Council document ISRP 97-1

Report of the Independent Scientific Review Panel

for the Northwest Power Planning Council

Review of the Columbia River Basin Fish and Wildlife Program as directed by the 1996 amendment to the Power Act

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EXECUTIVE SUMMARY

A. General Review of the Implementation Process

Columbia Basin fish (anadromous and resident) and wildlife populations have been in decline for a century. The decline has been broadly recognized as serious for at least five decades, and large investments have been made over that period of time in attempts to halt and reverse the decline. With the first ESA listing of a Columbia Basin salmon stock in 1991, the awareness and concern intensified, and the investments in recovery and mitigation increased even further. In FY98, the direct investment in the Council's program is about $143 million/year (CBFWA 1997) and flow manipulation to enhance survival of migrating salmon smolts creates an indirect cost due to foregone electrical power generation that may amount to an additional $150–180 million/year (NPPC 1994). In spite of these expenditures, the salmon continue to decline and additional listings under the federal Endangered Species Act have been proposed.

Against this background of apparent failure, it is logical to ask whether there is some basic qualitative flaw in the recovery and mitigation efforts, or whether the failure is due to insufficiency in the amount of the investment. It was in this mix of uncertainties that the Northwest Power Act was amended to require an evaluation of the program and its implementation. The Independent Scientific Review Panel (ISRP) was formed in January 1997 to implement that evaluation. We have, during our first six months of operation as a committee, reached the following general conclusions:

- There is a noticeable discrepancy between the mix of projects actually funded and the ISRP's interpretation of the intent and priorities in the FWP

- There is a somewhat greater discrepancy between the mix of projects actually funded and the Fish and Wildlife Program (FWP), if the recommendations from recent scientific panels (Snake River Recovery Team, *Upstream*, *Return to the River*, and the National Fish Hatchery Review Panel) are considered.

- Although the Council and BPA have project and proposal tracking systems that are adequate for administrative purposes, they did not provide adequate information for a detailed and comprehensive analysis of proposal quality, project quality, or program accomplishments.

- If changes in the tracking and information system are made, and if a new annual funding cycle is announced soon enough, it will be possible to conduct a detailed review of individual projects and program implementation in 1998.

B. Recommendations

As a result of our review of the FWP and its implementation in 1997, the ISRP reports the following recommendations to the Council. The bases for these recommendations are in the text of the report. The first set of general recommendations concern overall program administration. Their implementation would improve the ability of the ISRP to conduct an overall review of the program or improve its implementation. The remaining group of recommendations are related to Sections 5, 7, 10, and 11 of the FWP. Recommendations are listed first by a Section and sub-section identifier, indicating the location of each recommendation within the body of the report. In the Executive Summary, the ISRP recommendation is in normal type, with supporting text in *italics*.

General Recommendations

I.D.1 The ISRP recommends that the Council adopt its "Integrated Framework for Fish and Wildlife Management in the Columbia River Basin" and use it to structure and filter proposed measures for inclusion in the FWP as part of the forthcoming amendment process. *This framework is key to the development of a scientifically based and adaptive process to evaluate and prioritize projects on an annual basis.*

II.B.1 The ISRP recommends that proposal format require more detail on experimental and sampling design, monitoring, evaluation, and other analyses. *The current guidelines tend to emphasize compliance with measures and priorities and with federal and other regulations. These must be part of the judging of proposals, but more detail is needed to judge relative scientific merit and probable effectiveness.*

II.B.2 The ISRP recommends that Council and BPA staff work with the ISRP to develop a uniform set of standards and policies for review of new and continuing project proposals.

II.B.3 The ISRP recommends that annual project evaluations based on renewal proposals (i.e., project summaries) be supplemented with less frequent detailed peer reviews of projects along the lines of recommendations of the SRG to BPA in "Guide to Project Peer Review" (February 10, 1994). *Any project that continues for 3-5 years would be subject to this detailed peer review, which would aid in annual funding decisions*

III.A.1 The ISRP recommends increased attention by the Council to a more information-rich accounting and reporting system to facilitate the prioritization of ongoing and needed work. *This should be accomplished by fall 1997 to be of use in the next round of ISRP evaluations.*

III.A.2 The ISRP recommends the Council fund implementation of the comprehensive management review as described in measure 3.1E of the FWP.

III.A.3 The ISRP recommends that Council specify clearly the intent of Program-wide coordination and reinforce this by specifying coordinated review, rather than appointing separate sub-program review boards. *This will be particularly important for successful implementation of the watershed-based approach to habitat restoration called for in Section 7 and wildlife habitat protection called for in Section 11 of the FWP.*

III.A.4 The ISRP recommends that the FWP recognize and emphasize sustaining a "normative ecosystem", which includes not only anadromous and resident fish, but wildlife such as bald eagles, river otters, seabirds, marine mammals, and bears, as well as less conspicuous wildlife, such as songbirds, bats, and burrowing rodents.

IV.B.1 The ISRP recommends that the Council implement a competitive grants program as part of the FWP.

IV.D.1 The ISRP recommends the Council adopt an annual project review and selection process with a double track for competitive and targeted proposals (including project renewal proposals).

Recommendations Related to the Review of the Fish and Wildlife Program

III.B.1 The ISRP recommends that all migration-related research, monitoring and other management activities be coordinated and integrated across agencies and tribes through explicitly stated and complementary measures in the FWP, NMFS, FWS and tribal recovery plans.

III.B.2 The ISRP recommends quantitative evaluation of assumptions (e.g., flow-survival) upon which structural (e.g., passage facilities) and operational (e.g., flow augmentation) measures in the FWP and Recovery Plan are based.
This should include:

- *a) risk-benefit analysis of tradeoffs required to create normative conditions and habitat in the mainstems, and*
- *b) thorough peer-review and evaluation of the effectiveness of high-cost actions including:*
  - *1) routine monitoring of juvenile outmigrants*
  - *2) predator control bounty*
  - *3) biological studies of gas supersaturation*

III.B.3 The ISRP recommends quantification of food web dynamics and their associated effects on juvenile salmonid ecology in mainstem reservoirs.

III.B.4 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among anadromous fish related measures within Section 7 of the FWP.

III.B.5 The ISRP recommends that the FWP include an explicit measure to develop approaches and rationale for re-regulation of flows in tributaries to establish normative habitat conditions, as recommended in *Return to the River*.

III.B.6 The ISRP recommends that habitat policies and objectives be established for each major subbasin and coordinated with overall production goals for the subbasin.

III.B.7 The ISRP recommends that development of reliable watershed assessment procedures be given high priority.

III.B.8 The ISRP recommends that the Council not approve funding for the construction and operation of new artificial propagation programs in the FY98 program until a comprehensive review of existing hatchery programs adequately addresses Measures 7.0D, 7.1A, 7.1C, 7.1F, and until at least a preliminary policy addressing Measure 7.1D has been drafted.

III.B.9 To prevent a complete moratorium on new production, the ISRP recommends that the Council permit funding for an individual project only if the project proponents can demonstrate they have taken measures 7.0D, 7.1A, 7.1C, and 7.1F into account in the program design and the Council concurs. To ensure that standard is met, the individual projects should be funded only after a positive recommendation from an independent peer review panel.

III.B.10 The ISRP recommends the Council implement a comprehensive review of artificial propagation in the basin. *That review should be initiated as soon as possible and cover all propagation activities including hatcheries funded by sources outside the FWP.*

III.B.11 The ISRP recommends that watershed assessment *precede* implementation of restoration projects so that probable limiting habitat factors be identified and a reasonable expectation of restoration effectiveness exists.

III.B.12 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among related measures for resident fish within Section 10 of the FWP.

III.B.13 The ISRP recommends that the Council require a basin-wide systematic inventory of remaining native resident fish populations and their status, upon which opportunities for restoration and rebuilding native resident fish populations can be identified and prioritized.

III.B.14 The ISRP recommends that measures in sections 10.1 and 10.2, which focus on planning, development of policy guidelines, and assessments of remaining diversity and population status in resident fish populations, receive greater attention and project funding.

III.B.15 The ISRP recommends that resident fish artificial propagation facilities and projects be included in the comprehensive review of artificial propagation as described and recommended above in ISRP Recommendation III.B.10.

III.B.16 The ISRP recommends that *substitution* projects, particularly those using non-native species, be viewed cautiously because their implementation may pose significant threats to native resident fish species. Therefore, individual *substitution* projects should be reviewed by the artificial production review panel (see ISRP Recommendation III.B.9), prior to authorization.

III.B.17 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among related measures for wildlife within Section 11 of the FWP.

III.B.18 The ISRP recommends that the Wildlife Program include an explicit scientific research component. *This would be likely to increase mitigation success and would make evaluation and adjustment of the Program over time much more feasible.*

III.B.19 The ISRP recommends that additional scientific criteria be added to those currently used to prioritize proposals for mitigation projects. *For instance, the geomorphologic suitability of a site to sustain Habitat Units anticipated to be gained should be considered in prioritizing mitigation projects.*

III.B.20 The ISRP recommends that specific mechanisms be developed to coordinate the FWP with other programs that have significant impact on fish and wildlife and their habitat in the Columbia River Basin.

III.B.21 The ISRP recommends that a separate Scientific Review Group for the Wildlife Program not be formed, but rather that a single Review Group (currently the ISAB) be charged with review of both Fish and Wildlife issues within the FWP. *This should improve program coordination, which will likely remain difficult in such a large and complicated program as the FWP.*

III.B.22 The ISRP recommends that acquisition of land and of land easements continue to be given a high priority in the Wildlife Program, as habitat is necessary for wildlife populations and can be quantified reasonably by HEP in accord with obligations of BPA to various areas and groups.

III.B.23 The ISRP recommends that the Program give increased attention and priority to research designed to evaluate effectiveness of habitat measures in terms of direct assessment of wildlife populations and their ecology.

III.B.24 The ISRP recommends that Council include a portion of the Wildlife Program funds each year within the competitive grants program for research that could contribute to the benefit of wildlife. *Innovative monitoring and research proposals could be encouraged through this part of the Program.*

III.B.25 The ISRP recommends that monitoring, which now is based on the unit of mitigation, habitat (measured as HUs [Habitat Units], determined from HEP [Habitat Evaluation Procedure]), be extended to include a requirement for some degree of direct monitoring of target (and perhaps some non-target) wildlife populations.

SECTION I - INTRODUCTION

I-A. Background of 1996 Power Act Amendment

This report responds to a new Congressional mandate changing the way Columbia River Basin fish and wildlife projects are selected for funding by the Bonneville Power Administration (BPA). Until 1995, BPA implemented the Columbia River Basin Fish and Wildlife Program (FWP) by choosing measures to implement and selecting the specific projects and contractors for that implementation. In 1995, BPA and the Northwest Power Planning Council (hereafter Council or NPPC) adopted a new process which called on the fish and wildlife managers to prioritize projects for funding and present them to the Council in the form of an Annual Implementation Work Plan (AIWP). The Council can ratify or revise the managers' annual priorities before submitting them to BPA for funding. Also in 1995, the Clinton Administration agreed to set a six-year fixed budget for BPA's fish and wildlife costs. This agreement meant the new prioritization process had to allocate implementation funding within a fixed budget.

In 1996, Congress amended the Northwest Power Act and added new procedures to the prioritization process. The amendment directed the Council to form an Independent Scientific Review Panel (ISRP) to make recommendations to Council on funding and resource allocations within the FWP and to review the projects proposed for funding for their scientific merit and consistency with the Program. This review is to be reported to the Council before the Council adopts prioritization recommendations. The Council is obligated to explain in writing if its recommendations for project funding disagree with the ISRP's report.

The 1996 Power Act amendment thus further changes what has already been an annually evolving process for selecting fish and wildlife projects for Bonneville funding. The Power Act amendment reforms may be the most significant of all, especially by adding in a formal independent peer review process and also by assigning new responsibilities and accountability to the Council. Integrating the peer review process and the other changes into the project funding process will not be fully accomplished in this first year. The amendment by its own terms is to last for four years, recognizing that this is a multi-year experiment in reinventing the process for making decisions on how to invest hydropower revenues in fish and wildlife recovery. The process will extend over several years, in a cooperative, iterative and educational effort involving the Council, the ISRP, the fish and wildlife managers, Bonneville, and interested non-governmental entities.

I-B. ISRP Charge

The recent amendment to the Northwest Power Act, which mandated the formation of the Independent Scientific Review Panel (ISRP), calls for the ISRP to review funding allocations and projects within the FWP annually for four years starting in 1997. This review is to be reported to the Council (annually on 15 June; extended to 15 July for 1997 because of delays in gathering the project summaries for the CBFWA [Columbia Basin Fish and Wildlife Authority] prioritization process) before the Council adopts prioritization recommendations. The Council is obligated to explain in writing if its recommendations for project funding disagree with the report of the ISRP. To facilitate this, the ISRP has included all of its recommendations in the Executive Summary and has highlighted its specific recommendations throughout the body of the report.

The ISRP identified a potential problem arising from a mismatch between its statutory charge and CBFWA's approach to the prioritization process and the MYIP (Multi-Year Implementation Plan). The ISRP has been directed to review the funding allocations and projects relative to the implementation of the FWP. However, the MYIP addresses the FWP, NMFS's Biological Opinion and The Tribal Restoration Plan. Both the Anadromous Fish Caucus and the Resident Fish Caucus utilized the work done on the MYIP to guide them in the development of their FY98 work plans. Consequently, the ISRP reviewed the FY98 Annual Implementation Work Plan from a more limited perspective than CBFWA used when they developed it. We did not attempt to determine how much this mismatch may have impacted our recommendations in this year's review.

Our review examines and makes recommendations in two broad areas: Implementation of the Fish and Wildlife Program (Section III) and Enhancing Peer Review in the Fish and Wildlife Program (Section IV). Sections I and II provide relevant background information and describe our approach to this review.

I-C. History and Present Status of Peer Review in the FWP

Peer review is an established tradition in public sector research and development enterprises in the United States and much of the world. The General Accounting Office and the Office of Science and Technology Policy have stressed the need for peer review in federal funding agency policies and for reforms to ensure fairness in funding selections (General Accounting Office, "Peer Review: Reforms Needed to Ensure Fairness in Federal Agency Grant Selection," Washington, DC, June 1994). Technical (scientific) peer review of BPA-funded projects is one of the steps critical to attaining and maintaining a high level of technical quality in the FWP.

From their inception, the scientific advisory bodies now represented in the ISRP (Scientific Review Group, Independent Scientific Group, Independent Scientific Advisory Board) have stressed the need for peer review and have provided advice, as well as recommendations on specific policies and procedures to give BPA and the Council a peer review process responsive to

federal initiatives (Coutant and Cada 1985; SRG 1990; ISG 1994). Bonneville Power Administration has made extensive use of the ISG's 1994 report to develop and implement a computerized project summary form. The project summary contains fields or queries that the principal investigators or project leaders must respond to by providing information required for scientific and technical peer review. The queries ask for information such as project objectives, relevance to the FWP, and a detailed description of methodology. The summaries should serve a useful role for review, but as we discuss later in this report, most project summaries requesting 1998 funding fell well short of that goal.

I-D. Recent Reviews by Independent Panels

The Independent Scientific Group and a National Research Council panel recently reviewed aspects of salmon restoration in the Columbia River Basin. Their reports, *Return to the River* (ISG 1996) and *Upstream* (NRC 1996), present a scientific synthesis that highlights areas where the Columbia River Basin Fish and Wildlife Program (1994 FWP) could be amended to provide a more scientifically sound salmon recovery program into the next century. There are several common threads running through these reports:

- Salmon have declined from many causes and there is no "silver bullet" that will resolve the current crisis.

- Replacement of salmon or salmon habitat by artificial means has in many cases not lived up to expectations.

- It is impossible to return to completely natural or pristine conditions, but there are means of restoring natural processes and features to more normative conditions that will provide a basis for sustained salmonid recovery and productivity. Such actions, taken in an ecosystem context, are likely to provide long-term benefits to resident fish and wildlife, as well as salmon and steelhead.

- Fragmentation of institutional roles and responsibilities remains a significant barrier to coordinated salmon restoration.

Council staff has recently (April 10, 1997) produced a draft issue paper entitled "An Integrated Framework for Fish and Wildlife Management in the Columbia River Basin" which describes a programmatic framework for the restoration of anadromous and resident fish and wildlife resources in the Columbia River Basin. The framework integrates social, economic and scientific information and objectives and incorporates many of the ideas embedded in the ISG's "Conceptual Foundation" from *Return to the River*. The Basin's fisheries managers have incorporated the conceptual foundation and management framework into their draft Multi-Year Implementation Plan (MYIP) (pp. 8-18 and Appendix A of the *Draft FY 1998 Annual Implementation Work Plan*, CBFWA, June 4, 1997). There appears to be general consensus

among the fisheries managers and Council on most points in the program framework and its conceptual foundation, which is based on *Return to the River*.

I.D.1 Therefore, the ISRP recommends that the Council adopt its "Integrated Framework for Fish and Wildlife Management in the Columbia River Basin" and use it to structure and filter proposed measures for inclusion in the FWP as part of the forthcoming amendment process. This framework is key to the development of a scientifically based and adaptive process to evaluate and prioritize projects on an annual basis.

I-E. Regional Management of Fish and Wildlife and the Role of Adaptive Management

Rationale for Prioritization in ISRP Reviews

The ISRP undertook its review of the Fish and Wildlife Program and project implementation with an understanding that the primary objective in the region is the restoration of a healthy ecosystem that supports increased abundance and productivity from fish (anadromous and resident) and wildlife populations in the Columbia Basin. This goal is explicit in the priorities the Council's FWP places on protection and restoration of native fish and wildlife resources in native habitats, as well as in the anadromous fish doubling goal and its biodiversity constraints. We attempted to judge the merits of proposed expenditures of FWP funds according to their likely contribution to that goal.

At the same time, we recognize in the past there may have been sound reasons for the historical priorities, and that there may be institutional constraints requiring that shifts of actual funding priorities take place gradually.

Prioritization of Projects in Relation to a Coherent Strategy for Anadromous Fish

Achieving regional recovery and increased anadromous fish production will require management actions to repair or compensate for some present malfunctions in an entire ecosystem that spans substantial parts of four large states. This will require a highly coordinated set of management actions. In theory, there may be more than one strategy that would be capable of achieving the objective, but mixtures of strategies will not lend themselves to the necessary coordination. Currently there are three strategies for salmon recovery in the basin: Council's Fish and Wildlife Program, NMFS's Biological Opinion and the Tribal Restoration Plan. The MYIP is addressing all three plans and could, when it is finished, successfully integrate them into a comprehensive recovery program for the basin. If the CBFWA successfully integrates the three plans, the resulting program would be a better vehicle for setting project priorities.

The Role of Adaptive Management in the FWP

Existing knowledge may already be adequate to suggest a general framework for a recovery strategy of anadromous fish and development of a healthy ecosystem for fish and wildlife. That knowledge is summarized in recent syntheses such as *Upstream* (NRC 1996) and *Return to the River* (ISG 1996), and both present promising ideas for a scientific basis for proposing recovery actions. The Council's recent draft issue paper entitled "An Integrated Framework for Fish and Wildlife Management in the Columbia River Basin" describes a programmatic framework that incorporates many of the ideas from *Upstream* and *Return to the River*.

Although the framework and other documents may identify a specific strategy, the details of implementation--including decisions about how much is enough, and decisions about which interventions are proving most effective--will have to be learned during the course of the recovery. Details of the management actions that would be sufficient to achieve recovery goals will be tremendously important in their influence on the eventual success and cost of the recovery effort. Because present knowledge is not sufficient to determine the details of an implementation plan, there will need to be some element of experimentation in the recovery efforts themselves.

The adaptive management approach (Lee 1993; Volkmann and McConnaha 1993) offers the region a means to integrate new knowledge and experimentation into the applied effort of salmon recovery and maintenance of the Columbia River ecosystem. There is a fine balance to be struck in drafting a plan that has sufficient flexibility to accommodate a realistic need for ongoing fine tuning, but which still is concrete and specific enough to provide meaningful guidance.

Designing efficient management experiments, and conducting the monitoring to obtain timely and conclusive results from the experiments, will be crucial to the success of this adaptive approach. The design and analysis of the experiments, and design and operations of the required monitoring, may constitute a fair fraction of the recommended investment of the resources of the Fish and Wildlife Program and may occupy a fair fraction of the available talent, for these are demanding problems.

SECTION II – ISRP CHARGE AND APPROACH FOR 1997 REVIEW

II-A. ISRP Approach to the Review

Approach in 1997

The Independent Scientific Review Panel was appointed by the Council in December 1996 and began work in January 1997. The panel consisted of eight members from the existing Independent Scientific Advisory Board (ISAB) augmented by three new members with expertise in wildlife, oceans, and natural resource economics. The ISRP spent approximately two months familiarizing itself with the Columbia River Basin and the Fish and Wildlife Program (FWP), reviewing CBFWA's past prioritization efforts, and defining the scope of our 1997 review. By March 1997, we recognized several factors which would limit the scope and extent of our 1997 review. The ISRP was appointed in the middle (January) of an annual review cycle that ends on 15 June of each year. We concluded there was not enough time this year to develop the entire process, establish Peer Review Groups and conduct a rigorous scientific review of each BPA-funded project (which number more than 220). Additionally, in early March 1997, we reviewed a set of 100 project summaries and determined that the quality of information available in most of them was inadequate for rigorous scientific review. Consequently, the ISRP limited its work in 1997 to three primary tasks:

1. a general review of the projects and the project summary form (Section II-B);
2. a general review of the implementation of the FWP (Section III);
3. recommendations for improving review of proposals and refining an annual review cycle (Section IV).

The last task was intended to provide guidelines and assistance so that a complete review of projects can be conducted in 1998.

The ISRP recognizes that integrating the peer review process described in this report, as well as other changes in the project funding process will not be fully accomplished in this first year. The process of revising and reforming peer review in the Basin will extend over several years, in a cooperative, iterative and educational effort involving the Council, the ISRP, the fish and wildlife managers, Bonneville, and interested non-governmental entities. In that vein, future ISRP review efforts are described in the work plan below:

II-B. Review of 1998 Ongoing Projects and CBFWA Prioritization

In spite of staring our review in the middle (January) of an annual cycle ending in June of each year, we examined the project summaries of all ongoing projects during our review of the FWP (Figure 1; Section III). Although our initial review of a subset of 100 project summaries was conducted on a draft form of the summaries, we later examined all 220+ project summaries

in the same form that CBFWA used in development of their FY98 Annual Implementation Work Plan.

Review of Continuing (Ongoing) Project Descriptions

We interpreted our mandate from the 1996 Power Act Amendment to include a scientific review of some of the individual projects proposed for continued funding for the BPA-funded FWP. To accomplish this aspect of our review, we did the following.

The ISRP reviewed a preliminary draft of the FY 1998 Project Summary form that was to be used by BPA to collect information on projects in a common format. Comments on the draft form were provided to staff of the Power Planning Council. Our main concern was that the form be consistent with the guidelines for project proposals by Coutant and Cada (1985), the SRG (1990) and the ISG (1994). Those recommendations included the minimum standards for information to evaluate scientific and technical acceptability of projects, and were gleaned from a review of numerous funding agency requirements. The draft form did request many, but not all, of the recommended types of information.

In March, ISRP members read a subset of about 100 of the completed FY 1998 forms for continuing projects. The project summary form had changed since our earlier review of the draft. Each ISRP member reviewed 10-20 projects. The subset included a sample of all types of project, including research, monitoring, habitat improvement, and hatchery construction. In May, we examined all renewal project summaries in the same form that CBFWA used during its prioritization process. We did not evaluate new project proposals, because these were not solicited by BPA. Instead, BPA requested abbreviated statements of need without specific proposals. We did not review the Needs Statements as part of this ISRP report; however, we expect to include a review of them in our "Retrospective" report to Council later this fall.

We drew conclusions about the information-collection and review process from the renewal proposals we reviewed. We drew conclusions about the form, the quality of information supplied by project proposers, and how well we were able to discern project quality from the information provided.

Conclusions and Recommendations for FY 1998.

The information supplied in the FY98 proposed project summary forms was generally insufficient for a scientific peer review, although a number of project summaries provided adequate detail for review and several summaries were exemplary. The latter proposals demonstrated that the project summary form could be used for the purpose of scientific review, when adequate information was provided. Nevertheless, several categories of information were not provided, such as the names of personnel, their qualifications to do the work, and breakdown of costs. The information supplied on the form frequently did not provide enough technical detail to adequately represent some projects, based on personal knowledge by ISRP members. Consequently, the exercise of comparing projects proposed for FY 1998 on the basis of relative scientific and technical merit was not feasible using the project summary forms.

II.B.1 The ISRP recommends that proposal format require more detail on experimental and sampling design, monitoring, evaluation, and other analyses. The current guidelines tend to emphasize compliance with measures and priorities and with federal and other regulations. These must be part of the judging of proposals, but more detail is needed to judge relative scientific merit and probable effectiveness.

The current process of obtaining information for project evaluations suggests the need for institutional authority to establish the importance of providing information suitable for a scientific-technical peer review to guide decisions about future funding. Such authority is essential if the FWP is to succeed. Because we were unable to conduct a scientific-technical evaluation of individual projects for FY 1998 due to lack of appropriate information, we decided to emphasize evaluation of subject coverage instead, and attempt to assist the Basin in improving the process and quality of proposals for review in FY 1999.

II.B.2 The ISRP recommends that Council and BPA staff work with the ISRP to develop a uniform set of standards and policies for review of new and continuing project proposals.

The written standard and policy document should describe the peer review process, as well as the kind of information and technical detail that are necessary for peer review. The document should also provide guidance for investigators as they prepare or update project summaries for new or ongoing proposals. Finally, the document should also include information on the annual review cycle (Section IV-D) and its deadlines for proposal submission.

In order for the review of projects to occur smoothly within the context of the annual review cycle, particularly during the one or more years that will be required to formalize this process within the Basin, it is imperative that guidelines for the process and expectations be clearly defined for all parties involved. Formalizing peer review, the intent of the 1996 Power Act amendment, will likely need to be an educational and iterative process. Nevertheless, the annual review cycle, including the CBFWA prioritization process and the ISRP review of projects, will be compromised if deadline dates for project submission are not respected. Project summaries must contain adequate information and detail to allow scientific, technical review. A guidelines document will assist investigators in preparing project summaries. In the future, proposals that do not contain adequate information or are submitted after the deadlines, are likely to be excluded from the review process and not recommended for funding.

II.B.3 The ISRP recommends that annual project evaluations based on renewal proposals (i.e., project summaries) be supplemented with less frequent detailed peer reviews of projects along the lines of recommendations of the SRG to BPA in "Guide to Project Peer Review" (February 10, 1994). Any project that continues for 3-5 years would be subject to this detailed peer review, which would aid in annual funding decisions

Peer review of project proposals (both renewal and new) for scientific-technical quality should be part of a well-described project evaluation process. ISRP recommendations in this area are developed in Sections IV-C (A Peer Review Process for Project Proposals) and IV-D (Annual Proposal Review Schedule for the Fish and Wildlife Program).

II-C. ISRP Work Plan for 1998 - 2000

Year 2 (1998)

Work by the ISRP in 1997 will have set the stage for a 1998 comprehensive review of funded and proposed projects. Project reviews will occur from the perspective of topics (e.g., habitat, artificial production, etc.) and by subbasins, as the latter links different topical projects within specific geographic settings. The review process anticipates extensive use of Peer Review Groups for project review during this process.

Programmatic-level recommendations will arise out of the comprehensive projects review. These recommendations will contain more project-specific detail than do the 1997 programmatic recommendations contained in this report.

a) 1998 Project-level Review.
   - Comprehensively review funded and proposed projects
   - Review topically and by subbasin
   - Utilize Peer Review Groups

b) 1998 Programmatic-level Review
   - Refine the preliminary recommendations of 1997
   - Make project-specific recommendations where appropriate to programmatic concerns

Years 3 and 4 (1999-2000)

In addition to conducting further iterations of both project and programmatic reviews as described in Year 2, the ISRP will focus in 1999 on describing a long-term strategy in defining a Rationale and Protocol for future review efforts. This will include specific protocols, revised as needed from 1997 and 1998, for the review of projects, as well as programmatic review. The protocols would be defined within an adaptive management context. The vision, rationale, and protocols should provide guidance for future evaluations, rankings and prioritization of overall program goals, as well as for individual projects if the Congress or region decide to continue the ISRP efforts (either as the ISRP or another review group) beyond the four years mandated by the recent Power Act amendment.

SECTION III – REVIEW OF FWP IMPLEMENTATION

III-A. Comments on FWP Organization and Administration

The ISRP reviewed the budgets of individual projects submitted for approval in FY98 and summarized the data by major categories, i.e., hatcheries, habitat, mainstem passage, etc. (Figure 1). The ISRP developed charts (Figures 2-8) that illustrate the organizational relationship between projects and functional groups of measures in each of the sections of the FWP we reviewed. To construct Figures 2-8, we reviewed all the projects that were relevant to a specific section of the FWP. Then we determined which measure or functional groups of measures best described the primary objective of the project. In some cases a single project contributed to more than one measure, but in our analysis we only recognized the project's primary intent. For many projects, this required a judgement by the ISRP as to the project's primary purpose.

The summary presented in Figure 1 shows the distribution of funds among the projects recommended for funding in CBFWA's FY98 Annual Implementation Work Plan. Based on the above analyses, hatcheries were the highest priority, requesting the largest percentage of the budget (41%; 34% supplementation and 7% production). Habitat categories were the next largest funding request (32%). Of the total request for habitat, anadromous fish accounted for 47%, wildlife 42%, and resident fish 12%. Mainstem passage and habitat accounted for 17% of the requested funds. No funds were requested for work in the ocean or estuary.

In our attempt to conduct this initial review, our effort was impeded, in part, because the FWP and the CBFWA AIWP for anadromous fish projects use different organizational structures. The FWP organizes its anadromous fish measures around functional elements: salmon goal and framework, juvenile salmon migration, adult salmon migration, coordinated salmon production and habitat, and salmon harvest. The CBFWA AIWP organizes its anadromous fish projects into geographical units: Clearwater subbasin, Deschutes Subbasin, Fifteen Mile Subbasin, Grande Ronde Subbasin, Hood Subbasin, John Day Subbasin, Klickitat Subbasin, Lower Columbia Watershed, Columbia River Mainstem Subbasin, Snake River Mainstem Subbasin, Hanford and Mid-Columbia Subbasin, Salmon Subbasin, Salmon and Clearwater Subbasin, Tucanon and Asotin Subbasin, Umatilla Subbasin, Walla Walla Subbasin, Yakima Subbasin and a system-wide category. The ISRP did not evaluate the efficacy of the two organizational approaches. Each approach has positive points. However, we agree that restoration efforts, organized by watersheds in an ecosystem context, is logical and consistent with ecological theory (see *Return to the River*). Functional elements focus on major problem areas which makes it easier to assess the distribution of the total investment over the entire range of critical problems.

The different organizing structures make it difficult to relate the list of projects approved by CBFWA to the implementation of specific measures in the FWP. The CBFWA AIWP should include an explicit description of the relationship between the FWP and its recommended list of projects.

Our experience this year led us to the conclusion that there is a general lack of a disciplined approach to the implementation of the FWP, particularly for the anadromous fish section. There appears to be a general lack of concern regarding the relationship between the FWP and the Annual Implementation Work Plan. This problem was anticipated by the Council and was expressed on page 3-7 of the FWP. Some of the problems encountered this year would be resolved if more attention were given to the relationship between the FWP and the Annual Implementation Work Plan.

The above deficiencies notwithstanding, the ISRP is encouraged by CBFWA's development of a Multi-Year Implementation Plan (MYIP). The ISRP agrees with the need for a regional framework as contained in the MYIP and believes it will be useful in future project prioritization efforts. We believe conscientious adherence to the principles that comprise the conceptual foundation will improve implementation of the FWP and will alleviate some of the problems identifies in our 1997 review. The ISRP supports use of the MYIP to exert appropriate influence in the 1999 CBFWA prioritization process.

General Recommendations on Administrative Issues

The ISRP had difficulty relating measures in the FWP to specific actions in the basin. Although the Council has an accounting system to match measures with contracts, a more information-rich system is needed to relate measures to actions (past, present, and proposed), especially for complex sections of the FWP, such as Section 5 (Juvenile Migration) and Section 7 (Coordinated Salmon Production and Habitat). Because the accounting and reporting system available at the Council and BPA could not answer many of the ISRP's questions in the time available, the ISRP had to conduct its own survey. Operational measures in the FWP were especially difficult to relate to actual operations. Because there is a cost and often incompletely substantiated biological assumptions associated with fish-related operations, even though no contracts are let, the ISRP included operational measures in its charge for this overview of Section 5 of the FWP, Records are also poor for measures that have already been accomplished (i.e., the intent of the measure has been met) and thus no longer need active projects. For example, some measures have deadline dates, some predating the 1994 FWP, yet it is unclear whether the work was done or whether the work recorded in the accounting system actually satisfied the intent of the measure. Whether a project complies with a measure is often a judgment of the BPA Contracting Officer's Technical Representative (COTR). Neither the Council nor BPA have a bibliography of reports keyed to each measure in order for someone to evaluate accomplishments. Many of the proposals for FY 1998 funding received for ISRP review did not identify which Program measure the project sought to address. These difficulties are more than procedural--if funding is to fill gaps in knowledge identified in the FWP, then it is important to understand where those gaps remain to be filled. If operational measures were abandoned because the biological assumptions were incorrect, then this knowledge should be recorded. These improvements in the usefulness of the accounting system appear feasible and worth the effort.

III.A.1 The ISRP recommends increased attention by the Council to a more information-rich accounting and reporting system to facilitate the prioritization of ongoing and needed work. This should be accomplished by fall 1997 to be of use in the next round of ISRP evaluations.

The ISRP believes that the Council needs (and partially has):

- A systematic inventory of what has been accomplished already for each measure, including operational actions that do not have "projects" (with reports, administrative memos, etc. documenting accomplishment).

- A systematic inventory of what is being done now for each measure, both in operations and funded projects (with account numbers and descriptions for specific projects funded by BPA, Corps, NMFS, or other agencies). This inventory should indicate expected near- and long-term results.

- A systematic inventory of the measures in its Program that still need to be addressed, so that groups like the ISRP can prioritize them for future attention. The current accounting system shows measures without current projects, but it is not clear whether the work has already been completed or has been left out.

- A staff assigned to these functions to work closely with BPA COTRs to judge accomplishments, rather than having analysis left to its advisory boards. There is an educational value for the ISRP/ISAB to evaluate the specifics of the FWP, but the institution should keep the records. It is unlikely that computer searches alone will accomplish these inventories, although the StreamNet database might be used for this purpose.

Many of the problems discussed above are organizational and managerial and not scientific, however they impede the scientific evaluation. A managerial review could identify problems overlooked by the ISRP and do a better job of recommending corrective actions.

III.A.2 The ISRP recommends the Council fund implementation of the comprehensive management review as described in measure 3.1E of the FWP.

Numerous measures in the FWP call for coordination among measures, entities, and programs. One means of enhancing coordination among major programs, such as anadromous fish, resident fish, and wildlife, would be for a single review board to review proposals or projects from all areas, rather than establishing separate review boards for each program area.

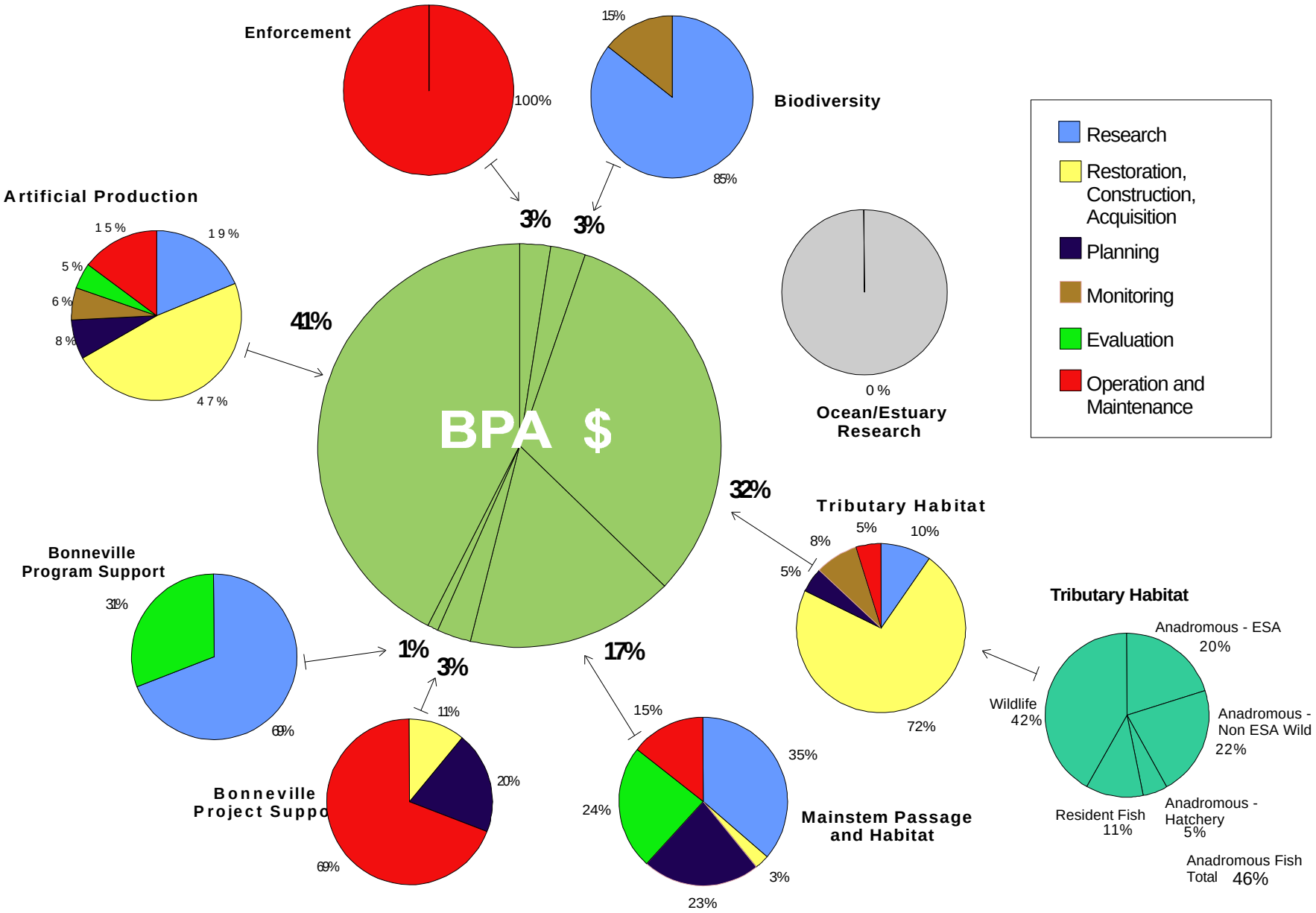
III.A.3 The ISRP recommends that Council specify clearly the intent of Program-wide coordination and reinforce this by specifying coordinated review, rather than appointing separate sub-program review boards. This will be particularly important for successful implementation of the watershed-based approach to habitat restoration called for in Section 7 and wildlife habitat protection called for in Section 11 of the FWP.

General Recommendations on Revisions to Fish and Wildlife Program

Terrestrial habitat, terrestrial wildlife, and ocean wildlife are part of the ecosystem, contributing to the ecological diversity and complexity that likely are necessary for preservation of both fish and wildlife populations. For example, selection pressure on fish populations by predators can be important to traits of fish, as well as an important contributor to the diversity of their ecosystem, and food provided to marine and terrestrial wildlife by fish helps to maintain the diversity and productivity of both terrestrial and aquatic systems and their component wildlife species.

III.A.4 The ISRP recommends that the FWP recognize and emphasize sustaining a "normative ecosystem", which includes not only anadromous and resident fish, but wildlife such as bald eagles, river otters, seabirds, marine mammals, and bears, as well as less conspicuous wildlife, such as songbirds, bats, and burrowing rodents.

Figure 1. Distribution of Funds in the FY98 CBFWA Recommendations



III-B. Review of specific sections of the FWP

Although the ISRP examined the entire Fish and Wildlife Program, our review emphasized the four major sections of the FWP (Sections 5, 7, 10 and 11) because of start-up problems in this first year of the review process. These sections deal with major elements of the FWP (e.g., juvenile migration, salmon production, resident fish, and wildlife) and therefore include a large percentage of the measures and funded projects in the program. In particular, we did not review adult salmon migration (Section 6) and salmon harvest (Section 8). Nevertheless, adult salmon migration and harvest management are extremely important to salmon recovery and need to be coordinated with other components of the program. We did not focus on individual projects, but reviewed the overall priorities and compared those priorities to the intent of the FWP. Therefore our recommendations are general in nature. In 1998, we will evaluate each project and provide project-prioritization recommendations to Council.

Section 5 - Juvenile Salmon Migration

Intent

Section 5 of the FWP addresses juvenile salmonid migration through the lower Snake River and mid- and lower Columbia River. A long preamble (5 pages) and subsections without measures (5.0A and 5.0B) explain the basic physical and biological problems for successful salmonid migration, relationship of fish migration to the basin's water budget (flow management to aid fish migration), the nature of scientific uncertainty about the ecosystem in the mainstem that supports successful migration, the anticipated value of an adaptive management approach to actions intended to aid migration, and the idea of conducting a major mainstem experiment to test several specific hypotheses about how fish migration might be improved. The hypotheses are described in a separate 5-page subsection (5.0E) without measures (specific measures regarding the hypotheses follow in subsequent subsections). There are two major hypotheses, one dealing jointly with river flow, water velocity, fish migration rate, and fish survival, and the other dealing with transportation of juvenile salmonids downstream by barge and truck. This section of the FWP is innovative and laudable for proposing specific hypotheses for improving juvenile salmonid migration and measures to test them. Many of the juvenile migration issues reviewed in the Independent Scientific Group's report, *Return to the River* (ISG 1996) are included in this section.

Many of the measures in Section 5 are "operational" rather than directing BPA expenditures. The operational measures require agencies to take certain actions as a part of their normal business operations. These operational measures outnumber those related to scientific research and monitoring. Section 5 has 189 measures assigned to the Council, major agencies (BPA, Corps of Engineers, NMFS, FERC, Bureau of Reclamation), "fish managers", "regulators", states, the public utility districts, specific utilities (e.g., Idaho Power Co.), specific smaller groups (Fish Operations Executive Committee, ISG, Pacific States Marine Fisheries Commission), and "relevant parties." Each operational objective (or group of objectives) is

accompanied by a biological objective (which entails an assumption that the biological objective will be met by the operation). There is clear intent to operationally expedite successful fish bypass of dams, increase flows, increase water velocities in reservoirs, control salmonid predators and reduce biological competition.

It is also the intent of Section 5 that important research and evaluation be funded and conducted by agencies other than BPA. Numerous actions are specified, for example, for the U.S. Army Corps of Engineers, which has its own extensive mainstem research program (USACE 1997). Coordination of operations and studies among agencies is intended to occur through a "Fish Operations Executive Committee" (5.1A).

The preamble makes four important observations that imply overall intent of the section. The first recognizes inherent conflicts among the purposes of the hydropower system. Apparently, it was not clear to the writers of the FWP how mainstem fish and wildlife objectives could be achieved along with the other objectives of the hydropower system, especially for all years with variable environmental conditions. Careful planning would be required. Second, changes must be made in the hydroelectric system over the long term to both make the fish and wildlife objectives more achievable and minimize continual (and implied sensitive and politically unsettling) impacts and tradeoffs among objectives, consistent with the Northwest Power Act. Third, there must be evaluation of the biological assumptions that underlie operational objectives to see if changed river operations could be expected to achieve the anticipated biological benefits. Evaluation of assumptions behind an action is different from evaluating the results of an action, although the two are related. Fourth, these activities need to be made with cooperation among all parties to ensure the continued adequacy, efficiency, affordability, and reliability of the region's power supply.

The ISRP believes these observations entail immense and important challenges for both overall management of the mainstem for juvenile salmon migration and for prioritizing work to be done with BPA funding under the FWP. The ISRP believes it is especially incumbent on the scientific and technical portions of the FWP to thoroughly scrutinize the biological assumptions behind operational (and structural) objectives. As major restructuring of the hydropower system is contemplated through drawdowns below normal operating pools and dam breaching, the biological foundations for these actions and other less drastic alternatives must be clear and well substantiated.

Implementation

Many of the measures in Section 5 have been implemented, although the context of the measures has changed greatly since the current FWP was written in 1993-94. In particular, the implementation of operational and experimental measures has been altered by specific actions mandated by the 1995 Biological Opinion by the National Marine Fisheries Service under the Endangered Species Act (NMFS 1995). These actions have often superseded the Council's measures and timetables, despite broadly similar biological objectives. For example, the Corps of Engineers references the Biological Opinion measures rather than the Council's FWP measures as justification for its research and evaluation projects at mainstem dams (USACE 1997). Specifically, the Council's schedule for experimental drawdown of selected reservoirs to

test effectiveness in aiding fish migration has been bypassed. These changes entail not only policy decisions, but often imply new or altered biological assumptions and they affect the ability to test assumptions. The prescriptive nature of the Biological Opinion seems to have been detrimental to the Council's objective of scrutinizing the validity of biological assumptions using BPA funding. There is need for a regional approach reconciling the Council's program and the NMFS requirements.

Of the 189 Section 5 measures in the FWP, 25 currently appear to have identifiable BPA project numbers associated with them, with the remainder being operational or background measures without specific BPA contracts (Figure 2). From the complementary perspective, the ISRP could relate 46 of the more than 220 BPA project numbers to specific Section 5 FWP measures, although this involved the ISRP making judgements about the relationship of a specific project to the FWP, rather than the proposer describing how the project related to a Program measure. Both tallies include multiple entries. Although few operational measures would be expected to be identified with specific BPA FWP projects, their biological basis still needs scrutiny (as noted above).

Projects funded by agencies other than BPA accomplish many FWP measures. The Corps of Engineers, the mid-Columbia P.U.D.s and NMFS, in particular, have funded projects that generally match many FWP measures related to juvenile salmon migration, albeit with little specific cross-referencing (e.g., USACE 1997). The FWP is not designed to relate only to BPA but to federal agencies in general, hence the reference of many measures to the Corps rather than BPA. Both the Corps and NMFS have ESA-related work that corresponds with measures in the FWP. The Corps funds essentially all of the transportation implementation and evaluation (5.8A), with the work being accomplished by the NMFS. The ISRP has surveyed the Corps of Engineers' Portland and Walla Walla districts for projects associated with the FWP Section 5. Most of these relate to improving Columbia and Snake river passage near or at dams (few BPA-funded projects), transportation, and effects of dissolved gas supersaturation (both agencies fund). The concentration of Corps' studies on the behavior of salmonids as they pass through reservoirs and encounter dams, biological evaluations of structural improvements, and studies that evaluate transportation seem appropriate to needs of the FWP. These multiple projects and agencies seem inadequately coordinated and integrated, in spite of the intent of Measure 5.1A, which describes coordination of operations and studies among agencies through a "Fish Operations Executive Committee".

III.B.1 Therefore, the ISRP recommends that all migration-related research, monitoring and other management activities be coordinated and integrated across agencies and tribes through explicitly stated and complementary measures in the FWP, NMFS, FWS and tribal recovery plans.

A number of assumptions on which operational measures in both the FWP and the NMFS Biological Opinion (including proposed major structural and operational modifications of the hydropower system) are based have not been evaluated. Quantification of these assumptions could allow more firm prediction of probable biological benefits to be derived from alternative management actions (structural and operational). Key assumptions include the responses of migrating juvenile salmonids to flow volumes, water velocities, temperature, and other ecological characteristics of the mainstem, both in riverine situations and in reservoirs. Some assumptions are being evaluated in detail by the PATH projects (further review of the PATH results by the ISRP or ISAB will be needed to determine what other areas should be covered). The assumptions should be evaluated in the parameter ranges capable of being managed in the basin (e.g., flow augmentation in the actual range of potential drafts from upstream reservoirs over the diversity of water availabilities). This research and monitoring can be accomplished under the framework of the FWP's "mainstem experiment."

There appear to be especially large BPA expenditures in a few areas and none in others, based on the clumping of stars in Figure 2. This seeming imbalance may act to the detriment of other needed studies and actions in the mainstem for juvenile migrants. There seems to be little systematic allocation of funds among areas of need as identified in the FWP. We cite three examples of heavy BPA commitment evident from Figure 2. First, routine monitoring the movement of juvenile salmonids absorbs a large amount of BPA funding (FWP subsection 5.1B) and general monitoring projects (measure 5.9A.1). Although the smolt monitoring work the ISG reviewed is generally of high quality (ISG 1995), the analysis to date seems to have been largely a documentation of the demise of salmonids in the basin with insufficient investigation of causes and potential alternative remedies. This work could be more focused on analyses that try to answer critical uncertainties about various alternative management approaches (that are explicit or implicit in other Program measures). This extended analysis will likely require new projects as well as an evolution of the existing program. Second, the bigmouth minnow (squawfish) predator control program is expensive even though predation is likely the secondary end-result of other multiple stresses and habitat degradation for juvenile salmonids. The primary causes of stress (e.g., damages from turbines and fish bypass systems or high temperatures) might better receive both additional study and attention to remedies. A thorough review of the predator control program has not been conducted. Third, gas supersaturation research receives considerable attention even though the physical causes and engineering solutions at the dams are known and the general biological detriment of high gas supersaturation is well proven. The research tests several key biological assumptions about gas bubble trauma, but the present emphasis could be considered as pursuing biological details as an excuse for not making the obviously needed engineering corrections at the dams. This program, too, has not been evaluated in the context of other needs of the FWP. Fourth, ISRP sees little substantiation that illegal catches are a major problem for salmon survival (this program targets catches of adults, but is a major drain on funds needed for work to protect juvenile salmonids).

A major set of the uncertainties addressed by the FWP in Section 5 are described in several measures, that direct the ISG (now the ISAB) to assist in developing a "mainstem experiment" to address uncertainties concerning flow, water velocity, fish migration rate, and survival. Companion studies on smolt transportation, also called for in this measure, are being

undertaken and funded by the Corps of Engineers. Therefore, the Council and NMFS should consider whether existing work (e.g., PATH, the NMFS reach survival studies and other PIT-tagging studies) constitutes the intent of the mainstem experiment, what other approaches might be taken, and whether any single (different) experiment is feasible and provide direction to the ISAB if additional assistance is desired.

The ISRP finds that ecological and hydrodynamic understanding of juvenile fish migration is inadequate for serious, quantitative evaluation of the major measures of the Council's FWP related to reservoir drawdown, dam breaching, and flow augmentation. All of these actions assume a fairly simple flow-survival relationship. When the complexities of the relationship are more fully understood, other management options for aiding migration will likely become evident (some were suggested in *Return to the River*). The quantitative strengthening of this knowledge base (for support or modification of flow-survival relationships) is seen by the ISRP as having high priority for realistic risk-benefit evaluations of structural and operational management options related to juvenile migration. As immensely important as they are, neither the physical nor biological assumptions related to flow augmentation are being adequately tested by any project funded by the Fish and Wildlife Program or by any other agency in the Columbia River basin.

III.B.2 The ISRP recommends quantitative evaluation of assumptions (e.g., flow-survival) upon which structural (e.g., passage facilities) and operational (e.g., flow augmentation) measures in the FWP and Recovery Plan are based. This should include:

a) risk-benefit analysis of tradeoffs required to create normative conditions and habitat in the mainstems, and

b) thorough peer-review and evaluation of the effectiveness of high-cost actions including:

1) routine monitoring of juvenile outmigrants
2) predator control bounty
3) biological studies of gas supersaturation

Major ecological events in the mainstem that could be affecting juvenile salmonids during their outmigration appear to have received little attention in existing projects, even when part of the FWP. For example, the American shad population has increased dramatically in the lower Columbia River and shad are colonizing progressively further upstream. The anticipated importance of shad is reflected in a set of FWP measures (5.7A2, 5.7B9, 5.7B10, 5.7B11) but there are no ongoing or planned projects. A second example is the invasion of the Columbia and Snake river reservoirs by estuarine invertebrate organisms, which are now found upstream as far as Lower Granite pool (ISG 1996). Although observed for several years in the monitoring

programs, these invaders have not been evaluated for their effects on declining salmonids in spite of likely food-chain interactions. In general, the replacement of riverine food chains for juvenile salmonids with reservoir food chains is hardly recognized in the FWP or in the research being funded (most food chain research has been funded by the Corps of Engineers as part of its dredged materials program).

III.B.3 The ISRP recommends quantification of food web dynamics and their associated effects on juvenile salmonid ecology in mainstem reservoirs.

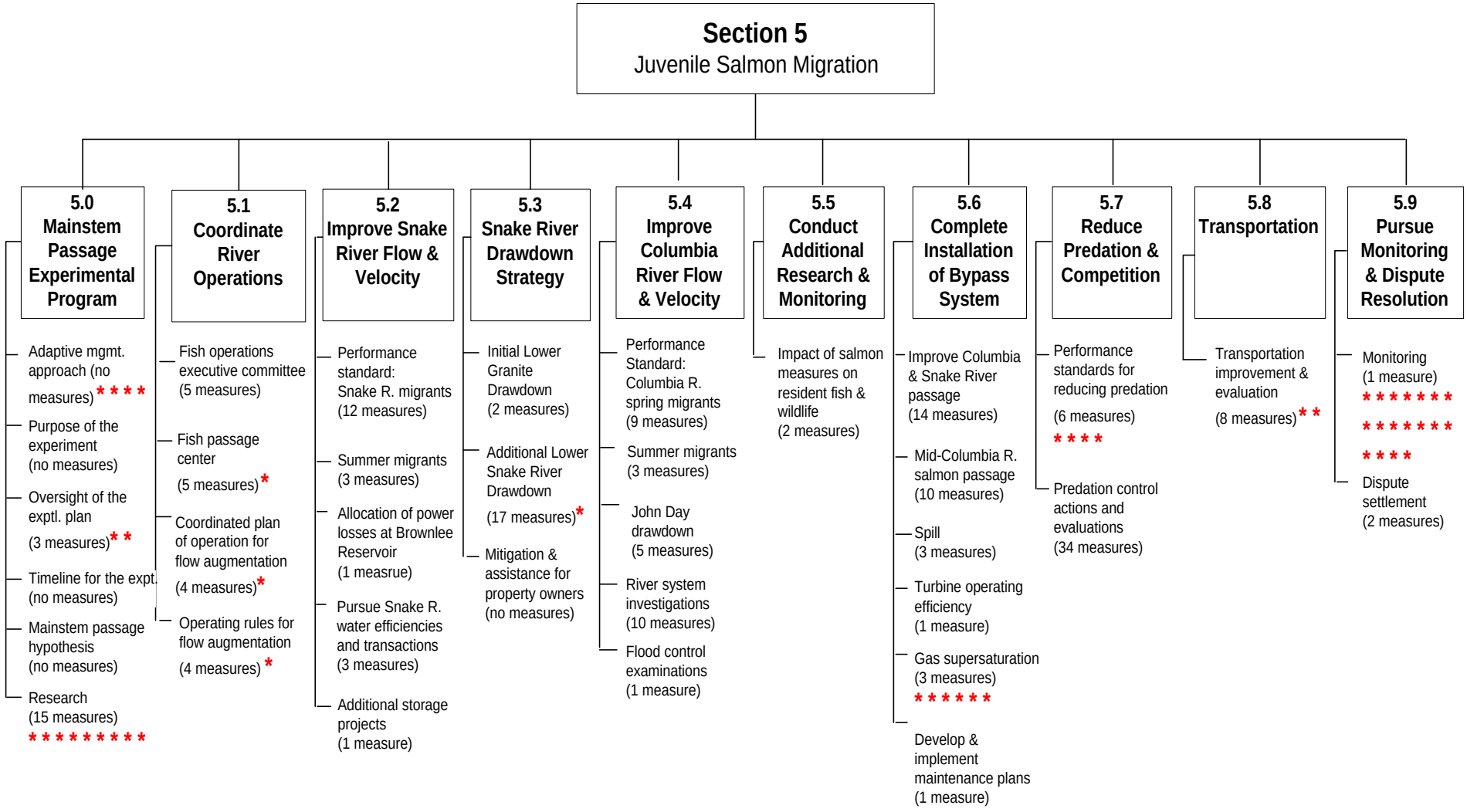


Figure **2. Distribution of projects among measures in Section 5 of the FWP.**

Section 7 - Coordinated Salmon Production and Habitat

Intent

Section 7 of the FWP contains measures intended to increase natural and artificial production in the basin. The measures in Section 7 fall into three broad categories: 1) increase, improve or evaluate artificial propagation; 2) improve habitat and increase natural production; and 3) a mixture of measures to gather basic information on habitat and existing wild and naturally spawning stocks, and to develop policies and plans. The Council's intent in Chapter 7 is to increase production from both natural and artificial sources. Subsections 7.0, 7.1, 7.2 and parts of the other measures in Section 7 imply that the Council also intended to ensure that the natural and artificial production systems are successfully integrated in the basin—in particular, that artificial propagation does not adversely affect natural production of the Pacific salmon's remaining biodiversity and that harvest of artificially propagated salmon not lead to coincident overharvest of naturally produced stocks.

The measures in Section 7 are tied to measures in other parts of the FWP. The Introduction to Section 7 identifies coordination between habitat (natural production) and artificial production measures as a critical element in an ecosystem approach to species recovery, then it goes on to state that the "starting point for coordination is the subregional process" (Section 3, Measure 3.1D). Clearly, the Council intended to increase artificial production consistent with guidelines that emerge from the subregional process. Measure 4.1D calls for the development of a biological diversity baseline to be composed of selected populations in the basin. The baseline is directly related to measures in Subsection 7.1 (Ensure Biodiversity). Measures such as 3.1D and 4.1D should logically precede or at least be implemented concurrent with the production and habitat measures in Section 7. The ISRP could find no evidence that Measures 3.1D and 4.1D have been completed, that work is ongoing or that there is an intent to complete those measures in the future.

Within Section 7, measures such as: Comprehensive Evaluation of Federal Production Activities (7.0D), Evaluation of Carrying Capacity (7.1A), Conserve Genetic Diversity (7.1B), Wild and Naturally Spawning Population Policy (7.1D), Systemwide and Cumulative Impacts of Existing and Proposed Artificial Production Projects (7.1F), and Adjust the Number of Hatchery Fish Released to Stay Within Basin Carrying Capacity (7.1G) appear to be logical precursors to major investment in new artificial propagation programs in the Basin. The results of those measures should provide important direction to the implementation of production measures and protect natural production and biodiversity in the basin. At a minimum they should be implemented concurrent with new production programs.

Implementation

The ISRP concludes that the emphasis in implementation of measures in Section 7 in FY97 and the FY98 proposed implementation are not consistent with the priorities of the Council's program. Implementation emphasized new artificial propagation to the nearly complete exclusion of those measures that give direction to and ensure effectiveness of the new production measures (Figures 3 and 5). The ISRP recognizes that not all the apparent precursor measures must necessarily be completed before new artificial production programs are implemented. However, the ISRP concludes that it is inconsistent with the FWP to proceed with a high level of investment in new artificial production while at the same time ignoring those measures that are needed to evaluate existing programs and give direction to new programs. For example, the evaluation of carrying capacity and its relationship to current production should precede and not follow a massive investment in new production facilities and programs. Also, credible evaluation of the existing hatchery program should be completed before new facilities are funded.

The apparent rush to invest in massive increases in artificial propagation is especially disconcerting given recent reviews and recommendations of scientific panels (National Fish Hatchery Review Panel 1994; NRC 1996; ISG 1996). All of these scientific panels have recommended caution and restraint in the use of artificial propagation.

The ISRP notes that implementation of captive brood technology appeared to receive a high priority (Figure 3) in the FY98 program. This does not appear to be consistent with the Council's program. The FWP clearly states that the captive brood programs should be consistent with the "products and conclusions of the genetics and natural production framework provided elsewhere in the section". We interpret that to mean completion of Measures 7.1D, 7.1F 7.1B and 7.1G. These measures are not being addressed or were inadequately addressed in the CEA (the draft Programmatic EIS examining impacts of artificial production). The state of Oregon has a wild fish policy and Washington is soliciting comment on a draft EIS for its wild fish policy. Oregon's policy and Washington's draft policy do not fulfill the intent of Measure 7.1D, which calls for the development of a wild and naturally spawning population policy that is consistent with the "Council's overall program goal and intended to protect genetic diversity, population identity, long-term fitness and evolutionary capacity." The ISRP interprets that to mean a single basinwide policy consistent with the FWP and approved by the basin's salmon management agencies and Tribes. The ISRP recognizes that captive brood programs (measures in 7.4D) need to be implemented to prevent extinction of populations within the listed ESU's. However, the Council should be concerned that the use of captive brood technology may grow to widespread implementation without adequate policy guidance. For example, measures 7.4D.1 and 7.4D.2 call for captive broodstock scoping studies and a demonstration project.

The FWP acknowledges that habitat degradation has been a major cause of salmon declines in the Columbia River Basin, and that present existing habitat is seeded at low levels. Degraded habitat is believed to be limiting to natural production even when population densities are low due to inadequate seeding because "reduced habitat quality results in lower survival during critical spawning, incubation, rearing and migration periods." The Council strongly endorses the concept of cooperative restoration planning undertaken by federal, state, private and

tribal organizations. They further state "if watershed restoration is to be successful, instream restoration should be accompanied by riparian and upslope restoration."

To achieve this objective, the Council proposes aggressive development of cooperative watershed restoration plans. These plans should be crafted after a commonly agreed-upon set of goals (7.6A) and objectives (7.6B) and based upon coordinated watershed planning (7.6C) which includes four elements: watershed assessment, identification of management alternatives, collaboration, and site-specific watershed management projects. All federal, state, private, and tribal interests should be included. Default habitat objectives are provided in the FWP until local, peer-reviewed, habitat objectives are established after a thorough watershed assessment (7.6D) and expedited funding for high priority projects is undertaken (7.6E).

The current FWP, however, includes very few projects that actually involve development of appropriate habitat goals, policies and objectives for different tributary systems (Figure 4). Many of the Model Watershed projects (7.7B) assume similar or identical habitat objectives and factors limiting natural production, but few actually attempt to test and evaluate them for the site in question. As a result, a very large proportion of the habitat restoration efforts are concerned with only a limited number of types of projects, specifically, adding structures to stream channels to achieve an approximately equal percentage of riffles and pools, fencing riparian zones to exclude livestock so as to promote streambank protection and vegetation recovery, and screening irrigation withdrawals to prevent entrainment of rearing or migrating salmonids (Figure 6). While these projects may be worthwhile, they are rarely if ever preceded by watershed assessments that have identified the projects as addressing a critical limiting factor. And, few projects include an evaluation process that monitors long-term project survival or biological effectiveness. A number of the habitat-related elements in the Fish and Wildlife Program are not addressed by any current projects. For example nearly all of the non-hydroelectric dams identified in section 7.10 (Provide Passage and Protective Screens on Tributaries) have no passage improvement projects associated with them.

The geographic distribution of habitat restoration efforts within the Columbia River basin is uneven, and the rationale for the distribution is obscure. Most projects are associated with tributary systems of the mid-Columbia (e.g., John Day, Yakima Rivers) or lower Snake River (e.g., Grande Ronde River). Large areas of the Columbia basin have no habitat restoration projects supported by the FWP, although we recognize there are numerous restoration programs operating on federal, state, private and tribal lands that do not fall under the program. Nevertheless, the rationale for selecting those watersheds that have received the majority of habitat restoration funds under the FWP is not clear; the ISRP is not aware of an objective process for setting priorities among subbasins. Additionally, there do not appear to be any projects recommended for FY98 that coordinate or integrate the FWP with the restoration program proposed by the Interior Columbia Basin Ecosystem Management Plan (ICBEMP) prepared by two major federal landowners in the basin—the Forest Service and Bureau of Land Management. Because of the basin-wide focus of both plans, such an integration seems essential to achieving the Council's directive for coordinated watershed planning.

Recommendations for FY98

Revisions to the FWP

III.B.4 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among anadromous fish related measures within Section 7 of the FWP.

The direction need not be specific to the level of the individual measure or project. However, it should indicate which classes of measures are related—new hatchery production and comprehensive evaluation, for example—and Council's intent regarding the appropriate implementation sequence for those measures.

III.B.5 The ISRP recommends that the FWP include an explicit measure to develop approaches and rationale for re-regulation of flows in tributaries to establish normative habitat conditions, as recommended in *Return to the River*.

Such a measure is not a part of the FWP, and there are no present habitat projects that adopt normative flows as a specific objective. The ISRP notes that the Council and NMFS have asked the ISAB to determine priority tributaries and reaches for development of normative habitats.

III.B.6 The ISRP recommends that habitat policies and objectives be established for each major subbasin and coordinated with overall production goals for the subbasin.

Habitat objectives should be landscape-based and should reflect, to the extent possible, the habitat goals set forth in *Return to the River*. Objectives based on the range of conditions characteristic of different subbasins are more likely to protect the genetic diversity of locally-adapted stocks than will attempts at one-size-fits-all habitat requirements of individual life cycle stages of individual species. The importance of periodic natural disturbances such as wildfires

and floods in maintaining healthy watersheds should also be acknowledged in the development of subbasin habitat objectives.

III.B.7 The ISRP recommends that development of reliable watershed assessment procedures be given high priority.

The ISRP recognizes that there is no standardization for watershed assessment in the basin. There are watershed assessments in use that could serve as a model for the Columbia Basin. They include the Washington State watershed analysis manual for forest lands and the USFS watershed analysis guidelines.

Implementation Recommendations

III.B.8 The ISRP recommends that the Council not approve funding for the construction and operation of new artificial propagation programs in the FY98 program until a comprehensive review of existing hatchery programs adequately addresses Measures 7.0D, 7.1A, 7.1C, 7.1F, and until at least a preliminary policy addressing Measure 7.1D has been drafted.

The ISRP recognizes that some facilities have been in the planning stage for several years and this recommendation would delay construction of projects considered high priority by the fish management agencies and tribes. The ISRP further recognizes that some of the best designed and implemented artificial propagation projects in the basin are funded through the Council's program. However, failure of the recent CEA (i.e., CBFWA's draft Programmatic EIS of December 1996) to adequately address Measures 7.0D, 7.1A, 7.1C, and 7.1F places that additional burden on individual projects.

III.B.9 To prevent a complete moratorium on new production, the ISRP recommends that the Council permit funding for an individual project only if the project proponents can demonstrate they have taken measures 7.0D, 7.1A, 7.1C, and 7.1F into account in the program design and the Council concurs. To ensure that standard is met, the individual projects should be funded only after a positive recommendation from an independent peer review panel.

Recommendations from the panel need to be beyond reproach in order for the region to move forward on the issue and role of artificial production. Therefore the panel should include qualified individuals from within the region, as well as the national or international community. For these same reasons, the panel should be subjected to the same conflict of interest rules that apply to the ISAB and ISRP.

III.B.10 The ISRP recommends the Council implement a comprehensive review of artificial propagation in the basin. That review should be initiated as soon as possible and cover all propagation activities including hatcheries funded by sources outside the FWP.

The comprehensive review should be conducted by an independent panel; ideally the same panel set up to review individual projects. The panel should consist of highly qualified individuals with regional and national perspectives on artificial production. The emphasis of the panel's review should be to examine the scientific basis for artificial production and to recommend to the region appropriate roles and uses of artificial production in the near term and long term. Detailed suggestions concerning the issues that a comprehensive review should include are presented in the ISAB's recent review of the draft Programmatic EIS (ISAB Report 97-5. April 1, 1997).

III.B.11 The ISRP recommends that watershed assessment *precede* implementation of restoration projects so that probable limiting habitat factors be identified and a reasonable expectation of restoration effectiveness exists.

It is recognized that implementation of many of the current suite of projects have been driven by restoration opportunity rather than by a prioritization of restoration needs. Many projects are implemented because an opportunity exists (e.g., a rancher willing to fence a riparian zone) rather than because there is reasonable cause to believe that the project will help relieve a significant bottleneck to natural production. While most habitat projects are generally helpful, if for no other reason than they help galvanize local support, few have been supported by prior evidence or an adequate monitoring plan that demonstrates expected project effectiveness.

In keeping with the goals of section 7.6. Model Watershed plans and other habitat improvement projects should be peer reviewed by habitat specialists to ensure that restoration activities are based on sound science and are appropriate to local settings. Funding of individual projects should be contingent on demonstrating that they are needed to increase the potential for natural production or to maintain the genetic diversity of local populations.

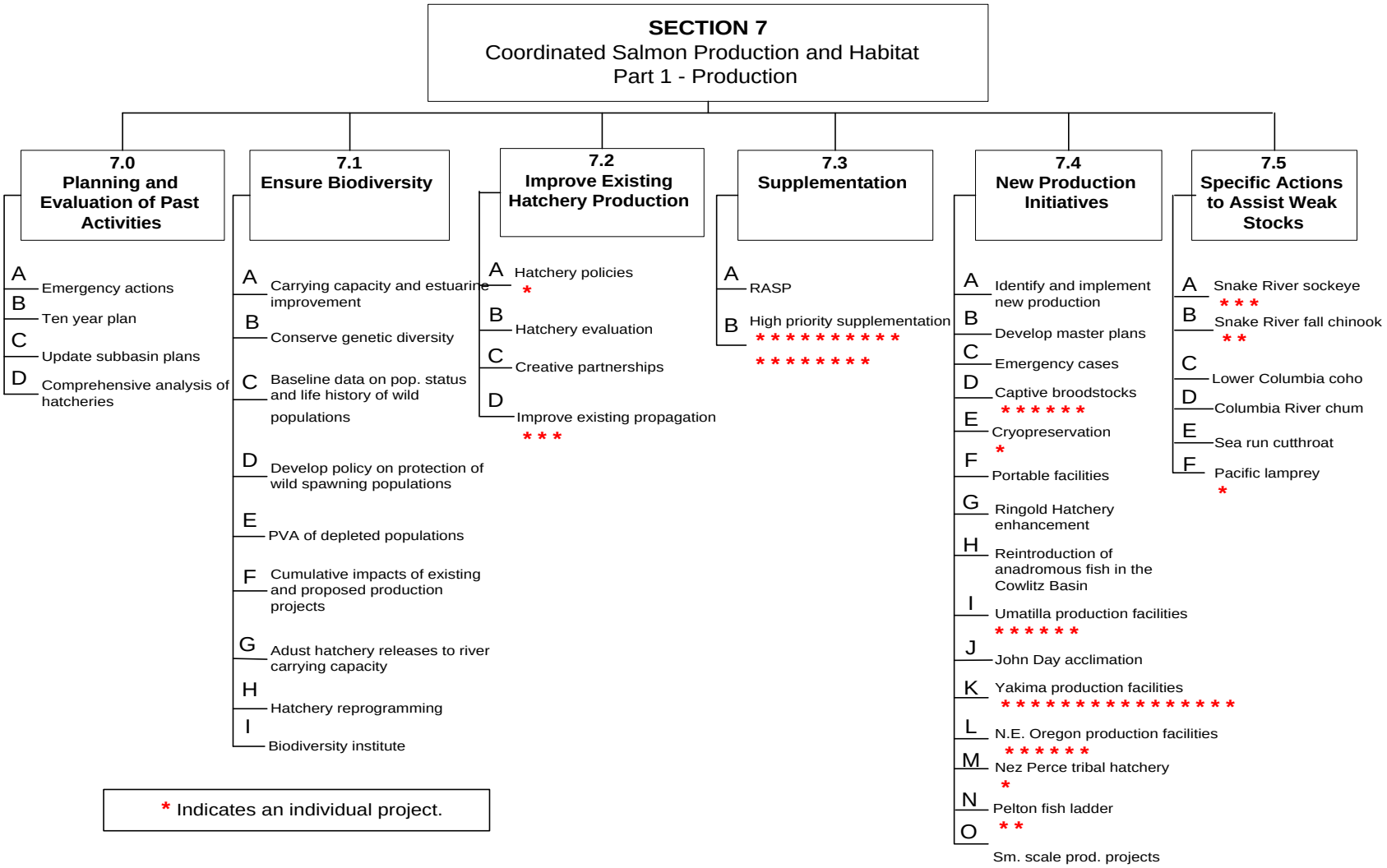


Figure **3. Distribution of production projects among measures in Section 7 of the FWP.**

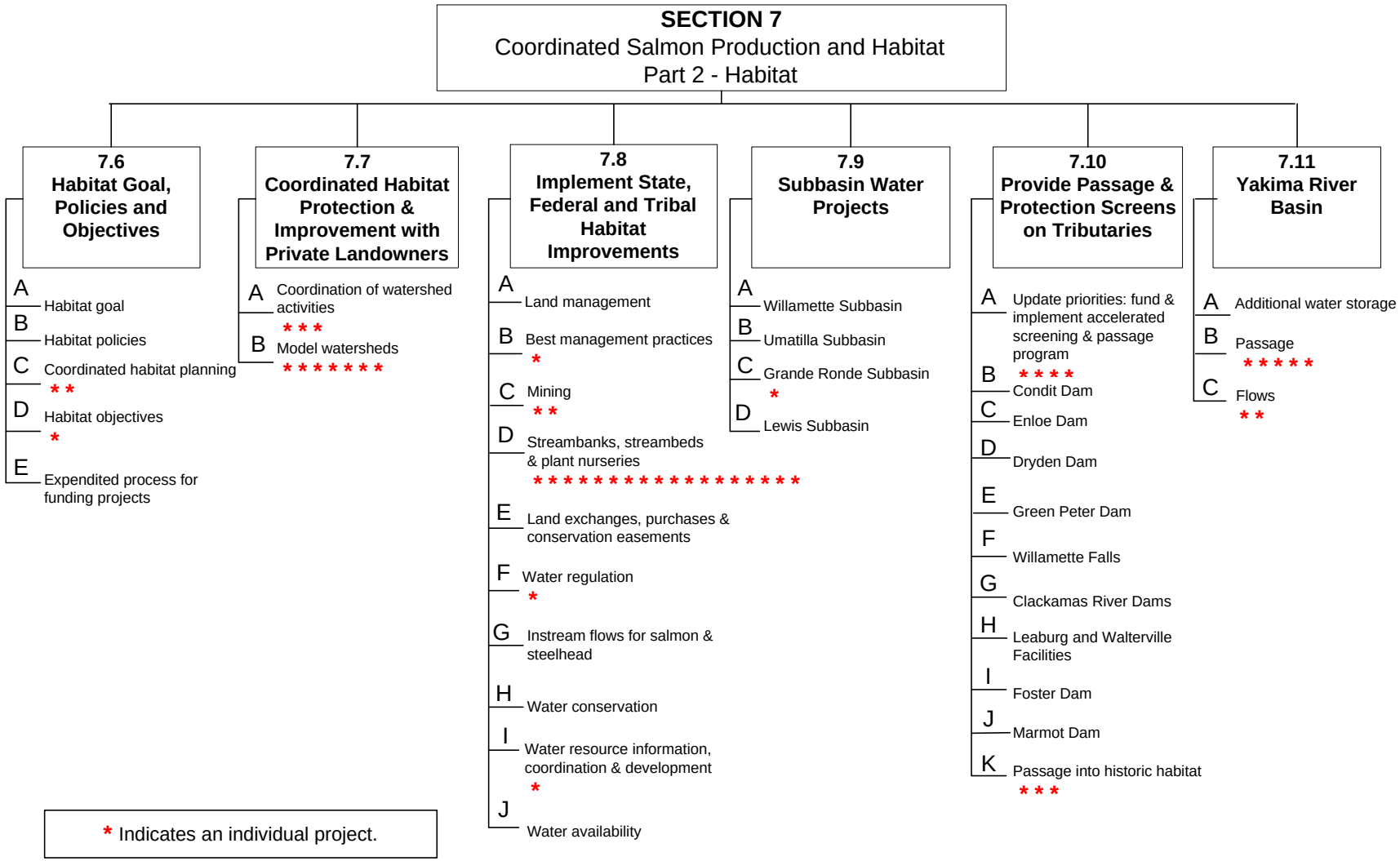


Figure 4. Distribution of habitat projects among measures in Section 7 of the FWP.

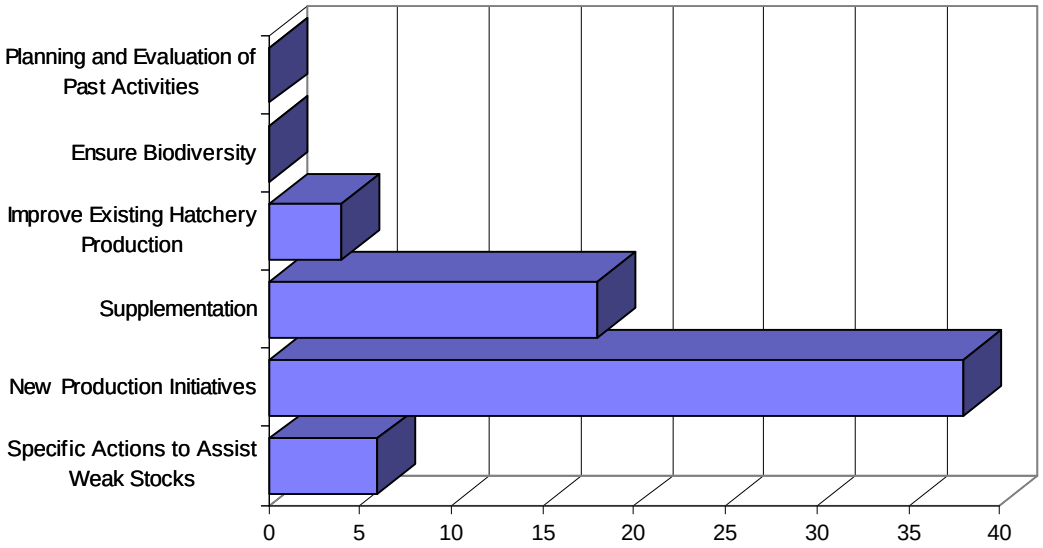


Figure 5. Distribution of production projects among the major measures in Section 7 of the FWP.

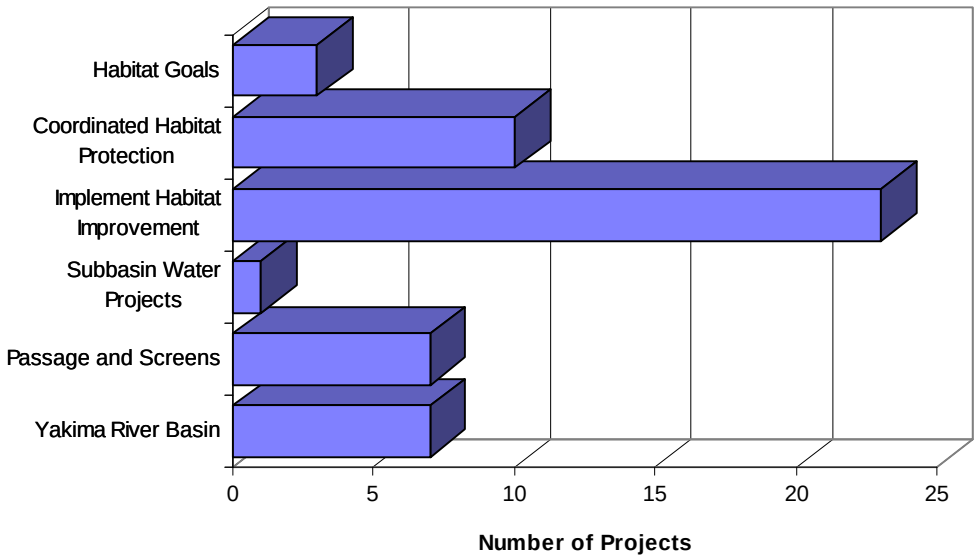


Figure 6. Distribution of habitat projects among the major measures in Section 7 of the FWP.

Section 10 - Resident Fish

Intent

Section 10 of the FWP contains measures intended to protect, mitigate, and enhance resident fish affected by development and operation of the hydropower system. Priority is given to native resident fish over non-native or introduced fish. Measures in the program attempt to balance needs of resident fish with those of anadromous fish through either *mitigation* or *substitution* activities. Measures in Section 10 fall into four broad categories (see Figure 7):

Mitigation categories

1. Planning, evaluation, and policy development
2. Inventory natural populations and subsequently improve natural production
3. Increase, improve or evaluate artificial production

Substitution categories

4. Resident fish substitutions and off-site mitigation

The Council's intent in Section 10 is to increase production from both natural and artificial sources. Subsections 10.1, 10.2 and parts of the other measures in Section 10 and appropriately referenced portions of Section 7 imply that the Council also intended to ensure that the natural and artificial production systems are successfully integrated in the basin—in particular, that artificial propagation does not adversely affect natural production of resident fish populations.

Much of Section 10 follows the logic and structure of Section 7 (Coordinated Salmon Production and Habitat, discussed above) and identifies the need for system-wide coordination and subregional planning in order for resident fish objectives to be achieved. Like Section 7, measures in Section 10 imply a logical sequence starting with evaluation of the status of native resident fish populations, leading to watershed or subregional rebuilding or production objectives, and culminating in measures (and derived projects) designed to meet the objectives. Measures in this sequence (10.2 to 10.6) generally fall into mitigation activities designed to recover and preserve the health of native resident fish, while measures in 10.8 deal with resident fish substitutions that attempt to compensate for lost salmon and steelhead production in areas permanently blocked by hydropower projects.

The resident fish portion of the FWP was difficult for the ISRP to evaluate because of differences in the kinds of projects funded through mitigation as opposed to substitution projects, as well as the different management philosophies behind these two activities. This has the effect of making Section 10 appear schizophrenic, as if it is composed of two different programs for resident fish, that have little connection to one another. The first approach represented by the *mitigation* portion of Section 10, focuses on native resident fish populations and describes at least implicitly, a logical sequence of assessment, evaluation, prioritization, and action. Implementation of this approach, however, falls considerably short of this logical balanced

treatment. Much of the discussion concerning habitat and watershed issues from Section 7 on salmon production (above), also apply to resident fish issues, and therefore, merit consideration in that light. Similarly, the FWP places priority emphasis on restoring native resident species in native habitats, although this priority is less apparent in the implementation of Section 10. Many of the points raised by the ISG (1966) in *Return to the River* concerning the interrelationship of habitat, increasing normative conditions, and increases in abundance and diversity of salmonids apply equally well to resident fish as to anadromous fish.

In contrast, the *substitution* portion of Section 10 (measures in 10.8) does not have an underlying logical framework of assessment and prioritization, but focuses on production and introduction of non-native species or forms in site- or situation-specific measures and projects. In many instances, substitution activities are completely isolated from native resident fish populations, so interactions between non-native and native fish will not occur. In instances where uncertainty about interaction exists, concerns about ecological and genetic interactions should be rigorously examined before any introduction occurs. Activities that introduce non--native fish into watersheds should probably be undertaken conservatively, if at all, as the FWP assigns priority to native fish in native habitat. The fisheries literature is replete with examples where introduced fishes have contributed to the loss of native fish species (Billington and Hebert 1991).

Implementation

As we observed for Sections 5 and 7 of the FWP, implementation of measures in Section 10 in FY97 and the proposed implementation for FY98 are not balanced, and thus, are not consistent with Council's program. Implementation overemphasizes artificial propagation compared to those measures that give direction to and ensure effectiveness (10.1 and 10.2; Figure 7). For example, several projects currently funded under sections 10.2 and 10.5 should be oriented toward assessment of genetic and life history diversity in native resident fish populations if the measures are followed explicitly; however, these projects actually have the establishment of artificial production goals as their primary objective, based on their project summaries.

The FWP in section 10.2 describes a priority hierarchy for addressing resident fish losses in the Columbia River Basin. Ironically, although the FWP implicitly describes the need for a basin-wide systematic inventory of remaining native resident fish populations and their status, it does not explicitly call for such an assessment. The ISRP wonders how restoration opportunities for native resident fish can be identified and prioritized without having completed a basin-wide inventory of resident fish populations and their status? Such an inventory, coupled with the evaluations and guidelines called for in section 10.2B (evaluation of ecological and genetic impacts of hatchery fish on resident fish), should be critical in establishing watershed or subregional resident fish objectives and determining the appropriate role for artificial production in reaching resident fish production and restoration goals.

Recommendation for FY98

Revisions to the FWP

III.B.12 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among related measures for resident fish within Section 10 of the FWP.

The direction need not be specific to the level of the individual measure or project. However, it should indicate which classes of measures are related—new hatchery production and comprehensive evaluation, for example—and Council's intent regarding the appropriate implementation sequence for those measures.

III.B.13 The ISRP recommends that the Council require a basin-wide systematic inventory of remaining native resident fish populations and their status, upon which opportunities for restoration and rebuilding native resident fish populations can be identified and prioritized.

Implementation Recommendations

III.B.14 The ISRP recommends that measures in sections 10.1 and 10.2, which focus on planning, development of policy guidelines, and assessments of remaining diversity and population status in resident fish populations, receive greater attention and project funding.

Many of the ISRP's recommendations concerning habitat and watershed issues from Section 7 on salmon production (above), also apply to resident fish management, and therefore, merit consideration in that light.

III.B.15 The ISRP recommends that resident fish artificial propagation facilities and projects be included in the comprehensive review of artificial propagation as

described and recommended above in ISRP Recommendation III.B.10.

Artificial production of resident fish within the basin involves many of the same objectives, issues and uncertainties associated with artificial propagation of anadromous stocks. Thus it is logical to include a review of resident fish propagation within the larger review of anadromous fish propagation called for in our earlier recommendation (III.B.10). The emphasis of the panel's review with respect to resident fish should be to recommend to the region appropriate roles and uses of artificial production in the near- and long-term maintenance of resident fish populations and biodiversity.

III.B.16 The ISRP recommends that *substitution* projects, particularly those using non-native species, be viewed cautiously because their implementation may pose significant threats to native resident fish species. Therefore, individual *substitution* projects should be reviewed by the artificial production review panel (see ISRP Recommendation III.B.9), prior to authorization.

Introductions of non-native species have had a devastating effect on native resident salmonids in the Columbia River Basin and elsewhere in western North America (Billington and Hebert 1991; Lee et al. 1996). Therefore, great concern and caution should be exercised when reviewing projects that propose using non-native species for substitution. As a point of clarity, non-native species can also include resident fish species native to the Columbia River Basin when they are introduced to locations outside of their native range. For example, most hatchery strains of rainbow trout were derived from coastal rainbow trout stocks. Thus, planting stocks in the interior Columbia Basin (east of the Cascade Mountains), is a non-native introduction because a different form of rainbow trout, interior rainbow trout (e.g., redband trout) exists there.

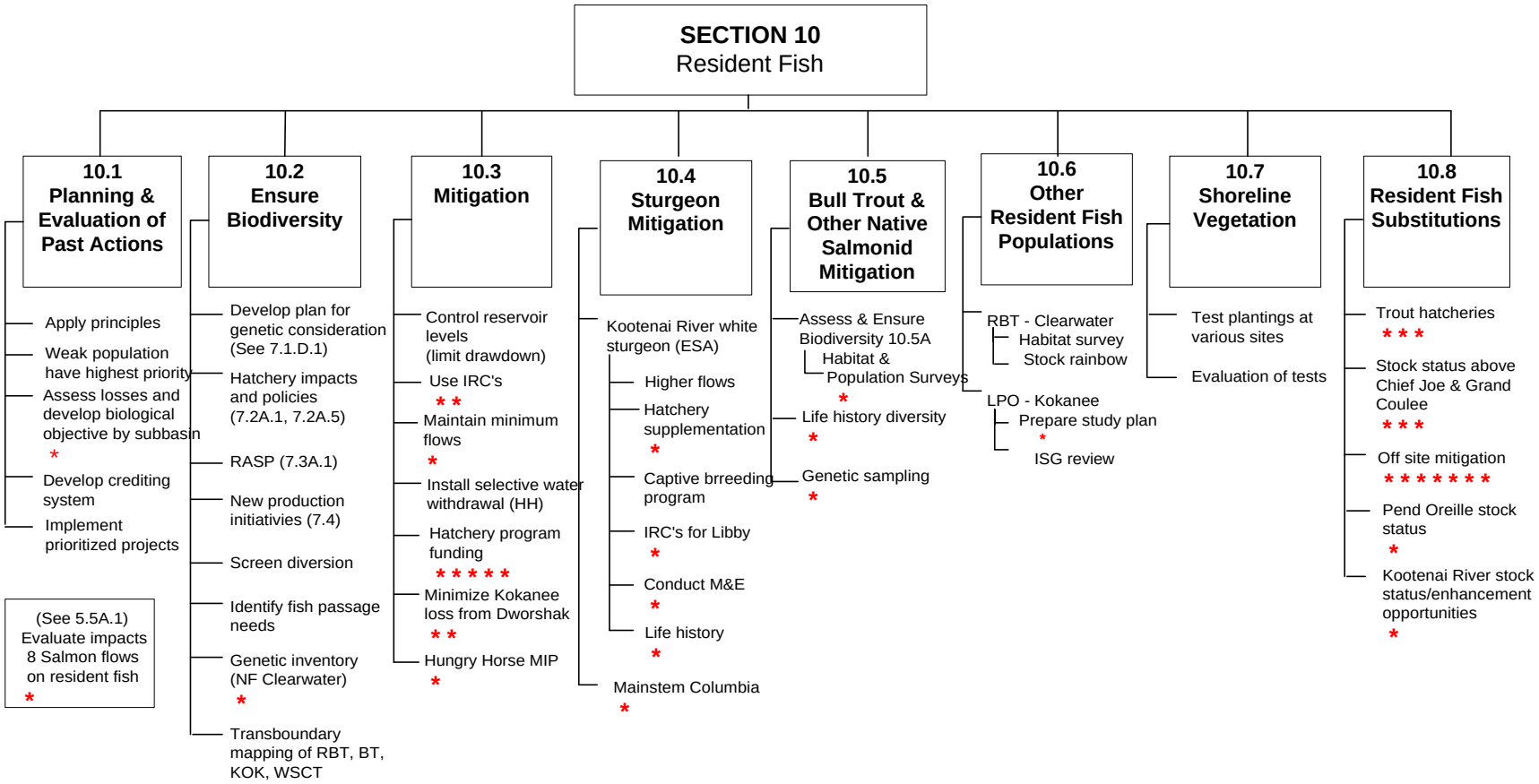


Figure 7. Distribution of projects among resident fish measures contained in Section 10 of the FWP.

Section 11 - Wildlife

Intent

Section 11 contains measures intended to fully mitigate for the wildlife losses that have resulted from the construction and operation of the federal and non-federal hydroelectric facilities (NPPC 1995, Draft FY98 Annual IWP). The Northwest Power Act calls on NPPC to develop a program to "protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries" (NPPC 1995). Mitigation is defined as "achieving and sustaining the levels of habitat and species productivity for the habitat units lost as a result of hydropower projects" (NPPC 1995). Mitigation priorities have been established, in the form of lists of habitat types and target species (which are primarily indicator species or Endangered Species Act (ESA) targeted species) with priority levels for the various subbasins in which mitigation is to be accomplished, and are to drive implementation of mitigation. Section 11 specifies policy development to guide implementation and includes 6 installment measures: planning, development of a single Wildlife Plan, credit for new actions, short-term agreements, long-term agreements, and the Snake River Compensation plan. Monitoring and Evaluation of effectiveness are called for in Measures 11.4 - 11.5 and are clearly necessary to establish full mitigation.

Implementation

Much has been done to implement the Wildlife Program, and reasonable coordination seems to have occurred in implementation within the Wildlife portion of FWP, stemming largely from activities of the Wildlife Working Group (WWG). However, coordination with other parts of FWP (i.e., Resident Fishes, Anadromous Fishes) seems largely lacking.

Implementation is in part reflected in Figure 8. Policies have been completed. Installment measures are well underway, with planning and land acquisition emphasized, particularly via long-term agreements. An EIS for the Wildlife Plan has been completed, but we note that the procedures explored in the EIS are primarily related to compliance with Federal and other regulations, rather than science-related.

The Wildlife Program has concentrated on protection and enhancement of wildlife habitat to compensate for effects on wildlife associated with hydropower development; both negative and positive effects are recognized. Potential projects are evaluated primarily on the basis of the number of "habitat units" (HUs) gained by purchase or protection of wildlife habitat, given compliance with policies and priorities that are listed in the FWP. The scientific basis for determination of HUs has been the theory for the Habitat Evaluation Procedure (HEP) and Habitat Suitability Indices (HSI) that has been developed over the last 30 years at the Biological Research Division, USGS, Fort Collins, Colorado (e.g., USFWS 1981). This methodology is reasonable and appropriate for quantification of the value of potential projects, but is not without weaknesses and limitations.

Current monitoring and evaluation of projects primarily involves following of HUs to assure that the anticipated habitat mitigation has occurred. Further monitoring and evaluation, at the overall programmatic level, are planned for implementation in the near future, but are not yet in place. Direct monitoring of wildlife populations is not a regular part of the Program; only monitoring of habitat, as HUs, is. Thus, the attainment of the ultimate goal of sustaining wildlife is largely unknown. This means that scientific merit (or effectiveness of implementation of the FWP) cannot be validated, either within the program or by an independent review. Scientific technical merit of the procedures used now can be evaluated, but this does not itself constitute adequate review of the scientific soundness or effectiveness of the Wildlife Program. Thus, we conclude that intent of the FWP is not yet met by implementation.

Recommendations for FY98

Revisions to the FWP:

III.B.17 The ISRP recommends that the Council provide clear direction as to the desired implementation sequence among related measures for wildlife within Section 11 of the FWP.

In particular, monitoring and evaluation, including adaptive management as an approach, should be implemented early in the process of land acquisition, development, management, or restoration.

III.B.18 The ISRP recommends that the Wildlife Program include an explicit scientific research component. This would be likely to increase mitigation success and would make evaluation and adjustment of the Program over time much more feasible.

More emphasis should be given to evaluation of effectiveness of management and restoration procedures at achieving wildlife population objectives. How and why various land management options affect habitat and wildlife are important topics of ecological study and the FWP could make important contributions here, as well as making its own efforts more efficient and effective by application of what is learned. Other areas described in recommendation II.B.24 also would be appropriate topics of research.

III.B.19 The ISRP recommends that additional scientific criteria be added to those currently used to prioritize proposals for mitigation projects. For instance, the geomorphologic suitability of a site to sustain Habitat Units anticipated to be gained should be considered in prioritizing mitigation projects.

It appears that much habitat acquired through the Wildlife Program undergoes extensive management and restoration. Thus, the geomorphologic suitability of a site to sustain the HUs anticipated to be gained should be considered in prioritizing mitigation projects. For instance, upland areas are not likely to sustain riparian habitat in the absence of irrigation, which introduces conflicts between Fish and Wildlife goals. These areas also are unlikely to provide overwintering habitat, which often is key to sustaining wildlife populations. The importance of areas that serve as winter range for wildlife and of the bottomlands that remain along undeveloped alluvial reaches (ISG 1996), many of which may be available by easement rather than purchase, should be recognized and incorporated into funding priorities. Also, projects that encompass entire drainages could provide particularly valuable landscape level habitat structure for both fish and wildlife.

III.B.20 The ISRP recommends that specific mechanisms be developed to coordinate the FWP with other programs that have significant impact on fish and wildlife and their habitat in the Columbia River Basin.

The need for FWP actions and the evaluation of their effectiveness may often be strongly influenced by actions of other programs such as the Interior Columbia Basin Ecosystem Management Project of the USFS and BLM, which will affect management of some 75 million acres of the CRB.

Implementation of the FWP:

III.B.21 The ISRP recommends that a separate Scientific Review Group for the Wildlife Program <u>not</u> be formed, but rather that a single Review Group (currently the ISAB) be charged with review of both Fish and Wildlife issues within the FWP. This should improve program coordination, which will likely remain difficult in such a large and complicated program as the FWP.

Outside unbiased review is essential to providing a clear view of program balance. Closer coordination is needed between fish and wildlife programs. For instance, fencing to protect streams for fish should be coordinated with the Wildlife Program, as should any predator control studies that are reviewed and funded through the Fishes Programs. Habitat acquired through the Wildlife Program may affect mitigation of effects on fishes and contributes to implementation of the Anadromous and Resident Fish Programs. Coordination between Fish and Wildlife Programs should extend to joint scientific research and monitoring programs.

III.B.22 The ISRP recommends that acquisition of land and of land easements continue to be given a high priority in the Wildlife Program, as habitat is necessary for wildlife populations and can be quantified reasonably by HEP in accord with obligations of BPA to various areas and groups.

III.B.23 The ISRP recommends that the Program give increased attention and priority to research designed to evaluate effectiveness of habitat measures in terms of direct assessment of wildlife populations and their ecology.

The underlying philosophy of the Wildlife Program is that provision of habitat will support wildlife. Certainly provision of habitat is a necessary first step to supporting wildlife; however, it may not be sufficient for a variety of reasons. Direct assessment of the effectiveness of the program requires direct study of wildlife populations and their ecological interactions with habitat and with other animals. The following two specific recommendations would contribute to achieving more direct information as to how the FWP has contributed to sustaining Wildlife in the Columbia River Basin.

III.B.24 The ISRP recommends that Council include a portion of the Wildlife Program funds each year within the competitive grants program for research that could contribute to the benefit of wildlife. Innovative monitoring and research proposals could be encouraged through this part of the Program.

For example, the value of anadromous and resident fish as food for terrestrial and marine wildlife populations might be investigated. Also, innovative research to establish high-quality and well-validated monitoring programs would be an appropriate and useful target for competitive funding, as would studies of the effectiveness and ecological mechanisms of habitat restoration, especially low cost and sustainable ecological restoration. These and many other

areas could greatly aid in establishing technical merit and effectiveness of the Wildlife Program.

III.B.25 The ISRP recommends that monitoring, which now is based on the unit of mitigation, habitat (measured as HUs, determined from HEP), be extended to include a requirement for some degree of direct monitoring of target (and perhaps some non-target) wildlife populations.

The decision of Council to mitigate at the level of habitat was prudent, given the biological primacy of habitat to viable populations and given the political and informational constraints on evaluation of losses, gains, and mitigation. However, HEP does not capture wildlife populations or dynamics directly, and the method is not designed to capture landscape-level habitat characteristics that may be important to wildlife. These limitations in the method are not addressed by the attempts to develop uniform standards for HEP that have been incorporated into the Wildlife Program.

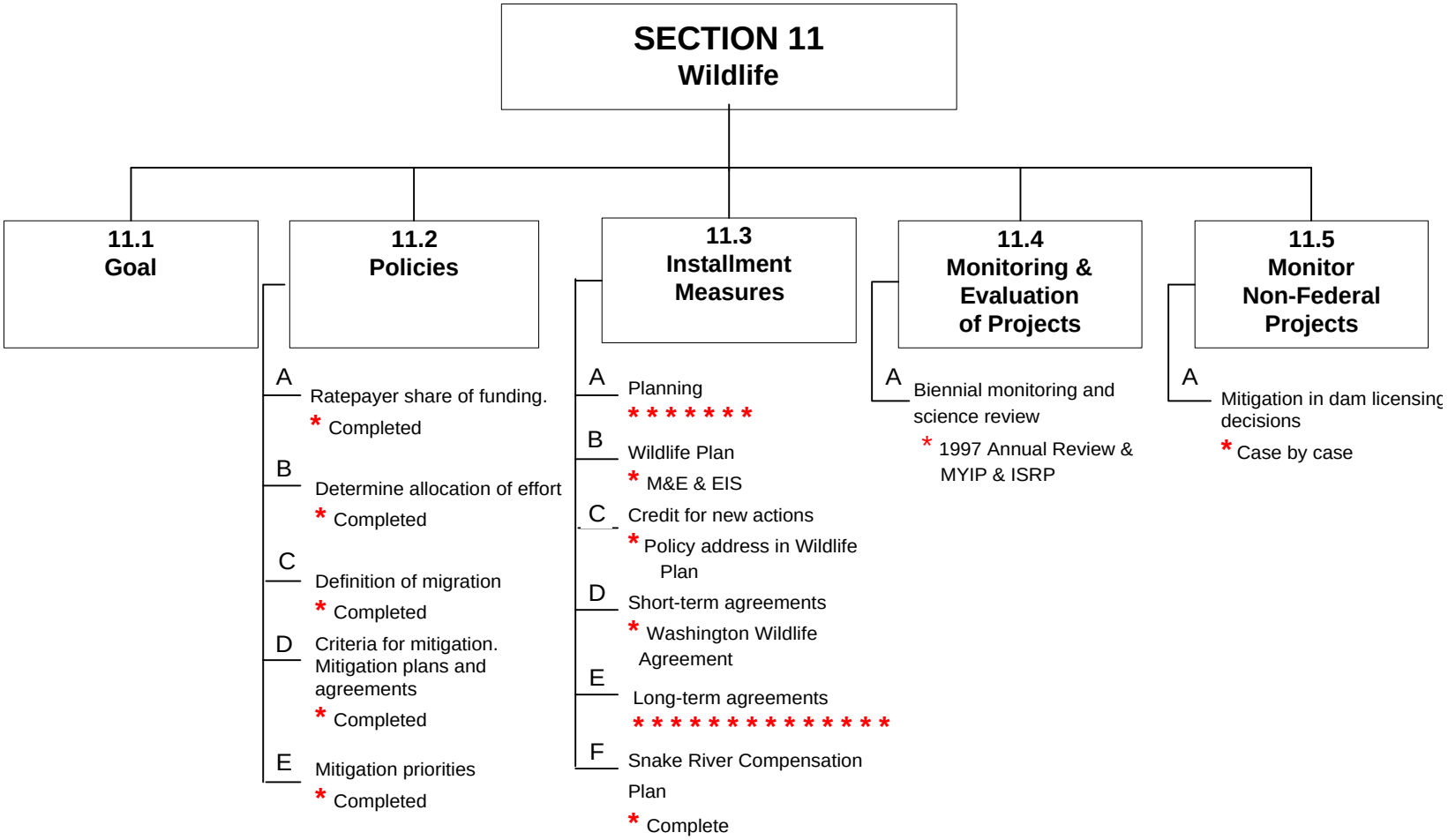


Figure 8. Distribution of projects among wildlife program measures contained in Section 11 of the FWP.

SECTION IV - Enhancing Peer Review in the FWP

Institutionalizing peer review within the Columbia River Basin Fish and Wildlife Program was the primary motivation behind the 1996 amendment to the Northwest Power Act. Implementation of peer review can and should involve more than simply conducting peer review on individual projects proposed for funding. Peer review also needs to occur at the programmatic level (Section IV-A), which is more complex and more difficult than review of individual projects. Additional initiatives, such as a competitive grants program (Section IV-B), as well as new processes, such as the peer review process for project proposals (Section IV-C) and implementation of an annual review schedule (Section IV-D), can maintain and enhance scientific and technical rigor in the FWP.

IV-A. Programmatic versus Project Peer Review

Evaluating different kinds of individual projects

The FWP encompasses many different kinds of activities, the funding of which might best be evaluated in different ways. Some portion of the budget is research. Because of the premium on innovation, creativity and technical rigor in research, the appropriate mechanisms for judging the scientific quality of individual project proposals for research would be open competition and scoring of proposals by an ad hoc team of peer reviewers selected for authority in the scientific specialties relevant to each proposal. For the next funding cycle (FY99), we (the ISRP) plan to conduct the evaluation of the research proposals with the assistance of scientific reviews of each proposal by ad hoc review committees (i.e., Peer Review Groups [PRGs]) that we will select from a large panel of experts that we will nominate, subject to approval by the Council and the National Research Council of the National Academy of Sciences.

A larger fraction of the FWP budget is for activities such as construction, acquisition, operations and maintenance, where the crucial issues are competence, efficiency and teamwork. The evaluation basis for individual project proposals in this category is largely a matter of ensuring that the project simply does what it is supposed to do within a reasonable budget and timeframe. Because of the integration of these activities into the ongoing business of the agencies that are implementing various aspects of the salmon recovery effort, there may be sound reasons for relaxing the requirement for open competition at the discretion of the agencies (or in accordance with whatever their respective contracting rules may be). The appropriate mechanism for providing expert advice on the funding decisions for projects in this category would be review by a standing committee of reviewers with a comprehensive understanding of the FWP and the salmon recovery efforts in the Basin. For next year, we (the ISRP) plan to conduct the evaluation of the non-research proposals based on our own understanding of the program.

A modest fraction of the FWP budget that falls somewhere in between the "research" category and the "operations" category, combining elements both of innovation and of routine

implementation. Many of the monitoring-related projects and some of the adaptive management projects may fall in this gray area. It may help in the evaluation of these projects to separate the design and interpretation-of-results component from the implementation (i.e., conducting the experiment or carrying out the monitoring operation) so that the respective components can be evaluated according to the appropriate review mechanism. For next year, we (the ISRP) will attempt to separate the research from the operations components of the monitoring and the adaptive management projects in this way, so that the research component can be reviewed according to the peer review mechanism we plan to use, and the operations component can be reviewed by the ISRP on the basis of our understanding of the program.

Programmatic priorities

From our survey of projects funded for 1997, we estimate that more than 1/3 of the budget is devoted to artificial production projects, 1/3 is devoted to tributary habitat projects, and roughly 1/5 is devoted to mainstem passage and mainstem habitat projects. This accounts for the bulk of the allocation of the FWP budget; but it is not clear how this de facto prioritization has come about, and it is not clear whether this really is the right prioritization.

The FWP lists all the measures its authors thought were important, without explicitly ranking them, and without stating how much should be spent on various types of activities. The ISRP has arrived at its own interpretation of the priorities implicit in the rationale and discussion presented in the FWP, and believes that the de facto prioritization reflected in the actual budget allocation does not reflect the priorities implicit in the FWP.

Other syntheses and reviews of the salmon problem in the Columbia Basin (*Return to the River*, *Upstream*, Recommendations of the Snake River Recovery Team) also present conceptual frameworks for salmon recovery, and these frameworks also imply prioritization for research and recovery activities. The ISRP believes that there is considerable agreement among these recent reviews, and that an explicit programmatic prioritization and FWP budget allocation should be developed based on these reviews. As noted earlier, one way to accomplish this would be to use the Integrated Framework as a guide to amend the FWP (see ISRP recommendation I.D.1).

It is the opinion of the ISRP that priorities based on the best available scientific consensus may result in rather different budget allocations from the current allocation. Notwithstanding our confidence in our judgment on the science, we realize that there is considerable controversy within the basin about important large-budget questions involving, in particular, the flow survival relationship, the efficacy of smolt transportation, the role and impacts of artificial production on wild stocks, and the effectiveness of artificial production in restoring the salmon runs. A comprehensive scientific review should be carried out as soon as possible, to establish consensus on these matters, so that proper programmatic prioritization can proceed accordingly.

Where adequate analyses have already been done on such questions, these analyses should be synthesized to arrive at a bottom line. For issues that have not been convincingly analyzed, but where sufficient hard data exist to resolve these questions, those data should be

analyzed. Where sufficient hard data do not exist, it is time to gather the required data and conduct the required experiments on a time-table consistent with the importance of the problem.

IV-B. Competitive Research Grants Program for the FWP

The ISG noted early in its tenure that a competitive grants program would foster innovative approaches to reducing uncertainties in the Columbia River salmonid recovery effort (SRG 1993). The ISRP endorses the recommendation of the ISG and strongly urges the Council to allocate a portion to this program. Other federal agencies, such as DOE and EPA, that have research and managerial responsibilities have successfully used or are implementing competitive grants programs as a means to promote creative approaches to applied and basic problems in research. In the Columbia Basin, an annual solicitation of proposals could be based on priority research areas, such as for example, the recommendations made in *Return to the River* (ISG 1996). Proposals should be subjected to independent review by the ISAB, ISRP, or other independent body and recommendations for funding forwarded to the Council for approval. The grants program should initially run for five years and then be peer reviewed for relevance of products to the goals, objectives and success of the FWP.

Rationale for a Grants Program

Section 13.1F of the 1994 FWP provides for solicitation of proposals to advance new ideas and means for reducing uncertainties in the fisheries restoration effort. Although the wording is vague, the measure apparently is intended to encourage innovative approaches to improving salmon survival, especially in the mainstem. Innovative new ideas and approaches are needed, and we believe that a competitive grants program would foster creative approaches to many measures in the FWP. It is likely that a relatively small investment in a competitive grants program could provide substantial improvement in the quality of research done in the Columbia River Basin and also begin to address many critical uncertainties.

Additionally, funds provided through competitive grants could be used to support multidisciplinary work/programs, such as ocean or coast programs, which may also include funds from other sources. A competitive grants program might also allow investigators to address information needs that have been missed or to strengthen/integrate existing programs.

Suggested Process for a Research Grants Program

Solicitation

One approach to the competitive grants program, similar to that used by other agencies, would be for the Council to ask the ISAB or ISRP to develop a solicitation document containing the rationale and requirements of the competitive grants program. The solicitation announcement should include an explanation of priority topics, explicit

instructions for proposal preparation, a description of the review process, funding limits, time limits and other conditions. Areas of emphasis within the solicitation document would likely change from year to year as learning occurs and priorities within the Basin shift.

The solicitation should be widely advertised and available upon request, via electronic and posted announcements. An explicit deadline for proposals should be given in the announcements, along with clear statement that the competition is open to any individual, university, agency, NGO (non-governmental organization), or company. The solicitation could encourage interagency or multi-disciplinary collaboration, depending upon the wishes of the Council or BPA, but emphasis should be on addressing scientific uncertainties pertaining to the FWP, rather than as an avenue for funding of annual ongoing needs.

Proposals

We have previously provided the Council and BPA with a detailed guide for the preparation of project proposals. The guide was developed broadly for the FWP and was based on guidelines used by a number of federal agencies for research proposals within their competitive grants programs.

Review

We suggest that the task of reviewing proposals be assigned to the ISRP or a scientific panel(s) selected by the ISAB and approved by the Council.

Accountability and Performance Evaluation

Progress and performance of work done under this grants program should be evaluated annually by the ISAB based on short (2 page) summaries provided by the Principal Investigators. Publication of results in peer reviewed journals is expected. BPA contracts might accept journal publications in lieu of completion reports for these projects.

Conclusion and Recommendation

We believe that the credibility and accountability of the FWP will be augmented by implementation of a competitive grants program.

IV.B.1 The ISRP recommends that the Council implement a competitive grants program as part of the FWP.

In the event that Council desires to implement or further explore a competitive grants program, the ISAB can develop a solicitation announcement and review process in accordance

with the procedures provided above. As other federal agencies have already implemented or are in the process of implementing competitive grants programs (e.g., EPA, NASA, USBR) to enhance their research programs, it would be possible to review those program's efforts and their solicitation announcements in order to adapt them to the Columbia River Basin and the FWP.

IV-C. A Peer Review Process for Project Proposals

The ISRP intends to conduct a review of funded and proposed projects in 1998 with the assistance of Peer Review Groups (PRGs). PRGs will be formed to review sets of projects in topical areas (e.g., mainstem passage, habitat, etc.) or regional areas (e.g., subbasin, Snake River, etc.). The PRGs will be composed of technically qualified individuals approved by the National Research Council. Project proposals will be reviewed by PRG members under the supervision of ISRP members. Each project proposal will be reviewed by several PRG members. The PRGs will summarize their reviews of each project, as well as appropriate suites of projects, and provide written commentary to the ISRP. These summary reviews, which will be made available to individual investigators, will be used by the ISRP in developing its 1998 report to Council.

PRG members will receive explicit written directions from the ISRP that assist them in their reviews of individual projects. The instructions will detail specific review criteria, as well as appropriate background information so their review takes place within the context of the FWP.

Conflict of Interest

It is imperative that the Fish and Wildlife Program avoid conflict of interest. Therefore, PRG members must disqualify themselves as reviewers if

1. the applicant or subcontractor (if any) is employed at the reviewer's home institution;

2. the reviewer served as either a thesis/dissertation advisor, postdoctoral advisor or a collaborator on a research project or co-author with the applicant on a joint publication related to the proposed work within the past 3 years;

3. the reviewer acted or will act as a paid consultant to the applicant's organization or will gain some benefit from the project; or

4. the reviewer has any management affiliation or financial interest in the organization or the investigators submitting this proposal.

Confidentiality

The Northwest Power Planning Council is responsible for protecting the confidentiality of each proposal and the details of its review. For this reason, reviewers must refrain from copying, quoting, or otherwise using material from the proposal or their review. Reviewers are

not to contact a proposer, but to direct questions to ISRP members, who can forward the questions to the appropriate person or channel. A general summary of the reviews will be prepared by the review panels (not disclosing the specific reviewers) and be provided only to proposal authors. These confidential summary reviews will be used by the ISRP in developing its 1998 report with recommendations to Council.

IV-D. Annual Proposal Review Schedule for the Fish and Wildlife Program

Every funding agency needs a clear funding cycle. The funding cycle should accommodate initiation of new projects as well as orderly renewal of contracts for continuation of work already underway. Many funding agencies must consider both within-agency funding and funding of outside groups such as universities or commercial firms.

The ISRP has interpreted its implementation of the 1996 Power Act Amendment as including recommendation of a funding cycle. To this end, we reviewed the report by Coutant and Cada (1985) and examined the recent proposal selection schedules of selected agencies. We have provided two case studies as examples--the US Department of Energy's Strategic Environmental R&D Program (SERDP) and the Hudson River Foundation's Hudson River Fund (HRF). SERDP is a large, governmental, applied research and development program for environmental management of contaminated energy-related sites; HRF is a small, non-governmental, endowment-funded, applied research program that develops information needed to maintain a healthy Hudson River ecosystem in the face of contaminants and power plant cooling. We have adapted this information to funding of the FWP, and suggest a potential proposal selection schedule.

Case Studies

1. Strategic Environmental Research and Development Program (DOE)

The Department of Energy's Strategic Environmental R&D Program operates on an annual cycle (Figure 9). Key elements are:

- "Statements of Need" developed by the Science Advisory Board in December following its review of the previous year's funding and its year-long evaluation of selected projects.

- Independent solicitations of proposals from DOE's National Laboratories (by internal letter in late December) and outside groups (by published Broad Area Announcement--BAA--in early January), with (for FY 1998) a minimum of 40% of funds allocated to agency laboratories and 60% allocated to all sources (which may also include agency laboratories).

- DOE management review of pre-proposals due in late February from non-DOE groups, followed by specific requests for proposals.

- Specified due dates for proposals (specific dates in late March for in-house track and end of April for BAA track).

- Peer review of all proposals conducted by an outside peer review contractor, with criteria for priority set by the Statement of Need and technical criteria established by DOE management.

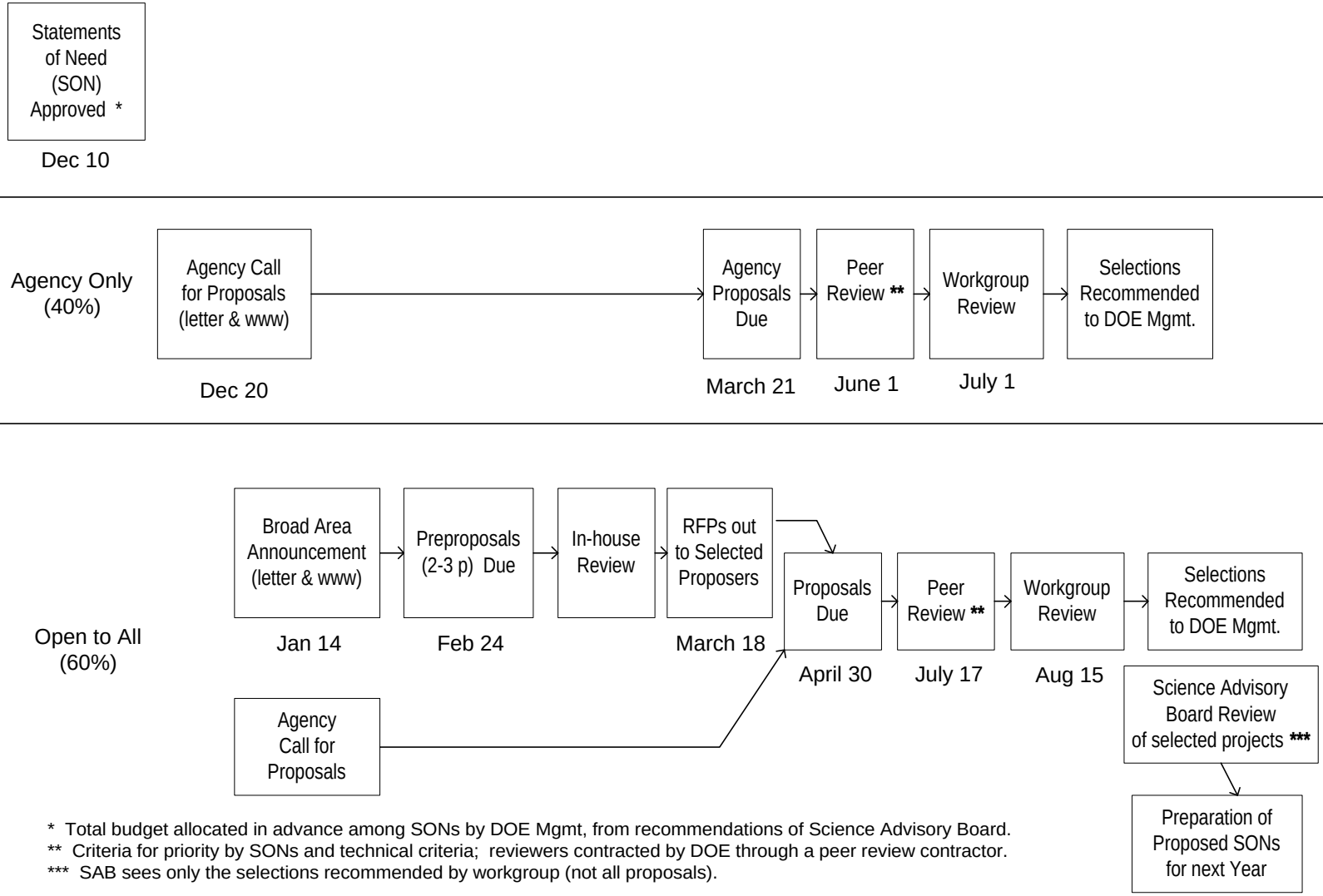
- Consolidation of peer reviews by a Work Group into funding recommendations in early July (agency) or mid August (BAA).

- Final project selection by DOE management by October 1 (start of fiscal year).

- Connection to the next year's cycle by the Scientific Advisory Board reviewing recommendations of the Work Group and selections by DOE management.

Renewal proposals for projects already funded for one to three years are shorter. A full proposal is required for continuing projects every 5 years. The SERDP management augments its formal proposal solicitations with on-site descriptions of the program to major research centers inside and outside the DOE.

Figure 9. 1996-97 Proposal Selection Schedule, DOE Strategic Environmental R & D Program
(for FY 1998 funding)



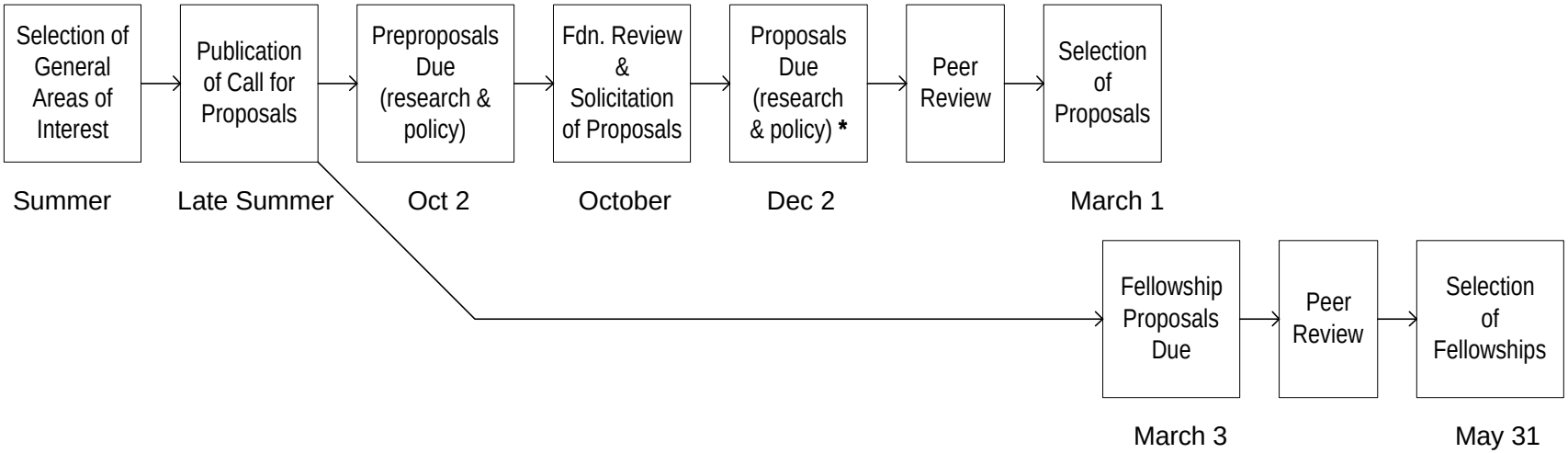
* Total budget allocated in advance among SONs by DOE Mgmt, from recommendations of Science Advisory Board.
** Criteria for priority by SONs and technical criteria; reviewers contracted by DOE through a peer review contractor.
*** SAB sees only the selections recommended by workgroup (not all proposals).

2. Hudson River Foundation

The Hudson River Foundation also operates on an annual cycle (Figure 10). Its key elements are:

- Any organization, agency or non-agency, may apply.
- It has established topical categories: scientific research, public policy research, travel grants, expedited grants, and graduate fellowships.
- The Foundation's Board of Directors and staff establish general areas of interest for the next funding year, especially for scientific research.
- A call for proposals is published (that includes all necessary forms) in late summer.
- Preproposals are due on a specific date in early October, which receive staff review for solicitation of full proposals (due in early December).
- Graduate fellowship applications are due on a date in early March.
- Proposals for Expedited Grants are considered throughout the year for study of emergency situations.
- All proposals are peer reviewed, using evaluation criteria specified by the Foundation.
- Notification of awards by 1 March, followed by arrangement of specific grant terms with successful applicants.

Figure 10. Hudson River Foundation Proposal Solicitation and Selection Schedule for 1996-97



***** Expedited grants are considered throughout the year but still must pass peer review.

ISRP Recommendation for the FWP

IV.D.1 The ISRP recommends the Council adopt a project review and selection process with a double track for competitive and targeted proposals (including project renewal proposals) (Figure 11).

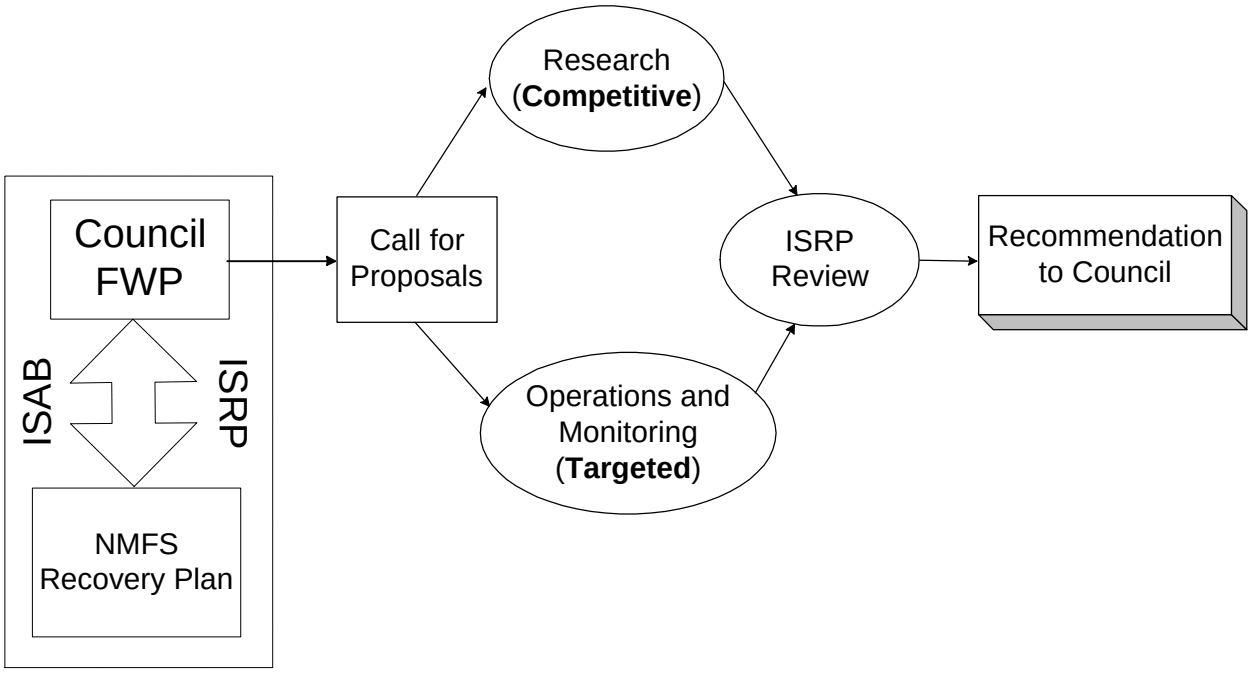


Figure 11. Recommended Proposal Solicitation and Selection Schedule for the Columbia River Basin Fish and Wildlife Program.

Statements of Need

Needed information or management actions are identified for emphasis in each funding year. The needs will change from year to year as needs are fulfilled over time. Some needs may be broadly stated (e.g., information to better understand the life-history diversity of salmonids), whereas others may be stated more specifically (e.g., design a surface spill system for The Dalles Dam). Others may emphasize long-term needs (e.g., continued monitoring of the numbers and

timing of downstream migrants). The Council would appear to be the proper focus for approving the annual list of needs for soliciting proposals in the context of a project selection process under the 1996 Power Act Amendment.

Call for Proposals

Proposals (both continuing and new) are solicited in two tracks, one track for targeted O & M (operations and maintenance) and the other track for any participants through a competitive grants program. Targeted projects could be of unlimited duration; whereas, competitive grants would be for a specified time period. Personnel of agencies and tribes would be eligible to apply for funding through the competitive grants program.

Solicitations would be issued by the Bonneville Power Administration (BPA). A specific letter would be sent to agencies and tribes and organizations already funded in the competitive grants program. Solicitations for new project ideas from other potential participants would be by the commonly used Broad Area Announcement (BAA), which would be distributed widely via letter, world-wide web, or Commerce Business Daily (all standard routes for federal government BAAs). Letters and the BAA would outline the year's needs, submission and evaluation processes, and evaluation criteria.

New versus Continuation Proposals

Each track (targeted and competitive grant) would produce full proposals for any new proposed project. These new project proposals would follow the format specified in the call for proposals, which should include elements described in Section IV-B (Competitive Research Grants Program for the FWP) and in Coutant and Cada (1985), SRG (1990), and ISG (1994).

Each track (targeted and competitive grant) also would produce continuation proposals annually. These proposals would be short and facilitated by an electronic form provided by BPA. The emphasis would be on a concise summary of the project, including the responsible organization and key staff, needs addressed (in solicitation, FWP, ESA, or other plan), project history, objectives, approach and methods, stocks or geographic area addressed, accomplishments to date, expected accomplishments in the coming year, and an updating of historical and anticipated project costs. These continuation proposals would be reviewed annually by the agencies/tribes through CBFWA and the ISRP to determine if the projects are worth continuing. The continuation proposals are not just administrative records but are the substantive basis for annual funding decisions in competition with new project proposals.

All projects proposed to be continued after being in operation for 5 years are to provide a more substantive summary and proposal. This would be required at each 5-year interval.

BPA Distributes all Proposals to CBFWA and ISRP

All proposals from both tracks, continuing and new, are in hand at BPA by February 1.

ISRP and CBFWA Reviews and Recommendations to Council

The ISRP (with its peer review groups) and CBFWA independently evaluate all proposals, new and continuing. Each organization establishes its procedures for these reviews. The reviews yield recommendations to the Northwest Power Planning Council by June 15.

Council Review of Recommendations and Direction to BPA to Fund

The Council reviews recommendations of CBFWA (the agencies and tribes) and the ISRP (the review body formed by the 1996 Power Act Amendment) and arrives at a decision on which projects, both new and continuing, to fund.

Project Authorization

BPA notifies project administrators of planned funding.

ISAB Review of Selected Projects

During the year, the ISAB may be asked to conduct a formal peer review of major projects selected by the Council and NMFS. The results of these reviews would be available to the CBFWA and ISRP in evaluations of continuation proposals.

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