United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181

September 17, 2013

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

Dear Chairman Bradbury:

Attached are comments and recommendations from the U. S. Fish and Wildlife Service for consideration as the Northwest Power and Conservation Council develops the 2014 Columbia Basin Fish and Wildlife Program. We support continuation of the current form and function of the Program that includes the recommendations from the State and Federal fish and wildlife managers and the Native American Tribes in the Columbia Basin; the use of the best available science; adaptive management; sub-basin plans; independent science review; a comprehensive program for research, monitoring and evaluation; fiscal accountability; and public involvement.

We are providing specific recommendations for issues and species that have received increased management attention since the current Program was completed in 2009. This includes Pacific lamprey conservation, bull trout, white sturgeon management, preventing the introduction of aquatic invasive species, the Comparative Survival Study, migratory birds, renewable energy integration, Protected Areas, and the feasibility of anadromous fish re-introduction into blocked areas.

While we encourage the Council to consider our comments and recommendation as they develop the Fish and Wildlife Program, we also believe the collective comments and recommendations from all the Federal and State fish and wildlife managers and Tribes in the Columbia Basin provide a comprehensive foundation on which the Council should develop the draft Program.

Thank you for the opportunity to provide comments, and we look forward to working with the Council as you develop the 2014 version of the Columbia Basin Fish and Wildlife Program.

Sincerely,

/s/ Richard Hannan

Acting Regional Director

U.S. Fish and Wildlife Service comments and recommendations for the Northwest Power and Conservation Council's Columbia Basin Fish and Wildlife Program

General Comments and Recommendations

Under the 1980 Pacific Northwest Electric Power Planning and Conservation Act, Congress charged the Northwest Power and Conservation Council (Council) with developing, and periodically amending, a Fish and Wildlife Program (Program) for the Columbia River Basin. The purpose is to outline a program to protect, mitigate and enhance fish and wildlife affected by the development and operation of hydroelectric facilities, while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply. The Council adopted the current version of the Program in 2009, which consists of the program framework; basinwide objectives and strategies; provisions relevant to the mainstem, estuary, ocean, and subbasins; and implementation guidelines. Also part of the Program are the subbasin plans for nearly 60 tributaries and mainstem reaches adopted in 2004-05 and 2010-11.

The Northwest Power Act (NWPA) requires the Council to request recommendations to amend the Fish and Wildlife Program at least every five years. This is done prior to the development of the Council's Power Plan. Once completed, the Fish and Wildlife Program is adopted into the Power Plan. The Fish and Wildlife Program and the Power Plan become the blueprint for how the Pacific Northwest will protect, mitigate, and enhance fish and wildlife resources while also assuring the Pacific Northwest continues to have adequate, efficient, economic, and reliable power system. Further, the NWPA requires all recommendations be accompanied by information that supports the recommendations.

The U.S. Fish and Wildlife Service has strongly supported the Council's Fish and Wildlife Program since its inception in 1982. We have participated in its development and implementation; and we look forward to working with the Council in the coming months as they develop the next iteration of the Program. Attached are comments and recommendations for consideration as the Council develops the Program. In general, we support continuation of the current form and function of the Program that includes the recommendations from the State, Tribal, and Federal fish and wildlife managers, the use of the best available science, adaptive management, subbasin plans, independent science review, a comprehensive program for research, monitoring and evaluation (RME), fiscal accountability, and public involvement.

We are also providing specific recommendations for issues and species that received increased management attention since the current Program was completed (2009). This includes Pacific lamprey conservation, bull trout, white sturgeon management, preventing the introduction of aquatic invasive species, the Comparative Survival Study, migratory birds, renewable energy integration, and the feasibility of re-introducing anadromous fish into blocked areas of the Columbia Basin.

We encourage the Council to consider our comments and recommendation as they develop the Program. However, we also believe the collective recommendations from all the Federal and State fish and wildlife managers and Native American Tribes in the Columbia Basin provide a comprehensive foundation on which the Council should develop the draft Program. We believe this is consistent with the requirements of the Northwest Power Act for the Fish and Wildlife Program.

Role of the Council's Fish and Wildlife Program

We recognize that thousands of actions are being taken, and millions of dollars are being spent, every year in the Columbia Basin to help restore Pacific salmon and other species of fish and wildlife affected by hydropower development. The extent of this regional effort is truly monumental. Although the actions, accomplishments, and funding for this effort represents one of the largest ecosystem restoration programs anywhere in the country, collectively these actions and activities are not expected to recover Pacific salmon stocks in the Columbia Basin to the extent they can be removed from the list of threatened and endangered species.

Fortunately, the Northwest Power Act created the Northwest Power and Conservation Council and mandated the development of the Fish and Wildlife Program. It's the Fish and Wildlife Program, in concert with the ESA Recovery Plans, which are developed by the National Marine Fisheries Service, that will lead to recovery. We believe the Program can point the way to ensuring healthy and harvestable stocks of fish and wildlife, including Pacific salmon, long into the future.

Specific Comments and Recommendations

For our comments under the Pacific Lamprey and Bull Trout sections, the existing language in the 2009 Fish and Wildlife Program are written in italics. Our suggested language is written in underlined italics and/or strikeouts. Recommendations for the Section C-Biological Objectives and Section D – Mainstem Strategies are all new. We recommend they be added to the Program.

Pacific Lamprey

Recommendations for the 2009 NPCC Fish & Wildlife Amendments - primarily for Sections for Biological Objectives, Basinwide Strategies, and Mainstem Strategies.

The Pacific Lamprey Conservation Initiative is the strategy of the U.S. Fish and Wildlife Service to improve the status of Pacific lamprey throughout their U.S. range. In cooperation with tribes, Federal, state, local agencies and other entities, a range wide assessment of Pacific lamprey (Pacific lamprey (*Entosphenus tridentatus*) Assessment and Template for Conservation Measures) was completed by the USFWS (Luzier et al. 2011). Other plans such as CRITFC's Tribal Pacific Lamprey Restoration Plan for the

Columbia River Basin (CRITFC 2011) and the USACE 10 Year Passage Plan for Pacific Lamprey (USACE 2009) are incorporated into the Conservation Initiative.

As part of the Initiative, a Conservation Agreement was signed in 2012 that encourages partners to cooperate to conserve Pacific lamprey (USFWS 2012). The goal of the Agreement is to achieve long term persistence and support traditional tribal cultural use of Pacific lamprey throughout their range. It provides a mechanism for interested parties to collaborate and pool available resources to expeditiously and effectively implement research and conservation actions that reduce or eliminate threats to Pacific lamprey to the greatest extent possible.

Our recommendations for Pacific lamprey are based on: 1) needs identified by partners under the Conservation Initiative/Agreement; 2) needs identified through regional consensus in various forums; 3) best management practices; and 4) technical guidance from the Columbia River Basin Lamprey Technical Workgroup. Critical needs that have been identified are: 1) restoration of passage for juvenile Pacific lamprey in the mainstem Columbia and Snake and tributaries; 2) restoration of passage for adult Pacific lamprey in the mainstem Columbia and Snake and tributaries; 3) data gaps in Pacific lamprey occupancy and distribution and the creation of a shared data clearinghouse; 4) research and implementation of artificial propagation for Pacific lamprey; 5) life history modeling; and 6) using best management practices to reduce impact of stream disturbing activities on all stages of lamprey. We also suggest that references to lamprey conservation plans and the species of lamprey be added to lists of anadromous fish in all sections of the Fish and Wildlife program.

Following are the U. S. Fish and Wildlife Service's recommendations for the next iteration of the Program.

Juvenile Lamprey Passage

The Corps sponsored a series of regional workshops for juvenile (macropthalmia) and larval (ammocoetes) lamprey passage and survival in 2011 and 2012. Regional partners (State, Federal and Tribal) prioritized the research needs for juvenile and larval lamprey passage and survival. The top three research needs were identified.

Recommendation

We recommend the Council support these research needs and add the following text as a bullet under C. Biological Objectives, 2. Specific Objectives and Performance Standards for Habitat Characteristics and for Population Performance, b. Migration and passage conditions for anadromous fish, page 39.

> *The Council recognizes the need to improve passage and survival of juvenile and larval Pacific lamprey migrating through the mainstem and advises the Corps and Bonneville, in coordination with Federal, State, and Tribal fish managers to ensure the rigorous collection of data needed to answer the following uncertainties of juvenile and larval lamprey passage.*

- *Determine spatial distribution (vertical and horizontal) of juvenile Pacific lamprey in forebays of mainstem Columbia and Snake River dams*
- *Complete a systematic investigation of juvenile bypass systems (JBS) impacts on juvenile Pacific lamprey at the lower Columbia and Snake River dams.*
- *Determine timing and magnitude of Pacific lamprey macrophthalmia outmigration at mainstem Columbia and Snake River dams.*

Adult Lamprey Passage

The Pacific Lamprey Conservation Agreement and the Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin identifies achieving substantive successful improvements in dam passage efficiencies and survival of primary importance. The Columbia River Basin Lamprey Technical Workgroup identified lamprey passage improvement at hydropower dams as the highest priority. The need to develop better aids to passage and a more complete understanding of passage problems through the FCRPS has become critical. A systematic ladder and entranceway evaluation survey, integrated with biological information and a stage-based model to evaluate lamprey passage at each FCRPS project is needed.

Recommendation

We recommend the Council support this work by adding the following text after the bullets under Lamprey and Sturgeon Passage, a. Lamprey on page 47.

The need to develop better aids to passage and a more complete understanding of passage problems through the FCRPS has become critical. A systematic ladder and entranceway evaluation survey, integrated with biological information and a stage-based model to evaluate lamprey passage at each FCRPS project should be completed.

- *Complete a systematic ladder and entranceway evaluation survey of all eight of the lower Columbia and Snake River FCRPS projects*
- *Develop a database with lamprey biological information and physical characteristics of ladders and entranceways by specific hydroelectric project that is easily accessible to all regional managers*
- *Integrate a stage-based model approach with lamprey biological information and physical characteristics of ladders and entranceways to evaluate and prioritize needs for regional lamprey passage improvements*

Recommendation

Revise the 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.

Distribution Monitoring and Evaluation

Many needs have been identified by regional co-managers for Pacific lamprey, and among the most critical is the need to fill in data gaps in Pacific lamprey occupancy and distribution and the creation of a shared data clearinghouse. Partners in most regions have started contributing to the collection of distribution and occupancy data but many areas with no data still exist. Some co-managers are currently working with the Columbia River Basin Lamprey Technical Workgroup and all partners to develop standardized sampling techniques for collection of this data. Regional workshops would facilitate development and training of standardized sampling techniques to ensure consistent and transferable information across the range of Pacific lamprey.

The co-managers have identified the development of a comprehensive GIS data clearing house as a critical tool for meeting conservation goals. It should include all mainstem and tributary lamprey data and would be accessible by the co-managers and the public. The data clearinghouse will be built on a GIS framework including demographics, threats, and conservation actions at both watershed and landscape scales.

Recommendation

We recommend the Council support this by adding the following text at the end of the section *Lamprey and Sturgeon Passage, a. Lamprey* on page 47.

Many needs have been identified by regional co-managers for Pacific lamprey, and among the most critical are the need to fill in data gaps in Pacific lamprey occupancy and distribution and the creation of a shared data clearinghouse.

The Council asks the Corps and BPA to fully support the following:

- *Conduct occupancy and distribution surveys in basins identified through the Pacific lamprey Conservation Initiative (i.e., basins where distribution is unknown). Surveys should use a statistically rigorous probabilistic design.*
- *Conduct workshops for regional partners to provide guidance on the sampling methodology and study design for occupancy and distribution surveys. A series of workshops should be held to blanket the geographical range of Pacific lamprey in the Pacific Northwest.*
- *Develop a data clearinghouse for Pacific lamprey based on a GIS framework containing occupancy and distribution, threat information, demographics and needed actions. This geographic framework should be WEB based and available to partners.*

Artificial Propagation of Pacific lamprey

Although information on Pacific lamprey abundance and distribution is limited, there is evidence (e.g. dam counts) that some segments of the Columbia Basin contain only remnants of historical numbers,

particularly in interior basins. While other management efforts may eventually improve lamprey productivity in the long term, more immediate efforts, such as the use of conservation aquaculture, may be needed to supplement natural production in specific areas in the interim. There is also a need for captive brood stock for research.

Recommendation

We recommend the Council support this by inserting new bullet under *Anadromous Fish Losses* on Page 11 as 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

Inserting a new section h. Pacific Lamprey Artificial Production on Page 19:

> *It is not likely that fragmented or isolated lamprey groups within the Columbia River Basin will naturally recolonize the upper portions of their range given the lack of adults and numerous threats, including the existing mainstem environment. Therefore, the long-term restoration of Pacific lamprey in the Columbia River Basin 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 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 lamprey in tributaries*

Recommendation

Revising 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 passage and survival has become an emerging issue. In the Columbia River Basin….* (retain remaining existing paragraph then add the following sentences)
>
> *It is likely that artificial propagation may need to be evaluated as a potential 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.*

Life history modeling

Significant gaps continue to exist in our understanding on the population dynamics and life history for Pacific lamprey. These gaps limit our ability to develop and prioritize restoration and management strategies. Information on lamprey life history will feed the development of population dynamic models, which are critical tool for conservation management. Primary uses of lamprey models are to identify limiting factors (population bottlenecks) and in aiding the development and prioritization of recovery strategies.

We recommend the Council support this by adding the following to the end of the section Lamprey and Sturgeon Passage, a. Lamprey on page 47.

- *Investigate life history of Pacific lamprey in selective populations in tributary streams of the lower and mid-Columbia and Snake river.*
- *Fund development of population dynamic modeling effort for Columbia River Pacific lamprey*

Best Management Practices

Recommendation

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 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. To help prevent further lamprey habitat degradation the Council supports the use of Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (USFWS, Forest Service 2010) which provides information on the best management practices for Pacific lamprey that can be incorporated into any stream disturbing activity (e.g., aquatic habitat restoration, prescribed fire, recreational development, grazing, gravel extraction/mining, water diversions, etc.) on lands managed by the Forest Service and Bureau of Land Management throughout the range of Pacific lamprey. In addition, this guidance can help other federal, state, tribal and private land managers with implementing stream disturbing activities that also afford protection for individual Lamprey and Lamprey populations.*

References to Pacific lamprey plans

Recommendation

Insert a new paragraph between paragraphs 1 and 2 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 the Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin and the USFWS Pacific Lamprey Conservation Initiative. Restoration of Pacific lamprey numbers and mitigation for lamprey losses should incorporate actions recommended in these plans.

Recommendation

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 that is built on subbasin plans 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. The Council also supports the consensus objectives and recommended actions being developed by the multi-agency and tribal groups for tributary and mainstem implementation under the Pacific Lamprey Conservation Initiative as updates to the subbasin plans.

Addition of Pacific lamprey to various sections

Recommendation

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

Append to the third bullet under *Planning Assumptions, Hydropower* on page 8 with:

Systemwide water management, including flow augmentation from storage reservoirs, should balance the needs of anadromous fish with those of resident fish in upstream storage reservoirs so actions taken to advance one species do not unnecessarily disadvantage other species. This would include, for example, Pacific lamprey burbot, green sturgeon, white sturgeon, Columbia River smelt, and whitefish.

Recommendation

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

Insert new section *g. Pacific Lamprey ~~Production~~ Translocation* 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.

Recommendation

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 - Revise *Manage for Variability* on Page 31 to include Pacific lamprey in the text.

Recommendation - Revise third bullet under *Estuary Strategies* on Page 32 to include Pacific lamprey.

Recommendation

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

Revise the 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

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 to 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

Revise the text of the first major bullet under *Lamprey* on Page 47 as follows:

Bonneville and the Corps, in coordination with federal, state, and tribal fish managers and the Council, should identify, develop, implement, and monitor measures to help restore Pacific lamprey including:

Delete the existing six sub-bullets and replace with the following 14 revised sub-bullets.

- *Specific fish passage structures for adult and juvenile lamprey*
- *Regional approaches to evaluate passage, abundance, distribution, and population structure, including the mainstem Columbia, Snake and Willamette rivers*
- *Development of PIT and active tags suitable for adult and juvenile lamprey and establish an annual regional lamprey tagging forum*
- *Development of a regional strategy for monitoring passage into tributaries to better understand differences in counts of adult lamprey between dams*
- *Development and implementation of a regional tagging and monitoring strategy for evaluating the timing of larval and juvenile lamprey movement and active outmigration from tributaries into the mainstem and passing mainstem hydropower projects.*
- *Increase knowledge regarding the use of the mainstem as spawning and rearing habitat with systematic occupancy sampling*
- *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 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*
- *Determine predation on adult and juvenile lamprey during 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*
- *Support the Pacific Lamprey Conservation Agreement through collaborative development and management of a comprehensive GIS data clearing for all mainstem and tributary lamprey data that is accessible by co-managers and the public.*

Recommendation

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.

References

CRBLTWG (Columbia River Basin Lamprey Technical Workgroup). 2005. Critical uncertainties for lamprey in the Columbia River Basin: results from a strategic planning retreat of the Columbia River Basin Lamprey Technical Workgroup.

CRITFC (Columbia River Inter-Tribal Fish Commission). 2011. Tribal Pacific Lamprey restoration plan for the Columbia River basin. Columbia River Inter-Tribal Fish Commission, Portland, Oregon. 100 pp with Appendix. http://www.critfc.org/salmon-culture/columbia-river-salmon/columbia-river-salmon-species/the-pacific-lamprey/lamprey-plan/

Keefer, M.L., T.C. Clabough, M.A. Jepson, E.L. Johnson, C.T. Boggs, C.C. Caudill. 2012. Adult Pacific Lamprey Passage: Data synthesis and fishway improvement prioritization tools. Department of Fish and Wildlife Sciences, College of Natural Resources, University of Idaho.

Luzier, C.W., H.A. Schaller, J.K. Brostrom, C. Cook-Tabor, D.H. Goodman, R.D. Nelle, K. Ostrand and B. Streif. 2011. Pacific Lamprey (Entosphenus tridentatus) Assessment and Template for Conservation Measures. U.S. Fish and Wildlife Service, Portland, Oregon. 282 pp.

USACE (U.S. Army Corps of Engineers). 2009. Pacific Lamprey Passage Improvements Implementation Plan – 2008-2018. U.S. Army Corps of Engineers, Northwestern Division, Portland District. July 2009 Final Report. 88 pp.

USFWS (U. S. Fish and Wildlife Service). 2010. Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus). U.S. Fish and Wildlife Service, Portland, Oregon. 25 pages.

USFWS (U.S. Fish and Wildlife Service). 2012. Pacific Lamprey Conservation Agreement. U.S. Fish and Wildlife Service, Portland, Oregon. 57 pp.

Bull Trout

Recommendations for the Program - primarily for Sections for Biological Objectives, Basin-wide Strategies, and Mainstem Strategies.

Bull trout have declined throughout their range due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of nonnative species. Because of the sharp declines bull trout were listed as threatened under the Endangered Species Act (USFWS 2000). The biological opinion (USFWS 2006) and the stipulated court settlement (USDC 2008) for the Kootenai River and the operation of Libby Dam, and the 2008 biological opinion for the Willamette River basin project (USFWS 2008) gave further documentation on the need to protect bull trout. Extensive research on bull trout has been conducted since 2000 (Anglin et al. 2010, Barrows et al. 2012, Bretz, 2009, Faler et al. 2008) that documents the tributary use and mainstem Columbia and Snake rivers use by bull trout. The final rule for designation of critical habitat for bull trout in the coterminous United States was made in 2010

(USFWS 2010). The Action Agencies have requested reinitiating consultation because of the critical habitat listing.

Based on the actions required under the current biological opinions, results of research since 2000 and the designation of bull trout critical habitat, the following are our recommendations for the Council's Fish and Wildlife Program.

Recommendation

Revise the first paragraph under *Resident Fish Losses* on page 12:

> *The development and operation of the hydrosystem has resulted in losses of native resident fish and resident fish diversity for species such as bull trout (listed as threatened under the ESA), cutthroat trout, kokanee, white sturgeon and other species. The following objectives address resident fish losses:*

Recommendation

To include the importance of the Bull Trout BiOp (and not just the salmon BiOp), the sentence in the second paragraph under *C. Biological Objectives, 1. Overarching Objectives and Priorities for the mainstem*, paragraph page 36:

> *Achieving the biological performance standards and fulfilling the relevant RPAs and RPMs for listed species set forth in the biological opinions is a key biological objective of the Council's Program and this mainstem plan.*

Recommendation

Add the following sub-bullet to the second bullet under C.2.a on page 36.

> *Evaluate how projects, reservoir conditions and operations impact connectivity among basins for bull trout.*

Recommendation

Revise the fifth bullet under *c. Resident fish and wildlife*, page 39:

> *Provide mainstem conditions that help to protect and enhance bull trout habitat and thus help to restore the abundance and productivity of bull trout populations that use the mainstem as they migrate into and out of tributary streams. The U.S. Fish and Wildlife Service's 2000 and 2006 biological opinions concerning hydrosystem operations that affect listed bull trout populations include objectives for that species, which are adopted here. Additionally, on September 30, 2010, the U.S. Fish and Wildlife Service designated critical habitat for bull trout throughout their U.S. range. This listing included the entire mainstem reaches of the Columbia and lower Snake Rivers. The Council's Program and this mainstem plan recognize the importance of this critical habitat for bull trout and support needed efforts to maintain and/or improve this critical habitat where needed.*

Recommendation

Add the following bullet after the revised bullet in Recommendation 4 (page 39).

Evaluate mainstem project specific impacts to migrating bull trout

Recommendation

Revise the first bullet on page 43 with the following:

In addition, the Council expects the federal operating agencies, in conjunction with the relevant state and federal fish and wildlife agencies and tribes to:

- *Identify the importance of protecting or improving the critical mainstem habitat for recovering bull trout populations. The Council expects the relevant state and federal fish and wildlife agencies to conduct the necessary research and report the analysis to the Council at the earliest possible date*

Recommendation

Add the following bullet after the revised bullet in Recommendation 6 (page 43).

Evaluate reservoir conditions and operations on foraging, overwintering, and migrating bull trout.

References

Anglin, D.R., D. Gallion, M. Barrows, S. Haeseker, R. Kock and C. Newlon. 2010. Monitoring the Use of the Mainstem Columbia River by Bull Trout from the Walla Walla Basin. 2005-2009 Final Report. Prepared for: The U.S. Army Corps of Engineers, Walla Walla District. 36 pp.

Barrows, M.G., D.R. Anglin, R. Kock, J.S. Skalicky. 2012. Use of the Mainstem Columbia River by Walla Walla Basin Bull Trout. 2010 Final Annual Report. Prepared for: The U.S. Army Corps of Engineers ,Walla Walla District. 52 pp.

Bretz, C.B. 2009. Evaluate Bull Trout Migration Between The Tucannon River And Mainstem Snake River Using Streamwidth Passive Integrated Transponder Tag Interrogation Systems. Annual Report 2007. Prepared for: The U.S. Army Corps of Engineers ,Walla Walla District. 17 pp.

Faler, M.P., G. Mendel and C. Fulton. 2008. Evaluation of Bull Trout Movements in the Tucannon and Lower Snake Rivers - Project Completion Summary (2002 through 2006). Project Number: 2002-006-00, Contract Numbers: USFWS - 24220, WDFW – 24204. 34 pp.

USDC (United States District Court). 2008. United States District Court for The District Of Montana, Missoula Division. Case 9:03-cv-00029-DWM, Document 152-2 Filed 09/02/2008. 12 pp.

USFWS (U.S. Fish and Wildlife Service). 2000. Biological Opinion: Effects to Listed Species from Operations of the Federal Columbia River Power System (December 2000). 97 pp.

USFWS (U.S. Fish and Wildlife Service). 2006. Biological Opinion regarding the effects of Libby Dam operations on the Kootenai River White Sturgeon, Bull Trout and Kootenai Sturgeon Critical Habitat (February 2006). 164 pp.

USFWS (U.S. Fish and Wildlife Service). 2008. Biological Opinion on the Continued Operation and Maintenance of the Willamette River Basin Project and Effects to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act (July 2008).

USFWS (U.S. Fish and Wildlife Service). 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States. Final Rule. Federal Register 75(200). October 18, 2010. pp 63898-64070.

Recommendations for Section C. of the 2009 Fish & Wildlife Program - Biological Objectives **(page 11).**

The current Fish and Wildlife Program (2009) calls for a science based process to inform policy choices on biological objectives, as supported by the Independent Science Advisory Board (ISAB). The Council has not implemented this section of the Program. We encourage the Council to restate the call to assess the current quantitative biological objectives and develop an updated and scientifically rigorous set of objectives. Reviewing and refining the adult fish return and SAR goals is appropriate to assure these are correctly scaled to evaluate the Program. Measureable objectives are essential to adaptive management because they provide quantitative targets to support the Program's vision, a method to track program progress (i.e., a report card); and a measure of improvement needed in the program.

The Fish and Wildlife Program's quantitative goals and related timelines for anadramous fish remain reasonable. Increasing total adult salmon and steelhead runs to an average of 5 million annually by 2025 and achieving SAR rates in the 2 – 6 % ranges; average 4% for Snake River and Columbia salmon and steelhead are sound targets. We recommend language to that effect should be added to the Biological Objectives to support quantitative program goals (page 11 of the 2009 Amendments).

Recommendation

We recommend the Council's Fish and Wildlife Program retain the current basin-level biological objective of Smolt-to-Adult Return rates that average 4% (range 2-6%) for Snake River and Upper Columbia salmon and steelhead populations. In the meantime, the Council should complete a scientifically based evaluation of more specific biological objectives.

Recommendations for Section D. of the Council's Fish & Wildlife Program - Mainstem Strategies **(page 40).**

The Comparative Survival Study

The U.S. Fish and Wildlife Service supports the Northwest Power and Conservation Council Fish and Wildlife Program's Monitoring, Evaluation, Research, and reporting strategies including continued

support for the Comparative Survival Study (CSS) (Tuomikoski et al. 2012). We believe the CSS provides basin-wide scientific data and analyses advancing the understanding of the conservation needs of salmon and steelhead in the Basin by monitoring the basin-level biological objectives defined in the Program along with evaluating the effects of mainstem operations on juvenile survival, juvenile migration rates, ocean survival, and smolt-to-adult survival (Tuomikoski et al. 2012, Haeseker et al. 2012). Second, the CSS data and analyses support the Ocean Strategies component of the Program through CSS efforts to identify the effects of ocean conditions on anadromous fish survival and use this information to evaluate and adjust inland actions (Haeseker et al. 2012). Third, the PIT-tagging conducted by the CSS, along with cooperative tagging efforts by other agencies are increasingly being used to improve in-season harvest management that support the Harvest Strategies component of the Fish and Wildlife Program.

Smolt-to-Adult return rates (SARs) have averaged 0.9% for wild spring-summer Chinook salmon from the Snake River. This is well below the Council's average SAR goal of 4% (Tuomikoski et al. 2012). In addition, Snake River wild spring-summer Chinook salmon have been under the minimum SAR goal of 2% in 15 years out of the 17 years that have been monitored. Similarly, SARs have averaged 1.6% and achieved the 2% minimum in only seven of thirteen years for wild steelhead from the Snake River.

Several recent studies have examined the environmental factors that influence SARs of Snake River spring-summer Chinook salmon and steelhead. Petrosky and Schaller (2010) analyzed about a 40 year time series of SAR estimates and found that both river and ocean environmental factors influenced SARs of Snake River Chinook salmon and steelhead. In addition, they found both river and ocean factors influenced ocean survival for these two species. The factors identified included water velocity and measures of spill in the FCRPS. Haeseker et al. (2012) analyzed a nine-year time series of river survival, ocean survival, and SAR estimates and similarly found that river and ocean environmental factors influenced ocean survival rates and SARs of Snake River Chinook salmon and steelhead. They concluded that improvements in SARs may be achievable across a range of marine conditions through increasing spill percentages and reducing water transit times during juvenile salmon out-migration. While the data set analyzed by Petrosky and Schaller (2010) differed from the data set analyzed by Haeseker et al. (2012), their results (i.e., river and ocean factors influenced SARs) were consistent across the two studies**.** Given that these studies indicate increased spill may increase SAR's and help recover depressed salmon and steelhead stocks, additional scientific studies are warranted to validate these preliminary conclusions, along with management actions to test such relationships on an experimental basis**.** We believe that additional scientific research relative to all the factors effecting salmon and steelhead in the Basin from egg to spawning adults is warranted.

Consistent with the Northwest Power Act's direction to the Northwest Power and Conservation Council to develop a program to "protect, mitigate, and enhance fish and wildlife… while assuring the Pacific Northwest an adequate , efficient, economical, and reliable power supply", it is important to expand scientific knowledge of the Columbia Basin. The Program's Monitoring, Evaluation, Research, and Reporting efforts have greatly added to the scientific understanding of the Basin, its fish and wildlife resources, their ecology, and limiting factors. Additionally, this knowledge provides the basis for

exploring management options for fish and wildlife managers as well as the operators of the FCRPS. We believe that the CSS studies along with other scientific studies funded by the Council are critical to meeting the objectives established by the Act.

Recommendation

We recommend the Fish and Wildlife Program continue to support the implementation of the Comparative Survival Study as part of its strategic Monitoring, Evaluation, Research, and Reporting efforts. This should include measures to evaluate whether spill can increase Smolt-to-Adult return rates and recover depressed salmon and steelhead stocks.

Haeseker, S. L., J.A. McCann, J. Tuomikoski, B. Chockley. 2012. Assessing Freshwater and Marine Environmental Influences on Life-Stage-Specific Survival Rates of Snake River Spring–Summer Chinook Salmon and Steelhead. Transactions of the American Fisheries Society 141(1):121-138.

Petrosky, C.E., and H.A. Schaller. 2010. Influence of river conditions during seaward migration and ocean conditions on survival rates of Snake River Chinook salmon and steelhead. Ecology of Freshwater Fish 10:520-536.

Tuomikoski, J. and eleven co-authors. 2012. Comparative Survival Study (CSS) of PIT-tagged Spring/Summer Chinook and Summer Steelhead 2012 Annual Report. Prepared by the Fish Passage Center, BPA Contract #19960200, 392 pp.

Fish Passage Center

The functions of the Fish Passage Center (FPC) form a key element in the Mainstem Monitoring and Evaluation component of the Fish and Wildlife Program. The primary purpose of the Fish Passage Center is to provide technical assistance and information to fish and wildlife agencies and tribes in particular, and the public in general, on matters related to the implementation of water management, spill, and passage measures in the program's Mainstem Plan. The FPC plans and implements the annual Smolt Monitoring Program (SMP) and the Gas Bubble Trauma study (GBT), which provides daily information for in-season management decisions. The FPC provides the agencies and tribes with reservoir operation information and analysis, including current and historical data. The FPC also coordinates the implementation of the joint agencies and tribes Comparative Survival Study (Tuomikoski et al. 2012).

During the in-river migration season, FPC summarizes current conditions and publishes a Weekly Report. FPC also provides web distribution of System Operation Requests (SOR's) made by the Salmon Managers. SOR's are requests to the U.S. Army Corps of Engineers to operate the Federal hydropower system to protect or enhance in-river fish passage and survival conditions.

Recommendation

We recommend the Mainstem Monitoring and Evaluation component of the Fish and Wildlife Program continue to implement the various functions performed by the Fish Passage Center.

Tuomikoski, J. and eleven co-authors. 2012. Comparative Survival Study (CSS) of PIT-tagged Spring/Summer Chinook and Summer Steelhead 2012 Annual Report. Prepared by the Fish Passage Center, BPA Contract #19960200, 392 pp.

PIT Tag Effects Study

Coded wire tags (CWT) and passive integrated transponder (PIT) tags are used extensively throughout the Columbia River Basin to address a wide variety of management and research questions. A recent study found that dual-tagged (CWT and PIT tagged) hatchery spring Chinook exhibit lower smolt-to-adult return rates compared to CWT smolts, indicating that PIT tags may impart a survival bias (Knudsen et al. 2009). Given the widespread use of CWT and PIT tags, further evaluations of potential tag effects would be informative for quantifying the level of bias, if present, associated with each of these two tag types. Towards this end, we initiated the PIT Tag Effects Study (PTES) at Carson National Fish Hatchery (NFH) in 2010 (Brignon and Haeseker 2011). The objectives are: 1) to determine the effects of PIT tags on spring Chinook salmon SAR's rates and to determine PIT tag loss rates throughout their life history.

Recommendation

Given the importance of tagging efforts in the basin, we recommend the Monitoring, Evaluation, Research, and Reporting Strategies element of the Fish and Wildlife Program foster the implementation of a basin-wide PIT tag effects study at several representative hatcheries across the Columbia basin for spring/summer Chinook salmon, steelhead, and fall Chinook salmon.

References

Brignon W.R., S.L. Haeseker. 2011. PIT-Tag Effects on Hatchery Salmonids: Carson National Fish Hatchery Spring Chinook Salmon. 2011 Annnual Report. Available at: http://www.fws.gov/columbiariver/publications.html

Knudsen, C. M., M. V. Johnston, S. L. Schroder, W. J. Bosch, D. E. Fast, and C. R. Strom. 2009. Effects of Passive Integrated Transponder Tags on Smolt-to-Adult Recruit Survival, Growth, and Behavior of Hatchery Spring Chinook Salmon. North American Journal of Fisheries Management 29:658–669.

Additional recommendations for research, monitoring and evaluation of Pacific salmon and steelhead in the Columbia Basin

We recommend the following be added to Artificial Production Strategies section page 18 of the 2009 Amendments:

Clearwater River B-run steelhead. We suggest that added emphasis be placed on understanding and maintenance of the genetic integrity of the historical North Fork Clearwater River B-run steelhead, the source stock for Dworshak NFH steelhead.

Additional research is needed on the current genetic content of the B-run steelhead for Dworshak NFH and if the population is sufficiently robust to maintain the historical content of the original North Fork Clearwater River population.

Additional research is needed on the relative hatchery and natural contribution to steelhead production in the Clearwater River. For example, it is important to understand whether supplementation and non-supplementation hatchery steelhead contributing to natural production within the Clearwater River.

Snake River Fall Chinook

Evaluate the use of unmanned aircraft system (UAS) technology for monitoring and evaluation

Redd counts are used to assess the spatial distribution of spawning by native salmonids in large rivers throughout the Pacific Northwest. The data is critical to recovery plans that require measures of spatial diversity for listed populations of fishes. Traditional methods of conducting redd surveys from aircraft are expensive, but more importantly, such methods can put lives at risk (Schiff and Barrett 2011). Snake River Fall Chinook salmon would be an ideal population to focus on in the development of a UAS plan as the fish spawn in large mainstem rivers, plus testing with UAS technology has already been initiated.

Recommendation

We recommend the development of a plan to use UAS technology for monitoring fish and wildlife population attributes, where applicable. Attributes measured on fish would include redd counts. Key areas to target in this plan would be large mainstem rivers such as the lower Snake River and its tributaries that are too large or remote for survey on foot.

References:

Schiff, D. J., and L. Barrett. 2011. Two Idaho Chapter AFS members die in helicopter crash. Fisheries 36(2): 92-93.

Understanding of the influence of anthropogenic activity on the food web of the Columbia River

The Council should consider incorporating the priorities of understanding food webs outlined by the Independent Scientific Advisory Board (ISAB 2011). The ISAB Report makes a strong case for investigating how the Columbia River basin food web supports the growth and survival of Pacific salmon and other native fishes. We believe that building upon existing data and expertise would be more effective at moving toward a more holistic understanding of food web function. This would also support decisions of the Fish and Wildlife Program to help sustain an abundant, productive, and diverse community of fish and wildlife in the Columbia River Basin. The role the food web plays in supporting

juvenile salmon and native fishes should be better understood given the constant threat of new biological invasions and anthropogenic habitat alterations. The proposed research will move the Program toward an ecosystem management approach to provide salmon with their total life cycle needs including an adequate food web to support growth and improve survival.

The Council should also build on and expand existing Fish and Wildlife projects that have collected food web data to incorporate concepts and research needs identified as ISAB priorities. Continue to support work under species-specific project whose results would be applicable to other related species. Although the ISAB report was comprehensive, the Council should remain flexible to support projects that address new and emerging challenges regarding changes to Columbia Basin food webs such as invasive species.

Fall Chinook salmon in Lower Granite Reservoir are an ideal species/habitat coupling for evaluating the food web relationships, as some historical invertebrate work has been conducted (Dorband 1980; Curet 1993; Haskell et al. 2006; Tiffan et al. 2013), growth and body size of listed juvenile fall Chinook salmon has declined over the past decade (Connor et al. in press), and an understanding of the food web has been identified as a key information need in recovery plans.

References:

Connor, W. P., K. F. Tiffan, J. M. Plumb, and C. M. Moffitt. In press. Evidence for density-dependent changes in growth, downstream movement, and size of Chinook salmon subyearlings in a large river landscape. Transactions of the American Fisheries Society (accepted May 2013).

Dorband, W.R. 1980. Benthic macroinvertebrate communities in the lower Snake River reservoir system. Doctoral dissertation. University of Idaho, Moscow.

Curet, T. S. 1993. Habitat use, food habits and the influence of predation on subyearling Chinook salmon in Lower Granite and Little Goose reservoirs, Washington. Master's Thesis. University of Idaho, Moscow.

Haskell, C.A., R.D. Baxter, and K.F. Tiffan. 2006. Range expansion of an exotic Siberian prawn to the Lower Snake River. Northwest Science 80:311-316.

Haskell, C.A., K.F. Tiffan, and D.W. Rondorf. 2013. The effects of juvenile American shad planktivory on zooplankton production in Columbia River food webs. Transactions of the American Fisheries Society 142:606-620.

ISAB (Independent Scientific Advisory Board). 2011. Columbia River food webs: developing a broader scientific foundation for fish and wildlife restoration. Available online at http:// www.nwcouncil.org/library/isab/2011-1/. (September 2011).

References:

IEAB (Independent Economic Analysis Board). 2013. Cost-effectiveness of fish tagging technologies and programs in the Columbia River Basin. Northwest Power and Conservation Council Report IEAB 2013-1, Portland, Oregon, 54 p.

Anderson, E. C., and J. C. Garza. 2005. A description of full parental genotyping. Report submitted to the Pacific Salmon Commission.

Creation of islands and shallow-water areas

Shallow-water habitats in reservoirs are used for rearing by native fishes and can be created by disposal of dredge material. Use of such created habitat can increase as juvenile abundance in natal riverine habitat upstream of reservoirs increases (e.g., Tiffan and Connor 2011; Connor et al. in press). However in the case of subyearling fall Chinook salmon, the characteristics of ideal island and shallow-water habitats have not been fully identified. Plans are being made to dredge Lower Granite Reservoir and to create rearing habitat for fall Chinook salmon subyearlings with the dredge material, but there are no plans to monitor and evaluate the use of the created habitat or its influence on growth and survival.

Recommendation

The Program should continue to support the creation of shallow-water habitat in reservoirs for use by native fishes, and should provide additional support for monitoring and evaluation of use especially by Chinook salmon in the Snake River Basin.

References:

Tiffan, K. F., and W. P. Connor. 2011. Seasonal use of shallow water habitat in the lower Snake River reservoirs by juvenile fall Chinook salmon. 2010–2011 final report of research to the U.S. Army Corps of Engineers, Walla Walla District.

Connor, W. P., K. F. Tiffan, J. M. Plumb, and C. M. Moffitt. In press. Evidence for density-dependent changes in growth, downstream movement, and size of Chinook salmon subyearlings in a large river landscape. Transactions of the American Fisheries Society (accepted May 2013).

Genetic Based Fish Marking

Full parental genotyping commonly referred to as parental based tagging (PBT) was first described by Anderson and Garza in 2005. The concept involves comparing the genotype of offspring (either as juveniles or returning adults) to a database of potential parent genotypes. Knowing the genetic makeup of all fish used as broodstock enables biologists to identify the progeny of hatchery broodstock, to obtain an accurate estimate of mis-clip rates for all participating hatcheries and with information on individuals and crosses can be used as a tool to monitor family size and variance in returns to each hatchery based on a wide range of hatchery practices. With the collection of additional biometric data, PBT can also be used to evaluate heredity of traits. In many large-river systems it is not possible to tag large enough sample sizes of natural-origin juveniles to estimate population status upon adult return. This is the case in the Snake River for the fall Chinook salmon population listed under the Endangered Species Act. Consequently, evaluating the status of the natural population relative to viability criteria in the developing recovery plan has been a large challenge and has relied on coded-wire tag recoveries.

The Independent Economic Analysis Board (IEAB) concluded that high sampling and lab costs for genetic-based markers makes those markers more expensive than coded-wire tags for most stocks (IEAB 2013). However, the IEAB also concluded that genetic marking generates data that has advantages over coded-wire tag data in some cases, and specifically referenced the Snake River basin as one such example.

Recommendation

We support genetic-based fish marking as a management tool through continued development and maintenance of a multi-agency database and through analysis of genetic samples to answer specific management questions related to straying and population status.

Migratory birds and salmonid predation

The U.S. Fish and Wildlife Service recognizes the impacts of avian predation on Pacific salmon in the Columbia Basin, particularly in the estuary, and the overall effects on salmon recovery. We recognize there is a strong regional interest in active management of avian predators to lessen their effects on juvenile Pacific salmon. However, we are equally concerned about how management actions, such as dissuasion and depredation, could potentially affect the sustainability of double-crested cormorants, Caspian terns, and other migratory birds on a regional/flyway level. Pacific salmon, cormorants, and terns are all native to the Pacific Northwest ecosystem. As such, we believe avian predation is a source of natural mortality, and should be viewed in the context of the many mortality factors facing Pacific salmon throughout their life history. Further, we believe that management actions to reduce avian predation and promote Pacific salmon recovery must not place significant risk to migratory bird populations.

Recommendation

We recommend a comprehensive regional, multi-species management approach be developed by the States, Tribes, and appropriate Federal agencies to address avian predation while also ensuring the long-term sustainability of migratory bird populations.

White Sturgeon

White sturgeon are an iconic mainstem fish that has been severely affected by construction and operation of the hydropower system in the Columbia River. This includes Kootenai River White sturgeon which is affected by the construction and operation of Libby Dam.

The status of white sturgeon is strongly tied to conditions in the mainstem, which are directly affected by the hydropower system. White sturgeon have declined significantly throughout most of the Columbia Basin, although the population segment below Bonneville Dam still shows substantial natural recruitment. 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 hydropower operations directly, through blocked passage or inundation of preferred

spawning areas, and indirectly, through the effects of water flow and sediment release on spawning success. In addition, recently documented predation on adult sturgeon by Steller sea lions just below the Bonneville Dam may threaten that population.

The fishery managers in the Columbia Basin recently completed a basin-wide framework plan for White sturgeon that synthesizes existing information and recommends actions to address limiting factors and information gaps.

Recommendation

We recommend that specific recommendations from this management plan be incorporated into the Program, in the mainstem section, as a sturgeon chapter. After ISRP review, the framework could be adopted into the Program.

We recommend the Council consolidate measures intended to address sturgeon restoration into set of strategies in the Mainstem Plan. The Council should also consider the recommendations of Oregon's White Sturgeon Conservation Plan and the White Sturgeon Framework Plan for inclusion into the Program. The Framework should be identified as a Program appendix on White Sturgeon.

Renewable energy integration into the Fish and Wildlife Program

The Northwest Power Act calls for the Council to facilitate the planning and development of the region's power system including development of renewable resources within the Columbia Basin, while protecting, mitigating and enhancing fish and wildlife resources. In recent years, the Council's Power Plan has recognized the importance of renewable energy sources in the Columbia Basin, such as wind power. We support the development of ecologically sustainable renewable energy. However, development of renewable energy must fully consider its effects on the fish and wildlife resources, particularly in the Columbia Basin.

We recognize the Columbia Basin is uniquely positioned for the development of renewable energy, particularly hydro- and wind power. We also recognize that many of the decisions on the siting of renewable energy infrastructure are State and local decisions, except on Federal lands. We also believe that, if not for the hydropower system in the Columbia River, the amount of renewable energy development would not be nearly as it is today. We are concerned that future renewable energy development may be hampered by significant obstacles if the effects of renewable energy development on fish and wildlife resources are not fully considered. As such, we recommend the Council's Fish and Wildlife Program include recommendations for reducing impacts of renewable energy development on aquatic and terrestrial resources. We believe the Council's recommendations may be applicable in a variety of Federal, State, and local decisions such as permit issuance or other supporting authorizations.

As previously stated, we encourage environmentally sustainable development of renewable energy projects. Our recommendations identify and highlight renewable energy's impact on fish and wildlife resources. These recommendations provide additional guidance and direction to the Council on how to

address fish and wildlife impacts pertaining to energy development. These recommendations could be incorporated into guidance and overall planning efforts for renewable energy development.

We recommend the Council consider the following:

1) Past, proposed and potential project actions, including transmission infrastructure projects, should evaluate their impacts on fish, wildlife and their habitats;
2) A region-wide assessment of suitability for siting terrestrial and aquatic renewable energy projects, prioritize possible sites, and examine potential site-specific and system-wide impacts to fish and wildlife. The outputs from this analysis should include a map of priority power generation development sites and power generation exclusion zones or protected areas, as was done for hydropower;
3) Explicit evaluation of transmission system expansion and its potential to impact fish and wildlife and their habitats as part of development scenarios and assessments; and
4) Identification, assessment and analyses of appropriate mitigation for fish and wildlife and their habitats.

Protected Areas

In 1988, the Council established approximately 44,000 miles of rivers and streams as Protected Areas to protect the most sensitive fish and wildlife habitat in the Pacific Northwest from the significant impacts of hydropower development. The Council conducted extensive research into which areas should be designated as Protected to preserve those rivers and streams where hydropower development would have major negative impacts that could not be mitigated or reversed. Further, Protected Areas are intended to direct energy developers to less sensitive areas where development could proceed without major impacts to important public resources, including fish and wildlife. Likewise, Protected Areas were established to save time, energy and resources due to the controversy involved in developing hydropower projects in these sensitive areas.

Protected Areas were also established outside the Columbia Basin since the electricity generated by these projects is marketed throughout the Pacific Northwest, including the Columbia Basin. The purpose for establishing Protected Areas was to "help minimize the expense and controversy involved in [hydropower] development, help guide development toward environmentally benign projects, and protect critical fish and wildlife resources." Additionally, the Council concluded that Protected Areas outside the Columbia Basin helped to meet U.S./Canada treaty commitments to rebuild Pacific salmon and steelhead stocks, and help avoid disproportionate harvest pressure on fish and wildlife in the Columbia Basin.

We believe the Protected Areas program continues to meet its goals, and is an important part of rebuilding fish and wildlife populations that have been damaged by hydroelectric development in the Pacific Northwest. However, these factors are not entirely effective at encouraging hydropower

development outside Protected Areas.[1] As such, a strong Protected Areas program remains critically important to the Council's Fish and Wildlife Program. Attempts to site projects in Protected Areas have the potential to generate considerable controversy and require a significant investment of time, energy and financial resources for all stakeholders. Although we support ecologically sound renewable energy development, including hydropower, we believe it is important to direct energy development to areas where permitting can proceed smoothly rather than setting up more hurdles in areas where development may not be appropriate in the first place.

Recommendation

The current Fish and Wildlife Program (2009) does not contain an exemption process that would allow hydropower projects to be developed in Protected Areas, and still be declared consistent with the Council's Fish and Wildlife Program. The Protected Area designation is to focus energy development in areas where permitting would not generate significant expense or controversy. Allowing an exemption process detracts from this important public purpose. As such, we do not believe an exemption process is warranted. We recommend the Council retain the Protected Areas Program as described in the current Fish and Wildlife program.

Prevent Establishment of Aquatic Invasive Species

The U.S. Fish and Wildlife Service recognizes and appreciates the Council's leadership on issues related to aquatic invasive species, and the potential for them to become established in the Columbia Basin. We believe zebra and quagga mussels represent a significant risk to the ecology and infrastructure of the Pacific Northwest in general, and the Columbia Basin specifically. The infrastructure assets at risk from these invasive species represent the foundation of the economy and the ecology of the Pacific Northwest. As such, it is imperative that the Region prevents further degradation of ecosystem function and ensures protections for species recovery investments, water delivery infrastructure, and hydropower production from the potentially devastating impacts of invasive species. To protect regional infrastructure assets and ecosystem function, the Council should focus on activities that are known to be effective at preventing the introduction of species such as zebra and quagga mussels and hydrilla, as well as activities aimed at stopping the spread of and controlling invasive species present in the basin such as Eurasian watermilfoil and flowering rush. These activities include, but are not limited to, inspection and decontamination of boats moored in infested waters and then transported on our roadways into and within the region.

We also believe that preventing invasive species from becoming established in the Columbia Basin is not just an issue of concern to the Council's Fish and Wildlife Program. The purpose of the Program, and its funding, is to protect, mitigate, and enhance fish and wildlife affected by hydropower development. The Program is not intended to protect Federal infrastructure investments from threats from invasive

[1] See Snohomish PUD No. 1, Sunset Fish Passage and Energy Project on the Skykomish River, FERC No. P-14295; Black Canyon Hydroelectric Project on the North Fork Snoqualmie River, FERC No. P-14110; and Twin Lakes Canal Company, Bear River Narrows Hydroelectric Project, FERC No. P-12486.

species such as zebra and quagga mussels that are predicted to have significant operational impacts as well as ecological impacts in the Columbia Basin. Protection of existing investments should be supported by operation and maintenance funding by the appropriate Federal agency. Coordinated efforts to prevent new introductions and control the spread of existing invaders will benefit both infrastructure and fish and wildlife.

Recommendation

We recommend the Council continue to play a regional leadership role in coordinating stakeholder groups around the issue of aquatic invasive species, particularly those that pose the greatest risk to the Columbia River Basin ecosystem and infrastructure. 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 leadership on aquatic invasive species prevention efforts in the region. In addition, we recommend the Council continue to show support for state and regional efforts to prevent and manage invasive species.

Specifically, we recommend enhanced inspection and decontamination efforts in the region, stronger measures to prevent the inadvertent spread of invasive species resulting from habitat research and restoration activities, improved communication and coordination throughout the basin, and maintaining the Council's leadership role as the key convener and coordinator in the Columbia Basin for science, policy and outreach.

Reintroduction of Anadromous Fish into Blocked Areas

The development of hydropower in the Columbia River Basin by the U.S. and Canada has directly and indirectly eliminated species of anadromous in substantial portions of their historical range. This outcome has devastated the culture, health, economy and spirituality of many Native American tribes in the Columbia Basin and First Nations in Canada. Further, it has denied numerous rural communities of the Pacific Northwest the economic, social, and ecological benefits associated with large numbers of Pacific salmon and steelhead returning to their native streams. And, most importantly, Pacific salmon and steelhead native to those watersheds have been, and continue to be, denied access to the spawning grounds they have occupied since time immemorial.

We realize the decisions to build hydropower projects without fish passage facilities were made in a different era. However, in the past ten years, the hydropower industry in collaboration with fishery managers in the Pacific Northwest have developed innovative passage techniques that allow adult and juvenile Pacific salmon to pass high-head dams. Projects under development and testing include the Pelton/Round Butte Project on the Deschutes River, the Willamette Basin projects in Oregon, and the Lewis River Projects in southwest Washington. We believe that reintroducing anadromous fish into historic habitat should be a key element of an integrated watershed approach to the Columbia River Basin and to the Fish and Wildlife Program. The Council should take this opportunity to develop a vision

for re-introduction of anadromous fish into blocked areas of the Columbia Basin and eventual development of fish passage facilities, where feasibility can be demonstrated.

Recommendation

In the 2014 version of the Fish and Wildlife Program, the Council should develop a vision for reintroduction of anadromous fish into blocked areas and, over the next five years, define the path forward on this issue. During this time, the Council should conduct a comprehensive evaluation of the reintroduction of anadromous fish into blocked areas of the Columbia Basin. A comprehensive evaluation should:

> Identify specific Federal and non-Federal hydropower projects that currently block anadromous fish from historic spawning grounds in the Columbia Basin;
>
> Evaluate the success of the current efforts at re-introducing anadromous fish into blocked areas throughout the Pacific Northwest;
>
> Assess the feasibility of reintroducing anadromous fish at each Federal and non-Federal project that currently blocks anadromous fish from historic habitat, and evaluate the potential for eventual development of fish passage facilities.

The details of a feasibility assessment should be developed in collaboration with the Federal and State fish and wildlife agencies, Native American Tribes, the appropriate Federal agencies, and the owners of non-Federal hydropower projects, if applicable. These assessments would evaluate the feasibility of anadromous fish reintroductions, at the reconnaissance level, to include costs, potential benefits, partnership opportunities, and timelines for initiation of these projects. We believe anadromous fish reintroduction should proceed sequentially, such that feasibility at each stage would be determined before the next phase is initiated.