



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

**Review**  
of  
**Fiscal Year 2002**  
**Innovative Proposals**  
for the  
**Columbia River Basin**  
**Fish and Wildlife Program**

**ISRP 2002-8**  
**May 24, 2002**

**ISRP and PRG Reviewers**

Charles C. Coutant  
Jack Griffith  
Susan S. Hanna  
Nancy Huntly  
Lyman McDonald  
John D. McIntyre  
Phillip Mundy  
Brian Riddell  
William Smoker  
Bruce Ward  
Richard R. Whitney  
Richard N. Williams

**Staff**

Erik Merrill

# **ISRP Review of Fiscal Year 2002 Innovative Proposals**

## **Contents**

Table of Proposals with Page Index .....	ii
17 Ranked Proposals .....	ii
Unranked Proposals .....	iv
 Background .....	 1
 ISRP Recommendations and Comments on Each Proposal Submitted.....	 2
Overall Results.....	2
17 Ranked Proposals .....	3
Unranked Proposals .....	19

## Table of Proposals with Page Index

The ISRP found that 17 proposals met the innovative criteria, described scientifically sound techniques, and offered potential benefits to fish and wildlife. These 17 ranked proposals are presented first by rank order and project ID. The remaining 20 unranked proposals are presented next. For a variety of reasons, these proposals did not provide adequate justification for funding under the innovative solicitation.

### 17 Ranked Proposals

Project ID	Title	Sponsor	Province, Subbasin	Budget Request	Rank	Page
<a href="#">34008</a>	Use a Multi-Watershed Approach to Increase the Rate of Learning from Columbia Basin Watershed Restoration Projects	ESSA Technologies Ltd.	Systemwide	\$199,764	1	3
<a href="#">34019</a>	Evaluate the Effects of Hyporheic Discharge on Egg Pocket Water Temperature in Snake River Fall Chinook Salmon Spawning Areas	Pacific Northwest National Laboratory	Blue Mountain, Snake Hells Canyon	\$196,299	1	4
<a href="#">34022</a>	Evaluate the population structure of chinook salmon by combining inferences from ecological, demographic, and molecular genetic analysis	USDA Forest Service Rocky Mountain Research Station	Mountain Snake, Salmon	\$199,957	1	5
<a href="#">34021</a>	Using stable isotope ratios to explore positive or negative impacts of American shad on salmon and the aquatic community in the Columbia River	U.S. Geological Survey	Lower Columbia, Columbia Lower	\$181,249	4	6
<a href="#">34036</a>	Development and Demonstration of Automatic Calibration Tools for Models to Assess Biological Performance of Habitat Restoration Strategies	Pacific Northwest National Laboratory	Systemwide	\$199,865	5	6
<a href="#">34002</a>	Evaluate Spawning Protocols and the Reproductive Success of Salmonids in Hatcheries	University of Washington	Systemwide	\$197,799	6	7
<a href="#">34001</a>	Pilot Study: Spatial and Temporal Occurrence of Salmonid Pathogens in the Upper Middle Mainstem Subbasin of the Columbia Cascade Province	Washington State University	Columbia Cascade, Columbia Upper Middle	\$199,461	7	8
<a href="#">34030</a>	Enhancing Instream Flow by Adopting Best Agricultural Management Practices	Washington State University	Blue Mountain, Asotin	\$199,312	8	9

Project ID	Title	Sponsor	Province, Subbasin	Budget Request	Rank	Page
<a href="#">34027</a>	Controlling the Distribution of American Shad ( <i>Alosa sapidissima</i> ) with Pulsed Ultrasound Near Fish Ladders and at a Sluiceway Entrance	Pacific Northwest National Laboratory	Systemwide	\$200,000	9	10
<a href="#">34004</a>	Develop Computational Fluid Dynamics Model to Predict Total Dissolved Gas Below Spillways	ENSR International, Inc.	Systemwide	\$225,077 (Sponsor said proposal could meet \$200K cap)	10	11
<a href="#">34010</a>	Visualization Tools for Information Discovery and Decision Support	Pacific Northwest National Laboratory/Battelle	Systemwide	\$199,867	11	12
<a href="#">34026</a>	Studying the Impacts of Dam Passage on the Vestibular System in Fish	Pacific Northwest National Laboratory	Systemwide	\$195,850	12	13
<a href="#">34023</a>	Laboratory, Prototype, and Field Evaluation of Undershot Horizontal Fish Screen in the Hood River Basin	Confederated Tribes of the Warm Springs Reservation of Oregon and Farmers Irrigation District	Columbia Gorge, Hood	\$187,004	13	14
<a href="#">34035</a>	Chinook Salmon Abundance Monitoring Using an Acoustic Camera	Pacific Northwest National Laboratory	Mountain Snake, Salmon	\$146,900	14	14
<a href="#">34017</a>	Low-Cost Thermal Imaging System for Aerial Remote Sensing Applications	Smart Mao Imaging	Systemwide	\$115,674	15	15
<a href="#">34005</a>	Application of DNA Fingerprinting Microarrays and Semi-Automated Data Analysis Methods for Salmonid Stock Identification in the Columbia Basin	Pacific Northwest National Laboratory	Systemwide	\$200,000	16	16
<a href="#">34029</a>	Geomorphic Controls on Salmonid Spawning Habitat in Mountain Drainage Basins of the Pacific Northwest	University of Idaho, USDA Forest Service Rocky Mountain Research Station	Systemwide	\$199,953	17	17

## Unranked Proposals

Project ID	Title	Sponsor	Province, Subbasin	Budget Request	Page
<a href="#">34003</a>	Salmon Run Generator (SRG).	Autek LLC	Systemwide	\$198,500	19
<a href="#">34006</a>	Assess Salmon Carcass Nutrient-Macroinvertebrate-Avian Relationships in Riparian Ecosystems of the Yakima Subbasin	Northwest Habitat Institute	Columbia Plateau, Yakima	\$184,280	19
<a href="#">34007</a>	New Life for dead stream	Baker Valley Irrigation District	Middle Snake, Powder	\$41,565	20
<a href="#">34009</a>	Net Pen Rearing Spring Chinook in Lake Osoyoos	Confederated Tribes of the Colville Reservation	Columbia Cascade, Okanogan	\$199,000	21
<a href="#">34011</a>	Western Painted Turtle Habitat Restoration Project	Portland's Environmental Services	Lower Columbia, Willamette	\$58,417	21
<a href="#">34012</a>	Sponsor A Smolt	Methow Salmon Recovery Foundation	Columbia Cascade, Methow	\$58,061	22
<a href="#">34013</a>	Restore Ecological Structure and Function to Grays Lake Using Decision Support System	U.S. Geological Survey - Biological Resources Division, Northern Rocky Mountain Science Center	Upper Snake, Headwaters	\$200,000	22
<a href="#">34014</a>	Assessing Potential Biological and Toxicological Effects of Parental Transfer of Environmental Contaminants to White Sturgeon in the Columbia River	Oregon State University	Systemwide	\$199,000	23
<a href="#">34015</a>	Neotropical Migratory Bird Habitat Restoration Project	Portland's Environmental Services	Lower Columbia, Willamette	\$197,320	23

Project ID	Title	Sponsor	Province, Subbasin	Budget Request	Page
<a href="#">34016</a>	Behavioral Motivation in the Evaluation of Culvert Designs for Juvenile Salmonid Passage	Pacific Northwest National Laboratory Marine Sciences Laboratory	Systemwide	\$199,989	24
<a href="#">34018</a>	Evaluate Engineering Conceptual Design and Field Application of Pisces Fish Passage Unit	Watershed Professionals Network, llc (WPN)	Systemwide	\$194,864	24
<a href="#">34020</a>	Fish Behavioral Guidance Through Water Velocity Modification PHASE ONE	Natural Solutions	Systemwide	\$222,586 (Sponsor said proposal could meet \$200K cap)	25
<a href="#">34024</a>	Integrating remote sensing and topographic indices to detect the impact of invasive species on critical winter elk forage areas	Confederated Tribes of the Umatilla Indian Reservation	Columbia Plateau, Umatilla	\$133,677	29
<a href="#">34025</a>	Assess role of estuarine habitat in maintaining chinook salmon life history diversity in the Columbia River using remote PIT tag monitoring systems	Oregon State University	Columbia Estuary, Mainstem Columbia	\$196,853	30
<a href="#">34028</a>	Innovative Technologies for Mapping Large Woody Debris and Assessing Fish Distribution	Battelle Marine Sciences Laboratory	Columbia Estuary, Mainstem Columbia	\$172,358	30
<a href="#">34031</a>	Biological and Economic Feasibility of Reintroducing Fishwheels to the Columbia River System	Steward and Associates	Lower Columbia, Cowlitz	\$260,525 (Sponsor resubmitted for \$199,945)	31
<a href="#">34032</a>	Otolith Marking using Portable Mist Incubation	Alaska Resource & Economic Development, Inc.	Columbia Estuary, Grays	\$121,952	32
<a href="#">34033</a>	Demonstrate novel methods of mist incubation and mechanical egg planting in salmon restoration.	Alaska Resource & Economic Development, Inc.	Systemwide	\$199,991	33
<a href="#">34034</a>	High-Speed Fish Screen for Irrigation Diversion	West Extension Irrigation District	Columbia Plateau, John Day	\$200,000	33
<a href="#">34037</a>	Analysis of alternative hatchery and fishery configurations in the Columbia River Basin	S.P. Cramer and Associates	Systemwide	\$67,200	34

## ISRP Review of Fiscal Year 2002 Innovative Proposals

### Background

The Council created the innovative solicitation, in part, to address ISRP recommendations from past reviews that the Council establish a special funding category to encourage innovative projects. The Council committed to do this and over the past several years has established a funding mechanism for innovative projects with the goal to improve knowledge, encourage creative thinking, and directly benefit fish and wildlife. For the Fiscal Year (FY) 1999 funding cycle, the Council identified three topics of special interest for which a solicitation and contracts were issued. For FY 2000, 12 projects were recommended for funding out of 42 projects ranked by the ISRP (these projects were submitted under the standard solicitation and received an ISRP elevated ranking for funding above CBFWA's tier 2 or 3 recommendations). For FY 2001, Bonneville and the Council created a specific solicitation for innovative fish and wildlife project proposals with a budget of \$2 million. The FY 2001 call for proposals requested work on nutrient supplementation and innovative harvest techniques, and limited budgets to \$400,000. 66 proposals were submitted that in total requested almost \$20 million. The ISRP ranked these proposals and the Council recommended funding for nine projects at just over \$2 million. For the status of funded "innovative" projects see [www.nwcouncil.org/innovative/](http://www.nwcouncil.org/innovative/).

For the FY 2002 solicitation under consideration in this report, BPA allocated up to \$2 million for innovative projects. As with the FY 2001 solicitation, innovative projects were defined as those which rely primarily on a method or technology that (1) has not previously been used in a fish or wildlife projects in the Pacific Northwest, or (2) although used in other projects, has not previously been used in an application of this kind.

In addition, the solicitation letter specified that:

1. Proposals cannot exceed a total request for Bonneville funding of \$200,000.
2. Proposals need to be consistent with the Council's Columbia River Basin Fish and Wildlife Program.
3. Proposals should be for innovative ideas and experimental methods to be tested as pilot projects rather than full-scale projects. For this reason, the duration of innovative projects should be limited to a maximum of 18 months. Exceptions to this time constraint may be considered under limited circumstances and require Council approval before the project is recommended for funding.
4. Cost-sharing is allowed, as long as it is consistent with the Program and does not generate in lieu funding situations, that is, situations in which Bonneville funding would replace an existing project or program or displace the mitigation responsibilities of another entity or person legally required to undertake the measure.
5. In some cases, out-of-basin settings provide a better or more cost-effective field site for testing new techniques and ideas than within-basin locations. Under these conditions, and where research results are directly relevant to Columbia River Basin problems, it may be fully appropriate to fund research projects in outside-the-basin locations.

The five elements above are responsive to the ISRP's FY 2001 review recommendations that the solicitation be focused on low cost, short term, pilot studies. For further details on the process see the solicitation letter at [www.cbfwa.org/reviewforms/innovative/letter.pdf](http://www.cbfwa.org/reviewforms/innovative/letter.pdf).

## ISRP Recommendations and Comments on Each Proposal Submitted

### Overall Results

Thirty-seven proposals were submitted for the FY2002 solicitation requesting about \$6.5 million. Several ISRP and Peer Review Group reviewers evaluated each proposal and provided comments and rough ranks for group discussion at the ISRP's project evaluation meeting. Determining whether a proposal is "innovative" can be difficult; consequently, the ISRP reviewed all the proposals for their technical merit and potential to contribute benefits to fish and wildlife. At the meeting, the ISRP discussed each proposal and reached consensus recommendations and rankings.

The ISRP found that 17 proposals met the innovative criteria, described scientifically sound techniques, and offered potential benefits to fish and wildlife. Of the 17, the top five proposals, and especially the top three tied for first, stood-out as proposals that are high priority meriting immediate funding. The proposals ranked from 6 to 12 also offered potentially valuable contributions to the Fish and Wildlife Program. Those ranked from 13 to 17 met the review criteria but did not demonstrate as strong a potential to provide significant benefits as the top 12. These 17 ranked proposals are presented below by rank order and project ID.

The ISRP did not rank the other 20 proposals submitted. For a variety of reasons, these proposals did not provide adequate justification for funding under the innovative solicitation. A few of these proposals were not innovative but offered approaches that could benefit the Fish and Wildlife Program. Several others were innovative but were not technically sound or did not demonstrate benefits to fish and wildlife. Most were neither innovative nor technically sound. Comments and recommendations on these 20 proposals are presented following the 17 ranked proposals.

Many of the proposals submitted for this solicitation were submitted in previous solicitations and subsequently improved. In fact, five of the top ten ranked proposals had been submitted and reviewed before. The high quality of and demonstrated need for some of these proposals are evidence of the value of this funding category.

Several proposals requested more than the \$200,000 specified for an innovative grant. The ISRP reviewed these proposals with the same scrutiny provided to other proposals. Preliminary contacts with the project sponsors indicate that they could readily bring the proposals under the \$200,000 cap. The ISRP makes no recommendation whether these proposals should be disqualified for not meeting the budget cap with their initial submittal.

Project sponsors should be aware of the opportunity to submit proposals or revised proposals for the Mainstem/Systemwide Solicitation, [www.cbfwa.org/reviewforms/systemwide/default.htm](http://www.cbfwa.org/reviewforms/systemwide/default.htm). Proposals are due June 3, 2002.

## 17 Ranked Proposals

### Rank 1

ProjectID: 34008

Use a Multi-Watershed Approach to Increase the Rate of Learning from Columbia Basin Watershed Restoration Projects

**Sponsor:** ESSA Technologies Ltd.

**Province:** Systemwide

**FY02 Request:** \$199,764

**Short Description:** Compile and compare data from habitat restoration projects in multiple watersheds to enhance the rate of learning about effects of restoration actions on fish populations, optimize the design of future restoration programs and improve monitoring.

**ISRP Recommendation and Comments:**

This number one ranked proposal is innovative and needed. Excellent detail is provided in each section. The project has a high probability of contributing benefit to fish and wildlife. It proposes to use existing information to generate understanding of the relation between fish and habitat needed to guide salmonid restoration programs. It addresses statistical challenges explicitly. Even the first step, simple systematic gathering of background information, will be of value. Reviewers strongly support this proposal for much-needed work that will be of value basinwide.

Because project planning and implementation in the Basin has taken place at a local level, the benefits to fish may also be local. This project is an attempt to look at the problem at higher scales (watersheds or multiple watersheds), using available information, to assess the habitat needs at the scales relevant to fish populations or metapopulations. Specifically, the proponents propose to systematically look at current projects in multiple watersheds, take an inventory of actions taken and information collected, and explore the opportunities to make between-watershed comparisons to enhance learning and improve the design of current and future restoration actions. This is an innovative, viable alternative and more design based approach to evaluation of habitat improvement and watershed restoration techniques than is the expert system and model based approach in EDT. The ISRP recommends funding this cost-effective, innovative pilot project to provide an independent check on evaluation of watershed restoration procedures. We agree with the proponents that "...an exploration of multi-watershed approaches to testing tributary restoration hypotheses, using both actual data from existing projects and potential data from future projects, can act as a catalyst to improving Columbia Basin tributary restoration programs."

The proposal is improved from last year's submittal that ranked 13 out of 66. This version is on a more appropriate scale with more of a workshop approach than the previously submitted proposal. The PIs are well qualified, and clearly have a grasp of Fish and Wildlife Program issues and the contents of ISRP reports. The sponsor demonstrates understanding of the role of experimental design, randomization, sampling units, etc. that is required in order to compare alternatives in watershed restoration projects.

**Rank 1****ProjectID:** 34019

Evaluate the Effects of Hyporheic Discharge on Egg Pocket Water Temperature in Snake River Fall Chinook Salmon Spawning Areas

**Sponsor:** Pacific Northwest National Laboratory**Province:** Blue Mountain      **Subbasin:** Snake Hells Canyon**FY02 Request:** \$196,299**Short Description:** Evaluate the relationships among river discharge, hyporheic zone characteristics, and egg pocket water temperature in Snake River fall chinook salmon spawning areas; evaluate the potential for improving Snake River fall chinook salmon smolt survival**ISRP Recommendation and Comments:**

This number one ranked proposal is innovative, very well written, technically sound, and high priority. If the project was successful, it could provide very substantial gains for Snake River fall chinook and the water budget. The proposal was favorably reviewed in the Blue Mountain provincial review and is improved from that submittal. The innovative aspect of this proposal is the potential application of results to reservoir management.

Summer flow augmentation to benefit downstream migrating fall chinook has been a contentious issue within the basin. The investigators hypothesize that extending the period of stable flows below the Hell's Canyon complex (now 10 to 20 days in December) well into the egg incubation period could provide more favorable conditions for incubation and decrease the time required for the eggs to hatch. Earlier emergence would make it possible for juvenile fall chinook to migrate downstream sooner than they currently do and thus enter the Snake River reservoirs earlier in the summer, when water temperatures and stream flows are more beneficial for survival. This change in migration timing could reduce the need for summer flow augmentation. A clear and reasonable line of logic backs the proposal.

However, it is uncertain if the two weeks earlier emergence would necessarily equate to two weeks earlier initiation of migration. If research documents this chain of events and timings, what is Idaho Power's commitment to managing Hells Canyon Dam/Complex to achieve this end?

The proposal describes a good relationship to regional planning documents. The proposal includes good involvement and cost share from Idaho Power Company and USFWS, which is an improvement from the Blue Mountain submittal. The proposal also notes cooperation from Idaho Power in manipulating discharge levels in concert with study objectives during Phase I (this proposal) and the planned Phase II follow-up (next proposal). Regarding the two phases, the authors have complied with the time frame and cost limits suggested for the Innovative Solicitation. Phase I is described as a pilot study but it does have follow-up plans (Phase II) that are very logical extensions of the pilot.

The objectives are clear and sufficient detail is presented in the Methods section to assess technical competency. The investigators are exceptionally well qualified to conduct this work. Both PI's have extensive experience in this area of research as well as familiarity with the study site and study organism. Both have an excellent publication record to support that work.

**Rank 1**

ProjectID: 34022

Evaluate the population structure of chinook salmon by combining inferences from ecological, demographic, and molecular genetic analysis

**Sponsor:** USDA Forest Service Rocky Mountain Research Station

**Province:** Mountain Snake      **Subbasin:** Salmon

**FY02 Request:** \$199,957

**Short Description:** Identify population structure of indigenous chinook salmon in the Middle Fork Salmon River from patterns of genetic variation indicated by microsatellite DNA markers and spatio-temporal patterns of spawning habitat utilization

**ISRP Recommendation and Comments:**

This number one ranked proposal is fundable, innovative, technically sound, and of high priority. This excellent proposal offers an innovative use of recent developments in analysis of molecular genetic markers (microsatellites) to define spatial and temporal patterns of genetic variability among spawning aggregations of chinook salmon. Results from this project could provide greater detail and improve resolution of patterns of population structure and dispersal (gene flow), and determine occurrence of possible population bottlenecks or founder events within populations. It would also provide analysis of dispersal among populations, and make use of existing data on spatial and temporal patterns of spawning activity to produce combined inferences about population structure and metapopulation dynamics.

The proposal brings together a very capable group of scientists, leaders in the field, to test fine-scale patterns of genetic variation among chinook salmon with spatial and temporal ecological data. Some of the techniques proposed are new and rapidly developing. The approach is innovative in that it leads on from work conducted elsewhere (see references in proposal) and within the Columbia-Snake. Microsatellite techniques and the accompanying statistical analyses have been progressing rapidly and this work will combine many of the latest techniques for field application and population management. It offers a logical step in the study of molecular genetic markers. Preliminary data from other systems (Lahontan cutthroat trout) suggest that the project will yield new insights appropriate to management of depressed endangered fish.

The proposed work is essential and critical for chinook in the study area. The proposal would have been appropriately funded as part of the Provincial Review process under stock assessment methods. The information to be gained from this project will contribute to analyses under related projects such as the Idaho Supplementation Studies and project 199902000 ([www.cbfwa.org/files/province/mtsnake/projects/199902000.htm](http://www.cbfwa.org/files/province/mtsnake/projects/199902000.htm)). The proposal will explore the possible alteration of genetic structure that might arise from supplementation and small numbers of brood fish (i.e., human-induced bottlenecks).

The proposal includes good cost share and relationships to ongoing projects. The bulk of the budget is going to the subcontractor (University of Nevada-Reno) for the genetics work.

Task 2 of Objective 1, collect additional tissue samples in 2002, should include a probabilistic sampling plan for collection of additional tissue samples.

**Rank 4****ProjectID:** 34021

Using stable isotope ratios to explore positive or negative impacts of American shad on salmon and the aquatic community in the Columbia River

**Sponsor:** U.S. Geological Survey**Province:** Lower Columbia      **Subbasin:** Columbia Lower**FY02 Request:** \$181,249**ISRP Recommendation and Comments:**

This fourth ranked proposal addresses a long-standing question that has not attracted the attention it deserves. The proposal is very well written and the study seems scientifically sound in design. While the basic methods are not truly innovative, they would be applied in an innovative and potentially important manner, and thus meet the innovative criteria. The ISRP and ISAB have frequently commented on the ecological impact of invasives and, in particular, the abundance of American Shad. To successfully manage Columbia basin salmon in the long term, it is essential that the region secure basic physical-chemical data that advances the understanding of the trophic dynamics of the freshwater food web that contains juvenile salmon.

This project has the potential to address several important questions concerning the level of concern managers should have about shad and the impact of shad on juvenile fall chinook salmon. The hypotheses are explicitly stated and highly relevant to the Fish and Wildlife Program. Whether the hypotheses are retained or rejected, the information gathered will be important to understanding sources of food and mortality in juvenile salmon in the Columbia River.

However, the uncertainty in the application of these methods seems to be that the isotope profile of the prey and predators is unknown; consequently, we do not know what the practical limitations of this technique will be. Given the short duration of these studies and that the proponents have met the requirements of the Innovative Solicitation, reviewers recommend investing in this proposal to collect the basic information and pilot analyses.

**Rank 5****ProjectID:** 34036

Development and Demonstration of Automatic Calibration Tools for Models to Assess Biological Performance of Habitat Restoration Strategies

**Sponsor:** Pacific Northwest National Laboratory**Province:** Systemwide**FY02 Request:** \$199,865 (\$205,715 with cost-share)

**Short Description:** This project will develop a calibration tool to enable analysis of biological productivity for streams and rivers throughout the Columbia Basin, but will be demonstrated on a specific subbasin (to be determined) within the Salmon River basin.

**ISRP Recommendation and Comments:**

This fifth ranked proposal is innovative and the potential for learning and for application are significant. If successful, this project will help automate the monumental tasks that are involved in developing trial data sets to calibrate models such as EDT.

The proponents propose to develop and demonstrate an automated calibration tool capable of simultaneously calibrating a sequence of distributed physical and biological process models assembled to assess efficacy of salmon recovery and habitat restoration strategies. The ISRP also supports the project because we believe that assistance in obtaining data sets from multiple sources and agencies via a distributed database system on the internet is very worthwhile. This

proposal does a good job incorporating constituents from around the basin and from multiple states.

The proponent knows and understands the problems involved with this research effort. In addition to the primary goals, this project will help point out important data gaps and it will improve accessibility of data via distributed systems on the internet. We recommend that the proponents also emphasize development of intermediate results in the calibration process that can be judged by an intelligent human as well as automation of the process by use of artificial intelligence and neural networks.

## **Rank 6**

**ProjectID:** 34002

Evaluate Spawning Protocols and the Reproductive Success of Salmonids in Hatcheries

**Sponsor:** School of Aquatic and Fishery Sciences, University of Washington

**Province:** Systemwide

**FY02 Request:** \$197,799

**Short Description:** Develop better protocols for spawning salmonids in hatcheries, and assess reproductive success of individual fish in hatcheries.

### **ISRP Recommendation and Comments:**

This sixth ranked proposal is fundable particularly for Part 2, the most innovative portion. Part 1.A. might be best limited to a regional survey. Part 2 will examine, through direct observation (parentage analysis) of a steelhead broodstock, the effect of hatchery artificial spawning practices on the genetic structure of a cultured population. Further, through comparison with structures resulting from natural patterns of mate selection, the sponsors propose to design and recommend hatchery practices that will result in more natural structures. This line of research may suggest changes from current best practices (which recommend random mating), but it is unlikely that many salmon hatcheries could produce matings consistent with the range of mating structures seen in nature. Furthermore it is likely that the reproductive success of families will differ between generations, reflecting different environmental conditions, and that the patterns of reproductive success of different mating systems will not be consistent from generation to generation. The samples from Forks steelhead adults will demonstrate the amount of variation in survival between families generated from current hatchery practices, an important innovation, but it won't be clear whether differential survival occurs during hatchery culture (domestication selection) or after release. The proposed review of artificial spawning protocols and policies as a basis for comparing natural patterns of mate selection, Part 1, is arguably not innovative in and of itself and to the extent that the review would extend beyond the Basin it would be only marginally pertinent to restoration.

**Rank 7**

ProjectID: 34001

Pilot Study: Spatial and Temporal Occurrence of Salmonid Pathogens in the Upper Middle Mainstem Subbasin of the Columbia Cascade Province

**Sponsor:** Washington State University**Province:** Columbia Cascade   **Subbasin:** Columbia Upper Middle**FY02 Request:** \$199,461**Short Description:** Monitor the occurrence of salmonid pathogens and assess sources, fate, and transport throughout the subbasin.**ISRP Recommendation and Comments:**

This seventh ranked proposal is technically excellent, fundable, and innovative. The idea is so new, however, that it is difficult for the ISRP to evaluate its potential importance to fish or its practical implementation until results are seen (this fits the purpose of the innovative process). While some skepticism is probably warranted about the significance and potential use of these assays for ultimately improving the survival of fish, results should help quantify pathogen loads to which fish are exposed within the basin and should be a valuable tool for observing effects of hatchery practices on pathogen concentrations. For example, results could provide specific information that might inform hatchery managers about suitable timing and locations for releases of hatchery-produced fish to minimize exposures to waterborne pathogens. The proposal allays some skepticism by planning to demonstrate levels of exposure that are effective in inducing example diseases. Thus, when the quantitative distribution of potential pathogens is described, the significance of the findings for disease initiation can be estimated. The ultimate question of whether or not significant losses of fish result from disease, and at what life-stages and locations, may be more readily answered if this rapid assay is available. Reviewers thought the pilot study would be better tested on the Snake River, which appears to be more pathogen prone.

The ISRP reviewed this proposal in the preliminary Columbia Cascade Provincial review and found it to be a good proposal, saying it also would be acceptable as an innovative proposal. However, that proposal was for four years at budgets of ~220K, 255K, 263K, and 68K. This pilot version retains the scientific elements that were viewed favorable in the Columbia Cascade but for a more limited study.

This proposal would use innovative DNA-based detection techniques to assay selected waters of the upper middle Columbia River basin (Columbia Cascade Province) for presence and relative abundance of several fish pathogens. Synoptic information on the occurrence of pathogens in broad regions has been hampered by lack of rapid detection techniques (reliance on standard culture approaches). This project would develop for fish pathogens a recently developed DNA-based detection system that has already been demonstrated successfully for human pathogens. The work is broken down into three explicit phases: methods development, pilot survey of selected waters, and search for sources of pathogen contamination. The detection technique would first be adapted for specific fish pathogens. The technique would then be applied to detection of fish pathogens in water samples collected from representative sites throughout the upper middle basin. The analyses would be quantitative. They can process great amounts of water and have fine scale detection rate -- 0.002 organisms per liter. They would quantify the significance of the presence of pathogens in the environment to actual infection of fish, using quantitative exposure-response equations. A dose-response relationship would be evaluated to suggest whether the quantities of pathogens per unit of water are sufficient to be an infectious problem for fish. Initial efforts would be made to locate the source(s) of pathogens in the water (e.g., hatchery effluents, polluted waters).

This proposal describes the new technique in appropriate detail to be persuasive that it is something worth pursuing for both its technique development and for the pathogen characterization it would provide. The proposed work is certainly innovative (has not been used for fish projects in the Northwest) and meets the ISRP criteria of sound science, consistency with the FWP, has potential benefit to fish, has clear objectives and expected outcomes, and has appropriate monitoring and evaluation in the form of quality assurance. The proposal goes through a rationale for regional relevance. There is a good attempt to integrate the proposed work with other pathogen projects (few) and other regional assessments. There are good hypotheses, objectives, tasks, and a good timeline. The presentation for the province review noted that initial samples will be taken from hatchery outfalls where pathogens could be expected to be most easily detected. Methods are presented in detail. Expected benefits overall, and benefits to fish are explicitly described. Facilities appear to be excellent and suitable (since the sort of work has already been done for human pathogens). The authors cite abundant, relevant scientific literature. There is an excellent set of resumes for well-qualified staff. The project meets ISRP evaluation criteria.

## **Rank 8**

**ProjectID:** 34030

Enhancing Instream Flow by Adopting Best Agricultural Management Practices

**Sponsor:** Washington State University

**Province:** Blue Mountain      **Subbasin:** Asotin

**FY02 Request:** \$199,312

**Short Description:** Goal: Increase water infiltration during high precipitation periods by adopting proper agriculture practices, and use land and aquifers to temporarily store water for subsequent release into streams for flow enhancement and temperature control.

### **ISRP Recommendation and Comments:**

This eighth ranked proposal is important and timely, but marginally innovative. It is a fairly complete presentation of an experimental approach to establishing the extent to which no-till management practices (the only type of “best management practice” to be examined) contribute to increased infiltration rates and eventually to summer flow. The investigation would be done through modeling and field-testing. The authors refer to similar work elsewhere and to a pilot project being conducted in the Pataha Creek subbasin that establish the relationship between no-till practices and increased filtration. This project’s addition is to test the degree to which increased filtration might augment summer flow. Consequently, the proposal is marginally innovative.

However, the proposal could provide valuable insight for the Basin. The preliminary results from a pilot study by the principal investigator demonstrated that “at the test plots in the Pataha Watershed, long-term no-till significantly reduced the amount of surface runoff and increased infiltration compared to conventional tillage. The water permeability of the long-term no-till fields was fivefold higher than that of the fields tilled with traditional methods. The infiltrated water undoubtedly contributes to the underground water storage and to the stream flow eventually. However, the question as to what degree can the increased infiltration help to augment the summer flow at a watershed level should be answered through this proposed project.” If these preliminary results hold, they could add additional inducements for dryland farmers and agriculture-related agencies to support no-till technology.

The Echo Meadows project and other proposals reviewed have proposed active and costly input of water into ground storage. This innovative project has the potential of more widespread application given the large acreage that might be converted to no-till practices. Effects of such a

program would not be dependent on continual Fish and Wildlife Program funding for active input of water into underground storage.

This proposal was reviewed in last years Innovative and was ranked 16 of 66 (in the upper third). We were critical because the USDA was not involved in sponsorship (now they are) and because we were skeptical that water "saved" would remain in stream channels for fish. As a pilot study the latter issue is secondary, but if no-till proves effective at increasing instream flows, legal protection of water for fish benefits will be paramount. The empirical question is whether, under existing holdings of water rights, the returned water would be appropriated or would stay in the streams.

The proposal could be supported as a pilot project with the idea that a much broader survey might be warranted in the future.

The weak points of the proposal are the failure to provide information on the statistical methods to be used under objective 1, establishing the connection between data collected under objective 1; and modeling under objective 2, and the rather sparse description of information transfer, especially since the proposal indicates that agencies and farmers are waiting to see this demonstration. More complete description of data archiving, data transfer, and circulation of research results should have been provided. Also, reviewers had questions regarding the affects of intensive herbicide use and whether increased water filtration might affect agricultural productivity.

## **Rank 9**

**ProjectID:** 34027

Controlling the Distribution of American Shad (*Alosa sapidissima*) with Pulsed Ultrasound Near Fish Ladders and at a Sluiceway Entrance

**Sponsor:** Pacific Northwest National Laboratory

**Province:** Systemwide

**FY02 Request:** \$200,000

**Short Description:** Evaluate pulsed ultrasound to direct American shad adults in and near fish ladders and near a sluiceway entrance. The purpose is to evaluate the potential for ultrasound as a tool to control shad movements near dams.

### **ISRP Recommendation and Comments:**

This ninth ranked proposal is innovative and technically sound. The use of ultrasound to control shad would be an innovative application in the Columbia River and could be a very useful tool if a decision was made to control shad production; e.g. if projects like 34021 show that shad have a negative impact on the salmonid ecosystem. Ultrasound has been successfully used for similar purposes in the Great Lakes. The proponents have considered past ISRP comments and provided a proposal consistent with time and funding constraints of this solicitation. (See proposal 25037, Evaluation of the effects of American shad on upstream migration of anadromous fishes at Priest Rapids Dam; [www.cbfwa.org/files/province/plateau/projects/25037.htm](http://www.cbfwa.org/files/province/plateau/projects/25037.htm).)

The background material presented indicates that there is a strong possibility that ultrasound could be used to control movement of shad. The design is a simple "on and off" application of the equipment and monitoring would be via the acoustic camera and counts in the fishways. The ISRP's preference would be to focus on the first two objectives of the proposal and deal with the third if necessary later.

The technology could have unknown negative consequences for many other species. To quote from the paper, “The range of fish species that are sensitive to ultrasonic pulsed sound is unknown.” (b. Technical and/or scientific background, para. 8). The proposal should ensure that the effects on other species such as lampreys and salmonids are tested. Apparently shad are much more sensitive to ultrasound than salmonids, but salmonid behavior should be observed with the video camera.

While mention is made of comparing counts of shad as they pass the fish ladders using video cameras, there is no discussion of methods that might be used to coordinate or compare counts with the ongoing ladder counts conducted by the COE. These ought to be useful for the M&E phase.

If shad are deemed to be in need of control, an alternative obvious solution to the proposed ultrasound is to re-design the fish ways so that the shad can't use them. It is well known that adult fishways can be designed to allow salmon to pass via sounding, whereas the shad do not sound in order to pass, and so are excluded. If this proposal were successful though, shad could be excluded without expensive construction or modification of any fishway.

## **Rank 10**

**ProjectID:** 34004

Develop Computational Fluid Dynamics Model to Predict Total Dissolved Gas Below Spillways

**Sponsor:** ENSR International, Inc.

**Province:** Systemwide

**FY02 Request:** \$225,077 (\$630,077 with cost-share) (The sponsor said that the proposal could be revised without significantly changing the project's scope to meet the \$200K cap.)

**Short Description:** Develop a computational fluid dynamics model to predict total dissolved gas levels below spillways that can be used to manage operation of a particular project and/or to predict benefit of proposed structural changes prior to their implementation.

### **ISRP Recommendation and Comments:**

This tenth ranked proposal is innovative, technically excellent, and covers an important topic. The proposal meets a regional need in adapting and applying well-known methods and software to help the region better understand the benefits and consequences of spill events and to forecast the effects of changes in spillway configurations designed to reduce gas supersaturation.

Computational Fluid Dynamics (CFD) models are being used for many hydraulic applications, and it is logical to try it here. The adaptation is innovative in that it combines deterministic equations with limited use of statistical models to understand the magnitude and distribution of dissolved gases below spillways. The logic for the model seems good. The proponents are well qualified to do the work, and the collaboration between ENSR and the Corps is an excellent mix of interests, capabilities, and eventual users.

The problem of modeling air entrainment in the plunge pool is particularly important to solve. The basic concept that mass exchange of gas between bubbles and water is an equilibrium process where the history of bubbles entrained below the spillway in time controls the TDG below the spillway has a firm basis in physical science. The success of the modeling effort will be tested against data at Bonneville Dam spillway, but Bonneville Dam may not be the best place to test this model.

The original submittal did not meet the cost limitations of the solicitation.

**Rank 11****ProjectID:** 34010

Visualization Tools for Information Discovery and Decision Support

**Sponsor:** Pacific Northwest National Laboratory/Battelle**Province:** Systemwide**FY02 Request:** \$199,867**Short Description:** Facilitate decision making by providing a suite of software tools for information access and visual analysis that help to quickly find and extract specific information from a vast array of text documents (reports, journals, messages, e-mail, etc.).**ISRP Recommendation and Comments:**

This 11<sup>th</sup> ranked proposal is innovative and fundable. It is a good proposal to address a potentially monumental problem facing the scientific community in the region. The PI's from PNNL propose to specialize PNNL software called, IN-SPIRE, to help one quickly extract and use information from electronic documents. IN-SPIRE has been developed to accept large volumes of unformatted text, determine dominant topics and relationships within the text, and present the results in a visual format that can be interpreted intuitively. This approach has the potential to uncover hidden information in large document collections and facilitates finding pertinent information without requiring investigators to read through every document in a collection.

However, the ISRP was not totally convinced that the software is really better than use of an existing search engine plus one's own well-tuned judgment. On the one hand, information glut is a real problem, but much of the problem comes from the glut of low quality information that must be sifted and weighed with judgment. This proposed software does not address information quality.

A drawback is that apparently the software is classified and could only be used by federal natural resource management agencies. The PNNL IN-SPIRE software suite was originally developed for the U.S. intelligence community. Use of IN-SPIRE will allow federal agencies involved in Columbia River resource management to analyze textual information from a variety of sources more quickly and more comprehensively.

The staff at PNNL have the technical training and experience necessary to have a high probability of producing a useful product. A primary question that should be addressed during the contracting period is access to the software by the public given that the project will be funded through the Council's Fish and Wildlife Program. In particular, access to the products of the project by state and tribal agencies would seem to be necessary. Even if the software cannot be made available to non-federal agencies, the cost of this project seems like a bargain for providing information to a substantial proportion of the scientific community in the Northwest U.S.

**Rank 12**

ProjectID: 34026

Studying the Impacts of Dam Passage on the Vestibular System in Fish

**Sponsor:** Pacific Northwest National Laboratory**Province:** Systemwide**FY02 Request:** \$195,850

**Short Description:** Assess feasibility of measuring response of juvenile salmonid's vestibular system to mechanical stimulation that mimics conditions observed during passage through spills, turbines, and juvenile bypass systems.

**ISRP Recommendation and Comments:**

This 12<sup>th</sup> ranked proposal is fundable and innovative. It is a technically excellent proposal for studies to relate physical/hydraulic parameters experienced by fish in dam passage to effects on fish to be observed in the laboratory. However, uncertainties associated with physiological mechanisms are not the key uncertainties in finding solutions to the problems of dam passage.

The physical parameters (e.g., acceleration) have been measured in actual dam passage by an electronically instrumented package called the Sensor Fish (conducted in separately funded studies). The proponents want to determine what effect these measured physical forces would have on a smolt's vestibular system (inner ear) — likely the most damaging physiological effect of passage. The method is to fix a fish on a shaker table, expose it to motions as strong as those in the spillways and turbines, and look for damage to vestibular structures. The proposed work could provide the physiological link between the physical conditions during dam passage and the long-term mortalities seen in the field (probably mediated by predation on fish that are behaving unnaturally because of loss of equilibrium due to vestibular damage). However, the shaker table may not be an adequate simulation of turbine or spill passage.

The work is clearly innovative, in that relating field exposures to such mechanical stresses to effects on the inner ear has not been done before for fish. The research is a radical departure from orthodox fisheries experimentation, in which researchers release a test group of fish into the spillway or turbine under certain conditions and see how many survive, and repeat the trial under a range of conditions until you know the mortality response to operating conditions such as spill rate or turbine loading. The proposed study is a way toward much more efficient experimentation. It holds promise of establishing a mechanistic dose-response relationship that can be used to evaluate the importance for fish of different hydraulic regimes. Thus, the work may well have benefit for fish and wildlife.

The premise of the work is that there are (or could be) feasible alternative spillway and turbine designs or operational procedures that would produce plausibly tolerable physical forces. There would be little sense in doing this work if no alternative spillway or turbine could be tolerable to fish. Work on alternative turbine designs is being undertaken with funding from the U.S. Department of Energy and the Corps of Engineers. Biological criteria to evaluate the alternative designs are needed.

The proposal establishes the relevance to the Fish and Wildlife Program and the BiOp. The work is scientifically sound (in fact, the proposal goes overboard in giving scientific background). There are clear objectives, tasks, and expected outcomes. Monitoring and evaluation for this type of study are not clearly relevant, except for evaluation of the results in publications. The main negative point is the highly basic physiological nature of the work. It might be argued, for example, that understanding the physiological mechanisms for loss of equilibrium is not needed for estimation of effects on predation. But one could also argue that the basics are useful and

needed, particularly in this case where the physical data are being obtained with such thoroughness and precision. We need a biological framework to relate to the extensive physical measurements being made.

### **Rank 13**

**ProjectID:** 34023

Laboratory, Prototype, and Field Evaluation of Undershot Horizontal Fish Screen in the Hood River Basin

**Sponsor:** Confederated Tribes of the Warm Springs Reservation of Oregon and Farmers Irrigation District

**Province:** Columbia Gorge      **Subbasin:** Hood

**FY02 Request:** \$187,004

**Short Description:** Test hydraulics and biological safety (injury and mortality) of undershot horizontal flat plate screen for application at Eliot Creek, a tributary to Middle Fork Hood River.

**ISRP Recommendation and Comments:**

This thirteenth ranked proposal is well prepared, collaborative, and marginally innovative. It is designed to test the efficacy of an undershot screen design to pass fish, sediment, and debris as compared to an overshot screen. The study design includes model, bench-scale and pilot scale testing of a new screening approach on the Hood River. Project structure and background presented in the proposal inspire confidence that the project will be able to reach its objectives.

Information gathered will be used to complete a “Proof of Concept” document. Apparently this document is needed to get approval to install a pilot application of a modified (undershot versus overshot) diversion screen in the Eliot Creek diversion. An overshot screen is currently under construction on Hood River, Oregon, but project sponsors state that overshot applications are not likely to perform as desired in waters with a heavy sediment-load. The proposition here is that a screen modified to be “undershot” has potential for overcoming this deficiency. Good cost share is described: “Construction funds are not sought in this application because they are already secured by MFID, and monitoring and evaluation of the Eliot Creek undershot screen is planned by MFID ...”

Although new to the Columbia River, similar technology has been used elsewhere in the Pacific Northwest, on the Salmon River diversion on Vancouver Island, Canada (contact Craig Wightman, Sr. Biologist, Provincial BC, Nanaimo). A site visit with design engineers is recommended for the project sponsors. The proposal should have included a concept diagram.

### **Rank 14**

**ProjectID:** 34035

Chinook Salmon Abundance Monitoring Using an Acoustic Camera

**Sponsor:** Pacific Northwest National Laboratory

**Province:** Mountain Snake      **Subbasin:** Salmon

**FY02 Request:** \$146,900

**Short Description:** (None provided)

**ISRP Recommendation and Comments:**

This 14<sup>th</sup> ranked project is fundable and innovative but judged to be medium priority. It is innovative because of the potential to piggy back on an ongoing project and use existing or planned infrastructure to investigate the feasibility of obtaining accurate spawner abundance information of spring and summer chinook salmon in small streams using acoustic camera technology based on the Dual-Frequency Identification Sonar (DIDSON) originally developed for

military applications. The budget is mainly for an engineering project to fabricate an upgraded version of the existing acoustic camera during the following winter, test it, and write fish counting software.

Funding of this project is in part dependent upon the status of the NPT-PNNL Mt. Snake proposal for the split-beam hydroacoustic array at the Secesh (Proposal #199703000), because there is need for the Crump weir, etc. The Secesh portion of that proposal was recommended for funding by the Council; thus, this innovative proposal appears to be feasible. The ISRP questioned why this component was not proposed in the suit of monitoring technologies proposed in projects 199703000 (hydroacoustic system in the Secesh River, video in Lake Creek, and video and Vaki equipment in Marsh Creek), 27019 (hydroacoustic equipment in Minam River), and 28052 (Johnson Creek – weir and hydroacoustic equipment) as a unit. In the review of those projects the ISRP "...concluded that existing monitoring elements (e.g., Lake Creek video, weir and redd counts in Johnson Creek) should be continued, and installation of a single experimental high tech application is fundable. The type of installation to be tested, however, remains a question. Team members with experience in "high-tech" applications, are convinced that existing information shows resistivity counters have the greatest promise for applications such as those identified in these proposals. Given expert opinion regarding the relative value of present alternatives, the sponsors need to provide a convincing case for eliminating a resistivity counter as the installation to be evaluated at the chosen experimental site." Also, the ISRP noted that "The installation needs to be viewed as experimental, and should address problems of site selection, methods for getting fish into the target area at high flow, variable water conditions, cost, and practicality." Because of these same concerns and questions, the ISRP ranks the present proposal as medium to low priority.

## **Rank 15**

**ProjectID:** 34017

Low-Cost Thermal Imaging System for Aerial Remote Sensing Applications

**Sponsor:** Smart Mao Imaging

**Province:** Systemwide

**FY02 Request:** \$115,674

### **ISRP Recommendation and Comments:**

This 15<sup>th</sup> ranked proposal is innovative but moderate priority. The proposal justifies the work as meeting the innovative criteria and could be of use to many working in the Columbia River Basin. Lower cost methods for necessary monitoring to collect visual and thermal data are of value in allowing better use of the limited funds available for remediation and mitigation. The benefits are a step or two removed from direct immediate biological benefit, but could nevertheless be of value in improving lower-cost monitoring technology. The project personnel appear to be very well qualified to conduct the work. This is mainly an engineering and construction project with the possibility of failure if FAA will not approve their external mount on light fixed wing aircraft.

Thermal infrared imagery for watershed assessments, habitat measurement, and total maximum daily load (TMDL) monitoring has been used with the advent of the Forward Looking Infrared Radiometer (FLIR). The proponent of this project proposes to design, test, and certify a very inexpensive combined FLIR and small format digital camera in one portable unit. A subcontractor has been contacted to provide engineering and administrative assistance for FAA approval of the new unit for the Cessna 170. A subcontractor has also been contacted to develop an efficient GIS interface to facilitate the use of acquired imagery.

The science behind this proposal appears to be sound. Success depends on the technical aspects of engineering design and building a unit that will be approved by the FAA for external mounting on widely available and inexpensive fixed wing aircraft such as the Cessna 170. The proposal (and the attached letter from Teasdale) suggest that there is some reason to expect door-strut mounts to be a challenge to make work or to have approved by FAA. The ISRP is not able to evaluate whether that makes this project unlikely to succeed. The ISRP suggests that the Council obtain additional review of the feasibility of building and certifying such a unit by an experienced engineer. If successful, the payoff in useful scientific information appears to be substantial for mapping and monitoring remote subbasins in the Columbia Basin.

Can fixed winged applications provide comparable results to helicopter applications?

On the more negative side, the proposal uses a lot of paper without providing a lot of information as to a) how the system will be designed/tested –what plans are there for design parameters to vary and what criteria will be used in evaluating outcomes, b) transfer of information to the potential users basin-wide (4 workshops, but how advertised, how structured, is this enough?). Also, it seems there may be patent issues if the major product is a door-strut mount. If BPA funds this, will it belong freely to BPA or the public for use?

## **Rank 16**

**ProjectID:** 34005

Application of DNA Fingerprinting Microarrays and Semi-Automated Data Analysis Methods for Salmonid Stock Identification in the Columbia Basin

**Sponsor:** Pacific Northwest National Laboratory

**Province:** Systemwide

**FY02 Request:** \$200,000

**Short Description:** Use recent advances in DNA microarray technology to address genetic issues underlying questions related to hatchery management and interactions of wild and hatchery populations

### **ISRP Recommendation and Comments:**

The 16<sup>th</sup> ranked proposal is innovative and technically sound, but is of low to moderate priority. The study proposes to bring a new genetic assay technique, microarrays, into Columbia River salmon management and provide "real - time" analysis. The technique also provides high genetic resolution, down to the family line or pedigree level usually associated with DNA fingerprinting. Nevertheless, the assay in 34001 would probably be a better test for the applicability of the microarray technology for the Fish and Wildlife Program than this proposal. The microarray technology is not likely the best tool for the questions and tasks this proposal outlines, i.e., that of mixed stock analysis and population classification. A straightforward multiplexed microsatellite analysis would probably better address these issues than the proposed microarray approach.

A similar proposal was submitted for the FY2001 innovative solicitation and was ranked 15 out of 66 proposals submitted. This proposal is improved from the earlier version, and they have adopted the ISRP suggestion to focus on a few stocks. Specifically, this incarnation focuses on four specific chinook stocks as a proof of concept that the microarray technique will permit users to identify fish with particular stocks or groups—obviating much of the need for tags and marks. In theory this technique could perhaps be valuable in assessing success of YKFP supplementation, as they claim, but reviewers would have to take that on faith because details are not provided.

Microarrays, one of the newest technologies to hit molecular biology, have been developed to assess the expression of many genes at once in response to a given stimulus. The technology has been used extensively in pharmacogenetics and bioinformatics, where a large literature base has developed. However, developing DNA libraries for fish populations and then using them to identify individuals in this way is not proven. Fundamentally, microarrays are better suited for the comparative expression of genes and for mutation detection than for population genetics applications. The researchers appear to be competent in microarray development for cryptosporidians and bacteria in general, but do not seem particularly strong in use of this technique for fish. The literature cited on DNA fingerprinting and its use in salmon populations is not entirely up-to-date. In the early 90s, the basin investigated the utility of the multi-locus DNA fingerprinting approach to addressing management concerns for chinook salmon. The effort did not yield much useful information due in part to the polyploidy nature of salmonids, which generated gels with overlapping confounding banding patterns. The subsequent use of single-locus probes overcame these problems, but few single-locus probes have been developed specifically for salmonids.

The authors argue that the technology has potential for clearly distinguishing separate breeding groups of fish and that assignment of individuals to specific stocks can occur rapidly; they intend to demonstrate these applications. The authors also argue that the technology has potential for helping to address some of the important questions concerning the Basin's fisheries. Most of the important questions concerning hatchery and wild fish require quantitative information related to fitness. How will this "new" technology help to answer questions concerning effects of habitat degradation and hatchery fish interbreeding on the fitness of endemic fish populations? Additionally, it is not clear how quantitative levels of divergence can be generated from the microarray data, and how the microarray data analysis can deal with issues of non-Mendelian inheritance and the occurrence of null alleles. The latter two issues have been dealt with extensively in the salmonid allozyme literature and are being addressed with the burgeoning microsatellite literature.

## **Rank 17**

**ProjectID:** 34029

Geomorphic Controls on Salmonid Spawning Habitat in Mountain Drainage Basins of the Pacific Northwest

**Sponsor:** University of Idaho, USDA Forest Service Rocky Mountain Research Station

**Province:** Systemwide

**FY02 Request:** \$199,953

**Short Description:** Develop and field test a model for predicting watershed-scale availability of salmonid spawning gravels as a function of channel hydraulics and sediment supply. Results will provide a tool for defensible, proactive, ecosystem management at basin scales.

### **ISRP Recommendation and Comments:**

This 17<sup>th</sup> ranked proposal is technically fundable, but is of marginal innovation and importance. This is a proposal from a talented group of researchers that would take advantage of their past and ongoing work in the Middle Fork Salmon River. However, there seems no priority need for this work and the general applicability of its results remains un-established; thus, there does not seem to be a compelling need for the work when compared to other proposals. A similar proposal was submitted by these investigators in the Mt. Snake Provincial review and received a not fundable recommendation from the ISRP.

The proposal is innovative in the sense that new modeling procedures are being proposed to predicting watershed-scale availability of salmonid spawning gravels as a function of hydrogeographic features including channel characteristics and availability of sediment. Specifically, the proposal is to adapt an existing hydrogeomorphic model developed for coastal streams to mountain streams in Idaho. Resource specialists do not presently have such a tool but it is not clear that the tool would be of significant use even if it were available. One beneficial use could be verification that actions to restore/enhance spawning habitat are consistent with the structure of the channel at the project site.

We suggest that the proponent implement double blind testing of the model predictions in areas other than the Middle Fork of the Salmon River after development. Also, procedures for sampling of sediments should be described in more detail. What are the procedures by which samples will be "...taken at systematic locations along the downstream length of the river, and with special attention paid to differences above and below tributary junctions ... and across lithologic or structural boundaries...?"

## Unranked Proposals

**ProjectID:** 34003

Salmon Run Generator (SRG).

**Sponsor:** Autek LLC

**Province:** Systemwide

**FY02 Request:** \$198,500

**Short Description:** Protect the fish, produce the energy. Traditional generators create energy via water forced through blades, damaging fish. The SRG design creates energy from the perimeter of the turbine, and allows fish to swim harmlessly through the middle.

**ISRP Recommendation and Comments:**

Not fundable. This is innovative for the Columbia Basin, but the proposal is not fundable because the links to fish and biological concerns are not adequate. It does not meet the criteria for relevance to the Fish and Wildlife Program. The evaluation of the biological effects of the Archimedes screw drive is inadequate. A test of the technology on salmon or even salmonids is not proposed. Application to adult passage also seems far-fetched. The prototype should be applied under conditions more realistic than an aquarium, and it is curious that this apparatus hasn't been tested in a lab situation. A qualified research biologist with hydro-experience in large river systems should be associated with the assessment, and with preparation of the proposal.

This proposal is engineering focused and there are other, more appropriate, funding sources. The Department of Energy is funding projects of this sort (development of novel turbine designs). The Archimedes screw is not a new concept and is already being tested at Alden Labs in prototype. This proposal would have to be evaluated by engineering personnel qualified in turbines and generators, which the ISRP is not. From a biological perspective, this may have promise as a low-power producer that might have minimal effects on fish, both by lack of a dam and by less turbine-induced mortality than dam-based turbines. However, the proposal does not provide an adequate design to test fish passage efficiency. To conduct an adequate biological test would likely far exceed the annual amount budgeted for all innovative projects.

Although not a scientific concern, the unstated objective of the proposal appears to be to use public money to fund the research and development necessary to patent a proprietary technology.

**ProjectID:** 34006

Assess Salmon Carcass Nutrient-Macroinvertebrate-Avian Relationships in Riparian Ecosystems of the Yakima Subbasin

**Sponsor:** Northwest Habitat Institute

**Province:** Columbia Plateau    **Subbasin:** Yakima

**FY02 Request:** \$184,280

**Short Description:** Explore the nutrient pathway: salmon carcass nutrients > benthic insect standing crop > adult insect production > riparian nesting insectivorous birds.

**ISRP Recommendation and Comments:**

There is little doubt that an increase in aquatic invertebrates induced by salmon carcasses could provide greater forage and thus a higher abundance of insectivorous birds, yet this remains unquantified. Exploration of the nutrient pathway with stable isotopes is at most marginally innovative and this study is poorly designed. If it were adequately designed this project might tie to or follow from currently funded proposals of a related nature (carcass additions); i.e., an extension of the work of Pearsons (see innovative proposals 2001). Pilot studies (leaning on

related studies in progress, as suggested in the proposal) might proceed at a much-reduced cost, towards testable hypotheses and a larger scale experiment.

There are many areas with and without salmonids, at which, one might compare the abundance and distribution of insectivorous birds to provide some of the preliminary evidence that should have been presented or proposed (adequate stratification of habitats would be necessary). Abundance and diversity in control and treatment sections may provide most of the required information (and perhaps already available) that one might need to access the role of salmon carcasses on insectivorous birds – there seems little need at this stage for detailed process-orientated models. Furthermore, this may not be possible given the variability typically found in samples of aquatic invertebrates. The authors need to conduct some preliminary statistical analyses of existing invertebrate data to show that this proposal is realistic. It is not clear why measures of aquatic invertebrate standing crop are important to the hypothesis except in the case of dippers. The authors should show that the number of emerging aquatic insects (and standing crop) is a significant part of the available forage for nesting birds during the period proposed for study. The stable isotope analyses might provide further evidence of the importance of marine-derived nutrients (as shown elsewhere), but there is little information provided on the latter in this proposal. Some investigation early in the study could assist in determining the sensitivity of that work and the required sampling. However, while the USFWS Breeding Bird Survey shows declining trends of some of the species that use riparian areas in the Columbia Basin, there is no evidence implicating salmon at this time. Given their extensive migratory pathways, many other causes of the declines need to be considered as well.

Other questions:

- Given what is known about variation in bird abundance, species diversity, and nesting success, are the birds that are expected to be observed in the few sampling areas proposed sufficient to test the hypothesis?
- How do vegetation samples contribute to a test of the hypothesis?
- “As part of regular nest monitoring, eggshells discarded by adult birds after hatching will be collected.” Won’t these eggshells be difficult to find? Don’t the adult birds generally carry these shells far from the nest? To what data will results of the stable isotopes in eggshells be compared? Will this part of the study provide any quantitative assessment related to the hypothesis? If these isotopes are found both in fish and shells, what does that contribute to the test of the hypothesis?

**ProjectID:** 34007

New Life for dead stream

**Sponsor:** Baker Valley Irrigation District

**Province:** Middle Snake      **Subbasin:** Powder

**FY02 Request:** \$41,565

**Short Description:** Restoring an old stream to reclaim a fishery, wildlife habitat for all aquatic species

**ISRP Recommendation and Comments:**

Not innovative. This project does not meet the innovative criteria and would have been more appropriately submitted for the Middle Snake Provincial Review (now nearing completion). The techniques proposed for stream restoration are not innovative in the Columbia River Basin, and no attempt was made to show how the proposed project met the innovative criteria.

**ProjectID: 34009**

Net Pen Rearing Spring Chinook in Lake Osoyoos

**Sponsor:** Confederated Tribes of the Colville Reservation

**Province:** Columbia Cascade    **Subbasin:** Okanogan

**FY02 Request:** \$199,000

**Short Description:** This project will investigate and demonstrate the feasibility of recreating a unique lake-rearing spring chinook salmon population in Lake Osoyoos to expand the diversity, distribution, and abundance of an endangered ESU.

**ISRP Recommendation and Comments:**

The proposal left too many issues unaddressed and net pens are not innovative; this proposal belonged in the Columbia Cascade Province review (which is nearing completion). The sponsors have considerable experience with net pen rearing of other species, which is the method proposed for acclimation of chinook in this case. The new idea is that this approach has not been attempted to restore chinook stocks.

There is historical information of a spring Chinook run to the Okanogan, but the spawning stream is not in useable condition at this time. The probability of establishing a spring chinook run seems very low, as is the ability to (simultaneously) generate a recreational and subsistence fishery.

There are many logistical concerns with this proposal. No evidence is provided that net pens may be sited in Lake Osoyoos, and the likelihood of putting the net pens in area that is suitable (cold enough) is slim. The number of streams suitable for spring chinook in the area is minimal, and no indication of potential impact to the present recreational uses of the lake, including the recreational fishery, was given.

There are questions about whether the net pen reared fish would migrate out of Lake Osoyoos or residualize. The proposal would PIT tag half of the smolts in order to follow their progress out of the lake.

More than 18 months would be needed to evaluate this project because of the life history of chinook. It is not clear what the duration of the project would be. The total number of months shown in the budget sheet includes items that overlap in their schedules, and will not add up to a full duration.

Concerns notwithstanding, this was one of the few innovative proposals that offered the potential to directly increase fish populations.

**ProjectID: 34011**

Western Painted Turtle Habitat Restoration Project

**Sponsor:** Portland's Environmental Services

**Province:** Lower Columbia    **Subbasin:** Willamette

**FY02 Request:** \$58,417

**Short Description:** Protect and re-establish western painted turtle nesting and basking habitat through solid waste removal and native revegetation at Bonneville Ponds. Perform pre and post-project monitoring to determine affects on western painted turtle populations.

**ISRP Recommendation and Comments:**

This proposal does not meet the innovative criteria and should not be considered under this solicitation. Provision of habitat improvements is not a novel approach. Although it may very well be valuable to attempt to maintain turtle populations through habitat maintenance and restoration, this approach is not novel. Additionally, the proposal is quite superficial and makes many statements that are either vague or that require support that is not provided either by data

presentation or citations from the literature (e.g., connectivity is key to the health of the ecosystem of SBLWA). The methods are not presented in adequate detail to judge the quality of the monitoring data that would result. The proposal seems very narrow in focus, as does the recognized group of stakeholders to be involved (BES, BPA, and Port of Portland).

**ProjectID: 34012**

Sponsor A Smolt

**Sponsor:** Methow Salmon Recovery Foundation

**Province:** Columbia Cascade    **Subbasin:** Methow

**FY02 Request:** \$58,061

**Short Description:** Develop a long-term self-sustaining interactive public sponsorship program for recovery efforts in the Methow Subbasin through the PTAGIS database system in conjunction with evaluation of the Twisp Steelhead Acclimation site.

**ISRP Recommendation and Comments:**

Not innovative and not an adequate proposal. This proposal requests funds for project management and website development of a “sponsor a smolt” program. The project would develop a program of public sponsorship to create a funding base for pit tagging of smolts at an acclimation facility. Public sponsorship of the “sponsor a smolt” program is presented as the innovative part of the project. However, the proposal emphasizes the tagging rather than the public program. The project would not analyze the effectiveness of public involvement in funding.

If the project were based on public involvement it would address questions like the following: What is the target level of smolt sponsorship? What sponsorship level would need to be achieved to create a permanent source of funds? What if only partial funds were raised? How would tagging activities be modified? The proposal reads as though funding to tag 6000 smolts is assured.

The project may not maintain public interest in sponsorship because the tagged fish will not be detectable for most of their lifecycle. Additionally, the proposers should consider whether the public would accept an average return rate of 1% or less on their investment of sponsorship. Is there a risk of them getting discouraged at this return on investment?

**ProjectID: 34013**

Restore Ecological Structure and Function to Grays Lake Using Decision Support System

**Sponsor:** U.S. Geological Survey - Biological Resources Division, Northern Rocky Mountain Science Center

**Province:** Upper Snake                      **Subbasin:** Headwaters

**FY02 Request:** \$200,000

**Short Description:** Collect and synthesize hydrological, geomorphological and ecological data into a decision support system to optimize water management at Grays Lake.

**ISRP Recommendation and Comments:**

Not innovative but a thorough proposal that addresses a significant need in an important location, and features unusually good potential for cooperation among groups and interests. It should have been submitted in the Upper Snake provincial review (which is nearing completion).

There is no innovative aspect to this project. Its objectives are to, (1) compile and collect the data necessary to describe current hydrologic and ecologic conditions at Grays Lake, and (2) import these data into a decision support system that will allow wildlife and irrigation managers to make quantitative decisions regarding the ecological and economic costs and benefits of various water management options at Grays Lake.

The proposal presents a very nice background and overview of the Gray's Lake water and wildlife issues (little appears to be known on the Yellowstone cutthroat trout population thought to be a relic one in Gray's Lake). These sections of the proposal are very thorough. Objectives and tasks are well described in general terms, but lack specific detail on specific methods and analyses to be used. For example, it would have been nice to see more detail on development of the Decision Support Model (Task 7), particularly as this is the project's central task. Nevertheless, the PI team looks well qualified to conduct the work, which has some level of support from the local landowners.

**ProjectID: 34014**

Assessing Potential Biological and Toxicological Effects of Parental Transfer of Environmental Contaminants to White Sturgeon in the Columbia River

**Sponsor:** Oregon State University

**Province:** Systemwide

**FY02 Request:** \$199,000

**Short Description:** Examine the potential effects of environmental contaminants on white sturgeon reproduction. Explore the possibility of developing a tool by which to monitor the contaminant load passed onto white sturgeon progeny.

**ISRP Recommendation and Comments:**

Marginally innovative and not high priority. The proposal was carefully prepared and describes a project to assess whether PCBs occur in white sturgeon gonads and blood, to examine whether levels in these tissues are correlated so as to provide a non-lethal sampling tool, and to assess whether offspring of contaminated adults experience low growth, survival, or deformity. Methods described here appear to have been used elsewhere, with success. However, only one portion of this seemed innovative: objective 2, to assess possible non-lethal sampling of female gametes for PCBs. That objective was a relatively minor feature of the proposal.

The proposal may lead to some understanding of recruitment failure, but it offers little in the way of remediation, thus is mainly academic. Effort in reduction of contaminants is required. The proposal did not clearly discuss the results of considerable efforts underway on this topic in the last decade (i.e. WSCRPRG).

**ProjectID: 34015**

Neotropical Migratory Bird Habitat Restoration Project

**Sponsor:** Portland's Environmental Services

**Province:** Lower Columbia      **Subbasin:** Willamette

**FY02 Request:** \$197,320

**Short Description:** Compare the effectiveness of prescribed burning and other treatment methods on fire dependent plant communities, reduce fuel loads of non-native plants, and re-establish native plantings creating native habitat for Neotropical Migratory Songbirds.

**ISRP Recommendation and Comments:**

Not innovative. This proposal is to experiment with prescribed fire in the restoration of songbird habitat adjacent to the Willamette River in Portland, Oregon. Although it argues for priority funding due to ongoing work to date, it fails to establish how it is an innovative approach, versus an application of existing techniques for habitat restoration.

Additionally, the proposal is not strong. The focus appears to be research, but the proposal lacks an experimental design, rigorous adequate sampling methods, and description of statistical approach. The language used by the proponents suggests that what is planned is more a demonstration of techniques that are assumed to be desirable. The work would not be fundable

under other solicitations without a much better developed approach to truly evaluating effectiveness of restoration methods.

Task 1 is to develop a site plan for the tests and restoration activities involving key stakeholders. Prominently missing from the list of stakeholders are the local landowners/homeowners. Their input should occur at this initial stage in some form, rather than seeking it later, after a plan has been developed.

**ProjectID: 34016**

Behavioral Motivation in the Evaluation of Culvert Designs for Juvenile Salmonid Passage

**Sponsor:** Pacific Northwest National Laboratory Marine Sciences Laboratory

**Province:** Systemwide

**FY02 Request:** \$199,989

**Short Description:** Test hypotheses concerning the cues for upstream movement by juvenile salmonids in order to develop evaluations of new and retrofit culvert designs.

**ISRP Recommendation and Comments:**

Benefits from this proposal are not adequately demonstrated. This is a well-prepared and interesting proposal by a strong team of researchers to “... test hypotheses concerning the cues that elicit upstream movement by juvenile salmonids.” However, it is difficult to ascertain how the information gained from these behavioral studies could be used in field applications (and several are already known; e.g., dark areas), or in the evaluations of culvert designs, which clearly remain a problem.

**ProjectID: 34018**

Evaluate Engineering Conceptual Design and Field Application of Pisces Fish Passage Unit

**Sponsor:** Watershed Professionals Network, llc (WPN)

**Province:** Systemwide

**FY02 Request:** \$194,864

**Short Description:** Complete testing of the PISCES fish passage device in a lab and controlled field location to evaluate fish reaction and fish passage efficiency.

**ISRP Recommendation and Comments:**

Meets the innovative criteria but the proposal, though improved from earlier iterations submitted in BPA solicitations, still has some shortcomings. The device is still too sketchily described to facilitate review at this point. The sponsors need to be put this technology in context with other technologies, specifically laying out potential benefits to fish.

There has been a lot of work on surface collectors for juvenile salmon beyond the tests at Cowlitz Dam that is discussed. Others should have been referenced and discussed in more detail in this proposal. The proposal is unique in putting an emphasis on turbulence as the primary factor affecting response of juvenile salmon, a factor the Independent Scientific Group, in Return to the River 2000 ([www.nwcouncil.org/library/return/2000-12.htm](http://www.nwcouncil.org/library/return/2000-12.htm)), advised as deserving of attention. While the proposal puts emphasis on potential application at hydroelectric projects, the potential application seems to be more in line with the scale of circumstances at irrigation intakes and the like. Whether there is an urgent need for this technology for that application is a question that should have been better demonstrated in the proposal.

The tests already scheduled by consultants will provide valuable information.

“Pisces” is an idea and conceptual design for an apparatus that is being “sold” as a low cost, low maintenance, and effective alternative for protecting fish from entering water intakes. The comparison of costs and potential effectiveness with existing technology was not included in the presentation.

In addition, there is the issue of the proprietary nature of the device. Although not central to the scientific review, policy makers should be aware of the issue. The proposal requests public funding to facilitate further development and testing of the apparatus. If results of the assessment are positive, the developers (Balaton) “...will expand into a privately funded controlled series of applications at representative of the sites, species, and environmental conditions indicated as feasible by the lab and field tests.” The proposal seems to be a request for the public to complete development and initial testing of this apparatus, which ultimately will remain in private ownership.

**ProjectID: 34020**

Fish Behavioral Guidance Through Water Velocity Modification PHASE ONE

**Sponsor:** Natural Solutions

**Province:** Systemwide

**FY02 Request:** \$222,586 (Sponsor said the proposal could be revised without significantly changing the project’s scope to meet the \$200K cap.)

**Short Description:** Develop a means & method of duplicating or simulating “bulk flows” in a quiescent environment, such as a hydro facility, and integrating induced turbulence to the mechanism to provide multiple natural migratory cues for guiding fish to safe passage routes.

**ISRP Recommendation and Comments:**

Not fundable. Although the approach is innovative, the proposal is not technically adequate. The sponsors should be encouraged to keep working on this and to enlist further input from fish biologists.

This is an innovative proposal to provide a “hydraulic welcome station” for migrating juvenile salmon at the upstream end of the forebay pool. By adapting a technique used in the mining industry, a jet of water would be created from a barge, or possibly a fixed structure, located at the upstream edge of the forebay pool. The artificial water jet would be designed to approximate the thalweg velocity and turbulent flows characteristic of the river upstream from the forebay pool. The water jet would be created by a device known as a “Venturi eductor” which would direct juvenile salmon toward collectors for surface bypass systems (SFB) located at the downstream end of the forebay pool, on the face of the dam. The Venturi eductor is intended to enhance the effectiveness of surface bypass collectors by getting the juvenile salmon directly through the forebay pool and into the collectors of the SFB without delay. The proposal shows a reasonably good understanding of current information about what the Fish and Wildlife Program specifies for juvenile salmon migrations.

Although it starts with a great concept, the approach to implementation gives the overall proposal a slow finish. Several fundamental questions were not answered; “Would the implementation ultimately prove safe for juvenile salmon and other fish?”, “How many of these eductors would be needed at the entrance to the typical forebay?” and “How far downstream would the velocity enhancing effect of the eductor jet last?” The lack of information on the safety of this method of increasing water velocities for juvenile salmon is indicative of the general lack of biological criteria for development and operation of the appliance. The proposal needs to demonstrate further interaction with fish biologists familiar with the issue. The lack of information on how eductor-based passage devices would fit into the forebay of a Columbia River low head dam may be indicative of a shortage of hydraulic physics and engineering content in the proposal. Figures

are sorely needed to show the layout and positioning of project components (eductors, etc) for both a theoretical (or actual) fullscale forebay and for the prototype testing. The issue of scale needs to be addressed: what might be the size and cost of pumps and eductors needed to produce enough hydraulic change to be meaningful fish. The proposal gives a tantalizing view of what might be accomplished, but it does not go far enough to allow evaluation of the chances for success. The proposal is too preliminary to be competitive. Specific questions and comments needing attention are given below.

General, non-task specific comments:

1. An important technical point is the ratio of motive water to effluent water, said to be 1:5 – 1:6 for a four inch eductor tube used in dredge mining. The actual ratio of motive:effluent in the example of the proposal for application to juvenile salmon is 1:7, i.e. 6400 gpm motive flow to produce 44,800 gpm effluent flow.  $44.8/6.4 = 7.0$

2. The proposal's use of the term "thalweg" is confusing, substituting "thalweg" in place of term, "thalweg flows." For example, the statement in the proposal incorrectly equates bulk flows with thalweg, "*the hypothesis that bulk flow or thalweg can be generated in the far & intermediate fields of forebays ...*" (Section e. Proposal objectives, tasks and methods, Objectives, first para.) A thalweg is the line defining the lowest points along the length of a river bed. Water particle velocities and turbulence are typically maximized in this part of a river, hence the interest in, "thalweg flows," and "thalweg velocity" in relation to juvenile salmon migrations. Thalweg is not a synonym for "bulk flows."

Comments: Task (A) 2002 - 3D Profile the Zone of Influence of Venturi Eductors.

- What sizes of eductors are being tested? The proposal states, "These tests will be performed with each eductor size, ..." but this paragraph contains no information on what size eductors are being tested.
- Why are the eductor tubes initially being tested from locations on the bottom [of the test reservoir] up? The region of interest for juvenile chinook is from the top down, with the likelihood function of finding fish with depth being something like a Poisson shaped curve with its mean (depth) depending on the race (stream or ocean) and state of maturity.
- What will be the size of the hydroacoustic "dead zone" adjacent to the air-water interface and the water-bottom interface? The "dead zone" is where the noise generated by reflection of the hydroacoustic signals from the ADCP renders interpretation of observations from this instrument problematic at these depths.
- What is the range of the vertical scale of the data describing the zone of influence (i.e. does it start at zero depth, or at some point below the surface dictated by the limitations of the ADCP?).
- Will the values used to describe current vectors in the "zone of influence" at the surface (air-water interface) be actual measurements, or extrapolations?
- Why are current meters not being employed to augment the ADCP for surface current measurements?

Task (B) 2002 - Determine the parameters of eductor sizing, efficiency, spacing and ability to replicate bulk flow.

- What is known about the physics and engineering of large venturi eductors? What are the likely problems of scale? Is there a theoretical concept (equation) or rule of thumb describing how power/pumping capacity requirements increase as a function of eductor diameter to guide the engineering work?
- Could juvenile salmon be attracted by the flow net created by pumping motive water from the river?
- Would the motive water intakes need to be screened?
- Would current velocities created by pumping near the motive water intake ever exceed the maximum burst swimming speed of a juvenile salmon?

Task (C) 2002 - Design and Build a Prototype Environmental Eductor for Deployment and Testing.

What are the engineering and biological criteria that would be used to judge whether it is reasonable and prudent to proceed with the large bore prototype? For example, if  $x$  describes the distance along a horizontal line perpendicular to the direction of thrust in a cross section of the “zone of influence”, and  $v$  is current velocity, what values of  $dv/dx$  are biologically unacceptable? Practically speaking, at what rates of change in velocity with distance are shear forces sufficient to cut the smolt into pieces? Could this project create a “water knife” that would kill smolts that came within range? If it could have been shown that the domain of  $dv/dx$  does not include values considered lethal, this would have been a big selling point for this proposal. Questions regarding potential deleterious effects of the technology on survival of juvenile salmon are raised in the proposal but not answered. Some examples follow. Quote from the paper, “Since there are no moving parts in the eductor tube, gravels (or fish) can pass through the eductor without damaging it – or in the case of fish, damage to themselves.” (About Venturi Eductors, second para.) Comment: Moving mechanical parts are not the only things capable of creating physical forces that can injure or kill juvenile salmon. Hydraulic forces such as cavitation and shear can also kill or injure. Quote from the paper, “(2) The extreme velocities produced at the center of the “zone of influence” will cause smolt to shear way, not be entrained, and thus serve as a velocity “curtain”.” (Venturi Eductors, third para.)

Quote from the paper, “Since the mining industry has largely been concerned with the amount of suction produced, no one has prepared graphs or flow charts for the discharge side of the eductor: hence, the purpose of this project. About Venturi Eductors, third para.) Comment: The data from the discharge side of the eductor should be used in conjunction with biological information already available to develop criteria for deciding if development and application of a big bore eductor would have the desired positive effects on the survival of the juvenile salmon. See <http://www.cbfwa.org/files/awp00/projects/20054.htm#reviews>.

Question: How much effluent flow would be needed at a typical far field forebay location? What fraction of the average flow of the river in question is 100 cfs? Comments: This raises the question of how many of these Venturi eductors would need to be placed in the far field forebay to have the biological effects intended. Conversions to cfs are as follows: 44,800 gpm is 99.83 cfs is about 100cfs. 1000gpm = 2.233 cfs, so 44,800 gpm = about 100 cfs. Approx = 1:7 ratio of motive to effluent flow. Would flows of 100 cfs be sufficient? Would more than one eductor of this size be required? What is the practical limit on the size of venturi eductors, i.e. how much

bigger than 48 inches in diameter can Venturi eductors be constructed? Are there Venturi eductors as large as 48 inches in diameter in operation today, or have there ever been historically?

Task (D) 2002 - Physical Testing Prototype Environmental Eductor - With and Without Engineered Induced Turbulence

What biological criteria are to be evaluated during testing of the prototype?

Task (G) (2003) - Evaluation of Natural Like Bypass Inlet and Demonstration of the Behavioral Guidance System's Ability to Entrain Smolt.

Comment: This needs to happen long before step G.

### **Conversions**

32 inch pipe uses 856 cfm motive to provide 5990 cfm effluent

32 inch pipe takes 14.27 cfs to provide 99.83 cfs approx = 1:7 ratio

5990 cu ft per min = 44,800 gallons per min

856 cu ft min = 6400 gallons per min

Flow = 1 =  $2.832 \times 10^{-2} \text{ m}^3 \text{ s}^{-1} / 1 \text{ ft}^3 \text{ s}^{-1}$

1 gal per minute = 0.000 0631 cubic meters per sec = 0.134 cubic feet minute = 0.134/60 cfs = 0.002233 cfs

### **Sources used in this review**

Clayton, B. R. and R.E.D. Bishop (1989) Mechanics of Marine Vehicles. Gulf Publishing Company, Houston (Section 1.4).

<http://www.ex.ac.uk/cimt/dictunit/ccflowv.htm>

Independent Scientific Group, Return to the River 2000 ([www.nwcouncil.org/library/return/2000-12.htm](http://www.nwcouncil.org/library/return/2000-12.htm)), Chapter 6. Hydroelectric System Development: Effects on Juvenile and Adult Migration.

“The role of hydrodynamic features other than thalweg velocity in fish emigration needs to be further explored, for a proven link to such features as stage waves and turbulent bursts. A greater understanding of hydrodynamic features may offer opportunities for water management that could be more effective in moving fish with less water than would current applications, such as the water budget.” Return to the River 2000 – Chapter 6 page 217.

The project has some other drawbacks as well. The work will take place in Montana where there will not be access to migrating salmon or the dams where problems in passage are proposed to be addressed. It is proposed for two years, whereas the request for proposals specifies a limit of 18 months unless sufficient justification is given for a longer study period. The budget exceeds the \$200,000 limit (although it appears they would be able to reduce it to meet the cap).

**ProjectID: 34024**

Integrating remote sensing and topographic indices to detect the impact of invasive species on critical winter elk forage areas

**Sponsor:** Confederated Tribes of the Umatilla Indian Reservation

**Province:** Columbia Plateau      **Subbasin:** Umatilla

**FY02 Request:** \$133,677

**Short Description:**

Use remote sensing and GIS analysis in combination with extensive range plots to evaluate the 30-year historical trend of the impacts of non-native species, cheatgrass and yellow starthistle, on critical winter elk forage areas.

**ISRP Recommendation and Comments:**

Not fundable, the proposal is inadequate and the innovation is minimal. Reviewers found the proposal quite hard to follow. This proposal is innovative in the sense that the proponents propose to integrate robust statistical analysis (Neural Networks and Fuzzy Logic) with new remote sensing techniques to evaluate the 30-year historical trend of the impacts of non-native species, cheatgrass and yellow starthistle, on critical winter elk forage areas. If successful, the techniques would have applications elsewhere for monitoring and prediction of the spread of invasive weeds on terrestrial rangelands.

The link to benefit to fish and wildlife is not adequately demonstrated. It is not clear how the ground-truthing of this project will be done. The proponents indicate that study sites will be located in topographically diverse areas and that ten locations for each plant community (star thistle, cheatgrass, perennial grassland) will be monitored for a total of 30 sites, but use of the resultant data is only loosely noted. Without some strong ground-truthing criteria, reviewers do not see how a convincing history of impact can be reconstructed. Protocols should be given for site selection. Will sites be in pure stands of cheatgrass, yellow starthistle, and native grasses, or are mixed stands to be selected? What are the criteria for site selection?

In addition to the use of data from training sites to refine the classification procedures, additional post-classification evaluations of accuracy of maps should be conducted. Double blind evaluations should be made.

Basically, the proposed work would seem simply to look for good spectral signals of cheatgrass and star thistle. The data to be used seem too skimpy – images from one very wet year and one very dry year to characterize spectral variability; images from 3 years from 1977 to 2001 to describe a 30-year history of impact.

There are many loose, unreferenced statements in the proposal (e.g., ‘these species adapt to and modify the environment in order to promote their own establishment’, ‘as few as 10 plants/foot can seriously impact perennial seedlings’, ‘soil loss is increased by 600% when comparisons are made among the deeper rooted species and the shallower rooted species’). The proposal contains much generalization from the literature without adequate presentation of rationale. The proposed work would seem to continue in the vein of broad generalization with the result that little concrete information would be gained.

**ProjectID: 34025**

Assess role of estuarine habitat in maintaining chinook salmon life history diversity in the Columbia River using remote PIT tag monitoring systems

**Sponsor:** Oregon State University

**Province:** Columbia Estuary    **Subbasin:** Mainstem Columbia

**FY02 Request:** \$196,853

**Short Description:** Quantify the role of estuarine marsh channels in the behavior, growth and life history diversity of sub-yearling salmon using an innovative application of remote monitoring stations (antennae) for PIT tags.

**ISRP Recommendation and Comments:**

Marginally innovative and the potential benefits from this proposal appear minimal. The project proposes to assess the use of PIT tags as a tool for study of estuary use by juvenile chinook salmon and would complement work by USFW (Zydlewski et al.) in Abernathy Creek, where similar technology is being applied to assess pre-smolt behavior of wild and hatchery salmonids (project 200101200 and proposal 30008). While the question being studied could be important in demonstrating the value of estuary habitats for fall chinook salmon, reviewers see little new information that this proposal would provide. The use of PIT tags and the development of the new antennae arrays are not really innovative and the proposed use is only marginally so. Further, the scale of the program would have to be very limited given only three arrays and the need to monitor direction of passage. The proposal is limited in scope and numbers of tags. Apparently, PIT tags and the antennae are effective in saltwater but this should have been documented in the proposal. The study itself is limited to the upper estuary.

**ProjectID: 34028**

Innovative Technologies for Mapping Large Woody Debris and Assessing Fish Distribution

**Sponsor:** Battelle Marine Sciences Laboratory

**Province:** Columbia Estuary    **Subbasin:** Mainstem Columbia

**FY02 Request:** \$172,358

**Short Description:** Evaluate side scan sonar as mapping tool for subtidal large woody debris (LWD) and develop protocols for its use. Evaluate the DIDSON acoustic camera for assessing fish distribution in relation to LWD.

**ISRP Recommendation and Comments:**

Not fundable. Although innovative, the proposal is technically inadequate and the results would not likely be of significant benefit to fish and wildlife. The proposal definitely involves innovative equipment but the proposal did not really address any of the concerns (i.e., shallow water habitats and fish species identification) noted in the ISRP comments in the Columbia Estuary provincial review of proposal 30014, *Map Subtidal Large Woody Debris and Other Habitat Features in Relation to Fish Distribution in the Lower Columbia River Estuary* ([www.cbfwa.org/files/province/estuary/projects/30014.htm](http://www.cbfwa.org/files/province/estuary/projects/30014.htm)).

The project does not link its technique testing and survey protocols well to specific questions about how juvenile salmonids use the estuary and what critical things we need to know in those habitats. The project focuses primarily on technique testing. While the purpose of the Innovative Solicitation is to bring new ideas and test new applications of techniques to Columbia River Basin salmon issues, this proposal seems like it needs more background work showing that the techniques can adequately assess habitat and fish (including IDs) accurately (or within acceptable limits). As it is, the proposal has two major uncertainties: one, whether the techniques can adequately assess habitats and identify juvenile salmonids and species; and two, how these data will provide something specifically useful about estuary habitats that we currently do not have (our lack of knowledge on subtidal LWD, notwithstanding). A far more direct means to examine this habitat would be to construct study sites and monitor fish use rather than passively sample

habitats with advanced electronics as proposed here. There is no study design established, so we cannot assess procedures, methods, etc.

**ProjectID: 34031**

Biological and Economic Feasibility of Reintroducing Fishwheels to the Columbia River System

**Sponsor:** Steward and Associates

**Province:** Lower Columbia      **Subbasin:** Cowlitz

**FY02 Request:** \$260,525 (Request for over \$200K was an oversight. Sponsor resubmitted budget for \$199,945).

**Short Description:** This project will determine whether fishwheels can be successfully constructed and profitably operated under the current regulatory and economic constraints that govern Columbia River fisheries.

**ISRP Comment and Recommendations:**

The technology is not innovative. The questions regarding implementation are primarily regulatory and social rather than technical. The ISRP agrees that the re-introduction of fishwheels as a selective fishing technique would be useful for the Columbia River Basin allowing harvestable numbers of healthy stocks of salmon or steelhead to be captured and kept, while fish from other stocks could be released alive to continue to the spawning grounds or hatcheries.

The proposal states, "A key question is whether fishwheels can be successfully constructed and operated under the current regulatory and economic constraints that govern Columbia River fisheries" (p. 2). The ISRP raised these questions in our previous review of a similar proposal submitted for the FY2001 Innovative Solicitation ("Live Capture Harvest," #22066; [www.cbfwa.org/2001/innovative/projects/22066.htm](http://www.cbfwa.org/2001/innovative/projects/22066.htm)).

A fish wheel is a sampling appliance, like a gill net or a fish trap. Its success at capturing and keeping fish alive is well established. There should be no doubt that a fishwheel can be constructed. If they decide to give it a try, there are a number of companies (i.e. LGL Sidney, BC, Canada) that can install and demonstrate the operation of fish wheels for catching salmon alive. The implementation issue is a policy concern, about whether or not non-lethal harvesting makes sense in a situation where there is very high pressure to provide fishing opportunity to treaty fishing tribes, while at the same time the ESA requires separating endangered and threatened fish from hatchery fish.

Fishwheels were used extensively in the Columbia River prior to being outlawed by the initiative process in the state of Washington, followed soon by Oregon. The question is whether its operation will be permitted. The law does not apply to treaty tribes, as long as the tribe adopts an appropriate regulation for the fishery (U.S. v Oregon and Washington, 1969). Since the Cowlitz Tribe is sponsoring the proposal, it would seem reasonable for the tribe to adopt (or have adopted?) a regulation permitting the operation of fishwheels in the areas proposed, thus addressing the question whether operation of a fishwheel would be permitted pursuant to fishery regulations. The proposal does not address whether other regulatory agencies need to be consulted. These might include NMFS, the Corps of Engineers, other treaty tribes with rights to fish in the areas proposed, and others. We see no discussion of these points, which the sponsor itself identifies as key questions. These are administrative questions that are not dealt with in the methods or tasks section of the proposal.

Regarding the economics, not a lot of details are provided as to how the economics and regulatory issues will be analyzed. Reference is made to a "market analysis" and a simulation model to assess costs and benefits, but those references suggest that economic feasibility will depend on showing higher total returns (revenues minus costs) with fishwheel technology versus

gillnets. This is really not an issue, as we know that fishwheels would be more cost-effective overall than gillnets, nor is it the point. With regard to the economics of fishing technology, the economic question is as much the distribution of net revenues as the amount. Economic issues related to allocation and distribution are what underlay the "political wrangling" the proposal cites as the reason for their discontinuance in the past. And the "carefully stated assumptions and constraints" on the simulation model (p.8), would probably have to assume away these complexities.

There is an inaccuracy in one statement in the proposal ... Aboriginal fishers in BC are not using these as a fishing technique to replace their past practices, at present the wheels operating in BC are experimental and associated with research or assessment programs. There are locations, however, where the wheels are very effective and could be used as a selective fishing tool. Their success is very site specific. From a strictly technical perspective, the ISRP supports developing this prototype fishwheel as a demonstration program, but any proposal would need to be more specific about the criteria to be used for evaluating performance, i.e. what gear types would it be compared against, and what potential advantages would be measured?

The original budget request was for \$260,000, which exceeds the maximum specified in the RFP; the sponsor revised the budget to \$199,945.

**ProjectID: 34032**

Otolith Marking using Portable Mist Incubation

**Sponsor:** Alaska Resource & Economic Development, Inc.

**Province:** Columbia Estuary    **Subbasin:** Grays

**FY02 Request:** \$121,952

**Short Description:** Development of Otolith Marking in a Mist Incubation environment using three methods

**ISRP Recommendation and Comments:**

Not fundable, only marginally innovative, and not an adequate proposal. The technique has already been tested. The concept, a modular transportable system for applying thermal marks to wild-spawning salmon, has been demonstrated in Alaska by the Northern Regional Aquaculture Association (Sitka, AK; Steve Reifenhohl, 907-747-850) in cooperation with NOAA Fisheries Auke Bay Lab (Juneau; Don Mortensen, 907-789-6088). They used streamside incubators, recirculating water during marking, and propane heaters. They marked several hundred thousand pink salmon at Auke Creek, Juneau, and chum salmon on a stream on Kuiu Island. Mortensen is preparing a technical memorandum reporting their results.

The proposal seeks to establish the effectiveness of creating pre-hatch thermal marks with mist incubation by testing three approaches, but provides little detail about these tests. It may be that use of a mist incubator would save energy costs and constitute a significant innovation; the proposers report that they have experience with mist incubation systems but give no information about that experience. The proposal cites unpublished report of Alaska trials as its only reference in the technical background. Tasks and methods are provided in abbreviated form. The proposers have not developed protocols for testing and demonstrating the proposed system (task 1 is to collaborate with WDFW to do so, but there is no indication from WDFW of its commitment to do so; tasks 3, 4, and 5 indicate a conceptual plan for methods but no rigorous plan is presented; task 6, develop an otolith remover isn't needed, technicians with knives and forceps are quite efficient.) The proposal presents no conceptual design for the 'connex' trailer facility. Not much more detail is given on the techniques or its application in the Columbia River Basin. Overall, this is an incomplete proposal.

**ProjectID: 34033**

Demonstrate novel methods of mist incubation and mechanical egg planting in salmon restoration.

**Sponsor:** Alaska Resource & Economic Development, Inc.

**Province:** Systemwide

**FY02 Request:** \$200,000 (\$622,324 with proposed cost-share)

**Short Description:** Documentation of methods and procedures for mist incubation and mechanical egg planting in two separate systems and the collaborative authoring of a procedures manual for application of this innovative technology

**ISRP Recommendation and Comments:**

This proposal is not fundable, innovative, or technically justified. This sister proposal to 34032 is slightly more complete, but has similar problems. The technique is at most marginally innovative, as it is well known and has been in use for a decade in Alaska. There is no indication of the need for these techniques or of how the techniques will be integrated into restoration in any subbasin. Mist incubation is not new (ARED will provide the technology as part of cost sharing but there's no documentation of the existence of the technology). The egg planter is not new, and was developed and patented 20 years ago. Transportable, modular, incubation systems are not new and have been developed, for instance, by NSRAA and NOAA Fisheries Auke Bay Lab (see comment on 34032). The budget is not explained or justified; there are large matches of cash from PEW and the Southeast Salmon Recovery Fund that are not documented; there are several cooperators indicated but no documentation of what their role would be.

Additionally, a big portion of the large budget is to collate and publish standard operating procedures, which after 10 years of application in Alaska are probably already developed. Why do mist incubation units have to be designed if they are already in application? The tasks and methods are very sparse.

**ProjectID: 34034**

High-Speed Fish Screen for Irrigation Diversion

**Sponsor:** West Extension Irrigation District

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

**FY02 Request:** \$200,000

**Short Description:** Install a high-speed fish screen at the lower pump station for the West Extension Irrigation District (Public) and L3 Farms (Private).

**ISRP Recommendation and Comments:**

Not fundable, the proposal is not adequate. This brief proposal leaves too many unaddressed issues for it to be supported at this point. The screen appears to be marginally innovative (used in Alberta previously), and there is no mention of monitoring for effectiveness. The pilot scale evaluation described in the Canadian reference, and observations of the screen in Willow Creek, Alberta, do not adequately demonstrate the ability of the screen to pass salmonids with minimal injury. Has the design been reviewed and endorsed by NMFS or Oregon agencies?

**ProjectID: 34037**

Analysis of alternative hatchery and fishery configurations in the Columbia River Basin

**Sponsor:** S.P. Cramer and Associates

**Province:** Systemwide

**FY02 Request:** \$67,200

**Short Description:** Quantify the potential effects of changes in 1) hatchery number, location, species, production, and marking and 2) fishing methods, closures, or reconfiguration on hatchery salmon returns, harvest benefits, and wild population risks.

**ISRP Recommendation and Comments:**

Not fundable, the proposal is technically inadequate, and innovation is not demonstrated. While this proposal suggests the work would be innovative, the proposal provides too little detail for reviewers to assess the value of the work or innovative nature. The proposal seems overly simplistic in its interpretation of what would be required to assess alternative hatchery and fishery configurations. The proposal makes no comment on issues of limiting factors to production, environmental trends and issues, estimation methods or modeling procedures, etc. The issue is substantially more complicated than portrayed: how would completeness of release records be evaluated, how will catch for release groups without tag allocations be estimated, how will optimality evaluated and against what standards? Activities proposed appear to be duplicative to some extent of activities already underway on an annual cycle at ODFW, WDFW, IDFG, PSMFC, PFMC, and PSC.

It is hard to believe that the 400 hours of time proposed in this project will lead to important new insights on altering how hatcheries and fisheries are regulated in the Columbia River Basin. The current configuration of hatcheries in the Columbia River Basin and of fisheries on Columbia River salmon is a complex mosaic that has been set in concrete by a series of events over the past 147 years. Knowing how to configure hatchery production and fisheries in order to meet any set of arbitrary political and/or biological objectives is a relatively minor task compared to the social and political heavy lifting that has to occur before such objectives can be agreed upon, and the decisions taken to implement the agreements.

The PI has a known track record, as does the firm he works through, which inspires some confidence; however, as stated above, the proposal is technically inadequate.