



**Independent Scientific Review Panel**  
for the Northwest Power and Conservation Council  
851 SW 6<sup>th</sup> Avenue, Suite 1100  
Portland, Oregon 97204  
isrp@nwcouncil.org

# Final Review

of the

## United States Army Corps of Engineers' Anadromous Fish Evaluation Program

for

### Fiscal Year 2004

(AFEP Review Part II. FY04 Final Programmatic Review)



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Charles C. Coutant  
Susan Hanna  
Nancy Huntly  
William Liss

Lyman McDonald  
Brian Riddell  
William Smoker  
Richard Whitney

Richard N. Williams  
John D. McIntyre, PRG  
Tom Poe, PRG  
Erik Merrill, Staff

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## Executive Summary

This is the final report by the ISRP of its initial review of the US Army Corps of Engineers (Corps) Anadromous Fish Evaluation Program (AFEP) for Fiscal Year 2004. The AFEP program provides scientific information to assist the Corps in making engineering, design, and operations decisions to support safe, efficient passage of fish through the eight mainstem Columbia and Snake River hydroelectric projects. The ISRP review provides the opportunity to ensure that AFEP proposals receive a similar level of scrutiny for scientific soundness as proposals in the Northwest Power and Conservation Council's Fish and Wildlife Program.

The Corp's Anadromous Fish Evaluation Program and the Council's Fish and Wildlife Program represent the two largest fisheries management and recovery programs in the Columbia River Basin. However, there are significant differences between the two programs in their structures, proposal development, and proposal review processes. For example, the AFEP lacks a long-term strategic research plan or framework, whereas the Council's 2000 Fish and Wildlife Program and the ongoing subbasin planning exercise are specifically aimed at providing long-range planning for future fish and wildlife management goals. There is also a lack of coordination between AFEP and the Council's Fish and Wildlife Program, with the FCRPS 2000 BiOp being the nearly exclusive justification for the AFEP studies, thus neglecting broader, long-range goals. Nevertheless, the AFEP does a good job in using short-term research results immediately for both policy decisions and planning near-term new work. The present AFEP repertoire of projects consists almost entirely of site-specific studies directed at narrow objectives for application to the specific dam site.

The ISRP recommends that the Corps develop strategic multi-year research plans including identification of where more mechanism-oriented strategies (e.g. behavioral or mortality mechanisms) could yield benefits in research productivity, efficiency, and economy of time and funds, resulting in faster implementation of fish-protective features.

The next area of concern by the ISRP was in the AFEP proposal development and review process. Presently, the AFEP lacks an independent scientific review of proposals at any stage. In the future, the ISRP could provide this function; however, the current internal iterative process of proposal development does not lend itself to an independent proposal review process like the ISRP provides to the Council and BPA for Fish and Wildlife Program proposals. For example, in this initial review, most of the AFEP pre-proposals were not well enough developed to be amenable to scientific review. It also appears that as a result of the iterative proposal development process, the current AFEP proposal review process has little bearing on the selection of proposals for funding. Unless the AFEP proposal development process is modified, future ISRP review of AFEP proposals may not be particularly useful, as the present AFEP process does not have clear decision points where ISRP review can provide value to the scientific quality of the proposed studies and inform project selection and funding.

Finally, the ISRP sees the need for more explicit solicitation and funding of mechanism-oriented research to solve problems addressed by the AFEP mission. Presently, AFEP proposals can be grouped into those that are dependent upon hydrosystem operation decisions for the upcoming study year and those that are independent of such constraints. The ISRP recommends that

proposals in the dependent category be prepared late enough in the fall to allow for current-year data to be analyzed (project report does not need to be completed) with a specific study design based on the best current management advice or questions and include contingency plans (e.g. alternate study designs/sample sizes etc.) to cover a reasonable range of operational alternatives. Proposals that are independent of hydrosystem operations can be solicited earlier and prepared over a longer timeframe that allows for a higher standard of proposal preparation following criteria as recommended by the ISRP.

# **Final ISRP Review of the US Army Corps of Engineers’ Anadromous Fish Evaluation Program for Fiscal Year 2004**

## **Introduction**

This is the second and final of two ISRP reports containing the results of the ISRP’s review of the US Army Corps of Engineers (Corps) Anadromous Fish Evaluation Program (AFEP) for Fiscal Year 2004. In its first report, issued on October 15<sup>th</sup>, 2003, the ISRP provided comments on each of the 52 pre-proposals submitted to meet the research needs for the AFEP in Fiscal Year 2004. That report was intended to aid the Corps in selecting among pre-proposals and assist the project sponsors in drafting final proposals. The ISRP’s comments were limited because the pre-proposals did not provide enough information for a complete technical review. This second report provides comments on the proposals submitted with the final projects selected for Fiscal Year 2004 funding by the Corps, but the primary purpose of this report is to provide programmatic comments and recommendations on the Anadromous Fish Evaluation Program and project selection process as a whole. This report specifically addresses review questions provided by the Northwest Power and Conservation Council (Council) in a June 2003 letter to the ISRP (Appendix 1).

The AFEP’s main purpose is to produce scientific information to assist the Corps in making engineering, design, and operations decisions for the eight mainstem Columbia and Snake River hydroelectric projects. These decisions are intended to support safe, efficient passage of fish through the mainstem migration corridor (AFEP is further described below). Funding for the AFEP is appropriated by Congress, expended by the Corps, and reimbursed by the Bonneville Power Administration (BPA). Unlike projects directly funded through the Columbia River Basin Fish and Wildlife Program (Council’s program), AFEP projects had not previously undergone ISRP review. Consequently, this review provides the opportunity to ensure that AFEP proposals receive a similar level of scrutiny for scientific soundness as the Fish and Wildlife Program proposals, as directed by the Council.

The ISRP review of the AFEP was undertaken pursuant to the U.S. Congress’ Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill, which directed the ISRP to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by the Bonneville Power Administration (the “reimbursable” program). The conference report specifies that the ISRP is to use the same standards in its review and recommendations as it does in its review of projects proposed to implement the Council’s program.

The ISRP reviews proposals with regard to whether they:

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

There are four major components of the reimbursable program:

- 1) Columbia River Fish Mitigation Program (Corps of Engineers)
- 2) Fish and Wildlife Operations and Maintenance Budget (Corps of Engineers)
- 3) Lower Snake River Compensation Plan (U.S. Fish and Wildlife Service)<sup>1</sup> and
- 4) Leavenworth Hatchery (Bureau of Reclamation).

The AFEP is an informal grouping of projects from the first two components, largely the first one.

## Review Process

In June 2003, the Council requested the ISRP to focus its Fiscal Year 2004 reimbursable review effort on the AFEP. The ISRP has released two previous reports regarding the Corps' Columbia River Fish Mitigation Program (CRFMP). The first ISRP review conducted in 1999 relied on the Independent Scientific Advisory Board's (ISAB) congressionally directed Corps Capital Program review.<sup>2</sup> For that review, the ISAB completed a series of reviews covering Corps' projects and studies related to adult passage, John Day Dam extended length turbine intake screens, the Bonneville Dam bypass system outfall, and dissolved gas. In addition, the ISAB provided a broader conceptual review of the Corps' program.<sup>3</sup> The second ISRP review, conducted in 2001, covered the decision-making process on Bonneville Powerhouse I bypass options.<sup>4</sup>

During both of those reviews, ISRP members identified the research projects that are implemented through AFEP as the most logical component of the Corps program suitable for ISRP review. These research projects are distinguishable from projects that involve ordinary maintenance and operations of fish-related facilities, the costs of which are also passed to BPA as reimbursable portions of the Corps expenditures. The primary obstacles were synchronizing schedules and identifying review materials and opportunities for input. After ongoing conversations between Council staff, the Corps, and the ISRP, it appeared that an ISRP review could be integrated with the Corps' established AFEP review process for 2003.

The Council's request specified that the ISRP's technical review be at a pilot scale with a focus on AFEP proposals covering the estuary and fish survival at the Columbia River federal hydroelectric projects (project survival). In consultation with Council and Corps staff, the ISRP

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<sup>1</sup> The ISRP completed a review of the Lower Snake River Compensation Plan projects in the course of the provincial reviews. See the ISRP's Lower Snake River Compensation Plan Final Proposal Review for Columbia Plateau, Blue Mountain and Mountain Snake Provinces (ISRP 2002-6). April 23, 2002.

[www.nwcouncil.org/library/isrp/isrp2002-6.pdf](http://www.nwcouncil.org/library/isrp/isrp2002-6.pdf)

<sup>2</sup> ISRP Review of the BPA Reimbursable Account Programs in the Columbia River Basin as Requested in the Senate-House Conference Report on FY99 Energy and Water Development Appropriations Bill (ISRP 1999-1). April 1999. [www.nwcouncil.org/library/isrp/isrp99-1.htm](http://www.nwcouncil.org/library/isrp/isrp99-1.htm)

<sup>3</sup> Report of the Independent Scientific Advisory Board Review of the U.S. Army Corps of Engineers' Capital Construction Program. Part III. Overview of the U.S. Army Corps of Engineers' Capital Construction Program (ISAB 1999-4). February 16, 1999. [www.nwcouncil.org/library/isab/isab99-4.htm](http://www.nwcouncil.org/library/isab/isab99-4.htm)

<sup>4</sup> ISRP Preliminary review of the United States Army Corps of Engineers' Bonneville Decision Document Juvenile Fish Passage Recommendation October 2001 (ISRP 2001-11). December 18, 2001. [www.nwcouncil.org/library/isrp/isrp2001-11.htm](http://www.nwcouncil.org/library/isrp/isrp2001-11.htm)

further refined the subset of project survival proposals to those for the John Day, Ice Harbor, and The Dalles dams.

The ISRP and Peer Review Group (PRG) members have participated in several steps of the AFEP proposal process:

- Participation in an AFEP overview presentation from the Corps;
- Observation of Corps' meetings where one-page statements of needs were developed;
- Observation of Study Review Work Group and System Configuration Team meetings for prioritizing statements of needs and proposed studies;
- Review of pre-proposals in relation to the statements of needs (at least three reviewers to examine the highlighted subsets of proposals. One reviewer, but usually two or more, also reviewed the other proposals so that the ISRP could grasp the full extent of the AFEP);
- Participation in the Corps' AFEP pre-proposals presentation and discussion meeting;
- Discussion of the pre-proposals with the full ISRP to draft consensus comments;
- Submittal of a preliminary ISRP report with comments on each of the 52 pre-proposals;
- Observation of a Studies Review Work Group meeting regarding the designs for Ice Harbor Dam passage studies in 2004;
- Participation in the AFEP Annual Research Review;
- Review of final proposals selected for funding or further development.

These review steps were intended to engage the ISRP in the Corps' project selection process so that the ISRP could gather sufficient information to make project-specific and programmatic assessments on the substance, scale, scope, and process of the AFEP, to determine at what point in the Corps process it would be appropriate to insert an ISRP review of project proposals, and to compare the AFEP with the Council's Fish and Wildlife Program. The ISRP's review approach was selected to be least disruptive of the Corps' normal, annual cycle of selecting AFEP projects. The AFEP schedule and process of setting priorities and selecting projects were found to be significantly different from those of the Fish and Wildlife Program.

## **Description of the Corp's Anadromous Fish Evaluation Program<sup>5</sup>**

### ***Background***

The U.S. Army Corps of Engineers, Northwestern Division, has sponsored biological studies continuously since at least 1952. Over time, an integrated, applied research program has evolved to better understand and improve anadromous fish passage conditions at its multi-purpose projects on the Columbia and lower Snake Rivers in Oregon and Washington. These biological research, monitoring, and evaluation studies have continued under various names and are now managed under the Anadromous Fish Evaluation Program (AFEP). The AFEP is coordinated with federal, state, and tribal fish agencies that provide both technical and policy input to the Corps on study objectives, experimental design, and methodologies. A few AFEP studies are funded from project operations and maintenance accounts. Most AFEP biological studies are integral components of the broader Columbia River Fish Mitigation Program (CRFMP), a large

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<sup>5</sup> Summarized by the ISRP from materials provided by the Corps, including Corps' web sites, handouts, and oral presentation to the ISRP.

Corps construction account which funds numerous fish passage improvements at Columbia and Snake River mainstem dams. Funds for the CRFMP are appropriated by the U.S. Congress and reimbursed by BPA as costs of federal hydropower production. Study schedules are closely linked to construction activities so that biological questions can be answered in a timely manner.

Historically, Corps-funded studies have focused on hydropower project-specific adult and juvenile fish passage issues, and on transportation of juveniles downstream to avoid the dams. Most of the passage facilities and operations on the river have been developed and refined based on results of these studies. These facilities and operations include adult fish ladders and collection channels, juvenile bypasses with turbine intake screens and associated bypass facilities, the juvenile fish transportation program, spill for juvenile fish passage, and a comprehensive set of project/hydrosystem operating criteria. Recently, AFEP has included seven main areas of investigation: surface bypass, transportation, conventional turbine intake bypass systems, drawdown feasibility, in-river passage (spill, dissolved gas, reach survival), adult fish migration, and in-turbine passage. Lamprey passage and the Columbia River estuary are recent additions to the AFEP agenda. Most studies are developed as integral components of larger study and evaluation features of the CRFMP related to new passage technologies, while some evaluate existing project features. Dam-specific studies are generally phased among dam projects (work concentrated on a few dam projects each year).

The AFEP for FY2004 will consist of about 30 studies expected to cost about \$30 million for research contracts (including personnel, equipment, and tags), project services, and administrative support.

### ***Purpose***

The AFEP's main purpose is to produce scientific information, largely biological, to assist the Corps in making engineering, design, and operations decisions for the eight mainstem Columbia and Snake River dams to provide safe, efficient passage for fish through the mainstem migration corridor. Specific management goals and objectives are to improve fish survival through all routes, provide acceptable migration conditions, maintain water quality standards, and minimize cost and generation loss. Each dam project has multiple authorized purposes and uses, including hydroelectric power production along with migratory fish passage, and is affected by several environmental and project operating statutes. These include the Endangered Species Act (ESA), Clean Water Act (CWA), National Environmental Policy Act (NEPA), Northwest Power Act (NPA), and Fish and Wildlife Coordination Act (FWCA).

General guidance for AFEP goals and objectives has been taken in the past from regional fisheries managers and the Council's Fish and Wildlife Program, but for FY04 the primary focus is on satisfying action items specified in the Federal Columbia River Power System 2000 Biological Opinion (FCRPS 2000 BiOp) and the Fish and Wildlife Service BiOp for protection of listed salmon, steelhead, bull trout, and white sturgeon. These biological opinions include measures to evaluate and make decisions on new passage technologies and system configurations. The FCRPS 2000 BiOp-directed biological studies have the highest priority in the AFEP program. Most are conducted to answer key questions about behavior, survival, and

condition of fish as they migrate through the mainstem corridor to facilitate system configuration decisions. The Corps develops decision documents for changes in facilities and operations based, in part, on information obtained from the AFEP's biological studies.

### **Coordination**

Coordination with regional fish and wildlife agencies and tribes is a key component of the Corps' fish passage program, including the AFEP. The Corps conducts technical coordination through three interagency work groups: (1) the Studies Review Work Group (SRWG), which develops, reviews, and prioritizes the research, monitoring and evaluation studies, (2) the Fish Facility Design Review Work Group (FFDRWG), which provides input to engineering and design of fish passage facilities and new passage technologies, and (3) the Fish Passage Operations and Maintenance Work Group (FPOM), which provides input on ongoing project operations and maintenance issues. Primary work group participants include fish passage specialists with the Idaho, Oregon, and Washington fisheries and wildlife departments, the Columbia River Inter-Tribal Fish Commission, NOAA Fisheries, USFWS, Northwest Power and Conservation Council, and Bonneville Power Administration. Meetings are open to any interested participants interested in Columbia basin fish restoration. The various coordination groups are integral to the AFEP process.

### **Annual AFEP Program Review**

In mid-November each year, the Corps hosts oral presentations of AFEP studies, largely from the previous year. The "program review" offers all AFEP participants and any other interested persons a chance to hear the current status of projects and their results from the investigators, during 20-minute presentations. Abstracts for all presentations are bound and distributed prior to the program review. The Portland and Walla Walla districts alternately host the gathering in their home cities.

### **Relation to Regional Forum Groups**

The Regional Forum has been developed since 1995 by NMFS/NOAA Fisheries and other regional entities to implement ESA provisions for protection and recovery of listed salmon species. A group organized by the Regional Forum, the System Configuration Team (SCT), prioritizes and recommends to the Corps elements of the CRFMP for implementation. Those CRFMP items that require biological studies become priority areas of investigation for the AFEP. The SRWG and other technical coordination groups use priorities developed by the SCT to recommend AFEP study objectives. Most disagreements or issues related to interpretations of technical information are resolved in the work groups. Any unresolved issues are brought to the Regional Forum groups for further discussion and resolution. Updates of SCT and FFDRWG activities are provided to the SCT, which addresses issues that are not resolved in the technical coordination groups. Issues or disputes not resolved by the System Configuration Team are forwarded to the Implementation Team (IT) for resolution. If the IT is unable to agree on a course of action, the matter may be referred to the Executive Committee (EC; top regional administrators of the federal agencies) for a recommendation. Regardless of how far the disputes

are elevated, the Corps' Northwestern Division Commander is responsible to make the final decision based on recommendations that emerge from the Regional Forum process.

### **Corps AFEP Management**

District and Division Coordinators manage the AFEP, guiding and coordinating the preparation of study summaries, proposals, schedules, and completion reports. The Coordinators work closely with Corps engineering and operations offices to ensure that studies adequately address program needs and regional preferences. Schedules are incorporated into work plans for CRFMP elements and submitted to the SCT for review and comment. The Coordinators convene meetings of the technical work groups, record minutes, and ensure that action items are completed. They oversee study completion by contractors, federal research groups, and universities. Documents are submitted to Northwestern Division fish program managers for programmatic/policy review, then approved by the Division Commander, who makes the final decision on makeup of each year's AFEP and CRFMP.

## **AFEP Project Development, Review, and Selection Processes**

### ***General Description and Schedule***

A component of the ISRP's review assignment was to participate in a sufficient number of AFEP meetings to be able to examine the AFEP process and observe how study proposals are developed, reviewed, and selected; to identify a point at which ISRP review would be least disruptive and most helpful; and to determine if study proposals are developed in a scientifically sound manner. To accomplish this task, the ISRP had at least one representative attend a series of the SRWG meetings (from April 30, 2003 to January 14, 2004). The SRWG was the primary focus of ISRP observation because it develops, reviews, and prioritizes all AFEP studies. A single SRWG represents both the Walla Walla and Portland districts. Work group participants include fish passage specialists with the Idaho, Oregon, and Washington fisheries and wildlife departments, the Columbia River Inter-Tribal Fish Commission, NOAA Fisheries, USFWS, Northwest Power and Conservation Council, and the Bonneville Power Administration. The Corps staff worked with the SRWG to develop study objectives, preliminary proposals, and final proposals.

The AFEP coordination schedule for 2003 featured SRWG meetings in March and April to develop research needs and study objectives, and in May to produce one-page study summaries (statements of research needs) for desired work in FY 2004. These project summaries were reviewed and prioritized in June and were the basis for soliciting preliminary study proposals in July. The SRWG heard oral presentations and reviewed these preliminary proposals in September. The Corps then asked for final proposals in November. After the Corps received preliminary FY 2004 budget advice in late December, the Corps and SRWG made recommendations and selections of studies to be conducted in 2004. These were forwarded to the SCT, which then made final recommendations to the Corps for funding of studies.

## ***AFEP SRWG Study Development Process***

One of the key roles of the Studies Review Work Group is to develop the research, monitoring, and evaluation studies that comprise the AFEP. To do this they must determine research needs and study objectives for ongoing and new studies each year.

Since the ESA listings, the agenda and study research needs for the SRWG have been almost totally dictated by the BiOp. Because the large number of Reasonable and Prudent Alternative actions (RPAs) in the BiOp precludes concurrent investigation of all RPAs because of budget constraints, the AFEP must prioritize its research activities. The NOAA Fisheries members of the SRWG seemed to have the most influence on which RPAs are addressed each year. This influence is a logical outcome of NOAA Fisheries' prominent role in authoring the BiOp and its RPAs.

In March or April of each year, the Studies Review Work Group, with regional participation, holds a number of sub-group meetings (one for each of the major topic areas of the AFEP) to determine research needs and study objectives for the next fiscal years' research, monitoring and evaluation (RME) studies. There were eight such sub-groups in 2003: (1) transportation/delayed mortality, (2) adult salmon, (3) in-river passage and survival, (4) project specific (e.g. behavioral guidance structure (BGS), surface bypass collector (SBC), removable surface weir (RSW)), (5) bull trout, (6) monitoring technology, (7) estuary, and (8) other (e.g. temperature, predation, etc.).

The SRWG meeting of April 30, 2003 was a key meeting with a goal to determine and prioritize the 2004 objectives for all juvenile salmonid in-river passage and survival studies for each of the eight Corps Columbia and Snake River mainstem dams. The workgroup was also expected to set precision requirements for each of these 2004 studies. This planning process appeared to be a very difficult and a somewhat unsuccessful one for several reasons: (1) without having results of 2003 studies, workgroup members were uncertain about setting 2004 objectives (a case in point was that the final setting of 2004 objectives for most of the Walla Walla Districts' passage and survival studies for Ice Harbor, Lower Monumental, and Lower Granite dams did not occur until a planning meeting of the SRWG on October 1, 2003, after preliminary proposals were prepared), (2) insufficient time was allocated to developing study objectives and precision requirements for 17 or 18 large and complex passage and survival studies, and (3) too few researchers participated.

The ISRP observes that by spending a little more time developing strategic multi-year research plans in the late winter/early spring, the SRWG would make future annual planning efforts much more organized and less time consuming. For example, a system-wide, multi-year strategy to prioritize, implement, and evaluate a new fish passage structure, such as the removable surface weir (RSW), would provide better long-range guidance and coordination of RME activities within and between Corps' districts.

The AFEP lacks, but would benefit from, a strategic, multi-year research plan or framework. Strategic multi-year research plans with contingencies and alternative tests built in would make the program stronger by reducing time and resources spent annually.

The SRWG meetings in the early spring are when sound scientific input needs to be applied. Sufficient time must be allotted and adequate input from the researchers is needed to provide independent scientific input and review. It is important for the fisheries and Corps managers to determine the scope and direction of applied research, but the development of study designs and methods is more appropriately left to research expertise. The SRWG should be a committee with experience and expertise in planning, developing, and designing studies. The ISRP observes that re-chartering the SRWG to make it more technically oriented and to include greater input of outside independent reviewers at all stages of project development would aid the scientific soundness of the studies.

The SRWG membership and charter need to be altered to make it a more technically focused work group that could better ensure scientific soundness.

It appears that the Corps and this work group are sometimes too focused on one or two years of recent study results and may prematurely apply an engineering solution (e.g. the BGS at Lower Granite) to address fisheries passage and survival problems at the hydroelectric projects.

The SRWG has demonstrated a willingness to address questions regarding study design and statistical precision. This is a positive sign that the program promotes open scientific discussion when questions arise. An example of this was when a special SRWG meeting was convened, on December 11, 2003, to discuss the potential bias in route specific survival estimates, the protocols for tag releases in ongoing radio telemetry survival studies, and to determine if these studies had high enough precision to produce valid results.

### **AFEP SRWG Review Process and Preliminary Proposal Review**

The SRWG also has the task of reviewing all study designs, proposals, and reports at various stages of completion. The major review in the SRWG schedule for determining studies for FY 2004 was the pre-proposal review held September 15-17, 2003. The ISRP participated in this review meeting and provided review comments for each of these pre-proposals.<sup>6</sup>

One issue the ISRP identified in its AFEP pre-proposal review report (October 2003) was that most of the pre-proposals were not well enough developed to be amenable to scientific review and, as written, did not meet ISRP criteria for scientific soundness. Detail on research methods and study variables was particularly lacking. Reasons provided for this lack of detail were that researchers were still analyzing 2003-2004 data, hydro-operation plans were not finalized, and final study designs were pending the selection of the final set of objectives and hypotheses that would fit the operation plans. Specification of the variables to be tested for effects on survival is essential for the development of a complete, scientifically sound study plan. Conducting a meaningful technical review without a detailed study design is not possible.

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<sup>6</sup> ISRP 2003-14. Review of Fiscal Year 2004 Pre-proposals for the US Army Corps of Engineers' Anadromous Fish Evaluation Program. October 15, 2003. [www.nwcouncil.org/library/isrp/isrp2003-14.htm](http://www.nwcouncil.org/library/isrp/isrp2003-14.htm)

Some pre-proposals did not appear to be as constrained by hydro-operations or past years' data (e.g. estuary or avian predation pre-proposals), but even these did not provide sufficient details to enable scientific review and comparison for soundness between competing proposals.

The 52 AFEP pre-proposals reviewed by the ISRP were organized into six broad categories plus a seventh miscellaneous grouping, as shown below. Of the 52 pre-proposals reviewed, 35 (67%) were considered incomplete and inadequate for scientific review. Each of the AFEP pre-proposals (with corresponding ISRP review comments) was also re-examined to determine which were dependent upon hydrosystem operation decisions for upcoming study year and which were independent of such constraints.

<b>Study Type and Proposal #</b>	<b>Number of Proposals</b>	<b>Incomplete</b>	<b>Dependent</b>	<b>Independent</b>
Estuary Studies - # 1-8	8	6	0	8
Fish Survival & Passage Studies - #9-27	19	17	17	2
Surface Bypass Studies - # 28-31	4	1	1	3
Adult Studies - # 32-36	5	5	0	5
Bypass Studies - # 37-41	5	0	0	5
Transportation Studies - # 42-49	8	4	0	8
Miscellaneous Studies (# 50 Bull Trout, #51 White Sturgeon, #52 Avian Predation)	3	2	0	3
<b>Summary Results</b>	<b>52</b>	<b>35 (67%)</b>	<b>18 (35%)</b>	<b>34 (65%)</b>

As expected, the pre-proposals in the Fish Survival and Passage category were almost all incomplete because they depend on hydrosystem operational decisions or complete analysis of the current year's study data that were not yet made. The ISRP could find no legitimate reasons for the 17 (35%) incomplete pre-proposals that were not constrained by hydrosystem operations

The ISRP has two recommendations based on this analysis: (1) proposals in the dependent category could be prepared late enough in the fall to allow for current-year data to be analyzed (project report does not need to be completed) with a specific study design based on the best current management advice or questions and include contingency plans (e.g. alternate study designs/sample sizes etc.) to cover a reasonable range of operational alternatives; (2) proposals that are independent of hydrosystem operations need to meet a higher standard of proposal preparation following criteria as recommended by the ISRP.

AFEP proposals could be phased so that projects that do not depend on operational details or prior year's results could be prepared and reviewed early and those that do have such constraints could be prepared and reviewed later. This time phasing would help both the short time schedule and the quality of proposals.

The SRWG process does not appear to include a review of final proposals. Reviews of pre-proposals, conducted by the SRWG members and their agencies, appear cursory. Some bio-statistical review is provided (by Cliff Pereira of Oregon State University) of selected proposals

to assess adequacy of statistical analysis and study design. The reviews are oral in nature and result in very few written comments. The ISRP does not see that independent scientific peer review has much bearing on the AFEP project selection process, despite the existence of some scientific review and dialogue between project sponsors and the Corps.

The AFEP might consider conducting future pre-proposal reviews following Annual Results Review presentations. At that point, critical data should be available for incorporation into the next year's plans.

In addition, the ISRP observes inconsistency in both the pre-proposal and final proposal format and content. It would be helpful for reviewers if a standard proposal format, such as that used within the Council's program, were developed and required of all proposals submitted to AFEP.

The ISRP notes that, especially for the new AFEP topic areas of ocean and estuary, lamprey, and avian and piscivorous predation, the AFEP and the Council's program have significant overlap. Some proposals have been funded through both programs. For these areas of program needs, proposals should follow a consistent format. The format required of proposals to the Council's program includes sections on: 1) technical and scientific background, 2) rationale and significance to regional programs, 3) relationships to other programs, 4) project results (history), 5) objectives, tasks, and methods, and 6) information on facilities, equipment, and key personnel. This format would provide reviewers consistent presentation of information and explicit reference to identified research needs.

A similar issue is that proposals for ongoing research were purposefully focused on plans for next year's activities. Reporting on previous results was discouraged under the rationale that the Annual AFEP Review provided an opportunity to present results, yet it was early in the year when data were not yet fully available. This approach is not the most effective or efficient for independent scientific review. Instead, project sponsors should present results of past year's activities to justify next year's objectives, tasks, and methods.

For those areas of the AFEP that overlap the Fish and Wildlife Program, the Corps and the Council might want to explore a joint solicitation. This would increase coordination between programs, increase competition among proposals, and result in a more efficient proposal solicitation and review process.

In addition, the ISRP found it hard to piece together the interrelated projects at each dam and the projects employing similar methods systemwide. To address a similar problem in the Council's program, the ISRP recommended the umbrella proposal concept, which evolved into subbasin summaries and eventually into subbasin plans. These documents provide the background and context for various strategies and help inform reviewers, administrators, and project sponsors to better understand and coordinate overlapping efforts.

The AFEP lacks an independent scientific review of proposals at any stage. Existing review is inadequate to ensure reasonable standards of quality in AFEP studies. The ISRP recommends that the AFEP review schedule and process be re-organized to include a step for an independent scientific review of study proposals. Unless the AFEP proposal development process is modified, future ISRP review of AFEP proposals may not be particularly useful, as the present AFEP process does not have clear decision points where ISRP review can provide value to the scientific quality of the proposed studies and inform project selection and funding. For areas of overlap with the Council's program, the Corps and the Council should explore a joint proposal solicitation.

### **AFEP Study Selection Process**

Both the SRWG and the SCT have major roles in the study selection process.

The SRWG began narrowing the field of potential studies by first ranking or prioritizing the research needs and study objectives in the initial stages of study planning and development (i.e. at the March and April 2003 meetings). In June, the SRWG ranked the one-page research needs summaries and that is the last formal ranking that this workgroup does. It seems to be a critical point in the selection process, because the Corps uses these rankings to request study pre-proposals and the rankings do not appear to change much throughout the remainder of the year.

The SCT has the primary function of prioritizing the AFEP capital construction, research, and operations/maintenance projects for the Columbia River Fish Mitigation Program. Unlike the SWRG, the SCT uses proposed study cost estimates in their ranking and selection process. Early in the study development process the SCT builds a spreadsheet of potential capital spending and study needs based on RPAs and ongoing AFEP research, monitoring, and evaluation studies. All items are initially ordered on the basis of the previous years' final rankings. The team then applies a preliminary budget estimate for each item and the spreadsheet is modified as needed through the year. The final ranking of these projects by the SCT usually determines which studies are funded upon receipt of a final budget.

It is apparent that the current AFEP proposal review process has little bearing on the selection of proposals for funding. The ISRP recommends that the AFEP require a technically adequate and complete proposal prior to selection for funding.

The SCT is composed of many of the same members as the Studies Review Work Group (SRWG). The process might be perceived to have greater objectivity were these groups composed of different members and did not include potential project sponsors.

An ISRP representative attended one SCT meeting. The proceedings were found to be difficult to follow because discussions were based on a large spreadsheet containing 114 measures. One line on the spreadsheet, for example, was listed as "TDA forebay study" at a cost of \$4.5 million but this study really consisted of 5 or 6 separate studies. It seemed that some studies (potentially unnecessary or lower priority), could get funded only because they are lumped with high priority studies. Also, some high priority studies may not get funded because they are to be conducted at

a hydroelectric project with a relatively low priority. Studies at John Day Dam, for example, are lumped together on the spreadsheet as “JDA biological studies” and ranked #56, four lines below the cutoff point for the 2004 budget projection of \$70 million (for entire CRFM program).

One wonders if all passage or survival issues have been addressed at this dam. To avoid some of the problems indicated above, each study should be listed and ranked separately.

A small percentage of AFEP studies are open to competition. The bulk of the work is done by research divisions of federal government agencies (e.g. NMFS, USGS, USFWS, COE-WES); large service contractors (e.g. Battelle, Normandeau, and numerous engineering companies) with long-term contracts; and university cooperative fish and wildlife research units associated with federal government agencies (e.g. Oregon State University-USFWS, and the University of Idaho-USGS). Most studies are selected by direct Corps sole-source solicitation of study contracts after the SRWG and SCT have completed final project prioritizations.

The ISRP developed an impression that the AFEP has grown so large so quickly, that the process needs revisiting and re-organization. The Corps and NOAA should be commended for developing a process that allows for significant agency and public interface. However, it appears that participation is now so intense that participants cannot keep up with it (and don't) to the detriment of overall program goals. A systemwide strategic research plan would provide a framework within which these system-level considerations can be represented.

## **AFEP's Relationship and Coordination with the Council's Fish and Wildlife Program**

A preponderance of projects that focus upon short-term accommodation of the 2000 BiOp is evident in the AFEP program for 2004, to the near exclusion of broader, long-term goals of the Council's Fish and Wildlife Program. Only three of the (52) reviewed pre-proposals mentioned the Council's program. This is a reflection of guidance from the Corps. The ISRP observes that these are not competing programs, but components of a whole regional effort directed at common objectives. It seems symptomatic of the AFEP's short-term planning that the mutual objectives are not more formally recognized and incorporated.

There is, however, evidence that the coordination between the Council's program and AFEP is improving. One example is the development of the 2004 Summer Spill Study at Bonneville Dam that was called for under the Council's program and will be administered under the AFEP by the Corps. The avian predation and lamprey research studies are also examples of studies that are initially funded under one program and can switch to the other program.

If study proposals are potentially going to be submitted to both programs (as some have been), it is critical to have better coordination between both programs, including the use of similar standard formats for study proposals, scheduling the review of the past years study results (does not have to be a final report) so it is completed prior to the review of study proposals for the following year, and use the same criteria to judge the fundable vs. un-fundable proposals.

Coordination between AFEP and the Council's program could be accomplished if the Corps provided the Council an annual briefing of AFEP study results and how passage improvements have addressed the strategies in the Council's program. Such a briefing may also help identify research needs not being met by either program. The Council's Mainstem Amendments open up an avenue for such communication where they call for an annual report to the Council on the AFEP process.

## **AFEP's Use of Study Data for Recent Policy Decisions and Future Research Planning**

Information gathered by the AFEP studies, whose objectives are currently determined by reference to the BiOp, seems to be extensively used for immediate policy decisions and short-term future research needs. For example, RPA Action 68 states "The Corps and BPA shall continue spill and passage survival studies at The Dalles Dam in 2001. Research results shall be considered, in consultation with NMFS, through the annual planning process, to assess the need for additional changes in spill to further improve fish survival by 2002, but no later than 2005."

Policy decisions: Data from AFEP spill passage and survival studies at The Dalles Dam (TDA) since the mid 1990s have been used to inform decisions related to alteration of spill % (64 to 40%), spill patterns (from centered "crowned" pattern to a north skewed "juvenile" pattern which keeps the majority of spill flow in main thalweg), and construction of a spillway training/blocking wall (to keep spill flow from southern-most open spill bays from being entrained in a large eddy which is pulled back into the bulk spill flow).

Future Research Needs (Short-term): A detailed example is illustrative. Spillway survival studies conducted at The Dalles Dam (TDA) in the mid to late 1990s indicated that survival for juvenile salmonids passing the spillway was lower than survival observed at other FCRPS dams. Those study results raised many questions, some concerning the validity of the results (the survival estimates were relative estimates and from hose/bucket releases of PIT tagged fish - sometimes hatchery fish), and some investigators and managers wanted to begin research that addressed why spillway survival was lower at this project. Radio telemetry improved precision of survival estimates and also had juveniles passing the project more volitionally, as opposed to point/hose releases. A number of research studies were initiated to examine why survival of spill-passed juvenile salmonids at The Dalles Dam was lower than at most other mainstem Columbia and Snake River dams and to determine if the mortality was primarily direct (due to physical strike or hydraulic shear effects upon passing) or indirect (due to piscine or avian predation). These included studies using balloon tags, sensor fish, pikeminnow radio telemetry, and radio tagged juvenile salmonids in tailrace egress studies. Spillway passage studies over several years at The Dalles Dam have indicated fairly high spill passage effectiveness (%fish:%spill = ~ 2:1). These results have led to the development of proposals beginning in 2004 to examine juvenile salmonid distribution and approach patterns as they enter The Dalles Dam forebay with the goal of developing measures (e.g. removable spillway weirs or behavioral guidance devices) to increase fish passage efficiency (FPE).

Future Research Needs (Long-term): Data from AFEP studies are not used in the development of long-term research plans. The previous paragraph indicates that study results are used in a logical step-by-step process to address a series of questions related to, for example, spill survival at The Dalles Dam. However, the study designs, treatments, and methodologies for estimating survival have changed so frequently over the past ten years that the data are difficult to compare from one year to the next. A long-term strategic plan to address the problem when first detected might have guided the research and decision-making to an earlier conclusion.

The AFEP is best characterized as using short-term research results immediately for both policy decisions and planning near-term new work (perhaps too quickly), but neglecting long-term needs and strategies. The Corps should incorporate into its AFEP process a planning step for long-term needs and strategies to serve as a guide for annual decisions.

## **Species Needing Attention and Coordination by the AFEP and Council's Fish and Wildlife Program**

As a consequence of the primary focus upon the BiOp for selecting studies in the AFEP process, there is a high likelihood of overlooking species other than listed species that merit attention with respect to problems in passage at the dams and in the reservoirs of the hydroelectric system. We describe two such species, including American shad and native white sturgeon, which deserve attention from and coordination between the AFEP and the Council's program. A recent study on white sturgeon, just initiated by the AFEP intends to address some longstanding research and management needs of this species.

### ***American Shad***

While the life history and habits of American shad are well known from studies elsewhere, few studies have been conducted that are specific to the Columbia River. The ISRP has reviewed only a few proposals for studies of American shad, and none has been funded under either the Council's program or AFEP. There are several compelling reasons for a need to understand the impacts of American shad on Pacific Northwest salmonids and their role in the Columbia River ecosystem.

1. Adult shad at the mainstem dams have shown a dramatic increase in their numbers since counts began at Bonneville Dam in 1938 (Oregon Dept. F&W and Wash. Dept. F&W, 2002).<sup>7</sup> Counts rose from fewer than 10,000 in 1938 to a peak of 4 million in 1989 and have ranged between about 2 to 3 million since then. What is the carrying capacity of the Columbia River ecosystem for this species and what will be the long-term consequences for salmon?

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<sup>7</sup> Oregon Dept. F&W and Wash. Dept. F&W, 2002. Status Report Columbia River Fish Runs and Fisheries, 1938-2000. Oregon Dept. F&W and Wash. Dept. F&W, 2002). Clackamas, OR and Olympia, WA. 324 pp

2. There have been complaints by Oregon and Washington fishery managers that there are so many adult shad in the ladders at the dams at some times that they (might) impede the progress of salmon. Another hypothesis suggests that they might spread diseases as a result of crowding with salmon in the ladders. No documentation exists to support these speculations.
3. A third speculation is that juvenile shad might compete with juvenile salmon that use the same plankters for food. In a general ecological context, it would appear to be reasonable to conclude that something (animal) had to move over to make room for shad. What was it?
4. Management efforts to date (by developing a fishery for shad) have been hampered by the fact that the shad run coincides with runs of some chinook stocks that require protection, so commercial fisheries have not been possible except in some small backwater areas (e.g., Washougal Slough).

The Corps interest in American shad appears to be limited to the fish ladder problems. However, fish ladder problems (if any) impinge on management/policy issues that are different for shad than for salmonids, because a policy decision might be made to deliberately impede passage of American shad as an introduced, non-native species that might interact unfavorably with the native fauna in the ecosystem. Therefore, the Corps should exercise special care in assuring that its efforts with American shad are in conformity with potential Council recommendations.

### ***Effects of Other Introduced and Exotic Species***

In addition to American shad, there are a number of other introduced and exotic species present in the Columbia River Basin Ecosystem that we know very little about. Some of these species include: channel catfish, yellow perch, bluegill/other sunfish, crappies, Eurasian milfoil, Asiatic clams (*Corbicula manilensis*), and others. All of these species have an impact on juvenile salmonids, either directly (as predators) or indirectly (by altering the food base). As these species continue to become more dominant in the ecosystem they will have a greater impact on salmon populations. Studies should be initiated as soon as possible to understand the significance of these impacts. It is not clear that the Corps has a responsibility that would encompass these species, but the Corps should be alert to regional decisions, including Council decisions, that might bear on passage or survival issues at the dams.

### ***White Sturgeon<sup>8</sup>***

Beginning in the 1980s, a white sturgeon mitigation and restoration program was initiated in the Columbia and Snake rivers, funded in part by the Corps and in part by BPA through the Council's Fish and Wildlife Program. Most of this continuing effort is now in the Council's program, addressing Measure 10.4A.2 of the 1994 Program. The fish passage issues have received little attention, while the research and mitigation efforts have focused on population assessments and rebuilding of populations (in lower Columbia River reservoirs by transfers from

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<sup>8</sup> See Coutant, C. C. 2004. A riparian habitat hypothesis for successful reproduction of white sturgeon. *Reviews in Fisheries Science* 12:23-73.

the healthy population below Bonneville Dam and in the Kootenai by an experimental hatchery program). No white sturgeon projects have been reported in AFEP annual reviews 1998-present, although there may have been some earlier.

This year, the AFEP planning process developed a “Research Summary” for a new project (ADS-04-NEW) on “White Sturgeon Passage at Lower Columbia River Dams.” The summary states: “Improving passage for sturgeon at dams is an important part of future actions needed to help restore and maintain white sturgeon populations.” The summary gives specific objectives for evaluating adult sturgeon passage in the east ladder of The Dalles Dam in 2004-2006 and evaluating fishway designs to facilitate upstream passage in 2006-2007. It also provides a general objective of evaluating operations that may negatively affect survival, passage, and spawning success in the vicinity of lower Columbia River dams.

One proposal was submitted to fulfill this research summary: Proposal 51, “Behavior of white sturgeon near hydroprojects and fishways” submitted by the USGS, NMFS, and University of Idaho, with M. Parsley, M. Moser, and C. Peery as project leaders, and given the study code WTS-04-New. The ISRP was pleased to see both the Corps’ attention to this topic and a well-prepared proposal that met the ISRP review criteria. This study proposal was selected for funding in Fiscal Year 2004.

## **Topical Comments on Research Approaches and Passage Strategies**

### ***Site-specific studies vs. search for mechanisms***

The ISRP review has identified a dichotomy between present and potential AFEP strategies that we believe affects its productivity in solving fish passage issues. The present AFEP repertoire of projects consists almost entirely of rather short-term, site-specific studies directed at narrow objectives for application largely to the studied dam site alone. These projects are intended to build knowledge gradually about the functioning of that dam project with respect to fish passage or other features that need fixing. Although similar information (e.g., fish passage efficiency, fish guidance efficiency, routes of passage) is obtained for different dam projects, and general knowledge about relevant data types is gained, the information is largely treated as dam-specific. The result of this research strategy is a protracted timeframe of many years in which each relevant bit of information is extracted at each dam in turn (and at different flows, operating levels, etc.) and used for adjusting conditions there. To some extent this is needed because dam configurations are not identical. However, there are general principles of fish behavior that can be applied generally in site-specific designs.

A more productive strategy for many purposes (e.g., smolt guidance to surface bypasses) would be one that emphasizes understanding of the behavioral mechanisms involved, which could then be applied to each dam location without need for so much site-specific trial and error. This is the modus operandi of most of science. An example would be the development of understanding of smolt behavior in hydraulic gradients. Such information might be obtained in a laboratory, a bioengineering facility or an example dam site, aided by use of computer models, and be applicable at all locations where fish and hydraulics interact (essentially everywhere fish passage

is an issue). A predictive capability could be developed that would transcend the vagaries of empirical, site-specific, operation-specific, flow-specific data collection and analysis. The site-specific work would then consist of obtaining the relevant hydraulic data under differing operational scenarios and monitoring smolt performance after predictions have been made and prototype physical modifications installed. Other examples abound from the current list of issues and research projects.

We recommend that strategic planning be conducted by the Corps to identify where a more mechanism-oriented strategy (e.g. behavioral or mortality mechanisms) could yield benefits in research productivity, efficiency and economy of time and funds (and thus faster implementation of fish-protective features). The topic of smolt passage and hydraulics seems like a prime candidate for such rethinking of strategy. There is an analog in the early adult fish-ladder research of the 1930s, which focused on obtaining generic information on adult salmon behavior in hydraulic structures at a common bioengineering facility (associated with but only peripherally a functional part of Bonneville Dam). The Bonneville Bioengineering facility's use of such a strategy could be translated to the current issues of smolt downstream passage. Similar reassessment of strategies and reorientation to development of more mechanism-oriented approaches would be fruitful for issues of lamprey upstream passage, lamprey impingement on turbine bypass screens, predator deterrents, and other topics raised in the present AFEP repertoire of projects.

Strategic planning should be conducted by the Corps to identify where a more mechanism-oriented strategy (e.g. behavioral or mortality mechanisms) could yield benefits in research productivity, efficiency and economy of time and funds (and thus faster implementation of fish-protective features).

### ***An Approach for Funding of More Mechanism-Oriented Research***

The ISRP sees the need for more explicit solicitation and funding of mechanism-oriented research to solve problems addressed by the AFEP mission. As indicated in the previous section, most of the AFEP projects appear to be directed toward specific management issues, often very site-specific ones identified by the Corps. Yet, they have clear potential for application at many other sites, if studies are appropriately conceived and designed. Although technique innovation by the AFEP has yielded important new results, focus on more basic research areas may also be needed. For example, there are hints that dam passage effectiveness at low flows may depend in part on location and trajectory of smolts in a reservoir considerably upstream of the dam. Also, instability of flows in reservoirs may contribute to passage problems (and possibly solutions). If given an opportunity, innovative thinkers in the fisheries community may come up with solutions to problems that are not now even considered. New ideas that may be currently relegated to low priority in the AFEP project selection process because they do not fit the present mold may be the key to future successes.

The ISRP recommends that a portion of the Annual AFEP budget be allocated to solicitation and funding of mechanism-oriented research proposals. This solicitation should be directed to the entire fisheries research community and not just to traditional contractors, although they would not be excluded. A reasonable justification for the new idea would need to be provided through a

complete research proposal not tied to vagaries of operational decisions. Such proposals should be judged on largely scientific grounds, with secondary overview by fisheries or hydrosystem managers.

A portion of the Annual AFEP budget should be allocated to solicitation and funding of mechanism-oriented research proposals.

### ***Turbine Research***

Proposals to modify turbine design and operation with the objective of improving smolt survival need to be viewed in the context of other mitigation approaches in place and planned. The current strategy for improving smolt survival emphasizes avoiding turbine passage that, if successful in meeting survival goals of the Council and NOAA Fisheries, would make such improvements in survival through turbines moot.

It has been a common belief in the Columbia River Basin that mortalities and life-threatening injuries of downstream-migrating salmon smolts passing through turbines are minimized when the turbines are operated at near peak efficiency (most power production per unit of water passed). This belief stems from early fisheries research and fisheries bioengineering summaries prepared for the Corps by Milo Bell (first published in 1973), which led to recommendations that turbines be operated within 1% of peak efficiency. Both the Council's program and the FCRPS 2000 BiOp adopted this 1% standard for operating turbines (see Skalski et al. 2002 for a historical summary<sup>9</sup>). This standard has recently been questioned as a result of careful review of the early work and compilation of recent balloon-tag fish-survival research at federal and public utility district dams, which showed direct survival to vary little with turbine efficiency (Skalski et al. 2002). Fish survival, measured in this way, appeared to be more a function of turbine geometry and water flow characteristics than turbine efficiency. This result is consistent with an ongoing Department of Energy (DOE) program to develop advanced turbine designs (geometry and water flow characteristics) that are more "fish friendly" including the Minimum Gap Runner turbine tested by DOE and the Corps at Bonneville Dam in 2002.

As a result of the newly analyzed test results and responding to RPA Actions 58 and 59 of the FCRPS BiOp, the Corps developed a 2004 "Study Summary" on "Research needed to establish new turbine operating guidelines at McNary Dam" [Study Code OTS-W-04-1 (New)]. The RPA Actions relate to operating all turbine units for optimum fish passage survival (Action 58) and determining the appropriate operating ranges of the new MGR turbines to increase smolt survival (Action 59). The Study Summary presented the overall goal of determining how best to operate turbine units at McNary Dam to maximize survival of juvenile salmonids, with sets of specific objectives between 2004 and 2006 leading to attainment of this goal.

Two preliminary proposals were submitted in response to this Study Summary. Pre-proposal 26 "Survival and migration behavior of juvenile salmonids at McNary Dam, 2004," was submitted

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<sup>9</sup> Skalski, J. R., D. Mathur, and P. G. Heisey. 2002. Effects of turbine operating efficiency on smolt passage. N. Amer. J. Fish Manage. 22:1193-1200.

by the USGS, with R. Perry as project leader. This proposal was a fairly thorough, stand-alone proposal. It would use radio telemetry to evaluate passage and survival of both yearlings (chinook and steelhead) and underyearlings (chinook) at McNary Dam. Pre-proposal 27 “Evaluation of juvenile salmonid condition in McNary Dam gatewells with prototype vertical barrier screens under various turbine operating conditions” was submitted by NMFS, with R. F. Absolom as project leader. It was a minimal proposal for fairly straightforward work, but with little background and justification. The study would characterize and compare the physical damages, if any, to samples of yearling chinook, steelhead and sockeye and underyearling chinook in gatewells and the fish bypass system of McNary Dam in three turbine flow rates representing peak turbine efficiency, best turbine geometry, and maximum turbine discharge. It would also study new vs. existing vertical barrier screens (VBS) at high turbine flow rates. There is little context provided for the work, which does not appear to address the question of turbine passage survival except as indirect effects of varying turbine flows on survival in the juvenile fish bypass and gatewells.

The ISRP appreciates the Corps’ desire to cover all possibilities for improving smolt survival at its projects, but the panel is concerned that the gains related to turbine efficiency may be negligible when combined with on-going strategies to minimize smolt passage through turbines. Currently, the goal of 95% survival at each project is attained or approached by maximizing the percentage of fish passing by non-turbine routes (spill, turbine bypasses, sluiceways; >80%) and maximizing survival in these alternative routes. With a goal of only 20% of fish going through turbines, it would take large improvements in survival through this route for there to be much effect on total survival of dam passage. However, the expected improvements in smolt survival resulting from operational changes to maximize survival rather than match peak turbine efficiency are only a few percentage points (3.2% per Skalski et al. 2002, or a dam passage improvement in survival of 0.6 % assuming 20% of fish go through turbines). This change is likely within the margin of normal variability and measurement error.

On the other hand, Skalski et al. (2002) observed that smolt mortality through operating turbines ranged from essentially zero to slightly over 10% even with the guideline of operating within 1% of peak efficiency. This wide variation suggests that appreciable gains in survival might be made by better designs of turbine systems. Nonetheless, even a 10% gain in survival must be considered in the context of the current strategy of bypassing turbines (10% gain in turbine survival equates to just a 2% gain when 80% of the fish are bypassed).

The Skalski paper does not consider the possibility that delayed mortality as distinguished from direct mortality (measured by balloon tags) in turbine passage might be different depending upon operating efficiency (or design) of the turbines. Perhaps effects of draft tube turbulence on disorientation of smolts, which shows up as delayed effects, might be overlooked by studies that focus on efficiency and direct mortality alone. This might be an appropriate question for a different proposal.

It would be a major change in fish-protection strategy for the FCRPS to now focus on survival through the turbines. Does this work signal a change in strategy away from avoiding turbines and toward safer turbine passage? Is there really more to be gained for fish by improving turbine designs and operating procedures than from bypassing them through spill, juvenile bypass

systems, sluices, or surface bypasses? A broader context for the proposed work and an analysis of the ‘big picture’ seem needed before major site-specific investments are made by the AFEP in studies of fish survival at different turbine efficiencies.

Aside from small gains in fish protection, changes in operating rules for turbines could have important benefits for the FCRPS’s hydropower production. The gains could come from more electricity being generated and more flexibility for how turbines at different dams are operated (potentially leading to overall increases in the whole power system’s efficiency). These are technical subjects beyond the expertise of the panel. However, if the benefits are largely to accrue to power producers rather than to fish, we recommend that the costs of such studies be borne by funds other than fish-protection funds.

Studies directed at turbine improvements need to be undertaken in the context of other fish-protection approaches available in the basin and prioritized for budgeting according to their potential benefits to fish versus benefits to the power system.
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## Conclusions and Recommendations

### 1. Strategic Research Planning

The AFEP does a good job in using short-term research results immediately for both policy decisions and planning near-term new work, but lacks a strategic research plan or framework. Strategic multi-year research plans with contingencies and alternative tests built in would make the program stronger by reducing time and resources spent annually.

Recommendation: By developing strategic multi-year research plans in the late winter/early spring, the SRWG would make future annual planning efforts much more organized and less time consuming. For example, a systemwide strategy to prioritize, implement, and evaluate a new fish passage structure, such as the removable surface weir (RSW), would provide better long-range guidance and coordination between districts. A long-range plan might include options to be followed that would depend upon results obtained at annual check-points.

### 2. SRWG Membership and Charter

The SRWG membership and charter have become too dominated by fishery managers and need to be altered to make this a more technically focused work group that can improve the scientific soundness of the studies.

Recommendation: The SRWG should be a committee with experience and expertise in planning, developing, and designing studies. The ISRP recommends re-chartering the SRWG to make it more technically oriented and to include greater input of outside independent reviewers at all stages of project development. It appears that the Corps and this work group are sometimes too focused on one or two years of recent study results and may prematurely apply an engineering solution (e.g. the BGS at Lower Granite) to address fisheries passage and survival problems at the hydroelectric projects.

### 3. Incomplete Proposals

Most of the pre-proposals were not well enough developed to be amenable to scientific review and, as written, did not meet the criteria for scientific soundness specified in the 1996 Amendment to the Power Act. Of the 52 pre-proposals reviewed by the ISRP, 35 (67%) were considered incomplete and inadequate for scientific review. Each of the AFEP pre-proposals (with corresponding ISRP review comments) was also re-examined to determine which were dependent upon hydrosystem operation decisions for upcoming study year vs. project pre-proposals that were independent of such constraints. As expected, the pre-proposals in the Fish Survival and Passage category were almost all incomplete because they depend on hydrosystem operational decisions that were not yet made or complete analysis of the current year's study data. The ISRP could find no legitimate reasons for the 17 (35%) incomplete pre-proposals that were not constrained by hydrosystem operations.

About one-half (14 of 32) of the final proposals remained incomplete: 14 needed further clarification or rationale to determine technical adequacy, 13 were adequate, 4 were provisionally adequate, and one was technically inadequate. One-half (16) reflected responses to ISRP comments and suggestions made on the pre-proposals, two bore little or no resemblance to

the pre-proposals submitted on the subject, and 10 were basically unchanged from the pre-proposal.

Recommendation: The ISRP has two recommendations based on this analysis: (1) proposals in the dependent category could be prepared late enough in the fall to allow for current-year data to be analyzed (project report doesn't need to be completed) with a specific study design based on the best current management advice or questions and include contingency plans (e.g. alternate study designs/sample sizes etc.) to cover a reasonable range of operational alternatives, and (2) proposals that are independent of hydrosystem operations should be prepared and reviewed on an earlier schedule and need to meet a higher standard of proposal preparation following criteria as recommended by the ISRP.

#### **4. Lack of Independent Scientific Review**

The AFEP lacks an independent scientific review of proposals at any stage. Just over half the final proposals (17 of 32) provided sufficient technical detail or rationale for the ISRP to find them technically adequate (or provisionally adequate pending completion of a final design); consequently, the existing review process is inadequate to ensure reasonable standards of quality in AFEP studies. About half the proposals were improved in response to ISRP comments, even though responding to an ISRP review was not a formal requirement of the AFEP process. This response demonstrated the ability of the AFEP project sponsors to incorporate scientific peer review, albeit in a limited manner, and that such a review could be of value.

Recommendation: The AFEP review schedule and process should be re-organized to include a step for an independent scientific review of study proposals. The AFEP might consider conducting the future proposal review following the Annual Results Review presentations. Unless the AFEP proposal development process is modified, future ISRP review of AFEP proposals may not be particularly useful, as the present AFEP process does not have clear decision points where ISRP review can provide value to the scientific quality of the proposed studies and inform project selection and funding.

#### **5. Current AFEP Proposal Review has little Bearing on Selection of Proposals**

It is apparent that the current AFEP pre-proposal review process has little bearing on the selection of proposals for funding. Instead the BiOp and regional agency priorities drive the funding decision before the pre-proposals are submitted.

Recommendation: The Corps AFEP process should require a technically adequate and complete proposal prior to selection for funding, and should incorporate a process for meaningful outside review for scientific soundness.

#### **6. Lack of Coordination Between AFEP and the Council's Program**

The ISRP notes a lack of coordination between AFEP and the Council's program, with the FCRPS 2000 BiOp being the nearly exclusive justification for the AFEP studies, neglecting broader, long-range goals. However, this is an opportune time to increase that coordination with the recent Council Mainstem Amendments and some recent coordination has occurred.

Specifically, the Council, the Corps and others in the region collaborated to develop the summer spill study at Bonneville Dam called for in the Council's Mainstem Amendments.

Recommendation: At the policy level, Coordination between AFEP and the Council's Program could be increased, if the Corps provided the Council an annual briefing of AFEP study results and how passage improvements have addressed the strategies in the Council's program. Such a briefing may also help identify research needs not being met by either program.

At the project level, in the areas of overlap between the programs such as the estuary, mainstem predation, system survival studies, white sturgeon, and lamprey research, it would be beneficial for project sponsors of both the Fish and Wildlife Program and AFEP to organize joint working groups or find some other way to increase coordination.

### **7. Site-specific vs. Mechanism-oriented Studies**

The present AFEP repertoire of projects consists almost entirely of site-specific studies directed at narrow objectives for application largely to the studied dam site alone. These projects are intended to build knowledge gradually about the functioning of that dam project with respect to fish passage or other features that need fixing. The AFEP has made some progress with this approach, but strategic planning would increase efficiency and cost effectiveness.

Recommendation: The Corps should develop strategic multi-year research plans including identification of where more mechanism-oriented strategies (e.g. behavioral or mortality mechanisms) could yield benefits in research productivity, efficiency, and economy of time and funds, resulting in faster implementation of fish-protective features.

The ISRP sees the need for more explicit solicitation and funding of mechanism-oriented research to solve problems addressed by the AFEP mission. A portion of the Annual AFEP budget should be allocated to solicitation and funding of mechanism-oriented research proposals. This solicitation should be directed to the entire fisheries research community and not just to traditional contractors, although they would not be excluded.

## Appendix 1. Council Review Questions to the ISRP

The Council posed the following technical, process, and programmatic questions to the ISRP.

### Project Specific Technical Review

As specified in the Appropriations language, the ISRP is to review the subset of proposals in regard to whether they:

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

Specifically, the ISRP review of the subset of AFEP proposals should address the following questions:

1. Are the research objectives for each of the technical areas appropriate for the current level of scientific knowledge and need?
2. Are the research objectives from which research proposals are being developed clearly identified?
3. Are the experimental/study designs of the preliminary proposals scientifically sound (do they include a power analysis, identify appropriate surrogate stocks, demonstrate rigorous methodology, explain logistical constraints)?
4. Do the final proposals adequately address the research objectives?
5. For ongoing projects, was the research conducted as designed? If problems arose, were the changes in the study adequate to address the problem?
6. Is the data analysis appropriate for the study as conducted?
7. Does the information provided support a decision related to design, operation, construction, or configuration of the hydrosystem?

In sum, 1) do the estuary and project/in-river survival projects meet the objectives of the AFEP, as described in the statements of need, in a scientifically sound manner, and 2) will the data generated by the estuary and project/in-river survival projects inform the analyses of critical questions/uncertainties in the Columbia River Basin; i.e., are the right data being collected?

### Process

1. Is the AFEP proposal selection process adequate to ensure independent scientific peer review? If not, how can it be improved to allow for review?

2. Given basic differences and legal requirements in the programs, is the AFEP project solicitation and selection process as open, competitive, and rigorous as that of the Fish and Wildlife Program?
3. Are there opportunities to make the AFEP and Fish and Wildlife Program processes more consistent to allow for ready comparisons between programs for such efforts as identifying research gaps?
4. Are there opportunities for further coordination - standard proposal forms, review criteria, etc?

#### Programmatic

1. Section 4(h)(11)(A) of the Northwest Power Act calls for the Corps and other Federal agencies responsible for managing, operating, or regulating Columbia River Basin hydroelectric facilities to take into account at each relevant stage of decisionmaking processes to the fullest extent practicable, the program adopted by the Council:
  - a) Are the general strategies from the Council's 2000 Fish and Wildlife Program, pages 25-30, being addressed in the AFEP?
  - b) Although recently released, the Council's 2003 Mainstem Amendments calls for an experimental approach to improving fish passage, to what extent is the AFEP currently implementing these experiments?
2. To the extent that the AFEP is informed or driven by the Endangered Species Act (BiOp), the Clean Water Act, and the Northwest Power Act, is the program integrated and sequenced in a scientifically sound manner? Is a broad/integrative context provided by the AFEP? Is the AFEP supported by a planning framework or document?
3. How is the information gathered by the AFEP used to inform future research needs and an immediate policy decisions?
4. With the information gained in this review and the provincial reviews, are there key uncertainties or research gaps related to the operation of the hydroelectric projects that do not appear to be adequately addressed in the Columbia River Basin by AFEP, the Fish and Wildlife Program, or the mid-Columbia Public Utility Districts' passage programs? What are the reasons for the uncertainties or gaps? Are there alternatives not currently provided within the AFEP research objectives? These should be described in detail.
5. How are costs integrated in the project selection process? How does the Corps make decisions on how to most economically and effectively provide safe passage for fish through the hydropower system?

## Appendix 2. ISRP Comments on Individual Funded Proposals

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## Appendix 2. ISRP Comments on Individual Funded Proposals

This appendix includes the ISRP's review of final proposals selected for funding by the Corps. Because these proposals were selected for funding before this final ISRP review step, the review obviously is not intended to inform funding decisions, as is the case with ISRP reviews of Columbia River Basin Fish and Wildlife Program proposals. Instead, this final proposal review allowed for ISRP participation and observation through the entire AFEP process to provide the ISRP with context to make programmatic and process comments and recommendations. The review comments below are provided to improve implementation of the studies. The ISRP recommends that these final comments including unaddressed comments from the preliminary proposal review be fully considered by the Corps and the principal investigators as they finalize statements of work and begin implementation of their studies.

The following table provides a summary breakdown of how or whether the final proposals were revised in response to ISRP review comments on the pre-proposals and how well they met the criterion of technical adequacy.

**Table 2. Final Proposal Review: Summary Findings**

	Final Proposal and Revision Status				Total
	No response was needed	Final Proposal had no to slight revisions (no proposal for one)	Final proposal was revised with some response to ISRP	New Final Proposal	
<b>Technical Adequacy</b>					
Adequate	4		8	1	13
Provisionally adequate: final design needed			3	1	4
Further clarification or rationale needed to determine technical adequacy		10	4		14
Inadequate			1		1
<b>Total</b>	<b>4</b>	<b>10</b>	<b>16</b>	<b>2</b>	<b>32</b>

We found that 4 of the 32 final proposals submitted to the Corps in response to their selection for funding were adequate with respect to scientific soundness in the pre-proposal stage. Of the remaining 28 that the ISRP felt required additional information, ten proposals showed little or no response to ISRP comments, and one of those had no final or pre proposal. Sixteen of the 32 were revised in some way, and 8 of the 16 were judged to be fully adequate. In addition, two new proposals were submitted for which no pre-proposal was submitted. In summary, it appears that the ISRP improved or affected the scientific soundness of about half the proposals selected for funding. (The Bonneville Dam summer spill study, and a kelt study with funding extended from 2003 were not included in this table.)

## Estuary Proposals

The proposal contents of the three ongoing projects in the estuary did not change from pre-proposal to final proposal.

1. A study to estimate salmonid survival through the Columbia River estuary using acoustic tags

**Status:** Funded

**Study Code:** EST-P-01      **Agency/Author:** NMFS, PNNL / McComas, Carlson

**Final Comments:**

The final proposal is only superficially changed from the preliminary proposal. The only change made is the submission date and the substitution of “final” for “preliminary.” ISRP questions identified in the preliminary review (listed below) remain unaddressed. In particular, additional detail on methods, sample sizes and analyses were not provided. Consequently, parts of this project are not technically justified.

Examples of unaddressed comments include that results of work done in Summer and Fall 2003 are not reported (e.g., the evaluation of the ability to deploy, anchor and retrieve a three-element fixed detection array in the lower estuary). The proposal still refers to activities to be undertaken in Summer 03 in the future tense.

Steve Smith, NOAA statistician, is listed for estimation of survival rates. However, sample sizes recommended to meet Objective 2 are not justified, and it is not clear that the experiments to test the arrays, e.g., Objective 2, are well designed. Written protocols for design (including required sample sizes) and analysis should be given or referenced for what appears to be rather ad hoc experiments.

As stated in our preliminary review, the overall study designs and potential analyses seem to have been well planned. If they can collect the data, then analyses for estimation of time in the estuary and survival rates would seem to be straightforward.

**ISRP Comments on Preliminary Proposal:**

This is a clearly written proposal to conduct the fourth year of design and feasibility testing of tagging and acoustical detection. FY04 would be the final year in the development phase of the project, after which full-scale implementation would begin. The project is ambitious but the potential benefits are substantial. The tagging and detection techniques being developed are proposed to answer questions pertaining to estimation of delayed mortality between Bonneville Dam and the mouth of the Columbia River, the characterization of smolt use of the estuary, the effect of estuarine restoration actions on habitat selection and survival, and the variation in smolt behavior in the estuary over time. The development and testing has proceeded logically in a step-by-step fashion with each step further advancing the technology.

The proposal presents a careful and thorough summary of work done to date, the rationale for that work, lessons learned, and modifications made. The objectives are measurable and are reasonable in relation to the overall goal. The approach described under each objective appears

complete and reasonable. The discussion of FY05 fish requirements recognizes that sample size will depend on information generated during FY04. It is implied, but not stated in detail, that in FY05 and beyond, sample sizes and analytical approaches will be shaped to explicitly address the management questions regarding delayed mortality, estuary use, etc. This is a significant technical question that must be more explicitly addressed in future proposals.

The questions identified during review included:

1. Can a tag small enough for use in subyearling fall Chinook be developed? This is a crucial uncertainty because empirical studies to date suggest that juvenile fall Chinook tend to spend more time in the estuary feeding and rearing than do spring Chinook juveniles. Furthermore mortality resulting from tagging will need to be determined. The proposal refers to holding fish to test for tagging mortality, but such tests cannot address issues of stress levels or predation after releases. Is it possible to develop a test to directly monitor these issues?
2. Pertaining to tag size, the proposal indicates that the tag size fits the median sized sub-yearling. Is this an adequate representation of wild fall Chinook to address the proposal's objectives? The panel recognizes the challenges of studying the smaller sized fish, but is there a complementary study that could be designed to address this concern? This issue also relates to concerns for differences in the survival and habitat uses of hatchery and wild juveniles.
3. Related to point (2), how does this project relate to project EST-P-02 that proposes to assess salmonid habitat use within the estuary? Is there duplication of proposed effort? What is the acoustic assessment likely to reveal that will not be shown in EST-P-02?
4. In general, more thought needs to be given to whether it is feasible for the tagging and detection technology to achieve the objectives of determining survival estimation and estuarine behavior. For example, although the techniques are potentially useful for measuring delayed mortality, is it feasible logistically to determine delayed mortality? It seems that the experimental design may need to involve measurement of in-river survival of a group of acoustically tagged Snake River fish above Bonneville and below Bonneville. The estimates below Bonneville will need to be compared to survival estimates of an acoustically tagged group released below Bonneville to determine if the survival of this group is higher than the survival of tagged Snake River fish. The tag requirements of such an experiment could be substantial.

In terms of the ISRP's ability to conduct a peer review of this proposal, the generally descriptive nature of the proposal limits any scientific review. There are goals and objectives presented and methods described very generally, but after three years of work, what are the results to-date? For scientific review, more detail on methods, samples sizes, and analyses proposed is needed.

## 2. Estuarine habitat and juvenile salmon-current and historic linkages in the lower Columbia River and estuary

**Status:** Funded

**Study Code:** EST-P-00-1     **Agency/Author:** NMFS / Bottom, Ed Casillas

**Final Comments:**

This large, complicated, and needed research project is so generally stated that the ISRP was not able to make a definitive determination on its technical adequacy. The proposal could have documented progress in a much better fashion, but the only change made in the December 2003 final proposal over the August 2003 preliminary proposal is the submission date and the removal of “preliminary” on the cover sheet. Otherwise, the final proposal is exactly the same as the preliminary proposal. Extensive ISRP review comments and suggestions, listed below, while they may have been considered by the principal investigators, are not referenced or addressed in the final proposal.

This proposal is closely related to two NOAA Fisheries projects in the estuary and plume that have received funding through the Fish and Wildlife Program - Survival and Growth of Juvenile Salmonids in the Columbia River Plume (199801400, Casillas)

[www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=CE2003199801400](http://www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=CE2003199801400) and; Historic habitat opportunities and food-web linkages of juvenile salmon in the Columbia River estuary:

Implications for managing flows and restoration (200301000, Bottom)

[www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=CE2003000030001](http://www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=CE2003000030001).

This project is a large scale “research” project at specific study sites rather than a long term monitoring project for, say abundance, presence/absence, or habitat use. The “index” sites have been subjectively selected rather than selection by some type of probabilistic sampling that would allow statistical inferences to larger areas. The research is undoubtedly needed, but it is a mistake to intend to use a series of “indicator sites” for development of a long term monitoring program for abundance (or presence/absence) and habitat when the entire estuary is of interest. Probably the goals of long-term monitoring for abundance (or presence/absence) and habitat use over the entire estuary should be separated from the relatively shorter term research projects (study of food, habitats, etc.).

**ISRP Comments on Preliminary Proposal:**

This proposal has been reviewed and considered by members of the panel several times.

Consequently, our comments relate to this proposal specifically and to our continued thinking about estuary studies and estuary restoration programs generally. We have attempted to separate these comments.

The panel continues to support this much needed research and believes that the study will contribute significantly to understanding the role of estuarine conditions in salmon growth and survival. The investigators are very well qualified and have an excellent track record of achievements in Columbia River estuary science. However, the proposal doesn’t make direct reference to FCRPS RPAs.

This ongoing project is large and complicated, but the proposal is very general. Given the scope of activities and past research, this proposal would have benefited from a global perspective on what is being learned and how that knowledge will be applied. This proposal is lengthy and contains a large number of tasks to support the three objectives. But it is frequently difficult for the reviewer to keep in mind the knowledge the proposal is intended to generate, and how that knowledge will translate into achieving the goal of protection and restoration priorities for the Columbia River estuary.

This proposal would be enhanced by more specificity about assumptions, approaches, and how the research links to problem solving in the Columbia River Estuary. Despite a large number of tasks and subtasks, the overall tone of the proposal is very general. For example, under Sub-task 1.2, point 2. FY 2004, refers to assessing whether “the existing monitoring design adequately depicts trends in salmon life-history and genetic diversity throughout the lower estuary”, but what would these be assessed against and what criteria would be used to assess the need to change? How would researchers know whether the existing monitoring design will adequately depict trends in salmon life history and diversity? Under Subtask 3.1.b., progress to date is described as “Selected data sets have been chosen for analysis and hypotheses have been derived,” without any detail as to what they are. In the summaries of progress to date, the emphasis is on what has been done, but few specifics are provided about what has been learned. Specifics are also lacking in methods to be used for proposed work, particularly in the tasks to be completed in FY04.

Issues that were identified by the reviewers include:

- a) Emphasis is placed on establishing historic conditions. Some clarification could be provided as to the relevance of historic conditions, would historical conditions actually be appropriate or achievable under current environmental conditions? What does it mean to reconstruct historical habitat? Does “historic” mean at a single point in time or at different points in time? It seems that the relevance of “historic” is to establish a baseline against which current conditions can be compared. But most useful to the policy environment is to understand those attributes of historic habitat that are key, those that may or may not have been duplicated or at least substituted in the process of change over time, and those that are attainable now. The emphasis on “historic” seems to risk becoming too simplistic to be useful.
- b) The investigators propose that emergent marshes, a scrub/shrub wetlands, and forested wetlands represent different stages of estuarine plant succession. How well established is this supposition? Whether these vegetation types represent successional stages or different plant community types that have developed in locations with different environmental conditions may be relevant to predictions for long term habitat change and so influence restoration protocols.
- c) Of particular concern is an apparent assumption that the expression of life history diversity (in a genetic sense) has been reduced through modification of the estuary (amongst other impacts in the upper Basin). Impacts of estuary changes are certainly likely for fall Chinook and chum salmon given their smaller size during juvenile migration, but how would the loss of genetic variation in life history types be differentiated from difference in the availability of habitat types? This seems to be analogous to the long-standing debate in ecology concerning habitat occupancy

versus habitat preferences. We do not see that the absence of certain habitat types leads to the assumption that there has been a corresponding loss of genetic variation for use of this habitat. Plasticity in habitat use may be a true life history strategy for salmonids that use complex environments as opposed to specific adaptations to certain habitats. We may be over simplifying what the authors' intended in this proposal, but we would recommend research into the genetic nature of these "life history" types before concluding that changes in habitat have selected against types of fall Chinook and chum. Even if it is correct, as recent analyses imply, that temporal and spatial patterns of estuarine rearing by juvenile salmon have been simplified, does this necessarily lead to a reduction in diversity of salmon life histories? Or to a reduction of resilience and productivity? What degree of adaptation to simplified habitats could have taken place?

For the authors' consideration, other specific questions that were identified include:

1. How long-term does monitoring have to be to establish a trend that will associate variations in abundance and life-histories with changes in biological and physical conditions?
2. How many long-term indicator sites will be established, and how will these be determined? What will be the effect on establishing trends of changing site locations (i.e. how can you establish trends if sampling locations and protocols evolve throughout the course of the study)?
3. If existing uses of habitat are being documented, how do you learn about potentially beneficial habitat that may be currently non-existent? How do you learn about what is not there, and how do you learn about the extent to which salmon have been able to adapt to the loss of habitat types?
4. How do you establish historic uses of different habitat types? Do you infer salmonid presence and productivity from habitat existence?
5. Throughout, the focus of the work is to establish correlations. But the intent of the project is to extend these correlations to predicted responses to change. How will causality be derived from correlation? It is asserted that the development of empirical associations between habitat variables and salmon productivity will allow prediction of responses of juvenile salmon to past or future changes, but this remains to be demonstrated.
6. How many different habitat types are there in the Columbia River Estuary and are all being studied by this project? How are "representative" habitat types determined? Are habitats distinguished at the landscape scale, or does this scale aggregate over several types of habitat?

### 3. Evaluation of the relationship among time of ocean entry, physical, and biological characteristics of the estuary and plume environment and adult return rates

**Status:** Funded

**Study Code:** EST-02-03      **Agency/Author:** NMFS / Muir

**Final Comments:**

The final proposal is exactly the same as the preliminary proposal. It still bears the August 2003 submission date and “preliminary” in the title. ISRP review comments and suggestions are not referenced or addressed in the final proposal.

This proposal’s statistical design is not described in sufficient detail to ensure that it is technically adequate. Justification should be given for the numbers of coded wire tagged and PIT-tagged smolts to release. What differences in SARs can be expected to be detected with the planned sample sizes?

The appropriate statistical analysis would seem to be multiple logistic regression (rather than ordinary multiple regression) of the number of returns versus non-returns for each release group on the predictor variables: time of release, density of predators, etc.

What is the “75% sample rate” referred to in reference to an expected number of 250 returning adults?

**ISRP Comments on Preliminary Proposal:**

This proposal is clearly written. The objectives and relevance to the FCRPS are clear. It is useful to have lower Columbia River releases so that upriver factors do not confound the analysis.

A key uncertainty, and a key question for the researchers, is whether it is reasonable to expect to observe enough variation in estuary and nearshore environment in the two-month period to be able to detect differences in SARs. The ability to detect association of estuary biological and physical factors with variation in SARs hinges on there being enough variation in these factors during the 2-month release period. How much variation is it reasonable to expect in this short period? Ocean conditions, even in the nearshore, are not likely to vary a great deal in that time period. What will the researchers do if there is not enough variation within the release period?

The complexity of proposed actions requires much more detail on methods to provide an adequate scientific review. The statistical analysis seems simplistic. Is a time series analysis needed if data from multiple years are going to be used in the regression? Are more sophisticated survival models required? Are the explanatory variables likely to be sufficiently independent to permit a meaningful analysis?

#### 4. Evaluating cumulative ecosystem response to restoration projects in the Columbia River estuary

**Status:** Funded

**Study Code:** EST-04-P-New2

**Agency/Author:** PNNL, NMFS / Thom, Roegner

**Final Comments:**

The proposal was revised somewhat in response to ISRP comments. However the revisions were not responsive to the major review concerns.

This proposal remains vague and general, and is not technically justified. The metrics for evaluating ecosystem response do not adequately capture important ecosystem functions and, at best, only indirectly relate to fish populations. Consequently the adequacy of this approach for addressing important questions related to fish survival and habitat use is highly uncertain. Furthermore, there is a large body of literature on this subject that was not taken into account in the proposal. This proposal attempts to address a very ambitious goal, and the current state of the science does not indicate that the proposal's approach is feasible.

A lot of the detail requested by the ISRP remains to be determined through the literature review and the interactions with Columbia River Estuary investigators. However, in response to ISRP comments the revised proposal has added the following detail:

- management implications of project results
- reference to other Columbia River Estuary monitoring projects
- expanded description of the concept of cumulative net improvements as reflected in “cumulative restoration impacts” and “cumulative restoration effects”
- reference to the intent to adopt metrics and indicators guided, but more specifically developed than, those in the Columbia River Estuary RME plan.
- more detail about the content of the protocols manual.
- a new task (1.4) outlining field work to clarify existing monitoring uncertainties or develop new methods
- more specific detail about the components of the conceptual framework
- more detail about the components of the framework serving as metrics of cumulative effects (task 2.3)
- revision of the “why do field research” (task 2.5) description with the addition of some detail.
- explicit reference to the larger Columbia Basin context and the need to consider it (task 4.4).
- A statement of intent to coordinate with other action effectiveness research projects undertaken through the RME plan.
- addition of 4 new references

Some of the implementation questions remain unaddressed. For example, the adoption and use of a single protocol is assumed to happen if the investigators find it beneficial. Potential complications in implementing a single protocol, for example incompatible incentives among investigators, are not discussed. Recovery goals for the Columbia River Estuary are not addressed.

**ISRP Comments on Preliminary Proposal:**

The AFEP research goal for this topic is to provide objective methods to predict and evaluate the cumulative response of ecosystem functions to restoration actions in the Lower Columbia River Estuary. The emphasis of the AFEP research summary is on measurement. The research summary lists six objectives: to develop (1) the empirical basis for cumulative assessment methodology; (2) a set of metrics to evaluate cumulative effects of restoration; (3) a framework for predicting cumulative effects of individual projects; (4) field evaluations for measuring ecosystem response to restoration projects; (5) a data acquisition and management system for evaluation; and (6) an adaptive management system.

The overall goal of proposal EST-04-P-New2 is to develop an estuarine monitoring system. The focus of the proposal is to develop methods to assess, monitor and quantitatively evaluate the cumulative effect of Columbia River Estuary salmon habitat restoration actions. The proposal is explicit about its underlying assumptions, which seem reasonable in that they emphasize standardization of data and methods, identification and assessment of key attributes, the use of an overarching framework, and adaptive management based on what is learned from monitoring.

However, the proposal provides little substantive detail as to how the research goal would be accomplished. To achieve project goals the proposal needs more thoughtful and thorough development. As written, reasonable assurance of project success is not evident because the proposal lacks sufficient detail about methods and implementation. Some components sound like a proposal to develop a proposal.

Most of the proposed work is literature review intended to aid development of methodology. The investigators provide little insight into the form of the cumulative assessment methodology, the possible ecosystem scale metrics and how they would relate to salmon restoration, and the model for predicting cumulative effects on major ecosystem functions, whatever these functions may be. Objective 2, which entails all of the above, is supposed to be completed in one year. This timeframe seems highly unrealistic.

The proposal should describe experimental design and sampling protocols, or at least discuss the major issues related to experimental design, instead of saying that a statistician will be consulted on experimental design.

Specific questions and comments:

1. One of the purposes of monitoring is to assess the extent to which goals are being achieved. Are there goals for the Columbia River Estuary? If so, they should be explicitly stated in the proposal.
2. It may be overly optimistic to assume that a one-day meeting for Columbia River Estuary projects will allow the description of existing monitoring protocols. Will the project PIs also be consulted in the development of assessment methodology and metrics? How will buy-in for these be achieved?

3. Task 2.3. describes a “semi-quantified conceptual model.” More clarification of the structure and function of this model is needed.
4. How will investigators determine whether tasks 2.1 – 2.4 indicate the need for field testing? Field-testing methods would not seem to be optional.
5. It is unclear how the ecosystem perspective for monitoring would be developed. The proposal should provide more detail as to how concepts such as functionality, habitat suitability and natural state would be measured. What are the appropriate ecosystem metrics? Do they focus on fitness of salmonid populations and suitability of salmonid habitat or are they broader? What data exist to serve as a baseline?

The proposal leaves issues related to implementation largely unaddressed. The project will attempt to develop methods that apply at a cross-project scale without the authority to enforce them or to adaptively manage. The project must therefore rely on voluntary coordination and incentives to cooperate. More attention should be given as to how to achieve this, combined with a realistic assessment of the incentives and disincentives for projects to cooperate. Detail should be provided as to how standardized monitoring protocols can be implemented across projects. Would project-specific monitoring be subsumed and funded under this framework approach for the Columbia River Estuary? The proposal lacks evidence of the agency and regional commitment that would be required to ensure success.

Finally, the proposal should firmly establish the qualifications of the investigators to undertake this project. The proposal lists good participants but, as written, it creates the impression that the investigators do not have extensive knowledge in the estuary and do not fully appreciate the difficulty, the required coordination, or the time required to accomplish project objectives. Additionally, the proposal does not display an awareness of the considerable amount of ongoing efforts to develop monitoring and evaluation programs for the upper river.

## **Fish Survival Studies**

### ***The Dalles Dam***

#### **9. Evaluation of direct survival at The Dalles Spillway**

**Status:** Funded

**Study Code:** SPE-P-00-8

**Agency/Author:** COE / Mike Langeslay      **COE Lead:** Langeslay

**Final Comments:**

This is the first review for this recently submitted proposal; a proposal was not submitted for the AFEP preliminary proposal review in September 2003. This “proposal” is actually a Task Order from the Corps to Normandeau Associates, and thus is structured differently from other proposals reviewed. The Task Order is clearly directed toward one contractor, who would use balloon tags for determining survival and for relocating instrumented packages. The confidence

placed by the Corps in the qualifications and ability of the contractor to perform this type of study is fully justified in this clear and high quality proposal.

The proposal includes good detailed background, which provides the best summary of recent results of spillway studies at The Dalles Dam. This background builds a sound justification for this proposed study and demonstrates the logic of analyses and studies that brought the work to the point of the needed 2004 study. Some references (e.g. NMFS studies, 1997-2000 and USGS radio telemetry studies, 1999 and 2000) need to be added, to document research study results that are mentioned but not referenced. However, in general, the literature cited section is relevant and adequate.

The primary objectives are incomplete. The authors indicate that passage effects/survival will be tested at two discharges but the discharge amounts are not given. What are they? It is also unclear if the discharges to be tested relate to maximum or safe amounts to spill per bay or to some other project spill volumes or patterns. The rationale for objectives can be found in the detailed background but it would be helpful to have a brief statement of justification or rationale following each objective as most of the other proposals do.

The justification for the optional objectives is also un-specified and needs to be given. Direct effects of passage through Spillbay 8 may be important to discern because: (1) this spillbay will be used to provide “training spill” for the desired spill pattern and fish will pass through this spillbay, or (2) during periods of high river flow (in spring) spillbays south of the new spillway training wall will need to be opened?

In addition, while the proposal does specify that the objective of the study is to obtain an estimate of direct survival and rates of injury of juvenile salmonids in passage over the spillway, there should be a reference to proposal number 12, “Estimate the survival of migrant juvenile salmonids through The Dalles Dam using Radio Telemetry: 2004 evaluations” (SPE-P-00-8), which is designed to develop an estimate that would include indirect effects of passage on survival. In fact, the proposal includes no section entitled ‘Relationship to Other Proposed or Ongoing Research’ (or a similar title). Many (if not most) of the proposals that did include such a section were very light on specifics. For example, in relationship to this proposal, number 13 includes such a section, but it is quite general and makes no mention of any specific projects. The point is that these two need to be evaluated together to get a complete picture of what happens to fish and why as they pass the spillway. On the other hand both proposals do a rather thorough job of providing the necessary background information needed to put the proposal objectives in a meaningful context. The duplication of that effort might be avoided by an up-front background paper that would serve for all of them, and would help the reviewers to have it at the outset. Proposal 11, “Characterization of The Dalles Dam spillway environment” (SPE-P-00-8) should also be described in such a background paper as it is to be done in conjunction with this project.

The Scope of Work generally and clearly lays out the methods to be used, including study design, source of fish, sample size, desired precision, tagging techniques, statistics, etc. The design is based on experience gained in prior studies. The study protocols are clearly described with adequate detail. However, a detailed statistical analysis design is not described in the

proposal. Sample sizes (numbers of fish to release) were justified by reference to precision obtained in prior studies; i.e., readers are referred to two Normandeau reports for the details. The analysis design or a summary of the analyses to be used should be included in the proposal, as it is often difficult to get access to such technical reports.

This is a high priority study because of the need to evaluate effects of the new training wall in The Dalles Dam spillway, and the need to test the effects (on juvenile salmonids) of spilling more water through fewer spillbays. The proposal satisfies the ISRP review assignment questions and is technically adequate (provisionally). Final test conditions need to be specified.

**ISRP Comments on Preliminary Proposal:**

No proposal was available so Mike Langeslay of the COE gave a brief description of the study design, which is a balloon tag study. As more flow (18 or 21 kcfs) will be put through fewer spill bays (2, 4, and 6), the COE and regional fish managers want to know what the direct survival and injury levels are under these spill conditions. The study will be done in the spring using yearling spring Chinook. This study has high priority, because survival studies at The Dalles Dam have shown relatively low survival for juvenile salmonids passing the spillway, particularly through the more southern spill bays. It is unknown whether increasing spill through the more northern spill bays and decreasing spill at the south spill bays will prove a safer passage route for smolts.

## 11. Characterization of The Dalles Dam spillway environment

**Status:** Funded

**Study Code:** SPE-P-00-8      **Agency/Author:** PNNL / Tom Carlson, Marshall Richmond

**Final Comments:**

The pre-proposal was rated very highly by the ISRP, was one of the most complete submitted during the first review, and needed few revisions. The few comments provided by the ISRP were addressed (i.e. missing references and documentation were added), and the revision included other useful material as well. However, the experimental apparatus for underwater collision experiments in the laboratory was still not described with any detail (top of page 16). Is this because the test apparatus is not yet fully designed? The authors should indicate so, if that is the case.

This project is to be done in conjunction with Proposal 9, “Evaluation of direct survival at The Dalles Spillway” (SPE-P-00-8), and using the contractor for Proposal 9 for recapturing the sensor fish. Now that we have Proposal 9 for review, it is clearer that the two proposals are intimately linked.

The proposal is technically adequate and satisfies the questions outlined in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

This was a very complete and well prepared pre-proposal. The review of literature and background provided in this proposal is very helpful in putting the other proposals for The Dalles Dam (TDA) tailrace studies in context and understanding their objectives. A minor complaint is

that the Project Summary Section is too long and could be streamlined by condensing from about six to two pages.

It is not clear from the outset that the goals and objectives are for a multi-year study (not just 2004), particularly since the Anticipated Duration (on the cover page) is given as January 2004 – December 2004. This is confusing to reviewers. The authors need to include references providing details regarding the major techniques (i.e. sensor fish and the CFD model) to be used for characterizing The Dalles Dam spillway environment. Starting on page 3 or 4, when sensor fish are first mentioned, references should be added which document the development and testing of this new innovative tool. There is also a list of uses of the sensor fish on page 4 but references/reports are not cited. References for the CFD model, pages 4 and 5, also need to be provided. A comment made during the review meeting indicated the Department of Energy did have peer-reviewed documents describing sensor fish and CFD model development.

The underwater collision experiments will provide some useful data to assist in understanding how and why certain injuries occur in turbulent environments at hydroelectric projects, but the authors did not adequately describe the experimental apparatus that will be used (top of page 16). This apparatus needs to be described or a good reference added which does so. This section would also benefit the reviewers by including a brief review of the literature dealing with underwater collisions of fish with physical structures.

The section on “Expected results and applicability” is well done. This is a useful method of foreseeing possible shortcomings in the design or possible adjustments to obtain more information with little additional effort, and to foresee what applications might or might not be made in the process of deciding on management options.

## 12. Estimate the survival of migrant juvenile salmonids through The Dalles Dam using Radio Telemetry: 2004 evaluations

**Status:** Funded

**Study Code:** SPE-P-00-8     **Agency/Author:** USGS / Tim Counihan

### **Final Comments:**

The focus of this study is on obtaining survival estimates of juvenile salmonids passing The Dalles Dam by various routes. The proposal is more complete than the preliminary one. Some of the incomplete study designs (one of the major concerns of the ISRP for many of the AFEP preliminary proposals), which were noted in the first submission, have been better defined. An important aspect is testing the new statistical model. The revision shortened the statistical methods and added more detail on other aspects, as suggested by the ISRP. Objectives were condensed. Readers get a good idea of what they plan to do.

However, Objective 2, route specific survival (RSS) estimates, is still incomplete because the authors are waiting for the University of Washington to provide a revised model that accounts for potential bias in the original RSS model estimates. As the authors state, it appears that this delay was caused by the request of the COE and the SRWG to utilize this new model for RSS estimates. One of the obvious problems created by the last minute revisions to study designs/analysis designs is that the newly revised procedure will not have been peer reviewed

prior to its use, and errors in the procedure may not be noted until it is too late. Moreover, John Skalski's models are so specialized that few could review the revisions of the model in a timely manner. It would likely be informative and beneficial if they compared Skalski methods with previously used methods.

Advantages of the radio-telemetry method are described at the top of page 5 in the context of disadvantages of the PIT tag method. A balanced presentation would have described the drawbacks of the radio-telemetry method as well. Such an analysis might assist the investigators in development of a study design that might minimize the potential drawbacks.

A background document summarizing all the studies at The Dalles Dam would be beneficial; see comments on proposal 9, "Evaluation of direct survival at The Dalles Spillway" (SPE-P-00-8).

This proposal like several other proposals needs to give a summary of the dead fish testing methods. The proposal still does not refer to or provide proper linkage to the next one, SBE-P-00-17, as the ISRP recommended (see comments below for proposal #13, SBE-P-00-17).

The following comments apply to this proposal and the other two related radio-telemetry studies at Bonneville and the Dalles Dam.

This proposed work is very similar to work proposed at Bonneville Dam "Estimate the survival of sub-yearling Chinook salmon through Bonneville Dam during two spill operation scenarios using radio-telemetry: 2004" (proposal #55) and SPE-P-02-1 "Estimating the survival of migrant juvenile salmonids through Bonneville Dam using Radio Telemetry: 2004 evaluations" (proposal #16).

The study is well designed by competent experienced principal investigators with a team including statistician, John Skalski. The field experiment methods should be consistent with the design recommended by Skalski, which likely means a three rather than two release strategy.

Methods for estimation of required sample sizes should be given or referenced, e.g. it is unclear if one or two sample procedures are being used in the Section "Sample Size for the RSSM analysis." See, e.g. Zar (Page 106 and page 132, 1999). Are the sample sizes based on point estimation with associated measures of precision and accuracy leading to confidence intervals with high probability (power) that the half-width is no more than the effect size to be detected?

Zar, J.H. 1999. Biostatistical Analysis, Fourth Edition. Prentice Hall, NY.

Skalski presented an overview of release-recapture methods for estimation of survival of juveniles at the Portland District Corps of Engineers survival studies meeting held December 11, 2003. If we understood his presentation correctly, there was discussion of non-statistical bias in estimation of the route specific survivals with the design proposed in this study, leading him to suggest a design based on three releases with one release at the dam into a well defined route, e.g. ice and trash sluiceway. At issue is whether or not the non-statistical bias is real and of sufficient magnitude to require the three release design? Apparently, these issues are to be

investigated in Objective 2 and Objective 1 of SPE-P-02-1, but a study plan is not yet available. We assume the potential overlap will be eliminated.

Point estimates for parameters of interest are complicated ratios and ratios of ratios that typically have unknown statistical biases associated with them and no explicit formulas for variances. The formulas for reconstruction of dam survival and other parameters are more complex; e.g., some involve linear combinations of products of these ratios. Apparently, variances for dam survival and route specific survival estimates are approximated by the “delta” method with unknown accuracy, precision, and statistical bias. We believe that the properties of these approximations (including properties of formulas for target sample sizes) should be compared with bootstrapping of real data and Monte Carlo simulations before data from this project are analyzed and the next round of survival studies are designed.

Minor Comment. The confidence intervals listed in Table 1 are best guesses based on the models, assumptions, and planned sample sizes.

In summary, this high priority proposal generally satisfies the standards set forth in the ISRP assignment and is technically adequate (provisionally). Final study design specifications and a revised RRS model for making survival estimates in Objective 2 are needed.

**ISRP Comments on Preliminary Proposal:**

This is a relatively well-prepared proposal to the extent that 2004 operational plans or treatments are still undetermined. Not having the 2000-2002 survival studies reports or results to date available (i.e. results are only generally described in the Current Status Section) as a basis for review is a problem, because previous years results would obviously show the necessity for continuing on the same track or altering the study design. Adding a Table summarizing survival results to date, as in the project proposal for study #13 (SPE-P-00-17), would be helpful.

As stated in this report’s introduction, a major concern with this pre-proposal, as well as with many other pre-proposals reviewed (e.g. #s 13, 18, 20, 21, 22, 23, 24, and 25), is that these proposals contain statements that indicate that the ’04 study designs will be not be finalized until: “the final set of objectives and hypotheses has been selected.” (by regional managers?), “2003 data are completed”, or “until the operational test designs are determined after further discussion this fall”. It is understandable that decisions for study designs and objectives should be largely based on the most up-to-date data. However, with incomplete study designs/proposals in hand it is impossible for reviewers to do a meaningful technical review.

It appears that this proposal is closely linked to the following one (#13). In fact, this proposal uses the tagged fish from that study to generate the survival estimates. This linkage should be stated more explicitly. Better yet, they could be combined or an umbrella proposal done for studies that are closely linked. On page 5 reference is made to personal communications from Adams and Hockersmith to the effect that the method of estimating survival by passage route using radio tagged fish in both the Snake River and mid-Columbia River gives comparable “trends” in results. It would be more convincing had references been cited to Shane Bickford at Douglas PUD.

In the last paragraph on page 6 and again in the last paragraph on page 10, the authors indicate that survival of fish passing through the north spillbays was less than for fish passing via the south spillbays. Don't results to date show higher survival through the north spillbays, as opposed to the south spillbays?

The proposal, on page 13 to use drogues to evaluate egress by juvenile salmonids, depends upon an assumption that fish are carried as passive objects in flowing water. This may not be true. Salmonids have a well-developed sensory system for detecting flow and are able to modify their positions and orientations in flowing water. This may give information on a "worst case scenario", but may not be realistic, considering fish behavioral responses. The proposal is heavy on statistical aspects (from assumptions to calculations) but light on other methods such as the exact nature of the telemetry tags, locations and numbers of antennae and receivers, the vendor for the tags and receiving equipment, etc. The proposal presumes knowledge of the telemetry system that may not be warranted for many reviewers.

### 13. Estimate fish, spill and sluiceway passage efficiencies of radio-tagged juvenile salmonids at The Dalles Dam in 2004

**Status:** Funded

**Study Code:** SBE-P-00-17 **Agency/Author:** USGS / John Beeman, Alec Maule

**Final Comments:**

The focus of this study is on describing the passage routes of juvenile salmonids at The Dalles Dam. This reasonable proposal is largely unchanged from the preliminary one. In response to ISRP comments, details on tagging and other protocols were added and references to previous work were also added. Some 2003 data became available and was added.

On page 6 of the proposal it is said that "...the current operational plan is to pass 40% spill through spill bays 1 through 6, which will likely alter the proportions of fish population passing the powerhouse, sluiceway and spillway from previous operations at TDA." There is no discussion of the question whether this change in operations might suggest alteration of the study design, perhaps to emphasize sampling in proportion to expected abundance of fish (based on past experience) or other modifications. The study design, in terms of locations of antenna arrays and the like, is not described as differing from previous ones.

Linkage between this USGS study #13 (SBE-P-0017) and the USGS radio telemetry survival study at the Dalles Dam #12 (SPE-P-008) has still not been addressed in either of these proposals as the ISRP recommended, although there is some good cooperation with #12 (SPE-P-00-8) on providing radio-tagged fish for this study. An umbrella document describing how all studies at The Dalles Dam are linked and coordinated would still be the best way to provide a comprehensive explanation and justification for the full scope of the research and monitoring at each project. Another solution to avoid this confusion and overlap would be to combine the passage metrics study #13 with the survival study #12. The same tagged fish are used to generate passage metrics and survival estimates so it makes sense to have this work combined in one proposal. The same recommendation would apply to study proposals #15 and #16 for Bonneville Dam and study proposals #18 and #20 for John Day Dam.

The sockeye pilot test objective in the preliminary proposal was not more fully described. It was removed. The ISRP believes that the AFEP needs to begin studies relating to passage effects on sockeye condition and survival. Radio telemetry is an important tool to examine passage behavior and effects and feasibility studies should be initiated to do so.

In summary, this high priority proposal is technically adequate and satisfies the standards set forth in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

The objectives are clearly defined and well justified. The use of the summary table of metrics from previous years studies was very useful to have giving a better context for proposed study. This type of table should be required in proposals for all ongoing projects that have several years of results to report. The FPEs for 2002 (incorrectly labeled 2003 in the proposal, but clarified at the proposal meeting) are quite low and may indicate very low survival for 2003 (yet to be completed). Was anything different in dam operations this year? On page 6 in paragraph 2 there is a brief mention of a proposed pilot study to determine detection rates of radio tagged juvenile sockeye salmon. What is the purpose and rationale for this? As this is a new element for the ongoing study, this should be treated with much more detail, maybe as a separate study objective.

This ongoing proposal expectedly lacks the detail of a new study proposal (the project sponsors can cite previous years reports). However, in the methods section the project sponsors totally skip over the task and activity of tagging the fish including: type of tag and details, tagging technique (gastric or surgical?), description of juveniles to be tagged, and collection and holding techniques.

***Bonneville Dam***

**15. Movement, distribution, and passage behavior of Radio-Tagged juvenile salmonids at Bonneville Dam associated with FPE and survival tests**

**Status:** Funded

**Study Code:** SBE-P-00-7     **Agency/Author:** USGS / Adams

**Final Comments:**

This proposal focuses on describing the passage routes of juvenile salmonids approaching Bonneville Dam and monitors ten passage metrics (e.g. fish passage efficiency, fish guidance efficiency, spillway efficiency, spillway effectiveness, corner collector efficiency,....etc.) at Bonneville Dam. A related proposal focuses on estimating survival of those fish as a consequence of passing by those routes.

This proposal was modified appropriately from the preliminary proposal. It was well prepared the first time and needed few revisions. The background and justification were strengthened. New emphasis is provided on summer spill issues. Sections were reorganized for easier readability. These are people who know their work well and do a fine job of it.

The main comment by the ISRP on this proposal was that there needed to be some better way to explain how all the closely related studies at Bonneville Dam (i.e. radio telemetry and hydroacoustics studies) were coordinated and integrated. This is because we now see separate radio telemetry studies using the same fish to generate their data, and radio telemetry and hydroacoustic studies generating the same metrics such as spill efficiency, fish passage efficiency, etc. See comments above for proposal # 13 for some suggestions related to this concern.

The proposal is linked to other radio-tagging studies at Bonneville Dam (e.g., proposal 16) and related to work at The Dalles (proposal 13). The other radio-tagging studies above Bonneville are expected to provide sufficient numbers of tagged fish to provide the expected precision of various measures of fish passage efficiencies.

The following comment is a side issue and was inspired by thinking in terms of a progress report rather than a proposal. At paragraph 3, it may be concluded from the ratios given that spill effectiveness is non-linear. This could be important at levels of spill that are less than the levels included in the estimates because spill will actually be less effective than the ratios would suggest. Whether the differences would be large enough to be of concern would be a matter deserving further scrutiny. This paragraph seems somewhat irrelevant, or at best a minor detail, when the next paragraph is taken into account. That next paragraph indicates that the “treatment” (spill volume relative to river flow) had a significant effect on efficiency of passage of Chinook and steelhead. Very interesting and useful information, which deserves further amplification in the final report of progress, and perhaps evaluation in terms of the study design.

Minor Comment. At paragraph 1 on page 6, there appears to be a typo. It appears that the end of the last sentence should read “...2.5 and 2.4 h at B1”, rather than “at the spillway”.

In summary, this high priority proposal is technically adequate and satisfies the standards set forth in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

Many of the comments made on proposal 13 apply to this proposal as well. This proposal could be combined with the next one, #16, or an umbrella proposal could be done for Bonneville describing how these proposed studies are linked (plus other overlapping studies which may be gathering data on the same metrics but with different methods, such as hydroacoustics). The background is well done and the objectives clearly defined and justified. There is sufficient summary data from previous years in the Current Status Section of the proposal to build the logic for continuing to gather the same passage metrics in '04, add FGE, and focus on passage efficiency and survival through the new corner collector at B2.

## 16. Estimating the survival of migrant juvenile salmonids through Bonneville Dam using Radio Telemetry: 2004 evaluations

**Status:** Funded

**Study Code:** SPE-P-02-1     **Agency/Author:** USGS / Counihan

**Final Comments:**

This proposal focuses on estimating survival of juvenile salmonids as they follow the various passage routes at Bonneville Dam, while proposal 15 uses the same tagged fish to describe their passage routes. It has many of the same features as the similar study by the same contractor to obtain those estimates at The Dalles Dam. However, the final proposal has emphasized more Bonneville-specific considerations. As with The Dalles studies, one is designed to describe the passage routes and the other to estimate survival in passage as the fish follow those routes.

In the final proposal, objectives were consolidated from nine to five, eliminating specific consideration of the Corner Collector (including it among other routes of passage). Specifically, the major revisions were to lump old objectives 4, 5, 6, and 7 into new objective 4 (i.e., to estimate route specific survival of juvenile yearling and sub-yearling Chinook salmon passing through Bonneville Dam) and to eliminate objective 8 (a feasibility study of estimating survival of sub-yearling Chinook passing this project during periods of no spill in August). The proposed use of tagged yearling steelhead has also been eliminated.

The current status section was strengthened with informative text giving prior results. The statistical aspects were presented in detail. However, as with the study at The Dalles, the design of one objective is not fully described, as it depends upon an analytical model for estimation of survival by passage route that is still under development by the University of Washington. The revised model is expected to better account for bias in the route specific survival estimates (see comments above for similar radio telemetry survival study proposal #12 at The Dalles Dam). The final design is therefore not available for review at this time. Based upon previous experience and the qualifications of Dr. John Skalski, who is said to be the person developing the model, it is likely, given our comments below, that Dr. Skalski will provide sufficient information to guide the design that will be required for application and evaluation of the model.

Reviewers noticed the same paragraph at the top of page 5 that appears in the proposal for The Dalles radio-tagging study. It describes advantages of radiotelemetry as a tool for this kind of study. Drawbacks of the method and potential pitfalls deserve to be discussed as well as the advantages.

A comment on the progress report: At page 9, one has to wonder about the reliability of these quite high estimates of survival through the turbines. Where is the downstream recovery location for control and experimental groups? If close to the project, what is the probability of detecting a dead fish and reporting it as a survivor?

On page 16 it is proposed to radio tag and release dead fish into the tailrace of Bonneville Dam to assess false detection rates. Such a procedure requires an assumption that the fish that are tagged and killed will be distributed and will follow the same paths in the river as fish that are killed as a result of events encountered during passage. Considering the potential variations that

might be induced by the events themselves, it may be necessary to conduct a rather elaborate study with many release sites and fish killed by various means.

This proposal is very similar to “Estimating the survival of sub-yearling Chinook salmon through Bonneville Dam during two spill operation scenarios using radio-telemetry: 2004” (proposal 55) and SPE-P-00-8 “Estimating the survival of migrant juvenile salmonids through The Dalles Dam using radio-telemetry: 2004 evaluations” (proposal 12) Review comments should apply to all three proposals. Also, there appears to be potential for direct overlap with the sub-yearling Chinook components.

The study is well designed by competent experienced principal investigators with a team including statistician, John Skalski. The field experiment methods should be consistent with the design recommended by Skalski – this likely means a three rather than two release strategy.

Methods for estimation of required sample sizes should be given or referenced, e.g. it is unclear if one or two sample procedures are being used in the Section “Sample Size for the RSSM analysis.” See, e.g. Zar (Page 106 and page 132, 1999).

Zar, J.H. 1999. Biostatistical Analysis, Fourth Edition. Prentice Hall, NY.

Skalski presented an overview of release-recapture methods for estimation of survival of juveniles at the Portland District Corps of Engineers survival studies meeting held December 11, 2003. If we understood his presentation correctly, there was discussion of non-statistical bias in estimation of the route specific survivals with the design proposed in this study, leading him to suggest a design based on three releases with one release at the dam into a well defined route, e.g., ice and trash sluiceway. Apparently, this issue is to be investigated under Objective 1 of this proposal and Objective 2 of the proposal SPE-P-00-8 “Estimate the survival of migrant juvenile salmonids through the Dalles Dam using radio telemetry: 2004 evaluation.” We assume the potential overlap will be eliminated.

Point estimates for parameters of interest are complicated ratios and ratios of ratios that typically have unknown statistical biases associated with them and no explicit formulas for variances. The formulas for reconstruction of dam survival and other parameters are more complex; e.g., some involve linear combinations of products of these ratios. Apparently, variances for dam survival and route specific survival estimates are approximated by the “delta” method with unknown accuracy, precision, and statistical bias. We believe that the properties of these approximations (including properties of formulas for target sample sizes) should be compared with bootstrapping of real data and Monte Carlo simulations before data from this project are analyzed and the next round of survival studies are designed.

Minor Comments. The standard errors listed in Table 1 are best guesses based on the models, assumptions, and planned sample sizes. They are not guaranteed.

An editorial point. In a couple of places reference is made to “submerged screen intakes”, where it is clear that the text should read “submerged intake screens”.

In summary, this high priority proposal, in general, is technically adequate and satisfies the standards set forth in the ISRP assignment. However, Objective 1 and survival model revisions need to be satisfactorily completed.

**ISRP Comments on Preliminary Proposal:**

See comments on the survival proposal for The Dalles Dam (#12).

**55. Summer Spill Study: Estimating the survival of sub-yearling Chinook salmon through Bonneville Dam during two spill operation scenarios using radio-telemetry: 2004.**

The following review was provided in a memo to Doug Marker, Fish and Wildlife Director, Northwest Power and Conservation Council, April 6, 2004. The project sponsor, the Corps, and BPA responded to the ISRP concerns described below, but the ISRP did not have time to review and discuss those responses before release of this report. The ISRP will provide a separate memo containing the final review of this proposal.

**Recommendation**

In general, the proposal is well prepared by competent experienced principal investigators with a team including statistician, John Skalski. Good background is provided from previous spill and survival studies conducted in the Columbia River, and a fair case is made for the need for summer spill survival studies. However, the proposal needs to clearly specify the experimental design that would be subject to the statistical analysis. Specifically, the spill treatments need to be described in greater detail. These issues require a response or proposal revision before the ISRP can make a final determination on the proposal's technical adequacy. The ISRP understands this proposal has been slated for funding, and tags have been purchased. However, the ISRP is also aware this could be a multi-year project, and our comments and request for a response are intended to ensure a strong and clear experimental design for the project from the outset.

**Comments**

This study overlaps and expands an ongoing study by the USGS at Bonneville Dam, "Estimating the survival of migrant juvenile salmonids through Bonneville Dam using radio-telemetry: 2004 evaluations" (SPE-P-02-1) and is very similar to "Estimate the survival of migrant juvenile salmonids through the Dalles Dam using radio telemetry: 2004 evaluation" (SPE-P-00-8). The present study adds a treatment to the ongoing Bonneville study and focuses on subyearling Chinook in contrast to the ongoing study, which includes yearling and subyearling Chinook and steelhead.

While the ongoing study does not specify the dates to be covered by the study, this one specifies two periods: from June 20 to July 20 and July 1 to July 31 to be covered by the study.

Under Study Objective 1, the two spill conditions to be tested are clearly spelled out, but the rationale is not given. The details of how spill treatments will be varied per day within each

period also need to be given. The rationale for the BiOp spill is a given (75 kcfs day spill and spill to the gas cap at night), but how was the 50 kcfs 24 hr spill decided on? Two other related questions:

- (1) Is the spread between spill levels enough? There will only be a difference during the day (of 25 kcfs) because the spill volume to the gas cap at Bonneville at night averages ~ 50 kcfs. Maybe a test between 75 kcfs and 50 kcfs is sufficient but the proposal should include a summary of previous spill survival data to make the case.
- (2) Why wasn't a "spill on vs. spill off" test proposed?

Study Objective 2 is proposed to evaluate the spill test in Objective 1 for two periods, June 20 – July 20 and July 1 – July 31. It is clear that this objective is, in part, a feasibility study to determine if a radio-tag study can be done for sub-yearling Chinook nearing the later summer when water temperatures are warming. This is a worthwhile goal. The overlap in periods to be evaluated is not adequately explained. The third set of estimates, generated for July 20- July 31 should also be better explained. In sum, the treatment alternating between these two or three overlapping periods should be clearly articulated.

The principal investigators should consider separating the analysis into four blocks, two times of day and two spill levels. The proposal makes no mention of this. This block design would extract more information and probably would require no more fish. They need to be able to separate day versus night as well as different spill levels.

The following comments apply to this proposal and the other two related radio-telemetry studies at Bonneville and the Dalles Dam.

We would like to see less emphasis on "hypothesis testing." The authors tend to lean toward "estimation" but we would suggest almost exclusive emphasis on point estimation with associated measures of precision and accuracy leading to confidence intervals with high probability (power) that the half-width is no more than the size of the effect to be detected.

Methods for estimation of required sample sizes should be given or referenced, e.g. it is unclear if one or two sample procedures are being used in the Section "Sample Size for the RSSM analysis." See, e.g. Zar, J.H. 1999. Biostatistical Analysis, Fourth Edition. Prentice Hall, NY. (Page 106 and page 132).

John Skalski presented an overview of release-recapture methods for estimation of survival of juveniles at the Portland District Corps of Engineers survival studies meeting held December 11, 2003. If we understood his presentation correctly, there was discussion of non-statistical bias in estimation of the route specific survivals with the design proposed in this study, leading him to suggest a design based on three releases with one release at the dam into a well defined route, e.g. ice and trash sluiceway. Apparently, this issue is to be investigated under Objective 2 of the proposal SPE-P-00-8 "Estimate the survival of migrant juvenile salmonids through the Dalles Dam using radio telemetry: 2004 evaluation" and Objective 1 of SPE-P-02-1. The issues should be discussed in the present proposal. Is the non-statistical bias of sufficient magnitude to require the three-release design? We assume the potential overlap in the studies will be eliminated.

Point estimates for parameters of interest are complicated ratios and ratios of ratios that typically have unknown statistical biases associated with them and no explicit formulas for variances. The formulas for reconstruction of dam survival and other parameters are more complex, e.g. some involve linear combinations of products of these ratios. Apparently, variances for dam survival and route specific survival estimates are approximated by the “delta” method with unknown accuracy, precision, and statistical bias. We believe that the properties of these approximations (including properties of formulas for target sample sizes) should be compared with bootstrapping of real data and Monte Carlo simulations before data from this project are analyzed and the next round of survival studies are designed.

**Minor comment.** The standard errors listed in Table 1 are best guesses based on the models, assumptions, and planned sample sizes. They are not guaranteed.

**A final programmatic comment.** Summer spill is currently a key issue, and this study starts to address some of the questions of the benefit of summer spill by providing real data, which provides rationale to move forward with this project. However, a primary issue the ISRP has identified in the review of the AFEP is the need for a long-term plan for fish studies related to the hydrosystem with proposals developed as far in advance of implementation as feasible to allow for adequate planning, and proposal development and review.

## 17. Hydroacoustic evaluation of juvenile salmonid fish passage efficiency at Bonneville Dam in 2004

**Status:** Funded

**Study Code:** SBE-P-00-7    **Agency/Author:** PNNL / Gene Ploskey

**Final Comments:**

This proposal is technically adequate and satisfies the standards set forth in the ISRP assignment. As the ISRP indicated in the initial review, the preliminary proposal for this study was very well prepared and complete, so few revisions were expected. However, two new major tasks were added: (1) a broad review and synthesis of all previous research on juvenile salmonids at Bonneville Dam prior to 2004, and (2) use of the acoustic camera to describe swim paths and collection efficiencies of smolts approaching the B2 corner collector. The ISRP does not know why these additions were made but positive contributions to the AFEP should result from each added task. The need for a review and synthesis of fisheries research at Bonneville Dam is due because a significant number of fairly large and complex studies have been conducted there over the past 10 to 20 years. This summary should be especially useful for management level decisions about future directions, and to assist other investigators in designing their studies. The use of the acoustic camera to help evaluate juvenile salmonid entrance and passage behavior at the new corner collector at B2 is also a worthwhile, positive addition to this study. The remainder of the proposal includes no experiment or direct test, per se. It is primarily a monitoring and evaluation effort.

With reference to the comments by the ISRP on the preliminary proposal, reviewers noticed no mention of shad, and no specification of the dates to be included in the study.

**ISRP Comments on Preliminary Proposal:**

This is a very complete and well-done proposal. The overlap of hydroacoustic and radio telemetry is beneficial and complementary, as long as the studies are well coordinated and the data are integrated. This is a key evaluation tool of the new corner collector at B2 and the designed coverage in this area with multiple tools is more than adequate. The only drawback is the seasonal limitation of stopping at July 15 because of the juvenile shad emigration, but radio telemetry can help fill in this void.

***Lower Snake River Dams***<sup>10</sup>**23. Direct injury/ survival of juvenile Chinook salmon passing through the spillway at Ice Harbor Dam**

**Status:** Funded

**Study Code:** SPE-W-04-1    **Agency/Author:** COE / Smith

**Final Comments:**

No proposal was available for ISRP review. The priority of the work described in the Corps scope of work appears high.

**ISRP Comments on Preliminary Proposal:**

The presentation characterized this “pre-proposal” as a general scope of work prepared by the Corps, and not a true proposal. Thus, its status is ambiguous and difficult to review. Much of what is to be done has yet to be determined (sources of fish, which spillways, which spill levels, etc.).

This proposal (really a brief statement of work) would use unspecified technologies to estimate direct injury to fish passing through Ice Harbor Dam under two operating conditions yet to be specified. This proposal relates to the “Study Summary” of the same Study Code (SPE-W-04-1) entitled “In-river fish passage and survival at Ice Harbor Dam”, which indicated performance between FY 2000 and FY 2006 (apparently a continuing study, as was confirmed at the presentation). The summary is oriented primarily toward survival studies, which is the subject of this “proposal.” The only Multi-Year Plan that seems to fit this proposal is “Ice Harbor Survival/Efficiency Study” updated June 30, 2003, which shows a performance period from FY 2003 to FY 2006. This “proposal” appears to be an early draft of the Study Summary. The ISRP understands that the SRWG is working on a study plan for Ice Harbor.

There are no methods given, so it is impossible to judge whether the work would be based on sound science principles. There is a presumed benefit to fish from determining the current survival in spillways, but this is not discussed. The single objective of determining direct injury and survival is clearly stated. No information on data analysis is presented and no relationship is drawn between this data collection and any decision.

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<sup>10</sup> The ISRP’s pre-proposal review (ISRP 2003-14) included general comments on proposals 21, 22, 23, 24, and 25. Those comments can be found before the review of proposal 23. Comments were also provided on the relative merits between 24 and 25 (26). Those comments followed proposal 24.

## 24. Fish Passage and Survival at Lower Monumental and Ice Harbor Dams

**Status:** Funded

**Study Code:** SPE-W-04-1    **Agency/Author:** NMFS / Eppard

**Final Comments:**

The title of this proposal was changed to “Fish Passage and Survival at Lower Monumental and Ice Harbor dams”, as a result of the change in emphasis from McNary Dam to Ice Harbor Dam. This change is reflected in the revised objectives. The proposal is to describe passage behavior and to estimate total project and route specific survival rates of yearling Chinook salmon under two spill conditions at Lower Monumental Dam and similarly at Ice Harbor Dam. Subyearlings would also be studied at Ice Harbor Dam. The survival rates of juvenile steelhead from Lower Monumental Dam and McNary Dam would also be estimated.

This proposal has been significantly revised and many of the revisions recommended by the ISRP were addressed. The original McNary objective 3 (survival estimates) has been dropped and is now in the USGS proposal # 26. Instead of objectives specifying estimates of survival “under existing operations at...” Now the proposal refers to evaluation of the effects of two spill levels on the parameters to be measured. On page 7, it is said that project operations at Lower Monumental Dam have not yet been finalized, nor have those at Ice Harbor Dam (page 1) but that the study will probably follow a 4-day block design with 2 days of spill discharge volume described in the 2000 FCRPS BiOp through all 8 spillbays, 24 hours per day, followed by 2 days of spill discharge described in the BiOp discharged in a “bulk” spill pattern 24 hours a day. Bulk spill patterns are said to be patterns which use fewer spill bays and individual spillway gates are open a minimum of five stops. Without knowing the two amounts of spill to be tested and compared how can a reviewer evaluate whether this study proposes a valid test?

The ISRP needs to have more details on the choice of this study design. For example we have questions such as 1) what is the basis for choosing those two treatments? 2) would it be wiser to randomize the order in which the two treatments are applied? 3) will powerhouse loading be maintained at the same level under both treatments? Unfortunately, this lack of specificity in test conditions is common to most of the AFEP survival and passage studies, and seems to be due to the Corps and regional fish managers waiting to see what 2004 river flows and operational plans will be.

Although most of the ISRP comments were addressed, the overall goal of the proposal remains elusive. Is the strategy to find routes and survival under these two conditions this year and to get similar data for other conditions in other years with an ultimate goal to gain predictability across a wide range of conditions? Or, is the strategy based on these two conditions because they represent about all the operators will tolerate and they want to know which of the two is better for the fish? In any case, it is difficult to understand where all of this is intended to go and whether it has a good chance of getting there. If the desire is to get data for these two conditions (and only within the context of other conditions specific to 2004, and to the fish used) then it seems to be technically appropriate and feasible, but its success depends on convergence of several factors (as acknowledged by the authors). The proposal should provide a rationale for the study design that they select.

This study, like other radio tagging studies offers to release dead fish in order to estimate the rate of “false” detections (i.e., detections of tags on dead fish). There needs to be a discussion of potential problems with the approach proposed and their possible effects on the descriptions of fish behavior and survival estimates.

There should be a discussion of the assumptions required for use of the “paired release” model mentioned on page 3, in order to obtain reliable estimates of relative survival under the two test conditions. Such a discussion might reveal otherwise unforeseen need for adjustments of the release schedule or other features of the study plan. See page 19 of proposal number 26 below.

The statistical design, sample sizes, and potential analyses seem to be well thought through for estimation of project survival rates. However, for route-specific survival rates it seems that the methods of Skalski et al. (2002) will be needed, and these methods are not well described in the proposal and are not referenced.

Skalski, J.R., R. Townsend, J. Lady, A.E. Giorgi, J.R. Stevenson, and R.D. McDonald. 2002. Estimating route-specific passage and survival probabilities at a hydroelectric project from smolt radiotelemetry studies. *Canadian Journal of Fisheries and Aquatic Sciences*. 59: 1385-1393.

The formulas for estimation of required sample sizes all appear to be conservative and, if necessary, it might be possible to cut the cost of the study and still meet objectives.

In summary, this proposal generally satisfies the standards set forth in the ISRP assignment and is technically adequate (provisionally). The overall goal for the study needs to be clarified and the final study design specifications are needed.

#### **ISRP Comments on Preliminary Proposal:**

This is a relatively complete proposal. However, this evaluation recognizes that some operational features of the study (mainly spill regimes at all dams and turbine operating features at McNary) are incomplete pending decisions about operation of the hydropower system in 2004. Study details sufficient to make a determination whether this proposal or Proposal 25 is better are not provided in the proposal (although this proposal extends its work to McNary). The proposal says they will “... estimate relative survival... under existing operations at Ice Harbor Dam”, and further on “under existing operations at McNary Dam.” The ISRP has two questions: 1) What are the “existing operations”, and 2) Is there a basic problem that lies behind the objectives to measure survival “under existing operations”, i.e. are operations likely to vary, and thus affect relative survivals? If so, then the ISRP would need to review a more complete study plan.

This proposal would use radio-telemetry (primarily) and PIT-tag technologies to determine and evaluate route selection, passage timing and survival of juvenile salmonids passing Lower Monumental, Ice Harbor, and McNary dams under operational and experimental conditions yet to be determined by the Corps. This proposal relates to several study summaries: SPE-W-04-1, “In-river fish passage and survival at Ice Harbor Dam”, which indicated performance between FY 2000 and FY 2006 (apparently a continuing study, as was confirmed at the presentation); SPE-W-04-1, “In-river fish passage and survival at Lower Monumental Dam” (FY04-06;

apparently a new study although not designated as such); and OTS-W-04-1 (New), “Research to establish new turbine operating guidelines at McNary Dam”. The first two summaries are oriented primarily toward route of passage and survival studies, which is the subject of this proposal. The third Study Summary is related to determining survival under different operating conditions of McNary Dam turbines. The Multi-Year Plans that seem to fit this proposal are “Ice Harbor Survival/Efficiency Study”, which shows a performance period from FY 2003 to FY 2006, “Lower Monumental Survival/Efficiency Study” (2003-2006), and “McNary Survival/Efficiency Study” (2004-2006). All one-page multi-year plans were updated June 30, 2003. These “plans” give little planning, however, the ISRP understands that the SRWG is working on a study plan for Ice Harbor.

The proposal provides useful information directly and by reference to indicate that the work will be based on sound scientific principles. There is an overall goal and several objectives, all of which focus on evaluation of components of the overall goal. It might have been stated that the real objective is to have highly effective fish passage. There is sufficiently clear reference to Biological Opinion decisions to infer a benefit for fish of obtaining this information. There are clearly defined objectives with evaluation of collected data as the outcome. The planned data analyses are not given in detail, but prior successful work is referenced liberally. This is a monitoring study with evaluation as the main objective. This seems adequate for this brief proposal format.

The reviewers liked the double tagging method proposed in this study (radiotelemetry and PIT tags). Side-by-side comparisons of passage estimates using the two technologies are needed to resolve some uncertainties raised by previous studies.

#### Detailed Comments:

1. Objective 1 is limited to “existing operations at Lower Monumental Dam.” Shouldn’t it also be limited to the stock, brood, size/condition of fish used, and for the dates of the experiment? Reviewers had the same comment for other objectives.
2. Objective 6 – Isn’t there an inconsistency here? All other objectives are to be conducted under existing operating conditions, but this objective requires manipulation of the operating configuration. Is this proposed as an optional objective assuming that the Corps can provide two spill conditions for comparison?
3. It would have been helpful to reviewers to add brief comments on page 5 to explain application of both radio and PIT tags.
4. Page 5 – When “regrouped” are their numbers to be supplemented when needed? If so, what is the assurance that all fish will perform comparably?
5. Page 6 – last sentence – What are “reasonably precise estimates?” Shouldn’t sample sizes be set based on a desired precision? If that sample size cannot be obtained, managers have to consider whether it is worth proceeding.
6. Critical Limitations: What is being done/proposed to ensure that these limitations do not preclude completion of a successful project? How will survival be estimated? How are assumptions associated with survival estimation being verified? Is interference from other telemetry projects likely and, if so, how will it be eliminated? If the assumptions cannot be verified, are the data to be produced useful to action agencies?

## 26. Survival and migration behavior of juvenile salmonids at McNary Dam, 2004

**Status:** Funded

**Study Code:** OTS-W-04-1 (NEW) **Agency/Author:** USGS / Perry

**Final Comments:**

This proposal is to describe behavior and estimate survival by route of passage for yearling Chinook salmon, subyearling Chinook salmon and steelhead at McNary Dam. Both PIT and radio tags will be used. The purpose is to obtain baseline data for comparison with studies to be conducted following installation of new turbines in the powerhouse. The objectives are laid out well in the beginning. There is a good section on background, status, and overview. The statistical design, sample sizes, and proposed analyses seem to be well thought through.

The final proposal includes some significant revisions, the major one being the deletion of Objectives 3 and 4 (to estimate the survival rates of yearling Chinook, objective 3, and sub-yearling Chinook, objective 4, through the turbines at McNary Dam under treatments within and outside the range of 1% of peak efficiency). This may have been in part due to comments by the ISRP and due to the results of a power analysis, indicating that too large of a sample size (beyond budgetary constraints) of radio tagged juvenile salmonids would be needed to conduct this study.

On the same point, on page 5 of the final proposal, the authors provide valuable information on a preliminary study they conducted to assess the effects of operating turbines outside of the 1% variation around peak efficiency required by the BiOp and the Council's Fish and Wildlife Program. The study makes it possible to determine the sample sizes that would be required to obtain estimates of differences in fish survival of various magnitudes. That information can be applied to any of the survival studies that involve comparisons of different plant operating regimes (spill or powerhouse loading). Given that information, it ought to be possible to specify the magnitude of differences in survival that it will be possible to detect. After the new turbines are installed. That information, in turn, should make it possible for the decision makers to specify for the present study, the sample sizes (number of radio tagged fish) required to assist them in their evaluations later on. However, that analysis is not included in this proposal.

The primary impetus for this study now, is that McNary will be undergoing major rehabilitation within the near future, so baseline survival estimates for yearling Chinook, sub-yearling Chinook, and yearling steelhead are needed prior to these changes.

In summary, this proposal is technically adequate and satisfies the standards set forth in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

This project would use radiotelemetry to evaluate passage and survival of both yearlings (Chinook and steelhead) and underyearlings (Chinook) at McNary Dam, including evaluation of alternative turbine operating modes (to compare survival at operation slightly off peak efficiencies). It responds to a new Study Code (OTS-W-04-1) and the Study Summary of the same number. The most relevant Multi-Year Plan is "McNary Survival/Efficiency Study" although that one-page plan does not mention studies of turbine operating efficiency. The ISRP was told the study is directed at a long-term McNary modernization project, which is fitting new

turbines. The set of one-pagers and the proposal do not do a sufficient job of explaining the broader context, however.

Furthermore, two objectives (3 and 4) of this proposed study are to estimate survival of juvenile salmonids in passing through turbines at McNary Dam when operated other than within 1% efficiency. The proposal goes to lengths to estimate sample sizes of fish required, but tells the reviewer nothing about what efficiency levels are planned to be tested. The reviewer is left with no basis for determining the likelihood of success of this study, or potential applicability of results. See ISRP comments under proposal 18 (pertaining to the set for proposals 18, 19, and 20) for details that are needed.

This proposal is roughly equivalent to the McNary portion of NMFS' Proposal 24, which lumped the Lower Monumental, Ice Harbor, and McNary work in one proposal. It is apparently the USGS's answer to OTS-W-04-1 but in a separate proposal. The proposal adapts the Lower Monumental/Ice Harbor proposed methods to the McNary location. The details of the Corps' study plan are not available, so the proposal lays out what it can without those details.

To the extent possible with incomplete plans by the Corps, this is a well-written proposal by a group that is well qualified to do the work. However, as the ISRP stated in the review a similar proposal in the Council's Fish and Wildlife Program Mainstem/Systemwide project selection process (see proposal 35023<sup>11</sup>), the ISRP does not feel that it is appropriate to include the cost of this study in the fisheries budget because the expected benefits to fish survival are miniscule. As Dr. John Skalski responded to our question during the oral presentation by Dalip Mathur at that time, when one considers the fish guidance efficiency of the turbine intake screens and the implementation of the spill program, the proportion of fish approaching the project that end up passing through the turbines is very small, so any improvement in total survival of fish passing the project that might be expected from changes in turbine efficiency would be extremely small.

## 27. Evaluation of juvenile salmonid condition in McNary Dam gatewells with prototype vertical barrier screens under various turbine operating conditions

**Status:** Funded

**Study Code:** OTS-W-04-1 (NEW) **Agency/Author:** NMFS / Absolon

### **Final Comments:**

This is a very narrowly focused proposal with a straightforward, but limited, presentation of objectives and methods. This study intends to evaluate the fish-passage performance at a high flow rate of a redesigned vertical barrier screen (VBS) dividing the gatewell into two portions. The gatewell with VBS is part of the bypass system that diverts juvenile salmonids from the turbine intakes. The A slot of turbine units 2, 3, and 4 will be equipped with the redesigned VBS for the test, to be compared to the A slots of units 5 and 9, which are equipped with VBSs of the old design. The relative physical condition of PIT-tagged yearling and subyearling Chinook and sockeye will be the subjects of the study. Test fish will be recovered for examination in the sampling facility of the bypass flume.

<sup>11</sup> [www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=SW2003000035023](http://www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=SW2003000035023)

The major revision to this proposal is deletion of a second test related to previously planned turbine efficiency studies. Now the only tests will be to compare effects of the new vertical barrier screens (VBS) to the old/existing VBS on yearling and sub-yearling Chinook and juvenile sockeye salmon under high discharge. The flow to be evaluated has now been selected by the Corps (16,400 cfs). Adequate detail to better explain the context for this study was not added to the proposal as recommended by the ISRP.

The estimated numbers of fish needed (sample sizes) appear to be reasonable, but the potential statistical analysis and assumptions required for analysis are not described well enough so that calculations can be verified. For example, using rough approximations in objective 1, the half-width of an approximate 95% confidence interval on the differences of two proportions with 0.9(1150) fish in each group might be as large as  $\pm 4\%$ , not 2%. Methods and assumptions should be better described.

Also, there is little presentation and no discussion of the selected test criteria (given as just “descaling and injury”) to be used to assess the differences in fish condition, if any, that might be seen between fish that experience the old design versus the new. Descaling and injury (cuts? loss of equilibrium? broken back?) should be described and the method of quantification given.

**ISRP Comments on Preliminary Proposal:**

This is a minimal proposal for fairly straightforward work, which is described but with little background and justification.

This study would characterize and compare the physical damages, if any, to samples of yearling Chinook, steelhead and sockeye and underyearling Chinook in gatewells and the fish bypass system of McNary Dam in two tests: (1) new versus existing vertical barrier screens (VBS) (at high turbine flow rates) and (2) three turbine flow rates representing peak turbine efficiency, best turbine geometry, and maximum turbine discharge. Fish would be obtained from gatewells, PIT-tagged, and returned to the gatewells and sampled in the juvenile fish facility of the fish bypass system and subsequently downriver in the Smolt Monitoring Program.

The study responds to Study Summary OTS-W-04-1 (New). The summary calls specifically for evaluations of gatewell conditions for these fish species/ life stages (presumably meaning fish condition in the gatewells). The relevant Multi-Year Plan is “McNary Survival/Efficiency Study”.

Although brevity obscures many details of methods, the numbers of fish needed for statistically meaningful results have been determined.

There is little context provided for the work. Only brief reference is made to results of prior years’ studies, which are mentioned in the Summary.

## Surface Bypass

### *The Dalles Dam*

#### 29. Fish passage studies for surface flow bypass development at The Dalles Dam

**Status:** Funded

**Study Code:** SBE-P-00-17    **Agency/Author:** PNNL / Johnson

**Final Comments:**

In general, the proposal is well planned and thorough. There has been some reorganization in the final. More financial information is provided. All ISRP comments were addressed including the addition of the rationale and justification for each of the objectives.

More information on the study design than provided would be necessary to complete a definitive technical review of this proposal. The proposal promises that: “A rigorous experimental design will be implemented to compare sluice passage rates and efficiency for the purpose of improving sluice gate operations to maximize sluice fish passage.” Reviewers need to see details of that experimental design. Also, it is noted on page 2 of the proposal that: “The fish facility Design Review Group will finalize the location of the ‘east’ sluice gates and the specific combinations of open gates (the treatment) at a later date.” Nevertheless, the proposal indicates on page 10 that: “The comparison of the sluice gate treatments (objective 3) will require a randomized block experimental design.” It is not clear to the reviewers that this particular design is “required”, nor that it is necessarily the best design for the questions posed. Again, more information is needed.

In summary, this proposal generally satisfies the standards set forth in the ISRP assignment and is technically adequate (provisionally). Final study design specifications are needed.

**ISRP Comments on Preliminary Proposal:**

This proposal is well developed and thorough. The details on data acquisition and analysis are reassuring given that the investigator is familiar with the kinds of problems to be dealt with, knows how to collect useable data, and analyze them to produce useful results. The hydroacoustics approach (its deployment in the field and its analytical techniques) has been well developed by Johnson, Ploskey, and colleagues over the years and is a valuable tool for Columbia River research. This is an appropriate application. It would be helpful if the title had the word hydroacoustics in it to distinguish it from all the radiotelemetry studies. As noted for Proposal 21, the relative justifications of hydroacoustic and telemetry techniques (alone or together) might be presented.

The hydroacoustics passage metrics (fish passage efficiency, spill passage efficiency, spill effectiveness, and sluice passage efficiency) overlap with the radio telemetry passage metrics (Study # 13). This is a strength in the 2004 program (having independent estimates of the same metrics), as long as there is good coordination amongst researchers and integration of study results. It would be helpful if the authors included a brief rationale or justification following each objective. It seems that this is a format followed in many of the other pre-proposals. On page 7, under the heading “Experimental Design”, we read, “If the comparison of east vs. west sluice passage is implemented (Objective 3), then a randomized block experimental design will be necessary...” But what if there is a different question asked by the managers? What would be the

statistical method of analysis? Under the heading “Expected Results and Applicability”, we read, “The results from this study and others will provide the region with information to make decisions regarding long-term smolt protection measures at The Dalles Dam.” The statement is inadequate. It provides no understanding of the context for this study. What is the problem at The Dalles Dam and how will information from this study help with management decisions?

The proposal anticipates the study lasting through 2007 (p. 10) but there is no indication of the plans for years after 2004. At the top of page 10 there is a section titled “Analysis of Fish Movement and Hydraulic Data” that relates to the analysis of data obtained by the acoustic camera. It was not found in the analysis methods in SBE-P-00-07, where the authors indicated to locate it. Therefore, it is probably in some other proposal. The authors should include a brief description (in this section) of how these data will be analyzed.

### 31. Three-dimensional behavior and passage of juvenile salmonids at The Dalles Dam, 2004

**Status:** Funded

**Study Code:** SBE-P-00-17 **Agency/Author:** USGS, PNNL / Cash, Faber

**Final Comments:**

This proposal will use acoustic tags to describe behavior of juvenile salmonids in the forebay at The Dalles Dam. A three-dimensional tracking system is proposed for use. Results will be useful for comparison with results from hydroacoustic and radio tracking studies. It is hoped that the study will provide more detail of fish behavior and help refine methods for fish to avoid turbine passage.

The final proposal included revisions that were responsive to ISRP comments. Objectives 1 and 2 have been clarified as to specific areas to be monitored in the forebay and several references added, as suggested. However, relevance to the RPAs has not been described with any detail as the ISRP suggested.

All references to the collection of the ADV and ADCP data have been deleted. Maybe this was due to budgetary issues (the cost for this equipment is quite high and the data are expensive to collect) or due to the fact that a CFD model is being prepared for The Dalles forebay. However, the addition of water velocity data (surface to bottom in key areas of the forebay and near passage entrance locations of the dam such as sluiceway gates, spill gates, or turbine entrances) could provide another dimension for interpreting fish passage behavior and movements in the forebay and would strengthen this study.

The ISRP especially appreciated the appeal by the contractor at the bottom of page 12, “Periods of consistent powerhouse operations will be advantageous to the analysis of data on fish behavior, passage and facilitate comparisons of output from the Numerical Fish Surrogate simulation model. Stable powerhouse operations at turbines 1-7 would be advantageous in post-season simulations using a Computational Fluid Dynamics model.” In this context the word “advantageous” is too weak. The ISRP would suggest “critical” or essential to obtain maximum value from the study.

It has become ever more clear to reviewers over the years that the system operators are not sufficiently aware of the value (to the system over the long haul) of their involvement in fish studies to the point of modifying (where feasible) operations so as to provide periods of stable powerhouse operations during which an adequate set of observations on fish response can be obtained to make possible some definite conclusions. If possible, such arrangements could significantly shorten the time required for studies to obtain sufficient data for their purposes, thus shortening the time required to make well informed decisions.

This proposal is technically adequate and satisfies the standards set forth in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

The general approach of developing 3-dimensional fish locations and trajectories in the forebay to correlate with hydraulic information and the model by Andy Goodwin (better reference for this model is needed) is especially good. As in project SBE-P-0017 (#30 above), it would be interesting to have Goodwin make some predictions of fish movement using the hydraulic data and test those predictions with the empirical data. Relevance to the RPAs should be described, not just the numbers provided. Dates on the Activities were wrong (2004 should be 2003 in several places).

In the rationale section following Objective 1, the authors indicate that a 3-D system would allow us to gather continuous data on fish as they move through The Dalles Dam forebay and especially need detailed movements in the area 400m upstream of the dam. However, all 3 tasks (1.1, 1.2, and 1.3) indicate that the 3-D system will be deployed to monitor juvenile salmonids just upstream of the ice-trash sluiceway. Is it correct to assume that Objective 2 is proposing to cover the 400m up river of the dam? The areas of the forebay that will be acoustically monitored for tagged fish movements and distribution need to be more clearly delineated and described. There are several places where statements are made referring to 3-D study results (e.g. “played a critical role in the development of the surface bypass concept throughout the Columbia River Basin.” paragraph 3, page 3) without giving references to reports or papers backing up these claims. Again, at the top of page 6, the authors state that “In 2000, 2001, 2002, and 2003 the use of 3-D systems was fully implemented at Lower Granite Dam (USGS) and Bonneville Dam, powerhouse 1 (USGS, Battelle, WES).” but no references are given. Are reports documenting results of these numerous studies available, or are they still in preparation or review?

The problem with gastric implantation of tags is not clearly stated, as this was the standard procedure in the 1960s and the techniques were well developed for adults (smaller scale would work for juveniles). On page 10 it sounded as though collection of ADV and ADCP data was not certain. This seems essential to have. Getting the equipment (purchase and deployment) will be a large cost, but the study objectives seem worth it. If there is no equipment yet, how is this classified as a continuing project?

## Adult Studies

32. Evaluation of adult salmon and steelhead migrations past dams, through reservoirs, and into tributaries in the lower Columbia River-2004

**Status:** Funded

**Study Code:** ADS-00-1

**Agency/Author:** U of I, NMFS / Peery, Burke

**Final Comments:**

This proposal was improved significantly in revision. Almost all ISRP comments have been thoroughly addressed. The proposal now contains two new and clear objectives, while two ambiguous alternative studies (3-D tracking, DIDSON) are dropped. There is more information on past work, including reference to their web site and many more references to reports. The results are still given skimpily, though, perhaps because the past data have not yet been analyzed. There is a much improved methods section, especially in answer to the ISRP question about how sample numbers were determined.

This proposal is to monitor the upstream migrations of adult salmon and steelhead by means of tracking fish outfitted with radio transmitters. Such monitoring has been ongoing for a decade or more. Much useful information has been gathered on rates of fall back of adults, delays encountered at certain projects, and so on. The objective to establish a web-based data system is commendable. In particular it ought to be useful in analyses that would produce some generalizations or ideas that would deserve testing by an experimental approach. For example at the bottom of page 10, the proposal states "Information on where and when fish fall back is needed to better manage spill and flow at the lower Columbia River dams."

For decades managers at the Fish Passage Center have conducted observations on effects of patterns of flow from powerhouses and spillways at all of the projects on the Columbia River mainstem and Snake River. In the process, they have developed criteria for operations of fish ladders, powerhouse loading sequences, and spillway operating sequences that are incorporated into the annual operating plans of the projects. It seems to the ISRP that the criteria could be improved now that the radio telemetry tool is available. There previously was no way to accumulate objective data that could be scrutinized for the purpose of refining those operating criteria for fish ladders and powerhouse operations. It is reasonable to consider focusing these efforts on specific questions, such as these that are related to adult migrations. The associated question is what should be the purpose and magnitude of a long-term monitoring program?

The new section on sample size, including power analyses, was well done, but to further strengthen the section, expected precision of estimates should be given based on the proposed sample sizes. Also precision of estimates from previous years should be given. The numbers of tagged adults would seem to yield estimated rates of passage, fallback, etc. with about  $\pm 5\%$  or better precision, but exact values should be given.

We find it unusual that requests are being made for funding to analyze or make available data collected in previous studies. Were those studies not funded for analysis and report preparation?

In summary, this high priority proposal is technically adequate and satisfies the standards set forth in the ISRP assignment.

**ISRP Comments on Preliminary Proposal:**

It was helpful to have the title page say that this is a continuation proposal (for most proposals, this had to be deciphered from the text). The proposal did not initially give the gist of the past results to see the logic of what was being proposed, although some good description was given later in the proposal. The methods were not explained in the proposal (statements like “same as last year” do a reviewer little good). The methods in the Project Summary did not even tell what kind of tag is used (sonic, radio, archival, etc.). There is actually good use of past data, although these data seem to have accumulated without much evaluation as the study years rolled along. There is only one past report cited for this long-continued study (are there others that we are supposed to know about already?). The number of fish to be tagged was determined as the minimum number to “fully evaluate passage conditions”, but how would the authors know? Would researchers ever “fully” evaluate passage conditions? It was not clear whether the work in 1c (page 9) is actually being proposed (3-d acoustic tracking and DIDSON acoustic camera). The information provided is not sufficient for peer review. Given the apparent lack of reports on previous work, the planned multi-year summaries and model are excellent and much needed, as is the web-based data archive (could this be set up and supported by the region like that for PIT tags).

### 33. Professional Services: Research and Monitoring Involving Radio Telemetry of Adult Salmon and Adult Lamprey Throughout the Watersheds of the Walla Walla District

**Status:** Funded

**Study Code:** ADS-W-00-1

**Agency/Author:** U of I / Peery

**Final Comments:**

This is an improved proposal, but the entire effort is in need of detailed re-evaluation.

As in the preliminary proposal, research and monitoring of adult lamprey is included in the title, but nothing regarding lamprey appears in the proposal. The ISRP called attention to this anomaly in its earlier review, but this misrepresentation was not fixed. The final proposal is clearly for evaluation of adult salmon and steelhead only.

The goal of the several studies described in the proposal is to assess the passage and delay of adult salmon and steelhead at McNary and the lower Snake River dams, to evaluate fish responses to river conditions and project operations (primarily temperature) and to evaluate measures to improve adult passage. The overall proposal contains three discrete components: (1) radiotagging 650 spring/summer Chinook salmon and 350 steelhead at Bonneville Dam and tracking them upstream past McNary Dam and through the lower Snake River, including into Columbia and Snake tributary spawning areas (fish would also receive small temperature recorders to document thermal exposures when fish are retrieved at hatcheries for spawning); (2) tagging 250 Chinook salmon and steelhead at Lower Granite Dam with acoustic tags that transmit temperature and depth, to monitor reactions to cool discharges from Dworshak Reservoir; and (3) tagging an undetermined number of Chinook salmon and steelhead migrants at Ice Harbor Dam with archival radio/data storage tags to better evaluate effects of temperatures in the lower Snake River on passage and survival. The proposal identifies the specific action

items in the 2000 BiOp that are addressed, and references the Council's program. The work is a continuation of previous year's studies from the early 1990s, with the third study being a specific new approach for 2004. There seems to be a strengthened focus on evaluation the efficacy of cool water releases from Dworshak Dam on Snake River migration conditions, survival, and reproductive success.

The authors added considerable detail to the final proposal, consistent with the ISRP review comments on the preliminary proposal. Background information is provided, with references and a URL for a web site. There are good objectives and sub-objectives (but note that the text includes numbered objectives not included, such as 5a on page 14) and good descriptions of methods including determination of certain sample sizes. Whereas the preliminary proposal did not provide sufficient information for a technical review, the final proposal is sufficient for review.

Although we noted that the temperature work proposed was well described in the preliminary proposal, we gave it special scrutiny in the final proposal because of temperature's increased emphasis as a study parameter and object of river management (Dworshak releases). We now question whether the temperature sensors' response times are too long to justify the component of the study to evaluate temperature exposure in water encountered by migrating adults, including possible temperature-caused delays. On page 13 of the proposal, the implanted temperature sensing tag is said to require 30 to 60 minutes to adjust to a 6 degree Celsius change in temperature. This long response time indicates that the temperature being recorded is the deep body temperature of the fish rather than the temperature of the water through which it is migrating. If an objective of the study is to determine behavioral responses to temperatures encountered in migration (as befitting questions of delay and selection of depth or tributary mouths), the internal body temperature is inappropriate (see numerous studies in the literature on temperature selection by fish using acoustic and radio transmitters spanning three decades or more).

A fish can sense temperature much more quickly than what might be recorded as body temperature. In fact, fish are able to thermoregulate by adjusting the timing of their exposures to widely varying temperatures in order to maintain a relatively constant body temperature (if suitable temperatures are available). They also have well developed avoidance temperatures and preferred temperature ranges. The standard solution to obtaining water temperature exposures for behavioral studies is to use an external lead for the sensor when the tag is internal (such tags were developed and in use in the early 1970s) or an external tag. If, however, the only objective is to determine the integrated thermal exposure as represented by body temperatures (more appropriate for physiological or reproduction studies), then the tags are appropriate. The proposal and the ongoing work would benefit from a thorough re-evaluation of what information is needed and how to obtain it for the benefit of temperature management in the river.

In some cases, the methods are still too brief to allow evaluation of adequacy of statistical design, sample sizes, or potential analyses in relation to the expected results. For example, in Objective 2c, "Evaluate ... cool water releases from Dworshak..." there are no results given although the study has been underway for two years, no justification of the sample sizes, i.e., the

need to tag 250 Chinook and steelhead, and no indication of the statistical analyses that have or may be conducted.

The continuing effort under this proposal (and perhaps related proposals) seems overdue for a focused, in-depth review by the ISRP or another independent review body. A large amount of work has been done in past years and is proposed for 2004. The continuing long lag between fieldwork and the analysis and publication of the results suggests that the studies are overly ambitious. The ISRP sees no fault in wanting to know most of what is proposed. Temperature management in the Snake River in summer by Dworshak releases is a major operational feature of the hydrosystem that likely has far more importance than the oft-debated and controversial summer flow augmentation schemes. However, the strategies for getting that information in a form useable to river management, and the methods employed seem in need of detailed re-evaluation.

**ISRP Comments on Preliminary Proposal:**

Research and monitoring of adult lamprey is included in the title of this proposal, but nothing appears in the proposal regarding lamprey. Is this one linked to proposal #36? This is a relatively weak pre-proposal, with proposed 2004 research stated in mostly very general terms in the text at the end of each objective or sub-objective description. With the exception of the temperature work proposed (Objective 5), which is fairly well detailed, the proposed studies for 2004 need to be described in much more detail before an adequate technical review can be done. As stated for the previous proposal # 32, it appears that many years of radio telemetry studies on adult salmonids have been done, but reports documenting the results are lacking. The information provided is not sufficient for peer review.

34. An evaluation of abundance, downstream passage behavior and return rates from steelhead kelts passing Lower Columbia River dams; including a post construction evaluation of modifications to The Dalles Dam spillway and the Bonneville powerhouse II corner collector

**Status:** Funded

**Study Code:** ADS-02-6

**Agency/Author:** COE FFU / Wertheimer

**Final Comments:**

The final proposal was improved by including more study design detail than the preliminary proposal the ISRP reviewed earlier. Nevertheless, many of the ISRP's suggested comments did not appear to have been addressed directly in the final proposal, particularly the comments below about greater presentation of results thus far, and coordination with other kelt projects and their supporting institutions.

This is an interesting proposal for an ongoing study that is examining passage of steelhead kelts through the Lower Columbia hydrosystem projects. The proposal outlines work proposed for the third and final year of the study. Because this is the final year of a three-year study, there should be a synthesis of data in the proposal. A few summary observations on results thus far were made in the discussion surrounding Objective 5, but these do not constitute a clear summary of project results and learning to date.

Based on the limited data presented in the proposal, the return rates seen so far are poor. It is important that this study be coordinated with USACE and tribal kelt studies in the Snake River (centered around Lower Granite Dam) and the Yakima River. Information from the Lower Columbia River study could inform the upriver studies. Such coordination may already be in place; however, it is not explicitly described in the proposal. Coordination with other kelt studies in the Columbia River basin and might lead to a greater understanding of present and potential spawning contributions from naturally or artificially reconditioned steelhead kelts. For example, information from upriver and lower river studies together might show that upriver reconditioning and release of mature fish back into the proximity to natal systems results is a measurable and important contribution to upriver steelhead populations, while return rates of kelts navigating the hydrosystem (up and down or some combination thereof) are too low to justify the activity biologically or economically.

The proposal did not contain adequate detail to review the data collection methods or proposed analytical methods; however, based on the preliminary proposal, reviewers had a concern about covariation among data detection points for a single kelt migrating down through the hydrosystem as it would be sequentially detected at successive dams. Therefore, the detections would not be independent of one another. The proposal did not provide enough detail to determine how the project sponsors might address this and other analytical questions. Expected precision of estimates of downstream passage rates and SARs should be given based on the proposed sample sizes. Also precision of estimates of downstream passage rates and current SARs from previous years should be given.

**ISRP Comments on Preliminary Proposal:**

This is an interesting proposal for an ongoing study that is examining passage of steelhead kelts through the Lower Columbia hydrosystem projects. The proposal outlines work proposed for the third and final year of the study. It contained quite a bit of information, but not enough to allow a thorough scientific or technical review. Because this is the final year of a three-year study, there should be a synthesis of data in the proposal.

Based on the presentation and the small amount of data presented in the proposal, the return rates seen so far are poor. It is important that this study be coordinated with USACE and tribal kelt studies in the Snake River (centered around Lower Granite Dam) and the Yakima River. Information from the Lower Columbia River study could inform the upriver studies. Such coordination may already be in place; however, neither the proposal nor the presentation described other kelt studies in the Columbia River basin and how they might be linked into a greater understanding of present and potential spawning contributions from naturally or artificially reconditioned steelhead kelts. For example, information from upriver and lower river studies together might show that upriver reconditioning and release of mature fish back into the proximity to natal systems results is a measurable and important contribution to upriver steelhead populations, while return rates of kelts navigating the hydrosystem (up and down or some combination thereof) are too low to justify the activity biologically or economically.

The proposal did not contain adequate detail to review the data collection methods or proposed analytical methods; however, based on the preliminary proposal, reviewers had a concern about covariation among data detection points for a single kelt migrating down through the

hydrosystem as it would be sequentially detected at successive dams. Therefore, the detections would not be independent of one another. The proposal did not provide enough detail to determine how the project sponsors might address this and other analytical questions.

## **Lamprey**

36. Evaluation of adult salmon, steelhead, and **lamprey** migrations past dams, through reservoir in the lower Columbia River, and into tributaries

**Status:** Funded

**Study Code:** LPS-P-04 New

**Agency/Author:** NMFS, U of I / Moser, Peery

**Final Comments:**

The proposal is to evaluate the ability of lamprey adults to utilize a facility specifically designed for their upstream passage, using the Bradford Island makeup water channel as a route to the forebay. The design shows considerable promise, and the investigators are to be complimented for their ingenuity in developing this idea based upon careful observations of lamprey behavior.

We observed that the proposal is identical with the pre-proposal, page for page and line for line. There is no indication that the sponsors considered the ISRP comments on the pre-proposal, some of which were substantive and intended to be helpful.

After further review of the proposal, we offer the following comments on the study design that deserve attention in the finalization of the project design and implementation:

It is not clear that proper experimental designs are being used in this study. For example, in Table 1, a 2 by 3 by 2 factorial experiment with 12 basic treatment combinations is described with two additional “treatments”: stair-step, night and stair-step with alternating incline sections, day. Our concern is whether or not the batches of 10 fish each can be randomly assigned to the 14 treatment combinations (i.e., are all 14 treatments available at the same time and are batches randomly assigned?) and if not, what type of “blocking” or “split-plot” design over time is being used? The same question can be asked of the study outlined in Table 2. The design and analysis of these experiments does not seem to be trivial and should be specified in the proposal.

The ISRP offers several observations for the sponsors to consider further. The holding boxes are designed with a drop to prevent lamprey from falling back down the channel. It is well that there is also a plan to have observers in place and to provide a means of detecting lamprey that do fall back in spite of this drop. Lamprey can use their mouths to attach to objects and move over virtually vertical (smooth) surfaces under some conditions. Another thought is that, considering the same behavior, it might be worth introducing objects, such as smooth rocks in the bottom of the channel, to assist lamprey in finding attachments and areas of temporary sanctuary.

The sponsors should coordinate (or continue to coordinate) their efforts with efforts in the Great Lakes (although these are different species of lamprey there should be some similarities). In the Great Lakes, researchers have successfully attracted lamprey into channels with synthetic hormones.

**ISRP Comments on Preliminary Proposal:**

This research will provide much needed information that should lead to improved passage of lampreys at Bonneville Dam and contribute to improvements of lamprey passage at other dams. The research will test improved designs for bypass structures to allow passage of lampreys through the makeup water channels to the forebay at Bonneville Dam. The research also will evaluate lamprey behavior in 26 fishway configurations. The investigators should carefully consider whether it is necessary to test all of these configurations. Are there certain configurations that theory and past experience suggest should be the most likely to improve passage?

Have the authors considered the possibility of simply adding roughness to the bottom of the ladders by introducing rocks/boulders of appropriate size to break up the directional flow on a small scale and give the lamprey an avenue for transit, along with attachment surfaces they are known to use in migrating upstream?

**Bypass Studies****38. Studies to establish biological design criteria for fish passage facilities: High velocity flume development 2004**

**Status:** Funded

**Study Code:** BPS

**Agency/Author:** NMFS / Gessel

**Final Comments:**

The final proposal is identical to the preliminary proposal. ISRP concerns about the actual significance of any stress caused in transport remain. Page 2 includes the words "... it is believed that ..." a problem exists. The proposal needs to include a convincing case that additional stress exists and the reasons that stress is likely to be a significant contributor to the performance of Chinook salmon. If that case can be made, the proposal seems technically sufficient and likely to be successful if all elements converge as planned.

**ISRP Comments on Preliminary Proposal:**

The pre-proposal is well done with a good background, clearly stated objectives, and a sound research design. The major justification for the study is that when juvenile steelhead are transported with juvenile Chinook, the smaller Chinook juveniles are stressed (McCabe et.al., 1979). However, it appears that there is no evidence that Chinook hauled with steelhead produce fewer adult Chinook returns than a control. If there is currently no evidence of harm, wouldn't it be more appropriate to find out if the stress to smaller Chinook juveniles translates into higher mortalities, before investing resources to determine the most effective process for separating juvenile salmonids of different sizes?

#### 40. Evaluation of modified vertical barrier screens and extended-length submersible bar screens at John Day Dam

**Status:** Funded

**Study Code:** BPS-P-00-15    **Agency/Author:** NMFS / Brege

**Final Comments:**

This proposed study is reasonable and necessary, as the ISRP indicated in comments on the preliminary proposal. No changes were made in the final proposal. The focus of this study is on the performance of the redesigned VBS. While it is a part of the bypass system that depends upon the extended-length submersible bar screens to divert the fish into the gatewells (thus explaining the title of the proposal) there is apparently no intention to conduct further evaluations of the FGE of the screens themselves, which performed very well in previous tests, but there was unacceptable rate of descaling of diverted fish. The source of the problem is thought to be twofold, the spacing of the bars in the ESBS itself, and failure of elements of the VBS due to stress, leading to development of openings and spacings that did not meet criteria. The problem with the ESBS has been corrected with a bar screen of different spacing. This proposal is to evaluate measures undertaken to correct the problem with the VBS.

Although the ISRP found the preliminary proposal to be technically adequate, the ISRP offers the following comments on the proposal's statistical design to improve implementation of the study. Precision of estimates should be reported along with the point estimates from previous studies.

It is not clear if the proper unit of replication is being using in the planning or analysis of these experiments. In objective 1, the "sample size" is 5, i.e., 5 groups of 200 fish. Variation from group to group and the mean response averaged over 5 groups appear to be the proper statistics to be used in the analysis, but the analysis and planning may be incorrectly conducted as if a sample of 1000 independent fish are being examined. In Objective 2, two "treatments" each with a sample size of 6, i.e., 6 groups of 100 fish each, will be compared. Batches of fish should be randomly assigned to the treatments. The necessary number of replications and estimation of effects should be determined using methods in, e.g., Zar (Page 106 and page 132, 1999). The proposal should clearly specify the assumptions and methods to be used in design and analysis.

Zar, J.H. 1999. Biostatistical Analysis, Fourth Edition. Prentice Hall, NY.

In summary, this proposal generally satisfies the standards set forth in the ISRP assignment and is technically adequate.

**ISRP Comments on Preliminary Proposal:**

This is a reasonable project. The primary question addressed in this study is whether modification of the materials used for the vertical barrier screens may affect the injury rate and/or survival of subyearlings as they are diverted with the intake screens into the gatewells where they may be subject to contact with the vertical barrier screens. The question is good, relevant to needs, and the design seems adequate, for what seems to be fine tuning of the bypass system at John Day Dam.

#### 41. Evaluation of gatewell modifications at Bonneville second powerhouse using an integrated approach

**Study Code:** BPS-P-00-14    **Agency/Author:** PNNL / Ploskey

**Status:** Funded

**Final Comments:**

The ISRP found this proposal to be one of best submitted during the first review. The proposal is largely unchanged from the pre-proposal. The only revision noted in this proposal from the first review was that the objective to use fyke nets to sample guided and unguided fish and provide calibration data for hydroacoustic sampling has been eliminated. Reviewers did not know why this was done, but it may be due to the fact that sufficient hydroacoustic sampling has been done in the past at Bonneville powerhouse II to proceed without fyke net sampling calibration.

The study is to estimate FGE resulting from a set of modifications to the submerged traveling screens (STS) at a couple of unit intakes. It will also measure orifice passage efficiency (OPE) at those units for comparison with unmodified units. PIT tags and hydroacoustics will be used.

Upon further review, the ISRP offers the following comments to improve the experimental design/methods: The proposal includes the right words in describing the proposed analysis, but it was difficult for reviewers to definitively determine if proper statistical design and analysis are being used. On page 7 there is a statement that paired (“by day”) “t” tests will be used to compare (“evaluate”) descaling rates during periods approximating FGE tests. It is not clear what this process would consist of. On page 8, it is said that Proc Mixed (SAS) will be used to do the analysis of variance to compare the hydroacoustic estimates of FPE for modified versus unmodified gatewells. More details would assist the reviewers. Specification of the parameters included in the analysis would help in understanding. Presumably these would include the turbine loading in the test unit(s) as well as adjacent units, duration of the test, and others. It would be of interest to note what the expected magnitude of “unbalance” due to varying dam operations might be. On page 9-10 there is a description of a test to be used to detect differences in proportions of fish detected as passing through the gap and up into the gatewell each night. Arcsin transformations of the data are mentioned. The specific test criterion is not mentioned, but is presumably a “t” test as in the descaling rates. The reviewers saw no plea for stabilized turbine loading such as was called for in proposal 31.

In summary, this proposal generally satisfies the standards set forth in the ISRP assignment and is technically adequate.

**ISRP Comments on Preliminary Proposal:**

This proposal is very well done; among the best of all submissions. The background is highly detailed, the objectives clearly stated and justified, and the appropriate data will be collected with several complementary methods to adequately address each of the objectives.

## Transportation Studies

42. A study to compare SARs of in river migrating versus transported anadromous salmonids

**Status:** Funded

**Study Code:** TPE-W-00-1    **Agency/Author:** NMFS / Matthews

**Final Comments:**

The preliminary proposal was split into two final proposals: 2004-42A (Snake River anadromous salmonids) and 2004-42B (Columbia River anadromous salmonids).

Proposal 42A will incorporate an evaluation of effects on SAR of slowing down the barges so as to take 10 days instead of 2 days to reach the release site below Bonneville Dam. It is not clear whether it is intended to extend the duration of all trips throughout the period of migration, or to apply the extension only to barge loads early in the season (which would seem to be more logical). The basic study will depend upon a mix of wild and hatchery yearling Chinook and steelhead, and hatchery subyearling Chinook (if available).

42B. The Background section provided in this proposal puts a quite different spin on the context, purpose and objectives of this study than the preliminary proposal we reviewed previously. In fact, it has practically nothing in common with the preliminary proposal, which focused on Lower Granite Dam and relative survivals of in-river and transported migrants from Lower Granite Dam to McNary Dam. This proposal focuses on evaluating possible benefits of transporting fish that originate in the upper Columbia River (mid-Columbia Reach). PIT tagged yearling and subyearling Chinook and steelhead of hatchery origin will be collected at McNary Dam and a portion of them transported by barge to below Bonneville Dam, while the remainder are allowed to continue migrating in-river. The Background section does not provide an adequate review of previous studies on this subject to put this one in context and justify its objectives. (See comments below on Williams et al., 2003).

The following review comments apply to both of the proposals.

We continue to agree with the review of the preliminary proposal. The studies are important and ongoing with additional objectives to compare SARs of transported and inriver subyearling Chinook salmon migrants. The Principal Investigators are well qualified, and the studies are well designed.

In general, it appears that substantial resources have been expended attempting to learn whether or not transport is beneficial. The December 21, 2003 NOAA white paper, "Effects Of The Federal Columbia River Power System On Salmon Populations", by the Fish Ecology Division Northwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 2725 Montlake Boulevard East, Seattle, Washington 98112-2097 (Williams et al.) includes results of an effort to bring transport data together for a detailed assessment of what is worth continuing, or modifying, and what is not. On page 55 of Williams et al. (2003) the following quote is found "We identified above that on an annual basis transported wild Snake River spring-summer Chinook salmon have had return rates similar to fish that migrated through the hydropower system." A similar conclusion concerning fall

Chinook is found on page 63 of Williams et al. (2003), namely “From these data, we have two general conclusions. First, transportation of fall Chinook neither greatly harms nor helps the fish, and thus transportation is consistent with a “spread the risk” strategy.” In light of these conclusions in a recent paper on which one of the Principal Investigators of this proposal is an author, it seems that the proposal should provide better justification for funding of continued studies to compare SARs for transported versus in river yearling wild Chinook and fall Chinook.

A reference should be given for the sample size formula used, e.g., Zar (1999).

Zar, J.H. 1999. Biostatistical Analysis, Fourth Edition. Prentice Hall, NY.

Estimates of the standard errors of  $\text{LN}(T/I)$ , the natural logarithm of a ratio of ratios, are based on asymptotic approximate formulas with unknown accuracy or statistical bias. A comparison should be made between results of these approximate formulas for the precision of estimated  $\text{LN}(T/I)$  and the formula for sample sizes with the results of bootstrapping for precision, bias, and power of confidence intervals using real data. Monte Carlo simulation studies of the properties of the approximation formulas should also be completed before these methods receive widespread use in planning of PIT-tagging studies.

Minor Comments. We assume that SARs of inriver fish that are bypassed 1, 2, 3, ... times will be estimated if sample sizes are adequate.

In summary, these related proposals are technically adequate and satisfy the standards set forth in the ISRP assignment. However, we note that the lack of correspondence between the preliminary proposal and the final proposal with respect to objectives and methods, indicates that the ISRP review of the pre-proposal was not sufficiently considered.

#### **ISRP Comments on Preliminary Proposal:**

This proposal involves two ongoing projects and proposes three new projects that are logical extensions of past work. The proposal is well written and clearly differentiates the five activities or objectives. This proposal is similar to a proposal to the Mainstem/Systemwide submissions to BPA (Project 35047) but we have compared these proposals and each activity in this proposal is supported on its own merit.

The objectives or studies in this proposal include:

1. Objective 1: compare SARs of PIT-tagged wild yearling Chinook salmon and wild steelhead smolts. The proposal is in the Snake River, compares barged versus in-river migrants non-detected at any downstream dam, and is an ongoing study. This proposal involves recovery of adults only and analysis.
2. Objective 2: compare SARs of PIT-tagged hatchery-reared sub-yearling Chinook salmon. The proposal would be in the Snake River, compare barged versus two other release groups, and is a new study. The two releases are late spring and fall. Costs also include recovery of past tag releases and analysis.

3. Objective 3: compare SARs of PIT-tagged hatchery-reared yearling Chinook salmon and steelhead smolts from the upper Columbia River, and compare barged versus smolts bypassed in a full-flow pipe. Continuation of an initial study conducted in 2003. Sample sizes for this objective are very large and, therefore, likely to be very expensive.
4. Objective 4: compare SARs of subyearling Chinook PIT-tagged and transported from McNary Dam to below Bonneville with in-river migrants released into the McNary tailrace. Study involves upper Columbia River subyearlings previously tagged at McNary collection facility. This proposal involves recovery of adults only and analysis.
5. Objective 5: compare SARs of PIT-tagged wild yearling Chinook that are transported under “current” conditions versus a proposed delayed barging scheme. A new proposal to be conducted in the Snake River as a pilot year in 2004. The objective is to delay release of early transported smolts in an effort to increase their marine survival rate.

Of the new proposals, the upper Columbia study with yearling Chinook and steelhead is likely to be very expensive (if this is an issue) given the sample sizes presented in the proposal. The calculations are based on reasonable assumptions but the supporting agency may wish to review the costs for that one project.

#### 44. Electronic recovery of ISO-PIT tags from piscivorous bird colonies in the Columbia River Basin

**Status:** Funded

**Study Code:** BPS-00-11      **Agency/Author:** NMFS / Ryan

**Final Comments:**

The final proposal was modified slightly but not sufficiently to respond to the ISRP comments on objective 3 of the preliminary proposal.

We continue to agree with the basic assessment in our review of the Preliminary Proposal. The proposal is for the continuation of an important PIT-tag detection program begun in 1998, with two notable additions proposed.

The final proposal was modified to show how the information will be used, explicit inclusion of sampling sites in McNary Reservoir in objective 1, and specific reference to sampling the same islands sampled in 2001 (with the exception of two islands, for which the exclusion was not explained). The inclusion of McNary pool in this proposal raises the question of overlap with the funded proposal Number 52 from Oregon State University (Roby). This overlap should have been better explained.

Our major criticism of the proposal continues to be that justification for sites selected and sample sizes of tags were not presented to meet Objective 3, “Compare vulnerability of salmonids released directly into the estuary to salmonids detected at Bonneville Dam”. In this regard, the revised proposal did not adequately address the ISRP concerns. Sampling methods on each island seem appropriate, however. Two statisticians were listed as Key Personnel on the proposal, but the inattention to justification of numbers of PIT-tagged fish to be released and

statistical analyses to be conducted leads us to wonder if they had adequate input in preparation of the proposal. For example, statistics to be computed and targets for precision of statistics are not stated. No justification is given for the plans to tag 3,000 steelhead, fall Chinook salmon, and coho salmon at each of the hatcheries. Are these numbers of tagged fish adequate or inadequate to meet the objective? This lack of rationale is in stark contrast to other proposals submitted by NOAA Fisheries, e.g. #2004-42 A and B for study of SARs of transported and inriver migrants, in which the numbers were explained.

Similar to this proposal's tag detection approach on Rice Island taking advantage of the Caspian tern colony byproducts, the ISRP wondered whether the principal investigators have considered attempting to gather fish predation information by running a PIT tag detector across sediment deposition zones in the river, putting a detector in the hopper slurry for Rice Island, or similar aquatic detection locations.

Minor Question: Why were surveys of Little Memaloose and Three Mile Canyon Islands dropped from the study?

#### **ISRP Comments on Preliminary Proposal:**

This proposal is for the continuation of an important PIT-tag detection program begun in 1998, and with two notable additions proposed. Four objectives are presented including: detection of PIT tags on piscivorous bird colonies in the Basin (ongoing objective), use of the detections to assess vulnerability of salmonid groups to predation (ongoing), comparing vulnerability of salmonids released into the estuary versus those detected at Bonneville Dam (new), and estimation PIT-tag detection efficiency at the various colonies (ongoing or new was not stated in the proposal). The latter objective is based on some past sampling and is a good test of the sampling program, however, the basis of the sample sizes and past results were not presented.

The suggested application of PIT tags to downstream salmon population is also a reasonable addition to the project, but again the justification for sites selected and sample sizes of tags were not presented.

The ISRP has two comments on data analysis in this proposal. The section on analysis was very brief and would obviously be inadequate for any peer review. However, our comments were:

- 1) once a measure of tag detection at a colony is estimated, how is it incorporated into the estimation of predation mortality? PIT tags are individual markers but are applied to groups of fishes (possible at a hatchery or one day at a collection facility), is the mortality rate on a "group" of tags increased by the rate of non-detection?
- 2) the data analysis section refers to comparing detections to total releases, but the probability of an individual being killed will be related to the previous mortalities (i.e., PIT-tag removals) on a group of tags. This section of the report is so condensed as to seem misleading.

Given the demonstrated losses of PIT tags to piscivorous birds, this proposal is clearly an important project to continue. However, the expansion of these recoveries to predation mortality rates is an important step in partitioning downstream mortalities from marine mortality rates, and merits much more explanation than included in this proposal.

#### 45. Sampling PIT-tagged juvenile salmonids migrating in the Columbia River estuary

**Status:** Funded

**Study Code:** BPS-00-9      **Agency/Author:** NMFS / Ledgerwood

**Final Comments:**

The ISRP continues to agree with the basic assessment in our review of the Preliminary Proposal that the proposal is technically adequate and justified.

We offer the following comments to improve the final proposal and its implementation: Our primary criticism is that design and analysis of the “experiments” seem to be a bit ad hoc; e.g., the authors state that “In 2004, we propose to continue these “funnel tests” [for estimation of detection probability of a PIT-tagged fish] on a weekly basis or more frequently if needed to verify detector performance” and “We will continue to use underwater video and divers to evaluate fish and net interactions and observe the behavior of fish as they move through the net and PIT-tag detector tunnels.” In particular, methods and planned analyses for evaluation of timing and possible residence of salmonids in brackish water (Objective 3) are missing. Written protocols for data collection and analysis of all such studies should be given or referenced. We note also that there are no NOAA Fisheries statisticians listed as Key Personnel on this proposal for conduct of very quantitative research.

**ISRP Comments on Preliminary Proposal:**

This proposal is for the continuation of a novel and essential recovery program in the estuary for PIT-tagged salmonids from upstream in the Columbia River. Since 1995, these researchers have been developing trawls and, now other net configurations, to detect PIT-tagged salmonids pass through these nets and released without any handling. The detection efficiency has been gradually improved to the point that an estimated 2% of the PITs passing Bonneville Dam were detected in 2003. This proposal would continue to examine detection efficiencies, develop a new sampling configuration for a nearshore sampling system, and would extend the sampling period through the summer to beginning recovery of sub-yearling PIT tags. These detections are essential to any estimate of survival of PIT-tagged salmonids to the Bonneville Dam, and can be complementary to the bird predation studies that recovery PITs in the lower river colonies.

The proposal is very clearly written, and methods and data analysis well described. The proposal presents the possibility of using trawls in the lower estuary to also assess survival in the estuary, duration of passage or use, etc. This possibility is interesting but the amount of time a trawl may function in the lower estuary may be a limiting factor.

#### 46. Evaluation of post-release losses and barging strategies that minimize post-release mortality and determination of the benefits of early spring transport from the Snake River

**Status:** Funded

**Study Code:** TPE-W-00-2    **Agency/Author:** OSU / Schreck

**Final Comments:**

A final proposal was not provided in time for an ISRP review. A response was warranted on several technical issues described below in the ISRP's initial comments.

**ISRP Comments on Preliminary Proposal:**

This proposal includes an objective to continue evaluation of post-release losses and barging strategies that minimize post-release mortality (Objective 1) and a new project to determine the effects of early spring transport from the Snake River (Objective 1b.).

The proposal provides an in-depth description of the project and past results. The proposal is generally well written, with the exception that the description of the new objective was confusing. Our understanding to that task is that it will assess why spring Chinook that are barged during the early portion of the emigration from the Snake River have survivals very similar to the run-of-the-river spring Chinook (i.e., no benefit from barging). Assuming our interpretation is correct, the description of the method proposed, page 18, is very limited. The fish would be tracked using radiotelemetry but the total sample size is only 150 fish (3 days x 50 fish). What is the basis of these samples and what level of comparison can be made using this sample size?

However, the majority of the proposal is a continuation of studies involving radiotelemetry and acoustic tags to study survival and migration of spring Chinook from Bonneville through the estuary and into the coastal nearshore waters. The committee continues to strongly support these technologies to provide insight into the locations and timing of mortalities during this downstream phase. The expansion of the acoustic arrays into the nearshore ocean is a welcomed addition.

## Bull Trout Study

### 50. Swimming performance of bull trout

Status: Funded for close out of ongoing proposal.

**Study Code:** BT-P-04-New      **Agency/Author:** USGS, USFWS / Mesa, Zydlewski

**Final Comments:**

This project was scheduled for completion in FY 2003 and is carried over this year only as a completion action. The Corps is relying on last year's final proposal, so a final proposal responding to the ISRP comments was not developed. In finishing the project, the Corps and project sponsors should consider the relevant ISRP comments provided below.

**ISRP Comments on Preliminary Proposal:**

This project seems to have the cart before the horse. They need to first demonstrate that some problems exist. This proposal is based on a presumption that bull trout are relatively poor swimmers. The more appropriate experiment is to test whether or not bull trout find migration challenges overwhelming. If that is demonstrated, alternative explanations including swimming performance become worthy of consideration.

**Specific Comments:**

1. Assuming swimming performance is a problem for bull trout confronting migration challenges, is it realistic to assume that the conditions proposed here for study will provide any real comparability to those confronting a migrating bull trout?
2. Holding mixed sizes of bull trout in a single tank will result in fewer fish upon arrival than you had when you left. How will you account for any difference that may be associated with the time a fish is held in the tank?
3. Are there plans to account for any StressCoat and stock effect?
4. Page 6. What is "fully characterize the swimming performance?"
5. You plan to use fish captured in 2002, 2003, and 2004. Presumably, many of these fish have been held under culture conditions and have lost much of their physical fitness. If so, will the results of the proposed tests be accurate?
6. Page 8 – Two size categories are proposed: 10-24 cm and 25-40 cm. These are very broad ranges – some fish in the small category could be twice as large as other fish in the same category. Will this provide any meaningful relationship to size?
7. Objective 2 will be done with fish from Objective 1. Wouldn't it be more appropriate to use fish that had not been stressed in previous tests?
8. You reported that the chambers are not available. Have you tested the apparatus so that you are confident that the "erratic behavior" that caused previous failures will not occur here too?
9. Page 9 – You propose to complete three trials for each fish, and based on the results make a decision as to whether or not you can combine the results. Have you now confirmed this approach with a statistician? How does this proposed experiment and analysis relate to potential problems for bull trout at dams?
10. You are proposing to do the blood work on 8-10 fish. Given the variance reported for these kinds of data, will the sample provide useful information?

## White Sturgeon Study

### 51. Behavior of white sturgeon near hydroprojects and fishways

**Study Code:** WTS-04-New      **Agency/Author:** USGS, NMFS, U of I / Parsley, Moser, Peery

**Final Comments:**

The project is technically adequate and of high priority. Reviewers were encouraged that the project was funded. Over the past 10 or more years, proposals have been submitted to AFEP to study the effects of hydroelectric development on white sturgeon. To the ISRP' knowledge this will be the first one funded by AFEP, and the proposal has a thorough background and strong justification for support.

**ISRP Comments on Preliminary Proposal:**

This is a well written, technically sound proposal for needed work on a principal resident species that is impacted by the dams.

This proposal would tag adult and sub-adult white sturgeon with radio or acoustic tags and determine their location and behavior in tailwaters, near fish ladder entrances, in fish ladders, and in the forebays of Lower Columbia River dams, particularly The Dalles. The objective is to learn why sturgeon generally fail to use fish ladders and thus are blocked by dams. White sturgeon do pass through The Dalles Dam; the research would seek something particularly suitable about the configuration at that project. The telemetry would use existing receivers placed at the dams for other research, especially adult salmonid behavior studies (although some new receivers would be placed especially for sturgeon, e.g., in fish ladders). The proposal is responsive to the "one-pager" ADS-04-NEW, and to the Council's Program requirement to mitigate resident species impacted by the hydrosystem. There is no Corps Multi-Year Plan that is applicable.

The ISRP was told that this work is regularly proposed and not funded, but the ISRP believes work on this problem is justified. The background section explained the rationale for the work especially well.

## Avian Predation in the Mid-Columbia

### 52. Avian predation on juvenile salmonids in the McNary Pool, Columbia River.

**Status:** Funded

**Study Code:** Not Applicable      **Agency/Author:** OSU / D. Roby and K. Collis

**Final Comments:**

A final proposal was not received in time for an ISRP review. The ISRP preliminary comments below still apply that the project appears justified but a more comprehensive proposal needs to be developed to allow for a scientific review. Since the preliminary comments addressed a proposal consisting of two pages, no independent scientific review has been conducted on this funded program specifically for the AFEP.

The ISRP favorably reviewed a similar proposal, by the same principal investigators, submitted for Fish and Wildlife Program funding. Tasks associated with work at McNary pool were included in that proposal; see [www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=SW2003199702400](http://www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=SW2003199702400). Apparently, this proposal and the estuary component was picked up by the AFEP after the Council recommended that it not be funded through the Fish and Wildlife Program due to a clear link to the Corps to resolve a lawsuit more closely related to the impacts of channel dredging (in the estuary).

**ISRP Comments on Preliminary Proposal:**

This proposal consists of two pages but does present a case for the development of a more comprehensive proposal. The authors present recent results of avian predation impacts in the McNary Dam area that were comparable to the predation impacts at Rice Island. Predation in these freshwater pools may even increase given water clarity and if growth of the colonies continues. The authors also suggest that management of the colonies in the lower river could result in relocation of the birds to these more interior colonies. The tasks outlined in the proposal are reasonable and follow, although there was not enough description of the vulnerability studies (task 4) for us to assess the method.

Given the past productivity of the authors and their successful completion of studies in the estuary, it would seem prudent to request a more comprehensive proposal be developed.

The proposal presents an interesting question concerning total avian predation pressures in the Columbia Basin. Given the results of studies in the estuary and then the results presented in this pre-proposal, what is the possible range of total predation on salmonids and what portion of the juveniles could this represent. In some years, large numbers of deaths may be a relatively small portion of the total emigration. However, in years with low flow or poor returns, the avian predation could present a major portion of the emigrants and should be accounted for in other planning exercises (e.g., harvest planning). The ISRP suggests that the Basin may want to investigate this range of impacts and develop a scoping paper of the potential effects and how to respond to them.

**53. Hydroacoustic Evaluation of the Effect of Turbine Efficiency at McNary Dam in 2004**

**Status:** Funded

**Study Code:** ADS-02-6

**Agency/Author:** Battelle / Moursond

**Final Comments:**

A preliminary proposal was not reviewed. This proposal is to use hydroacoustics at McNary Dam to estimate FGE. The ISRP supports the randomized block comparison proposed as suggested by the authors rather than the design referred to in the Corps' Scope of Work. This proposal's randomized block design would allow isolation of the effects of turbine loading on fish velocities and FGE, a highly desirable feature. Of course, this will require adherence to a rigid schedule of turbine loading, as specified in Table 1 provided by the contractors. The ISRP strongly recommends that the Corps adopt the proposed study design and assure that it is adhered to.

Employment of hydroacoustic methods is ideally suited for the study, because, the interest of the study is in 1) relative comparisons, rather than absolute measures of FGE, and 2) fine-scale (hourly) measurements to relate to effects of turbine loading.

The proposal is technically adequate and satisfies the standards set forth in the ISRP assignment. The inclusion of this study among those for which “final” proposals were delivered although it was not among those with a pre-proposal, indicates once more the difficulty of incorporating an efficient and effective peer review in the AFEP process.

## Appendix 3. ISRP Comments on Not Funded Proposals

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## Appendix 3. ISRP Comments on Not Funded Proposals

This appendix includes ISRP review comments on preliminary proposals that were not selected for funding by the Corps. These comments were originally provided in the ISRP's report, Review of Fiscal Year 2004 Pre-proposals for the US Army Corps of Engineers' Anadromous Fish Evaluation Program (ISRP 2003-14). October 15, 2003. The comments are included again here, so readers can see comments on the full suite of proposals submitted to the AFEP for Fiscal Year 2004 funding without cross-referencing the original report.

### Estuary and Plume

#### 5. Evaluating long-term and cumulative changes in the lower Columbia River estuary

**Status:** Not Funded

**Study Code:** EST-04-New5

**Agency/Author:** USGS / Petersen

**ISRP Comments on Preliminary Proposal:**

The proposed work will use sediment cores to document historical changes (at a decadal scale) in ecosystem structure and processes in the Columbia River estuary and relate these changes to human activities (e.g., dam construction) and natural environmental variation (e.g. regime shifts). This project would develop indicators of change in aquatic community condition. These metrics would relate to primary production, diversity, contaminants, and availability of organic material over time.

The investigators have conducted a preliminary study on selected cores from the estuary that suggests that the proposed approach is feasible.

The investigators, however, need to provide more detail about how this work will relate directly to estuary restoration. The key question would be whether measurements of sediment attributes provide the appropriate indicators of habitat or aquatic community health. How would the link be made between variables of interest to paleoecologists and current indicators of ecosystem health? The proposal needs much more detail as to how it would apply the core sample data to answer current restoration questions, and how it would tie in with other projects that also are looking at historical conditions and their relation to the present, such as the work by Bottom and Casillas. Additionally, to accurately document historical changes requires that the cores be taken from sites that are neither depositional nor erosional. How will the investigators ensure that sample sites meet this criterion?

General comments on the statement of need for research concerning “Evaluation of adult salmon habitat use in the Columbia River estuary and plume” and competing pre-proposals 6, 7, and 8:

The ISRP questioned the priority of this statement of need, but these preliminary studies could be used to assess whether an issue related to adult mortality exists. Each of these proposals is very preliminary and could not comment on the stated tasks of associating adult habitat use to changes

in flow and the Federal Power System. None of the three proposals reviewed contained enough information to allow scientific review and ranking, and all demonstrated very rudimentary knowledge of salmon physiology and movement in estuaries. What is the evidence that a problem exists? The proposals are clearly intended to be at a pilot level to test the methodologies, but none showed sufficient depth of planning to separate one proposal from the others. However, the Brown and Geist proposal refers to technologies that are still developmental and may not be available for this work plan.

These pilot studies involve the study of adult spring Chinook use of the estuary under spring flow and climatic conditions. These conditions may not be the most representative under which to test for impacts of hydrosystem flows and the estuary on adult salmon. The panel was surprised that none of the proposals considered the known changes to flow regimes and their relation to possible impacts on adult salmon migrations and survival. Further, is the primary interest in assessing survival through the estuary and lower river, or the use of habitats during this movement? The latter could be much more difficult to assess and may vary between years depending on the flow regime and temperatures. The Panel would have benefited from a more explicit statement of the information needs and why this is considered an issue.

The ISRP was also struck that none of the proposals indicate any effort to contact the fishers who have a long history of working in the estuary and an appreciation for how salmon use the estuarine environment.

## 6. Evaluation of adult salmon habitat use in the Columbia River estuary and plume

**Status:** Not Funded

**Study Code:** EST-04-New4

**Agency/Author:** U of I, OSU / Peery, Schreck

### **ISRP Comments on Preliminary Proposal:**

The goal of this project is to develop detailed information on the distribution and use of the Columbia River plume and estuary by adult salmonids. It has objectives to determine macro-scale and micro-scale use of the estuary by adult salmon migrants, and to assess the need for further evaluation. The proposal would collect information on the temporal and spatial patterns of habitat uses (the micro-scale) in the estuary (no comments related to the plume?) and use this to determine the potential impacts on adult salmon of operations in the Federal Power System. However, at the level of detail presented in this proposal, it is not possible to comment on the likelihood of such a study. Clearly, at the level contained in this text, the objectives could not be met, but each of the proposals is obviously written at a pilot or exploratory level. This proposal, however, refers to “monitoring to determine patterns of microhabitat use” which implies a longer-term commitment and could become very costly. Before such an objective is supported, a real problem should be identified and a full monitoring design presented. This proposal is also differentiated from the other two in referring to a Merwin trap to capture and sample fish. This could be a very useful study in itself and may merit consideration as an experimental sampling tool that would allow live capture and release of salmon.

To relate adult use of the estuary to flow variations, researchers will have to associate fish location with actual flow rates and depth of water, etc. The proposal does not comment on the accuracy of fish location based on the detection methods. Even the discussion of the mobile

tracking brings into question how to relate to position of the fish and GPS? The detection range of a tag could be several hundred meters, but small errors in distance could imply very different habitats in the flow channel for example.

The proposal is not clear on where the sampled fish would be captured. If capture is in the estuary, then there will likely be concerns for mortality of tagged fish since they will be acclimating to freshwater and susceptible to stress of handling. If an objective of the study is to assess habitat use and survival of adults, then there should clearly be consideration of how to assess tagging related mortality.

The very general nature of this proposal resulted in numerous questions being listed by the panel:

1. What methods of mobile tracking would be used?
2. What methods of fish sampling and collection would be used?
3. What protections would be in place for ESA listed fish?
4. What statistical analysis will establish patterns of use?
5. Why is the timing and scope of year 1 sampling different from subsequent years? Are there methodological issues to be worked out in a pilot?
6. How will the subsample (to determine microhabitat use) be chosen? What is its size?
7. How will the assessment of residency, survival, and habitat use be done from the data collected?
8. How will the linkages between estuary use and survival and operation of the hydrosystem be analyzed?
9. What would determine whether multiple years of data would be needed?

See general comments on pre-proposals 6, 7, and 8 above.

## 7. Adult salmon use of the Columbia River estuary and plume

**Status:** Not Funded

**Study Code:** EST-P-04-New1

**Agency/Author:** NMFS, WDFW, OSU / Burke, Ashbrook, Schreck

### **ISRP Comments on Preliminary Proposal:**

The objectives in this proposal are those specified in the request for proposals, but the tasks discussed under each objective are quite poorly written. The tasks appear to describe work that has already been done, information that is already known, or work not directly relevant to the objective. For example, objective 1 is to determine the best technique for capturing, tagging, and tracking salmon. Methods described under objective 1, however, describe only one method for doing this and it is not clear where the sampling will occur and if the same methods would be used in the plume environment. (Collection of adults in Cathlamet Bay would not seem to meet the basic intent to study use of the estuary by adults.)

Under Objective 2, does monitoring “survey operations” imply a different sampling method? A similar problem exists with objective 3, that obviously is based on information not presented in the proposal and therefore cannot allow for review. Objective 2, to evaluate cost-effectiveness of monitoring tributaries vs. known-source fish, does not contain any evaluation of cost-effectiveness but rather focuses on how they will determine fate of the fish. But further, the fate

of the fish is incomplete. If a fish was from above Bonneville but strayed, that has a very different interpretation than if it did not survive. If the objective of these proposals is to examine the survival rate of adults and their use of the estuary habitats, presumably the objective implies knowing the fate of each tagged fish. This limitation also negates the last statement under Objective 4 that all possible fates of fish can be either estimated or measured directly. Objective 5 will only be examined at a very cursory level since the resolution of habitat definition and use will apparently be defined by the positions of the detection arrays.

An important issue related to our comments on tagging mortality (under proposal 6) is addressed under Biological Effects in this proposal. These authors suggest that there will be little to no mortality from sampling and they provide a citation to Matter and Sandford (2003). Unfortunately, the citation in the References is incomplete, so the basis for their statement cannot be examined. We remained concerned that this issue be carefully considered in these studies.

Although the three pre-proposals for work with adults in the estuary did not provide adequate information to make a definitive ranking, this pre-proposal, with the qualifications of its researchers and available equipment, provides the highest likelihood of producing useful information during an initial pilot study. However, given the number of concerns noted above, the ISRP would recommend a much more thorough proposal be prepared before funding. See general comments on pre-proposals 6, 7, and 8 above.

## 8. Adult salmon use of the Columbia River estuary and plume

**Status:** Not Funded

**Study Code:** EST-P-04-New3

**Agency/Author:** PNNL / Brown

### **ISRP Comments on Preliminary Proposal:**

Objectives of this proposal are the same as for proposals 6 and 7. However, the background section (III A.) leads to some confusion regarding how it relates to the objectives. In particular, the last two paragraphs seem to pertain to juveniles and not adult use of the estuary, although their extension to adults is possible. The panel disagreed with the comment regarding extended delays in the estuary being common. The comment about late-run Tules may relate to the origin of these fish as opposed to a general feature of salmon in estuaries. In other large rivers such as the Fraser River, holding in the estuary is definitely the exception and not the rule. Only one stock of sockeye salmon is actually known to hold in the estuary at all. However, salmon may move on tidal currents for a few days as they acclimate to the freshwater environments.

The proposal is very short on detail about how the objectives would be accomplished. “Several methods will be assessed” for capturing listed salmon means only that commercial and recreational catch will be used. How will the catch be sampled? What information will be collected? How will the data be analyzed? The proposal only states “extensive notes will be taken” and capture and handling techniques “will be recorded.”

Unlike proposal 7, various options for fish tracking are considered, but these are only described as options, without an indication as to which will actually be tested. Cost effectiveness evaluation is directly addressed, but a measure of “effectiveness” is not described. For example, would it be more cost effective to put receivers at each downstream tributary or would it be

better to only use fish of known source upriver (detect PIT tags or DNA sampling)? The answer to this question depends in large part on the sample size needed to meet the project objectives, i.e., precision about mortality rate, does the study intend to examine mortality rate differences between stocks, etc. The proposal seems to take a more analytical approach to the objectives than does #7, but it too is quite vague in methodological detail.

The panel must emphasize though that this proposal's reference to new acoustic transmitter tags are not fully developed, and it is our understanding that the detectors have not been developed to the point of application and deployment. This concern is most clearly expressed in section D that states that "Battelle currently has **much** of the gear", and that telemetry gear "will **largely** be covered" by other projects. Compared with existing capabilities and experience in proposal 7, these added risks are necessary. See general comments on pre-proposals 6, 7, and 8 above.

## Fish Survival Studies

### *The Dalles Dam*

10. Detection of changes in escape behavior among salmon smolts following passage down The Dalles Spillway

**Status:** Not Funded

**Study Code:** SPE-P-00-8     **Agency/Author:** Oak Ridge National Laboratory / Glenn Cada (Langeslay presented)

**ISRP Comments on Preliminary Proposal:**

The proposal provided for review is a one-page preliminary proposal. A comment made during the review meeting indicated that the authors could offer a more complete proposal if requested. In the background section the authors indicate that the significance of sub-lethal stressors (i.e. turbulence) related to indirect mortality/predation has not been studied. However, studies have been published on this subject (see Mesa 1994, TAFS). Also, there is a considerable body of literature published on fast-start performance, startle-response, and mechanisms affecting predator avoidance response times (e.g. P. Webb published several such papers in the 1970s and 1980s, Harper and Blake 1990, Sigismondi and Weber 1988). Some of these should be included in the background to give a firm basis for this line of research.

In the background section the authors say that there is a need to quantify indirect mortality so the full consequences of passage through a hydroelectric dam can be assessed. However, there is no description in the proposal of how they will quantify indirect mortality with this technique. It is proposed to conduct this study in conjunction with a balloon tag study. However, no reference is given to that other study, as a result of which, it is difficult to evaluate this one. In fact, it appears that the Hi-Z Turbine tag study mentioned may only be hypothetical. No information is provided on the numbers of fish expected to be included in the study, nor on the species of interest.

Based on the brief description of how they will apply the escape behavior technique at The Dalles Dam (TDA), it appears that they will receive balloon tagged fish just after recovery from passing through the spillway (about 5 min), then film the behavioral response to a "startling stimulus" in a holding tank on a boat in the tailrace or at a shore facility and compare passed fish

response to control fish response. The instability of a boat in the tailrace would probably be too difficult for filming. Using a balloon tagged fish (plus a radio tag attached) for behavioral response studies may not produce useful or valid data due to possible tag effects, excessive handling in removal of tags, and holding time prior to initiation of filming. As it stands, the proposed study does not address a research objective of significance for the current level of scientific knowledge and need in the basin. Further, it would not provide information needed for a decision on spillway design or operation, and no mention is made of such a possibility.

#### 14. Relative significance of predation by smallmouth bass on juvenile salmonids in the tailrace of The Dalles Dam

**Status:** Not Funded

**Study Code:** SPE-P-04-New

**Agency/Author:** USGS / Theresa Liedtke, Jim Petersen, Matthew Mason

**ISRP Comments on Preliminary Proposal:**

Objective 1 seems to be important to pursue because of the relatively high rate of indirect mortality documented in The Dalles Dam (TDA) tailrace. It is also a worthwhile idea of trying a method that will identify the location where predation occurs because sampling of predatory fish in their holding areas may lead to a false impression as to the degree of predation, as a result of bias in the sample.

A problem was noted in the statement that “We do not propose to make highly rigorous estimates, but rather will make estimates that are comparable between predator species and will answer a question such as, ‘Is the loss due to smallmouth bass twice (half) the loss due to northern pikeminnow?’” It seems that the primary determinant in precision of the estimate will be the population estimates. Applying an appropriate number of tags and exerting an appropriate sampling effort should produce estimates that can be more precise than the objective specified, which seems quite loose. A more useful approach here might be one like proposal #11 adopted, imagine possible outcomes and possible applications. The context here is one of trying to account for losses of juvenile salmonids using the spillway as a route of passage at The Dalles. The estimate of interest is the portion of losses in the spillway that can be accounted for as due to smallmouth bass predation. Therefore, the beginning point should be a statement of those spillway losses (already given in other proposals), then move to description of a method to estimate the fraction due to predation (maybe both pikeminnow and bass). The precision needs to be sufficient to be able to compare with the total number.

How will sufficient numbers of smallmouth bass and northern pikeminnow be collected to make reasonable estimates of population size, especially when you are stratifying sampling by habitat? The project sponsors have sampled here before and should have some data to set minimum sample sizes.

The EMG methodology is an innovative approach that, if successful, could be applied towards numerous predator-prey questions. The EMG telemetry approach may be a viable approach for determining the exact time a predator fed, but if applied to the field there is no description of how the specific location of the event would be determined. It would help if the authors could

add an Activity 2.2.4 (page 9), which would indicate that if Activities 2.2.2 and 2.2.3 were successful, then a procedure to determine specific locations of events in TDA tailrace would be initiated. There is no schedule for Task 2.2.

### ***John Day Dam***

18. Estimate the survival of migrant juvenile salmonids passing through John Day Dam using Radio Telemetry; 2004 evaluations

**Status:** Not Funded

**Study Code:** SPE-P-00-7    **Agency/Author:** USGS / Counihan

**ISRP Comments on Preliminary Proposal:**

Reviewers are hampered by a lack of sufficient detail on the questions to be addressed by these studies at John Day Dam (numbers 18, 19 and 20). It may be said that the methodologies are well described in 18 and 20, but hard to evaluate without a complete description of the overall study design. Objectives are well stated, but qualified by a statement, such as in Proposal 18, that the study design cannot be set/finalized until the “final set of objectives and hypotheses [are] selected” (by the regional managers?).

These proposals, numbers 18, 19, and 20 need to be considered in the context of: 1) a statement of the overall problem to be addressed along with 2) sufficient background information for the reviewers to understand what progress has been made, 3) explanation of how each proposal fits into the overall problem, and 4) a description of the line of investigation that has been and now is being pursued. After reviewing all three proposals it is perhaps possible to piece together what may be some of the necessary information. Proposal 20 is the most helpful because it provides some of the factual background information necessary to evaluate whether the steps taken to date are scientifically sound or not (one of the charges to the ISRP).

Reviewers may deduce that two ideas regarding application of spill are being tested at John Day Dam, either or both of which might increase the effectiveness of spill as a passage alternative for juvenile salmonids. Since no improvements are specified at other passage routes, it appears that the study is based on a premise that increasing spill effectiveness will improve fish passage efficiency (FPE) and thus improve total survival of juveniles passing the project. However, it appears that there is a question about whether the method used to increase spill effectiveness might adversely affect survival in spill (proposal 18), whether routes of egress might be affected (proposal 19), in addition to the basic question about effectiveness of spill under the various spill scenarios being tested (proposal 20).

It appears that one idea being tested to date requires measurement of effects of spreading spill over a daily 24-hour period versus a 12-hour period at night, and the other test has to do with measuring the effectiveness of different amounts of spill (relative to total river flow), and (it appears) combinations of spill amount in the daytime versus nighttime (interaction effects?). These require measurement of the numbers of fish that choose spill as a passage route under the test conditions, and require measurement of the numbers of fish that choose other passage routes under each spill scenario, in order to arrive at estimates of FPE as in proposal 20. Survival would be measured in proposal 18 and egress in proposal 19.

A fully informed review might affect the decision about what spill combinations should be tested next, or what sequence of spills should be used next in the tests, as well as suggestions on a statistically sound study design that might more efficiently measure interaction effects.

### 19. Monitor tailrace egress at juvenile bypass system outfall under test discharge levels at John Day Dam

**Status:** Not Funded

**Study Code:** SPE-P-00-7     **Agency/Author:** USGS / Liedtke

**ISRP Comments on Preliminary Proposal:**

See comments under proposal 18. This is another ongoing study pre-proposal that suffers from the fact that it was prepared prior to analysis of 2003 data. This is an ongoing study, since 2000, but we don't find any reports cited giving results of those studies. Results from previous research are required to determine if the research was conducted as designed and is producing the necessary data to effectively address the objectives. As with many of the ongoing studies, the methodology (descriptions of Tasks and Activities) is lacking in sufficient detail (e.g. description of fish to be tagged, radio tag description, type of tag insertion – gastric or surgical, holding protocols, set up of fixed receiving equipment, boat tracking protocols, etc). At least citations of more detailed descriptions of the protocols and equipment in previous reports or proposals should be included.

### 20. Estimate the fish, spill and juvenile bypass passage efficiencies, spill effectiveness and forebay residence times of radio-tagged juvenile salmonids relative to spill test at John Day Dam in 2004

**Status:** Not Funded

**Study Code:** SPE-P-00-7     **Agency/Author:** USGS / Beeman

**ISRP Comments on Preliminary Proposal:**

See comments under Proposal 18. The proposal says that spill efficiency and spill effectiveness are collectively referred to as SPE in this proposal (p. 3, paragraph 3). This does not appear to be helpful from the reviewer's perspective. It simply introduces another set of initials and does not clarify the issue. It merely stirs together some parameters that are best viewed separately. The proposal also says Hansel estimated spill effectiveness as ranging from 1.1:1 to 2.4:1. Such a statement perpetuates an assumption that the relationship is linear. Whitney et al, 1997<sup>12</sup> reported that studies to that time had shown that the relationship is not linear. It would not be expected to be linear, based on expected behavior of salmonid smolts. Also, it appears that there may have been some transposition of numerator and denominator in the parameter for spill effectiveness, which logically ought to reflect the percentage of fish diverted in spill relative to the percentage of flow occurring as spill (not the inverse). Otherwise, one will obtain a very large whole number in cases where spill accomplishes little or nothing, when what is needed is a parameter that will reflect a percentage of fish passed in spill at various levels of spill relative to total flow. The resulting parameter will range from 0 to 100% in the extremes. See Gary Johnson proposal SBE-P-00-17, footnote on page 2.

<sup>12</sup> [www.nwcouncil.org/library/1997/97-15.htm](http://www.nwcouncil.org/library/1997/97-15.htm)

It is evident that the difference in FPE shown in Table 1, and referred to on page 4 as differences between years (with a note to the reader to check the different treatments between years) is actually due to treatments and not annual differences. The conclusion should have been clearly stated – that for Chinook, when daytime spill is 30% of river flow and nighttime spill is at least 45%, FPE is higher with 24-hour spill than with 12-hour spill. Increasing nighttime spill to 53% did not increase FPE. Providing 30% spill day and night did not improve FPE over the strategy of providing 54% nighttime spill for 12 hours with no daytime spill.

The spill treatment levels to be tested in 2004 are crucial to the design and therefore the evaluation of this proposal and the ones associated with it. Page 5 indicates the spill levels to be tested have not yet been decided. Information is given on page 6 as to the sample sizes of detected radio tagged fish required for two levels of precision. The levels of spill chosen for comparison may or may not conform to the ability of the study design to detect differences.

It appears from Table 1 that daytime spill is quite effective for subyearling Chinook. That being the case, a useful test would be something less than 30% daytime spill and less than 50% nighttime. Since the timing of migration of yearling Chinook and steelhead is earlier than subyearling Chinook, it ought to be useful to design a study that focuses on the spring period separately from the summer period when subyearlings are most abundant. That being the case, a spring study might test spills of 30/30 versus 0/45 (ala 2002 test) to verify the results of the 2002 test. A summer study might test spills of 40/30 versus 30/40. A worthwhile, much needed study.

## **Lower Snake Dams**

### 21. Hydroacoustic evaluation of fish passage at Ice Harbor Dam

**Status:** Not Funded

**Study Code:** SPE-W-04-1    **Agency/Author:** COE / Smith

**ISRP Comments on Preliminary Proposal:**

The ISRP received a cursory document for review, which the presentation characterized as a general scope of work prepared by the Corps, and not a true proposal. Thus, its status is ambiguous and difficult to review.

The study would use hydroacoustic techniques to determine the relative numbers of downstream-moving fish that pass through each passage route of Ice Harbor Dam (the proposal states spillway, turbines, and fish bypass in some places but only spillway and turbines in other places).

This proposal relates to the “Study Summary” of the same Study Code (SPE-W-04-1) entitled “In-river fish passage and survival at Ice Harbor Dam”, which indicated performance between FY 2000 and FY 2006 (apparently a continuing study, as was confirmed at the presentation). The summary is oriented primarily toward survival studies, although it states that “Fish behavior and horizontal distribution of both spring and summer migrants is also needed for decisions related to RSW placement.” The only Multi-Year Plan that seems to fit this proposal is “Ice Harbor Survival/Efficiency Study” updated June 30, 2003, which shows a performance period from FY 2003 to FY 2006. The Multi-Year Plan does not include hydroacoustics studies, however, which

is the topic of this proposal. Thus, there is an incomplete and ambiguous definition of need in the Corp's justification documents. However, the ISRP understands that the SRWG is working on a study plan for Ice Harbor.

There is insufficient information in the proposal, Study Summary, or Multi-Year Plan to determine whether the proposed work is based on "sound science principles." There is no justification for the work, and the proposal is written as a task order with specific contractual details. Insufficient background and context is given to evaluate the current level of knowledge and need for the work. Thus, it is impossible to judge the appropriateness of the objectives.

Sufficient information and justification is not given to determine if the study design is scientifically sound or to establish whether there will be any "benefit to fish" (other than the statement that the Corps wants to increase survival), although such benefit can be imagined. There was no attempt to relate the study to that Corps' goal. The four objectives and outcomes in the proposal are vague and unclear and are not clearly related to the eight objectives listed in the Study Summary. Tasks are not discussed in relation to objectives.

The use of hydroacoustics is not justified, especially considering that the Multi-Year Plan included just radiotelemetry and use of PIT tags and the Study Summary is oriented mainly toward survival (which hydroacoustics will not provide). The proposal does not demonstrate that the Corps is getting what is needed with the hydroacoustic technique, although the technique is standardized and used often in Corps' projects. There is some redundancy with telemetry techniques; the differences in information should be presented. Hydroacoustics gives an amalgam of all fish. Because it is difficult to distinguish species with hydroacoustics, does the fyke net study provide enough ground truth for species identification? Is one abundant species driving the findings? Is it sufficient to track hatchery releases by the detailed hatchery release schedule? At downstream dams, the studies are stopped on July 15 because of shad, so later migrants are not monitored via hydroacoustics. Is this a problem at Ice Harbor? Radio telemetry, on the other hand, is limited by size (and whether mostly hatchery fish are tagged). This technique may be particularly biased against certain stocks such as those from downstream tributaries where migrants tend to be smaller, a deficiency that could be evaluated using data from hydroacoustics. In this, or perhaps another, proposal the relative values of hydroacoustic and telemetry information might be presented.

These are probably important data to collect. However, the "proposal" is clearly a cut-and-paste from a prior year task order (without even changing some of the dates). As such it has no scientific/technical value for review. It might more appropriately be a task in a larger proposal on fish passage at Ice Harbor.

#### Specific Comments

1. Is this a recent version of Proposal 23 (see general comments, below)?
2. Objective a. is to monitor fish passage at two operational configurations at Ice Harbor Dam. Either in a COE RFP or in this proposal, the basis for this objective should be described. It seems that data must exist as a basis for some hypothesis that comparing fish passage under these two configurations will show some effect.
3. Statement d. doesn't seem to be an objective.

4. Task 2.1.1.a – What basis is used to eliminate bays?
5. Task 2.1.1.c – Statement is not clear.
6. Task 2.1.1.d – What is the precision of estimates at Ice Harbor and on what is it based?
7. 2.1.2 – Second sentence is not clear.
8. 2.1.3 second paragraph – What information will they provide?
9. What is the error associated with the technology in applications such as proposed?
10. QA/QC. b. These methods should be included in the proposal.
11. How will you “truth” the data being obtained as to species and sizes?
12. Are survival experiments to be repeated several years in sequence with all conditions held constant (at least conditions that can be held constant)?

### General Comments on Ice Harbor proposals 21, 23, 24, 25:

The Ice Harbor proposals (Corps #s 21,23), USGS #25, and NMFS #24) are responses to a common RFP (Study Summary) implying that the COE has asked for proposals to meet specific information needs. The same specific Corps’ Study Summary is listed, and by implication the same Multi-Year Plan. However, both the summary and plan are short in length and amount of information, so tracking this defined need, and the abilities of the proposals to meet those needs, is difficult. Proposals # 21 and 23 appear to be outlines of study proposals similar to RFPs prepared by the Corps, which they then distribute to potential contractors. As they are now, each of these pre-proposals is incomplete. For example, the background sections lack references to previous studies and fail to identify pertinent passage or survival issues; there is no justification or rationale for objectives; study tests and treatments have not been determined; and detailed methodologies are lacking.

This group of proposals has considerable overlap. The general thrust of the proposals is to monitor where migrants “pass” the dam or dams, and their survival in passage. Understanding the context of the several proposals seems important. We learned during the presentations that proposals 21 and 23 are open-ended placeholders by the Corps for someone’s (unidentified) funded project, whereas proposals 24 and 25 are competing proposals for the same work.

With incomplete information about the Corp’s needs, one can only speculate about the relationships among these proposals in terms of both the techniques and species to be tested. Proposal 23 may be an earlier version of the Study Summary. Proposal 21 is to use hydroacoustic monitoring (Chinook salmon mentioned in Proposal 23) of downstream migrant passage routes at Ice Harbor and Lower Monumental dams. The other proposals emphasize survival estimation. Proposal 25 is to use sub-yearling Chinook salmon (hatchery) and radio-telemetry at both Ice Harbor and Lower Monumental dams to describe migration path and survival in passage. Proposal #24 has similar objectives (now understood to be competing). It is a proposal to conduct experiments at Lower Monumental, Ice Harbor, and McNary dams using yearling and sub-yearling Chinook salmon, and yearling steelhead captured in upstream traps. The fish will be fitted with radio and PIT tags prior to release at sites upstream and downstream of these dams. Projects 24 and 25 intend to estimate survival in each passage route. Unless there is some suspicion that the radio-telemetry projects will not get accurate estimates of migration route choices, and that this deficiency can be overcome with hydro-acoustics, the latter seems to be redundant. A choice between Project 24 and 25 seems to depend on how well they each

responded to the RFP (Study Summary). The Study Summary did not call for applications of all these technologies to compare results and the Multi-Year Plan does not even mention hydroacoustics (but calls for radiotelemetry and PIT-tags). The Corps does not seem to desire information that requires application and comparison of technologies, suggesting that this difference among proposals merely reflects each proponent's favorite technique.

At least some of these projects are to continue work in progress, which makes comparison with new proposals difficult. Project 24 is based on Corps-funded work from several previous years, and it asks for support to continue another year. Project 21/23 also seems to be a request to continue, and the USGS proposal 25 appears to be new (although not designated as such). Project 21 intends to estimate how many fish during the smolt migration pass via each possible passage. All of the proposed work, absent crippling problems with river conditions or sample size, will help to characterize results for the specific fish they use and for the dam-river conditions during the tests in 2004.

There seems to be a need for closer collaboration among these projects if they are to be conducted concurrently. The proposals have several similar objectives, potentially conflicting techniques, and may interfere. Efficiencies may exist by combining equipment and personnel, and sharing similar objectives.

The proposals were prepared absent complete information concerning expected operating conditions at Ice Harbor Dam, sources of fish, and numbers of fish. If the number of fish required by the power analyses cannot be obtained, will the projects be terminated? If they proceed with insufficient numbers of fish, will the results be useful to the fisheries managers?

## 22. Hydroacoustic evaluation of fish passage at Lower Monumental Dam

**Status:** Not Funded

**Study Code:** SPE-W-04-4    **Agency/Author:** COE / Smith

### **ISRP Comments on Preliminary Proposal:**

The presentation characterized this "pre-proposal" as a general scope of work prepared by the Corps, and not a true proposal. Thus, its status is ambiguous and difficult to review. It is an almost exact copy of Proposal 21 on Ice Harbor Dam, to the extent that the name Ice Harbor remains in the text.

The study would use hydroacoustic techniques to determine the relative numbers of downstream-moving fish that pass through each passage route of Lower Monumental dam (the proposal states spillway, turbines, and fish bypass in some places but only spillway and turbines in other places).

This proposal relates to the "Study Summary" of the same Study Code (SPE-W-04-4) entitled "In-river fish passage and survival at Lower Monumental Dam", which indicated performance between FY 2004 and FY 2006. The summary is oriented primarily toward survival studies. The only Multi-Year Plan that seems to fit this proposal is "Lower Monumental Survival/Efficiency Study" updated June 30, 2003, which shows a performance period from FY 2003 to FY 2006. The Multi-Year Plan does not include hydroacoustics studies, however, which is the topic of this proposal. Thus, there is an incomplete and ambiguous definition of need in the Corp's

justification documents. However, the ISRP understands that the SRWG is working on a study plan for Ice Harbor, which may extend to Lower Monumental.

At item e. in the list of data requirements, the government should have specified the level of precision desired, i.e. “95% confidence intervals with a permissible range of X% of the point estimate.” 95% C.I. alone is not sufficient, when the range might be from 0 to 100%.

No details are given on the methods (calculations) to be used in expanding the hydroacoustic counts into estimates of fish numbers.

See comments on the nearly identical Proposal 21.

## 25. Survival and migration behavior of sub-yearling juvenile Chinook salmon at Ice Harbor and Lower Monumental Dams, 2004

**Status:** Not Funded

**Study Code:** SPE-W-04-1    **Agency/Author:** USGS / Adams

### **ISRP Comments on Preliminary Proposal:**

This is a preliminary proposal, pending more details on the study design (e.g., spill experimental design from the Corps). The proposal needs more detail to be amenable to an ISRP technical review. Insufficient information is presented to adequately compare this proposal with Proposal 24 (apparently competing proposals), especially since the scopes are quite different.

This proposal would use radiotelemetry to establish the migration routes and survival of just juvenile sub-yearling Chinook salmon at Lower Monumental and Ice Harbor dams. It is in direct response to two of the Corps’ Study Summaries: SPE-W-04-1, “In-river fish passage and survival at Ice Harbor Dam”, which indicated performance between FY 2000 and FY 2006 (apparently a continuing study, as was confirmed at the presentation); and SPE-W-04-1, “In-river fish passage and survival at Lower Monumental Dam” (FY04-06; apparently a new study although not designated as such). The Multi-Year Plans that seem to fit this proposal are “Ice Harbor Survival/Efficiency Study”, which shows a performance period from FY 2003 to FY 2006, and “Lower Monumental Survival/Efficiency Study” (2003-2006). The full context of past and proposed work is not clear from either the Corps’ documents or this proposal. The ISRP understands that the SCT is working on a more detailed study plan for Ice Harbor.

No specific study design has been proposed for this evaluation, according to the authors. The proposal is developed around an assumption that there will be two treatments at Ice Harbor Dam during the summer, and two at Lower Monumental. Apparently the “treatments” to which this refers are spill levels that may be tested. The ISRP is asked to review the proposal on the basis of this assumption, and an assumption that the expected differences in passage can be detected within the limits of the system described on pages 7, 8., and 13. The ISRP review is contingent on this assumption being met. The background information tells the reader that little work on this subject has been conducted during the summer outmigration.

On page 12 reference is made to studies by Muir et al., 1995, and Eppard et al., 2002, that produced estimates of survival using PIT tag technology, but says that no radio-telemetry

investigation has been undertaken during the summer. What differences in information are to be expected from these two techniques? Are both methods needed? Are the estimates comparable? It seems that some further justification is needed, not simply that it is a different technique.

Reviewers objected to some of the cut-and-paste redundancy, but the objectives and tasks are clearly laid out. Discussion of assumptions is excellent. These are experienced telemetry researchers and they should be able to produce very useful results on both passage routes and survival.

#### Detailed Comments:

1. It would help reviewers if the introductory material included some review of what is known about passage at these dams. It is suggested that recent studies of sub-yearling passage have not been conducted, but results from earlier studies and those on yearlings might be instructive to include here.
2. The goals are far too broad for what is proposed by implying they will describe relations between fish performance and spill, powerhouse operations, varying flows, pool levels, turbine operations, and spill volumes. The results are in fact likely to reflect only conditions at the time of testing and the specific fish used in the test.
3. To what does the statement “relative survival” apply in the third goal statement?
4. Won’t the source of fish and their characteristics influence the results?
5. Isn’t Objective 1 overstated because a range of conditions will not be studied?
6. The two operating configurations to be tested have not been selected. What is the basis on which the selection will be made? Does the existing information suggest a hypothesis that is to be tested by use of these two configurations? Knowing answers to these questions is important for a number of reasons. The study plan would probably differ, plus the study design might benefit by inclusion of a more efficient rigorous statistical design. The very choice of spill levels to be tested might benefit by review that could make that kind of suggestion. There is a need to make a more direct connection between past, present, and future levels of spill – or other variables to be included in the study plan. A good plan should specify alternatives to be tested that build upon outcomes of past and current results. See PNNL proposal 11, which discusses expected results and applicability.
7. Are there to be two operating configurations at both Ice Harbor and Lower Monumental? If so, will they be separate in time?
8. Page 5 - If only 36% of steelhead were traveling in the upper 12 ft of the reservoir, how can researchers conclude “... that flow nets near the surface may be more effective for passing juvenile salmonids”?
9. Page 6 – What are the data that led to a conclusion that “... the MITAS system has enhanced our ability to determine the approach paths and routes of passage relative to spill conditions and surface bypass tests.”
10. Page 9, Activity 1.1.1 and Activity 1.1.2 – Isn’t the best possible configuration determined at each installation site? The technology is put forth here as a means to gather the data described in the goals and objectives, but it now reads as though its applicability has to be determined. If the technology needs to be proved, a separate proposal is needed with that as a goal.

11. How will researchers eliminate the possibility that a tagged fish may respond differently to passage challenge than does an untagged fish?
12. The “dead fish release” procedure is somewhat unclear. A dead fish has an identifying coded tag but will just drift with currents, correct?
13. Task 1.6, Activity 1.6.1 – Include a brief statement of results (e.g., any significant problems?). What does “relatively small” mean? Under Schedule: What will be the basis for this decision?
14. Objective 2 text: Fish from Lower Monumental release: How will these fish be accounted for in the Ice Harbor experiment? Is there any chance that successful Lower Monumental migrants will be more successful in passing Ice Harbor because of their success at Lower Monumental? Wouldn't that confound any results if supplemental fish were required for Ice Harbor test?
15. Task 1.5.1 – This again sounds like the technology may need further development before the proposal can proceed with confidence that the goals and objectives can be met.
16. Pages 17-19: Given that survival is a highly contentious issue, shouldn't actions be taken to test whether or not the listed assumptions are appropriate? If the assumptions are not verified, are the data to be produced any better than no new data?
17. Page 20, Impacts to other researchers: How much reduction of multiple signal collisions and unwanted detection was produced?

#### Comments on the relative merits of proposals 24 and 25 (26):

The scopes of the two studies are different. Proposal 24 (NMFS) is broader, for it plans to study McNary Dam as well as Ice Harbor and Lower Monumental, river-run hatchery yearling Chinook salmon as well as sub-yearling Chinook, and use PIT tags as well as telemetry for Ice Harbor. It also intends to address the issue of different turbine operations at McNary. Proposal 25 would focus on just subyearlings at only Lower Monumental and Ice Harbor. Depending on funding, Proposal 24 may be overstretching (and thus do a poorer job by attempting to cover too much) but Proposal 25 may be too limited in scope for the Corps' needs. Both studies are well formulated to the extent that it might be possible to develop a proposal with uncertain experimental treatments to be determined by the Corps. However, the Corps should recognize that adequate peer review might contribute meaningfully to design of an experiment that would specify the experimental treatments and thereby most efficiently address the questions or problems under study.

An attempt to compare these two proposals brings out the fact that planning for such research on the Lower Snake River dams and McNary needs to be improved. The planning lacks sufficient emphasis on long-range applicability of alternative outcomes of studies. Although both proposals nominally respond to the same Corps requests (Study Summaries and Multi-Year Plans), the “one-pagers” and the one-page “plans” lack specificity on the Corps' intent so that quite distinct scopes are proposed. In both cases, the operational features to be compared are not known (not yet established by the Corps) so that any semblance of hypothesis formation and experimental design is impossible. Such details should not be left to the last minute, or the research will suffer. Only when it is clear what is wanted and why, can reviewers decide whether one proposal or the other has a better chance of success.

Pre-proposal 26 appears to be the McNary portion of pre-proposal 25, which would make the more logical comparison to be between pre-proposal 24 and the combination of pre-proposals 25 and 26.

## Surface Bypass

### *Lower Granite Dam*

28. Migrational characteristics of juvenile sub-yearling salmon in the forebay of Lower Granite Dam relative to removable spillway weir tests, 2004

**Status:** Not Funded

**Study Code:** SBE-W-96-1

**Agency/Author:** USGS / Adams

**ISRP Comments on Preliminary Proposal:**

This is a well-written, reasonably complete proposal for continuing fish behavior studies at the experimental removable spillway weir at Lower Granite Dam. Ample background is provided, including results of prior work (except for 2003, which was still being analyzed). Details and rationale are included about numbers of fish to be tagged, placement of receivers, experimental design (generalized from prior years' experiences, in absence of Corps' information), assumptions for survival testing, etc. This work and this contractor have yielded important information in the past.

This is a proposal to conduct radio-telemetry studies of subyearling Chinook salmon in the forebay of Lower Granite Dam during experimental trials of the removable spillway weir by the Corps. Routes of passage and behavior in the forebay would be determined using small radio tags and an array of fixed antennae on or near the dam. Sufficient fish would be tagged to obtain the statistical significance of results. Focus would be on the fish's selective use of the removable spillway weir. In addition, survival would be estimated for passage routes using control releases below the dam and the standard Route Specific Survival Model. The proposal responds to Corps' Summary Code SBE-W-96-1, and is a continuation of prior studies (the subyearlings had not yet been studied). Clear objectives are listed and discussed, and the relevant specific research need of the Corps' Summary is indicated.

However, the proposal lacks operational details, which are to be provided later by the Corps. On page 4 the proposal states, "Because the Corps has not given us a detailed study design, it is difficult for us to conduct a rigorous power analysis." Without knowing the detailed study design it is not possible to conduct a rigorous peer review.

Questions regarding further development of the study design include:

- 1) Will the study involve alternating periods with the removable spillway weir in place and not in place?
- 2) Will the study design involve varying amounts of flow through the removable spillway weir?
- 3) Will there be combinations of varying flows and removable spillway weir in place and not in place?

Such designs deserve scrutiny by a peer review group to help assure that the most efficient study design is developed.

### 30. Distribution and movement of fish and flow upstream of The Dalles Dam and implications for Surface-flow bypass

**Status:** Not Funded

**Study Code:** SBE-P-00-17

**Agency/Author:** PNNL / Faber

**ISRP Comments on Preliminary Proposal:**

This is another case of where the radio telemetry and mobile hydroacoustic studies overlap in the study objective to determine the movement and distribution (approach patterns) of smolts as they enter into the forebay of The Dalles Dam. Again, this may be a strength in the 2004 program, to have independent estimates of movement patterns for the same area, as long as the researchers coordinate well and work together in integrating the resultant data.

In the second paragraph of page 3, the authors indicate that the flow information in the forebay of The Dalles Dam will be acquired using acoustic Doppler current profilers and an existing CFD model. A description of the existing CFD model or a reference for the model needs to be included in the proposal.

It would be helpful if the authors included a brief rationale or justification for each objective (page 4). This study proposes to describe the distribution and movements of juvenile salmonids in the forebay of The Dalles Dam and is built around the hope that some means can be found to divert fish away from the powerhouse and toward the spillway. Whitney et al. 1997<sup>13</sup> summarizes attempts to accomplish this feat. Generally, forebay diversions of that sort have not been successful for a lot of reasons. Collection of fish in the forebay for transfer to below the dam has been accomplished in several locations, where the numbers of fish and the sizes of the powerhouses (projects) are not as large as The Dalles or other mainstem dams, Whitney et al., 1997. It would be good if the authors could insert some text in the background describing some of the difficulties faced in attempting to divert or guide juvenile fish in a large forebay environment. Possible outcomes of the study should be specified, along with a discussion of the possible applications. That would be the place to review Whitney et al., 1997. The basis for this study (possible application of a forebay diversion device) is highly doubtful, based on much past experience. The information could be useful for other purposes.

Fish flux (on page 10)? As this is not a common term, a definition is needed. What is the “ERDC portion” mentioned in the budget section? This was not mentioned in the text.

General comment – It is a novel approach that they will be looking at fish distribution as they approach the immediate forebay, not just determine where the fish go through the dam (where they are coming from as well as where they are going). Most research is too concentrated on just calculating passage routes. The study might even go farther upstream. The integration with hydrodynamics is good, although it would be better to get more information than just strain. Some predictions of fish presence in the hydraulic regime using Andy Goodwin’s model

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<sup>13</sup> [www.nwcouncil.org/library/1997/97-15.htm](http://www.nwcouncil.org/library/1997/97-15.htm)

(reference needed) might give a hypothesized fish distribution that could be tested by the empirical data, rather than using the model in a strictly retrospective way. This would be a novel “hypothesis testing” approach for the Columbia River work. It would have been good to see some data demonstrating that placing the sensors at a distance ahead of the boat motor is sufficient to prevent fish avoidance during motorized transects (boat motors are noisy underwater even at a distance, as swimmers know). It is recommended that the ADCP data collected in the forebay not be time averaged immediately, so that the details of turbulence can be retained.

## Adult Studies

35. Evaluation of an instream pit detection system to monitor adult salmon and steelhead homing and straying behavior

**Status:** Not Funded

**Study Code:** ADS-00-4      **Agency/Author:** U of I, USFWS / Peery, Zydlewski

**ISRP Comments on Preliminary Proposal:**

This project proposes to evaluate the use of instream PIT tag detection technology to monitor fish straying (temporary or permanent) using the 23 mm ISO (134kHz) PIT tags that have been used successfully in studies such as the USFWS’s steelhead study on Abernathy creek. Consequently, the proposed study should more fully describe whether its goals are to reevaluate the ISO PIT technology or to evaluate temporary versus permanent straying.

The biggest change proposed in this study from earlier small-scale studies was the proposal to apply this technology to much larger systems like the Deschutes, John Day, Klickitat, or Yakima where straying has been identified as a problem or potential problem. Unfortunately, neither the proposal nor the presentation presented evidence that application of the ISO PIT technology is feasible in river systems as large as the Deschutes. It was unclear from the presentation whether the sponsors proposed installing the ISO PIT tag detectors in arrays across the mainstem lower Deschutes (or any other major tributary) or whether the application would be primarily in tributaries to these, such as Trout Creek in the Deschutes. Other potential detection sites might include locations along the banks where steelhead migrate or in fishways, such as the ladder at Sherars Falls on the Deschutes. None of this was articulated in the proposal or the presentation and clearly needs to be included in a full proposal before a technical review is possible.

Finally, discussion of potential information and applications needs to be more fully discussed in order to warrant investing in this technology at this scale. For all the effort involved, what would the region gain using this method over radio-tags other than potential long-term efficiency?

## Bypass Studies

37. DIDSON technology development and fish behavior research related to fish passage at Columbia Basin dams

**Status:** Not Funded

**Study Code:** BPS, SBE      **Agency/Author:** U of I / Liou

**ISRP Comments on Preliminary Proposal:**

This is an excellent proposal. The technology may revolutionize research approaches for optimizing smolt passage at dams (comparable to the impact of PIT tags).

This research would develop the use of the DIDSON acoustic camera for relating fish behavior to the detailed hydraulics of dam structures, especially fish bypasses. The research would emphasize signal-processing technologies to maximize information yield and tests of the strain-velocity-pressure hypothesis for fish behavior developed by Goodwin. Unique tagging methods to optimize fish identification by the camera would be explored. Initial studies would be conducted in laboratory tank settings where fish, hydraulics, and the placement of the DIDSON camera can be manipulated to obtain maximum information. Further research would be conducted in field locations such as the Bonneville 2 Corner Collector.

This is an unsolicited proposal that thoroughly established its need and provided ample information to judge its scientific soundness. The work is broadly related to several Study Codes (Study Summaries), none of which call specifically for this work. They are BPS-P-00-15, BPS-P-03-NEW, SBE-03-1-NEW, SBE-03-NEW, and SBE-P-00-17. This proposal recommends an innovative approach to reaching the objectives of all of the cited Study Codes.

39. Development and evaluation of full-flow PIT-tag interrogation systems for Bonneville and John Day Dams

**Status:** Not Funded

**Study Code:** BPS-P-03-New      **Agency/Author:** NMFS / Prentice

**ISRP Comments on Preliminary Proposal:**

The PIT-tag interrogation systems for Bonneville and John Day Dams are needed, and the proposal seems feasible based upon previous development of the adult PIT tag detections system. The investigators are unquestionably the best qualified to do the work. Similar PIT tag development work by the NMFS lab is funded through the Fish and Wildlife Program. (See [www.cbfwa.org/files/province/systemwide/projects/198331900n.doc](http://www.cbfwa.org/files/province/systemwide/projects/198331900n.doc).)

## Transportation Studies

43. A study to evaluate the effects of transporting spring/summer Chinook salmon in the presence of steelhead smolts

**Status:** Not Funded

**Study Code:** TPE-W-04-06 **Agency/Author:** NMFS / Gilbreath

**ISRP Comments on Preliminary Proposal:**

This study is linked to #38 and answers some of the above questions on proposal # 38. The studies proposed in this one should be completed prior to initiating #38. This is a well-designed study. The only concern is that the sample size of the marked groups may not be large enough to estimate smolt to adult return rates (given variation in adult returns to Lower Granite).

47. Evaluation of post-release losses and barging strategies that minimize post-release mortality

**Status:** Not Funded

**Study Code:** TPE-W-00-2 **Agency/Author:** OSU / Schreck

**ISRP Comments on Preliminary Proposal:**

The ISRP assumes that this study code refers to the proposal TPE-W-00-2, Objective 2. This one page of ideas, however, does not constitute a proposal. But, both of the tasks identified by Dr. Schreck could be valid points for investigation. There does, however, seem to be an obvious sequence to the studies. We would definitely support investigating the second task (task b) first. The laboratory studies could be well controlled and would eliminate the uncertainty associated with releasing the smolts into estuarine conditions, as identified in the proposal.

Study plans to address the first task could also be further developed. It would seem apparent that large numbers of the smolts released should have been PIT-tagged so that smolt-to-adult survival rates can be estimated and compared to alternative treatments. But depending on the hypotheses to be tested, a decision may be to use radio-tags for examining bird predation or acoustic tags to provide more direct measures of emigration timing, routes of passage, etc.

If requested for comment, the ISRP would be unlikely to support the change in use of barges etc. that would be required to study task (a). However, task (b) could apparently be added to other projects and would be a very logical study to undertake in support of task (a) if it was to be considered in the future.

48. Water temperature effects on juvenile fall Chinook salmon survival at the hydroprojects

**Status:** Not Funded

**Study Code:** TPE-W-04-03 New **Agency/Author:** OSU / Schreck

**ISRP Comments on Preliminary Proposal:**

This proposal is a very brief one-page concept proposal that does not provide enough information for technical review. The goals of determining the effects of elevated water temperatures on juvenile fall Chinook during in-river migration and providing quality control for

tagging studies may be quite important. However, there is only some limited anecdotal data given to indicate poor survival of fall Chinook juveniles at a holding facility at Lower Granite Dam in 2003. The justification for this type of study needs to be fully developed and a detailed study design given that will provide data to address the study questions/objectives.

#### 49. Use of a gene chip to study the effects of transportation procedures on juvenile salmonids

**Status:** Not Funded

**Study Code:** TPE-W-04-6 New      **Agency/Author:** OSU / Schreck

**ISRP Comments on Preliminary Proposal:**

This one-page proposal proposes to examine the effect of transportation procedures on various physiological components using gene chip/array technology. The proposal notes that the technique allows assay of 100s-1000s of parameters by examining the genes that are turned on or off following a particular experience. The proposal also notes that the technique has been successfully applied in medial and mammalian research, although no detail or examples were provided on how the research was applied and what kind of questions it was used to answer. At this point, the technique is untried in fisheries.

It is impossible to review the proposed work given the lack of detail provided in the pre-proposal. Prior to supporting what is clearly a research and development effort, it seems prudent to review a full proposal that includes an extensive literature cited section and examples of applied results to resource management questions from the gene chip/array technology. Given the strong applied and implementation focus of the AFEP, the program's responsibility to fledgling research and development efforts such as this proposal is unclear. This is a policy and administrative level question, rather than a scientific one.

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