VOLUME 3

SAMPLE IMPLEMENTATION ACTIONS, RESEARCH MONITORING AND EVALUATION, AND POLICY AND PLANNING

VOLUME 3

SAMPLE IMPLEMENTATION ACTIONS, RESEARCH MONITORING AND EVALUATION, AND POLICY AND PLANNING

One of the major challenges within the Region has been understanding the interrelationships among the numerous proposed fish and wildlife mitigation and recovery actions. One reason for this difficulty is that these actions are derived from many different regional proposals, each of which has been designed to meet a specific goal. In addition, the lack of an effective tool to illustrate these interrelationships has hampered understanding.

BPA's EIS team has reviewed, analyzed, and sorted many proposed actions, using a structured approach in order to capture and display these interrelationships. The following information is the product of this endeavor. In order to keep track of actions taken for fish and wildlife, this Volume will be periodically updated with new sample implementation actions; research, monitoring, and evaluation proposals; and policy and planning approaches developed throughout the Region.

HOW THE SAMPLE IMPLEMENTATION ACTION TABLES WERE DEVELOPED

First, numerous regional proposals and plans aimed at benefiting the natural environment, specifically fish and wildlife, were compiled and reviewed. The sources are identified in the reference list at the end of this discussion. Next, recommendations from these sources were grouped into three categories: Sample Implementation Actions (SIA); Research, Monitoring, and Evaluation (RM&E); and Policy and Planning (P&P). The EIS team defined SIAs as those activities that could be carried out with the purpose of producing some type of beneficial effect for fish and wildlife. RM&E measures originate from the same sources as the SIAs; however, unlike those actions, these measures could be applied to multiple Policy Directions and are really the preliminary steps required before an action can be developed and implemented. P&P approaches are defined as those initial steps taken in developing RM&E measures or SIAs.

The SIAs were then sorted by compatibility with the five Policy Direction alternatives. Based on the numerous regional proposals and actions on how to best achieve fish and wildlife mitigation and recovery, BPA developed five basic but distinct alternative Policy Directions. These Policy Directions are points on a broad range of potential Policy Directions the Region could follow. These directions, explored in detail in both the draft EIS and this Final EIS, are as follows:

- **Natural Focus**
- **Weak Stock Focus**
- **Sustainable Use Focus**
- **Strong Stock Focus**
- **Commerce Focus**

Chapter 3 (in Volume 1) contains detailed descriptions of each of these, as well as of the baseline Status Quo alternative (i.e., "no action").

Next, the set of proposed SIAs for each alternative Policy Direction, and the RM&Es and P&Ps, were divided into three sections that represent significant areas of concern for the Region:

- the *Fish and Wildlife* Section;
- the *Commerce* Section; and
- the *Tribes* Section.

Finally, the proposed SIAs, RM&Es, and P&Ps were sorted one more time into more specific categories known as Key Issues (see Chapter 3 in Volume 1 for details) within these three sections. These key issues were identified by the Region as being critical for resolution. Several technical specialists assisted in the sorting. The tables that follow contain the SIAs, RM&Es, and P&Ps. BPA recognizes that others might have sorted the actions somewhat differently, but the Tables characterize what the EIS team, after careful consideration, determined to be most appropriate and functional.

SPECIAL NOTES ABOUT THE TABLES

In order to limit repetition among Policy Directions, a "best-fit" approach was taken. SIAs were often placed under one direction, although the action could also be found, though less suitably, under another direction. This sorting was done in order to better illustrate distinctions among the five different Policy Directions as defined in this EIS.

- Since the sample actions and other measures are merely examples, any reference to a specific date should be disregarded. The dates were left in to maintain the integrity of the suggested actions and also to help delineate the time of origin.
- There are many more proposed sample actions under the Weak Stocks Focus and Sustainable Use Focus Policy Directions. This is to be expected, because these two Policy Directions currently represent the areas where most of the regional effort is being concentrated. As would be anticipated, the placing of the proposed actions follows a normal distribution curve, with more actions associated with the middle alternative Policy Directions and fewer actions in what can be perceived as the more extreme alternative Policy Directions.
- Where regional proposals did not address a particular action area, the EIS Team has supplied sample actions to give the reader a more comprehensive view of each Policy Direction. These are marked "Sample Action." All other actions in the tables are identified by the name of the process or document from which they came, for example: *Tribal Vision, Governors' Recommendations,* or *Final All-H Paper Dec. 2000*. (See the list of references below.)
- The actions found in these pages are examples only and do not necessarily represent all specific possibilities, nor do they represent the position, an implied endorsement, or commitment by the BPA.

- The inclusion of a specific SIA, RM&E, or P&P in the following tables does not make it an action proposed for implementation by BPA. The tables are meant to show the types of implementation actions that could be taken by one or more entities in the Region under a given Policy Direction. Inclusion in the tables does not in any way create any responsibility on anyone to implement the actions.

APPLICATION OF SAMPLE IMPLEMENTATION ACTIONS

BPA recognizes that its selection of a Policy Direction may guide only its own fish and wildlife mitigation and recovery efforts. Other stakeholders in the Region have the flexibility and freedom to support fish and wildlife mitigation and recovery efforts in a manner appropriate to their particular circumstances. If all regional stakeholders choose to follow a consistent Policy Direction by active choice, each agency—Federal, state, tribal, commercial entity, and private citizen will decide how (or whether) to implement the sample implementation actions of that Policy Direction within their respective jurisdiction(s) and authorit(ies). In addition to the sample actions identified in this EIS, regional stakeholders could implement other actions that are developed, so long as they are consistent with the regionally chosen Policy Direction.

If regional policy continues to develop as it has in the past, by default, it is not likely that regional stakeholders would implement an agreed upon Policy Direction. Instead, it is likely that various actions from across all of the Policy Directions would be implemented, with some stakeholders choosing to implement actions from one Policy Direction and other stakeholders implementing actions from another Policy Direction. The Region runs the risk of having the implementation actions conflicting with, rather than complementing, each other.

Under either scenario, others may use this EIS to assess the environmental consequences of their actions. Some may even adopt the EIS to satisfy their own environmental review requirements. In addition, BPA and other decisionmakers can choose to implement their respective sample implementation actions on a *voluntary* basis, through *incentives*, or through *regulation*.

HOW TO READ THE TABLES IN THIS SECTION

The sample implementation action tables are made up of two main components—the Policy Direction, and the sample implementing actions consistent with the theme or basis for that Policy Direction. The implementation actions are grouped by the Key Regional Issues that were identified in Table 3.1-1 of Volume 1, to help the reader better understand and find the types of actions that might be taken in a particular area. Figure V3-1 illustrates this breakdown of the components.

It is important to recall the Status Quo.

- **Status Quo** represents a continuation of a Policy Direction that comprises the uncoordinated implementation actions the Region was following prior to 2002.

Figure V3-1: Integration of Policy Directions and Sample Implementation Actions

Policy Direction
(Policy Direction title and theme)

SAMPLE IMPLEMENTATION ACTIONS

FOR THE

NATURAL FOCUS POLICY DIRECTION

Emphasizes *removing the past major human interventions* in the ecosystem and allowing the existing fish and wildlife to return to a natural balance without further major human intervention *(let nature heal itself)*.

Sample Implementation Actions
(Includes Key Issues and examples of the types of actions for each issue)

FISH & WILDLIFE

1 HABITAT

Humans would have less control of the system in this alternative (Framework Alternative 1). Options must focus on recreating key natural ecosystem components within which…fish evolved and prospered, not focus on attempting to circumvent natural ecosystem processes (Framework Concept Paper 9). Effort and money…would be redirected toward changing the ecosystem back toward the condition it was in prior to large-scale human development (Framework Alternative 1). The ecosystem is able to achieve conditions consistent with native fish and wildlife with a minimum of external support (Draft Framework Alternative 1).

Restore as many areas as possible through natural means (Framework Alternative 1). Phase out use of artificial means of salmon recovery, such as barging and hatcheries, as habitat is restored (Framework Alternative 1). Restore the ecosystem to a much more natural state by eliminating dams, hatcheries and other artificial constraints and approaches (Framework Alternative 1). Restore natural processes throughout entire watershed and ecosystem. Identify, protect and connect aquatic refuges and reserves (Framework Concept Paper 1).

The first step towards mitigation involves looking at a list of activities in the local area that are linked to degradation of the ecosystem. Once these activities are listed, we can begin to look at what type of changes we can make that are realistic. The key to this step is working within social and economic structures (which incorporate ecosystem value) to choose how a certain activity can be altered. By examining these activities outside a 'cause and effect context,' *[support]* the notion that we are not able to predict individual and cumulative effects upon the surrogate measures, but acknowledging that some type of pathway of influence exists (Framework Concept Paper 16).

Humans are just beginning to realize how complex the interconnections in the ecosystem really are. What we do know is that our present society recognizes that our ecosystem has been thrown off balance. Those living in the Columbia Basin have identified salmon recovery to be of utmost priority and concern. It has been said that the first step to solving a problem is acknowledging it exists. A proactive strategy that stresses prevention followed by mitigation is an effective tool that can be used to help our troubled ecosystem. The challenge lies in making sure the situation does not get worse, and moving from there to make it better (Framework Concept Paper 16).

Maintain and restore the natural ecosystem that includes all naturally producing indigenous species, and their habitats (Framework Concept Paper 4). Increase habitat connections throughout the basin (Framework Alternative 5). Where designated lands identified in the habitat assessment are already publicly owned, implement management practices that ensure that those lands function naturally (LCREP). Restore vegetative patches, patterns, structure and species composition to be more consistent with the landform, climate and biological and physical characteristics of the ecosystem (ICBSDEIS, R-O2). Maintain habitats by permitting natural forces, including disturbance events such as fire, to continue whenever these processes will contribute to long-term sustainability of habitat (ICBSDEIS, T-O2).

Establish riparian and upland area conditions that provide the full set of functions needed to maintain water and habitat quality that will support native aquatic species, achieved mainly through natural regenerative processes (Draft All-H paper Dec. 1999). Establish riparian reserves to protect vegetation and soils (Spirit of the Salmon). Set aside the Hanford Reach as an ecological preserve (Framework Alternative 5). Adhere to and enforce existing habitat laws, regulation (including water quality, screening, fish passage, etc); strengthen where needed. Develop incentives and cost sharing programs (Tribal Vision).

[W]e prefer to benefit salmon through strategies and actions that emphasize and build upon natural processes. While we recognize this may not always be feasible, we think it is an important policy decision that will, in turn, clarify the region's choice of strategies and allow us to make most effective use of our finite financial resources (Governors' Recommendations, July 2000).

Restoration efforts must focus on restoring habitats and developing ecosystem conditions and functions that will allow for expanding and maintaining a diversity within, and among, species in order to sustain a system of robust populations in the face of environmental variation (Council's 2000 Fish and Wildlife Program).

Even in degraded or altered environments, native species in native habitats provide the best starting point and direction for needed biological conditions in most cases. Where a species native to that particular habitat cannot be restored, then another species native to the Columbia River Basin should be used (Council's 2000 Fish and Wildlife Program).

[The following] fundamental principles will be the basis…for the measures used to characterize the Columbia Basin ecosystem and its interrelated parts and to evaluate ecosystem changes that may result from various strategies and actions: 1) The abundance and productivity of fish and wildlife reflect the conditions they experience in their ecosystem over the course of their lifecycle; 2) Natural ecosystems are dynamic, evolutionary, and resilient; 3) Ecosystems are structured hierarchically; 4) Ecosystems are defined relative to specific communities of plant and animal species; 5) Biological diversity accommodates environmental variation; 6) Ecosystems develop primarily through natural processes. *7)* Ecological management is adaptive and experimental; and 7) Human actions can be key factors

The Status Quo Policy Direction provides the *baseline* for comparing any future Policy Directions and gives readers and decisionmakers a common basis for comparing potential Policy Directions over time.

The types of actions displayed in the Fish and Wildlife section tend to be implemented by government agencies with jurisdiction over habitat, harvest, hatcheries, and hydropower. Actions that appear in the Commerce section are focused on changes in economic activity that could be implemented or funded by commercial entities, or other related entities, to support the fish and wildlife mitigation and recovery measures listed in the Fish and Wildlife sections. Actions in the Tribal section are focused on changes that might be made in harvest and hatchery practices, or in habitat located on tribal lands, to support fish and wildlife mitigation and recovery measures listed in the Fish and Wildlife sections.

The following is a list of the sources used for the sample implementation actions.

REFERENCE FOUND IN 3A TABLE	REFERENCE FULL TITLE
_/_/01 letter from _____ to the Federal Caucus [or BPA], 5YIP	**Endangered Species Act Implementation Plan for the Federal Columbia River Power System**. Public Comment Letters. USDOI/ Bureau, Corps, and BPA. [known as 5-Year Implementation Plan]. Summer 2001.
BPA Appendix D: Action Table and Reports, June 5, 2001	**Appendices D and E.** 5-Year Implementation Plan in previous reference.
Columbia River Conference IV	**Columbia River Conference IV.** Stevenson, Washington, March 16 & 17, 2000.
Council's Artificial Production Review	**Artificial Production Review Report and Recommendations**. Northwest Power Planning Council, Document 99-15, October 13, 1999.
Council's 2000 Fish and Wildlife Program	**2000 Columbia River Basin Fish and Wildlife Program.** Northwest Power Planning Council. Document 2000-19.
Draft All-H Paper Dec. 1999	**Conservation of Columbia Basin Fish: Building a Conceptual Recovery Plan (Conceptual Plan)**. Federal Caucus. [formerly known as Draft "All H" Paper]. December 1999.
Draft All-H Paper Habitat Option 2, Dec. 1999	**Appendices for Habitat, Harvest, Hatcheries, and Hydro.** See previous reference for All-H Paper.
Final All-H Paper Dec. 2000	**Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy (Basinwide Strategy).** Federal Caucus. December, 2000b.
Draft Biological Opinion, July 2000	**Biological Opinion: Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin**. National Marine Fisheries Service (NMFS), NW Fish Science Center. Seattle, WA. July 27, 2000.
Framework Concept Paper _	**Framework Concept Papers 1-28**. Northwest Power Planning Council, November 1998. (See Appendix D of this FWIP EIS for summary of letters.)
FWS Biological Opinion Dec. 2000	**Operation of the Federal Columbia River Power System. Biological Opinion**. USDOI/USFWS. December 20, 2000.

REFERENCE FOUND IN 3A TABLE	REFERENCE FULL TITLE
Governors' Recommendations July 2000	**Recommendation for the Protection and Restoration of Fish in the Columbia River Basin**. Governors, Pacific Northwest States. July 2000.
Human Effects Analysis Appendix D	**Human Effects Analysis of the Multi-species Framework Alternatives: Appendix D**. Phase II Final Report. Northwest Power Planning Council. Report No. 2000-5. February 2000.
ICBEMP FEIS	**Interior Columbia Basin Ecosystem Management Project Final Environmental Impact Statement.** USDA/USFS and USDOI/BLM. December 2000.
ICBSDEIS Alternative S_ ICBSDEIS, B-___	**Interior Columbia Basin Supplemental Draft Environmental Impact Statement**. USDA/USFS and USDOI/BLM. March 2000.
Idaho Plan 1998	**Idaho's Anadromous Fish Stocks: Their Status and Recovery Options Report to the Director**. Idaho Department of Fish and Game (IDFG). 600 S. Walnut, Boise, ID 83707. IDFG 98-13. May 1, 1998.
LCREP Summary LCREP	**Lower Columbia River Estuary Program, Comprehensive Conservation and Management Plan**. Supported by the States of Oregon and Washington and the U.S. Environmental Protection Agency. June 1999.
Comment FWIP-___	**BPA Fish and Wildlife Implementation Plan Draft EIS**. Public comment letters in Appendix K of this EIS. May 2001.
NMFS Biological Opinion 2000 Action Table Dec. 2000	**Effects to Listed Species from Operation of the Federal Columbia River Power System: Action Table**. Biological Opinion. USDOI/USFWS. December 20, 2000.
Oregon Plan	**The Oregon Plan: Executive Summary Overview.** Executive Order No. EO 99-01; The Oregon Plan for Salmon and Watersheds. Final Plan, March 1997.
Framework Alternative __	**The Year of the Decision, Renewing the Northwest Power Planning Council's Fish and Wildlife Program: Alternatives 1-7.** Northwest Power Planning Council published seven multi-species recovery alternatives. February 2000.
PM ___	**BPA Fish and Wildlife Implementation Plan Draft EIS: Public Meeting**. Public comment and information meetings. Summary in Appendix K of this EIS. June-September 2001.
Rand Report 2002	**Generating Electric Power in the Pacific Northwest – Implications of Alternative Technologies.** Christopher G. Pernin, Mark A. Bernstein, Andrea Mejia, Howard Shih, Fred Rueter, Wilbur Steger. This report was conducted by RAND Science and Technology for the Pew Charitable Trusts. Santa Monica, CA. September 2002.
RFU 1999	**The Pulp Pollution Primer**. Delores Broten and Jay Ritchlin. Reach for Unbleached! Foundation. Vancouver, BC, Canada. October 5, 1999.
SOR FEIS	**Final Columbia River System Operation Review Environmental Impact Statement.** USDOE/BPA; Corps, and BOR. DOE/EIS-0170. November 1995.

REFERENCE FOUND IN 3A TABLE	REFERENCE FULL TITLE
Spirit of the Salmon	**Spirit of the Salmon (Wy-Kan-Ush-Mi Wa-Kish-Wit), The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes.** CRITFC (Columbia River Inter-Tribal Fish Commission). 1996.
The Lower Snake River Juvenile Salmon Migration Feasibility Report/ Environmental Impact Statement Executive Summary	**Final Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.** Corps, Walla Walla District, Walla Walla, WA. February 2002.
Tribal Vision	**CRITFC (Columbia River Inter-Tribal Fish Commission).** Tribal Vision: The Tribal Vision for the Future of the Columbia River Basin and How to Achieve It. July 15, 1999.
Washington Plan	**Statewide Strategy to Recover Salmon.** State of Washington. Washington State Joint Natural Resources Cabinet. September 21, 1999.
ACSH	**Climate Policies Present Investment Risks, Opportunities: ACSH.** Martin Whittaker. 2001.
Fiber Futures	**Promoting Innovative Fiber Products from Nonwood and Recycled Sources.** Future Fibers. San Francisco, CA. 2002.
NRCS	**Programs of the Natural Resources Conservation Service.** US Department of Agriculture. *Last visited 11/25/02.* http://www.nrcs.usda.gov/NRCSProg.html
NW Forest Plan ROD	**Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.** USDA/USFS and USDOI/BLM. April 1994.
Gordon Burns Comment	**Pipes could safely guide young salmon**. Associated Press. Comment by Gordon Burns. *Last visited 11/25/02*. http://www.kgw.com/environment/stories/kgw_1125_env_salmon_dam.3fee86cf.html
e.g., *Deconstruction – Building Disassembly and Material Salvage: The Riverdale Case Study*. Peter Yost and Eric Lund, Upper Marlboro, MD: NAHB Research Center 1997	**Deconstruction—Building Disassembly and Material Salvage: The Riverdale Case Study.** US EPA. June 1997.
Hawken	**The Ecology of Commerce.** Paul Hawken. 1993.
World Business Council for Sustainable Development	**Eco-efficiency.** World Business Council for Sustainable Development: South Africa. On-line 2002.
Pete Morton	**The Economic Benefits of Wilderness**. The Wilderness Society. 1999.
INFISH/PACFISH EAs	**Inland Native Fish Strategy.** USDA Forest Service. 1995 **Decision Notice/Decision Record, Finding of No Significant Impact, and Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds.** USDA Forest Service and USDOI Bureau of Land Management. 1995.
INFISH BiOp August 1998 PACFISH BiOp June 1998	**Biological Opinion for the effects to bull trout from continued implementation of land and resource management plans.** USDOI Fish and Wildlife Service. 1998.

REFERENCE FOUND IN 3A TABLE	REFERENCE FULL TITLE
Western Governors' Association	**A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan.** Western Governors' Association. 2002.
Idaho DFG	**Idaho Game Fisheries.** Idaho Department of Fish and Game. Compiled by Jacqueline Harvey. 1999.
RTO West	**Regional Transmission Organizations, Final Rule.** Federal Energy Regulatory Commission. 1999.
Schaerer Thoreau Institute	**Incentives for Species.** Brett Schaerer, Thoreau Institute. 1996.
State Lands Thoreau Institute	**State Lands and Resources: Conclusions and Recommendations.** Different Drummer Magazine. O'Toole. Thoreau Institute. 1998.
Range Thoreau Institute	**Concept Paper—Redefining Range/Grassland Management on the Public Lands.** Thoreau Institute. Last accessed online December 2002.
Testimony Thoreau Institute	**Testimony of Randal O'Toole on Federal Forest Management and Ownership before the Forests and Public Land Management Subcommittee Senate Energy and Natural Resources Committee.** November 1995.
BLM Thoreau Institute	**Recreation Fee Demo Project: You Play, You Pay (from Inside the Bureau of Land Management).** Karyn Moskowitz.
Dan Fagin	**Serious Fun.** Long Island Newsday. 1999.
Corp VARQ EA/FONSI	**Upper Columbia Alternative Flood control and Fish Operations Interim Implementation; Libby and Hungry Horse Dams; Montana, Idaho and Washington; Final Environmental Assessment, December, 2000.** Appendix G Finding of No Significant Impact. U.S. Army Corp of Engineers.
BOR VARQ EA/FONSI	**Voluntary Environmental Assessment, FONSI 02-02. Interim Operation of the VARQ Flood Control Plan At Hungry Horse Dam, MT.** March, 2002. Bureau of Reclamation.

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
STATUS QUO POLICY DIRECTION

Uses human intervention to mitigate the perceived problems facing fish and wildlife populations and to aid their recovery, with no unified or single regional plan. Independent strategies, multiple plans, different and sometimes conflicting goals, multiple governmental actions, and unclear expectations tend to result in a complicated and confusing mixture of many policy themes.

FISH & WILDLIFE

1 HABITAT

Under the Northwest Power Act, Bonneville is required to protect, mitigate and enhance the fish and wildlife affected by the development and operation of the Federal hydropower projects on the Columbia River and its tributaries. The agency is obligated to provide treatment for fish and wildlife that is equitable with other project purposes. Bonneville must take into account, to the extent fully practicable, the Fish and Wildlife Program that the Northwest Power Planning Council adopts and recommends. Tribal, state, and Federal fish and wildlife resources agencies, local governments, universities, watershed councils, and individuals recommend the Fish and Wildlife Program actions.

The budget for the Program (about $127 million annually) is divided into three general categories: anadromous fish projects (approximately 70 percent of the budget); resident fish and wildlife projects (about 15 percent of the annual budget); and anadromous fish habitat work (about 15 percent of the budget).

Projects funded by the Program address the array of possible mitigation actions, including:

- Research projects, marking and tagging projects, monitoring and evaluation projects, and projects that develop new technology useful for monitoring and evaluation.
- A wide array of habitat improvement projects, including screening water diversions, replacing temporary irrigation dams with alternative fish friendly structures, fencing projects, water development projects, vegetative plantings and plant control, and environmental monitoring and evaluation projects.
- Land and water acquisitions, conservation easements, mainstem passage improvements, predator control actions, facilities' construction and operations and maintenance (O&M) actions, and watershed coordination.
- Special provisions are applied for the protection and management of critical habitat supporting species listed under the ESA.
- Enforcement of existing laws that provide for the protection of fish and wildlife and their habitat.

While different Federal agencies administer different lands, and Federal lands are subject to multiple mandates and demands, the fact that they are owned by a single entity means that Federal lands can be more amenable to integrated habitat management. Particularly since 1993, when the Northwest Forest Plan was adopted, Federal agencies have taken important steps toward a common vision of land management. Habitat management increasingly addresses landscape- and watershed-level approaches that address broad ecosystem issues in the Basin, including the decline of salmon and other species; poor forest health leading to catastrophic fires; and the expansion of noxious weeds on degraded rangelands.

The tribal viewpoint encompasses the need to take actions that restore habitat to levels that support not only de-listing of species under the ESA, but also the maintenance of sustainable, harvestable fish runs and wildlife throughout widespread areas of the basin.

Continue protection of habitat that is already protected by local laws, such as water quality standards, discharge permits, fish and wildlife passage requirements, etc. (Framework Concept Paper 4).

- On non-Federal lands, there are a number of Federal and state programs that either regulate activities or are aimed at restoring habitat. There are also Federal and state programs that provide incentives, particularly funding and technical assistance, to help land and water users protect and restore aquatic and terrestrial habitat.

1-1 Anadromous Fish
The ESA and Federal land and resource management plans infer limited road building, grazing restrictions, and more protective stream buffers. Anadromous fish habitat restoration is based on pilot projects and political priorities. Current mitigation programs provide fish primarily for harvest. The ESA provides protections for listed stocks.
1-2 Resident Fish
Resident fish habitat receives lower priority than anadromous fish habitat. The focus is on mitigating for fish losses in areas around and above water storage projects. Sturgeon are a major focus.
1-3 Introduced Species
Resident fish above blockages are often introduced (rather than native) species. Habitat programs focus on opening up access (e.g., culverts), fencing, riparian, and streambed work to promote native species; and actions to reduce non-native predators.
1-4 Wildlife
Effects on wildlife from dam development are mitigated through land purchases and dedications, wildlife trusts, and land acquisitions to establish preserves. Mitigation agreements with states and tribes aim to replace inundated wildlife habitats.
1-5 Predators of Anadromous Fish
Programs aim to reduce non-native predators of anadromous fish. For example, the Northern Pikeminnow Management Program was designed to substantially reduce predation losses of juvenile outmigrants—Northern pikeminnow harvest fisheries have been employed since 1990. Also, terns that feed on anadromous fish are controlled (e.g., at Rice Island).
1-6 Watersheds
Currently, watershed approaches to habitat management are being funded by BPA and used throughout the Columbia Basin to implement the Fish and Wildlife Program. In many cases, the Natural Resources Conservation Service through its county offices is facilitating these efforts with participation from the states of Oregon, Washington, and Idaho, and the tribes. The focus is moving from piecemeal approaches to whole watersheds, with projects tested on a pilot basis by watershed.
1-7 Tributaries
Habitat projects on tributaries address anadromous fish, resident fish, and wildlife. Below blockages, the focus is on anadromous fish; above blockages, the focus is on resident fish. The selection process for tributary habitat actions generally lacks a prioritization component.
1-8 Mainstem Columbia
Habitat actions on the mainstem focus on migration corridors, with little attention to habitat structure.
1-9 Reservoirs
Two flow management strategies are used for reservoir operations: limit the winter and spring drafts of storage reservoirs to increase spring flows and the probability of full reservoirs at the beginning of summer; and draft from storage reservoirs during the summer to increase summer flows.
1-10 Estuary and Ocean
Estuarine and ocean habitat currently receives little or no emphasis. Dredging to deepen the Columbia River navigation channel is planned. Selected actions are conducted in estuary habitat to reduce imminent risks and improve survival of listed stocks (e.g., Rice Island measures).
1-11 Water Quality
Habitat measures to address water quality focus on Federal projects in the mainstem, primarily total dissolved gas (nitrogen supersaturation) and water temperature issues.

2 HARVEST

2-1 Anadromous Fish

Anadromous fish harvest restrictions vary for ocean and in-river fisheries. Ocean fisheries are governed by U.S. and Canadian regulations, and the Pacific Salmon Treaty (PST). The PST is a 10-year agreement that implements an abundance-based (rather than quota-based) ocean harvest regime for chinook and coho salmon. The regime is moving from a catch-based to escapement-based harvest management strategy. The agreement places special emphasis on further restrictions for fisheries that incidentally harvest weak stocks, and on getting the required number of fish onto the spawning grounds. The two primary principles of the treaty are fish conservation and equity (harvest sharing). Ocean fisheries have been greatly curtailed—increasingly restrictive regulations, shortened seasons, area closures, special gear regulations, license moratoria, and buyout of fishing fleets have all occurred to limit harvests. Also, the PST establishes funds to pay for commercial salmon fleet reduction and fisheries knowledge improvement.

In-river commercial fisheries include the non-Indian gillnet fishery below Bonneville Dam, and the treaty Indian gillnet fishery above Bonneville Dam and McNary Dam. Freshwater sport fisheries operate in the mainstem and in tributaries throughout Oregon, Washington and Idaho (run sizes permitting). And Tribal subsistence and ceremonial fisheries are conducted in the mainstem and in some tributaries as well (run sizes permitting).

Incidental harvest of listed stocks occurs inadvertently. The amount of incidental harvest varies by geographic area and species. Fishing in mixed stock areas would continue to be constrained by natural stocks present in the fishery and harvest allocation requirements. The current harvest management trend, accelerated by ESA listings, is to reduce harvest rates in mixed stock areas in favor of harvest in fisheries closer to the rivers of origin where the stocks can be segregated and more selectively caught. Large mixed-stock fisheries that once were managed to maximize catch are now managed to reflect the productive capability and conservation needs of naturally spawning fish and to achieve allocation objectives to river-of-origin fisheries. Management techniques such as time, area, and gear management would be used to ensure greater harvest selectivity. New mass marking technologies that make it possible to identify and selectively harvest hatchery fish, even in mixed stock areas, would continue to be developed and employed.

For many species of Columbia River salmon, harvest allocation between non-Indian and treaty Indians is subject to continuing jurisdiction of the Federal courts under *United States v. Orego*n and *United States v. Washington.* Under those cases, certain tribes are entitled to a fair share (50%) of the harvestable fish. The central issues in both of these long-standing cases deal with state regulation of treaty Indian fishing (primarily involving harvest allocation), and legal standards for conservation and management. The parties to *U.S. v. Oregon* are presently negotiating harvest and hatchery programs in hopes of developing a management plan that addresses conservation under the ESA while meeting trust obligations to the tribes.

Fisheries law enforcement in sport and commercial fisheries is conducted by the states and the United States acting through the Coast Guard, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Tribal fisheries enforcement is implemented by the respective tribes and cooperatively through the Columbia River Inter-tribal Fisheries Enforcement Office.

2-2 Resident Fish

Resident fish are managed by the states for sport and maintenance of species. Some species also are managed by Indian tribes for subsistence. Federally-listed species, such as bull trout, receive special protection.

2-3 Wildlife

Wildlife are managed by the states for sport and maintenance of hunted species; and some species are managed by Indian tribes for subsistence, ceremonial and cultural purposes. Federally-listed wildlife species receive special protection.

3 HATCHERIES

There are more than 150 hatcheries and associated facilities for anadromous and resident fish in the basin. Federal and state agencies, Indian tribes and private interests operate them. Many are intended to mitigate the impact of dams, which have blocked access to about one-third of the salmon and steelhead habitat that existed historically in the Columbia basin. Resident fish hatcheries, like salmon and steelhead hatcheries, mitigate

losses caused by the hydropower system. In some cases, such as in areas blocked by dams, losses of anadromous species are mitigated through the production of resident species, which may include native and nonnative species adapted to the altered environment. Artificial production programs produce the majority of salmon and steelhead that annually return to the Columbia River, and significant amount of resident trout and other resident fish. Most of the artificial production programs in the Columbia River Basin are financed with Federal money in some way.

The emphasis of the hatchery programs is on a coordinated habitat restoration/production program in which artificial production efforts are tied to habitat improvements. Hatcheries focus on: mitigation for fish losses associated with hydrosystem construction and operation; improvement of the quality and survival of hatchery fish produced and released; conserving genetic resources; and testing new methods to enable use of hatcheries in ESA recovery efforts.

3-1 Anadromous Fish

The majority of the funds spent under the Mitchell Act have been used to mitigate for the salmon and steelhead losses that occurred throughout the river by developing hatchery production in the lower Columbia. Mitchell Act facilities are largely concentrated in the lower Columbia below Bonneville Dam (16 facilities) or in the Bonneville Dam pool area (7 facilities). Cutbacks in Congressional appropriations have been largely responsible for the reduction in total production. Production to preserve lower-river and ocean harvest opportunities has been the main focus of the Mitchell Act program. Two facilities are located in the mid-Columbia area upstream of the confluence with the Snake River.

In the Water Resources Development Act of 1976, Congress authorized funding for a program to mitigate for fish and wildlife losses caused by construction and operation of the four lower Snake River hydroelectric projects (Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams), known as the Lower Snake River Compensation Plan (LSRCP). Three recently completed fall chinook facilities on the Snake and Clearwater rivers (Pittsburg Landing, Big Canyon, Capt. John's Rapids), although part of the LSRCP program, have operations and evaluation costs directly funded by Bonneville Power Administration. The purpose of the LSRCP has been to replace lost salmon, steelhead and trout fishing opportunities, with management goals focused on replacing the loss of returning adult steelhead and salmon, rather than on releasing a given number of smolts.

Separate from the LSRCP is a production program to mitigate for steelhead and resident trout losses caused by the construction of Dworshak Dam, blocking the North Fork Clearwater River in Idaho. For this purpose, the Corps of Engineers funded the construction of the Dworshak National Fish Hatchery and the USFWS receives funds via the Corps to operate the facility, all reimbursed by Bonneville (the Dworshak hatchery also produces spring chinook as part of the LSRCP). The primary goal of fishery mitigation at Dworshak has been to artificially preserve the North Fork steelhead run.

Authorized in 1966 and operational by 1978, the Warm Springs National Fish Hatchery is located on the Warm Springs River in Oregon and funded and operated by the U.S. Fish and Wildlife Service. This is one of the few federally funded anadromous production facilities in the basin outside of the Mitchell Act facilities that are not directly or by reimbursement funded by Bonneville.

Anadromous fish mitigation for dams on tributaries on the Willamette River is provided by the Leaburg, McKenzie, Marion Forks, South Santiam, and Willamette hatcheries. The Oregon Department of Fish and Wildlife operates the hatcheries under a cooperative agreement with the Corps, and the Corps provides a majority of the funding while the State of Oregon also provides a substantial portion of the funds. The Bonneville Power Administration reimburses the Corps funded portion.

In addition to federally funded production programs, privately owned and public electric utilities produce millions more fish as mitigation for the impacts of their FERC-licensed dams.

State fish and wildlife agencies and tribes operate many of the federally financed production facilities. They also operate most of the production facilities associated with FERC-licensed projects. But the state agencies also operate hatcheries in the basin that are not federally funded or linked to FERC-licensed projects, projects funded by the states themselves and developed primarily to address declining fisheries.

3-2 Resident Fish

Hatcheries continue to produce significant numbers of native and non-native resident fish species. Frequently, resident fish species are substituted for anadromous species in aquatic areas blocked by hydro or other development. Special hatchery provisions are used to address species listed for protection under the ESA.

4 HYDRO

4-1 Dam Modifications and Facilities

Existing dams and hydro facilities remain in place. Ongoing improvements to the hydro system would continue, with roughly the existing annual level of investment continuing into the future. Improvements address concerns for fish passage and water quality targets of the Federal Clean Water Act. Fish passage efforts emphasize year-to-year planning and project implementation to improve passage at eight mainstem dams via structural modifications, more or improved spillway flow deflectors, turbine improvements, adult fish attraction modifications, new trash booms, modifications to fish separators, added cylindrical dewatering screens, and juvenile fish bypass systems including new fish barges.

Major additional structural modifications under consideration include:

- Modifying adult ladder entrances and exits to improve adult passage survival.
- Installing juvenile bypasses at all major dams with high fish mortality rates.
- Installing fish screens at dams and over irrigation diversion outlets.
- Developing fish byways to divert and rejoin rivers.
- Constructing a smolt canal paralleling the Snake and Columbia Rivers from the mouth of the Clearwater to just below Bonneville Dam.
- Developing new facilities and equipment to improve the juvenile fish transportation program.
- Installing locks at additional dams to expand the navigation system.
- Modifying recreational facilities to allow their use over a wider range of operating conditions.

There are no fish passage facilities specifically designed for bull trout. As a result, it is unknown if the existing fishways at the Lower Snake or Columbia River Dams are suitable for bull trout. There are no fish passage facilities at Albeni Falls Dam at the outlet of Lake Pend Oreille.

4-2 Hydro Operation

The Federal hydro system is operated to serve an array of individual project and system purposes, including power generation, flood control, navigation, irrigation, recreation, fish and wildlife and other purposes defined by Congressional authorizations. System-wide purposes focus on supplying electrical energy to meet existing and projected loads, flood control, and more recently, salmon recovery. Current hydro operations reflect recommendations of Biological Opinions to promote recovery of listed fish stocks. Measurable performance standards are being developed to guide future system improvements.

Water is managed per the 1995 Water Budget, as well as additional water for flow augmentation to benefit the anadromous fish migration. The additional water is stored in Grand Coulee, Libby, and Arrow, and provided on a sliding scale tied to runoff forecasts. Flow targets are established at Lower Granite and McNary.

Since 1991, special flow operations for Kootenai River white sturgeon spawning and egg incubation have been in effect at Libby Dam project from April 1 through early July. In recent years, operating guidelines developed by the USFWS have specified that discharges from Libby Dam not be fluctuated for electrical load following purposes.

A selective water withdrawal system at Libby Dam provides temperature control to protect cold-water fish such as bull trout in the Kootenai River. The USFWS has specified special rates for reducing flow in the Kootenai River downstream from Libby Dam following flow augmentation for sturgeon spawning and incubation. Temporary flow-ramping rates and stable flows are established when necessary to minimize stranding and desiccation of bull trout and other aquatic life along the river edges. The USFWS also requested that steady flows of 8,000 cfs be maintained between the end of the sturgeon flows and the start of augmentation flows for salmon. The present strategy for improving bull trout habitat conditions includes maintaining steady summer streamflows and reducing short-term flow fluctuations downstream from both Libby and Hungry Horse Dams.

Presently, there are no specific measures designed to improve conditions for burbot migrations or spawning,

nor are there any specific operations or structural measures in place to improve conditions for white sturgeon in the Lower Snake or Columbia Rivers, or westslope cutthroat.

4-3 Spill

Voluntary spill has been used as an interim passage strategy for anadromous fish since the late 1970s, pending development of more effective alternatives. Spill is an action provided to reduce turbine-related mortality of juvenile salmon and steelhead at lower Snake and Columbia River hydroelectric projects. Currently, voluntary spill for fish passage is provided at each of the eight Federal mainstem dams in the spring, up to interim dissolved-gas limits established by the States of Oregon and Washington. Fish spill is provided at Bonneville, The Dalles, and Ice Harbor Dams for 24 hours/day, and for 12 hours/day at John Day, McNary, Lower Monumental, Little Goose, and Lower Granite Dams.

When the falling water plunges into the water below, air can be entrained and dissolved under pressure, thus raising dissolved gases. This can form bubbles in fish, which may result in injury or death. The amount of spill is at the levels recommended in Biological Opinions, assuming that waivers are obtained from the states of Oregon and Washington to exceed their 110% TDG state water quality standards. Federal agencies would continue to provide spill for fish passage, but not to exceed TDG levels allowed under the standard. Both structural and operational measures (e.g., flow detectors) have been employed to reduce dissolved gas supersaturation levels during periods of spill. Other measures are also employed to manage dissolved gas and additional measures are under development for potential future consideration.

4-4 Flow

Current flow programs, with some protection for upstream reservoirs, would continue. Flow augmentation, or use of water from storage reservoirs to augment natural streamflows, is one of the primary strategies to mitigate the effects of impoundments and the regulated hydrograph on juvenile passage. The general concept of flow augmentation is to increase flows and water velocities when most juvenile migrants are present. Water from key storage reservoirs – Grand Coulee, Dworshak, Hungry Horse, Libby, Snake River reservoirs, and Canadian reservoirs – is used to augment natural flows to meet these targets, to the extent possible. The probability of meeting these targets varies depending on snow pack and the runoff volume forecasts, shape of the runoff, and general weather patterns throughout the spring and summer flow augmentation period.

A flow augmentation program aims to restore more natural flow patterns during the time juvenile and adult salmon and steelhead are migrating. Biological Opinions include two flow management strategies: (1) limiting the winter and spring drafts of storage reservoirs to increase spring flows and the probability of full reservoirs at the beginning of summer; and (2) drafting from storage reservoirs during the summer to increase summer flows. In the Snake River, operational measures would continue to include flow augmentation from Dworshak Reservoir as needed to moderate temperatures in the lower Snake River. Water from Canadian storage reservoirs may be secured to meet flow needs.

4-5 Reservoir Levels

Spanning the river, the dams form a physical barrier that impedes the river's flow, forming an artificial lake or reservoir. Water pools behind each dam covering land that was previously exposed, allowing navigation and creating opportunities for recreation, irrigation, and water supplies. Reservoir levels would continue to be managed as multi-use facilities that provide navigation, flood control, hydropower, irrigation, recreation, and fish and wildlife benefits.

Storage reservoir levels would be managed to maximize availability of flow augmentation water in the spring and summer. Some mainstem run-of-river reservoirs (Little Goose, Lower Monumental, and Ice Harbor) on the lower Snake River and John Day Reservoir on the Columbia River would be lowered during the spring and summer migration periods to increase water velocity, which is intended to increase the migration rate and survival of salmonid smolts. However, the Lower Snake River dams are all run-of-river dams, which means that they have limited storage capacity in their reservoirs and pass water through the dam at about the same rate as it enters the reservoir.

4-6 Water Quality

The Federal hydropower system would continue to operate to reduce water temperatures during periods of juvenile and adult fish migration and to reduce the harmful effects of elevated levels of spill-generated total dissolved gas (TDG) on anadromous and resident fish. For example, flows would be released from Dworshak

Dam to help reduce water temperatures in the lower Snake River for migrating fall chinook salmon and steelhead. Gas concentrations would be controlled by limiting the amount of spill at mainstem dams and by installing gas abatement structures that reduce the generation of TDG.

4-7 Juvenile Migration and Transportation

Under a spread-the-risk strategy, juvenile migrating fish pass dams in three ways: (1) through the turbines, (2) over the spillways, or (3) through bypass systems where they are diverted to trucks or barges for transport. Some juvenile fish may enter the intake openings of the powerhouse, move with water through the turbines and exit on the other side. The fish may experience trauma from pressure changes, turbulent water conditions, or striking the machinery; however, about 90 to 95 percent of fish entering the turbines survive past the dam.

Currently, most juvenile migrants pass dams through non-turbine routes. Some juvenile fish travel in water passing through the spillway and falling to the lower river. These fish may be damaged in the fall or be affected by dissolved gasses in the water; however, about 98 percent of fish passing through the spillway survive.

Juvenile fish bypass systems include screened turbine intakes, and ice and trash sluiceways. Turbine intake screens are devices designed to intercept fish that enter turbine intakes. The two kinds of screens that are currently employed are submersible traveling screens and extended-length submersible bar screens. The Dalles Dam is the only Federal mainstem dam without mechanical screens. The screens guide the fish to a channel that conveys them to the downstream side of the dam and back into the river or into trucks or barges for transportation to below the dam. Juvenile fish bypass facilities would be operated continuously during the fish passage period from April through November. All juvenile fish bypass systems would be operated and maintained based on the Corps' criteria, as modified.

Juvenile fish transportation is a means to convey fish past multiple dams and reservoirs to reduce the cumulative effects of dam-related and reservoir-related mortality. Juvenile migrants that are guided by turbine intake screens are collected in channels or holding tanks, and loaded onto trucks or barges and transported for release below Bonneville Dam where they continue their migration to the ocean. The collected and transported fish may suffer delays and handling stress; however, about 98 to 99 percent of the transported fish survive to the point of release below Bonneville Dam. Research covering various aspects of juvenile fish passage would be implemented annually based on provisions in Biological Opinions and through coordination with regional work groups. These studies would be intended to provide information related to key passage uncertainties, for improving operational criteria, modifying/improving existing fish passage facilities, and constructing new passage facilities.

4-8 Adult Fish Passage

General concepts for adult fish passage at low-head dams were fairly well established at the time that large dams were constructed on the Columbia River. As a result, adult passage facilities, such as fishway entrances, collection/transportation channels, and ladders, were incorporated into the original construction of some mainstem dams. These adult fish passage facilities would continue to be operated and maintained. In general, the migration rate of adult migrants through dams and reservoirs would be similar to that of pre-impoundment.

All the mainstem hydroelectric dams in the Columbia/Snake migration corridor have fish ladders and associated auxiliary water supply and powerhouse collection facilities. The adult fish passage period is March through November at Bonneville, The Dalles, and John Day dams; and March through December at McNary and the four lower Snake River projects. Adult salmonids (and other species) are counted at each mainstem dam, with the schedule varying according to location and time of year.

The height difference between the river on the downstream side of the dam and the reservoir behind the dam is approximately 100 feet for all of the Lower Snake Dams. Fish ladders, which have been in place since the dams were built, and devices to attract fish to the entrances of the ladders are the primary aid to surmounting the dams. The Corps would continue to investigate and adopt new technologies for maximizing the number of fish that safely pass the dams in both directions.

Research covering various aspects of adult fish passage would be implemented annually based on provisions in Biological Opinions and through coordination with regional work groups. These studies would be intended to provide information related to key passage uncertainties, for improving operational criteria, modifying/improving existing fish passage facilities, and constructing new passage facilities.

4-9 Flood Control
Existing dams with flood control capabilities would continue to be operated for that purpose.
COMMERCE
5 POWER
5-1 Existing Generation
System operations and configurations for power generation would continue as they have been, as modified to protect and recover fish listed under the ESA.
5-2 New Energy Resources
New generation resources, mostly CTs, would continue to be developed to meet increasing demand. New generation sources would be subject to environmental laws including NEPA, Clean Air and Water Acts, and FERC licensing.
5-3 Transmission Reliability
Actions to maintain and improve power transmission reliability would continue in order to meet demands of economic growth and development. Upgrades and improvements would be subject to environmental laws including NEPA, Clean Air and Water Acts, and FERC licensing.
6 INDUSTRY
6-1 Industrial Development
Proposed new industry is reviewed at the local level for compliance with existing local zoning and environmental ordinances. Local zoning plans and plans for water supply and other public services may be subject to Federal or state environmental documentation requirements. New industry is subject to environmental regulations, including the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); the Toxic Substances Control Act of 1976 (TSCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); the Resource Conservation and Recovery Act (RCRA); the Clean Air Act (CAA); the Clean Water Act (CWA); the Endangered Species Act (ESA); and others. Common law and statutory law regarding environmental impacts, damages and liability may also affect the behavior of industrial growth.
6-2 Aluminum and Chemical
Aluminum and chemical production facilities would continue to be subject to existing environmental regulations, including CERCLA, TSCA, FIFRA, RCRA, CAA, CWA, ESA and others.
6-3 Mining
Existing and future mining operations would continue to be subject to existing environmental regulations, including CERCLA, TSCA, FIFRA, RCRA, CAA, CWA, ESA and others. On Federal land, mining operations are managed according to Federal land and resource management plans.
6-4 Pulp and Paper
Pulp and paper production facilities would continue to be subject to existing environmental regulations, including CERCLA, TSCA, FIFRA, RCRA, CAA, CWA, ESA and others.
7 TRANSPORTATION
7-1 Navigation and Barging
The Columbia and Willamette Rivers would continue to be dredged to maintain the shipping channels. A lower Columbia navigation channel-deepening project is planned to enhance river transportation. Navigation locks would continue to be operated to lift and lower boats and barges between the lower river levels downstream of the dams and the higher reservoir levels. The Federal Rivers and Harbors Act would continue to regulate potential obstructions in navigable waterways.
7-2 Trucking, Railroads, and Infrastructure
Existing railroads and trucking facilities would continue to operate and complement the barging industry.

8 AGRICULTURE

Environmental considerations for agricultural operations are addressed by a variety of Federal, state, and local programs for public and private lands. Take avoidance and critical habitat provisions of ESA would continue to affect agricultural practices.

8-1 Irrigation

Millions of acres of land in the Basin would continue to be irrigated. Although most withdrawn water eventually returns to streams from agricultural runoff or from ground water recharge, crops consume much of the water. Idaho, Oregon, and Washington water resources agencies have adopted limited, temporary moratoria on new water diversion permits from sensitive salmon streams. The Corps would continue to issue permits for water withdrawal structures in waters of the United States and in navigable waterways.

8-2 Pesticides and Agricultural Practices

On Federal land, agricultural management and pesticide application would continue as directed by existing and amended land and resource management plans. Standards would continue or be modified to address conservation recommendations from the Biological Opinions for listed species. On private land, programs administered by the USDA and EPA may influence agricultural practices. Many USDA conservation subsidies, some targeted to water conservation and water quality, currently are provided under the Environmental Quality Incentives Program. Cost sharing and technical assistance are provided for approved practices. Some agricultural lands are leased and put in long-term conserving uses under the Conservation Reserve and Wetlands Reserve Programs. The USDA and EPA would continue to administer laws and programs to control pesticide use on private lands and to reduce potential adverse effects of agricultural practices.

8-3 Grazing

On Federal land, grazing would continue to be managed according to land and resource management plans, as modified to address ESA species listings.

8-4 Forestry

Environmental effects of forestry practices are addressed by a number of Federal and state laws and programs. On Federal land, forest management would be directed by Federal land and resource management plans. On private land, state laws regulate practices and Federal laws provide certain management incentives to provide conservation outcomes.

9. COMMERCIAL HARVEST

Commercial harvest of salmon within the Columbia River is regulated by the Columbia River Compact, a bi-state compact established by the legislatures of Oregon and Washington in 1918. Compact fishing regulations are implemented under the state laws of Oregon and Washington and allow the sale and purchase of fish caught commercially in non-Indian and treaty Indian fisheries. The Compact is supported by the state staffs of Oregon and Washington, and the Technical Advisory Committee, composed of representatives of the state, tribal and U.S. agencies that are parties to *U.S. v. Oregon*. The tribal governing bodies of each of the tribes collaborate with the Compact agencies in establishing fishing regulations that affect tribal members.

With the exception of a limited commercial fishery in 2000, no commercial in-river fisheries directed at upper Columbia River spring chinook have occurred since 1977, and impacts have been limited to tribal ceremonial and subsistence and very minimal incidental catch levels. As a result, the average harvest rate on that spring chinook presently averages less than 6 percent. For summer chinook, there have been no commercial fisheries since 1965. Taking into account the very limited tribal ceremonial and subsistence fisheries, the harvest rate for the summer chinook run has averaged less than 3 percent annually since 1986. There has been no commercial harvest of sockeye salmon since 1988 (with the exception of a very limited three-day commercial fishery targeting sockeye in the mainstem Columbia River in 2000). Columbia River sockeye are not known to be harvested in ocean fisheries.

Presently, there are no commercial or sport fisheries directed at Lower Columbia River chum salmon, although chum are taken incidentally in gillnet fisheries for coho and chinook salmon, and a minor catch occurs in tributary recreational fisheries.

Ocean commercial fisheries have been greatly curtailed, with a corresponding reduction of the ocean commercial salmon fishing fleet. Increasingly restrictive regulations, shortened seasons, area closures, special gear regulations, license moratoria, and buyout of fishing fleets have all occurred to limit harvests. The annual commercial and sport catch of chinook off Washington and northern Oregon coasts (where Columbia River chinook predominate in the catch) has declined from nearly 600,000 fish in 1974 to an average of about 15,000 fish since 1994.

10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Local land use, zoning, and planning regulations guide residential and commercial development, which is affected by ESA, CWA, and other multiple Federal laws and incentives.

11 RECREATION

Ocean recreational fishing would continue to harvest Columbia River salmon off the Oregon, Washington and California coasts. Also, recreational fisheries occur in the mainstem, and in various tributaries in Idaho, Oregon, and Washington. Marine harvest regulations would continue to be enforced by the states and the U.S. through NMFS, USFWS and Coast Guard. Sport fishing for anadromous fish in state waters is regulated and administered by the respective fish and wildlife departments in Idaho, Oregon and Washington. Recreational fishing would emphasize the use of hook-and-line gear.

TRIBES

12 TRIBES

12-1 Tribal Harvest

There is a unique and long-standing relationship between the U.S. government and the region's Indian tribes. The United States holds a trust responsibility to all tribes to protect tribal trust resources, including natural resources such as fish, wildlife, timber and water, and cultural resources. In treaties between some tribes and the U.S. government, the tribes reserved certain rights, including fishing rights, that have been adjudicated through court proceedings notably, *U.S. v. Oregon*. Many people believe that multiple agency, tribal, and individual efforts in the Region lack overall direction and focus, and that the existing governance structures do not adequately include tribal sovereign governments in decisionmaking.

Current mitigation programs attempt to provide fish for harvest and protection mechanisms for listed stocks. All-Hatchery fish would continue to be marked to enable selective harvest. Tribal harvest would be managed to achieve escapement goals of adults to spawning grounds.

To the extent the resource permits, tribal people would continue to fish for ceremonial, subsistence, and commercial purposes employing—as they always have— using a variety of technologies. Tribal people fish from wooden scaffolds and from boats using set nets, spears, dip nets, and poles and lines.

Ecosystem and fish production actions would be taken that promote and sustain fishing opportunities in treaty reserved usual and accustomed fishing areas. Ceremonial, subsistence, and commercial fisheries would be conducted, consistent with court interpretations of Indian treaties. As run sizes permit, tribal members would continue to catch salmon primarily with set gillnets in the mainstem Columbia River.

12-2 Tradition, Health, Spirituality

Tribal society is closely linked with the natural world. There is no distinction between natural resources and cultural resources--all are necessary for culture, economy, religion and a way of life to be expressed, practiced and maintained. Tribal people still maintain a dietary preference for salmon, and its role in ceremonial life remains preeminent. Salmon are important and necessary for physical health and for spiritual well being.

The present condition of the ecosystem and its fish and wildlife resources limits the ability of the tribes to enjoy those resources and to exercise self-determination. As a result, tribal well-being, health, economics, and all other aspects of tribal culture are compromised.

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
NATURAL FOCUS POLICY DIRECTION

Emphasizes *removing the past major human "interventions"* in the ecosystem and allowing the existing fish and wildlife to return to a natural balance without further major human intervention *(let nature heal itself)*.

FISH & WILDLIFE

1 HABITAT

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands (NW Forest Plan ROD).

Options must focus on recreating key natural ecosystem components within which…fish evolved and prospered, not focus on attempting to circumvent natural ecosystem processes (Framework Concept Paper 9).

Effort and money…would be redirected toward changing the ecosystem back toward the condition it was in prior to large-scale human development (Framework Alternative 1).

The ecosystem is able to achieve conditions consistent with native fish and wildlife with a minimum of external support (Draft Framework Alternative 1).

The time has come to take a proactive versus reactive approach to ecosystem management. This translates into thinking about how to prevent degradation from occurring, rather than mitigating it after the damage has been done (Framework Concept Paper 16).

Protect remaining good quality habitat throughout the Columbia Basin (Framework Concept Paper 5; Draft All-H paper, Dec. 1999).

Protect, connect, and restore key habitats (Framework Alternative 3).

Restore as many areas as possible through natural means (Framework Alternative 1).

Restore natural processes throughout entire watershed and ecosystem. Identify, protect, and connect aquatic refuges and reserves (Framework Concept Paper 1).

Maintain and restore the natural ecosystem that includes all naturally producing indigenous species, and their habitats (Framework Concept Paper 4).

Where designated lands identified in the habitat assessment are already publicly owned, implement management practices that ensure that those lands function naturally (LCREP).

Maintain habitats by permitting natural forces, including disturbance events such as fire, to continue whenever these processes will contribute to long-term sustainability of habitat (ICBSDEIS, T-O2).

Establish riparian and upland area conditions that provide the full set of functions needed to maintain water and habitat quality that will support native aquatic species, achieved mainly through natural regenerative processes (Draft All-H paper Dec. 1999).

Establish riparian reserves to protect vegetation and soils (Spirit of the Salmon).

[The following] fundamental principles will be the basis…for the measures used to characterize the Columbia Basin ecosystem and its interrelated parts and to evaluate ecosystem changes that may result from various strategies and actions: 1) The abundance and productivity of fish and wildlife reflect the conditions they experience in their ecosystem over the course of their lifecycle; 2) Natural ecosystems are dynamic, evolutionary, and resilient; 3) Ecosystems are structured hierarchically; 4) Ecosystems are defined relative to specific communities of plant and animal species; 5) Biological diversity accommodates environmental variation; 6) Ecosystems develop primarily through natural processes; 7) Ecological management is adaptive and experimental; and 8) Human actions can be key factors structuring ecosystems (Council's Artificial Production Review).

Encourage human activities to develop in ways that allow expression of a productive natural system consistent with the needs of native fish, wildlife, and plant communities (Draft Framework Alternative 1).

The ecosystem recovers depleted populations to the point of self-sustainability with a very low probability of extinction in the foreseeable future (Draft Framework Alternatives 2, 3, 4, 5).
Establish wild genetic preserve areas to hedge against ecological risks of engineering failures and meet human demands for wilderness and existence value of species of interest. Use wild reserve areas to address "existence values" of wild species (Draft Framework Alternative 7).
Identify, protect, and connect aquatic refuges and reserves (Framework Concept Paper 1).
Restore river health, thereby restoring fish and wildlife in conditions under which they evolved (Framework Concept Paper 2).
Restore habitat employing both passive and active techniques, particularly in restoring heavily damaged ecosystems (Comment FWIP-019).
Protect pristine ecosystems (Comment FWIP-045).
1-1 Anadromous Fish
Begin improving in-channel stream conditions for anadromous fish by improving or eliminating land-use practices that degrade watershed quality (Framework Concept Paper 3; Spirit of the Salmon).
Afford the highest protection to pristine and relatively undamaged habitats ("refuge" habitat) whether through existing Federal and state laws and regulations, or new legislation (Framework Concept Paper 5).
Protecting and recovering salmonids and other aquatic species requires protecting land on and around fish-bearing streams (Governors' Recommendations, July 2000).
Give the highest priority to protecting the habitat for fish that reproduce in the wild (Framework Concept Paper 22).
[W]e prefer to benefit salmon through strategies and actions that emphasize and build upon natural processes. While we recognize this may not always be feasible, we think it is an important policy decision that will, in turn, clarify the region's choice of strategies and allow us to make most effective use of our finite financial resources (Governors' Recommendations, July 2000).
Re-create key natural ecosystem components within which fish evolved and prospered. Do not attempt to circumvent natural ecosystem processes (Framework Concept Paper 9).
Efforts should strive to recreate, as closely as possible, the natural migration conditions under which salmon and steelhead evolved (Idaho Plan 1998).
1-2 Resident Fish
Re-create key natural ecosystem components within which fish evolved and prospered. Do not attempt to circumvent natural ecosystem processes (Framework Concept Paper 9).
1-3 Introduced Species
Limit access to high quality areas to prevent additional introductions of non-native species (Sample Action).
Restore the native grass, forb, and shrub composition within the sagebrush and shrub steppe cover types (ICBSDEIS, R-O10).
1-4 Wildlife
Logs present on the forest floor before a disturbance event provide habitat benefits that are likely to continue. It seldom will be appropriate to remove some (NW Forest Plan ROD).
1-5 Predators of Anadromous Fish
Restore natural biological communities in tributary streams such that they exhibit natural predator/prey relationships (Draft All-H paper Dec. 1999).
Restore more natural predator-prey conditions (e.g., broader food base for aquatic, terrestrial and avian predators (Framework Concept Paper 6).

1-6 Watersheds
Design and implement watershed restoration projects in a manner that promotes long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and attains Aquatic Conservation Strategy objectives (NW Forest Plan ROD).
Restore natural processes throughout entire watershed and ecosystem. Restore damaged riparian areas and watersheds; re-establish more natural streamflows; and let floodplains be floodplains (Framework Concept Paper 1).
Stop government programs and subsidies that allow or promote new development or replace existing development in sensitive floodplains and other areas (Tribal Vision).
Re-establish ecological linkages in watersheds, linking the aquatic system with the terrestrial. This should also include watersheds where dams create an ecological barrier, isolating a portion of the river from others (Framework Concept Paper 10).
Return water to streams throughout the basin to recreate natural flows and hydrograph of pre-dam and pre-diversion conditions (Framework Concept Paper 1).
If necessary, initiate land management designed to return a watershed to a natural hydrologic regime, e.g., re-vegetation of areas adversely affected by past land-disturbing activities (Spirit of the Salmon).
Reestablish floodplains, wetlands, and estuary areas to promote passive flood control, develop spawning and rearing habitat, and enhance water quality (Framework Concept Paper 7).
Maintain fully functional riparian and wetland vegetation and improve (through restoration and/or passive ["hands-off"] management of natural recovery processes) riparian and wetland vegetation that is not fully functional…. (ICBEMP FEIS).
1-7 Tributaries
Protect and restore degraded habitats in tributary watersheds. Emphasize the use of natural processes to restore native habitat characteristics and ecological functionality. Use minimal structural or other actions to restore these habitats. Restore normative seasonal flow patterns in tributaries through voluntary measures. Remove or bypass physical or biological impediments (e.g., culverts, highways, and railroads) that fragment habitats for different species and life stages and between aquatic and terrestrial areas (Draft Framework Alternative 6; Framework Concept Paper 21).
Protect, connect, and restore habitat on the tributaries throughout the basin (Framework Alternative 1).
To protect and recover tributary habitat, land and water users and managers must meet a series of habitat conditions associated with survival rates (Framework Concept Paper 3).
Declare specific tributaries (e.g., John Day River) "off-limits" to hatcheries to provide buffers against asserted genetics problems with hatchery production (Framework Concept Paper 26).
To meet the objectives of restoring and protecting instream flows, water right holders must take action under applicable state water laws to create instream water rights (Framework Concept Paper 17).
Reclaim spawning and rearing habitat by reopening access to fish migrations and repairing degraded tributaries (Framework Concept Paper 8).
Save our Wild Salmon and the Sierra Club support aggressive habitat actions in tributaries, including screening irrigation diversions, removing passage barriers and acquiring additional flows. (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP; 9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).
1-8 Mainstem Columbia
Protect Hanford Reach (FWS, DOE) (Final All-H Paper Dec. 2000). Set aside the Hanford Reach as an ecological preserve (Framework Alternative 5).
Designate the Hanford Reach of the Columbia River under the Federal Wild and Scenic Rivers Act, and re-establish normative river conditions there (Tribal Vision).
[Implement] significant land use changes on both public and private lands (Framework Alternative 1).

Mainstem habitat is returned to natural conditions that are linked to a downstream passage survival rate closer to that which existed prior to construction of the dams (Spirit of the Salmon).
Restore productive normative river segments in the mainstem Columbia and Snake Rivers (Framework Concept Paper 5).
1-9 Reservoirs
No reservoirs at John Day, McNary, and four Lower Snake project sites, except those created by natural conditions. Reservoirs at other dams may be drawn down (Sample Actions).
1-10 Estuary and Ocean
Re-establish normative estuarine conditions to expand the size of the estuary and increase its productivity (Draft Framework Alternatives 2, 3, 5).
Provide technical assistance and facilitate implementation of programs to protect and restore wetlands in the Puget Sound basins (Washington Plan, 2000).
1-11 Water Quality
Establish sediment regimes (input, storage, transport) consistent with those under which the aquatic ecosystem evolved (Draft All-H paper Dec. 1999).
2 HARVEST
Reduce virtually all fishing except that related to tribal ceremonial and subsistence purposes (Framework Alternative 1).
The needs of the ecosystem with regard to native fish and wildlife take precedence over other management objectives such as harvest (Draft Framework Alternative 1).
2-1 Anadromous Fish
Establish escapement objectives by population in each watershed that maintain natural selection and nutrient enrichment of streams with salmonid carcasses (Framework Concept Paper 10).
Maintain salmon escapements within ranges necessary to conserve and protect potential salmon production and to maintain normal ecosystem functioning (Framework Concept Paper 19).
Reduce ocean harvest to increase numbers of returning adults (Framework Alternative 4).
Ban harvest in the mainstem (Framework Alternative 7).
Curtail harvest for a period of years until the fisheries resources return to sustainable levels, then increased harvesting can gradually be reintroduced, subject to careful monitoring and evaluation (Comment FWIP-045).
2-2 Resident Fish
Continue to suspend stocking of fluvial rainbow trout in tributaries utilized by adfluvial rainbow trout (Framework Concept Paper 13).
2-3 Wildlife
Manage populations to the carrying capacity of available habitat (Sample Actions).
3 HATCHERIES
Protect and enhance naturally spawning Columbia Basin fish and wildlife populations. This includes all salmonids and wildlife native to the Columbia Basin (Framework Concept Paper 20).
The Shoshone-Bannock Tribes oppose the use of hatcheries to supplement wild fish populations (9/28/01 letter; no author or recipient indicated, 5YIP).
Do not harm wild salmon stocks (Framework Concept Paper 1).
Decrease/eliminate artificial fish production overall (FC All-H paper).
Discontinue hatcheries (Comment FWIP-019).
Curtail or discontinue hatcheries because of their effect on wild fish (Comment FWIP-045).

3-1 Anadromous Fish
Discourage the use of artificial production except in special circumstances such as temporary preservation of genetic resources (Framework Alternative 1).
Do not accept artificial production in lieu of habitat protection. Use funds saved by downsizing hatchery programs to restore habitat (Framework Concept Paper 1).
Adopt safeguards to prevent stocking programs from harming wild salmon, and if stocking will harm a wild population, do not stock (Framework Concept Paper 1).
Eliminate or modify hatcheries and hatchery practices that negatively impact wild stocks (Framework Concept Paper 25).
Sally Streeter objects to HGMPs, and instead supports a "Wild Fish Policy" (8/15/01 letter from Sally Streeter to the Federal Caucus, 5YIP).
Phase out use of artificial means of salmon recovery, such as barging and hatcheries, as habitat is restored (Framework Alternative 1).
Restore the ecosystem to a much more natural state by eliminating dams, hatcheries, and other artificial constraints and approaches (Framework Alternative 1).
3-2 Resident Fish
Discourage the use of artificial production except in special circumstances such as temporary preservation of genetic resources (Framework Alternative 1).
4 HYDRO
Support those measures that restore or mimic natural functions (Framework Alternative 1).
4-1 Dam Modifications and Facilities
Breach or lower one or more mainstem dams to re-establish riverine conditions in the mainstem Columbia and Snake rivers (Draft Framework Alternatives 1, 2, 3).
Breach the John Day, McNary, and four Lower Snake dams (Framework Alternative 1).
Build no new dams in salmon and steelhead habitat (Framework Concept Paper 1).
It is the policy of the Shoshone-Bannock Tribes to restore the natural riverine system, including breaching of dams (9/28/01 letter; no author or recipient indicated, 5YIP).
Other commenters have supported dam breaching, particularly the four dams on the lower Snake (9/4/01 letter from Jack Rose to the Federal Caucus, 5YIP; 9/4/01 letter from Richard Carasone to the Federal Caucus, 5YIP).
Adopt mitigation measures, up to and including modifications and removal of dams, which are consistent with the ISAB recommendations to create a more natural or "normative" river system. On non-Federal dams, remove projects for which it is extremely costly or difficult to adequately mitigate the adverse impacts (e.g., Condit, Enloe) (Framework Concept Papers 1, 21).
On other non-Federal dams, utilize relicensing or license reopener clauses to adopt mitigation measures consistent with the ISAB recommendations to create a more natural or "normative" river system (Framework Concept Paper 1).
Achieve natural river-level drawdown of lower Snake projects (partially dismantling Lower Granite, Little Goose, Lower Monumental, and Ice Harbor by removing the earthen portion of each dam by spring 2005) (Framework Concept Paper 2).
In the Snake River (Objectives 1-3): achieve objectives for all Snake River stocks by implementing natural river in the lower Snake by 2005 (bypass 4 dams, removing the earthen portion of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor) (Framework Concept Paper 2).
The incremental drawdown strategy should incrementally invoke drawdown. That is, drawdown two dams and evaluate (for some pre-determined period of time with some pre-determined incremental objectives), then drawdown the next group of dams if monitoring results meet expectation. So long as evaluation meets interim

goals, proceed with rest of dam breaching approach. This incremental approach would be used for all actions taken (Framework Concept Paper 7b).
Evaluate feasibility of breaching (B1, B2) John Day Dam, and implement by 2012 (Framework Concept Paper 6).
Restore normative river habitat conditions by breaching the four lower Snake River dams and drawing down John Day Reservoir to spillway crest. Restore normative river conditions and reduce reliance on the short-term technological fixes such as the Federal juvenile fish transportation program and additional water from upstream storage reservoirs in Montana and Idaho (Framework Concept Paper 5).
Every hydroelectric dam, whether federally owned or operated by a public or private utility licensed by the Federal Energy Regulatory Commission (FERC), [should] operate according to the following conditions: (a) flows required of sufficient quality and quantity, and at the ecologically appropriate time as dictated by the natural hydrograph; (b) minimal unnatural daily flow variations; (c) installation and maintenance of state of the art fish passage facilities; and (d) consistency with correlative watershed protection and restoration efforts (Framework Concept Paper 5).
Restore the ecosystem to a much more natural state by eliminating dams, hatcheries, and other artificial constraints and approaches (Framework Alternative 1).
Remove four to six dams, with the ones considered most harmful to weak stocks being given priority in removal (Comment FWIP-019).
4-2 Hydro Operation
Breach the John Day, McNary, and four Lower Snake dams (Framework Alternative 1).
Provide a more normative hydrograph in the Columbia and Snake rivers to create and maintain mainstem riverine habitats in unimpounded areas. This would move away from an emphasis on minimum flows toward a regime that would include periodic flooding and droughts between years and smooth ramping to and away from the spring freshet within a year (Draft Framework Alternative 1).
4-3 Spill
Some spill would be used for flood control purposes. Storage of water would be limited in order to create a more natural hydrograph (i.e., closer to what existed prior to the construction of storage dams) (Sample Actions).
4-4 Flow
Restore natural river levels and hydrograph to lessen impacts to natural ecosystem (Framework Concept Paper 4).
Manage flows in the Hanford Reach to match natural seasonal and daily patterns (Framework Alternative 5).
In the Columbia, the development of normative flow conditions with flow augmentation from the Upper Columbia and IRCs at storage projects (would) create a more natural hydrograph (Framework Concept Paper 5).
Restore normative flow conditions from Priest Rapids dam to the estuary, using spring and summer flow augmentation under a system operating plan that implements a normalized hydrograph (Framework Concept Paper 2).
4-5 Reservoir Levels
Reduce the amount of water stored for hydropower production to provide for more natural flows, including periodic flooding and droughts to restore native plants (Framework Alternative 1).
At other lower Columbia dams *[besides John Day and McNary, which would be breached under this Policy Direction]*, operate at lowest possible reservoir elevation (generally MOP) (Framework Concept Paper 5).
Operate the John Day reservoir at spillway crest (Framework Concept Paper 1).
Draw down the reservoir behind John Day Dam to Minimum Operating Pool (MOP) immediately, and to spillway crest or natural river level, on a year-round basis, in the near term (Tribal Vision).

4-6 Water Quality
Strictly enforce the Clean Water Act throughout the Columbia River Basin (Framework Concept Papers 7a, 7b).
4-7 Juvenile Fish Passage and Transportation
Stop barging and trucking juvenile salmonids (Tribal Vision).
Eliminate fish transportation (Framework Alternatives 2, 3; Framework Concept Papers 1, 2, 3, 4; SOR FEIS Alternative 9a).
Save our Wild Salmon would support a reduction, and possibly elimination, of fish transportation (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).
Eliminate juvenile fish transportation and allow fish to migrate on their own through the river in order to connect with selected adaptations such as travel time, feeding regimes, escaping overcrowding, disease transmission, suitable arrival timing to estuary, and normal levels of natural mortality (Framework Concept Paper 5).
The Sierra Club supports the elimination of juvenile fish transportation, especially trucking fish (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).
Phase out use of artificial means of salmon recovery, such as barging and hatcheries, as habitat is restored (Framework Alternative 1).
4-8 Adult Fish Passage
Re-connect instream aquatic habitats via the removal, modification or circumvention of physical or biological impediments (e.g., culverts, diversion structures, highways, high temperatures) to passage (Draft All-H paper Dec. 1999).
4-9 Flood Control
Allow seasonal flooding of mainstem areas within unimpounded reaches to restore floodplain conditions and vegetation patterns (Draft Framework Alternatives 2, 3).
Relax and seek flexibility in rigid flood control rule curves to recreate normative hydrographs and reclaim floodplain habitat (Tribal Vision).
Re-connect stream channels, flood plains, and wetlands such that inundation and water table elevation is consistent with naturally functioning patterns (Draft All-H paper Dec. 1999).
Restore and maintain the timing, variability, and duration of floodplain inundation and water table elevation (ICBEMP FEIS).
COMMERCE
5 POWER
5-1 Existing Generation
Eliminate hydropower generation in the Lower Snake and reduce hydropower generation in the Columbia River (Framework Alternative 1).
Natural river operation would eliminate the system's load-shaping and reduce average annual energy by taking turbines out of service (SOR FEIS Alternative 5c).
5-2 New Energy Resources
No further hydroelectric development in habitat that supports anadromous or resident salmonids (Framework Concept Paper 5).
Install and operate an array of photovoltaic panels on the south-facing slopes near Lower Granite Dam, connected into existing transmission facilities at the dam, to relieve regional dependency on hydroelectric power (Email, Comment Letter #36).
BPA will grant a 30% subsidy to any homeowner or small business that properly installs a rooftop photovoltaic solar collector which is connected to the public grid. BPA will prevail upon regional utilities to purchase

power thus generated. This action will: 1) diversify sources of electricity; 2) provide supplemental electrical power that will offset electrical demand especially during critical summertime daylight hours; 3) improve the integrity of the public grid by reducing long transmission loads during peak and near peak hours; 4) augment the likelihood of increased spill for summertime migrating smolts; and 5) stimulate the solar industry locally and nation wide (Email, Comment Letter #37).

5-3 Transmission Reliability

Major changes to transmission system will be required if the John Day, McNary and Snake River dams are breached. New power plants that are constructed to provide replacement power may also require transmission additions, depending on their location (Sample Action).

Reduced road densities on public lands could affect access to transmission facilities, which impairs the ability to perform maintenance in a timely manner, causing the potential for longer outages in emergencies (Sample Action).

6 INDUSTRY

6-1 Industrial Development

[Assume] increased facility deconstruction and material salvage (e.g., *Deconstruction – Building Disassembly and Material Salvage: The Riverdale Case Study*. Peter Yost and Eric Lund, Upper Marlboro, MD: NAHB Research Center 1997).

Protect high quality aquatic habitat on private lands while allowing restricted use (Human Effects Analysis Appendix D).

Increase emphasis on eco-efficiency, including the three Rs of conservation—reduce, reuse, recycle (e.g., World Business Council for Sustainable Development), and eco-effectiveness, whereby all the products and materials manufactured by industry provide nourishment for something new after each useful life (Hawken).

6-2 Aluminum and Chemical

Implement land use regulations to prohibit industrial facilities from locating/operating in sensitive areas (Sample Action).

6-3 Mining

For leaseable minerals, prohibit surface occupancy within Riparian Reserves for oil, gas, and geothermal exploration and development activities were releases to not already exist (NW Forest Plan ROD).

Prohibit solid and sanitary waste facilities in Riparian Reserves (NW Forest Plan ROD).

Strengthen habitat protection through stricter standards for logging, livestock grazing, mining, and road building (Framework Concept Paper 1).

6-4 Pulp and Paper

Use pollution prevention to reduce or eliminate toxic and conventional pollution generated during manufacturing and industrial processes (LCREP).

Increase eco-efficiency and reduce risks for human[s] and the environment by (World Business Council for Sustainable Development):

- Conserving raw materials and energy, eliminating toxic raw materials and reducing the quantity and toxicity of all emissions and waste
- Reducing negative impacts along the life cycle of a product
- Incorporating environmental concerns into designing and delivering services.

[Focus] on catalyzing the use of agricultural residues and other tree-free fibers in pulp and paper, building materials,…and other sustainable fiber-based products (Fiber Futures).

Promote the use of agricultural residues and other non-wood fibers in currently wood-dependent pulp and paper and building materials industries (Fiber Futures).

7 TRANSPORTATION
New road building should rarely occur in watersheds that are currently unroaded or have very few roads (ICBEMP FEIS).
7-1 Navigation and Barging
Remove dikes and manage dredging and other measures to restore estuarine habitats (Human Effects Analysis Appendix D).
Maintain barge transportation open through the drawdown of John Day Dam by using shallow draft vessels to the Tri-Cities area (Framework Concept Paper 7b).
7-2 Trucking, Railroads, and Infrastructure
For each existing or planned road, meet Aquatic Conservation Strategy objectives by ... avoiding wetlands entirely when constructing new roads (NW Forest Plan ROD).
Provide support for alternative forms of transportation of agricultural and other products including improved rail service (Framework Concept Paper 5).
8 AGRICULTURE
BPA shall, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, negotiate and fund long-term protection for 100 miles of riparian buffers per year in accordance with criteria BPA and NMFS will develop by June 1, 2001 (NMFS BiOp 2000, Action #153, Dec. 2000; BPA Appendix D: Action Table and Reports, R-153, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #1, Oct. 2002).
Provide permanent protection for riparian areas in agricultural areas by *[expanding and]* supplementing agricultural incentive programs (BPA, with FSA and NRCS) (Final All-H Paper Dec. 2000).
Halt any further impairment of wetlands. Prevent additional soil compaction. Prevent removal of riparian vegetation. Prohibit activities that would contribute to the creation or maintenance of peak flows earlier or greater than those that would occur naturally (Spirit of the Salmon).
8-1 Irrigation
Lower irrigation pumps to adjust to changed river levels and provide support for increased electrical costs (Framework Concept Paper 5).
Reduce existing permits for water withdrawal. Encourage cultivation of less water-intensive crops. *[Initiate more intensive]* agricultural water conservation, irrigation waste water treatment, and irrigation withdrawals screening (Human Effects Analysis Appendix D).
Reduce existing permits for water withdrawal. Encourage cultivation of less water-intensive crops (Human Effects Analysis Appendix D).
8-2 Pesticides and Agricultural Practices
Encourage integrated pest management and sustainable farming practices, and end inefficient, unauthorized, and illegal use of water (Framework Concept Paper 1).
[Encourage] nutrient and pest management practices needed to limit delivery of pollutants that create eutrophic or toxic conditions for fish and other aquatic organisms (Draft All-H paper Dec. 1999).
[Encourage] pesticide/herbicide reduction (Human Effects Analysis Appendix D).
8-3 Grazing
Adjust grazing practices to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives. If adjusting practices is not effective, eliminate grazing (NW Forest Plan ROD).
Strengthen habitat protection through stricter standards for logging, livestock grazing, mining, and road building (Framework Concept Paper 1).
Protect sites from grazing (NW Forest Plan ROD).

8-4 Forestry
Strengthen habitat protection through stricter standards for logging, livestock grazing, mining, and road building (Framework Concept Paper 1).
Manage logging on public forested lands to produce normative age stands (Draft Framework Alternative 2).
Allow a more normative fire frequency on public forest lands within limits imposed by safety considerations. Allow a more normative fire frequency on private forest lands using incentives and similar means within limits imposed by safety considerations (Draft Framework Alternatives 2, 3; Human Effects Analysis Appendix D).
Prohibit timber harvest, including fuelwood cutting, in Riparian Reserves [with exceptions (NW Forest Plan ROD).
No new roads will be built in remaining unroaded portions of inventoried (RARE II) roadless areas (NW Forest Plan ROD).
Incorporate increased public forest protection as the most cost-effective method for protecting fish and wildlife (Comment FWIP-028).
9 COMMERCIAL HARVEST
Retire commercial fishing licenses through buy-outs (Framework Concept Paper 27).
10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT
Assess the potential impacts of proposed development. Identify cumulative impacts and habitat attributes that might be lost. Present alternatives that minimize impacts. If impacts are unavoidable, mitigation shall take one of five forms in order of preference (LCREP): a) Restoration: returning a damaged habitat as closely as possible to its condition prior to damage b) Enhancement: making changes or improvements to habitat to replace functions or values lost or damaged c) Preservation: protecting habitat in adjacent areas that are equivalent to the area damaged and that might otherwise be subject to unregulated activity d) Creation: converting a non-functioning habitat area into one having all of the physical and biological characteristics of the area lost or damaged e) Cash mitigation: providing cash compensation for lost habitat to be used for habitat protection and restoration.
Restore terrestrial, riparian, and aquatic habitats where adverse effects or pending risks to these habitats from roads can be quickly reduced (ICBSDEIS, R-O12).
Protect high quality aquatic habitat on private lands while allowing restricted use (Human Effects Analysis Appendix D).
[Encourage] urban storm runoff control, municipal waste management, obstruction removal, and road management. Manage land use and riparian conditions to maintain water quality (Human Effects Analysis Appendix D).
11 RECREATION
Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy (NW Forest Plan ROD).
Since passage of the Wilderness Act, economists have expanded and refined their methods for estimating the total economic benefits of wilderness. [A] total economic valuation framework illustrates that wilderness is a multiple-use resource that provides a multitude of benefits to the current generation as well as future ones (Pete Morton). *Estimate the total economic benefits of wilderness and use the Wilderness Act to promote a network of wild lands (Sample Action).*

TRIBES
12 TRIBES
12-1 Tribal Harvest
Honor tribal rights, including treaty fishing rights, to catch fish for ceremonial and subsistence purposes (Framework Concept Paper 20).
12-2 Tradition, Culture, Spirituality
Maintain and restore the natural ecosystem that includes all naturally producing indigenous species, their habitats, and provides human sustenance, and acknowledge that this must also provide for cultural and spiritual needs (Framework Concept Paper 4). Recognize native plant communities as traditional resources that are important to tribes and an essential component to treaty-reserved gathering rights (ICBSDEIS, B-045). Better understand and incorporate into Federal land management how places are valued by American Indians (ICBSDEIS, B-069).

This page intentionally left blank.

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
WEAK STOCK FOCUS POLICY DIRECTION

Emphasizes *human intervention to promote recovery* of weak species of fish and wildlife that are listed or proposed for listing under the Endangered Species Act or other legal protections.

FISH & WILDLIFE

1 HABITAT

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted (NW Forest Plan ROD).

Minimize short-term risk, especially to threatened, endangered, or proposed species; important species habitats; and riparian areas (ICBSDEIS Alternative S2).

Increase the overall productivity and resilience of the Columbia River ecosystem by stopping the loss of biological diversity of fish, wildlife, and plants, especially those listed under the Endangered Species Act (Framework Alternatives 2, 3, 5, 6).

Contribute to recovery of federally listed or proposed species (or subspecies or populations) across their ranges by maintaining and restoring habitat quality, quantity, and effectiveness (ICBSDEIS, B-O52).

The first step towards moving back to a balanced ecosystem is recognition of the fact that it cannot be allowed to get any worse. This is the essence of taking a proactive, rather than reactive stance to ecosystem management. We define this as a 'no further impact' scenario. A 'no-further impact' scenario will have certain defined parameters. These are generally described by the regulations. For example, nitrogen concentrations cannot exceed the current value of x mg/L, and impervious surface in the Basin will not exceed current levels (Framework Concept Paper 16).

Conserve and restore different types of habitat and corridors between those habitats within each ecosystem; preserve genetic diversity (Framework Concept Paper 1).

Balance the need for restorative actions to address long-term threats to listed and proposed species with the short-term need to protect listed and proposed species (ICBSDEIS, B-O53).

Restore vegetative patches, patterns, structure, and species composition to be more consistent with the landform, climate, and biological and physical characteristics of the ecosystem (ICBSDEIS, R-O2).

Protect, connect, and restore key habitats (Framework Alternative 3).

Increase habitat connections throughout the basin (Framework Alternatives 1, 2, 5).

Improve measurements of survival through all salmonid life stages to identify high mortality areas and reduce mortality (Framework Concept Paper 26).

Review existing laws that are destructive to habitats that are critical for indigenous species (Framework Concept Paper 4).

Protect weak salmon and its habitat in order to maintain resource productivity (Framework Concept Paper 19).

Protect existing high quality habitat and improve degraded habitat. If savings can be found in existing management actions, the savings will be applied to the most critical fish and wildlife activities (Framework Concept Paper 20).

[T]his strategy applies to the restoration of weak stocks: the restoration should focus first on the habitat where portions of that population are doing relatively well, and then extend to adjacent habitats (Council's 2000 Fish and Wildlife Program).

Make salmon programs cost-effective; save BPA Fish and Wildlife monies for programs providing the highest probability of success; avoid big-ticket spending for marginally beneficial projects; and maintain or reduce BPA direct/reimbursable spending over time, as listed stocks recover (Framework Concept Paper 2;

Framework Alternative 5).

Adhere to and enforce all applicable tribal, state and Federal laws and regulations (including water quality standards, discharge permits and fish and wildlife screening requirements), strenghten them where needed, and develop incentives and cost-sharing programs to assist in their implementation (Tribal Vision).

Stop government programs and subsidies that allow or promote new development or replace existing development in sensitive floodplains and other areas (Tribal Vision).

Manage public lands, which provide critical wild salmon habitat, for the benefit of the salmon (Framework Concept Paper 1).

Land and water users and managers should meet specified habitat conditions associated with targeted salmon survival rates (Framework Concept Paper 3).

Protect and enhance habitats and ecological function to allow for the restoration of more natural population structures, by allowing for the expansion of productive populations and by habitat restoration actions that connect weak populations to stronger populations and to each other. Allow for the recovery of depleted and listed populations to at least the point of self-sustainability and a low probability of extinction (Council's 2000 Fish and Wildlife Program).

Increase genetic connections and gene flow within the ecological system to facilitate development, expansion and protection of population structures (Council's 2000 Fish and Wildlife Program).

Issue [adjust, or eliminate] leases, permits, rights-of-way, and easements to avoid effects that would retard or prevent attainment of the Riparian Management Objectives and avoid adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

Use land acquisition, exchange, and conservation easements to meet Riparian Management Objectives and facilitate restoration of fish stocks and other species at risk of extinction (INFISH/PACFISH EAs).

Increase the overall productivity and resilience of the Columbia River ecosystem by stopping the loss of biological diversity of fish, wildlife, and plants, especially those listed under the Endangered Species Act (Framework Alternatives 2, 3, 5, 6).

Seek authorization for Lower Columbia River Greenway Program (DOI/DOA). Establish Greenway Habitat Protection Fund to protect 10,000 acres of wetlands *[and]* 3,000 acres of upland (Final All-H Paper Dec. 2000).

Implement the Lower Columbia Greenway Project *[including]* (Final All-H Paper Dec. 2000):

- Habitat mapping and priorities for protection or restoration
- Habitat acquisition/protection
- COE habitat restoration
- Monitoring
- Public education and outreach

In the short term, maintain and secure terrestrial source habitats that have declined substantially in geographic extent from the historical to the current period and source habitats that have old-forest characteristics (ICBSDEIS, T-O1).

Establish pre-development baseline information and restore and/or mitigate to pre-development conditions and circumstances (Tribal Vision).

Increase connections within freshwater areas to facilitate wide distribution of energy and nutrients within the system. Establish riparian conditions that allow energy and nutrient transfer between terrestrial and aquatic areas via predation, carcass scavenging or plant production and grazing (Draft Framework Alternative 5).

The viewpoint of Save our Wild Salmon is that key functions or functional attributes of rivers should be re-established (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).

Idaho identified the following as key near-term actions consistent with their perspective with habitat priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP):

- Implement holistic restoration of critical habitat in the Upper Salmon River, including the Lemhi, Pahsimeroi and East Fork Salmon rivers, identified in the Mountain Snake Provincial Review.

- Implement additional habitat enhancement and protection actions on ESA critical habitat as identified in the Mountain Snake Provincial Review.

Administer grant programs to assist users with Management Plan implementation and to assist school children in educational efforts that focus on endangered species and habitat loss (LCREP).

Maintain and prevent loss of old forest in dry and moist forest potential vegetation groups (PVGs). Maintain old forest in patch sizes that are consistent with the landform, climate, and biological and physical conditions of the ecosystem. Where appropriate, change the stand structure from multi- to single-story (ICBEMP FEIS).

1-1 Anadromous Fish

Implement actions that result in the best survival of listed stocks (ESA-listed anadromous salmonids) (Framework Concept Paper 6).

Based on the historical strengths of the Columbia River, increase the abundance and resilience of chinook salmon with the ocean-type life history by providing or restoring spawning and rearing habitats in main-stem and lower tributary areas (Draft Framework Alternative 5; Draft Framework Alternative 6).

Rebuild Snake River fall chinook in the Blue Mountains ERU by attaining a 2-6% adult return rate (to Snake-Clearwater confluence), by restoring spawning habitat in the lower Snake, by substantially improving smolt survival from the mouth of the Clearwater to the mouth of the Snake, and by normalizing flows in existing habitat below Hells Canyon dam (Framework Concept Paper 2).

Reclaim the anadromous fish resource and the environment on which it depends for future generations… Restore anadromous fishes to historical abundance in perpetuity (Framework Concept Paper 3).

Recover Snake River sockeye by attaining a 1.5-2.0% adult return rate to Redfish Lake, in the Central Idaho Mountains ERU (Framework Concept Paper 2).

In subbasins with listed salmon and steelhead, BPA shall fund protection of currently productive non-Federal habitat, especially if at risk of being degraded, in accordance with criteria and priorities BPA and NMFS will develop by June 1, 2001 (NMFS BiOp 2000, Action #150, Dec. 2000; BPA Appendix D: Action Table and Reports, R-150, June 5, 2001; 2003/2003-2007 Implementation Plan; Habitat Strategy #1, Oct. 2002).

The Action Agencies and NMFS shall study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area (NMFS BiOp 2000, Action #156, Dec. 2000; BPA Appendix D: Action Table and Reports, R-156, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #2, Oct. 2002).

BPA shall fund actions to improve and restore tributary and mainstem habitat for Columbia River chum salmon in the reach between The Dalles Dam and the mouth of the Columbia River (NMFS BiOp 2000, Action #157, Dec. 2000; BPA Appendix D: Action Table and Reports, R-157, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #2, Oct. 2002).

Improve existing habitat and fully evaluate passage opportunities through relicensing and Section 7 consultation for Idaho Power Company dams (Final All-H Paper Dec. 2000).

[T]he food chain in the natal streams needs to be upgraded with either salmon carcasses or by fertilizer briquettes that are being used by B.C. biologists on Vancouver Island to increase the steelhead and salmon populations (Letter Comment #31).

Complete HCP for Mid-Columbia Dams (Final All-H Paper Dec. 2000).

Locate water drafting sites to avoid adverse effects to listed anadromous fish and instream flows, and in a manner that does not retard or prevent attainment of Riparian Management Objectives (INFISH/PACFISH EAs).

Extend indefinitely NMFS March 1, 1995, Opinion and all subsequent related direction, to all Land and Resource Management Plans (LRMPs) in both steelhead ESUs in order to reduce adverse effects not previously the subject of consultation on LRMPs until such time as new, long-term plan-level direction is adopted for both salmon and steelhead (PACFISH BiOp June 1998).

Extend 17 Snake River basin biological opinion (SBO) provisions for salmon to include steelhead ESUs to assure that adverse effects are reduced or avoided (PACFISH BiOp June 1998).

Review actions conducted under LRMPs to assure that adverse effects are otherwise reduced or avoided (PACFISH BiOp June 1998).

Provide additional mitigative measures in steelhead strongholds in the Snake River basin ESU to reduce the potential of adverse combined effects (PACFISH BiOp June 1998).

Accelerate restoration of steelhead habitat in the Snake River basin ESU (PACFISH BiOp June 1998).

Breach the dams to increase spawning grounds for wild fish (Comment FWIP-020).

Removing the four lower Snake River dams would have substantial biological benefits for all Columbia and Snake migrating salmon and steel head by opening up otherwise lost spawning habitat and decreasing the adverse water temperatures and other pollution (e.g. dissolved gas) that accumulate in the rivers (Comment FWIP-038).

Restore anadromous salmonid populations to levels that are biologically sustainable (Oregon Plan, 1997).

Implement restoration, enhancement and protection efforts in salmonid habitat, of Parks and Recreation Commission properties (Washington Plan, 2000).

Restore the widest possible set of healthy naturally reproducing populations of salmon and steelhead in each relevant province by 2012. Healthy populations are defined as having an 80 percent probability of maintaining themselves for 200 years at a level that can support harvest rates of at least 30 percent (Council's 2000 Fish and Wildlife Program).

1-2 Resident Fish

Increase the abundance and resilience of bull trout, burbot, cutthroat trout, and other native aquatic species by providing or restoring spawning and rearing habitats in areas above anadromous fish blockages. It is recognized that non-native species may be important components of these communities in some cases, however, the focus is on development of native habitats and communities (Draft Framework Alternatives 2, 3).

Restore ecosystem components that were represented by healthy anadromous fish runs to benefit native resident and wildlife by increasing the prey base and nutrient cycling, and reducing constraints on resident fish management actions through more normative management actions for anadromous fish (Framework Concept Paper 6).

The Washington Department of Fish and Wildlife supports research and modifications to the FCRPS that will offer collateral or direct benefits to non-salmonid species, particularly white sturgeon and Pacific lamprey (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

In support of Bull Trout mitigation, the State of Idaho supports fish passage improvements, flow improvements, and tributary enhancements/restoration as mitigation actions for resident fish species (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The State of Idaho has identified the following projects that it is either presently conducting or believes should be undertaken immediately, and that it believes warrant Federal financial assistance: the Lake Pend Oreille Predation Research identified in the Mountain Columbia Provincial Review; the evaluation of bull trout life history in Dworshak Reservoir identified in the Mountain Snake Provincial Review; the Dworshak Dam impacts assessment and fisheries investigation, including hydro acoustics work, identified in the Mountain Snake Provincial Review; implementation of a conservation plan for high priority bull and westslope cutthroat trout habitat in Trestle Creek tributary; and implementation of Pend Oreille/Priest Lake exotic fish species suppression and native fish protection (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Apply the results of watershed analysis where required or applicable, and consider expected benefits to bull trout during the design and prioritization of instream habitat enhancement and restoration projects, culvert replacement upgrades, and road decommissioning actions. Assess proposed watershed and habitat restoration actions to ensure that potential short term adverse effects to bull trout are outweighed by long term benefits (INFISH BiOp August 1998).

Apply relevant PACFISH and INFISH objectives, standards and guidelines, and relevant aspects of the June 19, 1998 additional commitments in design and implementation of watershed and habitat restoration actions (INFISH BiOp August 1998).

In support of Bull Trout mitigation, the State of Idaho supports fish passage improvements, flow improvements, and tributary enhancements/restoration as mitigation actions for resident fish species (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

1-3 Introduced Species

Eliminate introduction of new exotic species; control populations of existing exoctic species (Tribal Vision).

Attention should be given to controlling or eliminating exotic fish that prey on and displace anadromous salmonids (Framework Concept Paper 11).

Implement measures to rid our river system of dangerous invasive species, for example zebra mussels (Comment FWIP-029).

Maintain noxious-weed-free plant communities (cover types) or restore plant communities with noxious weed infestations through use of broad-scale integrated weed management (IWM) strategy(ies) (ICBEMP FEIS).

Exotic plant communities, other than seedlings, should meet minimum requirements of soil stability and maintenance of existing native plants. Rehabilitate these plant communities to perennial communities of diverse composition and structure when feasible, cost-effective methods are developed. *Rationale*: It is the intent of this objective to rehabilitate exotic plant communities, such as cheatgrass, back to the perennial plant communities that occupied these sites prior to human disturbances (ICBEMP FEIS).

1-4 Wildlife

Site-specific timber harvest, roading, and fire management plans in known lynx range … should be developed in consultation with state wildlife agencies and should address: (1) minimizing road construction, closing unused roads, and maintaining roads to the minimum standard possible; (2) using prescribed fire to maintain forage for snowshoe hare in juxtaposition with hunting cover; (3) designating areas as closed to kill trapping of any furbearer to avoid incidental lynx mortality to maintain population refugia for lynx in key areas; (4) planning for kill trapping closure on a wider basis if data indicate a declining lynx population as a result of incidental trapping mortality; and (5) developing and implementing a credible survey and monitoring strategy to determine the distribution of lynx throughout its potential range (NW Forest Plan ROD).

Maintain adequate numbers of large snags and green-tree replacements for future snags within the four species'[white-headed woodpecker, black-backed woodpecker, pygmy owl, and flammulated owl]ranges in appropriate forest types … Black-backed woodpeckers also require beetle-infested trees for foraging; some such trees should be provided in appropriate habitat (NW Forest Plan ROD).

Suitable northern spotted owl habitat should be maintained through time using various management techniques. The objective will be to always maintain an amount of suitable habitat equal to median amounts observed in pair home ranges in the province (NW Forest Plan ROD).

Timber harvest is prohibited within occupied marbled murrelet habitat at least until completion of the Marbled Murrelet Recovery Plan. The silvicultural treatments and non-habitat within the 0.5-mile circle must protect or enhance the suitable or replacement habitat (NW Forest Plan ROD).

Late-successional reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem (NW Forest Plan ROD).

Specific habitat components or features that contribute to the viability of species should be maintained and, where needed, restored. These features include, but are not limited to caves, mines, cliffs, talus, or burrows (ICBSDEIS, B-O46).

Develop broad-scale connectivity/linkages of wide-ranging carnivore habitat (ICBSDEIS, B-O49).

Minimize isolation of wide-ranging carnivore populations (ICBSDEIS, B-O50).

Special habitat components or features that contribute to the viability of species should be maintained and, where needed, restored. These features include but are not limited to caves, mines, cliffs, talus, or burrows (ICBEMP FEIS).

Minimize isolation of wide-ranging carnivore populations at the local level using existing planning processes and coordinating across administrative boundaries (ICBEMP FEIS).

1-5 Predators of Anadromous Fish

…incorporate the following measures into hydrosystem operations and management: Predator reduction and abatement (Tribal Vision).

We recommend changing existing sport fishing restrictions to concentrate on species that prey on, and compete with, salmon for food, including northern pikeminnow. Sport fishing regulation changes also should strive to minimize effects of exotic species on native species. The Region could experience short-term benefits from increased fishing opportunities for these competitor species (Governors' Recommendations, July 2000).

Immediately authorize expanded predator controls (MMPA) (Final All-H Paper Dec. 2000).

Improve predator control (including developing a sea bird management plan) (COE, NMFS, USFWS) (Final All-H Paper Dec. 2000).

Reduce predator populations in the mainstem and estuary (Framework Concept Paper 25).

Create and maintain sufficient activity on Rice Island to discourage occupation by Caspian Terns and Cormorants that prey on smolts, and if necessary make changes to the island that discourage avian predator habitat (Framework Concept Paper 27; PM Pasco).

Take direct action to control the bird population on Rice Island, marine mammals, and Northern pikeminnow that prey on salmon (Framework Alternative 7).

Remove Rice Island. Don't relocate the terns (PM Pasco).

Plant vegetation that discourages nesting of terns at Rice Island and the peninsula at the mouth of the Walla Walla River (Framework Concept Paper 11).

The Washington Department of Fish and Wildlife supports predator control, but does not believe that predator control should substitute for providing river flows and conditions that more nearly approximate normative (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

Rice Island and the peninsula at the mouth of the Walla Walla River should be planted in vegetation that discourages nesting of terns (Framework Concept Paper 11).

The legitimate, but disparate, focus of varying Federal laws, including the Endangered Species Act, the Migratory Bird Treaty Act, and the Marine Mammal Protection Act, present management challenges as we seek to protect ESA-listed juvenile and adult salmon and steelhead that, in turn, are prey for the birds and mammals also protected by these laws. We support actions to improve the coordination among these laws so that they are not working at cross-purposes (Governors' Recommendations, July 2000).

We recommend that the U.S. Army Corps of Engineers (Corps), NMFS, and the Fish and Wildlife Service develop a long-term management plan to address predation by fish-eating birds and marine mammals. The relocation of Caspian terns within the estuary was a good start but is not sufficient by itself. The number of Caspian terns, as well as that of double-crested cormorants, should be significantly reduced in the Columbia River Estuary. The Caspian tern predation rate on juvenile salmon and steelhead remains unacceptable, as is the inability of the Federal agencies to agree upon a common approach and a lead agency status for this effort. We recommend that such an approach be presented to the Region by the appropriate Federal agencies by the end of the year. As part of the long-term management strategy for seals and sea lions, we recommend congressional approval of NMFS's Framework Concept Paper to acquire additional authority to take seals and sea lions that persistently impact listed salmonid species (Governors' Recommendations, July 2000).

The Corps, in coordination with the NMFS Regional Forum process, shall implement and maintain effective means of discouraging avian predation (e.g., water spray, avian predator lines) at all forebay, tailrace, and bypass outfall locations where avian predator activity has been observed at FCRPS dams. These controls shall remain in effect from April through August, unless otherwise coordinated through the Regional Forum process. This effort shall also include removal of the old net frames attached to the two submerged outfall bypasses at Bonneville Dam. The Corps shall work with NMFS, FPOM, USDA Wildlife Services, and USFWS on recommendations for any additional measures and implementation schedules and report progress in the annual facility operating reports to NMFS. Following consultation with NMFS, corrective measures shall be

implemented as soon as possible (NMFS BiOp 2000, Action #101, Dec. 2000; BPA Appendix D: Action Table and Reports, R-101, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Action Agencies shall continue to implement and study methods to reduce the loss of juvenile salmonids to predacious fishes in the lower Columbia and lower Snake rivers. This effort will include continuation and improvement of the ongoing Northern Pikeminnow Management Program and evaluation of methods to control predation by non-indigenous predacious fishes, including smallmouth bass, walleye, and channel catfish (NMFS BiOp 2000, Action #100, Dec. 2000; BPA Appendix D: Action Table and Reports, R-100, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Reduce non-native predators (Framework Concept Paper 1).

Predator control is a pre-condition for any effort to get the Region to undertake major habitat measures. Undertake the most effective [predator control] methods without delay (Comment FWIP-029).

1-6 Watersheds

Provide for retention of old-growth fragments in watersheds where little remains (NW Forest Plan ROD).

Mandate appropriate water conservation measures to reduce out-of-stream demands for water (Tribal Vision).

Acquire water rights and conservation easements on adjacent private lands [*for instream flows*] (Tribal Vision).

Prevent further degradation and destruction of wetlands and restore impacted wetland areas (Tribal Vision).

Improve or eliminate land use activities and practived that degrade water and watershed quality (Tribal Vision).

Connect fragmented habitat (Tribal Vision).

Actively restore watersheds where salmon populations are in imminent danger of extirpation. Use "Coarse Screening Process" to develop demonstration projects (Framework Concept Paper 3).

Support watershed improvements and processes in the Oregon and Washington Plans (Framework Concept Paper 27).

Implement seven watershed restoration initiatives targeting core populations most at risk (USFS, BLM) (Final All-H Paper Dec. 2000).

Save our Wild Salmon supports water acquisition (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).

BOR shall initiate programs in three priority subbasins (identified in the Conceptual Recovery Plan) per year over 5 years, in coordination with NMFS, USFWS, the states and others, to address all flow, passage, and screening problems in each subbasin over 10 years. Under the NPPC program, BPA addresses passage, screening, and flow problems, where they are not the responsibility of others. BPA expects to expand on these measures in coordination with the NPPC process to complement BOR actions (NMFS BiOp 2000, Action #149, Dec. 2000; BPA Appendix D: Action Table and Reports, R-149, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #1, Oct. 2002).

Watersheds within the upper Columbia River basin ESU and Snake River basin ESU should be treated as key watersheds (as directed by PACFISH) and as designated critical habitat (PACFISH BiOp June 1998).

Restore and maintain the timing, variability, and duration of floodplain inundation and water table elevation (ICBSDEIS, R-O8).

Protect existing high quality habitat and accelerate restoration in high priority subbasins (USFS, BLM) (All-H Paper Dec. 2000)

Improvement in stream flows and water quality is "of utmost importance" to the Upper Columbia Regional Fisheries Enhancement Group. This includes the removal or reconfiguration of dikes and levees that disconnect active flood plain and side-channel habitat (9/20/01 letter from Michael B. Ward to the Action Agencies, 5YIP).

Develop a stream flow restoration Memorandum of Understanding to serve as a flow restoration plan template for use in restoring flows and ensuring adequate water for fish in watersheds with Endangered Species Act

(ESA) listings (Washington Plan, 2000).

Evaluate the effects of management on aquatic (including a biological component), riparian (including riparian-associated terrestrial species), and hydrologic (including uplands) condition through Watershed Condition Indicators (WCIs). For aquatic and hydrologic conditions use the NMFS/USFWS matrix of pathways and indicators as interim indicators until WCIs are ready for implementation (ICBEMP FEIS).

Restore connectivity within and among watersheds and networks of well-distributed high quality habitats that sustain populations of aquatic and riparian-dependent species (ICBEMP FEIS).

Authorize and fund FEMA buybacks of floodplain structures in priority habitats (Final All-H Paper Dec. 2000).

1-7 Tributaries

Establish pre-development baseline information and restore and/or mitigate to pre-development conditions and circumstances (Tribal Vision).

Focus intensively on improvements in both the mainstem sections of the Columbia and Snake Rivers and their tributaries. Manage river regulation of tributaries to remove thermal blockages that impede biological exchange within the basin (Draft Framework Alternatives 2, 3).

Promote aggressive habitat recovery methods for tributaries and in the Columbia and Snake River mainstems that optimize spawning and rearing habitat, including breaching dams in the tributaries where biologically and economically feasible (Framework Concept Paper 7).

Maintain and improve egg-to-smolt survival in natal tributaries (Framework Concept Paper 2).

Re-establish sources of large woody debris for each stream adequate to maintain long term supply and to meet the structure and nutrient needs of the stream (Framework Concept Paper 10).

Weir tributaries to allow only wild fish pass above the weir to spawn (Framework Concept Paper 13).

Fix flow, screening, and passage problems in priority subbasins, beginning in 2001 in the Methow, Upper John Day, and Lemhi (Final All-H Paper Dec. 2000).

Establish in-stream flows for anadromous fish tributaries within five years (Final All-H Paper Dec. 2000).

Save our Wild Salmon and the Sierra Club support aggressive habitat actions in tributaries, including screening irrigation diversions, removing passage barriers, and acquiring additional flows. (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP; 9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

Improvement in stream flows and water quality is "of utmost importance" to the Upper Columbia Regional Fisheries Enhancement Group. This includes the removal or reconfiguration of dikes and levees that disconnect active flood plain and side-channel habitat (9/20/01 letter from Michael B. Ward to the Action Agencies, 5YIP).

Re-establish sources of large woody debris for each stream adequate to maintain long term supply and to meet the structure and nutrient needs of the stream (Framework Concept Paper 10).

Establish instream flows in tributaries that reflect natural seasonal flow patterns. (Draft All-H paper Dec. 1999).

Provide instream flows adequate to support the natural functioning of small streams and tributaries as part of the Columbia River Basin's natural ecosystem (Framework Concept Paper 17).

Identify stream reaches and sub-basins where restoration efforts are most likely to be effective and focus restoration efforts in these areas (Oregon Plan, 1997).

Adopt instream flows by rule in high priority basins identified in the Statewide Strategy to Recover Salmon (SSRS) (Washington Plan, 2000).

Develop and begin implementation of comprehensive stream flow restoration plans in high priority instream flow restoration basins identified in the Statewide Strategy to Recover Salmon (SSRS) (Washington Plan, 2000).

Preserve and/or restore buffer areas in appropriate locations along tributaries and the mainstem to a condition that is adequate to maintain a healthy, functioning riparian zone for the lower river and estuary (LCREP).

1-8 Mainstem Columbia

Possibilities for a mainstem habitat implementation plan: create shallow-water habitat by excavating backwater sloughs, alcoves, and side channels and other measures add large woody debris to these systems; re-connect alcoves, sloughs, and side channels to the main channel; establish emergent aquatic plants in shallow water areas; re-establish or enhance historic or existing wetlands; mimic natural hydrographs to the extent practicable; dredge or excavate lateral channels that have silted in; acquire and protect a belt of lands adjacent to the mainstems (Draft All-H paper Dec. 1999).

Protect, conserve and enhance identified habitats, particularly wetlands, on the mainstem of the lower Columbia River (LCREP).

1-9 Reservoirs

Provide instream and reservoir environmental conditions necessary to provide adequate survival of resident fish and other aquatic species. Explore ways to stabilize reservoir levels (Draft All-H paper Dec. 1999).

1-10 Estuary and Ocean

Protect and restore critical estuary habitat (Framework Concept Paper 3; Spirit of the Salmon).

Restore 3,000 acres of tidal wetlands along the lower 46 river miles to return tidal wetlands to 50 percent of the 1948 level (LCREP).

Restore 13,000 acres of tidal wetlands in the lower 46 miles of river and adjoining tributaries. Take additional actions based on recommendations of Lower Columbia River Estuary Program, EPA Estuary Program and and Corps study (to be conducted). Coordinate Federal and state threatened and endangered species recovery activities in the lower Columbia River and estuary and help local communities meet species recovery requirements (LCREP).

Provide and maintain public information and education efforts about the lower river and estuary that focus on endangered species, habitat loss and restoration, biological diversity, and lifestyle practices and connections to the river (LCREP).

[Implement more] public education and outreach (Final All-H Paper Dec. 2000).

The Corps and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River. The Corps shall seek funds for the Federal share of the program, and BPA shall provide funding for the non-Federal share. The Action Agencies shall provide planning and engineering expertise to implement the non-Federal share of on-the-ground habitat improvement efforts identified in LCREP, Action 2 (NMFS BiOp 2000, Action #160, Dec. 2000; BPA Appendix D: Action Table and Reports, R-160, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #3, Oct. 2002).

Protect critical estuary habitat and restore former estuary habitat (Tribal Vision).

Evaluate flow regulation, river operations and estuary-area habitat changes to better understand the relationship between estuary and near-shore plume characteristics and the productivity, abundance and diversity of salmon and steelhead populations (Council's 2000 Fish and Wildlife Program).

Enhance the natural expression of biological diversity in salmon and steelhead populations to accommodate mortality and environmental variability in the ocean (Council's 2000 Fish and Wildlife Program).

Restore ecological role of salmon in coastal ecosystems in a manner and to an extent consistent with restoration goals (Oregon Plan, 1997).

Maintain public information and education efforts about the lower river and estuary that focus on endangered species, habitat loss and restoration, biological diversity, and lifestyle practices and connections to the river (LCREP).

Coordinate Federal and state threatened and endangered species recovery standards in the lower Columbia River and estuary and help local communities meet species recovery requirements (LCREP).
1-11 Water Quality
Emphasize a substantial and explicit tie between water quality compliance efforts (already under court orders in three states) and salmon recovery (Draft All-H Paper Habitat Option 2, Dec. 1999). Determine water quality standards for fish habitat—for example, water temperatures can be no higher than 60ºF. If standards are not met, land and water managers must take action that will achieve compliance (Spirit of the Salmon).
Manage human activities to meet regional and Federal air and water quality standards (Framework Alternatives 1, 2, 3, 4).
Establish a sediment threshold for spawning areas that is not limiting to salmonid egg development and fry emergence (Framework Concept Paper 10).
Implement the Clean Water Act, including the timely development of total maximum daily load regimes and enforcement of state ambient water quality standards and designated waterway uses in Idaho, Montana, Oregon, and Washington (Framework Concept Paper 5).
Improve water quality in the mainstem and tributaries by reducing or eliminating toxic pollution, point and non-point sources and other contaminanat discharges in compliance with applicable water quality criteria (at a minimum) (Tribal Vision).
Implement increased regulation by the Federal agencies under the CWA and ESA (Draft All-H Paper Habitat Option 2, Dec. 1999).
Stream and river reaches throughout the Columbia River Basin have flow and water quality problems that impede regional fish recovery efforts. The states are setting water quality standards and preparing implementation plans in accordance with previously established schedules. The states are also reviewing instream flow levels to address biological requirements for ESA-listed aquatic species. We are concerned, however, that the timelines for these tasks be fully consistent with the timeline required for salmon recovery. Therefore, we recommend Federal assistance and support be made available to the states to better coordinate these timelines and, where necessary, to accelerate water quality improvements and to establish instream flows that benefit listed aquatic species in the Columbia Basin (Governors' Recommendations, July 2000).
BOR shall evaluate the water quality characteristics of each point of surface return flows from the Columbia Basin Project to the Columbia River and estimate the effects these return flows may have on listed fish in the Columbia River and in the wasteways accessible to listed fish. By June 1, 2001, BOR shall provide NMFS with a detailed water quality monitoring plan, including a list of water quality parameters to be evaluated. If the water quality sampling reveals enough water quality degradation to adversely affect listed fish, BOR shall develop and initiate implementation of a wasteway water quality remediation plan within 12 months of the completion of the monitoring program (NMFS BiOp 2000, Action #39, Dec. 2000; BPA Appendix D: Action Table and Reports, R-39, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).
Protect, enhance, rehabilitate and restore instream flows and conditions and overall watershed health and productivity—specifically:… Monitor existing water withdrawals and halt all unauthorized, not permitted or otherwise illegal withdrawals or uses. (Tribal Vision)
Develop and implement TMDLs for anadromous fish tributaries within five years (Final All-H Paper Dec. 2000).
Determine water quality standards for fish habitat—for example, water temperatures can be no higher than 60ºF. If standards are not met, land and water managers must take action that will achieve compliance (Spirit of the Salmon).
Improve water quality through watershed habitat improvements and compliance with federally approved state and tribal water quality standards (Draft All-H paper Dec. 1999).
Implement water conservation for public water suppliers, and agricultural irrigation districts, and implement waste water reuse programs focused toward 19 high priority basins identified in Statewide Strategy to Recover Salmon (SSRS) (Washington Plan, 2000).
Implement key salmon related actions contained in "Washington's Water Quality Management to Control Non-

point Source Pollution," (Washington Plan, 2000).

Develop and implement schedule for water cleanup plans - Total Maximum Daily Load (TMDL) – focusing on watersheds with listed species first (Washington Plan, 2000).

Prohibit storage of fuels and other toxicants [and refueling] within Riparian Habitat Conservation Areas [with certain exceptions] (INFISH/PACFISH EAs).

2 HARVEST

Manage fisheries for the resource, not harvest (Framework Concept Paper 5).

Develop selective harvest to ensure reasonable fishing opportunities while reducing impacts to native stocks (Framework Concept Paper 5).

Weak stock management reforms are permanent. Future increases in mixed stock area fisheries will depend almost entirely on increased production of weak natural populations and/or greater harvest selectivity (Draft All-H paper Dec. 1999).

Target strong stocks *[for harvest]* and minimize impacts on weak and imperiled stocks (Framework Concept Paper 1).

Initially, harvest rates would be low in tributary, mainstem, and ocean fisheries until measurable responses were obtained from combined actions, and then harvest rates would increase consistent with recovery and rebuilding goals (Framework Concept Paper 6).

Shift fishing effort to rivers of origin to emphasize benefits to local economies and to promote known stock fisheries (Framework Alternatives 1, 2, 3).

Reform the region's harvest policies to prohibit mixed stock harvest. This can be accomplished by shifting to live capture and release in areas where natural and hatchery stocks are intermingled and by emphasizing terminal fisheries where harvest can occur on known strong or hatchery stocks (Framework Concept Paper 14).

The Oregon Department of Fish and Wildlife supports live capture options (9/25/01 letter from Tony Nigro to Neal Coenen, 5YIP).

Mark All-Hatchery fish so as to facilitate selective harvest. Weak stock management is impossible without selective harvest; selective harvest (other than terminal harvest) is impossible without marking All-Hatchery fish (Framework Alternative 7).

Expand genetic diversity by allowing sufficient escapement to achieve full seeding of each protected stock's spawning habitat (Framework Concept Paper 25).

Manage harvest to protect weakest protected stocks (currently, ESA-listed stocks) to achieve adequate spawning ground escapement and seeding (Framework Concept Paper 26).

Manage for escapement to spawning grounds (Framework Concept Paper 27). Ensure adequate natural spawner escapement to streams (Framework Concept Paper 20).

Place a moratorium on harvest of wild stocks in the mainstem, with tributary-by-tributary escapement goals for protected wild stocks. Mainstem harvest can be allowed only to the extent that the weakest wild stock subject to protection has adequate spawning escapement for adequate seeding (Framework Concept Paper 26).

Implement harvest actions that protect weak stocks (Framework Concept Paper 4).

Integrate harvest management to assure that conservation efforts made in one fishery can be passed through subsequent fisheries. Revise harvest management to more adequately spread the risk of imprecision and error in predicted run size. Enact more conservative harvest limits on fisheries farthest from the spawning grounds, for which information is less adequate. Develop adequate escapement, catch, and age data on important natural spawning populations. Establish in-season management protocols that can better estimate abundance and stock composition (Council's 2000 Fish and Wildlife Program).

The Inland Ports and Navigation Group has expressed concern regarding the use of commercial netting for harvesting (8/31/01 letter from Walter H. Evans, III to BPA). The concern is that harvest may selectively remove the larger/stronger fish, leaving only the smaller/weaker fish to spawn, thus resulting in a gradual decline in the genetic viability of populations. Under the weak stock focus, BPA would consider funding

research to examine this issue.

We commit to support a recovery approach designed not only to achieve ESA de-listing levels but also to rebuild the runs to levels that support treaty and non-treaty harvest. But we believe rebuilding requires that All-Harvest may have to be reduced in the short term, together with aggressive actions taken to address mortality in the other life stages. We respect the legal status and cultural importance of Indian treaty fishing rights. Changes in harvest management suggested below must be developed in partnership with the treaty tribes so they are consistent with the ongoing harvest and production litigation under *U.S. v. Oregon*, and also with Federal and state governments to comply with the Pacific Salmon Treaty (Governors' Recommendations, July 2000).

Develop stable system capable of supporting sustainable…fish populations and harvest, equal to the level of historical (pre-dam) conditions (Framework Concept Paper 13).

2-1 Anadromous Fish

The region's fisheries law enforcement programs should be strengthened to ensure accountability and reduce illegal catch. Increased law enforcement should be concentrated and coordinated with habitat strategies to aid specific watersheds. We recommend this be accomplished through appropriate tribal, state and Federal law enforcement programs (Governors'Recommendations, July 2000).

Financial incentives must be broadened beyond selective fisheries to include economic incentives to reduce impacts to listed stocks, financial assistance for developing "value-added" fishery-related industries and mitigation of economic impacts to fishing-dependent communities (Governors' Recommendations, July 2000).

Establish harvest regimes based on escapement goals to enable the recovery and restoration of all salmon and other fish and wildlife species (Tribal Vision).

Manage harvest to protect weak stocks by stopping All-Harvest of wild fish (Framework Alternative 7).

Manage human activities to minimize artificial selection or limitation of life history traits (Council's 2000 Fish and Wildlife Program).

Allow harvest only where impacts to wild fish are quantified and minimized (Framework Concept Paper 5).

Develop selective harvest to ensure reasonable fishing opportunities while reducing impacts to native stocks (Framework Concept Paper 5).

Fish would be caught in their rivers of origin to emphasize benefits to local communities and to minimize impacts on weak wild stocks (Framework Alternative 1).

Continue development of selective fisheries where there are no adverse effects on wild stocks (Framework Concept Paper 5).

As part of the Pacific Salmon Treaty process, the Pacific Salmon Commission should adopt a coast-wide abundance-based regime for chinook to protect depressed and less productive natural stocks. This is extremely necessary for Columbia and Snake River chinook that traverse through and graze for much of their adult life in Gulf of Alaska or Canadian waters. Harvest impacts for chinook would be reduced to 50% total mortality throughout their range (Framework Concept Paper 5).

Establish a harvest management process that achieves escapement objectives and is accountable each year for those objectives (Framework Concept Paper 10).

Redirect lower river mixed-stock commercial harvest to terminal harvest away from mainstem migration corridor. No improvement in upriver stocks is possible with present high levels of mixed stock harvest (Framework Concept Paper 26).

The Shoshone-Bannock Tribes are opposed to the marking of all hatchery fish. Instead, they support mixed-stock area closures and fisheries relocation (9/28/01 letter; no author or recipient indicated, 5YIP).

Replace mixed stock fisheries with known stock fisheries with the purpose of achieving spawner abundance goals. The fisheries should be managed as a by-product of salmonid protection (Framework Concept Paper 10).

Shift to terminal fisheries to allow for selective stock harvest (Framework Concept Paper 27).

Work toward elimination of ocean salmon harvest, including treaty negotiations with Canada. If each country catches "its own" salmon, search, production and management costs of commercial salmon harvest will decrease, along with political friction (Framework Concept Paper 26).

Limit fishing during the Pacific Decadal Oscillation period and stop hunting endangered species on the way to their breeding grounds (PM Pasco).

Provide sufficient funding for managing fisheries and contributing to the transition to selective fisheries, and for the 1999 Pacific Salmon Treaty Agreement (Final All-H Paper Dec. 2000).

Implement the recently negotiated Pacific Salmon Treaty conditions for Alaskan and Canadian fisheries, except that additional voluntary reductions would be sought in these fisheries. All other harvest impacts on listed populations would be reduced to conservation crisis levels for a period of years, after which harvest could be adjusted (Draft All-H Paper Harvest Option 3, Dec. 1999).

Implement conservation crisis levels, defined as levels similar to the 1999 harvest rates for listed spring/summer chinook, and comparable conservation crisis levels for listed Snake River fall chinook and listed steelhead. All of these rates would be frozen until recovery goals are achieved (Draft All-H Paper Harvest Option 3, Dec. 1999).

Implement the recently negotiated Pacific Salmon Treaty (PST) conditions in all ocean fisheries and, as contemplated in that agreement, further constrain U.S. fisheries south of Canada in some years if necessary to comply with the ESA. It would apply the constraints currently being developed for upper Willamette and lower Columbia chinook salmon. When abundance of listed stocks is similar to 1999, the in-river fisheries would be managed to limit impacts on listed summer chinook to 5 percent or less and on spring chinook to 7 percent or less. In-river fall fisheries would be managed so as not to exceed the 1999 harvest rate limits for Snake River fall chinook and B-run steelhead. In anticipation of higher abundance in the future, a schedule would be developed that allows harvest rates to increase as abundance increases (Draft All-H Paper Harvest Option 1, Dec. 1999).

Constrain harvest impacts on listed ESUs to no more than recently established current levels (Final All-H Paper Dec. 2000).

Seek opportunities to further reduce fishing impacts on listed fish where necessary and effective by helping the states and tribes develop alternative fishing techniques and/or locations and by enabling more selective fisheries and helping to develop the necessary institutional mechanisms and analytical capabilities to support management of selective fisheries (BPA/NMFS/USFWS) (Final All-H Paper Dec. 2000).

Seek opportunities to increase harvest in ways that do not harm listed ESUs (NMFS/USFWS) (Final All-H Paper Dec. 2000).

Pursue conservative harvest policies (weak stock management) (Final All-H Paper Dec. 2000).

Decrease mixed stock harvest; accept economic incentives not to fish during certain migration periods (Framework Concept Paper 27).

Impose sanctions on nations that illegally catch salmon and steelhead (Framework Concept Paper 1).

Idaho identified the following as key near-term actions consistent with their perspective with harvest priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP):

- Snake River Basin
  - Implement IDFG incidental mortality (research) in selective sport fisheries projects, identified in Mountain Snake Provincial Review.
  - Continue implementation of rearing, marking and selective fishery programs for salmon and steelhead, and upgrade equipment to support new technology and a comprehensive marking program.
- Extra-Snake River Basin
  - Expand and support use of selective fisheries, including appropriate economic mitigation.
  - Investigate additional migration timing and movement information to support selective fishing.
  - Investigate methods to differentiate listed and non-listed fall chinook to shape mainstem fisheries.

Decrease harvest for all but the very strongest species with close attention to the numbers returning (Comment

FWIP-019).
Manage harvest and fishery- related mortality to achieve numbers and distribution of spawners consistent with management objectives (Oregon Plan, 1997).
Comprehensive species management planning -- Continue and complete Comprehensive Species Management Planning under U.S. v. Washington and U.S. v. Oregon: review and revise regional harvest management plans relative to salmonid rebuilding and recovery goals; review/identify spawner and/or exploitation rate objectives, and identify fishery measures that meet spawner/exploitation guidelines in order to ensure sustainable harvest consistent with stock protection and ESA. This includes development of Comprehensive Chinook and Comprehensive Coho Management Plans for Puget Sound stocks; development of recovery and rebuilding plans for listed (such as Hood Canal summer chum) and non-listed stocks, as well as management plans for selected coastal rivers; implementation of U.S. and Canadian fishing regimes that support the 1999 Pacific Salmon Treaty Annexes and achieve stock protection and recovery objectives; completion of individual watershed plans initiated under U.S. v. Washington and the Puget Sound Salmon Management Plan (Washington Plan, 2000).
Continue to implement annual harvest measures, through the North of Cape Falcon/Pacific Fisheries Management Council fishery season-setting process, that achieve spawner/exploitation objectives consistent with salmon recovery. Annual fishery measures include time, area and gear restrictions, and specify measures that implement selective harvest of hatchery fish, where appropriate, and that reduce release mortality of non-target species. Continue/pursue ESA authorization for harvest-related incidental takes through Sections 7 (endangered and threatened species) or 4(d) (threatened species) of ESA (Washington Plan, 2000).
Continue non-Indian commercial salmon fleet license buyback (Washington Plan, 2000).
2-2 Resident Fish
Establish harvest regimes based on escapement goals to enable the recovery and restoration of all salmon and other fish and wildlife species (Tribal Vision).
Develop stable system capable of supporting sustainable resident fish populations and harvest, equal to the level of historical (pre-dam) conditions (Framework Concept Paper 13).
2-3 Wildlife
Continue monitoring and evaluation of wildlife populations to determine success of enhancement and maintenance of habitat values, and establish post-enhancement recovery goals and corresponding limits on harvest (Tribal Vision).
Establish harvest regimes based on escapement goals to enable the recovery and restoration of all salmon and other fish and wildlife species (Tribal Vision).
3 HATCHERIES
Use hatcheries and other propagation programs only as part of a broader, ecosystem-based plan (Framework Concept Paper 1).
Determine genetic and life history diversity of fish populations as a benchmark for management and recovery actions (Framework Concept Paper 10).
Focus on listed anadromous fish, while optimizing benefits and minimizing risks to resident and non-listed anadromous fish. Wherever possible, options should provide complementary benefits among resident and anadromous fish, as well as native wildlife populations (Framework Concept Paper 9).
Maintain and protect population structure including small, less productive populations (Framework Concept Paper 10).
Preserve or enhance existing native stock structures and genetic diversity (Framework Concept Paper 9).
Terminate hatcheries that contribute to the decline of native salmonid populations through disruption of genetic and life history diversity and have negative ecological effects on target and non-target native populations (Framework Concept Paper 10).
Increase production of indigenous fish and wildlife species to full natural productivity (Framework Concept

Paper 4).

Preserve or enhance existing native stock structures and genetic diversity (Framework Concept Paper 9).

Make natural spawning the top priority, stocking only in accordance with the natural carrying capacities of each watershed (Framework Concept Paper 1).

Use artificial production with an emphasis on protection and recovery of native fish, employing appropriate conservation management actions such as supplementation to provide eggs and juveniles for outplanting (Framework Concept Paper 4).

Emphasize supplementation and captive brood programs to help maintain weak naturally spawning populations (Framework Concept Paper 27).

Discontinue current hatchery rearing and release methods (Spirit of the Salmon).

Naturally selected populations should provide the model for successfully artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics (Council's 2000 Fish and Wildlife Program).

The entities authorizing or managing an artificial production facility should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some other combination of those purposes for each population of fish addressed (Council's 2000 Fish and Wildlife Program).

Artificial production programs might be used to rebuild populations of fish that spawn naturally and also provide fish for tribal, sport, and commercial harvest. In doing so, they should minimize the adverse impacts from interactions between artificially produced fish and those that spawn naturally. Interactions can adversely impact the unique genetics of fish that spawn naturally and, over time, dilute or weaken the unique genetic makeup of those populations (Council's Artificial Production Review, October 1999; Council's 2000 Fish and Wildlife Program).

The State of Idaho supports the use of hatcheries to enhance recovery (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Expand the safety net program for the most at-risk populations; use a variety of conservation hatchery techniques to aid the recovery effort (NMFS/BPA/USFWS) (Final All-H Paper Dec. 2000).

The State of Idaho supports the safety-net program, and has submitted projects related to safety-net programs via the Provincial Review (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Idaho identified the following as key near-term actions consistent with their perspective with hatchery priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP):

- Develop Snake Basin fall chinook plan with state, tribal and Federal parties.
- Implement the IDFG's four-step planning projects for Idaho steelhead and salmon, as identified in the Mountain Snake Provincial Review.
- Develop HGMPs for LSRCP/Federal programs identified in the Mountain Snake Provincial Review.
- Develop additional well water at Sawtooth and Pahsimeroi hatcheries.
- Implement evaluation of federally-funded unclipped steelhead released for *United States vs. Oregon*-directed supplementation, as identified in Mountain Snake Provincial Review.

Declare specific tributaries "off-limits" to hatcheries *[e.g., John Day River]* to provide buffer zones against genetic problems with wild fish (Framework Concept Paper 26).

3-1 Anadromous Fish

Use artificial production, with an emphasis on protection and recovery of native fish, employing appropriate conservation management actions such as supplementation to provide eggs and juvenile fish for out-planting (Tribal Vision).

To facilitate a robust harvest program for hatchery fish in a way that does not impact wild fish, we endorse a program that results in the marking of hatchery fish that pose threats to ESA-listed fish, to the fullest expent consistent with the Pacific Salmon Treaty. We also urge tribal, state and Federal fish managers to put such a program in place promptly, as it will be difficult to implement many improved harvest techniques until it is

possible to identify hatchery-reared fish (Governor' Recommendations, July 2000).

Finally, hatchery operations must be modified so that excess fish are not being produced for fisheries where they cannot be harvested because of the impacts on weak stocks. Harvest goals must be linked to fish production goals (Governors' Recommendations, July 2000).

Use supplementation to: Rebuild salmon populations, including those at high risk of extirpation, and minimize genetic risks such as inbreeding depression…(Tribal Vision).

Modify the National Marine Fisheries Service's "Evolutionarily Significant Unit" ("ESU") policy and state "wild fish" policies to increase their flexibility so as to allow effective implementation of supplementation programs consistent with sound conservation biology principles (Tribal Vision).

Increase programs to conserve genetic resources, and significantly decrease mitigation programs below currently planned levels (Draft All-H Paper Hatcheries Option 3, Dec. 1999).

For re-creating self-sustaining populations, stock fish that are as locally adapted and undomesticated as possible in as small an amount as possible for as few years as possible. Do not accept artificial production in lieu of habitat protection. Use funds saved by downsizing hatchery programs to restore habitat (Framework Concept Paper 1).

Allow hatchery programs to continue only where there is no impact to wild salmonids. Where hatchery programs continue, adopt dramatically different hatchery practices that mimic natural conditions in broodstock selection, rearing, feeding, acclimation, and release (Framework Concept Paper 5).

Develop and test the concept of a conservation hatchery where the purpose is to conserve wild, native salmonid populations including their evolutionary potential, locally adapted gene pools, and characteristic phenotypes and behaviors (Framework Concept Paper 10).

Maintain genetic and life history diversity represented by each population in each watershed (Framework Concept Paper 10).

[End] the transfer of salmonids among hatcheries and subbasins (Framework Concept Paper 10).

Allow use of hatcheries in areas below dams that block salmon migration, but require that the fish release closely match those lost (Framework Alternatives 3, 4, 5).

The State of Idaho supports the development and implementation of HGMPs for all federally funded hatcheries within the Columbia River Basin by December 31, 2003 (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The Colville Confederated Tribes support the use of HGMPs to address hatchery reform and supplementation issues (10/2/01 letter from Joe Peone to BPA, 5YIP).

The Corps, in coordination with USFWS, shall design and implement appropriate repairs and modifications to provide water supply temperatures for the Dworshak National Fish Hatchery that are conducive to fish health and growth, while allowing variable discharges of cold water from Dworshak Reservoir to mitigate adverse temperature effects on salmon downstream in the lower Snake River (NMFS BiOp 2000, Action # 33, Dec. 2000; BPA Appendix D: Action Table and Reports, R-33, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Implement transfers of facilities or responsibility for operation of certain production programs subject to approved HGMPs for up to four hatcheries (Final All-H Paper Dec. 2000).

Using new authorizations and appropriations and/or BPA funds as necessary and appropriate, the Corps, working with USFWS, shall oversee the design and construction of capital modifications identified as necessary in the HGMP planning process for Lower Snake River Compensation Plan anadromous fish hatchery programs. These improvements shall begin immediately after the relevant HGMPs are completed and approved by NMFS, and shall be completed as expeditiously as is feasible. BPA shall provide for the operations and maintenance costs of these reforms and shall reimburse the Federal Treasury for an appropriate share of the capital costs. The Corps shall have begun to implement reforms for programs affecting the most at-risk species by the 3-year check-in (NMFS BiOp 2000, Action #170, Dec. 2000; BPA Appendix D: Action Table and Reports, R-170, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #2, Oct. 2002).

BOR shall implement the reforms identified in the HGMP planning process for the Grand Coulee mitigation

anadromous fish hatchery programs, beginning immediately following completion of the relevant (NMFS approved) HGMPs and completing the work as expeditiously as feasible. BPA shall fund the operations and maintenance costs of the reforms and shall reimburse the Federal Treasury for an appropriate share of the capital costs. BOR shall have begun to implement reforms for programs affecting the most at-risk species by the 3-year check-in (NMFS BiOp 2000, Action #171, Dec. 2000; BPA Appendix D: Action Table and Reports, R-171, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #2, Oct. 2002).

The Corps shall implement the reforms identified in the HGMP planning process for the Corp's Columbia River basin mitigation anadromous fish hatchery programs, beginning immediately after the relevant HGMPs are completed and are approved by NMFS. The work shall be completed as expeditiously as feasible. BPA shall fund the operations and maintenance costs of the reforms and shall reimburse the Federal Treasury for an appropriate share of the capital costs. The Corps shall have begun to implement reforms for the programs affecting the most at-risk species by the 3-year check-in (NMFS BiOp 2000, Action #172, Dec. 2000; BPA Appendix D: Action Table and Reports, R-172, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #2, Oct. 2002).

BPA shall implement the reforms identified in the HGMP planning process for Federal and federally funded hatcheries, beginning immediately after the relevant HGMPs are completed and approved by NMFS. The work shall be completed as expeditiously as possible. BPA shall have begun to implement reforms for the programs affecting the most at-risk species by the 3-year check-in (NMFS BiOp 2000, Action #173, Dec. 2000; BPA Appendix D: Action Table and Reports, R-173, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #2, Oct. 2002).

Working through regional prioritization processes to the extent feasible and in coordination with NMFS, BPA shall collaborate with the regional, state, tribal, and Federal fish managers and the Pacific States Marine Fisheries Commission to enable the development and implementation of a comprehensive marking plan. Included in this action are the following four steps (NMFS BiOp 2000, Action #174, Dec. 2000; BPA Appendix D: Action Table and Reports, R-174, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #3, Oct. 2002):

1. Develop a comprehensive marking strategy for all salmon and steelhead artificial production programs in the Columbia River basin by the end of 2001.
2. Provide funding by March 1, 2001, to begin marking all spring chinook salmon that are currently released unmarked from Federal or federally funded hatcheries.
3. Provide funding, beginning in FY 2002, to implement the Action Agencies' share of the comprehensive marking plan for production not addressed in (2) above.
4. Obtain funding contributions as appropriate for additional sampling efforts and specific experiments to determine relative distribution and timing of hatchery and natural spawners.

BPA shall, in coordination with NMFS, USFWS, and the relevant state and tribal co-managers, fund the four-step planning process described above as quickly as possible and, if so determined by that process, implement safety-net projects as quickly as possible at least for the following salmon and steelhead populations: 1) A-run steelhead populations in the Lemhi River, main Salmon River tributaries, East Fork Salmon River, and Lower Salmon River; 2) B-run steelhead populations in the Upper Lochsa River and South Fork Salmon River; and 3) spring/summer chinook populations in the Lemhi, East Fork, and Yankee Fork Salmon Rivers, and Valley Creek (NMFS BiOp 2000, Action #175, Dec. 2000; BPA Appendix D: Action Table and Reports, R-179, June 5, 2001).

BPA shall, in coordination with NMFS, USFWS, and the relevant state and tribal co-managers, fund the development of HGMPs for the Grande Ronde and Tucannon spring/summer chinook safety-net programs (NMFS BiOp 2000, Action #176, Dec. 2000; BPA Appendix D: Action Table and Reports, R-180, June 5, 2001).

BPA shall commit to a process whereby funds can be made quickly available for funding the planning and implementation of additional safety-net projects for high-risk salmon and steelhead populations NMFS identified during the term of this biological opinion (NMFS BiOP 2000, Action #178, Dec. 2000; BPA Appendix D: Action Table and Reports, R-182, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #1, Oct. 2002).

Expand the safety net program for the most at-risk populations; use a variety of conservation hatchery

techniques to aid the recovery effort (NMFS/BPA/USFWS) (Final All-H Paper Dec. 2000).

In 2002, BPA shall begin to implement and sustain NMFS-approved, safety-net projects (NMFS BiOp 2000, Action #177, Dec. 2000; BPA Appendix D: Action Table and Reports, R-181, June 5, 2001).

Implement HGMPs at Federal, state, and tribal facilities by making necessary operational improvements and capital changes in programs and facilities (Final All-H Paper Dec. 2000).

Prepare and implement HGMPs for state-run hatcheries (Final All-H Paper Dec. 2000).

Concurrently [with the development of fish passage] re-introduce fish species and stocks that genetically and behaviorally resemble the assemblages present before the construction of the Upper Columbia River dams. Reestablishment of healthy anadromous fish populations will require artificial production facilities to establish populations while adequate habitat is filled and degraded habitat is rehabilitated (Framework Concept Paper 13).

Manage hatchery populations consistent with Natural Production, Gene Conservation, and Wild Fish policies (ODFW) (Oregon Plan, 1997).

Evaluate supplementation and stock recovery production programs relative to wild fish needs, define appropriate stock recovery methods involving supplementation, implement improvements to existing programs as needed, and determine potential for additional programs that could contribute to wild fish recovery; modify or eliminate programs that have a high risk of adversely affecting listed wild fish. (Phase II) (Washington Plan, 2000)

Implement improved artificial production practices and facilities to protect wildstocks (Washington Plan, 2000).

3-2 Resident Fish

Develop artificial propagation and managmenet strategies and techniques for white sturgeon populations above Bonneville Dam (Tribal Vision; Framework Concept Paper 3; Spirit of the Salmon).

The Action Agencies shall continue to maintain the preservation stocking program *[of Kootenai River white sturgeon]* (BPA Appendix D: Action Table and Reports, June 5, 2001). For example, the program operated by the Kootenai Tribe of Idaho, and associated rearing facilities operated by B.C. Ministry of Environment, Lands and Parks (FWS BiOp 2000, Action #8(4)(a), Dec. 2000; BPA Appendix D: Action Table and Reports, R-263, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Support equitable portion of ongoing Kootenay Lake fertilization program (Lake Pend Oreille Kokanee Mitigation Research) (FWS BiOp 2000, Action #8(1)f, Dec. 2000; BPA Appendix D: Action Table and Reports, R-237, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

4 HYDRO

Use relicensing and ESA consultation to improve flows, passage, etc. at non-Federal dams on the Deschutes, Lewis, Cowlitz, and other basins (FERC) (Final All-H Paper Dec. 2000).

The position of Save our Wild Salmon is that major investments in bypass facilities will yield little in survival benefits (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).

View the cost of fishery recovery as an investment to an economic benefit for the entire regional population rather than a cost or loss of benefits of the hydroelectric projects (Framework Concept Paper 15).

4-1 Dam Modifications and Facilities

Breach one or more dams (Framework Alternatives 1, 2, 3).

Breach Lower Snake River Dams (Draft All-H Paper Hydro Option 3 Dec. 1999; Framework Concept Papers 1, 2, 3, 4, 5, 6, 7a, 7b).

Snake River dams are breached as soon as Congressional authorization and appropriation occur (Draft All-H Paper Dec. 1999).

Commenters support dam breaching, particularly the four dams on the lower Snake (9/4/01 letter from Jack Rose to the Federal Caucus, 5YIP; 9/4/01 letter from Richard Carasone to the Federal Caucus, 5YIP).

Restore natural river levels, conditions and habitat in the Lower Snake River by removing the earthen embankments at Ice Harbor, Lower Monumental, Little Goose and Lower Granite dams and mitigate for the economic and other short-term impacts that will occur; draw down Lower granite reservoir to 710 feet (spillway crest) until embankment removal is assomplished (Tribal Vision).

Achieve natural river-level drawdown of lower Snake projects (partially dismantling Lower Granite, Little Goose, Lower Monumental, and Ice Harbor by removing the earthen portion of each dam by spring 2005) (Framework Concept Paper 5).

Implement hydropower actions under time-line requirements of ESA, and drawdown feasibility studies of John Day Dam (Framework Concept Paper 6).

Build no new dams in salmon and steelhead habitat (Framework Concept Paper 1).

This alternative consists of breaching the four *[Lower Snake]* dams and creating a free-flowing 140-mile stretch of river. This would involve removing the earthen embankment section of each dam and eliminating the reservoirs behind the dams. Under this alternative, all facilities for transporting fish would cease to operate. A free-flowing river can be achieved by removing only the embankment. The powerhouses, spillways, and navigation locks would not be removed, but would no longer be functional, eliminating power production and commercial navigation (The Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement Executive Summary, US Army Corps of Engineers).

Remove existing extended length turbine intake screens; halt construction of new screens and consider removing existing standard length screens (Tribal Vision).

The Corps and BPA, through the annual planning process, shall develop and implement 1- and 5-year operations and maintenance (O&M) plans and budgets that enhance the capability to operate and maintain fish facilities at FCRPS projects for listed salmonid stocks (NMFS BiOp 2000, Action #6, Dec. 2000; BPA Appendix D: Action Table and Reports, R-6, June 5, 2001)

The Corps shall continue design development of a prototype RSW and extended deflector for testing at John Day in 2002. The Corps should synthesize evaluation results, determine the fish survival benefits of one or more RSWs or a skeleton bay surface bypass, and install the units as warranted (NMFS BiOp 2000, Action #72, Dec. 2000; BPA Appendix D: Action Table and Reports, R-72, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate a surface bypass RSW at McNary Dam, based on prototype results at other locations, and shall install the unit in multiple spillway bays, as warranted (NMFS BiOp 2000, Action #75, Dec. 2000; BPA Appendix D: Action Table and Reports, R-75, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall complete the extended submerged intake screen systemwide letter report and implement recommended improvements (NMFS BiOp 2000, Action # 96, Dec. 2000; BPA Appendix D: Action Table and Reports, R-96, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall complete the ongoing prototype powerhouse system surface collection evaluations at Bonneville First Powerhouse in 2000. The Corps shall compare the prototype with screened bypass systems and, if warranted, design and construct permanent facilities after full consideration and resolution of biological and engineering uncertainties, especially high-flow outfall investigations (NMFS BiOp 2000, Action #61, Dec. 2000; BPA Appendix D: Action Table and Reports, R-61, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue design development and construction of a Bonneville Second Powerhouse permanent corner collector at the existing sluice chute, pending results of high-flow outfall investigations. The Corps shall construct new facilities if, and as soon as, evaluations confirm the optimum design configuration and survival benefits (NMFS BiOp 2000, Action #66, Dec. 2000; BPA Appendix D: Action Table and Reports, R-66, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies shall remove all unnecessary obstructions in the higher velocity areas of the intake-to-draft tube sections of the turbine units (NMFS BiOp 2000, Action # 91, Dec. 2000; BPA Appendix D: Action Table and Reports, R-91, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The incremental drawdown strategy should incrementally invoke drawdown. That is, drawdown two dams and

evaluate (for some pre-determined period of time with some pre-determined incremental objectives), then drawdown the next group of dams if monitoring results meet expectation. So long as evaluation meets interim goals, proceed with rest of dam breaching approach. This incremental approach would be used for all actions taken (Framework Concept Paper 7b).

Locate new hydroelectric ancillary facilities outside Riparian Habitat Conservation Areas...Locate, operate, and maintain hydroelectric facilities that must be located in Riparian Habitat Conservation Areas to avoid effects that would retard or prevent attainment of the Riparian Management Objectives and avoid adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

At the time of the SOR, the Corps' System Configuration Study (SCS) was evaluating major structural modifications to some of the 14 Federal projects in response to the NPPC's Phase 2 and Phase 3 amendments to its regional Fish and Wildlife Program. Structural measures were suggested for study during the SOR, but were not pursued because they were part of the SCS or otherwise considered beyond the scope of the SOR. These measures included (SOR FEIS at Chapter 4 (Detailed Fish Operating Plan (DFOP) – SOS 9a)):

- Modifying adult ladder entrances and exits to improve adult passage survival
- Installing juvenile bypasses at all major dams with high fish mortality rates
- Installing fish screens at dams and over irrigation diversion outlets
- Developing fish byways to divert and rejoin rivers
- Constructing a smolt canal paralleling the Snake and Columbia Rivers from the mouth of the Clearwater to just below Bonneville Dam
- Developing new facilities and equipment to improve the juvenile fish transportation program
- Installing locks at additional dams to expand the navigation system
- Modifying recreational facilities to allow their use over a wider range of operating conditions.

In the Snake River (Objectives 1-3): achieve objectives for all Snake River stocks by implementing natural river in the lower Snake by 2005 (bypass 4 dams, removing the earthen portion of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor) (Framework Concept Paper 2).

Please remove the earthen portion of the four lower Snake River Dams to allow more natural passage for these fish (Comment FWIP-001).

4-2 Hydro Operation

To avoid jeopardy to the Snake River ESUs, the Action Agencies must improve FCRPS-project configurations and operations to the extent practical in the immediate five year term, while also laying the groundwork for and seeking Congressional authority in 2006 to drawdown projects in the Snake River. At the same time, they should experiment with and begin to implement measures outside the FCRPS that may be required in addition to drawdown or which may be sufficient, without drawdown, to ensure long-term survival…of all listed ESUs in the basin (Draft Biological Opinion, July 2000).

Use flow, spill, drawdowns, peak efficiency turbine operation, new turbine technology, and predator control projects to improve inriver juvenile salmon survival; avoid fluctuations caused by power peaking operations (Framework Concept Paper 3; Spirit of the Salmon).

The Washington Department of Fish and Wildlife supports reduction of flow fluctuations (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

On the Columbia, implement *normative* changes in operations (as defined by the Independent Scientific Advisory Board in *"Return to the River"*), improving in-river migration for salmon (Framework Concept Paper 2).

Implement Integrated Rule Curves (IRCs) at all storage projects and create IRCs for projects that do not presently have integrated operational rules, by modeling watershed technology. (Significant expertise is readily available from scientists in Montana and the USACE.) Refine IRCs using a team of site-specific experts. After IRCs are developed, a system model with sufficient time resolution (e.g., weekly or daily) can incorporate operating rules at various dams (Framework Concept Paper 2).

The Corps, in coordination with the Regional Forum, shall maintain juvenile and adult fish facilities within identified criteria and operate FCRPS projects within operational guidelines contained in the Corps' Fish Passage Plan. The Corps shall coordinate with NMFS on the development of these criteria and operational

guidelines before the start of each fish passage season (generally February 1) (NMFS BiOp 2000, Action #144, Dec. 2000; BPA Appendix D: Action Table and Reports, R-144, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

[Implement] more aggressive operational measures for flow and spill. The Federal agencies would seek increased flow augmentation from Canadian reservoirs and improved water quantity and quality from the upper Snake River. Spill at many projects may be expanded to daylight hours (Draft All-H Paper Hydro Option 2, Dec. 1999).

Implement operational constraints at Libby Dam to minimize the adverse effects of rapid and severe river flow fluctuations on bull trout. Conduct studies to monitor the adequacy of the constraints (FWS BiOp 2000, Action #10.A.1(1), Dec. 2000; BPA Appendix D: Action Table and Reports, R-273, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

[P]rovide increased velocities for anadromous fish by establishing flow targets during the migration period (SOR FEIS Alternative 9c).

Every hydroelectric dam, whether federally owned or operated by a public or private utility licensed by the Federal Energy Regulatory Commission (FERC), operates according to the following conditions: (a) flows required of sufficient quality and quantity, and at the ecologically appropriate time as dictated by the natural hydrograph; (b) minimal unnatural daily flow variations; (c) installation and maintenance of state of the art fish passage facilities; and (d) consistency with correlative watershed protection and restoration efforts (Framework Concept Paper 5).

[O]perate turbines within 1% of peak efficiency when smolts are present (Idaho Plan, 1998).

4-3 Spill

The Corps and BPA shall implement an annual spill program, consistent with the spill volumes and TDG limits identified in Table 9.6-3, at all mainstem Snake and Columbia River FCRPS projects as part of the annual planning effort to achieve the juvenile salmon and steelhead performance standards (NMFS BiOp 2000, Action #54, Dec. 2000; BPA Appendix D: Action Table and Reports, R-54, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

From Priest Rapids downstream, *normative* steps include meeting flow minimums and 24-hour spill during the spring migration (Framework Concept Paper 2).

The State of Idaho and the Washington Department of Fish and Wildlife support spill as an effective means of reducing juvenile mortality (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP; 9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

The Sierra Club supports spill for passage, including strict, mandated criteria for flow augmentation (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).The Action Agencies shall provide at least 10,000 cfs of increased release capacity at Libby Dam in two increments of at least 5,000 cfs each under the following conditions, sequence, and schedule (FWS BiOp 2000, Actions #8(2)(a)1-6, Dec. 2000; BPA Appendix D: Action Table and Reports, R-241-246, 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002):

a) [Test] spillway in 2001 to reliably estimate the maximum spillway flow dilution capability and compliance with the state water quality standard of 110 percent gas saturation. Possible changes in dissolved gas concentrations throughout the Kootenai River shall be evaluated [and] effects of the spill on bull trout and other fish in the Kootenai River [shall be monitored]. Investigate and restore, if necessary, Kootenai River channel capacity to accommodate the increased release capacities at Libby Dam (35,000 cfs). By spring 2002, the Action Agencies will begin routine use of the existing spillway for sturgeon flow augmentation. This spillway option shall only be considered a viable long term conservation measure if VarQ, or a comparable flood control/storage procedure, is in effect which assures the reservoir surface routinely exceeds the spillway elevation by the time sturgeon flows are needed. The timing of spillway use shall be determined in part by the ability to maintain 10 degrees Celsius at Bonners Ferry with the selective withdrawal facilities at Libby Dam. If, by December 30, 2001, it is determined that at least 5,000 cfs can not be routinely passed over the spillway within the total dissolved gas criteria of 110%, or VarQ or some other flood control/storage procedure has not been adopted, the Action Agencies shall immediately begin preparation of NEPA documentation and seek funding for installation of one turbine or spillway flow

deflectors, which are to be operational by spring 2004.

b) By spring 2007, the Action Agencies will seek means and be prepared to release an additional 5,000 cfs (total of at least 10,000 cfs) at Libby Dam for sturgeon conservation.

Make operational and structural changes to reduce uncontrolled spill and high levels of dissolved gas at Lower Columbia River dams if it is determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS (BPA Appendix D: Action Table and Reports, R-280, June 5, 2001). For example, investigate, and in coordination with the Service, implement as appropriate, structural and operational measures to reduce TDG production. The Corps has recently installed flow deflectors at John Day Dam and, through its Gas Abatement Study, is investigating other potential measures at other FCRPS projects to reduce gas supersaturation. Measures recommended in this study to reduce gas supersaturation should be implemented as soon as possible (FWS BiOp 2000, Action #11.A.2(3a), Dec. 2000; BPA Appendix D: Action Table and Reports, R-310, June 5, 2001; 2003/2003-2007 Implementation Plan; Resident Fish Strategy #2, Oct. 2002).

Spill is recognized as a highly effective means of passing juvenile salmon downstream, reducing the mortality associated with passage through many turbine sets and in most bypass systems. The use of spill should be improved -- in duration, timing and quantity -- at all the Federal hydropower projects (Governors' Recommendations, July 2000).

4-4 Flow

Issue no new water rights and limit additional comsumption of water withdrawals that would negatively impact instream flows (Tribal Vision).

Meet all established flow targets every year established under the Endangered Species Act by securing additional water from storage in the upper Snake and Columbia systems until *[Snake River]* dams are removed (Framework Concept Paper 1). After dams are bypassed, eliminate Snake River flow augmentation. Adjust system operations to normalize Snake River flows below Hells Canyon complex (Framework Concept Papers 2, 5).

Restore and maintain flow regimes sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient and wood routing (ICBSDEIS, R-O7).

Move away from an emphasis on minimum flows toward a regime that would include periodic flooding and droughts between years and smooth ramping to and away from the spring freshet within a year (Draft Framework Alternatives 2, 3).

In the Columbia, the development of normative flow conditions with flow augmentation from the Upper Columbia and IRCs at storage projects (would) create a more natural hydrograph (Framework Concept Paper 5).

Rebuild Mid-Columbia spring/summer chinook, sockeye, and summer steelhead by improving smolt survival in the mainstem portion of the Columbia Plateau ERU, using flow augmentation from the upper Columbia and a normalized hydrograph (Framework Concept Paper 2).

From Priest Rapids downstream, *normative* steps includemeeting flow minimums and 24-hour spill during the spring migration (Framework Concept Paper 2).

Secure Canadian storage on upper Columbia to augment flows in spring and summer (Framework Concept Paper 2).

Continue current flow programs, with some protection for upstream reservoirs. Secure use of water from Canadian storage reservoirs to meet flow needs (Framework Alternatives 5, 6).

More water from the Snake River Basin and possibly Canada would be left in the river for fish (Framework Alternative 4).

Direct management actions include restoring free-flowing river reaches and associated riparian habitats, and reducing existing conflicts of flow augmentation between resident and anadromous fish. Indirect benefits to freshwater ecosystems would accrue from management to restore anadromous populations (Framework Concept Paper 6).

There would be a reduction in the fluctuation of flows from Priest Rapids to reduce fry stranding and stabilize riparian areas. Federal agencies would continue to use the existing volume of water for management of flows for the benefit of various fish stocks and species of concern (Draft All-H Paper Hydro Option 1, Dec. 1999).

The Action Agencies shall operate FCRPS dams and reservoirs with the intent of meeting the flow objectives (Table 9.6-1) on both a seasonal and weekly average basis for the benefit of migrating juvenile salmon (NMFS BiOp 2000, Action # 14, Dec. 2000; BPA Appendix D: Action Table and Reports, R-14, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Action Agencies shall operate the FCRPS to provide flows to support chum salmon spawning in the Ives Island area below Bonneville Dam (NMFS BiOp 2000, Action #15, Dec. 2000; BPA Appendix D: Action Table and Reports, R-15, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Regulate flows to maximize probability of allowing significant sturgeon recruitment (BPA Appendix D: Action Table and Reports, R-232, June 5, 2001). For example, the Action Agencies shall regulate flows from Libby Dam to achieve water volumes, water velocities, water depths, and water temperature at a time to maximize the probability of allowing significant *[Kootenai River white]* sturgeon recruitment (FWS BiOp 2000, Action #8(1)(a), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

During water year 2001, store water volumes based on tiered approach (BPA Appendix D: Action Table and Reports, R-234, June 5, 2001). For example, during water year 2001 (October 1, 2000 - September 30, 2001), the Action Agencies shall store water and supply, at a minimum, water volumes during May, June and July based upon a water availability or "tiered" approach (in addition to storage needs for listed bull trout, salmon, and the 4,000 cfs minimum releases from Libby Dam) to enhance survival of *[Kootenai River white Sturgeon]* eggs, yolk sac larvae, or larvae reared under the preservation stocking program and released into the Kootenai River (FWS BiOp 2000, Action #8(1)(c), Dec. 2000).

BPA and the Corps shall continue to request and negotiate agreements to annually provide 1 Maf of Treaty storage from January through April 15, release the water during the migration season, and seek additional storage amounts (NMFS BiOp 2000, Action #24, Dec. 2000; BPA Appendix D: Action Table and Reports, R-24, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA and the Corps shall continue to request and negotiate with BC Hydro for storage of water in non-Treaty storage space during the spring for subsequent release in July and August for flow enhancement, as long as operations forecasts indicate that water stored in the spring can be released in July and August (NMFS BiOp 2000, Action #25, Dec. 2000; BPA Appendix D: Action Table and Reports, R-25, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA and the Corps shall continue to evaluate, request, and negotiate with BC Hydro the shaping and release of water behind Canadian Treaty storage projects in addition to the non-Treaty storage water previously discussed during July and August (NMFS BiOp 2000, Action #26, Dec. 2000; BPA Appendix D: Action Table and Reports, R-26, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Improved Flows: improve flow operations to provide water conditions beneficial to migrating juvenile and adult fish. Improvements in Canadian flows with a potential of up to 2 MAF over time. Flood control study to allow further flow improvements. Implementation of flood control adjustments to reduce risks to listed resident fish from salmon flows (Final All-H Paper Dec. 2000).

Seek opportunities to reduce the second peak flow created by July/ August salmon flow through Kootenay Lake, perhaps via a Libby-Arrow water exchange. Consummate exchange agreements by October 2001. (FWS BiOp 2000, Action #8(1)(e), Dec. 2000; BPA Appendix D: Action Table and Reports, R-236, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002). [Note: This action favors sturgeon over Columbia River Listed salmonids migrating in the summer.]

[T]he Action Agencies shall report specifically on the effects of load following on levee integrity throughout the Kootenai Valley over the last 26 years. The Action Agencies shall limit daily load following in the outflow from Libby Dam to the extent that levees in Kootenai Valley are no longer damaged (FWS BiOp 2000, Actions #8(3)(e,f), Dec. 2000; BPA Appendix D: Action Table and Reports, R-257-258, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

During sturgeon recruitment flow periods, allow local inflow to supplement Libby Dam releases to the

maximum extent feasible, while assuring public safety by monitoring water levels throughout the relevant areas of the basin (FWS BiOp 2000, Action #8(3)(g), Dec. 2000; BPA Appendix D: Action Table and Reports, R-259, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

During water year 2001, seek means to store and release water to provide for bull trout base flow and ramping volumes at Libby Dam (FWS BiOp 2000, Action #11.A.1(1a), Dec. 2000; BPA Appendix D: Action Table and Reports, R-289, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Provide 6,000 cfs minimum flow for bull trout during July and August if Koocanusa elevations are below salmon guidelines and salmon augmentation will not occur (FWS BiOp 2000, Action #11.A.1(1b), Dec. 2000; BPA Appendix D: Action Table and Reports, R-290, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

It is recommended that the Action Agencies seek cooperation of West Kootenai Power and other involved agencies and parties in Canada to negotiate higher Kootenay Lake/Kootenai River stages within the 1938 IJC order during sturgeon spawning flows. This may promote sturgeon recruitment with less stored water and fewer configuration improvements at Libby Dam during intermediate and low water years (FWS BiOp 2000, Action #12.1, Dec. 2000).

As U.S. representatives on the Kootenay Lake board of control, and operators of Libby Dam, it is recommended that the Action Agencies seek opportunity to provide low flows in the Kootenai River during January or February for burbot migration and spawning (FWS BiOp 2000, Action #12.2, Dec. 2000).

Store water under VarQ at Libby dam and supply water volumes from May- July based on tiered volumes (BPA Appendix D: Action Table and Reports, R-235, June 5, 2001; FWS BiOp 2000, Action #8(1)(d), Dec. 2000; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

The Action Agencies shall acquire water for instream use from BOR's Upper Snake River basin projects and Idaho Power Company's Hells Canyon Complex during the spring and summer flow augmentation periods to improve the likelihood of achieving spring and summer flow objectives at Lower Granite Dam (NMFS BiOp 2000, Action #32, Dec. 2000; BPA Appendix D: Action Table and Reports, R-32, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

During sturgeon recruitment flow periods, allow local inflow to supplement Libby Dam releases to the maximum extent feasible, while assuring public safety by monitoring water levels throughout the relevant areas of the basin (FWS BiOp 2000, Action #8(3)(g), Dec. 2000; BPA Appendix D: Action Table and Reports, R-259, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Restore normative flow conditions from Priest Rapids dam to the estuary, using spring and summer flow augmentation under a system operating plan that implements a normalized hydrograph (Framework Concept Paper 5).

Implement a normalized annual hydrograph below Priest Rapids (Framework Concept Papers 2, 5).

Waterwatch supports legally mandated minimum flows (9/6/01 letter from Karen Russell to the Action Agencies, 5YIP).

Idaho identified the following as key near-term actions consistent with their perspective with habitat priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP):

- Address stream flows, barriers, screens and diversion consolidations in the Lemhi and Upper Salmon drainages in coordination with holistic restoration.
- Support State-led investigations and solutions to critical stream flow needs.

4-5 Reservoir Levels

Reduce the amount of water stored for hydropower production to provide for more natural flows, including periodic flooding and droughts to restore native plants (Framework Alternative 1).

Coordinate reservoir operation across the watershed subbasins to achieve a protracted runoff event to aid anadromous species recovery while protecting and restoring aquatic ecosystems in the headwaters (Framework Concept Paper 8).

Restore natural river levels to the lower Snake River (below Hells Canyon complex) and draw down John Day

dam to spillway crest level; and restore natural river ecosystem components throughout the basin. Keep water levels in Libby, Roosevelt, Dworshak, and Hungry Horse reservoirs relatively full and stable (Framework Concept Paper 4).

By October 1, 2002, the Corps shall develop and, if feasible, implement a revised storage reservation diagram for Libby Reservoir that replaces the existing fall draft to a fixed end-of-December elevation. One option is to evaluate variable drafts based on the El Niño Southern Oscillation Index (SOI) predictions or other forecast methodologies of runoff volume. To implement this change, the Corps shall complete successful coordination with Canada under the Columbia River Treaty (NMFS BiOp 2000, Action #36, Dec. 2000; BPA Appendix D: Action Table and Reports, R-36, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Reservoir drafting to 10 feet from full pool during summer for anadromous fish recovery is shaped to achieve a gradual drawdown from the spring peak and to eliminate flow fluctuation in the rivers downstream. This reduces the width of the varial zone and enhances riverine productivity. Environmental conditions in storage reservoirs and downstream river reaches improve biological productivity and complement mitigation efforts. Site-specific environmental concerns are addressed by fine-tuning the overall system plan (Framework Concept Paper 8).

BOR shall operate Banks Lake at an elevation 5 feet from full during August by reducing the volume of water pumped from Lake Roosevelt into Banks Lake by about 130 kaf during this time (NMFS BiOp 2000, Action #23, Dec. 2000; BPA Appendix D: Action Table and Reports, R-23, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Continue lake winter elevation study to promote kokanee spawning /recruitment along the shore of Lake Pend Oreille (BPA Appendix D: Action Table and Reports, R-276, June 5, 2001). Specifically, the Action Agencies shall continue the lake winter elevation/kokanee egg-to-fry survival study on Lake Pend Oreille for the next six years. The study shall begin in 2001 by drafting the lake to fall/winter water levels of elevation 2051 feet. This is intended to allow winter storms to improve the condition of spawning gravel along the shore of Lake Pend Oreille. During the fall/winter of 2002, maintain the Lake Pend Oreille at elevation 2055 until fry emerge from shoreline gravels. By September 2003 FWS will secure independent scientific review relative to the appropriate duration (one to three years) of maintaining winter lake elevations at 2055 feet and provide written recommendations to the Action Agencies for fall/winter operations for 2003 through 2006. During this six year period, the Action Agencies, in coordination with FWS and IDFG, shall evaluate the effects of varying winter lake level elevations on all life stages of kokanee in Lake Pend Oreille, and predator/prey dynamics. If, in September 2007, it is determined that this action is effective in significantly improving kokanee production as bull trout forage, FWS will provide written recommendations on the frequency of varying Lake Pend Oreille winter lake elevations for the remainder of this biological opinion. The Action Agencies, FWS, and IDFG shall meet annually to evaluate Lake Pend Oreille kokanee monitoring results and make necessary adjustments through subsequent in-season management (FWS BiOp 2000, Action #10.A.1(4), Dec. 2000).

4-6 Water Quality

…incorporate the following measures into hydrosystem operations and management: Water temperature and total dissolved gas reduction and abatement to comply with the Federal Clean Water Act (Tribal Vision).

Prevent lethal temperature rises (Framework Concept Paper 1).

The Corps shall continue the spillway deflector optimization program at each FCRPS project and implement it, as warranted. The Corps and BPA shall conduct physical and biological evaluations to ensure optimum gas abatement and fish passage conditions. Implementation decisions will be based on the effect of spill duration and volume on TDG, spillway effectiveness, spill efficiency, forebay residence time, and total project and system survival of juvenile salmon and steelhead passing FCRPS dams (NMFS BiOp 2000, Action #134, Dec. 2000; BPA Appendix D: Action Table and Reports, R-134, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate TDG abatement options at Libby Dam, including the installation of spillway deflectors and/or additional turbine units. The Corps shall construct gas abatement improvements at Libby on the Kootenai River, as warranted, to reduce TDG levels below the project (NMFS BiOp 2000, Action #137, Dec. 2000; BPA Appendix D: Action Table and Reports, R-137, June 5, 2001).

The Corps shall investigate TDG abatement options at Dworshak Dam and implement options, as warranted, in coordination with the annual planning process (NMFS BiOp 2000, Action #139, Dec. 2000; BPA Appendix D: Action Table and Reports, R-139, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall work through the regional forum process to identify and implement measures to address juvenile fish mortality associated with high summer temperatures at McNary Dam. As a starting point, the Corps shall assemble and analyze the temperature data that have been recorded in the McNary forebay, collection channel, and juvenile facilities. The Corps shall examine relationships among juvenile mortality, temperatures, river flow rates, and unit operations in detail. The Corps shall investigate the feasibility of developing a hydrothermal computational fluid dynamics model of the McNary forebay to evaluate the potential to determine optimal powerhouse operations or structural modifications for minimizing thermal stress of juvenile salmon collected in the summer and to conduct a modeling program, if warranted (NMFS BiOp 2000, Action #142, Dec. 2000; BPA Appendix D: Action Table and Reports, R-142, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall evaluate and implement structural and operational alternatives to improve juvenile transportation at the collector dams (NMFS BiOp 2000, Action #53, Dec. 2000; BPA Appendix D: Action Table and Reports, R-53, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

4-7 Juvenile Fish Passage and Transportation

Develop juvenile and adult anadromous fish passage capabilities, employing any and all possible biological, engineering/technological, legal, political and societal means, to circumvent the current artificial barriers to anadromous fish migration at Chief Joseph and Grand Coulee dams, Dworshak Dam and the Hells Canyon Complex (Hells Canyon, Oxbow and Brownlee dams) (Tribal Vision).

Develop adult and juvenile anadromous fish passage capabilities -- exploring all possible engineering, technological, and societal means -- to circumvent the current barriers to anadromous salmon and steelhead migration at Chief Joseph and Grand Coulee dams (Framework Concept Paper 13).

Transport juvenile salmon from mainstem collector projects when conditions in the river are judged to be adverse due to low flow, high temperatures, high spill, or other conditions (Framework Alternative 5).

Save our Wild Salmon is concerned that the Action Agencies place to high a value on juvenile fish transportation (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).

The Sierra Club supports the elimination of juvenile fish transportation, especially trucking fish (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

The Sierra Club is opposed to juvenile fish transportation, especially trucking fish (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

Eliminate the Federal juvenile fish transportation program except where necessary- until breaching and drawdown occurs- during extremely low flows or as dictated by other deleterious conditions caused by existing FCRPS operations (Framework Concept Paper 5).

The Corps shall not initiate collection of subyearling fall chinook for transportation at McNary Dam until inriver migratory conditions are deteriorating (i.e., no longer spring-like) (NMFS BiOp 2000, Action #43, Dec. 2000; BPA Appendix D: Action Table and Reports, R-43, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

If results of Snake River studies indicate that survival of juvenile salmon and steelhead collected and transported during any segment of the juvenile migration (i.e., before May 1) is no better than the survival of juvenile salmon that migrate inriver, the Corps and BPA, in coordination with NMFS through the annual planning process, shall identify and implement appropriate measures to optimize inriver passage at the collector dams during those periods (NMFS BiOp 2000, Action #51, Dec. 2000; BPA Appendix D: Action Table and Reports, R-51, June 5, 2001).

The Corps shall continue John Day prototype development and investigations of extended submerged intake screens, gatewell vertical barrier screens, and, if necessary, orifices to optimize guidance and safe passage through the system, including a gatewell debris cleaning plan. This work shall include an assessment of fry passage. The Corps shall design and construct new screen systems for safe passage of juvenile salmonids, as

warranted. Juvenile bypass outfall survival investigations shall also be conducted (NMFS BiOp 2000, Action #73, Dec. 2000; BPA Appendix D: Action Table and Reports, R-73, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

[A]id juvenile salmon migration by drawing down reservoirs at four lower Snake River projects, permitting the lowering of reservoirs approximately 100 feet to near original riverbed levels (SOR FEIS Alternative 5c).

[Implement] aggressive passage improvements, including specific passage upgrades for juvenile fish at individual dams. Improvements vary by location, including relocation of bypass outfalls, refined screens and bypass facilities, development of surface bypass, spillway modifications and more effective spill, improved turbine operations and design, predator management, mainstem and estuarine habitat (Final All-H Paper Dec. 2000).

It is therefore the Commission's position that smolt collection and barging should be phased-out in favor of a comprehensive program to increase the survival of in-river migrants to levels necessary for recovery (Idaho Plan, 1998).

[M]inimize multiple bypass passage in the lower Snake River for in-river migrants… (Idaho Plan, 1998).

Do not use trucks to transport any smolts (Idaho Plan, 1998).

4-8 Adult Fish Passage

Develop juvenile and adult anadromous fish passage capabilities, employing any and all possible biological, engineering/technological, legal, political and societal means, to circumvent the current artificial barriers to anadromous fish migration at Chief Joseph and Grand Coulee dams, Dworshak Dam and the Hells Canyon Complex (Hells Canyon, Oxbow and Brownlee dams) (Tribal Vision).

Develop adult and juvenile anadromous fish passage capabilities -- exploring all possible engineering, technological, and societal means -- to circumvent the current barriers to anadromous salmon and steelhead migration at Chief Joseph and Grand Coulee dams (Framework Concept Paper 13).

Provide a variety of passage routes at the remaining mainstem dams…including surface bypass, submerged screens, and spill (Framework Alternatives 1, 2, 3).

The Upper Columbia Regional Fisheries Enhancement Group puts the highest priority on improvements to adult and juvenile fish passage (9/20/01 letter from Michael B. Ward to the Action Agencies, 5YIP).

The Corps shall use information from previous and ongoing investigations regarding the problem of adult steelhead holding and jumping in the fish ladders at John Day Dam, develop a proposed course of action, and implement it, as warranted (NMFS BiOp 2000, Action #110, Dec. 2000; BPA Appendix D: Action Table and Reports, R-110, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies shall operate the FCRPS to provide access for chum salmon spawning in Hamilton and Hardy creeks (NMFS BiOp 2000, Action #16, Dec. 2000; BPA Appendix D: Action Table and Reports, R-16, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct, 2002).

The Corps shall develop and implement a program to better assess and enumerate indirect prespawning mortality of adult upstream-migrating fish. Such mortality may be due to, or exacerbated by, passage through the FCRPS hydro projects. If measures are identified which will reduce the unaccountable adult loss rate and/or the prespawning mortality rate, the Corps shall implement these measures as warranted. The program should also enhance efforts to enumerate unaccountable losses associated with tributary turnoff, harvest, or other factors in FCRPS mainstem reservoirs and upstream of FCRPS projects (NMFS BiOp 2000, Action #118, Dec. 2000; BPA Appendix D: Action Table and Reports, R-118, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall develop and maintain an auxiliary water-supply, emergency-parts inventory for all adult fishways where determined necessary, in coordination with NMFS (NMFS BiOp 2000, Action #121, Dec. 2000; BPA Appendix D: Action Table and Reports, R-121, June 5, 2001).

Appropriate measures shall be developed to ensure upstream and downstream passage for bull trout is not impeded if it is determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS (BPA Appendix D: Action Table and Reports, R-278, June 5, 2001; FWS BiOp 2000, Action #10.A.2(2), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Develop performance standards for bull trout. Develop priority list of FCRPS dams to determine upstream and downstream passage needs of bull trout. Based on the priority list of 11(2), initiate research to determine the upstream and downstream passage needs of bull trout at FCRPS dams. Based on research in 11(3), implement measures needed for bull trout passage at FCRPS dams (BPA Appendix D: Action Table and Reports, R-283, R-284, R-285, R-286, June 5, 2001; FWS BiOp 2000, Actions #11.1; 11.2; 11.3; 11.4, Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002). If the information from these studies warrants consideration of additional modifications to facilities or operations, then FWS will work with the Action Agencies to implement these measures, as appropriate, or to reinitiate consultation, if necessary (: FWS BiOp 2000, Actions #10.A.2(2), 11.A.3(1e), Dec. 2000; BPA Appendix D: Action Table and Reports, R-315, June 5, 2001).

Restore salmon and steelhead passage into upper portions of the basin at Chief Joseph, Grand Coulee, and Hells Canyon dams (Framework Alternative 1).

Develop adult and juvenile anadromous fish passage capabilities—exploring all possible engineering, technological, and societal means—to circumvent the current barriers to anadromous salmon and steelhead migration at Chief Joseph and Grand Coulee dams (Framework Concept Paper 13).

Save our Wild Salmon would support decreased efforts to improve passage, as their position is that major investments in bypass facilities will yield little in survival benefits (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).

4-9 Flood Control

Flood control operations are modified from current operations to allow for variable releases during the runoff period to simulate a naturally shaped spring freshet (Framework Concept Paper 8).

The Action Agencies shall operate the FCRPS during the fall and winter months in a manner that achieves refill to April 10 flood control elevations, while meeting project and system minimum flow and flood control constraints before April 10. During the spring, the Action Agencies shall operate the FCRPS to meet the flow objectives and refill the storage reservoirs (Albeni Falls, Dworshak, Grand Coulee, Hungry Horse, and Libby) by approximately June 30 (NMFS BiOp 2000, Action #18, Dec. 2000; BPA Appendix D: Action Table and Reports, R-18, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps shall routinely identify opportunities to shift system flood control evacuation volumes from Brownlee and Dworshak reservoirs to Lake Roosevelt and identify such opportunities for the Technical Management Team. The Corps shall implement flood control shifts as necessary to best protect listed fish, as called for by NMFS in coordination with the Technical Management Team, taking into account water quality issues and the concerns of all interested parties (NMFS BiOp 2000, Action #21, Dec. 2000; BPA Appendix D: Action Table and Reports, R-21, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps and BOR shall implement VARQ flood control operations, as defined by the Corps (1999d), at Libby by October 1, 2001, and at Hungry Horse by January 1, 2001. By February 1, 2001, the Corps shall develop a schedule to complete all disclosures, NEPA compliance, and Canadian coordination necessary to implement VARQ flood control at Libby (NMFS BiOp 2000, Action #22, Dec. 2000; BPA Appendix D: Action Table and Reports, R-22, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Resident Fish Strategy #1, Oct. 2002; FWS BiOp 2000, Action #8(1)(b), Dec. 2000; BPA Appendix D: Action Table and Reports, R-233, June 5, 2001; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

The Service recommends that the Action Agencies initiate Section 7 consultation on the proposed Columbia River Treaty Flood Control Operating Plan, October 1999. Proposed changes contained in this Plan may affect sturgeon spawning/rearing habitat conditions necessary for the survival and recovery of those species (FWS BiOp 2000, Action #12.3, Dec. 2000).

Seek means to restore, maintain, or enhance levees throughout the Kootenai Valley to the greater of the Corps' 84- 99 1961 specs or adequate to contain 100-year event per Libby authorization. In interim, limit flows to Bonners Ferry levee elev. of 1,764 ft. (BPA Appendix D: Action Table and Reports, R-254, June 5, 2001; FWS BiOp 2000 Action 8(3)(b), Dec. 2000). For example, by May 2004 the Action Agencies shall seek means to restore, maintain, or enhance levees throughout the Kootenai Valley to the greater of: 1) the PL

84-99 Corps' 1961 levee specifications, or 2) the levee elevations needed to contain the flows/river stages of the 100 year event as authorized for the Libby Project, which is now defined as 1,770 feet at Bonners Ferry. The Action Agencies shall also seek means to incorporate conservation measures for sturgeon, including self maintaining rocky spawning substrates, as a component and Federal purpose of any new levee project above. In the interim, the Service and Corps will coordinate efforts to attempt to limit sturgeon spawning flows so they do not exceed a levee elevation of 1,764 feet at Bonners Ferry (FWS BiOp 2000, Action 8(3)(b), Dec. 2000).

The Action Agencies shall report specifically on the effects of load following on levee integrity throughout the Kootenai Valley over the last 26 years. The Action Agencies shall limit daily load following in the outflow from Libby Dam to the extent that levees in Kootenai Valley are no longer damaged (FWS BiOp 2000, Actions #8(3)(e)-(f), Dec. 2000; BPA Appendix D: Action Table and Reports, R-257-258, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Implement IRCs and tiered flow regime from Libby Dam to provide sufficient flows and habitat for successful white sturgeon spawning and recruitment (Framework Concept Paper 13).

Idaho identified the following as key near-term actions consistent with their perspective with habitat priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP): Develop and implement integrated rule curves for Dworshak Reservoir.

COMMERCE

5 POWER

5-1 Existing Generation

Provide support for increased electrical costs (Framework Concept Paper 5).

Adapt by lessening demand on electricity (Comment FWIP-011).

5-2 New Energy Resources

Replace lost generation capacity through a least-cost mix of power purchases, aggressive energy conservation programs, the development of cost-effective renewable power sources, and high-efficiency thermal generation. Mitigate incremental production of carbon dioxide through offsets (Framework Concept Paper 7b).

Use conservation measures or alternative energy sources to make up for the 4 or 5% of the generation capacity lost after breaching the four lower Snake River dams (Comment FWIP-016, 017, 023).

Use renewable resources [e.g. wind] to supply environmentally benign power and generate jobs and a good source of commerce (Comment FWIP-016).

Diversify the current mix by replacing 20 percent of the projected growth in natural-gas combined-cycle generation with wind turbines, increased energy efficiency, or combined wind power, solar power, and energy efficiency (Rand Report 2002).

Remove the four lower Snake River dams and replace their power capacity with natural gas combined-cycle generation, increased energy efficiency, or combinations of wind power, solar power, and energy efficiency (Rand Report 2002).

5-3 Transmission Reliability

To improve the future flexibility of the transmission system, BPA's Transmission Business Line shall initiate planning and design necessary to construct a Schultz-Hanford 500-kV line or an equivalent project, with a planned schedule for implementation by 2004 or 2005 (NMFS BiOp 2000, Action #55, Dec. 2000; BPA Appendix D: Action Table and Reports, R-55, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA's Transmission Business Line shall continue to evaluate strategically located generation additions and other transmission system improvements and report progress to NMFS annually. BPA's Transmission Business Line shall also limit future reservations for transmission capacity, as needed, to enable additional spill to meet performance standards, while minimizing effects on transmission rights holders (NMFS BiOp 2000, Action #57, Dec. 2000; BPA Appendix D: Action Table and Reports, R-57, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Action Agencies shall seek redundancy in transformers at Libby Dam to assure that sturgeon flows can be released. Loss of one transformer can result in the loss of use of two turbines, or 10,000 cfs of release capacity (FWS BiOp 2000, Action #8(2)(d), Dec. 2000; BPA Appendix D: Action Table and Reports, R-252, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

BPA's Transmission Business Line shall continue efforts to evaluate, plan, design, and construct a joint transmission project to upgrade the west-of-Hatwai cutplane and improve the transfer limitations from Montana (NMFS BiOp 2000, Action #56, Dec. 2000; BPA Appendix D: Action Table and Reports, R-56, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

6 INDUSTRY

6-1 Industrial Development

Development of new facilities that may adversely affect late-successional reserves should not be permitted. New development proposals that address public needs or provide significant public benefits, such as power lines, pipelines, reservoirs, recreation sites, or other public works projects will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated. These will be planned to help least possible adverse impacts on late-successional reserves. Developments will be located to avoid degradation of habitat and adverse effects on identified late-successional species (NW Forest Plan ROD).

State water resource agencies throughout the Columbia River Basin enforce existing water laws, including those relating to the doctrine of waste, individual water right terms and conditions, measurement of existing uses, and ensuring instream water rights are protected (Framework Concept Paper 5).

6-2 Aluminum and Chemical

Eliminate aluminum and chemical manufacturing in area adjacent to or with the potential to impact weak stock/population critical habitat (Sample Action).

Provide two options for the energy-intensive direct-service industries (DSIs) that purchase electric power directly from the Bonneville Power Administration (BPA) and other suppliers of bulk electric power (Rand Report 2002):

- invest in enough energy efficiency to cover their demands or
- have DSIs pay market rates for power.

6-3 Mining

Mineral activity permits will include appropriate stipulations (e.g., seasonal or other restrictions) related to all phases of mineral activity (NW Forest Plan ROD).

Manage public lands, which provide critical wild salmon habitat, for the benefit of the salmon. Strengthen habitat protection through stricter standards for logging, livestock grazing, mining and road building (Framework Concept Paper 1).

Avoid adverse effects to listed species and designated critical habitat from mineral operations (INFISH/PACFISH EAs).

Minimize/reduce the adverse effects of mining actions, including placer mining, recreational suction dredging, and gold panning, that result in take of the species by implementing all relevant standards and guidelines…(INFISH BiOp August 1998).

For mining operations on BLM-administered lands that are not required to have an approved Plan of Operation (see 43 C.F.R. § 3809.1-4), respond to all mining notices within 10 calendar days by advising the operator that the mining activity shall not cause take of bull trout unless the operator has first obtained an incidental take permit under section 10 of the ESA. BLM will advise the operator of what actions are needed to prevent adverse impacts to bull trout and their habitat (INFISH BiOp August 1998).

Improve mining discharges *[and]* mining practices. Rehabilitate *[and reclaim]* marginal and closed mines (Human Effects Analysis Appendix D).

6-4 Pulp and Paper

… support a pulp industry with …: (RFU 1999)

- Totally chlorine-free, zero-discharge pulp mills, which produce no liquid effluent and minimize the quantity and toxicity of air pollution and solid waste, are a desirable and achievable goal.
- Closed-loop operations will eliminate all toxicity to aquatic environments by eliminating all discharge into them. This is important because some toxicity continues to cause harm, even in mills using no chlorinated compounds. Additionally, water use will be significantly reduced, leaving more water for fish habitat and other uses.
- Practices that eliminate water pollution also greatly improve air quality. In addition to ending chlorine-caused air pollution, TCF closed-loop mills prevent foul-smelling, toxic air pollution and increase work place safety. These changes will directly benefit workers and people in mill towns, who are exposed to bleaching chemicals, process gases, emissions from treatment ponds, and bacteria and fungi on wood chips and sludge.
- [Use of] Oxygen-based kraft pulps [that] show no appreciable shortcomings in pulp quality compared to products bleached with chlorine dioxide….
- eliminate all chlorinated organic pollutants in pulp effluent, not just make them "non-detectable" to current test equipment;
- reduce contamination of fish, shellfish, and other organisms in the food chain;
- reduce other pollution (e.g., color and suspended particles) that damage salmon spawning beds and other aquatic habitats.

7 TRANSPORTATION

7-1 Navigation and Barging

Maintain shipments from Port of Lewiston by moving to rail transportation. If rail capacity to Lewiston is inadequate, expand capacity to needed level to replace shipping capability lost through shutdown of Lower Snake barge transportation (Framework Concept Paper 7b).

7-2 Trucking, Railroads, and Infrastructure

Provide support for alternative forms of transportation of agricultural and other products including improved rail service (Framework Concept Paper 5).

Avoid, reduce or minimize the adverse effects of road construction, reconstruction and maintenance on bull trout habitat components; particularly water quality, flow and hydrology, and channel condition and dynamics (INFISH BiOp August 1998).

In collaboration with the Service, the USFS and BLM will develop and implement guidance for use by administrative units for minimizing/reducing effects of road management programs on bull trout. Issues that should be addressed in this guidance document include, but are not limited to, road construction, reconstruction, removal, obliteration and decommissioning as well as an assessment of unroaded and low density roaded areas in relation to conservation of bull trout. The exact scope, format and detail of this guidance document should be decided through interagency discussions. Following are items for consideration in completing this task (INFISH BiOp August 1998).

To avoid or minimize incidental take associated with the adverse effects of road construction, reconstruction and maintenance on water quality, flow and hydrology, and channel condition and dynamics, each [Federal] administrative unit shall apply the pertinent standards and guidelines for road construction and decommissioning as described in the Land and Resource Management Plans, as amended by PACFISH and INFISH (INFISH BiOp August 1998).

Increase infrastructure investments as opposed to continued taxpayer and ratepayer subsidization of the Snake River waterway (Comment FWIP-038).

8 AGRICULTURE

Federal regulatory efforts would increase to ensure that non-Federal land and water use would not continue to degrade fish habitat. This would occur through a combination of increased ESA rule development, increased ESA enforcement, and increased CWA enforcement (Draft All-H paper, Habitat Option 3, Dec. 1999).

Emphasize watershed restoration in all management decisions and reduce commodity subsidies that harm salmon and steelhead habitat (Framework Concept Paper 1).
8-1 Irrigation
Maximize irrigation efficiency and accountability, and decrease out-of-stream water withdrawals (Tribal Vision).
Reduce irrigation withdrawals (Framework Concept Paper 23).
Irrigation - Provide mitigation to farmers affected by drawdown of reservoirs to extend pumps and replace diversion screens. Provide efficient, temporary mitigation to extend ground water well pumping for irrigators affected by lowered water table due to drawdown. Look for opportunities to promote water conservation and efficiencies (Framework Concept Paper 7b).
Establish programs to screen all pumps and restore passage at problematic diversions and obstructions (Final All-H Paper Dec. 2000).
Lower irrigation pumps to adjust to changed river levels and provide support for increased electrical costs (Framework Concept Paper 5).
Objectives: The water management strategy for fish should be restructured to improve biological benefits and reduce societal cost measures. Water management must be consistent with state authority over water rights. New strategies of water management are promoted that have an anticipated beneficial impact for threatened fish stocks, including river watershed projects and water transfer programs (Framework Concept Paper 27).
Protect and increase instream flows by limiting additional consumptive water withdrawals, using the most efficient irrigation methods, preventing soil compaction and riparian vegetation removal and wetland destruction; where necessary, restore soil, restore riparian vegetation and re-create wetlands (Framework Concept Paper 3; Spirit of the Salmon).
By March 1, 2002, BOR shall install screens meeting NMFS' screen criteria at the canal intakes to the Burbank No. 2 and Burbank No. 3 pump plants. BOR shall connect the Burbank No. 3 intake canal to Burbank Slough to provide juvenile fish egress. BOR shall coordinate with NMFS on each of the actions identified above (NMFS BiOp 2000, Action #38, Dec. 2000; BPA Appendix D: Action Table and Reports, R-38, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).
BOR shall pursue water conservation improvements at its projects and shall use all mechanisms available to it under state and Federal law to ensure that a reasonable portion of any water conserved will benefit listed species (NMFS BiOp 2000, Action #28, Dec. 2000; BPA Appendix D: Action Table and Reports, R-28, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).
BOR shall investigate the attraction of listed salmon and steelhead into wasteways and natural streams receiving waste water from the Columbia Basin Project. If listed fish are found to be attracted into these channels, BOR shall work with NMFS to identify and implement structural or operational measures to avoid or minimize such use, as warranted (NMFS BiOp 2000, Action #37, Dec. 2000; BPA Appendix D: Action Table and Reports, R-37, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).
Establish adequate instream flow conditions for salmon by using, for example, the Instream Flow Incremental Methodology (Framework Concept Paper 28).
8-2 Pesticides and Agricultural Practices
[Encourage] pesticide/herbicide reduction (Human Effects Analysis Appendix D).
Restore damaged habitats (e.g., acquire water rights needed for sensitive and weak species; fence riparian areas, acquire conservation easements, rest lands that are over used, etc.) (Framework Concept Paper 4).
Develop Total Maximum Daily Loads (TMDLs) and Water Quality Management Area Plans (WQMAPs) in concert with the ESA (Executive Order No. EO 99-01 [The Oregon Plan For Salmon And Watersheds]).
Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

Refine and update state restrictions on pesticide applications and provide technical assistance on proper use of pesticides to ensure compliance with Endangered Species Act (ESA)and Clean Water Act (CWA) (Washington Plan, 2000).

8-3 Grazing

Prevent damage to and destruction of riparian vegetation by fencing and other means, such as purchasing grazing permits and restore impacted riparian areas (Tribal Vision).

Modify grazing practices (e.g., accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect listed anadromous fish (INFISH/PACFISH EAs).

Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that will not retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish (INFISH/PACFISH EAs).

Adjust wild horse and burro management to avoid impacts that prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish (INFISH/PACFISH EAs).

Review, modify, and implement annual operating instructions or term grazing permits for those allotments/leases which encompass streams known or expected to contain bull trout addressed in this BO to meet appropriate PACFISH or INFISH objectives (INFISH BiOp August 1998).

Develop and implement grazing management plans and practices in areas of known or suspected bull trout spawning to minimize/reduce trampling of redds and other direct and indirect effects that may result in take of the species (INFISH BiOp August 1998).

When reviewing and modifying grazing actions to minimize/reduce incidental take, amend livestock grazing annual operating instructions, term grazing permits or leases to incorporate appropriate criteria for evaluating ecological conditions of affected areas to ensure attainment of ACS objectives. The evaluation criteria should be developed by USFS and/or BLM range and other interdisciplinary specialists, in coordination with the Service through Level 1 teams (INFISH BiOp August 1998).

Implement management actions, as appropriate, to minimize the impact of livestock grazing in known bull trout spawning areas. Some actions which may be considered include numbers of animals, timing and duration of grazing, herding, fencing of riparian areas, or upland water sites (INFISH BiOp August 1998).

8-4 Forestry

Retained patches should be protected for multiple rotations to provide support for those organisms that require very old forests (NW Forest Plan ROD).

Reduce road densities on public forested lands, on or adjacent to critical habitat (Draft Framework Alternatives 2, 3).

Particularly in weak stock watersheds, restore vegetation patches, patterns, structure, and species composition to be more consistent with the landform, climate, and biological and physical characteristics of the ecosystem, and provide the source of habitat for terrestrial species. Manage disturbances to make vegetation patterns more consistent with their location in the landscape (ICBSDEIS, R-O2).

For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects on listed anadromous fish by [best management practices for roads] (INFISH/PACFISH EAs).

Determine the influence of each road on the Riparian Management Objectives and avoid adverse effects on listed anadromous fish by…reconstructing road and drainage features…, prioritizing reconstruction…, [and] closing and stabilizing or obliterating, and stabilizing roads (INFISH/PACFISH EAs).

Analyze, design, and implement timber harvest activities to meet the requirements of PACFISH and INFISH, and such additional measures as needed to minimize/reduce incidental take of bull trout… (INFISH BiOp August 1998).

Adopt and implement new forest practices rules consistent with the Forests and Fish Report (Forestry Module) and ESHB 2091- [An Act relating to forest practices as they affect the recovery of salmon and other aquatic resources, 1999.] (Washington Plan, 2000)

Complete Habitat Conservation Plan (HCP) on the forestry module by 2003 (Washington Plan, 2000).

Purchase small landowners Forest Riparian Easements (FRE) (Washington Plan, 2000).

Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of Riparian Habitat Conservation Areas [if possible] (INFISH/PACFISH EAs).

9 COMMERCIAL HARVEST

Continue development of selective fisheries where there are no adverse effects on wild stocks (Framework Concept Paper 5).

Implement harvest actions that protect weak stocks (Framework Concept Paper 4).

Address incidental mortality (Spirit of the Salmon).

Selectively decrease commercial harvest of Columbia River salmon in the ocean by negotiating agreements with commercial fishing interests that provide economic incentives not to fish during return periods for designated stocks (Framework Concept Paper 27).

The Action Agencies shall work with NMFS, USFWS, and Tribal and state fishery management agencies in a multiyear program to develop, test, and deploy selective fishing methods and gear that enable fisheries to target nonlisted fish while holding incidental impacts on listed fish within NMFS-defined limits. The design of this program and initial implementation (i.e., at least the testing of new gear types and methods) shall begin in FY 2001. Studies and/or pilot projects shall be under way and/or methods deployed by the 3-year check-in (NMFS BiOp 2000, Action #164, Dec. 2000; BPA Appendix D: Action Table and Reports, R-164, June 5, 2001; 2003/2003-2007 Implementation Plan, Harvest Strategy #1, Oct. 2002).

Reduce ocean harvest to increase numbers of returning adults (Framework Alternative 4).

All other harvest impacts on listed populations would be reduced to conservation crisis levels for a period of years, after which harvest could be adjusted (Draft All-H Paper Harvest Option 3, Dec. 1999).

Decrease commercial [harvest] except for the very strongest species (Comment FWIP-019).

Decrease commercial and lower river sport fishing harvest to strengthen listed species (Comment FWIP-029).

10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Assess the potential impacts of proposed development. Identify cumulative impacts and habitat attributes that might be lost. Present alternatives that minimize impacts. The preferred alternative will have no adverse impacts. If impacts are unavoidable, mitigation shall take one of five forms in order of preference (LCREP):

a) Restoration: returning a damaged habitat as closely as possible to its condition prior to damage
b) Enhancement: making changes or improvements to habitat to replace functions or values lost or damaged
c) Preservation: protecting habitat in adjacent areas that are equivalent to the area damaged and that might otherwise be subject to unregulated activity
d) Creation: converting a non-functioning habitat area into one having all of the physical and biological characteristics of the area lost or damaged
e) Cash mitigation: providing cash compensation for lost habitat to be used for habitat protection and restoration.

Update of administrative guidelines for consideration by counties and cities on inclusion of the Best Available Science and to give special consideration to salmon conservation in their local Critical Areas Ordinances adopted under the Growth Management Act (GMA) (Washington Plan, 2000).

11 RECREATION

Development of new facilities that may adversely affect late-successional reserves should not be permitted. New development proposals that address public needs or provide significant public benefits, such as power lines, pipelines, reservoirs, recreation sites, or other public works projects will be reviewed on a case-by-case basis and may be approved when adverse effects can be minimized and mitigated. These will be planned to help least possible adverse impacts on late-successional reserves. Developments will be located to avoid degradation of habitat and adverse effects on identified late-successional species (NW Forest Plan ROD).

Focus sport fisheries on hatchery stocks and healthy stocks (Human Effects Analysis Appendix D).

Design, construct, and operate [or reconstruct] recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the RMOs and avoids adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

Adjust [or eliminate] dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish (INFISH/PACFISH EAs).

Address attainment of Riparian Management Objectives and potential effect on listed anadromous fish and designated critical habitat in Wild and Scenic Rivers, Wilderness, and other Recreation Management plans (INFISH/PACFISH EAs).

[Breach the four lower Snake River Dams allowing] the economic benefits from recreation and sport fishing [to] replace the hundreds of millions of dollars spent on taxpayer subsidies for dam-dependent industries (Comment FWIP-011, 014).

Breach the lower four Snake River dam, use the addition of longer fishing seasons to more than offset the loss of barging jobs and power generation (Comment FWIP-013).

Maintain traditional…recreational…uses of natural resources (including salmon) if they are consistent with achieving restoration of salmon populations, although not necessarily in historic allocation proportions (Oregon Plan, 1997).

TRIBES

12 TRIBES

Inform and coordinate with affected federally recognized tribes on weed control programs (ICBEMP FEIS).

12-1 Tribal Harvest

Decrease mixed stock commercial harvest; accept economic incentives not to fish during certain migration periods (Framework Concept Paper 27).

Shift to terminal fisheries to allow for selective stock harvest (Framework Concept Paper 27).

[F]unding of new tribal facilities required under the Fish and Wildlife Program as well as the reprogramming of the Mitchell Act and implementation of John Day mitigation are also necessary measures for restoration (Spirit of the Salmon).

Modify the existing basin-wide mechanisms of the *Columbia River Fish Management Plan* (CRFMP), the Fish and Wildlife Program, and FERC Orders to more fully implement treaty fishing rights to take fish at all usual and accustomed fishing places. Use the Endangered Species Act in a manner that is consistent with implementation of treaty rights to natural resources (Spirit of the Salmon).

Restore tribal fisheries at all usual and accustomed fishing sites (Spirit of the Salmon).

Allow limited tribal harvest of healthy fish and wildlife populations (Comment FWIP-019).

Decrease commercial and sport fishing harvest while granting preferred harvest status to Tribes (Comment FWIP-029).

Restrict tribal harvest of endangered species to harvest be traditional technique, including spearing, hook and line, and hand nets (Comment FWIP-045).

12-2 Tradition, Culture, Spirituality

Maintain traditional…cultural uses of natural resources (including salmon) if they are consistent with achieving restoration of salmon populations, although not necessarily in historic allocation proportions (Oregon Plan, 1997).

Recognize native plant communities as traditional resources that are important to tribes and as essential component to treaty-reserved gathering rights (ICBEMP FEIS).

Breach dams to allow access to traditional fishing, hunting and gathering sites (Sample Action).

This page intentionally left blank.

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
SUSTAINABLE USE FOCUS POLICY DIRECTION
Emphasizes *human intervention as part of goal to rebuild and maintain* sustainable fish and wildlife populations to promote expanded harvest and recreation opportunities.

FISH & WILDLIFE

1 HABITAT

Provide habitat capable of: (1) supporting viable populations of plant and animal species, (2) contributing to recovery of listed species, and (3) supporting productive and diverse plant and animal populations and communities to meet social needs (ICBSDEIS, B-O43).

Maintain and restore aquatic and terrestrial habitat quality and quantity to support harvestable plants, fisheries, and aquatic and terrestrial species (ICBSDEIS, B-O44).

Locate incident bases, camps, helibases, staging areas, and helispots and other centers for [fire] incident activities outside Riparian Reserves (NW Forest Plan ROD).

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (NW Forest Plan ROD).

During actual fire suppression activities, fire managers will consult with resource specialists (e.g., botanists, fisheries and wildlife biologists, hydrologists) familiar with the area, the standards and guidelines, and their objectives, to assure that habitat damage is minimized (NW Forest Plan ROD).

Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected (NW Forest Plan ROD).

Identify and attempt to secure in-stream flows needed to maintain riparian resources, channel conditions, and aquatic habitat (NW Forest Plan ROD).

The Colville Confederated Tribes support land acquisitions (10/2/01 letter from Joe Peone to BPA, 5YIP).

Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives (NW Forest Plan ROD).

Maximize the available spawning habitat of the target species by manipulation of water levels during the crucial periods of time of egg laying, incubation, and emergence of free swimming fry (Framework Concept Paper 12).

Moderately increase efforts to protect and restore habitat. The Federal agencies would focus on Federal land management, Federal immediate actions, and on improved coordination of Federal funding for non-Federal actions. This option does not seek significant new commitments from state, tribal, and local governments. However, it would build on existing watershed efforts wherever available (Draft All-H Paper Habitat Option 1, Dec. 1999).

The actions focus "on restoring and maintaining ecosystems across the project area and providing for the social and economic needs of people while reducing short- and long-term risks to natural resources from human and natural disturbances." Conserve current aquatic and riparian habitats that support important native fish population centers. This includes maintenance of hydrologic, riparian and instream processes and functions; water quality; connectivity; and noxious weed control (ICBSDEIS, A1-O1).

Strengthen habitat protection through stricter standards for logging, livestock grazing, mining, and road building (Framework Concept Paper 1).

A proactive strategy that stresses prevention followed by mitigation is an effective tool that can be used to help our troubled ecosystem. The challenge lies in making sure the situation does not get worse, and moving from there to make it better (Framework Concept Paper 16).

Protect existing high quality habitat and improve degraded habitat. Actions will be judged on their ability to produce fish, reduce conflict, and probability of success versus their cost. Actions that are the least expensive,

but do the greatest good will be selected first. Apply management actions in a way that balances wildlife, anadromous and resident fish interests (Framework Concept Paper 20).

Continue protection of habitat that is already protected by local laws, such as water quality standards, discharge permits, fish and wildlife passage requirements, etc. Enforce existing Federal laws that provide for protection of fish, wildlife, and their habitats (e.g., The Fort Bridger Treaty, Clean Water Act, Clean Air Act, Endangered Species Act, National Pollution Discharge Emissions System, wild and scenic river designations, wilderness areas, etc.) (Framework Concept Paper 4).

Improved land management actions would be implemented on Federal, state, tribal, and private land to increase productivity and restore connectivity of populations. Major actions should be coordinated through the experimental management program (Framework Concept Paper 6). Make salmon programs cost-effective; save BPA Fish and Wildlife monies for programs providing the highest probability of success; avoid big-ticket spending for marginally beneficial projects; and maintain or reduce BPA direct/reimbursable spending over time, as listed stocks recover (Framework Concept Paper 2; Framework Alternative 5).

Implement a least-cost program that ensures the highest level of biological benefit for the public and ratepayer dollars spent (Framework Concept Paper 25).

Goal: Restore sustainable, naturally-reproducing fish and wildlife populations to support tribal and non-tribal harvest, cultural practices, and economic benefits by restoring the biological integrity and genetic diversity of the Columbia River ecosystem (Framework Concept Paper 2).

Eliminated habitat: Where habitat for a target population is irreversibly altered or blocked, and therefore there are no opportunities to rebuild the target population by improving its opportunities for growth and survival in other parts of its life history, then the biological objective will be to provide a substitute. In the case of wildlife, where the habitat is inundated, substitute habitat would include setting aside and protecting land elsewhere that is home to a similar ecological community. For fish, substitution would include an alternative source of harvest (such as a hatchery stock) or a substitution of a resident fish species as a replacement for an anadromous species (Council's 2000 Fish and Wildlife Program).

Restoration efforts must focus on restoring habitats and developing ecosystem conditions and functions that will allow for expanding and maintaining a diversity within, and among, species in order to sustain a system of robust populations in the face of environmental variation (Council's 2000 Fish and Wildlife Program).

Even in degraded or altered environments, native species in native habitats provide the best starting point and direction for needed biological conditions in most cases. Where a species native to that particular habitat cannot be restored, then another species native to the Columbia River Basin should be used (Council's 2000 Fish and Wildlife Program).

…rehabilitate degraded habitats in other areas (Council's 2000 Fish and Wildlife Program).

Increase energy and nutrient connections within the system to increase productivity and expand biological communities (Council's 2000 Fish and Wildlife Program).

Expand the complexity and range of habitats to allow for greater life history and between species diversity (Council's 2000 Fish and Wildlife Program).

Restoring habitat and access to habitat that establishes life history diversity is a priority (Council's 2000 Fish and Wildlife Program).

Increase the abundance and range of existing habitats and populations (Council's 2000 Fish and Wildlife Program).

Expand and connect existing habitat pockets to facilitate development of resilient population structures for aquatic communities (Council's 2000 Fish and Wildlife Program).

Manage species composition (diversity), structure and age class, cover, density, and surface litter on native rangeland plant communities (ICBSDEIS, B-33).

Require instream flows and habitat conditions for hydroelectric and other surface water development proposals that maintain or restore riparian resources, favorable channel conditions, and fish passage, reproduction, and growth… During relicensing of hydroelectric projects, provide written and timely license conditions to the Federal Energy Regulatory Commission (FERC) that require fish passage and flows and habitat conditions that

maintain/restore riparian resources and channel integrity (INFISH/PACFISH EAs).

Issue[, adjust, or eliminate] leases, permits, rights-of-way, and easements to avoid effects that would retard or prevent attainment of the Riparian Management Objectives and avoid adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

Use land acquisition, exchange, and conservation easements to meet Riparian Management Objectives and facilitate restoration of fish stocks and other species at risk of extinction (INFISH/PACFISH EAs).

Design and implement fish and wildlife habitat restoration and enhance actions in a manner that contributes to attainment of the Riparian Management Objectives (INFISH/PACFISH EAs).

Fund land acquisitions and conservation easements (BPA) (Final All-H Paper Dec. 2000).

Establish programs to screen all pumps and restore passage at problematic diversions and obstructions (Final All-H Paper Dec. 2000).

Non-listed species, both resident and non-resident, are of great importance to the Colville Confederated Tribes (10/2/01 letter from Joe Peone to BPA, 5YIP).

Implement restoration programs (BPA) (Final All-H Paper Dec. 2000).

Humans are just beginning to realize how complex the interconnections in the ecosystem really are. What we do know is that our present society recognizes that our ecosystem has been thrown off balance. Those living in the Columbia Basin have identified salmon recovery to be of utmost priority and concern. It has been said that the first step to solving a problem is acknowledging it exists. A proactive strategy that stresses prevention followed by mitigation is an effective tool that can be used to help our troubled ecosystem. The challenge lies in making sure the situation does not get worse, and moving from there to make it better (Framework Concept Paper 16).

Accelerate land acquisition, using LWCF *[Land and Water Conservation Fund]* funds prioritizing fish habitat (USFS, BLM) (Final All-H Paper Dec. 2000).

Outside of major urban areas, develop incentives, zoning, or other measures to protect riparian areas and to allow normative development of riparian zones (Draft Framework Alternative 6).

The ecosystem would be…managed primarily with respect to native fish, wildlife, and plant species (Draft Framework Alternative 5).

Change from an engineering driven process to an environmental science driven process that results in aquatic environments conducive to productive populations that are capable of sustaining the future populations of the Pacific Northwest (Framework Concept Paper 15).

Provide healthy riparian forestlands to increase the inflow of waters to the Columbia Basin as a whole (Comment FWIP-028).

Give highest priority to areas above blockages (Comment FWIP-043).

Correct fish passage barriers (Washington Plan, 2000).

Correct fish screening problem (Washington Plan, 2000).

Adopt and implement consistent wetland, riparian, and aquatic habitat protection standards that result in an increase in quality and quantity of habitat (LCREP).

Manage vegetation structure, stand density, species composition, patch size, pattern, and fuel loading and distribution to reduce the prevalence of…severe disturbances; and so the landscape succession/disturbance regimes and terrestrial source habitats are resilient to natural disturbances (ICBEMP FEIS).

Use prescribed fire to reverse the declining trend in air quality. *Rationale*: Through prescribed burning, overall air quality can be improved by: (1) moving some of the smoke to spring and fall when fuel and air conditions are cooler and more moist; (2) reducing the size of wildfires; (3) reducing the severity of wildfires; and (4) managing cumulative effects from prescribed fire smoke (ICBEMP FEIS).

Decisions on management of wildfires and planned prescribed burns should be considered in the context of potential local and regional impacts on air quality, visibility, and haze, and should include impacts from other sources of particulate matter (ICBEMP FEIS).

Inform and coordinate with public and private landowners to increase safety in the urban-rural-wildland interface. Work together to reduce risk from natural disturbance by: reducing live and dead fuel loading, ladder fuels, and ignition sources; thinning forests to reduce tree density; creating single story structures; favoring shade-intolerant species; maintaining low risk of crown fires; and using prescribed fire to maintain low fuel levels (ICBEMP FEIS).

Use fire to restore and/or sustain ecosystem health based on sound scientific principles and information and balanced with other societal goals (ICBEMP FEIS).

Maintain preparedness planning and fire suppression programs to prevent unacceptable loss from fire (ICBEMP FEIS).

Avoid disruption of hydrologic flow paths and processes by locating, designing, and conducting road construction and reconstruction to avoid unstable and potentially unstable lands (ICBEMP FEIS).

Increase the abundance of shade-intolerant species…in pure stands, and in mixed stands where it is ecologically appropriate. Favor retention of emergent large trees…. Create stands with stocking levels and fuel loads that are more resilient to wildfire, insects, and disease (ICBEMP FEIS).

Manage species composition (diversity), structure and age class, cover, density, and surface litter on native rangeland plant communities appropriate to soil type, climate, and landform, to maintain the following source habitats (rangeland cover types): big sagebrush, low sagebrush, mountain sagebrush, salt desert shrub, fescue-bunchgrass, wheatgrass-bunchgrass, and antelope bitterbrush-bluebunch wheatgrass (ICBEMP FEIS).

Use an integrated mix of restoration activities to repattern succession/ disturbance regimes and achieve sustainable landscape conditions (ICBEMP FEIS).

1-1 Anadromous Fish

Restoration of anadromous fish into areas blocked by dams should be actively pursued where feasible (Council's 2000 Fish and Wildlife Program).

The action alternatives focus "on restoring and maintaining ecosystems across the project area and providing for the social and economic needs of people while reducing short- and long-term risks to natural resources from human and natural disturbances" (ICBSDEIS).

Restore terrestrial, riparian, and aquatic habitats where adverse effects or pending risks to these habitats from roads can be quickly reduced (ICBSDEIS, R-O12).

Restore connectivity within and among watersheds and networks of well-distributed high-quality habitats that sustain populations of aquatic and riparian-dependent species (ICBSDEIS, R-O23).

Restore instream and riparian habitat of sufficient quality, patch size, and distribution to support healthy populations of native fish and riparian-dependent species (ICBSDEIS, R-O24).

[T]he food chain in the natal streams need to be upgraded with either salmon carcasses or by fertilizer briquettes that are being used by B.C. biologists on Vancouver Island to increase the steelhead and salmon populations (FWIP Comment #31).

Support BPA offsite mitigation strategy (Final All-H Paper Dec. 2000).

Take action to reintroduce anadromous fish into blocked areas, where feasible (Council's 2000 Fish and Wildlife Program).

Cooperate with…fish management agencies to identify and eliminate adverse effects on native anadromous fish associated with habitat manipulation, fish stocking, fish harvest, and poaching (INFISH/PACFISH EAs).

Begin improving in-channel stream conditions for anadromous fish by improving or eliminating land-use practices that degrade watershed quality (Framework Concept Paper 3; Spirit of the Salmon).

The State of Idaho supports nutrient enhancement of spawning and rearing habitat as a possible tool for incrementally increasing productivity of anadromous populations (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Increase the abundance of anadromous fish to increase the biomass of ocean-derived energy and nutrients delivered to freshwater areas (Draft Framework Alternative 1).

Quantify the benefits and costs of existing and proposed measures to protect Columbia Basin salmon and steelhead populations, taking account of adverse impacts and costs to other species of interest, if any (Framework Concept Paper 26).

Engineer spawning channels to expand natural spawning areas (Framework Alternative 7).

Properly engineered spawning channels can result in better-than-natural salmonid production through natural spawning at minimal cost (Draft Framework Alternative 7).

Restore anadromous salmon above Grand Coulee Dam, as suggested by the upper Columbia blocked area Tribes (Comment FWIP-039).

Mitigate for impacts caused by the Owyhee Dam on the Owyhee River system (Comment FWIP-043).

1-2 Resident Fish

In areas below storage projects, protect, mitigate and enhance resident fish that are affected by altered annual flow regimes, daily load following, temperature modifications, and nutrient trapping (Framework Concept Paper 13).

Above the dams that block salmon and steelhead migration, tailor programs to provide resident fish and wildlife required by local conditions and management needs (Framework Alternatives 2, 4, 5).

Protect, mitigate, and enhance resident fish populations to the extent they were or are affected by construction and operation of dams (Framework Concept Paper 13).

Substitution: Mitigation in areas blocked to salmon and steelhead by the development and operation of the hydropower system is appropriate, and flexibility in approach is needed to develop a program that provides resident fish substitutions for lost salmon and steelhead where in-kind mitigation cannot occur (Council's 2000 Fish and Wildlife Program).

Substitution is appropriate for lost salmon and steelhead in areas that previously had anadromous fish, but where anadromous fish access is now permanently blocked by hydropower development and where in-kind mitigation cannot occur. Substitution should occur in the vicinity of the salmon and steelhead losses being addressed, but substitution and mitigation measures may occur on or off-site (Framework Concept Paper 13).

Restore native resident fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where original habitat conditions exist and where habitats can be feasibly restored (Council's 2000 Fish and Wildlife Program).

Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish at least to the extent that they have been affected by the development and operation of the hydrosystem (Council's 2000 Fish and Wildlife Program).

Increase the abundance of adfluvial and migratory resident fish to distribute energy and nutrients within freshwater areas, especially above anadromous blockages (Draft Framework Alternative 1).

1-3 Introduced Species

In general nonnative species (planned and animal) should not be introduced into Late-Successional Reserves (NW Forest Plan ROD).

Eliminate introduction of new exotic species; control populations of existing exoctic species (Tribal Vision).

Maintain noxious-weed-free plant communities (cover types) or restore plant communities with noxious weed infestations through use of broad-scale integrated weed management strategies (ICBSDEIS, B-O11).

Manage land uses and reduce the extent of biological crust (microbiotic crust) development where potential for biological crust development is high (ICBSDEIS, R-O11).

Discourage proliferation of non-native species (Framework Alternatives 3, 12).

Avoid the introduction of unwanted exotic species and control the deliberate introduction of desirable exotic species in the lower Columbia River and estuary (LCREP).

Prevent, control and monitor spread of aquatic nuisance species (Washington Plan, 2000).

Avoid the introduction of unwanted exotic species and manage the deliberate introduction of desirable exotic species in the lower Columbia River and estuary (LCREP).
1-4 Wildlife
Produce and maintain an optimal level of late-successional and old-growth stands on landscape scale. In these designated areas, certain silvicultural treatments and fire hazard reduction treatments would be allowed to help prevent complete stand destruction from large catastrophic events such as high-intensity, high severity fires; or disease or insect epidemics (NW Forest Plan ROD).
Maintain and restore the species composition and structural tweak that diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of course woody debris sufficient to sustain physical complexity and stability (NW Forest Plan ROD).
Maintain and restore habitat to support well-distributed populations of native plant, invertebrates, and vertebrate riparian-dependent species (NW Forest Plan ROD).
Provide coarse woody debris well distributed across the landscape in a manner which meets the needs of species and provides for ecological functions … Provide coarse woody debris within a forest patch so that the appropriate microclimate for various organisms that use this substrate is available (NW Forest Plan ROD).
Provide a renewable supply of large down logs well distributed across the matrix landscape in a manner that meets the needs of species and provides for ecological functions (NW Forest Plan ROD).
Protect, mitigate, and enhance wildlife populations with continual operations and maintenance to ensure an ecological baseline having healthy habitat values with little or no risk of significant long-term degradation (Tribal Vision).
Above the dams that block salmon and steelhead migration, tailor programs to provide resident fish and wildlife required by local conditions and management needs (Framework Alternatives 2, 4, 5).
Restore sustainable, naturally-reproducing fish and wildlife populations to support tribal and non-tribal harvest, cultural practices, and economic benefits by restoring the biological integrity and genetic diversity of the Columbia River ecosystem (Framework Concept Paper 2).
Manage for native species, protecting existing range, expanding migratory corridors and providing habitat linkages to promote genetic diversity and provide for human use and enjoyment (Framework Concept Paper 7; Framework Concept Paper 7b).
Determine areas currently rendered non-useful for particular wildlife species (for example, blocked migration corridors, summer/winter areas, staging areas, etc.) and utilize substitution mitigation for displaced wildlife and wildlife habitats (Tribal Vision).
Maintain and/or recruit adequate numbers, species, and sizes of snags and levels of downed wood to meet the needs of wildlife (ICBSDEIS, B-O31).
Increase the abundance and range of existing populations and habitats. Expand and connect existing habitat pockets to facilitate development of normative population structures for aquatic communities. Connect wildlife preserves and habitats with suitable connecting habitats (Draft Framework Alternative 1).
Implement vegetative practices that provide suitable cover to control erosion and runoff as well as provide food and shelter for wildlife (Draft All-H paper Dec. 1999).
Coordinate mitigation activities throughout the basin and with fish mitigation and restoration efforts, specifically by coordinating habitat restoration and acquisition with aquatic habitats to promote connectivity of terrestrial and aquatic areas (Council's 2000 Fish and Wildlife Program).
Cooperate with…wildlife management agencies to identify and eliminate wild ungulate impacts (INFISH/PACFISH EAs).
The coarse woody debris retained should approximate the species composition of the original stand to help replicate pre-existing suitable habitat conditions (NW Forest Plan ROD).
For many species, benefits will be greatest if trees are retained in patches rather than singly. Because very

small patches do not provide suitable microclimates for many of these organisms, patches should generally be larger than 2.5 acres (NW Forest Plan ROD).

Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats (NW Forest Plan ROD).

Apply management actions in a way that balances wildlife, *[and]* anadromous and resident fish interests (Framework Concept Paper 20).

Restore vegetation patches, patterns, structure, and species composition to be more consistent with the landform, climate, and biological and physical characteristics of the ecosystem, and provide the source of habitat for terrestrial species. Manage disturbances to make vegetation patterns more consistent with their location in the landscape (ICBSDEIS, R-O2).

Develop and implement habitat acquisition and enhancement projects to fully mitigate for identified losses (Council's 2000 Fish and Wildlife Program).

Maintain and/or recruit adequate numbers, species, and sizes of snags and levels of downed wood to meet the needs of wildlife, invertebrates, fungi, bryophytes, saprophytes, lichens, other organisms, long-term soil productivity, nutrient cycling, carbon cycles, and other ecosystem processes (ICBEMP FEIS).

1-5 Predators of Anadromous Fish

Increased amount of riparian vegetation will provide shade, which lowers water temperature and reduces threat of predators (Framework Concept Paper 1).

The Action Agencies, in coordination with the Caspian Tern Working Group, shall continue to conduct studies (including migrational behavior) to evaluate avian predation of juvenile salmonids in the FCRPS reservoirs above Bonneville Dam. If warranted and after consultation with NMFS and USFWS, the Action Agencies shall develop and implement methods of control that may include reducing the populations of these predators (NMFS BiOp 2000, Action #102, Dec. 2000; BPA Appendix D: Action Table and Reports, R-102, June 5, 2001).

[Change] existing sport fishing restrictions to concentrate on species that prey on, and compete with, salmon for food, including northern pikeminnow. Sport fishing regulation changes also should strive to minimize effects of exotic species on native species. The Region could experience short-term benefits from increased fishing opportunities for these competitor species (Governors' Recommendations, July 2000).

Institute measures to reduce or eliminate non-native fish that compete or prey upon salmon (Comment FWIP-044).

1-6 Watersheds

Watershed restoration should restore channel complexity. In-stream structures should only be used in the short term and not as a mitigation for poor land management practices (NW Forest Plan ROD).

Watershed restoration should focus on removing and upgrading roads (NW Forest Plan ROD).

Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species (NW Forest Plan ROD).

Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations (NW Forest Plan ROD).

Fell trees in Riparian Reserves when they pose a safety risk. Keep felled trees on-site when needed to meet coarse woody debris objectives (NW Forest Plan ROD).

Acquire water rights and conservation easements on adjacent private lands [*for instream flows*] (Tribal Vision).

Improve or eliminate land use activities and practices that degrade water and watershed quality (Tribal Vision).

Federal financial assistance, both from Congress and/or BPA, should be provided to help fund existing activities designed to improve ecosystem health and fish and wildlife health and protection. These include

state and tribal on-reservation programs to develop total maximum daily loads (TMDLs), enhance water quality monitoring, secure water and land rights for fish and wildlife benefits, implement the lower Columbia River estuary program, undertake other watershed restoration activities and, where necessary, establish instream flows (Governors' Recommendations, July 2000).

Mandate appropriate water conservation measures to reduce out-of-stream demands for water (Tribal Vision).

Prevent further degradation and destruction of wetlands and restore impacted wetland areas (Tribal Vision).

Projects designed to improve conditions for fish, wildlife, or watersheds should be considered if they provide late-successional habitat benefits or if their effects on late-successional associated species is negligible (NW Forest Plan ROD).

[W]here necessary, restore soil, restore riparian vegetation and re-create wetlands (Framework Concept Paper 3).

Implement wetland restoration and management practices that help maintain stream flows, filter pollutants, and provide flood storage (Draft All-H paper Dec. 1999).

Land and water users and managers should meet specified habitat conditions associated with targeted salmon survival rates (Framework Concept Paper 3).

Focus work in small tributaries in priority basins, where naturally low streamflows are exacerbated by irrigation withdrawals and where returning even a small amount of water to the stream has significant ecological benefits for anadromous and resident fish (Framework Concept Paper 17).

Management actions should sustain hydrologic processes characteristic of the geoclimatic settings. Hydrologic processes critical for balanced landscapes/ecosystems include, but are not limited to, streamflows and sediments in channels (ICBSDEIS, B-O8).

Maintain and improve physical integrity of aquatic ecosystems, including shorelines, banks, and bottom configurations (ICBSDEIS, B-O37).

Maintain and improve riparian and wetland vegetation to (ICBSDEIS, B-O38):

a. Provide an amount and distribution of woody debris sufficient to sustain physical and biological complexity characteristics of natural aquatic and riparian ecosystems,

b. Provide adequate summer and winter thermal regulation within riparian and aquatic zones,

c. Help achieve rates of surface erosion, bank erosion and channel migration characteristics off those under which plant communities developed, and

d. Provide appropriate amounts and distributions of source habitats for riparian or wetland-dependent species.

Maintain and restore healthy ecosystems and watersheds, which preserve functional links among ecosystem elements to ensure the continued persistence, health and diversity of all species including game fish species, non-game fish species, and other organisms (Council's 2000 Fish and Wildlife Program).

Protect and restore freshwater habitat for all life history stages of the key species. Protect and increase ecological connectivity between aquatic areas, riparian zones, floodplains and uplands (Council's 2000 Fish and Wildlife Program).

Increase the connections between rivers and their floodplains, side channels and riparian zones (Council's 2000 Fish and Wildlife Program).

Manage riparian areas to protect aquatic conditions and form a transition to floodplain terrestrial areas and side channels (Council's 2000 Fish and Wildlife Program).

Identify, protect and restore the functions of key alluvial river reaches (Council's 2000 Fish and Wildlife Program).

Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of Riparian Management Objectives (INFISH/PACFISH EAs).

Increased tributary flows, improved water quality, improved watershed health, and the total ecosystem

approach are of great importance to the Colville Confederated Tribes (10/2/01 letter from Joe Peone to BPA, 5YIP).

Watershed improvements for salmon and steelhead and resident fish will benefit other aquatic, wildlife, and plant species as well (Draft All-H paper Dec. 1999).

Management actions should sustain hydrologic processes characteristic of the geoclimatic settings. Hydrologic processes critical for healthy ecosystems include, but are not limited to, stream flows and sediment in channels (ICBEMP FEIS).

On unstable or potentially unstable lands,…do not increase the natural frequency and distribution of landslides (ICBEMP FEIS).

1-7 Tributaries

Coordinate mitigation plans with system operating plans, reclaiming spawning and rearing habitat by opening migration corridors and repairing degraded tributaries. Coordinate funding among Federal, state, and private sources (Framework Concept Paper 2).

Segregate habitat into "nature preserve" tributaries and "production/supplementation" (hatchery) tributaries to allow increased hatchery production (Framework Concept Paper 26).

Maintain and improve egg-to-smolt survival in natal tributaries (Framework Concept Paper 2).

Declare some tributaries off-limits to hatchery production and others as production and supplementation watersheds (Framework Alternative 7).

Segregate habitat into "nature preserve" tributaries and "production/supplementation" (hatchery) tributaries (Framework Concept Paper 25).

Re-invest the economic benefits of a restructured hydro program into water management projects [from the New Water Management Alternative] for tributaries and watersheds, providing new water storage options, more effective water right transfers and changes, and incentives for increased water efficiency (Comment FWIP-027).

Focus water management on upper river and tributary fish enhancement projects. Potential projects should reflect a broad range of options for new water storage, water transfers and changes, and water efficiency measures (Comment FWIP-027).

1-8 Mainstem Columbia

Restore productive normative river segments in the mainstem Columbia and Snake Rivers (Framework Concept Paper 5).

Protect, conserve, and enhance identified habitats, particularly wetlands, on the mainstem of the lower Columbia River (LCREP).

Mainstem habitat must be returned to natural conditions, which are linked to a 71% downstream passage survival rate, closer to those that existed prior to construction of the dams. This can be done by providing additional spill and water flows, among other measures. Begin restoration of mainstem habitat, including provisions to address toxic pollution as well as provisions for additional spill and water flows (Spirit of the Salmon).

Recolonize extinct populations once habitat conditions and connectivity improve. Therefore, if protected, areas such as the Hanford Reach of the mainstem Columbia River for fall chinook, and portions of the Clearwater and Salmon River subbasins in Idaho for westslope cutthroat trout, will serve as a foundation from which natural population and metapopulation structure can be re-established (Framework Concept Paper 5).

Enhance Mid-Columbia fall chinook by preserving existing habitat in the Hanford Reach, and implementing a normalized annual hydrograph below Priest Rapids (Framework Concept Paper 2).

Possibilities for a mainstem habitat implementation plan: create shallow-water habitat by excavating backwater sloughs, alcoves, and side channels and other measures add large woody debris to these systems; re-connect alcoves, sloughs, and side channels to the main channel; establish emergent aquatic plants in shallow water areas; re-establish or enhance historic or existing wetlands; mimic natural hydrographs to the extent practicable; dredge or excavate lateral channels that have silted in; acquire and protect a belt of lands adjacent

to the mainstems (Draft All-H paper Dec. 1999).

Reconnect restored tributary habitats to protected or restored mainstem habitats, especially in the area of productive mainstem populations (Council's 2000 Fish and Wildlife Program).

Provide habitat and conditions in the mainstem rivers to result in a high rate of survival for juvenile and adult migrating salmon and other fish species (Framework Alternatives 2, 3; orig. Framework Alternative 5).

Install irrigated spawning channels below dam tailraces and elsewhere to increase mainstem spawning habitat (Framework Concept Paper 26).

Establish, or modify, minimum flows (including mainstem flows) to meet instream needs. Evaluate the cumulative impact of all proposed water withdrawals, diversions, or instream structures to ensure that established minimum flows are maintained (LCREP).

1-9 Reservoirs

Provide instream and reservoir environmental conditions necessary to provide adequate survival of resident fish and other aquatic species. Explore ways to stabilize reservoir levels (Draft All-H paper Dec. 1999).

The Action Agencies will work with FWS and Montana Department of Fish, Wildlife, and Parks to re-establish appropriate vegetation in the 20 foot drawdown zone of Hungry Horse Reservoir. A schedule should be developed for plans and funding to be secured by 2003, with implementation by 2005 (FWS BiOp 2000, Action #12.8, Dec. 2000).

1-10 Estuary and Ocean

Protect critical estuary habitat and restore former estuary habitat (Tribal Vision).

Increase the use of the estuary to allow transported smolts to mature and acclimate to [ocean] water conditions. Use mobile pens to hold smolts in the lower Columbia and estuary (Framework Concept Paper 27).

Identify, protect and restore ecosystem functions in the Columbia River estuary and near-shore ocean discharge plume as affected by actions within the Columbia River watershed (Council's 2000 Fish and Wildlife Program).

Restore estuarine habitats by removing dikes and managing dredging and other navigational measures consistent with prudent safety considerations. Investigate, and where feasible implement, measures to restore normative input of sediment and organic matter into the estuary. Manage dredging in the estuary to minimize creation of habitats that artificially increase predation or have other adverse ecological effects (Draft Framework Alternative 5).

Restore estuarine conditions that provide for adequate prey production, cover, and habitat complexity for both smolts and returning adults. Restore quantity and quality of shallow water estuarine habitats (e.g., wetlands and marshes, tidal channels, submerged aquatic vegetation) to those that will support natural aquatic communities. Restore estuarine flow, sediment, and nutrient levels to those that support natural aquatic communities. Restore estuarine temperature, turbidity, bacteria, dissolved oxygen, and gas and salinity concentrations that support natural aquatic communities (Draft All-H paper Dec. 1999).

Restore 3,000 acres of tidal wetlands along the lower 46 miles to return tidal wetlands to 50% of the 1948 level (LCREP).

Ensure that human-caused changes in the river morphology and sediment distribution within the river channel and estuary are managed so that native and desired species are not harmed (LCREP).

1-11 Water Quality

Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes (NW Forest Plan ROD).

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and

riparian communities (NW Forest Plan ROD).

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, great, and character of sediment input, storage, and transport (NW Forest plan ROD).

Manage the river and river uses for seasonal flows and water quality consistent with the needs of salmon, steelhead, and resident fish species (Framework Alternative 1).

Minimize delivery of chemical retardant, foam, or additives to surface waters (NW Forest Plan ROD).

In Riparian Reserves, water drafting sites should be located and managed to minimize adverse effects on riparian habitat and water quality, as consistent with Aquatic Conservation Strategy objectives NW Forest Plan ROD).

Adhere to and enforce all applicable tribal, state and Federal laws and regulations (including water quality standards discharge permits and fish and wildlife passage and screening requirements), strengthen them where needed, and develop incentives and cost-sharing programs to assist in their implementation (Tribal Vision).

Improve water quality by eliminating sources of toxic pollution that accumulates in fish tissue and by reducing discharges of other contaminants to meet water quality criteria for anadromous fish (Framework Concept Paper 3; Spirit of the Salmon).

Improve water quality in the mainstem Columbia and Snake Rivers by reducing or eliminating toxic pollution sources and other contaminant discharges in compliance with applicable water quality criteria (at a minimum) (Tribal Vision).

Improve water quality in the mainstem and tributaries by reducing or eliminating toxic pollution, point and non-point sources and other contaminanat discharges in compliance with applicable water quality criteria (at a minimum) (Tribal Vision).

Limit the amount of sediment in spawning habitat and in streams generally (Sprit of the Salmon).

Support TMDL development and implementation (BPA) (Final All-H Paper Dec. 2000).

Post emergence water levels must be monitored and controlled, if need be, to prevent stranding of fry and to maintain appropriate temperatures (Framework Concept Paper 12).

Maintain water quality and hydrologic processes necessary to support beneficial uses including healthy riparian, aquatic, and wetland ecosystems. Water quality and hydrologic processes should be within the range of variability representative of the inherent capability of the watershed area that supports beneficial use (ICBSDEIS, B-O40).

Strive to develop water quality restoration plans that apply to an entire watershed or subbasin (ICBSDEIS, B-O41).

Use existing MOUs with state water quality agencies to develop partnerships that include other Federal, state, local and tribal organizations, watershed councils, private citizens, and non-Federal landowners, to maximize the benefits of existing efforts for water quality protection and restoration (ICBSDEIS, B-O42).

Restore water quality, water quantity, and hydrologic processes necessary to support healthy riparian, aquatic, and wetland ecosystems (ICBSDEIS, R-O31).

Develop and implement water quality restoration plans for all impaired water bodies on Forest Service and BLM-administered lands by scheduling and implementing the 303(d) protocol (ICBSDEIS, R-O32).

Manage human activities to meet regional and Federal air and water quality standards (Framework Alternative 1).

Enforce existing pollution control laws and meet the standards of the Clean Water Act (Framework Concept Paper 1).

Allow patterns of water flow to move more than at present toward the natural hydrographic pattern in terms of quantity, quality and fluctuation (Council's 2000 Fish and Wildlife Program).

Increase the correspondence between water temperatures and the naturally-occurring regimes of temperatures throughout the basin (Council's 2000 Fish and Wildlife Program).

Significantly reduce watershed erosion where human activities have accelerated sediment inputs (Council's 2000 Fish and Wildlife Program).

Provide healthy forestlands to reduce sedimentation (Comment FWIP-028).

Provide healthy forestlands to minimize instream temperature swings (Comment FWIP-028).

Implement the Yakima River sediment reduction plan (Washington Plan, 2000).

Carry out spill prevention and response, and contaminated sediments programs to eliminate or reduce risks and impacts on aquatic systems (Washington Plan, 2000).

Develop and implement TMDLs for anadromous fish tributaries within five years. Coordinate TMDL and Water Quantity planning assessments with NPPC program. Provide TMDL technical assistance to states (Final All-H Paper Dec. 2000).

Avoid delivery of chemical retardant, foam, or additives [for fuels management] to surface waters [with certain exceptions] (INFISH/PACFISH EAs).

Reduce the volume and velocity and improve the water quality of stormwater runoff in developed areas (LCREP).

Use best management practices to reduce non-point source pollution (LCREP).

Reduce and maintain temperature and total dissolved gas, in the mainstem and tributaries, to help sustain native species (LCREP).

Reduce the bacterial contamination sometimes found in the Columbia River and its tributaries to limit human exposure to contaminated water (LCREP).

Eliminate new sources of bioaccumulative chemicals; eliminate existing source discharges of bioaccumulative chemicals; and control bioaccumulative discharges from contaminated sites (LCREP).

Require all permitted discharges to surface water to use alternatives to chlorine to protect aquatic life where such alternatives provide equivalent removal and treatment of bacteria (LCREP).

Reduce hydrocarbon (PAHs) and heavy metal emissions from petroleum powered engines that contaminate runoff with toxic chemicals (LCREP).

Regulate and track the use of hazardous material to prevent re-uses that contaminate surface water or groundwater (LCREP).

2 HARVEST

The program should seek to increase harvest opportunities consistent with sound biological management practices. Harvest rates should be based on population-specific adult escapement objectives designed to protect and recover naturally spawning populations (Council's 2000 Fish and Wildlife Program).

Artificial production of fish may be used to replace capacity, bolster productivity, and alleviate harvest pressure on weak, naturally spawning resident and anadromous fish populations (Council's 2000 Fish and Wildlife Program).

Establish harvest regimes based on escapement goals to enable the recovery and restoration of all salmon and other fish and wildlife species (Tribal Vision).

Allow enough adults of each stock to escape harvest so that they can spawn and perpetuate harvestable runs over the long-term (Framework Concept Paper 1).

In anticipation of higher abundance in the future, a schedule would be developed that allows harvest rates to increase as abundance increases (Draft All-H paper Harvest Option 1, Dec. 1999).

Meet non-Indian harvest objectives through artificial production (Framework Alternative 6).

Artificially produced fish created for harvest should not be produced unless they can be effectively harvested in a fishery (Council's 2000 Fish and Wildlife Program).

Opportunities for increased harvest: Each subbasin plan and hatchery management plan should identify (a) where there is an opportunity for a terminal fishery and (b) any instance in which increased harvest is possible

but will not occur under the existing harvest regime, and the changes that would be necessary to allow the harvest to occur (Council's 2000 Fish and Wildlife Program).

The State of Idaho points out that incidental harvest mortality (beyond that which is reported as harvest) should not be ignored. They support research into the extent of mortality caused by harvest and harvest methods, including selective gear. Their position is that further increases in harvest should be tied to sustained improvement in wild/listed stock productivity, and that size and condition of adult fish should be taken into account when determining spawning escapement past the fisheries (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The Action Agencies shall work with NMFS, USFWS, and tribal and state fishery management agencies to develop methods for crediting harvest reforms, and the survival benefits they produce, toward FCRPS offsite mitigation responsibilities. A crediting approach shall be agreed upon by the 3-year check-in (NMFS BiOp 2000, Action #168, Dec. 2000; BPA Appendix D: Action Table and Reports, R-168, June 5, 2001; 2003/2003-2007 Implementation Plan, Harvest Strategy #1, Oct. 2002).

Continue development of selective fisheries where there are no adverse effects on wild stocks (Framework Concept Paper 5).

Improve gear for selective harvests (Framework Concept Paper 27).

Utilize production/harvest regimens that minimize impacts on naturally spawning populations, including mixed stock conflicts (Framework Concept Paper 20).

Implement region-wide and international management of harvest, including ocean (Framework Concept Paper 20).

[Protect] fish and wildlife habitat to preserve hunting and fishing opportunities (PM Spokane).

Continue to investigate selective fishing methods in Washington ocean, inside marine, and freshwater fishing areas, and methods to reduce incidental impacts on non-target stocks and species. Measures implemented may include enhanced time, area, and gear depth measures, release of non-target species; requiring special fishing methods to reduce release mortality; setting limits on non-Indian catch of non-target species; and requiring logbooks for non-Indian commercial net fishers (Washington Plan, 2000).

Unify policing functions under *United States v. Oregon* to gain accurate harvest counts, using aerial or satellite-based estimation techniques to corroborate self-reporting by fishermen (Framework Concept 26).

Maintain and restore aquatic and terrestrial habitat quality and quantity to support harvestable plants, fisheries, and aquatic and terrestrial species (ICBEMP FEIS).

2-1 Anadromous Fish

As another important means of achieving the mainstem reductions described above, as well as replacing lost mainstem fishing opportunities, fisheries should be established in terminal areas below Bonneville Dam and in Zone 6, similar to those currently taking place in Oregon's Youngs Bay. Commercial harvest opportunities would target the hatchery-produced stocks returning to terminal areas. Reformed hatchery programs, which we address elsewhere in this document, could include establishing these terminal fisheries (Governors' Recommendations, July 2000).

Re-introduce anadromous salmon and steelhead above Chief Joseph and Grand Coulee dams to restore anadromous and resident fish abundance and harvest to historical levels through mitigation program or fish passage capability (Framework Concept Paper 13).

Cooperate with…fish management agencies to identify and eliminate adverse effects on native anadromous fish associated with habitat manipulation, fish stocking, fish harvest, and poaching (INFISH/PACFISH EAs).

The State of Idaho supports marking of all hatchery fish to enable selective harvest (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Maintain escapements: the escapement goal is the annual number of adults, or a range of values, that the management entity intends to successfully spawn within a designated watershed (Framework Concept Paper 19).

Allow enough wild salmon from each stock to escape harvest to spawn naturally and perpetuate the run

(Framework Concept Paper 1).
Harvest rates should be set to ensure the productivity of the associated natural population. Manage salmon harvest to meet spawning and ecological escapement needs (Draft Framework Alternatives 2, 3).
Where stock information is inadequate or absent, managers should acknowledge this uncertainty and manage conservatively. Harvest managers must acknowledge that salmon productivity varies over time and should act conservatively to account for limitations in assessment information and management capabilities (Council's 2000 Fish and Wildlife Program).
Conduct one-time purchase of replacement selective harvest gear for affected harvest interests with monies saved through operational changes at dams (Framework Concept Paper 26).
Reduce mixed stock harvest and mark all hatchery fish to facilitate selective harvest (Framework Concept Paper 25).
Harvest salmon in a manner consistent with the degree of uncertainty regarding the status and biology of the resource (Framework Concept Paper 19).
Eliminate certain fisheries, such as that in Southeast Alaska (Framework Alternative 4).
Manage mixed stock fisheries on the natural stocks and/or stock groups affected by the fishery (not on hatchery stocks) (NMFS) (Final All-H Paper Dec. 2000).
Discourage non-selective fisheries and pursue selective fisheries (support mass marking and other tools and take a lead role in developing the necessary analytical capabilities to support management of selective fisheries) (Final All-H Paper Dec. 2000).
Naturally reproducing populations will be enhanced by setting fishing regulations to concentrate angler harvest on hatchery fish, continuing efforts to preserve and restore spawning and rearing habitat, and improving survival of downstream migrants (Idaho Plan, 1998).
2-2 Resident Fish
Recover fisheries within dammed natural lakes to within 75% of their historic levels prior to impoundment (Framework Concept Paper 22).
Re-introduce anadromous salmon and steelhead above Chief Joseph and Grand Coulee dams to restore anadromous and resident fish abundance and harvest to historical levels through mitigation program or fish passage capability (Framework Concept Paper 13).
Administer and increase opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild, and hatchery-reared stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historic abundance (includes intensive fisheries within closed or isolated systems) (Council's 2000 Fish and Wildlife Program).
2-3 Wildlife
Continue monitoring and evaluation of wildlife populations to determine success of enhancement and maintenance of habitat values, and establish post-enhancement recovery goals and corresponding limits on harvest (Tribal Vision).
3 HATCHERIES
Increase reliance on careful use of hatcheries and other artificial methods of supplementation (Framework Alternative 2).
The manner of use and value of artificial production must be considered in the context of the environment in which it will be used (Council's Artificial Production Review, October 1999; Council's 2000 Fish and Wildlife Program).
Supplement under seeded natural spawning areas with hatchery production (Framework Concept Paper 27).
Use hatchery technology in rebuilding stocks… Use low-cost, low technology hatchery techniques for supplementation actions (Framework Concept Paper 27).
Except for wild salmon refuges or areas where the habitat is blocked or eliminated, supplementation of natural

runs with artificially produced fish may be used for the purpose of rebuilding the natural runs, although the decision of whether to employ supplementation for this purpose is one that should be made locally, as part of the subbasin plan. The object of such supplementation is to restore and maintain a healthy fish population that eventually, after appropriate habitat improvements, will become self- sustaining. In areas where sufficient fish habitat exists but natural production is insufficient to meet demands, fish stocks may be rebuilt through supplementation. Appropriate wild stocks will be evaluated and utilized wherever possible (Council's 2000 Fish and Wildlife Program).

Hatcheries intended solely to produce fish for harvest may be used to create a replacement for the lost or diminished harvest. The hatchery must be located and operated in a manner that does not lead to adverse effects on other stocks through excessive straying or excessive take of weak stocks in a mixed-stock fishery (Council's 2000 Fish and Wildlife Program).

Use hatcheries and other propagation programs only as part of a broader, ecosystem-based plan (Framework Concept Paper 1).

A simultaneous focus on both strong and weak stocks of fish will encourage natural straying that can be combined with managed supplementation to enhance weakened naturally spawning stocks in all watersheds where natural spawning is feasible. The needs of other fish and wildlife species need to be considered and balanced with management actions taken to protect and enhance threatened or endangered species (Framework Concept Paper 14).

The State of Idaho supports the overall concept of balancing needs (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Use supplementation to help rebuild salmon populations at high demographic risk of extirpation. Use supplementation to reintroduce salmon to watersheds from which they have been extirpated (Spirit of the Salmon; Framework Concept Paper 3).

Production watersheds will be used to support artificial production through the use of modern hatcheries or other artificial methods (Framework Concept Paper 14).

The entities authorizing or managing an artificial production facility should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some other combination of those purposes for each population of fish addressed (Council's 2000 Fish and Wildlife Program).

Enhance production of harvestable populations of salmon resources to the extent they can be harvested by means that do not interfere with quantitative stream escapement goals for naturally spawning salmon populations (Framework Concept Paper 14).

Focus on wild native fish, while recognizing appropriate roles of hatchery and non-native fish where ecologically prudent (Framework Concept Paper 9).

Mark all hatchery fish *[with an identifiable external mark]* to facilitate selective harvest (Framework Concept Papers 5, 26, 27).

Utilize production/harvest regimens that minimize impacts on naturally spawning populations, including mixed stock conflicts (Framework Concept Paper 20).

Artificial production programs might be used to rebuild populations of fish that spawn naturally and also provide fish for tribal, sport, and commercial harvest. In doing so, they should minimize the adverse impacts from interactions between artificially produced fish and those that spawn naturally. Interactions can adversely impact the unique genetics of fish that spawn naturally and, over time, dilute or weaken the unique genetic makeup of those populations (Council's Artificial Production Review, October 1999; Council's 2000 Fish and Wildlife Program).

Restructure hatchery management to improve success in meeting fish and wildlife objectives (Framework Concept Paper 25).

3-1 Anadromous Fish

Continue research on Pacific lamprey, develop artificial production strategies and techniques, and implement them to supplement natural lamprey production (Tribal Vision).

Use supplementation to: Reintroduce salmon to watersheds from which they have been extirpated (including the Upper Columbia River), to re-establish naturally spawning salmon runs genetically and behaviorally similar to those present before construction of the Upper Columbia River dams (Chief Joseph and Grand Coulee) and the Mid-Snake River dams (Hells Canyon Complex) (Tribal Vision).

Abandon efforts to protect existing wild stocks in tributaries where there is already significant hatchery influence (Framework Alternative 7).

Use supplementation to help rebuild salmon populations at high demographic risk of extirpation and to reintroduce salmon to watersheds from which they have been extirpated (Framework Concept Paper 3; Spirit of the Salmon).

To facilitate a robust harvest program for hatchery fish in a way that does not impact wild fish, we endorse a program that results in the marking of hatchery fish that pose threats to ESA-listed fish, to the fullest extent consistent with the Pacific Salmon Treaty. We also urge tribal, state, and Federal fish managers to put such a program in place promptly, as it will be difficult to implement many improved harvest techniques until it is possible to identify hatchery-reared fish (Governors' Recommendations, July 2000).

Artificial production will be limited or curtained in areas to be managed for natural production (Idaho Plan, 1998).

Releases of hatchery-produced fish will be managed to minimize straying of those fish as juveniles or adults into wild fish streams (Idaho Plan, 1998).

Continue to mass mark chinook and coho hatchery products so that hatchery fish can be differentiated from wild fish in fisheries and on spawning grounds (Washington Plan, 2000).

3-2 Resident Fish

For substitution purposes, resident fish may include landlocked anadromous fish (e.g., white sturgeon, kokanee, and coho) as well as traditionally defined resident fish species (Framework Concept Paper 13).

Plant significant numbers of kokanee eggs collected by IDFG and purchased from outside agencies in incubation protection systems throughout the southern parts of lake Pend Oreille until the gas saturation problem is corrected, and then concentrate on restoring wild spawning in the northern part of the lake with similar strategies (Framework Concept Paper 12).

Purchase 10 million kokanee eggs from outside agencies each year until the recovery goal is reached. This would augment the Idaho Department of Fish and Game egg collection at Sullivan Springs. These eggs would increase the hatchery production of fry and provide for protected incubation planting of eggs (Framework Concept Paper 12). Supplement the quantity of target species eggs needed by hatcheries by purchasing eggs from other agencies. These eggs would be used in augmenting the number of emerging fry that would be expected to be produced from planting of hatchery fry and from the deposit of eggs in protected natural incubation environments. About 10 million eggs per year would need to be purchased (Framework Concept Paper 12).

Resident Fish (Non-Native) – Maintain and enhance populations in areas where native populations have been extirpated or reduced to such an extent that native species restoration is biologically or economically infeasible. Use of non-native populations as a substitute fishery serves only as a mitigative response to economic and social concerns over the uncompensable loss of native species (Framework Concept Paper 7b).

Restore native resident fish abundance and diversity by promoting a wide array of life history characteristics, maintaining, restoring and reestablishing the necessary resilience and persistence that allows human use and enjoyment of native resident populations in the face of natural environmental fluctuations and human induced sources of mortality. Restoration of native resident fish abundance occurs through (Framework Concept Paper 7b):

- Restoring depressed populations to sustainable, harvestable levels and enhancing healthy native resident fish stocks;
- Reintroducing and reestablishing stocks in their traditional range, where biologically feasible and economically justifiable.

Revise the planting of fry from the Cabinet Gorge hatchery from release in the Clark Fork river to planting in

the southern part of Lake Pend Oreille until the gas saturation problem that exists in the lower Clark Fork river is overcome (Framework Concept Paper 12). Transport fry ready for release from the Cabinet Gorge hatchery to the southern parts of lake Pend Oreille whenever gas saturation in the Clark Fork river is over 100% including release at Sullivan Springs (Framework Concept Paper 12).

Supplement wild incubation by the use of artificial protection devices [Vibrant boxes for example] to increase the egg to fry survival from normal wild survival percentages of less than 10% to over 80% survival of protected eggs to fry (Framework Concept Paper 12).

Protect, mitigate, and enhance resident fish populations negatively affected by construction and operation of dams, including impacts from water released form storage projects, altered annual flow regimes, daily load following, temperature modifications and nutrient trapping, to the maximum extent practicable (Tribal Vision).

Mitigate hydrosystems and other impacts by native fish restoration, if possible, and native/non-native fish substitution where appropriate… (Tribal Vision).

Attempt to restore and enhance conditions to increase and maintain native resident fish species wherever possible. Allow mitigation with non-native species only in limited situations. Depending upon the results of research and study of population dynamics, the effort should be placed on the enhancement of wild spawning rather than on the use of hatchery production to increase target populations (Framework Concept Paper 12).

For areas above the dams that block salmon migration, allow hatcheries to produce native-type fish that could survive in the changed ecosystem (Framework Alternative 2).

[Follow] a comprehensive mitigation program of native resident fish restoration and native/non-native fish substitution; i.e., continuation and enhancement of the policies, goals and objectives documented in the Power Planning Council's 1995 Fish and Wildlife Program and the Columbia Fish and Wildlife Authority's (1997) Multi-Year Implementation Plan (Framework Concept Paper 13).

4 HYDRO

Mainstem hydrosystem operations and fish passage efforts should be directed at re-establishing natural river processes where feasible and consistent with the Council's responsibility for maintaining an adequate, efficient, economical, and reliable power supply (Council's 2000 Fish and Wildlife Program).

[In] Tier 1 Key Watersheds: For hydroelectric and other surface water development proposals, required in-stream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage (NW Forest Plan ROD).

Consider all fish populations together when considering changes to hydropower system. Avoid benefiting one at the detriment of another. Fisheries must be viewed as an integrated whole, similar to the way flood control is viewed (Framework Concept Paper 22).

The Washington Department of Fish and Wildlife supports development and implementation of facilities and operations that provide direct protection to fish held in or being conveyed through FCRPS fish facilities (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

If the population-level analysis indicates that the combination of actions affecting all life stages of a species will <u>not</u> result in a high probability of survival and a moderate to high likelihood of recovery, mortality caused by the hydrosystem must be reduced to no more than the level that would occur if the hydrosystem was not in place. The FCRPS can achieve this goal through off-site mitigation, if it is not feasible to achieve through FCRPS improvements (Draft Biological Opinion, July 2000).

Minimize the impact of the hydro system on fish and wildlife populations, including passage of anadromous fish downstream and upstream (Framework Concept Paper 20).

4-1 Dam Modifications and Facilities

…incorporate the following measures into hydrosystem operations and management: New and/or improved turbine technology and efficiency (Tribal Vision).

…incorporate the following measures into hydrosystem operations and management: Turbine operation within 1% peak efficiency (Tribal Vision).

Capital improvements at the mainstem dams *[should be]* designed to approximate natural conditions (e.g.,

surface bypass) (Framework Alternative 5).

Remove existing extended-length turbine intake screens; halt installation of new screens and consider removing existing standard-length screens (Tribal Vision).

[Further modify] the configuration and operation of the hydrosystem where appropriate and necessary to benefit fish and so long as the modifications do not jeopardize the region's reliable electricity supply (Governors' Recommendations, July 2000).

The Sierra Club would like to see immediate improvements for both juvenile and adult survival, including reservoirs; dam and reservoir passage improvements at the four Lower Columbia River dams, the five mid-Columbia mainstem projects, and the four Lower Snake River dams; as well as a permanent spillway crest drawdown of the John Day (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

The Corps shall continue design development and 2001 prototype testing of upper turbine intake occlusion devices at The Dalles, with a goal of increased non-turbine passage rates through either the sluiceway or the spillway. The Corps shall install occlusion devices across the entire powerhouse, as warranted (NMFS BiOp 2000, Action #69, Dec. 2000; BPA Appendix D: Action Table and Reports, R-69, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue design development of a prototype RSW and extended deflector for testing at John Day in 2002. The Corps should synthesize evaluation results, determine the fish survival benefits of one or more RSWs or a skeleton bay surface bypass, and install the units as warranted (NMFS BiOp 2000, Action #72, Dec. 2000; BPA Appendix D: Action Table and Reports, R-72, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate a surface bypass RSW at McNary Dam, based on prototype results at other locations, and shall install the unit in multiple spillway bays, as warranted (NMFS BiOp 2000, Action #75, Dec. 2000; BPA Appendix D: Action Table and Reports, R-75, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall initiate design development and testing of extended submerged intake screens and vertical barrier screens at Lower Monumental Dam and construct units as warranted (NMFS BiOp 2000, Action #78, Dec. 2000; BPA Appendix D: Action Table and Reports, R-78, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue high-flow outfall investigations to determine whether it is appropriate to modify bypass outfall criteria in the context of high-discharge bypass discharges (NMFS BiOp 2000, Action #84, Dec. 2000; BPA Appendix D: Action Table and Reports, R-84, June 5, 2001).

The Action Agencies shall remove all unnecessary obstructions in the higher velocity areas of the intake-to-draft tube sections of the turbine units (NMFS BiOp 2000, Action #91, Dec. 2000; BPA Appendix D: Action Table and Reports, R-91, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall complete the extended submerged intake screen systemwide letter report and implement recommended improvements (NMFS BiOp 2000, Action #96, Dec. 2000; BPA Appendix D: Action Table and Reports, R-96, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue design development and, subsequently, construct an emergency auxiliary water supply system at The Dalles Dam's east ladder (NMFS BiOp 2000, Action #122, Dec. 2000; BPA Appendix D: Action Table and Reports, R-122, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue to investigate alternatives to dewater adult auxiliary water system floor diffusers for inspection at The Dalles adult fishway powerhouse collection channel. The Corps shall implement design and construction of needed changes, as warranted (NMFS BiOp 2000, Action #123, Dec. 2000; BPA Appendix D: Action Table and Reports, R-123, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall develop and implement an automated monitoring and alarm system at appropriate FCRPS projects, as determined in the NMFS Regional Forum, to monitor changes in head differential remotely between the primary auxiliary water supply conduits/channels and the adult collection channels and to minimize diffuser damage due to excessive differentials. The Corps shall ensure that diffuser gratings for all

auxiliary water supply systems are securely fastened. The Corps shall work through FPOM to develop a monitoring program for inspecting diffuser gratings and grating fasteners (NMFS BiOp 2000, Action #125, Dec. 2000; BPA Appendix D: Action Table and Reports, R-125, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall complete investigations of improved wet separator designs in 2002. The Corps shall design and construct a new wet separator at McNary, Lower Monumental, and Little Goose Dams, as warranted (NMFS BiOp 2000, Action #95, Dec. 2000; BPA Appendix D: Action Table and Reports, R-95, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall design the spillway Number 1 (end bay) deflector at John Day Dam, and implement as warranted, in coordination with the annual planning process (NMFS BiOp 2000, Action #140, Dec. 2000; BPA Appendix D: Action Table and Reports, R-140, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall develop and implement preventative maintenance programs for fish passage facilities that ensure long-term reliability, thereby minimizing repair costs (NMFS BiOp 2000, Action #145, Dec. 2000; BPA Appendix D: Action Table and Reports, R-145, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall complete the ongoing prototype powerhouse system surface collection evaluations at Bonneville First Powerhouse in 2000. The Corps shall compare the prototype with screened bypass systems and, if warranted, design and construct permanent facilities after full consideration and resolution of biological and engineering uncertainties, especially high-flow outfall investigations (NMFS BiOp 2000, Action #61, Dec. 2000; BPA Appendix D: Action Table and Reports, R-61, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Fund full COE capital and O&M programs (Final All-H Paper Dec. 2000).

The Corps shall continue design development and construction of a Bonneville Second Powerhouse permanent corner collector at the existing sluice chute, pending results of high-flow outfall investigations. The Corps shall construct new facilities if, and as soon as, evaluations confirm the optimum design configuration and survival benefits (NMFS BiOp 2000, Action #66, Dec. 2000; BPA Appendix D: Action Table and Reports, R-66, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue to develop and construct spillway deflectors at Chief Joseph Dam by 2004 to minimize TDG levels associated with system spill (NMFS BiOp 2000, Action #136, Dec. 2000; BPA Appendix D: Action Table and Reports, R-136, June 5, 2001).

Locate new hydroelectric ancillary facilities outside Riparian Habitat Conservation Areas...Locate, operate, and maintain hydroelectric facilities that must be located in Riparian Habitat Conservation Areas to avoid effects that would retard or prevent attainment of the Riparian Management Objectives and avoid adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

…For hydroelectric and other surface water development proposals, give priority emphasis to in-stream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage (NW Forest Plan ROD).

Redesign the dams to mimic the natural aquatic bathymetric structure using Wheels, Pools, and Falls approach to mitigation of hydroelectric project impacts in the Columbia Basin (Framework Concept Paper 15).

The Washington Department of Fish and Wildlife supports development and implementation of facilities and operations that provide direct protection to fish held in or being conveyed through FCRPS fish facilities (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

A suggestion has been made that the Action Agencies consider a specific "fish-friendly" hydro-electric turbine (8/8/01 letter from Jim Carnicom to the Federal Caucus, 5YIP). Prototypes are in operation at Bonneville.

Continue to fine tune the fish-friendly turbine prototype on Unit #4, First Powerhouse at Bonneville Dam. When testing is complete, then every Kaplan turbine on the Columbia and Snake River over 40 years old should be replaced by the new high tech turbines (Framework Alternative 7; Framework Concept Paper 11).

Ensure that "fish-friendly" turbines are available in time for renovation of mainstem facilities (Framework

Concept Paper 26).

Modify dams in a cost-effective manner that contributes to improved fish passage (Comment FWIP-029).

Implement reasonable hydro improvements including fish passage and turbine design (Comment FWIP-029).

Incorporate naturalized surface bypass systems that mimic natural stream conditions to bypass both adults and juvenile fish of all species (Comment FWIP-033).

4-2 Hydro Operation

…incorporate the following measures into hydrosystem operations and management: Reduced water level fluctuations form power peaking operations (Tribal Vision).

Operate the hydrosystem, as it is configured now or in the future, to: Maximize in-river juvenile anadromous fish survival and health consistent with reservoir operations established in the Northwest Power Planning Council's Fish and Wildlife Program (Tribal Vision).

Operate the hydrosystem, as it is configured now or in the future, to: Restore, rebuild and reclaim such conditions and habitat where they have been altered or destroyed (Tribal Vision).

The Corps, in coordination with the Regional Forum, shall maintain juvenile and adult fish facilities within identified criteria and operate FCRPS projects within operational guidelines contained in the Corps' Fish Passage Plan. The Corps shall coordinate with NMFS on the development of these criteria and operational guidelines before the start of each fish passage season (generally February 1) (NMFS BiOp 2000, Action #144, Dec. 2000; BPA Appendix D: Action Table and Reports, R-144, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Washington Department of Fish and Wildlife supports research and modifications to the FCRPS that will offer collateral or direct benefits to non-salmonid species, particularly white sturgeon and Pacific lamprey (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

Adopt a new water management alternative for the Columbia River Basin that would substantially change the existing operating regime to one that improves hydropower generation and fish and wildlife benefits within the Region. Comment (FWIP-027).

Ensure that operation of hydropower, water supply, and flood control dam projects, that are either proposed or petitioned for re-approval/re-licensing, protect and reduce/mitigate impacts on salmon and its habitat (Washington Plan, 2000).

Our vision of the future includes the cost-effective generation of electricity in an environmentally responsible manner (Framework Concept Paper 20).

4-3 Spill

Manage spill at dams to keep dissolved gas levels within Federal clean water guidelines (Draft Framework Alternative 1).

…incorporate the following measures into hydrosystem operations and management: Spill and/or surface bypass to achieve 80% Fish Passage Efficiency (FPE) or better through non-powerhouse routes (Tribal Vision).

Specific spill percentages are established at run-of-river projects to achieve no higher than 120 percent daily average total dissolved gas (SOR FEIS Alternative 9a).

The Corps and BPA shall continue (pending results of the McNary Transport Evaluation) to bypass juvenile spring migrants collected at McNary Dam and shall provide the spring spill levels described for that project (NMFS BiOp 2000, Action #41, Dec. 2000; BPA Appendix D: Action Table and Reports, R-41, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The State of Idaho and the Washington Department of Fish and Wildlife support spill as an effective means of reducing juvenile mortality (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP; 9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

Adjust spill on a project-by-project basis to optimize passage survival at non-collector projects (*e.g.*, reduce spill at The Dalles and Ice Harbor), taking care to balance potential positive effects on juveniles against

negative effects on adults (Framework Concept Paper 26).

Assuming increased transportation, moderate spill regimes would be employed at non-collector facilities, working in combination with spill deflectors and improved turbine passage survival. For Snake River projects, a spill passage regime would be established at Ice Harbor, with minimum or non-programmatic spill at other projects. Mid Columbia River system spill passage regime established by Mid Columbia PUD's. All spill regimes would be optimized for fish passage, gas production control, and economic costs (Framework Concept Paper 27).

The use of spill should be improved, experiments testing spill benefits should be expanded and the effects to juvenile fish survival should be monitored and evaluated (Comment FWIP-044).

[S]pill to the maximum allowable by state water quality agencies at all dams on the lower Snake and Columbia rivers when spring migrants are present… (Idaho Plan, 1998).

Spill to the maximum allowable by state water quality agencies at all collector projects throughout the spring migration period. This should be maintained at all but the lowest flows, based on the discretion of the Salmon Managers (Idaho Plan, 1998).

4-4 Flow

Augment and manipulate flows and storage volumes when necessary to more closely approximate the natural, historic river hydrograph (Tribal Vision).

Manage the river to return seasonal flow patterns for salmon and steelhead while also protecting upriver fish that don't migrate to the ocean (Framework Alternative 2).

Flow augmentation should not impair resident fish program objectives in upper river system (Framework Concept Paper 27).

Continue current flow programs, with some protection for upstream reservoirs. Secure use of water from Canadian storage reservoirs to meet flow needs (Framework Alternatives 5, 6).

Establish or modify minimum flows (including Columbia River flows) to meet instream fish and wildlife needs. Evaluate the cumulative impact of all proposed water withdrawals, diversions, or instream structures to ensure that established minimum flows are maintained (LCREP).

The position of the State of Idaho is that flow objectives should be targets, not requirements (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Systemwide water management, including flow augmentation from storage reservoirs, should balance the needs of anadromous species with those of resident fish species in upstream storage reservoirs so that actions taken to advance one species do not unnecessarily come at the expense of other species (Council's 2000 Fish and Wildlife Program).

The Action Agencies shall operate FCRPS dams and reservoirs with the intent of meeting the flow objectives (Table 9.6-1) on both a seasonal and weekly average basis for the benefit of migrating juvenile salmon (NMFS BiOp 2000, Action #14, Dec. 2000; BPA Appendix D: Action Table and Reports, R-14, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA and the Corps shall continue to request and negotiate agreements to annually provide 1 Maf of Treaty storage from January through April 15, release the water during the migration season, and seek additional storage amounts (NMFS BiOp 2000, Action #24, Dec. 2000; BPA Appendix D: Action Table and Reports, R-24, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA and the Corps shall continue to request and negotiate with BC Hydro for storage of water in non-Treaty storage space during the spring for subsequent release in July and August for flow enhancement, as long as operations forecasts indicate that water stored in the spring can be released in July and August (NMFS BiOp 2000, Action #25, Dec. 2000; BPA Appendix D: Action Table and Reports, R-25, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

BPA and the Corps shall continue to evaluate, request, and negotiate with BC Hydro the shaping and release of water behind Canadian Treaty storage projects in addition to the non-Treaty storage water previously discussed during July and August (NMFS BiOp 2000, Action #26, Dec. 2000; BPA Appendix D: Action Table and

Reports, R-26, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Action Agencies shall acquire water for instream use from BOR's Upper Snake River basin projects and Idaho Power Company's Hells Canyon Complex during the spring and summer flow augmentation periods to improve the likelihood of achieving spring and summer flow objectives at Lower Granite Dam (NMFS BiOp 2000, Action #32, Dec. 2000; BPA Appendix D: Action Table and Reports, R-32, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Allow for seasonal fluctuations in flow. Stabilize daily fluctuations (Council's 2000 Fish and Wildlife Program).

Require instream flows and habitat conditions for hydroelectric and other surface water development proposals that maintain or restore riparian resources, favorable channel conditions, and fish passage, reproduction, and growth… During relicensing of hydroelectric projects, provide written and timely license conditions to the Federal Energy Regulatory Commission (FERC) that require fish passage and flows and habitat conditions that maintain/restore riparian resources and channel integrity (INFISH/PACFISH EAs).

Identify and cooperate with Federal, tribal, state and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat (INFISH/PACFISH EAs).

Establish or modify minimum flows (including Columbia River flows) to meet instream fish and wildlife needs. Evaluate the cumulative impact of all proposed water withdrawals, diversions, or instream structures to ensure that established minimum flows are maintained (LCREP).

Provide daily and seasonal flow patterns to prevent stranding of juvenile fish and to ensure successful salmonid spawning and hatching (Framework Alternative 1).

The State of Idaho supports, as an interim measure, utilizing releases from Dworshak and Brownlee Reservoirs to achieve a flow objective of 100 kcfs at Lower Granite Dam during the spring migration period when juvenile migrants are present, but not at the cost of flow for summer migrants (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Adjust system operations to normalize Snake River flows below Hells Canyon complex (Framework Concept Paper 5).

One commenter suggested that a fixed minimum percentage of the total available flow should be reserved at all times for the river itself (9/7/01 letter from Maia Genaux to the Federal Caucus, 5YIP)

Restructure the existing mainstem flow targets/augmentation program, creating no measurable fish detriments, but increasing mainstem hydropower production (Comment FWIP-027).

Phase out he flow objective approach at dams for spring and summer migrants as long term measures are developed to address water velocity and temperature concerns (Comment FWIP-044).

Condition hydropower projects with instream flow requirements and operational changes for juvenile rearing, adult spawning, and juvenile and adult passage (Washington Plan, 2000).

[W]here the benefits of flow augmentation has been documented, migrating fish should be left in the river to benefit from it (Governors' Recommendations, July 2000).

4-5 Reservoir Levels

Protect, mitigate, and enhance resident fish in hydropower system storage projects to the fullest extent practicable from negative impacts associated with water releases (Framework Concept Paper 13).

Implement Integrated Rule Curves (IRCs) at upstream projects (e.g., Libby, Hungry Horse) to benefit resident fish and wildlife, and to restore a more natural hydrograph with no loss of flood controls (Framework Concept Paper 5).

Install totalizing flow meters at major diversion points. For water withdrawn from reservoirs, install gauges that identify the water surface elevation range from full reservoir to dead pool elevation. Additionally, if the reservoir is located in-channel, install gauges upstream and downstream of the reservoir (Framework Concept Paper 28).

Some mainstem and run-of river FCRPS reservoirs on the lower Snake River and John Day Reservoir would be lowered during the spring and summer migration periods to increase water velocity. Three of the lower

Snake projects (Little Goose, LM, IH) would be operated within one foot of MOP from April 3 until adult fall chinook begin to enter the Snake River, as determined in season by the TMT. Lower Granite Dam would be operated within one foot of MOP from April 3 to November 15 each year. After November 15, all four reservoirs would be operated within their normal 5-foot operating ranges. McNary, The Dalles, and Bonneville dams would be operated within their normal ranges. From April 20 to September 30 each year, John Day would be operated within a 1.5-foot range above elevation 262.5 feet as long as irrigation withdrawal was unaffected and if additional space was not needed for flood control. The pool elevation would be raised if irrigation pumping problems occurred. During the fall and winter months, all four lower Columbia River projects would be operated within their normal operating range, with the exception of temporary flood control storage at John Day, if needed (Draft Biological Opinion, July 2000).

Manage water resource to more closely mimic natural historic river hydrograph (for example, through improved utilization of water from Canadian storage, Banks Lake and various irrigation projects), but maintain to the maximum extent practicable, full, stable water levels in Lakes Roosevelt and in Libby, Dworshak and Hungry Horse reservoirs according to their Integrated Rule Curves and consistent with the Northwest Power Planning Council's Fish and Wildlife Program (Tribal Vision).

Operate reservoirs and modify water diversions to provide optimum instream flows needed by salmon and other native aquatic species (Framework Concept Paper 1).

Implement the IRCs at all storage projects incorporating the Libby Dam approach of tiered flows and careful use of the VARQ flood control strategy. Reduce reservoir drawdown and improve reservoir refill probability to assure a sustainable basin-wide operation for all native species and their prey in the Columbia River watershed. Replace static flow targets in the lower Columbia with attainable normative-type flow targets resulting from basin-wide application of IRCs (Framework Concept Paper 8; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

Efforts would continue to acquire additional water from Canadian reservoirs, implement "Variable Q" flood control operations at Libby and Hungry Horse dams to protect resident fish, and meet minimum discharge requirements for fall chinook and chum salmon spawning and rearing needs in the Hanford reach and below Bonneville Dam. In addition, fluctuation of flows from Priest Rapids would be reduced to limit fry stranding and stabilize riparian areas. Integrated Rule Curve (IRC) operation at storage dams would be further evaluated and implemented based on tradeoffs in benefits to resident fish and effects on salmon habitat and other system operation purposes (Draft All-H paper Hydro Option 2, Dec. 1999; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

The Washington Department of Fish and Wildlife supports VARQ, as well as other modifications to the FCRPS that will increase the flexibility of the system (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP). Montana Fish Wildlife and Parks strongly supports rapid implementation of VARQ at Hungry Horse and Libby Dams (9/27/01 letter from Jeff Hagener to the Action Agencies, 5YIP; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

The Corps shall operate the lower Snake River reservoirs within 1 foot of MOP from approximately April 3 until small numbers of juvenile migrants are present and shall operate the John Day pool within a 1½-foot range of the minimum level that provides irrigation pumping from April 10 to September 30 (NMFS BiOp 2000, Action #20, Dec. 2000; BPA Appendix D: Action Table and Reports, R-20, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

On the lower Columbia, operate John Day at minimum irrigation pool (MIP) year-round while JDA studies are completed. Although changes at JDA (MOP, spillway crest, etc.) may be desired in the future, it appears that operation of JDA below MIP in BPA's next rate period (2002-2006) is constrained by incomplete studies and NEPA processes. Accordingly, complete JDA studies while implementing and assessing configuration changes on the lower Snake (Framework Concept Paper 5).

Idaho supports keeping mainstem reservoir levels at minimum operating pool during the spring migration period and operating John Day Reservoir at minimum irrigation pool (Idaho Plan, 1998).

4-6 Water Quality

Implement physical measures and operational actions to optimize water quality conditions (temperature and dissolved gas) where consistent with overall objectives and other strategies (Draft All-H paper Dec. 1999).

The Washington Department of Fish and Wildlife supports projects to reduce dissolved gas levels (and thereby increase spill caps), as well as research on the effects of dissolved gasses on juvenile and adult salmonids (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

…incorporate the following measures into hydrosystem operations and management: Water temperature and total dissolved gas reduction and abatement to comply with the Federal Clean Water Act (Tribal Vision).

Require Washington Water Power Company to install systems on Cabinet Gorge and Noxon Rapids dams to reduce nitrogen gas saturation to 110% by the year 2001 (Framework Concept Paper 12).

Require the installation of devices or modify dam operations that will result in the reduction of nitrogen gas saturation to a maximum of 110%. This strategy must be accompanied with a monitoring system that will verify the gas saturation does not exceed accepted levels. This must apply to all Federal dams and dams that are not owned by a Federal agency, but are installed on waters that fall within the definition of the Columbia river drainage basin regardless of which state or states the targeted body of water is in and the location of the dam (Framework Concept Paper 12).

The Corps shall investigate TDG abatement options at Libby Dam, including the installation of spillway deflectors and/or additional turbine units. The Corps shall construct gas abatement improvements at Libby on the Kootenai River, as warranted, to reduce TDG levels below the project (NMFS BiOp 2000, Action #137, Dec. 2000; BPA Appendix D: Action Table and Reports, R-137, June 5, 2001).

The Corps shall investigate TDG abatement options at Dworshak Dam and implement options, as warranted, in coordination with the annual planning process (NMFS BiOp 2000, Action #139, Dec. 2000; BPA Appendix D: Action Table and Reports, R-139, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall work through the regional forum process to identify and implement measures to address juvenile fish mortality associated with high summer temperatures at McNary Dam. As a starting point, the Corps shall assemble and analyze the temperature data that have been recorded in the McNary forebay, collection channel, and juvenile facilities. The Corps shall examine relationships among juvenile mortality, temperatures, river flow rates, and unit operations in detail. The Corps shall investigate the feasibility of developing a hydrothermal computational fluid dynamics model of the McNary forebay to evaluate the potential to determine optimal powerhouse operations or structural modifications for minimizing thermal stress of juvenile salmon collected in the summer and to conduct a modeling program, if warranted (NMFS BiOp 2000, Action #142, Dec. 2000; BPA Appendix D: Action Table and Reports, R-142, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Improve water quality while meeting fish passage objectives, and development of a Water Quality Improvement Plan for dissolved gas and temperature (Final All-H Paper Dec. 2000).

The State of Idaho supports use of removable spillway weirs, fish separation collectors, and those improvements necessary to address water quality issues relating to temperature and dissolved gas (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Establish a temperature standard that is not limiting to salmonid adults, juveniles, and eggs (Framework Concept Paper 10).

Enforce existing pollution control laws and meet the standards of the Clean Water Act (Framework Concept Paper 1).

4-7 Juvenile Fish Passage and Transportation

Actions to improve juvenile and adult fish passage through mainstem dams, including fish transportation actions and capital improvement measures, should protect biological diversity by benefiting the range of species, stocks and life-history types in the river, and should favor solutions that best fit natural behavior patterns and river processes, while maximizing fish survival through the projects. Survival in the natural river should be the baseline against which to measure the effectiveness of other passage methods (Council's 2000 Fish and Wildlife Program).

Manage water resources to more closely mimic the natural, historic river hydrograph (for example, through improved utilization of water from Canadian storage, Banks Lake and various irrigation projects) (Tribal

Vision).

Make use of fish transportation as appropriate (Framework Alternative 5).

Provide safe passage for juveniles moving down stream and adults moving upstream at all hydro projects (Federal and non-Federal) in the basin (Framework Concept Paper 1; Framework Concept Paper 20).

Fish transportation: Continue "spread the risk" approach; reduce trucking; continue to study delayed mortality issue (Final All-H Paper Dec. 2000).

Incorporate juvenile and adult salmon passage facilities on all water diversions (Framework Concept Paper 28).

The Corps shall extend the period of barge transportation from the lower Snake River dams and McNary to further reduce reliance on trucking (NMFS BiOp 2000, Action #44, Dec. 2000; BPA Appendix D: Action Table and Reports, R-44, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall complete design for new juvenile bypass facilities at Lower Granite Dam, including enlarged orifices and bypass gallery, open-channel flow bypass, improved separator for juvenile separation by size, and improved fish distribution flumes and barge-loading facilities and shall proceed to construction, as warranted (NMFS BiOp 2000, Action #81, Dec. 2000; BPA Appendix D: Action Table and Reports, R-81, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue the design development, fabrication/deployment, and testing of a prototype RSW at Lower Granite, in conjunction with the existing prototype powerhouse occlusion devices, including the forebay behavioral guidance structure (BGS) and upper turbine intake occlusion devices. As warranted by prototype test results, the Corps shall install one or more permanent RSWs and occlusion devices at appropriate lower Snake hydro projects, in coordination with the annual planning process (NMFS BiOp 2000, Action #80, Dec. 2000; BPA Appendix D: Action Table and Reports, R-80, June 5, 2001; 2003/2003-2007 Implementation Plan Hydro Strategy #1, Oct. 2002).

The Corps shall continue John Day prototype development and investigations of extended submerged intake screens, gatewell vertical barrier screens, and, if necessary, orifices to optimize guidance and safe passage through the system, including a gatewell debris cleaning plan. This work shall include an assessment of fry passage. The Corps shall design and construct new screen systems for safe passage of juvenile salmonids, as warranted. Juvenile bypass outfall survival investigations shall also be conducted (NMFS BiOp 2000, Action #73, Dec. 2000; BPA Appendix D: Action Table and Reports, R-73, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate, design, and construct, as warranted, a new juvenile bypass outfall at Lower Monumental Dam. Investigations shall be conducted in conjunction with spillway deflector and spill pattern optimization studies (NMFS BiOp 2000, Action #76, Dec. 2000; BPA Appendix D: Action Table and Reports, R-76, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA, in coordination with the Fish Passage Operations and Maintenance Coordination Team (FPOM), shall operate all turbine units at FCRPS dams for optimum fish passage survival (NMFS BiOp 2000, Action #58, Dec. 2000; BPA Appendix D: Action Table and Reports, R-58, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps shall continue to transport all non-research juvenile salmonids collected at the Snake River collector projects. The Corps and BPA shall continue to implement voluntary spill at all three Snake River collector projects when seasonal average flows are projected to meet or exceed 85 kcfs (NMFS BiOp 2000, Action #40, Dec. 2000; BPA Appendix D: Action Table and Reports, R-40, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps shall evaluate and implement structural and operational alternatives to improve juvenile transportation at the collector dams (NMFS BiOp 2000, Action #53, Dec. 2000; BPA Appendix D: Action Table and Reports, R-53, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA shall operate the collector projects to maximize collection and transportation during the summer migration (i.e., no voluntary spill except as NMFS deems necessary for approved research) (NMFS BiOp 2000, Action #42, Dec. 2000; BPA Appendix D: Action Table and Reports, R-42, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps shall identify and implement improvements to the transportation program (NMFS BiOp 2000, Action #52, Dec. 2000; BPA Appendix D: Action Table and Reports, R-52, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Spokane Tribe supports improved passage for non-listed fish (9/7/01 letter from Alfred M. Peone to BPA, 5YIP).

Achieve all objectives by passing juvenile fish past existing dams via flow/spill, and with improved passage for juveniles and adults achieved through relatively low-cost modifications (Framework Concept Paper 1).

The Sierra Club would like to see immediate improvements for both juvenile and adult survival, including reservoir; dam and reservoir passage improvements at the four Lower Columbia River dams, the five mid-Columbia mainstem projects, and the four Lower Snake River dams, as well as a permanent spillway crest drawdown of the John Day (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

Develop an environmentally friendly passageway for anadromous salmonids (Framework Concept Paper 11).

At the Snake River projects – Lower Granite, Little Goose, and Lower Monument – pursue increased transportation actions during the juvenile migration season; conduct for spring/summer chinook, steelhead, and fall chinook. At McNary modify operations to provide expanded transportation for spring and summer migrants. Secure additional barges to enhance direct loading operations and reduce holding times. Evaluate and monitor program on an annual basis for improvements (Framework Concept Paper 27).

At Lower Granite and Little Goose finish extended length screens and surface collectors. At Lower Monument evaluate the need for new bypass improvements. At Ice Harbor no extended length screens installed, offer little benefit in increased transportation program. At McNary install extended length screens to increase collection efficiency. At John Day develop surface bypass for existing skeletal bays. At The Dalles rely upon existing sluiceway with a moderate spill regime. At Bonneville, the use of sluiceways and spill should be relied upon for fish passage. Turbine improvements on a predetermined schedule, with priority assigned to Lower Columbia River projects, then moving up river (Framework Concept Paper 27).

The State of Idaho supports use of removable spillway weirs, fish separation collectors, and those improvements necessary to address water quality issues relating to temperature and dissolved gas (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Population abundance will be increased by improving survival of juveniles and adults with priority on major mortality factors related to migration through the hydroelectric system and regional fisheries (Idaho Plan, 1998).

[A] short term action include[s]: 1) a spread-the-risk strategy that provides balance between smolts allowed to migrate in the river and smolts transported (Idaho Plan, 1998).

[A] short term action include[s]: 2) improve in-river migration conditions by promoting spillway passage, at least 80% fish passage efficiency, mainstem reservoirs at minimum operating pool, and prioritizing limited stored-water supplies to benefit mainstem reservoir passage of springtime juvenile migrants…. (Idaho Plan, 1998).

Transport from two dams only during the spring migration period. Existing PIT tag data on survival of bypassed and transported smolts support Idaho's preference for transporting all smolts collected at Lower Granite and Little Goose dams, and returning all bypassed fish to the river at Lower Monumental and McNary dams (Idaho Plan, 1998).

The Corps shall investigate surface bypass (e.g., RSW) at Lower Monumental Dam, based on prototype results at other locations, and install in multiple spillway bays, as warranted (NMFS BiOp 2000, Action #77, Dec. 2000; BPA Appendix D: Action Table and Reports, R-77, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Set up an underwater pumping system above a dam that would create a flow of water to carry young fish away from the dam and into a man-made river channel carved around the structure (Gordon Burns Comment).

4-8 Adult Fish Passage

Actions to improve juvenile and adult fish passage through mainstem dams, including fish transportation actions and capital improvement measures, should protect biological diversity by benefiting the range of

species, stocks and life-history types in the river, and should favor solutions that best fit natural behavior patterns and river processes, while maximizing fish survival through the projects. Survival in the natural river should be the baseline against which to measure the effectiveness of other passage methods (Council's 2000 Fish and Wildlife Program).

…incorporate the following measures into hydrosystem operations and management: Additional adult fish ladders, new designs and structural improvements to existing ladders and improved maintenance of existing ladders (Tribal Vision).

Operate the hydrosystem, as it is configured now or in the future, to: Maximize adult anadromous fish health, survival and spawning capacity (Tribal Vision).

Provide safe passage for juveniles moving down stream and adults moving upstream at all hydro projects (Federal and non-Federal) in the basin (Framework Concept Paper 1; Framework Concept Paper 20).

PPC supports efforts to improve surface collection and passage (9/28/01 letter from Robert G. Walton to the Action Agencies, 5YIP).

Use stored cold water, additional ladders, ladder improvements, and ladder maintenance to enhance mainstem adult passage; incorporate 24-hour video fish counting (Spirit of the Salmon; Framework Concept Paper 3).

Incorporate juvenile and adult salmon passage facilities on all water diversions (Framework Concept Paper 28).

The Corps shall ensure that alterations to fish ladders and adult passage facilities to accommodate Pacific lamprey passage do not adversely affect salmonid passage timing and success (NMFS BiOp 2000, Action #119, Dec. 2000; BPA Appendix D: Action Table and Reports, R-119, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall develop improved operations for adult fishway main entrances at FCRPS dams so that the best possible attraction conditions are provided for adult migrants, both at the four Columbia River hydro projects and the four lower Snake hydro projects (where reservoir elevations are held near MOP). The Corps shall report the findings of fishway entrance flow-balancing investigations in a report to NMFS by the end of 2001 and shall continue to work through FPOM to evaluate and implement, as warranted, structural changes to satisfy fish passage plan fishway entrance criteria (NMFS BiOp 2000, Action #120, Dec. 2000; BPA Appendix D: Action Table and Reports, R-120, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall develop and implement a program to better assess and enumerate indirect prespawning mortality of adult upstream-migrating fish. Such mortality may be due to, or exacerbated by, passage through the FCRPS hydro projects. If measures are identified which will reduce the unaccountable adult loss rate and/or the prespawning mortality rate, the Corps shall implement these measures as warranted. The program should also enhance efforts to enumerate unaccountable losses associated with tributary turnoff, harvest, or other factors in FCRPS mainstem reservoirs and upstream of FCRPS projects (NMFS BiOp 2000, Action #118, Dec. 2000; BPA Appendix D: Action Table and Reports, R-118, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate and enumerate fallback of upstream migrant salmonids through turbine intakes at all lower Snake and lower Columbia River dams. The Corps shall implement corrective measures to reduce turbine mortality, as warranted (NMFS BiOp 2000, Action #111, Dec. 2000; BPA Appendix D: Action Table and Reports, R-111, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate ways to provide egress to adult fish that have fallen back into juvenile collection galleries and primary dewatering facilities at Ice Harbor and McNary dams. The Corps shall either install structural, or implement operational, remedies to minimize delay and injury of fish that fall back, as warranted (NMFS BiOp 2000, Action #112, Dec. 2000; BPA Appendix D: Action Table and Reports, R-112, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall develop and maintain an auxiliary water-supply, emergency-parts inventory for all adult fishways where determined necessary, in coordination with NMFS (NMFS BiOp 2000, Action #121, Dec. 2000; BPA Appendix D: Action Table and Reports, R-121, June 5, 2001).

The Corps shall investigate adult fish delay and fallback at ladder junction pools and implement remedies to

reduce this problem, as warranted (NMFS BiOp 2000, Action #116, Dec. 2000; BPA Appendix D: Action Table and Reports, R-116, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA shall conduct a comprehensive evaluation to investigate the causes of headburn in adult salmonids and shall implement corrective measures, as warranted (NMFS BiOp 2000, Action #108, Dec. 2000; BPA Appendix D: Action Table and Reports, R-108, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue biological and engineering investigations and design of a composite ice and trash sluiceway outfall relocation and adult ladder auxiliary water system at The Dalles Dam and shall construct such devices as warranted (NMFS BiOp 2000, Action #70, Dec. 2000; BPA Appendix D: Action Table and Reports, R-70, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall examine existing fish-ladder water temperature and adult radio-telemetry data to determine whether observed temperature differences in fishways adversely affect fish passage time and holding behavior. If non-uniform temperatures are found to cause delay, means for supplying cooler water to identified areas of warmer temperatures should be developed and implemented in coordination with the annual planning process (NMFS BiOp 2000, Action #114, Dec. 2000; BPA Appendix D: Action Table and Reports, R-114, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall complete adult fishway auxiliary water supply evaluations at each lower Snake River hydro project and implement corrective measures as warranted (NMFS BiOp 2000, Action #129, Dec. 2000; BPA Appendix D: Action Table and Reports, R-129, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Manage attraction flows, spill, and ladder entrances and exits and in-ladder conditions to minimize adult migrational delay and maximize adult passage survival (Framework Alternatives 1, 2, 3).

The Spokane Tribe supports improved passage for non-listed fish (9/7/01 letter from Alfred M. Peone to BPA, 5YIP).

Achieve all objectives by passing juvenile fish past existing dams via flow/spill, and with improved passage for juveniles and adults achieved through relatively low-cost modifications (Framework Concept Paper 1).

Make low-cost capital improvements to enhance in-river migration (e.g., gas abatement deflectors, adult fish ladder improvements, and experiments with low-cost notched spill gates for juvenile passage). At The Dalles, evaluate measures to reduce passage problems caused by the unusual configuration (Framework Concept Paper 2).

The Sierra Club would like to see immediate improvements for both juvenile and adult survival, including reservoir; dam and reservoir passage improvements at the four Lower Columbia River dams, the five mid-Columbia mainstem projects, and the four Lower Snake River dams, as well as a permanent spillway crest drawdown of the John Day (9/27/01 letter from Chase C. Davis to the Action Agencies, 5YIP).

Population abundance will be increased by improving survival of juveniles and adults with priority on major mortality factors related to migration through the hydroelectric system and regional fisheries (Idaho Plan, 1998).

4-9 Flood Control

Shape the timing and volume of combined discharges from the various projects to adhere to desired flood control requirements and the needs of resident fish, while simultaneously providing a protracted flow event to speed smolt outmigration. The more natural hydrograph enhances resident fish and wildlife in all affected waters (OPR: NMFS/USACE) (Framework Concept Paper 2).

The Action Agencies shall operate the FCRPS during the fall and winter months in a manner that achieves refill to April 10 flood control elevations, while meeting project and system minimum flow and flood control constraints before April 10. During the spring, the Action Agencies shall operate the FCRPS to meet the flow objectives and refill the storage reservoirs (Albeni Falls, Dworshak, Grand Coulee, Hungry Horse, and Libby) by approximately June 30 (NMFS BiOp 2000, Action #18, Dec. 2000; BPA Appendix D: Action Table and Reports, R-18, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Corps and BOR shall implement VARQ flood control operations, as defined by the Corps (1999d), at

Libby by October 1, 2001, and at Hungry Horse by January 1, 2001. By February 1, 2001, the Corps shall develop a schedule to complete all disclosures, NEPA compliance, and Canadian coordination necessary to implement VARQ flood control at Libby (NMFS BiOp 2000, Action #22, Dec. 2000; BPA Appendix D: Action Table and Reports, R-22, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002; FWS BiOp 2000, Action #8.1(b), Dec. 2000; BPA Appendix D: Action Table and Reports, R-233, June 5, 2001; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

Implement Integrated Rule Curves (IRCs) and careful use of VARQ flood control strategy at all storage projects (Framework Concept Papers 2, 8, 13; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

Create IRCs for projects that do not presently have integrated operational rules, by modeling watershed technology. (Significant expertise is readily available from scientists in Montana and the USACE.) Refine IRCs using a team of site-specific experts. After IRCs are developed, a system model with sufficient time resolution (e.g., weekly or daily) can incorporate operating rules at various dams (Framework Concept Papers 2, 8).

The Washington Department of Fish and Wildlife supports VARQ, as well as other modifications to the FCRPS that will increase the flexibility of the system (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

Montana Fish Wildlife and Parks strongly supports rapid implementation of VARQ at Hungry Horse and Libby Dams (9/27/01 letter from Jeff Hagener to the Action Agencies, 5YIP; Corp VARQ EA/FONSI, Dec. 2002; BOR VARQ EA/FONSI, March 2002).

Reduce reservoir drawdown and improve reservoir refill probability to assure a sustainable basin-wide operation for all native species and their prey in the Columbia River watershed. Replace static flow targets in the lower Columbia with attainable normative-type flow targets resulting from basin-wide application of IRCs (Framework Concept Paper 8).

COMMERCE

5 POWER

5-1 Existing Generation

Avoid fluctuations caused by power peaking operations (Framework Concept Paper 3).

Shift regional energy "peaking" or "load following" to Upper Columbia projects, primarily Grand Coulee and Chief Joseph, and to other USACE facilities (Framework Concept Paper 2).

Provide a hydropower backbone for the power system (albeit reduced from current levels) (Framework Alternatives 2, 3).

Institute measures to ensure cost-effective salmon recovery, to provide certainty in Fish and Wildlife costs for BPA, and thereby maintain the region's low energy costs (Framework Concept Paper 2).

Pursue safe deposition and timely clean up of nuclear wastes stored at the Trojan and Hanford nuclear facilities (LCREP).

5-2 New Energy Resources

New generation resources would include a least-cost mix of power purchase energy conservation, cost effective renewable resources, and high efficiency CTs (Sample Action).

Develop additional sources of power and greatly increase energy conservation, regardless of what happens to the four dams on the Snake (Comment FWIP-045).

5-3 Transmission Reliability

Undertake transmission reinforcement actions to maintain system reliability (Sample Action).

Manage transmission right-of-way vegetation to benefit targeted wildlife species (Sample Action).

Improve transmission system to avoid potential outages caused by migratory bird interactions, thereby reducing potential harm to bird species (Sample Action).

6 INDUSTRY
Use pollution prevention to reduce or eliminate toxic and conventional pollution generated during manufacturing and industrial processes (LCREP).
Require that industrial wastewater that is discharged to municipal wastewater treatment facilities does not contain materials that exhibit chronic toxicity or that interact with other chemicals to cause toxic effects (LCREP).
Require all marine facilities to have safety and spill prevention and clean up plans in place and to have sewage and bilge pump out facilities and treatment procedures (LCREP).
6-1 Industrial Development
[Encourage] emissions trading … to garner the necessary widespread support. While direct taxation leaves little room for gaining competitive or commercial advantage, the use of permit trading or similar mechanisms can create opportunities for companies to benefit using superior organizational or strategic positioning. (ACSH).
[Encourage] urban storm runoff control, municipal waste management, road management, *[and]* obstruction removal (Human Effects Analysis Appendix D).
6-2 Aluminum and Chemical
Use pollution prevention to reduce or eliminate toxic and conventional pollution generated during manufacturing and industrial processes (LCREP).
6-3 Mining
Locate [minerals management] structures, support facilities, and roads outside Riparian Reserves. Where no alternative to citing facilities in Riparian Reserves exists, locate them in a way compatible with Aquatic Conservation Strategy objectives (NW Forest Plan ROD).
Road construction will be kept to a minimum necessary for the approved mineral activity. Such roads will be constructed and maintained to meet roads management standards and to minimize damage to resources in the Riparian Reserve. When a road is no longer required for mineral or land management activities it will be closed, obliterated, and stabilized (NW Forest Plan ROD).
If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, and releases can be prevented, and stability can be ensured, then: ... Locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials (NW Forest Plan ROD).
If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, and releases can be prevented, and stability can be ensured, then: ... Reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives (NW Forest Plan ROD).
Salable mineral activities such as sand and gravel mining and extraction within Riparian Reserves will occur only if Aquatic Conservation Strategy objectives can be met (NW Forest Plan ROD).
Avoid adverse effects to listed species and designated critical habitat from mineral operations (INFISH/PACFISH EAs).
Locate [mining] structures, support facilities, and roads outside...Close, obliterate and revegetate roads no longer required for mineral or land management activities (INFISH/PACFISH EAs).
Prohibit solid and sanitary waste [mining] facilities in Riparian Habitat Conservation Areas [unless certain conditions are met] (INFISH/PACFISH EAs).
For leasable minerals, prohibit surface occupancy [or adjust operating plans] within Riparian Habitat Conservation Areas for oil, gas, and geothermal exploration and development activities (INFISH/PACFISH EAs).
Improve mining discharges *[and]* mining practices. Rehabilitate *[and reclaim]* marginal and closed mines (Human Effects Analysis Appendix D).

6-4 Pulp and Paper
Encourage the adoption of the 3 "r"s (reduce, reuse, recycle) as part of a non-regulatory assistance program to prevent pollution (Sample Action).
7 TRANSPORTATION
Update Highway Runoff Manual and negotiate NPDES Phase 2 Municipal Stormwater Permits (Washington Plan, 2000).
Determine the long-term road system that supports natural resource objectives, minimizes road-related risks and adverse effects from existing and future planned roads, and provides access to public lands (ICBEMP FEIS).
7-1 Navigation and Barging
Restrict new dredging and improve existing dredging management practices (Tribal Vision).
Save our Wild Salmon is concerned that habitat may be harmed by dredging portions of the lower Columbia River estuary. (9/7/01 letter from Nicole Cordan to the Federal Caucus, 5YIP).
7-2 Trucking, Railroads, and Infrastructure
Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy Objectives. At a minimum, this plan shall include provisions for the following activities: ... inspections and maintenance during storm events ... inspections and maintenance after storm events (NW Forest Plan ROD).
Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy Objectives. At a minimum, this plan shall include provisions for the following activities: ... Road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources (NW Forest Plan ROD).
Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy Objectives. At a minimum, this plan shall include provisions for the following activities: ... Traffic regulation during wet periods to prevent damage to riparian resources (NW Forest Plan ROD).
For each existing or planned road, meet Aquatic Conservation Strategy objectives by ... restricting sidecasting as necessary to prevent the introduction of sediment to streams (NW Forest Plan ROD).
Meet Aquatic Conservation Strategy objectives by ... reconstructing roads and associated drainage features that pose a substantial risk (NW Forest Plan ROD).
Meet Aquatic Conservation Strategy objectives by ... closing and stabilizing, or obliterating and stabilizing roads based on ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs (NW Forest Plan ROD).
New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris …. Crossings will be constructed and maintained to prevent diversion of stream flow out of the channel and down the road in the event of crossing failure (NW Forest Plan ROD).
For each existing or planned road, meet Aquatic Conservation Strategy objectives by ... minimizing disruption of natural hydrologic flow paths, including diversion of stream flow and interception of surface and subsurface flow (NW Forest Plan ROD).
New roads (temporary, semi-permanent or permanent) in Riparian Habitat Conservation Areas shall be minimized to the greatest extent possible, and shall be constructed only where watershed analyses have been completed to document that the roads would not prevent attainment of ACS objectives (INFISH BiOp August 1998).

8 AGRICULTURE

Implement soil and water conservation practices that control erosion and runoff in order to reduce stream sedimentation, flooding, and bank erosion and those that help to maintain or improve base streamflows (Draft All-H paper, Dec. 1999).

Implement actions to create wetlands, e.g., re-introduction of beavers. Implement actions needed to promote re-vegetation of riparian areas and de-compaction of soils where recovery is not occurring naturally. If necessary, initiate land management designed to return a watershed to a natural hydrologic regime, e.g., re-vegetation of areas adversely affected by past land-disturbing activities (Spirit of the Salmon).

Expand on agricultural incentive programs (Final All-H Paper Dec. 2000).

Reform and enforce land use statutes governing growth management, forestry practices, and agricultural practices (e.g., Washington Forests & Fish model) (Final All-H Paper Dec. 2000).

Implement soil and water conservation practices that control erosion and runoff in order to reduce stream sedimentation, flooding, and bank erosion and those that help to maintain or improve base streamflows (Draft All-H paper Dec. 1999).

8-1 Irrigation

Maximize irrigation efficiency and accountability, and decrease out-of-stream water withdrawals (Tribal Vision).

Adopt strong water conservation programs and use saved water to replenish flows (Framework Concept Paper 1).

Meter groundwater and surface water withdrawals (Spirit of the Salmon).

Screen water diversions on all fish-bearing streams (Framework Concept Paper 28).

By March 1, 2002, BOR shall install screens meeting NMFS' screen criteria at the canal intakes to the Burbank No. 2 and Burbank No. 3 pump plants. BOR shall connect the Burbank No. 3 intake canal to Burbank Slough to provide juvenile fish egress. BOR shall coordinate with NMFS on each of the actions identified above (NMFS BiOp 2000, Action # 38, Dec. 2000; BPA Appendix D: Action Table and Reports, R-38, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Identify and use appropriate water conservation measures in accordance with state law (Framework Concept Paper 28).

Support water acquisitions using Federal funding (Final All-H Paper Dec. 2000).

State water resource agencies throughout the Columbia River Basin enforce existing water laws, including those relating to the doctrine of waste, individual water right terms and conditions, measurement of existing uses, and ensuring instream water rights are protected (Framework Concept Paper 5).

[Initiate more intensive] agricultural water conservation, irrigation waste water treatment, *[and]* irrigation withdrawals screening (Human Effects Analysis Appendix D).

Implement soil and water conservation practices that control erosion and runoff in order to reduce stream sedimentation, flooding, and bank erosion, and those that help to maintain or improve base streamflows (Draft All-H paper).

The protection of instream flows is fundamentally a "water quantity" issue. Recent changes in state water laws that allow instream flows to be recognized and protected provide the basis for strategies for providing instream flows in small streams and tributaries. State law changes may involve: 1) providing that instream use is a beneficial use for which a water right can be issued; 2) allowing existing out-of-stream water rights to be transferred to instream water rights; and 3) encouraging efficiency in water use to reallocate saved water to instream use (Framework Concept Paper 17).

8-2 Pesticides and Agricultural Practices

Reduce the use of pesticides in agriculture to lower input to terrestrial and aquatic areas (Framework Alternatives 1, 2, 3).

[Encourage] nutrient and pest management practices needed to limit delivery of pollutants that create

eutrophic or toxic conditions for fish and other aquatic organisms (Draft All-H paper Dec. 1999).

Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on listed anadromous fish (INFISH/PACFISH EAs).

Herbicides, insecticides, and other toxicants, and other chemicals shall be applied only in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives (NW Forest Plan ROD).

Idaho has submitted project proposals regarding Combined Animal Feeding Operations that will contribute to improving water quality in tributaries, and ultimately in the mainstem (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Revise farm conservation practices related to water quality and fish habitat found in the Natural Resources Conservation Service (NRCS) Field Office Technical Guides (FOTGs) to meet Endangered Species Act (ESA) and Clean Water Act (CWA) requirements (Washington Plan, 2000).

Implement Conservation Reserve Enhancement Program (CREP) (Washington Plan, 2000).

8-3 Grazing

Locate new livestock handling and/or management facilities outside Riparian Reserves. For existing livestock handling facilities inside the Riparian Reserve, ensure that Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, require the location or removal of such facilities (NW Forest Plan ROD).

Limit livestock trailing, bedding, watering, loading, and other handling efforts (NW Forest Plan ROD).

Manage grazing, especially on public lands, to reduce riparian impacts and input of organic nutrients and pathogens into water sources (Framework Alternatives 1, 2, 3).

Install fencing to keep range animals away from stream sides (Framework Concept Paper 23).

Maintain grazing through use of best management practices, while imposing riparian set-asides and fencing allotments in fish-bearing streams and sensitive wildlife refugia. Provide efficient, temporary mitigation to ease transition to different land management practices (Framework Concept Paper 7b).

Prevent damage to and destruction of riparian vegetation by fencing or other means, such as purchasing grazing permits and restore impacted riparian areas (Tribal Vision).

Locate…livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas (INFISH/PACFISH EAs).

Adjust or eliminate grazing practices that retard or prevent attainment of reserves objectives (NW Forest Plan ROD).

[Encourage] nutrient and pathogen load reduction from grazing/agriculture. Reduce grazing impacts to riparian/aquatic ecosystem (Human Effects Analysis Appendix D).

Increase the geographic extent and connectivity of rangeland cover types and structural stages (terrestrial source habitats) that have declined substantially in geographic extent from the historical to the current period (ICBSDEIS, R-O21).

Land uses such as livestock grazing…, and where applicable, timber harvest and recreation, should provide:

a. Adequate cover to promote infiltration, soil water storage, and maintain soil stability in upland areas;
b. Adequate cover and plant community structure in riparian-wetland areas to promote the attainment of proper functioning condition
c. (1) Soil surface conditions that support infiltration; (2) soil subsurface conditions that ensure movement of soil water into the soil profile; and (3) the combination of soil surface and soil subsurface conditions in (1) and (2) which will ensure soil water storage;
d. As minimal an increase and spread of noxious weeds as possible, over and above the inherent increase and spread of noxious weeds by natural disturbances;
e. Soil and vegetation conditions that provide opportunity for establishment of desirable plants;
f. Maintenance and restoration of water quality;

g. Maintenance and the opportunity for restoration of terrestrial source habitat, patch size, and density;
h. For reduction of the potential conflicts between domestic sheep and bighorn sheep (ICBEMP FEIS).

8-4 Forestry

For each existing or planned road, meet Aquatic Conservation Strategy objectives by ... minimizing road and landing locations in Riparian Reserves (NW Forest Plan ROD).

Some salvage that does not meet the preceding guidelines will be allowed when salvage is essential to reduce the future of fire or insect damage to late-successional forest conditions (NW Forest Plan ROD).

Management should retain adequate coarse woody debris quantities in the new stand so that in the future it will still contain amounts similar to naturally regenerated stands (NW Forest Plan ROD).

Management should focus on retaining stands that are likely to persist until late-successional conditions have developed and the new stand is again producing large snags (NW Forest Plan ROD).

All standing live trees should be retained, including those injured (e.g., scorched) but likely to survive (NW Forest Plan ROD).

The potential for benefit to species associated with late-successional forest conditions from salvage is greatest when stand-replacing events are involved. Salvage in disturbed sites of less than 10 acres is not appropriate because small forest openings are an important component of old-growth forests. In addition, salvage should occur only in stands where disturbance has reduced canopy closure to less than 40 percent, because stands with more closure are likely to provide some value for species associated with these forests (NW Forest Plan ROD).

West of the Cascades - There is no harvest allowed in stands over 80 years old.… Thinning (precommercial and commercial) may occur in stands up to 80 years old regardless of the origin of the stands (NW Forest Plan ROD).

Reduce the risks of large-scale disturbance [i.e. fire] east of the Cascades and in the Oregon and California Klamath Provinces. Given the increased risk of fire in these areas…additional management activities are allowed in late-successional reserves (NW Forest Plan ROD).

Outside Roadless Areas – Reduce existing system and nonsystem road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds (NW Forest Plan ROD).

Silvicultural treatments may be used to restore large conifers in Riparian Reserves (NW Forest Plan ROD).

Coarse woody debris already on the ground should be retained and protected to the greatest extent possible from disturbance during treatment (e.g., slash burning and yarding) which might otherwise destroy the integrity of the substrate (NW Forest Plan ROD).

Down logs should be left within forest patches that are retained under green-tree retention guidelines in order to provide the microclimate that is appropriate for various organisms that use this substrate (NW Forest Plan ROD).

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance (NW Forest Plan ROD).

For lands administered by the BLM in Oregon north of Grants Pass, … and including the entire Coos Bay District … [w]hen an area is cut, 12 to 18 green trees per acre will be retained. … For lands administered by the BLM in Oregon south of Grants Pass, retain 16-25 large green trees per acre in harvest units (NW Forest Plan ROD).

Work with the Governors on a long-term strategy to deal with the wildland fire and hazardous fuels situation, as well as the needs for habitat restoration and rehabilitation in the Nation. The managers expect that a collaborative structure, with the States and local governments as full partners, will be the most efficient and effective way of implementing a long-term program (Western Governor's Association's).

Promote sustainable *[harvest]* while providing for…riparian set-asides for salmonid fish-bearing streams. Provide efficient, temporary mitigation to ease transition to different land uses where economic opportunities are reduced (Framework Concept Paper 7b).

Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except…where catastrophic events…result in degraded riparian conditions…, remove salvage trees only when present…, [and] to acquire desired vegetation characteristics (INFISH/PACFISH EAs).

Cooperate with…agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives (INFISH/PACFISH EAs).

Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood…[and] construct and maintain crossings to prevent diversion of streamflow out of the channel (INFISH/PACFISH EAs).

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (INFISH/PACFISH EAs).

Trees may be felled in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives (INFISH/PACFISH EAs).

Analyze, design, and implement timber harvest activities to address impacts from the action on water quality, habitat access, habitat elements, channel condition and dynamics, stream flow, hydrology, and watershed conditions (INFISH BiOp August 1998).

Limit clearcuts for logging to sizes that are determined to result in retention of native species and ecological functions (Draft Framework Alternatives 2, 3).

Manage logging on public forested lands to produce normative age stands. Manage logging on private forested lands to produce normative age stands using incentives and similar means (Draft Framework Alternatives 2, 3).

Reduce forestry impacts to riparian/aquatic ecosystem. Limit size and frequency of clearcuts. *[Allow]* normative fire frequency. Develop normative forest age structure. Provide gradual forest ecotones. Reduce forest road density (Human Effects Analysis Appendix D).

Fuelwood gathering will be permitted only in existing cull decks, where green trees are marked by silviculturalists to thin (consistent with standards and guidelines), to remove the blowdown blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large-scale disturbances (NW Forest Plan ROD).

Incorporate Washington State Forest Practices rules in future site-specific plans on all non-Federal forested lands in Washington state (Comment FWIP-025).

Carry out functions of the Small Forest Landowner Office (SFLO) (Washington Plan, 2000).

Update watershed analysis manual, facilitate watershed analyses and approve forest practices permits based on watershed analysis (Washington Plan, 2000).

Enhance field staff in DNR and WDFW to assist landowners in implementing and ensuring compliance with the new forest practices rules (Washington Plan, 2000).

To ensure attainment of aquatic, terrestrial, and riparian objectives, prevent or minimize adverse effects from road and landing construction and reconstruction (ICBEMP FEIS).

9 COMMERCIAL HARVEST

In anticipation of higher abundance in the future, a schedule would be developed that allows harvest rates to increase as abundance increases (Draft All-H paper Harvest Option 1, Dec. 1999).

Increase recreational and commercial harvests (Framework Alternatives 2, 3, 4, 5).

Allow enough adults of each stock to escape harvest so that they can spawn and perpetuate harvestable runs over the long-term (Framework Concept Paper 1).

Buy selective gear for harvesters and improve harvest enforcement (Framework Alternative 7).

10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Restore terrestrial, riparian, and aquatic habitats where adverse effects or pending risks to these habitats from roads can be quickly reduced (ICBSDEIS, R-O12).

Update the stormwater manual to address stormwater impacts of new development on habitat and water quality

(Washington Plan, 2000).

Update the Puget Sound Stormwater Management Program and, as appropriate, update model ordinances for local stormwater management programs to be consistent with changes to the Puget Sound Management Plan (Washington Plan, 2000).

Provide Technical Assistance to local governments adopting and implementing stormwater management programs (Washington Plan, 2000).

Redesign and upgrade high priority stormwater outfalls and drainage facilities (retrofit) to current design and regulatory standards (Washington Plan, 2000).

11 RECREATION

New recreational facilities within Riparian Reserves, including trails and dispersed sites, should be designed to not prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives (NW Forest Plan ROD).

Removal of snags and logs may be necessary to reduce hazards to humans along roads and trails, and in or adjacent to campgrounds. Where materials must be removed from the site, as in a campground or on a road, a salvage sale is appropriate. In other areas, such as along roads, leaving material on-site should be considered. Also, material will be left where available course woody debris is inadequate (NW Forest Plan ROD).

Manage recreation areas to minimize disturbance to species (NW Forest Plan ROD).

Focus sport fisheries on hatchery stocks and healthy stocks (Human Effects Analysis Appendix D).

Introduced game fish…provide sport fisheries where habitat conditions are unsuitable for native species and also provide a diversity of angling opportunity (Idaho DFG).

Adjust [or eliminate] dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish (INFISH/PACFISH EAs).

Address attainment of Riparian Management Objectives and potential effect on listed anadromous fish and designated critical habitat in Wild and Scenic Rivers, Wilderness, and other Recreation Management plans (INFISH/PACFISH EAs).

Design, construct, and operate [or relocate or close] fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of the Riparian Management Objectives or adversely affect anadromous fish (INFISH/PACFISH EAs).

Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives (NW Forest Plan ROD).

Identify and increase points of public access to the river. Ensure that access does not cause further loss of habitat, increased erosion, loss of riparian vegetation, or degradation of water quality (LCREP).

TRIBES

12 TRIBES

12-1 Tribal Harvest

[Advocate for] habitat *[and]* production actions that promote and sustain fishing opportunities in all treaty reserved usual and accustomed fishing areas (Framework Concept Paper 3).

Establish harvest regimes consistent with the Conservation Principles of U.S. v. Oregon, other applicable case law, Treaties and Executive Orders, that account for and properly apportion all direct and indirect sources of salmon mortality, including that inflicted by the hydrosystem, tributary land and water use and management practices, and other such sources (Tribal Vision).

"Put fish back in the rivers" *[e.g., hatchery supplementation]* in order to move toward full treaty rights (Framework Concept Paper 3).

Substitute resident fish and wildlife, plus enhance their habitats in blocked areas (Framework Concept Papers 8, 13).

Use supplemented *[salmon]* stocks in the mainstem to meet tribal harvest objectives (Framework

Alternative 6).

Manage harvest to protect treaty rights, and focus on meeting the needs of Zone 6 tribal fishery (Framework Concept Paper 27).

Conduct ceremonial, subsistence, and commercial fisheries consistent with court interpretations of Indian treaties (Framework Alternatives 1, 2, 3).

Continue efforts to "put fish back in rivers" *(e.g., supplementation)* in order to move toward achievement of full treaty rights (Framework Concept Paper 3).

Goal: Restore sustainable, naturally-reproducing fish and wildlife populations to support tribal and non-tribal harvest, cultural practices, and economic benefits by restoring the biological integrity and genetic diversity of the Columbia River ecosystem (Framework Concept Paper 2).

Restore salmonid abundance and diversity to sustainable levels, allowing Columbia Basin populations to reach tribal treaty harvest objectives. Rebuild self-sustaining populations of sturgeon and lamprey throughout their historic range, if possible, to restore the cultural value of these populations (Framework Concept Paper 7b).

Provide financial incentives for alternative commercial and economic activity for tribes with in river fishing rights that agree to temporarily suspend or reduce commercial fishing (Framework Concept Paper 27).

Within 7 years, halt the declining trends in salmon, sturgeon and lamprey populations originating upstream of Bonneville Dam. Within 25 years, increase the total adult salmon returns of stocks originating above Bonneville Dam to 4 million annually and in a manner that sustains natural production to support tribal commercial as well as ceremonial and subsistence harvests. Within 25 years, increase sturgeon and lamprey populations to naturally sustainable levels that also support tribal harvest opportunities (Framework Concept Paper 3).

Secure and continue to provide harvest opportunities that meet treaty and cultural needs (Framework Concept Paper 4).

Re-establish traditional tribal fisheries at all usual and accustomed fishing stations and sites (Tribal Vision).

Stop ignoring superior tribal reserved instream water rights; fully recognize and honor them (Tribal Vision).

12-2 Tradition, Culture, Spirituality

Maintain and restore the natural ecosystem that includes all naturally producing indigenous species, their habitats, and provides human sustenance, and acknowledge that this must also provide for cultural and spiritual needs (Framework Concept Paper 4).

Recognize native plant communities as traditional resources that are important to tribes and an essential component to treaty-reserved gathering rights (ICBSDEIS, B-O45).

Provide ceremonial, subsistence and commercial fisheries consistent with court interpretations of Indian treaties (Framework Alternatives 2, 3).

This page intentionally left blank.

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
STRONG STOCK FOCUS POLICY DIRECTION
Emphasizes *human intervention to avoid declines* of strong fish stocks and strong wildlife populations preventing weakened conditions that require legal protection.

FISH & WILDLIFE

1 HABITAT

Emphasis (top priority) will be applied to protecting and expanding existing healthy core populations *[and the healthiest habitat]* (Framework Concept Paper 4; Framework Concept Paper 20).

The ecosystem increases currently productive fish and wildlife species (Framework Alternatives 2, 3, 4, 5).

Strong salmon and steelhead runs increase in number and inhabit more of the river system (Framework Alternative 6).

The first step towards mitigation involves looking at a list of activities in the local area that are linked to degradation of the ecosystem. Once these activities are listed, we can begin to look at what type of changes we can make that are realistic. The key to this step is working within social and economic structures (which incorporate ecosystem value) to choose how a certain activity can be altered. By examining these activities outside a 'cause and effect context,' we are supporting the notion that we are not able to predict individual and cumulative effects upon the surrogate measures, but acknowledging that some type of pathway of influence exists (Framework Concept Paper 16).

Enhance conditions for currently productive (as opposed to solely native) fish and wildlife populations (Framework Alternative 6).

Efforts to improve the status of fish and wildlife populations in the Basin should focus first on habitat that supports existing populations that are healthy and productive. Next…expand adjacent habitats that have been historically productive or have a likelihood of sustaining healthy populations by reconnecting or improving habitat (Council's 2000 Fish and Wildlife Program).

Protect the areas and ecological functions that are at present relatively productive for fish and wildlife populations (e.g., the Hanford Reach fall chinook; spring chinook in the upper John Day River) to provide a base for expansion of healthy populations…(Council's 2000 Fish and Wildlife Program).

Accept significant variation in the productivity, capacity and life-history diversity for any particular population over any particular time period, as part of the normal environmental condition. A measure of whether key ecological functions have increased sufficiently will be whether the system can accept normal environmental variation without collapse of the fish and wildlife population and community structure (Council's 2000 Fish and Wildlife Program).

Geographic areas with the highest potential for increasing numbers of naturally spawning fish will be emphasized (Framework Concept Paper 20).

Maintain existing and created habitat values (Council's 2000 Fish and Wildlife Program).

[M]aintain and promot[e] (a) healthy, productive, and diverse plant and animal communities as appropriate to soil type, climate, and landform (terrestrial source habitats); and (b) ecological processes of nutrient cycling, energy flow, and the hydrologic cycle (ICBEMP FEIS).

1-1 Anadromous Fish

The truth is that there is no acceptable way that we can come into compliance with the Endangered Species Act as it relates to salmon in the entire Columbia River System. The truth is that we are simply unwilling to come to grips with the issue that we have, probably irrevocably, decided that the Columbia River is a working river harnessed to provide the cheapest electrical energy in the world—and, simply, we ain't about to give that up. The truth is that playing games with various combinations of attempts to assuage limiting factors for the salmon will not do the job—and we know it. If we frankly admit that we cannot obey the law, we are free to do the best we can to save the remnant populations. That can be done through a combination of directing money and resources to the places they will do the most good, and letting people off the hook who have

nothing to do with those efforts (Dr. Jack Ward Thomas, speaking to the Columbia River Conference IV, March 16 & 17, 2000).

Protect quality riverine, riparian, and upland habitat that currently sustains viable salmonid populations (e.g., the Columbia River's Hanford Reach for fall chinook or the Clearwater and Salmon subbasins for westslope cutthroat and spring/summer chinook) (Framework Concept Paper 5).

The truth is that there is no acceptable way that we can come into compliance with the Endangered Species Act as it relates to salmon in the entire Columbia River System. The truth is that we are simply unwilling to come to grips with the issue that we have, probably irrevocably, decided that the Columbia River is a working river harnessed to provide the cheapest electrical energy in the world—and, simply, we ain't about to give that up. The truth is that playing games with various combinations of attempts to assuage limiting factors for the salmon will not do the job—and we know it. If we frankly admit that we cannot obey the law, we are free to do the best we can to save the remnant populations. That can be done through a combination of directing money and resources to the places they will do the most good, and letting people off the hook who have nothing to do with those efforts (Dr. Jack Ward Thomas, speaking to the Columbia River Conference IV, March 16 & 17, 2000).

The Department will emphasize maintaining remaining runs of wild, native stocks of salmon and steelhead where they occur (Idaho Plan, 1998).

1-2 Resident Fish

Maintain habitat to support strong populations of resident fish (Sample Action).

1-3 Introduced Species

If introduced species are thriving (and not threatening healthy native species), their habitat conditions would be maintained (Sample Action).

Maintain habitat of existing strong populations of non-native species (Sample Action).

1-4 Wildlife

Implement vegetative practices that provide suitable cover to control erosion and runoff as well as provide food and shelter for wildlife (Draft All-H paper Dec. 1999).

1-5 Predators of Anadromous Fish

Focus control efforts on those predators that impact strong stocks (Sample Action).

1-6 Watersheds

Some watersheds will be designated prime habitat for naturally reproducing salmon and steelhead populations (Framework Concept Paper 14).

1-7 Tributaries

For currently productive species and their associated habitats (Framework Alternatives 1, 4; Framework Concept Paper 2):

- Protect, connect, and restore habitat on the tributaries throughout the basin
- Test the effectiveness of restoring habitat in tributary watersheds
- Maintain and improve egg-to-smolt survival in natal tributaries.

Designate tributaries with extensive hatchery influence as "production/supplementation" tributaries and abandon efforts to protect existing wild stocks in such tributaries (Framework Concept Paper 26).

1-8 Mainstem Columbia

Enhance Mid-Columbia fall chinook by preserving existing habitat in the Hanford Reach, and implementing a normalized annual hydrograph below Priest Rapids (Framework Concept Paper 2).

Provide adequate spawning and rearing flows under Vernita Bar Agreement (FERC) (Final All-H Paper Dec. 2000).

1-9 Reservoirs
Maintain existing reservoir habitat to support strong fish stocks and wildlife populations (Sample Action).
1-10 Estuary and Ocean
Maintain and preserve existing conditions and habitat quality in estuaries (Sample Action).
1-11 Water Quality
Improve water quality by eliminating sources of toxic pollution that accumulates in fish tissue and by reducing discharges of other contaminants to meet water quality criteria for anadromous fish (Framework Concept Paper 3; Spirit of the Salmon).
2 HARVEST
Maintain salmonid escapements: the escapement goal is the annual number of adults, or a range of values, that the management entity intends to successfully spawn within a designated watershed (Framework Concept Paper 19). Allow enough adults of each stock to escape harvest so that they can spawn and perpetuate harvestable runs over the long-term (Framework Concept Paper 1). Meet non-Indian harvest objectives through artificial production (Framework Alternative 6). In anticipation of higher abundance in the future, a schedule would be developed that allows harvest rates to increase as abundance increases (Draft All-H Paper Harvest Option 1, Dec. 1999).
2-1 Anadromous Fish
[Manage] Alaskan and Canadian ocean fisheries based on chinook abundance (Spirit of the Salmon). Re-negotiate Pacific Salmon Treaty (US-Canada) to prevent overfishing (Framework Concept Paper 1). Set escapement objectives for fish by population per watershed (Framework Concept Paper 20). *[For naturally spawning fish populations]* Emphasis (top priority) will be applied to protecting and expanding existing healthy core populations (Framework Concept Paper 20). Larger salmonid metapopulations will be used as the level of genetic organization to be conserved (Framework Concept Paper 20).
2-2 Resident Fish
Maintains healthy resident fish population fort harvests, including introduced species (Sample Action).
2-3 Wildlife
Manage wildlife to keep existing species healthy for continued harvest (Sample Action).
3 HATCHERIES
Naturally selected populations should provide the model for successfully artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics (Council's 2000 Fish and Wildlife Program). Where the critical habitat is largely intact, artificial production is not currently occurring, and the fish population has good potential, then no artificial production should be used. Those populations and their associated spawning and early rearing habitat should be preserved and protected (Council's 2000 Fish and Wildlife Program). Abandon efforts to protect existing wild stocks in tributaries where there is already significant hatchery influence (Framework Alternative 7).
3-1 Anadromous Fish
Use hatcheries as practicable to compliment healthy stock (Sample Action).

3-2 Resident Fish
Use hatcheries as practicable to compliment healthy populations (Sample Action).
4 HYDRO
4-1 Dam Modifications and Facilities
Implement dam modifications to increase efficiency as long as they do not adversely affect strong stocks (Sample Action).
4-2 Hydro Operation
Operate the hydrosystem, as it is configured now or in the future, to: Maintain, protect and enhance currently healthy natural riverine conditions and habitat (Tribal Vision).
4-3 Spill
Meet current TDG standards. Spill if proved beneficial for healthy stocks (Sample Action).
4-4 Flow
Continue current flow programs, with some protection for upstream reservoirs (Framework Alternatives 5, 6). Manage flows in the Hanford Reach to match natural seasonal and daily patterns (Framework Alternative 5). Reject continued demands for Upper Snake flow augmentation because of its ineffectiveness as a means to aid the listed species and its high societal cost and divisiveness (Comment FWIP-040).
4-5 Reservoir Levels
Maintain, to the maximum extent practicable, full, stable water levels in Lake Roosevelt and in Libby, Dworshak and Hungry Horse reservoirs according to their Integrated Rule Curves and consistent with the Council's Fish and Wildlife Program (Tribal Vision).
4-6 Water Quality
Implement physical measures and operational actions to optimize water quality conditions (temperature and dissolved gas) where consistent with overall objectives and other strategies (Draft All-H paper Dec. 1999).
4-7 Juvenile Fish Passage and Transportation
Make use of fish transportation as appropriate (Framework Alternative 5).
4-8 Adult Fish Passage
The Corps shall investigate adult fish delay and fallback at ladder junction pools and implement remedies to reduce this problem, as warranted (NMFS BiOp 2000, Action #116, Dec. 2000; BPA Appendix D: Action Table and Reports, R-116, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).
4-9 Flood Control
Maintain existing flood control practices unless they adversely impact strong populations of fish and wildlife (Sample Action).
COMMERCE
5 POWER
5-1 Existing Generation
Increase hydropower generation so long as it does not productive populations are not impacted (Sample Action).
5-2 New Energy Resources
New generation resources would continue to be developed to meet increasing demand (Sample Action). *Increased hydrosystem operation flexibility allows the system to be better shaped to compliment new renewable resource generation, such as wind (Sample Action).*

5-3 Transmission Reliability
Accelerate transmission maintenance and road access improvements to insure system reliability (Sample Action).
Reprioritize and construct new transmission facilities according to increased hydropower generation (Sample Action).
6 INDUSTRY
6-1 Industrial Development
Manage land use and riparian conditions to maintain water quality (Human Effects Analysis Appendix D).
6-2 Aluminum and Chemical
Allow increased development in marginal habitat (Sample Action).
6-3 Mining
Permit sand and gravel mining and extraction within Riparian Habitat Conservation Areas only if no alternatives exist…(INFISH/PACFISH EAs).
6-4 Pulp and Paper
Limit new pulp and paper production that would affect currently productive populations (Sample Action).
7 TRANSPORTATION
7-1 Navigation and Barging
No changes required in transportation (Sample Action).
Increase barging to maintain economic benefits for rural communities and make Northwest products more competitive (Comment FWIP-029).
7-2 Trucking, Railroads, and Infrastructure
Possible changes to construction practices near healthy populations (Sample Action).
8 AGRICULTURE
Reduce subsidies historically used to protect weak stock habitat increasing agricultural production (Sample Action).
8-1 Irrigation
Reduce incentives for water conservation except where they benefit productive fish populations (Sample Action).
Use screening and management incentives to reduce impacts to productive fish populations (Sample Actions).
8-2 Pesticides and Agricultural Practices
Monitor pesticides for impacts on currently productive populations. Use incentives where impacts are likely (Sample Action).
8-3 Grazing
Install fencing to keep range animals away from stream sides (Framework Concept Paper 23).
Protect, maintain, and/or improve air quality on Forest Service- and BLM-administered lands in the project area. Evaluate the long-term improvements in summer air quality compared with the short-term deteriorations to spring and fall air quality associated with prescribed burning. Manage these short- and long-term risks to air quality (ICBEMP FEIS).
Upland rangelands must first be in proper functioning condition to allow for restoration of desired conditions. Areas in proper functioning condition should be prevented from becoming non-functioning (ICBEMP FEIS).

8-4 Forestry
Increase timber harvest and improve management practices to avoid impacts to healthy populations of fish and wildlife (Sample Action).
Protect, maintain, and/or improve air quality on Forest Service- and BLM-administered lands in the project area. Evaluate the long-term improvements in summer air quality compared with the short-term deteriorations to spring and fall air quality associated with prescribed burning. Manage these short- and long-term risks to air quality (ICBEMP FEIS).
9 COMMERCIAL HARVEST
Set harvest rates at levels that ensure that productivity of target populations is maintained (Sample Actions).
Promote mixed-stock harvest (Sample Action).
10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT
Reduce restrictions on development and promote managed growth to avoid impacts to strong stocks/populations (Sample Action).
11 RECREATION
Manage recreational harvest of fish and wildlife consistent with sustaining healthy stocks/populations (Sample Action).
TRIBES
12 TRIBES
12-1 Tribal Harvest
[Advocate for] habitat *[and]* production actions that promote and sustain fishing opportunities in all treaty reserved usual and accustomed fishing areas (Framework Concept Paper 3).
12-2 Tradition, Culture, Spirituality
Support federally recognized tribes' and communities' subsistence needs to the greatest extent practicable (ICBSDEIS, B-061).

SAMPLE IMPLEMENTATION ACTIONS
FOR THE
COMMERCE FOCUS POLICY DIRECTION

Emphasizes *human intervention to enhance the economic value* of river uses and allocates a portion of the revenues to fund fish and wildlife mitigation.

FISH & WILDLIFE

1 HABITAT

Manage the Columbia River Basin to provide maximum sustainable economic benefits to the Region (Framework Alternative 7).

Seek the maximum use of economic incentives to implement only cost-effective strategies. Put human economic needs above changes designed to enhance the natural environment (Framework Alternative 7).

Select fish and wildlife measures for implementation based on cost-effectiveness analysis to maximize the public benefit from expenditures of finite salmon recovery funds (Framework Concept Paper 25).

Those actions that have the greatest biological benefit at the lowest cost will be implemented first (Framework Concept Paper 14; Framework Concept Paper 20).

If savings can be found in existing management actions, the savings will be applied to the most critical fish and wildlife activities (Framework Concept Paper 20).

Sort habitat into "nature preserve" and production categories. Decentralize habitat decisions and focus regional habitat decisions on inter-jurisdictional issues. Leave habitat issues to local decision-makers, eliminate wildlife mitigation, and use the BPA Environmental Foundation to fund habitat improvements (Framework Alternative 7).

Liquidate and cap current habitat mitigation efforts funded by BPA and substitute Bonneville Environmental Foundation or other vehicle for habitat grants (Framework Concept 26).

Focus habitat improvement funds on "wild reserve" rivers (Framework Concept 26).

A biodiversity trust fund could be set up on a local, state, or national scale, and would have an unlimited variety of conservation options that it could choose to support. These choices would include: purchasing land to establish preserves, purchasing conservation easements, paying for endangered species on private lands, buying conservation contracts, offering grants or low-interest loans to conservation projects, and conducting research (with a small, fixed percentage of the fund) (Schaerer Thoreau Institute).

The State of Idaho supports critical habitat conservation, but does not support Federal acquisition of land or water rights within the State (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

End Federal, regional, and state regulation of habitat restoration (Framework Alternative 7).

The Upper Columbia Regional Fisheries Enhancement Group supports incentive-based and voluntary habitat restoration efforts on non-Federal land. They also support conservation easements, land acquisition, and fostering sociological changes in the perception of fisheries restoration (9/20/01 letter from Michael B. Ward to the Action Agencies, 5YIP).

The first step towards mitigation involves looking at a list of activities in the local area that are linked to degradation of the ecosystem. Once these activities are listed, we can begin to look at what type of changes we can make that are realistic. The key to this step is working within social and economic structures (which incorporate ecosystem value) to choose how a certain activity can be altered. By examining these activities outside a 'cause and effect context,' *[support]* the notion that we are not able to predict individual and cumulative effects upon the surrogate measures, but acknowledging that some type of pathway of influence exists (Framework Concept Paper 16).

Given the major responsibilities that will fall upon private landowners, voluntary habitat improvements need to be fully encouraged through the use of a federally funded incentive program (Governors' Recommendations, July 2000).

A locally led, voluntary approach is the only way to get the needed private landowner trust and stewardship

needed to restore fish and wildlife to sustainable levels (Comment FWIP-002).
Provide economic incentives to private landowners to implement conservation measures (Comment FWIP-045).
Implement mitigation for transportation projects - statewide alternative mitigation policy guidance, identify wetland bank sites development, and administer the *Advanced Mitigation Revolving Accoun*t (Washington Plan, 2000).
Design and promote incentives for non-regulatory land use protection programs (Washington Plan, 2000).
1-1 Anadromous Fish
Abandon regional government supervision of habitat restoration. State and local entities will produce more effective efforts, particularly if improved harvest management rewards localities that invest in habitat restoration by allowing salmon and steelhead to return to the improved habitat (Framework Concept Paper 26).
Building upon successes elsewhere, we endorse creation of salmon sanctuaries that protect key aquatic habitats and related uplands through voluntary conservation easements, leases, land purchases, and tax-incentive donations. The Region should attempt to obtain substantial additional habitat protections in the locations that promise the greatest benefits for fish (Governors' Recommendations, July 2000).
Actively encourage and support voluntary actions that will assist achievement of restoration goals (Oregon Plan, 1997).
Develop proposals for a variety of compensation and incentive programs to support achievement of restoration goals (Oregon Plan, 1997).
1-2 Resident Fish
Select fish and wildlife measures for implementation based on cost-effectiveness analysis to maximize the public benefit from expenditures of finite salmon recovery funds (Framework Concept Paper 25).
1-3 Introduced Species
Introduce mammalian predators to control tern populations on Rice Island and elsewhere (Framework Concept Paper 26; Framework Alternative 7).
Resident Fish (Non-Native) – Maintain and enhance populations in areas where native populations have been extirpated or reduced to such an extent that native species restoration is biologically or economically infeasible. Use of non-native populations as a substitute fishery serves only as a mitigative response to economic and social concerns over the uncompensable loss of native species (Framework Concept Paper 7b).
1-4 Wildlife
[F]und fish and wildlife out of user fees plus Federal grants. Non-game wildlife funding can come from a share of recreation fees and donations (possibly including income tax checkoffs) (State Lands Thoreau Institute).
Turn over percentage of (hunting) license revenues to habitat restoration projects (Framework Concept Paper 26).
1-5 Predators of Anadromous Fish
Allow limited hunting for marine mammals to control populations. High percentages of returning adults show evidence of marine mammal attacks (Framework Concept 26).
The State of Idaho supports efforts to reduce bird predation (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).
Introduce mammalian predators to control tern populations on Rice Island and elsewhere (Framework Concept Paper 26; Framework Alternative 7).
1-6 Watersheds
Consider on a prioritized basis capital funding for new river watershed projects that would provide measurable fish benefits by improving in-stream conditions, and be of other economic benefit (Framework Concept

Paper 27).
Complete all subbasin plans and utilize watershed councils, Conservation Reserve Programs, and other financial incentives to encourage land owners and managers to improve riparian and other habitat conditions (Framework Concept Paper 25).
Acquire water through donation, lease, purchase and conserved water projects, using a free market, voluntary, cooperative approach, and works with interested water rights holders, local watershed councils, and community leaders and agency officials (Framework Concept Paper 17).
Decentralize decision making concerning local-specific habitat problems through watershed councils (Framework Concept Paper 25,26).
There will be a great deal of bottom-up autonomy and local control over implementation plans for specific watersheds by local Watershed Councils. The regional Council will compensate people for economic losses resulting from implementation of the Plan's measures (Framework Concept Paper 14).
The philosophical approach will be to create local support and ownership for watershed management through a high degree of local control over how the available funds are spent (Framework Concept Paper 14).
Provide incentives (start-up grants, tax breaks, etc.) and technical assistance to encourage local landowners, businesses, corporations, and trustee agencies to improve and protect wetland and riparian areas. Include incentives for using best management practices (BMPs) to demonstrate appropriate techniques (LCREP).
Revise guidelines for development and implementation of local Floodplain Management Plans and for use of non-regulatory tools and incentives to reconnect river and floodplains (Washington Plan, 2000).
1-7 Tributaries
Seek out opportunities for collaborative partnerships with stakeholders to restore and protect instream flows (Framework Concept Paper 17).
Develop an endowed trust fund to financially support improvements by private parties and local governments and tribes on the tributaries and mainstem (Framework Concept Paper 27).
[Support] voluntary exchanges to obtain needed water for fish and support the development of water markets to effect exchanges among willing buyers and sellers. This strategy has potential to contribute to fish recovery, and we are committed to support changes in state law or policies to facilitate this approach. Recognize *[that there are]* existing efforts to conserve water and support further assistance to promote conservation (Governors' Recommendations, July 2000).
Dedicate additional revenues from the sale of electricity to other forms of mitigation in the tributaries (Framework Concept Paper 27).
Link habitat restoration and stock management to provide full seeding for "nature preserve" tributaries, and report the degree to which this is achieved annually (Framework Concept Paper 25).
Designate tributaries with extensive hatchery influence as "production/supplementation" tributaries and abandon efforts to protect existing wild stocks in such tributaries (Framework Concept Paper 26).
1-8 Mainstem Columbia
Develop an endowed trust fund to financially support improvements by private parties and local governments and tribes on the…mainstem (Framework Concept Paper 27).
1-9 Reservoirs
Protect the established ecosystems that the dams have created (Framework Concept Paper 11).
1-10 Estuary and Ocean
Establish an award program to promote successful stewardship and pollution prevention activities [of the Columbia River estuary](LCREP).

1-11 Water Quality
Develop partnerships with the timber industry, irrigated agriculture, dry-land farmers, ports, tribes, municipalities and other land owners to improve habitat and water quality (Framework Concept Paper 27).
Establish an award program to promote successful stewardship and pollution prevention activities (LCREP).
2 HARVEST
Financial incentives must be broadened beyond selective fisheries to include economic incentives to reduce impacts to listed stocks, financial assistance for developing "value-added" fishery-related industries, and mitigation of economic impacts to fishing-dependent communities (Governors' Recommendations, July 2000).
Highest net economic benefits will come from non-tribal recreational harvest, which can select for hatchery stocks (Draft Framework Alternative 7).
Artificially produced fish created for harvest should not be produced unless they can be effectively harvested in a fishery (Council's 2000 Fish and Wildlife Program).
2-1 Anadromous Fish
Shift to terminal fisheries to allow for selective stock harvest (Framework Concept Paper 27).
2-2 Resident Fish
Focus efforts on both commercial (fish farm) and sport fisheries. Maintain or increase populations of economically important resident fish, including introduced species. Manage harvest to stimulate recreational use and economic values (Sample Action).
2-3 Wildlife
Allow hunting of economically valuable species. Institute user fees for hunting on public lands, which would be used to improve habitat for target species (Sample Action).
3 HATCHERIES
Make extensive use of fish hatcheries to meet fishing needs and to make up for lost habitat (Framework Alternatives 6, 7).
Transfer hatcheries to tribal management in settlement of treaty obligations (Framework Alternative 7).
Production watersheds will be used to support artificial production through the use of modern hatcheries or other artificial methods (Framework Concept Paper 14).
Share fishing tag revenues with hatcheries that return fish to watersheds (Framework Alternative 7).
Close down or convert under-performing production hatcheries (Framework Concept Paper 27).
Implant hatchery releases to reduce mixed-stock fisheries (Framework Concept Paper 27).
Use low-cost, low technology hatchery techniques for supplementation actions (Framework Concept Paper 27).
Use hatcheries to make up for lost habitat (Framework Alternative 4).
Use significantly more hatcheries to replace lost spawning areas (Framework Alternative 5).
Develop new hatchery production in the John Day pool to mitigate for lost habitat (Framework Alternative 2).
Mark Powers supports conversion of the Columbia River to a 100 percent hatchery fishery (4/18/01 letter from Mark Powers to the Federal Caucus, 5YIP).
I support moving all hatchery management to the tribes (Comment FWIP-031).
3-1 Anadromous Fish
Allow hatchery operators to share revenue from salmon and steelhead tags in hatchery watersheds to establish feedback loop for hatchery success (Framework Concept Paper 26).

3-2 Resident Fish
Use hatchery production to provide offsite mitigation or for replacement above blocked areas. Provide maximum production of economically valuable species in harvest areas (Sample Action).
Resident Fish (Non-Native) – Maintain and enhance populations in areas where native populations have been extirpated or reduced to such an extent that native species restoration is biologically or economically infeasible. Use of non-native populations as a substitute fishery serves only as a mitigative response to economic and social concerns over the uncompensable loss of native species (Framework Concept Paper 7b).
4 HYDRO
Maintain the multiple-purpose public benefits of Columbia and Snake River dams and river system. Continue to develop the economic potential of the Columbia River system (Framework Concept Paper 25).
4-1 Dam Modifications and Facilities
Changes in the system's configuration may occur but only when critical survival bottlenecks are identified that cannot be circumvented through other means and where the costs are justified by the probable biological benefits (Framework Concept Paper 14).
The Corps shall develop and implement preventative maintenance programs for fish passage facilities that ensure long-term reliability, thereby minimizing repair costs (NMFS BiOp 2000, Action 145, Dec. 2000; BPA Appendix D: Action Table and Reports, R-145, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).
4-2 Hydro Operation
Maximize multiple purpose benefits of Federal water projects. Increase hydropower production. Maintain flood control. Maintain navigation. Maintain irrigation (Draft Framework Alternative 7; Framework Concept Paper 26).
Impairing the navigability of the river, its hydro-electric capacity, and its flood control capacity are not in the public interest (Framework Concept Paper 21).
Create one-time endowment of funding vehicle monies saved through mainstem operational changes (Framework Concept 26).
4-3 Spill
Reduce…flow augmentation and…spill at hydroelectric dams (Framework Concept Paper 25).
Install fish-friendly turbines in all of the skeletal bays and "spill" excess water through these turbines instead of over the dams (Framework Concept Paper 11).
4-4 Flow
Abandon all spring flow augmentation and real-time management of flow for fish (Framework Alternative 7; PM Twin Falls).
Eliminate existing spring-summer flow targets of National Marine Fisheries Service (Framework Concept Paper 27).
Reduce…flow augmentation and…spill at hydroelectric dams (Framework Concept Paper 25).
Change the flow augmentation program to produce additional funds for fish and wildlife measures (Framework Alternative 6).
Eliminate Snake River flow augmentation (Framework Concept Paper 5).
Allow flow augmentation based on the "willing buyer, willing seller" method only (PM Twin Falls).
Undertake efforts to purchase or lease, from willing sellers and lessors, water rights necessary to maintain instream flows in accordance with appropriate state and Federal laws (Framework Concept Paper 28).

4-5 Reservoir Levels
Levels would be driven by revenue production – PNCA critical water planning (Sample Action).
Maintain stability in levels to protect communities that depend on reservoirs for recreation and tourism income (Sample Action).
4-6 Water Quality
Sell "pollution credits" and use proceeds to fund mitigation (Sample Action).
4-7 Juvenile Fish Passage and Transportation
Improve and maximize fish barging of juvenile smolts (Framework Alternative 6; Framework Concept Paper 25).
Maximize smolt transportation by eliminating spill at all collection facilities, and improve transportation by experimenting with release strategies (i.e., further downstream) to avoid substantial estuarine mortality (Draft Framework Alternative 7; Framework Concept Paper 26).
The Washington Department of Fish and Wildlife supports reduced reliance on trucking by extending the period of barge transportation, and also supports research on the effects of transportation (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).
Reactivate sluiceway passage at available projects and expand surface collector efforts (Framework Concept Paper 26).
[Operate] the existing facilities to maximize the passage of fish through the existing collectors into trucks or barges for transport downriver. Voluntary spill to bypass fish would be minimized. Fish would be collected in the existing facilities and transported past the dams. Under this alternative, there would be no need to modify spillway flow deflectors, because voluntary spill would be minimized. Some juvenile fish would still pass through the dam turbines (The Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement Executive Summary, US Army Corps of Engineers).
All fish screens should be removed and transportation discontinued. It has been proven that bypass systems have a higher mortality than the turbines (Framework Concept Paper 11).
4-8 Adult Fish Passage
Replace old turbines with fish-friendly turbines (Framework Alternative 7).
4-9 Flood Control
Enhance recreational opportunities and continue to provide regional flood control benefits (Draft Framework Alternative 7; Framework Concept Paper 25).
Maintain and enhance the economic benefits of our existing hydropower system: that includes navigation, irrigation, recreation, flood control, and power production (Framework Concept Paper 11).
Impairing the navigability of the river, its hydro-electric capacity, and its flood control capacity are not in the public interest (Framework Concept Paper 21).
COMMERCE
5 POWER
5-1 Existing Generation
Maintain or increase hydropower production (i.e., hydroelectric generation) of Columbia River dams (Framework Alternative 7; Framework Concept Papers 11, 25).
Limit electric ratepayer funding of fish and wildlife restoration to offsetting effects of hydropower development and operation, and require other economic sectors to bear recovery costs necessitated by their activities (Framework Concept Paper 26).
Increase the output of cheap, clean, renewable hydropower from the existing hydropower system (Framework Concept Paper 11).

Provide security for BPA, by committing to affordable steps that achieve substantive improvements for fish and wildlife, retaining the region's low cost energy (Framework Concept Paper 2).
5-2 New Energy Resources
Federal, state, and local financial incentives would be available to promote new power generation (e.g., Federal solar and wind energy tax credits; Oregon Business Energy Tax Credit) (Sample Action).
5-3 Transmission Reliability
Enhance service reliability by promoting competition among independent power suppliers. Customers with competitive options will factor reliability into purchasing decisions. Power producers will not get paid unless they provide reliable power (Sample Action). [Assisted by the Federal Energy Regulatory Commission] appropriate regional transmission institutions could: (1) improve efficiencies in transmission grid management; (2) improve grid reliability; (3) remove remaining opportunities for discriminatory transmission practices; (4) improve market performance; and (5) facilitate lighter handed regulation (RTO West).
6 INDUSTRY
Provide subsidized hazardous material disposal opportunities for small volume users and generators (LCREP).
6-1 Industrial Development
Use tools and incentives in local planning ordinances and state laws to ensure that development is environmentally sensitive (LCREP). Establish an award program to promote successful stewardship and pollution prevention activities (LCREP).
6-2 Aluminum and Chemical
De-emphasize government regulation, allow aluminum and chemical industries flexibility in choosing how to meet standards for air pollution, water quality, etc. (Sample Action).
6-3 Mining
De-emphasize government regulation, allow mining industry flexibility in choosing how to meet standards for air pollution, water quality, etc. (Sample Action).
6-4 Pulp and Paper
De-emphasize government regulation, allow pulp and paper industry flexibility in choosing how to meet standards for air pollution, water quality, etc. (Sample Action).
7 TRANSPORTATION
7-1 Navigation and Barging
Any long-term vision for the Columbia River should include its navigability… The system of inland ports and marine transportation needs to be recognized and maintained as a necessary and integral part of preserving the environment of this Region (Draft Framework Alternative 7; Framework Concept Papers 11, 21, 25, 26). *Allow channel dredging for navigation (Sample Action).* Impairing the navigability of the river, its hydro-electric capacity, and its flood control capacity are not in the public interest (Framework Concept Paper 21). Protect navigation by operating reservoirs at MOP and allowing continued economic vitality to the rural and smaller communities east of the Cascades (Comment FWIP-029).
7-2 Trucking, Railroads, and Infrastructure
Expand infrastructure cost-effectively as demand increases (Sample Action).
8 AGRICULTURE
Eliminate Federal and state government subsidies that encourage, promote and sustain otherwise uneconomic agricultural and other economic values (Tribal Vision).

Given the major responsibilities that will fall upon private landowners, voluntary habitat improvement programs need to be fully encouraged through the use of a federally funded incentive program. Increased riparian fencing is an obvious place to start (Governors' Recommendations, July 2000).

Develop partnerships with the timber industry, irrigated agriculture, dry-land farmers, ports, tribes, municipalities, and other land owners to improve habitat and water quality (Framework Concept Paper 27).

8-1 Irrigation

Maintain existing irrigation and allow increased consumptive use of Columbia Basin water (Framework Concept Papers 11, 25, 26).

[Initiate more intensive] agricultural water conservation *[and]* irrigation waste water treatment, *[and]* screen irrigation withdrawals (Human Effects Analysis Appendix D).

Consider water transfers and trades to promote efficient use of water, and to enhance in-stream flows for selected tributary areas (Framework Concept Paper 27).

Water rights have attributes of private property rights (in the sense that water rights may not be taken for public use without just compensation), and water right holders have the right to decide what to do with their property within limits of applicable state law. A water right market provides one means for water right holders (as willing "sellers") and other parties (as willing "buyers") to transfer water from out-of-stream to in-the-stream use, subject to review and approval by the state (Framework Concept Paper 17).

Restore normative seasonal flow patterns in tributaries through measures such as improved irrigation efficiency, use of xeric (less water intensive) crops, lease or sale of water rights, or other voluntary measures (Draft Framework Alternatives 2, 3).

Habitat objectives would be accomplished by land and water lease, purchase, subsidy and similar incentives (Human Effects Analysis).

8-2 Pesticides and Agricultural Practices

Use USDA conservation programs including the NRCS's Environmental Quality Incentives Program (EQIP), the Wildlife Habitat Incentives Program (WHIP), the Wetlands Reserve Program (WRP), the Stewardship Incentives Program (SIP), and the Emergency Watershed Protection Program (EWP) (Sample Action).

8-3 Grazing

Create a series of incentives for holders of a new kind of lease to improve and maintain a high quality resource, including (Range Thoreau Institute):

1. Opportunities for investing in, or receiving financial benefits from, conserving land resources through creation of a new market for authorizing uses of our range/grassland resources;
2. Long-term tenure on the land; and
3. Increased flexibility in how the lands are, or are not, used and managed.

A new kind of lease would be available for the public lands range/grassland resource. This new lease would extend for 30 years and provide for flexibility in management activities. It could be used for a variety of activities, including livestock grazing, wildlife management, and endangered species conservation. There would no longer be a "grazing only" permit. The new lease would grant the holder an exclusive interest in the range/grassland resource subject to the lease, but will not convey a property interest in the public lands, and will not restrict other "multiple uses" on those lands. The lease holder's use of the public resource would be reviewed by the Federal land management agency at 5 year intervals to determine if the lands are improving or being maintained in such a manner that meets public lands standards (Range Thoreau Institute).

Derive social and economic benefits, promote commercial activity, and foster demand for labor and capital formation through producing a variety of goods and services from Forest Service and BLM-administered lands according to land management plan allocations and management direction (ICBSDEIS, B-O55).

8-4 Forestry

Road construction in Late-Successional Reserves for silvicultural, salvage, and other activities generally is not recommended unless potential benefits exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be

routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging, should be considered to provide access for activities in reserves (NW Forest Plan ROD).

[A]ll Federal forest resources can be funded out of user fees… The best incentives are provided by funding management out of net user fees, because such funding gives managers the incentive to engage only in profitable activities--which usually means the activities with the greatest social return. In contrast, an agency funded out of a percentage of gross user fees has an incentive to cross-subsidize unprofitable activities with profitable ones to insure that it keeps its full share of the gross… [F]ocus not on the question of "Who owns the forests?" but on the question of "What are the incentives facing forest managers?" To provide the best incentives…build Federal forest reforms around the trust concept... First, turn the Federal forests into a series of forest trusts. The trusts could be individual national forests and BLM districts, or all of the forests in each state, or divided along other lines. The exact size of each trust is not important, although I suggest that a trust larger than a current Forest Service region would be unwieldy and a trust smaller than a current national forest would be susceptible to economic failure (Testimony Thoreau Institute).

Increase forest product productivity (Draft Framework Alternative 7).

Manage logging on private forested lands to produce normative age stands using incentives and similar means (Draft Framework Alternative 3).

9 COMMERCIAL HARVEST

Emphasize fish farming. Manage harvest through financial incentives (Sample Actions).

Decrease mixed stock commercial harvest…switch to terminal fishery to allow for selected harvest (Framework Concept Paper 27).

Provide financial incentives for alternative commercial and economic activity for tribes with in-river fishing rights that agree to temporarily suspend or reduce commercial fishing (Framework Concept Paper 27).

Develop Youngs Bay and other tributaries as preferred options for commercial and sport fisheries (Framework Concept Paper 27).

Retire commercial fishing licenses through buyouts (Framework Concept Paper 27).

Accept financial incentives for alternative commercial and economic activity; temporarily suspend or reduce commercial harvest (Framework Concept Paper 27).

Decrease mixed stock commercial harvest; provide economic incentives not to fish during certain migration periods (Framework Concept Paper 27).

10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Decrease regulations on development; allow developers flexibility in protecting natural resources in areas targeted for development (Sample Action).

Use tools and incentives in local planning ordinances and state laws to ensure that development is environmentally sensitive (LCREP).

Approve transfer of Class IV general forest practices permits to local governments (these are permits needed to convert parcels from forest management to development) (Washington Plan, 2000).

11 RECREATION

Meet human demands for recreation in natural, undisturbed habitat with adequate supply of wild reserve areas (Draft Framework Alternative 7).

Focus efforts on developing economically valuable sport fisheries (Human Effects Analysis Appendix D; Draft Framework Alternatives 2, 3; Framework Concept Paper 25).

Develop Youngs Bay and other tributaries as preferred options for commercial and sport fisheries (Framework Concept Paper 27).

[Protect] fish and wildlife habitat to preserve hunting and fishing opportunities (PM Spokane).

User fees for recreation, in the long run, may shift incentives away from selling environmentally and fiscally

damaging timber, mineral and grazing leases, and toward recreation. However, this will only happen when managers who oversee both programs within a district are able to make decisions based on fair market valuation of resources and real costs (BLM Thoreau Institute).

[Develop industrial recreation:] the traditional conception of parks, beaches and waterways as open spaces for passive relaxation is gradually giving way to a more active, regimented and costly vision of outdoor leisure. Instead of unadulterated green acres and uninterrupted shoreline vistas, the park or beach of the future is more likely to feature mountain biking, kayaking and guided nature walks, with detailed rules spelling out where, when and how leisure-seekers can participate. And instead of being subsidized and managed by the government, those highly organized forms of recreation—everything from golf courses and marinas to inline skating parks and water slides—will increasingly be run by private contractors seeking a profit (Dan Fagin).

Recreational fishing opportunities are maintained and promoted, consistent with escapement goals and the fulfillment of tribal treaty obligations (Framework Concept Paper 27).

TRIBES

12 TRIBES

12-1 Tribal Harvest

Redirect tribal mixed-stock commercial harvest to selective harvest at fish ladders and in tributaries (Framework Alternative 7).

Use supplemented stocks in the mainstem to meet tribal harvest objectives (Framework Alternative 6).

Move hatcheries to tribal management, because tribes may have longer-term management focus, and will reap 50% of harvestable fish pursuant to Supreme Court Treaty interpretations, again establishing feedback loop for hatchery success (Framework Concept Paper 26).

12-2 Tradition, Culture, Spirituality

Support federally recognized tribes' and tribal communities' subsistence needs to the greatest extent practicable (ICBSDEIS, B-O61).

SAMPLE IMPLEMENTATION ACTIONS
FOR
POLICY, PLANNING AND PROCESS

FISH & WILDLIFE

1 HABITAT

The Council recommends that Bonneville establish a funding agreement for land and water acquisitions. The Council will establish a mechanism, including an advisory entity, that can act flexibly, quickly, and responsibly in approving funding for land and water acquisition proposals (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Full compensation for unavoidable fish losses or fish habitat losses through habitat restoration or replacement, appropriate propagation, or similar measures consistent with the provisions of this program (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Locating temporary access roads in areas to be inundated (Council's 2000 Fish and Wildlife Program).

State, tribal, local, and Federal entities would significantly increase their level of coordination, planning, and habitat implementation. There would also be an increase in Federal funding for habitat assessments, plans, immediate actions, and monitoring. Initially, there would be an increased allocation of Federal funds to assessments and planning that would precede all but immediate actions. Immediate actions would reduce imminent risks and immediately improve survival (Draft All-H Paper Habitat Option 2, Dec. 1999).

Restorable habitat: Where the habitat for a target population is absent or severely diminished, but can be restored through conventional techniques and approaches, then the biological objective for that habitat will be to restore the habitat with the degree of restoration depending on the biological potential of the target population. Where the target population has high biological potential, the objective will be to restore the habitat to intact condition, and restore the population up to the sustainable capacity of the habitat. In this situation, if the target population had been severely reduced or eliminated as a result of the habitat deterioration, the use of artificial production in an interim way is a possible policy choice to hasten rebuilding of naturally spawning populations after restoration of the habitat. Where the target population has low biological potential -- for example, when downstream rearing conditions severely limit the survival of juveniles from a given spawning area -- the objective will be to restore the habitat to intact condition and consider sustained but limited supplementation as a possible policy choice (Council's 2000 Fish and Wildlife Program).

Compromised habitat: Where the habitat for a target population is absent or substantially diminished and cannot reasonably be fully restored, then the biological objective for that habitat will depend on the biological potential of the target species. Where the target species has high biological potential, the objective will be to restore the habitat up to the point that the sustainable capacity of the habitat is no longer a significant limiting factor for that population. The objective also is to restore the population of the target species up to the sustainable capacity of the restored habitat. Sustained supplementation in a limited fashion is a possible policy choice in this instance (Council's 2000 Fish and Wildlife Program).

Review existing laws that are destructive to habitats that are critical for indigenous species (Framework Concept Paper 4).

Strongly endorse the concept of local planning for recovery of salmonids and other aquatic species. This concept has the advantage of bringing together local and tribal governments with local citizens to develop and implement local recovery plans. A local focus also helps avoid duplication of efforts and "top-down" planning. Recovery plans developed at the local level, whether through state salmon plans, Federal agency actions, or through the Council's process, must be complementary (Governors' Recommendations, July 2000).

Geographic areas with the highest potential for increasing numbers of naturally spawning fish will be emphasized (Framework Concept Paper 20).

The State of Idaho supports the overall concept of balancing needs (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The timeframe for seeing change in the ecosystem must also be defined before any mitigative measures are undertaken (Framework Concept Paper 16).

The timeframe for seeing change in the ecosystem must also be defined before any mitigative measures are undertaken (Framework Concept Paper 16).

Intact habitat: Where the habitat for a target population is largely intact, then the biological objectives for that habitat will be to preserve the habitat and restore the population of the target species up to the sustainable capacity of the habitat. When the biological potential of a target population is high, biological risk should be avoided and restoration should be by means of natural spawning and rearing (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Avoiding all unnecessary or premature clearing of land before filling the reservoir (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Replacing riparian vegetation if natural revegetation is inadequate (Council's 2000 Fish and Wildlife Program).

Cooperate with…agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans or other cooperative agreements to meet Riparian Management Objectives (INFISH/PACFISH EAs).

Use planned restoration only to mitigate existing problems not to mitigate the effects of proposed activities (INFISH/PACFISH EAs).

Allow for biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability (Council's 2000 Fish and Wildlife Program).

Through ICBEMP's and the Northwest Forest Plan's aquatic strategies, provide a base for habitat protection (USFS, BLM) (Final All-H Paper Dec. 2000).

Limit regional governmental role to clearinghouse for information about successful habitat restoration strategies (Framework Concept 26).

Monitor agencies to ensure that restoration actions and resources are prioritized, and reduce duplication of effort (Oregon Plan, 1997).

Establish an infrastructure to assure responsibility and accountability for maintaining momentum of public outreach and education efforts through coordination of state and Federal agencies responsible for natural resource management (Oregon Plan, 1997).

Establish "adaptive management" working group to frame environmental management questions, identify practical alternatives for answering these questions, and suggest need for appropriate changes in resource management practices (Oregon Plan, 1997).

The Commission strongly advocates an adaptive management approach that does not defer decisions simply because of uncertainty and controversy…. The Department is directed to advocate changes it feels likely to have net beneficial effects (Idaho Plan, 1998).

Adopt revised Shorelines Management Guidelines and assist local governments in updating their Shoreline Master Programs (SMPs) (Washington Plan, 2000).

Complete the 20-year Washington Transportation Plan (WTP) to include environmental sustainability. Maintaining a sustainable environment (including salmon protection and restoration) is a goal of WTP and the following are four primary objectives to support the goal (Washington Plan, 2000):

- . Maintain habitat and watershed quality and connectivity.
- . Maintain air quality.
- . Meet water quality standards

Provide technical and financial assistance for fish passage and screening (Washington Plan, 2000).

The Action Agencies and NMFS shall work within regional prioritization and congressional appropriation processes to establish and provide the level of FCRPS funding to develop and implement a basin-wide

hierarchical monitoring program. This program shall be developed collaboratively with appropriate regional agencies and shall determine population and environmental status (including assessment of performance measures and standards) and allow ground-truthing of regional databases. A draft program including protocols for specific data to be collected, frequency of samples, and sampling sites shall be developed by September 2001. Implementation should begin no later than the spring of 2002 and will be fully implemented no later than 2003 (NMFS BiOp 2000, Action #180, Dec. 2000; BPA Appendix D: Action Table and Reports, R-184, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

Percent of fish and wildlife budget in a subbasin should match the percent of impact to that subbasin. Strategies: CBFWA should develop a formula for dividing up recovery efforts based on miles of river impacted, acres of reservoir created, and wildlife units lost. Funding should then follow similar distribution (Framework Concept Paper 22).

Establish and apply an effective management system to control human activities that affect salmon (Framework Concept Paper 19).

Establish performance goals and end-points to clarify expectations and to clarify what success will look like. Those who…are paying should have a clear idea of how much is enough (Framework Concept Paper 20).

Limit the amount of monitoring projects that are funded to *[a percentage]* of the total budget and no more than *[a specified proportion]* of an individual project (Framework Concept Paper 22).

Ensure that significant costs would be justified by effective fish and wildlife recovery before they are incurred. This justification would be made through research and experimentation (Framework Alternative 4).

Protection and expansion of habitats and ecological functions should allow for an increase in the number, complexity and range of multi-species fish and wildlife assemblages and communities. Increases in the productivity, abundance, and life-history diversity of specific fish and wildlife populations are dependent on, and should not be viewed in isolation from, these multi-species communities (Council's 2000 Fish and Wildlife Program).

Use the RASP process to establish rebuilding plans for native salmonids (Framework Concept Paper 10).

Use a continuing process of planning, implementation, monitoring, evaluating, and incorporating new knowledge into management strategies, for adjustment purposes, where: (1) a planned direction is adapted to a site-specific situation which is different than what was assumed during planning, (2) an event changes the characteristics of the environment, (3) new information accululates over time through monitoring that indicates planned objectives are not being met, and/or (4) research indicates a need for change (ICBEMP FEIS).

Consolidate and coordinate restoration activities…where multiple needs can be addressed relative to aquatic health, riparian processes and functions, forest health, rangeland health, recovery of succession/disturbance regimes, and socio-economic and tribal needs (ICBEMP FEIS).

1-1 Anadromous Fish

Within 7 years, halt the declining trends in salmon, sturgeon, and lamprey populations originating upstream of Bonneville Dam (Framework Concept Paper 3).

The Forest Service and BLM propose to develop and implement a coordinated, scientifically sound, broad-scale, ecosystem-based management strategy for lands they administer in the ICBEMP project area (ICBSDEIS).

[P]olicies need to be considered in the context of the natural conditions of the Columbia River Basin as it now exists. In most places, this ecosystem is significantly altered from the time when Europeans began inhabiting the basin more than 150 years ago. This means that fish populations adapted to the original "natural" conditions of the Columbia basin may not be the same as those that are now or could be naturally produced. This does not mean that habitat will not be improved to be more productive for native fish populations and species, but only that the original habitat conditions are not achievable in the foreseeable future. Therefore, when these policies speak of natural conditions, they are referring to current or foreseeable improvements in the existing, altered ecosystem (Council's Artificial Production Review, Section II.D).

Identify, at appropriate scales, the major factors that have contributed to the decline in the ESUs (Oregon Plan, 1997).

Establish explicit objectives and timelines for correcting factors for decline and achieving desired population characteristics (Oregon Plan, 1997).

Establish quantifiable criteria and standards by which progress toward each objective will be measured (Oregon Plan, 1997).

Integrate Federal, state, tribal, local, corporate, and non- governmental activities and projects that are designed to recover salmon populations and the habitats upon which they depend (Oregon Plan, 1997).

Establish accountability and responsibility for implementing OCSRI through a specific position in state government (Oregon Plan, 1997).

Establishing and maintain an active process to overcome institutional barriers to restoration and improve communication and coordination with the Legislature, local governments, ports, state and Federal agencies, watershed councils, soil and water conservation districts, Oregon universities, industries, and conservation organizations (Oregon Plan, 1997).

Establish an infrastructure to support a comprehensive monitoring program (Oregon Plan, 1997).

Establish an Independent Scientific Review Group that will evaluate the OCSRI on a routine, ongoing basis. This group will make recommendations to the Governor and the Legislature, Oregon agency boards and commissions, the OCSRI Implementation Team, and NMFS. In addition, the Group will establish a routine working relationship with the Implementation and Monitoring teams, and may direct some work by the teams towards analyses that are needed to evaluate or improve the efficacy of the Conservation Plan (Oregon Plan, 1997).

The Commission supports an adaptive approach that focuses on preservation of wild fish in the near-term and hastened efforts to develop appropriate long-term actions (Idaho Plan, 1998).

Establish a Coordinated Information System. Although the Pacific Northwest is data rich, it is information poor. Data is stored in a random and haphazard fashion in some cases, in highly organized and computerized fashions in other places, and in combinations of these approaches in still other cases. The Region needs a standardized information system that is capable of providing answers to basic questions regarding the documentation of progress toward recovery salmon and other aquatic species. This information needs to be provided in a form accessible to everyone as part of the annual accountability report (Governor's Recommendations, July 2000)

The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for habitat measures that provide offsite mitigation (NMFS BiOp 2000, Action #7, Dec. 2000; BPA Appendix D: Action Table and Reports, R-7, June 5, 2001).

Implement multiple-scale assessments and data management systems (USFS, BLM) (Final All-H Paper Dec. 2000).

For the mainstem Columbia and Snake rivers, we must focus not only on currently accessible habitat, but also look for opportunities to increase the current level of habitat access with all dams remaining in place (Governors' Recommendations, July 2000).

The Action Agencies shall continue to fund studies that monitor survival, growth, and other early life history attributes of Snake River wild juvenile fall chinook (NMFS BiOp 2000, Action #190, Dec. 2000; BPA Appendix D: Action Table and Reports, R-194, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

The Action Agencies and NMFS shall work with affected parties to establish regional priorities within the congressional appropriations processes to set and provide the appropriate level of FCRPS funding to develop recovery goals for listed salmon ESUs in the Columbia River basin. Tasks shall include defining populations based on biological criteria and evaluating population viability in accordance with NMFS' viable salmonid population approach. These tasks shall be completed by 2003 (NMFS BiOp 2000, Action #179, Dec. 2000; BPA Appendix D: Action Table and Reports, R-183, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

1-2 Resident Fish
Utilize the Level 1 team consultation process and apply the "bull trout matrix" or a similar approach as agreed to by the agencies (USFS, BLM, and the Service…) to evaluate actions to determine the potential effects on bull trout, and to assure interagency coordination to complete the consultation process. In addition, update the environmental baseline at the section 7 watershed scale to include proposed actions once consultation is concluded (INFISH BiOp August 1998).
Ensure that the timing of any work within intermittent or perennial stream channels…is designed to minimize/reduce short-term adverse effects to aquatic habitat and bull trout (INFISH BiOp August 1998).
Implement adaptive management approach for designing and implementing actions for improving survival of sturgeon and bull trout (BPA Appendix D: Action Table and Reports, R-270, June 5, 2001; FWS BiOp 2000, Action 10(6), Dec. 2000).
[C]ollaborate in development of multi-year road restoration strategies for key, priority and special emphasis watersheds (INFISH BiOp August 1998).
1-3 Introduced Species
1-4 Wildlife
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Avoiding inundation of wildlife habitat, insofar as practical (Council's 2000 Fish and Wildlife Program).
Change the overall wildlife management strategy from one of quantitative habitat restoration to one of qualitative habitat creation and restoration and quantitative wildlife population restoration and enhancement (Framework Concept Paper 7b).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Timing construction activities, insofar as practical to reduce adverse effects on nesting and wintering grounds (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... Constructing subimpoundments and using all suitable excavated material to create islands, if appropriate, before the reservoir is filled (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Providing artificial nest structures when appropriate (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Avoiding construction, insofar as practical, within 250 meters of active raptor nests (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Avoiding critical riparian habitat (as designated in consultation with the wildlife managers) when clearing, riprapping, dredging, disposing of spoils and wastes, constructing diversions, and relocating structures and facilities (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Creating subimpoundments by diking backwater slough areas, creating islands and nesting areas (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Regulating water levels to reduce adverse effects on wildlife during critical wildlife periods (as defined in consultation with the fish and wildlife managers) (Council's 2000 Fish and Wildlife Program).
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Improving the wildlife capacity of undisturbed portions of new project areas (through such activities as managing vegetation, reducing disturbance, and supplying food, cover and water) as compensation for otherwise unmitigated harm to wildlife and wildlife habitat in other parts of the

project area (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Acquiring land or management rights, such as conservation easements, where necessary to compensate for lost wildlife habitat at the same time other project land is acquired and including the associated costs in project cost estimates (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Funding operation and management of the acquired wildlife land for the life of the project (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: …Granting management easement rights on the acquired wildlife lands to appropriate management entities (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Do not acquire power from hydroelectric projects located in protected areas. The Council believes that the Long-Term Intertie Access Policy's reliance on protected areas is consistent with the Council's power plant and fish and wildlife program as they apply to fish and wildlife in the Columbia River Basin. The Council continues to recommend that Bonneville adopt a similar policy with respect to protected areas outside the Columbia River Basin (Council's 2000 Fish and Wildlife Program).

1-5 Predators of Anadromous Fish

The Unified Regional Plan must address the full scope of the region's fish and wildlife resources and their interactions with each other, the economy, and the interests of humans. For example, marine mammal populations and laws and policies that protect them must be balanced with efforts to recover weak naturally spawning salmon and steelhead populations where marine mammal predation is a documented problem (Framework Concept Paper 14).

We recommend that the U.S. Army Corps of Engineers (Corps), NMFS and the Fish and Wildlife service develop a long-term management plan to address predation by fish-eating birds and marine mammals (Governors' Recommendations, July 2000).

As part of the long-term management strategy for seals and sea lions, we recommend congressional approval of NMFS's proposal to acquire additional authority to take seals and sea lions that persistently impact listed salmonid species (Governors' Recommendations, July 2000).

1-6 Watersheds

Key Watersheds are highest priority for watershed restoration (NW Forest Plan ROD).

Clearly anadromous fish are a key component to watershed and subwatershed interactions. Targeting appropriate experimental design strategies in combination with multi-scale landscape characterizations may produce a more informed understanding of species/habitat interactions. Initially, the interactions between the watershed and subwatersheds may be addressed. Most agencies have several years of data and local expertise relating to the managed resource (Framework Concept Paper 24).

[Encourage] non-governmental participation in planning and implementation of watershed solutions (Federal Habitat Team, NRCS) (Final All-H Paper Dec. 2000).

BPA shall work with the NWPPC to ensure development and updating of subbasin assessments and plans; match state and local funding for coordinated development of watershed assessments and plans; and help fund technical support for subbasin and watershed plan implementation from 2001 to 2006. Planning for priority subbasins should be completed by the 2003 check-in. The Action Agencies will work with other Federal agencies to ensure that subbasin and watershed assessments and plans are coordinated across non-Federal and Federal land ownerships and programs (NMFS BiOp 2000, Action #154, Dec. 2000; BPA Appendix D: Action Table and Reports, R-154, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #1, Oct. 2002).

Support watershed improvements and processes in the Oregon and Washington Plans (Framework Concept Paper 27).

With the Council, develop subbasin and watershed assessments and plans; ensure that assessments and plans

are coordinated across non-federal and Federal ownerships and programs (Final All-H Paper Dec. 2000).

To assist the local planning effort, we recommend that state authorities designate priority watersheds for salmon and steelhead and that plans for these watersheds be developed by October 1, 2002. Plans for all watersheds in the Columbia River Basin should be developed by 2005 (Governors' Recommendations, July 2000).

Employ voluntary, multi-stakeholder collaborative approaches to protect, restore and monitor natural resources and to resolve natural resource conflicts. These approaches should be open and inclusive, based on existing laws, and conducted within a framework of natural systems–watershed, ecosystems, bioregions or other defining landforms–using the best available science. This recommendation is patterned after successful approaches used all across the country. It is intended to provide impetus for stakeholders and communities to work together in searching for common goals, resolving conflicts, becoming aware of and using best available science, meeting legal requirements for protecting the environment, monitoring natural resources, and redeeming collective responsibility for conditions and trends of resources (Spirit of the Salmon).

To ensure that proposed actions are designed to provide for long term habitat benefits while avoiding, minimizing or reducing short term impacts, utilize information and recommendations from completed watershed analysis reports, the most current watershed scale environmental baseline and the determination of effects of proposed actions using the bull trout Matrix and Checklist, or an agreed upon approach (INFISH BiOp August 1998).

To assist the local planning effort, we recommend that state authorities designate priority watersheds for salmon and steelhead and that plans for these watersheds be developed by October 1, 2002. Plans for all watersheds in the Columbia River basin should be developed by 2005 (Governors' Recommendations, July 2000).

The Action Agencies and NMFS shall work within regional prioritization and congressional appropriations processes to establish and provide the appropriate level of FCRPS funding for a program to acquire and digitize aerial or satellite imagery of the entire Columbia River basin once every 3 to 5 years (NMFS BiOp 2000, Action #181, Dec. 2000; BPA Appendix D: Action Table and Reports, R-185, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

Establish reference watersheds and populations throughout the basin to serve as a control for management actions. Streams already included in this status are John Day, MF Salmon, and Wenaha. Reference watersheds should cover range of species and ecological conditions (Framework Concept Paper 10).

Management Actions: The best available technology would be used to improve stream quality at a random selection of replicate streams in a watershed or ecosystem. Response variables would be measured annually with annual assessments comparing treated and nontreated/control streams. Decision rules and time frames would be established *a priori* to determine success of remediation actions. Different subsets of streams would receive different remediation actions to compare strategies and identify cost-effective approaches to stream-wide recovery (Framework Concept Paper 23).

Use watershed-scale information to address resource conditions, risks, and opportunities; to provide context and focus for site-specific NEPA analysis, decision making, implementation, and monitoring; and to enhance the agencies' ability to estimate direct, indirect, and cumulative effects (ICBEMP FEIS).

Inform, coordinate with, and cooperate with affected partners when planning and implementing watershed-scale wildland fires across administrative boundaries to manage fuels, restore or maintain ecosystems, and obtain desired distribution of vegetation patches and patterns (ICBEMP FEIS).

1-7 Tributaries

Management actions to implement instream flow protection for small streams and tributaries throughout the Region include: 1) supporting agency efforts to address small stream and tributary streamflow issues, including information gathering and analysis, and development of policies and programs; and 2) seeking out opportunities for collaborative partnerships with stakeholders to restore and protect instream flows. Stakeholders include water right holders; watershed councils and other community groups; non-governmental organizations including land and water trusts; and Federal, state and local governmental agencies and tribes (Framework Concept Paper 17).

Work with states to secure and protect minimum flows with a Federal nexus (FS, BLM) (Final All-H Paper Dec. 2000).
Fund technical support for 2001-2006 plan implementation; identify in annual and 5-year implementation plan appropriate habitat actions and implement them (Final All-H Paper Dec. 2000).
Provide technical assistance to state instream flow work (USGS, USBR) (Final All-H Paper Dec. 2000).
Test the effectiveness of restoring habitat in tributary watersheds (Framework Alternative 4).
1-8 Mainstem Columbia
Possibilities for a mainstem habitat implementation plan: create shallow-water habitat by excavating backwater sloughs, alcoves, and side channels and other measures add large woody debris to these systems; re-connect alcoves, sloughs, and side channels to the main channel; establish emergent aquatic plants in shallow water areas; re-establish or enhance historic or existing wetlands; mimic natural hydrographs to the extent practicable; dredge or excavate lateral channels that have silted in; acquire and protect a belt of lands adjacent to the mainstems (Draft All-H paper Dec. 1999).
BPA, working with BOR, the Corps, EPA, and USGS, shall develop a program to 1) identify mainstem habitat sampling reaches, survey conditions, describe cause-and-effect relationships, and identify research needs; 2) develop improvement plans for all mainstem reaches; and 3) initiate improvements in three mainstem reaches. Results shall be reported annually (NMFS BiOp2002, Action #155, Dec. 2000; BPA Appendix D: Action Table and Reports, R-155, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #2, Oct. 2002).
Assess opportunities for mainstem habitat improvements (BPA) (Final All-H Paper Dec. 2000).
Establish a common vision for and unified commitment to the health of the river (LCREP).
1-9 Reservoirs
Mitigation for impacts to natural lakes should be given a high priority within the Councils Program (Framework Concept Paper 22).
1-10 Estuary and Ocean
Prioritize habitats for protection and restoration (2001) (LCREP) (Final All-H Paper Dec. 2000).
Facilitate Lower Columbia River Estuary Program implementation (LCREP, EPA).
Strengthen Lower Columbia River Estuary Program authority (Final All-H Paper Dec. 2000).
The effect of ocean habitat on salmonid species should be considered in evaluating freshwater habitat management to understand all stages of the salmon and steelhead life cycle (Council's 2000 Fish and Wildlife Program).
Focus greater emphasis on areas of the salmonid ecosystem that have not traditionally received much attention (e.g., estuary/ocean) (Framework Concept Paper 20).
Given that long-term, biologically based management for the ocean is now in place, other steps can be explored to reduce ocean impacts on listed fish through use of more selective fishing techniques and a licensed buyback program that can reduce the current excess fishing capacity (Governors Recommendations, July 2000).
BPA and the Corps, working with LCREP and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary (NMFS BiOp 2000, Action #159, Dec. 2000; BPA Appendix D: Action Table and Reports, R-159, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #3, Oct. 2002).
The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to develop a physical model of the lower Columbia River and plume. This model will characterize potential changes to estuarine habitat associated with modified hydrosystem flows and the effects of altered flows where they meet the California Current to form the Columbia River plume (NMFS BiOp 2000, Action #194, Dec. 2000; BPA Appendix D: Action Table and Reports, R-198, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E

Strategy #3, Oct. 2002).

The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies to develop an understanding of juvenile and adult salmon use of the Columbia River plume (NMFS BiOp 2000, Action #197, Dec. 2000; BPA Appendix D: Action Table and Reports, R-201, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

Develop floodplain management and shoreland zoning protection programs (LCREP).

Create an entity that serves as an advocate for the lower Columbia River and estuary (LCREP).

Implement the Estuary Program information management plan (LCREP).

1-11 Water Quality

Establish, in coordination with the International Joint Commission, a transboundary Watershed Board to examine, cocordinate and improve managmeent of Basin water quantity and water quality (Tribal Vision).

Emphasize a substantial and explicit tie between water quality compliance efforts (already under court orders in three states) and salmon recovery (Draft All-H Paper Habitat Option 2, Dec. 1999).

Authorize and fund expanded Corps of Engineers Restoration Program (Final All-H Paper Dec. 2000).

Negotiate "a road map" to meet requirements of Clean Water Act (CWA) and Endangered Species Act (ESA) (Washington Plan, 2000).

Develop and implement consistent water quality related laws, rules, and standards (LCREP).

Develop a basin-wide strategy for identified toxic and conventional pollutants that defines their sources, fate and effects, and reduces their discharge (LCREP).

Develop maximum pollutant loads for streams that do not meet water quality standards (LCREP).

In subbasins (or within smaller watershed areas) with mixed ownership, use the 303(d) protocol or an alternate analytical process agreed to by the interagency partners on Federal lands. Inform, coordinate with, and cooperate with non-Federal landowners, watershed councils, state agencies, tribes, the Natural Resource Conservation Service, and other interested parties, providing them an opportunity to use the agreed upon process to address water quality problems. Strive to develop water quality restoration plans that apply to an entire watershed or subbasin (ICBEMP FEIS)

2 HARVEST

2-1 Anadromous Fish

If each country catches "its own" salmon, production and management costs of commercial salmon harvests will decrease, along with political friction (Framework Concept Paper 26).

The Federal, state and tribal fisheries managers (not BPA) must be held accountable for developing and implementing salmon production and harvest policies that can successfully implement the Endangered Species and Regional Powers Acts, treaties with the tribes and Canada, Trust responsibilities and other Federal fisheries obligations (Comment FWIP-032).

Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest. Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish (Council's 2000 Fish and Wildlife Program).

Maintain public support and involvement for sustained use and protection of salmon resources (Framework Concept Paper 19).

Establish Alaskan and Canadian ocean fisheries based on chinook abundance. Address incidental mortality (Spirit of the Salmon).

Renegotiate international treaties to prevent overfishing, provide conservation incentives, and impose sanction on nations whose fleets illegally catch salmon and steelhead (Framework Concept Paper 1).

The Action Agencies, with assistance from NMFS and USFWS, shall annually develop 1- and 5-year plans for

hatchery and harvest measures that provide offsite mitigation (NMFS BiOp 2000, Action #8, Dec. 2000; BPA Appendix D: Action Table and Reports, R-8, June 5, 2001).

Given that long-term, biologically based management for the ocean is now in place, other steps can be explored to reduce ocean impacts on listed fish through use of more selective fishing techniques and a license buyback program that can reduce the current excess fishing capacity. Additional opportunities may exist to align viable fisheries with the opportunities available through a license buyback program given the excess fishing capacity that currently exists. Finally, a random-observer program is needed to ensure the collection of information necessary for managers and the industry to reduce salmon bycatch mortality (Governors' Recommendations, July 2000).

2-2 Resident Fish

2-3 Wildlife

3 HATCHERIES

Artificial production and other non-natural interventions should be consistent with the central effort to protect and restore habitat and avoid adverse impacts to native fish and wildlife species (Council's 2000 Fish and Wildlife Program).

All management and action plans should be reviewed by independent scientists. All assumptions should be displayed and the scientific basis for the action should be carefully defined so that it is subject to peer review (Framework Concept Paper 10).

The Program should give the highest priority to protecting the habitat for fish which reproduce in the wild. Lower priority should be given to hatchery programs for fisheries which need a temporary boost (< one generation) to fill newly created habitat. Lowest priority should be given to hatchery programs which are long term and provide fisheries with low potential for becoming self sustaining. Hatchery programs for endangered species should be reviewed on a case by case basis (Framework Concept Paper 22).

Artificial production must be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties. Hatcheries must be operated in a manner that recognizes that they exist within ecological systems whose behavior is constrained by larger-scale basin, regional, and global factors. A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation. Appropriate risk management needs to be maintained in using the tool of artificial propagation (Council's 2000 Fish and Wildlife Program).

Establish a basin-wide policy for the conservation of native wild populations, their population structure, and biological diversity (Framework Concept Paper 10).

Establish a licensing and review process for state, tribal and Federal hatcheries that are periodically reviewed for relicensing. This would allow adaptive management to influence the operations of the hatchery (Framework Concept Paper 10).

In recognition of the risk and uncertainty associated with artificial production, each artificial production activity must be approached experimentally with a plan detailing the purpose and method of operation, the relationship to other elements of the subbasin plan, including associated habitat and other projects within the subbasin plan, specific measurable objectives for the activity, and a regular cycle of evaluation and reporting of results. This approach will allow the Region to address the remaining uncertainties on a case-by-case basis and quickly make adjustments in artificial production activities where warranted (Council's 2000 Fish and Wildlife Program).

Over the next three years, every artificial production program and facility in the basin, Federal and non-Federal, should undergo a review to determine its consistency with these strategies, scientific principles, and policies. After five years, the Council, other regional decision-makers, and Congress should assess whether existing review, funding, and planning processes are successful in implementing needed reforms in artificial production practices (Council's 2000 Fish and Wildlife Program).

Fully implement CRFMP *[Columbia River Fish Management Plan]* in terms of production provisions by calling upon the Policy Committee to initiate comprehensive production planning and an implementation process. The CRFMP contains authoritative provisions for production planning from both a policy and

technical standpoint and includes detailed measures for dispute resolution. Because fisheries on the abundant runs produced from hatcheries are constrained by protection of weak natural stocks and hatchery practices, and funding is under attack, incentives exist to shift hatchery emphasis toward saving stocks particularly in danger of extirpation and restoring a more balanced level of production above Bonneville Dam. The tribes' technical recommendations and subbasin plans address the locations and means to accomplish this shift and the parties to *U.S. v. Oregon* are the sole parties with authority to develop comprehensive fish production plans (Spirit of the Salmon).

Reconsider the ESU interim policy on the use of propagation… While the ESU, developed in a more integrated format, may be an appropriate indicator of distinctiveness for listing purposes, it should not be used as a limitation on the recovery of a listed species in a particular habitat (Spirit of the Salmon).

It is time to recognize that hatcheries are used for multiple purposes, primarily producing fish for harvest but also for rebuilding naturally spawning populations through the technique of supplementation and for captive broodstock experiments. Careful thought must be given to how these techniques could maximize the efficiency of fish production to provide treaty, sport, and commercial harvest opportunities while also protecting and rebuilding unique fish populations and complying with existing laws and legal processes, such as the *U.S. v. Oregon* litigation (Governors' Recommendations, July 2000).

The entities authorizing or managing an artificial production facility should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some other combination of those purposes for each population of fish addressed (Council's 2000 Fish and Wildlife Program).

3-1 Anadromous Fish

Consistent with the Artificial Production Review, the region's fish managers and tribes should jointly develop a comprehensive supplementation plan that includes aggressive monitoring and evaluation. We commit state agencies to work with tribal fish managers to develop such a plan. The plan should specify watersheds that can be used for supplementation, and also recommend respective tribal, state and Federal roles in implementation of the supplementation plan (Governors' Recommendations, July 2000).

To begin this process of reform, we recommend all hatcheries in the Columbia River Basin be reviewed within three years to determine the facilities' specific purposes and potential future uses in support of fish recovery and harvest. The Council should identify priority hatcheries that need expedited review and complete the reviews within eight months so that modification of hatchery operations can commence by January 1, 2001 (Governors' Recommendations, July 2000).

Funding for hatchery reforms must be a joint Federal, state and Bonneville responsibility. We recommend that, regardless of the funding source, future hatchery funding decisions take into account consistency with Artificial Production Review reforms (Governors' Recommendations, July 2000).

We expect state, Federal and tribal fish agencies to produce a long-term production and harvest plan that protects ESA-listed fish. To that end, we call for a new Columbia Rover Fish Management Plan to be agreed upon in time for the spring 2001 salmon fishery (Governors' Recommendations, July 2000).

The Action Agencies and NMFS shall work within regional prioritization and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for a hatchery research, monitoring, and evaluation program consisting of studies to determine whether hatchery reforms reduce the risk of extinction for Columbia River basin salmonids and whether conservation hatcheries contribute to recovery (NMFS BiOp 2000, Action #184, Dec. 2000; BPA Appendix D: Action Table and Reports, R-188, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #2, Oct. 2002).

Set performance standards based upon returning fish, with an emphasis on wild fish (Framework Concept Paper 27).

The Action Agencies shall fund the development of NMFS-approved HGMPs for implementation, including plans for monitoring and revising them as necessary as new information becomes available. HGMPs have to be completed first for the facilities and programs affecting the most at-risk species (Upper Columbia and Snake River ESUs), followed by those affecting mid-Columbia, and then the Lower Columbia ESUs. HGMPs for all the Columbia basin hatchery programs and facilities should be completed (and approved by NMFS) by the 3-year check-in (NMFS BiOp 2000, Action #169, Dec. 2000; BPA Appendix D: Action Table and Reports,

R-169, June 5, 2001; 2003/2003-2007 Implementation Plan, Hatchery Strategy #2, Oct. 2002).

Develop approved HGMPs for all hatchery facilities in the Columbia Basin (Final All-H Paper Dec. 2000).

The Action Agencies and NMFS shall work within regional priorities and congressional appropriations processes to establish and provide the appropriate level of FCRPS funding for studies to determine the reproductive success of hatchery fish relative to wild fish. At a minimum, two to four studies shall be conducted in each ESU. The Action Agencies shall work with the Technical Recovery Teams to identify the most appropriate populations or stocks for these studies no later than 2002. Studies will begin no later than 2003 (NMFS BiOp 2000, Action #182, Dec. 2000; BPA Appendix D: Action Table and Reports, R-186, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #3, Oct. 2002).

Unify and standardize hatchery reporting obligations to single funding entity and require reporting concerning success in generate returning adults to applicable watersheds (Framework Concept Paper 26).

The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for studies of PIT-tagged wild stocks from the lower river streams. The studies shall be used to contrast stock productivity and hydrosystem effects (NMFS BiOp 2000, Action #188, Dec. 2000; BPA Appendix D: Action Table and Reports, R-192, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #3, Oct. 2002).

3-2 Resident Fish

4 HYDRO

4-1 Dam Modifications and Facilities

Each state commits, by October 1 this year *[2000]* and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding. The list could include such things as screening diversions and replacing culverts, as well as removal of, or passage at, tributary dams, as is being done at Condit, Wapatox, and Marmot dams (Governors' Recommendations, July 2000).

Pass legislation to effectuate the drawdown of the four Lower Snake River Dams and John Day Dam (Framework Concept Paper 7a,7b).

The Action Agencies shall consider all state-of-the-art turbine design technology to decrease fish injury and mortality before the implementation of any future turbine rehabilitation program (including any major repair programs, the ongoing rehabilitation program at The Dalles Dam, and any future program at Ice Harbor Dam). The Action Agencies shall coordinate within the annual planning process before making decisions that would preclude the use of fish-friendly technologies and to minimize any adverse effects of project downtime (NMFS BiOp 2000, Action #92, Dec. 2000; BPA Appendix D: Action Table and Reports, R-92, June 5, 2001).

Conduct advance planning for possible future actions, including dam breaching (Final All-H Paper Dec. 2000).

4-2 Hydro Operation

The Action Agencies shall coordinate with NMFS, USFWS, and the states and tribes in preseason planning and in-season management of flow and spill operations. This coordination shall occur in the Technical Management Team process (see Section 9.4.2.2) (NMFS BiOp 2000, Action #17, Dec. 2000; BPA Appendix D: Action Table and Reports, R-17, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002; FWS BiOp 2000, Action #10(5), Dec. 2000; BPA Appendix D: Action Table and Reports, R-269, June 5, 2001:).

The Action Agencies shall coordinate development and implementation of the hydro portion of the 1- and 5-year implementation plans through the Regional Forum, chaired by NMFS (NMFS BiOp 2000, Action #2, Dec. 2000; BPA Appendix D: Action Table and Reports, R-2, June 5, 2001).

Seek timely input and concurrence on Columbia River Treaty, IJC Orders, and all other decision-making processes involving transboundary waters (BPA Appendix D: Action Table and Reports, R-238, June 5, 2001; FWS BiOp 2000, Action #8(1)(g), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

As a contingency plan, the Corps (in cooperation with other Federal agencies) shall develop a project management plan to reevaluate more intensive hydropower-related actions (including breaching) for the four

lower Snake River dams. The project management plan will identify the scope, schedule, costs, tasks, products, and responsibilities for the reevaluation study. The study should assess all significant changed conditions to the Lower Snake River Feasibility Report and Environmental Impact Statement (Corps 1999c). The project management plan should be consistent with direction from Congress, Corps authorities, and other legal requirements. The completed project management plan should be coordinated with the appropriate regional interests. The project management plan should include, but not be limited to, plans to mitigate disproportionate impacts to communities, industries, and Tribes, detailed water and air quality effects, implementation plans, and a complete public involvement program. The decision to start the reevaluation study should result from the NMFS check-in process in Section 9.5. The Corps will request funding or reprogramming to complete the project management plan within 1 year after NMFS' issuance of a check-in report indicating the need to seek additional authority. The study should result in a general reevaluation report and supplemental environmental impact statement, which would be used to seek authorization and/or appropriations to implement, recommended action(s), if needed. The general reevaluation report/ supplemental environmental impact statement will require approximately 2 years to complete (NMFS BiOp 2000, Action #147, Dec. 2000; BPA Appendix D: Action Table and Reports, R-147, June 5, 2001).

Prioritize research funding to document project-specific effects on anadromous fish, and effects of operational changes. Make decisions based on best available quantification of effects of operational changes (Framework Concept Paper 26).

The Action Agencies, coordinating through the Technical Management Team, shall develop and implement a 1- and 5-year water management plan and in-season action plans for the operation of the FCRPS (NMFS BiOp 2000, Action #3, Dec. 2000; BPA Appendix D: Action Table and Reports, R-3, June 5, 2001).

The Action Agencies, coordinating through the System Configuration Team, shall annually develop and implement a 1- and 5-year capital investment plan for the configuration of the FCRPS projects (NMFS BiOp 2000, Action #4, Dec. 2000; BPA Appendix D: Action Table and Reports, R-4, June 5, 2001).

4-3 Spill

4-4 Flow

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... Flows and reservoir levels of sufficient quantity and quality to protect spawning, incubation, rearing and migration (Council's 2000 Fish and Wildlife Program).

The position of the State of Idaho is that flow objectives should be targets, not requirements (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Before entering into any agreement to commit currently uncontracted water or storage space in any of its reservoirs covered by this biological opinion to any other use than salmon flow augmentation, BOR shall consult with NMFS under ESA Section 7(a)(2). Such consultations shall identify the amount of discretionary storage or water being sought, the current probability of such storage or water being available for salmon flow augmentation, and any plan to replace the storage volume currently available to salmon flow augmentation that would be lost as a result of the proposed commitment. Also, BOR shall consult with NMFS before entering into any new contract or contract amendment to increase the authorized acreage served by any irrigation district receiving BOR-supplied water. NMFS' criterion in conducting such reviews is to ensure that there be zero net impact from any such BOR commitment on the ability to meet the seasonal flow objectives established in this biological opinion. Replacement supplies should have at least an equal probability of being available for salmon flow augmentation as the storage space or water that is being committed (NMFS BiOp 2000, Action #27, Dec. 2000; BPA Appendix D: Action Table and Reports, R-27, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Flow management in the Columbia and Snake mainstems should continue as part of the mainstem strategy. Flow augmentation pursuant to state law, a key component of flow management, remains controversial. But there are ways to reduce the controversy in the future. First, Federal agencies must document the benefits of flow augmentation and the precise attributes of flow that may make it beneficial. Second, where the benefits of flow augmentation have been documented, migrating fish should be left in the river to benefit from it. Third, the Region should review off-river storage for additional water if flow augmentation is going to continue to be a key strategy. Fourth, flow management should be designed to integrate all water-related statutory mandates, including not only the Endangered Species Act but also the Clean Water Act, and should

consider impacts to non-anadromous listed and unlisted species. Fifth, implementation of flow management should fully account for actual water conditions so that, for example, if cool water is provided for temperature benefits, the benefits are not negated by simultaneous releases of warmer water from other sources. Sixth, additional water may be available for flow augmentation if flood control operations can be prudently altered. The Corps and NMFS should work with the Region on a study to determine whether flood control rule curves can be reconfigured to allow shaping of flows to improve survival of migrating salmon and steelhead. Finally, the Region should explore whether salmon benefits could be achieved through cooperative agreements regarding power peaking operations, such as those currently in place for the Hanford Reach stocks and listed chum salmon spawning below Bonneville Dam (Governors' Recommendations, July 2000).

It is recommended that the Action Agencies seek cooperation of West Kootenai Power and other involved agencies and parties in Canada to negotiate higher Kootenay Lake/Kootenai River stages within the 1938 IJC order during sturgeon spawning flows. This may promote sturgeon recruitment with less stored water and fewer configuration improvements at Libby Dam during intermediate and low water years (FWS BiOp 2000, Action #12(1), Dec. 2000).

4-5 Reservoir Levels

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Flows and reservoir levels of sufficient quantity and quality to protect spawning, incubation, rearing and migration (Council's 2000 Fish and Wildlife Program).

[I]nclude a more clearly defined process to determine the social, economic and biological costs and benefits of operating John Day at reduced levels (Idaho Plan, 1998).

The Action Agencies shall provide to FWS an annual operational schedule to be supplemented on a monthly basis. The annual schedule shall include month-end estimates of water surface elevation at Hungry Horse Reservoir and estimates of monthly discharge from Hungry Horse Dam. The monthly supplement shall include a report of actual operations over the previous month and shall include daily water surface elevation at Hungry Horse Reservoir and hourly spill and releases at Hungry Horse Dam (FWS BiOp 2000, Action #11.A.1(2c), Dec. 2000; BPA Appendix D: Action Table and Reports, R-292, June 5, 2001).

The Action Agencies shall provide to FWS an annual operational schedule to be supplemented on a monthly basis. The annual schedule shall include month-end estimates of water surface elevation at Koocanusa Reservoir and estimates of monthly discharge from Libby Dam. The monthly supplement shall include a report of actual operations over the previous month and shall include daily water surface elevation at Koocanusa Reservoir and hourly spill and releases at Libby Dam (FWS BiOp 2000, Action #11.A.1(1c), Dec. 2000; BPA Appendix D: Action Table and Reports, R-291, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

4-6 Water Quality

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Assurance that the project will not degrade water quality beyond the point necessary to sustain sensitive fish species (as designated in consultation with fish managers) (Council's 2000 Fish and Wildlife Program).

The Action Agencies, coordinating through the Water Quality Team, shall annually develop a 1- and 5-year water quality plan for operation and configuration measures at FCRPS projects (NMFS BiOp 2000, Action #5, Dec. 2000; BPA Appendix D: Action Table and Reports, R-5, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

4-7 Juvenile Fish Passage and Transportation

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... The best available means for aiding downstream and upstream passage of anadromous and resident fish (Council's 2000 Fish and Wildlife Program).

The Federal agencies would seek increased funding to pursue more aggressive implementation of measures to improve passage survival (Draft All-H Paper Hydro Option 2, Dec. 1999).

[A]llow the Federal, state and tribal salmon management agencies to collectively determine the specific

transportation measures for each year (Idaho Plan, 1998).

To benefit salmon migrants, both upstream and downstream, expedited schedules should be established to design and install passage improvements (Governors' Recommendations, July 2000).

…Consistent with our preference to emphasize and build upon natural processes, we believe strategies and actions should be implemented that provide the best possible survival for fish that migrate in the river through the reservoirs and past the dams. We recognize that in the short term there are survival benefits from continuing to use fish transportation as a transitional strategy. However, we believe that when ongoing research affirms that survival of listed salmon populations would increase from migration in an improved river environment, an increasing number of juvenile fish should then be allowed to migrate in-river. An immediate evaluation is also necessary of survival rates for fish transported by trucks compared to barges. If survival is lower in trucks and barging is an available alternative, then trucking should be discontinued (Governors' Recommendations, July 2000).

4-8 Adult Fish Passage

To benefit salmon migrants, both upstream and downstream, expedited schedules should be established to design and install passage improvements (Governors' Recommendations, July 2000).

The Upper Columbia Regional Fisheries Enhancement Group puts the highest priority on improvements to adult and juvenile fish passage (9/20/01 letter from Michael B. Ward to the Action Agencies, 5YIP).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... The best available means for aiding downstream and upstream passage of anadromous and resident fish (Council's 2000 Fish and Wildlife Program).

To benefit salmon migrants, both upstream and downstream, expedited schedules should be established to design and install passage improvements (Governors' Recommendations, July 2000).

Each state commits, by October 1 this year and annually thereafter, to provide a list of priority fish passage projects to the Council for proposed funding (Governors' Recommendations, July 2000).

The Action Agencies and NMFS shall work within the annual planning and congressional appropriation processes to establish and provide the appropriate level of FCRPS funding for comparative evaluations of the behavior and survival of transported and downstream migrants to determine whether causes of D can be identified for the reach between Bonneville Dam and the mouth of the Columbia River (NMFS BiOp 2000, Action #186, Dec. 2000; BPA Appendix D: Action Table and Reports, R-190, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).:

4-9 Flood Control

Authorize system-wide flood control review (Final All-H Paper Dec. 2000).

Develop floodplain management and shoreland zoning protection programs (LCREP).

COMMERCE

5 POWER

5-1 Existing Generation

5-2 New Energy Resources

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...Consultation with the fish managers and the Council throughout study, design, construction and operation of the project (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... Specific plans for flows and fish facilities prior to construction (Council's 2000 Fish and Wildlife Program).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ... Assurance that all fish protection measures are fully operational at the time the project begins operation (Council's 2000 Fish and Wildlife Program).

5-3 Transmission Reliability
Amend the Federal Power Act to require FERC to approve the formation of and oversee a private self-regulatory organization that prescribes and enforces mandatory reliability standards; to provide FERC with the authority to require transmitting utilities to turn over operational control of transmission facilities to an independent system operator; and to encourage the development of regional transmission planning and siting groups (e.g., DOE's Comprehensive Electricity Competition Plan) (Sample Action).
6 INDUSTRY
6-1 Industrial Development
6-2 Aluminum and Chemical
6-3 Mining
For mining operations where the [Federal] administrative unit has discretion to require a Plan of Operations, require such a plan if the mining operation has the potential to adversely affect bull trout. Ensure that the plan complies with applicable minerals management standards and guidelines for the ACS (INFISH BiOp August 1998).
6-4 Pulp and Paper
7 TRANSPORTATION
In the development or revision of Access and Travel Management Plans, ensure the public (including appropriate state, county, and tribal entities) is involved and that access to public lands is retained to the extent possible (ICBEMP FEIS).
7-1 Navigation and Barging
A proactive strategy is needed to determine how best to balance long-term fish recovery with other societal interests…. The strategy should include local community involvement in helping find ways to keep economic sectors whole (e.g., alternative ways to get barged commodities to market) if recovery measures impact those economies (Idaho Plan, 1998).
7-2 Trucking, Railroads, and Infrastructure
8 AGRICULTURE
Idaho identified the following as key near-term actions consistent with their perspective with habitat priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP): Continue prioritization of agricultural conservation land management practices for anadromous waters and integrate such prioritization with the Action Agencies' riparian buffer objectives. The use of financial incentives and processes that empower local decision-making can effectively be used to accelerate efforts to meet both economic and environmental objectives (Comment FWIP-002).
8-1 Irrigation
Within 2 years from the date this opinion is signed, BOR shall provide NMFS with a detailed progress report addressing possible instances where BOR-supplied water within the Columbia River basin is being used without apparent BOR authorization to irrigate lands. In the report, BOR shall indicate how it shall proceed to identify and address instances of unauthorized use (NMFS BiOp 2000, Action #29, Dec. 2000; BPA Appendix D: Action Table and Reports, R-29, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).
8-2 Pesticides and Agricultural Practices
Develop guidance document for Comprehensive Irrigation District Management Plans for use by irrigation districts to address Endangered Species Act (ESA) and Clean Water Act (CWA) issues and requirements (Washington Plan, 2000).
8-3 Grazing
As allotment management plans are amended or revised, modify the AMPs to meet appropriate PACFISH or INFISH objectives (INFISH BiOp August 1998).

Minimize fluctuations in Federal land management programs and activities to promote a more predictable operating environment for forest and rangeland related businesses (ICBEMP FEIS).
8-4 Forestry
Immediately establish an emergency team to develop a rehabilitation treatment plan…whenever Riparian Habitat Conservation Areas are significantly damaged by a wildfire or a prescribed fire burning out of prescription (INFISH/PACFISH EAs). Design a new "forest practices permit system" to streamline the processing of forest practices applications and improve the public ability to review and comment on proposed forest practices on state and private forest lands (Washington Plan, 2000). Minimize fluctuations in Federal land management programs and activities to promote a more predictable operating environment for forest and rangeland related businesses (ICBEMP FEIS).
9 COMMERCIAL HARVEST
Review commercial permits and noncommercial recreational boating and floating as a Federal action (PACFISH BiOp June 1998). Expand marking and catch sampling programs for ocean and inriver fisheries where Columbia River stocks are caught (Framework Alternative 7).
10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT
Develop and provide critical technical assistance and information, such as technical guidelines and maps to support local governments update of their Critical Areas Ordinances (Washington Plan, 2000). Develop a Stormwater Management Strategy Plan for Washington State (Washington Plan, 2000). Use tools and incentives in local planning ordinances and state laws to encourage environmentally sensitive development (LCREP). Help local governments comply with Federal, state and local environmental and land use laws (LCREP).
11 RECREATION
Review commercial permits and noncommercial recreational boating and floating as a Federal action (PACFISH BiOp June 1998).
TRIBES
12 TRIBES
Develop mutual learning opportunities through technology transfer and training opportunities to enhance the effectiveness of tribal involvement in Forest Service and BLM programs (ICBEMP FEIS).
12-1 Tribal Harvest
Within 25 years, increase the total adult salmon returns of stocks originating above Bonneville Dam to 4 million annually and in a manner that sustains natural production to support tribal commercial as well as ceremonial and subsistence harvests (Framework Concept Paper 3). Within 25 years, increase sturgeon and lamprey populations to naturally sustainable levels that also support tribal harvest opportunities (Framework Concept Paper 3). Transfer the Klickitat hatchery to the Yakama Indian Nation; the Kooskia, Clearwater, and Dworshak hatcheries to the Nez Perce Tribe; and the Lookingglass and Umatilla hatcheries to the Umatilla Tribes under authority of the Indian Self-Determination Act. Provide operation and maintenance funds for hatchery operation and for the transfer of other hatcheries as needed. Fund and implement Fish and Wildlife measures to construct tribal production facilities. Redirect Mitchell Act propagation facility capacity and implement mitigation for John Day Dam… Because tribes retain the exclusive right to take fish on their reservations and because the hatcheries listed are located within the boundaries of their reservations or ceded areas and serve the purpose of protecting treaty fish resources, tribes are entitled to a transfer of hatchery properties along with the operation and maintenance funding to maintain them. The Federal government should also transfer other hatchery facilities that may assist in restoring upper river anadromous fish populations (Spirit of the Salmon).

Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: … Assurance that the project will not degrade fish habitat or reduce numbers of fish in such a way that the exercise of treaty or executive order tribal rights will be diminished (Council's 2000 Fish and Wildlife Program).
12-2 Tradition, Culture, Spirituality
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: … Assurance that the project will not inundate the usual and accustomed, traditional or contemporary fishing places of any tribe without tribal approval (Council's 2000 Fish and Wildlife Program). Within 25 years, increase the total adult salmon returns of stocks originating above Bonneville Dam to 4 million annually and in a manner that sustains natural production to support tribal commercial as well as ceremonial and subsistence harvests (Framework Concept Paper 3). Improve understanding and incorporate into Federal land management how places are valued by American Indians (ICBEMP FEIS).

SAMPLE IMPLEMENTATION ACTIONS
FOR
RESEARCH, MONITORING AND EVALUATIONS

FISH & WILDLIFE

1 HABITAT

[Survey] amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropods [as specified in Table C-3] (NW Forest Plan ROD).

Management actions must be taken in an adaptive, experimental manner because ecosystems are inherently variable and highly complex. This includes using experimental designs and techniques as part of management actions, and integrating monitoring and research with those management actions to evaluate their effects on the ecosystem (Council's 2000 Fish and Wildlife Program).

Improve measurements of survival through all salmonid life stages to identify high mortality areas and reduce mortality (Framework Concept Paper 26).

The Action Agencies, in coordination with NMFS, USFWS, and other Federal agencies, NWPPC, states, and tribes, shall develop a common data management system for fish populations, water quality, and habitat data (NMFS BiOp 2000, Action #198, Dec. 2000; BPA Appendix D: Action Table and Reports, R-202, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct 2002).

The Action Agencies and NMFS, in conjunction with the Habitat Coordination Team, will develop a compliance monitoring program for inclusion in the first 1- and 5-year plans (NMFS BiOp 2000, Action #163, Dec. 2000; BPA Appendix D: Action Table and Reports, R-163, June 5, 2001).

The Action Agencies shall coordinate their efforts and support offsite habitat enhancement measures undertaken by other Federal agencies, states, Tribes, and local governments by the following (NMFS BiOp 2000, Action #152, Dec. 2000; BPA Appendix D: Action Table and Reports, R-152, June 5, 2001 (list added from BiOp); 2003/2003-2007 Implementation Plan, Habitat Strategy #1, Oct. 2002):

1. Support development of state or Tribal 303(d) lists and TMDLs by sharing water quality and biological monitoring information, project reports and data from existing programs, subbasin or watershed assessment products.
2. Participating, as appropriate, in TMDL coordination or consultation meetings or work groups.
3. Using or building on existing data management structures, so all agencies will share water quality and habitat data, databases, data management, and quality assurance.
4. Participating in the NWPPC's Provincial Review meetings and Subbasin Assessment and Planning efforts, including work groups.
5. Sharing technical expertise and training with Federal, state, Tribal, regional, and local entities (such as watershed councils or private landowners).
6. Leveraging funding resources through cooperative projects, agreements and policy development (e.g., cooperation on a whole-river temperature or water quality monitoring or modeling project).

Assess natural mortality levels to gain understanding of when human-induced hydrosystem and other effects are fully mitigated (Framework Concept Paper 26).

Employ prioritized compliance monitoring, educational programs, and enforcement efforts strategically designed to improve compliance with existing laws and environment protections crucial to restoration (Oregon Plan, 1997).

Establish a comprehensive, interdisciplinary, interagency environmental monitoring program to monitor implementation of proposed actions and measure achievement of environmental objectives (Oregon Plan, 1997).

Establish appropriate environmental benchmarks that will represent successful achievement of OCSRI goals and identify appropriate interim indicators that will track progress toward overall goals (Oregon Plan, 1997).

Complete "Reinvent National Environmental Policy Act" pilot projects to address environmental concerns on a broad geographical area and earlier into transportation project planning (Washington Plan, 2000).

Establish an institutional commitment to involve the public in finding solutions and developing action plans for salmon recovery and management (Framework Concept Paper 10).

Inventory and prioritize habitat types and attributes needing protection and conservation. Identify habitats and environmentally sensitive lands that should not be altered (LCREP).

Monitor the effectiveness of habitat protection, restoration and mitigation projects (LCREP).

Pursue opportunities for both formal research experimentation and management developed field trials for accelerated learning (ICBEMP FEIS).

Develop and maintain enhanced air quality predictive and monitoring capability for assessing the risks associated with prescribed and wildfire management decisions and for making more informed smoke management decisions (ICBEMP FEIS).

1-1 Anadromous Fish

Obtain the information necessary to begin restoring the characteristics of healthy lamprey populations (Council's 2000 Fish and Wildlife Program).

Evaluate opportunities to improve spawning habitat in the Ives Island area (Final All-H Paper Dec. 2000).

Closely and continuously monitor tributary production and escapement to improve management (Tribal Vision).

Initiate at least three tier 3 studies (each necessarily comprising several sites) within each ESU (a single action may affect more than one ESU). In addition, at least two studies focusing on each major management action must take place within the Columbia River basin. The Action Agencies shall work with NMFS and the Technical Recovery Teams to identify key studies in the 1-year plan. Those studies will be implemented no later than 2003 (NMFS BiOp 2000, Action #183, Dec. 2000; BPA Appendix D: Action Table and Reports, R-187, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #2, Oct. 2002).

Use research and monitoring data to improve computer models to assemble existing data and relationships to predict effects on salmon and steelhead from management actions (Framework Concept Papers 25, 26).

Use computer metapopulation models to predict extinction probabilities for listed stocks, and annually reassess extinction probabilities to reconsider listing decisions (Framework Concept Papers 25, 26).

A recent study by the Battelle Pacific Northwest National Laboratory and the U.S. Geological Survey (USGS) found a substantial percentage of the historic mainstem riverine habitat for Snake River fall chinook still remains unimpounded upstream of the Hells Canyon complex. Although there is still riverine environment where fall chinook historically spawned, it may not be capable of supporting fish today because of degraded quality. It must be better understood whether the present quality of the historic habitat is capable of supporting a self-sustaining population of fall chinook above the Hells Canyon complex. The feasibility of reintroduction, including an evaluation of the existing habitat, is being investigated as part of the Federal Energy Regulatory Commission (FERC) relicensing process for the Hells Canyon complex (Governors' Recommendations, July 2000).

Research to document the growth, migration timing, survival, and SARs for wild juvenile fall chinook salmon migrating from the Snake River to the mouth of the Columbia River (NMFS BiOp 2000, Appendix H, Research Action #1036, Dec. 2000; BPA Appendix D: Action Table and Reports, R-208, June 5, 2001).

Research to produce information on migrational characteristics of Columbia and Snake river basin salmon and steelhead (NMFS BiOp 2000, Appendix H, Research Action #1193, Dec. 2000; BPA Appendix D: Action Table and Reports, R-212, June 5, 2001).

Establish a comprehensive monitoring program, including methods to measure whether objectives are being met and to detect population declines and increases in each ESU (Oregon Plan, 1997).

Identify areas currently supporting relatively high densities of spawning and rearing by anadromous salmonids (i.e., core areas) (Oregon Plan, 1997).

Evaluate the condition and role of core areas when making decisions regarding priority of habitat protection and restoration (Oregon Plan, 1997).

Methods to evaluate spawner-to-spawner population responses also should be explored (Idaho Plan, 1998).

Inventory and Prioritize fish passage barriers and fish screening problems (Washington Plan, 2000).

Enhance statewide monitoring of rate of harvest, riparian zone management, etc. consistent with Forests and Fish Report (Washington Plan, 2000).

1-2 Resident Fish

By December 1, 2002, complete an evaluation and report on any changes in depth, water velocity and substrate in the vicinity of Bonners Ferry which have occurred since Libby Dam became operational. If [spawning/incubation] habitat changes are documented…the above report should be expanded to include all feasible remedies [such as channel constrictions or other physical habitat modification(s)] to restore [and maintain suitable spawning/incubation] substrate, water velocities, and depths [between RKM 228 and 246, or greater water depths above RKM 246] (BPA Appendix D: Action Table and Reports, R-261-62, June 5, 2001; FWS BiOp 2000, Action #8(3)(i)-(j), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Idaho identified the following as key near-term actions consistent with their perspective with habitat priorities (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP): Investigate smolt condition related to adult return to assess potential mitigation benefits of nutrient enhancement as identified in the Mountain Snake Provincial Review.

Determine the movements of bull trout from the Hood River and other tributaries into Bonneville Dam reservoir (BPA Appendix D: Action Table and Reports, R-304, June 5, 2001; FWS BiOp 2000, Action #11.A.2(1e), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Determine the characteristics of the resident fish food sources in terms of abundance, survival, ability to support proposed resident fish populations, and potential to maintain or increase in the future (Framework Concept Paper 12).

Evaluate re-establishment of fluvial bull trout in the Klickitat River (BPA Appendix D: Action Table and Reports, R-306, June 5, 2001; FWS BiOp 2000, Action #11.A.2(1g), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

If substantial numbers of bull trout use the lower Columbia River reservoirs or attempt to pass FCRPS dams, then determine use and suitability of bull trout habitat for all life history stages in the Lower Columbia River (BPA Appendix D: Action Table and Reports, R-308, June 5, 2001; FWS BiOp 2000, Action #11.A.2(2b), Dec. 2000).

Determine the extent of bull trout use of the Lower Columbia River affected by the FCRPS (BPA Appendix D: Action Table and Reports, R-277, June 5, 2001; FWS BiOp 2000, Action #10.A.2(1), Dec. 2000).

Determine the presence and use of the mainstem Snake River by bull trout. Implement monitoring and studies to provide critical information on bull trout distribution, timing, and usage of the lower Snake River dams and reservoirs (BPA Appendix D: Action Table and Reports, R-281, June 5, 2001; FWS BiOp 2000, Action #10.A.3(1), Dec. 2000).

Investigate the presence and use of the mainstem by bull trout migrating from the Tucannon River (BPA Appendix D: Action Table and Reports, R-314, June 5, 2001; FWS BiOp 2000, Action #11.A.3(1d), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Estimate annual population size of bull trout migrating to and from the Lower Columbia River reservoirs, and develop abundance trends over time (BPA Appendix D: Action Table and Reports, R-303, June 5, 2001; FWS BiOp 2000, Action #11.A.2(1d), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Complete assessments of resident fish losses throughout the basin resulting from the hydrosystem, expressed in terms of the various critical population characteristics of key resident fish species (Council's 2000 Fish and Wildlife Program).

'[D]evelop a mechanism for improved monitoring accountability and oversight of management actions that affect bull trout or their habitats, designed to meet the applicable objectives, standards and guidelines of

PACFISH and INFISH (INFISH BiOp August 1998). [C]onduct a comprehensive review of existing unroaded and low density roaded areas throughout the Columbia River and Klamath River bull trout DPSs and determine their importance for the long-term conservation of bull trout. The information will serve as the foundation of a conservation strategy based on the protection of existing high quality habitat with the necessary connectivity between these areas (INFISH BiOp August 1998). Through interagency coordination, develop stratified monitoring plans (e.g. at the watershed or subbasin scales) to evaluate impacts of management actions to bull trout. The management program areas to address and a schedule for their development will be agreed to by the interagency team. The plans should address, at a minimum, both compliance and effectiveness monitoring (INFISH BiOp August 1998).
1-3 Introduced Species
1-4 Wildlife
Quantify wildlife losses caused by the construction, inundation, and operation of the hydropower projects (Council's 2000 Fish and Wildlife Program). An assessment should be conducted of direct operational impacts on wildlife habitat (Council's 2000 Fish and Wildlife Program).
1-5 Predators of Anadromous Fish
The Action Agencies shall quantify the extent of predation by white pelicans on juvenile salmon in the McNary pool and tailrace. A study plan shall be submitted to NMFS by September 30, 2001, detailing the study objectives, methods, and schedule. Based on study findings, and in consultation with USFWS and NMFS, the Action Agencies shall develop recommendations and, if appropriate, an implementation plan (NMFS BiOp 2000, Action #103, Dec. 2000; BPA Appendix D: Action Table and Reports, R-103, June 5, 2001). The Action Agencies shall recover PIT-tag information from predacious bird colonies and evaluate trends, including hatchery-to-hatchery and hatchery-to-wild depredation ratios (NMFS BiOp 2000, Action #104, Dec. 2000; BPA Appendix D: Action Table and Reports, R-104, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002). The Action Agencies, in coordination with NMFS, shall investigate marine mammal predation in the tailrace of Bonneville Dam. A study plan shall be submitted to NMFS by June 30, 2001, detailing the study objectives, methods, and schedule (NMFS BiOp 2000, Action #106, Dec. 2000; BPA Appendix D: Action Table and Reports, R-106, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002). The Corps shall conduct a post-construction evaluation of the new debris containment boom at Little Goose to monitor populations and behavior of aquatic predators when debris accumulates at the log boom (NMFS BiOp 2002, Action #79, Dec. 2000; BPA Appendix D: Action Table and Reports, R-79, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002). Research to quantify the abundance of potential predators before and after a trash boom is installed in the forebay of Little Goose Dam (NMFS BiOp 2000, Appendix H, Research Action #2005, Dec. 2000; BPA Appendix D: Action Table and Reports, R-229, June 5, 2001). Research designed to evaluate the large-scale predation patterns of northern pikeminnow on juvenile salmonids and American shad (BPA project 9007800) (NMFS BiOp 2000, Appendix H, Research Action #2006, Dec. 2000; BPA Appendix D: Action Table and Reports, R-230, June 5, 2001).
1-6 Watersheds
Use the "Coarse Screening Process" (or other similar methods), where applicable, to establish baseline habitat standards and conditions that land and water users and managers must meet which limit watershed impacts to maintain and improve fish and wildlife habitat (Tribal Vision). 1) Construct a suite of course scale (1:24,000 base) ecological characterizations for each watershed (e.g., Grande Ronde Watershed); 2) Identify the available data that is ecologically relevant to the pattern of the managed resources; 3) Develop functional thresholds, which characterize significant (measurable) changes in

the watershed; 4) Review and publishing of case studies that link abstract and empirical models; and 5) Target ecological functions and patterns at critical/ESA spatial scales (Framework Concept Paper 24).

Conduct a pilot basin-wide (Chehalis basin) integrated flood hazard reduction study consistent with the guidelines on development and implementation of local Floodplain Management Plans and use of non-regulatory tools and incentives discussed in Lan-4 (Washington Plan, 2000).

1-7 Tributaries

Evaluate potential habitat use of the White Salmon River subsequent to removal of Condit Dam (BPA Appendix D: Action Table and Reports, R-305, June 5, 2001; FWS BiOp 2000, Action #11.A.2(1f), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Operate fish weirs on spawning tributaries to assess adult escapement and potential introgression of hatchery fish into the spawning population (Framework Concept Paper 13).

Evaluate comparative cost effectiveness of improved habitat/wild reserve tributary production vs. production/supplementation tributary production (Framework Concept 26).

Objective: Stream-wide recovery measured by improvements in adult salmon return numbers, spawner-recruit ratios, and fingerling-to-adult ratios would be the objective of adaptive management strategies. These measures of recovery provide integrated responses of survival and fecundity useful in monitoring environmental quality. The purpose of field trials would be to assess whether remediation actions enhance responses over yet nontreated control streams. Advantageous treatments would then be applied to new sets of streams for further comparison with prior treatments. A stair-step design would be implemented where adaptive management would test progressively better strategies for stream remediation based on prior field trial results. Strategy: The stair-step strategy to field testing progressively better remediation actions is motivated by large numbers of candidate streams and annual resources to address only some fraction each year. The experimental prerequisites of replication and randomization can be used to establish cause-and-effect linkages between remediation actions and improvements in survival and fecundity responses of salmonids. Environmental covariates concerning water quality, biotic responses of invertebrate populations, and habitat quality would be systematically measured to interpret variation in stream responses to remediation actions (Framework Concept Paper 23).

For those BOR projects located in the Columbia River and its tributaries downstream from Chief Joseph Dam (Table 9.6-2), BOR shall, as appropriate, work with NMFS in a timely manner to complete supplemental, project-specific consultations. These supplemental consultations shall address effects on tributary habitat and tributary water quality, as well as direct effects on salmon survival (e.g., impingement, entrainment in diversions, false attraction to return flows, and others). These supplemental consultations shall address effects on mainstem flows only to the extent to which they reveal additional effects on the in-stream flow regime not considered in this biological opinion (e.g., flood control) (NMFS BiOp 2000, Action #30, Dec. 2000; BPA Appendix D: Action Table and Reports, R-30, June 5, 2001).

BPA shall, in coordination with NMFS, experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage. BPA will begin these experiments as soon as possible and submit a report evaluating their efficacy at the end of 5 years (NMFS BiOp 2000, Action #151, Dec. 2000; BPA Appendix D: Action Table and Reports, R-151, June 5, 2001).

Management Actions: The best available technology would be used to improve stream quality at a random selection of replicate streams in a watershed or ecosystem. Remediation actions may include such corrective actions as fencing to keep range animals away from stream sides, retaining stream flow and reducing irrigation withdraw, enhancing riffle zones and gravel beds, and returning nutrients in the form of fish carcasses to the streams. Response variables would be measured annually with annual assessments comparing treated and nontreated/control streams. Decision rules and time frames would be established a priori to determine success of remediation actions. Different subsets of streams would receive different remediation actions to compare strategies and identify cost-effective approaches to stream-wide recovery (Framework Concept Paper 23).

Closely monitor tributary production and escapement to improve management (Spirit of the Salmon).

Fund and evaluate innovative approaches to flow restoration (BPA) (Final All-H Paper Dec. 2000).

1-8 Mainstem Columbia
Use drawdown to test restoration effects on mainstem habitat (Framework Alternative 4).
1-9 Reservoirs
Survey reservoir habitat for extant spawning locations and focus on expanding areas with existing populations (Framework Concept Paper 26). MANAGEMENT ACTION FOR STRATEGY #3: To minimize trial expense, again choose the shortest reservoir on the Columbia. Try out various ways (gravel cleaning barges, etc.) to provide the spawning conditions along the edges of reservoirs which, together with the newly induced accelerated movement of water along the river edges, will mimic the original river conditions for spawning (and possibly even improve on them) (Framework Concept Paper 18).
1-10 Estuary and Ocean
Monitor effectiveness of newly adopted abundance-based management for North Pacific Ocean fisheries in reducing direct and indirect (incidental) fishing mortality on Columbia Basin salmon (Tribal Vision). Ensure that incidental salmon mortality (bycatch on non-targeted species) in other North Pacific and Bering Sea fisheries is accounted for and minimized through strict monitoring and adaptive management (Tribal Vision). NMFS should work with the Region to conduct an intensive study to address the role of the ocean in fish recovery, including the relative impact on fish mortality due to ocean predation, lack of food sources, temperature problems and harvest regimes. In addition, management of fish in freshwater should reflect new information about the ocean as it is developed (Governors' Recommendations, July 2000). During 2001, the Corps and BPA shall seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration (NMFS BiOp 2000, Action #158, Dec. 2000; BPA Appendix D: Action Table and Reports, R-158, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #3, Oct. 2002). The Action Agencies shall develop a pilot study to assess the feasibility of enhancing the function of ecological communities to reduce predation losses and increase survival in reservoirs and the estuary (NMFS BiOp 2000, Action #105, Dec. 2000; BPA Appendix D: Action Table and Reports, R-105, June 5, 2000). During 2000, BPA, working with NMFS, shall continue to develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the relationship among hydropower, water management, estuarine conditions, and fish response. The work will enable the agencies to identify information gaps that have to be addressed to develop recommendations for FCRPS management and operations (NMFS BiOp 2000, Action #162, Dec. 2000; BPA Appendix D: Action Table and Reports, R-162, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #3, Oct. 2002). Research to identify empirically the benefit to juvenile salmon of tidal freshwater and oligohaline transition zones in the Columbia River estuary (NMFS BiOp 2000, Appendix H, Research Action #2004, Dec. 2000; BPA Appendix D: Action Table and Reports, R-228, June 5, 2001). Conduct habitat mapping inventory in early 2001; develop and implement modeling and restoration criteria beginning early 2001 (BPA, Corps, LCREP) (Final All-H Paper Dec. 2000). Develop conceptual model of estuary conditions and fish population structure and resilience (Final All-H Paper Dec. 2000). Between 2001 and 2010, the Corps and BPA shall fund a monitoring and research program acceptable to NMFS and closely coordinated with the LCREP monitoring and research efforts (Management Plan Action 28) to address the estuary objectives of this biological opinion (NMFS BiOp 2000, Action #161, Dec. 2000; BPA Appendix D: Action Table and Reports, R-161, June 5, 2001; 2003/2003-2007 Implementation Plan, Habitat Strategy #3, Oct. 2002).

Implement monitoring and evaluation program (Final All-H Paper Dec. 2000).

Dedicate research funding to investigate ocean conditions and impacts on salmon including adequacy of the ocean food chain (Framework Concept Paper 27). The State of Idaho supports further research into ocean survival, including (a) ocean growth and survival of listed species across productive and unproductive conditions and (b) possible differential adult survival by ESU attributable to ocean growth rates and distribution (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Expand knowledge and understanding of the ocean and Columbia River estuary (Framework Concept Paper 27). NPPC supports research, monitoring, and evaluation for the estuary and near ocean (9/28/01 letter from Robert G. Walton to the Action Agencies, 5YIP).

NMFS should work with the Region to conduct an intensive study to address the role of the ocean in fish recovery, including the relative impact on fish mortality due to ocean predation, lack of food sources, temperature problems and harvest regimes. In addition, management of fish in freshwater should reflect new information about the ocean as it is developed. For example, it may be necessary to adjust hatchery production based on a better understanding of changes in ocean carrying capacity (Governors' Recommendations, July 2000).

Coordinate volunteer monitoring programs and create or coordinate volunteer opportunities on the lower river (LCREP).

Implement the Estuary Program long-term monitoring plan (LCREP).

1-11 Water Quality

Monitor and evaluate potential effects of pollutants on human health, and fish and wildlife. Develop a basin-wide strategy for identified toxic and conventional pollutants that defines their sources, fate, and effects and reduces their discharge (LCREP).

BOR shall evaluate the water quality characteristics of each point of surface return flows from the Columbia Basin Project to the Columbia River and estimate the effects these return flows may have on listed fish in the Columbia River and in the wasteways accessible to listed fish. By June 1, 2001, BOR shall provide NMFS with a detailed water quality monitoring plan, including a list of water quality parameters to be evaluated. If the water quality sampling reveals enough water quality degradation to adversely affect listed fish, BOR shall develop and initiate implementation of a wasteway water quality remediation plan within 12 months of the completion of the monitoring program (NMFS BiOp 2000, Action #39, Dec. 2000; BPA Appendix D: Action Table and Reports, R-39, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Identify continuous features (ex. streams) that exhibit linear characteristics and assign a quality rank to stream segments based on a suit of desirable values (ex. ODFW Stream Benchmarks). Several definitions of patch boundaries and edge measures exist at differing spatial scales within a landscape. For water related questions, gradients describing physical and temporal properties may by more appropriate. If, for example, a question was related to the late summer flow on a subwatershed. A possible method may analyze datasets including, hydrologic responsiveness, moisture, landform, heat, and vegetation type (Framework Concept Paper 24).

Continue to monitor water temperature profiles in the south end of Lake Koocanusa (BPA Appendix D: Action Table and Reports, R-260, June 5, 2001; FWS BiOp 2000, Action #8(3)(h), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Strategy #1, Oct. 2002).

Monitor and evaluate potential effects of pollutants on human health and wildlife (LCREP).

2 HARVEST

The State of Idaho supports research into the extent of mortality caused by harvest and harvest methods, including selective gear (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The Oregon Department of Fish and Wildlife supports selective harvest research (9/25/01 letter from Tony Nigro to Neal Coenen, 5YIP).

The State of Idaho points out that incidental harvest mortality (beyond that which is reported as harvest) should not be ignored. They support research into the extent of mortality caused by harvest and harvest methods, including selective gear. Their position is that further increases in harvest should be tied to sustained improvement in wild/listed stock productivity, and that size and condition of adult fish should be taken into

account when determining spawning escapement past the fisheries (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Improve harvest data and stock information to promote better harvest management and protect weaker stocks. Consolidate and unify harvest data -- both from marine and inriver fisheries, counts and samples -- into an accessible database. Provide real-time information for use by fisheries managers and planners. Conduct a regularly scheduled scientific review of harvest data and harvest practices (Council's 2000 Fish and Wildlife Program).

2-1 Anadromous Fish

We support increasing the selectivity of mainstem harvesting by exploring further gear, timing and location restrictions. The Region must initiate research to better understand migration timing and movement of individual stocks to better selective fishing techniques (Governors' Recommendations, July 2000).

The Action Agencies shall work with NMFS, USFWS, tribal and state fishery managers, and the relevant Pacific Salmon Commission and Pacific Fishery Management Council (PFMC) technical committees to develop and implement methods and analytical procedures (including revising and/or replacing current fishery management and stock assessment models based on these methods and procedures) to estimate fishery and stock-specific management parameters (e.g., harvest rates). The Action Agencies shall place particular emphasis on current methods and procedures affected by the transition to mass marking of Columbia River basin hatchery produced fish and/or deployment of selective fishery regimes in the Columbia River basin, addressing these concerns within a time frame necessary to make the new selective fishing regimes feasible. Specifically, the Action Agencies shall facilitate the development of models, methods, and analytical procedures by the 3-year check-in (NMFS BiOp 2000, Action #165, Dec. 2000; BPA Appendix D: Action Table and Reports, R-165, June 5, 2001; 2003/2003-2007 Implementation Plan, Harvest Strategy #2, Oct. 2002).

The Action Agencies shall work with NMFS, USFWS, and Tribal and state fishery management agencies to develop improved methods for estimating incidental mortalities in fisheries, with particular emphasis on selective fisheries in the Columbia River basin, doing so within the time frame necessary to make new marking and selective fishery regimes feasible. The Action Agencies shall initiate studies and/or develop methods by the 3-year check-in (NMFS BiOp 2000, Action #167, Dec. 2000; BPA Appendix D: Action Table and Reports, R-167, June 5, 2001; 2003/2003-2007 Implementation Plan, Harvest Strategy #2, Oct. 2002).

The Oregon Department of Fish and Wildlife supports selective harvest research (9/25/01 letter from Tony Nigro to Neal Coenen, 5YIP).

The Action Agencies shall work with NMFS, USFWS, the Pacific States Marine Fisheries Commission, and Tribal and state fishery management agencies to implement and/or enable changes in catch sampling programs and data recovery systems, including any required changes in current databases (e.g., reformatting) and associated data retrieval systems, pursuant to the time frame necessary to implement and monitor mass marking programs and/or selective fishery regimes in the Columbia River basin. Specifically, the Action Agencies shall facilitate the revision of programs and systems, as needed, by the 3-year check-in (NMFS BiOp 2000, Action #166, Dec. 2000; BPA Appendix D: Action Table and Reports, R-166, June 5, 2000; 2003/2003-2007 Implementation Plan, Harvest Strategy #2, Oct. 2002).

Continue and expand commercial and recreational fishery monitoring to collect data on which catch estimates are based, to collect basic biological information used to determine stock demographics and distribution in fisheries, and to ensure that new fishing techniques are achieving the desired outcomes. Capture, handling, and collection of biological samples from ESA-listed species may require incidental take authorization under Sections 7, 10, or 4(d) ESA (Washington Plan, 2000).

2-2 Resident Fish

Determine the relationship of the targeted resident fish species population dynamics and its predators, including sports harvest. This should include an estimation of the level of harvest that could be sustained while the population is in the recovery stages, as well as at the recovery level (Framework Concept Paper 12).

2-3 Wildlife
3 HATCHERIES
Artificial production actions must have an experimental, adaptive management design. This design will allow the Region to evaluate benefits, address scientific uncertainties, and improve hatchery survival while minimizing the impact on, and if possible benefiting, fish that spawn naturally (Council's 2000 Fish and Wildlife Program).
Evaluate flow augmentation components of options. Experimentally manipulate hatchery releases. In a reverse staircase, hatchery releases would be initially reduced, and then increased, to provide contrast to treatments (Framework Concept Paper 5).
Increase the resources devoted to collecting and analyzing natural production information and data (Framework Concept Paper 5).
Design artificial propagation programs as monitored experiments; ensure reporting protocols are consistently updated and all facility operations subject to periodic independent scientific review (Framework Concept Paper 5).
Use central entity to serve as clearinghouse for successful approaches to artificial production, such as spawning channels and egg boxes (Framework Concept Paper 26).
Research and design artificial propagation strategies to supplement natural lamprey production, and sturgeon production above Bonneville Dam (Spirit of the Salmon; Framework Concept Paper 3).
Research to compare the biological and physiological indices of wild and hatchery juvenile fish exposed to stress from bypass, collection, and transportation at the dams on the lower Snake and Columbia rivers (NMFS BiOp 2000, Appendix H, Research Action #1136, Dec. 2000; BPA Appendix D: Action Table and Reports, R-211, June 5, 2001).
Complete comprehensive WDFW hatchery program evaluation, developing recommendations for improvements in hatchery practices that affect native fish populations (such as hatchery fish release locations, size and timing, localized broodstocks, wild fish upstream passage at hatchery traps, hatchery discharge water quality, and disease exchange issues) and ensure ESA compliance, as well as measures that improve hatchery fish survival and promote more efficient use of facilities. (Phase I) (Washington Plan, 2000)
Review artificial production in the Columbia Basin (Washington Plan, 2000).
Complete the review of, and alter where necessary, all Federal (e.g., Mitchell Act and Lower Snake River Compensation Plan) and private- and public utility-sponsored (dams operated according to FERC license terms) hatchery mitigation programs to secure consistency with basin-wide wild fish escapement and production goals and objectives (Framework Concept Paper 5).
Establish an annual status review for each wild native population in the basin (Framework Concept Paper 10). Review the hatchery program and its effect on native, wild salmonids, and the ecosystem that supports them (Framework Concept Paper 10).
3-1 Anadromous Fish
Implement aggressive monitoring and evaluation programs to reduce uncertainties e.g., hatchery/wild fish interactions, the effectiveness of hatchery spawners, etc., and assess performance of conservation efforts (Final All-H Paper Dec. 2000).
Fund applied genetics research unit to restore lost size of salmonids, improve disease resistance, and improve tolerance for warmer habitat, as well as other genetic improvements that will increase salmonid abundance (Framework Concept Paper 26).
Continue artificial production-related research, including post-release behavior, migration speed, homing and health of hatchery fish, in order to refine practices that reduce ecological interactions with wild fish (Washington Plan, 2000).
Research *[and]* develop artificial propagation actions to supplement natural lamprey production (Tribal Vision).

Conduct research on Pacific lamprey and design artificial propagation strategies to supplement natural production (Spirit of the Salmon; Framework Concept Paper 3).

Establish a biodiversity institute for the basin with the purpose of attracting scientists from many disciplines and given the time to evaluate and analyze information and develop a science based salmonid rebuilding program (Framework Concept Paper 10).

3-2 Resident Fish

The Action Agencies shall maintain the current level(s) of monitoring associated with all stages of natural recruitment, and the preservation stocking program (FWS BiOp 2000, Action #8(4)(b), Dec. 2000; BPA Appendix D: Action Table and Reports, R-264, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Complete assessments of resident fish losses throughout the basin resulting from the hydrosystem, expressed in terms of the various critical population characteristics of key resident fish species (Council's 2000 Fish and Wildlife Program).

4 HYDRO

4-1 Dam Modifications and Facilities

…incorporate the following measures into hydrosystem operations and management: 24-hour video fish counting (Tribal Vision).

Evaluate structures in the Snake and Columbia River Basins that have lost their usefulness or may no longer be economically viable to operate and maintain. Structures *[such as dams]*…could also be evaluated for removal and/or modification (Framework Concept Paper 21).

Set up a systematic process whereby other dams (irrigation, navigation, flood control, etc.) in the Columbia River Basin and the impacts of such projects on ecological processes are identified, quantified, and addressed (Framework Concept Paper 5).

The incremental drawdown strategy should incrementally invoke drawdown. That is, drawdown two dams and evaluate (for some pre-determined period of time with some pre-determined incremental objectives), then drawdown the next group of dams if monitoring results meet expectation. So long as evaluation meets interim goals, proceed with rest of dam breaching approach. This incremental approach would be used for all actions taken (Framework Concept Paper 7b).

As set out in Action 50 (Section 9.6.1.3.4), BPA and the Corps shall install necessary adult PIT-tag detectors at appropriate FCRPS projects before the expected return of adult salmon from the 2001 juvenile outmigration. These adult PIT-tag detectors shall be used as needed for calculating transport benefits, conversion rates, and SARs for listed salmon and steelhead (NMFS BiOp 2000, Action #192, Dec. 2000; BPA Appendix D: Action Table and Reports, R-196, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

BPA and the Corps shall install necessary adult PIT-tag detectors at appropriate FCRPS projects before the expected return of adult salmon from the 2001 juvenile outmigration (NMFS BiOp 2000, Action #50, Dec. 2000; BPA Appendix D: Action Table and Reports, R-50, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

To insure that proposed hydro system changes are focused on documented sources of fish mortality, the entire hydropower system will undergo a detailed fish mortality audit. This audit will document the major sources of mortality for both adults and juvenile salmon and steelhead as they move through the system. Changes in system configuration and operation will be designed to rectify the highest sources of fish mortality with the goal of improving the overall cumulative survival rates, with priority given to adults over juveniles because of their biological significance to the propagation of future generations of salmon and steelhead (Framework Concept Paper 14).

The Corps shall continue to develop and evaluate improved fish-tracking technologies and computational fluid dynamics (numerical modeling). The ability to integrate these technologies and fluid dynamics shall be assessed as a potentially improved means of determining fish responses to forebay hydraulic conditions (NMFS BiOp 2000, Action #85, Dec. 2000; BPA Appendix D: Action Table and Reports, R-85,

June 5, 2001).

The Corps shall include evaluations of divider walls at each FCRPS project in the spillway deflector optimization program. Design development and construction of divider walls would begin only after coordination within the annual planning process, and only if warranted (NMFS BiOp 2000, Action #135, Dec. 2000; BPA Appendix D: Action Table and Reports, R-135, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall address debris-handling needs and continue to assess more efficient and effective debris-handling techniques to ensure that the performance of both new and old fish passage facilities will not be compromised (NMFS BiOp 2000, Action #146, Dec. 2000; BPA Appendix D: Action Table and Reports, R-146, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall complete the design of debris removal facilities for the Bonneville First Powerhouse forebay (NMFS BiOp 2000, Action #63, Dec. 2000; BPA Appendix D: Action Table and Reports, R-63, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate methods to provide additional emergency auxiliary water to The Dalles Dam north fishway when the normal auxiliary water supply is interrupted (NMFS BiOp 2000, Action #124, Dec. 2000; BPA Appendix D: Action Table and Reports, R-124, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall initiate an investigation and prepare a report on the Bonneville First Powerhouse Bradford Island and Cascade Island adult fishway auxiliary water system by the end of 2001. In the report, the Corps shall identify measures that will improve or replace aging components, thereby enhancing current and long-term performance and reliability (NMFS BiOp 2000, Action #126, Dec. 2000; BPA Appendix D: Action Table and Reports, R-126, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall continue its investigation of the Bonneville Second Powerhouse adult fishway auxiliary water system and shall identify measures to satisfactorily address emergency backup auxiliary water needs (NMFS BiOp 2000, Action #127, Dec. 2000; BPA Appendix D: Action Table and Reports, R-127, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue to evaluate the need for improvements of the existing intake screens, gatewell vertical barrier screens' cleaning system, and bypass facilities (including debris containment and removal systems, separation, sampling, loading, and outfall facilities) at the four lower Snake River hydropower projects (NMFS BiOp 2000, Action #94, Dec. 2000; BPA Appendix D: Action Table and Reports, R-94, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies, in coordination with the Regional Forum, shall determine the appropriate operating range of turbines equipped with minimum gap runners (MGRs) to increase survival of juvenile migrants passing through these new turbine designs (NMFS BiOp 2000, Action #59, Dec. 2000; BPA Appendix D: Action Table and Reports, R-59, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002). The State of Idaho supports evaluation of these new designs (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

The Corps shall continue the investigation of minimum gap runners at the Bonneville First Powerhouse (NMFS BiOp 2000, Action #64, Dec. 2000; BPA Appendix D: Action Table and Reports, R-64, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall complete Bonneville Second Powerhouse post-construction evaluation of the new juvenile fish bypass outfall and address design and operational refinements as warranted (NMFS BiOp 2000, Action #65, Dec. 2000; BPA Appendix D: Action Table and Reports, R-65, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue Bonneville Second Powerhouse investigations of measures to improve intake screen fish guidance efficiency and safe passage through the gatewell environment. This work shall include an assessment of fry passage (NMFS BiOp 2000, Action #67, Dec. 2000; BPA Appendix D: Action Table and Reports, R-67, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall complete Bonneville First Powerhouse prototype evaluations of extended submerged intake and gatewell vertical barrier screens, including an assessment of fry passage (NMFS BiOp 2000 Action #62,

Dec. 2000; BPA Appendix D: Action Table and Reports, R-62, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Evaluate feasibility of breaching (B1, B2) John Day Dam, and implement by 2012 (Framework Concept Paper 6).

Compare the structure of the dams with the natural river structure to see what dimensions of the dams are outside of the ranges of the natural river structures (Framework Concept Paper 15).

4-2 Hydro Operation

Finally, the Region should explore whether salmon benefits could be achieved through cooperative agreements regarding power peaking operations, such as those currently in place for the Hnaford Reach stocks and listed chum and salmon spawing below Bonneville Dam (Governors' Recommendations, July 2000).

The Corps shall conduct detailed engineering and design work for improvements recommended in the general reevaluation report and supplemental environmental impact statement described in the preceding action. The Corps shall seek funding to allow initiation of the engineering and design work to occur immediately upon completion of the final general reevaluation report. The engineering and design work shall include only those activities on (or near) the implementation schedule critical path for the recommended actions, up to the award of the first construction contract. For a dam breach recommendation, the critical path activities shall include turbine physical modeling (for use as low level outlets), rock source explorations for embankment erosion protection (riprap), and hydraulic (physical) modeling for the embankment removal and channelization. Tentative milestones for the general reevaluation report/EIS and engineering and design work are as follows, based on the check-in process identified in Section 9.5 (see RPA for list) (NMFS BiOp 2000, Action #148, Dec. 2000; BPA Appendix D: Action Table and Reports, R-148, June 5, 2001).

Research to collect relevant information for lower Columbia River fall chinook and chum salmon so that recommendations can be made for configuration and operation of the FCRPS to protect and/or enhance mainstem spawning populations (NMFS BiOp 2000, Appendix H, Research Action #2001, Dec. 2000; BPA Appendix D: Action Table and Reports, R-225, June 5, 2001).

Design and conduct studies necessary to determine the indirect effects of Libby dam operations on sturgeon recruitment and mortality (BPA Appendix D: Action Table and Reports, R-256, June 5, 2001; FWS BiOp 2000, Action #8(3)(d), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Bonneville and the Federal operating agencies will work cooperatively with the Council to produce an annual report which will provide an accounting of its fish and wildlife expenditures and hydropower operation costs (Council's 2000 Fish and Wildlife Program).

4-3 Spill

Spill is recognized as a highly effective means of passing juvenile salmon downstream, reducing the mortality associated with passage through many turbine sets and in most bypass systems. The use of spill should be improved—in duration, timing and quantity—at all the Federal hydropower projects. Experiments testing spill benefits at different levels and times of year should be expanded, and the impacts on juvenile fish survival from these alternative spill operations, including summer spill, should be carefully monitored and evaluated (Governors' Recommendations, July 2000).

The Corps and BPA shall evaluate adult fallback and juvenile fish passage under daytime spill to the gas cap at Bonneville Dam in 2002 and 2003, after deflector optimization improvements allow for increased spill above current levels. Research results will be considered, in consultation with NMFS through the annual planning process, to determine implementation of additional changes in spill to further improve fish survival (NMFS BiOp 2000, Action #60, Dec. 2000; BPA Appendix D: Action Table and Reports, R-60, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

PPC supports research on the cumulative effects of spill, including gas and impact on adult passage (9/28/01 letter from Robert G. Walton to the Action Agencies, 5YIP).

The Corps and BPA shall continue spill and passage survival studies at The Dalles Dam in 2001. Research results shall be considered, in consultation with NMFS through the annual planning process, to assess the need for additional changes in spill to further improve fish survival by 2002, if possible, but no later than 2005

(NMFS BiOp 2000, Action #68, Dec. 2000; BPA Appendix D: Action Table and Reports, R-68, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA shall continue investigation of 24-hour spill at John Day Dam in 2001. Research results will be considered, in consultation with NMFS through the annual planning process, to determine implementation of daytime spill to further improve juvenile fish survival as needed for its contribution to the performance standard (NMFS BiOp 2000, Action #71, Dec. 2000; BPA Appendix D: Action Table and Reports, R-71, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Experiments testing spill benefits at different levels and times of year should be expanded, and the impacts on juvenile fish survival from these alternative spill operations, including summer spill, should be carefully monitored and evaluated (Governors' Recommendations, July 2000).

4-4 Flow

[T]he Federal agencies must document the benefits of flow augmentation and the precise attributes of flow that may make it beneficial (Governors' Recommendations, July 2000).

[T]he Region should review off-river storage for additional water if flow augmentation is going to continue to be a key strategy (Governors' Recommendations, July 2000).

Snake River summer flow targets must be analyzed to determine if there are tangible biological benefits (Framework Concept Paper 27).

The State of Idaho views evaluation of the benefits of flow augmentation as a key near-term action (9/28/01 letter from Dirk Kempthorne to BPA, 5YIP).

Evaluate flow augmentation components of options (e.g., A3 vs. A5; B1 vs. B2) (Framework Concept Paper 6).

Determine the effectiveness of increased flows in improving sturgeon recruitment and any adverse effects to bull trout below Libby Dam (Kootenai River Fisheries Investigation) (BPA Appendix D: Action Table and Reports, R-248, June 5, 2001). For example, the Action Agencies have proposed to seek funding to conduct biological studies, in consultation with FWS, to both determine the effectiveness of increased flows in improving sturgeon recruitment and to determine any adverse effects to bull trout in the Kootenai River below Libby Dam (FWS BiOp 2000, Action #8(2)(a)8, Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002). If, as a result of these increased releases, in any year during the 10-year life of this biological opinion, a new year class of at least 20 naturally recruited yearling or older sturgeon is documented, the Action Agencies shall reinitiate consultation with FWS before proceeding with any additional facilities or improvements at Libby Dam for sturgeon flow augmentation (FWS BiOp 2000, Action #8(2)(a)9, Dec. 2000; BPA Appendix D: Action Table and Reports, R-249, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

Analyze the dynamics of the water flowing through the river structures and the ranges of the flow, velocity, head, turbulence and other parameters that would have occurred under the natural environmental fluctuations (Framework Concept Paper 15).

Experiment with late summer/fall flow augmentation in low water years (Framework Concept Paper 26).

4-5 Reservoir Levels

Experiment with limited drawdown of the reservoir behind McNary Dam (Framework Alternatives 4, 5).

The Action Agencies shall evaluate potential benefits to adult Snake River steelhead and fall chinook salmon passage by drafting Dworshak Reservoir to elevation 1,500 feet in September. An evaluation of the temperature effects and adult migration behavior should accompany a draft of Dworshak Reservoir substantially below elevation 1,520 feet (NMFS BiOp 2000, Action #34, Dec. 2000; BPA Appendix D: Action Table and Reports, R-34, June 5, 2001).

Conduct a study to determine the effect of flow fluctuations on stranding or entrapment of bull trout or their prey in FCRPS reservoirs if it is determined that there is a significant bull trout population in the Lower Columbia River affected by the FCRPS (BPA Appendix D: Action Table and Reports, R-279, June 5, 2001; FWS BiOp 2000, Action #10.A.2(3), Dec. 2000).

BOR shall assess the likely environmental effects of operating Banks Lake up to 10 feet down from full pool during August. The assessment and NEPA compliance work shall be completed by June 2002 to determine future operations at this project by the summer of 2002 (NMFS BiOp 2000, Action #31, Dec. 2000; BPA Appendix D: Action Table and Reports, R-31, June 5, 2001; 2003/2003-2007 Implementation Strategy, Hydro Strategy #2, Oct. 2002).

4-6 Water Quality

The Corps shall complete its DGAS by April 2001. The results of this study will be used to guide future studies and decisions about implementation of some long-term structural measures to reduce TDG (NMFS BiOp 2000, Action #130, Dec. 2000; BPA Appendix D: Action Table and Reports, R-130, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Washington Department of Fish and Wildlife supports projects to reduce dissolved gas levels (and thereby increase spill caps), as well as research on the effects of dissolved gasses on juvenile and adult salmonids (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

The Action Agencies shall monitor the effects of TDG. This annual program shall include physical and biological monitoring and shall be developed and implemented in consultation with the Water Quality Team and the Mid-Columbia PUDs' monitoring programs (NMFS BiOp 2000, Action #131, Dec. 2000; BPA Appendix D: Action Table and Reports, R-131, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The Action Agencies shall develop a plan to conduct a systematic review and evaluation of the TDG fixed monitoring stations in the forebays of all the mainstem Columbia and Snake river dams (including the Camas/Washougal monitor). The evaluation plan shall be developed by February 2001 and included as part of the first annual water quality improvement plan. The Action Agencies shall conduct the evaluation and make changes in the location of fixed monitoring sites, as warranted, and in coordination with the Water Quality Team. It should be possible to make some modifications by the start of the 2001 spill season (NMFS BiOp 2000, Action #132, Dec. 2000; BPA Appendix D: Action Table and Reports, R-132, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

As part of DGAS, the Corps shall complete development of a TDG model to be used as a river operations management tool by spring 2001. Once a model is developed, the applications and results shall be coordinated through the Water Quality Team. The Corps shall coordinate the system-wide management applications of gas abatement model studies with the annual planning process, the Transboundary Gas Group, the Mid-Columbia Public Utilities, and other interested parties (NMFS BiOp 2000, Action #133, Dec. 2000; BPA Appendix D: Action Table and Reports, R-133, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

The action agencies shall develop a plan to model water temperature effects of alternative operations (BPA Appendix D: Action Table and Reports, R-271, June 5, 2001). For example, the Action Agencies shall develop and coordinate with the Service, NMFS and EPA on a plan to model the water temperature effects of alternative Snake River operations, including Libby and Hungry Horse Dams. The modeling plan shall include a temperature data collection strategy developed in consultation with EPA, NMFS, and state and tribal water quality agencies. The data collection strategy shall be sufficient to develop and operate the model and to document the effects of the project operations (FWS BiOp 2000, Action 10(7), Dec. 2000).

By June 30, 2001, the Action Agencies shall develop and coordinate with NMFS and EPA on a plan to model the water temperature effects of alternative Snake River operations. The modeling plan shall include a temperature data collection strategy developed in consultation with EPA, NMFS, and state and tribal water quality agencies. The data collection strategy shall be sufficient to develop and operate the model and to document the effects of project operations (NMFS BiOp 2000, Action #143, Dec. 2000; BPA Appendix D: Action Table and Reports, R-143, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

Evaluate and report on total dissolved gas downstream of Albeni Falls Dam (BPA Appendix D: Action Table and Reports, R-295, June 5, 2001). For example, by October 1, 2004, the Action Agencies shall evaluate and report to the Service on total dissolved gas concentrations downstream of Albeni Falls Dam in the Pend Oreille River which may occur within the full range of operations of the facility, including forced spills (FWS

BiOp 2000, Action #11.A.1(3c), Dec. 2000).

Review and analyze water quality data to calculate ranges of temperature and dissolved gas supersaturation that would have occurred as a result of flow dynamics experienced for the given natural structures (Framework Concept Paper 15).

The Washington Department of Fish and Wildlife supports research on the effects of dissolved gasses on juvenile and adult salmonids (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

4-7 Juvenile Fish Passage and Transportation

The Corps and BPA shall assess less-intrusive, PIT-tag interrogation methods at FCRPS juvenile bypass systems with interrogation sites, including McNary, John Day, and Bonneville dams. The Corps and BPA shall also assess providing a similar detection capability for the Ice Harbor juvenile bypass system (NMFS BiOp 2000, Action #87 Dec. 2000; BPA Appendix D: Action Table and Reports, R-87, June 5, 2001).

The Action Agencies shall investigate state-of-the-art, novel fish detection and tagging techniques for use, if warranted, in long-term research, monitoring, and evaluation efforts (NMFS BiOp 2000, Action #193, Dec. 2000; BPA Appendix D: Action Table and Reports, R-197, June 5, 2001; 2003/2003-2007 Implementation Plan, RM&E Strategy #1, Oct. 2002).

The Action Agencies shall examine the effects of draft tubes and powerhouse tailraces on the survival of fish passing through turbines (NMFS BiOp 2000, Action #90, Dec. 2000; BPA Appendix D: Action Table and Reports, R-90, June 5, 2001).

The Corps shall continue evaluations to assess the need for improvements of the existing intake screens, gatewell vertical barrier screen cleaning system, and bypass facilities (including debris containment and removal systems, separation, sampling, loading, and outfall facilities) at McNary to determine where improvements are necessary to reduce problems experienced during the 1996 flood, increase fish survival, and resolve holding and loading facility problems, including raceway jumping by juvenile salmon and steelhead and debris plugging of bypass lines. Additionally, the Corps shall evaluate whether the existing juvenile bypass system outfall should be relocated (NMFS BiOp 2000, Action #74, Dec. 2000; BPA Appendix D: Action Table and Reports, R-74, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue to investigate RSWs, in conjunction with extended spillway deflectors, as a means of optimizing safe spillway passage of adult steelhead kelts and juvenile migrants (NMFS BiOp 2000, Action #138, Dec. 2000; BPA Appendix D: Action Table and Reports, R-138, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Colville Confederated Tribes support research into passage and reconditioning of steelhead kelts (10/2/01 letter from Joe Peone to BPA, 5YIP).

The Corps and BPA, in coordination with NMFS through the annual planning process, shall evaluate transport to in-river return ratios for wild SR yearling chinook salmon and steelhead. In addition, the Corps and BPA shall also evaluate the effects of transportation on summer-migrating subyearling SR chinook salmon (NMFS BiOp 2000, Action #46, Dec. 2000; BPA Appendix D: Action Table and Reports, R-46, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

During all transport evaluations, the Corps and BPA, in coordination with NMFS through the annual planning process, shall include an evaluation of delayed mortality (D) of transported versus in-river migrating juvenile anadromous salmonids (NMFS BiOp 2000, Action #47, Dec. 2000; BPA Appendix D: Action Table and Reports, R-47, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Oregon Department of Fish and Wildlife supports further research of delayed mortality (9/25/01 letter from Tony Nigro to Neal Coenen, 5YIP).

The Washington Department of Fish and Wildlife supports research on the effects of transportation (9/28/01 letter from Bill Tweit to the Federal Caucus, 5YIP).

The Action Agencies shall continue to fund and expand, as appropriate, fish marking and recapturing programs aimed at defining juvenile migrant survival for both transported and non-transported migrants and adult returns for both groups. These studies shall also compare the SARs of transported and non-transported fish to

calculate the differential delayed mortality (D), if any, of transported fish (NMFS BiOp 2000, Action #185, Dec. 2000; BPA Appendix D: Action Table and Reports, R-189, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall evaluate strategies to enhance post-release survival of transported fish; examples of such strategies include timing releases so that fish arrival at the estuary corresponds to minimal interactions with predators and maximum availability of forage and locating releases so as to decrease passage time through areas of high predation (NMFS BiOp 2000, Action #49, Dec. 2000; BPA Appendix D: Action Table and Reports, R-49, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Action Agencies shall investigate and partition the causes of mortality below Bonneville Dam after juvenile salmonid passage through the FCRPS (NMFS BiOp 2000, Action #195, Dec. 2000; BPA Appendix D: Action Table and Reports, R-199, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall include bull trout in the species to be counted and recorded at Bonneville, The Dalles, John Day, and McNary dams. The Corps shall record the occurrence of bull trout in the smolt monitoring facilities at the Lower Columbia River dams (FWS BiOp 2000, Action #11.A.2(1a)-(1b), Dec. 2000; BPA Appendix D: Action Table and Reports, R-300-02, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Immediately include bull trout in the species to be counted at Lower Granite, Little Goose, Lower Monumental, and Ice harbor dams (BPA Appendix D: Action Table and Reports, R-312, June 5, 2001; FWS BiOp 2000, Action #11.A.3(1b), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

The Action Agencies shall include observations of bull trout captured in field activities under their funding (e.g., research studies and northern pikeminnow reward program fisheries) and report that information annually to the *[USFWS]* (BPA Appendix D: Action Table and Reports, R-300, 302, June 5, 2001; FWS BiOp 2000, Actions #11.A.2(1a), (1c), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

The Action Agencies shall investigate hydraulic and behavioral aspects of turbine passage by juvenile steelhead and salmon through turbines to develop biologically based turbine design and operating criteria. The Corps shall submit a report to NMFS stating the findings of the first phase of the Turbine Passage Survival Program by October 2001. Annual progress reports will be provided after this date (NMFS BiOp 2000, Action #89, Dec. 2000; BPA Appendix D: Action Table and Reports, R-89, June 5, 2001).

By January 2002, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of an extended-length, intake screen bypass system, a surface-collection bypass system, and hybrid alternatives at Bonneville First Powerhouse. Through the annual planning process, the Corps shall determine which of these configurations to implement (NMFS BiOp 2000, Action #97, Dec. 2000; BPA Appendix D: Action Table and Reports, R-97, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

By January 2003, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of replacing existing standard-length intake screens with extended-length screens at the John Day Dam powerhouse to surface collection at one or more skeleton or spillway bays. Through the annual planning process, the Action Agencies shall then determine the need for, and the implementation priority of, these configuration alternatives (NMFS BiOp 2000, Action #98, Dec. 2000; BPA Appendix D: Action Table and Reports, R-98, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall continue to investigate a way to increase entry rates of fish approaching surface bypass/collector entrances (NMFS BiOp 2000, Action #86, Dec. 2000; BPA Appendix D: Action Table and Reports, R-86, June 5, 2001).

By January, 2003, the Action Agencies shall develop an analysis that compares the relative passage survival benefits of replacing existing standard-length intake screens with extended-length screens at the Lower Monumental Dam powerhouse turbines to a removable RSW surface bypass system (NMFS BiOp 2000, Action #99, Dec. 2000; BPA Appendix D: Action Table and Reports, R-99, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies, in coordination with NMFS through the annual planning process, shall investigate the spillway passage survival of juvenile salmonids at appropriate FCRPS dams. These investigations shall assess the effect of spill patterns and per-bay spill volumes on fish survival, across a range of flow conditions. The Action Agencies shall develop a phased approach (including costs and schedules) and set priorities, in consultation with NMFS in the annual planning process, to continue spillway passage survival studies in 2001 and future years (NMFS BiOp 2000, Action #82, Dec. 2000; BPA Appendix D: Action Table and Reports, R-82, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies, in coordination with NMFS through the annual planning process, shall evaluate the effect of spill duration and volume on spillway effectiveness (percent of total project passage via spill), spill efficiency (fish per unit flow), forebay residence time, and total project and system survival of juvenile steelhead and salmon passing FCRPS dams. Studies shall include both collector and non-collector projects. Adult passage considerations and potential adult fallback shall also be considered in study designs. Little Goose and Lower Granite dams shall be specifically considered for daytime spill studies. An overall phased study approach for spill evaluations will be determined in the 1- and 5-year implementation plans (NMFS BiOp 2000, Action #83, Dec. 2000; BPA Appendix D: Action Table and Reports, R-83, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Investigate the use of surface collectors and other devices to enhance guidance at dams (Framework Concept Paper 25).

MANAGEMENT ACTION FOR STRATEGY #2: To minimize trial expense, choose the shortest reservoir on the Columbia for testing the viability of artificially impelling a stream of water along both edges of the reservoir to simulate the movement of water that took place along the original river banks, both sweeping smolt downstream and guiding adult salmon upstream (Framework Concept Paper 18).

Develop "naturalized" bypass systems that strive to mimic the in-stream like conditions…and use directed water velocity to induce fish movement into the naturalized bypass system, or other bypass routes. These [naturalized] systems would bypass both adults and juvenile fish of all species (Comment FWIP-033).

Focus research efforts on identification of survival through alternate passage methods at dams to reduce "hot spots" for mortality (Framework Concept Paper 26).

Research to evaluate in-river migration survival versus transportation survival from Lower Granite Dam to below Bonneville Dam (NMFS BiOp 2000, Appendix H, Research Action #1242, Dec. 2000; BPA Appendix D: Action Table and Reports, R-221, June 5, 2001).

Research to evaluate modifications to the juvenile fish PIT-tag diversion systems at Lower Granite and Little Goose dams on the Snake River (NMFS BiOp 2000, Appendix H, Research Action #2002, Dec. 2000; BPA Appendix D: Action Table and Reports, R-226, June 5, 2001).

Research to determine the relative survival of migrating juvenile salmonids passing through the spillway of The Dalles Dam (NMFS BiOp 2000, Appendix H, Research Action #900, Dec. 2000; BPA Appendix D: Action Table and Reports, R-204, June 5, 2001).

Research to assess the migration timing and relative survival of transported and in-river juvenile Chinook salmon migrating volitionally from Bonneville Dam to the mouth of the Columbia River (NMFS BiOp 2000, Appendix H, Research Action #946, Dec. 2000; BPA Appendix D: Action Table and Reports, R-205, June 5, 2001).

Research to determine the movement, distribution, and passage behavior of radio-tagged juvenile salmonids at Bonneville, The Dalles, and John Day dams on the lower Columbia River (NMFS BiOp 2000, Appendix H, Research Action #1130, Dec. 2000; BPA Appendix D: Action Table and Reports, R-210, June 5, 2001).

Study 1 will provide up-to-date survival estimates of juvenile salmonids as they migrate past McNary Dam (NMFS BiOp 2000, Appendix H, Research Action #1212-1, Dec. 2000; BPA Appendix D: Action Table and Reports, R-214, June 5, 2001).

Study 2 will identify specific trouble areas in the juvenile fish bypass system at Lower Monumental Dam (NMFS BiOp 2000, Appendix H, Research Action #1212-2, Dec. 2000; BPA Appendix D: Action Table and Reports, R-215, June 5, 2001).

Study 3 will compare the performance of juvenile salmonids tagged with sham radio-transmitters with the

performance of juvenile salmonids PIT-tagged at Lower Granite Dam (NMFS BiOp 2000, Appendix H, Research Action #1212-3, Dec. 2000; BPA Appendix D: Action Table and Reports, R-216, June 5, 2001).

Study 4 will determine the tailrace residence times and behavior of radio- tagged hatchery chinook salmon under various operational conditions at Lower Monumental Dam and will identify spill conditions that maximize fish passage efficiency at Ice Harbor Dam… (NMFS BiOp 2000, Appendix H, Research Action #1212-4; BPA Appendix D: Action Table and Reports, R-217, June 5, 2001).

Research to provide fishery managers with detailed information on the response of outmigrating juvenile anadromous salmon to operation of a prototype surface bypass structure (removable spillway weir) at Lower Granite Dam (NMFS BiOp 2000, Appendix H, Research Action #1240, Dec. 2000; BPA Appendix D: Action Table and Reports, R-219, June 5, 2001).

Studies to provide fishery managers with data on the timing, passage, and survival of outmigrating juvenile salmonids in relation to the operations of John Day, The Dalles, and Bonneville dams (NMFS BiOp 2000, Appendix H, Research Action #1241, Dec. 2000; BPA Appendix D: Action Table and Reports, R-220, June 5, 2001).

Research to evaluate juvenile fish survival through the Ice Harbor Dam spillway on the Snake River (NMFS BiOp 2000, Appendix H, Research Action #1243; BPA Appendix D: Action Table and Reports, R-222, June 5, 2001).

Research to monitor the effects of the juvenile fish bypass system at Ice Harbor Dam on the Snake River in Washington (NMFS BiOp 2000, Appendix H, Research Action #996, Dec. 2000; BPA Appendix D: Action Table and Reports, R-207, June 5, 2001).

Six research studies to evaluate juvenile fish collection/bypass facilities at selected Snake and Columbia river FCRPS dams (NMFS BiOp 2000, Appendix H, Research Action #1244, Dec. 2000; BPA Appendix D: Action Table and Reports, R-223, June 5, 2001).

Research to compare SARs of marked yearling and subyearling chinook salmon and steelhead juveniles transported from McNary Dam to below Bonneville Dam with the SARs of marked in-river migrating juveniles of these species released into the tailrace of McNary… (NMFS BiOp 2000, Appendix H, Research Action #2003, Dec. 2000; BPA Appendix D: Action Table and Reports, R-227, June 5, 2001).

[A] short term action include[s]: 3) research to address transport vs. in-river dam passage, flow-survival relationships, and overall survival needed to achieve recovery (Idaho Plan, 1998).

The Region should investigate options to spread the risk more equitably without increasing risk to in-river migrants (Idaho Plan, 1998).

By the end of 2001, the Corps shall develop, in coordination with NMFS and the other Federal, state, and tribal salmon managers, a McNary Dam transportation evaluation study plan specifically focusing on the response of UCR spring chinook and steelhead to transportation. Approved research should begin by 2002, if feasible (NMFS BiOp 2000, Action #45, Dec. 2000; BPA Appendix D: Action Table and Reports, R-45, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

4-8 Adult Fish Passage

An immediate evaluation is also necessary of survival rates for fish transported by trucks compared to barges. If survival is lower in trucks and barging is an available alternative, then trucking should be discontinued (Governors' Recommendations, July 2000).

The Corps and BPA, in coordination with the Fish Facility Design Review Work Group and the Fish Passage Improvement Through Turbines Technical Work Group, shall continue the program to improve turbine survival of juvenile and adult salmonids (NMFS BiOp 2000, Action #88, Dec. 2000; BPA Appendix D: Action Table and Reports, R-88, June 5, 2001).

The Action Agencies shall determine the number of adults passed through turbines, then, if warranted, investigate the survival of adult salmonid passage through turbines (including steelhead kelts) (NMFS BiOp 2000, Action #93, Dec. 2000; BPA Appendix D: Action Table and Reports, R-93, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Research to evaluate the conversion rates (i.e., survival through the FCRPS), travel times, and passage routes

of adult steelhead that have spawned (kelts) and are emigrating past hydroelectric facilities on their migration back to the ocean (NMFS BiOp 2000, Appendix H, Research Action #1224, Dec. 2002; BPA Appendix D: Action Table and Reports, R-218, June 5, 2001).

The Action Agencies shall conduct a comprehensive evaluation to assess survival of adult salmonids migrating upstream and factors contributing to unaccounted losses (NMFS BiOp 2000, Action #107, Dec. 2000; BPA Appendix D: Action Table and Reports, R-107, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA shall conduct a comprehensive evaluation to investigate the causes of headburn in adult salmonids and shall implement corrective measures, as warranted (NMFS BiOp 2000, Action #108, Dec. 2000; BPA Appendix D: Action Table and Reports, R-108, June 5, 20012003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Develop a priority list of the FCRPS dams for evaluation to determine the extent of bull trout entrainment (FWS BiOp 2000 Action #11(5), Dec. 2000; BPA Appendix D: Action Table and Reports, R-287, June 5, 2001). Based on the priority list in 11(5), the action agencies shall assess the extent of bull trout entrainment at FCRPS Dams. If entrainment is determined to be significant, the Action Agencies will explore techniques to deter bull trout entrainment (e.g., the expansion of strobe light research) (FWS BiOp 2000, Action #11(6), Dec. 2000; BPA Appendix D: Action Table and Reports, R-288, June 5, 2001).

Implement monitoring and studies to provide information on bull trout entrainment and distribution, timing, and usage of Dworshak reservoir (BPA Appendix D: Action Table and Reports, R-282, June 5, 2001; FWS BiOp 2000, Action #10.A.3(2), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Estimate annual population size of bull trout migrating to and from Dworshak Reservoir and develop abundance trends over time (BPA Appendix D: Action Table and Reports, R-317, June 5, 2001; FWS BiOp 2000, Action #11.A.3(2a), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

The Corps shall continue biological and engineering investigations and design of a composite ice and trash sluiceway outfall relocation and adult ladder auxiliary water system at The Dalles Dam and shall construct such devices as warranted (NMFS BiOp 2000, Action #70, Dec. 2000; BPA Appendix D: Action Table and Reports, R-70, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall investigate measures to reduce adult steelhead and salmon fallback and mortality through the Bonneville Dam spillway. A final report shall be submitted to NMFS stating the findings of these investigations and recommending corrective measures. Potential remedies shall be included in the annual planning process (NMFS BiOp 2000, Action #113, Dec. 2000; BPA Appendix D: Action Table and Reports, R-113, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall examine existing fish-ladder water temperature and adult radio-telemetry data to determine whether observed temperature differences in fishways adversely affect fish passage time and holding behavior. If non-uniform temperatures are found to cause delay, means for supplying cooler water to identified areas of warmer temperatures should be developed and implemented in coordination with the annual planning process (NMFS BiOp 2000, Action #114, Dec. 2000; BPA Appendix D: Action Table and Reports, R-114, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps and BPA shall conduct a comprehensive depth and temperature investigation to characterize direct mortality sources at an FCRPS project considered to have high unaccountable adult losses (either from counts and/or previous adult evaluations) (NMFS BiOp 2000, Action #115, Dec. 2000; BPA Appendix D: Action Table and Reports, R-115, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Corps shall evaluate adult count station facilities and rehabilitate where necessary at all projects to either minimize delay of adults or minimize counting difficulties that reduce count accuracy (NMFS BiOp 2000, Action #117, Dec. 2000; BPA Appendix D: Action Table and Reports, R-117, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

The Corps shall initiate an engineering study to evaluate existing limitations relating to its inability to satisfy fish passage plan operating criteria at the John Day Dam north shore ladder (NMFS BiOp 2000, Action #128, Dec. 2000; BPA Appendix D: Action Table and Reports, R-128, June 5, 2001; 2003/2003-2007

Implementation Plan, Hydro Strategy #1, Oct. 2002).

The Action Agencies shall continue to implement adult salmonid counting programs at FCRPS dams, but shall improve the reporting of these counts (NMFS BiOp 2000, Action #191, Dec. 2000; BPA Appendix D: Action Table and Reports, R-195, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #3, Oct. 2002).

Immediately expand the fish counting period to record year-around at Lower Monumental and Little Goose dams for 3 consecutive years. Add counting at adjacent dams if warranted (BPA Appendix D: Action Table and Reports, R-313, June 5, 2001; FWS BiOp 2000, Action #11.A.3(1c), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #2, Oct. 2002).

Evaluate the feasibility of reestablishing bull trout passage at Albeni Falls Dam (BPA Appendix D: Action Table and Reports, R-275, June 5, 2001; FWS BiOp 2000, Action #10.A.1(3), Dec. 2000). For example, by October 1, 2004, the Action Agencies shall conduct a feasibility study for reestablishment of two-way passage of adult and sub-adult bull trout at Albeni Falls Dam. This study must include observations of movement and survival of radio tagged bull trout from Lake Pend Oreille, and survival of adult and subadult bull trout passing through or over Albeni Falls Dam. The study must also analyze the feasibility of structural improvements such as fish ladders and measures to guide fish away from turbines. If fish passage is determined to be necessary the Action Agencies will seek appropriations for the construction of the facility by October 1, 2008 (FWS BiOp 2000, Action #10.A.1(4), 11.A.1(3a), Dec. 2000; BPA Appendix D: Action Table and Reports, R-276, 293, June 5, 2001).

The Corps shall initiate an adult steelhead downstream migrant (kelt) assessment program to determine the magnitude of passage, the contribution to population diversity and growth, and potential actions to provide safe passage (NMFS BiOp 2000, Action #109, Dec. 2000; BPA Appendix D: Action Table and Reports, R-109, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

MANAGEMENT ACTION FOR STRATEGY #2: To minimize trial expense, choose the shortest reservoir on the Columbia for testing the viability of artificially impelling a stream of water along both edges of the reservoir to simulate the movement of water that took place along the original river banks, both sweeping smolt downstream and guiding adult salmon upstream (Framework Concept Paper 18).

The feasibility of reintroduction, including an evaluation of the existing habitat, is being investigated as part of the Federal Energy Regulatory Commission (FERC) relicensing process for the Hells Canyon complex. While mindful of the challenges involved, options and costs should continue to be assessed as part of the relicensing process. A similar challenge confronts reintroduction of migrating salmonids above Chief Joseph and Grand Coulee dams, particularly above Grand Coulee. Nevertheless, encourage work currently under way to assess the possibility (Governors' Recommendations, July 2000).

MANAGEMENT ACTION FOR STRATEGY #1: To minimize trial expense, choose a low rise dam at the lower end of the Columbia for testing the viability of new kind of fish ladder which features side by side pool strings moving in opposite direction in which the weight of one string counterbalances the weight of the other to minimize the expenditure of energy needed to move adult salmon up and smolt down from reservoir to reservoir, past the dam. Once the best size/speed etc. has been found, apply it to the remaining dams on the Columbia (Framework Concept Paper 18).

The Corps shall complete adult fishway auxiliary water supply evaluations at each lower Snake River hydro project and implement corrective measures as warranted (NMFS BiOp 2000, Action #129, Dec. 2000; BPA Appendix D: Action Table and Reports, R-129, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #1, Oct. 2002).

Use new and existing information to expand salmon passage models to cover entire salmon lifecycle (Framework Concept Paper 26).

Focus mainstem research efforts on measurement of survival through alternate passage methods at dams to reduce "hot spots" for mortality (Framework Alternative 7).

Study the natural aquatic environment to determine the dimensions of the river structures—pools, falls, rapids, and habitat—that proved to be safe for fish passage as demonstrated by the existence of healthy productive populations (Framework Concept Paper 15).

Research on the energy expenditure of upstream migrating adult salmon and steelhead in the Columbia and

Snake rivers, for assessing the potential influence of delay, fallback, water temperature, and dam operations (e.g., spill) on migration energetics… (NMFS BiOp 2000, Appendix H, Research Action #2007, Dec. 2000; BPA Appendix D: Action Table and Reports, R-231, June 5, 2001).

Research designed to monitor and evaluate adult returns of hatchery-origin fall chinook salmon released as juveniles above Lower Granite Dam on the Snake River (NMFS BiOp 2000, Appendix H, Research Action #1058, Dec. 2000; BPA Appendix D: Action Table and Reports, R-209, June 5, 2001).

Research to develop and evaluate adult PIT- tag interrogation systems for future installation at mainstem FCRPS facilities on the lower Columbia and Snake rivers (NMFS BiOp 2000, Appendix H, Research Action #1194, Dec. 2000; BPA Appendix D: Action Table and Reports, R-213, June 5, 2001).

The Corps and BPA shall evaluate the effects of prior transport as smolts on the homing of adults (NMFS BiOp 2000, Action #48, Dec. 2000; BPA Appendix D: Action Table and Reports, R-48, June 5, 2001).

Research to assess the passage success of migrating adult salmonids at the eight dams and reservoirs on the lower Columbia and the lower Snake rivers, to evaluate specific flow and spill conditions, and to evaluate measures to improve adult anadromous fish passage… (NMFS BiOp 2000, Appendix H, Research Action #994, Dec. 2000; BPA Appendix D: Action Table and Reports, R-206, June 5, 2001).

Research at several mainstem FCRPS dams (Lower Granite, Little Goose, Lower Monumental, and McNary dams) to identify and enumerate adult steelhead kelts that pass through associated juvenile fish bypass facilities by using mark-recapture methods (NMFS BiOp 2000, Appendix H, Research Action #2000, Dec. 2000; BPA Appendix D: Action Table and Reports, R-224, June 5, 2001).

4-9 Flood Control

The Corps and NMFS should work with the Region on a study to determine whether flood control curves can be reconfigured to allow shaping of flows to improve survival of migrating salmon and steelhead (Governors' Recommendations, July 2000).

Evaluate feasibility of variable December 31 flood control target of 2,411 feet at Libby Dam. Adopt target if feasible (BPA Appendix D: Action Table and Reports, R-239, June 5, 2001). For example, by June 2003, the Action Agencies shall evaluate the feasibility of a variable December 31 flood control target of 2,411 feet at Libby Dam, based on various alternative long range forecasting procedures and any opportunities arising from operational or configuration changes (additional turbines or spillway flow deflectors) addressed elsewhere in this biological opinion to be adopted by October 2003 if deemed feasible (FWS BiOp 2000 Action #8(1)(h), Dec. 2000).

Evaluate flood levels and public safety concerns along the banks of the Kootenai River below Libby Dam, and the feasibility of increasing releases above any identified channel capacity constraints. Provide a report to the Service (FWS BiOp 2000, Action #8(3)(a), Dec. 2000; BPA Appendix D: Action Table and Reports, R-253, June 5, 2001; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).

The Corps shall develop and conduct a detailed feasibility analysis of modifying current system flood control operations to benefit the Columbia River ecosystem, including salmon. The Corps shall consult with all interested state, Federal, Tribal, and Canadian agencies in developing its analysis. Within 6 months after receiving funding, the Corps shall provide a feasibility analysis study plan for review to NMFS and all interested agencies, including a peer-review panel (at least three independent reviewers, acceptable to NMFS, with expertise in water management, flood control, or Columbia River basin anadromous salmonids). A final study plan shall be provided to NMFS and all interested agencies 4 months after submitting the draft plan for review. The Corps shall provide a draft feasibility analysis to all interested agencies, NMFS, and the peer-review panel by September 2005 (NMFS BiOp 2000, Action #35, Dec. 2000; BPA Appendix D: Action Table and Reports, R-35, June 5, 2001; 2003/2003-2007 Implementation Plan, Hydro Strategy #2, Oct. 2002).

COMMERCE
5 POWER
5-1 Existing Generation
5-2 New Energy Resources
Do not …support any hydroelectric development in the Columbia River Basin without specifically providing for these development conditions: ...The collection of data needed to monitor and evaluate the results of the fish protection efforts (NWPPC Fish and Wildlife Program, 2001).
5-3 Transmission Reliability
6 INDUSTRY
6-1 Industrial Development
6-2 Aluminum and Chemical
6-3 Mining
Develop inspection, monitoring, and reporting requirements for mineral activities (INFISH/PACFISH EAs).
If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, and releases can be prevented, and stability can be ensured, then: ... Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics (NW Forest Plan ROD).
6-4 Pulp and Paper
7 TRANSPORTATION
7-1 Navigation and Barging
7-2 Trucking, Railroads, and Infrastructure
For each existing or planned road, meet Aquatic Conservation Strategy objectives by ... completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings (NW Forest Plan ROD).
8 AGRICULTURE
The Action Agencies shall quantify the effects of groundwater seepage associated with the magnitude and duration of sturgeon flows on crops [in the Kootenai Valley relative to all other types high flow/stage events which occur in the Kootenai River] and identify feasible remedies (BPA Appendix D: Action Table and Reports, R-255, June 5, 2001; FWS BiOp 2000 Action #8(3)(c), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002). The effects of direct precipitation and runoff from small tributaries within the Kootenai Valley on both surface and ground water levels shall also be accounted for in this study. This shall include delineation of specific sites affected and identification of all feasible remedies specific to those sites such as, drainage, willing seller land purchases, and enrollment in the Department of Agriculture's Wetland Reserve Program (FWS BiOp 2000, Action 8(3)(c), Dec. 2000; 2003/2003-2007 Implementation Plan, Resident Fish Strategy #1, Oct. 2002).
8-1 Irrigation
8-2 Pesticides and Agricultural Practices
8-3 Grazing
8-4 Forestry
A management assessment should be prepared for each large Late-Successional Reserve (or group of smaller Late-Successional Reserves) before habitat manipulation activities are designed and implemented (NW Forest Plan ROD).
Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of Riparian Management Objectives, and to minimize disturbance of riparian ground cover and vegetation (INFISH/PACFISH EAs).

Design prescribed burn projects and prescriptions to contribute to the attainment of the Riparian Management Objectives (INFISH/PACFISH EAs). Review, approve and monitor road maintenance and abandonment plans (Washington Plan, 2000).
9 COMMERCIAL HARVEST
Consolidate and unify harvest data–both from marine and in-river fisheries, counts, and samples–into an accessible database. Provide real-time information for use by fisheries managers and planners. Conduct a regularly scheduled scientific review of harvest data and harvest practices (Council's 2000 Fish and Wildlife Program). Evaluate the use of commercial netting for harvest (Comment FWIP-029).
10 RESIDENTIAL AND COMMERCIAL DEVELOPMENT
11 RECREATION
TRIBES
12 TRIBES
12-1 Tribal Harvest
12-2 Tradition, Culture, Spirituality

This page intentionally left blank.

ACRONYMS

ACS	Aquatic Conservation Service
All H	The "All H" paper (referring to hydro, habitat, hatcheries, and harvest). Now titled the Basinwide Salmon Recovery Strategy.
BC	British Columbia
BiOp	biological opinion
BLM	Bureau of Land Management
BO	biological opinion
BOR	Bureau of Reclamation
BPA	Bonneville Power Administration
Bureau	Bureau of Reclamation
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
cfs	cubic feet per second
COE	U.S. Army Corps of Engineers
Corps	U.S. Army Corps of Engineers
Council	Northwest Power Planning Council
CTs	combustion turbines
CWA	Clean Water Act
DGAS	Dissolved Gas Abatement Program
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ERU	Ecological Reporting Units
ESU	evolutionarily significant unit
FCRPS	Federal Columbia River power system
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FPOM	Fish Passage Operations and Maintenance Coordination Team
FWS	U.S. Fish and Wildlife Service

FY	fiscal year
HCP	habitat conservation plans
HGMP	hatchery and genetic management plan
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IFDG	Idaho Department of Fish and Game
IJC	International Joint Commission
IRC	Integrated Rule Curve
ISAB	Independent Scientific Advisory Board
JDA	John Day
kaf	one thousand acre feet
kV	kilovolt
LCREP	Lower Columbia River Estuary Program
LSRCP	Lower Snake River Compensation Plan
MAF	one million acre feet
MOP	minimum operating pool
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service (now known as NOAA Fisheries)
NPPC	Northwest Power Planning Council
NRCS	Natural Resource Conservation Service
OCSRI	Oregon Coastal Salmon Restorative Initiative
ODFW	Oregon Department of Fish and Wildlife
O&M	operations and maintenance
PIT	"passive integrated transponder" tags
PST	Pacific Salmon Treaty
PUD	public utility district
RCRA	Resource Conservation and Recovery Act
RMOs	riparian management objectives
ROD	record of decision
SAR	smolt to adult returns
SOR	System Operation Review
RSW	removable spillway weir
TCF	totally chlorine-free
TDG	total dissolved gas

TMDL	total maximum daily loads
TMT	technical management team
TSCA	Toxic Substances Control Act of 1976
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VARQ	variable discharge flood control strategy
WCI	watershed condition indicator
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources

This page intentionally left blank.