



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

Review of Fiscal Year 2004 Pre-proposals
for the
United States Army Corps of Engineers'
Anadromous Fish Evaluation Program

(AFEP Review Part I. FY04 Pre-proposal Review)

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

October 15, 2003

ISRP 2003-14

ISRP Review of Fiscal Year 2004 Pre-proposals for the US Army Corps of Engineers' Anadromous Fish Evaluation Program

Contents

Introduction.....	1
Review Questions	3
ISRP Comments on Individual Pre-proposals	5
Estuary Proposals.....	5
1. A study to estimate salmonid survival through the Columbia River estuary using acoustic tags.....	5
2. Estuarine habitat and juvenile salmon-current and historic linkages in the lower Columbia River and estuary.....	6
3. Evaluation of the relationship among time of ocean entry, physical, and biological characteristics of the estuary and plume environment and adult return rates.....	8
4. Evaluating cumulative ecosystem response to restoration projects in the Columbia River estuary	8
5. Evaluating long-term and cumulative changes in the lower Columbia River estuary.....	10
<i>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:</i>	10
6. Evaluation of adult salmon habitat use in the Columbia River estuary and plume	11
7. Adult salmon use of the Columbia River estuary and plume	12
8. Adult salmon use of the Columbia River estuary and plume	13
Fish Survival Studies	14
The Dalles Dam.....	14
9. Evaluation of direct survival at The Dalles Spillway (no proposal).....	14
10. Detection of changes in escape behavior among salmon smolts following passage down The Dalles Spillway..	14
11. Characterization of The Dalles Dam spillway environment.....	15
12. Estimate the survival of migrant juvenile salmonids through The Dalles Dam using Radio Telemetry: 2004 evaluations.....	15
13. Estimate fish, spill and sluiceway passage efficiencies of radio-tagged juvenile salmonids at The Dalles Dam in 2004.....	16
14. Relative significance of predation by smallmouth bass on juvenile salmonids in the tailrace of The Dalles Dam	17
Bonneville Dam.....	18
15. Movement, distribution, and passage behavior of Radio-Tagged juvenile salmonids at Bonneville Dam associated with FPE and survival tests.....	18
16. Estimating the survival of migrant juvenile salmonids through Bonneville Dam using Radio Telemetry: 2004 evaluations.....	18
17. Hydroacoustic evaluation of juvenile salmonid fish passage efficiency at Bonneville Dam in 2004	18
John Day Dam.....	18
18. Estimate the survival of migrant juvenile salmonids passing through John Day Dam using Radio Telemetry; 2004 evaluations	18
19. Monitor tailrace egress at juvenile bypass system outfall under test discharge levels at John Day Dam.....	19
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.....	20
Lower Snake River Dams	21
21. Hydroacoustic evaluation of fish passage at Ice Harbor Dam.....	21
<i>General Comments on Ice Harbor proposals 21, 23, 24, 25:</i>	22
22. Hydroacoustic evaluation of fish passage at Lower Monumental Dam.....	24
23. Direct injury/ survival of juvenile chinook salmon passing through the spillway at Ice Harbor Dam	24
24. Fish Passage and Survival at Lower Snake River and McNary dams	25
25. Survival and migration behavior of sub-yearling juvenile Chinook salmon at Ice Harbor and Lower Monumental Dams, 2004	26
<i>Comments on the relative merits of proposals 24 and 25 (26):</i>	28

ISRP 2003-14 AFEP Part I. FY04 Pre-proposal Review

26. Survival and migration behavior of juvenile salmonids at McNary Dam, 2004.....	29
27. Evaluation of juvenile salmonid condition in McNary Dam gatewells with prototype vertical barrier screens under various turbine operating conditions.....	30
Surface Bypass.....	30
Lower Granite Dam.....	30
28. Migrational characteristics of juvenile sub-yearling salmon in the forebay of Lower Granite Dam relative to removable spillway weir tests, 2004.....	30
The Dalles Dam.....	31
29. Fish passage studies for surface flow bypass development at The Dalles Dam.....	31
30. Distribution and movement of fish and flow upstream of The Dalles Dam and implications for Surface-flow bypass.....	32
31. Three-dimensional behavior and passage of juvenile salmonids at The Dalles Dam, 2004.....	33
Adult Studies	34
32. Evaluation of adult salmon and steelhead migrations past dams, through reservoirs, and into tributaries in the lower Columbia River-2004.....	34
33. Professional Services: Research and Monitoring Involving Radio Telemetry of Adult Salmon and Adult Lamprey Throughout the Watersheds of the Walla Walla District [Salmon and adult lamprey throughout the watersheds of Walla Walla District].....	34
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.....	35
35. Evaluation of an instream pit detection system to monitor adult salmon and steelhead homing and straying behavior.....	35
Lamprey	36
36. Evaluation of adult salmon, steelhead, and lamprey migrations past dams, through reservoir in the lower Columbia River, and into tributaries	36
Bypass Studies	36
37. DIDSON technology development and fish behavior research related to fish passage at Columbia Basin dams	36
38. Studies to establish biological design criteria for fish passage facilities: High velocity flume development 2004	37
39. Development and evaluation of full-flow PIT-tag interrogation systems for Bonneville and John Day Dams	37
40. Evaluation of modified vertical barrier screens and extended-length submersible bar screens at John Day Dam	37
41. Evaluation of gatewell modifications at Bonneville second powerhouse using an integrated approach.....	38
Transportation Studies	38
42. A study to compare SARs of in river migrating versus transported anadromous salmonids.....	38
43. A study to evaluate the effects of transporting spring/summer Chinook salmon in the presence of steelhead smolts	39
44. Electronic recovery of ISO-PIT tags from piscivorous bird colonies in the Columbia River Basin	39
45. Sampling PIT-tagged juvenile salmonids migrating in the Columbia River estuary	40
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.....	40
47. Evaluation of post-release losses and barging strategies that minimize post-release mortality	41
48. Water temperature effects on juvenile fall chinook salmon survival at the hydroprojects.....	41
49. Use of a gene chip to study the effects of transportation procedures on juvenile salmonids.....	41
Bull Trout Study.....	42
50. Swimming performance of bull trout.....	42
White Sturgeon Study.....	43
51. Behavior of white sturgeon near hydroprojects and fishways.....	43
Avian Predation in the Mid-Columbia	43
52. Avian predation on juvenile salmonids in the McNary Pool, Columbia River.	43

ISRP Review of Fiscal Year 2004 Pre-proposals for the US Army Corps of Engineers' Anadromous Fish Evaluation Program

Introduction

In 1998, the U.S. Congress' Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill directed the Independent Scientific Review Panel to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by the Bonneville Power Administration (Bonneville's "reimbursable" program). The ISRP is to use the same standards and make recommendations as in its review of the projects proposed to implement the Northwest Power and Conservation Council's Columbia River Basin Fish and Wildlife Program. Pursuant to the conference report, in June 2003, the Council requested the ISRP to focus its Fiscal Year 2004 reimbursable review effort on the United States Army Corps of Engineers' Anadromous Fish Evaluation Program (AFEP), which is one component of Bonneville's "reimbursable" program.

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 to provide safe, efficient passage of fish through the mainstem migration corridor. Funding for the AFEP is appropriated by Congress, expended by the Corps, and reimbursed by Bonneville. Unlike projects directly funded through the Columbia River Basin Fish and Wildlife Program, AFEP projects have not undergone ISRP review; consequently, this review provides the opportunity to ensure that AFEP proposals receive a similar level of scrutiny for scientific soundness as Fish and Wildlife Program proposals.

This is the first of two reports pertaining to the ISRP's review. In this report, the ISRP provides comments on each of the 52 pre-proposals submitted to meet the research needs for the AFEP in Fiscal Year 2004. The report is intended to aid the Corps in selecting among pre-proposals and assist the project sponsors in drafting final proposals. However, the ISRP comments are limited because the pre-proposals did not provide enough information for a complete technical review. The Council's request specified that the ISRP's technical review be at a pilot scale and the ISRP focus on subsets of 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 further defined the subset of project survival proposals as those for the John Day, Ice Harbor, and The Dalles dams. Consequently, the ISRP assigned 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.

The review steps to this stage that have included an ISRP or Peer Review Group member are:

- 1) participation in an AFEP overview presentation from the Corps,
- 2) observation of Corps' meetings where one-page statements of needs were developed,
- 3) observation of Study Review Work Group and System Configuration Team meetings for prioritizing statements of needs and proposed studies,
- 4) review of pre-proposals in relation to the statements of needs,
- 5) participation in the Corps' AFEP pre-proposals presentation and discussion meeting, and
- 6) discussion of the pre-proposals with the full ISRP to draft consensus comments.

The ISRP's pre-proposal review is intended to engage the ISRP in the Corps' project selection process so that the ISRP can gather sufficient information to make project specific and programmatic assessments on the substance, scale, scope, and process of the AFEP, and to compare the AFEP with the Council's Fish and Wildlife Program. The timing of the ISRP's pre-proposal reviews 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 are significantly different from that of the Fish and Wildlife Program.

The ISRP will observe several important remaining steps in the AFEP process before its review is finished. These include the Corps' selection of pre-proposals for implementation or further consideration, the development of pre-proposals into statements of work, and the reporting of study results at the annual AFEP research workshop. In recognition of these remaining steps, the ISRP defers making overall programmatic comments and final recommendations on projects until the review is complete. The ISRP will issue a second report by mid-January 2004 that will provide programmatic comments and recommendations on the Anadromous Fish Evaluation Program and project selection process as a whole, and will specifically address the questions described in the section below.

One issue the ISRP intends to fully address in its final report is how to best incorporate scientific peer review in the Corps' process. Most of the pre-proposals reviewed by the ISRP are not well enough developed to be amenable to scientific review and, as written, do not meet ISRP criteria for scientific soundness. Detail on research methods and study variables is particularly lacking in the pre-proposals. For some pre-proposals this lack of detail is because the researchers are analyzing 2003 data, and/or 2004 hydro-operation plans are not finalized. These proposals (e.g. #s 13, 18, 20, 21, 22, 23, 24, 25, 28, etc) contain statements indicating that the 2004 study designs will not be finalized until: "the final set of objectives and hypotheses has been selected", "2003 data are completed", or "until the operational test designs are determined after further discussion this fall". It is understandable that study designs and objectives should be largely based on the most up-to-date data, but the specification of the variables to be tested for effects on survival is essential for the development of a complete, appropriate study plan. The variables chosen for analysis are significant determinants of whether the project will significantly contribute to problem solving, and these variables should be subject to review. Conducting a meaningful technical review without a detailed study design is not possible.

Other pre-proposals are not as constrained by hydro-operations or past years' data (e.g. estuary or avian predation pre-proposals) but still do not provide details that should (and could) be provided to enable scientific review and comparison between competing proposals.

To support a thorough and efficient scientific review, detail on project background and relation to passage problems should be documented and provided along with fully developed proposals. In the next stage of the review, the ISRP will review final study designs or statements of work for many of these proposals. Project details adequate to support scientific review may be provided at this stage. As the ISRP drafts its programmatic report it will address the questions below with specific attention given to whether the AFEP project development and funding process is sequenced so that an ISRP or other independent review can usefully influence the development of proposals, inform policy decisions surrounding the proposals, and ensure program accountability.

Review Questions

The Council posed the following technical, process, and programmatic questions to the ISRP. These will be fully addressed in the ISRP's second report. Although most of the ISRP comments on the pre-proposals do not specifically identify the ISRP's technical review criteria and questions, reviewers considered these criteria and questions as they drafted comments on individual pre-proposals.

Project Specific Technical Review

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

- i. are based on sound science principles;
- ii. benefit fish and wildlife;
- iii. have clearly defined objectives and outcomes; and
- iv. 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?

ISRP Comments on Individual Pre-proposals

Estuary Proposals

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

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

ISRP Comments:

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 sub-yearling fall chinook can 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 committee'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

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

ISRP Comments:

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 “historical” 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

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

ISRP Comments:

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

Study Code: EST-04-P-New2 **Agency/Author:** PNNL, NMFS / Thom, Roegner

ISRP Comments:

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.

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

Study Code: EST-04-New5

Agency/Author: USGS / Petersen

ISRP Comments:

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

Study Code: EST-04-New4

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

ISRP Comments:

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

Study Code: EST-P-04-New1 **Agency/Author:** NMFS, WDFW, OSU / Burke, Ashbrook, Schreck

ISRP Comments:

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

morality 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

Study Code: EST-P-04-New3

Agency/Author: PNNL / Brown

ISRP Comments:

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

9. Evaluation of direct survival at The Dalles Spillway (no proposal)

Study Code: SPE-P-00-8

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

ISRP Comments:

No proposal was available so Mike Langeslay of the COE gave a brief description of the study design, which was 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.

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

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

ISRP Comments:

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.

11. Characterization of The Dalles Dam spillway environment

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

ISRP Comments:

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

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

ISRP Comments:

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

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

ISRP Comments:

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.

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

Study Code: SPE-P-04-New

Agency/Author: USGS / Theresa Liedtke, Jim Petersen,

Matthew Mason

ISRP Comments:

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.

Bonneville Dam

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

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

ISRP Comments:

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

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

ISRP Comments:

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

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

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

ISRP Comments:

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.

John Day Dam

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

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

ISRP Comments:

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

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

ISRP Comments:

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

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

ISRP Comments:

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, 1997¹ 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.

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.

¹ www.nwcouncil.org/library/1997/97-15.htm

Lower Snake River Dams

21. Hydroacoustic evaluation of fish passage at Ice Harbor Dam

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

ISRP Comments:

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

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

ISRP Comments:

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.

23. Direct injury/ survival of juvenile chinook salmon passing through the spillway at Ice Harbor Dam

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

ISRP Comments:

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.

See general comments about proposals 21, 23, 24, and 25 under Proposal 21.

24. Fish Passage and Survival at Lower Snake River and McNary dams

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

ISRP Comments:

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?

Also, see general comments on proposals 21, 23, 24, and 25 under Proposal 21.

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

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

ISRP Comments:

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-

paggers” 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.

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

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

ISRP Comments:

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’ 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 35023²), 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

² www.cbfwa.org/cfsite/ResultProposal.cfm?PPID=SW2003000035023

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

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

ISRP Comments:

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 vs 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 year’s studies, which are mentioned in the Summary.

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

Study Code: SBE-W-96-1

Agency/Author: USGS / Adams

ISRP Comments:

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.

The Dalles Dam

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

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

ISRP Comments:

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 '04 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.

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

Study Code: SBE-P-00-17

Agency/Author: PNNL / Faber

ISRP Comments:

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. 1997³ 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.

³ www.nwcouncil.org/library/1997/97-15.htm

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 (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.

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

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

ISRP Comments:

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

Study Code: ADS-00-1

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

ISRP Comments:

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 [Salmon and adult lamprey throughout the watersheds of Walla Walla District]

Study Code: ADS-W-00-1

Agency/Author: U of I / Peery

ISRP Comments:

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

Study Code: ADS-02-6

Agency/Author: COE FFU / Wertheimer

ISRP Comments:

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 in 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.

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

Study Code: ADS-00-4

Agency/Author: U of I, USFWS / Peery, Zydlewski

ISRP Comments:

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?

Lamprey

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

Study Code: LPS-P-04 New

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

ISRP Comments:

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

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

Study Code: BPS, SBE

Agency/Author: U of I / Liou

ISRP Comments:

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.

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

Study Code: BPS **Agency/Author:** NMFS / Gessel

ISRP Comments:

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?

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

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

ISRP Comments:

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.)

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

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

ISRP Comments:

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

ISRP Comments:

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

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

ISRP Comments:

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. Samples 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.

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

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

ISRP Comments:

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).

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

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

ISRP Comments:

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., IT-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

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

ISRP Comments:

This proposal is for the continuation of a novel and essential recovery program for PIT-tagged salmonids from upstream of the Columbia River estuary. 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

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

ISRP Comments:

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.

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

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

ISRP Comments:

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

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

ISRP Comments:

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

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

ISRP Comments:

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.

Bull Trout Study

50. Swimming performance of bull trout

Study Code: BT-P-04-New

Agency/Author: USGS, USFWS / Mesa, Zydlewski

ISRP Comments:

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

ISRP Comments:

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.

Study Code: Not Applicable

Agency/Author: D. Roby and K. Collis

ISRP Comments:

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.