

# 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.

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### 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 hydro-system 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 hydrosystem.
- 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.

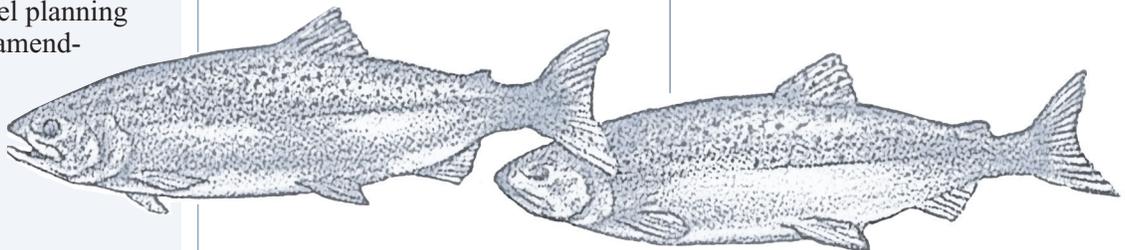
More specific basinwide objectives could help determine the amount of change needed across the basin to fulfill the vision. They will also help determine the cost-effectiveness of program strategies and provide a basis for monitoring, evaluation, and accountability. These more specific objectives will 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 habitat<sup>1</sup> 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 potential<sup>2</sup>

<sup>1</sup> As used in this section, “habitat” includes the ecological functions of the habitat and the habitat structure.

<sup>2</sup> 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 population<sup>3</sup> 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

<sup>3</sup>“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.

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“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.”

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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.)

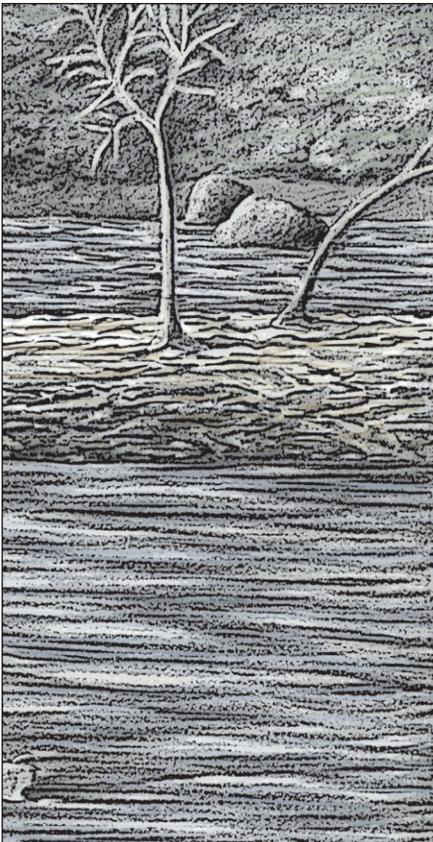
### **Address Transboundary Species**

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 aggressive

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

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“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.”

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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.

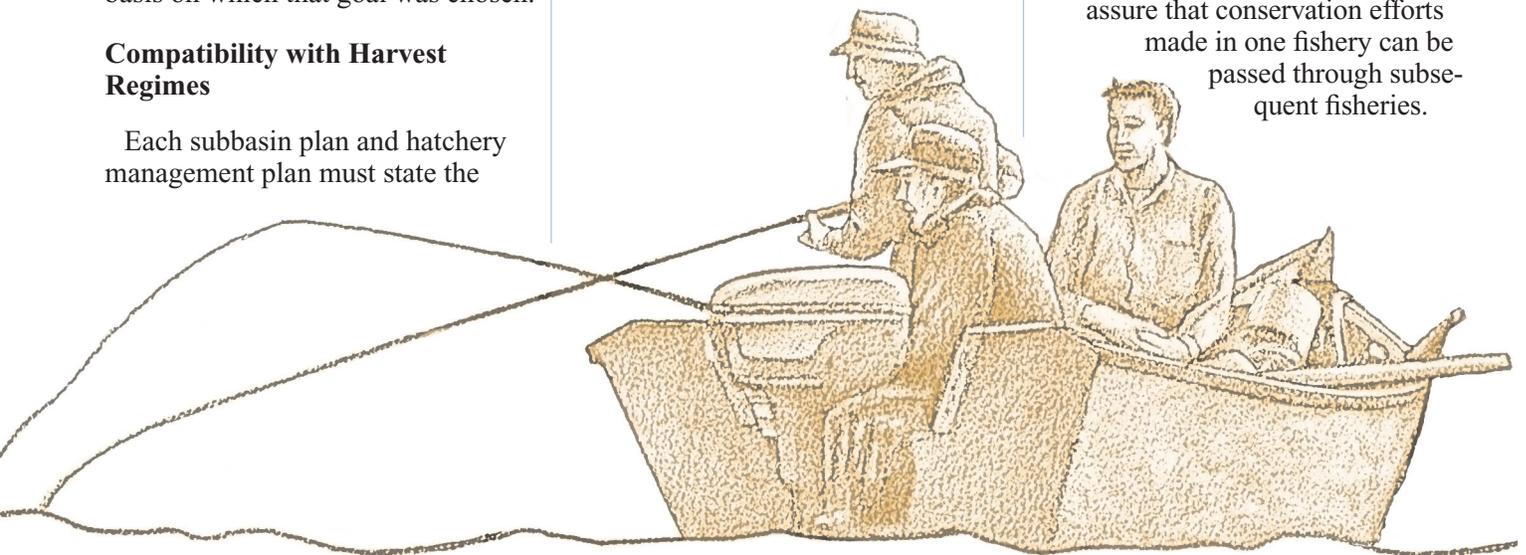
### **Opportunities for Increased Harvest**

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

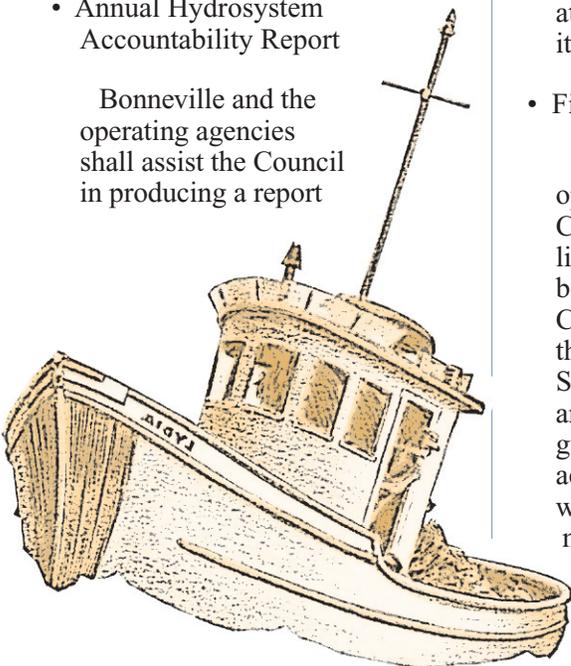
Through the biological opinions, the federal agencies have established an implementation structure for annual and in-season operations and for recommendations on funding for passage improvements. It is the Council's perspective that the part of the implementation structure that allows for technical review 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.<sup>4</sup> A predetermined protocol should be established by the Technical Management Team and the Implementation Team for emergency actions.<sup>5</sup> 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.<sup>6</sup>

**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-

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<sup>4</sup> 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.

<sup>5</sup> 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.

<sup>6</sup> 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

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“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.”

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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.

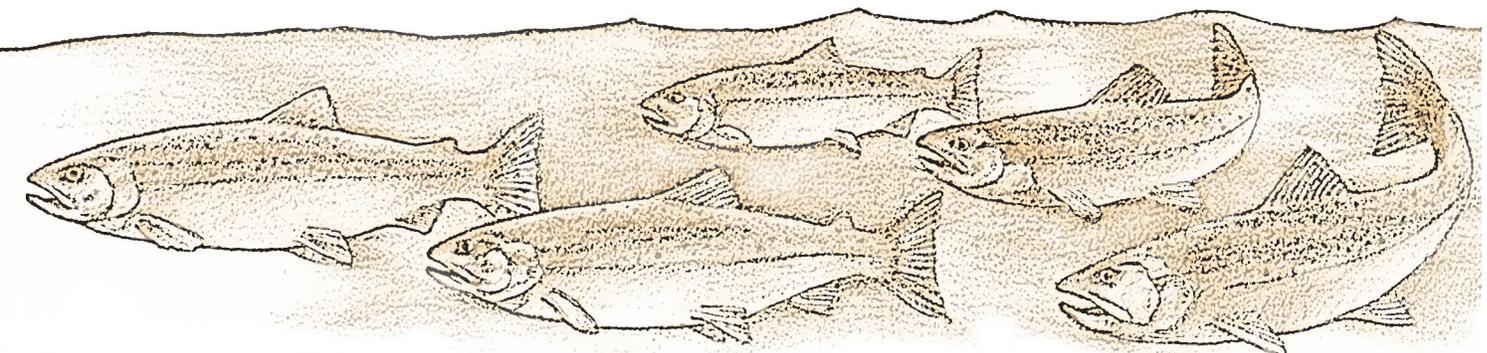
### **Research**

#### **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.

