

NORTHWEST POWER PLANNING COUNCIL

COLUMBIA RIVER BASIN

FISH AND WILDLIFE PROGRAM





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COUNCIL DOCUMENT 2000-19



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EXECUTIVE SUMMARY

Historically, salmon and steelhead migrated through much of the Columbia River Basin, an area the size of France, that includes portions of seven states and British Columbia. These fish once spawned as far upriver in the Columbia as the headwaters at Columbia Lake, British Columbia, 1,200 miles from the mouth of the river near Astoria, Oregon. Salmon and steelhead migrated up the Snake River, the Columbia's largest tributary, as far as Shoshone Falls, 615 miles from the confluence and more than 900 miles from the Pacific Ocean. The Columbia River Basin also supported numerous populations of resident fish — those that don't migrate to the ocean — and wildlife.

Beginning in the late 1800s and increasing from the 1930s on, there was a large decline of salmon and steelhead in the Columbia River and its tributaries, from an estimated peak of 10-16 million adult fish returning to the basin each year to about 1 mil-

lion in recent years. While loss of habitat, harvest, and variable ocean conditions have all contributed to this decline, it is estimated that the portion of the decline attributable to the construction and operation of hydroelectric dams in the Columbia River Basin is, on average, about 5 million to about 11 million adult fish. Hydroelectric dams also adversely affected resident fish and wildlife in the basin.

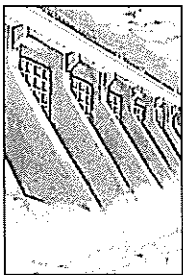
In 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act, which authorized the states of Idaho, Montana, Oregon and Washington to create the Northwest Power Planning Council. The Act directs the Council to prepare a program to protect, mitigate and enhance fish and wildlife of the Columbia River Basin that have been affected by the construction and operation of hydroelectric dams while also assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply. The

Act also directs the Council to inform the public about fish, wildlife and energy issues and to involve the public in its decision-making.

The Council's Columbia River Basin Fish and Wildlife Program is the largest regional effort in the nation to recover, rebuild, and mitigate impacts on fish and wildlife. The Council adopted the first program in November 1982.

The 2000 program marks a significant departure from past versions, which consisted primarily of a collection of measures directing specific activities. The 2000 Program establishes a basinwide vision for fish and wildlife — the intended outcome of the program — along with biological objectives and action strategies that are consistent with the vision. Ultimately, the program will be implemented through subbasin plans developed locally in the more than 50 tributary subbasins of the Columbia and amended into the program by the Council. Those plans will be consistent with the basinwide vision and objectives in the program,

THE FOUR HS AND THEIR IMPACT ON FISH AND WILDLIFE



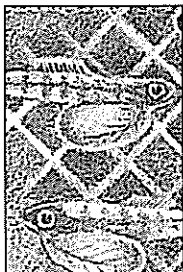
HYDROPOWER

The program recommends that resources and energy be directed away from breaching the four federal dams on the lower Snake River, recognizing that the federal government has decided breaching will not occur in the next five years (coincidentally, that is the Council's statutory planning horizon for the fish and wildlife program). Instead, the program recommends actions to improve dam-passage survival that are biologically sound and economically feasible — actions that benefit the range of species in the river and fit natural fish behavior patterns.



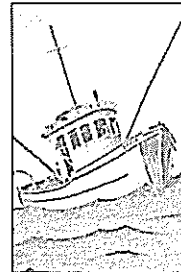
HABITAT

The program directs significant attention to rebuilding healthy, naturally producing fish and wildlife populations by protecting and restoring habitats and the biological systems within them. The program also recognizes the ocean as habitat and includes strategies to increase our understanding of its variable nature and, to the extent feasible, separate the effects of the ocean environment from those of the freshwater environment.



HATCHERIES

The program requires that fish hatcheries funded through the program operate consistent with reforms recommended to Congress by the Council in 1999, reforms that would shift hatchery production away from a primary focus on providing fish for harvest to also providing fish to rebuild naturally spawning populations.



HARVEST

The program promotes increased fish harvest, consistent with sound biological management practices, recognizing that harvest provides significant cultural and economic benefits to the region.

and its underlying foundation of ecological science.

The 2000 program addresses all of the "Four Hs" of impacts on fish and wildlife — hydropower, habitat, hatcheries and harvest.

In preparing the 2000 Fish and Wildlife Program, the Council solicited recommendations from the region's fish and wildlife agencies, Indian tribes, and others, as required by the Northwest Power Act. The agencies and tribes responded, and the Council also received proposals from other interested parties. In all, the Council received more than 50 recommendations totaling more than 2,000 pages. After reviewing the recommendations, the Council prepared a draft and then conducted an extensive public comment period before finalizing the program in December 2000.

The Council's responsibility is to mitigate the impact of hydropower dams on all fish and wildlife in the Columbia River Basin, including endangered species, through a program of enhancement and protection. As a planning agency required by law to balance fish and wildlife enhancement against impacts to the region's hydropower system, the Council is uniquely positioned as an honest broker among the agencies, tribes, electric utilities and environ-

"Through its fish and wildlife program, the Council provides guidance and recommendations on hundreds of millions of dollars per year of Bonneville Power Administration revenues to mitigate the impact of hydropower on fish and wildlife."

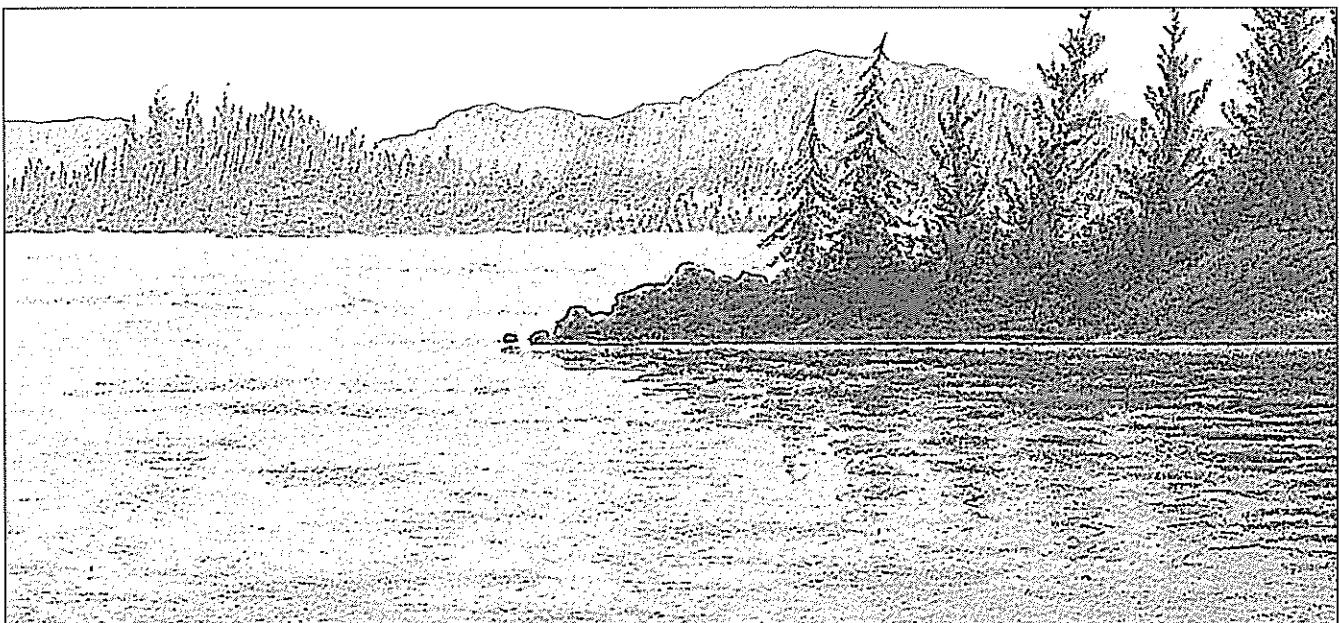
mental and business interests whose activities and legal rights involve the rivers, hydropower, fish and wildlife. In this role, the Council provides the most objective public forum to discuss and debate fish and wildlife and energy issues.

Through its fish and wildlife program, the Council provides guidance

and recommendations on hundreds of millions of dollars per year of Bonneville Power Administration revenues to mitigate the impact of hydropower on fish and wildlife. That amount is expected to increase in the future as enhancement efforts expand and accelerate. The funding is provided by Bonneville from the sale of electricity generated at 29 federal hydropower dams and one non-federal nuclear power plant in the Columbia River Basin.

The Council ensures the public accountability of these expenditures by submitting each project proposed for funding under its program to a thorough review by the region's fish and wildlife agencies and Indian tribes, the public, and by an 11-member panel of independent scientists, the Independent Scientific Review Panel. Established by Congress, panel members are appointed by the Council from recommendations of the National Academy of Sciences.

This program, and more information about the Council, its fish, wildlife and power planning activities, and public involvement opportunities, can be found at the Council's website, www.nwcouncil.org.



INTRODUCTION

A. THE NORTHWEST POWER PLANNING COUNCIL

The Northwest Power Planning Council, an interstate compact agency of Idaho, Montana, Oregon and Washington, was established under the authority of the Pacific Northwest Electric Power Planning and Conservation Act of 1980. The Act directs the Council to develop a program to "protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat, on the Columbia River and its tributaries ... affected by the development, operation and management of [hydroelectric projects] while assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply." The Act also directs the Council to ensure widespread public involvement in the formulation of regional power policies.

This document is the Council's Columbia River Basin Fish and Wildlife Program. As a planning, policy-making and reviewing body, the Council develops and then monitors implementation of the program, which is implemented by the Bonneville Power Administration, the U.S. Army Corps of Engineers, the Bureau of Reclamation and the Federal Energy Regulatory Commission and its licensees.

The Northwest Power Act directs the Council to develop its program and make periodic major revisions by first requesting recommendations from the region's federal and state fish and wildlife agencies, appropriate Indian tribes (those within the basin) and other interested parties. When the Council issues a draft amended program, an extensive public comment period is initiated that includes public hearings in each of the four states and consultations with interested parties. After closing the comment period, and following

"In the future, the Council will amend into the program locally developed plans for the more than 50 tributary subbasins of the Columbia River and a plan for the mainstem."

a review and deliberation period, the Council adopts the revised program. This must occur within a year of the deadline for receiving recommendations for amendments.

B. A NEW PROGRAM STRUCTURE

This is the fifth revision of the Columbia River Basin Fish and Wildlife Program since the Council adopted its first program in November 1982. This time, as in the series of program amendments between 1991 and 1995, the program is being revised in phases. Unlike past versions of the program, which were criticized by scientists for consisting primarily of a number of measures that called for specific actions without a clear, programwide foundation of scientific principles, this version of the program expresses goals and objectives for the entire basin based on a scientific foundation of ecological principles. In the future, the Council will amend into the program locally developed plans for the more than 50 tributary subbasins of the Columbia River and a plan for the mainstem. These plans will be consistent with the goals and objectives for the basin and also with goals and objectives that will be developed for the 11 ecological provinces of the

basin. The provinces are groups of adjacent subbasins with similar ecological features.

With the subbasin plans in place, the program will be organized in three levels: 1) a basinwide level that articulates objectives, principles and coordination elements that apply generally to all fish and wildlife projects, or to a class of projects, that are implemented throughout the basin; 2) an ecological province level that addresses the 11 unique ecological areas of the Columbia River Basin, each representing a particular type of terrain and corresponding biological community; and 3) a level that addresses the more than 50 subbasins, each containing a specific waterway and the surrounding uplands.

The Council believes this unique program structure, goal-oriented and science-based, will result in a more carefully focused, scientifically credible and publicly accountable program that will direct the region's substantial fish and wildlife investment to the places and species where it will do the most good.

C. THE FRAMEWORK CONCEPT

The program's goals, objectives, scientific foundation and actions are structured in a "framework," an organizational concept for fish and wildlife mitigation and recovery efforts that the Council introduced in the 1994-1995 version of the program. The 2000 program, organized with the framework concept, is intended to bring together, as closely as possible, Endangered Species Act requirements, the broader requirements of the Northwest Power Act and the policies of the states and Indian tribes of the Columbia River Basin into a comprehensive program that has a solid scientific foundation. The program also states explicitly what the Council is trying to accomplish, links the program to a specific set of objectives, describes the strategies to be employed and establishes a scientific basis for the program.

Thus, the program guides decision-making and provides a reference point for evaluating success.

To develop a framework for the program, in November 1998 the Council initiated the Multi-Species Framework Project. The Framework Project was managed by a state-federal-tribal committee and administered by the Council. The project brought together hundreds of individuals representing state and federal agencies, Indian tribes, environmental and industry groups, and interested citizens to propose and discuss potential fish and wildlife recovery actions. The actions ranged from breaching dams to leaving them in place, and from shutting down fish hatcheries and fish harvest to boosting artificial production of fish. From more than 100 actions proposed in the process, the Council assembled seven alternatives for analysis using a state-of-the-art analytical system called Ecosystem Diagnosis and Treatment (EDT). The EDT analysis addressed the biological benefits of each alternative, and a separate Human Effects Analysis addressed the economic and social impacts and benefits of the alternatives.

The Council did not choose a specific alternative for this version of the program. Rather, the goals and objectives in this program were derived from the recommendations received from the region for amendments to this program and from

among several of the Framework Project alternatives. Through an amendment proceeding that began in January 2000, the Council restructured the program with a comprehensive, underlying framework of general scientific and policy principles that apply to the entire Columbia River Basin. The fundamental elements of the program are:

The vision, which describes what the program is trying to accomplish with regard to fish and wildlife and other desired benefits from the river;

The biological objectives, which describe the ecological conditions needed to achieve the vision; and

The implementation strategies, procedures and guidelines, which guide or describe the actions leading to the desired ecological conditions.

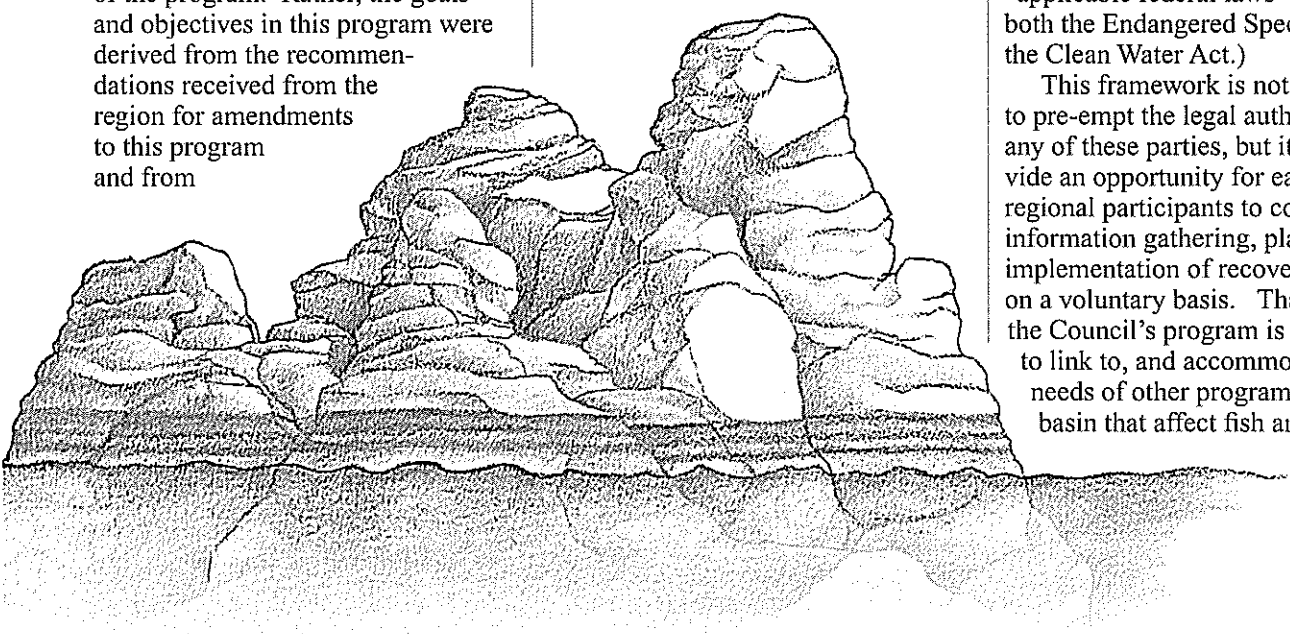
In other words, the vision implies biological objectives that set the strategies. In turn, strategies address biological objectives and fulfill the vision. The scientific foundation links the components of the framework, explaining why the Council believes certain kinds of management actions will result in particular physical habitat or ecological conditions of the basin, or why the ecological conditions will affect fish and wildlife populations or communities.

Under the Northwest Power Act, the Council's fish and wildlife program is not intended to address all fish and wildlife problems in the basin from all sources. But the Council adopted the vision, objectives, strategies and scientific foundation with the belief that they will complement and help support other fish and wildlife recovery actions in the region.

This program recognizes that others besides the Council are developing plans and taking actions to address these issues. In particular, the four Northwest states and the Columbia Basin's 13 Indian tribes each have fish and wildlife initiatives under way. Many of these parties already have subbasin and watershed planning initiatives under way, and are also addressing Endangered Species Act concerns.

Throughout the basin, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service are administering the Endangered Species Act, which requires information gathering, planning, and mitigation actions. In addition, the Environmental Protection Agency, in cooperation with the states and tribes, is taking actions to achieve compliance with the Clean Water Act. (As used elsewhere in this program, "applicable federal laws" includes both the Endangered Species Act and the Clean Water Act.)

This framework is not intended to pre-empt the legal authorities of any of these parties, but it does provide an opportunity for each of these regional participants to coordinate information gathering, planning, and implementation of recovery actions on a voluntary basis. That is, the Council's program is designed to link to, and accommodate, the needs of other programs in the basin that affect fish and wildlife.



This includes meeting the needs of the Endangered Species Act by describing the kinds of ecological change needed to improve the survival and productivity of the diverse fish and wildlife populations in the basin.

Measures implementing this program are funded by the Bonneville Power Administration through revenues collected from electricity ratepayers. Although Bonneville has fish and wildlife responsibilities under both the Endangered Species Act and the Northwest Power Act, in many cases, both responsibilities can be met in the same set of actions. Therefore, in recommending projects for funding under this program, the Council will address both sets of responsibilities wherever feasible. Again, knowledge of the plans and activities of other regional participants will be essential for the Council to be able to assure that the projects it recommends for funding are coordinated with, and do not duplicate, the actions of others.

D. IMPLEMENTATION DURING A PERIOD OF TRANSITION

In the future, the program will be implemented primarily through subbasin plans, which will be consistent with the programwide goals, objectives and scientific foundation. While those plans are under development, the Council has provided for ongoing project review and funding.

A subbasin assessment and planning process will complete the program at the subbasin level and provide the implementation plans out of which fish and wildlife projects are proposed for Bonneville funding to implement the program.

The subbasin assessment is a technical exercise designed to identify the biological potential of each subbasin and the opportunities for restoration. Based on this, fish and wildlife managers, land managers, private landowners, and other people responsible for fish and wildlife and

"The program includes
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and evaluating
biological benefits..."

habitat conditions in the respective subbasins can develop subbasin plans consisting of goals, objectives, strategies, and proposed actions that are consistent with the objectives and criteria in the program.

Depending on the extent and quality of past assessment and planning work, the planning process in a particular subbasin could range from a relatively quick and straightforward review and updating of existing plans to a fundamental and extensive development process. Using the program amendment procedures in the Northwest Power Act, the Council intends to review subbasin plans and adopt agreed-upon plans into the program.

Meanwhile, the Council will continue to make annual recommendations to Bonneville regarding funding of projects to implement the program. The Council relies on the recommendations of the Independent Scientific Review Panel and the region's fish and wildlife managers as the basis for its funding recommendations. The Council and the Independent Scientific Review Panel also have a responsibility for reviewing other fish and wildlife projects proposed for funding by federal agencies and reimbursed by Bonneville.

The program describes a rolling project review process in which one-third of the program and fish and wildlife projects funded by Bonneville are reviewed each year in some depth by the fish and wildlife managers, the Independent Scientific Review Panel and the Council. An important criterion for a funding recommendation is consistency with the vision, objectives and strategies in the revised program and in the relevant subbasin plan, when adopted. In

the rolling project review, the priorities for actions at the basin, province, and subbasin level will be reflected as budget priorities for implementation of specific projects.

The program includes procedures for monitoring and evaluating biological benefits gained by actions taken under the program. The evaluation process feeds information back into the program planning and project review process, with adaptive management mechanisms for revising program objectives or actions if what has been adopted proves unsuccessful.

Because this program has a significantly different structure and implementation procedure than past versions of the program, the Council wanted to make a provision for projects initially funded under previous versions of the program to continue — as long as they are reviewed by the Independent Scientific Review Panel and recommended for funding by the Council. Thus, unless expressly modified by the provisions of this program, existing projects will continue to be in effect.

Most of the existing projects in the program are specific items for implementation at specific locations. As part of the subbasin planning process described above, these measures will be reviewed, together with proposals for new measures, for inclusion in subbasin plans. When a subbasin plan is adopted, it will include both the new measures for that subbasin and the existing measures that will be continuing. At that time, the measures currently in the program for that subbasin will be replaced by the subbasin plan.

BASINWIDE PROVISIONS

A. VISION FOR THE COLUMBIA RIVER BASIN

The vision is the outcome intended for this program. Actions taken at the basin, province, and subbasin levels should be consistent with, and designed to fulfill, this vision. Thus, this vision guides the choice of biological objectives and, in turn, the selection of strategies.

1. The Overall Vision for the Fish and Wildlife Program

The vision for this program is a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife, mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem and providing the benefits from fish and wildlife valued by the people of the region. This ecosystem provides abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest and the conditions that allow for the recovery of the fish and wildlife affected by the operation of the hydrosystem and listed under the Endangered Species Act.

Wherever feasible, this program will be accomplished by protecting and restoring the natural ecological functions, habitats, and biological diversity of the Columbia River Basin. In those places where this is not feasible, other methods that are compatible with naturally reproducing fish and wildlife populations will be used. Where impacts have irrevocably changed the ecosystem, the program will protect and enhance the habitat and species assemblages compatible with the altered ecosystem. Actions taken under this program must be cost-effective and consistent with an adequate, efficient, economical and reliable electrical power supply.

"...this program will be accomplished by protecting and restoring the natural ecological functions, habitats, and biological diversity of the Columbia River Basin."

2. Specific Planning Assumptions

As part of this vision, the Council also adopts the following policy judgments and planning assumptions for the fish and wildlife program.

- No single activity is sufficient to recover and rebuild fish and wildlife species in the Columbia River Basin. Successful protection, mitigation, and recovery efforts must involve a broad range of strategies for habitat protection and improvement, hydrosystem reform, artificial production, and harvest management.
- The Bonneville Power Administration should make available sufficient funds to implement measures in the program in a timely fashion.
- This is a habitat-based program, rebuilding healthy, naturally producing fish and wildlife populations by protecting, mitigating, and restoring habitats and the biological systems within them, including anadromous fish migration corridors. Artificial production and other non-natural interventions should be consistent with the central effort to protect and restore habitat and avoid

adverse impacts to native fish and wildlife species.

- Management actions must be taken in an adaptive, experimental manner because ecosystems are inherently variable and highly complex. This includes using experimental designs and techniques as part of management actions, and integrating monitoring and research with those management actions to evaluate their effects on the ecosystem.
- Actions to improve juvenile and adult fish passage through mainstem dams, including fish transportation actions and capital improvement measures, should protect biological diversity by benefiting the range of species, stocks and life-history types in the river, and should favor solutions that best fit natural behavior patterns and river processes, while maximizing fish survival through the projects. Survival in the natural river should be the baseline against which to measure the effectiveness of other passage methods.
- For the purpose of planning for this fish and wildlife program, and particularly the hydrosystem portion of the program, the Council assumes that, in the near term, the breaching of the four federal dams on the lower Snake River will not occur. However, the Council is obliged under law to revise its fish and wildlife program every five years, at a minimum. If, within that five-year period, the status of the lower Snake River dams or any other major component of the Federal Columbia River Power System has changed, the Council can take that into account as part of the review process.
- Mainstem hydrosystem operations and fish passage efforts

should be directed at re-establishing natural river processes where feasible and consistent with the Council's responsibility for maintaining an adequate, efficient, economical, and reliable power supply.

- The effect of ocean habitat on salmonid species should be considered in evaluating freshwater habitat management to understand all stages of the salmon and steelhead life cycle.
- Systemwide water management, including flow augmentation from storage reservoirs, should balance the needs of anadromous species with those of resident fish species in upstream storage reservoirs so that actions taken to advance one species do not unnecessarily come at the expense of other species.
- There is an obligation to provide fish and wildlife mitigation where habitat has been permanently lost due to hydroelectric development. Artificial production of fish may be used to replace capacity, bolster productivity, and alleviate harvest pressure on weak, naturally spawning resident and anadromous fish populations. Restoration of anadromous fish into areas blocked by dams should be actively pursued where feasible.
- Artificial production actions must have an experimental, adaptive management design. This design will allow the region to evaluate benefits, address scientific uncertainties, and improve hatchery survival while minimizing the impact on, and if possible benefiting, fish that spawn naturally.
- Harvest can provide significant cultural and economic benefits to the region, and the program should seek to increase harvest opportunities consistent with sound biological management

practices. Harvest rates should be based on population-specific adult escapement objectives designed to protect and recover naturally spawning populations.

- Achieving the vision requires that habitat, artificial production, harvest, and hydrosystem actions are thoughtfully coordinated with one another. There also must be coordination among actions taken at the subbasin, province, and basin levels, including actions not funded under this program. Accordingly, creating an appropriate structure for planning and coordination is a vital part of this program.

B. SCIENTIFIC FOUNDATION AND PRINCIPLES

The scientific foundation reflects the best available scientific knowledge. The scientific principles summarize this knowledge at a broad level. The actions taken at the basin, province, and subbasin levels to fulfill the vision should be consistent with, and based upon, these principles.

1. Purpose of the Scientific Foundation

In developing a program to fulfill the vision statement above, the Council is relying on the best available scientific knowledge. While the vision is a policy choice about what the program should accomplish, the scientific foundation describes our best understanding of the biological realities that will govern how this is accomplished. The program can succeed only as it recognizes these realities and builds upon them.

Thus, the scientific foundation is the basis for the working hypotheses that underlie this program. It also provides specific guidance for program measures. For example, the strategies for the use of artificial production are an application of the scientific foundation to the use of

hatcheries for raising fish within the Columbia River Basin.

The scientific foundation consists of the scientific principles, a detailed discussion of those principles, the geographic structure of the program, and a set of more specific scientific rules and hypotheses. Only the scientific principles and the geographic structure appear in this volume of the program; the remainder of the foundation is in the Technical Appendix for this program.

The rules and hypotheses in the Technical Appendix will change over time in response to new scientific information. These rules and hypotheses will continue to be evaluated as the program is implemented and will be revised as needed.

In contrast, the scientific principles below are intended to be relatively fixed points of reference. Although scientific knowledge will improve over time, modification of the principles should occur only after due scientific deliberation. The Council charges the Independent Scientific Advisory Board with the primary role in reviewing and recommending modifications to the scientific principles in the future prior to any major revision of this program.

2. Scientific Principles

As part of the scientific foundation, the program recognizes eight principles of general application. It is intended that all actions taken to implement this program be consistent with these principles.

The scientific principles are grounded in established scientific literature to provide a stable foundation for the Council's program. A more detailed discussion of the implications of these principles, together with citations to the supporting references, is included in the Technical Appendix.

SCIENTIFIC PRINCIPLES

Principle 1. The abundance, productivity and diversity of organisms are integrally linked to the characteristics of their ecosystems.

The physical and biological components of ecosystems together produce the diversity, abundance and productivity of plant and animal species, including humans. The combination of suitable habitats and necessary ecological functions forms the ecosystem structure and conditions needed to provide the desired abundance and productivity of specific species.

Principle 2. Ecosystems are dynamic, resilient and develop over time.

Although ecosystems have definable structures and characteristics, their behavior is highly dynamic, changing in response to internal and external factors. The system we see today is the product of its biological, human and geological legacy. Natural disturbance and change are normal ecological processes and are essential to the structure and maintenance of habitats.

Principle 3. Biological systems operate on various spatial and time scales that can be organized hierarchically.

Ecosystems, landscapes, communities and populations are usefully described as hierarchies of nested components distinguished by their appropriate spatial and time scales. Higher-level ecological patterns and processes constrain, and in turn reflect, localized patterns and processes. There is no single, intrinsically correct description of an ecosystem, only one that is useful to management or scientific research. The hierarchy should clarify the higher-level constraints as well as the localized mechanisms behind the problem.

Principle 4. Habitats develop, and are maintained, by physical and biological processes.

Habitats are created, altered and maintained by processes that operate over a range of scales. Locally observed conditions often reflect more expansive or non-local processes and influences, including human actions. The presence of essential habitat features created by these processes determines the abundance, productivity and diversity of species and communities. Habitat restoration actions are most effective when undertaken with an understanding and appreciation of the underlying habitat-forming processes.

Principle 5. Species play key roles in developing and maintaining ecological conditions.

Each species has one or more ecological functions that may be key to the development and maintenance of ecological conditions. Species, in effect, have a distinct job or occupation that is essential to the structure, sustainability and productivity of the ecosystem over time. The existence, productivity and abundance of specific species depend on these functions. In turn, loss of species and their functions lessens the ability of the ecosystem to withstand disturbance and change.

Principle 6. Biological diversity allows ecosystems to persist in the face of environmental variation.

The diversity of species, traits and life histories within biological communities contributes to ecological stability in the face of disturbance and environmental change. Loss of species and their ecological functions can decrease ecological stability and resilience. It is not simply that more diversity is always good; introduction of non-native species, for example, can increase diversity but disrupt ecological structure. Diversity within a species presents a greater range of possible solutions to environmental variation and change. Maintaining the ability of the ecosystem to express its own species composition and diversity allows the system to remain productive in the face of environmental variation.

Principle 7. Ecological management is adaptive and experimental.

The dynamic nature, diversity, and complexity of ecological systems routinely disable attempts to command and control the environment. Adaptive management — the use of management experiments to investigate biological problems and to test the efficacy of management programs — provides a model for experimental management of ecosystems. Experimental management does not mean passive “learning by doing,” but rather a directed program aimed at understanding key ecosystem dynamics and the impacts of human actions using scientific experimentation and inquiry.

Principle 8. Ecosystem function, habitat structure and biological performance are affected by human actions.

As humans, we often view ourselves as separate and distinct from the natural world. However, we are integral parts of ecosystems. Our actions have a pervasive impact on the structure and function of ecosystems, while at the same time, our health and well being are tied to these conditions. These actions must be managed in ways that protect and restore ecosystem structures and conditions necessary for the survival and recovery of fish and wildlife in the basin. Success depends on the extent to which we choose to control our impacts so as to balance the various services potentially provided by the Columbia River Basin.

C. BIOLOGICAL OBJECTIVES

The biological objectives describe the conditions that are needed to reach the vision, consistent with the scientific principles. The program fulfills the vision by achieving these objectives.

1. Overarching Objectives

The Northwest Power Act directs the Council to develop a program to "protect, mitigate, and enhance" fish and wildlife of the Columbia River and its tributaries, including related spawning grounds and habitat affected by the development and operation of the federal hydrosystem. In the vision, the Council has stated four overarching biological objectives for this program. They are:

- A Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife.
- Mitigation across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydro-system.
- Sufficient populations of fish and wildlife for abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest.
- Recovery of the fish and wildlife affected by the development and operation of the hydrosystem that are listed under the Endangered Species Act.

The Council recognizes that achieving these broad objectives is not the sole responsibility of this fish and wildlife program nor the Bonneville Power Administration. Complementary actions by other governmental agencies and funding sources, including Canadian entities where appropriate, as well as the support and participation of the citizens of the

Northwest, will be needed for these objectives to be fully achieved. Consequently, the focus of the program is limited to fish and wildlife affected by the development, operation, and management of the hydrosystem.

2. Basin Level Biological Objectives

Biological objectives describe physical and biological changes needed to achieve the vision, based on the information we now have and thereby fulfill the vision. Biological objectives have two components: (1) biological performance, describing responses of populations to habitat conditions, described in terms of capacity, abundance, productivity and life history diversity, and (2) environmental characteristics, which describe the environmental conditions or changes sought to achieve the desired population characteristics. Where possible, biological objectives are intended to be empirically measurable and based on an explicit scientific rationale. Objectives at the basin level are more qualitative, but objectives should become increasingly quantitative and measurable at the province and subbasin levels. These basinwide objectives will help determine the amount of change needed across the basin to fulfill the vision. They will also help determine the cost effectiveness of program strategies, and provide a basis for monitoring, evaluation and accountability.

The Council will establish specific biological objectives at the province level and in subbasin plans identifying the changes needed in characteristics of the environment and target populations. The program provides the following biological objectives at the basin level.

Objectives for Biological Performance

The Council recognizes that significant losses of anadromous fish, resident fish, and wildlife and their habitats have occurred as a result of the development and operation of the hydrosystem. To be consistent with the Power Act, these losses establish the underlying basis for population objectives for the program as a whole. Collectively, specific biological objectives should represent what is considered to be mitigation for losses under the program.

Anadromous Fish Losses

The Council recognizes that the scientific basis for biological objectives is not certain and will shift over time as our knowledge improves. Further, we expect to learn a great deal through the process of developing subbasin plans. The Council intends to review, and if necessary, revise these objectives in the course of adopting subbasin plans in a subsequent amendment process. On an interim basis, until subbasin plans identify actual targets, the Council adopts the following regional objectives for anadromous fish:

- Halt declining trends in salmon and steelhead populations above Bonneville Dam by 2005. Obtain the information necessary to begin restoring the characteristics of healthy lamprey populations.
- Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can

support harvest rates of at least 30 percent.

- Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish.

Substitution for Anadromous Fish Losses

Part of the anadromous fish losses has occurred in the blocked areas. A corresponding part of the mitigation for these losses must occur in those areas. The program has a "Resident Fish Substitution Policy" for areas in which anadromous fish have been extirpated. Given the large anadromous fish losses in the blocked areas, these actions have not mitigated these losses. The following objectives address anadromous fish losses and mitigation requirements in all blocked areas:

- Restore native resident fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where original habitat conditions exist and where habitats can be feasibly restored.
- Take action to reintroduce anadromous fish into blocked areas, where feasible.
- Administer and increase opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild, and hatchery-

reared stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historic abundance (includes intensive fisheries within closed or isolated systems).

Resident Fish Losses

The development and operation of the hydrosystem has also resulted in losses of numbers and diversity of native resident fish, such as bull trout, cutthroat trout, kokanee, white sturgeon and other species. The following objectives address resident fish losses:

- Complete assessments of resident fish losses throughout the basin resulting from the hydrosystem, expressed in terms of the various critical population characteristics of key resident fish species.
- Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms.
- Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to the extent that they have been affected by the development and operation of the hydrosystem.
- Achieve population characteristics of these species within 100 years that, while fluctuating due to natural variability, represent on average full mitigation for losses of resident fish.

Wildlife Losses

Development and operation of the hydrosystem also resulted in wildlife losses through construction and inundation losses, direct opera-

tional losses or through secondary losses. The program has included measures and implemented projects to obtain and protect habitat units in mitigation for these calculated construction/inundation losses. Operational and secondary losses have not been estimated or addressed. The program includes a commitment to mitigate for these losses. More specific wildlife objectives are:

- Quantify wildlife losses caused by the construction, inundation, and operation of the hydro-power projects.
- Develop and implement habitat acquisition and enhancement projects to fully mitigate for identified losses.
- Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas.
- Maintain existing and created habitat values.
- Monitor and evaluate habitat and species responses to mitigation actions.

Objectives for Environmental Characteristics

Basin level environmental characteristics describe the kinds of changes that are needed across the Columbia Basin to achieve the changes in biological performance described earlier. Again, the intent is to achieve the vision and allow for mitigation under the Power Act for the fish and wildlife losses resulting from the development and operation of the hydrosystem. The Council is including in the Appendix of this program a provisional set of environmental characteristic objectives for the basin level.

The Council directs the Independent Scientific Advisory Board to review the basin level environmental characteristics in the Appendix by June 2001. The Independent Scientific Advisory Board should report to the Council on the scientific soundness and basinwide applicability of the environmental characteristics, as well as their utility for further defining biological objectives at the province and subbasin levels. As part of its review, the Independent Scientific Advisory Board should consider and report to the Council on the applicability of these objectives in the most altered areas of the basin, the blocked areas.

The Council will make the Independent Scientific Advisory Board's report publicly available and seek views and comment from interested parties. The Council will consider the report of the Independent Scientific Advisory Board and the views and comments of others on the report, and will confirm or revise these basin level objectives for environmental characteristics for purposes of providing guidance for subbasin level planning and further program amendments.

3. Further Development of Biological Objectives at the Basin Level

Biological objectives, comprising both biological performance and environmental characteristic standards, will be established at the province level and subbasin level (in subbasin plans) in subsequent program amendments. However, the efforts at assessment and planning that will precede the formal adoption of province and subbasin level biological objectives may further inform the basin level objectives adopted here. This is possible in two primary ways. First, assessment and planning at these levels should test the validity of the general basin level biological objectives, as previously described. Second, assessment and planning at these levels may identify more specific, quantified biological objectives for the program as a whole. Examples might include abundance and performance objectives for fish populations that transcend more than one province, specific programwide objectives for improvement in certain habitat types, and specific objectives for water management and coordinated operation of the hydrosystem to benefit fish and wildlife.

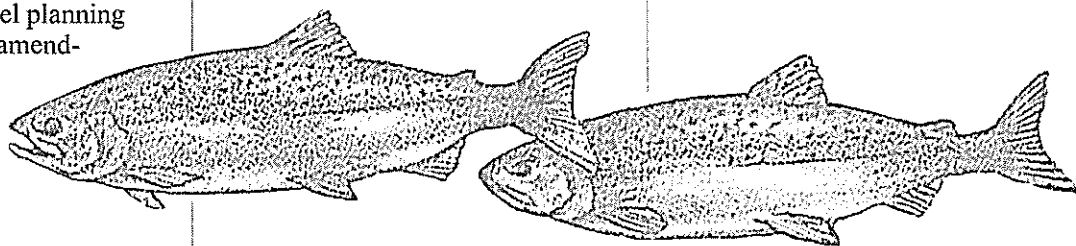
More specific basinwide objectives could help determine the amount of change needed across the basin to fulfill the vision. They will also help determine the cost-effectiveness of program strategies and provide a basis for monitoring, evaluation, and accountability. These more specific objectives will be considered as guidance for subbasin planning, and for adoption when the Council considers adoption of prov-

ince level biological objectives and subbasin plans.

4. Significance of Objectives and Strategies

These objectives and the strategies that follow are to be used as guidance for developing province and subbasin plans, as the basis for development of more specific objectives, and as a basis for Council recommendations to the Bonneville Power Administration regarding project funding. Proposed measures will be evaluated for consistency with these objectives and strategies. A primary function of the monitoring and evaluation components of this program is to measure progress toward achieving these objectives.

All province and subbasin plans must be consistent with these objectives.



D. STRATEGIES

Strategies are plans of action to accomplish the biological objectives. In developing strategies, the program takes into account not only the desired outcomes, but also the physical and biological realities expressed in the scientific foundation.

1. Introduction

This program anticipates that detailed plans, consistent with the biological objectives, will be developed locally for each of the more than 50 subbasins in the Columbia River Basin. Because most of the specific actions will be addressed at the province and subbasin levels, most of the strategies will be developed there. At the subbasin level, "strategies" will include the particular measures to be implemented within a given subbasin.

Thus, at the basin level, most of the strategies are guidelines for implementation at other levels of the program. However, these strategies also include specific measures for subjects that transcend one or more of the provinces, such as data management, research, monitoring and evaluations.

"In general, the purpose of the strategies at the basin level is to allow maximum local flexibility."

In general, the purpose of the strategies at the basin level is to allow maximum local flexibility while assuring that subbasin plans follow the best available scientific knowledge, are consistent with one another, and together, form a well-integrated, well-organized, and comprehensive fish and wildlife program.

These strategies are presumed to be applicable to all subbasin plans and projects proposed for funding. This presumption may be overcome by showing, to the satisfaction of the Council, compelling reasons why the particular action proposed will be a greater benefit to fish and wildlife than one that is in accordance with these strategies. In addition, in the case of subbasin plans, when a plan proposed for adoption is not consistent with these strategies, the proponent may also propose that these strategies

be amended so that the plan will be in compliance. Again, such amendments will require a showing of compelling reasons why the amendment will result in greater benefit to fish and wildlife.

2. Linkage of General Biological Objectives with Strategies

Because this is a habitat-based program, implementation strategies will vary depending on the current condition and the restoration potential of the habitat¹ for the species and life stages of interest. For example, with regard to fish spawning and rearing in either the mainstem or tributaries, the first consideration in any particular area is the current condition of the habitat for spawning and rearing and the potential for protection or restoration of that habitat for natural production. If the potential for restoring the natural production of the habitat is low, or the biological potential²

¹ As used in this section, "habitat" includes the ecological functions of the habitat and the habitat structure.

² The "biological potential" of a species means the potential capacity, productivity, and life history diversity of a population in its habitat at each life stage.

Criteria			Examples of Strategies	
Habitat Condition	Description	Biological Potential of Target Species	Habitat Strategy	Possible Artificial Production Strategy
Intact	Ecological functions and habitat structure largely intact	High	Preserve	No artificial production
		Low	Preserve	Limited supplementation
Restorable	Potentially restorable to intact status through conventional techniques and approaches	High	Restore to intact	Interim supplementation
		Low	Restore to intact	Limited supplementation
Compromised	Ecological function or habitat structure substantially diminished	High	Moderate restore	Limited supplementation
		Low	Moderate restore	Supplementation
Eliminated	Habitat fundamentally altered or blocked without feasible option	High	Substitute	Replacement hatchery
		Low	Substitute	Replacement hatchery

of the target population³ is low because of survival problems elsewhere in its life cycle, the area may become a candidate for certain types of artificial production.

The table on the previous page illustrates possible applications of this approach to strategies within this program.

Intact habitat: Where the habitat for a target population is largely intact, then the biological objectives for that habitat will be to preserve the habitat and restore the population of the target species up to the sustainable capacity of the habitat.

When the biological potential of a target population is high, biological risk should be avoided and restoration should be by means of natural spawning and rearing. When the biological potential of the target population is limited by external factors, such as the presence of mainstem dams or other factors, supplementation is a possible policy choice to augment natural capacity and productivity, in a limited fashion that ensures that the majority of production will be the result of natural spawning.

Restorable habitat: Where the habitat for a target population is absent or severely diminished, but can be restored through conventional techniques and approaches, then the biological objective for that habitat will be to restore the habitat with the degree of restoration depending on the biological potential of the target population. Where the target population has high biological potential, the objective will be to restore the habitat to intact condition, and restore the population up to the sustainable capacity of the habitat. In this situation, if the target population had been severely reduced or eliminated as a result of the habitat deterioration, the use of artificial production

³“Target species” or “target population” means a species or population singled out for attention because of its harvest significance or cultural value, or because it represents a significant group of ecological functions in a particular habitat type.

“This program relies heavily on protection of, and improvements to, inland habitat as the most effective means of restoring and sustaining fish and wildlife populations.”

in an interim way is a possible policy choice to hasten rebuilding of naturally spawning populations after restoration of the habitat.

Where the target population has low biological potential — for example, when downstream rearing conditions severely limit the survival of juveniles from a given spawning area — the objective will be to restore the habitat to intact condition and consider sustained but limited supplementation as a possible policy choice.

Compromised habitat: Where the habitat for a target population is absent or substantially diminished and cannot reasonably be fully restored, then the biological objective for that habitat will depend on the biological potential of the target species.

Where the target species has high biological potential, the objective will be to restore the habitat up to the point that the sustainable capacity of the habitat is no longer a significant limiting factor for that population. The objective also is to restore the population of the target species up to the sustainable capacity of the restored habitat. Sustained supplementation in a limited fashion is a possible policy choice in this instance.

Where the target species has low biological potential, the objective will be to restore the habitat up to the point that the sustainable capacity of that habitat is no longer a significant limiting factor for that population. In this instance, a possible policy choice

is expanded artificial production that utilizes the natural selection capabilities of the natural habitat to maintain fitness of both natural and artificial production.

Eliminated habitat: Where habitat for a target population is irreversibly altered or blocked, and therefore there are no opportunities to rebuild the target population by improving its opportunities for growth and survival in other parts of its life history, then the biological objective will be to provide a substitute. In the case of wildlife, where the habitat is inundated, substitute habitat would include setting aside and protecting land elsewhere that is home to a similar ecological community. For fish, substitution would include an alternative source of harvest (such as a hatchery stock) or a substitution of a resident fish species as a replacement for an anadromous species.

3. Habitat Strategies

Primary strategy: Identify the current condition and biological potential of the habitat, and then protect or restore it to the extent described in the biological objectives.

This program relies heavily on protection of, and improvements to, inland habitat as the most effective means of restoring and sustaining fish and wildlife populations. However, it also recognizes that depending on the condition of the habitat and the target species, certain categories of mitigation investments are likely to be more effective than others. Thus, an important function of this strategy is to direct investments to their most productive applications.

Changes in the hydrosystem are unlikely within the next few years to fully mitigate impacts to fish and wildlife. However, the Northwest Power Act allows off-site mitigation for fish and wildlife populations affected by the hydrosystem. Because some of the greatest opportunities for improvement lie outside the immediate area of the hydrosystem — in the tributaries and subbasins off the

mainstem of the Columbia and Snake Rivers — this program seeks habitat improvements outside the hydrosystem as a means of off-setting some of the impacts of the hydrosystem.

For example, passage through the hydrosystem causes injury to spring chinook. While measures at the dams can and should be taken to reduce this injury, as long as the dams exist they will continue to cause some of this injury. As an offset, the program may call for improvements in spawning and rearing habitats in tributaries where there are no dams present. By restoring these habitats, which were not damaged by the hydrosystem, the program helps compensate for the existence of the hydrosystem.

Habitat considerations extend beyond the tributaries, however. Historically, the mainstem Columbia and Snake rivers were among the most productive spawning and rearing habitats for salmonids and provided essential resting and feeding habitat for mainstem resident and migrating fish. Protection and restoration of mainstem habitat conditions must be a critical piece of this habitat-based program.

As explained further in other parts of this program, a specific plan will be developed for each of the subbasins in the Columbia River Basin and for related sections of the mainstem Columbia and Snake rivers, as well as objectives and strategies for each ecological province. Each subbasin plan will begin with an assessment of the current physical and biological conditions, and then address the improvements that are needed.

The Council believes there is a wide variety of potentially successful approaches that may be used to improve and maintain habitat, and also believes that the choice of which approach to use is best left to a local, site-specific decision, subject to scientific review. However, all subbasin plans, and measures within those plans, should be consistent with the vision and biological objectives, and the following strategies:

Build from Strength

Efforts to improve the status of fish and wildlife populations in the basin should protect habitat that supports existing populations that are relatively healthy and productive. Next, we should expand adjacent habitats that have been historically productive or have a likelihood of sustaining healthy populations by reconnecting or improving habitat. In a similar manner, this strategy applies to the restoration of weak stocks: the restoration should focus first on the habitat where portions of that population are doing relatively well, and then extend to adjacent habitats.

Restore Ecosystems, Not Just Single Species

Increasing the abundance of single populations may not, by itself, result in long-term recovery. Restoration efforts must focus on restoring habitats and developing ecosystem conditions and functions that will allow for expanding and maintaining a diversity within, and among, species in order to sustain a system of robust populations in the face of environmental variation.

Use Native Species Wherever Feasible

Even in degraded or altered environments, native species in native habitats provide the best starting point and direction for needed biological conditions in most cases. Where a species native to that particular habitat cannot be restored, then another species native to the Columbia River Basin should be used. Any proposal to produce or release non-native species must overcome this strong presumption in favor of native species and habitats and be designed to avoid adverse impacts on native species.

Substitution

Mitigation in areas blocked to salmon and steelhead by the development and operation of the hydropower system is appropriate, and flexibility in approach is needed to develop a program that provides resident fish substitutions for lost salmon and steelhead where in-kind mitigation cannot occur. The "Compilation of Salmon and Steelhead Losses in the Columbia River Basin" and the "Numerical Estimates of Hydropower-related Losses" adopted in Appendices D and E of the 1987 program, and contained in the Appendix to this program together, are the starting place for the Council's approach regarding substitution.

Include the Estuary

The estuary is an important ecological feature that is negatively affected by upriver management actions and local habitat change. While less is known about the potential for improvement in the estuary than is known about the potential for improvement in most other parts of the Columbia River Basin, there are indications that substantial improvements are possible and that these improvements may benefit most of the anadromous fish populations. The estuary will be included as one of the planning units for this program. (The freshwater plume and the ocean itself are also important habitats for salmon and are addressed in the Ocean Conditions section of this program.)

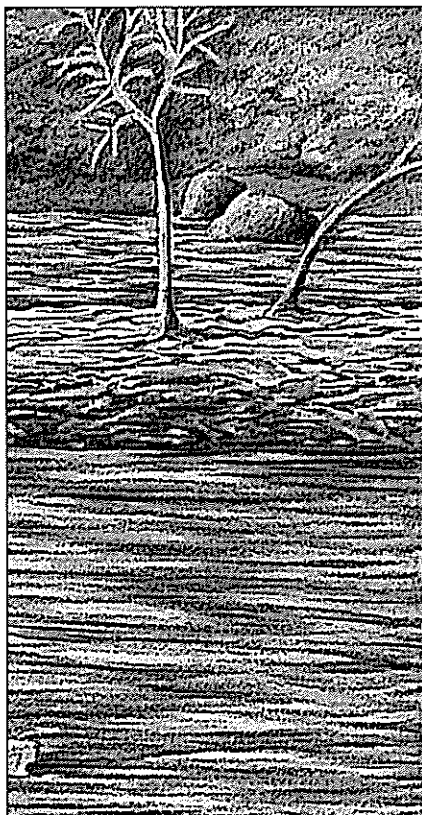
Address Transboundary Species

Because about 15 percent of the Columbia River Basin is in British Columbia, including the headwaters of the Columbia and several of its key tributaries, ecosystem restoration efforts should address transboundary stocks of fish and wildlife and transboundary habitats. Where mitigation measures are designed to benefit both U.S. and Canadian fish and wildlife populations, U.S. ratepayer funding should be in proportion to anticipated benefits to the U.S. populations.

4. Artificial Production Strategies

Primary strategy: Artificial production can be used, under the proper conditions, to 1) complement habitat improvements by supplementing native fish populations up to the sustainable carrying capacity of the habitat with fish that are as similar as possible, in genetics and behavior, to wild native fish, and 2) replace lost salmon and steelhead in blocked areas.

The critical issue that the region faces on artificial production is whether artificial production activities can play a role in providing significant harvest opportunities throughout the basin while also acting to protect and even rebuild naturally spawning populations. Artificial production must be used in a manner consistent with ecologically based scientific principles for fish recovery. Fish raised in hatcheries for harvest should have a minimal impact on fish that spawn naturally. Fish reared in hatcheries or by other



artificial means for the purpose of supplementing the recovery of a wild population should clearly benefit that population.

The science on this issue is far from settled. Improperly run, artificial production programs can do damage to wild fish runs. However, when fish runs fall to extremely low levels, artificial production may be the only way to keep enough of that population alive in the short term so that it has a chance of recovering in the long term. What is not so clear is the extent to which artificially produced fish can be mixed with a wild population in a way that sustains and rebuilds the wild population.

The Council has weighed these uncertainties and, recognizing that inaction also holds a large risk, has adopted the strategies in this section. These strategies, which are summarized in the Biological Objectives table on page 15, are intended to address the limitations and opportunities of specific habitat conditions.

Implementation of Recommendations from Artificial Production Review

The Council and the region's fish and wildlife managers recently completed a multiyear review of artificial production in the Columbia River Basin. This review established a set of standards to be applied in all artificial production programs in the Columbia River Basin, and this program incorporates these standards as minimum standards for all artificial production projects. The full description of these standards is in the Artificial Production Review section of the Appendix. In summary, the policies are:

- The purpose and use of artificial production must be considered in the context of the ecological environment in which it will be used.
- Artificial production must be implemented within an experimental, adaptive management design that includes an aggres-

sive program to evaluate the risks and benefits and address scientific uncertainties.

- Hatcheries must be operated in a manner that recognizes that they exist within ecological systems whose behavior is constrained by larger-scale basin, regional and global factors.
- A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation.
- Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics.
- The entities authorizing or managing an artificial production facility or program should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some combination of those purposes for each population of fish addressed.
- Decisions on the use of the artificial production tool need to be made in the context of deciding on fish and wildlife goals, objectives and strategies at the sub-basin and province levels.
- Appropriate risk management needs to be maintained in using the tool of artificial propagation.
- Production for harvest is a legitimate management objective of artificial production, but to minimize adverse impacts on natural populations associated with harvest management of artificially produced populations, harvest rates and practices must be dictated by the requirements to sustain naturally spawning populations.

- Federal and other legal mandates and obligations for fish protection, mitigation, and enhancement must be fully addressed.

Wild Salmon Refuges

Where the critical habitat is largely intact, artificial production is not currently occurring, and the fish population has good potential, then no artificial production should be used. Those populations and their associated spawning and early rearing habitat should be preserved and protected.

Harvest Hatcheries

Hatcheries intended solely to produce fish for harvest may be used to create a replacement for the lost or diminished harvest. The hatchery must be located and operated in a manner that does not lead to adverse effects on other stocks through excessive straying or excessive take of weak stocks in a mixed-stock fishery.

Restoration

Except for wild salmon refuges or areas where the habitat is blocked or eliminated, supplementation of natural runs with artificially produced fish may be used for the purpose of rebuilding the natural runs, although the decision of whether to employ supplementation for this purpose is one that should be made locally, as part of the subbasin plan. The object of such supplementation is to restore and maintain healthy fish populations, with sufficient genetic and life history diversity to ensure that eventually, after appropriate habitat improvements, they will become self-sustaining.

Experimental Approach

In recognition of the risk and uncertainty associated with artificial production, each artificial production activity must be approached experimentally with a plan detailing the purpose and method of opera-

tion, the relationship to other elements of the subbasin plan, including associated habitat and other projects within the subbasin plan, specific measurable objectives for the activity, and a regular cycle of evaluation and reporting of results. This approach will allow the region to address the remaining uncertainties on a case-by-case basis and quickly make adjustments in artificial production activities where warranted.

Initial Review

Over the next three years, every artificial production program and facility in the basin, federal and non-federal, should undergo a review to determine its consistency with these strategies, scientific principles, and policies. These evaluations will be a prerequisite for seeking continued funding and/or adopting a subbasin plan into the program in the next phase of the amendment process. These evaluations must be guided in part by basin, province level and subbasin level visions, goals and objectives, and by overarching policies for artificial production based on the policies stated earlier.

Annual Reporting and Five-year Review

After five years, the Council, other regional decision-makers and Congress should assess whether existing review, funding and planning processes are successful in implementing needed reforms in artificial production practices. In the interim, the entities responsible for artificial production programs should issue annual reports on their progress in achieving the policies and standards called for in the Artificial Production Review. The Council will act as a clearinghouse to obtain, compile, and distribute these annual reports for review by decision-makers and the public.

Artificial Production Committee

In order to achieve a regional perspective and a unified approach to artificial production reform, an advisory committee to the Council will be created. The advisory committee will be tasked with reporting quarterly on implementation of artificial production reforms across the basin in a consistent, coordinated and efficient manner. A small team of agency personnel, independent scientists, and representatives of non-governmental organizations will be assigned to watch over and coordinate the reform effort. One early task for the committee will be to further define the approach, work plan and decision points for evaluating the purpose of all the artificial production programs and facilities over the next three years.

5. Harvest

Primary strategy: Assure that subbasin plans are consistent with harvest management practices and increase opportunities for harvest wherever feasible.

The Council makes no claim to regulatory authority over harvest of fish and wildlife. It recognizes and affirms the fish and wildlife managers' legal jurisdiction and tribal trust and treaty rights.

However, there is little point in recommending funding for implementation of a subbasin plan when

FAST FACT

The largest major tributary to the Columbia River Basin is the Snake River, which is more than 1,000 miles long.

the objectives for the plan cannot be reached under current harvest regimes. If, for example, a wildlife mitigation project aims to re-establish an elk herd in a subbasin, and existing regulations will allow for overly aggressive harvest of the herd while it is first being established, there is good reason to doubt whether the project can succeed.

On the other hand, there is also no advantage to increasing fish populations in the interest of greater harvest if the anticipated harvest regimes will not allow that harvest to take place. A hatchery that rears fish solely for harvest is of little benefit if the majority of those fish go uncaught because the potential harvest is restricted by the presence of another, much weaker stock.

Therefore the Council adopts the following harvest strategies:

Contributions to Harvest and Escapement Goals

Each subbasin plan and hatchery management plan must explicitly describe the expected contribution to harvest for each of the harvested stocks or species. In the case of wildlife, the plan must indicate the area in which the wildlife will be harvested. In the case of fish, the plan must indicate the expected contribution to specific fisheries. In both instances, the plan must identify clear escapement goals for each species or stock and explain the basis on which that goal was chosen.

Compatibility with Harvest Regimes

Each subbasin plan and hatchery management plan must state the

"A hatchery that rears fish solely for harvest is of little benefit if the majority of those fish go uncaught because the potential harvest is restricted by the presence of another, much weaker stock."

likelihood that adequate numbers of adults will remain or return to the subbasin to assure reproductive success and meet subbasin goals for the next generation. If the escapement required for the plan to succeed is greater than that which occurs under current harvest regimes, then the plan should also indicate whether and how the current regimes will be adjusted and whether the managers for that harvest have concurred with the adjustment.

Artificial Production

Artificially produced fish created for harvest should not be produced unless they can be effectively harvested in a fishery or provide other significant benefits. The appropriate reform for artificial production pro-

grams that do not meet this strategy is termination or revision so that the program complies with this strategy.

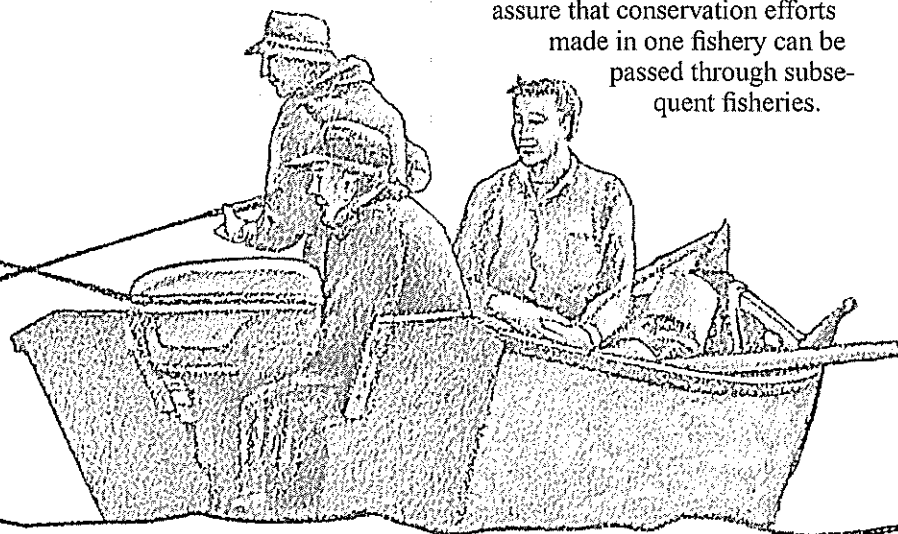
Opportunities for Increased Harvest

Each subbasin plan and hatchery management plan should identify (a) where there is an opportunity for a terminal fishery and (b) any instance in which increased harvest is possible but will not occur under the existing harvest regime, and the changes that would be necessary to allow the harvest to occur. The plan may also identify, and propose for funding if needed, equipment, marking techniques, management costs, and monitoring and evaluation costs required to establish the feasibility of selective harvest techniques that allow for additional harvest of species and stocks originating in that subbasin or at that hatchery.

Monitoring and Reporting

The Council recommends the following practices in harvest management, and will seek to encourage the region's fish and wildlife managers to adopt them:

- Maintain an open and public process, allowing public observation of harvest and allocation discussions and timely dissemination of harvest-related information in a publicly accessible manner.
- Integrate harvest management to assure that conservation efforts made in one fishery can be passed through subsequent fisheries.



- Manage harvest to ensure the risk of imprecision and error in predicted run size does not threaten the survival and recovery of naturally spawning populations.
- Monitor inriver and ocean fisheries and routinely estimate stock composition and stock-specific abundance, escapement, catch, and age distribution. Expand monitoring programs as necessary to reduce critical uncertainties. Manage data so that it can be easily integrated and readily available in real time.
- Manage harvest consistent with the protection and recovery of naturally spawning populations.
- Biennially, solicit scientific peer review of harvest management plans and analyses, starting in January 2002.

6. Hydrosystem Passage and Operations

Primary strategy: Provide conditions within the hydrosystem for adult and juvenile fish that most closely approximate the natural physical and biological conditions, provide adequate levels of survival to support fish population recovery based in subbasin plans, support expression of life history diversity, and assure that flow and spill operations are optimized to produce the greatest biological benefits with the least adverse effects on resident fish while assuring an adequate, efficient, economical, and reliable power supply.

The development and operation of the hydrosystem has major impacts on fish.

These impacts are not restricted to anadromous fish. White sturgeon spawning depends on certain patterns of spring flow; trout and other species migrate between reservoirs and adjoining streams and are affected by reservoir levels. High rates of discharge from a reservoir may reduce the food supply available to fish in that

"The Council plans to enact a mainstem coordination plan containing measures for the hydrosystem by October 2001 in a subsequent phase of this program."

reservoir and even entrain those fish, sending them downstream. Even fish living in free-flowing stretches below reservoirs can be strongly impacted by sudden changes in river elevation or water temperature resulting from operation of the upstream project.

Wildlife are also affected by the development and operation of hydroelectric projects. In particular, reservoir levels greatly affect the

MAJOR IMPACTS OF THE HYDROSYSTEM ON FISH:

1. The dams themselves are barriers to upstream and downstream migration.
2. The dams, and the reservoirs behind them, reduce the velocity of the river, affecting juvenile and adult migration speed.
3. The storage, release, and impoundment of water changes the pattern of water flows and water temperatures above, through and below the hydroelectric dams and changes the characteristics of the estuary.
4. The reservoirs eliminate spawning and rearing areas in the mainstem by increasing the river depth, decreasing water velocity, and retaining sediments.
5. Changes in reservoir elevation affect the access of fish to adjoining streams, and affect the availability of food for fish living in the reservoirs.

trees, shrubs, and grasses that would normally grow at the water's edge and provide wildlife nesting and feeding habitat.

All of these impacts are basically habitat issues. The strategies identified earlier in the habitat section are applicable here as well, and several of the strategies in this section are simply specialized applications of those in the habitat section.

The Council recognizes that the National Marine Fisheries Service and U.S. Fish and Wildlife Service, acting under the authority of the Endangered Species Act, will be prescribing detailed conditions for the improvement and operation of the hydrosystem through the issuance of biological opinions. These conditions focus on the needs of listed species, especially migration and passage needs.

The Council plans to enact a mainstem coordination plan containing measures for the hydrosystem by October 2001 in a subsequent phase of this program. The purpose of these measures will be to recommend ways in which the hydrosystem operations called for in the biological opinions could be adjusted, so as to assure that those operations meet the needs of ESA-listed stocks and the dictates of the Northwest Power Act. The hydrosystem measures will also provide necessary guidance to the Council's subbasin planning process.

Until October 2001, when the Council plans to have these hydrosystem measures developed, the Council recommends that Bonneville, the Bureau of Reclamation, the U.S. Army Corps of Engineers, and other operating agencies not move forward with previously called-for but unimplemented measures in Sections 5 and 6 of the 1994-1995 Fish and Wildlife Program (Council document 94-55) relating to hydrosystem operations, including specific flow augmentation measures, except to the extent the measures are fully consistent with the hydrosystem strategies outlined in this Phase One program.

The Power Act requires the Council, in this program, to adopt mea-

asures to "protect, mitigate, and enhance" all fish and wildlife affected by the operation of the hydrosystem, and to include measures that provide for improved survival of fish at hydroelectric facilities and for flows of sufficient quality and quantity to improve production, migration and survival. The Act also requires the Council to assure that the measures in this program are consistent with "an adequate, economical, efficient, and reliable power supply."

While the Council must consider the impacts of the conditions imposed by the federal agencies under the Endangered Species Act, the Council has a broader mandate. As part of this mandate, the Council recognizes that the survival of listed species affected by the hydrosystem must be an integral component of the Council's fish and wildlife plan. Addressing Endangered Species Act requirements together with the long-term management of healthy stocks is a long-term planning objective of the Council. The Northwest Power Act requires that the Council must assure that the needs of fish and wildlife are met as efficiently as possible, while also assuring the continued reliability, adequacy and affordability of the regional power supply.

The Council believes that the federal agencies operating the hydro-system will have some flexibility in implementing the conditions imposed under the Endangered Species Act. In addition, the manner in which the hydrosystem is operated outside of the circumstances regulated by the Endangered Species Act may still have important consequences for fish and wildlife.

The Council adopts the following hydrosystem strategies:

Strategy: Provide conditions in the hydrosystem for adult and juvenile fish that most closely approximate natural physical and biological conditions.

In its Energy and Water Development appropriations bill for Fiscal

Year 1998, Congress asked the Council, with the assistance of the Independent Scientific Advisory Board, to review the capital improvements at mainstem dams proposed by the Corps of Engineers. The reports produced by this review contain a set of technical findings and recommendations. The reports are included in the Technical Appendix. Based on these reports, and the recommendations of others, the Council is adopting this general strategy, which includes, but is not limited to, the following elements:

- **Protect Biological Diversity**

Actions to improve juvenile and adult fish passage through mainstem dams, including the use of fish transportation, should protect biological diversity by benefiting the range of species, stocks and life-history types in the river, and should favor solutions that best fit natural behavior patterns and river processes. Survival in the natural river should be the baseline against which to measure the effectiveness of other passage methods. To meet the diverse needs of multiple species and allow for uncertainty, multiple juvenile passage methods may be necessary at individual projects.

- **Juvenile Fish Passage**

To provide passage for juvenile fish that closely approximates natural physical and biological conditions, and to increase the energy produced by the hydro-system, the U.S. Army Corps of Engineers should 1) continue testing and developing surface bypass systems, taking into account the widest range of biological diversity, utilizing an expedited approach to prototype development, and ensuring full evaluation for the developmental phase; 2) relocate bypass outfalls in those circumstances where there are problems with predation and juvenile fish injury and

mortality; and 3) modify turbines to improve juvenile survival.

- **Adult Passage**

The U.S. Army Corps of Engineers should improve the overall effectiveness of the adult fish passage program. This includes expediting schedules to design and install improvements to fish passage facilities. Cool water releases from reservoirs should continue to be used to facilitate migration. More emphasis should be placed on monitoring and evaluation, increased accuracy of fish counts, installation of PIT-tag detectors, evaluation of escapement numbers to spawning grounds and hatcheries, research into water temperature effects on fish passage, and the connection between fish passage design and fish behavior.

- **Annual Report on Capital Improvements**

The Corps of Engineers, working within the regional fish and wildlife project selection process, should report to the Council annually on how the prioritization criteria and decisions on passage improvements take into account these principles.

- **Implementation of These Principles**

The Council 1) expects that the Independent Scientific Review panel will apply these principles during the panel's review of the reimbursable portion of the Bonneville fish and wildlife budget, which includes the Corps' passage program; 2) will itself apply these standards in its review of any Independent Scientific Review Panel report and resulting recommendations to Congress on these passage budget items; and 3) will recommend to Congress, in its reimbursable budget recommendations, that budget requests from

the Corps of Engineers be evaluated for consistency with these principles.

- Protect and Expand Mainstem Spawning and Rearing Habitat

The operation of the hydrosystem should protect, and where possible, expand, mainstem spawning and rearing areas. In instances where this strategy conflicts with flows for juvenile migration or temperature control, the system operators should identify the potential conflict and seek recommendations from state and federal agencies and tribes on how to best meet the two needs.

- Inriver Migration and Transportation

Because the existence of the dams and reservoirs creates conditions that are not natural, the Council, while seeking to improve inriver conditions, recognizes that there are survival benefits from transportation of migrating juvenile salmon. Therefore, the Council 1) accepts juvenile fish transportation as a transitional strategy; 2) will give priority to the funding of research that more accurately measures the effect of improved inriver migration compared to transportation; 3) will recommend increasing inriver migration when research demonstrates that salmon survival would be improved as a result of such migration; and 4) endorses the strategy of "spread the risk" which, depending on water and environmental conditions, divides migrating juvenile salmon and steelhead between inriver passage and transportation.

Strategy: Manage the hydrosystem so that patterns of flow more closely approximate the natural hydrographic patterns, and assure any changes in water management are premised upon, and proportionate to, fish and wildlife benefits.

- Balance Systemwide Water Management Among Different Species and Life Stages

Systemwide water management, including flow augmentation from storage reservoirs, should balance the needs of resident fish with those of anadromous fish, and the needs of migrating fish with those of spawning and rearing fish. In instances where flow management needs conflict with this program, the system operators should identify the potential conflict and seek recommendations from the Council, fish and wildlife agencies and tribes and other affected entities on how best to balance the different needs. Conflicts shall be reported to the Council.

- Coordination

In fulfilling the operating conditions for the hydrosystem established under the Endangered Species Act and Clean Water Act, the federal system operating agencies shall, to the fullest extent practicable, meet those conditions in a manner which protects other fish and wildlife species affected by the operation of the hydrosystem. In providing information on operations to meet the needs of a particular species or set of species, the Fish Passage Center shall take into account, through consultation with the fish and wildlife managers, the needs of other species and indicate how these needs can best be balanced or accommodated. The fish and wildlife managers should indicate to the Fish Passage Center whether such conflicts among the needs of different species exist and, when present, recommend remedies. On an interim basis, the operating conditions needed to meet the needs of these other species are those that were adopted by the Council in Section 10 of its 1995 program

amendments. When the mainstem coordination plan and sub-basin plans are adopted by the Council, the relevant conditions will be included in the plans.

Strategy: Assure that flow and spill operations are optimized to produce the greatest benefits with the least adverse effects on resident fish while assuring an adequate, efficient, economical, and reliable power supply.

The Council's program must be consistent with "an adequate, efficient, economical, and reliable power supply." The Council will analyze potential impacts to the power system of different water management and operation strategies, including proposed federal operations to meet Endangered Species Act and Clean Water Act requirements, determine if the operations ensure an adequate, efficient, economical, and reliable power supply, and recommend operational changes if not. The Council is particularly interested in the efficiency and effectiveness of the operations undertaken for fish and wildlife. The Council will be preparing recommendations that optimize energy production, capacity and especially reliability while meeting diverse fish and wildlife needs.

- In-season Changes

The Bonneville Power Administration, in consultation with the

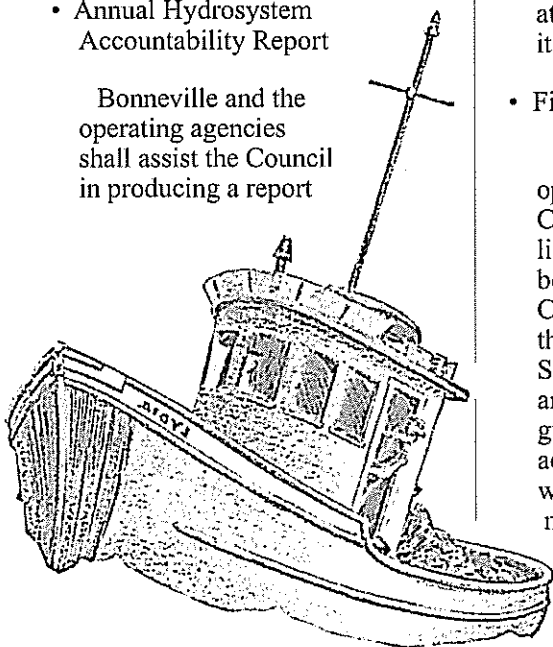
FAST FACT

Four species of Pacific salmon—chum, chinook, coho and sockeye—and two species of anadromous trout—steelhead and sea-run cutthroat—are found in the Columbia River Basin.

U.S. Army Corps of Engineers and the Bureau of Reclamation, before undertaking a particular operation of the hydrosystem to benefit, or that will adversely affect, fish or wildlife, shall provide a written statement of the estimated cost or benefit and impact on the power system of the proposed action. The Fish Passage Center, in consultation with the fish and wildlife managers, shall provide a brief written statement of the incremental benefit or detriment to fish or wildlife anticipated from the proposed change. In the event that a fish and wildlife agency or tribe believes that the proposed action will have an adverse effect on fish and wildlife, Bonneville should also obtain a brief written statement of the adverse effect. Copies of these statements should be furnished to those parties considering the request, to the Council, and made available to the public. This provision shall not apply to an operation in response to a biological opinion requirement if the requirement is so specific that it leaves essentially no discretion to the operating agencies on how to fulfill the requirement.

- Annual Hydrosystem Accountability Report

Bonneville and the operating agencies shall assist the Council in producing a report



that shall provide an accounting of Bonneville's fish and wildlife expenditures and hydropower operations costs. For example, the report should summarize 1) the overall cost and impact to the hydro and transmission system of operations for fish and wildlife and other non-power needs; 2) a summary of each change requested, the outcome of that request, and the reason for approving or denying that request; and 3) recommendations from fish and wildlife managers and tribes for modifications to the operating regimes or investments in facilities to improve fish and wildlife habitat within the hydrosystem without undue affect on the costs to, or impacts on, the hydrosystem.

- Annual Report on Flow Augmentation

Bonneville, in consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, shall prepare an annual report based on scientific research for review by the Independent Scientific Advisory Board that documents the flow augmentation actions taken, the benefits of flow augmentation for fish survival, and the precise attributes of flow that may make it beneficial.

- Fish Passage Center

This program continues the operation of the Fish Passage Center. The Council will establish and appoint an oversight board for the Fish Passage Center, with representation from the National Marine Fisheries Service, the tribes, the Council, and others, to provide policy guidance and assure regional accountability and compatibility with the regional data management system. The Fish Passage

Center shall prepare an annual report to the Council and the oversight board, summarizing its activities and accomplishments.

- In-season Management Coordination

Through the biological opinions, the federal agencies have established an implementation structure for annual and in-season operations and for recommendations on funding for passage improvements. It is the Council's perspective that the part of the implementation structure that allows for technical review functions adequately, although there is a need for greater participation by affected entities. The Council recommends to the federal agencies that the Technical Management Team and the Implementation Team be jointly sponsored by the Council and the federal agencies, and allow for effective participation in these considerations by the relevant federal agencies, the Council and states, the tribes of the Columbia River Basin, and other affected entities, in a highly public forum. The Council will initiate discussions to jointly sponsor these coordination teams.

- Annual Operating Plan

The Council requests that each year, prior to March 1, the in-season management participants prepare and make available to the Council and the public an annual operating plan, describing the specific hydrosystem operations recommended for that year. In those instances where specific operations have not been determined as of March 1, the plan should identify the additional decisions that will need to be made, and the basis on which the participants expect to make them.

- Emergency Actions

To ensure the reliability of the power supply, power system

operators may curtail fish and wildlife operations temporarily during emergency situations.⁴ A predetermined protocol should be established by the Technical Management Team and the Implementation Team for emergency actions.⁵ However, the option of curtailing fish and wildlife operations during emergency situations should not be used in lieu of establishing an adequate and reliable power supply.⁶

Strategy: Establish and maintain a plan to assure coordination of mainstem operations and improvements.

- Mainstem Coordination Plan

The Council will assist interested parties to develop and recommend for adoption into this program a mainstem coordination plan, similar to the sub-

⁴ An emergency can occur due to a major temperature drop like those experienced in 1989 and 1990 or due to the temporary loss of generation from a major resource like the Columbia Generating Station or a powerhouse at a mainstem dam, or the loss of a major portion of the transmission capability on the northern or southern interties.

⁵ In general, all existing resources in the Western Integrated System should be dispatched prior to curtailing fish and wildlife operations. All reasonable efforts should also be made to relieve the emergency using demand-side resources, including requests for customers to voluntarily cut back use. During winter emergencies, water being held in reservoirs for spring and summer flow augmentation may be drafted. Once the emergency is resolved, any flow augmentation water used should be replaced as soon as possible, to the extent possible. During summer emergencies, bypass spill for fish may be curtailed or reduced or additional flow augmentation water may be released.

⁶ If the Northwest power system is deemed to be inadequate, new resources (whether generating or demand-side) should be developed to bring the system up to expected standards. Resources that integrate more effectively with fish and wildlife operations should be given highest priority for development.

basin plans described in this program. This plan will develop standards for systemwide coordination, such as flow regimes, spill, reservoir elevations, water retention times, passage modifications at mainstem dams, and operational requirements to protect mainstem spawning and rearing areas. This plan is in addition to the annual operating plan described earlier.

- Specific Biological Objectives and Measures Relevant to Hydro-system Operations

As the Council considers and adopts specific objectives and measures at the system, province, and subbasin levels, the Council may adopt more specific biological objectives and measures for mainstem operations. As provided in the section on further rulemakings, page 51, the mainstem coordination plan will be the vehicle for considering and adopting these specific objectives and measures. Specific objectives and measures will be coordinated with the mainstem and hydrosystem standards and actions contained in the National Marine Fisheries Service's and U.S. Fish and Wildlife Service's biological opinions and with the requirements of applicable federal laws.

- Key Uncertainties

As part of its cycle for project funding recommendations, the Council will regularly convene a meeting of fish and wildlife agencies and tribes and hydro-system operating agencies for the purpose of identifying key uncertainties about the operation of the hydrosystem and associated mainstem mitigation activities such as transportation of juvenile fish. This list of key uncertainties will be the starting point for targeted requests for research proposals.

- Longer-term Planning Perspectives

The region is in need of long-term planning regarding the current constraints on, and objectives of, water management, including current flood control requirements; the limitations on the purposes of managing water under the Columbia River Treaty; the requirements, opportunities and challenges of considering broader habitat needs, such as mainstem spawning and rearing habitat, estuary and plume impacts, and ocean habitat; and the region's long-term energy and capacity power system needs in the context of a changing energy industry, and the potential implications for fish and wildlife.

Working with federal agencies in the region, the tribes and the state fish and wildlife agencies, the Council will facilitate a long-term planning study to include consideration of reconfiguration and operational alternatives that could provide benefits for fish and wildlife on a broad scale. The study should also assess the economic and hydropower impacts of all reconfiguration and operational alternatives.

FAST FACT

In 1998, the Council designated 44,000 miles of river reaches in the basin as "protected areas" where hydroelectric development would have endangered fish and wildlife and their habitat.

Strategy: Assure that hydroelectric relicensing and future development provides protection for fish and wildlife.

- Hydroelectric Development and Licensing

The Council has adopted a set of standards for the Federal Energy Regulatory Commission and others to apply to the development and licensing of hydroelectric facilities in the Columbia River Basin. This includes designating certain river reaches in the basin as "protected areas," where the Council believes that hydroelectric development would have unacceptable risks of loss to fish and wildlife species of concern, their productive capacity, or their habitat. The standards, the river reaches to be protected, and the conditions relating to that protection, are identified in the Future Hydroelectric Development section of the Appendix to this program.

7. Wildlife

Primary strategy: Complete the current mitigation program for construction and inundation losses and include wildlife mitigation for all operational losses as an integrated part of habitat protection and restoration.

Some previous versions of this fish and wildlife program have treated wildlife mitigation measures as separate from fish mitigation measures. In this program, the Council has revised its approach, treating a given habitat as an ecosystem that includes both fish and wildlife.

Table 11-4 of the Council's 1994-1995 Fish and Wildlife Program, which is included on pages C-4 thru C-7 of the Appendix to this program, estimated wildlife losses due to hydropower construction. The 1994-1995 Program called upon the fish and wildlife managers and Bonneville to use this table as the starting point for wildlife mitigation measures and short- and long-term

mitigation agreements. The program also called upon these parties to reach agreement on how wildlife mitigation projects and fish mitigation projects should be credited toward identified losses.

A portion of the habitat units identified in Table 11-4 have been acquired in the wildlife mitigation projects to date, and some mitigation project agreements establish the basis on which the project will be credited toward these losses. However, no agreement has been reached on the full extent of wildlife losses due to the operations of the hydrosystem, nor has there been agreement on how to credit wildlife benefits resulting from riparian habitat improvements undertaken to benefit fish.

The extent of the wildlife mitigation is of particular importance to agencies and tribes in the so-called "blocked" areas, where anadromous fish runs once existed but were blocked by development of the hydrosystem. While there are limited opportunities for improving resident fish in those areas, resident fish substitution alone seldom is an adequate mitigation

Given the vision of this program, the strong scientific case for a more comprehensive, ecosystem-based approach, and the shift to implementation of this program through provincial and subbasin plans, the Council believes that the wildlife mitigation projects should be integrated with the fish mitigation projects. Therefore the Council adopts the following wildlife strategies:

Completion of Current Mitigation Program

To provide an orderly transition between the past fish and wildlife program and this program, Bonneville and the fish and wildlife managers should complete mitigation agreements for the remaining habitat units. These agreements should equal 200 percent of the habitat units (2:1 ratio) identified as unannualized losses of wildlife habitat from construction and inundation of



the federal hydropower system as identified in Table 11-4, which is included in the Appendix to this program. This mitigation is presumed to cover all construction and inundation losses, including annualized losses. In addition, for each wildlife agreement that does not already provide for long-term maintenance of the habitat, Bonneville and the applicable management agency shall propose for Council consideration and recommendation a maintenance agreement adequate to sustain the minimum credited habitat values for the life of the project.

- Allocation of Habitat Units

Habitat acquired as mitigation for lost habitat units identified in Table 11-4 must be acquired in the subbasin in which the lost units were located unless otherwise agreed by the fish and wildlife agencies and tribes in that subbasin.

- Habitat Enhancement Credits

Habitat enhancement credits should be provided to Bonneville when habitat management activities funded by Bonneville lead to a net increase in habitat value when compared to the level identified in the baseline habitat inventory and subsequent habitat inventories. This determination should be made through the periodic monitoring of the project site using the Habitat Evaluation Procedure (HEP) methodology. Bonneville should be credited for habitat enhancement efforts at a ratio of one habitat unit credited for every habitat unit gained.

- Operational Losses

An assessment should be conducted of direct operational impacts on wildlife habitat. Subbasin plans will serve as the vehicle to provide mitigation for direct operational losses and secondary losses. Annualization

“Better understanding of the conditions salmon face in the ocean can suggest which factors will be most critical to survival, and thus give insight as to which actions taken inland will be the most valuable.”

will not be used in determining the mitigation due for these losses. However, where operational or secondary losses have already been addressed in an existing wildlife mitigation agreement, the terms of that agreement will apply.

Implementation Guidelines

Project selection will be guided by subbasin plans incorporating wildlife elements. The subbasin plans will reflect the current basin-wide vision, biological objectives and strategies, and will also outline more specific short-term objectives and strategies for achieving specific wildlife mitigation goals. The plans will act as work plans for the fish and wildlife managers and tribes, with an emphasis on fully mitigating the construction and inundation and direct operational losses by a time certain, and will be revisited regularly as part of the provincial review cycle. Mitigation programs should provide protection of habitat through fee-title acquisition, conservation easement, lease, or management plans for the life of the project.

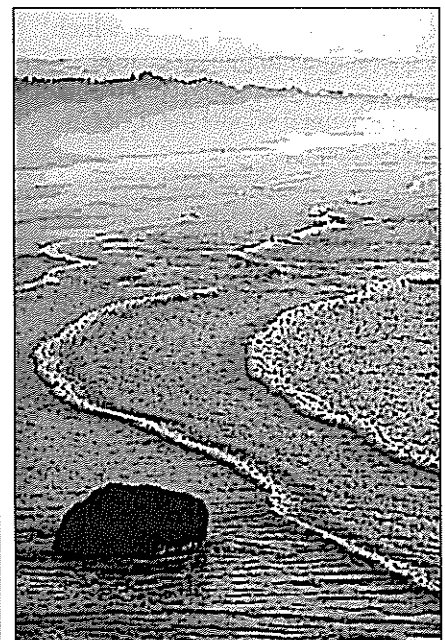
8. Ocean Conditions

Primary strategy: Identify the effects of ocean conditions on anadromous fish and use this information to evaluate and adjust inland actions.

The Council considers the ocean environment an integral component of the Columbia River ecosystem. Freshwater and marine environments are not independent from one another and are linked via large-scale atmospheric and oceanographic processes. The Council recognizes that these environments are utilized differently by different salmonid species and may serve different purposes.

The ocean is not a constant environment. Variations in ocean conditions occur over relatively short periods of a few years, as well as over longer-term cycles measured in decades. Within any time period, geographic variation in conditions can be pronounced as well. As a result, salmon populations are constantly fluctuating, and may pass through decade-long cycles of abundance, followed by equally long cycles of scarcity.

While we cannot control the ocean itself, we can take actions to assure that the salmon of the Columbia River Basin are well pre-



pared to survive in varying conditions. Better understanding of the conditions salmon face in the ocean can suggest which factors will be most critical to survival, and thus give insight as to which actions taken inland will be the most valuable.

An accurate and timely understanding of the survival in the ocean of each of the Columbia River Basin stocks also helps us assess the value of measures undertaken in this program. Because the ultimate measure of success is the number of adult fish returning, accurate monitoring and evaluation of inland efforts depends on our ability to isolate the effects of the ocean on a stock from the effects of those inland actions.

Without the ability to distinguish ocean effects from other effects, we may be tempted to confuse large returns with successful mitigation practices. Or, poor returns of adult fish may lead to abandonment of mitigation actions that are in fact highly beneficial unless we can recognize that the poor returns are in spite of, and not because of, these mitigation actions.

The estuary is addressed in the habitat strategy section because protecting and restoring estuarine habitat is feasible and involves some of the same strategies as habitats farther inland. This section addresses the freshwater plume, the near-shore conditions, and the high seas, which are less subject to human control.

The Council adopts the following ocean strategies:

Manage for Variability

Ocean conditions and regional climates play a large role in the survival of anadromous fish and other species in the Columbia River Basin. Management actions should strive to help those species accommodate a variety of ocean conditions by providing a wide range of life history strategies.

Distinguish Ocean Effects from Other Effects

Monitoring and evaluation actions should recognize and take into account the effect of varying ocean conditions and, to the extent feasible, separate the effects of ocean-related mortality from that caused in the freshwater part of the life cycle.

9. Research, Monitoring, and Evaluation

Primary strategies: 1) Identify and resolve key uncertainties for the program; 2) monitor, evaluate, and apply results; and 3) make information from this program readily available.

The heart of this program is a set of immediate actions to improve conditions for fish and wildlife. Despite a large body of knowledge about the needs of fish and wildlife, there are still many instances in which there is not yet enough information to fully understand which actions will be most effective. The intention of the Council — and the Northwest Power Act — is for the region to make

the best possible choice of actions based on the available information. Thus, lack of perfect information is not grounds for inaction.

The purpose of the research strategies under this program is to identify and resolve key uncertainties.

The purpose of the monitoring and evaluation strategies is to assure that the effects of actions taken under this program are measured, that these measurements are analyzed so that we have better knowledge of the effects of the action, and that this improved knowledge is used to choose future actions.

The purpose of the data management strategies is to support the research, monitoring, and evaluation strategies by making the results readily available. The data management strategy is also intended to increase the public accountability of this program by making the results accessible not only to specialists, but also to the public at large.

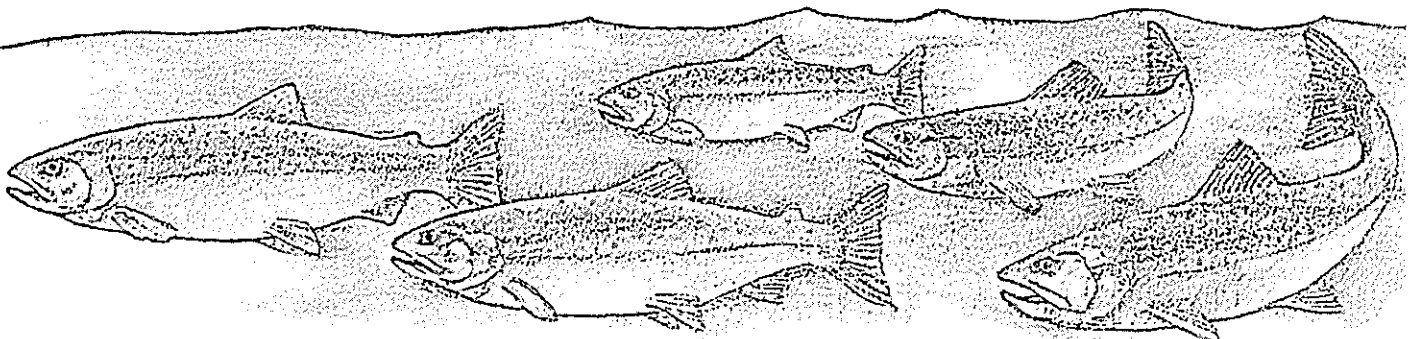
Research

Research Plan

The Council will establish a basin-wide research plan, similar to the subbasin plans, which identifies key uncertainties for this program and its biological objectives and the steps needed to resolve them. The plan will identify major research topics, including ocean research, and establish priorities for research funding.

Coordination

The research plan will be coordinated with the research elements of



the mainstem plan and the subbasin plans. The process for developing the plan and associated budgets will ensure independent scientific review, input from fish and wildlife agencies and tribes, independent scientists, and other interested parties in the region.

Open Access to Results

All completed research funded by Bonneville will be made readily available to all interested parties through the Internet and a library open to the public. This includes abstracts and information about how to obtain the full text of any report. Research projects will be required to submit all necessary information, including abstracts, within six months after research is conducted.

“State of the Science” Review

The Council will implement projects to review the current state of the science in key research areas. This effort may include the use of reports, surveys, conferences, and journals. In particular, the Council will work with the Independent Scientific Advisory Board to develop a series of reports to survey past research and summarize the state of the science in key areas.

Monitoring and Evaluation

Guidelines for Collecting Data and Reporting Results

The Council will initiate a process involving all interested parties in the region to establish guidelines appropriate for the collection and reporting of data in the Columbia River Basin.

Project Standards for Monitoring and Evaluation

Except where these criteria are clearly inapplicable, each project proposed for funding under this program must satisfy the following monitoring and evaluation criteria:

- The project must have measurable, quantitative biological objectives. (Related projects may rely on a single set of biological objectives.)
- The project must either collect or identify data that are appropriate for measuring the biological outcomes identified in the objectives.
- Projects that collect their own data for evaluation must make this data and accompanying metadata available to the region in electronic form. Data and reports developed with Bonneville funds should be considered in the public domain. Data and metadata must be submitted within six months of their collection.
- The methods and protocols used in data collection must be consistent with guidelines approved by the Council.

Bonneville, in its contracting process, should ensure that each project satisfies these four criteria.

Standards for Monitoring and Evaluation of Subbasin Plans

Subbasin plans will contain biological objectives as well as a plan for monitoring and evaluation to assess whether the projects implemented under the subbasin plan are achieving the objectives. The monitoring and evaluation portion of a subbasin plan should 1) identify the monitoring and evaluation tasks related to the objectives; 2) identify who will do the evaluation and on what schedule; 3) explain what kind of independent review will be incorporated if the main part of the monitoring and evaluation will be done by a main participant in the plan implementation; and 4) provide a budget for the monitoring and evaluation work. The project-specific monitoring and evaluation described above should feed information into the subbasin level evaluation.

Standards for Determining whether Objectives of the Program as a whole at the Basin and Province Levels are Being Achieved

Program implementation must also include as a systemwide project a program to evaluate whether the individual actions in the various subbasins are achieving the objectives of the program stated at the basin and province levels. The Council will work with other relevant parties in the basin to design this program-level monitoring and evaluation program, including describing the evaluation tasks, who will do the work, the possible budget, and the possible use of the independent science panels in assisting with this evaluation effort. The goal should be for the Council to produce an annual evaluation report of the success of the program in meeting its objectives.

Data Management

Data Gaps

The Council will initiate a process for identifying data needs in the basin, surveying available data, and filling any data gaps.

Dissemination of Data Via the Internet

The Council will initiate a process for establishing an Internet-based system for the efficient dissemination of data for the Columbia Basin. This system will be based on a network of data sites, such as Streamnet, Northwest Habitat Institute, Fish Passage Center, Columbia River Data Access in Real Time (DART), and others, linked by Internet technology. The functions of each data site, or module, will be clearly articulated and defined.

ECOLOGICAL PROVINCES

The program organizes the more than 50 subbasins of the Columbia River Basin into 11 ecological provinces, which are groups of adjoining subbasins with similar climates and geology. Because each province has its own distinct environment and fish and wildlife populations, each will have its own vision, biological objectives, and strategies. Those elements will be adopted in a later rulemaking. The province level visions, objectives, and strategies will be consistent with those adopted at the basin level.

A. GEOGRAPHICAL STRUCTURE

The Columbia River is an integrated biophysical system, but the basin is too large and complex for us to understand or manage as a single entity. At the same time, managing each piece as an independent entity risks losing appreciation for the interaction between components and their collective performance as a system. For this reason, the Council is adopting an ecologically based structure for the Columbia River ecosystem that emphasizes the interrelationships of the parts, including the Canadian portion of the basin to the extent information is available.

Within the Columbia River ecosystem, the scientific foundation defines areas with distinct ecological character that it termed ecological provinces (Figure 1). Ecological provinces are distinct subdivisions of the landscape containing ecologically related subbasins. The provinces are distinguished primarily on patterns related to hydrology, climate and regional geology.

These physical patterns relate to biological population patterns as well. Populations within a province are more likely to be related to other populations within that province than to populations in other provinces. Life history and other characteristics

...the Council is adopting an ecologically based structure for the Columbia River ecosystem that emphasizes the interrelationships of the parts, including the Canadian portion of the basin to the extent information is available."

should group into patterns that reflect physical habitat structure.

Each province consists of a set of adjoining watersheds with similar ecological conditions and tributaries that ultimately connect, flowing into the same river or lake. These provinces are thus appropriate units around which to organize and evaluate recovery objectives and efforts.

For our purposes, a subbasin can only be in one province; boundaries do not cut across subbasins. Hydroelectric dams, including the major dams on the Columbia and Snake rivers, are also considered to be within provinces.

Based on patterns of terrestrial vegetation, the headwaters of a subbasin are often distinct from the lower reaches and have been put into separate areas in other schemes. However, for purposes of planning, it makes little sense to split subbasins. Instead, we treat each subbasin as an integral component of a set of related subbasins forming a province. Table 1 displays the provinces and subbasins of the Columbia River Basin.

B. PROVINCE VISIONS, OBJECTIVES, AND STRATEGIES

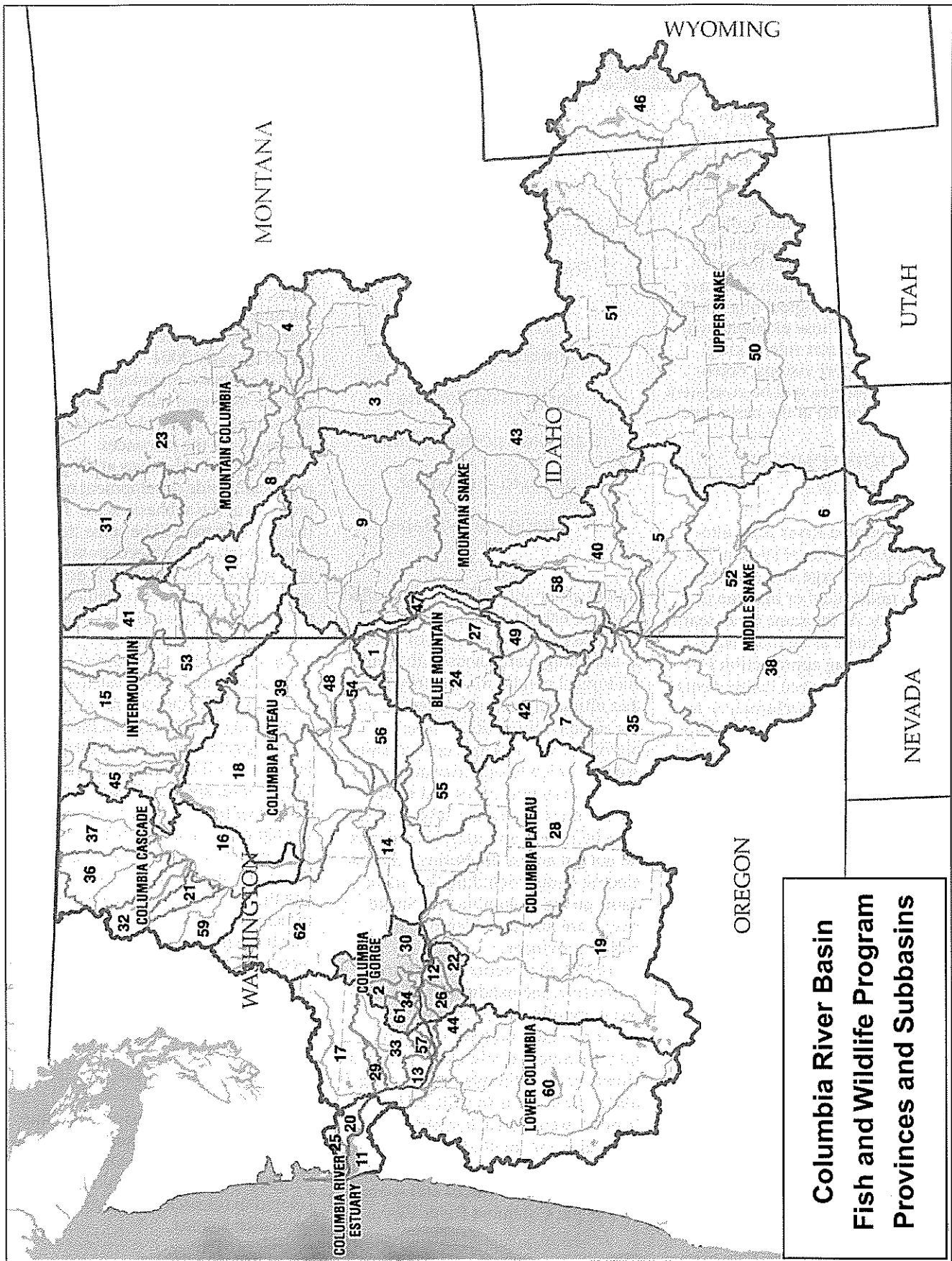
The Council has not yet adopted specific visions, objectives, or strategies for ecological provinces. Before offering more specific guidance at the province level, the Council believes that it is important to complete a preliminary assessment at the province level, identifying the attributes, needs, and opportunities that are unique to each province. That assessment is expected to be completed by early 2001. Upon completion of subbasin planning, the Council expects to amend into the program appropriate visions, objectives, and strategies for the provinces.

Biological objectives at the province scale guide development of the program at the subbasin scale. It is likely that there will be some iteration among biological objectives at the various scales as information is developed. However, the Council intends to develop a provisional set of objectives at the province scale to provide planning guidelines for subbasin planning. These may be revisited in the future to reflect the experience gained in planning at the subbasin level.

Biological objectives at the province level will be used to 1) "size" the program and describe the amount of change needed across the province; 2) help determine cost effectiveness of program measures; and 3) provide the basis for program accountability and the monitoring, evaluation and research associated with this program. The biological objectives at the province level are not intended to be prescriptive or regulatory in nature. Instead, they provide guidance for planning at the subbasin level.

C. OCEAN

For planning purposes under this program, the Council also recognizes the North Pacific Ocean as a geographic unit that should be considered in research, monitoring, and evaluation actions.



**Columbia River Basin
Fish and Wildlife Program
Provinces and Subbasins**

Subbasins

- | | |
|--------------------------|-----------------------------|
| 1 Asotin | 32 Lake Chelan |
| 2 Big White Salmon | 33 Lewis |
| 3 Bitterroot | 34 Little White Salmon |
| 4 Blackfoot | 35 Malheur |
| 5 Boise | 36 Methow |
| 6 Bruneau | 37 Okanogan |
| 7 Burnt | 38 Owyhee |
| 8 Clark Fork | 39 Palouse |
| 9 Clearwater | 40 Payette |
| 10 Coeur D'Alene | 41 Pend Oreille |
| 11 Columbia Estuary | 42 Powder |
| 12 Columbia Gorge | 43 Salmon |
| 13 Columbia Lower | 44 Sandy |
| 14 Columbia Lower Middle | 45 San Poil |
| 15 Columbia Upper | 46 Snake Headwater |
| 16 Columbia Upper Middle | 47 Snake Hells Canyon |
| 17 Cowlitz | 48 Snake Lower |
| 18 Crab | 49 Snake Lower Middle |
| 19 Deschutes | 50 Snake Upper |
| 20 Elochoman | 51 Snake Upper Closed Basin |
| 21 Entiat | 52 Snake Upper Middle |
| 22 Fifteenmile | 53 Spokane |
| 23 Flathead | 54 Tucannon |
| 24 Grande Ronde | 55 Umatilla |
| 25 Grays | 56 Walla Walla |
| 26 Hood | 57 Washougal |
| 27 Imnaha | 58 Weiser |
| 28 John Day | 59 Wenatchee |
| 29 Kalama | 60 Willamette |
| 30 Klickitat | 61 Wind |
| 31 Kootenai | 62 Yakima |

Ecological Provinces

- | | | | |
|--|------------------------|--|-------------------|
| | Columbia River Estuary | | Blue Mountain |
| | Lower Columbia | | Mountain Columbia |
| | Columbia Gorge | | Mountain Snake |
| | Columbia Plateau | | Middle Snake |
| | Columbia Cascade | | Upper Snake |
| | Intermountain | | |

Columbia River Basin Including Canada

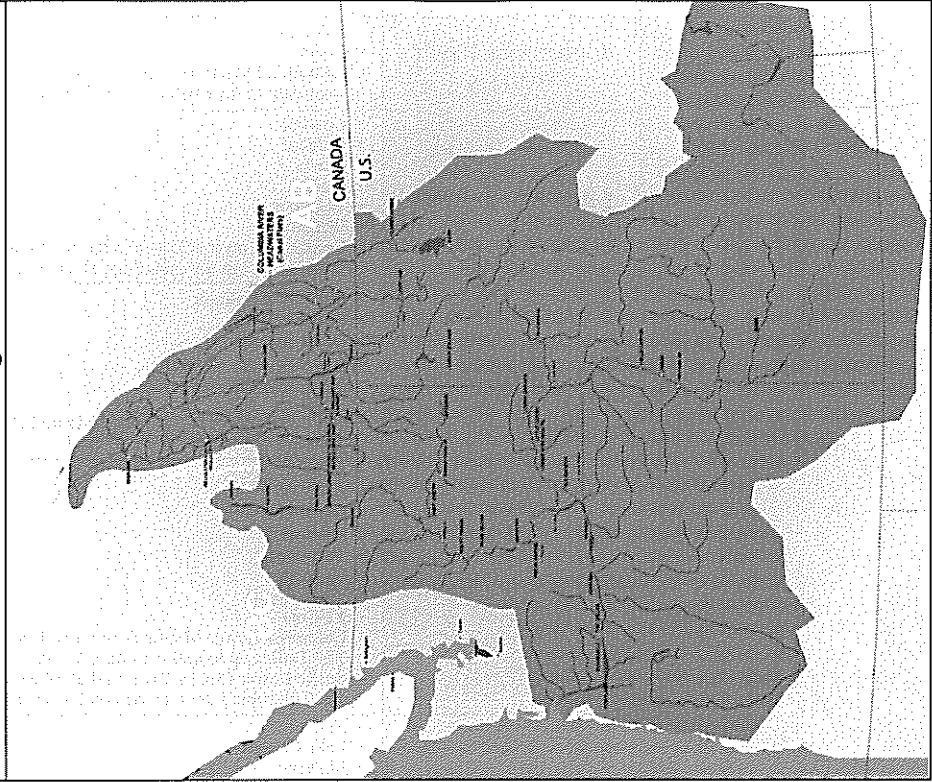


Table 1: Geographic Structure of the Columbia River Ecosystem Excluding the Marine Landscape

Landscape	Province	Subbasin
Columbia River Basin	Columbia River Estuary	<ul style="list-style-type: none"> Elochoman Grays Columbia Estuary (Columbia River and all other tributaries from the ocean upstream to the confluence with the Cowlitz river)
	Lower Columbia	<ul style="list-style-type: none"> Cowlitz Kalama Lewis Sandy Washougal Willamette Columbia Lower (Columbia River and all other tributaries upstream of the Cowlitz to, but not including, Bonneville Dam)
	Columbia Gorge	<ul style="list-style-type: none"> Big White Salmon Fifteenmile Hood Klickitat Little White Salmon Wind Columbia Gorge (Columbia River and all other tributaries between, and including Bonneville and The Dalles dams)
	Columbia Plateau	<ul style="list-style-type: none"> Crab Deschutes John Day Palouse Tucannon Umatilla Walla Walla Yakima Columbia Lower Middle (Columbia River and all other tributaries upstream of The Dalles up to and including Wanapum Dam) Snake Lower (Snake River and all other tributaries between the confluence with the Columbia river and the confluence with the Clearwater River)
	Columbia Cascade	<ul style="list-style-type: none"> Entiat Lake Chelan Methow Okanogan Wenatchee Columbia Upper Middle (Columbia River and all other tributaries upstream of Wanapum Dam to, but not including, Chief Joseph Dam)
	Intermountain	<ul style="list-style-type: none"> Coeur d'Alene, including Coeur d'Alene Lake Pend Oreille San Poil Spokane Columbia Upper (Columbia River and all other tributaries from Chief Joseph Dam to the international border)
	Mountain Columbia	<ul style="list-style-type: none"> Bitterroot Blackfoot Clark Fork Flathead Kootenai
	Blue Mountain	<ul style="list-style-type: none"> Asotin Grande Ronde Imnaha Snake Hells Canyon (Snake River and all other tributaries upstream of the confluence with the Clearwater River to, and including, Hells Canyon Dam)
	Mountain Snake	<ul style="list-style-type: none"> Clearwater Salmon
	Middle Snake	<ul style="list-style-type: none"> Boise Bruneau Burnt Malheur Owyhee Payette Powder Weiser Snake Lower Middle (Snake River and all other tributaries upstream of Hells Canyon Dam to the confluence with the Boise River) Snake Upper Middle (Snake River and all other tributaries from the confluence with the Boise River upstream to the confluence with Clover Creek near the town of King Hill)
Upper Snake	<ul style="list-style-type: none"> Upper Snake (Snake River and tributaries from Clover Creek upstream to the headwaters of the Henry's Fork) Upper Closed Basin Headwaters of the Snake (Snake River and all tributaries from the Heise gauging station upstream to headwaters in Wyoming) 	

SUBBASINS

The preceding sections of this program address fish and wildlife needs on two different levels: the Columbia River Basin as a whole and at the next level, the 11 ecological provinces within the basin. This section addresses the third level, the more than 50 subbasins within those ecological provinces. For each of these subbasins a locally developed "plan" will be adopted into the program. Each plan will have its own vision and biological objectives and will identify specific actions needed for fish and wildlife in that subbasin. The plans must be consistent with the visions, biological objectives, and strategies adopted at the basin and province levels, but otherwise are free to make unique choices and reflect local policies and priorities. The subbasin plans will be the basis for review and funding of most fish and wildlife projects in this program.

A. SUBBASIN PLANS

The fish and wildlife program is implemented principally at the subbasin level. It is at this subbasin level that the more general guidance provided by the basin and province level visions, principles, objectives, and strategies is refined in light of local scientific knowledge, policies, and priorities.

The subbasin plans will be adopted into the program, becoming the third tier of the program structure. If the vision for the basin is to be realized, it will be through successful selection and implementation of subbasin level goals, objectives, and strategies. Plans at this level will guide Bonneville funding of fish and wildlife activities. Subbasin level plans should also provide an opportunity for the integration and coordination of projects and programs funded by entities other than Bonneville, including Canadian entities in

"Subbasin plans will be reviewed for their consistency with biological objectives and strategies at the basin and province levels."

transboundary areas of the subbasins.

Subbasin plans will be reviewed for their consistency with biological objectives and strategies at the basin and province levels. Similarly, as subbasin plans are adopted into the program, higher level objectives and strategies may be modified to reflect and accommodate the information and initiatives of the plan.

Subbasin plans will also be the context for review of proposals for Bonneville funding each year by the fish and wildlife agencies and tribes, the Independent Scientific Review Panel and the Council. Once subbasin plans are approved, all of these entities will be able to review the projects proposed for Bonneville funding to determine if they are scientifically sound in light of existing and desired ecological conditions in the subbasin and the goals and objectives presented in subbasin plans.

1. Required Elements of Subbasin Plans

For purposes of the program a subbasin level plan must include the following three general components in order to be eligible for adoption into the fish and wildlife program:

- A subbasin assessment providing a description of historical and existing conditions;

- A clear and comprehensive inventory of existing projects and past accomplishments;
- A 10-15 year management plan.

Each of these components is discussed below. The Technical Appendix contains a detailed description of each element and of the process that the Council will use to develop the subbasin level of the program. A template for the plan will be developed collaboratively and included in the Technical Appendix.

It is anticipated that subbasin plans will be revised and updated every three to five years as new information becomes available and conditions change.

2. General Principles for Subbasin Plans

- Planning in any subbasin will start from the information contained in subbasin summaries and existing plans and documents. The program will only fund new planning activities where there are clear gaps and omissions.
- The Council's subbasin plans will not duplicate plans that have been developed or will soon be developed by others, including states, tribes, or the federal government.
- Wherever possible and scientifically warranted, the Council will adopt existing plans into the subbasin plans.
- The final subbasin plan to be adopted by the Council should enjoy a wide range of support from all interested parties.

3. Subbasin Assessment

The assessment is a technical phase that describes existing and historic resource conditions and characteristics. The assessment scope covers both aquatic and terrestrial

environments and addresses anadromous and resident fish, and wildlife. This initial assessment will rely primarily on existing information already compiled by fish and wildlife agencies, water resource agencies, and other interested parties within the subbasins.

A template for subbasin assessment has been developed for this program through the collaborative efforts of regional scientists. This template has broad support, and will be accepted for both the plans adopted as part of the fish and wildlife program, for ESA recovery planning activities, and for water quality management plans under the Clean Water Act.

A full copy of the assessment template is contained in the Technical Appendix. The template has seven separate sections:

- Background and Introduction
- Subbasin description
- Habitat condition and trends, historic and current (at a level of detail consistent with the 6th level habitat unit code, HUC)
- Synthesis and interpretation (narrative descriptions coupled with maps indicating habitats and species of interest)
- Summary
- Assessment validation and monitoring
- References

The Council will provide assistance and work with the region's federal, state, and tribal fish and wildlife managers and all other interested parties to complete assessments, using this template, for each of the subbasins by early 2001. These assessments will then be made available to local, state, federal, and tribal planners to use as a foundation for developing the management plan component of subbasin plans.

"In most subbasins, there are already several programs underway that in some way are involved in watershed planning or restoration. The Council believes that the projects funded under its program should take into account these existing programs and be coordinated with them. "

The Council is aware that there is a large number of watershed and subbasin level activities throughout the basin that are using a wide variety of formats for assessments and planning. The Council intends to rely on the information gathered in those activities as much as possible and does not intend this template to undermine or displace these on-going efforts. However, for purposes of this program it is important to compile this information in a consistent format that permits the coordination of Bonneville-funded activities and planning under the Endangered Species Act and Clean Water Act.

The Council expects that the initial assessments in some subbasins will encounter significant data gaps requiring additional information. In such cases, the subbasin plan should identify this need, and include the measures necessary to meet it. In all cases, it is expected that the body of information on which the assessment is based will continue to grow and that, as a regular part of each project review and funding cycle, the assessments and plans will be updated.

Most of the fish species of interest for subbasin planning move beyond their subbasins of origin for at least some stages of their life cycle. Subbasin planners will need information and analytical tools that allow them to understand the biological constraints on their fish populations that stem from areas outside the subbasin, such as mainstem survival rates, ocean and inriver harvest rates, effects of interactions with fish from other subbasins, and ocean conditions. The Council will ensure that subbasin planners have access to information of this type.

4. Inventory of Existing Activities

In most subbasins, there are already several programs underway that in some way are involved in watershed planning or restoration. The Council believes that the projects funded under its program should take into account these existing programs and be coordinated with them. This coordination will yield a more scientifically and biologically sound fish and wildlife plan and reduce costs.

Thus, the second general component of a subbasin level plan will be a description of the existing fish and wildlife and habitat projects that are occurring, or have occurred, in the recent past in the subbasin. This element should include: 1) all activities that are taking place or are planned in the subbasin and 2) objectives related to protecting, mitigating or enhancing fish, wildlife, or their habitats, regardless of funding source or management entity. Both implementation and planning activities should be addressed. The description for each project or activity should include:

- a description of activity, including its term, its monitoring and evaluation elements, and its goals and objectives
- identification of management or lead entities for each activity
- identification of authorizing process or entity (Northwest Power

Planning Council, National Marine Fisheries Service, Federal Energy Regulatory Commission, state watershed planning agency, etc.)

- identification of relationship to other activities in the subbasin
- identification of funding source
- a synopsis of accomplishments or failures of activity — related to established goals and objectives where possible
- identification of limiting factors or ecological processes the activity is designed to address

5. Management Plan

The management plan is the heart of the subbasin plan. It sets forth the strategies that will be implemented at a local level. The management plan should be the last major component of the subbasin plan to be developed because the goals and objectives that are included within it will need to reflect what is learned in the assessment and inventory work. It is in the management plan that policy, legal, and ecological considerations are merged. The management plan should have a 10-15 year horizon. Management plans adopted into the Council's program must be consistent with the Northwest Power Act and specifically section 4(h)(6) of the act. Necessary elements of the management plan include:

- A vision for the subbasin
- Biological objectives for fish and wildlife that:
 - are consistent with province and basin level visions, objectives, and strategies adopted in the program
 - are responsive to the subbasin assessment findings
 - are consistent with legal rights and obligations of fish and wildlife agencies and tribes

"Starting in 2001, the Council intends to begin accepting subbasin level plans for adoption into the program."

with jurisdiction over fish and wildlife in the subbasin, and agreed upon by co-managers in the subbasin. Where there are disagreements among co-managers that translate into differing biological objectives, the differences and the alternative biological objectives should be fully presented

- complement the programs of tribal, state and federal land or water quality management agencies in the subbasin
- integrate Endangered Species Act and Clean Water Act requirements as fully as possible
- have measurable outcomes
- Strategies that will be employed over the term of the plan to meet the established vision and biological objectives, including:
 - an explanation linking the strategies to the established subbasin biological objectives and vision and the subbasin assessment
 - an explanation of how and why the strategies presented were selected over other alternative strategies (e.g. passive restoration strategies v. intervention strategies)
 - a proposed sequence and prioritization
 - additional steps required to compile a more complete or detailed assessment

- A projected budget for the term of the subbasin plan, including:
 - a detailed three-year implementation budget
 - a more general long-term (10-15 year) budget
- A monitoring and evaluation plan that will show whether the actions taken to implement the subbasin plan are achieving their objectives
- Any additional steps that are necessary to achieve compliance with Endangered Species Act and Clean Water Act requirements applicable to that subbasin

6. Developing Plans at the Subbasin Level

Starting in 2001, the Council intends to begin accepting subbasin level plans for adoption into the program. The Council knows that this schedule is very aggressive. However, there is little support in the region for either several more years of discussion and planning or for starting actions that are not grounded in science-based, subbasin level plans. The Council believes that the first attempt to develop comprehensive subbasin plans must be completed as soon as possible, and that improvements can be made as new information and experience dictates.

The Council sees subbasin plans as flexible documents that will be

FAST FACT

Of the original salmon and steelhead habitat available in the Columbia River Basin, 55 percent of the area and 31 percent of the stream miles have been eliminated by dam construction.

revised and updated approximately every three years. For those who are unable to participate in this timeframe, and for those topics that can not be addressed as fully as may be ideal, there will be other opportunities in the near future.

The Council believes that subbasin plans must be developed within an open public process that provides ample opportunity for participation by a wide range of state, federal, tribal, and local managers, experts, landowners, local governments, and stakeholders. The details of that process will vary from subbasin to subbasin, but there are essentially two stages.

First, at the local level, interested parties need to work together to develop a plan that, as far as possible, embodies the knowledge, policies, and support of the people in that subbasin. Recognizing that this effort will need to be undertaken somewhat differently in each subbasin, the Council will work with state, tribal, federal, and local parties to determine which approach is most likely to succeed in a particular subbasin, and then help support that approach. The Council believes that other entities are better equipped to take the lead in the local effort, and does not intend to become a lead entity at the local level in the subbasin planning process.

Second, when a subbasin plan is proposed for adoption into the program, the Power Act's program

amendment standards require a public process with full opportunity for public comment and participation. The Act also requires that, at the end of the process, the Council make a decision based on statutory standards.

It is important to recognize that, while the Council can encourage interested parties to work together on a common plan for each subbasin, it cannot preclude any person from submitting a plan. Under the Power Act, the Council is obliged to consider and make a decision on each recommendation it receives.

After the basin and province levels are fixed in the current program amendment cycle, the Council will:

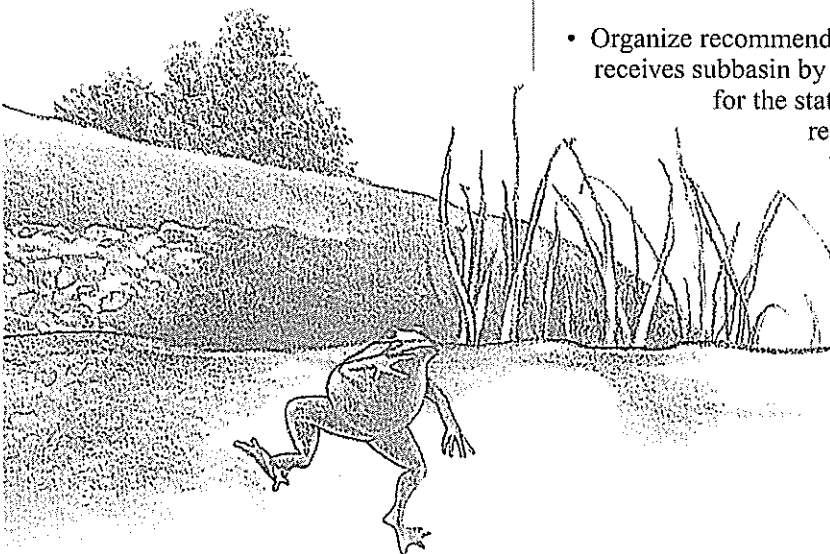
- Make subbasin assessments available on its website and through other means to the planners, decision-makers, and the public as soon as they are completed
- Issue a formal notice and request for recommendations to amend the program. This notice will be limited, and explain that only recommendations at the subbasin level of the program will be considered
- Take extra steps to target this subbasin notice at local governments, stakeholders, planners, watershed groups and land and water managers in each subbasin
- Organize recommendations it receives subbasin by subbasin, for the statutory recommendation com-

ment period. This is intended to facilitate coordination and discussion by those that have made recommendations in any particular subbasin

- Assist in facilitating the discussions in the subbasins aimed at reconciling the recommendations and ensuring that the program standards for plans are met
- Produce drafts of the subbasin plans that are crafted from the recommendations and the facilitated discussions for public comment
- Adopt into the program subbasin plans that meet the established standards. Where more time is needed, the Council may adopt placeholders for a subbasin, and establish a longer timeframe for adoption to facilitate continued discussions

The Act directs the Council to give special consideration to the recommendations of tribal, state and federal fish and wildlife management entities when considering matters related to fish and wildlife. Therefore, subbasin plans should be developed with the participation of fish and wildlife managers with jurisdiction in the subbasin.

As outlined above, the Council will require that subbasin plans demonstrate their relationship to Endangered Species Act and Clean Water Act requirements. This should best be achieved by the participation of the applicable regulatory entities in the subbasin level amendment. Because the Council cannot compel this participation, the Council hopes these entities will participate volun-



tarily, and the Council expects that state and federal agencies and tribes will encourage and facilitate their involvement.

Local, state, tribal and federal land and water management entities have programs, authority, and jurisdiction beyond that of the fish and wildlife managers. The Council will not require the participation of these entities, but will evaluate the level of involvement provided to them in the planning process, and the level of agreement that they have with the completed plan, when it considers adopting a plan into the program and/or in making its funding recommendations to Bonneville.

Finally, it is anticipated that the Council and its staff will assist in a facilitation role as plans are developed, and will also seek to ensure that planners address all criteria that ultimately are developed.

7. Scientific Review of Sub-basin Plans

The Council will utilize the expertise of independent scientists and boards to review subbasin plans. Examples of questions that may be asked of the reviewers are:

- Do the assessments contain the elements required by the criteria?
- Are the goals, objectives, and strategies scientifically appropriate in light of the assessment and inventory?
- Are the goals, objectives, and strategies consistent with those established at the province and basin levels?
- Do the plans demonstrate that alternative management responses have been adequately considered?

- Are subbasin plans within each province collectively consistent with the province goals, objectives, and strategies?

In addition, the Council believes that independent review of the sub-basin plans will be an important part of ensuring they are appropriate and useful.

IMPLEMENTATION PROVISIONS

This section contains the administrative provisions for the program.

A. PROJECT IMPLEMENTATION, PROJECT SELECTION AND MANAGEMENT

Because this program involves hundreds of projects and many millions of dollars per year in funding, an orderly process is needed to decide which projects should be funded and to administer these decisions once they are made. This section describes that process.

The procedures for implementing this program should ensure that planning results in on-the-ground actions, and that those actions feed information about their results back to the region to guide future decisions. The Council will use the procedures in this section to integrate Bonneville funding for this program with Endangered Species Act requirements and the collaborating programs of the states, tribes and federal and local governments. This section also incorporates the strides made in recent years to define improved selection and management practices for fiscal accountability and improved information about regional fish and wildlife efforts.

This section is intended to outline the essentials of the project selection process. A more detailed description is included in the Technical Appendix.

1. Deadlines for Reports

A number of the strategies in this program call for certain reports to be prepared on an annual or biennial basis. The Council will consult with the parties involved in preparation of these reports to establish the most appropriate time of the year for com-

"The procedures for implementing this program should ensure that planning results in on-the-ground actions and that those actions feed information about their results back to the region to guide future decisions."

pletion of each report. Following approval by the Council, these deadlines will be recorded in the Technical Appendix. Deadlines established for these reports are subject to change by mutual agreement between the Council and the reporting parties. Unless otherwise indicated, all reports are due beginning in calendar year 2002.

2. Project Selection — Basic Requirements and Roles

While the Council has always been involved in efforts to ensure that the program it adopts is being implemented effectively, Congress gave the Council an increased and explicit role in program implementation in a 1996 amendment to the Power Act. The Act now charges the Council, with the assistance of the Independent Scientific Review Panel, to make annual recommendations to Bonneville on projects to be funded through the Bonneville fish and wildlife budget to implement the program.

The Power Act specifies certain standards and minimum procedures for the project review process, but otherwise affords the Council broad discretion to define the procedures

for conducting project review and selection. The processes outlined below describe the statutory requirements and the particular approach that the Council intends to use for the foreseeable future to address these requirements and implement the program. The Council will continue to refine and modify program implementation measures it finds necessary to best accomplish the fish and wildlife purposes of the Act.

In 1998, the U.S. Congress' Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill directed the Council, again with the assistance of the Independent Scientific Review Panel, to also review on an annual basis the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by Bonneville (the "reimbursable programs"). The four major components of the reimbursable program include the Columbia River Fisheries Mitigation Program (Corps of Engineers); Fish and Wildlife Operations and Maintenance Budget (Corps of Engineers); Lower Snake River Compensation Plan (U.S. Fish and Wildlife Service); and the Leavenworth Hatchery (Bureau of Reclamation). It is the Council's intent to integrate to the maximum extent possible the review of these reimbursable programs with the review of the projects funded by Bonneville to implement the Council's program.

FAST FACT

Columbia River Basin resident fish, which spend their entire life cycle in freshwater, include: warm-water species, bass and walleye; and cold-water species, cutthroat, bull trout and kokanee.

Role of the Independent Scientific Review Panel

The 1996 amendment to the Power Act directed the Council to form the Independent Scientific Review Panel and Scientific Peer Review Groups to review projects proposed for funding to implement the Council's program through the Bonneville Power Administration's annual fish and wildlife budget. The Act requires the Independent Scientific Review Panel to determine whether projects proposed for funding:

- Are based on sound science principles
- Benefit fish and wildlife
- Have clearly defined objectives and outcomes
- Have provisions for monitoring and evaluation of results
- Are consistent with the program

The Independent Scientific Review Panel then provides the Council its recommendations regarding project quality and priorities. The 1998 conference report directed the Independent Scientific Review Panel to also review the reimbursable projects using the same standards and provide recommendations to the Council.

Role of the Council

The Council's primary role in the project review process is to decide which projects to recommend to Bonneville for funding to implement the program. The Council is also to provide recommendations to Congress and to the federal agencies on funding for the reimbursable programs.

Several considerations must go into those recommendations. The Council must allow for public review and comment on the projects proposed for funding and the Independent Scientific Review Panel's recommendations. The Council must fully consider and respond to

the recommendations of the Independent Scientific Review Panel; the Council must review and determine for itself whether proposed projects are consistent with the Act and the program, including adopted sub-basin plans. The Council must determine if proposed projects have met programmatic or project-specific conditions. By statute, the Council must take into consideration the effects of ocean conditions on fish and wildlife populations and must determine that projects employ cost effective means to meet program objectives.

Role of the Fish and Wildlife Managers

Currently, the fish and wildlife managers, through the Columbia Basin Fish and Wildlife Authority, develop a draft annual program implementation work plan from the projects proposed for funding. This draft annual work plan is the culmination of a technical and management review of all proposed projects, and it establishes a proposed annual budget and project priorities. The Independent Scientific Review Panel and the Council review the projects proposed for funding in the context of the managers' draft work plan. The Council anticipates that the fish and wildlife managers will continue to organize themselves and jointly provide these recommendations in the work plan to the Council.

The project reviews and advice of the fish and wildlife managers are valuable to the Council as it deliberates on its funding recommendations. With the program's focus on subbasin level plans as the guiding documents for program implementation, it will be critical that the fish and wildlife managers involve others in the subbasins — stakeholders, land owners and managers, other state and federal agencies, and other interested parties — in a meaningful manner in the development of draft work plans to be able to continue using these work plan recommendations as the foundation for the Council's project recommendations.

3. Project Selection – Province-based Project Review Process

The Council is shifting the annual project solicitation, review and selection of projects from a basin-wide exercise to one that focuses on needs identified at a province and subbasin scale. This shift was made to better align the project selection process with this program's structure that focuses planning and implementation most directly at those levels. Further, in focusing the review on a limited number of provinces and subbasins each year, a more in-depth review of proposed projects can be accomplished. This in-depth review, conducted within a more structured subbasin and province context, will enable the Council to recommend multi-year funding for projects.

Elements of province reviews include:

- The Council provides for a province meeting to explain the review process to those interested in how Bonneville funding may be used within that province. Lead groups are selected for each subbasin to develop subbasin summaries or, where completed and adopted by the Council, review subbasin plans to identify fish and wildlife project needs that may be proposed for Bonneville funding for the next three years
- Fish and wildlife needs (from a summary or plan) are made widely available, and Bonneville solicits for project proposals to meet the identified needs
- Sponsors of ongoing projects submit project renewal proposals that include plans for the next three years, descriptions of results to date, and briefings on background documents. Ongoing projects will also submit all relevant planning, research, and background documents. Sponsors of new projects submit pro-

posals. All projects must be tied to the approved subbasin plan. Reimbursable programs that are within that province provide similar information

- Bonneville should review proposed projects and budgets to ensure that regulatory needs, including compliance with applicable federal laws, are considered, that questions about the adequacy or appropriateness of proposed budgets are resolved in the Council's recommendation process, and that any concerns Bonneville has about the performance of ongoing projects are identified
- The Independent Scientific Review Panel reviews proposals and supporting documents in the context of subbasin plans and the fish and wildlife program
- The Independent Scientific Review Panel conducts subbasin/province visits with project sponsors, managers and others. The visit includes an opportunity for project sponsors to present their proposals and for a subsequent question and answer session with the Independent Scientific Review Panel. In addition, the Independent Scientific Review Panel may conduct project-specific visits
- After the visit, the Independent Scientific Review Panel produces a draft report on proposals recommended for funding, including specific questions, and provides it to project sponsors for comments and revisions
- The project sponsors respond to the draft report
- The Independent Scientific Review Panel addresses the responses and issues a final report and recommendations to the Council. The Council considers the Independent Scientific Review Panel report, other statu-

tory and programmatic considerations, and makes final funding recommendations on program implementation to Bonneville. The Council also makes recommendations on the funding of projects within the reimbursable programs to Congress and the relevant federal agencies

- Systemwide projects will be reviewed as a separate unit within the review schedule. Wherever possible, projects within the mainstem will be reviewed as part of the review of the province in which they are located, although certain projects that concern systemwide passage, water management and dissolved gas issues may be reviewed as part of a separate category of integrated mainstem passage activities

4. Project Funding Priorities

The Northwest Power Act establishes Bonneville's obligation to fully mitigate for fish and wildlife impacts from the development and operation of the hydropower system. The Council recognizes its obligation, in turn, to construct a program that guides Bonneville's mitigation efforts. The Council recognizes that the work necessary to satisfy Bonneville's mitigation obligation must be staged to accommodate yearly budget limitations. The Council also believes that final determination of the yearly direct program budget may properly be reserved for a later phase of the program amendment process where the project funding needs will be more greatly informed by subbasin planning. Funding for provincial budgets to implement subbasin plans will be part of the direct program budget along with any subsequent increases.

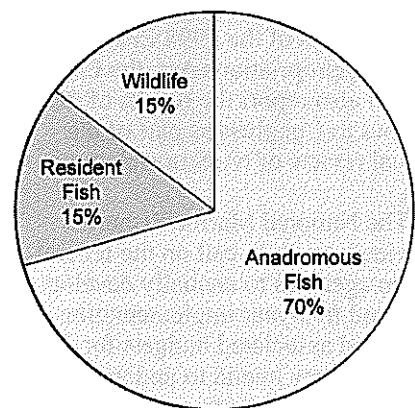
The Council adopts the following funding principles to prioritize among the many needs to address fish and

wildlife impacts throughout the basin:

- The Bonneville Power Administration will fulfill its Fish and Wildlife Funding Principles (September 16, 1998) including the commitment to "meet all of its fish and wildlife obligations"
- The determination of provincial budget levels should take into account the level of impact caused by the federally operated hydropower system. Other factors will also influence this determination including opportunities for off-site mitigation
- Wildlife mitigation should emphasize addressing areas of the basin with the highest proportion of unmitigated losses

To prioritize among the many needs to address fish and wildlife impacts throughout the basin, the Council will maintain the current funding allocation for anadromous fish (70 percent), resident fish (15 percent), and wildlife (15 percent), until a new budget allocation is adopted.

Funding Allocation



5. Coordination with Other Regional Programs

The Council will pursue opportunities to integrate program strategies with other federal, state, tribal, Canadian, and volunteer fish and wildlife

restoration programs. The Council will use the subbasin planning process to identify coordination needs and opportunities. The subbasin planning process should inventory regulatory requirements, including Endangered Species Act and Clean Water Act measures, clarify water and land management objectives affecting fish and wildlife, and fit program funding to other programs for the maximum benefit.

As the Council refines the province-based project review and funding process, it will focus the information requirements of the process to identify how project sponsors may link their efforts to address program objectives with the objectives or requirements of other programs.

The Council will use the subbasin planning process to review Endangered Species Act and Clean Water Act requirements in more detail and obtain independent scientific review of both the program measures and the requirements of applicable biological opinions. The Council will present the results of these reviews and any revised recommendations to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to consider further revision or reconciliation of biological opinion requirements. Pursuant to the requirements of the 1998 Energy and Water Appropriations Act, the Council will also report the results of these reviews to Congress as part of the annual review of reimbursable projects.

The National Marine Fisheries Service intends to call on the federal action agencies to annually develop one- and five-year implementation plans and associated budgets for activities they intend to undertake to meet the performance standards and objectives for listed species. The Council endorses this approach, and once the requirement is further defined, will seek to incorporate these plans into the subbasin review process.

For non-operational measures proposed by biological opinions for Bonneville funding (such as research

"The Council will pursue opportunities to integrate program strategies with other federal, state, tribal, Canadian, and volunteer fish and wildlife restoration programs."

or off-site habitat measures), the Council will call on Bonneville, the National Marine Fisheries Service and the Fish and Wildlife Service to first define proposed projects consistently with the project proposal form and process for Bonneville's direct-funded program. The Council will seek review of these proposals with the other projects proposed in the project review process.

6. Project Management

To facilitate multi-year funding and contracting, the Council will require projects to identify specific tasks, objectives, deliverables, and their associated costs. Bonneville and the Council will establish protocols to ensure that projects stay within their approved scope and funding authorizations.

Bonneville shall define terms and conditions for project contracts that support timely and complete reporting by contractors of expenditures and progress toward defined project objectives. These requirements should ensure that project sponsors report expenditures and progress in enough detail to monitor performance of the specific tasks and objectives identified in the original project proposal from the Council.

7. Annual Report to Governors and the Region

Bonneville and the federal operating agencies will work coopera-

tively with the Council to produce an annual report which will provide an accounting of its fish and wildlife expenditures and hydropower operation costs.

8. Funding Agreement for Land and Water Acquisitions

Experience implementing this program has shown great advantages in being able to move quickly and flexibly to acquire interests in land and water rights for the purpose of protecting or enhancing fish and wildlife habitat. Often the opportunity for an important acquisition exists only for a short period of time, and often there is a substantial price advantage in being able to quickly close the transaction. The time and uncertainty of the current project selection process, and the procedural constraints on real estate acquisition by the federal agencies have made these transactions relatively difficult and more costly than necessary.

The Council recommends that Bonneville establish a funding agreement for land and water acquisitions. The Council will establish a mechanism, including an advisory entity, that can act flexibly, quickly, and responsibly in approving funding for land and water acquisition proposals. The primary elements are:

- A dedicated budget within Bonneville's fish and wildlife funding establishing the amount of funding for land and water acquisitions available per year, for a multi-year period. The budget would be known as the "Land and Water Acquisition Fund"
- An advisory board appointed by the Council after consultations with representatives from Bonneville, federal and state fish and wildlife and land management agencies, Columbia Basin Indian tribes, non-profit organizations specializing in habitat and water acquisitions, and the Council. The board would recommend

for Council approval all land and water acquisitions from the dedicated budget. The Council will make all final recommendations and decisions regarding land and water acquisitions from the fund

- Specific procedures and criteria for the board to use in identifying, reviewing, and deciding whether to recommend proposals for land and water acquisitions. These criteria will be reviewed by the Independent Scientific Review Panel, but specific land and water acquisitions would not require Independent Scientific Review Panel review. An element of these criteria will be a preference for proposed actions that 1) address imminent risks to the survival of one or more species listed under the Endangered Species Act and 2) are broadly recognized as achieving direct fish and wildlife benefits. The criteria should emphasize consistency with the program's biological objectives and subbasin plans
- Standardized terms for implementing acquisitions, including matters of contracting, management, crediting, operation and maintenance costs, and monitoring and evaluation requirements
- Accountability provisions for reporting on monies spent, properties acquired, biological gain, and consistency with program and subbasin objectives. The program as a whole will receive periodic Independent Scientific Review Panel review

The Council will work with Bonneville and other interested parties to establish the details of the acquisition fund and have it ready for acquisitions by January 1, 2001. All acquisitions must be on a willing buyer, willing seller basis, consistent with state water law, and consistent with the other provisions of this program. Council members will be notified of all acquisition proposals under consideration

"The Council recommends that Bonneville establish a funding agreement for land and water acquisitions."

by the advisory board. The fund will not be used for a proposed acquisition if both Council members from that state object to the acquisition.

The fund will not take title to acquisitions except on an interim basis, but will, for each transaction, identify an appropriate entity to hold the interest acquired. The fund will work in cooperation with other efforts that are already underway to benefit fish and wildlife through acquisitions of land and may provide cost sharing or full funding for transactions that have been arranged by others. In appropriate circumstances, the fund may provide for the continuing payment of local taxes and fees on an acquisition.

B. INDEPENDENT SCIENTIFIC REVIEW

All projects funded under this program are required by law to undergo review by an independent science panel. In addition, the program uses a second, related panel of scientists to provide advice to the region on key scientific issues.

Independent scientific review is an established tradition in research and development programs in the United States and much of the world. Independent scientific review can help decision-makers separate scientific variables from other considerations (political, economic, cultural, etc.) and help ensure that environmental decision-making reflects the best scientific knowledge of the day. In the Columbia River Basin, the magnitude of scientific research undertaken and uncertainties that remain are staggering. Independent scientific review can

identify strengths and weaknesses of scientific programs and critical information gaps that are most relevant to management and policy decisions.

Independent scientific review for the fish and wildlife program is implemented by two groups: the Independent Scientific Review Panel and the Independent Scientific Advisory Board. Each group provides unique services to the program. The Independent Scientific Review Panel reviews individual projects in the context of the program and makes recommendations on matters related to those projects. The Independent Scientific Advisory Board provides an on-call scientific body for peer review of various reports, projects, and issues affecting Columbia River Basin fish and wildlife.

The Independent Scientific Review Panel was created after the last Council program amendment, and the Independent Scientific Advisory Board's role was expanded from the 1994-1995 Program to meet the National Marine Fisheries Service's needs. This program amendment formalizes, distinguishes, and specifies the roles, responsibilities, and procedures of the two groups while maintaining a strong link between the groups. The background and responsibilities for each group, and a description of the shared administrative procedures for both groups follows.

FAST FACT

Columbia River Basin resident fish, which spend their entire life cycle in freshwater, include: warm-water species, bass and walleye; and cold-water species, cutthroat, bull trout and kokanee.

1. The Independent Scientific Review Panel

Review Responsibilities

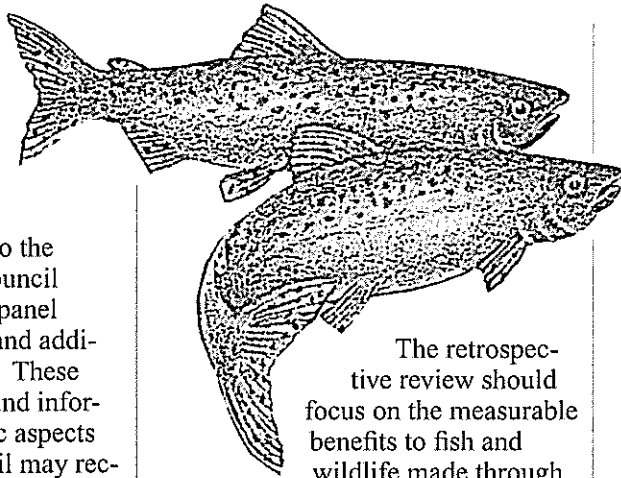
The 1996 amendment to the Power Act directed the Council to appoint an 11-member panel of independent scientists and additional peer review groups. These scientists provide advice and information regarding scientific aspects of projects that the Council may recommend for funding by Bonneville. The Independent Scientific Review Panel and peer review groups have responsibilities in three areas:

- Review projects proposed for Bonneville funding to implement the Council's program

The Power Act directs the Independent Scientific Review Panel to review annually projects that are proposed for Bonneville funding to implement the Council's program. The Act specifies the review standards that the Independent Scientific Review Panel is to use and the kinds of recommendations to make to the Council. The Council must fully consider the Independent Scientific Review Panel's report prior to making its funding recommendations to Bonneville, and must explain in writing wherever the Council's recommendations differ from the Independent Scientific Review Panel's.

- Retrospective review of program accomplishments

The 1996 amendment also directs the Independent Scientific Review Panel, with assistance from the Scientific Peer Review Groups, to annually review the results of prior-year expenditures based upon the project review criteria and submit its findings to the Council.



The retrospective review should focus on the measurable benefits to fish and wildlife made through projects funded by

Bonneville and previously reviewed. The Independent Scientific Review Panel's findings should provide biological information for the Council's ongoing accounting and evaluation of Bonneville's expenditures and the level of success in meeting the objectives of the program, as described in the monitoring and evaluation section. Also as part of the Independent Scientific Review Panel's annual retrospective report, the Independent Scientific Review Panel should summarize its province review efforts and identify the major basinwide programmatic issues gleaned from the province reviews.

- Review projects funded through Bonneville's reimbursable program

In 1998, the U.S. Congress' Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill directed the Independent Scientific Review Panel to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by Bonneville, using the same standards and making recommendations as in its review of the projects proposed to implement the Council's program. Further details of the Independent Sci-

entific Review Panel's project review responsibilities are described earlier, in the section on project selection.

The Independent Scientific Review Panel is a standing group that meets throughout the year. Recommendations from the Independent Scientific Review Panel are reached by consensus. The Independent Scientific Review Panel may enlist Peer Review Group members to assist in reviews. From the pool of Peer Review Group members, the Independent Scientific Review Panel selects reviewers who have the appropriate expertise for the review at issue. The Independent Scientific Review Panel develops guidelines and criteria for reviews that include lists of materials reviewed, site-visit protocols, and limits to reviewer and project sponsor communication.

2. The Independent Scientific Advisory Board

The Council and the National Marine Fisheries Service established the Independent Scientific Advisory Board to provide independent scientific advice to the region through measures described in the Council's 1994-1995 Fish and Wildlife Program and the National Marine Fisheries Service's 1995 Proposed Recovery Plan for Snake River Salmon. Rather than establish two groups, the National Marine Fisheries Service and the Council created the Independent Scientific Advisory Board. In creating the Independent Scientific Advisory Board, the National Marine Fisheries Service and the Council hoped to avoid gridlock over scientific uncertainty, circumvent unnecessary additional research, and resolve conflicting advice and opinions on recovery issues and measures.

Review Procedures

The Independent Scientific Advisory Board is a standing group that meets regularly throughout the year. Recommendations from the Independent Scientific Advisory Board are reached by consensus. The Independent Scientific Advisory Board may enlist ad hoc members to assist in reviews. Ad hoc members may include Independent Scientific Review Panel and Peer Review Group members. The Independent Scientific Advisory Board conducts reviews in a manner consistent with its terms of reference and procedures policy.

Independent Scientific Advisory Board Administrative Oversight Panel

A panel consisting of the chair of the Northwest Power Planning Council, the regional administrator of the National Marine Fisheries Service, and a representative from the Columbia Basin Indian tribes provides administrative oversight for the Independent Scientific Advisory Board and approves the Independent Scientific Advisory Board work plan. The panel makes appointments to the Independent Scientific Advisory Board from a list developed by a Scientific Screening Committee. Decisions of the panel shall be by majority vote. The Council shall work with the National Marine Fisheries Service and the regional Indian tribes to amend the Independent Scientific Advisory Board's terms of reference to provide this role for the regional Indian tribes, and to define protocols for the Administrative Oversight Panel that ensure the Independent Scientific Advisory Board's continued independence.

Specific Tasks of the Independent Scientific Advisory Board

- Evaluate the program's scientific principles to ensure they are consistent with the best available science

- Evaluate the fish and wildlife program on its scientific merits in time to inform amendments to the fish and wildlife program and before the Council requests recommendations from the region
- Evaluate National Marine Fisheries Service recovery plans for Columbia River Basin stocks and aspects of the recovery process when requested
 - Review the scientific and technical issues associated with efforts to improve anadromous fish survival through all life stages, based on adaptive management approaches
 - Review and provide advice on priorities for conservation and recovery efforts, including research, monitoring and evaluation
- Provide specific scientific advice on topics and questions requested from the region and approved by the oversight panel. Tribes, fish and wildlife agencies and others may submit questions to the Independent Scientific Advisory Board through the oversight panel. The Independent Scientific Advisory Board may also identify questions and propose reviews. The oversight panel and the Independent Scientific Advisory Board reviews these questions in a timely manner and decides which are amenable to scientific analysis, are relevant to the Council's and National Marine Fisheries Service's programs, and fit within the Independent Scientific Advisory Board's work plan

In 2000, The National Marine Fisheries Service established a Recovery Science Review Panel and Technical Review Teams that will provide scientific advice on West Coast salmon recovery efforts. The Independent Scientific Advisory Board effort will be coordinated with The National

Marine Fisheries Service's panel and teams to avoid redundancy.

3. Administration of the Independent Scientific Review Panel, the Scientific Peer Review Groups, and the Independent Scientific Advisory Board Membership

The Independent Scientific Review Panel and the Independent Scientific Advisory Board shall each be composed of eleven members. Peer Review Groups shall be composed of a pool of scientists sufficient in size and expertise to assist the Independent Scientific Review Panel in its review responsibilities. To ensure coordination and avoid redundancy of efforts between the Independent Scientific Review Panel and the Independent Scientific Advisory Board, at least two members of the Independent Scientific Review Panel shall be on the Independent Scientific Advisory Board. Other Independent Scientific Advisory Board members should be considered for appointment to the Peer Review Group.

Membership for each group shall include, to the extent feasible, scientists with expertise in Columbia River anadromous and resident fish ecology, statistics, wildlife ecology, and ocean and estuary ecology, fish husbandry, genetics, geomorphology, social and economic sciences, and other relevant disciplines. There

FAST FACT

While development of the hydrosystem harmed some species of wildlife, others benefited. Waterfowl, for example, gained new shoreline feeding and wintering habitat when reservoirs filled behind dams.

should be a balance between scientists with specific knowledge of the Columbia River Basin and those with more broad and diverse experience. Members should have a strong record of scientific accomplishment, high standards of scientific integrity, the ability to forge creative solutions to complex problems, and a demonstrated ability to work effectively in an interdisciplinary setting.

Independent Scientific Review Panel and Independent Scientific Advisory Board membership terms are for three years, not to exceed two terms. Term limits of the members are staggered to ensure continuity of effort. Peer Review Group members do not have specific terms, but the Independent Scientific Review Panel and the Council will review the pool of Peer Review Group members on an annual basis and update it when appropriate.

Appointment Procedures

The appointment procedures to fill vacancies on the Independent Scientific Advisory Board and the Independent Scientific Review Panel, and to augment the pool of Peer Review Group members, follows three steps. The first two steps are the same for each group.

First, the Council, in cooperation with the Independent Scientific Advisory Board Oversight Panel, invites the region to submit nominations.

Second, a three-member committee of the National Academy of Sciences, assisted by the National Research Council, evaluates the credentials of the nominees, submits additional nominees if necessary, and recommends a pool of qualified candidates for potential appointment.

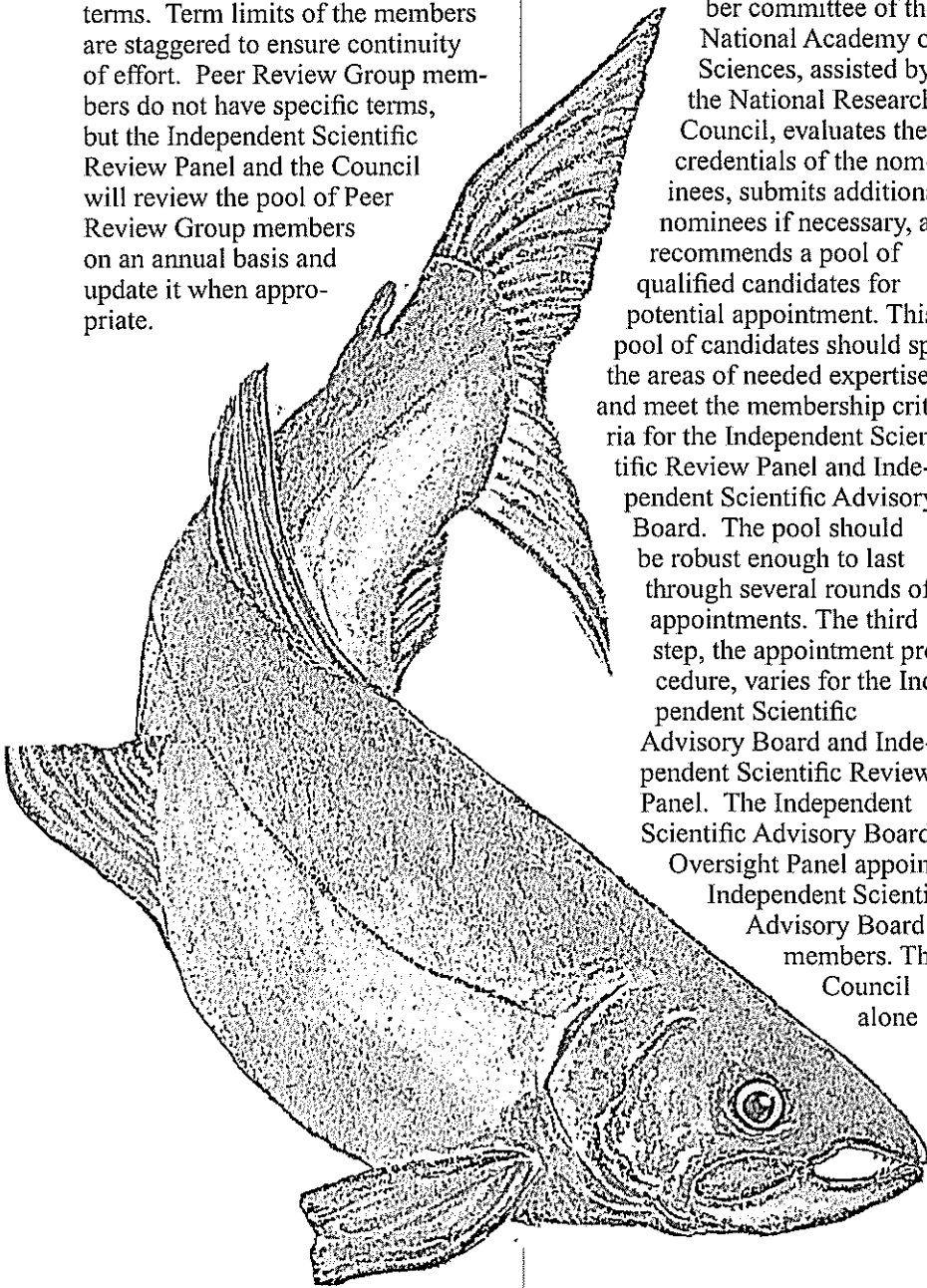
This pool of candidates should span the areas of needed expertise and meet the membership criteria for the Independent Scientific Review Panel and Independent Scientific Advisory Board. The pool should be robust enough to last through several rounds of appointments. The third step, the appointment procedure, varies for the Independent Scientific Advisory Board and Independent Scientific Review Panel. The Independent Scientific Advisory Board Oversight Panel appoints

Independent Scientific Advisory Board members. The Council alone

appoints Independent Scientific Review Panel and Peer Review Group members.

Conflict of Interest

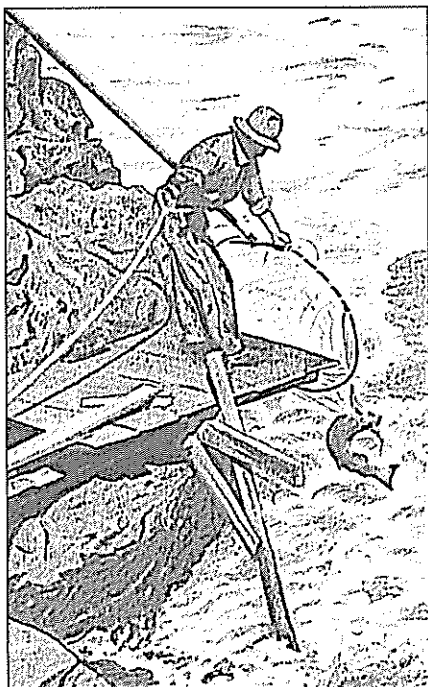
Independent Scientific Advisory Board, Independent Scientific Review Panel and Scientific Peer Review Group members are subject to the conflict of interest standards that apply to scientists performing comparable work for the National Academy of Sciences. At a minimum, members with direct or indirect financial interest in a project shall be recused from review of, or recommendations associated with, such a project. The Council may create a Conflict of Interest Policy that satisfies the needs of the program, applies to the Independent Scientific Review Panel and the Independent Scientific Advisory Board, and is at least as rigorous as the National Academy of Sciences standards.



TRIBAL RIGHTS, WATER RIGHTS, AND THE ROLE OF FISH & WILDLIFE AGENCIES

A. RECOGNITION OF TRIBAL ROLE

The Council recognizes that the Indian tribes in the Columbia River Basin have vital interests directly affected by activities covered in this program. These Indian tribes are sovereigns with governmental rights over their lands and people, and with rights over natural resources which are reserved by or protected in treaties, executive orders, and federal statutes. The United States has a trust obligation toward Indian tribes to preserve and protect these rights and authorities. Nothing in this program is intended to affect or modify any trust or treaty right of an Indian tribe. The Council also recognizes that implementation of this program will require significant interaction and cooperation with the tribes, and commits to working with the tribes in a relationship that recognizes the tribes' interests in co-management of affected fish and wildlife resources, and respects the sovereignty of tribal governments.



B. WATER RIGHTS

As provided by the Northwest Power Act, nothing in this program shall affect the rights or jurisdictions of the United States, the states, Indian tribes, or other entities over waters of any river or stream or over any groundwater resources or otherwise be construed to alter or establish the respective rights of States, the United States, Indian Tribes, or any person with respect to any water or water-related right.

C. ROLE OF FISH AND WILDLIFE AGENCIES

The Northwest Power Act envisions a strong role for fish and wildlife agencies and Indian tribes in developing the provisions of this program. In Sections 4(h)(6)(A) and 4(h)(6)(D) of the Act, the Council is directed to include program measures that it determines (A) "complement the existing and future activities of the Federal and the region's State fish and wildlife agencies and appropriate Indian tribes" and (D) "will be consistent with the legal rights of appropriate Indian tribes in the region."

SCHEDULE FOR FURTHER RULEMAKINGS

This program describes additional amendment proceedings that are intended by the Council for further revisions. In order to assure that these further revisions are adopted in an orderly manner, the Council commits to the following schedule:

A. MAINSTEM COORDINATION PLAN

On or before May 1, 2001, the Council will solicit recommendations for a mainstem coordination plan, similar to a subbasin plan. The plan will consider ways in which the hydrosystem operations called for in the biological opinions could be adjusted so as to assure that these operations meet the needs of ESA-listed stocks and the dictates of the Northwest Power Act. The hydrosystem measures contained in this plan will also provide necessary guidance to the Council's subbasin planning process.

The plan will include, as appropriate, specific measures such as standards for systemwide coordination, flow regimes, spill, reservoir elevations, water retention times, passage modifications at mainstem dams, operational requirements to protect mainstem spawning and rearing areas, and operational requirements to protect resident fish and wildlife.

The Council plans to complete this rulemaking by October 2001.

B. OBJECTIVES FOR BASIN LEVEL ENVIRONMENTAL CHARACTERISTICS

The Council has requested review by the Independent Scientific Advisory Board of the basin level environmental characteristics contained in the Appendix to this program by June 2001. Following this review, if further changes are merited, the Council will request recommendations on or

before October 2001 and consider amendments to these objectives, with final amendments adopted by July 2002. The date of completion may vary depending on the comments received and issues raised.

C. PROVINCE LEVEL GOALS, OBJECTIVES, AND STRATEGIES

The Council will continue to work with interested parties to develop potential goals, objectives, and strategies at the level of ecological provinces. The Council expects that the information developed for, and in, the subbasin planning process will also inform the province level elements, and help shape the subbasin plans so that they are coordinated with the plans of other subbasins in their province.

At this time, the Council is not scheduling a further rulemaking for province level goals, objectives, and strategies. If further information is developed that merits such amendments, the Council will solicit recommendations and accept amendments.

In the course of adopting subbasin plans, the Council will consider how the proposed plans fit with one another within and among provinces. The Council expects that, at the conclusion of the subbasin planning process, it will conduct a specific amendment process to incorporate specific provincial visions, objectives, and strategies.

D. SUBBASIN PLANS

In January 2001, the Council will issue a call for recommendations for subbasin plans. Recommendations will be received on or before May 1, 2001; November 1, 2001; May 1, 2002; November 1, 2002; May 1, 2003; November 1, 2003; May 1, 2004; and November 1, 2004. The Council will make a decision on each subbasin plan within one year of its

receipt, unless otherwise agreed by the recommending party.

In other words, subbasin plans can be submitted on any of these dates during this three-year period, and the date of final decision will be one year or less after receipt. For example, a plan submitted on November 1, 2002, will be acted upon by November 1, 2003.

The Council is taking this approach to assure that subbasin plans can be submitted when ready, and also to assure that the parties working on a plan within a subbasin have a reasonable opportunity to come together on a common plan. The Council recognizes that the timing for submission of plans will vary depending on a number of factors, including the level of information and planning already available in a subbasin and the working relationship among the participants.

Under the Northwest Power Act, there is no requirement of consensus in order for a recommendation to be submitted to the Council and it is possible that different parties will submit different plans for a given subbasin. However, the level of support by the affected parties in a subbasin for a plan can be an important factor in gauging how well the plan meets the standards of the Northwest Power Act, and whether that plan can be effectively implemented. Thus, the Council strongly encourages interested parties to work together as much as possible to present a single, well-supported plan for each subbasin.

FAST FACT

The Columbia-Snake River System is a unified transportation system with thirty-six deep and shallow water ports.

TRANSITION PROVISIONS

CONTINUATION OF EXISTING MEASURES

Unless specifically stated otherwise, all measures not directly superseded by this program will continue to have force and effect until 1) a subbasin plan has been adopted by the Council for the subbasin in which the project is located (or, for research and mainstem measures, a research or mainstem plan); 2) the measure has been specifically repealed in a subsequent rulemaking; or 3) three years have elapsed following the final approval of this program, whichever occurs first.

APPENDIX A: GLOSSARY

The definitions in this list are provided for clarification of terms used throughout this program.

A

Act — See Northwest Power Act.

adaptive management

A scientific policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing program actions as vehicles for learning. Projects are designed and implemented as experiments so that even if they fail, they provide useful information for future actions. Monitoring and evaluation are emphasized so that the interaction of different elements of the system are better understood.

anadromous fish

Fish that hatch in freshwater, migrate to the ocean, mature there and return to freshwater to spawn. For example, salmon or steelhead.

applicable federal laws

The Endangered Species Act and the Clean Water Act.

B

biological diversity

The variety of, and variability among, living organisms and the ecological complexes in which they occur. Biological diversity at its most basic level is the genetic diversity (genetic variation found within each species), phenotypic and morphological diversity (physical, life history and behavioral variation found within each species), species diversity (number of species in a given ecosystem), and community/ecosystem diversity (variety of habitat types and ecosystem

processes extending over a region).

biological performance

The responses of populations to habitat conditions, described in terms of capacity, abundance, productivity, and life history diversity.

biological potential

The biological potential of a species means the potential capacity, productivity and life history diversity of a population in its habitat at each life stage.

blocked areas

Areas in the Columbia River Basin where hydroelectric projects have created permanent barriers to anadromous fish runs. These include the areas above Chief Joseph and Grand Coulee dams, the Hells Canyon Complex and other smaller locations.

Bonneville Power Administration (Bonneville)

The sole federal power marketing agency in the Northwest and the region's major wholesaler of electricity. Created by Congress in 1937, Bonneville sells power to public and private utilities, direct service customers, and various public agencies in the states of Washington, Oregon, Idaho, Montana west of the Continental Divide, (and parts of Montana east of the Divide) and smaller adjacent areas of California, Nevada, Utah and Wyoming. The Northwest Power Act charges Bonneville with additional duties related to energy conservation, resource acquisition, and fish and wildlife.

Bureau of Reclamation, U.S. Department of the Interior

An agency that administers some parts of the federal program for water resource development and use in western states. The Bureau of Reclamation owns and operates a number

of dams in the Columbia River Basin, including Grand Coulee and several projects on the Yakima River.

bypass system

A channel or conduit in a dam that provides a route for fish to move through or around the dam without going through the turbine units.

C

captive broodstock

Fish raised and spawned in captivity.

carrying capacity

The number of individuals of one species that the resources of a habitat can support.

Columbia River Compact

An interstate compact between the states of Oregon and Washington by which the states jointly regulate fish in the Columbia River.

Columbia River System

The Columbia River and its tributaries.

Columbia River Treaty

The treaty between the United States and Canada for the joint development of the Columbia River. It became effective on September 16, 1964.

Corps of Engineers, U.S. Department of the Army (Corps)

An agency with the responsibility for design, construction and operation of civil works, including multipurpose dams and navigation projects.

cost-effective

Where equally effective alternative means of achieving the same sound biological objective exist, the

alternative with the minimum economic cost is considered the most cost-effective measure.

D

dissolved gas

The amount of chemicals normally occurring as gases, such as nitrogen and oxygen, that are held in solution in water, expressed in units such as milligrams of the gas per liter of liquid. Supersaturation occurs when these solutions exceed the saturation level of the water (beyond 100 percent).

E

ecosystem

The biological community considered together with the land and water that make up its environment.

environmental characteristics

The environmental conditions or changes sought to achieve the desired changes in population characteristics.

escapement

The number of salmon and steelhead that return to a specified point of measurement after all natural mortality and harvest have occurred. Spawning escapement consists of those fish that survive to spawn.

estuary

The part of the wide lower course of a river where its current is met and influenced by the tides.

extinction

The natural or human-induced process by which a species, subspecies or population ceases to exist.

F

Federal Energy Regulatory Commission (FERC)

The Commission issues and reg-

ulates licenses for construction and operation of non-federal hydroelectric projects and advises federal agencies on the merits of proposed federal multipurpose water development projects.

fish and wildlife agencies

This category includes the Fish and Wildlife Service, U.S. Department of the Interior; the Idaho Department of Fish and Game; the Montana Department of Fish, Wildlife and Parks; the National Marine Fisheries Service, U.S. Department of Commerce; the Oregon Department of Fish and Wildlife; and the Washington Department of Fish and Wildlife.

Fish Passage Center

The center established under section III (D)(6) of the program.

flows

The rate at which water passes a given point in a stream or river, usually expressed in cubic-feet per second (cfs).

flow augmentation

Increased flow from release of water from storage dams.

H

habitat

The locality or external environment in which a plant or animal normally lives and grows. As used in this program, habitat includes the ecological functions of the habitat structure.

harvest management

The process of setting regulations for the commercial, recreational and tribal fish harvest to achieve a specified goal within the fishery.

hydroelectric power or hydropower

The generation of electricity using falling water to turn turbo-electric generators.

hydrosystem

The hydroelectric dams on the Columbia River and its tributaries.

I

Implementation Team

A policy-level working group established by the National Marine Fisheries Service to provide advice on the implementation of the biological opinion on the effects of the federal dams in the Columbia River basin. The IT oversees the Technical Management Team, which deals with hydrosystem operations, and the System Configuration Team, which deals with structural changes at the dams to improve fish passage.

impoundment

A body of water formed behind a dam.

irrigation screens

Screens using wire mesh placed at the point where water is diverted from a stream or river. The screens keep fish from entering the diversion channel or pipe.

J

juvenile

Fish from approximately one year of age until sexual maturity.

M

mainstem

The main channel of the river in a river basin, as opposed to the streams and smaller rivers that feed into it. In the fish and wildlife program, main-

stem refers to entirety of the Columbia and Snake rivers.

mainstem passage

The movement of salmon and steelhead around or through the dams and reservoirs in the Columbia and Snake rivers.

mainstem survival

The proportion of anadromous fish that survive passage through the dams and reservoirs while migrating in the Columbia and Snake rivers.

metadata

Data exist in two forms — primary data and metadata. Primary data are numbers or counts — for example, the number of adult fish counted in a given time period, interval and location. Metadata describe how those numbers were obtained, including the monitoring design (selection of times and locations), objectives, and methods.

mixed-stock fishery

A harvest management technique by which different species, strains, races or stocks are harvested together.

N

natural production

Spawning, incubating, hatching and rearing fish in rivers, lakes and streams without human intervention.

naturally spawning populations

Populations of fish that have completed their entire life cycle in the natural environment and may be the progeny of wild, hatchery or mixed parentage.

Northwest Power Act

The Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. 839 et seq.), which authorized the creation of the Northwest Power Planning Council. The act directs the Council to develop

this program to protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries, to establish an Independent Scientific Review Panel to review projects implementing this program that are proposed for funding by Bonneville, and to make final recommendations to Bonneville on implementation projects.

O

off-site mitigation

The improvement in conditions for fish or wildlife species away from the site of a hydroelectric project that had detrimental effects on fish and/or wildlife, as part or total compensation for those effects. An example of off-site mitigation is the fish passage restoration work being conducted in the Yakima River Basin for the detrimental effects caused by mainstem hydroelectric projects.

operational losses

The direct wildlife losses caused by the day-to-day fluctuations in flows and reservoir levels resulting from the operation of the hydrosystem.

P

passage

The movement of migratory fish through, around, or over dams, reservoirs and other obstructions in a stream or river.

PIT tags

Passive Integrated Transponder tags are used for identifying individual salmon for monitoring and research purposes. This miniaturized tag consists of an integrated microchip that is programmed to identify individual fish. The tag is inserted into the body cavity of the fish and decoded at selected monitoring sites.

plume

The area of the Pacific Ocean that is influenced by discharge from the Columbia River, up to 500 miles beyond the mouth of the river.

population

A group of organisms belonging to the same species that occupy a well-defined locality and exhibit reproductive continuity from generation to generation.

powerhouse

A primary part of a hydroelectric dam where the turbines and generators are housed and where power is produced by falling water rotating turbine blades.

R

rearing

The juvenile life stage of anadromous fish spent in freshwater rivers, lakes and streams before they migrate to the ocean.

reservoir

A body of water collected and stored in an artificial lake behind a dam.

resident fish

Fish that spend their entire life cycle in freshwater. For program purposes, resident fish includes landlocked anadromous fish (e.g., white sturgeon, kokanee and coho), as well as traditionally defined resident fish species.

resident fish substitutions

The enhancement of resident fish to address losses of salmon and steelhead in those areas permanently blocked to anadromous (ocean-migrating) fish as a result of hydroelectric dams.

riparian habitat

Habitat along the banks of streams, lakes or rivers.

run

A population of fish of the same species consisting of one or more stocks migrating at a distinct time.

S**salmonid**

A fish of the Salmonidae family, which includes soft-finned fish such as salmon, trout and whitefish.

smolt

A juvenile salmon or steelhead migrating to the ocean and undergoing physiological changes (smoltification) to adapt its body from a freshwater to a saltwater existence.

spawn

The act of fish releasing and fertilizing eggs.

species

A group of individuals of common ancestry that closely resemble each other structurally and physiologically and that can interbreed, producing fertile offspring.

spill

Releasing water through the spillway rather than through the turbine units.

spillway

The channel or passageway around or over a dam through which excess water is released or "spilled" past the dam without going through the turbines. A spillway is a safety valve for a dam and, as such, must be capable of discharging major floods without damaging the dam, while maintaining the reservoir level below some predetermined maximum level.

stock

A population of fish spawning in a particular stream during a particular season. They generally do not interbreed with fish spawning in a different stream or at a different time.

subbasin

A set of adjoining watersheds with similar ecological conditions and tributaries that ultimately connect, flowing into the same river or lake. Subbasins contain major tributaries to the Columbia and Snake rivers.

supplementation

The release of hatchery fry and juvenile fish in the natural environment to quickly increase or establish naturally spawning fish populations.

subbasin planning

A coordinated systemwide approach to planning in which each subbasin in the Columbia system will be evaluated for its potential to produce fish in order to contribute to the goal of the overall system. The planning will emphasize the integration of fish and wildlife habitat, fish passage, harvest management and production.

T**target population**

A species or population singled out for attention because of its harvest significance or cultural value, or because it represents a significant group of ecological functions in a particular habitat type.

terminal fishery

A fishery designed to increase harvest of abundant fish stocks and minimize effects on depleted stocks by focusing the fishery on locations where the abundant stocks are produced — in net pens, for example — and where the fish also return to spawn.

Technical Management Team

A technical working group established by the National Marine Fisheries Service to provide advice on how to operate the federal dams in the Columbia River Basin in a manner that minimizes fish and wildlife impacts. The TMT deals with issues such as reservoir storage levels, flow augmentation, and spill.

transboundary

Refers to U.S. and Canadian border..

transportation

Collecting migrating juvenile fish and transporting them around the dams using barges or trucks.

tribes

In this program, these include the Burns-Paiute Tribe; the Coeur d'Alene Tribes; the Confederated Tribes of the Colville Reservation; the Confederated Salish-Kootenai Tribes of the Flathead Reservation; the Confederated Tribes of the Umatilla Reservation of Oregon; the Confederated Tribes of the Warm Springs Reservation of Oregon; the Confederated Tribes and Bands of the Yakama Nation; the Kalispel Tribe of Indians; the Kootenai Tribe of Idaho; the Nez Perce Tribe of Idaho; the Shoshone-Paiutes of the Duck Valley Reservation; the Shoshone-Bannock Tribes of the Fort Hall Reservation; and the Spokane Tribe of Indians.

W**watershed**

The area that drains into a stream or river. A subbasin is typically composed of several watersheds.

weak stock

A stock of fish where the long-term survival of the stock is in doubt. Typically this is a stock where the population is small and is barely

reproducing itself or is not reproducing itself. While ESA-listed stocks are considered weak stocks, the term also includes other populations that would not yet qualify for ESA listing.

wild populations

Fish that have maintained successful natural reproduction with little or no supplementation from hatcheries.

APPENDIX B: HYDROELECTRIC DEVELOPMENT CONDITIONS

FUTURE HYDROELECTRIC DEVELOPMENT

Much of this program has focused on mitigating damage done to Columbia River Basin fish and wildlife by hydropower development and operations in the past. But the future is equally important. The Corps of Engineers and the Bureau of Reclamation continue to study the need for additional federal hydroelectric projects and to plan for new development in the basin. The Federal Energy Regulatory Commission has many permits and applications pending for hydroelectric development in Idaho, Oregon, Montana and Washington. Many of those applications and permits are for projects throughout the Columbia River Basin. Dozens of small or medium-sized hydroelectric projects are proposed for tributary drainage basins that contain important anadromous fish habitat. However, most new hydroelectric development will be accomplished by private or non-federal public entities licensed by the Federal Energy Regulatory Commission.

Many of the proposals are for hydroelectric projects that would produce less than 5 megawatts of electricity. Although individual small projects may have no significant adverse effects on the fish and wildlife resources of the basin, the cumulative effects of such development throughout a river basin could be quite harmful. These cumulative effects need to be taken into account fully.

The Council estimates that 4,600 stream miles of Columbia River Basin salmon and steelhead spawning and rearing habitat have been lost to development, not including losses of migration routes and of resident fish and wildlife habitat. Minimizing further habitat loss is especially important in view of the Council's goal of doubling salmon and steelhead runs in the Columbia

River Basin consistent with system policies (see Sections 2 and 4). Development in critical fish and wildlife areas leads to divisive and expensive conflicts that the Council believes can be avoided through resource planning.

The Council finds that future hydroelectric developers in the basin should be required to mitigate harm to fish and wildlife and has adopted program measures calling for such mitigation. New hydroelectric development has the potential to cause further damage to the basin's fish and wildlife resources as well as to negate ongoing Council efforts to remedy damage caused by the existing hydropower system. Federal agencies also should assess and mitigate the cumulative effects on fish and wildlife of multiple hydroelectric projects.

The Council also intends to continue to review applications for Federal Energy Regulatory Commission permits and licenses and for Corps of Engineers and Bureau of Reclamation proposals for hydroelectric development. The purpose of this review is to identify program measures related to the proposed development to ensure that any new development in the basin is consistent with this fish and wildlife program and the Council's Northwest Power Plan. The Council's reviews would complement and recognize, not supplant, the role of the fish and wildlife agencies and tribes in reviewing proposals for hydroelectric projects.

1. FUTURE HYDROELECTRIC DEVELOPMENT

Conditions

Federal Energy Regulatory Commission, Corps of Engineers, Bureau of Reclamation and Bonneville

Do not license, exempt from license, relicense, propose, recommend, agree to acquire or wheel power from, grant billing credits for, or otherwise support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions:

- Consultation with the fish managers and the Council throughout study, design, construction and operation of the project;
- Specific plans for flows and fish facilities prior to construction;
- The best available means for aiding downstream and upstream passage of anadromous and resident fish;
- Flows and reservoir levels of sufficient quantity and quality to protect spawning, incubation, rearing and migration;
- Full compensation for unavoidable fish losses or fish habitat losses through habitat restoration or replacement, appropriate propagation, or similar measures consistent with the provisions of this program;
- Assurance that the project will not inundate the usual and accustomed, traditional or contemporary fishing places of any tribe without tribal approval;
- Assurance that the project will not degrade fish habitat or reduce numbers of fish in such a way that the exercise of treaty or executive order tribal rights will be diminished;
- Assurance that all fish protection measures are fully operational at the time the project begins operation;
- The collection of data needed to

monitor and evaluate the results of the fish protection efforts; and

- Assurance that the project will not degrade water quality beyond the point necessary to sustain sensitive fish species (as designated in consultation with the fish managers).

Do not license, relicense, exempt from license, propose, recommend, agree to acquire or wheel power from, grant billing credits for, or otherwise support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions:

- Consultation with wildlife managers and the Council throughout study, design, construction and operation of the project;
- Avoiding inundation of wildlife habitat, insofar as practical;
- Timing construction activities, insofar as practical, to reduce adverse effects on nesting and wintering grounds;
- Locating temporary access roads in areas to be inundated;
- Constructing subimpoundments and using all suitable excavated material to create islands, if appropriate, before the reservoir is filled;
- Avoiding all unnecessary or premature clearing of land before filling the reservoir;
- Providing artificial nest structures when appropriate;
- Avoiding construction, insofar as practical, within 250 meters of active raptor nests;
- Avoiding critical riparian habitat (as designated in consultation with the wildlife managers) when clearing, riprapping, dredging, disposing of spoils and wastes, constructing diver-

sions, and relocating structures and facilities;

- Replacing riparian vegetation if natural revegetation is inadequate;
- Creating subimpoundments by diking backwater slough areas, creating islands and nesting areas;
- Regulating water levels to reduce adverse effects on wildlife during critical wildlife periods (as defined in consultation with the fish and wildlife managers);
- Improving the wildlife capacity of undisturbed portions of new project areas (through such activities as managing vegetation, reducing disturbance, and supplying food, cover and water) as compensation for otherwise unmitigated harm to wildlife and wildlife habitat in other parts of the project area;
- Acquiring land or management rights, such as conservation easements, where necessary to compensate for lost wildlife habitat at the same time other project land is acquired and including the associated costs in project cost estimates;
- Funding operation and management of the acquired wildlife land for the life of the project;
- Granting management easement rights on the acquired wildlife lands to appropriate management entities;
- Collecting data needed to monitor and evaluate the results of the wildlife protection efforts;
- Assurance that the project will not inundate the usual and accustomed, traditional or contemporary hunting places of any tribe without tribal approval; and
- Assurance that the project will

not degrade wildlife habitat or reduce numbers of wildlife in such a way that the exercise of treaty or executive order tribal rights will be diminished.

Ensure that all licenses for hydroelectric projects or documents that propose, recommend or otherwise support hydroelectric development explain in detail how the provisions of this section will be accomplished or the reasons why the provisions cannot be incorporated into the project.

2. PROTECTED AREAS

From the inception of this program, the Council has supported the concept of protecting some streams and wildlife habitats from hydroelectric development, where the Council believes such development would have major negative impacts that could not be reversed. Beginning in 1983, the Council directed extensive studies of existing habitat and has analyzed alternative means of protection. In 1988, the Council concluded that: 1) the studies had identified fish and wildlife resources of critical importance to the region; 2) mitigation techniques cannot assure that all adverse impacts of hydroelectric development on these fish and wildlife populations will be mitigated; 3) even small hydroelectric projects may have unacceptable individual and cumulative impacts on these resources; and 4) protecting these resources and habitats from hydroelectric development is consistent with an adequate, efficient, economical, and reliable power supply. The Council, relying on these studies, designated certain river reaches in the basin as "protected areas," where the Council believes hydroelectric development would have unacceptable risks of loss to fish and wildlife species of concern, their productive capacity or their habitat.

River reaches to be protected are those reaches or portions of reaches listed on the "Protected Areas List"

adopted by the Council on August 10, 1988, and subsequently. For each river reach listed on the Protected Areas List, the fish and wildlife to be protected are those on the list. The Council will supply a copy of the Protected Areas List to any party free of charge.

Protect Areas From New Hydropower Development

The following are not affected by protected areas:

- Any hydroelectric facility or its existing impoundment that as of August 10, 1988, had been licensed or exempted from licensing by the Federal Energy Regulatory Commission;
- The relicensing of such hydroelectric facility or its existing impoundment;
- Any modification of any existing hydroelectric facility or its existing impoundment; and
- Any addition of hydroelectric generation facilities to a non-hydroelectric dam or diversion structure.
- Transition projects: The Council recognizes that there exist, as of August 10, 1988, applications for hydroelectric projects that are in various stages of completion before the Federal Energy Regulatory Commission. In many cases the applicants have made substantial investments and have completed, or nearly completed, agreements with all interested parties, including state fish and wildlife agencies. The Council recognizes that the Federal Energy Regulatory Commission may be obligated to complete its processes on these applications, but expects where possible that this measure will be taken into account to the fullest extent practicable.

The Council recognizes that there may exist preliminary permits or applications for licenses or exemptions for hydroelectric projects at sites that were not previously within protected areas, but which may be included within protected areas as a result of amendments approved by the Council. An important purpose of protected areas is to encourage developers to site projects outside protected areas. The Council therefore exempts from the effect of an amendment that designates a previously unprotected area as protected, any project for which the developer had obtained a preliminary permit or filed an application for license or exemption prior to the date on which the Council entered rulemaking on the amendment. However, it is the Council's intention that the Federal Energy Regulatory Commission give full consideration to the protection of fish and wildlife resources located at these project sites and provide suitable protection and mitigation for such resources in the event that a license or exemption is approved.

- Effect on water rights and riparian areas: This measure should not be interpreted to authorize the appropriation of water by any entity or individual, affect water rights or jurisdiction over water, or alter or establish any water or water-related right. The Council does not intend this measure to alter or affect any state or federal water quality classification or standards, or alter any management plan developed pursuant to the national Forest Management Act, 16 U.S.C. 1601, et seq., or the Federal Land Policy Management Act, 43 U.S.C. 1701, et seq., except to the extent planning decisions are directly related to hydropower licensing and development. Nor should this measure be interpreted to alter, amend, repeal, interpret, modify, or conflict with any interstate

compact made by the states. If this measure is found by a court or other competent authority to conflict with any other interstate compact, this measure will terminate with respect to the area involved, without further action of the Council.

This measure applies to river reaches, or portions of river reaches, and to river banks or surrounding areas only where such areas would be directly affected by a proposed hydroelectric project. In adopting this measure, the Council has not attempted to balance all the factors that may be relevant to land management determinations.

Bonneville Power Administration

Do not acquire power from hydroelectric projects located in protected areas. The Council believes that the Long-Term Intertie Access Policy's reliance on protected areas is consistent with the Council's power plan and fish and wildlife program as they apply to fish and wildlife in the Columbia River Basin. The Council continues to recommend that Bonneville adopt a similar policy with respect to protected areas outside the Columbia River Basin.

Federal Energy Regulatory Commission

Under the Northwest Power Act, the Federal Energy Regulatory Commission, and all other federal agencies responsible for managing, operating, or regulating federal or non-federal hydroelectric facilities located on the Columbia River or its tributaries are required to take protected area designations into account to the fullest extent practicable at all relevant stages of decision-making processes. The Council recognizes that the Federal Energy Regulatory Commission makes licensing and exemption decisions for non-federal projects, and does not expect

that the Commission will abandon its normal processes with regard to projects located in protected areas. Rather, consistent with Section 4(h)(11) of the Northwest Power Act, the Council expects that the Federal Energy Regulatory Commission will take the Council's judgment into account, and implement that judgment in licensing and exemption decisions unless the Federal Energy Regulatory Commission's legal responsibilities require otherwise.

3. ADDITIONAL PROTECTIONS AND CONSISTENCY OF HYDRO-POWER DEVELOPMENT

Cumulative Effects

Federal Project Operators and Regulators

Review simultaneously all applications or proposals for hydroelectric development in a single river drainage, through consolidated hearings, environmental impact statements or assessments, or other appropriate methods. This review shall assess cumulative environmental effects of existing and proposed hydroelectric development on fish and wildlife.

Ensure Consistency With This Program

Federal Energy Regulatory Commission

Require all applicants for licenses (including license renewals, amendments and exemptions) and preliminary permits in the Columbia River Basin to demonstrate in their applications how the proposed project would take this program into account to the fullest extent practicable.

Provide the Council with copies of all applications for licenses (includ-

ing license renewals, amendments and exemptions) and preliminary permits in the Columbia River Basin so that the Council can comment in a timely manner on the consistency of the proposed project with this fish and wildlife program. This provision is not intended to supplant review of such applications by the fish and wildlife agencies and tribes.

Federal Land Managers and Federal and State Fish and Wildlife Agencies

Incorporate pertinent elements of the fish and wildlife program in the terms and conditions they apply to projects exempted from licensing under Federal Energy Regulatory Commission exemption procedures. The Council also requests federal land managers to incorporate this program into their permit procedures related to hydroelectric development on lands they manage.

Corps of Engineers, Bureau of Reclamation, and any Other Federal Agency Studying or Proposing Hydroelectric Development in the Columbia River Basin

Provide opportunity for Council review and comment.

APPENDIX C: WILDLIFE PROVISIONS

WILDLIFE PROVISIONS

Mitigation Priorities

Bonneville and Wildlife Managers

Ensure that wildlife mitigation projects implemented in fulfillment of this program are consistent with the basinwide implementation priorities described in Tables 11-1, 11-2 and 11-3, below.

Table 11-1 Lower Columbia Subbasin Wildlife Mitigation Priorities

Habitat Types--Target Species	Priority
Riparian/Riverine <ul style="list-style-type: none">• Great Blue Heron	High
Old Growth Forest <ul style="list-style-type: none">• Northern Spotted Owl	High
Wetlands <ul style="list-style-type: none">• Great Blue Heron• Band-tailed Pigeon• Western Pond Turtle	High
Coniferous Forest <ul style="list-style-type: none">• Ruffed Grouse• Elk• American Black Bear/Cougar	Medium

Table 11-2 Upper Columbia Subbasin Wildlife Mitigation Priorities

Habitat Types--Target Species	Priority
Riparian/River <ul style="list-style-type: none"> • Bald Eagle (breeding) • Black-capped Chickadee • Peregrine Falcon 	High
Shrub-Steppe <ul style="list-style-type: none"> • Sharp-tailed Grouse • Pygmy Rabbit • Sage Grouse • Mule Deer 	High
Wetlands <ul style="list-style-type: none"> • Mallard • Redhead 	High
Islands <ul style="list-style-type: none"> • White Pelicans 	Medium
Agricultural Lands <ul style="list-style-type: none"> • Swainson's Hawk • Ring-necked Pheasant 	Low

Table 11-3 Snake River Subbasin Wildlife Mitigation Priorities

Habitat Type--Target Species	Priority
Riparian/Riverine <ul style="list-style-type: none"> • Bald Eagle (breeding) • Bald Eagle (wintering) • River Otter • Black-capped Chickadee • Peregrine Falcon • Ruffed Grouse 	High
Wetlands <ul style="list-style-type: none"> • Mallard 	High
Native Grasslands and Shrubs <ul style="list-style-type: none"> • Mule Deer/Elk • White-tailed Deer • Sharp-tailed Grouse 	Medium
Coniferous Forest <ul style="list-style-type: none"> • Elk 	Medium
Old Growth Forest <ul style="list-style-type: none"> • Pileated Woodpecker 	Medium
Lowland Forest <ul style="list-style-type: none"> • White-tailed deer 	Low

MONITOR AND EVALUATE WILDLIFE EFFORTS AT NON- FEDERAL PROJECTS

Non-federal hydroelectric projects are licensed by the Federal Energy Regulatory Commission. The Electric Consumers Protection Act of 1986 (ECPA) mandates that the Federal Energy Regulatory Commission give equal consideration to the protection, mitigation of damage to, and enhancement of wildlife in licensing and relicensing decisions.

Mitigation Considerations in Dam Licensing Decisions

Federal Energy Regulatory Commission

In developing license conditions, take into account to the fullest extent practicable the policies established in this section, and the measures taken by Bonneville and others to implement this section, and Section 12.1A.2 of this program. In particular, it is important to take into account the mitigation projects at federal projects undertaken pursuant to this section, to ensure that license conditions are consistent with and complement these wildlife mitigation projects and contribute fully and proportionately to regional wildlife mitigation goals.

Council

The Council will monitor the Federal Energy Regulatory Commission licensing and relicensing proceedings and comment or intervene where appropriate.

Table 11-4 identifies the losses due to hydropower construction at federal dams in the Columbia River Basin.

<i>Table 11-4 Estimated Losses Due to Hydropower Construction (losses are preceded by a “-”, gains by a “+”)</i>	
Species	Total Habitat Units
Albeni Falls	
• Mallard Duck	-5,985
• Canada Goose	-4,699
• Redhead Duck	-3,379
• Breeding Bald Eagle	-4,508
• Wintering Bald Eagle	-4,365
• Black-Capped Chickadee	-2,286
• White-tailed Deer	-1,680
• Muskrat	-1,756
• Yellow Warbler	+171
Lower Snake Projects	
• Downy Woodpecker	-364.9
• Song Sparrow	-287.6
• Yellow Warbler	-927.0
• California Quail	-20,508.0
• Ring-necked Pheasant	-2,646.8
• Canada Goose	-2,039.8
Anderson Ranch	
• Mallard	-1,048
• Mink	-1,732
• Yellow Warbler	-361
• Black Capped Chickadee	-890
• Ruffed Grouse	-919
• Blue Grouse	-1,980
• Mule Deer	-2,689
• Peregrine Falcon	-1,222 acres*
* Acres of riparian habitat lost. Does not require purchase of any lands.	
Black Canyon	
• Mallard	-270
• Mink	-652
• Canada Goose	-214
• Ring-necked Pheasant	-260
• Sharp-tailed Grouse	-532
• Mule Deer	-242
• Yellow Warbler	+8
• Black-capped Chickadee	+68
Deadwood	
• Mule Deer	-2080
• Mink	-987
• Spruce Grouse	-1411
• Yellow Warbler	-309

Table 11-4 (cont.) Estimated Losses Due to Hydropower Construction
(losses are preceded by a “-”, gains by a “+”)

Species	Total Habitat Units
Palisades	
• Bald Eagle	-5,941 breeding
	-18,565 wintering
• Yellow Warbler/	-718 scrub-shrub
• Black Capped Chickadee	-1,358 forested
• Elk/Mule Deer	-2,454
• Waterfowl and Aquatic Furbearers	-5,703
• Ruffed Grouse	-2,331
• Peregrine Falcon*	-1,677 acres of forested wetland
	-832 acres of scrub-shrub wetland
	+68 acres of emergent wetland
* Acres of riparian habitat lost. Does not require purchase of any lands.	
Willamette Basin Projects	
• Black-tailed Deer	-17,254
• Roosevelt Elk	-15,295
• Black Bear	-4,814
• Cougar	-3,853
• Beaver	-4,477
• River Otter	-2,408
• Mink	-2,418
• Red Fox	-2,590
• Ruffed Grouse	-11,145
• California Quail	-2,986
• Ring-necked Pheasant	-1,986
• Band-tailed Pigeon	-3,487
• Western Gray Squirrel	-1,354
• Harlequin Duck	-551
• Wood Duck	-1,947
• Spotted Owl	-5,711
• Pileated Woodpecker	-8,690
• American Dipper	-954
• Yellow Warbler	-2,355
• Common Merganser	+1,042
• Greater Scaup	+820
• Waterfowl	+423
• Bald Eagle	+5,693
• Osprey	+6,159
Grand Coulee	
• Sage Grouse	-2,746
• Sharp-tailed Grouse	-32,723
• Ruffed Grouse	-16,502
• Mourning Dove	-9,316
• Mule Deer	-27,133
• White-tailed Deer	-21,362
• Riparian Forest	-1,632
• Riparian Shrub	-27
• Canada Goose Nest Sites	-74

Table 11-4 (cont.) Estimated Losses Due to Hydropower Construction
(losses are preceded by a “-”, gains by a “+”)

Species	Total Habitat Units
McNary	
• Mallard (wintering)	+13,744
• Mallard (nesting)	-6,959
• Western Meadowlark	-3,469
• Canada Goose	-3,484
• Spotted Sandpiper	-1,363
• Yellow Warbler	-329
• Downy Woodpecker	-377
• Mink	-1,250
• California Quail	-6,314
John Day	
• Lesser Scaup	+14,398
• Great Blue Heron	-3,186
• Canada Goose	-8,010
• Spotted Sandpiper	-3,186
• Yellow Warbler	-1,085
• Black-capped Chickadee	-869
• Western Meadowlark	-5,059
• California Quail	-6,324
• Mallard	-7,399
• Mink	-1,437
The Dalles	
• Lesser Scaup	+2,068
• Great Blue Heron	-427
• Canada Goose	-439
• Spotted Sandpiper	-534
• Yellow Warbler	-170
• Black-capped Chickadee	-183
• Western Meadowlark	-247
• Mink	-330
Bonneville	
• Lesser Scaup	+2,671
• Great Blue Heron	-4,300
• Canada Goose	-2,443
• Spotted Sandpiper	-2,767
• Yellow Warbler	-163
• Black-capped Chickadee	-1,022
• Mink	-1,622
Dworshak	
• Canada Goose-(breeding)	-16
• Black-capped Chickadee	-91
• River Otter	-4,312
• Pileated Woodpecker	-3,524
• Elk	-11,603
• White-tailed Deer	-8,906
• Canada Goose (wintering)	+323
• Bald Eagle	+2,678
• Osprey	+1,674
• Yellow Warbler	+119

*Table 11-4 (cont.) Estimated Losses Due to Hydropower Construction
(losses are preceded by a “-”, gains by a “+”*

Species	Total Habitat Units
Minidoka	
• Mallard	+174
• Redhead	+4,475
• Western Grebe	+273
• Marsh Wren	+207
• Yellow Warbler	-342
• River Otter	-2,993
• Mule Deer	-3,413
• Sage Grouse	-3,755
Chief Joseph	
• Lesser Scaup	+1,440
• Sharp-tailed Grouse	-2,290
• Mule Deer	-1,992
• Spotted Sandpiper	-1,255
• Sage Grouse	-1,179
• Mink	-920
• Bobcat	-401
• Lewis' Woodpecker	-286
• Ring-necked Pheasant	-239
• Canada Goose	-213
• Yellow Warbler	-58

APPENDIX D: PROVISIONAL STATEMENT OF BIOLOGICAL OBJECTIVES FOR ENVIRONMENTAL CHARACTERISTICS AT THE BASIN LEVEL

The following is a provisional set of environmental characteristic objectives for the basin level. The Council has asked the Independent Scientific Advisory Board to review these provisional basin level environmental characteristics by June 2001. The ISAB will report to the Council on the scientific soundness and basin-wide applicability of the environmental characteristics, as well as their utility for further defining biological objectives at the province and sub-basin levels. As part of its review, the ISAB should consider and report to the Council on the applicability of these objectives in the most altered areas of the basin, the blocked areas.

The Council will make the ISAB's report publicly available and seek views and comment from interested parties. The Council will consider the report of the ISAB and the views and comments of others on the report, and will confirm or revise these basin level objectives for purposes of providing guidance for sub-basin level planning and further program amendments.

Provisional biological objectives for environmental characteristics at the basin level

Basin level environmental characteristics describe the kinds of changes that are needed across the Columbia basin to achieve the biological performance objectives called for by the program.

1. Protect the areas and ecological functions that are at present relatively productive for fish and wildlife populations (e.g., the Hanford Reach fall chinook; spring chinook in the upper John Day River) to provide a base for expansion of healthy populations as we rehabilitate degraded habitats in other areas.

- Protect and enhance habitats and ecological function to allow for the restoration of more natural population structures, by allowing for the expansion of productive populations and by habitat restoration actions that connect weak populations to stronger populations and to each other. Allow for the recovery of depleted and listed populations to at least the point of self-sustainability and a low probability of extinction.
 - Protection and expansion of habitats and ecological functions should allow for an increase in the number, complexity and range of multi-species fish and wildlife assemblages and communities. Increases in the productivity, abundance, and life-history diversity of specific fish and wildlife populations are dependent on, and should not be viewed in isolation from, these multi-species communities.
- 2. Protect and restore freshwater habitat for all life history stages of the key species. Protect and increase ecological connectivity between aquatic areas, riparian zones, floodplains and uplands.**
- Increase the connections between rivers and their floodplains, side channels and riparian zones.
 - Manage riparian areas to protect aquatic conditions and form a transition to floodplain terrestrial areas and side channels.
 - Identify, protect and restore the functions of key alluvial river reaches.
 - Reconnect restored tributary habitats to protected or restored mainstem habitats, especially in

the area of productive mainstem populations.

- 3. Allow patterns of water flow to move more than at present toward the natural hydrographic pattern in terms of quantity, quality and fluctuation.**
- Habitat restoration may be framed in the context of measured trends in water quality.
 - Allow for seasonal fluctuations in flow. Stabilize daily fluctuations.
 - Increase the correspondence between water temperatures and the naturally-occurring regimes of temperatures throughout the basin.
 - Significantly reduce watershed erosion where human activities have accelerated sediment inputs.
- 4. Increase energy and nutrient connections within the system to increase productivity and expand biological communities.**
- 5. Allow for biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability.**
- Expand the complexity and range of habitats to allow for greater life history and between species diversity.
 - Manage human activities to minimize artificial selection or limitation of life history traits.
 - Restoring habitat and access to habitat that establishes life history diversity is a priority.

6. Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of population structures.

- Increase the abundance and range of existing habitats and populations.
- Expand and connect existing habitat pockets to facilitate development of resilient population structures for aquatic communities.

7. Identify, protect and restore ecosystem functions in the Columbia River estuary and nearshore ocean discharge plume as affected by actions within the Columbia River watershed.

- Evaluate flow regulation, river operations and estuary-area habitat changes to better understand the relationship between estuary and near-shore plume characteristics and the productivity, abundance and diversity of salmon and steelhead populations.

8. Enhance the natural expression of biological diversity in salmon and steelhead populations to accommodate mortality and environmental variability in the ocean.

9. Accept significant variation in the productivity, capacity and life-history diversity for any particular population over any particular time period, as part of the normal environmental condition. A measure of whether key ecological functions have increased sufficiently will be whether the system can accept normal environmental variation without collapse of the fish and wildlife population and community structure.

Basin and province level objectives must also describe expectations for the characteristics of the mainstem, estuary and ocean environments shared by all populations of salmon and steelhead in the subbasins. In other words, subbasin planners need to know what are the program's expectations or assumptions for survival of their respective populations in the parts of their life cycles outside the subbasins, including survival through the mainstem and in the estuary and ocean. For example, the objectives and strategies that planners would choose for a subbasin might vary substantially if expectations for juvenile survival through the mainstem over the planning period are 50 percent versus 90 percent.

APPENDIX E: FINDINGS ON RECOMMENDATIONS

The findings on Year 2000 recommendations total 3,000 pages, available in sections online at www.nwcouncil.org/library/2001/2001-12.