Council Document ISRP 2000-1

Review of the BPA Reimbursable Account Programs in the Columbia River Basin as Requested in the Senate-House Conference Report on FY99 Energy and Water Development Appropriations Bill.

Report of the

Independent Scientific Review Panel

for the Northwest Power Planning Council

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ISRP Letter/Memo 99-1

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I. Introduction

In 1998, the U.S. Congress' Senate-House conference report on the FY1999 Energy and Water Development Appropriations bill included a new assignment for the Independent Scientific Review Panel (ISRP or Panel) and the Northwest Power Planning Council (Council). The ISRP was to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by the Bonneville Power Administration (BPA) and to make funding recommendations to Congress. The ISRP was directed to determine whether the proposals are consistent with the scientific criteria in the Pacific Northwest Electric Power Planning and Conservation Act as amended in 1996, and provide a report to the Council by April 1 of each year. The Council, in turn, must report to the Congress annually by May 15.

The ISRP was constrained in this first year review of the reimbursable program by the lack of lead time for the review and by an already ambitious work schedule from January to June 1999 through our ongoing commitment to review the direct-funded program (mandated by the 1996 amendment to the Power Act). Consequently, our 1999 review is limited to a description of the program elements and recommendations to reschedule and improve the review for the next year. To accomplish those two tasks, we relied on help from Council staff, Council briefing documents, and on recent assessments of various program elements by other review groups including the Independent Scientific Advisory Board (ISAB). For this year, we decided to define the scope of the new directive—what constitutes the reimbursable program—and develop an approach to the review that will yield a thorough scientific evaluation without compromising the ISRP's other assignments. In addition, key programs that will be evaluated in subsequent years are described. For this report we have adopted the term "Letter/Memo", which has been used in the past by the ISAB for reports to administrators with a low level of detail where time for preparation was short.

We have attached Appendix A, which provides more information on the basis for the ISRP assignment, and Appendix B, which provides some preliminary information on selected projects we examined as an exercise to help define the scope of the assignment.

A first task of this year's ISRP review has been to clarify distinctions between the "reimbursable" and direct-funded accounts in the overall fish and wildlife funding from BPA and to identify the specific reimbursable accounts that could be scientifically reviewed. The distinction between direct-funded and reimbursable projects proved to be unclear. The reimbursable category contained projects with several distinct legislative histories and in some cases funding has shifted in recent years between direct and reimbursable accounts. Thus, this initial fact-gathering about what constitutes the reimbursable accounts has been a major task in itself (aided greatly by Council staff [1]), and has consumed much of the allotted time. The complexity of the situation is illustrated by Figure 1 (page 5).

There are four major components of the reimbursable program that we have identified at this time:

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

The first component has already been reviewed by the Independent Scientific Advisory Board, and a brief summary of that review is included in this report in Appendix A.

II. Conclusions and Recommendations

We concluded that research and other projects funded under the reimbursable program should, as much as possible, be reviewed using the same criteria and specifications used by ISRP to review the direct program. Specifically, formats for project proposals should be consistent with those used in the direct program. Because they are not now similar, it will be important for the agencies, BPA, and the Council to develop such commonality.

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[1] We acknowledge with appreciation the assistance of personnel of the Corps of Engineers, Witt Anderson, Gary Johnson, and Adele Merchant in compiling lists and descriptions of Corps projects related to fish mitigation.

The ISRP recommends all projects included in the reimbursable review in subsequent years should be evaluated using the criteria and specification used by the ISRP to review the direct-funded programs. Specifically, project proposal formats and other requirements should be made consistent with those used for project review in the direct-funded programs.

Rationale — The ISRP currently lacks sufficient information to scientifically evaluate parts of the reimbursable program. To remedy that problem, we recommend using the proposal format that has been developed over the past three years for the direct-funded programs.

As indicated earlier, the schedule for this review is now concurrent with review of the direct-funded program. The ISRP cannot do justice to both requests from Congress without rescheduling one of the evaluations.

The ISRP recommends that a staggered annual schedule be agreed upon among Congress, the Council and the ISRP such that the reimbursable review occurs annually, in the autumn at a time when it does not conflict with the annual review of the direct-funded process.

Rationale — the ISRP cannot conduct adequate reviews of the direct-funded and reimbursable programs simultaneously.

Finally, we recognize from this first review that many components of the reimbursable program are routine operations and maintenance (O&M) functions. Further analysis will be needed to establish which components warrant scientific review.

The ISRP recommends that the responsible agencies (Corps of Engineers, U. S. Fish and Wildlife Service, and Bureau of Reclamation) provide an inventory of research-related and O&M projects.

Rationale — Many programs funded through the reimbursable program are routine operations and maintenance functions that are not amendable to scientific evaluation. To facilitate planning for next year's review, the ISRP needs a complete inventory of projects along with their purpose, research, operation and maintenance, construction, etc.

To effectively and efficiently complete the evaluation of the reimbursable program, the ISRP, Council staff and agencies must develop a detailed operational plan. The plan needs to be completed with enough lead time so everyone can execute their responsibilities effectively.

> **The ISRP recommends that a subcommittee of the panel work with appropriate Council staff to develop a detailed plan for the review to be carried out in 2000.**

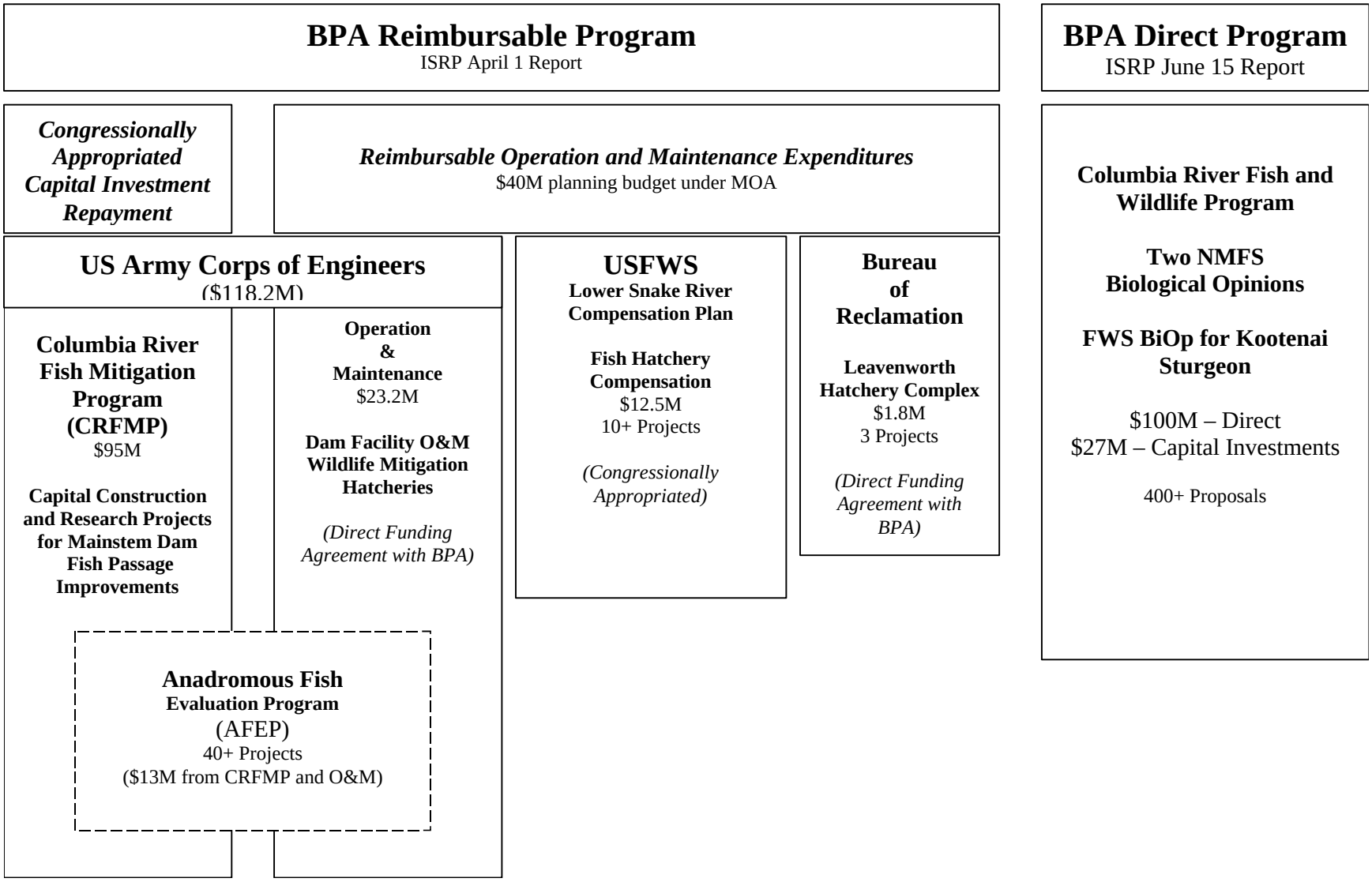
Rationale — Any evaluation of a program of the size and complexity of the reimbursable programs requires careful planning and coordination. Such planning and coordination will be needed before the ISRP can complete the review of reimbursable programs in FY 2000.

III. Summary

In summary, the ISRP has devoted this first report to a definition of the nature and status of the reimbursable program and to how the ISRP can most effectively carry out the wishes of the Congress for review of both the direct and reimbursable programs. The ISRP anticipates substantive scientific review of the program in fall 1999.

Figure 1. ISRP Scope of Review – "Reimbursable" and "Direct" Program

Budget figures (BPA funding only) and numbers of projects (amenable to scientific review) included in the chart below are annual estimates based on FY99 appropriations, ongoing BPA agreements, and project submittals. Actual budgets and the number of funded projects vary from year to year.



Appendix A. Background and Scope of the Assignment

Introduction

This appendix describes in detail Congress' direction and how expenditures and operations funded through Bonneville break into the direct-funded and reimbursable programs. We then describe the scope of the 1999 review and the criteria we intend to use in the review.

Appendix B provides our descriptions of the reimbursable program's major elements that we have identified, the U.S. Army Corps of Engineers, the Lower Snake River Compensation Program, and the Leavenworth Hatchery program.

Direction from Congress

In late 1998, Congress asked the ISRP and the Council to review the programs funded by BPA as part of what is known as the "reimbursable" accounts and to make funding recommendations to Congress. The request came in the Senate-House conference report on the FY99 Energy and Water Development Appropriations bill:

> "*Independent Scientific Review Panel.* The conferees recommend that, with regard to Columbia Basin fish and wildlife projects, programs, or measures proposed in a federal agency budget to be reimbursed by the Bonneville Power Administration, the Independent Scientific Review Panel should annually review such proposals, determine whether the proposals are consistent with the criteria in Section 4(h)(10)(D) of the Pacific Northwest Electric Power Planning and Conservation Act, make any recommendations that the Panel considers appropriate to make the project, program, or measure meet the criteria in that Section, and transmit the recommendations to the Northwest Power Planning Council no later than April 1 of each year. These Panel recommendations should be available to the public and should be subject to public comment.
>
> The conferees further recommend that the Panel recommendations should be fully considered by the Northwest Power Planning Council when making its final

recommendations of projects proposed by federal agencies and reimbursed by the Bonneville Power Administration.

The conferees direct the Panel[2] to submit its recommendations to the House and Senate Committees on Appropriations and relevant authorizing Committees no later than May 15 of each year. If the Northwest Power Planning Council does not incorporate a recommendation of the Panel in its recommendations, the Council should explain in writing its reasons for not accepting Panel recommendations." *Conference Report H. Rept. 105-749 (September 25, 1998), at 112-13*.

The reference to Section 4(h)(10)(D) of the Northwest Power Act is a reference to the 1996 amendment to the Power Act that established the ISRP and directed the panel and Council to review implementation of the Council's Fish and Wildlife Program. Under that amendment the ISRP and the Council have been reviewing projects proposed for direct-funding by BPA. The Senate-House conference committee has now broadened that review to those parts of the Bonneville fish and wildlife budget that consist of BPA reimbursements to the U.S. Treasury for fish and wildlife appropriations, or that are still part of the "reimbursable" accounts at Bonneville, even if now direct-funded.

Direct-funded and Reimbursable Programs

Under a 1995 budget agreement, memorialized in a 1996 Memorandum of Agreement regarding BPA's fish and wildlife budget,[3] Bonneville agreed to the following fish and wildlife budget

[2] The Council staff has concluded that this reference to the "Panel" is an inadvertent error in the Conference Report. Given the rest of the report language, it is the staff's view that this sentence should refer to the *Council* submitting its recommendations to the Congressional committees by May 15. The conferees appear to have been trying to mirror the procedures in the 1996 Power Act amendment for review of direct program expenditures—a scientific panel review, with Panel recommendations to the Council (by April 1), followed by public comment and a Council review, followed by Council recommendations to the Congressional committees, by May 15 of each year. Thus, the report language states in an earlier paragraph that the Panel is to transmit the Panel's recommendations *to the Council* by April 1. The Panel's recommendations are to be fully considered by the *Council* when making "its final funding recommendations." And, if the *Council* does not incorporate a recommendation of the Panel in its recommendations, the Council is to explain in writing the reasons for differing with the Panel. In this context, it makes sense that it would be the *Council* submitting its recommendations to the Congressional committees by May 15, although the Council will, of course, attach the Panel's report and the Council's written response to the Panel's recommendations.

[3] More precisely, in 1995, Bonneville, NMFS and chairman of the Council negotiated, and the Clinton Administration agreed to, a six-year (1996-2001) budget for Bonneville's fish and wildlife funding, memorialized in a letter from the head of the Office of Management and Budget. Toward the end of 1996, Bonneville, Corps of Engineers, Bureau of Reclamation, NMFS, and USFW developed and signed, in

commitments through Fiscal Year 2001: First, Bonneville agreed to absorb the financial consequences of the current set of system operations, whatever the cost (with a few exceptions). These operations include implementing the Biological Opinions for Snake River salmon (National Marine Fisheries Service (NMFS)) and Kootenai sturgeon (U. S. Fish and Wildlife Service (USFWS)), as well as a few other system elements. The financial costs of these operations vary dramatically depending on year-to-year water conditions, and consist of a combination of foregone revenues, power purchases, and the estimated impacts on capacity and other system benefits. For the purposes of the budget agreement, Bonneville estimated the average annual financial impact to itself at $183 million. Because of high water conditions in the last few years, the actual financial impact to Bonneville has been substantially less.

Second, Bonneville agreed to provide an average of $252 million per year through fiscal year 2001 for actual expenditures in three categories:

1) **Direct program expenditures —** This category consists of direct expenditures by Bonneville for projects related to the Council's Fish and Wildlife Program and the two Biological Opinions, primarily habitat, production, mainstem monitoring, research and coordination projects. The budget agreement expected this category to average $100 million per year. Obligations in this category have been as expected.

2) **Capital investment repayments** — ("direct" investments and "reimbursable" investments) This budget category includes paying off the debt from *direct* capital investments by Bonneville (mostly related to the Council's Fish and Wildlife Program, such as the capital costs of new artificial production facilities) and from capital investments made by Congressional appropriations (primarily for modifications to mainstem dams by the Corps of Engineers) that Bonneville is obligated to *reimburse* to the Treasury. Bonneville's budget commitment was to average $112 million per year to cover the repayment stream—the mortgage payment—for both past and expected direct and reimbursable capital investments. The budget agreement assumed that the expected capital repayment expenditures in this category would reflect, in part, a further investment by Bonneville in *direct* capital during the life of the budget agreement of $27 million per year, and that Congress would also make available $565 million in new capital investments over the life of the agreement. Bonneville has made available the direct

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consultation with the Council and the region's Indian tribes, a Memorandum of Agreement for the Bonneville Fish and Wildlife Budget to implement the less formal budget agreement.

capital as expected, but Congress has not appropriated funds to the Corps of Engineers at the expected level. This means Bonneville's repayment obligation is not increasing as fast as expected, and thus the agency will not average $112 million per year through the life of the agreement.

3) **Reimbursable operations and maintenance expenditures** — This category consists of Bonneville reimbursements to the Treasury for congressional appropriations for various operations and maintenance expenditures, such as for the artificial production facilities of the Lower Snake River Compensation Plan. The budget agreement expected that this category would average $40 million per year over the life of the agreement.

The 1996 Amendment to the Power Act subjected Bonneville's direct expenditures and direct capital investments to independent scientific review. The conference report language now adds to that review all proposals for reimbursable capital investments and reimbursable operations and maintenance expenditures. However, there are other federal fish and wildlife investments in the basin that are not subject to scientific review, for example, the Mitchell Act appropriation for artificial production and irrigation diversion screens. Projects funded by the federal land management agencies to improve fish and wildlife habitat is the other major category outside of Bonneville's budget and thus outside the ISRP review process.

Scope of the Review

Bonneville now *directly funds* the operation and maintenance and other non-capital costs for fish and wildlife facilities and activities of the Bureau of Reclamation (i.e., Leavenworth Hatchery) and the Corps of Engineers (e.g., operation and maintenance of mainstem passage and transportation activities, hatchery operations and maintenance, etc.). Formerly these activities were funded through reimbursable appropriations, and they are still accounted for by Bonneville in the reimbursable expenditures account. Although they are no longer "reimbursements" they have not been shifted to the direct-funded program and they are not reviewed as part of the 1996 Power Act amendment project review process. The Council recommended that the ISRP's review include all of these expenditures.

The ISRP's reimbursable review includes the following programs and projects:

1) **Columbia River Fisheries Mitigation Program (Corps of Engineers) —** capital investments in dam passage improvements on the lower Columbia and lower Snake dams that are either in the implementation (capital construction) phase or the study/investigation phase.

2) **Fish and wildlife operations and maintenance budget (Corps of Engineers) —**
   a. research projects (including the Anadromous Fish Evaluation Program)
   b. juvenile and adult passage facilities
   c. juvenile transportation program
   d. hatchery facilities funded by the Corps of Engineers and operated by the U.S. Fish and Wildlife Service or the Oregon Department of Fish and Wildlife:
      (1) Dworshak National Fish Hatchery on the North Fork of the Clearwater River, as partial mitigation for Dworshak Dam
      (2) Bonneville and Spring Creek hatcheries in the Bonneville Dam area of the lower Columbia, as partial mitigation for the John Day Dam
      (3) Marion Forks, South Santiam, Leaburg, McKenzie, and Willamette hatcheries on tributaries of the Willamette River, as partial mitigation for the various projects in the Willamette
      (4) Cole M. Rivers Hatchery on the Rogue River, as partial mitigation for Applegate and Elk Creek dams on tributaries to the Rogue
   e. wildlife mitigation expenses.

3) **Lower Snake River Compensation Plan (U.S. Fish and Wildlife Service) —** operation and maintenance expenses for ten hatcheries and sixteen satellite facilities for adult trapping and juvenile acclimation and release facilities on or for the lower Snake, Salmon, Clearwater, Walla Walla, Grande Ronde, Imnaha, Tucannon, Touchet and Walla Walla subbasins, as partial mitigation for the four lower Snake River dams.

4) **Leavenworth Hatchery (Bureau of Reclamation) —** operation and maintenance expenditures for the Leavenworth Complex which is funded by the Bureau of Reclamation but managed by the U.S. Fish and Wildlife Service, as partial mitigation for Grand Coulee Dam.

Standards/criteria for the ISRP's Review

The conference report language ties the ISRP's review of the reimbursable programs to the criteria in the 1996 amendment to the Power Act. The report language calls on the panel to "determine whether the proposals are consistent with the criteria in Section 4(h)(10)(D)" of the Power Act and to recommend how "to make the project, program, or measure meet the criteria in that Section." The ISRP was directed to base its recommendations on a "determination that projects: are based on sound science principles, benefit fish and wildlife, and have a clearly defined objective and outcome with provisions for monitoring and evaluation of results." These will be the basic criteria for the panel's review of the reimbursable budget items.

The same section of the Power Act further directs the ISRP "to adequately ensure that the list of prioritized projects recommended is consistent with the Council's program." We have concluded this criterion is not directly applicable to the reimbursable programs, because many of the projects (e.g., the Lower Snake River Compensation Plan) have origins and sources of authority outside the Power Act and the Council's program. Obviously, there is a need to coordinate these projects. Perhaps Congress is asking the ISRP to assess their consistency with the Council's program.

The conference report language recommends that the ISRP make its recommendations on the reimbursable projects to the Council by April 1. The Council is to make the ISRP's recommendations available to the public for review. The Council is also obligated to "fully consider" the recommendations and to explain in writing, if the Council's recommendations disagree with those contained in the report. As stated earlier, this schedule is impossible to meet this year, so the ISRP has developed a recommendation to revise the deadlines.

The ISRP undertook this review with an understanding that the primary objective in the region is the restoration of a healthy ecosystem that supports increased abundance and productivity from native fish (anadromous and resident) and wildlife populations in the Columbia Basin. This goal is explicit in the priorities of the Council's Fish and Wildlife Program, Endangered Species Act (ESA), as well as other major salmon restoration plans for the basin (ISAB1999a).

ISRP Approach to the 1999 Review

The ISRP was appointed by the Council in December 1996 and began work in January 1997. It presently consists of eleven members, seven of which are shared with the Independent Scientific Advisory Board. In addition to a diversity of experience in fisheries, genetics, and ecology, ISRP members have expertise in artificial production, wildlife, oceans, and natural resource economics.

The ISRP's main task has been, and continues to be, a comprehensive review of the Northwest Power Planning Council's Fish and Wildlife Program (i.e., Bonneville's direct-funded program). The 1996 amendment to the Power Act calls for the ISRP to review funding allocations and projects within the Council's fish and wildlife program annually for four years starting in 1997. Each year's review is to be reported to the Council by June 15 before the Council adopts prioritization recommendations. The majority of the work conducted by the ISRP in this review of the direct-funded program occurs between January and June of each year due to the constraints of Bonneville's annual funding cycle. Review of the direct-funded program is a large task and the ISRP members time and energy are taxed to complete the task on schedule. By necessity, this obligation constrained the scope and depth of our 1999 review of the reimbursable program.

The ISRP recognizes that integrating the peer review process described in this report into the reimbursable program, 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 Council, ISRP, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, other fish and wildlife managers, BPA, and other interested non-governmental entities.

Appendix B. Major Elements Identified in the Reimbursable Program

1. U.S. Army Corps of Engineers

Columbia River Fisheries Mitigation Program

The U. S. Army Corps of Engineers' Columbia River Fisheries Mitigation Program – capital investments in dam passage improvements on the lower Columbia and lower Snake river dams that are either in the implementation (capital construction) phase or the study/investigation phase.

In the Conference Report on the FY 1998 Energy and Water Development Appropriations Act (House Report 105-271), Congress asked the Council, with the assistance of the ISAB, to review the Corps of Engineers' Columbia River Fisheries Mitigation Program (CRFMP). The Council approved a scope of work for the review based on regional comments received on a draft scoping document. Policy issues were addressed by the Council, while identified technical issues were addressed by the ISAB. Because of the large number of projects and the complexity of many, the ISAB review focused on an evaluation of major fish passage strategies, as well as several controversial projects. The controversial projects were identified by the System Configuration Team (SCT) during their deliberations. The ISAB review focused on proposed passage improvements rather than those already underway, including: 1) Bonneville Dam juvenile bypass improvements, specifically relocation of the bypass outfall, 2) installation of extended-length screens at John Day Dam, and 3) testing and development of surface bypass for juvenile salmon at Lower Granite Dam. In addition the ISAB provided reviews of : 4) the problem of gas supersaturation, and 5) adult passage at the mainstem dams.

Once the ISAB completed reports on the five specific subjects, it developed broad recommendations in an overview report. In that report, the ISAB identified two principles that should guide decisions to modify dams to improve passage for salmon: 1) Protect biodiversity by designing passage solutions to benefit the full range of species, stocks and life history types in the river; and 2) favor passage solutions that best fit natural behavior patterns of salmon and river processes the fish encounter (ISAB 1999a). The ISAB concluded that, given these two principles, multiple passage solutions probably will be required and are not necessarily duplicative. The

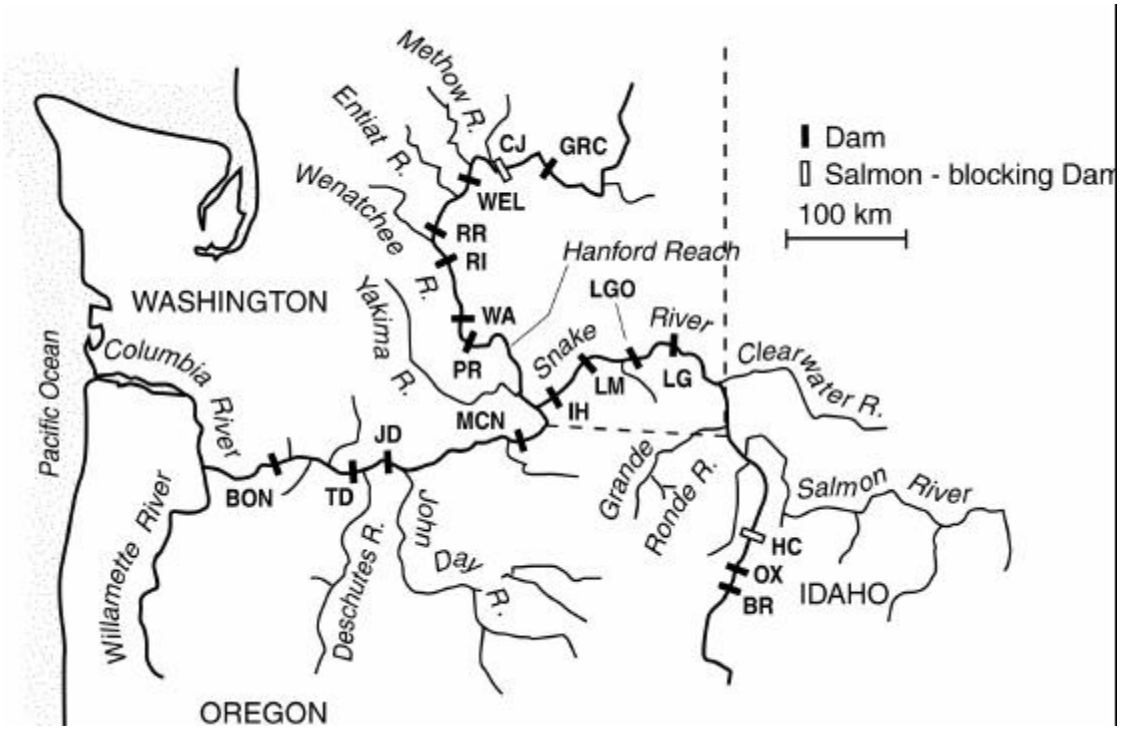
ISAB also recommended that the Corps of Engineers develop a process to inquire whether existing, proposed or alternative improvements in passage technologies are consistent with these principles.

In the development of passage solutions, the ISAB advised that explicit statements of biological premises and hypotheses such as those that formed a basis for evaluation of the prototype surface bypass facility at Lower Granite Dam was a valuable aid for efficient development of bypass solutions, and is a procedure that should be widely adopted.

In addition, the ISAB developed a list of guidelines to serve as a test of biological effectiveness for proposed actions. The test would consider whether the action is: 1) Consistent with the behavior and ecology of the species; 2) supportive of the physical and biological conditions necessary for successful completion of normal life history requirements for the species; 3) based upon a valid scientific rationale; and 4) consistent with an ecosystem approach in protecting other species. The Council staff concurred with the ISAB's approach and recommendations, and recommended that the Corps and others revise their decision making processes and criteria to be consistent with the principles, guidelines and ecosystem perspective set out by the ISAB (NPPC 1999). NPPC (1999) also instructed the ISRP to apply the principles and guidelines from the ISAB to its review of the projects in the reimbursable portion of the BPA fish and wildlife budget.

Brief reviews of the ISAB reports are provided below, as illustrations of how the principles can affect decisions on bypass solutions. Locations of the dams are shown in Figure 2.

Figure 2. Major features of the Columbia River Basin hydropower system including tributaries and dams. There is no fish passage upstream of Chief Joseph and Hells Canyon dams. (Source: USFWS 1998)



LEGEND

BON=Bonneville	WA=Wanapum	GRC=Grand Coulee	HC=Hells Canyon
TD=The Dalles	RI=Rock Island	**IH=Ice Harbor**	OX=Oxbow
JD=John Day	RR=Rocky Reach	**LM=L. Monumental**	BR=Brownlee
MCN=McNary	WEL=Wells	**LGO=Little Goose**	
PR=Priest Rapids	CJ=Chief Joseph	**LG=L. Granite**	

1) **Juvenile Salmon Bypass Improvements at Bonneville Dam —** The SCT was not able to agree on a proposal to relocate the juvenile bypass outfall at Bonneville Dam. The ISAB was asked to review the proposal and make a recommendation. The ISAB found that juvenile salmon were subjected to high mortality at the outfall of the bypass at Bonneville Dam due to its location (ISAB 1998a). The ISAB recommended proceeding with relocation. The basic problem with the present outfall is that it concentrates juvenile salmon in an area of low flow velocities that favor predation.

2) **Installation of Extended-Length Intake Screens at John Day Dam —** The ISAB found that even if expected improvements in fish guidance were to be realized, the extended-length intake screens would continue to be selective toward certain species and life history types of salmon. The lamprey, a species of interest to the treaty tribes, are not effectively bypassed by intake screens (ISAB 1998a). Because of concerns about effects on biodiversity, coupled with the lack of documentation of expected improvements in fish guidance, the ISAB recommended against installation of extended-length screens at John Day Dam.

3) **Surface Bypass System at Lower Granite Dam —** The ISAB concluded that, given the demonstrated selectivity of intake screens and the potential effects on biodiversity, it is time to find an adjunct to that technology. Surface collection continues to show promise as a bypass measure for juvenile salmon (ISAB 1998b). Surface bypass utilizes a natural tendency of juveniles to migrate in the upper layer of the water column.

4) **Dissolved Gas Abatement Program —** The goal should be to use the most cost effective manner possible to reduce systemwide total dissolved gas to levels safe for all aquatic life (ISAB 1998c). Spill levels that produce supersaturation are not limited to the spill program that is designed as a bypass measure for juvenile salmon. Therefore, the Corps should proceed immediately with known methods, such as completing installation of flip-lip spillways to prepare for high flow events that will require spill. Enough is known to proceed without additional biological studies, at this time.

5) **Adult Fish Passage —** The ISAB concluded that problems with adult passage have not been adequately dealt with (ISAB 1999a). Many questions remain about the effects of delay or extra energy expenditure en route upstream.

Fish and Wildlife Operations and Maintenance Budget

Corps of Engineers' fish and wildlife operations and maintenance budget which supports research projects (including the Anadromous Fish Evaluation Program), juvenile and adult passage facilities, juvenile transportation program, hatchery facilities (funded by the Corps of Engineers and operated by the USFWS or ODFW), and wildlife mitigation expenses.[4]

The U. S. Army Corps of Engineers, Northwestern Division, has sponsored biological studies continuously since 1952 to better understand and improve anadromous fish passage conditions at its multi-purpose projects on the Columbia and lower Snake Rivers. These monitoring, research, and evaluation studies have been managed under the Anadromous Fish Evaluation Program (AFEP). The AFEP is coordinated with federal, state, and tribal fish agencies who provide both technical and policy level input to the Corps on study objectives, experimental design, and methodologies. A few AFEP studies are now funded from project operations and maintenance accounts. Most studies are integral components of elements of the Columbia River Fish Mitigation project (CRFM), a large Corps construction account that funds numerous fish passage improvements at Columbia and Snake River mainstem dams.

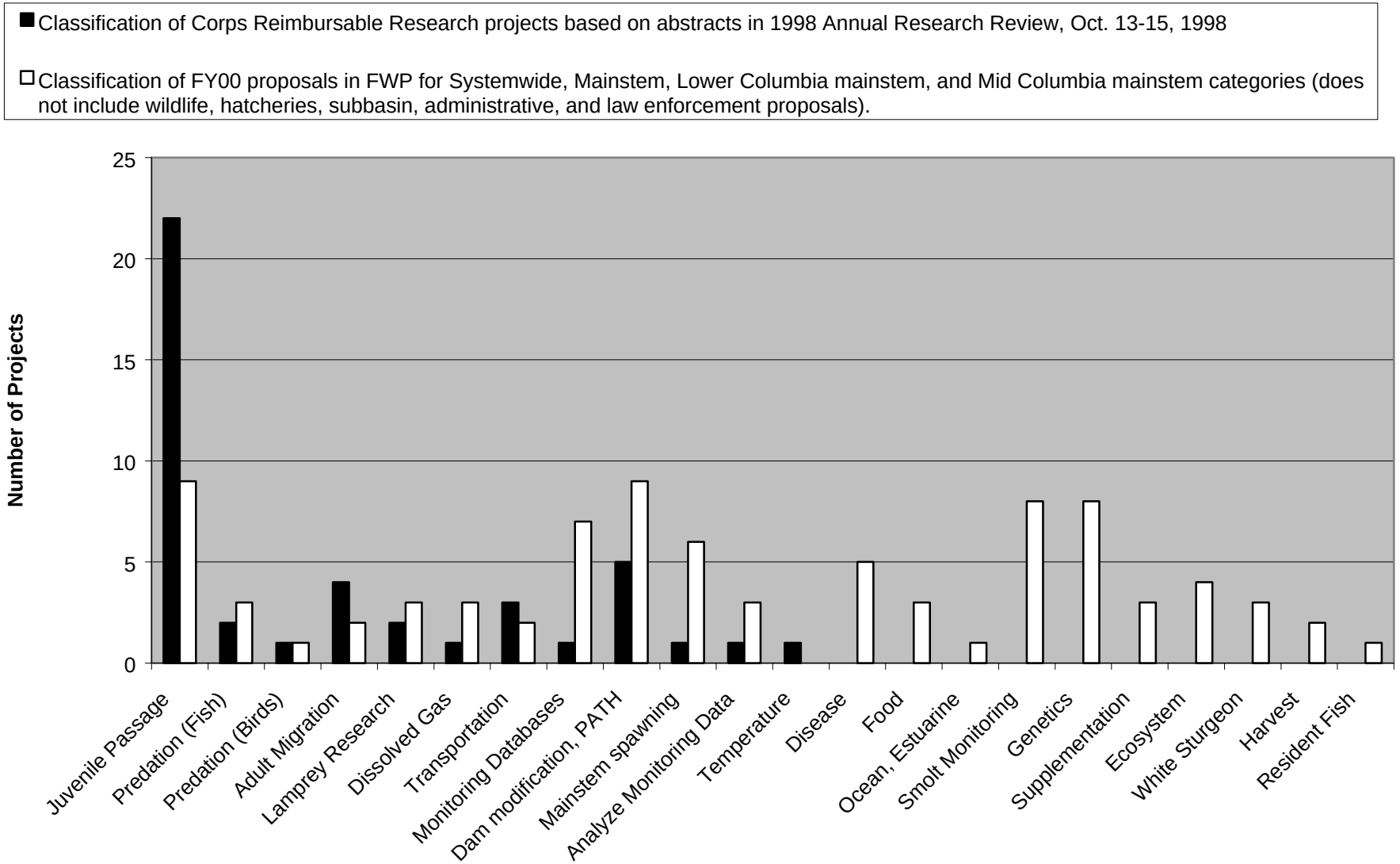
Historically, Corps of Engineers funded studies have focussed on project-specific adult and juvenile fish passage issues. Most of the passage facilities and operations on the river have been developed and refined based on results of these studies. These include adult fish ladders and collection channels, juvenile bypasses with turbine intake screens, the juvenile fish transportation program, spill for juvenile fish passage, and a comprehensive set of project/hydrosystem operating criteria.

According to Corps' criteria, the CRFM includes over 40 studies costing about $13 million in 1999, including research contracts, tags, project services and administrative support. These studies evaluate passage success, survival, and fish condition for surface bypass technologies, transportation, conventional bypass systems, spill, total dissolved gas, drawdown, adult migration/passage, in-river passage, and turbine passage. Most are developed as integral components of larger study and evaluation features of the CRFM related to new passage technologies, while some evaluate existing project features. In addressing the assignment from

[4] Both the hatchery component and the wildlife component are large and complex programs to analyze. There often are joint contributions to their support. At this time, we do not have an adequate understanding of their scope within the reimbursable program. We anticipate that the ISRP review of direct funding will help clarify the matter.

Congress, the ISRP attempted to identify studies that might benefit from an ISRP review. The approach we used, to obtain a preliminary idea, was to examine the abstracts of project reports included in the Corps' Annual Research Review for 1998 (Corps of Engineers 1998), and the project descriptions provided in the FY 2000 Proposals for Systemwide, Mainstem, Lower Columbia mainstem, and mid-Columbia mainstem categories. The results are shown in Figure 3. This provides a preliminary description of the boundaries that might encompass the ISRP review, based on our judgement at this time. Closer inspection will no doubt reduce the number somewhat, as overlaps among projects are identified, and routine monitoring activities are eliminated from the review.

Figure 3. Comparison of FWP and Corps Mainstem Columbia River Research

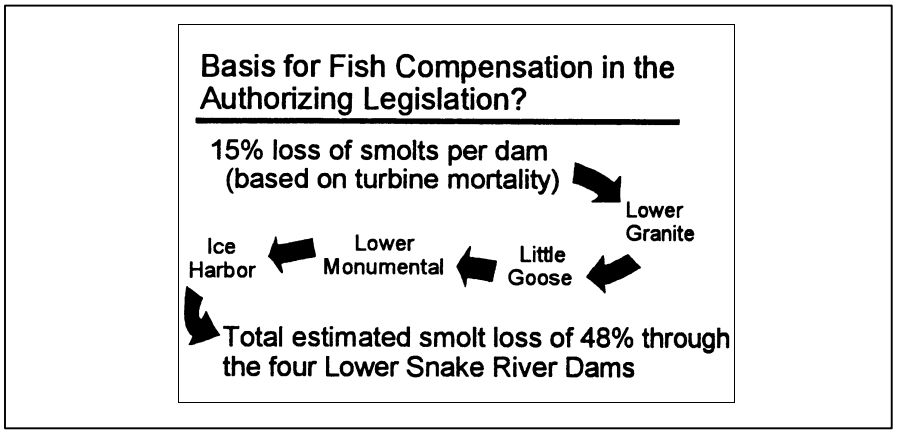


2. Lower Snake River Compensation Program

The U.S. Fish and Wildlife Service's Lower Snake River Compensation Program (LSRCP) oversees operation and maintenance expenses for ten hatcheries and sixteen satellite facilities. The projects include adult trapping and juvenile acclimation and release facilities on/or for the lower Snake, Salmon, Clearwater, Walla Walla, Grande Ronde, Imnaha, Tucannon, Touchet and Walla Walla subbasins. The LSRCP was authorized by the Water Resources Development Act of 1976, Public Law (P.L.) 94-587, to mitigate and compensate for fish and wildlife resource losses caused by the construction and operation of Ice Harbor (1961), Lower Monumental (1969), Little Goose (1970), and Lower Granite (1975) dams (Figure 1; USFWS 1998).

The basis for the LSRCP production targets was an estimated turbine mortality of 15% of the emigrating smolts at each of the four Lower Snake dams (Figure 4). The cumulative losses were estimated to be 48% of the pre-dam Snake river chinook salmon and steelhead runs (Table 1). The LSRCP called for the construction of hatcheries to produce sufficient juveniles to compensate for that loss. Compensation focused on replacing adult spring/summer and fall chinook and summer steelhead. However, there were other anadromous species (coho and sockeye) still returning to the basin at the time of dam construction.[5] Congress authorized the U.S. Army Corps of Engineers to construct the facilities, Bonneville to repay the treasury for the cost of the program from revenues generated by power sales, and the USFWS or NMFS to administer the program.

Figure 4. Order of smolt losses at the four lower Snake River dams.



[5] It is worth noting today more than twenty years later that coho salmon went extinct in the Snake River basin in the early 1980s, and sockeye salmon were listed as endangered under the ESA in 1991. An expensive rescue effort focusing on captive brood technology has kept Snake Basin from virtual extinction, but perhaps not functional extinction. The extent of adult sockeye returns, if any, over the next few years to the Snake basin will probably indicate the ultimate fate of that program.

Table 1. Computation of adult anadromous fish losses associated with the four Lower Snake River dams and locks. (Source: Corps of Engineers 1975)

	Fall chinook	Spring/summer chinook	Steelhead trout
Estimated Snake River run	32,663	122,200	114,800
Adult losses attributed to the Lower Snake Projects[2]	**18,300**[3]	**58,700**	**55,100**

[2] Estimated Snake River run times 48% (total estimated turbine-related losses).
[3]For fall chinook, formula for adult loss calculation is (Snake R. run minus 5,000 adults) * 48% plus 5,000 adults. The 5,000 adults is credited for those that spawned in the reach inundated by the reservoirs – that loss was direct and therefore added in directly to compute the total loss.

The plan also calls for resident trout production to compensate for the loss of angler days when the dams inundated about 140 miles of spawning habitat

In addition to the adult return goals identified in the compensation plan, the LSRCP also has responsibilities to comply with the ESA and to meet tribal trust responsibilities. Under the ESA, LSRCP actions are not to jeopardize listed species. Fish hatchery production has been adjusted where appropriate to meet ESA requirements.

According to the compensation plan, the LSRCP will continue efforts to maintain non-listed chinook salmon, steelhead, and rainbow trout programs under Section 7 of the ESA for future compensation options. However, as endemic stocks are developed, many of the program's non-local stocks will likely be phased out and replaced with local populations.

In FY 1998, 11.23 million salmon, steelhead and rainbow trout juveniles weighing 1.56 million pounds were released from LSRCP facilities. The numbers, pounds of fish produced, release sites, and sizes were adjusted in 1998 to reduce impacts on listed species.

Internal Reviews

The LSRCP has made a number of management changes over the years. After roughly a decade of operation, the USFWS sponsored a program-level review in 1990 (Herrig 1990). In 1998, a

second larger and more in-depth review was conducted by the USFWS in Boise, Idaho (USFWS 1998). Its goal (The Lower Snake River Compensation Plan Status Review Symposium) was to inform the regional decision makers, public, and scientists to promote informed decisions on the future program direction. During the symposium, LSRCP-funded fisheries scientists summarized and addressed the status of their projects dealing with steelhead, spring and summer chinook, and fall chinook. Two panels, one of seven independent scientists and another of seven stakeholders, provided comments throughout and at the end of the review.

The LSRCP Hatchery Program and the LSRCP mitigation efforts have not been able to meet their goals. As noted above, the original goal of the LSRCP was to compensate for the loss of 48% of the juveniles migrating downstream through the system; the other 52% of the run was expected to be maintained with the mitigation modifications such as installation of turbine intake screens, flip-lip spillway construction at the dams, barging/trucking smolts, and habitat improvement work. Based on the 1998 Status Review assessments, participants concluded that neither the (compensated) hatchery nor the naturally-spawning chinook populations have done as well as expected. Many of the chinook programs are no longer production-oriented programs as envisioned in the authorizing legislation, but rather are supplementation-oriented programs, due to the depressed status of the donor stocks. Steelhead (compensated) hatchery populations have done quite well in a number of years, whereas the naturally-spawning populations have deteriorated to the point that all endemic populations in the Snake River basin are now listed under the ESA. The returns remain well below pre-dam levels.

They noted that the continued precipitous decline of Snake basin chinook stocks, and the fear that steelhead stocks are starting to mirror the chinook declines, has shifted some of the responsibility, if not the focus, of the LSRCP to recovering natural populations, rather than mitigating for adult salmon and steelhead losses and enhancing recreational fishing opportunities.

3. Leavenworth Hatchery

Bureau of Reclamation's Leavenworth Hatchery -- operation and maintenance expenditures for facility funded by the Bureau but managed by the U.S. Fish and Wildlife Service, as partial mitigation for Grand Coulee Dam

The ISRP will review the Leavenworth National Fish Hatchery because the Bureau of Reclamation receives funding from BPA's reimbursable expenditure account. This reimbursable

expenditure is set at $1,805,000 for FY 2000 under a direct-funding agreement with BPA. Including BPA's contribution, the current approved FY 2000 budget for the Leavenworth National Fish Hatchery complex is $2,579,000. Apparently, the original operation and maintenance estimates given to the Bureau of Reclamation and BPA were inadequate to meet the base operation and maintenance needs of the Leavenworth Complex. Consequently, the Bureau of Reclamation submitted a proposal for FY 2000 funding through the Columbia River Basin Fish and Wildlife Program for $603,000. The ISRP and peer review groups are reviewing this proposal along with the other 400 proposals submitted for funding through the fish and wildlife program. Outyear cost for the Leavenworth complex are estimated at $5,184,717 in FY 2001; $6,208,796 in FY 2002; $6,321,920 in FY 2003; and $4,609,937 in FY 2004.

The Leavenworth hatchery complex includes the Leavenworth, Entiat and Winthrop National Fish Hatcheries. Construction of these facilities was authorized by Congress along with authorization for construction of Grand Coulee Dam in 1938. They were established as part of what was called the Grand Coulee Fish Maintenance Project (GCFMP) in an effort to maintain runs of salmon and steelhead whose spawning and rearing areas were to be obstructed by the construction of Grand Coulee Dam (Mullan 1987). In that effort, beginning in 1939, salmon were trapped in the fish ladder at Rock Island Dam, 150 miles downstream (Fish and Hanavan 1948). A portion of the fish were trucked to tributaries (Wenatchee, Entiat and Okanogan rivers) where they were released with the hope they would spawn, while others were taken to the hatchery as brood stock for egg take and rearing of the juveniles. Surveys had shown that abundance of salmon was low in the tributaries, suggesting that the project could restore and enhance these runs as mitigation for losses above Grand Coulee Dam. The goals of the project were to maintain a catch and escapement of 48,600 chinook, 79,700 sockeye, and 5,000 steelhead from the mid-Columbia or the number of fish estimated to be present when Grand Coulee Dam was built (Calkins et al. 1939).

There is a difference of opinion as to whether the GCFMP was a success or not. While the numbers of fish in the tributaries showed an increase in the decade of the 1950's, other factors affecting general abundance of salmon, such as restrictions in the lower river fisheries, may have accounted for the increase (Ricker 1972). Mullan et al. (1992) felt that at least the project was

successful in maintaining the genetic diversity of the stocks of salmon above Rock Island Dam. Chapman et al. (1995), believed that from an analysis of the genetic information, they should be considered part of a common species unit. Although there is now evidence of a degree of genetic distinction among certain spring chinook populations above Rock Island Dam. Chapman et al. (1995) felt that any divergence must have occurred subsequent to the GCFMP. With respect to summer/fall chinook (which they combined) they felt that the GCFMP had effectively homogenized the stock (Chapman et al. 1994a). Steelhead, on the other hand, showed a resistance to homogenization, which they thought was probably due to exchanges of alleles among resident rainbow/steelhead (Chapman et al. 1994b). One might conclude from the above information that all of the authors are correct, i.e.: the temporary improvement in fishery management in the 1950's contributed to an increase in tributary populations, coinciding with the GCFMP, as Ricker suggested; what Mullan called maintenance of diversity was maintenance of potential diversity, assuming the alleles are still present in the population though homogenized; which would agree with Chapman et al.'s analysis.

The hatchery part of the program continues to this day. Grand Coulee Dam has been replaced as the lowermost obstacle to passage of salmon by Chief Joseph Dam, another Corps of Engineers project, located 50 miles downstream. Initially, the hatcheries were funded by Congress as part of the budget of the U. S. Bureau of Fisheries (in the Department of Commerce) and later, the Fish and Wildlife Service (Department of Interior). Over the years, there have been a number of transfers among federal agencies of the responsibility for the budget of the Leavenworth Complex.

There have been changes in the hatchery program over the years. Spring chinook remain the primary focus of the hatchery program. Sockeye were included in the GCFMP, both by transfers to tributaries and by hatchery culture. Attempts to culture sockeye salmon at the Leavenworth Complex continued from 1944 to 1964 when they were discontinued (Mullan 1986). Mullan (1986) concluded that while sockeye originating from the hatchery made up 4–6% of the returning adults, they showed no better ratio of adult numbers to juvenile numbers than wild fish. Foerster (1968) observed that in the first half of this century, hatchery culture of sockeye was undertaken on a large scale in waters of the Pacific Coast of North America, but was virtually

discontinued when it was recognized that the benefits were largely inconsequential in relation to natural production.

Coho salmon were also included in the GCFMP and were cultured at the Leavenworth and Winthrop hatcheries at various times over the years from 1944 to 1973 (Mullan 1983). The numbers were never large, the largest number spawned being 689 females in 1968. Beginning in 1944 the egg take was occasionally augmented from sources outside the mid-Columbia reach. Mullan, 1983 noted that coho were virtually eliminated from the mid-Columbia reach prior to the completion of Grand Coulee Dam in 1941. While coho from the hatchery contributed to sport and commercial fisheries in the ocean and lower Columbia River, they never developed self-sustaining populations in the mid-Columbia tributaries.

A relatively small effort is directed toward steelhead. Each year about 80 adults are trapped as they enter Icicle Creek at the Leavenworth Hatchery. This results in the release of about 100,000 smolts two years later, which meets the goal specified in the proposal.

The mitigation goal for spring chinook salmon is an annual release of 2,200,000 yearlings from the Leavenworth facility, 800,000 from the Entiat, and 1,000,000 from the Winthrop facilities. However, those goals are not attainable due to inadequate water supply, antiquated rearing ponds, poor adult holding ponds, and absence of site-specific evaluation of operations. Planned production at Leavenworth is 1,625,000 yearlings, at Entiat 400,000, and at Winthrop 800,000 yearlings. In addition 400,000 sub-yearlings are released from the Entiat Hatchery.

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