

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 sub-basin 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 "sub-regional" 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 to streamline these processes, both to improve the quality of the public debate and to minimize delay in decision-making.

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

6.1 COORDINATED HABITAT AND PRODUCTION PROCESSES

6.1A Evaluating and Implementing Habitat and Production Measures

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

- The subregional process (Section 6.1B) should identify measures to help specific populations. These measures should be included in an annual work plan submitted to the Council and the implementation planning process. Section 6.2C prescribes a special screening process for supplementation projects suggested in the course of the 1991–1992 amendment process. For those projects, the process in Section 6.2C should be followed instead of the subregional process.
- The implementation planning process (Section 7.1B) should prioritize measures that emerge from the subregional process (or the process described in Section 6.2C) using the six principles discussed on page 18. This process should include independent peer review on the degree to which proposed measures pose risk to biological diversity. For measures that pose appreciable risk to biological diversity, but address critical uncertainties, the peer review should also provide an opinion on whether potential learning benefits justify the risk. These measures should be submitted to the Council in the annual implementation work plan for Council review and approval. A fast-track process should be developed for appropriate, locally based habitat initiatives.
- Where applicable, the National Environmental Policy Act and the Endangered Species Act processes should be initiated. The “purpose and need” section of any environmental document should reflect the six principles discussed on page 18. If the National Environmental Policy Act or the Endangered Species Act are not applicable, or these processes do not provide information required in master plans (Section 6.2D), a master plan should be developed. Information available from cumulative impact studies (Section 6.2E), carrying capacity studies (Section 6.1C), and wild and natural production data (Section 6.2A) should be incorporated in these evaluations.
- The resulting analyses should be reported to implementing agencies, interested parties and the Council. The Council will determine whether the projects are

consistent with this program and the Northwest Power Act.

- Following approval, implementation, monitoring and evaluation should occur.

6.1B Subregional Process

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

Fishery Managers and Bonneville

1. Form subregional teams to assist in implementation of fish and wildlife measures in the following subregions of the Columbia River Basin:
 - below Bonneville Dam;
 - Bonneville Dam to Priest Rapids Dam;
 - Priest Rapids Dam to Chief Joseph Dam;
 - above Chief Joseph Dam;
 - Snake River from mouth to Hells Canyon Dam; and
 - above Hells Canyon Dam.

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

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

- b. Provide reasons for concluding that the project would pose no appreciable risk to biological diversity among or within anadromous and resident fish populations, using the best available tools (such as the Regional Assessment of Supplementation Projects, Chapter III.C of the Integrated System Plan, Habitat Project Selection Criteria) and data (such as the wild and natural production data in Section 6.2A, hatchery analyses in Section 6.2B and cumulative impacts studies in Section 6.2E) to support reasoning.
- c. For proposed artificial production measures, explain whether the measure would make use of existing production facilities and if not, why not.
- d. Approach the needs of target populations from an ecosystem perspective. Give special priority to projects that are part of model watersheds, or other coordinated watershed programs.
- e. Expedite consideration of appropriate, locally based habitat projects.
- f. If a measure is designed to create harvest opportunities, explain whether those opportunities will be in tributaries or other areas where there would be no significant, additional harvest pressure on weak populations.
- g. Explain any steps needed to ensure that activities to benefit one species will not inappropriately harm another.
- h. Explain whether the measure would help address a critical uncertainty (Section 7.1B).
- i. Provide estimates of cost and biological effectiveness of proposed measures for the target fish population. Relate biological effectiveness to success in meeting survival targets, rebuilding schedules, performance standards or other relevant, biologically based factors. Specify the time period over which improvement may be expected.
- j. Explain how the measure would be monitored and evaluated.

6.1C Evaluation of Carrying Capacity

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

Bonneville

1. Fund a preliminary evaluation of tributary, mainstem (including reservoirs), estuary, plume, near-shore ocean and marine salmon survival, ecology, carrying capacity and limiting factors. Include competition between shad and anadromous salmonids. As part of the evaluation, estimate the current salmon carrying capacity of the Columbia River mainstem, tributaries, estuary, plume and near-shore ocean for juvenile fish, using primarily existing data. The evaluation should also make recommendations for management responses to fluctuating estuary and ocean conditions, such as adjusting total numbers of releases to take such conditions into account. The evaluation should include analysis of existing data, identification of critical uncertainties and research needs, and estimates of incremental gains from improvements in each area.
2. Fund development of a study plan based on the critical uncertainties and research needs identified in the evaluation, which should be presented to the Council by December 1993. The study plan should include provisions for federal funding or cost sharing of the study. Upon approval by the Council, Bonneville and/or other parties identified by the Council should fund the proposed study.

6.2 PRODUCTION

Because opportunities to achieve significant salmon production increases through improving natural habitats are limited, additional salmon increases may have to be achieved through artificial production—creating artificial spawning and rearing environments such as hatcheries. The dilemma is that artificial production can have negative effects on wild and naturally spawning salmon populations. For example, young hatchery-produced fish may compete with wild and naturally produced juveniles for food and habitat. Or, returning hatchery-bred adults may interbreed with naturally spawning fish, altering gene pools. In the past, artificial production programs have had detrimental effects on wild gene pools and biodiversity.

In developing these production measures, the Council has identified measures that are consistent with the goal of doubling the number of salmon and steelhead in the basin while maintaining existing levels of biodiversity. This means understanding and documenting the life cycle of wild and naturally spawning fish populations at the stream level so that broader management decisions, while not necessarily made at the stream level, are better informed. It means improving the operations of artificial production facilities, so that impacts of hatchery fish on wild and naturally spawning populations are minimized and the quality of hatchery fish is improved. It means making investments and other adjustments to provide

harvest opportunities in tributaries or other areas and to facilitate rebuilding of weak populations. It includes scientifically supported programs to supplement weak wild and naturally spawning fish populations with hatchery fish. It also means proceeding with extreme caution to avoid damaging remaining wild and naturally spawning populations, and fully implementing adaptive management with a systematic monitoring and evaluation strategy.

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

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

Others recommend the proper use of some form of artificial propagation (such as supplementation) to aid in recovery of depleted populations. Proponents of this view say that numerous small populations are being lost due to continuing damage and lack of corrective action, with the result that basinwide population diversity is declining. They fear that these populations have already lost the ability to recover on their own because severe reductions in population size have already reduced the genetic diversity important for recovery. In addition, these populations may not be well adapted to survival in the face of dramatic human-caused changes in the basin's environment. Thus, proponents of artificial propagation recommend rapidly increasing the sizes of these small populations to prevent their extinction and loss in genetic diversity by properly using some form of artificial propagation.

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

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

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

- Take actions to protect and rebuild the freshwater habitat of weak wild and naturally spawning populations. This would include combinations of a variety of techniques: restoring healthy stream/river habitats used for spawning, rearing and overwintering; improving mainstem passage and migration corridor condition; reducing losses of downstream migrants owing to irrigation diversions; restoring water quality; and restoring overall watershed and riparian system condition. Fish harvest rates also should be reduced to support rebuilding.
- Take actions to rebuild population numbers for weak wild and naturally spawning populations as quickly as possible. This would include combinations of a variety of techniques such as: the proper use of artificial propagation to prevent extinction and further loss of genetic diversity; prevention or minimization of detrimental genetic and ecological impacts to wild and naturally spawning populations from all human actions affecting the river and its watershed, including hatchery programs; management of fish harvests to support rebuilding.
- Fully implement adaptive management for the purposes of carrying out restorative actions. Adaptive management is an approach to complex natural resource problems where prompt corrective action is needed despite incomplete knowledge of the resource. Adaptive management relies on a systematic monitoring and evaluation strategy. In addition, it is recommended that a procedure be developed for conducting a population vulnerability analysis to determine the status of various populations and facilitating the selection of various options for restoring the population.

6.2A Wild and Naturally Spawning Populations

Council Genetics Team

1. Complete a proposed plan for conserving genetic diversity within and among Columbia River Basin salmon and steelhead stocks. Report to the Council by December 31, 1991. The framework should provide recommendations for how to achieve sustainable increases in salmon and steelhead populations. Specifically, recommend an approach to identifying provisional genetic conservation units for production and harvest, and rules for taking action with regard to those conservation units. The team also should assist in the development of performance standards for conserving genetic diversity of natural, supplemented and hatchery stocks.
2. Participate in the coordinated habitat and production process described in Section 6.1. Develop technical proposals for improved conservation of biodiversity, including identification of genetic conservation refuges, alternative approaches to artificial production, and any other appropriate proposals.

Collection of Population Status, Life History and Other Data on Wild and Naturally Spawning Populations

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

Bonneville

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

Fishery Managers in Consultation with National Marine Fisheries Service and Other Technical Experts

4. Develop and submit to the Council a proposed program to collect information on wild and naturally spawning populations, including index populations, by June 30, 1993. This should be consistent and coordinated with population monitoring specified as part of the rebuilding schedules in Section 2.3. The long-term objective of the program is to collect information related to the sustainability of wild and naturally spawning salmon and steelhead populations, including risk containment monitoring of impacts of management action or inaction. The program should include proposals to accomplish the following elements:
 - a. Refine the identification of wild and naturally spawning populations provided for above, and develop necessary data bases.
 - b. Develop a profile on the status of wild and naturally spawning populations.
 - c. Develop a profile on genetic, life history and morphological characteristics of wild and naturally spawning populations. Describe the characteristics to be maintained by management actions.
 - d. Identify limiting factors for wild and naturally spawning populations.
 - e. Identify natural carrying capacity of habitat for the populations.

Bonneville

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

Wild and Naturally Spawning Population Policy

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

Fishery Managers

6. By March 31, 1993, develop and review with the Council a proposed wild and naturally spawning population conservation policy consistent with the Council's overall program goal and intended to protect genetic diversity, population identity, long-term fitness and evolutionary capacity. The policy should

address habitat protection, restoration, management and improvement; water use; harvest management; releases of non-native fish; interactions between resident and anadromous fish; use of wild and naturally spawning populations as brood stock for artificial production; risk assessment and containment; and monitoring and evaluation.

Fishery Managers

7. By June 30, 1993, in consultation with appropriate specialists in genetics and land and water managers, establish a comprehensive wild and naturally spawning salmon population conservation program. Provide for Council and public review. The program should consider for inclusion, but not be limited to, the following:
 - a. Management and funding to address factors that limit populations.
 - b. Habitat management and restoration to maintain and increase the productivity of wild and naturally spawning populations through the maintenance of their biological characteristics.
 - c. Management to maintain the genetic, life history and morphological characteristics of wild and naturally spawning populations, including sustainable long-term spawning escapements and redd counts.
 - d. Maintenance of reproductive isolating mechanisms for wild and naturally spawning populations.
 - e. Determination of current and sustainable effective population sizes for wild and naturally spawning populations, and determination of natural carrying capacity of the habitat which supports these populations.
 - f. Annual evaluation and reporting of the results of fisheries, land and water management actions.

Biodiversity Institute

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

All Interested Regional Entities

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

Population Vulnerability Analyses

Bonneville

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

6.2B Improved Operations of Hatcheries

Hatchery Policies, Coordination and Operations

Nearly 100 artificial production facilities produce 170 million to 200 million smolts annually in the Columbia River Basin. Approximately 75 percent of Columbia River Basin salmon and steelhead adults are produced in hatcheries. The purpose of these facilities is to mitigate for losses of salmon and steelhead production resulting from dams and other developments. The facilities are operated by different entities, each with its own guidelines for selection, maintenance and spawning of brood stock, mating, rearing and release of juveniles. Concerns have been raised that hatcheries contribute to the decline of wild and naturally spawning stocks through overfishing of these stocks in mixed-stock fisheries, ecological interactions between hatchery, wild and naturally spawning fish, and genetic impacts of hatchery fish on wild and naturally spawning stocks. Such concerns were identified in petitions to list certain salmon stocks under the Endangered Species Act. The Council concluded that regional standards and procedures for hatchery operations should be developed that are consistent with the goal of rebuilding weak wild and naturally spawning stocks. To help develop tools to reduce the impacts of hatchery production on wild and naturally spawning

stocks, the Council convened a group of nationally recognized geneticists. These geneticists have been asked to bring the best current scientific knowledge to salmon and steelhead production issues. A number of products have resulted from this effort and are being reviewed at the technical and policy levels in the region.

Bonneville

1. Fund fishery managers and other experts as needed to develop by October 31, 1992, in consultation with appropriate specialists in genetics, basinwide guidelines to minimize genetic and ecological impacts of hatchery fish on wild and naturally spawning stocks. In the development of the guidelines, apply the best available scientific knowledge, and include: a) provisions for changing current management practices, operational goals and procedures for artificial production facilities to stress protection and recovery of weak stocks; b) approaches to basinwide coordination of hatchery production to reduce impacts of hatchery stocks on wild and naturally spawning fish; and c) monitoring and evaluation of hatchery and wild and naturally spawning stock interactions. Submit a report to the Council for public review in early 1993.
2. Fund the design of an impact assessment to examine the effects of Columbia River Basin hatcheries (individually and collectively) on wild and naturally spawning fish. The impact assessment would use the best available scientific knowledge and state-of-the-art assessment procedures. Complete the design, and report to the Council by June 30, 1993.

Council

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

Integrated Hatchery Operations Team and Fishery Managers

4. By January 15, 1992, create an Integrated Hatchery Operations Team. The team should consist of representatives from Washington Department of Fisheries, Washington Department of Wildlife, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, the tribes, Pacific Northwest Utilities Conference Committee,

Bonneville, the Corps, Mid-Columbia Public Utility Districts, the Council and National Marine Fisheries Service. It should coordinate with production planning activities described in Section 6.2F, below. Duties of the group are described below.

Bonneville

5. Fund the activities of the Integrated Hatchery Operations Team so that it is operational by January 15, 1992.
6. Fund the development of regionally integrated hatchery policies, building upon guidelines being developed under Section 6.2B1.

Fishery Managers

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

The policies should include the following elements:

- a. *Fish health policy*: Hatchery practices and operations should preclude the introduction and/or spread of any fish disease within the Columbia Basin, and maximize the health of fish released from hatcheries.
- b. *Genetic policy*: Hatchery facilities and programs should avoid adverse genetic effects on wild, natural and hatchery fish populations and enhance the sustained quality of production from hatcheries.
- c. *Ecological interactions policy*: Hatchery facilities and programs should avoid adverse interactions between wild, natural and hatchery fish populations, including predation, displacement or competition for habitat. They should maximize post-release survival of hatchery fish by increasing similarity of hatchery fish to wild and naturally spawning fish, and by balancing the numbers of fish released and release strategies with the capacity of the natural environment.
- d. *Hatchery performance standards policy*: The purpose, goals and objectives of each hatchery should be evaluated in light of the general hatchery policies stated above. Performance standards should be developed for each hatchery, in addition to those provided in this program, including expectations for harvest, maintenance of genetic integrity (including life history, effective population size, morphology and other important traits), fish health and ecological interactions.

Criteria and plans for monitoring and evaluating achievement of the performance standards should be developed.

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

Integrated Hatchery Operations Team

8. Develop detailed descriptions for each of the above policies by October 31, 1992. Develop specific and detailed performance standards relating to each of the policies, implementation guidelines and operating criteria consistent with National Marine Fisheries Service recovery plan criteria by March 1993. Work in consultation with appropriate specialists in genetics and other experts. Incorporate the basinwide guidelines to minimize adverse genetic and ecological impacts of hatchery fish on wild and naturally spawning stocks developed under Section 6.2B. The implementation guidelines, standards and criteria should undergo scientific peer review.
9. Develop criteria for the hatchery audits, to be used by independent auditors. Complete the criteria by January 31, 1993. Obtain independent scientific review for the criteria and revise them as necessary in response to the review. Report to the Council by March 31, 1993.

Fishery Managers

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

Integrated Hatchery Operations Team

11. Prepare a program to monitor compliance with the hatchery performance standards and provide for a coordinated hatchery monitoring program. The monitoring program should incorporate the Aug-

mented Fish Health Monitoring Program, through which Bonneville provides funds to augment state and federal efforts to ensure adequate, consistent levels of disease monitoring. Cooperate with the Coordinated Information System to develop data reporting standards and procedures for all facilities.

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

Hatchery Evaluation

Bonneville

13. Beginning in 1993, fund ongoing independent audits of hatchery performance in consultation with the Integrated Hatchery Operations Team. Such audits should be conducted at least every three years and more frequently, if possible and warranted. Include recommendations for improving performance and for modifying or terminating hatchery programs. Results of the audits should be presented to the Council beginning in December 1993.
14. Fund a comprehensive analysis of existing data on basinwide trends in hatchery fish survival. The analysis should identify trends over time and by hatchery or geographic area, and correlate hatchery fish survival with natural factors, hatchery operations and other fish or river management actions. The results of the analysis should be reported to the Integrated Hatchery Operations Team by January 1994.

Creative Partnerships in Hatchery Production

Bonneville

15. By June 15, 1993, fund an analysis of opportunities for alternative hatchery institutional arrangements and ways to implement them. By December 31, 1993, develop and propose a policy to encourage artificial production programs in which alternative institutional arrangements between implementors and managers are used.

Marking Hatchery Salmon

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

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

Fishery Managers

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

Bonneville

17. Starting in 1992, fund a program to mark all salmon from hatcheries having high stray rates, using the mark determined by fishery management agencies to be acceptable for this purpose, and to evaluate the effectiveness of such marking.
18. Fund fishery managers to coordinate with appropriate technical experts to determine the feasibility of marking all hatchery salmon, scope the marking program and identify alternative uses for the information obtained. The marking program should minimize mortalities caused by marking and meet the following criteria: a) the mark should be applied without handling individual fish or causing significant stress; b) the mark should endure throughout the life cycle of the fish; c) the mark should be read-

able without killing the fish bearing the mark; and d) the methods should be inexpensive enough to permit the marking, sampling and processing of a representative sample of recovered marks at a reasonable cost. Conduct this evaluation in conjunction with the evaluation in Section 6.2B16, above. Specifically, the information should provide answers to questions needed to resolve conflicts between hatchery programs and goals for wild and naturally spawning fish stocks, and improve hatchery fish survival. Report to the Council by February 1, 1992.

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

Bonneville and Fishery Managers

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

6.2C Supplementation Planning and Implementation

Regional Assessment of Supplementation

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

Regional Assessment of Supplementation Project Team

1. Working with appropriate experts in genetics, provide a framework for implementing and evaluating proposed and ongoing supplementation activities in a coordinated and experimental fashion. This should include provisions for assessing anadromous and resident species interactions in proposed supplementation projects. Complete a basinwide exper-

imental design framework for supplementation by December 31, 1991. Complete the remainder of the supplementation framework and submit it to the Council for review and approval by December 31, 1992.

Bonneville

2. Continue to fund the Regional Assessment of Supplementation Project.

Evaluation, Design and Implementation of Proposed Additional Supplementation Experiments

Fishery Managers

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

Bonneville

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

Hatchery Operators Not Funded by Bonneville

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

6.2D New Production Initiatives

Identification, Evaluation and Implementation of New Production Initiatives

Fishery Managers

1. Use the Coordinated Habitat and Production process identified in Section 6.1 to identify, evaluate and im-

plement new production initiatives. Such initiatives may include measures to address the needs of weak stocks, such as scientifically sound supplementation, restoration of eliminated populations, demonstrations of captive brood stock technology, cryopreservation, portable and low-capital techniques, acclimation, conversion of existing artificial production facilities and other approaches. Initiatives may also include actions to provide harvest opportunities in tributaries or other areas and to facilitate rebuilding of weak stocks.

Development of Master Plans

Fishery Managers

2. Because of the need to address potential conflicts among increased production, mixed-stock harvest, gene conservation, consistency with other plans and other objectives, the Council calls for detailed master plans where there is not a National Environmental Policy Act document that provides enough information to evaluate new artificial production projects. Below, the Council provides a suggested list of master plan elements. This list is intended to offer guidance, not to impose requirements. Not all of these elements may be relevant in all projects, and some elements we have not listed may be important. In general, however, the following elements should be considered in the course of master planning:
 - a. project goals;
 - b. measureable and time-limited objectives;
 - c. factors limiting production of the target species;
 - d. expected project benefits (e.g., gene conservation, preservation of biological diversity, fishery enhancement and/or new information);
 - e. alternatives for resolving the resource problem;
 - f. rationale for the proposed project;
 - g. how the proposed production project will maintain or sustain increases in production;
 - h. the historical and current status of anadromous and resident fish in the subbasin;
 - i. the current (and planned) management of anadromous and resident fish in the subbasin;
 - j. consistency of proposed project with Council policies, National Marine Fisheries Service's recovery plans, other fishery management plans, watershed plans and activities;
 - k. potential impact of other recovery activities on project outcome;
 - l. production objectives, methods and strategies;
 - m. brood stock selection and acquisition strategies;
 - n. rationale for the number and life-history stage of the fish to be stocked, particularly as they relate to the carrying capacity of the target stream and potential impact on other species;
 - o. production profiles and release strategies;

- p. production policies and procedures;
- q. production management structure and process;
- r. related harvest plans;
- s. constraints and uncertainties, including genetic and ecological risk assessments and cumulative impacts;
- t. monitoring and evaluation plans, including a genetics monitoring program;
- u. conceptual design of the proposed production and monitoring facilities, including an assessment of the availability and utility of existing facilities; and
- v. cost estimates for various components, such as fish culture, facility design and construction, monitoring and evaluation, and operation and maintenance.

Emergency Cases

Fishery Managers

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

National Marine Fisheries Service

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

6.2E Environmental Impacts and Carrying Capacity

Systemwide and Cumulative Impacts of Existing and Proposed Artificial Production Projects

Bonneville

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

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

Fishery Managers

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

Adjust Total Number of Hatchery Fish Released to Stay Within Basin Carrying Capacity

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

Fishery Managers

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

6.2F Production Planning

The Council acknowledges the commitment of parties to U.S. v. Oregon to use the framework of the Columbia River Fish Management Plan to rebuild upriver runs through production planning and the commitment of the parties to make recommendations for actions by February 1992. The Council further recognizes that Congress has instructed the U.S. Fish and Wildlife Service and the

National Marine Fisheries Service to prepare plans and implement pilot programs designed to assist in rebuilding fish runs above Bonneville Dam and to report to Congress on such activities within 120 days of enactment of those agencies' appropriations. To coordinate with the foregoing measures, the Council calls on the fishery managers to:

- take the products of the Regional Assessment of Supplementation Project and the Council's genetics team into consideration in production planning;
- obtain review of production plans by appropriate scientific experts in light of the frameworks provided by the Regional Assessment of Supplementation Project and the Council's genetics team;
- coordinate with the Integrated Hatchery Operations Team in production planning; and
- periodically brief the Council on progress.

6.2G Other Production Measures

Captive Brood Stocks

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

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

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

National Marine Fisheries Service and Bonneville

1. Complete a scoping study identifying captive brood stock research needs by March 31, 1993, and fund necessary research by June 30, 1993. Fund develop-

ment of captive brood stock technology and implementation of captive brood stock programs to aid in recovery of severely depleted stocks of salmonids in the Columbia River Basin. Programs should be consistent with the products and conclusions of the genetics and natural production framework provided elsewhere in this section. Critical investigations that need to be funded concurrently include:

- a. review of the state of the art of captive brood stock management technology;
 - b. development of genetically sound methods of sourcing and breeding brood stock to ensure genetic stability and gamete quality;
 - c. modeling of genetic consequences of captive brood stock programs;
 - d. development of captive brood stock culture systems that minimize loss of fish;
 - e. development and testing of a model brood stock program;
 - f. evaluation and comparison of fish husbandry techniques;
 - g. evaluation of fish health problems;
 - h. investigation of reproductive and non-reproductive physiology; and
 - i. evaluation of fitness of captive brood progeny for supplementation.
2. Fund captive brood stock demonstration projects identified under the coordinated habitat and production process.

Cryopreservation

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

Federal and State Agencies

3. By December 31, 1992, fund research to improve cryopreservation technology and develop applications for helping to restore and preserve depleted populations.
4. Fund demonstrations of cryopreservation identified in the coordinated habitat and production process.

Portable Facilities for Adult Salmon Collection and Holding, and for Juvenile Salmon Acclimation

As weak stocks or populations of salmon and steelhead are identified and assessed, supplementation will be one option to consider to help rebuild these stocks. Decentralized facilities to permit the capture and holding

of brood stocks and facilities to acclimate the juvenile fish before release could be useful in this effort. The use of local brood stocks is fundamental to maintaining genetic diversity. The use of acclimation and release facilities prior to release is important to increase juvenile fish survival and ability to imprint on the release stream, and thereby reduce to natural levels their straying into other watersheds. The portability of these facilities should allow them to be used flexibly.

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

Bonneville

5. Fund the planning, design, construction and operation of a demonstration project for the development of portable adult collection and holding facilities and juvenile acclimation and release facilities. The project should build on the earlier work funded by Bonneville⁷ and other relevant information and experience. The project should be initiated in 1991, with facilities in place in 1992.
6. Fund additional demonstration projects identified in the coordinated habitat and production process.

Ringold Hatchery Site Enhancement and Water Development

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

Bonneville

7. Insofar as needed to secure a 100 cubic-feet per second water right for the Ringold hatchery facility, fund planning, design and construction of the necessary facilities to capture up to 100 cubic-feet per second of water and deliver it to the area of the hatchery site.
8. Fund planning, design and construction of the facilities determined to be necessary to improve existing production. Report to the Council for approval before proceeding with construction.

Reintroduction of Anadromous Fish in the Upper Cowlitz River Basin

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

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

Pacific Lamprey

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

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

Bonneville

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

6.3 SPECIFIC ACTIONS TO ASSIST WEAK STOCKS

6.3A Snake River Sockeye Salmon

In the summer of 1991, the Shoshone-Bannock Tribes, the Idaho Department of Fish and Game, the Bonneville Power Administration and others initiated an emergency program to conserve Snake River sockeye. The Council endorses this effort, but regards this program as a highly experimental measure that should be implemented with appropriate safeguards.

Bonneville

1. Fund the program of the Shoshone-Bannock Tribes and the Idaho Department of Fish and Game to protect and rebuild Snake River sockeye with the following features:
 - a. Divide smolts captured for rearing in this program among two or more lots. Each lot should have a separate water supply, alarm system and other protective measures.
 - b. A panel of genetics experts should provide advice throughout the recovery effort. This panel should address aspects such as rearing and mating techniques, research protocols and monitoring needs.
 - c. Provide an annual review of the practices and performance of the program for review by the National Marine Fisheries Service and the Council.
 - d. Recognize the experimental nature of these emergency actions, and incorporate monitoring and evaluation measures to learn from implementation.
2. Regularly update the Governors of the Northwest states, the Northwest Congressional delegation, the Council and other concerned parties on the progress of this project.

Bonneville and Fishery Managers

3. Fund and develop for Council review a feasibility study for reintroduction of sockeye salmon into appropriate production areas. This study should consider reintroduction in all historical production areas. This study should also consider creating anadromous populations by managing kokanee, such as

those found in Pelton Reservoir, in a manner that allows access to the ocean. This study should be coordinated with the Regional Assessment of Supplementation Project, appropriate specialists in genetics, and the coordinated implementation, monitoring and evaluation approach. It should also be consistent with the National Marine Fisheries Service's recovery plan for sockeye in the Snake River.

6.3B Snake River Fall Chinook Salmon

Fishery Managers

1. In consultation with the National Marine Fisheries Service and consistent with the recovery plan, use the Regional Assessment of Supplementation Project process and develop an experimental design for implementing, monitoring and evaluating supplementation of Snake River fall chinook. Submit to Council for approval by March 31, 1993.

Bonneville

2. Upon approval by the Council in consultation with the National Marine Fisheries Service, implement supplementation experimental design developed by the fishery managers.
3. Expeditiously fund studies to define the range, limiting factors and needs, especially regarding flow and temperature, and provide basic life history information for Snake River fall chinook.
4. Fund studies to determine the genetic structure and population status of Snake River fall chinook.
5. Fund a study of the spawning and rearing habitats utilized by fall chinook salmon in the Snake River, and examine factors influencing their migratory behavior.

6.3C Endemic Spring Chinook in Grande Ronde Subbasin

The Minam and Wenaha rivers, in the Grande Ronde River Basin, have been designated by the state of Oregon as genetic sanctuaries for wild, endemic spring chinook salmon. But stray hatchery fish of non-local origin have been observed in the Minam and Wenaha basins in recent years. There is an immediate need to eliminate hatchery strays from entering these genetic sanctuaries.

Starting with the 1990 brood, hatchery operators have marked for identification all hatchery chinook in the Grande Ronde River Basin. Trapping facilities on the lower reaches of the Minam and Wenaha rivers are needed so that all fish entering these genetic sanctuaries can be trapped and examined, hatchery fish can be removed,

and natural escapement levels and population productivity of these rivers can be determined.

Bonneville

1. Fund planning, design, construction and operation of spring chinook trapping facilities on the lower reaches of the Minam and Wenaha rivers.

6.3D Lower Columbia River Coho Salmon

Natural production of coho salmon in the lower Columbia River has declined to extremely low levels. Fewer than 25,000 spawn naturally in scattered tributaries of the lower river. In 1990, a petition was filed with the National Marine Fisheries Service for protection of the population under the Endangered Species Act of 1973. On June 7, 1991, the National Marine Fisheries Service declined to list the population after its review of available data failed to identify a population segment in the lower Columbia River genetically distinct from coastal populations, but expressed a willingness to evaluate additional data.

Naturally reproducing coho in the lower Columbia River represent an important resource that can be protected and rebuilt. The values of doing so include maintaining genetic diversity, reducing the almost exclusive dependence on hatchery production and preserving recovery opportunities. In implementing the following measures, Bonneville funding should be limited to the extent to which coho populations have been affected by hydropower, or to particular instances in which off-site recovery measures would be appropriate mitigation for hydropower impacts.

Oregon and Washington

1. Explore adopting management goals to rebuild naturally reproducing populations of lower river coho to self-sustaining levels.
2. Continue research to determine genetic distinctions between lower river coho and coastal populations. Submit products of the research to the National Marine Fisheries Service.
3. Incorporate recommendations of the Regional Assessment of Supplementation Project and the Council's genetics team in developing management directions.

Bonneville and Fishery Managers

4. Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing coho populations.
5. Fund a survey of land management regulations affecting coho habitat. Include reviews of state forest practices, regulations and federal land management

plans affecting coho habitat. Develop recommendations for revisions to support rebuilding objectives.

6. Fund a review of current production and harvest management practices for impacts on naturally reproducing coho populations, including competition from release of juveniles, disease and predation. Solicit recommendations for revisions of management practices to support rebuilding efforts.

6.3E Columbia River Chum Salmon

Chum salmon are listed in the Integrated System Plan as a stock of high concern. Counts from the spawning grounds have dropped from more than 700 per mile in the early 1950s to a low of fewer than 100 per mile in recent times. Catches of this species exceeded 700,000 per year in the 1920s, but catches have exceeded 2,000 fish only twice since 1960. The last few years' counts have been up slightly, but abundance continues to be low compared to historic counts.

Chum once spawned in many tributaries of the Columbia Basin, including some above Bonneville Dam. They are now found only in the Grays, Elochoman and Lewis subbasins, and Hardy and Hamilton creeks. Habitat degradation, passage barriers and harvest have all contributed to reductions in this species. In implementing the following measures, Bonneville funding should be limited to the extent to which chum populations have been affected by hydropower, or to particular instances in which offsite recovery measures would be appropriate mitigation for hydropower impacts.

Oregon and Washington

1. Identify naturally reproducing populations of chum salmon and adopt management goals to rebuild those populations to self-sustaining levels.
2. Incorporate recommendations of the Regional Assessment of Supplementation Project and the Council's genetics team in developing management directions.

Bonneville and Fishery Managers

3. Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing chum salmon populations.
4. Fund a survey of land management regulations affecting chum salmon habitat. Include reviews of state forest practices, regulations and federal land management plans affecting chum salmon habitat. Develop recommendations for revisions to support rebuilding objectives.
5. Fund a review of current production and harvest management practices for impacts on naturally reproducing chum salmon populations. Solicit recom-

mendations for revisions of management practices to support rebuilding efforts.

6.3F Columbia River Sea-Run Cutthroat Trout

Sea-run cutthroat trout are found in all tributaries below and several tributaries above Bonneville Dam. No good measure of run strength exists. Likewise, little is known about early life history survival, ocean survival, catch, or escapement of Columbia Basin sea-run cutthroat trout populations. It is known that these populations are depressed. Experts believe that habitat degradation and interactions with hatchery salmon and steelhead have caused this depression. Regardless, sport angling for sea-run cutthroat trout is an important fishery, and much support for rebuilding these populations is evident. In implementing the following measures, Bonneville funding should be limited to the extent to which sea-run cutthroat trout populations have been affected by hydropower, or to particular instances in which offsite recovery measures would be appropriate mitigation for hydropower impacts.

Oregon and Washington

1. Identify naturally reproducing populations of sea-run cutthroat trout and adopt management goals to rebuild those populations to self-sustaining levels.
2. Incorporate recommendations of the Regional Assessment of Supplementation Project and the Council's genetics team in developing management directions.

Bonneville and Fishery Managers

3. Survey subbasin plans submitted as part of the Integrated System Plan to determine limiting factors for naturally reproducing sea-run cutthroat trout populations.
4. Fund a survey of land management regulations affecting sea-run cutthroat trout habitat. Include reviews of state forest practices, regulations and federal land management plans affecting sea-run cutthroat trout habitat. Develop recommendations for revisions to support rebuilding objectives.
5. Fund a review of current production and harvest management practices for impacts on naturally reproducing sea-run cutthroat trout populations. Solicit recommendations for revisions of management practices to support rebuilding efforts.

6.4 HABITAT OBJECTIVES, POLICIES AND PERFORMANCE STANDARDS⁸

Wild and naturally spawning populations of salmon and steelhead are generally at low levels throughout the Columbia River Basin. Accordingly, habitat is seeded at low levels. Even so, improvements in habitat quality are needed to increase the productivity of many stocks. This increased productivity will result in more of the offspring from these returning adults surviving to begin migration to the ocean. For other stocks, maintenance of existing high quality habitat is essential. It is important also that the quantity of available habitat not decrease. In some circumstances, it may even be desirable to provide access to areas that have become blocked to migration of these species. In short, a key element to ensuring the long-term productivity of wild and naturally spawning Columbia River Basin salmon and steelhead stocks is maintaining and improving habitat quantity and quality.

Maintaining and improving salmon and steelhead habitat productivity is an extremely complex task. It requires coordination of virtually all activities that occur in a subbasin. The Council believes that it is not only possible to attain this coordination, but that coordination will allow habitat to be protected and improved without undermining the economic uses of other resources. Simply stated, it is not the intent of the Council to exclude customary land- and water-use activities. Through comprehensive watershed management, innovative approaches can be developed cooperatively by the locally and regionally affected parties that will allow fisheries resources and economic activities to co-exist. This approach has an additional benefit of ensuring better results and, therefore, more effective investments by ratepayers and others interested in the subbasin.

Coordinated, cooperative efforts to protect and improve salmon and steelhead habitat in the basin are needed. Habitat has decreased by more than a third, and much of the remaining habitat has been degraded as a result of diverse human activities. An example of habitat change caused by human activities has been documented by the U.S. Forest Service for spring chinook salmon. In an ongoing project that is comparing 1936-1942 stream survey records to current conditions, the Forest Service has found that large pool habitat in representative subbasins throughout the Columbia system has decreased

8. For 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.

50 percent to 75 percent over the past 50 years. And much of this habitat was already degraded to some extent when the surveys were initially completed. Significantly, the sole exception to pool loss has been in wilderness areas, where quantity of pool habitat has remained constant or increased.

According to the Northwest Power Act, ratepayer funds may be used, in appropriate circumstances, as a means of achieving offsite protection and mitigation for the effects of the hydropower system. These effects include salmon and steelhead losses caused in the mainstem and tributary areas of the Columbia Basin. Losses and degradation of habitat have been caused by the construction of hydroelectric dams and numerous other human activities. Funds to maintain and improve habitat have come from the region's ratepayers to provide off-site mitigation for losses caused by the dams, and from federal, state, local and private sources. In this section, the Council has identified additional actions that need to be implemented by Bonneville and others. The Council expects that a significant portion of the funds to accomplish these important tasks will come from sources other than ratepayers.

The Council recognizes the loss of stocks of salmon and steelhead has occurred, in part, because of continual degradation of the quality and reduction of the quantity of habitat in the Columbia River Basin. This trend continues to affect the abundance and diversity of the stocks that remain. For this reason, dramatic steps must be taken to protect and improve habitat. As stated above, the Council believes that comprehensive watershed management is integral to protecting and rebuilding salmon and steelhead stocks in the Columbia River Basin as well as promoting economic health and stability in the region. The structure and provisions of the Council's habitat section recognize this relationship and also the urgency of implementing projects addressing the habitat needs of these stocks.

6.4A Habitat Objectives

The Council has the following objectives for Columbia River Basin salmon and steelhead habitat. These objectives should be pursued aggressively.

All Relevant Parties

1. Ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive watershed management basis.
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.

6.4B Habitat Policies

Federal, State and Local Land and Water Managers, Users and Owners; Fishery Managers; and Others

1. Improve and maintain coordination of land and water activities to protect and improve the productivity of salmon and steelhead stocks. The Council encourages local cooperation and coordination to address habitat protection and improvement and to resolve problems created by competing missions. The Council encourages private parties to be proactive and to work cooperatively with resource managers to maintain and improve habitat.
2. Develop and implement procedures to ensure compatibility and compliance with the Council's habitat objectives, policies and performance standards. At a minimum, implement and require compliance with state, federal, local and tribal laws, regulations, and policies relating to Columbia River Basin salmon and steelhead habitat regulation and management.
3. Give highest priority to habitat protection and improvement in areas of the Columbia Basin where low or medium habitat productivity or low pre-spawning survival for identified weak populations are limiting factors. Give priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowners.
4. For actions that increase habitat productivity or quantity, give priority to actions that maximize the desired result per dollar spent. Also, give higher priority to actions that have a high probability of succeeding at a reasonable cost over those that have great cost and highly uncertain success.
5. Provide elevated or new funding necessary for the successful and timely implementation of the items listed in this section. Funding sources for implementing provisions of the habitat section should include, but not be limited to, the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, Soil Conservation Service, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Corps of Engineers, Agricultural Stabilization and Conservation Service, Bonneville Power Administration, other relevant federal agencies, all relevant state agencies, local governments, private landowners, resource users and tribes. Cost and effort sharing is encouraged.
6. Encourage the involvement of volunteers and educational institutions in cooperative habitat enhancement projects throughout the basin.

6.4C Habitat Performance Standards

The Council recognizes that habitat performance standards cannot be the same in all areas of the region, due to differences in soils, topography, vegetation and climate. Consequently, habitat performance standards that acknowledge and incorporate these local differences need to be established for each watershed.

Local Watershed Managers

1. As watershed coordination is initiated, in consultation with fisheries, land and water managers, develop a more comprehensive set of habitat performance standards taking into account differences in climate, location, soils, topography and other pertinent factors unique to each area. These habitat performance standards should address the following:
 - a. Vegetation
 - shading
 - overhanging vegetation
 - b. Streambanks
 - stability
 - heights
 - undercutting
 - c. Water Quality
 - temperature
 - suspended solids
 - chemicals
 - d. Stream Morphology
 - riffles
 - runs
 - glides
 - pools
 - e. Stream Channel
 - widths
 - depths
 - sinuosity
 - gradient
 - f. Substrate
 - composition
 - embeddedness
 - sedimentation
 - g. Instream Habitat
 - woody debris
 - aquatic vegetation
 - cover (boulders, turbidity, etc.)

The Council anticipates and encourages alternative approaches in developing such standards. At the same time, the Council requests that the relevant parties explicitly consider the approach and standards provided for reference in Appendix B in developing their own approaches and standards. As

watershed habitat performance standards are developed, submit them to the Council for review and coordination.

Idaho, Oregon and Washington Northwest Power Planning Council Offices

2. By December 31, 1993, provide the Council with adopted habitat performance standards or a report on progress toward adoption.

Council

3. Review habitat performance standards as submitted, for consistency, appropriateness and regional coordination.

Relevant Parties

4. The Council expects that actions to restore and preserve critical habitat will proceed in parallel with development of habitat performance standards. Relevant parties are requested to provide the Council with approaches for meeting performance standards on the following schedule:
 - a. by December 31, 1998, in subbasins where weak stocks are present;
 - b. within five years after designation of a subbasin as a model watershed; and
 - c. by December 31, 2003, in all other subbasins.

States, Tribes, Federal Agencies, Land and Water Managers, and Private Landowners

5. Because the region places a very high priority on protecting existing habitat, and because the watershed-specific habitat performance standards will take time to develop, in the interim, manage activities to maintain the quality and quantity of existing habitat. In so doing, ensure the following in perennial and intermittent streams supporting salmon and steelhead:
 - a. comply with existing federal and state water quality standards;
 - b. allow no human-caused increase of sedimentation that may result in a significant adverse effect on weak salmon, steelhead or resident fish stocks;
 - c. retain existing woody debris;
 - d. retain existing vegetation in riparian areas to supply woody debris in the stream; and
 - e. manage for frequency of pools similar to those observed in undisturbed but comparable areas to the extent needed to provide sufficient habitat for salmon and steelhead.

6.5 COOPERATIVE HABITAT PROTECTION AND IMPROVEMENT WITH PRIVATE LANDOWNERS

The Council has adopted the following as a program habitat objective: Ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive watershed management basis. The Council does not view comprehensive watershed management as a planning process. It is a way of doing business that allows for coordination of the goals and objectives of all interests in order to use available natural, human and fiscal resources in the most beneficial manner. Thereby, investments in development and usage of resources in a subbasin, including production of salmon and steelhead, will benefit.

Comprehensive watershed management should enhance and expedite implementation of actions by clearly identifying gaps in programs and knowledge, by striving over time to resolve conflicts, and by keying on activities that address priorities. A long-term commitment from all local, state and regional entities interested in each subbasin will be necessary. This effort cannot be viewed as something to be accomplished quickly or having an endpoint. It will need to evolve over time to become truly comprehensive. To succeed, it must become institutionalized in each subbasin.

The Council believes that protection and improvement of habitat on private lands is an essential component of comprehensive watershed management. A key to this approach is the voluntary action of the owners of these lands. Without explicit, direct involvement of private landowners in identification and implementation of habitat actions, protection and improvement of habitat on private lands has little chance of success.

During investigation of habitat issues, the Council was impressed with the number of private initiatives to protect the fisheries habitat in the region. These include activities to prevent erosion, as typified in the Tucannon River Subbasin, as well as other programs conducted by local conservation districts, Oregon Governor's Watershed Enhancement Board, Trout Unlimited, Long Live the Kings, the Adopt-a-Stream Foundation and others. The Council applauds these worthy efforts to involve different affected interests in development, implementation and funding of coordinated habitat protection and improvement activities. These types of activities need to occur in every subbasin and on a more comprehensive level.

Local Role

A locally based, bottom-up, voluntary approach for protection and improvement of habitat on private lands is needed. The coordinated resource management approach is an example of the type of program that might provide the basis for such an approach. This process brings together local landowners and key interests in a facilitated forum to identify goals for improving and managing lands within a geographic area of common interest.

State Role

Statewide lead entities, such as the state conservation commissions or other appropriate bodies, should be identified to facilitate coordinated habitat protection and improvement with private landowners. In addition, the Council's model watersheds should complement these efforts.

Federal Role

Coordination of watershed activities will include an important role for federal agencies. Activities on federal and private lands must be coordinated and consistent to achieve comprehensive watershed management. In addition, federal funding of activities on private and public lands must continue and at increased levels. The Council is committed to supporting efforts in this regard. Also, it is expected that coordination of activities on private lands will result in approaches that complement and comply with the requirements for habitat recovery plans under Section 10 of the Endangered Species Act. This will require coordination of watershed activities with the National Marine Fisheries Service.

Council Role

The Council expects that coordination of watershed activities will result in identification of projects to improve and protect habitat on private lands. These projects should be submitted directly to the Council to allow for the necessary subbasin and regional coordination. The Council will review these submissions to identify appropriate funding sources and to help ensure prompt, coordinated implementation of appropriate projects. The Council, in identifying funding sources for private-landowner projects, will take into consideration, to the extent possible, whether the private land is being managed in accordance with applicable federal and state laws such as the Endangered Species Act and state water quality standards.

6.5A Coordination of Watershed Activities

Idaho, Oregon and Washington

1. Each state should select a lead entity, such as the state conservation commission or other appropriate entity, to support local subbasin efforts to coordinate watershed activities. This support should include providing technical or other resources, coordinating state agencies involvement, and ensuring consistency with state law and policies. The local subbasin efforts should include all interested parties and work with appropriate model watershed groups. They should develop and implement approaches, such as the coordinated resource management approach, for coordinating watershed activities. These efforts should include consideration of the salmon and steelhead integrated and subbasin plans and other relevant documents. Submit products of these efforts to the Council and National Marine Fisheries Service for review.

Bonneville

2. Provide initial funding for at least one coordinator in each of the states of Idaho, Oregon and Washington to initiate efforts to coordinate watershed activities. These coordinators may also coordinate development of model watersheds (see Section 6.5B1, below).

Council

3. Review products of local watershed coordination efforts for consistency with other activities in the appropriate subbasin and the region. Coordinate this review with the National Marine Fisheries Service. Identify funding sources and assist in obtaining funding for appropriate activities.

6.5B Model Watersheds

Bonneville

1. Provide initial funding for at least one model watershed coordinator selected by each respective state. These coordinators may also coordinate watershed activities (see Section 6.5A2, above).

Idaho, Oregon and Washington

2. Each state should select a coordinating entity for each model watershed project, such as the state conservation commission or other appropriate entity. Accomplish the following within the first year of implementation for each model watershed project:
 - a. Compile a compendium of all sources of human and fiscal resources that are potentially available for protection and improvement of habitat for the model watershed. Coordinate this activity on a regional and state level, as appropriate.
 - b. Identify all parties with an interest in each model watershed. Set up procedures to include all these parties in the development and implementation of the model watershed. Convene a watershed conference that includes all parties with an interest in the model watershed.
 - c. Compile all existing plans, programs, policies, laws and other appropriate items that relate to comprehensive watershed management in each model watershed.
 - d. Identify gaps and conflicts in the existing plans, programs, policies, laws and other appropriate items that hinder comprehensive watershed management in each model watershed.
 - e. Set out a path and procedures for filling gaps and addressing conflicts.
 - f. Identify key factors limiting salmon and steelhead productivity.
 - g. Identify priority on-the-ground actions to address key limiting factors.
 - h. Provide for the involvement of volunteers and educational institutions in the implementation of projects.

3. By the second year, begin implementation of priority on-the-ground actions that address key limiting factors for salmon and steelhead production through the implementation planning process (see Section 7.1B). In addition, initiate the path and procedures for filling gaps and addressing conflicts.
4. Each state report individually to the Council annually by October 15 on progress in each model watershed. This report should include an overview prepared by the coordinating entity for each model watershed. It should detail the knowledge gained through experience in the subbasin that could be useful for developing comprehensive watershed management in other subbasins.

Council

5. Review annual model watershed reports. Produce and disseminate a document that describes lessons learned in model watersheds and provides advice that might be useful in other watersheds.

6.6 STATE, FEDERAL AND TRIBAL HABITAT ACTIONS

6.6A Land Management

U.S. Forest Service (Regions 1, 4, 6) and Bureau of Land Management (Idaho and Oregon/Washington Offices)

1. Immediately begin implementing the procedures outlined in the Anadromous Fish Habitat Policy and Implementation Guide and seek means to accelerate the Anadromous Fish Habitat Plan. By September 1, 1992, all land management activities should be designed to at least maintain the quantity and quality of existing salmon and steelhead habitat.
2. In streams where either water quality standards or federal land management plan objectives for fish habitat and water quality are not being met, initiate actions needed for recovery. Special attention should be given to insect infestation as it relates to catastrophic fire danger that may threaten salmon and steelhead habitat.
3. Review and, as necessary, amend existing land management plans to incorporate the Council's habitat objectives, policies and performance standards.
4. Immediately initiate development, updating and implementation of livestock management plans and provide adequate staffing and funding to monitor and supervise all livestock permits in salmon and steelhead production areas consistent with the Council's habitat objectives, policies and performance standards. By December 31, 1996, revise all livestock management plans, as necessary, to incorporate and implement the Council's habitat objectives, policies and performance standards and to address enhancement of riparian areas and compliance with state water quality standards and best management practices.⁹
5. Report to the Council by March 15 annually on the effect of federal land management actions on salmon and steelhead populations, and habitat status and trends on federal lands in the Columbia River Basin.

Idaho, Oregon, Washington and Appropriate Indian Tribes in Consultation With Appropriate Water Quality Agencies

6. Establish best management practices under the Clean Water Act to maintain and improve salmon and steelhead production. Best management practices should be designed to meet the Council's habitat objectives, policies and performance standards. Conduct monitoring to ensure that best management practices are implemented and that instream salmon and steelhead habitat and water quality goals are

met. Present practices to the Council by June 30, 1993.

State and Federal Agencies and Tribes

7. Review and, if necessary, seek improvements to mining laws to promote salmon and steelhead productivity. Ensure that all mining activities comply with state water quality standards. Report to the Council on progress on this measure by June 30, 1993, and annually thereafter.

Idaho, Oregon, Washington, Bureau of Land Management, U.S. Forest Service and Tribes

8. Work with model watershed and other appropriate groups to identify and protect riparian and underwater lands associated with perennial and intermittent streams contributing to salmon and steelhead production, regardless of whether a particular portion of a stream is fish-bearing. Where water quality standards are being met, retain existing shade, vegetation, standing and down large woody debris, and small woody debris. Where water quality standards are not being met, initiate action to increase shade, re-vegetation, standing and down large woody debris, and small woody debris. Report to the Council on progress on this measure by June 30, 1993, and annually thereafter.

Idaho, Oregon, Washington, Bureau of Land Management (Idaho and Oregon/Washington Offices) and U.S. Forest Service (Regions 1, 4, 6)

9. Immediately develop programs to explore and implement land exchanges, purchases or easements of a sufficient width to improve and maintain salmon and steelhead production in privately owned riparian areas and adjacent lands, with full compensation of landowners. In implementing this measure, acquisition of easements should be the preferred approach for protecting riparian areas and adjacent lands. Exchange or purchase that results in net gains of land in public ownership should be considered the lowest priority method for this purpose. States and federal agencies report progress to the Council by December 31, 1993. In addition, federal agencies provide a list

9. 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.

to the Council by December 31, 1993, of high quality riparian lands that potentially could be acquired through exchange.

Bonneville and Other Implementing Entities

10. Provide funding for the acquisition and management of permanent conservation easements for rebuilding and maintaining Columbia Basin salmon and steelhead populations. These acquisitions should be on a willing-seller and willing-buyer basis. Report to the Council on progress on this measure by June 30, 1993, and annually thereafter.

6.6B Water Quality and Quantity

Water Regulation

Idaho, Oregon and Washington

1. Review state water quality standards and compliance procedures by June 30, 1993, and report to the Council findings and any limitations in resources to programs that could impact meeting the habitat objectives, policies and performance standards of the program. If necessary, adjust water quality standards and compliance procedures to meet the program habitat objectives, policies and performance standards.

Idaho, Montana, Oregon, Washington, and Federal and Tribal Agencies

2. Improve enforcement of existing water rights and duties for diversions and use from the mainstems of the Columbia and Snake rivers and tributaries. To facilitate these determinations, ensure that existing and new diversions affecting salmon and steelhead streams are equipped with devices to measure instantaneous and seasonal flows.

Instream Flows for Salmon and Steelhead

Idaho, Montana, Oregon and Washington

3. To protect salmon and steelhead in the Columbia River and its tributaries: establish instream flow protection levels; enforce water right permit conditions; deny new water rights if water is not available consistent with salmon and steelhead needs, or if existing water rights or the public interest would be detrimentally affected; and acquire water rights on a voluntary basis by purchase, gift, or through state or federal funding of water conservation or efficiency improvements that produce water savings. Use all available authorities to protect water provided for salmon and steelhead habitat or passage. If existing authorities are inadequate, identify authorities need-

ed and seek legislative approval. In determining whether a proposed diversion or transfer would be consistent with salmon and steelhead needs, consult with fish and wildlife agencies and Indian tribes to determine whether the proposed use would cause any reduction in the quantity or productivity of salmon and steelhead habitat.

Bonneville and Other Implementing Entities

4. Provide funding for the acquisition and management of critical water rights for rebuilding and maintaining Columbia Basin salmon and steelhead populations. These acquisitions should be on a willing-seller and willing-buyer basis. Report to the Council on progress on this measure by June 30, 1993, and annually thereafter.

Idaho, Oregon, Washington and Bureau of Reclamation

5. Review the adequacy of existing law and administration to protect enhanced instream flows for fish. Report results to the Council by June 30, 1993.

Water Conservation

Salmon and steelhead need adequate river flows for spawning, rearing and migration. With growing development pressures on streams, there is a need to find innovative ways to leave more water in streams. More efficient out-of-stream water use may be a fruitful strategy. There are many questions about how conserved water actually can be secured for salmon and steelhead. The Council agrees that there is a pressing need to answer these questions.

Council

6. Continue to emphasize water conservation and efficiency improvements to help salmon and steelhead.

Bureau of Reclamation

7. In 1991, initiate a cooperative effort with the states of Idaho, Oregon and Washington, and with irrigators, to select and design at least four demonstration water conservation projects, to provide additional instream flow and enhanced water quality for production of weak stocks. One or more weak stocks should be present in any given subbasin selected for demonstration. There should be at least one demonstration project in Idaho, Oregon and Washington. Consider opportunities to combine one or more of the water conservation demonstration projects with model watershed projects described under Section 6.5B.

8. Take initiative to secure the necessary funding to complete watershed selection and planning by the end of 1993, and complete implementation of the demonstration projects by December 31, 1996.

Water Resource Information Coordination and Development

Environmental Protection Agency and the Council

9. Secure funding through appropriate sources and establish a mechanism to facilitate coordination of water quality activities relating to Columbia River Basin fish and wildlife resources. This should be an integrated basinwide approach that includes coordinated data management and an annual public report and review process. Use a cooperative approach including participation by all relevant entities such as Bonneville, Corps of Engineers, Federal Energy Regulatory Commission, Bureau of Reclamation, fish managers, state water quality agencies, state water resource agencies, tribal agencies, land management agencies, U.S. Geological Survey and others. Report status of this activity to the Council by April 15 annually.
10. Coordinate development of a study plan to compile and evaluate existing water quality information, identify data gaps and priority problems, and recommend proposals to address gaps and priority problems. Use a cooperative approach including participation by all relevant entities such as Bonneville, Corps of Engineers, Federal Energy Regulatory Commission, Bureau of Reclamation, fish managers, state water quality agencies, state water resource agencies, tribal agencies, land management agencies, U.S. Geological Survey, Council and others. Coordinate with the Columbia River Estuary Bi-State Study as well as other appropriate studies and programs. The project should include analysis of point sources, non-point sources, dioxin pollution, transboundary pollution, sewage in metropolitan areas and cumulative effects. Complete study plan and submit to the Council by April 15, 1993. After Council approval of the study plan, Environmental Protection Agency, Council and other relevant entities secure funding through appropriate sources to implement study plan. Report status of this activity to the Council by April 15 annually.

Idaho, Montana, Oregon and Washington

11. Explore expanding scope of the Columbia River Estuary Bi-State Study to include all of the Columbia River Basin. If feasible, this would be more effective in addressing comprehensively all interrelated water quality and quantity aspects of the basin.

Water Availability

Water is a finite resource. The Council is concerned that continuing diversions of Columbia River and tributary water will degrade stream conditions needed by salmon and steelhead. Competing demands for water must be evaluated, and Idaho, Oregon and Washington must consider the cumulative effects of new diversions on water for salmon and steelhead. Elsewhere in this document, the Council calls for water efficiency, water marketing programs and other means of augmenting flows for fish. Continuing with water diversions that would deprive salmon and steelhead of the benefits of these programs would make little sense.

Idaho, Montana, Oregon and Washington

12. Continue discussions through the Interstate Agreement Workgroup to reach an interstate agreement to protect from appropriation additional Columbia and Snake river basin stream flows that come from storage releases, water conservation or other efficiency improvements, where the water is needed to maintain and rebuild salmon and steelhead populations.

Idaho, Montana, Oregon, Washington, Bureau Of Reclamation and Bonneville, in Coordination with Indian Tribes and Other Parties

13. Develop a regional assessment of the availability of water for salmon and steelhead spawning, incubation, emergence and migration in the Columbia River and its tributaries, given current and projected water use and plans to provide secure flows for salmon and steelhead. The assessment should include a range of 50 percent to 95 percent probability of water availability. Scope the assessment and submit a plan of work to the Council by October 31, 1992, and submit the assessment by the end of 1993.

Council

14. Fund a study of watersheds in which water availability in tributaries is an important limiting factor for weak stocks.

Subbasin Water Projects

Willamette Subbasin Actions

Corps of Engineers

15. Complete investigation of the feasibility of installing devices to control the temperature of the water discharged from Detroit Dam on the North Santiam River by March 31, 1996. The Corps should report study progress to the Council annually and should

make recommendations to the Council at the conclusion of the study.

16. Complete investigation of the feasibility of installing devices to control the temperature of water discharged from Cougar and Blue River dams in the McKenzie River Basin by March 31, 1995. The feasibility study should include an evaluation of non-structural alternatives, such as modification of existing project operating rule curves, in combination with various temperature control devices to restore downstream water temperatures to near pre-project conditions. The Corps should report study progress to the Council every six months and should make recommendations to the Council at the conclusion of the study.

Corps of Engineers, Bureau of Reclamation and Fishery Managers

17. Immediately begin consultations to develop a storage agreement to ensure minimum flows necessary to protect salmon and steelhead below Willamette River projects

Umatilla Subbasin Pumping Project

Bonneville

18. Provide power or reimbursement for power costs to Bureau of Reclamation pumping plants designed to exchange Columbia River water for Umatilla River water, so long as the exchange is administered in accordance with federal and state laws, the permit issued pursuant to Application 71293, the transfer order issued pursuant to Application T6621E, and memoranda of agreement resulting from the Contested Case Proceeding on Protested Water Applications 71293 and T6621E.

Grande Ronde Subbasin Water Temperature Project

Water temperature problems throughout the Columbia Basin signal the need to gain experience in solving this problem in an important area such as the Grande Ronde Subbasin.

Environmental Protection Agency and Other Entities

19. Coordinate design of a demonstration project to evaluate and address water temperature problems in the Grande Ronde Subbasin. Work cooperatively with all relevant entities including model watershed project participants. Complete project design and submit it to the Council by April 15, 1993. After Council approval of the project design, Environmental Protection Agency, Council and other relevant

entities secure funding through appropriate sources to implement study plan.

6.6C Water Diversion Screening

During the last 50 years, state and federal entities initiated water diversion screening programs in several parts of the Columbia River Basin. Hundreds of screens have been installed on important fish-bearing streams. Unfortunately, salmon and steelhead are still being lost in diversions throughout the basin. A large number of diversions, including many on the Salmon and Grande Ronde rivers and other streams that support weak stocks, remain unscreened. In addition, many of the existing screening facilities are in need of maintenance or other improvements.

There is an immediate need to accelerate the installation of new facilities on unscreened diversions and repair or upgrade older facilities. Unscrened or poorly screened diversions result in the loss of many juvenile salmon and steelhead that have survived the rigors of natural rearing only to be killed at the beginning of their journey to the ocean. This effort has a high probability of reducing salmon and steelhead mortality and will require the use of all available resources for funding, design, construction and installation. Because of the need for quick action, it is especially important that the resources of the private sector be used to ensure timely construction and installation of high priority screens and measuring devices, if such resources are necessary to meet the desired installation time line.

This process is not intended to interfere with the implementation of screening activities using existing funding mechanisms and programs. Those activities should proceed simultaneously with the process outlined below. As the oversight committee and Technical Work Groups are developed, the products developed by these groups should be integrated into the ongoing processes as well as the implementation planning process (see Section 7.1B).

Fishery Managers

1. Develop a prioritized list of tributary screening and passage facility improvements for stream diversions in the Columbia River Basin affecting salmon and steelhead. Improvement can include new facilities and the upgrading and maintenance of existing facilities. The list should also include Columbia River and Snake River mainstem pump diversions. Coordinate this list with the assessment of mainstem diversions in Section 6.6C6. Priority initially should be given weak stocks, with emphasis on stocks petitioned under the Endangered Species Act in the Snake River Basin. This list should be updated annu-

ally through the implementation planning process (see Section 7.1B).

All Parties

2. Criteria for design, construction, operation and maintenance of facilities should be based on standards and criteria developed by the National Marine Fisheries Service in concert with other agencies with expertise in the areas of screening and fish protective facilities in the region. Use the existing expertise of federal, state and tribal entities and others, including the private sector, to accelerate implementation of screening and passage measures. In addition, conduct statistically valid evaluations of screening facilities, as necessary, to ensure that fish are adequately protected and the numbers of adult fish returning to the Columbia River, as a result of this program, are assessed. Evaluation should be coordinated through the implementation planning process (see Section 7.1B).

Bonneville

3. Fund costs associated with operation of the Fish Screening Oversight Committee and Technical Work Groups established by the National Marine Fisheries Service. These committees should be incorporated into the implementation planning process (see Section 7.1B). The oversight committee should include state, federal (including Bonneville), Council, tribal and irrigation representatives. The committee should provide overall direction, set priorities and ensure oversight of objectives, funding opportunities, standards, biological criteria and evaluation. The Technical Work Groups should include passage experts and other appropriate technical personnel representing federal, state, tribal and irrigation entities. The Yakima Fish Passage Technical Work Groups are to recommend project priorities within their area of concern to the oversight committee and to work with the entity constructing the diversion screens and passage facilities to ensure the facilities are constructed according to the prescribed criteria and that the necessary project evaluation is designed and implemented. In the case of large projects, this may include the following:
 - a. establish written operating criteria;
 - b. develop preliminary designs;
 - c. see that necessary permit processes are carried out;
 - d. make certain private landowner and public concerns are addressed;
 - e. review detailed designs to ensure that biological and engineering criteria are met;
 - f. monitor construction phases;

- g. monitor operation and maintenance phases in compliance with criteria and recommend corrective actions if necessary; and
- h. conduct project evaluations.

National Marine Fisheries Service, Working with Oversight Committee, Appropriate Technical Work Groups and Bonneville

4. Identify resources that will be needed to accomplish screening and passage work, and prepare a general operational plan, including a schedule, budget, proposed cost sharing and incentive programs. The presumption is that diversion owners will contribute a significant amount of funding for installation and maintenance of screens. Under current federal law, some federal funds may be available to assist in diversion screening. The plan will also address how ongoing screening and passage programs funded by the Mitchell Act and the states will be comprehensively integrated basinwide. The National Marine Fisheries Service, the oversight committee, and Bonneville should review this plan with the Council by February 1, 1992. The goal is to complete the installation of all needed screens and passage facilities by the end of 1995.

Bureau of Land Management (Idaho and Oregon/Washington Offices), U.S. Forest Service (Regions 1, 4, 6) and Bureau of Reclamation (Pacific Northwest Region)

5. Require as a condition of both existing and new water use authorizations, that diversion structures have functional fish screens and other passage facilities for man-made barriers to salmon and steelhead that meet the criteria referenced above. For existing authorizations, wherever practical, and especially on high priority diversions, the three agencies should proceed to design and install screens on a multiagency or shared-cost basis, with authorization renewals contingent on reimbursement to the agency, or other arrangements satisfactory to the agency. By March 1, 1992, the three federal agencies should report on their progress, including the number of such permits, estimated screening costs, resources needed to implement and monitor the program, and a time frame for compliance.

Corps of Engineers

6. By January 1993, resume the program to inspect all underwater diversions in the mainstem Columbia and Snake rivers to determine whether screens that prevent losses of juvenile and adult salmon are installed and operating. Repair, update and, where necessary, install screens on all diversions by December 31, 1995. The presumption is that diversion owners will fund installation and maintenance of screens.

The Corps of Engineers, National Marine Fisheries Service and other appropriate sources might also be considered as potential funding sources. Work under this measure should be coordinated with all other measures under this section.

6.6D Expedited Process for Funding Projects

Many high priority habitat improvement projects involve transactions with private landowners and water rights holders. In working with the private sector, timely access to funding will be essential once negotiations have concluded and parties are ready to proceed. This ability to move quickly is not currently in place, and it is essential to capitalize on agreements to undertake cooperative habitat improvement and protection.

Bonneville

1. In consultation with the fishery managers, the Council and other relevant parties, explore alternative procedures for funding high priority habitat projects expeditiously. Report to the Council on a proposed procedure by December 31, 1992.