coastal Salmon Recovery Fund, and state initiatives. Maps are provided for each Columbia River Basin province and subbasin identifying the locations of dams, hatcheries, and restoration projects. Narratives, graphs, and tables identify listed species, subbasin plan focal species, limiting factors for these species, and available data on the abundance of each species. Individual projects in a subbasin are listed and linked electronically to proposals maintained by CBFWA and reports archived by BPA.

The ISRP was provided electronic copies of the draft report in August 2006 and was briefed on the Web site in December 2006 by CBFWA staff. The draft report and Web site were a good start on providing information on Columbia River Basin fish and wildlife resources, their habitats, limiting factors, and projects to support the restoration of these species. The information could serve as a source for reports of substantial geographic breadth with general treatment of specific topics, such as the Council reports to the Governors and the United States Congress.

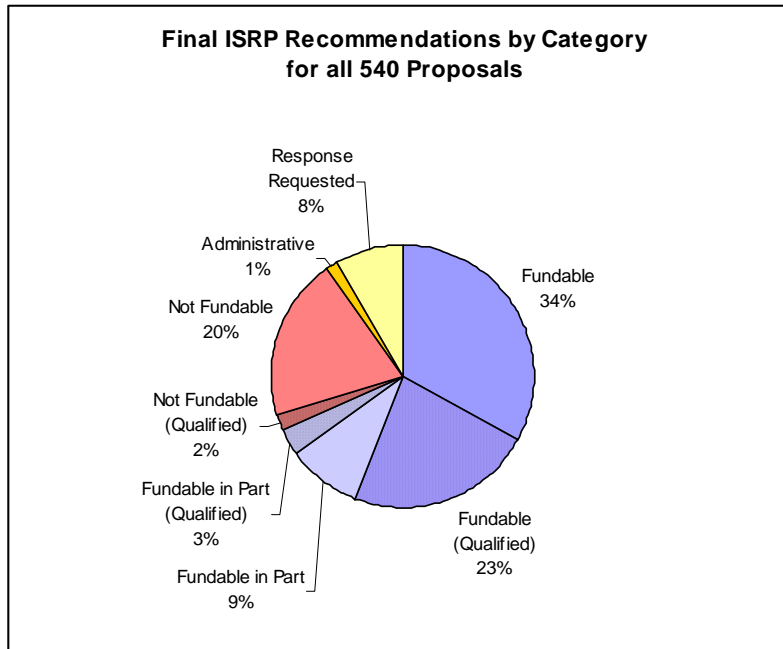
According to the background text in the Status of the Resource report, once biological objectives for the subbasins and provinces are established, the report format will be modified to include progress toward achieving those objectives and serving adaptive management decision making. At this time the depth of information needed to evaluate restoration strategies, determine the extent of benefits to fish and wildlife, and fully understand the locations and magnitude of the problems with limiting factors within subbasins and provinces is not present in the Status of the

Resource report. The information that is available is necessary, but not yet sufficient to establish a summary of the benefits of Fish and Wildlife Program projects.

V. Summary Comparison of FY 2007-09 Project Recommendations from the ISRP and Council with Each Other and Prior Proposal Reviews

In this section the ISRP provides some comparisons between ISRP recommendation types, ISRP and Council FY 2007-09 recommendations, and the FY 2007-09 review and previous reviews. Besides basic interest, these general comparisons can be used to help refine future solicitations and reviews. While the retrospective analysis above considers the 262 proposals submitted for ongoing projects, this section considers the full 540³ FY 2007-09 new and ongoing proposals reviewed by the ISRP.

Figure 5



Overall ISRP FY 2007-09 Recommendations

In the final review of FY 2007-09 proposals, the ISRP, considering the technical merits and potential benefits of each proposal, found that 369 proposals were fundable or fundable in part (69%); 118 proposals were not fundable (22%); eight proposals were primarily administrative in nature (1%); and 45 proposals needed a response for the ISRP to make its final recommendation,

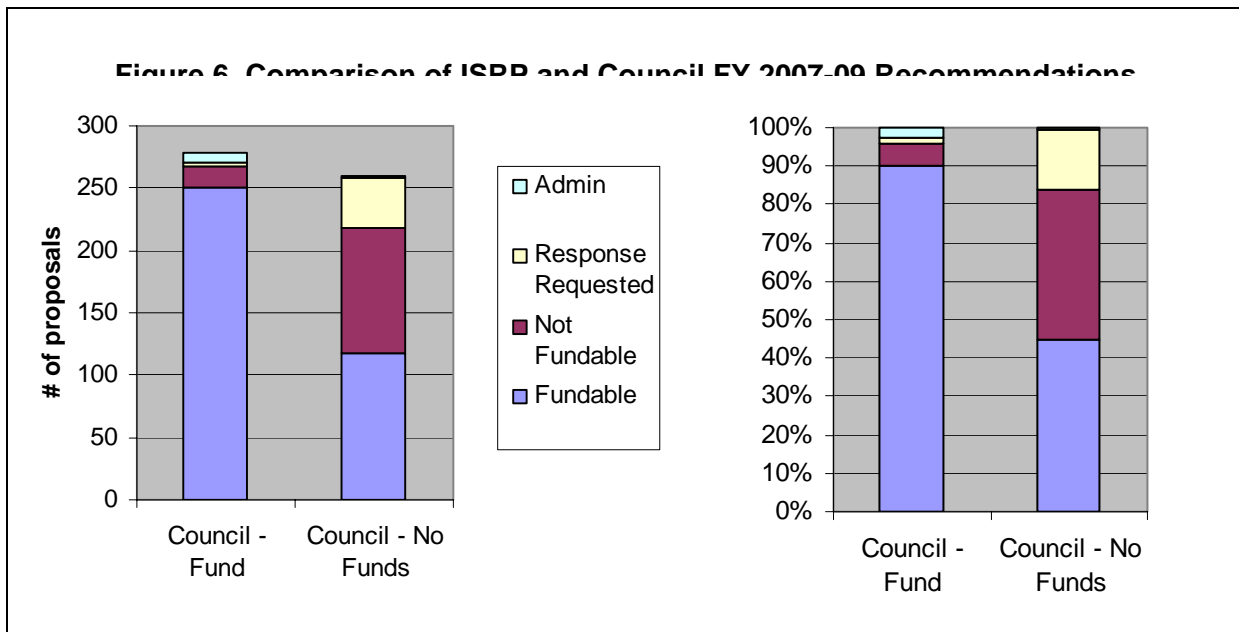
³ The ISRP reviewed 540 proposals of 541 submitted. The ISRP did not review the Independent Scientific Advisory Board's proposal because of conflicts of interest. Also, the Council made recommendations on 538 (not including the ISAB) rather than 540 proposals, so when comparisons are made between ISRP and Council recommendations, we refer to the 538, not the 540. Two new proposals that received not fundable recommendations from the local prioritization groups and Council were not included in the Council's final database.

but responses were not provided (8%). The charts below show a more detailed breakdown of ISRP recommendations for the entire 540 proposals and for the 219 proposals that submitted responses in the fix-it loop. In our Final FY 2007-09 Report, we continued to see a general improvement in the quality of the proposals and the scientific basis of the Fish and Wildlife Program. However, we emphasized that further directed effort is needed in certain areas especially prioritization of habitat actions, monitoring and evaluation, and reporting of results.

Comparison of ISRP and Council FY 2007-09 Recommendations

Figure 6 below provides the numbers of proposals of each category that the Council recommended for funding to the Bonneville Power Administration to implement the Fish and Wildlife Program. The ISRP “Not Fundable” recommendation is not a “do not fund” decision. Rather, it is an evaluation of the scientific and technical soundness of a project. The Council retains the decision authority, and can recommend for funding projects that the ISRP deemed not fundable, with suitable justification.

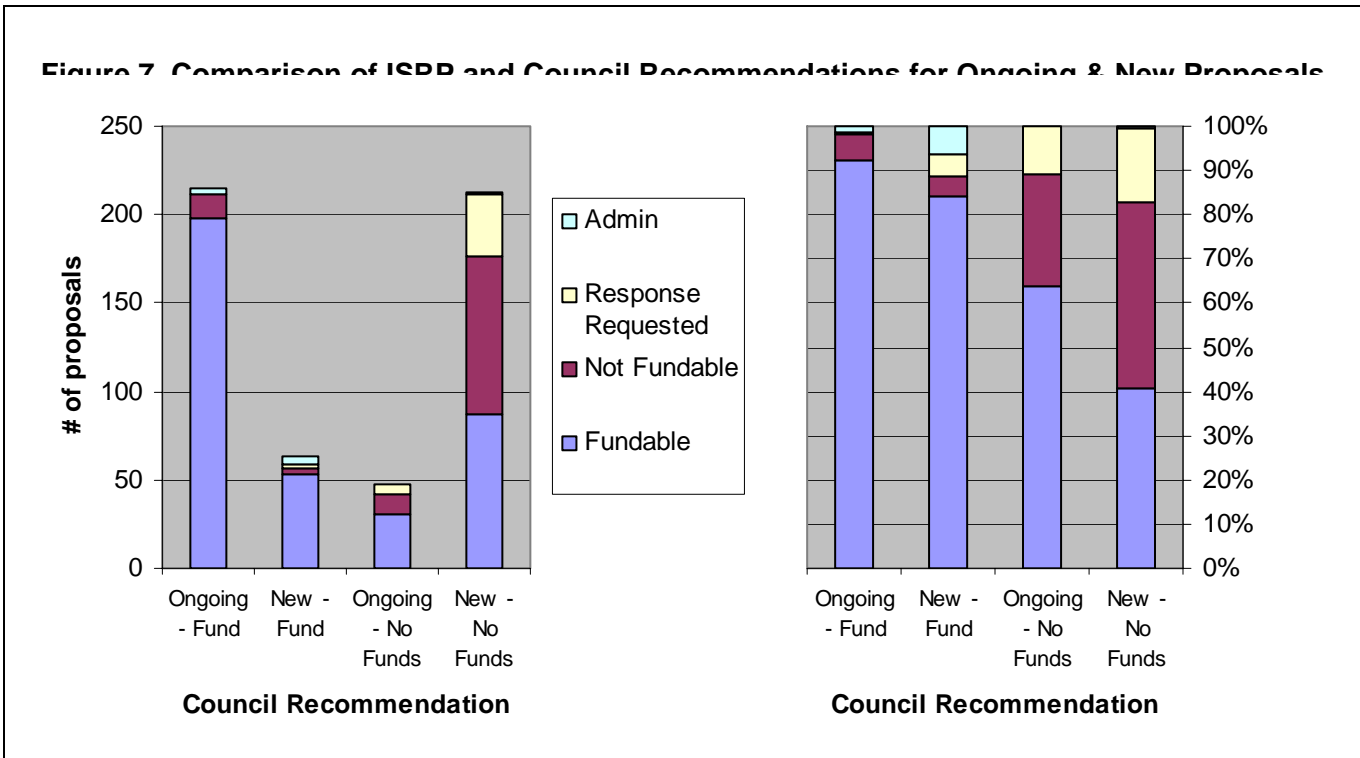
Of the 368 proposals that received fundable recommendations from the ISRP, the Council recommended 251 to Bonneville Power Administration (68%). Sixteen proposals that the ISRP did not recommend as meeting the ISRP technical review criteria were recommended to Bonneville Power Administration by Council. These sixteen proposals comprised 14 percent of the proposals that received a not fundable recommendation, and approximately 6 percent of the projects recommended to Bonneville Power Administration by the Council.



Fate of New versus Ongoing Projects

FY 2007-09 Review

In the FY 2007-09 solicitation, there were 278 new and 262 ongoing projects. Figure 7 shows the comparison between the ISRP and Council recommendation by proposal count and percentage. In sum, the ISRP found 139 (50%) of the new proposals fundable, and the Council recommended 53 of those (38% of the fundable new proposals) to the Bonneville Power Administration. In contrast the ISRP found that 228 (87%) of the ongoing proposals were fundable and Council recommended 215 (94% of the fundable ongoing proposals) ongoing proposals for funding to the Bonneville Power Administration.

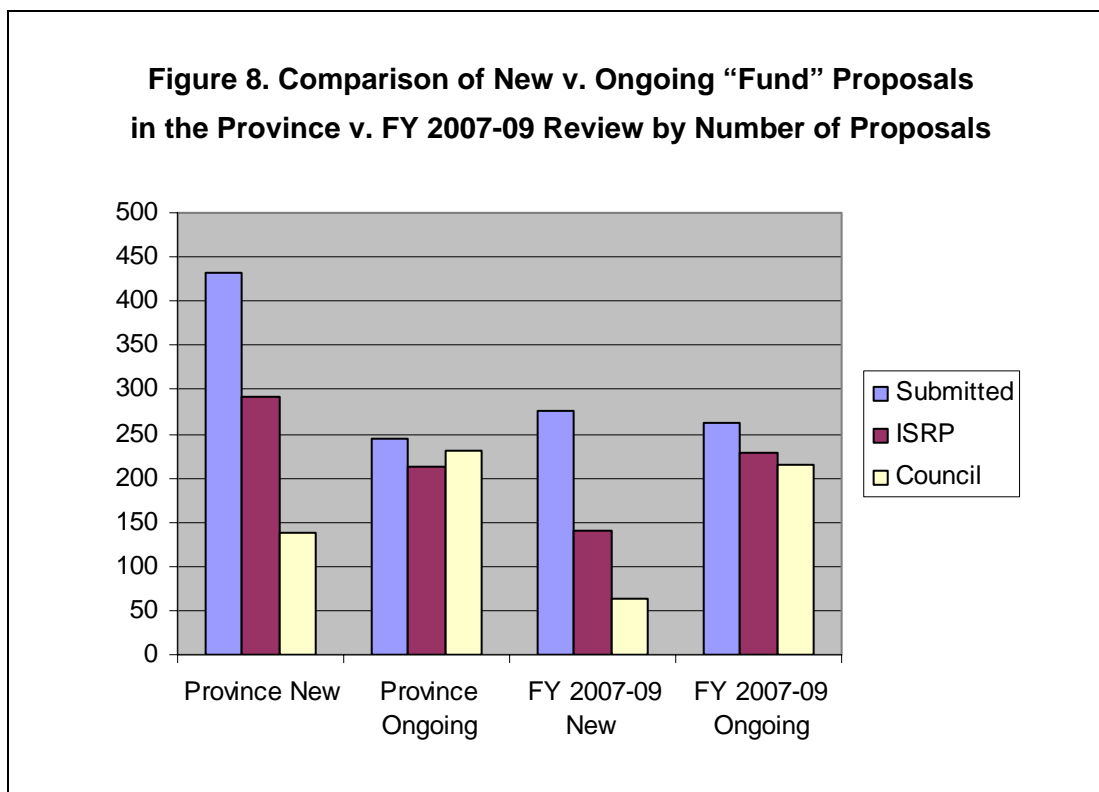


FY 2007-09 Review compared to Rolling Provincial Reviews

The proportion of ongoing projects that the ISRP found fundable was similar in both the FY 2007-09 and the 2001-03 Provincial Reviews (87% and 90%, respectively). The proportion of fundable new proposals was significantly lower than ongoing proposals in each of these solicitations, and lower in FY 2007-09 than in the Provincial review (60% versus 68%). In FY 2007-09, the Council recommended 82% of ongoing projects for funding, which was a 12% decrease from the 94% of projects that the Council recommended for funding in the Provincial review. The Council’s recommendation not to provide funds for approximately 47 ongoing projects was a significant change from past solicitations; for example, only 15 ongoing projects were not recommended for funding in the Province reviews.

The Council recommended 23% of new FY 2007-09 projects for funding compared to 32% in the Province reviews. This continues the past fate of new proposals. In the Province and FY

2007-09 reviews, new proposals are roughly 60% less likely to be recommended for funding than ongoing projects. New proposals apparently have a higher threshold to succeed in getting Fish and Wildlife Program funding, than ongoing projects. This observation reinforces the previous ISRP findings and recommendation that targeted solicitations, and parallel, but separate review tracks be used for new projects and existing long-term projects (See ISRP 2006-7⁴). The ISRP also continues to recommend innovative project solicitations.



Response Review (Fix-It-Loop)

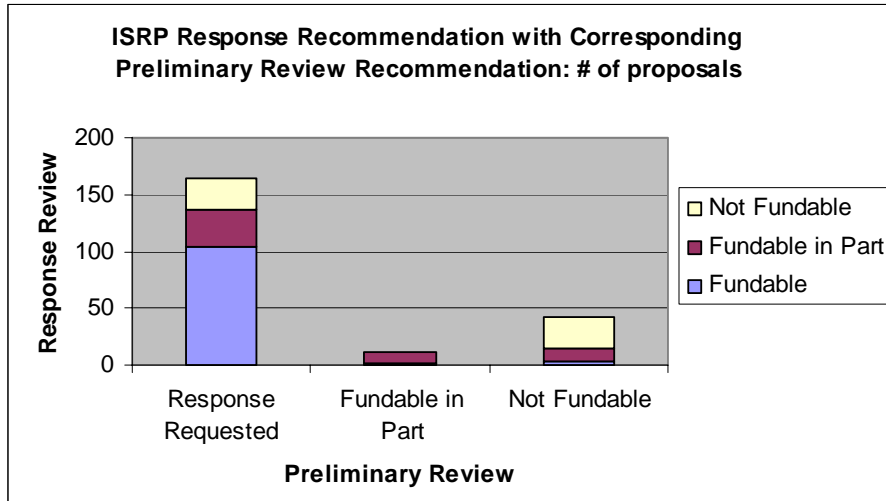
The ISRP preliminary review requested a response from 210 proposals. The ISRP received 219 responses, 165 proposals for which a response was requested. Forty-five proposals declined to submit a response because they were identified as a low priority in the local priority screening. The ISRP also received and reviewed responses for 54 proposals that we did not request a response (42 Not Fundable and 12 Fundable in Part).

In the final review, 83% of the proposals for which a response was requested by the ISRP received a Fundable, Fundable-In-Part, or Fundable (Qualified) recommendation (Figure 9). This contrasts with only 33% of the proposals that received a Not Fundable recommendation in the preliminary review. This suggests that those proposals that the ISRP identifies as needing a

⁴ ISRP 2006-7. A Framework for ISRP Review of New and Ongoing Projects for the Columbia River Basin Fish and Wildlife Program. www.nwcouncil.org/library/isrp/isrp2006-7.htm.

response are very likely to provide sufficient information to meet the guidelines and criteria that is used by the ISRP to find a proposal technically sound. An important point, however, is that a fairly large percent (33%) of Not Fundable proposals were able to revise their proposals such that they were deemed fundable. *This argues strongly for allowing/encouraging all proposals regardless of the preliminary ISRP recommendation to submit a response if the project has strong support from subbasin and provincial screening processes.*

Figure 9



In the Provincial Review 73% of the proposals submitted responses, whereas in the FY 2007-09 review only 41% submitted responses. The proportion of proposals that were fundable following the response review in FY 2007-09 (83%) was identical to the proportion that were fundable following the response review in the Provincial Review. This indicates that response loop continues to be justified as an integral part of the ISRP project review. It provides a learning opportunity for project sponsors and the ISRP.

Numbers of Proposals Submitted FY 2000, Provincial, and FY 2007-09 Solicitations

The FY 2000 solicitation received 400 proposals, the Provincial solicitations 676, and the FY 2007- 09 solicitation 540. The number of proposals submitted from FY 2000 to FY 2007-09 increased 35%, the Provincial to FY 2007-09 decreased 20%.

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Appendix 1. Exemplary Proposals for Results Reporting

As described in the analysis section above, most proposals did not report results in such a manner that the measurable benefits to fish and wildlife could be evaluated. In other words, an analysis of effectiveness of particular strategies is not possible from what was provided in the proposals. However, a fair number of projects did report results at such a level that evaluations of effectiveness were possible. Some of these projects achieved this level of monitoring, evaluation, and reporting for certain tasks and deliverables and not others. In this section of the report, the ISRP identifies a subset of projects as examples for the Council and project sponsors regarding what the ISRP believes constitutes adequate reporting of results. These exemplary projects are organized below by topic. The exemplary projects are not an exhaustive list of suitable examples. Projects that are not identified here but have adequate evaluations of the reporting of results need not be offended.

A. Artificial Production

199801001 – Grande Ronde Captive Propagation O & M

The Grande Ronde captive propagation program collects spring Chinook salmon parr in Catherine Creek, Lostine River, and the Upper Grande Ronde River, and then rears them to maturity, spawns them, and rears the progeny for release back into the three donor populations.

The project proposal has a monitoring and evaluation program in place, and the project history presented in the proposal was thorough, particularly Table 2. This table reports biological data on the success of the project from collecting parr and subsequently rearing them to maturity, spawning them; and provides a summary the release of smolts and parr and their return as adults. The fish culture practices can be evaluated from the data provided. No benchmarks for success have been established, so at this time the data provide a reporting of the means and variance in what can be expected from this type of endeavor.

There are two important elements that need to be emphasized in the future. One is using these data in a comparison with other types of projects employing alternative captive rearing strategies (i.e. Salmon River project that collects parr (or eggs) and rears them for release as adults) to contribute to establishing the comparative efficacy of different approaches. The second is the use of various elements of the experimental design (i.e. use of reference locations) to establish whether there is a response in terms of natural fish abundance from the captive propagation program.

At this time we can only evaluate the fish culture aspects of the project, not whether there is a benefit to the abundance of natural-origin salmon populations.

20030600 – Relative Reproductive Success of Wild and Hatchery Origin Snake River Fall Chinook Spawners Upstream of Lower Granite Dam

This project originated in 2003/2004 as one of the projects selected following an RFS to evaluate the relative reproductive success of hatchery fish (salmon) spawning in the wild to fulfill the BiOp obligations of RPA 182. The purpose of the RPA 182, and the RFS projects, was to obtain data to improve the estimates of productivity of natural populations of listed salmon. Most of these projects establish the pedigree of individual fish from among the parents that reached spawning grounds. Under that circumstance, adults are intercepted at a weir to obtain tissue for genotyping. Juveniles can be collected from streams when they depart for the marine environment.

Fall Chinook cannot be evaluated using pedigree methods because of their spawning locations. It would be impractical to collect tissue from adults and then juveniles to establish an individual pedigree. This project is evaluating an alternative statistical approach that relies on estimating the proportion of natural and hatchery fish in a spawning aggregate and then estimating the proportion of the progeny of those fish in subsequent juvenile samples. This approach requires that the hatchery and natural populations under investigation are sufficiently genetically different to conduct a robust analysis. At this time, the project has collected data and evaluated the distinctiveness of Lyons Ferry Hatchery fall Chinook and natural fall Chinook from the Snake River. They are distinct. The next step is to evaluate whether the magnitude of the differences are sufficient to make robust estimates of the contribution of each population of parents to the next generation. The data presented in the proposal history indicates this should be completed in the 2007-09 time frame.

199604300 – Johnson Creek Artificial Propagation Enhancement Project

This project collects natural-origin Snake River summer Chinook adults at a picket weir in Johnson Creek in the South Fork Salmon River drainage, and then releases progeny from these adults back into Johnson Creek following rearing at McCall Fish Hatchery. The project proposal presents a thorough summary of the data on biological attributes of the natural and hatchery-origin salmon in this stream. One of the important metrics they report is the female-to-female replacement rate for two broodyears (1998 and 2000). In the 1998 broodyear the replacement rate was just slightly lower for the fish removed for hatchery production (6.95 compared to 6.99). In broodyear 2000, the female-to-female replacement rate was considerably lower (2.88 compared to 4.46) for the females collected for hatchery production. These results indicate that abundance would have been higher in the stream if the females had been left to spawn naturally. Contrast of the trends in abundance and productivity between this treatment location and other reference streams should provide additional information on the efficacy of supplementation to provide a demographic boost to the treated stream.

B. Habitat

200301300 - Grays River Watershed Restoration

The history of perturbations in this watershed was very well documented, including the specific problems regarding chum and Chinook salmon spawning habitat. The proposal gave a clear depiction of limiting factors affecting chum salmon as identified in the literature and in the subbasin plan. Excellent rationales were given for large woody debris and riparian restoration. Use of photos, charts and graphics was helpful. Excellent literature citation was provided. Good descriptions of the restoration monitoring needed were included throughout the work element and methods sections. A brief but sufficient history of the predecessor project, the watershed assessment, was provided in the project history section of the proposal. Further detailed history (with project results) was presented in the significance to regional programs section of the proposal. All tasks were completed as scheduled: 1) completion of a geomorphic assessment of watershed condition, 2) field substrate, bedform, and hyporheic temperature data collection, 3) development, and verification of two models.

200104101 - Forrest Conservation Area Management

The Forrest Conservation Area was purchased by the Confederated Tribes of Warm Springs Reservation of Oregon (Tribes) in 2002 as a high priority project with BPA mitigation funds. The project has since received BPA annual funding for O&M as part of the Memorandum of Agreement between the Tribes and BPA. The Conservation Area is 4,232 acres and is split into two geographically separate parcels located along the Upper Middle Fork and Upper Mainstem John Day Rivers in the John Day Subbasin. Though currently well below its potential for fish and wildlife due to previous habitat degradation, the property contains critical habitat used by spring Chinook, summer steelhead, and a variety of wildlife. Spawning spring Chinook densities on the Middle Fork property are the highest in the basin and the property represents 4,083 Habitat Units (HU) of protection for seven wildlife mitigation species for BPA. Previous ISRP reviews of this proposal were very positive and noted that it was an important high priority project. The current project proposal recounted biological results (gains) that have occurred since acquisition of the property. The technical and scientific background was excellent. It described in detail the subbasin context and the Forrest Conservation area within it. It included a description of the property, assessments conducted, baseline conditions, limiting factors, desired future conditions, and restoration strategies to achieve these. Helpful photos were provided. A good description of habitat issues that need to be addressed by the activities proposed in this project was also provided.

200205300 - Assess Salmonids Asotin Creek Watershed

The proposal did a fine job of reporting of progress to date. The installation of a resistivity counter will be a positive step and should help enumerate adult Chinook and steelhead escapements, particularly in combination with the juvenile PIT tag effort. The goal of this

project is to assess the status of anadromous salmonid populations in the Asotin Creek watershed. Much of Asotin Creek and its tributaries have been straightened, diked, or relocated. Many habitat restoration projects have been completed or are ongoing in the Asotin Creek watershed with state (Salmon Recovery Funding Board, Washington Conservation Commission) and federal (BPA) funding. More than \$1.5 million has been spent on habitat restoration projects in the Asotin Creek Subbasin. The data suggests that Asotin Creek – above eight FCRPS dams on the Snake and Columbia Rivers – has a highly productive and resilient population of naturally-producing summer steelhead, which may be an important nursery of the Snake River steelhead ESU.

199603501 - Yakama Reservation Watersheds Project

This ongoing project is pursuing the restoration of stream habitat conditions, particularly for steelhead, in the Satus, Toppenish and Ahtanum Creek watersheds in the Yakima River subbasin. The proposal summarizes the baseline survey work that provided the basis for a combination of irrigation diversion screening, riparian zone exclusion fencing, returning stream reaches to historic grades, and returning flows to streams. The sponsors are to be commended for the organization and presentation of the past and proposed work. A good qualitative summary of past results and actions with some data on fish abundance/trends based on snorkel surveys and redd counts is presented. Staff are to be commended for their insight, and their patient but assertive approach. However, they are dealing with some fairly sophisticated rehabilitation on a large scale, the results of which should be further evaluated, summarized, and reported in peer reviewed literature such as Restoration Ecology.

C. Wildlife

199609401 - Scotch Creek Wildlife Area

This project acquired land with a major land purchase and several subsequent purchases totaling 16,620 acres within one of the Washington Department of Fish and Wildlife's Sharp-tailed Grouse Management Zones. The goal was to establish and maintain a viable grouse population on the Scotch Creek WMA and surrounding area. Management included restoring old agricultural fields by using prescribed burns and collecting seeds of local native plant species to have commercially grown to provide locally adapted seed stock for planting. Well described habitat condition surveys have been made to assess habitat quality which include photo records. But, equally important was the monitoring of the sharp-tailed grouse population response to the management activities. The grouse population was nearly gone before new genetic stock was added to the population in 1998-2000. Then, as habitat management activities started showing positive effects, the grouse population began to increase substantially in 2002-2005. New population goals have been established and additional land acquisitions are planned. The proposal notes that monitoring and evaluation have been critical to the success of the project.

199802200 - Pine Creek Conservation Area: Wildlife Habitat and Watershed Management on 33,557-acres to benefit grassland, shrub-steppe, riparian, and aquatic species

The Pine Creek Conservation Area protects 33,557 acres of grasslands, shrub-steppe and riparian habitats in the lower John Day subbasin. Along with providing improved habitat conditions for large ungulates, birds, and amphibians, aquatic habitats should be improved for summer steelhead, redband trout, and spring Chinook salmon. Management actions have included returning water to streams, prescribed fires, culvert removal, weed control, juniper cutting, and fence removal. Monitoring the conservation area has included aerial photography of habitat, deer and elk counts, bird counts, steelhead spawning surveys, and water quality, temperature, and stream flow. Data summaries for each of the monitoring metrics are provided in the project history. The project is well suited to provide evaluation of these habitat improvement strategies by ongoing monitoring of the target focal species.

D. Resident Fish

199404700 - Lake Pend Oreille Fishery Recovery Project

The Lake Pend Oreille Fishery Recovery Project, which serves as partial mitigation for Albeni Falls Dam on the Pend Oreille River is attempting to reverse a decline in kokanee which serve as a forage base for bull trout. The operational hypothesis is that late summer drawdown of the reservoir creates a shoreline less suitable for kokanee spawning than the pre-dam, pre-drawdown natural lakeshore. The project is progressing through an experiment to test the affect of lake level on kokanee recruitment, as well as the efficacy of stocking juvenile kokanee. They demonstrate a relationship between kokanee female abundance and subsequent recruitment, and find that stocking juveniles is not increasing the kokanee abundance. The project history gives an excellent overview showing how a well-planned program can, in 10 years, gain significant insight into a very complex system that is exceptionally difficult to sample. Map and figures were appreciated.

198806500 - Kootenai River White Sturgeon Inventory

The title (on white sturgeon) does not represent the content of the proposed work. This proposal is so broad in scope -- covering sturgeon, burbot, salmonids, and ecosystem rehabilitation -- that it is not a model the ISRP encourages. Nonetheless, the project has been exceptionally productive at evaluating problems with the key species in the Kootenai River, and the work has been well reported in workshops, symposia, and the peer-reviewed literature. Additional information on the focal species obtained from the proposed work will add to the understanding of their limiting factors. However, with at least a decade of investigative work completed to date, little progress has been made to improve natural recruitment of either sturgeon or burbot. So, unfortunately, there is not a realistic basis for optimism that solutions will be found in the near-term.

199800200 Snake River Native Salmonid Assessment

The goal of the project is to secure long-term persistence of native salmonids – bull trout, mountain whitefish, redband, and Yellowstone cutthroat trout in the Upper Snake River Basin, ideally at self-sustaining harvestable levels, by: 1) assessing current status; 2) identifying limiting factors; 3) developing recovery plans where necessary.

At this time, the project has completed extensive field surveys establishing the distribution of the species, and evaluated limiting factors for Yellowstone cutthroat trout. This proposal continues status assessment and analysis of limiting factors for redband trout; undertakes efforts to reduce hybridization between Yellowstone cutthroat and introduced rainbow trout by rainbow trout removal; and attempts to improve Yellowstone cutthroat trout status by removal of introduced brook trout. The project is clearly laid out, is marching steadily along toward its well-defined objectives, and is setting a standard for such work in the interior Rocky Mountain West. The section describing relationships to other projects is exceptionally strong. The project history is very nicely done, with a truly impressive set of reports and manuscripts in press and already published. It should serve as a model for proposal writing and reporting of results for an ongoing proposal.

200200200 - Restore Natural Recruitment of Kootenai River White Sturgeon

This project executes on-the-ground habitat restoration work, research, modeling, and data assessment in the Kootenai River where white sturgeon have reproduced historically, but now are unsuccessful at producing recruits (even though they spawn). The background of the proposal provides a comprehensive summary of the status of efforts to understand the factors limiting reproduction and/or recruitment of white sturgeon in the Kootenai River. There are excellent communication plans and the project sponsors have a record of producing annual reports, peer-reviewed publications, and presentations.

E. Mainstem, Ocean, and Estuary

199102900 - Research, Monitoring, and Evaluation of Emerging Issues and Measures to Recover the Snake River Fall Chinook Salmon ESU

This is a proposal that seeks to continue an ongoing project that collects field data to identify the factors that contribute to changes in life history timing, growth, and survival of wild juvenile Snake River fall Chinook salmon. The technical background section of the proposal is quite extensive and includes many good summary metrics (e.g. annual redd counts, incubation temperatures, growth rates, etc.).

Important results from this study include (1) the documentation of how dam construction has altered the life history characteristics of fall Chinook via shifting production to areas with relatively cooler water temperatures and lower growth potentials, (2) identification of two alternate life history types of fall Chinook salmon in the Snake River basin, “ocean-type” and

“reservoir-type”, and (3) an analysis of return adult spawner data (i.e. scale pattern analysis, 1998-2003) that indicates the reservoir-type fall Chinook return to spawn at disproportionately higher rates.

The proposal sets a standard by including a concise year-by-year summary of the project's contributions, along with the list of BPA annual reports (13) and peer-reviewed publications (26). The proposal also identifies the adaptive management implications of their study results, so that decisions on hydrosystem operation and supplementation can be made informatively.

199302900 - Survival Estimates for the Passage of Juvenile Salmonids through Snake and Columbia River Dams and Reservoirs

This proposal seeks to continue an ongoing study that uses PIT tag data to provide annual estimates of reach and hydropower system survival of juvenile salmonids migrating through the Snake and Columbia Rivers. These estimates are important for understanding the significance of mortality related to the hydrosystem and guiding structural and operational changes made to improve hydropower system survival.

Reporting from this project has been excellent, producing 17 annual reports for BPA (available from BPA's web site) and 11 peer-reviewed publications. Development of survival estimation methodology has been a strong contribution from this project, and other researchers throughout the basin now use the CJS methods of survival estimation.

The reach and dam passage survival information gained from this study has been instrumental in focusing research and mitigation efforts throughout the hydropower system and was used extensively in preparation of the NMFS 2004 BiOp. The results from this study have also helped in our understanding of the role hydropower system mortality plays within the entire salmon life cycle. The proposal would be improved by adding a summary of survival estimate metrics, as the technical background section only discusses the estimates in general terms.

199801400 - Columbia River Basin Juvenile Salmonids Survival and Growth in the Columbia River Plume and Northern California Current

The goals of this project are to understand how ocean and Columbia River plume conditions affect juvenile salmonids, to predict how changing ocean conditions will affect salmonid growth and survival, and to recommend how to link management actions to river, plume and ocean conditions for effective management of salmon. This project has good reporting of results in the scientific literature by all proponents in the study. The proposal included a thorough review of past results. These results demonstrate that the distribution, abundance, condition, and survival of juvenile Columbia River salmon vary synchronously with ocean conditions. Salmon performance measures include both traditional (e.g., size, condition, growth rates, diets) and new innovative measures (e.g., pathogen infections, parasite loads, growth hormone levels).

The results are pertinent to management and operation of the FCRPS. For example, river flow has a strong impact on Columbia River plume volume, and plume volume can influence smolt-to-adult ratios (Fig. A5). CORIE physical circulation models used in this project have already provided managers with guidelines on time of ocean-entry and the use of river flow regulation to benefit juvenile salmon survival. The desired outcome of this project is that products (ecological indicators, forecasts of the effect of climate and ocean conditions on salmon survival) provided each year by the sponsors will help BPA managers evaluate the success or failure of various mitigation programs. Key to this is whether or not the sponsors have collected a sufficient time series of stock-specific data on Columbia River salmonid ESUs during their surveys in the Columbia River plume and northern California Current.

200300900 - Canada-USA Salmon Shelf Survival Study

This project maps ocean conditions that affect the ocean growth and survival of juvenile salmon in coastal marine waters from southern British Columbia into southeast Alaska and identifies which stocks of Columbia River salmon that forage in these areas. This project has good reporting of results in the scientific literature by all proponents in the study. Section B (technical and scientific background) of the proposal provided an exemplary review and evaluation of our understanding of the problems of juvenile salmon migration, marine survival and growth and their interannual linkages to the ocean environment. To date, results indicate diets of juvenile salmon distributed off the west coast of Vancouver Island are deficient in calories, resulting in poor early ocean growth and survival of northward-migrating stocks of Columbia River salmon.

While data time series are not sufficient at present to warrant adaptive management, examples of how project results might be used by managers were provided in the proposal. For example, Fig. 13 shows a strong positive relation ($R^2 = 0.91$, $n = 5$ years of data) between smolt-to-adult survival (SAR) of Snake River spring Chinook salmon and growth of juvenile coho salmon off the west coast of Vancouver Island. If confirmed by additional years of observations, this relation could be used to forecast Columbia River Chinook salmon runs several years in advance of adult returns. Information on other useful metrics in the “High Seas Salmon database” maintained at the Pacific Biological Stations is needed. Local or MSRT comments stated that the purpose of this project was to recover coded-wire tagged salmon, indicating that the sponsors might benefit from increased reporting to stakeholders on results specific to Columbia River salmon.

200301000 - Historic Habitat Opportunities and Food-Web Linkages of Juvenile Salmon in the Columbia River Estuary and Their Implications for Managing River Flows and Restoring Estuarine Habitat

This proposal addresses the Columbia River hydroelectric system’s impacts on estuarine habitat opportunity and capacity to support diverse life histories of juvenile salmon. This project has a good history of reporting of results in the scientific literature by the CORIE researchers who investigated physical aspects of the estuary. In Phase II of this project, sponsors proposed to reconstruct historic changes in juvenile salmon rearing opportunities and food web linkages in

the Columbia River estuary and evaluate their implications for managing river flows and restoring estuarine habitats. Phase II plans for reporting of results were exemplary, and included peer-reviewed journal publications, student theses, articles for general readership, databases and CORIE modeling products distributed via the internet, annual project reviews, and oral presentations at scientific and local stakeholder's meetings. Metrics that characterize physical habitat opportunity were developed and extended to local physical conditions (water velocity, temperature, salinity) in Phase I, and have already been used by the US Army Corps of Engineers to evaluate the impact of proposed channel improvements (see section 2. "Simulation of Habitat Change). Metrics are needed for evaluating the results of physical circulation/habitat opportunity modeling scenarios with respect to juvenile salmon survival in the estuary and increments in survival that could be accrued from habitat restoration.

F. Systemwide RME

198910700 Statistical Support for Salmonid Survival Studies

The project supports improved monitoring and evaluation capabilities by developing study designs and analysis tools to estimate juvenile and adult salmonid survival and survival relationships. In addition, the project provides statistical guidance to investigators in the Northwest. The project history section of the proposal provides a very impressive and a significant list of contributions. The results have been reported to the region via a large number of technical reports and peer reviewed papers. There is an impressive history of peer-reviewed publications related to the past activities of the sponsors.

200001400 Evaluate Population Dynamics and Habitat Use of Lampreys in Cedar Creek (Lewis River Subbasin), Washington

The project is a continuation of work begun in 2000 at Cedar Creek in the lower Columbia River and investigates the distribution, abundance and status of lamprey in Cedar Creek. Work at this location is important because it is the only lamprey sampling site located below the mainstem dams, providing the opportunity to compare trends in abundance of lamprey populations not affected by mainstem dams with those occurring above the dams. The project is well designed and should yield important information on lamprey biology in the lower Columbia. Of particular significance is the effort to improve sampling techniques for larval lamprey. The results of the work in Cedar Creek are applicable to, and can help guide, sampling efforts and assessments in other Columbia River Basin tributaries.

The project sponsors provide an excellent summary of past accomplishments that clearly demonstrates the need for the proposed work. Detailed quantitative results of past work were organized according to the objectives and given in the initial proposal and a summary and conclusions were provided which allowed evaluation of progress of the project toward accomplishing the project's clear and focused objectives.

200201600 - Evaluate the Status of Pacific Lamprey in the Lower Deschutes River Subbasin, Oregon

This project, initiated in 2002, seeks to refine understanding of life history, adult escapement, and habitat use of lamprey in the lower Deschutes subbasin. The sponsors provided a detailed quantitative description of results, organized according to the project's the original objectives, which clearly documented progress since the inception of the project. The results included determination of larval distribution in tributaries of the lower Deschutes, larval densities and habitat use, numbers of larval emigrants, and estimation of adult escapement. An especially important element of the project is development and testing of a lamprey rearing habitat predictive model that could prove useful in other Columbia Basin tributaries.

Appendix 2. Table of FY 2007-09 Proposals with ISRP Evaluation of Results Reporting Organized by Proposal Number

The ISRP’s approach to the evaluation, and consequent qualifications, are described in Section II. A. in the body of the report. From that section we repeat that the Council, sponsors, and other interested parties should recognize considerable care is needed in interpreting the “reporting of results” based on ISRP reviews of the proposals alone. Even with the qualifications, we think our analysis provides some very useful general observations that can guide future review processes and, importantly, the direction of monitoring and evaluation in the program. In addition, we took special care to validate our evaluations on those projects held out as good examples and those identified as needing immediate improvement.

Proposal Number	Title	Subbasin	ISRP Final FY07-09 Rec.	Council FY07-09 Rec. Expense and Capital	Tasks	Phys. Data	Bio. Data	Summarized	Applied	ISRP Evaluation of Results Reporting
198201301	Coded-Wire Tag Recovery	Systemwide	Fundable	\$6,390,585	x		x	x	x	Adequate
198201302	Annual Stock Assessment - Coded Wire Tag Program (ODFW)	Systemwide	Fundable (Qualified)	\$686,325	x		x	x	x	Adequate
198201303	Coded Wire Tag - USFWS	Systemwide	Fundable (Qualified)	\$346,614	x		x			Mostly Adequate
198201304	Coded Wire Tag - WDFW	Systemwide	Fundable (Qualified)	\$1,005,282	x		x	x	x	Adequate
198331900	New Marking & Monitoring Tech	Systemwide	Fundable	\$2,969,790	x		x	x	x	Adequate
198335000	Nez Perce Tribal Hatchery Operations & Maintenance	Clearwater	Fundable	\$6,099,660	x					Results needed
198335003	Nez Perce Tribal Hatchery M&E	Clearwater	Fundable	\$5,700,000	x		x	x		Adequate
198343500	Umatilla Hatchery Satellite Facilities O&M	Umatilla	Fundable (Qualified)	\$2,776,498	x					Ok for type
198343600	Umatilla Passage O&M	Umatilla	Not fundable (Qualified)	\$1,477,215	x					Results needed (critical)

Proposal Number	Title	Subbasin	ISRP Final FY07-09 Rec.	Council FY07-09 Rec. Expense and Capital	Tasks	Phys. Data	Bio. Data	Summarized	Applied	ISRP Evaluation of Results Reporting
198402100	Mainstem, Middle Fork, John Day Rivers Fish Habitat Enhancement Project	John Day	Fundable in part (Qualified)	\$1,020,000	x	x	x			Results needed (critical)
198402500	ODFW Blue Mountain Oregon Fish Habitat Improvement	Grande Ronde	Fundable (Qualified)	\$1,095,000	x					Results needed (critical)
198503800	Colville Hatchery	Columbia Upper	Fundable in part	\$3,009,999	Y/N		x	x		Mostly Adequate
198506200	Juvenile Fish Screen Evaluations in Columbia Plateau Province	None Selected	Fundable	\$0	x		x	x	x	Adequate
198605000	White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam	Systemwide	Fundable	\$3,655,000	x	x	x	x	x	Adequate
198710001	Umatilla Anad Fish Hab - CTUIR	Umatilla	Not fundable (Qualified)	\$978,000	x	x	x			Results needed (critical)
198710002	Umatilla Subbasin Fish Habitat Improvement Project	Umatilla	Not fundable (Qualified)	\$840,792	x	x	x			Results needed (critical)
198712700	Smolt Monitoring By Non-Federal	Systemwide	Fundable (Qualified)	\$7,055,190	x		x	x		Results needed
198802200	Umatilla Fish Passage Operations	Umatilla	Not fundable (Qualified)	\$1,086,492	x		x			Results needed (critical)
198805301	Grande Ronde/Imnaha Endemic Spring Chinook Supplementation Northeast Oregon Hatchery	Grande Ronde	Fundable in part	\$16,763,009	x		x			Mostly Adequate
198805303	Hood River Production M&E - Ws	Hood	Fundable	\$1,620,000	x		x			Results needed
198805304	Hood River Production Program - ODFW M&E	Hood	Fundable	\$1,590,000	x	x	x	x	x	Adequate
198805305	Northeast Oregon (NEOH) Outplanting Facilities Master Plan	Grande Ronde	Response requested	\$18,870	x					Results needed
198805307	Hood R Prod O&M - WS/ODFW	Hood	Fundable	\$833,718	x		x			Results needed

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198805308	Hood River Powerdale Dam Fish Trap/Oak Springs/Pelton Ladder -Operation and Maintenance	Hood	Fundable	\$1,750,846	x					Ok for type
198805315	Hood River Adult Salmonid Trapping Facilities/Parkdale Fish Facility Expansion	Hood	Not fundable	\$0	NA					NA
198806400	Kootenai River Native Fish Restoration and Conservation Aquaculture	Kootenai	Fundable (Qualified)	\$7,302,520	x		x	x	x	Adequate
198806500	Kootenai R White Sturgeon Inventory	Kootenai	Fundable	\$3,091,730	x	x	x	x	x	Adequate
198810804	StreamNet (CIS/NED)	Systemwide	Fundable (Qualified)	\$6,945,099	x					Results needed
198811525	YKFP - Design & Construction (Nelson Springs replacement facility)	Yakima	Fundable (Qualified)	\$0	x					Mostly Adequate
198811535	Klickitat Fishery YKFP Design	Klickitat	Fundable in part	\$13,550,000	x					Ok for type
198812025	YKFP Management, Data, Habitat	Yakima	Fundable (Qualified)	\$799,998	x					Ok for type
198812035	YKFP Klickitat Management, Data, and Habitat	Klickitat	Fundable	\$1,384,998	x					Ok for type
198902401	Evaluation of Juvenile Salmonid Outmigration and Survival in the Lower Umatilla River Basin.	Umatilla	Fundable	\$0	x		x	x	x	Adequate
198902700	Power Repay Umatilla Basin Project	Umatilla	Not fundable (Qualified)	\$3,000,000	x					Results needed (critical)
198903500	Umatilla Hatchery Operation and Maintenance and Fish Liberations	Umatilla	Fundable (Qualified)	\$2,824,992	x					Mostly Adequate
198906201	Annual Work Plan CBFWA	Systemwide	Fundable (Qualified)	TBD	x					Results needed
198909600	Genetic Monitoring of Snake River Chinook Salmon and Steelhead	Systemwide	Fundable	\$1,450,575	x		x	x		Mostly Adequate
198909800	Idaho Supplementation Studies	Salmon	Fundable (Qualified)	\$5,850,918	x		x	x		Mostly Adequate

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198910700	Statistical Support For Salmonid Survival Studies	Systemwide	Fundable	\$753,684	x		x	x	x	Adequate
199000500	Umatilla Hatchery - M&E	Umatilla	Fundable (Qualified)	\$1,718,544	x		x	x	x	Adequate
199000501	Umatilla Basin Natural Production Monitoring and Evaluation Project	Umatilla	Not fundable (Qualified)	\$1,185,387	x		x			Results needed
199001800	Lake Roosevelt Rainbow Tr Hab/Pass Improvement Project	Sanpoil	Fundable (Qualified)	\$1,828,451	x	x	x			Results needed (critical)
199004400	Coeur D'Alene Reservation Habitat Enhancement (Coeur d'Alene Subbasin)	Coeur d'Alene	Fundable	\$4,447,660	x	x	x	x		Mostly Adequate
199004401	Lake Creek Land Acquisition	Coeur d'Alene	Fundable	\$0	x					Ok for type
199005500	Idaho Steelhead Monitoring and Evaluation Studies	Clearwater	Fundable	\$1,900,758	x		x	x	x	Adequate
199007700	Dev Of Systemwide Predator Control for Northern Pikeminnows.	Systemwide	Fundable	\$9,000,000	x		x	x	x	Adequate
199008000	Columbia Basin Pit-Tag Information System.	Systemwide	Fundable (Qualified)	\$7,500,000	x		x			Results needed
199009200	Wanaket Wildlife Area	Umatilla	Fundable	\$677,934	x	x				Mostly Adequate
199101901	Hungry Horse Mitigation/Flathead Lake	Flathead	Not fundable	\$889,000	x	x	x	x		Results needed (critical)
199101903	Hungry Horse Mitigation Program	Flathead	Fundable (Qualified)	\$5,183,000	x	x	x			Results needed (critical)
199101904	Hungry Horse Mitigation - Stocking of Offsite Waters - Creston NFH	Flathead	Fundable (Qualified)	\$431,013	x					Results needed
199102800	Pit Tagging Wild Chinook	Salmon	Fundable	\$1,050,000	x		x	x	x	Adequate
199102900	Research, monitoring, and evaluation of emerging issues and measures to recover the Snake River fall Chinook salmon ESU	Systemwide	Fundable	\$1,369,125	x		x	x	x	Adequate
199104600	Spokane Tribal (Galbr Sprgs) H	Columbia Upper	Fundable in part	\$2,185,000	x		x			Results needed
199104700	Sherman Creek Hatchery - O&M	Columbia Upper	Fundable in part	\$885,154	x		x			Results needed

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199105100	M&E Statistical Support For Life-Cycle Studies	Systemwide	Fundable	\$1,243,164	x		x	x	x	Adequate
199106000	Pend Oreille Wetlands Wildlife Mitigation Project - Kalispel	Pend Oreille	Fundable in part (Qualified)	\$0	x	x	x			Results needed (critical)
199106100	Swanson Lake Wildlife Mitigation Project (Swanson Lakes Wildlife Area)	Crab	Fundable	\$249,999	x	x	x	x		Mostly Adequate
199106200	Spokane Tribe Wildlife Mitigation	Spokane	Fundable	\$7,090,000	x					Results needed (critical)
199107100	Snake River Sockeye Salmon Habitat and Limnological Monitoring	Salmon	Fundable	\$873,288	x	x	x	x		Adequate
199107200	Redfish Lake Sockeye Salmon Captive Broodstock Program	Salmon	Not fundable	\$3,051,210	x		x	x	x	Adequate
199107300	Idaho Natural Production Monitoring	Salmon	Fundable in part	\$2,353,950	Y/N		x	x	x	Adequate
199107800	Burlington Bottoms Wildlife Mitigation Project	Willamette	Fundable	\$334,975	x	x	x	x		Mostly Adequate
199200900	Yakima Phase II/Huntsville Screen Operation & Maintenance	Yakima	Fundable	\$450,000	x					Results needed
199201000	Habitat Improvement/Enhancement - Fort Hall, Idaho	Snake Upper	Fundable in part	\$825,164	x	x	x	x		Mostly Adequate
199202601	Grand Ronde Model Watershed Program Habitat Restoration - Planning, Coordination and Implementation	Grande Ronde	Fundable (Qualified)	\$3,551,547	x					Results needed (critical)
199202603	Upper Salmon Basin Watershed Project (USBWP) provides technical and administrative support with project implementation guidance to landowners to implement fish habitat projects on private lands.	Salmon	Fundable (Qualified)	\$1,965,000	x	x	x			Results needed
199202604	Investigate Life History Of Spring Chinook Salmon and Summer Steelhead in the Grande Ronde River Subbasin	Grande Ronde	Fundable	\$2,460,000	x		x	x	x	Adequate

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199204000	Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research	Salmon	Not fundable	\$2,474,982	x		x	x	x	Adequate
199204800	Colville Confederated Tribes Wildlife Mitigation Project	Columbia Upper	Fundable in part (Qualified)	\$2,899,999	x	x	x			Results needed (critical)
199205900	Amazon Basin/Eugene Wetlands -	Willamette	Fundable	\$773,797	x	x	x			Results needed
199206100	Albeni Falls Wildlife Mitigation	Pend Oreille	Fundable in part (Qualified)	\$24,604,323	x					Results needed (critical)
199206200	Yakama Nation - Riparian/Wetlands Restoration	Yakima	Fundable	\$0	x	x	x	x		Results needed
199206800	Willamette Basin Mitigation	Willamette	Fundable in part (Qualified)	\$10,661,110	x					Results needed (critical)
199302900	Survival Estimates for the Passage of Juvenile Salmonids Through Snake and Columbia River Dams and Reservoirs	Systemwide	Fundable	\$5,218,599	x		x	x	x	Adequate
199303501	Red River Restoration O & M	Clearwater	Response requested	\$0	x	x				Results needed
199304000	Fifteenmile Creek Habitat Restoration and Monitoring Project	Fifteenmile	Fundable (Qualified)	\$971,061	x	x	x	x		Mostly Adequate
199305600	Research to advance hatchery reform, including captive broodstocks	Systemwide	Fundable (Qualified)	\$3,000,000	x		x	x	x	Adequate
199306000	Select Area Fisheries Enhancement Project	Columbia Estuary	Fundable	\$5,400,000	x		x	x	x	Adequate
199306600	Oregon Fish Screens Project	John Day	Fundable	\$3,128,100	x					Results needed
199401500	Idaho Fish Screening and Passage Improvements	Salmon	Fundable	\$2,504,220	x		x	x	x	Adequate
199401805	Continued Implementation of Prioritized Asotin Creek Watershed Habitat Projects	Asotin	Fundable (Qualified)	\$801,000	x	x				Results needed
199401806	Tucannon Stream and Riparian Protection, Enhancement, and Restoration	Tucannon	Fundable (Qualified)	\$993,999	x	x	x			Results needed (critical)

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199401807	Improve Habitat For Fall Chinook, Steelhead in the Lower Snake and Tucannon Sub basins.	Tucannon	Fundable (Qualified)	\$193,000	x					Results needed (critical)
199402600	Pacific Lamprey Research and Restoration Project	Umatilla	Fundable in part (Qualified)	\$0	x	x	x			Results needed
199404200	Trout Creek Fish Habitat Restoration Project	Deschutes	Fundable (Qualified)	\$1,200,000	x	x	x			Results needed
199404300	Lake Roosevelt Fisheries Evaluation Program (formerly Data Collection)	Columbia Upper	Fundable	\$3,630,053	x		x	x	x	Mostly Adequate
199404400	Enhance, protect and maintain shrub-steppe habitat on the Sagebrush Flat Wildlife Area (SFWA)	Columbia Upper Middle	Fundable	\$300,000	x	x	x			Mostly Adequate
199404700	Lake Pend Oreille Fishery Recovery Project: purpose to restore fisheries impacted by the federal hydropower system within the Idaho portion of the Pend Oreille drainage.	Pend Oreille	Fundable	\$2,899,921	x	x	x	x	x	Adequate
199404900	Kootenai River Ecosystem Improvements Project	Kootenai	Fundable	\$5,087,400	x	x	x	x		Results needed
199405000	Salmon River Habitat Enhancement	Salmon	Fundable in part	\$694,140	x	x	x	x		Mostly Adequate
199405400	Migratory Patterns, Structure, Abundance and Status of Bull Trout Populations in Subbasins of the Columbia Gorge, Columbia Plateau and Blue Mountain Provinces	Systemwide	Fundable (Qualified)	\$0	x		x	x		Mostly Adequate
199405900	Yakima Basin Environmental Education Program	Yakima	Fundable	\$0	x					Results needed (critical)
199500100	Kalispel Tribe Resident Fish P	Pend Oreille	Fundable in part	\$1,632,923	x	x	x	x	x	Results needed
199500400	Libby Mitigation Program	Kootenai	Fundable	\$2,502,570	x	x	x	x		Mostly Adequate

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199500900	Lake Roosevelt Rainbow Trout N	Columbia Upper	Fundable	\$435,000	x		x	x		Mostly Adequate
199501100	Chief Joseph Kokanee Enhancement	Columbia Upper	Fundable in part	\$1,538,613	x					Results needed
199501300	Resident Fish Substitution Program	Clearwater	Fundable in part	\$600,000	x		x	x	x	Adequate
199501500	Duck Valley Fisheries Project ??? Operations, Maintenance, Monitoring and Evaluation	Owyhee	Fundable	\$1,554,342	x	x	x	x		Adequate
199502700	Lake Roosevelt White Sturgeon Recovery Project	Columbia Upper	Fundable (Qualified)	\$1,509,140	x		x	x	x	Adequate
199502800	Piscivorous Avian Resource Utilization of Moses Lake and the Relationship to Other Systems	Crab	Not fundable	\$0	x	x	x	x		Results needed
199503300	O&M Yakima Basin Fish Screens	Yakima	Fundable	\$288,000	x	x	x	x	x	Mostly Adequate
199505700	Southern Idaho Wildlife Mitigation	Snake Upper	Fundable	\$1,179,059	x	x	x			Results needed
199505701	Southern Idaho Wildlife Mitigation	Boise	Fundable	\$65,315	x					Results needed
199505702	Southern Idaho Wildlife Mitigation	Snake Upper	Not fundable	\$6,150,000	x					Results needed (critical)
199505703	Southern Idaho Wildlife Mitigation	Owyhee	Fundable	\$7,914,049						Ok for type
199506001	Iskuulpa Watershed Project	Umatilla	Fundable	\$525,000	x	x	x	x	x	Adequate
199506325	Yakima Klickitat Fisheries Project - Monitoring And Evaluation	Yakima	Fundable (Qualified)	\$13,500,000	x		x	x	x	Adequate
199506335	YKFP - Klickitat Subbasin Monitoring and Evaluation	Klickitat	Fundable in part (Qualified)	\$1,560,000	x	x	x	x	x	Mostly Adequate
199506425	YKFP Policy/Plan/Technical	Yakima	Fundable (Qualified)	\$549,999	x					Ok for type
199601100	Walla Walla Juvenile and Adult Passage Improvements	Walla Walla	Fundable (Qualified)	\$2,636,000	x					Results needed
199601900	Technical Management Team (TMT)	Systemwide	Fundable (Qualified)	\$885,837	x		x	x		Adequate

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199602000	Pit Tagging Spring/Summer Chin	Systemwide	Fundable (Qualified)	TBD	x					Results needed
199602100	Gas Bubble Disease Research & Monitoring of Juvenile Salmonids	Systemwide	Fundable	\$66,815	x					Results needed
199603501	Yakama Reservation Watersheds Project	Yakima	Fundable	\$0	x	x	x	x	x	Mostly Adequate
199604000	Mid-Columbia Coho Restoration Project	Wenatchee	Fundable (Qualified)	\$0	x		x	x	x	Mostly Adequate
199604200	Restore and Enhance Anadromous Fish Populations and Habitat in Salmon Creek	Okanogan	Fundable (Qualified)	\$0	x					Mostly Adequate
199604300	Johnson Creek Artificial Propagation Enhancement Project	Salmon	Fundable in part	\$3,029,310	x		x	x		Mostly Adequate
199604601	Walla Walla River Basin Fish Habitat Enhancement	Walla Walla	Fundable (Qualified)	\$1,013,130	x					Results needed
199606700	Manchester Spring Chinook Captive Broodstock Project	Multiprovince	Fundable (Qualified)	\$2,004,427	x		x	x	x	Mostly Adequate
199607000	McKenzie Focus Watershed	Willamette	Fundable	\$0	x	x	x	x	x	Mostly Adequate
199607702	Protect and Restore Lolo Creek Watershed	Clearwater	Fundable	\$782,166	x	x	x	x		Mostly Adequate
199607703	Protect and Restore Waw'aalamnime to 'Imnamatnoon Creek Analysis Area	Clearwater	Fundable	\$1,103,529	x	x	x	x		Mostly Adequate
199607705	Restore McComas Meadows/ Meadow Creek Watershed	Clearwater	Fundable in part	\$993,777	x	x		x		Mostly Adequate
199608000	NE Oregon Wldf Proj (Npt) Precious Lands	Grande Ronde	Fundable	\$1,248,000	x	x	x			Results needed (critical)
199608300	CTUIR Grande Ronde Subbasin Restoration Project	Grande Ronde	Fundable	\$570,000	x	x	x			Mostly Adequate
199608600	Clearwater Focus Program, Idaho SCC	Clearwater	Admin (see comments)	\$294,000	x					Results needed (critical)
199608701	Montana Focus Watershed Coordinator	Flathead	Admin (see comments)	\$303,560	x					Results needed (critical)
199609401	Scotch Creek Wildlife Area	Okanogan	Fundable	\$600,000	x	x	x	x	x	Adequate

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199700100	Idaho Chinook Salmon Captive R	Salmon	Fundable	\$1,554,000	x		x	x		Mostly Adequate
199700400	Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams.	None Selected	Fundable	\$1,967,402	x	x	x	x		Results needed
199701100	Shoshone-Paiute Habitat Enhancement	Owyhee	Fundable (Qualified)	\$948,662	x					Results needed (critical)
199701325	Yakima/Klickitat Fisheries Project Operations and Maintenance	Yakima	Fundable (Qualified)	\$7,999,998	x					Ok for type
199701335	Klickitat Fishery YKFP O & M	Klickitat	Fundable in part (Qualified)	\$250,000	x					Ok for type
199701501	Imnaha River Smolt to Adult Return Rate and Smolt Monitoring Project	Imnaha	Fundable	\$0	x		x	x	x	Mostly Adequate
199701900	Evaluate the Life History of Native Salmonids in the Malheur Subbasin	Malheur	Fundable	\$922,538	x	x	x	x		Mostly Adequate
199702400	Avian Predation on Juvenile Salmonids in the Lower Columbia River	Systemwide	Fundable (Qualified)	\$1,410,000	x	x	x	x	x	Adequate
199703000	Chinook Salmon Adult Abundance Monitoring [Formerly - Listed Stock Adult Escapement]	Salmon	Fundable	\$915,213	x		x	x	x	Adequate
199703800	Listed Stock Chinook Salmon Gamete Preservation	Multiprovince	Fundable (Qualified)	\$195,000	x		x	x	x	Adequate
199705100	Yakima Basin Side Channels	Yakima	Fundable	\$139,998	x	x				Results needed
199705600	Klickitat Watershed Enhancement	Klickitat	Fundable	\$0	x	x	x			Results needed (critical)
199706000	Focus Watershed Coordinator - Nez Perce Tribe	Multiprovince	Admin (see comments)	\$441,000	x					Results needed (critical)
199800200	Snake River Native Salmonid Assessment	Snake Upper Middle	Fundable	\$1,055,606	x	x	x	x	x	Adequate
199800300	Spokane Tribe Wildlife Mitigation Operations & Maintenance	Spokane	Fundable	\$886,820	x	x	x			Results needed
199800401	Columbia Basin Bulletin	Systemwide	Fundable (Qualified)	\$450,000	x					Mostly Adequate

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199800702	Gd Ronde Supp Lostine O&M/M&E	Grande Ronde	Fundable (Qualified)	\$1,487,801	x		x	x		Mostly Adequate
199800703	Grande Ronde Supplementation Operations and Maintenance	Grande Ronde	Fundable (Qualified)	\$2,053,362	x		x	x		Mostly Adequate
199800704	Grande Ronde Basin Endemic Spring Chinook Supplementation Project: Northeast Oregon hatcheries implementation-ODFW	Grande Ronde	Fundable (Qualified)	\$600,000	x		x	x		Mostly Adequate
199801001	Grande Ronde Captive Brood O&M	Grande Ronde	Fundable in part (Qualified)	\$2,171,154	x		x	x		Adequate
199801003	Spawning distribution of Snake River fall Chinook salmon	Snake Hells Canyon	Fundable (Qualified)	\$156,000	x		x	x		Mostly Adequate
199801004	Monitor and Evaluate Performance of Juvenile Snake River Fall Chinook Salmon from Fall Chinook Acclimation Facilities	Snake Hells Canyon	Not fundable (Qualified)	\$0	x		x	x		Mostly Adequate
199801005	Pittsburg Landing Fall Chinook Acclimation Project (FCAP)	Snake Hells Canyon	Not fundable (Qualified)	\$2,188,905	x					Results needed (critical)
199801006	Captive Broodstock Artificial Propagation	Grande Ronde	Fundable in part (Qualified)	\$527,154	x		x	x		Mostly Adequate
199801400	Ocean Survival Of Salmonids	Systemwide	Fundable (Qualified)	\$6,511,800	x	x	x	x	x	Adequate
199801600	Salmonid Productivity, Escapement, Trend, and Habitat Monitoring in the John Day River Subbasin	John Day	Fundable (Qualified)	\$2,100,000	x	x	x	x	x	Mostly Adequate
199801700	North Fork/Mid-John Day Fish Passage Improvement	John Day	Fundable	\$1,428,764	x	x	x	x		Results needed
199801800	John Day Watershed Restoration	John Day	Fundable	\$2,897,132	x	x	x			Results needed
199801900	Wind River Watershed Restoration	Wind	Fundable (Qualified)	\$999,999	x	x				Results needed

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199802100	Hood River Fish Habitat	Hood	Fundable (Qualified)	\$2,099,476	x	x	x			Results needed (critical)
199802200	Pine Creek Conservation Area: Wildlife Habitat and Watershed Management on 33,557-acres to benefit grassland, shrub-steppe, riparian, and aquatic species.	John Day	Fundable	\$630,000	x	x	x	x	x	Adequate
199802800	Trout Creek Watershed Restoration Project	Deschutes	Fundable (Qualified)	\$495,000	x					Results needed
199803100	Implement Wy-Kan-Ush-Mi Wa-Kis	Systemwide	Fundable (Qualified)	TBD	x					Results needed
199900301	Evaluate Spawning of Fall Chinook and Chum Salmon Just Below the Four Lowermost Mainstem Dams	Systemwide	Fundable	\$2,338,758	x		x	x	x	Adequate
199901000	Pine Hollow/Jackknife Habitat	John Day	Fundable	\$0	x		x			Results needed
199901500	Big Canyon Fish Habitat	Clearwater	Not fundable	\$0	x					Results needed (critical)
199901600	Protect & Restore the Big Canyon Creek Watershed	Clearwater	Fundable in part	\$495,000	x					Results needed (critical)
199901700	Protect and Restore Lapwai Creek Watershed	Clearwater	Fundable in part	\$1,169,295	x					Results needed (critical)
199901900	Restore Salmon River (Challis, Idaho)	Salmon	Not fundable	\$0	x	x				Results needed (critical)
199902000	Analyze Chinook Salmon Spatial and Temporal Dynamics and Persistence	Systemwide	Fundable (Qualified)	\$277,674	x		x	x		Results needed
199902500	Sandy River Delta Habitat Restoration	Sandy	Fundable	\$0	x	x	x	x		Mostly Adequate
200000100	Anadromous Fish Habitat & Pass	Okanogan	Fundable (Qualified)	\$349,999	x	x	x	x		Mostly Adequate
200000400	Monitor, Protect, and Rehabilitation of Bull Trout and Westslope Cutthroat Trout Habitat in the Upper Kootenay River Subbasin	Kootenai	Fundable	\$189,000	x	x	x	x		Results needed
200000900	Logan Valley Wildlife Mitigation Site	Malheur	Fundable	\$467,482	x	x				Mostly Adequate

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200001200	Evaluate Factors Limiting Columbia River Chum Salmon	Columbia Lower	Fundable	\$454,998	x	x	x			Results needed
200001400	Evaluate Population Dynamics And Habitat Use Of Lampreys In Cedar Creek (Lewis River Subbasin), Washington.	Lewis	Fundable	\$0	x	x	x	x		Mostly Adequate
200001500	Oxbow Conservation Area Management	John Day	Fundable	\$600,210	x	x	x			Mostly Adequate
200001600	Tualatin River NWR Additions	Willamette	Fundable	\$614,350	x	x	x			Mostly Adequate
200001700	Recondition Wild Steelhead Kelt	Systemwide	Fundable in part	\$1,200,000	x		x			Mostly Adequate
200001900	Tucannon River Spring Chinook Captive Broodstock Program	Tucannon	Fundable	\$285,000	x		x	x		Mostly Adequate
200002100	Securing Wildlife Mitigation Sites - Oregon Ladd Marsh WMA and Grande Ronde Subbasin Wetlands	Grande Ronde	Fundable	\$195,000	x	x	x	x		Mostly Adequate
200002600	Rainwater Wildlife Area Operations and Maintenance	Walla Walla	Fundable	\$900,000	x	x				Mostly Adequate
200002700	Acquisition Of Malheur River Wildlife Mitigation Project	Malheur	Fundable	\$1,033,426	x	x				Mostly Adequate
200002800	Evaluate Pacific Lamprey In Clearwater	Clearwater	Fundable in part	\$0	x	x	x	x		Mostly Adequate
200003100	North Fork John Day Basin Anadromous Fish Habitat Enhancement Project	John Day	Fundable	\$600,000	x					Mostly Adequate
200003300	Walla Walla River Fish Passage Operations	Walla Walla	Fundable (Qualified)	\$387,702	x		x			Results needed
200003500	Rehabilitate Newsome Creek - S	Clearwater	Fundable (Qualified)	\$952,422	x	x	x			Results needed
200003600	Protect And Restore Mill Creek	Clearwater	Fundable	\$450,000	x	x		x		Mostly Adequate
200003800	NEOH Walla Walla Hatchery - Three Step Master Planning Process	Walla Walla	Not fundable	\$0	NA					NA
200003900	Walla Walla Subbasin Collaborative Salmonid Monitoring & Evaluation Project	Walla Walla	Fundable (Qualified)	\$2,743,080	x					Results needed

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200100300	Adult Pit Detector Installation	Systemwide	Fundable	\$564,468	x		x	x	x	Adequate
200102100	15 Mile Creek Riparian Buffers	Fifteenmile	Fundable (Qualified)	\$266,555	x					Results needed
200102600	Status, Genetics, and Life History of Coastal Cutthroat Trout above Bonneville Dam	Columbia Gorge	Not fundable	\$0	x		x			Results needed
200102700	Western Pond Turtle Recovery - Columbia River Gorge - Washington	Columbia Gorge	Fundable	\$0	x		x	x		Mostly Adequate
200102800	Banks Lake Fishery Evaluation Project	Crab	Fundable in part	\$0	x	x	x	x	x	Mostly Adequate
200102900	Ford Hatchery Operations & Maintenance	Columbia Upper	Fundable in part	\$382,067	x					Results needed
200103100	Intermountain Province Resident Fish Conference and E-Library	Columbia Upper	Fundable	\$40,000	x					Ok for type
200103200	Coeur D'Alene Fisheries Enhancement, Hangman Creek	Spokane	Fundable	\$1,820,327	x	x				Results needed
200103300	Hangman Restoration Project	Spokane	Fundable in part (Qualified)	\$1,972,081	x	x				Results needed
200104101	Forrest Conservation Area Management	John Day	Fundable	\$619,905	x	x	x			Mostly Adequate
200105300	Reintroduction of Chum Salmon into Duncan Creek	Columbia Lower	Fundable	\$474,999	x		x	x		Adequate
200200200	Restore Natural Recruitment of Kootenai River White Sturgeon	Kootenai	Fundable	\$8,000,000	x	x	x	x	x	Adequate
200200300	Secure & Restore Resident Fish Habitat	Flathead	Not fundable	\$17,081,000						Results needed
200200800	Reconnect Kootenai River with the historic floodplain	Kootenai	Fundable in part	\$1,198,150	x					Ok for type
200201100	Kootenai Floodplain Operational Loss Assessment	Kootenai	Fundable	\$2,134,401	x	x				Mostly Adequate
200201301	Water Entity (Rpa 151)	Systemwide	Fundable (Qualified)	\$15,000,000	x	x		x		Results needed

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200201400	Sunnyside Wildlife Mitigation	Yakima	Fundable in part	\$270,000	x	x				Mostly Adequate
200201500	Provide Coordination and Technical Assistance to Watershed Councils and Individuals in Sherman County, Oregon	John Day	Response requested	\$0	x					Results needed
200201600	Evaluate the Status of Pacific Lamprey in the Lower Deschutes River Subbasin, Oregon	Deschutes	Fundable	\$396,000	x	x	x	x		Adequate
200201800	Tapteal Greenway Riparian Corridor Enhancement, Protection and Education Outreach--Phase II (Tapteal Bend and Horn Rapids).	Yakima	Fundable (Qualified)	\$0	x					Results needed (critical)
200201900	Wasco Riparian Buffers	Deschutes	Fundable (Qualified)	\$210,480	x					Results needed
200202501	Yakima Tributary Access & Habitat Program	Yakima	Fundable (Qualified)	\$3,199,998	x	x				Results needed
200202600	Morrow County Riparian Buffers Umatilla County Riparian Buffers	Umatilla	Response requested	\$0	x	x				Results needed
200202700	Forecasting Hydrosystem Operations to Benefit Anadromous Fish Migration	Systemwide	Fundable	\$0	x	x				Results needed
200203000	Develop Progeny Marker for Salmonids to Evaluate Supplementation	Umatilla	Fundable	\$529,000	x		x	x	x	Adequate
200203100	Growth modulation in salmon supplementation	Yakima	Fundable (Qualified)	\$1,061,550	x		x	x	x	Adequate
200203200	Snake River fall Chinook salmon life history investigations	Systemwide	Fundable	\$3,000,000	x		x	x		Mostly Adequate
200203400	Wheeler Co Riparian Buffers	John Day	Response requested	\$0	x					Results needed
200203500	Gilliam Co Riparian Buffers	John Day	Response requested	\$0	x					Results needed
200203600	Restore Walla Walla River Flow	Walla Walla	Fundable	\$1,242,000	x					Results needed
200203700	Freshwater Mussel Research and Restoration Project	Umatilla	Fundable (Qualified)	\$0	x	x	x	x		Adequate

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200204500	Coeur D'Alene Fish Habitat Acquisition	Coeur d'Alene	Not fundable	\$0						NA
200205000	Continued Riparian Buffer Projects on Couse/Tenmile and other Salmonid Bearing Streams in Asotin County.	Asotin	Fundable (Qualified)	\$699,999	x					Results needed
200205300	Assess Salmonids Asotin Cr Ws	Asotin	Fundable	\$636,000	x		x	x		Mostly Adequate
200205400	Protect & Restore the Asotin Creek Watershed	Asotin	Fundable in part (Qualified)	\$0	x					Results needed
200205900	Yankee Fork Salmon River Dredge Tailings Restoration Project	Salmon	Fundable in part (Qualified)	\$481,119	x					Ok for type
200206000	Nez Perce Harvest Monitoring	Multiprovince	Fundable	\$979,938	x		x	x	x	Adequate
200206100	Restore Potlatch R Watershed	Clearwater	Fundable	\$1,192,458	x	x	x	x	x	Mostly Adequate
200207000	Lapwai Cr Anadromous Habitat	Clearwater	Fundable in part	\$260,000	x	x	x			Ok for type
200207200	Protect & Restore Red River Watershed	Clearwater	Fundable (Qualified)	\$1,179,354	x					Mostly Adequate
200207400	Protect and Restore Crooked Fork to Colt Killed Analysis Area	Clearwater	Fundable	\$684,366	x					Mostly Adequate
200300100	Manastash Creek Passage & Screening	Yakima	Not fundable (Qualified)	\$1,500,000	x	x				Results needed
200300600	Effectiveness Monitoring of Estuary Restoration in the Grays River and Chinook River Watersheds	Columbia Estuary	Not fundable	\$0	x	x	x			Results needed
200300700	Lower Columbia River and Estuary Ecosystem Monitoring	Columbia Estuary	Fundable (Qualified)	\$1,233,000	x	x	x	x		Mostly Adequate
200300900	Canada-USA Shelf Salmon Survival Study	Systemwide	Fundable in part	\$574,992	x	x	x	x	x	Mostly Adequate

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200301000	Historic Habitat Opportunities and Food-Web Linkages of Juvenile Salmon in the Columbia River Estuary and Their Implications for Managing River Flows and Restoring Estuarine Habitat	Grays	Fundable (Qualified)	\$0	x	x	x	x	x	Adequate
200301100	Columbia R/Estuary Habitat	Columbia Estuary	Fundable (Qualified)	\$3,048,000	x					Results needed (critical)
200301200	Shillapoo Wildlife Area	Columbia Lower	Fundable	\$570,000	x	x				Results needed
200301300	Grays River Watershed Restoration	Grays	Fundable	\$601,612	x	x				Ok for type
200301700	Integrated Status and Effectiveness Monitoring Program (ISEMP): The design and evaluation of monitoring tools for salmon populations and habitat in the Interior Columbia River Basin.	Systemwide	Fundable (Qualified)	\$5,508,000	x					Mostly Adequate
200302200	Okanogan Basin Monitoring and Evaluation Project (OBMEP)	Okanogan	Fundable	\$1,173,999	x					Ok for type
200302300	Chief Joseph Hatchery Program	Okanogan	Fundable in part	\$2,800,000	x					Ok for type
199701900	Assess the feasibility of the Upper Malheur Watershed to support the reintroduction of anadromous Fish populations above the Beulah and Warm Springs Reservoirs	Middle Snake	Not fundable	\$0						NA
200303600	CBFWA Collaborative Systemwide Monitoring and Evaluation Program	Systemwide	Fundable (Qualified)	\$1,969,000	x	x	x	x	x	Adequate
200303800	Evaluate Restoration Potential of Snake River Fall Chinook Salmon Spawning Habitat	Systemwide	Fundable	\$0	x	x	x	x	x	Adequate
200303900	Monitor Repro In Wenat/Tuc/Kal	Wenatchee	Fundable	\$0	x		x	x	x	Adequate

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200304100	Evaluate Delayed (Extra) Mortality Associated with Passage of Yearling Chinook Salmon through Snake River Dams	Systemwide	Fundable	\$2,939,451	x					Adequate
200305000	Evaluate Of Reproduction Of Steelhead	Systemwide	Fundable	\$840,319	x		x	x	x	Adequate
200305400	Reproduction Of Steelhead In Hood River	Systemwide	Fundable	\$872,550	x		x	x		Adequate
200306000	Evaluating relative reproductive success of wild and hatchery origin Snake River fall Chinook spawners upstream of Lower Granite Dam	Systemwide	Fundable (Qualified)	\$28,979	x		x	x		Adequate
200306200	Evaluate the Relative Reproductive Success of Reconditioned Kelt Steelhead	Systemwide	Fundable in part	\$1,105,275	x		x	x	x	Adequate
200306500	Klickitat River Cooperative Evaluation Program (Formerly Bull Trout Presence, Origin, and Movements In Bonneville Reservoir)	Klickitat	Not fundable (Qualified)	\$0	x		x	x		Results needed
200307200	Habitat and Biodiversity Information System For Columbia River Basin	Systemwide	Fundable	\$473,493	x					Results needed
200311400	Acoustic Tracking For Survival	Systemwide	Fundable in part (Qualified)	\$3,600,000	x		x	x		Results needed
200400200	PNAMP Funding	Systemwide	Fundable	\$150,000	x					Adequate
200500100	Pilot Study for Research, Monitoring, and Evaluation of Subyearling Salmon in Tidal Freshwater of the Columbia River	Columbia Lower	Fundable in part (Qualified)	\$0	x					Mostly Adequate
200500200	Operation of the Lower Granite Dam Adult Trap	Systemwide	Fundable	\$875,406	x					Results needed
200600100	McIntyre Dam Feasibility Study	Okanogan	Fundable	\$0	x					Ok for type

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200600300	Desert Wildlife Area O&M (Wetland Enhancement)	Crab	Not fundable	\$0	x					Ok for type
200600400	Wenas Wildlife Area O&M	Yakima	Fundable	\$999,999	x	x				Mostly Adequate
200600500	Asotin Creek Wildlife Area O&M (Schlee Acquisitions)	Asotin	Fundable	\$231,000	x	x	x			Results needed
200600600	Habitat Evaluation Procedures (HEP)	Multiprovince	Fundable in part	\$666,000	NA					NA
200600800	Evaluation of the Biological Effects of the Northwest Power and Conservation Council's Mainstem Amendment on the Fisheries Upstream and Downstream of Hungry Horse and Libby Dams, Montana.	Flathead	Fundable	\$1,129,500	x	x	x	x	x	Mostly Adequate

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