

# **Fish and Wildlife Program/Framework Concept:**

## **Strawman**

**February 24, 2000**

Note: This is a “Strawman,” an illustration of the kind of revisions the Council has in mind in its current call for proposed revisions to adopt a framework into its Fish and Wildlife Program. While portions of this document have been discussed with the Council, it is a staff draft only and does not necessarily represent the views of the Council or its individual members.

This document is issued so that others can see how a framework like the one developed in the Multi-Species Framework process might be applied to the Council’s Fish and Wildlife Program.

After the deadline has passed for the receipt of recommendations from fish and wildlife agencies, Indian tribes, and other interested parties, there will be a time of public comment on those recommendations. After that, the Council will issue a draft of its proposed amendments. That draft will be prepared in light of the recommendations and comments. Whether the draft amendments resemble this “Strawman” in any respect depends on what the Council learns from the recommendations and comments, which are yet to be received.

Northwest Power Planning Council

Document 2000-2

# Table of Contents

## Introduction to the fish and wildlife program/Framework Concept

### Part 1 -- Program at the Basin Level

- A. Vision for the Columbia River Basin
  - 1. Overall vision
  - 2. Specific planning assumptions
- B. Biological Objectives
- C. Strategies
  - 1. Implementation standards
    - (a) Standards for artificial production
    - (b) Standards for mainstem passage
    - (c) Standards for water and hydrosystem management (including flow augmentation, spill, dissolved gas management and optimizing power and non-power objectives)
    - (d) Standards to guide the consideration of ocean and estuary conditions
    - (e) Standards concerning the relationship of this program to harvest management
    - (f) Standards relating to future hydroelectric development/Protected Areas
    - (g) Standards for research, monitoring and evaluation
    - (h) Standards for data management and analysis

### Part 2 -- Ecological Province Level

- A. Ecological structure: provinces and subbasin
- B. Province-level visions
- C. Province-level biological objectives

### Part 3 -- Subbasin Plans

- A. Elements of a subbasin plan
- B. Participation criteria for subbasin planning
- C. Review of subbasin plans

### Part 4 -- Fish and Wildlife Selection Process

### Part 5 -- Scientific Foundation

- A. Basic scientific principles

### Attachment: Examples of Biological Objectives

- A. Ecosystem characteristics
- B. Biological performance objectives

### Glossary

## Introduction

The purpose of these amendments is to help the Council develop a new Columbia River Basin Fish and Wildlife program. This new program will be organized around the framework concept. The program is intended to bring together, as closely as possible, Endangered Species Act requirements, the broader requirements of the Northwest Power Act and the policies of the states and Indian tribes of the Columbia River Basin into a comprehensive program that has a solid scientific foundation.

In the 1994 amendments to its fish and wildlife program, the Council introduced the idea of a “framework” for the program and for the region’s fish and wildlife recovery efforts at large. The framework would establish a logical structure for the measures in the Council’s program. Based on the framework concept, the Council’s program would also contain explicit goals and objectives for the program and state the program’s scientific basis.

The framework concept was not further developed in the 1994 amendments. A number of reviews of the Council’s fish and wildlife program, especially the Independent Scientific Group’s 1996 Return to the River review requested by the Council, subsequently criticized the program for lacking an explicit statement of its underlying scientific foundation and, especially, for being a collection of measures not well tied to a comprehensive framework of goals and objectives. The annual reviews of project proposals by the Independent Scientific Review Panel have also repeatedly criticized the program for its failure to provide an adequate context for evaluating projects.

In addition, the number of fish and wildlife populations in the Columbia River Basin that have been listed under the Endangered Species Act continues to increase. But the region’s experience with responding to these listings has also highlighted the need to think and plan for the needs of fish and wildlife populations in an integrated, comprehensive way. Piecemeal solutions can mean that efforts to recover one population jeopardize other populations.

Over the last two years, the Council worked with federal agencies, Indian tribes, states, industrial and agricultural interests, and environmental interests to develop and expand the framework concept through the Multi-Species Framework Project. The Council now is amending the fish and wildlife program to bring those efforts to fruition -- to adopt a program organized around a scientific and policy framework of goals and objectives.

The revised program will state explicitly what the Council is trying to accomplish with the fish and wildlife program, link it to a specific set of objectives and describe the strategies to be employed. It will also describe the scientific basis for the program. The program will both guide decisions on what actions to take and provide a reference point for evaluating success.

The fundamental elements of the framework are: the *vision*, which describes what the program is trying to accomplish with regard to fish and wildlife and other desired benefits from the river; *biological objectives*, which describe the ecological conditions needed to achieve the vision; and implementation *strategies, procedures and standards*, which guide or describe the actions leading to the desired ecological conditions. In other words, *the vision* implies *biological objectives* which set the *strategies*. In turn, *strategies* address *biological objectives* and fulfill the *vision*.

The *scientific foundation* links the components of the framework, explaining why the Council believes certain kinds of management actions will result in particular physical habitat or ecosystem conditions of the basin; or why the ecosystem conditions will affect fish and wildlife populations or communities.

Based on the framework, the Council intends to develop and implement the program at three geographic levels -- the *basin* as a whole; smaller geographic divisions of the basin called *ecological provinces*; and *subbasins* that are components of each province. Framework elements, especially biological objectives and implementation standards, at the *basin* and *province* levels will guide a *subbasin* planning process to complete the program framework and provide the vehicle for implementation of actions intended to achieve the objectives and for evaluating the actions taken.

Under the Power Act, the Council's fish and wildlife program is not intended to address all fish and wildlife problems in the basin from whatever source. The Council's task is to design a program to protect, mitigate and enhance fish and wildlife affected by the hydrosystem, and to ensure that the consumers of electric power bear the cost of actions designed to deal with adverse impacts caused by the development and operation of the hydrosystem only. But the Council is adopting the vision, objectives, strategies and scientific foundation with the belief that they can apply to all of the region's fish and wildlife recovery actions -- to link to and accommodate the needs of other programs in the basin that affect fish and wildlife and to offer the possibility of the Council's Columbia River Basin Fish and Wildlife Program as a unifying and coordinating framework for fish and wildlife activities across the basin. This includes meeting the needs of the Endangered Species Act for listed fish and wildlife species, as a subset of describing the kinds of ecological change needed to improve the survival and productivity of the diverse fish and wildlife populations in the basin.

Thus, in describing a subbasin planning process to serve the needs of the fish and wildlife program, the Council is aware that the federal agencies, led by the National Marine Fisheries Service with its responsibility for consultations and recovery planning for anadromous fish species listed under the Endangered Species Act, are considering subbasin assessments and planning as a possible vehicle for implementing habitat changes needed under the ESA. The Council is also aware that at least three of the states of the Columbia basin are in the process of developing watershed or subbasin plans for purposes under state law. The Council aims to maximize coordination and cooperation and avoid duplication. Thus it is the Council's intent that the subbasin assessments and plans developed under this program also contain any elements that the National Marine Fisheries Service (or the U.S. Fish and Wildlife Service) may require so that the plans can address endangered species considerations. As well, the Council intends that subbasin assessments and plans developed for the purposes of the fish and wildlife program be coordinated with the relevant state planning processes, and to the maximum extent possible, be consistent with or even the same as the plans developed for the states.

#### ***Summary of how the revised fish and wildlife program will work***

- **Revised program framework at the basin and province level.** In the year 2000 revisions to the fish and wildlife program, the Council will adopt a framework composed of a vision, objectives, strategies and implementation standards and scientific principles for the basin and program as a whole and for subdivisions of the basin called ecological provinces.

- **Subbasin assessments and plans.** A subbasin assessment and planning process will follow the revision of the program. This will complete the program at the subbasin level and provide the implementation plans out of which fish and wildlife projects are proposed for Bonneville funding to implement the program. The subbasin assessment is a technical exercise designed to identify the biological potential of each subbasin and the opportunities for restoration. Based on this, fish and wildlife managers, land managers, private landowners, and other people responsible for fish and wildlife and habitat conditions in the respective subbasins will develop a subbasin plan consisting of goals, objectives, strategies, and proposed actions, consistent with the objectives and criteria in the revised program. Depending on the extent and quality of past assessment and planning work, the planning process in a particular subbasin could range from a relatively quick and straightforward review and updating of existing plans to a fundamental and extensive development process. Using the program amendment procedures in the Northwest Power Act, the Council intends to review subbasin plans and adopt agreed-upon plans into the program.
- **Rolling project review by the Independent Scientific Review Panel and Council.** Under the Power Act, the Council has the responsibility for conducting an annual review of projects proposed for funding by Bonneville to implement the Council's program, using recommendations from the Independent Scientific Review Panel (ISRP) as a primary basis for its final decisions. The Council and the ISRP also have a responsibility for reviewing other fish and wildlife projects proposed for funding by federal agencies and reimbursed by Bonneville. The revised program will describe a rolling project review process in which one-third of the program and fish and wildlife projects funded by Bonneville will be reviewed each year in some depth by the ISRP and the Council. An important criterion for a funding recommendation will be consistency with the vision, objectives and strategies in the revised program and in the relevant subbasin plan, when adopted. In the rolling project review, the priorities for actions at the basin, province, and subbasin level will be reflected as budget priorities for implementation of specific projects.
- **Monitoring and evaluation.** The revised fish and wildlife program will include procedures for monitoring and evaluating the biological benefits gained by actions taken under the program. The evaluation process will feed information back into the program planning and project review process, with adaptive management mechanisms for revising program objectives or actions if what has been adopted proves unsuccessful.
- **Effect on existing measures in the program.** Unless expressly modified by the provisions of this program, existing measures will continue to be in effect. Most of the existing measures in the fish and wildlife program are specific items for implementation at a particular location. As part of the subbasin planning process described above, these measures will be reviewed, together with proposals for new measures, for inclusion in the subbasin plan. When a subbasin plan is adopted, it will include both the new measures for that subbasin and the existing measures that will be continuing. At that time, the measures currently in the program for that subbasin will be replaced by the subbasin plan.

## Part 1 -- Program at the Basin Level

### A. Vision for the Columbia River Basin

The vision is the basis for the Council's program. At each ecological level, it indicates the choice of biological objectives and, in turn, the selection of strategies. The vision is a pragmatic statement of intent that drives the rest of the program.

#### 1. The overall vision for the fish and wildlife program:

The vision of the program is a Columbia River ecosystem that restores the abundance, productivity and diversity of biological communities and habitats that have historically contributed to the environmental, social, cultural, and economic well being of the Columbia River Basin. The vision also includes an adequate, efficient, economical and reliable electrical power supply for the region. This substantially preserves the hydroelectric potential of the Columbia River within the constraints imposed by the obligation to protect, mitigate and enhance fish and wildlife as affected by the hydroelectric system. It provides ecological conditions that recover species listed under the Endangered Species Act and biological abundance and productivity to support tribal harvest guaranteed by law and treaty. This vision requires restoration of ecosystem functions and habitats that have been altered or lost. The ecosystem needs to be more ecologically resilient and able to maintain its characteristics in the face of environmental variation. It needs to retain and increase the abundance of wildlife, resident and anadromous fish and associated habitats that define the character of the Columbia River Basin.

#### 2. Specific planning assumptions.

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

- No single activity is sufficient to recover and rebuild fish and wildlife species in the Columbia River Basin. Successful recovery efforts must involve a broad range of strategies for habitat improvement, hydrosystem reform, artificial production, and harvest management.
- Efforts to improve the status of fish and wildlife populations in the basin should focus first on habitat that supports existing populations that are healthy and productive. Next, we should expand adjacent habitats that have been historically productive or have a likely probability of sustaining healthy populations by reconnecting or improving habitat.
- Increasing the abundance of single populations will not, by itself, result in long-term recovery. Restoration efforts must focus on 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.

- 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 research and evaluation with those management actions to measure their effects on the ecosystem.
- Actions to improve juvenile and adult fish passage through mainstem dams, including fish transportation actions, 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. Spill 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, the Council assumes that, in the near term, the breaching of the four federal dams on the lower Snake River will not occur, either because the National Marine Fisheries Service and the Corps of Engineers will not recommend breaching, or because Congress will not authorize and appropriate funds to breach these dams. Given these assumptions, there also is the need for the region to redirect its resources and energy to actions of more immediate effect that are biologically sound and economically feasible.
- 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.
- There is an obligation to provide fish and wildlife mitigation where habitat has been permanently lost due to development. In those cases, artificial production will be used to replace capacity, bolster productivity, and alleviate harvest pressure on weak naturally spawning resident and anadromous fish populations. Artificial production funded under this program will be consistent with the guidelines provided herein and must be within an experimental, adaptive management design to evaluate benefits, address scientific uncertainties, and improve hatchery survival while minimizing the impact on, and if possible benefiting, fish that spawn naturally.
- Even in degraded or altered environments, native species in native habitats provide the best template and direction for needed biological conditions in most cases. Any proposal to produce or release non-native species, including resident fish substitution programs, must overcome this strong presumption in favor of native species and habitats and be designed to avoid adverse impacts on native species.
- 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 natural spawning populations.
- The estuary of the Columbia River, its nearshore discharge plume and adjacent marine area, are part of the Columbia River Ecosystem. The estuary and plume are important ecological features that likely have been, and continue to be, negatively impacted by upriver management actions and local habitat change. River uses and management actions in and

above the estuary must consider the effects on the estuary and the plume for the fish and wildlife species of concern to the region.

- 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 sufficient level of productivity and a wide range of biological diversity. Monitoring and evaluation actions should recognize and take into account the effect of varying ocean conditions and, to the extent feasible, separate out the effects of ocean-related mortality from that caused in the freshwater part of the lifecycle.

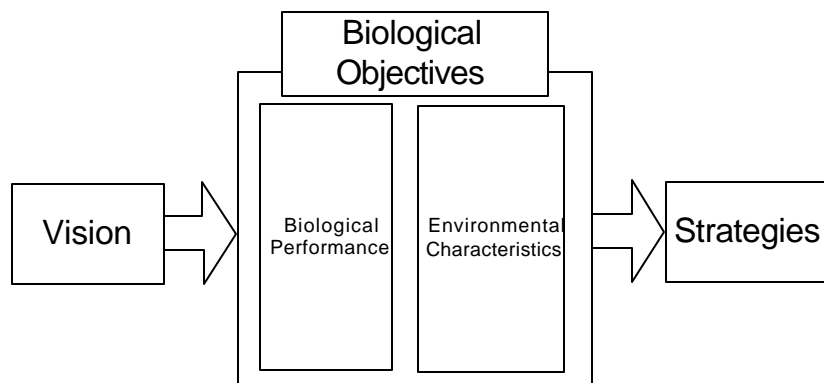
## B. Biological Objectives

The biological objectives are the characteristics of the ecosystem that we need to reach the vision based on the information we now have. They are intended to be empirically measurable, and will be reached through the strategies described in the next section. The objectives in this section relate to the basin as a whole and are therefore necessarily somewhat general. At the province and subbasin levels, objectives consistent with these, but much more specific to the unique circumstances of the particular province or subbasin, will be adopted.

While the details of subbasin plans will vary across the region, each subbasin plan is expected to address the biological objectives identified here and the objectives of the respective province.

Biological objectives have two components: (1) *environmental characteristics* describe the physical and biological habitat characteristics and their functions in the ecosystem; (2) *biological performance objectives* describe the expected response of specific species to the ecological condition. Collectively, the two components that form the biological objectives describe the type of ecological system that is needed to meet the vision. The strategies, in turn, address these objectives as the means to achieve the vision (Figure 1). Environmental characteristics include measures of habitat condition such as flow, water quality, vegetation, sediment, land use and ecological function. Biological performance is an expression of these characteristics and is measured for aquatic and terrestrial species such as chinook salmon, bull trout, beaver and black bear in terms of capacity, productivity and life history diversity.

**Figure 1. Biological objectives and their relation to the vision and strategies.**





In summary, these biological objectives are intended to direct the program to achieve the following: (1) protect the habitats and ecological functions that are currently productive for fish and wildlife populations and communities (e.g., the Hanford Reach fall chinook; spring chinook in the upper John Day River, etc.) to provide a base for expansion of healthy populations as we rehabilitate degraded habitats in other areas; (2) significantly expand the habitats, functions and populations from the core areas by habitat restoration and by improving the connections among currently productive areas; (3) emphasize rehabilitation of ecological processes and functions as the means to achieve goals for specific fish and wildlife species and populations; (4) encourage protection and restoration efforts to take into account the entire natural and cultural ecosystem affecting focal fish and wildlife species, in a continuum of terrestrial, freshwater, estuarine and marine habitats.

We anticipate that the program as amended will include a technical section in which each of the following objectives is discussed in detail. That detail section will contain, so far as is reasonably possible, specific measurements and targets for each of these objectives. What follows is a listing of the general categories of objectives. Specific examples of what some of the details might look like are attached to the end of this "strawman" document.

### **1. Objectives for ecosystem characteristics**

1. Protect and restore freshwater and terrestrial habitat for all life history stages of the focal species. Protect and increase ecological connectivity between major habitat types, including aquatic areas, riparian zones, floodplains and uplands.
2. Increase energy and nutrient connections within the system to increase productivity and expand normative biological communities.
3. Allow for biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability.
4. Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of normative population structures.
5. Manage human activities so that patterns of water runoff and flow tend more than at present toward the natural hydrographic pattern in terms of quantity, quality and fluctuation.
6. Identify, protect and restore normative ecosystem functions in the Columbia River estuary and nearshore ocean discharge plume as affected by actions within the Columbia River watershed.

## **2. Biological performance objectives**

1. Increased productivity, abundance, life history diversity and complex structure of the fish and wildlife populations.
2. Metapopulation hypothesis: Salmon and steelhead form a spatially structured system of core and satellite local populations connected to some degree by dispersal within a general framework of local adaptation with resultant life history diversity. Habitat restoration should be structured to enhance these connections and encourage development of a healthy population structure.
3. Expand habitat and ecosystem functions that significantly increase the abundance, productivity, life history diversity and structural complexity of salmon, steelhead, and bull trout populations well above the recovery level.
4. Population productivity: Viable anadromous fish populations (or metapopulations) should exhibit sufficient productivity during freshwater life-history stages to meet the social objectives identified in the vision (including harvest) and maintain abundance even during poor ocean conditions.
5. Population abundance: Populations should be large enough to survive environmental variation of the magnitude observed in the past, from ocean condition fluctuations to local disturbance and populations should be sufficiently abundant to provide important ecological functions in the environments they occupy.
6. Population diversity: Sustain and increase the ability of the environment to facilitate development of a range of life history solutions to address environmental variability.

[It is anticipated that the program would also contain specific performance indicators for focal wildlife species]

## **C. Strategies**

Strategies are plans of action to accomplish the objectives and thereby fulfill the vision. Since most of the specific actions will be addressed at the subbasin level, most of the strategies will be developed there. However, it is important that the strategies at the provincial and subbasin levels be consistent with basin-wide standards, guiding actions toward the basin objectives and vision stated above and the scientific foundation. Thus, at the basin level, there are comprehensive standards for implementation. Also at the basin level, strategies will be developed in areas that transcend one or more of the provinces, such as data management, research, monitoring and evaluations.

## 1. Implementation Standards

In developing strategies at all levels of this program, the following standards should be applied:

We anticipate that the program as amended will include a technical section in which each of the following standards is discussed in further detail.. What follows is a listing of the general categories of standards with some examples of the kinds of standards that might be adopted in each category.

### (a) Artificial Production Standards

The policies and standards adopted in the Artificial Production Review must be applied when considering the continued or new use of artificial production as a strategy within a subbasin plan or when proposing funding for new or existing artificial production facilities under the program. Those policies and standards are fully described in Part II of the Artificial Production Review (Council document 99-15). The standards in general are:

- The manner of use and the value of artificial production must be considered in the context of the 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 benefits and address scientific uncertainties.
- Hatcheries must be operated in a manner that recognizes that they exist within ecological systems 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 a 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 artificial production need to be made in the context of, and consistent with, goals, objectives and strategies at the subbasin and province levels.

- Appropriate risk management needs to be maintained in using 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.

**(b) Standards for mainstem passage**

Two biological principles in particular should become the dominant focus of decisions about how to improve fish passage through the hydrosystem:

- ***protect biodiversity*** -- passage solutions must be designed to benefit the range of species, stocks and life-history types in the river, which may require multiple passage solutions at a project, and
- ***favor passage solutions that best fit natural behavior patterns and river processes*** -- the best passage solutions are those that take into account and work with the behavior and ecology of the species and life-history types using the river system, that mimic the natural situations and processes that emigrating salmonids encountered in their evolutionary history.

The two principles are linked. Technologies that most closely approximate the natural physical and biological conditions of migration would seem most likely to accommodate diverse species/stocks.

The Corps of Engineers and other federal agencies in the region that participate in decisions on mainstem passage modifications must take into account these principles to the fullest extent practicable at every stage of considering and deciding upon passage improvements. The Council recommends that these agencies ensure that their decision-making processes and criteria are consistent with the principles stated here. This means developing project ranking criteria and budget decision explanations that are responsive to all of the principles, especially the two core themes of protecting biodiversity and designing passage solutions that favor natural behavior patterns and river processes. Most important, passage standards, objectives, designs and evaluations should all focus on protecting the wide array of species and life history types in the river, not just the weighted average or most abundant species, and must ultimately be related to increases in adults back to the spawning grounds, not just the survival of juveniles (or adults) through the federal Columbia River hydropower system.

For these reasons, the Council requests that the Corps of Engineers, working within the regional prioritization process, report to the Council and the region on how the prioritization criteria and other decision-making standards for passage improvements are being revised to be consistent with the principles here. To further the implementation of these principles, the Council:

- Expects that the Independent Scientific Review Panel (ISRP) will apply the principles during the Panel’s review of the reimbursable portion of the Bonneville fish and wildlife budget, which includes the Corps’ passage program;
- Will itself apply these standards in its review of any ISRP report and resulting recommendations to Congress on these passage budget items; and
- Will recommend to Congress, in its reimbursable budget recommendations, that budget requests from the Corps of Engineers be evaluated for consistency with these principles.

**(c) Standards for water and hydrosystem management** (including flow augmentation, spill, dissolved gas management, system configuration and optimizing power and non-power objectives)

[To be developed following further consultation. Where practicable, the program will include specific performance standards.]

**(d) Standards to guide the consideration of ocean and estuary conditions**

Three general principles guide the Council in the consideration of ocean and estuary conditions when deciding matters under the program:

- The Council views the estuary of the Columbia River, its nearshore discharge plume, and adjacent marine area as part of an ecosystem that includes the Columbia River Basin itself. The abundance of salmon reflects the overall condition of the entire ecosystem and, therefore, variability in the conditions of both the freshwater and marine environments.
- Salmon and steelhead in the Columbia River accommodate ocean mortality and environmental variability through a sufficient level of productivity and a wide range of biological diversity. As a result, taking ocean conditions into account involves ensuring that the program and its objectives, strategies, and projects are designed and evaluated in regard to their potential to restrict or enhance the natural expression of biological diversity in salmon populations.
- The Columbia River estuary and near-shore plume are important ecological features that likely have been, and continue to be, negatively impacted by upriver management actions and local habitat change. Consideration of ocean conditions should include evaluation of flow regulation and river operations in regard to their impacts on the estuary and near-shore marine areas as well as better understanding of the effect of ocean conditions outside the estuary and plume.

**(e) Standards concerning the relationship of this program to harvest management**

- Harvest management must take into account the relation of salmon abundance to conditions in other components of the ecosystem connected by the life-cycle of the target fish.

- Harvest rates and levels should be determined on the basis of adult escapement objectives designed to protect and recover natural spawning populations and the ecosystem functions supported by those naturally spawning populations, such as nutrient and energy flows.
- Revise harvest management to more adequately spread the risk of imprecision and error in predicted run size. Enact more conservative harvest limits on fisheries farthest from the spawning grounds, for which information is less adequate.
- While the Council has no authority to set harvest levels, as part of the review of a subbasin plan, those presenting it will need to demonstrate that the population levels proposed in the plan are consistent with current or anticipated future harvest regimes in those areas through which the fish must pass in reaching the subbasin.

**(f) Standards relating to future hydroelectric development/protected areas**

[To be taken directly from Section 12 of the existing fish and wildlife program]

**(g) Standards for research, monitoring and evaluation**

Actions taken under this program must be monitored and evaluated to determine whether they achieve the biological objectives established at the subbasin, province and basin levels. In the course of creating plans, and in implementing the program, the Council will work with interested parties to develop and recommend for funding specific monitoring and evaluation activities consistent with the following principles:

- Implement monitoring and programmatic evaluation as a major objective of the fish and wildlife program, based on the framework concept and structure developed for this program. Focus monitoring and evaluation efforts to determine the extent to which actions achieve biological objectives and visions at the subbasin, province and basin levels.
- Develop and include new metrics that permit monitoring and evaluation of river conditions and ecosystem functions identified in the biological objectives and in the list of habitat attributes and ecosystem characteristics that are part of the scientific foundation.
- Monitor and evaluate the levels of productivity, abundance, life history diversity and structural complexity of a representative set of populations of the focal species identified in the program (chinook salmon, steelhead, bull trout, black bear, beaver, bald eagle) at all life stages.
- Develop measures of the spatial diversity of local populations and life history types within watersheds. Restoration of extinct life history patterns will probably be an early indication of restoration of environmental conditions and ecological functions and indicate progress toward redevelopment of resilient population and metapopulation structures.

- Identify healthy core and satellite populations throughout the region. To facilitate the design, implementation and evaluation of a monitoring program, the organization of the fish and wildlife program is based on a presumed metapopulation structure so that a metapopulation is not split among two or more provinces. Monitoring and evaluation efforts should similarly be organized to test this and recognize population structure.
- Identify and evaluate the extent of protection and re-establishment of key physical linkages connecting the habitats of populations, connecting local populations to each other, and connecting the habitats of possible core population areas and between core and satellite populations to facilitate dispersal.
- Encourage an explicit statement of current beliefs that affect monitoring and evaluation programs; allow for rigorous examination of evidence for beliefs, framing of alternative hypotheses, and design of monitoring and evaluation to fairly test all reasonable hypotheses, through basic data collection and/or conduct of monitoring experiments.

**(h) Standards for data management and analysis**

- All information collected as part of this program should be made freely accessible to all parties.
- All information collected as part of this program should adhere to a set of common standards for data exchange and dissemination to be developed.

[More to be developed]

## **Part 2. Ecological Province Level**

### **A. Ecological structure: provinces and subbasins**

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

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

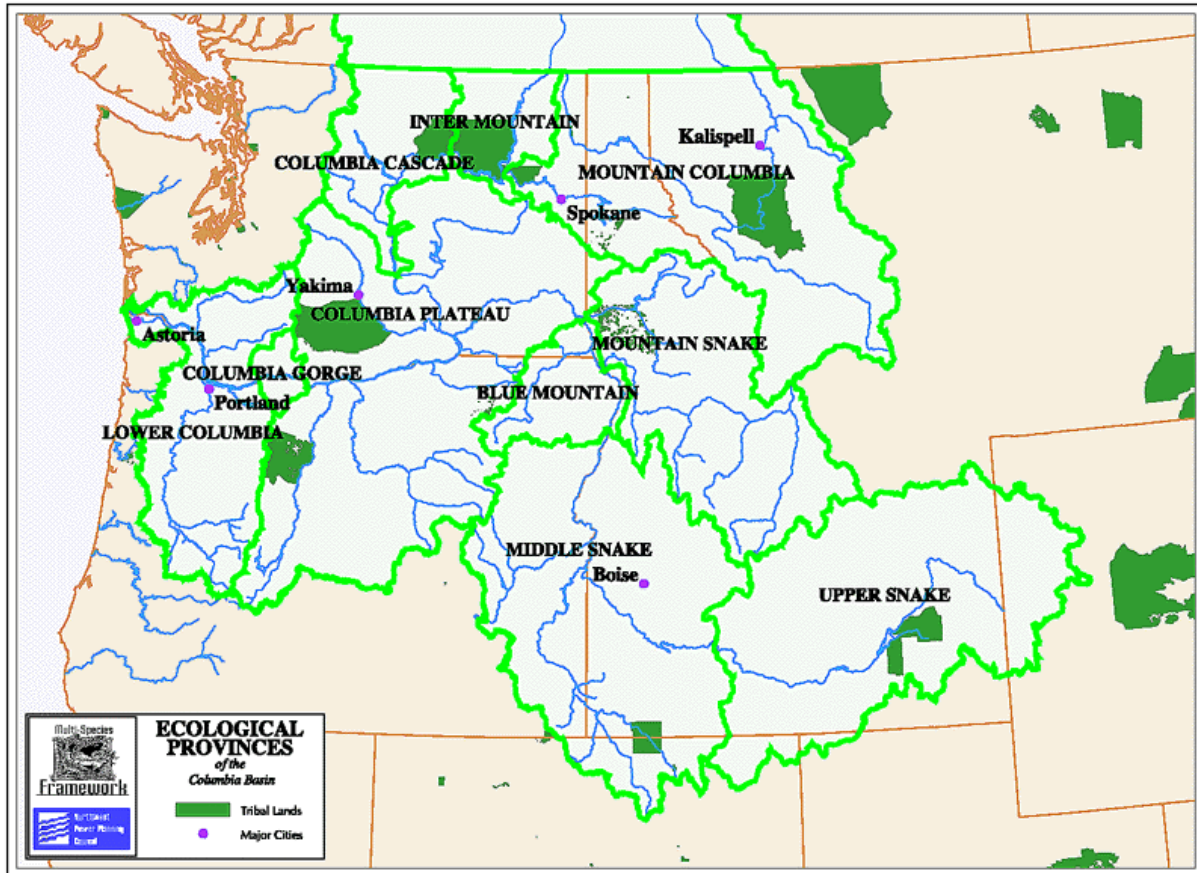
The Council accepts as an hypothesis that these physical patterns relate to biological population patterns as well. Populations within a province are more likely to be related to other populations within that province than to populations in other provinces. Life history and other characteristics should group into patterns that reflect physical habitat structure. Each province consists of a set of ecologically related watersheds that are connected to larger hydrologic units. These provinces are thus appropriate units around which to organize and evaluate recovery objectives and efforts.

For our purposes, a subbasin can only be in one province; boundaries do not cut across subbasins (an exception was made for the Spokane River, split between two provinces at Lake Coeur d'Alene). Hydroelectric dams, including the major dams on the Columbia and Snake Rivers, are also considered to be with provinces.

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



Figure 2. Ecological Provinces of the Columbia River Ecosystem



**Table 1. Geographic Structure of the Columbia River Ecosystem excluding the Marine Landscape**

Landscape	Province	Subbasin
Columbia River Basin	Columbia River Estuary	<ul style="list-style-type: none"> <li>• Youngs</li> <li>• Grays</li> <li>• Elochoman</li> <li>• Columbia River and all tributaries downstream of the Cowlitz River confluence</li> </ul>
	Lower Columbia	<ul style="list-style-type: none"> <li>• Cowlitz</li> <li>• Kalama</li> <li>• Lewis</li> <li>• Willamette</li> <li>• Washougal</li> <li>• Sandy</li> <li>• Columbia River and all tributaries above the estuary and downstream of, but not including, Bonneville Dam</li> </ul>
	Columbia Gorge	<ul style="list-style-type: none"> <li>• Wind</li> <li>• White Salmon</li> <li>• Little White Salmon</li> <li>• Klickitat</li> <li>• Hood</li> <li>• Fifteenmile Creek</li> <li>• Columbia River and all tributaries between, and including, Bonneville and The Dalles dam</li> </ul>
	Columbia Plateau	<ul style="list-style-type: none"> <li>• Deschutes</li> <li>• John Day</li> <li>• Yakima</li> <li>• Umatilla</li> <li>• Walla Walla</li> <li>• Crab Creek</li> <li>• Tucannon</li> <li>• Columbia River and all tributaries upstream of The Dalles up to and including Wanapum Dam</li> <li>• The Snake River and all tributaries from Lewiston, Idaho, to the confluence with the Columbia River</li> </ul>
	Columbia Cascade	<ul style="list-style-type: none"> <li>• Wenatchee</li> <li>• Entiat</li> <li>• Lake Chelan</li> <li>• Methow</li> <li>• Okanogan</li> <li>• Columbia River and all tributaries downstream from, but not including, Chief Joseph Dam to Wanapum Dam</li> </ul>
	Inter-Mountain	<ul style="list-style-type: none"> <li>• Powder</li> <li>• San Poil</li> <li>• Spokane downstream of Lake Coeur d'Alene</li> <li>• Columbia River and all tributaries between and including Chief Joseph Dam and the US/Canada border</li> </ul>

	Mountain Columbia	<ul style="list-style-type: none"> <li>• Pend Oreille</li> <li>• Spokane above and including Lake Coeur d'Alene</li> <li>• Priest</li> <li>• Kootenai</li> <li>• Clark Fork</li> <li>• Flathead</li> <li>• Blackfoot</li> <li>• Bitterroot</li> </ul>
	Blue Mountain	<ul style="list-style-type: none"> <li>• Grande Ronde</li> <li>• Asotin</li> <li>• Imnaha</li> <li>• Snake River and all tributaries from Lewiston to Hells Canyon Dam</li> </ul>
	Mountain Snake	<ul style="list-style-type: none"> <li>• Clearwater</li> <li>• Salmon</li> </ul>
	Middle Snake	<ul style="list-style-type: none"> <li>• Burnt</li> <li>• Powder</li> <li>• Weiser</li> <li>• Boise</li> <li>• Owyhee</li> <li>• Bruneau</li> <li>• Snake River and all tributaries from Hells Canyon Dam to Shoshone Falls</li> </ul>
	Upper Snake	<ul style="list-style-type: none"> <li>• Big Wood</li> <li>• Little Wood</li> <li>• Little Lost</li> <li>• Henry's Fork</li> <li>• Snake River and all tributaries from Shoshone Falls to headwaters, all closed basins within the Columbia Basin east of Shoshone Falls</li> </ul>

**B. Province-level visions**

A brief vision will be developed for each province. We expect the vision will reflect the unique opportunities and biological communities found within that province.

**C. Province-level biological objectives (to be developed)**

A limited number of unique biological objectives will be developed for each province to assure that the subbasin plans within that province are consistent with one another and the province-level vision. However, we expect that the majority of the biological objectives will be established in the subbasin plans and not at the province level.

## **Part 3 -- Subbasin Plans**

### **A. Elements of a subbasin plan**

Actions to implement the fish and wildlife program principally will occur at the subbasin level of the program framework. Subbasin planning will serve two related purposes in the program.

First, subbasin plans are an integral element of the program planning structure. Plans at this level will provide the ultimate direction for Bonneville-funded activities that affect fish and wildlife. Subbasin plans should also provide an opportunity for the integration and coordination of projects and programs funded by others than Bonneville. Under the program framework, subbasin plans and their implementing actions must be collectively designed to advance the visions and objectives at province and basin levels. If the vision for the basin is to be realized, it will be through successful selection and implementation of subbasin level goals, objectives, and strategies.

Second, subbasin level plans will provide the context in which the Independent Scientific Review Panel (ISRP) will review fish and wildlife proposals for Bonneville funding each year. In past reports, the ISRP has criticized projects proposed for funding for lack of adequate explanation or justification in light of existing ecological conditions in the relevant watersheds and subbasins, and for a failure to relate projects to goals and objectives even at a subbasin level. Once subbasin plans are approved, the ISRP will be able to review the projects proposed for Bonneville funding to determine if they are based on sound science and are consistent with the fish and wildlife.

Subbasin planning across the basin must be conducted with a relatively high level of uniformity if the plans are to serve the purposes described above. This does not mean that the goals, objectives, and strategies will be similar across all of the subbasins. In fact, quite the opposite is expected, and likely necessary, if the basin vision is to be attained. Rather, the template, or structure of subbasin plans will need to be relatively fixed from one area to the next if they are to fulfill the multi-scale planning role that is envisioned, to allow for consideration of their consistency with program and province objectives and criteria, and to provide an adequate context for project proposal review by the ISRP.

As stated previously, the Council is aware that federal agencies, led by the National Marine Fisheries Service, are considering subbasin assessments and planning as a possible vehicle for implementing habitat changes under the ESA. The Council is also aware that at least three states are developing watershed or subbasin plans for purposes under state law. The Council aims to maximize coordination and cooperation and avoid duplication with these efforts. To that end, the Council intends that subbasin assessments and plans developed under this program also contain any elements that the National Marine Fisheries Service (or the U.S. Fish and Wildlife Service) may require so that the plans can address endangered species considerations. As well, the Council intends that subbasin assessments and plans developed for the fish and wildlife program be coordinated with the relevant state planning processes, and to the maximum extent possible be consistent with or even the same as plans developed for the states.

For purposes of the program a subbasin plan must include the following three components:

1. A *subbasin assessment* providing a description of historical and existing conditions, an assessment of the biological potential of the basin and an identification of restoration opportunities;
2. A clear and comprehensive *inventory of existing projects* and past accomplishments;
3. A 10-to-15 year *management plan* which, among other things, addresses the objectives and performance criteria identified above, and includes a monitoring and evaluation plan.

To assure a consistent approach to subbasin planning so that, to the fullest extent possible, this activity is coordinated with the needs of the states, tribes, and the Endangered Species Act responsibilities of the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, and with other related concerns such as Clean Water Act compliance plans, the Council will consult with these and other interested parties and adopt a standard template for subbasin assessments and plans.

It is anticipated that the subbasin plans for a province will be developed together, and give full consideration to the impacts that the plans in one subbasin will have on adjacent subbasins. Upon completion, subbasin plans will be considered by the Council for adoption into this program as described below, and will be used as the basis for implementation decisions in the project selection process.

## **B. Participation criteria for subbasin planning**

The Northwest Power Act directs the Council to give special consideration to the recommendations of that tribal, state, and federal fish and wildlife management entities when considering matters related to fish and wildlife. The Council will require that subbasin plans proposed for adoption into the program, or used as the basis for justifying projects to be funded by Bonneville, be developed with the participation of fish and wildlife managers with jurisdiction in the subbasin.

Also, as outlined above, the Council expects that subbasin plans demonstrate their consistency with the Endangered Species Act. To best accomplish this, the applicable regulatory entities should be included in the planning effort, particularly in the development of the management plan. The Council cannot compel these parties to participate, but it wants to assure that these entities can voluntarily participate. The Council expects that the fish and wildlife managers will encourage and facilitate their involvement.

Local, state, tribal, federal and private land and water owners and managers have programs, authorities, and jurisdictions beyond that of the fish and wildlife managers. Again, the Council cannot compel the participation of these entities, but will require that they be given the opportunity to participate. The Council will evaluate the level of involvement provided them in the planning process, and the level of agreement that they have with the completed plan, when it considers adopting a plan into the program and in making its funding recommendations to Bonneville. In a practical sense, it will be important for those preparing the subbasin plan to build support for the plan with those whose cooperation will be essential to successful implementation of the plan.

The Council recognizes the major on-going efforts of state and local agencies in developing watershed assessments and plans. Nothing in this program is intended to supplant or duplicate the work of these agencies. To the fullest extent practicable and consistent with the subbasin assessment and planning template adopted by the Council, the assessments and information prepared by these agencies should be incorporated in the assessments prepared pursuant to this program. The Council

also intends that the plans prepared by these entities be given full consideration in developing the subbasin plans for fish and wildlife pursuant to this program.

While it is desirable that all of the fish and wildlife managers with jurisdiction over fish and wildlife within the area of the subbasin plans reach agreement among themselves, the Council also acknowledges that each of these managers has a separate legal authority and that the managers will not necessarily be in agreement on all aspects of a plan. In such cases, the Council will require the managers to identify the disagreement, and for each manager to submit with the plan: (a) a concise statement describing the nature of the disagreement, and (b) a description of how the plan would be best adapted to that manager's interest. While the Council has no authority to resolve such disputes, Council and its staff will assist in a facilitation role as plans are developed, and will also seek to ensure that planners address all criteria and objectives in the program.

### **C. Review of subbasin plans**

The Council will request that subbasin plans be reviewed by an independent science panel, such as the Independent Scientific Advisory Board. Examples of questions that may be asked of the reviewers are:

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

The Council then will engage in a public review of the subbasin plan and of whatever report and recommendation the Council receives from the independent scientific body. The Council anticipates using the procedures of the Northwest Power Act to adopt subbasin plans into the fish and wildlife program under terms that will allow for the adaptation and modification of the plans as we learn from evaluations of actions.

## Part 4 -- Fish and Wildlife Project Selection Process

This section describes the procedures, criteria and priorities to govern the process for reviewing projects in the rolling ISRP/Council project review process. It contains guidance for Bonneville implementation, budget and contract management of Council-recommended projects.

The Council develops but does not implement the fish and wildlife program. With few exceptions, Bonneville does not implement the program, either. Instead, the Northwest Power Act directs Bonneville to use its “fund” -- its power revenues -- and other authorities to protect, mitigate and enhance fish and wildlife “in a manner consistent with” the Council’s program. Under this provision, Bonneville funds fish and wildlife projects and activities proposed by others -- primarily but not exclusively the state and federal fish and wildlife agencies and tribes and the federal project operating agencies -- to implement the program. A 1996 amendment to the Northwest Power Act specifies procedures for an annual review by the Independent Scientific Review Panel and the Council of projects proposed for funding, culminating in funding recommendations to Bonneville. This part briefly describes how the project review process will work under the new program.

The annual project review required by the Act will be administered at the province level. The program will describe a sequence in which three or four of the eleven provinces will be reviewed each year, beginning with Fiscal Year 2001. On such a schedule, this “rolling review” will revisit each province once every three years. A separate group of projects that are systemwide in nature (or at least transcend beyond a single province), such as Streamnet or the smolt monitoring program, will always be reviewed once every three years. For any particular area, this means ISRP review and Council funding recommendations covering three -year periods, rather than the single-year review and recommendations of the past.

While the annual process will be *administered* by the Council at the province scale, the actual ISRP *project review* will focus at the subbasin scale. That is, the ISRP will review all of the projects proposed for a subbasin together. Until the development of subbasin plans, the ISRP and Council review will evaluate whether projects proposed for a particular subbasin: (a) implement the vision, objectives, strategies and implementation standards established in the program at the basin and province levels, and (b) are consistent with each other and with available assessment information about the particular needs and opportunities in that subbasin.

Once subbasin plans are developed and adopted as described in Part 3 above, including a demonstration that the subbasin plan implements the objectives at the basin and province levels, projects proposed for Bonneville funding would need to demonstrate in the rolling review that they are implementing those subbasin plans. In this annual review, the ISRP review will focus less on specific project proposal forms, and more on the proposed projects’ consistency with the goals, objectives, and strategies that are established in adopted subbasin plans. The review will be iterative, with the ISRP communicating directly with project proponents, and visiting the project areas in the subbasins as part of its review.

What are called the “reimbursable” projects will also be reviewed in the province-based rolling review. These projects fall into two categories: (1) capital investments by Congress, mostly to the Corps of Engineers for dam modifications to increase juvenile and adult salmon survival through the system, for which Bonneville pays the capital repayment expenses (i.e., the mortgage payment), and (2) operation and maintenance expenses and other non-capital costs currently or historically reimbursed by Bonneville for certain fish and wildlife activities, such as the U.S. Fish and Wildlife Service’s Lower Snake River Compensation Plan hatcheries or the Corps of Engineers’ mitigation hatcheries. The sponsors of these projects, such as the Corps of Engineers and the Fish and Wildlife Service, will also be asked to submit their projects for review in the appropriate province review and to relate their projects to the relevant vision, objectives and standards in the program and, where appropriate, to adopted subbasin plans.

The general review process for a province is as follows:

1. Provide notice to the public that the ISRP will commence its review of a specifically identified province.
2. When they exist, provide adopted subbasin plans to the public and the ISRP.
3. Solicit proposals to implement subbasin plan goals, objectives, and strategies of the subbasin plans in the province being reviewed.
4. Proponents of “direct program” projects and “reimbursable” projects provide proposals linked to objectives in the program and, where appropriate, adopted subbasin plans.
5. ISRP visits subbasins, receives presentations from project proponents and issues a preliminary report that is distributed for public comment.
6. Draft work plan is provided by project proponents.
7. ISRP provides a final report.
8. Council makes recommendations for funding to Bonneville.

To facilitate multi-year funding and contracting, the Council will require projects to identify specifically tasks, objectives, deliverables and associated costs. Bonneville and the Council will establish protocols to ensure that projects stay within their approved scope and funding authorizations. The Council and/or Bonneville may audit some or all of the projects annually to ensure that they are remaining within approved scope and funding authorizations.

Finally, until the program is amended and subbasin plans meeting established standards are adopted into the program, the rolling review process will use existing management plans and the best available subbasin information. This information will be organized in a “subbasin summary” format that substantially follows the general subbasin plan construction and participation standards identified in Part 3. Each subbasin summary will contain an “assessment information” component that collects and organizes existing information, a component identifying and discussing past fish and wildlife activities and accomplishments in the subbasin, and a summary of existing fish and wildlife management plans and their objectives. These subbasin summaries will provide a sufficient basis for funding near-term needs. However, the Council expects that longer-term management



plans and funding commitments will need to be established through subbasin plans meeting the standards such as those discussed above and in Part 3. The Council will lead the effort to have those plans developed as soon as possible.

## Part 5 -- Scientific Foundation

The scientific foundation for the fish and wildlife program provides an explicit scientific basis for developing biological objectives, and for linking strategies, objectives and visions at the subbasin, province and basin levels. In this part, the scientific foundation is briefly described. We anticipate that the program as amended will include a technical section in which each of the following principles is discussed in detail.

### A. Basic scientific principles

The scientific principles constitute the most basic technical elements of the Council's fish and wildlife program. While these principles are themselves general in scope, the implementation strategies that follow are based upon them. The Council and others will use these scientific principles, together with the objectives and more specific implementation principles, to evaluate the actions proposed to implement the program.

#### **Principle 1: Biological abundance, productivity and diversity reflect ecosystem structure and conditions.**

Progress toward goals for fish and wildlife species is achieved by allowing the ecosystem to develop in a manner consistent with the biological needs of the target species and requires restoration or preservation of suitable habitat conditions throughout the life cycle of key species. Rather than attempting to engineer the biological system to accommodate human activities, these activities must be adjusted to operate within the biological system.

#### **Principle 2. Ecosystems are dynamic, evolutionary and resilient.**

Natural ecosystems are dynamic and constantly changing. The program should anticipate and accommodate change, and must recognize that disturbances are an important part of development and maintenance of habitat. Efforts to stabilize and reduce disturbance will fundamentally alter habitats to the detriment of capacity, productivity and diversity of target species.

#### **Principle 3. Ecosystems are structured hierarchically.**

Any particularly described ecosystem is composed of smaller scale ecosystems and is also a component of larger-scale systems. At any point, the ecosystem reflects the behavior of smaller scale components and is constrained by the larger-scale system. Program elements developed at any level need to be consistent with elements developed at larger and smaller scales. Thus the vision and objectives for the Columbia River Basin will constrain and direct the vision and objectives for an ecological province and, in turn, the vision and objectives for individual subbasins and watersheds. Achieving the objectives at the basin and province levels will depend largely on the success of actions at the local levels.

**Principle 4. Ecological structure and performance are defined with respect to specific biological communities and questions.**

Ecosystems and their conditions are defined in relation to a community or assemblage of interacting species and not by individual species. Plants and animals do not exist as isolated elements. Instead, they interact closely with other species and the habitat to form a system. Their ability to survive, reproduce and evolve depends not only on the hydrology, geology and climate, but also on interactions with other individuals and species through competition, predation and natural selection. These interactions select and develop healthy, robust populations.

**Principle 5. Biological diversity accommodates environmental variation.**

Variation in biological characteristics helps species cope with environmental variation. A more diverse species or interrelated collection of species has a greater range of possible solutions to the challenges posed by variation in the environment. Biological variation is reflected in life history traits, behavior and physical features of each species. We should manage our activities to allow natural expression of biological diversity.

**Principle 6. Ecosystem conditions develop primarily through natural processes.**

Natural ecosystems are created, altered and maintained primarily by natural processes encompassing the entire life history of species of interest. Habitats develop in response to the local hydrology, geology and climate. Species and communities develop to match the resulting habitat template. Management to achieve goals for specific species implies allowing normal ecological processes to operate and develop an appropriate environment.

**Principle 7. Ecological management is adaptive and experimental.**

What is critical to fish and wildlife restoration in one period of time may not be critical in another as the ecosystem shifts in response to internal or external factors. As we learn about ecosystems, new strategies may be indicated. Monitoring and evaluation need to be built into management programs from the ground up, in order to provide and make use of relevant information about how actions actually affect ecosystem conditions and how those changes affect biological response.

**Principle 8. Human actions modify ecosystem function and biological performance.**

In highly developed ecosystems like the Columbia River, human actions and technology will continue to dominate the system. However, those actions can be managed in a manner consistent with the needs of other species.

## **Attachment: Examples of Biological Objectives**

### **A. Ecosystem characteristics**

Protect the areas and ecological functions that are currently productive for fish and wildlife populations and communities of interest (e.g., the Hanford Reach fall chinook; spring chinook in the upper John Day River, etc.) to provide a base for expansion of healthy populations as we rehabilitate degraded habitats in other areas. Significantly expand the functions and populations from the core areas by habitat restoration and by improving the connections among currently productive areas. Habitat restoration efforts should emphasize rehabilitation of ecological processes and functions as the means to achieve goals for specific fish and wildlife species and populations. Protection and restoration of the ecological system must address or take into account the entire natural and cultural ecosystem affecting focal fish and wildlife species, in a continuum (where appropriate) of terrestrial, freshwater, estuarine and marine habitats.

1. Protect and restore freshwater habitat for all life history stages of the focal species. Protect and increase ecological connectivity between major habitat types, including aquatic areas, riparian zones, floodplains and uplands.
  - Increase the connections between rivers and their floodplains, side channels and riparian zones.
  - Manage riparian areas to protect the aquatic system and form a transition to floodplain terrestrial areas and side channels.
  - Identify, protect and restore the functions of key alluvial river reaches.
  - Reconnect restored tributary habitats to protected or restored mainstem habitats, especially in the area of productive mainstem populations.
  - Establish habitat connections between protected terrestrial and aquatic areas.
  - Land and water activities should allow riparian zones to maintain a range of normative vegetative characteristics, i.e., characteristics occurring in watersheds with normative disturbance patterns.
  - Increasing the percentage of normative riparian zones should include an increase in percentage of riparian zones with late-successional forest characteristics.
  - Maintain, increase and connect native plant community composition and structures.
2. Increase energy and nutrient connections within the system to increase productivity and expand normative biological communities.
  - Increase the abundance of anadromous fish to increase the biomass of ocean-derived energy and nutrients delivered to freshwater areas.
  - Increase the abundance of resident fish to distribute energy and nutrients within freshwater areas, especially above anadromous blockages.
  - Increase connections within freshwater areas to facilitate wide distribution of energy and nutrients within the system.
  - Establish riparian conditions that allow energy and nutrient transfer between terrestrial and aquatic areas.
3. Allow for biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability.

- Expand the complexity and range of normative habitats to allow for greater life-history and between species diversity.
  - Manage human activities to minimize artificial selection or limitation of life history traits.
  - Restoring habitat and access to habitat that establishes life history diversity is a priority.
4. Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of normative population structures.
    - Increase the abundance and range of existing habitats and populations.
    - Expand and connect existing habitat pockets to facilitate development of normative population structures for aquatic communities.
    - Connect wildlife preserves and habitats with suitable connecting habitats.
  5. Manage human activities so that patterns of water run-off and flow tend more than at present toward the natural hydrographic pattern in terms of quantity, quality and fluctuation.
    - Increase seasonal fluctuations in flow. Stabilize daily fluctuations.
    - To increase habitat connections, increase percentage of reaches with free-flowing discharge regimes.
    - Increase the correspondence between water temperatures and the normative regimes of temperatures throughout the basin.
    - Significantly reduce watershed erosion where human activities have accelerated sediment inputs. Human activities should tend toward no net increase in sediment over natural inputs.
    - Habitat restoration may be framed in the context of measured trends in water quality -- functional habitats for the focal salmonid species are characterized by high quality water (pure, cool and clear).
  6. Identify, protect and restore normative ecosystem functions in the Columbia River estuary and nearshore ocean discharge plume as affected by actions within the Columbia River watershed.
    - Enhance the natural expression of biological diversity in salmon and steelhead populations to accommodate mortality and environmental variability in the ocean.
    - Evaluate flow regulation, river operations and estuary-area habitat changes to better understand the relationship between estuary and near-shore plume characteristics and the productivity, abundance and diversity of salmon and steelhead populations.

[It is anticipated that a limited number of additional objectives will be developed, consistent with the above science principles and objectives, to address terrestrial characteristics relating to wildlife.]

## **B. Biological performance objectives**

1. Protection and expansion of normative habitats and ecological functions should increase the productivity, abundance, life history diversity and complex structure of the fish and wildlife populations.

- A measurement of the extent of improvements in normative habitats and ecological functions will be increases in the productivity, abundance, life history and structural complexity of focal species such as chinook (both ocean and stream types), steelhead, bull trout, beaver, eagles and other fish-eating birds, and black bear.
- Accept significant variation in the first three indicators — productivity, capacity and/or life-history diversity — for any particular population over any particular time period, as part of the normal environmental condition. A measure of whether key ecological functions have increased sufficiently will be whether the system can accept normal environmental variation without collapse of the fish and wildlife population and community structure.
- Allow for the restoration of more normative population structures by allowing for the expansion of productive populations and by habitat restoration actions that connect weak populations to stronger populations and to each other. Allow for the recovery of depleted populations to at least the point of self-sustainability and a low probability of extinction.
- Protection and expansion of normative habitats and ecological functions should also allow for an increase in the number, complexity and range of multi-species fish and wildlife assemblages and communities. Increases in the productivity, abundance and life-history diversity of specific fish and wildlife populations are dependent on and should not be viewed in isolation from these multi-species communities.

2. Population structure/salmonid metapopulation hypothesis: Manage salmonid populations, especially chinook, under a metapopulation hypothesis, that is, under the assumption that salmonid populations under more normative ecosystem conditions in the Columbia formed (and will form again) a spatially structured system of core and satellite local populations connected to some degree by dispersal within a general framework of local adaptation with resultant life history diversity.

- Allow for the development of sustainable metapopulation structures to reduce risks of extinction and increase life history diversity, adaptive capacity, and population stability and resilience in the face of environmental and human variation.
- Core populations are large productive populations with low probabilities of extinction that may serve to stabilize salmon productivity in their region and function as a source population for recolonization of connected but less favorable habitats where satellite populations occur. The large chinook populations that once existed in the mainstem and lower tributaries to the Columbia and Snake apparently served as core populations for provincial metapopulations. Redirect present restoration efforts, which focus almost exclusively on weak, remaining satellite populations, to (1) identifying and protecting the habitats for currently productive core populations, (2) expanding remaining core population areas by habitat restoration activities and improved connections between areas that are productive or potentially productive; (3) restoration and/or reconnection of potential core habitats at strategic areas in the basin; (4) improving habitat and connectivity from the cores to areas with current or potential productive capacity for satellite populations.
- Truly significant and sustainable increases in the abundance of naturally spawning salmon in the Columbia River are unlikely without restoring spawning and other habitats

in mainstem and lower tributary areas for chinook salmon with the ocean-type life history.

3. Protect and expand the habitat and ecosystem functions that support steelhead and bull trout, and that steelhead and bull trout contribute to and, if possible, to significantly increase their abundance, productivity, life history diversity and structural complexity well above that recovery level.
4. Population/metapopulation structure -- general objectives:
  - Habitat for fish is dynamic. Suitable habitat is constantly being created and destroyed by natural processes. Do not destroy habitat patches faster than naturally created. Protect both the total area and the number of habitat patches.
  - Protecting the habitat and ecological functions that support source subpopulations is the highest priority.
  - Maintain habitat patches that appear to be suitable or marginally suitable for the focal species, but which currently contain no fish. In the dynamics of natural populations, there may be time lags between the appearance of empty but suitable habitat and colonization of that habitat from a source population.
  - Natural rates of straying and dispersal among sub-populations should not be substantially increased or decreased through human actions.
  - Protect the habitat and thus the populations within a metapopulation or an otherwise connected set of populations or sub-populations across a significant portion of the range of those connected populations. Some of the populations/sub-populations should be geographically widespread, reducing the risk of extinction from spatially correlated environmental variation. Some of the populations should be geographically close and well-connected to each other for recolonization support in the event of the decline of one.
  - Allow for the protection of population structures that display diverse life histories and phenotypes.
  - Population status evaluations should take into account hypotheses and uncertainty about population structure.
5. Population productivity -- general objectives. Sustained productivity of the focal salmonid species requires a network of complex and interconnected habitats, which are created, altered, maintained and destroyed by natural physical processes in freshwater, the estuary and ocean.
  - A population's natural productivity and trends in productivity should be sufficient to maintain its abundance above viable level over time, meaning a spawner-to-spawner ratio or cohort-replacement ratio fluctuating around 1.0 or above. Population productivity estimates should span entire life-cycle (e.g., spawner-to-spawner or smolt-to-smolt).
  - While population parameters include significant variation over time due to environmental variation, viable populations should not exhibit sustained declines in productivity or abundance that span multiple generations and affect multiple brood-year cycles.
  - Viable populations should not exhibit trends in traits that portend productivity declines (e.g., reduced size of adults; increasing age-at-return).
  - A viable population that includes naturally spawning hatchery fish should exhibit sufficient productivity from naturally produced spawners to maintain abundance at or above the viability thresholds in the absence of a hatchery subsidy, at a natural return ratio at 1.0 or higher. Such a population should not exhibit a trend of proportionally increased contributions from naturally spawning hatchery fish.

- Viable anadromous fish populations (or metapopulations) should exhibit sufficient productivity during freshwater life-history stages to maintain abundance at or above viability thresholds even during poor ocean conditions.
  - Population status evaluations should take into account uncertainty about productivity levels and trends in productivity
6. Population abundance -- general objectives:
- Populations (or metapopulations) should be large enough to survive environmental variation of the magnitude observed in the past, from ocean condition fluctuations to local disturbance
  - Populations should be sufficiently abundant to provide important ecological functions in all environments they occupy. Salmonids modify their physical and biological environment in various ways throughout their life cycle, benefiting the population itself and improving habitat conditions for other organisms. Abundance levels required for these effects depend largely on local habitat structure.
  - Population status evaluations should take into account uncertainty about abundance.
7. Population diversity -- general objectives. Sustain and increase the ability of the environment to allow for various life history solutions.
- Human-caused factors such as habitat changes, harvest pressures, passage solutions, artificial propagation, and exotic species introductions should not select for limited life histories and should not substantially alter life-history traits such as run timing, age structures, size, fecundity, morphology, behavior, and molecular genetic characteristics.
  - Natural processes of dispersal should be maintained -- human-caused factors should not substantially alter the rate of gene flow among populations.
  - Natural processes that cause ecological variation should be protected, maintained and expanded -- maintain spatial and temporal variation in habitat character.
  - Population status evaluations should take into account uncertainty about requisite levels of diversity.

[We expect to add here performance indicators for focal wildlife species, which may include numerical expressions of performance that are the norm in more traditional programs, such as population and harvest targets]



## GLOSSARY

The definitions in this list have no legal significance and are provided only for clarification of terms used throughout this document.

### **Adequate, efficient, economical, and reliable power supply, an**

Section 4(h)(5) of the Northwest Power Act requires the Council to develop a program to protect, mitigate and enhance fish and wildlife affected by the development and operation of the hydrosystem, “while assuring to the Pacific Northwest *an adequate, efficient, economical, and reliable power supply*”. For a discussion of the meaning of this language, refer to pages 1-15 to 1-16 and Appendix C of the Council’s 1994 Columbia River Basin fish and wildlife program, Council document, 94-55.

### **Adfluvial**

Possessing a life history trait of migrating between lakes or rivers and streams.

### **Alluvial**

Deposited by running water.

### **Anadromous fish**

Fish such as salmon that hatch in fresh water, migrate to ocean water to grow and mature, and return to fresh waters to spawn.

### **Aquatic habitat**

The water-based locality or geographic area in which a plant or animal species naturally lives or grows.

### **Artificial production**

Spawning, incubating, hatching or rearing fish in a hatchery or other facility constructed for fish production.

### **Biological diversity (biodiversity)**

Variety of plant and animal life co-existing in a specific habitat.

### **Biological objectives**

Describes the types of ecological conditions needed to achieve the vision.

### **Conduit**

Restricted natural passageway such as a stream; greater limitations than corridor.

### **Confluence**

Junction or union of two or more streams; body of water produced by the union of several streams.

### **Corridor**

Linear natural areas and habitats primarily reserved for wildlife needs.

**Ecological province**

Smaller geographic divisions of a basin. The Multi-Species Framework Project defined eleven separate ecological provinces in the Columbia River Basin.

**Ecosystem**

The living and nonliving components of the environment which interact or function together, including plant and animal organisms, the physical environment and the energy systems in which they exist.

**Escapement**

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

**Estuary**

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

**Flow**

The volume of water, often measured in cubic feet per second, flowing in a stream.

**Flow augmentation**

Increased flow from release of water from storage dams.

**Framework**

A logical structure for recovery and mitigation measures, organized around a set of goals and objectives for the program and an explicit statement of the program's scientific basis for linking management strategies to regional and local objectives.

**Habitat**

Locality or geographic area in which a plant or animal species naturally lives or grows.

**Harvest management**

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

**Implementation strategies, procedures and principles**

Guide or describe broadly the kinds of actions that will maintain or move the system from its existing conditions to the needed conditions.

**Indigenous**

Native to the region.

**Mitigation**

The creation, restoration or enhancement of a wetland area to maintain the functional characteristics and processes of the wetland, such as its natural biological productivity, habitats, and species diversity, unique water features and water quality.

**Morphology**

A study of the form and structure of animals and plants.

**Natural area**

A landscape unit composed of plant and animal communities, water bodies, soil and rock; largely devoid of human-made structures; maintained and managed in such a way as to promote or enhance populations of wildlife.

**Normative ecosystem**

An ecosystem where specific functional norms or standards that are essential to maintain diverse and productive populations are provided.

**Northwest Power Act**

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (16 U.S.C. 839 et seq.), which authorized the creation of the Northwest Power Planning Council and directed it to develop this program to protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries.

**Passage**

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

**Plume**

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

**Resident fish**

Occupying headwater reaches; may disperse locally, but generally considered non-migratory.

**Riparian**

Relating to the banks of a water body.

**Spill**

Releasing water through the spillway rather than through the turbine units at hydroelectric projects.

**Vision**

Describes what the program is trying to accomplish with regard to fish and wildlife and other desired benefits from the river.

**Watershed**

A topographically discrete unit or stream basin, including the headwaters, main channel, slopes leading from the channel, tributaries and mouth area.

**Wetland communities**

Land areas where excess water is the dominant factor determining the nature of soil development and the types of plant and animal species living at the soil surface. Wetland soils retain sufficient moisture to support aquatic or semi-aquatic plant life.