



1994
Columbia River Basin
Fish and Wildlife
Program

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COLUMBIA RIVER BASIN

FISH AND WILDLIFE PROGRAM

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Section 1

INTRODUCTION: COLUMBIA RIVER SALMON AND STEELHEAD AND THE NORTHWEST POWER ACT

"The Council shall promptly develop and adopt...a program to protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat, on the Columbia River and its tributaries ... affected by the development, operation and management of [hydroelectric projects] while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply."

Pacific Northwest Electric Power Planning and Conservation Act
of 1980

INTRODUCTION

1.1 PURPOSE

Ever since the Northwest Power Act was passed in 1980, the Columbia River Basin's fish and wildlife have been the subject of increasing attention, not just from groups that are dependent on the river or its fish, but from the public at large. A major goal of the Act is to address the impacts that the region's hydroelectric dams have had on fish and wildlife. The Act pays particular attention to anadromous fish -- salmon and steelhead -- and the impact of hydroelectric dams on these fish. The Columbia Basin's anadromous fish, the Act says, "... are of particular significance to the social and economic well-being of the Pacific Northwest and the Nation and are dependent on suitable environmental conditions substantially obtainable from the management and operation of the Federal Columbia River Power System and other power generating facilities on the Columbia River and its tributaries." During the past decade, significant efforts and money have been spent to protect and rebuild the affected populations.

But those efforts have not been enough to rescue some species. Some of the region's salmon and steelhead runs have been declining at alarming rates, so alarming that, since 1990, certain populations have been the focus of regional, as well as national attention. In mid-November 1991, to no one's surprise, the National Marine Fisheries Service officially declared Snake River sockeye salmon an endangered species.

In April 1992, the Fisheries Service designated Snake River spring/summer and fall chinook as threatened species. These declarations triggered a set of actions required under the federal Endangered Species Act of 1973. One of these actions is the development of recovery plans.

The Endangered Species Act sends a clear message that the region must redouble its efforts to protect its fish, especially those that spawn naturally in rivers rather than in hatcheries. The Northwest Power Planning Council's concern is not just for those runs that have been placed on the national endangered species list, but for all weak salmon runs in the Columbia Basin.

Fortunately, the Northwest did not lose time debating whether Snake River sockeye and the other listed runs -- spring, summer and fall chinook -- are in fact threatened or endangered. Building on its decades of experience with salmon, the Northwest began developing its own regional plan in 1991 for those species that are most critically depleted other salmon and steelhead populations basinwide. Important groundwork for the salmon rebuilding effort was laid in a Salmon Summit convened in late 1990 by the region's Governors and Senator Mark Hatfield. The summit, made up of the user, policy and interest groups connected with the Columbia Basin's waterways, came up with critical short-term measures that were implemented in 1991 to stem further decline. Those measures bought the region time. From there, development of a regional salmon rebuilding plan moved to the arena of the Northwest Power Planning Council, the interstate body that has provided a regional forum for the past 10 years through its Columbia River Basin Fish and Wildlife Program. The Council, whose members are appointed by the Governors of Idaho, Montana, Oregon and Washington, develops its program under the Northwest Power Act.

Just as the endangered species petitions for Snake River salmon underscored the critical condition of some Columbia Basin salmon runs, the petitions also highlighted the need to address impacts on salmon at every stage of their life cycle. After the Salmon Summit, the Governors asked the Council to expand its focus to address all activities that impact salmon, not just the hydroelectric system.

The Council took up where the Salmon Summit left off in the spring of 1991 by initiating a process to amend its fish and wildlife program in four phases. The first three phases constitute a salmon rebuilding strategy. It is aimed at rebuilding all weak salmon stocks. The fourth phase of the amendment process addressed resident fish and wildlife.

This document, the 1994 Columbia River Basin Fish and Wildlife Program, resulted from the amendments. The program gives the region comprehensive strategies for protecting, mitigating and enhancing the basin's fish and wildlife.

The Council intends that the elements of this program be adapted as needed and as new information becomes available. Not only has the Council provided flexibility to make changes as appropriate, it has designed the program to add flexibility to the region's knowledge of fish and wildlife.

Such a program, developed with regional input, should prove to be an essential guide for federal agencies in devising recovery plans for fish or wildlife listed under the Endangered Species Act. Without it, the federal government or courts would be left to impose a plan of their own. A regional plan, based on extensive input from all the basin's interest groups as well as Northwest citizens, has the advantage of reflecting the unique values, perspective and interests of the region.

But this document represents much more than a guide to recovery actions. It is the first truly comprehensive strategy for salmon and steelhead in the Columbia River Basin. It is a long-range plan to amend river operations, increase salmon productivity, repair salmon habitat and refine salmon harvests. It is designed to balance competing river uses while strengthening and rebuilding salmon and steelhead runs throughout the basin. The Council's aim is to make future Endangered Species Act petitions unnecessary, and ultimately to produce healthy and harvestable populations of fish.

Regarding resident fish -- those that don't migrate to the ocean during their lives -- this program recognizes that these fish suffered from many of the same impacts as salmon. The Council's goal for freshwater fish is to recover and preserve the health of populations that were injured by the hydropower system, where feasible. If it is not feasible to mitigate losses where they occurred, then these losses will be mitigated elsewhere in the basin.

The Council's goal for wildlife is similar. Some flood plain and riparian habitats that are important to wildlife were inundated when reservoirs behind the dams filled with water. A number of other dam-related impacts altered land and streamside areas where wild birds and animals live. The goal for wildlife in this program is to achieve and sustain levels of habitat and species productivity that fully mitigate wildlife losses resulting from the construction of dams.

The 1994 Columbia River Basin Fish & Wildlife Program supersedes the 1987 Program and includes some measures from that program that were not completed but remain relevant.

The Northwest Power Act and the Fish and Wildlife Program

The Northwest Power Act directed the Council to develop this program and make periodic major revisions by first requesting recommendations from the region's federal and state fish and wildlife agencies, appropriate Indian tribes (those within the basin) and other interested parties. These recommendations are

to include measures that Bonneville and other federal agencies can implement to protect, mitigate and enhance fish and wildlife affected by hydroelectric dams; objectives for developing and operating hydroelectric dams in a way designed to protect, mitigate and enhance fish and wildlife; and coordination of fish and wildlife management, research and development (including funding).

The Council adopted its first Columbia River Basin Fish and Wildlife Program in 1982. The program was amended in 1984, 1987 and 1991-93. The Act placed great emphasis on the fish and wildlife of the Columbia River Basin. That emphasis is made clear in the language of the Act. For example, the Act states that one of its goals is:

“...to protect, mitigate and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries, particularly anadromous fish, which are of significant importance to the social and economic well-being of the Pacific Northwest and the Nation and which are dependent on suitable environmental conditions substantially obtainable from the management and operation of the Federal Columbia River Power System and other power generating facilities on the Columbia River and its tributaries.”

No single approach will bring about the changes needed to achieve this vision. Mainstem survival improvements, salmon habitat and production measures, and harvest regulations all must work toward rebuilding healthy fish runs. Drawing a blueprint for these changes ultimately requires a judicious consideration of all the standards of the Northwest Power Act. Within this framework, however, several points deserve emphasis:

- **System approach:** In developing the Columbia River Basin Fish and Wildlife Program, the Council must deal with the Columbia River and its tributaries as a system¹. This system touches a broad range of human activities-hydropower production, navigation, flood control, agriculture, recreation and many other land and water development activities. Opportunities for improved coordination and cooperation, as well as for increased conflict, are enormous. Building a fish and wildlife program that properly accounts for these activities requires the broadest possible involvement of the public and affected interests.
- **Regional power supply:** While the fish and wildlife program must “protect, mitigate and enhance fish and wildlife affected by the development, operation and management” of Columbia River Basin hydropower facilities, it must do so in a way that ensures the region “an adequate, efficient, economical and reliable power supply.” The Council has called for aggressive exploration of structural changes to the hydropower system, such as reservoir drawdown

¹This means the region can formulate solutions that address the cumulative impact of the basin's entire hydropower system.

strategies, as well as non-structural changes, such as innovations in system operations, seasonal power exchanges, water use efficiencies, and the like. These non-structural innovations in particular will require careful integration when planning for the power system, fish and wildlife, and water use to ensure that the needs of salmon, power and other users are addressed.

- **Federal responsibilities:** These solutions can become reality because the Northwest Power Act explicitly gives the Bonneville Power Administration, the region's federal electrical power marketing agency, the authority and responsibility to use its legal and financial resources "to protect, mitigate, and enhance fish and wildlife to the extent affected by the development and operation of any hydroelectric project of the Columbia River and its tributaries in a manner consistent with ... the program adopted by the Council ... and the purposes of this Act." The Act further requires Bonneville and the federal hydropower project operators and regulators to take the program into account to the fullest extent practicable at each relevant stage of their decision-making processes. To ensure this cooperation, the Council is required to consult with a variety of groups in the Northwest and to maintain comprehensive programs for public participation. This program reflects those requirements.

Those participating in the development of this program included federal and state fish and wildlife agencies, Indian tribes, utilities, federal program implementors (Bonneville, Corps of Engineers, Bureau of Reclamation and the Federal Energy Regulatory Commission), state and local governments, federal and state land and water managers, environmental groups and other interested parties, including private citizens. Through this program, the citizens of Idaho, Montana, Oregon and Washington have an opportunity to share in the decision to protect the Columbia Basin's fish and wildlife resources and to counter the harm caused by decades of hydroelectric development and operations. Among key issues considered by the Council are:

- **Fishery management:** The region's fish and wildlife agencies and Indian tribes (often described collectively in this program as the "fishery managers") play a special role in the program. The program must complement the agencies' and tribes' existing and future activities, and also must be consistent with the legal rights of those Columbia Basin tribes that signed treaties with the federal government in 1855.
- **Best available scientific knowledge:** In considering fish and wildlife recommendations, the Act requires the Council to rely on the best available scientific knowledge. Because that knowledge often is incomplete, future salmon research should focus on critical uncertainties. The region must take pains to monitor actions and make adjustments where advisable. Where equally effective means of achieving the same sound biological objective exist, the Council chooses the alternative with the lower economic cost. Clearly, the

term "biological objective" is relevant to cost-effectiveness analysis. The Council has committed to do more such analysis. The Council will explore this issue in relation to its upcoming mainstem rulemakings. In addition, the Council expects that Bonneville will do additional work on cost-effectiveness in its implementation of habitat measures.

- **River flows:** The Act specifically recognizes that salmon depend on "suitable environmental conditions substantially obtainable from the management and operation" of power generating facilities of the Columbia River Basin. The Council is directed to adopt measures to "provide flows of sufficient quality and quantity between such facilities to improve production, migration and survival of such fish as necessary to meet sound biological objectives."
- **Equitable treatment:** The Act requires federal implementing agencies to manage and operate hydropower facilities to provide "equitable treatment for fish and wildlife with the other purposes for which such system and facilities are managed and operated." Therefore, the Council's determinations regarding salmon survival in the main bodies of the Columbia and Snake rivers, where the major federal dams are located, aim to meet the needs of salmon with a level of certainty comparable to that accorded the other operational purposes.

Meanwhile, resident fish and wildlife populations also need attention. This program recognizes that efforts to improve the survival of these populations also must increase. Funding for resident fish and wildlife mitigation proceeded at low levels in the past, and the Council expects these activities will get a higher percentage of Bonneville's fish and wildlife program budget in the future. The Council believes that a level of approximately 15 percent for resident fish and 15 percent for wildlife -- leaving 70 percent for salmon -- is an appropriate budget planning target.

In some instances, measures designed to benefit one fish species or population can inadvertently harm others. For example, measures to help juvenile fish migrate to the ocean sometimes can harm adult fish migrating upriver from the ocean to spawn. River operations to benefit salmon can harm resident fish populations in areas blocked to salmon. The Council intends that actions designed to help salmon pose no appreciable risk to biological diversity among or within fish populations, including resident fish.

1.2 ROLE OF THE COUNCIL AND OTHER AGENCIES

In adopting the Northwest Power Act, Congress expected to overcome the harm to fish and wildlife caused by Columbia River hydroelectric dams. To that end, the Act anticipates that the Council and the federal implementing agencies will cooperate to achieve the goals set by Congress, as well as respect the role each

has to play. Fish and wildlife protection, mitigation and enhancement will never occur if each agency tries to substitute its individual judgment for the scientific knowledge, expertise and judgment of those who went before.

The Council is a planning, policy-making and reviewing body. It develops and monitors implementation of this fish and wildlife program, which is implemented by the Bonneville Power Administration, the Corps of Engineers, the Bureau of Reclamation, and the Federal Energy Regulatory Commission (FERC) and its licensees. Under Section 4(h)(11)(A) of the Northwest Power Act, these federal operating and regulating agencies are directed by Congress to exercise their responsibilities, in a manner consistent with the purposes of the Act and other applicable laws, to provide equitable treatment for fish and wildlife. The federal agencies are also directed to take this program "into account at each relevant stage of decision-making processes to the fullest extent practicable." In addition, in Section 4(h)(10)(A), Congress has directed Bonneville to use the Bonneville fund and all of the agency's legal authorities "to protect, mitigate, and enhance fish and wildlife to the extent affected by the development and operation of any hydroelectric project of the Columbia River and its tributaries in a manner consistent with. . .the program adopted by the Council under this subsection, and the purposes of this Act."

In the case of program measures involving non-federal projects, the processes of the FERC must be respected. Under the Federal Power Act, FERC must review a program measure and the license of the affected hydroelectric project to determine if the license can and should be amended.

In developing and amending the fish and wildlife program, the Council incorporates qualifying recommendations or modifications of recommendations received from outside parties, along with recommendations the Council initiates on its own, into a draft amendment document.

Receipt of initial recommendations initiates an extensive public comment period, which includes issuance of a draft amendment document, public hearings in each of the four states and consultations with interested parties. During the development of the initial program and the subsequent amendment proceedings, public comments resulted in thousands of pages of testimony from dozens of groups and individuals.

After closing the comment period and following a review and deliberation period, the Council adopts final program measures. In developing the original program in 1982 and in subsequent amendments, the Council used recommendations it received as the basis for its draft document and made significant changes in the final document as a result of public comment on the draft. The Council also lists recommendations it does not adopt, along with a rationale for each rejection.

Adoption of the amended program must occur within a year of the deadline for receiving recommendations for amendments. When the Council declines to adopt any recommendation, it must explain, as part of the program, why the recommendation is less effective than the existing program measures or why it is inconsistent with the standards for program measures set up by the Act. The Council has not attempted to distinguish between those measures where the Council believes it has direct authority and those measures where that authority belongs to others.

The Council is calling on the parties identified as implementors of these measures to report to the Council on their progress. If the measures are not being implemented, the parties should explain why. For its part, the Council is committed to monitoring and evaluating implementation of this program much more aggressively than in the past. It will do so through audits, shared regionally and with the National Marine Fisheries Service, and through oversight activities associated with Council meetings. The Council also will initiate consultations to discuss priorities further. These consultations will begin in March 1994 with the goal of concluding by November 1994. Based on these consultations, the Council intends to revise and add detail to the Action Plan.

Ultimately, the successful recovery of salmon, steelhead, resident fish and wildlife stocks depends less on legal authority than on cooperation. Only through the committed and enthusiastic participation of all affected parties will a full recovery be achieved.

1.3 HISTORICAL PERSPECTIVE

Program Development

Efforts to develop the fish and wildlife program began immediately after enactment of the Northwest Power Act on December 5, 1980. By April 1981, fish and wildlife agencies and Indian tribes had established an ad hoc executive committee to coordinate their recommendations. The Council was formed on April 28, 1981, and issued its request for fish and wildlife program recommendations on June 10, 1981. More than 400 recommendations were received for the original program.

From the beginning, the level of public participation has far exceeded the Council's expectations. The quantity and quality of the comments is evidence that the Council, the fish and wildlife agencies, Indian tribes, Bonneville, federal project operators and regulators, utilities and the public are committed to solving the basin's fish and wildlife problems permanently. The interest in this program and the amount of thought, time and effort put into this process have been exceptional.

Lessons of the Past Decade

Today, the Columbia River Basin Fish and Wildlife Program is not quite 12 years old, about the age of three generations of salmon. Unfortunately, the problems for the basin's fish have been more than a century in the making. Human activities ranging from fishing to agriculture to power production took a toll, and so did natural events such as drought, floods and ocean conditions. If a decade has not been enough time to arrest the salmon's decline, it has been time to teach the region some important lessons. Any approach to fisheries recovery will require contributions from all who benefit from the river. And a rebuilding plan must be comprehensive. Piecemeal efforts simply have not been effective.

The challenge is best illustrated by the salmon's extensive environment, an environment defined by migratory habits that recognize no governmental boundaries. Salmon hatch in inland headwaters and travel downstream to mature in the ocean. Depending on the species, after three to five years, they return to the river. Thanks to an extraordinary homing instinct, they make their way to their home tributary where they will spawn and die. This wide-ranging environment, sometimes encompassing thousands of miles, became the arena for salmon recovery efforts in the 1980s.

During that decade, for the first time, the region looked at a coordinated approach involving the salmon's habitat; their passage down the rivers, particularly the mainstems of the Columbia and Snake; their harvest; and their production (both natural and artificially aided). This coordination echoes pleas to take an ecosystem approach to recovery under the Endangered Species Act, and it remains the foundation for a recovery plan in the 1990s.

While the foundation laid in the past decade for a systemwide approach was sound, the focus of the 1980s proved too narrow. The fish and wildlife program's interim goal was to double runs, but not at the expense of genetic diversity. Overall runs ranged between about 1.5 million and 4 million in the 1980s. However, some weaker runs continued to decline, thereby threatening genetic diversity and fitness. It became more apparent that the diversity of the runs, not just the number of fish, was an important consideration.

Despite some gains made in the early 1980s, overall salmon and steelhead populations are about a fifth of their pre-development run size, and only about 20 percent of the remaining fish spawn in the rivers. Most wild and naturally spawning stocks are declining. There are some promising exceptions to the general decline in wild and naturally spawning stocks. Some stocks, such as upriver bright fall chinook that spawn in the Hanford Reach of the Columbia, have increased during the last 10 years.

While these improvements are encouraging, the Council's concern is not just for salmon. The Council is concerned about all weak stocks of fish and wildlife in the basin. The program gives highest priority to ratepayer-financed mitigation for weak, but recoverable, native fish populations injured by the hydropower system. The Council prefers to rebuild native species in native habitats, where feasible, but recognizes that this must be done carefully to avoid impacts on existing populations.

The Council continues to support increasing resident fish populations where salmon runs cannot be rebuilt. Such substitutions have been part of the fish and wildlife program since the early 1980s. Under the program's direction, and in consultation with state agencies and Indian tribes, hatcheries have been built to raise and release resident fish .

Expanded Focus

The endangered species petitions dramatically underscored the need to make preserving diversity of salmon runs a higher priority. This renewed focus also affected the Council's own role. Previously, the Council's fish and wildlife program had addressed primarily the effects of the hydropower system on salmon and steelhead.

With the endangered species listings, it became clear that a realistic recovery effort had to be broader, involving all the river uses: power production, flood control, agriculture, navigation, water supply, recreation, land development practices and fishing. When the Northwest Governors, Congressional delegation and the National Marine Fisheries Service looked to the Council to come up with a comprehensive recovery plan, they also asked the Council to assume this broader role. The Council has done so. It developed an integrated plan that seeks contributions from all river users.

1.4 COSTS AND RESPONSIBILITIES

Congress established three major principles in the Northwest Power Act to govern the economic costs for measures in this fish and wildlife program. First, hydropower ratepayers are to pay only for those measures designed to deal with the effects of hydropower development and operations. Second, measures must protect, mitigate and enhance fish and wildlife while assuring the region an adequate, efficient, economical and reliable power supply. Third, program measures must use the alternative with the lowest economic cost where equally effective ways of reaching the same sound biological objective exist. The Council has taken specific steps in the following program areas to further the economic principles set down by Congress.

- **Salmon and steelhead losses and goal:** The Council has conducted an extensive analysis to estimate the scope of losses of salmon and steelhead related to hydropower development and operations. It concluded that from 5 million to 11 million fish, have been lost due to the effects of hydropower. As a result, the program's goal of doubling the current run size of 2.5 million salmon and steelhead is well within the scope of hydropower-related losses. [See Section 2.1, Program Goal]

- **Salmon and steelhead policies:** The policies, which will guide efforts toward the doubling goal, are designed to help promote sound ratepayer investments. For example, the program calls for assessing the genetic risks of proposals related to producing more fish. Genetic diversity among fish is essential to the long-term productivity of salmon and steelhead stocks in the basin. The program also emphasizes the crucial need for passage at the dams and adequate river flows between the dams on the mainstem Columbia and Snake rivers, if fish produced with ratepayer funding in the tributaries and in hatcheries are to survive. The program's salmon and steelhead production policy calls for developing "master plans" to resolve potential conflicts among increased production, mixed-stock harvest and other objectives, such as gene conservation, before the Council approves ratepayer funding of new artificial production facilities. In its harvest management policy, the program calls on harvest managers to regulate catch, including mixed-stock harvest, to support ratepayer-funded production and passage efforts. The program's adaptive management policy encourages projects to be designed to produce information that will reduce biological uncertainty and aid future decision-making.

- **Cost Estimates for Program Measures**

The Council has reasonably accurate cost estimates for measures in the program. These estimates either were provided to the Council or were developed by Council staff. There is a problem, however, in that Bonneville is understandably reluctant to provide cost estimates for projects it later will negotiate with contractors. The Council expects to find a way around this problem in the future so that the cost of specific measures can be estimated with more precision.

- **Research priorities.** The program focuses ratepayer-funded salmon and steelhead research into six areas of emphasis, each aimed at improving the effectiveness of existing production and passage facilities and techniques.

- **Monitoring and evaluation.** The Council is committed to a monitoring and evaluation program to promote sound ratepayer investments in salmon and steelhead projects. Changes in salmon and steelhead run sizes will be evaluated to determine whether those changes are due to ratepayer-funded efforts or to other causes. Monitoring and evaluation also will provide feedback so that

ineffective actions can be identified and changed. [See Section 7.2, Monitoring and Evaluation.]

- Water budget evaluation: The program reflects the need to examine the effectiveness of the water budget and to explore alternative proposals to provide river flow benefits to fish while minimizing impacts on the power system. [See Section 3, Juvenile Salmon Migration.]
- Dam passage: The program emphasizes installation of bypass systems and use of transportation, rather than more costly spill, as the long-term methods to improve fish passage around mainstem dams.
- Resident fish and wildlife criteria: The program includes criteria that specifically tie resident fish and wildlife mitigation projects to hydropower-related losses of those species and their habitat.
- New hydropower development: Measures calling for conditions on new hydropower development should help protect against new hydropower generation that would undermine ratepayer-funded enhancement of salmon and steelhead, resident fish and wildlife.
- Contributions from others. Throughout the program, the Council recognizes that non-hydropower factors also have contributed significantly to declines in fish and wildlife in the basin. Flood control operations, irrigated farming, overfishing, logging and mining are among them. As a result, the program notes the need for complementary funding or other efforts from sources other than hydropower ratepayers.

The Northwest Power Act anticipates that Bonneville will play an active role in this program's implementation by requiring the agency to take the necessary steps to ensure the "timely implementation" of the Act in a "sound and businesslike manner." In addition to fulfilling the duties imposed on the other agencies, Bonneville also is to use the powers provided by the Act and other relevant laws, and the finances available in the Bonneville fund, to protect, mitigate and enhance fish and wildlife. These actions are to be consistent with both the requirements of the Act and with the Council's program. Bonneville has the authority to buy, sell and exchange electrical power, provide transmission services, propose power rates, and participate in power system planning and operations.

With the Division Engineer for the Corps of Engineers, the Bonneville Administrator also acts as the United States Entity in carrying out the provisions of the Columbia River Treaty regarding use of Columbia River Basin water stored in Canadian reservoirs. All these provisions indicate that the federal project

operators and regulators, particularly Bonneville, are expected to ensure that their decisions reflect this program and other requirements related to fish and wildlife.

Two Types of Costs

There are two types of costs associated with the fish and wildlife program -- lost revenues and outlays. The additional storage to provide increased spring flows would mean that power operators would have to forego some power generation at the dams during winter months, reduce sales of power outside the region, and potentially make some additional power purchases. Some of the costs referred to in this draft document are for projects, as well as flow measures, and these costs were updated during this rulemaking.

The Council estimates the value of lost hydropower production from the salmon and steelhead measures would average \$40 million to \$70 million annually. For the worst-case scenario, in the lowest water years when the region would have to purchase large amounts of electricity from outside the region, the cost could be as high as \$170 million. This would be in addition to the approximately \$55 million in foregone revenues that resulted from flow measures in the Council's 1987 fish and wildlife program.

In addition to lost revenues and power purchases, the Council estimated direct costs of salmon and steelhead measures to be about \$30 million in 1992 and \$36 million in 1993. These measures were amended into the fish and wildlife program in separate rulemakings and incorporated into the 1994 program. These costs were added to approximately \$90 million in Bonneville annual outlays to fund ongoing measures from previous versions of the Council's program and to repay Bonneville's ongoing debt to the U.S. Treasury for screens and fish ladders at the mainstem dams, as well as other fish mitigation obligations. In 1993, Bonneville's total spending for fish and wildlife -- including the new salmon measures, ongoing resident fish and wildlife measures from previous versions of the Council's program, Treasury repayment, and so on -- was about \$300 million. This amount varies each year, depending on the amount of revenues lost to increased flows. Bonneville's fish and wildlife costs are expected to increase as new bypass screens are funded by Congress and added to the Bonneville debt, and as other program costs rise. As noted earlier in this document, the Council expects Bonneville to devote a larger percentage of its fish and wildlife program budget to resident fish and wildlife mitigation in the future than has been devoted in the past.

It is estimated that the impact of these costs could translate into about a 4-percent increase in the Bonneville Power Administration's wholesale rates, which could increase as additional capital obligations are incurred. The impact on retail electricity rates is expected to be somewhat less, and ultimately will depend on how utilities choose to pass on their costs and how much of their costs stem from purchases from Bonneville.

These are substantial costs, but the region should also bear in mind the cost of inaction. Without effective restoration measures, the region stands to lose wild and naturally spawning salmon stocks whose genetic resources may be critical to the long-term sustainability of the Snake River runs. Without an effective regional program, a federally administered Endangered Species Act process could impose substantially more onerous costs on irrigators, electric utilities, navigators, fishing communities and others who use the Columbia River and its resources. While the Council has not sought to put a dollar value on this outcome, no one should mistake the value of a determined, long-term regional salmon program.

Regional Funding and Staffing

Because it is a regional program to rebuild weak salmon stocks, the Council's program calls for participation and funding by state and federal entities and others. The Bonneville Power Administration is the major source of funding for actions in this program, but many state agencies have requested additional funding from Bonneville to comply with the Council's measures.

All levels of government must bear responsibility for adequately funding and staffing salmon rebuilding measures or run the almost certain risk that the recovery effort will be delayed, with potentially disastrous results. The Council has developed a regional program that in some respects goes well beyond the Council's authorities, and the Northwest's Governors have pledged to implement this program.

Until now, most salmon rebuilding costs have been borne by electric power consumers through the Bonneville Power Administration pursuant to the provisions of the Northwest Power Act. To the extent that measures -- including off-site measures and programs -- respond to the impacts on salmon by the region's hydroelectric system, these costs are appropriate. But salmon runs were diminished, and rebuilding measures are required, because of a variety of other causes. The costs of responding to these other causes should be shared by all responsible parties. The Council will work with the states, Bonneville and other federal agencies to clarify funding responsibilities.

The Council intends to make cost-effectiveness an important part of the program. A successful program is one that provides permanent restoration of salmon runs at the lowest cost. Such a program cannot be restricted to any one life stage, but must comprehensively include all stages. Short term, least-cost calculations are not part of this plan, but aiming for long-run success is.

1.5 COUNCIL COMMITMENTS

The Council finds this program to be consistent with the purposes of the Northwest Power Act. The Council has evaluated the measures included in this program on the basis of the recommendations, supporting documents, consultations and public comment contained in its record. It has determined that the measures will protect, mitigate and enhance fish and wildlife affected by the development, operation and management of hydroelectric facilities located on the Columbia River and its tributaries, while assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply. The Council also has determined that these measures meet the requirements of Section 4(h)(6) of the Act.

The Council is committed to a stringent program of monitoring and evaluating progress to ensure that the region's investment in salmon pays off. Rebuilding targets and performance standards are being instituted to provide explicit means of measuring progress. The Council will modify or eliminate activities that do not provide sufficient progress toward stated goals and objectives, and will consider other actions.

In comments on drafts of this plan, several parties have raised concerns about the effects that drafting upriver storage reservoirs for salmon flows could have on resident fish and wildlife in headwater areas. The Council does not intend to address the environmental problems of salmon by indiscriminately shifting environmental problems to upriver areas. It is committed to avoiding such impacts as much as possible, and to monitoring and evaluating them should they occur. Section 903(b)(1) and (2) of the 1987 Fish and Wildlife Program have been included in the revised program.

Other comment received in public review of this program made it clear that the region is divided over the scientific merits of some major measures to rebuild fish populations. Two issues that remain intensely debated are the relationship of increased flows to fish survival and the proper role of supplementing wild and naturally spawning fish populations with hatchery-reared fish. Both will be examined closely under the Council's program.

The Council also strongly believes that the region must work to improve its understanding of the interdependence among fish, wildlife and human activities, such as power system operations, harvest, water use and land management. Relatively minor changes in any one of these can appear to have minor impacts on salmon. Taken together, they can have significant cumulative impacts.

The Council is obligated to base its decisions on the best available scientific knowledge. But in some cases, even the best data is sketchy. The Northwest Power Act and the Endangered Species Act processes make it clear that salmon stocks cannot wait for complete resolution of the debate. The Council has chosen to act now, recognizing that the actions can be modified as new information is available.

1.6 OTHER RESPONSIBILITIES

The Council believes that the Northwest Power Act required changes in planning, operations, regulation and other decision-making processes to implement this program and fulfill the Act's fish and wildlife objectives. To address that necessity, the Council has adopted measures designed to ensure that program measures are viewed as hard constraints on the hydroelectric power system to the full extent required by the Act. Bonneville is to act in a manner that is consistent with the program when it signs contracts, grants billing credits, acquires resources, and takes other action pertinent to this program. FERC is to initiate appropriate proceedings to implement program measures promptly at non-federal projects.

All federal project operators and regulators are to integrate program water flow measures into power system rule curves; consider the use of Canadian storage as a source for water for fish flows; and maintain all fish facilities at their projects in good repair. The Council also urges these operators and regulators to develop mutually satisfactory consultation and coordination arrangements with fish and wildlife agencies and tribes. Ultimately, the Council expects the federal project operators and regulators to implement program measures or explain in detail why they cannot do so.

The Council is an interstate compact. Its members are appointed by the Governors of the Northwest states. The Council is not a federal agency. Its program is developed under the Northwest Power Act, not the National Environmental Policy Act nor the Endangered Species Act. However, most of the program's specific measures are implemented by federal agencies.

To facilitate federal implementation, the Council explores environmental impacts of its proposals as fully as possible within its amendment process. Federal agencies are encouraged to make use of the Council's evaluation so that the region can act promptly to protect salmon and steelhead while complying fully with National Environmental Policy Act and Endangered Species Act requirements. The Council commits itself to working with the federal agencies to integrate the Council's processes with the National Environmental Policy Act and Endangered Species Act processes.

In determining the sources of water for fish and power flows, the use of Columbia River Basin water stored in Canadian reservoirs, as well as such water stored in reservoirs in the United States, must be considered. An exchange of notes may be necessary to provide release of Canadian storage water, the United States Entity (the Corps of Engineers and Bonneville), under the lead of the U.S. Department of State. In general, fish flows should be accommodated in all

planning, management and operations conducted under the Columbia River Treaty between the United States and Canada.

1.7 INDIAN RIGHTS

In writing the Northwest Power Act, Congress stressed the importance of recognizing the legal rights of Indian tribes in this program. Section 4(h)(6)(D) of the Act requires program measures to be consistent with the legal rights of Indian tribes. Section 10(e) emphasizes that nothing in the Act affects or modifies Indian rights. Section 10(h) confirms that the Act does not limit Indian water rights. The full scope of Indian rights and their application in specific situations remains unclear. In some cases, those rights are being litigated. The Council is not in a position to adjudicate those rights and does not purport to do so in this program.

Nonetheless, the Council recognizes that the decline of the salmon runs, particularly the Snake River fall chinook, poses problems for Indian tribes to whom the U.S. government has special responsibilities. The Council's program must be consistent with the rights of these tribes. The Council is committed to meeting its own responsibilities and to helping the federal agencies meet theirs, while addressing the problems of weak stocks.

1.8 WATER RIGHTS

Congress and the Council recognize that this program must be implemented within a complex scheme for allocating rights to use Columbia River Basin water. As noted in the Northwest Power Act, and in Section 15, Disclaimers, nothing in this program authorizes appropriation of water, affects rights to water or jurisdictions over water, or establishes the respective rights to water of the United States, states, Indian tribes or individuals to water. The Council assumes that the federal implementing agencies will work hard to develop cooperative and creative ways to implement the program's water flow measures with those requirements in mind.

The Council will continue to consult with Indian tribes, state water agencies, and the federal project operators and regulators to provide assistance in these matters. The Council is particularly mindful that the states are considering the increasing effects on fish of water diversions in the Columbia and Snake river systems, and taking into account both those effects and this program as they develop their individual water resource management programs.

1.9 SUMMARY

If the language of this program is more subdued than the rhetoric of the 1980s' programs, it is at least more clear-eyed. The region knows a lot more. It understands more. It has better tools and, despite continuing controversy,

broader cooperation. The enormous scope of the recovery effort is clearer. It will take a lot longer and a lot more effort to rebuild a healthy and diverse salmon and steelhead population throughout the Columbia Basin. In fact, it will take a persistent effort into the next century just to save some of the runs.

This is not a grim assessment. It is a realistic one. The program is is not a panacea, but a valuable foundation for the effort that is yet to be completed. At the same time, the region cannot lose sight of the fact that multipurpose development of the Columbia River system has produced huge benefits. These benefits need not be lost if all beneficiaries of the basin's waterways approach this rebuilding effort with a willingness to contribute. Balance is a key word. The Council's overall intent is to have balance so that all uses of the river remain viable.

TERMS USED IN THE PROGRAM

The following shorthand terms are used throughout this program for various government agencies, Indian tribes and other entities. See Appendix E, Glossary, for definitions of other terms used in the program.

Abbreviations	Full Name
Bonneville	Bonneville Power Administration, U.S. Department of Energy
Bureau of Reclamation	U. S. Department of the Interior, Bureau of Reclamation
Corps	U.S. Department of the Army, Corps of Engineers
Federal land managers	<ul style="list-style-type: none">• Bureau of Indian Affairs• Bureau of Land Management• National Park Service• U.S. Forest Service
Federal project regulators	<ul style="list-style-type: none">• Bonneville,• Bureau of Indian Affairs• Bureau of Reclamation• Corps of Engineers• Federal Energy Regulatory Commission

FERC

**Federal Energy Regulatory
Commission, U.S. Department
of Energy**

**Fish and wildlife managers,
fish managers**

- **Fish and Wildlife Service, U.S.
Department of the Interior**
- **National Marine Fisheries Service
U.S. Department of Commerce**
- **Oregon Department of Fish and
Wildlife**
- **Idaho Department of Fish and Game**
- **Montana Department of Fish,
Wildlife and Parks**
- **Washington Department of Fisheries**
- **Washington Department of Wildlife**

State land managers

- **Idaho Department of Lands**
- **Oregon Division of State Lands**
- **Montana Department of Natural
Resources and Conservation**
- **Washington Department of Natural
Resources**

State water managers

- **Idaho Department of Water
Resources**
- **Montana Department of Natural
Resources and Conservation**
- **Oregon Department of Water
Resources**
- **Washington Department of Ecology**

Columbia Basin Indian Tribes

- **Burns-Paiute Indian Colony**
- **Coeur d'Alene Tribes**
- **Confederated Tribes of the Colville Reservation**
- **Confederated Salish-Kootenai Tribes of the Flathead Reservation**
- **Confederated Tribes of the Umatilla Reservation of Oregon**
- **Confederated Tribes of the Warm Springs Reservation of Oregon**
- **Confederated Tribes and Bands of the Yakima Indian Nation**
- **Kalispel Indian Community**
- **Kootenai Tribe of Idaho**
- **Nez Perce Tribe of Idaho**
- **Shoshone-Paiute Tribes of the Duck Valley Reservation**
- **Shoshone-Bannock Tribes of the Fort Hall Reservation**
- **Spokane Tribe of Indians**

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Section 2

Program System Approach and Salmon and Steelhead Framework and Goal

INTRODUCTION

9 The Northwest Power Act calls upon the Council to develop a fish and
10 wildlife program designed to deal with the Columbia Basin as a system [4(h)(1)(A)].
11 The need for this approach was apparent in 1980 when Congress passed the Act.
12 This need has become more urgent and increasingly complex with continually
13 growing regional demands to provide more electricity, meet more out-of-stream
14 uses of water, increase recreational opportunities, as well as to provide sufficient
15 quantity and quality of habitat for fish and wildlife.
16

17 The Columbia River Basin is a diverse set of local ecosystems
18 interconnected by the rivers, streams and creeks that flow through the system.
19 These local ecosystems are interdependent and made up of living and non-living
20 components. They include plant and animal communities linked by predation,
21 competition, and other ecosystem processes. These communities are the basis of
22 diversity--not only the diversity of species found in a system, but also the diversity
23 or variation within each species in the system. This diversity is critical to short-
24 term and long-term productivity in the system.
25

26 Managing the basin effectively requires a system approach that recognizes
27 the importance of the health of the natural system. It must take into account and
28 balance human needs with limitations inherent in the natural system. This
29 requires acknowledging short-term and long-term consequences or tradeoffs in
30 decision making. It includes considering tradeoffs between fish and wildlife
31 resources and other uses of the Basin as well as tradeoffs between and among
32 anadromous fish, resident fish and wildlife.
33

34 The Council recognizes that the Northwest Power Act provides it with limited
35 authority in regard to implementing an ecosystem approach. Simply stated, the
36 Council can not mandate a system approach to all resource users and managers
37 in the Columbia River Basin. Even if it could, this approach would not succeed
38 without the cooperation and participation of all of the basin's natural resource
39 owners, users and managers. The success of a comprehensive ecosystem
40 approach will hinge on extensive cooperation and initiative.
41

42 It is important to bring to this effort the best scientific insights on the health
43 of the system. A periodic assessment of the ecological health of the basin is
44 integral to this approach. This assessment should not be made unnecessarily
45 complex. It should identify measures of ecosystem health to be analyzed as part

1 of the system approach. It is important to monitor the system to ensure that
2 resident and anadromous fish minimize impacts to each other.

3 4 **2.1 System Goal**

5
6 The Council system goal is a healthy Columbia Basin, one that supports
7 both human settlement and the long-term sustainability of native fish and wildlife
8 species in native habitats where possible, while recognizing that where impacts
9 have irrevocably changed the ecosystem, we must protect and enhance that
10 ecosystem. To implement this goal, the program will deal with the Columbia
11 Basin as a system; will protect, mitigate and enhance fish and wildlife while
12 assuring an adequate, efficient, economical and reliable power supply; and will be
13 consistent with the activities of the ~~fish and wildlife~~ agencies and tribes.

14 15 Council

- 16
17 1. Explore methods to assess trends in system health. These methods should
18 evaluate a reasonable number of factors for which ecosystem health
19 information is readily available, but might include factors for which new
20 information would be needed. If found feasible, this assessment will result
21 in a periodic report on the ecological health of the Columbia River Basin.

22 23 **2.2 System Policies**

24 25 A. Preferred Species and Habitat

26
27 The program preference is to support and rebuild native species in native
28 habitats, where feasible. This means that remaining fish and wildlife habitat
29 should be protected and restored to promote production of native species,
30 especially habitat that supports weak populations of fish and wildlife. The
31 Council also recognizes that in certain instances, such as the mainstem Columbia
32 and Snake river corridors, fish and wildlife habitat has been altered so that some
33 native species are ill adapted. In these instances, projects that enhance species
34 adapted to the altered habitat may be appropriate and may in fact, be the only
35 available form of mitigation. However, any such action must follow a thorough
36 evaluation of the consequences, if any, to existing native species or the practicality
37 of restoration of native species.

38 39 B. Assessment of Program Measures

40
41 In order to promote a system approach, the Council will periodically assess
42 program measures to identify conflicts and assess tradeoffs in the basin. This will
43 include tradeoffs between and among fish and wildlife populations as well as with
44 hydropower, irrigation, transportation, flood control, recreation, and other human
45 activities in the basin. It also includes comparison of the costs of alternative

1 means to achieve biological objectives and relative effectiveness of the proposed
2 alternatives.

3
4 Council

- 5
6 1. In consultation with the program implementors, develop a method to
7 identify conflicts and assess tradeoffs between and among program
8 measures and basin activities by December 31, 1994.
9
10 2. Continue to review program measures for purposes of prioritization, cost-
11 effectiveness and biological effectiveness. Incorporate in this review the
12 method to identify conflicts and assess tradeoffs.
13

14 C. Cost-Sharing

15
16 The Council expects that relevant parties will use cost sharing, where
17 pertinent, to fund measures called for under this program. Projects that mitigate
18 the effects of non-hydropower caused problems (e.g. man-caused passage barriers
19 in reservoir tributaries, fencing of overgrazed riparian areas and sediment control
20 projects) are considered to be particularly appropriate for cost sharing.
21

22 D. Natural Barriers

23
24 Natural barriers block migration of fish populations in many parts of the
25 basin. The most common barrier is a waterfall. Populations blocked include
26 migrating anadromous (salmon, steelhead) and resident (trout, kokanee, sturgeon)
27 fish species. Over the past several years the desirability of providing passage at
28 natural barriers has been called into question. Introduction of new species into
29 established systems can cause severe disruptions. Indigenous species can be
30 eliminated or greatly compromised. Naturally blocked areas frequently provide
31 genetic refuges and angling opportunities. For these reasons, the program does
32 not call for further actions to provide passage over natural barriers.
33

34 E. Columbia River Basin Reservoir Operation and Accounting Procedure

35
36 Reservoirs in the Columbia River system are operated to benefit numerous
37 purposes. These purposes can include hydropower production, flood control,
38 recreation, irrigation, transportation, fish and wildlife, and others. Currently it is
39 not possible to easily determine the purpose of storage and release actions
40 undertaken by river operators (see section 2.2B). This creates considerable
41 uncertainty and controversy. The basin needs a comprehensive, agreed to
42 accounting system for water storage and releases from basin reservoirs.
43

44 The final accounting system should provide information on which storage
45 projects provided flow augmentation water, when it was provided, what volume

1 was provided, and what race(s) of fish the releases were intended to benefit. The
2 design of the accounting system should include provisions to allow monitoring
3 and evaluation studies. Structure of the accounting system should allow fish
4 lifecycle models to be used to determine or estimate the biological benefit of flow
5 augmentation. It should also accommodate the use of other biological models or
6 mechanisms to determine the impact of flow augmentation releases on reservoir or
7 river populations of resident fish. The accounting system should recognize and
8 numerically account for each, including concurrent, use for which water is
9 released such as power sales, power exchanges, flood control, irrigation
10 diversions, and others. Existing mechanisms used in water management should
11 be reviewed for contribution to the water accounting system. These include, but
12 are not limited to, computer planning models, mechanisms used to calculate
13 headwaters benefit payments, procedures used to calculate the cost of water
14 budget or reviews of operations resulting from historic water budget calls.

15

16 Bonneville, Corps of Engineers, Bureau of Reclamation

17

18 1. Develop, in cooperation with other appropriate parties, an accounting
19 system that will clearly identify the purpose and quantity of any release of
20 water from any Columbia Basin storage reservoir by December 31, 1994.
21 Thereafter, ensure that the accounting system is readily accessible to all
22 interested parties on a real time basis. Submit the accounting system to the
23 Council for review and approval.

24

25 Bonneville

26

27 2. Fund the accounting system after approval by the Council.

28

29 3. Fund the activities in section 2.2E.4 for all storage projects in the Columbia
30 River Basin.

31

32 Fish Managers, Bonneville, Bureau of Reclamation and Corps

33

34 4. Complete the following activities and submit reports to the Council by
35 December 31, 1996:

36

37 a. Identify reservoir levels necessary to maintain or enhance fish and
38 wildlife;

39

40 b. Analyze the relationship between drawdown limits and fish flow
41 measures set for resident and anadromous fish in this program,
42 including the water budget;

43

44 c. Develop alternative means to resolve any conflicts between drawdown
45 limits and requirements for fish flows; and

- 1
2 d. Determine and analyze the probable effects of drawdown limits on the
3 power system and flood control.
4

5 Relevant Parties

- 6
7 5. Fund, as a high priority, all measures in the program that address reservoir
8 operations such as development of biological rule curves and determination
9 of operational mitigation actions. These measures should be completed by
10 December 31, 1996.
11

12 F. Planning Target for Resident Fish and Wildlife

13
14 Council and Bonneville

- 15
16 1. The resident fish section of the program contains specific projects that
17 should be implemented. These projects should be completed in rank order
18 over the next 10 years as outlined in the action plan--by the end of the year
19 2003. Each year, the Council will review the annual implementation plan
20 and work with Bonneville in its budget planning process to ensure
21 implementation of the Council's program.
22

23 It is the Council's expectation that funding for resident fish and wildlife
24 mitigation, having proceeded at low levels in the past, will be accorded a
25 higher percentage of budget outlay in the future. The Council believes that
26 a level of approximately 15 percent for resident fish and 15 percent for
27 wildlife (i.e., 15 percent of Bonneville's fish and wildlife project budget)
28 reflects an appropriate budget planning target. These figures are
29 approximations; year-to-year variations may occur. If there are not enough
30 Council-approved projects ready for implementation in a given year, the
31 15% planning targets should not apply. The Council will review these
32 targets in 1996, after the resident fish loss assessments are completed.
33

34 In setting these budget planning targets, the Council does not encourage
35 selective or slowed implementation of anadromous fish measures, nor does
36 it expect unilateral decisions to amend or materially alter such measures.
37 Full and efficient program implementation remains critical if the region is to
38 do more than react to the Endangered Species Act.
39

40 G. Funding Actions that Address Transboundary Species

41
42 The Council calls for the development, funding and implementation of
43 agreements between the fish and wildlife managers on both sides of the United
44 States/Canada border that recognize the mutual benefit of protection, mitigation
45 and enhancement for transboundary species. In general, where mitigation

1 measures are designed to benefit United States and Canadian populations, United
2 States ratepayer funding should be in proportion to United States benefits.
3 Bonneville and the United States fish and wildlife managers should negotiate with
4 Canadian entities through the appropriate channels to determine the United
5 States share of funding on a per project basis. Protection, mitigation and
6 enhancement of transboundary stocks includes, but is not limited to, agreements
7 about water quantity and quality management such as reservoir operations,
8 storage activities, instream flows, and pollution control/abatement.

9 10 **2.3 Salmon and Steelhead Framework and Goal**

11
12 To be effective, the fish and wildlife program must be more than a collection of
13 measures. Individual efforts must be coordinated and measures integrated into an
14 overall plan designed to achieve specific goals and objectives.

15
16 To achieve this coordination, the salmon and steelhead sections of this
17 program do three things:

18
19 First, the program is focused and organized around a framework. This
20 framework consists of an overall goal (of doubling salmon and steelhead runs
21 without loss of biological diversity) and rebuilding schedule for Snake River
22 salmon populations. The program also provides a process for developing
23 additional rebuilding targets, salmon and steelhead rebuilding schedules,
24 survival targets and performance standards to track change for individual
25 measures. (See Appendix A for details on the framework elements.) The goal
26 and rebuilding targets, along with the other program measures, should guide
27 the region toward salmon and steelhead rebuilding, while important work is
28 done to complete the framework.

29
30 Second, the program establishes a coordinated implementation process (see
31 Section 7) in which implementing agencies, working through the Bonneville
32 Power Administration's implementation planning process, can systematize and
33 prioritize the implementation of program measures. Recognizing that the
34 Council is a planning and oversight entity, not an implementing entity, action
35 on program measures will be managed by implementing agencies, not the
36 Council. The Council will monitor and comment on this process, offer help
37 where requested, and may, through additional program amendments, establish
38 new measures or priorities.

39
40 Third, reflecting the Council's longstanding commitment to adaptive
41 management, the program establishes a process to monitor and evaluate
42 program implementation in a way that adds systematically to the region's
43 knowledge of salmon and steelhead recovery (see Section 7).

44

1 **2.4 Salmon and Steelhead Goal: Double Salmon and Steelhead**
2 **Runs Without Loss of Biological Diversity¹**
3

4 In crafting the overall goal of this salmon rebuilding strategy, the Council is
5 faced with the challenge of balancing the need to increase the number of fish in
6 the Columbia, maintain and enhance biological diversity, and preserve wild and
7 naturally spawning populations.
8

9 The production of salmon and steelhead in the basin prior to development has
10 been estimated at 10 million to 16 million fish. Today's total production of salmon
11 and steelhead amounts to around 2.5 million fish. Five million to 11 million fish
12 are estimated to have been lost due to development of the hydroelectric system.
13 Thus, significant change in the system is required. To address the loss due to
14 hydroelectric development, the Council set a numeric target for the 1987 program--
15 doubling of salmon and steelhead production in the Columbia Basin.
16

17 While numeric increases are needed, they must be tempered by the
18 understanding that the Council wants increases that can be sustained over the
19 long term. The importance of this was recognized by the Council in the 1987
20 program. Rebuilding was not to be driven inexorably toward a numeric goal, but
21 was to be tempered by the assessment of genetic impacts, use of a mix of
22 production methods and emphasis on the area above Bonneville Dam.
23

24 Concern for biological diversity and preservation of wild and naturally
25 spawning stocks has been heightened by the listing of several Snake River salmon
26 populations as endangered or threatened under the Endangered Species Act, and
27 the identification of numerous other weak populations. There is increasing
28 concern that preservation of the diversity of populations and biological traits
29 present in the Columbia Basin may be essential to maintain increased fish
30 numbers on a sustained basis.
31

32 Unfortunately, these two resource values--increased numbers and biological
33 diversity--often appear incompatible. On the one hand, measures to increase
34 population size in the short term can decrease biological diversity. On the other,
35 measures to conserve biological diversity may limit the region's ability to achieve
36 short-term gains in production. Sustainable increases in numbers, however, will
37 require a healthy, biologically diverse resource that can be productive and
38 accommodate environmental variability.
39

40 The Council sees its role as planning for the restoration of a healthy,
41 productive resource throughout the accessible range of habitat in the Columbia
42 Basin. To do this on a sustained basis will require actions directed not only at

¹ Biological diversity means the array of genetic, physical, life history and behavioral characteristics contained within the salmon and steelhead resource of the Columbia Basin.

1 increasing the number of fish, but also actions to conserve biological diversity and
2 increase the productivity of natural stocks. Increased numbers and the
3 conservation of biological diversity are not incompatible. They are both key to the
4 conservation of the resource and fulfillment of the obligations of the Northwest
5 Power Act. A productive and biologically diverse population is essential to
6 increased production that can be sustained over the long term.

7 8 **2.4A Salmon and Steelhead Doubling Goal**

9
10 The Council has adopted as its overall goal the doubling of the total number of
11 adult salmon and steelhead in the Columbia Basin as fast as possible without
12 further loss of biological diversity among or within anadromous and resident fish
13 populations.

14
15 The doubling goal applies to the basin as a whole. It may not be possible or
16 desirable to double the populations of all species in all subbasins. Specific means
17 and locations for increasing production will be identified in future planning.

18
19 The time needed to double the runs will depend on a number of factors,
20 including the program policies for mainstem survival, harvest management and
21 fish production, and on further assessment of production opportunities.

22 The Council recognizes that any action has the potential for causing some genetic
23 change in the population. In establishing biodiversity as part of its goal, the
24 Council states its desire to avoid adverse genetic change to the maximum extent
25 practicable; to consider genetic impacts as important criteria for selection of
26 measures; and to monitor changes in genetic and life history diversity as
27 measures are implemented. This does not preclude carefully designed, controlled
28 and monitored supplementation programs.

29
30 Except where human-induced habitat changes have produced increases in
31 some species to the detriment of salmon and steelhead (squawfish as an example),
32 efforts to meet these goals for salmon and steelhead should not occur at the
33 expense of other native species and wildlife. Because most of the loss of salmon
34 and steelhead production as a result of hydroelectric development has occurred
35 above Bonneville Dam, the Council will continue to focus its efforts on this area.

36
37 The Council recognizes that this goal will require actions on all fronts over
38 many life cycles of salmon and steelhead. In the short term, it will require
39 increased attention to the need to conserve biological diversity and halt the decline
40 in many populations. This may occur at the expense of actions that might provide
41 greater short-term increases in numbers, but could possibly jeopardize the
42 biological health of the resource in the long term. It will require increases in
43 mainstem passage survival, improved habitat and production practices, and
44 diligent management of harvest.

1 To help focus efforts toward this goal, six principles should be used to evaluate
2 activities in subregional planning (see Section 6.1) and other program processes:

3
4 1. Priority should be given to activities that aim to rebuild weak, upriver
5 populations, including populations listed under the Endangered Species Act. (See
6 page 97 for a definition of weak stock.)

7
8 2. Program activities should pose no appreciable risk to biological diversity among
9 or within fish populations (including resident fish), with the exception of principle
10 number five, below. The best available data and assessment tools should be used
11 to evaluate biological risk before determining whether to proceed, and activities
12 should be followed-up with monitoring and evaluation.

13
14 3. The region should approach habitat and production activities from a total-
15 watershed perspective, not as activities that occur in isolation from land and water
16 conditions in watersheds. Special priority should be given to projects that are part
17 of model watersheds or other coordinated watershed programs, especially those
18 with local community involvement.

19
20 4. While the bulk of the region's attention is currently focused on threatened and
21 endangered stocks, it is important not to lose sight of this region's obligations to
22 fulfill Indian treaties and provide fish for Indian and non-Indian harvesters.
23 Investments and adjustments should be made to provide harvest opportunities in
24 tributaries or other areas and to facilitate rebuilding weak populations.

25
26 5. Consistent with the Council's adaptive management policy, priority should be
27 given to activities that address critical uncertainties and/or test important
28 hypotheses. Activities should be designed as experiments so that the results fill in
29 the region's understanding of salmon and their survival requirements. Even a
30 measure that poses risks for a population may be acceptable if the potential
31 learning benefits are high enough.

32
33 6. Because of concerns over the basin's salmon carrying capacity, the effects of
34 hatchery-produced fish on those that spawn in streams, and the cost of
35 hatcheries, new salmon production facilities generally should not be constructed
36 unless it is clear that the need for fish cannot be met with existing facilities, or a
37 new facility would be a better way to achieve the program's goals.

38
39 The subregional process (Section 6.1B) should generate important information
40 on the costs and biological effectiveness of habitat and production measures. This
41 information will contribute to the independent evaluation of program cost-
42 effectiveness by an independent scientific group (Section 7), and be reflected in the
43 annual implementation work plan (Section 7).

44

1 All of these principles reflect important concerns, but for at least the next five
2 years, the preponderance of the ratepayers' investment should be directed to
3 rebuilding weak stocks. Both the potential biological value of weak stocks and the
4 requirements of the Endangered Species Act suggest that the path to doubling
5 must begin with weak populations.
6

7 This weak-stock priority includes populations listed under the Endangered
8 Species Act, but is not limited to these populations. The Northwest Power Act calls
9 for a long-term approach to fish and wildlife mitigation, not simply a reaction to
10 immediate problems. Treaties with Indian tribes and with Canada call for the
11 United States' best efforts to rebuild these populations to self-sustaining,
12 harvestable levels. The Council is committed to this cooperative effort. Moreover,
13 there are many weak salmon populations not listed under the Endangered Species
14 Act. It is in the region's interest to take forceful steps to strengthen these
15 populations before it becomes necessary to list them. Limiting ratepayer
16 investments to threatened or endangered species in these circumstances is simply
17 an invitation for new Endangered Species Act petitions.
18

19 While the preponderance of the ratepayers' investments should be directed to
20 weak stocks, weak stocks should not be the exclusive focus of the program. Over
21 the past decades, Indian tribes and other harvesters have given up harvest on
22 species after species, and that disturbing trend appears to be continuing. For
23 tribal fishing rights to have meaning, there must be enough fish in the rivers to
24 allow a reasonable harvest. Upriver fishers are entitled to salmon populations that
25 are more than museum specimens. In the long term, as weak stocks are rebuilt,
26 harvest opportunities may be expanded throughout the basin, consistent with
27 rebuilding targets. In the short term, the region should also make investments
28 and adjustments to provide harvest opportunities in tributaries or other areas
29 where there will be no significant negative effect on weak populations.
30

31 **2.4B Performance Standards for the Salmon and Steelhead Goal**

32

33 Doubling performance standard: The doubling goal should be based on the
34 average number of adult salmon and steelhead in the Columbia River Basin from
35 1977 to 1981, the five years prior to the Council's adoption of its first Columbia
36 River Basin Fish and Wildlife Program. That five-year average has been estimated
37 to be 2.5 million salmon. Today's numbers should be obtained by combining the
38 number of adult salmon and steelhead of all species counted at Bonneville Dam,
39 the number of fish spawning below Bonneville Dam and the estimated number of
40 salmon caught in the ocean and in rivers below Bonneville Dam. The program
41 monitoring report (Section 7) should provide an annual accounting of production
42 relative to this performance standard.
43

44 Biological diversity performance standard: The performance standard will be
45 the existing level of biological diversity. Existing biological diversity will be defined

1 by a list of base-line populations against which populations will be compared
2 annually. The natural processes of extinction and speciation will result in
3 variation around the base line over time. New knowledge also may indicate the
4 need for revision in the base-line list of populations.

5 6 **Implementing Agencies and Fishery Managers**

- 7
8 1. To establish the biodiversity base line, the Council calls on participants in the
9 implementation planning process to convene an appropriate group of experts
10 from the fishery agencies, tribes and elsewhere to provide recommendations for
11 the population list. A final recommended list of populations should be
12 submitted to the Council by December 31, 1992. The program monitoring
13 report (Section 7) should provide the annual list of populations and include a
14 qualitative, and if possible, quantitative assessment of status and conditions
15 for each population. The annual review will also include recommendations to
16 modify the population list on the basis of new information.

17 18 **2.4C Basis for the Salmon and Steelhead Goal**

19
20 The Northwest Power Act directs the Council to develop a Columbia River
21 Basin fish and wildlife program to protect, mitigate and enhance fish and wildlife
22 "affected by the development, operation and management" of the hydropower
23 system in the basin. Essential to this definition is an understanding of the extent
24 to which salmon and steelhead have been affected by the hydropower system. In
25 1985, the Council began gathering information on the extent and causes of the
26 declining numbers of salmon and steelhead in the basin. In 1985 and 1986, the
27 public reviewed and debated the nature and limitations of that information. [The
28 results of the Council's efforts have been published in a separate volume entitled
29 Appendix D: Compilation of Information on Salmon and Steelhead Losses in the
30 Columbia River Basin.]

31
32 After compiling information on salmon and steelhead losses, the Council
33 solicited extensive public comment on the contribution of the hydropower system
34 to declines in run sizes. Based on the losses information and on public comment,
35 the Council identified alternative ways to estimate the portion of total losses that
36 could be attributed to hydropower. [These alternatives are described in Appendix
37 E: Numerical Estimates of Hydropower-Related Losses, published in a separate
38 volume.]

39
40 Following is a summary of the Council's analysis of: 1) losses from all
41 causes, and 2) losses related to development and operation of the hydropower
42 system. [For further analysis, refer to Appendices D and E.]
43

1 (1) Estimate of Losses from all Causes. After an intensive review of the available
2 data to make an informed judgment, the Council reached the following broad
3 conclusions regarding salmon and steelhead losses.
4

5 Estimates of the average annual adult salmon and steelhead runs before
6 development in the basin (dating to the mid-19th century) range from about 10
7 million to 16 million fish. In contrast, the average annual run size now is about
8 2.5 million adult fish. These estimates indicate a net basinwide decline in run size
9 of about 7 million to 14 million adult fish due to a range of causes including
10 fishing, logging, mining, grazing, agriculture, irrigation, pollution and urban
11 development, as well as hydropower development and operation.
12

13 Salmon and steelhead habitat in the entire basin has decreased from about
14 14,700 river miles before 1850 to about 10,100 river miles in 1976, a loss of about
15 30 percent. Salmon and steelhead habitat in the Columbia River Basin above
16 Bonneville Dam has decreased from about 11,700 river miles before 1850 to about
17 7,600 river miles in 1976, about a 35 percent loss.
18

19 The greatest salmon and steelhead losses occurred in the Columbia and
20 Snake river drainages above Bonneville Dam. The three main factors responsible
21 for these losses are loss of habitat; mortality of adult and juvenile fish passing
22 through mainstem dams and reservoirs; and mixed-stock fisheries. Habitat
23 losses, as described above, have been extensive. Passage mortality has been
24 estimated to average 15 to 30 percent of downstream migrants per dam and 5 to
25 10 percent of upstream migrants per dam. This has enormous effects on upriver
26 runs.
27

28 Cumulative juvenile passage mortality for fish migrating downstream past
29 nine dams has been estimated to be 77 to 96 percent, depending on the volume
30 and timing of streamflows. Cumulative adult passage mortality for fish passing
31 nine dams upstream to spawning areas has been estimated to be 37 to 61
32 percent.¹
33

34 In some mixed-stock fisheries, upriver wild and natural stocks, already
35 weakened by habitat and passage losses, commingle with abundant lower-river
36 hatchery stocks. Because fishers generally do not distinguish among stocks in
37 mixed-stock fisheries, all stocks present may be harvested at the same rate. In
38 the past, harvest rates in mixed-stock fisheries generally were set to ensure
39 adequate returns of hatchery fish, rather than to protect wild and natural runs.

¹These juvenile and adult mortality rates assume downstream mortality rates of 15 to 30 percent per dam and upstream mortality rates of 5 to 10 percent per dam. These rates do not include higher survival levels that may be attainable by further improvements in bypass and transportation.

1
2 Past efforts to mitigate the effects of development have had major
3 implications for the salmon and steelhead fisheries. First, a series of fishing
4 regulations contributed to a shift from inriver fishing to ocean fishing. Ocean
5 fisheries (including those in Canada and Alaska) have accounted for up to 73
6 percent of the total Columbia River Basin chinook harvested in some years.
7 Second, large-scale hatcheries were constructed. The majority of hatchery fish
8 originally were raised and released in the lower river, supporting the expansion of
9 the lower-river and ocean fisheries and resulting in increased harvest of already
10 depleted wild and upriver stocks.

11
12 Historical records show that Columbia River Basin Indian tribes relied
13 extensively on salmon and steelhead. Because most of the tribes are located in
14 the upper portion of the basin, the decline in numbers of fish, combined with the
15 shift of fish production from the upper to lower basin, have had an incalculable
16 impact on tribal economies, cultures and religions.

17
18 (2) Estimate of Hydropower-Related Losses. The Council developed several
19 methods for estimating hydropower-related losses. Using these methods, the
20 Council estimated that declines in run size due to hydropower development and
21 operation range from about 5 million to 11 million adult fish. This compares with
22 the total decline from all causes of about 7 million to 14 million adult fish. The
23 Council recognizes that data are limited and that other approaches to calculating
24 losses may be possible, but it anticipates that all reasonable approaches would
25 result in loss estimates in this range.

26
27 Cannery records support the reasonableness of the 5 to 11 million range.
28 Canneries on the lower Columbia River kept records of the number of salmon and
29 steelhead delivered by fishermen. The maximum catch, according to these
30 records, occurred in the 1880 to 1920 period and was about 8.8 million fish
31 annually. Anthropological information for this period suggests that the Indians
32 caught an additional 0.9 million fish and that non-Indian settlers in the upper
33 portions of the Columbia Basin probably harvested a similar number.

34
35 Thus, one reasonable estimate of the historical maximum catch in the
36 Columbia Basin is about 10.5 million fish. Assuming that four out of every five
37 fish were caught, the total run size can be estimated at about 13 million fish.
38 Given the current run size of 2.5 million fish, this would mean that the salmon
39 and steelhead run size has declined by more than 10 million from all causes. Of
40 that 10 million, about 8 million can be attributed to the hydropower system. That
41 8 million includes 4 million salmon and steelhead that were produced in the areas
42 blocked by Chief Joseph and Hells Canyon dams. Losses caused by mainstem
43 hydropower operation (assuming that 15 percent of downstream migrants are
44 killed at each mainstem dam) account for the decline of the other 4 million fish.

1 [Appendices D and E in separate volumes provide additional background
2 information.]
3

4 The present runs of about 2.5 million adult fish would have to be increased
5 by 5 million to reach the low end of the range of estimated hydropower-related
6 losses. Such an increase may not be feasible because biological, socio-economic
7 and other limits on fish production may prevent such rebuilding. Increases in the
8 salmon and steelhead runs will come through specific program measures
9 consistent with system policies and planning. If 5 million more adult fish are
10 produced as a result of this program, the Council may review its analysis of the
11 hydropower ratepayers' share for protecting, mitigating and enhancing salmon
12 and steelhead to judge whether the range can be narrowed.
13

14 The estimated range is stated in terms of a net loss or reduction in run size.
15 It does not take into account the accumulation of hydropower-related losses of
16 salmon and steelhead year by year since hydropower development started. Such
17 cumulative losses would be far greater than 5 million to 11 million adult fish.
18

19 **2.5 Snake River Chinook Rebuilding Targets, Performance** 20 **Standards and Monitoring** 21

22 To focus the region's efforts until further biological and policy decisions are
23 made, the Council sets rebuilding targets for wild and naturally spawning Snake
24 River salmon populations above Lower Granite Dam as follows: annual averages of
25 50,000 adult spring chinook, 20,000 adult summer chinook and 1,000 adult fall
26 chinook. These represent ambitious targets, but targets the Council believes are
27 achievable in the long term. Relative to the estimated 1991 returns of wild and
28 naturally spawning fish, they will require more than an order of magnitude
29 increase in numbers. Although the targets call for a strong recovery from the
30 current situation, they will not restore these populations to their condition prior to
31 development of the basin's hydroelectric system. The key component for achieving
32 this rebuilding target is increasing the percent of smolts that survive to return as
33 adults. Survival improvements of this magnitude will require aggressive
34 implementation of all immediate and intermediate-term measures in the program.
35

36 Rebuilding targets do not quantify any party's obligation under the Northwest
37 Power Act. Rebuilding targets represent the Council's judgment of ambitious,
38 interim population sizes that achieve the Council's goal and can be achieved by
39 carrying out the mix of measures called for in this program. The feasibility of
40 achieving these targets with measures in the program was checked using the best
41 analytical computer models available. Because the program provides options for
42 some actions (e.g., in mainstem passage), the analysis indicated a range of
43 possible outcomes, reflecting possible future decisions.
44

1 The Council supports rebuilding Snake River salmon populations to
2 productive, fishable levels as rapidly as possible within program goals. The
3 Council recognizes that immediate measures are not enough to achieve an
4 adequate level of rebuilding or the management goals of the state of Idaho and will
5 continue to seek greater rebuilding. Accordingly, the Council has identified
6 additional actions for fast-track evaluation. Because these evaluations are in
7 progress, the framework does not prejudge Council decisions on additional steps
8 that may be needed to rebuild salmon and steelhead populations. Expeditious
9 action is required of the fishery agencies, tribes, Bonneville, the Corps and others
10 to complete actions, such as modeling rebuilding schedules and evaluating
11 drawdown engineering and costs, thereby permitting timely decisions by the
12 Council in 1993, and thereafter.

13
14 The Council will initiate an amendment process by August 1993, to be
15 concluded by October 1993, if possible, to adopt revisions to the rebuilding targets
16 for Snake River spring, summer and fall chinook. The Council's decision on the
17 rebuilding targets for Snake River stocks will be based on the best scientific
18 information available at that time.

19 20 **Independent Scientific Group**

21
22 In the Snake River, the Council will track progress toward rebuilding targets
23 through Lower Granite Dam salmon counts corrected for the hatchery
24 contribution, and with other techniques. The independent scientific group,
25 which is described in Section 7, should devise methods to track program
26 progress. These methods should address the effect of natural variation in fish
27 populations and assess the likelihood that the rebuilding targets will be
28 achieved within the specified time frame. If the rebuilding targets are not being
29 achieved, the Council will review the measures in the program during its future
30 amendment processes.

31 32 **2.5A Population Monitoring**

33
34 While dam counts of salmon will provide important, timely information on
35 progress toward rebuilding runs, they combine several possibly diverse
36 populations of spring, summer and fall chinook above Lower Granite. In so doing,
37 important information about the status of these individual populations can be
38 lost. At the same time, it may be prohibitive, both in terms of money and effort, to
39 closely monitor every potentially distinct portion of this larger population.
40 Monitoring activities themselves also have the potential for causing salmon losses
41 within weak populations.

42
43 For these reasons, the Council intends to establish a limited number of
44 indicator populations that will be the focus of intensive monitoring. The genetic
45 stock identification project in Section 5 may indicate that revision of these

1 indicator populations is needed in the future. The purpose of indicator population
2 monitoring is not only to provide detailed stock status information on these
3 particular populations, but also to provide basic life history and survival
4 information that will be applicable to all populations within the larger population.
5 This will provide the Council with a clearer picture of the factors limiting natural
6 populations and permit refinement of the program over time.

7 8 **Implementing Agencies and Fishery Managers**

- 9
- 10 1. The Council calls on the implementing agencies and fishery managers to
11 propose a limited set of populations that can serve as indicators of Snake River
12 chinook populations. These can include hatchery stocks if necessary to provide
13 harvest rates for wild and naturally spawning populations. The indicator stocks
14 selection should be closely coordinated with and take advantage of existing
15 monitoring and research efforts including U.S./Canada Treaty efforts, Idaho
16 habitat evaluations and Idaho supplementation research. The entities should
17 work closely with the Idaho Department of Fish and Game and the Nez Perce
18 and Shoshone-Bannock tribes to prepare a proposal. The proposal should
19 include not only a list of populations, but also the appropriate information to
20 be collected for each population. This should include basic life history and
21 survival rates as well as stock status. The proposal should be submitted to the
22 Council by December 31, 1992, for implementation in 1993.

23 24 **2.6 Development of Rebuilding Elements**

25
26 In this document, the Council has introduced the idea of a program framework
27 to structure and focus program measures. Work on the framework elements as
28 well as coordinated development and refinement of analytical tools will continue.
29 These tools will help analyze additional actions and, equally important, help
30 identify information needs. This will help the Council establish new and review
31 existing program biological goals, measures and performance standards. Key
32 purposes of further analytical development and Council action are to establish
33 clear links between the rebuilding targets and the performance standards and
34 measures needed to accomplish the targets and to establish a relationship
35 between flow, river velocity and survival. (See Section 7.3.)

36
37 A major part of the framework is the rebuilding plans for each Snake River
38 chinook population. Because of pending decisions on regional initiatives, the
39 Council is unable at this time to establish all the elements of rebuilding plans.
40 These decisions are scheduled to be made between 1993 and 1995. The Council
41 calls on participants in the implementation process to work with the Council to
42 develop recommendations for the rebuilding plans in time to contribute to the
43 process of deciding on these regional initiatives. After the decisions are made, the
44 Council will adopt rebuilding plans for identified Snake River chinook populations.
45 These will include rebuilding targets and schedules. Commencing such a process

1 is not intended to and does not substitute for expeditious action on the rebuilding
2 measures already adopted in these amendments. Details on framework elements
3 are provided in Appendix A.

4 5 **Implementing Agencies and Fishery Managers**

- 6
7 1. Working with the Council, begin to develop rebuilding plans for identified
8 population management units. The plans should include the elements of a
9 rebuilding plan identified in Appendix A, including definition of the population
10 management unit, management goal, rebuilding target, survival targets,
11 rebuilding schedule and performance standards. The Council views this as a
12 limited effort that should draw on the information developed in system
13 planning, new information developed since then (including information on
14 genetic needs and weak stocks) and the coordinated analytical methods
15 process(Section 7.3). As much as possible, rebuilding plans should reflect and
16 incorporate the subbasin plans developed as part of the 1987 program. A
17 schedule and work plan for development of the rebuilding plans should be
18 submitted to the Council by January 15, 1993.. Recommendations on the
19 rebuilding plans for Snake River populations should be submitted to the
20 Council by March 1, 1993.. Recommendations for other populations should be
21 submitted to the Council as soon as possible and not later than January 15,
22 1995.

23 24 **Bonneville**

- 25
26 2. Fund travel and reasonable expenses of the fishery managers necessary to
27 develop these recommendations.

28 29 **2.7 Development of Performance Standards**

30
31 The effectiveness of actions is often uncertain and depends on other actions. It
32 will be important for the Council and the region to track measures in a timely
33 manner. Performance standards for each action or set of actions should provide
34 an easily measurable index that relates to the type of biological or physical change
35 intended. Performance standards are intended to provide a point of reference
36 against which to monitor change, and units of measure to define change. They are
37 not intended to state or limit obligations or to resolve technical uncertainties.

38
39 Performance standards will take a variety of forms. In some cases they will
40 specify changes in survival when these are presently measurable; in others, they
41 may relate to physical or qualitative changes, or relate to accomplishing certain
42 tasks within certain time frames. However, it is the Council's intention that
43 performance standards relate to actual biological results (e.g., improvements in
44 survival) whenever feasible, and not just to factors that relate inferentially to
45 biological change.

1
2 At the same time, performance standards must be measurable on a timely
3 basis and relate directly to the biological change intended by the measure.
4 Performance standards should be linked to the rebuilding schedules and survival
5 targets, and reflect changes needed to meet the biological objectives. They are not
6 intended to be rigid and inflexible, but should respond to new knowledge. As
7 information improves, better performance standards may become apparent.

8 9 **Implementing Agencies and Fishery Managers**

- 10
11 1. Solicit input from the following groups to develop additional performance
12 standards: Fish Passage Advisory Committee, Fish Transportation Oversight
13 Team, Integrated Hatchery Operations Team, Regional Assessment of
14 Supplementation Project and the Technical Advisory Committee of the
15 Columbia River Compact.

16
17 Recommendations for additional performance standards for individual
18 measures or logical groupings of measures should be developed through the
19 implementation process. Participants in the process should solicit input from
20 other appropriate groups or individuals. Each group should review program
21 measures appropriate to its area of expertise and provide recommendations for
22 performance standards. A final list of recommendations should be submitted to
23 the Council by March 1, 1993. Performance standards should reflect program
24 measures and survival targets. The Council will review and act on these
25 recommendations to provide a final set of performance standards.

26 27 **2.8 Management Review**

28
29 This fish and wildlife program has, by necessity, been drawn in large part from
30 science that is not yet fully developed, and its many complex measures constitute
31 an immensely difficult and highly expensive undertaking for the region. In order
32 then to realize the best value from this program, its component measures must be
33 implemented and monitored in a coherent, well-organized, and carefully
34 disciplined manner. In developing the program, the Council has taken the first
35 steps toward orderly implementation. The Council also acknowledges the efforts
36 of Bonneville, the fish and wildlife agencies, tribes and others to organize and
37 coordinate program initiatives as they are implemented. However, the Council
38 recognizes that the program is composed of discrete parts, and believes that these
39 separate measures need to be systematically directed under a comprehensive
40 structure that facilitates adaptive management, and ensures that the region
41 receives the best possible return from its investments in fish and wildlife
42 mitigation.

43
44 In its *Strategy for Salmon*, the Council called for a number of additional steps
45 to improve program implementation. The Council called for the establishment of

1 "an appropriate management structure with clear responsibility and
2 accountability for the implementation of this program" (section 7.1B). The Council
3 called for funding of an independent scientific review group to evaluate the
4 effectiveness of the program, and to identify key biological uncertainties (sections
5 7.2B and C), committed to retaining an independent consultant to review the entire
6 structure of committees and groups involved in implementation (section 7.2F), and
7 agreed to continuing review of program measures for the purpose of prioritization,
8 cost-effectiveness, and biological effectiveness (section 7.2E). The Council also
9 called for the development of a program framework and performance standards
10 (sections 2.3 and 2.4).

11
12 The Council believes these measures are important, and need to be carried out
13 as swiftly as possible. However, the Council also believes that additional
14 assistance is needed, both to encourage the successful implementation of these
15 measures, and to improve the overall effectiveness of the program.

16 17 **Council**

18
19 For these reasons, not later than April 1, 1994, the Council will issue a request
20 for proposals from recognized management consulting firms for an analysis of the
21 overall management structure of the program, with particular attention to matters
22 such as: (1) designing means to recognize and address key biological
23 uncertainties, (2) developing measureable benchmarks and clearly identified
24 objectives, (3) establishing a workable mechanism for setting program priorities
25 and monitoring progress, (4) reducing costs and delays in the implementation
26 process, and (5) putting in place a clear system of accountability.

27
28 The consulting firm chosen for this study will be requested to complete the
29 analysis and submit draft recommendations to the Council and the region for
30 review and comment not later than October 1, with a final report within 45 days
31 after close of comment. Based on this report, and the comments received on it,
32 the Council intends to adopt an overall structure for the adaptive management of
33 the program and its measures. Once adopted, this strategy will provide a basis for
34 highly effective performance by assuring that the Council focuses appropriate
35 management attention on the key elements of, and the pivotal decisions required
36 in, the fish and wildlife program.

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SECTION 3 JUVENILE SALMON MIGRATION

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Salmon and steelhead begin and end life in many diverse streams and tributaries throughout the Columbia River Basin, but they all eventually share one route. They must make their way down and ultimately back up the mainstems of the Columbia and Snake rivers as they go to and from their spawning beds. Between passages, they spend most of their adult lives in the Pacific Ocean.

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Given that their unusual life cycle depends on a long river journey that can stretch hundreds of miles, it is clear that safe passage is paramount to their survival. Downstream passage is especially dangerous for juveniles because of the effects of dams and slow-moving reservoirs: turbine, bypass and spill-related mortalities, predation, migration delays and high water temperatures. The fish are on a biological time clock. To reach the ocean safely, the spring migrants must complete their downstream journey quickly.

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Development of the dams has greatly altered the natural flows and cross-sectional areas of rivers in the basin. The spring runoff is stored in reservoirs so it can be used during periods of naturally low flows. Regulating the river in this fashion increases its ability to produce electricity, as well as to provide for irrigation, transportation, recreation and flood control throughout the year. However, this practice and others also reduce river flows, particularly during the spring when juvenile salmon and steelhead are migrating downstream to the ocean.

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The combination of reduced flows and the greater cross-sectional area of the river due to reservoir storage slows the juvenile fish as they migrate from their area of origin to the ocean. An increase in travel time in the river can affect the migratory behavior of juvenile fish and increase their exposure to predatory fish and birds. Reduced flows also endanger juvenile salmon by raising water temperatures, altering water chemistry and increasing susceptibility to disease and predation.

44
45

The physical problems faced by salmon and steelhead have been compounded by the diversity of the parties involved in the river basin's management. Even with major efforts to increase the amount of water for salmon and steelhead, matching water supplies with the needs of spring and summer migrating fish poses a substantial problem of analysis and coordination.

From the start in 1982, the Council's program recognized and focused on the importance of improving mainstem survival for both smolts and returning adult

1 salmon. However, in recent years, the problem has been exacerbated by a
2 series of low water years, caused primarily by drought conditions in the
3 southern and eastern parts of the basin. The Snake River Basin has been
4 particularly dry. It is believed that this drought contributed significantly to a
5 reversal in the increases in run sizes observed in the early 1980s.
6

7 To increase salmon survival in the mainstem, the approach must be
8 multifaceted. Flows and reduced water temperatures alone are not sufficient.
9 Control of predation, improved and/or new fish transportation methods, and
10 completion of programs to install and upgrade screens at both the dams and
11 all unscreened water diversions are all vital to successful mainstem passage.
12

13 When it first addressed these problems in 1982, the Council developed a
14 "water budget" to be used between April 15 and June 15. The water budget is
15 a block of water set aside for fish and released during the spring runs to create
16 an artificial freshet that speeds juvenile fish to the ocean. Separate water
17 budgets were established for measurement at Priest Rapids and Lower Granite
18 dams, both in Washington.
19

20 Through the use of the water budget, the fish and wildlife agencies and
21 tribes can increase spring flows to aid the downstream migration of juveniles.
22 The Council established a schedule of firm power flows for the April 15 to June
23 15 period to provide a base from which to measure water budget use. (Firm
24 power is the electricity that the hydropower system guarantees it can produce.
25 That guarantee was premised on the assumption that this amount of
26 hydropower is available even in historic low (critical) water conditions.) The
27 water budget may be used to implement any flow schedule that would assure
28 juvenile salmon survival, provided the flows allow existing firm non-power
29 commitments, such as flood control, to be met.
30

31 The Columbia River Inter-Tribal Fish Commission contributed an
32 important element to the development of the water budget by pointing out that
33 optimum flows for downstream migration are only needed when the fish are
34 present. Recognition of this factor led to the concept of "shaping" fish flows,
35 which in turn led to the concept of a specified volume of water rather than
36 specified flow levels. This volume of water, to be shaped by the fish and wildlife
37 agencies and tribes, became the water budget.
38

39 Computer simulations indicate that the Snake River Basin has insufficient
40 water during critical low water conditions to meet the flows recommended by
41 the fish and wildlife agencies or to ensure that the system's reservoirs refill
42 frequently enough to be used for future power and fish flow needs. To reflect
43 these physical limitations, the Council set the water budget for Lower Granite
44 Dam in the Snake River Basin below what had been recommended, and set the
45 water budget for Priest Rapids Dam in the mid-Columbia above the level

1 recommended. This larger water budget for Priest Rapids Dam increased the
2 total size of the water budget from 67.8 kcfs-months to 78 kcfs-months and,
3 together with the ability to shape the flows, improved the region's ability to
4 meet optimum flows below the confluence of the Snake and the Columbia.
5

6 To improve coordination between fish and power interests, the Council
7 called for two coordinators known as fish passage managers (originally called
8 water budget managers):. one appointed by the basin's fish and wildlife
9 agencies, and one selected by the majority of Columbia River Basin tribes. In
10 199__, the agencies and tribes began operating with a single fish passage
11 manager. The Council provides a fish passage advisor on its staff to review the
12 operation of the water budget, advise the Council on all matters related to the
13 water budget, and assist the Council in resolving water budget disputes.
14

15 The Council called for a study of the water budget's biological effects,
16 including reductions to smolt travel time and improvements to smolt survival,
17 and its impacts on the power system. In 1987, the fish and wildlife program
18 was modified to encourage experimentation with and evaluation of alternatives
19 for implementing the water budget.
20

21 In 1991 and 1992, with new data showing continuing declines in wild stocks,
22 the Council adopted two kinds of measures to supplement the earlier water
23 budget. First, a set of immediate measures--i.e., measures that could be
24 implemented in time for the 1992 fish migration. These measures are
25 contained in Sections 3.1-3.4, 3.7-3.8, 3.9.8 and 3.9.9. Second, recognizing
26 that these immediate measures are not sufficient to rebuild some weak
27 populations, the Council identified a set of intermediate-term measures that
28 will be needed for rebuilding, but which must be evaluated further before
29 implementation. These measures are contained in Sections 3.5-3.7.
30

31 **Immediate Measures**

32
33 The Council established a process to address potential trade-offs between the
34 flow needs of Snake River spring, summer and fall chinook based on limited
35 water storage capacity and availability of water at appropriate temperatures.
36 Fishery managers and river operators should consider the benefits of proposed
37 measures for weak stocks, and the cost to other stocks and river users. Lower
38 water temperature may be important to the survival of fall chinook, and it will
39 be affected by the source of mainstem flows (e.g., cold water reservoirs) as well
40 as other factors such as local watershed conditions.
41

42 To augment flows for Snake River spring migrants, the program includes
43 measures calling for lower Snake River reservoirs to be operated at near
44 minimum operating pools, and for major storage contributions from Dworshak
45 Reservoir, the Hells Canyon Complex and projects in the Snake River Basin.

1 The same projects are called on to supply water to address water temperature
2 problems for Snake River adult summer migrants (fall chinook). If there is a
3 conflict between operations for spring and summer Snake River migrants, the
4 Council calls for the conflict to be resolved by the Fish Operations Executive
5 Committee in consultation with the National Marine Fisheries Service. The
6 1991-92 measures superseded earlier Snake River water budget provisions.
7

8 For Columbia and Snake river spring migrants, the program includes measures
9 calling for the John Day Reservoir to be operated at a lower than normal level,
10 and for substantially augmented flows, in addition to the existing water budget.
11 For summer migrants, the Council calls for additional flows to be made
12 available on an experimental basis, and for Bonneville to continue to seek
13 energy exchanges and other power system operational changes to help increase
14 flows. Because these measures are expensive and often controversial, the
15 Council calls for careful monitoring of their biological effectiveness. The Council
16 will consider modification if biological data so indicates.
17

18 The program also includes measures calling for aggressive efforts to control
19 predation and improve salmon transportation in barges. The Council is not
20 choosing inriver migration to the exclusion of options such as transportation.
21 The Council has not found sufficient biological evidence on which to make such
22 a choice. It is choosing to use either or both, as long as they are consistent
23 with improved survival. The Council is proposing to improve conditions for
24 survival in both modes of migration to the greatest extent practicable.
25

26 For the short term, the program measures call for a Fish Operations Executive
27 Committee described in Section 3.2, to develop accounting procedures to
28 improve the management of water for fish in the Snake and Columbia rivers.
29 This committee should seek ways to make current operations more responsive
30 to the needs of fish. The Council welcomes recommendations from these
31 groups, or others, for improvements in the flow program. The Council supports
32 analyses of alternative ways to accommodate increased flows for fish.
33

34 The Council believes that these immediate measures, taken together, should
35 improve survival for Snake and Columbia river sockeye, and spring, summer
36 and fall chinook. However, the region needs expanded options for improving
37 the survival of juvenile fish migrating in the river, both in the short term and
38 the longer term.
39

40 **Intermediate-Term Measures**

41

42 In Sections 3.5 and 3.6, the Council calls for demonstration, testing and
43 evaluation of measures to achieve yet higher levels of mainstem protection in
44 the longer term. Over the coming two years, the region must explore structural
45 and non-structural improvements such as reservoir drawdowns, new storage,

1 water use efficiency improvements, and new approaches to power system
2 operations, such as seasonal exchanges. Unless they are structurally or
3 economically infeasible, biologically unsound, or inconsistent with Sections
4 4(h)(5)-(7) of the Northwest Power Act, these measures should be implemented
5 expeditiously. While the implementation schedule for these measures is
6 ambitious, it is meant to convey the sense of urgency the Council believes
7 these problems merit.

8
9 The Council believes that reservoir drafting holds great promise as a strategy
10 for improving river velocities in the lower Snake River and increasing the
11 survival of the Snake River salmon smolt migration. The reservoir drafting
12 strategy, as well as additional measures, will be fully developed, demonstrated,
13 tested and evaluated for quick implementation, unless it is shown to be
14 structurally or economically infeasible, biologically imprudent or inconsistent
15 with Sections 4(h)(5)-(7) of the Northwest Power Act.

16
17 Finally, measures designed for salmon must take into account the effects on
18 resident fish and wildlife, especially endangered species, and on other uses of
19 the river system, as well as impacts on the Northwest economy.

20 21 **3.1 Performance Standards For Immediate Measures**

22 23 **3.1A Snake River Spring Migrants**

24
25 Incorporate the measures described below into firm power planning.¹ Figure 6
26 illustrates the approximate flows attained when these measures are applied to
27 the historical water record.

28 29 **3.1B Columbia River Spring Migrants**

30
31 Through firm power planning, provide 58 kcfs-months (3.45 million acre-feet)
32 of shapeable water. *In addition, provide up to 3 million acre-feet of water subject*
33 *to conditions specified below.*

34 35 **3.2 River operations**

36 37 **3.2A Fish Operations Executive Committee**

¹ Where the Council calls for incorporation of flow or other measures into firm planning, the Council means that: the federal project operators and regulators incorporate these measures in all system planning and operations performed under the Columbia River Treaty, the Pacific Northwest Coordination Agreement, all related rule curves, and in other applicable procedures affecting river operations and planning; and all parties will act in good faith in implementing these measures as firm requirements. (Former section 303(a)(3)).

1
2 Through an annual policy and technical process, the region will address flow
3 and temperature regimes and reconcile measures described below to achieve
4 protection for salmon and steelhead. The process will be initiated by the
5 Council and managed by the Fish Operations Executive Committee, which will
6 be appointed by the Council and made up of senior management
7 representatives of the Council, as well as power and fishery interests.
8

9 This Executive Committee should produce a detailed, annual implementation
10 plan for carrying out this aspect of the program. Insofar as practical, the
11 committee should incorporate matters such as spill, transportation, the Corps'
12 Fish Passage Plan, the fishery agencies' and tribes' Detailed Fishery Operating
13 Plan, the coordinated plan of operation for flow augmentation (section 3.2C),
14 annual operating plans for the Non-Treaty Storage Fish and Wildlife
15 Agreement, planning for coordinated system operations, Idaho Power
16 Company's proposed operations under its weak stock plan, water identified by
17 the Snake River Anadromous Fish Water Management Office, spring and fall
18 trade-offs, research and monitoring results, and other mainstem passage
19 matters.
20

21 In its meetings, the committee should identify all water available in a particular
22 year and plan for its use. During low flow conditions, when the monthly
23 average flow equivalent² of 85,000 cubic-feet per second in the Snake River
24 cannot be provided for the full migration period, flows should be distributed to
25 protect a portion of all known naturally reproducing stocks. The plan will have
26 the flexibility to move flows between May and June, if such shaping is more
27 likely to achieve the intent of this program. If there are conflicting water
28 demands among anadromous species, conflicts should be resolved by the Fish
29 Operations Executive Committee in consultation with the National Marine
30 Fisheries Service.
31

32 All alterations in river operations undertaken pursuant to these amendments
33 should consider impacts on resident fish and other species, especially
34 threatened, endangered or native species, and should seek to avoid adverse
35 effects on those species. The committee should produce an operating plan by
36 March 31 of each year, and will need to begin in the preceding year to complete
37 its work.
38

² "Flow equivalent" means the flow level required to achieve the same water particle travel time as 85,000 cubic-feet per second at average normal pool elevations at all projects. For example, 81,000 cubic-feet per second at minimum operating pool elevations is the flow equivalent of 85,000 cubic-feet per second at average normal pool levels.

1 The Fish Passage Center should manage water supplies for fish in accordance
2 with the annual implementation plan. To assist the full range of stocks
3 migrating in the Snake and Columbia rivers, every effort must be made to
4 shape water stored for fish flow augmentation to the fullest extent practicable.
5 Any proposed deviations from the implementation plan must be approved by
6 the Executive Committee. Therefore, the Executive Committee must develop a
7 procedure to address fish flow operations throughout the fish migration
8 season, if necessary.

9
10 Accounting procedures for the use of this water will be developed under the
11 auspices of the Fish Operations Executive Committee. These procedures will be
12 provided to the Council and other interested parties. Pending development and
13 Council approval of new accounting rules, the provisions set out below (section
14 3.2D) will continue to apply. All water supplies acquired under the measures
15 below will be applied to the fish migration.

16
17 However, the Columbia River and its tributaries make up an extremely complex
18 operating system. The Council recognizes that the flow, velocity and
19 temperature improvement measures contained in this amendment will have a
20 substantial impact on the operations of this system.

21
22 Given more time and experience, it is likely that additional refinement of these
23 measures can be achieved, resulting in greater operational efficiency and better
24 coordination between the needs of fish and other uses of the river.

25
26 The Council welcomes proposals from river operators, especially those
27 proposals that emerge from the river operations process described above, for
28 better ways of providing equivalent amounts of water for salmon and steelhead
29 within time frames specified in this amendment. Any such proposals should be
30 submitted to the Council and, on approval, implemented.

31
32 The Council expects that, beginning in 1992, river operation changes for fish
33 will be in accordance with these measures as they are now written. The Council
34 will carefully monitor these operations, and will welcome suggestions from all
35 interested persons on how they can be improved. In the fall of 1992, and of
36 each subsequent year until further notice, the Council will review the
37 operations. At that time, it will determine whether these measures should be
38 revised to provide the intended benefits to fish in the most practical and
39 efficient manner.

40
41 **3.2B Fish Passage Center**

42
43 **Bonneville:**

1 1. Fund the establishment and operation of a Fish Passage Center, including
2 funds for a fish passage manager position, technical and clerical support and
3 the services of consultants when necessary, as jointly agreed to by Bonneville
4 and the fish and wildlife agencies and tribes. This support will assist the fish
5 passage manager in: A) planning and implementing the annual smolt
6 monitoring program; B) developing and implementing flow and spill requests;
7 and C) monitoring and analyzing research results to assist in implementing the
8 water budget and spill planning and in preparing reports.

9
10 **Fish Passage Center:**

11
12 2. House the fish passage manager and staff and function as the primary
13 program center for housing data and information regarding juvenile fish
14 passage. All data collected and stored at the Fish Passage Center will be
15 available upon request to all interested parties.

16
17 **Bonneville:**

18
19 3. Provide funds to establish a "fish passage manager" position designated by
20 the federal and state fish and wildlife agencies, and the Columbia River Basin
21 Indian tribes. The fish passage manager will provide expert assistance to the
22 designated entities in working with the power project operators and regulators
23 to ensure that requirements for fish are made a part of all river system
24 planning and operations. The fish passage manager will be selected on the
25 basis of knowledge of the multiple purposes of the regional hydropower system
26 as well as the water needs of fish and wildlife, and ability to communicate and
27 work with the fish and wildlife agencies, tribes, project operators and
28 regulators and other interested parties, including members of the public. The
29 Council will provide a fish passage advisor on its staff to review the operation of
30 the water budget; advise the Council on all matters related to fish passage; and
31 to assist in resolving fish passage disputes.

32
33 **Fish Passage Center and Bonneville:**

34
35 4. The Council expects Bonneville and the fish and wildlife agencies and
36 tribes to cooperate fully in developing the contractual agreements necessary to
37 carry out tasks described in this section. Pursuant to this expectation, the
38 Council or its staff will review all contracts related to the Fish Passage Center
39 and the fish passage managers as provided in Sections _____:
40 Coordination.

41
42 5. The fish passage manager will be the primary point of contact between the
43 power system and the fish and wildlife agencies and tribes on matters
44 concerning all flow and velocity augmentation, temperature control and spill
45 operations affecting juvenile fish migrating downstream at hydroelectric

1 projects operated by the Corps of Engineers and the Bureau of Reclamation on
2 the mainstem of the Columbia and Snake rivers. The fish passage manager
3 will be responsible for informing the Corps of Engineers when and to what
4 extent the manager wishes to draw on the water budget. In making requests,
5 the fish passage manager should: (a) give the Corps three days written notice
6 of changes in the planned flow schedule, unless otherwise agreed to by the
7 manager and the Corps; and (b) take into account flow and reservoir level
8 fluctuation requirements for resident fish. The Corps will: inform the other
9 project operators and regulators of water budget requests and spill
10 communications to the extent necessary; manage and implement annual water
11 budget and juvenile fish passage plans and make in-season spill decisions in
12 consultation with the fish passage manager and the Fish Operations Executive
13 Committee.

14
15 **3.2C Coordinated plan of operation for flow augmentation**

16
17 **Federal project operators and regulators:**

18
19 1. By January 15 of each year, meet with a committee composed of the fish
20 passage manager, the Council's fish passage advisor and representatives of the
21 power system operators to review the official January volume-of-runoff
22 forecast; to coordinate the system's flow operation for the current year with the
23 Fish Operations Executive Committee; and to report to the Fish Operations
24 Executive Committee on development of the annual coordinated plan of
25 operation for flows for the juvenile fish migration. Conduct a similar meeting
26 in mid-February and mid-March of each year. This committee also shall
27 evaluate alternative water budget and other flow measures' implementation
28 procedures and report to the Council.

29
30 **Corps of Engineers:**

31
32 2. By March 20 of each year, provide to the Fish Operations Executive
33 Committee and the Council a coordinated plan of operation for flow
34 augmentation for the periods April 15 through June 30 and July 1 through
35 September 30. During these periods, submit to the Fish Operations Executive
36 Committee and the Council and the fish passage manager a daily flow report
37 and make available a copy of the National Weather Service weekly flow forecast.
38 During the remainder of the year, submit a monthly flow report to the Council.

39 **Fish Passage Center:**

40
41 3. By November 1 of each year, submit to the Fish Operations Executive
42 Committee and the Council a single report that explains the scheduling of flow
43 augmentation and supporting rationale for that calendar year. This report will
44 include:
45

- 1 a. The actual flows achieved for that calendar year;
- 2
- 3 b. A record of the estimated number of smolts that passed Lower
- 4 Granite and Priest Rapids dams, and the period of time over which
- 5 the migration occurred; and
- 6
- 7 c. A description of the flow shaping used for that calendar year to
- 8 achieve improved smolt survival.
- 9

10 **Bonneville:**

11

12 7. Pay the travel costs and related travel expenses for one or two

13 representatives from each Columbia River Basin Indian tribe to attend up to

14 three meetings per year for the purpose of coordinating tribal flow

15 augmentation activities.

16

17 **3.2D Operating rules for flow augmentation.**

18

19 1. To provide a base from which to measure use of water for flow augmentation,

20 the Council has established the "firm power flows" listed in Table 1. For the

21 Columbia River, the fish passage manager will request flows for Priest Rapids

22 and/or The Dalles dams and dates on which these flows are desired. The flow

23 requests must be greater than the firm power flows. For the Snake River, the

24 fish passage manager will request flows from either Dworshak or Brownlee

25 reservoirs, or both, to provide flow augmentation at Lower Granite Dam. The

26 fish passage manager must give the Corps of Engineers three days' written

27 notice of changes in the planned flow schedule from the water budget volumes,

28 unless otherwise agreed to by the manager and the Corps. For the Columbia

29 River, water budget use will be measured as the difference between the actual

30 average weekly flows or the fish passage manager's flow request at Priest

31 Rapids Dam, whichever is less, and the firm power flows, or as agreed to by the

32 project operators and the fish passage manager.

33

34 **Table 1**

35 **Firm Power Flows**

36 **(average weekly kcfs)**

37

38 Priest Rapids

39

40 April 15 through April 30	76
41 May 1 through May 31	76
42 June 1 through June 15	76
43 (Former section 303(a)(2))	

1 2. The Council recognizes that the description of the water budget lacks
2 many of the operating details that will be addressed as the water budget is
3 implemented and operating problems occur. Recognizing that operating
4 decisions could influence the effectiveness of the water budget, the Council
5 recommends the following priority for competing uses of the hydropower
6 system:

- 7
8 First: Firm Power to Meet Firm Loads
9 Second: Water Budget and other flow measures
10 Third: Reservoir Refill
11 Fourth: Secondary Energy Generation (beyond that provided in
12 connection with use of the water budget)

13
14 3. The Council recognizes that flow augmentation measures must be
15 implemented within the context of laws related to federal, state and Indian
16 water rights. [See Section 1500: Disclaimers.]

17 18 **3.3 SNAKE RIVER FLOW, VELOCITY AND TEMPERATURE CONTROL**

19 20 **3.3A Spring Migrants**

21
22 Use the following measures to aim to provide a minimum monthly average flow
23 equivalent of 85,000 cubic-feet per second at Lower Granite from April 16
24 through June 15 in all water years. Figure 6 illustrates the approximate flows
25 attained when these measures are applied to the historical water record.

26 27 **Corps of Engineers**

28
29 1. Unless drawdown experiments require otherwise, reduce the level of Lower
30 Granite, Little Goose, Ice Harbor and Lower Monumental pools to near
31 minimum operating pool levels when juvenile fish begin migrating (typically
32 about April 16). The Fish Operations Executive Committee will plan for
33 reservoir refill between the end of the juvenile fall chinook migration and the
34 beginning of the adult fall chinook migration. Ensure that refill does not reduce
35 the effectiveness of temperature control measures. At present, near minimum
36 operating level is assumed to be one foot above the minimum operating
37 elevation. Identify and report to the Council by March 15, 1992, any measures
38 which can be implemented promptly to remove limiting conditions and allow
39 operations at a lower level without adversely affecting present users.

40 41 **Bonneville, Corps of Engineers, Bureau of Reclamation and Other Parties**

42
43 2. Operate the Dworshak Reservoir to improve salmon migration conditions
44 consistent with the measures listed below:
45

1 a. From January to April 30, in years when Snake River runoff is forecast to be
2 below average, shift system flood control storage space to other Columbia
3 Basin projects.

4
5 b. Dworshak should be as close as possible to its upper rule curve by April 15
6 of each year.

7
8 c. When the official April forecast for the April-July runoff at Lower Granite is
9 less than 16 million acre-feet, Dworshak will provide 900,000 acre-feet of water
10 plus any water gained from the flood control shift for juvenile fish flow
11 augmentation. This volume of water is in addition to any minimum flow release
12 requirements at Dworshak. When the runoff forecast is greater than 16 million
13 acre-feet and less than 29 million acre-feet, Dworshak will provide all available
14 water, including any water gained from the flood control shift, for juvenile fish
15 flow augmentation, while providing a 70-percent confidence of refill by July 31.
16 When the runoff forecast is 29 million acre-feet or more, augmentation from
17 Dworshak is not required.

18
19 d. Dworshak's outflow is limited to 25,000 cubic-feet per second during the
20 migration period.

21
22 e. In emergency situations, for capacity needs, Dworshak may be temporarily
23 used to respond until arrangements can be made to continue filling toward the
24 upper rule curve.

25
26 **Bureau of Reclamation and Idaho**

27
28 3. Use uncontracted storage space to supply at least 90,000 acre-feet of water
29 for spring migrants.

30
31 **Bureau of Reclamation, Idaho, Oregon, Bonneville and Other Parties**

32
33 4. Unless the forecasted April through July runoff at Lower Granite exceeds 29
34 million acre-feet, use water efficiency improvements, water marketing
35 transactions, dry-year option leasing, storage buy-backs, and other measures
36 to secure at least 100,000 acre-feet of water from the Snake River Basin for
37 spring migrants. Of this amount, half should be secured by the Bureau of
38 Reclamation, and half should be secured with financial incentives provided by
39 Bonneville (through the Idaho Water Rental Pilot Project, or such other
40 processes as the Bureau of Reclamation, Idaho, Oregon and Bonneville choose).

41
42 **Bonneville**

43
44 [Duplicates 3.3B.8]Idaho Power Company, Corps of Engineers, Bureau of
45 Reclamation and Federal Energy Regulatory Commission

1
2 5. Operate Brownlee Reservoir to ensure that water described in Sections
3 3.3A3 and 3.3A4, above, is passed to assist spring migrants. Report to the
4 Council each year during the river operations planning process (Section 3.2) on
5 the Idaho Power Company's effort to shape this water.
6

7 6. Unless the forecast April through July runoff at Lower Granite exceeds 29
8 million acre-feet, draft Brownlee Reservoir during May to a minimum elevation
9 of 2,069 feet above sea level, which will provide a maximum of 110,000 acre-
10 feet for spring migrants whenever sufficient inflows are forecast, so that
11 resident fish, fall chinook and Brownlee refill by July 1 will not be significantly
12 affected. In years when Snake River runoff is forecast to be below average, shift
13 system flood control storage space from Brownlee to other Columbia Basin
14 projects whenever possible and needed.
15

16 **Bureau of Reclamation, Idaho and Oregon**
17

18 7. Establish, in cooperation with fish and wildlife agencies, Indian tribes and
19 interested parties, a Snake River Anadromous Fish Water Management Office
20 to facilitate the use of water from the Snake River Basin. Report to the Council
21 by May 1992.
22

23 **3.3B Fall Chinook**
24

25 **Corps of Engineers, Bonneville and Other Parties**
26

27 1. Continue to release cool water during August and September from both
28 Dworshak and the Hells Canyon Complex dams to reduce lower Snake River
29 water temperatures for adult fall chinook salmon and steelhead. Evaluate the
30 effectiveness of this measure. The objective of this evaluation is to target
31 reduced water temperatures at Ice Harbor Dam by September 1 of each year,
32 and to determine the effectiveness of these operations on adult fish passage
33 through the lower Snake River. Report results of this evaluation to the Council
34 by December 1993. Policy and technical guidance for determining the
35 magnitude and timing of Snake River temperature control releases from
36 Dworshak and Brownlee should be provided in a July meeting of the Fish
37 Operations Executive Committee.
38

39 2. If Dworshak Reservoir is full or nearly full by the end of July, draft
40 Dworshak Reservoir as much as 20 feet in August as needed for the
41 temperature control evaluation. In September, beginning immediately after
42 Labor Day, release up to 200,000 acre-feet of additional cool water from
43 Dworshak Reservoir, as needed for the temperature control evaluation. If
44 Dworshak Reservoir is not full, use of Dworshak for temperature control will be
45 addressed in the July meeting of the Fish Operations Executive Committee.

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All Parties

3. Seek funding assistance for necessary modifications to recreational and commercial facilities to allow Dworshak Reservoir to operate at reduced levels to improve survival of fall chinook consistent with the mitigation provisions of these amendments (see Section 8).

Idaho Power Company and Federal Energy Regulatory Commission

4. Modify operation of the Hells Canyon Complex to provide coordinated fall and spring flows below Hells Canyon Dam to maintain fall chinook spawning, incubation and emergence. Evaluate options for providing more water for fish flows from Brownlee Reservoir, including substantially improved ability to shape water from the Snake River Basin for spring and summer migrants, and report to the Council by the end of 1993.

5. During July, draft Brownlee Reservoir to a minimum elevation of 2,067 feet above sea level, to provide up to 137,000 acre-feet for the juvenile fall chinook migrants. Refill this space in August with water from the Snake River Basin. The amount of July draft at Brownlee is subject to the availability of water in Section 3.3B7, below.

6. During September, draft 100,000 acre-feet from Brownlee Reservoir to help reduce Snake River water temperatures for adult fish passage. In addition, pass 100,000 acre-feet of water from the Snake River Basin through the Hells Canyon hydropower complex.

Bureau of Reclamation, Idaho, Bonneville and Other Parties

7. Use water efficiency improvements, water marketing transactions, dry-year option leasing, storage buy-backs, and other measures to provide up to 137,000 acre-feet of water to refill the Brownlee Reservoir in August, in light of the operation described in Section 3.3B5, above, and to provide 100,000 acre-feet of water to reduce water temperatures (see Section 3.3B6, above). Of this amount, half should be secured by the Bureau of Reclamation, and half should be secured on a matching basis using financial incentives provided by Bonneville (through the Idaho Water Rental Pilot Project or such other processes the parties choose).

Bonneville

8. Fund an independent, third-party evaluation of the effectiveness of these measures in Sections 3.3A.4 and 3.3B.7, above, to provide water for salmon and steelhead.

1
2 **3.3C Allocation of Power Losses at Brownlee Reservoir**
3

4 To allocate non-power impacts equitably between Dworshak and Brownlee
5 reservoirs, some spill at Dworshak may be necessary. It is expected that Idaho
6 Power Company will experience power losses as a result of operating Brownlee
7 Reservoir for the purpose of supplying the water budget. Idaho Power
8 Company maintains that, through its settlement agreement and FERC license,
9 it has compensated for all adverse effects of its projects on fish. The Council
10 does not express an opinion on this question. Nevertheless, the Council
11 believes that Idaho Power Company's participation in providing flows on the
12 Snake River will help significantly in providing systemwide flows for
13 downstream migration. If Idaho Power Company experiences a power loss as a
14 result of participating in the water budget, and it is determined that the need
15 for water from Brownlee Reservoir is not attributable to the development and
16 operation of Idaho Power Company's Hells Canyon Complex, Bonneville shall
17 replace the loss in-kind. [See Section 1203(a)(4): Coordination.]
18

19 **3.4 Columbia River Flow And Velocity**
20

21 **3.4A Spring Migrants**
22

23 **Bonneville, Corps of Engineers, Bureau of Reclamation and Other Parties**
24

25 1. Beginning immediately, operate John Day Reservoir at minimum irrigation
26 pool from May 1 to August 31 of each year. Minimum irrigation pool is the
27 lowest level at which the irrigation pumps drawing from the reservoir will
28 operate effectively. Monitor and evaluate the biological benefits of John Day
29 Reservoir operations so that the Fish Operations Executive Committee can gain
30 better information to determine in future years how the operations can
31 complement flow velocities and other factors to achieve rebuilding targets. The
32 Council recognizes that, as was the experience in 1991, under certain
33 conditions, a slightly higher elevation may be required and some daily flexibility
34 is necessary for operation of the reservoir. Other portions of this rule contain
35 measures that will permit irrigators and other users of the John Day Pool to
36 operate effectively at lower pool levels. The Council expects the level of the
37 minimum irrigation pool to be lowered as these measures are implemented.
38 The Council expects that this will be accomplished by 1994. The intent of this
39 provision is for the John Day Reservoir to be operated at the lowest practical
40 level during the spring and summer migrations of juvenile chinook and sockeye
41 salmon.
42

43 2. Through firm power planning, provide 58 kcfs-months (3.45 MAF) of water
44 at Priest Rapids Dam, to be used by the Fish Passage Center consistent with

1 the Fish Operations Executive Committee's annual implementation plan,
2 during the period April 15 through June 15. [From section 303(a)(1)].

3
4 3. When the adjusted April forecast for the January-July runoff at The Dalles
5 Dam is less than 90 million acre-feet, have water in storage and available for
6 juvenile fish flow augmentation by April 30. The appropriate volume is derived
7 from the curve in Figure 7 based on the official April forecast, adjusted to the
8 National Weather Service 95-percent confidence level. This volume is in
9 addition to the existing water budget volume. When applied to the 20 lowest
10 water years in the historical water record, this volume of water would provide
11 approximately the flows shown in Figure 8.

12
13 4. Actions taken to store the required volume should not violate the following
14 conditions:

15
16 a. flood control limitations;

17
18 b. project minimum flow requirements; and

19
20 c. Vernita Bar Agreement requirements, which protect fall chinook below
21 Priest Rapids Dam.

22
23 **Bonneville**

24
25 5. Beginning in January of each year, provide to the Council and other
26 interested parties a written monthly report of the volume of water stored
27 pursuant to Section 3.4A2, above. By April 30th of each year, identify the
28 location and total volume of water stored for juvenile fish flow augmentation.

29
30
31 **Corps of Engineers and Bonneville**

32
33 6. Provide to the Council and other interested parties a written monthly report
34 on where system flood control storage is being provided, including a summary
35 of system flood control shifts.

36
37 **Figure 7**

38
39 **Figure 8**

40
41
42
43 **All Parties**

1 7. Whenever flow augmentation measures are in effect, the weekend and
2 holiday average flows should not be lower than 80 percent of the average of the
3 five preceding weekdays.

4
5 8. The 140,000 cubic-feet per second flow cap in the mid-Columbia River is
6 removed.

7
8 **Bonneville**

9
10 9. Because of the uncertainty in the supply of out-of-region energy,
11 immediately secure options for one or more resources to augment reduced
12 hydroelectric energy during winter months. If the region is unable to store
13 enough water for any reason other than those specified in Section 3.4A3,
14 above, immediately begin to acquire the optioned resources called for under
15 Objective 2 of the 1991 Northwest Conservation and Electric Power Plan, or
16 otherwise acquire resources that are consistent with the plan, in an amount
17 sufficient to ensure that the full volume of required water is available in
18 succeeding years. The Council will consult with representatives from all
19 interested parties to determine the proper amount and timing of the acquired
20 resource(s).

21
22 **3.4B Summer Migrants**

23
24 **Bonneville**

25
26 1. During July and August in below average water years, provide a volume of
27 water from the U.S. Non-Treaty Storage water available in that year to facilitate
28 evaluations described below.

29
30 2. Continue to seek energy exchanges and other energy alternatives with
31 potential to increase Columbia River flows in July and August to facilitate
32 evaluations and improve survival of summer migrants.

33
34 **3.5 Monitoring and Dispute Resolution**

35
36 **3.5A Monitoring**

37
38 **Bonneville:**

39
40 1. Fund an annual smolt monitoring program to be conducted by the fish
41 and wildlife agencies and tribes. The monitoring program will provide
42 information on the migrating characteristics of the various stocks of salmon
43 and steelhead within the Columbia Basin. The program should include:
44

- a. Field monitoring of smolt movement to determine the best timing of storage releases;
- b. Coordination of runoff forecasts with water budget use and shaping;
- c. Continuous monitoring of runoff conditions and fish movement at Lower Granite and Priest Rapids dams to provide information to allow changes in water budget use if actual runoff conditions are inconsistent with runoff forecasts; and
- d. Coordination of hatchery releases with water budget use.

3.5B Dispute Settlement

1. In the event that the fish and wildlife agencies and tribes are unable to agree on a flow schedule for the water budget, the fish passage manager immediately will notify the Fish Operations Executive Committee, which will assist them in promptly resolving the dispute. In the event that the dispute cannot be resolved, the Council may establish and transmit to the Corps of Engineers its own flow schedule for the water budget.

2. If federal project operators and regulators cannot resolve planning and operational disputes related to mainstem fish operations, the Fish Operations Executive Committee will meet with the representatives of those entities to help resolve the dispute. The Council will consult with the fish and wildlife agencies, tribes, Public Utility Districts (PUDs), the Federal Energy Regulatory Commission (FERC), and other interested parties throughout implementation of the program. [See Section 1200: Coordination.]

3.6 Snake River Reservoir Drawdown Strategy

The region must expand existing options for improving survival of juvenile fish migrating in the river. In this section, the Council identifies actions necessary to develop, demonstrate and implement a reservoir drawdown strategy for the lower Snake River. This strategy is intended to provide inriver juvenile migration conditions that will promote rebuilding of imperiled Snake River anadromous fish stocks.

Snake River flow augmentation and transportation measures, described in Sections 3.3 and 3.9, will be pursued pending implementation of the Snake River reservoir drawdowns. Such drawdowns will be implemented to achieve rebuilding targets unless they would be structurally or economically infeasible, biologically imprudent, or inconsistent with Sections 4(h)(5)-(7) of the Northwest Power Act. The Council will review and re-evaluate transportation and flow measures upon receipt of final reservoir drawdown plans. It is the

1 intent of the Council that these measures will be in addition to or complement
2 measures already initiated to achieve rebuilding targets.

3
4 The region needs to evaluate these actions to identify biological benefits for
5 weak stocks and strategies to mitigate adverse effects on other river users.
6 Parties conducting tests and evaluations should report progress to the Council
7 no less than semiannually, beginning May 30, 1992, and submit interim
8 reports by November 1, 1992, and final reports by November 1, 1993. As soon
9 as the results are available, they will be reviewed by the Council to develop the
10 best strategy to meet biological goals and objectives. The Council will provide
11 for public involvement prior to its decision on the drawdown strategy. It is the
12 intent of the Council to have the Snake River drawdown strategy implemented
13 by April 1995, unless shown to be structurally or economically infeasible,
14 biologically imprudent or inconsistent with Sections 4(h)(5)-(7) of the Northwest
15 Power Act.

16 17 **3.6A Drawdown Evaluation**

18
19 An integrated, multidisciplinary planning effort is necessary to demonstrate
20 and develop the Snake River reservoir drawdown strategy. The development of
21 the reservoir drawdown strategy will focus on the four lower Snake River
22 projects and will include an operations plan, design plan, mitigation plan and
23 biological plan. The plans will determine the best method for implementing the
24 reservoir drawdown strategy while mitigating impacts to other users of the
25 river.

26 27 **Operations Plan**

28
29 The operations plan will consist of a detailed program for the implementation of
30 reservoir drawdowns and will include, but is not limited to, the following
31 elements:

- 32
- 33 • criteria for depth and duration of drawdown;
- 34
- 35 • the sequence in which reservoirs will be lowered and
36 refilled;
- 37
- 38 • rates of drawdown and refill;
- 39
- 40 • provisions for refilling mainstem reservoirs following the drawdown period;
- 41
- 42 • plans for using water evacuated from the mainstem reservoirs to enhance
43 downstream flows for fish migration;
- 44
- 45 • operations required for juvenile fish passage;

- 1
2 • operations required for adult fish passage;
3
4 • evaluation of shifting flood control responsibilities during drawdown period
5 to the lower Snake River projects and among storage projects in the
6 Columbia River Basin to provide additional storage at other projects; and
7
8 • procedures for planning, coordinating and implementing reservoir
9 operations.

10
11 **Design Plan**

12
13 The design plan will consist of a feasibility analysis, preliminary design work
14 and preliminary cost estimates for structural modifications needed to
15 implement the operations plan. The design plan will be developed in
16 conjunction with the operations plan. The design plan will consider measures
17 to permit operation of the following facilities at lower reservoir elevations:

- 18
19 • adult fishways;
20
21 • turbines and associated facilities;
22
23 • turbine intake screens and fish bypass facilities;
24
25 • collection and transportation facilities for juvenile migrants;
26
27 • physical devices and other measures to control nitrogen gas supersaturation
28 and any other conditions such as sedimentation that may be associated
29 with reservoir operations; and
30
31 • any additional design activities necessary to evaluate the modifications
32 needed to facilitate implementation of the mitigation provisions of this
33 amendment.

34
35 **Mitigation Plan**

36
37 The mitigation plan will consist of measures to mitigate the impact of the
38 reservoir drawdown strategy to the extent practicable. The Council anticipates
39 that reservoir drawdown will have both economic and environmental impacts.
40 Mitigation of these impacts is an integral and necessary part of any overall
41 changes that would involve such drawdowns. Consistent with the mitigation
42 section of these amendments (Section 8), the costs of mitigating impacts should
43 be shared regionally and/or nationally so that local communities, industries,
44 businesses and other entities that depend on the Snake River do not bear a
45 disproportionate share of the burden. Development of the mitigation plan

1 should proceed concurrently with development of the operations and design
2 plans. The mitigation plan should address:

- 3
- 4 • stability of bridges, railways, levees and other structures that may be
5 affected by implementation of the operations plan;
6
- 7 • impact of reservoir drawdown on the economic sectors affected by
8 disruption of barge traffic on the lower Snake River, shifting lock
9 maintenance operations into the drawdown period, alternative navigation
10 and commodity shipping strategies, construction of additional storage
11 facilities for products of commerce, measures to facilitate other means of
12 transportation, relief for increased shipping costs, loss of market access,
13 and other measures;
- 14
- 15 • impacts of reservoir drawdowns on resident fish, wildlife (particularly
16 threatened or endangered species), recreational users and the recreational
17 industry, and other environmental values;
18
- 19 • impacts on irrigation, including cost and other requirements necessary to
20 relocate irrigation pipe inlets and to supply water; and
21
- 22 • impacts on county, state or federal roads and transportation corridors.
23

24 **Biological Plan**

25
26 The biological plan will analyze the effects of pool drawdown on salmon,
27 steelhead, resident fish and wildlife. This should include the analysis of
28 available information and any new information that results from interim tests.
29 The effects of drawdown on fish survival should be compared to alternative
30 means to enhance survival. The biological plan should be coordinated with the
31 design and operations plans, particularly in regard to development of
32 drawdown alternatives.
33

34 **Interim Plans**

35
36 By November 1, 1992, interim plans prepared pursuant to this section should
37 be submitted to the Council for review and approval. At that time, the Council
38 will establish an implementation schedule for further steps in the development
39 of a reservoir drawdown program. Final plans should be submitted by
40 November 1, 1993, for Council review and approval. The Council will provide
41 for public involvement prior to its decisions. Given the critical status of Snake
42 River salmon runs, the schedule will reflect an expedited time frame for
43 implementation. The Council's determination to approve, reject or amend a
44 plan will be based upon whether the operations plan and design plan provide
45 for improved survival of Snake River salmon and steelhead to meet rebuilding

1 targets, and whether implementation would be structurally or economically
2 infeasible, biologically imprudent, or inconsistent with Sections 4(h)(5)-(7) of
3 the Northwest Power Act.

4
5 **Bonneville and Corps of Engineers**

6
7 1. In consultation with the fishery managers of the Snake River Basin, starting
8 as early as possible in 1992, conduct any tests necessary to assist in the
9 formulation of the plans called for in this measure.

10
11 **Council, Bonneville, Corps of Engineers and Bureau of Reclamation**

12
13 2. Establish a committee to coordinate analyses conducted by the federal
14 agencies and oversee the development of the plans described in this section.
15 The committee, chaired by the Council, will consist of a representative from
16 each of the following: Corps of Engineers, Bonneville, Bureau of Reclamation,
17 Idaho, Montana, Oregon, Washington and Indian tribes. The committee's work
18 will facilitate regional involvement in ongoing federal processes relating to lower
19 Snake River reservoir drawdowns and will help prevent unnecessary
20 duplication between federal and Council-sponsored efforts. The Council will
21 provide ongoing coordination with other interested parties in the region, and
22 will be responsible for overseeing the development, scheduling and completion
23 of the plans called for in this section.

24
25 **Bonneville**

26
27 3. In coordination with the committee, fund independent technical resources
28 as needed to enable the committee to review the adequacy of analyses
29 conducted by the federal agencies and to conduct their own analyses when the
30 committee or the chair deem appropriate. Funding will be based on a scope of
31 work approved by the Council no later than February 1992.

32
33 **Federal Project Operators and Regulators**

34
35 4. Implement approved plans in accordance with the schedule adopted by the
36 Council. To ensure prompt implementation of any plans approved by the
37 Council, federal implementing agencies should incorporate the planning
38 process and its results into ongoing administrative processes including, but not
39 limited to, National Environmental Policy Act and Endangered Species Act
40 processes.

41
42 5. Incorporate the specifications of such approved plans in all system planning
43 and operations performed under the Columbia River Treaty, the Pacific
44 Northwest Coordination Agreement, Congressional authorizations and
45 appropriations, all related rule curves, and other applicable procedures

1 affecting river operations and planning; and implement approved reservoir
2 drawdown plans as "firm" requirements.

3
4 **Congress and Corps of Engineers**

5
6 6. It is possible that refilling the four lower Snake River reservoirs that have
7 been drawn down to near spillway crest elevation would reduce lower Columbia
8 River navigation channels one or two feet. To address these potential impacts,
9 the Council requests that: a) Congress consider authorizing dredging to
10 maintain a 40-foot navigation channel; b) the Corps begin any necessary
11 National Environmental Policy Act process; and c) the parties time these
12 actions to be consistent with implementation of the lower Snake River
13 drawdown program.

14
15
16
17 H:\SA-12894.DOC

1
2
3
4 **SECTION 3B**

5 **3.7 Additional Measures to Increase Survival**

6 In this section, the Council identifies actions that should begin right away, so
7 that the results can be used by the end of 1993. Included are additional longer-
8 term actions to augment flows, reduce temperatures or otherwise further
9 improve fish survival in the Columbia River Basin. These measures should be
10 in addition to and not displace measures already initiated. Parties conducting
11 tests and evaluations should report progress to the Council no less than
12 semiannually, beginning May 30, 1992, and submit final reports by the end of
13 1993. The results will be reviewed by the Council as soon as available to
14 develop the best strategy to meet rebuilding targets. The object of the process
15 outlined below is to identify and remove impediments to these measures, and
16 expeditiously implement those that achieve rebuilding targets unless shown to
17 be structurally or economically infeasible, biologically imprudent or
18 inconsistent with Sections 4(h)(5)-(7) of the Northwest Power Act.

19
20 **3.7A John Day Drawdown**

21
22 **Corps of Engineers, Bonneville, Washington, Oregon and Others**

23
24 1. Identify and report to the Council by March 15, 1992, any measures that
25 can be implemented promptly to remove limiting conditions and allow the John
26 Day Reservoir to be operated at a lower level without adversely affecting
27 present users, even if the measures do not achieve minimum operating pool
28 level. For example, if localized dredging around certain irrigation pump intakes
29 would allow the pumps to function effectively at lower reservoir levels and
30 therefore allow the pool to be operated at lower levels, this should be reported
31 to the Council together with an estimate of the time to complete and cost of the
32 dredging.

33
34 2. Beginning immediately: determine requirements, including cost of
35 measures, time to complete, and mitigation of impacts to reservoir users, to
36 permit annual operation of John Day Reservoir at minimum operating pool
37 level (257 feet elevation) from May 1 to August 31; and evaluate potential
38 biological impacts of such an operation. Report these findings to the Council as
39 soon as feasible and not later than November 1, 1992.

40
41 3. Following Council review of the findings described in Section 3.7A2, above,
42 and in consultation with user groups along the reservoir, prepare and
43 implement a mitigation plan consisting of measures to mitigate the economic
44 and other impacts of the reservoir drawdown to the extent practicable.
45 Consistent with the mitigation provisions of this amendment (Section 8), the

1 costs of mitigation impacts should be shared so that local communities,
2 industries, businesses and other entities that depend on the John Day
3 Reservoir do not bear a disproportionate share of the burden. The plan should
4 address, but not be limited to:

5
6 a. Design, engineering, permitting, equipment and installation costs of
7 relocating irrigation intakes and enlarging pumps as required for irrigators to
8 continue operations adjacent to the reservoir (or providing alternative means of
9 moving irrigation water to application).

10
11 b. Devising alternative, higher efficiency means of moving water to
12 applications, including irrigation canals or pipelines from McNary Reservoir or
13 other cooperative ventures to exploit economies of scale. To the extent pumping
14 energy efficiencies can be achieved by Bonneville customers, Bonneville should
15 finance and/or purchase such energy savings as a means of offsetting capital
16 costs to users.

17
18 c. Impacts of reservoir drawdowns on resident fish, wildlife (particularly
19 threatened or endangered species and existing wildlife refuges), recreationists
20 and the recreation industry, and other environmental values.

21
22 d. Stability of bridges, railways, levees and other structures that may be
23 affected by implementation of the plan.

24 25 **3.7B Additional Storage**

26 27 **Bureau of Reclamation, Corps of Engineers, Bonneville, Idaho, Oregon and** 28 **Others**

29
30 1. Beginning in 1992 and concluding by the end of 1993, conduct a
31 cooperative appraisal of the potential for new Snake River Basin storage to
32 provide additional water for lower Snake River flow augmentation to aid
33 migrating salmon and steelhead, or to provide added flood control storage that
34 would augment salmon and steelhead flows. Identify and make preliminary
35 evaluation of engineering, hydrologic, economic and environmental aspects of
36 potential sites. In addition, expeditiously explore short-term options to develop
37 storage capacity for at least 200,000 acre-feet of water. The Bureau and others
38 should give highest priority to potential new storage opportunities that:

39
40 a. have highest refill probability;

41
42 b. are or can be associated with new water supplies made available by the
43 Council-mandated Bureau water conservation projects under this program;

1 c. are located where they provide opportunities to shape flows to benefit fish
2 migration (without intervening barriers);

3
4 d. are located where they provide opportunities to moderate instream
5 temperatures to benefit fish migration; and

6
7 e. are not subject to state or other regulation that will preempt stored water or
8 otherwise substantially impair employment of the projects to benefit fish
9 migration.

10 11 **3.7C Water Measures**

12
13 Augmenting flows for salmon and steelhead will require a mix of measures
14 because no single alternative is likely to eliminate the need for all other
15 alternatives. This section puts a high priority on measures such as water
16 banks, water efficiency improvements, water transactions and the like. In
17 calling for these measures, the Council does not intend to alter or affect the
18 water rights or authorities of states, Indian tribes, the United States, or any
19 individual. Rather, it seeks to define a role for ratepayers in providing
20 incentives to augment streamflows for salmon and steelhead, and to encourage
21 water management by the states and others that contributes to sustainable
22 salmon and steelhead runs.

23 24 **Idaho, Oregon, Washington and Bureau of Reclamation**

25
26 1. Organize a water committee with membership from state, federal, tribal,
27 water user, utility and conservation interests, Bonneville and the Council. With
28 advice and assistance from the committee, recommend options to secure, by
29 the end of 1996, at least 1 million acre-feet of additional water from the Snake
30 River Basin, and more if possible, to aid spring and summer migrants, using
31 water efficiencies, market mechanisms, water transactions and the like.

32
33 Recommendations should include:

34
35 a. incentive and regulatory programs;

36
37 b. ways to use existing institutional structures and resolve legal and
38 institutional barriers such as those raised by Idaho water managers to benefit
39 fish flows;

40
41 c. changes in law, policy and administration to facilitate increases in flows for
42 fish;

43
44 d. methodologies to determine the cost-effectiveness of various water
45 alternatives;

1
2 e. funding sources for such measures; and

3
4 f. a framework for determining priorities among water alternatives.

5
6 2. Submit a work plan and budget for staff or contractor assistance to
7 accomplish this work and submit recommendations no later than the end of
8 1993.

9
10 **Bonneville**

11
12 3. Fund travel and related expenses for committee members, and staffing and
13 contractor expenses shown in the work plan and budget approved by the
14 Council.

15
16 **Bureau of Reclamation, U.S. Geological Survey, U.S. Department of**
17 **Agriculture and Soil Conservation Service**

18
19 4. Evaluate the potential for water conservation, water efficiency or other
20 measures in the above listed agency programs with the most potential to
21 benefit anadromous fish, and least impact on third parties. Include an
22 evaluation of potential to use crop rotation programs to facilitate dry-year
23 option water leasing activities. Report to the Council and the states' water
24 committee.

25
26 **Bonneville, Corps of Engineers and Bureau of Reclamation**

27
28 5. Under the auspices of the Columbia River Water Management Group, fund a
29 review of the current water supply forecasting system, including:

30
31 a. potential for accuracy improvements of volume forecasts;

32
33 b. potential for forecasting the shape of runoff;

34
35 c. benefits of expanding telemetered snow monitoring system; and

36
37 d. resolution of the institutional barriers for the installation of hydrologic
38 measurement sites in existing and proposed wilderness areas.

39
40 Should the review identify methods for improving accuracy or significant
41 benefits elsewhere, Bonneville, the Bureau, the Corps or the states should fund
42 implementation of those methods.

43
44 **3.7D River System Investigations**

1 **Bonneville, Corps of Engineers and Bureau of Reclamation in Consultation**
2 **with the Council and Other Parties**

3
4 1. Evaluate seasonal exchanges, long-term nonfirm transactions, options for
5 storing water above power rule curves, accelerated acquisition of winter
6 peaking conservation and renewables, efficient direct application of renewable
7 resources, wholesale and retail price structures, and other changes in power
8 system operations that could increase flows for salmon and steelhead, or offset
9 the cost of improving salmon and steelhead flows. Complete and report to the
10 Council not later than the end of 1993. Include, among alternatives examined
11 in the System Operations Review, a full range of system coordination
12 alternatives to facilitate such alternative power system operations. Take steps
13 to include the Idaho Power Company in the coordinated system.
14

15 **3.7E Flood Control Examinations**

16
17 **Corps of Engineers and Others**

18
19 1. Re-examine all Columbia River Basin flood control strategies and rules to
20 identify modifications, including alternatives to impoundment that could yield
21 more useful or shapeable flows for fish, such as alternative structural and non-
22 structural flood protection measures. Such evaluations should include, but not
23 be limited to: the possibility of shifting flood control storage to the space
24 provided when lower Snake River and John Day reservoirs are pulled down to
25 minimum operating pool or lower; the effects and trade-offs required of reduced
26 levels of flood protection, including decreasing the rainfall factor of safety; and
27 separating system flood control from local flood control storage requirements,
28 favoring local flood control requirements, in upper basin storage projects.
29 Submit final report not later than the end of 1993.
30

31 **3.7F Research and Monitoring**

32
33 **Flow, Velocity and Salmon Survival**

34
35 During the 1980s, the region made unsatisfactory progress in evaluating the
36 relationship between spring and summer flow, velocity and fish survival,
37 notwithstanding concerted efforts by several parties. A lack of consensus on
38 the issues has hindered conclusion of this debate. The importance of this
39 relationship is such that continued stalemate is a serious problem. The Council
40 joins with the National Marine Fisheries Service and other regional interests in
41 insisting that this relationship immediately receive the highest priority in the
42 region's research efforts.
43

44 **Council**
45

1 1. Promptly fund an independent, third-party scientific evaluation of all new
2 and existing information and analysis on river velocity and survival of juvenile
3 spring, summer and fall chinook and sockeye salmon. The contractor(s) for
4 these evaluations should be independent of institutional constraints and
5 biases, and not representative of regional federal agencies, fisheries agencies,
6 tribes or utilities. The results of this review and evaluation shall be submitted
7 to the Council by June 15, 1993.

8
9 2. By August 1993, based on the independent, third-party, scientific
10 evaluation, initiate an amendment process, to be concluded by October 1993, if
11 possible, to adopt program amendments stating the Council's position on the
12 relationship between flow, velocity, travel time and survival of juvenile spring,
13 summer and fall chinook, sockeye salmon and steelhead.

14
15 **Bonneville**

16
17 3. As soon as possible, fund additional, independent, third-party scientific
18 evaluations to determine the relationship of flow and water velocity to the travel
19 time and survival of juvenile spring, summer and fall chinook and sockeye
20 salmon. The contractor(s) or university-based research team for these
21 evaluations should be independent of institutional constraints and biases, and
22 not be representatives of regional federal agencies, fishery agencies, tribes or
23 utilities. Bonneville's Scientific Review Group, or an independent procurement
24 process, should assist in developing the technical aspects of the request for
25 proposals and help review, rate and select the independent contractor(s).

26
27 4. The independent contractor(s) should report their research design, efforts
28 and results to date to the Council by July 15, 1993, and quarterly thereafter.

29
30 5. Continue to fund, on an expedited basis, ongoing evaluations in this
31 research area of emphasis.

32
33 **Fishery Managers**

34
35 6. Make available from hatcheries or other appropriate sources the required
36 numbers of juvenile salmon necessary to conduct the flow, travel time and
37 survival studies called for in Section 3.7F3-3.7F5, above.

38
39 **PIT Tags¹**

40
41 **Bonneville**

¹PIT tags are used for identifying individual salmon for monitoring and research purposes. This miniaturized tag consists of an integrated microchip that is programmed to include specific fish information. The tag is inserted into the body cavity of the fish and decoded at selected monitoring sites.

1
2 7. Fund on an expedited basis application of PIT tags, installation of detectors,
3 and other salmon marking techniques for evaluations.
4

5 8. Fund the installation of juvenile salmon PIT tag detection facilities at Little
6 Goose, Lower Monumental, John Day, McNary and Bonneville dams, to
7 facilitate assessments of naturally producing stocks and improve the quality of
8 monitoring the effects of juvenile and adult fish passage. Installation should be
9 in coordination with the Corps of Engineers and the fishery managers.
10

11 **Gas Supersaturation**

12

13 **Bonneville**

14

15 9. Fund a study of gas supersaturation and its effects on salmon and
16 steelhead passing through dam turbines, collection and bypass systems,
17 spillways, adult ladders and other means, particularly in connection with
18 possible reservoir drawdowns.
19

20 **Resident Fish and Wildlife**

21

22 **Idaho, Montana, Oregon and Washington, in Coordination with** 23 **Appropriate Indian Tribes**

24

25 10. By February 28, 1993, review, compile and submit to the Council all
26 existing information on the impacts of salmon and steelhead flow operations on
27 resident fish or wildlife. In addition, identify specific research, monitoring and
28 evaluation activities needed to determine the potential impacts of salmon and
29 steelhead flow operations on resident fish and wildlife, particularly native
30 species, in and around Hungry Horse, Libby, Grand Coulee, Brownlee and
31 Dworshak reservoirs. Use this information to develop analytical methods or
32 biological rule curves for reservoir operations, similar to those being developed
33 by the Montana Department of Fish, Wildlife and Parks for Hungry Horse and
34 Libby reservoirs. Include an evaluation of impacts on recreation and the
35 recreational industry.
36

37 **Bonneville**

38

39 11. Fund research, monitoring and evaluation activities needed to determine
40 the potential impacts of salmon and steelhead flow operations on resident fish
41 and wildlife, particularly native species, in and around Hungry Horse, Libby,
42 Grand Coulee, Brownlee, Dworshak and other reservoirs.
43

44 **3.8 Screens**

45

1
2 When the first hydroelectric dams were constructed in the mainstem of the
3 Columbia River, many people believed that providing adequate upstream
4 passage over the dams for adult salmon returning to spawn was sufficient to
5 sustain salmon and steelhead runs. Since that time, research has shown that
6 juvenile salmon and steelhead heading downstream also suffer a significant
7 mortality rate as they encounter the dams.

8
9 Pressure changes within each turbine are the primary cause of juvenile salmon
10 deaths. The impact of the moving turbine blades and the shearing action of
11 water in the turbine can also cause injuries or death. In addition, juvenile
12 salmon and steelhead may be stunned after passing through the turbines, thus
13 increasing their vulnerability to predators, especially squawfish, which are
14 abundant at the base of each dam. The Council recognizes the need to address
15 all phases of mainstem salmon survival, including installation of juvenile fish
16 screening and bypass systems.

17
18 The Council has taken a number of actions to reduce mortality rates of juvenile
19 fish at the dams. It has called for permanent bypass facilities to be installed at
20 mainstem dams. However, to protect juvenile fish while these installations
21 were being built, the Council required the dam operators to spill sufficient
22 water at the dams to guarantee a specified level of fish survival. With spill,
23 fish-laden water is diverted through a spillway, passing the dam without going
24 through its turbines. (Spill is to be distinguished from the water budget in that
25 it helps juvenile fish around the dams. The water budget speeds the migrants'
26 journey between dams.) The Council also adopted measures to transport
27 juvenile salmon and steelhead around some dams, as determined by the fish
28 and wildlife agencies and tribes.

29
30 In 1982, the Council called for development of mechanical bypass systems at
31 five public utility district dams regulated by FERC in the mid-Columbia area.
32 In 1984, operators four of the five dams agreed to develop bypass systems as
33 part of a settlement with fish and wildlife agencies and tribes, which had
34 petitioned FERC to make bypass a condition of license renewals for the dams.
35 Spill, which is to be used to protect fish until the bypass systems are operating,
36 is to be shaped in coordination with the fish and wildlife agencies and tribes.
37 In 1987, the Council amended the program to incorporate provisions of a
38 settlement agreement concerning fish protection measures at Rock Island Dam.
39 The settlement capped several years of litigation over the advisability of
40 mechanical bypass systems for juvenile fish, whether a hatchery would be a
41 reasonable substitute, what level of spill would be appropriate to protect
42 juvenile fish, and other issues. The settlement agreement calls for the
43 development of juvenile bypass systems, and installation of the systems if
44 certain criteria are satisfied. The agreement also provides for the creation of an
45 innovative "Fisheries Conservation Account," which the joint fishery parties

1 who have signed the agreement may use for bypass studies, bypass
2 development, or to purchase spill. The agreement specifies spill levels and
3 provides for studies of summer spill. A hatchery and satellite facilities will be
4 constructed promptly, and habitat and other studies will be conducted to help
5 determine the proper use of the fish produced. Changes were also made in
6 adult fishway operating criteria and modifications.

7
8 In 1984 the Council considered a number of proposals for improving fish
9 passage efficiency and smolt survival at Columbia and Snake river dams with
10 the goal of improving smolt survival systemwide. Some recommendations
11 proposed waiting for results of studies on fish passage problems before taking
12 action to improve bypass efficiencies. The Council, however, found that the
13 critical status of the runs on the Columbia and Snake rivers require prompt
14 action instead of continued delay and study. As a result, amendments to the
15 program called for the Corps of Engineers to develop coordinated interim
16 juvenile fish passage plans, including spilling water over the dams, while
17 developing permanent solutions to passage problems at John Day, The Dalles,
18 Bonneville, Lower Monumental and Ice Harbor dams.

19
20 At the Council's request, the Corps completed a comprehensive report on smolt
21 transportation in 1986. In addition, the Council adopted a 90 percent fish
22 guidance efficiency standard as a design criterion for devices that deflect fish
23 away from turbine intakes. The Council required that the level of spill be
24 sufficient to guarantee at least 90 percent fish survival at specified projects for
25 the middle 80 percent of the spring and summer migrations until mechanical
26 bypass systems are installed.

27
28 In 1987, the Council adopted a "share the wealth" measure to provide
29 increased levels of spill in years when water is above the critical level.
30 Recognizing that many of the issues associated with spill have been
31 institutional in nature, the Council committed to facilitate agreement between
32 the fish and wildlife agencies, Indian tribes, and the Corps regarding this
33 "sliding scale" approach to spill, and other matters.

34
35 In 1988, the Bonneville Power Administration, state and federal fish and
36 wildlife agencies, Indian tribes, and utility representatives negotiated an
37 agreement on spills for a ten-year period beginning December 31, 1988, at
38 Lower Monumental, Ice Harbor, John Day, and The Dalles dams ("Spill
39 Agreement," or "Agreement").

40
41 In this section, the Council establishes performance standards and sets
42 schedules for the installation of new or improved screens and bypass systems
43 at Snake and Columbia river federal dams. Additionally, the Council calls for
44 monitoring and evaluation of existing screens and new screen designs to

1 improve their effectiveness and ensure the availability of functional screens for
2 anticipated changes in flow/velocity regimes.

3
4 **3.8A Performance Standards**

5
6 **Corps of Engineers**

7
8 1. Develop and implement a coordinated permanent juvenile passage plan
9 developed in consultation with the fish and wildlife agencies and tribes,
10 consisting of a schedule for design and installation of a powerhouse collection
11 and bypass system at Ice Harbor and The Dalles projects. (Unless otherwise
12 allowed by the Ten-Year Spill Agreement, use a 90 percent fish guidance
13 efficiency standard as a design criterion for the turbine intake screens.
14 However, the standard need not be used if it is demonstrated to the Council's
15 satisfaction, on the basis of hydraulic model studies or prototype screen and
16 biological test results, that the 90 percent standard cannot be achieved.) The
17 Corps shall measure fish guidance efficiency and report results to the Council.

18
19 2. Install and provide operational fish passage screens and bypass systems at
20 all unscreened federal mainstem dams according to the following schedule:

21
22 a. Ice Harbor. Provide an interim screening and sluiceway bypass operation by
23 March 1993. Provide a completed and operational screening and low-velocity
24 flume bypass system by March 1996.

25
26 b. The Dalles. Provide operational screening and bypass system by March
27 1998.

28
29 3. Ensure a 98-percent or greater salmon survival rate in all bypass and
30 collection facilities from the deflector screens to the end of the bypass system
31 outfall. Where possible, increase survival of smolts in the area below the
32 bypass release points by removing fish predators, protecting migrants from
33 predation by birds, providing alternative release sites or modifying bypass
34 operations.

35
36 **Corps of Engineers and Mid-Columbia Public Utility Districts**

37
38 4. Achieve fish passage efficiencies of at least 70 percent and 50 percent for
39 spring and summer migrants, respectively, at all mainstem Columbia and
40 Snake river projects that have juvenile fish bypass facilities installed.

41
42 **3.8B Measures**

43
44 **LOWER COLUMBIA AND SNAKE RIVER PASSAGE**

1 **Corps of Engineers, Bonneville and Other Parties**

2
3 1. For mainstem projects operated by the Corps of Engineers on the Columbia
4 and Snake rivers (Figure 7), the following provisions apply until mechanical
5 bypass systems are installed and operational.

6
7 a. Provide spill at Lower Monumental, Ice Harbor, John Day, and The
8 Dalles dams in conformance with the Spill Agreement, for as long as the spill
9 obligations of the Spill Agreement remain in effect.

10
11 b. If the Spill Agreement terminates between November 15 and August
12 22 because one or more of the parties withdraw, the Spill Agreement's spill
13 provisions remain in effect until the first August 23 following withdrawal. If
14 withdrawal does not occur between November 15 and August 23, the Spill
15 Agreement's spill provisions terminate on the first April 14 following
16 withdrawal. After these dates, the spill measures of the 1987 program apply to
17 Corps spill operations until further action by the Council.

18
19 c. Upon withdrawal of any party from the Spill Agreement, the Council
20 will immediately request recommendations for amendments to this program to
21 improve survival of juvenile anadromous fish pending installation and
22 operation of mechanical bypass systems. The subject of the amendment
23 proceeding will be whether to retain the spill measures of this program, or to
24 adopt other measures. The Council will act on such recommendations within
25 120 days of the time the recommendations are received.

26
27 **Corps of Engineers**

28
29 2. Complete evaluation, design and prototype testing of extended-length fish
30 screens and, if effective, install them according to the schedule in Table 1. In
31 view of slippage in past schedules, maintain this schedule unless it is wholly
32 impracticable because of Congressional funding limitations or instructions,
33 physical infeasibility, or because the Council determines installation should
34 not occur.

35
36 3. During design and preparation for installation of fish passage facilities,
37 evaluate and report to the Council concerning modifications that may be
38 needed to accommodate alternative flow and velocity measures outlined in
39 Section ___ (Lower Snake River Drawdown Strategy).

40
41
42 Table 1
43 Extended-Length Fish Screen Projects Schedule

44
Project Completion Date

McNary	March 1995
Lower Granite	March 1996
Little Goose	March 1996
John Day	March 1998
The Dalles	March 1998

- 1
- 2
- 3 4. Install fish guidance improvements, including lowered submersible traveling
- 4 fish screens, streamlined trashracks and turbine intake extensions at
- 5 Bonneville Dam Second Powerhouse by March 1993.
- 6
- 7 5. Expedite evaluation of fish passage efficiency at Bonneville Dam First
- 8 Powerhouse and report to the Council modifications that may be needed to
- 9 meet the standards in Section 3.8A, above. Expedite rehabilitation of old
- 10 generating units.
- 11
- 12 6. Continue studies at McNary Dam to evaluate the expanded juvenile fish
- 13 bypass and collection system.
- 14
- 15 7. Install state-of-the-art juvenile fish size separator and flume at Lower
- 16 Granite Dam to improve the existing fish collection and bypass system.
- 17 Complete installation by March 1996.
- 18

19 **Corps of Engineers and Other Parties**

- 20
- 21 8. Explore promising new approaches to fish bypass technologies, including
- 22 the use of sound to guide fish. Should results of this research indicate high
- 23 efficiencies at costs lower than screen modifications, and no persuasive
- 24 biological or other considerations that would preclude use of a new technique,
- 25 bring a proposal to the Council for incorporating it into bypass strategies.
- 26
- 27 9. Conduct a sluiceway injury and mortality study at Ice Harbor Dam.
- 28

29 **MID-COLUMBIA RIVER PASSAGE**

30 **Douglas County Public Utility District**

- 31
- 32
- 33 10. *Subject to Federal Energy Regulatory Commission approval, ensure that*
- 34 *the installed juvenile fish bypass system tailored to the unique features of Wells*

1 *Dam continues to operate effectively and in accordance with the terms and*
2 *conditions of the 1990 Wells Settlement Agreement.*

3
4 **Chelan County Public Utility District**

5
6 11. Subject to Federal Energy Regulatory Commission approval:

7
8 a. Complete testing and evaluation of a prototype juvenile fish screening and
9 bypass system at Rocky Reach Dam and report the results of such tests and
10 evaluation to the Council by August 31, 1993. The evaluation should compare
11 the effectiveness of the prototype screening and bypass system with the best
12 available bypass system. If the tested system is not effective, the Chelan
13 County Public Utility District should evaluate, design and install an alternative
14 collection and bypass system at Rocky Reach Dam similar to the surface water
15 downstream passage sluiceways at The Dalles and Ice Harbor dams.

16
17 b. Complete installation at Rock Island Dam of a juvenile fish screening and
18 bypass system, as set forth in sections B and C of the Rock Island Settlement
19 Agreement.

20
21 c. Subject to Federal Energy Regulatory Commission approval, develop plans
22 for spills at Rocky Reach and Rock Island projects by March 1 of each year, as
23 set forth in the stipulated agreement for Rocky Reach Dam and the 1986
24 Settlement Agreement for Rock Island Dam (Section C "Fisheries Conservation
25 Account" or Section D "Spill Program").

26
27 **Grant County Public Utility District**

28
29 12. Subject to Federal Energy Regulatory Commission approval:

30
31 a. Complete testing and evaluation of prototype juvenile fish screening and
32 bypass systems at Wanapum and Priest Rapids dams and report the results of
33 such tests and evaluation to the Council and the Federal Energy Regulatory
34 Commission.

35
36 b. Complete installation at Wanapum Dam of a fully operational juvenile fish
37 screening and bypass system by March 1, 1998, or inform the Council of the
38 reasons why this date cannot be met.

39
40 c. Complete installation of a fully operational juvenile fish screening and
41 bypass system at Priest Rapids Dam by March 1, 1997, or inform the Council
42 of the reasons why this date cannot be met.

43
44 d. Subject to Federal Energy Regulatory Commission approval, provide an
45 increased level of spill at both Wanapum and Priest Rapids dams to improve

1 fish survival for 80 percent of both the spring and summer salmon migrations,
2 while avoiding dissolved gas supersaturation problems. The Mid-Columbia
3 Coordinating Committee will have the responsibility to govern the timing and
4 distribution of spill. Implement such a plan for spill each year at Wanapum
5 and Priest Rapids dams until juvenile fish screening and bypass systems are
6 installed and operational at each project.

7
8 **Mid-Columbia Public Utility Districts**

9
10 13. Subject to Federal Energy Regulatory Commission approval, coordinate
11 and consult with the fish and wildlife agencies and tribes through the three
12 coordinating committees (Wells, Rock Island and mid-Columbia) in the design
13 of prototype bypass system studies, as well as research, evaluation and all
14 other activities required in this section to achieve the most effective permanent
15 solutions to juvenile fish passage problems in the mid-Columbia. By March 20
16 of each year, develop and submit to the Federal Energy Regulatory
17 Commission, members of the coordinating committees and the Council an
18 annual fish passage and project operational and maintenance plan. The annual
19 fish passage plan for the mid-Columbia public utility district projects should be
20 coordinated with the various annual implementation plans developed under the
21 auspices of the Fish Operations Executive Committee. At the request of the
22 tribes, fish and wildlife agencies or public utility districts, the Fish Operations
23 Executive Committee and/or the Council will help resolve any disputes related
24 to achieving the objectives of this plan.

25
26 **MAINTENANCE PLANS**

27
28 **Federal Project Operators and Regulators**

29
30 14. Develop a plan for repair and maintenance of any part of each dam
31 relating to the passage of juvenile salmon and steelhead, including: 1)
32 measures to be followed in the event that any such facility breaks, is washed
33 out or ceases to operate and 2) designation of an individual responsible for
34 carrying out the plan. If any dam operator fails to comply with the plan, the
35 Council will ask the person responsible for carrying out the plan to explain at a
36 Council meeting the reasons for the non-compliance. The Council will decide
37 upon appropriate action at that time.

38
39 **3.9 PREDATION**

40
41 Hydropower development in the Columbia Basin resulted in an environment
42 that favors salmon predators. Conditions beneficial to predatory fish include
43 increased predator spawning habitat, slightly warmer water temperatures, and
44 the introduction of millions of hatchery fish that are diseased and ill-suited to
45 escape predation. Other factors that improve predator success include

1 concentrations of smolts at hydropower facilities, and the incapacitation of
2 smolts passing through generator turbines. These modifications also have
3 increased predation by birds. Predator vulnerability may also be increased for
4 juvenile fish passing through existing bypasses and sluiceways.

5
6 In this section, the Council calls for measures to reduce predation, including a
7 squawfish management program that employs targeted fisheries or other
8 measures to achieve the removal of about 20 percent of the squawfish
9 population, with the expectation that this will lower reservoir salmon mortality
10 by 25 percent. A comprehensive monitoring and evaluation program will
11 evaluate the effectiveness of predator control efforts. These efforts will then be
12 modified if necessary.

13 14 **3.9A Performance Standard**

15 16 **Bonneville, Corps of Engineers and Mid-Columbia Public Utility Districts**

17
18 1. Reduce squawfish population by about 20 percent, with the expectation that
19 this will lower salmon mortality in reservoirs by 25 percent, in the Snake and
20 Columbia rivers.

21 22 **3.9B Measures**

23 24 **Bonneville and Other Parties**

25
26 1. Implement, monitor and evaluate long-term effectiveness of an expanded
27 squawfish demonstration project. Evaluation should quantify changes in
28 predator populations and in the overall rate of predation. Provide an annual
29 report to the Council on the effectiveness of this program beginning October
30 1992.

31 32 **Corps of Engineers, Bonneville and Federal Energy Regulatory** 33 **Commission**

34
35 2. Evaluate and expeditiously implement measures to reduce smolt mortality
36 due to fish and avian predation at bypass system release sites. These measures
37 should include, but not be limited to, modifications to existing bypass system
38 outfall structures, modification of project or bypass system operations, or other
39 measures intended to disperse juvenile fish releases below dams.

40 41 **National Marine Fisheries Service**

42
43 3. Continue to evaluate the extent of interactions between marine mammal
44 and salmon populations.

1 **Mid-Columbia Public Utility Districts**
2

3 4. Subject to Federal Energy Regulatory Commission approval, develop a
4 coordinated study plan with the fishery managers to evaluate the extent of
5 predation on juvenile salmon migrating through the five mid-Columbia River
6 reservoirs. By October 1993, all five reservoirs should be indexed for predator
7 populations. The public utility districts should prepare a comprehensive report
8 on the extent of predation and predator indexing in the five mid-Columbia
9 River reservoirs by January 1994. The three mid-Columbia coordinating
10 committees should consult with the Council to determine the need for predator
11 control programs. If the mid-Columbia coordinating committees and the
12 Council jointly determine that predator control programs are warranted, then
13 the public utility districts will implement, monitor and evaluate measures to
14 alleviate juvenile salmonid predation in the appropriate reaches of the five mid-
15 Columbia reservoirs beginning in June 1994.
16

17 **3.10 TRANSPORTATION**
18

19 In coordination with the region's fish and wildlife agencies and Indian tribes,
20 the Corps of Engineers operates a large-scale program to collect and transport
21 juvenile salmon and steelhead. This program has been an integral part of the
22 region's fish passage enhancement measures since 1981.
23

24 The Council recognizes that despite considerable research and evaluation on
25 the benefits of transportation, much disagreement remains. Nonetheless, in the
26 near term, especially in low water conditions, transportation is one of the tools
27 the region has to improve salmon survival. In the longer term, depending on
28 results of continuing evaluation, transportation may be useful in the mix of
29 techniques the region will employ to decrease salmon mortality associated with
30 their migration through the reservoirs. Transportation is unlikely to be a
31 panacea, and improvements over the present system are undoubtedly possible.
32 Moreover, investment in such improvements and continuing evaluation are
33 relatively inexpensive, so regardless of the final decision on transportation's
34 long-term role, the region will not regret the effort and expenditure.
35

36 Accordingly, the Council calls on the Corps, in collaboration with the tribes,
37 state fishery managers and the National Marine Fisheries Service, to
38 aggressively evaluate and implement these potential transportation program
39 improvements, using the services of outside contractors and other available
40 parties, as needed, to accelerate implementation of these measures.
41

42 The Council believes that the fishery managers, through the Fish Transport
43 Oversight Team, are best able to decide when and where to employ smolt
44 transportation. At the same time, it is apparent that additional information is
45 needed regarding when and how transportation benefits fish survival. In

1 addition, several innovative ideas for alternative transportation collection
2 systems, techniques and management have been suggested during the
3 amendment process. These should be investigated. The region would benefit
4 from a regular infusion of creative ideas for the improvement of transportation
5 management and operations from a broad spectrum of interests. The Council
6 encourages other parties to come forward with creative ideas for
7 transportation, and calls on the transportation operators to take these ideas
8 into full account.

9
10 **Fishery Managers**

11
12 1. Conduct smolt transportation under conditions where the available
13 scientific evidence indicates that the survival from smolt to adult return to the
14 spawning ground will be greater with transportation than without
15 transportation. Continue smolt transportation as a key element of juvenile
16 passage survival until a more cost-effective and biologically sound strategy is
17 found.

18
19 2. Participate in the evaluation of smolt transportation and provide test fish
20 during all flow years from hatcheries or other appropriate sources. If a suitable
21 source of test fish is not found or if fish cannot be provided for other reasons,
22 report immediately to the Council and suggest alternative evaluations.

23
24 **Fishery Managers and Corps of Engineers**

25
26 3. The Fish Transportation Oversight Team should include representatives
27 from the region's fishery agencies, tribes and the Corps. Through the Fish
28 Transportation Oversight Team, prepare annual transport guidelines reflecting
29 Sections 3.10.1 and 3.10.2, plus an annual report of transportation
30 improvements and evaluations reflecting Sections 3.10.5, 3.10.8 and 3.10.9.
31 Submit annual transport guidelines and an annual report to the Fish
32 Operations Executive Committee and the Council by March 15 of each year.

33
34 **River management agencies**

35
36 4. To the extent possible, when planning implementation of river operations
37 and other program measures, do so in a manner that accommodates the Fish
38 Transportation Oversight Team's planned transportation program for that year.

39
40 5. Subject to Fish Transportation Oversight Team finding that risks to smolts
41 are within acceptable levels, evaluate the effectiveness of transportation to
42 increase juvenile survival to adult spawning stage in all water conditions, a
43 variety of alternative fish passage conditions and collection points. The Corps
44 should take the lead in coordinating this evaluation. The evaluation should
45 focus on spring, summer and fall chinook, especially in the Snake River. To the

1 extent possible, include evaluation of the benefits and opportunities of
2 transportation for sockeye salmon as well. These studies shall be designed to
3 yield statistically reliable results and to evaluate the effects of collection point
4 and inriver passage conditions and post-release survival on the benefit ratio of
5 transported and non-transported fish. Incorporate and coordinate this
6 research with the Fish Passage Development and Evaluation Program whenever
7 possible. The Corps should report to the Council on the outline of a transport
8 evaluation program by January 30, 1993.

9
10 6. Continue to collect information on the biological effects of smolt
11 transportation for use in comparative evaluations of alternative mainstem
12 survival strategies.

13
14 **Corps of Engineers**

15
16 7. Conduct and fund smolt transportation activities at those times and
17 locations specified in the guidelines prepared by the Fish Transportation
18 Oversight Team developed in Section 3.10.4. The Council supports the funding
19 of the barges, equipment, facilities and other expenses necessary to conduct
20 the annual smolt transportation program in accordance with the provisions
21 developed by the fish and wildlife agencies and tribes.

22
23 8. In cooperation with the fishery managers, as a high priority, evaluate
24 techniques for improving transportation for fall chinook, especially in the
25 Snake River. Report to the Council by January 30, 1993, and annually
26 thereafter, on options available, needed facility modifications and research
27 needs. Include in the evaluation the extended use of barges to transport fall
28 chinook even during times of low fish numbers as an alternative to truck
29 transport. Also, evaluate the use of refrigeration or other sources of cool water,
30 reduced densities, and other stress reduction techniques to improve transport
31 effectiveness, particularly for fall chinook.

32
33 9. On an expedited basis, improve salmon transportation by upgrading
34 facilities and improving operations. Improvements should include: reducing
35 smolt holding periods to no more than two days, minimizing fish densities,
36 reducing stress in holding areas through shading or other means, and
37 developing smolt release strategies, including dispersing fish to minimize
38 predation. Immediately evaluate: a) measures to reduce loading densities
39 during peak migration periods; b) varied smolt transit times; c) the feasibility of
40 constructing and operating acclimation facilities below Bonneville Dam; and d)
41 alternative release sites further downriver. Report to the Council by the end of
42 1993 on the status of these improvements and evaluations, and on the
43 feasibility of increasing transport benefits.

44

1 10. Expedite funding for a preliminary evaluation of: a) the feasibility of
2 constructing and operating alternative fish bypass and collection facilities at
3 the upstream end of Lower Granite Reservoir and nearby tributaries for
4 downstream migrating salmon and steelhead; b) the feasibility of constructing
5 an alternative stream channel or pipeline structure adjacent to or in the river
6 to transport smolts to below Bonneville Dam; and c) the feasibility and benefits
7 of net pens to increase survival of transported fish in reducing mortality
8 associated with bypass outfall areas. The evaluation will include preliminary
9 engineering, as well as economic and biological parameters. Report results of
10 all evaluations by December 31, 1992.

11
12 **Bonneville**

13
14 11. Continue to conduct research on the survival of hatchery, wild and
15 naturally spawning chinook salmon from headwater production areas and sites
16 to mainstem transport sites to determine the extent of mortality prior to
17 transportation. Determine the cause (i.e., water quantity, water quality, food
18 supply, disease, smolt quality, predation, etc.) of any high mortality rates prior
19 to transport.

20
21 **Fishery Managers, Federal River Operators and Other Parties**

22
23 12. Evaluate means by which safe and timely migration of salmon through
24 the reservoirs can be improved for inriver migration, collection and
25 transportation. Report to the Council by March 15, 1993, and annually
26 thereafter.

27
28 **3.11 Flows for Natural Production**

29
30 **Fish and Wildlife agencies, tribes and Grant County PUD:**

31
32 a. Comply with the flow plan incorporated in the FERC license for Priest
33 Rapids Dam.

34
35 b. Evaluate the effectiveness of the improved flows and report the results of this
36 evaluation to the Council and to FERC.

37
38 **Background.** The Vernita Bar section of the Columbia River immediately
39 below Priest Rapids Dam in the Hanford Reach is extremely valuable to natural
40 production of fall chinook salmon. Significant declines in production have
41 occurred since the 1970s. The fish and wildlife agencies have shown that
42 increasing flows above the present 36,000 cfs minimum flow level would
43 provide increased spawning habitat.

44
45 **Bonneville:**

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c. In consultation with the fish and wildlife agencies and tribes, fund studies to investigate the effect of establishing improved flows for fisheries production below Hells Canyon Dam, including a minimum flow for the spawning, incubation and rearing of salmon and steelhead and limits on river level fluctuations. These studies shall also include estimates of power losses associated with improved flows.

Background. The last remaining free-flowing stretch of the mid-Snake River is below Hells Canyon Dam. The fish and wildlife agencies and tribes believe that this stretch could be improved for fall chinook salmon and steelhead spawning by establishing minimum flows and limits on river level fluctuations.

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1
2 **SECTION 4**

3
4 **ADULT SALMON MIGRATION**

5
6
7 **Introduction**

8
9 Mainstem Columbia and Snake river hydroelectric projects and some tributary
10 projects are physical barriers to adult salmon and steelhead migrating from the
11 ocean to spawning areas upstream. To solve this problem, adult fish passage
12 facilities have been constructed at 13 mainstem dams on the Snake and
13 Columbia rivers. Water flows and spill guidelines also have been adopted to
14 provide unimpeded passage and maximum attraction of the fish to the fishway
15 entrances.

16
17 However, at some adult passage facilities, there are still problems that result in
18 delayed passage and mortality. For example, flow and spill conditions intended
19 to assist juvenile migrants at some dams tend to discourage upstream fish
20 migration, mask the flows that attract fish to the fishway, or induce fallback so
21 the fish must relocate and reascend the ladder. These conditions may also
22 increase the level of total dissolved gas in the water to levels lethal to both fish
23 and fish food organisms.

24
25 In addition, inadequacies in certain mainstem adult passage facilities and in
26 the operation and maintenance of these facilities create passage delays or
27 reduce the success of adult fish passage. Losses and delays of returning adult
28 salmon and steelhead at each dam due to upstream migration problems can be
29 significant and have a cumulative effect. Reducing these passage mortalities
30 could increase significantly the number of adult salmon available for harvest
31 and production.

32
33 The Council has adopted a number of measures to improve adult migrant
34 survival. The Council calls on the Corps of Engineers to implement all spill and
35 operating criteria for mainstem adult fish passage facilities and to make needed
36 improvements. In addition, the Council calls on the Corps to leave juvenile fish
37 screens installed for a longer period to provide protection for adult salmon that
38 fall back through the powerhouse. The Council also recommends adding
39 project biologists to routinely inspect fish passage facilities at mainstem Corps
40 dams. The Council also calls for various evaluations and studies to improve the
41 effectiveness of passage facilities and, ultimately, the survival of adult salmon
42 and steelhead.

43
44 In addition, the fish and wildlife agencies and tribes pointed out that some
45 disease problems among migrating salmon and steelhead may be caused or

1 intensified because of their concentration at fish ladders. The Council
2 maintains that this problem warrants further research, and calls for research
3 on fish disease at passage facilities.

4 5 **4.1 MEASURES**

6 7 **Corps of Engineers**

8
9 1. Adhere to all existing fishway operating and spill criteria and evaluate
10 needed improvements in criteria jointly with fishery managers.

11
12 2. Continue to evaluate all mainstem adult passage facilities, evaluate the need
13 for new facilities, the effectiveness of entrance attraction flows and fishway
14 hydraulics and make facility improvements as necessary. Provide and install,
15 as necessary, back-up parts, attraction water pumps or fish turbines at each
16 dam for use in the event of failure of these systems.

17
18 3. Keep fish screens in place at each dam beyond the juvenile migration where
19 adult fallback is a documented problem, as indicated in the fishway operating
20 criteria developed jointly with the fishery managers and subject to the need for
21 annual screen maintenance.

22
23 4. Continue to upgrade existing adult fish passage facilities, including: a)
24 automation of control systems; b) placement of staff gauges (flow measuring
25 devices) in areas that are accessible for both cleaning and reading; and c)
26 providing velocity meters in areas of known low velocity in the collection
27 channels.

28
29 5. Provide at least two additional project biologists to inspect both adult and
30 juvenile fish passage facilities at each of the eight federal mainstem dams on a
31 regular basis throughout the fish passage season to ensure all fish facilities are
32 operating according to agreed-upon criteria.

33
34 6. Evaluate the effects of shad population increases on adult salmon passage
35 at mainstem dams. Include in the evaluation the feasibility of selective shad
36 removal in adult ladders. Report results to the Council by November 1994.

37
38 7. Evaluate potential methods for decreasing water temperature in mainstem
39 fish ladders and apply where appropriate.

40
41 8. Evaluate the effects on adult salmon passage of zero nighttime flow
42 conditions in the lower Snake River. Report results to the Council by December
43 1993.

44 45 **Corps of Engineers, Bonneville and Fishery Managers**

1
2 9. Evaluate the extent, and identify the causes of interdam adult salmon
3 losses, including non-dam losses, and take action to address these causes, as
4 necessary. Report results to the Council by January 1994.
5

6 **Corps of Engineers and Bonneville**
7

8 10. To improve the accuracy of the present adult fish counting procedures,
9 evaluate the feasibility and benefits of using video-based or other automatic
10 counting and species recognition systems for monitoring adult fish passage at
11 mainstem Columbia and Snake river dams. Report results to the Council by
12 December 1993. If approved by the Council, institute video-based counting of
13 adult fish at appropriate locations.
14

15 **Bonneville**
16

17 11. Continue with research and development on the feasibility of installing
18 adult fish PIT-tag detectors in the adult fish passage facilities of mainstem
19 dams, including consideration of the capability of removing selected fish stocks
20 for transport. Report results to the Council by December 1994.
21

22 A number of diseases that affect adult fish have been associated with fish
23 ladders and attraction facilities at existing dams. Studies are needed to
24 document the extent to which these disease problems cause losses of fish.
25

26 **Bonneville**
27

28 12. Fund studies to investigate diseases that occur at fish passage facilities.
29

30 **Bonneville and Corps of Engineers, in Cooperation with Idaho Power
31 Company and Other Interested Parties**
32

33 13. Continue to evaluate whether releasing cool water from both Dworshak
34 Dam and the Hells Canyon Complex during August and September improves
35 adult fall chinook survival. This evaluation should be consistent with the
36 guidelines specified in Sections 3.3B1, 3.3B2 and 3.3B4-3.3B6. The objective of
37 this evaluation is to reduce water temperatures at Ice Harbor Dam by
38 September 1 of each year, and to determine the effectiveness of these
39 operations on adult fish survival and passage through the lower Snake River.
40 Report results of this evaluation to the Council by December 1993. Policy and
41 technical guidance for determining the magnitude and timing of Snake River
42 temperature control releases from Dworshak and Brownlee should be provided
43 in a July meeting of the Fish Operations Executive Committee. In addition:
44

1 a. Upgrade the COLTEMP⁴ water temperature prediction model using the data
2 and knowledge gained from all previous water temperature control operations
3 and monitoring;

4
5 b. Add to the existing water temperature data monitoring network to collect
6 meteorological and hydrological data that will identify the effect of tributary
7 watershed management and resulting inflow temperatures on mainstem Snake
8 River water temperatures. Include additional water temperature and water
9 velocity measurements in the lower Snake River.

10
11 c. Conduct additional salmon and steelhead migration studies, and coordinate
12 with ongoing fish migration and behavior such as timing, movement, fallback,
13 straying and other characteristics. Report results to the Council by December
14 1993.

15
16 d. Provide for coordinated data base management.

17
18 **Mid-Columbia Public Utility Districts**

19
20 14. Subject to Federal Energy Regulatory Commission approval, evaluate
21 adult fish passage at each mid-Columbia public utility district project to
22 determine if losses are occurring at or between the dams. This study should
23 include adult fish count evaluations and development of a coordinated,
24 comprehensive study plan with fishery managers to evaluate existing adult fish
25 passage at all five mid-Columbia dams and reservoirs, including determination
26 of optimum flows and development of spill configuration guidelines to improve
27 upstream migration conditions. To the extent possible, such evaluations
28 should be coordinated with similar adult fish passage studies being planned by
29 the Corps of Engineers for the federal Columbia River mainstem projects, as
30 well as complementing the terms of existing Federal Energy Regulatory
31 Commission Wells and Rock Island Settlement Agreements between Douglas
32 and Chelan County public utility districts and fishery managers. Compile the
33 results of such evaluations into a comprehensive report on adult fish passage
34 at the five mid-Columbia Public Utility Districts' projects and submit it to the
35 Federal Energy Regulatory Commission, the Council and members of the three
36 mid-Columbia coordinating committees.

37
38 **Chelan County Public Utility District**

39

⁴ COLTEMP is a Columbia River Basin water temperature model developed by the U.S. Army Corps of Engineers. It is used to predict water temperatures under alternative reservoir release strategies.

1 15. At Rock Island Project, implement the operating criteria and adult
2 fishway modifications provided in Section F, "Adult Fish Ladders" of the
3 Settlement Agreement dated April 24, 1987, filed in the relicensing proceeding
4 for Project 943 and FERC Docket Nos. E-9569, et al.

5
6 **Mid-Columbia Public Utility Districts**

7
8 16. Subject to Federal Energy Regulatory Commission approval, continue to
9 implement fishway operating criteria for optimum fish passage for the mid-
10 Columbia projects under their control. Evaluate and revise, if necessary, the
11 criteria in consultation with the fish and wildlife agencies and tribes.

12
13 **Maintenance Plans**

14
15 **Federal Project Operators and Regulators**

16
17 17. Develop a plan for repair and maintenance of any part of each dam
18 relating to the passage of adult salmon and steelhead, including: 1) measures
19 to be followed in the event that any such facility breaks, is washed out or
20 ceases to operate, and 2) designation of an individual responsible for carrying
21 out the plan. If any dam operator fails to comply with the plan, the Council
22 will ask the person responsible for carrying out the plan to explain at a Council
23 meeting the reasons for the non-compliance. The Council will decide upon
24 appropriate action at that time.

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Section 5

Salmon Harvest

INTRODUCTION

Because of the critical status of some salmon stocks and the need to realize the benefits of changes in hydrosystem operations, the number of salmon harvested must be further limited to allow a sufficient number of adult fish to return to spawn. Those salmon that return, called the escapement, must do so in large enough numbers to rebuild the populations, not just to sustain current low numbers.

Control of harvest, therefore, is a critical component in building a long-term, sustained increase in runs. That simple concept is the only thing that is simple about harvest. Harvest control is complicated by the fact that regulations fall under a number of jurisdictions, that there is a mixed-stock fishery, and that the demand for salmon to harvest generally exceeds the supply.

Harvest has been shaped by decades of negotiations between the United States and Canada, and by extensive litigation that has involved ocean and inriver fisheries and treaty and non-treaty fisheries.

A 1985 treaty between the United States and Canada provides for international management of stocks that migrate through waters of both nations. The Pacific Salmon Commission, formed under the treaty, makes recommendations to both nations on the conduct of salmon fisheries. The treaty cut back interceptions of salmon returning to Northwest rivers. Stocks of chinook salmon, particularly upper river bright fall chinook from the Columbia River, benefited from the overall cap on chinook harvested in Canadian and Alaskan fisheries. Importantly, the interception of Columbia River salmon by British Columbia is directly related to the interception of salmon of Canadian origin in U.S. fisheries (Alaska and Washington). Further reductions in the Canadian interception of Columbia River stocks may require northern Washington fishermen to reduce their harvest of Fraser River sockeye, for example. Parties to the treaty will meet in 1993 to discuss revisions. This will provide an opportunity to further reduce the interceptions of weak stocks of Columbia River chinook salmon.

The Pacific Fishery Management Council manages salmon fisheries from three to 200 miles off the coast. State regulations that extend to three miles offshore must be consistent with Pacific Fishery Management Council regulations. Since 1980, ocean commercial and recreational fisheries have been constrained in both season length and allowable harvest, compared to earlier years. Salmon seasons off

1 Alaska are regulated by the State of Alaska, but must be consistent with Pacific
2 Salmon Commission recommendations.

3
4 The Columbia River Fish Management Plan, developed as part of the agreement
5 reached under U.S. v. Oregon, established a process that the Columbia River
6 Treaty tribes and state management agencies use to regulate tribal and non-tribal
7 fisheries in the river. The state of Idaho and the Shoshone-Bannock Tribes are not
8 signatories to this agreement. The plan sets specific goals, timetables and
9 methods for cooperative management of salmon and steelhead stocks, including
10 both natural and hatchery fish production and allocation of harvests.

11
12 The Columbia River Compact is the forum used to set commercial fishing
13 regulations in the river. Congress ratified the agreement between Oregon and
14 Washington for the regulation, preservation and protection of fish in waters over
15 which the states share jurisdiction. The state of Idaho is not a member of this
16 compact, nor are the Indian tribes. While the individual states set their own sport
17 fishing regulations for the river, these regulations must complement previous
18 agreements for conservation and allocation for other fisheries.

19
20 All the tribal governments involved in salmon and steelhead harvest have
21 regulations to control and manage the harvest in tribal commercial, ceremonial
22 and subsistence fisheries. These regulations are coordinated with state
23 regulations.

24
25 In this harvest section, the Council makes no claim to regulatory authority. It
26 clearly recognizes the fishery managers' jurisdiction and tribal treaty rights, and
27 no measure is intended to affect or modify these rights. The Council also
28 acknowledges that there has been substantial progress in harvest management
29 over several decades and that declines in harvest levels have come at considerable
30 economic cost to tribal, coastal and inland communities.

31
32 Nevertheless, additional measures are necessary if the region is to meet its long-
33 term goal of biological diversity by rebuilding weak runs, and if it is to provide
34 sustainable and adequate harvest levels for tribal, sport and commercial fisheries.

35
36 One of the major challenges harvest managers face is that the fisheries in both the
37 ocean and mainstem Columbia River are mostly mixed-stock fisheries (see Section
38 5.3 for additional discussion of mixed-stock fisheries).

39
40 Another difficult and related problem is that there are more demands for salmon
41 for harvest than there are harvestable fish. The fishing power of commercial fleets
42 is much larger than necessary to take the harvestable surplus of salmon each
43 year. The recreational fishery also has grown over the years and is capable of
44 harvesting large numbers of salmon. The large demand for salmon to harvest puts
45 a great deal of pressure on the management systems to deliver the maximum

1 number of fish for harvest. Inadequate information and budgets, and the variable
2 nature of the salmon, the environment and the fishing fleets, all make it extremely
3 difficult to precisely manage harvest impacts on weak stocks.
4

5 In the Columbia River Basin, the problem associated with mixed-stock fisheries
6 results, at least in part, from operation of an increasing number of hatcheries. The
7 mixed-stock fishery problem cannot be resolved without implementing a harvest
8 management program that coordinates harvest of production from different areas
9 and also is consistent with both hatchery and natural production. The solution
10 also requires the development and implementation of complementary programs to
11 increase the productivity and survival of wild and naturally spawning stocks
12 throughout their life cycle. It is the Council's belief that progress in improved
13 stock identification and in technology that permits selective fisheries has the
14 potential for allowing greater harvest of strong stocks and greater protection of
15 weak ones. Regional fisheries interests are particularly urged to press for
16 additional gains in both areas.
17

18 The Council has developed measures in this section that call for:
19

- 20 • Development of a program that will help fishery managers identify weak stocks
21 so that these stocks can be afforded better protection in mixed-stock fisheries.
22
- 23 • Ongoing review and revision of sport and commercial fishing regulations in
24 areas where weak stocks are found.
25
- 26 • More complete accounting of salmon harvest in general and, in particular, as a
27 by-catch in fisheries for other species.
28
- 29 • Improved law enforcement to reduce illegal taking of salmon and public
30 education programs concerning the impacts of illegal or wasteful fisheries.
31
- 32 • Development of marking and alternative capture technology that will allow
33 unmarked wild and naturally spawning salmon to be released safely.
34
- 35 • Development of terminal harvest opportunities in the Columbia River and
36 tributaries to allow harvest of stronger stocks while minimizing impacts on
37 weak ones.
38

39 The Council believes the measures in this section can and should be implemented
40 by the Pacific Salmon Commission, Pacific Fishery Management Council,
41 Columbia River Compact, and other existing state and tribal management entities.
42

43 The Council also believes that the state of Idaho and the appropriate Columbia
44 River Basin tribes, if they believe their membership appropriate, should be
45 included in the Columbia River Compact.

1
2 **5.1 Harvest Goals, Objectives and Rebuilding Schedules**

3
4 **5.1A Management Goals and Escapement Objectives**

5
6 **Fishery Managers**

7
8 1. Expedite the development and/or re-evaluation of management goals⁵ and
9 spawning escapement objectives⁶ (see Section 2). Harvest should be managed to
10 meet rebuilding targets, recognizing the statistical quality of the run forecast and
11 the uncertainties associated with escapement objectives. Failure to establish and
12 manage for spawning escapement objectives could jeopardize Council support for
13 future funding of production and habitat measures in the Council's program.
14

15 **5.1B Rebuilding Schedules**

16
17 **Fishery Managers**

18
19 1. Develop and/or review and revise as necessary escapement objectives and
20 rebuilding schedules as stated in Sections 2 and 5.1A1. Harvest managers should
21 especially consider how existing harvest management and legal agreements can be
22 modified to assist with achievement of the rebuilding targets. The development of
23 rebuilding schedules for weak stocks will require the identification and annual
24 achievement of survival targets at a number of stages throughout the life cycle of
25 specific weak stocks.
26

27 **All Parties**

28
29 2. Assist in the development of rebuilding schedules that consider all sources of
30 mortality.
31

⁵ Management goals specify the management intent for the stock and the number of fish needed to fulfill this intent. Management goals also define the population management units that may be evolutionarily significant units, stocks, or collections of stocks.

⁶ Escapement objectives specify the number of fish, either as a single number or a range, required to spawn to fulfill the biological requirements of the population management unit and achieve the management goal over the long term. Escapement objectives should incorporate the concepts of minimum viable population and effective population size, and accommodate the uncertainty and variability in biological productivity and environmental conditions.

1 **5.1C Consultation**

2
3 **Fishery Managers**

4
5 1. Consult with the Council during April of each year on the consistency of
6 harvest management with the rebuilding schedules and escapement objectives of
7 the fish and wildlife program. The consultation will address:

8
9 a. the extent to which harvest rates, escapement objectives and management
10 goals were achieved during the previous year's harvest season;

11
12 b. the extent to which proposed regulations for the coming season are expected to
13 achieve harvest rates, escapement objectives and management goals; and

14
15 c. a status report on management goals, escapement objectives and rebuilding
16 schedules for weak stocks.

17
18 **5.2 Harvest Rates and Regimes**

19
20 While there is need to reduce harvest to facilitate rebuilding in the short term,
21 there is also an urgency to move forward with salmon marking programs and to
22 develop selective fishing gear and terminal harvest opportunities to increase
23 harvest over the long term while protecting weak stocks of salmon. Fishery
24 managers should look for ways of providing incentives to further reduce harvest
25 and accelerate the shift to selective fisheries. This section provides managers with
26 targets, but does not prescribe means to implement. The management agencies
27 should have maximum flexibility to be creative and work with various fishing
28 interests to come up with workable harvest strategies that will meet not only
29 escapement objectives, but also existing and future Indian treaty requirements
30 and non-treaty allocation, economic and social objectives.

31
32 **Fishery Managers**

33
34 1. Implement harvest regimes that protect critical brood stock as part of a
35 comprehensive effort to rebuild specific weak runs. Harvest reductions are of
36 particular importance to protect weak stocks currently in the ocean. Manage
37 harvest as outlined here to help meet escapement and management objectives and
38 strive to pass through population gains associated with other elements of this
39 program until rebuilding schedules are met.

40
41 2. Document how harvest rates were calculated and develop a standard for
42 expressing harvest rates that can be used for assessing impacts in future
43 fisheries. Select an appropriate base period for the calculation of historical harvest
44 rates as a standard to which future harvest rates can be compared. This

1 information should be made available as part of the unified report called for in
2 this section.

3 4 **5.2A Sockeye**

5
6 Manage the fisheries to allow only limited tribal ceremonial and subsistence
7 sockeye harvest below the confluence of the Snake and Columbia rivers to
8 facilitate ongoing emergency efforts to rebuild the Snake River population.
9 Commercial fisheries should not be allowed below the confluence until the Snake
10 River sockeye run is rebuilt to a level where the population could support some
11 incidental harvest without jeopardizing rebuilding efforts. The Council also
12 understands that the U.S. v. Oregon parties are committed to rebuilding, and
13 when appropriate, will use the U.S. v. Oregon Management Plan's emergency
14 modification provisions to assist rebuilding. Relevant parties should consult on
15 the potential to target commercial sockeye fisheries in the Columbia River above
16 the confluence of the Snake River, while respecting tribal treaty rights.

17 18 **5.2B Fall Chinook**

19
20 Snake River fall chinook have been harvested at rates too high to allow rebuilding.
21 In the base period 1984-1990, harvest rates were consistently in the range of 70
22 percent to 77 percent (averaging 74 percent). Fisheries affecting Snake River fall
23 chinook should be managed to provide harvest at a rate no greater than 55
24 percent in 1992-1995. These fisheries include those falling under the jurisdiction
25 of the Pacific Salmon Commission and Pacific Fishery Management Council, as
26 well as fisheries within the Columbia River Basin.

27
28 The Council strongly urges that fisheries affecting Snake River fall chinook be
29 further reduced below the specified 55-percent harvest rate using the measures
30 described below, and calls upon fishery managers to aggressively implement these
31 actions. The Council will closely monitor rebuilding of the runs and harvest
32 constraints to ensure that harvest constraints are contributing their appropriate
33 share to rebuilding.

34 35 **5.2C Spring Chinook**

36
37 The Council recognizes the efforts of the fishery managers and harvesters to
38 reduce the catch of upriver spring chinook that began in 1976. Relevant parties
39 should continue to manage the Columbia River harvest of spring chinook
40 according to U.S. v. Oregon. Keep impacts of the non-treaty inriver fisheries at
41 about 4 percent of the upriver run, the 1987-1991 average. Monitor ocean
42 fisheries to ensure that incidental harvest rates remain low, about 2 percent or
43 less of the upriver run.

1 **5.2D Summer Chinook**

2
3 The Council recognizes that there have been no commercial target fisheries for
4 summer chinook since 1964, and that the tribal ceremonial and subsistence and
5 non-treaty incidental catches of summer chinook have been fewer than 1,000 and
6 100 fish each year, respectively, since the mid-1980s. Continue to manage for this
7 level of impact until the populations rebuild sufficiently to allow a higher
8 incidental harvest rate. Subsequently, manage the Columbia River harvest of
9 summer chinook according to U.S. v. Oregon.

10
11 **5.2E Voluntary Harvest Reduction For All Fisheries**

12
13 **Fish Bank Program**

14
15 **Bonneville, Fishery Managers and Commercial Fishers**

16
17 1. Design and implement a "fish bank" program (similar to a farm bank where
18 farmers are paid not to farm) to temporarily reduce harvest by leasing available
19 fishing permits and/or licenses.

20
21 **Fishery Managers**

22
23 2. Reduce harvest level proportionately from that achieved under Sections 5.2A-
24 5.2D, above. To determine the level of reduction, use historical catch over a
25 specific time or other criteria as the managers deem effective, feasible and fair (for
26 example, use the average documented landings for the previous five-year period).

27
28 **Bonneville**

29
30 3. Develop a compensation plan including criteria for qualifying for and
31 continuing in the program. Continue the program through 1995. Review its
32 effectiveness annually with the Council.

33
34 4. Fund the planning and implementation of the program, upon Council approval.

35
36 **5.3 Harvest Alternatives**

37
38 One of the major challenges harvest managers face is that there are mostly mixed-
39 stock fisheries in the mainstem Columbia River, as well as in the ocean. This
40 means fishers harvest a mixture of hatchery-produced and naturally produced
41 stocks from many different areas of origin. Because juvenile salmon survival is
42 usually greater among hatchery-produced fish, these stocks generally can
43 withstand a higher harvest rate than most naturally produced fish. However,
44 fishers in mixed-stock fisheries are generally unable to harvest specific stocks
45 selectively. Thus, naturally produced stocks and weaker (fewer individuals in the

1 population) hatchery stocks are often harvested at rates appropriate for stronger
2 stocks. The result is over-fishing of weaker stocks.

3
4 In order to allow harvest of stronger stocks, some incidental take of weaker stocks
5 is inevitable in most fisheries. Fishery managers use the best available data to
6 estimate incidental harvest under different fishing regimes. Fishing seasons and
7 quotas are then set on the basis of acceptable impacts on weaker stocks.

8
9 To speed the rate at which weak stocks rebuild and to provide opportunities to
10 harvest stronger stocks over the long term in the Columbia River, it is essential
11 that development and evaluation of live-catch fishing technologies and known-
12 stock fisheries be started immediately. Opportunities for selective harvest in ocean
13 fisheries are more limited and will depend on better knowledge of the distribution
14 of various stocks in the ocean (see Section 5.4).

15 16 **5.3A Harvest Planning**

17 18 **Bonneville**

19
20 1. Fund the fishery managers and fishers to develop and implement plans to
21 evaluate the feasibility of live-catch fishing technologies and known-stock fisheries
22 by 1995. Include a detailed analysis of alternative incentives to encourage known-
23 stock fisheries, including direct subsidies for known-stock fisheries in lieu of--not
24 in addition to--mixed-stock harvest in the mainstem Columbia River. Consult with
25 the Council prior to implementation and annually on progress.

26
27 2. To the extent practical, the Council supports enhancement activities geared
28 towards stocks that contribute to adequately controlled fisheries. This policy is
29 intended to protect ratepayers from investing in major capital construction
30 facilities that contribute to uncontrolled fisheries.

31 32 **5.3B Development of Alternative Capture Technologies**

33
34 This measure develops and evaluates capture technologies to increase harvest of
35 abundant fish stocks and minimize effects on depleted salmon stocks. The gear
36 should minimize mortality of fish that are to be released.

37 38 **Bonneville**

39
40 1. Fund pilot projects to demonstrate the feasibility of various methods to
41 selectively harvest abundant stocks while conserving weak stocks. This effort
42 should provide for participation by harvesters in the development of new methods
43 and address such questions as public acceptance of the proposed technology,
44 number and location of possible fishing sites, legislative changes needed to apply
45 the proposed technology and harvester selection for participation in the fishery.

1
2 **5.3C Terminal Harvest Fisheries in the Columbia River and Tributaries**

3
4 This measure calls for identification and development of terminal fishing
5 opportunities to harvest abundant stocks while minimizing the incidental harvest
6 of weak stocks.

7
8 **Bonneville**

9
10 1. Fund a study to evaluate potential terminal fishery sites and opportunities.
11 This study should include: general requirements for developing those sites (e.g.,
12 construction of acclimation/release facilities for hatchery smolts so that adult
13 salmon would return to the area for harvest); the potential number of harvesters
14 that might be accommodated; type of gear to be used; and other relevant
15 information needed to determine the feasibility and magnitude of the program.
16

17 **5.4 Stock Identification**

18
19 **5.4A Expand Genetic Stock Identification Sampling**

20
21 **Fishery Managers**

22
23 1. Develop and implement an expanded genetic stock identification program for
24 monitoring inriver and ocean fisheries. Review the proposed program with the
25 Council by January 31, 1993, prior to implementation.
26

27 **Bonneville and Fishery Managers**

28
29 2. Share the cost of expanding the program to achieve the desired level of
30 information needed.
31

32 **5.4B Improve Genetic Stock Identification Data Base**

33
34 **Fishery Managers**

35
36 1. Determine the need for further development of a genetic stock identification
37 data base for Columbia River stocks. Evaluate the potential for using DNA
38 "fingerprinting" and other methods to identify chinook, coho, chum, sockeye and
39 steelhead stocks in the Columbia River Basin. Review findings and
40 recommendations with the Council by January 31, 1993.
41

42 **Bonneville**

43
44 2. Fund the genetic stock identification program upon Council approval.
45

1 **5.4C Increase Sample Rate of Harvest**

2
3 **Fishery Managers**

4
5 1. Develop expanded marking and catch sampling programs as required for ocean
6 and inriver fisheries where Columbia River weak stocks are caught. Review with
7 the Council as quickly as possible the magnitude and cost-effectiveness of any
8 expansion in the existing marking and catch sampling programs prior to
9 implementation.

10
11 **Bonneville and Fishery Managers**

12
13 2. Share the cost of expanding marking and sampling programs to achieve the
14 desired level and precision of additional coverage.

15
16 **5.5 Other Harvest Measures**

17
18 **5.5A Review Sport Fishing Regulations**

19
20 **State Fishery Agencies**

21
22 1. Re-examine sport fishing regulations, including trout fishing regulations, in
23 weak stock areas and adopt catch-and-release regulations, closures or other
24 measures as needed to protect depressed populations. Complete the review of
25 needed changes in sport fishing regulations with the Council before the 1993
26 sport angling season.

27
28 **5.5B Accounting for Incidental Harvest of Salmon**

29
30 **Pacific Fishery Management Council and North Pacific Fishery Management**
31 **Council**

32
33 1. Report to the Northwest Power Planning Council on the incidental harvest of
34 Columbia River salmon in other fisheries under their respective jurisdictions.
35 Review with the Power Council the magnitude of the interceptions and potential
36 for limiting or reducing such interceptions, including the use of guidelines for
37 incidental harvest in those fisheries. Incidental catches should be estimated, and
38 the number of salmon caught applied toward the appropriate salmon harvest
39 quota.

40
41 **5.5C Law Enforcement and Public Education on Impacts of Illegal or**
42 **Wasteful Fisheries**

43
44 **High Seas Drift-Net Fisheries**
45

1 **Tribal, State and Federal Government Agencies, Including the Departments**
2 **of State and Commerce, as well as Other Public and Private Parties**

3
4 1. Use all available authorities to put a rapid end to all high seas drift-net
5 fisheries. The Council commends Congress for its prompt ratification of the United
6 Nations resolution calling for an immediate, general abandonment of drift netting.

7
8 **Illegal Domestic Ocean and River Harvest**

9
10 **Bonneville and Appropriate Tribal, State and Federal Enforcement Agencies**

11
12 2. Develop and implement an expanded enforcement program to provide
13 additional protection to Columbia River salmon and steelhead with an emphasis
14 on weak stocks throughout their life cycle. The program should include an
15 educational component for the public. Fund the needed program, and review
16 accomplishments and scope of the program annually with the Council.

17
18 **5.5D Voluntary Commercial Fishing Permit Buy-Back Program**

19
20 **Washington, Oregon, Bonneville and Regional Utilities**

21
22 1. Develop and fund a voluntary commercial fishing permit buy-back program for
23 non-treaty Columbia River commercial fisheries. The program should be limited to
24 two to four years. The goals of the program are generally to: a) reduce fishing
25 capacity on the river; b) respond to dislocations resulting from more restrictive
26 harvest regulation; c) encourage shifting to selective and/or terminal harvest
27 practices employing improved marking and selective harvest technologies as they
28 are identified and become available; and d) promote sound management,
29 conservation and protection of the resource. Oregon and Washington should retire
30 any permits bought out under this program, and no substitute permits should be
31 issued in their stead.

32
33 **5.5E Inclusion of Idaho and Indian Tribes in Columbia River Compact**

34
35 **States and Congress**

36
37 1. Enact legislation to include Idaho and appropriate Columbia River Basin tribes,
38 if they deem their membership appropriate, in the Columbia River Compact.

39
40 **5.5F Unified Reporting of Harvest Data**

41
42 Reporting of commercial and sport salmon harvest, as well as dam passage
43 information and spawning surveys, is scattered among a variety of jurisdictions.
44 This information is needed by the Council, all of the involved agencies and tribes,

1 and the public, all of whom must expand substantial effort to gather the
2 information each year.

3

4 **National Marine Fisheries Service**

5

6 1. Prepare and circulate a unified report by June 1 of each year on harvest and
7 escapement of various salmon and steelhead stocks in the Columbia Basin.

8

9 **Idaho**

10

11 2. Report to the Council by March of each year the number and species of
12 anadromous fish harvested whether hatchery, wild and naturally spawning.

13

14

15

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SECTION 6

COORDINATED SALMON PRODUCTION AND HABITAT

INTRODUCTION

An ecosystem approach to species recovery requires close coordination of habitat and production measures. Coordination should ensure that habitat and production measures are driven by the needs of specific populations, and the condition of the watersheds in which those populations live. Effective coordination should provide an opportunity to build on local energies and initiatives, helping to ensure that ratepayers get maximum return from their investments, and make the best use of the subbasin and system plans prepared by the fish and wildlife agencies and Indian tribes. The process outlined in this section is intended to use the analysis and judgment contained in these plans and other resource plans, adapt them to the needs of weak stocks and watershed conditions, and learn from new information.

The starting place for coordination will be a "subregional" process designed to bring relevant interests together to address the needs of weak fish populations in particular watersheds. A total watershed perspective, in which fish needs, land and water conditions, and local, private and government initiatives are viewed together, will play an essential role in the ultimate success of efforts to rebuild salmon and steelhead. To give watershed planning a head start, the Council calls for a "model watersheds" program (Section 6.5B), in which watershed-oriented techniques can be pioneered and evaluated, and promising developments may be incorporated in the subregional process.

Part of the task of coordination is to build on the opportunities and constraints of existing implementation processes, and avoid creating new processes that may diffuse the region's efforts. The implementation planning process (developed by the fish and wildlife agencies, Indian tribes and the Bonneville Power Administration to help prioritize efforts to implement the fish and wildlife program) should play a valuable role in bringing land and water managers and other interested parties into a coordinated implementation process. Because many measures will be implemented by federal agencies, the National Environmental Policy Act may apply. Where it applies, the National Environmental Policy Act can generate important analysis that should inform the region's decisions. With the listing of salmon stocks under the Endangered Species Act, the provisions of that law will play an important role. In the process outlined below, we recognize the need to evaluate habitat and production measures in light of these laws and processes, and make the best use of these evaluations in Council decisions. The Council also supports efforts

1 to streamline these processes, both to improve the quality of the public debate
2 and to minimize delay in decision-making.

3
4 In this section, the Council calls for efforts to support these processes. Under
5 Habitat (Sections 6.4-6.6), we call for changes in land and water management,
6 water diversion screening, habitat priorities and an expedited funding process.
7 Under Production (Section 6.2), we call for immediate efforts to gather data on
8 wild and naturally spawning stocks, review impacts of the existing hatchery
9 system and coordinate supplementation activities. In the Council's view, this
10 work will greatly assist the region's decision-making processes. In the absence
11 of this work, the Council believes that implementation of habitat and
12 production measures will continue to suffer from inadequate information,
13 disjointed policy, uncertainty and delay. The region should begin this work
14 promptly, to overcome these obstacles and allow recovery efforts to proceed
15 expeditiously.

16 17 **6.1 Coordinated habitat and production processes**

18 19 **6.1A Evaluating and Implementing Habitat and Production Measures**

20
21 Habitat and production measures should be coordinated, evaluated and
22 implemented in a five-step process:

- 23
24 • The subregional process (Section 6.1B) should identify measures to help
25 specific populations. These measures should be included in an annual work
26 plan submitted to the Council and the implementation planning process.
27 Section 6.2C prescribes a special screening process for supplementation
28 projects suggested in the course of the 1991-1992 amendment process. For
29 those projects, the process in Section 6.2C should be followed instead of the
30 subregional process.
- 31
32 • The implementation planning process (Section 7.1B) should prioritize
33 measures that emerge from the subregional process (or the process
34 described in Section 6.2C) using the six principles discussed on page 18.
35 This process should include independent peer review on the degree to which
36 proposed measures pose risk to biological diversity. For measures that pose
37 appreciable risk to biological diversity, but address critical uncertainties,
38 the peer review should also provide an opinion on whether potential
39 learning benefits justify the risk. These measures should be submitted to
40 the Council in the annual implementation work plan for Council review and
41 approval. A fast-track process should be developed for appropriate, locally
42 based habitat initiatives.
- 43
44 • Where applicable, the National Environmental Policy Act and the
45 Endangered Species Act processes should be initiated. The purpose and

1 need" section of any environmental document should reflect the six
2 principles discussed on page 18. If the National Environmental Policy Act or
3 the Endangered Species Act are not applicable, or these processes do not
4 provide information required in master plans (Section 6.2D), a master plan
5 should be developed. Information available from cumulative impact studies
6 (Section 6.2E), carrying capacity studies (Section 6.1C), and wild and
7 natural production data (Section 6.2A) should be incorporated in these
8 evaluations.

- 9
- 10 • The resulting analyses should be reported to implementing agencies,
11 interested parties and the Council. The Council will determine whether the
12 projects are consistent with this program and the Northwest Power Act.
- 13
- 14 • Following approval, implementation, monitoring and evaluation should
15 occur.
- 16

17 **6.1B Subregional Process**

18

19 On June 1, 1991, the fisheries agencies and Indian tribes of the Columbia
20 Basin Fish and Wildlife Authority submitted the Integrated System Plan for
21 Salmon and Steelhead Production in the Columbia River Basin to the Council.
22 The building blocks for the Integrated System Plan are the 31 subbasin plans
23 prepared for each of the major subbasins or watersheds of the Columbia River
24 Basin that produce salmon and steelhead. These plans, along with other
25 resource management plans, will be the starting point for identifying actions to
26 help specific salmon populations. Plans developed under the program, and
27 otherwise, will be used to address other fish and wildlife species.

28

29 **Fishery Managers and Bonneville**

30

31 1. Form subregional teams to assist in implementation of fish and wildlife
32 measures in the following subregions of the Columbia River Basin:

- 33
- 34 • below Bonneville Dam;
- 35
- 36 • Bonneville Dam to Priest Rapids Dam;
- 37
- 38 • Priest Rapids Dam to Chief Joseph Dam;
- 39
- 40 • above Chief Joseph Dam;
- 41
- 42 • Snake River from mouth to Hells Canyon Dam; and
- 43
- 44 • above Hells Canyon Dam.
- 45

1 Participation on the teams should include appropriate fish and wildlife
2 agencies, tribes, utilities, Bonneville, land and water managers, private
3 landowners, citizen groups, Council and others. For each subregion, the teams
4 will use the Integrated System Plan, subbasin plans, other fish and wildlife
5 *plans and any other available relevant plans and information to prepare*
6 *recommendations for the annual implementation work plan and the annual*
7 program monitoring report (see Section 7.1B). Each team will be responsible for
8 identifying any conflicts with other resource management plans in the relevant
9 subregion, along with options for resolving these conflicts. Recommendations
10 should:

11
12 a. Explain whether the measure would address factors that limit weak stocks.
13 (See Appendix C, page 97, for a definition of weak stocks.) Rebuilding weak
14 populations, especially populations listed under the Endangered Species Act,
15 should be given priority.

16
17 b. Provide reasons for concluding that the project would pose no appreciable
18 risk to biological diversity among or within anadromous and resident fish
19 populations, using the best available tools (such as the Regional Assessment of
20 Supplementation Projects, Chapter III.C of the Integrated System Plan, Habitat
21 Project Selection Criteria) and data (such as the wild and natural production
22 data in Section 6.2A, hatchery analyses in Section 6.2B and cumulative
23 impacts studies in Section 6.2E) to support reasoning.

24
25 c. For proposed artificial production measures, explain whether the measure
26 would make use of existing production facilities and if not, why not.

27
28 d. Approach the needs of target populations from an ecosystem perspective.
29 Give special priority to projects that are part of model watersheds, or other
30 coordinated watershed programs.

31
32 e. Expedite consideration of appropriate, locally based habitat projects.

33
34 f. If a measure is designed to create harvest opportunities, explain whether
35 those opportunities will be in tributaries or other areas where there would be
36 no significant, additional harvest pressure on weak populations.

37
38 g. Explain any steps needed to ensure that activities to benefit one species will
39 not inappropriately harm another.

40
41 h. Explain whether the measure would help address a critical uncertainty
42 (Section 7.1B).

43
44 i. Provide estimates of cost and biological effectiveness of proposed measures
45 for the target fish population. Relate biological effectiveness to success in

1 meeting survival targets, rebuilding schedules, performance standards or other
2 relevant, biologically based factors. Specify the time period over which
3 improvement may be expected.

4
5 j. Explain how the measure would be monitored and evaluated.

6 7 **6.1C Evaluation of Carrying Capacity**

8
9 Implementing an ecosystem approach requires knowledge of the Columbia
10 River ecosystem. The Council therefore calls on Bonneville and federal agencies
11 to evaluate salmon survival in the Columbia River, its estuary and in the
12 ocean. This analysis should increase understanding of the ecology, carrying
13 capacity and limiting factors that influence salmon survival under current
14 conditions.

15 16 **Bonneville**

17
18 1. Fund a preliminary evaluation of tributary, mainstem (including reservoirs),
19 estuary, plume, near-shore ocean and marine salmon survival, ecology,
20 carrying capacity and limiting factors. Include competition between shad and
21 anadromous salmonids. As part of the evaluation, estimate the current salmon
22 carrying capacity of the Columbia River mainstem, tributaries, estuary, plume
23 and near-shore ocean for juvenile fish, using primarily existing data. The
24 evaluation should also make recommendations for management responses to
25 fluctuating estuary and ocean conditions, such as adjusting total numbers of
26 releases to take such conditions into account. The evaluation should include
27 analysis of existing data, identification of critical uncertainties and research
28 needs, and estimates of incremental gains from improvements in each area.

29
30 2. Fund development of a study plan based on the critical uncertainties and
31 research needs identified in the evaluation, which should be presented to the
32 Council by December 1993. The study plan should include provisions for
33 federal funding or cost sharing of the study. Upon approval by the Council,
34 Bonneville and/or other parties identified by the Council should fund the
35 proposed study.

36 37 **6.2 PRODUCTION**

38
39 Because opportunities to achieve significant salmon production increases
40 through improving natural habitats are limited, additional salmon increases
41 may have to be achieved through artificial production creating artificial
42 spawning and rearing environments such as hatcheries. The dilemma is that
43 artificial production can have negative effects on wild and naturally spawning
44 salmon populations. For example, young hatchery-produced fish may compete
45 with wild and naturally produced juveniles for food and habitat. Or, returning

1 hatchery-bred adults may interbreed with naturally spawning fish, altering
2 gene pools. In the past, artificial production programs have had detrimental
3 effects on wild gene pools and biodiversity.

4
5 In developing these production measures, the Council has identified measures
6 that are consistent with the goal of doubling the number of salmon and
7 steelhead in the basin while maintaining existing levels of biodiversity. This
8 means understanding and documenting the life cycle of wild and naturally
9 spawning fish populations at the stream level so that broader management
10 decisions, while not necessarily made at the stream level, are better informed.
11 It means improving the operations of artificial production facilities, so that
12 impacts of hatchery fish on wild and naturally spawning populations are
13 minimized and the quality of hatchery fish is improved. It means making
14 investments and other adjustments to provide harvest opportunities in
15 tributaries or other areas and to facilitate rebuilding of weak populations. It
16 includes scientifically supported programs to supplement weak wild and
17 naturally spawning fish populations with hatchery fish. It also means
18 proceeding with extreme caution to avoid damaging remaining wild and
19 naturally spawning populations, and fully implementing adaptive management
20 with a systematic monitoring and evaluation strategy.

21
22 Populations whose numbers have been greatly depleted as a result of human
23 activities pose a special dilemma. All parties agree that restoring the freshwater
24 habitats and migration corridors of Columbia River Basin salmon is key to
25 recovering depleted populations. There is concern, however, that
26 implementation of passage improvement, and habitat protection and
27 restoration measures that have been proposed to date will not be sufficient to
28 recover depleted populations in a timely manner. As a result of this concern,
29 artificial propagation has been identified as an important tool to further aid
30 depleted populations. However, there has been much debate in the region
31 concerning the proper role of artificial propagation.

32
33 Some oppose or are skeptical of using artificial propagation to assist depleted
34 populations. This is because of the risk that artificial propagation could change
35 the identity of depleted isolated populations or reduce their ability to recover by
36 altering their ability to survive over the long term in their natural environment.

37
38 Others recommend the proper use of some form of artificial propagation (such
39 as supplementation) to aid in recovery of depleted populations. Proponents of
40 this view say that numerous small populations are being lost due to continuing
41 damage and lack of corrective action, with the result that basinwide population
42 diversity is declining. They fear that these populations have already lost the
43 ability to recover on their own because severe reductions in population size
44 have already reduced the genetic diversity important for recovery. In addition,
45 these populations may not be well adapted to survival in the face of dramatic

1 human-caused changes in the basin's environment. Thus, proponents of
2 artificial propagation recommend rapidly increasing the sizes of these small
3 populations to prevent their extinction and loss in genetic diversity by properly
4 using some form of artificial propagation.

5
6 The process of devising the best strategies for restoration of the depleted
7 populations of threatened and endangered species will require rigorous
8 integration of genetics, evolutionary biology, demography and ecology in
9 addition to the best cooperative efforts of resource managers. Scientific
10 resolution is unlikely to provide one generic answer, but rather two or more
11 different answers appropriate for different existing conditions of populations in
12 the basin.

13
14 Because the Council recognizes that there are legitimate biological concerns
15 associated with measures to protect and restore depleted anadromous fish
16 populations, it calls for undertaking multiple actions on a site-specific basis.
17 That is, a given population may be at risk of inbreeding depression and loss of
18 adaptability for various reasons. The susceptibility to one risk or another varies
19 among populations in part due to different interactions among the specific
20 populations and environmental factors.

21
22 For salmon, the Council envisions a strategy that considers all available
23 options to develop an effective approach to salmon restoration, and monitors
24 and evaluates the results of these actions in an adaptive management
25 approach. The appropriate combination of actions for a specific population
26 should be determined by the site-specific circumstances of that population.
27 The following options should be considered:

- 28
29 • Take actions to protect and rebuild the freshwater habitat of weak wild and
30 naturally spawning populations. This would include combinations of a
31 variety of techniques: restoring healthy stream/river habitats used for
32 spawning, rearing and overwintering; improving mainstem passage and
33 migration corridor condition; reducing losses of downstream migrants owing
34 to irrigation diversions; restoring water quality; and restoring overall
35 watershed and riparian system condition. Fish harvest rates also should be
36 reduced to support rebuilding.
- 37
38 • Take actions to rebuild population numbers for weak wild and naturally
39 spawning populations as quickly as possible. This would include
40 combinations of a variety of techniques such as: the proper use of artificial
41 propagation to prevent extinction and further loss of genetic diversity;
42 prevention or minimization of detrimental genetic and ecological impacts to
43 wild and naturally spawning populations from all human actions affecting
44 the river and its watershed, including hatchery programs; management of
45 fish harvests to support rebuilding.

- 1
2 • Fully implement adaptive management for the purposes of carrying out
3 restorative actions. Adaptive management is an approach to complex
4 natural resource problems where prompt corrective action is needed despite
5 incomplete knowledge of the resource. Adaptive management relies on a
6 systematic monitoring and evaluation strategy. In addition, it is
7 recommended that a procedure be developed for conducting a population
8 vulnerability analysis to determine the status of various populations and
9 facilitating the selection of various options for restoring the population.

10
11 **6.2A Wild and Naturally Spawning Populations**

12
13 **Council Genetics Team**

14
15 1. Complete a proposed plan for conserving genetic diversity within and among
16 Columbia River Basin salmon and steelhead stocks. Report to the Council by
17 December 31, 1991. The framework should provide recommendations for how
18 to achieve sustainable increases in salmon and steelhead populations.
19 Specifically, recommend an approach to identifying provisional genetic
20 conservation units for production and harvest, and rules for taking action with
21 regard to those conservation units. The team also should assist in the
22 development of performance standards for conserving genetic diversity of
23 natural, supplemented and hatchery stocks.

24
25 2. Participate in the coordinated habitat and production process described in
26 Section 6.1. Develop technical proposals for improved conservation of
27 biodiversity, including identification of genetic conservation refuges, alternative
28 approaches to artificial production, and any other appropriate proposals.

29
30 **Collection of Population Status, Life History and Other Data on Wild and**
31 **Naturally Spawning Populations**

32
33 To meet the program goal, base-line information that will improve management
34 and conservation of wild and naturally spawning populations is needed. High
35 priority populations should be identified immediately so that these can be
36 monitored as soon as possible. An extensive initial data collection effort is
37 needed so that interim population units in the basin can be identified. And
38 long-term monitoring strategies need to be developed. The following actions
39 should be coordinated with development of rebuilding schedules called for in
40 Section 2.3. Utilize the Habitat Selection Criteria developed by the coordinated
41 habitat and production process as part of the criteria for collection of biological
42 data.

43
44 **Bonneville**
45

1 3. Fund the design of an extensive one- or two-year study to identify wild and
2 naturally spawning salmon and steelhead populations in the Columbia River
3 Basin based on genetic, morphological, life history and any other relevant
4 information, and recommend possible indicator populations for monitoring.
5 Consult with appropriate specialists in genetics in designing the project. Bring
6 alternative study designs to the Council by December 31, 1992. Upon Council
7 approval, fund the study.

8
9 **Fishery Managers in Consultation with National Marine Fisheries Service**
10 **and Other Technical Experts**

11
12 4. Develop and submit to the Council a proposed program to collect
13 information on wild and naturally spawning populations, including index
14 populations, by June 30, 1993. This should be consistent and coordinated with
15 population monitoring specified as part of the rebuilding schedules in Section
16 2.3. The long-term objective of the program is to collect information related to
17 the sustainability of wild and naturally spawning salmon and steelhead
18 populations, including risk containment monitoring of impacts of management
19 action or inaction. The program should include proposals to accomplish the
20 following elements:

- 21
22 a. Refine the identification of wild and naturally spawning populations
23 provided for above, and develop necessary data bases.
24
25 b. Develop a profile on the status of wild and naturally spawning populations.
26
27 c. Develop a profile on genetic, life history and morphological characteristics of
28 wild and naturally spawning populations. Describe the characteristics to be
29 maintained by management actions.
30
31 d. Identify limiting factors for wild and naturally spawning populations.
32
33 e. Identify natural carrying capacity of habitat for the populations.

34
35 **Bonneville**

36
37 5. Coordinate with the activities described above and fund a project to scope
38 program costs, duration, feasibility and relative benefits for levels of monitoring
39 ranging from complete monitoring of all wild and naturally spawning salmon
40 and steelhead populations, to monitoring of index populations only. Report to
41 the Council with alternative program approaches by September 30, 1993.

42
43 **Wild and Naturally Spawning Population Policy**
44

1 To conserve, manage and rebuild the basin's remaining wild and naturally
2 spawning populations, a policy giving such populations explicit priority is
3 needed.

4
5 **Fishery Managers**
6

7 6. By March 31, 1993, develop and review with the Council a proposed wild
8 and naturally spawning population conservation policy consistent with the
9 Council's overall program goal and intended to protect genetic diversity,
10 population identity, long-term fitness and evolutionary capacity. The policy
11 should address habitat protection, restoration, management and improvement;
12 water use; harvest management; releases of non-native fish; interactions
13 between resident and anadromous fish; use of wild and naturally spawning
14 populations as brood stock for artificial production; risk assessment and
15 containment; and monitoring and evaluation.
16

17 **Fishery Managers**
18

19 7. By June 30, 1993, in consultation with appropriate specialists in genetics
20 and land and water managers, establish a comprehensive wild and naturally
21 spawning salmon population conservation program. Provide for Council and
22 public review. The program should consider for inclusion, but not be limited to,
23 the following:
24

25 a. Management and funding to address factors that limit populations.
26

27 b. Habitat management and restoration to maintain and increase the
28 productivity of wild and naturally spawning populations through the
29 maintenance of their biological characteristics.
30

31 c. Management to maintain the genetic, life history and morphological
32 characteristics of wild and naturally spawning populations, including
33 sustainable long-term spawning escapements and redd counts.
34

35 d. Maintenance of reproductive isolating mechanisms for wild and naturally
36 spawning populations.
37

38 e. Determination of current and sustainable effective population sizes for wild
39 and naturally spawning populations, and determination of natural carrying
40 capacity of the habitat which supports these populations.
41

42 f. Annual evaluation and reporting of the results of fisheries, land and water
43 management actions.
44

45 **Biodiversity Institute**

1
2 Scientists and natural resource managers have become increasingly concerned
3 about the need to manage in a way that recognizes the importance of a diverse
4 and productive ecosystem. Biodiversity is the variety of and variability in living
5 organisms, with respect to genetics, life history, behavior and other
6 fundamental characteristics. Biodiversity is important at the levels of
7 landscapes, ecosystems, species and populations. There is increasing
8 recognition that conserving biodiversity is key to the sustainability of natural
9 resources, including fish and wildlife. Conserving biodiversity means fostering
10 human development activities that protect the integrity of ecosystems, thereby
11 sustaining natural resources.

12 13 **All Interested Regional Entities**

14
15 8. Cooperatively fund a feasibility study for a Pacific Northwest biodiversity
16 institute. The institute would address native and resident salmonids, their
17 habitat and ecosystems at stream, watershed and landscape levels. The
18 purpose of the institute would be to assist in developing research and
19 monitoring programs, provide scientific peer review, provide scientific expertise
20 for regional planning and conduct research. Upon Council approval, fund
21 project design, including cost sharing.

22 23 **Population Vulnerability Analyses**

24 25 **Bonneville**

26
27 9. Fund the development and application of a procedure to conduct population
28 vulnerability analyses for depleted salmon and steelhead populations. The
29 procedure should be used to determine the status of populations and facilitate
30 the selection of options for recovering them. Coordinate with appropriate
31 specialists in genetics and the regional analytical methods coordination process
32 (see Section 7). Report to the Council by June 30, 1993.

33 34 **6.2B Improved Operations of Hatcheries**

35 36 **Hatchery Policies, Coordination and Operations**

37
38 Nearly 100 artificial production facilities produce 170 million to 200 million
39 smolts annually in the Columbia River Basin. Approximately 75 percent of
40 Columbia River Basin salmon and steelhead adults are produced in hatcheries.
41 The purpose of these facilities is to mitigate for losses of salmon and steelhead
42 production resulting from dams and other developments. The facilities are
43 operated by different entities, each with its own guidelines for selection,
44 maintenance and spawning of brood stock, mating, rearing and release of
45 juveniles. Concerns have been raised that hatcheries contribute to the decline

1 of wild and naturally spawning stocks through overfishing of these stocks in
2 mixed-stock fisheries, ecological interactions between hatchery, wild and
3 naturally spawning fish, and genetic impacts of hatchery fish on wild and
4 naturally spawning stocks. Such concerns were identified in petitions to list
5 certain salmon stocks under the Endangered Species Act. The Council
6 concluded that regional standards and procedures for hatchery operations
7 should be developed that are consistent with the goal of rebuilding weak wild
8 and naturally spawning stocks. To help develop tools to reduce the impacts of
9 hatchery production on wild and naturally spawning stocks, the Council
10 convened a group of nationally recognized geneticists. These geneticists have
11 been asked to bring the best current scientific knowledge to salmon and
12 steelhead production issues. A number of products have resulted from this
13 effort and are being reviewed at the technical and policy levels in the region.
14

15 **Bonneville**

16
17 1. Fund fishery managers and other experts as needed to develop by October
18 31, 1992, in consultation with appropriate specialists in genetics, basinwide
19 guidelines to minimize genetic and ecological impacts of hatchery fish on wild
20 and naturally spawning stocks. In the development of the guidelines, apply the
21 best available scientific knowledge, and include: a) provisions for changing
22 current management practices, operational goals and procedures for artificial
23 production facilities to stress protection and recovery of weak stocks; b)
24 approaches to basinwide coordination of hatchery production to reduce
25 impacts of hatchery stocks on wild and naturally spawning fish; and c)
26 monitoring and evaluation of hatchery and wild and naturally spawning stock
27 interactions. Submit a report to the Council for public review in early 1993.
28

29 2. Fund the design of an impact assessment to examine the effects of
30 Columbia River Basin hatcheries (individually and collectively) on wild and
31 naturally spawning fish. The impact assessment would use the best available
32 scientific knowledge and state-of-the-art assessment procedures. Complete the
33 design, and report to the Council by June 30, 1993.
34

35 **Council**

36
37 3. Continue to convene and fund a team of scientific experts that will be
38 available to Bonneville, the Council and the fishery managers to help scope the
39 hatchery impact assessment and help develop basinwide hatchery operating
40 guidelines. The team also will be available to consult with Bonneville, the
41 Council and the fishery managers in the implementation of new artificial
42 production activities, and review ongoing artificial production, in light of the
43 basinwide hatchery operating guidelines. The products and activities of the
44 team will be made available for public review.
45

1 **Integrated Hatchery Operations Team and Fishery Managers**

2
3 4. By January 15, 1992, create an Integrated Hatchery Operations Team. The
4 team should consist of representatives from Washington Department of
5 Fisheries, Washington Department of Wildlife, Oregon Department of Fish and
6 Wildlife, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service,
7 the tribes, Pacific Northwest Utilities Conference Committee, Bonneville, the
8 Corps, Mid-Columbia Public Utility Districts, the Council and National Marine
9 Fisheries Service. It should coordinate with production planning activities
10 described in Section 6.2F, below. Duties of the group are described below.

11
12 **Bonneville**

13
14 5. Fund the activities of the Integrated Hatchery Operations Team so that it is
15 operational by January 15, 1992.

16
17 6. Fund the development of regionally integrated hatchery policies, building
18 upon guidelines being developed under Section 6.2B1.

19
20 **Fishery Managers**

21
22 7. Develop regionally integrated policies for management and operation of all
23 existing and proposed hatcheries in the Columbia Basin. These should be
24 consistent with the goal of increasing sustained production while maintaining
25 genetic resources in the Columbia River Basin. Prepare a work plan to develop
26 these policies including schedules, time frames, work products, and budget
27 and funding requirements by January 15, 1992.

28
29 The policies should include the following elements:

30
31 a. Fish health policy: Hatchery practices and operations should preclude the
32 introduction and/or spread of any fish disease within the Columbia Basin, and
33 maximize the health of fish released from hatcheries.

34
35 b. Genetic policy: Hatchery facilities and programs should avoid adverse
36 genetic effects on wild, natural and hatchery fish populations and enhance the
37 sustained quality of production from hatcheries.

38
39 c. Ecological interactions policy: Hatchery facilities and programs should avoid
40 adverse interactions between wild, natural and hatchery fish populations,
41 including predation, displacement or competition for habitat. They should
42 maximize post-release survival of hatchery fish by increasing similarity of
43 hatchery fish to wild and naturally spawning fish, and by balancing the
44 numbers of fish released and release strategies with the capacity of the natural
45 environment.

1
2 d. Hatchery performance standards policy: The purpose, goals and objectives
3 of each hatchery should be evaluated in light of the general hatchery policies
4 stated above. Performance standards should be developed for each hatchery, in
5 addition to those provided in this program, including expectations for harvest,
6 maintenance of genetic integrity (including life history, effective population size,
7 morphology and other important traits), fish health and ecological interactions.
8 Criteria and plans for monitoring and evaluating achievement of the
9 performance standards should be developed.

10
11 e. Regional hatchery coordination policy: Columbia River Basin production
12 facilities should operate under a regional coordination program, including
13 hatchery programs and operations, harvest and research. The objectives of the
14 coordination program should be to facilitate implementation of the regional
15 hatchery policies, incorporate harvest and research considerations in hatchery
16 planning, increase information exchange, coordinate operations to minimize
17 impacts on wild and naturally spawning populations, and foster sharing of
18 facilities to increase their effectiveness.

19 20 **Integrated Hatchery Operations Team**

21
22 8. Develop detailed descriptions for each of the above policies by October 31,
23 1992. Develop specific and detailed performance standards relating to each of
24 the policies, implementation guidelines and operating criteria consistent with
25 National Marine Fisheries Service recovery plan criteria by March 1993. Work
26 in consultation with appropriate specialists in genetics and other experts.
27 Incorporate the basinwide guidelines to minimize adverse genetic and
28 ecological impacts of hatchery fish on wild and naturally spawning stocks
29 developed under Section 6.2B. The implementation guidelines, standards and
30 criteria should undergo scientific peer review.

31
32 9. Develop criteria for the hatchery audits, to be used by independent auditors.
33 Complete the criteria by January 31, 1993. Obtain independent scientific
34 review for the criteria and revise them as necessary in response to the review.
35 Report to the Council by March 31, 1993.

36 37 **Fishery Managers**

38
39 10. Submit to the Council a plan for implementing the policies by June
40 1993. As part of implementing the regional hatchery coordination policy,
41 identify measures for better coordinating basinwide hatchery management that
42 ensure coordinated planning and learning while encouraging creative, site-
43 specific approaches to improving operations. Upon Council approval of the
44 plan, fishery managers may request Council approval of Bonneville funding for
45 implementing specific parts of the policies.

1
2 **Integrated Hatchery Operations Team**

3
4 11. Prepare a program to monitor compliance with the hatchery performance
5 standards and provide for a coordinated hatchery monitoring program. The
6 monitoring program should incorporate the Augmented Fish Health Monitoring
7 Program, through which Bonneville provides funds to augment state and
8 federal efforts to ensure adequate, consistent levels of disease monitoring.
9 Cooperate with the Coordinated Information System to develop data reporting
10 standards and procedures for all facilities.

11
12 12. Report to the Council annually, beginning in January 1993. Describe
13 new hatchery policies and how operations at existing and planned hatcheries
14 are being changed to implement them and any new information leading to
15 revision of policies and operations. New information should include results of
16 the hatchery impact assessment (Section 6.2B2), the hatchery survival trends
17 analysis (Section 6.2B14) and the carrying capacity evaluation (Section 6.1C),
18 when available. Finally, describe the extent of achievement of performance
19 standards, and recommend future improvements and needed research. The
20 annual report will be made available for review by all relevant parties.

21
22 **Hatchery Evaluation**

23
24 **Bonneville**

25
26 13. Beginning in 1993, fund ongoing independent audits of hatchery
27 performance in consultation with the Integrated Hatchery Operations Team.
28 Such audits should be conducted at least every three years and more
29 frequently, if possible and warranted. Include recommendations for improving
30 performance and for modifying or terminating hatchery programs. Results of
31 the audits should be presented to the Council beginning in December 1993.

32
33 14. Fund a comprehensive analysis of existing data on basinwide trends in
34 hatchery fish survival. The analysis should identify trends over time and by
35 hatchery or geographic area, and correlate hatchery fish survival with natural
36 factors, hatchery operations and other fish or river management actions. The
37 results of the analysis should be reported to the Integrated Hatchery
38 Operations Team by January 1994.

39
40 **Creative Partnerships in Hatchery Production**

41
42 **Bonneville**

43
44 15a. By June 15, 1993, fund an analysis of opportunities for alternative
45 hatchery institutional arrangements and ways to implement them. By

1 December 31, 1993, develop and propose a policy to encourage artificial
2 production programs in which alternative institutional arrangements between
3 implementors and managers are used.

4
5 15b. The Council does not take a position on funding for the construction of
6 any other hatcheries or the operation and maintenance of existing hatcheries
7 currently funded by the state or federal government. This program will not
8 include such funding unless adequate controls are imposed on the ocean and
9 river harvest of salmon and steelhead.

10 11 **Marking Hatchery Salmon**

12
13 The inability to easily identify hatchery fish exacerbates several problems. For
14 example, concerns have been raised that stray hatchery fish may interbreed
15 with wild and naturally spawning stocks, or with other hatchery stocks, with
16 detrimental genetic impacts. To protect Snake River fall chinook, which have
17 been listed as threatened under the Endangered Species Act, it has been
18 proposed that all fall chinook released from hatcheries with histories of
19 significant straying be marked. In addition, it generally is not possible to
20 distinguish hatchery salmon from wild and naturally spawning salmon in
21 mixed-stock fisheries. Finally, because not all hatchery salmon are marked,
22 data on migration patterns, contribution to fisheries and other biological traits
23 that, if known, could be used to improve survival, are limited.

24
25 Marking all hatchery salmon has the potential to help solve these problems,
26 making it possible to identify stray hatchery fish and remove them from wild
27 and naturally spawning populations and from other hatchery brood stocks, to
28 harvest hatchery fish selectively, affording some protection to naturally
29 spawning stocks, and allowing better data to be gathered on characteristics of
30 hatchery stocks. However, some important concerns need to be addressed. For
31 example, marking fish is believed to decrease their survival, perhaps
32 considerably. In addition, conflicts with use of the fin clip to identify coded-wire
33 tagged fish need to be resolved.

34 35 **Fishery Managers**

36
37 16. Identify by December 31, 1991, and report to the Council concerning
38 hatcheries known to have relatively high rates of straying, whose strays are
39 believed to be a threat to the integrity of wild and naturally spawning or
40 hatchery stocks. Identify, if possible, an acceptable mark for fish from these
41 hatcheries that complements existing marking programs.

42 43 **Bonneville**

1 17. Starting in 1992, fund a program to mark all salmon from hatcheries
2 having high stray rates, using the mark determined by fishery management
3 agencies to be acceptable for this purpose, and to evaluate the effectiveness of
4 such marking.

5
6 18. Fund fishery managers to coordinate with appropriate technical experts
7 to determine the feasibility of marking all hatchery salmon, scope the marking
8 program and identify alternative uses for the information obtained. The
9 marking program should minimize mortalities caused by marking and meet the
10 following criteria: a) the mark should be applied without handling individual
11 fish or causing significant stress; b) the mark should endure throughout the
12 life cycle of the fish; c) the mark should be readable without killing the fish
13 bearing the mark; and d) the methods should be inexpensive enough to permit
14 the marking, sampling and processing of a representative sample of recovered
15 marks at a reasonable cost. Conduct this evaluation in conjunction with the
16 evaluation in Section 6.2B16, above. Specifically, the information should
17 provide answers to questions needed to resolve conflicts between hatchery
18 programs and goals for wild and naturally spawning fish stocks, and improve
19 hatchery fish survival. Report to the Council by February 1, 1992.

20
21 19. Share funding of externally marking Willamette River spring chinook to
22 allow identification of adults upon return to the Willamette Basin. Such
23 marking will allow differential harvest of underutilized hatchery fish and
24 identification of the current population size of wild and naturally spawning
25 spring chinook in the basin.

26 27 **Bonneville and Fishery Managers**

28
29 20. Mark all hatchery-reared chinook by 1995 to facilitate selective harvest
30 in the future, pursuant to findings from the marking feasibility study called for
31 above.

32 33 34 **Improved Propagation at Existing Facilities**

35 36 **Bonneville**

37 21. Fund research, development and demonstration of improved husbandry
38 practices at hatcheries that will lead to increased production and improved fish
39 survival to adulthood. Also fund tests of new techniques at Columbia River
40 Basin artificial propagation facilities.

41
42 **Background.** Numerous biological and environmental factors are known to
43 affect the quality of juvenile fish released from hatcheries. The term
44 "husbandry" refers to the proper control of these factors. In the hatchery, the
45 factors affecting juveniles include nutrition, rearing density, water temperature,

1 physiological state of smoltification, dissolved oxygen and nitrogen, and type of
2 rearing pond or raceway. For returning adults, size, location and time of
3 release are primary factors affecting their migrant patterns.

4
5 **Bonneville**

6 22. Fund research, development and testing of hatchery rearing operations
7 and release strategies aimed at improving the efficiency of hatcheries and
8 increasing the survival of artificially propagated fish to adulthood. This
9 research, development and testing should incorporate effective husbandry
10 practices from Section 703(e)(1).

11
12 **Background.** The traditional spring outmigration period for most wild juvenile
13 salmon and steelhead in the Columbia River Basin is in April and May.
14 Historically, hatchery release strategies emulated wild fish outmigration in
15 terms of the timing and size of juvenile fish released from hatcheries. But
16 environmental conditions in the river and estuary have changed markedly due
17 to hydroelectric development. New rearing strategies are required to match the
18 release time of hatchery salmon and steelhead to the changed conditions of the
19 river and estuary. Downstream migrations must be programmed to coincide
20 with the most favorable conditions of food availability, predator abundance,
21 river and ocean temperatures, flows and other influencing factors.

22
23
24 **Bonneville**

25
26 23. Fund development of programs and methods to improve fish health
27 protection in hatchery facilities. The development and related research of
28 methods should include:

- 29
30 (A) Prevention of the introduction of diseases into the Columbia River
31 Basin;
32 (B) Prevention of the spread of detected fish pathogens;
33 (C) Improvement of breeding and rearing practices;
34 (D) Minimization of the impact of fish diseases on wild and cultured
35 stocks; and
36 (E) Improvement in detection, diagnosis and control of fish diseases and
37 parasites.

38
39 **Background.** Due to the high density of fish in hatcheries, rearing ponds and
40 transportation systems, infectious diseases and parasites are a major concern.
41 Sensitive, accurate and rapid diagnosis would help operators detect the
42 presence of a disease and permit timely treatment.

43
44 24. Upon approval by the Council, provide funds to develop a sensitive,
45 reliable index for predicting smolt quality and readiness to migrate. The index

1 shall be validated by conducting a test using a selected species and selected
2 hatcheries. Proposals for further action may be submitted to the Council upon
3 completion of the test.

4
5 **Background.** A number of complex changes occur in salmon and steelhead
6 that allow them to convert from freshwater residents to saltwater residents.
7 Several biochemical, physiological, morphological and behavioral processes are
8 involved. A greater understanding of these processes is required to improve
9 smolt survival after their release from hatchery facilities.

10 11 **6.2C Supplementation Planning and Implementation**

12 13 **Regional Assessment of Supplementation**

14
15 The Regional Assessment of Supplementation Project was created in late 1990
16 to provide a comprehensive framework for supplementation. The project is
17 being carried out by technical representatives from the fishery managers,
18 utilities, Bonneville, the Council and others. One of its products will be a
19 recommended planning process. This process will include setting
20 supplementation objectives in terms of post-release survival, reproductive
21 success, long-term fitness and ecological interactions; analyzing benefits and
22 risks; and developing monitoring strategies to contain risk. This planning
23 process was expected to be complete by August 1992, and all Regional
24 Assessment of Supplementation Project products are to be completed by
25 December 31, 1992.

26 27 **Regional Assessment of Supplementation Project Team**

28
29 1a. Working with appropriate experts in genetics, provide a framework for
30 implementing and evaluating proposed and ongoing supplementation activities
31 in a coordinated and experimental fashion. This should include provisions for
32 assessing anadromous and resident species interactions in proposed
33 supplementation projects. Complete a basinwide experimental design
34 framework for supplementation by December 31, 1991. Complete the
35 remainder of the supplementation framework and submit it to the Council for
36 review and approval by December 31, 1992.

37 38 **Bonneville**

39
40 1b. Continue to fund the Regional Assessment of Supplementation Project.

41 42 **Evaluation, Design and Implementation of Proposed** 43 **Additional Supplementation Experiments**

44 45 **Fishery Managers**

1
2 2. Use existing processes, including Regional Assessment of Supplementation
3 Project and Chapter III.C. of the Integrated System Plan, to prepare
4 evaluations, including biological risk assessments, for proposed
5 supplementation experiments that have been submitted by the Columbia River
6 Inter-Tribal Fish Commission. Conclude initial review and report to the Council
7 by January 31, 1993. Complete evaluations by June 30, 1993.
8

9 **Bonneville**

10
11 3. Fund evaluations, including biological risk assessments, of priority
12 supplementation projects proposed by the fishery managers.
13

14 **Hatchery Operators Not Funded by Bonneville**

15
16 4. Monitor and evaluate future and ongoing major supplementation activities
17 to answer critical uncertainties identified by the Regional Assessment of
18 Supplementation Project. Upon completion of the Regional Assessment of
19 Supplementation Project basinwide experimental design, the analysis of
20 ongoing and planned projects, and the survey of critical uncertainties, the
21 Council will call on the implementation planning process to expeditiously
22 identify monitoring and evaluation needs. Report to the Council on progress
23 implementing this measure by January 15, 1993.
24

25 FERC shall direct Chelan County PUD to fund design, construction,
26 operation and maintenance of a hatchery program, including satellite facilities,
27 for Rock Island Project in accordance with Section E "Hatchery-Based
28 Compensation" of the Settlement Agreement dated April 24, 1987, filed in the
29 relicensing proceeding for Project No. 943 and Docket Nos. E-9569, et al.
30

31 **6.2D New Production Initiatives**

32
33 **Identification, Evaluation and Implementation of New Production**
34 **Initiatives**

35
36 **Fishery Managers**

37
38 1. Use the Coordinated Habitat and Production process identified in Section
39 6.1 to identify, evaluate and implement new production initiatives. Such
40 initiatives may include measures to address the needs of weak stocks, such as
41 scientifically sound supplementation, restoration of eliminated populations,
42 demonstrations of captive brood stock technology, cryopreservation, portable
43 and low-capital techniques, acclimation, conversion of existing artificial
44 production facilities and other approaches. Initiatives may also include actions

1 to provide harvest opportunities in tributaries or other areas and to facilitate
2 rebuilding of weak stocks.

3 4 **Development of Master Plans**

5 6 **Fishery Managers**

7
8 2. Because of the need to address potential conflicts among increased
9 production, mixed-stock harvest, gene conservation, consistency with other
10 plans and other objectives, the Council calls for detailed master plans where
11 there is not a National Environmental Policy Act document that provides
12 enough information to evaluate new artificial production projects. Below, the
13 Council provides a suggested list of master plan elements. This list is intended
14 to offer guidance, not to impose requirements. Not all of these elements may be
15 relevant in all projects, and some elements we have not listed may be
16 important. In general, however, the following elements should be considered in
17 the course of master planning:

- 18
19 a. project goals;
- 20
21 b. measureable and time-limited objectives;
- 22
23 c. factors limiting production of the target species;
- 24
25 d. expected project benefits (e.g., gene conservation, preservation of biological
26 diversity, fishery enhancement and/or new information);
- 27
28 e. alternatives for resolving the resource problem;
- 29
30 f. rationale for the proposed project;
- 31
32 g. how the proposed production project will maintain or sustain increases in
33 production;
- 34
35 h. the historical and current status of anadromous and resident fish in the
36 subbasin;
- 37
38 i. the current (and planned) management of anadromous and resident fish in
39 the subbasin;
- 40
41 j. consistency of proposed project with Council policies, National Marine
42 Fisheries Service's recovery plans, other fishery management plans, watershed
43 plans and activities;
- 44
45 k. potential impact of other recovery activities on project outcome;

- 1
2 l. production objectives, methods and strategies;
3
4 m. brood stock selection and acquisition strategies;
5
6 n. rationale for the number and life-history stage of the fish to be stocked,
7 particularly as they relate to the carrying capacity of the target stream and
8 potential impact on other species;
9
10 o. production profiles and release strategies;
11
12 p. production policies and procedures;
13
14 q. production management structure and process;
15
16 r. related harvest plans;
17
18 s. constraints and uncertainties, including genetic and ecological risk
19 assessments and cumulative impacts;
20
21 t. monitoring and evaluation plans, including a genetics monitoring program;
22
23 u. conceptual design of the proposed production and monitoring facilities,
24 including an assessment of the availability and utility of existing facilities; and
25
26 v. cost estimates for various components, such as fish culture, facility design
27 and construction, monitoring and evaluation, and operation and maintenance.
28

29 **Emergency Cases**

30
31 **Fishery Managers**

32
33 3. The Council recognizes that more immediate actions may be required for
34 emergency cases, such as badly damaged populations with decreasing
35 escapements. Documentation of the emergency nature of any such case and
36 proposals for immediate production actions should be brought to the Council,
37 which then will work with relevant parties to evaluate and initiate the
38 necessary actions.
39

40 **National Marine Fisheries Service**

41
42 4. At an early date, develop guidelines for determining when emergency
43 actions, such as using captive brood stock or other emergency propagation, live
44 trapping and transplantation technologies, should be used to aid in recovery of
45 listed or potentially listed salmon and steelhead populations.

1
2 **Additional Artificial Production Facilities**

3
4 **Council**

5
6 5. Should the Council determine that additional hatchery propagation
7 facilities are required to compensate for fish losses caused by the hydropower
8 system, Bonneville shall provide funds to design, construct, operate and
9 maintain such facilities.

10
11 **Background.** Additional hatchery capacity may be necessary for the
12 restoration of Columbia River fish and particularly naturally spawning fish.

13
14 **6.2E Environmental Impacts and Carrying Capacity**

15
16 **Systemwide and Cumulative Impacts of Existing and Proposed Artificial**
17 **Production Projects**

18
19 **Bonneville**

20
21 1. Scope a study to evaluate the cumulative and systemwide impacts of
22 existing and proposed artificial production activities on the ecology, genetics
23 and other important characteristics of Columbia River Basin anadromous and
24 resident salmonids. Coordinate this study with the genetic impact assessment
25 of Columbia River Basin hatcheries called for in Section 6.2B2, above. Report
26 to the Council by December 31, 1992. Upon Council approval, fund the study.

27
28 2. Fund a study to develop a method to be used by project proposers and
29 implementors for assessing systemwide and cumulative impacts of proposed
30 new artificial production projects. The method should take into account
31 impacts of ongoing artificial production programs as identified above. The
32 method should help meet requirements of the National Environmental Policy
33 Act and the Endangered Species Act. Report to the Council by December 31,
34 1992.

35
36 **Fishery Managers**

37
38 3. In addition to existing methods for evaluating proposed artificial production
39 projects (for example, Regional Assessment of Supplementation Project and
40 Chapter III.C. of the Integrated System Plan), use the method for assessing
41 systemwide and cumulative impacts when available.

42
43 **Adjust Total Number of Hatchery Fish Released to Stay Within Basin**
44 **Carrying Capacity**

1 The number of hatchery fish released into the Columbia River has steadily
2 increased since hatchery production began in the late 1800s. Between 170
3 million and 200 million hatchery fish are currently released into the Columbia
4 River Basin system annually. However, the capacity of the Columbia River
5 Basin to support young fish has decreased during this time. Some scientists
6 have suggested that the number of fish released may exceed the capacity of the
7 present-day river, estuary and ocean to support their growth and survival to
8 adulthood. Exceeding system carrying capacity may be partly responsible for
9 decreasing survival of hatchery and wild and naturally spawning stocks.

10
11 **Fishery Managers**

12
13 4. Until the carrying capacity preliminary evaluation in Section 6.1C is
14 complete (December 1993), take precautions not to exceed carrying capacity for
15 juvenile salmonids through operations of Columbia River Basin hatcheries.
16 Report to the Council by December 31, 1992, on the precautionary measures
17 that will be put in place.

18
19 **6.2F Production Planning**

20
21 The Council acknowledges the commitment of parties to U.S. v. Oregon to use
22 the framework of the Columbia River Fish Management Plan to rebuild upriver
23 runs through production planning and the commitment of the parties to make
24 recommendations for actions by February 1992. The Council further recognizes
25 that Congress has instructed the U.S. Fish and Wildlife Service and the
26 National Marine Fisheries Service to prepare plans and implement pilot
27 programs designed to assist in rebuilding fish runs above Bonneville Dam and
28 to report to Congress on such activities within 120 days of enactment of those
29 agencies' appropriations. To coordinate with the foregoing measures, the
30 Council calls on the fishery managers to:

- 31
32 • take the products of the Regional Assessment of Supplementation Project
33 and the Council's genetics team into consideration in production planning;
34
35 • obtain review of production plans by appropriate scientific experts in light of
36 the frameworks provided by the Regional Assessment of Supplementation
37 Project and the Council's genetics team;
38
39 • coordinate with the Integrated Hatchery Operations Team in production
40 planning; and
41
42 • periodically brief the Council on progress.

43
44 Council
45

1 (1) Review a comprehensive plan developed by the fish and wildlife agencies
2 and tribes for reprogramming lower river hatcheries. Where current knowledge
3 is sufficient, certain stocks may be moved to particular upriver streams. Initial
4 efforts shall focus on the needs of upriver stocks. The fish and wildlife
5 agencies and the tribes will cooperate in this effort.

6
7 **Bonneville**

8
9 (1) After Council review of the reprogramming plan developed by the fish and
10 wildlife agencies and Indian tribes, provide funds to transfer a portion of the
11 fish from existing lower Columbia River hatcheries to release sites in the upper
12 Columbia River system to assist in restoring naturally spawning stocks, as
13 provided in that plan.

14
15 **Background.** The Mitchell Act and John Day hatcheries were provided to
16 mitigate fishery losses because of the federal development of the Columbia
17 River Basin for hydropower and other purposes (such as irrigation and
18 navigation) for which these projects were authorized. Reprogramming hatchery
19 operations by developing new release strategies is intended to help rebuild
20 upriver runs and improve tribal fisheries. The Council strongly supports
21 restoration of naturally spawning upriver stocks, but further consultation with
22 the fish and wildlife agencies and tribes is required to determine a final release
23 plan.

24
25 **6.2G Other Production Measures**

26
27 **Captive Brood Stocks**

28
29 Captive brood stock programs have the potential to rapidly increase adult fish
30 numbers, while retaining genetic diversity of severely depleted wild or naturally
31 spawning stocks of salmon. The captive brood stock concept differs from that
32 used in conventional hatcheries in that fish of wild origin are maintained for a
33 single generation in captivity. Their offspring are released to supplement wild
34 and naturally spawning populations.

35
36 Implementation of captive brood stock programs may be the most effective
37 means of accelerating recovery of severely depleted stocks. High survival from
38 egg to adult, and maintenance in captivity for no more than a single generation
39 should ensure that genetic integrity and adaptability to native habitats are
40 preserved. Even in a situation where barriers to survival were relaxed to the
41 point that the population could double each generation, it is projected to take
42 more than nine generations for a run to rebuild to the same number of
43 spawners as could be provided by a captive brood stock program in one
44 generation. Furthermore, stable egg supplies provided by a captive brood stock

1 program should be a catalyst for habitat restoration and help ensure stock
2 recovery.

3
4 Researchers have been developing basic captive brood stock methodologies for
5 a number of years. Nevertheless, considerable technical information is required
6 prior to implementation of large-scale captive brood stock programs.

7
8 **National Marine Fisheries Service and Bonneville**

9
10 1. Complete a scoping study identifying captive brood stock research needs by
11 March 31, 1993, and fund necessary research by June 30, 1993. Fund
12 development of captive brood stock technology and implementation of captive
13 brood stock programs to aid in recovery of severely depleted stocks of
14 salmonids in the Columbia River Basin. Programs should be consistent with
15 the products and conclusions of the genetics and natural production
16 framework provided elsewhere in this section. Critical investigations that need
17 to be funded concurrently include:

- 18
19 a. review of the state of the art of captive brood stock management technology;
20
21 b. development of genetically sound methods of sourcing and breeding brood
22 stock to ensure genetic stability and gamete quality;
23
24 c. modeling of genetic consequences of captive brood stock programs;
25
26 d. development of captive brood stock culture systems that minimize loss of
27 fish;
28
29 e. development and testing of a model brood stock program;
30
31 f. evaluation and comparison of fish husbandry techniques;
32
33 g. evaluation of fish health problems;
34
35 h. investigation of reproductive and non-reproductive physiology; and
36
37 i. evaluation of fitness of captive brood progeny for supplementation.

38
39 2. Fund captive brood stock demonstration projects identified under the
40 coordinated habitat and production process.

41
42 **Cryopreservation**

1 Cryopreservation (preservation of fish gametes by freezing) has the potential of
2 allowing "banking" of genetic stocks for future use, especially when the
3 population is severely depleted and its habitat has been damaged or destroyed.
4

5 **Federal and State Agencies**

6

7 3. By December 31, 1992, fund research to improve cryopreservation
8 technology and develop applications for helping to restore and preserve
9 depleted populations.
10

11 4. Fund demonstrations of cryopreservation identified in the coordinated
12 habitat and production process.
13

14 **Portable Facilities for Adult Salmon Collection and Holding, and for Juvenile 15 Salmon Acclimation**

16

17 As weak stocks or populations of salmon and steelhead are identified and
18 assessed, supplementation will be one option to consider to help rebuild these
19 stocks. Decentralized facilities to permit the capture and holding of brood
20 stocks and facilities to acclimate the juvenile fish before release could be useful
21 in this effort. The use of local brood stocks is fundamental to maintaining
22 genetic diversity. The use of acclimation and release facilities prior to release is
23 important to increase juvenile fish survival and ability to imprint on the release
24 stream, and thereby reduce to natural levels their straying into other
25 watersheds. The portability of these facilities should allow them to be used
26 flexibly.
27

28 The demonstration project should involve only existing hatchery programs or
29 fish populations that are currently being supplemented.
30

31 **Bonneville**

32

33 5. Fund the planning, design, construction and operation of a demonstration
34 *project for the development of portable adult collection and holding facilities and*
35 *juvenile acclimation and release facilities.* The project should build on the
36 earlier work funded by Bonneville¹ and other relevant information and
37 experience. The project should be initiated in 1991, with facilities in place in
38 1992.
39

40 6. Fund additional demonstration projects identified in the coordinated habitat
41 and production process.
42

¹Bonneville Power Administration. *Compendium of Low-Cost Pacific Salmon and Steelhead Trout Production Facilities and Practices in the Pacific Northwest.* October 1984.

1 **Ringold Hatchery Site Enhancement and Water Development**

2
3 The Washington Departments of Fisheries and Wildlife currently have water
4 rights for 100 cubic-feet per second of water from springs located adjacent to
5 the Ringold Hatchery site. Of this amount, the agencies are only able to
6 capture and use about 36 cubic-feet per second. The agencies cannot make the
7 full water rights permanent, unless the facilities for capturing, transporting
8 and using the water are improved. These rights have a permit status, which
9 means the state has the legal right to take water, but a certificate of
10 appropriation is not issued until the water is actually being used. The
11 temporary permit will be revoked and the water right lost in 1991, if action is
12 not initiated to use the water.

13
14 **Bonneville**

15
16 7. Insofar as needed to secure a 100 cubic-feet per second water right for the
17 Ringold hatchery facility, fund planning, design and construction of the
18 necessary facilities to capture up to 100 cubic-feet per second of water and
19 deliver it to the area of the hatchery site.

20
21 8. Fund planning, design and construction of the facilities determined to be
22 necessary to improve existing production. Report to the Council for approval
23 before proceeding with construction.

24
25 **Reintroduction of Anadromous Fish in the Upper Cowlitz River Basin**

26
27 In 1991, Bonneville entered into an agreement with Public Utility District No. 1
28 of Lewis County to purchase the electricity output from the Cowlitz Falls
29 Project. The project is located above Mayfield and Mossyrock Dams on the
30 Cowlitz River, which currently block passage of anadromous fish into the upper
31 Cowlitz Basin. In a settlement agreement for Bonneville's acquisition of the
32 project, Bonneville agreed to fund smolt collection and transportation facilities
33 at Cowlitz Falls to facilitate the reintroduction of anadromous fish above
34 Mossyrock Dam. Bonneville is coordinating a technical advisory group,
35 composed of state and federal fish agencies, Tacoma and Lewis County
36 utilities, and environmental groups, to establish objectives for fish in the upper
37 Cowlitz watershed. One of the objectives includes reintroduction of
38 anadromous fish. The members of the working group are guiding development
39 of project plans and their implementation. The Council notes with approval the
40 cooperative effort to plan reintroduction of anadromous fish in the upper
41 Cowlitz and the agreement on production objectives. The Council expects these
42 agreed upon objectives to be incorporated within the system planning process
43 identified in the coordinated habitat and production process for the Cowlitz
44 Subbasin.

1 In December 1991, the Washington Department of Fisheries announced its
2 change in policy on the reintroduction of a limited number of adult
3 anadromous fish to the upper watershed. The Fisheries Department felt the
4 risk from disease was minimal for spring chinook. They indicated an intent to
5 withhold a decision on fall chinook until more data was in hand and indicated
6 that winter run steelhead were also suitable for reintroduction. As a direct
7 result of this change, reintroduction of salmon and steelhead to the Cowlitz
8 tributaries above Mayfield Dam has already begun. All precautions should be
9 taken to ensure the sound application of biological principles during
10 reintroduction.

11 12 **Pacific Lamprey**

13
14 Pacific lamprey are anadromous fish historically present in the Columbia and
15 Snake rivers. Lamprey are a traditional food source for Columbia Basin Indians
16 and remain culturally important. The Council has not previously called for
17 measures to address lamprey populations. The tribes have noted that lamprey
18 populations appear to be declining.

19 20 **Bonneville**

21
22 9. Fund a unified data collection and analysis project to provide a status
23 report to the Council on Pacific lamprey populations in the Columbia and
24 Snake rivers by December 31, 1993.

25 26 **Construction of Major Production Facilities**

27 28 Umatilla Production Facilities

29 30 Bonneville

31
32 10. Fund the Confederated Tribes of the Umatilla Reservation of Oregon to
33 operate and maintain the Bonifer and Minthorn juvenile release and adult
34 collection and holding facilities on the reservation. Also fund the construction
35 of a facility to demonstrate the use of oxygen supplementation hatchery
36 techniques to produce summer steelhead and chinook salmon smolts for
37 release in the Umatilla juvenile release and adult collection and holding
38 facilities and for outplanting in the upper Umatilla River to enhance natural
39 and hatchery production.

40
41 **Background.** The fish and wildlife agencies and tribes have constructed and
42 are operating acclimation ponds on the Umatilla Reservation. Smolts would be
43 transported to these ponds from hatchery facilities for imprinting before release
44 and outplanted in the upper Umatilla River. Returning adults would provide
45 an improved fishery for the Umatilla tribes and other fishermen.

1
2 **John Day Acclimation Facilities**

3
4 **Fish And Wildlife Agencies And Tribes**

5
6 11.a. Develop jointly a plan for designing, constructing and evaluating
7 temporary acclimation ponds. The primary purpose of the
8 temporary acclimation ponds will be to assess the effectiveness of
9 using acclimation ponds to improve survival of fish released in
10 upriver habitat. If suitable release sites are not identified above
11 McNary Dam, then sites in the John Day Pool should be considered.
12 The plan will provide the following:

- 13
14 1. A proposal for temporary acclimation sites;
- 15
16 2. Design elements that are necessary to test the effectiveness
17 of the concept of acclimation ponds. The plan may include
18 different technologies in different locations;
- 19
20 3. Brood stock and release guidelines for the proposed facilities
21 to ensure that releases: a) do not adversely affect the genetic
22 integrity of stocks potentially affected by the hatchery
23 releases; b) are compatible with the fish naturally inhabiting
24 the release locations; c) are disease-free; and d) are
25 coordinated with other management and enhancement
26 activities in the basin;
- 27
28 4. Monitoring and evaluation studies to assess the effectiveness
29 of the facilities, including a comparison of the survival of
30 juveniles released without benefit of acclimation with those
31 benefiting from acclimation; and,
- 32
33 5. Cost estimates and a schedule for design, construction and
34 evaluation.

35
36 **Bonneville**

- 37
38 b. Upon approval by the Council of the acclimation pond plan, fund
39 design, construction and evaluation of the temporary facilities.
40
- 41 c. Upon approval by the Council, fund the design, construction,
42 operation and maintenance of permanent John Day acclimation
43 ponds. These ponds will be used to imprint fall chinook.
44

1 **Background.** In an effort to restore the level of adult bright fall
2 chinook returns that were lost due to construction of John Day
3 Dam, the Bonneville and Spring Creek fish hatcheries were
4 expanded. Smolts from the hatcheries are released above John Day
5 Dam. To achieve maximum smolt survival, it is believed to be
6 necessary to hold the fish to relieve stress caused by transportation
7 and to imprint the smolts. Council approval of permanent facilities
8 will be based on the demonstrated effectiveness of the temporary
9 facilities.

10
11 **Yakima Production Facilities**

12
13 **Bonneville**

14
15 12. Fund design, construction, operation and maintenance of a hatchery to
16 enhance the fishery for the Yakima Indian Nation as well as other harvesters.
17 The hatchery will be a central outplanting facility, used to raise juvenile fish for
18 release in the Yakima Basin and elsewhere in the Columbia River Basin. The
19 purpose of the hatchery will be to supplement natural runs. Nothing in this
20 measure is intended to imply that this will be the only outplanting facility for
21 the Yakima Basin or the Columbia River Basin.

- 22
23
24 a. Upon approval by the Council of the master plan, fund the detailed
25 design, engineering and construction of the hatchery and associated
26 facilities.
27
28 b. Fund management of operation and maintenance of the hatchery.
29 Before making annual budget requests for operation and
30 maintenance, the hatchery manager will develop a status report on
31 the previous year's operations. The status report will include a
32 production plan for the coming year and an analysis showing how
33 the plan is consistent with salmon and steelhead management
34 activities throughout the basin.
35
36 c. Fund biological monitoring and evaluation studies identified in the
37 master plan. The results of the studies will be used to improve
38 management at the Yakima central outplanting facility and at
39 similar facilities elsewhere in the basin.
40

41 **Background.** Much is still unknown about the impact of hatchery-produced
42 fish on wild populations. The design and management of this hatchery will
43 allow fish and wildlife agencies and tribes to learn more about these impacts
44 and to identify the best methods for carrying out hatchery production and
45 supplementation of natural production. The Outlet Creek site, because of its

1 water supply and available acreage, was identified by the U.S. Fish and Wildlife
2 Service in a 1979 feasibility study, The Yakima Fish Hatchery, funded by
3 Bonneville as the best location for a hatchery on the Yakima Indian
4 Reservation. The Council believes it is important to proceed with this project
5 as soon as possible because of the importance of the added production to be
6 provided by the facility; the potential learning benefits of the facility; and the
7 long lead time required for planning, design and construction of the facility.

8
9 **Northeast Oregon Production Facilities**

10
11 **Bonneville**

12
13 13. Fund planning, design, construction, operation, maintenance and
14 evaluation of artificial production facilities to raise chinook salmon and
15 steelhead for enhancement in the Hood, Umatilla, Walla Walla, Grande Ronde
16 and Imnaha rivers and elsewhere. The artificial production facilities will be
17 used to supplement natural production in these rivers.

- 18
19 a. Prior to design of the facilities, fund development of a master plan
20 for the outplanting facilities, coordinated with the Integrated System
21 Plan. The master plan should address the elements shown in
22 section 6.2D.2.
23
24
25 b. Upon approval by the Council of the master plan, fund the detailed
26 design, engineering and construction of the hatchery and associated
27 facilities.
28
29 c. Fund operation and maintenance of the hatchery. Before making
30 annual budget requests for operation and maintenance, the facility
31 manager will develop a status report on the previous year's
32 operations. The status report will include a production plan for the
33 coming year and an analysis that shows how the plan is consistent
34 with salmon and steelhead management activities throughout the
35 basin.
36
37 d. Fund biological monitoring and evaluation studies identified in the
38 master plan. The results of the studies will be used to improve
39 management at the Yakima central outplanting facility and at
40 similar facilities elsewhere in the basin.

41
42 **Background.** The primary objective for these facilities is similar to that stated
43 for the Yakima outplanting facility. The fish and wildlife agencies and tribes
44 expect this facility to provide for outplanting of about 2.3 million to 3 million
45 spring chinook juveniles in the five Oregon rivers identified in the measure.

1 The Council maintains that the fish and wildlife agencies and tribes should
2 play the lead role in developing the master plan for the northeastern Oregon
3 hatchery. It also maintains that the facility need not necessarily be limited to
4 spring chinook, as originally proposed, if other stocks would benefit from
5 hatchery supplementation. While the focus may be on spring chinook stocks,
6 the fish agencies and tribes may wish to consider appropriate supplementation
7 of other stocks. Monitoring and evaluation studies should be coordinated with
8 supplementation research and related management and with propagation
9 activities.

10
11 Bonneville

12
13 14. Provide funds to develop and test low-cost, small-scale salmon and
14 steelhead propagation facilities adaptable to Columbia River Basin locales.
15 Once the concept of using low-cost, small-scale hatcheries in the Columbia
16 River Basin has proved to be feasible, take the steps necessary to use as many
17 of these low-cost, small-scale hatcheries as required.

18
19 **Background.** The major advantages of low-capital propagation are: 1) it
20 requires a smaller water supply, and 2) it is readily adaptable to individual
21 drainages, enabling the conservation of gene pools. The Council encourages
22 community involvement in projects of this nature.

23
24 Nez Perce Tribal Hatchery

25
26 15. Upon approval by the Council of design and construction plans for low-
27 capital propagation facilities, fund the construction, operation and
28 maintenance of those facilities. The Nez Perce Tribe will develop the master
29 plan consistent with section 6.2D.2.

30
31 **Background.** The Nez Perce Reservation in Idaho includes more than 300
32 miles of rivers and streams with suitable habitat. Upon demonstration that
33 low-cost, small-scale salmon and steelhead propagation facilities are
34 practicable and upon approval of the plans by the Council, construction,
35 operation and maintenance of low-cost, small-scale salmon and steelhead
36 propagation facilities will be funded on the Nez Perce Reservation.

37
38 Pelton Dam Fish Ladder

39
40 16. Fund propagation of salmon and/or steelhead smolts in the 2.8-mile long
41 fish ladder located at Pelton Dam on the Deschutes River in Oregon. This
42 production will be in addition to the fish propagation activities being conducted
43 there by Portland General Electric to mitigate the effects of Pelton and Round
44 Butte dams and will not affect the mitigation responsibilities of that company.
45 The Oregon Department of Fish and Wildlife and the Confederated Tribes of the

1 Warm Springs Reservation of Oregon will develop a master plan for Council
2 approval prior to Bonneville funding of design and construction. The master
3 plan should address the elements shown in section 6.2D.2.

4 5 **6.3 SPECIFIC ACTIONS TO ASSIST WEAK STOCKS**

6 7 **6.3A Snake River Sockeye Salmon**

8
9 In the summer of 1991, the Shoshone-Bannock Tribes, the Idaho Department
10 of Fish and Game, the Bonneville Power Administration and others initiated an
11 emergency program to conserve Snake River sockeye. The Council endorses
12 this effort, but regards this program as a highly experimental measure that
13 should be implemented with appropriate safeguards.

14 15 **Bonneville**

16
17 1. Fund the program of the Shoshone-Bannock Tribes and the Idaho
18 Department of Fish and Game to protect and rebuild Snake River sockeye with
19 the following features:

20
21 a. Divide smolts captured for rearing in this program among two or more lots.
22 Each lot should have a separate water supply, alarm system and other
23 protective measures.

24
25 b. A panel of genetics experts should provide advice throughout the recovery
26 effort. This panel should address aspects such as rearing and mating
27 techniques, research protocols and monitoring needs.

28
29 c. Provide an annual review of the practices and performance of the program
30 for review by the National Marine Fisheries Service and the Council.

31
32 d. Recognize the experimental nature of these emergency actions, and
33 incorporate monitoring and evaluation measures to learn from implementation.

34
35 2. Regularly update the Governors of the Northwest states, the Northwest
36 Congressional delegation, the Council and other concerned parties on the
37 progress of this project.

38 39 **Bonneville and Fishery Managers**

40
41 3. Fund and develop for Council review a feasibility study for reintroduction of
42 sockeye salmon into appropriate production areas. This study should consider
43 reintroduction in all historical production areas. This study should also
44 consider creating anadromous populations by managing kokanee, such as
45 those found in Pelton Reservoir, in a manner that allows access to the ocean.

1 This study should be coordinated with the Regional Assessment of
2 Supplementation Project, appropriate specialists in genetics, and the
3 coordinated implementation, monitoring and evaluation approach. It should
4 also be consistent with the National Marine Fisheries Service's recovery plan
5 for sockeye in the Snake River.
6

7 **6.3B Snake River Fall Chinook Salmon**

8 **Fishery Managers**

9
10
11 1. In consultation with the National Marine Fisheries Service and consistent
12 with the recovery plan, use the Regional Assessment of Supplementation
13 Project process and develop an experimental design for implementing,
14 monitoring and evaluating supplementation of Snake River fall chinook.
15 Submit to Council for approval by March 31, 1993.
16

17 **Bonneville**

18
19 2. Upon approval by the Council in consultation with the National Marine
20 Fisheries Service, implement supplementation experimental design developed
21 by the fishery managers.
22

23 3. Expeditiously fund studies to define the range, limiting factors and needs,
24 especially regarding flow and temperature, and provide basic life history
25 information for Snake River fall chinook.
26

27 4. Fund studies to determine the genetic structure and population status of
28 Snake River fall chinook.
29

30 5. Fund a study of the spawning and rearing habitats utilized by fall chinook
31 salmon in the Snake River, and examine factors influencing their migratory
32 behavior.
33

34 **6.3C Endemic Spring Chinook in Grande Ronde Subbasin**

35
36 The Minam and Wenaha rivers, in the Grande Ronde River Basin, have been
37 designated by the state of Oregon as genetic sanctuaries for wild, endemic
38 spring chinook salmon. But stray hatchery fish of non-local origin have been
39 observed in the Minam and Wenaha basins in recent years. There is an
40 immediate need to eliminate hatchery strays from entering these genetic
41 sanctuaries.
42

43 Starting with the 1990 brood, hatchery operators have marked for
44 identification all hatchery chinook in the Grande Ronde River Basin. Trapping
45 facilities on the lower reaches of the Minam and Wenaha rivers are needed so

1 that all fish entering these genetic sanctuaries can be trapped and examined,
2 hatchery fish can be removed, and natural escapement levels and population
3 productivity of these rivers can be determined.

4 5 **Bonneville**

6
7 1. Fund planning, design, construction and operation of spring chinook
8 trapping facilities on the lower reaches of the Minam and Wenaha rivers.

9 10 **6.3D Lower Columbia River Coho Salmon**

11
12 Natural production of coho salmon in the lower Columbia River has declined to
13 extremely low levels. Fewer than 25,000 spawn naturally in scattered
14 tributaries of the lower river. In 1990, a petition was filed with the National
15 Marine Fisheries Service for protection of the population under the Endangered
16 Species Act of 1973. On June 7, 1991, the National Marine Fisheries Service
17 declined to list the population after its review of available data failed to identify
18 a population segment in the lower Columbia River genetically distinct from
19 coastal populations, but expressed a willingness to evaluate additional data.

20
21 Naturally reproducing coho in the lower Columbia River represent an important
22 resource that can be protected and rebuilt. The values of doing so include
23 maintaining genetic diversity, reducing the almost exclusive dependence on
24 hatchery production and preserving recovery opportunities. In implementing
25 the following measures, Bonneville funding should be limited to the extent to
26 which coho populations have been affected by hydropower, or to particular
27 instances in which off-site recovery measures would be appropriate mitigation
28 for hydropower impacts.

29 30 **Oregon and Washington**

31
32 1. Explore adopting management goals to rebuild naturally reproducing
33 populations of lower river coho to self-sustaining levels.

34
35 2. Continue research to determine genetic distinctions between lower river
36 coho and coastal populations. Submit products of the research to the National
37 Marine Fisheries Service.

38
39 3. Incorporate recommendations of the Regional Assessment of
40 Supplementation Project and the Council's genetics team in developing
41 management directions.

42 43 **Bonneville and Fishery Managers**

1 4. Survey subbasin plans submitted as part of the Integrated System Plan to
2 determine limiting factors for naturally reproducing coho populations.

3
4 5. Fund a survey of land management regulations affecting coho habitat.
5 Include reviews of state forest practices, regulations and federal land
6 management plans affecting coho habitat. Develop recommendations for
7 revisions to support rebuilding objectives.

8
9 6. Fund a review of current production and harvest management practices for
10 impacts on naturally reproducing coho populations, including competition from
11 release of juveniles, disease and predation. Solicit recommendations for
12 revisions of management practices to support rebuilding efforts.

13
14 **6.3E Columbia River Chum Salmon**

15
16 Chum salmon are listed in the Integrated System Plan as a stock of high
17 concern. Counts from the spawning grounds have dropped from more than 700
18 per mile in the early 1950s to a low of fewer than 100 per mile in recent times.
19 Catches of this species exceeded 700,000 per year in the 1920s, but catches
20 have exceeded 2,000 fish only twice since 1960. The last few years' counts have
21 been up slightly, but abundance continues to be low compared to historic
22 counts.

23
24 Chum once spawned in many tributaries of the Columbia Basin, including
25 some above Bonneville Dam. They are now found only in the Grays, Elochoman
26 and Lewis subbasins, and Hardy and Hamilton creeks. Habitat degradation,
27 passage barriers and harvest have all contributed to reductions in this species.
28 In implementing the following measures, Bonneville funding should be limited
29 to the extent to which chum populations have been affected by hydropower, or
30 to particular instances in which offsite recovery measures would be appropriate
31 mitigation for hydropower impacts.

32
33 **Oregon and Washington**

34
35 1. Identify naturally reproducing populations of chum salmon and adopt
36 management goals to rebuild those populations to self-sustaining levels.

37
38 2. Incorporate recommendations of the Regional Assessment of
39 Supplementation Project and the Council's genetics team in developing
40 management directions.

41
42 **Bonneville and Fishery Managers**

43
44 3. Survey subbasin plans submitted as part of the Integrated System Plan to
45 determine limiting factors for naturally reproducing chum salmon populations.

1
2 4. Fund a survey of land management regulations affecting chum salmon
3 habitat. Include reviews of state forest practices, regulations and federal land
4 management plans affecting chum salmon habitat. Develop recommendations
5 for revisions to support rebuilding objectives.
6

7 5. Fund a review of current production and harvest management practices for
8 impacts on naturally reproducing chum salmon populations. Solicit
9 recommendations for revisions of management practices to support rebuilding
10 efforts.
11

12 **6.3F Columbia River Sea-Run Cutthroat Trout**

13
14 Sea-run cutthroat trout are found in all tributaries below and several
15 tributaries above Bonneville Dam. No good measure of run strength exists.
16 Likewise, little is known about early life history survival, ocean survival, catch,
17 or escapement of Columbia Basin sea-run cutthroat trout populations. It is
18 known that these populations are depressed. Experts believe that habitat
19 degradation and interactions with hatchery salmon and steelhead have caused
20 this depression. Regardless, sport angling for sea-run cutthroat trout is an
21 important fishery, and much support for rebuilding these populations is
22 evident. In implementing the following measures, Bonneville funding should be
23 limited to the extent to which sea-run cutthroat trout populations have been
24 affected by hydropower, or to particular instances in which offsite recovery
25 measures would be appropriate mitigation for hydropower impacts.
26

27 **Oregon and Washington**

28
29 1. Identify naturally reproducing populations of sea-run cutthroat trout and
30 adopt management goals to rebuild those populations to self-sustaining levels.
31

32 2. Incorporate recommendations of the Regional Assessment of
33 Supplementation Project and the Council's genetics team in developing
34 management directions.
35

36 **Bonneville and Fishery Managers**

37
38 3. Survey subbasin plans submitted as part of the Integrated System Plan to
39 determine limiting factors for naturally reproducing sea-run cutthroat trout
40 populations.
41

42 4. Fund a survey of land management regulations affecting sea-run cutthroat
43 trout habitat. Include reviews of state forest practices, regulations and federal
44 land management plans affecting sea-run cutthroat trout habitat. Develop
45 recommendations for revisions to support rebuilding objectives.

1
2 5. Fund a review of current production and harvest management practices for
3 impacts on naturally reproducing sea-run cutthroat trout populations. Solicit
4 recommendations for revisions of management practices to support rebuilding
5 efforts.
6

7 **6.4 HABITAT OBJECTIVES, POLICIES AND PERFORMANCE** 8 **STANDARDS²** 9

10 Wild and naturally spawning populations of salmon and steelhead are generally
11 at low levels throughout the Columbia River Basin. Accordingly, habitat is
12 seeded at low levels. Even so, improvements in habitat quality are needed to
13 increase the productivity of many stocks. This increased productivity will result
14 in more of the offspring from these returning adults surviving to begin
15 migration to the ocean. For other stocks, maintenance of existing high quality
16 habitat is essential. It is important also that the quantity of available habitat
17 not decrease. In some circumstances, it may even be desirable to provide
18 access to areas that have become blocked to migration of these species. In
19 short, a key element to ensuring the long-term productivity of wild and
20 naturally spawning Columbia River Basin salmon and steelhead stocks is
21 maintaining and improving habitat quantity and quality.
22

23 Maintaining and improving salmon and steelhead habitat productivity is an
24 extremely complex task. It requires coordination of virtually all activities that
25 occur in a subbasin. The Council believes that it is not only possible to attain
26 this coordination, but that coordination will allow habitat to be protected and
27 improved without undermining the economic uses of other resources. Simply
28 stated, it is not the intent of the Council to exclude customary land- and water-
29 use activities. Through comprehensive watershed management, innovative
30 approaches can be developed cooperatively by the locally and regionally
31 affected parties that will allow fisheries resources and economic activities to co-
32 exist. This approach has an additional benefit of ensuring better results and,
33 therefore, more effective investments by ratepayers and others interested in the
34 subbasin.
35

36 Coordinated, cooperative efforts to protect and improve salmon and steelhead
37 habitat in the basin are needed. Habitat has decreased by more than a third,
38 and much of the remaining habitat has been degraded as a result of diverse
39 human activities. An example of habitat change caused by human activities

²For this section of the program, habitat is defined generally as freshwater tributary areas where salmon and steelhead rear and/or spawn, and tributary migration corridors. It should be noted that salmon and steelhead habitat extends beyond these areas into the mainstem Columbia and Snake rivers, the Columbia River estuary and the ocean. Other sections of the program address these other habitat areas.

1 has been documented by the U.S. Forest Service for spring chinook salmon. In
2 an ongoing project that is comparing 1936-1942 stream survey records to
3 current conditions, the Forest Service has found that large pool habitat in
4 representative subbasins throughout the Columbia system has decreased 50
5 percent to 75 percent over the past 50 years. And much of this habitat was
6 already degraded to some extent when the surveys were initially completed.
7 Significantly, the sole exception to pool loss has been in wilderness areas,
8 where quantity of pool habitat has remained constant or increased.

9
10 According to the Northwest Power Act, ratepayer funds may be used, in
11 appropriate circumstances, as a means of achieving offsite protection and
12 mitigation for the effects of the hydropower system. These effects include
13 salmon and steelhead losses caused in the mainstem and tributary areas of the
14 Columbia Basin. Losses and degradation of habitat have been caused by the
15 construction of hydroelectric dams and numerous other human activities.
16 Funds to maintain and improve habitat have come from the region's ratepayers
17 to provide off-site mitigation for losses caused by the dams, and from federal,
18 state, local and private sources. In this section, the Council has identified
19 additional actions that need to be implemented by Bonneville and others. The
20 Council expects that a significant portion of the funds to accomplish these
21 important tasks will come from sources other than ratepayers.

22
23 The Council recognizes the loss of stocks of salmon and steelhead has
24 occurred, in part, because of continual degradation of the quality and
25 reduction of the quantity of habitat in the Columbia River Basin. This trend
26 continues to affect the abundance and diversity of the stocks that remain. For
27 this reason, dramatic steps must be taken to protect and improve habitat. As
28 stated above, the Council believes that comprehensive watershed management
29 is integral to protecting and rebuilding salmon and steelhead stocks in the
30 Columbia River Basin as well as promoting economic health and stability in the
31 region. The structure and provisions of the Council's habitat section recognize
32 this relationship and also the urgency of implementing projects addressing the
33 habitat needs of these stocks.

34 35 **6.4A Habitat Objectives**

36
37 The Council has the following objectives for Columbia River Basin salmon and
38 steelhead habitat. These objectives should be pursued aggressively.

39 40 **All Relevant Parties**

41
42 1. Ensure human activities affecting production of salmon and steelhead in
43 each subbasin are coordinated on a comprehensive watershed management
44 basis.

1 2. At a minimum, maintain the present quantity and productivity of salmon
2 and steelhead habitat. Then, improve the productivity of salmon and steelhead
3 habitat critical to recovery of weak stocks. Next, enhance the productivity of
4 habitat for other stocks of salmon and steelhead. Last, provide access to
5 inaccessible habitat.
6

7 **6.4B Habitat Policies**

8 9 **Federal, State and Local Land and Water Managers, Users and Owners;** 10 **Fishery Managers; and Others**

11
12 1. Improve and maintain coordination of land and water activities to protect
13 and improve the productivity of salmon and steelhead stocks. The Council
14 encourages local cooperation and coordination to address habitat protection
15 and improvement and to resolve problems created by competing missions. The
16 Council encourages private parties to be proactive and to work cooperatively
17 with resource managers to maintain and improve habitat.
18

19 2. Develop and implement procedures to ensure compatibility and compliance
20 with the Council's habitat objectives, policies and performance standards. At a
21 minimum, implement and require compliance with state, federal, local and
22 tribal laws, regulations, and policies relating to Columbia River Basin salmon
23 and steelhead habitat regulation and management.
24

25 3. Give highest priority to habitat protection and improvement in areas of the
26 Columbia Basin where low or medium habitat productivity or low pre-spawning
27 survival for identified weak populations are limiting factors. Give priority to
28 habitat projects that have been integrated into broader watershed improvement
29 efforts and that promote cooperative agreements with private landowners.
30

31 4. For actions that increase habitat productivity or quantity, give priority to
32 actions that maximize the desired result per dollar spent. Also, give higher
33 priority to actions that have a high probability of succeeding at a reasonable
34 cost over those that have great cost and highly uncertain success.
35

36 5. Provide elevated or new funding necessary for the successful and timely
37 implementation of the items listed in this section. Funding sources for
38 implementing provisions of the habitat section should include, but not be
39 limited to, the U.S. Forest Service, Bureau of Land Management, Bureau of
40 Reclamation, Soil Conservation Service, National Marine Fisheries Service, U.S.
41 Fish and Wildlife Service, Corps of Engineers, Agricultural Stabilization and
42 Conservation Service, Bonneville Power Administration, other relevant federal
43 agencies, all relevant state agencies, local governments, private landowners,
44 resource users and tribes. Cost and effort sharing is encouraged.
45

1 6. Encourage the involvement of volunteers and educational institutions in
2 cooperative habitat enhancement projects throughout the basin.

3
4 **6.4C Habitat Performance Standards**
5

6 The Council recognizes that habitat performance standards cannot be the same
7 in all areas of the region, due to differences in soils, topography, vegetation and
8 climate. Consequently, habitat performance standards that acknowledge and
9 incorporate these local differences need to be established for each watershed.

10
11 **Local Watershed Managers**
12

13 1. As watershed coordination is initiated, in consultation with fisheries, land
14 and water managers, develop a more comprehensive set of habitat performance
15 standards taking into account differences in climate, location, soils, topography
16 and other pertinent factors unique to each area. These habitat performance
17 standards should address the following:

18
19 a. Vegetation

- 20
21 • shading
22
23 • overhanging vegetation
24

25 b. Streambanks

- 26
27 • stability
28
29 • heights
30
31 • undercutting
32

33 c. Water Quality

- 34
35 • temperature
36
37 • suspended solids
38
39 • chemicals
40

41 d. Stream Morphology

- 42
43 • riffles
44
45 • runs

- 1
- 2 • glides
- 3
- 4 • pools
- 5
- 6 e. Stream Channel

- 7
- 8 • widths
- 9
- 10 • depths
- 11
- 12 • sinuosity
- 13
- 14 • gradient

15

16 f. Substrate

- 17
- 18 • composition
- 19
- 20 • embeddedness
- 21
- 22 • sedimentation

23

24 g. Instream Habitat

- 25
- 26 • woody debris
- 27
- 28 • aquatic vegetation
- 29
- 30 • cover (boulders, turbidity, etc.)

31

32 The Council anticipates and encourages alternative approaches in

33 developing such standards. At the same time, the Council requests that the

34 relevant parties explicitly consider the approach and standards provided for

35 reference in Appendix B in developing their own approaches and standards. As

36 watershed habitat performance standards are developed, submit them to the

37 Council for review and coordination.

38

39 **Idaho, Oregon and Washington Northwest Power Planning Council Offices**

40

41 2. By December 31, 1993, provide the Council with adopted habitat

42 performance standards or a report on progress toward adoption.

43

1 **Council**

2
3 3. Review habitat performance standards as submitted, for consistency,
4 appropriateness and regional coordination.

5
6 **Relevant Parties**

7
8 4. The Council expects that actions to restore and preserve critical habitat will
9 proceed in parallel with development of habitat performance standards.
10 Relevant parties are requested to provide the Council with approaches for
11 meeting performance standards on the following schedule:

- 12
13 a. by December 31, 1998, in subbasins where weak stocks are present;
14
15 b. within five years after designation of a subbasin as a model watershed; and
16
17 c. by December 31, 2003, in all other subbasins.

18
19 States, Tribes, Federal Agencies, Land and Water Managers, and Private
20 Landowners

21
22 5. Because the region places a very high priority on protecting existing habitat,
23 and because the watershed-specific habitat performance standards will take
24 time to develop, in the interim, manage activities to maintain the quality and
25 quantity of existing habitat. In so doing, ensure the following in perennial and
26 intermittent streams supporting salmon and steelhead:

- 27
28 a. comply with existing federal and state water quality standards;
29
30 b. allow no human-caused increase of sedimentation that may result in a
31 significant adverse effect on weak salmon, steelhead or resident fish stocks;
32
33 c. retain existing woody debris;
34
35 d. retain existing vegetation in riparian areas to supply woody debris in the
36 stream; and
37
38 e. manage for frequency of pools similar to those observed in undisturbed but
39 comparable areas to the extent needed to provide sufficient habitat for salmon
40 and steelhead.

1 **6.5 Cooperative Habitat Protection and Improvement with Private**
2 **Landowners**

3
4 The Council has adopted the following as a program habitat objective: Ensure
5 human activities affecting production of salmon and steelhead in each
6 subbasin are coordinated on a comprehensive watershed management basis.
7 The Council does not view comprehensive watershed management as a
8 planning process. It is a way of doing business that allows for coordination of
9 the goals and objectives of all interests in order to use available natural,
10 human and fiscal resources in the most beneficial manner. Thereby,
11 investments in development and usage of resources in a subbasin, including
12 production of salmon and steelhead, will benefit.

13
14 Comprehensive watershed management should enhance and expedite
15 implementation of actions by clearly identifying gaps in programs and
16 knowledge, by striving over time to resolve conflicts, and by keying on activities
17 that address priorities. A long-term commitment from all local, state and
18 regional entities interested in each subbasin will be necessary. This effort
19 cannot be viewed as something to be accomplished quickly or having an
20 endpoint. It will need to evolve over time to become truly comprehensive. To
21 succeed, it must become institutionalized in each subbasin.

22
23 The Council believes that protection and improvement of habitat on private
24 lands is an essential component of comprehensive watershed management. A
25 key to this approach is the voluntary action of the owners of these lands.
26 Without explicit, direct involvement of private landowners in identification and
27 implementation of habitat actions, protection and improvement of habitat on
28 private lands has little chance of success.

29
30 During investigation of habitat issues, the Council was impressed with the
31 number of private initiatives to protect the fisheries habitat in the region. These
32 include activities to prevent erosion, as typified in the Tucannon River
33 Subbasin, as well as other programs conducted by local conservation districts,
34 Oregon Governor's Watershed Enhancement Board, Trout Unlimited, Long Live
35 the Kings, the Adopt-a-Stream Foundation and others. The Council applauds
36 these worthy efforts to involve different affected interests in development,
37 implementation and funding of coordinated habitat protection and
38 improvement activities. These types of activities need to occur in every
39 subbasin and on a more comprehensive level.

40
41 **Local Role**

42
43 A locally based, bottom-up, voluntary approach for protection and
44 improvement of habitat on private lands is needed. The coordinated resource
45 management approach is an example of the type of program that might provide

1 the basis for such an approach. This process brings together local landowners
2 and key interests in a facilitated forum to identify goals for improving and
3 managing lands within a geographic area of common interest.

4 5 **State Role**

6
7 Statewide lead entities, such as the state conservation commissions or other
8 appropriate bodies, should be identified to facilitate coordinated habitat
9 protection and improvement with private landowners. In addition, the Council's
10 model watersheds should complement these efforts.

11 12 **Federal Role**

13
14 Coordination of watershed activities will include an important role for federal
15 agencies. Activities on federal and private lands must be coordinated and
16 consistent to achieve comprehensive watershed management. In addition,
17 federal funding of activities on private and public lands must continue and at
18 increased levels. The Council is committed to supporting efforts in this regard.
19 Also, it is expected that coordination of activities on private lands will result in
20 approaches that complement and comply with the requirements for habitat
21 recovery plans under Section 10 of the Endangered Species Act. This will
22 require coordination of watershed activities with the National Marine Fisheries
23 Service.

24 25 **Council Role**

26
27 The Council expects that coordination of watershed activities will result in
28 identification of projects to improve and protect habitat on private lands. These
29 projects should be submitted directly to the Council to allow for the necessary
30 subbasin and regional coordination. The Council will review these submissions
31 to identify appropriate funding sources and to help ensure prompt, coordinated
32 implementation of appropriate projects. The Council, in identifying funding
33 sources for private-landowner projects, will take into consideration, to the
34 extent possible, whether the private land is being managed in accordance with
35 applicable federal and state laws such as the Endangered Species Act and state
36 water quality standards.

37 38 **6.5A Coordination of Watershed Activities**

39 40 **Idaho, Oregon and Washington**

41
42 1. Each state should select a lead entity, such as the state conservation
43 commission or other appropriate entity, to support local subbasin efforts to
44 coordinate watershed activities. This support should include providing
45 technical or other resources, coordinating state agencies involvement, and

1 ensuring consistency with state law and policies. The local subbasin efforts
2 should include all interested parties and work with appropriate model
3 watershed groups. They should develop and implement approaches, such as
4 the coordinated resource management approach, for coordinating watershed
5 activities. These efforts should include consideration of the salmon and
6 steelhead integrated and subbasin plans and other relevant documents.
7 Submit products of these efforts to the Council and National Marine Fisheries
8 Service for review.

9
10 **Bonneville**

11
12 2. Provide initial funding for at least one coordinator in each of the states of
13 Idaho, Oregon and Washington to initiate efforts to coordinate watershed
14 activities. These coordinators may also coordinate development of model
15 watersheds (see Section 6.5B1, below).

16
17 **Council**

18
19 3. Review products of local watershed coordination efforts for consistency with
20 other activities in the appropriate subbasin and the region. Coordinate this
21 review with the National Marine Fisheries Service. Identify funding sources and
22 assist in obtaining funding for appropriate activities.

23
24 **6.5B Model Watersheds**

25
26 **Bonneville**

27
28 1. Provide initial funding for at least one model watershed coordinator selected
29 by each respective state. These coordinators may also coordinate watershed
30 activities (see Section 6.5A2, above).

31
32 **Idaho, Oregon and Washington**

33
34 2. Each state should select a coordinating entity for each model watershed
35 project, such as the state conservation commission or other appropriate entity.
36 Accomplish the following within the first year of implementation for each model
37 watershed project:

38
39 a. Compile a compendium of all sources of human and fiscal resources that
40 are potentially available for protection and improvement of habitat for the
41 model watershed. Coordinate this activity on a regional and state level, as
42 appropriate.

43
44 b. Identify all parties with an interest in each model watershed. Set up
45 procedures to include all these parties in the development and implementation

1 of the model watershed. Convene a watershed conference that includes all
2 parties with an interest in the model watershed.

3
4 c. Compile all existing plans, programs, policies, laws and other appropriate
5 items that relate to comprehensive watershed management in each model
6 watershed.

7
8 d. Identify gaps and conflicts in the existing plans, programs, policies, laws
9 and other appropriate items that hinder comprehensive watershed
10 management in each model watershed.

11
12 e. Set out a path and procedures for filling gaps and addressing conflicts.

13
14 f. Identify key factors limiting salmon and steelhead productivity.

15
16 g. Identify priority on-the-ground actions to address key limiting factors.

17
18 h. Provide for the involvement of volunteers and educational institutions in the
19 implementation of projects.

20
21 3. By the second year, begin implementation of priority on-the-ground actions
22 that address key limiting factors for
23 salmon and steelhead production through the implementation planning
24 process (see Section 7.1B). In addition, initiate the path and procedures for
25 filling gaps and addressing conflicts.

26
27 4. Each state report individually to the Council annually by October 15 on
28 progress in each model watershed. This report should include an overview
29 prepared by the coordinating entity for each model watershed. It should detail
30 the knowledge gained through experience in the subbasin that could be useful
31 for developing comprehensive watershed management in other subbasins.

32 **Council**

33
34
35 5. Review annual model watershed reports. Produce and disseminate a
36 document that describes lessons learned in model watersheds and provides
37 advice that might be useful in other watersheds.

38 **6.6 State, Federal and Tribal Habitat Actions**

39 **6.6A Land Management**

40
41 **U.S. Forest Service (Regions 1, 4, 6) and Bureau of Land Management**
42 **(Idaho and Oregon/Washington Offices)**
43
44
45

1 1. Immediately begin implementing the procedures outlined in the
2 Anadromous Fish Habitat Policy and Implementation Guide and seek means to
3 accelerate the Anadromous Fish Habitat Plan. By September 1, 1992, all land
4 management activities should be designed to at least maintain the quantity
5 and quality of existing salmon and steelhead habitat.

6
7 2. In streams where either water quality standards or federal land
8 management plan objectives for fish habitat and water quality are not being
9 met, initiate actions needed for recovery. Special attention should be given to
10 insect infestation as it relates to catastrophic fire danger that may threaten
11 salmon and steelhead habitat.

12
13 3. Review and, as necessary, amend existing land management plans to
14 incorporate the Council's habitat objectives, policies and performance
15 standards.

16
17 4. Immediately initiate development, updating and implementation of livestock
18 management plans and provide adequate staffing and funding to monitor and
19 supervise all livestock permits in salmon and steelhead production areas
20 consistent with the Council's habitat objectives, policies and performance
21 standards. By December 31, 1996, revise all livestock management plans, as
22 necessary, to incorporate and implement the Council's habitat objectives,
23 policies and performance standards and to address enhancement of riparian
24 areas and compliance with state water quality standards and best management
25 practices.³

26
27 5. Report to the Council by March 15 annually on the effect of federal land
28 management actions on salmon and steelhead populations, and habitat status
29 and trends on federal lands in the Columbia River Basin.

30
31 **Idaho, Oregon, Washington and Appropriate Indian Tribes in Consultation**
32 **With Appropriate Water Quality Agencies**

33
34 6. Establish best management practices under the Clean Water Act to
35 maintain and improve salmon and steelhead production. Best management
36 practices should be designed to meet the Council's habitat objectives, policies
37 and performance standards. Conduct monitoring to ensure that best
38 management practices are implemented and that instream salmon and

³ Best management practices are a practice or combination of practices that are the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with state water quality goals. The practicality of these efforts should include technological, economic and institutional considerations. The development and evolution of best management practices requires the input of experts on each resource that may be impacted in order that all values are appropriately considered.

1 steelhead habitat and water quality goals are met. Present practices to the
2 Council by June 30, 1993.

3
4 **State and Federal Agencies and Tribes**

5
6 7. Review and, if necessary, seek improvements to mining laws to promote
7 salmon and steelhead productivity. Ensure that all mining activities comply
8 with state water quality standards. Report to the Council on progress on this
9 measure by June 30, 1993, and annually thereafter.

10
11 **Idaho, Oregon, Washington, Bureau of Land Management, U.S. Forest**
12 **Service and Tribes**

13
14 8. Work with model watershed and other appropriate groups to identify and
15 protect riparian and underwater lands associated with perennial and
16 intermittent streams contributing to salmon and steelhead production,
17 regardless of whether a particular portion of a stream is fish-bearing. Where
18 water quality standards are being met, retain existing shade, vegetation,
19 standing and down large woody debris, and small woody debris. Where water
20 quality standards are not being met, initiate action to increase shade, re-
21 vegetation, standing and down large woody debris, and small woody debris.
22 Report to the Council on progress on this measure by June 30, 1993, and
23 annually thereafter.

24
25 **Idaho, Oregon, Washington, Bureau of Land Management (Idaho and**
26 **Oregon/Washington Offices) and U.S. Forest Service (Regions 1, 4, 6)**

27
28 9. Immediately develop programs to explore and implement land exchanges,
29 purchases or easements of a sufficient width to improve and maintain salmon
30 and steelhead production in privately owned riparian areas and adjacent lands,
31 with full compensation of landowners. In implementing this measure,
32 acquisition of easements should be the preferred approach for protecting
33 riparian areas and adjacent lands. Exchange or purchase that results in net
34 gains of land in public ownership should be considered the lowest priority
35 method for this purpose. States and federal agencies report progress to the
36 Council by December 31, 1993. In addition, federal agencies provide a list to
37 the Council by December 31, 1993, of high quality riparian lands that
38 potentially could be acquired through exchange.

39
40 **Bonneville and Other Implementing Entities**

41
42 10. Provide funding for the acquisition and management of permanent
43 conservation easements for rebuilding and maintaining Columbia Basin
44 salmon and steelhead populations. These acquisitions should be on a willing-

1 seller and willing-buyer basis. Report to the Council on progress on this
2 measure by June 30, 1993, and annually thereafter.

3
4 **6.6B Water Quality and Quantity**

5
6 **Water Regulation**

7
8 **Idaho, Oregon and Washington**

9
10 1. Review state water quality standards and compliance procedures by June
11 30, 1993, and report to the Council findings and any limitations in resources to
12 programs that could impact meeting the habitat objectives, policies and
13 performance standards of the program. If necessary, adjust water quality
14 standards and compliance procedures to meet the program habitat objectives,
15 policies and performance standards.

16
17 **Idaho, Montana, Oregon, Washington, and Federal and Tribal Agencies**

18
19 2. Improve enforcement of existing water rights and duties for diversions and
20 use from the mainstems of the Columbia and Snake rivers and tributaries. To
21 facilitate these determinations, ensure that existing and new diversions
22 affecting salmon and steelhead streams are equipped with devices to measure
23 instantaneous and seasonal flows.

24
25 **Instream Flows for Salmon and Steelhead**

26
27 **Idaho, Montana, Oregon and Washington**

28
29 3. To protect salmon and steelhead in the Columbia River and its tributaries:
30 establish instream flow protection levels; enforce water right permit conditions;
31 deny new water rights if water is not available consistent with salmon and
32 steelhead needs, or if existing water rights or the public interest would be
33 detrimentally affected; and acquire water rights on a voluntary basis by
34 purchase, gift, or through state or federal funding of water conservation or
35 efficiency improvements that produce water savings. Use all available
36 authorities to protect water provided for salmon and steelhead habitat or
37 passage. If existing authorities are inadequate, identify authorities needed and
38 seek legislative approval. In determining whether a proposed diversion or
39 transfer would be consistent with salmon and steelhead needs, consult with
40 fish and wildlife agencies and Indian tribes to determine whether the proposed
41 use would cause any reduction in the quantity or productivity of salmon and
42 steelhead habitat.

1 **Bonneville and Other Implementing Entities**

2
3 4. Provide funding for the acquisition and management of critical water rights
4 for rebuilding and maintaining Columbia Basin salmon and steelhead
5 populations. These acquisitions should be on a willing-seller and willing-buyer
6 basis. Report to the Council on progress on this measure by June 30, 1993,
7 and annually thereafter.

8
9 **Idaho, Oregon, Washington and Bureau of Reclamation**

10
11 5. Review the adequacy of existing law and administration to protect enhanced
12 instream flows for fish. Report results to the Council by June 30, 1993.

13
14 **Water Conservation**

15
16 Salmon and steelhead need adequate river flows for spawning, rearing and
17 migration. With growing development pressures on streams, there is a need to
18 find innovative ways to leave more water in streams. More efficient out-of-
19 stream water use may be a fruitful strategy. There are many questions about
20 how conserved water actually can be secured for salmon and steelhead. The
21 Council agrees that there is a pressing need to answer these questions.

22
23 **Council**

24
25 6. Continue to emphasize water conservation and efficiency improvements to
26 help salmon and steelhead.

27
28 **Bureau of Reclamation**

29
30 7. In 1991, initiate a cooperative effort with the states of Idaho, Oregon and
31 Washington, and with irrigators, to select and design at least four
32 demonstration water conservation projects, to provide additional instream flow
33 and enhanced water quality for production of weak stocks. One or more weak
34 stocks should be present in any given subbasin selected for demonstration.
35 There should be at least one demonstration project in Idaho, Oregon and
36 Washington. Consider opportunities to combine one or more of the water
37 conservation demonstration projects with model watershed projects described
38 under Section 6.5B.

39
40 8. Take initiative to secure the necessary funding to complete watershed
41 selection and planning by the end of 1993, and complete implementation of the
42 demonstration projects by December 31, 1996.

1 **Water Resource Information Coordination and Development**

2
3 **Environmental Protection Agency and the Council**

4
5 9. Secure funding through appropriate sources and establish a mechanism to
6 facilitate coordination of water quality activities relating to Columbia River
7 Basin fish and wildlife resources. This should be an integrated basinwide
8 approach that includes coordinated data management and an annual public
9 report and review process. Use a cooperative approach including participation
10 by all relevant entities such as Bonneville, Corps of Engineers, Federal Energy
11 Regulatory Commission, Bureau of Reclamation, fish managers, state water
12 quality agencies, state water resource agencies, tribal agencies, land
13 management agencies, U.S. Geological Survey and others. Report status of this
14 activity to the Council by April 15 annually.

15
16 10. Coordinate development of a study plan to compile and evaluate existing
17 water quality information, identify data gaps and priority problems, and
18 recommend proposals to address gaps and priority problems. Use a cooperative
19 approach including participation by all relevant entities such as Bonneville,
20 Corps of Engineers, Federal Energy Regulatory Commission, Bureau of
21 Reclamation, fish managers, state water quality agencies, state water resource
22 agencies, tribal agencies, land management agencies, U.S. Geological Survey,
23 Council and others. Coordinate with the Columbia River Estuary Bi-State
24 Study as well as other appropriate studies and programs. The project should
25 include analysis of point sources, non-point sources, dioxin pollution,
26 transboundary pollution, sewage in metropolitan areas and cumulative effects.
27 Complete study plan and submit to the Council by April 15, 1993. After
28 Council approval of the study plan, Environmental Protection Agency, Council
29 and other relevant entities secure funding through appropriate sources to
30 implement study plan. Report status of this activity to the Council by April 15
31 annually.

32
33 **Idaho, Montana, Oregon and Washington**

34
35 11. Explore expanding scope of the Columbia River Estuary Bi-State Study
36 to include all of the Columbia River Basin. If feasible, this would be more
37 effective in addressing comprehensively all interrelated water quality and
38 quantity aspects of the basin.

39
40 **Water Availability**

41
42 Water is a finite resource. The Council is concerned that continuing diversions
43 of Columbia River and tributary water will degrade stream conditions needed
44 by salmon and steelhead. Competing demands for water must be evaluated,
45 and Idaho, Oregon and Washington must consider the cumulative effects of

1 new diversions on water for salmon and steelhead. Elsewhere in this
2 document, the Council calls for water efficiency, water marketing programs and
3 other means of augmenting flows for fish. Continuing with water diversions
4 that would deprive salmon and steelhead of the benefits of these programs
5 would make little sense.

6
7 **Idaho, Montana, Oregon and Washington**

8
9 12. Continue discussions through the Interstate Agreement Workgroup to
10 reach an interstate agreement to protect from appropriation additional
11 Columbia and Snake river basin stream flows that come from storage releases,
12 water conservation or other efficiency improvements, where the water is needed
13 to maintain and rebuild salmon and steelhead populations.

14
15 **Idaho, Montana, Oregon, Washington, Bureau Of Reclamation and**
16 **Bonneville, in Coordination with Indian Tribes and Other Parties**

17
18 13. Develop a regional assessment of the availability of water for salmon and
19 steelhead spawning, incubation, emergence and migration in the Columbia
20 River and its tributaries, given current and projected water use and plans to
21 provide secure flows for salmon and steelhead. The assessment should include
22 a range of 50 percent to 95 percent probability of water availability. Scope the
23 assessment and submit a plan of work to the Council by October 31, 1992, and
24 submit the assessment by the end of 1993.

25
26 **Council**

27
28 **Subbasin Water Projects**

29
30 **Willamette Subbasin Actions**

31
32 **Corps of Engineers**

33
34 15. Complete investigation of the feasibility of installing devices to control the
35 temperature of the water discharged from Detroit Dam on the North Santiam
36 River by March 31, 1996. The Corps should report study progress to the
37 Council annually and should make recommendations to the Council at the
38 conclusion of the study.

39
40 16. Complete investigation of the feasibility of installing devices to control the
41 temperature of water discharged from Cougar and Blue River dams in the
42 McKenzie River Basin by March 31, 1995. The feasibility study should include
43 an evaluation of nonstructural alternatives, such as modification of existing
44 project operating rule curves, in combination with various temperature control
45 devices to restore downstream water temperatures to near pre-project

1 conditions. The Corps should report study progress to the Council every six
2 months and should make recommendations to the Council at the conclusion of
3 the study.

4
5 **Corps of Engineers, Bureau of Reclamation and Fishery Managers**

6
7 17. Immediately begin consultations to develop a storage agreement to
8 ensure minimum flows necessary to protect salmon and steelhead below
9 Willamette River projects

10
11 18. Continue studies to establish flow guidelines for the spawning, incubation
12 and rearing of salmon and steelhead in the Willamette Basin. Corps: report the
13 results of these studies to the Council annually.

14
15 19. Based on the results of the required studies, propose to the Council flow
16 guidelines to be incorporated into the operation of dams in the Willamette
17 Basin.

18
19 20. Upon approval by the Council of flow guidelines for federal hydropower
20 projects in the Willamette Basin, operate federal projects in accordance with
21 those guidelines. In the meantime, meet the established minimum flows.

22
23 **Background.** Over the past several years, the Corps has coordinated most
24 reservoir operations in the Willamette Basin with state and federal fish and
25 wildlife agencies. The Corps has, for the most part, accepted those agencies'
26 proposals for flow guidelines, but maintains that certain agency proposals are
27 unacceptable because they require more storage than is available. The Corps
28 also asserts that there are conflicting flows in the proposed guidelines and that
29 studies are necessary to determine the effects on the entire Willamette system.
30 The purpose of the study period is to resolve these differences.

31
32 **Umatilla Subbasin**

33
34 **Bonneville**

35
36 22. Provide power or reimbursement for power costs to Bureau of
37 Reclamation pumping plants designed to exchange Columbia River water for
38 Umatilla River water, so long as the exchange is administered in accordance
39 with federal and state laws, the permit issued pursuant to Application 71293,
40 the transfer order issued pursuant to Application T6621E, and memoranda of
41 agreement resulting from the Contested Case Proceeding on Protested Water
42 Applications 71293 and T6621E.

1 **Bureau of Reclamation**

- 2
3 23. Use the 6,000 acre-feet of storage in McKay Reservoir, which is not
4 contracted on a long-term basis, to enhance Umatilla River flows for
5 anadromous fish in cooperation with the fish and wildlife agencies
6 and tribes.
7

8 **Federal Project Operators And Regulators**

- 9
10 24. If new reservoirs are constructed for additional storage, the federal project
11 operators and regulators shall propose dedicating a specific portion
12 of storage necessary for the achievement of flows to protect, mitigate
13 and enhance fish and wildlife.
14

- 15 25. Long-term pumping

16
17 **Bonneville**

- 18
19 a. Provide power or reimbursement for power costs to Bureau of
20 Reclamation pumping plants designed to exchange Columbia River water
21 for Umatilla River water.
22

23 **Bureau of Reclamation**

- 24
25 b. Obtain consent from all affected water users and regulators and provide
26 assurance to the Council that water exchanged to augment streamflows
27 will be used to meet annual flow objectives established by the Oregon
28 Department of Fish and Wildlife and the Confederated Tribes of the
29 Umatilla Reservation of Oregon.
30

31 **The Oregon Water Resources Department**

- 32
33 c. Report annually to the Council regarding the amount of water provided
34 by pumping, the amount of exchanged water, and the disposition of the
35 exchanged water. In describing the disposition of exchanged water, the
36 report should indicate how much exchanged water is: (1) lost to
37 evaporation, ground water, and other natural losses; (2) diverted for out-
38 of-stream uses, and of this diverted water, the extent and timing of
39 return flows; and (3) left instream without loss or diversion. If any of this
40 information cannot be provided because of the problems in monitoring or
41 otherwise, the report should discuss whether and how monitoring
42 problems could be solved. Report to the Council regarding the
43 establishment of a water right for enhanced instream flows resulting
44 from the pumping exchange.
45

1 **Bureau of Reclamation**

- 2
3 d. Fund state fish and wildlife agency and tribal quantitative monitoring
4 and evaluation studies to determine the biological effectiveness of this
5 measure.

6
7 26. Interim Pumping

8
9 **Bonneville**

- 10
11 a. Pending installation of Bureau of Reclamation pumps, provide power or
12 reimbursement for power costs associated with interim pumping for
13 anadromous fish as proposed by the Columbia Basin Fish and Wildlife
14 Authority.

15
16 Oregon Water Resources Department

- 17
18 b. Report to the Council annually, as in subparagraph (a), the long-term
19 pumping measure.

20
21 27. Monitoring and Evaluation

22
23 Oregon Department of Fish and Wildlife and the Confederated Tribes of
24 the Umatilla Indian Reservation

- 25
26 a. Monitor and qualitatively evaluate the biological benefits of interim
27 pumping, and file a report with the Council and Bonneville annually.

28
29 **Bureau of Reclamation**

- 30
31 b. Beginning in 1989, fund state fish and wildlife agency and tribal
32 quantitative monitoring and evaluation studies to determine the
33 biological effectiveness of interim and long-term pumping.

34
35 **Bureau of Reclamation, Bonneville, Oregon Department of Fish and**
36 **Wildlife, Confederated Tribes of the Umatilla Indian Reservation,**
37 **and the Oregon Water Resources Department**

- 38
39 c. Jointly develop a monitoring and evaluation workplan that: (a)
40 coordinates the parties' monitoring and evaluation activities; and (b) identifies
41 the parties' administrative and funding commitments.

1 **Grande Ronde Subbasin Water Temperature Project**

2
3 Water temperature problems throughout the Columbia Basin signal the need to
4 gain experience in solving this problem in an important area such as the
5 Grande Ronde Subbasin.

6
7 **Environmental Protection Agency and Other Entities**

8
9 28. Coordinate design of a demonstration project to evaluate and address
10 water temperature problems in the Grande Ronde Subbasin.. Work
11 cooperatively with all relevant entities including model watershed project
12 participants. Complete project design and submit it to the Council by April 15,
13 1993. After Council approval of the project design, Environmental Protection
14 Agency, Council and other relevant entities secure funding through appropriate
15 sources to implement study plan.

16
17 Lewis River

18
19 Pacific Power and Light Company

20
21 29. Subject to FERC approval, develop a flow plan in consultation with the
22 fish and wildlife agencies and tribes and the Washington
23 Department of Ecology for the spawning, incubation and rearing of
24 salmon and steelhead below Merwin Dam on the north fork of the
25 Lewis River. Upon approval by the Council and FERC, the flow plan
26 will become a part of this program.

27
28 **Background.** PP&L, the Washington Department of Fisheries, and the
29 Washington Department of Game are developing a flow plan for the lower Lewis
30 River below Merwin Dam. The Council will review this plan when it becomes
31 available.

32
33 McKenzie River

34
35 Eugene Water and Electric Board

36
37 30. Subject to FERC and Council approval, fund a study of the lower
38 McKenzie River to determine the flows required for the spawning,
39 incubation and rearing of salmon and steelhead.

40
41 **Background.** The McKenzie River is the most important producer of spring
42 chinook salmon in the Willamette Basin. The EWEB hydroelectric facilities at
43 Leaburg and Walterville divert water from the mainstem river. The overall river
44 flow is not affected by this non-consumptive use of water, but two sections of
45 the river, between the intakes and the return canals, receive significantly

1 reduced flows during certain periods. Studies by the fish and wildlife agencies
2 indicate that greater flows are required to maintain natural propagation of
3 anadromous fish.

4 5 **6.6C Tributary Passage**

6
7 During the last 50 years, state and federal entities initiated water diversion
8 screening programs in several parts of the Columbia River Basin. Hundreds of
9 screens have been installed on important fish-bearing streams. Unfortunately,
10 salmon and steelhead are still being lost in diversions throughout the basin. A
11 large number of diversions, including many on the Salmon and Grande Ronde
12 rivers and other streams that support weak stocks, remain unscreened. In
13 addition, many of the existing screening facilities are in need of maintenance or
14 other improvements.

15
16 There is an immediate need to accelerate the installation of new facilities on
17 unscreened diversions and repair or upgrade older facilities. Unscreened or
18 poorly screened diversions result in the loss of many juvenile salmon and
19 steelhead that have survived the rigors of natural rearing only to be killed at
20 the beginning of their journey to the ocean. This effort has a high probability of
21 reducing salmon and steelhead mortality and will require the use of all
22 available resources for funding, design, construction and installation. Because
23 of the need for quick action, it is specially important that the resources of the
24 private sector be used to ensure timely construction and installation of high
25 priority screens and measuring devices, if such resources are necessary to
26 meet the desired installation time line.

27
28 This process is not intended to interfere with the implementation of screening
29 activities using existing funding mechanisms and programs. Those activities
30 should proceed simultaneously with the process outlined below. As the
31 oversight committee and Technical Work Groups are developed, the products
32 developed by these groups should be integrated into the ongoing processes as
33 well as the implementation planning process (see Section 7.1B).

34 35 **Fishery Managers**

36
37 1. Develop a prioritized list of tributary screening and passage facility
38 improvements for stream diversions in the Columbia River Basin affecting
39 salmon and steelhead. Improvement can include new facilities and the
40 upgrading and maintenance of existing facilities. The list should also include
41 Columbia River and Snake River mainstem pump diversions. Coordinate this
42 list with the assessment of mainstem diversions in Section 6.6C6. Priority
43 initially should be given weak stocks, with emphasis on stocks petitioned
44 under the Endangered Species Act in the Snake River Basin. This list should

1 be updated annually through the implementation planning process (see Section
2 7.1B).

3
4 **All Parties**

5
6 2. Criteria for design, construction, operation and maintenance of facilities
7 should be based on standards and criteria developed by the National Marine
8 Fisheries Service in concert with other agencies with expertise in the areas of
9 screening and fish protective facilities in the region. Use the existing expertise
10 of federal, state and tribal entities and others, including the private sector, to
11 accelerate implementation of screening and passage measures. In addition,
12 conduct statistically valid evaluations of screening facilities, as necessary, to
13 ensure that fish are adequately protected and the numbers of adult fish
14 returning to the Columbia River, as a result of this program, are assessed.
15 Evaluation should be coordinated through the implementation planning
16 process (see Section 7.1B).

17
18 **Bonneville**

19
20 3. Fund costs associated with operation of the Fish Screening Oversight
21 Committee and Technical Work Groups established by the National Marine
22 Fisheries Service. These committees should be incorporated into the
23 implementation planning process (see Section 7.1B). The oversight committee
24 should include state, federal (including Bonneville), Council, tribal and
25 irrigation representatives. The committee should provide overall direction, set
26 priorities and ensure oversight of objectives, funding opportunities, standards,
27 biological criteria and evaluation. The Technical Work Groups should include
28 passage experts and other appropriate technical personnel representing
29 federal, state, tribal and irrigation entities. The Yakima Fish Passage Technical
30 Work Groups are to recommend project priorities within their area of concern
31 to the oversight committee and to work with the entity constructing the
32 diversion screens and passage facilities to ensure the facilities are constructed
33 according to the prescribed criteria and that the necessary project evaluation is
34 designed and implemented. In the case of large projects, this may include the
35 following:

- 36
37 a. establish written operating criteria;
38
39 b. develop preliminary designs;
40
41 c. see that necessary permit processes are carried out;
42
43 d. make certain private landowner and public concerns are addressed;
44

- 1 e. review detailed designs to ensure that biological and engineering criteria are
2 met;
3
4 f. monitor construction phases;
5
6 g. monitor operation and maintenance phases in compliance with criteria and
7 recommend corrective actions if necessary; and
8
9 h. conduct project evaluations.

10
11 **National Marine Fisheries Service, Working with Oversight Committee,**
12 **Appropriate Technical Work Groups and Bonneville**

13
14 4. Identify resources that will be needed to accomplish screening and passage
15 work, and prepare a general operation and maintenance plan, including a
16 schedule, budget, proposed cost sharing incentive programs and monitoring
17 and evaluation plans. The presumption is that diversion owners will contribute
18 a significant amount of funding for installation and maintenance of screens.
19 Under current federal law, some federal funds may be available to assist in
20 diversion screening. The plan will also address how ongoing screening and
21 passage programs funded by the Mitchell Act and the states will be
22 comprehensively integrated basinwide. The National Marine Fisheries Service,
23 the oversight committee, and Bonneville should review this plan with the
24 Council by February 1, 1992. The goal is to complete the installation of all
25 needed screens and passage facilities by the end of 1995.

26
27 **Bureau of Land Management (Idaho and Oregon/Washington Offices), U.S.**
28 **Forest Service (Regions 1, 4, 6) and Bureau of Reclamation (Pacific**
29 **Northwest Region)**

30
31 5. Require as a condition of both existing and new water use authorizations,
32 that diversion structures have functional fish screens and other passage
33 facilities for man-made barriers to salmon and steelhead that meet the criteria
34 referenced above. For existing authorizations, wherever practical, and
35 especially on high priority diversions, the three agencies should proceed to
36 design and install screens on a multiagency or shared-cost basis, with
37 authorization renewals contingent on reimbursement to the agency, or other
38 arrangements satisfactory to the agency. By March 1 of each year the three
39 federal agencies should report on their progress, including the number of such
40 permits, estimated screening costs, resources needed to implement and
41 monitor the program, and a time frame for compliance.
42

1 **Corps of Engineers**

2
3 6. By January 1993, resume the program to inspect all underwater diversions
4 in the mainstem Columbia and Snake rivers to determine whether screens that
5 prevent losses of juvenile and adult salmon are installed and operating. Repair,
6 update and, where necessary, install screens on all diversions by December 31,
7 1995. The presumption is that diversion owners will fund installation and
8 maintenance of screens. The Corps of Engineers, National Marine Fisheries
9 Service and other appropriate sources might also be considered as potential
10 funding sources. Work under this measure should be coordinated with all
11 other measures under this section.

12
13 **Condit Dam**

14
15 **Pacific Power and Light Company**

16
17 7. Subject to FERC approval, design and construct facilities immediately to
18 allow upstream and downstream migration of anadromous fish at Condit Dam.
19 Assume full responsibility for annual operation and maintenance costs of these
20 facilities.

21
22 **Background.** Condit Dam once had a fish ladder, but the ladder was washed
23 out. Therefore, no passage to the upper White Salmon River currently exists
24 for adult migrants. If fish passage were provided, 30 to 40 miles of spawning
25 habitat would become available above Condit Dam. FERC ordered PP&L to
26 study the feasibility of providing fish passage past the dam. This study,
27 completed in September 1982, determined that passage is feasible.

28
29 **Enloe Dam Fish Passage**

30
31 **Federal Energy Regulatory Commission**

32
33 8. Require any holder of a license for an operating hydroelectric facility at
34 Enloe Dam to design and construct the hydroelectric facility improvements to
35 be compatible with future installation and operation of upstream and
36 downstream anadromous fish passage facilities. If the Council determines that
37 anadromous fish should be introduced into the Similkameen River, above
38 Enloe Dam, require the licensee to construct and operate appropriate
39 anadromous downstream passage facilities. Upstream passage could
40 potentially provide the region with the opportunity for the establishment of an
41 anadromous fish run throughout the more than 320 linear miles of spawning
42 and rearing habitat of the Similkameen Basin. This could be considered as off-
43 site enhancement or mitigation for mainstem Columbia River anadromous fish
44 losses and would not be the responsibility of the Enloe hydroelectric licensee.

1 Determination of regional responsibility, if any, for upstream fish passage
2 facilities will be decided at a future date.

3
4 **Dryden Dam Screens**

5
6 **Bonneville**

7
8 9. Fund the planning, design, construction and evaluation of improvements in
9 the fish screens and bypass facilities at the water diversion canal at Dryden
10 Dan on the Wenatchee River. The work should be coordinated with Chelan
11 County PUD's maintenance of the overflow structure, to minimize costs and
12 ensure that the screens, bypass structure, and overflow structure
13 accommodate each other.

14
15 **Federal Energy Regulatory Commission**

16
17 10. If hydropower facilities are later proposed to be added to the Dryden dam
18 or diversion, require the licensee to reimburse Bonneville for an equitable
19 portion of the cost of these fish screens and bypass facilities.

20
21 **Green Peter Dam**

22
23 **Corps of Engineers**

24
25 11. Conduct studies to determine the effect of fluctuating flows at Green Peter
26 Dam on the maintenance of steelhead runs in the South and Middle Santiam
27 rivers. The studies should include:

- 28
29 (A) An evaluation of the effect of maximum and minimum flows or
30 combinations of flows on adult steelhead movement;
31
32 (B) Monitoring of steelhead movement in Green Peter and Foster
33 reservoirs to determine whether delays in migration are occurring in
34 the reservoirs; and
35
36 (C) An assessment of spawning and rearing areas above Green Peter
37 Reservoir to determine if alterations that affect spawning and
38 rearing have occurred.

39
40 **Background.** Since the completion of the Green Peter Dam/Foster Dam
41 complex on the South and Middle Santiam rivers in 1969, the number of native
42 winter steelhead has decreased in the upper South Fork and Middle Fork of the
43 Santiam River. In 1979 and 1980 no adults returned to the Green Peter Dam
44 adult trap, and in 1981 only 13 adults returned. Research is necessary to
45 determine solutions for the decreasing runs to the Middle Santiam River.

1
2 **Willamette Falls Fishway**

3
4 **Bonneville and the Portland General Electric Company**

5
6 12. Subject to FERC approval, jointly install, operate and maintain an adult
7 trapping facility in the Willamette Falls fishway. Funding for the facility should
8 be in the same proportion as the original ratio of federal-to-PGE funding of the
9 adult fishway.

10
11 **Background.** The fishway at Willamette Falls provides entrance to the upper
12 Willamette Basin for fish destined for upriver areas. Currently up to 50
13 percent of the annual spring chinook counted at Willamette Falls cannot be
14 accounted for at upstream locations. The ability to trap adult fish will permit
15 the collection of biological data for improved management. It is estimated that
16 an effective adult trap will provide increases of almost 10 percent in adults
17 returning to the upper Willamette River.

18
19 **Clackamas River Dam**

20
21 **Fish And Wildlife Agencies and Portland General Electric Company**

22
23 13. Work cooperatively to investigate and resolve adult fish passage problems
24 associated with PGE's Clackamas River hydroelectric dams.

25
26 **Background.** The fish and wildlife agencies maintain that the fishways located
27 at the three PGE dams on the Clackamas River have not been effective and
28 adult fish are delayed in moving upstream. PGE maintains that the delay of
29 adult fish is not due to the ineffectiveness of its fish ladders, but is caused by
30 the Oregon Department of Fish and Wildlife's smolt release program. Summer
31 steelhead smolts that normally would be released above PGE's North Fork
32 project are released into the North Fork ladder to keep the fish from being
33 caught by trout fishermen. Spring chinook smolts are released at the
34 Clackamas hatchery immediately below River Mill Dam.

35
36 **Eugene Water and Electric Board**

37
38 14. Subject to Federal Energy Regulatory Commission approval, design,
39 construct and operate by August 1, 1995, a new right bank fish ladder at
40 Leaburg Dam and a velocity barrier in the Leaburg powerhouse tailrace, or
41 equivalent alternative means to prevent injury and migration delay of adult
42 salmon. Assume full responsibility for annual operation and maintenance of
43 these adult passage facilities. If the Leaburg relicense application is delayed,
44 take prompt action to amend the existing license to complete the right bank
45 fish ladder on schedule. In the event Federal Energy Regulatory Commission

1 approval is earlier than anticipated in the Eugene Water and Electric Board's
2 proposed schedule, make a good-faith effort to accelerate completion of the
3 right bank fish ladder.

4
5 15. Subject to Federal Energy Regulatory Commission approval, design and
6 construct a velocity barrier in the Walterville Hydroelectric Project tailrace to
7 prevent the migration delay and injury of adult anadromous fish. The velocity
8 barrier should be completed and operational no later than July 1, 1995.
9 Assume full responsibility for annual operation and maintenance of this adult
10 passage facility. If the Walterville relicense application is delayed, take prompt
11 action to amend the existing license to complete the velocity barrier on
12 schedule. In the event Federal Energy Regulatory Commission approval is
13 earlier than anticipated in the Eugene Water and Electric Board's proposed
14 schedule, make a good-faith effort to accelerate completion of the Walterville
15 project tailrace velocity barrier.

16
17 **Bonneville**

18
19 16. Fund the placement of structures immediately downstream of Starbuck
20 Dam to provide sufficient backwater for spring chinook and steelhead to jump
21 the dam during spring runoff, and construction of a structure at the base of
22 the dam to allow fall chinook passage during low flows.

23
24 **Marmot Dam**

25
26 Portland General Electric Company 17. Subject to FERC approval,
27 continue studies to determine the effectiveness of the existing juvenile bypass
28 system and screens at Marmot Dam.

29
30 Background. Marmot Dam is owned by PGE and is located on the upper
31 Sandy River in Oregon. The project diverts 600 cfs from the Sandy River
32 through Marmot Canal into turbines on the Bull Run hydroelectric project. A
33 study currently is being conducted to determine whether juvenile fish
34 migrating from the upper Sandy River are subject to delay, mortality or
35 diversion into the forebay of the power turbines at Bull Run. The upper Sandy
36 River has a high potential for fish production. A comprehensive evaluation of
37 the existing bypass and screening system is necessary to determine if safe and
38 undelayed passage can be provided.

39
40 **Sullivan Plant**

41
42 Portland General Electric

43
44 18. Subject to FERC approval, conduct studies to evaluate the juvenile bypass
45 system and screening at the Sullivan Plant.

1
2 **Background.** PGE owns and operates a powerhouse, the Sullivan Plant, at
3 **Willamette Falls** on the Willamette River. The plant diverts 5,000 cfs from the
4 river into the hydroelectric turbines, and, during low flows, most of the water
5 from the river passes through the turbines. PGE has taken several measures
6 to correct existing problems, including shutting down the powerhouse during
7 low flows and installing bypass screening. Further studies are needed to
8 evaluate the effectiveness of these measures.

9
10 **Foster Dam**

11
12 **Corps of Engineers**

13 **19. Evaluate existing studies and investigate alternative methods of providing**
14 **adequate downstream fish passage at Foster Dam.**

15
16 **Background.** Foster Dam is a low-head dam on the South Santiam River.
17 When it was constructed, downstream migrants were expected to pass
18 successfully through the turbines or under the spillway gates. Juvenile spring
19 chinook and sockeye have been successful in passing the dam, but native
20 winter steelhead have not. From 1973 to 1981, annual runs of steelhead
21 declined from an estimated 1,900 adults to fewer than 500.

22
23 **Leaburg Canal**

24
25 **Eugene Water and Electric Board**

26
27 **20.. Subject to Federal Energy Regulatory Commission approval, make**
28 **improvements to the existing juvenile fish screen cleaning and bypass facilities**
29 **at the Leaburg Canal Hydroelectric Project by December 31, 1992, and ensure**
30 **that the fish bypass and screen cleaning systems continue to operate**
31 **effectively. Ensure that the juvenile fish passage efficiency of the Leaburg**
32 **screen and bypass system is not reduced when the Eugene Water and Electric**
33 **Board's proposal to raise the elevation of Leaburg Lake is implemented.**
34 **Assume full responsibility for annual operation and maintenance of these**
35 **facilities.**

36
37 **Background.** Substantial populations of juvenile salmon and steelhead
38 migrate through the portions of the McKenzie River affected by the Leaburg
39 project. Studies have shown significant mortalities associated with turbine
40 passage. EWEB has agreed to provide a bypass system.

41

1 Walterville Canal

2
3 **Eugene Water and Electric Board**

4
5 21.. Subject to Federal Energy Regulatory Commission approval, design and
6 construct a permanent screening and bypass system for juvenile migrants at
7 the Walterville Canal Hydroelectric Project. The juvenile fish bypass facilities
8 should be completed and operational no later than November 11, 1995.
9 Assume full responsibility for annual operation and maintenance of these
10 facilities. If the Walterville relicense application is delayed, take prompt action
11 to complete the screening and bypass facilities on schedule by either preparing
12 and filing a fish passage facility plan with the Federal Energy Regulatory
13 Commission under Article 34 of the existing license or amending the existing
14 license. In the event the Regulatory Commission's approval is earlier than
15 anticipated in the Eugene Water and Electric Board's proposed schedule, make
16 a good faith effort to accelerate completion of the Walterville juvenile fish
17 bypass facilities.

18
19 Background. Walterville Canal is operated by EWEB in conjunction with
20 Leaburg Canal. The problems encountered by juvenile migrants at this project
21 are essentially the same as those at Leaburg.

22
23 **6.6D Expedited Process for Funding Projects**

24
25 Many high priority habitat improvement projects involve transactions with
26 private landowners and water rights holders. In working with the private
27 sector, timely access to funding will be essential once negotiations have
28 concluded and parties are ready to proceed. This ability to move quickly is not
29 currently in place, and it is essential to capitalize on agreements to undertake
30 cooperative habitat improvement and protection.

31
32 **Bonneville**

33
34 1. In consultation with the fishery managers, the Council and other relevant
35 parties, explore alternative procedures for funding high priority habitat projects
36 expeditiously. Report to the Council on a proposed procedure by December 31,
37 1992.

38
39 **6.7 Yakima River Basin**

40
41 Background. The Yakima River Basin (Figure XXX) is located east of the
42 Cascade Range in Washington, where annual precipitation is very low.
43 Irrigation has changed the Yakima River Valley from a near-desert environment
44 to one of the most productive agricultural regions in the country. Valuable
45 agricultural crops are grown there, thanks to a series of irrigation diversion

1 dams, canals and ditches. Three irrigation diversion dams also divert water for
2 hydroelectric generation. However, in a low water year, the demand for
3 irrigation water for farming and ranching still exceeds the water supply.
4 Available water must be allocated among competing uses, and the provision of
5 streamflows sufficient to support anadromous and resident fish historically has
6 received a lower priority. Yet, because the Yakima's fish habitat remains
7 largely intact, most fish and wildlife experts consider this basin to be one of the
8 areas with the best potential for producing anadromous fish in the Columbia
9 River Basin. The fish in the Yakima Basin already are beginning to rebound,
10 with 12,000 returning to spawn in 1987, compared to 2,000 in 1980.

11
12 In the past, during certain times of the year, sections of the river below
13 some diversion dams have been dry, making fish migration impossible. Water
14 in the pools that remain and in the river below irrigation returns reaches
15 temperatures that are too high to support cold-water fish species. In addition,
16 irrigation return flows carry sediment and chemicals into the Yakima River.
17 However, water quality problems are secondary to those concerning water
18 quantity. Additional water storage, and changes in existing storage operations
19 and water management functions, are needed in the Yakima River Basin to
20 satisfy fish requirements while meeting other competing demands, particularly
21 irrigation uses.

22
23 In addition to water supply problems, many of the fish screens and
24 passage facilities at the various irrigation and hydroelectric structures that
25 control streamflows in the Yakima Basin were outdated, in ill-repair or non-
26 existent when this program was developed in 1982.

27
28 The Council adopted Yakima River Basin measures primarily as off-site
29 enhancement. Off-site enhancement is a way to compensate for fish and
30 wildlife lost due to development and operation of a hydropower project
31 elsewhere in the Columbia River Basin. Such enhancement is used when it is
32 not desirable or feasible to mitigate the adverse impacts at the hydropower site
33 where the fish were lost. This program's Yakima measures include actions to
34 correct structural problems at irrigation diversion dams, canals and ditches
35 that interfere with the passage of anadromous fish. These are off-site
36 enhancement projects to mitigate the impacts of hydropower elsewhere in the
37 basin. Measures to provide passage or protection in the lower Yakima River
38 have received priority and are nearly completed. Once the lower-river passage
39 problems are solved, emphasis will be placed on the upper reaches.

40
41 Notable progress has been made on the Yakima Basin projects. Screens
42 and ladders have been completed at a number of diversion dams. Other
43 passage projects are well under way or near completion. The increased fish
44 runs recorded in 1986 underscore the Yakima River's potential as one of the
45 most promising areas for off-site enhancement in the Columbia River Basin.

1
2 The Council recognizes that the water needs of the Yakima River Basin,
3 including provision of adequate flows for fish, cannot be satisfied without
4 additional storage, changes in existing storage operations and/or modification
5 of water management practices. Although Bumping Lake (on the Naches arm
6 of Yakima River in central Washington) has a long history of study as a suitable
7 site for added storage, several other sites also have significant potential. These
8 sites are being studied by the Bureau of Reclamation and the Washington
9 Department of Ecology. The results of this study should be considered in
10 identifying the site or sites to be developed for additional storage.

11
12 The Council also recognizes the critical importance of the Yakima River's
13 potential for natural propagation and as a system for releasing hatchery fish.
14 An outplanting facility to supplement natural production in the Yakima Basin
15 will be developed in accordance with Section 503(c)(2): Harvest Management
16 and Section 703(f)(3): Wild, Natural and Artificial Propagation.

17
18 Additional water storage in the Yakima River Basin should be used
19 primarily to provide flows to allow the rebuilding of anadromous fish
20 populations and to protect resident fish. Recent studies to estimate the flow
21 requirements for anadromous fish will provide the Council with better
22 information for identifying basinwide flows for anadromous fish protection.
23 Results of these studies also will provide a more detailed basis for determining
24 the amount of water storage necessary for fish flows, a key factor in basin
25 water planning and assessment of storage sites.

26
27 When additional water storage is developed in the basin, a major use of
28 this water should be to protect, mitigate and enhance the basin's anadromous
29 and resident fish and wildlife. Flexibility in water management could be
30 increased through construction of reregulating dams. The Council endorses
31 this as a means to allow the additional stored water to be used for both
32 agriculture and fish enhancement.

33
34 The Council encourages more efficient use of water in the basin. Irrigation
35 results in the loss of large volumes of water, primarily through transpiration,
36 poorly maintained canals and ditches, and field flooding practices. Water also
37 has been used for frost protection of crops, a practice that appears to be
38 gaining popularity. Other irrigation methods could use less water. For
39 example, irrigation waters can be distributed through closed, pressurized
40 systems. In addition, water management alternatives, such as water banking,
41 have been proposed.

42
43 Funding of many program measures in the Yakima River Basin is part of a
44 cooperative effort involving Bonneville, the Bureau of Indian Affairs, the Bureau
45 of Reclamation and others. The Council anticipates that cooperative funding

1 will continue as provided under Section 1203(d)(4): Coordination, which calls
2 on Bonneville to work with the Council and the federal project operators to
3 identify the most expeditious means for funding measures at federal projects.

4
5 **6.7A Additional Water Storage**
6

7 1. Before specifying program measures to resolve the storage problem in the
8 Yakima River Basin, the Council will consult with the fish and wildlife agencies
9 and tribes, especially the Yakima Indian Nation. The Council will evaluate the
10 results of the Bureau of Reclamation and Washington Department of Ecology
11 study of alternative storage sites and other studies of improved flows for
12 anadromous fish. Based on this consultation and evaluation, the Council will
13 develop measures that identify a site, or a combination of sites, and the
14 amount of storage required. The Council maintains that the stored water
15 should be used primarily to protect, mitigate and enhance anadromous and
16 resident fish in the basin. The Council also will evaluate the use of
17 reregulating dams to provide maximum flexibility in managing the additional
18 stored water.

19
20 2. The Council encourages all parties to use water as efficiently as possible
21 in order to satisfy the many needs in the Yakima River Basin, to take any
22 interim steps to improve fish flows in the Yakima River, and to support a
23 program of additional storage incorporating appropriate cost-sharing
24 arrangements.

25
26 3. To reduce the amount of additional storage required, the Council will
27 consult with water users regarding more efficient water-use practices in the
28 basin, including alternative irrigation methods and water planning.

29
30 4. In keeping with the provisions of Section 210, Title II of Public Law 97-293
31 (the Reclamation Reform Act of 1982), the Council expects that:

32
33 a. The Secretary of the Interior will encourage the full consideration
34 and incorporation of prudent and responsible water conservation
35 measures in the operations of non-federal recipients of irrigation
36 water from the Yakima Project, where such measures are shown to
37 be economically feasible for those recipients.

38
39 b. Each Yakima River Basin irrigation district that has entered into a
40 repayment contract or water service contract pursuant to federal
41 reclamation law or to the Water Supply Act of 1958, as amended (43
42 U.S.C. 390b), will promptly develop a water conservation plan
43 containing definite goals, appropriate water conservation measures,
44 and a schedule for meeting the water conservation objectives.
45

1 c. To ensure coordination of ongoing programs, the Secretary of the Interior
2 will enter into memoranda of agreement with federal agencies that
3 can assist in implementing water conservation measures. Such
4 memoranda will provide for involvement of non-federal entities,
5 including the Council, the Washington Department of Ecology, the
6 Yakima Indian Nation, water users' organizations and other
7 appropriate groups, to ensure full public participation in water
8 conservation efforts.
9

10 **6.7B Passage**

11 Bonneville:

12
13
14 1. After consultation with the fish and wildlife agencies, the tribes and the
15 Bureau of Reclamation, and upon approval by the Council, implement needed
16 fish passage improvements at irrigation diversion dams, canals and ditches in
17 the basin. Lower river passage improvements will be made first. They will be
18 followed by passage improvements in the upper river.
19

20 2. Upon approval by the Council, fund a study to determine the feasibility of
21 re-establishing runs of anadromous fish above Cle Elum Dam. If results of the
22 study indicate that restoration is feasible, Bonneville shall fund the
23 construction of fish passage facilities at Cle Elum Dam.
24

25 3. Fund the construction of fish passage facility projects included in the two
26 highest-priority groups established by the Yakima Passage Technical Work
27 Group approved by the Council. Construction will begin with the highest
28 priority facilities as established by a predesign memorandum and the Yakima
29 Passage Technical Work Group. The Yakima Passage Technical Work Group
30 may substitute projects from lower-priority groups for projects in groups 1 and
31 2 based on information developed or circumstances encountered during design.
32 The Yakima Indian nation and the fishery agencies should continue to make
33 efforts to secure cost-sharing funding for the construction of Yakima Basin fish
34 passage facilities listed in Appendix A Table. Funding for the two unscreened
35 projects on tribal land should be conditioned on the Yakima Indian Nation
36 adopting a requirement that any future water diversions on tribal land are
37 screened at the time the diversion is made.
38

39 **6.7C Flows**

40
41 1. Upon approval by the Council and in consultation with the Washington
42 Department of Ecology, the Bureau of Reclamation shall provide the minimum
43 flows required for fish passage, spawning, incubation and rearing at Prosser
44 and Roza dams and other locations in the basin. The Council encourages
45 Pacific Power and Light Company to work with the Washington Department of

1 Ecology, fish and wildlife agencies and tribes to provide such flows at the
2 Wapatox Project. The Council will specify minimum flow requirements and the
3 location of flow control and monitoring points after evaluating the results of the
4 instream flow studies.

5
6 2. Until the results of instream flow studies are available, the Council will
7 support the establishment of interim flows upon receipt of proposals from the
8 fish and wildlife agencies and tribes, especially the Yakima Indian Nation.
9 Those proposals will identify specific flow control and monitoring locations and
10 information on the adequacy and safety of the recommended flows.

11
12 3. Before supporting any flows for fish in the Yakima Basin, the Council will
13 consult with the System Operations and Advisory Committee, irrigation
14 districts, Washington Department of Ecology, the Bureau of Reclamation, fish
15 and wildlife agencies and tribes.

16
17 **Background.** The System Operations and Advisory Committee was established
18 as a means for fish and wildlife agencies, tribes, irrigation districts and the
19 Bureau of Reclamation to negotiate flows to protect spawning and incubation
20 in the Cle Elum River and elsewhere in the Yakima Basin.

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Section 7

COORDINATED IMPLEMENTATION, MONITORING AND EVALUATION

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Introduction

The Council recognizes the need to employ a systemwide approach to address the needs of Columbia River Basin fish and wildlife. To accomplish this, a coordinated implementation, monitoring and evaluation process is essential. This process should be flexible enough to evolve over time. It should facilitate identification of priorities. It should provide coordination at levels needed to accomplish basinwide as well as local watershed objectives. Coordination must also encompass all programs, plans, policies and statutes that affect fish and wildlife produced in the Columbia River Basin. It must allow all affected parties meaningful participation, encourage local implementation and guidance and provide needed regional coordination. The approach should also provide a mechanism for accountability.

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Considering all the functions that need to be addressed by coordinated implementation, monitoring and evaluation at both the regional and local level, it is easy to envision a complicated system of committees with frequent meetings and numerous assignments. The intent of the Council is to avoid this approach as much as possible. Coordinated implementation, monitoring and evaluation should be lean on process and heavy on implementation of on-the-ground actions for fish and wildlife. Standing committees and meetings should be kept to a minimum. When meetings are needed, existing groups and committee structures should be used. If existing committees are not appropriate for topics that need to be addressed, informal gatherings or ad-hoc approaches should be used to accomplish the need. The processes and committees that are created should be reviewed frequently to ensure their continuing need. In short, the Council intends that coordinated implementation, monitoring and evaluation should expedite, not burden, actions for fish and wildlife.

37
38

7.1 Coordinated Implementation

39
40

7.1A Basin Oversight Group

41
42

Council

43
44
45

1. Organize and convene a Basin Oversight Group, consisting of policy-makers from the state and federal implementing entities and other interested parties, to aggressively pursue implementation of this program. The Basin Oversight

1 Group will meet at least annually to address progress, problems and issues
2 regarding program implementation. This group will review the annual
3 implementation work plan and the annual program monitoring report. It will
4 make recommendations to the Council by July 31 of each year. Meetings of the
5 Basin Oversight Group will focus on needed actions and implementation
6 problems, not routine reporting. All other committees identified in this program
7 will coordinate with the Basin Oversight Group.
8

9 **7.1B Implementation and Monitoring**

10
11 As the region moves forward to realize the ambitious goals of the fish and
12 wildlife program it will pursue two closely related, parallel paths. One is the
13 implementation path-that is, taking specific actions identified in the annual
14 implementation work plan. This path will include steps to address
15 uncertainties and refine actions over time. The second path is evaluation. The
16 evaluation path will monitor overall program implementation, evaluate the
17 effectiveness of actions taken, and judge their scientific merits. One outcome
18 will be an annual assessment of the program's performance-the annual
19 program monitoring report. This report can be used to determine the need, if
20 any, for mid-course corrections.
21

22 A key component of program implementation is feedback, through
23 implementation of actions and program monitoring, to facilitate the refinement
24 of the program over time. For this, the program framework (described in
25 Section 2 and Appendix A) will act as a yardstick for evaluating the
26 performance of the program.
27

28 There are many areas where current information is incomplete because we are
29 as yet unable to measure some key variables, and because of the possibility of
30 unforeseen events. The Council expects to revisit the schedules and targets as
31 necessary based on information gathered by the monitoring program and
32 evaluation of implemented actions. If progress toward the performance
33 standards or meeting rebuilding schedules falls significantly short, the Council
34 will revisit all or part of the program.
35

36 **Implementation of Actions Including Research Projects**

37
38 Bonneville's implementation of this program to date has been guided by an
39 implementation planning process negotiated with the fish and wildlife agencies
40 and tribes. Bonneville created a policy review group and a scientific review
41 group to review implementation questions. Coordination and prioritization of
42 actions occurs in technical scoping groups that focus on different aspects of
43 the program. In this section, the Council calls for this implementation process
44 to be broadened to include land and water managers and other interested
45 parties to produce an annual implementation work plan and a monitoring

1 report, and to provide for independent scientific review of the program and its
2 implementation. The annual implementation work plan should reflect program
3 goals and *principles, and any prioritization of measures developed by the*
4 *Council.*

5
6 **Bonneville, Fishery Managers and Others**
7

8 1. Expand the implementation planning process so that participants prioritize
9 and coordinate implementation of all program measures, including research.
10 Participants should include the Council, the National Marine Fisheries Service,
11 fish and wildlife agencies, Indian tribes, Bonneville, river operators, land and
12 water managers, utilities, citizen groups and others.

13
14 2. Participants in this expanded process should prepare an annual
15 implementation work plan:

16
17 a. detailing actions by all parties to implement program measures;

18
19 b. prioritizing actions, using the six principles described on pages 2-3 and 2-4
20 and any other prioritization developed by the Council;

21
22 c. identifying criteria used to select habitat actions;

23
24 d. identifying and explaining any conflicts with dates or schedules in the
25 Council's program and suggesting modifications;

26
27 e. describing actions to deal with uncertainties identified by the independent
28 scientific group; and

29
30 f. estimating costs of implementing measures.

31
32 3. The annual implementation work plan should include (but not be limited to)
33 actions to address key scientific uncertainties associated with the program and
34 its measures (see Section 7.2C).

35
36 4. The annual implementation work plan should be submitted to the Council
37 by June 15 of each year. In the course of its review, the Council will review the
38 list of key uncertainties (see Section 7.2C), and the manner in which the work
39 plan proposes to address these uncertainties. Unless the Council provides
40 otherwise, responsible parties should proceed with implementation within 45
41 days of submitting the work plan to the Council.

42
43 **Federal Government, States and Tribes**
44

1 5. Review the measures in this program that call for collective action by the
2 states, tribes and other entities. Designate the appropriate entity to coordinate
3 implementation of each measure. The designated entity should be responsible
4 for preparing work plans and reporting progress. By January 1, 1993, report to
5 the Council these designations. Where sources of funding are not identified,
6 discuss *the capabilities of the states, tribes and other entities to implement the*
7 *measures with available resources.* For each measure that cannot be met with
8 available resources, and there is clearly no obligation of the Bonneville Power
9 Administration under the Northwest Power Act, propose:

- 10
11 a. an alternative funding source;
12
13 b. the estimated cost for implementation; and
14
15 c. the legal authority for allocating the necessary funds from the proposed
16 source.
17

18 **Federal Energy Regulatory Commission**

19
20 6. For measures addressed directly to Federal Energy Regulatory Commission
21 licensees, or that are otherwise relevant to Commission decision-making, take
22 measures into account to the fullest extent practicable.
23

24 **Management and Coordination**

25
26 Under the Northwest Power Act, the Council's role is to develop a regional fish
27 and wildlife program. Implementation of this program is placed in the hands of
28 others. The success of this program depends primarily on the willingness and
29 ability of those implementing it.
30

31 The Council recognizes that implementation of this program will be a major
32 challenge to the region. In some respects, this program is the biological
33 equivalent of the Manhattan project, a project undertaken in great urgency and
34 expense, and depending on the coordinated efforts of many separate groups.
35

36 To get major pieces of work under way quickly, this program establishes a large
37 number of committees and working groups. The Council is especially
38 concerned that these groups work closely together to achieve the primary goal
39 of this program, the successful recovery of the salmon and steelhead
40 populations in the Columbia River Basin in a manner which is as fast, efficient
41 and cost-effective as possible.
42

43 Effective management and coordination of this program is essential. The
44 Council believes two measures will contribute significantly to management and
45 coordination.

1
2 First, the Council urges Bonneville, as primary funding agency, to work with
3 the agencies, tribes and other implementors to establish an appropriate
4 management structure with clear responsibility and accountability for the
5 implementation of this program. While the decision on exactly what this
6 structure should be is one best made by the implementors, the ability to make
7 prompt and effective implementation decisions is critical. In particular, the
8 management structure should include an executive, whether an individual or a
9 small team, who is responsible for results, can determine priorities, make final
10 decisions, resolve disputes and avoid deadlocks.

11
12 Second, the Council agrees to take all steps possible to further implementation
13 of this program. The Council recognizes that even the most carefully developed
14 plans can be improved with experience and will need adjustments and
15 corrections as they are carried out. The Council intends to promptly take up
16 and act upon any suggestions from implementors for changes in program
17 measures that will improve implementation.

18
19 The Council will also use the extent of its powers, including both the legal
20 authority given to the Council under the Act and its persuasive power with
21 Congress, the states and the public, to encourage the full participation of
22 implementing agencies. In the event that an agency is unwilling to cooperate in
23 carrying out this regional program, the Council wishes to be advised
24 immediately so that appropriate steps can be taken.

25
26 **Bonneville:**

27
28 7. Pursuant to the requirements of Sections 4(h)(5)(A) through 4(h)(11) of the
29 Act, fund those program measures that have been approved for funding by the
30 Council. To promote coordination and efficiency and eliminate duplication,
31 submit the following to the Council: notices of program interest; requests for
32 proposals; proposed contracts; and a statement explaining how each proposed
33 contract will implement a particular program measure. Inform the Council of
34 any other fish and wildlife-related activities it plans to conduct and shall
35 provide the Council an opportunity to comment on the design of such projects.

36
37 8. The Council will continue to use its intergovernmental agreement with
38 Bonneville to ensure an expedited review of all funding proposals in accordance
39 with Section 1203(d)(2).

40
41 9. Where the Council calls on Bonneville to fund program measures at
42 federal projects, the Council's intention is that Bonneville immediately initiate
43 discussions with the appropriate federal project operator and the Council to
44 determine the most expeditious means for funding those measures. As
45 provided by the Northwest Power Act, the amounts expended by Bonneville

1 pursuant to this program shall be allocated as appropriate by Bonneville, in
2 consultation with the Corps of Engineers and the Bureau of Reclamation,
3 among the various hydroelectric projects of the Federal Columbia River Power
4 system. Those funds shall be allocated to the various project purposes in
5 accordance with existing accounting procedures for the Federal Columbia River
6 Power System.

7
8 10. Where the Council calls on Bonneville to fund a program measure upon
9 Council approval, the Council's intention is that Bonneville fund that measure
10 when the Council approves it for funding purposes. A program amendment
11 will not be required prior to such funding.

12
13 11. In selecting among alternative means for funding program activities on
14 Indian reservations, choose a means that fully complements the activities of
15 the affected Indian tribe and recognizes the unique rights and concerns of
16 Indian tribes with respect to reserved Indian lands.

17
18 12. Monetary costs and electric power losses resulting from the
19 implementation of the program shall be allocated by the Administrator
20 consistent with individual project impacts and systemwide objectives of Section
21 4(h) of the Northwest Power Act.

22 23 **Adaptive Management**

24
25 The goal of this program can be achieved only if all parties in the
26 Columbia River Basin learn from implementation of the program. This policy of
27 learning by doing is called "adaptive management." Faced with substantial
28 biological uncertainty, the parties involved should act affirmatively to protect
29 and enhance fish and wildlife affected by hydropower development and
30 operations. They must design projects carefully so that information can be
31 collected to improve future management decisions. Projects should test
32 quantitative hypotheses wherever possible, taking into account the need for
33 control or comparison cases and for statistical validity.

34
35 Adaptive management is a scientific policy. It calls for a conscious effort
36 to improve fish and wildlife management, using elements of this program as
37 experiments that can provide useful information not otherwise available.
38 Adaptive management also is a system policy, combining monitoring,
39 evaluation and research throughout the Columbia River Basin so that the
40 aggregated effects of this program can be detected, assessed and improved over
41 time. The system monitoring and evaluation process described in Section
42 206(d) will aid adaptive management by providing feedback on program
43 projects.

44 45 **7.2 Monitoring and Evaluation**

1
2 While implementors seek to take actions and clarify uncertainties, those who
3 monitor and evaluate the program should determine if the program's goals are
4 being met and if runs are being rebuilt. Evaluators also should evaluate the
5 scientific credibility of the program. Program monitors also should review the
6 scientific credibility of the program and and provide independent scientific
7 review and a means to interject creative thinking, innovation and new ideas.
8 The measures below describe a procedure to assess implementation and
9 progress, and evaluate the program on its scientific merits.

10
11 The purpose of these monitoring and evaluation activities is to ensure that the
12 region systematically improves its knowledge of what measures work, what
13 measures do not and why. To help identify areas where we most need to
14 improve our understanding, the Council is calling on an independent scientific
15 group (see Section 7.2B, below) to identify "key uncertainties"-questions whose
16 answers are most crucial to the success of program measures in rebuilding
17 salmon and steelhead populations. These questions will be used by the
18 implementation process in identifying measures to be implemented, and by the
19 Council and the region in reviewing the annual implementation work plan, to
20 be sure that our approach to learning is well thought through. The Council
21 sees this as a critical step in carrying out an adaptive management approach to
22 salmon and steelhead rebuilding. The Council recognizes that the region
23 cannot expect perfect knowledge before taking action, and must act on the
24 basis of the best information available at that time.

25
26 The Council expects to learn not only from program implementation, but also
27 from the Endangered Species Act and other federal processes, which will tend
28 to focus federal agency implementation of the Council program, other salmon
29 recovery measures and other analyses of salmon recovery. For example, the
30 Corps' National Environmental Policy Act analysis of 1992 river operations
31 showed some technical difficulties in the program's spring flow program in the
32 Snake River. The National Marine Fisheries Service's 1992 consultation process
33 on river operations also led to changes in summer flows and spill. The Council
34 does not expect to amend its program each time one of these developments
35 occurs. Rather, over the course of several seasons, a group of program issues
36 may emerge, and an amendment process can be initiated. This will require the
37 Council not only to pay careful attention to this program's evaluation
38 processes, but to monitor the National Marine Fisheries Service's consultation
39 process.

40
41 Because salmon populations and their environment are dynamic, monitoring
42 and evaluation should account for the possibility that, even as the region takes
43 steps to rebuild salmon populations, other human activities may undermine
44 these efforts. Accordingly, program implementors and evaluators and the
45 Council should try to anticipate potential impacts and take steps to avoid them

1 before they occur. Where this is not possible, appropriate steps should be
2 taken to mitigate impacts after the fact.

3 4 **7.2A Annual Program Monitoring Report**

5 6 **Bonneville**

7
8 1. Fund the coordinated preparation of an annual program monitoring report
9 as part of the expanded implementation planning process. This report should
10 compile and summarize information on program implementation, performance
11 standards, harvest and stock status. The report should be based on the
12 coordinated information system (Section 7.6). The annual monitoring report
13 should reflect broad technical review and input, including the Council and the
14 National Marine Fisheries Service. The final report should be submitted to the
15 Council and the National Marine Fisheries Service by June 15 each year.

16 17 **7.2B Independent Scientific Evaluation**

18 19 **Bonneville**

20
21 1. Fund an independent scientific group to evaluate the program in terms of
22 the following questions:

23
24 a. Are survival targets being met?

25
26 b. Are rebuilding targets being met?

27
28 c. Are program goals being met?

29
30 d. Are effort and money being invested in a cost-effective manner?

31
32 e. Are there unintended effects on resident fish, wildlife or the environment,
33 and if so, how might they be minimized?

34
35 The group should make use of the past efforts of the Council's Monitoring
36 and Evaluation Group. The independent scientific group should also review
37 questions submitted by the Council or through the implementation process.
38 The group should be fully compensated for its time and travel.

39
40 The independent scientific group should consist of people with strong natural
41 or social science experience who have demonstrated an ability to provide
42 independent review of complex environmental issues. The group (and contract
43 or staff support for the group) should be organized and funded to ensure the
44 scientific credibility of its evaluations, free of institutional constraints or biases.
45 Selection of independent scientific group members should be made in

1 consultation with the Council, with advice from participants in the
2 implementation process. To ensure that the group is independent of
3 institutional constraints and biases, consider organizing this effort through an
4 independent contractor, a university-based group, or both. The group may
5 suggest improvements in the program, in research projects, in the coordinated
6 information system, or in the implementation process, including changes that
7 would facilitate evaluation. The group should scope its review process, prepare
8 a proposed budget and report to the Council by June 15, 1993. Following
9 Council approval of the budget, evaluation activities should proceed, and
10 evaluation reports should be submitted to the Council biennially, beginning on
11 June 15, 1994.

12

13 **7.2C Key Uncertainties**

14

15 **Independent Scientific Group**

16

17 1. Identify and revise over time key uncertainties associated with program
18 measures. These key uncertainties should be those information needs most
19 critical to the achievement of program goals, and rebuilding and survival
20 targets.

21

22 **7.2D Endangered Species Act Coordination**

23

24 **Council**

25

26 1. Monitor the Endangered Species Act consultation process to ensure that
27 program monitoring and evaluation results are considered, and that the
28 Council is aware of developments in river operations, harvest, habitat and
29 production activities that may suggest the need for program amendments.

30

31 **7.2E Prioritization and Cost-Effectiveness**

32

33 **Council**

34

35 1. Continue to review program measures for purposes of prioritization, cost-
36 effectiveness and biological effectiveness.

37

38 **7.2F Streamlining Implementation**

39

40 **Council**

41

42 1. Retain an independent consultant to review, in consultation with
43 appropriate parties, the entire structure of committees and groups involved in
44 planning or implementing fish and wildlife program measures. By August

1 1993, prepare a report identifying ways to reduce process and increase
2 efficiency wherever possible.

3
4 **7.2G Salmon And Steelhead Research And Evaluation**

5
6 (a) **Guiding Principles for the Columbia River Basin Salmon and Steelhead**
7 **Research Program**

8
9 (1) **Salmon and steelhead research under this program is expected to be**
10 **designed to reduce scientific uncertainty and increase knowledge to achieve the**
11 **salmon and steelhead goal and policies of this program.**

12
13 (2) **Research priorities are expected to reflect a systemwide analysis of the**
14 **major uncertainties and problems associated with increasing runs in a**
15 **biologically sound manner.**

16
17 (3) **Funding of research by Bonneville and the Corps should be consistent**
18 **with the critical uncertainties identified in Section 7.2C.**

19
20 (4) **Knowledge gained as a result of the research program is to be reviewed**
21 **and evaluated in a central policy forum and made available in a timely manner**
22 **to policy-makers, resource managers, biologists, hydroelectric project operators**
23 **and regulators, and other interested parties.**

24
25 (5) **The fish and wildlife agencies and tribes should participate in development**
26 **and oversight of the research program.**

27
28 (6) **Bonneville and the project operators and regulators are expected to**
29 **provide the funding and resources necessary to implement the research**
30 **program.**

31
32 (7) **Research funded by Bonneville and the Corps under this program is**
33 **expected to be coordinated with research funded by other entities to ensure**
34 **efficient use of funds and maximum return on research investments.**

35
36 **7.3 Regional Analytical Methods Coordination**

37
38 **To develop and assess regional strategies to rebuild salmon and steelhead, and**
39 **to make the program framework operational, analytical tools should be**
40 **developed that are both understandable and credible. Computer models and**
41 **other analytical methods are essential to the program framework. They provide**
42 **a means to link program measures to survival targets, rebuilding schedules**
43 **and rebuilding targets. A variety of tools may be developed that span legitimate**
44 **scientific differences or reflect different approaches. This process should not**
45 **stifle these differences, but instead should promote understanding of their**

1 implications. However, the region should integrate these tools into a unified
2 approach. The Council applauds the considerable progress in this direction,
3 and calls on the technical staffs of the various parties to expedite development
4 of analytical tools and their documentation to assist decision-making.

5
6 All computer models are based on imperfect knowledge. They cannot fully
7 represent the complexity of the Columbia River ecosystem, much less predict
8 the future. There remain major uncertainties regarding the biological
9 effectiveness of some measures. Models necessarily incorporate assumptions
10 that are debatable, even where they are based on the best available scientific
11 knowledge.

12
13 During the course of the 1991-1992 amendment process, substantial efforts
14 were devoted to the development of new analytical tools with which to evaluate
15 the targets. Not all of these tools were fully developed and reviewed at the time
16 the amendment process was completed. The Council wishes to make use of
17 these tools, while recognizing that these tools also will be limited by imperfect
18 knowledge. New analytical tools will not resolve scientific uncertainties that
19 have plagued the region for years.

20
21 In short, we are involved in a long learning process that will be shaped both by
22 analytic models and new information. To ensure that the benefits of this debate
23 are fully reflected in this program, the Council has outlined a process in
24 Sections 2.3 and 7.1 for updating the rebuilding plans on an ongoing basis.

25 26 **7.3A Implementation Process**

27 28 **Bonneville, Fishery Managers and Others**

29
30 1. Begin a continuing process to review, coordinate and develop analytical
31 tools to assist decision making, facilitate program evaluation, and identify
32 critical uncertainties. This should be linked closely with and contribute to the
33 development of framework elements in Section 2.3. This process also should
34 interact closely with the coordinated information system and efforts to monitor
35 and evaluate this program. This process should seek to incorporate new
36 information, events and techniques into improved projections of rebuilding
37 schedules under this program.

38
39 This should be a technically oriented process that is responsive to policy and
40 management needs. A primary goal should be to promote understanding and
41 effective use of computer models, data bases and other analytical tools. This
42 includes the development of standards for model documentation, modification
43 and dissemination. Through this process, identify areas of agreement between
44 different approaches. Where different points of view and interpretation are
45 evident, identify the implications of these disagreements and suggest research

1 and other actions to resolve the difference. The process should also prepare a
2 common bibliography and input data base. This should be developed in
3 consultation with the Coordinated Information System. Provide a progress
4 report to the Council by July 1993.

5
6 **Bonneville**

7
8 2. Supply funding necessary to establish and maintain this process including
9 travel expenses of participants and facilitation, documentation or other
10 support.

11
12 **7.4 Continuing evaluation of sources of salmon mortality**

13
14 There is continuing debate over the contribution of various human activities to
15 salmon mortality. To a certain extent, this debate involves complex interactions
16 that would lend themselves to evaluation only after lengthy basic research and
17 analysis. However, several parties have offered analyses that provide a general
18 picture of relative contributions to fish mortality, and the Council believes it
19 may be worthwhile to refine these analyses in an effort to arrive at a common
20 understanding of these questions.

21
22 **Council**

23
24 1. Refine and elaborate analyses of the relative contributions of various human
25 activities to fish mortality. Circulate the resulting analyses for public review.

26
27 **7.5 Research and Monitoring Information Dissemination Bonneville and**
28 **Corps of Engineers**

29
30 1. Annually publish a summary of results from all studies funded under the
31 program. This should consist of concise descriptions of the project, results to
32 date and future directions. Summaries should be prepared by the contractors,
33 and compiled and published by Bonneville.

34
35 2. Specify as part of the above task that summaries of research originating
36 from the fish and wildlife program be submitted to the Coordinated Information
37 System in appropriate form for incorporation into its research information data
38 base. Fund the development of similar summaries for prior research conducted
39 under the fish and wildlife program.

40
41 3. Hold annual symposiums at which contractors present the results of their
42 studies, beginning in March 1993. The purpose of these symposiums is two-
43 fold: first, to promote the use of research and monitoring information funded
44 under this program by managers and non-research personnel, and, second, to

1 provide peer review and coordination of research within the research
2 community.

3 4 **7.6 Coordinated Information System**

5 6 **Bonneville**

7
8 1. Continue to fund the development of the Coordinated Information System to
9 promote effective exchange and dissemination of information in standardized,
10 electronic format throughout the basin. The Coordinated Information System
11 should be maintained as an objective vehicle for collection and dissemination of
12 information to and from all parties. It should be used in close cooperation with
13 the fishery managers and other concerned parties. This development should
14 include making available information from primary sources such as fishery
15 managers and secondary sources, such as the Fish Passage Center and the
16 Pacific States Marine Fisheries Commission. Standardizing data formats and
17 establishing data needs will be an ongoing responsibility of those developing
18 the Coordinated Information System. Include the following data bases:
19

20 **Anadromous Fish Data Base**

21
22 Those developing the Coordinated Information System should assemble and
23 tabulate on an annual basis and make available in electronic format all data
24 necessary to the production, updating and enhancement of information in the
25 1985 Bonneville-funded Stock Assessment Report. The Stock Assessment
26 Report should be revised and released by October 1992. Thereafter, those
27 responsible for the Coordinated Information System should update the report
28 on a regular basis. Other types of natural, hatchery and system information
29 requested for program monitoring and evaluation should be included in the
30 anadromous fish data base. Hatchery data should be developed in cooperation
31 with the Integrated Hatchery Operations Team and should contain all data
32 necessary to ascertain the performance of Columbia River Basin hatcheries.
33

34 **Scientific Information Data Base**

35
36 Existing information from fish and wildlife program projects, other regional
37 research efforts, and related national and international anadromous fish
38 research should be compiled and made available to users in the form of a
39 computerized bibliographic data base and a systematic, readily accessible,
40 document retrieval system. Research data bases that are maintained by
41 various fish and wildlife entities should be cataloged in a summary data base
42 describing the information and detailed instructions on how to access this
43 data.
44

45 **Habitat Data Base**

1
2 Information to permit evaluation of the status of anadromous fish habitat in
3 the Columbia River Basin should be compiled and made available to
4 Coordinated Information System users. The data base should include a
5 hierarchical classification system. This should include information on carrying
6 capabilities, survival rates and habitat-related human activities. In developing
7 and maintaining this capability, explore options to survey habitat conditions,
8 such as analysis of aerial photographs, that could be more expeditious, less
9 cumbersome and less costly than conventional methods. Also, explore using a
10 standard organizing approach such as the Geographic Information System.
11

12 **7.7 Project Accounting Data Base**

13 **Bonneville**

14
15
16 1. In cooperation with the fishery managers, develop a data base and tracking
17 system to monitor and categorize expenditures by geographic location
18 (Environmental Protection Agency River Reach System), species, type of action
19 and other relevant categories. This should be developed in coordination with
20 the Coordinated Information System. This data base should focus on
21 Bonneville expenditures, but also include other agencies' funding activities
22 under the fish and wildlife program. Bonneville should expedite development of
23 this data base and seek to have a working prototype by September 1993.
24

25 **7.8 Promising new ideas for improving salmon survival**

26
27 The Council has called for additional flows, augmented transportation,
28 drawdown studies, evaluations of several possible changes in power system
29 operations and other ways to improve passage survival. Success of any of these
30 measures is uncertain. Other ideas may be as promising. The Council has also
31 called for new fish marking techniques, methods for selective harvest and
32 investigation of the use of sound to divert salmon away from turbines. The
33 Council is concerned that these new ideas might be lost in the debate over
34 existing measures or allowed to languish. This measure is intended to provide
35 an expedited process to encourage innovative approaches to improving salmon
36 survival, especially in the mainstem.
37

38 **Bonneville, Corps of Engineers and Bureau of Reclamation**

39
40 1. Accept and, if necessary, solicit proposals from all sources to improve
41 passage and other aspects of salmon survival.
42

43 2. Screen and evaluate such proposals on an expedited basis and promptly
44 present promising ideas to the Council.
45

1 The Council will review promising ideas on an expedited basis, with input from
2 fish managers, and determine whether or not development of these ideas
3 should be pursued. Upon Council approval, development should be promptly
4 funded.

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SECTION 8

MITIGATION OF ADVERSE EFFECTS

Introduction

Fulfillment of the Northwest Power Act mandate to "protect, mitigate and enhance" the anadromous fish resource of the Columbia River Basin will impose costs throughout the region. All river users will have to share in making sacrifices if significant progress is to be made in rebuilding salmon and steelhead runs. At the same time, maintaining the economic health of the basin also is vital to the Northwest.

The Council intends to work closely with the National Marine Fisheries Service, appropriate state and federal agencies, and members of affected groups in its evaluation of these issues. The Council seeks to work cooperatively with these agencies concurrent with, but on a broader scale than is required by the Endangered Species Act. The Council sets an ambitious schedule for a regional mitigation program meant to give as much lead time as possible to state and federal legislators for needed funding.

In the case of costs borne by the power system, the means of spreading the impact are readily available. In other cases, significant costs are visited upon smaller industries and communities, which often have no way of either spreading costs or passing them along. A regional effort at mitigation should be directed particularly at these latter groups.

These groups include the salmon fishing industry, irrigators, recreational users of the rivers, river navigation interests, and their customers. Obviously, not all members of these groups are affected. Among those that are, the level of impacts and ability to bear the impacts will vary widely. In developing mitigation strategies, the Council believes the region should give special consideration to small, family owned businesses and farms.

In general, the Council takes the position that those who use the river should bear the costs of that use, including a share of the costs of measures necessary to rebuild fish stocks affected by that use. The Council is aware, however, that many river users based their decision to invest and engage in economic activities associated with the river, including the design of their facilities and practices, on prevailing river management practices of federal agencies and others. In some instances, designs were based on assurances from federal agencies of "normal" practices, which may not be followed under new river operation strategies.

1 At a minimum, and consistent with the needs of the fish, these users should be
2 afforded a reasonable transition period to adjust from the old ways of doing
3 business to the new. Without such transition time, costs and dislocations may be
4 unnecessarily harsh. The Council will also work to identify instances where
5 federally granted facility permits did not preserve the full range of specified
6 operating levels for federal reservoirs.

7
8 Regional and/or national mechanisms for financing the costs of transition should
9 be sought or devised. Favorable terms should be provided, such as extended
10 repayment schedules, buydowns of interest, subordinated debt instruments, loan
11 guarantees, even outright grants-in-aid. Creative approaches such as using energy
12 savings to finance new, higher-efficiency irrigation pumps, should be explored and
13 implemented.

14
15 With respect to reservoir drawdown, the Council is unequivocal in its expectation
16 that any 1992 experiment or long-term drawdown scenario must permit irrigators
17 to irrigate crops. As river operations are changed, irrigators must be given the
18 necessary time to adjust by redesign and replacement of their pumping systems
19 and extension of their pipes or other chosen means of adjustment. The Council is
20 committed to mitigating the costs of this change prior to the change taking place.
21 This means, at a minimum, that either the region or Congress must provide the
22 capital costs of pump redesign and relocation. In addition, irrigators must be
23 granted sufficient time to complete a change of their pumps. These changes must
24 be securely in place prior to initiation of any drawdown scenario. Other river users
25 who face similar impacts should be accorded similar treatment.

26
27 Regionalizing costs should not, however, mean simply turning to Bonneville as the
28 region's "deep pocket" for meeting mitigation needs. Such an approach would be
29 neither sufficient to the region's needs nor equitable to Bonneville's customers.
30 The states have the means of absorbing some costs; and other mechanisms must
31 be found or devised.

32
33 There is an additional federal role to play in mitigation. While most costs should
34 be borne in the region, the Endangered Species Act is federal legislation, and
35 regional actions to comply with it address national, as well as regional, priorities.
36 In developing mitigation strategies, federal agencies should be assigned an
37 appropriate share of the responsibilities and costs.

38
39 **Council, State and Federal Agencies and National Marine Fisheries Service, in**
40 **Consultation with Other Parties**

41
42 1. By March 31, 1992, inventory expected economic, biological and operational
43 effects of implementing measures called for in this salmon strategy including, but
44 not limited to, effects on navigation, agriculture, recreation, harvest, electric power
45 generation and use, and resident fish and wildlife.

1 Initiate a public process to solicit methods available to mitigate adverse effects or
2 allow transition time to those affected through alterations in operations,
3 management and timing of measures; assistance in meeting the costs of adjusting
4 to new conditions; and other means.

5
6 2. By June 30, 1992, develop a mitigation plan with specific actions assigned to
7 responsible agencies and parties. Identify capital requirements for mitigation
8 measures and potential sources of assistance, including the potential for use of a
9 regionally based trust fund. Participate in negotiating general terms and
10 conditions of such assistance so that it will be usable to recipients.

11
12 3. By July 31, 1992, prepare recommendations to federal agencies, state
13 governments and others identified as potential sources of assistance. Submit a
14 report to Congress and seek assistance from the Northwest Congressional
15 delegation to secure approval for federal funding.

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SECTION 9

RESIDENT FISH

Introduction

Resident fish are freshwater fish that live and migrate within the rivers, streams and lakes of the Columbia River Basin, but do not travel to the ocean. Resident fish exist throughout the basin and are particularly important in areas where anadromous fish runs are blocked by natural or manmade obstructions.

Hydroelectric projects have created a number of problems for resident fish. In the natural state, the Columbia River and its tributaries often ran at high volume and velocity and thereby flushed sediment downstream, keeping gravel spawning beds clean. But hydroelectric projects slowed and decreased the flow, allowing sediment to build up over the spawning beds. Sediment particles also have an affinity for chemical pollutants, creating potentially harmful concentrations in the reservoirs and other resident fish environments.

The white sturgeon is a species critically affected by hydroelectric development. Biologically an anadromous fish, the white sturgeon is relatively abundant in the Columbia River below Bonneville Dam. However, some populations are now confined to certain stretches of the river above Bonneville because dams have blocked migration. Because of the sturgeon's extended life cycle (approximately 20 years to spawning size), the white sturgeon may be depleted without an opportunity for quick restoration. Other resident fish species of special interest include kokanee, bull trout, burbot, redband trout and westslope cutthroat trout.

As with anadromous fish, reservoir manipulation may interfere with the flows needed for resident fish spawning, incubation, emergence, rearing and migration. In addition, reservoir manipulation impair the environment for spawning, incubation and rearing of some reservoir inhabiting species. For example, discharging water from a reservoir lowers the reservoir water level, which may deprive fish eggs of the water they need; diminish the food supply; crowd the fish into a smaller aquatic living space; and change the temperature of the remaining water.

This section of the program addresses resident fish losses caused by hydropower development and operation as well as substitutions of resident fish to compensate for losses of salmon and steelhead in areas permanently blocked by hydropower projects.

A major challenge in protecting, mitigating and enhancing resident fish, as well as anadromous fish and wildlife, is assembling a program that resolves

1 potential conflicts among demands for power generation and other resource
2 development activities, the need for flows for anadromous and resident fish, and a
3 healthy reservoir environment for resident fish. The Council is confident that the
4 measures contained herein and that will be added over time will achieve this
5 necessary balance.
6

7 Under the Council's program, limits will be developed on the drawdown of
8 certain reservoirs for power purposes, and minimum flow requirements will be set
9 to protect fish and their habitat. Other measures call for using storage water to
10 maintain appropriate water temperatures, streambed protection, artificial
11 propagation, and a variety of studies on fish habitat and on the impacts of
12 hydroelectric operation. The Council has also approved resident fish substitution
13 projects that will contribute to these efforts.
14

15 **9.1 Resident Fish Goal**

16
17 The program goal for resident fish is the recovery and preservation of the
18 health of native resident fish injured by the hydropower system, where feasible,
19 and mitigation for resident fish losses elsewhere in the system. Accomplishing
20 this goal will require participation of many parties whose practices now adversely
21 affect the health of the system, including but not limited to hydropower facility
22 operators. The responsibilities of such operators will take into account the
23 difference between losses and gains at each hydropower project to determine
24 whether losses have occurred.¹ Credit will be given for past mitigation actions
25 associated with the project. This goal will necessitate basinwide coordination
26 among all resident fish projects and with other basin activities to ensure
27 consistency with the program system approach. Preference will be given to
28 resident fish activities that address losses at hydropower facilities for which an
29 assessment of losses and gains is completed and approved by the Council. This
30 preference should not affect ongoing activities.
31

32 In addition, the Council believes that elements of the framework concept
33 outlined in Section 2 of the Strategy for Salmon need to be applied to resident fish,
34 as well as salmon and steelhead. For this reason, the Council calls for the
35 identification of resident fish mitigation objectives and, to the extent appropriate,
36 associated rebuilding schedules, survival targets, and performance standards.
37 Also, an effective monitoring program is essential to this approach. This approach
38 should ensure that resident fish actions taken under the program are oriented to
39 results.
40

¹Gains could include those found at the project site (i.e., in the reservoir or immediately below the dam) and also those found away from the project site (e.g., reservoir raises the water table in surrounding area and forms pothole lakes amenable to resident fish production).

1 **Fishery Managers**
2

- 3 1. Complete assessments of resident fish losses and gains related to
4 construction and operation of each hydropower facility throughout the
5 Columbia River Basin and submit to the Council for approval by the end of
6 1995. Use existing loss estimates, where available, and accomplish in a
7 consistent manner. Include assessment of and proposed crediting approach
8 for ongoing and past mitigation activities at each project. Also identify
9 proposed objectives including, to the extent appropriate, associated
10 rebuilding schedules, survival targets, performance standards and
11 monitoring activities for mitigation for losses at each facility.
12

13 **Bonneville**
14

- 15 2. Fund the fishery managers' efforts to complete assessments of resident fish
16 losses throughout the Columbia River Basin.
17

18 **9.2 Resident Fish Policies**
19

20 **9.2A. Priorities**
21

22 The Council has the following priorities for Columbia River Basin resident
23 fish. These priorities should be fully considered in addressing resident fish losses
24 related to development and operation of the hydropower system.
25

26 **Relevant Parties**
27

- 28 1. Accord highest priority to weak, but recoverable, native populations injured
29 by the hydropower system as such populations are identified to the Council
30 by the fish managers.
31
32 2. Accord areas of the basin where anadromous fish are not currently present
33 high priority.²
34
35 3. Accord resident fish projects that also provide benefits for wildlife and/or
36 anadromous fish high priority.
37
38 4. Accord populations that support important fisheries high priority. This
39 priority applies to introduced and native species including trout, sturgeon,
40 kokanee, burbot, bass, perch and others.
41

²For purposes of the program, resident fish and resident fish substitution measures are accorded equal priority.

1 **9.2B. Natural and Artificial Propagation**

2
3 Artificial propagation is used for increasing or introducing fish populations.
4 But these activities must be pursued carefully, because artificial propagation can
5 detrimentally affect the long-term sustainability of native and introduced species
6 that exist in the area where stocking occurs. Concerns include competition,
7 predation and inter-breeding with existing resident and anadromous species,
8 especially native naturally produced species. A full discussion of these types of
9 concerns occurs in program section 6.2. The Council believes that many of the
10 actions called for in that section should be applied to resident fish. These actions
11 are outlined below.

12
13 **Relevant Parties**

14
15 Complete the following to address natural and artificial propagation for
16 Columbia Basin resident fish species. Implementation will require different
17 levels of scope and effort depending on the type of propagation being
18 addressed. For instance, a thorough and comprehensive approach to
19 conserving genetic diversity is needed for native species. At the other end of
20 the range, non-native species stocked for harvest without any expectation
21 that they will reproduce naturally have minimal genetic diversity
22 requirements. Within this range lie the genetic diversity needs of non-native
23 populations introduced with the intent to encourage natural production.

24
25 Considering the range addressed above, implement the following in a
26 manner that avoids unnecessary delay and redundancy. Where the
27 following are substantially addressed under the National Environmental
28 Policy Act and/or relevant state environmental policy acts, consider that
29 process to be in compliance with this section. In addition, completion dates
30 identified for this section are intended to discourage unnecessary delay.

- 31
32 1. Development of a plan for conserving genetic diversity as called for in
33 section 6.2A1 should address resident fish as well as anadromous fish.
34 Complete plan addressing resident fish and submit to the Council by June
35 30, 1994.
- 36
37 2. Development of basinwide guidelines to minimize genetic and ecological
38 impacts of hatchery fish on wild and naturally spawning species as called
39 for in section 6.2B1 should address, where the potential for such impacts
40 exists, resident fish as well as anadromous fish. Complete guidelines and
41 submit report to Council by December 31, 1994.
- 42
43 3. Team of scientific experts that address hatchery impact assessment and
44 basinwide hatchery operating guidelines called for in section 6.2B3 should
45 address resident fish as well as anadromous fish.

1
2 4. Regional Assessment of Supplementation Project activities called for in
3 section 6.2C measures 1 and 2 should address resident fish as well as
4 anadromous fish.

5
6 5. Measures addressing new program initiatives called for in section 6.2D
7 measures 1 through 3 should apply to resident fish as well as anadromous
8 fish.

9
10 **9.2C. Comprehensive Watershed Management**

11
12 The importance of good habitat for resident fish equals that of anadromous
13 fish. Likewise, the degraded condition of resident fish habitat in the Columbia
14 Basin often rivals that of anadromous fish. For this reason, the program
15 provisions noted in section 6.5 (Cooperative Habitat Protection and Improvement
16 with Private Landowners) should also apply to resident fish. The Council believes
17 comprehensive, cooperative watershed management is essential to making good
18 investments in protecting, mitigating and enhancing resident fish in the Columbia
19 River Basin.

20
21 All Relevant Parties

22
23 1. Implement section 6.5 of this program (see Salmon Strategy) to also apply to
24 resident fish, including the model watershed provisions, where applicable.

25
26 **9.2D. Project Implementation and Selection**

27
28 The Council expects that measures listed in the resident fish section of the
29 program will be implemented and that these measures will increase resident fish
30 populations. In this regard, the Council calls for the Annual Implementation
31 Work Plan to include a list of ranked resident fish projects that demonstrates that
32 the program is being implemented. Proposed actions that deviate from the
33 program should be clearly marked and an explanation of the need for deviation
34 provided. The Council will evaluate the proposed work plan and, if necessary, will
35 consider amendments to this section to ensure that resident fish measures are
36 implemented

37
38 The Council recognizes that over time, the desirability of implementing
39 certain projects may change. Likewise, desirable projects that are not currently
40 foreseeable may become evident over time. Proposals for amendment of the
41 program to address these situations can be submitted to the Council. The
42 following should be demonstrated for every proposed project:

- 43
44 • Documentation of or agreement on resident fish losses attributable to
45 the hydroelectric facility at issue;

- 1
- 2 • Incorporate adaptive management principles by defining the
- 3 anticipated results in terms of hypotheses to be tested³ and by
- 4 including appropriate monitoring and evaluation to determine
- 5 whether and why those results have been achieved;
- 6
- 7 • Complement activities of fish and wildlife agencies and tribes;
- 8
- 9 • Comply with the policies set out in this program;
- 10
- 11 • Appear likely to achieve significant biological results;
- 12
- 13 • Assess tradeoffs with anadromous fish and wildlife activities;
- 14
- 15 • Reflect a management plan with sound biological objectives;
- 16
- 17 • Demonstrate consultation and coordination with interested parties;
- 18
- 19 • Include estimated costs and a schedule for implementation and
- 20 evaluation; and,
- 21
- 22 • Otherwise meet the standards of the Northwest Power Act.

23
24 **All Relevant Parties**

- 25
- 26 1. Implement resident fish projects identified in the program by December 31,
 - 27 2003.

28
29 **Bonneville**

- 30
- 31 2. Fund relevant parties to implement the resident fish section of the program.

32
33 **9.3 RESIDENT FISH MEASURES**

34
35 **9.3A Project Operations**

36
37 **Bureau of Reclamation**

- 38
- 39 1. Ensure that Anderson Ranch Dam is operated to maintain established
- 40 minimum flow levels for the wintering and spawning of trout in the south
- 41 fork of the Boise River.
- 42

³These hypotheses should be stated in quantitative terms if possible.

1 Bureau of Reclamation

- 2
- 3 2. Consult with the Oregon Department of Fish and Wildlife and affected
- 4 irrigation districts to explore the potential for releasing surplus water when
- 5 it is available from Owyhee, Warm Springs and Beulah reservoirs. Such
- 6 releases would be made during the non-irrigation season to benefit
- 7 downstream resident fish.

8

9 Federal Energy Regulatory Commission

- 10
- 11 3. To maintain habitat conditions suitable for the survival of resident fish in
- 12 Georgetown Lake, do not alter future operations of the Flint Creek project
- 13 from past practices without considering and incorporating the multiple uses
- 14 of the project, including the needs of the fish.

15

16 Montana Power Company

- 17
- 18 4. Continue funding an evaluation of the Milltown Dam proposed operating
- 19 procedures to determine whether they will protect resident fish downstream
- 20 from the project. Include an analysis of suspended sediments, associated
- 21 heavy metals, and organic pollutants, as well as an evaluation of the
- 22 potential effect of these pollutants on resident fish. Propose alternatives for
- 23 mitigation to the Council if the investigations reveal that an adverse effect
- 24 on the fish will result from the proposed operation.

25

26 Bureau of Reclamation, the Corps of Engineers and other project operators

- 27
- 28 5. In consultation with the Council, tribes, and fish and wildlife agencies, use
- 29 storage, where existing structures allow, to maintain water temperatures
- 30 within the best ranges for fish habitat.

31

32 Fish Managers, Bonneville, the Corps, and the Council

33

34 Kokanee in Lake Pend Oreille have for 27 years been on a perilous decline.

35 The Council has been presented with testimony from the fish managers and

36 others that this decline, in all probability, is caused by reservoir drawdown below

37 2056 feet. Other parties have suggested the decline could be caused by mysis

38 shrimp, hatchery practices, low primary/secondary production, and/or

39 inadequate stream spawning habitat. The Council is concerned about the cause

40 of the decline and in protecting the substantial ratepayer investment in key

41 programs that have been developed at Lake Pend Oreille in past years. The

42 Council calls for immediate action to address this problem.

- 43
- 44 6. By November 30, 1993, meet to discuss the yearly operation of Lake Pend
- 45 Oreille and to develop a scope of work for a scientifically valid study to

1 answer key questions related to water level management and kokanee
2 spawning/recruitment including appropriate consideration and analysis of
3 other possible causative factors listed above. Focus discussions on the
4 yearly operation of Lake Pend Oreille on immediate opportunities to
5 experiment with the management of winter lake-levels to benefit kokanee
6 spawning/recruitment. Submit the study scope of work to the Council for
7 review by March 31, 1994.

8
9 **Bonneville and Corps**

- 10
11 7. Upon Council approval of scope of work, fund Lake Pend Oreille study.
12 Submit results to the Council by December 31, 1997.

13
14 **9.3B Hungry Horse Dam Resident Fish Mitigation**

15
16 **Bureau of Reclamation**

- 17
18 1. To aid reproduction of kokanee in the Flathead River and to aid rearing of
19 other fish species and invertebrates, operate Hungry Horse Dam to provide
20 the following instantaneous flows in the Flathead River at Columbia Falls.
21
22 a. Flows for spawning not less than 3,500 cfs or more than 4,500 cfs
23 from October 15 through December 15. The 4,500 cfs cap may be
24 exceeded if kokanee are not present at the spawning sites.
25 Coordinate with Montana Department of Fish, Wildlife and Parks and
26 the Confederated Salish and Kootenai Tribes to determine when this
27 restriction may be lifted.
28
29 b. A minimum flow for incubation of at least 3,500 cfs provided 24
30 hours per day from December 15 through April 30.
31
32 c. A minimum flow for emergence of 3,500 cfs provided 24 hours per day
33 during the period from May 1 through June 30.
34
35 d. A minimum flow of at least 3,500 cfs provided 24 hours per day from
36 July 1 through October 15 for rearing of bull trout, cutthroat trout
37 and mountain whitefish, and for aquatic invertebrate production.

38
39 Report monthly to the Council the hourly average river flows. Include an
40 estimate of the costs in megawatts and dollars to the hydropower system
41 associated with meeting these flows. Modify the required flows when
42 requested by the Montana Department of Fish, Wildlife and Parks and
43 Confederated Salish and Kootenai Tribes for study purposes.
44

1 **Confederated Salish and Kootenai Tribes and Montana Department of Fish,**
2 **Wildlife and Parks**

- 3
4 2. **Continue to refine biological rule curves to limit drawdown of Hungry Horse**
5 **Reservoir to protect resident fish. Submit proposed biological rule curves to**
6 **the Council for review and consideration by June 1, 1994. Submit an**
7 **interim report by April 1, 1994.**

8
9 **Bureau of Reclamation**

- 10
11 3. **Until the Council takes further action, enforce the drawdown limit of 85 feet**
12 **at Hungry Horse Reservoir, except in years of extremely high runoff when**
13 **additional drafting may be required for flood control. The intent of this**
14 **measure is to improve historic dam operational practices to provide more**
15 **favorable biological conditions for resident fish in the reservoir and affected**
16 **river reaches and to help balance conditions for anadromous and resident**
17 **fish so that the recovery of one is not done at the expense of the other.**

18
19 **Bonneville**

- 20
21 4. **Continue to fund studies to evaluate the effect of Hungry Horse Dam**
22 **operating procedures on resident fish.**
23
24 5. **In years when the drawdown limit is exceeded for power purposes at Hungry**
25 **Horse Dam, immediately fund the mitigation of fish losses to the extent**
26 **those losses are caused by power operations.**

27
28 **Bureau of Reclamation**

- 29
30 6. **In years when the drawdown limit is exceeded for system flood control**
31 **purposes at Hungry Horse Dam, immediately fund the mitigation of fish**
32 **losses to the extent those losses are caused by system flood control**
33 **operations.**
34
35 7. **If a conflict occurs between maintaining the minimum flows required by**
36 **Section 9.3B1 and maintaining reservoir levels required by Section 9.3B3,**
37 **consult with the Confederated Salish and Kootenai Tribes and Montana**
38 **Department of Fish, Wildlife and Parks to determine which requirements are**
39 **preferred.**

40
41 **Relevant Parties**

- 42
43 8. **Resident fish loss estimates identified in the Fisheries Mitigation Plan For**
44 **Losses Attributable to the Construction and Operation of Hungry Horse**

1 Dam prepared by Montana Department of Fish, Wildlife and Parks and the
2 Confederated Salish and Kootenai Tribes are incorporated into the program.

3
4 Montana Department of Fish, Wildlife and Parks and the Confederated
5 Salish and Kootenai Tribes

6
7 9. Implement the long-term implementation plan limited to non-operational
8 mitigation measures as approved by the Council in March 1993.

9
10 10. Initially, limit hatchery supplementation activities called for in the
11 implementation plan to kokanee only. Limit facilities for production of
12 kokanee to temporary and low cost. Use facilities to test the feasibility of
13 increasing kokanee populations in the Flathead Basin. If kokanee
14 populations can meet the criteria for determining success of kokanee
15 reintroduction, as stated in the Hungry Horse Dam Fisheries Mitigation
16 implementation plan, make recommendations to the Council for
17 construction of permanent production facilities, if warranted. Limit
18 supplementation activities for other species to research aimed at
19 development and refinement of supplementation techniques for westslope
20 cutthroat trout and bull trout. Submit recommendations to the Council
21 regarding supplementation of these species based on results of this
22 research.

23
24 11. Implement habitat improvement projects in the implementation plan to be
25 consistent with maintenance of the genetic integrity of native fishes and
26 protection of species that are endangered, threatened, or of special concern
27 that occur in the improved or newly accessible habitat. This concern is
28 critical where passage is considered over natural barriers.

29
30 Bonneville

31
32 12. Consult with the State of Montana and the Confederated Salish and
33 Kootenai Tribes to explore alternative methods, including a trust agreement,
34 for financing the long-term, non-operational mitigation features of the
35 implementation plan. Explore cost shares to fund aspects of the
36 implementation plan, especially for projects that mitigate the effects of non-
37 hydropower caused problems (e.g. man-caused passage barriers in reservoir
38 tributaries, fencing of overgrazed riparian areas and sediment control
39 projects). If the parties listed above reach agreement on a suitable method
40 for financing, submit recommendations to the Council for approval. Fund
41 the agreement upon approval.

1 Bonneville, the Bureau of Reclamation, and the Corps

- 2
3 13. Consider operational measures proposed in the mitigation plan, except for
4 construction of a temperature control structure at Hungry Horse Dam, in
5 the System Operations Review process. Report findings and
6 recommendations from this process to the Council by June 30, 1994.

7
8 Council

- 9
10 14. The determination of losses and appropriate measures contained in the
11 Hungry Horse Dam mitigation plan assumes that the operation of Hungry
12 Horse Dam will be conducted in accordance with current practices. Under
13 current practices, (a) reservoir drawdown for power purposes is limited by
14 Section 9.3B3 of the Council's fish and wildlife program, (b) reservoir
15 drawdown for flood control is conducted in accordance with the assignment
16 of project flood control responsibility in effect prior to the 1992 operating
17 year, and (c) no drawdown of the reservoir, other than proportional drafting
18 for the existing water budget, takes place for the purpose of increasing
19 downstream flows to benefit salmon and steelhead. In the event that any
20 significant changes to current practices are undertaken, reopen this
21 determination for the purpose of setting appropriate drawdown limitations
22 to ensure that the mitigation measures contained in the plan remain
23 adequate and effective.

24
25 Bonneville and the Bureau of Reclamation

- 26
27 15. Install a selective withdrawal structure at Hungry Horse Dam to allow for
28 temperature control to benefit resident fish. Explore cost sharing for the
29 structure.

30
31 Bureau of Reclamation, Confederated Salish and Kootenai Tribes, Montana
32 Department of Fish, Wildlife and Parks, and Montana Power Company

- 33
34 16. Coordinate the Kerr and Hungry Horse dams mitigation programs so that
35 measures taken under these programs are consistent. Address Hungry
36 Horse Dam operational features in the System Operations Review. Address
37 coordination of non-operational features of these programs in the Hungry
38 Horse Dam resident fish implementation plan.

39
40 Bonneville

- 41
42 17. Fund an Instream Flow Incremental Methodology (IFIM) study of the
43 mainstem Flathead River from the South Fork confluence downstream to
44 the river inlet on Flathead Lake. Include recommendations for seasonal

1 ramping rates and allowable flow fluctuations to benefit westslope cutthroat
2 and bull trout spawners and juveniles, and insect production.
3

4 **9.3C Libby Dam Resident Fish Mitigation**

5 6 Corps of Engineers

- 7
- 8 1. Develop operating procedures for Libby Dam to ensure that sufficient flows
9 are provided to protect resident fish in the Kootenai River and Lake
10 Kooacanusa. Require a minimum flow of 4,000 cfs. In years of extremely low
11 runoff, provide no less than 3,000 cfs. Based on the best available
12 historical record, and in consultation with the Montana Department of Fish,
13 Wildlife and Parks, Confederated Salish and Kootenai Tribes, Kootenai Tribe
14 of Idaho, Idaho Department of Fish and Game and the Council, include in
15 the operating procedures a definition of "extremely low runoff" that will
16 permit the 4,000-cfs requirement to be met to the fullest extent practicable.
17 Until new procedures are adopted, operate Libby Dam under existing
18 criteria.
19

20 Confederated Salish and Kootenai Tribes, Montana Department of Fish,
21 Wildlife and Parks, Kootenai Tribe of Idaho and Idaho Department of Fish
22 and Game
23

- 24 2. Continue to refine biological rule curves to limit drawdown of Libby
25 Reservoir to protect resident fish. Submit proposed biological rule curves to
26 the Council for review and consideration by June 1, 1994. Submit an
27 interim report by April 1, 1994.
28

29 Corps of Engineers

- 30
31 3. Until the Council takes further action, enforce the drawdown limit of 90 to
32 110 feet at Libby Reservoir, except in years of extremely high runoff when
33 additional drafting may be required for flood control. The intent of this
34 measure is to improve on historic dam operational practices to provide more
35 favorable biological conditions for resident fish in the reservoirs and affected
36 river reaches and to help balance conditions for anadromous and resident
37 fish so that the recovery of one is not done at the expense of the other.
38

39 Bonneville

- 40
41 4. Continue to fund studies to evaluate the effect of Libby Dam operating
42 procedures on resident fish. Include a study of the effects of Libby Dam
43 operations on reproduction and rearing of white sturgeon in the Kootenai
44 River including assessing when and where fish are present, food

1 requirements and sources, effects of pollutants, population recovery and
2 propagation methods. Coordinate this work with section 9.3F.
3

- 4 5. In years when the drawdown limit is exceeded for power purposes at Libby
5 Dam, immediately fund the mitigation of fish losses to the extent those
6 losses are caused by power operations.
7

8 **Corps of Engineers**
9

- 10 6. In years when the drawdown limit is exceeded for system flood control
11 purposes at Libby Dam, immediately fund the mitigation of fish losses to the
12 extent those losses are caused by system flood control operations.
13
- 14 7. If a conflict occurs between maintaining the minimum flows required by
15 Section 9.3C1 and maintaining the reservoir levels required by Section
16 9.3C3, consult with the Montana Department of Fish, Wildlife and Parks,
17 Confederated Salish and Kootenai Tribes, Idaho Department of Fish and
18 Game, and the Kootenai Tribe of Idaho to determine which requirements are
19 preferred.
20

21 **Bonneville and the Corps of Engineers**
22

- 23 8. In cooperation with the State of Montana evaluate and if beneficial to
24 resident fish; feasible; cost effective under the Council's power plan; and in
25 compliance with all applicable Montana and federal laws fund adding three
26 generators at Libby Dam. If feasible, such additions may allow the reservoir
27 to fill during wet years earlier than otherwise and, thereby, maintain a pool
28 level higher than otherwise possibly benefiting fish in the reservoir. Also,
29 project spill could be reduced with benefits for fish in the Kootenai River
30 downstream from the project. Include in the evaluation the following:
31

- 32 a. Review the adequacy of existing ramping rates. No more than five
33 generators could be used under any circumstances for peaking or
34 load following. This limit is a result of historic proceedings that
35 addressed this issue at Kootenai Falls and Jennings Rapids.
36
- 37 b. Assume that operation of all eight units simultaneously would be
38 strictly prohibited except during declared flood emergencies or for
39 demonstrated beneficial resident fish flow operations. At no time
40 would the full capacity be available solely for power purposes.
41
- 42 c. Operations are assumed to be an efficiency upgrade (i.e. existing non-
43 power constraints would be met, volume releases would not be
44 increased and peaking and other operations would be constrained as
45 needed to protect the resident fish resource and dependent

1 ecosystems above and below the dam). The project is assumed to
2 remain a five unit project, albeit with operation of the newer turbines
3 instead of the older units, and not as an eight unit project.
4

5 d. The project, when modified with additional units, will be expected to
6 comply with present and future non-power constraints. Any
7 additional generation produced by the project as a result of these
8 changes would go to the Federal Columbia River Power System to be
9 used to offset the investment in the project and other beneficial
10 purposes as determined by the Bonneville Administrator.
11

12 e. Include analysis of costs, fisheries, reservoir operations, water use,
13 and water quality.
14

15 Bonneville

- 16
- 17 9. Fund the removal of materials that have accumulated in Kootenai River
18 tributary deltas below Libby Dam as a result of the dam's construction and
19 operation, because these materials interfere with the migration of spawning
20 fish.
21

22 **9.3D Dworshak Dam Resident Fish Mitigation**

23

24 Idaho Department of Fish and Game, Nez Perce Tribe, National Marine
25 Fisheries Service, Bonneville, Bureau of Reclamation, and Corps
26

- 27 1. In consultation with relevant entities, review the following measures and
28 develop recommendations for appropriate actions to mitigate for losses of
29 resident fish caused by Dworshak Dam. Address provisions in the Council's
30 salmon strategy and pertinent results of the System Operations Review in
31 the recommendations. Report the results of this process to the Council
32 within 90 days following adoption of this measure.
33

34 Idaho Department of Fish and Game and the Nez Perce Tribe
35

- 36 2. Analyze methods to avoid or minimize entrainment of kokanee at Dworshak
37 Dam including behavioral avoidance devices such as strobe lights,
38 pneumatic hammers, bubble screens and sound generators.
39
- 40 3. Implement annual mid-water trawling to further define the relationship
41 between the fishery, kokanee densities and the water year.
42
- 43 4. Implement annual kokanee spawner counts in appropriate creeks.
44

- 1 5. Implement a genetic inventory in the North Fork Clearwater River drainage
2 to determine the genetic status of the endemic westslope cutthroat trout
3 population including genetic introgression of the westslope cutthroat trout
4 population by introduced rainbow trout. Based on the study, make
5 recommendations regarding further planting of rainbow trout in the North
6 Fork drainage.

7
8 **Bonneville**

- 9
10 6. Fund Idaho Department of Fish and Game and the Nez Perce Tribe to
11 implement the above measures.

12
13 **Corps of Engineers**

- 14
15 7. In coordination with appropriate fish and wildlife agencies and the Nez Perce
16 Tribe, fund fish stocking activities in Dworshak Reservoir and in the North
17 Fork of the Clearwater River upstream from the reservoir consistent with the
18 Memorandum of Understanding between the Idaho Department of Fish and
19 Game and the Corps.. Fund monitoring to determine the effects of the
20 resident fish mitigation program on endemic fish populations, particularly
21 westslope cutthroat trout upstream from Dworshak Dam.

22
23 **Corps of Engineers, Bureau of Reclamation, and Bonneville**

- 24
25 8. Investigate the following in the System Operation Review process: (i) the
26 feasibility of avoiding downward fluctuations in Dworshak reservoir pool
27 level from June 1 through August 31 to prevent dewatering smallmouth
28 bass spawning nests, (ii) the feasibility of achieving normal full pool during
29 June, if flood runoff forecasting allows, to avoid rising pool levels and
30 associated temperature depressions in near shore areas when smallmouth
31 bass are spawning, and (iii) the feasibility of avoiding reservoir evacuation
32 for winter flood control or hydropower prior to September 1 date identified in
33 the current flood control operating curve to promote terrestrial invertebrates
34 deposition which is an important food source for trout and smallmouth
35 bass.

36
37 **9.3E Big Fork Hydroelectric Project Resident Fish Mitigation**

38
39 **Pacific Power and Light Company**

- 40
41 1. Continue to operate the Big Fork Hydroelectric Project under provisions
42 included in the project's Federal Energy Regulatory Commission license.

1 Montana Department of Fish, Wildlife and Parks, the Confederated Salish-
2 Kootenai Tribes, and Pacific Power and Light Company
3

- 4 2. Examine mitigation alternatives to address losses of westslope cutthroat
5 trout, rainbow trout, bull trout and kokanee in the Flathead River system
6 caused by the Big Fork Hydroelectric Project.
7
- 8 3. Continue to work together to ensure coordination of Big Fork Hydroelectric
9 Project operations with Montana Department of Fish, Wildlife and Parks and
10 the Confederated Salish-Kootenai Tribes fish management objectives.
11

12 **9.3F Sturgeon Mitigation**

13

14 Sturgeon were once abundant in the Columbia River Basin. Population
15 levels in some areas of the basin have declined, thereby, raising concern about the
16 long term sustainability of the species. The Council believes that these studies
17 and evaluations should be done quickly and on-the-ground projects identified and
18 implemented as soon as possible to address the needs of this species. In addition,
19 these studies should be coordinated to avoid redundant work and to increase the
20 potential for learning.
21

22 **Bonneville**

23

- 24 1. Fund research to determine the impact of development and operation of the
25 hydropower system on sturgeon in the Columbia River Basin. These studies
26 may include: 1) habitat requirements, 2) maintenance of genetic integrity, 3)
27 stock assessment, 4) potential for artificial propagation and 5) migrating
28 potential. Specific recommendations for the protection, mitigation and
29 enhancement of sturgeon may be submitted to the Council upon completion
30 of these studies.
31
- 32 2. Fund the Umatilla Tribe, Nez Perce Tribe, Spokane Tribe, and Colville Tribe
33 to implement the sturgeon measures listed below.
34

35 **Umatilla Tribe**

36

- 37 3. Prepare an evaluation, including a biological risk assessment (see Strategy
38 for Salmon section 6.2C.2), of potential means of rebuilding sturgeon
39 populations between Bonneville Dam and the mouth of the Snake River.
40

41 **Nez Perce Tribe**

42

- 43 4. Prepare an evaluation, including a biological risk assessment (see Strategy
44 for Salmon section 6.2C.2), of potential means of rebuilding sturgeon

1 populations in the Snake River between Lower Granite and Hells Canyon
2 dams.

3
4 Spokane and Colville tribes

- 5
6 5. Perform a three year baseline assessment of sturgeon in Lake Roosevelt
7 from Grand Coulee dam to the international border, including the Spokane
8 River arm on the Spokane Indian Reservation. Include estimates of current
9 population size, abundance of each age class, age:length frequency,
10 recruitment rate, natural and fishing mortalities, distribution and migration
11 patterns, harvest, life history, habitat usage, environmental factors affecting
12 abundance, and an assessment of potential for artificial propagation.
13 Submit recommendations from these studies to the Council.
14

15 **9.3G Bull Trout Mitigation**

16
17 Bull trout were once abundant in the Columbia River Basin. Population
18 levels have declined in some areas, thereby raising concerns about the long term
19 sustainability of the species. The measures below call for studies and evaluations.
20 The Council believes that these studies and evaluations should be done quickly
21 and on-the-ground projects identified and implemented as soon as possible to
22 address the needs of this species. In addition, these studies should be
23 coordinated to avoid redundant work and to increase the potential for learning.
24

25 Bonneville, other Federal Agencies, States, hydroelectric project owners and
26 other entities as appropriate

- 27
28 1. Fund bull trout population and habitat surveys in the Middle Fork
29 Willamette and McKenzie River systems and habitat improvements identified
30 in the surveys to benefit bull trout.
31
32 2. Fund a study of the status, life history, habitat needs, and limiting factors
33 for bull trout populations in the Deschutes, Grande Ronde, Hood, John
34 Day, and Umatilla subbasins.
35
36 3. Fund the Confederated Salish-Kootenai Tribes and Montana Department of
37 Fish, Wildlife and Parks to initiate a comprehensive genetic sampling
38 program for bull trout in the Flathead River Basin.
39
40 Confederated Salish-Kootenai Tribes and Montana Department of Fish,
41 Wildlife and Parks
42
43 4. Initiate a comprehensive genetic sampling program for bull trout in the
44 Flathead River Basin to provide basic genetic information needed for
45 rebuilding bull trout populations, including the use of supplementation for

1 rebuilding purposes, as well as to identify non-lethal genetic sampling
2 techniques.

3
4 **9.3H Additional Resident Fish Measures**

5
6 Idaho Department of Fish and Game

- 7
8 1. Provide information to the Council on whether habitat in the Clearwater
9 River below its north fork is suitable for rainbow trout. If the habitat is
10 suitable and production of rainbow trout will not conflict with production of
11 chinook salmon, provide a plan to stock the river with rainbow trout.
12 Coordinate development of this plan with the Nez Perce Tribe and the
13 National Marine Fisheries Service

14
15 Bonneville

- 16
17 2. Fund the program for stocking rainbow trout in the Clearwater River if it is
18 found to be desirable.

19
20 Corps of Engineers

- 21
22 3. Fund a study to evaluate the existing and potential salmonid and spiny-
23 rayed fish and their habitat in the Pend Oreille River from Lake Pend Oreille
24 downstream to Albeni Falls Dam. Coordinate this study with Idaho
25 Department of Fish and Game, Washington Department of Wildlife and
26 appropriate tribes. Submit recommendations based on studies results.
27 Upon approval of the Council, fund recommendations.

28
29 Bonneville

- 30
31 4. Fund efforts to restore sturgeon and burbot populations in the Kootenai
32 River. These populations are dependent on the productivity of fish habitats
33 in the entire Kootenai River system including the Kootenay River and
34 Kootenay Lake in British Columbia. Coordinate and cost share this
35 measure with Canadian fish managers.

36
37 Bonneville, other Federal Agencies, States, hydroelectric project owners and
38 other entities as appropriate

- 39
40 5. Fund test vegetation plantings at appropriate reservoirs and evaluate
41 results. Appropriate reservoirs might include Hills Creek, Dworshak, Libby,
42 Hungry Horse and others. Incorporate the results of shoreline vegetation
43 studies at Revelstoke and other reservoirs into this test. Based on the
44 results of the test vegetation plantings, fund a feasibility study to identify
45 which hydroelectric projects in the basin would benefit from such

1 revegetation improvements. Submit results and recommendations of this
2 feasibility study to the Council by December 31, 1997.

3
4 Bureau of Reclamation or appropriate irrigation districts

- 5
6 6. Fund maintenance of the barrier net system at the outlet from Banks Lake
7 into the main irrigation canal to conserve the spawning population of
8 kokanee in the lake.

9
10 **9.4. RESIDENT FISH SUBSTITUTIONS POLICY**

11
12 Salmon and steelhead probably never will be able to return to some areas of
13 the basin because of blockages by dams. These include the areas above Chief
14 Joseph and Grand Coulee dams, the Hells Canyon complex and other smaller
15 blocked areas. In its analysis of the contribution of the hydropower system to
16 salmon and steelhead losses (see Appendix ?), the Council has addressed the
17 extent to which resident fish substitutions should be used to mitigate losses of
18 salmon and steelhead production in these areas.

19
20 The Council has concluded that: 1) mitigation in blocked areas is
21 appropriate where salmon and steelhead were affected by the development and
22 operation of the hydroelectric projects; 2) to treat the Columbia River and its
23 tributaries as a system, resident fish substitution is reasonable for lost salmon
24 and steelhead in areas where in-kind mitigation cannot occur; and, 3) flexibility in
25 approach is needed to develop a program that complements the activities of the
26 fish and wildlife agencies and tribes and that is based on the best available
27 scientific knowledge. For substitution purposes, resident fish may include
28 landlocked anadromous fish (e.g., white sturgeon, kokanee, and coho), as well as
29 traditionally defined resident fish species.

30
31 Resident fish substitution projects will:

- 32
33 (a) Address unmitigated losses of salmon and steelhead attributable to
34 development or operation of hydropower projects;
35
36 (b) Generally occur in the vicinity of the salmon and steelhead losses being
37 addressed; and
38
39 (c) Be consistent with program section 9.2.
40

1 **9.4A RESIDENT FISH SUBSTITUTION PROJECTS**

2
3 **Bonneville**

- 4
5 1. Fund the following resident fish substitution activities and projects in the
6 blocked area above Chief Joseph Dam to partially mitigate for salmon and
7 steelhead losses incurred as a result of the construction and operation of
8 Chief Joseph and Grand Coulee dams.

9
10 **Colville Tribe**

- 11
12 a. Operate and maintain the resident trout hatchery on the Colville Indian
13 Reservation.
14
15 b. Evaluate natural production of kokanee above Chief Joseph Dam
16 including Nespelem River, Big Sheep Creek, Alder Creek, Deep Creek,
17 Orapaken Creek, Onion Creek and the San Poil River. The purpose of
18 this measure is to evaluate the status of naturally producing kokanee,
19 determine what measures are necessary to ensure self-sustaining
20 populations, and determine the feasibility of using these fish in the
21 ongoing kokanee hatchery program in this area.

22
23 **Coeur d'Alene Tribe**

- 24
25 c. Design, construct and operate a trout hatchery on the Coeur d'Alene
26 Reservation; implement and maintain habitat improvement projects;
27 and implement a five-year monitoring program to evaluate the
28 effectiveness of the hatchery and habitat improvement projects.

29
30 **Spokane Tribe**

- 31
32 d. Operate and maintain kokanee salmon hatcheries at Galbraith Springs
33 and Sherman Creek. Use the Sherman Creek hatchery as an
34 imprinting site and egg collection facility to provide a source of kokanee
35 fry for: i) stocking into Banks Lake and ii) transferring to Galbraith
36 Springs hatchery for rearing to fingerling size before planting into Lake
37 Roosevelt. Coordinate decisions on hatchery production, stocking and
38 outplanting locations through a three-member committee consisting of
39 one representative each appointed by the Confederated Tribes of the
40 Colville Reservation, the Spokane Tribe of Indians, and the Washington
41 Department of Wildlife.
42
43 e. Operate and maintain pilot projects for improving habitat and passage
44 into and out of Lake Roosevelt tributary streams for rainbow trout. The
45 aim of this measure is to emphasize natural production by: i)

1 facilitating passage of migratory rainbow trout between Lake Roosevelt
2 and its tributary streams, and ii) improving fry and fingerling rearing
3 habitat in these streams.
4

- 5 f. Monitor to evaluate the effectiveness of the above measures. Include
6 the following components: i) a year-round creel census survey to
7 determine angler use, composition and rates of catch, growth and
8 condition of fish; ii) assessment of feeding habits of kokanee, rainbow
9 and walleye and densities of their preferred prey; iii) comparison of
10 rainbow trout adult and fingerling abundance in tributaries before and
11 after habitat and passage improvements are made; and iv) a
12 mark/recapture study designed to assess the effectiveness of different
13 kokanee release and outplanting sites. Focus the study on kokanee
14 migratory tendencies and distribution in Lake Roosevelt after their
15 release and homing back to the outplanting sites during spawning
16 migration. Continue the monitoring program through at least the year
17 2000.
18

19 **Kalispel Tribe**
20

- 21 g. Design, construct, operate and maintain a warm water low capital
22 bass hatchery on the Kalispel Indian reservation.
23
24 h. In collaboration with Washington Department of Wildlife, conduct
25 advanced design, construct, operate and maintain habitat improvement
26 projects to enhance bull trout and cutthroat trout in three
27 demonstration tributaries of the Pend Oreille River--LeClerc, Cee Cee
28 Ah, and Skookum creeks.
29
30 i. Working with the U.S. Forest Service and Washington Department of
31 Wildlife, remove exotic brook trout in Cee Cee Ah Creek.
32
33 j. In collaboration with Washington Department of Wildlife, design,
34 construct, operate and maintain water control structures and repair
35 dikes on the Pend Oreille Wetlands Wildlife mitigation project for the
36 purpose of creating a bass nursery slough. Stock a portion of the bass
37 production from the Kalispel Tribal hatchery into this slough in an
38 attempt to cut hatchery production costs since fry can prey on natural
39 foods. Screen the water control structures to prevent access by
40 reservoir species that prey on bass fry.
41
42 k. Construct and place artificial cover structures to increase the amount
43 of bass fry winter cover in the Box Canyon Reach of the Pend Orielle
44 River.
45

- 1 1. In collaboration with the Washington Department of Wildlife, conduct a
2 four year monitoring program to assess effectiveness of bull trout and
3 cutthroat trout habitat improvements in tributary streams and
4 hatchery supplementation of largemouth bass in the Pend Orielle River.
5

6 **Kootenai Tribe**
7

- 8 m. Operate and maintain a low-capital sturgeon hatchery on the Kootenai
9 Indian Reservation. With Bonneville, explore alternative ways to make
10 effective use of the hatchery facility year-round.
11
12 n. Survey the Kootenai River downstream from Bonners Ferry, Idaho, to
13 the Canadian border to: i) evaluate the effectiveness of the hatchery
14 and ii) assess the impact of water-level fluctuations caused by Libby
15 Dam on hatchery operation for outplanting of sturgeon in the Idaho
16 portion of the Kootenai River.
17
18 o. Perform a five year baseline assessment of all fish stocks in the Idaho
19 portion of the Kootenai River, Idaho. Focus on those river reaches
20 historically fished by the Kootenai Tribe of Idaho, determine the current
21 status of all fish stocks, identify fisheries enhancement opportunities in
22 the Idaho portion of the Kootenai River, and identify mechanisms to
23 restore or replace the Kootenai Tribe's historic kokanee, cutthroat
24 trout, bull trout, rainbow trout, and burbot fisheries in the tributaries
25 of the Kootenai River. Upon completion of this survey, Kootenai Tribe
26 and Idaho Department of Fish and Game submit identified alternatives
27 for fishery improvement to the Council.
28

29 **Lake Roosevelt Forum**
30

- 31 p. Implement the rainbow trout net pen rearing program in Lake
32 Roosevelt including (i) operation and maintenance of 26 existing net
33 pens, (ii) procurement, operation and maintenance of 10 additional net
34 pens, and (iii) associated research and monitoring. As a condition of
35 Bonneville funding, operation of the net pen rearing program will be
36 coordinated and consistent with appropriate state and tribal fish
37 management policies including those addressing stock selection and
38 release strategies. In addition, continue voluntary contributions and
39 private sector funding as a cost-share for the net pen rearing program.
40

41 **Fish Managers**
42

- 43 q. Identify and study the feasibility of alternatives for preventing resident
44 fish from being swept downstream out of Grand Coulee Reservoir.
45 Alternatives could include sound guidance, light guidance, screens,

1 project operation modifications, and others. Also, consider the need for
2 hydro-acoustic fish tracking devices at the forebay and turbine intakes
3 of the third powerhouse and at the turbine intakes of the main
4 powerhouse at Grand Coulee Dam. Complete these studies and make
5 recommendations to the Council by December 31, 1996.
6

7 **Washington Department of Wildlife**
8

- 9 r. Upon satisfactory demonstration to the Council that there is not a
10 better project in the blocked area above Chief Joseph Dam, determine
11 the most feasible measures for enhancing desirable fish populations in
12 Moses Lake. Include assessment of the current availability and use of
13 spawning, rearing and cover habitats including hydrological and
14 limnological factors associated with each as well as evaluating the age
15 class structure, species composition and competition involved at each.
16

17 **Bonneville and Idaho Power Company and the Bureau of Reclamation**
18

- 19 2. Consult with the relevant fish agencies and tribes to apportion funding
20 responsibilities for the following resident fish substitution projects above
21 Hells Canyon Dam. These projects will partially mitigate for salmon and
22 steelhead losses above this blocked area as a result of the construction and
23 operation of hydropower projects in the Columbia River Basin. Report the
24 results of this consultation process to the Council within 90 days following
25 adoption of this measure. Should the parties fail to assign funding
26 responsibilities for projects within 90 days, the Council will immediately
27 enter rulemaking and assign funding responsibilities using a method of its
28 own choosing.
29

30 **Shoshone-Paiute Tribe**
31

- 32 a. Implement the following projects at the Duck Valley Indian
33 Reservation:
34
- 35 1. annual stocking of catchable and fingerling trout of the
36 appropriate stocks in reservation lakes and streams;
37
 - 38 2. review reservation surface water and groundwater suitability for
39 resident fish production facilities;
40
 - 41 3. evaluate alternative sources of catchable and fingerling resident
42 fish;
43
 - 44 4. analyze feasibility of developing an additional lake fishery at
45 Coyote Sink;

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5. implement, monitor and evaluate resident fish habitat improvement and protective measures. Include the following habitat protective measures and improvements: (i) management recommendations for reservoir pool levels, (ii) reservoir rehabilitation measures for non-game fish and aquatic vegetation control, (iii) reservoir inlet and outlet screening, (iv) improvement of recreational fishing sites, (v) stream riparian zone restoration by planting vegetation, fencing overgrazed areas, and stream bank stabilization, and (vi) baseline water quality survey to assess contaminants that may affect trout populations; and
 6. Acquire or construct a trout production facility and operate and maintain the facility for the production of trout for stocking on the Duck Valley Indian Reservation and elsewhere. Assess opportunities for joint production strategies with the Shoshone-Bannock Tribe, including the training of tribal members in fish culture.

20 Idaho Department of Fish and Game

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35
- b. Design, construct, place and evaluate shoreline habitat in C.J. Strike Reservoir, in consultation with Idaho Power Company, to provide for improvement of resident fish populations.
 - c. Annually propagate and release 400,000 kokanee fry into Lucky Peak Reservoir; and construct and operate a kokanee spawning trap at Lucky Peak Reservoir to take approximately 500,000 eggs annually. Coordinate this project with the Corps.
 - d. Annually propagate and release 1 million coho fingerlings into Cascade Reservoir. Construct, operate and maintain additional hatchery capacity to allow for the propagation of these coho. Coordinate this project with the Bureau of Reclamation.

36 Shoshone-Bannock Tribe

- 37
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44
- e. Design, construct, operate, and maintain a resident trout hatchery on the Fort Hall Reservation.
 - f. Implement habitat restoration and enhancement activities in Spring Creek and Clear Creek along the Fort Hall Bottoms located on the Fort Hall Reservation.

- 1 g. In coordination with the Idaho Department of Fish and Game, evaluate
2 the current operating procedures of American Falls Dam to determine
3 the impact of those procedures on native fish populations.
4

5 Oregon Department of Fish and Wildlife
6

- 7 h. Implement habitat improvement measures to enhance redband trout
8 and smallmouth bass in the Malheur River Basin.
9

10 Bonneville
11

- 12 3. Fund the following resident fish substitution actions in the blocked area
13 above Dworshak Dam to partially mitigate for salmon and steelhead losses
14 incurred as a result of the construction and operation of hydropower
15 projects in the Columbia River Basin.
16

17 Nez Perce Tribe
18

- 19 a. Develop, maintain and manage trout ponds within the Nez Perce Indian
20 Reservation including: (i) physical improvement, physical maintenance,
21 fishery monitoring and fish stocking of two existing trout ponds; (ii)
22 identification through site inventory and analysis of additional sites
23 suitable for fish pond construction; (iii) construction of 6 to 12
24 additional fish ponds depending on availability of suitable sites; and (iv)
25 physical maintenance, fishery monitoring and fish stocking of the
26 additional fish ponds.
27

28 Bonneville and Portland General Electric Company
29

- 30 4. Consult with the relevant fish agencies and tribes to apportion funding
31 responsibilities for the following resident fish substitution project above
32 Pelton Dam. This project will partially mitigate for salmon and steelhead
33 losses above this blocked area as a result of the construction and operation
34 of hydropower projects in the Columbia River Basin. Report the results of
35 this consultation process to the Council within 90 days following adoption of
36 this measure. Should the parties fail to assign funding responsibilities for
37 projects within 90 days, the Council will immediately enter rulemaking and
38 assign funding responsibilities using a method of its own choosing.
39

40 Warm Springs Tribe
41

- 42 a. Determine how the crayfish population in Lake Billy Chinook fits into
43 the altered ecosystem. Include specific objectives of determining sex,
44 size composition, growth rate, and size at maturity of the crayfish
45 population; size, relative abundance, and seasonal movement of the

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**crayfish population; potential availability as a significant food item,
especially for bull trout; and management recommendations.**

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Section 10

WILDLIFE

INTRODUCTION

The development of the hydropower system in the Columbia River Basin has affected many species of wildlife as well as fish. Some floodplain and riparian habitats important to wildlife were inundated when reservoirs were filled. In some cases, fluctuating water levels caused by dam operations have created barren vegetation zones, which expose wildlife to increased predation. In addition to these reservoir-related effects, a number of other activities associated with hydroelectric development have altered land and stream areas in ways that affect wildlife. These activities include construction of roads and facilities, draining and filling of wetlands, stream channelization and shoreline riprapping (using large rocks or boulders to reduce erosion along streambanks). Finally, in some cases the construction and maintenance of power transmission corridors have altered vegetation, increased access to and harassment of wildlife, and increased erosion and sedimentation in the Columbia River and its tributaries.

The habitat that was lost because of the hydropower system was not just land, it was home to many different, interdependent species. In responding to the system's impacts, we should respect the importance of natural ecosystems and species diversity.

While the development of the hydropower system has caused negative effects on wildlife, it also has resulted in a number of beneficial effects. For example, the creation of reservoirs has provided important resting, feeding and wintering habitat for waterfowl. In addition, where reservoir storage is used for irrigation as well as power generation, the irrigation water has promoted extensive growth of grass and food that could not otherwise exist in such a dry climate. These areas have provided important habitat for wildlife; on the other hand, a large body of scientific evidence shows that some of the species have not sustained initial population increases. Programs to protect, mitigate and enhance wildlife affected by hydroelectric development should consider the net effects on wildlife associated with hydropower development.

Although the Northwest Power Act refers to them as "hydropower facilities", the dams serve multiple purposes--hydropower, flood control, navigation, irrigation, recreation, and other purposes. Congress encouraged a comprehensive response to the fish and wildlife impacts of dams on the Columbia River and its tributaries, and rejected the piecemeal, fragmented approach that characterized past mitigation efforts. The Council believes the region will benefit from a coordinated approach to wildlife mitigation. At the same time, as Congress specified,

1 consumers of electric power should pay only the cost of measures to deal with the
2 effects of electric power. The Act gives Bonneville the responsibility to allocate
3 expenditures to the various project purposes in consultation with the Corps of
4 Engineers and the Bureau of Reclamation in accordance with existing accounting
5 procedures.

6
7 The Council's program will address the full impacts of the "hydropower
8 facilities" in the broad sense that Congress intended, including all effects traceable
9 to any of the projects' purposes. Bonneville, in consultation with the Army Corps
10 of Engineers and the Bureau of Reclamation--should allocate implementation
11 costs, and develop any cooperative agreements needed to ensure coordinated and
12 expeditious program implementation.

13
14 It is critical, however, that implementation of wildlife measures not be delayed
15 by these allocations. Bonneville funding for the ratepayer share of wildlife
16 mitigation should proceed expeditiously, pursuant to short term agreements.
17 There is no reason for ratepayer wildlife mitigation in the short term to wait for a
18 determination of the financial responsibility of other project purposes. For the
19 longer term, if there is no agreement on funding allocations, the federal agencies
20 should work with the Council and the congressional delegation to arrive at a
21 solution.

22 23 24 25 **10.1 Wildlife Program Goal.**

- 26
27 1. To achieve and sustain levels of habitat and species productivity in
28 order to fully mitigate for the wildlife losses that have resulted from
29 construction and operation of the federal and non-federal hydroelectric
30 system.
31

32 **10.2 Policies**

33 **10.2A. Losses**

34 35 **Bonneville and Wildlife Managers**

- 36
37 1. Use the loss estimates in Table 4, as they may be adjusted by the Council
38 after further deliberation on the Audit of Wildlife Loss Assessments, as the
39 starting point for identifying wildlife measures and developing short term and
40 long term wildlife mitigation agreements.

1 **Council**

- 2
3 2. Within one year the adopt final loss estimates.
4
5

6 **10.2B. Ratepayer Share of Funding**

7
8 **Bonneville**

- 9
10 1. Through consultation with the Corps of Engineers, the Bureau of
11 Reclamation, Wildlife Managers, state and federal land management agencies,
12 tribes, utilities, the Council and other interested parties allocate wildlife
13 mitigation expenditures to the various project purposes in accordance with
14 existing accounting procedures. Complete this process by July 30, 1994.
15
16 2. In consultation with other responsible operators and managers coordinate
17 ratepayer funded measures with measures to deal with impacts caused by
18 non-electric power development and operations to develop a comprehensive
19 coordinated wildlife mitigation strategy. The parties should develop any
20 cooperative agreements necessary to ensure coordinated and expeditious
21 program implementation and should submit them to the Council for review
22 and approval by December 1, 1994. Should the parties fail to develop
23 agreements necessary to ensure coordinated program implementation then
24 the Council will take the actions necessary to ensure such agreements are
25 developed.
26
27 3. Report to the Council yearly on progress to date on all coordinated wildlife
28 mitigation activities.
29

30 **10.2C. Definition of Mitigation**

- 31
32 1. For purposes of this Program, mitigation is defined as achieving and sustaining
33 the levels of habitat and species productivity for the habitat units lost as a result
34 of the construction and operation of the federal and non-federal hydropower
35 system.
36

37 **10.2D. Losses Statements**

38
39 **Bureau of Reclamation**

- 40
41 1. Within 90 days from the adoption of this program, fund a study to develop
42 statements of wildlife and/or wildlife habitat losses at the Cascade hydro
43 project. These statements shall take into account all existing information
44 pertinent to the project area and shall address both realized and potential

1 positive and negative effects. Loss statements shall be submitted to the
2 Council for review and adoption into Table 4.

3
4
5 **10.2E. Mitigation Plans and Agreements**

6
7 **Bonneville and Wildlife Managers**

8
9 1. In developing wildlife mitigation plans and projects demonstrate the extent
10 to which the plans comply with the following:

- 11
12 a. Are the least costly way to achieve the biological objective;
- 13
14 b. Have measurable objectives, such as the restoration of a given number of
15 habitat units;
- 16
17 c. Protect high quality native or other habitat or species of special concern,
18 whether at the project site or not, including endangered, threatened, or
19 sensitive species;
- 20
21 d. Provide riparian or other habitat that can benefit both fish and wildlife;
- 22
23 e. Mitigate losses in-place, in-kind, where practical. When a wildlife
24 measure is not in-place, in-kind, the habitat units protected, mitigated or
25 enhanced by that measure will be credited against mitigation due for one or
26 more hydroelectric projects. ; and
- 27
28 f. Help protect or enhance natural ecosystems and species diversity over
29 the long term;
- 30
31 g. Complement the activities of the region's state and federal wildlife
32 agencies and Indian tribes, and in particular state clearly how plans or
33 projects would complement agency and tribal policies or programs to protect
34 or enhance natural ecosystems and species diversity over the long term;
- 35
36 h. Encourage the formation of partnerships with other persons or entities
37 which would reduce project costs, increase benefits and/or eliminate
38 duplicative activities;
- 39
40 i. Not impose on Bonneville the funding responsibilities of others, as
41 prohibited by section 4(h)(10)(A) of the Northwest Power Act;
- 42
43 j. Address special wildlife losses in areas that formerly had salmon and
44 steelhead runs that were eliminated by hydroelectric projects (for example,
45 societal and tribal wildlife losses);

1
2 k. Address concerns over additions to public land ownership and impacts
3 on local communities, such as reduction or loss of local government tax
4 base, special district tax base, or the local economic base; or consistency
5 with local governments' comprehensive plans;
6

7 1. Use publicly-owned land for mitigation, or management agreements on
8 private land, in preference to acquisition of private land, while providing
9 permanent protection or enhancement of wildlife habitat in the most cost-
10 effective manner.
11

12 13 **10.2F. Crediting**

14 **Council**

15
16
17 1. In consultation with the Wildlife Managers, tribes, Corps of Engineers,
18 Bureau of Reclamation and Bonneville, determine the amount of credit to be
19 given for existing wildlife mitigation undertaken in association with the federal
20 hydropower projects. The results of the determination shall be submitted to
21 the Council by July 31, 1994.
22

23 2. By September 1994, based on the results of the determination and the
24 adjusted loss estimates (10.2.A.1), initiate an amendment process to amend
25 the wildlife mitigation section of the program.
26

27 3. Credit for New Actions

28
29 a. The Council endorses the use of habitat units as the preferred unit of
30 measurement for mitigation accounting unless parties to an agreement
31 develop another method that in the Council's opinion, adequately takes into
32 account both habitat quantity and quality adequate to mitigate for the
33 identified losses.
34

35 b. The hydropower system must protect, mitigate and enhance wildlife to the
36 extent affected by Columbia River Basin hydropower facilities. This
37 obligation will be discharged when these effects are fully addressed, i.e.,
38 when mitigation actually offsets the loss caused by a hydropower facility.
39 Mitigation agreements may predict a certain level of mitigation, as long as
40 provision is made for monitoring and evaluation to determine if the
41 predicted benefits were realized.
42

43 c. The Council recognizes that there are inconsistencies throughout the basin
44 in how to determine the amount of credit given for acquisitions of habitat

1 involving the protection of existing habitat. For example, under the Lower
2 Snake Compensation Plan, the Corps has agreed to credit acquisitions for
3 habitat protection at a half of the value given to enhancement type projects,
4 while in the Washington Wildlife Mitigation Agreement the ratio is
5 dependent on the type of lands (public or private) and whether the
6 mitigation is based on acres or habitat units. The Council calls upon
7 Bonneville and the Wildlife managers to jointly develop a consistent,
8 systemwide method for addressing this issue.

- 9
10 d. The Council recognizes some fish habitat projects provide benefits to wildlife
11 as well as fish. Because of this the Council calls upon Bonneville and the
12 Wildlife Managers to develop a method for crediting wildlife benefits from
13 fish projects.

14
15
16 **10.2G. Operational Losses**

17
18 **Bonneville**

19
20 1. Fund studies to develop statements of wildlife and/or habitat losses and gains
21 caused by the operation of the federal hydropower system. The studies should be
22 designed to identify both direct and indirect operational losses and gains to fish
23 and wildlife habitat and should be based on a written plan designed to promote
24 consistency of results between and among projects and encourage early public
25 and local involvement. To the extent practicable the studies should rely on the
26 information developed in the System Operation Review. The studies should be
27 submitted for review and adoption into the program on or before December 31,
28 1996.

29
30
31 **10.3. Implementation**

32
33
34 **10.3A. Agreements**

35
36 **Bonneville and Wildlife Managers**

37
38 **1. Short Term Agreements**

39
40 a. To ensure that wildlife mitigation proceeds expeditiously, within 90 days
41 following the adoption of this Program consummate interim 5 year agreements,
42 similar to the interim Washington Wildlife Mitigation agreement, with the states of
43 Idaho and Oregon and appropriate Indian tribes
44

1 **Interested Parties**

2
3 b. If the parties are unable for any reason to reach agreement within this time
4 frame then by February 15, 1994, submit to the Council a list of wildlife
5 mitigation projects for implementation. Each October 1, thereafter, submit to
6 the Council a list of wildlife mitigation projects for implementation.

7
8 **Council**

9
10 c. Select and approve those projects to be funded for a given fiscal year.

11
12 **Bonneville**

13
14 d. Upon Council approval, fund the projects approved by the Council.

15
16 e. Continue to fund ongoing wildlife mitigation projects and incorporate them into
17 the interim agreements.

18
19
20 **Bonneville, The Corps of Engineers, The Bureau of Reclamation and Wildlife**
21 **Managers**

22
23 **2. Allocation of Effort:**

24
25 a. Using the process described in 10.2.B.1 determine the allocation of
26 expenditures by the relevant federal entities needed to achieve full mitigation of
27 wildlife losses attributable to the construction and operation of the federal
28 hydroelectric facilities.

29
30 **3. Long Term Agreements**

31
32 a. Within 3 years following the adoption of this Program, develop long term
33 agreements for all wildlife mitigation. The following elements should be
34 considered and addressed in the development of long term agreements:

- 35
- 36 1. Clear objectives (e.g., number of habitat units, acres and/or habitat types,
37 sample projects with list of indicator species).
 - 38
 - 39 2. Demonstration of how the agreement is expected to meet, exceed or fall
40 short of wildlife loss assessments.
 - 41
 - 42 3. Demonstration that the level of funding provided has substantial likelihood
43 of achieving stated wildlife mitigation objectives.
 - 44

- 1 4. Demonstration of consistency with the Council's wildlife rule policies and
2 standards.
- 3
- 4 5. Incentives to ensure effective implementation of the agreement with
5 periodic monitoring and evaluation (including an audit at least every other
6 year) to ensure progress and document successes and failures.
- 7
- 8 6. Demonstration that the agreements do not impose financial liabilities on
9 states or tribes for third party claims for additional mitigation. State/tribal
10 liability should be limited to good-faith performance of the mitigation
11 agreement and should not include the risk of financial or biological
12 uncertainty.
- 13
- 14 7. Criteria for re-evaluation or reopening to consider whether mitigation
15 actually has been achieved.
- 16
- 17 8. Provisions for public involvement during implementation (e.g., advisory
18 council, hearings, etc.).
- 19
- 20
- 21 b. Before any agreement is signed, the Council will review the agreement in an
22 open, public process, and determine whether it is consistent with this program.

23 **10.3B. Mitigation Priorities**

24 **Bonneville and Wildlife Managers**

- 25
- 26
- 27
- 28 1. Ensure that wildlife mitigation projects implemented in fulfillment of this
29 program are consistent with the basin-wide implementation priorities described in
30 the following Tables 1, 2, and 3:
- 31
- 32

33 **10.4 Monitoring and Evaluation.**

34

35

36 The Council is interested in ensuring that mitigation actually occurs on the
37 ground and accordingly is providing for monitoring to determine projected benefits
38 to wildlife that result from the program.

39

40 **Bonneville**

- 41
- 42 1. Fund the coordinated preparation of a biennial monitoring report. The report
43 should compile information on wildlife implementation, habitat units gained, and
44 the status of wildlife populations. The report should reflect broad technical review

1 and input, including the Council. The final report should be submitted to the
2 Council by June 15, every other year.

3
4 2. Fund an independent scientific review group to evaluate the progress and
5 success of wildlife mitigation efforts.
6

7 8 9 **10.5 Lower Snake River Compensation Program.**

10
11 The Corps of Engineers is in the final stages of implementing mitigation
12 plans for the Lower Snake River Fish and Wildlife Compensation Plan.
13 The Compensation Plan was authorized by Congress in 1976. The Corps
14 has acquired 97 percent of the acreage called for in the plan and intends
15 to acquire the remaining acreage by September 1994. Final habitat
16 developments on acquired lands will be completed by September 1996.
17

18 **Council**

- 19
- 20 1. The Council believes that when complete, the wildlife portion of the
21 Compensation Plan developed by the Corps will meet their
22 acreage/funding obligations mandated by Congress. However, based on
23 preliminary findings, the Council is concerned that the plan enacted by
24 the Corps may not fully mitigate the habitat unit losses identified for the
25 Lower Snake River hydroelectric projects. Accordingly, the Council will
26 review the Corp's plan and, as outlined below, amend its program to
27 address unmitigated wildlife losses associated with the Lower Snake River
28 Projects.
29
 - 30 2. Upon submission of the Corps final report, amend wildlife losses and
31 mitigation credit for the Lower Snake River Fish and Wildlife
32 Compensation Plan into the program.
33

34 **Corps of Engineers**

- 35
- 36 3. Within 90 days following adoption of this program, the Corps will develop a
37 process to more fully involve the Nez Perce Tribe. This involvement will
38 include, if determined possible, funding, the Nez Perce Tribes' assistance
39 and participation in analyzing mitigation credits associated with land
40 acquisition and development under the Lower Snake River Compensation
41 Plan. The Tribe will participate in the coordination of interagency
42 meetings which may be necessary during the final stages of Compensation
43 Plan completion. The Corps will coordinate with the appropriate agencies,
44 tribes, Bonneville and the Council regarding activities related to
45 completing work under the Compensation Plan. A preliminary summary of

1 the losses and mitigation credit for the plan will be submitted to the
2 Council by the end of December 1994.

- 3
- 4 4. The Corps will complete wildlife mitigation as authorized under the Lower
5 Snake River Fish and Wildlife Compensation Plan. Upon completion of all
6 activities in 1996, the Corps will submit a report to the Council
7 documenting the work completed and the mitigation credited in terms of
8 habitat units.
 - 9
 - 10 5. The Corps will report any inconsistencies or delays to the Council
11 regarding implementation of 10.5.2. and 10.5.3.

12

13 **Bonneville**

- 14
- 15 6. Within 90 days following adoption of this program, report to the Council
16 all costs reimbursed to the U.S. Treasury by Bonneville associated with the
17 wildlife mitigation portion of the Lower Snake River Fish and Wildlife
18 Compensation Plan. The Council will review this information and make
19 further judgments, if appropriate, regarding Bonneville's ability to
20 financially assist the implementation of 10.5.3.
 - 21
 - 22 7. Upon Council adoption of the loss estimates and the mitigation credit as
23 submitted to the Council in 10.5.2., fund implementation of the
24 hydropower share of unaddressed mitigation according to Section 10.3.A.
25 of the program. Highest priority should be given to unaddressed losses
26 sustained by the Nez Perce Tribe and Yakima Indian Nation.

27

28 **10.6 Non-federal projects**

29

30 Non-federal hydroelectric projects are licensed by the Federal Energy
31 Regulatory Commission (FERC). The Electric Consumers Protection Act of 1986
32 (ECPA) mandates that the FERC give equal consideration to the protection,
33 mitigation of damage to, and enhancement of wildlife in licensing and relicensing.
34

35

36 **Federal Energy Regulatory Commission**

- 37
- 38 1. In developing license conditions, take into account to the fullest extent
39 practicable the standards established in this section, and the measures taken by
40 Bonneville and others to implement this section, and section 1103(a)(2) of this
41 program. In particular, it is important to take into account the mitigation projects
42 at federal projects undertaken pursuant to this section, to assure that license
43 conditions are consistent with and complement these wildlife mitigation projects
44 and contribute fully and proportionately to regional wildlife mitigation goals.
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1. The Council will monitor the FERC licensing and relicensing proceedings and comment or intervene where appropriate.

Table 1

Lower Columbia Subbasin Wildlife Mitigation Priorities

Habitat Types Target Species	Priority
Riparian/Riverine Great Blue Heron	High
Old Growth Forest Northern Spotted Owl	High
Wetlands Great Blue Heron Band-tailed Pigeon Western Pond Turtle	High
Coniferous Forest Ruffed Grouse Elk American Black Bear/Cougar	Medium

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Table 2

Upper Columbia Subbasin Wildlife Mitigation Priorities

Habitat Types Target Species	Priority
Riparian / River	High
Bald Eagle (breeding)	
Black-capped Chickadee	
Peregrine Falcon	
Shrub-Steppe	High
Sharp-tailed Grouse	
Pygmy Rabbit	
Sage Grouse	
Mule Deer	
Wetlands	High
Mallard	
Redhead	
Islands	Medium
White Pelicans	
Agricultural Lands	Low
Swainson's Hawk	
Ring-necked Pheasant	

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Table 3

Snake River Subbasin Wildlife Mitigation Priorities

Habitat Type Target Species	Priority
Riparian/Riverine	High
Bald Eagle (breeding)	
Bald Eagle (wintering)	
River Otter	
Black-capped Chickadee	
Peregrine Falcon	
Ruffed Grouse	
Wetlands	High
Mallard	
Native Grasslands and Shrubs	Medium
Mule Deer/Elk	
White-tailed Deer	
Sharp-tailed Grouse	
Coniferous Forest	Medium
Elk	
Old Growth Forest	Medium
Pileated Woodpecker	
Lowland Forest	Low
White-tailed deer	

1 TABLE 4

2

3 (Losses are preceded by a "-" symbol, gains by a "+").

4

5 ALBENI FALLS

6

Species	Total Habitat Units
Mallard Duck	-5,985
Canada Goose	-4,699
Redhead Duck	-3,379
Breeding Bald Eagle	-4,508
Wintering Bald Eagle	-4,365
Black-Capped Chickadee	-2,286
White-tailed Deer	-1,680
Muskrat	-1,756
Yellow Warbler	+171

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8

9 ANDERSON RANCH

10

Species	Total Habitat Units
Mallard	-1,048
Mink	-1,732
Yellow Warbler	-361
Black Capped Chickadee	-890
Ruffed Grouse	-919
Blue Grouse	-1,980
Mule Deer	-2,689
Peregrine Falcon	-1,222 acres*

11

12 *Acres of riparian habitat lost. Does not require purchase of any lands.

13

1
2 **BLACK CANYON**
3

Species	Total Habitat Units
Mallard	-270
Mink	-652
Canada Goose	-214
Ring-necked Pheasant	-260
Sharp-tailed Grouse	-532
Mule Deer	-242
Yellow Warbler	+8
Black-capped chickadee	+68

4
5
6 **PALISADES**
7

Species	Total Habitat Units
Bald Eagle	-5,941
	breeding
	-18,565
	wintering
Yellow Warbler /	-718
	scrub-shrub
Black Capped Chickadee	-1,358
	forested
Elk/Mule Deer	-2,454
Waterfowl & Aquatic Furbearers	-5,703
Ruffed Grouse	-2,331
Peregrine Falcon*	-1,677
	acres of forested
	wetland
	-832
	acres of scrub-shrub
	wetland
	+68
	acres of emergent
	wetland

8
9 * Acres of riparian habitat lost. Does not require purchase of any lands.
10

1 WILLAMETTE BASIN PROJECTS

2

Species	Total Habitat Units
Black-tailed Deer	-17,254
Roosevelt Elk	-15,295
Black Bear	-4,814
Cougar	-3,853
Beaver	-4,477
River Otter	-2,408
Mink	-2,418
Red Fox	-2,590
Ruffed Grouse	-11,145
California Quail	-2,986
Ring-necked Pheasant	-1,986
Band-tailed Pigeon	-3,487
Western Gray Squirrel	-1,354
Harlequin Duck	-551
Wood Duck	-1,947
Spotted Owl	-5,711
Pileated Woodpecker	-8,690
American Dipper	-954
Yellow Warbler	-2,355
Common Merganser	+1042
Greater Scaup	+820
Waterfowl	+423
Bald Eagle	+5693
Osprey	+6159

3

4

5 GRAND COULEE

6

Species	Total Habitat Units
Sage Grouse	-2,746
Sharp-tailed Grouse	-32,723
Ruffed Grouse	-16,502
Mourning Dove	-9,316
Mule Deer	-27,133
White-tailed Deer	-21,362
Riparian Forest	-1,632
Riparian Shrub	-27
Canada Goose Nest Sites	-74

7

8

1 MCNARY DAM WILDLIFE LOSSES

2

SPECIES	Potential Habitat Units
Mallard (wintering)	+13744
Mallard (nesting)	-6959
Western meadowlark	-3,469
Canada goose	-3,484
Spotted sandpiper	-1,363
Yellow warbler	-329
Downy woodpecker	-377
Mink	-1,250
California quail	-6,314

3

4

5 JOHN DAY

6

SPECIES	Total Habitat Units
Lesser scaup	+14,398
Great blue heron	-3,186
Canada goose	-8,010
Spotted sandpiper	-3,186
Yellow warbler	-1,085
Black-capped chickadee	-869
Western meadowlark	-5,059
California quail	-6,324
Mallard	-7,399
Mink	-1,437

7

8

9 THE DALLES

10

THE DALLES DAM SPECIES	Total Habitat Units
Lesser scaup	+2,068
Great blue heron	-427
Canada goose	-439
Spotted sandpiper	-534
Yellow warbler	-170
Black-capped chickadee	-183
Western meadowlark	-247
Mink	-330

11

12

1 **BONNEVILLE**

2

TARGET SPECIES **Total Habitat Units**

Lesser scaup	+2,671
Great blue heron	-4,300
Canada goose	-2,443
Spotted sandpiper	-2,767
Yellow warbler	-163
Black-capped chickadee	-1,022
Mink	-1,622

3

4

5 **DWORSHAK**

6

SPECIES **Total Habitat Units**

Canada goose-breeding	-16
Black-capped chickadee	-91
River Otter	-4,312
Pileated Woodpecker	-3,524
Elk	-11,603
White-tailed deer	-8,906
Canada goose-wintering	+323
Bald eagle	+2,678
Osprey	+1,674
Yellow warbler	+119

7

8 **MINIDOKA**

9

SPECIES **Total Habitat Units**

Mallard	+174
Redhead	+4,475
Western grebe	+273
Marsh wren	+207
Yellow warbler	-342
River otter	-2,993
Mule deer	-3,413
Sage grouse	-3,755

10

1 Chief Joseph

2

SPECIES

Total Habitat Units

Lesser scaup	+1440
Sharp-tailed grouse	-2290
Mule Deer	-1992
Spotted sandpiper	-1255
Sage grouse	-1179
Mink	-920
Bobcat	-401
Lewis' woodpecker	-286
Ring-necked pheasant	-239
Canada goose	-213
Yellow warbler	-58

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Section 11

Future Hydroelectric Development

INTRODUCTION

Much of this program has focused on mitigating damage done to Columbia River Basin fish and wildlife by hydropower development and operations in the past. But the future is equally important. The Corps of Engineers and the Bureau of Reclamation continue to study the need for additional federal hydroelectric projects and to plan for new development in the basin. FERC has many applications pending for hydroelectric development in Idaho, Oregon, Montana and Washington and more than 100 outstanding preliminary permits (indicating ongoing project feasibility studies) in those four states. Many of those applications and permits are for projects throughout the Columbia River Basin. Dozens of small or medium hydroelectric projects are proposed for tributary drainage basins that contain important anadromous fish habitat. However, most new hydroelectric development will be accomplished by private or non-federal public entities licensed by the Federal Energy Regulatory Commission (FERC). FERC has at least 115 applications pending for hydroelectric development in Idaho, Oregon, Montana and Washington and at least 92 outstanding preliminary permits (indicating ongoing project feasibility studies) in those four states. Many of those applications and permits are for projects throughout the Columbia River Basin. From 20 to 50 small or medium hydroelectric projects are proposed for tributary drainage basins that contain important anadromous fish habitat.

Many of the proposals are for hydroelectric projects that would produce less than 5 megawatts of electricity. Although individual small projects may have no significant adverse effects on the fish and wildlife resources of the basin, the cumulative effects of such development throughout a river basin could be quite harmful. Improvements are needed in the decision-making on proposed hydropower development, so that cumulative effects are fully taken into account.

The Council estimates that 4,600 stream miles of Columbia River Basin salmon and steelhead spawning and rearing habitat have been lost to development, not including losses of migration routes and of resident fish and wildlife habitat. Minimizing further habitat loss is especially important in view of the Council's goal, adopted in 1987, of doubling salmon and steelhead runs with the Columbia River Basin consistent with system policies (see Program section 204). Development in critical fish and wildlife areas leads to divisive and expensive conflicts that the Council believes can be avoided through resource planning.

1 The Council finds that future hydroelectric developers in the basin should be
2 required to mitigate harm to fish and wildlife and has adopted program measures
3 calling for such mitigation. New hydroelectric development has the potential to
4 cause further damage to the basin's fish and wildlife resources as well as to negate
5 ongoing Council efforts to remedy damage caused by the existing hydropower
6 system. Federal agencies also should assess and mitigate the cumulative effects
7 on fish and wildlife of multiple hydroelectric projects. Additional improvements
8 are needed in methods for assessing cumulative effects and for incorporating such
9 assessments into federal review processes.

10
11 From the inception of this program, the Council has supported the concept of
12 protecting some streams and wildlife habitats from hydroelectric development,
13 where the Council believes such development would have major negative impacts
14 that could not be reversed. Beginning in 1983, the Council directed extensive
15 studies of existing habitat and has analyzed alternative means of protection. In
16 1988, the Council concluded that: (1) the studies had identified fish and wildlife
17 resources of critical importance to the region; (2) mitigation techniques cannot
18 assure that all adverse impacts of hydroelectric development on these fish and
19 wildlife populations will be mitigated; (3) even small hydroelectric projects may
20 have unacceptable individual and cumulative impacts on these resources; (4)
21 protecting these resources and habitats from hydroelectric development is
22 consistent with an adequate, efficient, economical, and reliable power supply. The
23 Council, relying on these studies, designated certain river reaches in the Basin as
24 "protected areas," where the Council believes hydroelectric development would
25 have unacceptable risk of loss to fish and wildlife species of concern, their
26 productive capacity, or their habitat.

27
28 The Council also intends to continue to review applications for FERC permits
29 and licenses and for Corps of Engineers and Bureau of Reclamation proposals for
30 hydroelectric development. The purpose of this review is to identify program
31 measures related to the proposed development in order to ensure that any new
32 development in the basin is consistent with this fish and wildlife program and the
33 Council's Northwest Power Plan. The Council's reviews would complement and
34 recognize, not supplant, the role of the fish and wildlife agencies and tribes in
35 reviewing proposals for hydroelectric projects.

36 37 **11.1 Conditions of Development**

38
39 FERC, the Corps, the Bureau of Reclamation and Bonneville:

40
41 1. Do not license, exempt from license, relicense, propose, recommend, agree to
42 acquire power from, grant billing credits for, or otherwise support any
43 hydroelectric development in the Columbia River Basin without providing for:
44

- 1 a. Consultation with the fish and wildlife agencies and tribes and the Council
2 throughout study, design, construction and operation of the project;
3
4 b. Specific plans for flows and fish facilities prior to construction;
5
6 c. The best available means for aiding downstream and upstream migration of
7 salmon and steelhead;
8
9 d. Flows and reservoir levels of sufficient quantity and quality to protect
10 spawning, incubation, rearing and migration;
11
12 e. Full compensation for unavoidable fish losses or fish habitat losses through
13 habitat restoration or replacement, appropriate propagation, or similar measures
14 consistent with the provisions of this program;
15
16 f. Assurance that the project will not inundate the usual and accustomed
17 fishing and hunting places of any tribe;
18
19 g. Assurance that the project will not degrade fish habitat or reduce numbers of
20 fish in such a way that the exercise of treaty rights will be diminished; and
21
22 h. Assurance that all fish protection measures are fully operational at the time
23 the project begins operation.

24
25 FERC, the Corps, the Bureau of Reclamation and Bonneville:
26

- 27 2. Do not license, relicense, exempt from license, propose, recommend, agree to
28 acquire power from, or otherwise support any hydroelectric development in the
29 Columbia River Basin without specifically providing for these development
30 conditions:
31
32 a. Consulting with the wildlife agencies and tribes and the Council throughout
33 study, design, construction and operation of the project;
34
35 b. Avoiding inundation of wildlife habitat, insofar as practical;
36
37 c. Timing construction activities, insofar as practical, to reduce adverse effects
38 on nesting and wintering grounds;
39
40 d. Locating temporary access roads in areas to be inundated;
41
42 e. Constructing subimpoundments and using all suitable excavated material to
43 create islands, if appropriate, before the reservoir is filled;
44

- 1 f. Avoiding all unnecessary or premature clearing of land before filling the
2 reservoir;
3
- 4 g. Providing artificial nest structures when appropriate;
5
- 6 h. Avoiding construction, insofar as practical, within 250 meters of active raptor
7 nests;
8
- 9 i. Avoiding critical riparian habitat (as designated in consultation with the fish
10 and wildlife agencies and tribes) when clearing, riprapping, dredging, disposing of
11 spoils and wastes, constructing diversions, and relocating structures and
12 facilities;
13
- 14 j. Replacing riparian vegetation if natural revegetation is inadequate;
15
- 16 k. Creating subimpoundments by diking backwater slough areas, creating
17 islands and nesting areas;
18
- 19 l. Regulating water levels to reduce adverse effects on wildlife during critical
20 wildlife periods (as defined in consultation with the fish and wildlife agencies and
21 tribes);
22
- 23 m. Improving the wildlife capacity of undisturbed portions of new project areas
24 (through such activities as managing vegetation, reducing disturbance, and
25 supplying food, cover and water) as compensation for otherwise unmitigated harm
26 to wildlife and wildlife habitat in other parts of the project area;
27
- 28 n. Acquiring land or management rights where necessary to compensate for lost
29 wildlife habitat at the same time other project land is acquired and including the
30 associated costs in project cost estimates;
31
- 32 o. Funding operation and management of the acquired wildlife land for the life
33 of the project;
34
- 35 p. Granting management easement rights on the acquired wildlife lands to
36 appropriate management entities; and
37
- 38 q. Collecting data needed to monitor and evaluate the results of the wildlife
39 protection efforts.
40
- 41 3. Ensure that all licenses for hydroelectric projects or documents that propose,
42 recommend or otherwise support hydroelectric development explain in detail how
43 the provisions of Sections 1103(a)(1)-(2) will be accomplished or the reasons why
44 the provisions cannot be incorporated into the project.
45

1 **11.2 Protected Areas**

2
3 **11.2A Areas protected from new hydropower development.**

4
5 1. River reaches to be protected are those reaches or portions of reaches listed
6 on the "Protected Areas List" adopted by the Council on August 10, 1988, and
7 subsequently. For each river reach listed on the Protected Areas List, the fish and
8 wildlife to be protected are those on the List. The Council will supply a copy of the
9 Protected Areas List to any party free of charge.

10
11 **Bonneville Power Administration:**

12
13 2. Do not acquire power from hydroelectric projects located in protected areas.
14 The Council believes that the Long-Term Intertie Access Policy's reliance on
15 protected areas is consistent with the Council's power plan and fish and wildlife
16 program as they apply to fish and wildlife in the Columbia River Basin. The
17 Council continues to recommend that Bonneville adopt a similar policy with
18 respect to protected areas outside the Columbia River Basin.

19
20 **Federal Energy Regulatory Commission:**

21
22 3. Under the Northwest Power Act, the Federal Energy Regulatory Commission
23 (FERC), and all other federal agencies responsible for managing, operating, or
24 regulating federal or non-federal hydroelectric facilities located on the Columbia
25 River or its tributaries are required to take protected area designations into
26 account to the fullest extent practicable at all relevant stages of decisionmaking
27 processes. The Council recognizes that the FERC makes licensing and exemption
28 decisions for nonfederal projects, and does not expect that the FERC will abandon
29 its normal processes with regard to projects located in protected areas. Rather,
30 consistent with section 4(h)(11) of the Northwest Power Act, the Council expects
31 that the FERC will take the Council's judgment into account, and implement that
32 judgment in licensing and exemption decisions unless the FERC's legal
33 responsibilities require otherwise.

34
35 **11.2B Projects not affected.**

36
37 1. This measure does not apply to:

38
39 a. any hydroelectric facility or its existing impoundment that had as of August
40 10, 1988, been licensed or exempted from licensing by the Federal Energy
41 Regulatory Commission;

42
43 b. the relicensing of such hydroelectric facility or its existing impoundment;

1 c. any modification of any existing hydroelectric facility or its existing
2 impoundment;

3
4 d. any addition of hydroelectric generation facilities to a non-hydroelectric dam
5 or diversion structure.

6
7 11.2C Transition projects.

8
9 1. The Council recognizes that there exist, as of August 10, 1988, applications
10 for hydroelectric projects are various stages of completion before the Federal
11 Energy Regulatory Commission. In many cases the applicants have made
12 substantial investments and have completed, or nearly completed, agreements
13 with all interested parties, including state fish and wildlife agencies. The Council
14 recognizes that the Federal Energy Regulatory Commission may be obligated to
15 complete its processes on these applications, but expects where possible that this
16 measure will be taken into account to the fullest extent practicable.

17
18 2. The Council recognizes that there may exist preliminary permits or
19 applications for licenses or exemptions for hydroelectric projects at sites which
20 were not previously within protected areas but which may be included within
21 protected areas as a result of amendments approved by the Council. An
22 important purpose of protected areas is to encourage developers to site projects
23 outside protected areas. The Council therefore exempts from the effect of an
24 amendment designated a previously unprotected area as protected any project for
25 which the developer had obtained a preliminary permit or filed an application for
26 license or exemption prior to the date on which the Council entered rulemaking on
27 the amendment. However, it is the Council's intention that the Federal Energy
28 Regulatory Commission give full consideration to the protection of fish and wildlife
29 resources located at these project sites and provide suitable protection and
30 mitigation for such resources in the event that a license or exemption is approved.

31
32 11.2D Effect on water rights and riparian areas:

33
34 1. This measure should not be interpreted to authorize the appropriation of
35 water by any entity or individual, affect water rights or jurisdiction over water, or
36 alter or establish any water or water-related right. The Council does not intend
37 this measure to alter or affect any state or federal water quality classification or
38 standards, or alter any management plan developed pursuant to the national
39 Forest Management Act, 16 U.S.C. 1601, et seq., or the Federal Land Policy
40 Management Act, 43 U.S.C. 1701, et seq., except to the extent planning decisions
41 are directly related to hydropower licensing and development. Nor should this
42 measure to interpreted to alter, amend, repeal, interpret, modify, or conflict with
43 any interstate compact made by the states. If this measure is found by a court or
44 other competent authority to conflict with any other interstate compact, this

1 measure will terminate with respect to the area involved without further action of
2 the Council.

3
4 2. This measure applies to river reaches, or portions of river reaches, and to
5 river banks or surrounding areas only where such areas would be directly affected
6 by a proposed hydroelectric project. In adopting this measure, the Council has
7 not attempted to balance all the factors that may be relevant to land management
8 determinations.

9
10 **11.2E Amendments:**

11
12 1. Upon submission to the Council of a state or tribal comprehensive plan or
13 state or tribal river basin or watershed plan, the Council will promptly initiate
14 amendment proceedings and carefully consider amending this measure to reflect
15 appropriate portions of the state or tribal plan. With regard to resident fish and
16 wildlife, the Council recognizes that individual state and tribal interests are
17 particularly strong.

18
19 2. The Council will also consider revising protected areas upon completion of
20 system planning (see Section 205).

21
22 3. Other amendments to this measure will be considered in accordance with
23 section 1303.

24
25 **11.3 Cumulative Effects**

26
27 **Federal project operators and regulators:**

28
29 1. Review simultaneously all applications or proposals for hydroelectric
30 development in a single river drainage, through consolidated hearings,
31 environmental impact statements or assessments, or other appropriate methods.
32 This review shall assess cumulative environmental effects of existing and proposed
33 hydroelectric development on fish and wildlife.

34
35 **11.4 Consistency**

36
37 **Federal Energy Regulatory Commission:**

38
39 1. Require all applicants for licenses (including license renewals, amendments
40 and exemptions) and preliminary permits in the Columbia River Basin to
41 demonstrate in their applications how the proposed project would take this
42 program into account to the fullest extent practicable.

43
44 2. Provide the Council with copies of all applications for licenses (including
45 license renewals, amendments and exemptions) and preliminary permits in the

1 Columbia River Basin so that the Council can comment in a timely manner on the
2 consistency of the proposed project with this fish and wildlife program. This
3 provision is not intended to supplant review of such applications by the fish and
4 wildlife agencies and tribes.

5
6 **Federal Land Managers and Federal and State Fish and Wildlife Agencies**

7
8 3. Incorporate pertinent elements of the fish and wildlife program in the terms
9 and conditions they apply to projects exempted from licensing under FERC
10 exemption procedures. The Council also requests federal land managers to
11 incorporate this program into their permit procedures related to hydroelectric
12 development on lands they manage.

13
14 Corps of Engineers, the Bureau of Reclamation, and any other federal agency
15 studying or proposing hydroelectric development in the Columbia River Basin:

16
17 4. Provide opportunity for Council review and comment.
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Section 12

Amendments

INTRODUCTION

Congress gave the Council one year to develop an initial program that would address the complex and long-term technical, legal, economic and political problems associated with the effects of hydroelectric power development on fish and wildlife in the Columbia River Basin. Since the initial program was adopted in 1982, the Council has conducted three comprehensive amendment processes (1984, 1987 and 1991-93) and more than fifteen issue-specific amendment processes. While these amendment processes require time and energy, they are essential if the program is to adapt to new information and changing conditions.

By law, the Council must open the program for review at least once every five years, and in connection with major revisions to the power plan. The Council also may amend the program at any time on its own motion. Such a motion either may be initiated by the Council itself or may be in response to the recommendations of interested entities or individuals. The Council encourages critics of the program to resolve their concerns by consulting with the Council and undertaking to amend the program rather than engaging in divisive, time-consuming and expensive court proceedings.

Whether an amendment is proposed by the Council or recommended by another entity, amendments to the program must satisfy the requirements of the Northwest Power Act.

12.1A Amendment proposals on the Council's own motion

The Council on its own motion may consider a program amendment at any time. In doing so, it will provide for public comment, consultation and adherence to the requirements of the Act, as described in Section 12.1D. Any party may request that the Council consider a program amendment on its own motion, by submitting an amendment application as provided for in Section 12.1C. The Council may, at its discretion, choose whether or not to consider such a program amendment. If the Council chooses not to consider a program amendment, the amendment application will be returned by the Council and may be resubmitted during the next review period under Section 12.2.

12.1B Mandatory review.

The Northwest Power Act requires the Council to review the Northwest Conservation and Electric Power Plan at least every five years and to request recommendations to amend the Columbia River Basin Fish and Wildlife Program

1 "prior to the development or review of the plan, or any major revision thereto."
2 The Council may, at its discretion, request recommendations to amend the fish
3 and wildlife program, or any portion of it, more frequently than every five years
4 and independently of revisions to the power plan.

5
6 **12.1C Form of recommendations.**
7

8 The Council will prepare application forms specifying the Council's
9 requirements for information for recommendations to amend the program.
10 Interested parties may use these forms, or may submit recommendations in letter
11 form. In either case, amendment recommendations should contain the following
12 information:
13

14 1. A proposed amendment to the program, showing new language proposed to
15 be added and existing language proposed to be stricken;
16

17 2. A detailed description of how the proposed amendment would satisfy the
18 standards of Sections 4(h)(5)-(6) of the Act, including:
19

20 a. How and to what extent the recommended measure would protect,
21 mitigate or enhance fish or wildlife, including: 1) a description of the
22 techniques proposed; 2) an estimate of the expected biological benefits
23 (in measureable terms, if possible); and 3) a plan for determining
24 whether the expected benefits are achieved;
25

26 b. How the fish and wildlife involved have been affected by the
27 development, operation and management of hydropower facilities in the
28 Columbia River Basin;
29

30 c. A description and analysis of all available scientific knowledge related
31 to the proposed amendment;
32

33 d. An estimate of the costs, losses of power and impact on rates, if any,
34 that would result if the amendment were adopted; and
35

36 e. A plan and schedule for funding and implementing the proposed
37 amendment.
38

39 3. A verification of the facts stated in the application, signed by the person who
40 prepared the application and the person authorizing the application; and
41

42 (5) If the application is submitted by a state, state subdivision or tribe under
43 Section 4(g)(3) of the Act, a certification that the state, subdivision or tribe has
44 adopted the recommended objective and Bonneville has reviewed it.
45

46 **12.1D Council Review**

1
2 1. The Council will review and then propose action on each application for
3 amendment accepted for consideration. In considering the applications, the
4 Council will consult with appropriate power managers, operators and regulators,
5 fish and wildlife agencies, tribes and Bonneville customers; will provide public
6 notice and an opportunity for comment (in writing and at public hearings) on the
7 proposed Council actions; and will otherwise adhere to the requirements of the
8 Act.

9
10 2. Following public comment and consultation, the Council will act on each
11 recommended amendment by:

12
13 a. Adopting it;

14
15 b. Adopting it with modifications based on the comments and
16 consultations; or

17
18 c. Rejecting it for failure to conform to the statutory standards for
19 program elements.

20
21 3. The Council will act on each recommended amendment within one year after
22 receiving it.

23
24 **12.1E Protected areas amendments**

25
26 1. Any party may file a petition with the Council to change the designation of a
27 river reach as protected or unprotected or to change the reason for a protected
28 designation.

29
30 2. Before filing a petition with the Council, the petitioner must notify the
31 appropriate state agency and consult with that agency regarding the change in
32 designation.

33
34 3. Petitions must contain the following:

35
36 a. The location of the affected river reach, including the reach number as
37 listed in the Council's protected areas data base.

38
39 b. A statement of the facts showing the anticipated benefits and the
40 anticipated detriments of the project.

41
42 c. An explanation of how the project will affect the Council's plan and
43 program, or, if outside the Columbia Basin, how the project will affect the plan or
44 relevant state and tribal comprehensive plans.

1 d. An explanation of how the petitioner has determined that the project
2 will achieve exceptional fish and wildlife benefits.

3
4 e. A summary of consultations the petitioner has had with relevant fish
5 and wildlife agencies and Indian tribes regarding the petition, and the responses
6 of the agencies and tribes.

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SECTION 13

DISCLAIMERS

14.1. **DISCLAIMERS**

Nothing in this program will:

1. Affect or modify any treaty or other right of an Indian tribe;
2. Authorize the appropriation of water by any federal, state, or local agency, Indian tribe or any other entity of individual;
3. Affect the rights or jurisdictions of the United States, the states, Indian tribes, or other entities over waters of any river, stream or groundwater resource;
4. Alter, amend, repeal, interpret, modify or conflict with any interstate compact;
5. Alter or establish the respective rights of the United States, states, Indian tribes or any person with respect to any water or water-related right;
6. Affect the validity of any existing license, permit or certificate issued by any federal agency pursuant to federal law; or
7. Otherwise conflict with the savings provisions in Section 10 of the Northwest Power Act.

14.2. **SCOPE**

This program applies solely to fish and wildlife, including related spawning grounds and habitat, located on the Columbia River and its tributaries. Nothing in this program alters, modifies or affects in any way the laws applicable to rivers or river systems, including electric power facilities related thereto, other than the Columbia River and its tributaries, or affects the rights and obligations of any agency, entity, or person under such laws.

14.3. **VALIDITY**

If any provision of this program or the application of any provision is held invalid, no other provision of this program or its application will be affected as a result.

1994 Columbia River Basin Fish and Wildlife Action Plan

07-Feb-94

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
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2 : PROGRAM FRAMEWORK AND GOAL

2.1 REFINE SYSTEM GOAL WHICH SUPPORTS HUMAN SETTLEMENT AND SUSTAINABILITY OF NATIVE FISH RUNS

	2.1 Program system goal is a healthy Columbia Basin.	<u>Ongoing</u>
<i>Council</i>		
	2.1.1 Explore methods to assess trends in system health.	

2.2 DEVELOP SYSTEM POLICIES

	2.2A Program preference is to support and rebuild native species in native habitats, where feasible.	<u>Ongoing</u>
<i>Council</i>		
	2.2B Council will periodically assess program measures to identify conflicts and assess tradeoffs in the Columbia Basin.	<u>Ongoing</u>
<i>Council</i>		
	2.2B.1 Develop a method to identify conflicts and assess tradeoffs between and among program measures and basin activities.	<u>12/31/94</u>
<i>Council</i>		
	2.2B.2 Continue to review program measures for purposes of prioritization, cost-effectiveness and biological effectiveness.	<u>Ongoing</u>
<i>Relevant Parties</i>		
	2.2C Use cost sharing, where pertinent, to fund program measures.	<u>Ongoing</u>
	2.2D Program does not call for actions to provide passage over natural barriers.	<u>Ongoing</u>
	2.2E Need for and requirements of Columbia River Basin reservoir operation and accounting procedure.	<u>Ongoing</u>
<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Corps</i>
	2.2E.1 Develop reservoir accounting system for the Columbia River Basin.	<u>12/31/94</u>
<i>Bonneville</i>		
	2.2E.2 Fund reservoir accounting system.	<u>Ongoing</u>
<i>Bonneville</i>		
	2.2E.3 Fund all activities in section 2.2E.4.	<u>12/31/96</u>

Entity(s)	Action Description	Completion Date	
Bonneville	Bureau of Reclamation	Corps	Fish Managers
2.2E.4.a	Identify reservoir levels necessary to maintain or enhance fish and wildlife in the Columbia Basin.		<u>12/31/96</u>
Bonneville	Bureau of Reclamation	Corps	Fish Managers
2.2E.4.b	Analyze the relationship between drawdown limits and fish flow measures set for resident and anadromous fish in this program, including the water budget.		<u>12/31/96</u>
Bonneville	Bureau of Reclamation	Corps	Fish Managers
2.2E.4.c	Develop alternative means to resolve any conflicts between drawdown limits and requirements for fish flows.		<u>12/31/96</u>
Bonneville	Bureau of Reclamation	Corps	Fish Managers
2.2E.4.d	Determine and analyze the probable effects of drawdown limits on the power system and flood control.		<u>12/31/96</u>
Relevant Parties			
2.2E.5	Fund, as a high priority, all measures in the program that address reservoir operations.		<u>12/31/96</u>
Bonneville	Council		
2.2F.1	Review the annual implementation plan and ensure implementation of the program.		<u>Ongoing</u>
2.2G	Develop, fund and implement agreements between the fish and wildlife managers on both sides of the United States/Canada border that recognize the mutual benefit of protecting, mitigating and enhancing transboundary species.		<u>Ongoing</u>

2.3 DEVELOP SALMON AND STEELHEAD FRAMEWORK

2.3 Salmon and Steelhead Framework and Goal

2.4 DOUBLE SALMON AND STEELHEAD RUNS WITHOUT LOSS OF BIOLOGICAL DIVERSITY

2.4A Salmon and Steelhead Doubling Goal

2.4A.1 Priority given to activities that aim to rebuild weak, upriver populations.

2.4A.2 Program activities should pose no appreciable risk to biological diversity among or within fish populations.

2.4A.3 The region should approach habitat and production activities from a total watershed perspective.

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
2.4A.4	Do not lose sight of the region's obligations to fulfill Indian treaties and provide fish for Indian and non-Indian harvest.	
2.4A.5	Priority should be given to activities that address critical uncertainties and / or test important hypotheses.	
2.4A.6	New salmon production facilities generally should not be constructed.	
2.4B	Performance Standards for the Salmon and Steelhead Goal	
<i>Fish Managers</i>	<i>Implementing Agencies</i>	
2.4B.1	Participants in the IPP should convene an appropriate group of experts to provide recommendations for a base-line population list which would define the existing level of biological diversity.	<u>12/31/92</u>
2.4C	Basis for the Salmon and Steelhead Goal	
<i>Independent Scientific Group</i>		
2.5	Snake River Chinook Rebuilding Targets, Performance Standards and Monitoring. Adopt revisions to the rebuilding targets for Snake River spring, summer, and fall chinook. Devise methods to track progress towards the rebuilding targets.	<u>10/93</u>
2.5	DEVELOP SNAKE RIVER CHINOOK REBUILDING TARGETS, PERFORMANCE STANDARDS AND MONITORING	
2.5A	Population Monitoring	
<i>Fish Managers</i>	<i>Implementing Agencies</i>	
2.5A.1	Propose a limited set of populations that can serve as indicators of Snake River chinook populations.	<u>12/31/92</u>
2.6	DEVELOP REBUILDING ELEMENTS	
2.6	Development of Rebuilding Elements	
<i>Fish Managers</i>	<i>Implementing Agencies</i>	
2.6.1	Working with the Council, begin to develop rebuilding plans for identified population management units.	
<i>Bonneville</i>		
2.6.2	Fund travel of the fishery managers necessary to develop recommendations in 2.6.1.	
2.7	DEVELOP ADDITIONAL PERFORMANCE STANDARDS	

Entity(s)	Action Description	<u>Completion Date</u>
2.7	Development of Performance Standards	
Fish Managers	Implementing Agencies	
2.7.1	Solicit input from a variety of groups to develop additional performance standards.	
2.8 PERFORM MANAGEMENT REVIEW		
Council		
2.8	Management Review	<u>4/1/94</u>

3 : JUVENILE SALMON MIGRATION

3.2 COORDINATE RIVER OPERATIONS

<i>Council</i>	<i>Fish Operations Executive Committee</i>	
3.2A	Produce annual rivers operation plan, Council will review implementation of river operations; determine needed revisions	
<i>Bonneville</i>		
3.2B.1	Continue to fund the Fish Passage Center and the fish passage manager.	
<i>Fish Passage Center</i>		
3.2B.2	Function as the primary program center for housing and distributing data regarding juvenile fish passage.	
<i>Bonneville</i>		
3.2B.3	Fund the "fish passage manager"	
<i>Bonneville</i>	<i>Fish Passage Center</i>	
3.2B.4	Regional cooperation with all parties.	
<i>Bonneville</i>	<i>Fish Passage Center</i>	
3.2B.5	Fish passage manager will be primary point of contact.	
<i>Federal Project Operators</i>	<i>Federal Project Regulators</i>	
3.2C.1	Coordinate the system's flow operation and report to the Fish Operations Executive Committee.	<u>Jan 15, Yearly</u>
<i>Corps</i>		
3.2C.2	Submit to the Fish Operations Executive Committee and the Council a coordinated plan of operation for flow augmentation.	<u>Mar 20, Yearly</u>
<i>Fish Passage Center</i>		
3.2C.3	Submit to the Fish Operations Executive Committee and the Council a single report explaining flow augmentation schedules.	<u>Nov 1, Yearly</u>
<i>Bonneville</i>		
3.2C.4	Pay travel costs for tribal member participation.	
<i>Council</i>		
3.2D.1	Establish "firm power flows" at mainstem projects.	
<i>Council</i>		
3.2D.2	Establish priorities for competing uses of the hydropower system.	
<i>Council</i>		
3.2D.3	Recognition that flow measures must conform to applicable laws.	

3.3 IMPROVE SNAKE RIVER FLOW, VELOCITY AND TEMPERATURE CONTROL

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
<i>Corps</i>		
3.3A.1	Report to Council measures to remove limits to levels of operating Lower Snake dams	<u>3/15/92</u>
<i>Bonneville</i>	<i>Corps</i>	<i>Reclamation</i>
3.3A.2	Operate Dworshak reservoir to improve salmon migration conditions	
<i>Idaho</i>	<i>Reclamation</i>	
3.3A.3	Supply at least 90,000 acre feet of uncontracted storage for spring migrants	
<i>Bonneville</i>	<i>Idaho</i>	<i>Oregon</i>
3.3A.4	Secure at least 100,000 acre feet from Snake River Basin for spring migrants	<i>Reclamation</i>
<i>Bonneville</i>		
3.3A.5	Fund an independent evaluation of the effectiveness of Snake water marketing and conservation measures in providing water for salmon	
<i>Bureau of Reclamation</i>	<i>Corps</i>	<i>FERC</i>
3.3A.6	Operate Brownlee to ensure water is passed to assist spring migrants.	<i>Idaho Power</i>
<i>Bureau of Reclamation</i>	<i>Corps</i>	<i>FERC</i>
3.3A.7	Draft Brownlee under certain conditions to provide flow for spring migrants.	<i>Idaho Power</i>
<i>Idaho</i>	<i>Oregon</i>	<i>Reclamation</i>
3.3A.8	Establish Snake River Anadromous Fish Office	<u>5/31/92</u>
<i>Bonneville</i>	<i>Corps</i>	
3.3B.1	Report on effectiveness of cool water release measures on Snake adult passage	<u>12/31/93</u>
<i>Bonneville</i>	<i>Corps</i>	<i>Other Parties</i>
3.3B.2	Draft Dworshak under certain conditions to provide flows for temperature control.	<u>Aug- Sept, Yearly</u>
<i>All Parties</i>		
3.3B.3	Seek funding to modify commercial and recreational facilities at Dworshak to allow operations at reduced levels	
<i>FERC</i>	<i>Idaho Power</i>	
3.3B.4	Report on options to improve delivery of fish flows through Brownlee	<u>12/31/93</u>
<i>FERC</i>	<i>Idaho Power</i>	
3.3B.5	Draft Brownlee under certain conditions for fall migrants.	
<i>FERC</i>	<i>Idaho Power</i>	
3.3B.6	Draft Brownlee in September for temperature control.	
<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Idaho</i>
3.3B.7	Using a variety of water measures, provide flows to refill Brownlee.	<i>Other Parties</i>
<i>Bonneville</i>		
3.3B.8	Fund an independent evaluation of effectiveness of Upper Snake water marketing and conservation measures in providing fall water for salmon	

Entity(s)	Action Description	Completion Date
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Bonneville

3.3C Replace power losses at Brownlee under certain conditions.

3.4 IMPROVE COLUMBIA RIVER FLOW AND VELOCITY

Bonneville	Corps	Other Parties	Reclamation
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3.4A.1 Operate John Day reservoir at MOP, monitor and evaluate the benefits to fish survival from John Day operations

Bonneville	Bureau of Reclamation	Corps	Other Parties
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3.4A.2 Provide specified water for juvenile fish.

Bonneville	Bureau of Reclamation	Corps	Other Parties
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3.4A.3 Under certain conditions, provide water for juvenile fish migration from The Dalles.

Bonneville	Bureau of Reclamation	Corps	Other Parties
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3.4A.4 Actions taken in 3.4A.3 should not violate certain conditions.

Bonneville

3.4A.5 Provide monthly report on volume of water stored on upper Columbia

Corps

3.4A.6 Provide monthly report on where fish augmentation water is being stored

All Parties

3.4A.7 Whenever flow augmentation measures are in effect, the weekend and holiday average flows should not be less than 80% that of the five preceding weekdays.

All Parties

3.4A.8 The 140 kcfs cap in the mid-Columbia River is removed.

Bonneville

3.4A.9 Secure more options to augment reduced hydroelectric energy during winter months.

3.5 PURSUE MONITORING AND DISPUTE RESOLUTION

Bonneville

3.5A.1 Continue to fund the smolt monitoring program.

Fish Operations Executive Committee	Fish Passage Center
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3.5B.1 Resolve disputes over the flow schedule of the water budget.

Council	Fish Operations Executive Committee
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3.5B.2 If disputes cannot be resolved under 3.5B.1, step in to resolve dispute.

3.6 PURSUE SNAKE RIVER RESERVOIR DRAWDOWN STRATEGY

Council	Drawdown Planners
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Entity(s)	Action Description	Completion Date
3.6A	Interim report on drawdown plans, report to Council on drawdown feasibility. Following interim report, Council will establish an implementation schedule for further steps in developing a reservoir drawdown program.	<u>11/1/92</u>
<i>Bonneville</i>	<i>Corps</i>	
3.6A.1	Conduct any tests necessary to assist in the formulation of the plans called for in this measure.	
<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Corps</i> <i>Council</i>
3.6A.2	Establish a drawdown planning committee	
<i>Bonneville</i>		
3.6A.3	Fund the independent review of drawdown analyses	<u>2/1/92</u>
<i>Federal Project Operators</i>	<i>Federal Project Regulators</i>	
3.6A.4	Implement approved drawdown plans; incorporate planning process into NEPA and ESA obligations	
<i>Federal Project Operators</i>	<i>Federal Project Regulators</i>	
3.6A.5	Incorporate specifications of approved plans from 3.5A.4 in all system planning and operation.	
<i>Congress</i>	<i>Corps</i>	
3.6A.6	Address potential impacts of drawdown to lower Columbia navigation channel	
3.7 PURSUE ADDITIONAL MEASURES TO INCREASE JUVENILE SURVIVAL		
<i>Bonneville</i>	<i>Corps</i>	<i>Oregon</i> <i>Others</i>
<i>Washington</i>		
3.7A.1	Report to Council measures which can remove limits to operational levels at John Day pool	<u>3/15/92</u>
<i>Bonneville</i>	<i>Corps</i>	<i>Oregon</i> <i>Others</i>
<i>Washington</i>		
3.7A.2	Report to Council requirements to operate John Day pool at 257.0 feet elevation	<u>11/1/92</u>
<i>Bonneville</i>	<i>Corps</i>	<i>Oregon</i> <i>Washington</i>
3.7A.3	Following Council review of John Day operation requirements, prepare and implement a mitigation plan for operating John Day reservoir at lower levels	
<i>Bonneville</i>	<i>Corps</i>	<i>Idaho</i> <i>Oregon</i>
<i>Reclamation</i>		
3.7B.1	Report on Snake river basin storage appraisal study	<u>12/31/93</u>
<i>Bureau of Reclamation</i>	<i>Idaho</i>	<i>Oregon</i> <i>Washington</i>
3.7C.1	Organize a water use advisory committee.	
<i>Reclamation</i>	<i>States</i>	
3.7C.2	Submit work plan and budget for Snake flow augmentation water committee	
<i>Bonneville</i>		

Entity(s)	Action Description	Completion Date
3.7C.3 <i>Reclamation</i>	Fund travel and related expenses for committee members.	
3.7C.4 <i>Bonneville</i>	Report on water conservation and improved efficiency for benefits to anadromous fish. <i>Bureau of Reclamation</i>	
3.7C.5 <i>Bonneville</i>	Under auspices of Columbia River Water Management Group, report on review of water forecasting system. <i>Bureau of Reclamation</i>	
3.7D.1 <i>Corps</i>	Report on power measures to increase fish flows, offset fish flow costs	<u>12/31/93</u>
3.7E.1 <i>Council</i>	Reexamine all flood control rules to yield more useful flows.	<u>12/31/93</u>
3.7F.1 <i>Council</i>	Promptly fund an independent, third party scientific evaluation on river velocity and survival.	<u>6/15/93</u>
3.7F.2 <i>Bonneville</i>	Initiate an amendment process to state the Council's position of flow, travel time, and survival of juvenile salmon	<u>8/31/93</u>
3.7F.3 <i>Bonneville</i>	Fund evaluations of flow and velocity effectiveness in improving survival.	<u>7/15/93</u>
3.7F.4 <i>Bonneville</i>	Contractors should report all efforts to the Council quarterly.	
3.7F.5 <i>Fish Managers</i>	Continue to fund ongoing evaluations in this area of research emphasis.	
3.7F.6 <i>Bonneville</i>	Make available from hatcheries, the required numbers of juvenile salmon needed for studies.	
3.7F.7 <i>Bonneville</i>	Fund PIT tags, detectors and other marking techniques for evaluation	
3.7F.8 <i>Bonneville</i>	Fund installation of juvenile PIT tag detectors at mainstem dams.	
3.7F.9 <i>States</i>	Fund a study of gas supersaturation effects on survival, particularly in connection with reservoir drawdowns <i>Tribes</i>	
3.7F.10 <i>Bonneville</i>	Review and submit existing information on impacts of flow operations on storage reservoirs. Continue to develop biological rule curves.	<u>2/28/93</u>
3.7F.11	Fund research and monitoring of effects of salmon flows on resident fish and wildlife at storage reservoirs	

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
3.8 COMPLETE INSTALLATION OF BYPASS SCREENS		
<i>Corps</i>	3.8A.1 Develop and implement a coordinated permanent juvenile passage plan.	
<i>Corps</i>	3.8A.2a Lower Monumental screen and bypass operational	<u>3/31/92</u>
<i>Corps</i>	3.8A.2b Provide interim screening and sluiceway at Ice Harbor, complete operational screening and flume bypass system at Ice Harbor	<u>3/31/93</u>
<i>Corps</i>	3.8A.2c Mainstem screen and bypass construction on Council schedule for The Dalles.	<u>3/31/98</u>
<i>Corps</i>	3.8A.3 Ensure a 98% or greater salmon survival rate in all bypass and collection facilities	
<i>Corps</i>	<i>Mid-Columbia PUDs</i>	
	3.8A.4 Achieve fish passage efficiencies of at least 70% and 50% for spring and summer migrants, respectively, at all mainstem projects that have juvenile bypass facilities.	
<i>Bonneville</i>	<i>Corps</i>	<i>Other Parties</i>
	3.8B.1 Provide Spill Agreement spills at Lower Monumental, Ice Harbor, John Day, and The Dalles.	
<i>Corps</i>	3.8B.2 Complete evaluation, design and prototype testing of extended length screens.	<u>See Table 1</u>
<i>Corps</i>	3.8B.3 Evaluate and report to the Council of modifications that may be needed to accommodate measures outlined in Section 3.6.	
	3.8B.4 Install fish guidance improvements at Bonneville second powerhouse.	<u>3/93</u>
<i>Corps</i>	3.8B.5 Report needed modifications for fish passage at Bonneville I	
<i>Corps</i>	3.8B.6 Continue studies at McNary to evaluate the expanded juvenile fish bypass and collection system.	<u>3/31/96</u>
<i>Corps</i>	3.8B.7 Install juvenile fish separator and flume at Lower Granite	<u>3/31/96</u>
<i>Corps</i>	3.8B.8 Explore promising new approaches to fish bypass technologies	
<i>Corps</i>	<i>Other Parties</i>	
	3.8B.9 Conduct a sluiceway injury and mortality study at Ice Harbor Dam.	
<i>Douglas County PUD</i>	3.8B.10 Ensure that juvenile bypass at Wells Dam operates effectively	

Entity(s)	Action Description	Completion Date
Chelan County PUD		
3.8B.11a	Complete evaluation of juvenile fish bypass system at Rocky Reach Dam and report to Council	<u>8/31/93</u>
Chelan County PUD		
3.8B.11b	Complete installation of juvenile bypass system at Rock Island Dam as per settlement agreement	
Chelan County PUD		
3.8B.11c	Develop plans for spills at Rocky Reach and Rock Island dams as per settlement agreement	<u>3/1</u> <u>Yearly</u>
Grant County PUD		
3.8B.12.a	Complete evaluation of prototype juvenile fish bypass systems at Wanapum and Priest Rapids and report to Council and FERC	
Grant County PUD		
3.8B.12b	Complete installation of juvenile fish bypass system at Wanapum Dam	<u>3/1/98</u>
Grant County PUD		
3.8B.12c	Complete installation of juvenile fish bypass system at Priest Rapids Dam	<u>3/1/97</u>
Grant County PUD		
3.8B.12d	Provide increased spill at Wanapum and Priest Rapids	
Mid-Columbia PUDs		
3.8B.13	Develop and submit an annual fish passage and project operation and maintenance plan	
Federal Project Operators	Federal Project Regulators	
3.8B.14	Develop a plan for repair and maintenance of any part of each dam relating to the passage of juvenile salmon and steelhead.	
3.9 REDUCE RESERVOIR PREDATION		
Bonneville	Corps	Mid-Columbia PUDs
3.9A.1	Reduce squawfish population by about 20%.	
Bonneville		
3.9B.1	Report on the effectiveness of the squawfish demonstration project	<u>10/31/92</u>
Bonneville	Corps	FERC
3.9B.2	Evaluate modifications to bypass release systems to reduce predation	
NMFS		
3.9B.3	Continue to evaluate interactions between marine mammals and salmon	
Mid-Columbia PUDs		
3.9B.4	Report on the extent of predation and predator indexing in the Mid-Columbia reservoirs	<u>1/31/94</u>
3.10 IMPROVE TRANSPORTATION		
Fish Managers		

Entity(s)	Action Description	Completion Date
3.10.1	Continue smolt transportation under conditions where the available scientific evidence indicates a benefit over in-river survival.	
<i>Fish Managers</i>		
3.10.2	Present guidelines for smolt transportation	<u>3/1/93</u>
<i>Fish Managers</i>		
3.10.3	Participate in the evaluation of smolt transportation and provide test fish during all flows years from hatcheries or other appropriate sources.	
<i>Corps</i>	<i>Fish Managers</i>	
3.10.4	The Fish Transportation Oversight Team should prepare annual guidelines, plus an annual report of transportation evaluations and improvements.	
<i>Corps</i>		
3.10.5	Report on the outline of a transportation evaluation program	<u>1/30/93</u>
<i>Corps</i>	<i>Fish Managers</i>	
3.10.6	Continue to collect information on the biological effects of smolt transportation.	
<i>Corps</i>		
3.10.7	Conduct and fund smolt transportation activities at those times and locations specified in the guidelines developed by the FTOT.	
<i>Corps</i>		
3.10.8	Test use of alternative strategies to reduce stress and improve transportation of fall chinook,	<u>1/30/93</u>
<i>Corps</i>		
3.10.9	Report on the status of improving transportation conditions	<u>12/31/93</u>
<i>Corps</i>		
3.10.10	Evaluate alternative transportation methods	<u>12/31/92</u>
<i>Bonneville</i>		
3.10.11	Continue research to determine survival rates of fish before reaching transportation collection sites	
<i>Fish Managers</i>	<i>River Operators</i>	
3.10.12	Report on means to improve migration conditions in reservoirs	<u>3/15/93</u>
3.11 IMPROVE FLOWS FOR NATURAL PRODUCTION		
<i>Fish and Wildlife</i>	<i>Grant County PUD</i>	
<i>Agencies and Tribes</i>		
3.11a	Comply with the flow plan for Priest Rapids Dam.	
3.11b	Evaluate the effectiveness of the improved flows and report the results of this evaluation to the Council and FERC.	
3.11c	Fund studies of improved flow below Hells Canyon Dam.	

4 : ADULT SALMON MIGRATION

4.1 IMPROVE ADULT SALMON SURVIVAL

Corps

4.1.1 Evaluate, with fish managers, needed improvements in fishway operation and spill criteria

Corps

4.1.2 Evaluate mainstem adult passage facilities, make needed improvements, and install back-up facilities

Corps

4.1.3 Keep fish screens in place at each dam beyond the juvenile migration where adult fallback is a documented problem.

Corps

4.1.4 Continue to upgrade existing adult passage facilities

Corps

4.1.5 Provide at least two additional biologists at mainstem dams

Corps

4.1.6 Evaluate the effects of shad population increases. Report to Council 11/30/94

Corps

4.1.7 Evaluate methods for decreasing water temperature in ladders

Corps

4.1.8 Report effects of zero nighttime flow. 12/31/93

Bonneville

Corps

Fish Managers

4.1.9 Evaluate interdam adult losses 1/31/94

Bonneville

Corps

4.1.10 Evaluate feasibility of using video based counting. Report to Council; institute if feasible 12/31/93

Bonneville

4.1.11 Continue research and development of adult PIT tag detectors at mainstem dams. Report to Council 12/31/94

Bonneville

4.1.12 Fund studies to investigate diseases that occur at fish passage facilities. 12/31/93

Bonneville

Corps

Idaho Power

4.1.13 Evaluate effect of cool water releases from Dworshak and Brownlee on adult survival. Report to Council 12/31/93

Bonneville

Corps

Idaho Power

4.1.13a Upgrade COLTEMP model with all previous data

Bonneville

Corps

Idaho Power

4.1.13b Add to water temperature data network on Snake temperatures

Entity(s)	Action Description	Completion Date
Bonneville	Corps	Idaho Power
4.1.13c	Conduct additional adult migration studies. Report to Council	<u>12/31/93</u>
Bonneville	Corps	Idaho Power
4.1.13d	Provide for coordinated adult migration data base management	
Mid-Columbia PUDs		
4.1.14	Evaluate adult fish passage at mid-Columbia projects to determine inter-dam losses; compile report to FERC and Council	
Chelan County PUD		
4.1.15	At Rock Island project, implement operating criteria specified in the April 24, 1987 settlement agreement.	
Mid-Columbia PUDs		
4.1.16	Subject to FERC approval, continue to implement fishway operating criteria for optimum fish passage for Mid-Columbia projects under their control.	
Federal Project Operators	Federal Project Regulators	
4.1.17	Develop a plan for repair and maintenance of any part of each dam relating to the passage of adult salmon and steelhead.	

5 : SALMON HARVEST

5.1 DEVELOP HARVEST GOALS, OBJECTIVES AND REBUILDING SCHEDULES

Fish Managers

5.1A.1 Expedite management goals and escapement objectives

Fish Managers

5.1B.1 Develop and/or review and revise escapement objectives and rebuilding schedules for weak stocks

All parties

5.1B.2 Assist in the development of rebuilding schedules considering all sources of mortality.

Fish Managers

5.1C.1 Annually consult with Council in April on consistency of harvest management with rebuilding schedules

5.2 ADOPT HARVEST RATES AND REGIMES

Fish Managers

5.2.1 Implement harvest regimes that protect critical brood stocks and pass through population gains associated with program

Fish Managers

5.2.2 Document how harvest rates were calculated. Include as part of unified harvest data report

Fish Managers

5.2A Limit sockeye harvest below Snake and Columbia confluence

Fish Managers

5.2B Limit fall chinook total harvest to 55 percent through 1995

Fish Managers

5.2C Continue to manage spring and summer chinook according to U.S. v. Oregon

Bonneville *Commercial Fishers* *Fish Managers*

5.2E.1 Design and implement voluntary harvest reduction measures (Lease-back)

Fish Managers

5.2E.2 Reduce harvest levels proportionately.

Bonneville

5.2E.3 Develop a compensation plan including criteria for qualifying for and continuing in the plan.

Bonneville

5.2E.4 Fund the planning and implementation of the program.

5.3 IMPROVE HARVEST PLANNING

Bonneville

Entity(s)	Action Description	Completion Date
5.3A.1	Develop and implement live catch and known stock methods. Report annually on progress.	
<i>Bonneville</i>		
5.3A.2	To the extent practical, the Council supports enhancement activities geared towards stocks that contribute to adequately controlled fisheries.	
<i>Bonneville</i>		
5.3B.1	Fund pilot projects for selective harvest technology	
<i>Bonneville</i>		
5.3C.1	Fund study evaluating potential terminal fishery sites and opportunities.	
<hr/>		
5.4 IDENTIFY STOCKS		
<i>Fish Managers</i>		
5.4A.1	Develop and implement expanded genetic stock identification program. Review with Council	<u>1/31/93</u>
<i>Bonneville</i>	<i>Fish Managers</i>	
5.4A.2	Share the cost of expanding the program to achieve the desired level of information needed.	<u>1/31/93</u>
<i>Fish Managers</i>		
5.4B.1	Scope genetic stock identification data base for Columbia River stocks. Review with Council	<u>1/31/93</u>
<i>Bonneville</i>		
5.4B.2	Fund the genetic stock identification program upon Council approval.	<u>1/31/93</u>
<i>Fish Managers</i>		
5.4C.1	Develop expanded catch sample and marking programs Review with Council the effectiveness of existing programs	
<i>Bonneville</i>	<i>Fish Managers</i>	
5.4C.2	Share the cost of expanding marking and sampling programs to achieve the desired level of precision of additional coverage.	
<hr/>		
5.5 PURSUE OTHER HARVEST MEASURES		
<i>States</i>		
5.5A.1	Review with Council need for changes in sport fishing regulations	
<i>NPFMC</i>	<i>PFMC</i>	
5.5B.1	Report to Council on incidental harvest of Columbia River salmon	
<i>Federal Agencies</i>	<i>Fish and Wildlife Agencies and Tribes</i>	<i>Other Parties</i> <i>State agencies</i>
5.5C.1	Use all available authorities to put a rapid end to all high seas drift-net fisheries.	
<i>Bonneville</i>	<i>Fish Managers</i>	
5.5C.2	Implement harvest enforcement program; review accomplishments annually with Council	
<i>Bonneville</i>	<i>States</i> <i>Utilities</i>	
5.5D.1	Develop and implement fishing permit buy-back program	

<i>Entity(s)</i>	Action Description	<u>Completion Date</u>
<i>Congress</i>	<i>States</i>	
5.5E.1	Enact legislation to include Idaho and tribes in Columbia River Compact	
<i>NMFS</i>		
5.5F.1	Prepare and circulate a unified annual report on harvest and escapement of Columbia Basin stocks	
<i>Idaho</i>		
5.5F.2	Report the number and species of anadromous fish harvested	<u>3/31/93</u>

6 : COORDINATED SALMON PRODUCTION AND HABITAT

6.1 COORDINATE HABITAT AND PRODUCTION MEASURES

Relevant Parties

6.1A Coordinate, evaluate and implement habitat and production measures using the five-step process.

Bonneville Fish Managers

6.1B.1 Form six subregional teams to assist in implementation of measures.

Bonneville

6.1C.1 Fund a preliminary evaluation of ecological carrying capacity and limiting factors

Bonneville

6.1C.2 Fund development of a comprehensive carrying capacity study plan. Report to Council 12/31/93

6.2 INITIATE PRODUCTION ACTIVITIES

Council Genetics

Team

6.2A.1 Report on framework to conserve genetic diversity 12/31/91

Council Genetics

Team

6.2A.2 Participate in the coordinated habitat and production process described in Section 6.1

Bonneville

6.2A.3 Fund scope and design of study to identify wild salmon populations. Include alternative study designs 12/31/92

Fish Managers

6.2A.4 Develop and submit to Council proposal to collect information on naturally spawning populations 6/30/93

Bonneville

6.2A.5 Fund project to scope costs, duration, feasibility and benefits of alternative programs for monitoring naturally spawning populations 9/30/93

Fish Managers

6.2A.6 Develop and review with Council a proposed conservation policy for wild and naturally spawning populations 3/31/93

Fish Managers

6.2A.7 Establish naturally spawning population conservation coordination program. Provide for Council and public review. 6/30/93

Regional Parties

6.2A.8 Fund feasibility study for Pacific Northwest biodiversity institute.

Bonneville

Entity(s)	Action Description	Completion Date
	6.2A.9 Report on procedure to conduct population vulnerability analyses on depleted stocks	<u>6/30/93</u>
Bonneville		
	6.2B.1 Fund fish managers to develop guidelines to minimize genetic impacts from hatchery fish	<u>10/31/92</u>
Bonneville		
	6.2B.2 Fund design of impact assessment of hatcheries on wild fish	<u>6/30/93</u>
Council		
	6.2B.3 Continue to convene and fund a genetics team to consult in hatchery guidelines	
Fish Managers		
	6.2B.4 Form Integrated Hatchery Operations team	<u>1/15/92</u>
Bonneville		
	6.2B.5 Fund the activities of the Integrated Hatchery Operations Team	<u>1/15/92</u>
Bonneville		
	6.2B.6 Fund the development regionally integrated hatchery policies	
Fish Managers		
	6.2B.7 Prepare work plan for development of hatchery guidelines	<u>1/15/92</u>
Integrated Hatchery Operations Team		
	6.2B.8 Descriptions for hatchery policies and performance standards	<u>10/31/92</u>
Integrated Hatchery Operations Team		
	6.2B.9 Complete criteria for independent hatchery audits, report the results of scientific review of hatchery audit criteria	<u>1/31/93</u>
Fish Managers		
	6.2B.10 Submit plan for implementing Integrated Hatchery Operations Team hatchery guidelines	<u>1/31/94</u>
Integrated Hatchery Operations Team		
	6.2B.11 Prepare program to monitor compliance with performance standards	<u>1/31/94</u>
Integrated Hatchery Operations Team		
	6.2B.12 Annually report on hatchery policies and operations	<u>1/31/93</u>
Bonneville		
	6.2B.13 Report results of independent hatchery audits at least every three years	<u>12/31/93</u>
Bonneville		
	6.2B.14 Fund analysis of existing data on basinwide trends in hatchery fish survival	<u>1/31/94</u>
Bonneville		
	6.2B.15a Fund an analysis of opportunities for alternative institutional arrangements for hatchery production	<u>6/15/93</u>
Bonneville		

Entity(s)	Action Description	Completion Date
6.2B.15b	Propose a policy to encourage artificial production programs in which alternative institutional arrangements between implementors and managers are used.	<u>12/31/93</u>
<i>Fish Managers</i>		
6.2B.16	Report on hatcheries known to have high stray rates	<u>12/31/91</u>
<i>Bonneville</i>		
6.2B.17	Fund program to mark salmon from hatcheries with high stray rates	
<i>Fish Managers</i>		
6.2B.18	Determine feasibility of marking hatchery salmon	<u>2/1/92</u>
<i>Bonneville</i>		
6.2B.19	Cost-share marking of Willamette spring chinook	
<i>Bonneville</i>	<i>Fish Managers</i>	
6.2B.20	Mark all hatchery -reared chinook by 1995	
<i>Bonneville</i>		
6.2B.21	Fund research, development and demonstration of improved husbandry practices	
<i>Bonneville</i>		
6.2B.22	Fund research, development and testing of hatchery rearing operatinos and release strategies	
<i>Bonneville</i>		
6.2B.23	Fund development of programs and methods to improve fish health protection	
<i>Bonneville</i>		
6.2B.24	Fund development of a sensitive, reliable index for predicting smolt quality and migration readiness	
<i>Regional Assessment of Supplementation Project</i>		
6.2C.1a	Provide a framework for implementing and evaluating proposed and ongoing supplementation activities	<u>12/31/92</u>
<i>Bonneville</i>		
6.2C.1b	Continue to fund the Regional Assessment of Supplementation Project	<u>12/31/92</u>
<i>Fish Managers</i>		
6.2C.2	Conclude initial evaluation of proposed additional supplementation experiments. Report to Council by January 31, 1993. Complete evaluations by June 30, 1993.	<u>1/31/93</u>
<i>Bonneville</i>		
6.2C.3	Fund evaluations of proposed priority supplementation projects proposed by the fishery managers	<u>6/30/93</u>
<i>Non-federal hatchery managers</i>		
6.2C.4	Monitor and evaluate future and ongoing supplementation activities. Report progress to Council	<u>1/15/93</u>
<i>Chelan County PUD</i>	<i>FERC</i>	

Entity(s)	Action Description	Completion Date
6.2C.5	Fund design, construction, and maintenance of a hatchery program per Section E of the Settlement Agreement dated April 24, 1987	
Fish Managers		
6.2D.1	Use the Coordinated Habitat and Production process in Section 6.1 to identify, evaluate and implement new production initiatives.	
Fish Managers		
6.2D.2	Develop detailed Master Plans where there is not a NEPA document.	
Fish Managers		
6.2D.3	Document and report to the Council emergency cases that may require immediate actions.	
NMFS		
6.2D.4	Develop guidelines for using emergency breeding measures to aid in recovering populations	
Bonneville	Council	
6.2D.5	Should the Council determine that additional hatchery facilities are required, Bonneville shall provide funds to design, construct, operate and maintain such facilities.	
Bonneville		
6.2E.1	Scope a study to evaluate cumulative impacts of current and proposed artificial production activities. Upon Council approval, fund study to evaluate cumulative impacts of current and proposed artificial production activities.	<u>12/31/92</u>
Bonneville		
6.2E.2	Fund a study to develop a method for project proposers and implementors to assess systemwide and cumulative impacts of proposed artificial production projects.	<u>12/31/92</u>
Fish Managers		
6.2E.3	Use the method for assessing systemwide and cumulative impacts when available, in addition to other methods.	<u>12/31/92</u>
Fish Managers		
6.2E.4	Report precautions taken to restrict hatchery releases while carrying capacity study underway	<u>12/31/92</u>
Fish Managers		
6.2F	Brief Council on progress in developing a coordinated production plan	
Council		
6.2F.1	Review a comprehensive plan developed by the agencies and tribes for reprogramming lower river hatcheries	
Bonneville		
6.2F.2	Fund transfer of reprogrammed fish after Council review of plan	
Bonneville	NMFS	
6.2G.1	Complete scoping study of captive breeding research needs by March 31, 1993, and fund necessary research by June 30, 1993.	<u>3/31/93</u>
Bonneville	NMFS	

Entity(s)	Action Description	Completion Date
6.2G.2	Fund captive broodstock demonstration projects identified under the coordinated habitat and production process	
<i>Federal agencies</i>	<i>State agencies</i>	
6.2G.3	Fund research to improve cryopreservation technology and develop applications for restoring and preserving depleted populations	<u>12/31/92</u>
<i>Appropriate agencies</i>		
6.2G.4	Fund demonstrations of cryopreservation	
<i>Bonneville</i>		
6.2G.5	Fund demonstration project for portable adult holding and juvenile acclimation facilities	<u>12/31/91</u>
<i>Bonneville</i>		
6.2G.6	Fund Additional demonstration projects for portable adult holding and juvenile acclimation facilities identified in Section 6.1	<u>12/31/91</u>
<i>Bonneville</i>		
6.2G.7	Fund planning of facilities at Ringold Hatchery to secure 100 cfs water right	
6.2G.8	Fund planning, design and construction of the facilities determined to be necessary to improve existing production at Ringold Hatchery	
<i>Bonneville</i>		
6.2G.9	Report results of data collection and analysis on the status of Pacific lamprey populations	<u>12/31/93</u>
<i>Bonneville</i>		
6.2G.10a	Fund the Confederated Tribes of the Umatilla Reservation of Oregon to operate Bonifer and Minthorn facilities	<u>12/31/93</u>
<i>Bonneville</i>		
6.2G.10b	Fund design, construction, operation and evaluation of Umatilla Hatchery and needed satellite facilities, prior to the construction of this facility, develop a facility master plan for Council approval.	
<i>Agencies/Tribes</i>		
6.2G.11a	Develop a plan for John Day temporary acclimation facilities	
<i>Bonneville</i>		
6.2G.11b	Upon approval of the Council of the plan for temporary John Day acclimation facilities, fund design, construction and evaluation	
<i>Bonneville</i>		
6.2G.11c	Upon approval of the Council fund design, construction and evaluation of permanent John Day acclimation facilities	
<i>Bonneville</i>		
6.2G.12a	Yakima Hatchery Facilities: Fund development of a master plan.	
<i>Bonneville</i>		
6.2G.12b	Yakima Hatchery Facilities: Upon approval of the master plan, fund design, construction, operation and maintenance of a hatchery for fishery enhancement and supplementation of natural runs for the Yakima Indian Nation and other harvesters.	

Entity(s)	Action Description	Completion Date
Bonneville		
6.2G.12c	Yakima Hatchery Facilities: Fund management of operations and maintenance.	
Bonneville		
6.2G.12d	Yakima Hatchery Facilities: Fund biological monitoring and evaluation studies identified in the master plan.	
Bonneville		
6.2G.13a	Northeast Oregon Production Facilities: Fund development of a master plan.	
Bonneville		
6.2G.13b	Northeast Oregon Production Facilities: Upon approval of the master plan, fund design, engineering and construction of the hatchery and associated facilities.	
Bonneville		
6.2G.13c	Northeast Oregon Production Facilities: Fund operation and maintenance of the hatchery .	
Bonneville		
6.2G.13d	Northeast Oregon Production Facilities: Fund biological monitoring and evaluation studies identified in the master plan.	
Bonneville		
6.2G.14	Provide funds to develop and test low-cost, small-scale salmon and steelhead propagaion facilliteis	
Bonneville		
6.2G.15	Upon approval by the Council fund the construction, operation and maintenance low-capital propagation facilities for the Nez Perce Tribe.	
Bonneville		
6.2G.16	Upon approval by the Council, fund propagation of salmon and/or steelhead smolts in the fish ladder at Pelton Dam on the Deschutes River.	
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6.3 DEVELOP SPECIFIC ACTIONS TO ASSIST WEAK STOCKS		
Bonneville		
6.3A.1	Fund Snake River experimental sockeye recovery project.	
Bonneville		
6.3A.2	Regularly update the Govenors of the Northwest states, the Northwest Congressional delegation, the Council and other concerned parties on the progress of the Snake River sockeye recovery project.	
Bonneville		
Fish Managers		
6.3A.3	Fund and develop for Council review a plan for reintroduction of sockeye into appropriate production areas	
Fish Managers		
6.3B.1	Submit experimental design for supplementing Snake River fall chinook	<u>3/31/93</u>
Bonneville		
6.3B.2	Implement experimental design for supplementing Snake River fall chinook.	
Bonneville		

Entity(s)	Action Description	Completion Date
6.3B.3	Fund studies to define the range, limiting factors and needs of Snake River fall chinook	
Bonneville		
6.3B.4	Fund studies to determine genetic structure and population status of Snake River fall chinook	
Bonneville		
6.3B.5	Fund study of spawning and rearing habitat used by Snake River fall chinook	
Bonneville		
6.3C.1	Fund planning and construction of spring chinook trapping facilities on Grande Ronde tributaries	
Oregon	Washington	
6.3D.1	Identify naturally producing populations of lower Columbia coho and adopt management goals to rebuild those populations	
Oregon	Washington	
6.3D.2	Continue research to determine genetic distinctions between lower river coho and coastal populations.	
Oregon	Washington	
6.3D.3	Incorporate recommendations of the RASP and the Council's genetics team in developing management directions for coho salmon.	
Bonneville	Fish Managers	
6.3D.4	Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing coho populations.	
Bonneville	Fish Managers	
6.3D.5	Fund a survey of land management regulations affecting coho habitat.	
Bonneville	Fish Managers	
6.3D.6	Fund a review of current production and harvest management practices for impacts on naturally reproducing coho populations.	
Oregon	Washington	
6.3E.1	Identify naturally producing populations of chum salmon and adopt management goals for rebuilding.	
Oregon	Washington	
6.3E.2	Incorporate recommendations of the RASP and the Council's genetics team in developing management directions for chum salmon.	
Bonneville	Fish Managers	
6.3E.3	Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing chum populations.	
Bonneville	Fish Managers	
6.3E.4	Fund a survey of land management regulations affecting chum salmon habitat.	
Bonneville	Fish Managers	
6.3E.5	Fund a review of current production and harvest management practices for impacts on naturally reproducing chum salmon populations.	
Oregon	Washington	

Entity(s)	Action Description	Completion Date
6.3F.1	Identify naturally producing populations of sea-run cutthroat trout and adopt management goals for rebuilding.	
<i>Oregon</i>	<i>Washington</i>	
6.3F.2	Incorporate recommendations of the RASP and the Council's genetics team in developing management directions for sea-run cutthroat trout.	
<i>Bonneville</i>	<i>Fish Managers</i>	
6.3F.3	Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing sea-run cutthroat trout populations.	
<i>Bonneville</i>	<i>Fish Managers</i>	
6.3F.4	Fund a survey of land management regulations affecting sea-run cutthroat trout habitat.	
<i>Bonneville</i>	<i>Fish Managers</i>	
6.3F.5	Fund a survey of land management regulations affecting sea-run cutthroat trout habitat.	

6.4 DEVELOP HABITAT OBJECTIVES, POLICIES AND PERFORMANCE STANDARDS

Relevant Parties

- 6.4A.1 Ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive watershed management basis.

Relevant Parties

- 6.4A.2 At a minimum, maintain the present quantity and productivity of salmon and steelhead habitat. Then, improve the productivity of salmon and steelhead habitat critical to recovery of weak stocks. Next, enhance the productivity of habitat for other stocks of salmon and steelhead. Last, provide access to inaccessible habitat.

Federal Water Managers *Fish Managers* *Local Land Managers* *Local Water Managers*

Other Relevant Entities *Owners and Users* *State Land Managers* *State Water Managers*

- 6.4B.1 Improve and maintain coordination of land and water activities to protect and improve the productivity of salmon and steelhead stocks.

Federal Water Managers *Fish Managers* *Local Land Managers* *Local Water Managers*

Other Relevant Entities *Owners and Users* *State Land Managers* *State Water Managers*

- 6.4B.2 Develop and implement procedures to ensure compatibility and compliance with the Council's habitat objectives, policies, and performance standards.

Federal Water Managers *Fish Managers* *Local Land Managers* *Local Water Managers*

Other Relevant Entities *Owners and Users* *State Land Managers* *State Water Managers*

- 6.4B.3 Give highest priority to habitat protection and improvement in areas of the Columbia Basin where low productivity for identified weak populations are limiting factors.

Entity(s)	Action Description			Completion Date
Federal Water Managers	Fish Managers	Local Land Managers	Local Water Managers	
Other Relevant Entities	Owners and Users	State Land Managers	State Water Managers	
6.4B.4	For actions that increase habitat productivity or quantity, give priority to actions that maximize the desired result per dollar spent.			
Federal Water Managers	Fish Managers	Local Land Managers	Local Water Managers	
Other Relevant Entities	Owners and Users	State Land Managers	State Water Managers	
6.4B.5	Provide elevated or new funding necessary for the successful and timely implementation of the items listed in this section.			
Federal Water Managers	Fish Managers	Local Land Managers	Local Water Managers	
Other Relevant Entities	Owners and Users	State Land Managers	State Water Managers	
6.4B.6	Encourage the involvement of volunteers and education institutions in cooperative habitat enhancement projects throughout the basin.			
Local Watershed Managers				
6.4C.1	Develop comprehensive habitat performance standards			
Idaho Council office	Oregon Council office	Washington Council office		
6.4C.2	Report on adoption of habitat performance standards			<u>12/31/93</u>
Council				
6.4C.3	Review habitat performance standards as submitted.			
Relevant Parties				
6.4C.4	Provide approaches for meeting performance standards to restore and preserve habitat.			<u>12/31/98</u>
Federal Agencies	Land Managers	Private Land Owners	States	
Tribes	Water Managers			
6.4C.5	Maintain the quality and quantity of existing habitat while developing habitat performance standards.			<u>12/31/93</u>
6.5 PURSUE COOPERATIVE HABITAT PROTECTION AND IMPROVEMENT WITH PRIVATE LANDOWNERS				
Idaho	Oregon	Washington		
6.5A.1	Select lead entities to coordinate and implement local watershed habitat activities.			
Bonneville				
6.5A.2	Fund a coordinator in Oregon, Washington and Idaho to initiate coordinated watershed activities.			
Council				

Entity(s)	Action Description	Completion Date
6.5A.3	Review products of local watershed efforts, identify funding sources and assist in obtaining funding for activities.	
Bonneville		
6.5B.1	Provide initial funding for model watershed coordinators	
Idaho	Oregon Washington	
6.5B.2	Select lead entity and accomplish task list within first year of each implementation of model watershed project.	
Idaho	Oregon Washington	
6.5B.3	Implement actions starting in second year of each model watershed project.	
Idaho	Oregon Washington	
6.5B.4	Report on progress in each model watershed.	<u>10/15/93</u>
Council		
6.5B.5	Review state model watershed annual reports. Produce a document about the lessons for other watersheds	

6.6 IMPLEMENT STATE, FEDERAL AND TRIBAL HABITAT ACTIVITIES

Bureau of Land Management	Forest Service	
6.6A.1	Implement Anadromous Fish Habitat Policy and Implementation Guide and Salmon Summit habitat guidelines.	<u>9/1/92</u>
Bureau of Land Management	Forest Service	
6.6A.2	Initiate recovery actions in streams where water quality standards or land management plan objectives for fish habitat and water quality are not being met.	
Bureau of Land Management	Forest Service	
6.6A.3	Review and, as necessary, amend existing land management plans to incorporate the Council's habitat objectives and performance standards	
Bureau of Land Management	Forest Service	
6.6A.4	Revise livestock management plans on federal lands for riparian enhancement	<u>12/31/96</u>
Bureau of Land Management	Forest Service	
6.6A.5	Report on the effect of land management actions on salmon	<u>3/15/93</u>
Idaho	Oregon Tribes Washington	
6.6A.6	Establish, monitor and report on land use best management practices.	<u>6/30/93</u>
Federal Agencies	State agencies Tribes	
6.6A.7	Report progress on review and revision of mining laws to promote fish productivity.	<u>6/30/93</u>
Bureau of Land Management	Forest Service Idaho Oregon	
Tribes	Washington	

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
6.6A.8	Report progress on identification and protection of permanent riparian management areas for perennial and intermittent streams contributing to fish production.	<u>6/30/93</u>
<i>Bureau of Land Management Washington</i>	<i>Forest Service Idaho Oregon</i>	
6.6A.9	Develop programs to explore and implement land exchanges, purchases and easements. Provide list to Council.	<u>12/31/93</u>
<i>Bonneville</i>	<i>Implementing Entities</i>	
6.6A.10	Fund acquisition and management of conservation easements and critical water rights	<u>6/30/93</u>
<i>Idaho</i>	<i>Oregon Washington</i>	
6.6B.1	Review state water quality standards and compliance. Report to Council the findings and limitations in resources	<u>6/30/92</u>
<i>Idaho</i>	<i>Oregon Washington</i>	
6.6B.2	Improve enforcement of water rights and uses.	
<i>Idaho</i>	<i>Montana Oregon Washington</i>	
6.6B.3	Allocate and manage water to protect fish in Columbia River mainstem and tributaries.	
<i>Bonneville</i>	<i>Implementing Entities</i>	
6.6B.4	Acquire and maintain critical water rights for fish. Report annually to the Council.	<u>6/30/93</u>
<i>Bureau of Reclamation</i>	<i>Idaho Oregon Washington</i>	
6.6B.5	Review adequacy of existing law and administration for protecting enhanced instream flows for fish. Report results to the Council.	<u>6/30/93</u>
<i>Council</i>		
6.6B.6	Continue to emphasize water conservation and efficiency improvements to help salmon and steelhead.	
<i>Bureau of Reclamation</i>		
6.6B.7	Initiate cooperative effort to select and design demonstration water conservation projects	<u>12/31/91</u>
<i>Bureau of Reclamation</i>		
6.6B.8	Secure funding for demonstration water conservation projects and complete implementation.	<u>12/31/96</u>
<i>Council</i>	<i>Environmental Protection Agency</i>	
6.6B.9	Secure funding and establish a mechanism to coordinate Columbia Basin water quality activities related to fish and wildlife.	<u>4/15/93</u>
<i>Council</i>	<i>Environmental Protection Agency</i>	

Entity(s)	Action Description	Completion Date
	6.6B.23.a Provide power or reimbursement for power costs to Bureau of Reclamation for Umatilla and Columbia rivers water exchange.	
Bureau of Reclamation		
	6.6B.23.b Obtain consent from affected water users and regulators and assure Council that water exchanged to augment streamflows in the Umatilla Basin will be used appropriately.	
Oregon Water Resources Department		
	6.6B.23.c Report annually to the Council concerning water exchange program in the Umatilla Basin.	
Bureau of Reclamation		
	6.6B.23.d Fund quantitative monitoring and evaluation studies to determine effectiveness of Umatilla Basin water exchange program.	
Bonneville		
	6.6B.24.a Fund interim measures necessary for Umatilla Basin water exchange program.	
Oregon Water Resources Department		
	6.6B.24.b Report annually to the Council concerning interim measures taken regarding the water exchange program in the Umatilla Basin.	
Oregon Department of Fish and Wildlife		
	6.6B.25.a Monitor and qualitatively evaluate the biological benefits of the interim Umatilla Basin water exchange program. Annually submit report to Council and Bonneville.	
Bureau of Reclamation		
	6.6B.25.b Fund activities relating to the Umatilla Basin water exchange program under measure 6.6B.25.b beginning in 1989.	
Bonneville	Bureau of Reclamation	Oregon Department of Fish and Wildlife
		Oregon Water Resources Department
Umatilla Tribe		
	6.6B.25.c Develop monitoring and evaluation workplan for Umatilla Basin water exchange program.	
Environmental Protection Agency	Other Entities	
	6.6B.26 Submit project design for Grande Ronde water temperature demonstration project	<u>4/15/93</u>
Pacific Power and Light Company		
	6.6B.27 Develop flow plan for spawning, incubation and rearing of salmon and steelhead below Merwin Dam on the north fork Lewis River. Submit for approval to Council and FERC.	

Entity(s)	Action Description	Completion Date
Eugene Water and Electric Board		
6.6B.28	Develop a study plan to determine flows required for spawning, incubation and rearing of salmon and steelhead in the lower McKenzie River. Submit for approval to Council and FERC. Fund after approval.	
Fish Managers		
6.6C.1	Develop prioritized list of tributary screening and passage projects	
All Parties		
6.6C.2	Design, construct, operate and maintain fish screening and passage facilities in the tributaries based on standards and criteria developed by the NMFS. Accelerate implementation of screening and passage measures using expertise of federal, state, tribal, private and other entities. Conduct evaluations of screening facilities to ensure that fish are protected and to assess numbers of adult fish.	
Bonneville		
6.6C.3	Fund Fish Screening Oversight Committee and technical work groups established by the NMFS to address this topic.	
NMFS		
6.6C.4	Identify resources needed to complete installation of tributary screens and passage facilities by 1995. Review operation plan with Council	<u>2/1/92</u>
Bureau of Land Management Bureau of Reclamation Forest Service		
6.6C.5	Report on screening and passage improvement on federal lands	<u>3/1/92</u>
Corps		
6.6C.6.a	Resume program to inspect all underwater diversions in the mainstem Columbia and Snake rivers for screening effectiveness.	<u>1/31/93</u>
Corps		
6.6C.6.b	Repair, update and install screens on all underwater diversions in the mainstems of the Columbia and Snake rivers.	<u>12/31/95</u>
Pacific Power and Light Company		
6.6C.7	Provide for construction of passage facilities at Condit Dam by November 15, 1991. [Section 703(c)(2).]	<u>11/15/91</u>
FERC		
6.6C.8	Require the design and construction of passage facilities at Enloe Dam.	
Bonneville		
6.6C.9	Fund all aspects of fish screens and bypass facilities at Dryden dam.	
FERC		
6.6C.10	If hydropower facilities are later proposed to be added to Dryden dam or diversion, require licensee to reimburse Bonneville for an equitable portion of the cost of these fish screens and bypass facilities.	
Corps		
6.6C.11	Conduct studies to determine the effect of fluctuating flows at Green Peter Dam on steelhead runs.	

Entity(s)	Action Description	Completion Date
Bonneville	Portland General Electric	
6.6C.12	Subject to FERC approval, operate adult trapping facility in the Willamette Falls fishway.	
Fish Managers	Portland General Electric	
6.6C.13	Work cooperatively to investigate and resolve adult fish passage problems associated with PGE's Clackamas River hydroelectric dams.	
Eugene Water and Electric Board		
6.6C.14	Complete new adult fish ladder at Leaburg Dam	<u>8/1/95</u>
Eugene Water and Electric Board		
6.6C.15	Complete velocity barrier at Walterville project	<u>7/1/95</u>
Bonneville		
6.6C.16	Fund Starbuck Dam passage improvement	
Portland General Electric		
6.6C.17	Continue studies to determine the effectiveness of the existing juvenile bypass system and screens at Marmot Dam.	
Portland General Electric		
6.6C.18	Continue studies to determine the effectiveness of the existing juvenile bypass system and screens at the Sullivan Plant.	
Corps		
6.6C.19	Continue studies to determine the effectiveness of the existing juvenile bypass system and screens at Foster Dam.	
Eugene Water and Electric Board		
6.6C.20	Improve the juvenile fish bypass facilities at Leaburg Dam	<u>12/31/92</u>
Eugene Water and Electric Board		
6.6C.21	Complete permanent juvenile fish bypass facility at Walterville project	<u>11/11/95</u>
Bonneville		
6.6D.1	Propose alternative procedures for funding high priority habitat projects. Report to the Council by December 31, 1992.	<u>12/31/92</u>

6.7 INITIATE ACTIVITIES IN THE YAKIMA RIVER BASIN

Council

- 6.7A.1 Before specifying program measures to resolve water storage problems in Yakima River Basin, Council will consult with relevant parties

All Parties

Entity(s)	Action Description	Completion Date
6.7A.2	The Council encourages all parties to use water as efficiently as possible, to take interim steps to improve fish flows, and support additional storage with appropriate cost-sharing.	
Council	Relevant Parties	
6.7A.3	To reduce the amount of additional storage required, the Council will consult with relevant parties regarding more efficient-use practices in the basin.	
All Parties		
6.7A.4	The Council expects that all relevant parties will act consistently with Section 210, Title II of Public Law 97-293 (the Reclamation Reform Act of 1982).	
Bonneville		
6.7B.1	Implement needed fish passage improvements in the Yakima Basin.	
Bonneville		
6.7B.2	Fund a study to determine the feasibility of re-establishing runs of anadromous fish above Cle Elum Dam.	
Bonneville		
6.7B.3	Fund construction of fish passage facility projects in the Yakima Basin.	
Bureau of Reclamation		
6.7C.1.a	After approval by the Council, provide minimum flows for fish passage, spawning, incubation and rearing at Prosser and Rosa dams and other locations in the Yakima Basin.	
Pacific Power and Light Company		
6.7C.1.b	The Council encourages provides minimum flows for fish passage, spawning, incubation and rearing at the Wapatox Project in the Yakima Basin.	
Council		
6.7C.1.c	Specify minimum flows requirements and the location of flow control and monitoring points in the Yakima Basin after evaluating results of instream flow studies.	
Council		
6.7C.2	Support establishment of interim flows in the Yakima Basin upon receipt of proposals from fish managers.	
Council		
6.7C.3	Consult with System Operations and Advisory Committee, irrigation districts, Washington Department of Ecology, the Bureau of Reclamation, and fish managers before supporting any flows for fish in the Yakima Basin.	
Bonneville		
6.7D.1	Fund design and construction of a hatchery for salmon and steelhead enhancement in the Yakima River Basin and elsewhere.	
Council		
6.7D.2	Decide which stocks may be produced at the hatchery authorized by measure 6.7D.1.	

7 : COORDINATED IMPLEMENTATION, MONITORING AND EVALUAT

7.1 PURSUE COORDINATED IMPLEMENTATION

Council

7.1A.1 Organize and convene a Basin Oversight Group.

Bonneville *Fish Managers* *Others*

7.1B.1 Expand implementation planning process to involve all measures

Bonneville *Fish Managers* *Others*

7.1B.2 Participants in expanded implementation planning process should prepare an annual implementation work plan Annual

Bonneville *Fish Managers* *Others*

7.1B.3 The annual implementation work plan should include actions to address key scientific uncertainties associated with the program

Bonneville *Fish Managers* *Others*

7.1B.4 Submit the annual implementation work plan to the Council by June 15 each year. Unless the Council provides otherwise, proceed with implementation 45 days after submitting the work plan

Federal Government *States* *Tribes*

7.1B.5 Designate lead entities for program implementation and propose funding sources and levels 1/1/93

FERC

7.1B.6 For measures addressed to the Federal Energy Regulatory Commission, take measures into account to the full extent practicable.

Bonneville

7.1B.7 Fund programs approved by the Council; for proposed projects submit notices of program interest, and other information informing the Council how the proposed project implements the program.

Bonneville

7.1B.8 The Council will continue to use its intergovernmental agreement to ensure an expedited review of all funding proposals

Bonneville

7.1B.9 Where Bonneville funds program measures at federal projects, the amounts expended shall be allocated among the various project purposes.

Bonneville

7.1B.10 Council program amendments are not necessary where the Council has called on Bonneville to fund a program measure upon Council approval.

Bonneville

7.1B.11 In selecting among alternative means for funding program activities on Indian reservations, choose a means that full complements the activities of the affected Tribe and recognizes the unique rights and concerns of the tribes.

Bonneville

Entity(s)	Action Description	Completion Date
7.1B.12	Monetary costs and electric power losses resulting from implementation of the program shall be allocated consistnet with individual project impacts and the systemwide objectives of the Northwest Power Act.	
7.2 MONITOR AND EVALUATE PROGRAM IMPLEMENTATION		
<i>Bonneville</i>		
7.2A.1	Submit annual coordinated program monitoring report	
<i>Independent Scientific Group</i>		
7.2B.1	Submit work plan and review process for program evaluation, submit first program report by June 15, 1994.	<u>6/15/93</u>
<i>Independent Scientific Group</i>		
7.2C.1	Identify key uncertainties of program measures	
<i>Council</i>		
7.2D.1	Monitor the Endangered Species Act process to ensure that program monitoring and evaluation reports are considered.	
<i>Council</i>		
7.2E.1	Continue to review program measures for prioritization, cost-effectiveness, and biological effectiveness	
<i>Council</i>		
7.2F.1	Retain an independent consultant to prepare a report identifying ways to reduce process and increase efficiency in planning and implementing program measures.	<u>8/31/93</u>
7.3 COORDINATE REGIONAL ANALYTICAL METHODS		
<i>Bonneville</i>		
	<i>Fish Managers</i>	<i>Others</i>
7.3A.1	Provide a progress report on development of analytical tools to assist decision making and program evaluation	<u>7/31/93</u>
<i>Bonneville</i>		
7.3A.2	Fund the establishment and maintenance of process in response to Measure 7.3A.1 including travel expenses, facilitation, documentation or other support.	
7.4 CONTINUE EVALUATION OF SOURCES OF SALMON MORTALITY		
<i>Council</i>		
7.4.1	Circulate for public review analysis of the relative contributions of various human activities to fish mortality	
7.5 DISSEMINATE RESEARCH AND MONITORING INFORMATION COLLECTED BY BONNEVILLE AND THE CORPS OF ENGINEERS		
<i>Bonneville</i>		
	<i>Corps</i>	
7.5.1	Publish results from studies performed under program, hold annual symposium.	<u>3/31/93</u>
7.5.2	Fund development of summaries of research completed under the fish and wildlife program and submit to the Coordinated Information System.	

Entity(s)	Action Description	Completion Date
7.5.3	Hold annual symposiums where study results are presented.	<u>3/31/93</u>
7.6 IMPLEMENT THE COORDINATED INFORMATION SYSTEM		
<i>Bonneville</i>		
7.6.1	Fund Coordinated Information System	
7.7 IMPROVE AND IMPLEMENT THE PROJECT ACCOUNTING DATA BASE		
<i>Bonneville</i>		
7.7.1	Develop project database to track projects by geographic location and other categories	<u>9/30/93</u>
7.8 PURSUE PROMISING NEW IDEAS FOR IMPROVING SALMON SURVIVAL		
<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Corps</i>
7.8.1	Accept and solicit proposals from all sources to improve passage and other aspects of salmon survival.	
<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Corps</i>
7.8.2	Screen and evaluate such proposals and present promising ideas to the Council on an expedited basis.	

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
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8 : MITIGATION OF ADVERSE EFFECTS

8.1 PURSUE MITIGATION OF ADVERSE EFFECTS

<i>Council</i>	<i>Federal agencies</i>	<i>NMFS</i>	<i>State agencies</i>
8.1.1	Inventory economic, biological and operational impacts of implementing salmon strategy. Use public process to solicit information for this measure.		<u>3/31/92</u>
<i>Council</i>	<i>Federal agencies</i>	<i>NMFS</i>	<i>State agencies</i>
8.1.3	Prepare recommendations to potential sources of assistance for impacts of implementing salmon strategy. Submit report to Congress and seek assistance to secure federal funding.		<u>7/31/92</u>
8.1.2	Develop plan to mitigate for impacts of implementing salmon strategy.		<u>6/30/92</u>

<i>Entity(s)</i>	<i>Action Description</i>	<i>Completion Date</i>
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9 : RESIDENT FISH

9.1 DEVELOP RESIDENT FISH GOAL

Fish Managers

9.1.1	Complete assessments of resident fish losses related to hydropower facilities and submit to the Council.	<u>12/31/95</u>
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Bonneville

9.1.2	Fund resident fish losses assessments (see 9.1.1).	
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9.2 IMPLEMENT RESIDENT FISH POLICIES

Relevant Parties

9.2A	Fully consider program resident fish priorities in addressing resident fish losses related to hydropower (see 9.2A.1-4).	<u>Ongoing</u>
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Relevant Parties

9.2A.1	Accord highest priority to weak, but recoverable, native populations injured by the hydropower system (see 9.2A).	<u>Ongoing</u>
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Relevant Parties

9.2A.2	Accord areas of the basin where anadromous fish are not currently present high priority (see 9.2A).	<u>Ongoing</u>
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Relevant Parties

9.2A.3	Accord resident fish projects that also provide benefits for wildlife and /or anadromous fish high priority (9.2A).	<u>Ongoing</u>
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Relevant Parties

9.2A.4	Accord populations that support important fisheries high priority (see 9.2A).	<u>Ongoing</u>
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Relevant Parties

9.2B.1	Develop a plan for conserving genetic diversity and submit to Council.	<u>6/30/94</u>
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Relevant Parties

9.2B.2	Develop basinwide guidelines to minimize genetic and ecological impacts of hatchery fish on wild and natural stocks and submit to the Council.	<u>12/31/94</u>
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Relevant Parties

9.2B.3	Team of scientific experts should address hatchery impact assessments and basinwide hatchery operating guidelines.	<u>Ongoing</u>
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Relevant Parties

9.2B.4	Apply Regional Assessment of Supplementation Project activities to resident fish.	<u>Ongoing</u>
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Relevant Parties

9.2B.5	Apply program measures that address new production initiatives to resident fish.	<u>Ongoing</u>
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9.2D	Provide Council with list of ranked projects for resident fish in the draft Annual Implementation Work Plan.	
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Relevant Parties

Entity(s)	Action Description	Completion Date
9.2C.1	Apply comprehensive watershed management measures in program to resident fish.	<u>Ongoing</u>
Relevant Parties		
9.2D.1	Implement resident fish projects identified in the 1993 program.	<u>12/31/03</u>
Bonneville		
9.2D.2	Fund relevant parties to implement the resident fish section of the program (see 2.2F.1).	<u>Ongoing</u>
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9.3 IMPLEMENT RESIDENT FISH MEASURES		
Bureau of Reclamation		
9.3A.1	Operate Anderson Ranch Dam to maintain minimum flows for trout in the south fork Boise River.	<u>Ongoing</u>
Bureau of Reclamation		
9.3A.2	Explore potential for releasing surplus water in Owyhee, Warm Springs and Beulah reservoirs to benefit resident fish.	
FERC		
9.3A.3	Do not alter operation of Flint Creek project without considering needs of resident fish in Georgetown Lake.	<u>Ongoing</u>
Montana Power Company		
9.3A.4	Continue funding evaluation of operating procedures at Milltown Dam.	
Bureau of Reclamation		
	Corps	Other Project Operators
9.3A.5	Use storage to maintain water temperatures within the best ranges for fish habitat.	<u>Ongoing</u>
Bonneville		
	Corps	Council
		Fish Managers
9.3A.6	Develop scope of work for study of Lake Pend Oreille kokanee.	<u>3/31/94</u>
Bonneville		
	Corps	
9.3A.7	Fund Lake Pend Oreille kokanee study (see 9.3A.6).	<u>12/31/97</u>
Bureau of Reclamation		
9.3B.1	Operate Hungry Horse Dam as called for in Sections 9.3B.1.a-d.	<u>Ongoing</u>
Bureau of Reclamation		
9.3B.2	Refine biological rule curves for Hungry Horse Dam. Submit interim report by 4/1/94. Submit proposed rule curves to Council by 6/1/94.	<u>6/1/94</u>
Bureau of Reclamation		
9.3B.3	Enforce drawdown limit of 85 feet at Hungry Horse Dam.	<u>Ongoing</u>
Bonneville		

Entity(s)	Action Description	Completion Date
9.3B.4	Continue to fund studies to evaluate the effect of Hungry Horse Dam operating procedures on resident fish.	
Bonneville		
9.3B.5	Fund mitigation of resident fish losses caused by drawdown of Hungry Horse Dam for power purposes.	<u>Ongoing</u>
Bureau of Reclamation		
9.3B.6	Fund mitigation of resident fish losses caused by drawdown of Hungry Horse Dam for flood control purposes.	<u>Ongoing</u>
Bureau of Reclamation		
9.3B.7	If conflict occurs when implementing 9.3B.1 and 9.3B.3, consult with relevant fish managers.	<u>Ongoing</u>
Relevant Parties		
9.3B.8	Resident fish losses identified in Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam are incorporated into the program.	<u>Ongoing</u>
Confederated Salish-Kootenai Tribes	Montana Department of Fish, Wildlife and Parks	
9.3B.9	Implement Hungry Horse Dam long-term resident fish mitigation implementation plan.	<u>Ongoing</u>
Confederated Salish-Kootenai Tribes	Montana Department of Fish, Wildlife and Parks	
9.3B.10	Test supplementation of kokanee and develop supplementation techniques for cutthroat trout and bull trout for Hungry Horse Dam resident fish mitigation. Submit results and recommendations to Council.	
Confederated Salish-Kootenai Tribes	Montana Department of Fish, Wildlife and Parks	
9.3B.11	Implement habitat improvement projects to mitigate for Libby Dam in a biologically and ecologically sound manner.	<u>Ongoing</u>
Bonneville		
9.3B.12	Explore alternative methods for funding Hungry Horse Dam resident fish mitigation. Submit recommendations to the Council. Use method upon approval.	
Bonneville	Bureau of Reclamation	Corps
9.3B.13	Consider operational mitigation measures proposed in the Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam in the system operation review process. Report findings to the Council.	<u>6/30/94</u>
Council		
9.3B.14	Reopen Hungry Horse Dam mitigation measures if Hungry Horse Dam is not operated under current practices.	<u>Ongoing</u>

Entity(s)	Action Description	Completion Date
Bonneville	Bureau of Reclamation	
9.3B.15	Install a selective withdrawal structure at Hungry Horse Dam.	
Bureau of Reclamation	Confederated Salish-Kootenai Tribes	Montana Department of Fish, Wildlife and Parks
9.3B.16	Coordinate Kerr and Hungry Horse dams resident fish mitigation programs.	<u>Ongoing</u>
Bonneville		
9.3B.17	Fund Instream Flow Incremental Methodology study for mainstem Flathead River.	
Corps		
9.3C.1	Develop operating procedures for Libby Dam to protect resident fish. Until new procedures are adopted, operate under existing criteria.	
Confederated Salish-Kootenai Tribes	Idaho Department of Fish and Game	Kootenai Tribe of Idaho
		Montana Department of Fish, Wildlife and Parks
9.3C.2	Refine biological rule curves for Libby Dam. Submit interim report by 4/1/94. Submit propose rule curves to Council by 6/1/94.	<u>6/1/94</u>
Corps		
9.3C.3	Enforce drawdown limit of 90 to 100 feet at Libby Dam.	<u>Ongoing</u>
Bonneville		
9.3C.4	Continue to fund studies to evaluate the effect of Libby Dam operating procedures on resident fish including white sturgeon.	
Bonneville		
9.3C.5	Fund mitigation of resident fish losses caused by drawdown of Libby Dam for power purposes.	<u>Ongoing</u>
Corps		
9.3C.6	Fund mitigation of resident fish losses caused by drawdown of Libby Dam for flood control purposes.	<u>Ongoing</u>
Corps		
9.3C.7	If conflict occurs when implementing 9.3C.1 and 9.3C.3, consult with relevant fish managers.	<u>Ongoing</u>
Bonneville	Corps	
9.3C.8	Evaluate adding three generators to Libby Dam.	
Bonneville		
9.3C.9	Fund removal of accumulated materials in the Kootenai River.	
Bonneville	Bureau of Reclamation	Corps
		Idaho Department of Fish and Game
Nez Perce Tribe	NMFS	
9.3D.1	Review Sections 9.3D.2-8 and develop appropriate recommendations to mitigate for resident fish losses at Dworshak Dam. Report results to the Council.	<u>3/3/94</u>

Entity(s)	Action Description	Completion Date
Idaho Department of Fish and Game	Nez Perce Tribe	
9.3D.2	Analyze kokanee entrainment at Dworshak Dam (see 9.3D.1).	
Idaho Department of Fish and Game	Nez Perce Tribe	
9.3D.3	Implement annual mid-water trawling at Dworshak Reservoir (see 9.3D.1).	
Idaho Department of Fish and Game	Nez Perce Tribe	
9.3D.4	Implement annual kokanee spawner counts (see 9.3D.1).	
Idaho Department of Fish and Game	Nez Perce Tribe	
9.3D.5	Implement genetic inventory of fish in North Fork Clearwater River drainage (see 9.3D.1).	
Bonneville		
9.3D.6	Fund Sections 9.3D.2-5 (see 9.3D.1).	
Corps		
9.3D.7	Fund resident fish stocking, including monitoring, in and upstream of Dworshak Reservoir (see 9.3D.1).	
Bonneville	Bureau of Reclamation	Corps
9.3D.8	Investigate alternative operational approaches at Dworshak Dam in the System Operation Review (see 9.3D.1).	
Pacific Power and Light Company		
9.3E.1	Operate Big Fork Dam according to FERC license.	Ongoing
Pacific Power and Light Company		
9.3E.2	Examine mitigation alternatives for Big Fork Project.	
Pacific Power and Light Company		
9.3E.3	Ensure coordination of Big Fork Project operations with fish managers objectives.	Ongoing
Bonneville		
9.3F.1	Fund sturgeon research. Submit results to Council.	
Bonneville		
9.3F.2	Fund Sections 9.3F.3-5.	
Umatilla Tribe		
9.3F.3	Prepare evaluation for rebuilding sturgeon population between Bonneville Dam and mouth of Snake River.	
Nez Perce Tribe		
9.3F.4	Prepare evaluation for rebuilding sturgeon population in the Snake River between Lower Granite and Hells Canyon dams.	
Colville Tribe	Spokane Tribe	

Entity(s)	Action Description	Completion Date		
9.3F.5	Perform baseline assessment of sturgeon in Lake Roosevelt. Submit recommendations to the Council.			
<i>Bonneville</i>	<i>Federal Agencies</i>	<i>Hydroelectric Project</i>	<i>Other Entities</i>	
		<i>Owners</i>		
<i>States</i>				
9.3G.1	Fund bull trout surveys in the Middle Fork Willamette and McKenzie systems and habitat improvements identified in surveys.			
<i>Bonneville</i>	<i>Federal Agencies</i>	<i>Hydroelectric Project</i>	<i>Other Entities</i>	
		<i>Owners</i>		
<i>States</i>				
9.3G.2	Fund bull trout surveys in the Deschutes, Grande Ronde, Hood, John Day and Umatilla subbasins.			
<i>Bonneville</i>	<i>Federal Agencies</i>	<i>Hydroelectric Project</i>	<i>Other Entities</i>	
		<i>Owners</i>		
<i>States</i>				
9.3G.3	Fund bull trout genetic sampling program in Flathead River Basin.			
<i>Confederated Salish-Kootenai Tribes</i>	<i>Montana Department of Fish, Wildlife and Parks</i>			
9.3G.4	Initiate bull trout genetic sampling program in Flathead River Basin.			
<i>Idaho Department of Fish and Game</i>				
9.3H.1	Provide Council with information concerning stocking rainbow trout in the Clearwater River below the north fork.			
<i>Bonneville</i>				
9.3H.2	Fund stocking rainbow trout in the Clearwater River below the north fork if found to be desirable.			
<i>Corps</i>				
9.3H.3	Fund study of fish production potential downstream from Albeni Falls Dam.			
<i>Bonneville</i>				
9.3H.4	Fund efforts to restore sturgeon and burbot in the Kootenai River.			
<i>Bonneville</i>	<i>Federal Agencies</i>	<i>Hydroelectric Project</i>	<i>Other Entities</i>	
		<i>Owners</i>		
<i>States</i>				
9.3H.5	Fund test vegetation plantings at appropriate reservoirs and identify hydropower projects that would benefit from revegetation improvements. Submit results to the Council.			<u>12/31/97</u>
<i>Bureau of Reclamation</i>	<i>Irrigation Districts</i>			
9.3H.6	Fund maintenance of barrier net system at Banks Lake.			<u>Ongoing</u>

9.4 FOLLOW RESIDENT FISH SUBSTITUTION POLICY

Bonneville

Entity(s)	Action Description	Completion Date
9.4A.1 <i>Colville Tribe</i>	Fund resident fish substitution projects above Chief Joseph Dam.	<u>Ongoing</u>
9.4A.1.a <i>Colville Tribe</i>	Operate and maintain the resident fish hatchery on Colville Indian Reservation.	<u>Ongoing</u>
9.4A.1.b <i>Coeur d'Alene Tribe</i>	Evaluate natural production of kokanee above Chief Joseph Dam.	
9.4A.1.c <i>Spokane Tribe</i>	Design, construct, operate and maintain a trout hatchery on the Coeur d'Alene Reservation; implement and maintain habitat improvement projects; and implement a five-year monitoring program.	
9.4A.1.d <i>Spokane Tribe</i>	Operate and maintain kokanee salmon hatcheries at Galbraith Springs and at Sherman Creek.	<u>Ongoing</u>
9.4A.1.e <i>Spokane Tribe</i>	Operate and maintain habitat and passage improvement projects on Lake Roosevelt tributary streams for rainbow trout.	
9.4A.1.f <i>Kalispel Tribe</i>	Monitor and evaluate Sections 9.4A.1.d-e through at least the year 2000.	
9.4A.1.g <i>Kalispel Tribe</i>	Design, construct, operate and maintain a bass hatchery on the Kalispel Indian reservation.	
9.4A.1.h <i>Kalispel Tribe</i>	Design, construct, operate and maintain habitat improvement projects on tributaries of the Pend Oreille River.	
9.4A.1.i <i>Kalispel Tribe</i>	Remove brook trout in selected Pend Oreille River tributaries.	
9.4A.1.j <i>Kalispel Tribe</i>	Design, construct, operate and maintain project to create a bass nursery slough in the Pend Oreille wetlands.	
9.4A.1.k <i>Kalispel Tribe</i>	Construct and place structures for bass enhancement in the Pend Oreille River.	
9.4A.1.l <i>Kootenai Tribe</i>	Implement a four year monitoring and evaluation program of Sections 9.4A.1.g-k.	
9.4A.1.m <i>Kootenai Tribe</i>	Operate and maintain sturgeon hatchery on the Kootenai Indian Reservation. Evaluate potential uses of the hatchery.	
9.4A.1.n <i>Kootenai Tribe</i>	Evaluate the effectiveness of the hatchery called for in 9.4A.1.l and to assess the impact of water-level fluctuations caused by Libby Dam on sturgeon outplanting from the hatchery in the Idaho portion of the Kootenai River.	

Entity(s)	Action Description	Completion Date
9.4A.1.o	Perform a five year baseline assessment of fish stocks in the Kootenai River. Submit results including recommendations for fishery improvement to the Council.	
Lake Roosevelt Forum		
9.4A.1.p	Implement rainbow trout net pen rearing program in Lake Roosevelt.	<u>Ongoing</u>
Fish Managers		
9.4A.1.q	Identify and study alternatives for preventing resident fish from being swept downstream out of Grande Coulee Reservoir. Submit recommendations to the Council.	<u>12/31/96</u>
Washington Dept. of Wildlife		
9.4A.1.r	Determine measures for enhancing fish in Moses Lake.	
Bonneville	Bureau of	Idaho Power
	Reclamation	
9.4A.2	Apportion funding responsibilities for resident fish substitution projects above Hells Canyon Dam.	<u>3/3/94</u>
Shoshone-Paiute Tribe		
9.4A.2.a.1	Implement annual stocking of trout on the Duck Valley Indian Reservation.	<u>Ongoing</u>
Shoshone-Paiute Tribe		
9.4A.2.a.2	Implement water survey for resident fish hatchery on the Duck Valley Indian Reservation.	
Shoshone-Paiute Tribe		
9.4A.2.a.3	Evaluate alternative sources of resident fish for planting on the Duck Valley Indian Reservation.	
Shoshone-Paiute Tribe		
9.4A.2.a.4	Analyze development of a fishery at Coyote Sink on the Duck Valley Indian Reservation.	
Shoshone-Paiute Tribe		
9.4A.2.a.5	Implement, monitor and evaluate resident fish habitat measures on the Duck Valley Indian Reservation.	
Shoshone-Paiute Tribe		
9.4A.2.a.6	Acquire or construct trout production facility. Operate and maintain the facility for planting on the Duck Valley Indian Reservation and elsewhere. Assess opportunities for cooperation with the Shoshone-Bannock Tribe.	
Idaho Department of Fish and Game		
9.4A.2.b	Design, construct, place and evaluate resident fish shoreline habitat improvement in C.J. Strike Reservoir.	
Idaho Department of Fish and Game		
9.4A.2.c	Propagate and release kokanee into, and construction and operation of a kokanee trap at, Lucky Peak Reservoir.	

Entity(s)	Action Description	Completion Date
Idaho Department of Fish and Game		
9.4A.2.d	Construct, operate and maintain hatchery capacity and propagate coho for release into Cascade Reservoir.	
Shoshone-Bannock Tribe		
9.4A.2.e	Design, construct, operate and maintain a resident trout hatchery on the Fort Hall Reservation.	
Shoshone-Bannock Tribe		
9.4A.2.f	Implement habitat restoration activities on the Fort Hall reservation.	
Shoshone-Bannock Tribe		
9.4A.2.g	Evaluate the impact of American Falls Dam operating procedures on native fish populations.	
Oregon Department of Fish and Wildlife		
9.4A.2.h	Implement habitat improvement measures in the Malheur River Basin.	
Bonneville		
9.4A.3	Fund resident fish substitution projects above Dworshak Dam.	<u>Ongoing</u>
Nez Perce Tribe		
9.4A.3.a	Develop, maintain and manage trout ponds on the Nez Perce Indian Reservation.	
Bonneville Portland General Electric		
9.4A.4	Apportion funding responsibilities for resident fish substitution projects above Pelton Dam.	<u>3/3/94</u>
Warm Springs Tribe		
9.4A.4.a	Determine role of crayfish in Lake Billy Chinook ecosystem.	

Entity(s)	Action Description	Completion Date
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10 : WILDLIFE

10.2 IMPLEMENT WILDLIFE POLICIES

<i>Bonneville</i>	<i>Wildlife Managers</i>	
10.2A.1	Use loss estimates, as adjusted by Council as starting point for identifying measures and developing agreements.	<u>Ongoing</u>
<i>Council</i>		
10.2A.2	Adopt final loss estimates.	<u>12/31/94</u>
<i>Bonneville</i>		
10.2B.1	Allocate wildlife mitigation expenditures to the various project purposes in accordance with existing accounting procedures.	<u>7/30/94</u>
<i>Bonneville</i>		
10.2B.2	Develop comprehensive strategy to coordinate ratepayer funded wildlife mitigation measures with measures to deal with impacts caused by non-power development and operations.	<u>12/31/94</u>
<i>Bonneville</i>		
10.2B.3	Report to Council yearly on comprehensive, coordinated regional wildlife mitigation strategy.	<u>Annually</u>
<i>Bureau of Reclamation</i>		
10.2D.1	Fund loss statements for Cascade hydro project.	<u>2/15/94</u>
<i>Council</i>		
10.2F.1	Determine the amount of credit to be given for existing wildlife mitigation activities at the federal hydropower projects.	<u>7/31/94</u>
<i>Council</i>		
10.2F.2	Initiate amendment process to amend wildlife mitigation section of the Program.	<u>9/1/94</u>
<i>Bonneville</i>	<i>Wildlife Managers</i>	
10.2F.3.c	Develop a consistent, systemwide method for crediting new wildlife mitigation actions.	<u>12/31/94</u>
<i>Bonneville</i>	<i>Wildlife Managers</i>	
10.2F.3.d	Develop a method for crediting wildlife benefits from fish projects.	<u>12/31/94</u>
<i>Bonneville</i>		
10.2G.1	Fund studies to develop statements of wildlife and/or habitat losses and gains caused by the operation of the federal hydropower system.	<u>12/31/96</u>

10.3 IMPLEMENT WILDLIFE MEASURES

<i>Bonneville</i>	<i>Wildlife Managers</i>	
10.3A.1a	Implement short term wildlife agreements with Idaho, Oregon and/or appropriate Indian Tribes.	<u>2/15/94</u>

Entity(s)	Action Description	Completion Date
10.3A.1b	In the absence of short term agreements, submit a list wildlife mitigation projects to the Council.	<u>2/15/94</u>
10.3A.1c	Select and approve wildlife projects to be funded for a given fiscal year.	<u>Annually</u>
10.3A.1d	Fund projects approved by Council.	<u>Annually</u>
Bonneville		
10.3A.1e	Continue to fund ongoing wildlife mitigation projects and incorporate them into agreements.	<u>Ongoing</u>
Bonneville		
10.3A.3	Implement long term agreements for wildlife mitigation.	<u>12/31/96</u>
10.4 MONITOR AND EVALUATE WILDLIFE MEASURES		
Bonneville		
10.4.1	Fund and submit a coordinated biennial wildlife monitoring report.	<u>Biennially</u>
Bonneville		
10.4.2	Fund an independent scientific review group to evaluate the progress and success of wildlife mitigation.	<u>Ongoing</u>
10.5 IMPLEMENT LOWER SNAKE RIVER COMPENSATION PROGRAM		
Council		
10.5.1	Review wildlife portion of final Lower Snake Compensation Plan and amend program to address unmitigated wildlife losses.	<u>12/31/96</u>
Council		
10.5.2	Amend wildlife losses and mitigation for the Lower Snake River Compensation Plan into the program.	<u>12/31/97</u>
10.5.3	Develop and fund a process that fully involves affected tribes in planning and implementation of the Lower Snake River Compensation Program and submit preliminary summary of the losses and mitigation credit.	<u>2/15/94</u> & <u>12/31/94</u>
10.5.4	Submit report to the Council documenting the work completed and the mitigation credited in terms of habitat units.	<u>12/31/96</u>
10.5.6	Report all costs reimbursed to the U.S. Treasury associated with Lower Snake Compensation Plan.	<u>2/15/94</u>
Bonneville		
10.5.7	Fund implementation of the hydropower share of unaddressed mitigation.	
10.6 MONITOR NON-FEDERAL HYDROPOWER PROJECTS		

<i>Entity(s)</i>	Action Description	<u>Completion Date</u>
10.6.1	Take into account to the fullest extent practicable the standards established in Section 10 of the Program, and the measures taken by Bonneville and others to implement wildlife mitigation.	<u>Ongoing</u>
<i>Council</i>		
10.6.2	Monitor the FERC licensing and relicensing proceedings and comment and intervene where appropriate.	<u>Ongoing</u>

<i>Entity(s)</i>	<i>Action Description</i>	<u><i>Completion Date</i></u>
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11 : FUTURE HYDROELECTRIC DEVELOPMENT

11.1 DEVELOP CONDITIONS OF DEVELOPMENT FOR FUTURE HYDROPOWER

<i>Bonneville</i>	<i>Bureau of Reclamation</i>	<i>Corps</i>	<i>FERC</i>	
11.1	Apply Sections 11.1-3 to all new projects.			<u>Ongoing</u>

11.2 CONTINUE IMPLEMENTATION OF PROTECTED AREAS

<i>Council</i>				
11.2	Review Action Plan and other program sections in light of protected-area designations. [Section 1103(c).]			<u>Ongoing</u>

11.2A.1	Protect river reaches listed in the "Protected Areas List" adopted by the Council and as amended.			<u>Ongoing</u>
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<i>Bonneville</i>				
11.2A.2	Do not acquire power from hydroelectric projects in protected areas.			<u>Ongoing</u>

<i>Council</i>				
11.2A.3	Work with FERC on assessment of new hydropower projects and incorporation of protected-area designations into FERC decision-making. [Sections 1103(c)(2) and (e).]			<u>Ongoing</u>

<i>Relevant Parties</i>				
11.2B	Do not apply protected areas to certain instances.			<u>Ongoing</u>

<i>FERC</i>				
11.2C.1	Take protected areas into account to the fullest extant practicable, where possible.			<u>Ongoing</u>

<i>FERC</i>				
11.2C.2	Give full consideration to protection of fish and wildlife resources located at project sites which were not previously within protected areas, but which may be added by amendment of the Council.			<u>Ongoing</u>

<i>Relevant Parties</i>				
11.2D	Affect of protected areas on water rights and riparian areas.			<u>Ongoing</u>

<i>Council</i>				
11.2E	Amendment of protected areas.			<u>Ongoing</u>

11.3 INVESTIGATE CUMULATIVE EFFECTS

<i>Federal Project Operators</i>	<i>Federal Project Regulators</i>			
11.3.1	Review cumulative environmental effects of all applications and proposals for hydropower development.			<u>Ongoing</u>

11.4 PURSUE CONSISTENCY

FERC

Entity(s)	Action Description	Completion Date
11.4.1	Require applicants for licenses and preliminary permits in the Columbia River Basin to demonstrate how would take program into account to the fullest extent practicable.	<u>Ongoing</u>
FERC		
11.4.2	Provide Council with copies of applications for licenses and preliminary permits in the Columbia River Basin.	<u>Ongoing</u>
Federal Fish and Wildlife Agencies	Federal Land Managers	State Fish and Wildlife Agencies
11.4.3	Incorporate elements of program into hydropower exemption procedures and into hydropower permit procedures on federally managed lands.	<u>Ongoing</u>
Bureau of Reclamation	Corps	Other Federal Agencies
11.4.4	Provide opportunity for Council review and comment for studies of or proposals for hydropower development in the Columbia River Basin.	<u>Ongoing</u>

APPENDIX A

FRAMEWORK ELEMENTS

The program framework provides the foundation for the fish and wildlife program. It consists of an overall program goal, rebuilding targets for identified population management units, schedules to achieve the rebuilding targets, survival targets to define needed change, performance standards to track change and measures designed to meet survival targets. Not all of these elements have been provided in this strategy, but a process for completing them is described in Section 2.3. Once completed, the framework will provide a hierarchy of actions directed at achieving the program's overall goal.

Components of the Program Framework

Program Goals

The overall goals set the direction and scope of the program and provide the philosophy that guides the Council's selection of measures. Examples include goals to maintain and enhance stock diversity, restore weak runs and double overall salmon production. Collectively, the other elements of the program are expected to make significant progress toward or accomplish the overall goals.

Rebuilding Targets

Rebuilding targets provide the management intent, numeric target for rebuilding and the expected time to achieve this target. Rebuilding schedules refer to specific population management units and incorporate the idea of stock conservation units, minimum sustainable population size, compatibility with other stocks and expected variability. Rebuilding schedules are based on the biological needs of the fish, management goals and the projected effectiveness of actions. Numeric rebuilding targets for population management units are planning targets that contribute to the Council's overall numeric goal. Like the overall goal, they are not intended to define or limit the obligation of any party under the Northwest Power Act. Rebuilding targets are dynamic elements that will likely change as knowledge increases and protection techniques are improved. Rebuilding targets do not serve as a ceiling on the Council's goals for restoring anadromous fish runs and are adopted with the understanding that the Council will continue to seek to rebuild the runs as rapidly as possible consistent with the program's biological diversity goal and genetic considerations.

1 **Survival Targets**

2
3 Survival targets state the amount of survival change needed in major program
4 areas to meet the rebuilding schedule. While survival targets may incorporate
5 policy concerns, they must be based on a sound technical and analytical
6 foundation that incorporates all phases of the life cycle of salmon and steelhead.
7 This will require development of analytical tools and information.

8
9 Survival targets address each stage in the salmon life cycle, including:

- 10
11 • juvenile passage survival;
12
13 • adult passage survival;
14
15 • critical habitat productivity;
16
17 • harvest; and
18
19 • depending upon genetic analyses, artificial production techniques to
20 supplement rebuilding.

21
22 **Performance Standards**

23
24 The effectiveness of actions is often uncertain and depends on other actions. It will
25 be important for the Council and the region to track measures in a timely manner.
26 Performance standards for each action or set of actions should provide an easily
27 measurable index that relates to the type of biological or physical change
28 intended. Performance standards provide a point of reference against which to
29 monitor change, and units of measure to define change. They are not intended to
30 state or limit obligations or to resolve technical uncertainties.

31
32 **Measures**

33
34 Program measures are specific actions to be undertaken and funded to contribute
35 to achieving biological objectives and rebuilding schedules. When monitoring
36 shows a program measure is not performing adequately, the measure should be
37 modified or replaced. Measures must stand or fall on the basis of their
38 demonstrated contribution toward the rebuilding target.

39
40 **SAMPLE ELEMENTS OF A REBUILDING PLAN**

41
42 **Population Management Unit**

43
44 The population management unit is the physical and biological description of the
45 population that is referred to in the rebuilding plan. It often will be defined in

1 terms of a specific area or counting site, for example, spring chinook above Lower
2 Granite Dam on the Snake River. It should be a generally homogeneous
3 population, but it can contain separate identifiable populations that may be the
4 subject of further monitoring.

5
6 If the population management unit is defined as wild and naturally spawning
7 spring chinook salmon originating above Lower Granite Dam on the Snake River,
8 returns of fish to hatcheries above Lower Granite Dam would not be included in
9 this population management unit. If monitoring indicates that escapement needs
10 for individual populations are not being met, the Council may modify its
11 definition.

12 13 Characteristics

14
15 This section provides a brief description of the population management unit to
16 expand the definition.

17
18 In the case of the example used above, characteristics might include the following.
19 These fish spawn mainly in tributaries to the Snake River. Juveniles rear for one
20 year in the tributaries and migrate downstream as yearlings in the spring. Adults
21 return after one to four years in the ocean in the spring and early summer. The
22 assumed dates for passage of spring chinook at Lower Granite Dam are March 1
23 through June 17. Idaho Department of Fish and Game has identified 14
24 populations within this population management unit.

25 26 Present Condition

27
28 This section should provide a brief description of the present condition and its
29 relation to historical returns. Important fluctuation in the population should be
30 noted.

31
32 For example, the return trend for the naturally spawning spring chinook from
33 above Lower Granite Dam is shown in Figure A-1. This population management
34 unit declined sharply in 1979. Lower Granite Dam began operation in 1975 and
35 reported its first fish counts in that year. Since 1979, returns have fluctuated
36 around an average of 6,900 wild and naturally spawning fish with a low of 2,400
37 fish in 1991, returns far below historical averages.

38 39 Management Goal

40
41 The management goal for the population management unit should be described
42 both in terms of harvests and biological aspects. If management goals are to be
43 established for individual populations within the greater population management
44 unit (Salmon River spring chinook, for example), they should be compatible with
45 the goal for the population management unit.

1
2 The management goal at the level of the population management unit for the
3 example we've been using is to achieve productive and biologically diverse wild
4 and naturally spawning populations that can support carefully regulated fisheries
5 above Lower Granite Dam and in the Columbia River. To do this, the population
6 must also be compatible with mortality resulting from adult and juvenile passage
7 through the mainstem after the region's best efforts to minimize these losses.
8

9 Rebuilding Targets and Schedules

10
11 While rebuilding targets primarily reflect management goals, they also reflect what
12 is reasonably achievable with the methods at hand. Rebuilding schedules should
13 be based on available analytical projection methods and reflect available
14 information. Because information should improve over time, rebuilding schedules
15 will also change over time. Rebuilding schedules should reflect expected annual
16 variation in returns to provide realistic expectations and to guide evaluation.
17

18 Performance Standards

19
20 The performance standard for the rebuilding target and schedule should provide a
21 measure that is easily reported annually. Dam counts of salmon are one example.
22 Performance standards should incorporate expected annual variation, with the
23 goal of identifying if the region is on track toward achieving the desired rebuilding.
24

25 Population Monitoring

26
27 This section should describe additional monitoring that goes beyond the
28 performance standard and beyond the level of the population management unit. It
29 should include a list of populations that could be the target of intensive
30 monitoring to identify stock status and important life history characteristics. The
31 Council calls for development of the indicator stocks in Section 2.2A.
32
33
34
35
36
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38

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Appendix B

REFERENCE HABITAT PERFORMANCE STANDARDS

Sediment

1. Limit the percentage of fine sediments (less than 6.4 millimeters) in salmon and steelhead redds to no more than 20 percent just prior to fry emergence.
2. In subbasins currently limited by sediment problems, ensure no increase in sediment input from implementing measures.

Water Temperature

3. Water temperatures should not fall under or exceed the temperature ranges identified for upstream migration, spawning, incubation or preferred juvenile rearing, as specified in Table B-1.

Large Woody Debris

4. Provide for long-term recruitment of large woody debris at levels comparable to those observed throughout unmanaged areas.
5. Preclude the removal of existing large woody debris from stream channels (including non-fish producing waters) to protect the sediment and nutrient storage and processing function of stream ecosystems producing salmon and steelhead.

Large Pools

6. Manage for frequency of pools comparable to those observed in unmanaged areas to the extent needed to provide sufficient habitat for salmon and steelhead.

Water Quality Generally

7. Fully comply with applicable state and federal standards.

Other applicable reference sources include available information and recommendations found in state and federal regulations and statutes, existing best management practices, the watershed option in Alternatives for Management of Late-Successional Forests of the Pacific Northwest, Watershed Management Guide for the Interior Northwest, cumulative watershed effects program of the National Council of the Paper Industry for Air and Stream Improvement,

1 recommendations of the relevant state agencies regarding riparian **classification**
2 and protection, and other applicable sources.

3
4
5
6
7

Table B-1
Water Temperature Criteria for Salmon and Steelhead (oFahrenheit)

Species	Upstream Migration	Spawning	Incubation	Preferred	Optimum	Upper Lethal
Chinook						
• Fall	51-67	42-57	41-58	45-58	54	77
• Spring	38-56	42-57	41-58	45-58	54	77
• Summer	56-68	42-57	41-58	45-58	54	77
Chum	47-60	45-55	40-56	52-58	56	78
Coho	45-60	40-60	40-56	53-58	-	78
Steelhead	-	39-49	-	45-58	50	75
Sockeye	45-60	51-54	-	52-58	-	-
Pink	45-60	45-55	-	42-58	-	-

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APPENDIX C

Completed Actions

The progress made in protecting and enhancing fish and wildlife in the Columbia River Basin can be measured, in part, by the actions and projects completed since the Northwest Power Planning Council adopted the first fish and wildlife program in 1982. These accomplishments represent the combined efforts of the Council, the Bonneville Power Administration, federal and state agencies and regulators, Indian tribes, public and private utilities, and other interested groups and citizens.

For construction actions, this list includes only projects on which construction is complete. Completed contracts within construction projects, such as feasibility studies, are not included unless the program only calls for a feasibility study. References are to the 1984 program unless otherwise indicated.

<u>Major Implementing Agencies</u>	<u>Action</u>	<u>Former Program Section and Action Item Numbers</u>
Council	Supplemental budget for salmon and steelhead planning	201, action item 36.1 (as amended in 1985)
Council	Goals work plan Compilation of losses information Salmon and steelhead productivity analysis Blocked area identification Resident fish productivity analysis Related consultations	201, action item 36.2 (as amended in 1985)
Council	Adaptive management workshop	201, action item 39.4 (as amended in 1985)
FERC, Douglas County PUD	Spill effectiveness report: Wells Dam	404(a)(1), 404(a)(10), action item 32.13 (1st bullet)

FERC, Chelan County PUD	Spill effectiveness report: Rocky Reach and Rock Island dams	404(a)(2), 404(a)(10), (3rd bullet)
FERC, Grant County PUD	Spill effectiveness report: Priest Rapids Dam	404(a)(3), 404(a)(10), action item 32.11 (2nd bullet)
FERC, Grant County PUD	Spill effectiveness report: Wanapum Dam	404(a)(3), 404(a)(10), action item 32.11 (4th bullet)
Corps	Biological and prototype screen testing report for The Dalles Dam	404(b)(4)(B), action item 32.4 (2nd bullet)
Corps	Report on evaluation of screens and bypass at both Bonneville Dam powerhouses	404(b)(5), action item 32.3 (2nd bullet)
Corps	Biological and prototype screen testing at Lower Monumental Dam	404(b)(8), action item 32.8 (2nd bullet)
FERC, Eugene Water and Electric Board	Installation of juvenile bypass facility at Leaburg Canal (Willamette subbasin)	404(b)(14), action item 32.18
Corps	Transportation report and proposals	404(b)(17), action item 32.2 (3rd bullet)
Corps	Report on adult passage delays at John Day Dam	604(a)(5), action item 32.5 (4th bullet)

Corps	Installation of vertical slot counters at The Dalles Dam	604(b)(3), action item 32.4 (5th and 6th bullets)
Bonneville	Tumwater-Dryden dams adult passage feasibility study (Wenatchee subbasin)	604(c)(3), (1982 program)
Bonneville	Little Falls Creek fish passage (Willamette subbasin)	704(d)(1)
Bonneville	White River Falls passage feasibility study (Deschutes subbasin)	704(d)(1) (Table 2), action item 34.5
Bonneville	Deschutes River gravel study	704(d)(1) (Table 4), (1982 program)
Bonneville	Deer Creek habitat improvement (John Day subbasin)	704(d)(1) (Table 2), action item 34.5
Bonneville	Murderers Creek habitat improvement (John Day subbasin)	704(d)(1), action item 34.5
Bonneville	Beech Creek habitat improvement (John Day subbasin)	704(d)(1), action item 34.5
Bonneville	Canyon Creek habitat improvement (John Day subbasin)	704(d)(1), action item 34.5

Bonneville	Granite Boulder Creek habitat improvement (John Day subbasin)	704(d)(1), action item 34.5
Bonneville	Clear and Granite Creek habitat improvement (John Day subbasin)	704(d)(1), action item 34.5
Bonneville	South Fork John Day River habitat improvement and passage (except Izee Falls passage) (John Day subbasin)	704(d)(1), action item 34.5
Bonneville	Lower Umatilla River channel modification (Umatilla subbasin)	704(d)(1), action item 34.5
Bonneville	Meadow Creek passage (Clearwater subbasin)	704(d)(1), action item 34.5
Bonneville	Eldorado Creek passage (Clearwater subbasin)	704(d)(1), action item 34.5
Bonneville	Crooked Fork Lochsa River passage (Clearwater subbasin)	704(d)(1), action item 34.5
Bonneville	Peavine Creek habitat improvement (Grande Ronde subbasin)	704(d)(1), action item 34.5
Bonneville	South Fork Salmon River Tributaries fish passage: Johnson and Boulder Creeks (Salmon subbasin)	704(d)(1), action item 34.5
Bonneville	Dryden Dam passage	704(d)(1),

	(Wenatchee subbasin)	action item 34.5
Bonneville	Tumwater Falls Dam passage (Wenatchee subbasin)	704(d)(1), action item 34.5
Pacific Northwest Health Protection Committee	Fish health proposal	704(h)(2)(E)
Bonneville	Design and construction of Umatilla release, collection and holding facilities	704(i)(1), (1982 program)
Bonneville	Supplementation work plan	704(k)(1), action item 34.24
Bonneville, FERC, Council, Montana Power Company, Montana Department of Fish Wildlife & Parks	Painted Rocks Reservoir water purchase	804(e)(1), action items 41.5 and 41.14
Bonneville, Washington Water Power, Idaho Department of Fish and Game	Construction of Cabinet Gorge hatchery	804(e)(4)-(5), action item 41.4

Bureau of Reclamation	Installation of barrier net at Banks Lake	804(e)(7), action item 41.17
Bonneville	Sturgeon work plan	804(e)(8), action item 41.3
Bureau of Reclamation	Juvenile screen, smolt trap, and right-bank ladder at Prosser Dam (Yakima subbasin)	904(d)(2) action item 34.2
Bonneville Bureau of Reclamation	Fishways and screens at Horn Rapids Diversion Dam (Yakima subbasin)	904(d)(4) (Table 3-(A)), action item 34.3
Bonneville	Fishways and screens at Sunnyside Diversion Dam (Yakima subbasin)	904(d)(4) (Table 3-(B)), action item 34.3
Bonneville, Bureau of Indian Affairs	Fishways and screens at Wapato Diversion Dam (Yakima subbasin)	904(d)(4) (Table 3-(C)), action item 34.3
City of Yakima, Washington Department of Ecology	Vertical slot fishway and counting facility at Naches /Cowiche Diversion Dam (Naches River) (Yakima subbasin)	904(d)(4) (Table 3-(I)), action item 34.3
Bonneville	Vertical slot fishway at Toppenish Creek Flood Control Project (headworks of Satus Main Canal) (Yakima subbasin)	904(d)(4) (Table 3-(J)), action item 34.3

Bonneville	Vertical slot fishway and fish screening facility at Toppenish Creek Diversion Dam (Yakima subbasin)	904(d)(4) (Table 3-(K)), action item 34.3
Bonneville	Fishing screening facilities Stevens Ditch (Naches River) (Yakima subbasin)	904(d)(4) (Table 3-(M)), action item 34.3
Bonneville, Montana Department of Fish, Wildlife and Parks, Council and others	Mitigation plans for Hungry Horse and Libby dams	1004(b)(3),(5) and Table 4, action items 40.4 and 40.8
Council	Research study	1104(c)(1), action items 34.26 and 39.3

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APPENDIX D

GLOSSARY

The definitions in this list have no legal significance and are provided only for clarification of terms used throughout this program.

acclimation pond

Concrete or earthen pond or a temporary structure used for rearing and imprinting juvenile fish in the water of a particular stream before their release into that stream.

Act--See Northwest Power Act.

adaptive management

A scientific policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing program actions as vehicles for learning. Projects are designed and implemented as experiments so that even if they fail, they provide useful information for future actions. Monitoring and evaluation are emphasized so that the interaction of different elements of the system are better understood.

adult equivalent population

The number of fish that would have returned to the mouth of the Columbia River in the absence of any prior harvest.

af (acre-foot)

Unit of volume measurement used to describe a quantity of water stored in a reservoir. One acre-foot of water covers one acre to a depth of one foot or 325,850 gallons.

anadromous fish

Fish that hatch in freshwater, migrate to the ocean, mature there and return to freshwater to spawn. For example, salmon or steelhead.

approach velocities

Water velocities at or near the face of a fish screen.

- 1 **artificial production or artificial propagation**
2
3 Spawning, incubating, hatching or rearing fish in a hatchery or other facility
4 constructed for fish production.
5
- 6 **attraction**
7
8 Drawing fish to dam fishways or spillways through the use of water flows.
9
- 10 **barrier net**
11
12 A net system that is placed across a river, stream or channel to block the passage
13 of fish from dam turbine intakes or other hazards without blocking the water flow.
14
- 15 **baseline stream survey**
16
17 A survey of the physical and biological resources and characteristics of a stream.
18
- 19 **base load**
20
21 The minimum load in a power system over a given period of time. Base load
22 resources run continually except during maintenance and outages.
23
- 24 **billing credits**
25
26 Under the Northwest Power Act, a payment by Bonneville to a customer (in cash
27 or offsets against billings) for actions taken by that customer to reduce
28 Bonneville's obligations to acquire new resources.
29
- 30 **biodiversity**
31
32 The variety of and variability in living organisms, with respect to genetics, life
33 history, behavior and other fundamental characteristics.
34
- 35 **blocked areas**
36
37 Areas in the Columbia River Basin where hydroelectric projects have created
38 permanent barriers to anadromous fish runs. These include the areas above Chief
39 Joseph and Grand Coulee dams, the Hells Canyon Complex and other smaller
40 locations.
41
- 42 **Bonneville Power Administration (Bonneville)**
43
44 The sole federal power marketing agency in the Northwest and the region's major
45 wholesaler of electricity. Created by Congress in 1937, Bonneville sells power to
46 public and private utilities, direct service industrial customers, and various public

1 agencies in the states of Washington, Oregon, Idaho, Montana west of the
2 Continental Divide, (and parts of Montana east of the Divide) and smaller adjacent
3 areas of California, Nevada, Utah and Wyoming. The Northwest Power Act charges
4 Bonneville with additional duties related to energy conservation, resource
5 acquisition, and fish and wildlife.

6
7 **brood stock**

8
9 Adult fish used to propagate the subsequent generation of hatchery fish.

10
11 **Bureau of Reclamation, U.S. Department of the Interior**

12
13 An agency that administers some parts of the federal program for water resource
14 development and use in western states. The Bureau of Reclamation owns and
15 operates a number of dams in the Columbia River Basin, including Grand Coulee
16 and several projects on the Yakima River.

17
18 **bypass system**

19
20 A channel or conduit in a dam that provides a route for fish to move through or
21 around the dam without going through the turbine units.

22
23 **captive brood stock**

24
25 Fish raised and spawned in captivity.

26
27 **carrying capacity**

28
29 The number of individuals of one species that the resources of a habitat can
30 support.

31
32 **cfs (cubic feet per second)**

33
34 A unit used to measure water flow.

35
36 **collection and bypass system**

37
38 A system at a dam that collects and holds the fish approaching the dam for later
39 transportation or moves them through or around the dam without going through
40 the turbine units.

41
42 **Columbia River Compact**

43
44 An interstate compact between the states of Oregon and Washington by which the
45 states jointly regulate fish in the Columbia River.

1 **Columbia River Inter-Tribal Fish Commission**

2
3 The Commission is the coordinating body of the Yakima, Nez Perce, Umatilla and
4 Warm Springs Indian tribes. These tribes all signed the 1855 treaties that
5 reserved their rights to Columbia River salmon and steelhead, certain wildlife and
6 other resources.

7
8 **Columbia River System**

9
10 The Columbia River and its tributaries.

11
12 **Columbia River Treaty**

13
14 The treaty between the United States and Canada for the joint development of the
15 Columbia River. It became effective on September 16, 1964.

16
17 **Coordinated Information System**

18
19 Still under development, this system is designed to allow interested parties to
20 access technical information about Columbia River salmon and steelhead.

21
22 **Corps of Engineers, U.S. Department of the Army (Corps)**

23
24 An agency with the responsibility for design, construction and operation of civil
25 works, including multipurpose dams and navigation projects.

26
27 **creel census survey**

28
29 The collection of data concerning the number of fish caught by sport fishers on a
30 particular stream or in a particular area.

31
32 **critical period**

33
34 The sequence of low water conditions during which the hydropower system's
35 lowest amount of energy can be generated while drafting storage reservoirs from
36 full to empty. Under the Pacific Northwest Coordination Agreement, the critical
37 period is based on the lowest multimonh streamflow observed since 1928. Based
38 on analysis of flows at The Dalles, this streamflow is also the lowest since
39 recordkeeping began in 1879.

40
41 **critical water**

42
43 The low streamflow conditions in the critical period, under which the hydropower
44 system will generate only about 12,300 average megawatts. In an average year,
45 the Northwest hydropower system will produce about 16,400 average megawatts.

46

1 **cryopreservation**

2

3 The long term preservation of fish gametes by freezing.

4

5 **deflector screens / diversion screens**

6

7 Wire mesh screens placed at the point where water is diverted from a stream or
8 river. The screens keep fish from entering the diversion channel or pipe.

9

10 **demography**

11

12 The study of characteristics of human populations, especially size, density,
13 growth, distribution, migration and vital statistics and the effect of these on social
14 and economic conditions.

15

16 **drawdown**

17

18 The release of water from a reservoir for power generation, flood control, irrigation
19 or other water management activity.

20

21 **economies of scale**

22

23 Reductions in the average cost of a product that result from increased production.

24

25 **ecosystem**

26

27 The biological community considered together with the land and water that make
28 up its environment.

29

30 **electrophoresis**

31

32 A technique that allows biologists to determine fish origins by analyzing the
33 genetic variation in fish body fluid and muscle tissue. The technique is used to
34 determine which stocks are being caught in ocean fisheries in order to better
35 regulate ocean fishing.

36

37 **embeddedness**

38

39 The degree to which dirt is mixed in with spawning gravel.

40

41 **emergence**

42

43 The act of fish leaving their incubation environment in the gravel to forage for
44 food.

45

1 **escapement**
2
3 The number of salmon and steelhead that return to a specified point of
4 measurement after all natural mortality and harvest have occurred. Spawning
5 escapement consists of those fish that survive to spawn.
6
7 **estuary**
8
9 The part of the wide lower course of a river where its current is met and influenced
10 by the tides.
11
12 **evolutionary biology**
13
14 The study of the processes by which living organisms have acquired distinguishing
15 characteristics.
16
17 **extinction**
18
19 The natural or human-induced process by which a species, subspecies or
20 population ceases to exist.
21
22 **Federal Energy Regulatory Commission (FERC)**
23
24 The Commission issues and regulates licenses for construction and operation of
25 non-federal hydroelectric projects and advises federal agencies on the merits of
26 proposed federal multipurpose water development projects.
27
28 **federal land managers**
29
30 This category includes the Bureau of Indian Affairs; the Bureau of Land
31 Management; the National Park Service, all part of the U.S. Department of the
32 Interior; and the Forest Service, U.S. Department of Agriculture.
33
34 **federal project operators and regulators**
35
36 Federal agencies that operate or regulate hydroelectric projects in the Columbia
37 River Basin. They include the Bonneville Power Administration, the Bureau of
38 Indian Affairs, the Bureau of Reclamation, the Corps of Engineers and the Federal
39 Energy Regulatory Commission.
40

1 **fingerling**

2
3 A young fish from the time of the disappearance of the yolk sac to the end of the
4 first year of growth. It ranges in size from approximately 1 to 3 inches.

5
6 **firm energy load carrying capability (FELCC)**

7
8 The amount of firm energy that can be produced from a hydropower system based
9 on the system's lowest recorded streamflows and the maximum amount of
10 reservoir storage currently available to the system.

11
12 **firm energy or firm power**

13
14 Electric energy that is considered assurable to the customers to meet all agreed
15 upon portions of the customers' load requirements over a defined period.

16
17 **fish and wildlife agencies**

18
19 This category includes the Fish and Wildlife Service, U.S. Department of the
20 Interior; the Idaho Department of Fish and Game; the Montana Department of
21 Fish, Wildlife and Parks; the National Marine Fisheries Service, U.S. Department
22 of Commerce; the Oregon Department of Fish and Wildlife; the Washington
23 Department of Fisheries; and the Washington Department of Game.

24
25 **fish flows**

26
27 Artificially increased flows in the river system called for in the fish and wildlife
28 program to quickly move the young fish down the river during their spring
29 migration period. (See "water budget.")

30
31 **fish guidance efficiency**

32
33 The percentage of the total number of fish approaching a turbine intake that are
34 deflected from a dam's turbine units by a fish guidance device such as a turbine
35 intake screen.

36
37 **Fish Passage Center**

38
39 Part of the water budget program, the center plans and implements the annual
40 smolt monitoring program; develops and implements flow and spill requests; and
41 monitors and analyzes research results to assist in implementing the water
42 budget. (See water budget.)

1 **fish passage efficiency**
2
3 The percentage of the total number of fish that pass a dam without passing
4 through the turbine units.
5
6 **fish passage managers**
7
8 Located at the Fish Passage Center, the two fish passage managers are
9 responsible for the specific planning, implementation and monitoring activities of
10 the Center aimed at helping fish on their migratory routes in the Columbia River
11 Basin. One manager is designated by a majority of the federal and state fish and
12 wildlife agencies, and the other manager is designated by a majority of the
13 Columbia River Basin Indian tribes. (See Fish Passage Center.)
14
15 **fish screen**
16
17 A screen across the turbine intake of a dam, designed to divert the fish into the
18 bypass system.
19
20 **fishway (also called a fish ladder)**
21
22 A device made up of a series of stepped pools, similar to a staircase, that enables
23 adult fish to migrate up the river past dams.
24
25 **flows**
26
27 The rate at which water passes a given point in a stream or river, usually
28 expressed in cubic-feet per second (cfs).
29
30 **flow augmentation**
31
32 Increased flow from release of water from storage dams.
33
34 **forage species**
35
36 Fish that serve as a food source for carnivorous fish.
37
38 **forebay**
39
40 The part of a dam's reservoir that is immediately upstream from the powerhouse.
41
42 **forebay guidance net**
43
44 A large net placed in the forebay of a dam to guide juvenile fish away from the
45 powerhouse.
46

- 1 **fry**
2
3 The stage in the life of a fish from the hatching of the egg through the absorption
4 of the yolk sac until it is about 1 inch long.
5
6 **game fish**
7
8 A fish that is regulated by law for recreational harvest.
9
10 **gametes**
11
12 The sexual reproductive cells, eggs and sperm.
13
14 **gas supersaturation**
15
16 The overabundance of gases in turbulent water, such as at the base of a dam
17 spillway. Can cause fatal condition in fish similar to the bends.
18
19 **gene**
20
21 The chemical unit of hereditary information that can be passed on from generation
22 to generation.
23
24 **gene pool**
25
26 The total genes in a breeding population.
27
28 **genetic conservation**
29
30 The preservation of genetic resources in breeding populations.
31
32 **genetic conservation refuge**
33
34 Reserve area whose goal is to protect genetic diversity and natural evolutionary
35 processes within and among natural populations, while allowing varying degrees
36 of exploitation and modification.
37
38 **genetic diversity**
39
40 All of the genetic variation within a species. Genetic diversity includes both genetic
41 differences among individuals in a breeding population and genetic differences
42 among different breeding populations.
43

- 1 **genetic integrity**
2
3 The ability of a breeding population or group of breeding populations to remain
4 adapted to its natural environment.
5
6 **genotype**
7
8 The complement of genes in an individual.
9
10 **glides**
11
12 Stream areas with velocities generally less than one cubicfoot per second and with
13 a smooth surface. Water depth generally is less than two feet.
14
15 **gpm (gallons per minute)**
16
17 A unit used to measure water flow.
18
19 **gravity feed system**
20
21 A system that provides flow in a channel or conduit through the use of gravity.
22
23 **habitat**
24
25 The locality or external environment in which a plant or animal normally lives and
26 grows.
27
28 **harvest controls**
29
30 Regulations established for commercial and sport fisheries to ensure that the
31 correct proportion of the different stocks escape to spawn.
32
33 **harvest management**
34
35 The process of setting regulations for the commercial, recreational and tribal fish
36 harvest to achieve a specified goal within the fishery.
37
38 **headworks**
39
40 A flow control structure on an irrigation canal.
41
42 **headwaters**
43
44 The source and upper part of a stream or river.
45

- 1 **homing behavior**
2
3 Behavior that leads mature salmon and steelhead to return to their stream or lake
4 of origin for spawning.
5
- 6 **husbandry**
7
8 The scientific management and control of the hatchery environment for the
9 production of fish or wildlife.
10
- 11 **hydroelectric power or hydropower**
12
13 The generation of electricity using falling water to turn turbo-electric generators.
14
- 15 **hydrology**
16
17 The scientific study of the water of the earth, its occurrence, circulation and
18 distribution, its chemical and physical properties, and its interaction with its
19 environment, including its relationship to living things.
20
- 21 **hydropower system**
22
23 The hydroelectric dams on the Columbia River and its tributaries.
24
- 25 **impoundment**
26
27 A body of water formed behind a dam.
28
- 29 **imprinting**
30
31 The physiological and behavioral process by which migratory fish assimilate
32 environmental cues to aid their return to their stream of origin as adults.
33
- 34 **incubation**
35
36 The period of time from egg fertilization until hatching.
37
- 38 **Instream Flow Work Group**
39
40 An interagency group that simulated the effects of various fish flow regimes by
41 using hydropower-regulation computer models. The group was composed of
42 technical experts and water resource managers from the fish and wildlife agencies,
43 federal dam operators and regulators, and state water management agencies.
44
- 45 **instream flows**--See flows.
46

1 **intake traveling screens**--See turbine intake screens.

2

3 **interim spill**

4

5 The spilling of water over John Day, The Dalles, Bonneville, Lower Monumental
6 and Ice Harbor dams to aid fish passage. This method will be used until
7 permanent solutions to juvenile fish passage problems are developed.

8

9 **intertie**

10

11 A transmission line or system of lines permitting a flow of energy between major
12 power systems. The Northwest has an intertie connection with California.

13

14 **juvenile**

15

16 Fish from one year of age until sexual maturity.

17

18 **kcfs (thousand cubic feet per second)**--See cubic feet per second.

19

20 **kcfs-month**

21

22 One kcfs-month is a flow of 1,000 cubic feet per second for one month or 0.0595
23 million acre-feet.

24

25 **kilowatt-hour (kWh)**

26

27 A basic unit of electrical energy that equals one kilowatt of power applied for one
28 hour.

29

30 **known-stock fishery**

31

32 A harvest management technique by which specific stocks are harvested in either
33 a mixed-stock or a single-stock fishery.

34

35 **limnology**

36

37 The study of the life and phenomena of lakes, ponds and streams.

38

39 **low-head dam**--A dam at which the water in the reservoir is not high above the
40 turbine units.

41

42 **Maf (million acre-feet)**--See af.

43

1 **mainstem**

2

3 The main channel of the river in a river basin, as opposed to the streams and
4 smaller rivers that feed into it. In the fish and wildlife program, mainstem refers to
5 the Columbia and Snake rivers.

6

7 **mainstem passage**

8

9 The movement of salmon and steelhead around or through the dams and
10 reservoirs in the Columbia and Snake rivers.

11

12 **mainstem survival**

13

14 The proportion of anadromous fish that survive passage through the dams and
15 reservoirs while migrating in the Columbia and Snake rivers.

16

17 **mark-recapture study**

18

19 A study that estimates population size by marking a segment of the population at
20 one time and later measuring the ratio of marked animals to total animals.

21

22 **mechanical bypass systems**--See bypass system.

23

24 **megawatt (MW)**

25

26 The electrical unit of power that equals one million watts or one thousand
27 kilowatts.

28

29 **mid-Columbia**

30

31 The section of the Columbia River between the junction with the Snake River and
32 Chief Joseph Dam.

33

34 **Mid-Columbia Coordinating Committee**

35

36 A committee whose primary purpose is to improve fish passage at the mid-
37 Columbia dams. It determines annual operating requirements for fish passage at
38 the dams; schedules research projects; and implements flow and spill
39 requirements of the Mid-Columbia Settlement Agreement. The committee is
40 composed of eight representatives of the fish and wildlife agencies, Indian tribes,
41 the three mid-Columbia Public Utility Districts, and a power purchaser's
42 representative.

43

- 1 **mid-Columbia dams**
2
3 Dams owned by the mid-Columbia Public Utility Districts. They include Wells,
4 Rocky Reach, Rock Island, Wanapum and Priest Rapids dams.
5
6 **mid-Columbia Public Utility Districts (PUDs)**
7
8 Public Utility District No. 1 of Grant County, Public Utility District No. 2 of Chelan
9 County and Public Utility District No. 1 of Douglas County.
10
11 **minimum flow level**
12
13 The level of streamflow sufficient to support fish and other aquatic life; to
14 minimize pollution; or to maintain other instream uses such as recreation and
15 navigation.
16
17 **minimum operating pool**
18
19 The lowest water level of an impoundment at which navigation locks can still
20 operate.
21
22 **Mitchell Act**
23
24 The Mitchell Act of 1938 (Public Law No. 75-502, 16 U.S.C.755), which authorizes
25 federal funds for hatchery construction and operation within the Columbia River
26 Basin.
27
28 **mixed-stock fishery**
29
30 A harvest management technique by which different species, strains, races or
31 stocks are harvested together.
32
33 **morphology**
34
35 A study of the form and structure of animals and plants.
36
37 **natural production**
38
39 Spawning, incubating, hatching and rearing fish in rivers, lakes and streams
40 without human intervention.
41
42 **naturally spawning populations**
43
44 Populations of fish that have completed their entire life cycle in the natural
45 environment and may be the progeny of wild, hatchery or mixed parentage.
46

1 **naturalization**

2
3 The process by which introduced fish successfully establish a naturally spawning
4 population.

5

6 **Northwest Power Act**

7

8 The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (16
9 U.S.C. 839 et seq.), which authorized the creation of the Northwest Power
10 Planning Council and directed it to develop this program to protect, mitigate and
11 enhance fish and wildlife, including related spawning grounds and habitat on the
12 Columbia River and its tributaries.

13

14 **off-site enhancement**

15

16 The improvement in conditions for fish or wildlife species away from the site of a
17 hydroelectric project that had detrimental effects on fish and/or wildlife, as part or
18 total compensation for those effects. An example of off-site enhancement is the
19 fish passage restoration work being conducted in the Yakima River Basin for the
20 detrimental effects caused by mainstem hydroelectric projects.

21

22 **on-site**

23

24 Usually refers to projects or activities designed to address harm caused to fish and
25 wildlife at the site of the harm.

26

27 **outfall**

28

29 The mouth or outlet of a river, stream, lake, drain or sewer.

30

31 **outmigration**

32 The migration of fish down the river system to the ocean.

33

34 **outplanting**

35

36 Hatchery-reared fish released into streams for rearing and maturing away from
37 the hatchery sites.

38

39 **Pacific Northwest Coordination Agreement**

40

41 An agreement between federal and non-federal owners of hydropower generation
42 on the Columbia River system. It governs the seasonal release of stored water to
43 obtain the maximum usable energy subject to other uses.

44

1 **Pacific Northwest Utilities Conference Committee (PNUCC)**

2
3 A group formed by Pacific Northwest utilities officials in order to coordinate policy
4 on Pacific Northwest power supply issues and activities. PNUCC lacks contractual
5 authority, but it plays a major role in regional power planning through its Policy;
6 Steering; Fish and Wildlife; and Lawyers committees, and the Technical
7 Coordination Group. PNUCC publishes the Northwest Regional Forecast,
8 containing information on regional loads and resources.

9
10 **passage**

11
12 The movement of migratory fish through, around, or over dams, reservoirs and
13 other obstructions in a stream or river.

14
15 **pathogens**

16
17 Any agent that causes disease, such as a virus, protozoan, bacterium or fungus.

18
19 **peaking generation**--see power peaking

20
21 **peaking operations**--see power peaking

22
23 **PIT tags**

24
25 PIT tags are used for identifying individual salmon for monitoring and research
26 purposes. This miniaturized tag consists of an integrated microchip that is
27 programmed to include specific fish information. The tag is inserted into the body
28 cavity of the fish and decoded at selected monitoring sites.

29
30 **plume**

31
32 The area of the Pacific Ocean that is influenced by discharge from the Columbia
33 River, up to 500 miles beyond the mouth of the river.

34
35 **population**

36
37 A group of organisms belonging to the same species that occupy a well-defined
38 locality and exhibit reproductive continuity from generation to generation.

39
40 **population vulnerability analysis**

41
42 A systematic process for estimating species, location and time-specific criteria for
43 persistence of a population.

1 **powerhouse**

2
3 A primary part of a hydroelectric dam where the turbines and generators are
4 housed and where power is produced by falling water rotating turbine blades.
5

6 **power peaking**

7
8 The generation of electricity to meet maximum instantaneous power requirements.
9 The term usually refers to daily peaks.
10

11 **predator**

12
13 An animal that lives by preying upon others.
14

15 **Public Utility District (PUD)**

16
17 A government unit established by voters of a district to supply electric or other
18 utility service.
19

20 **rearing**

21
22 The juvenile life stage of anadromous fish spent in freshwater rivers, lakes and
23 streams before they migrate to the ocean.
24

25 **redd**

26
27 A spawning nest made in the gravel bed of a river by salmon or steelhead.
28

29 **reproductive isolating mechanisms**

30
31 Mechanisms that retain genetic diversity among populations. The primary
32 reproductive isolating mechanism for anadromous fish is accuracy of homing,
33 which can be reduced by improper hatchery operations. Stock transfers also
34 reduce reproductive isolation.
35

36 **reprogramming**

37
38 The development of a new plan for the time and location of the release of hatchery-
39 produced fish into rivers and streams, especially in the upper river areas.
40

41 **reregulating dam**

42
43 A dam and reservoir, located downstream from a hydroelectric peaking plant, with
44 sufficient storage capacity to store the widely fluctuating discharges from the
45 peaking plant and to release them in a relatively uniform manner downstream.
46

- 1 **reservoir**
2
3 A body of water collected and stored in an artificial lake behind a dam.
4
- 5 **resident fish**
6
7 Fish that spend their entire life cycle in freshwater. For program purposes,
8 resident fish includes landlocked anadromous fish (e.g., white sturgeon, kokanee
9 and coho), as well as traditionally defined resident fish species.
10
- 11 **resident fish substitutions**
12
13 The enhancement of resident fish to address losses of salmon and steelhead in
14 those areas permanently blocked to anadromous (ocean-migrating) fish as a result
15 of hydroelectric dams.
16
- 17 **riffle**
18
19 A shallow extending across the bed of a stream over which water flows swiftly so
20 that the surface of the water is broken in waves.
21
- 22 **riparian habitat**
23
24 Habitat along the banks of streams, lakes or rivers.
25
- 26 **riprap**
27
28 A streambank protection method using large rocks, boulders or debris to reduce
29 erosion.
30
- 31 **river miles**
32
33 Miles from the mouth of a river to a specific destination or, for upstream
34 tributaries, from the confluence with the main river to a specific destination.
35
- 36 **rule curves**
37
38 Graphic guides to the use of storage water. They are developed to define certain
39 operating rights, entitlements, obligations and limitations for each reservoir.
40
- 41 **run**
42
43 A population of fish of the same species consisting of one or more stocks migrating
44 at a distinct time.
45

1 **runoff**

2
3 The portion of rain or snowmelt that runs across the land surface or infiltrates the
4 soil and flows through the surface soil to ultimately reach stream channels.
5

6 **Salmon and Steelhead Conservation and Enhancement Act**

7
8 The Salmon and Steelhead Conservation and Enhancement Act of 1980 (Public
9 Law 96-561, 16 U.S.C. 3301 et seq.), which authorized the establishment of a
10 cooperative program to conserve and enhance the Pacific Northwest's salmon and
11 steelhead stocks. The law called for the creation of the Salmon and Steelhead
12 Advisory Commission; the development of a comprehensive salmon and steelhead
13 enhancement plan; and a "buy-back" program for commercial fishing vessels,
14 licenses and gear.
15

16 **salmonid**

17
18 A fish of the Salmonidae family, which includes soft-finned fish such as salmon,
19 trout and whitefish.
20

21 **sinuosity**

22
23 The amount of bending, winding and curving in a stream or river.
24

25 **sluiceway**

26
27 An open channel inside a dam designed to collect and divert ice and trash in the
28 river (e.g., logs) before they get into the turbine units and cause damage. (On
29 several of the Columbia River dams, ice and trash sluiceways are being used as, or
30 converted into, fish bypass systems.)
31

32 **smolt**

33
34 A juvenile salmon or steelhead migrating to the ocean and undergoing
35 physiological changes (smoltification) to adapt its body from a freshwater to a
36 saltwater existence.
37

38 **spawn**

39
40 The act of fish releasing and fertilizing eggs.
41

42 **spawning escapement**

43
44 The total number of adult fish returning to a hatchery or stream to spawn.
45

1 **spawner trap**

2

3 A barrier erected in a stream or in a fish ladder intended to divert adult salmon or
4 steelhead for holding prior to taking their eggs or sperm for culturing.

5

6 **speciation**

7

8 The natural process by which new species evolve from existing ones.

9

10 **species**

11

12 A group of individuals of common ancestry that closely resemble each other
13 structurally and physiologically and that can interbreed, producing fertile
14 offspring.

15

16 **spill**

17

18 Releasing water through the spillway rather than through the turbine units.

19

20 **spillway**

21

22 The channel or passageway around or over a dam through which excess water is
23 released or "spilled" past the dam without going through the turbines. A spillway
24 is a safety valve for a dam and, as such, must be capable of discharging major
25 floods without damaging the dam, while maintaining the reservoir level below
26 some predetermined maximum level.

27

28 **spillway crest elevation**

29

30 The point at which the reservoir behind a dam is level with the top of the dam's
31 spillway.

32

33 **squawfish**

34

35 Refers to the northern squawfish, a native Pacific slope fish that is a major
36 predator of smolts in the mainstem reservoirs.

37

38 **stock**

39

40 A population of fish spawning in a particular stream during a particular season.
41 They generally do not interbreed with fish spawning in a different stream or at a
42 different time.

43

1 **state water management agencies**

2
3 State government agencies regulate water resources. They include the Idaho
4 Department of Water Resources; the Montana Department of Natural Resources
5 and Conservation; the Oregon Water Resources Department; and the Washington
6 Department of Ecology.

7
8 **storage**

9
10 The volume of water in a reservoir at a given time.

11
12 **stream morphology**

13
14 The study of the form and structure of streams.

15
16 **subbasin**

17
18 Major tributaries to and segments of the Columbia and Snake rivers.

19
20 **subbasin planning**--See system planning.

21
22 **subimpoundment**

23
24 An isolated body of water created by a dike within a reservoir or lake.

25
26 **supplementation**

27
28 The release of hatchery fry and juvenile fish in the natural environment to quickly
29 increase or establish naturally spawning fish populations.

30
31 **system planning**

32
33 A coordinated systemwide approach to planning in which each subbasin in the
34 Columbia system will be evaluated for its potential to produce fish in order to
35 contribute to the goal of the overall system. The planning will emphasize the
36 integration of fish passage, harvest management and production.

37
38 **tailrace**

39
40 The canal or channel that carries water away from the dam.

41
42 **terrestrial furbearers**

43
44 Furbearing animals that dwell primarily on land.

45

1 **test fish**
2
3 Fish used for research purposes.
4
5 **thermal plants**
6
7 A power plant that generates electricity by burning coal, oil or other fuel, or by
8 nuclear fission.
9
10 **transboundary**
11
12 Refers to U.S. and Canadian border, transboundary pollution refers to pollution
13 originating in Canada.
14
15 **transportation**
16
17 Collecting migrating juvenile fish and transporting them around the dams using
18 barges or trucks.
19
20 **travel corridors**
21
22 Paths animals use during their migrations.
23
24 **tribes**
25
26 In this program, these include the Burns-Paiute Indian Colony; the Coeur d'Alene
27 Tribes; the Confederated Tribes of the Colville Reservation; the Confederated
28 Salish-Kootenai Tribes of the Flathead Reservation; the Confederated Tribes of the
29 Umatilla Reservation of Oregon; the Confederated Tribes of the Warm Springs
30 Reservation of Oregon; the Confederated Tribes and Bands of the Yakima Indian
31 Nation; the Kalispel Indian Community; the Kootenai Tribe of Idaho; the Nez Perce
32 Tribe of Idaho; the Shoshone-Paiutes of the Duck Valley Reservation; the
33 Shoshone-Bannock Tribes of the Fort Hall Reservation; and the Spokane Tribe of
34 Indians.
35
36 **turbine intake screens**
37
38 Large screens, which may have moving or non-moving parts, designed to be
39 placed in a dam's turbine intake at an angle to deflect juvenile fish from the
40 intakes into a bypass system.
41
42 **uncontracted water**
43
44 A volume of water in a storage reservoir that is not assigned for other purposes,
45 such as irrigation.
46

1 **upriver stocks**

2

3 Salmon and steelhead stocks that spawn in the Columbia River or its tributaries
4 above Bonneville Dam.

5

6 **upwelling**

7

8 Near the continental shelf, the movement to the surface of ocean bottom waters
9 that are rich in nutrients.

10

11 **U.S./Canada Pacific Salmon Treaty**

12

13 Signed in 1984 and ratified by Congress in 1985 as the Salmon Treaty Act, this
14 treaty governs the harvesting of certain salmon stocks in the commercial fisheries
15 of Alaska, Canada and the western United States.

16

17 **velocity**

18

19 In this concept, the speed of water flowing in a watercourse, such as a river.

20

21 **velocity barrier**

22

23 A physical structure, such as a barrier dam or floating weir, built in the tailrace of
24 a hydroelectric powerhouse, which blocks the tailrace from further adult salmon
25 or steelhead migration to prevent physical injury or migration delay.

26

27 **wasteway**

28

29 An open ditch or canal that discharges excess irrigation water or power plant
30 effluent into the river channel.

31

32 **water banking**

33

34 An administrative system for renting surplus water.

35

36 **water budget**

37

38 A means of increasing survival of downstream migrating juvenile fish by
39 increasing Columbia and Snake river flows during the spring migration period.
40 The water budget was developed by the Council, which oversees its use in
41 conjunction with the fish and wildlife agencies and Indian tribes, the U.S. Army
42 Corps of Engineers, the Bonneville Power Administration and the Bureau of
43 Reclamation.

44

1 **watershed**

2

3 The area that drains into a stream or river.

4

5 **weak stock**

6

7 Listed in the Integrated System Plan's list of stocks of high or highest
8 concern; listed in the American Fisheries Society report as at high or moderate
9 risk of extinction; or stocks the National Marine Fisheries Service has listed.
10 "Weak stock" is an evolving concept; the Council does not purport to establish a
11 fixed definition. Nor does the Council imply that any particular change in
12 management is required because of this definition.

13

14 **wild populations**

15

16 Fish that have maintained successful natural reproduction with little or no
17 supplementation from hatcheries.

18

19

20

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