

DECISION DOCUMENT

Regarding

RESPONSIBILITIES under the ENDANGERED SPECIES ACT,
CLEAN WATER ACT, and ADDITIONAL LAWS

Following the

DECEMBER 2000 NATIONAL MARINE SERVICE
BIOLOGICAL OPINION

and

DECEMBER 2000 U.S. FISH AND WILDLIFE SERVICE
BIOLOGICAL OPINION

on

OPERATION of MAJOR PROJECTS

of the

FEDERAL COLUMBIA RIVER POWER SYSTEM

in

2001 and FUTURE YEARS

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I. SUMMARY

On December 21, 2000, the National Marine Fisheries Service (NMFS) issued a final Biological Opinion after Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin (2000 NMFS BO). On December 20, 2000, the U.S. Fish and Wildlife Service (FWS) issued a final Biological Opinion regarding effects of FCRPS operations upon Kootenai River white sturgeon and bull trout (2000 FWS BO).

This document records the Bonneville Power Administration's (BPA) decision to implement the reasonable and prudent alternative (RPA) described in the NMFS BO, as expressed in 1- and 5-year implementation plans and possibly subsequent consultations.¹ This document also responds to the essential fish habitat conservation recommendations by NMFS pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. 2000 NMFS BO at Part 12. In addition, this document records BPA's plan to meet Clean Water Act responsibilities. BPA intends to implement the RPA consistent with treaties, executive orders, and other Federal laws recognizing Indian Tribes and trust responsibilities to Native American Indian Tribes. BPA will also implement the RPA consistent with its responsibilities to take the Northwest Power Council's Fish and Wildlife Program into account and to give equitable treatment to fish and wildlife.

This document also records BPA's decision to coordinate operation of the FCRPS consistent with FWS' determination of no-jeopardy for bull trout and to implement the FWS BO's RPA for Kootenai River white sturgeon, consistent with applicable law.¹

II. INTRODUCTION

A Actions Reviewed by the NMFS and FWS Biological Opinions (BOs): Operation of Major Projects of the Federal Columbia River Power System and Irrigation Projects

The BPA, the Army Corps of Engineers (COE), and the Bureau of Reclamation (BOR) coordinate operation of major projects of the Federal Columbia River Power System (FCRPS). These projects are Dworshak, Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams, powerplants, and reservoirs in the Snake River basin; Albeni Falls, Hungry Horse, Libby, Grand Coulee, Banks Lake (features of the Columbia Basin Project), and Chief Joseph projects in the

¹ This decision document refers to and highlights particular portions of the 2000 NMFS and FWS BOs. The document's description of portions of the BOs should not be construed to conflict or be inconsistent with the language of the BOs themselves, which BPA intends to implement.

middle and upper Columbia River basin; and McNary, John Day, The Dalles, and Bonneville dams, powerplants, and reservoirs in the lower Columbia River Basin. 2000 NMFS BO at § 1.0, p. 1-3. In addition, these agencies, primarily BPA, undertake significant offsite enhancement of habitat for fish and wildlife adversely affected by these projects.

The FCRPS operates to serve an array of individual project and system purposes. Individual project purposes vary widely but include power generation, flood control, navigation, irrigation, recreation, and fish and wildlife enhancement and protection. Operation of the FCRPS entails coordinated operation of the individual projects, including development and implementation of inter-agency agreements among COE, BOR, and BPA to plan operation and actually operate the FCRPS, and agreements for coordination of operations with Canada and utilities in the Pacific Northwest.

BOR also consulted on the continued operation and maintenance of 17 additional projects that are not part of the FCRPS. While several of these projects include power plants and/or provide flood control benefits, they are all authorized to provide water for irrigated agriculture. 2000 NMFS BO at § 1.0.

B. Responsibilities under the Endangered Species Act

Pursuant to the Endangered Species Act (ESA), NMFS has listed twelve species of salmonids in the Columbia Basin. NMFS BO at 1-6. The recently concluded ESA consultations with NMFS addressed all twelve of these species.

Pursuant to the ESA, FWS has listed several species of animals and plants in the Columbia River Basin. FWS has concurred in writing that FCRPS operations are not likely to adversely affect gray wolf, grizzly bear, peregrine falcon, or any listed plants. 2000 FWS BO at 1. FWS continues to rely on its March 1, 1995, BO finding that FCRPS operations avoid jeopardy to bald eagles. *Id.* at 2. With respect to BOR projects upriver of Lower Granite Dam, FWS continues to rely on a separate BO issued on October 15, 1999. *Id.* at 2. Therefore, because potential changes in FCRPS operations affected two fish species - Kootenai River sturgeon and bull trout - the recently concluded ESA consultations with FWS focused on these species.

The ESA requires Federal agencies, in consultation with NMFS and FWS, to insure that their actions are not likely to jeopardize the continued existence of listed species, that their actions are not likely to result in the destruction or adverse modification of critical habitat, and that they utilize their authorities to further the purposes of the ESA by carrying out programs for the conservation, or recovery, of listed species.² The ESA also proscribes take of listed species,

² 16 U.S.C. § 1536(a).

unless such take is consistent with an incidental take statement or permit issued by NMFS or FWS, or is otherwise exempt from take.³

C. Responsibilities under Treaties with Indian Tribes, the Clean Water Act, Northwest Power Act, and Additional Laws.

The Federal agencies must integrate treaties and other applicable laws into their decisionmaking, including the following.

- The statutes authorizing construction and operation of Federal dams in the Columbia River Basin, and the Columbia River Treaty between the United States and Canada, call for operation of the FCRPS to serve multiple uses, including flood control, navigation, the generation of power and irrigation.
- Treaties with Indian Tribes, executive and departmental orders, fishing and hunting rights, and the concept of government-to-government relations, lead Federal agencies to consult and discuss with Tribes how their actions affect Native Americans.
- The Clean Water Act calls for the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters.
- The Pacific Northwest Electric Power Planning and Conservation Act (NW Power Act) provides that BPA should make expenditures to protect, mitigate, and enhance fish and wildlife consistent with the Pacific Northwest Power and Conservation Planning Council's Fish and Wildlife Program and also provide an economic and reliable power supply. The NW Power Act also requires Federal agencies responsible for managing, operating, or regulating Federal or non-Federal hydroelectric facilities to provide equitable treatment for fish and wildlife and to take the NW Power Council's Fish and Wildlife Program into account to the fullest extent practicable.
- The Magnuson-Stevens Fishery Conservation and Management Act directs Federal agencies to consider recommendations for reducing effects on essential fish habitat.
- The National Environmental Policy Act directs Federal agencies to analyze and consider environmental impacts prior to making decisions.
- The National Historic Preservation Act requires Federal agencies to consider potential impacts to cultural resources.
- Under the Native American Grave Protection and Repatriation Act, Federal agencies must protect the rights of lineal descendants and Indian Tribes and Native Hawaiian organizations to the repatriation and disposal of certain Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony.
- Consistent with the Fish and Wildlife Coordination Act, Federal agencies must give equal consideration to wildlife conservation and,

³ 16 U.S.C. §§ 1536(o), 1538, 1539.

with respect to certain projects impounding a body of water, consult with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service and make adequate provision, consistent with the primary purposes of such impoundment, for the consideration of wildlife resources and its habitat.

Particular sections of the 2000 NMFS BO address not only responsibilities under the Endangered Species Act, but also responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act, under the Clean Water Act, and with Tribes. Consequently, this decision document addresses each of these responsibilities in separate sections.

D. Process Leading to New NMFS and FWS BOs

1. Submission of Multi-Species Biological Assessment and Reinitiation of Formal Consultation

On March 2, 1995, after extensive consultations, NMFS issued a comprehensive biological opinion on the FCRPS (1995 NMFS BO) to COE, BOR, and BPA, (collectively, the FCRPS Action Agencies). After additional consultations, NMFS issued supplemental biological opinions to address impacts of the FCRPS on additional listed species. NMFS' May 14, 1998, supplemental BO addressed effects of the FCRPS on newly listed steelhead in the Upper Columbia River, Snake River, and Lower Columbia River. NMFS' December 9, 1999, supplemental BO evaluated BOR's planned operation to deliver 427 thousand acre-feet of upper Snake River water for flow augmentation and BOR projects in the Snake River system above Lower Granite Dam. NMFS' February 4, 2000, BO considered the effects of FCRPS operations on six additional species that NMFS had listed as threatened or endangered in March 1999.⁴ The FCRPS Action Agencies have operated and configured the FCRPS consistent with these BOs.

The 1995 NMFS BO called for extensive review of long-term options over a 5-year period. The supplemental BOs continued this approach toward longer-term decisionmaking. To complete this process at the end of the 5-year period, the FCRPS action agencies chose to reinitiate formal consultation. To do so, they completed and submitted to NMFS a biological assessment on December 21, 1999, entitled, "Multi-Species Biological Assessment of the Federal Columbia River Power System" and reinitiated formal consultation.

The FCRPS action agencies also submitted to FWS their December 21, 1999, biological assessment entitled, "Multi-Species Biological Assessment of the Federal Columbia River Power System" and reinitiated formal consultation.

⁴For an additional summary of these BOs, see 2000 NMFS BO, § 2.2, pp. 2-1 – 2-2. A complete list of threatened or endangered species under the ESA appears at 2000 NMFS BO § 1.0, pp. 1-6 – 1-7.

2. Formal Consultation

After reinitiation of formal consultation, the FCRPS action agencies met almost weekly with NMFS to prepare, exchange, and discuss information relevant to FCRPS operations and preparation of a biological opinion to insure the agencies use the best science and commercial data available and to determine the reasonableness and prudence of action alternatives. After considering comments from the Action Agencies, NMFS issued a draft biological opinion, dated July 27, 2000, for review by states and Tribes and other interested persons. After a series of meetings with states and Tribes and other interested persons, and, again, almost weekly meetings with the FCRPS action agencies, NMFS issued a final BO on December 21, 2000.⁵

After reinitiation of formal consultation, the FCRPS action agencies also met regularly with FWS to prepare, exchange, and discuss information relevant to preparation of a biological opinion. After considering comments from the Action Agencies, FWS issued a draft biological opinion, dated July 27, 2000, for review by states and Tribes and other interested persons. After meetings with states and Tribes and other interested persons, and, again, meetings with the FCRPS action agencies, FWS issued a final BO on December 20, 2000.

E. Relationship of 2000 NMFS BO to the Basinwide Salmon Recovery Strategy and Standard for Avoidance of Jeopardy

1. Basinwide Recovery Strategy

Beginning in 1999 and continuing through 2000, the Federal Caucus developed a Basinwide Recovery Strategy for salmonid species in the Columbia River Basin. The Federal Caucus consists of representatives from Pacific Northwest regional offices of nine Federal agencies who have met regularly to address ESA and other environmental issues. It includes NMFS, the Corps, BOR, BPA, Environmental Protection Agency (EPA), the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), FWS, and the U.S. Forest Service (USFS).

In December 1999 the Federal Caucus released a draft Conceptual Recovery Plan that outlined difficult choices that the Pacific Northwest must make to recover listed salmon, resident fish, and other aquatic species. After discussions and consultations with states and Tribes, and extensive public comment period,

⁵ BPA is aware of possible litigation to challenge the 2000 NMFS BO and to seek a court order to reinitiate formal consultation. If a court order or other circumstances actually lead to reconsideration of the 2000 NMFS BO and to reinitiation of formal consultation, then, during the re-consultation, BPA anticipates that NMFS and the FCRPS action agencies will conduct again or supplement the extensive review of long-term options called for by the 1995 NMFS BO. BPA anticipates that, during this time, the Federal agencies will operate the FCRPS consistent with the 2000 NMFS BO, to the extent it still applies, and the 1995 NMFS BO.

the Federal Caucus updated the scientific information, considered the comments from Tribes, states, and the public about options and alternatives, and prepared the Basinwide Recovery Strategy. Recovery Strategy at Vol. I, p. 11.

The Recovery Strategy describes a range of potential Federal activities that could meet ESA obligations and rebuild Columbia basin stocks (Basinwide Recovery Strategy). Non-Federal (Tribal, state, local, and private) activities are also considered in the Recovery Strategy to the extent that they can contribute to the recovery of ESA-listed species in the Columbia River Basin. Recovery options are considered and analyzed across each life stage of ESA-listed fish: habitat, hatcheries, harvest, and the hydropower system (the four “Hs” of the salmon’s life cycle, which leads some to call the Recovery Strategy the “All-H Paper.”).

The Recovery Strategy “outlines the expected improvements in hydro, habitat, hatcheries, and harvest needed to meet the goals of the ESA.” 2000 NMFS BO at 9-1, n. 1. NMFS will use the Strategy as a guideline for evaluating actions that affect the listed species. *Id.* Consistency with the Strategy “ensures that actions are both avoiding jeopardy and enabling the recovery of listed species.” *Id.* The success of the Basinwide Salmon Recovery Strategy “hinges on active and effective leadership and significantly improved coordination among Federal, state, Tribal, and local agencies.” Recovery Strategy at Vol. I, p. 8.

The Recovery Strategy establishes a context for new biological opinions. Within this context, NMFS and the FCRPS action agencies engaged in and completed consultations, and NMFS completed the 2000 NMFS BO. The BO’s RPA is a major component of the Basinwide Recovery Strategy. 2000 NMFS BO at § 9.2, p. 9-7.

2. Avoidance of Jeopardy

NMFS concludes that the RPA for the FCRPS avoids jeopardy because, “[t]he increased reliability of implementing the Basinwide Recovery Strategy measures, together with other ongoing Federal measures for survival and recovery specific to other life stages and the improved survival that will result from the hydropower measures of this RPA, ensure that each of the eight ESUs will have a high likelihood of survival and a moderate-to-high likelihood of recovery.” 2000 NMFS BO at § 9.7.4.1, pp. 9-281 *et seq.* (quotation on p. 9-282 – 9-283); 2000 NMFS BO at § 1.3.1.1, p. 1-12. Improvements achieved by the RPA, in combination with improvements from other ongoing Federal actions, and the cumulative effects of state or private activities that are reasonably certain to occur, “should be sufficient to allow the FCRPS and BOR operations [and implicitly other actions as well] to meet the jeopardy standard.” 2000 NMFS BO at § 9.3, p. 9-21. The RPA, “together with the measures identified in the Basinwide Recovery Strategy,” is “sufficient to achieve the biological requirements of the listed ESUs and, thus, sufficient to avoid jeopardy and adverse modification of critical habitat.” 2000

NMFS BO at 9-15. Similarly, the RPA “includes a better-defined commitment by the Action Agencies to fund offsite mitigation activities than did the biological assessment. The RPA also calls for performance standards, a schedule, and a process for ensuring that the offsite mitigation activities of the Action Agencies combined with the activities expected of other Federal and non-Federal entities will achieve necessary survival improvements.” *Id.* at § 9.7.2.12, p. 9-240.

The coordinated effort described by the RPA is the Basinwide Recovery Strategy. Federal actions should complement and encourage state, Tribal, and community efforts, not hinder them. Recovery Strategy at Vol. I, p. 9.

Consistent with the concept that the jeopardy standard requires improvements in all actions, improvements by the FCRPS action agencies should complement and encourage, but not displace or substitute for, efforts by other Federal agencies, states, Tribes, and regional or local entities, and vice versa. 2000 NMFS BO at 9-3,⁶ 21, 135-136, 212; Recovery Strategy at Vol. I, p. 9. Non-Federal actions, such as non-Federal dams on the mainstem Columbia, must also meet the jeopardy standard, taking into account actions in the other Hs. Recovery Strategy at Vol. I, pp.19, 63-64. In this sense, all actions are relevant to salmon survival and recovery.

F. Consideration of Views of States, Tribes, and the Public

The Federal agencies have had several meetings and discussions with Tribes to consider Tribal views and impacts of FCRPS operations upon Tribal interests. For a description of these meetings, please see the section of this document entitled, “Meeting Responsibilities to Tribes.”

The Federal agencies have also had several meetings and discussions with state representatives and with representatives of the Northwest Power Planning Council. States have also participated in the Federal agency executive meetings with states and Tribes on March 16, March 30, April 6 (telephone conference), April 13, April 27, May 11, May 25 (telephone conference), June 1 (telephone conference), June 15 (telephone conference), and June 29, discussed elsewhere in this document.

A comprehensive public involvement process paralleled these Tribal and State discussions. Between March and December 1999, the Federal Caucus initiated a public information process to assist understanding of the complex issues and to

⁶ “Offsite mitigation provided by the Action Agencies will not preclude the need for improvements in habitat, hatcheries, and harvest by other Federal or Non-Federal parties, nor will it diminish the obligation of these other parties to seek improvements in furtherance of Section 7(a)(1) or Section 7(a)(2). Offsite mitigation is intended to complement, not displace, actions by other entities to address habitat, hatcheries, and harvest. Where there are overlaps between offsite mitigation activities of the Action Agencies and the responsibilities of other Federal and non-Federal entities, costs and implementation responsibilities will be shared and coordinated as appropriate.” 2000 NFMS BO at 9-3

participate effectively during the formal public comment period. Federal Caucus representatives participated in numerous stakeholder briefings and public meetings in conjunction with the NW Power Council's Multi-Species Framework Project, which developed broad, longer-term ecosystem goals for all species, not only species listed under the ESA. Between February and March 2000, the formal comment period included fifteen public meetings in five states. Interested citizens had many options for participation, including verbal testimony and tape-recorded testimony during the public meetings, and written or e-mailed comments. The Federal Caucus reviewed and considered over 60,000 written comments, which are summarized, along with responses, in Volume 3 of the Basinwide Salmon Recovery Strategy. See 2000 NMFS BO at § 2.7, pp. 2-9 – 2-12. The Federal Caucus also shared information through a series of "Citizen Guide" newsletters, a new website, and a formal public information meetings.

III. MEETING ESA RESPONSIBILITIES: THE NMFS BO'S RECOMMENDED REASONABLE AND PRUDENT ALTERNATIVE (RPA) FOR AVOIDING JEOPARDY

In their Multi-Species Biological Assessment, the FCRPS action agencies proposed continued FCRPS operations consistent with the 1995 NMFS BO, as they may be revised by the reinitiation of consultation. In its 2000 BO, NMFS concluded that continued operations as described in the 1995 NMFS BO, without sufficient revisions for the long term, was not adequate to avoid jeopardy. NMFS recommended a new reasonable and prudent alternative (RPA) for avoiding jeopardy to listed species and adverse destruction or modification of their critical habitat.

The 2000 NMFS BO presents a long-term RPA for avoiding jeopardy. To avoid jeopardy, the RPA requires satisfaction of performance standards. To satisfy the performance standards, the RPA requires development of 1- and 5-year implementation plans to define and revise particular measures for implementation. The RPA then presents an initial set of particular measures and actions designed to meet the performance standards, subject to revision through the 1- and 5-year planning process. To ensure progress toward the performance standards, the RPA provides for midpoint reviews in 2003, 2005, and 2008. 2000 NMFS BO at § 9.1.5, p. 9-3; § 9.5, pp. 9-37 et seq.

The RPA calls for improvements in fish passage at and between dams and in offsite mitigation for habitat, hatcheries, and harvest in addition to improvements in habitat, hatcheries, and harvest by other Federal and non-Federal parties. 2000 NMFS BO at §9.1.3, pp. 9-2 – 9-3. All these improvements are needed to meet NMFS' jeopardy standard. Id.

A. Performance Standards

The RPA centers on performance standards that will meet NMFS' jeopardy standard as the RPA is implemented through 2010. 2000 NMFS BO at § 9.1.1, p. 9-1. Performance standards are "measures of success" needed for establishing the levels of improvement necessary for survival and recovery. Recovery Strategy at p. 38. First tier performance standards are life-cycle, population-level performance standards required to achieve an adequate likelihood of survival and recovery for that population. Second tier life-stage performance standards allocate the performance expectations needed across each stage of the life-cycle to achieve the population level performance standards. Finally, third tier standards guide the determination of performance standards for particular categories of actions in habitat, harvest, hatcheries and hydro, and are intended to achieve the life-stage performance standards. They allocate expectations needed for each life stage among the types of activities affecting that life stage. Third tier standards can be specific to a group of similar activities such as hydroelectric projects, or even more specific to a particular activity, such as operation of the FCRPS. 2000 NMFS BO at § 9.1.1, pp. 9-1 – 9-2; Recovery Strategy at pp. 38-40.

The standards "depend on clear objectives, measurable results, and accountability." 2000 BO at 9-7. NMFS "will apply the performance standards when determining whether implementation of the RPA continues to satisfy ESA standards." 2000 NMFS BO at 9-7.

The BO recognizes that applicable performance measures may not be met in all years. For example, the fifty-year historical record of water years shows a wide range of water conditions. Consequently, the NMFS BO recognizes that meeting flow objectives and refilling reservoirs "may not be possible every year, especially in low water years." 2000 NMFS BO at p. 9-62. The percentage of water years in which flows at Snake and Columbia River dams will meet or exceed flow objectives is materially below 100%. 2000 NMFS BO at § 9.7.1.3.1, p. 9-190.

B. One- and Five-Year Implementation Plans

To achieve the standards, the RPA calls for rolling 1- and 5-year plans for implementation of measures to achieve these performance standards. The planning process "is critical to achieving the FCRPS hydro and offsite performance standards." 2000 NMFS BO at 9-3, § 9.4, pp. 9-23 *et seq.* The plans "will cover all operations, configuration, research, monitoring, and evaluation actions," as well as offsite habitat, hatchery and harvest actions implemented by the FCRPS action agencies. *Id.* at 9-3. They must prioritize possible actions, integrate all FCRPS operations and configuration, and specify specific actions to be carried out as offsite mitigation. *Id.* at 9-23. Prioritization will be a function of the feasibility of a measure, its probable contribution to

meeting performance standards, and consideration of the best available science and input from states and Tribes. Id. at 9-25.

The FCRPS action agencies are developing these implementation plans. In 2001, the FCRPS action agencies will issue drafts of their first five-year plan, for the years 2002-2006, and their first annual plan, for the year 2002, for public review and comment. The action agencies intend to consider comments on these drafts and to issue final plans later in 2001.

C. Particular Measures and Actions

The RPA describes an extensive set of hydro, habitat, harvest, artificial propagation, and research, monitoring, and evaluation measures designed to achieve applicable performance standards. 2000 NMFS BO at §9.6, pp. 9-53 – 9-180. Hydro measures consist of operational (e.g., flow augmentation and spill) and structural improvements (e.g., extended screens, new outfalls, surface bypass technology, improved turbine designs) to improve juvenile survival in reservoirs and as they pass dams, improving adult survival as they return to spawn, improvements in water quality, and active investigation to reduce or resolve scientific uncertainties. Id. at § 9.6.1.1, pp. 9-53 – 9-55. Habitat measures identify the Action Agencies' contribution to the Basinwide Recovery Strategy and will improve tributary, estuarine, and mainstem habitats. Id. at § 9.6.2, p. 9-133. Harvest measures describe how the action agencies can contribute to development of selective fisheries potentially reducing impacts of harvest on listed fish. Id. at 9-143. Artificial propagation measures describe how the action agencies can assist reform of hatcheries and artificial propagation programs and create an Artificial Propagation Safety-net Program. Id. at § 9.6.4. The research, monitoring, and evaluation plan provides a basis for assessing the effectiveness of the RPA's measures and identifying opportunities for changes. Id. at § 9.6.5, p. 9-161.

However, given uncertainties, changing conditions, and additional information from research, monitoring, and evaluation, these measures are subject to change. As determined through the implementation planning process, the action agencies may revise and change combinations of measures sufficient to meet the performance standards. 2000 NMFS BO at § 9.1.2, p. 9-2. "The RPA allows for revision of the specific measures throughout its term, as long as the Action Agencies make steady progress toward meeting performance standards and remain on track for full attainment of the hydro standards by 2010." Id. at § 9.1.4, p. 9-3. The action agencies will monitor and evaluate their actions under the RPA, "as amended by annual and 5-year plans." Id. at § 9.6.5, p. 9-163. The action agencies may also propose additional measures to substitute for initial measures not implemented. Id. at § 9.4.2.13, p. 9-35.

D. Mid-Point Reviews

To ensure progress toward meeting performance standards, the RPA provides for mid-point evaluations in years 3, 5, and 8 of the BO. 2000 NMFS BO at § 9.5.1, p. 9-37. The evaluation process overlays the 1- and 5-year planning process. Id. In year 3, NMFS will evaluate the Action Agencies' success in developing 1- and 5-year plans and the implementation of actions identified in those plans. Id. at § 9.5.2.3, p. 9-43. In years 5 and 8, in addition to reviewing status of listed stocks, NMFS will ask whether the Action Agencies have implemented the habitat, hatchery, and hydro projects specified in the 1- and 5-year plans. Id. at § 9.5.3.3, p. 9-46; § 9.5.4.3, p. 9-48. For each review, if NMFS determines that implementation is on track, then implementation can proceed. If NMFS instead determines that implementation is not meeting expectations, then NMFS will recommend how the Action Agencies can implement changes through revised 1- and 5-year plans. Id. at 9- 39 (Figure 9.5.2 "Evaluation Flow Chart"), 43 (3-year review), 47 (5-year review), 49 (5-year review). If the status of listed fish does not improve consistent with the estimated level of improvement needed to achieve survival and recovery indicator criteria, and NMFS reasons that solutions cannot be remedied through changes to the 1- and 5-year plans, then NMFS and the action agencies will consider additional efforts, including seeking additional authority from Congress and reinitiation of formal consultation. Id. at 9-47 (3-yr. review), 49 (5-yr. review); for elaboration of the level of improvement needed to achieve the survival and recovery indicator criteria, see § 9.2.2.1 of the BO, pp. 9-8 – 9-11.

E. Allowance for Emergencies, and Declarations of Power System Emergencies in 2001

The NMFS BO allows for adjustments in case of unforeseeable power system, flood control, and other emergencies. 2000 NMFS BO at § 9.6.1.2.3, p. 9-62. However, the action agencies should view emergency actions as a last resort and should not use emergencies in place of long-term investments that could allow fish operations while maintaining other purposes, such as an adequate and reliable power system. Id. Discussion of emergencies of exceptional magnitude or duration should include involvement of regional executives. Id.

The BO's allowance for emergencies is not hypothetical. This year, BPA's load is in excess of resource capability after full implementation of BO measures. Due to poor precipitation during the winter of 2000-2001, the power crisis in California, and unprecedented increases in the market price for power, BPA lacks resources to continually purchase the power needed to meet this deficit. Consequently, BPA has periodically declared power system emergencies, initially on January 18 and most recently on April 2, to draft reservoirs and reduce spill further than otherwise recommended by the BO to meet firm load. For the same reasons, BPA may have to declare emergencies in the future months. For an explanation

of the bases on which BPA has declared power system emergencies and may declare additional emergencies in 2001, see "Power Emergencies – Memorandum for the Record" from Gregory K. Delwiche, Vice President, Generation Supply, to the File, dated February 26, 2001.

To enhance policy-level consideration of the emergencies as well as the low water year, regional executives of the Federal agencies have met almost weekly since December 2000. They have also given presentations to and discussed relevant issues with the Pacific Northwest Electric Power Planning and Conservation Council, states, and Tribes. The Federal agencies also decided to open some of their executive meetings to Tribal and state and other representatives. Federal executive meetings or telephone conferences with Tribal and state representatives have occurred on March 16, March 30, April 6 (telephone conference), April 13, April 27, May 11, May 25 (telephone conference), June 1 (telephone conference), June 15 (telephone conference), and June 29.

To plan operational decisions in a difficult year, the Federal agencies recently developed operating principles for 2001. BPA shared proposed principles with Federal agencies and others for comment on or about February 20, issued a revised version of the principles on or about March 2, and, after receiving comments from states and Tribes, developed a further revised version entitled, "Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations" (March 30, 2001). The Operating Criteria and Priorities present (1) reliability criteria that, if not met, could trigger declarations of emergencies, (2) actions taken and to be taken by BPA to avoid power system emergencies, and (3) fishery operations priorities for 2001.

After development of the 2001 Criteria and Priorities, BPA and the Federal agencies drafted a "Federal Agencies' 2001 FCRPS Operations Plan Proposal," which they presented at the April 13 executive meeting with states and Tribes for comment. The objective of the Operations Plan is to meet the reliability criteria in the Federal Agencies Criteria and Priorities (March 30, 2001) while making best efforts to minimize adverse impacts to fish. The Operations Plan also provides a framework for development of the 2001 Water Management Plan for operation of the FCRPS in consideration of the NMFS and FWS biological opinions.

The Plan (1) reviews conditions leading to the extremely low water year, unprecedented increases in power prices, and the causes of power system emergencies, (2) summarizes reliability criteria that, if not met, could trigger declarations of emergencies, (3) identifies measures undertaken by BPA to avoid declarations of emergencies, (4) describes spring and summer operations, including transportation of some juvenile fish and available water for spill for juvenile fish remaining in river.

BPA received comments from states and Tribes and considered them as it revised the Plan. On May 25, 2001, after taking these comments into consideration, BPA adopted a 2001 Operations Plan. The document may be revised and supplemented as the Federal agencies receive updated information about the power as well as fish conditions.

1. Measures to Avoid or Mitigate the Occurrence of Emergencies

BPA does not lightly declare emergencies. To mitigate the occurrence and consequent impact of emergencies, BPA engages in prodigious efforts to reduce load and acquire resources to meet load. A summary of actions to reduce load and increase energy sources follows.

- Energy Exchanges with California—2 for 1 exchanges provided BPA with additional 500 mw-months of energy;
 - Acquisition of Power from Industries—BPA has secured over 2600 mw-months of load reduction at a cost of more than \$310 million;
 - Achievement of approximately 600 mw-months of load reduction through irrigation buy-down at a cost of approximately \$25 million;
 - Acquisition of Market Energy—From December through April, secured 1100 mw-months of market energy at a cost of \$200 million;
 - Conservation of Energy—expedited the implementation of conservation credits;
 - Oregon and Washington Calls for Conservation—assisted governors in their call for 10% reduction in consumption;
 - Solicitation for proposals for generation from wind power with a capacity of 1000 MW;
 - To avoid increases in BPA's rates that the Pacific Northwest economy may not be able to tolerate, BPA's Administrator has called for BPA's industrial customers to suspend operations for two years and for BPA's public and investor-owned utility customers to reduce their loads by 5-10 percent.
 - BPA has encouraged the Pacific Northwest to consider, especially during trying times such as 2001, how to meet both power system reliability and fish and wildlife needs in a fiscally responsible manner.

With efforts by BPA and others in the region to conserve energy and to develop additional resources, the risk of a power system emergency due to the current tenuous nature of load-resource balance of BPA and in the Pacific Northwest will decline. Many new projects currently under various stages of planning and construction will be completed within approximately three years. Consequently, the heightened risk of a power system emergency could exist for up to a three-year period. However, the duration of a particular emergency, if it is declared, will depend upon the particular circumstances applicable to that emergency. Improvements in many factors, including warmer winter weather conditions, increased precipitation, increased generation from other sources, reductions in

load, and reasonable market prices for power, can rapidly end an emergency. If BPA declares an emergency, BPA will terminate the emergency as soon as resources become sufficient to meet load.

For additional description of these efforts to avoid and reduce the occurrence and duration of emergency operations, please see "Power Emergencies – Memorandum for the Record," supra, and the Federal Agencies' 2001 FCRPS Operations Plan, supra.

As result of these efforts, during the power system emergency declared on April 2, instead of providing no spill to benefit migration of juvenile anadromous fish during the Spring, BPA reduced the extent of emergency operations by providing in May and June a moderate level of spill – 600 MW-months – consistent with the power system reliability criteria.

2. Alternative Measures to Offset Adverse Impacts of Emergencies

In addition to efforts to moderate the adverse impacts of emergency operations by avoiding or reducing the extent of emergencies, BPA is attentive to offsetting adverse impacts on fish from emergency operations that do occur. For example, reductions in spill may reduce survival due to a higher mortality associated with in-river migration of juvenile fish. Therefore, BPA is soliciting proposals and selecting measures to provide additional survival benefits to fish.

F. Scientific Review

NMFS conducted extensive analyses to determine stock status, current population growth trends, and improvements needs across the full life cycle of these species to avoid jeopardy. NMFS' analysis also reflects the anticipated benefit of aggressive hydrosystem improvements that are considered achievable, and the remaining improvements necessary by the Action Agencies, other Federal agencies, states, Tribes, and public. These analyses are complex and based on empirical data and professional judgment. Where views differ or uncertainty exists, NMFS, after conducting sensitivity analyses to capture the broader range of views, has responsibly chosen appropriate assumptions and parameters.

To reduce uncertainties, the FCRPS Action Agencies, as part of the RPA, will use research, monitoring, and evaluation (RM&E) to reduce or resolve these uncertainties. Through the implementation planning process, the Federal agencies anticipate revising the RPA, as appropriate, consistent with the RM&E.

Consequently, BPA believes that the RPA responsibly projects, based upon the best available scientific evidence, avoidance of jeopardy and the destruction or adverse modification of critical habitat. As additional information becomes

available, BPA anticipates revisions to the RPA to improve the RPA's effectiveness in satisfying ESA responsibilities.

IV. MEETING ESA RESPONSIBILITIES: THE FWS BO'S APPROVAL OF THE PROPOSED ACTION AS IT AFFECTS BULL TROUT AND RECOMMENDED REASONABLE AND PRUDENT ALTERNATIVE (RPA) FOR AVOIDING JEOPARDY TO STURGEON

A. FWS Conclusions

After formal consultation, FWS concluded that FCRPS operations avoided jeopardy to bull trout. 2000 FWS BO at 62-63. Consequently, BPA will work with the other FCRPS action agencies to operate the FCRPS consistent with the operations reviewed by FWS.

Because FWS needed additional commitments to flow augmentation and restrictions on variations in flows, FWS concluded that proposed operations failed to avoid jeopardy to Kootenai River white sturgeon. 2000 FWS BO at 70. FWS then recommended an RPA for avoiding jeopardy. Principal recommendations in the RPA follow.

- The RPA modifies operations of Libby Dam to assure storage of water for augmentation of Kootenai River flows during sturgeon spawning and development during early life stages. 2000 BO at 71. The recommended flows vary, depending upon the ampleness of the water year. Id. at 71 et seq.
- The RPA also recommends increases in the release capacity at Libby Dam. Id. at 74 et seq.
- The action agencies should seek ways to avoid public safety and other concerns from flooding and leakage from levees. Id. at 77 et seq.
-
- The action agencies should maintain a preservation stocking program operated by the Kootenai Tribe of Idaho and monitor all stages of natural recruitment and the preservation stocking program. Id. at 79.

The FWS BO also allows for adjustments to operations during emergencies. 2000 FWS BO at 8 & 9 (regarding Hungry Horse Dam), 14 & 16 (regarding Libby Dam).

B. Scientific Review

After reviewing the current status of the bull trout, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, FWS concluded that continued operation of the FCRPS was not likely to jeopardize the continued existence of bull trout. 2000 FWS BO at 62-63. After reviewing the current status of the Kootenai River sturgeon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, FWS developed an RPA that avoids jeopardy to sturgeon. 2000 FWS BO at 71.

BPA biologists have reviewed the scientific information supporting FWS' conclusions and recommendations and believe that operations consistent with these conclusions will amply avoid jeopardy to bull trout and sturgeon. These analyses are complex and based on empirical data and professional judgment. Consequently, BPA believes that the RPA responsibly projects, based upon the best available scientific evidence, avoidance of jeopardy and the destruction or adverse modification of critical habitat.

V. MEETING RESPONSIBILITIES UNDER THE MAGNUSON-STEVENSON ACT: ESSENTIAL FISH HABITAT (EFH)

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, the FCRPS action agencies have consulted with NMFS on actions affecting essential fish habitat (EFH), and NMFS has provided recommendations for conserving EFH. 2000 NMFS BO at Part 12. "Essential fish habitat" means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Magnuson Stevens Act, § 3, 16 U.S.C. § 1802(10). Species of fish with designated or recommended EFH include more than those species listed under the Endangered Species Act. 2000 NMFS BO at § 12.1, p. 12-2 –12-3.

After receiving these conservation recommendations, the FCRPS action agencies must provide a detailed response that explains the extent to which the agencies intend to follow or not follow the recommendations. 16 U.S.C. § 1855(b)(4)(B). This part of BPA's decision document provides BPA's response to the EFH conservation recommendations.

A. EFH Conservation Recommendations

NMFS' EFH conservation recommendations consist of proposals for improvements in the estuary.

Action 158: During 2001, the Corps and BPA shall seek funding and develop an action plan to rapidly inventory estuarine habitat, model

physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

Action 159: BPA and the Corps, working with LCREP and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Action 160: The Corps and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.

Action 161: Between 2001 and 2010, the Corps and BPA shall fund a monitoring and research program acceptable to NMFS and closely coordinated with the Conservation Reserve Enhancement Program monitoring and research efforts (Management Plan Action 28) to address the estuary objectives of this biological opinion.

Action 162: During 2000, BPA, working with NMFS, shall continue to develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience.

Action 163: The Action Agencies and NMFS, in conjunction with the Habitat Coordination Team, will develop a compliance monitoring program for inclusion in the first 1- and 5-year plans.

2000 NMFS BO at § 12.5, pp. 12-10 – 12-13.

B. The Basinwide Salmon Recovery Strategy Provisions for Estuarine Improvements Are Comparable to the EFH Conservation Recommendations.

These recommendations are consistent with the Basinwide Salmon Recovery Strategy. BPA intends to respond to take the EFH recommendations into consideration as it implements its share of the Recovery Strategy. Pertinent excerpts from the Recovery Strategy follow.

- Recovery may hinge upon efforts to restore health to the estuary as well as tributaries. Recovery Strategy, Vol. 1, p. 1.
- The estuary is an important habitat used by all salmon and steelhead in the Columbia River Basin. Strategy, Vol. 1, p. 2.

- The Recovery Strategy's Habitat Plan provides for the protection and improvement of estuary habitat. Id. at 5.
- "Survival improvements are likely to have the biggest effect in the first year of life (when most of the fish are in the tributaries) and during the transition to salt water (when the fish are in the estuary). Id. at 5.
- Using the Lower Columbia River Estuary Program as a foundation, Federal agencies will work with state, local, Tribal, and private partners to acquire or restore thousands of acres of estuary habitat over the next 5-10 years. Id. at 6, 47-48.
- Performance standards include those for estuary and early ocean survival. Id. at 9.
- Improvements in the estuary benefit all 12 ESUs to varying degrees. Id. at 24.
- Survival improvements in spawning and rearing habitat in the tributaries and in estuary habitat are a centerpiece of this Strategy because the science indicates that the greatest opportunity for achieving significant survival improvements is in these habitat types. Id. at 26.
- One of the ecological objectives is to prevent further degradation of estuary habitat conditions. Id. at 33.
- The Recovery Strategy enumerates Federal actions to restore estuary habitat. Id. at 50.
- In the estuary, silted channels, dikes, and high culverts prevent access to spawning, rearing, feeding, and refugia habitats. Id. at 53.
- Capital improvements at dams have the potential to improve estuarine habitat. Id. at 60.
- Additional water to augment flows could also enhance estuarine conditions. Id. at 62.
- Improvement in estuary habitat "must play a vital role in rebuilding the productivity of salmon runs throughout the Columbia Basin." Basinwide Salmon Recovery Strategy, Vol. 2, p. 26.
- Biological analyses "suggest that significant opportunities exist for securing additional improvements in overall population trends by reducing the substantial mortality in the estuarine and early ocean life stages." Basinwide Salmon Recovery Strategy, Vol. 2, p. 36; Vol. 1, p. 27, 39.
- The recovery strategy provides for assessments of estuary habitat, developing a plan for salmon conservation in the estuary, habitat acquisition and restoration, floodplain restoration, predator control, information management, monitoring and research, and inter-agency and inter-jurisdictional coordination. Recovery Strategy, Vol. 2, pp. 26-31.

C. The NMFS BO RPA Provisions for Estuarine Improvements Are Comparable to the EFH Conservation Recommendations

The 2000 NMFS BO's RPA for avoiding jeopardy to listed species includes measures that are similar, if not identical, to the recommended EFH conservation measures. One of the objectives of the RPA's habitat actions is estuary improvement. 2000 NMFS BO at 9-133. With respect to operation of the FCRPS, "The potential for delayed, pre-spawning mortality of adults and for survival effects related to estuary or plume conditions created through water management practices are also highly critical uncertainties." 2000 NMFS BO at § 9.1.6, p. 9-4.

The 2000 NMFS BO's RPA, therefore, provides many measures relating to study of effects on and improvements to estuarine habitat. Measures specifically addressing estuarine habitat include:

Action 102: The Action Agencies, in coordination with the Caspian Tern Working Group, shall continue to conduct studies (including migrational behavior) to evaluate avian predation of juvenile salmonids in the FCRPS reservoirs above Bonneville Dam. If warranted and after consultation with NMFS and USFWS, the Action Agencies shall develop and implement methods of control that may include reducing the populations of these predators. ... This effort must be coordinated with ongoing avian control activities in the Columbia River estuary and with the USDA Wildlife Services and USFWS.

Action 105: The Action Agencies shall develop a pilot study to assess the feasibility of enhancing the function of ecological communities to reduce predation losses and increase survival in reservoirs and the estuary.

Action 106: The Action Agencies, in coordination with NMFS, shall investigate marine mammal predation in the tailrace of Bonneville Dam. A study plan shall be submitted to NMFS by June 30, 2001, detailing the study objectives, methods, and schedule.

Action 158: During 2001, the Corps and BPA shall seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

Action 159: BPA and the Corps, working with LCREP and NMFS, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Action 160: The Corps and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.⁷

Action 161: Between 2001 and 2010, the Corps and BPA shall fund a monitoring and research program acceptable to NMFS and closely coordinated with the LCREP monitoring and research efforts (Management Plan Action 28) to address the estuary objectives of this biological opinion.

Action 162: During 2000, BPA, working with NMFS, shall continue to develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience.

Action 163: The Action Agencies and NMFS, in conjunction with the Habitat Coordination Team, will develop a compliance monitoring program for inclusion in the first 1- and 5-year plans.

These and other habitat measures in the RPA should complement but not displace other programs, including Oregon's Lower Columbia River Estuary Program (LCREP). 2000 NMFS BO at 9-136.

Technically, the estuarine measures in the RPA and the EFH conservation measures are not identical. The RPA measures are arguably narrower than EFH recommendations because the RPA measures focus on improvements to estuarine habitat for listed salmon while the EFH conservation recommendations apply to all species with designated EFH habitat, a broader spectrum of species than those listed under the ESA. For a reference to species with designated EFH, see 2000 NMFS BO at § 12.1. However, the potential improvements from the RPA measures are broad and will benefit more than listed salmonid species.

Given the prodigious task of improving conditions for salmonid species – the estuarine-residing species most significantly affected by dams - BPA will concentrate its resources on implementing the 2000 NMFS BO's RPA. Although these estuarine measures in the RPA exist for the purpose of benefiting salmon, BPA expects these improvements will benefit all estuarine species, not only listed salmonid species. In addition, when BPA is considering alternatives providing comparable benefits at comparable cost to listed salmonid species, BPA will prefer those alternatives that also benefit EFH of additional species.

⁷ This measure adds, as does the almost identical EFH conservation recommendation appearing in action 160, "The Corps shall seek funds for the Federal share of the program, and BPA shall provide funding for the non-Federal share." Whether funds from BPA, a Federal agency, would constitute a non-Federal share is questionable.

VI. MEETING CLEAN WATER ACT RESPONSIBILITIES: IMPROVING WATER QUALITY

This Part VI of the Decision Document describes the action agencies' plan to meet CWA responsibilities. NMFS, EPA, and the Action Agencies have considered the respective biological objectives of the ESA and the Clean Water Act (CWA). 2000 NMFS BO at § 9.6.1.7, p. 9-119. They recognize the substantial overlap of statutory purpose: to protect listed species (ESA) and to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (CWA). More specifically, while the ESA requires Federal agencies to ensure that their actions do not jeopardize listed species or result in the destruction or adverse modification of critical habitat, the CWA generally requires Federal agencies to avoid the discharge or runoff of unpermitted pollutants and meet state water quality standards. 16 U.S.C. § 1536; 33 U.S.C. §§ 1311, 1323. These agencies also recognize the need to resolve potential conflicts in objectives. Consequently, they have endeavored to coordinate ESA and CWA decisionmaking. 2000 NMFS BO at §9.6.1.7, p. 9-119. They have done so by defining an RPA in the 2000 NMFS BO that includes measures for improving water quality, 2000 NMFS BO at §§ 9.4.2.4, p. 9-29; 9.6.1.7, pp. 9-119 et seq.; § 9.6.2.1, Action 152, pp. 9-135 – 9-136. They will also develop a basin-wide water quality plan to progress toward meeting state water quality standards. 2000 NMFS BO at Appendix B.

In National Wildlife Federation v. U.S. Army Corps of Engineers, Civ. No. 99-442-FR (D.Or. filed Feb. 16, 2001), a recent order by Federal District Court of Oregon Judge Frye directed the Army Corps of Engineers, with respect to the Lower Snake dams, to replace its record of decision following the 1998 NMFS Supplemental BO with a new decision that "addresses its compliance with its legal obligations under the Clean Water Act within sixty days of the order of summary judgment." Not a party, BPA defers to COE to respond to the still active lawsuit. However, BPA intends that its decision document complement that developed by COE.

The commitments expressed in the 2000 NMFS BO continue substantive actions by the FCRPS Action Agencies to improve water quality and to make further improvements and progress toward meeting applicable water quality standards. The principal water quality standards affecting dams are those for total dissolved gas, which increase after water spills over a dam, and water temperature. NMFS, EPA, and the FCRPS action agencies have focused on these water standards.

A. Achievements Improving Water Quality

1. Temperature

The FCRPS action agencies have made substantial improvements to water quality over the past several years. The Corps of Engineers has been designing, building, modifying, and operating dams with consideration for water quality issues, and making operational and structural changes to storage dams to improve water quality, over the past three decades. The Corps has had active water quality programs in the Northwestern Division office and in the Portland, Seattle, and Walla Walla district offices since the 1970s. In the late 1990s, the water quality program for the Northwestern Division and three Districts represented a 31 staff-year effort.

Corps design and construction activities at storage projects included the completion of Libby Dam and Dworshak Dam (both completed in the early 1970s) with selective withdrawal structures to release water from different levels within the reservoir to control downstream water temperatures. During the past 10 years, the Corps has been providing cool water from Dworshak Dam to reduce the water temperature of the lower Snake River during the summer. Currently, a retrofitted selective withdrawal structure at Cougar Dam, in the Willamette River Basin, is in the advanced planning stages. The Willamette System Temperature Control Study of the 1980s identified several feasible alternative temperature control modifications that could be retrofitted to the Cougar and Blue River dams.

Concerning temperature, the Corps' Waterway Experiment Station (Corps national science center) has already provided a cost estimate for a plan to model temperature effects of alternative Snake River Operations, and discussions between BPA, the Corps and EPA regarding how this should be accomplished have been initiated. The action agencies will continue to manage storage reservoirs (particularly Dworshak) to retain and release cooler water for the benefit of listed fish throughout the in-season.

2. Dissolved Gas

The Corps began spilling water over the Corps dams on the lower Columbia and Snake rivers in 1977 as a way of improving juvenile fish survival. However, spill has associated risks because spilled water entrains air when the water plunges into the spillway basins, causing raised levels of total dissolved gas (TDG), sometimes in excess of state water quality standards. As a result, there have been conflicts between ESA needs for spill and CWA goals of water quality attainment. In past years, this has been addressed through standard modifications or waivers under the BO.

Spillway deflectors help reduce TDG by producing more horizontal spill flow patterns, and limiting the plunge depth of water over dam spillways. Spillway flow deflectors (also called flip lips) were placed at seven of eight Corps dams on the lower Columbia and Snake rivers. Flow deflectors at the eighth dam, The Dalles Dam, were not installed because its shallow stilling basin allowed higher spill levels with lower gas production. A more comprehensive spill program was initiated at the request of the Northwest region in 1989 when a long-term spill agreement was signed by the Bonneville Power Administration. Spilling water and juvenile fish over dam spillways is considered one of the safe methods to get fish past dams to meet ESA requirements. Under the National Marine Fisheries Service 1995 Biological, spill at the dams was increased substantially during juvenile fish migrations. The Corps' Dissolved Gas Abatement Study (DGAS) was started in 1994, in anticipation of the 1995 Biological Opinion calling to for evaluation methods to reduce TDG at the Corps dams on the lower Columbia and Snake rivers. The Phase I study report released in April 1996 provided for installing new deflectors at Ice Harbor and John Day. Phase II is to be completed in FY 2001. The short-term structural measures include improvements already made at several projects such as modifying existing spillway deflectors or adding deflectors. Operational alternatives include spill pattern adjustments or combinations of spill patterns.

The 1998 Supplemental Biological Opinion requested the Corps and the Bureau of Reclamation (BOR) to coordinate efforts in a joint study of dissolved gas abatement for Chief Joseph and Grand Coulee Dams. The Seattle District of the Corps published a Final Environmental Assessment and Finding of No Significant Impact in June 2000, recommending combined alternatives of flow deflectors and operational modifications to include joint operation of Chief Joseph and Grand Coulee Dams.

The Bureau of Reclamation conducted a study at Grand Coulee Dam to determine the impact of various types of releases of water from the dam. The study determined the most efficient way to release water (other than through turbines) which created the least amount of dissolved gas. When the study was completed, operational procedures were implemented in accordance with the findings of the study. Also, monitoring of dissolved gas has been improved by the installation of a monitoring site in the Grand Coulee forebay. Recently, an appraisal level study was completed evaluating 42 options of modifying Grand Coulee Dam for dissolved gas abatement. Three alternatives were carried forward into a detailed study. The two-year study was completed and the report was posted on the Internet on October 30, 2000.

To minimize high TDG conditions throughout the system, a spill priority list process was developed and implemented by the Corps. Spill at each Corps forebay or tailwater is updated as needed, often daily, during the juvenile fish migration season. Changing spill patterns based on river flow criteria, avoiding the use of spillways without deflectors, and allowing the hydroelectric power units

to operate outside their 1% peak efficiency flow range are other reservoir management tools to reduce TDG production. Adjusting hydropower unit maintenance schedules to avoid times of fish passage, identifying additional energy loads to service, and displacing available thermal projects serving the same loads also help relieve the need for involuntary spill, discussed in more detail below.

Upstream storage dams also hold backwater for flood control and other uses, interrupting the seasonal flow patterns. Water retention allows flow augmentation, and it can reduce TDG in the Columbia - Snake system. The Corps, BOR, and the Bonneville Power Administration (BPA) participate in the Technical Management Team process with the salmon managers of the region to distribute the seasonal flow to aid salmon migration and to regulate the TDG levels in the Columbia-Snake system.

The DGAS study will be published for review and comment by the end of April 2001, and is expected to be finalized by the end of September 2001. The final report may contain additional TDG reduction projects. TDG monitoring is already being implemented throughout the mainstem, and a systematic review to improve reliability and accuracy of the fixed monitoring stations is already occurring in the Water Quality Team subcommittee. The Corps has also made recommendations to the Water Quality Team concerning a system-wide TDG model (Mass 1 and Mass 2).

3. Monitoring and Evaluation

Monitoring and evaluation have made possible selection and execution of the improvements described in the preceding section. The Corps has been maintaining a TDG and water temperature-monitoring program on the Columbia and Snake rivers since 1984 to provide water quality data needed to schedule spill for fish passage and to monitor project performances in relation to water quality standards to identify remedial actions. The program has been an integral part of the Corps water management program. The TDG and water temperature monitoring expanded in 1994 in response to a National Marine Fisheries request to spill every year at the lower eight lower Columbia and Snake Dams and became an annual requirement. Cooperation of monitoring efforts from the BOR and the mid-Columbia PUDs has been excellent. The Corps made TDG and water temperature data available on the worldwide web for its own projects and other dam operators in the system. In 1996, the Portland, Seattle, and Walla Walla districts assumed the responsibility for operation and maintenance of the monitoring sites. By 1999, a total of 41 sites measuring TDG and water temperature at the forebay and tailwater locations at 27 Corps sites, for 4 BOR sites, and 10 mid-Columbia PUDs were established. An annual report on the Corps monitoring is prepared.

In its support efforts, the Corps Reservoir Control Center also uses numerical models such as COLTEMP and neural network analysis to relate forebay and tailwater TDG levels to spill and total project releases. There have been regional modeling tools developed by the DGAS study that will be used for water quality management. MASS1, MASS2, and MASSHYBRID have been developed for the Columbia-Snake system. A spreadsheet model called SYSTDG has also been developed to show how to generate system-wide power subject to water quality restraints. The Corps also maintains scroll-case water temperatures for use in reservoir operation scheduling. It also monitors water temperatures in some fish ladders and conducts studies related to water temperature and fish passage at those facilities.

4. Input from States and Tribes and Canada

The Corps, BPA and BOR (Action Agencies) participate in regional forum activities related to water temperature and TDG as members of the regional Water Quality Team. TDG data are posted at real-time basis on the Technical Management Team homepage for weekly reservoir control operations interagency decision-making. Another regional forum in which the Action Agencies participate is the international Transboundary Gas Group, made up of Columbia Basin stakeholders from Canada and the United States.

5. Development of a Long-Term Water Quality Plan

The action agencies are developing a basin-wide water quality plan for the Columbia River mainstem to progress toward meeting state water quality standards, as described in the 2000 NMFS BO at Appendix B. The development of the Plan will include preparation of an environmental impact statement that will allow for participation by the public.

B. Additional Commitments to Improve Water Quality Expressed in the 2000 NMFS BO

1. Long-term Basinwide Goals to Meet State and Tribal Water Quality Standards

NMFS, EPA, and the FCRPS action agencies commit to progress toward meeting state water quality standards.

The water quality plan in Appendix B includes the following basinwide goals for TDG and temperature. NMFS, EPA, and the Action Agencies commit to work toward these goals. They recognize, however, that reaching the goals may take more time than the duration of this biological opinion and that exceedances may, nevertheless, occur.

Total Dissolved Gas Goal. The long-term TDG goal (10 to 15 years) is to reach the 110% TDG standard in all critical habitat in the Columbia and Snake River basins while taking actions to recover listed species in the basins. For anadromous fish, achieving the goal would mean fish passage survival levels are consistent with the performance standards for the mainstem projects.⁸

* * *

Water Temperature Goal. The long-term goal for water temperature is standard attainment in all critical habitat in the Columbia and Snake River basins.

2000 NMFS BO at § 9.6.1.7, pp.9-121 - 9-122.

The FCRPS action agencies will use the dissolved gas goal to “guide operating and capital improvement decisions relating to TDG created during periods of spill.” 2000 NMFS BO at § 9.6.1.7, p. 9-121; Appendix B, p. B-7. They will also take actions to move toward the temperature standard. 2000 NMFS BO at § 9.6.1.7, p. 9-122; Appendix B, p. B-11.

2. Schedule for Implementation of Water Quality Measures

The Action Agencies’ particular measures to improve water quality are of two categories. First is a set of dissolved gas and temperature measures essential for the survival and recovery of the species. BO at 9-119. These measures are part of the RPA. BO at §§ 9.4.2.4, 9.6.1.4.5, 9.6.1.2.6, 9.6.1.2.7, 9.6.1.6.2, 9.6.1.7.2, 9.6.2.1. As part of their annual 1- and 5-year implementation plans, the Action Agencies will also develop 1-and 5-year water quality plans. Consequently, each year, the Action Agencies’ 1-and 5-year plans will define the measures that they will implement for the upcoming years. The Action Agencies will implement these measures within the period addressed by the RPA, which is 10 years.

The second category is a set of additional measures that are not part of the RPA but that the Action Agencies will consider as they develop a water quality plan. *Id.* at 9-119. The Action Agencies describe their commitment to develop a water quality plan in Appendix B to the NMFS BO, entitled “Development of a Water Quality Plan for the Columbia River Mainstem: A Federal Agency Proposal.” The additional measures appear as ESA conservation recommendations for the recovery of listed species. *Id.* at § 11. During implementation of the 2000 NMFS

⁸ Appendix B to the 2000 NMFS BO, “Development of a Water Quality Plan for the Columbia River Mainstem,” p. B-7, elaborates:

The long-term (10 to 15 years) dissolved gas goal is to reach the state and Tribal TDG standard, which is currently 110% for river discharges up to the 7-day, 10-year flow in all critical habitat in the Columbia River and Snake River basins while taking actions to recover listed species in the basin.

BO RPA, the action agencies will also consider implementation of these or different additional measures.

3. Particular Water Quality Measures to Implement

Concise lists of particular measures to improve water quality appear at the end of the 2000 NMFS BO, Appendix B. Table B-2, pp. B-20 – B-21, summarizes measures that are part of the RPA. Table B-3, p. B-22, summarizes conservation recommendations. They are also attached to the end of this decision document as Appendix B.

a. Dissolved Gas Measures

Dissolved gas measures include monitoring and studies of levels of dissolved gas, effects on fish, and how to reduce these levels. The Corps of Engineers is on schedule to complete its comprehensive dissolved gas study (DGAS) later in 2001, which the action agencies will use to guide future studies and decisions about implementation of long-term structural measures to reduce TDG (Action 130). The action agencies will monitor the effects of TDG, improve measurements at TDG monitoring stations, and develop a TDG model (Actions 131-133).

Dissolved gas measures contain on-the-ground improvements, including continuation of the spillway deflector optimization program at each project (Action 134), spillway deflectors at Chief Joseph Dam by 2004 (Action 136), construction of gas abatement improvements at Libby Dam (Action 137), and design and implementation of a spillway deflector at John Day Dam, (Action 140), and prototype surface spillway bypass at Lower Granite and John Day dams (Action 72, 80, 81, 138). The spillway deflector optimization program (Action 134) schedules installation of additional deflectors at the following dams: 4 deflectors at McNary dam by Spring 2002, 6 deflectors at Bonneville by Spring 2002, 2 deflectors at Lower Monumental by Spring 2003, and 2 deflectors at Little Goose by 2004 and 19 deflectors at Chief Joseph by 2004. An evaluation of a full complement of deflectors at The Dalles is scheduled to be completed by 2005. The Corps is also attempting to expedite construction projects for a removable spillway weir at Lower Granite and a stilling basin repair project at Lower Monumental. All of these projects are expected to lower TDG levels within the mainstem. The action agencies will also evaluate and install, as warranted, divider walls as part of a spillway deflector optimization program (Action 135) and TDG abatement options at Dworshak Dam (Action 139).

BPA will also undertake additional measures to reduce or avoid the risk of involuntary spill, which can occur in water years with high levels of flow. There are two types of involuntary spill: lack-of-turbine spill and lack-of-load (“overgeneration”) spill. Lack-of-turbine spill occurs when total river flows exceed powerhouse hydraulic capacity. Overgeneration spill is an amount of spill that

could have passed through turbines had there been load for the resulting energy generated. Overgeneration spill generally occurs in periods of low energy consumption, such as the middle of the night and on weekends.

The additional measures to moderate effects of involuntary spill will be comparable to those used in 1997, when projected spring runoff was near the largest on record for the Snake River and in the top ten percent of the historical record for the Columbia River at The Dalles, and BPA delineated many measures to avoid these types of spill. To reduce or avoid occasions of lack-of-turbine spill, BPA and the action agencies will try to maximize the number of turbines in service during spring runoff and maximize the storage of water in headwater storage reservoirs. To reduce or avoid occasions of lack-of-load spill, they will seek to increase load served by turbines at the dams by shutting down or displacing non-hydro generating units such as the Columbia Generating Station, by pricing hydroelectric power to encourage demand for it, especially during light load hours, and serving load outside the Pacific Northwest. For a more detailed description of these possible measures, see "Bonneville Power Administration Plans for Minimizing Spill March 1997," attached to this Decision Document as Appendix A.

b. Temperature Measures

Temperature measures include evaluation of effects of temperature on fish (Action 140 and 141), examination of juvenile mortality, temperatures, and operations at McNary Dam (Action 142), and a plan to model water temperature effects of alternative Snake River operations (Action 143).

Temperature measures also include on-the-ground improvements. The action agencies will, to the extent feasible, use cool water from Dworshak Dam to reduce downstream water temperatures. Action 140; § 9.6.1.2.3, Action 19, p. 9-65 ("The Action Agencies shall manage Dworshak discharge to attempt to maintain water temperatures at the Lower granite Reservoir forebay dissolved gas monitoring station at or below 68°F (20°C).")

In addition, as part of the RPA, the FCRPS action agencies will undertake substantial efforts to improve tributary habitat. 2000 NMFS BO at § 9.6.2.1, pp. 9-133 *et seq.* Improvements to habitat will improve tributary water quality, including temperature. See Action 152, pp. 9-135 – 9-136.

c. Additional Measures

The studies included in the RPA and in Appendix B anticipate additional on-the-ground measures after completion of the studies. Proposed criteria for evaluating additional actions include:

- How does the proposal meet the tenets of the 2000 FCRPS Biological Opinion and the water quality plan (i.e., how does the proposal complement the two activities)?
- How does the proposal demonstrate substantial progress toward meeting the 110% TDG and temperature standards by the 2005 check-in point?
-
- If the proposal is a study, how will it increase the existing knowledge base to meet the temperature and/or dissolved gas standard?
-
- How does the proposal build on existing science to achieve project goals?
-
- How does the proposal go beyond mitigation for FCRPS impacts to enhance anadromous fish recovery?
-
- Is the proposal cost-effective?
-
- Is there consensus among Federal, state, and Tribal representatives to implement the proposal?

2000 NMFS BO at Appendix B, § B.6.4, p. B-24. BPA will use these and additional criteria as it considers additional measures.

4. Progress Toward Water Quality Goals Requires Resolution of Uncertainties and Conflicts.

Meeting these goals does not admit to easily or rapidly completed solutions. As the term *basinwide* goals indicates, solutions require improvements by multiple parties and activities, not only FCRPS activities. With regard to TDG, the BO states:

A systemwide approach is needed to address gas generated at mainstem projects where fish are present and at upstream facilities (i.e., outside the current range of listed salmon) in both the U.S. and Canada, the five PUD dams on the Columbia River between the Snake River and Chief Joseph Dam, and the Hells Canyon Complex on the Snake River. Some exceptions are noted in the ability to meet the state and Tribal TDG standard.

2000 NMFS BO at 9-121. Progress toward the water quality goals will take time. “[T]he water quality plan is likely to require lengthy study and implementation exceeding the duration of this [10-year] biological opinion.” 2000 NMFS BO at Appendix B, p. B-19. The long term TDG and water temperature goals may entail 10-15 years. 2000 NMFS BO at Appendix B, p. B-7.

a. Transition to Temperature Water Quality Goals Requires Resolution of Uncertainties

Temperature solutions require resolution of considerable uncertainties and complex interrelationships. With regard to temperature, the BO recognizes that improvements in temperature conditions will require study of these multiple factors and evaluation of options for altering temperature.

In the mainstem Columbia and Snake rivers, attainment of the temperature standard is very complex, due to a number of interrelated factors that affect water temperatures at certain times of the year and to the limited ability to alter water temperature in the mainstem. In the tributaries, attainment of the temperature standard is also complex, due to many of these same factors and the long time needed to realize the temperature benefits of remedial actions (such as growth of trees for shading riparian areas). Therefore, in the near term, working with the state and/or Tribe with relevant regulatory authority, the interim goal is to move toward attaining the standard. Establishing TMDLs is expected to significantly promote progress toward the interim goal.

2000 NMFS BO at 9-122.

Improving water temperature within the FCRPS is a complicated enterprise. First, water temperature in the Columbia and Snake rivers is the combined effect of elevated temperature of incoming tributary waters coupled with any additional heat transfer that may occur as a result of the FCRPS. Generally, when water temperature is a concern within the FCRPS (e.g., during mid-summer to late fall), water temperature is typically elevated throughout the basin. However, although natural conditions such as high air temperatures are an important factor, the relative contribution of various factors to increased water temperature is largely unknown. Second, structural and operational alternatives to modify water temperatures are limited. Third, regardless of actions taken under any configuration, water temperature will often exceed the standard during mid-summer to late fall. Water temperatures in the Lower Snake River exceeded standards even prior to construction of the Lower Snake Dams. Draft Lower Snake River Juvenile Salmon Migration Feasibility Study (December 1999), § 5.3.2.2. In summary, efforts to improve water temperature in the mainstem Columbia and Snake necessarily include actions in watersheds throughout the Columbia Basin.

BPA has three specific concerns regarding water temperature within the FCRPS project area:

1. Investigation and remedies to site-specific conditions where water temperatures exceed those of surrounding waters. An example would be the McNary juvenile fish facility. The goal in these site-specific

cases would be to reduce elevated temperatures to that of surrounding waters.

2. Determination of how much the existence and operation of the FCRPS projects contributes to increased temperature of water compared to its temperature as it enters the FCRPS, and how alternative operations or configuration would affect this "heat transfer." This can be accomplished through a well-designed temperature monitoring program and computer modeling.
3. Consideration of how Upper Snake River water management may create a mismatch between water temperature conditions and fall chinook life stage requirements (spawning/rearing/migration timing) in the Lower Snake, and how alternative operations in the Upper Snake could contribute to improved conditions across all life stages.

Progress toward the long-term temperature goal will require considerable resolution of uncertainties and identification of additional measures that can reduce temperature. To progress toward the long-term temperature goal, the FCRPS action agencies will, to the extent feasible, work with NMFS, USFWS, EPA, and states and Tribes through an adaptive management process to:

- Make operational and capital investment decisions at the FCRPS projects to move toward attainment of thermal water quality standards.
- Seek consensus on offsite mitigation measures that would contribute to attainment of water temperature standards.
- Fund, implement, and report on adequate physical and biological temperature monitoring to assess compliance with state and Tribal water quality standards and other special conditions that may apply.
- Cooperate with others to fund implementation and modeling to better assess and act on thermal water quality problems and opportunities.
- Develop emergency measures that may be needed to address immediate and acute water temperature problems affecting listed salmon.

2000 NMFS BO at appendix B, p. B-11. In addition, the feasibility of meeting the long-term goal will be revisited annually during the water quality improvement planning process. Id.

b. Transition to Total Dissolved Gas Water Quality Goals Requires Resolution of Uncertainties and Conflicts

Meeting these standards also requires resolution of conflicts. NMFS' preferred method of passing fish by dams in the Columbia River mainstem, at least in the short term, is voluntary spill. NMFS also calls for releases of water for flow augmentation from Dworshak in a manner that causes spill. In NMFS' view, no current structural modification has been identified that would reduce TDG levels to meet state or Tribal water quality standards without threat of adverse effects to passing fish. 2000 NMFS BO at § 9.6.1.7.1, p. 9-120. Although spill increases the level of dissolved gas above state water standards, the NMFS BO's RPA calls for spill to aid passage of fish.

Without physical modifications to the dams beyond those that are presently under way, the long-term TDG goal cannot be attained between April and August at and between the eight mainstem FCRPS dams. This is a result of the need to rely on spill to safely pass juvenile salmon around those dams. A similar issue exists with Dworshak Dam, where, in some circumstances, spill is necessary to contribute to the attainment of spring and summer flow objectives for salmon migration and water temperature standards in the Clearwater and lower Snake Rivers. In the near term, therefore, it will be necessary to conduct spill operations that cause exceedances of the 110% TDG gas standard. The Corps will take the actions necessary to implement the spill operation called for in this biological opinion, including spill in accordance with the special TDG conditions set forth below.⁹ NMFS will provide technical assistance, as necessary, to support the Corps' actions.

* * *

Special TDG Conditions for Juvenile Fish Passage. At the eight Columbia and Snake river mainstem hydro projects, and consistent with state and Tribal water quality variances, spill will be reduced as necessary when the average TDG concentration of the 12 highest hourly measurements per calendar day exceeds 115% of saturation at the forebay monitor of any Snake or lower Columbia river dam or at the Camas/Washougal station below Bonneville Dam. Spill will also be reduced when the 12-hour average TDG levels exceed 120% of saturation at the tailrace monitor at any Snake River or lower Columbia River dams or Dworshak Dam. Spill will also be reduced when instantaneous TDG levels exceed 125% of

⁹ In 2001, to maintain power system reliability consistent with the emergency provisions of the NMFS BO, BPA has had to declare power system emergencies, which has reduced the levels of spill that would otherwise be provided. However, as expressed in section III.C of this document, BPA is undertaking prodigious efforts to avoid and moderate the occurrence and adverse effects of emergency operations and to develop measures to offset adverse effects on listed fish that do occur.

saturation for any 2 hours during the 12 highest hourly measurements per calendar day at any Snake, Clearwater, or lower Columbia River monitor.

2000 NMFS BO at § 9.6.1.7.1, p. 9-121, Appendix B at B-7.

However, spill for fish passage is a short-term strategy:

[S]pill for fish passage that results in exceedances of the 110% gas standard is considered an interim strategy in the sense that the long-term goal is to keep TDG levels within water quality standards.

2000 NMFS BO at 9-120.

In the longer term, the Federal agencies will consider and implement structural and operational changes to progress toward dissolved gas standards while still meeting survival objectives of listed salmon.

To assess the feasibility of reducing TDG to the 110% standard while still meeting the survival objectives of listed salmon, EPA, NMFS, USFWS, and the Federal Action Agencies commit to continued efforts to identify water quality improvement actions (see Appendix B). These efforts will lead to decisions on whether structural or operational changes exist that will allow FCRPS projects to achieve both fish passage and water quality objectives, and encourage changes in non-Federal Columbia River basin projects that have a cumulative effect of reducing TDG levels systemwide. Information developed from these studies may also provide a basis for future decisions concerning beneficial use and water quality criteria revisions. Such decisions will result from a coordinated effort between EPA and NMFS and discussions with states, Tribes, and other interested parties. The EPA, NMFS, USFWS, and the Federal Action Agencies will continue to work toward implementing a combination of actions that benefit both fish survival and water quality.

2000 NMFS BO at 9-120. Measures for both improving juvenile passage survival and water quality include development of alternative fish passage measures, such as surface bypass. 2000 NMFS BO at § 9.6.1.2, pp. 9-54, 55. Surface bypass efforts potentially reduce dissolved gas supersaturation levels. 2000 NMFS BO at § 9.7.1.1.3, p. 9-184.

Consequently, the FCRPS action agencies intend to “make operational and capital investment decisions at the Federal projects to reduce levels of gas generated by spill and to reduce the reliance on spill as a primary means of juvenile fish passage.” 2000 NMFS BO at Appendix B, p. B-7. As an alternative way to pass fish, NMFS advises the FCRPS action agencies to continue to investigate prototype surface spillway bypass systems. 2000 NMFS BO at §§ 9.6.1.4.5, pp. 9-94 et seq.; 9.6.1.7.2, pp. 9-122 et seq. However, transition to

the long-term standard depends upon development of and reliance on these alternative systems. Until the Federal agencies have confidence in an alternative bypass system, NMFS is not likely to support reducing spill. If NMFS continues reliance on spill, then a modification of applicable water quality standards may be warranted.

The transition to the longer-term dissolved gas goal also affects how the FCRPS action agencies install spill deflectors, a concrete structure installed at the bottom of a bay in dam's spillway to reduce TDG. Installation of a deflector can be optimized in terms of depth and shape for *voluntary* spill used to pass fish, or for *involuntary* spill in excess of that desired for fish passage, which periodically occurs when the flow of water exceeds a dam's capacity to store it or pass it through turbines. (For a description of involuntary spill, see the following subsection.) A deflector consists of poured concrete and cannot be changed after installation. BPA intends to support only installation of additional deflectors optimized for involuntary spill and the goal of meeting dissolved gas standards.

5. Integration of Water Quality Measures with Other Responsibilities

The Federal agencies will integrate decisions to improve water quality into their planning processes. As expressed in Appendix B to the 2000 NMFS BO:

The water quality plan will include possible measures for implementation to improve water quality. These measures, such as ESA and fish and wildlife measures, will be coordinated with established processes. These include planning and review processes of the NWPPC, including the Independent Scientific Review Panel, the Columbia Basin Fish and Wildlife Authority, the NMFS' Regional Forum, and, if appropriate, the Columbia River Basin Forum. Some measures may also require congressional approval. NMFS, EPA, USFWS, and the Federal Action Agencies intend to support implementation of those measures that successfully garner approval through these processes. A common approach for selecting water quality, ESA, and fish and wildlife measures to implement should foster coordination among NMFS, EPA, USFWS, and the Federal Action Agencies, and increase effective use of available but finite resources. The outcome of these processes is a collection of measures undertaken by the Action Agencies to serve the agencies' various statutory purposes within budgetary parameters. Recommendations approved by applicable processes could be identified in the water quality plan for implementation.

2000 NMFS BO at Appendix B, p. B-25.

As stated above, the action agencies have already agreed to initiate a basin-wide water quality plan very similar to the planning process described in Appendix B.

VII. Meeting Responsibilities to Tribes: Consideration of Tribal Views and Impacts of FCRPS Operations upon Culturally Important Resources

As expressed in the Basinwide Salmon Recovery Strategy, there is a unique and long-standing relationship between the U.S. government and Federally recognized Indian Tribes (hereafter referred to as "Tribes"). The U.S. government has a trust responsibility to protect those Tribes' trust resources and treaty rights, to respect the sovereignty of Tribal governments, and to act consistently with the statutes and the missions of respective agencies. Recovery Strategy at Vol. 1, p. 17.

To consider impacts upon Tribes associated with operation of the FCRPS, BPA and other Federal agencies have engaged in and will continue to engage in consultations and discussions with Federally recognized Tribes in the Columbia River Basin. Some of these meetings included participation by states and the public. The Action Agencies will take into consideration the National Historic Preservation Act (NHPA), the Native American Grave Protection and Repatriation Act, Archaeological resources Protection Act, American Indian Religious Freedom Act, and guidance provided in Executive Order 13007 "Indian Sacred Sites." BPA has and will consider impacts on culturally important resources, including anadromous and resident fish, even if these resources fall outside the scope of the narrower definitions of historic properties, such as "cultural resources," defined in the NHPA or other statutes. Recovery Strategy at Vol. 1, p. 18.

A. Discussions with Tribes during Development of the Basinwide Recovery Strategy and 2000 NMFS BO

During development of the Recovery Strategy and the 2000 NMFS BO, Federal Agencies met with Federally recognized Tribes of the Columbia Basin. *Id.* at 17; See Volume 3, "Regional Coordination and Public Involvement," for a summary of these discussions; 2000 NMFS BO at § 2.5, pp. 2-3. BPA intends to continue these consultations and discussions as it participates in the development of the 2000 NMFS BO implementation plans. One goal of such meetings is to identify potential effects on culturally important resources early in the planning process before selecting a preferred action. Recovery Strategy at Vol. 1, p. 18.

During ESA consultation, the Federal agencies met with and considered views of states, Tribes, and others. NMFS held a series of meetings with state and Tribal fish and wildlife managers that began on February 2, 2000. NMFS also briefed the Northwest Power Planning Council and engaged in subsequent discussions with NWPPC members.

NMFS also issued a draft biological opinion, dated July 27, 2000, for review by states and Tribes and other interested parties. During the comment period following this draft BO, NMFS conducted a series of technical-level planning and policy-level meetings with Tribes. In addition, after the draft Basinwide Recovery Strategy was released in July 2000, the Federal Caucus engaged in government-to-government consultations with 13 Native American Tribes in the Columbia River Basin.

During the comment period following publication of the draft NMFS BO and the draft Recovery Strategy, NMFS also discussed the draft BO at meetings with the Northwest Power Council and the offices of the governors of Pacific Northwest states. The FCRPS Action Agencies participated in these meetings.

For more detailed information respecting Federal agency consultations and discussions with Tribes, states and the public during consultation leading to the 2000 NMFS BO, see 2000 NMFS BO § 2.5, pp. 2-3 *et seq.*; Conservation of Columbia Basin Fish, Final Basinwide Salmon Recovery Strategy, Volume I, pp. 17-19, and 2000 NMFS BO at 2-9.

B. Discussions with Tribes After Issuance of the 2000 NMFS BO

Subsequent to issuance of the biological opinion, the Action Agencies have engaged in discussions and consultations with Tribes as the agencies have deliberated on operational decisions in 2001. The prime matter of importance to all parties has been the extremely low water year and unprecedented climb in market prices for electrical power, which have compelled BPA to periodically declare power system emergencies. To make better decisions during this difficult year, the regional executives of Federal agencies, including the Action Agencies, have met almost weekly since December 2000. They have also given presentations and engaged in discussions with states and Tribes. To enhance this dialogue, the Federal agencies have invited representatives of states and Tribes to participate in some of their executive meetings. Executive meetings and telephone conferences have occurred on March 16, March 30, April 6 (telephone conference), April 13, and April 27, May 11, May 25 (telephone conference), June 1 (telephone conference), June 15 (telephone conference), and June 29. The Federal agencies will schedule additional meetings as the year progresses.

In addition, the Corps of Engineers consulted with the Columbia River Inter-Tribal Fish Commission on April 12 and 27. To the extent practicable, the Federal agencies also have consulted and will consult with an individual Tribe on matters of particular interest to that Tribe.

The 2000 NMFS BO provides additional opportunities for Tribal involvement during its annual implementation planning process, which identifies and selects particular measures for implementation. On a more technical level, the Federal

agencies look to the Technical Management Team (TMT), which is open to participation by state and Tribal representatives, for in-season management of available water. The Federal agencies have promptly notified TMT of declarations of emergencies and discussed possible responses.

More generally, as expressed in the BO,

The Action Agencies and NMFS encourage participation by the Tribes and Tribal organizations in all of the Technical Management Team, System Configuration Team [structural improvements], Water Quality Team, and Implementation Team processes, and in regional planning activities such as the CBFWA/NWPPC process where much of the planning for offsite mitigation activities will occur. Such participation will provide abundant opportunities at the technical level to collect, synthesize, and exchange information to seek consensus on implementing the hydro and offsite mitigation actions identified in the biological opinion. Decisions at the policy level are also important and may occur through direct communications with Tribes or through policy level forums such as the Columbia River Basin Forum.

The Action Agencies, in keeping with their Federal trust responsibilities, will coordinate with and seek the input of appropriate Tribes during their development of the 1- and 5-year plans.

2000 NMFS BO at § 9.4.2.9, p. 9-32. As indicated by the BO, additional meetings and consultations will occur as the year progresses.

C. Revisions to Planning and Decisions in 2001 that Address Tribal Concerns

In consideration of comments from Tribes, as well as others, the Federal agencies have made and will make adjustments to planning and operations in 2001 that directly address Tribal concerns. Examples to date follow.

- The Federal Agencies' "Criteria and Priorities for 2001 FCRPS Operations" (March 30, 2001), expressly recognizes that the Federal agencies will operate the FCRPS projects consistent with treaties and executive orders with Pacific Northwest Indian Tribes and the Federal Government's trust responsibilities, as well as cultural resource laws such as the National Historic Preservation Act and the Native American Grave Protection and Repatriation Act.
- The 2001 FCRPS Operations Plan designates a targeted elevation at the Grand Coulee project.

- The Federal Agencies provided spill to aid the migration of Spring Creek Hatchery fish, a fish not listed under the ESA but important to Tribal fisheries.
- The Federal agencies have maintained flows to cover redds at Vernita Bar and the Hanford Reach, which support healthy runs of non-ESA-listed fish important to Tribal fisheries.
- The Federal agencies give high priority to refilling Dworshak and using releases of Dworshak water to reduce temperature.
- BPA has engaged in prodigious efforts to avoid or moderate power system emergency operations by buying back and thereby reducing industrial and irrigation load, by buying power on the market, calling for conservation, and soliciting proposals for additional wind generation.
- Notwithstanding emergency operations, BPA continues undiminished its expenditures to support fish and wildlife measures, principally those in the Northwest Power Planning Council's Fish and Wildlife Program, which support non-ESA-listed as well as ESA-listed fish and wildlife of importance to Tribes.
- In addition to its usual fish and wildlife measures, BPA is developing measures to offset any adverse impacts to listed fish resulting from emergency power operations. Many of the offset measures will benefit unlisted as well as listed fish.
- By its efforts to avoid emergency operations and otherwise offset the unavoidable adverse impacts of emergency operations, and through its ongoing efforts under the Council's program to implement the multi-species, long-term Basinwide Salmon Recovery Strategy, BPA is giving equitable treatment to fish and wildlife consistent with the purposes of the Northwest Power Act.

BPA recognizes that its decisions, especially in 2001, a year with extremely low runoff and power system emergencies, will not adopt all recommendations by Tribes or fully meet Tribal interests. However, the effort to engage in discussions with Tribes, and to solicit comments and participation in regional and other meetings, shows that the Federal agencies seek a constructive working relationship within Tribes, solicit and take Tribal views into consideration, and attempt to respond within their multiple statutory responsibilities. On a longer term basis, the Federal agencies, Tribes, and states all share a common goal, as expressed in different but similar ways in the Basinwide Salmon Recovery Strategy, the 2000 NMFS BO, the NW Power Council's Fish and Wildlife Program, and planning documents by Tribes: healthy populations of

non-ESA-listed as well as ESA-listed anadromous fish that permit Tribal as well as non-Tribal harvest.

VIII. ENVIRONMENTAL IMPACT ANALYSIS

BPA's environmental impact analysis of the effects-of implementing the NMFS and FWS biological opinions is in three parts. The System Operation Review (1995) and its record of decision (1997), along with analyses tiered to them, cover operation of the FCRPS. The Programmatic Wildlife Mitigation (1997) and Programmatic Watershed Management (1997) EISs provide coverage for off-site mitigation under both the biological opinions and the Council's program. BPA's Draft Regional Fish and Wildlife Implementation Plan EIS was issued this spring with a final due this fall. It will cover the over-arching policy alternatives available to BPA.

In the 1997 SOR ROD, BPA adopted the environmentally preferred alternative—implementation of the reasonable and prudent alternative actions in the 1995 NMFS and FWS biological opinions. This strategy supported the recovery of ESA-listed fish by operating the dams and reservoirs covered by the SOR EIS to benefit those species. BPA's adoption of NMFS' biological opinions in 1998 for steelhead and in 2000 for chum built upon this foundation by adding system operational measures to help recover those species as well. BPA will continue to use the SOR as the base for its NEPA compliance for operational actions under the 2000 FCRPS biological opinions. Where actions are not currently covered by the SOR, BPA will complete additional NEPA compliance documents before implementing those portions of the RPA. Such actions may include VARQ and fall flows for chum. Depending upon the content of the COE's final VARQ and Lower Snake River Feasibility EISs, BPA may adopt or incorporate part of their analyses by reference as part of its own NEPA compliance.

BPA has used its programmatic Watershed Management and Wildlife Mitigation EISs to expedite off-site mitigation pursuant to the Northwest Power Act. The NMFS biological opinion expressly includes extensive off-site mitigation actions within its RPA. BPA will tier site-specific analyses to these programmatic EISs where appropriate; otherwise, BPA will conduct stand-alone NEPA analyses as appropriate until it completes its forthcoming Regional Fish and Wildlife Implementation Plan EIS.

Upon issuance of this ESA decision document, BPA will use existing NEPA documentation to implement many hydrosystem and off-site actions under the RPA. Where necessary, this may include supplementing analyses, preparing environmental assessments, or the use of categorical exclusions. The actions that remain will be scheduled in the 1- and 5-year implementation plans so any additional NEPA documentation necessary can be completed to allow their timely

execution. BPA expects the Final Regional Fish and Wildlife Implementation Plan EIS will cover the majority of these remaining actions.

As a matter of physics, the Columbia River will flow, necessitating operation of the FCRPS at all times. BPA must simultaneously comply with the ESA and other mandates. Therefore, BPA will begin implementing certain actions under the biological opinions now. With the recent release of the Draft Fish and Wildlife Implementation Plan EIS, the policy discussions stimulated by the EIS will inform the initial implementation plans. This decision reflects some policy-level commitments. It does not, however, reflect a final determination on an overarching policy direction for how to fulfill all of BPA's fish and wildlife obligations for the next 10 years. Instead, this decision is but one of many decisions that BPA must make to adopt and implement an overall policy direction to guide our fish and wildlife planning, mitigation, and recovery efforts. Because the 1- and 5-year planning process allows for annual opportunities to exercise our discretion in how to adaptively implement the biological opinions, we believe we will meet all of our environmental mandates with these coordinated policy development and implementation planning processes.

IX. DECISIONS

Avoiding jeopardy to species listed under the Endangered Species Act and destruction or adverse modification of their critical habitat, improving water quality consistent with applicable state and Tribal water quality standards under the Clean Water Act, addressing impacts upon Indian Tribes, providing an economical and reliable power supply under the Northwest Power Act, and meeting the responsibilities of additional laws is a challenging task. This document records BPA's decision to work with the COE and BOR and other Federal agencies to undertake the following commitments, consistent with BPA's NEPA analyses and as described more fully in this decision document.

A. Biological Opinions

- Implement the 2000 NMFS BO RPA for listed anadromous fish, as developed and supplemented pursuant to the RPA's implementation planning process, consultations, and midpoint reviews, in order to avoid jeopardy to listed species and avoid destruction or adverse modification of their critical habitat.
- Implement the 2000 FWS BO RPA for sturgeon, and operate the FCRPS consistent with the FWS conclusions that operations avoid jeopardy to other listed species reviewed by FWS.
- Implement RPA measures in a manner consistent with the Basinwide Salmon Recovery Strategy, to enable recovery of listed salmonid species.

- Comply with the terms and conditions of the 2000 NMFS BO's incidental take statement, consistent with the regulations for measures, terms and conditions in an incidental take statement,¹⁰ to avoid illegal take of listed salmonid species.
- Comply with the terms and conditions of the 2000 FWS BO's incidental take statement, consistent with the regulations for measures, terms and conditions in an incidental take statement,¹⁰ to avoid illegal take of listed salmonid species.

B. Basinwide Recovery Strategy

- Implement measures supporting the Basinwide Salmon Recovery Strategy, in order to foster recovery of listed anadromous species, an objective sought by all Federal agencies, states, and Tribes.

C. Essential Fish Habitat

- Implement appropriate provisions in the 2000 NMFS BO RPA and Basinwide Salmon Recovery Strategy for improvements to the Columbia River estuary, in order to improve EFH.

D. Water Quality

- Implement the water quality provisions of the 2000 NMFS BO RPA, develop a water quality plan, and implement additional measures consistent with Appendix B to the 2000 NMFS BO, to improve water quality, progress toward meeting state and Tribal water quality standards, and meet Clean Water Act responsibilities.

E. 2001 Operations

- In light of the extremely low water year and unprecedented increases in power prices in 2001, meet ESA and power responsibilities in 2001 by working with NMFS, FWS, other Federal agencies, states, and Tribes to:
 - Use the "Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations" (March 30, 2001), and the Federal Agencies' 2001 FCRPS Operations Plan (May 25, 2001), as they may be supplemented or revised, to guide decisions in 2001.

¹⁰ As provided by the regulations jointly issued by NMFS and FWS, the measures and terms and conditions of the incidental take statement will be implemented so that they are minor and do not alter the basic design, scope, timing or duration of the action agencies' activity determined to avoid jeopardy. 50 C.F.R. 402.14(i)(2).

- Offset adverse impacts resulting from power system emergency operations.

F. Coordination with States and Tribes

- As practicable within timelines needed to make decisions, coordinate these efforts with states and Tribes and the Northwest Power Council.
- Continue to meet with states and Tribes to consider their advice and recommendations about how to improve conditions for fish and wildlife.
- Continue to meet and consult with Tribes to consider and respond to impacts of implementation of the BOs upon Tribes and Tribal interests.

G. NEPA

- Make decisions consistent with its NEPA analyses.

Dated this 8th day of August 2001



Stephen J. Wright
Acting Administrator
Bonneville Power Administration

APPENDIX A

EXAMPLE OF METHODS FOR REDUCING INVOLUNTARY SPILL

Bonneville Power Administration
Plans for Minimizing Spill
March 1997

Background

Spill at hydroelectric projects can occur for several reasons. The 1995 Biological Opinion issued by the National Marine Fisheries Service (NMFS) mandates that spill occur at mainstream projects to aid in fish passage. The amount of this spill, "fish spill," to be provided is a percentage of total project outflow, but limited so as to not produce TDG levels exceeding 120 percent. The state-established water quality standard for TDG is 110 percent but the State agencies that have responsibility for the standard have waived their standard on an annual basis to allow the Biological Opinion spill program to be implemented.

There are two other types of spill in addition to fish spill. These are lack-of-turbine spill and lack-of-load ("overgeneration") spill. Lack-of-turbine spill occurs when total river flows exceed powerhouse hydraulic capacity. Overgeneration spill is an amount of spill that could have been passed through turbines had there been load for the resulting energy generated. Overgeneration spill generally occurs in periods of low energy consumption ("light load hours"), such as the middle of the Month and on weekends.

The 1997 spring runoff is projected to be near the largest on record for the Snake River, and in the top 10 percent of the historical record for the Columbia River at The Dalles. Consequently, we expect Snake River springtime flows to be in the 150-250 thousand cubic feet per second (kcfs) range during the majority of the spring/summer Chinook juvenile outmigration. Lower Columbia River flows are projected to be in the 400-500 kcfs range. As a result of these high flows, TDG levels are expected to exceed saturation amounts in the late-April to mid-July period. These high TDG levels (perhaps as high as 135 percent) will be reached because of lack-of turbine spill. The volume of water this spring will completely overwhelm the hydraulic capacity of the generating system, even when all turbines are on-line and running flat-out. Overgeneration spill will also elevate gas levels, but by fewer than five percentage points. Our efforts to minimize both types of spill are described below.

To reduce lack-of-turbine spill we have primarily focused on working with the Corps of Engineers to maximize turbine availability this spring. All but five units at the lower Snake/Columbia River dams are expected to be available for service; which compares to about 10 units generally being out of service during the 1996 spring outmigration. Three units will be out of service for ongoing generator rewinds, a fourth is having generator exciter and turbine rehabilitation work performed. Bonneville is finding the immediate repair and return-to-

service of the fifth unit, Ice Harbor Unit 5, on an emergency basis; however, it will not be available this season.

Our other primary strategy for reducing lack-of-turbine spill is to maximize the storage of water into headwater storage reservoirs during the spring runoff. This year, virtually every storage reservoir on the system will be drawn down as much as possible prior to the spring freshet for flood control, allowing as much spring runoff to be stored as possible. This deep drawdown is controversial, especially at Grand Coulee, as it conflicts with other reservoir uses.

It should be noted that various research efforts are planned on the river this year, primarily to investigate surface bypass technologies. This effort may force unplanned outages of certain units from time-to-time. Similarly, routine maintenance and inspections of fish bypass screens will require periodic outages lasting a few hours. It is uncertain whether conditions will be found during these inspections that require longer outages. All, unplanned outages will be carefully scrutinized to maximize unit availability during the high flow period.

Actions for Reducing

With respect to reducing overgeneration spill, we have a multi-faceted strategy for this spring.

Our first action will be to shut down Washington Nuclear Plant #2 (NWP2) prior to the migration season and not restart the reactor until TDG levels are below 120 percent and energy from the plant can be marketed.

Second, we are aggressively marketing our expected surplus energy inventory. We currently have about 5000-6000 average megawatts (aMW) of uncommitted light load hour energy in the April - June period. Our uncommitted heavy load hour inventory is much less, and we are able to market virtually all of it either on an advance contract basis or through the daily spot energy market. Because of the magnitude of the light load hour surplus, we are focusing sales on flat and light load hour products. Flat sales such as thermal plant displacement increase our light load hour demand thus reducing overgeneration spill. However, there is a limit to the amount of flat load we can pursue because these deals also increase our heavy load hour demand.

Our spring marketing strategy includes the following attributes:

- Discount pricing for flat and light load hour products to encourage purchasing of light load hours.
- Aggressive pursuance of flat thermal displacement sales both in the Northwest and outside the region (see Enclosure 2).

- Negotiation of a "Gas Abatement/Energy Exchange" agreement with Alberta's Transalta Utility Corporation under which Bonneville delivers light load hour energy in March – June (Up to 400 megawatts {MW}), and receives return of 20 percent of this delivery in July.
- Sale of a unique light load hour product that allows the market to distinguish (and purchase) higher valued light load hours, thus increasing load in light load hours, and decreasing overgeneration spill. We have sold 350 MW of this product to date.

A review of the attached plant-by-plant breakdown of our thermal displacement efforts shows that while we have had some success in displacing several facilities, many plants are expected to continue operating through the spring. There are several reasons why we have been unable to come to terms with the owners of these resources:

- During the spring months, Northwest thermal resources that remain on-line (such as Colstrip, Centralia, and Bridger) are generally operated at high energy output during the on-peak or heavy load hours and at a minimum level during off-peak or light load hours. Therefore, the owners want to purchase displacement power that is shaped in a manner similar to how these units would otherwise operate. Selling power to mirror this type of operation is not helpful in mitigating overgeneration spill because the hydrosystem is most vulnerable to spill during the off-peak or light load hours.
- Maintenance is often scheduled during the spring, with some plants being taken off-line even without displacement purchases (due to loads generally being lighter).
- Owners are declining to commit to resource displacements at currently offered prices in the hopes of getting even lower prices later in the daily spot market. The resource owners are willing to wait to see if the price in the daily market is lower than what they have been offered in the monthly market. This result leaves us uncertain as to the amount of displacement that will actually occur as these owners attempt to secure further economic gains through waiting.

Displacement opportunities with resource owners in California or in the Inland Southwest are also difficult due to the lack of transmission availability in southern California. Both Southern California Edison and Los Angeles Department of Water and Power are reserving a large part of the transmission availability for their own use. For example, last year we displaced Salt River Project's (an Inland Southwest utility) share of the Palo Verde nuclear plant but this year, due to transmission constraints, we are unable to reach this plant. Further, the owners of many resources are interested in on-peak or heavy load hour purchases only, yet the overgeneration spill usually occurs in off-peak or light load hours.

Our third measure for managing overgeneration spill is to use the pump-generators at Grand Coulee in the generation mode during the daytime as much as the system will allow. This action increases heavy load hour generation but consumes energy during the nighttime when water is pumped from Lake Roosevelt to Banks Lake.

Fourth, there are a variety of other realistic but marginal actions we are investigating. They reflect our strong interest in reducing overgeneration spill as much as possible. They include:

- Recharging the Snake River aquifer - this removes some water from the river in the springtime when it would be spilled and instead puts it in the ground. It appears the State of Idaho is pursuing this action.
- Opening transmission access outside the region for the purpose of delivering immediate spill energy to dams that would not already be spilling at this time. There is a possibility that access to Colorado or Missouri River systems could be obtained.
- Pumping water into the Columbia Basin Project and allowing it to pass through waste canals. We are working with the Bureau of Reclamation on developing methods for spilling through the irrigation waste canals. This action consumes excess energy during pumping as was noted above and allows some water to bypass several generating projects downstream.
- Verifying that regional irrigation pumping is occurring in light load hours to the maximum extent possible.

Fifth, we are attempting, through the Western Systems Coordinating Council (WSCC), to have the Northwest/Southwest Intertie rating upgraded closer to its full capability. Following the power outage of August 10 last year, the Intertie to the Southwest was restricted to less than full capability in order to conservatively protect reliability. Bonneville has agreed that WSCC concurrence is appropriate before raising Intertie levels because outages in the Pacific Northwest do have a ripple effect throughout the integrated western system. The WSCC is in the final stages of review to allow the combined AC/DC wintertime rating to be upgraded from 5200 to 6250 MW. All indications are that this upgrade will occur. Bonneville is currently conducting studies to be used by WSCC to decide at what level the spring rating should be set. Our analysis will be reviewed by a Blue Ribbon panel set up after last year's outage and by the WSCC. A springtime rating of 6250 MW should be sufficient for meeting the maximum Southwest demand for Northwest power. However, if WSCC were to decide not to increase the springtime rating above 5200 MW, we would, in this kind of water year, have insufficient transmission capability to satisfy Southwest market demand and additional spill would occur. Furthermore, if the Intertie is not restored to near its full 7900 MW capability for the summer, we may have periods, in early July, in which energy may be spilled instead of marketed. A near-full Intertie rating is more important in the summer because Southwest loads are greater in the late-June to September period, as compared to the spring. Also, during the

springtime Southwest utilities will have an abundance of their own hydro-generated energy, due to a deep snowpack in California.¹¹

The sixth and seventh measures for managing overgeneration spill are interrelated and are referred to as distribution of overgeneration spill through a "spill priority list" and delivery of "immediate spill energy." When the first five actions described above are insufficient for dissipating excess energy, overgeneration spill energy is spread throughout the region by distributing spill to as many hydroelectric projects as possible. The spill is allocated through a spill priority list developed by the interagency Technical Management Team (TMT). Last year, the TMT monitored spill on a real-time basis and modified the list as needed to minimize the impacts to fish. This year, more projects have been added to the list to distribute spill further outside the primary fish migration corridor. When spill is spread to non-Federal hydro projects on this list, Bonneville delivers "free" energy to the owners of these projects to replace the energy that otherwise would have been generated, hence the term "immediate spill energy."

The objective of the spill priority list is to systematically raise TDG levels throughout the system by increasing spill amounts at projects according to an established order. Generally, that order is to first increase spill at mainstream non-collector projects (i.e., those not used to collect fish for transportation). Next, spill is increased at the mid-Columbia projects (through immediate spill energy deliveries). If more energy must be dissipated, spill is increased at Grand Coulee and Chief Joseph, further up the Columbia, then at out-of-corridor projects, such as Hungry Horse and the Willamette projects, and then at mainstream collector projects (i.e., McNary, Lower Monumental, Little Goose, Lower Granite). As more spill is required, it is placed at projects in this order up to a maximum amount. With this approach, TDG levels rise equivalently throughout the system. It should be noted that this spill priority list also attempts to shift spill away from projects known to be significant gas producers (such as John Day and Ice Harbor) to the maximum extent possible, so that remaining spill at these projects will be lack of turbine spill. As part of this spill priority list, the mid-Columbia utilities, Seattle City Light, Washington Water Power, West Kootenay Power and Light, and B.C. Hydro also accept immediate spill energy in exchange for spilling at their dams. In total and depending on runoff, these non-Federal parties accepted from 200 to 1500 aMW of energy in spill last year. We are attempting to further broaden the list of available utilities and hydro plants to be used in this manner. In particular, Libby, Mica, Revelstoke, Kerr, Minidoka, American Falls, and the Hells Canyon projects are some of the projects not on the priority list. At some of these projects, there are significant concerns of high TDG levels immediately downstream of the project.

¹¹ The contents of this document, including the facts discussed in the above paragraph pertaining to the combined AC/DC rating, were written in 1997. Subsequently, the WSCC-approved combined AC/DC ratings for winter 2000-2001, spring 2001, and summer 2001 are 7160 MW, 7900 MW and 7575 MW, respectively.

We have recently approached Portland General Electric and the City of Portland to spill water at Bull Run Reservoir and some projects in the Clackamas River in exchange for immediate spill energy. They have indicated a willingness to do this if the details can be worked out. We are in contact with Seattle City light to see if they can spill at their Summer Falls project. We have also contacted B.C. Hydro to see if they can accept any additional immediate spill, however they are unsure at this time how much additional spill they can take.

Eighth, we may be able to reduce overgeneration spill under some conditions during the spring runoff by holding back water during light load hours and "shaping" it into daytime energy generation. During periods of extremely high flows, the hydrosystem has very little ability to shape generation into daytime hours because mainstream run-of-river reservoirs (1) do not have sufficient storage capability to hold back water at night, and/or (2) are already generating at full powerhouse capacity during the daytime. However, there may still be periods during the springtime when flows are low enough to allow shaping into the daytime. During such periods, operating outside the Biological Opinion-mandated 1 percent peak efficiency requirements during the daytime and/or operating outside the minimum pool requirements on the lower Snake River and John Day could enhance night-to-daytime shifting or light load hour to heavy load hour shaping. On the Snake River, for example, when flows are in the 80-115 kcfs range, operating over the full forebay range could help to reduce overgeneration spill. When and if such conditions arise, and if operating outside the 1 percent efficiency or the minimum pool elevation criteria could reduce overgeneration spill at a time when such spill is causing TDG levels to be above 120 percent, then we plan to propose a temporary relaxation of these requirements in the weekly Technical Management Team meetings.

Despite all of the above measures, we anticipate that during this spring's high runoff period, there will still be overgeneration spill although it will be a much lesser TDG contributor compared to lack-of-turbine spill. As noted above, we estimate that during the highest flow periods this year, overgeneration spill will add fewer than five percentage points to total TDG levels and lack of turbine spill will add 10 to 15 percent or more. Overgeneration spill cannot be completely eliminated under high river flow conditions because, as a whole, daytime energy consumption is much greater than nighttime, and hydro generation cannot be shaped. As flows recede to levels that allow generation to be shaped consistent with energy consumption patterns, overgeneration spill can be eliminated.

APPENDIX B

CLEAN WATER ACT ACTIONS
(TABLES B-2 AND B-3 OF THE 2000 NMFS BO)