APPENDIX B

Findings on the Recommendations for Mainstem Plan Amendments to the 2000 Columbia River Basin Fish and Wildlife Program

Introduction

On March 14, 2001, the Northwest Power and Conservation Council[1] requested that state and federal fish and wildlife agencies, Indian tribes and others submit recommendations for amendments to the Council's *2000 Columbia River Basin Fish and Wildlife Program* concerning the mainstem Columbia and Snake rivers. A memorandum accompanying the request for recommendations outlined certain points to consider in developing mainstem amendment recommendations. Council Document No. 2001-04.

By the June 15, 2001, deadline for submitting mainstem amendment recommendations, the Council received nearly 1,000 pages of recommendations and supporting information from 22 entities and individuals. As required by Section 4(h)(4) of the Northwest Power Act, the Council released the recommendations to the public for an opportunity for review and comment, until October 2001. Council Document No. 2001-16; http://www.nwcouncil.org/library/recommend/mainstem/Default.htm.

In October 2002, the Council released for public review and comment a draft of proposed mainstem amendments to the fish and wildlife program, and at the same time invited further comment on the mainstem amendment recommendations originally received. The Council held a number of public hearings in the four states of the Council (Washington, Oregon, Montana and Idaho) and received extensive written comments on the draft amendments and the recommendations. Written comments on the draft mainstem amendments and recommendations are posted on the Council's website, at http://www.nwcouncil.org/fw/program/mainstem/2002-16Comments/default.asp. After reviewing the recommendations and the comments on the draft mainstem amendments, the Council revised the draft and adopted substantive mainstem amendments to the program in April 2003.[2]

In this section of the program, the Council provides written findings explaining its disposition of the mainstem amendment recommendations, as required by Section 4(h)(7) of the Power Act. When the Council rejected a rec-

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1 When the Council issued the call for recommendations, it was known by the name Northwest Power Planning Council. In mid-2003, the Council changed the name by which it is known to the Northwest Power and Conservation Council. Both names are short forms of the Council's official legal name, the Pacific Northwest Electric Power and Conservation Planning Council.

2 The Council's final decision on the mainstem amendments occurred more than a year after the Council received the recommendations for mainstem amendments. See Northwest Power Act, Section 4(h)(9) ("The Council shall adopt such program or amendments thereto within one year after the time provided for receipt of the recommendations."). The Act does not specify the consequences for failing to meet the specified date, nor a procedure for extending the date to act on the recommendations.

In March of 2002, knowing that it would not be able to complete its consideration of and adopt final mainstem amendments within the one-year time period, the Council decided, at its regular Council meeting for that month, to adopt a revised schedule that would move the completion of the mainstem amendments beyond the one-year date, and provided notice of this decision and its reasons to those who submitted recommendations and other interested parties. No recommending party or any one else complained about or challenged the Council's decision to extend the schedule. The reasons given included the fact that the power system operational issues in 2001 especially were extraordinary, diverting the Council and relevant staff away from being able to give the level of attention to the mainstem recommendations that they deserved. Yet the Council, staff and the public needed more time than usual to understand the general system planning issues in the context of the reliability crisis of that year. The Council had not been dilatory; the members and staff worked consistently on the mainstem plan recommendations and related mainstem issue since receiving the recommendations. Even so, it was not possible to complete the mainstem amendment process by mid-June 2002 and provide sufficient consideration and public attention to the proposed amendments.

ommendation, these findings explain how the Council's decision comports with the standards in that section of the Act. In the course of responding to the recommendations, these findings also address the major issues raised by commentors on the draft amendments. References in these findings to the 2003 Mainstem Amendments are to what is called the "Pre-Publication Copy," Council Document No. 2003-04 (April 2003).

Context and Scope of the Mainstem Amendments

— General Findings on Recommendations

2000 Fish and Wildlife Program

The mainstem amendments are the second step in what will eventually be a comprehensive revision of the fish and wildlife program. In the first phase, which resulted in the 2000 Fish and Wildlife Program, the Council reorganized the program around a comprehensive framework of scientific and policy principles. The fundamental elements of the revised program are the vision, which describes what the program is trying to accomplish with regard to fish and wildlife and other desired benefits from the river; basinwide biological objectives, which describe in general the fish and wildlife population and habitat characteristics needed to achieve the vision; implementation strategies, which will guide or describe the actions needed to achieve the desired ecological conditions; and a scientific foundation, which links these elements and explains why the Council believes certain kinds of actions should result in desired habitat conditions and why these conditions should improve fish and wildlife populations in the desired way.

The program amendments in 2000 set the stage for the subsequent phases of the program revision process, in which the Council will adopt specific objectives and strategies for the river's mainstem and tributary subbasins, consistent with the basinwide vision, objectives and strategies in the program and its underlying scientific foundation. These findings conclude the adoption of a set of program amendments relevant to the mainstem Columbia and Snake rivers. The Council next intends to incorporate specific objectives and measures for tributaries into the program in locally developed subbasin plans for the more than 60 subbasins of the Columbia River.

The role of the mainstem amendments was described in the 2000 Fish and Wildlife Program, in the section on Basinwide Hydrosystem Strategies and in the section entitled Schedule for Further Rulemakings. The Council repeated this guidance in the March 14, 2001, request for mainstem amendment recommendations. The mainstem amendments are to contain the specific objectives and strategies (or measures) for the federal operating agencies and others to implement in the mainstem Columbia and Snake rivers to protect, mitigate and enhance fish and wildlife affected by the development and operation of hydroelectric facilities while assuring the region an adequate, efficient, economical and reliable power supply. The final amendments thus include objectives and strategies relating to, among other matters:

- the protection and enhancement of mainstem habitat, including spawning, rearing, resting and migration areas for salmon and steelhead, resident salmonids and other anadromous and resident fish;
- system water management;
- passage spill at mainstem dams;
- adult and juvenile passage modifications at mainstem dams;
- juvenile fish transportation;
- reservoir elevations, operational requirements and habitat conditions to protect resident fish and wildlife;
- water quality conditions; and
- research, monitoring and evaluation.

In developing the mainstem amendments, the Council asked the recommending entities to consider, among other things, the consistency of their mainstem recommendations with the basinwide provisions in the 2000 Fish and Wildlife Program, especially the role of a mainstem plan in a multispecies, habitat-based, basinwide program. The Council evaluated the mainstem recommendations and the draft and final program amendments for consistency with the program framework elements adopted in 2000, including the vision, biological objectives, habitat and

hydrosystem strategies, and underlying scientific principles. The Council also evaluated the draft and final amendments for consistency with, and a basis in, the mainstem recommendations, as explained in these findings.

Biological Opinions on the operation of the federal Columbia hydrosystem

In the past, the Council's fish and wildlife program included detailed provisions for the configuration and operation of the hydrosystem to benefit fish and wildlife. In December 2000, NOAA Fisheries (formerly the National Marine Fisheries Service) and the U.S. Fish and Wildlife Service issued biological opinions for the operation of the Federal Columbia River Power System to benefit populations of salmon, steelhead, bull trout and white sturgeon listed as threatened or endangered under the federal Endangered Species Act and found throughout the mainstem. The mainstem and hydrosystem objectives and measures in these biological opinions run to hundreds of pages of detail and hundreds of actions on water management, system configuration, river flows, reservoir management, passage improvements, spill, juvenile transportation, predator management, mainstem habitat and more. The federal system operating agencies — the Corps of Engineers, Bureau of Reclamation and Bonneville Power Administration — agreed in subsequent Records of Decision to implement the hydrosystem measures in the biological opinions. These measures affect the entire mainstem and every species of fish and wildlife in the mainstem, whether listed or not. And these measures are built on foundations developed in the Council's program over the last 20 years.

Thus in developing the mainstem amendments, the Council asked the recommending entities to consider, among other things, how the mainstem amendments should relate to the biological opinions on hydrosystem operations. The recommendations received by the Council in response may be grouped into four categories:

- recommendations that the Council adopt mainstem amendments that incorporate or at least are consistent with the objectives and measures in the biological opinions;
- based on a conclusion that the biological opinions did not prescribe sufficient flow, spill and passage operations to benefit listed (as well as non-listed) salmon and steelhead, recommendations that the Council adopt additional or different measures to that end;
- based on a conclusion that the operations specified in the biological opinions are not optimal or sufficient to protect, enhance or mitigate for the adverse effects of the hydrosystem on resident fish, recommendations that the Council adopt objectives and measures for that purpose that would be supplemental to the biological opinion operations, or would require a shift in current implementation of the biological opinions but within the apparent flexibility of the opinions; or would be in conflict with biological opinion operations; and
- based on the conclusion that the biological opinions exceeded what is necessary in terms of flow and spill to benefit listed fish, to the unreasonable detriment of the power supply and other uses of the river, recommendations that the Council call for scaled-back flow and spill operations, or at least immediate evaluations of the current operations to determine the most biologically and cost effective set of operations.

Given this set of recommendations, and the current state of federal mainstem operations for fish and wildlife, the Council decided on the following approach for adopting mainstem objectives and strategies, an approach with three main elements:

First, the Council incorporated the hydrosystem objectives and measures from the two biological opinions into the Council's program as the baseline set of federal system operations for fish affected by the Columbia hydrosystem. The objectives and measures in the biological opinions represent the recommendations of the federal fish and wildlife agencies with jurisdiction under the Endangered Species Act (and the recommendations of others as well) concerning the appropriate biological conditions and hydrosystem operations to protect and improve the status of

the listed species spread across the mainstem, from migrating salmon in the lower parts of the Columbia and Snake rivers to bull trout and Kootenai River white sturgeon in the upper parts of the system. These operations also strongly affect non-listed anadromous and resident fish, largely but not always in beneficial ways.[3]

Second, the mainstem amendments include a set of habitat considerations, objectives and strategies intended to protect, mitigate and enhance all the fish and wildlife of the Columbia River Basin in the mainstem, whether listed or not, a broader focus required of the Council by the Power Act. Because the 2000 biological opinions concern only the listed species (even as they affect other fish in the system), and because most of the listed salmon and steelhead spawn and rear outside of the mainstem above or below the mainstem hydroprojects, the biological opinion measures may not be complete or optimal when the broader habitat needs of a broader range of fish and wildlife are taken into account. So, based on recommendations submitted, and consistent with the basinwide vision, biological objectives and strategies in the 2000 Program, the Council adopted mainstem objectives and strategies intended to allow for the appropriate mainstem habitat conditions to benefit a wide range of multiple species of salmon, steelhead, other anadromous fish, resident fish and wildlife affected by the hydrosystem, not just listed species.

When the strategies intended to benefit non-listed species appear to conflict with the measures in the biological opinions, or when the strategies intended to benefit upriver resident fish, whether listed or not, appear to conflict with the measures in the salmon and steelhead biological opinion, the Council does not mean that the federal operating agencies should act contrary to the biological opinions in order to implement strategies in the Council's program. The Council's intent instead is that the federal operating agencies make every effort practicable to use the operational flexibility inherent in the biological opinions to meet the biological opinion requirements while attempting to meet the objectives and implement the other strategies in the Council's program.

Third, the mainstem amendments include a specified set of evaluations, tests and experiments related to hydrosystem operations for fish. Scientific and policy uncertainty continues to plague a number of the mainstem actions in the NOAA Fisheries biological opinion intended to benefit salmon and steelhead. This leads to an inability to measure the extent of the benefits gained and to great differences of opinion as to the value of continuing these actions, especially as some may have adverse effects on resident fish and significant costs to the power system.

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3 The federal district court of Oregon recently declared NOAA Fisheries' 2000 hydrosystem biological opinion to be unlawful and remanded that opinion to NOAA. The court concluded that NOAA Fisheries, in determining that the combined suite of mainstem and off-site measures in the opinion's reasonable and prudent alternatives would avoid jeopardy, improperly relied on the occurrence of a number of non-federal off-site mitigation actions that are not reasonably certain to occur, and improperly relied on the occurrence of a handful of federal actions that have not yet undergone an ESA Section 7 consultation, both contrary to what is required for a jeopardy analysis in NOAA Fisheries' own regulations implementing the ESA. "Opinion and Order," National Wildlife Federation v. National Marine Fisheries Service, CR 01-640-RE (May 7, 2003).

The court's action in remanding the biological opinion to NOAA Fisheries does not affect the Council's mainstem amendments. The Council was careful not to adopt or incorporate the two biological opinions themselves into the Council's program. Instead, the Council concluded that the mainstem hydrosystem objectives and measures in the biological opinions recommended to the federal operating agencies would become the baseline mainstem hydrosystem objectives and measures in the Council's program as well. These measures and objectives are now independently part of the Council's program.

The Council has no reason to believe that these measures will not represent the basic core of the federal operating agencies' operations for fish and wildlife in the near future. As noted above, the system operating agencies — the Corps of Engineers, Bureau of Reclamation and the Bonneville Power Administration — have executed Records of Decision identifying the hydrosystem measures in the biological opinion as the measures they will be implementing in the next few years. The issues that the plaintiffs raised in the biological opinion litigation included the adequacy of the extinction analysis used by NOAA Fisheries and the validity of relying on a suite of off-site mitigation measures to offset in part the jeopardy impacts of the hydrosystem. The plaintiffs did not challenge the hydrosystem measures themselves (except for an emergency clause that allow the operations to be curtailed under certain circumstances, and which is not part of the hydrosystem measures that the Council adopted); the plaintiffs did not name the operating agencies as defendants, and the court's opinion does not address or find fault with these mainstem measures. It may be that the plaintiffs pursue additional measures in the mainstem for salmon and steelhead, but no party argued that the basic hydrosystem operations already in the biological opinion are inappropriate or should not be implemented. These measures are the starting point or baseline for further considerations.

This is a large part of the reason the federal and state fish and wildlife agencies and lower river tribes have produced different plans, programs and recommendations regarding the appropriate mainstem operations for salmon and steelhead, including conflicting program amendment recommendations to the Council.

The Council concluded that many of the biological opinion measures must be subject to systematic and rigorous monitoring and evaluation to determine if the measures have the biological benefits expected and represent the most cost-effective actions to achieve these benefits. Some of the recommended strategies to benefit resident fish in upriver reservoirs suffer from similar uncertainties and costs, and similarly need implementation and evaluation, often in the form of implementation through an experimental design.

For these reasons, the mainstem amendments include not only the detailed set of evaluations, tests and experiments for the hydrosystem, they also include an approach for prioritizing mainstem research as well as specific priorities for that research; and recommendations for how better to integrate research, monitoring and evaluation results into decisions about mainstem actions and power system operations. The Council calls for certain tests and experiments even when they may require implementing within a range of system operations, so as to focus on areas where the quantitative benefits from biological opinion operations require additional understanding or verification, or where benefits to non-listed species from varied operations may be significant without adverse impacts on listed species, or both. The Council believes this approach is consistent with the biological opinions, which allow considerable flexibility to conduct necessary tests. The opinions were adopted with the recognition that as new scientific information is developed, actions called for in the opinions could and would be changed where appropriate. As information is gleaned from these evaluations and tests, the Council's goal is to provide recommendations to the federal hydrosystem operating agencies and fish and wildlife agencies for the most biologically effective spill, flow and other mainstem operations and actions at the minimum economic cost.

In settling on this approach, the Council adopted, modified or rejected the recommendations in the four categories described above in the following manner:

General Finding No. 1: Recommendations to incorporate into the program the objectives and measures in the biological opinions. The federal fish and wildlife and operating agencies submitted this recommendation, but others did, too. For example, incorporating the biological opinion measures into the program was the centerpiece of the recommendations from the Washington Department of Fish and Wildlife. The Council adopted these recommendations.

Also included in this category are certain recommendations the Council received for the purpose of protecting and improving mainstem habitat (broadly considered) for a wide range of populations and species of anadromous and resident fish and wildlife, not just listed species. These recommendations did not necessarily refer to, or have a basis in, the biological opinions but were not incompatible with the particular provisions of those opinions. The Council adopted a number of objectives and measures based on recommendations of this type, as highlighted in the summary of specific recommendations that follows this general section of the findings.

General Finding No. 2: Recommendations based on a conclusion that the biological opinions did not prescribe sufficient flow, spill and passage operations to benefit listed (as well as non-listed) salmon and steelhead, thus calling for the Council to adopt additional or different measures for that purpose. The Council did not adopt recommendations that would have the Council call for the implementation of flow, spill and passage operations for salmon and steelhead that are in conflict with what the biological opinions call for or will allow for.

The category analyzed here included, for example, recommendations from the fish and wildlife agencies of Oregon and Idaho and the Columbia River Inter-Tribal Fish Commission for additional and different flow and spill measures. The Commission also recommended the breaching of the federal dams in the lower Snake River. These recommendations carried over into the Council program amendment process disputes these entities had with NOAA Fisheries in the development of the biological opinion concerning what are the appropriate measures for salmon and steelhead. The Save Our Wild Salmon Coalition and the Northwest Resource Information Center, Inc., joined in these recommendations. All of these recommendations would have additional costs to the power system in terms of lost energy and dollars, some would have impacts to upriver listed and unlisted resident fish.

By rejecting the recommendations that would have the Council call at this time for additional or different flow, spill and passage measures for salmon and steelhead, the Council does not mean or imply that it has evaluated the science underlying the different positions and concluded that NOAA Fisheries is correct and the Oregon and Idaho agencies and the Commission are incorrect, or that the Council gave greater weight to the biological judgments of the federal agencies and less or none to the judgments of the others. Program amendment recommendations from all fish and wildlife agencies and tribes are due special consideration by the Council under the Power Act. The Council recognizes that the different positions are based in legitimate differences in opinion as to the meanings to be drawn from imperfect scientific information and from different managerial perspectives and assumptions of risk. Time and more information may reveal that the federal agencies are correct in the decisions about what is needed to prevent extinction and recover listed salmon and steelhead, or that these state agencies and tribes are correct, or that neither is correct. The difficulty for the Council was how to decide what the Council's program should say at this time about mainstem configuration and operations for salmon and steelhead in light of the different recommendations from the federal and state fish and wildlife agencies and tribes. The standards for adopting and rejecting recommendations in Section 4(h) of the Power Act are essentially premised on the assumption that the recommendations of the fish and wildlife agencies and tribes will coincide, and that any conflicts found in the recommendations will be between fish and wildlife managers and other river users. The standards are not well adapted to situations in which the federal salmon agency differs from state and tribal salmon agencies as to what are the appropriate measures for salmon and steelhead. One reason the Council gave at least presumptive weight to the federal agency recommendations, at least as the baseline or starting point for the measures in the program, is because the ultimate focus is on adopting a set of operations that the Council can expect the federal operating agencies to implement to benefit salmon and steelhead. The systemwide operational measures from the federal fish and wildlife agencies with ultimate jurisdiction under the ESA for listed species carry by far the most weight with the federal operating agencies and, in fact, are now the basic set of hydrosystem operations that those agencies have adopted in their Records of Decision for operations, and thus are the operations for the Council to establish as the baseline for the program. The issue then has been what to do with the different or additional recommendations of the state and tribal managers.

The Council concluded that the hydrosystem measures in the biological opinions themselves held a key to resolving this dilemma. The biological opinions represented the culmination of a complicated multi-year process by the federal fish and operating agencies to evaluate the effects of hydrosystem operations on the listed fish species spread throughout the Columbia. That process included a thorough airing of the different scientific and policy views of the federal, state and tribal fish managers as well as the views of environmental groups, industry groups and others, resulting in an extensive administrative record and resolution of key issues by NOAA Fisheries and U.S. Fish and Wildlife Service, the agencies with ultimate responsibility to determine what are the appropriate actions to take to protect and improve the conditions for listed species. Most important here, the hydrosystem part of the NOAA Fisheries' salmon and steelhead biological opinion recognized the uncertainties and legitimate differences in opinion. The biological opinion included measures and mechanisms to test key assumptions and uncertainties about flow, spill, passage and

system configuration; to monitor progress in reversing the population trends; and to adapt management prescriptions as more is learned about the status of the stocks and the effects of measures taken. The biological opinion measures thus internalized the debates and left room for the evaluation and possible implementation of precisely these recommendations of the state fish and wildlife agencies and tribes. The Council did not believe the region would be well served by having the Council adopt program amendments now calling for the federal operating agencies to engage in the different operations recommended rather than allowing the evaluation and adaptive management process of the biological opinions to work. The Council chose instead to emphasize evaluating the current extensive set of operations against a set of alternatives before firmly deciding on new directions.

It is true that the Council's and the federal agencies' responsibilities under the Power Act are different and broader than under the Endangered Species Act. The Power Act is concerned with protecting all fish and wildlife, not just listed species, from the adverse effects of the hydrosystem and with mitigating for the adverse effects that cannot be avoided. And while "mitigation" is not defined in the act, clearly it means a mitigation goal that is greater than just avoiding jeopardy to the continued existence of listed species and presumably greater than recovering populations just to the point of being able to delist them but derive no other benefit. This is reflected in the Vision of the 2000 Program (repeated in the mainstem amendments) of "mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem and providing the benefits from fish and wildlife valued by the people of the region," including "abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest" as well as "allowing for the recovery of the fish and wildlife affected by the operation of the hydrosystem and listed under the Endangered Species Act." Thus, it might be argued that while the measures in the biological opinions may be sufficient to avoid jeopardy and start down the path toward recovery of the listed species, the different or additional flow, spill and passage actions in the state and tribal recommendations are necessary to provide additional improvements in the status of all salmon and steelhead populations in the system to meet the greater mitigation goals of the Power Act and the program.

The problem with this argument, however, is that the recommendations from the state agencies and tribes are not presented in this way, nor are the biological opinions constructed in this way. The water management and passage measures in the biological opinions affect and benefit all the salmon and steelhead in the river. NOAA Fisheries did not adopt the hydrosystem measures with an understanding that these measures would provide a self-limited benefit to the listed populations — up to but not above what is required to satisfy the Endangered Species Act — while leaving on the table a host of operational and passage measures for salmon and steelhead that could be implemented but that NOAA could ignore because they would provide greater protection and survival benefits than required for the ESA, or because they would benefit only non-listed salmon, or because they would produce abundance for harvest opportunities beyond the requirements of the ESA. (To the contrary, an assumption throughout the biological opinion is that one purpose for the federal government's efforts is to recover these populations to allow for, and even while allowing for, salmon harvest opportunities.) Instead, NOAA Fisheries included every reasonable and prudent hydrosystem operation and passage improvement it believed appropriate and optimal for salmon and steelhead (short of dam removal), and called for implementation of those that can be implemented now and for evaluation and implementation within a short-time period for those that were not yet ready for implementation. In the latter category, for example, the biological opinion called for "a detailed feasibility analysis of modifying current system flood control operations to benefit the Columbia River ecosystem, including salmon" (RPA Action 35), echoing the Commission's recommendation to the Council that a substantial rethinking of flood control is necessary to provide the more normative river hydrograph the Commission believes is necessary for salmon. The Council incorporated both types of measures into the program, with emphasis on points important to the state and tribal recommendations. These include, for example, an explicit statement by the Council in its water man-

agement strategies that the Corps of Engineers should "place a priority on conducting the further comprehensive review of flood control operations called for in the NOAA Fisheries 2000 Biological Opinion."

Conversely, the state agencies and tribes that recommended additional or different hydrosystem actions for salmon and steelhead did *not* do so based on an analysis or explanation that the measures in the biological opinion satisfy what the populations require under the ESA, but that the additional or different measures are needed to meet a higher population standard under the Power Act. Instead, as noted above, these agencies and tribes simply disagree with NOAA Fisheries on what are the appropriate operations for salmon and steelhead, whether listed or not.

For just one example, the recommendations from Oregon, the Columbia River Inter-Tribal Fish Commission, and the Idaho Department of Fish and Game call for more spill than the biological opinion, such as 24-hour instead of 12-hour spill at certain projects. NOAA Fisheries did not call for less spill because only that amount was needed to meet ESA requirements. Instead, NOAA Fisheries sought to establish optimal levels of spill for salmon survival through the dams. And the contrary recommending entities do not call for greater spill operations because that is needed to satisfy Power Act obligations beyond the ESA. These entities, too, seek to establish what they believe are optimal levels of spill for salmon survival. Recognizing the uncertainties and differences of opinion, the biological opinion measures do not call just for a certain set of spill operations. They also include an extensive set of spill assessments, tests, investigations, actions and evaluations to better determine optimal spill levels for salmon, including among many other matters an assessment of shifting to 24-hour spill. (Biological Opinion, pages 9-84 to 9-102, 9-119 to 9-126; RPA Actions 54-57, 60, 68-72, 75, 77, 80, 82-83, 130-40.) No standard or obligation in the Power Act would be served by the Council calling for the operating agencies to implement different spill operations at this time on the basis of the recommendations of Oregon, Idaho and CRITFC, rather than recognizing and incorporating the spill operations *and* evaluation process set out in the biological opinion, which became in this forum the recommendations of NOAA Fisheries. Moreover, the different spill operations recommended would reduce the power output of the system, thereby further reducing the adequacy, reliability, efficiency and economy of the power system, a Power Act concern of the Council. So the Council chose instead to add its own emphasis to the importance of an experimental approach for determining the optimal levels of spill. And the analysis is precisely the same for the other additional or different flow and passage measures for salmon and steelhead in the state and tribal recommendations.

If the Council ever had a sense that the hydrosystem measures for salmon and steelhead pursued by the federal agencies were sufficient for ESA purposes but left out an obvious set of additional measures needed to meet requirements of the Power Act to "protect and mitigate" obligation for the same populations, separately recommended to the Council, the Council would adopt the recommendations and additional measures into the program. That is not the situation here. Also, the Council is always cognizant of the need to adopt additional measures to protect non-listed salmon and steelhead (and other) populations in those moments when even the extensive federal hydrosystem measures do not reach or benefit those non-listed populations. For one of many examples, the Council called for the federal agencies, in deciding on spill operations as compared to the benefits of transportation, to give priority recognition to important although not listed populations of salmon and steelhead that cannot be transported or are not effectively transported, giving examples (2003 Mainstem Amendments, at 15). For another example, the Council called for the federal agencies to manage flows to benefit the Hanford Reach fall chinook population on an equal basis with managing water to benefit listed species (2003 Mainstem Amendments, at 7, 19).

For these reasons, the Council concludes that adopting the recommendations of those state agencies, tribes and environmental groups to call now in the program for additional or different hydrosystem flow, passage and spill objectives and measures for salmon and steelhead than those in the biological opinions would be:

- less effective in protecting, mitigating and enhancing salmon and steelhead in the mainstem than adopting the recommendations of the federal agencies to incorporate the biological opinion measures and objectives in the program (which includes the measures allowing for extensive evaluation of alternative operations), *see* Power Act, § 4(h)(7)(C);
- inconsistent with the information and the comments in the record concerning the most appropriate way to handle the debates over appropriate salmon measures, *id.*, § 4(h)(5), (7)(A), (C);
- inconsistent with an effort to reconcile the conflicting recommendations of all the fish and wildlife agencies and tribes in a way that deals with the river as a system, *see* Power Act, § 4(h)(1)(A), (6), (7), (7)(B);and
- inconsistent with the Council's efforts to assure the region an adequate, reliable, efficient and economical power supply while protecting, mitigating and enhancing fish and wildlife affected by the hydrosystem, *id.*, § 4(h)(5), (7)(A).

General Finding No. 3: Recommendations based on a conclusion that the operations specified in the biological opinions are not optimal or sufficient to protect, enhance or mitigate for the adverse effects of the hydrosystem on resident fish, calling for the Council to adopt objectives and measures for that purpose that would be supplemental to the biological opinion operations, or would require a shift in current implementation of the biological opinions but within the apparent flexibility of the opinions; or would be in conflict with biological opinion operations. Two sets of recommendations best illustrate the recommendations in this category. The Spokane and Colville Tribes recommended reservoir elevation minimums for Lake Roosevelt to benefit resident fish in the lake that would result in Grand Coulee operations and summer river flows in the lower river different from the Grand Coulee operations in the NOAA Fisheries 2000 Biological Opinion. And the Montana Department of Fish, Wildlife and Parks recommended summer operations at Hungry Horse and Libby dams to benefit resident fish in the reservoirs and in the river reaches below the dams that would change operations at both projects compared to biological opinion operations and reduce summer flows in the lower river.

The Council defers to the judgments of these fish and wildlife agencies and tribes as to what would be the most appropriate operations to protect and mitigate the resident fish in the areas under their jurisdictions. And so the Council reflected these recommendations in the mainstem amendments, to a certain extent. But, the operations recommended by these entities for resident fish were often inconsistent with the systemwide water management operations in the salmon and steelhead biological opinion and the operations recommended to the Council by the salmon agencies and tribes to protect and mitigate the salmon populations of the system. The comments on the draft amendments and the Council's own power system analysis also indicated that implementation of the alternative operation at Grand Coulee would have significantly more adverse effects on the ability of the hydrosystem to meet electricity demand in the region. The Council concluded, in the face of this conflict, that it would not be an improvement to ignore or back away from the baseline operations recommended to the Council for salmon and steelhead protection in order to provide operations for resident fish based on other agency and tribal recommendations. And again, the Council believes the solution to this dilemma is for the Council and the other entities to work within the flexibility and adaptive management principles in the hydrosystem measures of the salmon and steelhead biological opinion.

Thus, as noted above, the Council did include strategies to benefit resident fish species, both listed and non-listed, that in some cases conflict with the current implementation of the measures in the salmon and steelhead biological opinion. The Council does not mean by that action that the federal operating agencies should act contrary to the biological opinions in order to implement these other strategies in the Council's program. The Council's intent instead is that the federal

operating agencies make every effort practicable to use the operational flexibility inherent in the biological opinions to meet the biological opinion requirements and implement the other strategies in the Council's program.

For example, the Council calls for spring and summer operations at Grand Coulee consistent with biological opinion operations and with ordinary hydrosystem power operations, but then calls on the federal agencies, working with the tribes, the Council and others, to work toward meeting the reservoir elevations and water retention times recommended by the Lake Roosevelt area tribes when possible. The Council took an additional step with regard to summer operations at Hungry Horse and Libby, calling on the federal agencies to implement the operation recommended by Montana (limits on reservoir drafting that result in higher reservoir levels and steady outflows) as an experimental design within the adaptive management capabilities of the hydrosystem measures of the biological opinion. The Council called on the operating agencies to consult with a team formed from the Council, the Independent Scientific Advisory Board and others to design the experiment, with the hypothesis that the proposed operations will significantly benefit listed and non-listed resident fish in the reservoirs and in the portions of the rivers below the reservoirs without discernible effects on the survival of juvenile and adult anadromous fish when compared to ordinary operations under the biological opinions. The Council noted that little hard information exists about the relationship, if any, between levels of flow, flow augmentation and juvenile and adult salmon survival through the lower Columbia hydrosystem reach. The Council concluded that the experiment called for would allow for that kind of information to be gathered in a systematic way, while also testing the predicted benefits of the proposed operation to resident fish.

In conclusion, the Council adopted modified versions of these types of recommendations for the reasons described here and finds what it adopted to be:

- consistent with an effort to reconcile the conflicting recommendations of all the fish and wildlife agencies and tribes in a way that deals with the river as a system, *see* Power Act, § 4(h)(1)(A), (6), (7), (7)(B);
- more effective than the original recommendations in the protection, mitigation and enhancement of *all* the fish and wildlife affected by the hydrosystem, *id.*, § 4(h)(7)(C); and
- consistent with the best available, if at times conflicting, scientific knowledge presented by different fish and wildlife agencies and tribes to support conflicting recommended operations for the fish species of their particular concern, *id.*, § 4(h)(6)(B), (7), (7)(B), (C).

General Finding No. 4: Recommendations based on the conclusion that the biological opinions exceeded what is necessary in terms of flows and spill to benefit listed fish, to the unreasonable detriment of the power supply and other uses of the river, and so the Council should call for scaled-back flow and spill operations, or at least immediate evaluations of the current operations, to determine the most biologically and economically efficient operations to allocate the region's limited resources. In this category, for example, the Columbia-Snake River Irrigators Association, Eastern Oregon Irrigators Association, Northwest Irrigation Utilities and Idaho Water Users recommended that the Council call for reductions in flow augmentation and spill compared to what is in the NOAA Fisheries biological opinion. Similar to recommendations based on concerns that measures in the biological opinions were insufficient (See General Finding No. 2), these recommendations carried into the Council program amendment process a dispute these entities have with NOAA Fisheries and the salmon managers in general as to the biological efficacy and cost effectiveness of the flow and spill measures for salmon.

The Council declined to adopt recommendations of this type for a number of related reasons. The recommendations that would have the Council call for reduced spill and flow operations as not needed for salmon and steelhead were not supported by any of the fish and wildlife agencies and tribes concerned with salmon, whatever the differences among them. Moreover, statutory responsibility for deciding which hydrosystem actions to take to protect

and improve the conditions for listed species lies with NOAA Fisheries and the U.S. Fish and Wildlife Service, not with private entities challenging those agencies. Except in unusual circumstances, the Council will defer under the Power Act to the biological judgments of the fish agencies and tribes on these matters. That is especially true here, where the biological opinions represented the culmination of a complicated multi-year process by the federal fish and operating agencies to evaluate the effects of hydrosystem operations on the listed species spread throughout the Columbia. As noted, that process included a thorough airing of the different views and information of all the interested entities, including the fishery agencies and tribes, federal operating agencies, Bonneville customers and other industry groups, environmental groups and others, resulting in an extensive administrative record and resolution of the key issues by NOAA Fisheries in the final salmon and steelhead biological opinion.

This does not mean that the Council considers these recommendations to raise frivolous issues. As also noted above, considerable scientific uncertainty exists as to what are the optimal levels of flow and spill for salmon and steelhead survival. A number of the recommending entities from industry — from the Public Power Council and the Pacific Northwest Generating Cooperative, for example — did not recommend that the Council adopt specific spill and flow operations contrary to the biological opinions, but did raise the point that some scientific information calls into question whether the extensive spill and flow measures in the biological opinion are required to obtain the levels of survival that salmon need through the hydrosystem. Moreover, these measures are costly to the region's power system. And so these entities recommended that the Council place a high priority on flow and spill evaluations aimed at determining the most cost-effective levels of spill and flow. Based in part on recommendations of this type and on supporting information and comments submitted by Bonneville customers and industry groups, the Council recognized the need for aggressive testing of certain assumptions and uncertainties embedded in the biological opinion measures as they relate to spills, flow augmentation, reservoir drafting and other matters, in order to determine what are the most biologically effective spill, flow and other mainstem operations and actions at the minimum cost to the power system. And as explained above, the salmon and steelhead biological opinion allows for precisely these kinds of evaluations and adaptive management actions.

For these reasons, to the extent that the recommendations in the category call for the Council to adopt specific spill and flow actions contrary to and less than the hydrosystem measures in the biological opinions, the Council concludes that adopting these recommendations would be less effective in protecting, mitigating and enhancing salmon and steelhead in the mainstem than adopting the recommendations of the federal agencies to incorporate the biological opinion measures and objectives in the program (which includes the measures allowing for extensive evaluation of alternative operations), *see* Power Act, § 4(h)(7)(C), and would not be consistent with giving due weight to the recommendations and expertise of the fish and wildlife and agencies or tribes or complement their existing and future activities, *id.*, § 4(h)(6), (7), (7)(B).

Regional Power System Problems

The Power Act requires the Council to adopt a fish and wildlife program that not only protects, mitigates and enhances fish and wildlife but also ensures that the region will continue to enjoy an adequate, efficient, economical and reliable power supply. With regard to the latter, the Council evaluated current hydrosystem operations under the biological opinions, the recommendations for mainstem amendments and the draft and final mainstem amendments to ensure that the adopted objectives and measures for mainstem hydrosystem operations are consistent with the Council's power supply obligations.

Energy systems, markets and policy changed radically since the last revision of the fish and wildlife program in the mid-1990s. Federal hydrosystem operations in 2001 brought a concrete example of a problem that the Council had seen developing over the last half-decade — electricity demands placed on the federal hydrosystem were increasingly

greater than what the federal system could produce in a year of historically low runoff and river levels. The Bonneville Power Administration did not acquire new, long-term resources that could have closed the gap, largely due to the dynamics of regional and West Coast energy developments. Additional problems with West Coast power markets in 2000 and 2001 prevented Bonneville from being able to make up the energy deficit in those markets through power purchases, leading to a situation in 2001 in which the federal agencies curtailed regional load and reduced system operations intended to benefit fish and wildlife in order to maintain the reliability of the region's power system. Even with significant changes to the hydropower operations specified for fish, the system still produced inadequate energy to meet the region's demands. This forced many of the region's utilities to curtail loads while still spending large sums to purchase power. When surplus energy was available for purchase, it was at a cost that resulted in significant rate increases and made it difficult to maintain an economical power supply in the region.

For these reasons, the Council's analysis of the adequacy, efficiency, economy and reliability of the region's power supply, which accompanies the mainstem amendments and these findings (Appendix A to the 2003 Mainstem Amendments), includes consideration of the current status of the region's power system. The Council's conclusion is that the region's power system should be adequate and reliable for the next few years due to the development of new power supplies, reductions in demand and loss of loads that have occurred since early 2001. The objectives and measures to protect, mitigate and enhance fish and wildlife included in the mainstem amendments do not affect that conclusion. The analysis also concludes, however, that the region faces the possibility in later years of spiraling back into the power supply problems seen in 2001 unless measures are taken to ensure that new resources are added to the regional power supply in a more certain fashion. The analysis suggests possible actions by the federal agencies and others in the region to ensure that the federal system provides the specified operations for fish and wildlife and meets the electricity demands in most, if not all, low-water years. The Council is reviewing and revising its 20-year power plan as called for by the Act. The power plan will address the region's power supply and reliability issues in more detail.

General Finding No. 5: Given this context, the Council received a number of recommendations relating to power supply and power planning actions. This is unusual for a fish and wildlife program amendment process. These included recommendations from the Columbia River Inter-Tribal Fish Commission, the Columbia Basin Fish and Wildlife Authority, the State of Oregon, the Northwest Energy Coalition, the Save Our Wild Salmon coalition, and others. The thrust of these recommendations was that the Council should call for hydrosystem operations, system configuration changes and energy resource actions that would allow the system to provide the operations needed for fish even in low water years, while also ensuring that the region has an adequate, reliable, efficient and economical power supply. The Council does not disagree with the premise or goals of these recommendations. The Act calls for hydrosystem operations and a regional power system that provide both protection for fish and wildlife and for an adequate, reliable and economical power supply. One of the central tasks faced by the Council in the revision of the power plan is to help ensure both of these goals in the long run. Deferring full consideration of this matter to the power plan is appropriate, given the conclusions of the Council in the analysis of the region's power supply and the effects of the fish and wildlife measures on that power supply, which showed resources to be adequate in the near term.

The Council also received power supply-related recommendations from Bonneville customer groups, such as the Public Power Council and the Pacific Northwest Generating Cooperative, recommending that the Council call for evaluations and decisionmaking processes that analyze fish and wildlife actions to determine their impacts on the region's power supply and to search aggressively for efficiencies and cost-effectiveness in fish and wildlife operations. The Council agreed with these recommendations, too, as described above — calling for changes in evaluations and decisionmaking processes to better incorporate power supply considerations and calling for rigorous evaluation of current flow and spill measures and alternatives to determine what levels of both are necessary to provide the biological benefits needed for fish at the least cost to the power system.

Summary of Specific Recommendations and Findings

In this section, the Council sets forth its findings on the specific mainstem recommendations. As most of the recommendations fit into the categories analyzed above, the general findings the Council made for recommendations in those categories apply to most of the specific recommendations, as explained here. The specific recommendations are briefly summarized in this document; the recommendations in full are available as Council Document No.2001-16, and may also be found on the Council's website at http://www.nwcouncil.org/library/recommend/mainstem/Default.htm. Written comments on the draft mainstem amendments and the recommendations are also posted on the Council's website, at http://www.nwcouncil.org/fw/program/mainstem/2002-16Comments/default.asp.

Federal and State Fish and Wildlife Agencies and Indian Tribes, collectively

Recommendation No. 9: Columbia Basin Fish and Wildlife Authority

The Columbia Basin Fish and Wildlife Authority is the collective voice of the basin's state and federal fish and wildlife agencies and Indian tribes. The Authority recommended that the Council's mainstem amendments at a minimum must accommodate implementation of the provisions of National Marine Fisheries Service and U.S. Fish and Wildlife Service's 2000 Biological Opinions. The Authority also noted that the Northwest Power Act requires that the Council set a broader standard than the Endangered Species Act for rebuilding the basin's fish and wildlife resources, and thus recommended that the Council's mainstem plan provide for more than the survival and recovery of listed fish and wildlife by being amended consistent with the management objectives and recommendations of the fish and wildlife managers regarding all fish and wildlife affected by the hydrosystem.

The Authority recommended that collectively the Columbia River Inter-Tribal Fish Commission tribes' *Spirit of the Salmon Plan,* the upper Columbia tribes' *Blocked Area Management Plan* and the biological opinions provide what is needed for listed and non-listed resident fish and salmon and strike a balance between fish and wildlife and the other purposes for which the system is operated, consistent with the purposes of the Northwest Power Act. Thus, the Council should adopt measures for the basin's hydrosystem sufficient to accommodate implementation of all the measures in these plans. To the extent there may be inconsistencies in fish and wildlife measures among these plans, the fish and wildlife managers should resolve these matters, not the Council. The Council should assist by adopting a process in which the managers will bring forward their resolution of inconsistencies among plans for approval by the Council.

The Authority also recommended that the Council use all of the tools available to resolve the region's power supply problems, including an emphasis on conservation, alternative energy technologies and creative use of energy markets. This is needed to ensure that operations for fish and wildlife become hard constraints on the system, to prevent curtailments of fish operations during low water conditions, to provide for improved or additional fish operations in the future and to allow for river flows that more closely approximate the natural hydrograph.

As highlighted in the section containing the general findings, the Council acted consistently with this recommendation in a number of ways. Among other things, the Council:

- incorporated the measures of the biological opinions as the baseline for the mainstem system operations of the program;
- agreed with the general point that the Power Act contains a different legal standard than the Endangered Species Act, encompassing a broader set of affected fish and wildlife and a protection and mitigation goal beyond preventing extinction and delisting of endangered or threatened fish, and agrees that the Council must

adopt program measures that give due weight to the expertise and responsibilities of the fish and wildlife managers and complement their activities;

- worked, on this basis, to accommodate the recommendations of the different agencies and tribes *within* the context of biological opinion operations, such as:
  - Grand Coulee operations based on recommendations by the upper Columbia tribes to protect resident fish populations in Lake Roosevelt important to the tribes;
  - experimental summer operations at Hungry Horse and Libby dams based on recommendations from the Montana Department of Fish, Wildlife and Parks to provide improved conditions for fish in the reservoirs and in the river reaches below the dams;
  - a number of objectives and strategies to benefit non-listed salmon and steelhead drawn from or consistent with the recommendations of the state agencies and the Inter-Tribal Fish Commission, including a set of mainstem habitat objectives and strategies; an objective to increase fall chinook spawning in the mainstem; smolt-to-adult survival rate interim objectives and a process to investigate extending these objectives; objectives and strategies designed to shift water management over time so that patterns of flow more closely approximate natural hydrographic patterns; an objective of meeting state water quality standards; equal priority protection for Hanford Reach fall chinook; and spill and transport strategies that state an equal priority for protection of non-listed naturally spawning and hatchery populations important to the tribes and states;
- included provisions recognizing that operations to improve conditions for salmon and steelhead migration may conflict with operations to protect or enhance mainstem habitat for salmon and steelhead or resident fish, and calling on the system operators and the fish and wildlife agencies and tribes to identify potential conflicts, priorities, trade-offs, and opportunities and consult with the Council, affected entities and the public on how best to resolve conflicting needs.

Also, as explained in **General Finding No. 5**, the Council agreed with the basic premise that there is a need to ensure that the hydrosystem can provide the specified operations for fish and wildlife while the power supply meets electricity demands of the region in most if not all years. The Council's power system analysis accompanying these findings concluded that, because of developments since 2001, the region's power system should be adequate and reliable for the next few years and not unduly vulnerable to curtailment of flow and spill operations for fish in low water conditions. But, the region faces the possibility of spiraling back into the power supply problems seen in 2001 unless measures are taken to ensure that new resources are added to the regional power supply in a more certain fashion. The analysis suggests actions that federal agencies and others in the region could take to ensure that the federal power system provides the specified operations for fish and wildlife and meets electricity demands even in low water years. The analysis also notes that the Council is revising its 20-year power plan as called for by the Northwest Power Act and that the power plan will address the region's power supply and reliability issues in more detail. Further consideration of the power supply recommendation will be deferred to the power plan revision.

On the other hand, the Council did not adopt recommendations that would call now for implementation of spill, flow and dam modification measures that clearly conflict with or cannot be accommodated within the measures of the biological opinions, even if they came from the state fish and wildlife agencies or Indian tribes, for all the reasons explained in **General Finding Nos. 2 and 3**. Instead the Council emphasized the need for evaluations and experimental management, which it believes can be accommodated within the biological opinions. These evaluations and management actions will systematically review whether operations additional to or different than the biological opinions can better protect all of the multiple populations and species of salmon, steelhead and resident fish in the mainstem while providing a reliable, adequate and economical power supply for the region.

Federal Fish and Wildlife, System Operation and Environmental Agencies

Recommendation No. 22: National Marine Fisheries Service, United States Fish and Wildlife Service, Corps of Engineers, Bureau of Reclamation

Recommendation No. 4: Bonneville Power Administration

Recommendation No. 8: National Marine Fisheries Service

The federal agencies — Bonneville, the Corps of Engineers, the National Marine Fisheries Service (now NOAA Fisheries), the Fish and Wildlife Service and the Bureau of Reclamation — recommended that the Council adopt objectives and measures in its program consistent with the objectives and measures in the NMFS' and USFWS' 2000 FCRPS Biological Opinions, and that the Council and its program assist in the implementation of these biological opinions and of the action agencies' implementation plans derived from the biological opinions. The Council adopted this recommendation in that it incorporated the hydrosystem objectives and measures in those biological opinions into the program. **General Finding No. 1.**

Bonneville added a number of recommendations on specific issues, such as operating the system in a manner that focuses increasingly on the natural ecological functions that support salmon mitigation and recovery, passage and water quality (dissolved gas and water temperature) actions, performance standards for mainstem system operations, critical uncertainties in the mainstem, mainstem habitat and more. The Council concludes that the specifics of almost all of what Bonneville recommended on these points came from or were based on provisions of the salmon and steelhead biological opinion and are covered by the general finding noted above.

Both NOAA Fisheries and Bonneville recommended that the Council's mainstem amendments consider the effects of conditions in the estuary, plume and near-shore ocean on salmon and the effects of hydrosystem operations on that estuary, plume and near-shore environment. The Council adopted mainstem habitat objectives and strategies calling for water management to allow flows to approximate natural hydrographic patterns more closely, an objective that applies to flows in the estuary and plume. And the Council adopted the more specific objective and strategy of identifying, protecting, enhancing, restoring and connecting ecosystem functions in the Columbia River estuary and nearshore ocean discharge plume as affected by actions within the Columbia River mainstem, calling for an evaluation of flow regulation and changes to estuary-area habitat and biological diversity.

Bonneville also recommended that the Council adopt a number of provisions relating to water allocation and water rights, including the possible effects on system operations and Bonneville funds of settlement ideas being discussed in the Snake River Basin Adjudication, moratoria on additional consumptive use withdrawals, and a possible interstate agreement to protect instream water rights. The Council did not adopt these recommendations. The Council did adopt, in the 2000 Program and in the 2003 Mainstem Amendments, habitat objectives and strategies for enhancing mainstem and tributary habitat, providing appropriate flows and working toward more natural hydrographic patterns as key to that habitat quality. The Council also adopted a provision in the 2000 Program for funding water acquisitions as one of the strategies in a habitat-based program. The Council concludes that this is appropriate guidance for the Council to provide on these types of issues at the system level. The states and others involved in water allocation and water rights matters are encouraged to manage their water allocation issues within this context. To the extent that specific areas have water quantity problems, the Council defers consideration of those matters to the relevant subbasin plans, including the individual mainstem reach plans, that will be prepared and proposed for inclusion in the program.

Recommendation No. 7: United States Environmental Protection Agency

The Environmental Protection Agency recommended that the Council's mainstem amendments reflect or incorporate the priorities, schedules and work efforts of the joint state, EPA and tribal effort to establish state and tribal standards under the Clean Water Act for temperature and dissolved gas in the mainstem Columbia and Snake rivers. The Council adopted a general objective of meeting state and federal water quality standards under the Clean Water Act.

States and State Fish and Wildlife Agencies

Recommendation No. 6: Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife recommended a number of strategies and ecosystem objectives, including:

- include the elements of the biological opinions as the base for mainstem operations and hydrosystem configuration to address ESA-listed fish;
- because the Council has the responsibility to provide additional actions to accommodate non-listed species and the broader mitigation objectives under the Power Act, integrate into the program elements of such plans as the draft Chelan/Douglas Public Utility District Habitat Conservation Plan, the Vernita Bar Agreement, and the Grant Public Utility District Spill Memorandum of Agreement;
- improve the health of the estuary and the river below Bonneville Dam;
- protect the limited amount of mainstem spawning habitat for salmon and sturgeon below Bonneville Dam;
- mitigate for the coastal and nearshore fish and wildlife losses due to hydrosystem-induced changes to the Columbia River plume;
- improve upstream and downstream migration survival rates through the hydro system; improve the operational reliability of juvenile and adult fish passage facilities, in particular the reliability of adult attraction water supplies;
- maintain the ecological integrity of the Hanford Reach, particularly by addressing the negative impacts of slumping at the White Bluffs; take further actions to limit fry stranding and entrapment of Hanford Reach fall chinook;
- preserve and enhance white sturgeon populations throughout the mainstem, including the discontinuous populations above Bonneville Dam;
- in blocked areas such as Lake Roosevelt, support efforts to maintain the resident fish communities that serve as ecological, cultural and economic substitutes for lost anadromous populations;
- manage predator populations that have benefited from ecosystem alterations (such as the Northern Pikeminnow, spiny rays, cormorants and Caspian Terns), and whose predation rates on native fish populations are considerably elevated over historical levels, to minimize negative impacts on salmon;
- continue mitigation for hydrosystem operational impacts on currently established riparian zones, while recognizing that mitigation for construction losses to inundated riparian zones has been largely accomplished;
- develop a coordinated information system — efforts currently underway through the Regional Assessment Advisory Committee should help frame that need.

The Council adopted provisions consistent with the bulk of the department's recommendations, including provisions that:

- incorporate the elements of the biological opinions as the program's base for mainstem operations and hydrosystem configuration;
- recognize the responsibility for accommodating non-listed species and the broader mitigation objectives under the Power Act as described above;

- call for priority protection for the Hanford Reach habitat and protection of and improvements in spawning and rearing flows for fish that spawn there;
- call for protecting and increasing the limited amount of other spawning habitat in the mainstem;
- allow for review and the possibility of endorsement of habitat conservation plans;
- include objectives and strategies for protecting and improving habitat conditions in the estuary and near-shore area, especially as related to hydrosystem-induced changes to the Columbia River plume;
- emphasize the need for improvements in upstream and downstream migration survival rates through the hydro system, including the need to improve the overall effectiveness of the adult fish passage facilities;
- include objectives and strategies for protecting and enhancing abundance and productivity of white sturgeon populations throughout the mainstem, including the discontinuous populations above Bonneville;
- support the efforts in Lake Roosevelt to protect and increase important resident fish communities as substitution for lost anadromous populations; and
- call for protection and improvements in riparian habitat to increase the survival and production of wildlife species in the mainstem affected by the development, operation, and management of the hydrosystem.

The department's recommendation did not call for specific operations for salmon and steelhead (or for resident fish) that would be in conflict with the operations that are called for, or are possible to accommodate, under the biological opinions. In the event the department's recommendations could be interpreted to call implicitly for operations beyond the biological opinions, that way, the Council did not adopt that approach, for the reasons given in **General Finding Nos. 2 and 3.**

The department also recommended that the Council take action to help resolve the power supply problems that led to curtailment of fish operations in 2001, so that fish operations become a hard constraint on system operations and curtailments of fish operations are not used in lieu of establishing an adequate and reliable power supply. **General Finding No.** 5 (and *see* the accompanying discussion of the power supply issue) and the discussion in response to the similar recommendation of the Columbia Basin Fish and Wildlife Authority respond to this recommendation..

Recommendation No. 5: State of Oregon
Recommendation No. 14: Idaho Department of Fish and Game

The State of Oregon, through the Oregon Department of Fish and Wildlife, submitted extensive recommendations in all mainstem areas, including a significant set of water management, flow and spill measures for salmon and steelhead, many of them different from NOAA Fisheries' biological opinion.

Recommendations in this latter category included increased spring and summer flow objectives at Lower Granite Dam and increased fall/winter flow objectives at Bonneville; increased summer drafts from storage projects under certain conditions; additional water out of the upper Snake and out of the Canadian part of the Columbia; implementation of the VARQ flood control modification at Libby and Hungry Horse only under certain conditions; increased spill at The Dalles and the Snake projects; and a juvenile transportation operation that would reduce juvenile transportation under low flow conditions. The Council did not adopt these recommendations, as explained in **General Finding No. 2**.

On the other hand, Oregon recommended a number of measures for salmon and steelhead consistent with the biological opinions, and the Council adopted these provisions by incorporating the measures of the opinions into the pro-

gram and in some cases by adopting or emphasizing provisions of interest to Oregon, if not always as detailed. This includes recommendations and program amendments calling for:

- systemwide review of flood control;
- flow and spill operations that match the biological opinion measures;
- a program objective to meet state and federal water quality standards under the Clean Water Act, reflecting specific Oregon recommendations for long-term actions to meet temperature, gas and toxic standards;
- objectives and strategies to protect biodiversity and favor fish passage methods that are consistent with natural fish migration and river processes;
- continued support for the "spread-the-risk" transportation approach and the concept of improving in-river conditions to reduce the need to rely on transportation;
- recognition that spillway passage continues to be an effective inriver passage route, more benign in general than juvenile bypass systems;
- dam modifications and passage improvements such as spillbay deflectors, removable spillway weirs, and surface bypass collectors, as well as improvements in turbine design and operation;
- necessary planning and evaluations to ensure that alternative actions including breaching of Snake River dams can be implemented on a timely basis if non-breach alternatives fail to meet ESA performance standards for the listed Snake River populations (Oregon recommended that such an action is consistent with the NOAA Fisheries biological opinion; the Council stated that its policy on breaching is consistent with the approach of NOAA Fisheries); and
- improvements in annual and in-season decisionmaking on hydrosystem operations by constructing a hydro operations decisionmaking forum that includes state, tribal and federal management expertise in both biological and power system issues.

Oregon also recommended a set of amendments relating to white sturgeon, bull trout, resident fish in general, and wildlife. The Council adopted provisions consistent with these recommendations, if often not as detailed. For example, Oregon recommended a set of objectives and actions to benefit white sturgeon, including a particular McNary operation to optimize spawning. The Council adopted an objective of enhancing the abundance and productivity of white sturgeon to rebuild and sustain naturally spawning populations and harvest, including operating the hydrosystem to maximize spawning and rearing success. For wildlife, Oregon recommended protecting and improving riverine and riparian habitats and reducing limiting factors to wildlife in the mainstem; the Council adopted an objective to that end.

Finally, Oregon recommended improvements in the way the power system is developed and managed so that hydrosystem operations to meet fish and wildlife needs are viewed as minimum environmental compliance standards for the hydropower system, just as air quality standards are minimums for fossil fuel power plants. The region's power supply system should be designed and operated to meet power needs while ensuring that appropriate hydro system operations for fish and wildlife recovery are provided in all years. **General Finding No.** 5, the accompanying discussion of the power supply issue, and the discussion in response to the similar recommendation of the Columbia Basin Fish and Wildlife Authority respond to this recommendation.

The Idaho Department of Fish and Game recommended a set of amendments similar to Oregon's in approach, if not as extensive and with some differences in detail. The explanation as to how the Council addressed Oregon's recommendations applies here as well. For example, the department recommended a few operations for salmon

and steelhead additional to or different from the biological opinion (such as 24-hour spill to higher gas caps in certain instances) that the Council did not accept, for the reasons explained in **General Finding No.2**. On the other hand, the department emphasized a set of salmon and steelhead provisions that are consistent with how the Council understands the biological opinions, such as flood control evaluations; measures to reduce water temperatures; juvenile transportation operations and evaluations; general principles regarding passage; adult passage improvements; and more. The Council adopted provisions consistent with the recommendations. Finally, the department recommended smolt-to-adult survival rates that the Council adopted as an interim objective.

Recommendation No. 12: Montana Department of Fish, Wildlife and Parks

The Montana Department of Fish, Wildlife and Parks recommended a set of objectives and strategies intended to improve habitat conditions for listed and non-listed resident fish in the headwater storage reservoirs and the stretches of river below their dams, especially Hungry Horse and Libby dams in Montana, and for wildlife in the areas affected by the headwater reservoirs. These recommendations include:

- restore populations of native fish and wildlife to self-sustaining levels capable of supporting harvest;
- restore normative conditions in the seasonal pattern and stability of river discharges and reservoir conditions;
- operate dams to provide reservoir operations that are consistent with VARQ and IRC concepts by 2002;
- reduce the frequency of refill failure (to within five feet of full pool) at Hungry Horse and Libby Reservoirs as compared to historic operations;
- implement seasonal flow windows and flow ramping rates in the Flathead and Kootenai Rivers downstream of the storage reservoirs; establish a gradual ramp-down of river flows after the spring runoff to maintain stable discharges, especially during the biologically productive summer months, to benefit native species;
- mitigate impacts in the rivers below Libby and Hungry Horse Dams by planning a steady draft from July through September; the standard should be a 10-foot draft, not 20;
- maintain minimum flows in the Flathead and Kootenai Rivers;
- reduce runoff forecasting error by increasing the number of snow monitoring sites and improved remote-sensing technology;
- re-vegetate the top 20 feet of the varial zone in Hungry Horse and Libby reservoirs (where possible in low gradient areas);
- protect, restore, and enhance riparian/wetland habitat above and below Hungry Horse and Libby Dams, meeting the annual goals set forth in management and mitigation plans;
- restore in-channel habitat structure, function, and complexity;
- restore riparian and wetland habitats and floodplain function;
- complete an operational impact assessment and develop plans to mitigate for any impacts that the operations of Hungry Horse and Libby Dams may cause to the development and successional trends of riparian wildlife habitats and their associated aquatic components, in cooperation with ongoing fisheries mitigation activities;
- maintain temperatures within the tolerance range of native fish species;
- operate selective withdrawal devices at Hungry Horse and Libby Dams to mimic the natural thermal regime in the rivers downstream;
- improve riparian and in-stream habitat using stream channel and riparian habitat restoration methods;
- meet the federal Clean Water Act TMDL (Total Maximum Daily Load) goal for reduction in phosphorus;

- support new techniques for bank stabilization as alternatives to the standard riprap material (these new techniques would serve as demonstration models for the reduction of sediment to the mainstem and lakes);
- protect critical wetland and riparian habitats through acquisition or conservation easements; identify and rank all high priority areas and establish purchase/protection mechanisms; and
- work with the Focus Watershed Coordination projects in the Flathead and Kootenai drainages to identify site-specific wetland/riparian restoration projects and coordinate with landowners, agencies and other funding sources.

The Council adopted mainstem amendments largely consistent with these recommendations, at least with respect to:

- general objectives and strategies for mainstem habitat;
- general objectives and strategies regarding riparian, wetland and floodplain habitat for fish and wildlife affected by the hydrosystem;
- objectives and strategies toward more natural hydrograph patterns, which include matching seasonal patterns and the stability of river discharges and reservoir conditions;
- the VARQ flood control strategy implementation, which is in the biological opinions;
- the minimum flow regimes for sturgeon and bull trout, consistent with the Fish and Wildlife Service's biological opinion and these recommendations; and
- a general objective of meeting Clean Water Act water quality standards, which would include a TMDL for phosphorus.

The summer operation recommended for Hungry Horse and Libby is not consistent with the current summer operation for those dams under the salmon and steelhead biological opinion. For that reason, the Council did not adopt the recommendation in the sense of simply calling for its implementation. However, the Council believes it is possible to test these operations under the biological opinions, calling for their implementation as an experiment with the hypothesis that the proposed operations will significantly benefit listed and non-listed resident fish in the reservoirs and in the portions of the rivers below the reservoirs without discernible effects on the survival of juvenile and adult anadromous fish when compared to ordinary operations under the biological opinions. **General Finding No 3;** *see also* **General Finding No. 2**.

Finally, the department's recommendation contained a number of specific habitat actions in the areas affected by the existence and operation of Hungry Horse and Libby dams. These would be more appropriate to consider as part of the subbasin plans for those areas.

Indian Tribes

Recommendation No. 1: Columbia River Inter-Tribal Fish Commission

The Columbia River Inter-Tribal Fish Commission (CRITFC) provided by far the most extensive set of mainstem recommendations. The recommendations included a set of new objectives and measures, as well as an edited version of the mainstem sections from the 1994 program, retaining much of the detail. The summary here is intended to capture the range of topics included in the recommendations, with special emphasis on what is new and on the topics the Commission itself emphasized; the full details of the Commission's recommendations are on the Council's website at http://www.nwcouncil.org/library/recommend/mainstem/01.htm. Scientific reports and other documents submitted by the Commission in support of the recommendations can be found in the bound volumes of the recommendations, Council Document No. 2001-16, Vol. 1.

Mainstem habitat

As a general matter, all of the recommendations of the Commission were intended to improve habitat conditions in the mainstem for salmon and steelhead and other species that spawn, rear, rest or migrate through the mainstem Columbia and Snake rivers. Recommendations specifically focused on systemwide water management and on migration passage are addressed further below; in this section the focus is on recommendations that either generally concerned habitat conditions and population responses or that were specifically focused on protecting and increasing mainstem spawning and rearing habitat. A summary of the recommendations for mainstem habitat objectives and strategies includes:

- emphasize healthy rivers and watersheds with abundant and diverse species assemblages and their management, maintenance and restoration, with particular attention to ecosystem diversity, productivity and stability;
- emphasize natural production of fish provided by such rivers and watersheds;
- reintroduce and restore anadromous fish to the rivers and streams that historically supported them, in numbers sufficient to provide for the needs of the ecosystem and people, in perpetuity;
- protect critical estuary habitat and restore former estuary habitat; restrict new dredging and improve existing dredging management practices;
- configure and operate the hydrosystem to:
  - maximize inriver juvenile anadromous fish survival and health consistent with flows and dam and reservoir operations established in the CRITFC 2000 and 2002 River Operations Plans;
  - maximize adult anadromous fish health, survival and spawning capacity;
  - maintain, protect and enhance currently healthy natural riverine conditions and habitat;
  - restore, rebuild and reclaim such conditions and habitat where they have been altered or destroyed;
- increase smolt-to-adult return rates to 4-6 percent for Snake River and upper Columbia salmon and steelhead by 2008;
- reduce pre-spawning mortality by 50 percent by 2006;
- improve water quality in the mainstem Columbia and Snake rivers by:
  - meeting the gas supersaturation and temperature standards under the Clean Water Act;
  - reducing or eliminating toxic pollution sources and other contaminant discharges in compliance with applicable water quality criteria (at a minimum);
- protect the Hanford Reach — re-establish normative river conditions in the Hanford Reach and designate the reach under the federal Wild and Scenic Rivers Act;

- passage behind barriers — 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);
- restore normative river conditions to provide spawning, resting and rearing habitat for salmon and steelhead in the mainstem of the Columbia and Snake rivers by 2006;
- provide a mainstem hydrograph that resembles the shape of the normative hydrograph;
- provide 9,000 acres of spawning habitat for Snake River fall chinook by 2006; and
- provide 40 miles of fluvial spawning habitat for mid-Columbia fall chinook core populations identified by the Independent Scientific Group in *Return to the River 2000* (Council Document 2000-12) by 2008.

The Council adopted a significant set of objectives and strategies to identify, protect, restore and extend mainstem habitat, consistent with and in significant part based on the recommendations of the Commission. These provisions focused on protecting, restoring and enhancing the river's ecological functions for spawning, rearing, resting and migrating salmon and steelhead to sustain abundant, productive and diverse populations and communities. Consistent with the recommendations summarized above, these habitat provisions emphasized such matters as:

- managing the water through the system to more closely approximate natural hydrographic patterns;
- an emphasis on allowing biological diversity to increase among and within populations and species to increase ecological resilience to environmental variability;
- protecting, enhancing, restoring and connecting ecosystem functions in the Columbia River estuary;
- meeting state and federal water quality standards under the Clean Water Act, including actions to reduce toxic contaminants;
- an interim objective pending further consultations of contributing to achieve smolt-to-adult return rates in the 2-6 percent range;
- an objective to "increase the amount of spawning habitat for fall chinook core populations in the lower and mid-Columbia area and in the lower Snake area," which recognized the Commission's recommended numerical target but then called for consultation with others before considering actual adoption of numerical objectives;
- specific protection for the Hanford Reach (the Council did not call for designation of the reach under the Wild and Scenic Rivers Act, as that is out of the reach of the federal operating agencies to whom the program is primarily addressed); and
- restoration of anadromous fish into mainstem areas currently blocked by dams, where feasible.

Water Management

Moving the system back to a natural hydrograph was the keystone to the Commission's overall objective of creating the appropriate habitat conditions for salmon and steelhead and other fish in the Columbia. The Commission recommended:

Overarching objectives of water management

Manage water resources to mimic more closely the 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 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:

- restore normative river conditions to provide spawning, resting and rearing habitat for salmon and steelhead in the mainstem of the Columbia and Snake Rivers by 2006;
- provide a mainstem hydrograph that resembles the shape of the normative hydrograph;
- improve conditions for salmonid production by increasing flow and water velocity, decreasing downstream migration time for anadromous fish and decreasing the quantity of habitat for predatory and competing fish species while endeavoring to provide inriver conditions to maximize adult fish survival between dams, and while providing reservoir and river conditions to protect resident fish;
- manage storage and flood control to provide flood peaks and floodplain habitat; and
- manage water to eliminate stranding and other problems associated with the use of the hydrosystem especially for peaking purposes.

Natural hydrograph strategy and flow targets

- Modify the current flow management strategy in which seasonal targets have not been met on a seasonal, weekly or daily basis. Also, the existing operating strategy of seasonal, flat-target flows fails to protect salmon in early portions of emergence and migration periods before April 10 and after the planning date of August 31. The planning dates for the salmon migration should be modified to begin on March 20 and end on September 30; over 80 percent of the adults migrate through the mainstem after August 31.
- Reshape river runoff to a normative hydrograph. Use state-of-the-art forecasting tools and sliding scales appropriate for the runoff year, with a peak that is timed to that of predevelopment runoff at each one of the three major river points — Lower Granite, Priest Rapids and The Dalles. Table 1 specifies peak flow levels at the three major index sites for low, medium and high flow years, based on January-July runoff:

Table 1.	Sliding Scale Normative Hydrograph Peak Flows		
Index Site	Low (52-84 maf)	Medium (85-105 maf)	High (>106 maf)
The Dalles	336 kcfs	420 kcfs	504 kcfs
Priest Rapids	249kcfs	300 kcfs	360 kcfs
Lower Granite	90 kcfs	120 kcfs	156 kcfs

- Use flow augmentation, changes in flood control and other actions as needed, implemented through firm power planning, to meet sliding-scale flow augmentation targets at The Dalles, Priest Rapids and Lower Granite dams, based on the January-July runoff volume forecast on April 1. Achieve a peak hydrograph of at least 420

kcfs at The Dalles in average water years and a sliding scale based on the January-July runoff at The Dalles in other water years. Achieve peak hydrographs at Lower Granite and Priest Rapids dams. For average volume forecasts, use normative flow values shown in Table 2, below. For above-average volume forecasts, use 120 percent of the normative flows (130 percent for Lower Granite Dam). For below-average volume forecasts, use 80 percent (The Dalles), 83 percent (Priest Rapids), or 75 percent (Lower Granite) of the normative flows. Table 2 shows the recommended flows (in kcfs) for an average water year to create a normative hydrograph:

Flow (kcfs)	Lower Granite	Priest Rapids	The Dalles
January	30	70	125
February	40	70	125
March 1-15	40	70	130
March 16-31	50	90	150
April 1-15	70	140	220
April 16-30	80	170	270
May 1-15	100	240	370
May 16-31	120	260	390
June 1-15	110	300	420
June 16-30	90	275	380
July 1-15	50	240	300
July 16-31	45	195	250
August 1-15	40	175	220
August 16-31	40	150	195
Sept.1-15	35	130	170
Sept.16-30	30	95	130
October	20	80	110
November	30	70	125
December	30	70	125

- Limit chum spawning, incubation and early emergence flows below Bonneville Dam to 125 kcfs.
- Maintain flows at the Hanford Reach at no more than 70 kcfs during daylight hours and nighttime moonlight hours of the adult bright fall chinook spawning period (approximately October 20- November 22). Ensure, with the assistance of the Mid-Columbia public utility districts, that Hanford Reach fall chinook fry are provided with an increasing hydrograph from March 15- June 20 as measured on a daily basis.
- Make available, on a real-time basis, runoff, reservoir storage, hydrological and system operating model results to tribes and federal and state fish and wildlife agencies to enable timely and informed fish migration operational decisions.
- Once the normative hydrograph is established in any particular year, the federal operators should meet recommended flow regimes on at least a weekly basis.

Specific strategies to achieve flow objectives

Flood control:

- Modify flood control to provide for fish flows, reservoir refills and energy production. The Corps of Engineers should relax and seek flexibility in rigid, overly conservative flood control rule curves to recreate normative hydrographs, reclaim mainstem and estuarine floodplain habitat and ensure that storage reservoirs meet biological criteria. Flood peaks and floodplain habitat are key factors in regulating the existence and productivity of fish populations. 1-3.5 million acre feet of water could be made available for spring and summer salmon migrations basinwide by incorporating more flexible flood control management:
  - Use state-of-the-art forecasting tools to implement necessary flood control flexibility to meet reservoir elevation objectives and normative hydrograph index points described above to meet at least a 420 kcfs peak at The Dalles in early June for all runoff years.
  - Seek flexibility in flood control in storage reservoirs basinwide.
  - Manage late fall and winter flood control releases of Bureau of Reclamation storage in upper Snake reservoirs during late August and September to augment flows for adult fall chinook and steelhead. Data from the Bureau of Reclamation indicate that many upper Snake River reservoirs are near full during the late summer and fall months and must be evacuated for flood control in the winter.
  - BPA shall purchase at least 0.5-1 MAF of flood control storage space from Canadian entities to store water to create the normative hydrograph and to ensure that storage reservoirs meet IRC and other biological criteria.
  - In the long term, complete and implement a basin-wide review of flood control focusing on additional flood control flexibility.

Reservoir Storage and Flow Augmentation:

- Develop a coordinated plan of operation for flow augmentation as part of effort in meeting flow targets.
- Reservoir storage should be managed to meet normative hydrograph objectives, IRCs and other biological criteria.
- Grand Coulee, Libby and Hungry Horse dams:
  - The normative river concept calls for stabilizing upstream storage reservoirs by using integrated rule curves and other biological curves established for Libby, Hungry Horse and Grand Coulee dams consistent with the findings of the ISAB.
  - The order of priority for releasing water from Columbia upstream reservoirs for flow augmentation should be Grand Coulee, Libby and Hungry Horse dams.
  - Operate Libby and Hungry Horse to integrated rule curves and stabilize Lake Roosevelt to elevation 1283 during August and September. In order to assure these criteria, at least 500 kaf of water intended for Banks Lake should remain in Lake Roosevelt.
  - Do not fill Lake Roosevelt above elevation 1283 during September, but pass all inflows to the lower Columbia.
  - Complete gas abatement structural designs to reduce total dissolved gas from Grand Coulee Dam to meet water quality standards. Investigate alternatives that can result in temperature control as well as gas abatement. Seek funding to implement the alternative that best meets both temperature and gas standards by December 2005.

- Dworshak Dam:
  - Normative river concept calls for stabilizing upstream storage reservoirs by utilizing integrated rule curves and other biological curves established for Dworshak consistent with the findings of the Independent Scientific Advisory Board.
  - Follow the Nez Perce Tribe and State of Idaho Management Plan. Flexibility is needed in the timing of Dworshak flood control evacuations. There should be water for a spring and August peak of 14 kcfs. During spring keep the reservoir near full in order to sustain the 14 kcfs flows. In augmenting flow for Snake River spring migrants, limit outflow to 12 kcfs unless temporary gas variances and approval have been obtained from the Nez Perce Tribe and the State of Idaho. The reservoir should be filled to elevation 1600 by early June. Keep Dworshak full until August 1 unless water quality concerns force earlier evacuation. Flows for the first half of September should be 12 kcfs to support adult passage in the Clearwater and flush remaining juveniles.
  - The Corps of Engineers shall operate Dworshak to elevation 1600 by August 1.
  - Allow Dworshak to draft to elevation 1,520 feet by the end of September, if needed to assist in meeting the summer basin flow and velocity objectives. Concurrence by the Nez Perce Tribe and the State of Idaho is necessary to use storage below elevation 1520 feet. Seek funding assistance for necessary modifications to recreational and commercial facilities to allow Dworshak Reservoir to operate at reduced levels to improve survival of fall chinook.
  - Continue to evaluate whether releasing cool water from both Dworshak Dam and the Hells Canyon Complex during August and September improves adult fall chinook survival.
- Brownlee Dam:
  - FERC should require Idaho Power Company to use upper Snake water to keep the Brownlee reservoir near elevation 2058 and pass all additional flow. Brownlee should remain near full pool until storage is needed to augment fish flows.
  - As needed to meet operational flow or temperature objectives, operate Brownlee Dam to provide up to 110,000 acre-feet of water in the spring for flow augmentation. Pass inflow in June (do not refill). Draft Brownlee to a minimum of elevation 2,067 to provide up to 137,000 acre-feet in July. Pass through the full complement of upper Snake water provided by the Bureau of Reclamation in June, July and August. Provide at least 100,000 acre-feet in September.
  - Continue to evaluate whether releasing cool water from both Dworshak Dam and the Hells Canyon Complex during August and September improves adult fall chinook survival.
  - Investigate and implement operations and configurations to reduce total dissolved gas from the Hells Canyon Complex as necessary to meet water quality standards.
- Additional water — Snake and Columbia:
  - The Bureau of Reclamation, Bonneville and the states to provide: By 2002, an additional 500,000 acre-feet of water from the Snake River Basin; by 2003 a further 500,000 acre-feet; and by 2005 a further 500,000 acre feet (for a total of 1,500,000 acre-feet over and above the 427,000 acre-feet currently called for) to augment flows in the lower Snake River in the April 10 through the September 30 time period. All water should be used to benefit both Snake and Columbia river migrants, with no corresponding reduction in Columbia River flows unless the Columbia River flow/velocity objective is being met. This water may be obtained through willing seller/buyer transactions, other non-structural approaches, new storage or a

combination of such alternatives. The states should cooperate to ensure that this water will be allowed to move freely downstream, undiminished by diversion.

- Reclamation to secure an additional 0.5 maf from Banks Lake and/or the Columbia Basin Project to enhance flows and reservoir storage requirements.
- Bonneville shall purchase an additional 1 maf from Canadian storage.

Seasonal Drawdowns:

- Implement an experimental drawdown of Lower Granite Reservoir to elevation 723 by June 20 to augment the declining Snake River hydrograph and to improve critical rearing habitat and passage for subyearling fall chinook. Do not fill the reservoir until October 31, after adult migrants have passed upstream of the reservoir. Operate the remaining Lower Snake reservoirs at Minimum Operating Pool until November 1.
- Drawdown and maintain John Day and McNary reservoirs to plus or minus 1.5 feet of minimum operating pool from March 20-October 31.

Power peaking, ramp flows, stranding and other problems associated with fluctuations of the hydroelectric system

- Manage water to eliminate stranding and other problems associated with the use of the hydrosystem, especially for peaking purposes.
- To prevent stranding of juvenile migrants and to maintain riparian community integrity, Dworshak releases should be ramped at a rate of 6 inches per hour as measured at the Clearwater gauge below Dworshak Dam. Adjust Dworshak release temperatures to meet the 68-degree water quality standard at Lower Granite Dam.
- In the Hanford Reach, for naturally spawning fall chinook, reduce power peaking from federal projects upstream to ramp flows at a rate of no more than 2 inches per hour during the early emergence of Hanford fry (March 20-April 20). Comply with the spawning and emergence flow plan for Vernita Bar incorporated into the FERC license for Priest Rapids Dam. Annually implement a flow plan that reduces fluctuations to no more than plus or minus 10 percent of daily average flows for the previous 24-hour flow period from the time of emergence to the time that Hanford fry have migrated from shoreline areas, as determined by tribes and fishery agencies. Consider amending the Vernita Bar Agreement to include the stranding flow plan; continue to fund fishery agency and tribal monitoring of juvenile stranding in the Hanford Reach; expand funding to increase the robustness of loss estimates.
- At the Hells Canyon Complex, limit all flow reductions by ramping rates of no more than 6 inches per hour as measured at Lime Point. Such impacts have caused fishery managers to invoke ramping rate criteria to limit power peaking activities in tributaries to less than a two-inch per hour change to shoreline areas. Modify operation of the Hells Canyon Complex to provide coordinated fall and spring flows below Hells Canyon Dam to maintain fall chinook spawning, incubation and emergence. Evaluate options for providing more water from Brownlee, including substantially improved ability to shape water from Snake River Basin for spring and summer migrants, and mechanisms for selected cool water releases.

The Council adopted a number of provisions that are consistent with, if far from as detailed as, key elements of the Commission's water management recommendations. The Council's central strategy for water management, consistent with the Commission's approach, is to manage water so that patterns of flow more closely approximate the natural hydrographic patterns and are directed at re-establishing natural river processes where possible. Particular ways in which the adopted amendments reflect the Commission's recommended principles is shown in this detail from the program:

- Manage water through the hydrosystem so that patterns of flow more closely approximate the natural hydrographic patterns and are directed at re-establishing natural river processes where feasible, and produce the highest possible survival rates for a broad range of affected fish within the physical limitations of the multiple purposes of the region's storage reservoirs and hydrosystem. Ensure that any changes in water management are premised on, and proportionate to, fish and wildlife benefits, while assuring the region an adequate, efficient, economical, and reliable power supply. Elements of this general strategy for water management include:
  1) Frame habitat restoration in the context of measured trends in water quantity and quality.
  2) Allow for seasonal fluctuations in flow, including floods. Reduce large and rapid short-term fluctuations. Reduce or eliminate stranding and other problems associated with fluctuation of the hydroelectric system.
  3) Increase the correspondence between water temperatures and the naturally occurring regimes of temperatures throughout the basin. To the extent possible, use stored water to manage water temperatures below the storage reservoirs where temperature benefits from releases can be shown to provide improved fish survival.
  4) Identify, protect, and restore ecosystem functions in the Columbia River estuary and nearshore ocean discharge plume as affected by actions within the Columbia River hydrosystem. This includes evaluating flow effects, river operations and estuary-area habitat changes, as well as local effects from activities such as dredging and pollution from urban areas, to better understand and improve the relationship between estuary and near-shore plume characteristics and the productivity, abundance and diversity of salmon and steelhead populations.
- Systemwide water management, including flow augmentation from storage reservoirs, should attempt to meet the needs of anadromous and resident fish species in the river and upstream storage reservoirs so that actions taken to benefit one species do not unnecessarily come at the expense of other species. Flow augmentation is defined as the intentional release or drafting of water from storage reservoirs for the purpose of increasing flows to enhance migratory conditions for juvenile and adult life-stages of salmon and steelhead through the reach of the lower river hydroelectric dams. The federal system operators, NOAA Fisheries and the U.S. Fish and Wildlife Service should identify potential conflicts and seek recommendations from the Council, fish and wildlife agencies, tribes, and other affected entities on how best to balance the different needs prior to the implementation of flow actions.

Also consistent with the Commission's recommendations, the Council's mainstem amendments attempt to stabilize the reservoir levels and the hydrograph out of the upstream storage reservoirs to protect and enhance resident fish in the reservoirs and in the river stretches below, through such mechanisms as the integrated rule curve operations for Hungry Horse and Libby and the Idaho management plan at Dworshak. The Council also calls for priority protection of the conditions for the Hanford Reach population, by calling for the system operators to:

> Manage flows, while maintaining consistency with this mainstem plan's flow and reservoir operations, to protect, improve, and expand spawning, rearing, and resting habitat in the mainstem and estuary. In particular, the federal and non-federal project operators should provide suitable and stable flows to establish and protect the habitat conditions necessary for spawning and rearing in the Hanford Reach on an equal basis with managing water to support the migration of listed species. This includes providing the flows required by the Vernita Bar agreement and by subsequent agreements to extend stable flows to reduce or prevent stranding problems in the reach. It also includes the need for the Bureau of Reclamation, as the operator of Grand Coulee Dam, and the operators of the mid-Columbia projects to take the steps necessary, separately and together, to further reduce flow fluctuations through the reach that affect spawning and rearing.

The Commission recognized that to implement its approach fully — to achieve a more natural hydrograph and higher flows in spring and summer for salmon while protecting reservoir values in spring and especially summer and providing the other flow benefits called for through the year — ultimately would require a significant re-thinking of flood control operations, so as not to draft the reservoirs too deep for flood control and allow more water to flow through the system at its normative time and not be captured, while still providing the flood protection needed for the health and safety of the river's residents. The Council followed the Commission's recommendation in the sense of calling for the Corps of Engineers to "place a priority on conducting the further comprehensive review of flood control operations called for in the NOAA Fisheries 2000 Biological Opinion."

The Council did not adopt other elements of the Commission's water management recommendations, especially the recommendations for flow targets in the lower river and at Priest Rapids Dam and for the management of the current storage (pending further flood control changes) to meet those targets that are different from and greater than what are called for in the objectives and measures in the biological opinions. The reasons the Council rejected these recommendations are given in **General Finding No.** 2. As noted just above, the Council agreed with the Commission in terms of the general principles that should guide planning and decisions for water management, especially in the long term. And the Council reiterates that rejecting these recommendations does not mean the Council has evaluated the science underlying the different positions and concluded that NOAA Fisheries is correct and the Commission is incorrect in what current operations best meet these principles. Nor does it mean that the Council gave greater weight to the biological judgments of the federal agencies and less or none to the judgments of the tribes. The Power Act requires the Council to give special consideration to program amendment recommendations from these tribes, and the Council recognizes that recommendations of the tribes are based in legitimate interpretations and meanings to be drawn from imperfect scientific information (if different from the interpretations of the federal agency) and from different managerial perspectives and assumptions of risk. Time and more information may reveal that NOAA Fisheries is not correct and the Commission is correct in the conclusions about what operations are needed for salmon and steelhead. But the evaluation and adaptive management framework embedded in the biological opinion measures is the framework in which to pursue these issues.

Passage (spill, bypass systems, transportation, dam breaching)

Here again the Commission presented the Council with an extensive and well articulated set of recommendations. A summary of the Commission's passage recommendations includes:

Basic approach/general passage objectives and strategies

- two biological principles in particular should guide decisions about how to meet standards for fish passage through the hydrosystem:
  - ***protect biodiversity*** — passage solutions must be designed to benefit the range of species, stocks and life-history types in the river, which may require multiple passage solutions at a project
  - ***favor passage solutions that best fit natural behavior patterns and river processes*** — the best passage solutions are those that take into account and work with the behavior and ecology of the species and life-history types using the river system, that mimic the natural situations and processes that migrating salmonids encountered in their evolutionary history;
- ensure 80 percent fish passage efficiency between 2001 and 2004, and 90 percent fish passage efficiency after 2004 (fish passage efficiency (FPE) is defined as passage through a hydroelectric project by non-power house routes) — achieve 80 percent fish passage efficiency at each Snake River project from April 15 to September 30 and at each Columbia River project from May 1 to September 30, while keeping dissolved gas levels within the limits of federal and state water quality standards and ensuring a high degree of adult passage success;

- in coordination with the tribes and state and federal fishery agencies, investigate comparative and relative direct and delayed mortality of fish through screens, turbines and spill at each dam; report to the Council;
- until investigations are completed, spread the risk to juvenile migrants by removing half of the turbine intake screens from all Corps mainstem projects, and provide the necessary spill to achieve a 90-percent FPE.

Transportation

- Transportation should not be used as a device to delay substantial improvements in inriver survival conditions.
- Adopt an interim strategy that substantially reduces and leads to the elimination of the number of fish transported.
- In-season transportation decisions should be made by the fish managers; in the case of stocks listed under the ESA, these decisions will be made by NOAA Fisheries in consultation with other fish managers.

Spill

- For mainstem projects operated by the Corps of Engineers on the Columbia and Snake rivers, provide spill to achieve 80-90 percent fish passage efficiency at each Snake River project from approximately April 10 to September 30, and at each Columbia River project from approximately April 10 to September 30, or as near as possible within the total dissolved gas guidelines established by federal and state water quality agencies:
  - spill to the total dissolved gas waiver level at each mainstem dam for 24 hours a day;
  - limited spill (about 3-5 kcfs per dam) for adult downstream passage should continue until adult salmon and steelhead cease to pass the dams;
  - spill levels can be modified based upon real-time monitoring of physical and biological parameters at the discretion of the tribes and fish and wildlife management agencies.
- Until investigations are completed, spread the risk to juvenile migrants by removing half of the turbine intake screens from all Corps mainstem projects, and provide the necessary spill to achieve a 90-percent FPE; implement water temperature and total dissolved gas reduction and abatement sufficient to comply with the federal Clean Water Act.
- Continue to evaluate and modify mainstem projects to reduce dissolved gas levels during spill operations and to increase spill efficiency (with specific details).

Bypass systems

- Ensure a 98-percent or greater salmon survival rate in all bypass and collection facilities from the deflector screens or surface bypass system entrances to the end of the bypass system outfall.
- Increase survival of smolts in the area below the bypass release points by removing fish predators, protecting migrants from predation by birds, providing alternative release sites, and/or modifying project operations to reduce predation.
- Explore promising new approaches to fish bypass technologies, including development and prototype testing of surface bypass systems, surface spill and behavioral guidance devices, such as the use of curtains to divert fish from turbines; provide annual reports to the Council by October of each year.
- At Bonneville Dam:
  - expedite evaluation of fish passage efficiency at the First Powerhouse and report to the Council modifications that may be needed to meet standards above;

- by April 2003, install modifications to allow operation of the Bonneville Second Powerhouse surface bypass sluiceway;
- by October 2004, complete design and environmental components to install a surface bypass system at the First Powerhouse.

- At Ice Harbor and The Dalles dams:
  - develop and implement a coordinated permanent juvenile passage plan, in consultation with the fish and wildlife agencies and tribes, consisting of a schedule for design and installation of surface bypass systems at Ice Harbor and The Dalles dams.
- At The Dalles and Lower Granite dams:
  - complete prototype testing of a surface flow juvenile bypass system.
- At McNary Dam:
  - continue studies to evaluate fish spill efficiency and modification to meet temperature standards in fish passage facilities; complete by 2003.

Turbine operations and improvements

- Operate turbines within 1 percent of peak efficiency from April 10 through September 30, and especially during peak migration periods; plan and coordinate deviations from the 1-percent peak efficiency criterion with the fishery agencies and tribes.
- Complete the turbine index testing program for each individual turbine unit at all mainstem dams; record deviations from the 1 percent criterion and provide the report to the agencies, tribes and the Council.
- Reduce water level fluctuations from power peaking operations.
- Pursue new and/or improved turbine technology and efficiency.
- Expedite rehabilitation of old generating units.

Adult passage

- As determined by the fish passage committee, the Corps should continue to upgrade existing adult fish passage facilities (with a number of details).
- Conduct adult telemetry evaluations, capable of tracking individual fish to spawning areas for comparison of spawner success and distribution with the populations at large.
- Conduct temperature and hydraulic studies at each dam fishway.
- Note problem areas identified by telemetry, temperature and hydraulic studies and implement structural remedies at all dams by 2005.
- Additional adult fish ladders: new designs and structural improvements to existing ladders and improved maintenance of existing ladders.
- Restrict new dredging and improve existing dredging management practices.
- Implement 24-hour video or automatic fish counting.
- Evaluate the effects of increased spill on adult passage.
- Evaluate the extent and identify the causes of interdam adult salmon losses, including non-dam losses, and take action to address these causes, as necessary.

Control of predators and invasive fish (reducing competition)

- Reduce pikeminnow population by more than 20 percent in the Snake and Columbia rivers with the expectation that this will result in more than a 50 percent reduction in the present consumption of juvenile salmonids (with details on management, evaluation, and research).
- Develop programs to eliminate shad from the Columbia System above Bonneville Dam, including evaluation of alternative upstream passage designs for preventing the upstream passage of shad while allowing salmon and steelhead to pass (with a number of other action and research details).
- Reduce numbers of non-native fish wherever they exist with listed species or weak runs, using any measures practicable, and curtail recruitment of non-native fish into the habitats of listed species and weak runs (with details for action, evaluation and research).
- Monitor and assess predation by birds and identify non-lethal methods of control; continue with moving tern colonies out of the Columbia River estuary.
- Develop a protocol for marine mammal predation control for immediate implementation in the event that evidence indicates control is needed to support listed species' recovery (with details for action and research).

Dam breaching

- Modify Snake River dams to natural river conditions to restore approximately 9,000 acres of spawning habitat for Snake River fall chinook and improve migration survival for juvenile and adult salmon and steelhead and lower water temperatures:
  - restore natural river levels, conditions and habitat by removing earthen embankments at Ice Harbor, Lower Monumental, Little Goose and Lower Granite dams by 2006;
  - beginning immediately, and concluding not later than December 31, 2004, complete all design, engineering and environmental review of facility and operating changes necessary to operate Lower Granite, Little Goose, Lower Monumental, and Ice Harbor at natural river level year-round; include all requirements and impacts relating to power production, flood control, navigation, irrigation and other river uses (with details on planning and coordination);
  - 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 accomplished.
- Draw down the reservoir behind John Day Dam to Minimum Operating Pool (MOP) immediately, and to spillway crest or natural river level by 2008, on a year-round basis to restore approximately 40 miles of spawning habitat for Columbia River fall chinook and also improve migration survival for juvenile and adult salmon and steelhead and reduce water temperatures. Apply for Congressional funding for implementation of Phase II of the John Day drawdown analysis. If funds are secured, implement the analysis following the recommendations and input from the state and federal fishery agencies and affected tribes by December, 2004.

Mid-Columbia passage — spill and passage

- At Rock Island Dam:
  - provide spill to protect 95 percent of the juvenile migrations at a 90-percent FPE level;
  - seek and implement recommendations of the Mid-Columbia Coordinating Committee, including adult passage investigations and passage modifications and structural changes, to bring the project into compliance with water quality standards.

- At Rocky Reach Dam:
  - provide interim spill to protect 95 percent of the juvenile migrations at a 90-percent FPE level;
  - make structural repairs to the spillway so the spillbays closest to the powerhouse can operate independently;
  - complete design and prototype to install a sluiceway through Unit 1 by 2004;
  - implement recommended studies by the tribes and fishery agencies necessary for the relicensing proceeding, and incorporate them into the draft relicensing application;
  - seek and implement recommendations of the Mid-Columbia Coordinating Committee, including adult passage investigations and structural changes to bring the project into compliance with water quality standards.
- At Wanapum and Priest Rapids dams:
  - following the 2000 Spill Settlement Memorandum of Agreement, provide an increased level of spill at both Wanapum and Priest Rapids dams to improve fish passage and survival for 95 percent of both the spring and summer salmon migrants, at a 90-percent FPE level while avoiding dissolved gas supersaturation problems; Mid-Columbia Coordinating Committee will have the responsibility to govern the timing and distribution of spill;
  - explore promising new approaches to juvenile fish bypass technology, including the use of surface bypass systems, by 2003;
  - seek and implement recommendations of the Mid-Columbia Coordinating Committee, including adult passage investigations and structural changes, to bring the projects into compliance with water quality standards;
  - based on results of adult fish passage research and in consultation with the Mid-Columbia Coordinating Committee, identify and correct all adult fishway deficiencies by 2003 at both dams;
  - install state-of-the-art fish counting facilities at both dams by April 2002;
  - in consultation with the Mid-Columbia Coordinating Committee, design prototype structural improvements to the Priest Rapids junction pool by April 2003.
- at Wells Dam:
  - subject to Federal Energy Regulatory Commission approval, ensure that the installed juvenile fish bypass system tailored to the unique features of Wells Dam continues to operate effectively and in accordance with the terms and conditions of the 1990 Wells Settlement Agreement;
  - continue to provide mitigation for unavoidable losses, including sockeye, using the recommendations of the agencies and tribes in the Wells Coordinating Committee;
  - monitor and evaluate water quality parameters and implement operational and structural remedies.
- Working with the Mid-Columbia Coordinating Committee and the Independent Scientific Group's technical group, Bonneville should determine the steps necessary to install PIT-tag detectors on projects in the mid-Columbia.

The Council's response to the Commission's passage recommendations is similar to its response to the water management recommendations. The Council adopted a set of basic principles, objectives and measures for passage consistent with the Commission's recommendations, including the two core biological principles to guide decisions about passage (protecting biodiversity and favoring passage solutions that best fit natural behavior patterns and river processes), which originated in a 1999 Council review and report on the Corps of Engineers' juvenile fish

mitigation program and which NOAA Fisheries later incorporated into its 2000 Biological Opinion. The Council also adopted strategies calling for:

- spill and transportation decisions to take into account as a priority the important non-listed populations of salmon and steelhead in the middle part of the river that cannot be transported;
- transportation to remain a spread-the-risk strategy at the call of the fish and wildlife managers;
- improvements in turbine operations;
- adult fish passage improvements of the types called for in the Commission's recommendations;
- continued recognition of spill as an effective inriver passage route; and more.

Incorporating the hydrosystem measures of the two biological opinions into the Council's program included an extensive set of passage modifications, gas abatement improvements, predator control measures, and so forth, consistent with much of the detail in the Commission's recommendations.

On the other hand, where the Commission recommended specific spill, transport and passage objectives and measures that are different from the spill, transport and passage measures in the biological opinions incorporated into the program, including dam removal, the Council did not adopt those recommendations for all the reasons given in **General Finding No. 2** and reiterated above. The dam modifications and the tests and evaluations called for in the biological opinions will be an appropriate forum for further evolution of optimal passage methods and operations.

Institutional arrangements; annual and in-season decisionmaking; research, monitoring and evaluation

The Commission's recommendations included a host of provisions concerning the procedures and institutional arrangements for making decisions on mainstem actions, for monitoring and evaluating mainstem actions and for mainstem research. Most of these recommendations came in the form simply of continued provisions from the Council's 1994 program. The research, monitoring and evaluation provisions relate largely to the habitat, water management and passage objectives and measures discussed above (some of which are explicitly noted) and also addressed in the responses above. Many if not most have been integrated into the biological opinion measures, and/or are a large part of the ongoing mainstem programs and projects funded and implemented by the federal agencies in consultation and with assistance from the states and tribes. Institutional arrangements include matters such as the organization, oversight and use of the Independent Scientific Advisory Board, addressed in the 2000 Program in a manner consistent with the recommendations here.

Regarding annual and in-season decisionmaking, the Commission recommended that the Council reconstitute the Fish Operations Executive Committee, a group to be appointed by the Council and affected tribes and made up of senior management representatives of the Council, as well as power and fishery interests. The FOEC would then oversee an annual policy and technical process to make the needed annual and in-season plans and decisions on matters such as reservoir operations, flow and temperature regimes, spill, transportation, system configuration investments, water quality investments and the reconciliation of mainstem measures designed to benefit various populations throughout the system. The recommendations then included detail on how this process would work. According to the Commission, re-establishing FOEC in this way is necessary because of problems with the current forums created by NOAA Fisheries, including an inability to foster regional participation, a lack of proper policy-level input and authority focused only on listed stocks.

The Council did not re-establish FOEC, but it adopted a provision otherwise consistent with this recommendation. Recognizing the problems with the current mainstem implementation forum, the Council recommended that the forum be jointly sponsored by the Council and the federal agencies to allow for consideration of broader fish and wildlife and power system concerns and for effective participation in these considerations by the relevant federal agencies, the Council and states, the tribes of the Columbia River Basin and other affected entities in a highly public forum.

Finally, the Commission recommended the continuation of the Fish Passage Center with the functions and arrangements described in the 1994-95 program amendments, plus additional funds to establish two fish passage manager positions, one designated by the federal and state fish and wildlife agencies and one designated by the Columbia River Basin Indian tribes. The Council continued the operation and basic functions of the Fish Passage Center as subordinate to the Executive Director of the Columbia Basin Fish and Wildlife Authority and the fish managers. Responding in part to concerns outside the fish managers about the transparency and accountability of the Center (including recommendations in the 2000 amendment process and the current one, as well, to substantially change the nature of the Center), the Council in the 2000 Program amendments established an oversight board for the Center with representation from the Council, NOAA Fisheries, state fish and wildlife agencies, tribes and others. The purpose of the oversight board is to provide policy guidance for the Center and to ensure that the Center carries out its functions in a way that assures regional accountability and compatibility with the regional data management system. The Council clarified the responsibilities of the oversight board in these amendments. The Council did not call for the funding of a second fish passage manager; in a time of tight budgets and the need to avoid further fragmentation of our institutional arrangements, the Council concluded that the proposal for another manager was not persuasive.

Power system changes

The Commission attached to its recommendations what it called its "Energy Vision for the Columbia River," a "diversified energy portfolio intended to meet the region's energy needs and restore Columbia River salmon." The vision included a set of strategies to meet peak loads at less cost, to distribute generation to avoid large new transmission investments and to use various trading and financial mechanisms to bring more financial stability. The overarching purpose was to ensure that normative flows for salmon are implemented even in low runoff and high energy-cost cycles. Details include matters such as funding 100 megawatts of distributed generation in the next two years; acquiring 1,000 megawatts of peak-load reduction resources in the next 10 years; Bonneville establishing a Conservation Business Line; rates and power pricing that reflect true fish costs and market conditions; fish operations as hard constraints in annual power system planning, and more.

As discussed above in **General Finding No. 5**, the Council agreed with the basic premise that there is a need to ensure that the hydrosystem can provide the specified operations for fish and wildlife while the region's power supply meets the electricity demands of the region. The Council's power system analysis that accompanies these findings concluded that, because of developments since 2001, the region's power system should be adequate and reliable for the next few years and not unduly vulnerable to curtailment of flow and spill operations for fish in low water conditions or adverse power markets. But, the region faces the possibility of spiraling back into the power supply problems seen in 2001 unless measures are taken to ensure that new resources are added to the regional power supply in a more certain fashion. The analysis suggests actions that the federal agencies and others in the region could take to ensure that the federal system provides the specified operations for fish and wildlife and meets the electricity demands in most, if not all, low water years. The analysis also notes that the Council is revising its 20-year power plan as called for by the Northwest Power Act, and that the power plan will address the region's power supply and reliability issues in more detail. Further consideration of the power supply recommendation here will be deferred to the power plan revision; all of the specific strategies recommended by the Commission will be under active consideration.

Recommendation No. 13: Spokane Tribe

The Spokane Tribe recommended a set of objectives and strategies largely focused on providing the appropriate habitat conditions for fish in Lake Roosevelt. These objectives and strategies would establish a balance between operations, actions and funding for salmon and steelhead to protect and improve resident fish as mitigation by substitution for the loss of anadromous fish in blocked areas. The recommendations include:

- Systemwide water management, including flow augmentation from storage reservoirs, must balance needs of anadromous species with those of resident fish species in upstream reservoirs so that actions to advantage one species do not unnecessarily come at the expense of other species.
- To protect spawning and rearing habitat for fish and wildlife in and adjacent to Lake Roosevelt, maintain the minimum elevation and water retention time operating conditions from Section 10.8B of the 1994-95 Program, until data from a fisheries evaluation program indicate the criteria should be changed:

Month	Minimum Elevations	Water Retention Times:
January	1270’	45 days
February:	1260’	40 days
Mar-Apr15:	1250’	30 days
Apr16:	1255’	30 days
May:	1265’	35 days
June-Dec:	1288’	40-60 days, or maximum historically achievable/month

- Continue the Lake Roosevelt monitoring and evaluation program. As more is learned about impacts of reservoir operations, Grand Coulee operations should be adjusted in response to minimize impacts on the tribe’s resources. Also, the wealth of information being collected should serve as the basis for Integrated Rule Curves for Grand Coulee operations. Adaptive management is needed to update Grand Coulee operations criteria in response to information from the Lake Roosevelt Fisheries Evaluation Program, to a systemwide flood control alternatives study, and to cultural resource surveys.
- Consistent with the 2000 biological opinions, the Corps of Engineers should fund appropriate studies of the potential for reconfiguration of the federal hydrosystem facilities and/or operating strategies to manage better for flood control with reduced impacts on fish and wildlife. Adjust operations as knowledge is gained through these studies.
- If necessary, mitigate for operations to implement the biological opinions that adversely affect fish and wildlife in the Blocked Area.
- Initiate as soon as possible the “long-term planning study to include consideration of reconfiguration and operational alternatives that could provide benefits for fish and wildlife on a broad scale” described in the hydrosystem strategy titled “Longer-term Planning Perspectives” in the 2000 Fish and Wildlife Program.
- Habitat restoration: Rebuild populations by protecting and restoring habitats. Provide habitat suitable to recover Columbia River white sturgeon. Manage riparian areas to protect the aquatic system and form transition zones to floodplain terrestrial areas. Protect low-elevation winter range habitat for wildlife. Encourage development of ecological connectivity between major habitat types. Require and fund creation of littoral habitat and fish structure along shores of Lake Roosevelt to diversify food available to fish and provide additional juvenile fish rearing habitat. Immediately and fully fund the remainder of unmitigated wildlife habitat losses, enabling managers to acquire promptly the management authority necessary to restore and protect core habitat areas.

- Until drastic habitat alterations in the connected mainstem habitats of the Columbia and Spokane Rivers are addressed, support native fish recovery efforts focused on tributary habitats to maintain genetic integrity of native assemblages. Recognize that drastically altered habitats currently available largely favor non-native species and stocks, which have been substituted successfully for recreational fisheries but have not addressed tribal subsistence losses.
- Use Spokane Tribal Water Quality Standards as targets for Lake Roosevelt water quality.
- Restore passage of anadromous fish into the blocked area ecosystem. Reestablishing anadromous passage at artificial barriers should include passage into the vast habitat upstream of Grand Coulee Dam. Approve funding for the sequence described in the Upper Columbia United Tribes' recommendations for the 2000 Program Framework — that is, feasibility and engineering studies and eventual facility investments to restore anadromous fish passage above Chief Joseph and Grand Coulee dams.
- Recognize tribal water rights.
- Remain focused on a participatory process to coordinate decisionmaking, rather than locking into a fixed operational strategy for the hydrosystem. The current system operations decision processes are inadequate. The Council should enhance the regional process to be broader than ESA, and involve state and tribal fish and wildlife managers in focused discussions with NOAA Fisheries and the Fish and Wildlife Service to reconcile specific measures, with the goal of having the two agencies declare that federal operating agencies can avoid jeopardy by complying with the Council's Fish and Wildlife Program. Revive and support the Columbia Basin Forum (previously known as the Three Sovereigns) as the template for a workable solution.
- Adopt a definite fish and wildlife budget that provides adequate funds, ensures equitable distribution of funds and provides participation as well as project funds. The fish and wildlife managers should be given the opportunity to participate, beginning in the early stages of the development of this budget.

The Council adopted a number of mainstem amendments consistent with the Spokane Tribe's recommendations, including:

- the basic principle that systemwide water management must balance the needs of anadromous and resident fish affected by the hydrosystem;
- a set of consistent mainstem habitat objectives and strategies in general and for the Lake Roosevelt area in particular;
- an emphasis on having the federal agencies conduct the systemwide flood control review called for in the biological opinion;
- a call to pursue restoration of anadromous fish in mainstem areas blocked by dams where feasible;
- a recommendation to sponsor jointly the regional hydrosystem decisionmaking forum to broaden participation and incorporate factors such as those expressed in the tribe's recommendations;
- an objective of meeting water quality standards under the Clean Water Act;
- an objective and strategy to stabilize and improve white sturgeon populations; and
- a wildlife habitat objective consistent with the wildlife mitigation objectives and strategies in the 2000 Program.

Also, a number of these recommendations were already addressed in the basinwide provisions of the 2000 Program amendments, including:

- he continuation of the resident fish substitution policy in the areas blocked to salmon and steelhead;

- the strong preference for the use of native species, with the recognition that proposals to use non-native species to match significantly altered habitats may overcome that strong presumption;
- recognition and protection of water rights, including tribal water rights (also part of the Power Act itself); and
- the principles of program implementation, project funding and project review and funding.

The specific details of implementation projects and funding allocations are more appropriately addressed in the project review and funding processes.

The Council adopted operating criteria for Lake Roosevelt to protect resident fish consistent with and based on the underlying principles of the tribe's recommended criteria, although not precisely the same. But, the Council did so in the context of also incorporating the measures of the biological opinion operations into the program as the baseline of operations. So, the Council called for spring and summer operations at Grand Coulee Dam consistent with biological opinion operations and with ordinary hydrosystem power operations, but then also called on the federal agencies, working with the tribes, the Council and others, to attempt where possible to meet the reservoir elevations and water retention times preferred by the Lake Roosevelt area tribes. Thus the Council adopted a revised form of this recommendation, as explained in **General Finding No. 3;** *see also* **General Finding No. 2**.

Recommendation No. 10: Colville Confederated Tribes

The Colville Tribes submitted recommendations that cover much of the same subject matter as the Spokane Tribe, including:

- recognition of the importance of the resident fish substitution policy to mitigate for the blockage of salmon and the need for system operations that provide the appropriate habitat conditions for these fish in Lake Roosevelt;
- the need to include measures to protect, mitigate and enhance all resident fish in hydropower system storage projects to the fullest extent practicable from negative impacts associated with basinwide water management;
- an overall goal and set of strategies to support tribal and non-tribal harvest and cultural and economic practices as well as the long-term sustainability of native fish and wildlife species in native habitats where possible, while recognizing that where impacts have irrevocably changed the ecosystem, there is a need to protect and enhance the habitat and species assemblages that remain;
- the need for a comprehensive review of the current flood control program to determine if flood control rule curves could be relaxed in order to provide additional water;
- investigation of the feasibility of reintroducing anadromous fish above Chief Joseph and Grand Coulee dams;
- investigation of measures to improve mainstem spawning and rearing habitat conditions throughout the Columbia River, including in the tailrace of Chief Joseph Dam;
- development of a plan to improve water quality in the Upper Columbia River mainstem, in that both temperature and total dissolved gas concentrations exceed acceptable water quality standards; and
- an initiative to stabilize populations of white sturgeon in the mainstem Columbia River above Grand Coulee Dam and prevent further declines and possible extinction.

The Council adopted a set of amendments consistent with, although less detailed than, these recommendations, as partly explained above in the response to the Spokane Tribe's recommendations. The Colville Tribes included a recommendation calling for the continued development and implementation of a fish entrainment deterrent system at Grand Coulee Dam. The Council did not include a provision quite that detailed, but agrees that this is one of

the implementation actions necessary to investigate consistent with the stated objective of providing the conditions needed to protect and build the fish populations in the lake to levels capable of supporting harvest consistent with the goals of the Colville and Spokane Tribes.

Environmental, Fishing and Conservation Groups

Recommendation No. 3: Save Our Wild Salmon
Recommendation No. 21: Northwest Resource Information Center, Inc.

The Save Our Wild Salmon coalition and the Northwest Resource Information Center, Inc., recommended that the Council call for a series of flow, spill and dam modification measures for salmon more extensive than called for in the biological opinions. The recommendations included adopting the flow and spill recommendations of Oregon and the Idaho fish and wildlife departments, such as additional water volumes to meet modified flow targets and 24-hour spill at all projects. The Northwest Resource Information Center, Inc. also recommended that the Council call now for the breaching of the four lower Snake dams; Save Our Wild Salmon recommend that the Council plan for breaching the lower Snake River dams if non-breach options fail to meet ESA requirements, by calling for the necessary planning and evaluations to ensure that alternative actions including breaching of the dams can be implemented on a timely basis if non-breach alternatives fail to meet rebuilding objectives. To the extent these groups recommended that the Council include flow, spill and dam breaching recommendations to benefit listed salmon beyond what is called for in the biological opinions — which is the essence of these recommendations — the Council did not adopt these recommendations for the reasons explained in **General Finding No. 2.**

Recommendation No. 11: Northwest Energy Coalition
Recommendation No. 3: Save Our Wild Salmon

The Northwest Energy Coalition and Save Our Wild Salmon recommended a series of strategies for power system operation, energy resource acquisition and Bonneville financial management to ensure the region has adequate and reliable generating capacity and reserves to meet regional load requirements even in low water conditions. This would ensure that there are no power system reasons for the operating agencies to fail to provide the specified flow and spill operations for fish even in low water conditions. As explained in **General Finding No. 5**, the Council agreed with the objective of these recommendations concerning the need to ensure that the hydrosystem provides the specified operations for fish and wildlife while the region's power supply meets the electricity demands of the region in most if not all years. The Council's power system analysis that accompanies these findings concluded that, because of developments since 2001, the region's power system should be adequate and reliable for the next few years and not unduly vulnerable to curtailment of flow and spill operations for fish in low water conditions. But, the region faces the possibility of spiraling back into the power supply problems seen in 2001 unless measures are taken to ensure that new resources are added to the regional power supply in a more certain fashion. The analysis suggests actions that the federal agencies and others in the region could take to ensure that the federal system provides the specified operations for fish and wildlife and meets the electricity demands in most, if not all, low water years. The analysis also notes that the Council is revising its 20-year power plan as called for by the Northwest Power Act and that the power plan will address the region's power supply and reliability issues in more detail. Further consideration of the power supply recommendations herxe will be deferred to the power plan revision.

Utility, Irrigation and Industry Groups

Recommendation No. 17: Columbia-Snake River Irrigators Association, Eastern Oregon Irrigators Association, Northwest Irrigation Utilities
Recommendation No. 19: Idaho Water Users

The irrigation and water user associations recommended various ways in which the Council should call for a shift in current water management operations and flow augmentation away from what is in the biological opinions and past Council programs. The recommendations included elimination of flow targets, specified volumes of storage allocated to spring and summer flows, elimination of upper Snake flow augmentation, and development of additional off-stream and tributary storage (using hydropower revenues gained by reducing mainstem flows to develop tributary water projects). The recommendations also included focusing juvenile passage on those actions that are the most biologically effective and cost-effective, not on strategies that provide conditions that most closely approximate natural conditions, with an emphasis on a full smolt transportation regime, particularly during low flow years, as well as priority for research on improvements in transportation effectiveness.

The Council called for additional priority studies on transportation, but otherwise did not adopt these recommendations for the reasons explained in **General Finding No. 4.**

Recommendation No. 2: Public Power Council
Recommendation No. 15: Pacific Northwest Generating Cooperative
Recommendation No. 18: Nespelem Valley Electric Cooperative

These entities did not recommend that the Council adopt specific flow and spill operations contrary to the biological opinions; in fact, the Public Power Council recommended that the Council tailor its mainstem amendments so that they effectively contribute to federal implementation of the 2000 biological opinions while assuring the region of an adequate, economic, efficient and reliable power supply. But these entities were concerned about the costs to the power system and the region of mainstem system operations for fish, and about the scientific uncertainty underlying many of these measures. Thus they recommended that the Council place a high priority on:

- a comprehensive review of the flow and spill measures;
- monitoring and evaluation aimed at determining what tangible biological benefits are really being attained from flows and spill; and
- determining the real impacts of flows and spill on the adequacy, reliability and economy of the power supply, with the goal of determining the most cost-effective levels of spill and flow. This information would assist in sound policy development.

The entities also recommended that the Council resist calls for additional flow and spill measures until it is demonstrated that these will improve survival and why, at what costs, and that less costly alternatives for achieving the same objectives are not available.

To the extent that these recommendations would have had the Council not incorporate the biological opinion measures into the program prior to a new comprehensive review of their scientific and economic soundness, the Council did not take that approach, for the reasons described in **General Findings Nos. 2, 4 and 5.** And to the extent that the Pacific Northwest Generating Cooperative recommended that the Council subject proposed measures to a cost-benefit analysis, the Power Act does not authorize the Council to use that particular type of analysis to decide on or reject program measures. *Northwest Resource Information Center, Inc. v. Northwest Power Planning Council*, 35 F3d 1371, 1393-95 (9th Cir. 1994). Otherwise, the Council adopted review, evaluation and adaptive management measures consistent with the substance of these recommendations, as described in the same general findings.

Others

Recommendation No. 16: Voith Siemens Hydropower Generation, Inc.

Voith Siemens recommended that the Council pursue advances in the mechanical and operational characteristics of generating turbines to increase fish survival through the turbines, and thus reduce the need for spill, and increase flow rates through the turbines, both of which would increase generation. The Council called for continued study and modifications of turbines and turbine operations to improve fish survival.

Recommendation No. 20: Allan Vernon: Minor

Mr. Vernon: Minor recommended a "water wall fish fence" along both sides of the Columbia to increase salmon spawning. The Council did not adopt this specific recommendation. The Council did adopt a set of objectives and general strategies to increase the extent, diversity, complexity and productivity of mainstem habitat for spawning and rearing, leaving for implementation processes to analyze specific proposals. The Council concludes this was a more effective path to protecting, mitigating and enhancing salmon and steelhead in the mainstem than adopting the specific recommendation from Mr. Vernon: Minor, *see* Power Act, § 4(h)(7)(C).