State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: 600 Capitol Way N, Olympia, WA 98501-1091 • (360) 902-2200 • TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

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Northwest Power and Conservation Council
851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204

Dear Council Members:

Thank you for the opportunity to submit the Washington Department of Fish and Wildlife's (WDFW) recommendations for amendments to the 2009 Fish and Wildlife Program (Program). Under the Northwest Power Act, state fish and wildlife agencies have a significant role in recommending changes to the Program. In recognition of this role and in the absence of a regional coordinating body, we worked with several tribal and state fish and wildlife agencies to develop common language for recommendations that were a shared high priority. As you read our recommendations, you will notice the same language reflected in the recommendations of others. Our intention was to highlight where the agencies are in alignment while also providing WDFW specific recommendations. Where you see common language, it indicates broad agreement amongst many of the state and tribal fish and wildlife managers in the Basin.

WDFW's complete recommendations are enclosed, but I wanted to highlight a few key points for Council attention. First, it is critical that the Council continue to ensure mitigation for all fish and wildlife resources impacted by the federal dams. Though the delisting of salmon is a priority for the Council, WDFW and our partners, it is just one element of the Program. We continue to support the policy decision by the Council to allocate 70 percent of the available funding for anadromous fish, 15 percent for resident fish, and 15 percent for wildlife. We also want to highlight that the 70 percent allocation for anadromous fish be inclusive of non-listed populations, like the Hanford Reach Fall Chinook Salmon population. Secondly, several mitigation responsibilities need to be strengthened including: funding for hatchery mitigation and monitoring, selective fisheries development and the Select Area Fisheries Enhancement (SAFE) program, resident fish loss and substitution, data management and reporting of high level indicators, and wildlife mitigation including transmission infrastructure. We also want to stress the continued importance of the 2:1 wildlife mitigation responsibility for construction and inundation.

The Council's Program, the Federal Columbia River Power System Biological Opinion, and the delisting of salmon are predicated on strong, effective, and timely implementation of adaptive management. We have been disappointed with the continued calls for reducing monitoring and reporting capacity not just at WDFW but throughout the region. Adequate monitoring is

essential to ensuring all aspects of the Program, including wildlife, resident fish, hatcheries, and salmon habitat restoration, are achieving their established objectives. Monitoring, the actual counting of the fish and wildlife, is just one part of adaptive management. We must also build adequate, transparent, and accessible data management and reporting systems for use in structured decision making processes to implement adaptive management in a timely manner. The Council has consistently identified the importance of accountability. Monitoring delivers accountability and the science upon which the Program depends.

We appreciate the excellent work by the Independent Science Advisory Board (ISAB) in reviewing the 2009 Program. It was a comprehensive and thorough review. We agree with the recommendations of the ISAB and support their implementation in the revised Program. In particular, their recommendations regarding sustainability, to develop more specific biological recommendations, and to improve monitoring strategies seem immediately relevant and dovetail with WDFW's recommendations. We fully endorse the ISAB's recommendations regarding climate change and are eager to begin a more detailed conversation about climate change in the Basin. Finally, we appreciate the attention that the ISAB gave to developing estuary strategies. WDFW is a key implementer of estuary restoration, and we continue to be concerned that there is not a strong monitoring program for estuary restoration.

Finally, we want to address the changing coordination landscape and the role of the Council. Without the presence of a regional coordinating body like the Columbia Basin Fish and Wildlife Authority, the region needs the Council to assist managers in convening essential policy and science conversations, such as the Council's policy/science workshops and forums. The Council must also maintain their role in providing Bonneville Power Administration (BPA) direction in regard to adequate levels of funding. Too often in recent years, projects that have been reviewed and approved through the Council process have not been implemented as approved due to subsequent decisions by BPA to reduce project scope and/or funding. WDFW believes this is inconsistent with the intent of the Northwest Power Act. In this regard, WDFW believes that the intent of the Act is accurately summarized on the Council website, at http://www.nwcouncil.org/reports/poweract/summary.

"The Act directs the Administrator to use the Bonneville Power Administration fund and applicable laws to protect, mitigate and enhance fish and wildlife projects of the Columbia River and its tributaries in a manner consistent with the Act, the plan, and the fish and wildlife program. The Act also directs the Administrator and other federal agencies responsible for managing, operating or regulating hydroelectric facilities on the Columbia River or its tributaries to provide equitable treatment for fish and wildlife in comparison with the other purposes of the facilities and take the Council's program into account as much as possible at each stage of decision making."

We acknowledge that the Council has acquired a number of new roles and challenges in recent years, but strongly encourage the Council to remain engaged in ensuring full implementation and funding of the Program, and reporting to the region on the implementation and effectiveness of

the Council's program and recommendations. We applaud the work of the Council through this Amendment process, and look forward to assisting with implementation of the revised Program.

Sincerely,

Philip Anderson
Director

Enclosure

Washington Department of Fish and Wildlife

Recommended Program Amendments to the 2009 Fish and Wildlife Program

9.16.13

Contents

1. Restructure the Program to Better Support Implementation of Adaptive Management

Current Program: Page 3, Program Framework, and throughout

Recommendation: Restructure the Fish and Wildlife Program to contain or have provisions to explicitly develop or track the following essential adaptive management steps:

1) Update the current status and trends of fish and wildlife resources the Program is intended to protect, mitigate, and enhance;
2) Adopt biological objectives and document the current gaps between Program objectives and status for the fish and wildlife resources identified in step 1;
3) Quantify the limiting factors and threats, in terms of their relationship to the biological objectives with associated assumptions, hypotheses and critical unknowns;

4) Adopt strategies and measures linked to limiting factors and threats with a quantification of expected outcomes toward the filling of the gaps identified in step 2;
5) Develop and maintain Research, Monitoring, and Evaluation Plans that will track the status and trends of focal species and their threats and limiting factors, collect the information necessary to test assumptions and hypotheses, address critical uncertainties, and evaluate the implementation of measures;
6) Share through reports, web tools, and other sources the accumulated monitoring and research data and information which will be used to carry out steps 7 and 8;
7) Develop an evaluation process that deliberately contemplates the information from steps 1–6 to verify or adjust assumptions and hypotheses, adjusts biological objectives, and adjusts strategies and measures; and,
8) Establish a process for adjusting the implementation of the Program to align with the changes identified in step 7.

Each of these eight steps is required to support a transparent, accountable, and effective planning, implementation and evaluation process. In this process, *measures* are the actions, or prescriptions for actions. They implement strategies to address the limiting factors that create the gaps in biological productivity of the focal populations.

Rationale: Adaptive management is built on the principle of learning by doing. Natural resource management is not an exact science. Therefore, the premise of this Program should be to state hypotheses then implement measures contained therein and monitor, report, and evaluate outcomes to provide a clear sequential structure to decisions required in the continuing evolution and implementation of the Program. Together, these steps will provide accountability for the Fish and Wildlife Program and are likely to increase the realized benefits for the region's overall investment in fish and wildlife restoration.

2. Adequate funding to meet mitigation responsibilities

Current program: pg. 14

Recommendation 1*:* Specify that Council plays a pivotal role in ensuring adequate funding to meet mitigation responsibilities including those that are not tied to Bonneville Power Administration's requirements under the Endangered Species Act.

Rationale*:* The Council's role, as described in the Power Act, is to recommend which projects are to be funded by Bonneville Power Administration (BPA). Recently, the Council has moved away from recommending funding levels for projects which has resulted in some Council recommendations either being inadequately funded or unfunded.

Recommendation 2: The Council and BPA have made significant infrastructure investments including fish screens, hatcheries, wildlife areas, and other capital improvements. BPA and the Council will work with the States and Tribes to create a process for capital refurbishment over the next ten years.

Measure 1: Council should direct funding for replacement and repair beyond current operation and maintenance to ensure the continued value of existing infrastructure investment in fish passage, hatcheries and wildlife areas.

Rationale: Existing fish screens, hatcheries and capital improvements on wildlife areas are aging and exhibiting the need for additional money beyond the yearly operation and maintenance budgets. If we begin now, we can plan for upcoming costs in a rationale and coordinated fashion. An overall plan for replacement will need input from all fish and wildlife managers as we prioritize and allocate resources accordingly.

Measure 2: The Council will allocate adequate money for mitigation responsibilities. Specifically:

a. Ensure mitigation responsibilities include mitigation from power line impacts. For example, Greater Sage Grouse populations are particularly impacted by power line corridors that effectively carve up sage grouse habitat, increase predation, and impair nesting and dispersal, reducing the likelihood of recovery.
b. Adequate funding to provide for hatchery conservation and mitigation programs, and associated monitoring. For instance, maintain funding for Coded Wire Tagging and recovery is essential for hatchery effectiveness monitoring.

Measure 3: Maintain adequate funding for Select Areas Fishery Enhancement (SAFE) as a core mitigation responsibility and selective harvest as a tool to protect listed species.

Rationale: The SAFE project has effectively reduced fishing impacts to listed anadromous fish in the mainstem Columbia River while mitigating for loss production caused by upstream dams by directing fisheries into off channel sites. In addition, selective sport and commercial fisheries have been effective at reducing fishing impact to natural origin spawners. The Council's continued support for these programs are critical to mitigating the impacts of the dams and providing commercial and recreational fishing opportunity.

Measure 4: Council will increase funding to achieve the objectives and goals of the resident fish section of the Program. Please refer to the resident fish section of this document for a full discussion of the rationale.

3. Role of Council and Implementation Provisions

3.1 Review and Ensure Implementation of Program Measures

Current Program: Page 63, Program Reporting

Recommendation 1: The Council should work with fish and wildlife managers and partners to provide a periodic review of implementation of Fish and Wildlife Program measures and provide an annual report of the measures that were implemented and those which were not. In addition, because of the importance of Subbasin plans, progress towards implementation of these plans should be reported on periodically. This could be as simple as documenting which measures are currently funded and those which have not been funded. The Council should use existing tracking tools to report on which elements of the Program are funded (and at what level) and which are currently unfunded.

As new measures are added to the Program, funding mechanisms need to be identified. To address the need for new funding, we recommend that the Council use their convening role to coordinate and leverage funding for new and existing measures in the Program with the following values:

- The Council's Program, though tied to ESA listed species, is broader than recovery of those species.
- Effort and funding needs to be balanced within the Program to ensure that all aspects of the Program move forward within the foreseeable future, though perhaps not within the next five years.
- The Council can uniquely address the needs of the ecosystem from the sub basin or basin wide perspective.
- BPA has large discretion regarding funding levels, but the measures listed in the Program are presumed to be funded, at some level. Tracking of these measures needs to be transparent.
- It is critical that the cost of administering the Program be kept low. It is important that in an annual review of implementation, an accounting for Program administration costs at BPA be reviewed, as well.

Recommendation 2: The Council should work with fish and wildlife managers and land and water management entities to identify opportunities to coordinate BPA project funding with other funding sources as appropriate to accomplish shared goals. Fish and Wildlife Program funds could leverage shared investments that support implementation of subbasin plans, recovery plans, salmon strongholds, and other mitigation and conservation strategies. The Fish and Wildlife Program and Council should:

- Create a liaison position to assist project sponsors in identifying complimentary (cost-share) grants, and
- Develop complimentary or shared grant application formats to standardize and simplify proposal development and submission. Standard formats would also facilitate proposal review and consideration by local watershed partnerships.

Rationale: The ISAB Report "Using a Comprehensive Landscape Approach for More Effective Conservation and Restoration" provides several case histories of programs that that employ socioeconomic engagement, a landscape perspective, governance and collaboration to work across traditional boundaries, leverage limited resources, and foster adaptive management (ISAB 2011-4). Among the reported lessons learned is that local organizations can be challenged to identify and generate funds needed to sustain investments, subbasin social engagement, integrated collaborative science and governance, and adaptive management. Tasking Council staff to reach out and coordinate with local watershed partnerships to help identify additional grant opportunities could better leverage BPA investments. Simplified or standardized formats for on the ground work could allow sponsors to efficiently and effectively communicate integrated project objectives and strategies to granting entities and facilitate proposal review by local watershed partnerships.

3. 2 Clarify BPA In-lieu Restrictions

Current Program: Page 7, Planning Assumptions

Recommendation: The Council should establish the in-lieu funding policy which shall be applied by BPA, and add it to the Program. In-lieu decisions by BPA should be reviewed by Council through a public process. Input from the Council is needed as the Fish and Wildlife Program is reviewed and updated to ensure that critical Federal Columbia River Power System (FCRPS) mitigation efforts receive the necessary funding from BPA for successful and timely implementation.

Rationale: Essentially, the Council's role is to interpret the Power Act and to develop recommendations from that interpretation in an open, transparent process. Section 4(h)(10)(A) of the Northwest Power Act requires BPA to protect, mitigate and enhance fish and wildlife to the extent affected by the development and operation of the hydropower projects of the FCRPS in a manner consistent with Council's fish and wildlife program and the purposes of the Act. The "in Lieu" provision of section 4(h)(10)(A) states that "Expenditures of the Administrator pursuant to this paragraph shall be in addition to, not in lieu of, other expenditures authorized or required from other entities under other agreements or provisions of Law."

BPA has interpreted this "In Lieu" provision of the Act by drafting an In Lieu Policy (June 2007) and assigning ratings to both new and ongoing projects. Since establishing this policy, BPA has made decisions not to initiate new efforts deemed as in lieu while ramping back on funding levels for other ongoing efforts (e.g., Burns Paiute Tribe - Malheur River Resident Fish Project No. 1997-019).

With this call for policy oversight from the Council, we recognize the critical need to focus ratepayer funding on fish and wildlife mitigation efforts that address FCRPS impacts and that this funding not supplant another entities legal responsibility for funding and implementation of fish and wildlife efforts. However, there are numerous permutations and interpretations of funding responsibility of entities for fish and wildlife efforts as well as the reality of what, if any specific funding has been required, made available, or appropriated for these efforts.

We also understand Congress' intent for the Northwest Power Act, in general, as providing an overarching structure among the myriad of fish and wildlife and environmental programs and laws currently within the extent of the Columbia River Basin.

3.3 Ensure Regional Coordination Forum

Current Program: Page 64, Program Coordination

Recommendation 1: Council should continue as a regional convener of issues related to Columbia Basin mitigation. Council should create an annual forum for states, tribes and partners to coordinate and discuss annual work priorities. The forum would result in the creation of an annual work plan to ensure that we are collectively engaged in discussions on what is most important to the Council and the region. Through the five years of this program, we recommend the following priority topics, and others as they arise, for Council engagement:

- Monitoring and Evaluation – To better understand M&E costs within the Program, specific information needs at each level of Program reporting should be clearly identified and incorporated to ensure cost effective and efficient data collection, data management, and data sharing.
- Research - Identify critical questions and improve funding mechanisms such that research projects are finished and new projects are identified.
- Zebra and Quagga Mussels – Improve the basins ability to prevent invasion.
- Habitat Restoration – Better understand how to leverage existing projects to evaluate the effectiveness of habitat restoration on populations.
- Science/Policy forums – A variety of topics including climate change, toxics, eulachon

- BPA funded assets – Identify and resolve long term challenges of maintaining BPA funded infrastructure and identify strategies to address replacement costs.
- Non-native species – Suppression and eradication of these species.
- Coordinated Assessments – Identify additional species and indicators for reporting.

Rationale:
The role of the Council has evolved over time to meet the needs of the Basin and to address endangered species listings in concert with BPA. The disbanding the Columbia Basin Fish and Wildlife Authority (CBFWA)leaves a gap in regional coordination as no one state or tribe can play a regional coordinating role, with the consequence that States and Tribes work more directly with Council Members and less with each other. As such, it falls to the Council and Council staff to play a greater coordinating role that meets the needs of all regional partners in serving and informing Council decisions. An annual work plan would provide sufficient advance notice to improve preparation and participation, ensuring that all parties benefit fully from the exchanges.

Recommendation 2: We recommend that the Council continue the inclusion of Fish and Wildlife Program Coordination funding in the updated program amendment process. Program Coordination funding is important to the region's fish and wildlife managers. The lack of any Columbia River Basin fish and wildlife entity to provide coordination makes it more critical to provide funding directly to those individual state and tribal managers who can provide their time and expertise. This coordination funding is also important for many of the tribes because it helps build capacity and levels the playing field, particularly for smaller tribes across the basin. It allows for important avenues for participation and travel to meetings, efforts that would not occur without this level of funding support.

Rationale: The current 2009 Council Fish and Wildlife Program describes the need for coordination funding provided by BPA for the purpose of various activities that support Program implementation. Activities range from activities such as data management and reporting, monitoring and evaluation, facilitating and participating in focus workgroups on Program issues, review of technical documents and processes, and information dissemination.

The Council in 2012 reviewed coordination projects and provided a decision on BPA coordination funding. In that decision document the Council included a table of detailed coordination activities appropriate for BPA funding. Those coordination tasks were designated by the Council as meeting priority needs for program coordination for the next two years, FY2013-2014. With this decision the Council indicated that these activities were well suited for program-level regional coordination funding and recognized that they would need the

assistance from partners throughout the region. In addition the Council stated that all of the work was intended to be of benefit at a basinwide or regional scale and should inform the Council for policy, program performance evaluation, and implementation decisions. The Council also recommended that this work should be accomplished by the appropriate fish and wildlife agencies and tribes recognized in the program and other entities such as Tribal Consortia that have the experience and capacity to coordinate this work at a basinwide scale.

3.4 Streamline ISRP Scientific Review

Current Program: P 65-66, Independent Scientific Review Panel

Recommendation: Modify the current language in the Program as follows:

- First bullet at the top of p. 65, add "new" to read, *"Review **new** projects proposed for Bonneville funding to implement the Council's Program."*
- Add a second bullet: ***"The Council, Action Agencies, and co-managers should jointly develop a new ISRP review process for mature projects, long-term projects, and Fish Accords projects."***
- Additionally, the Program should continue to support the existing strategic frameworks developed by the umbrella projects that have developed review processes for selection, prioritization and technical and science review of projects in coordination with local stakeholders, tribes and agencies.

Rationale: The existing ISRP review process is inefficient, labor-intensive, and duplicative. In the absence of clear guidance by the Council, the ISRP has been left to develop or modify its review process. The proposed recommendation would put process development under policy guidance and would allow the relevant parties to develop new review protocols that 1) keep the ISRP focused on what is necessary by law, 2) allow the parties to develop alternative review processes that take advantage of annual science and management conferences, and 3) could result in reviews that add value to proposed and ongoing projects 4) focus accountability on delivery of products.

For ongoing projects, consider an entirely different review regime that would make the reviewers partners in the local basins (as opposed to distant adversaries) with the mutual goal of improving subbasin programs and making them more successful. For example, four (or more) regional review panels – one each for the upper Columbia, Snake, mid-Columbia, and lower Columbia - might be composed of two at-large members nominated by the subbasin co-managers, one or two representatives from NOAA-Fisheries, a tribal representative, and maybe two members assigned to the subbasin by the ISRP. Members of these regional review panels

would be required to attend project review conferences to thoroughly understand the sub-basins, co-manager objectives, and the existing spectrum of implementation projects. Following the annual conference, a day would be dedicated to address concerns, discuss progress and ideas for making the program better, review recovery implementation issues, etc. Action items and a formal record would be kept and would become part of the review the following year. This type of review could be used to satisfy all of the legal review requirements for ongoing projects, including ESA permit compliance. A review panel so constituted would have a baseline understanding of local basin issues, advance knowledge of their respective concerns, and could come to reviews prepared to ask the questions needing answers. This informed dialogue would eliminate misunderstandings and the lost time that goes into the back-and-forth of the present review response loop.

4. Biological Objectives in the Program

Current Program: Pages 11-14, Biological Objectives, and Page 63, Program Reporting

Recommendations:
The Council should follow through on the existing language in the 2009 Program, page 11, to initiate a science based process to inform policy choices on biological objectives as supported by the ISAB. Until that time:

The language in the 2009 F&W plan, page 11, is a starting point for the quantitative performance goals for biological objectives but should be modified to include habitat and flow restoration strategies and improvements, hatchery, and harvest goals at the **population** level. Include the following language: "The Council will work with the fish and wildlife agencies, tribes, and others to: 1) initiate a process specifically aimed at updating quantitative biological objectives at population scale as needed for population performance, hatchery performance, harvest) and, if determined to be useful, 2) develop an updated and scientifically rigorous set of such quantitative objectives…... The Council then will consider adopting revised quantitative objectives in a future amendment process. In the interim the Council continues to recognize the quantitative goals described above as Program objectives at the basin level."

- Maintain the existing language from the 2009 Program listed below with modifications shown in bold. These are important general targets for highest level Program evaluation and should be maintained.
    - *"Increase total adult salmon and steelhead runs, in a manner consistent with achieving recovery of ESA listed populations and prevents additional listings of listed species, above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest, achieving smolt-to-adult return rates in the 2-6 percent range (minimum 2 percent; average 4 percent) for listed Snake River and upper Columbia salmon and steelhead.* ***Increase total***

adult runs for listed lower Columbia salmon and steelhead to achieve 75 percent of recovery goals (NOAA 2013) by 2025."

- *"Within 100 years achieve population characteristics that, while fluctuating due to natural variability, represent on average full mitigation for losses of anadromous fish caused by development and operation of hydroelectric facilities in the Columbia Basin."*

- Maintain the current basinwide biological objectives expressed in the 2009 Program with modifications shown here in bold (to represent a 10-year implementation plan for these recommendations):
  - "*Halt declining trends in Columbia River Basin salmon and steelhead populations* ***by 2024,*** ~~***especially those that originate above Bonneville Dam***~~*. Significantly improve the smolt-to-adult return rates (SARs) for Columbia River Basin salmon and steelhead, resulting in productivity well into the range of positive population replacement.* ***Restore healthy characteristics*** ~~***Continue restoration***~~ *of lamprey,* ***sturgeon, and eulachon*** *populations.*
  - *"Restore the widest possible set of healthy, naturally reproducing and sustaining populations of salmon and steelhead in each relevant ecological province* ***by 2024."***
- Continue to recognize productivity objectives for salmon and steelhead:
  - ***"As an interim goal, contribute to*** *achieving smolt-to-adult survival rates (SARs) in the 2-6 percent range (minimum 2 percent; average 4 percent) for listed Snake River and upper Columbia salmon and steelhead."*
- The Program should also continue to recognize the mitigation responsibility for areas where anadromous fish have been extirpated (see Substitution for Anadromous Fish Losses), the Resident Fish Substitution Policy should remain an integral part of the Program::
  - Replace existing introductory paragraphs at the top of page 12 with the following: "**A very significant** ***part of the anadromous fish losses has occurred in the blocked areas. A corresponding part of the mitigation for these losses must occur in those areas. The Program has a "Resident Fish Substitution Policy" for areas where anadromous fish have been extirpated. Given the large anadromous fish losses in the blocked areas, these actions have not adequately mitigated these losses. The following objectives address anadromous fish losses and mitigation requirements in all blocked areas:***
    - ~~***Investigate reintroduction of***~~ ***Take action to reintroduce*** *anadromous fish into all blocked areas,* ***where feasible****.*
    - ***As blocked areas are opened, establish escapement objectives in tributaries where fish passage and access to spawning and rearing habitat has been restored.***
    - *Restore and increase the abundance of native resident fish species* ***(subspecies, stocks and populations)*** *throughout their historic ranges when* ~~***original***~~ ***appropriate*** *habitat conditions exist or can be feasibly restored or improved.*

- ***~~Develop~~ Administer*** *and increase opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild, and hatchery-reared stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historic abundance* ***(includes intensive fisheries within closed or isolated systems)****."*

- Add biological objectives that address the reintroduction of extirpated populations in non-blocked areas above Bonneville Dam including sockeye in the Yakima Basin.
- Expand anadromous goals to the Subbasin and Province levels and add specific and measurable objectives for resident fish and wildlife to support high level indicators.
- The Council should report annually on progress towards achieving the Basin-Level Biological Objectives as presented in the Program. The reporting section of the Program (Section VII.E) should be expanded to include reporting high level indicators that represent the Program's basin-level biological objectives as reported in Section II.C of the current Program.
- Add explicit measurable biological objectives to support the more general Program goals consistent with ISAB recommendations (ISAB 2013-1). Also refer to Section 5 of this document, Species Focused Recommendations. These should integrate with the current Council high level indicators and would clarify how to report against current biological objectives:
    - Halt declining trends in salmon and steelhead populations
        - Graph trends in representative populations' abundance over time and determine whether populations are increasing, decreasing, or stable
    - Increase total runs that support tribal and non-tribal harvest
        - Report abundance of fish runs annually
        - Report tribal and non-tribal harvest in all fisheries annually
    - Achieve 5 million fish above Bonneville dam and 75 percent of recovery goals for LCR ESUs by 2025
        - Report annually total abundance by ESU for salmon and steelhead populations including harvest and other mortality
        - WDFW recommends reporting on abundance of salmon and steelhead relative to recovery goals.
        - WDFW recommends tracking fish forecasts compared to actual returns.
    - Achieve SARs of 2-6% with an average of 4% for Snake River and Upper Columbia River populations
        - Report annually appropriate dam to dam SARs for representative populations to determine if cumulative hydrosystem actions are achieving the targeted level of survival
    - Restore the widest set of salmon and steelhead populations in each province
        - Report population status by province including reintroduction goals
    - Restore lamprey, sturgeon and eulachon
        - Create a monitoring framework and report status of lamprey, sturgeon, and eulachon across the Columbia River Basin on a regular basis

- Restore lamprey production, passage and habitat
  - Report passage counts at dams annually and map lamprey distribution every 5 years

Rationale: The current Program, on page 11, calls for a process to assess the value of these goals. This should be implemented as called for. The Program should restate the call to assess the value of quantitative biological objectives and to develop an updated and scientifically rigorous set of such quantitative objectives. Reviewing and refining the adult fish return and SAR goals is appropriate to assure that these are correctly scaled to evaluate the Program. Measureable objectives provide:

- Quantitative targets to support the Program vision, moving the program from the abstract to the concrete;
- A method to track program progress (a report card); and
- A measure of improvement needed in the program.
- A method to adjust adult escapement as fish access and production potential of habitat is restored.

The above actions and metrics along with importance, feasibility, and cost components, help inform future funding priorities to achieve specific goals. This contributes to policy discussions to prioritize funding to achieve specific goals. It is currently possible to report progress against the basin-level biological objectives that are stated in the Program. Establishing a consistent, transparent, reliable report using metrics to demonstrate progress of Program implementation is required to support true adaptive management at the basin-wide scale. The data currently exists to report against the objectives; however, the data management capacity and practices are not in place to support efficient, cost effective reporting.

Reference:

National Marine Fisheries Service (NMFS). 2013. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead. Prepared by the National Marine Fisheries Service, Northwest Region, June 2013.

5 Wildlife

5.1 Wildlife Impacts

Current Program: Page 22, Operational Losses

Recommendation: Clarify and define the different types of wildlife losses (Operational, Construction/Inundation and Secondary) in the Program Glossary. Construction and Inundation losses are losses associated with the initial construction and inundation of the hydrosystem and are mitigated at a 2:1 ratio. Operational impacts or losses are the ongoing impacts from

operation of the hydrosystem. Secondary losses are impacts resulting from the loss of marine derived nutrients due to the loss of anadromous fish.

Construction and Inundation Recommendation: Maintain Council's 2000 commitment to 2:1 crediting ratio for habitat units remaining at that time. Revise or remove language in section 6.a. regarding unresolved stacking issues negating 2:1 crediting. Outstanding stacking issues should be resolved rather than forgoing 2:1 crediting.

Rationale: BPA has worked to settle outstanding mitigation responsibilities throughout the Basin but the work is not yet complete. Until all parties agree that settlement has been reached, the Council must maintain the Habitat Evaluation Procedure (HEP) methodology as the currency to resolve outstanding mitigation.

Suggested language: Encourage Settlement Agreements

The Council strongly encourages settlement agreements for construction and inundation including transmission lines, operational and secondary impacts. Settlement agreements should include the elements in section 6.a. The 2011 Wildlife Crediting Forum Report documents the difficulty encountered trying to come to a collective agreement on the resolution of wildlife credit accounting. The crediting ledger can be used to help resolve or make clear some of the outstanding crediting issues. However, there are many technical and record keeping issues with the crediting ledger, in combination with unresolved policy and implementation issues, which makes complete resolution of the ledger challenging; settlement agreements could extinguish these issues.

Operational Impacts Measure: BPA should fund the agencies and tribes to complete operational impact assessments using methods that provide a systematic approach to characterize active physical and biological processes in watersheds that are impacted by the operation of the FCRPS.

In addition, assess and account for the ongoing impacts and losses from operating, maintaining and constructing transmission lines. Transmission lines are one of the more limiting factors to sage grouse and other shrub-steppe obligates. The limiting factors include impacts from the lineal transmission lines, associated roads, tower footprints and stations.

A framework for assessing operational impacts shall be in place by 2015 with assessments initiated that same year.

Rationale: Hydropower operational impact assessments are needed to determine the extent and directions of ecological alterations and to institute a standard, rigorous, transferable, and regionally accepted assessment methodology to describe and quantify ecological losses

attributable to the FCRPS. The 2009 Program stated that the Council, with F&W managers and BPA, will assess the value of committing program resources on direct operational impacts on wildlife habitat. The Council should use its Wildlife Advisory Committee to convene the wildlife managers and BPA to develop protocols for assessing operational impacts including the operation, maintenance and management of transmission lines. The WAC should develop/review accepted methods to assess impacts from operations (i.e., functional impairments from lost peak flows, erosion, trophic impacts, changes in species composition, and other impacts identified by Forum). Possible sources for information include recent ISRP reviews and the pilot project nearing completion in the Kootenai Subbasin. The goal of the forum should be to have regionally accepted protocols by 2015 and completed operational loss assessments by the completion of this 5-year Program.

Given the vision of this program, the strong scientific case for a more comprehensive, ecosystem-based approach, and the shift to implementation of this program through provincial and subbasin plans; wildlife mitigation projects should complement fish mitigation projects. Lands protected as part of fish mitigation may be credited to offset wildlife operational losses if the lands protect priority focal wildlife habitats.

Recommendation Relative to Secondary Impacts: BPA should fund assessments of ecological impacts to fish and wildlife from the consequences of inundation, construction and operation. For instance, fund an assessment of impacts to natal streams from the reduction or loss of anadromous fish. An assessment of impacts from transmission lines and associated infrastructure shall also be undertaken. The assessments need to evaluate an array of core ecological parameters (e.g., biological/biotic and physical/abiotic) with the understanding that habitats, communities, and processes are ecologically linked. The results of these assessments will be the basis for quantification of secondary impacts and subsequent mitigation obligation. Existing and future habitat actions implemented to benefit anadromous fish may be suitable mitigation and contribute towards crediting for some of these impacts.

5.2 Adequately Fund Wildlife Projects

Current Program: Pages 20-22, Wildlife Strategies

Measure: BPA shall fund existing projects at levels adequate to implement wildlife area management plans.

Rationale: Ecological condition must be maintained on wildlife areas over time. Funding of wildlife areas has been flat lined for years and current funding levels are not reflective of full implementation of management plans that maintain habitat credits or improve quality of

habitat to achieve mitigation value.. BPA will fund wildlife projects at levels determined to be consistent with the project management plans.

Funding must be sufficient for habitat maintenance and enhancement, and appropriate monitoring as agreed upon in the management plans and the monitoring scheme developed/referenced below. Where management plans are not in place, BPA will provide interim funding to manage the wildlife projects and complete the management plans. In addition, it is imperative that BPA fund restoration after catastrophic events like fire and flood to maintain habitat values and infrastructure.

5.3 Adequately Fund Wildlife M&E

Current Program: Pages 20-22, Wildlife Strategies, and Pages 24-26, Monitoring, Evaluation, Research, and Reporting Strategies

Measure: BPA shall fund adequate monitoring, data management, and reporting to answer the following points in an annual report to Council and the region -

- Clarify how many habitat units have been mitigated for FCRPS construction and inundation caused losses of wildlife.
- Identify how many of those habitat units are secured through long term funding.
- Document how wildlife species and habitats are responding to FCRPS mitigation actions.
- Clarify the FCRPS mitigation responsibility for wildlife operational impacts.
- Clarify the FCRPS mitigation responsibility for wildlife secondary impacts.
- Clarify the FCRPS mitigation responsibility for fish and wildlife impacts associated with construction, maintenance, and operation, of transmission lines and associated roads and substations.

Recommendation: The Council, through their Wildlife Advisory Committee, should identify and support specific reporting requirements for wildlife and wildlife projects for the Program.

Rationale: It is appropriate for BPA to adequately fund research, monitoring and evaluation of wildlife mitigation projects that ensure tracking of crediting, to evaluate trends in ecological functions of managed ecosystems, and provide managers the ability to assess the effectiveness of their mitigation strategies by evaluating species and habitat responses that contributes to broader monitoring efforts. BPA should continue funding HEP surveys on acquired land in support of the Wildlife Advisory Committee to track mitigation implementation progress.

In 2010, the Council chartered the Wildlife Crediting Forum to provide advice on the quantifying and accounting system (informally known as the Ledger) for the wildlife habitat mitigation credits associated with the construction and inundation impacts of the Federal Columbia River Power System (FCRPS) within the Columbia River Basin. The database that currently houses the Ledger is called Pisces (BPA project accounting and management program/software). The Forum consisted of wildlife co-managers representing the 14 tribes and 3 state fish and game departments (Oregon, Washington, Idaho) impacted by the FCRPS; and representatives of the

U.S. Fish and Wildlife Service (USFWS), BPA, and BPA Customers. The State of Montana was not a Forum participant, as wildlife mitigation issues relating to FCRPS losses from construction and inundation have been settled by prior agreement between BPA and that state.

Following the Wildlife Crediting Forum, the co-managers developed a working draft for a reporting framework called the Wildlife Monitoring Implementation Strategy based on three categories of HLIs as determined by the Council. Further work is required to fully develop a reporting mechanism for the Council's needs. The Council identified the following three categories of HLIs:

1) Habitat and Vegetation Types – several metrics would be reported for each cover type that represents status and trend in quality and quantity of the cover type, which can infer benefits to focal species or guilds. While this data is collected by individual wildlife projects within the Program, compilation and reporting will be required at a scale larger than any individual project. Reporting this information would require a designated project to perform the summary, analysis and reporting necessary to provide useful and timely indicators for Council reports.

2) Focal Species – several national/state level data sets could be used to represent relative status of wildlife species in this area. This level of data would be retrieved from national or state databases, and not from the individual projects; however, most of the data is initiated at the project level. Reporting this information would require a designated project to perform the summary, analysis and reporting necessary to provide useful and timely indicators for Council reports.

3) Habitat Units – the BPA HU ledger would continue to be reported as a measure of mitigation actions implemented specific to the Fish and Wildlife Program. The recent completion of the Wildlife Crediting Forum has provided a clean slate for reporting HUs at the project scale, a project may be needed to provide the high level summary of this information similar to the CBFWA Status of the Resource Report and website.

In developing the Wildlife Monitoring Implementation Strategy (WMIS), wildlife managers considered the following concepts:

- Scale integration: data collected can be used at multiple scales of interest for decisions
- Integration across separate monitoring programs: information gathered serves multiple functions and thus reduces costs
- Integration of policy and technical domains: precision of data fits time frames and acceptable risks for decisions
- Species integration: collection of data for multiple species in an efficient manner
- Adequate sample size: sample sizes are statistically adequate to discern differences among populations, across spatial distributions, and across temporal scales relative to varying human-induced and natural environmental stressors

Based on this effort, the wildlife managers are prepared to engage with the Council and BPA to develop biological and environmental performance objectives for the wildlife portion of the Program and establish an annual and five-year reporting process for evaluating implementation success.

6. Resident Fish

6.1 Address Management of Non-natives as Resident Fish Mitigation

Current Program: Page 22-23, Resident Fish Mitigation

Measure: BPA should fund efforts to address all primary limiting factors affecting resident fish including non-native species eradication and suppression and coordinate these efforts with companion efforts that protect anadromous fish from non-native species.

Rationale and proposed Program language to be added to Section 2 and/or Section 7 under Basinwide Strategies: "*The threat of non-native species increasingly complicates the protection, restoration, and enhancement of resident fish species throughout the basin. Competition, predation and hybridization by non-natives often reduces the effectiveness of habitat protection and restoration efforts for native fish populations. Funding should be directed to treat the problem, not the symptoms, including research to better understand food-web interactions. Where non-native species have been identified as a primary limiting factor in subbasin plans, increased effort and funding should be directed to eradicate or suppress non-native species in conjunction with the proven methods that benefit their habitats.*"

6.2 Define Resident Fish Substitution for Anadromous Fish Losses

Current Program: Page 23-24, Resident Fish Substitution Strategies

Recommendation: The Council should work with the fish and wildlife managers to provide a clearer definition of Program goals, objectives and methodology for addressing anadromous fish losses through resident fish substitution actions, in order to evaluate adequate implementation and effectiveness of this portion of the Program.

Measure: BPA should provide adequate funding for projects such that the following objectives are achieved:

- Restore native fish species (subspecies, stocks and populations) to near historic abundance throughout their historic ranges where original habitat conditions exist and where habitats and access can be feasibly restored.
- Take action to reintroduce anadromous fish into blocked areas, where feasible.
- Administer and increase opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild, and hatchery-reared stocks that are compatible

with the continued persistence of native resident fish species and their restoration to near historic abundance (included intensive fisheries within closed or isolated systems).

Rationale: A wide cross section of resident fish substitution projects, particularly in the basins where passage of anadromous adults and juveniles is currently blocked by FCRPS projects, have been implemented over time without a standard definition of program goals or a methodology for converting anadromous fish losses to resident fish substitution goals where in-kind mitigation projects are not currently possible to implement. Giving clearer Council guidance for these types of efforts seems timely, as these mitigation requirements of BPA have not yet been uniformly and systematically addressed.

The current Program (Sections II. D 7&8) describes both resident fish mitigation and substitution programs. Four principles were outlined for guiding decisions on mitigation strategies to address anadromous fish losses in blocked areas, including the concept of resident fish substitution programs (page 24). These principles range across a wide spectrum of options, from investigating the feasibility of anadromous fish passage, enhancing native resident fish, and where not possible to mitigate with enhancement of native resident fish (e.g., through consumptive and non-consumptive programs including hatchery programs) to finally considering focusing on non-native resident fish populations – guided by an environmental risk assessment template developed with assistance of the Independent Scientific Advisory Board (ISAB) and the current subbasin and basinwide objectives.

While these various types of mitigation programs have merit and may be suitable for a wide variety of geographic areas and environmental conditions, without a common currency for evaluating the extent of a program and establishing program goals and objectives that adequately address the value of anadromous fish that were lost due to the effects of construction and operation of the FCRPS that created the passage blockages initially, full and equitable mitigation for these losses will remain difficult to define.

6.3 Resident Fish Loss Assessments

Current Program: Page 22-23, Resident Fish Mitigation and Crediting

Measure: BPA should fund the Agencies and Tribes to develop a methodology and complete resident fish loss assessments. The selection of a method should be at the discretion of the entities involved in performing the survey; however, to standardize the process and ensure a consistent level of accuracy across the basin the Council should form a workgroup of resident fish managers to address this issue. A framework for assessing resident fish losses shall be in place by 2015 with assessments initiated that same year.

Rationale: The Northwest Power and Conservation Council's (Council) amended Fish and Wildlife Program (Program) provides for resident fish mitigation "where construction and inundation losses have been assessed and quantified by the appropriate agencies and tribes, mitigation should occur through the acquisition of appropriate interests in real property at a minimum ratio of 1:1 mitigation to lost distance or area." Despite the mitigation provisions, the Program does not prescribe specific methodology for the calculation of lost resident fish habitat due to construction and inundation. Because of this omission, resident fish managers (i.e., Columbia Basin Fish and Wildlife Authority's (CBFWA) members and non-members) in the Columbia River Basin, working through the CBFWA Resident Fish Advisory Committee (RFAC), developed a methodology to allow for the consistent quantification of inundated resident fish habitat (CBFWA Members Action Notes, October 7, 2009).

The CBFWA sent a letter on October 8, 2009 to the Council suggesting a recommended methodology to calculate the amount of resident fish habitat that has been inundated by the construction of the Federal Columbia River Power System. The inundation methodology could serve as the foundation for future identification of operational losses.

The Council should develop and adopt a standard methodology through a public process that includes independent science review and the participation of the resident fish managers throughout the Columbia River Basin.

7. Habitat

7.1 Prevent Establishment of Aquatic Invasive Species

Current Program: Page 18, Non-Native Species Strategies

Measure: In order to protect the FCRPS assets, the Program should direct the BPA to provide proportionate funding for aquatic invasive species management activities that are known or likely to be effective at stopping the invasion and spread of aquatic animal species such as zebra and quagga mussels, and invasive aquatic plants such as Eurasian milfoil and flowering rush and other emerging species of concern. Funding should be equally provided through the Program and Operations and Maintenance budgets from Power Operations within BPA. These activities include, but are not limited to, inspection and decontamination of aquatic conveyances used or moored in infested waters and then transported on our roadways in the region including dam equipment.

Recommendation: The Northwest Power and Conservation Council should continue to play a regional leadership role in working with stakeholder groups around the issue of aquatic invasive species management, particularly for those species that pose the greatest risk to the Columbia

River Basin ecosystem and industries. In particular, the Fish and Wildlife Program should include specific language supporting the work of the 100th Meridian Initiative Columbia River Basin Team, which is coordinated by the Pacific States Marine Fisheries Commission. This group has provided strong, successful leadership on invasive species prevention efforts in the region. We recommend the Council ask for regular reports from 100th Meridian Initiative Columbia River Basin Team on the following items:

1. Current efforts in managing aquatic conveyances for aquatic invasive species
2. Research priorities relative to managing water bodies for aquatic invasive species, especially for prevention and rapid response actions
3. Opportunities for collaboration and lessons learned

Rationale: The Council must shift its current BPA funds from population control research to aquatic invasive species prevention and management. It is imperative that the Region prevent further degradation of ecosystem function and to ensure protections for species recovery investments, water delivery infrastructure, and hydropower production from the potentially devastating impacts of invasive species, such as the infectious salmon anemia virus, zebra and quagga mussels, etc.. Our recommendations relate to increased funding for enhanced inspection and decontamination efforts in the region, stronger measures to prevent the inadvertent spread of aquatic invasive species resulting from habitat research and restoration activities, and maintaining the Council's leadership role as a key partner in the Columbia Basin for science, policy and outreach.

7.2 Integrate Climate Change

Current Program: Page 51 – 52, Climate change planning considerations

Measure: Develop a comprehensive strategic plan, built upon existing planning documents, to address the potential impacts of climate change on the entire system, including the estuary and the ocean and develop a suite of strategies within the amended Program and fund implementation of strategies. (ISAB 2013-1)

Recommendation 1: Review current restoration, fish passage barrier removal, or habitat projects to ensure their resiliency under predicted future climate scenarios to ensure that investments made today are effective into the future.

Recommendation 2: Require project proposals and management plans to consider the potential impact on project outcomes of climate change and its associated variability and uncertainty. (ISAB Program Review, March 7, 2013)

Recommendation 3: We recommend amending the Program to include the ISAB recommendations for addressing climate change (p 16, Independent Science Advisory Board

(ISAB) Review of the 2009 Columbia River Basin Fish and Wildlife Program. 2013 -1; March 7, 2013).

Rationale: Considerable efforts have been made in the Columbia Basin to develop, implement and evaluate strategies to protect and restore populations of salmon, Pacific lamprey, and resident fish and wildlife, but most of these efforts have generally not addressed climate change impacts and adaptation to these impacts. Climate change is expected to significantly alter the ecology and economy of the Pacific Northwest during the 21st century (Mantua et al. 2009; Schnorbus et al. 2011). Rising air temperatures and erratic changes in precipitation patterns are expected to decrease snowfall and increase rainfall during the winter months, leading to shifts in the timing and quantity of runoff, including increased flooding during the winter when water is already in ample supply, and decreased flows during the summer when water demands are high. These changes will have significant impacts for freshwater and marine fisheries, hydropower production, flood risk management and water supply for agriculture and municipal uses. The impacts from climate change affect fish and wildlife in a number of ways. Some examples include migration patterns being altered, spawning and rearing grounds degraded, dramatic increases in poor habitat and loss of water quality and the increase of predators, aquatic contaminants and invasive species (Mantua et al. 2010). Any of these factors could, if not addressed, lead to species extinction.

In addition, particularly in the summer, other human water uses will create intense competition for limited water supply and will thus tax fish populations that are already in a precarious status. Thus, the human dimensions of climate change must be integrated into consideration of climate change impacts and adaptation on basin ecosystem function (Miles et al. 1999).

7.3 Implement Predator Control

Current Program: Page 52, Piscivorous predator control

Measure 1: BPA should continue to implement annually the base piscivorous predator-control program and expand northern pikeminnow (*Ptychocheilus oregonensis*) removals to other mainstem dams in the lower Columbia River ie, expand program to include northern pikeminnow removals at McNary and Bonneville dams. The action agencies should evaluate the effectiveness of focused pikeminnow removals for these expanded efforts and implement as warranted.

Rationale: The construction and operation of the hydrosystem has altered historical habitats and have created habitats more suitable for native and non-native piscivorous fish species. Disorientated salmonids that pass over or through the hydrosystem are easy prey for native northern pikeminnow in dam tailraces. The northern pikeminnow angler reward program has been successful in reducing the prey rates on native salmonids, but public access in boat restricted zones at hydropower projects is not feasible. The Predator Control Program's dam

angling effort by contracted fishers should be expanded in all tailraces where elevated northern pikeminnow predation rates are known to occur.

- Predation by northern pikeminnow and their relative abundance are assessed annually throughout the lower Columbia and Snake rivers and continue to remain lower than those observed prior to the implementation of the Predator Control program
- To date, it is not evident that compensation in predation, growth, or reproduction by surviving northern pikeminnow, or by other resident fish predators has occurred system-wide in response to Predator Control program fisheries, however, continued implementation emphasizes the need for continued evaluation efforts to monitor piscivore community dynamics and locally occurring compensatory mechanisms.
- Relative abundance of smallmouth bass has nearly doubled in areas of John Day Reservoir in recent years and may indirectly influence juvenile salmonid predation. Competitive interactions with northern pikeminnow, which may shift their diets and habitat selection in the presence of smallmouth bass, could exacerbate juvenile salmonid predation
- From 1990-2012, Predator Control fisheries have harvested more than 4 million northern pikeminnow, with annual exploitation for fish $\geq$ 250 mm averaging 13.7% (range: 8.5–19.5%) since 1991. The minimum goal of 10% exploitation has been exceeded every year since 1998 with a mean of 17.2%. Modeling efforts to describe northern pikeminnow annual exploitation, while assuming all other variables are constant, suggest a reduction in median percent predation by northern pikeminnow on juvenile salmon of 28% to 40%, as compared to pre-program levels since 1996. On average, the reduction of slightly over 5 million consumption events (minimum, 1.6 million; maximum, 8.5 million) annually could be attributed to predator removals.

Measure 2: BPA (and action agencies) should work cooperatively with NOAA Fisheries, USFWS, states, tribes and the Council to develop and implement system wide strategies to manage and reduce non-native fishes that compete and feed on native fish in mainstem and in tributaries. This also applies to section II.D.2 Non-Native Species Strategies, page 18.

Rationale: The Program, as currently implemented by BPA, is anadromous fish centric should more strongly consider impacts to native resident fish. The program seems to call out or emphasize focus on several non-native species, but this focus should not de-emphasize the need to address other non-native species in the Basin that have an effect on native fish populations (ie. northern pike, white crappie, yellow perch, etc…).

- Non-native fish have significant impact to native resident fish species
- Northern pike have greatly reduced native fish populations in the Pend Oreille system

- Walleye and smallmouth bass have reduced native resident populations in Lake Roosevelt
- Relative abundance of smallmouth bass have nearly doubled in areas of John Day Reservoir in recent years and may indirectly influence juvenile salmonid predation
- Competitive interactions with northern pikeminnow, which may shift their diets and habitat selection in the presence of smallmouth bass, could exacerbate juvenile salmonid predation
- The decades of emphasis on northern pikeminnow control has narrowed piscivorous predation to a singular focus with very little emphasis on baseline studies on populations, habitat use, and diets in the mainstem and major tributaries
- White crappie predation on juvenile spring Chinook salmon in Lookout and Hills Creek reservoirs may significantly increase mortality rates
- Lake trout threaten bull trout and other native trout in areas where lake trout have been introduced into native trout habitat
- The Program should support, and BPA should fund, additional research into the overall magnitude of the impacts of non-native predators including abundance, diel and temporal distributions, and food web interactions in order to help guide improved management of non-natives.

7.4 Salmon Habitat Restoration Monitoring

Measure**:** Council will continue to fund restoration action effectiveness monitoring to understand the site-scale fish and habitat response. Council will increase funding for watershed-scale monitoring of fish and habitat to inform life-cycle models that identify survival bottlenecks, prioritize actions accordingly, and evaluate population-level responses to restoration actions.

Recommendation: Council should continue to articulate that the most central question for restoring salmon habitat is: "What is the population response to salmon habitat restoration and what are the most effective ways of prioritizing and evaluating restoration actions?" In areas of supplementation, an additional critical question is: "What are the effects of supplementation on freshwater productivity and capacity, and how do these effects interact with habitat restoration efforts?"

Rationale: Existing fish and habitat monitoring programs could be improved so that their products are directly applicable to multiple aspects of recovery and mitigation (e.g., habitat restoration, artificial propagation, life-cycle models, etc.). The utility of monitoring programs that do not contribute to the evaluation, adaptive management, or prioritization of restoration

or management actions that may benefit populations is minimal. New programs that are capable of answering many questions simultaneously at spatial and temporal scales that are relevant for recovery should be prioritized. Although these are long term commitments, they are essential to understanding the value of investment made by BPA and regional partners in a process that is also long term.

For instance, action effectiveness monitoring at the restoration project scale (i.e., site of treatment) is a cost effective way to deliver unbiased information about how the project affects local or site scale attributes such as changes in habitat and use by fish, but by itself, does not provide information about population level response, and is therefore an incomplete answer to the question. In other words project-scale effectiveness monitoring is not designed to answer the question "how is the population affected by restoration"? This question requires information at broader spatial, and longer temporal scales, than action effectiveness monitoring is designed to provide. Project effectiveness monitoring information should lead to project selection that benefits target species and life stages, but the most critical gap in project prioritization is identifying which life stages to target to achieve population recovery. This requires a different monitoring approach that broadens the spatial and temporal monitoring of fish populations such that survival and movement data can be used to focus restoration actions appropriately. Information from project-scale monitoring will compliment this information by identifying specific locations and appropriate project types within target areas.

This new approach monitors habitat conditions and the fish population throughout its freshwater life cycle in an attempt to understand what life stage is limiting and why and then link those pattern to aquatic habitat conditions. In addition to fish in/fish out monitoring, this approach requires monitoring of incubation survival, parr distribution and survival, and habitat affecting freshwater life stages. Additionally, some areas may require investigation of incubation survival if parr-to-smolt survival is adequate, but spawner-to-parr productivity is low. Population response monitoring should occur year-round with PIT technology and smolt traps, and at spatial scales that are relevant for quantifying population dynamics (e.g., assessment units). These population-scale monitoring data provide a framework for informing life-cycle models that identify survival bottlenecks, prioritize restoration actions, and evaluate population-level responses to restoration actions. Additionally, initiating spatially-continuous census surveys of aquatic habitat and fish would provide critical information for identifying restoration areas, quantifying changes in fish distribution associated with restoration actions and climate change, and population-specific data to develop fish-habitat relationships for modeling. Council should support the leveraging of existing projects and funding to ensure coordination between life cycle models, habitat monitoring and habitat restoration, and fish monitoring data including fish in/fish out data.

Understanding population level response from restoration actions must consider the combined effects of habitat actions and artificial propagation on listed populations. Where restoration actions coincide with artificial propagation either intentionally or unintentionally, it is critical that monitoring be established or expanded to determine what impact artificial propagation may be having on the population. The monitoring additions and modifications described above can also be used to address habitat use by hatchery- and wild-origin fish and the spatial and temporal overlap of hatchery- and wild-origin fish in freshwater habitats.

Suggested Language: The council will fund fish population monitoring designed to detect population-level responses to habitat restoration actions. The council will also fund habitat monitoring (eg., rivescape surveys, bathymetric LiDAR, etc.) that produces information about the distribution of priority habitats for restoration or protection, fish distribution, and the data needed to develop functional fish-habitat relationships to maximize the efficiency of restoration actions. The Council will continue to fund research to determine impacts of artificially propagated populations in areas of restoration. The spatially and temporally continuous monitoring of fish populations and their response to restoration is valuable for emerging life-cycle models as a means to identify life-stage-specific survival bottlenecks, prioritize restoration and management actions, and evaluate progress of listed populations towards recovery or extinction.

8. Renewable Energy Integration into the Fish and Wildlife Program

Measure: The Council should develop, and BPA should fund:

1) Programs and processes to evaluate the impacts on fish and wildlife resources of all renewable energy sources (past, proposed and potential) and associated transmission infrastructure which includes the impacts from electrical infrastructure;
2) A region-wide assessment of suitability for siting terrestrial and aquatic renewable energy projects, prioritize possible sites, and examine potential site-specific and the cumulative impacts to fish and wildlife of development throughout the region. The outputs from this analysis should include a map of priority power generation development sites and power generation and transmission line exclusion zones or protected areas, as was done for hydropower; (Using recent work by the Western Governors Association and The Nature Conservancy within Eastern WA as a template)
3) Explicit evaluation of transmission system expansion and its potential to impact fish and wildlife as part of development scenarios and assessments; and
4) Identification, assessment and analyses of appropriate fish and wildlife mitigation.

Rationale: The Northwest Power Act (Act) directs the Council to conduct regional planning for power generation[1] and for fish and wildlife, to mitigate for the impacts of the hydrosystem.[2]

In recent years power planning has increasingly emphasized renewable power sources (wind, solar, geothermal, wave, etc.).[3] However, renewable power planning has often failed to fully and adequately consider its effects on fish and wildlife.

Sound energy management— siting, design, construction, production, storage, transmission, conservation, and mitigation—includes development of a systemic and holistic vision of energy resources and their potential use. This vision must treat power generation and transmission as an integrated system that includes consideration of: temporal and geographic elements of power demands; all forms of energy production (hydro, wind, solar, wave, nuclear, geothermal, etc.); transmission siting and construction impacts; direct and indirect impacts to fish, wildlife, and their habitat.

The purpose of the proposed amendment to the Fish and Wildlife Program is to identify and highlight the issue of renewable power's fish and wildlife impacts. Draft amendment language aims to provide additional guidance and direction to the Council on how to address renewable power's fish and wildlife impacts and incorporate it into overall planning efforts.

For example, the amendment could mandate establishing areas protected from wind power generation and transmission line alignments, as was done for hydropower development.[4]

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[1] Section 839 contains the "Congressional declaration of purpose." Among the purposes is [Section 839(3)] "to provide for the participation and consultation of the Pacific Northwest States, local governments, consumers, customers, users of the Columbia River System (including Federal and State fish and wildlife agencies and appropriate Indian tribes), and the public at large within the region in . . . [Section 839(3)(B)] facilitating the orderly planning of the region's power system . . .." Northwest Power Act, §2(3)(B), 94 Stat. 2698.

[2] *See* Section 839(3)(A), specifying participation and consultation by regional parties in "the development of regional plans and programs related to energy conservation, renewable resources, other resources, and protecting, mitigating, and enhancing fish and wildlife resources." Northwest Power Act, §2(3)(A), 94 Stat. 2697. Regional plans are to fulfill the purpose of the Act "to protect, mitigate and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries, particularly anadromous fish which are of significant importance to the social and economic well-being of the Pacific Northwest and the Nation and which are dependent on suitable environmental conditions substantially obtainable from the management and operation of Federal Columbia River Power System and other power generating facilities on the Columbia River and its tributaries" Northwest Power Act, §2(6), 94 Stat. 2698 (Section 839(6)).

[3] *See* Section 839(1)(B), which identifies as a purpose "encourage[ing]" "the development of renewable resources within the Pacific Northwest." Northwest Power Act, §2(1)(B), 94 Stat. 2697.

[4] 2009 Program, Protected areas, page 15-16. "The Council has adopted a set of standards for the Federal Energy Regulatory Commission, Bonneville and other federal agencies to apply to the development and licensing of new hydroelectric facilities in the Columbia River Basin. As part of this effort, the Council designated certain river reaches in the basin as 'protected areas.' The Council found that new hydroelectric development in a designated

Initial steps to accomplish this could be studies that identify and characterize critically-important regional fish and wildlife resources likely to be affected by wind power projects.

Additionally, amendment language should require consideration wildlife and their habitat that are potentially at risk from impacts from wind and solar energy projects. It should also explicitly identify linkages between energy development and fish and wildlife life histories. For example, wave energy development might be identified as potential affecting anadromous fish, which already suffer from the effects of Columbia River mainstem and tributary energy projects.

The Northwest Power Act calls for the Council to facilitate the orderly planning and development of the region's power system including development of renewable resources within the Columbia River Basin, while protecting, mitigating and enhancing fish and wildlife resources. The power system includes the vast transmission grid that supports the efficient delivery of power to the region's ratepayers.

9. Species Specific Recommendations

9.1 Integration with Endangered Species Act

Current Program: Pages 3-4, The Program Framework, and throughout

The purpose of the Endangered Species Act is to conserve the ecosystems upon which endangered species and threatened species depend and to provide a program for the conservation of such species. Furthermore, the ESA states that it is a policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species. The ESA's purpose and policies are complementary to the Council's mandate to develop a program to protect, mitigate and enhance fish and wildlife, included related spawning grounds and habitat, on the Columbia River and its tributaries.

In anticipation of ESA recovery plans, co-managers, including NOAA Fisheries, worked with the Council and subbasin planners to ensure that subbasin plans provided a good foundation for ESA recovery. Thus, as ESA recovery plans emerged, they were built on the foundation of the

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protected area would have unacceptable risks of loss to fish and wildlife species of concern, their productive capacity, or their habitat. The Council expects the Federal Energy Regulatory Commission, in the exercise of its licensing authority under the Federal Power Act, to take the Council's protected areas decision into account to the fullest extent practicable. The Commission should implement the Council's decision in the Commission's licensing and exemption proceedings unless the Commission's legal responsibilities require otherwise. The Council also expects Bonneville not to acquire power from or provide transmission support for a new hydroelectric development in a manner inconsistent with the Council's designation of protected areas. The standards, and the conditions relating to that protection, are identified in Appendix B to this Program titled "Hydroelectric Development Conditions."

subbasin plans. The recovery plans were developed by local stakeholder groups including the fishery agencies and tribes, states, local governments and other federal agencies. The final plans include ESA goals as well as broad sense goals, priority limiting factors, priority actions and costs. These recovery plans provide important context and guidance for the Council's Fish and Wildlife Program and they should be explicitly incorporated into the Program. Following are specific recommendations.

Recommendation 1: Maintain the current language under Program Framework, page 4, expressed in the 2009 Program with modifications shown here in bold:
"…*That is, the Council's Program is designed to link to and accommodate the needs of other programs in the basin that affect fish and wildlife. This includes meeting the needs of the ESA by* ***~~describing the kinds of ecological change needed to improve the survival and productivity of the diverse fish and wildlife populations in the basin.~~ implementing the Program to be consistent with ESA regulatory findings in biological opinions and rulemakings; incorporating ESA recovery criteria into Program biological objectives; and incorporating ESA recovery plans, including implementation plans, into Basin-wide and subbasin management plans and multi-year action plans***."

Recommendation 2: Update the current language under Implementation and Performance, page 5, expressed in the 2009 Program with modifications shown here in bold:
"The Council comprehensively revised the Program in 2000 with the addition of the current program framework, added specific measures and objectives for the mainstem in 2003, and then developed and adopted the subbasin management plans into the Program in 2004-05. Together, these elements provide a coordinated and integrated plan for fish and wildlife actions across the basin. The federal, state, and tribal governments have been working since then with local partners to expand the subbasin plans into ESA recovery plans for areas of the basin that include ESA-listed populations. ***~~The Council is planning a subsequent amendment process in 2009-2010 to update the subbasin management plans and Program objectives to reflect these and other recent planning developments.~~ Many ESA recovery plans for salmon and steelhead are now complete. Those recovery plans used the 2004-05 subbasin plans and this cycle should continue, so the subbasin plans should now incorporate the final ESA recovery plans***."

Recommendation 3: The ISAB points out a concern that the subbasin planning process was a great idea that has been diminished by the lack of support or continued engagement of the original stakeholders in recent years. The ISAB also recommends that the Council reconsider a planning process that utilizes other existing structures and uses salmon and steelhead recovery domains as an example. The Council should implement the ISAB's recommendations for landscape and subbasin planning, including the need to actively encourage and support a mid-scale (perhaps Province-level which is close to the recovery domains) planning process that supports and utilizes and existing partnerships and organizations.

Recommendation 4: In addition to, and support of, the recommendations provided under Section 2.2 of this document for Biological Objectives, also:

- Adopt the ISAB's recommendation to make the Basin-wide objective of 5 million salmon and steelhead by 2025 more specific with respect to wild and hatchery fish.
- Adopt the ISAB's recommendation to develop productivity objectives that reflect differences among species and populations. Incorporate ESA recovery productivity objectives.
- Adopt the ISAB's recommendation to establish quantitative biodiversity objectives for focal species and habitats. Incorporate ESA biodiversity objectives.
- Add language that states: ***"The Council's Program incorporates the quantitative recovery criteria from ESA recovery plans. It also incorporates the more qualitative broad sense goals in some recovery plans that go beyond ESA delisting."***

Rationale: These recommendations encourage the Council to incorporate ESA goals and objectives for recovery and delisting of threatened and endangered species into the Fish and Wildlife Program. In most cases, ESA delisting is not an ultimate goal and Fish and Wildlife Program goals should exceed and be broader than achieving ESA delisting. However, for listed species, ESA delisting should be an intermediate step towards the Fish and Wildlife Program goals. At any rate, the Council should clarify that a) ESA recovery and delisting is consistent with Fish and Wildlife program goals and b) actions to achieve Fish and Wildlife Program goals should not impede ESA delisting.

Recommendation 5: Maintain the current language under Objectives for Environmental Characteristics, page 13, expressed in the 2009 Program with modifications shown here in bold:
"***~~Allow for biological diversity among and within populations and species~~ Promote the increase of biological diversity among and within populations*** *to increase ecological resilience to environmental variability."*

Recommendation 6: Maintain the current language under Basinwide Strategies, page 14, expressed in the 2009 Program with modifications shown here in bold:
"As discussed in the Program's Implementation Provisions (Section VIII), the Council will work with Bonneville, fish and wildlife managers, and others to develop multi-year action plans for all areas of the Program. ***The multi-year action plans will incorporate priority actions for recovering listed species as described in recovery plans and ESA recovery implementation plans.*** *The Council will work with Bonneville to ensure reasonable implementation of all multi-year action plans*."

Recommendation 7: Under Habitat Strategies, pages 14-15, add a strategy to **"*Establish and implement a consistent process for prioritizing habitat actions*."**

Recommendation 8: Maintain the current language under Habitat Protection and Improvement Activities to Address Biological Objectives, page 16, expressed in the 2009 Program with modifications shown here in bold:
"*Habitat work is intended to be consistent with the Program's biological objectives and also with measures contained in subbasin plans* ***and ESA recovery plans****.*"

Recommendation 9: Recovery plans are also a source for actions that address climate change and toxics. Maintain the current language under Emerging Habitat Issues, page 16, expressed in the 2009 Program with modifications shown here in bold:
"…Specific measures to deal with these emerging issues are included in the mainstem plan, ***recovery plans,*** *and in many of the subbasin plans."*

Recommendation 10: Address the reintroduction of extirpated populations in non-blocked areas above Bonneville Dam. Under Artificial Production Strategies, page 18, maintain the current language with the following modifications shown here in bold:
"*3) to replace lost salmon and steelhead in blocked* ***and unblocked*** *areas.*"

Recommendation 11: In addition to subbasin plans, recovery plans also contain hatchery actions to rebuild natural runs. Under Artificial Production Strategies, page 19, at the end of the second sentence under "*d. Restoration*" insert "***and recovery plans***."

Recommendation 12: Under Updating Existing Subbasin Management Plans, page 58, insert "***A number of recovery plans have been completed. The subbasin management plans will be updated by 2014 to explicitly incorporate final recovery plans. For additional recovery plans completed after 2014, the Council will accept recommendations to incorporate those plans in the appropriate subbasin plans.*****"**

Recommendation 13: Under Implementation Provisions, page 59, it is important to adhere to the statement that, "*The Council will use the procedures in this section to integrate Bonneville funding for this Program with Endangered Species Act requirements, including the Endangered Species Act mandate for Federal agencies to carry out programs for the conservation of endangered and threatened species."*

Recommendation 14: Under Appendix E: Subbasin and Basinwide Measures, add to Columbia Gorge Province the Mid-Columbia Steelhead Recovery plan and the Lower Columbia Salmon and Steelhead Recovery Plan.

9.2 Lamprey

Current Program: various sections

Recommendation 1: Edit third bullet under *Habitat* on Page 7 to read: "*Ocean conditions should be considered in evaluating freshwater habitat management and to understand all stages of the salmon, steelhead* ***and Pacific lamprey*** *life cycles.*"

Recommendation 2: Insert new second paragraph under *Anadromous Fish Losses* on Page 11 as follows: "***No comparable analysis exists for Pacific lamprey; however, it is apparent that losses have been substantial. The Council recognizes and supports efforts to restore Pacific***

lamprey numbers, including adoption of the Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin and the USFWS Pacific Lamprey Conservation Agreement into the Fish and Wildlife Program. Restoration of Pacific lamprey numbers and directed mitigation for hydrosystem lamprey losses should incorporate actions recommended in these plans."

Recommendation 3: Insert new bullet under *Anadromous Fish Losses* on Page 11as follows:
"Continue restoration of Pacific lamprey by (1) restoring lamprey passage and habitat in the mainstem and in tributaries that historically supported spawning lamprey populations, (2) continuing efforts to translocate adult Pacific lamprey to appropriate areas to reduce upstream passage losses, and (3) evaluating artificial propagation as a way to mitigate for lost lamprey production when passage and habitat improvements alone are insufficient. Attain self-sustaining and harvestable populations of lamprey throughout their historic range."

Recommendation 4: Revise second bullet under *Objectives for Environmental Characteristics* on Page 13 to read: "*Protect, enhance, restore, and connect freshwater habitat in the Columbia River mainstem and tributaries for the life history stages of naturally spawning anadromous and resident salmonids* ***and Pacific lamprey****."*

Recommendation 5: Revise fourth paragraph under *Habitat Strategies* on Page 14 to read: "*For example, passage through the hydrosystem causes loss to salmon, steelhead, lamprey and resident fish. Measures at the dams can and should be taken to reduce this loss. As an offset for hydrosystem-caused losses, the Program* ***~~may also~~ calls*** *for improvements in spawning and rearing habitats in tributaries, the lower river, and estuary. By restoring these habitats, which were not damaged by the hydrosystem, the Program helps to compensate for the existence of the hydrosystem.****"***

Recommendation 6: Insert new section ***g. Pacific Lamprey Production*** on Page 19:
"The Council recognizes progress in the development of a Framework for Pacific Lamprey Supplementation Research in the Columbia River Basin. Translocation efforts have been successful at increasing adult spawning activity, larval recruitment, and larval distribution and have provided important Pacific lamprey life history information. Current and future translocation actions should be guided by the lessons learned from ongoing efforts.

It is not likely that fragmented, isolated or non-existent lamprey groups within the Columbia River Basin will naturally recolonize the upper portions of their range given the paucity of adult returns and numerous threats, including the existing mainstem environment. Therefore, the long-term restoration of Columbia River Basin lamprey may require the structured release of artificially propagated lamprey in priority areas to achieve a variety of management and conservation objectives.

- ***Continue development and implementation of lamprey translocation in accordance with state and tribal guidelines as a component of a regional recovery plan***
- ***Evaluate the role of lamprey artificial propagation as a research tool and for supplementation of local groups"***

Recommendation 7: Add sentence to opening paragraph for *Primary Strategy* on Page 31 as follows: "*Identify the effects of ocean conditions on anadromous fish survival and use this information to evaluate and adjust inland actions.* ***This should include evaluating the effects of ocean harvest on Pacific lamprey food resources*****.**"

Recommendation 8: Revise *Manage for Variability* on Page 31 to include Pacific Lamprey in the text.

Recommendation 9: Revise third bullet under *Estuary Strategies* on Page 32 to include Pacific Lamprey.

Recommendation 10: Revise first paragraph under *Vision of the Mainstem Plan* on page 35 as follows: "*…especially spawning, rearing, resting, migration,* ***and over-wintering habitats*** *for salmon, steelhead, lamprey, sturgeon, and resident fish populations."*

Recommendation 11: Revise second bullet under *2. Specific Objectives…* on Page 36 to read: "*Protect, enhance, restore and connect freshwater habitat in the mainstem for the life history stages of naturally spawning anadromous and resident salmonids* ***and lamprey****. Protect and enhance ecological connectivity between aquatic areas, riparian zones, floodplains, and uplands in the mainstem."*

Recommendation 12: Revise third bullet under "*Migration and passage conditions for anadromous fish*" on Page 38 as follows: "*The Council will consult with ...to determine the possibility of adopting hydrosystem survival performance standards for non-listed populations of anadromous fish including lamprey.* ***Efforts should be implemented to adopt an interim passage standard for adult Pacific lamprey of 80% per mainstem dam to be accomplished within 10 years and to improve passage further in subsequent years."***

Recommendation 13: Revise final bullet under *Water Quality* on Page 44 as follows: "*Implementing actions to reduce toxic contaminants in the water to meet state, tribal and federal water quality standards. The federal action agencies should partner with and support federal, tribal, state, and regional agencies' efforts to monitor toxic contaminants in the mainstem Columbia and Snake rivers and evaluate whether these toxic contaminants adversely affect anadromous or resident fish important to this Program. If so, implement actions to reduce these toxic contaminants or their effects if doing so will provide survival benefits for fish in mitigation of adverse effects caused by the hydropower system. In particular, investigate whether exposure to toxics in the mainstem, combined with the stress associated with dam passage, leave juvenile salmon* ***and adult and juvenile lamprey*** *more susceptible to disease and result in increased mortality or reduced productivity."*

Recommendation 14: Revise introductory text under *Lamprey and Sturgeon Passage*, *a. Lamprey*, on Page 47 to read: "***In recent years awareness of the effects of the hydrosystem on***

lamprey has increased, and the need for substantial additional effort addressing lamprey has become an emerging issue. *In the Columbia River Basin…. (retain entire existing paragraph).*

Artificial propagation needs to be evaluated as a tool for restoring lamprey and mitigating for losses. Development of life-cycle and bioenergetics models will help identify critical limiting factors and prioritize recovery actions. Budgets and staffing must be adequate to monitor the effects of actions taken to address lamprey issues."

Recommendation 15: Revise/add bullets under *Lamprey* on Page 47 as follows: "*Bonneville and the Corps, in coordination with federal, state, and tribal fish managers and the Council, should* ~~***implement the following measures to improve adult and juvenile Pacific lamprey passage survival and reduce delays in migration***~~ ***identify, develop, implement, and monitor measures to help restore Pacific lamprey including****:*

- ~~***Identify***~~ *Specific fish passage structures* ***for adult and juvenile lamprey***
- ***Research and identify appropriate and effective screening for water diversions***
- ***Regional approaches to evaluate passage, abundance, distribution, and population structure, including the mainstem Columbia, Snake and Willamette rivers***
- ***Develop tags suitable for adult and juvenile lamprey and a regional lamprey tagging forum***
- ***Develop a regional strategy for monitoring passage into tributaries to better understand differences in counts of adult lamprey between dams***
- ***Increase knowledge regarding the use of the mainstem as spawning habitat***
- *Identify operations at mainstem hydropower dams* ***such as ramping rates and water elevation changes*** *that delay, obstruct, or kill migrating* ***adult and juvenile*** *lamprey*
- ***Monitor and address effects of hydrosystem operations on juvenile lamprey residing in reservoirs***
- *Develop and implement* ~~***lamprey***~~ *passage aids* ***for adult and juvenile lamprey*** *at known passage obstacles*
- *Monitor lamprey passage at mainstem hydropower dams to evaluate passage improvement actions and to identify additional passage problem areas,*
- *Assess lamprey passage efficiency, direct mortality, and/or other metrics relating to migratory success of lamprey*~~***, and***~~
- *Determine predation on* ***adult and juvenile*** *lamprey during* ~~***mainstem passage***~~ ***migration***
- ***Determine the potential effects of climate change on lampreys, including the effects of increasing water temperatures and changing runoff regimes on lamprey energetics and performance. Develop adaptation strategies to address these affects, and***
- ***Support the USFWS Pacific Lamprey Conservation Agreement through collaborative development and management of data."***

Recommendation 16: Revise text under *Reintroduction of Anadromous Fish in Blocked Areas* on Page 56 as follows: *"….evaluate the feasibility of salmon, steelhead,* ***and Pacific lamprey*** *reintroduction, consistent with the objectives in the appropriate subbasin plans."*

Recommendation 17: Revise first paragraph under *Updating Existing Subbasin Management Plans* on Page 58 as follows: "*The Council recognizes that work has continued in some subbasins to refine and update management plans. The Council also recognizes that work has continued outside the Program, such as recovery planning, and the* ***Tribal Pacific Lamprey Restoration Plan****, that will influence implementation of the Council's Program at the subbasin level. The Council recognizes the objectives and recommended actions of the Tribal Pacific Lamprey Restoration Plan as updates to subbasin plans."*

9.3 White Sturgeon

Current Program: Page 12, 39, 41, 43, 47-49, 53, and 55

Measure: BPA should adequately fund sturgeon recovery and the recommendations from the Council's Columbia Basin White Sturgeon Planning Framework (NPCC 2013).

Recommendation 1: The Program should consolidate measures intended to address sturgeon restoration into set of strategies in the Mainstem Plan. Incorporate recommendations of Oregon's Lower Columbia River and Oregon Coast White Sturgeon Conservation Plan (ODFW 2011) and the Council's Columbia Basin White Sturgeon Planning Framework into the Program. The Framework should be identified as a Program appendix on White Sturgeon.

Rationale: White sturgeon are widely recognized as iconic mainstem fish species severely affected by construction and operation of the hydrosystem (ISAB 2013, NPCC 2013, ISAB programmatic review, Kootenai and select Zone 6 sturgeon reports 1995 and 2012). About "4% ($9.5 million) of annual direct Fish and Wildlife Program expenditures of $246 million in 2012 were dedicated to white sturgeon. Kootenai sturgeon projects account for the majority of sturgeon-related expenditures ($6.5 million). The remainder is distributed among one general and six accord projects" (NPCC 2013). The Council's Fish and Wildlife Program accounts for just a portion of total expenditures within the basin to restore white sturgeon populations. Four non-FCRPS hydropower entities, Idaho Power Company, Grant PUD, Chelan PUD, and Douglas PUD, fund substantial white sturgeon restoration programs within the reaches impacted by their hydropower projects.

"Of all fish species in the Basin, the status of white sturgeon is most strongly tied to conditions in the mainstem, which are directly affected by the hydrosystem. The white sturgeon has declined greatly in abundance throughout most of the Columbia Basin. Only the population segment below Bonneville Dam still shows substantial natural recruitment, despite the fact that it is affected by hydrosystem operations at all dams upstream. It is anticipated that diminished natural recruitment will be a major factor influencing sturgeon status and the sustainability of harvest fisheries. Natural recruitment of sturgeon is potentially affected by hydrosystem operations directly, through blocked passage or inundation of preferred spawning areas, and indirectly, through the effects of water flow, water temperature and sediment release on spawning timing and recruitment success. In addition, recently documented predation on adult

sturgeon by Steller sea lions just below the Bonneville Dam may threaten that population (ISAB 2013)"

In response to a Council request, sturgeon project sponsors recently completed a basin-wide framework plan for white sturgeon that synthesizes existing information and recommends actions to address limiting factors and information gaps. Strategic recommendations should be incorporated in to the mainstem plan as a sturgeon chapter. After ISRP review, the framework should be adopted into the Program.

Recommended Draft Language: Insert the following text into the *Mainstem Plan as Strategies for White Sturgeon:*

"The Program supports a vision of abundant and diverse white sturgeon populations and optimum sustainable fisheries throughout the historical range, achieved by a combination of natural production and careful supplementation, and supported through an adaptive, collaborative, coordinated, science-based mitigation, management, monitoring, and evaluation program to be achieved over the coming 50 years. Seven basic elements are incorporated into this vision: sustainability; natural production; biological characteristics; an inclusive program scope; effective monitoring, research, and evaluation; and rebuilding/mitigation.

To date, the Council has supported sturgeon program efforts that have effectively documented biology, status and limiting factors throughout the region. White sturgeon distribution, abundance, and productivity throughout the Columbia and Snake River basins are severely limited by habitat changes, particularly those associated with hydropower system construction and operation. Large areas of suitable sturgeon habitat remain throughout most of the historical range upstream from Bonneville Dam but use is currently limited by widespread passage limitations and natural recruitment problems that are the direct and/or indirect result of the development and operation of the Columbia River hydrosystem. The Council endorses additional work that contributes to conservation, recovery or mitigation goals identified in the Columbia Basin White Sturgeon Planning Framework (NPCC 2013).

Strategies to achieve the sturgeon vision include:

- *Operate the FCRPS to provide operations consistent with normative river conditions, including increased spring and summer flows and spill. Recruitment in many impounded areas has been positively correlated with high annual discharge April—July. Sturgeon are expected to benefit from court-ordered dam operational measures being implemented for salmon and steelhead.*
- *Continue to utilize and adaptively manage conservation hatchery programs as interim measures to avoid extinction of unique sturgeon populations.*
- *Hatchery production of sturgeon can be an appropriate mitigation strategy to supplement populations where natural recruitment is currently limited. This strategy should: (1) Be conservative and responsible in establishing protocols for source populations and numbers of hatchery fish released; (2) Build on knowledge gained from ongoing hatchery efforts in other areas; (3) Utilize experimental hatchery releases and*

monitoring to assess ecological factors and population productivity limitations; and (4) Optimize hatchery production and practices consistent with monitoring natural production and environmental carrying capacity which will most effectively be identified using an experimentally adaptive approach.

- *Some opportunities for sturgeon passage improvements exist but benefits are likely to be limited by habitat-related natural recruitment problems in most areas. Passage strategies for white sturgeon should include: (1) Detailed evaluations of costs, benefits and risks of passage improvements relative to other potential strategies; (2) Consideration of opportunities to incorporate sturgeon-friendly features in existing fish ladders during future ladder designs and planned modification where consistent with sturgeon population goals and objectives; (3) Opportunities for non-volitional passage by taking advantage of fish trapped in dewater draft tubes or fish ladders during maintenance; and (4) Continued review of protocols used to prevent fish stranding/mortality during planned maintenance activities at passage facilities.*
- *Investigate the use of site-specific habitat measures such as substrate enhancement and channel restoration as viable alternatives for improving natural recruitment in some areas.*
- *Support fishery monitoring and management in combination with the suite of other restoration options to mitigate for lost productivity and contribute to population rebuilding efforts. A better understanding is needed as to how areas will be determined to warrant harvest, where existing sturgeon sub-populations may be exhibiting depressed population recruitment as a result of hydro operation related limiting factors.*
- *Manage marine mammals to reduce predation of white sturgeon downstream of Bonneville Dam.*
- *Operate the hydrosystem to reduce mortality on white sturgeon. Develop an operational protocol to block access to turbine draft tubes during turbine dewatering and other maintenance operations to minimize white sturgeon entrainment, dewatering, and mortality.*
- *Conduct dredging operations in a manner minimizing operation-related mortality on white sturgeon.*
- *Conduct research that addresses critical white sturgeon uncertainties identified in the Columbia Basin White Sturgeon Planning Framework.*
- *Monitor and evaluate mitigative white sturgeon restoration actions, and population responses to environmental condition consistent with the Columbia Basin White Sturgeon Planning Framework."*
- *Assess the effects of climate change on basin sturgeon populations and develop adaptation strategies to address these impacts.*

Recommendation 2: The Council should incorporate ISAB recommendations for addressing hydrosystem impacts on Upper Columbia River White Sturgeon:

- Develop a credible white sturgeon habitat model for the UCR to quantify habitat throughout the year in conjunction with mainstem hydrosystem operations

- Identify the specific aspects of hydrosystem operations, such as duration of fluctuations in water releases and of water levels, that affect natural spawning, reproduction, growth and survival of larval and juvenile fishes, and overall recruitment success of white sturgeon in the UCR
- Investigate the potential impacts of trace element contamination of UCR sediments on the quality of critical white sturgeon habitat throughout the UCR from Lake Roosevelt upstream to the International Border.

Rationale: White Sturgeon in the Upper Columbia River (UCR) are a considered a 'Species at Risk' by the Canadian federal government, are a species of active research for the Washington Department of Fish and Wildlife (WDFW), and are the focus of a recent update to the UCR White Sturgeon Recovery Plan developed by US and Canada entities. That plan highlights a number of issues as contributing to poor white sturgeon populations and greatly diminished natural recruitment, including but not limited to, habitat diversity, flow regulation, water temperature, water clarity, total dissolved gas (TDG), contaminants, food availability, fish community alteration, predation, exploitation and incidental catch. Selected topics have benefited from recent studies by USGS, US EPA, WDFW, and the Colville and Spokane Tribes, but issues such as habitat diversity, flow regulation effects, temperature and elevated trace-element concentrations in bed sediments are in need of research. Specific to the UCR, the physical habitat for various life stages of white sturgeon have not been characterized or quantified, nor has the potential for trace-element contaminants to compromise critical habitats.

The amount, distribution and complexity of benthic substrates in Lake Roosevelt are currently unknown. Various life stages of white sturgeon are known to utilize and benefit from particular habitat types in the lower Columbia River, but similar understanding is not available for the UCR. Proper characterization of habitat availability would benefit fisheries managers in estimating what a sustainable population size should be. Substrate size, location and complexity (as substrate diversity) are key variables currently lacking characterization. Recent additions of detailed bathymetry of the Lake Roosevelt pool and lower portions of the UCR provided by US Bureau of Reclamation, and LiDAR (light detection and ranging) are key tools ready for application in developing a white sturgeon habitat model.

Superimposed on a habitat model for the UCR are the multiple lines of evidence that indicate trace element contamination in the sediments of the UCR may be a critical habitat stressor to the reproductive success of white sturgeon in the reach between Lake Roosevelt and the International Border. Preliminary evidence suggest that hydrosystem controlled conditions in the mainstem river play a controlling factor on exposure of white sturgeon to dissolved trace elements mobilized from river bed sediments.

Flow regulation has likely contributed to poor spawning and early-rearing success of white sturgeon in the upper Columbia River. Increased storage in the upper basin and hydro system operation have generally eliminated floods, reduced spring flows, and increased late summer through winter discharges. Recruitment of juvenile sturgeon has been widely correlated with

spring flow volume. White sturgeon depend on riverine habitats and seasonal floods to provide suitable spawning conditions. Flow for larval dispersal may be a limiting factor.

ISAB (Independent Scientific Advisory Board). 2013. Review of the 2009 Columbia River Basin Fish and Wildlife Program. Northwest Power and Conservation Council Report ISAB 2013-1.

NPCC (Northwest Power and Conservation Council). 2013. Columbia Basin White Sturgeon Planning Framework: February 2013 draft. Prepared for the Northwest Power and Planning Council, Portland, Oregon.

ODFW. 2011. Lower Columbia River and Oregon Coast White Sturgeon Conservation Plan. Oregon Department of Fish and Wildlife Ocean Salmon and Columbia River Program. Clackamas, Oregon.

9.4 Eulachon

Current Program: Lower Columbia Subbasin Plan (1 paragraph on Page 2-18)

Recommendation: Include measurable eulachon objectives in the Fish and Wildlife Program.

Measures: BPA should fund protection, mitigation and enhancement of eulachon through the following measures:

- Develop biological objectives for eulachon that are consistent with recovery.
- Monitor and evaluate eulachon abundance in the Columbia River Basin via annual spawning stock biomass surveys following protocols developed by the Washington Department of Fish and Wildlife and acoustic estimates by NOAA - NWFSC.
- Monitor and evaluate the causal mechanisms and migration/behavior characteristics affecting survival of larval eulachon during their first weeks in the Columbia River estuary, plume, and ocean environments.
- Monitor and evaluate the ecological importance of the tidal freshwater, estuary, plume, and nearshore ocean environments to the viability and recovery of eulachon in the Columbia River Basin.
- Develop an oceanographic indicators ecosystem conditions model to determine the significance of plume and nearshore ocean conditions that affect eulachon survival.
- Adjust the timing, magnitude, and frequency of hydrosystem flows (especially spring freshets) entering the estuary and plume to better reflect the natural hydrologic cycle, improve access to habitats, and provide better transport of coarse sediments and nutrients in the estuary and plume if these are found to be limiting to eulachon life history.

1. *To address changes in the hydrograph of the Columbia River on eulachon productivity and abundance, the Council should:*

- Monitor eulachon abundance in the Columbia River via annual spawning stock biomass surveys.
- Link biological data to river discharge.

2. *To address changes in the hydrograph of the Columbia River and adverse effects to eulachon egg and larvae survival in the Columbia River and Columbia River plume, the Council should:*

- Monitor and evaluate temporal and spatial species composition, abundance, and foraging rates of juvenile eulachon predators at representative locations in the estuary and plume.
- Monitor and evaluate the causal mechanisms and migration/behavior characteristics affecting survival of larval eulachon during their first weeks in the plume/ocean.
- Investigate the ecological importance of the tidal freshwater, estuary, plume, and nearshore ocean environments to the viability and recovery of eulachon in the Columbia River Basin.
- Investigate the causal mechanisms and migration/behavior characteristics affecting survival of larval eulachon during their first weeks in the plume/ocean.
- Develop a hydrodynamic numerical model for the estuary and plume to support critical uncertainties investigations.
- Operate the FCRPS to more closely approximate the shape of the natural hydrograph and to enhance flows and water quality to improve larval survival in the plume and ocean environments.

3. *To address passage-related adverse effects at Bonneville Dam, the Council should:*

- Monitor and report numbers of adult eulachon observed in samples from the Juvenile Bypass System and observed in the Adult Fish Passage System.

Rationale:
The Program currently does not address eulachon, an anadromous fish native to the Columbia River, and a species listed as threatened under the Endangered Species Act. This species has been heavily impacted by changes to the lower mainstem and estuary caused by construction and operation of the hydropower system. Substantial changes to flow, sediment delivery and the food web in the lower river have been well documented.

These measures are needed to address uncertainties regarding the effect of changes in the Columbia River hydrograph on survival, productivity and recovery potential of eulachon. As the Northwest Power Act directs the Council to develop a program to protect, mitigate, and

enhance fish and wildlife in the basin affected by the development, operation, and management of hydroelectric projects, the Council should update the Program to include eulachon and develop biological objectives for this species. As eulachon are listed as a threatened species under the Endangered Species Act, NOAA is in the process of developing a recovery plan, and has prepared a Federal Recovery Outline for eulachon that includes recovery tasks as part of a preliminary recovery strategy. The recommended measures are consistent with NOAA's Federal Recovery Outline for eulachon. Recovery of ESA-listed species is consistent with the Program's goals and objectives. Furthermore, measures adopted by the Council and funded by BPA to assist in the recovery of listed species affected by the development, operation, and management of hydroelectric projects is consistent with the Northwest Power Act and the Program.

10. Data Management

Current Program: Pages 24-26, Monitoring, Evaluation, Research, and Reporting

10.1 Support Data Management for Regional Reporting

Recommendation**:** Separate monitoring and evaluation from research in the Fish and Wildlife Program. Fund synthesis of long term data sets to understand change over time.

Measure 1: BPA should fund adequate data management projects with the agencies and tribes to support regional reporting requirements for evaluation of Program activities that are additional to the agencies' and tribes' routine data management activities. There are data specifically collected, managed, and analyzed due to the existence and operation of the FCRPS and its impact on fish and wildlife.

Measure 2: BPA should fund adequate reporting at the Council level to provide annual, and periodic, reporting of Program actions and effectiveness which supports Program scale adaptive management.

Rationale: The Council, tribal, state and federal natural resource managers agree that an information feedback process is required to inform management decisions about the use of fish and wildlife resources. Often this feedback process is characterized as "Adaptive Management," but this activity has not been funded or implemented.

A clear set of measurable biological objectives at various scales within the Program (high level indicators) could provide a top-down monitoring framework with which to guide data management infrastructure. A plan and process for reporting against those objectives could serve as an adaptive management tool for evaluating success of strategies and actions within the Program at each level.

A critical part of an adaptive management process is the collection, storage and analysis, and presentation of information about natural resources in a way that is useful to decision makers.

Yet this critical activity has received little recognition and even less support in the Fish and Wildlife Program. The following actions are needed to rectify this oversight:

- Restructure and simplify the Program to provide Goals, Measurable Objectives, Strategies and Measures at the Basinwide, Province and Subbasin scale. All measures should be linked back to specific measurable objectives. The goals and objectives should then guide the development of a data management framework to support specific annual, bi-annual, and five year reporting requirements;
- Use a Regional Coordination forum including BPA, Council, tribal, state, and federal resource managers, and data management leaders to develop and review regional restoration progress reports, discuss options to improve reporting, and provide policy guidance for data management efforts;
- Use the StreamNet and Pacific Northwest Aquatic Monitoring Partnership (PNAMP) forums for development of the technical issues and tools necessary for coordinated data management. Extend this forum over time to include wildlife and terrestrial habitat data and other key sources of fish and wildlife related data sources (especially the Corps and LSRCP, but others such as the USFS, BLM, BOR, NRCPs, etc.);
- Use the updated F&W Program as the starting point for developing a coordinated data management system based on explicit reporting requirements adopted by the Council.
- Expand the Coordinated Assessment Project effort (under StreamNet and PNAMP) to develop data standards and sharing processes for derived data to support ESA and Fish and Wildlife Program reporting needs;
- Incorporate concepts consistent with the Council staff Draft Guidance for Information Management, Evaluation and Reporting; and
- Incorporate concepts consistent with the Council staff Draft Guidance for a Balanced and Coordinated Approach for Conducting Monitoring and Research Activities.

10.2 Coordinated Assessments Monitoring and Reporting

Current Program: Pages 24-26, Monitoring, Evaluation, Research, and Reporting Strategies

Measure 1: The Council should adopt and BPA should fund full implementation of the Coordinated Assessments project to **report** on the indicators of natural origin spawners (NOR), smolt to adult return (SAR), adult to adult recruitment (AAR), and juveniles per spawner (JpS) for Columbia River salmon and steelhead populations.

Measure 2: BPA should fund expansion of the Coordinated Assessments project to include indicators for resident fish and wildlife.

Rationale: Approximately 78 million dollars are spent annually on anadromous monitoring in the Columbia Basin. This information is used to determine a population status and trend, effectiveness of habitat restoration, and for many other purposes. A variety of anadromous population data has been collected across various life stages and is reported by individual project sponsors in their annual reports. While this reporting is valuable at the project reporting scale, it is difficult to synthesize for reporting at the larger geographic scales such as

the population, subbasin, province, major population, DPS/ESU, or Columbia Basin scales. In addition, there are many possible indicators that could be used for reporting. In 2010, fisheries agencies and tribes started the Coordinated Assessments (CA) project to standardize indicators for reporting across spatial scales and a data exchange standard to facilitate the associated data sharing. This was followed up with a pilot project that successfully demonstrated the proof of concept for this project. The CA project has now moved to the implementation phase, which includes modifying and developing new agency databases for storing raw and summarized data, analysis tools, and reporting databases. The agreed upon CA indicators track specific life stage survival and/or abundance of salmon and steelhead to provide the information needed for adaptive management process in the Columbia Basin and provide the necessary data for the FCRPS BiOP. These are the key indicators used for population status and trend analysis and for NOAA to determine population status under the ESA. The Program should continue to support this successful effort and expand the CA process to develop data sharing standards for resident fish and wildlife data.

10.3 Research Plan

Recommendation**:** Develop a Fish and Wildlife Program Research Plan that prioritizes high priority research needs, critical uncertainties, and knowledge gaps. To be effective, this plan needs to engage both technical experts and policy makers.

Measure: Fund research needs separate from M&E needs and funding. Develop a model that encourages completing research projects with clear reporting requirements and that encourages new projects to be developed. The establishment of a rotating research fund for projects would assist the Region in moving from the current approach to a new model.

Rationale: The current F&W Program is based on a combined Research, Monitoring, and Evaluation (RME) program from Monitoring Evaluation Research and Reporting (MERR) Plan. The current F&W Program supports routine monitoring for tracking implementation measures, status and trends of species and limiting factors, and project effectiveness. While it is important to monitor, it is also very important to address uncertainties and knowledge gaps through science-based research. Splitting research and monitoring/evaluation may lead to better focus on addressing critical uncertainties that delay or postpone management decisions, and better allow accountability of research funding. In addition, research hypothesis should connect to Fish and Wildlife Program and tie directing to outstanding policy questions or concerns.

In addition to recognizing research in the program, the Council created the Ocean and Plume Science and Management Forum to engage researchers and fisheries managers to better understand the in river management applications of ocean research and identify future research priorities. One of the proposed products for this forum is to develop and recommend to the Council a prioritized list of studies to address the management questions to inform future needs. A natural place for this information is the Council's Research Plan.

Suggested Language**:** Maintain current language with emphasis on the use of science/management forums to establish research priorities.

The Council shall establish a process to address current concerns that research projects lack a sunset or a date by which the research must report on results. The Council shall develop a rotating research fund to encourage the completion of projects and the generation of new projects to find answers to management questions outstanding in the current Fish and Wildlife Program. Review current projects for opportunities to expand certain elements to address critical uncertainties.

Research: The Council, in collaboration with the parties listed above, will identify research priorities to resolve critical ecosystem or biological uncertainties through the use of science/management forums or other outreach programs. Research will focus on those areas where, in a reasonable amount of time, results could be generated or tools developed to better inform management decisions and to more efficiently deploy Program mitigation resources.

Research plan: The Council, with assistance from tribal and state managers, will update its research plan within one year of adoption of this program, which identifies major research topics and establishes priorities for research funding.

11. Hanford Reach/mainstem and estuary, spawning, rearing, and resting habitat.

Current program: page 48.

Recommendation 1: Change title to Columbia River mainstem and estuary, spawning, rearing, and resting habitat.

Recommendation 2. Maintain the language regarding the Vernita Bar agreement to protect the spawning and rearing habitat for Hanford Reach fall Chinook salmon and extend the language to include protection of chum salmon spawning in the maintsem Columbia River below Bonneville Dam.

Rationale: The Vernita Bar agreement has help protect the largest naturally spawning fall Chinook salmon population in the Columbia River and based on this success the agreement should be continued and recognized in the Councils program. Recent water regulation below Bonneville Dam by BPA, NOAA, fisheries agencies and tribes needed to be maintained to protect chum salmon spawning in the mainstem Columbia River.

12. Strongholds

Current Program: page 15.

Recommendation: Maintain 2009 language regarding strongholds.

Rationale: Strongholds refer to spatial areas where the performance of naturally spawning populations are stronger than other populations. Maintaining these populations is often more cost-effective than restoration. Thus maintaining strongholds emphasizes preservation of habitat and fish populations sustained by natural production.

13. Artificial Production

Current Program: page 19

Recommendation**:** Adopt the HSRG recommendations to clearly define hatchery goals, and metrics to assess hatchery performance. Adopt language from ISRP 2011 Retrospective Report to include but not limited to:

1. For supplementation programs include BACI design (supplemented versus unsupplemented populations) for abundance and productivity controlling for carrying capacity and spawner abundance (i.e., density dependence)

2. Determine if life stage specific density dependence is limiting the success of hatchery supplementation programs. If so, correct limiting factors.

Measure: Fund CRHEET to establish basin wide monitoring and evaluation standards to include effectiveness monitoring.

Rationale**:** Congress initiated the Columbia River Hatchery Reform Project in 2006. Part of that project is a Hatchery Scientific Review Group (HSRG) established to review hatchery and wild stocks and determine ways to improve management practices to meet conservation goals while providing for sustainable fisheries. The hatchery review process encompassed all anadromous hatchery programs in the Columbia River Basin and was completed by the HSRG in 2009. In the 2009 F& W Program indicated "the Council will consider adoption of the HSRG recommendations into the Program when completed."

In November 2009, the Washington Fish and Wildlife Commission adopted a series of measures for hatchery reform. Many of these were based on the HSRG reviews. Specifically, the first Policy Guideline adopted by the Washington Fish and Wildlife Commission was "Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated by the Department. In particular, promote the achievement of hatchery goals through adaptive management based on a structured monitoring, evaluation, and research program."

Suggested Language (Page 19): We recommend the Council adopt the same language as WDFW adopted for HSRG guidelines. "*Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated in the Columbia Basin. In particular, promote the achievement of hatchery goals through adaptive management based on a structured monitoring, evaluation, and research program.*"

13.2 Hatchery Effectiveness Monitoring

Current Program Location**:** Artificial Production Strategies, page 19

Measure: Provide funding to measure hatchery effectiveness through monitoring.

Rationale**:** Currently, many millions of dollars are spent annually on hatcheries in the Columbia Basin to mitigate for losses cause by the FCRPS and it is important for the Council to track the effectiveness of hatchery programs. Hatcheries and individual hatchery programs in the Columbia River have been reviewed by NOAA through the Columbia Basin Hatchery Environmental Impact Statement and Hatchery Genetic Management Plans, the Hatchery Science Review Group, and Independent Science Review Panel. In addition, the Council has developed an Artificial Production Review (ARP) Process (NPCC 1999). The NPCC (2004) judged a hatchery program to be successful if it met the following conditions: 1) it must produce a healthy and viable hatchery population; 2) it must make a sustainable contribution of adult returns to conservation and/or harvest; 2) its potential effects on wild and native populations and the environment must be understood, and 4) it must collect, record, evaluate, and disseminate information pertaining to the first three conditions so that decision-makers may be informed about the benefits and risks of the program relative to other means of achieving similar conservation and harvest goals.

While it is the responsibility of hatchery operators and funders to develop specific hatchery goals, the purpose of this amendment is to develop interim indicators that provide measures hatchery performance for the Council's role in hatchery oversight and to meet its reporting requirements. The minimum reporting indicators for successful hatcheries are 1) the number of juveniles released by life stage, and 2) the components of total adult hatchery production, which include the number of hatchery adults returning to the hatchery, spawning in rivers, and caught in fisheries as these can be used to assess the conservation and harvest benefits of all hatchery programs. In addition, to compiling this information in a report (see Roler 2012 for an example of total adult production report), we recommend a reporting database for these hatchery indicators be funded possibly through StreamNet.

Recommended Language: This should be a new bullet **f.** under Artificial Production Strategies.

f. *"The Council should adopt and BPA should fund hatchery effectiveness monitoring and reporting for Columbia Basin hatcheries. The minimum reporting indicators for successful hatcheries to meet the Council's APR are: 1) the number of juveniles released by life stage, and*

2) the components of total adult hatchery production, which include the number of hatchery adults returning to the hatchery, spawning in rivers, and caught in fisheries. These indictors can be used to assess the conservation and/or harvest benefits common of all hatchery programs. In addition to compiling this information for reporting, we also recommend a reporting database for these hatchery indicators be developed and funded to allow tracking of hatchery performance."

Northwest Power Planning Council. 1999. Artificial Production Review. Council document 99-15, Northwest Power Planning Council, Portland, OR.

Northwest Power Planning Council. 2004. Artificial Production Review: Final Basin Level Report. Council document 2004-17, Northwest Power Planning Council, Portland, OR.

Roler, R., and E. Olk. 2012. Annual Coded-Wire-Tag Program, Washington: missing production groups annual report for 2010. Washington Department of Fish and Wildlife. Prepared for Bonneville Power Administration. Project No. 1982-013-04, Contract No. 55548.

14. Fully Incorporate Estuary, Plume and Nearshore Ocean in Program

Current Program: various sections

Recommendation 1: Add language to the *Scientific Principles*, pages 9 and 10:

- *The Columbia River ecosystem includes the estuary, plume, and near shore ocean environments.*
- *Salmon, steelhead, lamprey, sturgeon and eulachon accommodate ocean mortality and environmental variability by having life histories that have a sufficient level of productivity and a wide range of biological diversity (i.e., resiliency).*

Recommendation 2: Add language to *Plume and Nearshore Ocean Strategies*, page 31. Retain the *Ocean strategies* and add:

- To Primary strategy, "*It is important to continue basic monitoring over time to increase understanding of the estuary, plume and nearshore ocean's role in anadromous fish survival and to have both baseline and real time information that can assist inland management decisions*."
- Add "*Ocean Strategy 3 - Identify the effects of ocean conditions on anadromous fish survival and use this information to evaluate and adjust inland management actions*."

Recommendation 3: Insert the following language into the Fish and Wildlife Program: *"Management of the Columbia River Basin hydropower system directly affects the ocean environment primarily in two ways: 1) it changes the natural hydrograph by development of the hydro-system, and changes estuary and plume habitats along with the timing and quantity of natural flows; and 2) the releases of large numbers of hatchery fish from Columbia River hatcheries may trigger density dependent effects in the estuary, plume and ocean."*

Measure 1: Fund a collaborative forum of scientists and managers to: 1) identify key management questions related to the estuary, plume, and nearshore ocean environments: 2) identify what research and monitoring has already been done that addresses these management questions; 3) identify ongoing baseline monitoring and research priorities; 4) identify opportunities for information sharing between scientists and managers and 5) recommend to the Council ways to improve the utility and in-river freshwater resource management benefits of both ongoing and proposed ocean, estuary and plume research conducted under the Program.

Rationale: Regional coordination between researchers and Columbia Basin managers is necessary for sharing information and for developing scientifically sound recommendations on monitoring and research priorities that can inform management actions. This forum can help with addressing the following additional measures.

Measure 2: Consider the complete anadromous fish life cycle and critical habitat needs, including the estuary, plume and nearshore ocean when making management decisions. Integrate the effects of future climate change into these decisions and develop adaptation strategies to address these effects.

Rationale: It is important to have a basic understanding of ocean survival in order to better understand freshwater survival and eventual adult returns. Understanding how, where and which anadromous fish experience both growth and mortality in the ocean can provide insights to freshwater management and can test commonly held assumptions about the river conditions for fish. For example, if a particular stock is demonstrating strong abundance, is it due to freshwater habitat restoration actions or specific ocean conditions? A thorough evaluation of the success of freshwater management actions (e.g., freshwater habitat improvements) requires that we know the effects of the ocean on Columbia River anadromous fish. This is consistent with the first Fish and Wildlife Program principle mentioned above; i.e., that the Council views the Columbia River ecosystem to include the estuary, plume, and nearshore ocean environments.

Measure 3: Optimize forecasts of adult returns.

Rationale: Through ocean research, project sponsors have begun to use ocean data to improve forecasting of adult returns. Fisheries managers have several methods for forecasting adult returns (e.g., age structure models, stock-recruit models, ocean indicators). Research has demonstrated that ocean condition indicators can provide helpful information that can be utilized to improve run forecasting accuracy. Forecasting of adult returns can be utilized to trigger conservation actions, set broodstock collection expectations and harvest seasons. In river forecasters typically use a sibling regression for forecasting annual adult returns. Until about ten years ago, this methodology was reasonably accurate for Chinook salmon. Recently, however, this methodology has not been very reliable. Researchers believe that changes in the age structure (age at maturation) of Chinook salmon may be behind the change. Managers are beginning to utilize other methods, often in combination, to more accurately predict adult run

size. The NOAA and DFO ocean indicators (stop light chart and multivariate analysis), developed and populated with data from the two ocean research projects, are being used to further salmon run forecasting.

Measure 4: Explore and implement adaptive management experiments to improve survival of anadromous fish.

Rationale: The Council has been interested for some time in ways in which managers can use the results of the ocean research to change/alter freshwater habitat and production management to improve overall survival. It has been suggested that there may be applications such as changing the timing of hatchery releases or changing migration methods (transport and in-river) to take advantage of optimal plume or ocean conditions and subsequently, to improve survival for these fish. Presently hatchery fish release timing is set by hatchery managers that are considering water temperature, readiness of the fish to migrate and to take advantage of in river flow. It is unclear, however, if potential management strategies are realistic or practical and if the potential survival benefits would outweigh other risks. Further discussions are warranted between researchers and freshwater fisheries and hatchery managers to explore the practical potential of these concepts. There are specific experiments that can be conducted using individual hatcheries that are already investigating variable release timing. Stock-specific information about growth and survival in the ocean should be better linked to stock management in the freshwater.

Measure 5: Continue to research direct and indirect effects of anthropogenic freshwater management on marine ecological attributes affecting anadromous fish habitat, life histories and productivity.

Rationale: Management of the Columbia River Basin hydropower system directly affects the ocean environment by changes in the natural hydrograph and ecological processes caused by development and operation of the hydro-system, and through changes to the estuary and plume habitats due to the timing, quantity and quality of river flows. There is much more to be learned about how to improve conditions and thus survival for anadromous fish in the estuary and plume.

Measure 6: The Program should address the uncertainty regarding the effectiveness of estuarine restoration projects and different types of habitat and whether they contribute to increased juvenile survival and hence increased adult returns.

Rationale: The primary critical uncertainty regarding estuarine restoration projects and different types of habitat is whether they contribute to increased juvenile survival and hence increased adult returns. Good estimates of residence time in rearing habitat, and the quantity and quality of the habitat that will likely influence survival, are generally lacking. Also, how fish move between rearing habitats and the importance of habitat connectivity and spatial distribution are poorly understood. Along these lines, a general understanding of the quantity of available habitat, quality of fish habitat, how fish use them, and how they are distributed

throughout the migration and rearing reaches of the Lower Columbia River and estuary are not well known. Another critical uncertainty is to identify status and trends of the ecosystem processes in the lower Columbia River and estuary to better understand the ecosystems processes and the effects on restoration and mitigation efforts.

Measure 7: Research is needed on forage fish in the lower estuary and nearshore area. The Fish and Wildlife Program should promote projects on forage fish in the lower estuary and nearshore area through the following measures:

- Identify spawning and rearing life history attributes of forage fish in the estuary
- Determine the role of forage fish as alternate prey for birds in the lower estuary
- Elucidate the role eulachon may have as an alternative prey for sea lions
- Determine how restoration projects in the estuary may contribute to reproductive success and rearing of forage fish
- Identify the relation between Columbia River flow and forage fish abundance in the estuary
- Identify role forage fish have in survival of juvenile Chinook salmon, coho, and steelhead
- Determine how climate change, ocean acidification, salinity, estuary turbidity maximum (ETM), and localized hypoxia are likely to affect forage fish in the coming decades

Rationale: The proposed amendment will update the Program to reflect a move toward ecosystem management approach to provide salmon with their total life cycle needs including an adequate food web to support growth and improve survival. Forage fish in the lower estuary include a broad group of species including surf smelt, Pacific sand lance, Pacific herring, eulachon, and juvenile American shad. These species have diverse reproductive strategies but all species can occur in the lower estuary during their life histories. For example, surf smelt and Pacific sand lance may use beaches for spawning while Pacific herring may spawn on nearshore macro-algae. Eulachon and American shad are anadromous and can produce large numbers of juveniles that disperse downstream and enter the estuary. The Fish and Wildlife Program places an emphasis on salmon restoration and forage fish are a major link between habitat and environmental conditions and the survival of salmon.

15. Protected Areas

Recommendation 1: Maintain the integrity and structure of the Protected Areas Program, protecting fish and wildlife as designated, both in and outside of the Columbia River Basin.

Rationale: Protected Areas were established to protect the most sensitive fish and wildlife habitat from the significant impacts of hydropower development and save time, energy and resources due to the controversy involved in siting hydropower projects in these sensitive

areas. The program is succeeding in meeting its goal, and continues to be consistent with providing an adequate, efficient, economical, and reliable power supply.

Recommendation 2**:** Strengthen exemption standards to ensure "exceptional benefits to fish and wildlife".

Recommendation 3: We recommend that the Council automatically send a letter to hydropower developers shortly after they receive a preliminary permit from FERC for a project proposed to be located in a Protected Area. The letter will notify the permittee that their project is located in a Protected Area, outline what Protected Areas are and what the implications are from FERC and BPA.

Rationale: Protected Areas were established to reduce the lengthy battles over proposed development of dams in sensitive areas and reduce the costs associated with these contentious debates. While the Protected Areas program has succeeded overall in this goal, lengthy and resource intensive processes continue to be carried out when a developer receives a preliminary permit from FERC for a project in a Protected Area. Currently, permittees are required to contact the Council, among a long list of tasks that they are required to undertake. Many developers are unaware of the implications of attempting to build in a Protected Area, and invest a great deal of resources into their projects before realizing that they are unlikely to receive a final permit from FERC and that they will be unable to connect to the BPA system. State agencies and the public likewise invest a great deal of resources in these proceedings. A proactive letter from the Council will further help to reduce controversy and save resources.

Recommendation: Reinstate language regarding exemptions for Protected Areas that was found in the 1995 Fish and Wildlife Program.

Rational**:** When the Council adopted the Protected Areas in 1988 (as amendment to the 1987 Fish and Wildlife Program), it included a provision allowing parties to petition the Council for an exception to a protected area designation for a project with exceptional fish and wildlife benefits. (Protected Areas Amendments and Response to Comments, Council Document No. 1988-22) The exception ended up as Section 1300(g) of the Program, and stayed in the Program through the 1994-95 version, as Section 13.1E.4 to 13.1E.6. It was subsequently dropped from the 2009 Program.

Suggested Language:

> *"Petitions for exceptions to protected areas:*
>
> *1) Any party may file a petition with the Council for an exception to a protected areas designation for a project with exceptional fish and wildlife benefits.*
>
> *2) Before filing a petition with the Council, the petitioner must notify the appropriate state agency and consult with that agency regarding the petition for exception.*

3) Petitions must contain the following:

a) The location of the affected river reach, including the reach number as listed in the Council's protected areas data base.

b) A statement of the facts showing the anticipated benefits and the anticipated detriments of the project.

c) An explanation of how the project will affect the Council's plan and program. Or. If outside the Columbia Basin, how the project will affect the plan or relevant state and tribal comprehensive plans.

d) An explanation of how the petitioner has determined that the project will achieve exceptional fish and wildlife benefits.

e) A summary of consultations the petitioner has had with relevant fish and wildlife agencies and Indian tribes regarding the petition, and the responses of the agencies and tribes."

16. Columbia Basin Water Transaction Program

Not in current Program

Measure: Ensure adequate funding to evaluate the biological effectiveness of water transactions.

Rationale: The Columbia Basin Water Transactions Program works with qualified local and state program partners who join with irrigation districts, landowners, producers and others on projects to enhance stream flows. There is currently funding for monitoring through the WA Department of Ecology which needs to be maintained to ensure that the investments made in water transactions are resulting in ecological improvements to the system.