



COLUMBIA BASIN FISH AND WILDLIFE AUTHORITY

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Coordinating and promoting effective protection and restoration of fish, wildlife, and their habitat in the Columbia River Basin.

The Authority is comprised of the following tribes and fish and wildlife agencies:

Burns Paiute Tribe

Coeur d'Alene Tribe

Confederated Salish and Kootenai Tribes of the Flathead Reservation

Confederated Tribes of the Colville Reservation

Confederated Tribes of the Umatilla Indian Reservation

Confederated Tribes of the Warm Springs Reservation

Confederated Tribes and Bands of the Yakama Nation

Idaho Department of Fish and Game

Kootenai Tribe of Idaho

Montana Fish, Wildlife & Parks

National Marine Fisheries Service

Nez Perce Tribe

Oregon Department of Fish and Wildlife

Shoshone-Bannock Tribes of Fort Hall

Shoshone-Paiute Tribes of Duck Valley

U.S. Fish & Wildlife Service

Washington Department of Fish and Wildlife

Coordinating Agencies

Columbia River Inter-Tribal Fish Commission

Upper Columbia United Tribes

Compact of the Upper Snake River Tribes

August 07, 2008

Mr. Greg Delwiche, Vice President
Bonneville Power Administration
905 NE 11th Avenue
Portland, OR 97208-3621

Mr. Bill Booth, Chairman
Northwest Power and Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, OR 97204-1348

Dear Messrs. Delwiche and Booth:

The fish and wildlife agencies and Tribes of the Columbia Basin Fish and Wildlife Authority (CBFWA) would like to request consultation on the development of comprehensive work plans to implement the Fish and Wildlife Program, Biological Opinions, and Columbia Basin Fish Accords for FY09-17. The Members of CBFWA appreciate the spirit of collaboration and cooperation exhibited by recent efforts to work with fish and wildlife managers both collectively and individually in developing long term implementation plans. In that context, and as agreed in the 2005 Coordination MOA with the UCUT Tribes, we would like to meet as a group to discuss a process for establishing work plans and budgets to implement the Fish and Wildlife Program, including the Biological Opinions, over the next ten years, especially as it pertains to FY09-11.

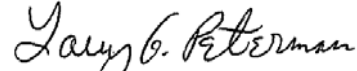
We are currently reviewing the Bonneville Power Administration's (BPA) FY08-09 budget, the Biological Opinions, the Columbia Basin Fish Accords, CBFWA's critical and essential FY07-09 projects, the fish and wildlife agencies and Tribes individual and collective Fish and Wildlife Program amendment recommendations and individual comments submitted to the Northwest Power and Conservation Council, and comparing these planning efforts with BPA's proposed fish and wildlife costs for FY09 and FY10-11. Although we have not completed our review of the funding needed to implement projects and commitments identified in the documents listed above, we are encouraged by the initial funding levels that BPA has identified for FY2009-11. The process that will be used to determine the funding priorities to implement the proposed budgets is unclear. Critical mitigation needs and commitments may not be addressed without that review and alignment. The fish and wildlife agencies and Tribes have specific authorities and expertise that can assist in establishing priorities that provide the maximum benefit to the fish and wildlife resources in the Columbia Basin. To that end, it is essential that the Bonneville Power Administration, the Northwest Power and Conservation Council, and the fish and wildlife agencies and Tribes meet to collaboratively develop a multi-year work plan.

Greg Delwiche, BPA
Bill Booth, NPCC
August 7, 2008
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Additionally, we feel consultation on a collaborative work plan could resolve what appears to be a disagreement between BPA and the fish and wildlife agencies and Tribes as it pertains to the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program amendment process. We reviewed the comments that BPA submitted to the Council on June 18, 2008 (see attached) in response to CBFWA recommendations to amend the Fish and Wildlife Program and there appears to be a striking gap in views of mitigation obligations and responsibilities for the construction and operation of the Federal Columbia River Power System. A candid discussion of this issue would be helpful for all of us.

We would like to reiterate that it appears these two issues could be compatible, and a meeting between us could serve to focus planning assumptions and would help us understand the path forward. We request that your staff coordinate with CBFWA staff to set up a meeting date with our Members in the near future to discuss the strategies for aligning these processes and working collaboratively with the fish and wildlife managers for future decision making.

Sincerely,



Larry Peterman, Chairman
Columbia Basin Fish & Wildlife Authority

Attachments:

1. 6/18/08 BPA's Comments on Recommendations for Amending the Columbia River Basin Fish and Wildlife Program
2. 6/10/2008 Appendix to Enclosure 1: Supporting BPA's April 4, 2008 Recommendations for Proposed Program Amendments
3. 6/16/08 Draft Program RM&E Language Expanding on BPA's Amendment Recommendations

cc: CBFWA Members
Council Members
Steve Wright and Bill Maslen, BPA



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

June 18, 2008

In reply refer to: KE-4

Mr. Bill Booth, Council Chair
Northwest Power & Conservation Council
851 SW Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348

Dear Chairman Booth:

Thank you for the opportunity to comment on recommendations for amending the Columbia River Basin Fish and Wildlife Program (Program). Given that 65 entities made recommendations to amend the Program totaling thousands of pages, these Bonneville Power Administration (BPA) comments focus primarily on those recommendations that raise some of the more significant legal or policy issues. Please note that BPA does not necessarily either support or oppose other recommendations not addressed in these comments.

Significant Legal and Policy Issues Posed by Certain Recommendations

BPA's review indicates that some recommendations from major program participants do not meet the Northwest Power Act's (Act) criteria for appropriate Program amendments. Under the Act, each individual recommendation for an amendment intended for BPA implementation must meet the following criteria:

1. Detailed information and data must support "all recommendations."¹
2. The "best available science" must support all recommendations.²
3. Proposals must "complement the existing and future activities" of the region's fish and wildlife resource managers.³
4. The alternative with minimum economic costs must prevail when two or more alternatives would meet the same sound biological objective.⁴
5. Measures that coordinate actions under the program "to deal with impacts caused by factors other than the development and operation of electric power facilities and programs" must "be implemented in accordance with agreements among the appropriate parties providing for the administration and funding" of those measures.⁵
6. BPA ratepayers shall bear the cost of mitigation measures for the Federal Columbia River Power System (FCRPS) only.⁶

¹ 16 U.S.C. § 839b(h)(3).

² *Id.* at § 839b(h)(6)(B).

³ *Id.* at § 839b(h)(6)(A).

⁴ *Id.* at § 839b(h)(6)(C).

⁵ *Id.* at § 839b(h)(8)(C).

⁶ *Id.* at § 839b(h)(8)(B).

BPA's comments in sections one through six below follow these criteria.

1. Supporting Detailed Information and Data.

- Unsupported Recommendations

As described above, the Act provides that “all recommendations shall be accompanied by detailed information and data in support of the recommendations.” However, several entities provided recommendations without supporting information and data. For example, “Section 6.0 Appendix: Supporting Documentation,” of the Columbia Basin Fish and Wildlife Authority (CBFWA) recommendation lacks any supporting documentation for 34 sections out of the 72 sections listed.⁷ Similarly, the Shoshone-Paiute Tribes’ recommendation omitted any reference to supporting documentation.⁸ Oregon submitted 86 numbered recommendations with citations to supporting documentation for only one.⁹ Absent “detailed information and data in support of the[se] recommendations,” they do not meet an essential non-discretionary requirement for Program amendments.¹⁰

- Changes to Subbasin plans

Another concern is the treatment of subbasin plans in the CBFWA proposal. The proposal provided updated summaries for each subbasin, including updated objectives. While some of the updates rely on recovery plans for ESA-listed anadromous fish, and such plans were developed with public input and review, the use of recovery plans for this purpose isn't clearly identified. (The “Supporting Documentation” in section 6 of CBFWA’s recommendations does not list any recovery plan or other science-based public process providing supporting data underpinning the recommended updates to subbasin plans.) Clarification of the process engaged in by CBFWA to update subbasin plan summaries based on recovery plans would be helpful.

It appears that the updates to resident fish and wildlife elements of subbasin plans, however, were done without an open public process. Once again, clarification of the process engaged in by CBFWA would be helpful. The Power Act’s specific call for public participation on recommendations “and supporting documents”¹¹ does not seem to have been met for the non-ESA portions of the changes/updates proposed by CBFWA. BPA suggests, therefore, that these changes should not be viewed as meeting the Act’s legal requirements.

- Use of the All-H Analyzer

CBFWA’s recommendations included some of the results of a modeling exercise using the so-called All-H Analyzer, or AHA model. Specifically, the CBFWA recommendations include estimates of

⁷ CBFWA, Final Recommendations, Section 6.0 Appendix: Supporting Documentation (Apr. 4, 2008) (showing the following recommendation sections lacked any supporting documentation: 1.0, 1.6, 2.0, 2.0.1, 2.0.2, 2.0.3, 2.0.3.1, 2.0.5, 2.0.8, 2.0.9, 2.1, 2.1.1, 2.1.2, 2.1.4, 2.1.4.4, 2.1.4.5, 2.1.5, 2.1.5.1, 2.1.5.3, 2.1.5.6, 2.1.5.7, 2.1.5.8, 2.1.5.12, 2.1.6, 2.1.7, 2.1.8, 2.2, 2.2.1, 2.2.2, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.3.7, 2.3.8).

⁸ Shoshone-Paiute Tribes recommendations (Apr. 4, 2008).

⁹ Oregon Department of Fish and Wildlife (ODFW) Attachment 1, recommendation no. 25 (Apr. 4, 2008).

¹⁰ 16 U.S.C. § 893b(h)(3).

¹¹ 16 U.S.C. § 839b(h)(4)(B).

the potential population response to a “no passage effect” management scenario, which is apparently intended to represent potential salmon abundance in the absence of large hydroelectric projects—in effect, a “no dams” scenario.

It is not clear whether and to what degree AHA modeling has informed CBFWA’s recommendations. It appears that the modeling results are being presented to indicate a view of the magnitude of the hydro system’s mitigation responsibility. (The estimates can be found for selected populations in the Limiting Factors and Threats tables in Section 3 of the recommendation. The modeling is described in sources found on the Council’s website.) The inclusion of AHA analyses in CBFWA’s recommendations, as well as the lack of a public process and independent science review of the modeling process, raises a number of legal, policy, and technical concerns.

According to its developers, the AHA model is primarily a hatchery management tool which enables managers to “project the effects of various hatchery scenarios, under differing harvest and habitat assumptions, on the productivity and abundance of associated natural spawners of natural and hatchery origin, in terms of whole population performance.”¹² BPA believes AHA may serve a useful role in the region’s ongoing hatchery reviews, but even in this case it is important that the model developers provide adequate documentation, as numerous reviewers have indicated that the model is inadequately documented, lacks peer review and validation, and have urged caution about its appropriate use.

For example, in 2005 the Independent Scientific Review Panel (ISRP) and Independent Scientific Advisory Board (ISAB) reviewed the AHA model (at the Council’s request) and observed:

“...an expert system predicting salmon productivity in the presence of wild/hatchery interactions will have unpredictable performance, and probably low reliability. At best, such a system will offer a useful way to organize assumptions and quantify the implications of adopting those assumptions, provided the tool carefully documents its own assumptions, as well as the user-supplied inputs, along with its output of predictions. If the tool is adequately documented, and adequately documents inputs as part of its output, the proper use of the tool is to generate hypotheses that should be tested, rather than accepted at face value.”¹³

The ISRP/ISAB then recommended as follows:

“Recommendation. The AHA model should not be used to aid in the development of draft numerical objectives for anadromous fishes, including natural returns, hatchery escapement, and harvest at the subbasin, province, and Columbia Basin levels until it is properly documented and validated in a substantive review.”¹⁴

¹² The All-H Hatchery Analyzer (AHA), Hatchery Reform Technical Discussion Paper (Aug. 2005) found at http://www.lltk.org/pages/hatchery_reform_project/HRP_Publications.html

¹³ Independent Scientific Review Panel/Independent Scientific Advisory Board, Review of the All-H Analyzer (AHA) (ISAB 2005-5) (February 4, 2005).

¹⁴ *Id.*

Other reviewers reached similar conclusions. The Puget Sound Technical Recovery Team organized a review of the model, which was being used to inform hatchery management in the Puget Sound region. The expert reviewers, all respected fisheries scientists, also served on various Northwest Technical Recovery Teams. Their conclusions, reached in 2005, remain relevant today because CBFWA did not present information showing that the model changed to address those criticisms. Key excerpts are as follows:

“The lack of documentation is a major weakness of the model. Without documentation describing the model and its assumptions, the model could be misused or the results could be easily misinterpreted.”¹⁵

“The reviewers agreed that ... the AHA model is best used heuristically to explore different strategies. The model should not be relied upon to allocate effects between different “H”s or decide “how much is enough,” especially in the absence of supporting empirical data or independent analyses.”¹⁶

“The model is currently undocumented, making scientific peer review impossible. Without an independent scientific review based on adequate documentation, it would be irresponsible for managers to assign much weight to the quantitative predictions of the model in making expensive and potentially risky decisions. Decisions need to be based on “best available science” and current “best available” scientific practice relies on the independent review process.”¹⁷

“In my opinion, this model is NOT appropriate for conducting a comprehensive analysis of alternative recovery scenarios.”¹⁸

If, in fact, fisheries managers choose to use AHA modeling to inform or support their views about appropriate biological goals, the use of AHA should be limited to developing hatchery management goals, as it was developed for.

BPA therefore strongly encourages the Council to scrutinize any proposed amendments that rely implicitly or explicitly on AHA analyses that go beyond hatchery management questions. While AHA has apparently undergone further development since the above referenced reviews, it remains largely undocumented. This renders its use, whether for biological objectives or other purposes, highly questionable. A critical precursor to any broader use of AHA should be a public process where the developers and users of AHA share current information, data, and assumptions in a transparent manner. In addition, meaningful scientific peer review should be provided so that clear and defensible judgments about the applicability of the CBFWA materials can be made.

Until AHA is adequately documented and subjected to independent scientific review, AHA modeling should not be thought of as meeting the Act’s requirements for “detailed information and data” and “the best available scientific knowledge.”

¹⁵ Review of the All-“H”-Analyzer Model, Puget Sound Technical Recovery Team (2005).

¹⁶ *Id.*

¹⁷ *Id.* comments of Paul McElhaney.

¹⁸ *Id.* comments of Michael Ford (emphasis in original).

2. Applying the Best Available Science.

- Biological Objectives

In addition to the AHA model issues noted above, CBFWA and most of its individual member agencies and tribes recommended modifying the Program's existing biological objectives, particularly those related to anadromous fish.¹⁹ We note that none of the proposals that continue to advance biological objectives in the 2000 Fish and Wildlife Program address the assumptions that the Independent Scientific Advisory Board identified as unsupported when it reviewed the Program's biological objectives.²⁰ Consequently, the resulting biological objectives in these proposals do not seem to incorporate the best available science as required for Program amendments.

- Smolt-to-Adult Survival Rates

Several entities make recommendations for the Program to continue to include an interim-objective for smolt-to-adult survival rates in the 2-6% range.²¹ BPA believes this objective does not fit well in a Program established to mitigate a hydroelectric system because it is not appropriate to hold the hydrosystem alone accountable for SARs given the many non-hydro influences and environmental conditions (e.g. ocean conditions) and other lifecycle impacts (e.g., harvest). In addition, the 2-6% SARs are probably not a meaningful Program benchmark in light of the best available science. NOAA Fisheries, for example, raised concerns about the utility of SARs given the influences of "numerous conditions, including ocean survival."²²

- Adaptive Management

CBFWA recommends that BPA implement the program as hundreds of "experiments" with hypotheses, controls, study designs, monitoring, and adjustments based upon observed results. The ISRP in its 2007 Retrospective Report noted that to meaningfully employ adaptive management, the co-managers needed to "reassess goals" "and reconfigure priorities when repeated efforts do not appear to yield tangible results."²³ If the Program continues to use or attempts to expand the use of adaptive management principles, then to employ the best available science the region must prepare to do a better job of rigorously reassessing goals and reconfiguring priorities at every level from individual projects to basin-wide policies.

- Resident Fish

It is BPA's view that resident fish issues continue to confound regional mitigation planning for the hydrosystem. Invasive species like bass and walleye receive protection as regulated sport fish, yet

¹⁹ See, e.g., CBFWA Recommendations § 2.1.2, page 35; Idaho Department of Fish and Game recommendations pages 9-10 (Apr. 4, 2008).

²⁰ ISAB, Review of the Biological Objectives of the 2000 Fish and Wildlife Program (ISAB 2001-6) (July 26, 2001).

²¹ See, e.g., CBFWA Recommendation § 2.1.2; Idaho Recommendation page 10.

²² NOAA Fisheries recommendation page 3 (Apr. 4, 2008).

²³ ISRP, Retrospective Report 2007, Adaptive Management in the Columbia River Basin, page 15 (ISRP) 2008-4) (Apr. 11, 2008).

they multiply and prey increasingly on native salmonid and resident fishes, or may otherwise compromise natural ecological processes and functions. While many fisheries managers support segregating resident fish mitigation from wildlife or anadromous fish, the Program emphasizes mitigating ecosystems, because in most instances resident fish historically shared habitats with anadromous fish or wildlife, or both.

The Council received numerous recommendations for new loss assessment methodologies and the reassessment of FCRPS impacts on resident fish. Those recommendations conflict with the effort, cost, and stated purposes associated with subbasin plan development. In 2005 the Council amended the Program with subbasin plans, developed through an extensive process at substantial cost to the region's ratepayers, that included resident fish as focal species. Those plans assessed resident fish mitigation needs and the factors limiting their productivity. To the extent the Program needs to target resident fish apart from the ecosystems affected by the FCRPS, subbasin plans provide a menu for mitigation efforts by the hydrosystem and also for mitigation of impacts by other regional entities.

Conducting new loss assessments at this time would shift resources away from on-the-ground mitigation. Assessments may also inappropriately shift non-FCRPS or non-hydropower impacts from other entities onto ratepayers. Such shifts neither promote action by others to address the impacts that they caused nor do they leverage cost-sharing. BPA urges the Council not to support new assessment methodologies or loss assessments that are not already planned or underway. Instead, the Program should concentrate effort more on directly mitigating the ecosystems affected by FCRPS construction and operation, guided by the menu of potential actions already included in subbasin plans.

3. Existing and Future Activities of the Region's Fish and Wildlife Managers.

- The 2008 FCRPS Biological Opinion and Fish Accords

The Act calls for Program measures that will “complement the existing and future activities” of the Federal and the region's state fish and wildlife agencies and tribes.²⁴ Two recent sets of documents describe existing and future activities for the next 10 years: the three 2008 NOAA Fisheries Biological Opinions on the FCRPS, Upper Snake operations, and *U.S. v Oregon* management, respectively, and the Columbia River Fish Accords entered into with two states and four tribes. Under the Act, the Program amendments should complement these new 10 year action plans formally endorsed by federal, state, and tribal fishery managers. In particular, the Program should reflect Biological Opinion and Fish Accord provisions overall as priority actions and performance targets for anadromous fish and other included species.

It appears that not all of CBFWA's recommendations mesh well with the Biological Opinions and the Accords. BPA has identified the following CBFWA recommendations that may be inconsistent with the 2008 NOAA Fisheries FCRPS Biological Opinions or the Accords, or both.

²⁴ 16 U.S.C. § 839b(h)(6)(A).

- Research monitoring and evaluation. The Accords expressly embrace the RM&E identified in section 2.1 of the FCRPS Action Agencies’ Biological Assessment.²⁵ In addition, the Accords provide funding for many RM&E projects. The tribes and states entering into the Accords have affirmed the adequacy of these efforts. CBFWA’s RM&E recommendation exceeds the robust effort already supported by the Accord parties, and calls for RM&E that provides “existing and planned status and trend, hatchery, harvest, hydro system and habitat monitoring into a framework that addresses local and regional needs.”²⁶ In addition, the recommendations identify “catch per effort”—needed for harvest management—as a hydrosystem performance standard.²⁷ These recommendations go well beyond both what the Biological Opinions require and what the Federal agencies need for robust implementation of efforts linked to mitigating hydrosystem effects. Additionally, CBFWA’s RM&E recommendations go well beyond the commitments and affirmation of adequacy of them reflected in the Accords.
- Project Solicitation. CBFWA requested that project solicitation and selection processes rely on the limiting factors in ESA recovery plans.²⁸ BPA expects future solicitations for ESA projects to be focused on meeting outstanding Biological Opinion requirements that are not already addressed in the Fish Accords. However, it should be clarified that the 2008 Biological Opinion and Accords include comprehensive mitigation packages that address ESA needs for 10 years based on a thorough review of biological priorities and limiting factors at the ESU and population levels consistent with recovery plans. A suggestion that further additional solicitations based on recovery plans that exceed that needed to meet the Biological Opinion post-2009 requirements would not be consistent with these agreements and plans.
- Clean Water Act Planning. The CBFWA recommendations contemplate Program guidance for regional Clean Water Act compliance plans.²⁹ The FCRPS Action Agencies have already taken steps in both the Biological Opinions and the Accords to address their Clean Water Act responsibilities, and the state and tribal Accord signatories agreed that those commitments sufficiently met the agencies’ responsibilities. In addition, Clean Water Act planning has been delegated to certified states and tribes and operates independent of the Program.
- Performance Standards and Objectives. The Biological Opinions and Accords rely on a system of specific “gap filling” objectives and specific performance standards and metrics that track improved fish survival. For example, hydro performance standards are 96% dam survival for spring migrants and 93% for summer migrants, with other performance relevant metrics of in river survival, delay, and SPE used for informed

²⁵ 2008 Columbia Basin Fish Accords MOA between the Three Treaty tribes and FCRPS Action Agencies § II.A.2.

²⁶ CBFWA recommendations § 2.0.3, page 28.

²⁷ CBFWA recommendations § 2.0.3, page 28.

²⁸ CBFWA recommendations § 1.5, page 24.

²⁹ CBFWA recommendations § 1.6, page 25

decision-making.³⁰ In the Biological Opinions and the Accords, fish trends over time are examined as part of an “All-H” and full life-cycle diagnostic process (with check-ins in 2013 and 2016) because these trends are influenced by many factors beyond the hydrosystem.

CBFWA uses a different performance standard than the Biological Opinions or the Accords: “progress towards meeting the overarching biological objectives identified in the Program are indicators of whether implementation of the Program is adequate to meet mitigation responsibilities.”³¹ Throughout section 3 in its recommendations, CBFWA also proposes different performance standards than those found in the FCRPS Biological Opinion or agreed to in the Accords.³² Consequently, CBFWA’s biological objectives and performance standards seem to be inconsistent with those in the Biological Opinions and the Accords.³³

Similarly, ODFW presented hydro recommendations that conflict with these resource management plans, particularly in the area of hydro performance. The prescriptive spill and flow regimes, specific project operations, and recommendations for new passage technologies that ODFW proposes³⁴ conflict with the performance standard-based approach reflected in the Biological Opinions and Accords by seven CBFWA members—NOAA Fisheries, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Colville Tribes, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Yakama Nation, the State of Idaho, and the State of Washington.

- Limiting Factors. CBFWA includes delayed mortality and latent mortality as limiting factors and considers transportation a “Threat.”³⁵ This is inconsistent with the Biological Opinion in that the Biological Opinion continues the spread-the-risk transportation strategy. Delayed or latent mortality is addressed in the Biological Opinions, and endorsed in the Accords, in a manner consistent with the advice of the ISAB (related to both empirical studies as well as COMPASS modeling).³⁶

- Relationship to Existing Wildlife Mitigation Agreements

CBFWA calls for the Program to direct BPA to mitigate 200% of the documented habitat losses, and then appears to also recommend doubling the habitat losses shown in Table 11-4 of the

³⁰ See generally, NOAA Fisheries, Issue Summaries of the 2008 FCRPS Biological Opinion <http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/upload/Final-Issue-Sums.pdf>; 2008 Columbia Basin Fish Accords MOA between the Three Treaty tribes and FCRPS Action Agencies, Attachment A.

³¹ CBFWA recommendations § 2.0.1, page 27.

³² CBFWA recommendations § 3.0.

³³ See generally, 2008 Columbia Basin Fish Accords MOA between the Three Treaty tribes and FCRPS Action Agencies § II.A.1 (adopting performance targets, standards, and metrics from the FCRPS Action Agencies’ 2007 Biological Assessment (pages 2-3 through 2-6) and the then draft FCRPS Biological Opinion).

³⁴ ODFW recommendations pages 27-30.

³⁵ CBFWA recommendation §§ 2.1.3-2.1.4, pages 37-38.

³⁶ ISAB, Latent Mortality Report (2007-1) (Apr. 6, 2007); ISAB, Review of the Comprehensive Passage Model (2008-3) (June 2, 2008).

Council's 2000 Program.³⁷ If this is an accurate conclusion to draw, it amounts to CBFWA calling for 4:1 crediting. Whether for 2:1 or 4:1 crediting, the CBFWA recommendation would be in direct conflict with the numerous existing wildlife mitigation agreements BPA has with 19 CBFWA members who all acknowledge 1:1 crediting for BPA.

BPA observed publicly in 2002 that the 2:1 crediting recommendation conflicts with other provisions within the same program and would violate valid existing crediting contracts between BPA and its wildlife mitigation partners.³⁸ Moreover, BPA notes that under the Dworshak and Montana Wildlife Mitigation "trusts," Idaho, Montana, and the Nez Perce Tribe must not support additional wildlife mitigation in their states for the dams covered by those agreements for 60 years, and if more wildlife mitigation is indeed needed then they agreed to hold harmless and indemnify BPA for those costs. Absent any supporting documentation or data indicating new information or changed circumstances that warrant the change from 1:1 to 2:1 crediting, and because that change has potential implications for the contracts supporting both past and ongoing wildlife mitigation efforts, there does not appear to be a compelling reason for pursuing programmatic changes regarding the longstanding wildlife crediting ratio.

4. Taking Economic Costs into Account when Alternatives may achieve the Same Biological Objective.

- Reducing Wildlife Mitigation Costs

After BPA submitted its amendment recommendations regarding wildlife, some resource managers questioned several of its proposals. Some resource managers seemed particularly concerned that BPA might move funding away from historic state and tribal wildlife managers and into new, innovative partnerships with other entities.

The arguments made against changing the dominant wildlife paradigm are misplaced. BPA advocates developing more partnerships to expand the footprint of wildlife protection efforts, and to bring greater flexibility, funding, and accountability into the Program. The cost-effectiveness of partnerships, even in acquiring easements, becomes apparent quickly: one-time stewardship funding³⁹ to oversee a landowner's adherence to a perpetual easement will cost much less (typically 1%-3% of an easement's cost) than even one year's O&M at the rates resource managers seek through the Program for similarly situated properties that they own (often 10% of fee purchase price annually).

³⁷ See, e.g., ODFW Attachment 1, recommendation no. 73 (supporting Table 2.3.1 in the CBFWA Recommendation which doubles all the habitat units lost shown in Table 11-4 from the 2000 Program); CBFWA recommendations § 2.3.1, page 64.

³⁸ Letter from Stephen Wright, BPA Administrator/CEO, to Larry Cassidy, Council Chairman (regarding wildlife crediting history and policy) (Mar. 1, 2002).

³⁹ Brenda Lind, *The Conservation Easement Stewardship Guide* at 66 (1991) (members of the Land Trust Alliance, a national organization of land trusts, recommended stewardship endowments for perpetual easements of \$1000 to \$7000 (in 1991 dollars) per easement, with monitoring costs running under \$200 annually). For the Lonestar easement that BPA recently secured, the Green Belt Land Trust obtained approximately \$70,000 for a one-time stewardship endowment from the seller to monitor the 199 acre, \$2.4 million dollar easement near Philomath, Oregon, in perpetuity.

In addition, BPA believes that exploring emerging markets like carbon credits could attract new mitigation partners and expand the Program’s mitigation reach. For example, with the Zena conservation easement near Salem, BPA acquired the carbon sequestration and credit rights at no additional cost. Now BPA is actively working with the Trust for Public Land and ODFW to use those carbon sequestration and credit rights to leverage other partners into expanding the project at a lower cost to ratepayers.

5. Limiting Recommendations to Hydrosystem Responsibilities.

- Expanding the Status of the Resource Report (SOTR)

Several fish and wildlife managers support CBFWA’s recommendation that BPA have sole funding responsibility for the SOTR. The value of the SOTR is regional in nature, and arises from many entities, not just the hydrosystem and its ratepayers. For instance, the proposal seeks to include “catch rates” in the SOTR⁴⁰ even though the Council in the past determined that fisheries managers should fund their own harvest monitoring.⁴¹ The CBFWA proposal also broadly states the SOTR should include population monitoring reports on all target species in a subbasin—even on species and subbasins unaffected by the FCRPS.

Expanding the SOTR as proposed first requires firm agreements to share the information gathering and reporting costs for both these kinds of off-site impacts caused by sources other than the FCRPS.⁴² In addition, some of the basic information collection proposed, particularly status monitoring, is at least in part the legitimate responsibility of the fish and wildlife managers themselves. It should also be noted that the FCRPS Biological Opinions, recent Fish Accords, the Council’s High Level Indicators initiative, Pisces and associated Report Center, and other actions already include extensive data gathering and reporting requirements. And the FCRPS Action Agencies have legally enforceable commitments to gather, analyze, and report data annually and to produce periodic comprehensive evaluations.⁴³ These are commitments that the Program should reflect. In addition, as the legislatively established Washington Forum on Monitoring noted, the SOTR lacks standardized categories of information “which makes it difficult if not impossible to ‘roll up’ this information so that it can be displayed by overall or ‘high-level’ indicators that are clear.”⁴⁴

All these reasons indicate that the SOTR, if pursued as scoped by CBFWA, would expand well beyond FCRPS mitigation reporting needs and Action Agency responsibilities. Therefore, before becoming part of the Program it must be supported with substantial, assured cost-sharing by other appropriate entities.

⁴⁰ CBFWA recommendations § 2.0.3, page 28.

⁴¹ Council, 1984 Program Appendix B at 15 (Oct. 10, 1984) (“The Council has concluded that gathering escapement data is a traditional fishery management agency responsibility.”). Where FCRPS management requires escapement data, it may be appropriate for BPA to fund other entities to collect it.

⁴² 16 U.S.C. § 839b(h)(8)(C).

⁴³ 2008 Columbia Basin Fish Accords MOA between the Three Treaty tribes and FCRPS Action Agencies § II.A.

⁴⁴ Washington Forum on Monitoring recommendations (Mar. 21, 2008)

6. BPA Ratepayers shall bear the cost of mitigation measures for the FCRPS only.

Several recommendations misunderstood the ratepayer mitigation responsibility and the FCRPS nexus needed to justify BPA funding. Program measures applicable to BPA must be provided as mitigation for the effects of the FCRPS, and must be in addition to and not “in lieu” of obligations that must be met by others, including other hydro operators.⁴⁵ There are numerous examples of recommended actions that go beyond the scope of FCRPS responsibilities. ODFW seeks “measures to address the potential impacts of global climate change and population growth on fish and wildlife resources” and lamprey passage at Portland General Electric’s Willamette Falls project.⁴⁶ IDFG seeks ratepayer funding to “quantify smallmouth predation” in Hells Canyon, an area dominated by Idaho Power Company’s three-dam Hells Canyon Complex; to reduce illegal fish harvest with new “easy to read road side signs that will inform anglers of the fishing regulations;” and to “address legacy sedimentation issues, such as road obliteration/decommissioning.”⁴⁷ BPA urges the Council to develop a broad, All-H Program, but to limit Program measures addressing BPA responsibilities to those with a clear FCRPS nexus.

Incorporation of Columbia Basin Fish Accords

The FCRPS Action Agencies and the state and tribal Accord parties agreed to a 10 year commitment of actions in support of the Action Agencies’ obligations both generally under the Northwest Power Act, as well as specifically for anadromous species listed under the ESA. The commitments include support for the actions in the 2008 Biological Opinions for the FCRPS and the Upper Snake. The commitments also include actions already reviewed and recommended by the Council to BPA, as well as expanded and new actions. The Parties found these commitments consistent with the Program and the Council’s intent to integrate Power Act and ESA responsibilities. The expanded and new actions are, moreover, subject to reasonable modifications determined by the Parties based on Council and ISRP review. BPA therefore encourages the Council to incorporate the Accords in their entirety into the amended Program through a general reference.

Other Important Considerations Noted in BPA’s Recommendations

The recommendations that BPA filed with the Council on April 4 anticipated many of the potential issues posed by recommendations from other entities. The following sections elaborate on several of those issues.

1. Implementation Provisions

Many resource managers seek to have the Program set BPA budgeting, accounting, and crediting policies. Given their role as BPA contractors, these resource managers have some general experience with these policies; but these are not matters where they possess the statutory expertise contemplated for recommendations to the Council. The Northwest Power Act neither calls for the

⁴⁵ 16 U.S.C. § 839b(h)(10)(A).

⁴⁶ ODFW recommendations, Attachment 1, nos. 11 and 46.

⁴⁷ Idaho Department of Fish and Game (IDFG) recommendations pages 51, 67, 69, and 71.

Program to include such provisions nor suggests that resource managers should expect deference to them.

Moreover, long-standing administrative and constitutional law principles dictate that federal agencies shoulder the primary responsibility for budgeting and accounting processes, capitalization policies, and statutory interpretations of their enabling acts. Comments and criticism on those processes, policies, and interpretations are always welcome, and BPA will consider them fully. But BPA cannot legally delegate its internal financial and management policy making responsibilities to state and tribal entities.

2. Level of Detail for Program Measures

Along with BPA, most other entities making recommendations for amendments supported the broad, thematic framework of the 2000 Program. Nevertheless, the Council also received many narrow, specific recommendations earmarking individual projects as proposed measures for the Program. The perceived need for such a shift from the framework established in the 2000 Program originates with two unfounded assumptions.

First, identifying projects and contracts in the Program supports an attempt to create a legally enforceable means of ensuring that BPA will fund specific entities for particular tasks. Looking to the Ninth Circuit's Fish Passage Center decision, those resource managers seem to be seeking an earmark of their projects, believing that Program language singling out their projects will ensure them a legal right under the Northwest Power Act for indefinite funding.

This perceived need originates with a fear that BPA intends to reduce its mitigation funding commitments. To the contrary, the Columbia Basin Fish Accords, the 2008 FCRPS Biological Opinion, and BPA's initial proposal for 2010-2011 mitigation budgets in the Integrated Program Review all indicate that the fish and wildlife mitigation funding will not just be stable but instead will be significantly increased.

Second, some entities propose amending the Program with specific projects to shield them from the potential funding instability that arises with unfavorable independent scientific review.⁴⁸ They believe that if the program lists individual projects, the projects can effectively avoid independent scientific scrutiny because, they argue, under the Act the ISRP reviews only "projects" proposed for funding from BPA's annual budget, not "measures" amended into the Program.⁴⁹

The Council, however, can and has had the ISRP and ISAB review Program elements, whether "projects" or "measures," as it did with the Program's biological objectives in 2001. Calling a project a measure doesn't insulate it from independent scientific review.

Moreover, excluding measures from independent scientific review would defeat the sound public policy underlying section 4(h)(10)(D) of the Act, which mandated ISRP review: Congress saw that when the same entities proposed, reviewed, ranked, selected, developed budgets for, and then

⁴⁸ See, e.g., ODFW recommendations, Attachment 4.

⁴⁹ See, e.g., ODFW comments, Attachment 4, pages 27-28 (June 12, 2008)

received ratepayer funding to implement their own projects, there arose an inherent conflict of interest.⁵⁰

For these reasons BPA strongly urges the Council not to amend additional specific projects or contracts into the Program.

3. Improving the Program's Effectiveness and the Region's Ability to Track It

The 2000 Program advanced a scientific framework to structure mitigation planning more comprehensively than past programs. The Council sought to shift the Program from a compilation of projects to a well-organized, focused, and scientifically supported plan directed at mitigating ecosystems. In response, the region added more projects. This improved the connections between many existing projects by adding new ones in between. Yet in 2001 the Council's Independent Scientific Advisory Board showed how the Program's biological objectives were neither sufficiently grounded in science, nor structured well enough to meaningfully measure the success of mitigation efforts.⁵¹ The new framework, in other words, could not by itself ensure project or budget proposals that addressed the basin's highest biological priorities—the key factors limiting properly functioning ecosystems.

Advancements in capturing and sharing information and ongoing initiatives to develop a comprehensive framework for reporting can serve as the backbone for measuring and reporting on Program implementation and effectiveness. For example, the initiative of the Council to develop “high level indicators” provides a regional context for comprehensive as well as Program-level reporting. The parties to the recent Biological Opinions and Fish Accords adopted clear biological objectives and metrics, with acknowledged reporting requirements and deadlines. The states, agencies, and tribes that adopted these reporting criteria and schedules did so after a years-long collaborative process that included the Council.

For species not protected under the ESA, particularly focal resident fish and wildlife species in the Program (and the ecosystems they depend on), BPA looks forward to working collaboratively with the Council, states, agencies, and tribes to adopt appropriate indicators to reflect progress of FCRPS mitigation efforts and its potential effectiveness to fish and wildlife and their habitats.

4. Basing Mitigation Efforts on Ecosystems and Emphasizing Biologically Measurable Performance

For a decade now, monetary issues have tended to overshadow questions about how to implement the program so as to be the most biologically effective. With the new Biological Opinions, Accords, and planned program funding increases, BPA made legally binding commitments for 10 years to significantly increase funding, and to track mitigation results more effectively. This should better enable focus on effective implementation and questions about funding levels, long-term stability, and predictability should therefore subside.

⁵⁰142 Cong. Rec. S10623 (daily ed. Sept. 17, 1996) (statement of Sen. Slade Gorton); *see also*, ISRP, Retrospective Report 1997-2005 pages 99-100 (ISRP 2005-14) (Aug. 31, 2005).

⁵¹ ISAB, Review of the Biological Objectives in the 2000 Fish and Wildlife Program (2001-6) (July 26, 2001).

In working to improve program planning and implementation, BPA will continue mitigating the unique ecosystems relied upon by resident fish and wildlife that the FCRPS affected, and to provide substitution in appropriate circumstances. As such, mitigation efforts to address FCRPS impacts throughout the region should be focused on localized ecosystem needs and objectives. This should come as no surprise because virtually all the entities that provided recommendations to the Council supported a planning framework based on programmatic priorities determined within a hierarchy of ecological and biological objectives. As part of this, evaluations of programmatic effectiveness and priorities should include a focus on ecosystem benefits, as compared to separate and distinct assessments of project spending categorized as resident fish, anadromous fish, or wildlife, given the broad multi-species ecosystem-oriented benefits of many projects.

Thank you for this opportunity to comment on the recommendations provided to the Council for amending the Program.

Sincerely,



Gregory K. Delwiche
Vice President, Environment, Fish and Wildlife

APPENDIX to Enclosure 1

Supporting

**BPA'S April 4, 2008 RECOMMENDATIONS FOR PROPOSED
PROGRAM AMENDMENTS**

June 10, 2008

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Appendix

Section A: Population Viability Analysis Estimating Survival Improvements Needed to Achieve Current Program Goals

Dr. Richard Hinrichsen, a research scientist and BPA consultant, performed the calculations for this assessment. In the table below, the numbers in the second column represent the survival improvements needed (for individual chinook salmon populations) in order to achieve the Program goal. The Program goal is interpreted to mean that salmon populations should have less than a 20 percent risk of extinction over a 200 year time frame, while sustaining average harvest rates of 30 percent. The table shows multipliers relative to current values of lifecycle survival needed to meet the extinction criteria. For example, a value of 1.97 for the Tucannon population indicates a 97% improvement in lifecycle survival is needed to achieve the Program goal. A value of 8.49 for Marsh Creek indicates the need for a 749% survival improvement.

For the sake of comparison, the numbers in the column to the far right are included to show the Interior Columbia River Technical Recovery Team's viability "gaps," or the survival improvements that would be needed for a population to meet the minimal requirements for viability and recovery. The gaps are also shown as multipliers.

As one can see, in most cases the Program goal requires survival improvements greater than those needed for viability (full recovery) – in many cases far greater. This is not likely to be achievable within the next decade, as reflected in the Program's current goals.

This analysis uses the Interior Columbia Basin Technical Recovery Team Quasi-Extinction Threshold (QET) assumption that extinction occurs when a population falls below 50 spawners for four consecutive years. The assessment methods were consistent with the NOAA Fisheries assessments used for the 2008 FCRPS BiOp and similar to the TRT evaluations for Recovery Planning. The mathematical methods employed are documented in the Final FCRPS Biological Opinion's Aggregate Analysis Appendix in a paper (Hinrichsen 2008) titled Analytical Methods for Population Viability Analysis of Endangered ESUs of the Interior Columbia River Basin.

Chinook Salmon Population	Needed Survival Increase to Achieve Program Goal	ICTRT Viability Gap at 5% Risk
Tucannon Spring Chinook	1.97	2.23
Lostine River Chinook	3.08	2.04
Grande Ronde Upper Mainstem Chinook	4.52	4.09
Catherine Creek Chinook	7.25	2.00
Imnaha River Chinook	2.23	2.23
Minam River Chinook	1.86	1.73
Wenaha River Chinook	3.17	2.38
Secesh River Chinook	1.49	1.45
South Fork Salmon East Fork (inc Johnson Cr.)	1.67	2.33
Big Creek Chinook	5.28	2.34
Bear Valley Creek	2.33	1.65
Marsh Creek Chinook	8.49	2.19
Sulphur Creek	8.22	2.42
Valley Creek Chinook	10.21	2.07
Lower Mainstem Salmon River (SRLMA)	4.00	2.36
Upper Mainstem Salmon River (SRUMA)	1.30	1.44
Wenatchee River Chinook	1.78	1.73
Entiat River Chinook	2.58	1.76

Section B: FCRPS Action Agency Proposed Metrics and Performance Standards

Table 1¹

Proposed RPA Strategy Overview		
Hydro Action Objective for All ESUs: Improve the Survival of Juvenile and Adult Fish as They Pass Through the Hydrosystem	Hydro Strategy 1	Operate the FCRPS to More Closely Approximate the Shape of the Natural Hydrograph and to Enhance Flows and Water Quality to Improve Juvenile and Adult Fish Survival
	Hydro Strategy 2	Modify Columbia and Snake River Dams to Maximize Juvenile and Adult Fish Survival
	Hydro Strategy 3	Implement Spill and Juvenile Transportation Improvements at Columbia River and Snake River Dams
	Hydro Strategy 4	Operate and Maintain Facilities at Corps Mainstem Projects to Maintain Biological Performance
Habitat Action Objective for All ESUs: Protect and Improve Tributary and Estuary Habitat to Improve Fish Survival	Habitat Strategy 1	Protect and Improve Tributary Habitat Based On Biological Needs and Prioritized Actions
	Habitat Strategy 2	Improve Juvenile and Adult Fish Survival in Estuary Habitat
Hatchery Action Objective for All ESUs: Fund FCRPS Mitigation Hatchery Programs in a Way that Contributes to Reversing the Decline of Downward-Trending ESUs	Hatchery Strategy 1	Ensure that Hatchery Programs Funded by the Action Agencies as Mitigation for the FCRPS are not Impeding Recovery
	Hatchery Strategy 2	Preserve and Rebuild Genetic Resources Through Safety-Net and Conservation Objectives to Reduce Extinction Risk and Promote Recovery
Harvest Action Objective for All ESUs: Improve Survival of Juvenile and Adult Fish as They Pass Through the Hydrosystem	Harvest Strategy 1	Fishery Conservation Effectiveness Programs
	Harvest Strategy 2	Potential Alternative/Terminal Fishing Locations
	Harvest Strategy 3	Develop Fishing Techniques to Enable Fisheries to Target Non-Listed Fish while Reducing Harvest-Related Mortality of ESA-Listed Species
Predation Management Action Objective for All ESUs: Improve Survival of Juvenile and Adult Fish as They Pass Through the Hydrosystem	Predation Strategy 1	Implement Piscivorous Predation Control Measures to Increase Survival of Juvenile Salmonids
	Predation Strategy 2	Implement Avian Predation Control Measures to Increase Survival of Juvenile Salmonids
	Predation Strategy 3	Implement Marine Mammal Control Measures to Increase Survival of Adult Salmonids at Bonneville Dam
RM&E Action Objective for All ESUs: Provide Information Needed to Support Planning and Adaptive Management and Demonstrate Accountability Related to Implementation of FCRPS ESA Hydropower and Offsite Actions for All ESUs	RM&E Strategy 1	Monitor Status of Selected Fish Populations Related to FCRPS Actions
	RM&E Strategy 2	Hydrosystem RM&E
	RM&E Strategy 3	Tributary Habitat RM&E
	RM&E Strategy 4	Estuary Habitat RM&E
	RM&E Strategy 5	Harvest RM&E
	RM&E Strategy 6	Hatchery RM&E
	RM&E Strategy 7	Predation Management RM&E
	RM&E Strategy 8	Coordination and Data Management
	RM&E Strategy 9	Implementation and Compliance Monitoring

¹ FCRPS Action Agencies, Biological Assessment for Effects of FCRPS and Mainstem Effects of the Tributary Actions on Anadromous Salmonid Species Listed Under the ESA at page 2-2 (Aug. 2007).

Adult Salmon Reporting Metrics²

Adult abundance and trends reflect the most accessible currency with which to evaluate the progress in region-wide recovery efforts over multiple years. They give an indication of how both the naturally spawning and hatchery-based portions of a listed species are doing.

Adult trends are also indicators of variability in ocean survival conditions, which can significantly affect the numbers of adult anadromous fish over multiple years. Because adult trends are so critical to understanding the progress of listed fish toward recovery, the Action Agencies will regularly track and report available data on overall adult abundance and trends for the ESUs. Adult abundance and trends represent an overarching performance target, not just for the FCRPS, but also for the collective actions by all parties in the Columbia River Basin for the conservation and recovery of listed fish. Specifically, this overarching performance target is a positive trend in adult abundance.

The primary benchmark for assessing progress of FCRPS actions for conservation of ESA-listed fish is adult and juvenile survival through the hydrosystem. The Action Agencies have the greatest influence on this outcome, and it is less confounded by actions of others. Hydrosystem performance will be tracked and evaluated through adult reach survival and juvenile dam survival performance standards, and through a juvenile system survival performance target.

For adult fish, the Action Agencies have largely achieved or exceeded the performance standards identified in the 2000 BiOp (Ruff 2004). The Action Agencies will use the following adult dam survival performance standards to continue to meet or exceed expected adult survival standards.

Table 2 Adult Performance Standards

ESU	Adult Standard	Reach	Rationale
Snake River Spring Chinook Salmon	90%	Bonn. to Lower Granite	Longest migratory route
Snake River Summer Chinook Salmon	94%	Bonn. to Lower Granite	Longest migratory route
Upper Columbia Spring Chinook Salmon	92%	Bonn. to McNary	Longest migratory route

² *Id.* at page 2-5.

Snake River Fall Chinook Salmon	92%	Bonn. to Lower Granite	Longest migratory route
Willamette River Chinook Salmon	None	None	Low Encounter Rate
Lower Columbia River Chinook Salmon	None	None	Surrogate of upriver ESU
Snake River Steelhead	N/A	Bonn. to Lower Granite	Unaccounted harvest leads to uncertainty in calculations
Upper Columbia River Steelhead	N/A	Bonn. to McNary	Unaccounted harvest leads to uncertainty in calculations
Mid-Columbia River Steelhead	N/A	Variable	Unaccounted harvest leads to uncertainty in calculations
Lower Columbia River Steelhead	None	None	Upriver Steelhead ESU surrogate
Willamette River Steelhead	None	None	Low Encounter Rate
Snake River Sockeye Salmon	None	None	Uncertainty in data
Lower Columbia River Coho Salmon	None	None	Upriver Chinook ESU surrogate
Columbia River Chum Salmon	None	None	Low Encounter Rate

Juvenile Dam Passage Survival Standards³

The Action Agencies propose specific performance standards of 96 percent average relative dam survival for spring migrating fish and 93 percent average relative dam survival for summer migrating fish. Survival averaging or tradeoffs between dams may occur only among the Snake River dams or among the lower Columbia River dams, but not between Snake and Columbia River dams.

Predation Management Performance⁴

Management of piscivorous and avian predation of juvenile salmonids is an effective means of increasing juvenile fish survival (Beamesderfer et al. 1996, Roby et al. 1998, NMFS 2000, Good et al. 2004). The Action Agencies will pursue focused measures that reduce predation mortality in the near and long term. These measures will be monitored annually for Programmatic-level standards.

For both piscivorous and avian predation, estimates of juvenile fish survival improvements associated with the 2007 to 2017 Actions (3.1 percent for chinook salmon, 4.4 percent for steelhead, and 1.7 percent for fall chinook salmon) will serve as long-term performance targets.

³ *Id.* at page 2-6.

⁴ *Id.*

Hatchery Performance Standards⁵

The Action Agencies have developed Hatchery actions that are expected to reduce extinction risk and increase abundance and productivity of several ESUs. The Hatchery Actions identify targeted populations and factors to be improved. Programmatic performance standards will be used, based on Action Agency commitments and implementation plans, to track implementation.

Although ongoing hatchery research, monitoring and evaluation (RM&E) has targeted many of the research needs described in the Hatchery Action, existing information remains insufficient to quantitatively estimate the effects of many of the actions proposed in the Hatchery Action, a view confirmed by the Hatchery/Harvest Workgroup. The expected benefits of the Action were qualitatively assigned as high, medium, or low value. These benefits represent the performance targets for adaptive management. Hatchery Action effectiveness research will help confirm and update the qualitative expectations of these benefits as new information becomes available.

These benefits (performance targets) are relative to the following objectives of the Hatchery Actions:

- Safety-net programs reduce extinction risk for target populations in Snake River sockeye salmon, Snake River spring/summer chinook salmon, Mid-Columbia River steelhead, lower Columbia River steelhead, and Columbia River chum salmon ESUs.
- Conservation hatchery programs increase abundance of target populations in Snake River spring/summer chinook salmon, Snake River fall chinook salmon, and upper Columbia River steelhead ESUs, thereby reducing the time to recovery.
- High-priority hatchery reform actions (i.e., those needed to address hatchery programs that are considered major limiting factors by NOAA Fisheries), result in improved abundance, productivity, diversity, and/or spatial structure of target populations.
- Future implementation of additional hatchery reforms identified through Columbia River Hatchery Scientific Review Group's hatchery review

⁵ *Id.* at pages 2-8 through 2-9.

process, combined with use of best management practices (BMPs) at FCRPS hatchery facilities, improve abundance, productivity, diversity, and/or spatial structure of target populations, depending on the nature of the reform.

Hatchery effectiveness monitoring and research will be used in the 2012 and 2015 comprehensive evaluations to test and update the expectations of these benefits and gauge the progress. As best management practices are adopted for specific hatchery programs, they will provide additional performance measures that Action Agencies will track and report.

Performance Targets and Standards Summary⁶

Table 3 provides a summary of performance targets, standards, monitoring, and reporting under the performance-based framework that the Action Agencies developed. To aid the agencies’ integration of their responsibilities under various laws, plans, and programs, the Council should consider adopting this framework.

• **Table 3** Outline of Performance Tracking and Reporting

• Performance Targets	• Performance Standards	• Monitoring	• Reporting
• Fish Population Metrics			
• Positive trends in abundance	•	• Context for prioritization of actions and adaptive management needs	• Comprehensive Evaluations [using NMFS Biological Review Team (BRT) Status Report]
• Hydrosystem			
• Percent system survival – by ESU or DPS	•	• Juvenile Passage RM&E and System Survival Modeling	• Comprehensive Evaluations
	• Hydrosystem Action Programmatic Standards	• Project Implementation and Compliance Monitoring	• Annual Progress Reports and Comprehensive Evaluations

⁶ *Id.* at page 2-9.

	<ul style="list-style-type: none"> Juvenile Dam Survival Standards (96 percent average for spring migrants and 93 percent average for summer migrants) 	<ul style="list-style-type: none"> Juvenile Passage Monitoring and Dam Survival Modeling 	<ul style="list-style-type: none"> Comprehensive Evaluations
<ul style="list-style-type: none"> Flow, gas, and temperature levels (adjusted to reflect annual and seasonal water conditions) 	<ul style="list-style-type: none"> Juvenile and Adult Hydrosystem Environmental and Physical Configuration Standards 	<ul style="list-style-type: none"> Environmental Monitoring at Mainstem Dams 	<ul style="list-style-type: none"> TMT Annual Water Management Plan Reports
	<ul style="list-style-type: none"> Adult Hydrosystem Survival (no significant change from current average survival levels) 	<ul style="list-style-type: none"> Adult System Survival Monitoring 	<ul style="list-style-type: none"> Annual Progress Reports and Comprehensive Evaluations
• Tributary Habitat			
<ul style="list-style-type: none"> Percent habitat quality improvement – by population for actions implemented from 2007 through 2017 		<ul style="list-style-type: none"> Intensively Monitored Watersheds, Status Monitoring, and Project-Level Monitoring informs and updates modeling 	<ul style="list-style-type: none"> Comprehensive Evaluations
	<ul style="list-style-type: none"> Tributary Habitat Action Programmatic Standards (3-year cycle) 	<ul style="list-style-type: none"> Project Implementation and Compliance Monitoring 	<ul style="list-style-type: none"> Annual Progress Reports and Comprehensive Evaluations
• Estuary Habitat			
<ul style="list-style-type: none"> Percent function improvements for Stream Type and Ocean Type ESUs for actions through 2007 and through 2017 		<ul style="list-style-type: none"> Status Monitoring and Project-Level Monitoring informs and updates modeling 	<ul style="list-style-type: none"> Comprehensive Evaluations
	<ul style="list-style-type: none"> Estuary Habitat Action Programmatic Standards 	<ul style="list-style-type: none"> Project Implementation and Compliance Modeling 	<ul style="list-style-type: none"> Annual Progress Reports and Comprehensive Evaluations

• Hatchery			
• Low, Medium or High benefits relative to objectives – by target populating	•	• Status Monitoring and Project-Level Monitoring and updates Lifecycle Modeling	• Comprehensive Evaluations
	• Hatchery Action Programmatic Standards; site-specific BMPs	• Project Implementation and Compliance Monitoring	• Annual Progress Reports and Comprehensive Evaluations
•	•	•	•
• Predation			
• Percent survival increase for spring and for summer migrants	•	• Predation Action Effectiveness Research and Status Monitoring	• Comprehensive Evaluations
	•	• Predation Exploitation rates	• Comprehensive Evaluations
	• Predation Action Programmatic Standards	• Project Implementation and Compliance Monitoring	• Annual Progress Reports and Comprehensive Evaluations

Section C: Summary of the ISAB’s Climate Change Findings⁷

Potential Impacts to Hydrology and Temperatures

Climate change could have the following potential biological effects on the Columbia River Estuary and the Pacific Ocean:

- For immigrating adults, an increase in ocean temperatures could lead to a loss in energy reserves because of increasing metabolic demand.
- Forecasts suggest higher average Columbia River flows in winter and early spring flows, and less snowmelt in summer in future years. It is reasonable to expect that any increase in freshwater temperatures will result in warming in the estuary.

⁷ ISAB, Climate Change Impacts on Columbia River Basin Fish and Wildlife (document 2007-2) (2007).

- On a global scale, increased upper ocean temperatures have been documented to reduce primary productivity since 1997.
- Of primary interest in the Pacific Northwest, the growing mismatch of coastal upwelling and smolt migrations would likely have significant negative impacts on marine survival rates. Warmer sea temperatures require increased prey consumption to maintain a given growth rate. This could delay the time when populations return to fresh water to spawn.

The ISAB made following key findings regarding potential effects from climate change on salmonids in the mainstem Snake and Columbia rivers:

- Increases in water temperature will accelerate the rate of egg development and lead to earlier emergence from mainstem redds, most likely at a smaller average size than historically. Smaller-sized fry may have lower survival due to increased vulnerability to predators.
- Predation on salmonids may be increased by elevated water temperatures. Warmer temperatures may reduce the size of smolts. Elevated water temperatures also will increase consumption rates and growth rates of predators.
- Warmer water temperatures may exclude salmonids from reaches with temperatures that are already close to their upper thermal limit. Metabolic rates will increase, leading to reduced growth rates where food is limited and smaller size at the end of the summer.
- Many fish pathogens and parasites common in the environment and their salmon hosts may increase mortality when smolts become thermally stressed.
- Potential impacts of increased water temperatures on adult salmon include delay in dam passage, failure to enter fish ladders, and loss of energy reserves due to increased metabolic demand.
- Numerous warm-water adapted fish, including several non-indigenous species, normally found in freshwater may expand their populations with the warmer water and seasonal expansion of freshwater habitats.

Changes in hydrology will affect tributary habitats in those watersheds where snow levels are impacted. Watersheds that are just above the current snow line currently may experience a change from a snowmelt-dominated hydrologic regime to one that is driven primarily by rainfall or rain on transient snow pack. Even those watersheds that remain above the snow line will experience earlier snowmelt runoff. These changes in hydrology all may affect salmonid productivity. Some of the highest quality aquatic habitat remaining in the

Columbia River Basin is found in forested areas. Forests lost to fire and insect outbreaks will disproportionately impact key habitats for fish and wildlife.

Potential effects on egg incubation and fry emergence in tributaries areas can include:

- Increased maintenance metabolism will produce smaller fry;
- Lower disease resistance may lead to lower survival;
- Faster embryonic development will lead to earlier hatching; and
- Increased mortality due to more frequent flood flows as snow level rises

Increased frequency and severity of flood flows during winter can affect over-wintering juvenile fish and eggs incubating in the streambed and elsewhere. Shifts in the timing and magnitude of natural runoff will likely introduce new selection pressures that may cause changes in the most productive timing or areas for spawning.

Potential effects on spring/summer rearing can include:

- Lower summer/early autumn flow will reduce habitat area,
- Cold-water species may be excluded from areas currently occupied,
- Lower growth due to increased metabolic rate (if food is limited),
- Competitive advantage from non-native and warm-water species,
- Increased predation mortality if temperatures exceed optimal levels, and
- Fish in streams with very cold water may benefit (high elevations).

Potential effects on over-winter survival can include:

- Potential for positive and negative effects;
- Higher water temperature increases metabolic rate and activity:
 - Higher growth rate with sufficient food
 - Lower growth rate if food is limiting;
- Higher predation rates; and
- Increased frequency and severity of winter high flow will have detrimental effects.

Section D: Standard Definitions of the Types of RM&E Projects

The following definitions of types of research, monitoring and evaluation are consistent with ongoing RM&E planning and coordination processes. BPA will use them with the PISCES database structure for submittal of proposals and subsequent management of selected projects:

1. Fish/Wildlife Population and/or Environmental Status and Trend

Monitoring – census or statistically designed monitoring of fish or wildlife population and/or environmental conditions (i.e. watershed conditions) to assess the current status or change (trend) over time. This is sometimes referred to as an observational study (ISRP, 2005). These monitoring data may also be used to correlate fish performance with environmental conditions.

- Ecosystem/Landscape level, broad-scale, periodic monitoring (referred to as Tier 1 Monitoring)
- Geographically localized, frequent monitoring (referred to as Tier 2 Monitoring)

2. Action Effectiveness Research – research to determine the effects of an action or suite of actions on fish survival, productivity and/or habitat conditions (referred to as Tier 3 monitoring). This is a manipulative experiment that statistically assesses the effect of a treatment (action) condition relative to a control or reference condition. Action effectiveness research can be performed for a localized effect (project or stream reach level effect) or for a watershed level effect (intensively monitored effect). Localized (project level) effects most commonly identify changes in habitat conditions associated with the action, while fish or biological responses may require a watershed level (intensively monitored approach) to capture a broader area in which a biological response is expressed.

3. Uncertainties Research – research to resolve scientific uncertainties regarding the relationships among fish or wildlife health, population performance (abundance, survival, productivity, distribution, diversity), habitat conditions, life history and/or genetic conditions (e.g., the existence and causes of delayed mortality, hatchery spawner reproductive success relative to wild populations, etc.). This is a manipulative experiment where variables are manipulated to infer or demonstrate cause and effect relationships using statistical-designed hypothesis testing. Uncertainties research does not include experimental research and monitoring specifically

targeting the effect of a mitigation or restoration action (this is Action Effectiveness Research). It also does not include monitoring (observational studies) of fish or habitat conditions with inferences from statistical correlation assessments (this is Status and Trend Monitoring).

4. Project Implementation and Compliance Monitoring – monitoring the execution and outcomes of projects. This type of monitoring does not require environmental response data directly linking restoration actions to physical, chemical, or biological responses.

- *Project Implementation* monitoring determines whether projects were carried out as planned, through documentation of the type and location of management action, and whether the action was implemented properly or complies with established standards. This is generally carried out as an administrative review and does not require any parameter measurements beyond those specified by the project design requirements. It is usually a low-cost monitoring activity that should be included for all mitigation activities.
- *Project Compliance* monitoring determines whether specified project criteria are being met, through a post-project auditing of project performance. This type of monitoring would typically not be carried out by the project sponsor, and may require the development of independent, compliance monitoring projects. A limited, statistical-designed sample of projects could be monitored annually for compliance.

Section E: Kinds of Coordination

Embedded Coordination

Many habitat and other projects contain coordination work elements. Such coordination is not, ultimately, on-the-ground action that conveys direct biological or environmental benefits to fish and wildlife. Since BPA and the Council have focused on programmatic categorizations derived from project-level characterizations (i.e., the principal thrust of project purposes viewed in its entirety), this type of coordination spending is generally not included in the 5 percent programmatic target for coordination and data management.

Watershed Coordination

BPA supports several watershed-based coordination functions through projects that are included in the 5 percent target. The purposes of these projects vary; however, several were originally initiated as pilot demonstrations or “models” 10 or more years ago, at a time when few resources were available to facilitate in

the development, or prove-up on the merits, of watershed-based planning and implementation. In the intervening years, as each state has developed management structures and a network of support and resources for watershed-based action and investment, the concept and approach has matured beyond the need for models or further demonstrations. The more BPA spends to “coordinate” the activities of others, the less funding is available for mitigation efforts that both directly address the limiting factors for fish and wildlife, and that can be counted as progress toward BPA’s mitigation responsibilities through measured performance based on biological objectives. The Program should phase out these costs.

Regional Coordination

BPA has funded some broad regional coordination projects, the intent of which was to support a forum through which fish and wildlife managers could build consensus recommendations to the Council regarding the development of the Program. While regional input remains important for developing the most biologically effective Program, new coordinating entities, and membership changes in older ones necessitate reconsidering the most appropriate way for BPA to support regional coordination efforts. The effectiveness of fish and wildlife manager coordination is a critical consideration, particularly given that this coordination work does not directly facilitate the implementation of on-the-ground benefits like the other two coordination categories BPA supports, discussed above. To ensure that regional coordination activities achieve the objectives set in the Act and the Program, BPA encourages the Council to facilitate further discussions among appropriate entities, outside of the amendment process, to revise its recommendations on regional coordination.

Those further discussions should consider that under the new FCRPS biological opinion, the Action Agencies will coordinate RM&E activities with other federal, state, and tribal agencies on an ongoing annual basis, including:

- Organizing and supporting the Corps’ Anadromous Fish Evaluation Program.
- Supporting and participating in the Council’s Columbia River Basin Fish and Wildlife Program project planning and review efforts.
- Supporting the standardization and coordination of tagging and monitoring efforts through participation and leadership in regional coordination forums such as the Pacific Northwest Aquatic Monitoring Partnership.
- Working with regional monitoring agencies to develop, cooperatively fund, and implement standard metrics, business practices, and

information collection and reporting tools needed to cooperatively track and report on the status of regional fish improvement and fish monitoring projects.

- Coordinating the further development and implementation of hydrosystem, tributary habitat, estuary/ocean, harvest, hatchery, and predation RM&E through leadership and participation in ongoing collaboration and review processes and workgroups.
- Coordinating implementation with other appropriate regional collaboration processes. This includes coordination related to statutory provisions for the federal government (BPA/Council), voluntary coordination among federal agencies (Federal Caucus), and coordination with regional processes for federal/nonfederal engagement (TMT, SCT, PNAMP, NED, and others).
 - NED, PNAMP and PNW-RGIC managers and coordinators should develop and implement a regional executive level memorandum of understanding or similar instrument to:
 - Identify priority information sharing needs;
 - Improve information sharing and complete a regional ecosystem and information framework;
 - Develop indicators, information collection standards, and protocols and information sharing arrangements;
 - Develop an executive leadership group to steer this effort and other necessary organizational and administrative arrangements including consideration of roles for NED, PNAMP and PNW-RGIC;
 - Identify resources for these tasks; and,
 - Set overall timelines and review progress.

Section F: Annualizing Wildlife Habitat Losses

Annualization requires three steps. The first step, typically done before project construction begins, estimates the “without dam” habitat quality and quantity. The Habitat Evaluation Procedure process and annualization weren’t developed until the late 1970s, so this wasn’t possible with the FCRPS projects. Instead, for each habitat type inundated, wildlife managers imagined what would have happened to that habitat if the dams had not been built.

The second step, often called “backcasting,” involves guessing what changes would occur to the habitat in each successive year. Like computer programmers developing a virtual world, resource managers would use their unique expertise

to visualize the hypothetical impacts from floods, plagues, fires, droughts, pestilence, climate change, harvest impacts, agriculture, mining, logging, road building and other development on each species and habitat type. This is done for each year from project construction until present.

For instance, Grand Coulee Dam inundated a number of orchards. For each year since construction, an annualization exercise would require that wildlife managers fathom the international apple markets, the rise of viticulture in the Northwest, and conjecture about how the orchard industry might have changed in that area. To construct Libby Dam, several roads, railroads, and small towns were relocated. To annualize those losses, assumptions would need to be made about the towns' changes annually, since dam construction to present.

The final annualization step is the "with dam" analysis. In addition to inundating habitat, a new reservoir establishes, among other things, a new shoreline on a landscape that previously was dry habitat. Over time, this new shoreline may create new wet meadows or possibly a new riparian area. Again, year by year since construction, the process would need to assess what benefits the new reservoir created for wildlife.

The "with dam" outcome is subtracted from the "without dam" outcome—for each year from pre-dam construction to present. Then the results for all the years are averaged; that is, annualized. Compared to the single point in time assessments like those in the Program, annualized losses may result in either higher or lower losses—and gains.

Section G: Wildlife Habitat Cover Type/Species Matrix Explanation

A cover type/species matrix is a table that displays impacted and/or compensation area cover types and HEP model species used to evaluate habitat quality on those cover types. The viewer is able to quickly identify loss assessment or compensation project cover types, determine the HEP model species used to assess habitat quality, and tally the number of HEP models/species applied to each cover type.

HEP MODEL	THE DALLES DAM COVER TYPE/SPECIES MATRIX					
	Rip. Tree	Rip. Shrub	Sand/Gravel/Cobble/Mud	Shrub-steppe/Grassland	Islands	Open Water
Canada Goose					X	
Spotted Sandpiper			X			
Mink	X	X				
Western Meadowlark				X		
Black-capped Chickadee	X					
Yellow Warbler		X				
Great Blue Heron			X			
Number of HEP Models per Cover Type	2	2	2	1	1	0

Section H: Implementation Strategies for the Willamette Subbasin

1. Coordinate the “on-site” investments called for in the Willamette biological opinions with “off-site” habitat improvement work done for fish or wildlife. The opinion aim primarily at operational and structural changes at the dams, but the draft recovery plan also identifies juvenile rearing as a key limiting factor. Off-site improvements aimed at floodplain reconnection will address key scientific principles of the Program such as the need to address various spatial scales and the importance of life history diversity as a buffer to environmental variation.⁸ Restored rearing habitat should help reestablish the native subyearling life history strategy for chinook.
2. Reform hatchery management practices consistent with the findings from the HSRG review. The NOAA Fisheries Willamette biological opinion will address some hatchery management concerns, but attention should also be paid to the completion and implementation of the hatchery genetic management plans for chinook and steelhead as well.
3. Protect the McKenzie River spring chinook population. While both winter steelhead and spring chinook are listed throughout the Willamette basin, the McKenzie spring chinook population remains relatively strong and represents an important element in the genetic legacy of the Upper Willamette ESU. Habitat improvement and hatchery management should make protecting this strong population a key objective.

⁸ Council, 2000 Program at 15.

4. Explore and adopt as appropriate one or more of the following ways of approaching mitigation that reflect the Willamette Subbasin's unique social, economic, and biological conditions.
 - a. Implement a model watershed approach to habitat improvement. This model has been successful in the Grande Ronde and the Columbia estuary. Develop project selection criteria specific to the Willamette based on limiting factors and strategies outlined in the draft recovery plan, the subbasin plan, the Oregon Conservation Plan, and the Willamette Floodplain Restoration Study. Design effectiveness monitoring programmatically, balancing the ISRP's call for better reporting of results and BPA's concern for emphasizing "on the ground" work.
 - b. Combine with other state and federal agencies and non-profit groups to coordinate a pulse of new mitigation initiatives and investments to create a significant beneficial cumulative impact as a preemptive effort to offset forecast climate and human impacts.
 - c. Coordinate habitat improvement activities with the Corps. The Corps expects to implement additional habitat restoration as part of the Willamette biological opinions. Where economically and biologically feasible, explore partnerships that help leverage Corps funding.
 - d. Partner with public land owners such as Oregon Department of State Lands. It holds significant amounts of land along the Willamette floodplain and has expressed an interest in managing its lands with an increased emphasis on fish and wildlife.
 - e. Focus actions on improving and protecting ecosystem function to provide benefits for multiple species. In particular, riparian and floodplain improvements can potentially benefit juvenile salmon and enhance cover types needed for wildlife mitigation. The U.S. Fish and Wildlife Service identified flood plain reconnection as a key strategy for recovering listed Oregon chub.⁹ Several projects—such as Lost Creek, Big Island, and Green Island—already take the ecosystem approach and provide recognized benefits for both fish and wildlife.¹⁰
5. Pursue innovative, market-based approaches to habitat protection. Partner with working forests and farms and use existing and emerging markets—such as those in sustainable forestry and carbon sequestration—

⁹ U.S. Fish and Wildlife Service, Oregon Chub Recovery Plan (1998).

¹⁰ Pope, M., Willamette Wildlife Mitigation Annual Report (2005).

to protect habitat. Consider projects integrated with or modeled after the Oregon Department of Transportation's conservation banking Program,¹¹ the Willamette Partnership's Willamette Ecosystem Marketplace,¹² or the Teton Regional Land Trust's conservation land buyer Program.¹³

¹¹ Oregon Department of Transportation, Statewide Banking Program: Final Agreement (2004).

¹² Primozych, D., and Vickerman, S., Willamette Ecosystem Marketplace (2007).

¹³ Information at <http://www.tetonlandtrust.org/index.html>

6/16/08 Draft Program RM&E Language expanding on BPA's Amendment Recommendations

{This draft document expands on BPA's earlier recommendations by providing more detailed language on RME that could be amended into the program. BPA hopes to include its final version of this RM&E language in a complete redline program document that should be ready for release shortly.}

Research, Monitoring and Evaluation

This 2008 Program updates the RM&E section to capture common objectives, strategies, and terminologies developed since 2000 through ongoing RM&E planning and collaboration efforts under the Program, the FCRPS BiOp, ESA Recovery Planning, and resource manager agreements. The region now has a common RM&E structure, vocabulary, and strategies coordinated collaboratively through regional RM&E and data management forums including the Pacific Northwest Aquatic Monitoring Partnership, the Northwest Environmental Data Network, and the Executive Summit on Information Sharing. Building on these commonalities, this Program adopts the following six fundamental advancements as the backbone of the Council's RM&E and data management plan.

1. The Program's RM&E will be structured in a common regional framework to better communicate, plan, and implement regional RM&E strategies. This structure tracks the 2008 NOAA Fisheries Biological Opinion for the FCRPS. The framework includes standard terminology for the different types of monitoring and research, and several standard categories of RM&E for organizing strategies. The Program now includes standard terminology for concepts like status and trend monitoring, action effectiveness research, critical uncertainty research, project implementation and compliance monitoring.
2. Within this framework, RM&E will strategically target information needed to answer key management questions that are critical to effective Program planning, implementation, and adaptive management. The Program now defines strategic level management questions for individual RM&E strategies. This focus on management questions and information needs will guide more explicit statements of RM&E strategies, support more targeted RM&E solicitation, and facilitate project selection and prioritization processes.

3. The Program's RM&E will align with regional collaborative efforts for standard and compatible monitoring and data management approaches that support both Program and Pacific Northwest regional information sharing and networking. This will provide cost efficiencies, more information of higher quality, better connectivity among RM&E projects, and require cost sharing agreements and collaborative monitoring efforts across the region.
4. The Program will adopt strategies for fish population and habitat status and trend monitoring collaboratively developed with the region as part of a broader Pacific Northwest regional status monitoring effort that includes identification of appropriate levels of cost sharing. This monitoring information is a shared responsibility of other regional agencies and it is not the sole responsibility of BPA to fund, but it provides critical information for the effective management of the F&W Program and ESA BiOp and recovery efforts and should therefore be a high regional priority.
5. The Program will adopt a set of high-level indicators to better track and report on biological and programmatic level performance and more clearly align the Program's evaluation and reporting requirements with similar efforts in the region. These indicators will be coordinated with similar performance reporting needs of other regional agencies to facilitate consistent and compatible information sharing and reporting.
6. The Program adopts several RM&E strategic categories and associated strategies to provide information that supports effective planning, implementation, and adaptive management and that demonstrates accountability in effectively meeting Program biological objectives.

Key Management Questions

The Northwest Power Act directs the Council to develop a program to protect fish and wildlife affected by the region's hydroelectric system. The Program's RM&E strategies will serve that end but not seek to reach beyond it. The following high level management questions provide a basis for the needs and priorities of Pacific Northwest regional RM&E, of which the Program's needs related to hydrosystem operations, impacts, and mitigation efforts, are but a part. Regional coordination and cost sharing will be required for monitoring related to several of these management questions where they overlap with the management and information needs of other regional entities.

1. *Are we meeting biological and programmatic performance objectives established within the Columbia Basin Fish and Wildlife Program, FCRPS BiOp and ESA Recovery Plans?*
2. *Where objectives are not being met, what factors are limiting our ability to achieve performance standards or objectives?*
3. *What is the effectiveness of different hydro and offsite mitigation actions in addressing factors limiting achievement of performance standards and objectives?*
4. *Is research and monitoring information accessible to the region and compatible with regional standards and protocols for monitoring, data collection and access?*
5. *Are actions being implemented and accomplished as proposed?*

High-level Indicators

The Council will provide an annual Program performance report that provides information on key indicators of Program success. These high-level indicators of performance will track the success of the Program at both a biological level and a program implementation level. Similar high-level indicators are being used by several federal, state and tribal programs across the Pacific Northwest for programmatic scale, high level reporting on the health of fish populations, the condition of watersheds, and the effectiveness and implementation of actions. To insure consistency and compatibility with regional high level indicators, and to encourage cost sharing of needed monitoring that supports these indicators, the Council will coordinate the development, adoption, updating, and reporting of high-level indicators with other entities in the region.

RM&E Strategic Categories and Strategies

Since the 2000 Program, resource managers have collaboratively identified several strategies to provide information needed to address these high level management questions as part of the Program. These strategies are accomplished primarily through the use of status monitoring, action effectiveness research, critical uncertainties research and project implementation and compliance monitoring. The following RM&E Strategic Categories include the pertinent management questions. This Program organizes these strategies following the structure in the 2008 FCRPS Biological Opinion and creates an ecosystem level approach to RM&E.

1. Fish Population Status Monitoring

2. Hydro RM&E
3. Tributary Habitat RM&E
4. Estuary and Ocean RM&E
5. Harvest RM&E
6. Hatchery RM&E
7. Predation and Invasive Species Management RM&E
8. Wildlife RM&E
9. Coordination and Data Management
10. Project Implementation and Compliance Monitoring

Strategic Category: Fish Population Status Monitoring

The following are the primary management questions with respect to the status of fish populations.

- What are the abundance, productivity, and spatial distribution of key fish populations affected by the FCRPS and other hydro projects?
- What is the proportion of spawners within ESA-listed salmonid populations that are of hatchery origin?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

***Strategy:** Monitor the status and trend of anadromous and resident fish populations relative to Program or Provincial level biological objectives.*

***Strategy:** Develop regional fish population monitoring approaches with common data collection and data management protocols as part of collaborative cost-sharing and coordination with other regional monitoring programs and non-hydro agency responsibilities.*

Anadromous and resident fish populations need to be monitored as appropriate to answer management questions regarding achievement of Programmatic and Provincial level biological objectives. The status of fish populations are a result of the combined effects of hydro and non-hydro conditions, and therefore this monitoring information and performance objectives are a shared responsibility with other regional federal and state entities. Regional cost sharing and collaborative monitoring are therefore a key component and requirement of this strategy. As such, the Council will seek and participate in a regional,

collaborative effort to define fish population monitoring needs and develop regional, strategic plans and cost sharing agreements for both anadromous and resident fish populations. Regional collaboration forums will be supported to facilitate this strategy.

Measures will be implemented under this Program to enable monitoring of hatchery-origin fish in natural spawning areas in support of the assessment of the status of wild populations and the effects of hatchery-origin fish upon those populations.

Strategic Category: Hydro RM&E

The following are the primary management questions with respect to FCRPS hydrosystem fish passage strategies.

- Are salmon and steelhead meeting juvenile and adult hydrosystem passage performance objectives?
- What are the most effective configurations and operations for achieving desired performance objectives in the FCRPS?
- What is the post-Bonneville mortality effect of changes in fish arrival timing and transportation to below Bonneville?
- Under what conditions does in-river passage provide greater smolt-to-adult return (SAR) rates than transport?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

Strategy: *Monitor and evaluate fish performance within the hydro electric corridor relative to biological objectives.*

Strategy: *Monitor and evaluate migration characteristics and river conditions relative to environmental and physical performance objectives.*

Strategy: *Monitor and evaluate the effects of changes in hydro system configurations and operations.*

Strategy: *Assess and investigate as appropriate critical uncertainties related to the scientific relationships that determine the survival and condition of fish passing thru or transported around the hydro system.*

These strategies provide information important to management questions regarding achievement of fish performance objectives, identification of limiting factors, and assessments of the effectiveness of actions within the hydro system of the Columbia Basin. These monitoring and research strategies are integral with the COE Anadromous Fish Evaluation Program and therefore require close coordination and collaboration with this program.

Strategic Category: Tributary Habitat RM&E

Management Questions: The following are the primary management questions with respect to tributary habitat offsite mitigation strategies.

- Are tributary habitat actions achieving the expected biological and environmental performance objectives?
- What are the tributary habitat limiting factors or threats preventing the achievement of desired tributary habitat performance objectives?
- What are the relationships between tributary habitat actions and fish survival or productivity increases, and what actions are most effective?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

***Strategy:** Monitor and evaluate tributary habitat conditions that may be limiting achievement of biological performance objectives.*

***Strategy:** Evaluate the effectiveness of tributary habitat actions relative to environmental, physical, or biological performance objectives.*

Effectively identifying habitat conditions that are limiting factors to fish productivity and evaluating the effectiveness of habitat actions that are being implemented as offsite mitigation for FCRPS effects are critical elements of both the F&W Program and FCRPS BiOp. This ongoing planning, adaptive management and performance evaluation of habitat actions will require a combination of broad, regionally coordinated and cost-shared status and trend monitoring with more localized, reach-level project effectiveness research, and intensively-monitored-watershed research. In addition, basic project implementation monitoring will be needed as part of these assessments. The collection and management of this information will need to be standardized

across the Pacific Northwest region for comprehensive assessments. Habitat based models will also need to be further advanced to facilitate these assessments.

Strategic Category: Estuary and Ocean RM&E

The following are the primary management questions with respect to Estuary Habitat mitigation strategies.

- Are aquatic, riparian, and upland estuary habitat actions achieving the expected environmental, physical or biological performance objectives?
- What are the limiting factors or threats in the estuary/ocean preventing the achievement of desired estuary habitat performance objectives?
- What are the relationships between estuary habitat actions and fish survival or productivity increases, and what actions are most effective?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

***Strategy:** Monitor and evaluate fish performance in the estuary and plume relative to environmental, physical, or biological performance objectives.*

***Strategy:** Monitor and evaluate estuary/ocean migration and habitat conditions that may be limiting achievement of biological performance objectives.*

***Strategy:** Evaluate the effectiveness of habitat actions in the estuary relative to environmental, physical, or biological performance objectives.*

***Strategy:** Assess and investigate as appropriate critical uncertainties related to the scientific relationships that determine the survival and condition of fish residing and/or migrating through the estuary and ocean.*

The estuary and ocean are where the majority of salmonid mortality takes place, yet it is the least understood life history stage. A broad range of estuary physical and biological metrics need to be monitored to improve our understanding of the relationships between different estuary habitat actions, the environment and the survival and productivity of salmonids. In addition, better understanding of salmonid early life history habitat conditions, timing, and distribution in the ocean is needed to address critical uncertainties for post-Bonneville survival of transported and non-transported fish.

Strategic Category: Harvest RM&E

The following are the primary management questions related to FCRPS-sponsored harvest management strategies.

- What is the effect of acquiring more accurate and precise in-river harvest estimates on the resultant estimates of straying and adult passage survival?
- Can selective fisheries targeting hatchery fish or healthy populations reduce impacts on ESA-listed populations?

The following strategy is focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

***Strategy:** Assess and investigate as appropriate critical uncertainties related to harvest estimates and harvest management practices.*

Uncertainties regarding harvest rates, incidental take, and illegal harvest need to be addressed to refine estimates of hydro upstream survival performance. In addition, critical uncertainties should be addressed regarding selective fishery methods and the feasibility of genetic stock identification monitoring techniques.

Strategic Category: Hatchery RM&E

The following are the primary management questions with respect to hatchery strategies.

- Are hatchery improvement programs and actions achieving the expected biological performance objectives?
- What is the proportion and origin of hatchery fish within naturally spawning salmon and steelhead populations?
- What deleterious effects does artificial production have on natural populations of anadromous fish?
- How can hatchery reforms reduce the deleterious effects of artificial production on listed populations?
- Can properly designed intervention programs using artificial production make a net positive contribution to recovery of listed populations?
- What is the reproductive success of hatchery fish spawning in the wild relative to the reproductive success of wild fish?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

***Strategy:** Evaluate the effectiveness of hatchery safety-net/conservation programs and the effectiveness of hatchery reform actions on the achievement of biological performance objectives.*

***Strategy:** Assess and investigate as appropriate critical uncertainties regarding the effects of artificial propagation on the viability of wild fish populations.*

Hydro impact mitigation currently includes major hatchery fish production, supplementation, and conservation programs supporting both harvest and population viability objectives. Evaluations of the effects of these hatchery programs and associated reform actions on wild fish populations are critical to future management of the Program and FCRPS BiOp actions.

Strategic Category: Predation and Invasive Species Management RM&E

The following are the primary management questions with respect to predation and invasive species management.

- What are the distributions, population sizes, and productivity for the major predators within the Columbia River Basin? Are there aquatic

invasive species present within the habitat of Columbia Basin fish populations?

- What are the impacts and consumption rates of major piscivorous, avian, and marine mammal predators on juvenile salmonids within the Columbia River Basin?
- Are predation management programs and actions achieving the expected biological performance objectives, including consideration of inter- and intra-specific compensation?
- Are there alternative management alternatives/actions to those currently being implemented to reduce the impact of predation? What are the most effective management alternatives/actions?

The following strategies are focused on providing information needed to answer these questions in support of planning, implementation, and adaptive management.

Strategy: Monitor the status of the Caspian Tern and the Double-Crested Cormorant populations in the Columbia River Estuary, their impacts on juvenile salmonids and the effectiveness of management strategies that may be implemented.

Strategy: Monitor the status of Inland Avian Predator populations in the Mid-Columbia River, their impacts on juvenile salmonids and the effectiveness of management strategies that may be implemented.

Strategy: Monitor the population status of marine mammals (e.g., Sea Lions and seals) below Bonneville Dam, their fish predation rates, and the effectiveness of deterrent actions.

Strategy: Evaluate the effects of the northern pike minnow removal program and investigate strategies to reduce non-indigenous piscivorous (e.g., walleye, bass) predation on salmonids.

Strategy: Develop guidelines and procedures for monitoring for presence and prevalence of aquatic invasive species.

Piscivorous, avian and marine mammal predation is a significant impact on fish populations in the Columbia Basin and predator monitoring and control actions are being used as an effective hydro offsite mitigation action under the Program and the FCRPS BiOp. RM&E to track the status of predation and the effectiveness of predator control actions is critical to the ongoing adaptive management of these complex and dynamic management actions.

Strategic Category: Wildlife RM&E

The primary management questions with respect to wildlife mitigation programs are:

- Are wildlife mitigation programs and actions achieving expected habitat unit or acreage objectives?
- What are the most effective actions for achieving wildlife habitat unit or acreage objectives?

***Strategy:** Evaluate the effectiveness of the wildlife mitigation program actions in meeting objectives.*

Tracking the response of wildlife habitat to the various management actions employed across the Program will allow for adaptive management the wildlife mitigation program. In some cases, the response of target wildlife species may also be monitoring to determine their response to management actions. The Council should arrange for any necessary wildlife species monitoring through existing monitoring programs that are being conducted by entities like the U.S. Fish and Wildlife Service, the states (e.g. the state Conservation Strategies), and others.

Strategic Category: Coordination and Data Management

The following is the primary management question with regard to RM&E coordination and data management.

- Is research and monitoring information accessible to the region and compatible with regional standards and protocols for monitoring, data collection and data access?

The following strategies are focused on addressing this question.

***Strategy:** Actively support the coordination and standardization of regional and Program monitoring efforts with other federal, state, and tribal monitoring programs including the development and adoption of standard requirements for metrics, sample designs, data collection protocols, data dictionary, meta-data, and data access.*

Strategy: *Work with regional federal, state and tribal agencies, and non-governmental entities to establish a coordinated, standardized, web-based distributed information network and a regional information management strategy for water, fish, and habitat data. Establish necessary administrative agreements to collaboratively implement and maintain the network and strategy.*

Adaptive management associated with all of the RM&E strategies of the Program is highly dependent on accessible and well documented information that follows regionally accepted and understood standards and protocols. Regional collaboration, partnerships, and agreements on these standards and protocols as part of a regional strategy for sharing and distributing information is critical to the success of the Program and the FCRPS BiOp.

Strategic Category: Project Implementation and Compliance Monitoring

The following is the primary management question with regard to project implementation and compliance monitoring.

- Are actions being implemented, accomplished, and functionally maintained as proposed?

The following strategies are focused on addressing this question.

Strategy: *Maintain a comprehensive project implementation tracking system with standard performance metrics that are coordinated with other regional federal, state, and tribal project tracking systems.*

Strategy: *Develop a project compliance monitoring program for independent post-project auditing of project performance to assess ongoing performance of habitat based mitigation projects in support of adaptive management planning.*

Project level monitoring is a key component adaptive management. This monitoring is needed to insure projects are implemented and functioning as proposed and that they continue to function as expected over the long term. This information is important to assess achievement of programmatic level objectives, but is also essential to designing action effectiveness studies and relating actions to expected action effects. This information collection will require project level implementation monitoring as well as independent post project auditing of the ongoing functionality of certain types of habitat projects (i.e., compliance monitoring).

Standard Definitions of the Types of RM&E Projects

1. Fish/Wildlife Population and/or Environmental Status and Trend Monitoring – census or statistically designed monitoring of fish or wildlife population and/or environmental conditions (i.e. watershed conditions) to assess the current status or change (trend) over time. This is sometimes referred to as an observational study (ISRP, 2005). These monitoring data may also be used to correlate fish performance with environmental conditions.
 - Ecosystem/Landscape level, broad-scale, periodic monitoring
 - Geographically localized, frequent monitoring
2. Action Effectiveness Research – research to determine the effects of an action or suite of actions on fish survival, productivity and/or habitat conditions. This is a manipulative experiment that statistically assesses the effect of a treatment (action) condition relative to a control or reference condition. Action effectiveness research can be performed for a localized effect (project or stream reach level effect) or for a watershed level effect (intensively monitored effect). Localized (project level) effects most commonly identify changes in habitat conditions associated with the action, while fish or biological responses may require a watershed level (intensively monitored approach) to capture a broader area in which a biological response is expressed.
3. Uncertainties Research – research to resolve scientific uncertainties regarding the relationships between fish or wildlife health, population performance (abundance, survival, productivity, distribution, diversity), habitat conditions, life history and/or genetic conditions (e.g., the existence and causes of delayed mortality, hatchery spawner reproductive success relative to wild populations, etc.). This is a manipulative experiment where variables are manipulated to infer or demonstrate cause and affect relationships using statistical-designed hypothesis testing. Uncertainties research does not include experimental research and monitoring specifically targeting the effect of a mitigation or restoration action (this is Action Effectiveness Research).
4. Project Implementation and Compliance Monitoring – monitoring the execution and outcomes of projects. This type of monitoring does not

require environmental response data directly linking restoration actions to physical, chemical, or biological responses.

- *Project Implementation* monitoring determines whether projects were carried out as planned, through documentation of the type and location of management action, and whether the action was implemented properly or complies with established standards. This is generally carried out as an administrative review and does not require any parameter measurements beyond those specified by the project design requirements. It is usually a low-cost monitoring activity that should be included for all mitigation activities.
- *Project Compliance* monitoring determines whether specified project criteria are being met, through a post-project auditing of project performance. This type of monitoring would typically not be carried out by the project sponsor, and may require the development of independent, compliance monitoring projects. A limited, statistical-designed sample of projects could be monitored annually for compliance.

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