Conservation of Columbia Basin Fish

Draft Basin-wide Salmon Recovery Strategy

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

Volume 2

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Prepared by
National Marine Fisheries Service
in consultation with the Federal Caucus

Army Corps of Engineers
Bonneville Power Administration
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Environmental Protection Agency
Fish and Wildlife Service
Forest Service

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1. Habitat Element of the Conceptual Recovery Plan

Solving the habitat puzzle across a landscape of mixed federal, state, tribal and private lands is an essential link in salmonid conservation. In this section, we outline a habitat conservation strategy that gives the basin a fast start, with measures geared to produce short-term benefit, and lays a foundation for habitat strategies that are geared to the unique conditions of each subbasin and watershed. The overall strategy has five parts:

Tributary Habitat

- A fast start for non-federal tributary habitat. In certain high-priority subbasins, federal agencies will begin immediately to work with non-federal partners to protect productive habitat and fix flow, passage and diversion problems. Federal agencies will participate in the Council's program to complete subbasin assessments and plans that will identify critical short- and long-term actions.

- A comprehensive approach to federal tributary habitat. A federal lands strategy will protect existing high-quality tributary habitat, accelerate restoration in high-priority tributary subbasins, and restore other habitat over the long term. In the short term, federal land will be managed by current programs that protect important aquatic habitats. That program will be augmented in important subbasins by a targeted restoration effort. In the longer term, management on the east side of the Cascades will be guided by the Interior Columbia Basin Ecosystem Management Project (ICBEMP). As ICBEMP is implemented, subbasin and watershed assessments and plans will target further habitat work.

Mainstem Habitat

- An experimental program for mainstem habitat. A mainstem habitat program will improve habitat to mimic the range and diversity of historic habitat conditions in the Columbia, Snake and Willamette rivers and evaluate the results.

Estuary Habitat

- A comprehensive approach to the estuary. A comprehensive estuary restoration program will inventory, protect and restore key habitats; and implement a major monitoring, analysis and research program to evaluate progress toward rebuilding the productivity of the system over the long term. These actions will be closely coupled to actions affecting flow and hatchery reform.

Implementation

A well-organized implementation process. A solid infrastructure will be established to ensure that habitat initiatives are organized, focused and managed toward clear objectives and tracked to

evaluate progress. To build this infrastructure, the federal agencies will form a Federal Habitat Team. The team will ensure a consistent federal strategy and provide non-federal parties with a predictable, collaborative federal partner. The agencies also commit to support development of performance standards and integrated research, monitoring and evaluation.

This strategy is premised on a close linkage between federal and non-federal habitat efforts. Federal programs under the Endangered Species Act, the Clean Water Act, the National Forest Management Act and other laws provide important legal and regulatory underpinnings for species recovery efforts. They also constitute an unmistakable reminder that species conservation implicates national interests. At the same time, species conservation is not just an obligation imposed by federal law. It is abundantly clear that salmon are of the highest importance to the people of the Northwest. Many of the landmark salmon programs over the last twenty years – the *Columbia River Basin Fish and Wildlife Program*, *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon*, the *Oregon Plan for Salmon and Watersheds*, the Washington Forest and Fish Agreement, the *Lower Columbia River Estuary Program* and others – have come from non-federal institutions. Salmon have deep roots in the Northwest, and protecting them did not become an urgent priority just because of the Endangered Species Act listings. The federal role in species recovery must be geared, then, not just to federal resource management, but also to non-federal conservation efforts. In this sense, the commitments the federal agencies offer in this section are commitments to work with non-federal partners who in many instances hold keys to solutions. This five-part strategy is designed to link federal and non-federal programs in a powerful way, establishing clear priorities and compatible assessment, planning and coordination mechanisms while recognizing the distinct roles of federal, state, tribal and local interests.

Habitat Program Objectives

Over the long term, the federal agencies have three overarching objectives for habitat restoration:

- Protect existing high quality habitats.
- Restore degraded habitats on a priority basis and connect them to other functioning habitats.
- Prevent further degradation of tributary and estuary habitat and water quality.

Achieving these objectives would not fully restore historic habitat quantity and quality, but should ensure that no population is driven to extinction because of poor habitat.

These objectives are tied to the basic habitat needs of species of concern.

[Insert Table 1 from the All-H draft (p.18)]

Tributary habitat

This section outlines major federal agency commitments to support conservation of non-federal habitat and federal land management initiatives in tributary subbasins. Federal agency support begins with a commitment to focus immediate attention on high-priority subbasins. These subbasins are areas with significant potential for improvement in productive capacity, significant amounts of good federal habitat to anchor restoration efforts, and significant numbers of water diversions where short-term gains could be secured by addressing flow, passage and screening problems. Over the longer term, habitat initiatives in these subbasins will be shaped by subbasin and watershed assessment and planning processes. Taken together, these measures will materially improve the biological productivity of tributary subbasins of the Columbia River Basin.

Nonfederal tributary habitat.

For non-federal habitat in Columbia basin tributaries, the federal agencies propose a program that will give a fast start to protecting productive habitat and fixing flow, passage and diversion problems. This fast-start strategy identifies priority subbasins, priority actions, and demonstration programs to fund immediate actions. In addition, federal agencies will participate in the Council's program to complete subbasin assessments and plans that will identify critical short- and long-term actions. The assessment and planning strategy identifies the process for identifying and supporting both short- and long-term actions.

A. Federal Support for Fast-Start Actions in Priority subbasins

For the near term, the federal agencies have identified 16 priority subbasins in which to focus short-term attention. These priority subbasins are places with stronghold areas anchored by federal land, where productive capacity could be significantly increased if problems related to water diversions (flows, passage and screening) were addressed. The priority subbasins, organized by evolutionarily significant unit, are:

Upper Columbia Spring Chinook and Steelhead:
- Methow
- Entiat
- Wenatchee

Snake River Fall and Spring/Summer Chinook and Steelhead:
- Upper Middle Fork Salmon
- Lower Middle Fork Salmon
- Upper Salmon
- Lemhi

Mid-Columbia Chinook and Steelhead:
- North Fork John Day

Upper John Day
Middle Fork John Day

Lower Columbia Chinook, Steelhead and Chum:
Lewis
Upper Cowlitz
Willamette-Clackamas

Upper Willamette Chinook and Steelhead:
Clackamas
North Santiam
McKenzie

Federal agencies will identify three of these subbasins per year in which to focus resources on protecting productive habitat and addressing water, passage and diversion problems. The analytical process by which these subbasins were identified is in on the Caucus Web site.

The short-term federal strategy in these subbasins will focus on four measures that are most likely to produce significant biological benefits in the near term:

- ***Protecting productive habitat***. Federal agencies put high priority on protecting habitat that is currently productive, especially if at risk of being degraded. These habitats should be protected through conservation easements, acquisitions or other means, so they can serve as anchor points for restoration. Restoring degraded habitat is of lower priority. Undertaking difficult and expensive efforts to restore degraded habitat while losing existing productive habitat would be a poor bargain.
- ***Restoring tributary flows***. Restoring flows to depleted streams is an essential way to immediately improve habitat productivity. Without sufficient water, tributary streams cannot support aquatic life, especially during summer months, regardless of other habitat restoration actions. Once provided, sufficient flows allow streams to recover productivity quickly and may reconnect important spawning and rearing areas.
- ***Screening and combining water diversions***. All fish that enter unscreened diversions are likely to die because of stranding, predation, entrainment, impingement, or adverse water quality. About a third of all legally-authorized water diversions in the Columbia River Basin are unscreened; of the remainder, fewer than 20% are screened to NMFS criteria. Screening to NMFS criteria is thought to reduce mortality almost to zero. Combining diversions can also reduce mortalities.
- ***Reducing passage obstructions***. Temporary berms, unladdered water diversion structures, low road crossings, bridge footings and culverts obstruct migrating fish and degrade streams. Once addressed, there is immediate benefit to migration, spawning and rearing conditions.

In each priority subbasin, the federal agencies commit to work with non-federal entities to protect existing productivity and resolve all flow, passage and diversion problems by the end of ten years. The first such basins will be selected from the priority subbasins based on biological considerations and local interest in working through ESA issues. Working with states, tribes and

others, the federal agencies will supply analysis, technical assistance, funding and Endangered Species Act and Clean Water Act regulatory coordination. Because the proposed lead agency, the Bureau of Reclamation, lacks authority to fund much of this work, it is possible that funding will be sought from Bonneville Power Administration to bridge the gap pending congressional approval.

Much of the information, expertise, planning, monitoring and enforcement for this work must come from state agencies. Federal agencies will need to work closely with states to ensure that mechanisms to protect stream flows are effective, for example. The federal agencies will immediately initiate discussions with the states to develop agreements regarding these programs.

Fix flow, passage and screening problems:

Lead agencies: USBR, working with NMFS (possible bridge funding from BPA).
Objective: Address all flow, passage and diversion problems over 10 years (completed in years 10-16).
Scope and timing: Start programs in three subbasins in each of five years, 16 subbasins total.
State support: Data, planning assistance and mechanisms for protecting flow (administrative processes, water masters, gauging).

Protect existing productive habitat:

Lead agency: BPA, working with non-profit land conservation organizations and others.
Scope and priority: At-risk habitats in priority subbasins.

B. Federal Support for Fast-Start Actions in All Subbasins

Restore tributary flows through a water brokerage:

Tributary flow problems are widespread, and solutions are, to this point, largely undemonstrated. For the most part, the feasibility of solutions—whether and how they can be implemented through existing laws and administrative processes—is an institutional question. To test innovative approaches to this problem, Bonneville proposes to fund this fall a project establishing a non-profit water brokerage to demonstrate transactional strategies for securing tributary flow—and where feasible, addressing water quality—in streams with significant non-federal diversions. The project would take advantage of the fact that various entities, government and non-government, have developed the capacity to secure instream water over the last several years using voluntary, transactional mechanisms. The project would develop a competitive process to supply water to increase flows and water quality at the least financial and administrative cost. The non-profit brokerage would also develop a plan for a pollution bank through which water quality credits could be exchanged in markets, and evaluate whether such projects could in another ten years complete enough water quality and quantity improvements to fully protect the non-federal land portion of critical habitat for species of concern.

In order to ensure a broad test of these innovative approaches, the project would respond to requests from projects in priority subbasins, above, but would not be limited to such projects or to transactions in priority subbasins. However, the primary emphasis of this project is to demonstrate the viability of non-government methods of rebuilding stream flows. Transactions that are independent of federal projects are an appropriate way to compare the results of federal and non-government methods. In general, the project should target water that is likely to rehabilitate ecological function for vulnerable species, either connecting productive habitats or connecting productive habitat to potentially productive habitats.

The initial effort will be for five years. An objective third-party evaluator such as the Independent Scientific Review Panel will evaluate the program after five years, and a decision would be made whether to continue.

The non-profit brokerage entity and the states would be responsible for negotiating appropriate state administrative and legal support for water transactions to benefit species. Federal agencies will be involved in the project only via a project oversight committee to supply support and policy guidance to the non-profit brokerage.

Lead agency: BPA, NMFS
Objective: Demonstrate ability to secure tributary flows at least monetary and administrative cost.
Scope: Any subbasin with listed populations, giving priority to requests from coordinated tributary projects;
Timing: January, 2001-January, 2006; decide in early 2006 whether to continue.
State support: administrative mechanisms to protect water acquired through transactions.

Integrate Clean Water Act and Endangered Species Act Requirements through TMDL Programs

The federal agencies are committed to integrating Clean Water Act and Endangered Species Act compliance. The agencies will seek funding for pilot programs to demonstrate how Clean Water Act and Endangered Species Act objectives can be accomplished in TMDL (total maximum daily load) planning efforts. These pilot programs would have five objectives:

- Integrate Endangered Species Act and Clean Water Act TMDL processes to avoid duplication of effort and sequential regulatory processes that frustrate grassroots watershed groups
- Develop one set of watershed goals that meet both Clean Water Act and Endangered Species Act requirements
- Provide watershed stakeholders with Clean Water Act and Endangered Species Act assurances to the extent allowable by law
- Preserve, protect and restore fish habitat consistent with the Clean Water Act and Endangered Species Act
- Develop and promote lessons learned by and from watershed groups.

Local watershed efforts typically involve multiple stakeholders who may have done watershed plans for various local, state, and federal requirements. Meeting the needs of ESA-listed species may require changes in existing plans or new plans altogether. Clean Water Act requirements for TMDL planning on impaired water bodies may require a different schedule, and could result in prescriptions that are different from those required under ESA. Some watersheds have successfully dealt with both laws; others are frustrated by lack of clear guidance, sufficient information or timely decisions.

The pilot projects will aim for watershed plans with integrated, measurable ESA/CWA goals and targets. Habitat and pollutant reduction plans should be complementary, but clearly should produce an approvable TMDL with an implementation plan with a suite of specific actions to meet the goals with voluntary or regulatory actions. Uncertainty may be acknowledged through adaptive management. The greater the degree of uncertainty, the greater the importance of monitoring and evaluation design and implementation. Successful watershed projects are expected to educate and assist other watersheds. Each watershed will provide "lessons learned" reports, with which the federal agencies can create templates for other watersheds.

Pilot projects would be chosen on the basis of nominations from the states of Oregon, Washington and Idaho. Tribes could submit nominations for watershed planning for which the majority of the watershed is in a reservation. Again, priority would be given to subbasins included in "coordinated tributary solution" projects, above. Watersheds or subbasins should meet the following criteria:

- 303(d)-listed waters and ESA salmonids
- the watershed has a viable stakeholder group, with effective leadership
- stakeholders and the state want to meet both the ESA and CWA in one process
- the current TMDL schedule is compatible with the pilot, or can be accelerated
- the watershed is representative of problems of water quality for salmonids (large urban watersheds would typically not qualify)
- the watershed has a significant ESA population, and a reasonable opportunity for restoration
- the watershed agrees to use appropriate assessment guidance.

EPA, NMFS, FWS, BPA, and other interested federal agencies will select watersheds in consultation with the nominators. Successful watersheds and/or the states will be asked to develop a plan to accomplish the ESA/CWA integration. Federal agencies will be available to consult, coordinate and assist in identifying funding options for implementation plans.

> Lead agencies: EPA, FWS
> Objective: (1) Three TMDLs and implementation plans/HCPs over three years; (2) evaluate ways to integrate Clean Water Act and Endangered Species Act requirements.
> Scope and timing: Any subbasin with listed populations, giving priority to requests from coordinated tributary projects, above. Begin January 2001.
> State support: State leadership, adjustment of TMDL development schedules.

Additional Federal Programs to Protect Tributary Habitat

In the short term, there are several additional ways in which federal agencies can protect fish habitat on non-federal lands. One example is the federal Farm Service Agency, which funds the Oregon Conservation Reserve Enhancement Program (CREP) to establish forested riparian buffers. Under the program, farmers and ranchers may enter into 10-15 year contracts to plant riparian buffers or restore wetlands on streams that provide habitat for listed salmonids. Overall, the program can fund buffers ranging from 35 to 150 feet along 4,000 miles of streams in Oregon, including the estimated 1,750 miles of salmon streams that cross agricultural lands. While the existing CREP program secures temporary (10-15 year) buffers, experience with similar programs suggests that these buffers can be made permanent by adding 25% to the contract price. Under the terms of the Oregon program, that portion of the landowner's water right that is appurtenant to the enrolled acreage must be dedicated to instream flows under Oregon law for the duration of the contract. (NMFS 1999). Thus, funding an additional 25% increment for this program would have both long term benefit from riparian planting and near-term benefit from increased stream flow. This is an obvious opportunity to leverage BPA funding with other federal funding and, given its potential contribution to instream flows and water quality, should be considered in connection with coordinated tributary projects, innovative transactional approaches, and ESA/TMDL integration projects, above.

Lead agency: BPA, FSA
Scope and priority: Aim to protect 100 stream miles per year pending refinement from subbasin and watershed assessments.
State support: Coordinate reserve programs
State and Local Programs to Protect Tributary Habitat

Much of the work of conserving habitat for weak fish populations will require attention from federal, state, tribal and local jurisdictions with relevant regulatory authority. The December, 1999 Habitat Appendix discussed the great variety of such programs that are underway. These programs are in many cases under review to determine whether adjustments are needed.

Lead: Northwest states and local governments
Scope and priority: Pending refinement from subbasin and watershed assessments, evaluate efficacy of existing laws and regulations in protecting habitat.

C. Support Subbasin and Watershed Assessment and Planning

In the long term, successful habitat recovery and watershed restoration for non-federal lands requires state and local stewardship. An overall framework for state and local stewardship can be created through subbasin and watershed habitat assessments and plans and ESU-scale recovery plans that establish goals, objectives and priority actions that are integrated across ownerships and programs.

Establishing subbasin and watershed assessment and planning templates and protocols will provide direction to local planning efforts on the level of inventory and analysis that regulatory and funding agencies need. To this end, the federal agencies are working with the Northwest

Power Planning Council, fish and wildlife managers, states, tribes and others on a series of subbasin and watershed assessments and plans (described in the Draft Conceptual Recovery Plan, Habitat Appendix, Section F, pages 65-74). Subbasin and watershed assessment processes will be informed by scientific analysis indicating where habitat work would be most effective – for example, the Northwest Fisheries Science Center's analysis of habitat-productivity relationships, and the Northwest Power Planning Council's Environmental Diagnosis and Treatment (EDT) analysis of where management actions would be most effective. Other useful analyses have been developed by the ICBEMP Science Team, state salmon conservation programs, watershed initiatives and others. Under current schedules, the Council's subbasin assessments will be completed around the end of 2000, with subbasin planning and watershed assessments to follow. As these steps are completed, priorities, targets and schedules will emerge, and the subbasin priorities outlined above can be added to and adjusted.

Lead agency: Northwest Power Planning Council
Objective: Basin and subbasin objectives
Timing: Preliminary subbasin assessments by early 2001; preliminary subbasin plans by 2002

The Council has also proposed to develop interim subbasin plans based on the subbasin assessments. The Council has not yet proposed a specific process for completing these plans. The federal agencies recommend that the subbasin planning process include all relevant state agencies, tribes, local governments, stakeholders and federal agencies. The federal agencies are committed to working with the Council and state and tribal fish and wildlife managers to develop a planning process that will result in scientifically based plans that have broad local support.

Once priorities have been established through subbasin assessment and planning, local groups can develop watershed restoration plans, including assessments and implementation actions that meet habitat and watershed restoration objectives and integrate local economic, social and environmental concerns. Watershed assessment templates should be compatible with the standardized template developed by the Northwest Power Planning Council, the States of Oregon and Washington, the federal land management agencies, the Environmental Protection Agency and others, to avoid inconsistent inventory and analysis and reduce time spent in review and revision. Individual conservation plans that meet the objectives of the watershed restoration plans should be developed and voluntarily implemented by private landowners. Restoration criteria and performance standards will establish accountability for funding and regulatory compliance. Such a process should be implemented as follows:

- Establish subbasin and watershed assessment and planning templates and protocols.
- Use a locally-led implementation process. Locally-led planning groups, with technical expertise from local, state, tribal and federal agencies, should develop watershed health plans to meet habitat needs, water quality requirements and local objectives. Implementation should be based on voluntary, incentive-based approaches within a regulatory context.
- Secure and coordinate funding, technical and financial assistance for non-federal landowners. Significant additional funding must be provided for technical and financial assistance for watershed and habitat restoration on private lands.

- Evaluate existing federal agricultural incentive programs and improve their effectiveness.
- Make ESA and Clean Water Act clearance more efficient for landowners through, for example, programmatic consultations, 4(d) rules and other mechanisms. Regulatory agencies should also provide non-federal landowners with guidance on regulatory standards (including ESA and Clean Water Act), conservation standards and specifications.
- Create systems for storing and disseminating data, information and technology that are compatible across federal and non-federal ownerships. Overall planning and implementation at ESU, sub-basin, watershed and farm level would benefit from more coordination.

Lead agency: NRCS, with NMFS and EPA
Objective: Watershed plans consistent with ESU and subbasin objectives in all priority subbasins in five years and remaining watersheds within the range of listed salmonids in ten years
Scope and priority: Pending refinement from subbasin and watershed assessments give priority to requests from coordinated tributary projects, above
State support: Coordinate with state watershed planning and funding.

Subbasin and watershed plans must also be integrated with ESU-scale recovery plans. Section ___ describes in more detail NMFS' approach to recovery plan. It includes establishing biological recovery goals for ESUs, and then identifying specific actions that will meet those goals. NMFS has appointed a Technical Recovery Team to establish biological goals for ESUs in the upper Willamette and lower Columbia and intends to establish an additional Technical Recovery Team for the interior Columbia basin. In consultation with the Council, states and tribes, NMFS will also appoint a Planning Recovery Team to develop ESU-scale recovery plans. These ESU-scale recovery plans will integrate subbasin plans geographically with each other, and with plans and actions in the other sectors (harvest, hatcheries and hydropower). They will also provide guidance on priorities to smaller scale subbasin and watershed planning efforts.

D. Short-term funding for other projects.

The above priorities are not intended to exclude other initiatives, such as habitat acquisition, for which funding may make sense in agency, Council or state planning in the short term. In determining whether other actions should be funded, the federal agencies urge that the following criteria be applied: first, all necessary assessment and planning (e.g., NEPA) has been completed so the initiative can begin before September 30, 2001. In addition, initiatives should:

- Restore or acquire potentially productive habitats that will be largely self-maintaining after the activities are complete; or
- Address imminent risks to survival of one or more species; or
- Result in substantial, measurable benefits to species survival in not less than 10 years after implementation; or
- Be part of an action plan that is derived from science-based assessment; or
- Address a habitat enforcement issue and result in the protection of aquatic habitats.

D. Tributary Performance standards.

To ensure that habitat conservation in tributaries is focused, federal agencies will develop habitat performance measures to ensure consistency among programs, link actions to objectives and provide a basis on which to determine progress.

Developing performance measures for tributary habitat actions is a challenge because it is so difficult to measure specific increases in salmon productivity from specific habitat improvements. Habitat improvements can take a decade or more to produce physical changes in the landscape or in the stream channel. Tracing the effect of these changes on salmon productivity takes time because salmon populations fluctuate naturally. Detecting change in productivity from habitat actions requires long-term data sets. Moreover, no single set of performance measures will apply at all geographic scales. Different measures will be relevant to basin, subbasin and watershed or stream-reach scales.

Notwithstanding these challenges, we can establish meaningful performance measures to guide management. We will identify certain ecological problems that limit species productivity, steps that need to be taken to address these problems, and ecological and management indicators that allow us to judge whether the steps we are taking are successful. Furthermore, ecological indicators must be related to the biological responses of the species of interest. Biological responses most sensitive to habitat changes are egg-to-smolt survival and the fitness of smolts. Linking these biological measures to performance standards that are good indicators of increases in salmon productivity (e.g., population growth rate) will provide the information needed to evaluate overall success. Performance standards can also be developed now that should be good indicators of increases in salmon productivity.

Based on our current understanding of the associations between ecosystem processes and salmonid populations, there are four key habitat factors that need to be linked to performance measures in tributary subbasins: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity; and habitat access. Changes in these attributes can be measured at the reach or watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level. Any specific combination of actions among these four factors will vary by watershed and subbasin.

Federal agencies will develop by July 2000 an initial set of performance measures based on these four factors, and tie these measures to a set of hypotheses associating habitat improvement with expected biological response. Performance standards initially will be expressed as a desired trend in these attributes rather than a specific endpoint. These measures and the associated standards will then be developed and refined through subbasin assessments and finer scale analysis (see below), integrated into a monitoring and evaluation program and tested and improved through targeted research. The subbasin assessments will take advantage of current tools available for evaluating habitat quality and quantity and salmon productivity. Monitoring, evaluation and research should enable policy makers to make adjustments in habitat programs,

evaluate and refine hypotheses over time, and make future decisions on the contribution of habitat measures to restoring healthy salmonid populations.

We have sufficient knowledge now to begin taking substantial actions to improve fish habitat. We propose to act on this knowledge and make adjustments as we gain additional knowledge. Timely action requires a series of planning and decision cycles that fully utilize available knowledge and build on previous success.

Tributary Habitat on Federal lands

The Forest Service and the Bureau of Land Management manage over 60 percent of the currently accessible spawning and rearing habitat for anadromous fish in the Columbia River Basin, located in the upper and mid-elevation portions of tributary areas. Ensuring that federal management maintains existing high quality habitat and restores degraded areas is essential if federal habitat is to provide a strong foundation for salmon recovery.

A. Aquatic habitat trends and current management of federal lands.

Aquatic habitat on federal and non-federal lands has generally declined in quality and quantity from historic conditions. Some federal lands have a legacy of logging, livestock grazing, road construction and mining. These areas may currently support salmonids, but at lower than historic levels. Some federal habitat tends to be closest to historic conditions in areas where little management has taken place, including wilderness and roadless areas.

Recent scientific assessments indicate that overall, the habitat conditions on federally-administered lands are in an upward trend. However, the extent to which this habitat can benefit salmonid populations is influenced by the other major factors that impact salmon survival: hatcheries, harvest and hydropower.

In the Columbia River Basin, the Forest Service and the Bureau of Land Management manage salmonid habitat under the direction of PACFISH, INFISH and related biological opinions, and in western Oregon and Washington under the Northwest Forest Plan. PACFISH, INFISH and the Northwest Forest Plan aim to protect areas that contribute to the salmonid recovery and improve riparian habitat and water quality throughout the Basin. To meet these objectives, the Northwest Forest Plan and PACFISH/INFISH:

- Establish watershed and riparian goals to maintain or restore all fish habitat
- Establish aquatic and riparian habitat management objectives
- Delineate riparian management areas
- Provide specific standards and guidelines for timber harvest, grazing, fire suppression and mining in riparian areas
- Provide a mechanism to delineate a system of key watersheds to protect and restore important fish habitats
- Use watershed analyses and subbasin reviews to set priorities and provide guidance on priorities for watershed restoration
- Provide general guidance on implementation and effectiveness monitoring

- Emphasize habitat restoration through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and replanting native vegetation along streams and rivers.

Biological opinions issued by NMFS and FWS have concluded that PACFISH and INFISH avoided jeopardy and conserved recovery options until long-term restoration strategies could be established. In addition, ESA consultations on thousands of specific BLM and Forest Service land management activities are occurring, either individually or "batched" by watershed, following Interagency Streamlining Consultation Procedures established in May 1995. To oversee the implementation of these biological opinions, regional executives from BLM, Forest Service, FWS and NMFS chartered the Interagency Implementation Team (IIT), comprised of senior staff and managers from those organizations. Based on their semi-annual assessment, the NMFS and FWS are satisfied with the progress the BLM and Forest Service have made to date in complying with the provisions of the PACFISH and INFISH biological opinions and the effectiveness of the IIT for tracking progress and resolving implementation issues.

B. Near-term priorities.

For the near term, BLM and Forest Service have chosen seven subbasins in the Columbia River Basin as highest priority for anadromous fish habitat restoration in a program to begin in fiscal year 2001. These subbasins were selected based on five criteria: (1) ICBEMP science assessments and restoration protocols developed by the Interagency Implementation Team; (2) the high degree of protection provided by key/priority watershed designation in the Northwest Forest Plan or consistency with the long-term aquatic restoration strategy of ICBEMP; (3) excellent opportunities for cooperative, whole-watershed restoration, with large joint BLM and Forest Service ownerships; (4) State and tribal government interest in cooperative habitat programs; and (5) they are below the four Snake River Dams, with a strong likelihood that they will have sufficient adult escapement for optimum utilization of restored habitat.

For investments on federal lands to reach their full potential, strong working partnerships will be needed with state salmon and watershed recovery programs, other federal agencies such as NRCS and non-federal landowners.

The fiscal year 2001 program, if funded, would begin a focused, five-year watershed restoration program for these subbasins. A multi-year program would ensure sustained and coordinated completion of high priority work. Restoration capability would increase by the third year of the program. A more detailed plan will be developed for these subbasins for fiscal years 2002 through 2006, in cooperation with the states, other federal agencies, tribal governments and willing non-federal landowners.

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Table _ Highest priority subbasins and costs for fiscal year 2001 habitat restoration.

Subbasins	McKenzie		Hood River/ 15 Mile		Wenatchee/ Yakima		Entiat		Wind River		MF John Day		SF John Day		TOTALS (thousands of dollars)	
Activities	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**
Roads	300	60	900	–	400	–	300	–	300	–	500	20	300	20	3000	100
Upslope Habitat	100	10	300	–	100	–	–	–	–	–	100	10	100	20	700	40
Riparian Habitat	100	10	300	–	100	–	100	–	100	–	100	20	100	30	900	60
In-channel Habitat	200	20	200	–	–	15	100	50	100	–	200	20	100	30	900	135
TOTALS (thousands of dollars)	700	100	1700	–	600	15	500	50	500	–	900	70	600	100	5500	335

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Subbasins above the four Snake River dams were given a lower priority for investments in habitat restoration projects because adult anadromous fish escapement during the last decade has not been sufficient to seed existing federal habitat. Generally, anadromous and resident fish habitat quality of federal land in the Snake River Basin is considered to be in good condition. Approximately 70 percent of the priority watersheds with listed anadromous fish are in wilderness or roadless areas. However, there are habitat restoration opportunities on federal lands in the Clearwater, Pahsimeroi, Upper Salmon, and Grande Ronde Rivers for resident fish, watershed health, and anadromous fish, if adult escapement improves.

Table _**Lower priority subbasins (4th field HUCs) and costs for habitat restoration for FY 2001.**

Subbasins	**Clearwater**		**Yankee Fork**		**Upper Salmon**		**Pahsimeroi**		**L. Grande Ronde**		**TOTALS (thousands of dollars)**	
Activities	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**	**FS**	**BLM**
Estimated Costs	1500	50	500	–	500	100	–	300	750	300	3250	750

Fiscal year 2001 program elements include road decommissioning; fish passage and drainage improvements; upland improvements to improve slope stability and watershed conditions; riparian planting, fencing, and thinning to reduce erosion and improve shading; and restoring habitat complexity in impacted stream channels. Examples include: (1) White River Oxbow Rehabilitation, which would remove one mile of valley bottom road, opening access to a half-mile of prime oxbow habitat for Upper Columbia steelhead, spring Chinook, and bull trout; (2) Miles Creek Boundary Fence Project protecting 6,500 acres of riparian and forested upland to benefit threatened Mid-Columbia steelhead; (3) Chikamin Pumice Mine rehabilitation, stabilizing ten acres of abandoned mine site impacting spring Chinook, steelhead, and bull trout in the Chiwawa River system; (4) Ramsey Creek channel restoration, improving three miles of instream and riparian habitat for threatened steelhead in the 15-mile system; (5) reconstructing and reconnecting dewatered segments of the Pahsimeroi River.

One of the differences between non-federal and federal land priorities is in the Salmon and Clearwater Basins. In those areas, relatively few adult fish return to spawn on federal lands because of problems with degraded rearing habitat, dam passage and other problems downstream. Accordingly, improving the condition of federal land in these areas only would produce limited additional value for these fish. At the same time, some of the problems that

limit returns to federal habitat are non-federal habitat problems. Dewatered areas, passage obstructions and inadequately screened diversions in non-federal areas lower in the stream system limit access to federal habitat. Moreover, the Salmon and Clearwater historically were among the most productive subbasins for spring and summer chinook. This fact suggests that correcting habitat problems in these subbasins is likely to produce a better response from the fish than efforts in areas where natural attributes don't support large numbers of salmon. Accordingly, non-federal habitat priority areas include these areas. This should increase escapement to habitat on federal lands that, in turn, may increase the priority of federal habitat restoration in these subbasins. Therefore, federal land managers are expected to protect high-quality federal habitats to support non-federal restoration efforts.

C. Long-term management in the interior basin: the Interior Columbia Basin Ecosystem Management Project.

The Forest Service and BLM, in cooperation with the FWS, NMFS and EPA, are preparing a broad-scale, ecosystem-based strategy to manage federal lands in the Columbia River Basin. The strategy, known as the Interior Columbia Basin Ecosystem Management Project (ICBEMP) addresses broad-scale issues of forest and range land health, terrestrial species habitats, social and economic conditions, and aquatic and riparian health. The aquatic component of this strategy will provide long-term guidance for the protection and restoration of aquatic habitat and, when finalized, will replace PACFISH and INFISH (interim strategies that currently guide federal land management in these areas). A final ICBEMP record of decision, expected in early 2001, will amend 62 land use plans for 32 Forest Service and BLM administrative units in the basin.

Key findings in the ICBEMP Science Assessment and Evaluation of alternatives are: 1) the aquatic conservation strategy proposed in the ICBEMP preferred alternative will improve aquatic habitats on federal lands over time, and 2) the preferred alternative's approach to assessing status, risk and opportunity at different geographic scales should lead to an effective approach to aquatic habitat restoration. In addition, the Science Assessment indicates that anadromous fish spawning and rearing capacity on many federal lands (especially in the upper Snake River Basin) is much greater than can be used by the small number of returning adult fish. This underscores the importance of integrating aquatic habitat restoration efforts on federal lands with similar efforts on non-federal lands and changes in harvest, hatcheries and hydropower programs.

The Forest Service and BLM have made the following commitments to ensure that federal land management under ICBEMP will help protect and recover listed fish (these principles may be adjusted by the ICBEMP NEPA process and Record of Decision):

- Retain or recharter the IIT (see above) or a similar interagency team to aid in the transition from interim aquatic management strategies and products developed by the IIT to the long term ICBEMP direction.
- Strategically focus Forest Service and BLM scarce restoration resources using broad scale aquatic/riparian restoration priorities to first secure federally-owned areas of high aquatic

integrity and second, restore out from that core, rebuilding connected habitats that support spawning and rearing.

- Ensure that land managers consider the broad landscape context of site-specific decisions on management activities by requiring a hierarchically-linked approach to analysis at different geographic scales. This is important to ensuring that the type, location and sequencing of activities within a watershed are appropriate and done in the context of cumulative effects and broad scale issues, risks, opportunities and conditions.
- Cooperate with similar basin planning processes sponsored by the Northwest Power Planning Council, BPA and other federal agencies, states and tribes to identify habitat restoration opportunities and priorities.
- Consult with NMFS and FWS on land management plans and actions that may affect listed fish species following the Streamlined Consultation Procedures for Section 7 of the Endangered Species Act, July, 1999.
- Collaborate early and frequently with states, tribes, local governments and advisory councils in land management analyses and decisions.
- Cooperate with the other federal agencies (in particular NMFS and FWS), states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require that land management plans and activities be consistent with approved recovery plans and conservation strategies.
- Collaborate with other federal agencies, states, tribes and local watershed groups in the development of watershed plans for both federal and non federal lands and cooperate in priority restoration projects by providing technical assistance, dissemination of information and allocation of staff, equipment and funds.
- Share information, technology and expertise, and pool resources, in order to make and implement better-informed decisions related to ecosystems and adaptive management across jurisdictional boundaries.
- Collaborate with other federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both federal and non-federal lands.
- Collaborate with other federal agencies, states and tribes in monitoring efforts to assess if habitat performance measures and standards are being met.
- Require that land management decisions be made as part of an ongoing process of planning, implementation, monitoring and evaluation. Incorporate new knowledge into management through adaptive management.
- Enhance the existing organizational structure with an interagency basin-wide coordinating group and a number of sub-regional interagency coordinating committees. These coordinating groups and committees will ensure the implementation of ecosystem-based management across federal agencies' administrative boundaries, resolve implementation issues, be responsible for data management and monitoring, and incorporate new information through adaptive management.

Mainstem habitat

1. Scope and background.

One of the important elements of the Independent Science Group's *Return to the River* report was the hypothesis that important gains in salmon productivity could come from increases in mainstem spawning and rearing habitat. The federal agencies will take immediate steps to test this hypothesis by improving mainstem habitats of the Snake River downstream of Weiser, Idaho, the Columbia River extending from Chief Joseph Dam to Bonneville Dam, and the Willamette River below the Corps' multipurpose projects, and evaluating the results. The Columbia River mainstem below Bonneville Dam is discussed in the next section, Estuary Habitat.

A recent report by Battelle Pacific Northwest National Laboratory and the U.S. Geological Survey's Western Fisheries Research Center. The report assesses the extent of riverine habitat lost to hydropower development, identifies the types of habitat modifications that have occurred as a result of lost habitat, and
suggests areas or actions with most potential to restore mainstem riverine habitat. The report identified three river reaches, all downstream of present migration barriers, as having high potential for restoration of
riverine processes: the Columbia River upstream of John Day Dam; the Columbia-Snake-Yakima river confluences; and the lower Snake River upstream of Little Goose Dam. The report noted that no systematic assessment of habitat modifications from dam construction has been done, and that potential restoration sites and/or specific benefits to salmon and steelhead have not been identified.

Other mainstem reaches have different needs and opportunities for improvement:

- *Willamette River*: Prior to European settlement, the river had five channels set in a wide, partially forested floodplain with many alcoves, sloughs, ponds, lakes and side-channels. Navigation channels down-cut the riverbed and drained sloughs and channels. Today, the river runs mostly free, constrained by high banks and terraces. All large water development projects, primarily intended for flood control, are located on tributaries.
- *Columbia River between Chief Joseph and Bonneville Dams*: This reach is deeply incised between basalt cliffs and mountains, or constrained by basalt hills and cobble/gravel terraces. The substrate is predominately cobble and gravel with compacted sands. Before settlement, it was a series of pools interspersed between islands, gravel bars and rapids. There was little riparian vegetation except where the river was wide, on islands and in confluence areas. Except for the Hanford Reach, the reach is now largely a series of pools. Water development projects in the reach are run-of-the-river with little water storage capacity. Vegetated areas are largely integrated into wildlife management areas and refuges.

- *Snake River below Weiser, Idaho:* Before development, the lower Snake River was severely incised, with boulders, cobble, gravel and sand substrates. Water elevations would vary as much as 25 feet, limiting riparian vegetation. Today, the reach is primarily a series of pools from the upstream limit of the McNary pool to Lewiston, Idaho. The heavy sediment loads resulting from slow flows, proximity to the dams, and loss of shallow water habitat have adversely affected the diversity, distribution and abundance of aquatic invertebrates below the confluence areas.

Habitat use by salmonids. As the Battelle-USGS report finds, large-scale water development over the last 65 years has inundated and degraded mainstem habitat on a significant scale. Some populations such as fall chinook were highly productive historically, and spawned largely in the mainstem and in the lower reaches of major tributaries. With current development, however, mainstem habitat characteristics and salmonid use are difficult to survey, sample, monitor and evaluate. As a result, we lack basic information on mainstem distribution and abundance of fish and their use – or potential use – of the mainstem habitats. We also lack protocols for studies, monitoring and evaluation, and reference sites to monitor and evaluate changes.

Information needs. Scientists understand how salmonids use and respond to the biotic, physical and chemical attributes of small streams and rivers, but have only limited knowledge of their uses and responses in large rivers, especially those in the Columbia River Basin. However, studies in other river systems in the Pacific Northwest indicate that mainstem habitat improvements can result in greater diversity, complexity and productivity. One of the threshold questions that must be addressed in designing a mainstem habitat program is the relationship of the size of an improvement to the size of the affected environment. While we can predict the response in diversity, complexity and function when we undertake a stream improvement, can we expect a comparable response in a much larger mainstem system?

2. <u>Action plan</u>.

The mainstem habitat program will: 1) develop a baseline data set; 2) develop and implement a habitat improvement plan that, insofar as possible, mimics the range and diversity of historic habitat conditions; and 3) develop and implement a rigorous monitoring and evaluation action plan that may lead to changes in the mainstem habitat program. These three actions are essential if we are to accurately assess the value of mainstem habitats to salmon and salmon recovery. Given the uncertainties, our approach begins with an assessment of the value and contribution of habitat system components to fish and water quality, and identification of cause-and-effect relationships between improvement actions and fish response.

In the Columbia mainstem above Bonneville Dam, habitat work will be undertaken largely by BPA as lead agency, working with the Bureau of Reclamation, Corps, Environmental Protection Agency, and the U. S. Geological Survey. Two Public Utility Districts (Chelan County and Grant County) have initiated habitat studies in the Mid-Columbia River. State and local government will be involved in activities in the Willamette.

More specifically:

A. Research priorities:

- Review historic habitat conditions.
- Given that a complete survey of conditions will be a large task and take considerable time, and the immediate need to help listed species, the research program will select a set of sampling reaches that can be used to characterize the mainstems. Data collection at these sites will be used to describe cause-and-effect relationships and to monitor future health and productivity. At least one site will be established in each of the impoundments below Chief Joseph Dam and Weiser, Idaho; three sites will be selected in the Willamette River (one below Eugene, one below Salem and one above the Multnomah Channel); at least three sites will be selected in the Columbia – above the Sandy River confluence, below the Multnomah Channel confluence, and below the Cowlitz River confluence. In identifying sites, the Battelle-USGS study will be carefully considered.
- Survey current bathymetric and topographical conditions (bottom of the channel to the top of the first bench or cliff above the 100-year floodplain), including substrate, water quality and quantity, nutrients; organic and benthic macroalgae availability, macro-invertebrates, fish, rooted aquatic plants, riparian vegetation and climate data.
- Identify further research needs based on monitoring at sampling reaches.

Lead agencies: BPA (lead), Corps, USGS, EPA, BR, NMFS
Objective: Identify sampling reaches; survey conditions; describe cause-and-effect relationships; identify research needs.
Timing: Begin October 2000

B. Immediate (I) and long-term (L-T) habitat improvement priorities for mainstem reaches generally:

- Excavate backwater sloughs, silted-in lateral channels, restore or create alcoves and side channels and create islands and shallow-water areas, to provide habitat adjacent to the main channels suitable for spawning, incubation, rearing, resting and predator cover. (I, L-T)
- Allow for reconnection of alcoves, sloughs and side channels to the main channel twice a year
- Reestablish and enhance historic and existing wetlands. (I, L-T)
- Stabilize reservoir water levels. Specifically, reduce daily and weekly fluctuations to improve productivity of existing shallow-water areas; enhance mainstem flows during critical periods to improve productivity of existing wooded wetlands, lakes, ponds, slough and alcoves. (I)
- Acquire from willing sellers a 100- to 325- foot land corridor in selected areas adjacent to the mainstems to allow for natural restoration; acquire other habitat through purchase, lease, easement or other means, to protect critical habitat. (I)

- Plant riparian and aquatic plants at appropriate locations. (L-T)
- Add large woody debris to increase organic material and enhance smolt habitat conditions by increasing pools and riffles, escape cover, a sediment sink and a nutrient source for macroinvertebrates. (I)
- Address non-point pollution from agricultural and urban runoff, improve animal management in shoreline areas, reduce pesticide and fertilizer use and improve stormwater treatment. (I)
- Complete TMDL compliance. (L-T)
- Develop and implement a monitoring and evaluation program. (I)
- Use information from sampling reaches to develop plans for other reaches. (L-T)

C. Habitat improvement action priorities by reach:

- Willamette River: Create and enhance alcoves, sloughs, marshes and other shallow water habitats; add large woody debris, especially in sand environments; improve water level management; acquire/protect shoreline corridors; reduce fertilizer use; improve flow management to enhance productivity of wooded wetlands.
- Snake River: Reduce and stabilize water level fluctuations, especially in lower river reservoirs; add large woody debris; enhance lake, slough and side channel connections to the main channel; create/enhance shallow-water areas in reservoirs, particularly near dam forebays and submerged benches and hillsides; acquire/protect/restore shoreline corridors around tributary confluence areas in the reservoirs to preserve riparian vegetation and prevent/control siltation problems; vegetate newly created/protected sites.
- Columbia River (Chief Joseph Dam to Bonneville Dam): Add large woody debris; create shallow water areas; enhance alcove, slough and side channel connections to the main channel; establish emergent aquatic plants in shallow water areas; stabilize reservoir water levels.

Lead agency: BPA (lead), Corps, NRCS (funding); EPA (water quality)
Objectives: Restore habitat; acquire riparian corridors; modify flow regimes; reduce non-point pollution; develop improvement plans for all reaches.
Timing: 200l-2012

Estuary habitat

1. Scope and background.

The Columbia River estuary extends from the ocean to Bonneville Dam at river mile 146. The estuary is where the river and migratory fish make the transition between salt and freshwater. In fact, the estuary is formed and modified continuously based on complex biological and physical interactions such as type and value of habitat, river flow, bathymetry (depth), and other physical processes such as sediment transport, which impact habitat access and quality for salmon. In

addition, there is evidence that the Columbia River plume (fresh water flowing west of the River's mouth) may extend biological and physical estuarine habitat features that are critical to salmon survival. The plume may also provide a unique salmon habitat through its interaction with the California Current and local ocean conditions off the mouth of the Columbia River.

A combination of natural and human-caused factors have changed the Columbia River estuary. Natural sediment accretion causes gradual uplifting, which converts marsh to willow and spruce swamp. Swamp-dominated floodplain is the end product of the estuarine process. Construction and operations of the federal hydropower system in the upper portion of the river, construction and maintenance dredging of the federal navigation channel in lower portion of the river, diking and filling of wetlands and other development have: caused extensive loss of tidal swamps, marshes, and emergent and forested wetlands; isolated tidal channels; reduced total sediment discharge by one-third; increased potential for salmon predation through disposal of dredged material; reduced the extent, speed, thickness, and turbidity of the River's plume; degraded water quality; altered the timing and volume of natural flow; and reduced flooding. Overall, these changes have simplified estuary habitat and changed water salinity, temperature and velocity. All of these problems can constrain salmon production.

While all Pacific salmon species use the estuary, the nature, degree and duration of use varies considerably, and this usage is the key factor in assessing the benefit to be gained from estuarine habitat actions. Historical evidence shows that juvenile salmon used the estuary for extended periods of time (from March to October at least, and very nearly the entire year). Some juvenile salmon populations experience 50 to 100% growth during residence in the estuary from April through August.

Hatcheries practices influence how juvenile fish use the estuary. Hatchery stock run times are much more compressed than those for native stocks. The scientific evidence also suggests that hatchery fish primarily use the channel margins, while native stocks tend to use the tidal and emergent forested marshlands. Hatchery fish traveling through the estuary to the ocean show no evidence of growth comparable to that observed in native fish. Restoration efforts must take these differences into account.

The lower river is also complex institutionally, with 19 federal agencies, 22 state agencies, 14 regional entities, 37 local governments, 14 ports, 4 treaty tribes and 44 non-governmental organizations involved to varying extents in managing, regulating, using and planning for the area. The Corps (permitting), NMFS and FWS (biological opinions and incidental take permits), BPA (hydropower operations and mitigation funding), EPA (Clean Water Act regulation), the Lower Columbia River Estuary Program (planning and coordination), the Northwest Power Planning Council (project funding and sub-basin planning), the Port of Portland (mitigation action associated with development), the Columbia River tribes (trust and treaty interests) and the states of Washington and Oregon (regulatory actions and LCREP participation), are all actively involved in estuary programs. Improved coordination among jurisdictions would minimize competing, uncoordinated or conflicting plans and programs, foster timely policy decisions, facilitate actions and reduce habitat improvement costs.

2. Action Plan

Estuary protection and restoration must play a vital role in rebuilding the productivity of salmon runs throughout the Columbia Basin. The states of Oregon and Washington, with congressional authorization under the Clean Water Act, have developed a management plan to help rebuild the estuary through the Lower Columbia River Estuary Program (LCREP). The federal agencies strongly support this plan as a starting point for the estuary's contribution to salmon recovery, seek to expand on it, and commit to help implement an aggressive estuary program. In 1999, the LCREP completed a consensus-based Comprehensive Conservation and Management Plan to provide a framework for managing and protecting the lower Columbia River and estuary. The plan aims to guide actions by federal, state, local and tribal governments and non-governmental interests to preserve and enhance habitat and water quality. The plan has established a foundation, and will have a permanent Implementation Committee in place in late 2000 (Mgt. Plan Action 13). Actions 1 through 6 are based largely on the Management Plan's recommendations. Federal programs are also engaged in habitat acquisition activities in the estuary and should be coordinated in the implementation process. Under the North American Waterfowl Management Plan, a program called Pacific Coastal Joint Ventures Plan is acquiring waterfowl habitat and exploring associated anadromous fish habitat. The Partners for Fish and Wildlife Program administered by FWS works with private landowners to restore wetlands. The Coastal Program administered by FWS has funds for habitat acquisition.

A. Mapping: Inventory estuary habitat; model physical and biological features of the historical lower river and estuary; and develop restoration criteria (Mgt. Plan Action I and general study).

Lead agency: LCREP and Corps (general investigation study)
Schedule: 2001

B. Adapt current plan to the specific ecological needs of salmon:

- Building on the LCREP plan, establish clear goals for salmon conservation in estuary to support the full range of salmon life history types
- Identify habitats whose characteristics and diversity support salmon productivity, and important connections among them
- Identify potential performance measures (see 5.2.4.3, below)
- Identify flow requirements necessary to support estuarine habitat requirements for salmon
- Include a concurrent program of research, monitoring and evaluation

Leads: LCREP, working with NMFS (federal lead) and non-federal parties
Schedule: 2001-2002

C. Habitat acquisition and restoration: Protect identified high quality habitats (Mgt. Plan Action 2) and restoring habitat through an aggressive ten-year acquisition and restoration program. The acquisition program will be administered by the LCREP's non-profit entity. The program's purpose would be to anchor a band of high-quality habitat on both sides of the river to support salmon rebuilding. A high priority should be put on restoring 10,000 acres of tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles (as more information is acquired, the target acreage will be revised). Federal agencies will provide key technical assistance and financial support. Restoration priorities should include:

- Acquiring rights to diked lands and breach levees at these sites
- Improving wetlands and aquatic plant communities
- Enhancing moist soil and wooded wetland via better management of river flows
- Re-establishing flow patterns that have been altered by causeways
- Supplementing nutrient base by importing nutrient-rich sediments and large woody debris into the estuary
- Modifying abundance and distribution of predators by altering their habitat
- Creating wetland habitats in sand flats between the north and south channels
- Creating shallow channels in inter-tidal areas
- Enhancing connections between lakes, sloughs, side channels and the main channel

Objective: anchor habitat on both sides of the river to support salmon recovery, including 10,000 acres of tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles.
Leads: States of Oregon and Washington with non-profit entity, federal lead FWS
Schedule: begin 2001, complete by 2010

D. Floodplain restoration. Remove structures that inhibit restoration of priority flood plain habitat; construct setback levees to protect important farmland and structures while partially restoring flood plain.

Leads: LCREP, FEMA, NRCS, working with state conservation districts
Schedule: 2001-2010

E. Predator control.

Lead agency: Corps, with FWS, NPPC (research funding); State resource agencies
Objective: Significantly reduce Caspian tern and cormorant predation on salmonids.
Scope and Timing: Short term: preclude Caspian Tern nesting on Rice Island. Intermediate term: prevent tern nesting on disposal islands around Rice island and prevent cormorant use of Corps-maintained pile dikes. Long-term – disperse tern population to range of historic nesting in Pacific states.

G. Information management and public education: Build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

Leads: LCREP-designated entity, with support from FWS, NPS, NMFS, CORPS, Sea Grant, Marine and Environmental Research and Training Station, Columbia River Estuary Study Task Force
Schedule: 2001-2010

H. Science.

- Implement a major monitoring and research program to estuary ecosystem the estuary and evaluate the efficacy of management actions to rebuild the productivity of the system over the long term. (Mgt. Plan Action 28)

Leads: Federal and state science entities and LCREP, expanding on LCREP monitoring plan.
Schedule: 2001-2010

- Develop a conceptual model focusing on critical linkages between estuarine conditions and salmon population structure and resilience to assess estuarine influence on salmon populations in the Columbia River. The model will highlight linkages that are likely impacted by upper river hydropower and water management and identify information gaps that need to be addressed in developing recommendations for FCRPS management and operations. (Ongoing)

Lead agencies: NMFS, BPA
Objective: A model of critical linkages between estuary conditions and salmon population structure and resilience for the Columbia River system.
Scope and timing: 1999 - 2000
State support: Oregon Department of Fish and Wildlife, University of Washington
Other support: Oregon Graduate Institute of Science and Technology

3. Performance measures and monitoring and evaluation

The federal agencies will develop performance measures for these actions using a similar approach as outlined for tributaries (see section 5.2.2.2.B):

Three broad habitat characteristics limit species productivity in the estuary: (1) shallow water habitats in the tidal freshwater reaches of the estuary, (2) oligohaline areas of the estuary such as emergent forested marsh lands, tidal marsh lands, and tidal channels, and (3) connectivity and diversity of estuarine habitat. In the planning process (see 2.B, above), the agencies will work with non-federal partners to develop a more detailed description of the three habitat categories, focusing on their function and value to the survival and recovery of anadromous fish.

Performance measures linking changes in these characteristics to expected biological responses will be developed based on testable hypotheses. The hypotheses will help organize modeling and restoration work, and establish a framework for monitoring, evaluation and research. These hypotheses will relate to such matters as:

- Individual habitats whose characteristics support salmon productivity
- Physical and biological connections among functioning habitats to improve ecological value
- Diversity of habitats needed to support a full range of life history types in the estuary
- Flow requirements needed to support estuarine habitat for salmon.

Leads: Federal and state science entities, working in LCREP planning process described in 2.B, above.
Schedule: 2001-2002

Information from monitoring, evaluation and research developed in the 2.B planning process will provide information with which to measure progress, refine hypotheses and adjust habitat actions.

4. Coordination

Infrastructure for Implementation.

A. Inter-agency and inter-jurisdictional coordination: the Federal Habitat Team.

Clear, regular and predictable lines of coordination between federal natural resource agencies need to be established at the basin scale in order for federal efforts to interact productively with state, tribal and local habitat initiatives. There should be many opportunities to coordinate habitat initiatives to maximize their effectiveness. The federal agencies propose to ensure this coordination through a Federal Habitat Team. The team will ensure consistency among federal agencies and coordinate at the basin level with non-federal entities and programs. By proposing a basin-scale coordination arrangement, the federal agencies do not at all suggest that habitat initiatives should be driven solely from the top down, however. Habitat recovery must also come from the watershed up. Effective habitat planning should integrate local, watershed thinking and basin-wide goals and constraints. Federal agencies need to work together to communicate effectively with state and tribal governments at the basin-scale, and to develop ways to support local watershed efforts.

With this in mind, the federal agencies—the U. S. Forest Service, Bureau of Land Management, Bonneville Power Administration, Natural Resource Conservation Service, National Marine Fisheries Service, Fish and Wildlife Service, Environmental Protection Agency, Bureau of Indian Affairs, U. S. Geological Survey, Army Corps of Engineers and Bureau of Reclamation—

propose to enter into a memorandum of agreement by December 2000, to accomplish the following functions:

Coordinate among federal agency habitat programs.

- Coordinate with those doing biological feasibility assessments (ESU by ESU and sub-basin by sub-basin) to achieve targeted improvements in salmonid habitat.
- Ensure that federal agency priorities are clear and that policies are interpreted in a consistent and coordinated manner.
- Coordinate budgeting among federal agencies to ensure efficiency and focus resources where they can best achieve targets.
- Ensure use of common watershed and subbasin assessment, planning, and monitoring and evaluation protocols.
- Provide for dispute resolution among federal agencies by, e.g., establishing a pool of respected agency and non-agency professionals, from which dispute resolution panels could be drawn.
- Link and share data: the federal agencies should facilitate the collection of habitat data for monitoring, ensure that it is supplied to parties responsible for monitoring and evaluation, and ensure its widespread availability.

Coordinate with nonfederal entities.

- At the basin scale, work with state, tribal and local governments and other entities in forums such as the Columbia Basin Forum and/or the Northwest Power Planning Council, and/or other forums that states and tribes prefer.
- Establish clear understandings with states and tribes regarding roles and responsibilities for executing the programs described above.
- Coordinate federal funding with non-federal budget processes, especially the Northwest Power Planning Council's prioritization process, the Bonneville fish and wildlife funding memorandum of agreement, and other budget mechanisms.
- Expand the availability of coordinated federal funding and technical support for local watershed programs.
- Ensure use and implementation of common watershed and subbasin assessment, planning, and monitoring and evaluation protocols.
- Streamline ESA and Clean Water Act compliance processes.

Support research, monitoring and evaluation. The federal agencies propose to ascertain and report federal agency progress in carrying out habitat initiatives, including the availability of resources and implications for the agencies' ability to carry out this strategy. These reports would also be geared to support long-term biological monitoring to assess the contribution of habitat improvements to improvements in population growth rates or other biological indicators.

Implementation. To accomplish this work, the federal agencies propose to dedicate senior staff with authority to carry out coordination functions, resolve implementation issues, and

organize sub-groups to address technical implementation issues. This group would be aided by appropriate levels of financial and staff support.

Lead agency: Interior, NMFS, BPA
Objective: Develop memorandum of understanding by October 2000.

Improving habitat in the lower Columbia River estuary on a broad scale presents a significant governmental and management challenge. To spark debate on the best way to manage the challenge, the federal agencies will consult with the states of Oregon and Washington and the Lower Columbia River Estuary Program to consider alternative means to structure, fund and manage a long-term habitat improvement action program. The agenda will include:

- Preparing a detailed list of tasks, with schedules and estimated costs
- Reviewing the responsibilities and authorities of agencies with jurisdiction and expertise, and preliminary identification of one or more lead entities
- Identifying gaps in structure and authority that must be addressed

Leads: *Ad hoc* group organized by LCREP, NMFS, Oregon and Washington
Schedule: Prepare and circulate a draft report for review by 2001

Analysis of Habitat Element:

1. Tributary subbasins.

The extensive program proposed for protecting and restoring the productivity of tributary habitat is premised upon the conclusion that securing the health of these habitats will boost the productivity of listed stocks. Tributary sub-basin data tend to confirm the hypothesis that an effective habitat program could significantly improve tributary habitat productivity over the long term for all ESUs except Snake River fall chinook. A synopsis of those data follows.

Estimates of potential tributary habitat improvement provide a general idea of the range of possible improvement in freshwater habitat productivity from an effective habitat program such as would come from a well-executed sub-basin and watershed assessment and planning process (which will include the estuary). The estimates in Table A were derived from the Northwest Power Planning Council's sub-basin planning data. (The method of deriving these estimates is described in more detail in Volume 2.) Table A shows the potential improvements in smolt production possible if habitat (as rated by subbasin planners) were improved from fair to good.

TABLE A

ESU	Range of incremental increase in smolt production (%)
Snake River	0-80 (Sp/Summer Chinook) 0-35 (Steelhead)
Upper Columbia	47-78 (Spring chinook) 0-45 (Steelhead)
Middle Columbia Steelhead	1-36
Lower Columbia	0-46 (Chinook) 1-34 (Steelhead)
Upper Willamette	3-80 (Chinook) 4-41 (Steelhead)

The Salmon River Basin provides a way to check these estimates and illustrates how habitat strategies can be identified at a finer scale. In the Salmon River Basin, NMFS conducted a finer-scale analysis that relates salmon production to certain habitat characteristics and land use patterns (Feist et al. in prep). That analysis shows lower abundance of salmon redds (nests) where there are more than 2 water diversions per 100 square kilometers and where grazing occurs. If impacts associated with diversions in these subbasins were corrected, there could be an improvement in average redd abundance of about 5 percent (1300 redds). Increases could be as high as 32 percent. If impacts associated with grazing were corrected, there would be an improvement in average redd abundance there could be an improvement in average redd abundance of about 9 percent, with increases potentially as high as 69 percent. Table B summarizes the results of the NMFS analysis.

TABLE B

	Current estimated redd capacity	Additional redds if habitat factor is corrected	
		Median (% increase)	95th Percentile (% increase)
Diversions	25,000	1273 (5%)	8019 (32%)
Grazing	25,000	2182 (9%)	17,276 (69%)
Total	25,000	3455 (14%)	25,295 (101%)

Grazing intensity negatively related to salmon abundance in the Salmon River basin. Locations where more that 25% of the area was designated for grazing consistently had fewer salmon than areas with less grazing pressure. Using the same approach for grazing land as was applied to diversions, correcting grazing impacts in the Salmon River Basin would generate an increase of 9% to median (2100 redds), or 69% to the 95th percentile (17,200 redds). If both diversion and grazing impacts were addressed, the total increase would range from 14% to 101%.

The National Marine Fisheries Service fully recognizes that these data are limited and projections must be approached with caution. NMFS and the other agencies therefore commit to refine these estimates through the sub-basin and watershed assessments and verify them through monitoring and evaluation as proposed below. These data nevertheless represent the best data available and provide a reasonable basis to estimate the potential for habitat improvement basin-wide. Sub-basin and watershed assessment and planning will calibrate these estimates and target habitat strategies to the circumstances of individual sub-basins and watersheds.

To develop these estimates, we reviewed historic data from Fulton and the systematic survey of anadromous fish production capacity that was developed as part of the Northwest Power Planning Council System/Sub-basin Planning effort in the late 1980's. We calculated the total smolt production in each sub-basin rated by system/sub-basin planners as “fair,” and asked what the change in smolt production would be if those sub-basins were improved and maintained to “good” through protection and restoration. We estimated the potential change in smolt production by multiplying the increment of smolt production currently rated “fair” by a factor of 1.8 (the ratio of smolt capacity rated “good” to that rated “fair”). The increment of improvement in smolt capacity divided by the original total for a sub-basin is an estimate of the relative contribution of the improvement.

We draw several lessons from this analysis. First, the analysis is generally consistent with the ranges shown in the sub-basin planning data. Second, the analysis provides an example of how sub-basin assessments can guide habitat strategies. In the Salmon River Basin, analysis points to strategies that correct problems associated with water diversions and grazing. Third, the analysis suggests a way to estimate short- and long-term benefits from different restoration strategies. For purposes of estimating short-term gain, the Salmon River Basin data of interest relate to diversions rather than grazing because correcting water diversion-related problems can be expected to produce shorter-term benefits and correcting grazing-related problems would not. If habitat problems related to water diversions were corrected in priority sub-basins, data from the Salmon River Sub-basin suggest that we could expect a 5-32% increase in habitat productivity in those sub-basins. In relatively pristine habitat, we would expect less potential for improvement, while in sub-basins with poorer habitat we would expect relatively high potential for improvement. However, addressing grazing-related problems could produce even greater improvement over the longer term, and so it is also important to continue and expand on efforts to reduce grazing pressure in the Salmon River Basin in the short term.

The percentage increases in the Salmon River analysis are of most use for our purposes, while the redd counts per se are not. The Salmon River analysis used Idaho Fish and Game redd counts from 1960-77, a period when chinook populations were relatively stable in that basin. These data were used because the relationships between habitat quality and salmon abundance are more clearly expressed at higher fish densities. After 1977, concentrations in chinook populations and redd densities declined coincident with changes in hydropower development, hatchery production and climate. However, the predicted proportional increase in redd abundance (Table A) should still reflect the relative improvement possible with habitat actions. Habitat effects related to water diversion and certain impacts associated with grazing affect mortality rates of salmon in a density-independent manner. De-watering a channel or generation of lethal water temperatures will eliminate virtually all fish inhabiting a stream reach. Therefore, correcting these types of problems should have a consistent, beneficial effect on salmon population performance regardless of the current population density. If the Salmon River analysis had used recent redd counts, increases in numbers of redds would be much smaller even though we would expect the percentage change to be in the same range.

In some cases there may be opportunities to restore high quality habitat conditions in areas used for summer rearing and overwintering by production from one or more upstream areas. Recent work with Oregon coastal coho, a stock with similar early life history characteristics to Snake River spring chinook, showed significant gains in survival following improvements in such habitat (Solazzi et al, 2000).

The habitat program is crafted to respond to these preliminary analyses. In the Conceptual Recovery Plan, the agencies identified sub-basins with significant amounts of habitat shown as “fair” in the sub-basin planning data (where productive capacity could be increased by improving the habitat to “good” condition), significant amounts of strong federal habitat (an anchor for restoration efforts), and significant numbers of water diversions (where addressing flow, passage and screening problems could produce short-term benefits). In these sub-basins,

the Salmon River Basin analysis suggests that focusing resources on protecting productive habitat and addressing water quantity and passage would maximize short-term gains.

The longer-term strategy is aimed at extending the type of analysis that was done in the Salmon River Basin to the basin as a whole, through sub-basin and watershed assessments. With those assessments, specific strategies can be designed for specific sub-basins and watersheds. Given differences in the landscape, these strategies are likely to differ from those suggested in the Salmon River Basin. However, sub-basin and watershed assessment and planning should lead to strategies that respond appropriately to conditions in particular areas. Moreover, the program calls for research, monitoring and evaluation to enable managers and policy makers to make mid-course corrections. As initial assumptions about habitat potential are refined, and as experience with program effectiveness accrues, priorities and programs can be revised.

Performance standards and measures will play a critical role in assuring that the habitat program is properly focused and delivering expected benefits:

- Above, we make preliminary estimates of the potential to improve habitat productivity basin-wide, and potential short-term effects of measures in priority sub-basins.
- The All-H program identifies habitat attributes that can serve as performance measures: in-stream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity; and habitat access.
- The federal agencies, working with CRI, Watershed Process Program, and EDT analysts, will establish hypotheses regarding the effect of strategies and actions on these habitat attributes.
- The federal agencies will establish an initial set of performance standards for achievement of habitat attributes and for achievement of management actions (for example, standards for number of actions taken within a given time frame). Standards for habitat attributes will be described in terms of desired trends.
- Initial performance standards will be developed and refined through sub-basin assessments and finer-scale analysis. Sub-basin assessments will take advantage of available tools for evaluating habitat quality and quantity and salmon productivity, including EDT, HVSP and CRI analysis.
- Performance standards will be integrated into a monitoring and evaluation program that tests and improves measures and standards through targeted research, enables policy makers to evaluate and refine hypotheses, make adjustments to habitat measures, and make further decisions on the contribution of habitat protection and restoration to recovery.

2. The Estuary

The CRI and other analyses strongly suggest that significant opportunities exist for securing additional improvements in overall population trends by reducing the substantial mortality in the estuarine and early ocean life stages. Improving estuarine conditions has the added benefit of potentially benefiting all stocks within the Columbia River Basin. Studies in the Skagit River

estuary tend to confirm the hypothesis that increasing estuarine habitat quantity and quality on the Columbia River would have a significantly positive effect on salmon survival. These studies, which involve subyearling chinook in the Skagit River in Washington, provide the only recent data with which to evaluate potential productivity increases from restoring estuarine habitat. The Skagit analysis suggests that estuarine habitat is an important bottleneck in the productive capacity of the Skagit system as a whole. There, for every hectare of high-quality estuarine habitat that may be restored, there is a projected increase of 22,000 smolts in the system's production overall -- a significant increase in survival.

All Columbia Basin salmon and steelhead pass through the estuary and are affected to some degree by conditions there. Humans have affected the Columbia and Skagit River habitats in a similar manner. Restoration actions taken on the Columbia River estuary are likely to have similar benefits for salmon survival, although the magnitude of increase may be different from that predicted for the Skagit. Snake River fall chinook are likely to benefit more from estuarine restoration in because they spend more time in the estuary. It is unclear whether the potential for increasing high-quality habitat in the Columbia estuary is as significant as that in the Skagit. For these reasons, the program concludes that increasing estuarine habitat quantity and quality on the Columbia River will have a considerable but unquantifiable effect on survival of all Columbia basin ESUs. Further monitoring and evaluation will allow better quantification of benefits.

The estuary element of the habitat program aims to maximize improvements for listed ESUs by building on the existing program of the Lower Columbia River Estuary Program, concentrating and refining LCREP's focus on listed species, and expanding the program to target habitat types that are most likely to benefit listed ESUs. Performance standards will be developed through logic similar to that described in the tributary habitat section.

3. Predation

Avian predation of salmon smolts in the Columbia River estuary remains significant, and the program anticipates a continued major effort to reduce predation-related mortality. Monitoring of bird populations in estuary has occurred from 1987 through 1999. Recent estimates of predation (1998 and 1999) show that 2.3 - 2.8% of the yearling chinook salmon and 11.3 - 16.4% of the steelhead. These estimates are for PIT tagged fish that were detected at Bonneville Dam and then the PIT tags were detected at bird nesting sites. The majority of these detections were from the Rice Island Caspian tern population, where 1.4 to 2.0% of the chinook salmon and 9.8 to 13.8% of the steelhead detected at Bonneville Dam were detected. These are conservative estimates of mortality because they account only for those PIT tags that were deposited on the nesting sites and not over water. These was no difference in the vulnerability of hatchery and wild steelhead to bird predation in 1998 and 1999. Hatchery chinook salmon were taken at 2.6 and 3.9 times the rate of wild Chinook salmon in 1998 and 1999, respectively. There was no difference in the vulnerability between barged and in-river migrating chinook salmon.

This empirical evidence shows that avian predation in the estuary is substantial. Quantitative salmonid life cycle modeling has been conducted recently to assess and partition the importance of survival downstream from Bonneville Dam to the overall life cycle. Sensitivity analyses

suggest that reducing mortality at early life stages, including in the estuary had a large potential to improve population growth rate. Reducing avian predation could contribute significantly. Efforts are underway to encourage the Caspian tern colony to migrate from Rice Island to East Sand. Monitoring of predation continues. The high level of mortality that is occurring below Bonneville Dam, especially for steelhead, shows that estuarine restoration efforts addressing mitigation of avian predation could have a substantial effect.

2. Harvest Element of the Conceptual Recovery Plan

Determining an appropriate harvest option poses difficult challenges. While it is intuitively obvious that killing fewer listed fish would be better, the weak runs are frequently intermingled with stronger runs in the same fisheries. Thus, reductions in a fishery to save a few fish from weak stocks can mean foregoing the harvest of a great many fish from the stronger runs. Most of the harvest of Columbia Basin fish today occurs in treaty-protected tribal fisheries. Nevertheless, state, tribal, and federal fishery managers have been successful in recent years at implementing many harvest reforms to reduce chronic overfishing of weak stocks, such as discontinuing the formerly-widespread practice of managing mixed stock fisheries for hatchery fish. Where fisheries affect listed stocks, NMFS has used its authorities under the ESA to impose additional, even tighter restrictions to protect those stocks. The general thrust of the harvest option presented in the Conceptual Recovery Plan is to embrace the harvest reforms that have occurred and, to the extent possible, develop, test, and implement additional reforms were necessary and appropriate.

Harvest reductions produce immediate increases in spawning escapement, thereby reducing the near-term risks of extinction more quickly and certainly than other conservation measures. However, larger escapements have relatively little impact on the capacity of the environment to produce fish if that capacity has been reduced due to habitat degradation. Once chronic overfishing has been eliminated – as it largely has been – additional harvest reductions mainly buy time for management measures in the other H's to take effect. Based on our analysis, we have concluded that a large number of the listed natural stocks have a high risk of extinction. The harvest rates recommended herein are based on those conclusions and our best judgment about what the wild stocks can withstand.

Overall Approach

The recommended harvest option is to cap harvest rates at recent levels and, in some cases, aggressively pursue opportunities to reduce them even further. In mixed stock fisheries – places where natural and strong stocks are intermingled – the harvest rates must be based on the abundance of the weakest natural stocks, not on surplus hatchery or strong natural stocks. The harvest rate caps represent ceilings on the incidental harvest of listed stocks; they are not intended to represent catch entitlements nor to sanction any particular level of incidental harvest when lesser impacts are feasible and practical. Opportunities would continue to be identified, developed, and pursued to further reduce impacts on listed ESUs by, for example, developing alternative harvest methodologies that enable a broader range of selective fisheries.

Specifics of the recommended approach are described in subsequent sections separately for ocean and freshwater fisheries, reflecting differences in affected fisheries and ESUs. In general, the recommended approach most closely resembles "Option 2" from the December 1999 draft of the Conceptual Recovery Plan. Ocean harvest levels would be set consistent with the new

fishery regimes negotiated and approved in 1999 by the United States and Canada under the Pacific Salmon Treaty (PST). In the Columbia River mainstem and other freshwater fisheries, the harvest rate limitations approved under the ESA for the 1999 fall season and 2000 spring season fisheries would continue until such time as recovery efforts led to demonstrable improvements in the status of the listed ESUs. The many details associated with managing in-river fisheries consistent with these guidelines should be developed by the applicable parties within the U.S. v Oregon forum.

Although the measures described herein define the basic parameters applicable to the harvest sector, opportunities for reducing harvest rates even further for several of the listed ESUs should continue to be pursued in cooperation with relevant fishery managers. There is no doubt that it will take a number of years before recovery measures in the non-harvest sectors have fully borne fruit. Therefore, the most likely and immediate source of relief from tight harvest restrictions lies in achieving greater catch selectivity, either through use of more selective fishing gear or by expanding fishing opportunities in known-stock, terminal areas. Accordingly, the fishery managers and the FCRPS action agencies should work together to implement an aggressive program for identifying, developing and implementing such opportunities. An improved fishery monitoring and evaluation program to support an adaptive approach to harvest management will be a critical part of the program. Over time, those efforts should provide additional benefits both to listed species and fisheries. As recovery progresses, controlled and modest increases in harvest rates in years of greater abundance may be appropriate, provided the recovery effort is not unduly impeded.

Tribal harvest considerations

Any plan or policies affecting 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 impacts the exercise of tribal fishing rights, presenting a major policy challenge for the region. The federal government has a trust obligation to uphold and protect those rights. (See the section on Government to Government Consultations for a further description of the nature and importance of this obligation.)

The Conceptual Recovery Plan attempts to balance the conservation of listed 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 Conceptual Recovery 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 Conceptual Recovery Plan again recommends allowing a level of tribal harvest that respects the trust obligation, even though it means

tolerating some additional risk and/or slowing the pace of recovery. Additionally, the Conceptual Recovery Plan 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. It is noted that in some situations, tribal catch could be substantially increased if the tribes were to expand their use of selective fishing methods.

It will no doubt be the focus of on-going government-to-government discussions between the tribes and the federal government to sort out whether the approach described herein 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. Their willingness 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 it allocates the conservation burden.

Ocean Fisheries

Summary of ocean approach. The recommended approach for the ocean fisheries is to fully implement the recently negotiated agreement between the United States and Canada under the Pacific Salmon Treaty. It is assumed that U.S. commitments under that agreement are fully funded by Congress it stays in place for the agreed period of time. The fishing regime for chinook salmon constrains the annual harvest in northern fisheries off Canada and Southeast Alaska based on the aggregate abundance of U.S. and Canadian chinook stocks. Fisheries off the coasts and in the rivers of Washington and Oregon are constrained by a "general obligation" that reduces the adult-equivalent mortality rate on depressed natural stocks in those fisheries by at least 40 percent relative to 1979-82 levels. Additionally, NMFS' jeopardy standard for Snake River fall chinook will continue to apply to ocean fisheries managed by the Pacific Fisheries Management Council (PFMC), thus ensuring at least a 30 percent reduction in overall ocean exploitation rates for that ESU, relative to the 1988-93 base years. A number of non-Columbia Basin weak stock constraints also can be expected to limit ocean fisheries off Washington and Oregon — sometimes more so than the PST general obligation or Snake River fall chinook jeopardy standard — for the foreseeable future. With these constraints in place, we do not foresee the need for additional management actions in ocean fisheries with respect to Columbia Basin stocks.

Discussion. Ocean exploitation rates on Snake River fall chinook have actually been reduced by an average of 38 percent since 1996; the expected reduction in 2000 is 42 percent, well in excess of the jeopardy standard for that ESU. The new PST regime, which represents the result of years of protracted negotiations between the United States and Canada, will be in place through the year 2008 (2010 for Fraser River sockeye), ensuring that ocean fisheries off Canada and Southeast Alaska also will be predictably and sufficiently constrained for many more years. Because Canadian fisheries are beyond U.S. jurisdiction, management actions taken in Canadian fisheries are the result of negotiated bilateral agreements and/or additional actions decided by Canada. Fortuitously, Canada has taken decisive action in recent years to greatly reduce ocean

fishery impacts — even more than required by the PST agreement — out of concern for its own stocks, and can reasonably be expected to continue doing so for the next several years. Because the new PST regime will expire before the recovery effort is complete, the parties will have to negotiate an extension to the current regime or a replacement regime at the appropriate time.

The new PST agreement was reviewed by the NMFS under section 7 for consistency with the ESA. In its biological opinion of November, 1999, NMFS determined that the new PST agreement meets the requirements of the ESA.

ESU-specific discussion. Of the 12 Columbia Basin ESUs listed under the ESA, nine are not appreciably affected by ocean harvests. Those nine include the five steelhead ESUs (**Lower Columbia River, Upper Willamette River, Middle Columbia River, Upper Columbia River, and Snake River steelhead**); **Snake River sockeye**; **Columbia River chum**; **Upper Columbia River spring chinook**; and **Snake River spring/summer chinook**. This information is derived from an extensive time series of catch and stock composition data collected over many years, and most particularly from the coastwide coded wire tag (CWT) program. Literally millions of coded wire tags have been placed in salmonids from the Columbia River in the past three decades. Fisheries from California to Alaska have been routinely sampled to recover CWTs. These data support the conclusion that ocean fisheries have little or no effect on these nine ESUs. Additionally, catch data, run timing information, and other scientific information derived from various techniques such as genetic stock identification corroborate this conclusion. Because these ESUs are not appreciably affected by ocean fisheries, no significant improvement in population growth rates for the populations in these ESUs is likely to be feasible as a result of further constraints on ocean fisheries. Notwithstanding this conclusion, harvest monitoring programs should continue to ensure that fishery impacts are being fully accounted for in the data.

Three Columbia Basin ESUs — **Lower Columbia chinook, Upper Willamette chinook, and Snake River fall chinook** — are taken in significant numbers in ocean fisheries. Because migratory habits differ among these three ESUs, so do the fisheries that most affect them, as noted below.

Lower Columbia chinook are comprised of both spring stocks and fall "tule" and "bright" stocks. The tules are most significantly impacted in Canadian fisheries, particularly off the West Coast of Vancouver Island (WCVI), and in ocean fisheries off Washington State. The spring and bright stocks migrate farther north than do the tule stocks. Approximately 60 percent of the ocean catch of the Lower Columbia ESU is comprised of tule stocks taken in the Canadian troll and sport fisheries off WCVI and in fisheries managed by the Pacific Fisheries Management Council (PFMC). The other 40 percent is comprised of spring and bright stocks caught in the more northerly fisheries off Northern British Columbia and Southeast Alaska.

Under the new PST regime, the WCVI, Northern British Columbia, and Southeast Alaska ocean fisheries will be managed based on the aggregate abundance of chinook in those fisheries. Of these three fisheries, the WCVI fishery was by far the most sharply reduced and constrained by the new PST agreement relative to previous regimes. This result was a primary objective of the U.S. in the treaty negotiations because that fishery greatly affects many listed

U.S. stocks originating in both the Columbia Basin and Puget Sound. In addition, as noted above, Canada has taken decisive action in recent years to reduce its ocean fisheries even beyond what is required by the new PST agreement. These voluntary measures by Canada will provide very real benefits for Lower Columbia chinook and other listed U.S. salmon, including Puget Sound chinook.

In its biological opinion on the PST agreement, NMFS concluded that harvests allowed under the new chinook salmon regime, taking into account PFMC management, will not impede recovery of this ESU.

Upper Willamette chinook and **Snake River fall chinook** tend to migrate farther north than Lower Columbia chinook as a whole, appearing in ocean catches off Northern British Columbia and Southeast Alaska. While the Southeast Alaska and northern British Columbia fisheries were not reduced as much by the new PST agreement as the WCVI fishery, Upper Willamette and Snake River fall chinook will benefit substantially from the overall limits contained in the new agreement. The impact rate for these ESUs in the two northern PST fisheries will remain quite small, and certainly much reduced from the treaty's base period (1979-82) levels. The exploitation rate on SRF chinook in Southeast Alaska fisheries, for example, averaged about 4 percent for the years 1993-96; Willamette chinook were affected at similar or lesser rates. The overall impact on the Snake River fall chinook ESU in the total package of Alaskan and Canadian fisheries will be reduced and constrained significantly under the new PST agreement. Based on the analysis presented in NMFS's biological opinion on the PST agreement, harvest impacts at these lowered rates will not prevent recovery of these ESUs. The more recently-available CRI analysis concludes that the complete elimination of harvest for this ESU would result in a significant boost in its growth rate (a "lambda" well in excess of 1.0). However, recovery can be achieved with a less dramatic set of reductions in the various ocean and freshwater fisheries.

Like Lower Columbia chinook, the Upper Willamette chinook are expected to benefit substantially from changes in hatchery practices and concomitant changes in the harvest management regime, particularly in the freshwater fisheries. Due to their earlier migratory timing, Upper Willamette chinook tend not to be harvested much in the more southerly ocean fisheries; the great majority of harvest of these fish occurs in the mainstem of the Columbia and Willamette rivers. Oregon is now mass marking its hatchery chinook production in the Willamette and intends to move entirely to mark-selective recreational fisheries in the terminal area by the 2002 fishing season. As a result, Oregon expects that freshwater exploitation rates on Upper Willamette natural chinook will be reduced to 10 percent or less, a dramatic harvest reduction relative to previous levels that approached as high as 50 percent. This very significant reduction in harvest impacts is expected to result in a significant improvement in population growth rate, well in excess of that required to reduce extinction risk to less than 5 percent in 100 years, according to CRI analysis, and thus will contribute significantly to the overall recovery effort for this ESU.

Freshwater Fisheries

Selecting a preferred option for the freshwater fisheries presents particularly difficult choices for the Federal caucus. On the one hand, in contrast to ocean fisheries, all of the listed ESUs are vulnerable to some extent to fisheries in the Columbia River mainstem. Many of the listed ESUs simply cannot withstand any significant harvest impact, especially given all the other factors likely to affect them for many more years. On the other hand, reductions in harvests were turned to first as the status of natural populations worsened and overall abundance began to decline in recent years. As a result, most fisheries within the Basin already have been repeatedly and severely reduced, so much so that today's fisheries reflect only a remnant of former fishing activity. As noted previously, most of the remaining fishery impacts occur in tribal fisheries, except for those ESUs originating below Bonneville Dam.

Summary of freshwater approach. The recommended approach for the freshwater fisheries would cap fishery harvest rates on the listed ESUs at levels no greater than those approved under the ESA for the 1999 fall and 2000 spring seasons. In all cases, management of fisheries must be keyed to the status of listed natural runs — employing weak stock management — as opposed to managing fisheries based on the aggregate abundance of hatchery and natural fish, or the abundance of intermingled but unrelated populations or ESUs. This will, in some cases, involve significant changes in the mechanisms used to set fishery harvest levels compared to those in the expired Columbia River Fish Management Plan.

It should be noted at the outset that adherence to harvest rate caps for listed natural fish will cause difficult challenges for the fisheries. The numbers of returning hatchery fish will vary significantly from year to year, often in unpredictable ways and even if the production of juveniles remains constant over time. Inevitably, there will be years when large numbers of hatchery fish return that are surplus to broodstock needs but which cannot be harvested in non-selective mixed stock fisheries. Nevertheless, there is no more important harvest reform than discontinuing the former practice of overfishing natural fish to fully harvest hatchery fish. Unless and until more effective selective fishing techniques are used, it will be difficult or impossible to fully realize the benefits of hatchery programs.

Fisheries in the Columbia Basin are generally divided for management purposes into a winter/spring/summer season (the "spring season") and a fall season, reflecting the timing of the various runs. What follows is a general description of how the fisheries would be managed under this approach, and the resulting impact on listed ESUs. As noted previously, the U.S. v Oregon parties should develop sufficiently detailed plans to implement this conservation-based approach.

Winter/Spring/Summer season ("spring season"). The spring season fisheries should continue to be limited to conservation level fisheries until such time as recovery efforts in the other sectors show demonstrable improvements in the status of the listed ESUs. Inter-annual variations, if any, in allowable harvest rates (stepped harvest rates) would be keyed to the status and abundance of listed natural-origin fish. The U.S. v Oregon managers should develop the

linkages between threshold escapement levels and annual variations in abundance. The overall harvest rate on Snake River and Upper Columbia spring chinook should continue to be capped at 6-9 percent, depending on the run sizes of the natural origin fish. These rates are intended primarily to accommodate a base level fishery for the tribes; thus the vast majority (if not all) of the harvest under this cap would occur in tribal fisheries. In past agreements the state and tribal parties envisioned even lower harvest levels for Snake River spring/summer chinook when the natural components of the ESU falls below certain levels. Because those features would provide additional benefits to the listed species, tribal and state managers should consider such reductions and also explore the feasibility of developing analogous natural stock escapement thresholds for Upper Columbia spring chinook. Impacts on the summer component of the Snake River spring/summer chinook ESU should continue to be substantially less, in the range of 2-3 percent, consistent with recent years' conservation level fisheries. These impacts would also occur primarily, if not entirely, in tribal fisheries.

The biological opinion for the spring 2000 fisheries focused on Snake River spring/summer, Upper Columbia spring, and Upper Willamette spring chinook ESUs as the fishery "driver" stocks. Going forward, tribal and state spring fisheries would continue to be managed actively and conservatively so as not to exceed the impact limits specified for these three ESUs in the biological opinion. For each of the several other ESUs that are incidentally harvested in the spring fisheries, but at lower rates than the driver stocks, the spring biological opinion set harvest rate caps at the upper range of recent years' levels. These caps were based on the assumptions that (1) the fisheries would be managed much as they had been in recent years, and (2) that actual impacts likely would be less in any given year than the upper end of the range. Even if the upper caps are reached, those rates would not jeopardize those species. The U.S. v Oregon parties should develop more detailed harvest plans to ensure that impacts on the co-mingled "non-driver" ESUs remain below the upper caps approved for the spring 2000 season and to provide for the possibility of new management approaches, such as selective fisheries, that may change the way the fisheries are managed.

Discussion. Already greatly constrained for decades due to the poor and declining status of upriver spring and summer chinook runs, the spring season fisheries were reduced further by a management agreement among the state, tribal, and Federal U.S. v Oregon parties after the Snake River spring/summer chinook listings. That agreement originally covered the 1996-98 seasons, then was extended through the 1999 season. For the 2000 season, despite repeated attempts, the U.S. v Oregon parties were unsuccessful in their attempts to reach an agreement for the spring fishery. NMFS analyzed the state and tribal proposals, concluding that the combined impact of the proposals for 2000 would jeopardize the continued existence of the Upper Columbia spring chinook and Snake River spring/summer chinook ESUs. For these reasons, NMFS concluded that a reasonable and prudent alternative to the proposed fisheries would be to limit the impact on Snake River and Upper Columbia spring chinook to 9 percent or less, given the forecasts for the 2000 runs.

Like NMFS' biological opinion on the spring fishery, this conceptual recovery plan is strongly informed by recent CRI analysis. That analysis confirms that spring chinook ESUs are in extremely dire shape, having a substantial risk of extinction even in the near term. CRI also

confirms that harvest reductions taken in previous years substantially benefitted these now-listed populations — in some cases probably preventing them from already becoming extinct. Given the low level of current fisheries, however, further reductions in spring fishery harvest rates would have relatively small, albeit potentially important effects on the growth rates of affected ESUs. On the other hand, because even modest increases in harvest rates could easily thwart the overall recovery effort, especially in the next several years and no matter what is done in the other Hs, it will be necessary to cap harvest rates in spring fisheries for some time, while continuing to seek and take advantage of any opportunities for further reductions in harvest rates. As stated previously, the success of this strategy in contributing to the recovery effort depends substantially on continued participation by the tribes. Because in all cases harvest rates limitations are expressed in terms of natural fish, the tribes could increase their total catch by employing greater selectivity to target hatchery fish in their fisheries.

Fall season fisheries. The fall season mainstem fisheries should continue to be limited by the existing jeopardy standard for Snake River fall chinook, which caps the in-river harvest rate on that ESU at a level 30 percent below the 1988-93 base period. The harvest rate on intermingled Snake River "B" run steelhead for the mainstem Columbia River fall fisheries should be capped for the 2000 season at no greater than 17 percent, as applied in 1999 and which then accommodated the minimal incidental impact needs of both the tribal and recreational mainstem fisheries. However, it must be noted that still-ongoing analysis of extinction risk for listed steelhead ESUs may well suggest that the 1999 harvest rate caps may be too high, and that reducing them may be necessary to achieve survival and recovery standards. Anticipating this eventuality, the general program noted previously for identifying and developing ways to further reducing incidental impacts on listed fish should prioritize its initial focus on the catch of "B" run steelhead during the fall season fisheries. No specific caps on other listed ESUs present in the fall fisheries is recommended at this time, based on the presumption that sufficient protection will be afforded those ESUs as long as the mainstem fisheries continue to be actively managed to stay within Snake River fall chinook and "B" run steelhead impact limits. The U.S. v Oregon parties are encouraged to develop harvest plans that ensure impacts on co-mingled listed ESUs will remain limited to the degree they currently are by the Snake River fall chinook and "B" run steelhead constraints. Such plans might address new management approaches, including selective fisheries, that may change the way the fisheries are structured and managed.

Discussion. NMFS' CRI analyzed the change in population growth rates that could be expected by changes in harvest rates relative to previous years. Not unexpectedly, the extent to which additional harvest reductions can contribute some more to the survival and recovery of a listed ESU depends on the how much it is still impacted in fisheries. The harvest rates on most listed ESUs have already been reduced significantly in recent years, so much so that in many cases little additional survival benefit would accrue even if fishing was discontinued everywhere. However, one ESU in particular, Snake River fall chinook, are still incidentally harvested at relatively high rates, albeit at much lower rates than prior to listing. Approximately 40-50 percent of the Snake River fall chinook are taken in the total of all fisheries, ocean and freshwater. These rates of impacts are not extraordinarily high for a healthy natural stock, or even one experiencing a temporary decline due to natural causes, but they are undeniably high for a listed stock. For this reason, the recommendation to continue to allow incidental harvest

rates at recent levels requires careful examination and justification in relation to the overall recovery effort for this ESU.

ESU-specific discussion. **Snake River fall chinook** survive and depend today on spawning habitat within a very small portion of their geographical range, which historically included the mainstem Snake River above Hells Canyon. Since construction of the Hells Canyon Dam, Snake River fall chinook have been blocked from about 80 percent of their historical range. Much of the remaining 20 percent of their historical habitat is now under reservoirs behind the four lower Snake River dams. As a result, naturally reproducing Snake River fall chinook today depend on relatively marginal habitats in a small segment of the Snake River below Hells Canyon and in colonized areas in the lower reaches of several Snake River tributaries.

The Snake River fall chinook ESU is comprised today of a single homogenous population; whatever population structure that may have existed historically was lost after construction of the dams. The population has been and continues to be routinely supplemented with hatchery production from the Lyons Ferry hatchery. Besides providing a safety net for this ESU, the hatchery program serves as a biologically appropriate source of juveniles for release at off-station sites to supplement natural production. The supplementation program is scheduled to be expanded over the next several years into additional areas, such as the Clearwater River, as the Nez Perce tribal hatchery fall chinook program becomes operational.

Both the PATH and CRI analyses suggest that near term risks of extinction for Snake River fall chinook are low, but CRI suggests a high likelihood of extinction in the long term for this ESU. The risk of extinction could be reduced to less than 5 percent in 100 years by a relatively modest (2.5 percent) increase in the average annual growth rate, a change that could be achieved either by breaching or by additional cuts in the harvest rates. As noted earlier, recent CRI analysis concludes that the complete elimination of harvest for this ESU would result in a significant boost in its growth rate (a "lambda," or average population growth rate, well in excess of 1.0). However, it must be considered that the substantial majority of the remaining incidental harvest of this ESU occurs in the fall season mainstem tribal fishery, and that such dramatic reductions may not be necessary for recovery.

The lack of remedy to the principal cause of the current status of Snake River fall chinook — blockage from its historical range and thus most of the suitable fall chinook spawning habitat — should be taken into account in determining which of several possible combinations of recovery options is appropriate. For many of the other ESUs, it can be argued that additional reductions in harvest impacts will help prevent extinctions and thereby buy sufficient time for the other efforts to recover the ESU to take effect and restore the ESU to naturally-sustainable, productive levels. Indeed, that is the principal underlying rationale for continuing the harvest constraints articulated throughout this conceptual recovery plan. However, there is relatively little immediate risk of extinction for the Snake River fall chinook under current conditions, and none of the recommended habitat measures, nor any changes in operation of the FCRPS short of breaching, will result in significant increases in the basic productivity of Snake River fall chinook.

A number of additional points should be noted. The benefits of actions taken in the last few years to improve juvenile Snake River fall chinook survival rates during downstream migration have not been fully realized and are not yet fully reflected in the CRI's analysis of the status of the ESU. Similarly, the benefits of recently revised ocean and in-river fisheries regimes may not yet be fully reflected. Indeed, those actions may have already increased the population growth rate sufficiently to meet extinction risk and recovery standards. Still on-going discussions to secure additional flows from the upper Snake may also provide additional benefits for this ESU and others.

The Federal Caucus is cognizant of the ramifications of its recommended option, including the fact that it may involve accepting a certain increment of additional risk. However, that increment of additional risk is really quite low, especially in the near term. Considering the severe impact that further reductions in SRF impacts would have on the mainstem tribal fishery, the Caucus believes that a small increment of additional risk is justified in this case. Accordingly, the Caucus recommends that the 1999 fall season constraints be continued, coupled with carefully planned supplementation programs. These measures, intended to stabilize the population at or above current numbers, would be continued the next 8-10 years or until such time as there is an appreciable change in either the status of this ESU or the habitat available to it.

Snake River, Upper Columbia River, Middle Columbia River, and Lower Columbia River steelhead ESUs. The Snake River fall chinook limit likely will be most constraining on the mainstem fall season tribal fishery in most years, so the actual impact rate on intermingled steelhead ESUs will be substantially less than the 17 percent limit specified herein as the initial cap on harvest rates for the "B" run component of the Snake River steelhead ESU. In 1999, for example, the actual impact rate on "Bs" was estimated at about 10 percent and 1-2 percent in the mainstem tribal and non-tribal fisheries, respectively. Resulting harvest rates on "A" run summer steelhead, which comprise the other component of the Snake River steelhead ESU as well as all the other listed ESUs in this fishery, are generally substantially lower than the "B" run harvest rates, on the order of 1-7 percent in 1999 depending on the ESU, because of their earlier timing and smaller size. Recently agreed measures designed to further reduce steelhead impacts, notably including the use of larger mesh gill nets in the tribes' fall season fishery, should lower steelhead impact rates even further. Nevertheless, CRI analysis concludes that the extinction risk is unacceptably high for these ESUs, and that lower harvest rates on steelhead may be needed. A lower harvest rate would not necessarily constrain the fall chinook fishery if effective selective harvest methods are adopted. Impact rates in tributary recreational fisheries, already managed as mark-selective fisheries targeting hatchery fish, should continue to be capped at recent levels, estimated to be less than two percent for natural steelhead, and verified by additional monitoring and evaluation studies.

Selective Fishing

Selective fishing provides a means to further reduce harvest rates on listed ESUs while preserving and/or expanding harvest opportunities. For this reason, selective fishing is emphasized throughout the Conceptual Recovery Plan, not only as a "bridging" strategy during

the recovery period, but also as a key to healthy and sustainable fisheries in the future. Once the status of currently listed natural stocks is clearly improved, non-selective mixed stock fishery constraints could be relaxed somewhat. Nevertheless, there will always be some stocks, particularly hatchery stocks, that can sustain higher harvest rates than others. Accordingly, the recommended harvest option includes the vigorous identification, development, application and expansion of new as well as traditional selective harvest methods and opportunities. These should be pursued with both of two distinct objectives in mind: (1) further reducing incidental impacts on listed species, and (2) maximizing fishery benefits by enabling the harvest of abundant stocks, particularly hatchery stocks, in ways that are benign to listed species.

As used here, "selective fishing" is a generic term that encompasses a broad range of harvest methods and management strategies. Within this range are at least three categories, in roughly ascending order of unrealized conservation potential: time selectivity; area selectivity; and gear selectivity with visual sorting.

Time selectivity. This is the simple notion underlying fishing seasons. The idea is to open the fishery when the target fish are present, but to close it when depressed (i.e., listed) fish comprise a pre-defined portion of the catch. Long a staple tool of fish managers, the potential for additional benefits to listed fish using this approach is likely to be very limited, both in the ocean and the mainstem Columbia.

Area selectivity. Fisheries can be located in areas that minimize the harvest of non-target stocks to the extent possible, subject to various constraints like mobility (e.g., tribal usual and accustomed fishing areas), jurisdictional constraints, and flesh quality (market demand) of the catch. Terminal fisheries can be used in some cases to provide alternative harvest opportunities to mixed stock fisheries. The general trend in recent years has been to lower harvest rates in mixed stock fisheries, resulting in lower ocean catches and, in some cases, increased availability of fish in terminal areas. Now, however, even many of the areas once considered terminal areas have been found to significantly impact listed fish. Relatively few unutilized opportunities exist to move existing fisheries or provide alternative fishing areas, but those that do exist should be identified and developed, especially given the need to provide meaningful tribal fishery opportunities. Significant potential benefit could accrue to some listed stocks by moving some of the remaining in- river fisheries out of the mainstem (e.g., commercial fisheries to "Select Areas;" sport fisheries out of the Columbia and into the Willamette); and/or providing tribal fishing opportunities at Hanford Reach and/or in suitable tributaries. Such opportunities will be limited also by cultural, legal, and economic considerations.

Gear selectivity, visual sorting, and selective-mark fisheries. The general idea here is to use gear types that tend to catch fish without killing them or that catch only certain types or sizes of fish. Catching fish without killing them makes it possible to release non-targeted fish. A number of different techniques already exist, such as using certain gill net mesh sizes that catch one species rather than another, or by sinking gill nets below the water surface, thereby lowering encounter rates with species like steelhead that tend to swim near the surface. Recently, the BPA provided funding to tribes for larger mesh gill nets for their fall season fishery to reduce impacts on steelhead, which are smaller than the chinook being targeted by the fishery. Additional

opportunities may exist to expand this program, at relatively modest cost. Note, however, that some of these kinds of approaches can be biologically counterproductive over time, for example, by selectively removing the oldest, largest, and most fecund fish from the spawning populations. Other potentially promising approaches include the expanded use of tangle nets, beach seines, fish wheels, or other live-capture methods that enable sorting of live fish and the release of unmarked fish or natural fish and/or non-targeted species. In some cases, institutional barriers must be overcome, such as regulations that prohibit the use of certain types of gear, like beach seines and traps.

The most promising potential, the one gaining most of the recent attention, involves **selective mark fisheries**. These fisheries combine the use of live-capture gear with the ability to visually discriminate between natural fish and hatchery fish. Before they are released as juveniles, hatchery fish can be marked, usually by removal of their adipose fin, allowing them to be identified as hatchery fish after they have grown and are caught in a fishery. This strategy has been used successfully for many years to enable selective freshwater fisheries for steelhead, and increasingly is being used for coho salmon in both freshwater and mixed-stock marine areas. Mass marking of all hatchery fish formerly was prohibitively expensive because of the high labor costs involved, especially for species released at very small sizes or in very large numbers. Now, the technology exists to mechanize the marking process, making it much more efficient and cost effective. Although the primarily focus has been on hook-and-line sport fisheries, the concept can be applied to any fishery that uses non-lethal gear.

Mass marking and selective mark fisheries are not without problems, however. For nearly three decades, fishery managers coastwide agreed to "sequester" the adipose fin clip. This meant that any fish that had its adipose fin removed was also carrying an internal binary coded-wire tag (CWT). By recovering and reading these tags, fishery managers and researchers could determine the survival rates, migratory patterns, timing, and a wealth of other stock specific, fishery specific, and hatchery specific information. Millions of these tags have been released and recovered over the years, providing data that now forms the informational backbone of fishery management and stock assessment programs coastwide. Maintaining the viability of the CWT program is an international commitment embodied in the Pacific Salmon Treaty. In the last few years, however, most fish produced in hatcheries have had the adipose fin removed for the purposes of monitoring hatchery straying and enabling selective fisheries, not simply to signify the presence of a CWT. Now, fish caught with a missing adipose fin may or may not have a CWT in it. Determining which fish carry CWTs requires the use of electronic detection devices and a whole new fishery catch sampling scheme. Furthermore, the statistical viability of the original CWT program relied on the assumption of randomness – a fish with a CWT was no more or less likely to be killed in a fishery than one without the tag. A selective fishery, by definition, is non-random. Consequently, the ability of the CWT program to provide statistically reliable fishery and stock specific information is threatened. A number of new and promising statistical and modeling techniques are under development to address these problems, but they have not yet been fully solved, particularly for chinook fisheries in mixed stock marine fisheries. Fisheries that occur in terminal and freshwater areas pose relatively fewer problems.

Besides the sampling and statistical problems, selective fisheries can result in significant incidental mortalities on the unmarked fish that are caught and released. This is particularly a problem in marine areas for long-lived species like chinook salmon that are vulnerable to multiple captures and releases, or fisheries occurring in freshwater areas with elevated water temperatures. Costs for mass marking and electronic detection sampling programs are high, in the millions of dollars annually.

Despite these complications, mass marking and selective mark fisheries present very promising opportunities to both reduce fishery impacts on listed salmon and the chance to preserve or increase fishery benefits. Accordingly, the Conceptual Recovery Plan recommends an intensive effort and sufficient funding to expand the use of selective fisheries in the recovery effort. Additionally, the fishery managers should work with the hydrosystem operators (including the FCRPS) to develop positive incentive-based approaches to harvest management. Such approaches could better align the interests of the fisheries in catching fish with the interest of the hydrosystem in achieving offsite survival benefits for listed fish. Mechanisms should be developed that credit reductions in incidental fishery mortality on listed fish toward both the objective of reducing fishery impacts on listed fish and the objective of increasing the total catch of unlisted fish in the fishery. As an example, the new Pacific Salmon Treaty Agreement has a mechanism whereby reductions in incidental mortalities can be divided between the fishery and the escapement from that fishery, i.e., half the savings can be used by the fishery to increase its total catch, and half can be used to reduce total mortality. Analogous mechanisms could be developed for Columbia Basin fisheries.

Potential Additional Harvest Reforms

As noted previously, the basic approach to harvest recommended in the Conceptual Recovery Plan is to rely on a set of harvest rate limits in extant fisheries that impact listed stocks until such time as their status is improved. Meanwhile, it is also recommended that fishery managers consider and/or develop other potential and innovative opportunities for further reducing harvest impacts on listed fish while improving harvest opportunities. In addition to expanding selective fisheries as discussed above, a menu of potential additional options might include, but may not be limited to, commercial fishing license buy-backs; fishery conservation easements, commercial catch price enhancements and improved marketing of fish and fish products. The Federal Caucus recommends that NMFS facilitate discussions among the fishery mangers and the FCRPS action agencies, for example, to explore these opportunities.

Performance Measures

The harvest rate caps described in the Conceptual Recovery Plan for each fishery group (ocean and freshwater) comprise the performance measures for harvest. For some listed ESUs, a specific harvest rate cap is identified for a particular set of fisheries. For example, the “southern” U.S. ocean fisheries and the in-river fall season fishery are to be managed so as not to exceed the established jeopardy limits for Snake River fall chinook. For all chinook, ocean fisheries must also be managed in compliance with the new Pacific Salmon Treaty regime, which constitutes a

set of calculable, stock-specific harvest constraints. Southern U.S. ocean fisheries 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. For both ocean and in-river fisheries, existing fishery management institutions annually provide reports that contain the metrics used to assess performance relative to the recommendations in the Conceptual Recovery Plan.

Implementation

Except as noted, implementation of the harvest measures identified in this document will occur primarily through a number of existing harvest management fora that have significant federal participation (NMFS and USFWS) at both the policy and technical levels. For ocean fisheries off British Columbia and Southeast Alaska, the primary forum is the Pacific Salmon Commission (PSC), created by the Pacific Salmon Treaty. The PSC oversees implementation of the agreed ocean fishery regimes by the two countries through their respective domestic management agencies. One of the four United States representatives on the Commission represents the U.S. federal government; the other three represent the treaty tribes, Alaska, and Washington/Oregon. The actual regulations for ocean fisheries in U.S. waters off Washington, Oregon, and California are developed annually by the Pacific Fisheries Management Council, created pursuant to the Magnuson-Stevens Fisheries Management and Conservation Act. The Council includes, as a permanent member, the Regional Administrator of the NMFS. The Council's recommendations are promulgated by the Secretary of Commerce, provided they are consistent with approved fishery management plans and "other applicable federal law," which in this case certainly includes the ESA. Fisheries on the Columbia River mainstem are managed within the U.S. v Oregon framework.. Both NMFS and USFWS participate as the federal parties in that forum. Finally, the NMFS and/or the USFWS must issue biological opinions and incidental take permits pursuant to the ESA for any proposed fishery that may affect one or more listed species.

Through its role in these various fora and processes, NMFS has the opportunity and authorities necessary to advocate harvest regimes and regulations consistent with the recommendations in the Conceptual Recovery Plan and recovery plans. In most cases, this will mean ensuring that incidental fishery harvest rates on listed stocks contained in annual fishery management plans are consistent with the ESA. Additionally, NMFS will also participate in these fora to identify and pursue various additional harvest reforms and alternative harvest opportunities, activities that may require federal resources for implementation. Harvest-related activities will be coordinated with the Federal Caucus to ensure that they are complementary and consistent with the overall recovery effort. As additional harvest reforms are identified and implemented that provide survival benefits to listed fish beyond the identified performance measures (caps), these will reported through the Caucus structure.

3. Hatchery Element of the Conceptual Recovery Plan

PART A:

Salmon and steelhead hatcheries constructed and operated largely as mitigation for the FCRPS, have contributed to the decline of natural-origin fish populations now listed pursuant to the Endangered Species Act. Implementing identified reforms to these propagation programs will increase the survival and recovery of the listed species. However, quantifying the effects of these hatchery reforms on the survival and recovery of listed species per the CRI analytical methods is not possible at this time.

Based on the best available scientific information, reform (or elimination) of propagation programs could significantly improve survival of affected natural spawning populations depending on the type and extent of the propagation activity affecting a given natural population. However, those listed populations little affected by outdated hatchery practices would not be improved by hatchery reforms. The basis for assuming significant benefits is described in the anlaysis below. Table 1 provides a qualitative assessment of how each of the 12 listed ESUs would likely be affected by the hatchery reforms currently being addressed.

The reforms to existing hatcheries primarily include development of new, local broodstocks and eliminating the inappropriate broodstocks, adopting proper mating protocols, implementing improved rearing protocols, managing the number of hatchery fish allowed to spawn naturally, constructing acclimation facilities to improve survival and homing, constructing broodstock collection facilities, marking hatchery fish to distinguish them from natural-origin fish, and drafting Hatchery & Genetic Management Plans to comprehensively guide future operations and monitoring & evaluation. Specific hatchery reform actions are based on recent Biological Opinions addressing hatchery operations and on the NWPPC's Artificial Production Review.

PART B:

Several important populations of listed salmon and steelhead in the Snake Basin have dropped to critical levels and their decline appears to be continuing. In the time required for habitat and propagation improvements to manifest themselves, these populations could go extinct. Additionally, other populations not yet of a critical nature could become so prior to other mitigation measures becoming effective.

The plan recommends immediate intervention with artificial propagation techniques to attempt an increase in population numbers for an interim period until necessary habitat improvements become effective. These interventions are not expected to be a long term solution to declining fish numbers, but a safety-net to keep populations above critical levels.

Given the status of the following populations, a thorough risk/benefit assessment should proceed immediately to determine the extent of intervention needed:

Steelhead: Lemhi River, Yankee Fork Salmon River, East Fork Salmon River, Lower Salmon River, and 2 (yet to be identified) B-run steelhead populations.

Spring/summer Chinook: Lemhi River, Yankee Fork Salmon River, Valley Creek, Grande Ronde River, Johnson Creek, and Tucannon River.

Fall Chinook: Lower Grande Ronde River.

If intervention is warranted, it must be preceded by completion of a Hatchery & Genetic Management Plan (HGMP) including a detailed plan of implementation. The emergency nature of this interim, safety-net strategy requires NEPA exemption for any intervention not requiring the construction of permanent hatchery rearing facilities at other than an existing hatchery site.

Costs of these 13 interventions will depend largely on the details developed through completion of the HGMPs. Although incremental expansions of existing facilities and/or use of temporary facilities will be pursued whenever possible, one-time capital costs of $10 million, and annual O&M and M&E costs of $550k per intervention may be required.

PART C:

Additional interventions on listed populations may be required in the near future. Such interventions (to maintain population diversity until habitat improvements are manifested) will depend on 1) population status, 2) results of ongoing supplementation experiments 3) extent of population diversity required for an ESU, and 4) results of a completed HGMP and risk/benefit assessment. Because such interventions are not the desired approach to recovery, but may become a necessary safety-net action, they will be withheld as long as prudent. When an emergency need is recognized, however, funding must be immediately available.

In a worse case scenario, capability should exist for up to 5 interventions annually. Reserve funding should be held and readily available for such circumstances.

Costs for an emergency intervention reserve should be sufficient to implement three years, or 15 projects. This equates to a worst case $150 million in capital and $8.25 million in annual O&M when fully implemented.

PART D:

The Northwest Power Planning Council's *Artificial Production Review* recommended measures to improve the benefits and minimize the risks of hatchery mitigation programs that should

contribute to overall recovery of listed populations. Many of these recommendations have been captured in earlier parts of this plan. Additional needed actions are 1) the development, review, and maintenance of HGMPs for hatchery mitigation programs and subsequent reporting of their performance at regularly scheduled reviews, and 2) research on a) the effects of hatchery supplementation programs on the survival and recovery of listed populations and b) improving the quality/survival of hatchery supplementation fish.

The biological effects of better propagation planning, public and scientific review of hatchery programs, and research is not estimable. These support programs for the extensive hatchery mitigation system are critical to its ongoing function and understanding its benefits and risks. These measures are critical to understanding propagation effects and effectively adapting management/operations, and even the use of hatcheries as a mitigative tool.

PERFORMANCE OBJECTIVES for Federal-nexus Mitigation Hatcheries:

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%; ESU hatchery-origin fish do not exceed 5% - 30%, 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 & 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.

Analysis of the Hatchery Element:

1. Production Hatchery Reforms

The Conceptual Recovery Plan recommends major and extensive reforms at existing mitigation hatcheries that are designed to eliminate or minimize the adverse effects of past poor propagation practices. Adverse effects include decreased fitness as a result of hatchery fish interbreeding with naturally spawning fish, and decreased survival as a result of hatchery fish competing with naturally spawning fish for space and food. The effects of poor practices can be substantial, although few studies have been done that quantify the harmful effects of hatcheries on naturally spawning populations. It is nevertheless possible to examine qualitatively the potential benefits of hatchery reforms.

> Long term research on steelhead in the Kalama River, WA. demonstrated that the reproductive competence of domesticated, non-locally derived hatchery fish in the wild was substantially less than the indigenous natural-origin fish. The hatchery fish were only 30% as successful as the wild fish at producing smolts and only 10% as successful at producing returning adults (Chilcote et al., 1986)

In the Clearwater River, ID hatchery steelhead survived to subyearlying size in the wild 80% as well as naturally-produced fish, and survival to the presmolt size was only 60% of the naturally-produced fish. (Reisenbichler 1997)

Hatchery steelhead in the Deschutes River basin, OR that were only 2 generations removed from the natural populations were found to survive at 80% of the rate of the naturally-produced population (Reisenbichler and McIntyre 1977)

For coho salmon, Fleming & Gross (1993) found indicators of strong selection against fish of hatchery origin and suggest that the behavior of the hatchery fish led to their poor reproductive success.

Highly domesticated Atlantic salmon females had less than 1/3 the reproductive success as wild females, while similar male fish had only 1-3% the reproductive success of wild males.

> Where domesticated hatchery fish, particularly of non-indigenous origin, stray onto the spawning grounds, their effects can be substantial. If these fish mate with each other, their immediate adverse effect may only be with later competition for food and space of any juveniles produced. If, however, the misplaced hatchery fish mate with indigenous fish, they can impart less adaptive traits to the native fish, reducing their productivity and survival. If this occurs on a significant scale over sufficient years, the overall productivity of the indigenous populations can be severely impacted.

It is not possible to quantify with any certainty the potential improvement to the survival and productivity of natural-origin, listed fish populations by eliminating interbreeding with hatchery fish. It is also not possible to estimate how long it would take for benefits to accrue. Nevertheless, the fitness of certain indigenous, listed populations may be substantially improved over time by eliminating this risk. As the studies cited above indicate, the productivity of hatchery fish (spawner-to-spawner) can be 20-90 percent less than the productivity of naturally spawned fish. Where hatchery fish interbreed to a significant extent with naturally spawned fish, and assuming the offspring survive at a rate no greater than hatchery fish, eliminating harmful interbreeding could improve the survival of the natural fish an equivalent amount. No studies currently exist that confirm the potential range of benefits from reduced interbreeding. For populations less significantly affected by poor hatchery practices, the improvement would be less marked. The program would stop the practice of using non-indigenous broodstock in the basin, except in a very few instances where it can be demonstrated that straying does not occur.

Adverse ecological effects from hatchery fish are also being addressed in the hatchery reforms. Hatchery programs have been documented as limiting natural populations through predation and competition for food and space between that hatchery and natural-origin fish. Although it is not possible to quantify the potential benefits from these reforms, Table X (Delarm) provides a qualitative estimate of the degree of benefit for each ESU.

2. Safety Net Supplementation

A number of upriver salmon and steelhead populations may require immediate intervention with artificial propagation, as the risks for short-term extinction appear too high. These emergency, safety net conservation programs are needed for 2-4 generations until habitat improvements that increase population productivity become effective.

Supplementation of natural-origin populations is still an experimental approach to enhancing self-sustaining populations. Supplementation research to date has demonstrated that high egg-smolt survivals can be achieved using artificial propagation, generally resulting in adult:adult replacement rates in excess of 1.0 -- replacement rates greater than those of naturally spawning fish. Supplementation is therefore a reasonably reliable strategy to enhance the abundance of listed fish, keeping their effective population size above critical levels. Continuing research will be important to determine the most effective reintroduction strategies. When applied to a sufficient number of individual populations within a listed ESU, it can also improve the prospects for overall diversity and stock structure within an ESU. Increasing abundance and stock structure within a seriously depressed ESU can therefore reduce the short-term probability of extinction.

Another important contribution of a supplementation program applied to severely depressed salmon populations relates to nutrient enhancement. Fish raised in hatcheries do not take severely limited nutrients from the riverine ecosystems, yet when these fish return from the ocean, they can deposit significant nutrients to assist future generations of natural-origin fish. Current depressed runs of salmon are only 6-7% of the historic biomass that returned to Pacific

Northwest streams. This current nutrient deficit may be one cause of the salmon's ecosystem failure and a limiting factor for their overall recovery to self-sustaining levels.

What is not known about supplementation, is whether as a recovery strategy such interventions can provide long-term benefits. Little information is available about the performance of fish from state-of-the-art supplementation or their progeny in the natural environment. And, there are no data on the long-term benefit of supplementation in recovering a self-sustaining natural population. Therefore, while short-term benefits can be expected, they may, or may not, provide long term benefits. When applied in conjunction with habitat improvements, supplementation can therefore provide a safety net from short-term extinction.

3. Summary of benefits of hatchery actions

Table ___ provides a qualitative assessment of the extent to which each listed ESU and their associated populations are affected by adverse hatchery practices that would be eliminated or substantially reduced by the reforms detailed in the Conceptual Recovery Plan. The Table also considers the value of safety-net supplementation for an initial number of critically depressed populations. A review of the Table's information generally indicates that Upper Willamette River Winter Steelhead ESU would be little benefited by planned hatchery reforms. Small benefits to survival and productivity would be expected for Snake River Spring/Summer Chinook, Snake River Sockeye, Upper Willamette River Spring Chinook, Lower Columbia River Chinook, and Columbia River Chum ESUs. Small to moderate benefits would be expected for Snake River Steelhead, Mid-Columbia River Steelhead, and Lower Columbia River Steelhead ESUs. Moderate benefits would be expected for the Snake River Fall Chinook and the Upper Columbia River Spring Chinook ESUs. Finally, moderate to high benefits would be expected for the Upper Columbia River Steelhead ESU.

Legend for following tables:

-- Expect little or no benefit associated with hatchery actions
x Expect relatively small benefit associated with hatchery actions
xx Expect relatively moderate benefit associated with hatchery actions
xxx Expect relatively high benefit associated with hatchery actions

Table --. Snake River Spring Chinook ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and Federal All-H Preferred Alternative (Fed-1 Plan)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Tucannon River	xxx	--	--	x	xxx
Grande Ronde					
Minam River	--	--	--	--	--
Lostine River	--	xx	--	x	xx
Wenaha River	--	--	--	--	--
Catherine Creek	--	xx	--	x	xx
Upper River	--	xx	--	x	xx
Imnaha River					
mainstem		x	--	x	x
Big Sheep	extinct?	x	--	x	x
Snake River					
Asotin Creek	extinct	xxx	--	x	xx
other tribs		--	--	xx	--
Lower Salmon River	--	--	--	--	--
Little Salmon River					
Little Sal. R.	--	--	--	--	--
Rapid River	--	--	--	--	--
South Fork Salmon River					
Upper mainstem	--	x	--	xx	xx
Lower mainstem	--	--	--	x	x
Secesh River	--	--	--	x	x
Johnson Creek	--	xx	--	xx	xx
E.F. South Fork	--	--	--	x	x
M.F. Salmon River					
mainstem to Indian Cr.	--	--	--	xx	x

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
mainstem Indian to Bear Cr.	--	--	--	xx	x
Marsh Creek	--	--	--	xx	x
Bear Valley and Elk Creeks	--	--	--	xx	x
Sulphur Creek	--	--	--	xx	x
upper Loon Creek	--	--	--	xx	x
lower Look Creek	--	--	--	xx	x
Camas Creek	--	--	--	xx	x
lower Big Creek	--	--	--	xx	x
upper Big Creek	--	--	--	xx	x
Lemhi River	--	xx	--	xx	xx
Pahsimeroi River	--	xxx	-	xx	xx
Upper Salmon River					
North Fork Salmon River	--	--	--	xx	x
lower East Fork Salmon River	--	--	x	xx	x
Herd Cr. and upper East Fork	--	x	--	xx	x
Yankee Fork	--	x	x	xx	x
upper Valley Creek	--	x	--	xx	x
lower Valley Creek	--	--	x	xx	x
mainstem below Redfish Lake Cr.	--	xx	--	xx	xx
mainstem above Redfish Lake Cr.					

Table --. Snake River Steelhead ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and Federal All-H Preferred Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Tucannon River	--	xx	xxx	xx	xxx
Asotin Creek	--	--	--	--	--
Grande Ronde River					
lower Grande Ronde R.	--	xx	xxx	xx	xxx
upper Grande Ronde R.	--	xx	-	xx	xx
Lostine/Wallowa R.	--	xx	xxx	xx	xxx
Minam	--	--	--	xx	--
Wenaha	--	--	--	xx	--
Joseph	--	--	--	xx	--
Imnaha River					
Sheep Creek	--	x	--	xx	x
Camp Creek	--	-	--	--	--
lower mainstem tribs	--	x	--	xx	x
upper mainstem tribs	--	-	--	--	--
Clearwater River					
lower mainstem "A" run	--	xx	--	xx	x
tribs	--	xx	--	xx	x
lower mainstem "B" run	--	xx	--	xx	x
tribs	--	x	--	xx	x
South Fork Clearwater	--	--	--	xx	x
Lochsa River					
Selway River					
Salmon River					
lower mainstem tribs	--	x	xxx	xx	xxx
South Fork Salmon River	--	--	--	xx	x
Middle Fork Salmon	--	--	--	xx	x
River	--	xx	xxx	xx	xxx
Upper Salmon River					
Mainstem Snake River					
Tributaries	--	xx	xxx	xx	xxx

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits

Table --. Snake River Sockeye Salmon and Fall Chinook Salmon ESU's qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Snake River Sockeye Salmon	--	--	--	x	x
Snake River Fall Chinook Salmon	--	xx	x	xx	xx

Table --. Upper Columbia River Spring Chinook ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Okanogan River	extinct	xxx	x	xx	xxx
Methow River					
Twisp River	x	x	--	x	x
Methow River	--	x	xxx	x	xxx
Entiat River	--	--	xxx	xx	xxx
Wenatchee River					
Chiwawa River	xx	xx	--	xx	xx
Nason Creek	xx	xx	--	xx	xx
White River	xx	xx	--	xx	xx
Little Wenatchee River	--	--	--	xx	x
Icicle Creek	--	--	x	x	x

Table --. Upper Columbia Steelhead ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population *	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Okanogan River	--	xxx	xx	xx	xxx
Methow River	--	xxx	xx	xx	xxx
Entiat River	--	x	xx	xx	xx
Wenatchee River	--	xx	xx	xx	xx

* Steelhead population structure within each River has not been designated at this time.

Table --. Mid-Columbia Steelhead ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Yakima River					
Satus Creek	--	--	--	x	x
Toppenish Creek	--	--	--	x	x
Naches/Upper Yakima River	--	--	--	x	x
Klickitat River					
Winter Steelhead	--	--	xx	xx	xx
Summer Steelhead	--	--	xx	xx	xx
Walla Walla					
Touchet River	--	xx	xxx	xxx	xxx
South Fork	--	--	--	xxx	xx
Mill Creek	--	--	x	xxx	xx
Umatilla River	--	--	x	x	x
John Day River	--	--	x	xx	x
Deschutes River					
Warm Springs River	--	x	--	xx	x
Dechutes River	--	--	xx	xx	xx
Fifteenmile Creek					
Winter Steelhead	--	--	--	xx	x

Upper Willamette River Spring Chinook ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Clackamas	--	--	xxx	xxx	xxx
Mollala	extinct	--	--	--	--
North Santiam	--	--	xx	xx	xx
South Santiam	--	--	--	xx	x
Calapooia	extinct	--	--	--	--
McKenzie	--	--	xx	xxx	xx
Middle Fork Willamette	--	xx	x	x	x
Coast Fork Willamette	extinct	--	--	--	--

Table --. Upper Willamette River winter steelhead ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Tualatin	--	--	--	--	--
Mollala	--	--	--	--	--
North Santiam	--	--	--	x	x
South Santiam	--	--	--	xx	x
Calapooia	--	--	--	--	--
Yamhill	uncertain if population existed here historically	--	--	--	--

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Luckiamute	uncertain if population existed here historically	--	--	--	--
Rickreall	uncertain if population existed here historically	--	--	--	--

Table --. Lower Columbia River Chinook ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Grays River					
Fall Chinook (Tule)	--	--	x	x	x
Elochoman River					
Fall Chinook (Tule)	--	--	xx	xx	xx
Abernathy Creek					
Fall Chinook (Tule)	--	--	--	--	--
Cowlitz River					
Spring Chinook	--	xxx	x	xx	xx
Fall Chinook (Tule)	--	xx	xx	xx	xx
Kalama River					
Spring Chinook	--	--	x	xx	x
Fall Chinook	--	--	x	xx	x
Lewis River					
Spring Chinook	--	--	x	x	x
Fall Chinook	--	--	x	x	x
East Fork (Tule)	--	--	x	x	x
NF & EF (Brights)	--	--	x	x	x
Washougal River					
Fall Chinook (Tule)	--	--	x	x	x
Wind River					
Fall Chinook	--	--	x	x	x
Little White Salmon River					
Fall Chinook (URB)	--	--	x	--	x
White Salmon River					
Fall Chinook (URB)	--	--	x	--	x
Lewis and Clark River					
Fall Chinook (Tule)	--	--	--	--	--
Klaskanine River					
Fall Chinook (Tule)	--	--	--	--	--

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Big Creek					
Fall Chinook (Tule)	--	--	--	--	--
Gnat Creek					
Fall Chinook (Tule)	--	--	x	x	x
Claskanine River					
Fall Chinook (Tule)	--	--	--	--	--
Clackamas River					
Fall Chinook (Tule)	--	--	x	x	x
Sandy River					
Spring Chinook	--	x	xx	xx	xx
Fall Chinook (Bright)	--	--	x	xx	x
Hood River					
Spring Chinook	--	x	x	--	x

Table --. Lower Columbia River Steelhead ESU
Qualitative Assessment of Potential Improvements for Listed Populations by Implementing Hatchery Reforms and the Federal Preferred Hatchery Alternative (Fed-1)

Basin/Population	Preservation of Populations	Enhancement Actions	Implementing Hatchery Reforms	M&E for Adaptive Management	Summary of Potential Benefits
Cowlitz River					
Late-winter upper basin	--	xxx	x	xx	xx
Toutle River	--	x	xx	x	xx
Kalama River					
Winter Steelhead	--	x	x	x	x
Summer Steelhead	--	x	x	x	x
Lewis River					
North Fork	--	--	xx	x	xx
East Fork	--	--	xx	x	x
Salmon Creek	--	--	xx	xx	xx
Washougal River					
Winter Steelhead	--	--	xx	x	xx
Summer Steelhead	--	--	x	x	x
Wind River					
Summer Steelhead	--	--	--	x	x
Winter Steelhead	--	--	--	x	x
Clackamas River					
North Fork	--	x	x	x	x
Eagle Creek	--	x	xx	xx	xx
Lower mainstem and tribs	--	--	xx	x	xx
Sandy River					
Late winters	--	x	xxx	xx	xxx
Hood River					
Winter Steelhead	--	--	x	x	x
Summer Steelhead	--	--	x	x	x
Columbia River Gorge Tribs	--	--	--	x	x

4. Hydropower Element of Conceptual Recovery Plan

FEDERAL HYDROPOWER

The conceptual recovery plan identifies actions that, combined with other ongoing and anticipated measures in the Columbia River basin outlined in the other elements of this paper, will probably ensure the long-term survival of listed species with a moderate to high likelihood of recovery. Based on the best available scientific information, the following fundamental components of the RPA allow the FCRPS to avoid jeopardizing the listed species.

Performance Standards

The FCRPS biological opinion defines certain performance standards that will, when attained, meet the jeopardy standard. There are several distinct types of performance standards. They include: Programmatic Standards to assess whether anticipated actions are being implemented; Biological Standards to assess the status of the ESUs and the effectiveness of implemented measures; and Physical Performance Standards to express ecological and management indicators in terms of habitat attributes (e.g. water quality). Biological Standards to assess the effectiveness of implemented measures are further broken down into Hydro and Offsite standards.

Hydro Performance Standards includes specific adult and juvenile survival levels (direct and indirect) expected to result from implementing the best or most aggressive actions that NMFS and the Action Agencies agree are biologically and technically feasible and within the authority of the Action Agencies. The Action Agencies are committed to attainment of the hydro standards by 2010.

Offsite Mitigation Standards include non-discretionary implementation of specific measures identified in the other elements of the conceptual recovery plan. The Action Agencies are committed to implementation of the offsite mitigation measures described in these sections. Details of the level of additional improvements to be attained through actions in other life stages as described in the conceptual recovery plan (including, but not limited to improvements to be attained through offsite mitigation by the FCRPS action agencies), are described in FCRPS biological opinion.

Hydropower Actions

This section outlines operational and structural fish passage improvements at FCRPS projects to increase the survival of listed fish. This section describes the specific hydro measures that, based upon the best scientific information available, NMFS has determined are:

- Biologically feasible and implementable
- Sufficient to achieve performance standards that represent the best the hydro system can do without dam breaching

- Sufficient to result in a high likelihood of survival and a moderate to high likelihood of recovery, in combination with offsite mitigation defined in below and with other improvements affecting the listed species elsewhere described in the Plan.

The hydrosystem measures included in this section are expected to reduce juvenile and adult salmonid mortality attributable to passage through the hydro system and to attain the hydro performance standards in the FCRPS biological opinion by 2010. The measures are broken down into the following categories:

- Water management—management of natural flows and system storage to meet salmon flow objectives

- Juvenile fish transportation—collection and barge transportation of fish to avoid mortality at mainstem hydro projects and in reservoirs

- Juvenile fish passage—configuration and operational actions and research activities at FCRPS projects that are designed to improve juvenile fish survival at the dams

- Reservoir passage—operations and active management of salmonid predators in the mainstem to improve the survival rates of juvenile fish passing through the reservoirs

- Adult passage and research—configuration and research activities to improve adult passage survival

- Water quality—improvement in total dissolved gas levels and water temperatures within the mainstem while working toward attainment of water quality standards

- Fish facility operations and maintenance—increase commitment and ability to operate and maintain aging and new fish passage facilities to the highest possible effectiveness through enhanced effort and adequate funding

Current activities within the FCRPS include actions in all of these categories. These and additional actions to be taken in each of the categories are identified and described in the Biological Opinion. NMFS has determined that all of these actions are necessary to achieve the hydro system performance standard. However, the strategy for achieving the objective stated above relies on the continued monitoring and evaluation of progress and the use of the information gathered to adjust or refine the actions taken. The specific measures may be revised over time through the annual and 5-year planning process.

There are seven areas of particular emphasis, which are discussed in the sections below:

- Improving water management

- Improving juvenile project passage survival

- Improving juvenile reservoir survival

- Improving adult passage survival
- Improving water quality
- Resolving critical uncertainties
- Enhanced operation and maintenance of fish passage facilities

Improving Water Management. Improved water management provides several direct and indirect survival benefits to salmon. Measures include managing reservoir draft and refill operations so they do not adversely affect salmon, and the use of stored water to improve salmon survival or water quality by augmenting flows. For many ESUs, the benefits are primarily measured in terms of improving the probability of achieving spring and summer flow objectives for migrating fish. Others ESUs, however, are also affected by the spawning, incubation and rearing conditions created by hydro operations. All ESUs may also be affected by estuarine and near-shore ocean conditions, which are in turn influenced by water storage activities. The new FCRPS biological opinion continues many of the 1995 Biological Opinion and 1998 and 2000 Supplemental Biological Opinion measures, including the following:

- Flow objectives at Lower Granite, Priest Rapids, McNary, and Bonneville dams
- In-season management for operational flexibility and best use of available water volumes
- Guidance on reservoir elevations in early spring, early summer, and at the end of the summer augmentation season
- Coordination with water releases from Canada, the upper Snake River, and the Hells Canyon Complex

In addition, there are several actions to improve water management for salmon, including the following:

- Additional drafts of selected FCRPS reservoirs
- Additional water from other sources
- Shifts of flood control among projects
- Implementation of VARQ flood control operations at Libby and Hungry Horse reservoirs
- Review of system flood control objectives
- Continued research on summer-migrating SR fall chinook salmon population losses

Improving Juvenile Project Passage Survival. Survival of juvenile salmon during their downstream migration through the FCRPS to the ocean can be further improved by providing more fish-friendly passage alternatives. Different actions are prescribed for different projects depending on their current configuration and survival levels. In general, the following actions are emphasized:

- Increased spillway passage using gas abatement and longer spill hours to allow increased spill volumes, spill pattern refinements and the evaluation of removable spillway weirs to improve spill efficiency

- Spillway passage research to identify additional potential survival and passage improvements

- Increased screen/bypass system effectiveness through extended screens, new outfalls, and improved hydraulic conditions

- Development and testing of surface bypass technology, with implementation as appropriate

- Improved turbine designs and operating guidelines

- Improved passage system operations and reliability

Improving Juvenile Reservoir Survival. Measures to identify and address mortality factors in the mainstem reservoirs are an important part of increasing the odds for survival of downstream migrating salmon. Actions include hydro operations, predator management, and habitat modifications that may reduce the effect of predators on salmonids. Furthermore, research and evaluation of passage survival through dams and reservoirs will continue, with emphasis on the effect of passage delay at dams and the relationship between dam passage and reservoir mortality. Numerous measures are planned to improve reservoir survival rates, including the following:

- Increased flow augmentation for summer migrants, particularly in the low water years

- Management of reservoir and run-of-river projects to reduce extreme water level fluctuations

- Management of predator populations (fishes, birds, and mammals)

Improving Adult Survival. Passage improvements are expected to reduce the direct and pre-spawning mortality of upstream migrating adult fish. Actions include a mix of research and configuration measures to identify and correct delay and mortality problems. Areas of emphasis include the following:

- Development of actions to reduce fallback through turbines and over spillways

- Increased facility reliability and the ability to maintain operating criteria
- Investigation of measures to protect steelhead kelts
- Investigation of pre-spawning mortality

Improving Water Quality. Water quality is vital to the overall health of the aquatic ecosystem as well as to the survival of listed anadromous fish. Two water quality parameters are of particular concern: total dissolved gas supersaturation and water temperature. Dissolved gas supersaturation is primarily a result of spill at dams; therefore, both operational and structural changes to dams are planned to reduce dissolved gas levels. Elevated water temperature is a more complex issue, stemming from land use practices throughout the basin as well as storage impoundments and dam operations. Numerous measures are planned to improve water quality, including the following:

- Structural and operational modifications at spillways (e.g., spillway deflectors, improved spill patterns)
- Development of alternative fish passage measures (e.g., surface bypass)
- Cool water releases from storage reservoirs (e.g., Dworshak Dam)
- Special powerhouse operations (e.g., McNary Dam)

Resolving Critical Uncertainties. Although we have a substantial amount of information regarding salmonid survival throughout the life cycle, there continues to be unexplained significant mortality that cannot be attributed to specific causal factors. While there are several plausible hypotheses to explain this mortality, many of the possible causes are unrelated to the hydrosystem. Of particular concern are potential delayed effects of hydrosystem actions. If the unexplained mortality is linked to identifiable hydrosystem actions, similar proposed actions could have a much lower survival benefit than predicted by direct survival estimates. Conversely, eliminating those actions (e.g., through breaching) could have a much higher benefit than what might be expected from changes in direct survival alone. Therefore, resolving uncertainties about unexplained mortality is a prerequisite to an estimate the effects of an aggressive non-breach approach or alternative actions.

In the Biological Opinion, NMFS does not propose limits on actions in any of the areas affected by uncertainty. NMFS proposes active investigation to reduce or resolve the uncertainty.

The hypothesis that delayed mortality results from passage through the hydrosystem is the most critical uncertainty regarding the effects of the hydrosystem on fish survival. It is a critical element in evaluating the effectiveness of measures on survival. Several hypothesized forms of delayed mortality are:

I. Delayed mortality of transported juvenile migrants (D value when expressed relative to the survival of non-transported migrants below Bonneville Dam). This will affect the degree to which transport improves survival rates.

I. Delayed mortality of inriver juvenile migrants (extra mortality). This will affect the degree to which breach, transport, and juvenile dam passage actions could contribute to improving survival rates.

I. Delayed mortality and/or passage effects on adults. This includes remedies to reduce unaccounted losses or unsuccessful spawning.

I. Estuarine/ocean survival. Differential timing or distribution in the estuary and ocean may help explain mortality that is otherwise attributed to the hydrosystem. Examples of this are the delayed mortality of transported and inriver juvenile migrants, discussed above.

Empirical data on these issues are limited. An improved understanding is critical because decisions on major hydrosystem configurations and/or operations will depend on the magnitude of delayed mortality and factors that contribute to it. For example, if unexplained mortality is significant, and it is solely associated with delayed effects of the hydrosystem, corrective measures within the hydrosystem can be identified to reduce it. However, if unexplained mortality is not significant regardless of its cause, addressing it would be a lower priority. If unexplained mortality is significant, but it is associated with conditions that affect fish before or after they encounter the hydrosystem, relevant non-hydro actions would be appropriate. The potential implications of unexplained mortality, and whether or not it is delayed hydrosystem mortality, make resolution of this issue a central component of the 5-year check-in and breach decision.

Offsite Mitigation Actions

The conceptual recovery plan also calls for offsite mitigation. These additional actions are included to improve the productivity of the listed salmon populations beyond the level of improvement that would be possible through hydro actions alone because, even with survival improvements in passage of fish at and between dams, significant mortality associated with FCRPS/BOR operations will continue to occur. The hydropower element, therefore, advises the Action Agencies that this additional offsite mitigation in other Hs (habitat, hatcheries, and harvest) is needed to achieve recovery. The strong support of the Action Agencies for actions in these other areas will increase the certainty and reliability of attaining potential improvements.

The offsite mitigation provided by the Action Agencies does not preclude the necessity of improvements in the other Hs by other Federal or Non-Federal parties, nor does it diminish the obligation of these other parties to seek improvements. It is intended to be complementary to, not in lieu of, actions taken by other entities affecting these Hs.

1- and 5- Year Plans

An annual, multi-year planning process to refine, implement, evaluate, and adjust annual efforts is a critical element to achieving the FCRPS hydro and off-site performance standards within the duration of the FCRPS biological opinion. This will be accomplished through development and implementation of one- and five-year plans to achieve both hydro performance standards and the

off-site mitigation performance standards. The plans will cover all operations, configuration, research, monitoring, and evaluation actions. The plans will also describe habitat, hatchery and harvest actions to be funded or otherwise carried out by the Action Agencies as off-site mitigation. The plan allows for revision to the specific measures over time through the one- and five-year plans, as long as the Action Agencies make steady progress toward meeting performance standards, and remain on track for full attainment of the hydro standards by 2010.

Comprehensive Five- and Eight-Year Check Ins

As with any assessment of future conditions there are risks associated with NMFS' determination that the actions to be implemented consistent with this plan will be adequate to ensure the long term survival of the listed ESUs. To manage that risk, NMFS has included critical monitoring and evaluation and specific performance measures and actions levels to trigger additional actions if needed. The region must be prepared to move forward with these alternative measures given the fact that it is possible that on-site and off-site measures will not have the predicted results, or that subsequent information will show the predicted improvements to be inadequate. The FCRPS biological opinion describes the performance standards and measures and the steps for review and decision-making regarding the adequacy and effectiveness of the actions. The plan calls for annual progress reports, major progress evaluations in 2005 and 2008, and pursuit of other options, including possible breaching of dams if necessary, to avoid jeopardy in the future.

Monitoring, Evaluation, and Progress Reporting

Considerable uncertainty exists on the effectiveness of measures identified in this plan and with regard to the benefits of breaching dams, principally with regard to delayed mortality associated with fish passing dams by means of transportation or remaining in river. To resolve these uncertainties, all measures undertaken to benefit fish must be undertaken as scientific studies with rigorous monitoring and evaluation, to learn new information about which measures work and do not work. The plan also calls for monitoring and evaluation of measures to assess an agency's progress in implementing its actions and the benefits resulting from the agency's implementation. The biological opinion establishes a set schedule of measures, milestones, standards and decisions to ensure that this evaluation process is disciplined and rigorous. Monitoring and evaluation may lead to revisions in measures undertaken by Action Agencies to meet performance standards.

While improved knowledge will reduce uncertainty, NMFS is cognizant that learning can entail delay, and delay can entail risks of extinction. A delay to gather additional information, for instance, could increase risks and still end with the "answer" not certain. The plan's provision for ongoing monitoring and evaluation, annual and five-year planning, rigorous review of progress, and use of breach as an option mitigate delay.

Advance Planning for Breach or Other Additional Actions

NMFS has given significant consideration to the options involving breach of the Lower Snake and possibly other dams. Generally, any action that removes or eliminates a source of adverse

effects from the listed species' life cycle increases certainty of improvements in survival. By reducing the effects of one type of human activity, breaching the four Lower Snake River dams provides more certainty of long term survival and recovery than do other measures.

To allow for the possibilities that hydro and offsite mitigation actions included in these RPAs will not provide the anticipated increases in survival, or that subsequent information shows the predicted improvements are inadequate, the FCRPS biological opinion requires Action Agencies to take specifications to ensure that alternative approaches are available. Although it does not rely on breach of any dams to avoid jeopardy, it does require further development of breach as a future option in the event that future conditions warrant it. NMFS recognizes that breach is a major action requiring NEPA compliance, congressional authorization, and appropriations before it can be implemented. This plan, therefore, calls for the FCRPS Action Agencies to conduct or continue analysis preliminary to seeking authorization from Congress, such as preliminary engineering and mitigation studies. The specific actions will reduce the time needed to seek congressional authorization for breach, and reduce the time needed for possible implementation, thereby avoiding risks of delay should breach later become a preferred approach.

Breach Triggers

The FCRPS biological opinion establishes a schedule for determination of whether to pursue breach as a means of avoiding jeopardy. This schedule addresses possible breach of one or a combination of hydroelectric projects. The schedule provides for a rigorous mid-point review of progress in 2005, another comprehensive review in 2008, and a determination under certain conditions to pursue breach if NMFS issues a failure report on the plan following one of these reviews.

Independent Peer Review

It is important that the public and the courts have confidence in the actions that the Action Agencies are taking and in the science that supports the plan and the biological opinion. Accordingly, the plan calls for independent peer review of the implementation progress reports developed by the action agencies in years five and year ten, and the updated extinction risk analyses prepared by NMFS in years five and eight.

Immediate Actions and Benefits

Because listed Columbia Basin anadromous fish are in such fragile condition, and in light of the uncertainties surrounding breaching, an immediate focus on areas and measures that provide short-term gains (1-10 years) for these populations is essential.

For the hydro system, the measures intended to provide these short term gains and the expected effects of those actions on juvenile and adult survival levels are described in detail in the FCRPS biological opinion. The commitment of the Action Agencies is to implement the specified Hydro measures and/or such additional measures as are needed to fully attain these system survival levels by 2010. These benefits and uncertainties are summarized briefly below.

Analysis of the Federal Hydropower Element

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. They include: enhanced spill and spillway improvements to facilitate higher spill levels without exceeding dissolved gas standards; improved flow management; physical improvements to both juvenile and adult fish passage facilities; increased use of barges (reducing the reliance on trucks to transport summer migrants); and continuation of spill at collector projects in the spring to reduce the proportion of Snake River fish transported. NMFS' estimate of the combined adult and juvenile survivals (direct and indirect) that will result from the implementation of these measures is the basis of the hydropower standard. The Action Agencies are committed to attainment of the hydropower standards by 2010. The Biological Opinion also describes an annual planning process to implement these necessary measures, or such additional measures as deemed by NMFS to be necessary to meet the performance standards and avoid jeopardy to listed salmon populations.

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. The following summary provides point estimates for the sake of illustration. The biological opinion describes ranges associated with all of these estimates and also discusses the significant uncertainties associated with the estimates.

For Snake River spring/summer chinook juvenile in-river survival is estimated to increase from 39.8 percent under current operations to 48.7 percent under aggressive hydro. Since such a large portion of Snake River fish are transported, this effect is somewhat masked in the system survival estimate, including delayed mortality, which changes from 56.0 percent under current operations to 56.7 percent under aggressive hydro. The estimated change in survival for adult fish from Bonneville to Lower Granite is from 79.4 percent to 85.1 percent.

For Snake River fall chinook—

10.4% to 15.6% in river juvenile
11.7% to 13.5% juvenile system with transport
60.7% to 72.1% adult system

For Snake River steelhead—

40.1% to 49.5% in river juvenile
46.0% to 49.5% juvenile system with transport
79.6% to 85.1% adult system

Estimated survival improvements for Upper Columbia, Mid-Columbia and Lower Columbia populations are based on the number of FCRPS projects that they encounter, four, four and one, respectively. Since very few, if any, of these ESUs are collected and transported under

either current operations or aggressive hydro, the estimates are more straight-forward and less dependent on assumptions related to the delayed effects of transportation. They are:

	Juvenile	Adult
UC spring chinook	56.9 to 66.0	89.1 to 92.2
UC steelhead	57.5 to 66.4	89.2 to 92.2
MC steelhead	57.5 to 66.4	89.2 to 92.2
LC chinook	73.6 to 79.0	97.2 to 98.0
LC steelhead	85.3 to 89.2	97.2 to 98.0

Analysis of the risks and benefits of breaching the four Lower Snake River dams reveal multiple uncertainties that cast doubt on the necessity of breaching at this time.

The extent of delayed mortality of non-transported fish under current operations and after breaching four dams is unknown. If delayed mortality is high and it all goes away after breaching four dams, this creates a major survival improvement associated with breaching. If there was little or no delayed mortality, or if there was a lot but breaching four dams only gets rid of a small part of it, the fish most likely will not perform better at meeting survival and recovery goals than with the aggressive option.

The extent of differential delayed mortality associated with transported fish is also unknown. This is important because, after breaching, there would be no Snake River transportation program. If differential delayed mortality is low before breaching, when a large percentage of the run is transported, this creates an apparent big jump in survival after breaching. The opposite is true: if differential delayed mortality is high, survival benefits for transported fish after breaching are likely to be minimal.

It is not clear at this point whether breaching would benefit adult fish returning to spawn. There is no clear evidence to suggest adult survival would be better with dams than without, an uncertainty that must be resolved in order to make an informed decision on breaching.

A final key uncertainty surrounding the benefits of breaching is whether juvenile survival in free-flowing stream reaches that used to be reservoirs would change dramatically. While this factor may be less important than those mentioned above, it is nonetheless unknown at this time.

NONFEDERAL HYDROPOWER

In addition to federal dams, there are a substantial number of major and minor nonfederal hydroelectric projects in the Columbia Basin that influence the survival and recovery of listed fish.

- Eleven dams owned and operated by the Idaho Power Company, including Hells Canyon;
- Five dams owned and operated by Chelan, Douglas, and Grant County PUDs on the mainstem Columbia River below Chief Joseph;

- The Pelton-Round Butte dams on the Deschutes River, and Marmot Dam on the Sandy River, and North Fork , Faraday ~~Oak Grove~~ and Rivermill dams and the Oak Grove Project on the Clackamas River, and the Sullivan Plant on the Willamette River owned and operated by Portland General Electric;
- the Leaburg/Walterville, Blue River and Carmen-Smith Projects on the McKenzie River owned and operated by the Eugene Water and Electric Board;
- the Chelan Falls project on the Chelan River, owned and operated by Chelan PUD;
- the Yale and Merwin Projects on the Lewis River and the Condit Project on the White Salmon, and the Wapatox Project on the Naches River and the Powerdale Project on the Hood River owned and operated by PacifiCorp; and,
- the Mayfield and Mossyrock Projects on the Cowlitz River owned and operated by Tacoma City Light.

These projects have had a number of adverse effects on salmon and steelhead, including inundation and alteration of habitat, blocked or impaired passage, inadequate minimum instream flows, blockage of bedload and woody debris transport, unstable river levels flows and water quality alterations. Much of the existing mitigation for nonfederal hydropower projects is inadequate for fish and wildlife needs, and some projects, such as Hells Canyon, Pelton/Round Butte, and Mayfield/Mossyrock still block fish from their historical habitat.

A number of nonfederal hydropower projects have taken steps to mitigate their adverse fish and wildlife effects. For example, the Vernita Bar agreement addresses flows through the Hanford Reach, and has been very successful in rebuilding Hanford Reach populations of upriver bright fall chinook (not listed under ESA). Further revisions of this beneficial agreement are under evaluation. At Wells Dam, juvenile fish passage under the terms of a FERC settlement is the best of any dam on the mainstem river – approximately 98 percent survival using a surface bypass system. Under another settlement, Idaho Power Company provides spawning flows for fall chinook below Hells Canyon Dam. In the upper Columbia, Chelan and Douglas PUDs have been negotiating a Habitat Conservation Plan, including on-site and off-site mitigation and performance standards, with NMFS and the USFWS.

Nevertheless, much improvement at nonfederal hydropower projects remains to be done.
In the course of relicensing and ESA consultation , all of these projects will be reviewed and updated to meet current fish and wildlife needs. Under the Council's Fish and Wildlife Program, (Section 12), specific conditions for new licenses and relicensing are established. In addition, under ESA, consultations with the FERC, the federal dam licensing agency, will result in measures to avoid "jeopardy" to listed fish.
Overall, the Federal Caucus proposes that nonfederal hydropower met the criteria for relicensing included in the Council's Program, and the ESA requirements for no jeopardy. Key requirements from the Council Program include:

- Consultation with fish and wildlife agencies and tribes and the Council throughout study, design, construction, and operation of the project;
- Specific plans for flows and fish facilities
- The best available means for aiding downstream and upstream migration of salmon and steelhead

- Flows and reservoir levels of sufficient quantity and quality to protect spawning, incubation, rearing, and migration.
- Full compensation for unavoidable fish losses or fish habitat losses through habitat restoration or replacement, appropriate propagation, or similar measures
- Assurance that the project will not degrade fish habitat or reduce numbers of fish in such a way that the exercise of treaty rights will be diminished.

The Federal Caucus will work together to accomplish this result through settlement agreements wherever possible. For specific projects, the Federal Caucus has the following recommendations:

- the implementation of the Mid Columbia HCP for the five PUD dams,
- continued implementation (and revision) of the Vernita Bar Agreement for Hanford Reach flows.
- Completion of a Hanford Reach management plan to ensure long term protection of fish, wildlife, and cultural resources in that area.
- Re-evaluation of all mitigation and hatchery programs as part of relicensing and ESA consultation.

NMFS and USF&W will use section seven authority under the Endangered Species Act to consult with the Federal Energy Regulatory Commission to ensure that the needs of anadromous and resident fish are met adequately through the re-licensing process.

5. Biological Background and Recovery Planning

Existing Conditions

Physical Setting

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. See map below. An enormous variety of plants and animals occupy the wide array of physical habitats in the Columbia River Basin.

[insert map from draft]

Ocean Conditions

Ocean conditions have major implications for salmon and steelhead productivity. It has been determined through various analytical efforts that ocean conditions generally vary with climatic conditions on both long-term and short-term scales. When conditions are cooler, in general the ocean is 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 or resources. Ion addition, there is anecdotal evidence that predator abundance may increase off the coast of Oregon and Washington during periods of warmer water. 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 by comparison. These trends generally correspond to fluctuations in adult salmon and steelhead returns. However, it is important to note that ocean oscillations have not been stable, moving up and down within the same basic temperature range. The overall trend has been toward warmer conditions in general. This trend also has major implications for anadromous fish recovery efforts.

The ability of the ocean to nurture salmon and steelhead is dependent on how many migrating juveniles actually make it past the estuary from the spawning areas. In addition, individual populations must have sufficient abundance to survive downturns in ocean conditions. Further monitoring and evaluation over time will reveal more about direct survival and mortality attributable to the ocean. For now, the ocean is but one additional factor that must be accounted for when developing a recovery strategy.

Predation

Consumption of migrating salmon by predators is another important factor affecting the productivity of salmon and steelhead. Migrating juvenile salmon are a targeted food source of numerous 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. Returning adult salmon are targeted primarily by marine mammals. Current studies show that consumption of juvenile salmonids by birds, particularly Caspian terns, is occurring in considerable volume. Likewise, preliminary research is showing marine mammal predation has a measurable effect on returning adults. The overall extent of predation in raw terms on listed species is not clear. Neither are the biological implications clear. Efforts have only recently been undertaken to assess these things. Further research and aggressive monitoring should reveal the trues extent and implications of predation within a relatively short time. In a balanced, properly functioning ecosystem, a certain amount of predation will always occur. It is the genetic predisposition of salmon and steelhead to produce offspring in sufficient numbers to survive and thrive under such circumstances. However, given the perilous state of decline being faced by many salmon and steelhead species, predation control could contribute to recovery efforts along with a suite of other management actions.

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 seven resident fish and other aquatic species as threatened or endangered. (See Figure _ – this is the graphic from Citizen's Guide 2, page 9). This section briefly reviews the status of the anadromous and resident fish populations remaining in the basin.

Anadromous Salmonids

Native salmon and steelhead are in decline throughout the basin. Some believe that 40 salmon stocks from Washington have become extinct during the last 150 years (Nehlsen, et al. 1991).

Historically, 10-16 million salmon and steelhead returned each year to spawn, but by the 1960s, that number had dropped to about 5 million. Today, only about a million fish return, and most of them originate from hatcheries, not from the wild. Of the anadromous **salmonid** stocks in the Columbia River Basin, about 60 percent are listed as depressed, threatened or endangered. At least 65 native stocks have been **extirpated**.

Chinook Salmon – Chinook salmon have a relatively widespread distribution throughout the basin, however most populations are seriously depressed. The highest commercial catches occurred in 1883 when nearly 22,000 tons were harvested Fulton (1968). While some healthy chinook populations remain, most are depressed and many have already been extirpated. Four ESUs are listed as threatened (Snake River fall-run, Snake River spring/summer run, Lower Columbia, and Upper Willamette River ESUs); one is endangered (Upper Columbia River spring run ESU).

Coho Salmon - Coho were once widespread and abundant in the Columbia Basin, but are now considered extinct in upper Columbia and Snake River drainages, and in serious decline in the remaining range in the lower Columbia River. Commercial catches in the 1920s peaked at greater than 700,000 fish landed (Fulton 1970). NMFS has tentatively identified a coho ESU that includes populations in southwest Washington and the lower Columbia River. This ESU is a candidate for ESA listing, however, it is unclear whether native, naturally reproducing coho still occur in the Columbia Basin.

Chum Salmon – Historically, this species may have spawned as far upstream as the Walla Walla River, but today chum salmon are found in a handful of tributaries and stream **reaches** downstream of Bonneville Dam. The spawning areas lost (primarily due to hydropower development) are not extensive and represent only a small portion of the available habitat (Fulton 1970). The Columbia River had an abundant chum population that supported annual harvests numbering in the hundreds of thousands. Current abundance is probably less than 1 percent of historic levels. NMFS has identified all Columbia River chum populations as a single ESU and listed them as threatened under the ESA.

Sockeye Salmon - This species is dependent on lake spawning habitats principally located in the Snake and Upper Columbia River Basins. Historically, commercial catches in the Columbia River may have reached nearly 1.3 million fish in the 1890s (Fulton 1970), but current returns are probably in the tens of thousands of fish. Counts of Snake River sockeye spawners have not exceeded 8 fish during the past decade and the ESU is kept alive only through a **captive-breeding program**. Although sockeye salmon in the Upper Columbia Basin are not listed, their numbers are depressed. There are at least three sockeye ESUs in the Columbia Basin, and one of these - the Snake River ESU - has been protected under the ESA since 1991.

Steelhead - Like chinook, steelhead spawning populations are still relatively widespread in the basin, however they too have undergone dramatic declines and local extinctions. Minimum run size estimates for Columbia Basin steelhead indicate that 150,000-450,000 adults returned during 1938-1967 (Fulton 1970). Current production estimates are in the tens of thousands, with the bulk of production coming from tributaries to the middle Columbia. NMFS has listed all five Columbia River ESUs as threatened or endangered under the ESA.

Coastal Cutthroat Trout - Commonly referred to as sea-run cutthroat, this species has a complex suite of **life history** types that include anadromous and resident types, as well as a freshwater migratory form. NMFS has identified one ESU that includes Columbia Basin populations (a southwest Washington/Columbia River ESU) and has proposed it for listing as a threatened species under the ESA.

Pink Salmon - Pink salmon are rarely encountered in the basin (Emmett, et al. 1991). NMFS has identified two ESUs in the lower 48 states, both in Puget Sound and the Strait of Juan de Fuca.

Resident Fish and Aquatic Species

Bull Trout – Bull trout in the Columbia Basin were listed as a threatened species under authority of the Endangered Species Act of 1973, as amended (ACT) on June 10, 1998. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, and the introduction of non-native species.

Bull trout have more specific habitat requirements compared to other salmonids. Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors. Bull trout are found primarily in colder streams; water temperature above 15 degrees C is believed to limit bull trout distribution. All life history stages are associated with complex forms of cover including large woody debris, undercut banks, boulders, and pools. Preferred spawning habitat consists of low gradient streams with loose, clean gravel and water temperatures of 5 to 9 degrees C in late summer to early fall.

Bull trout exhibit resident and migratory life-history strategies through much of the current range. Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake, river, or in certain coastal areas to saltwater. Migratory corridors link seasonal habitats for all bull trout life-history forms.

Recovery planning is currently underway and will focus on maintaining stronghold/core populations and restoring habitat connectivity and characteristics that have been destroyed or degraded. State and tribal representatives will incorporate information already compiled by previous state efforts to the extent possible in developing the overall recovery plan.

Redband Trout – Redband trout (*Oncorhynchus mykiss*) are a rainbow trout that are found in a number of areas of the inland West. In physical appearance they resemble both rainbow and cutthroat trout and for the most part are restricted to small streams in arid regions. However, Behnke (1992) considers nearly all rainbow trout east of the Cascade Mountains to be of the redband subspecies. Some apparent rainbow trout in certain streams in the Kootenai River drainage have been recognized by Montana as redband trout and are considered a Species of

Special Concern in that state and in Idaho. In March 2000, the Fish and Wildlife Service determined after it was petitioned for listing that the Great Basin redband trout, a fish that lives in parts of Oregon, California and Nevada, did not need protection under the Endangered Species Act.

Kootenai River White Sturgeon – The Kootenai River white sturgeon was listed as endangered on September 6, 1994. Modification of the Kootenai River white sturgeon's habitat by human activities has changed the natural hydrograph of the Kootenai River, altering white sturgeon spawning, egg incubation, and rearing habitats; and reducing overall biological productivity. These factors have contributed to a general lack of recruitment in the white sturgeon population since the mid-1960s. Short-term recovery objectives identified in the Recovery Plan completed in September 1999 are to re-establish successful natural recruitment and prevent extinction through use of conservation aquaculture. The long-term objective is to downlist and then delist the fish when the population becomes self-sustaining.

The operation of Libby Dam to provide sufficient flow at proper temperatures for successful white sturgeon spawning and recruitment of young is a critical factor in sturgeon recovery. Reservoir storage and salmon augmentation flows are just two of the factors that must be considered and integrated into an operational plan for Libby dam in arriving at sturgeon releases. The rate of change in discharge from Libby Dam also is an important consideration.

Snake River Snails – Five species of aquatic snails in the Snake River were listed as endangered (Idaho springsnail, Banbury Springs lanx, Utah valvata, Snake River physa) and threatened (Bliss Rapids snail). The species currently occur mainly in the remaining free-flowing reaches and spring alcove habitats of the Snake River between American Falls reservoir and C. J. Strike Dam. Habitat requirements generally include cold, clean, well-oxygenated flowing water of low turbidity. Threats to the species include diversion of water from the river and springs for agriculture, aquaculture, and hydroelectric power generation; return flows that are high in nutrients and sediment and may contain pesticides; rapid fluctuation in flows at and below hydroelectric generating facilities; and invasion of non-native species.

Recovery efforts for the snails will need to focus on reducing diversions or maintaining minimum flows, avoiding rapid changes in flows due to hydropower operations or providing salmon augmentation water, and improving water quality.

BIOLOGICAL REQUIREMENTS

Salmon and Steelhead

NMFS has defined the geographic boundaries of major stock groups or ESUs of Pacific Salmon throughout the West Coast that are genetically and demographically distinct from each other. Nineteen ESUs in the Columbia River Basin occupy four interconnected regions: (1) Snake River Basin, (2) upper Columbia River Basin, (3) middle Columbia River Basin, and (4) lower Columbia River/Willamette River Basin.

Life-history traits, such as run-timing, vary among and within ESUs due to selection imposed by a variety of factors, including differing times of peak stream flow, seasonal barriers to passage (e.g., waterfalls), and differing migration distances. This diversity of life history traits has been important in maintaining the historic abundance of salmon in the basin.

Like all organisms, salmon have individual maintenance requirements. In fresh water, these include adequate water quality (including temperature and dissolved oxygen requirements), sufficient water quantity, adequate food supply, and appropriate spawning and rearing habitat. Different species and different life-history types vary in their specific requirements. For example, chum salmon require **low-gradient tributary habitats** near tidal areas in the lower basin for spawning, while sockeye salmon spawn in beach gravels in lakes in the interior basin. The degree to which the biological requirements of individuals are met will affect the **viability** of the entire population or ESU, by affecting the size, stability, spatial structure and diversity of the population.

Survival in the ocean also affects salmonid populations. Shifts in ocean conditions, brought about by shifts in climate, have produced abrupt differences in salmon survival in the ocean (Francis and Hare 1994). Although the mechanisms affecting ocean survival are largely unknown, they are presumed to be the result of annual and decadal variation in nutrient availability (and thus, in an upward cascade, algal and zooplankton production) (e.g., Hare et al. 1999). Recent modeling suggests that climate changes due to doubled levels of atmospheric carbon dioxide would significantly alter coastal productivity, potentially affecting the growth, survival and distribution of salmon populations (Hinch et al. 1995, Welch et al. 1998).

1.5.2 Resident Fish and Other Aquatic Species

Resident fish and other aquatic species in the Columbia River Basin have similar biological requirements as Pacific salmon (e.g., good water quality, access to habitat/cover and food, and opportunities to breed) and will benefit from many actions to improve habitat for salmon. However, specific biological requirements vary by species.

Bull Trout – Bull trout display a high degree of sensitivity at all life stages to environmental disturbances and have more specific habitat requirements than many other salmonids (Fraley and Shepard 1989, Howell and Buchanan 1992, Rieman and McIntyre 1993). Length and timing of incubation to **emergence** (200 days or more during winter and early spring), the strong association of juvenile fish with stream channel **substrates**, and a fall spawning period make bull trout particularly vulnerable to altered flow patterns and associated channel instability. Successful bull trout spawning and development of embryos and juveniles requires very cold water temperatures. Extensive migrations are characteristic of the species and migratory bull trout facilitate the interchange of genetic material between populations, ensuring sufficient variability within populations.

Kootenai Rive White Sturgeon – White sturgeon are broadcast spawners, releasing their eggs and sperm in fast water. Based on recent studies, Kootenai River white sturgeon spawn during the period of historical peak stream flows from May through July (Apperson and Anders 1991;

Marcuson 1994). Spawning at peak flows with high water velocities disperses and prevents clumping of the adhesive eggs. Following fertilization, eggs adhere to the river substrate and hatch after a relatively brief incubation period of 8 to 15 days, depending on water temperature (Brannon et al. 1984).

Snake River Snails - Ecologically, the five listed species of Snake River snails share many characteristics, and in some locations two or more can be found sharing the same habitat. Their habitat requirements generally include cold, clean, well-oxygenated, flowing water of low **turbidity**. With the exception of the Utah valvata and possibly the Idaho springsnail, the listed snails prefer gravel-to-boulder size substrate. Despite these affinities, each of the five species has slightly different habitat preferences. The Idaho springsnail and Snake River physa are found only in the free-flowing mainstem of the Snake River. The Bliss Rapids snail and Utah valvata occur in both cold water springs or mainstem habitats, while the Banbury Springs lanx only occurs in cold-water springs.

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 intends to appoint Technical Recovery Teams for the upper and mid-Columbia River, as well as for the Snake River basin as soon as possible. Those teams will establish biological recovery goals for the ESUs in these areas within three years.

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.

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6. Implementation

[NOTE: TO BE INCLUDED]

7. Research, Monitoring and Evaluation

7.1 Introduction

The research, monitoring and evaluation proposal presented here is the first step in a developing program. Rather than a completely field-ready program, this section provides an outline of the data required to develop and assess recovery plans for listed salmonids within a single subbasin. This plan was developed with the ecology of an inland ecoregion, such as the Salmon River Basin, in mind; however, the plan does not specifically identify sampling locales within the basin.

This monitoring and evaluation effort is based on a data collection scheme developed to answer questions fundamental to the management and recovery of anadromous salmonids. These questions arise from fundamental uncertainties in these fishes' population processes, both in trends in abundance as well as the factors that regulate salmonid population dynamics.

The first goal of the question-based monitoring and evaluation scheme outlined here is to identify trends in abundance and productivity in populations of listed anadromous salmonids in the Salmon River Basin. For populations requiring recovery efforts to meet mandated survival and recovery goals, however, monitoring and evaluation will also focus on the efficacy of management actions. Therefore, establishing quantitative, mechanistic links between factors that can be manipulated and population responses is a second, critical goal of this effort.

The questions that drive the organization of this monitoring and evaluation program are divided into three major groupings or layers: i) population status, ii) mechanisms of population regulation (including both observational and experimental studies), and iii) management action compliance. Not all questions need be answered at all locales within the Salmon River Basin. This is one of the advantages of structuring the monitoring and evaluation program around mechanistically based questions. The results from targeted monitoring efforts that elucidate mechanisms will be applied across the monitoring/evaluation geographic region with the following caveats: all mechanistic explanations are hypotheses, are variable, and are influenced by higher order interactions not present in either the experimental or analytical framework. This will allow us to extrapolate from locally identified mechanisms, and to repeat these experiments across time and space, knowing that we will readily abandon the generality of a mechanism when warranted.

As with all experimental designs, the questions are hierarchically organized. The data collection scheme is very broad, primarily due to our ignorance of the mechanisms of population regulation in salmonid fishes. The hierarchical organizational scheme is designed to sample broadly in space for one suite of independent variables, but at a much finer scale for a second suite of parameters. Background level data collection will be performed with complete geographic coverage, while specific management actions or population regulation mechanisms will be evaluated on a finer local scale. We offer suggestions for the particular parameters to be

included in each of these sampling routines, but also allow that as our knowledge of salmonid population processes is refined, the program can be adapted.

The balance of this document is organized as follows: i) questions within each of the three major groupings (above) to be answered by the monitoring and evaluation program, and approaches to address these questions; ii) a plan to develop a sampling scheme for this monitoring program; iii) an outline of an analytical scheme that can accommodate the information gathered through this monitoring program; and, finally, iv) a very brief and preliminary description of the anticipated institutional coordination necessary to implement the program.

7.2 Questions and Approaches

7.2.1 What is the status of salmonid populations; does that status change through time?

A primary concern of salmonid management is determining the level of risk that populations face, including the current trends and abundance of populations, and determining whether those trends change. In addition, accurately determining population status is a vital part of assessing mechanisms of population regulation (question 7.2.2). A comprehensive monitoring program will thus address the following questions:

- *What are current abundances, and what are the long-term trends in population abundance?* The long-term trend of a population (its rate of change) is one of the most important parameters determining its viability, since a declining population will always reach extinction at some point in the future.

- *What proportion of the naturally spawning population is made up of hatchery-origin fish, and what is the reproductive efficacy of those fish?* The rate of change of the wild component of a population cannot be determined without knowing the contribution of hatchery-origin spawners to subsequent generations.

- *What are life-stage specific survival rates?* Population dynamics of salmonid populations are poorly predicted by the dynamics of terminal life stage spawners. Demographic information for multiple life stages is a far better measure of actual population dynamics and provides an important basis for mechanistic population models.

- *What is the spatial extent of breeding populations?* The distribution of spawners throughout the basin provides an assessment of the total breeding population, and of the temporal variability in utilization of spawning habitat. (Note that in some cases, total spawning population can also be determined by a passage barrier count at the base of the ESU or population.)

- *What is the peak and range of run-timing and time of spawning?* Knowing the temporal pattern of breeding habitat utilization can validate the use of peak counts of index reaches as representative samples of breeding populations.

- *What is the spatial distribution of juvenile fish*? Accurately assessing juvenile abundance (and therefore stage-specific survival rates) will require knowledge of the distribution of those fish.

Addressing these questions will require data collection both inside and outside the basin.

Assessing population trends, abundance, timing and ultimately survival rates will require spawner counts at index areas during key periods during the breeding season as well as comprehensive surveys of the basin. In some cases it may be more practical to make redd counts along the index areas since this method both integrates over time as well as representing reproductive efficacy and absolute spawner numbers. Spawner counts must differentiate between hatchery- and wild-born fish. When redd counts are used instead of direct fish counts, the fraction of hatchery-born fish will be determined at convenient locations (dams, ladders, weirs) within the basin. Determining specific sites for spawner count data will require consideration of both previously collected data, to ensure continuity, and experimental design, to ensure that the sampling is unbiased.

Determining stage-specific survival rates will require a variety of measures.
In particular, within the basin surveys should address female fertility (eggs/female), emergence rate (fry/redd) and juvenile (parr and smolt) abundance. As a result, we will be able to determine in-basin survival terms for these fishes' first year, broken into egg-fry, fry-parr and parr-smolt components. Outside the basin, we will continue following cohorts through their down-river migration to early ocean juvenile stages since both the first year survival and estuarine-early ocean survival are the life stages to which the population trajectory is most sensitive to reductions in mortality (CRI, 2000). Following fish outside of their natal basin will involve several tagging efforts. PIT-tagging smolts as they leave the Salmon basin will allow them to be followed through the FPS. Below Bonneville Dam, a small fraction of the PIT-tagged fish can be fitted with radio or sono-tags for individual based monitoring during their residence/transit period in the lower river, estuary and near-shore environment.

Finally, determining the relative reproductive success of hatchery-origin spawners, wild-origin spawners and hatchery-wild mixed pairs will require genetic sampling, optimally at several life stages.

7.2.2 What are the mechanisms of population regulation?

Even with a very complete knowledge of the status of populations, we need to understand the determinants of population regulation to be able to manage the populations for recovery. This section poses a set of explicit questions asking, which ecological, environmental or genetic factors control population growth? Answering these questions is a two step process: i) assessment of current conditions, identifying patterns suggesting relationships between current conditions and population status, ii) establishing cause-and-effect relationships between changes in conditions and salmonid population responses. These two steps are applied in turn to each of the following questions that address the mechanisms of population regulation:

- What is the local to landscape level variation in salmon productivity as indicated by subbasin to fine scale habitat assessment? For example, subwatershed and stream level assessments for habitat characteristics (e.g., LWD, gravel structure, water temperature, intergravel dissolved oxygen, gradient, and turbidity).

- What are the hatchery/wild fish interactions that result in direct or indirect resource competition as indicated by food and space resource use overlap/competition?

- What are the ocean conditions that act as determinants of salmon productivity as indicated by correlations in salmonid population numbers (returning spawners?) with ocean condition indices, zooplankton indices, or with direct measurements of ocean survival, fish condition or food supply?

- What are the aquatic community structure/dynamics that determine salmonid population processes as indicated by prey community and predator community? In particular, coupling of aquatic community dynamics to adult salmonid population dynamics, replacement of juvenile salmonids in the community by exotics or enhanced populations of resident fish. Known indicators of aquatic community dynamics important to salmonid productivity include: macroinvertebrate density/diversity and juvenile salmonid and salmonid predator gut contents. It will be important to extend some aspects of aquatic community structure monitoring below the Salmon River Basin, in particular, surveys of exotic or enhanced populations of resident fish.

- What are the aquatic ecosystem structure/dynamics that determine salmonid population processes as indicated by the primary productivity of salmonid supporting streams/reaches? Important indicators of a stream's productive capacity are: water chemistry, standing crop biomass (producers and consumers), dissolved organic carbon, benthic organic matter, isotope ratios to identify aquatic, terrestrial, marine sources of organic Carbon, Nitrogen and Phosphorous.

- What is the spatial spread of wild spawners from their natal reaches, and does it act as a determinant of salmonid population processes? Natural stray rates are virtually unknown, as are the factors that influence straying in wild fish populations. It is clear that anthropogenic disturbances can influence straying; hatchery fish have lower home stream fidelity, as would be expected from our understanding of homing physiology. However, the population level consequence of straying can only be hypothesized from the potentially detrimental effect of gene flow in the context of extensive local adaptation. A corollary of any exploration of straying is the assessment of the degree and importance of local adaptation. Such work is, however, beyond the scale of this monitoring and evaluation program, but indirectly addressed through a comprehensive survey of breeding site fidelity in wild populations.

- What is the genetic composition of breeding populations as a determinant of population processes? Obviously of importance, the genetic basis of breeding behavior is far too complex to address even as a single quantitative trait. However, tracking allele frequencies within select breeding populations serves as baseline data for explorations of introgression of

domesticated genotypes via hatchery fish as well as outcrossing that results from altered stray rates between wild populations.

- What is the extent of hatchery/wild fish interactions, in particular the behavioral/genetic basis for/against interbreeding as indicated by both the relative densities of hatchery-born and wild-born fish on the spawning grounds and the rate of introgression of genetic markers present predominantly in the hatchery population?

- What is the time course of naturalization of hatchery escapement? Hatchery adapted stocks breeding concurrently with wild populations introduces the risk of disrupting locally adapted gene complexes in the natural population; however, this risk is offset by the selective pressures present in the natural environment. As a result, domesticated stocks can become naturalized. Unfortunately the magnitude of either pressure, domestication through outcrossing or naturalizing selection, is not well characterized in wild salmonids.

- What are the anthropogenic sources of altered selective regimes, and how might they act to alter the regulation of natural salmonid populations? Salmonids domesticate easily, as illustrated by the success of production hatchery operations, and can be selectively bred, as illustrated by steadily shrinking body size in wild populations; however the extent to which unintentional selective regimes resulting from human activities have altered population processes is unknown. It is known that water temperature and feeding regimens affect phenotypic sex and age at maturity, so is not unreasonable to expect other human-induced selective pressures that act on demographic characteristics of wild salmonids.

Addressing these questions will require a two-phase data collection effort. Firstly, sub-basin and stream assessments, and then secondary experimental protocols to isolate population regulatory mechanisms. Data collection on population determinants will be coordinated with the population status surveys outlined in section 7.2.1.

Surprisingly little is known about the mechanisms of population regulation and the determinants of population productivity in north pacific salmonids. Numerous correlational studies have associated habitat features with salmon numbers, but rarely are the links strong enough to truly represent the mechanistic underpinnings to salmonid population biology. As such, a monitoring and evaluation program targeted at the determinants of salmonid population dynamics may appear to be a fishing expedition, falling victim to the 'measure everything everywhere' rubric of data collection. We have endeavored to include factors only to the extent that there is some basis for their exerting real regulatory effects. In addition, we advocate the adoption of an adaptive monitoring and evaluation scheme, where the set of independent variables to be measured is refined as the program progresses. This portion of the monitoring and evaluation program has three focal areas: habitat quality, habitat utilization by salmonids, and ecosystem processes.

Obviously the quality, very broadly defined, of salmonid habitat will effect their population dynamics. However, which characteristics of salmonid habitat are the strongest determinants of productivity is not known. Nonetheless, it is clear that the quality of salmonid breeding and rearing habitat varies naturally throughout the Salmon River Basin, and it is also clear that human activity has influenced the quality and quantity of habitat in the basin. Therefore, the

major focus of habitat quality monitoring will be characterization and assessment of habitat quantities thought to be important factors in determining the health and productivity of breeding and rearing reaches. This assessment will occur on two levels, subwatershed assessments of land use and land cover, and stream based surveys of productivity potential.

Land use land cover assessments are broad scale (6^{th} field HUC) landscape descriptions. This assessment, done as a baseline at the onset of a monitoring and evaluation program, and updated on a 3-5 year timeframe, categorizes the natural and anthropogenic features of the upland habitat with in the basin. As such, land use land cover forms the basis for mechanistic relationships between large-scale habitat characteristics and uses and salmonid productivity within the watershed. Typically these coverages are developed from satellite images and aerial photography, categorizing the landscape by many factors including, but not limited to: geology, gradient, vegetation type, forestry activity, mining sites, road density, stream crossings, grazing activity, agriculture and urbanization.

The potential for a steam to support anadromous salmonids, either in breeding or rearing is determined by a suite of characteristics both physical and biological. Monitoring these aspects is hampered by a lack of direct mechanistic relationships between particular characteristics and the level of productivity that they indicate. However, as a baseline, this monitoring and evaluation program will begin with stream based assessments of salmonid habitat to characterize the existing status of its physical and biological components.

The physical aspects of salmonid habitat will be assessed by characterizing the basin's streams' structural components that support salmonid productivity. In particular, the habitat complexity formed by riparian vegetation, gravel structure, large woody debris, cut banks and plunge pools. In addition it is important to note the potential ability of the immediate surroundings of the stream to maintain habitat diversity through such aspects as sediment and wood supply.

The biological basis of the basin's streams' potential to support salmonid populations will be assessed by monitoring the aquatic community structure. In particular, this monitoring and evaluation program will focus on fish assemblages and macroinvertebrate biomass. The composition of the piscine community determines both the predator and prey base for juvenile salmonids and hence directly effects survival. Of primary importance is determining the natural assemblage of fishes in productive salmonid rearing habitat since it is well understood that human activities have directly and indirectly altered fish communities. It is also known that juvenile salmonids depend heavily on macroinvertebrates, particularly insect larvae, as prey. Therefore, monitoring the density and diversity of aquatic macroinvertebrates, as well as their representation in the diet of juvenile salmonids, is essential to understanding the community level determinants of salmonid habitat productivity.

If salmonids preferentially utilize higher quality habitat then the fish themselves are a natural bioassay of habitat quality. Therefore it is essential to link the population status surveys to the habitat assessments and monitoring efforts. At some level associating productivity with habitat characteristics will occur during the analysis phase of this monitoring and evaluation program, however, direct comparisons of high and low use habitat can also elucidate the underlying population dynamical mechanisms. Of particular interest will be associations of habitat types to

age/stage classes of juvenile salmonids. However, the degree to which the habitat quality influences home stream fidelity in returning spawners is also of interest as a determinant of the genetic structure of breeding populations and the basis for selective breeding and local adaptation.

To some unknown extent salmonid population dynamics are regulated by large-scale environmental processes, both within freshwater rearing stages as well as during marine maturation stages. For the most part, these conditions are not available to be manipulated; however, they warrant monitoring for several important reasons. Firstly, if in fact they are the most important determinants of salmonid population productivity, current management action schemes will be meaningless. Secondly, even if large-scale environmental conditions are not the primary determinants of salmonid productivity, they certainly do play some role, and as such need to be monitored in order to determine their extent of regulatory control. Lastly, and perhaps most importantly, all environmental conditions vary in time and space, and thus must be monitored on the appropriate spatial and temporal scales if any other factor is to be identified as playing a role in salmonid population dynamics.

There are three major, somewhat interrelated, classes of background environmental characteristics to be monitored: ocean conditions, basin climate, and basin water quality.

No single ocean condition metric has been linked directly with all salmonid populations for a variety of reasons. Firstly, ocean conditions indices were not developed to measure the productivity on which north pacific salmonid juveniles and adults depend. Secondly, the spatial extent of most ocean condition indices is much greater than that utilized by single runs of north american salmonids. Ideally, a salmon specific ocean condition index should be developed, particularly with certain species and basins of origin in mind. Given these caveats, we advocate a hybrid of three ocean condition indices, as well as the further exploration of the utility of existing indices.

Using existing ocean condition indices we have no control over the spatial representation within the measures. In some cases they are too broad (PDO, PCI), and others too focused (zooplankton, Aleutian Is.), but the hope is that in concert these indices will represent the potential for ocean conditions to influence salmon river basin fish population dynamics.

To capture very broad scale conditions we will use both the Pacific Decadal Oscillation (PDO) index, monthly sea surface temperature and pressure over the entire Pacific Basin, and the Pacific Circulation Index (PCI), a record of seasonal shifts in the jetstream over the north pacific. To more directly assess productivity in the North Pacific we will use monthly zooplankton sampling already underway in the Gulf of Alaska. While this index does reflect the productivity forming the basis of maturing salmonid's prey base, the geographic extent is not perfectly matched to that of Salmon River Basin fishes. Thus, the utility of this measure is through the assumption that its sampling area represents productivity across the north pacific. And finally, we will use a near shore sea-surface productivity measure of the Columbia River plume and north along the shelf, representing ocean habitat utilized by these fishes during their early ocean phase. If this region is significantly uncoupled from either the basin wide PDO/PCI and Gulf of Alaska zooplankton index then some monthly productivity measure is required. This last metric

can be something as simple as NPP measured by chlorophyll concentration from satellite images with as run-specific spatial coverage as possible.

Although no single climate variable determines salmonid population dynamics completely, the combination of ambient temperature, precipitation and insolation drives the dynamics of the upland and aquatic ecosystems within which salmon spend several key life cycle stages. On a basin-wide scale the dynamics of the climate varies dramatically across time and space, however, the ecological response integrates over very large spatial and temporal scales. To a large extent, climatological monitoring will be used to develop a better understanding of natural variability in ecological determinants of population dynamics in the Salmon River Basin.

Spatially, coverage will reflect the complete river basin from NWS climate sites, integrated with predictive climate models. Since the actual link between ecological response variables and basin scale climate is not well known daily measures integrated over the watershed will capture important features of seasonal and inter annual variability. The particular climate variables to be measured are ambient temperature (daily mean and range), precipitation (daily), insolation.

Fish require water, there is no doubt of that, but to what extent does the quality and quantity of water effect salmonid population dynamics? In this case, the quality of water includes its potential to support secondary productivity.

These data will be collected at each population survey site during breeding, rearing and overwintering. Taking advantage of as much automated sampling as possible, record flow, temperature, turbidity, pH, dissolved oxygen, NPC concentrations, metals and pesticides concentrations, and primary productivity. Flow measurements will be taken from gauging stations already in place in the salmon basin. Temperature will be recorded on temperature data loggers (deployed and recovered at least semi-annually) on a daily basis (mean and range). Turbidity will be assessed with standard nephlometric turbidity methods with grab samples. pH will also be measured from grab samples with pH electrodes. Dissolved oxygen will be assessed by either Winkler titration or oxygen electrodes in the field on grab samples. At each sampling site, benthic sediment will be collected to be analyzed for heavy metals, bound pesticides, plasticizers and PCBs. Surface water samples should also be taken at the base of each subbasin for dissolved/suspended pesticides. Water samples will be collected at each site to measure concentrations and sources of dissolved/suspended Nitrogen, Phosphorus and Carbon. Primary productivity will be assessed in one of these manners: whole river bottle method, field surveys of standing algal biomass, or growth tiles deployed over inter-sampling intervals.

7.2.3 Compliance

In this monitoring scheme, compliance monitoring involves the implementation of management actions (i.e., the work's quality with respect to meeting design tolerances within the required timeframe), and encompasses two questions:

- Are the mandated management actions being implemented appropriately?
- Have they been implemented in their entirety, and maintained, if necessary?

While these questions appear trivial, this component of a monitoring program is very important for two reasons. 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.

Data collection for compliance monitoring will be targeted to specific management actions. All potential management actions to be carried out within the Salmon River Basin's monitoring and evaluation framework must explicitly incorporate this program's data collection template common to the spatial and temporal scales of the action. In addition, the action must be designed as an experiment such that proper controls are incorporated, and having sufficient power to detect the action's objective.

7.3 Sampling Design

7.3.2 Replication

The frequency and spatial distribution of a sampling effort is an important component of a research and monitoring program that is efficient in time, effort and money. In particular, a formal statistical analysis of natural variability Therefore, near-term efforts will focus on formally developing an appropriate sampling design. This design will incorporate elements of a probabilistic design (such as the Environmental Monitoring and Assessment Program, developed by the EPA) for determining population status and environmental conditions. It will also include more targeted sampling aimed at identifying patterns suggesting that specific natural or anthropogenic factors affect salmonid population dynamics and at establishing cause-and-effect relationships between environmental conditions and salmonid population responses. Finally, it will consider existing data sets, in order to maintain continuity with past efforts, when appropriate. The replication in space or time required for each data type will necessarily be dependent both on the magnitude of natural variability in that data (more variability requires a greater sampling effort) and on the scale at which it varies (water temperature, for example, varies on a shorter time scale than land cover or use). Because NMFS and Technical Recovery Teams will evaluate viability and recovery at the population scale, the fundamental unit for evaluating status will be demographically-independent populations.

7.3.3 Controls

In order to establish a cause-and-effect relationship between management actions and population responses, management actions must be conducted within an experimental framework, such as a BACI (Before-After-Control-Impact) design. Identity of impact-control pairs will be based on demographic, geographic and ecological factors in order to maximize the ability to detect a response.

7.4 Analytical Framework

Collecting data in the absence of an analytical framework is nearly as pointless as collecting data without an underlying question. An analytical framework provides the structure on which to hang both the data as well as the questions that drive the data collection. On a very simple level, the analytical framework that underlies this monitoring and evaluation program is the mechanistic basis for population regulation in Salmon River Basin salmonids. In this case the analytical framework is the link between all of the questions posed by the monitoring and evaluation program. That is to say, the analytical framework is the predictive relationship between all of the data collected, the mechanisms that they imply, and the future condition of the salmonid fishes in the Salmon River Basin.

To be useful the analytical framework must contain sufficient specificity that all mechanistic relationships can be included while simultaneously having sufficient generality that no interactions are impossible. To be analytical a framework must be mathematical, but all mathematical models impose mechanisms through their fundamental equations. Therefore, care must be taken in choosing a model that either has the same underlying mechanism that acts to generates the observations to be analyzed, or has such a general form so as not to imply a mechanism that acts at the same level as the data. If, as in the case with salmonid population regulation, the true mechanism is unknown, only a model of the latter type can be posed.

The best suited model form for a completely undetermined population dynamic is a matrix model. The only implied mechanism that cannot be avoided with a matrix population model is the assumption that population trajectories are Markov processes: population sizes at the next instant in time depend only on current conditions. The beauty of matrix population models lies in their generality – all forms of environmental and biological mechanisms that determined transition probabilities between life stages can be included. The only real limit is data, never a way to include it in the framework.

Thus, the analytical framework is the conceptual framework for the entire process of developing, implementing and adapting this monitoring and evaluation program. The framework of a matrix population model guides the questions that structure the monitoring and evaluation program, and a matrix population model is the conceptual framework for data collection and analysis. Since the entire program is framed as a series of questions informing the determination of population dynamical processes, as these relationships are developed their place in the mechanistic framework can be adapted. As we isolate population regulatory mechanisms we can easily refine both the manner in which data is collected and the analysis is structured because we have implemented a general flexible framework with mechanistic question driven data collection - an adaptive monitoring and evaluation program.

7.5 Logistics, Implementation and Coordination

A number of groups, most notably the Forest Service's Pacific NW Forest Science Laboratory, the EPA, and the Oregon Coastal Salmon Restoration Initiative, have developed scientifically rigorous monitoring protocols for aquatic systems. The NWFSC will work in conjunction with these groups and other regional agencies to refine the monitoring scheme proposed here, to

evaluate formally the necessary temporal and spatial replication, to identify specific localities at which the monitoring program will take place, and to develop data collection protocols.

Implementing this ambitious monitoring program will require an extraordinary degree of coordination among an enormous number of regional management agencies. Population status data are fundamental not only to risk assessment but also to determining mechanisms of population regulation. Local agencies will necessarily play an important role in acquiring and processing these data. Environmental condition data is important both for identifying patterns between salmonid productivity and natural or anthropogenic factors and in providing the important "Before" component of a BACI experiment. It is anticipated that much of these data will be collected during sub-basin assessment programs underway. Additional coordination will be important to ensure that the full complement of environmental factors are assessed during these efforts and that on-going data are collected as needed. Monitoring aimed at determining mechanistic cause-and-effect relationships between environmental conditions or management actions and population responses will be conducted on a case-by-case basis, dependent on the scale of the action. In these cases, agencies implementing actions and the monitoring design team may coordinate with groups or local agencies with specific expertise to apply appropriate data collection protocols.

Because this effort will be conducted on such a large scale, it will be imperative that all data collection and reporting be conducted in a manner that allows the data to be used not only for scientific support of management actions, but also to address more basic or theoretical issues that have the potential to inform management decisions. In particular, standards for data must encompass data collection, reporting, and access to that data.

8. Government to Government Policy Discussions

Discussions on the Conceptual Recovery Plan were held as listed in Table 1. Additional government to government discussions will occur after the Conceptual Recovery Plan and the FCRPS operations Biological Opinions are released to the Tribes and States for technical review and before final decisions are made.

Agendas were jointly developed by tribal and federal staff at several technical meetings prior to the meetings identified in Table 1. Technical meetings were also held with Tribal technical staff and Federal Caucus members to work through follow-up issues identified during the policy discussions. Additional responses to concerns and issued raised by tribal members and their representatives are also included in the main text of the Conceptual Recovery Plan, the Public Involvement section of this volume, and the FCRPS operations draft Biological Opinions.

Meeting records, attendee lists, agendas, and agreements and requests are included in this volume.

Tribal Concerns

In general, the concerns raised by the tribes were in the following areas. More specific detail is available in the meeting notes, agreements and requests included in this volume.

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

The Federal Caucus made commitments during the policy discussion to respond and follow-up to tribal concerns. These specific commitments are recorded in this volume. Many of these responses have been completed, while others will be taken during the period of implementation of the All H actions and FCRPS operations Biological Opinions.

Cultural Resources

Implementation of the recommended actions described in the Conceptual Recovery plan may potentially impact the tribal cultural resources throughout the Columbia Basin. During government to government policy discussions, the tribes emphasized the significance of the resident and anadromous fish and wildlife as part of the cultural heritage of the region's tribes. This significance goes beyond the current cultural resources program emphasis being addressed

by the Federal agencies as part of the impact of reservoir operations. The Federal Caucus recognizes this need to understand the broader definition of the cultural heritage brought by salmon and traditional areas into the planning and implementation of actions undertaken to address the fish and wildlife resources of the Columbia Basin.

Hydropower. The areas and impacts associated with the operation of the hydropower system as a result of guidance from the Conceptual Recovery Plan will be essentially the same as those described in the 1995 System Operating Review (SOR). Additional inventory and analysis will need to be accomplished for areas not covered by the SOR. Implementation and funding for the All-H actions associated with the operation of the hydro system will be implemented through the current Direct Funding Agreements.

Hatcheries. Hatcheries are an integral part of salmon restoration. Facilities development needs to be aware and respectful of cultural considerations throughout the design, construction, and implementation stages. Though the goal of a hatchery is to increase the production of salmon, it must not be done at the expense of cultural values and resources.

Harvest. The federal caucus acknowledges and affirms the tribes' right to catch salmon as part of their cultural heritage.

Habitat. Cultural considerations for habitat projects will include traditional properties, use areas, plants and other identified resources. Actions taken to improve salmon and resident fish habitat will protect these resources and cultural values.

Table 1 Listing of All-H Government to Government Policy Discussions

Date	Location & Format	Tribal Attendance	Agency Attendance
March 14, 2000	Lewiston, Idaho meeting	• Nez Perce • Umatilla • Warm Springs • Yakama	BPA, NMFS, COE, BOR, EPA, USFWS, BIA, BLM, DOJ, DOI
March 24, 2000	Spokane, Washington meeting	• Burns Paiute • Coeur d'Alene • Colville • Kalispell • Shoshone-Pauite • Shoshone Bannock • Kootenai • Confederated Salish & Kootenai • Spokane	BPA, NMFS, COE, BOR, EPA, USFWS, BIA
April 3, 2000	Portland, Oregon meeting	• Nez Perce • Umatilla Tribe • Warm Springs • Yakama	BPA, NMFS, COE, BOR, EPA, USFWS, BLM-Spokane District Manager, and USFS
April 4, 2000	Boise, Idaho meeting	• Burns Paiute • Coeur d'Alene • Colville • Kootenai • Shoshone-Paiute • Shoshone Bannock • Spokane	BPA, NMFS, COE, BOR, EPA, USFWS, BIA, and BLM
April 25, 2000	Washington, DC meeting	13 Columbia River Basin Tribes	NMFS, NOAA, US Army, DOI, DOJ, CEQ, BPA, USDA, EPA
June 28, 2000	Conference call	13 Columbia River Tribal Chairs	CEQ, BPA, NMFS, DOI, ???
July 27, 2000	Conference call	13 Columbia River Tribal Chairs	CEQ, BPA, NMFS, DOI, ??

Summary of Federal/Tribal Agreements

CRITFC/Federal Agencies (3/14/00, 4/3/00)
UCUT & Snake River Tribes/Federal Agencies (3/24/00, 4/4/00)
Columbia River Basin Tribal/Federal Agencies (4/25/00, 6/28/00)

- Salmon Rebuilding and Recovery: Achieving abundant, harvestable fish population goals within a set timetable must be a guiding principle. Tribal proposals for aggressive rebuilding goals and timetables will be evaluated through CRI process, and Federal agencies and Tribes will seek agreement. (NMFS, FWS, BPA, CRITFC – 2000)

- Treaty Fisheries (environmental baseline): A Tribal/Federal staff working group will work on including Tribal fisheries in the environmental baseline and establishing a multi-year harvest agreement. CRITFC's intent is to complete an environmental baseline analysis and synthesize information for inclusion into a multi-year BA/BiOp (CRITFC, NMFS, FWS).

- Trust Responsibility: The Federal agencies affirmed that they do not distinguish between Executive Order Tribes and Treaty Tribes in its policies and responsibilities to consult.

- Hydropower: The Tribes will propose a structure for increased, facilitated consultations among the Tribes, Corps of Engineers and other Federal agencies on the Corps' capital expenditures, operations and performance standards, and an enhanced Tribal role in system operation management. (CRITFC, BPA, Federal Hydro Caucus - 2000)

- Hatcheries: The Federal agencies will continue to work with the tribes on transfer of certain facilities to the Tribes, and will review the Tribes' artificial production proposal for potential implementation; the tribes are interested in development of a research facilities (CRITFC, Federal agencies – 2000-01)

- Habitat: The Tribes and Federal agencies will jointly review the Science Center's habitat feasibility studies, and will consider additional factors. (CRITFC, NMFS – 2000)

- Cultural Resources: The Federal agencies agreed to respond in the All-H Paper to the UCUT Tribes' request for designation of a lead agency for historic preservation; they will explain how cultural resources issues will be addressed; and they will amend the All-H Paper to better capture cultural issues. While the Paper will not be the vehicle for developing a basinwide cultural resource program, it should describe federal obligation and identify steps, measures and milestones, and provide a framework for future actions. The System Operation review process only addresses cultural resources affected by river operations; BPA will have further discussions with the Tribes, with the goal of learning more specifically about the Tribes concerns, and developing a list of specific steps and outcomes. Implementation of Biological Opinion requirements will require NEPA and will further address water quality initiatives and cultural issues. (BPA, BOR, COE – 2000)

- Resident Fish: The Federal agencies are committed to develop BiOps that address benefits for resident and anadromous species, as well as to incorporate further information about

resident fish needs in the Conceptual Recovery Plan, with continued discussions with the Tribes about their concerns. The UCUT Tribes pointed out that only 15% of the NWPPC funds go to resident fish, and 15% to wildlife; the agencies will work with the Tribes on evaluating these priorities. (NMFS, FWS, BPA – 2000)

- Blocked Areas: The UCUT Tribes seek a feasibility study of passage to blocked areas; BOR agreed to consider it through work with the Tribes on the Blocked Area Management Plan. (BOR – 2000)

- Water Quality: UCUT Tribes identified the need for funding for dissolved gas reduction projects and a study of Lake Roosevelt sediment contamination, and a need for EPA staffing in the Upper Columbia area. The Tribes want to participate in meetings between the U.S. and Canada on water quality issues in the Columbia River. (EPA – 2000)

- Other Issues:

    - The Tribes and NMFS will discuss use of surplus fish.

    - The Tribes expressed concern that there has been no ISRP review and no performance measures, for the ICBEMP process. The Federal agencies committed to use existing multi-party teams to address performance standards and measures.

    - The Tribes sought stronger language in the All-H Paper regarding actions of state agencies with statutory habitat responsibilities. The Federal agencies will strive to link NWPPC habitat programs with state and tribal actions. (NMFS – 2000)

    - UCUT Tribes stressed that resources must be provided or increased if the Tribes are to participate in the many federal consultations and committees provided for in the All-H Paper, BiOp and other federal processes.

Tribal - Federal Policy Discussion
March 14, 2000 - Lewiston, Idaho

Meeting Results - Synopsis

Introduction

The Tribal and Federal agency representatives and staff listed on the attached attendance sheet (Attachment 1) met on Tuesday, March 14th in Lewiston, Idaho. The attendees agreed to follow the attached agenda (Attachment 2). The attendees discussed all items on the agenda. The nature of the discussions is beyond the scope of this document, which records only the agreements reached between the Tribal and Federal agency representatives at this meeting.

Salmon Rebuilding and Recovery

1. As a matter of guiding principle, Federal salmon recovery and rebuilding efforts should achieve abundant, harvestable fish population goals within a set timetable.

2. Federal agencies and the Tribes will work together to reach agreement on aggressive and scientifically sound rebuilding goals and timetables. Toward that end, rebuilding goals and timetables proposed by the Tribes will be evaluated through the rebuilding model used in NMFS' CRI process.

3. The Tribes and Federal agencies jointly will approach the Northwest Power Planning Council staff to seek the Council's support for inclusion of the results of Tribal-Federal rebuilding goals and timetables into the Council's program amendment process. The Tribes and Federal agencies may decide jointly to ask for delay in the Council's process, if delay is clearly needed to ensure incorporation of those results into the Council's process.

4. The Federal agencies offered to amend the All-H after it is released, if needed to accommodate Tribal-Federal rebuilding goals and timetables.

Secure Treaty Fisheries

The Tribes and Federal agencies will establish a staff working group to discuss inclusion of Tribal fisheries in the environmental baseline and establishment of a multi-year harvest agreement..

Hydropower

1. The Federal agencies, led by the Corps of Engineers, agreed to increase consultation with the Tribes regarding the Corps' capital expenditures..

2. The Federal agencies agreed to ensure that the "Hydro Caucus" consults directly and in a timely way with the Tribes. The Agencies and Tribes agreed that this process is particularly

important in light of significant Federal agency actions to secure additional flows in the Columbia and Snake..

Hatcheries

1. The Federal agencies agreed in principle to support transfer of certain hatcheries to the Tribes. The Tribes identified the Umatilla, Kooskia, Klickitat, Dworshak, Clearwater, and Lookingglass hatcheries as possible candidates for transfer.

2. The Tribes and Federal agencies agreed to have a core group of technical and policy representatives review the Tribes' artificial propagation proposal with a view toward implementation of its concepts.

Habitat

1. The Federal agencies and Tribes agreed to continue the staff process recently begun involving Jim Weber, Mike Crouse, and Elizabeth Gaar.

2. The Federal agencies and Tribes agreed jointly to review the results of habitat feasibility studies being conducted by Dr. Bilby, and to expand their joint review to consider additional factors bearing on feasibility. CRITFC, BLM, and NMFS representatives.

Additional meetings

The Tribes and Federal agencies agreed to hold open the date of April 3rd for a possible regional level policy meeting to follow-up to this meeting. A leaders meeting is expected to be held April 18th in Washington. Other meetings, including coordination meetings led by Rob Lothrop (CRITFC) and Alex Smith (BPA) and those meetings required to implement the agreements recorded here, will continue as needed.

Attachment 1

TRIBAL FEDERAL POLICY DISCUSSION ATTENDANCE

Lewiston, Idaho - March 14, 2000

Name	Title/Organization	Phone #
Tom Jensen	Attorney, Troutman Sanders	(202) 274-2945
Don Sampson	Executive Director, CRITFC	(503) 238-0667
Si Whitman	NezPerce Tribe Fisheries	(208) 843-7321
Rob Lothrop	CRITFC	(503) 2380667
Elmer Crow, Jr.	NPF&W	(208) 843-7144
Elliott Moffett	Superintendent, Northern ID Agency - BIA	
Dan Opalski	EPA	(503) 230-3250
Alex Smith	BPA	(503) 230-5136
Philip Key	BPA-OGC	(503) 230-5299
Ron McKown	Reclamation	(208) 378-5095
Ken Pedde	Reclamation	(208) 378-5012
Keith Hatch	BIA	(503) 872-2876
Ric Ilgenfritz	NMFS	(206) 526-4646
Mike Crouse	BLM	(503) 952-6525
Peter Coppelman	DOJ/ENRD	(202) 514-2701
Fred Olney	USFWS	(503) 872-2761
Laura Daniel-Davis	DOI/Dep. Sec.	(202) 208-6291
Judi Johansen	BPA	(503) 230-5102
William Stelle	NMFS	(206) 526-6150
Carl Strock	Corps of Engineers, NWD	(503) 808-3700
Olney Patt, Jr.	CTWSRO	(541) 553-3257
Duane G. Clark	Yakama Nation	(509) 865-5121 x4329

Name	Title/Organization	Phone #
Jay Minthorn	Umatilla Tribe	(541) 276-3165
Vic Holt, Jr.	NezPerce	(208) 843-2253
Doug Dompier	CRITFC	(503) 231-1292
Claude Smith, Sr.	WS	(541) 553-3257
Jim Weber	CRITFC	(503) 238-0667
Rick Eichstaedt	Nez Perce Tribe Water Resources	(208) 843-7368
Greg Haller	Nez Perce Tribe Water Resources	(208) 843-7368
Bob Heinith	CRITFC	(503) 238-0667
Paul Lumby	CRITFC	(503) 731-1252
Carl Merkle	Umatilla Tribe	(541) 276-3449
Charles Hudson	CRITFC	(503) 731-1257
Jeremy Fivecrows	CRITFC	(503) 731-1275
Lynda Walker	Corps of Engineers, NWP	(503) 808-3715
Elizabeth Gaar	NMFS	(503) 230-5434
Herbert Jackson	NPF&W	(208) 843-2301
Connie Schriner	Corps of Engineers, NWW	(509) 527-7110
Lynda Nutt	Corps of Engineers, NWW	(509) 527-7135
Gary Sims	NMFS	(503) 230-5438

Attachment 2

Agenda
Tribal-Federal Discussions - March 14, 2000
Lewiston, Idaho

Item 1. Greeting and Blessing

Item 2. Approval of Agenda

Item 3. Discussion of CRITFC Tribes' Desired Commitments from Federal Agencies

a. Recovery and rebuilding commitment, numeric goal and deadline
b. Specific commitments regarding all 4 Hs
c. Secure treaty fisheries in interim
d. Enforceability

Item 4. Discussion of CRITFC Tribes' Desired Immediate Actions

a. Hydropower
   Decision pathway to breaching
b. Hatcheries
   1. Federal artificial propagation policies
   2. Hatchery transfers
c. Habitat
   Watershed restoration
d. Harvest
   Fisheries commitment
e. Collaborative science
   Recommitment to collaboration

Item 5. Discussions of future meetings

Item 6. Adjournment

Attachment 3

TRIBAL FEDERAL POLICY DISCUSSION ATTENDANCE

Spokane, WA, March 24, 2000

Name	Title/Organization	Phone #
Joe Peone	Colville Tribe	(509) 634-2110
Deb Louie	Colville Tribe	(509) 654-2212
Colleen Cawston	Colville Tribe	(509) 634-2208
Margie Hutchinson	Colville Tribe	(509) 634-2210
Guy Dodson, Sr.	Shoshone-Pauite Tribes	(208) 759-3246
Louise Dixey	Shoshone-Bannock Tribes	(208) 478-3816
Lionel Boyer	Shoshone-Bannock Tribes	(208) 478-3743
Amos First-Raised III	Burns Paiute Tribe	(541) 573-2088
Wanda Johnson	Burns Paiute	(541) 573-2088
Billy Bargain	Kootenai Tribe of Idaho	(503) 242-0705
Sue Ireland	Kootenai Tribe of Idaho	(208) 267-3620
Adriane Borgias	Kootenai Tribe of Idaho	(208) 267-3519
Gary Passmore	Colville Confederated Tribe	(509) 634-2826
Adeline Fredin	Colville Confederated Tribe	(509) 634-2692
Brent Hicks	Colville Confederated Tribe	(509) 634-2690
Hope Pennell	BPA-Spokane	(509) 358-7476
Brian Lipscomb	Confederated Salsih & Kootenai Tribes	(406) 675-2700
Kevin Howlett	Confederated Salish & Kootenai Tribes	(406) 677-2700
William Stelle	National Marine Fisheries Service	(206) 526-6150
Carl Strock	US Army Corps of Engineers	(503) 808-3700
Bill McDonald	US Bureau of Reclamation	(208) 378-5012
Ken Pedde	US Bureau of Reclamation	(208) 378-5012

Name	Title/Organization	Phone #
Bruce Wynne	Spokane Tribe	(509) 258-4581
Karl Funke	Facilitator	(301) 292-3569
Warren Seyler	Spokane Tribe	(509) 258-4581
Howard Funke	Spokane / Coeur d'Alene Tribes	(208) 667-5486
Mary Verner	Spokane Tribe	(509) 258-9042
Robert Sherwood	Spokane Tribe	(509) 258-7632
Jim Wynne	Spokane Tribe	(509) 258-9305
Art Flett	Spokane Tribe	(509) 722-5731
Pauline Flett	Spokane Tribe	(509) 722-5731
Bryan Flett	Spokane Tribe	(509) 258-4060
Louie Wynne	Spokane Tribe	(509) 258-4060
Richard James Mullen	Coeur d'Alene Tribal Council	(208) 686-1800
Keith Hatch	Bureau of Indian Affairs	(503) 872-2876
Bill Shake	US Fish & Wildlife Service	(503) 872-2761
Bob Hallock	US Fish & Wildlife Service	(509) 891-6839
Gordon Haugen	US Forest Service	(503) 808-2929
Scott Aikin	US Fish & Wildlife Service	(503) 231-6123
Ronald Peters	Coeur d'Alene Tribe	(208) 686-6307
Robert Matt	Coeur d'Alene Tribe	(208) 686-6008
Gary Sims	National Marine Fisheries Service	(503) 230-5438
Lynda Walker	US Army Corps of Engineers	(503) 808-3715
Chad Colter	Shoshone-Bannock Tribe	(208) 478-3761
Keith Kutchins	Shoshone Bannock Tribes	(208) 478-3758
John Gross	Kalispel Tribe	(509) 445-1147
Patti Stone	Colville Confederated Tribes	(509) 634-2415
Deane Osterman	Kalispel Tribe	(509) 445-1147
Francis J. Cullooyah	Kalispel Tribe	(509) 445-1147

Name	Title/Organization	Phone #
Sonya Bruce	Resource Writers	(503) 721-2571 x104
Craig Sprankle	US Bureau of Reclamation	(509) 633-9503
Ronald McKown	US Bureau of Reclamation	(509) 208-378-5095
Judi Johansen	BPA	(503) 230-5102
Mark Shaw	BPA	(503) 230-5239
Phil Key	BPA	(503) 230-4201
John Smith	BPA	(509) 358-7446
Bob Shank	BPA	(509 358-7357
Bob Beraud	BPA	(503) 230-3599
Robert Austin	BPA	(503) 230-4748
Victor Johnson	Burns Paiute	(503) 573-3220
Mary Lou Soscia	US Environmental Protection Agency	(503) 326-3250
Ric Ilgenfritz	National Marine Fisheries Service	(206) 526-4646
Francis A SiJohn	Coeur d'Alene Tribe	(208) 686-5511
Valerie Shelton	BPA	(509) 358-7361
Peter Campbell	Colville Confederated Tribes	(509) 359-2441
Roy Fox	BPA	(503) 320-4261

Attachment 4

Agenda/Discussion Items

Tribal-Federal Government-to-Government Policy Discussion on *ALL H Paper*
March 24, 2000, 9:30 a.m.
Spokane, WA

Spokane, Washington - Ridpath Hotel, 515 West Sprague Avenue, (509) 838-2711

I. OPENING and BLESSING

A. Welcome
B. Introduction
C. Initial Comments
   1. Tribal Chair
   2. Federal Chair
   3. Facilitator

II. OVERARCHING ISSUES

A. Recognition of Upriver Values/Address Cumulative Impact of Federal Actions
B. Trust Responsibility - Treaty/Executive Order Tribes
C. Water Quality - Upriver conditions - basinwide compliance with Clean Water Act
D. Cultural Resources must be addressed in all H's
E. Block Area Management Plan (Preliminary Overview)
F. Return Anadromous Fish Above Blocked Areas.

II. DISCUSSION OF TRIBAL CONCERNS REGARDING THE *ALL Hs PAPER* AND RELATED ACTIVITIES.

A. HYDROPOWER DISCUSSION
   1 Consultation and Collaboration-Federal decisions relating to additional drawdown of Grand Coulee for flood control and flow augmentation - including incentives for tribes to support BiOp.
   2 Immediate needs-merits of shifting power production/flood control between Grand Coulee Dam and Chief Joe.
   3 ACOE Drawdown/Dam Removal Study (DEIS) fails to consider impacts to upper Columbia Tribes interests.
   4 Resident Fish BiOp inadequately addressed/conflicts
   5 USACE capital expenditures - need for Regional Prioritization

2 HARVEST DISCUSSION
   1 Salmon harvest allocation for upriver tribes.
   2 Summer-Fall Chinook
   3 Immediate (Tribal) needs
   4 "Other"

3 HABITAT DISCUSSION

1 Federal Commitment to protect, mitigate and enhance habitat in accord with Conceptual Recovery Plan and related documents/plans
2 Federal land management practices inconsistent with protection, mitigation and enhancement of habitat
3 Clean Water Act and Endangered Species Act enforcement necessary in any case under any option
4 Immediate (Tribal) needs - End federal land exchanges within ESU's and ESA's

D. HATCHERIES DISCUSSION
1. Shift in emphasis - Mitigation to Conservation Hatcheries - upriver impacts
2. Augmentation needed upriver both anadromous and resident fish substitution
3. Conservation-Spring Chinook
4. Do not delegate/abrogate federal responsibility to states

IV. NEED FOR COORDINATION, COLLABORATION - GOVERNANCE/FUNDING

A. Need basinwide Forum and Tribes Need to be at the decision table
B. Ecosystem coordination of Federal, State, Tribal planning and implementation (NWPPC, FERC, Budgets, Water Management, Historic Preservation, Land Management) etc.
C. Funding for Tribes to Ensure Effective participation
D. Funding for protection, mitigation enhancement - the BPA Budget MOA and Direct Funding

V. SUMMARY AND CONCLUSIONS

VI. FUTURE MEETINGS/ISSUES

Attachment 1

TRIBAL FEDERAL POLICY DISCUSSION ATTENDANCE

CRITFC Office, April 3, 2000

Name	Title/Organization	Phone #
N. Kathryn Brigham	CTUIR	(541) 276-3165
Don Sampson	CRITFC	(503) 238-0667
Terry Courtney, Jr.	CRITFC	(541) 553-5630
Harold Blackwolf, Sr.	CRITFC	(541) 553-6232
Rob Lothrop	CRITFC	(503) 238-0667
Paul Lumley	CRITFC	(503) 731-1252
Phil Roger	CRITFC	(503) 731-1301
Roy Sampsel	CRITFC	(360) 665-6051
Alex Smith	BPA	(503) 230-5136
Philip Key	BPA	`(503) 230-5299
Gordon Haugen	US Forest Service	(503) 808-2929
Mike Crouse	Bureau of Land Management	(503) 952-6525
Mary Lou Soscia	Environmental Protection Agency	(503) 326-5873
Anne Badgley	US Fish and Wildlife Service	(503) 231-6118
Bill Shake	US Fish and Wildlife Service	(503) 872-2761
Ken Pedde	US Bureau of Reclamation	(208) 378-5012
Judi Johansen	BPA	(503) 230-5102
Colonel Rick Mogren	US Army Corps of Engineers	(503) 808-3701
William Stelle	National Marine Fisheries Service	(206) 526-6150
Bob Heinith	CRITFC	(503) 238-0667
Carl Merkle	CTUIR	(541) 276-3449

Name	Title/Organization	Phone #
Gary Sims	National Marine Fisheries Service	(503) 230-5438
Hugh Moore	BPA	(503) 230-5811
Lynda Walker	US Army Corps of Engineers	(503) 808-3715
Darrell Eastman	BPA	(503) 230-3869
Scott Aikin	US Fish & Wildlife Service	(503) 231-6123
Jim Weber	CRITFC	(503) 238-0667
Charles Hudson	CRITFC	(503) 238-0667

Attachment

Proposed Agenda

Tribal - Federal Policy Discussions
April 3, 2000 – 1:30-3:30 p.m.
CRITFC Conference Room – Portland, Oregon

1. Introductions - *Chair*

2. Approval of Agenda - *Chair*

3. Report on Implementation of Lewiston Meeting Commitments - *Tribal/Federal staff*
    a. Salmon Rebuilding and Recovery
    1) Progress report
        2) Direction needed

    b. Secure Treaty Fisheries
        1) Progress report
        2) Direction needed

    c. Hydropower
        1) Progress report
        2) Direction needed

    d. Hatcheries
        1) Progress report
        2) Direction needed

    e. Habitat
        1) Progress report
        2) Direction needed

4. Future Meetings - *Chair*

5. Adjournment (3:30 p.m.) - *Chair*

Attachment

TRIBAL FEDERAL POLICY DISCUSSION ATTENDANCE

Boise, Idaho, April 4, 2000

Name	Title/Organization	Phone #
Ken Pedde	US Bureau of Reclamation	(208) 378-5012
Judi Johansen	Bonneville Power Administration	(503) 230-5102
Colonel Mogren	US Army Corps of Engineers	(503) 808-3701
Will Stelle	National Marine Fisheries Service	(206) 526-6150
Bill Shake	US Fish & Wildlife Service	(503) 872-2761
Keith Hatch	Bureau of Indian Affairs	(503) 872-2876
Ronald Peters	Couer d'Alene Tribe	(208) 686-6307
Doug Cole	Environmental Protection Agency	(208) 378-5764
Dan Opalski	Environmental Protection Agency	(503) 326-3250
Billy Barquin	Kootenai Tribe of Idaho	(503) 292-0705
Daniel Gonzalez	Burns Paiute Tribe	(541) 573-1375
Jim St. Martin	Burns Paiute Tribe	(541) 573-2088
Haace St. Martin	Burns Paiute Tribe	(541) 573-1533
Amos First-Raised	Burns Paiute Tribe	(541) 573-2088
Mary Verner	Spokane Tribe	(509) 258-9042
Sue Ireland	Kootenai Tribe of Idaho	(208) 267-3620
Bob Hallock	US Fish and Wildlife Service	(509) 891-6839
Gary Sims	National Marine Fisheries Service	(503) 230-5438
Hugh Moore	BPA contractor / official notetaker	(503) 230-5811
Philip Key	BPA	(503) 230-5299
Alex Smith	BPA	(503) 230-5136
Deb Louie	Colville Tribe	(509) 634-2212

Name	Title/Organization	Phone #
Bob Beraud	BPA	(503) 230-3599
Terry Gibson	Shoshone Paiute Tribe	(775) 757-3211
Claudeo Broncho	Shoshone Bannock Tribes	(208) 478-3700
Larry Bagley	Shoshone-Bannock Tribe	(208) 478-3700
Jesse Wadsworth	Shoshone-Bannock Tribe	(208) 478-3700
Ted Howard	Shoshone Paiute Tribe	(775) 757-3211
Howard Funke	Spokane-Coeur d'Alene Tribes	(208) 667-5486
Bruce Wynne	Spokane Tribe	(509) 258-4581
Chad Colter	Shoshone-Bannock Tribes	(208) 478-3761
Joe Peone	Colville Tribe	(509) 634-2110
Karl Funke	Facilitator (Upriver)	(301) 292-1716
Robert Shank	BPA-Spokane	(509) 358-7357
Darrell Eastman	BPA	(503) 230-3869
Susan Graneth	ICBEMP-Boise	(208) 334-1770
Sarah McNary	BPA	(503) 230-4981
Reynaulda Taylor	Shoshone-Paiute Tribes	(775) 757-2610
Eloy Thacker	Shoshone-Paiute Tribes	(775) 757-3211
Richard Dick	Shoshone-Paiute Tribes	(775) 757-3211
Brian Lipscomb	Confederated Salish & Kootenai Tribes	(406) 675-2750
Robert Austin	BPA	(503) 230-4748
Bryan Flett	Spokane Tribe	(509) 258-4060
Lynda Walker	US Army Corps of Engineers	(503) 808-3715

Attachment

DRAFT AGENDA/DISCUSSION ITEMS
Tribal-Federal Government-to-Government Policy Discussion on ALL H Paper
April 4 DoubleTree/Riverside Boise, Idaho

I. OPENING and BLESSING
- A. Welcome
- B. Introduction
- C. Initial Comments
  1. Tribal Chairs/Representative
  2. Federal Chair (Because time is limited there a real need to focus on policy issues. If there are technical issues that need to be addressed in conjunction with the issues raised today, or other ALL H issue, staff will be able to meet on those tomorrow morning.)

II. REVIEW of AGREEMENTS and COMMITMENTS from MARCH 24TH SPOKANE MEETING.
- A. Identification of overarching issues from Snake River Basin Tribal perspective, if not already addressed.

III. DISCUSSION of TRIBAL CONCERNS REGARDING the *ALL H PAPER* and RELATED ACTIVITIES
- A. Hatcheries/Harvest
  1. Mitigation hatchery
  2. Mitigation vs. conservation hatchery practice/management
  3. Mitigation hatcheries in Snake River system
- B. Hydropower
  1. Grand Coulee and Chief Joe reservoir operations. (BiOp and VAR-Q)
  2. Hells Canyon Operations
- C. Habitat
  1. Implementation/enforcement of ALL H assumptions
  2. Intergovernmental coordination
  3. Funding for tribal participation
  4. Funding for protection, mitigation enhancement – BPA Budget MOA and Direct Funding

IV. NEED for COORDINATION, COLLABORATION–GOVERNANCE/FUNDING
V. CEQ MEETING
VI. SUMMARY and CONCLUSIONS
VII. FUTURE MEETINGS

UCUT & Snake River Tribes Government-to Government Policy Discussion
March 24, 2000 – Spokane, Washington
April 4, 2000 - Boise, Idaho
Agreements and Requests

Introduction

Tribal and Federal agency representatives and staff met on Friday, March 24, 2000, in Spokane, Washington. and in Boise Idaho, on April 4, 2000. Agendas for the meetings and attendee lists are attached. The following list describes the agreements and follow-up items that were reached at the meetings. A more detailed record of the meetings is also available.

Trust Responsibility

1. There is a perception among the upriver Tribes that the Federal government views its trust responsibility to Executive Order Tribes differently from the Treaty Tribes. Judi Johansen of BPA stated that the Federal government does not discriminate in its responsibility, and does not make distinctions between the Executive Order and the Treaty Tribes in its policies. Representatives of the other Federal agencies present concurred with Johansen's statement. Those agencies include: National Marine Fisheries Service, Army Corps of Engineers, Environmental Protection Agency, Bureau of Reclamation, U. S. Fish and Wildlife Service, Forest Service, and Bureau of Indian Affairs.

Cultural Resources

1. The Tribes asked the Federal agencies to designate a lead agency for historic preservation and explain how cultural resource issues are going to be addressed. The agencies agreed to come up with a response and respond to the Tribes. Judi Johansen has designated Bob Beraud, BPA, to take the lead on working with the other Federal agencies on this effort. Bob will be working with the Federal Tribal liaisons to coordinate tribal participation and input. Judi said the agencies need to work with the tribes and develop a list of specific steps and outcomes. She said that we won't be able to develop a basin wide cultural resources program in the All-H paper. The All-H paper, however, needs to describe federal obligations, steps, measures and milestones. It will provide a framework for dealing with cultural resources beyond the publication of the All H paper. (USBR and BPA lead*)*

2. The Tribes said their culture has to be the basis and underlying philosophy for decisions that affect them. They said there is no recognition of the upriver Tribes' cultural values in the All H paper. The Federal agencies acknowledged the need to change the All H paper and better capture the values and cultural issues. Will Stelle asked for Tribal guidance in capturing the issues, and Bruce Wynne said the Tribes needed to be involved in doing that. Federal Tribal liaisons will help coordinate input from the Tribes. It would be helpful if the Tribes designate the appropriate people for the federal liaisons to work with. (BPA, USBR, COE - *leads*)

3. The Tribes asked what NEPA compliance would be done for the BiOp, water quality, and cultural resources. Would it be the SOR EIS? They didn't think the SOR EIS covered the drafts of Lake Roosevelt being contemplated. Judi Johansen said a subgroup of the Caucus might have to look into this and provide an answer in the final All H paper. The Federal Caucus should provide this answer. (NMFS – *lead)*

Water Quality

1. A Tribal representative listed three things that are needed for water quality in the upper river: a north-central Washington presence for EPA; funding for projects that would reduce total dissolved gas (TDG); and a study of contaminated sediment in Lake Roosevelt. EPA should provide a response for this concern. (EPA – *lead)*

2. There is a meeting in May between the United States and Canada that will focus on water quality in the Columbia River, and the Tribes asked to be participants in that meeting. Mary Lou Soscia said EPA is committed to working on the upper Columbia water quality issues and elevating their importance. Soscia will seek to have Tribal participation in the May meeting. (EPS - *lead*)

3. Joe Peone raised concerns about Water Quality. He said a study is needed concerning toxic sediments in Lake Roosevelt. He said the tribes will oppose the BiOp if the issue of water quality and sedimentation is not addressed. (EPA/NMFS - *leads)*

Resident Fish

1. The Tribes asked the agencies to influence the BiOp to recognize the conflict between providing flows for salmon in the lower river and keeping resident fish and snail populations healthy in the upriver reservoirs. These operations are diametrically opposed. Tribal representatives asked how they could be reconciled? Bill Shake said the Federal agencies have agreed to jointly develop the BiOps and look at how the salmon operations, for example, impact sturgeon. We can have BiOps that provide benefits for both resident and anadromous species, and we will continue to have discussions that address the comments, he said. (FWS – *lead*)

2. A Tribal representative said there was too little attention given to resident fish and no mention of sturgeon in the All H paper. Bill Shake acknowledged that more information about the impacts to resident fish needs to be incorporated in the All H paper, and USFWS will give the matter more attention as the paper is revised. (FWS – *lead)*

3. A Tribal representative asked for a commitment that the inland USFWS offices would be more adequately staffed. Bill Shake said USFWS had allocated additional positions to its ESA programs, and there will be new positions added in the Spokane office. (FWS – *lead*)

4. The Tribes pointed out that the NPPC program is a major mechanism for funding, but only 15 percent of the funds go to resident fish and 15 percent to wildlife. Judi Johansen

explained that the priorities were set by CBFWA and NPPC, and she acknowledged that there had been an imbalance. You are saying let's change the priority, and I'm committed to helping you with that, Johansen said. (BPA – *lead)*

5. The tribes would like Redband trout addressed in the All-H paper. (FWS – *lead)*

Blocked Areas

1. The Tribes asked the Bureau of Reclamation to request a study related to the feasibility of fish passage into the blocked areas, including the use of water from the irrigation canal and Banks Lake. Bill McDonald said the Bureau of Reclamation would consider it in working with the Tribes on the Blocked Area Management Plan, but Reclamation would need Congressional authorization to study returning anadromous fish to the blocked area. When the Tribes issue this Plan, the federal agencies will work with them on further planning. (USBR/BLM – *lead*)

2. Joe Peone explained that the Colville tribes did not get any salmon allocation. Under what authority did the Colvilles not get an allocation? When Grand Coulee was constructed, four hatcheries were approved to mitigate for the loss of the fish. The fourth hatchery never got built although the Congressional authorization is in place. The BOR will follow up on this issue. (USBR – *lead*)

3. Chad Coulter asked how the All H Paper will address out-of-basin stock. Will Stelle agreed to find this out. (NMFS – *lead*).

4. Will Stelle agreed to follow up on the question why executive order tribes don't have an allocation for salmon. (NMFS – *lead*)

Hydro Operations

1. The Tribes and Federal agencies agreed to consult on proposals in the Biological Opinion for increased flow augmentation and transferring flood control from other reservoirs to Lake Roosevelt. Will Stelle and Judi Johansen agreed that consultation was needed and said they would schedule a meeting. (*NMFS/BPA - lead*)

2. The Tribes would like more information on what is going on with the relicensing of Hells Canyon Dam. They would like to be involved on issues that effect them on cultural resources, water quality and flow augmentation. NMFS will follow-up. (NMFS - *leads)*

3. The Tribes asked why there are no minimum flow requirements for Bueller and Warm Springs reservoir operations which allow them to be drained dry. Why is there no regulations of water quality? Ken Pedde at BOR agreed to take a look at this. (USBR - *lead*)

4. Bruce Wynne, Chair of the Spokane Tribe, asked that the Tribe participate in the flow augmentation decision making process as well as flood control. (*COE –lead*)

5. Terry Gibson, Shoshone-Paiute asked for a copy of the Department of Defense's Indian Policy. Col. Mogren said they would provide a copy. (*COE – lead)*

6. The Spokane Tribes have sent a letter to the Corps of Engineers requesting consultation on the flood control issue. Col. Mogren said that they are in the process of responding to this letter. They agree that consultation has to happen. The letter will be run by Howard Funke before it is signed to make sure it responds adequately. (*COE – lead*)

Resource/Funding Issues

1. Funding for tribal resources for participating in all these processes was raised as a concern by the Tribes. This will be considered by all agencies as things progress. Bob Shank, Tribal liaison from BPA reviewed new funding that was available to tribes that not all the tribes had applied for. (BPA – *lead*)

Future Consultations

1. The Tribes and Federal agencies agreed to hold another consultation meeting before they meet with CEQ in Washington, D.C., April 25 coordinated with the NPPC meeting April 4-5 in Boise might be the best time. This meeting was held and the follow-up items were included in this paper.

2. Additional issues about Habitat were raised to be discussed at other meetings in the Region.

3. A Cultural Resources technical meeting was held April 5th in Boise. A number of the attendees from the April 4th meeting attended. Follow-up issues under the cultural resource heading were discussed.

Attachment

Columbia River Tribal - Federal Policy Discussion
Attendance List April 25, 2000

Sid Whitman	Nez Perce Tribe
Penny Dalton	National Marine Fisheries Service
Olney Patt, Jr.	CTWSRO
Don Sampson	Columbia River Inter-Tribal Fish Commission
Randy Settler	Yakama Nation
Joe Peone	Colville Tribes (PeoneJ@Televar.com)
Howard Funke	Couer d 'Alene Tribe (gfunke@nidlink.com)
Warren Seyler	Spokane Tribe
Lionel Boyer	Shoshone-Bannock Tribes
Chad Colter	Shoshone-Bannock Tribes
Elgie Holstein	National Oceanic & Atmosphere Administration
Joseph W. Westphal	U.S. Army
David Hayes	Department of the Interior
Lois Schiffer	Department of Justice
George Frampton	Council on Environmental Quality
Judy Johansen	Bonneville Power Administration
Will Stelle	National Marine Fisheries Service
Roy Sampsel	Columbia River Inter-Tribal Fish Commission
Peter Coppelman	Department of Justice
Rob Lothrop	Columbia River Inter-Tribal Fish Commission
Laura Daniel-Davis	Department of the Interior
John Fred	Shoshone-Bannock Tribes
Gene Joseph	Colville Tribes
Larry Bagley	Shoshone-Bannock Tribes
Tom Dugan	George Water Consulting/Yakama Nation
Linda Delgado	Department of Agriculture
Sarah Laskin	Council on Environmental Quality
Bob Ziobro	National Marine Fisheries Service
Karl Funke	Upriver Facilitator
Howie Amett	Warm Springs Tribal Attorney
Tom Jensen	Facilitator
Roger Gorke	Environmental Protection Agency

Attachment

Proposed Agenda
Columbia Basin Tribal-Federal Policy Discussion
Washington, DC - April 25, 2000

1. Introductions

2. Opening prayer

3. Federal commitment to tribal interests; Trust responsibility re: Treaty and Executive Order tribes

4. Explanation of federal decision making process
    a. Current information on probable success of recovery efforts
    b. Federal decision making process and outcomes
        1) Biological opinions
            A. Hydro (NMFS and USFWS)
            B. Hatcheries
            C. Harvest
        2) ICBEMP and habitat
    c. Use of discretion/options for managing risk in face of technical uncertainty

5. Consultation progress
    a. Items completed or in progress
        1) Agreement to elevate tribal cultural concerns in All-H document
        2) Agreement on first phase of hatchery transfers
        3) Agreement to consult on flood control
        4) Agreement to study normative hydrograph
        5) Agreement on habitat acquisition criteria
        6) Analysis of tribal rebuilding goals

    b. Items needing significant additional attention
        1) ICBEMP and habitat
        2) Tribal-NMFS disagreement on artificial propagation policy
        3) Collaborative science
        4) Blocked-area management
        5) Resident fish management
        6) Flow augmentation
        7) Grand Coulee 4th mitigation hatchery
        8) Water quality/Lake Roosevelt
        9) Columbia River basin upriver organization and funding

6. Closing prayer

9. State and Federal Policy Discussions

Meetings between the federal agencies, the Council on Environmental Quality, and the states of Washington, Oregon, Idaho, and Montana, to discuss the federal government's approach to ESA implementation in the Columbia Basin were held prior to releasing the Plan for state and tribal review.

During these meetings, the federal participants briefed the state parties on the process and timeline for completing the draft biological opinions and Conceptual Recovery Plan. In addition, they previewed various substantive elements of both documents. The governors and their representatives raised numerous issues, including issues of state authorities related to water use, land use, and fisheries management policies.

Participants discussed the importance of coordination between state and federal agencies, and agreed in general to promote it wherever practicable. The governors and their representatives committed to crafting a four-state, basin-wide, salmon strategy emphasizing state authorities and providing guidance and observations regarding federal approaches to the issue.

The four-state strategy was released July 25, 2000. It and this plan will form the basis for further discussions between the states and federal government regarding the content of final recovery plans and biological opinions.

10. Public Involvement Report

Section I: Description of the Public Involvement Program

Introduction

The Conceptual Recovery Plan is one of a series of Federal reports focused on recovery of threatened and endangered fish in the Columbia River Basin. The paper serves as the conceptual foundation for a recovery plan to guide upcoming decisions that affect every part of the species' life cycle. These decisions will have an impact on human activities in the areas of habitat, hydropower, harvest, and hatcheries.

This Public Involvement Summary Report describes the efforts of the Federal Caucus to work with the region to develop this comprehensive approach. The Federal Caucus believes that regional participation is critical to the success and ultimately the implementation of a successful recovery plan. The Federal Caucus established a multiagency communications team to develop and carry out a broad-scale public involvement program that includes many educational and involvement activities. Carolyn Whitney of the Bonneville Power Administration (BPA) led the team.

Scope

The Conceptual Recovery Plan takes a basinwide approach to the question of species recovery. It addresses both anadromous and resident fish and other aquatic species in the United State's portion of the Columbia River Basin. This includes the states of Oregon, Washington, Idaho, Montana, and also southeast Alaska, where salmon harvest is a major component of the economy. The scope also includes the Federal Columbia River Power System (FCRPS), which is important to the region for flood control, power production, navigation, recreation, irrigation and other uses. The large geographic and cultural scope of the Conceptual Recovery Plan required a similar scope for the public involvement effort.

Public Involvement Strategies

The Communications Team faced a number of challenges to inform and engage the people of the region. Species recovery includes topics related to habitat, hydropower, harvest, hatcheries, biology and physical science and all the many processes and studies underway in the region. One goal of the Communications Team was to outline how all the pieces of the recovery plan fit together.

Another goal was to inform those people who could be affected by the actions suggested in the Conceptual Recovery Plan, but who may not have followed the issues until this time.

A third goal was to focus on all issues, not just the issue of potentially breaching the Snake River dams.

To meet these goals, the Communications Team centered its efforts in two areas: creating educational opportunities prior to the formal comment period on the Conceptual Recovery Plan to ensure that citizens had a solid understanding of the substance of the issues and the Caucus' process; and providing a variety of convenient ways for the public to participate in the formal comment process.

Educational Opportunities

The Communications Team sought to reach the broadest possible audience and to engage people with a variety of backgrounds and levels of knowledge. Initially, Federal Executives mailed two letters to the states, Tribes, stakeholders, and citizens introducing the Federal Caucus and describing the All-H process and involvement opportunities. The team then established a web site to post information on reports, publications, meetings, and related announcements. The web site received more than 4,000 hits between December 1999 and March 2000. The Communications Team also published a series of newsletters, using easy-to-understand language to explain the background and origin of the Conceptual Recovery Plan and the various reports, studies, and processes. These "Citizen Updates" were mailed to over 5,000 people. The team made available a toll-free phone number for citizens to pose questions and order copies of All-H materials.

Prior to the beginning of the formal-public comment period, Federal Caucus representatives participated in dozens of stakeholder and organization meetings to share information and answer questions. From March through November, Caucus representatives met with state and local government officials and agencies, utility executives, fish and wildlife interests, environmental groups, water users, and industry associations. (More information about these meetings is available upon request.) Federal Caucus representatives also made a concerted effort to reach out to regional news media to provide background information and keep reporters and editorial writers informed. Editorial board meetings were held with interested news and throughout February and March, the Caucus issued news releases for each of the public meeting locations.

In addition to these activities, the Federal Caucus hosted a public information meeting in Spokane, Washington on December 15, 1999, to help people prepare for effective participation in the formal comment process. More than 70 people from around the region attended the meeting.

At the same time as public involvement activities, the Federal Caucus met with affected Northwest Tribes in fulfillment of their Government-to-Government responsibilities. A record of these Federal-Tribal discussions are summarized in another appendix.

Science Workshops

National Marine Fisheries Service' (NMFS) Northwest Fisheries Science Center established a series of monthly workshops, alternating between audiences of technical experts and audiences with a mix of policy and technical participants (see Table 1). The technical workshops were a forum for NMFS scientists to present results, report on work in progress, and vet proposed approaches for future work with scientists from outside the agency. The intent was to gather suggestions, ideas, and critiques from technical representatives from a broad range of interested organizations.

The science and policy workshops were aimed at a wide audience. They were designed to provide policymakers and other interested persons an overview of NMFS' Cumulative Risk Initiative (CRI) analyses (current and future), as well as encourage discussion of applying scientific findings to decisionmaking scenarios. In addition, they offered a way for participants to provide feedback concerning these analyses and applications.

Table 1

NMFS Northwest Fisheries Science Center Workshops

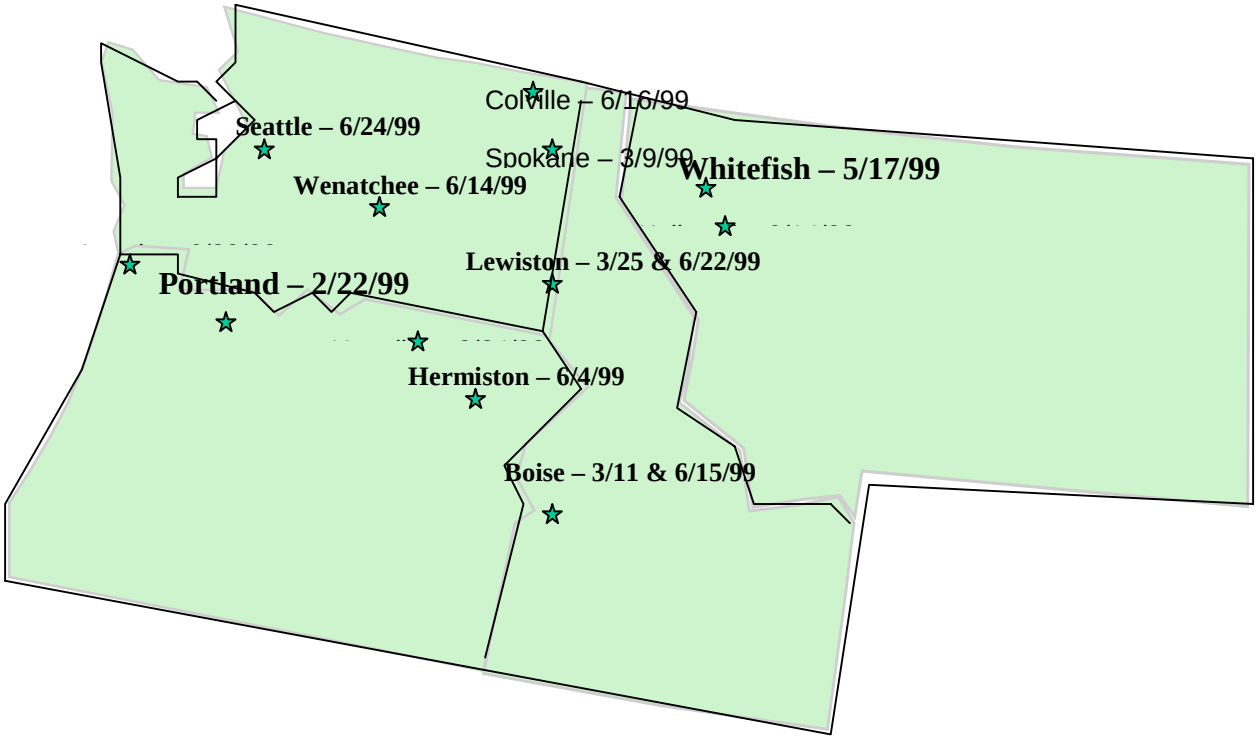
Date	Title of Workshop
July 22-23, 1999	A Technical Introduction to the CRI Analytical Approach
August 31, 1999	Putting the four H's together in the real world and using the analytical framework to evaluate specific management scenarios
September 29-30, 1999	Assessing productivity of habitats with respect to salmon populations
October 27, 1999	Data-poor, rapid analysis assessments for other ESU's* in the Columbia River system
December 7-8, 1999	Spatial analyses: How many populations are enough?
March 29, 2000 (co-sponsored by American Rivers)	CRI Update, Modeling by States and Tribes, and Recovery Standards

*ESU = evolutionarily significant unit

Participation in the Multispecies Framework Project

During the preparation of its Conceptual Recovery Plan, the Federal Caucus participated in the Multispecies Framework Project, a collaborative effort of the Northwest Power Planning Council (NWPPC), the Columbia River Basin's Indian Tribes and the Federal agencies in the basin. The Framework project looked at the alternatives available to the region for restoring fish and wildlife species to guide amendment of the NWPPC's Columbia River Basin Fish and Wildlife Program. While the goals of the Framework are more expansive than those of the Federal Caucus (the Framework focuses on broad ecosystem goals for all species while the Federal Caucus focuses on aquatic species listed under the ESA), some coordination of activities was possible between the two processes.

Federal Caucus representatives participated in the Framework's technical and management workgroups to



share information, data, and analytical tools. Federal Caucus representatives also participated with Framework staff in two series of public meetings held around the region to provide information on upcoming Federal studies and solicit input on fish and wildlife recovery efforts in general. The following map shows those Framework public meetings that included presentations and participation by Federal Caucus representatives. (More detailed information on each meeting is available upon request).

The Formal Comment Period: December 17, 1999 – March 17, 2000

The formal comment period on the Conceptual Recovery Plan began December 17, 1999 and continued through March 17, 2000.

The Communications Team established a number of mechanisms for the public to provide formal comments on the Conceptual Recovery Plan. The options for commenting included:

- Sending an e-mail;
- Mailing or faxing written comments;
- Handing in written comments at a public meeting;
- Taping three minutes of comments at the public meetings; or

- Providing three minutes of oral comments at the public meetings.

Public Meetings

The Federal Caucus hosted a series of 15 public meetings across five states in February and March 2000. During the same period, the U.S. Army Corps of Engineers (COE) had been planning to host related sets of public meetings on the draft Lower Snake River Juvenile Salmon Migration Feasibility Report Environmental Impact Statement (EIS) and the John Day Drawdown Phase 1 Study. Also, the BPA Fish and Wildlife Implementation EIS began its formal comment period at the same time. The Federal Caucus received requests from individuals and organizations to coordinate these processes so people did not have to attend so many different public meetings. The Federal agencies agreed to try to coordinate a format that would pull all of the meetings under the same tent. The Communications Team designed an agenda that accommodated all of the topics at a single meeting, while meeting the discrete administrative and legal requirements for each process.

To provide sufficient notice to the public, the Federal Caucus placed advertisements in local newspapers, mailed out information on dates and locations to a regionwide mailing list, and posted information on the All-H Web site. Individual phone calls were made to many organizations to ensure they received the meeting information and were able to pass it on to their respective members. Approximately 9,000 people attended the public meetings held in five states. Every effort was made to accommodate the large numbers in a safe and meaningful manner, as described in greater detail below.

Selection of Locations

Meeting locations were selected to provide access within two hours commuting time for most citizens. The following map displays dates, locations, and the number of attendees at each of the public meetings.

Portland* 1,200 attendees		**Missoula 225 attendees**	
Spokane*	800 attendees	Idaho Falls	520 attendees
Clarkston*	1,800 attendees	Twin Falls	600 attendees
Astoria	200 attendees	Ketchikan	72 attendees
Pasco*	300 attendees	Sitka	130 attendees
Boise*	1,100 attendees	Juneau	151 attendees
Seattle*	550 attendees	Petersburg	91 attendees
Kalispell	120 attendees		

* afternoon and evening sessions

Agendas and Design

The public meetings were designed to continue to inform people about the Conceptual Recovery Plan and process, the COE' Lower Snake River Draft EIS and John Day Drawdown Study, and provide opportunities for written and verbal comment. The meeting design included:

- Open house format (except in Alaska)
- Welcome packets with instructions on how to participate in each process, along with information about comment forms and deadlines for each process.
- Various displays about the salmon life cycle, the All-H influences (habitat, harvest, hatcheries, and hydropower), and major scientific studies such as the Plan for Analyzing and Testing Hypotheses (PATH) and the CRI.
- Resource managers and agency representatives available to talk informally with people and answer questions.
- Information booths and exhibits for related processes, including the COE' Snake River EIS and John Day Drawdown Study, the Interior Columbia Basin Ecosystem Management Project (ICBEMP), the Council, the Framework, and BPA's Fish and Wildlife Implementation EIS Space for information tables for interest groups such as Environmental groups, industry groups, stakeholder organizations and tribes.

The agendas for the public meetings included brief presentations, question and answer periods, and public comment time. To accommodate the broadest possible audience, both afternoon and evening session were held in most locations. All oral comment was limited to three minutes per person.

Section II: Summary of Public Comments and Responses

Comment Analyses Process

The public policy represented by the Endangered Species Act has attracted national and international attention to the region's salmon recovery efforts. The Caucus received letters and comments on its Conceptual Recovery Plan from around the country and from as far away as Australia.

The Federal Caucus contracted the services of Argonne National Laboratories, Environmental Assessment Division, in order to process all public comments from the formal comment period in an objective manner. The Caucus received over 35,000 postcards, 20,000 e-mails, and 3,500 letters along with the over 1,500 comments from the public meetings. All comments are logged into a data base as individual documents and categorized by comment topic. The following section summarizes the nature of the comments received and provides responses from the Caucus.

Comment Summaries and Responses

The Federal Caucus categorized the public comments according to these topics:

- **All-H 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 COE EIS, John Day Study, BPA EIS, ICBEMP**
- **Biological Opinions**
- **Public Involvement Process**
- **Native American Issues**
- **Implementation Issues**
- **Issues not fully considered**
- **Other issues**

In all, there were nearly 150 distinct issues raised during the comment period. The comments covered the range of issues addressed in the Conceptual Recovery 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 the All-H process.

Many people said better coordination of Federal responsibilities and activities through the All-H process is a step in the right direction. However, there is still a great deal of confusion over how the Federal Caucus and the Conceptual Recovery Plan fit into the regional salmon recovery picture.

Many commentors suggested evaluating the Hs equally or on the basis of how much each H has impacted salmon decline. Many commented about the pros and cons of breaching dams. Effects

of ocean conditions and predation were suggested as additions to be considered by the Federal Caucus.

Commentors asked for specific measures and actions that need to be taken to be able to recover listed species, including actions to address the humans affected by decisions. Some suggested that the Plan be an action and implementation plan, and that it also include nonfederal dams. The total cost of recovery was also requested.

The Federal Caucus considered the public comments thoroughly in completing the Conceptual Recovery Plan and made responses to each issue. Specific responses to the comments are included in the next section.

Public Comments
Federal Caucus Conceptual Recovery Plan

[RESPONSES TO BE ADDED IN FINAL PAPER]

1 ALL-H LIFE CYCLE APPROACH

ISSUE 01-001 Need for better coordination among Federal agencies.

Some people observed a need for Federal agencies in the Northwest to work together toward salmon recovery. Too often, they argued, the agencies have spent time and money working on competing studies and plans that did not contribute to progress toward salmon recovery. Although they recognized the Federal Caucus' efforts to coordinate Federal actions in the basin, they believe more work is needed. Some people offered specific suggestions for improved coordination, such as clarifying responsibilities and identifying common goals.

ISSUE 01-002 The All-H Paper does not adequately express sense of urgency of salmon recovery.

Many people expressed concern over the lack of urgency displayed by the All-H Paper. These people believe immediate action is necessary to prevent salmon extinction and feel enough scientific information is available to make a decision(s) regarding salmon recovery.

ISSUE 01-003 The All-H Paper is not realistic.

Some people commented that the All-H Paper did not provide realistic options for the region because it tried to appeal to all interests in the region. Others believe the process was biased and did not equally consider all of the interests in the region, but favored some interests at the expense of others. Many people noted that there are real disagreements about the final plan, and there are no easy solutions. Commentors included both those in favor of radical change and those opposed to any fundamental change in the existing system. Some believe salmon recovery is the most important objective and that it cannot be served without drastic measures. Others believe human and economic interests in the existing basin are more significant than salmon recovery and should not be sacrificed to save fish. Still others believe more study is needed to find better alternatives or "common sense solutions" that can accommodate divergent interests.

ISSUE 01-004 The All-H Paper should be amended and reissued for public comment.

Some people asked the Federal Caucus to provide supplemental information and reissue the All-H Paper. Requests for supplementation included additional analyses, description of monitoring and evaluation, development of mitigation measures, and correction of flaws in scientific models. These commentors believe more review is needed before a final decision is made.

ISSUE 01-005 The All-H Paper lacks specificity and is inadequate for decisionmaking.

Some people commented that the All-H Paper needed to provide specific information regarding the actions and consequences of the various alternatives. They believe the existing paper is not useful as an action plan because it provides little information for decisionmaking or for informed dialogue among the region's interests.

ISSUE 01-007 The All-H Paper does not consider all Hs equally.

Many commentors praised the design of the All-H Paper for looking at the four Hs affecting salmon decline, but they expressed concern that the Hs were not considered equally. Most of the people making this comment believe that the paper demonstrated an unfair bias against hydropower and dams. Some argued that the process had been reduced to pros or cons of dam breaching, rather than a discussion of saving salmon. They urged the Caucus to move beyond the "destructive debate over dams" and on to less polarizing options.

Other commentors noted that the Hs should not be treated equally because they have not had equal contributions to the decline of salmon. Many believe hydropower dams have had the most significant effect on the decline of salmon and should, therefore, pay the highest price for recovery.

ISSUE 01-008 The All-H process is a step in the right direction.

Many people commented that the All-H Paper is a step in the right direction and represents a significant improvement over prior work on salmon recovery in the Columbia River Basin. People supported the All-H approach in bringing together divergent interests and trying to come up with a balanced solution. They also commended the Federal Caucus on its progress toward developing goals and options for salmon recovery. Although many people believe additional work needs to be done to clarify goals and options, some commented that the framework was adequate as it stands and would result in a workable, balanced plan.

ISSUE 01-009 Need a comprehensive salmon recovery plan that identifies multiple actions.

Many people commented that successful salmon recovery would require development and adoption of a comprehensive plan. They stressed that salmon decline is a very complex issue, and there is no single action that can solve the problem. While many of the commentors endorsed the Federal Caucus for its comprehensive approach, many felt that the proposed measures were too narrow and should encompass a greater range of events.

ISSUE 01-010 Confusion over the role of the All-H Paper and the Federal Caucus.

Some commentors questioned the legal authority of the All-H Paper and the potential role it will play in salmon recovery. They expressed a need for better clarification of the outcomes of agreements of the All-H process and how agencies would incorporate the mandates of the All-H Paper into their individual decisionmaking processes. The commissioner of the Alaska Department of Fish and Game commented that the All-H Paper is confusing. "It is unclear if the document is intended to gather information to be used for recovery planning, to inform decisionmaking related to the Federal Columbia River Power System biological opinion, or for some other purpose. The Federal agencies should clarify exactly what role this document plays in the recovery of Snake and Columbia River salmon," he stated.

ISSUE 01-011 External factors affecting salmon productivity need to be addressed.

A number of external factors are also affecting successful salmon propagation. These factors include things like the effect of predators (seals and terns), gill net fishing practices, lack of adequate spawning areas, the need to restore the Columbia River estuary, land use practices, and failure to operate dams properly during critical periods of the production cycle. While many factors are listed, not all commentors agree on approaches to managing external factors. Alternatives proposed in the All-H process should consider management practices that would address these external factors.

ISSUE 01-012 Local communities have differing concerns and recommendations for Salmon Recovery.

The All-H process gave the nine Federal agencies the opportunity to hear comments from a wide variety of people in a large geographical area. While the purpose of the All-H process was to bring together issues according to the needs of salmon, many commentors expressed local concerns that differed from the overall responses in unique ways. One of the effects of the All-H process was developing a better understanding of local issues and where they fit in the overall context of Columbia River Basin issues. Often the commentors' recommendations and positions on the various issues reflect local concerns.

Note: The descriptions below seek to generally reflect the views from commentors who identified themselves as being residents of a particular community. The descriptions are <u>not</u> meant to narrowly define community sentiments, as the Caucus received comments across a broad spectrum of interests and positions. The Federal Caucus will consider all comments received, written and oral, on their merits, and that understand that sometimes the people who choose to speak at public meetings, or those who join a letter writing campaign, do not necessarily reflect the community feelings nor those of individual community members. In addition, many people who attended the public meetings did not necessarily reside in those locations.

Central and Southeastern Washington and Northeast Oregon. Many commentors who identified themselves as being from the Pasco community expressed opposition to alternatives that include dam breaching, since breaching the dams would eliminate their community's way of life, including electricity-dependent farming and industries. Many Pasco residents expressed pride in the transformation of their community made possible by the dams. As one commentor noted, "I do not want to go back to the way it was back in those days (before the dams) because

it was nothing but a dust bowl, rattlesnakes, and a real mess." Some commentors questioned the extent to which salmon have declined. Community members encouraged the Caucus to consider the other factors in salmon decline – harvest (overfishing and net fishing [in-stream and ocean]), predation, barging, ocean harvests, and climactic changes. They supported alternatives that restricted harvest of salmon, improved or created substitute habitat, and increased hatchery production.

Many commentors who identified themselves as being from the Lewiston/Clarkston area also expressed their opposition to dam breaching. Members of the Nez Perce Tribe testified in favor of all alternatives to recover salmon, including breaching. While many commentors expressed support for salmon recovery, they believe dam breaching is too drastic a solution, that all other measures should be exhausted first, and that a compromise solution can be found to save the fish and the dams. As one commentor put it, "[Taking out the dams] is a big gamble, and what you're gambling is my life and my livelihood and my family." Many consider themselves to be environmentalists, especially the farmers, and they resent outside interests coming in and prescribing actions that would potentially impact their lives so significantly. Lewiston/Clarkston residents expressed specific concerns about the increased cost of shipping, increased traffic, and increased wear-and-tear on roadways that would occur if the region losses barge navigation on the Columbia and Snake rivers.

Many commentors who identified themselves as being from *Montana* communities expressed concern over the use and potential restrictions on water flows in Montana. They believe water ought to be in local control and that Federal interests are usurping Montana's water rights. They are also concerned about the effects of flow augmentation and dam breaching on resident threatened and endangered fish species in Montana. People commented that the endangered resident fish in Montana were being relegated to a lower status than the endangered salmon in the Columbia River Basin. Residents from the Kalispell community generally expressed opposition to dam breaching and raised specific concerns ranging from increased freight costs, loss of water for agriculture, and increased power costs. Some commented that these costs come at no benefit to the state. Residents from the Missoula community generally expressed more support for dam breaching. Many people expressed a willingness to pay more for their electricity to bring back salmon populations. They spoke of a moral obligation to prevent extinction and the need to take immediate action to restore fisheries (including the bull trout populations, which these commentors believe would be helped by dam breaching). Some people in Missoula expressed concerns about the cost and pollution of replacement power and the potential loss of aluminum, paper, and other manufacturing industries that are reliant on cheap power.

Many commentors who identified themselves as being from *Idaho* communities expressed significant concern regarding the effects of flow augmentation on irrigation and fisheries in Idaho. State officials testified that they would support no measures that restricted Idaho's water supply. Many people testified to the empirical failure of flow augmentation to bring about salmon recovery. Government officials stated that Idaho was opposed to dam breaching, but many individual citizens, particularly those in the south, were in favor of dam breaching as a way to restore fisheries in Idaho as well as in the Columbia River Basin. Many people at the

Boise meeting testified that they had recently moved to Idaho, in large part because of its natural resources.

Commentors who identified themselves as being from *Alaska* communities expressed opposition to any further harvest restrictions citing significant economic losses to the sport and commercial fishing industries. State officials also expressed concerns about the potential effects of salmon restrictions on the Pacific Salmon Treaty, which were delicately negotiated between the U.S. and Canada. Alaskan commentors supported dam breaching as the best alternative to restore salmon populations and at the same time expressed interest in habitat restoration through pollution control, predation control, and ocean and in-stream habitats.

Northwest Oregon. Like Alaskan coastal communities, commentors who identified themselves as being from the Astoria community oppose further restrictions to salmon harvest, arguing that restrictions are unwarranted based on the fact that past experience with restrictions has not provided notable increases in fish populations. Astoria commentors expressed significant concerns about the decline in salmon populations and its effect on fisheries. They believe breaching the Lower Snake River dams presents the best opportunity for salmon recovery and ought to be the alternative adopted by the Federal Caucus (although people also expressed concerns about channel deepening and predation effects). They believe the fishing industry has suffered significant economic losses because of the dams, which, they contend, serve only a small minority of people.

Many *tribal representatives* attended public meetings and submitted comments to the public record. These comments from tribal representatives are described in section 14 of this report.

Commentors who identified themselves as being from *Seattle* covered a broad range of issues and opinions. Some supported all actions to benefits salmon, including breaching the four Lower Snake River dams; others questioned the specific measures.

Commentors who identified themselves as being from *Portland* favored all efforts to recover salmon, including breaching the four Lower Snake River dams. Some commentors tempered their comments by saying that the Caucus needed to establish firm goals, performance measures, and implementation plans for whatever actions were taken, and that the actions be thoroughly planned and tested to the maximum extent possible.

2 HYDROPOWER

ISSUE 02-001 **The All-H Paper process needs to address the significance of hydropower capacity that would be lost with breaching in the context of total regional power supply.**

Commentors took opposite positions on the importance of the hydropower capacity at the four Lower Snake River dams. Several pointed out that the output represents only 5 percent of the total capacity needs of the Northwest and that there were numerous ways of meeting that shortfall. Regarding increased costs, they point to the pending deregulation of the electric industry, providing opportunities for lower-priced power. Others indicated that the output of the four plants is approximately 1,200 megawatts (MW), which is the amount of power needed for the City of Seattle, or for most of the load in the states of Idaho or Montana. They further point out that studies conducted by the NWPPC indicate that an additional 3,000 MW of power will be needed in the near term to meet the region's expected growth of an estimated 2 million people. The All-H process needs to clarify the significance of losing the capacity and output of the four Lower Snake River dams in the context of the present and future power needs of the Pacific Northwest.

Lower Snake River Hydropower Plant Characteristics

	Ice Harbor	Lower Monumental	Little Goose	Lower Granite	Lower Snake Totals
Number of Units	6.0	6.0	6.0	6.0	24.0
In-Service Date	1 (1961) 2 (1962) 3 (1975)	2 (1969) 1 (1970) 3 (1979)	3 (1970) 3 (1978)	3 (1975) 3 (1978)	
ENERGY:					
Average Annual Energy (aMW) for Base Condition	264	332	317	333	1,246
Average Annual Energy (1,000 MWh) for Base Condition	2,313	2,908	2,777	2,917	10,915
Plant Factor Base Condition	38%	36%	34%	36%	36%
SYSTEM ENERGY COMPARISONS:					
Percent of PNW Federal System Avg Energy (Fed System = 11,136 aMW)	2%	3%	3%	3%	11%
Percent of Total PNW System Avg Energy (System = 24,479 aMW)	1%	1%	1%	1%	5%
CAPACITY:					
Nameplate Capacity Per Unit (MW)	3 (90) 3(111)	135	135	135	
Total Nameplate Capacity (MW)	603	810	810	810	3,033
Overload Capacity (Total Maximum Output) (MW)	693	931	931	931	3,486
SYSTEM CAPACITY COMPARISONS:					
Percent of PNW Federal System Peaking Capacity (Fed System = 23,824 MW)	3%	4%	4%	4%	15%
Percent of Total PNW System Peaking Capacity (System = 47,859 MW)	1%	2%	2%	2%	7%

ISSUE 02-002 **Replacing power lost as a result of implementing any of the project alternatives has significant ramifications for the region, even if the replacement power is from conservation resources. The environmental and economic ramifications of securing replacement power need to be well understood.**

Commentors did not agree on the potential sources of replacement power and took varying positions on the potential ramifications of securing that power. Generally, those who believe the loss of Snake River Dams power is insignificant point to the potential for conservation initiatives and renewable energy technologies to make up any shortfall. Others indicate that replacement power would likely come from thermal-based (coal/nuclear) sources that will be expensive and have the potential for exacerbating air-quality problems and causing other forms of environmental degradation typically found with thermal power sources. In addition, commentors believe there could be impacts to the regional transmission grid, depending on where replacement power originates. The All-H Paper needs to address how new power sources will be found and what the effects will be on the overall power grid and supporting transmission facilities.

ISSUE 02-006 **Modify Flow Augmentation.**

According to some commentors, flow augmentation from headwaters in Montana, Washington, and British Columbia should be geared to maximize biological benefits for mid and lower Columbia River salmon stocks, while minimizing adverse impacts to native resident fish such as bull trout, westslope cutthroat trout, and white sturgeon. Integrated Rule Curves (IRCs) and VARIABLE Q (VAR Q) flood control methods should be used at upstream storage projects (e.g., Libby, Hungry Horse) to benefit resident fish and to restore a more natural hydrograph, with no significant loss of flood control. Some people expresses the view that flow augmentation from the Upper Snake River above Brownlee Dam should no longer be required, people suggested that except on a willing-seller basis. Others expressed flow augmentation may continue from Dworshak Reservoir. This water and additional water from Idaho Power Company's Hells Canyon Complex may be required to normalize flows below Hells Canyon and to cool river temperatures for migrating Snake River fall chinook.

ISSUE 02-007 **Effects on Dam Siltation.**

Some commentors said the effects of dam siltation and siltation problems following dam breaching are not adequately covered in the All-H Paper. Silt in the reservoirs poses many problems (increased temperature, decreased water quality, less oxygen, increased productivity of warm-species fish [Walleye pike]). Once a dam has been breached and a new channel cut, downstream reaches can be negatively impacted by sediment.

ISSUE 02-008 **Increased costs resulting from replacement power.**

Commentors pointed out that removing the dams and finding substitute power is likely to result in increased costs to power users. The All-H process needs to recognize that increased costs of power are a possible outcome and to identify what those increased might be under any alternative.

ISSUE 02-009 **Additional benefits of Lower Snake River dams.**

The dams on the Lower Snake River provide numerous benefits and services, in addition to hydropower. Some of these services include water storage, flood control, and recreation. Many commentors believe that the loss of these services has the potential for serious consequences. For example, although flood control is not an authorized purpose of the dams, a comment indicated that the dams played a significant role in controlling floods that occurred in 1996. Commentors offered differing opinions on the role the facilities play in local irrigation. Some claim that irrigation is associated with the established reservoirs, while others indicate that is not the case. At issue is what are the consequences of removing dams in relation to the other services they provide.

ISSUE 02-011 Have all structural modifications to the dams been adequately explored?

One commentor suggested a potential solution to achieving greater survival rates: installing bypass structures at Lower Snake River dams. Other commenters stated that better analysis of other engineering solutions needs to take place. Fish friendly turbines and increased barging were also mentioned as ways to increase juvenile survival. On the basis of research at Lower Granite Dam, there is some feeling that survival could be increased with the use of yet untested structural modifications, enhanced by adjustments in dam operations. The All-H Paper needs to address whether all reasonable structural modifications have been adequately considered.

ISSUE 02-013 Water that is currently spilled or dedicated to flow augmentation could be put to better use in improving the situation for fish. Additional flow augmentation may have significant impacts in the states already providing water.

Some people suggested that using the water currently targeted for spills and flow augmentation as a source of revenue could free up significant funds for other more beneficial uses. Commentors suggest that water currently "lost" to beneficial use could be used to raise money that would support a fund for other activities, such as acquisition of habitat. The All-H Paper needs to evaluate the value of spills in light of a recent study by the NWPPC questioning the net benefits of spill. Some commentors contend that any additional water for flow augmentation from Idaho has the potential to deplete Idaho reservoirs, leaving some of them dry as much as 10 percent of the time and that there are more-reasonable alternatives to flow augmentation. The All-H Paper needs to consider both the economic and environmental impacts that may occur through increased augmentation in Idaho and other locations.

3 BIOLOGICAL OPINIONS

ISSUE 03-001 **Better coordination is needed between Biological Opinions issued by NMFS and U.S. Fish and Wildlife Service.**

Commentors agreed with the Federal Caucus that better coordination is needed among the Federal agencies to assure success of actions in restoring salmon populations. NMFS should combine and cross-reference the various Biological Opinions so stakeholders can understand agency actions and schedules stipulated in the opinions. Tracking the status of implementation of actions would be improved through a cross-referenced data base of the Biological Opinions. One commentor suggested that all Biological Opinions dealing with salmon be finalized in the same timeframe so that clear consistent information on biological priorities could be developed by the agencies.

ISSUE 03-002 **Provisions in the NMFS Biological Opinion were not carried out.**

Some commentors, when referring to the 1995 Biological Opinion, believed that the NMFS "switched its standards at the last minute to make its conclusions fit available data and keep the status quo on the hydro system..." The plan presented in the Biological Opinion to have drawdown of the John Day reservoir and provide additional water to the Snake River did not occur. The commentor also criticized NMFS for failing to carryout its plan to develop a "prompt but reliable schedule to make future decisions about what we are going to do to save salmon."

4 CONSERVATION GOALS, OBJECTIVES, PERFORMANCE MEASURES, AND MONITORING AND EVALUATION

ISSUE 04-001 **The All-H Paper does not present a good picture of internal coordination among the various agencies implementing the recovery plan, prioritization of the various goals presented, or assignment of clear responsibilities and accountability among the implementing agencies or government bodies.**

Some people commented that while the latest draft All-H Paper is an improvement over past planning measures, it still does not present a unified recovery plan that prioritizes the various goals or options to achieve those goals. The document is not clear on the assignment of responsibilities to the various implementing bodies, and as a result, accountability for implementing the various alternatives is lacking or fragmented. Specific comments included statements like:

- The Federal agencies working with the Caucus should seek agreement on a common set of priorities for funding and decisionmaking on implementation actions within each of the four Hs.
- The Federal agencies should document who is ultimately responsible for hatchery operations, habitat improvements, and changes in harvest practices?
- The Federal agencies should provide the region with the leadership to identify priorities among the goals if a conflict arises.
- The Federal agencies should clarify exactly what role the document plays in the recovery of Snake and Columbia River salmon.
- The Federal agencies should consider establishing a single governance body with sufficient authority to effectively implement a recovery plan.

ISSUE 04-002 **The All-H Paper inadequately addresses performance measures.**

There are a number of comments that applaud the first steps being taken by the Federal Caucus with regard to identifying performance measures in a recovery plan, particularly the utilization of biological assessments. The majority of comments on this topic, however, indicate that people in the region acknowledge that, at best, the All-H Paper only identifies a call for performance standards. The general opinion is that the paper does not adequately address what the measures should be overall or with respect to individual recovery areas, such as harvest, or provide details on what measures will be used to determine if certain goals are met. It is not clear to many people what monitoring means are to be used or how the evaluated data is to be incorporated into the management process for the recovery plan. More than one respondent expressed dissatisfaction with the fact that the paper lacks any quantifiable figures (perhaps meaning target goals) to inform the region when recovery would be achieved. Individual comments ranged from the general to the specific and are exemplified by the following:

- The All-H Paper must include recovery goals or a targeted level for the number of fish returning that would equate to a full recovery. Clear goals and accurate measurement of progress towards those goals is the only manner in which accountability takes place on a complex project.

- The final paper should include a description of how new information from the monitoring and evaluation process will be incorporated into management decisions and the choice of recovery actions.

- Goals need to be biologically based measurable and balanced standards that are developed and applied across all stages of the life cycle.

- The region needs specific goals for salmon recovery that meet the ESA and all treaty requirements, and measurable standards for achieving these goals.

- An effective monitoring and evaluation program for each of the Hs is also essential for the region to have success in recovering the listed stocks. An effective monitoring and evaluation program will prevent costly and regrettable mistakes

- The current approach to management of the recovery is not relying on measures of biological survival, but is based primarily on measures such as flow, percent spill, temperatures, etc.

ISSUE 04-003 The goals are in conflict.

The five goals discussed in the report are potentially inconsistent and may not be simultaneously attainable, according to some comments. For example, compensating for hatchery operations in order to increase fish populations, yet killing surplus fish, sets up fisheries management practices that are in conflict, and fisheries and tribal harvest numbers conflict. The Federal Caucus needs to provide the region with a list of priorities in the event of a conflict of interests. In addition, no procedures are in place for problem resolution.

ISSUE 04-004 Goals are ambiguous.

Some comments said that overall, the goals are poorly defined and ambiguous. Proposed actions to improve land habitat, water quality and quantity, and reduce predation are unspecified and not evaluated. The identified goals should be consistent with tribal harvest rights, not just for a delisting of the species. The final document needs to identify specific measures that would be biologically beneficial for the listed stocks.

ISSUE 04-005 Goals should include a human factor.

The All-H Paper covers all the biological and technical areas: harvest, habitat, hatcheries and hydropower. There is an additional H that has been omitted, humans, real people, real families who could be affected by the decisions made on this issue. These decisions could affect people's ability to work and live in the Northwest and human lives could be adversely affected by some of the actions considered.

ISSUE 04-006 Goals should focus on saving salmon.

The goals should clearly state that the principal objective is to save salmon, not to remove dams.

ISSUE 04-007 INFISH and PACFISH Standards

Commentors said INFISH and PACFISH standards should be applied to all Federal and state lands in critical habitat areas. Economic incentives should be offered to private landowners to

facilitate fencing of riparian areas, reducing or eliminating harmful diversion dams, screening irrigation ditches, and conserving water.

ISSUE 04-009 What is the role of project costs in the "Standards for Decision?"

Public information displayed at the March 7, 2000, meeting in Idaho Falls, Idaho, listed the Standards for Decision as: (1) Legally Defendable; and (2) Implementable. Various displays indicated; however, that the expected costs would be a basis for decisionmaking. The All-H process needs to indicate what the role of project costs are in final decisionmaking.

5 HABITAT

ISSUE 05-001 Habitat improvement/restoration/enhancement is needed for salmon recovery.

A majority of respondents discussing habitat strongly recommend that efforts be put forth to improve, restore, or enhance salmon habitat, indicating that this was the most important factor in salmon recovery. In most cases, the nature of the improvement or type of habitat is not mentioned; however, estuary and spawning habitat are frequently addressed. Many commentors recommend habitat protection as being important. Several responders said that habitat improvement efforts should be applied to private land as well as federally owned land. Many say that partial or complete removal of the dams would be necessary in addition to habitat restoration for salmon runs to recover, or that habitat restoration should be accompanied by harvest reductions and/or hatchery improvements. A few respondents state that they believe habitat loss or viability is not an important factor in salmon decline or recovery.

ISSUE 05-002 Effects of dams and dam breaching on salmon habitat.

A large number of responders indicate that breaching dams would open up, create or make available salmon habitat, and that this additional habitat availability is critical to salmon recovery. Several stated that habitat in the tributaries and/or spawning habitat is their main concern, while a few said the reservoirs were a problem for a number of reasons. Many responders simply indicated that the presence of the dams has caused habitat loss or made habitat inaccessible, and is thus responsible for salmon population declines. However, several responders state that breaching of the dams would be highly detrimental to salmon habitat and water quality due to the release of large amounts of sediment currently stored behind the dams.

ISSUE 05-003 Effects of predators on salmon populations.

Many responders indicated that an important factor in salmon population declines is the great increase in the number of predators on salmon, particularly at the lower end of the Columbia River, the estuary and ocean. These predators typically include sea lions, seals, and Caspian terns. Often, the problem is seen as an increase in predator populations resulting from ESA protections, and delisting or permitted takings are recommended. A number of responders indicated that the tern population increase is a direct result of the construction of in-stream islands from dredged material. Recommendations range from stopping the island construction to planting trees on the islands to discourage tern nesting. A small number of responders stated that they believed predation is not a factor in the failure of salmon runs to recover.

ISSUE 05-004 Effects of ocean conditions and climate on salmon populations.

Many responders felt that climate conditions play a significant role in salmon population trends. Usually these comments related to conditions in the Pacific Ocean, which when specified, referred to high water temperature and low nutrient levels. Many of these commentors stressed that although they believed this to be a serious problem, much more research needed to be done to determine the impact of ocean conditions on salmon populations. Many of these commentors indicated that very little could be done to mitigate the impact or change conditions. Several responders stated that ocean conditions had deteriorated coincident with when the Snake River dams were built and were now reversing to become more favorable to salmon survival. Responders implicating ocean conditions often indicated that the dams were not the cause of salmon declines. Other responders felt that drought conditions were at least partially responsible for poor habitat quality in tributary streams.

ISSUE 05-005 Importance of estuary habitat in salmon recovery.

Many commentors indicated that habitat associated with the Columbia River estuary was vitally important to salmon survival. Most of these people recommended unspecified estuary improvements or increased research into the use of this habitat by salmon in various life stages. Several responders were concerned that, while the Federal government seemed to agree with the value of the estuary, plans are under way to dredge portions of it and deepen the channel.

ISSUE 05-006 Importance of spawning habitat in salmon recovery.

A large number of commentors indicated that a primary cause of salmon decline and failure to recover is the inaccessibility or deterioration of spawning habitat. Many of these commentors felt restoration of this habitat could make a significant difference to salmon populations by increasing the area suitable for spawning, percentage of eggs hatching, and survival of salmon fry. Some problems with spawning habitat, according to commentors, include high water temperature and low food availability. Recommendations range from dam breaching to improving water quality. A few commentors indicated that farmers have already begun to improve stream conditions by reducing erosion and restoring riparian vegetation.

ISSUE 05-007 Land use within the watershed and impacts to salmon habitat.

People expressed concern about the impacts to salmon generally associated with land use and development trends. Concerns about development ranged from destruction of streamside habitat to reduction of water quality. Land management associated with agriculture or forestry practices was also discussed, and these practices were seen as a cause of reduced flows and increased sediment transport.

ISSUE 05-008 Improve effectiveness of habitat restoration.

Commentors suggested that habitat restoration should be accelerated only in areas where degraded salmon spawning and rearing habitat can be improved significantly. Examples include the Clearwater River drainage, where logging, road building, and mining continue to have adverse impacts on fish; and in the Pahsimeroi River, East Fork Salmon River, Lemhi River, and the Yankee Fork Salmon River, where improvements could be made, but currently do not stand in the way of the overall recovery potential of Snake River salmon because of the availability of abundant pristine habitat. Some people suggest that contrary to CRI findings, the availability of high-quality habitat is not currently a limiting factor for three of four ESA-listed Snake River stocks (fall chinook are the exception). Even the most aggressive habitat restoration measures could not be done quickly enough to prevent extirpation of the spring/summer chinook and sockeye.

ISSUE 05-009 Historical spending.

Some people disagreed with the use of past expenditures on habitat as an accurate estimate of the amount needed to achieve desired goals. The Federal Caucus should select a level of habitat action that would be effective, and then evaluate the associated costs.

ISSUE 05-010 Habitat improvements may not improve survivability.

Some commentors suggest that habitat improvements may not be productive according to the sensitivity analyses performed with PATH. In that study, habitat improvements found little appreciable change in meeting survival and recovery standards when other H parameters were held constant, according to commentors. There was only a small measurable change in probabilities of meeting survival and recovery thresholds for streams with very degraded habitats.

ISSUE 05-011 Representativeness of basin data.

The draft All-H Paper suggests that not all basins are the same and that some basins have greater needs than others. Some commentors suggest that Federal agencies should provide a rationale for evaluating basins and subbasins. The draft All-H Paper indicates that either 60 percent or 30 percent of the basins would be assessed. The rationale for selecting basins and excluding 15 to 20 percent of the watersheds needs to be provided. Some people further suggest that the draft All-H Paper and its appendices fail to distinguish properly between mainstem and subbasin actions. In particularly, some commentors suggest that the cost of mainstem actions would be significantly more than subbasin actions.

ISSUE 05-012 Man-made islands from dredging operations threaten salmon habitat.

Many people commented that the islands created by dredging operations in the Columbia River estuary have negatively affected salmon populations. The islands, they contend, have destroyed estuary habitat and encouraged the settlement of large populations of terns, which prey on salmon smolts. Commentors suggest cessation of dredging operations, removal of the islands (particularly Rice Island) and aggressive predator control programs for terns.

6 HATCHERIES

ISSUE 06-001 Add hatcheries to downstream and headwater reaches of the Columbia River.

Some commentors supported strategic placement of hatcheries where they would enhance wild salmon and steelhead production. One example would be hatcheries in the lower Columbia to supply fish for the commercial and Indian fisheries. Another example would be hatcheries at the headwaters to help raise smolt only part way or to the most desired (in terms of development and training) premigration stage of growth so numbers per spawning female can be substantially improved. Four hundred migrating smolt, per 5,000 eggs laid, leaves lots of room for improvement.

ISSUE 06-002 Enhance salmon recovery through hatchery improvements.

Commentors made numerous suggestions to improve hatchery programs, including:

- Mark all hatchery salmon.
- Improve genetic strength of broodstock through supplementation practices.
- Explore conversion of Mitchell Act Hatcheries to modern facilities.
- Address drastic changes in hatchery programs.
- Continue to give top priority to salmon through improvement of habitat, hatcheries and harvest control.
- Establish performance measures for hatcheries so there is no question adult salmon is the goal.
- Address harvest by implementing Pacific Salmon Treaty, improving spawning and estuary habitat, and improving hatchery practices through technology to support recovery efforts.
- Change tribal fisheries, including the development of terminal fisheries in the tributaries, where reductions in mortality of returning adults from a non-selective in-river fishery appear to have benefits to weakened stocks.
- Revise hatchery practices to move toward a conservation model.
- Change hatchery practices to more closely mimic nature.
- Focus efforts on extensive hatchery and/or spawning-bed enhancement.
- Improve hydropower, habitat, harvest, and hatchery operations.

ISSUE 06-003 Success of hatchery reform measures uncertain.

Several commentors questioned the Federal agencies ability to judge the success of hatchery reform measures in improving salmon recovery. The Federal Caucus was urged to use caution in putting too much weight on hatchery improvements in a comprehensive program to restore salmon populations in the Columbia and Lower Snake Rivers.

ISSUE 06-004 Disapproval of continued use of hatcheries in restoring salmon populations.

Some commentors suggest that hatcheries have been overused and have actually had a detrimental impact. They suggested that emphasis should be placed on protecting and restoring habitat upon which fish depend. Tribal commentors reminded the Federal agencies of their treaty rights and claimed that there was no moral justification for favoring commercial fish hatcheries.

ISSUE 06-006 Hatchery practices to maximize genetic diversity.

Several commentors expressed a preference for hatchery programs that improve and maximize genetic diversity of salmon stocks.

ISSUE 06-007 Jobs for Native Americans at fish hatcheries.

Commentors suggested that Native Americans could be offered additional programs to replace the loss of income for eliminating or severely restricting fishing, including, but not limited to training for and preferential offers of choice jobs at dams and hatcheries.

ISSUE 06-009 No evidence that hatchery salmon impact wild populations.

Commentors that favored continuation of hatchery programs disputed the belief that hatchery-reared salmon adversely affect wild populations. Specific comments included:

- Cross-breeding is not a reasonable rationale. Hatchery fish return to their hatchery to spawn. Wild fish return to their upstream source for spawning and therefore do not mix.

- Insufficient substantiation that hatcheries are involved with wild salmon populations. No action except, perhaps, more research to determine if there is a need.

ISSUE 06-010 Salmon from hatcheries using locally adapted stocks do not threaten wild populations.

Strays into a local area from hatcheries that are using a locally adapted stock do not constitute a threat to the local stocks, some commentors said. In fact, hatcheries that use local area fish can be used for supplementation programs. The commentors said they recognize the importance of reducing or eliminating strays from distant stocks. The degree that barging contributes to straying should be studied and appropriate measures taken if it is shown that barging fish contributes to this type of straying.

ISSUE 06-011 Revise the All-H Paper to identify responsible party for hatchery operations.

Commentators asked the Federal Caucus to identify specific responsibilities for hatchery operations and return implementation.

ISSUE 06-012 More research on genetics of hatchery fish.

Some commentors suggested that more research should be conducted on the benefits of hatchery fish. They suggest that the Federal agencies evaluate hybrid vigor through cross-breeding studies to evaluate the benefits in developing a stock that is better suited for release.

ISSUE 06-013 Mismanagement of hatcheries and harvest; sacrifice of hatchery fish.

Several commentors questioned the need to kill hatchery-reared fish when there seems to be such a shortage of salmon for harvest. Other commentors believe that Federal hatchery operations appear to be in conflict with

their goals. Commentors specifically mentioned the practice of deliberately killing "surplus" hatchery salmon that return to spawn and selling their eggs as fish bait is the topic of recent controversy. Using hatcheries to increase populations of salmon and killing surplus fish, appears to be a conflict in management priorities.

ISSUE 06-016 Hatchery fish should not be considered sufficient mitigation for losses of wild salmon.

Commentors emphasized the importance of saving wild salmon and suggested that "mitigation" programs were insufficient.

ISSUE 06-017 Hatcheries have been unfairly portrayed and represent an important option for restoring salmon stocks.

Several people noted that hatcheries could better contribute to salmon recovery in the region if they followed standards established by successful Native American and Alaskan hatcheries. These people believe hatcheries have been unfairly maligned as an alternative because of management problems with many of the Pacific Northwest hatcheries that are not inherent problems of hatcheries.

7 HARVEST

ISSUE 07-001 Harvest rates need to be reduced or eliminated.

Many people feel strongly that various forms of over-harvesting are primarily responsible for the imperiled state of the salmon, either in combination with or instead of the dams. The cumulative impact from all forms of harvesting need to be assessed, including ocean drift netting, trawling, and over-harvesting with gill nets by Native Americans. Some individuals believe that sport fishing also needs to be reduced and better controlled. The position of many commentors is that harvest rates are controllable elements that can make a significant positive impact on salmon stocks. Therefore, harvest restrictions need to remain key components of the salmon restoration program. Some commentors believe that more stringent restrictions or elimination of fishing should occur before dams are breached, and others stated that as long as harvests are allowed, the salmon will never recover, even with the breaching of the dams. Commentors support the All-H Paper in its statement that a 4 percent increase in fall chinook can be achieved without even partial dam breaching by reducing in-river and ocean harvests by 50 percent (or either fishery by 75 percent). For example, in-river harvests should be limited to only Native American tribes that have established treaties. A number of people expressed opinions that harvest should be eliminated in certain locales or for a period of time (e.g., river fishing should be curtailed from two to four years, or tribal and commercial fisheries should have a 10-year moratorium). Some commentors expressed a more extreme position that all commercial and Native American fishing should be stopped, including ocean fishing in U.S. and Canadian waters. It was suggested that commercial and tribal fishermen be paid not to fish.

ISSUE 07-002 Harvest methods or locations need to be modified.

A number of individuals believe that gill netting should be banned because it causes incidental takings of ESA-listed salmon. It was also expressed that the gill and set nets located from the mouth of the Columbia River upstream to McNary Dam must be having an effect and should be studied. Others stated that there should be a five-year moratorium on fishing with nets in rivers and Puget Sound to see what happens to the salmon stocks. Some commentors state that the use of gill nets is in conflict with attempts to save an endangered species and maintain a sustainable harvest. They believe that fishing locations should be changed from the mouths of rivers to terminal (tributary) locations to decrease non-selective in-river fishing and benefit weakened stocks. According to some comments, commercial and tribal fishermen in the lower reaches are catching excessive numbers of fish, a portion of which should be available for harvest in the upper reaches. It was suggested that Native Americans should fish off of the fish ladders to facilitate the release of protected species. Rather than controlling harvest rates, options should include a change in harvest methods, location, and/or equipment to allow increased taking of hatchery fish with less impact on native stocks. Complaints were made that commercial fishermen are not releasing wild fish like sports fishermen have to do. It was stated that in-river fishing should be limited to mouths of the rivers and that harvests at these locations should be allowed only after an adequate number of fish, for the available spawning sites upstream, have migrated past the rivers' mouths. Harvests would be allowed, but only for half of the remaining stock and for only the smaller individuals.

ISSUE 07-003 Ocean harvest has a significant adverse effect on salmon stocks.

Numerous commentors believe that excessive ocean harvesting is occurring and that harvest is not being considered as a factor causing declines in salmon stocks. There are concern that ocean fishing has doubled since the 1970s, and that sophisticated fishing equipment allows the harvesting of thousands of tons of salmon. These commentors blame declining salmon counts on offshore harvests. Some believe that the commercial fishing season in Alaska should be reduced. Others feel the international commercial fishing

industry should be responsible for developing the salmon fishery. At a minimum, they say, the Pacific Salmon Treaty must be implemented. Targeted ocean seasons should only be opened after scientists identify that salmon populations are not in jeopardy. In addition to limited harvest, some believe that ocean harvest should not be allowed within 200 miles of the coastline.

ISSUE 07-004 Harvesting is not the problem impacting the salmon.

A number of people take the position that harvest is not impacting salmon stocks. They base their view on the continually decreasing harvest limits placed on fishermen without any associated improvements in salmon stocks being observed. Some people expressed concern over the cumulative losses to salmon, considering any factor that causes a loss of salmon as a "harvest" issue. They note that 80 percent of salmon loss is accounted for by the dams, whereas fisheries account for 4 percent of the loss. Many acknowledge that commercial and sport fishing influence salmon and steelhead populations, but believe that the dams are the main factor accounting for the diminished stocks of these fishes.

ISSUE 07-005 No further harvest restrictions should be enacted because of economic hardships.

Many commentors believe that harvest reductions have had adverse economic effects. Some individuals expressed concern that last-minute closures of fishing seasons jeopardize sports fishing trips and the associated economies. Healthier runs are necessary so such closures will not occur, they state. Others feel that some fisheries have been severely restricted (U.S. commercial and sports fisheries), while others (Native American and foreign fisheries) have been left unchecked. Some believe that harvest levels are so low now, that any further reductions would not provide any benefits to the fish stocks. Others want to know how commercial and tribal fishermen and other associated businesses are going to be compensated if there are further restrictions on harvests.

ISSUE 07-006 Impacts of dam breaching on harvest and harvest-associated industries.

Some people said a restored salmon fishery would contribute at least as much to the regional economy as dam operations currently do. Several of these individuals believe that the evaluation of the economic benefits of dam removal was inaccurate in that it did not consider the total economic impacts on commercial, Native American, and sports fishing and associated industries, such as lodging and food. In contrast, others believe that the reservoirs support a significant sport fishery for steelhead, bass, and other fish (in addition to recreational and energy benefits). Some commentors doubt that dam removal would increase sport fishing and lead to an economic boost in certain areas.

ISSUE 07-007 A better understanding of the impact of Canadian, Alaskan, Northwest and other offshore fisheries is needed.

Some people believe that a better understanding of the migratory behavior of the listed species is needed in order to adequately determine the impact of ocean fishing. Overall, better information needs to be developed on the impact of ocean fishing on Columbia River stocks.

ISSUE 07-008 Predatory species are impacting harvests.

Many people commented that predatory species are imperiling salmonids. It is believed that the predators will eventually decrease stock levels needed to support Native American, commercial, or sport fishing. If fish population levels are to increase to their historic levels, predator populations need to be decreased to their historic levels, some state. Other commentors believe that predatory species, particularly seals, should be harvested. They feel this would lessen the impact on migratory fish and provide a secondary commercial industry (e.g., through seal skins and seal jerky).

ISSUE 07-009 Native Americans are over-fishing and indiscriminately harvesting fish.

Some people believe that the Native Americans are harvesting more fish than they need (e.g., selling fish would indicate a surplus catch). Native Americans should be paid to remove their nets in order to prevent over-fishing and indiscriminate harvesting, according to some commentors. Others feel that Native American fishing rights and salmonid recovery and survival may be incompatible.

ISSUE 07-010 Adequate space and time for harvest are not provided.

Some people express concern that Alaska commercial fishermen have a limited fishing season and a limited area within which they are allowed to harvest salmon. They further believe that this penalizes the fishermen from getting the share of the harvest they are paying to produce (e.g., through financial support of state-of-the-art hatcheries).

8 INSTITUTIONAL AND REGULATORY ISSUES

ISSUE 08-001 Does the All-H process conflict with laws governing water use in the states within the region?

The State of Idaho has indicated it will not support any additional release of water that is not authorized by state law governing water management. The All-H Paper needs to discuss whether proposed alternatives are consistent with state water laws.

ISSUE 08-002 Commitments made through the authorization of Columbia and Snake River projects must still be honored.

Some commentors point out that years ago, the Pacific Northwest and the Federal government made a commitment to the economic betterment of the region through development of the Snake River dams. Previous commitments were made to the irrigation farming and transportation industries. Ways need to be found to manage the recovery program with recognition of human needs, they say. Breaching dams will reduce water available for irrigation and power production. Other commentors indicated loss or reductions in these services would not be significant because economic forces are changing the character of employment in the Northwest. The All-H process needs to clarify how previous commitments made to the residents of the region will be honored in the recovery program.

ISSUE 08-003 Are changes to the current project configuration consistent with the United States' position on global warming?

Commentors suggested that replacement power is likely to be thermal-based generation from fossil fuels, which creates a potential for increased emissions to the atmosphere and potential impacts to global warming. President Clinton, in his 2000 State of the Union address, expressed considerable concern over actions that have the potential to increase global warming. The All-H process should address the potential of contributing to the global-warming phenomenon from proposed alternatives.

ISSUE 08-004 River flow operational moratoriums.

Commentors point out that in response to flow augmentation demands, the Bureau of Reclamation has instituted a moratorium on excess uses of water. The goals of the All-H Paper are not achievable with this moratorium in place.

ISSUE 08-005 Are the proposals contained in the All-H Paper in compliance with the Clean Water Act?

Several commentories raised the issue of whether the various alternatives identified comply with the Clean Water Act. Comments indicate a need for measuring and reporting the total daily load of listed pollutants that exceed standards. States are required to inventory rivers and list Total Maximum Daily Load allowable. In addition, a management plan may be required and the Federal government may have to take a lead in developing such a plan. The Clean Water Act would require at least a partial removal of existing dams. Commentors identified potential costs of $125 million for compliance with the Clean Water Act under alternatives that leave the dams in place. Other commentors expressed concern that agencies are still debating whether the Clean Water Act actually applies for the kinds of actions anticipated, and another indicated the Act did not apply to the Upper Snake River Basin and should not be used to further regulate those properties. The State of Washington and others asserted that state water quality standards apply to the Snake River, so any alternative will be subject to those regulatory requirements. The final All-H Paper needs to identify whether the All-H proposals comply with the Clean Water Act and, if found deficient, identify how compliance will be achieved.

ISSUE 08-006 Is a failure to act in a way that will assure increases in salmon stocks a violation of commitments made to Native American tribes?

A number of commentors said a failure to increase salmon stocks represents a significant violation of laws and regulations including the Treaty of 1855, and the June 5, 1997, Secretarial Order on "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act." Compensation to competing interests in the Columbia River would be substantially less than the value lost if salmon become extinct. Reparations required for the eventual loss of fish could approach several billion dollars. Dams impacted the lives of individuals living in coastal communities, particularly those who were part of the Palmer-Stevens Treaty Tribes.

ISSUE 08-007 The Endangered Species Act must be complied with in the implementation of any alternatives.

Commentors emphasized that efforts to recover salmon are driven by the mandates of the Endangered Species Act (ESA). Solutions to the salmon problem are likely to require the Federal government to take aggressive actions on how private land and water are used, and litigation is likely, according to some commentors. Compliance with the ESA is possible through implementation of the status-quo based alternative. Some commentors expressed a concern about a lack of consistency between the two agencies charged with implementation of the ESA.

ISSUE 08-008 Compliance with the Coastal Zone Management Act.

Commentors indicate that the Coastal Zone Management Act places requirements on Federal agencies. The All-H process must consider protection of salmon in the context of the Coastal Zone Management Act, as well as other state and Federal laws.

ISSUE 08-009 Compliance with the Clean Air Act.

Commentors suggested that breaching the Snake River dams would increase dust in the construction area. The State of Washington is empowered to implement the Clean Air Act, including the regulation of windblown dust. The All-H process should identify how it intends to comply with requirements of the Clean Air Act, in any alternative likely to be out of compliance.

ISSUE 08-010 Cumulative Effects.

Commentors stated that because the National Environmental Policy Act regulations require studies to include a discussion of indirect and cumulative impacts and the Clean Water Act calls for a consideration of cumulative effects "to the extent reasonable and practical," the All-H Paper should discuss the cumulative ramifications of proposed or potential actions.

ISSUE 08-011 BPA is required to provide inexpensive power to citizens in the Northwest.

Provide for development of low-cost hydropower in the Pacific Northwest, some commentors raise historic arrangements in the Northwest Power Planning Act (NWPPA). They suggest that there are goals between NWPPA and the ESA, which requires that BPA assure there are salmon left in the river. Commentors urge Federal agencies to reconcile these conflicts.

ISSUE 08-013 Lax enforcement of existing pollution laws could be a cause of increased incidences of cancer.

Commentors suggest that contaminated salmon may be a cause of increased incidences of cancer among Native American people. Salmon is a staple of Native Americans diets.

ISSUE 08-014 Role of the Pacific Salmon Treaty.

The Pacific Salmon Treaty was implemented with assistance from the published 1995 Proposed Recovery Plan, which established a recovery program for salmon. There is concern that the All-H process will attempt to use the Pacific Salmon Treaty to impose additional restrictions on salmon fishing, according to some comments. The All-H process is unclear on potential effects to salmon fishing in Alaska and needs to be more specific. The Pacific Salmon Treaty has been working for Alaska and provides certainty to the fishing industry. The All-H process needs to clarify how the Pacific Salmon Treaty is being considered in the decision process.

ISSUE 08-015 Compliance with the Regulatory Flexibility Act.

The All-H process must demonstrate compliance with the Regulatory Flexibility Act.

ISSUE 08-016 Opportunities for partnerships exist with affected stakeholders.

Some commentors offered assistance through the development of partnerships. Some suggested areas of partnership include

- Improved Habitat Rental program.
- Habitat Enhancement Incentives program.
- Safe Harbor Assurance program.

ISSUE 08-017 Compliance with the National Historic Preservation Act.

Commentors indicated that the provision of Section 106 of the National Historic Preservation Act (NHPA) may apply to the All-H process, and has been ignored. Some commentors believe the Advisory Council on Historic Preservation should have an oversight role in the All-H process.

9 SCIENCES

ISSUE 09-001 Additional quantitative information needed.

Commentors suggest that quantitative comparisons of fish mortality rates are needed for the following dam components:

- Slack water pool behind the dam;
- High pressure gradient turbine duct system;
- High diffusion rate spillway (super saturated nitrogen); and
- Low capture ratio high acquisition time, mono-directional fish ladders.

Analyses of this information may show that there is a common fault design for the dams on the Columbia River. A detailed functional test was not performed for safe fish-passage verification.

ISSUE 09-002 All-H Paper should incorporate ineffectiveness of smolt transportation.

Some commentors claim that the report should incorporate the conclusion of PATH's weight of evidence process and the Scientific Review Panel report that showed that smolt transportation was unlikely to be a viable recovery tool for listed Snake River stocks. Any option that relies heavily on the continued use of smolt transportation to reverse a 20-year decline, during which time transportation has been the principal strategy, is likely to fail. Juvenile fish trucking and barging has never produced SARs that are sufficient to maintain or restore ESA-listed Snake River stocks. The only significant population rebounds occurred when barging did not occur (e.g., the mid-1980s when there were high spring flows). The commentors recommended that normalized strategies should be pursued.

ISSUE 09-003 CRI model makes unrealistic assumptions about salmon and smolt populations.

Several commentors suggested that the CRI model was not the best source of scientific information for decisionmaking. In support of their views, they cite a series of criticisms from two scientific sources. In regard to salmon populations, the scientific critics noted:

- The model assumes that half the spawners are female and equal fecundity across age. Available information indicates that 10 percent of 3-year-olds and 67 percent of five-year-old spawners are females. Older fish produce more eggs.
- The CRI analysis uses egg-to-smolt survival as less than 2 percent when PATH and other studies have shown egg-to-smolt survival at about 5 percent. The lower, CRI estimate could incorrectly support improvement of spawning and rearing habitat as the best alternative for saving spring/summer salmon.
- The model used higher post-Bonneville smolt mortality and higher smolt-to-adult returns than either that estimated by BPA or those available in the literature. When commonly accepted survival estimates are used, the most important variable is not first-year survival but post-Bonneville survival. This indicates that the most important variable is delayed or extra mortality occurs in the ocean.
- In using Alaskan sockeye data for adult ocean survival and Oregon coho to estimate survival through the early ocean for spring/summer chinook, the CRI model produces smolt-to-adult returns higher than has

been seen since the Snake River dams were constructed. As such, these questionable SARs affect the estimated dam-related mortality impacts and undervalue the benefits of major changes to the hydrosystem.

ISSUE 09-004 CRI model underestimates extinction risks.

In regard to CRI estimates of extinction risks, commentors identified the following shortcomings.

- The model uses a "quasi-extinction threshold" that is lower than values typically used in extinction risk assessment. This causes the risk of extinction to be underestimated. This particular criticism was also put forth by a number of lay commentors.

- The model inappropriately uses averages in lieu of trends in population growth rate. As a result, model output underestimates the likelihood of extinction.

ISSUE 09-005 Scientific models used to assist in decisionmaking can be tailored to support predetermined conclusions

Many commentors note that science can become subjective when politics and emotion are involved in selection of alternatives. They perceive that supporting studies, statistics, conclusions, and subsequent peer review can be consciously or unconsciously manipulated to produce predetermined conclusions. Several suspect that some governmental groups or individuals are manipulating their studies in such a way as to get politically expedient answers. In regard to the conflicting results obtained from various analyses, commentors observe that the answers obtained from science depend upon the questions that are asked. Assessments of extinction risks and management options for ESA listed salmon populations in the Columbia and Snake River Basins vary greatly depending on the parameters, data, and models used in each analysis. In several cases, commentors have questioned the motivation of investigators using dated or unsubstantiated data in models and weighing decisions made in the peer review process. By weighting a particular combination of data, parameter and models, nearly any desired result can be obtained. Commentors suggested that when PATH and CRI analyses used the same data, results were very similar.

ISSUE 09-006 Need more information on salmon survival rates.

Several commentors related that in order to determine the best management solution (transport versus breach) estimates of survival are needed (e.g., post transport survival, extra mortality after dams, ocean mortality, number of spawning adults per year). Commentors shared their views and observations regarding a number of scientific models and processes, such as PATH, FLUSH, and CRiSP.

ISSUE 09-008 The survival of transported fish is less than that of in-river migrants.

Delayed mortality is a theoretical concept that tries to explain survival differences between transported and in-river fish. Some scientists and commentors postulate that before transported fish return to spawn, they suffer mortality that exceeds what would have occurred if they were not barged. The FLUSH model estimates that more than 80 percent of the fish transported will die, the CRiSP model estimates 60 percent, and recent PIT tagging studies indicate a loss of 45 percent.

Several commentors noted that many smolts die during their estuarine life cycle. They contend a part of this mortality is due to damage inflicted during transportation. Reports on the initial mortality of juvenile fish that are barged and trucked around the dams put the figure at 1 to 2 percent. One commentor, an experienced hauler who performed two mortality studies, cited a correlation between immediate and long-term mortality. He concluded that 1 to 2 percent mortality does not suggest the fish are so stressed that they would die in large numbers once out of sight. Another commentor observed that when the transported fish are released in the estuary they apparently become "disorientated" due to a water temperature differential and that many are eaten by sea gulls.

One commentor cites that in nearly all barging studies, the survival of returning adults barged as juveniles was 50 to 300 percent greater than the survival of adults that were not barged. Another suggested that some in-river smolts are undetected at dams and return at higher rates that those that were transported. While some differences in SAR exist between transported and undetected in-river migrants, no significant differences have been observed.

Delayed mortality is an important parameter with regard to deciding the role of juvenile fish transportation and assessing other alternatives relative to this mitigation measure. NMFS and CRI state that further studies could reduce the uncertainty surrounding delayed mortality; but do not specify the types of experiments.

ISSUE 09-009 Inadequate data gathering.

Some commentors believe that there are oversights in data gathering apparent in the draft All-H Paper. For example, the absence of salmon in the Klamath River, which has no dam, is not discussed. Similarly, there is no discussion on declines in salmon on such rivers as the Cowlitz and Nestucca that have no dams. Other factors are apparently involved, and an understanding of these factors may be of general importance to the decision process.

ISSUE 09-011 CRI model uses non-standard and untested methods.

Several commentors expressed reservations of the CRI model based on the critique of one scientific reviewer. In general, the reviewer noted that the model should be using standard risk assessment methodology as well as:

- The model does not use most recent available brood year data. Because these populations have been declining at an accelerating rate, the choice of older data produces more optimistic results than analyses that are based on the entire data record.

- The model relies on a non-standard method of sensitivity analysis. The standard percent method used by CRI indicates that mortalities affecting fish populations in the first year of life are the most important, and that each subsequent year of life is less important. When textbook recommended (elasticity) method is applied to the CRI model, it indicates that adult mortalities have the most impact on results.

- Because of the unorthodox approach taken in the CRI analyses, it is important to have the model validated (i.e., compare model predictions to actual data, discuss the impact of errors and assumptions, and compare methods and results to other model). Because these models may be used to justify delaying or taking a very risky decision, they should be peer-reviewed.

10 ECONOMICS

ISSUE 10-001 Dam removal will cause negative economic impact to the Pacific Northwest.

Among all the concerns regarding economics, the economic impact of dam removal (partial or full) received the most attention from commentors. While some people believe that removal of the dams will be good for the economy, boost the fishing industry, and create jobs, others believe that breaching the dams will devastate industry and the economy, and threaten jobs. Many people support dam removal while recognizing it could have a negative impact on the economy.

Specific concerns expressed with respect to economic loss of dam breaching include:

- Displacement of jobs due to local businesses closing or the high cost of operations if hydropower generation is lost.
- Increased cost of grain transportation, which will make dry land farming uneconomical for the region (Montana, North and South Dakota, Idaho, and Washington).
- High cost of maintaining and expanding transportation infrastructure.
- Decreased use of fishing opportunities, parks and campsites, golf, and the general tourist attractions along the Snake River, resulting in economic loss.
- High costs entailed in physical removal.
- The reductions in use and value of agricultural land, and the uncertain advantages it would provide for salmon recovery.

Areas where people feel dam removal will most likely lead to economic gain:

- Creation of more than 3,100 recreation-related jobs.
- Creation of stronger economy in general for the Northwest.
- Resurrection of a failed $3 billion a year salmon recovery program.
- Recovery of salmon.

ISSUE 10-002 Cost and benefit analysis of dam removal is incomplete and inaccurate.

Many commentors voiced concern that the scope of the cost accounting is too narrowly applied. They felt that information and dollar figures are absent, preventing people from making meaningful comparisons of alternatives. Some feel that selecting the best-case scenario for dam removal and the worst-case scenario for dam retention biases the cost figures. In some views, the cost of dam removal is inflated; in others, the cost of dam removal is underestimated.

Commentors urge reexamination and consideration of the following potential costs:

- Cost of meeting Clean Water Act water quality standards not addressed;

- Costs of reparation to tribes if salmon go extinct;
- Loss of secondary benefits such as hotels, restaurants, equipment sales and other services, to communities from decreased fishing and recreation;
- Costs of dredging;
- Costs of trucking smolts;
- Costs of replacing barge transportation with rail, including rail costs from Idaho and Montana;
- Loss of agricultural lands and irrigation;
- Costs of harvest restrictions, including economic and social consequences to fishermen;
- Costs of increased flooding;
- Costs of eliminating hatchery programs and related jobs, especially for Tribes and in Idaho;
- Costs of mining, grazing and agricultural restrictions for habitat improvements;
- Costs of replacement power; and
- Costs of hydropower generation.

Commentors urge reexamination of the following potential benefits:

- Improved quality of life and positive economic benefits from dam removal;
- Benefits of salmon to Native American tribes such as ceremonial, subsistence and religious values;
- Benefits of dam removal to commercial fisheries from Oregon to Alaska;
- Benefits of recreational activities to local communities; and
- Benefits of increased revenues from reduced spill and flow.

ISSUE 10-005 Economic loss associated with flow augmentation.

The Snake FR/EIS and All-H Paper discuss flow augmentation as a potential mitigation strategy for the salmon, but augmentation costs are not presented in either document. An additional 1 million acre-feet for flow augmentation results in an average loss of about $430 million annually to the economy of southern Idaho, according to a recent study by the Bureau of Reclamation. This water is used for irrigation by Idaho's potato industry. Similarly, compensation or mitigation is needed for farmers in eastern Washington and Oregon for water volumes needed to achieve target flows in non-breaching scenarios.

ISSUE 10-007 Economics of Alaska fishing rights.

Commentors claimed that harvest limits already affect Alaska fishermen negatively. King salmon season went from 160 days in the 1970s to 11 days in 1999. Further restrictions on ocean fishing makes little biological sense, considering that only one ESA-listed stock, Snake River fall chinook, is taken in significant quantities. Elimination of the entire Southeast Alaska salmon troll fishery would result in only five to 68

additional Snake River fall chinook making it back to their spawning grounds. Commentors estimate that a harvest cutback of approximately 10,000 Pacific chinook salmon is required to save every additional Snake River fall chinook and would come at a cost of $2 million to coastal fishing communities with no other major sources of income. Commentors also suggest that mortality rates from the Alaska fishery are insignificant compared with mortality rates caused during migration additional harvest restrictions.

ISSUE 10-009 Role of private funding in project implementation.

Some commentors suggest that if removal of dams is not an economically viable alternative, advocates for removal should consider making a financial contribution to potentially impacted communities.

ISSUE 10-010 Cumulative economic impacts are not adequately addressed and render many of the proposed alternatives unjustified.

Executing several of the options in the All-H Paper would result in significant economic impacts in a number of areas. Commentors identify potential impacts related to loss of hydropower, loss of irrigated cropland, cost of breaching dams, loss of navigation capability, and loss of productivity due to use of water for augmentation. Commentors suggested that the Federal agencies did not total these potential costs and identify the commutative economic impact.

11 RANGE OF ALTERNATIVES

ISSUE 11-003 The Federal Caucus needs to improve integrated alternatives.

Commentors urged the Federal Caucus to improve the options and make the integrated alternatives more realistic. Suggestions including:

- The harvest option should be more than a range of harvest rates. It should include changes in harvest methods, timing, location, equipment, and gear to allow larger harvest with less impact on listed stocks.
- The hatchery option should be coordinated with recovery goals and the harvest policies.
- The hydro options should be broader and not narrowly focused on the removal of Snake River dams.
- The habitat options should define who will participate without describing the types of actions that might be considered and without providing a basis for setting priorities.
- The description of the Pacific Salmon Treaty found in harvest Annex C should be expanded and included in the body of the document. The document should clarify for readers what the Pacific Salmon Treaty role is with regard to harvest management and explain that, of the four Hs, the harvest sector is already playing a significant role in terms of recovery of listed salmon.

ISSUE 11-009 Alternatives should include discussion of Hells Canyon and other upstream developments

Some commentors suggested that the Federal agencies should focus on alternatives to recover Snake River salmon stocks by including a discussion of Hells Canyon and other upstream development. The Federal Energy Regulatory Commission (FERC) reauthorization of the Hells Canyon project could have great effect on Snake River fall chinook by providing passage beyond Hells Canyon. Possible benefits, from measures such as requiring fish passage, should be considered within the All-H analysis of options as well as during relicensing.

ISSUE 11-010 Breaching option should include mitigation for juvenile and adult fish passage.

Commentors said it is not clear why the breaching option does not include increased mitigation measures at the four Columbia River dams to assist with juvenile and adult fish passage. For example, since the listing of Snake River fall chinook, harvest as a percentage of the total run has decreased (1988-92 about 58 percent of run harvested, 1993-97 about 36 percent of run harvested) while the percentage of returning adult fish associated with dam loss has increased (1988-92 about 28 percent lost, 1993-97 about 32 percent lost). The reasons for this increased adult non-harvest mortality and solutions to the problem should be identified.

ISSUE 11-013 Integrated alternatives and options presented in the All-H Paper are not comprehensive.

Some commentors suggest that ultimately, a recovery plan must address all the goals, be comprehensive across the life cycle of the listed stocks, internally consistent, and economically and politically achievable. The examples of integrated alternatives used in the draft All-H Paper do not seem to achieve these necessary conditions, according to some comments. Commentors urged the Federal Caucus to ensure that the integrated alternatives are a consistent assemblage of recovery and fisheries management options that will achieve the stated goals.

ISSUE 11-014 The Federal Caucus should consider additional alternatives to those presented in the All-H Paper.

Commentors indicated that there are an insufficient number of alternatives presented. Many commentors did not refer to specific alternatives by number, but provided suggestions for issues that should be addressed either in new alternatives or options within existing alternatives. The following topics were presented to enhance alternatives and options for salmon recovery:

- Modifying COE flood control management.
- Including the Clean Water Act to achieve water quality standards in the main-stem.
- Improving and streamlining coordination among Federal agencies.
- Estimating the impact of dam removal on bull trout populations in Montana that have already been negatively impacted by the existing drawdown schedule.
- Providing for increased mitigation measures at the four Columbia River dams to assist juvenile and adult fish passage (consider the potential benefits of drawdown of John Day Dam).
- Limiting the alternatives to those that can be implemented consistent with all present statutory authorities, not just the Endangered Species Act.

Some commentors suggested new alternatives. These included:

- Work with the NWPPC in developing a fourth alternative that features a new flow regime for the Columbia River system combined with significant investments in habitat improvement. The alternative would eliminate or curtail spring supplemental flows and set summer flows at levels for a "low water year." Voluntary spill would be reduced if no demonstrated biological value is obtained and the current level of barging smolts would continue.
- Pursue a partial breach design plan for the Lower Salmon River dams to enhance salmon access to upper reaches of the river and allow continued hydropower production.
- Adding Alternative 6 from the Multi-Species Framework process as an alternative in the All-H Paper; this alternative would result in a 30 percent increase of chinook stock compared to slightly more than 20 percent for dam breaching and 25 percent for the Federal Aggressive Approach.
- Add a new option that maximizes juvenile salmon and steelhead transportation.
- Clone fish that are endangered stock and not breach dams.
- Turn off lights at dams to eliminate predation on smolts by squawfish and limit navigation to daylight hours.
- Improve salmon recovery by using large pumps installed by the Department of Energy to pump water from the north part of the Hanford Reservation to create new streams draining into the Columbia; streams would provide "efficient spawning and rearing channels."
- Construct a large underwater pipeline that would pass below the reservoirs and bypass the dams to transport smolts to the mouth of the Columbia River.

- Direct fish away from the dam turbines using a low voltage electric grid, instead of barging.

ISSUE 11-015 Elements of an action plan.

Many commentors expressed support for the following elements of a new action plan:

- Centralize activities with NMFS.
- Modify hydropower systems.
- Provide technical and financial assistance to landowners and managers to improve riparian conditions.
- Eliminate mixed stock harvest in the Columbia River.
- Mark all hatchery salmon, improve genetic stock, and modernize Mitchell Act Hatcheries.
- Eliminate predators (Caspian Terns, marine mammal, etc.).
- Do oceanographic research to improve the understanding of biological limits and constraints within the ocean. Adjust the plan accordingly for decreases in ocean productivity.

12 PUBLIC INVOLVEMENT PROCESS

ISSUE 12-001 People are interested in salmon recovery issues and appreciated the opportunity to comment on the All-H Paper and process.

Many people commented that they really cared about the issue of salmon decline and the alternatives being considered to recover salmon populations. People expressed the need to involve a broad group of stakeholders in the development of implementation plans. They appreciated the opportunity to provide input into the decisionmaking process and asked that their comments be included in an official record. Many of the people attending the public hearings expressed appreciation to the Federal Caucus for scheduling hearings and making Caucus members available to hear comments and answer questions.

ISSUE 12-002 Concerns with public involvement process.

Some people expressed frustration with the All-H public involvement process. They felt the public hearings did not serve the purpose of providing a dialogue on salmon recovery. Some argued that the paper was of limited use because it contributed little new information to the debate. Others were more critical, commenting that the public process became a popularity contest between those for dam breaching and those against dam breaching, thus contributing to increased polarization within the region on an already contentious issue. Still others believe that at least some of the Federal agencies are not really interested in public comment nor will consider public comment in the decisionmaking process. The Caucus was also criticized for treating stakeholders unequally in the process. Individuals felt more consideration was given to some views than others. Interest groups were criticized for massive mail campaigns and "stacking meetings." Commentors believed these approaches contributed little to the debate beyond generating more paper. Other commentors said there was inadequate input from experienced technical people in the field, which cast doubts on the conclusions drawn in the document and at the hearings. Some people expressed frustration with scheduling or logistical problems with the meetings or the meeting locations.

ISSUE 12-003 The Federal Caucus did not allow the public adequate time to comment.

Some people expressed concern about the magnitude of the issues discussed in the All-H Paper and the limited time given the public to absorb and comment on those issues. They commented that the public and researchers were unfairly disadvantaged by the timeframes for comment and expressed concern that the limited time prevented meaningful consideration of the issues and could lead to rash conclusions and implementation plans.

13 RELATIONSHIP TO COE EIS, JOHN DAY, BPA EIS, ICBEMP, ETC.

ISSUE 13-001 Relationship to COE EIS, COE John Day Study, BPA EIS, ICBEMP, and other basin initiatives.

Some people commented on issues outside the All-H Paper, mostly related to specific options, recommendations, methodologies, and scope of the COE' EIS on the four Lower Snake River dams and its John Day drawdown study. Many of the comments received on the COE' EIS were also relevant to the All-H Paper, particularly those related to dam breaching. Some comments addressed issues outside the All-H content, such as specific alternatives or recommendations for a preferred alternative in the COE Lower Snake River FR/EIS.

ISSUE 13-003 The Columbia Basin Project, managed by the Bureau of Reclamation, needs to be a contributor to the water augmentation program.

The NMFS has proposed changes affecting both Lake Roosevelt and Banks Lake. One commentary has suggested that it is not appropriate to impact one fish and wildlife resource to the benefit of another. A formal consultation between the NMFS and the Bureau of Reclamation to determine water needs of the Columbia Basin Project, and what contribution the project should make to the water augmentation program.

14 COMMENTS PERTAINING TO THE TRIBES (7/17)

ISSUE 14-001 Salmon are an integral part of Native American culture and religion and should be protected.

Many Indians and non-Indians noted that salmon have an essential role in the heritage, traditions, culture and religion of the Columbia basin tribes and should be protected. The commentors believe that the current conditions of the river have had a very negative impact on the quality of life for Tribes. They favor restoration of the fisheries as the most important goal in the Columbia River Basin.

ISSUE 14-002 Federally recognized Indian Tribes hold a right to fish salmon in the Columbia River Basin.

Many people, Indians and non-Indians, feel strongly that Indian fishing rights must be upheld. They expressed the following views:

- Treaties guarantee the rights of Columbia Basin tribes to fish in their usual and accustomed places (as defined in 1855). The United States has an obligation to honor tribal fishing rights, and breaching the dams is the only option that would not violate treaty obligations.

- The economic costs of letting salmon go extinct are huge. Using taxpayer dollars to recover salmon is much better than incurring the huge costs (over $10 billion) of compensating Tribes for violation of treaty rights if the salmon go extinct.

- There should be no further restrictions on Tribal harvest of salmon in the Columbia River Basin. Current restrictions, the commentors believe, have already placed fishing rights in jeopardy. They further noted that Native Americans have voluntarily restricted harvest of some species in the past, and these efforts did not produce any measurable improvement in salmon populations.

ISSUE 14-003 Indian Tribes should have a greater role in developing salmon recovery plans.

Some people commented that tribal hatcheries and other recovery efforts had been successful and should be integrated into salmon recovery plans for the basin. People commented that Tribes ought to be more directly involved in the decisionmaking processes, both with regard to salmon recovery in general and in formal government-to-government negotiations. One commentor noted that the Federal Caucus was in violation of Section 106 of the National Historic Preservation Act because it had not formally consulted with the tribes or the State Historic Preservation Offices regarding potential impacts of the various alternatives considered in the All-H Paper to cultural resources.

ISSUE 14-004 The Tribal environmental ethic provides a model for balancing human and environmental needs in the region.

Many commented that Indian beliefs or ethics regarding protection and sustenance of the earth's resources provide a lesson in balancing the needs of people and salmon in the Northwest. Several commentors praised and credited the Indian environmental ethic for thousands of years of productive fisheries in the Northwest.

ISSUE 14-005 Indian treaties are too old and not relevant to today's environment.

Several commentors questioned the legitimacy of treaties negotiated with Indian tribes over 150 years ago before the development and population boom in the Northwest. The commentors maintain that tribal interests are too prominently represented in decisionmaking and that present conditions ought to provide the basis for negotiations between the Federal government and the tribes.

ISSUE 14-006 **Tribal fishing practices must be modified in order to recover salmon in the basin.**

Many of the persons making this comment suggested a ban on net fishing in the rivers. Others suggested restricting tribal harvest to areas under the dams or restricting their harvest to nonbreeding stock. Some people suggested that Indians were taking more fish than they needed and selling surpluses. These people believe Native American salmon harvest has significantly affected salmon populations and that there can be no salmon recovery without the modification or elimination of tribal salmon harvest in the Columbia Basin.

ISSUE 14-007 **Decisions regarding tribal trust resources are governed by the U.S. Constitution and must be made in a government-to-government setting.**

Commenters stated that Article XI of the Constitution places treaties in a position of supremacy over the laws of the United States. Since the decisions facing the Federal agencies are, to a degree, based on a treaty executed in 1855, they must be made in a way that acknowledges the treaty obligations as controlling law. A Presidential Memorandum, executed by President Clinton, requires government-to-government discussions with tribes on issues that affect tribal trust resources.

ISSUE 14-008

Tribes expressed the desire to redefine "cultural resources" to include natural and other resources that are of religious and cultural value to the tribes.

15 IMPLEMENTATION ISSUES/NEXT STEPS

ISSUE 15-001 A 25-year timeframe is too long.

Commentors suggest that the 25-year period discussed in the draft All-H Paper for achieving recovery is arbitrary, inconsistent with law, and likely to result in further delay of meaningful recovery measures. The goals should be met as soon as possible while minimizing economic harm. Neither the Endangered Species Act nor Federal treaties with the Columbia River Tribes permit such delays and citizens of the region should not be subjected to the large uncertainties caused by inaction. Commentors urged the Federal Caucus to implement known, effective recovery actions at once, given the high risk of imminent extinction for several stock. In addition, the All-H Paper should also discuss the relative cost of delay, including costs for actions extended over time and increased value for those actions that would have immediate benefits.

ISSUE 15-002 The government should focus on how salmon should be saved and not on the debate about whether dams should be removed.

Many people feel that breaching the Lower Snake River dams is not the answer and should only be considered as the last resort because of: (1) the potential negative impact on the regional economy; and (2) the highly uncertain outcomes for salmon survival. Many commentors were not supportive of putting local economies in jeopardy. Many commentors expressed concern that dam removal would address only four of 26 coast-run salmon and steelhead listed under ESA.

ISSUE 15-003 The government must have a specific work plan for habitat improvement.

Although proponents of dam removal are very firm in their position, those who are against breaching the dams are equally vehement. Many commentors have in common is a desire to see salmon habitats protected, restored and maintained. Many opposed to dam removal point to other factors that contribute to salmon decline and feel that measures should be implemented or strengthened in those areas. Dam proponents suggested the following habitat improvements:

- If the dams are removed, the sediment needs to be prevented from affecting the clear stream and not interfering with salmon habitat.
- If the dams are removed, fish ladders should be installed in dams in upper streams in order for returning salmon to spawn.
- All mitigation measures should be used in conjunction with dam removal to ensure the success of salmon population.

Those who are against breaching the dams propose the following actions regarding salmon habitat:

- Habitat protection needs to be measurable and accountable.
- The COE must stop shipping sediment to the manmade islands on the lower Columbia River.
- The COE must ensure that the river system complies with the Clean Water Act.
- Water quality improvement and continual habitat maintenance and restoration have to be enforced.

ISSUE 15-004 The All-H Paper ought to address mitigation strategies for those adversely affected by the proposed solutions for salmon recovery.

Many people commented that the All-H Paper needed to address mitigation for the "losers" in the salmon recovery plan. They suggested there needed to be a better understanding of the consequences of various options as well as some protections for those that would suffer under chosen options during the difficult transition period. Many of these commentors offered specific mitigation measures or strategies they believe need to be considered.

ISSUE 15-005 Financial issues with implementing the All-H alternatives.

Some commentors expressed concern that financial constraints are not addressed. Although the aggressive program and dam breaching alternatives rely heavily upon additional dollars being available in the future and the All-H Paper is silent as to how funding would be secured. For example, the aggressive program contains $750 million to $1.0 billion for reconfiguration activities between 2001 and 2010 (Hydropower Appendix, page 109). The Habitat Appendix, page 104, states that "a total investment of over $3 billion would be required to adequately address habitat needs in the Columbia River Basin through 2015." To the extent the aggressive program requires additional flow and spill as described in the Hydropower Appendix, the document does not address these measures. What the aggressive program will mean to BPA in terms of additional foregone revenue from power production should be discussed. The Federal Caucus needs to recognize that funding is a constrained resource and that the financial burden of recovery measures will in all likelihood rest mainly on the shoulders of Northwest citizens. The avoided-costs figure cited does not include costs associated with Clean Water Act compliance (estimated at approximately $125 million/year) and others that would be required if dams remain in place. Nor do the costs associated with partial dam removal account for reduced impacts that maybe possible with targeted transition investments and mitigation.

16 ISSUES NOT FULLY CONSIDERED/ADDITIONAL INFORMATION

ISSUE 16-001 Need improved dam analyses.

Commentors asked about the size of the historical runs before dam construction and what impact the dams have had on the run numbers. In similar areas without dams and continued pristine conditions, what has happened to runs over time?

ISSUE 16-002 Effect of radioactive pollutants on Hanford spawning beds.

One commentor expressed concern about the leaking of storage containers at the Hanford reservation. This commentor pointed to a June 1999 Spokesman-Review newspaper article that indicated Strontium 90 and chromium are migrating near salmon beds and pose a potential problem to the fish.