Conservation of Columbia Basin Fish

Draft Basin-wide Salmon Recovery Strategy

Update of the All- H Paper • July 27, 2000

Volume 1

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(Update of the All- H Paper)

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Conservation of Columbia Basin Fish

Draft Basin-wide Salmon Recovery Strategy

EXECUTIVE SUMMARY

Introduction

Many salmon and steelhead populations in the Columbia River Basin will be extinct or nearly so by the end of this century, unless the region makes major changes to improve their survival. Federal agencies have a fundamental responsibility under the Endangered Species Act to prevent extinction and foster recovery of listed species. This paper presents the federal government's recommendations for actions needed to recover threatened and endangered salmon and steelhead in the Columbia River Basin. It is designed to complement the recovery plans for resident fish and other aquatic species, and builds on actions already taking place to recover these species. Columbia Basin fish and wildlife will thrive again only if the people and governments of the basin work together; this paper commits the federal government to doing its part to conserve a precious national resource.

In 1994, a federal court rejected the 1993 Columbia River hydropower biological opinion, saying the "system was crying out for a major overhaul." These were the strongest words yet heard from the courts about the urgency of restoring salmon and steelhead runs to the Snake River. They served as a wake-up call for federal agencies, states, and other followers of Columbia Basin recovery efforts. The following year, the federal government initiated that overhaul in a new biological opinion that fundamentally altered the way the federal power system is operated. That opinion placed the needs of fish on equal footing with power generation, flood control, navigation, and irrigation. In the process, it brought changes to the power system that have significantly improved juvenile and adult fish survival.

The intervening five years have brought new information and changed circumstances to the issue. Nine more populations of salmon and steelhead have been listed under the Endangered Species Act. Notably, these listings included chinook and steelhead species inhabiting the Upper Columbia, Mid-Columbia, and Lower Columbia regions. The strategies in the 1995 decision focused on the options for rebuilding Snake River stocks alone. The additional listings have broadened the recovery challenge beyond the Snake River to encompass the entire basin.

In addition, new research and analyses have focused increased attention on human impacts on listed fish outside the hydropower system, exposing the extent to which land use, tributary water management, hatchery policies and harvest practices have contributed to the declines. This new research suggests that the greatest opportunities for survival improvements may lie outside the

scope of the hydropower corridor, and hinge on efforts to restore health to the tributaries and estuary where these populations spawn and rear.

The federal overhaul begun in 1995 is not yet complete and it must be broader in scope than earlier thought. As a new millennium begins, native salmon and steelhead, and many resident fish species, remain in a state of perilous decline throughout the Columbia River Basin concurrent with rapidly increasing human population growth and even greater pressure on existing natural resources. This Conceptual Recovery Plan calls for changes needed to recover salmon and steelhead, including additional improvements to the hydropower system, but also those needed to address human impacts to fish in all life stages. It also tries to account for natural cycles of environmental variation.

Federal agencies can implement much of the Plan using existing authorities and capabilities. Some recommendations will require new authorizations and congressional support or action by state, tribal and local governments. The federal agencies cannot solve this problem alone, or by acting unilaterally. Strong action by state and tribal governments, local authorities, and other participants must occur for recovery to succeed. All parties must coordinate efforts to fully realize benefits to species in decline.

The Federal Caucus Plan places priority on actions with the best chance of being implemented, the best chance of providing solid and predictable biological benefits, and the best chance of benefiting the broadest range of fish species. It calls for a contribution from governments and individuals at all levels, yet it also recognizes and complements the strong efforts already underway throughout the region.

It is important to recognize resources are limited. Congress and the region are most likely to commit resources to actions with immediate, predictable and broad benefits. Recovery efforts will be most effective — and resources most efficiently used – if all of the federal agencies coordinate their respective programs, and if they collectively coordinate with state and tribal programs.

The actions recommended are presented as a plan, not a menu. Improving conditions in many life stages, – freshwater spawning and rearing, juvenile migration, ocean transition, and upstream migration – is the most risk averse approach to achieve recovery of threatened and endangered salmon and steelhead. The Plan includes immediate actions aimed at all life stages to prevent extinction, and long-term actions to foster recovery. It is based on a thorough review of the best available scientific information about the anadromous fish life cycle, from spawning and rearing, to river migration and over-wintering, to hatchery interactions, to predation and ocean conditions. Actions taken to recover anadromous species are also intended to benefit resident fish and other aquatic species.

Because there are gaps and unavoidable uncertainties associated with the science, the Federal Caucus will establish a comprehensive research monitoring and evaluation program to reduce those uncertainties, and provide information for needed adjustments to strategies in the future. The federal agencies will measure progress in the life stages against performance standards for

each stage. Performance standards are central to the program because they provide clear objectives, measurable results and accountability.

Actions federal agencies can take now to stabilize populations and show immediate results across all life stages are the core of the Plan. Habitat actions will protect and restore tributary habitat to improve survival during spawning and rearing. These include removing passage barriers, screening diversions, purchasing in-stream flow rights, restoring water quality and acquiring high-quality habitat. The estuary is an important habitat used by all salmon and steelhead in the basin. Actions in the estuary include the restoration of tidal wetlands, rearing channels and flood plains. Actions in other sectors will help prevent extinction in the near term. These include improving passage through the dams, capping harvest, reforming existing hatcheries, and intervening with conservation hatcheries on an emergency basis where populations are at risk of imminent extinction.

The Plan also calls for coordinated subbasin assessments and plans, as proposed by the Northwest Power Planning Council. Plans will be organized around subbasins and be developed with states, local governments, tribes, private parties and federal agencies. This effort will require a solid commitment to action and coordination by all parties.

Much of the regional debate has focused on removal of Snake River dams. There is little doubt dam removal would benefit Snake River salmon and steelhead. The National Marine Fisheries Service is not recommending it at this time, however, for several reasons. There is scientific uncertainty about whether breaching dams is necessary to achieve recovery and whether breaching alone can lead to recovery. Only Snake River fish show a benefit from breaching, with no benefit to the other eight listed populations that do not originate in the Snake River Basin. Dam removal is not within the existing authority of the federal agencies, and cannot be implemented in a short time frame. And its high cost could preclude other actions needed throughout the basin. In short, the option of Snake River drawdown ranks as a lower priority than other available options because of narrow benefits, high uncertainties and high costs, and on balance does not appear to be warranted at this time.

The aggressive Plan is designed to provide immediate benefits and lead to salmon and steelhead recovery. This approach leaves breaching on the table as a future option, but challenges hydropower system operators now to meet rigorous survival goals over a discreet period, using continued improvements in flow and spill management and structural improvements at dams. System performance will be evaluated against science-based, peer-reviewed performance standards at five-, eight-, and ten-year intervals. Dam removal will again be joined if progress is inadequate or the Snake River populations decline, but not prior to testing the actions contained in the overall Plan. The Plan also commits the federal hydropower system to fund habitat, harvest and hatchery actions to mitigate for unavoidable mortality in the federal hydropower system.

Background

The decline of the Columbia's once-numerous fish runs is well documented. The human activities that have caused the decline of these fish are habitat, harvest, hatcheries, and hydropower. In December 1999, the nine agencies that make up the Federal Caucus released a draft of the Conceptual Recovery Plan outlining the difficult choices the region faces in recovering listed species.

In 15 public hearings, the Federal Caucus heard from more than 9,000 Northwest citizens. Over 60,000 written comments were received on the Plan and the Army Corps of Engineers' Lower Snake River Juvenile Salmon Migration Feasibility Study and Draft Environmental Impact Statement. The Federal Caucus also consulted with the region's Indian tribes, who have a special interest in the natural and cultural resources of the basin, especially its fish and wildlife. The message was clear. The people and governments of the region will make sacrifices to save the fish, but they want the burden to be shared and they want actions that will work.

This Plan reflects those comments and updated scientific information. Federal agencies will use this Plan as a blueprint to guide federal actions and interactions with state and local governments and tribes. NMFS and USFWS will use it to guide their decision-making through biological opinions issued under the Endangered Species Act.

Program Goals

The Federal Caucus has six goals for this Conceptual Recovery Plan:

- Conserve Species. Avoid extinction and foster long-term survival and recovery of Columbia Basin salmon and steelhead and other aquatic species.
- Conserve Ecosystems. Conserve the ecosystems upon which salmon and steelhead depend.
- Assure Tribal Fishing Rights and Provide Non-Tribal Fishing Opportunities. Restore salmon and steelhead populations over time to a level that provides a sustainable harvest sufficient to allow for the exercise of meaningful tribal fishing rights and provide non-tribal fishing opportunities.
- Balance the Needs of Other Species. Ensure that salmon and steelhead conservation measures are balanced with the needs of other native fish and wildlife species and do not unduly impact upriver interests.
- Minimize Adverse Effects on Humans. Implement salmon and steelhead conservation measures in ways that minimize their adverse socio-economic and other human effects.
- Protect Sensitive Indian Cultural Resources. In implementing conservation measures, act to preserve resources important to maintaining the traditional culture of basin tribes.

The Plan includes a combination of actions most likely to meet these goals. The actions reflect the best scientific understanding of what is necessary to conserve the species and their ecosystems. The Plan contemplates maintaining tribal fishing opportunities in the near term, and expanding them over time. The Plan recognizes the needs of other at-risk fish, wildlife and plant species within the basin. The Plan seeks to provide a measure of social and economic certainty

by seeking maximum benefit from the available resources, with clearly established implementation and monitoring processes.

Biological Considerations

The scientific analyses examined the risks and opportunities facing all salmon and steelhead population groups (known as "Evolutionarily Significant Units," or ESUs) listed under the ESA. In addition to assessing extinction risks, the analysis looked at how much improvement is needed to achieve survival and recovery. In short, it gives a sense of how the fish are performing now, the level at which they need to perform to avert risk, and the areas where improved performance are likely to have the greatest effect. The results are sobering. Generally, fish from the upper Columbia and Snake rivers have the furthest to go to reach recovery. Spring chinook in particular have an extremely high extinction risk in both the upper Columbia and Snake rivers.

The analyses also looked at those life stages where survival improvements would provide the greatest benefit. Generally, these are the life stages where the fish suffer the greatest mortality. The analysis shows that the highest mortality occurs in the first year of life and in the transition from freshwater to saltwater. Although mortality from dam passage is high for ESUs in the upper Columbia and Snake rivers, improving downstream survival, by itself, is unlikely to recover any of the upper basin species. For all ESUs, the analysis concluded that improvements in more than one life stage give the best chance for recovery.

There will always be a high degree of uncertainty about the science, given the sheer number of variables that affect salmon and steelhead performance. However, the agencies are prepared to take action in the face of uncertainty, based upon current knowledge. Ongoing uncertainties simply emphasize the importance of accountability, monitoring, and evaluation. It is critical to maintain the ability to adapt the strategy to reflect the latest information as the science evolves.

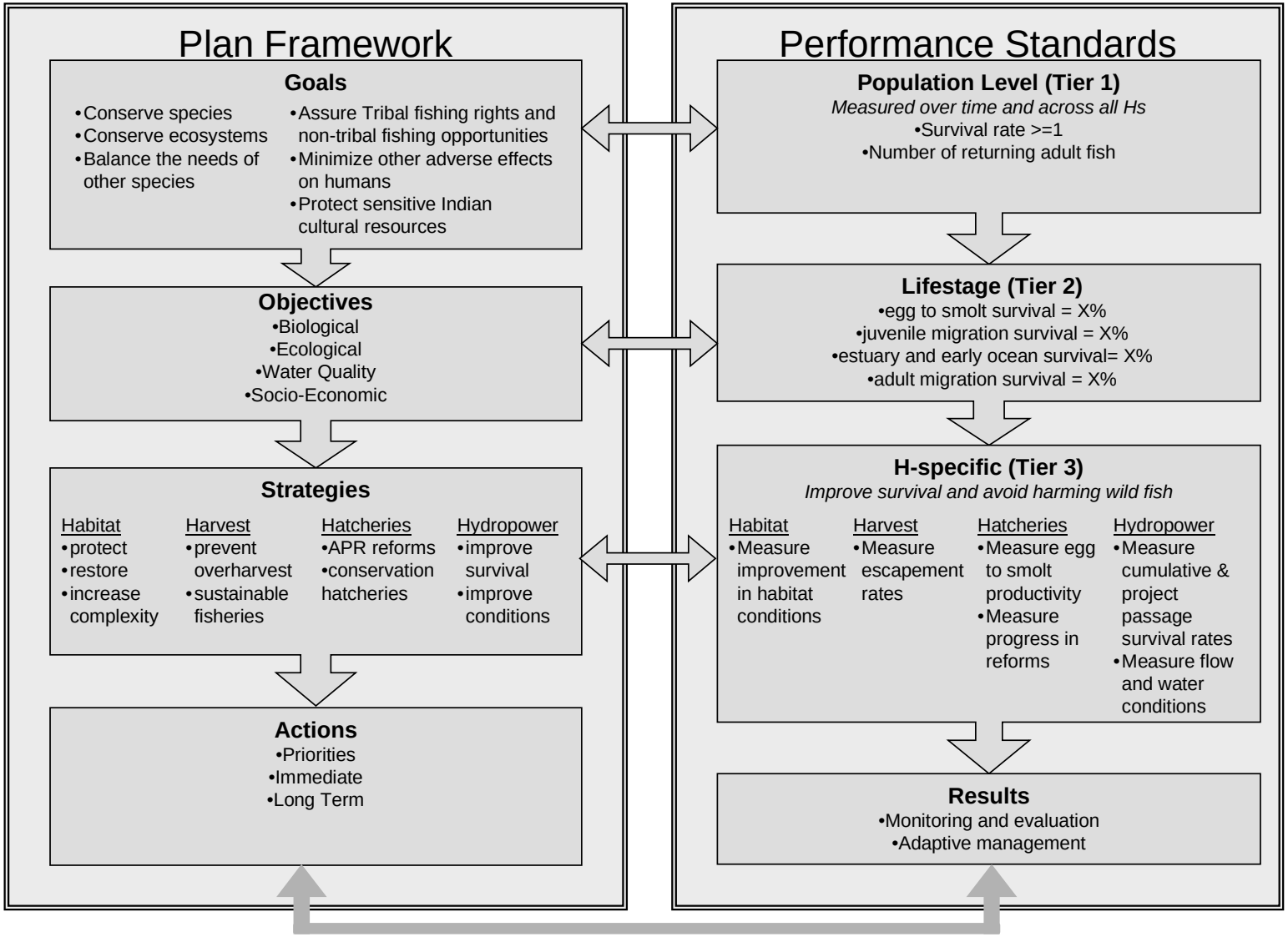
Conceptual Recovery Plan

The Conceptual Recovery Plan identifies immediate actions to prevent extinction and foster recovery by improving survival across all of the life stages. It emphasizes actions that are currently authorized, that have predictable benefits, and that benefit a broad range of species. It contains strategies and specific actions that will make federal, state and local actions more aggressive and more effective (see Figure 1). For the longer term, it identifies steps to develop recovery plans. Its success is premised on securing contributions to recovery from all governments within the region.

Recovery Strategies:

- Habitat: Take immediate actions to restore streamflow, remove passage barriers, protect high quality habitat and screen diversions.
- Habitat: Complete subbasin assessments and plans to prioritize longer-term actions.
- Hydropower: Maximize survival in the hydropower system through flow, spill, passage, and water quality measures and maintain dam breaching as a future option depending on progress in fish recovery.
- Hatcheries: Prevent extinction through supplementation.
- Hatcheries: Reform hatchery practices to eliminate risks to wild fish.
- Harvest: Cap harvest at or below current levels.

Figure 1 Conceptual Recovery Plan



Fixing salmon and steelhead **habitat** is particularly challenging. These fish range through federal and nonfederal land, forests, farms and cities. A vast number of human activities affect their habitat. In addition, very few studies have been done that quantitatively link management actions with habitat quality, and habitat quality with fish production. Yet there is no doubt fixing habitat is central to any recovery plan. Survival improvements are likely to have the biggest effect in the first year of life (when most of the fish are in the tributaries) and during the transition to salt water (when the fish are in the estuary). Fixing tributary and estuary habitat is key to recovering the fish and is the centerpiece of the Plan. Actions in the Plan focus on tributary habitats, both federal and non-federal; mainstem habitat, estuary habitat, and implementation.

Habitat Plan:

- *Immediate Actions* – Improve in-stream flows, restore water quality, screen diversions, remove passage barriers, secure high quality habitat.
- *Manage federal lands to protect fish.*
- *Protect and improve estuary habitat.*
- *Protect and improve tributary habitat.*
- *Improve mainstem habitat.*

For tributary habitats on nonfederal lands, the federal agencies will fund actions that will have immediate benefits. These include actions aimed at removing passage barriers, screening diversions, increasing in-stream flow, restoring water quality and protecting high quality habitats through the purchase of land or conservation easements across all lines of land ownership.

For long-term actions, the Conceptual Recovery Plan endorses the Northwest Power Planning Council strategy of conducting subbasin assessments and developing subbasin plans. The federal agencies have worked with the Council to develop an assessment template and a work plan to have a team of professionals complete the assessments. Once the assessments are complete by the end of 2000, the federal agencies will participate with state agencies, local governments, tribes and stakeholders to develop subbasin plans. As a complement to subbasin assessments and plans, NMFS has also begun a recovery planning effort that will establish population and ESU goals for abundance, productivity, distribution and diversity. The subbasin and recovery plans will then create the priorities for federal actions and funding.

For tributary habitats on federal land, the federal land managers will protect existing high quality habitat and accelerate restoration in high priority subbasins. In the short term, federal land will be managed under current programs that protect important aquatic habitats. That program will be augmented in important subbasins by a targeted restoration effort. In the longer term, federal land on the east side of the Cascades will be managed under the Interior Columbia Basin Ecosystem Management Project (ICBEMP), which will rely on subbasin and watershed assessments and plans to target further habitat work. On the west side of the Cascades, federal lands are managed under the Northwest Forest Plan.

Federal agencies will assess mainstem habitat and implement experimental programs to create more natural habitat areas along our system of reservoirs. They will also establish a management plan to protect the Hanford Reach, home to a healthy core population of fall chinook.

For the estuary, the Lower Columbia River Estuary Program, a partnership between EPA and state and local governments and citizens, will be the foundation of the recovery effort. As part of this Plan, federal agencies will work with state, local, tribal, and private partners to acquire or restore thousands of acres of estuary habitat over the next 5-10 years, creating a Lower Columbia River Greenway to benefit migrating fish. Predator control and improved river flows will be prominent features of efforts to improve the estuary.

The salmon's vast geographic range spans literally hundreds of different jurisdictions. Lack of coordination among these jurisdictions can undermine the best-laid habitat protection plans. The Conceptual Recovery Plan emphasizes coordination among federal agencies, and between the federal agencies and others. Coordination will occur through a federal habitat team, which will also provide a basin-level focus and one-stop shopping for states, local governments, tribes and others working to protect and restore habitat. In addition to coordinating federal funding with the subbasin plans adopted by the Council, the team will provide technical assistance, information on ESA and Clean Water Act compliance, and coordinate federal funding.

Another important aspect of implementation is monitoring and evaluation. The federal agencies have identified critical uncertainties that must be answered to establish an effective habitat program. The Plan proposes a comprehensive, basinwide monitoring effort that will address these critical uncertainties.

The Conceptual Recovery Plan limits **harvest** to no more than current levels, seeks opportunities to reduce harvest impacts on listed fish where necessary and effective, and seeks additional fishing opportunities in fisheries that do not affect wild fish, with particular emphasis on selective fisheries.

***Harvest Plan*:**

- Cap harvest at currently reduced rates.
- Increase selectivity of harvest and reduce take of listed fish further.
- Provide opportunities for increased harvest that does not affect listed fish.

Cutting harvest immediately increases spawning escapement and can reduce near-term risks of extinction. However, reductions in harvest rates on natural stocks have been the first response to declining production and ESA listing, and now harvest rates are so low for most stocks that further reductions will not yield major benefits. Most of the harvest impacts remaining on listed fish occur in treaty-protected fisheries, which have been especially hard-hit in recent years.

Although further reductions in the already-reduced harvest might provide small additional benefits for listed fish, the Plan does not generally recommend that action because of the importance of the treaty fishing right and the federal trust obligation.

Federal agencies will, however, seek to reduce impacts from harvest on the listed fish where such additional cutbacks are necessary and effective at aiding recovery. They will enable more selective fishing opportunities by marking most unlisted hatchery fish and developing and promoting the use of selective fishing techniques and locations to open up opportunities for increased tribal and non-tribal fishing while still protecting the listed stocks. They will also

provide funds to buy back state-issued commercial fishing licenses when doing so would be effective at reducing fishing effort.

The Conceptual Recovery Plan contains two primary **hatchery** initiatives. The first is to reform all existing production and mitigation hatcheries to eliminate or minimize their harm to wild fish. The second is to use conservation and supplementation programs on an interim basis to avoid extinction while other recovery actions take effect.

Hatchery Plan:

- Reform production facilities to minimize harm to wild fish.
- Use conservation and supplementation facilities to avoid extinction.
- Conduct aggressive research, monitoring, and evaluation program to quantify hatchery impacts over time.
- Transfer operation of certain hatchery production programs or ownership of certain hatcheries to tribes, subject to approved HGMPs, to facilitate co-management and tribal fisheries.

Protecting and managing for species diversity is the key to reforming hatchery operations. Diversity is reflected in the wild fish that are genetically adapted to the areas they inhabit. To protect this diversity, it is critical that hatcheries draw from the gene pool appropriate for the area. The Plan requires that any agency operating a hatchery develop a genetic management plan to govern production. Hatcheries will also be required to improve operations in other respects to ensure that the fish they release do not pose a threat to wild fish inhabiting the same areas, and to improve the survival rates of the hatchery stocks themselves.

The second part of the hatchery plan is to use conservation techniques to support weak stocks, at least on an interim basis. This will be done by collecting eggs and sperm from wild fish. The eggs will be fertilized and raised in a semi-natural environment. The fish will then be released into areas inhabited by the wild population, in theory adding abundance to the natural run.

Another key element of the hatchery plan will be to establish a research program designed to clarify wild-hatchery fish interactions and quantify the effects of hatchery supplementation on wild fish with a strong degree of certainty.

Another element of the hatchery plan involves using hatcheries to create fishing opportunities that are benign to listed populations, such as in terminal areas. This is particularly important to assist tribal fisheries. An example of one such program is the ongoing restoration efforts in the Umatilla Basin, which has resulted in fish returning to the river, and tribal and non-tribal fishing opportunities. In some cases, existing hatcheries could be transferred to or operated by the tribes for these purposes.

All salmon and steelhead in the basin are affected to some extent by the **hydropower** system. The Conceptual Recovery Plan calls for an aggressive program of improvements at existing dams, building on the survival improvements from current efforts. The Plan does not recommend removal of Snake River dams at this time. Instead, it establishes performance standards for survival of juvenile and adult fish, and a schedule for meeting those standards. Performance

standards are to be met through an aggressive program of improvements that includes more flow, more spill, and continued improvements in the dams themselves to pass more fish safely. If the schedule for performance standards is not met, and further contemporary studies suggest Snake River dam removal will recover Snake River stocks, NMFS would recommend breaching one or more of those dams.

Hydropower Plan:

- Improve flows.
- Improve spill and passage at dams.
- Improve water quality.
- Reduce fish trucking.
- Implement measures to protect resident fish.
- Conduct analysis of economic and cultural implications of dam breaching.
- Improve nonfederal hydropower dams.

The hydropower plan adds an element that was not in the draft Plan – off-site mitigation. The federal agencies responsible for the hydropower system will use appropriated and ratepayer funds primarily to fix habitat, harvest and hatcheries. Part of the ultimate decision on dam removal will depend on the ability of the hydropower system to improve fish survival through off-site mitigation measures.

Finally, the hydropower element includes a performance review in five years to determine whether the performance standards remain valid, and whether the system is on track to meet them. After ten years, a determination will be made whether the hydropower system performance has been sufficient to achieve recovery in combination with other measures, and, if not, whether breaching or other actions will be necessary. The Federal Caucus would seek review of these determinations by the Independent Scientific Advisory Board.

Implementation

The success of the Conceptual Recovery Plan hinges on active and effective leadership and significantly improved coordination among federal, state, tribal, and local agencies. Meeting these challenges successfully will require a renewed level of commitment and discipline for the governments of the Pacific Northwest. Successfully implementing actions in the habitat, harvest and hatchery sectors will be necessary for salmon recovery, regardless of the ultimate decisions by Congress on the subject of removing or reconfiguring federal dams.

Implementation:

- Coordinated federal funding and priorities
- Establishment of priorities
- Five-year and ten-year reviews
- Use of performance standards

A number of specific actions will make federal implementation of salmon conservation measures more effective. Most important is securing a level of funds to implement the Conceptual Recovery Plan. Also important is coordinated funding and priorities. Federal agencies will continue to participate in a federal caucus that will oversee implementation by federal agencies. The federal agencies will also establish mechanisms to coordinate federal actions in each H. For hydropower, the agencies will continue to work through a regional forum process similar to the

one that has existed for several years. For habitat, the agencies will establish an interdepartmental habitat caucus staffed by an interagency habitat team, described in the habitat section. Harvest will continue to be coordinated through the existing forums in *U.S. v. Oregon* and the Pacific Salmon Commission. Hatchery actions will be coordinated with the Council's annual funding process. NMFS and USFWS will also ensure implementation in all of the Hs through biological opinions.

The federal government will use these mechanisms to coordinate and engage with governments within the region to take maximum advantage of available resources and authorities. Significant initiatives are already underway within the region, including the Council program, tribal programs, state plans, and community-level efforts. The federal government intends its activities to complement and encourage such efforts, not suffocate them with additional and redundant mandates.

The Plan provides a disciplined structure for salmon and steelhead recovery, with specific goals and objectives. A fundamental part of this approach is establishing biologically-based performance standards for listed species for freshwater habitat, the hydropower corridor, and for estuary and early ocean survival. These performance standards will serve as the yardsticks to measure progress and judge whether dam reconfigurations and other actions must occur to rebuild populations.

Research, Monitoring and Evaluation

Properly designed monitoring programs will provide data for resolving a wide range of uncertainties, including determining population status, establishing causal relationships between habitat (or other) attributes and population response, and assessing the effectiveness of management actions. The information gained through monitoring programs will be a cornerstone in identifying alternative actions and refining recovery efforts. Such programs are therefore not only an integral part of any management action, but also a critical component of a recovery plan or adaptive management, affording managers the information to maintain or change strategies as necessary.

A complete monitoring program will address the following four major groupings of questions:

- **What is the status of salmonid populations; does that status change through time?**
- **What are the conditions in areas of different salmonid abundance; and, are there systematic patterns suggesting that specific natural or anthropogenic factors affect salmon population dynamics?**
- **Is there a cause and effect relationship between salmonid population responses and changes in conditions locally or across the landscape?**
- **Have management actions been implemented; have they been implemented appropriately and in their entirety?**

Conducting monitoring and evaluation effectively will require that both data collection and the implementation of management actions be highly coordinated. Collecting data to address any of these questions will require attention to issues of experimental design, including distribution of monitoring sites, appropriate replication and scale. Management actions must be conducted in the context of an experimental framework that will offer the greatest opportunities for detecting responses in the shortest amount of time. Similarly, it will be imperative that data collection be conducted in a standardized manner and that data is reported and managed in a regional database. Failure to maintain a scientifically rigorous, coordinated effort will not only render any monitoring program useless, but will also undercut the importance of the management actions themselves, since they will no longer contribute to our understanding of salmonid population responses.

The Northwest Fisheries Science Center, in collaboration with other regional science centers and other federal, state, tribal and local agencies, will develop a monitoring and evaluation program that addresses these major areas. The Federal Caucus will report annually on federal agency progress in carrying out recovery actions, including the availability of resources and the agencies' ability to carry out the Conceptual Recovery Plan. These reports would also be geared to support long-term biological monitoring to assess the contribution of improvements in each H to improvements in population growth rates or other biological indicators.

Working with the Region

Through a comprehensive effort that combines separate yet interrelated actions, a better future for the basin can be charted. It is time for citizens, governments and special interests in the Columbia River Basin to collectively take immediate and sustainable actions to rebuild the health of the basin. The Federal Caucus tenders this proposal to decisionmakers, the Northwest Delegation, and state and tribal administrations as a launching point for an aggressive, feasible, scientifically-based, balanced path toward basin recovery and rebuilding. Through consultation and collaboration, we hope to refine this proposal so that in its final form, it can serve as a comprehensive, long-term strategic direction for impending actions in the basin.

FOR MORE INFORMATION

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Introduction

In December 1999, the nine agencies that make up the Federal Caucus released the draft Conceptual Recovery Plan that outlined the difficult choices the Pacific Northwest must make to recover listed salmon, resident fish and other aquatic species. The Federal Caucus presented the most current science about listed species and offered options and integrated alternatives for the region to consider for recovery of these species. After consultations with states and federally recognized tribes of the Columbia Basin and an extensive public comment period, the Federal Caucus has updated the scientific information, considered the comments from the tribes, states and the public about the options and integrated alternatives, and has prepared this Conceptual Recovery Plan. The Federal Caucus will use this plan, in concert with tribes, states and local governments and many organizations and individuals to recover these species. The comprehensive approach will be implemented directly through **Biological Opinions*** issued by NMFS and USFWS on the Federal Columbia River Power System, and through other recovery processes in the region. The federal agencies cannot solve this problem alone, or by acting unilaterally. Strong action by state governments, local authorities and other participants must occur for recovery to succeed.

The Agencies of the Federal Caucus and their Responsibilities

The nine federal agencies in the Federal Caucus that developed this paper have differing authorities and jurisdictions for salmon recovery:

- National Marine Fisheries Service – Endangered Species Act (ESA) jurisdiction over anadromous fish; it also has a role regulating fisheries.
- US Fish and Wildlife Service(USFWS) – ESA jurisdiction over plants, wildlife and resident fish and also operates and administers hatchery programs and national wildlife refuges.
- Bonneville Power Administration (BPA) – markets electricity from federal dams; it also has a key role funding fish and wildlife mitigation.
- The Army Corps of Engineers (USACE) – operates federal dams and locks for multiple uses.
- US Bureau of Reclamation (USBR) – operates federal dams for multiple uses.
- Environmental Protection Agency (EPA) – implements and enforces the Clean Water Act.
- US Forest Service (USFS) – manages the national forest system.
- Bureau of Land Management (BLM) – manages public forests and rangeland.
- Bureau of Indian Affairs (BIA) – trustee for tribal and individual Indian lands and resources held in trust.

* Terms in bold are defined in the glossary.

After a federal court rejected the 1993 Columbia River hydropower biological opinion, a new biological opinion with options for operating and configuring the federal hydropower system brought major changes to the system to benefit fish. Water flows were increased in the mainstems during fish migration periods, improvements were made to provide multiple passage opportunities for fish at each dam, and more water was spilled over the top of each dam to help fish avoid turbines.

In addition to these changes, an in-season management team was established to tailor system operations to the needs of fish on a weekly basis. This has brought more precision to the agencies' efforts to improve fish survival, particularly for juvenile salmon.

Over the course of the past decade, other activities have been undertaken to benefit at-risk fish species. Salmon and steelhead harvest has been reduced steadily in the ocean and in the rivers. A major effort has been undertaken within the region to reform hatchery practices. Federal forests have been managed much more conservatively than in previous decades, particularly to protect rivers and streams. Dozens of community level initiatives have been started throughout the region to improve the quality and quantity of available habitat.

The science of salmon recovery has also improved. In 1996, the Independent Scientific Advisory Board was established to provide scrutiny of fish management decisions at all levels of government, without prejudice. While the existence of the board itself is not tied to salmon management, its presence likely has improved the quality of research, monitoring, and evaluation efforts, as well as agency decision-making in general.

Recent salmon and steelhead returns have increased, possibly as a result of these improvements. While improving climate conditions have undoubtedly benefited migrating salmon, it is also likely that the combined efforts of federal agencies to date has prevented the extinction of some populations, and reduced extinction risks faced by others.

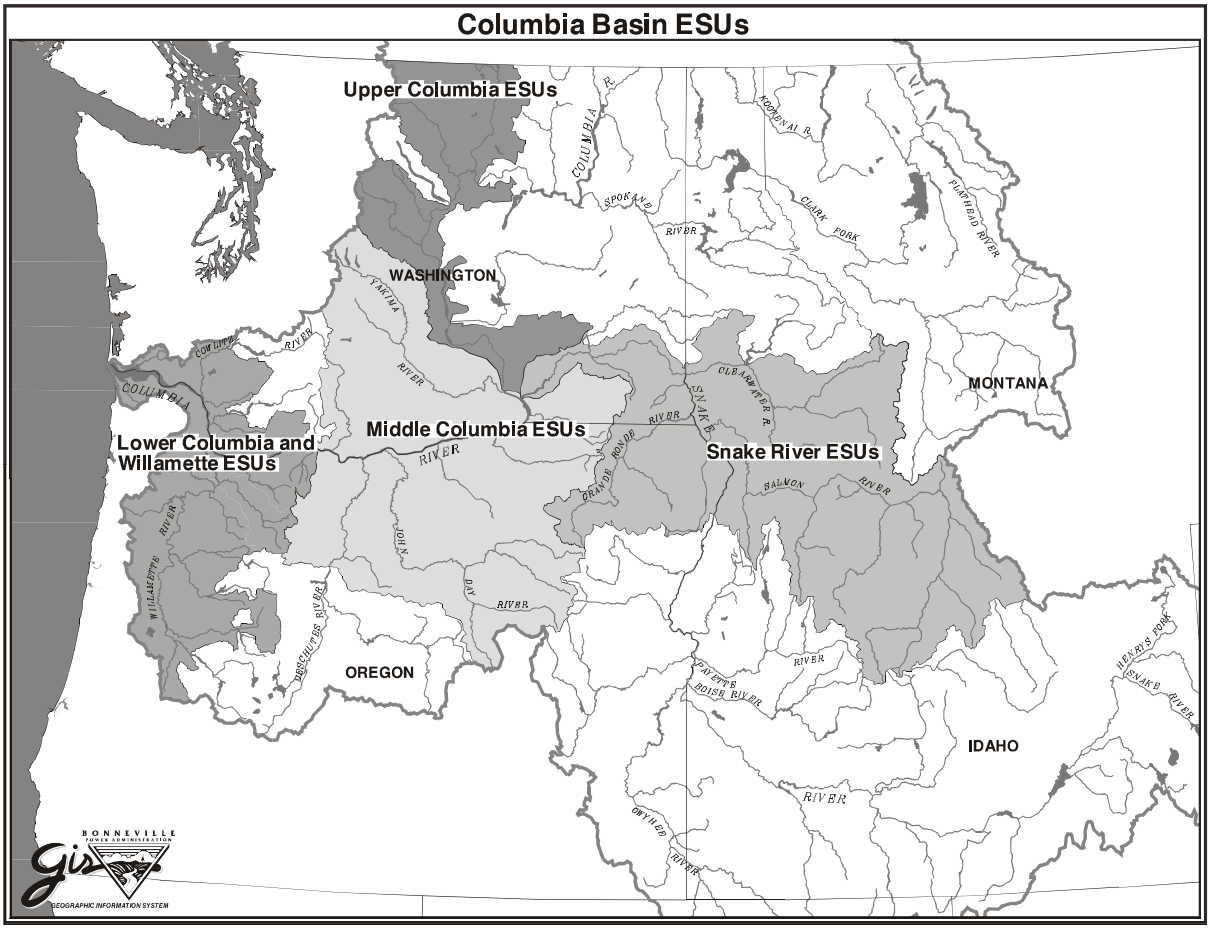
While much progress has been made, to date there has been no discernable trend toward recovery of listed salmon, steelhead, or resident aquatic species. Together, the actions described above provide a foundation for launching a more aggressive regionwide effort to achieve salmon recovery.

Volume 1 of this document presents a summary of the Conceptual Recovery Plan. Volume 2 contains a more detailed description of the actions' expected benefits and other technical information.

Background

The Columbia River Basin covers about 250,000 square miles in seven western states and British Columbia and is defined by unique geologic and water features. The states in the Pacific Northwest follow, in the most part, the basin's geographic features. An enormous variety of plants and animals occupy the wide array of physical habitats in the Columbia River Basin.

Native salmon and steelhead, and many resident fish and other aquatic species are in decline throughout the Columbia River Basin. All Columbia River Basin salmon stocks are in a state of perilous decline, especially Upper Columbia spring chinook and steelhead throughout its range (see map). Without substantial intervention, there is a greater than 50:50 chance that most of these stocks will be extinct by the next century, some much sooner.



The deterioration of the Columbia's once-numerous fish runs can be traced to the economic development of the basin. Human activities have caused the decline of these fish. Forestry, agriculture, mining, and urbanization have altered or destroyed tributary *habitat*. Fishing, or *harvest,* has reduced the number of adult fish that return to spawn. *Hatcheries* have introduced inbreeding and competition, may have been a source of disease for **wild fish**, and have in some cases induced fisheries to harvest at rates too high for natural stocks. And *hydropower* dams on the Columbia and Snake rivers have blocked and inundated **mainstem** habitat, altered natural flows, impeded passage of migrating fish, and created a series of pools where fish predators reside. Such land use practices and landscape alterations have also affected tribal cultures and the traditional use of resources. These four areas of human activity are the Hs of this Plan.

Populations, Stocks and Evolutionarily Significant Units

Populations are generally defined as a group of fish that interbreed when mature, and do not interbreed to a significant degree with other groups of fish. *Evolutionarily Significant Units (ESUs)* are groups of populations designated by NMFS for purposes of implementing the Endangered Species Act. ESUs are distinct groups of populations that typically occupy similar habitats, are genetically similar, and that represent an important component of the evolutionary legacy of the species. *Stocks* of fish are designated by managers generally for purposes of managing fisheries. In some cases, units identified by managers as "stocks" will be similar to populations. In a few cases, a unit identified as a "stock" will also coincide with a unit identified by NMFS as an ESU.

Natural factors, such as ocean conditions and natural predation, also influence the survival of salmon. Ocean conditions vary with climatic conditions on both long and short-term scales. When conditions are cooler, the ocean is generally more hospitable toward migrating salmon. Cool water temperatures are associated with high nutrient levels and food supplies. The reverse is also true; warmer conditions are associated with lower levels of resources. These are not the only characteristics of variant ocean conditions, but they are the primary indicators affecting the ability of salmon and steelhead to thrive once they leave the rivers. In general, ocean conditions have been below average over the past 20 years. From the early 1980s through the mid-1990s, conditions were relatively warm. In contrast, throughout the 1960s and 1970s, conditions were cooler. These trends generally correspond to fluctuations in adult salmon and steelhead returns. Though ocean conditions are not stable, the general trend has been toward warmer conditions.

Predation of migrating salmon is another important factor affecting the productivity of salmon and steelhead. Migrating juvenile salmon are a targeted food source of many species, including other aquatic species such as northern pikeminnows, bird species such as Caspian terns, pelicans, and cormorants, and marine mammals such as harbor seals and sea lions. There is some evidence to suggest that ocean conditions off the coasts of Washington and Oregon may influence predator abundance there, with warmer temperatures potentially more conducive to marine fish predators. Returning adult salmon are targeted primarily by marine mammals. Many juveniles and adults are taken by predators, but exact numbers for listed species are unknown. Predation is part of a properly functioning ecosystem, but given the decline of certain populations and the loss of numbers caused by other factors, predation is a factor to consider in the recovery of these species.

Processes for Change-Recovery Planning

Major changes must be made in a wide range of activities that cause harm to listed species if recovery of these species is to be successful. Critical federal and nonfederal decisions affecting Columbia and Snake River basins will be made soon that will determine the kind and magnitude of actions taken in the region. For example, states are developing Clean Water Act compliance measures, Tribal governments are developing habitat, supplementation and harvest strategies, the Northwest Power Planning Council is revising its Fish and Wildlife Plan, and federal agencies

are making decisions about land uses, operational and structural changes at dams, and harvest changes (see box). Making these decisions and implementing them so that the listed species recover will require consultation and collaboration from every agency and tribe, and the support of the people of the Pacific Northwest. The Federal Caucus offers this Conceptual Recovery Plan as a starting place for a scientifically-based, balanced path toward recovery and eventual rebuilding of these species.

Other Related Processes for Species Recovery in the Region

- *Northwest Power Planning Council and Multi-Species Framework Process*. Over the last two years the Council and other regional participants worked together on the Multi-Species Framework Project. The Framework Project highlighted the need for a comprehensive and coordinated approach to fish and wildlife in the region. In January 2000, the Council requested recommendations for amendments to its Columbia River Basin Fish and Wildlife Program. Through the amendment process the Council intends to restructure its fish and wildlife program and establish a comprehensive framework for the program. The Council believes that the Framework Project can provide useful planning guidance in the amendment process. The Council's amended fish and wildlife program is included as a vehicle for implementation of the Federal Caucus' Conceptual Recovery Plan.
- *U.S. Army Corps of Engineers' Lower Snake River Feasibility Study*. In December 1999, the Corps released a Draft Feasibility Report and Environmental Impact Statement that reviewed options for improving juvenile salmon migration in the lower Snake River. Breaching the four lower Snake dams is one of the options studied. The public was invited to comment on the draft report and EIS.. Decisionmakers will have an opportunity to consider the Federal Caucus' Conceptual Recovery Plan when making decisions about juvenile migration in the lower Snake River.
- *U.S. Army Corps of Engineers John Day Drawdown Phase I Study*. The study analyzed John Day Dam drawdowns to spillway crest and natural river levels for improved salmon survival. The Corps recommends no further study because of high economic cost and marginal biological benefits. The public comment period ended May 1, 2000.
- *Interior Columbia Basin Ecosystem Management Project (ICBEMP)*. The Bureau of Land Management and the Forest Service released a Supplemental Draft Environmental Impact Statement for the ICBEMP Project in March 2000. The ICBEMP is a massive federal land-use plan that covers 144 million acres in Oregon, Idaho, Washington, Montana, Nevada, Utah, and Wyoming. Of this amount 72 million acres are currently under federal control and the other 72 million acres are private property, state, county and tribal lands. The Supplemental Draft EIS focuses on the critical broad-scale issues related to: landscape health; aquatic and terrestrial habitats; human needs; and products and services. The aquatic programs outlined in the ICBEMP Supplemental Draft EIS display the federal habitat contribution available in the Basin. The official comment period closes July 2000.
- *Draft Biological Assessment on Operation and Configuration of the Federal Columbia River Power System (FCRPS)*. The Biological Assessment jointly prepared by the Corps of Engineers, Bureau of Reclamation, and BPA was submitted to NMFS on December 21, 1999. It is part of the consultation process, required by the Endangered Species Act, between NMFS and the three federal agencies that operate the FCRPS. The BA provides information regarding the impact of operation of the FCRPS on threatened or endangered species. NMFS will consider this information in the preparation of its Biological Opinion on the effects of the operation of the FCRPS on all listed salmon and steelhead in the basin. NMFS will also use the Federal Caucus' Conceptual Recovery Plan as an overall guide for the Biological Opinion.
- *Columbia River Basin Forum*. Formerly called The Three Sovereigns, the Columbia River Basin Forum is designed to improve the management of fish and wildlife resources in the Columbia River Basin. The process is an effort to create a new forum where the federal government, Northwest states and tribes could better coordinate, discuss and resolve basin-wide fish and wildlife issues under the authority of existing laws. The Forum is included as a vehicle for implementation of the Federal Caucus' Conceptual Recovery Plan.
- *Clean Water Act*. Over the next 10 to 12 years, EPA, the States, tribal governments, other federal agencies, and private landowners are investing millions of dollars in watershed and tributary improvements to meet Clean Water Act requirements. Restoration strategies called Total Maximum Daily Loads (TMDLs) are being developed for the Columbia River mainstem and tributaries, based on court orders and negotiated agreements through Clean Water Act litigation. In addition, the federal government has committed to the Clean Water Action Plan which is a federal partnership to promote and enhance locally based watershed improvements. Millions of dollars will be directed at the watershed level through the Clean Water Action Plan to improve water quality, restore habitat and recover threatened and endangered species.
- *U.S. v. Oregon* is a case addressing treaty fishing rights in the Columbia River Basin. The signatories to the settlement are the United States of America acting through the Department of the Interior and the Department of Commerce; the Nez Perce Tribe; the Confederated Tribes of the Umatilla Indian Reservation; the Confederated Tribes of the Warm Springs Reservation; the Confederated Tribes and Bands of the Yakama Indian Nation; and the states of Oregon and Washington.
- *Fish and Wildlife Implementation Plan Environmental Impact Statement.* BPA is drafting an EIS to examine the impacts that may arise from implementing one of the fish and wildlife directions considered in the other regional processes.
- *Lower Columbia River Estuary Program.* Part of EPA's National Estuary Program; Washington and Oregon released a management plan in 1999.

Recovery Planning

Salmon and Steelhead

The Conceptual Recovery Plan covers all ESUs of salmon and steelhead in the basin. It provides an overview of the issues and actions individual recovery plans are likely to specifically address, and will inform the planning process accordingly.

Under the Endangered Species Act, NMFS is responsible for developing detailed recovery plans for each ESU. NMFS intends to carry out this task in cooperation with other federal agencies, states, tribes and stakeholders and has already begun formal recovery planning for the upper Willamette and lower Columbia ESUs.

Recovery plans set biological recovery goals (or de-listing criteria) and the specific actions needed to achieve those goals. The ESA also requires that recovery plans include an estimate of the cost of needed actions. NMFS has focused its efforts first on the technical tasks involved in recovery planning for salmon and steelhead. Completion of these tasks will aid planners in identifying and prioritizing actions that will provide the greatest returns.

The first technical task is to identify the populations that make up the ESU and describe the characteristics that would allow us to conclude the populations are viable. The characteristics include abundance, spatial structure and diversity within the population, and minimum trends and productivity. Once populations are identified and described in this way, it is possible to construct different scenarios for recovery of the ESU in terms of number of populations, in what distribution and what level of abundance and productivity. It is likely that some populations will be identified as core populations, important to preserve regardless of the scenario chosen, while others may be a lower priority for immediate protection.

Another technical task is to identify factors limiting recovery. These factors are likely to differ among ESUs (for example, upriver ESUs will be more affected by hydropower operations than lower river ESUs). They may even differ among populations within an ESU (for example, a dam may block access to habitat for one population in an ESU, while urban development may be limiting the recovery of another). Technical experts can also assess habitat characteristics throughout the range of an ESU and identify those habitats that represent productive strongholds and those that could be strongholds if targeted for restoration.

In its formal recovery planning process in the upper Willamette and lower Columbia region, NMFS has appointed a Technical Recovery Team and charged it with completing these technical tasks. In the upper Columbia, a NMFS-led science team worked with the mid-Columbia Public Utility Districts to begin the first two recovery tasks (identifying populations and abundance recovery goals for them). The Northwest Power Planning Council has proposed to conduct subbasin assessments throughout the Basin, which would accomplish the technical task of assessing habitat.

With these processes in place, the task will still remain to set biological recovery goals for ESUs in the Snake River and for steelhead in the mid-Columbia region. NMFS is working with the federal agencies, the Council and others to determine how best to accomplish this task.

Completion of these technical tasks throughout the basin will provide much of the information needed to develop a plan of action that will lead to recovery. NMFS and the federal agencies recognize there are already a number of state and local processes in place working on local recovery plans. As it moves forward to develop recovery plans using this technical information, NMFS intends to rely on existing processes and institutions. The subbasin assessment and planning process proposed by the Council would include fisheries managers as well as state and local governments and watershed councils. This process may well provide the organization and include the stakeholders in the interior Columbia Basin that would enable NMFS to rely on this process to develop recovery plans. Subbasin plans would need to be "aggregated" to ensure they will provide for the recovery of the entire ESU. NMFS will continue to discuss these issues with all of the affected entities in the Basin. If appropriate, NMFS stands ready to appoint formal recovery teams to develop comprehensive plans for the listed ESUs.

Species Status

The Columbia River Basin historically supported many anadromous species, including hundreds of populations of chinook, sockeye, coho, chum and pink salmon, as well as steelhead, coastal cutthroat trout, white and green sturgeon, eulachon, and Pacific lamprey. Fifty-two fishes, both anadromous and resident, are native to the Columbia River Basin, including 13 **endemic** species (McPhail and Lindsey 1986). Changes in the physical, chemical and biological condition of land and water bodies throughout the basin have dramatically affected the status of many of these fish. Dam development blocked, inundated and **segmented habitat** for anadromous and resident fish, and human development and activities have altered or destroyed much of the habitat that remains.

In the late 1970s, concern about the protection of fish species led to consideration of Snake River salmon stocks for listing under the ESA. In 1980 Congress passed the Northwest Electric Power Planning and Conservation Act, which created the Northwest Power Planning Council and charged it with developing a fish and wildlife program. Passage of that Act and creation of the Council led NMFS to withhold listing. In 1991, NMFS listed Snake River sockeye as endangered, followed closely by listings of Snake River spring/summer and fall chinook. NMFS has listed 12 Columbia River Basin salmon and steelhead Evolutionarily Significant Units (ESU) as threatened or endangered under the Endangered Species Act. The U.S. Fish and Wildlife Service (USFWS) has listed two resident fish and five other aquatic species as threatened or endangered. The draft Plan briefly reviewed the status of the anadromous and resident fish populations remaining in the basin. This review is in Volume 2.

Institutional and Regulatory Context

Many laws, treaties and regulations affect anadromous fish and their habitats in the Columbia Basin, governing everything from reclamation projects to artificial propagation. The United States and Canada, nine federal agencies, five states (Oregon, Washington, Idaho, Montana and Alaska) and federally-recognized Indian tribes have different **authorities** over fish or fish habitat. Treaties between the United States and Indian tribes guarantee the region's tribes a right to meaningful fisheries.

Fish habitat extends from small headwater tributaries to the Columbia River estuary, covering federal, state, private and tribal lands. Countless programs exist to maintain current uses of the river, change current uses of the river, exploit natural resources and conserve natural resources. Institutions range from local watershed councils and water districts to basinwide organizations such as the Northwest Power Planning Council and Columbia Basin Fish and Wildlife Authority (CBFWA). Some have observed that the lack of a unified restoration plan and coordination among efforts in the basin is one of the factors preventing the recovery of anadromous fish (Bevan, et al. 1994). The purpose of this document is to help the region develop a recovery plan that results in better regional coordination and a unified regional direction.

Consultations and Discussions with Basin Tribes

There is a unique and long-standing relationship between the U.S. government and federally-recognized Indian tribes (hereafter referred to as "tribes"). The U.S. government has a **trust responsibility** to protect those tribes' trust resources and treaty rights, to respect the sovereignty of tribal governments, and to act consistently with the statutes and the missions of respective agencies.

After release of the draft Plan, the Federal Caucus met with the federally-recognized tribes of the Columbia Basin. A record of these discussions is in Volume 2. In general, the concerns raised by the tribes were in the following categories:

- Trust and Treaty Responsibility of the Federal Government
- Cultural Resources
- Water Quality
- Resident Fish
- Blocked Areas
- Hydropower Operations and Flood Control
- Salmon Rebuilding and Recovery Goals

- Treaty Fisheries
- Hatcheries
- Habitat Measures

The Federal Caucus recognizes that other natural resources, in addition to anadromous and resident fish, are important to maintaining the traditional culture of the tribes of the Columbia River Basin (such resources are called **culturally important resources**). The Federal Caucus recognizes that some of these culturally important resources may fall within the scope of the narrower definitions of **historic properties** as defined in the National Historic Preservation Act (NHPA). The Federal Caucus is faced with the challenge to consider these culturally important resources along with identified cultural resources and historic properties and to integrate the consideration into the planning and implementation of recovery programs and projects.

The Federally-recognized Tribes of the Columbia Basin at this writing are:

- Burns Paiute Tribe of the Burns Paiute Indian Colony of Oregon
- Coeur D'Alene Tribe of the Coeur D'Alene Reservation, Idaho
- Confederated Salish and Kootenai Tribes of the Flathead Reservation, Montana
- Confederated Tribes of the Colville Reservation, Washington
- Confederated Tribes of the Umatilla Reservation, Oregon
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Confederated Tribes and Bands of the Yakama Indian Nation of the Yakama Reservation, Washington
- Kalispel Indian Community of the Kalispel Reservation, Washington
- Kootenai Tribe of Idaho
- Nez Perce Tribe of Idaho
- Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho
- Shoshone-Paiute Tribes of the Duck Valley Reservation, Nevada
- Spokane Tribe of the Spokane Reservation, Washington

Any plan or policies affecting salmon and their harvest must address the issue of tribal fishing. All fisheries, including tribal fisheries, have been severely reduced in the last several years. A significant portion – in some cases the majority of the remaining harvest of listed-fish – now

occurs in tribal fisheries. Capping or further reducing harvest rates seriously affects the exercise of tribal fishing rights, presenting a major policy challenge for the region. The federal government's trust obligation to uphold and protect those rights requires that the Plan directly address this issue.

It will no doubt be the focus of ongoing government-to-government discussions between the tribes and the federal government to sort out whether the approach described here successfully reconciles the near-term requirement for continued harvest restrictions with the federal obligation to conserve the fish. Those discussions will require difficult decisions by all affected parties. Most importantly, they will require a great deal of additional patience and forbearance by the basin's tribes. The extent to which they are willing to offer more will depend in large part on how they perceive the region's commitment to restore the salmon resource, its efforts to provide fair and meaningful tribal fishing opportunities during the recovery period, and how the conservation burden is allocated.

As part of their future fish recovery implementation programs, the Federal Caucus is committed to the following:

- During the planning and development of programs and projects, consult with the tribes to identify their concerns for potential damaging effects of options upon culturally important resources, and take those concerns into account prior to the selection of a proposal or project.

- Use the full array of federal authorities to consider the effects of recovery options on culturally important resources that are not otherwise protected by treaty or under NHPA.

Public Involvement

The Federal Caucus developed a public involvement program to provide opportunities for the public to comment on the information in the draft Plan. A complete description of the public involvement program is in Volume 2 and on the Federal Caucus Web site, as well as a summary of comments received and federal responses to the comments.

The formal public comment period on the Plan began December 17, 1999 and continued through March 17, 2000. The Federal Caucus hosted a series of 15 public meetings across five states in February and March 2000 (see Figure ___). The Federal Caucus received over 60,000 individual comments during the comment period. The comments came in the form of letters, postcards, e-mails, and oral testimony and taped messages at the public meetings. All comments were logged into a database.

Comments and Responses – The Federal Caucus categorized the public comments according to topic. In all, there were 17 categories (see box) with nearly 150 distinct issues raised during the comment period. The comments covered the range of issues addressed in the draft Plan and a number of other topics related to Columbia River Basin economics and ecology. There were many compliments and criticisms of the Federal Caucus and its process.

Comment Categories

- Life Cycle Approach
- Conservation Goals, Objectives, Performance Measures and Monitoring and Evaluation
- Hydropower
- Habitat
- Hatcheries
- Harvest
- Science
- Range of Alternatives
- Economics
- Institutional and Regulatory Issues
- Relationship to Corps EIS, John Day Study, BPA EIS, ICBEMP
- Biological Opinions
- Public Involvement Process
- Native American Issues
- Implementation Issues
- Issues not fully considered
- Other issues

1. Supporting Analysis

1.1 Scientific Principles

The Federal Caucus developed these principles from various scientific reviews and recovery planning documents that have been developed for fish and wildlife recovery in the Columbia Basin. These principles were used to shape the Conceptual Recovery Plan and will be used for implementation of recommended actions.

- Conservation of Columbia Basin fish and aquatic species must address all aspects of the ecosystem and the species' lifecycle.

- Conservation requires a network of diverse, high quality, interconnected habitats and high water quality. Natural systems functioning properly are necessary to restore salmon and steelhead.

- Conservation requires preservation of life history diversity, genetic diversity and metapopulation organization. These characteristics affect the response of anadromous and resident fish populations to both demographic variation and variation in climate and environment.

- Conservation requires re-establishment of the nutrient cycle provided by decaying fish carcasses, to effectively cycle nutrients from ocean to freshwater.

- Because human activity, development and population growth will continue, conservation depends on managing human impacts to achieve suitable ecosystem conditions.

- Technology and research can be used to complement natural functions but cannot replace them.

- Salmon and steelhead populations can be evaluated based on abundance, productivity, population structure and genetic diversity.

1.2 Scientific Tools

Several ongoing technical efforts are currently assessing the impact of human-induced factors on declining salmonid populations, the conditions necessary for recovery, and potential effects of recovery efforts on those populations. The Plan is based on information from these and other studies to assess the risk of extinction for salmon and other species, and to determine the potential beneficial and adverse impacts of proposed changes in each of the Hs. These efforts are

conducted at different scales, and address different types of questions; these differences between the analytical efforts must be considered when interpreting (and applying) their results.

1.2.1. Population-based Tools

The **Cumulative Risk Initiative** (CRI), is an ongoing effort of the NMFS' Northwest Fisheries Science Center, that assesses population trends and the impact of various actions on those trends. First, the group analyzes data regarding the Hs to assess the impact of these factors on salmonid population growth. Concurrently, the team assesses the risk of extinction and constructs population computer models for species with sufficient data, using the most current estimates of survival rates for each life-stage of a species. These models can identify the times or stages at which changing survival rates will yield the largest impact on population growth rates. Follow-up work entails examining whether such changes in survival are biologically feasible and what management options will yield the best results. Finally, as conservation actions are implemented, NMFS, in collaboration with other regional scientists, will be engaging in ecological experiments to test hypotheses about the relationships between management actions in the Hs and salmon populations.

The Plan relies heavily on the CRI's projections of the risk that an ESU will reach extinction within 24 and 100 years. (Extinction is defined as one fish or fewer in a generation.) This is a useful tool for assessing the risk of not acting quickly to improve survivals, but this type of projection comes with some caveats:

- The extinction threshold may not be sufficiently conservative.
- The projections become less certain the farther out in time they go. Projections of extinction risk over 100 years are highly uncertain.

The Plan also relies on the CRI's analysis of how much survival improvements in different life stages will contribute to population growth rate. This is a useful tool for focusing regional efforts on management actions most likely to yield significant benefits, as well as the magnitude of change needed at each life stage. However, at this stage the CRI has only performed numerical experiments based on theoretical survival improvements. Some actions are more certain to lead to survival improvements than others (for example, harvest reductions versus reductions in **hatchery releases**). More work needs to be done to determine whether it is biologically feasible to achieve some of these theoretical improvements. The CRI has estimated the risk of extinction of populations within 11 of the 12 listed salmon and steelhead ESUs in the Columbia Basin, as well as the risk of serious decline in both the short and long term. (Snake River sockeye cannot be analyzed because of extremely low numbers.) The **Plan for Analyzing and Testing Hypotheses** (PATH) is a joint effort of several federal, state and tribal agencies designed to predict future salmon populations under a variety of hydropower system and other management actions. This model simulates salmon population trajectories under a wide range of "assumption sets." These assumptions correspond to a rate, or a parameter in the model, for which there are different hypotheses concerning the effect that a variety of factors have on

survival. Evaluating the likely effects of management actions on salmon populations entails running 240 to 1,920 different sets of assumptions. The likelihood of a particular management action achieving survival or recovery standards is then evaluated. PATH analyses show which actions are most robust (least risky) due to uncertainties in the model.

The **Viable Salmonid Population** (VSP) effort is another ongoing project of the Northwest Fisheries Science Center. This work defines characteristics of salmonid populations that can be considered viable, or self-sustaining over the long-term (at least 100 years). It provides guidelines for defining populations as well as qualitative and quantitative rules of thumb for identifying those populations that can be considered viable. Finally, it offers guidelines for the number and distribution of populations within an ESU necessary for an ESU to be considered viable. These rules of thumb consider genetic and life history diversity, spatial structure, as well as population size and trends in productivity.

The **Quantitative Analytical Report** (QAR) is a report NMFS and other federal agencies, state fisheries agencies, tribes, and the mid-Columbia Public Utility Districts agreed to develop to analyze the effects of a proposed Habitat Conservation Plan on upper Columbia spring chinook and steelhead. The effort includes a workgroup that is setting recovery goals, and another that is analyzing present risks of extinction and the likelihood of achieving recovery goals under the actions proposed in the plan. The workgroup is conducting extinction analyses using different population models. It will use the same models to project the likelihood that populations will reach the recovery goal.

1.2.2 Habitat-based Tools

The **Ecosystem Diagnosis and Treatment** (EDT) analysis is an *expert system,* developed by the Northwest Power Planning Council's Framework process, that organizes available information concerning the impact of habitat attributes on salmonid populations. With this approach, small, hydrologically-defined areas are described using habitat attributes. Knowledgeable experts, using all available information, define *rules* describing the effect of each of these attributes on salmonid survival at all life stages. Using these rules, the EDT analysis defines the productivity and capacity of a landscape. Analyzing management scenarios involves changing the appropriate habitat attributes in the appropriate areas, and engaging the expert-defined rules to assess the predicted productivity and capacity of the changed landscape.

The **Interior Columbia Basin Ecosystem Management Project** (ICBEMP) has also constructed an expert system. ICBEMP uses spatially-explicit habitat and population status databases to evaluate spatially-explicit predicted status of a population, elements and capacity of aquatic habitat, and the **biological potential** of a population. Predictions include influences on **population dynamics** that are not a direct effect of the habitat, such as genetic factors or migration rates from other populations. Computer models have been used to project habitat capacity and population status across the interior Columbia Basin from various habitat management scenarios. The models are specifically designed to inform decisions about risks to habitat, options for managing risks to habitat, and spatial priorities for habitat restoration efforts.

The models do not predict population size. ICBEMP analyses will be a primary tool for evaluating management actions on federal lands in the Columbia River Basin.

Finally, the **Watershed Processes Program** of the **Northwest Fisheries Science Center** is conducting analyses designed to associate habitat characteristics at the watershed or **subwatershed** level with salmonid productivity. This effort examines physical attributes of subwatersheds, such as topography, geology, and distribution of channel types, as well as land use characteristics, such as the proportion of the area that is forested or urbanized, or the condition of riparian zones. These habitat characteristics are then associated with salmonid production information to identify the characteristics of habitats that are most productive. These analyses can be used both to identify subwatersheds that are currently important in maintaining current populations (and therefore may have a high priority for conservation), and to identify those subwatersheds for which restoration efforts have the greatest potential to yield large results.

1.2.3 Other Tools

Several analytical methods with a smaller scope than those outlined above have also been used to address particular risks salmonids face during their life cycle. In particular, SIMPASS was used to model the effects of different hydropower system configurations on downstream survival. In addition, several models of harvest effects, including those devised by the Technical Advisory Committee to the *U.S. v. Oregon* process, were used to identify the impact of levels of harvest on different stocks.

In the near term, qualitative evaluations will be the primary tool used to evaluate impacts and expected outcomes of proposed actions for listed resident fish and aquatic species. Quantitative data are limited for these species and models have not been developed to evaluate impacts and assess outcomes of actions.

1.3 Rationale

This Conceptual Recovery Plan recommends a basinwide program that places priority on actions that can be implemented quickly, that are likely to provide solid and predictable biological benefits, and that will benefit the broadest range of species. The Plan is built on biological objectives, seeks to establish priorities based upon sound scientific principles, while recognizing that there is a limit to the resources available for the job and to the authority of federal agencies. The important questions to ask of the recovery plan are: does this plan as a whole have a reasonable chance of being implemented, and if so, can it reasonably be expected to result in the conservation and survival of the listed stocks in the basin as a whole? NMFS concludes that the answer to both questions is yes. This conclusion is based on the biological requirements of the species, the substantive elements of the Plan itself, and the best science available for evaluating the effects of this Plan. It is also based on the implementation measures provided and the robust

monitoring and evaluation commitments, both of which will enable agencies to make needed adjustments in the effort over time to stay on course for recovery.

The CRI analysis shows the status of each listed species is poor, and likely to get worse unless things change. Long-term extinction risks for most Columbia Basin populations are unacceptably high. Risk of a 90 percent decline in abundance, even in the next 24 years, is also high throughout the basin, especially for steelhead. In general, Snake River spring/summer chinook, upper Columbia River spring chinook, and steelhead throughout the basin have the greatest overall risk and require the greatest productivity improvements to avoid extinction and achieve recovery.

Given the near-term biological risks, the Plan places a premium on actions that can be taken immediately and that will yield benefits to these species quickly. The Plan emphasizes actions within the authority of the federal agencies and about which there is considerable regional agreement, such as conservation hatchery interventions, production hatchery reforms, conservative limits on harvests, improvements on federal lands, and improving passage at dams. It also emphasizes federal support for actions that state and local governments are planning or already undertaking, such as the Council's subbasin planning proposal, achieving water quality compliance for surface waters across the region, and restoring the productivity of the Columbia River estuary. In the habitat arena, where some actions can take decades to show benefits, the Plan emphasizes those measures that can be taken quickly, with longer term actions to be taken later based on subbasin assessments and plans.

The federal agencies also recognize that, even while the region has devoted considerable resources to restoring Columbia Basin fish, there are limits to those resources. The combination of near-term biological risks and resource limitations led the agencies to focus on actions that give the greatest "bang for the buck" – that have predictable benefits and that will benefit the greatest number of species. Getting the biggest bang for the buck can mean focusing on those life stages where improvements will yield the biggest survival increase, or on those actions that are more certain to result in improvements, regardless of the life stage. For example, scientific analysis suggests that improving survivals during the first two years of life, when the greatest mortality occurs, will give the greatest benefit. Because there are limits to improving survival at any life stage, it is likely that improvements in all life stages will have a greater effect on overall ESU productivity than focusing improvements on just one life stage. Getting the biggest bang for the buck can also mean focusing on actions that benefit a large number of ESUs. For example, improvements in dam passage in the lower Columbia River would benefit all upriver ESUs, and improvements in the estuary benefit all 12 ESUs to varying degrees.

Federal agencies also considered tribal trust responsibilities in developing this package. For some ESUs, such as Snake River fall chinook, eliminating harvest would substantially reduce the risks of extinction. Dramatically reducing hatchery production basinwide would also benefit nearly all ESUs to some degree, although it is impossible to quantify the benefit. The Plan does not recommend these actions, however, because of the importance of maintaining some level of tribal harvest. The Federal Caucus will consult with tribes to discuss the use of more selective harvest techniques.

Much of the regional debate has focused on removal of Snake River dams. There is little doubt dam removal would benefit Snake River salmon and steelhead. The National Marine Fisheries Service is not recommending it at this time, however, for several reasons. There is continuing significant scientific uncertainty about whether breaching dams is necessary to achieve recovery and whether breaching alone can lead to recovery. Only Snake River fish benefit from breaching, with no benefit to eight other listed populations. Dam removal would require explicit congressional authorization, and, once authorized, cannot be implemented on a short time frame. And its high cost could preclude other actions needed throughout the basin. The option of Snake River drawdown ranks as a lower priority than other available options because of the likely long time to implement, narrow benefits, biological uncertainties and high costs.

The Conceptual Recovery Plan is designed to provide immediate benefits and lead to salmon and steelhead recovery. This approach leaves breaching on the table as a future option, but challenges hydropower system operators now to meet rigorous survival goals over a discrete period, using continued improvements in flow and spill management and structural improvements at dams. System performance will be evaluated against scientifically grounded, peer reviewed performance standards at five, eight and ten-year intervals. Dam removal will be reserved as a contingency in the event progress toward these goals is inadequate, or if shown to be necessary by new scientific information about the Snake River stocks.

The Plan also commits the federal hydropower system to fund habitat, harvest and hatchery actions to mitigate for unavoidable mortality in the hydropower system, and to an aggressive monitoring and evaluation program by which to test assumptions, measure performance and reduce uncertainties over time.

Will the Plan Recover Listed Salmon and Steelhead ESUs?

This section describes the basis upon which the agencies have concluded that if implemented, this Plan is likely to allow for the long-term conservation and recovery of listed salmonids and other fish and wildlife resources of the Columbia and Snake basins. Issues of implementation are addressed in Section 2.2.

The CRI analyzed the sensitivity of some of the ESUs to improvements in different life stages. In general, the survival of analyzed ESUs is most sensitive to changes in the first and second years of life, where most of the mortality occurs. Survival in these life stages is affected by several human activities including hatchery operations, habitat degradation, and hydropower development. For most ESUs, the first year of life is spent in the tributaries. The period of transition from fresh water to salt water also represents a period of high mortality for most ESUs. Harvest mortality occurs in the adult life stage. Despite recent reductions for a large number of the listed stocks, harvests in ocean and in river fisheries remain a significant source of mortality for Snake River fall chinook. In-river fisheries also impose some level of harvest mortality on most steelhead ESUs. Because improvements in the first year of life and during ocean transition provide the greatest overall benefit, the Plan emphasizes habitat and hatchery actions – those actions aimed at improving survival in the tributaries and estuary. Because improvements across all life stages combined have greater benefit than improvements in just one life stage, the Plan emphasizes actions in all life stages.

Table __ shows the level of survival improvement needed for Columbia Basin ESUs to survive and recover. NMFS believes implementation of the overall Plan across all life stages will move listed populations to recovery levels over the long term. For example, robust implementation of this Plan will help arrest the degradation of existing high quality habitat and restore degraded habitats to greater productivity. Furthermore, NMFS has assessed the potential range of increases in salmon abundance that could result from these efforts using the best available scientific information available. These projections must be viewed with caution given the limits of the available data, but they do indicate the potential for substantial benefits.

Analysis of the Northwest Power Planning Council subbasin planning data shows that potential **habitat** capacity in the basin could provide for population increases within the range of what would be necessary to support recovery of for listed ESUs provided there are sufficient adults to seed the habitat. The data does not show whether such population levels would be sustainable, because many other variables affect the question of sustainability. However, it does show that it is possible to achieve the habitat capacity necessary to support sustainable populations under this Plan.

Additional analysis of natural processes and human activities in the Salmon River Basin shows how management actions can affect salmon and steelhead abundance. This analysis shows that the presence of water diversions and grazing activities correspond to lower fish abundance in that basin. It further shows that higher levels of grazing and diversion were associated with fewer fish, and where grazing and diversion were at lower levels, fish abundance was significantly higher. The Salmon River data illustrates how productive habitat strategies can be identified. The subbasin planning capacity data from the Council's subbasin planning provide guidance on where productive – or potentially productive – habitat exists. Together, this information provides the basis for the habitat program, enabling the agencies to prioritize actions and locations to achieve the greatest effects.

The Plan recommends that **harvest** on listed fish be capped at current levels in the ocean and in freshwater, including tribal, commercial, and recreational fisheries. The productivity rates identified by CRI as necessary to achieve survival and recovery account for harvest impacts at current levels. The Plan contemplates further negotiated reductions in harvest impacts based on increasing selectivity in fishing practices, but these potential future reductions are not assumed in the analysis. If they were achieved, they would benefit productivity and likely reduce extinction risks for affected ESUs, thus enhancing the overall recovery effort.

NMFS is confident of the potential to reduce risks and improve survivals associated with ongoing and new **hatchery** efforts and therefore propose an extensive program of hatchery reforms. The ability to quantify those improvements, however, is limited, further dictating the need for aggressive monitoring of these reforms. The agencies are certainly able to quantify more precisely the benefits of further reductions in harvest-related mortality, if the additional efforts within the Plan to reduce incidental impacts prove successful, and if the ability to measure continued improvements in passage related survivals remains robust.

The draft FCRPS Biological Opinion describes a set of specific, aggressive **hydropower** actions that NMFS has determined, on the basis of available scientific information and professional

judgment, will achieve the FCRPS hydropower performance standards. Most of the measures are aimed at improving passage survival through FCRPS dams and reservoirs through changes in project operations and improvements in project configuration. NMFS' best estimate of the additional improvement in adult and juvenile survival levels associated with these measures is modest and accrues primarily to in-river migrants and primarily in the Lower Columbia River.

In short, the predicted suite of improvements associated with the Plan as a whole rests upon a combination of robust data, best professional judgments based on limited but persuasive data, and well grounded scientific hypotheses which will be tested and evaluated through anticipated monitoring and evaluation.

Conclusions

The Conceptual Recovery Plan presents a suite of actions that can be implemented immediately and in the long term that will have significant benefits for a broad range of species. Because of the limits in the available data, it is impossible to quantify with precision the potential cumulative overall benefit that will result from the program. Nevertheless, it is possible to predict the benefits likely to result from this Plan based on data and information currently available. On this basis, NMFS concludes that the Plan will lead to the long-term conservation and recovery of the listed salmonid stocks throughout the Columbia and Snake basins. While this conclusion is made in the face of considerable uncertainty, NMFS has relied on the best available information in making this assessment. This includes a combination of quantitative data and analyses; best professional judgment based upon available data; and reasonable hypotheses, recognizing that adequate data is not yet available to provide greater certainty. The other federal agencies of the Caucus support and will participate in the implementation of the actions identified in the Plan.

As described in Table ___, substantial increases in fish survival are necessary. Even after full implementation of expected hydropower improvements, substantial improvement needs remain. NMFS has concluded that jeopardy can be avoided through the implementation of the hydropoower measures in the FCRPS biological opinion, and the implementation of feasible measures identified in the Conceptual Recovery Plan.

The off-site mitigation portion of the biological opinion assures that many measures identified in the Plan will be implemented by or with the support of the BPA, USACE, and USBR. NMFS has concluded measures expected to be implemented by other agencies and parties, combined with the off site measures in the biological opinion, are reasonably calculated to meet survival improvement needs identified in Table ___.

Because uncertainties about the science remain, the federal agencies have planned for the possibility that these conclusions will need to be reconsidered and revised. The entire Plan is based upon a rigorous monitoring and evaluation system that will continually assess species status and measure the results of management actions. In addition, the agencies will provide a conservation hatchery safety net to protect the native broodstock on an interim basis. The Plan provides regular procedural checkpoints in five, eight and ten years to determine whether prescribed actions are being implemented, and if they are generating the anticipated results.

These tools provide the agencies with the flexibility necessary to respond if the populations of listed species continue to decline. Finally, the Plan contemplates rigorous independent peer review of its scientific foundation and its monitoring and evaluation activities.

Table ___ Minimum risk estimates at the ESU level

ESU	Annual Rate of Population Change	Probability of a 90% Decline in Abundance in 100 years	Needed Percent Improvement in Annual Rate of Population Change to Prevent Severe Decline
Lower Columbia River Chinook	0.86	1.00	21
Upper Columbia R. Chinook	0.85	1.00	19
Snake River Spring/Summer Chinook	0.87	1.00	19
Snake River Fall Chinook	0.84	1.00	22
Upper Willamette Chinook	0.50	1.00	103
Columbia River Chum	1.03	0.00	0
Lower Columbia River Steelhead	0.72	1.00	37
Middle Columbia Steelhead	0.65	1.00	51
Upper Columbia River Steelhead	0.63	1.00	56
Snake River A+B Runs Steelhead	0.49	1.00	112
Upper Willamette Steelhead	0.84	1.00	20

Note: Minimum risk estimates at the ESU level: replacement rates, probability of a 90 percent decline in abundance in 100 years and the needed improvement in replacement rates to prevent this severe decline. All estimates assume that hatchery fish on the spawning grounds have a reproductive success one-fifth (20 percent) that of wild spawners. Both the reproductive success of hatchery fish and the proportion of spawners that are of hatchery-origin have a marked effect on the status of the wild population. However, the former values vary between populations within ESUs and the latter values are largely unknown. In some populations within ESUs, there are very few hatchery fish, and these estimates are likely to be high. In populations where a large proportion of spawners are of hatchery origin, and their reproductive success is high, these estimates may be low. The full range of risk estimates are discussed in the draft Biological Opinion.

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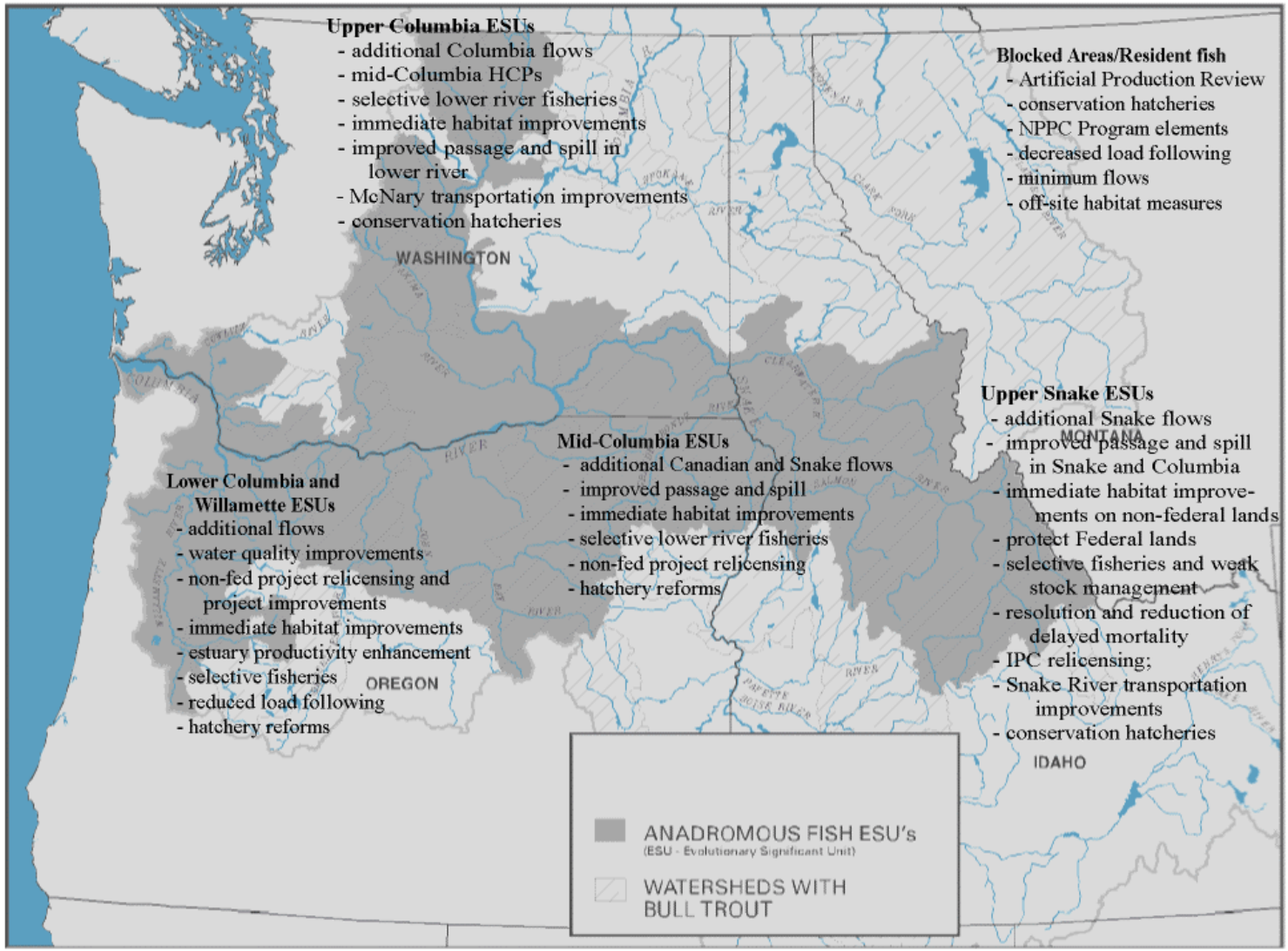
Table __Benefits from Actions by ESU

	Lower Columbia ESUs (5) Chum, Steelhead & Chinook, Upper Willamette Steelhead & Chinook	Snake River ESUs (4) Spring/summer Chinook, Steelhead, Fall Chinook & Sockeye	Mid-Columbia ESU (1) Steelhead	Upper Columbia ESUs (2) Spring Chinook & Steelhead
HYDRO				
Operational Improvements				
Additional Canadian flows	X	X	X	X
Additional Snake flows	X	X	X	X
Flood control review	Most likely benefit would be changes to estuary flow, particularly in years of moderate runoff; would have little effect in years of low or high flow			
Elimination of trucking	n/a	X	Dependent on resumption of spring transportation from McNary	
Improved spill passage	n/a	X	X	X
Resolution of delayed mortality	n/a	X	Dependent on resumption of spring transportation from McNary	
Water quality improvements	X	X	X	X
Capital Improvements at Dams				
Aggressive passage measures	n/a	X	X	X
Water quality improvments		X	X	X
Economic mitigation for breach	Multi-faceted mitigation for various impacts of dam breaching on river users, regional infrastructure, etc.			
Non-Federal				
Mid-Columbia HCP	n/a	n/a	n/a	X
IPC relicensing, incl. SRWRA	Projects block migration; benefit to Snake River ESU's primarily result of water management; benefit to other ESU's limited to potential water management effects in estuary			
Other relicencing	Projects generally block passage or are in blocked areas; benefit would be primarily to listed resident fish and potential benefits of improved water management or habitat improvements			
HATCHERIES				
ESA-Specific				
ESA captive brood stock	Last resort to protect genetics of wild fish; currently in place for Snake River Sockeye			
Conservation hatcheries	Moderate intervention to protect severely depressed stocks with careful supplementation			
Aggressive R, M, & E	Aggressive research, monitoring and evaluation to reduce critical uncertainties associated with artificially produced fish on wild fish			
General Reform				
APR	Comprehensive reform of hatchery practices to reduce risk of adverse impacts to wild stocks			
Non-listed supplementation	Selective use of supplementation of non-listed (locally adapted stocks), including potential selective harvest opportunity			
HABITAT				
Federal				
ICBEMP	n/a	X	X	X
Off-site Mitigation, Nonfederal Lands	X	X	X	X
Council Plan (BPA-funded)	x	X	X	X

	Lower Columbia ESUs (5) Chum, Steelhead & Chinook, Upper Willamette Steelhead & Chinook	Snake River ESUs (4) Spring/summer Chinook, Steelhead, Fall Chinook & Sockeye	Mid-Columbia ESU (1) Steelhead	Upper Columbia ESUs (2) Spring Chinook & Steelhead
Mainstem & estuary	X	X	X	X
Non-Federal				
State/city/local plans	X	X	X	X
TMDL/water quality plans	X	X	X	X
HARVEST				
Reduced impacts on weak stocks				
Weak stock management	X	X	X	X
Selective fisheries	X	X	X	X
Ocean fishery easements	X	n/a	n/a	?
Enhanced opportunity				
Terminal fisheries	Integration of site-specific habitat improvements, supplementation w/ locally adapted stocks, and terminal fishery (primarily for spring chinook)			
Value-added	Enhanced value products to increase economic value harvested fish; potential for all species			
IMPLEMENTATION & ACCOUNTABILITY	Formal, comprehensive coordination among federal agencies, state fish & wildlife agencies, Tribes, Columbia Basin Forum, Northwest Power Planning Council (and others) to ensure adequate staffing, budgets, consistency, and execution with comprehensive M&E to assess progress and to make necessary adjustments in implementation			


Upper Columbia ESUs
- additional Columbia flows
- mid-Columbia HCPs
- selective lower river fisheries
- immediate habitat improvements
- improved passage and spill in lower river
- McNary transportation improvements
- conservation hatcheries
Blocked Areas/Resident fish
- Artificial Production Review
- conservation hatcheries
- NPPC Program elements
- decreased load following
- minimum flows
- off-site habitat measures
WASHINGTON
Upper Snake ESUs
- additional Snake flows
- improved passage and spill in Snake and Columbia
- immediate habitat improvements on non-federal lands
- protect Federal lands
- selective fisheries and weak stock management
- resolution and reduction of delayed mortality
- IPC relicensing;
- Snake River transportation improvements
- conservation hatcheries
MONTANA
Mid-Columbia ESUs
- additional Canadian and Snake flows
- improved passage and spill
- immediate habitat improvements
- selective lower river fisheries
- non-fed project relicensing
- hatchery reforms
Lower Columbia and Willamette ESUs
- additional flows
- water quality improvements
- non-fed project relicensing and project improvements
- immediate habitat improvements
- estuary productivity enhancement
- selective fisheries
- reduced load following
- hatchery reforms
OREGON
IDAHO
ANADROMOUS FISH ESU's
(ESU - Evolutionary Significant Unit)
WATERSHEDS WITH BULL TROUT

2. Conceptual Recovery Plan

2.1 Goals and Objectives

The Federal Caucus used these goals and objectives, modified based on comments from tribal governments and the public, to develop the Conceptual Recovery Plan.

Goals

- Conserve Species. Avoid extinction and foster long-term survival and recovery of Columbia Basin salmon and steelhead and other aquatic species.
- Conserve Ecosystems. Conserve the ecosystems upon which salmon and steelhead depend.
- Assure Tribal Fishing Rights and Provide Non-Tribal Fishing Opportunities. Restore salmon and steelhead populations over time to a level that provides a sustainable harvest sufficient to provide for the meaningful exercise of tribal fishing rights and, where possible, provide non-tribal fishing opportunities.
- Balance the Needs of Other Species. Ensure that salmon and steelhead conservation measures are balanced with the needs of other native fish and wildlife species.
- Minimize Adverse Effects on Humans. Implement salmon and steelhead conservation measures in ways that minimize their adverse socio-economic and other human effects.
- Protect Sensitive Indian Cultural Resources. In implementing conservation measures, act to preserve resources important to maintaining the traditional culture of basin tribes.

Biological Objectives

- Maintain and improve upon the current distribution of fish and aquatic species, and halt declining population trends within 5-10 years.
- Establish increasing trends in naturally-sustained fish populations in each **subregion** accessible to the fish and for each ESU within 25 years.
- Restore distribution of fish and other aquatic species within their native range within 25 years (where feasible).
- Conserve genetic diversity and allow natural patterns of **genetic exchange** to persist.

Ecological Objectives

- Prevent further degradation of tributary, mainstem and estuary habitat conditions and water quality.
- Protect existing high quality habitats.
- Restore habitats on a priority basis.

Water Quality Objective

- In the long term, attain state and tribal water quality standards in all critical habitats in the Columbia River and Snake River basins.

Socio-Economic Objectives

- Select actions to restore and enhance fish and their habitat that achieve the biological and ecological objectives at the least cost.
- Mitigate for significant social and economic impacts and explore creative alternatives for achieving these objectives.
- Seek adequate funding and implementation for strategies and actions.
- Coordinate restoration efforts to avoid inefficiency and unnecessary costs.
- Restore salmon and steelhead to population levels that will support tribal and non-tribal harvest.
- Select actions that consider or take into account tribal socio-economic or cultural concerns.

The agencies believe their recommendations are the combinations most likely to meet these goals and objectives. The actions reflect the best scientific understanding of what is necessary to conserve the species and their ecosystems. The Plan contemplates maintaining tribal fishing opportunities in the near term, and expanding them over time. The Plan recognizes the needs of other at-risk fish, wildlife and plant species within the basin. The Plan seeks to provide a measure of social and economic certainty by seeking maximum benefit from the available resources, with clearly established implementation and monitoring processes.

2.2 Implementation

To be successful, this recovery Plan requires federal agencies to coordinate their respective programs with one another and with state, tribal and local programs. This section describes how the federal agencies intend to accomplish that coordination.

- **Continue the Federal Caucus**.
- **Establish a Memorandum of Understanding Among Federal Agencies**.
- **Continue the Regional Forum.**
- **Establish a Habitat Team**.
- **Coordinate Harvest and Hatchery Activities with Habitat and Hydropower Activities**.
- **Coordinate with other Regional Entities**
- **Collaborate with Others on Science**
- **Initiate Recovery Planning**.
- **Use Performance Standards**
- **Coordinate Federal Budgets**
- **Monitor and Evaluate Progress**

2.2.1 Continue the Federal Caucus

In December 1998 nine federal agencies with fish and wildlife management and implementation responsibilities in the Columbia River Basin formed a Federal Caucus to prepare for a long-term decision on operation and configuration of the Federal Columbia River Power System. The agencies participating in the Caucus are listed at the front of this document. The Federal Caucus is comprised of senior policy staff representatives from each of the nine agencies. The federal MOU will commit the original nine agencies, plus other federal agencies including those in the Department of Agriculture, to continue coordinating through the Federal Caucus.

Each of the caucus agencies has a key role to play in implementing and funding programs and applying regulations in the Columbia Basin that are the subject of the Plan. The Federal Caucus provides an effective structure for these agencies to harmonize their policies and oversee coordinated implementation of the Plan. Maintaining the Federal Caucus will also allow the federal agencies to coordinate more effectively with regional forums such as the Council and the

Columbia River Basin Forum. To further enhance regional coordination, Federal Caucus meetings will be open to the public.

The federal executives of the member agencies provide policy guidance to and resolve disagreements within the Caucus. The Federal Caucus is accountable for achieving performance standards across the Hs and measuring the effectiveness of the Plan.

2.2.2 Federal Agency Memorandum of Understanding

By December 2000, the federal agencies intend to enter into an MOU to formalize their commitment to coordinate their implementation, funding and monitoring of the Plan and to ensure common approaches and priorities for the recovery of listed fish. Specifically the MOU will commit federal agencies to:

- Establish an expanded Federal Caucus;
- Establish a Habitat Team;
- Consistent application of ESA, CWA, other relevant statutes and Tribal trust and treaty responsibilities as they relate to the conservation of Columbia Basin fish;
- Establish priorities for implementation;
- Coordinate budget development and expenditures;
- Coordinate with related efforts of state, tribal and local governments;
- Work with the states, tribes and the Northwest Power Planning Council to develop a comprehensive basinwide monitoring program.

2.2.3 Continue the Regional Forum as the "Hydropower Team"

The federal agencies will continue to coordinate operation and configuration of the FCRPS through a "Hydropower Team" (begun in 1995 and known as the NMFS Regional Implementation Team). Federal agencies participating in the Hydropower Team will include the "operating agencies" (Corps, USBR and BPA), NMFS, USFWS and EPA. As with the NMFS Forum, participation in the Hydropower Team, and all subgroups operating under the Team's guidance, will be open to representatives from the states, tribes, and federal agencies.

The Team will develop annual and five year plans to implement the operational and structural measures outlined in the biological opinions issued by NMFS and USFWS on operation and configuration of the FCRPS. The operating agencies will coordinate annual implementation,

prioritization of actions, review, and modification of measures outlined in the biological opinions through the Team.

Technical groups working under the direction of the Hydropower Team will address specific areas of hydropower implementation. These groups include the Technical Management Team (TMT); the System Configuration Team (SCT); and the teams addressing water quality, resident fish, and research, monitoring and evaluation.

The TMT will meet regularly during the salmon migration season to advise the Operating Agencies on the status of salmon migrations, and to consider dam and reservoir operations to optimize passage conditions for juvenile and adult anadromous fish, and to meet the needs of other listed aquatic species. The SCT will meet regularly to consider the results of scientific and engineering studies and to develop and recommend any necessary FCRPS facility improvements, including their priority, implementation schedule, and budget needs.

All meetings of the Hydropower Team are professionally facilitated and are open to the public. Minutes of the meeting are taken and available to participants and members of the public.

A Water Quality Improvement Team (WQIT) will be formed to implement the Water Quality Plan for the FCRPS to better link CWA and ESA requirements. The intent would be to link and integrate actions undertaken within the annual planning process and the Columbia River Basin Forum, through input and updates on Water Quality Plan implementation, including consideration of the traditional TMDL development and implementation processes to efforts to improve water quality on the mainstem Columbia River.

2.2.4 Establish a Habitat Team

Several federal agencies have land management responsibilities or habitat programs, including the U.S. Forest Service, BLM, BPA, Natural Resource Conservation Service, Farm Services Administration, NMFS, USFWS, EPA, Corps and USBR. These agencies will dedicate staff to a federal Habitat Team whose job will be to coordinate among federal programs, and between federal and state and tribal programs.

The Habitat Team will perform the following coordination and management functions.

Among federal agency habitat programs – The Habitat Team will improve coordination among federal habitat programs in several ways:

- **Policy coordination**: Coordinate federal agency policies and guidance consistent with this Plan.

- **Budget coordination**: Coordinate agency budgets to ensure efficiency, eliminate overlap, and focus resources where they can best achieve the goals of this Plan.

- **Technical Coordination**: Ensure federal agencies use and support complementary watershed and subbasin assessment and planning protocols.

- **Recovery Planning Coordination**: Ensure NMFS' and USFWS' recovery planning processes are supported by the federal agencies and are well-connected to other federal programs and actions.

Between federal agencies and others – Important salmon habitat is on nonfederal land. Recovery of the fish will only be successful if states, tribes, local governments and private parties address key water quantity, water quality, riparian, and other issues. The federal agencies will encourage voluntary and incentive-based efforts, using federal funds to leverage local resources and efforts. The Habitat Team will improve linkages between federal and nonfederal initiatives in several ways:

- **Support local watershed efforts**. Work with states and regional organizations to assist local watershed groups in obtaining funding and technical support from appropriate federal programs and agencies.

- **Support common habitat assessment tools**. Work with states, tribes, the Council and others to develop, support and use common watershed and subbasin assessment protocols.

- **Support data quality control and data sharing**: Work with states, tribes, the Council and others to develop and implement a basinwide monitoring strategy that includes a comprehensive monitoring plan, standardized data collection, and standardized data reporting.

- **Comprehensive monitoring and evaluation –** The Federal Caucus will report annually on federal agency progress in carrying out habitat initiatives and coordinate with state and tribal governments. Reports will relate to the performance standards for habitat in the Plan.

2.2.5 Coordinate Harvest and Hatchery Activities with Habitat and Hydropower Activities

Management of in-river harvest occurs under the auspices of the federal court in *U.S. v. Oregon.* Regulation of ocean harvest occurs pursuant to the Magnuson-Stevens Fisheries Management and Conservation Act and the Pacific Salmon Treaty. In addition, any harvest of ESA-listed fish must be authorized by NMFS or USFWS through ESA processes. NMFS and USFWS will use the Federal Caucus to keep other federal agencies apprised of harvest regulations and issues and to assure that harvest and hatchery activities are complementary and consistent with the overall recovery effort.

The Federal Caucus will coordinate plans for implementation, budget development and schedule for those hatcheries receiving federal funding from BPA, Corps, USBR, Lower Snake River Compensation Program, the Mitchell Act and other sources consistent with existing programs and responsibilities. The primary tool for achieving such coordination will be Hatchery Genetic Management Plans (HGMPs). HGMPs will improve budget planning for hatcheries, help set budget priorities (such as funding and construction schedules for upgrading hatcheries to meet necessary hatchery reforms), improve the level of certainty associated with planning and funding hatcheries, and ensure the proper data collection, monitoring, and evaluation procedures are in place. Coordinated planning should produce a more responsive, methodical, and cost-effective approach to urgently needed programs for species recovery and for meeting fisheries needs. Close coordination with the Council will be critical to assuring that the Region has a unified approach to the use and management of hatcheries within the basin.

2.2.6 Regional Coordination

Coordination of federal decision-making and funding with that of states, tribes and local governments is essential to the success of federal recovery efforts in the Columbia River Basin. One opportunity for coordination is through the Columbia River Basin Forum, which was formed in 1998 and has been chartered by the states of Idaho, Washington, Oregon and Montana, the federal government and several of the region's tribal governments. Four representatives each from tribal, state and federal governments form the Forum. The Forum is designed to improve the management of fish and wildlife resources in the Columbia River Basin without changes to existing laws. It provides a valuable forum for coordination and discussion of decisions being made by each of the government entities that affect fish and wildlife in the basin. Meetings of the Forum are open to the public. The Federal Caucus intends to continue federal participation in the Forum.

Coordination with the Northwest Power Planning Council also plays an important role in guiding the management of fish and wildlife resources in the Columbia River Basin. The Council is a product of the Northwest Power Planning and Conservation Act of 1980 and is charged with developing a Fish and Wildlife Program to protect, mitigate and enhance fish and wildlife in the Columbia Basin. The Council makes final recommendations on fish and wildlife measures, including BPA funding, after extensive input from fish and wildlife managers, independent scientists and the public. Federal agencies responsible for managing, operating or regulating federal or nonfederal hydroelectric facilities in the Columbia Basin are to take the Council's Program into account to the fullest extent practicable and to coordinate with other governmental entities in implementing their responsibilities.

The federal agencies have a trust responsibility to consult and confer with Indian Tribes. This communication takes place through various regional forums (such as the Columbia Basin Fish and Wildlife Authority and the Columbia River Basin Forum) and through government-to-government consultations.

Coordination with the states and tribes on Total Maximum Daily Load (TMDL) implementation is critical. A TMDL is a strategy for bringing a polluted river, lake or bay in compliance with

water quality standards to support fish, drinking and swimming. The states working with EPA and the tribes are developing thousands of TMDLs for the Columbia Basin over the next ten years and this work must be coordinated with these recovery efforts.

2.2.7 Science Collaboration

Critical uncertainties remain about several aspects of the salmon life cycle, including the role of ocean conditions, hatchery-wild fish interactions, genetic adaptability, and the timeframe over which habitat improvements will lead to population growth. Everyone involved in or affected by the policies that guide salmon and steelhead recovery wants to know what works, what doesn't work, what is being accomplished for the investment of public funds, and how to narrow the uncertainty of achieving recovery.

Comprehensive monitoring and evaluation of the region's efforts will be crucial to determining whether underlying assumptions are accurate, whether the plan is working and what adjustments need to be made. Data must be gathered, processed and reported in a standardized and timely way, and must be readily available to all involved in salmon recovery.

2.2.8 Initiate Recovery Planning

This Plan provides goals, objectives and actions at the scale of the entire basin. More specific recovery goals and measures need to be determined at smaller scales, applying local data and expertise and addressing local ecological and social issues. NMFS has initiated recovery planning for salmon and steelhead ESUs in the Upper Willamette and Lower Columbia River and expects to initiate recovery planning for ESUs in the interior Columbia Basin within the next few years. FWS has initiated recovery planning for Columbia River bull trout and conceptual plans for Kootenai River white sturgeon and Snake River snails. The agencies expect these recovery plans to provide specific numeric and qualitative criteria for de-listing, and to provide for site-specific actions to achieve the delisting criteria.

A related effort is the Council's subbasin planning process that will be implemented through the Northwest Power Act. The Council organizes the Columbia Basin into 53 subbasins, all with unique ecological and social issues. The Council is calling for the development of goals, objectives and management measures that will comprise a subbasin plan for each of the subbasins. Like recovery planning, the Council expects subbasin plans to provide numeric and qualitative goals and objectives and specific management measures. The purpose of these subbasin plans is to provide context and scientific foundation for implementing the Columbia Basin Fish and Wildlife Program (described in Volume 2). The Council has expressed its commitment to integrating the Fish and Wildlife Program with other subbasin and watershed programs.

The NMFS and FWS will strive to integrate recovery planning with the Council's subbasin planning and other state and tribal recovery initiatives. This integration is critical to ensure that

the collective efforts in a geographic area such as a subbasin or recovery plan unit can be added up for their progress in achieving delisting criteria. This integration needs to happen first through shared science assessment processes and secondly through fully-coordinated planning forums. The federal agencies will support, facilitate and help integrate these planning efforts to the greatest extent practicable.

2.2.9 Performance Standards

Performance standards are population, life stage, environmental, or implementation "measures of success." The following summary presents the agencies' current thinking about performance standards at various levels – population level, allocation among the life stages, and specific metrics for each H. These are only preliminary in nature, and will be updated over time as knowledge of actual performance becomes more refined.

Performance standards are central to this Plan (see box). They are the means for establishing the level of survival improvement in each stage of the salmon and steelhead lifecycle that are necessary for survival and recovery. Not only do performance standards create clear objectives,

Performance Measures and Standards

Performance measures and standards have been developed for each H. A *performance measure* describes a population, life-history stage specific, or human activity-specific biological condition. A *performance standard* is a value of a performance measure that has been identified as a management goal. For example, the parties to the proposed Mid-Columbia Habitat Conservation Plan (HCP) have suggested the "survival of smolts passing a dam" as a useful and informative performance measure and have set an associated standard of 95 percent. The Mid-Columbia public utility districts, which operate these projects, have proposed to implement a suite of actions that they believe will improve dam-passage survival up to the level of the performance standard within a short time frame. The success of these activities will be gauged through monitoring and evaluation.

Performance measures have been divided into three tiers. The first tier is the population/ESU level. Here, measures and standards (goals) can be stated in terms of spawner abundance, diversity of life-history types, the number and geographic distribution of spawning populations, or secondarily-derived statistics such as population growth rate and the probability of recovery or extinction. Population-level performance measures and their associated standards reflect the cumulative effects of survival throughout the life cycle, and management actions often affect survival or fish condition at the level of a specific life-history stage.

The second tier is life-stage specific. There are nine life-history stages (e.g., spawning to emergence, emergence to parr, parr to smolt, etc.). Within each life-history stage, management actions can affect fish survival or condition in each of the Hs.

The third tier is H specific. If only one source of human-caused mortality affects a particular life stage, the third tier performance measure for that life stage should be equal to the second tier performance measure.

Over time, compliance with these standards can be assessed through monitoring and evaluation. If progress toward meeting performance standards is not sufficient, adjustments can be made – either in the actions implemented or in the allocation of survival improvements across the Hs.

they provide flexibility to define the most efficient means of achieving the objectives.

Performance standards have been divided into three tiers, which are described below. Over time, compliance with these standards would be assessed through monitoring and evaluation. If progress toward meeting performance standards is insufficient, adjustments can be made, either in the actions implemented or in the allocation of survival improvements across the Hs.

Tier 1: Population Level Performance Standards

Tier 1 performance standards are intended to provide long term measures of success. They are measured over time, and across all Hs. The Tier 1 standards are:

- Survival Rates of Better than 1 to 1
- Numbers of Returning Adult Fish

The ultimate performance standards for the hydropower system and other human activities, taken together, is based on improvements in generational survivals. *From one generation to the next, adult-to-adult survival of better than 1 to 1 must be achieved to avoid extinction.* The agencies intend to use CRI to provide this assessment of progress in all Hs – hydropower, harvest, hatcheries, and habitat – on an ongoing basis.

Another overall measure of success at the population level is numbers of returning adults. *Over time, the numbers of returning adults for each listed population must be increasing toward recovery levels.* Like survival rates, this performance standard must be met by all Hs, taken together, not by hydropower alone.

Tier 2: Life Stage or H-Specific Performance Standards

Tier 2 performance standards are simply the allocation of Tier 1 standards across the life stages (some Hs affect more than one life stage). They are actually met through the more specific performance standards in Tier 3. The estimated benefits of improvements in each life stage will vary depending on ESU.

For tributary and estuary habitat, the agencies will estimate the survival improvements likely to result from protecting and restoring habitat characteristics described in Section 3. Recent analyses indicate that reducing mortality at early life stages holds great potential for increasing salmonid population growth rates; maintaining and restoring tributary and estuarine habitat is one approach to reducing that mortality – case studies suggest that substantial improvements are feasible.

For hatcheries, the agencies' estimates of survival improvements will be based on expected benefits from reduction of adverse hatchery-wild fish interaction, hatchery reforms, and use of supplementation as a conservation measure for weak populations.

For harvest, at this time no improvement in survival is estimated as a result of capping harvest. However, the agencies will revise this assumption as they assess survival improvements achieved through programs that lead to more selective fisheries.

For hydropower, improvements in survival through the federal hydropower system will be estimated for juveniles and adults. Additional survival increases can be expected from flow and passage improvements made at the many nonfederal dams in the basin.

For more information on these estimates, see the analyses of each tier two life stage strategy included in Volume 2.

Tier 3: Performance Standards for each H

Tier 3 performance standards are specific, measurable goals for each H. Some are immediate or short term in nature, while some are long term. They vary by each H, depending on the features that are relevant and measurable.

Tier 3 performance standards should target improved survival and reduction of harm to wild salmon and steelhead runs. Through the combination of these standards, real improvements throughout the fishes' lifecycle are possible. Responsibility for salmon and steelhead recovery is allocated among all Hs in an equitable manner, so that each sector does its fair share.

For ease in understanding, program objectives and performance standards for each H are summarized below. This information is also displayed in Table X.

Strategies for Habitat:

- Protection: To prevent further degradation of habitat conditions and water quality for all life stages

- Restoration: To increase the amount of high quality habitat and high water quality for spawning, rearing, and migration.

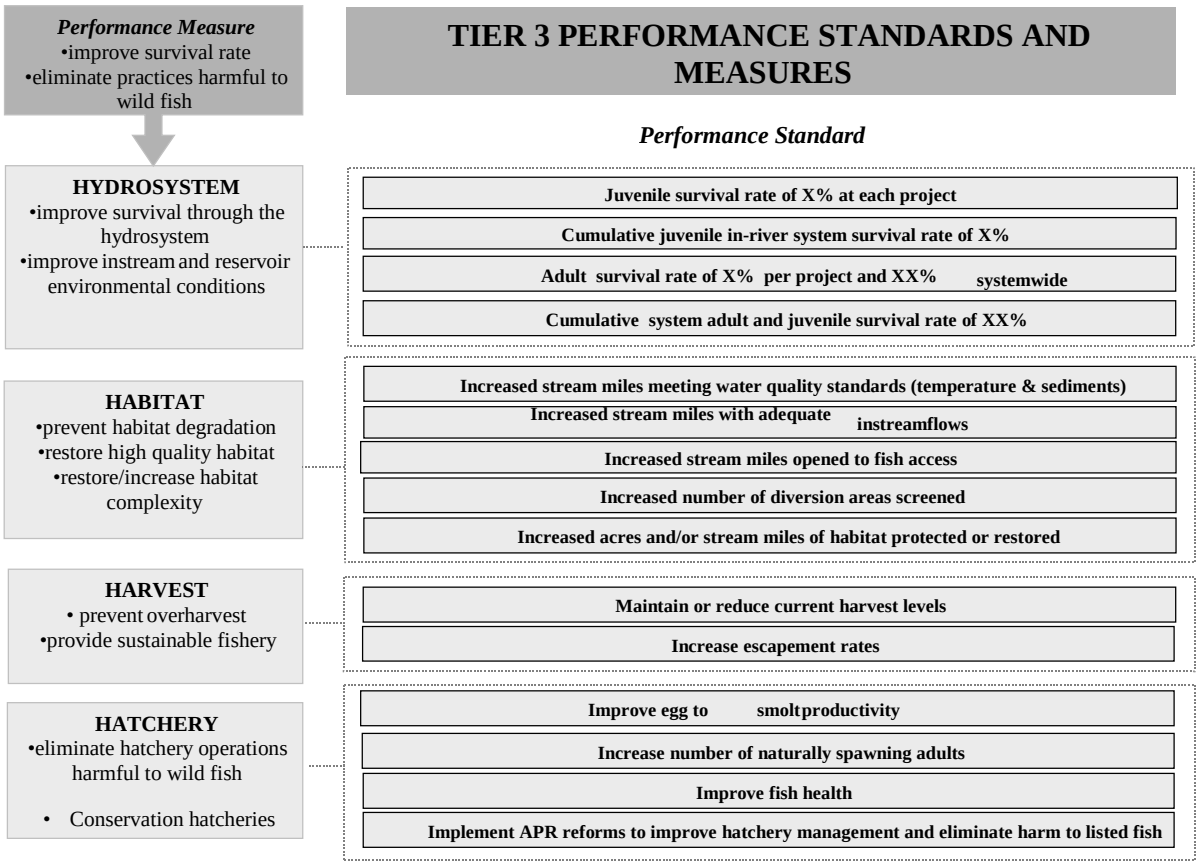
- Complexity: To restore the complexity and range of habitat conditions for all life stages.

Performance Standards for Habitat:

- Estimated Benefits:

- Use Ecosystem Diagnosis and Treatment Methodology and subbasin assessments.

Table X Tier 3 Performance Measures and Standards



- *Overall Productivity Standards:*

  - Egg-to-smolt productivity improvement
  - Fish fitness (s*ize and weight)*

- Ecological Standards:

  - Water Quality: Increase in areas where water quality standards met: temperature (summer high temperature) and sediment
  - Instream Flows: Increase in areas where instream flow needs are met (summer low flow)

- Fish Access: Increase in areas where fish access is restored
- Screening: Increase in areas where diversions are screened
- Protection: Numbers of acres/stream miles of habitat protected or restored

The ultimate performance standard to gauge habitat improvements is salmon productivity, a measure of how many salmon a particular river is capable of producing. The best long-term indicator of habitat productivity at this time is egg-to-smolt survival. This information, as well as its relationship to habitat characteristics, will have to be developed over a period of years. Egg-to-smolt productivity in representative habitat areas will be an essential part of our ongoing monitoring and evaluation program, to provide this base. Nevertheless, this information will not be useful to guide our decisionmaking in the short term.

For the short term, the agencies propose (1) to estimate potential benefits from habitat action using the Ecosystem Diagnosis and Treatment model and subbasin planning, in collaboration with the Northwest Power Planning Council; (2) to gauge success with habitat improvements using a scientifically rigorous monitoring and evaluation program. Based on available science, the agencies believe that there is a direct relationship between survival and the amount of habitat that is improved in the basin.

The proposed ecological criteria would be assessed at the basin and subbasin level, and over time, at the watershed and/or stream level. In addition, actual implementation of related management actions to meet the ecological standards would also be tracked**.** The Plan emphasizes rehabilitation of ecological processes and functions, not artificial creation of habitat.

Strategies for Harvest:

- Fishery Management: To manage fisheries in a manner that prevents overharvest and does not harm listed fish.
- Sustainable Fisheries: To provide sustainable fisheries, sufficient to allow for the meaningful tribal fishing rights and provide non-tribal fishing opportunities.

Performance Standards for Harvest:

- *Estimated Benefits:*
  - *Existing harvest management models*
- *Adult Fish Improvement Criteria:*
  - Maintenance or reductions in harvest of listed species
  - Resultant increase in escapement

Rationale for Harvest Performance Standards:

Measurement of harvest rates and escapement are straightforward, and are well developed by the parties involved in harvest management in the river and in the ocean. However, a mechanism must also be provided for attributing survival benefits to specific elements of voluntary or funded harvest reductions.provided through greater selectivity of fisheries. That mechanism should explicitly recognize that greater selectivity in a given fishery can be used for either or both of two objectives: Reduce take on listed stocks while (1) sustaining current harvest, or (2) increasing harvest. The agencies propose to measure these improvements based on reduction of harvest/increase in escapement of fish to spawn.

Strategies for Hatcheries

- Hatchery Reform: Eliminate potentially harmful hatchery practices.
- Conservation and Supplementation Hatcheries: Use on an interim basis to avoid extinction while other recovery actions take place.

Performance Standards for Hatcheries:

- *Estimated Benefits:*
- *Fish Improvements:*
  - Egg-to-smolt productivity improvements
  - increase in number of naturally spawning adults
  - improved fish health
  - APR improvements in management and potential harm to listed fish

Temporary conservation hatchery programs designed to contribute towards recovery of ESA-listed populations currently at critically low levels can yield immediate benefits for early life history stages by dramatically increasing egg to smolt survival. Measurement of success can be documented at a minimum through the number and quality of smolts produced for each population. Associated benefits for carefully implemented conservation programs would be the cumulative production of smolts over time, preserving the genetic material until adult returns can be measured.

Strategies for Hydropower:

- Improve Survival: To provide adequate survival and maintain healthy adult and juvenile fish migrating through the hydropower system.

- Improve Conditions: To provide instream and reservoir environmental conditions necessary to produce recruits and provide adequate survival of resident fish and other aquatic species.

Performance Standards for Hydropower:

- Biological:

  - Migrating Adults

  - Juveniles: transported and in-river

  - System: cumulative survival, including direct & indirect mortality

For direct actions taken in the hydrosystem, such as improvements for adult or juvenile passage, benefits can best be measured and documented based on changes to juvenile or adult survival. Both non-hydrosystem effects that are manifested within the hydrosystem as well as hydrosystem effects manifested outside the hydrosystem (i.e., indirect mortality) are also considered to provide an adequate basis for actions that can contribute to improvements.

A system survival standard would be the main measure of juvenile fish survival. System survival may be broken down into minimum survival levels per project, but these would not be considered hard limits. Rather, project-specific actions would be contemplated based the relative "priority" of needed improvements in relation to its contribution to system survival, the ESU stocks affected, alternative actions at other projects that may be more effective. Through this approach, investment choices would be made to ensure the greatest biological benefits for the various ESUs and their individual requirements.

- Programmatic:

Programmatic performance standards are the actions and the schedule for those actions that are defined in the annual planning process, the Biological Opinion, and this plan. In essence, the measure of performance is the success of the Action Agencies in implementation of actions defined in the Annual Plan. Evaluation of progress relative to this standard will be formalized through NMFS' review of the annual progress reports prepared by the Action Agencies, the annual NMFS findings letter, and the 5- and 8-year mid-point evaluations.

- Physical:

Physical performance standards supplement and, in some cases, serve as surrogates for biological performance standards. In the case of hydro actions, for example, there are some physical targets

or objectives directed at measures such as mainstem flow objectives and water quality that are intended to guide water management decisions.

2.2.10 Funding

Funding for staff and other resources will be needed to implement this Plan. While the federal agencies are in some cases offering and in other cases proposing stepped-up funding, they do not expect that resources will be available to do everything simultaneously, even if such an effort could otherwise be organized and staffed. With this in mind, the agencies intend to coordinate funding requirements and proposals that will be submitted through federal budget processes, and report on the availability of resources and implications for the agencies' ability to carry out this strategy.

The goals of the coordinated budget proposals include ensuring efficiency, eliminating overlap and omissions, and focusing resources where they can best achieve targets. The Federal Caucus will submit the coordinated plan and budget to the Regional Executives for approval. It will then be the responsibility of each agency to include its share of the plan and related funding requirements in its budget submission.

2.2.11 Monitoring and Evaluation

Monitoring and evaluation is not merely the periodic collection of data. Rather, properly designed monitoring programs will provide data for resolving a wide range of uncertainties, including determining population status, establishing causal relationships between habitat (or other) attributes and population response, and assessing the effectiveness of management actions. The information gained through monitoring programs will be a cornerstone in identifying alternative actions and refining recovery efforts. Such programs are therefore not only an integral part of any management action, but also a critical component of a recovery plan or adaptive management, affording managers the information to maintain or change strategies as necessary.

A complete monitoring program will address the following four major groupings of questions for listed salmonids:

- **What is the status of salmonid populations; does that status change through time?** A primary concern will be determining the level of risk populations face, including the current trends and abundance of populations, and whether those trends change. A comprehensive monitoring and evaluation program will include a sampling scheme that

allows changes in trends and/or abundance to be detected. In addition, the program will allow hatchery-origin spawners and their contribution to the next generation to be appropriately included in any analysis. Finally, determining life-stage specific survival and mortality rates will contribute to the development of short-term measures of stock performance that can supplement standard metrics such as recruits per spawner.

- **What are the conditions in areas of different salmonid abundance; and, are there systematic patterns suggesting that specific natural or anthropogenic factors affect salmon population dynamics?** This set of questions is primarily aimed at determining the status of factors thought to affect salmon populations, and using that assessment to suggest appropriate management actions and experiments. Several categories of "conditions" will be included in this effort. First, factors that affect populations outside of their spawning and rearing areas, or at a large scale, such as flow, climatic indicators, and indicators of ocean conditions will be tracked. Second, habitat attributes at both local and landscape scales will be assessed. Third, the community structure of at least freshwater and estuarine environments will be evaluated. This will include determining the abundance and distribution of a variety of species including: hatchery-reared fish (fry, parr, smolts, and adults), predators on salmonids, macroinvertebrates, and introduced species. And, finally, the degree of genetic introgression from hatchery stock or transplanted wild stocks will be assessed. Currently available data for many of these variables are anticipated to be compiled during subbasin planning efforts; additional data will be required to address many of these questions.

- **Is there a cause and effect relationship between salmonid population responses and changes in conditions locally or across the landscape?** At its simplest, this grouping of questions asks if a management action has been effective in improving survival rates for salmonids, and if so, how much. However, in many cases this will be a multi-tiered set of questions: did a management action cause the anticipated change in a condition (habitat attribute, or abundance of hatchery fish, for instance)? Did the change in conditions cause a response in salmonid populations? In addition, this area of monitoring and evaluation will also address more complex issues, such as the long-term or evolutionary effects of human-caused changes to the environment salmonids occupy.

- **Have management actions been implemented; have they been implemented appropriately and in their entirety?** While answering these questions appears trivial, this component of a monitoring program is very important for two reasons: one scientific, and the other regulatory. Scientifically, it is important to know that the management action has been put in place when evaluating its effects (particularly if the effects are measured in part away from the management activity, as the effects of hydrosystem or estuarine improvements are likely to be). From a regulatory perspective, this monitoring aspect will ensure that agencies and individuals responsible for mitigation or restoration activities in fact complete their responsibilities.

Obviously, these groupings of questions are not entirely independent. Information gathered to address one set of questions will necessarily inform questions asked within another major grouping. However, these groupings provide a logical framework in which to conduct

monitoring and evaluation for listed anadromous fish.

Monitoring and evaluation will also be important for resident fish and other aquatic species. It will provide critical information on bull trout population trends, distribution, timing and usage of FCRPS fish ladders, fish bypass, and smolt monitoring facilities and reservoir systems, and assess entrainment of bull trout through FCRPS dams. For Kootenai River white sturgeon, current levels of monitoring and evaluation will be maintained that are associated with all life stages of natural recruitment, and the preservation stocking program.

Conducting monitoring and evaluation effectively will require that both data collection and the implementation of management actions be highly coordinated. Collecting data to address any of these questions for any listed species will require attention to issues of experimental design, including distribution of monitoring sites, appropriate replication and scale. Management actions must be conducted in the context of an experimental framework that will offer the greatest opportunities for detecting responses in the shortest amount of time. Similarly, it will be imperative that data collection be conducted in a standardized manner and that data is reported and managed in a regional database. Failure to maintain a scientifically rigorous, coordinated effort will not only render any monitoring program useless, but will also undercut the importance of the management actions themselves, since they will no longer contribute to our understanding of salmonid population responses.

The Northwest Fisheries Science Center, in collaboration with other regional science centers and other federal, state, tribal and local agencies, will develop a monitoring and evaluation program that addresses these major areas. The Federal Caucus will report annually on federal agency progress in carrying out recovery actions, including the availability of resources and the agencies' ability to carry out the Conceptual Recovery Plan. These reports would also be geared to support long-term biological monitoring to assess the contribution of improvements in each H to improvements in population growth rates or other biological indicators.

The Federal Caucus will work with the states, tribes, Council and others to develop by January 31, 2001:

1. A comprehensive framework for a monitoring and evaluation plan. The framework will establish criteria for what physical and biological attributes should be monitored, at what scale, with what frequency, etc. In addition, the framework will identify background monitoring needs, what is currently being monitored, and what gaps exist, and what monitoring needs to be added to fill the gaps.

2. Standards for collecting, synthesizing and reporting data;

3. A mechanism for reporting data;

4. A process for ensuring the scientific credibility of the monitoring framework that includes review by the Independent Science Advisory Board;

5. A prioritized budget for research and monitoring to resolve critical uncertainties.

The federal agencies anticipate that many of these elements could ultimately be incorporated in the Council's fish and wildlife program. NMFS' Biological Opinion on operation and configuration of the FCRPS, which accompanies this Plan, identifies key research and monitoring that must be done to validate the assumptions in the Reasonable and Prudent Alternative. To the extent practicable, the federal agencies will work with states, tribes and the Council to ensure these required activities are well integrated into the more broadly based regional program.

3. Specific Actions and Benefits for Each H

3.1 Habitat Actions

Fixing salmon and steelhead **habitat** is particularly challenging. These fish range through federal and nonfederal land, forests, farms and cities. A vast number of human activities affect their habitat. In addition, very few studies have been done that quantitatively link management actions with habitat quality, and habitat quality with fish production. Yet there is no doubt fixing habitat is central to any recovery plan. Survival improvements are likely to have the biggest effect in the first year of life (when most of the fish are in the tributaries) and during the transition to salt water (when the fish are in the estuary). Fixing tributary and estuary habitat is key to recovering the fish and is the centerpiece of the Plan. Actions in the Plan focus on tributary habitats, both federal and nonfederal; mainstem habitat, estuary habitat, and implementation.

For tributary habitats on nonfederal lands in priority subbasins, the federal agencies will fund actions that will have immediate benefits. These include actions aimed at removing passage barriers, screening diversions, increasing in-stream flow, restoring water quality and protecting high quality habitats through the purchase of land or conservation easements across all lines of land ownership.

For long-term actions, the Plan endorses the Northwest Power Planning Council strategy of conducting subbasin assessments and developing subbasin plans. The federal agencies have worked with the Council to develop an assessment template and a work plan to have a team of professionals complete the assessments. Once the assessments are complete by the end of 2000, the federal agencies will participate with state agencies, local governments, tribes and stakeholders to develop subbasin plans. As a complement to subbasin assessments and plans, NMFS has also begun a recovery planning effort that will establish population and ESU goals for abundance, productivity, distribution and diversity. The subbasin and recovery plans will then create the priorities for federal actions and funding.

For tributary habitats on federal land, the federal land managers will protect existing high quality habitat and accelerate restoration in high priority subbasins. In the short term, federal land will be managed under current programs that protect important aquatic habitats. That program will be augmented in important subbasins by a targeted restoration effort. In the longer term, federal land on the east side of the Cascades will be managed under the Interior Columbia Basin Ecosystem Management Project (ICBEMP), which will rely on subbasin and watershed assessments and plans to target further habitat work. On the west side of the Cascades, federal lands are managed under the Northwest Forest Plan.

Federal agencies will assess mainstem habitat and implement experimental programs to create more natural habitat areas along our system of reservoirs. They will also establish a management plan to protect the Hanford Reach, home to a healthy core population of fall chinook.

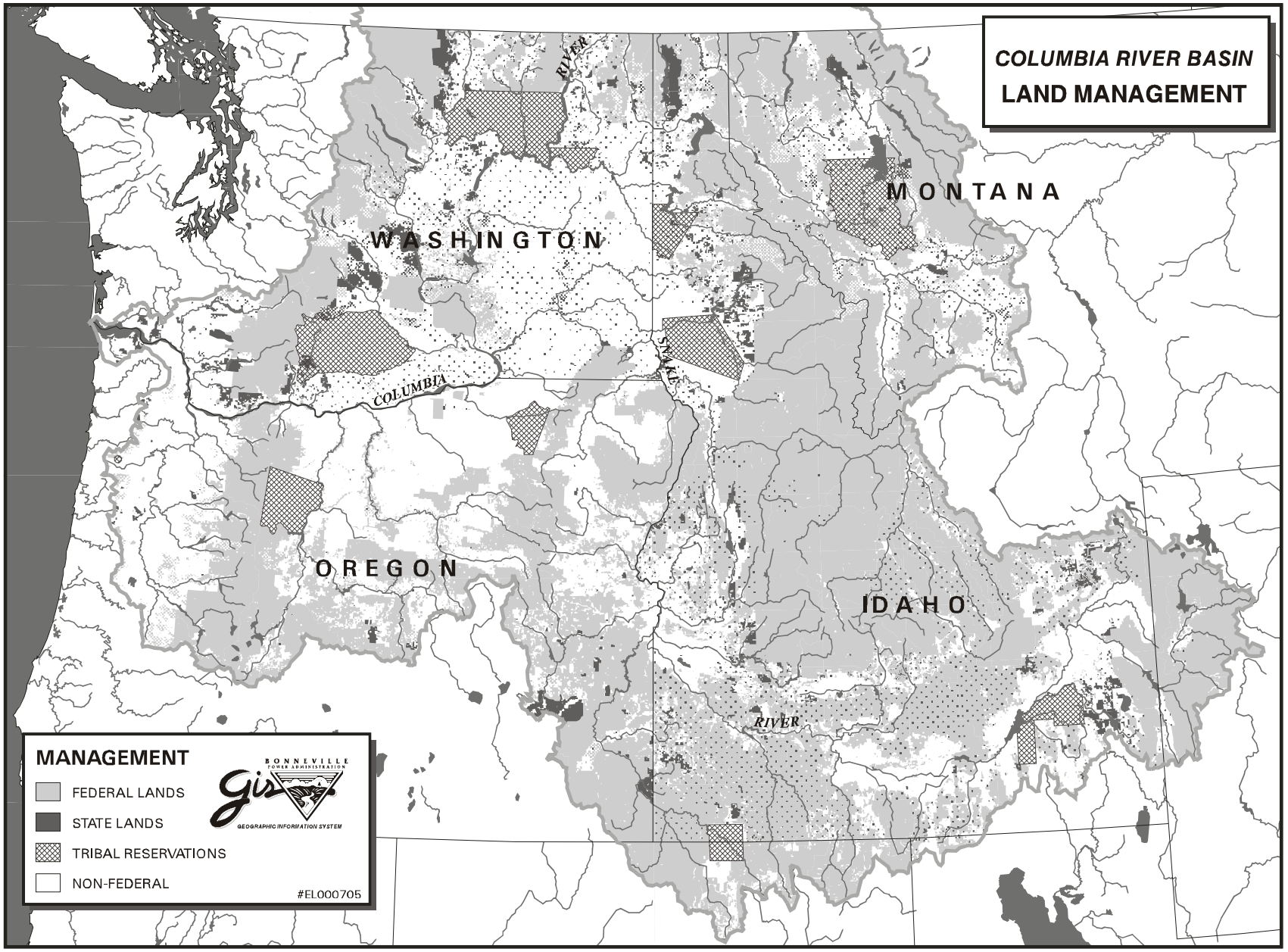
For the estuary, the Lower Columbia River Estuary Program, a partnership between EPA and state and local governments, will be the foundation of the recovery effort. As part of this program, federal agencies will work with state, local, tribal, and private partners to acquire or restore thousands of acres of estuary habitat over the next 5-10 years, creating a Lower Columbia River Greenway to benefit migrating fish. Predator control and improved river flows will be prominent features of efforts to improve the estuary.

The salmon's vast geographic range spans literally hundreds of different jurisdictions (see map). Lack of coordination among these jurisdictions can undermine the best-laid habitat protection plans. The Conceptual Recovery Plan emphasizes coordination among federal agencies, and between the federal agencies and others. Coordination will occur through a federal habitat team, which will also provide a basin-level focus and one-stop shopping for states, local governments, tribes and others working to protect and restore habitat. In addition to coordinating federal funding with the subbasin plans adopted by the Council, the team will provide technical assistance, information on ESA and Clean Water Act compliance, and coordinate federal funding.

Another important aspect of implementation is monitoring and evaluation. The federal agencies have identified critical uncertainties that must be answered to establish an effective habitat program. The Plan proposes a comprehensive, basin-wide monitoring effort that will address these critical uncertainties. The recommended actions most closely resemble Option 2 in the draft Planr.

More detail about the recommended actions is in Table __.

One key to achieving these benefits is collaboration, which is intrinsic to the proposed strategy. The Federal Caucus believes the Council's subbasin initiative provides the best opportunity for multiple jurisdictions to reach agreement on implementing the actions. If collaboration fails, and the recommended actions do not take place, federal agencies have authority to pursue the necessary survival improvements as suggested by Option 3 of the draft Plan.


COLUMBIA RIVER BASIN
LAND MANAGEMENT
WASHINGTON
MONTANA
OREGON
IDAHO
COLUMBIA
SNAKE
RIVER
RIVER
MANAGEMENT
FEDERAL LANDS
STATE LANDS
TRIBAL RESERVATIONS
NON-FEDERAL
BONNEVILLE POWER ADMINISTRATION
GIS
GEOGRAPHIC INFORMATION SYSTEM
#EL000705

3.1.1 Performance Standards

The ultimate performance standard for habitat is fish productivity. However, this will be difficult to establish for habitat because salmon survival improvements from habitat actions cannot be measured in the short term. Even in the long term, measuring progress toward a biologically-based standard will be challenging and expensive. Based on our current understanding of the associations between ecosystem processes and salmonid populations, four habitat factors will influence performance measures throughout the basin:

- instream flows;
- amount and timing of sediment inputs to streams;
- riparian conditions that determine water temperature, bank integrity, wood input, and maintain channel complexity; and
- habitat access.

The federal agencies will develop an initial set of performance measures based on these four factors.

3.1.2 Immediate Actions

Although some of the recommended actions will take three or more years to put in place, the federal agencies also support fast-track habitat actions in high-priority subbasins, gauged to maximize benefit in the short term. The Plan also establishes criteria for other immediate actions. A key criterion for determining what constitutes an appropriate immediate action will be whether it results in an immediate benefit to listed species. Federal agencies will work with the Council, tribes, and states to develop and implement high-priority habitat improvements of this kind.

Table __ List of Habitat Actions

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
Federal	**Manage Federal Lands to Protect Fish**	Through ICBEMP's and the Northwest Forest Plan's aquatic strategies, provide a base for habitat protection (USFS, BLM).			
		Implement seven watershed restoration initiatives targeting core populations most at risk (USFS, BLM).			
		Implement multiple-scale assessments and data management systems (USFS, BLM)			
		Accelerate land acquisition, using LWCF funds prioritizing fish habitat (USFS, BLM).			
	Restore Estuary Habitat	Facilitate Lower Columbia River Estuary Program implementation (LCREP, EPA).			
		Minimize impacts of predators (including developing a sea bird management plan) (COE, NMFS, FWS).			
		Secure additional Columbia and Snake flows (BPA, USBR).			
		Conduct habitat mapping inventory by early 2001 (BPA, LCREP)			
		Prioritize habitats for protection and restoration (2001)(LCREP).			

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
		Seek authorization for Lower Columbia River Greenway Program (DOI/DOA); Establish Greenway Habitat Protection Fund to protect 10,000 acres of wetlands; 3,000 acres of upland.			
		Authorize and fund expanded Corps of Engineers Restoration Program.			
		Authorize and fund FEMA buybacks of floodplain structures in priority habitats.			
	Restore Tributary Habitat	Work with states to secure and protect minimum flows w/federal nexus (FS, BLM).			
		Fund water acquisitions (USBR, BPA).			
		Provide technical assistance to state instream flow work (USGS, USBR).			
		Provide technical assistance to TMDL compliance (EPA).			
		Fund land acquisitions and conservation easements (NRCS, BPA).			
		Expand eligibility for CREP program (NRCS).			
		Revise NRCS Field Office Technical Guides by 10/01 (NRCS, NMFS, FWS, EPA).			
		Remove selected passage barriers (BPA, COE, USBR).			
		Screen irrigation diversions(NMFS, USBR).			

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
	Improve Mainstem Habitat	Assess opportunities for mainstem habitat improvements (BPA).			
		Implement restoration programs (BPA).			
		Protect Hanford Reach (FWS, DOE).			
		Provide adequate spawning and rearing flows under V.B.A. (FERC)			
State	**Protect & Restore Tributary Habitat**	Develop and implement TMDLs for anadromous fish tributaries within five years.			
		Establish in-stream flows for anadromous fish tributaries within five years.			
		Continue IPC flows for fall chinook chum spawning (COE, USBR).			
		Support water acquisitions using federal funding.			
		Coordinate TMDL and Water Quantity planning assessments with NPPC program.			
		Reform and enforce land use statutes governing growth management, forestry practices, and agricultural practices (WA Forest & Fish model).			
		Establish programs to screen all pumps and restore passage at problematic diversions and obstructions.			

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
	Restore estuary habitat	Facilitate implementation of Lower Columbia River Estuary Program**.**			
Congress	**Estuary Habitat**	Immediately authorize expanded predator controls (MMPA)			
		Strengthen Lower Columbia River Estuary Program authority.			

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
		Estuarine Program support (EPA).			
		Implement the Lower Columbia Greenway Project • Habitat mapping and priorities for protection or restoration • Habitat acquisition/protection • COE Habitat restoration • Monitoring • Public Education and outreach			
		Immediately authorize expanded COE estuarine restoration project			
	Tributary Habitat Funding	FS/ BLM restoration initiatives.			
		ICBEMP implementation.			
		Comprehensive habitat, flow, passage and diversion (COE, DOI, BPA)			
		Clean Water Act/Endangered Species Act compliance (EPA).			

Habitat Actions					
Entity	**Goal**	**Actions to Meet Goal***	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
		TMDL technical assistance to states.			
		Non-governmental participation in planning and implementation of watershed solutions (NRCS).			
		Expanded Conservation Reserve Program.			
		Support Federal Habitat Team (NMFS)			
Tribes		To be determined			

*Note: Most recommended actions will require consultation with USFWS and NMFS; these agencies are not listed separately under individual actions.

3.2 Benefits from Habitat Actions

By protecting existing high quality habitat and restoring degraded habitat on a priority basis, the federal agencies believe the habitat element of the Conceptual Recovery Plan will have significant measurable benefits for listed anadromous and resident fish. For each ESU, the Plan prioritizes subbasins for short-term habitat work based on potential for improvement in habitat capacity, degree of federal ownership (an anchor for restoration efforts), and number of water diversions (where addressing flow, passage and screening problems could produce short-term benefits). If implemented, the Plan should result in improving habitat conditions in priority subbasins over the course of ten years. In addition, other immediate measures should improve tributary flows, water quality and riparian conditions in a broader range of subbasins. According to the habitat analysis, the effects of this action would increase salmon and steelhead abundance to levels that are within the range of what would be necessary to support recovery. Short-term gains are expected through the following actions:

- Restoring tributary flows. Sufficient flows allow streams to recover productivity, and may reconnect important spawning and rearing habitats. Compared to habitat actions such as riparian revegetation or upland restoration, which may take decades to have significant effects, restoring flows can quickly improve stream ecology and water quality. It can also reasonably be expected to provide juvenile and adult passage, as well as juvenile rearing habitat, for listed anadromous and resident fish.

- Screening water diversions. All fish that enter unscreened diversions are likely to die due to stranding, predation, impingement, or adverse water quality. About a third of all legally authorized water diversions in the Columbia River Basin are unscreened; about two-thirds are screened in some fashion; and fewer than 20 percent are screened to NMFS criteria. Screening to NMFS criteria is thought to reduce mortality almost to zero. Screening can therefore immediately reduce mortality of listed populations.

- Addressing passage obstructions. On the mainstem, thermal blocks, sediment, and low flows at the confluence sometimes block tributary access. In the estuary, silted channels, dikes, and high culverts prevent access to spawning, rearing, feeding, and refugia habitats. In the tributaries, temporary berms, unladdered water diversion structures, low road crossings, bridge footings, and culverts can impede migrating fish. Temporary berms are a particular problem because they destroy riverbed armor, make stream channels more likely to degrade, and compound sedimentation problems. There is immediate benefit from making habitat more accessible.

- Protecting currently productive habitat and restoring outward. The federal agencies put high priority on protecting habitat that is currently productive, especially if at risk of being degraded. These habitats should serve as anchor points for restoring degraded habitat and reconnecting spawning and rearing areas systematically.

- Increasing the amount of habitat. Mitigating actions such as securing additional riparian, wetland, floodplain, inter-tidal, or shallow water habitats provide immediate benefits by

reducing the predicted decline in the quality of nonfederal habitat. Securing habitat ensures critical habitats exist for core ESU populations.

- Improve water quality - Improved water quality is a key in species recovery. There are thousands of impaired streams throughout the Columbia Basin. Improving the water quality of these streams will be critical in this recovery strategy.

3.3 Harvest Actions

The Federal Caucus proposes to continue the already-tight restrictions on fishing that have been imposed over the last decade, and, where necessary and effective, to reduce harvest impacts further. This includes full implementation of the 1999 Pacific Salmon Treaty Agreement and management of all fisheries, ocean and freshwater, to comply with harvest rate constraints outlined in the most recent NMFS biological opinions. Additionally, the Caucus proposes an aggressive program to further develop selective fisheries strategies to achieve the twin objectives of enabling the harvest of strong stocks and reducing impacts on listed ESUs.

The Federal Caucus recommends the following actions for harvest:

- Cap fishery harvest rates on listed species at already-reduced levels for most ESUs, and pursue opportunities to reduce them further. Manage fisheries based on the annual abundance and status of natural stocks affected by the fisheries.

- Expand, develop and/or apply alternative, more selective fishery techniques to reduce impacts on listed fish and provide alternative harvest opportunities.

- Develop terminal area fishing opportunities where harvest can occur that is benign to listed species.

- Develop a menu of options for reducing harvest impacts on listed fish even further, either permanently or temporarily by using concepts such as conservation easements, license buyouts, or alternative fishing gear deployment, and then test the feasibility and effectiveness of the options, and implement them where appropriate.

The objectives of the harvest strategy are to buy time for other recovery programs and measures to take effect; preserve at least some fishing, particularly for tribal fisheries, provided that doing so does not undermine the overall recovery effort, fully implement the 1999 Pacific Salmon Treaty Agreement; and develop a sustainable fishing strategy for the long term, with particular emphasis on selective fisheries. The biological analyses confirm that harvest has ongoing effects on the performance of listed species, in varying amounts depending on the particular ESU. It also confirms that additional harvest reductions or moratoria are unlikely, by themselves, to result in recovery for most ESUs, since harvest impacts already have been greatly reduced to very low levels. Conservative harvest management policies, however, can contribute to survival on an interim basis while other programs to improve survival are put into effect. Over the long

run, harvest constraints cannot be relied on to solve the fundamental problems causing natural salmon productivity to decline.

Strong steps have been taken over the past twenty years to end chronic overfishing practices. Mixed stock fisheries are now generally managed for abundance, and the needs of natural fish are given priority over hatchery fish. Since the listing of many species under the ESA, harvest has been reduced even further in all fisheries affecting listed stocks. Given that these reductions have already occurred, it is unlikely that further reductions are going to yield significant additional benefits to listed species. However, constraints on harvest at or near these now-reduced levels will remain an important part of the recovery effort during the rebuilding period.

Therefore, the Federal Caucus recommends capping harvest rates on listed salmon and steelhead at their currently reduced levels for 10 years or until the status of listed fish can support harvest increases. In addition, for those ESUs where harvest remains a significant source of mortality, further reductions of incidental take of listed species will be pursued through additional measures such as license buy-backs, gear changes, time and area restrictions, and selective fishing. To offset the economic consequences of capping harvest rates and securing additional reductions, the Federal Caucus recommends fishery managers develop alternative fishing opportunities in places and manners that are benign to listed fish.

The Plan attempts to balance the conservation of at-risk fish with the federal government's trust obligation to provide meaningful tribal harvest, both today and in the future. Where tribal fishing is involved, we recommend accepting a level of risk that is greater than the biology might strictly imply. Specifically, some populations are at such critically low levels that biological analyses supports a strong argument that all harvest should be eliminated (e.g., Snake River spring/summer chinook; upper Columbia spring chinook). Nevertheless, the Plan recommends an acknowledgment that there is an "irreducible core" of tribal harvest that is so vital to the trust obligation that the federal government will not eliminate it. For other populations, the biological analysis shows they can withstand some level of harvest. When tribal fishing is involved in those cases, the Plan again recommends allowing a level of tribal harvest that respects the trust obligation, even though it means tolerating some additional risk and slowing the pace of recovery. Finally, the Plan also recognizes the priority legal standing of the tribal fishing right; this is reflected in fishing regimes that result in tribal fishery impacts on listed fish being higher than in non-tribal fisheries. The Plan also emphasizes that in some situations, tribal catch could be substantially increased if the tribes were to expand their use of selective fishing methods.

3.3.1 Performance Standards

The harvest rate caps and/or specific compliance with the fishery plans as described in Volume 2 for each fishery group (ocean and freshwater) comprise the performance measures for harvest. For some listed ESUs, a specific harvest rate target or cap is identified for a particular set of fisheries. For example:

- U.S. fisheries south of Canada must comply with the Magnuson-Stevens Fisheries Management and Conservation Act and the adopted Fishery Management Plan covering salmon fisheries off Washington, Oregon and California, as well as with biological opinions issued by NMFS that caps impacts on Snake River fall chinook.

- Similarly, biological opinions issued by NMFS cap the in-river fall season fisheries, that incidentally harvest Snake River fall chinook and intermingled listed steelhead.

- Fisheries affecting chinook salmon must be managed in compliance with the new Pacific Salmon Treaty regime, which includes a set of calculable harvest constraints that will be routinely monitored over time.

- For both ocean and in-river fisheries, the existing fishery management institutions annually provide reports that contain the harvest metrics necessary to assess performance relative to the recommendations contained herein.

Table __ List of Harvest Actions

Harvest Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
Federal	**Limit harvest impacts**	Cap harvest impacts on listed ESUs at currently reduced levels for the next 10 years, and ensure that mixed stock fisheries are managed based on the weakest natural stocks affected by the fishery (NMFS)			
		Seek opportunities to further reduce fishing impacts on listed fish by helping the states and tribes develop alternative fishing techniques and/or locations and by enabling more selective fisheries and helping to develop the necessary analytical capabilities to support management of selective fisheries (BPA/NMFS/USFWS)			
		Seek opportunities to increase harvest in ways that do not harm listed ESUs (NMFS/USFWS)			
State	**Reduce Harvest Impacts**	Pursue conservative harvest policies (weak stock management)			
		Discourage non-selective fisheries and pursue selective fisheries (support mass marking and other tools and take a lead role in developing the necessary analytical capabilities to support management of selective fisheries)			
Congress	Funding	Provide sufficient funding for managing fisheries and enabling the transition to selective fisheries, and for the 1999 Pacific Salmon Treaty Agreement.			

Harvest Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
Tribes		To be determined			

3.4 Benefits from Harvest Actions

The Plan recommends that harvest impacts on listed fish be capped at or below current levels in the ocean and in freshwater, including tribal, commercial, and recreational fisheries. The productivity rates identified by CRI as necessary to achieve survival and recovery account for harvest impacts at current levels. The Plan contemplates further negotiated reductions in harvest impacts based on increasing selectivity in fishing practices, but these potential future reductions not assumed in the analysis. If they were achieved, they would benefit productivity immediately and likely reduce extinction risks for affected ESUs, thus enhancing the overall recovery effort.

3.5 Hatcheries Actions

The Federal Caucus recommends the following actions for hatcheries:

- Establish Hatchery and Genetic Management Plans (HGMP) for all hatcheries within the first three years.

- Reduce or eliminate adverse effects of traditional production practices on wild fish. Commence implementation of HGMPs immediately, with funding from BPA and congressional appropriations for needed reforms.

- Use conservation hatchery practices on selective basis to augment weak populations.

- Transfer operation of certain hatchery production programs or ownership of certain hatcheries to tribes, subject to approved HGMPs, to facilitate co-management and tribal fisheries.

The Federal Caucus recommends Hatchery Option 2. There are two categories of hatchery reforms contemplated in this option. First is the reduction and/or elimination of the negative impacts caused by traditional production hatcheries on wild stocks. Second is the selective use of conservation hatcheries, using genetically appropriate broodstock to bolster weak populations. Using conservation hatcheries to support weak stocks will provide a hedge against extinction risks in the near term.

Such reforms will be pursued in the context of Hatchery and Genetic Management Plans. The HGMP is a tool for defining goals and objectives of a particular hatchery, and its relationship to prioritized basin objectives, including harvest opportunities and wild stock performance. Specifically, each HGMP should ensure that genetic broodstock selected is appropriate, that it minimizes the potential for adverse ecological effects on wild populations, and that it is integrated into basinwide strategies to meet objectives of all Hs. Perhaps most importantly, each HGMP will include a rigorous monitoring and evaluation component to ensure facility goals and objectives are being met.

Minimizing adverse genetic and ecological effects of production hatcheries will likely yield a measurable biological benefit to wild stocks, although it will be difficult to demonstrate the relationship in the near term. By using adaptive management techniques, it will be possible to measure the benefits accruing to wild stocks through reform of production facilities over time.

Supplementation will be used to achieve two primary purposes. First, it will be targeted as a "safety net" for some listed stocks to assist recovery. In this respect, it will be preferred over captive broodstock programs. Second, it will also be used in streams where there are no listed stocks to enhance treaty and non-treaty fishing opportunities to the greatest extent possible, consistent with the Council's Artificial Production Review and ESA and following appropriate consultation with the affected tribes(s) and state(s). Certain hatcheries now operated by others will be transferred to tribal management or co-managed with tribes and will be operated under new supplementation protocols, combined with local habitat efforts. Over time, fishing opportunities provided by these programs, in combination with selective harvest techniques, could take pressure off of mixed stock mainstem fisheries.

3.5.1 Performance Standards

Performance standards will be established for hatcheries in the context of HGMPs. Standards will be developed in the following areas and measured over time for results:

1. Genetic Introgression: Local, ESU broodstock is utilized in all propagation programs within Critical Habitat, unless associated with an "Isolated" program. Hatchery broodstocks used in supplementation programs represent the genetic and life-history characteristics of the natural population(s) they are intended to supplement. Non-isolated hatchery programs regularly infuse natural-origin fish into the broodstock as described in an HGMP.

2. Hatchery-Origin Fish Straying: For naturally-spawning populations in critical habitats, non-ESU hatchery-origin fish do not exceed 5 percent; ESU hatchery-origin fish do not exceed 5 – 30 percent, unless specified in an HGMP for a conservation propagation program.

3. Marking: Hatchery populations are properly marked so as not to mask the status of the natural-origin populations or the capacity and proper functioning of Critical Habitat.

4. Viable and Critical Population Thresholds: Hatchery operations do not appreciably slow a listed population from attaining its viable population abundance. Hatchery operations do not reduce listed populations that are at, or below, critical population abundance.

5. Harvest Effects: Federal hatchery mitigation fish produced for harvest do not cause subsequent overharvest of listed stocks such that their recovery is appreciably slowed. Harvesting reforms are implemented to maintain and enhance harvest of mitigation fish in consideration of the constrained productivity of listed stocks caused by the FCRPS.

6. Hatchery Planning: Hatchery purposes, objectives, protocols, M&E, anticipated effects, and relationship to other critical management and planning processes are fully described in HGMPs.

7. Research: Scientific knowledge is increasing on the effects of hatchery supplementation and captive broodstock programs on the survival and recovery of natural-origin populations. The quality and survival of hatchery supplementation fish is increasing.

3.5.2 Immediate Actions

As in the case of habitat, there is a need for immediate hatchery reform and conservation actions. Federal agencies will work with the Council to accelerate funding and implementation of the reform measures from the hatchery biological opinions and related actions that should proceed over the next 1 to 3 years.

Table _ List of Hatchery Actions

Hatchery Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
Federal	**Reform Production Facilities**	Implement APR reforms at federal facilities (NMFS/BPA/USFWS) .			
		Leverage HGMPs at state and tribal facilities (NMFS/USFWS).			
	Protect weak stocks (list populations)	Expand conservation hatcheries (NMFS/BPA/USFWS)			
	Reduce uncertainties; assess performance	Implement aggressive M&E programs to reduce uncertainties re: hatchery/wild fish interactions, and assess performance of conservation efforts (NMFS/USFWS).			
	Create opportunities for terminal fisheries on non-ESA populations.	Implement transfers of facilities or responsibility for operation of certain production programs for up to four hatcheries and implement reforms to create opportunities for terminal fisheries on non-ESA populations. (USFWS, NMFS).			
State	**Reduce Hatchery**	Prepare and implement HGMPs for state-run hatcheries.			

Hatchery Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
	Impacts				
		Support safety net supplementation.			
Congress	**Reform Hatchery Programs**	Fund reforms of Mitchell Act and Lower Snake Hatchery programs.			
	Provide safety net	Fund aggressive safety net supplementation program.			
		Fund NMFS monitoring and evaluation of supplementation effects .			
Tribes		To be determined			

3.6 Benefits from Hatcheries Actions

A qualitative assessment of the extent to which each listed ESU and their associated populations are affected by adverse hatchery practices shows that such impacts can be eliminated or substantially reduced by the reforms detailed above. It also shows there is value in safety-net supplementation for an initial number of critically depressed populations. Together the reforms and conservation activities would provide benefits ranging from low, to medium, to high levels of survival improvements, depending on the ESU. While the actual benefits can only be quantified through rigorous monitoring and evaluation, the agencies are confident that they will contribute significantly to the overall recovery effort. Short-term benefits would include:

- Preserving the gene pool of at-risk populations through the cumulative production of smolts over time, until adult returns can be measured and assessed for reproductive fitness and long term contribution toward survival of ESA-listed populations.

- Limiting the adverse effects of hatchery practices upon the ESA-listed populations by instituting prioritized hatchery reforms.

- Reducing critical uncertainties about interactions between hatchery-raised fish and wild fish.

3.7 Hydropower Actions

The Federal Caucus recommends the following actions in the hydropower system (see map):

- Improved passage: Aggressive passage improvements, including more effective spill programs and specific passage upgrades for adult and juvenile fish at individual dams.

- Conduct analysis of economic and cultural implications of dam breaching.

- Improved Flows: Aggressive flow operations to provide water conditions beneficial to migrating juvenile and adults fish. Immediate improvements in Canadian flows with up to 2 million acre feet (MAF) over time. Immediate improvements from the Snake contingent upon ongoing discussions. Flood control study to allow further flow improvements. Implementation of flood control adjustments to further minimize risks to listed resident fish from salmon flows.

- Fish transportation: Continue spread the risk approach; significantly reduce trucking; continue to study **delayed mortality** issue.

- Water Quality. Measures to improve water quality while meeting fish passage objectives, and development of a long-term Water Quality Improvement Plan for dissolved gas and temperature.

The Federal Caucus recommends Hydropower Option 2 from the draft Plan.

3.7.1 Performance Standards

The ultimate performance standard for the federal hydropower system is survival of juvenile and adult fish through the migration corridor. A survival performance standard must also take into account indirect mortality fish may suffer after leaving the migration corridor as a result of their passage experience. The Plan establishes survival standards through the hydropower system that the federal agencies conclude are achievable with the present system in place. Because not all mortality associated with the system can be eliminated, the Plan also establishes expectations for off-site mitigation. The off-site mitigation goals are described more fully in NMFS' biological opinion on operation and configuration of the system, and are included in Volume 2. By funding programs and actions that achieve these goals, the federal agencies that operate and market power from the hydropower system will substantially contribute to the actions that need to be taken in the other sectors.

- Achieve project and system performance survival standards for each ESU in accordance with the FCRPS biological opinion.

- Carry out or fund off-site actions sufficient to mitigate for mortality caused by the hydropower system, or sufficient to achieve survival and recover of the ESUs, together with the other actions in this Plan.

With such standards in place, the performance of a hydropower project, or set of projects, can be measured for progress. If the standards are met, then such projects should continue to operate with the established parameters. If, however, the standards are not met, either through direct project survival rates or in combination with off-site mitigation, then it will be clear the projects in question cannot operate without jeopardizing and preventing recovery of listed ESUs. In this case, the project operator will have to consult on additional actions that could include project reconfiguration.

3.7.2 Immediate Actions

Columbia River Measures – To achieve a more normative river, significant amounts of additional water targeted to enhance flows during fish migration are needed. Working cooperatively with Canadian officials to find mutually-beneficial arrangements is key. Near-term arrangements could result in additional water to boost summer flows and enhance estuarine conditions. Mid-term (5-year) arrangements are targeted at additional summer flow augmentation, which could not only enhance water quality but could also significantly boost the ability to meet July and August flow targets.

Additionally, significant changes will be made to improve in-stream fish passage and water quality by modifying federal dam structures and operations. These changes will vary by project, but may include surface bypass, flow deflectors, and enhanced spill management.

A mainstem habitat program will also be initiated. Using techniques based on watershed assessment and planning, experimental projects to improve reservoir habitat conditions and riverine function will be developed and implemented in the next few years.

Integral to the planning and development of such proposed changes is the need to identify and take into consideration culturally important resources at the affected dams and reservoirs.

Recognizing that additional monitoring and evaluation may point to the need for further changes, this Plan includes studying modifications at John Day and McNary dams below the confluence of the Snake and Columbia rivers. Because these studies require congressional concurrence, we propose working in advance with the states, tribes, and Northwest delegation to identify specific performance criteria and protocols to guide the studies.

A review of systemwide flood control requirements will also be conducted to determine whether more flexibility can be secured in managing flow augmentation. A shift in flood control at federal projects, including Libby and Hungry Horse, is proposed as well as operation to address retention time at Grand Coulee. The Federal Caucus agencies will be consulting with tribes and states on these shifts, as well as with Canada.

Finally, while these actions will generally benefit all fish and wildlife species on the Columbia River by enhancing flows, riverine function, water quality and estuarine conditions, a rebalancing of reservoir operations is needed. This is intended to assure that salmon measures do not disproportionately harm ESA-listed (bull trout, white sturgeon), and non-listed resident species and federally-protected cultural resources.

Flow Augmentation –Through ongoing negotiations with stakeholders in Idaho, the USBR is seeking to increase supplies of water available for flow augmentation in the lower Snake and Columbia rivers, by acquiring greater access to Idaho's water banks. The goal of the USBR's efforts shall be to seek ways to increase the surety that 427 thousand acre-feet is available on an annual basis. Further acquisitions, long-term leases and long-term access to the water banks are needed to improve the surety that 427 thousand acre-feet of augmentation water can be provided. The exact amounts that could be available from this source for flow augmentation will vary annually with water supply and the level of access that might be acquired through these negotiations.

Any future decision to seek congressional authorization to breach the four major federal dams on the lower Snake River will be guided by scientifically-focused performance standards for fish passage and survival. The performance standards and accompanying protocols will guide decisions for interim dam operations and modifications.

Although breaching is not essential to the implementation of the Conceptual Recovery Plan, federal agencies will prepare for the possibility that breaching could become a necessary contingency. This will include studies to provide information necessary to inform a decision on

dam breaching authority, such as the implications of breaching for roads, rail, utilities, pumps, diversions, embankments, and bridges. The studies will specifically include strategies and options to mitigate disproportionate impacts to communities, industries and Indian tribes. These actions will reduce the time needed to seek congressional authorization for breach, and thus reduce the time needed for possible implementation, thereby avoiding risks of delay should breach later become a preferred approach. Finally, the federal agencies will continue research on the impacts of the fish transportation programs, especially delayed mortality.

Nonfederal Hydropower – The Federal Caucus recommends the following actions in the nonfederal hydropower system:

- Nonfederal mainstem Columbia River dams: complete habitat conservation plan under development for Chelan & Douglas, and execute collaborative process with Grant County to lay groundwork for re-licensing of mid-Columbia projects.

- Nonfederal mainstem Snake River dams: pursue collaborative process to prepare for re-licensing of Idaho Power projects.

- Nonfederal tributary hydropower projects: address the needs of listed species (e.g., flows, passage, survival improvements, hatchery reforms) on coordinated basis through customary **FERC** process and ESA consultation.

For nonfederal dams on the mainstem Columbia, the Federal Caucus proposes to implement the provisions and performance standards of the Mid-Columbia Habitat Conservation Plan to address additional improvement in juvenile and adult survival. The standards must assure a high likelihood of survival and a moderate to high likelihood of recovery over time, taking into account actions in the other Hs. The combination of standards in all Hs would reduce human caused hydropower impacts to the point at which listed ESUs face less than a 5 percent risk of extinction over 100 years.

With respect to the Idaho Power Dams on the Snake River, which are currently up for relicensing, a specific mitigation program, which will be subject to ESA consultation, is still under study and development. In addition to these, there is a substantial number of minor nonfederal hydropower projects in the basin that influence the survival and recovery of salmon and steelhead and other aquatic species. Performance improvements for these projects will be sought through ESA consultation on each project's relicensing process. These performance improvements will be based on the nonfederal hydropower project's portion of the population growth rate necessary to achieve survival and recovery. The standards may range from aggressive improvements over the status quo, to levels that reflect the best estimate of survival rates if hydropower impacts were completely eliminated.

If a nonfederal hydropower project or system cannot meet its performance standards, flexibility will be provided for the operator to provide additional mitigation off-site to make up the difference. If the standards are not met, either through direct project survival rates or in combination with off-site mitigation, then it will be clear the projects in question cannot operate

without jeopardizing and preventing recovery of listed ESUs. In this case, the project operator will have to consult on additional actions that could include project reconfiguration.

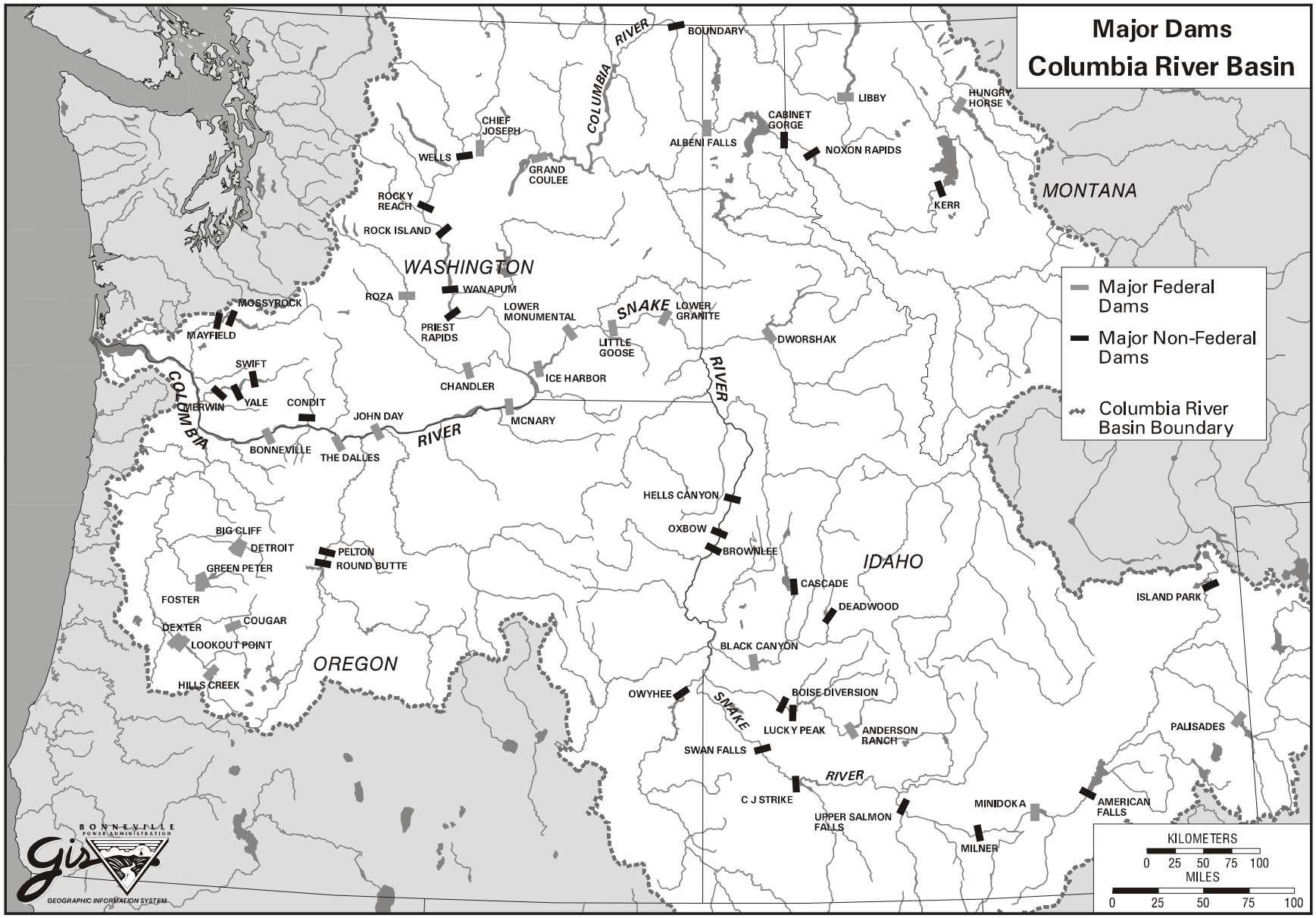

Major Dams
Columbia River Basin
Major Federal Dams
Major Non-Federal Dams
Columbia River Basin Boundary
BOUNDARY
COLUMBIA RIVER
LIBBY
HUNGRY HORSE
CABINET GORGE
ALBENI FALLS
NOXON RAPIDS
KERR
MONTANA
CHIEF JOSEPH
WELLS
GRAND COULEE
ROCKY REACH
ROCK ISLAND
WASHINGTON
ROZA
WANAPUM
PRIEST RAPIDS
LOWER MONUMENTAL
SNAKE
LOWER GRANITE
LITTLE GOOSE
DWORSHAK
MOSSYROCK
MAYFIELD
SWIFT
CHANDLER
ICE HARBOR
COLUMBIA RIVER
MERWIN
YALE
CONDIT
JOHN DAY
MCNARY
BONNEVILLE
THE DALLES
HELLS CANYON
OXBOW
BROWNLEE
IDAHO
BIG CLIFF
DETROIT
PELTON
ROUND BUTTE
GREEN PETER
CASCADE
ISLAND PARK
FOSTER
DEADWOOD
COUGAR
DEXTER
LOOKOUT POINT
BLACK CANYON
OREGON
HILLS CREEK
OWYHEE
BOISE DIVERSION
SNAKE RIVER
LUCKY PEAK
ANDERSON RANCH
PALISADES
SWAN FALLS
C J STRIKE
UPPER SALMON FALLS
MINIDOKA
AMERICAN FALLS
MILNER
KILOMETERS
0 25 50 75 100
MILES
0 25 50 75 100
BONNEVILLE POWER ADMINISTRATION
GIS
GEOGRAPHIC INFORMATION SYSTEM

Table __ List of Hydropower Actions

Hydropower Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
Federal	Additional Capital Improvements at dams (COE/BPA, EPA)	Aggressive passage improvements, including specific passage upgrades for juvenile fish at individual dams. Improvements vary by location, including relocation of bypass outfalls, refined screens and bypass facilities, surface bypass, spillway modifications and more effective spill, improved turbine operations and design, predator management, mainstem and estuarine habitat.			
		Conduct analysis of economic and cultural implications of dam breaching.			
	Improve operations for fish (BPA, COE, USBR)	Improved Flows: improved flow operations to provide water conditions beneficial to migrating juvenile and adult fish. Improvements in Canadian flows with a potential of up to 2 MAF over time. Immediate improvements from the Snake contingent upon ongoing discussions. Flood control study to allow further flow improvements. Implementation of flood control adjustments to further minimize risks to listed resident fish from salmon flows.			
		Fish transportation: Continue "spread the risk" approach; reduce trucking; continue to study delayed mortality issue.			
		Water Quality. Measures to improve water quality while meeting fish passage objectives, and development of a Water Quality Improvement Plan for dissolved gas and temperature.			

Hydropower Actions					
Entity	**Goal**	**Actions to Meet Goal**	**Timeframe**		
			Year 1	**Years 2-5**	**Years 6-10**
	Improve Nonfederal Hydro (NMFS, FERC)	Complete HCP for Mid-Columbia Dams.			
		Use relicensing and ESA consultation to improve flows, passage, etc. at non-federal dams on the Deschutes, Lewis, Cowlitz, and other basins (FERC).			
		Apply anadromous fish priorities to re-licensing for other nonfederal dams.			
		Settlement of Snake River adjudication.			
		Relicensing for passage improvement and Section 7 consultation for IPC dams.			
Congress	**Reduce Hydropower Impacts**	Fund full COE capital and O&M programs.			
		Authorize flood control review.			
		Support BPA off-site mitigation strategy.			
		Fund NMFS comprehensive M and E program			
Tribes		To be determined			

3.8 Benefits from Hydropower Actions

The federal hydropower system will be operated under a set of specific, aggressive hydropower actions that NMFS has determined, on the basis of available scientific information and professional judgment, will achieve hydropower performance standards. Most of the measures are aimed at improving passage survival through federal dams and reservoirs through changes in project operations and improvements in project configuration. NMFS' best estimate of the additional improvement in adult and juvenile survival levels associated with these measures is modest and accrues primarily to in-river migrants and primarily in the Lower Columbia River. These benefits are described on a numerical basis in Volume 2.

In general, immediate benefits are expected through improved flows, improved passage, enhanced spill, elimination of trucking fish, increased reliance on in-river migration during early spring, and mainstem habitat improvements. For the long term, the program focuses on understanding and addressing the factors contributing to mortality within the hydropower system.

- Improved flows. In particular, summer flows are lower than desired, and flow targets are not met in many runoff conditions. Near-terms actions, such as additional flows from select reservoirs (Canadian reservoirs and draft of Banks Lake), contribute to greater probability of meeting summer flow objectives.

- Improved spill. Additional spill and refinements to spill patterns provide near-term opportunity to increase juvenile fish survival at some dams. Additional spill provides relief from turbine-related mortality while other actions are developed.

- Transportation. During the summer, most transported juvenile migrants are trucked as opposed to barged. To reduce any uncertainties about potential adverse effects of trucking, greater reliance on barging can be initiated immediately. Preliminary data suggests that the in-river survival may be similar to that of transportation during the early spring. If this trend persists, more fish could be allowed to migrate in-river during April, postponing the start of transportation to May.

- Mainstem habitat improvements. The mainstem migration corridor may have untapped potential for developing more functional habitat attributes associated with fish survival. Further reductions in predation by birds and fishes can be achieved through focused habitat modifications and changes to in-river structures.

4. Glossary and Acronyms

5. References

6. Maps