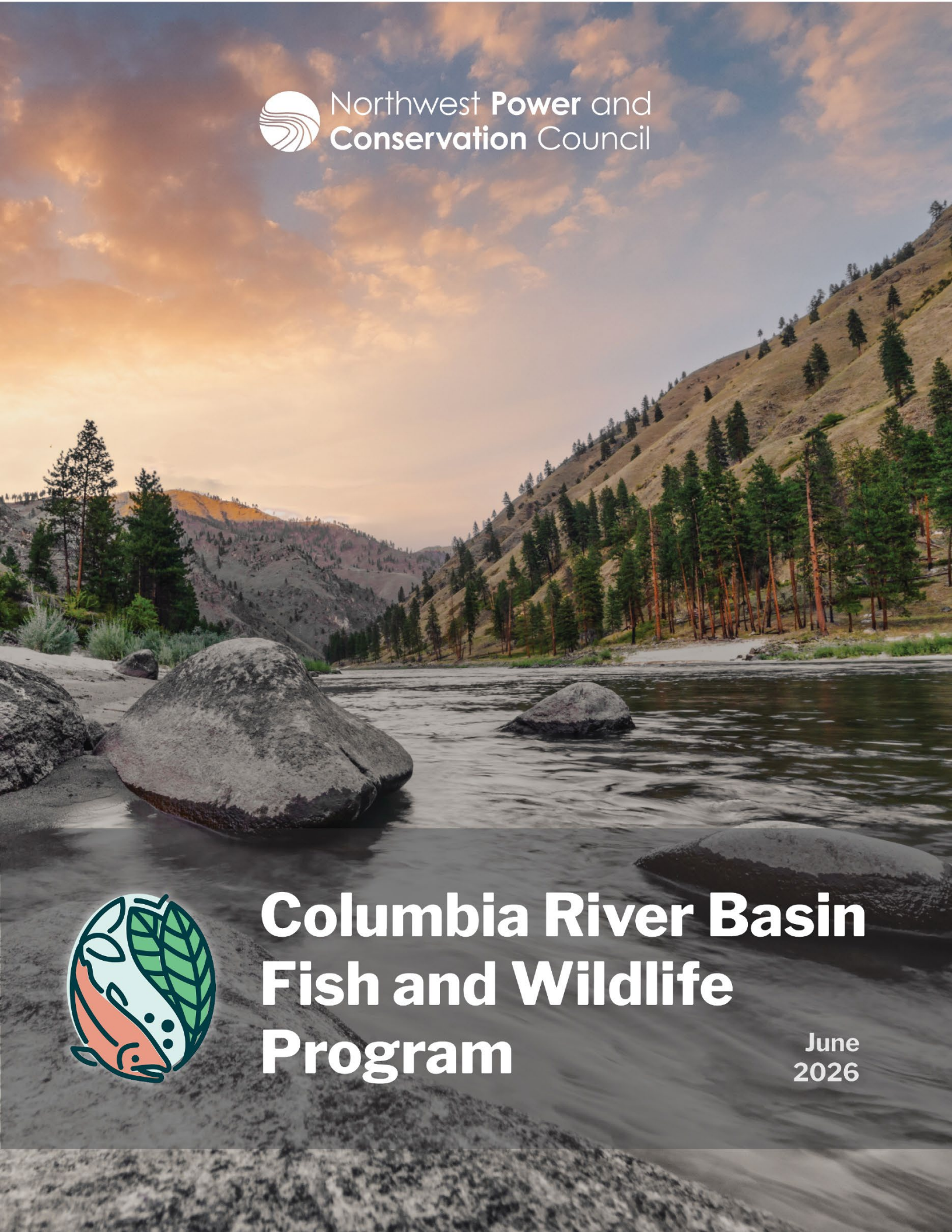

Northwest **Power** and **Conservation** Council

Columbia River Basin Fish and Wildlife Program

June 2026

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Message from the Council

The Northwest Power and Conservation Council is pleased to share the final 2026 Columbia River Basin Fish and Wildlife Program.

Crafting the 2026 Fish and Wildlife Program required rigorous planning and broad public engagement. Hundreds of recommendations, thousands of comments, public hearings in all four states and online, and hours of additional Council meetings went into developing it. These efforts highlight the dedication of state and federal agencies, tribes, utilities, ratepayers, environmental groups, industry groups, the public, and others in creating better outcomes for fish and wildlife and the communities that depend on them in the Columbia River Basin. The Council wishes to thank everyone who participated in this amendment process.

The 2026 Program has several key themes:

First, the Council sharpened its steady and dependable Program with a thorough reorganization that focuses on restoring ecosystem function by making long-term investments in a core set of strategies based on the best available science. The Council believes this will support opportunities to build on the Program's past achievements. The Council is committed to improving regional understanding of the Program's performance by more clearly defining, evaluating, and tracking the links between the actions that are taken and the changes that are expected as a result.

Second, the Council is supporting a set of hydrosystem operations, including 24/7 spill to 125% of the gas cap in the spring and limited flex, that will keep water moving for migrating juvenile and adult fish at critical times to benefit the most fish, while still meeting regional energy needs. The Council strongly advocates for the consistent implementation of a set of operations over a sufficient timeframe that would allow for a robust scientific evaluation of those operations.

Finally, the Council heard from the region on a wide breadth of important and timely topics, including but not limited to predator management, sturgeon, Pacific lamprey, resident fish, Snake River population declines, ocean conditions, expanded habitat restoration, and invasive species. The Council took a balanced approach, carefully considering what is within its purview and authority, and included measures in the Program intended to address these concerns. The Council, in collaboration with federal and state fish and wildlife agencies and tribes, also anticipates playing a role in facilitating work groups recommended by the region.

Shaped by these regional recommendations and funded primarily through the Bonneville Power Administration, the Council's Fish and Wildlife Program is one piece of the complex tapestry of efforts in the Columbia Basin. The U.S. Army Corps of Engineers, Bureau of Reclamation, and the Federal Energy Regulatory Commission also have responsibilities to implement some provisions of the Fish and Wildlife Program. The Council's Program is intended to mitigate for the impacts of the development and operation of the hydropower system on fish and wildlife. Low-cost, low-emission hydropower has provided many economic benefits to the Northwest and continues to play a vital role in providing adequate and reliable power to the region. However, the construction and operation of the hydropower system have had major impacts on salmon, steelhead, bull trout, lamprey, sturgeon, and many other species.

Today, the role of the Council is both more important and more challenging than ever. Demand for electricity is growing significantly as a result of increased electrification of homes, businesses, and transportation, tech sector growth, state decarbonization policies, and other factors. Winter and summer peaks have intensified, low water years have become more frequent, and the policy landscape has become more complex. Amongst all this, the Council must still ensure adequate, reliable, and cost-effective energy that serves the region's residents and businesses while protecting, mitigating, and enhancing fish and wildlife. At the same time, fish are facing continuing impacts from hydrosystem development and habitat degradation, as well as a growing list of new and interconnected challenges like expanding predation, increasing air and water temperatures, and invasive species.

As a planning body that represents four states and a wide variety of perspectives, the Council has grappled at length with these complex issues. The 2026 Program reflects the Council's commitment to a balanced approach, grounded in recommendations received from the region and the best available science. The 2026 Program strives to continue and enhance the core work of the Program while addressing contemporary concerns:

1. Protect and reinforce the 40-plus years of work done under the Fish and Wildlife Program through adequate, dependable, and long-term funding for maintenance, operation, repair, and to address inflation.
2. Continue the Council's longstanding commitment to improving spawning and rearing habitat that supports fish in the tributaries, mainstem, and estuary.
3. Increase focus, funding, and coordination for assessing and managing predation starting in the areas most likely to increase salmon and steelhead survival.
4. Measure progress towards achieving the Council's goals and objectives, including the long-standing goal of 5 million salmon and steelhead returning to the basin.

5. Recognize that fish and wildlife in the Columbia River Basin, especially salmon and steelhead, face challenges from many different directions. Encourage a whole-of-government approach in which funding, research, and monitoring are coordinated amongst entities including Bonneville, the Army Corps of Engineers, the Bureau of Reclamation and others, to achieve the best possible outcomes while minimizing the burden to ratepayers.

The impact of the Council's Fish and Wildlife Program is evident throughout the basin. Improvements in fish passage facilities and operations have dramatically decreased the amount of time it takes for juvenile salmon and steelhead to migrate through the hydropower system from the upper portions of the Columbia and Snake Rivers to the estuary. Dam-by-dam juvenile survival rates now exceed 95%, compared to the 70-85% survival rates in the 1980s. The Fish and Wildlife Program has also protected 44,000 miles of rivers and streams from additional hydropower development, installed over 1,800 screens to divert fish from irrigation ditches, and played a key role in advancing studies on the feasibility of reintroducing anadromous fish into areas currently blocked by dams. The Columbia Basin Water Transaction Program has partnered with hundreds of landowners to keep water in streams and find solutions that work for people and fish.

Additional successes include an increased focus on other native species that has directed critical funding toward bull trout, Pacific lamprey, sturgeon, cutthroat trout, wildlife species, and more. Habitat restoration has increased in scale and complexity over time, with a focus on restoring ecosystem function. It remains a vital cornerstone of the mitigation program, improving an average of 59,000 acres annually. Artificial production projects support tribal and nontribal harvest, sport fishing, and conservation needs of salmon and steelhead, as well as white sturgeon, burbot, and Pacific lamprey. Since the 2014 Program, research and development of methods to artificially produce Pacific lamprey resulted in the first lamprey releases in 2021. This production, as well as translocation programs, have increased the abundance of this culturally important species in the Columbia River Basin and supported opportunities for tribal harvest.

These examples represent only a small slice of the progress that the Program has supported. The Council looks forward to continuing to collaborate with partners across the region on the critical work of protecting, mitigating, and enhancing fish and wildlife in the Columbia River Basin.

Mike Milburn, Chair, Montana
Thomas (Les) Purce, Vice-Chair, Washington
Jeffery Allen, Idaho
KC Golden, Washington
Douglas Grob, Montana
Margaret Hoffmann, Oregon
Charles (Chuck) F. Sams III, Oregon
Ed Schriever, Idaho

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Part One: Introduction

Overview

Introduction

The Northwest Power and Conservation Council's 2026 Columbia River Basin Fish and Wildlife Program represents more than 40 years of efforts to protect, mitigate, and enhance fish and wildlife impacted by the hydrosystem in the Columbia River Basin. As one of the largest fish and wildlife mitigation efforts in the world, the Council's Program is part of the complex tapestry of conservation efforts in the Columbia Basin.

Program Organization

The 2026 Fish and Wildlife Program has been revised from the 2014 Fish and Wildlife Program/2020 Addendum for greater clarity and cohesiveness. The program actions (called measures) have been organized into more streamlined strategies that better align with an ecosystem focus. Some sections were combined to eliminate redundancies and improve organizational structure. Finally, the new Program strives to more clearly reflect the relationship between Program goals and objectives for protection, mitigation, and enhancement, and the actions necessary to achieve them.

The 2026 Program begins with an overview of the Columbia River Basin, the development of the hydrosystem and subsequent impacts on fish and wildlife, and the role of the Council in addressing ongoing impacts through protection, mitigation, and enhancement. Parts Two and Three step through the framework of the Program, outline the scientific foundation and principles that the Program is built on, and lay out the vision, goals, and objectives that the Program seeks to achieve. Part Four describes the tools for mitigation- the measures that will help achieve the goals and objectives, grouped by strategies, followed by Part Five, concepts guiding adaptive management and Part Six, ways to implement the Program effectively. Finally, Part Seven covers ways to evaluate the effectiveness of the Program- how we can tell if we're making progress towards our goals.

The Columbia River Basin

The headwaters of the Columbia River, where they begin in Canal Flats, British Columbia, are almost invisible. This mighty river begins as barely more than a seep in the ground, where a cold,

clear spring bubbles up and begins to wind its way north. From here, the Columbia travels a total distance of 1200 miles before it joins the Pacific Ocean near Astoria, Oregon. Between these two points, the Columbia River collects water from a basin roughly the size of France, or about 259,000 sq miles, draining from seven U.S. states, multiple tribal lands, and a portion of southeastern British Columbia. In all, the Columbia and its tributaries run through varied climatic conditions and topography – from alpine to desert to rainforest.

The Columbia River Basin is home to six species of Pacific salmon: Chinook, coho, sockeye, chum, pink salmon, and steelhead. The basin's runs were once amongst the largest in the world, with an estimated average of 10-16 million fish returning annually. The basin is also home to numerous resident fish species and other migratory species like Pacific lamprey, sturgeon, and eulachon. Since time immemorial, basin Tribes depended on these abundant runs of salmon and other native fish. Salmon and steelhead are keystone species in the ecosystem, feeding wildlife like bald eagles and black bears and returning critical nutrients to the forests of the Pacific Northwest. Salmon, steelhead, and other native fish and wildlife provide additional cultural and economic benefits to the region, including fishing and recreation.

Figure 1. Columbia River and major tributaries

Development of the Columbia Basin

The construction, inundation, and operation of the hydropower system had significant local and regional impacts on fish and wildlife. Other human activities in the region also contributed to a decline in fish and wildlife populations, including historical overharvesting; extractive land use like mining, ranching, logging, and intensive agriculture; development of the railroads and other transit; and growing population centers.

With its many major federal and non-federal hydropower dams, the Columbia River and its tributaries make up one of the most intensively developed river basins for hydropower in the world. The hydrosystem is a significant provider of renewable energy in the Columbia Basin and is key to maintaining the Pacific Northwest's low carbon footprint. Hydropower in the basin produces a substantial amount of all the electricity in the Pacific Northwest. Dams are also operated to provide flood control, irrigation, and other benefits that have contributed to the economic development of the Pacific Northwest. The hydropower system has also had significant and far-reaching adverse effects on the fish, wildlife, and people who depend on the river.

The Northwest Power Act

The Northwest Power Act of 1980 was passed as a result of an energy planning crisis in the Pacific Northwest, where inaccurate power demand forecasting led to the attempted development of unnecessary power plants at significant and continuing cost to ratepayers in the region. At the same time, salmon and steelhead populations in the Columbia River Basin were struggling due to the construction and operation of the hydropower system as well as negative impacts from other human activities. The Northwest Power Act authorized the states of Idaho, Montana, Oregon, and Washington to create an interstate compact agency – the Northwest Power and Conservation Council – and specified three primary responsibilities: develop a program to protect, mitigate, and enhance fish and wildlife impacted by the hydrosystem in the Columbia River Basin; develop a plan to add cost-effective conservation and generation resources that continue to assure the region an adequate, efficient, economical, and reliable power supply, and to do both with broad public engagement.

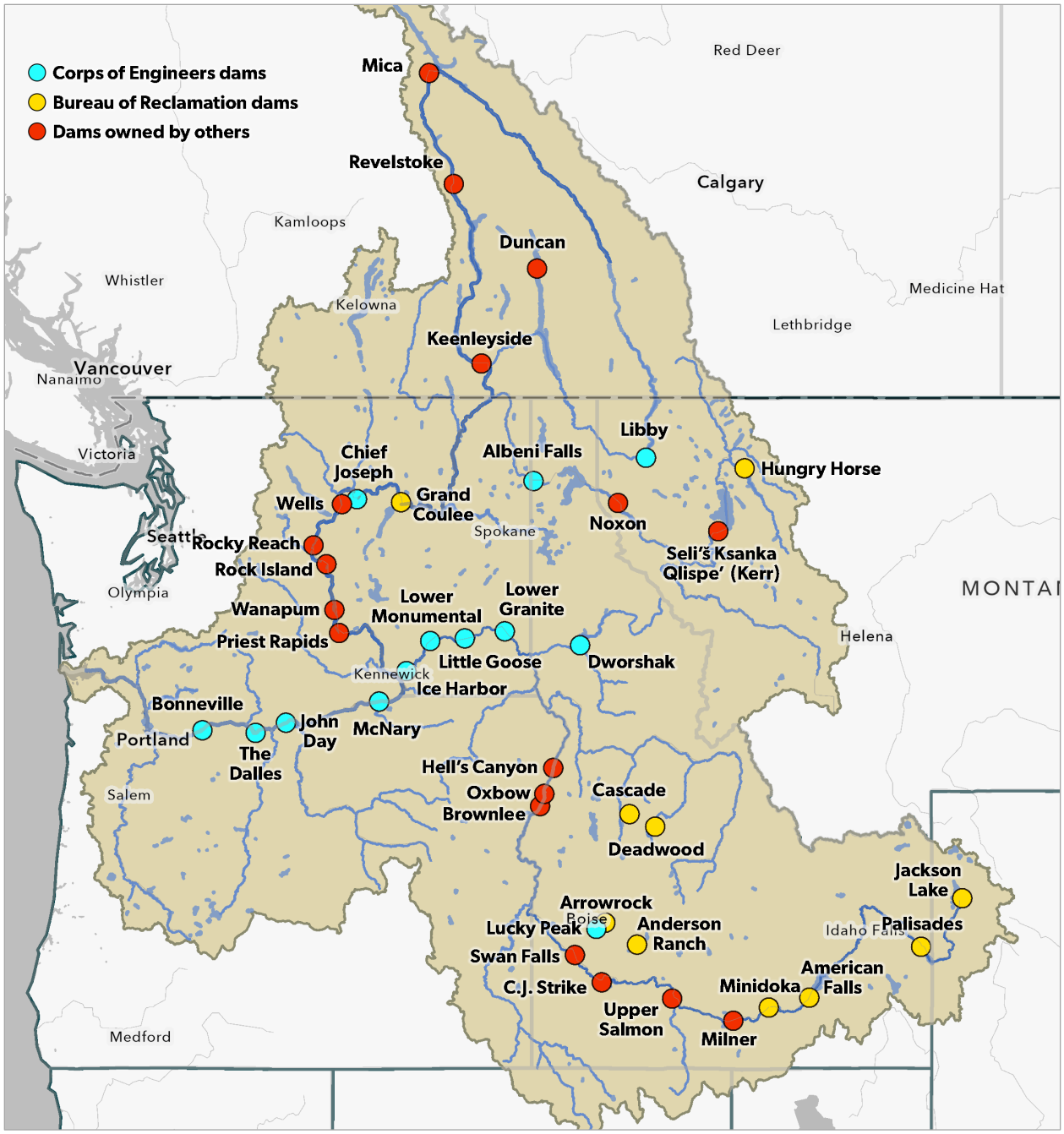

Figure 2. Over 250 hydroelectric facilities have been constructed in the basin since 1890. Large mainstem Columbia River dams were constructed between 1933 and 1971; large Snake River dams were constructed between 1952 and 1975. Due to scale, this figure shows mainstem dams on the Columbia and Snake Rivers, and a subset of tributary dams, but does not include all facilities that are part of the Federal Columbia River Power System. Also see interactive map.

Developing the Council's Fish and Wildlife Program

The Council developed and issued its first Fish and Wildlife Program in 1982. The Fish and Wildlife Program is updated approximately every five years. Under the Northwest Power Act, the process begins with a request for recommendations for Program measures and objectives from the region. The Act gives particular weight to recommendations made by federal and state fish and wildlife agencies and tribes, but any person or entity may submit recommendations. After recommendations are received, the Council opens up public comment on those recommendations. Next, the Council and staff synthesize recommendations and comments into draft amendments, presenting progress at both regularly scheduled monthly Council meetings and additional public meetings as needed. The Council then issues a draft Program, which begins an additional public comment period that includes extensive written comments, public testimony, public hearings in each of the four states, and consultations with interested parties. Following additional revision based on that public process, the Council adopts the Fish and Wildlife Program. Finally, the Council must adopt written findings that explain why recommendations were or were not included in the Program.

After the Council completes this process and adopts the Fish and Wildlife Program, under the Power Act, the Bonneville Power Administration (Bonneville) must use its fund and authorities to implement actions to protect, mitigate and enhance fish and wildlife in a manner consistent with the Council's Program. Additional federal agencies – the U.S. Army Corps of Engineers (the Corps of Engineers), the Bureau of Reclamation, and the Federal Energy Regulatory Commission (FERC) – also have responsibilities under the Act to exercise their authorities while taking into account the Council's Program at each relevant stage of decision-making processes to the fullest extent practicable to protect, mitigate and enhance fish and wildlife. After the revised Fish and Wildlife Program is adopted, the Council considers and adopts the latest version of the Northwest Power Plan.

Legal and Social Context of the Program

The Council recognizes that a range of legal and social factors influence how the natural resources of the Columbia River Basin are managed, and how the Council shapes the Fish and Wildlife Program. Successful protection, mitigation and enhancement efforts under the Northwest Power Act require the collaborative efforts of many entities and programs on a coordinated strategy for habitat protection and improvement, hydrosystem operations, artificial production, harvest management, and other actions, some funded under the program and some not. The Program's responsibility is to protect and mitigate for the effects of the hydrosystem on fish and wildlife and their habitats. It is important to recognize that there are other impacts to Columbia River Basin fish and wildlife beyond the hydrosystem, and those impacts can negatively influence or limit outcomes from the Program's protection and mitigation efforts. The Council recognizes the role of other entities in addressing these additional impacts to fish and wildlife in the Columbia River Basin, which require further funding and implementation of other actions under other laws and programs. These factors, some of which are detailed below, also influence what actions and strategies are feasible to implement to achieve the program vision.

Northwest Power Act general requirements. The Act directs the Council to protect, mitigate, and enhance the fish and wildlife affected by the development and operation of the Columbia River Basin hydropower facilities. The Council is to do so in a way that still assures the Pacific Northwest an adequate, efficient, economical, and reliable power supply, with an expectation in the Act that suitable environmental conditions for fish and wildlife are 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. The Council is to develop this Program on the basis of recommended measures and objectives largely from the federal and state fish and wildlife agencies and Indian tribes, recommended measures that the Council can expect to be implemented by the Bonneville Power Administration (Bonneville) and other federal agencies under the Act and other existing laws.

Public engagement. Public engagement is foundational to the Council's decision-making process, ensuring collaboration and transparency. There are multiple ways for interested parties to stay informed and get engaged. Council meetings are open to the public and hosted both online and in person throughout the region. Other resources include a monthly newsletter, annual reports, social media channels, and a website that serves as a regional hub of information on fish and wildlife and power planning. The Council uses these resources to amplify and illustrate the fish and wildlife work happening across the region and share these important stories with partners, the public, policymakers, and more.

Implementation under the Northwest Power Act and ratepayer responsibilities. Under the Act, consumers of the electric power from the hydroelectric dams of the Columbia River Basin (the ultimate end users of the power) are to bear the cost of measures designed to deal only with the adverse impacts caused by the development and operation of the electric power facilities. The Council's Program includes two types of measures to address these impacts. First, the Program contains measures that directly address the impacts that the hydrosystem has on fish and wildlife, through system operations and modifications implemented primarily by the Corps Engineers and Bureau of Reclamation. Second, the Program includes measures that address other limiting factors for fish and wildlife. This is because the Act authorizes the Council to include in the Program, in appropriate circumstances, "enhancement measures as a means of achieving offsite protection and mitigation with respect to compensation for losses arising from the development and operation of the hydroelectric facilities of the Columbia River and its tributaries as a system." The nexus to the hydrosystem that allows a measure to be an appropriate part of the Program is whether the measure will provide protection or mitigation benefits for fish or wildlife adversely affected by the hydrosystem or to compensate for effects not already mitigated.

On this basis, the Program has identified a comprehensive set of interrelated fish and wildlife issues and responsive strategies that are largely within Bonneville's authority to fund as direct and offsite protection and mitigation to satisfy Bonneville's obligations under the Act. The extent of Bonneville's funding obligation in any particular rate period will be determined through the procedures Bonneville uses to project which activities the agency needs to implement in that period to meet its obligations, estimates of the reasonable cost for these activities (expenditure and capital budget projections), and a determination of rates (in the rate case) necessary to produce the revenue needed to cover these costs. The other federal agencies with responsibilities to the Council's Program under the Act – the Corps of Engineers, Bureau of Reclamation, and Federal Energy Regulatory Commission – also implement a combination of measures to benefit fish and wildlife affected by the hydropower system. The combined implementation of measures addressing the direct impacts of the hydrosystem and the off-site mitigation measures must be sufficient to mitigate for the impacts of the Columbia hydropower system on fish and wildlife.

Bonneville uses a portion of its revenue from the sale of electricity generated by the Federal Columbia River Power System to satisfy its Power Act responsibilities by directly funding fish and wildlife protection, mitigation, and enhancement activities in a manner consistent with the Council's program and by reimbursing the federal Treasury for expenditures by the Corps, Bureau of Reclamation, as well as U.S. Fish and Wildlife Service for investments in fish passage and fish production under other authorities. The Council works with Bonneville and others to develop

budgets, implementation plans, and project recommendations that guide Bonneville rate-setting procedures on the level of effort necessary to act in a manner consistent with the program.

Shared responsibility. The development and operation of the hydropower system is only one factor in the loss of fish and wildlife in the Columbia River Basin, albeit a major factor. Improving conditions for fish and wildlife in the Columbia Basin and providing funding is a responsibility that the Council and its Program share with citizens, private entities, and government agencies throughout the region. The Act recognizes that Program measures may be more successful if implemented in coordination with the activities of others who are addressing factors other than those caused by the development and operation of electric power facilities and programs. Some of these factors and stressors are increasing in intensity. In such a case, program implementation allows for agreements among the appropriate parties providing for the coordinated administration and funding of additional measures. This current version of the program recognizes the whole-of-government approach to addressing the needs of salmon and steelhead and other fish and wildlife in the Columbia River basin. The Council considers whole-of-government in this context to mean that 1) the Council expects substantial contributions from the federal agencies with responsibilities under the Power Act to protect, mitigate, and enhance fish and wildlife impacted by the hydropower system, and 2) the Council encourages additional substantial contributions from Congress and other federal agencies and non-federal entities to address impacts to Columbia River Basin fish and wildlife from sources other than hydropower. The Council commits to working with other government entities in the basin to seek authorizations and funding from Congress to the federal agencies to complement and help make more effective the efforts funded by the ratepayers.

Role of fish and wildlife agencies and tribes. The Act envisions a strong role for the state and federal fish and wildlife agencies and the basin's Indian tribes in developing the measures and objectives of this program. The Council's program is to include measures, mostly recommended by the fish and wildlife agencies and tribes, that the Council determines "complement the existing and future activities of the Federal and the region's State fish and wildlife agencies and appropriate Indian tribes" and that will "be consistent with the legal rights of appropriate Indian tribes in the region."

Rights of Indian tribes. The Council recognizes that Indian tribes in the Columbia River Basin are sovereigns with governmental rights over their lands and people and with rights over natural resources that are reserved and protected in treaties, executive orders, and federal statutes. The United States has a trust obligation toward Indian tribes to preserve and protect these rights and authorities. Nothing in this Program is intended to affect or modify any treaty or other right of an Indian tribe. The Act and the Fish and Wildlife Program are intended instead as an effort in part to assist the Indian tribes in realizing their treaty and other rights and responsibilities with regard to

fish and wildlife. Thus, the Council also recognizes that implementation of this Program will require significant interaction and cooperation with the tribes. The Council commits to working with the tribes in a relationship that recognizes the tribes' interests in co-management of affected fish and wildlife resources and respects the sovereignty of tribal governments.

Harvest and harvest management and production agreements. The harvest of salmon, steelhead, and other fish provides significant cultural, economic, and recreational benefits to the region, and so the Program seeks to allow for harvest opportunities consistent with sound biological management practices. The Council's Program supports tribal and non-tribal harvest of fish and complements regional harvest management agreements, such as the Columbia River Compact, the U.S. v. Oregon Management Agreement, and the Pacific Salmon Treaty.

Applicable federal and state laws. The Council recognizes that the agencies that participate in and implement the Council's Program under the Act must also comply with and implement a range of federal and state laws. Relevant federal laws include the federal Endangered Species Act, the Clean Water Act, the National Environmental Policy Act, the authorizing legislation for particular projects within the Federal Columbia River Power System, and the Federal Power Act and licenses issued by the Federal Energy Regulatory Commission for non-federal projects. The Council designs the Program with the intent to complement these authorities and legal requirements and even assist other entities in their compliance through opportunities presented under the program.

Natural resources management. The Council is a planning agency that does not have management authority over natural resources, whether lands, waters, or fish and wildlife. These responsibilities lie with the federal, state, and tribal natural resources agencies. The Council's Program encourages collaboration and coordination so that program actions work in concert with, and do not conflict with fish and wildlife and other natural resources managers' activities and authorities.

Water rights. As provided by the Act, nothing in this Program shall affect the rights or jurisdictions of the United States, the states, the Indian tribes, or other entities over waters of any river or stream or any groundwater resources. Nor shall anything in this Program be construed to alter or establish the respective rights of the United States, the states, Indian tribes, or any person with respect to any water or water-related right.

Assuring the Pacific Northwest an Adequate, Efficient, Economical, and Reliable Power Supply

Section 4(h)(5) of the Northwest Power Act requires that the Council's fish and wildlife program consist of measures that protect, mitigate and enhance fish and wildlife affected by the development, operation and management of the Columbia River hydroelectric facilities "*while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply*." At the conclusion of a program amendment process the Council signifies in some manner that it has considered (a) how the collection of measures to be adopted as part of the program might affect the region's power supply; (b) the many other factors currently affecting or expected to affect the adequacy, efficiency, economics and reliability of the region's power supply; (c) and the requirements of the power planning process the Council will engage in under the Act following the completion of the amended fish and wildlife program. And with those considerations the Council also signifies an appropriate level of confidence that the region may implement the revised fish and wildlife program while assuring an adequate, efficient, economical, and reliable power supply. This is what is known variously as the "AEERPS" analysis or consideration or conclusion or statement, documented here.

Any AEERPS considerations and conclusions during a fish and wildlife program amendment process are tentative or preliminary, necessarily so. Following the program amendment process that resulted in the Council's 2026 Fish and Wildlife Program, the Council continues with and completes the separate statutory process under Sections 4(d) to 4(g) of the Northwest Power Act to review the Council's regional conservation and electric power plan, a process which will result in the Ninth Northwest Power Plan and of which the fish and wildlife program is but one element. The adequacy, reliability, efficiency and economics of the region's power supply can be fully gauged only in the context of a comprehensive review of the power system during the power planning process, especially as (a) fish and wildlife measures are but one of many factors and developments affecting the region's power supply and (b) the power plan's strategy for what cost-effective resources to add to the region's power supply is the vehicle intended under the Act for addressing the effects of the fish and wildlife program and other developments on the power system and maintaining an adequate, reliable and economical power supply.

Thus, the AEERPS considerations in this fish and wildlife program decision assume that the Council will adhere to the Power Act requirements in developing the power plan. This means approving a conservation and generating resource strategy to guide Bonneville and the region in acquiring cost effective resources as necessary to meet or reduce demand for electricity and to

"assist in meeting the requirements of section 4(h) of this Act." Section 4(h) is the section of the Act with the fish and wildlife program requirements. The idea is that cost-effective resource acquisitions will allow the power supply to remain adequate, reliable and economical while the federal agencies reliably implement hydrosystem operations and other actions that reduce system generation while they protect, mitigate and enhance fish and wildlife affected by the hydroelectric facilities.

The Council's considerations regarding what it means to approve the 2026 Fish and Wildlife Program measures while continuing to assure the region an "adequate, efficient, economical, and reliable" power supply are discussed in Appendix H of the Program. The summary conclusion is repeated here:

The operations in the 2026 Fish and Wildlife Program, when implemented, will alter the generation patterns of the region's hydropower system to some extent, but not to an extent significantly different than the impacts the system and the region have been accommodating in the recent past. There is no indication in the Council's analysis that the hydrosystem operations in the Council's program represent an adequacy and reliability issue by themselves, in the near-term or long-term, for either the region's power supply as a whole or for the federal system marketed by Bonneville. And what effects there are on the generation capacity of the system can be accommodated through the addition of new cost-effective conservation and generating resources – that is the point of the Northwest Power Act and the interplay of the Council's 2026 Fish and Wildlife Program with its follow-on Ninth Northwest Power Plan. There is also no indication that the program operations, when implemented, would substantially reduce the revenue expected by Bonneville or the investment costs of a new resource strategy compared to the operations implemented in recent years.

The Council's power plan analyses do show the region has significant resource needs and a clearly looming adequacy issue if action is not taken to add significant resources to the regional power supply in the next five years and beyond. The adequacy dilemma is driven by projections of increased demand much greater than the Council has seen in 45 years of power planning. At the same time, policies and economics are resulting in resource retirements and influencing the available resource mix. The characteristics and stability of hydropower generation are of high value in this transition. The Council has no reason to doubt that its power plan will be able to include an appropriate resource strategy that will add sufficient cost-effective resources to the region's existing power supply to meet these needs and maintain an adequate system, allowing both the use of the hydrosystem and the way in which reserves are planned and held to adapt within reason to better suit the evolved power supply. Adding new resources at the rate needed will be a challenge, but the Council also has reason to believe the region's utilities, governments, institutions - and the regional economy - will be up to the challenge. The Council is similarly

confident that the measures in the Fish and Wildlife Program will protect, enhance fish and wildlife while also being able to assure the region it will continue to enjoy an adequate, efficient, economical and reliable power supply.

Part Two: How the Fish and Wildlife Program is Organized

The Program Framework

The framework is an organizing tool that connects the actions outlined in the Program (called measures) to the objectives, goals, and overall vision of the Program. Principles of adaptive management help drive feedback between the framework elements, evaluation elements, and the scientific foundation of the Program. The framework is applied at all levels and scales of the Program, which are further described in the geographic structure section.

The fundamental elements of the Program framework are:

- The vision, which describes what the Council hopes to accomplish through protection, mitigation, and enhancement of fish, wildlife and habitat affected by the hydrosystem in the context of both the collaborative efforts toward restoring the broader ecosystem, and ongoing impacts to the ecosystem
- The goals and objectives, consistent with the vision, which describe the changes in the environment and the biological performance that are needed to achieve the vision
- The measures, which describe the actions to be taken that lead to the desired environmental and biological conditions (measures are grouped by strategies)
- The scientific foundation and principles, which provide the scientific rationale, based on the best available science, for why the Council believes certain management strategies and measures will result in particular ecological conditions and why these conditions will affect fish and wildlife populations or communities in a desired way to achieve the vision

Following the 2020 Addendum, indicators and assessments were developed to facilitate tracking and reporting on Program Implementation and Performance.

- Performance indicators describe physical and biological conditions in the basin relevant to the Program. They draw on information from projects and from other regional sources and typically include established benchmarks.
- Performance indicators are used to assess how the Program is being implemented and the progress being made towards meeting the Program's goals and objectives. Results from assessments inform future planning and implementation.

- An ongoing adaptive management feedback loop for the Program framework is illustrated in Figure 3.

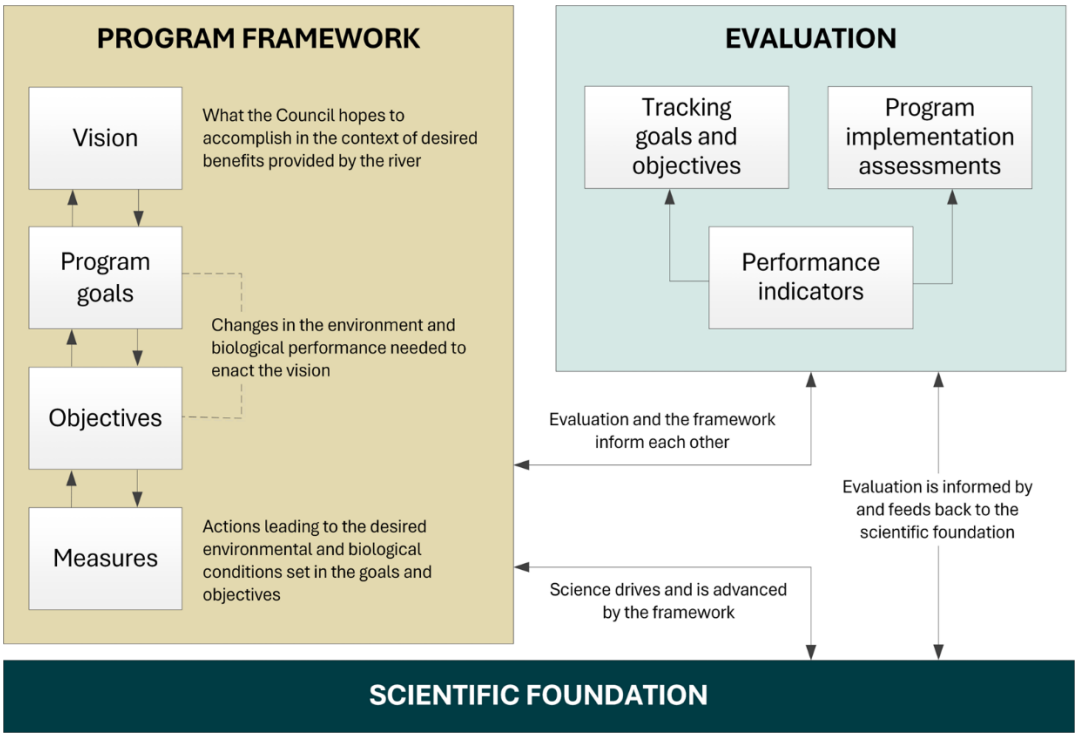

Figure 3. Fish and Wildlife Program framework

Adaptive Management

The Council is committed to an adaptive management approach (Figure 4) that uses research and monitoring data to understand how the Program and its associated projects and measures are performing, and to assess the status of focal species and their habitats. This information enables the Council to determine whether or not progress is being made toward Program goals and objectives. As such, adaptive management is an overlay to the Program framework. Planning, implementation, and evaluation steps are nested in the framework, and within planning and assessments of implementation and Program performance. The complete adaptive management approach is described in Part Five.

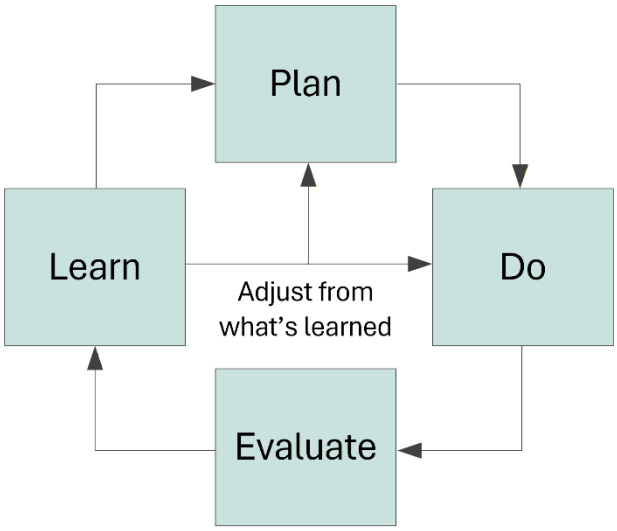

Figure 4. Adaptive Management Cycle

Applying the adaptive management approach to Program implementation provides a systematic process to learn and improve the strategies and measures used to mitigate, protect and enhance fish, wildlife, and habitats impacted by the hydrosystem in the Columbia River Basin. Monitoring, research, data management, evaluation and reporting are essential tools of adaptive management for assessing measures that implement the Program. Over the last 45 years, many critical uncertainties have been addressed through this process, yet significant gaps in knowledge remain. Addressing these knowledge gaps will assist in adapting the Program and its implementation.

Adaptive management cycle

Monitoring

- Monitoring ensures measures are implemented properly, comply with established standards, perform for the intended duration, and are completed as planned.
- Status and trend monitoring of fish, wildlife, and habitat provides baseline information needed to track progress toward Program goals and objectives, with particular attention to tracking quantitative biological objectives, reporting on indicators, and informing statistical models such as life-cycle models.

Research

- Research seeks to resolve critical uncertainties identified in the Council's research plan and assess new methods and technologies to improve the Program.

- Effectiveness projects address hypotheses regarding the degree to which an action is producing the intended benefit to fish, wildlife, or habitat; these results are relevant to management decisions.

Data management

- All monitoring and research data collected under the Program are designed to be readily accessible in regionally consistent formats to all interested parties in a timely manner and preserved beyond the longevity of a project.

Reporting

- Information acquired under the Program is organized, summarized, and reported to the public.

Evaluation

- Adapting to new information is an intrinsic part of the Program. The research, monitoring, and evaluation process ensures that this happens.

Program adaptive management

Currently, there are four main processes used to adaptively manage the Program and implementation of its projects:

- Amending the Program at least every five years pursuant to the Northwest Power Act (Act) per recommendations from the region, which are to be based on the best available science
- Regular reviews of the Program, including scientific reviews conducted by the Independent Scientific Advisory Board (ISAB)
- Reviews of Program-funded projects by the Independent Scientific Review Panel (ISRP) that inform Council recommendations about project implementation, [see ISRP, Council project recommendations, and CBFish.org] providing the opportunity to adjust project implementation over time to better align with refined science and continue to implement sound science
- Council assessments of Program implementation and performance (described in Parts Six and Seven of this Program, respectively)

Geographic Structure

The Columbia River Basin is an immense system that encompasses a vast array of physical, biological, and human elements. The Program recognizes that because of the size and complexity of this system, the basin is usually managed as a collection of individual components. However, the Act directs the Council to view the river as a single system in its planning. Managing the river as a system means recognizing its structure and how the parts work together. The Program also recognizes the Pacific Ocean as an integral component of the Columbia River ecosystem and includes a strategy for the ocean and freshwater plume.

The Program is organized into levels that make up its geographic structure and emphasize the relationships among the framework elements. The levels are:

- **Basinwide**: This level addresses the entire Columbia River Basin of about 259,000 square miles, including the plume and nearshore ocean. Basinwide guidance contains the Program vision, scientific foundation, biological objectives, strategies, and implementation provisions that apply generally across the Program and are implemented throughout the basin. This level represents management occurring at the landscape scale.
- **Mainstem**: In this Program, "mainstem" refers to the main channels of the Columbia and Snake rivers. The Program includes specific objectives and actions for the federal operating agencies and others to implement in the mainstem Columbia and Snake rivers to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric dams.
- **Subbasins**: This level represents geographic units of hundreds and in some instances thousands of square miles. Subbasins include all tributaries of the main Columbia and Snake rivers and also distinct sections of the mainstem rivers. The program includes 62 subbasins, as shown in Figure 5, 59 of which have subbasin plans and are a significant portion of the Council's Columbia River Basin Fish and Wildlife Program. These Subbasin Management plans contain specific objectives and measures that guide actions that implement the Program.
- **Other geographic scales**: Other geographic scales comprising adjoining subbasins with similar terrain and biological communities, called Ecological Provinces, may be used by the Council as geographic organizing tools to reference particular areas of the basin, or to review work occurring specifically in those areas. The Council may continue to use these organizing units as well as Evolutionarily Significant Units (ESUs) or Distinct Population

Segments (DPSs) for ESA-listed species, or other common geographic reference areas or management units to conduct its work, as appropriate.

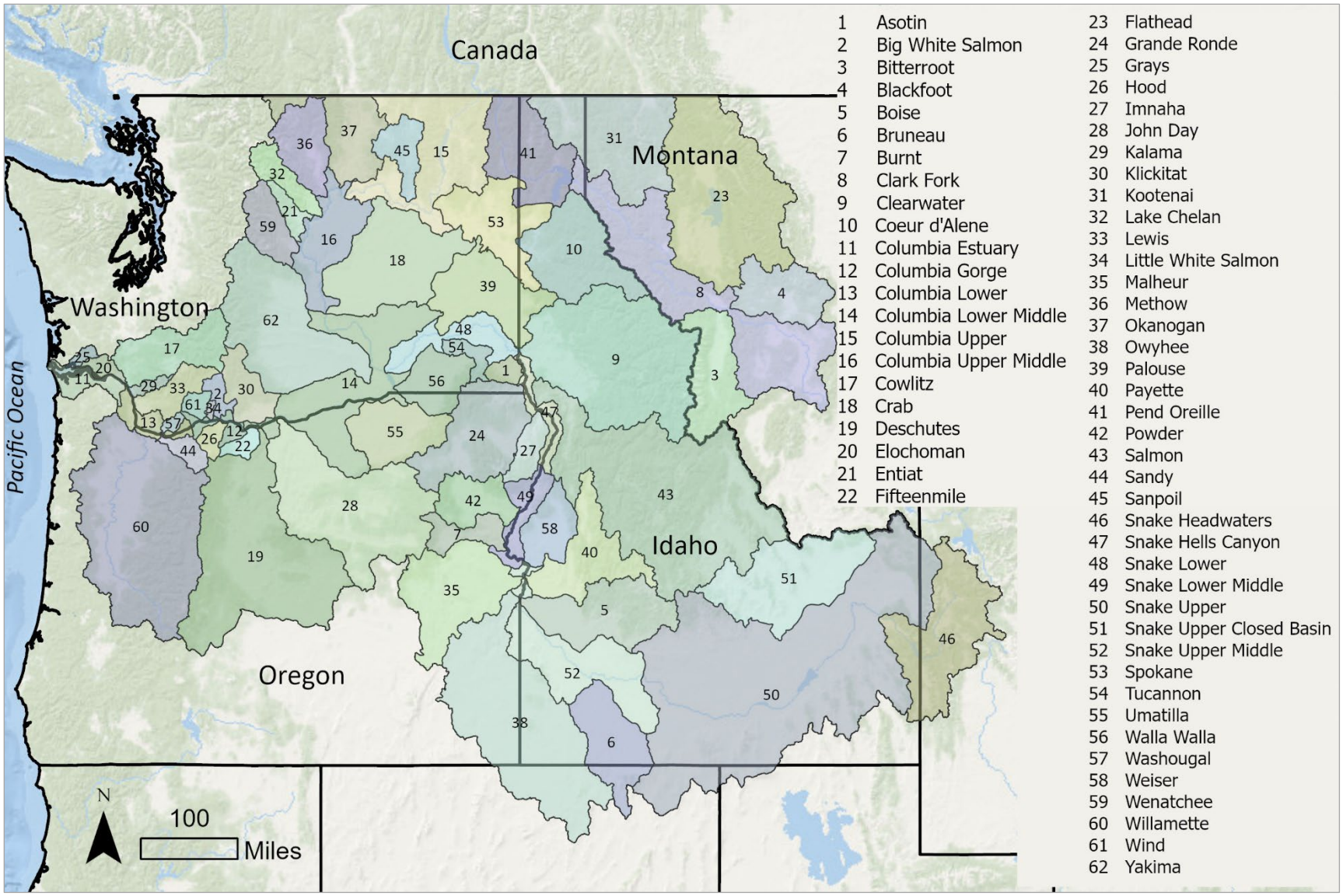

Figure 5. Columbia River Basin Fish and Wildlife Program Subbasins

Part Three: What the Program Seeks to Achieve

Vision

The vision for this Program is mitigation across the basin for the adverse effects to fish, wildlife, and habitat caused by the development and operation of the hydrosystem. Mitigation benefits the broader ecosystem, in which many partners collaborate to restore and sustain an abundant, productive, and diverse community of fish and wildlife, which has been impacted by a variety of human causes. As a result of mitigation and these external collaborations, the envisioned ecosystem provides abundant opportunities for tribal and non-tribal harvest, and the conditions that allow for rebuilding fish and wildlife populations affected by the hydrosystem.

The vision will be accomplished by protecting and restoring the natural ecological functions, habitats, and biological diversity of the Columbia River Basin. Where this is not feasible, other methods that are compatible with self-sustaining fish and wildlife populations will be used, including supporting populations through artificial production. Where impacts have irrevocably changed the ecosystem, the program will protect and enhance habitat and species assemblages compatible with the altered ecosystem.

Scientific Foundation and Principles

Significant ecological and environmental modifications have occurred in the Columbia River and its tributaries. A combination of actions is necessary to protect, mitigate, and enhance the fish, wildlife, and habitat impacted by the development, operation, and management of the hydrosystem. In order to achieve the vision of the Program, its strategies and actions must be founded on the best available scientific understanding.

The scientific foundation describes our best current understanding of the biological realities that govern how the Program's vision will be accomplished. It is summarized in Return to the River and subsequent reports produced by the Independent Scientific Advisory Board. The Council is directed by Congress, through the Northwest Power Act, to use the best available scientific information in its decisions and to continually improve the program's scientific understanding. The Independent Scientific Advisory Board is responsible for developing, reviewing, and recommending modifications to the Program's scientific principles.

The scientific foundation informs the Program's scientific principles, which summarize our current knowledge at a broad level. Program measures and actions should be consistent with those principles, to the greatest extent possible, recognizing that implementation may require balancing competing demands. These principles function as a compass, guiding planning and implementation, and supporting pragmatic decision-making.

Guiding Scientific Principles

Principle 1 – Take the entire ecosystem into account: To restore salmon, steelhead, and other native fish and wildlife in the Columbia River Basin, take the entire ecosystem (including the blocked areas) into account, including riparian, upland, freshwater, estuarine, and ocean components, and the linkage and feedback between the natural and human systems.

- Ecosystems include all living things in a given area, interacting with their physical environment.
- Ecosystems are hierarchical; large-scale physical conditions set the stage for physical and biological processes that occur at smaller scales of space and time.
- Ecosystems in the basin have evolved over millions of years and are constantly responding to natural disturbances and changes. Historical processes of disturbance and ecological change and their interactions with more recent human-caused changes determine the diversity, abundance, and productivity of plants and animals.

Principle 2 – Provide diverse habitats to support the entire life cycle: To restore and sustain diverse, abundant, and resilient populations of native fish and wildlife, policy and management actions will need to provide the diverse array of habitats that these animals require throughout their life cycles and the connections among them that allow access.

- Landscape perspectives provide essential physical and biological contexts for protecting and restoring river networks and the aquatic ecosystems that sustain native fish, wildlife, and plant communities.
- Factors that limit fish and wildlife abundance often change over time and differ across the landscape. Actions to address limiting factors must consider the full life cycle and geographic range of fish and wildlife species, while recognizing the broader context of large-scale environmental change.
- Restoring salmon, steelhead, resident fishes, and other native fish and wildlife will require sustaining connections among all habitats that these species require in rivers,

lakes, estuaries, ocean, riparian zones, and uplands at appropriate times throughout their life cycles.

Principle 3 – Maintain diversity to support persistence and resilience: The diversity of life histories, genetics, populations, and biological communities allows ecosystems to adapt to environmental change. Maintaining this diversity is important for sustaining native fish and wildlife into the future, especially in the face of natural and human-caused changes in climate, water quantity and quality, extreme events, exposure to non-native organisms including pathogens, and other conditions.

- Genetic diversity provides the raw material that allows populations of salmon, steelhead, and other native fish and wildlife to adapt to unpredictable or changing conditions.
- This genetic diversity interacts with environmental conditions to produce a portfolio of life history characteristics of fish and wildlife (e.g., different body sizes, timing of migrations). Different characteristics are beneficial under different environmental conditions, and this diversity of characteristics collectively confers resilience and increases capacity of populations to thrive under changing conditions.
- Artificially introducing genetic variation through translocations or artificial propagation has recognized risks, benefits, and uncertainties. These require monitoring and evaluation to assess the results and identify possible unanticipated outcomes.
- Fish and wildlife are also part of a diverse biological community comprised of other aquatic and riparian animals, plants, and microbes. These other species support biological and physical conditions that allow fish and wildlife to persist in the Columbia River Basin.

Principle 4 – Understand and acknowledge the human values affecting ecosystem management: Fish and wildlife live within complex ecosystems highly influenced by humans. In the Pacific Northwest, human populations continue to grow, along with associated impacts on the environment. Achieving ecosystem resilience and persistence requires understanding and acknowledging the societal and cultural values for these animals and their ecosystems and incorporating these values in decision making.

- Ecosystem conditions affect all species, including the well-being of humans.
- Managing ecosystems effectively requires implementing actions in an adaptive management framework.

- Effective mitigation and restoration will require policy and management actions that (1) are based on scientific principles and Traditional Ecological Knowledge, (2) address societal values, (3) recognize the strengths and weaknesses of decision-making processes, and (4) identify beneficial policy options.

Goals and Objectives

Program goals and objectives characterize what the Program seeks to accomplish through protecting, mitigating, and enhancing those habitats and biological systems adversely affected by the construction and operation of hydroelectric dams in the Columbia River Basin. They also provide a means to evaluate progress. Goals represent long-term, large-scale, and overarching targets, whereas objectives describe the specific, often quantitative, steps that need to be taken on the way to meeting goals. The Program's goals and objectives are consistent with the Act and with the Program's vision, describing the changes in the environment and the biological performance that are needed to achieve the vision.

There are two general types of Program goals and objectives. When hydrosystem losses have been quantitatively assessed, such as with anadromous salmon and steelhead and certain aspects of the wildlife and resident fish impacts, the Program's goals and objectives are explicitly described in terms of mitigating for those quantified hydrosystem losses.

In contrast, when hydrosystem losses have not been specifically identified, such as with sturgeon, lamprey, and resident species, the Program does not contain specific quantified mitigation objectives based in assessed hydrosystem losses. For these species, quantified objectives were provided by federal and state fish and wildlife agencies and tribes in a series of workshops leading up to the 2020 Program Addendum, based on external plans targeting these species. Refinements on those objectives came in the recommendations for the 2026 Program. The Council did not independently evaluate the objectives originating in external plans. Instead, the Council recognizes them as relevant to the Program under the following criteria: 1) they were well developed by others in the region; 2) they clearly related to the Program goals; 3) implementing the Program's measures under the Power Act would likely contribute to meeting these targets; and 4) the targets were relatively easy to understand and track. All of these numerical objectives are considered provisional pending further discussion among relevant fish and wildlife agencies and tribes. And none of them are intended by the Council to be considered solely the responsibility of the hydrosystem mitigation Program to achieve. It is also important to note that these external plans contain larger sets of actions than those covered in the Fish and Wildlife Program and a broader set of objectives than those specifically associated with the scope of the Program's hydrosystem mitigation responsibility. By making use of the measures

and objectives in these other plans for the Program purposes, the Council does not adopt these other plans into the Program.

For these reasons, this set of objectives are prefaced by language making clear that the actions implemented under Program measures intended to protect and mitigate for hydrosystem impacts on these species will "contribute to…" the success in achieving these objectives. The Program's responsibility is not to the numerical objective, but to implement actions under the Act to address the hydrosystem effects on these species in a way that may also help to some extent achieve the specified objective. Achieving the full objective depends on regional efforts beyond the Program's area of responsibility.

Regardless of whether goals and objectives are specifically related to a hydrosystem responsibility or are derived from external plans, the ability of the region to achieve these goals and objectives will depend on the coordinated actions of many parties, and progress has already been observed. In 2024, the Council completed a comprehensive effort to track and report on the status of Program goals and objectives. This report included substantial methods and context for understanding the progress that has been made over the last 45 years, and the magnitude of Program objectives, relative to where we are today. The Council will continue to report on goals and objectives using information provided by the region. We invite open dialogue, timely reporting on Program implementation, successes, and challenges, and a spirit of mutual accountability for the achievement of these goals and objectives. These results are presented publicly. More detail on the approach is provided in Part Seven of this Program, sources of information for goals and objectives are available here, results appear on Program Tracker, and status is documented in the Goals and Objectives Report.

Anadromous Salmon and Steelhead

Goal

Increase total adult salmon and steelhead runs of Columbia River origin to a 10-year rolling average of five million annually, in a manner that emphasizes increases in the abundance of the populations that originate above Bonneville Dam. It would take multiple generations of increasing abundance to achieve this goal as a 10-year average from where abundance is today. A near-term deadline to reach this goal may not be feasible absent extraordinary environmental conditions in freshwater and the ocean. However, annual returns have at times exceeded 4 million salmon and steelhead since the goal was adopted. As such, by 2035, show meaningful progress in increasing overall abundance toward this goal and continue to track shorter term increases in abundance and productivity through objectives.

For the purposes of this goal, total adult salmon and steelhead abundance numbers should be obtained by combining the number of adult salmon of all species counted at Bonneville Dam, the number of fish spawning below Bonneville Dam, and the estimated number of salmon caught in the ocean and in rivers below Bonneville Dam. Increases in abundance everywhere in the river are important, given that hydropower development and operations affect the entire river and all salmon and steelhead. But because most of the loss of salmon and steelhead production as a result of hydroelectric development has occurred above Bonneville Dam, increases in abundance to satisfy this goal must come predominantly from the area above Bonneville Dam.

Increasing the total salmon and steelhead runs to five million is an interim Program goal that began in the 1987 Program's commitment to "double the runs." This total abundance target is lower than the Council's estimates of the losses of anadromous fish due to the development and operation of the Columbia River hydroelectric facilities. (See the Program's Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin and Numerical Estimates of Hydropower-Related Losses). While the Program has always assumed artificial production will be one of the strategies used to achieve this goal, the proportion of naturally spawning fish contributing to this goal should increase as natural production increases.

The Program's numerical goal for salmon and steelhead is part of an overarching qualitative goal, consistent with the program's vision and the Act, to protect, mitigate and enhance salmon and steelhead adversely affected by the Columbia River hydroelectric power system, including related spawning grounds and habitat. By doing so, the Program will contribute to reversing the decline in populations and make progress toward restoring and then maintaining stable healthy populations of salmon and steelhead that support sustainable fisheries and allow for desired expressions of traditional cultural values and practices. Populations that are healthy and support

sustainable fisheries are defined as abundant, productive, genetically diverse, and spatially distributed within the Columbia River Basin, and provide ample opportunities for subsistence, ceremonial, recreational and (where appropriate) commercial fisheries that are of tribal trust, treaty, and non-treaty origin.

Biological Objectives (S)

S1 - Contribute to achieving the targets for salmon and steelhead adult abundance by stock developed and summarized by the NOAA Marine Fisheries Advisory Committee's (MAFAC) Columbia Basin Partnership Task Force.

The Council adopts this Program objective under the following premise: The Council has never distributed the Program's total salmon and steelhead abundance goal among stocks and areas of the basin. The Task Force developed abundance targets distributed across stocks and areas but did not allocate responsibility for meeting those targets among the Columbia River hydropower system and other mortality sources. For that reason, the Task Force's targets are not to be understood as a division of the Council Program's interim hydrosystem goal of an average annual abundance of 5 million total salmon and steelhead adults. Nor does the Council intend these distributed targets to represent, by themselves, the basis for distribution of the Program's effort under the Northwest Power Act to protect, mitigate and enhance salmon and steelhead in the different areas of the basin. Instead, the Council expects work implemented under the Program will contribute toward achieving these distributed targets along the way to achieving the overarching Program goal, and thus the Council will track progress toward these distributed abundance targets as part of program performance.

S2 - Contribute to achieving a smolt-to-adult return ratio (SAR) in the 2-6 percent range (minimum 2-percent; average 4-percent) for natural-origin stream-type Chinook salmon and summer steelhead in the Upper Columbia and Snake Rivers. The Council acknowledges that, in the absence of SAR targets developed specifically for other species or runs, this target has been applied more broadly than originally intended. Therefore, because of differences in life histories, evaluate whether a new or specific SAR target is needed for other species and runs, or other regions of the basin. By the end of 2027, the Council requests a status update on the data needs and process to evaluate existing targets or develop new targets for other species and runs.

S3 - Continue to improve juvenile passage survival through the hydrosystem.

S4 - Achieve the following annual adult salmon and steelhead survival standards for the Bonneville Dam to Lower Granite Dam reach and the Bonneville Dam to McNary Dam reach:

ESU	Adult Performance Standard	Reach
Snake River fall Chinook	81.2%	BON to LGR
Snake River spring-summer Chinook	91.0%	BON to LGR
Snake River sockeye	Use Snake River spring/summer Chinook salmon and steelhead as surrogate until a standard is developed	BON to LGR
Snake River steelhead	90.1%	BON to LGR
Upper Columbia River spring Chinook	90.1%	BON to MCN
Upper Columbia River steelhead	84.5%	BON to MCN
Middle Columbia River steelhead	Use Snake River steelhead as surrogate until a standard is developed	Variable
Columbia River chum	None; assume survival is adequate if Snake River Chinook BON to LGR standard is met	None
Lower Columbia River Chinook	None; assume survival is adequate if Snake River spring/summer Chinook and Snake River fall Chinook standards are met	None
Lower Columbia River coho	None; assume survival is adequate if Snake River fall Chinook standards are met	None
Lower Columbia River steelhead	None; assume survival is adequate if Snake River steelhead standards are met	None
Upper Willamette River Chinook	None	None
Upper Willamette River steelhead	None	None

S5 - With the agreement of the relevant co-managing state agencies and tribes, contribute to assessing and, where appropriate, expanding anadromous fish distribution into historical habitat above blocked areas.

S6 - Bonneville-funded hatchery programs meet the production commitments underlying each program (whether from *US v Oregon* Management Agreement or elsewhere).

S7 - Contribute to maintaining genetic diversity over time.

All Other Native Aquatic Focal Species

Goal

The Program goal, consistent with the Program vision and the Act, is to protect, mitigate and enhance these other native focal aquatic species adversely affected by the development and operation of the Columbia River hydroelectric power system, including related spawning grounds and habitat.

The Program does not include quantitative hydropower loss assessments and hydropower-related quantitative mitigation goals for aquatic species other than anadromous salmon and steelhead, with the exception of the impacts of Hungry Horse and Libby dams on certain resident fish species. As described in more detail at the beginning of this part, at this point, the Program's "objective" toward these species is the same as stated in the Goal statement - to protect, mitigate and enhance their status by the addressing the effects of the development and operation of hydrosystem on these species. But those efforts to protect, mitigate and enhance other native focal species under the Northwest Power Act and the Council's Program will then also help contribute to efforts to achieve the following objectives that are based in other plans in the region for the same species, restoring and maintaining stable healthy populations, supporting sustainable fisheries, and allowing for desired expressions of traditional cultural values and practices. Populations that are healthy and support sustainable fisheries are defined as abundant, productive, genetically diverse, and spatially distributed in areas of the historic range within the Columbia River Basin, and provide ample opportunities for subsistence, ceremonial, recreational and (where appropriate) commercial fisheries that are of tribal trust, treaty, and non-treaty origin.

Biological Objectives

White Sturgeon (WS)

As described above, in the absence of quantitative goals and objectives based in hydropower loss assessments, the Program objective is protect, mitigate and enhance white sturgeon affected by the development and operation of the hydropower system. In doing so, contribute as appropriate to achieving the following white sturgeon adult abundance targets, as well as other population characteristics, derived from sturgeon management plans across the region.

WS1 - Abundance:

Lower Columbia River and Lower Snake River:

Abundance objectives for subadult (38-65" Fork Length; FL) and adult (66" + FL) white sturgeon.

Location	Calculation	Origin	Subadults	Adults
Lower Columbia	3-year running mean	Wild	300,000	6,250
Bonneville Reservoir	3-event sampling mean	Wild	67,973	6,728
The Dalles Reservoir	3-event sampling mean	Wild	47,125	3,392
John Day Reservoir	3-event sampling mean	Wild and hatchery	208,081	5,055
McNary Dam to Priest Rapids Dam; Snake River below Lower Granite Dam	TBD	TBD	TBD	TBD

Middle Snake River:

- Natural, stable age structure population with a minimum of 3,443 adult fish from Lower Granite to Hells Canyon as measured every 5 years.

Upper Snake River:

Reach	Adult abundance
Upper Power Plant Dam downstream to Shoshone Falls	500
Shoshone Falls downstream to upper Salmon Falls Dam	450
Upper Salmon Falls Dam downstream to Lower Salmon Falls Dam	260
Lower Salmon Falls Dam downstream to Bliss Dam	110
Bliss Dam downstream to C.J. Strike Dam	2,065
C. J. Strike downstream to Swan Falls	460
Swan Falls downstream to Brownlee Dam	2,900
Brownlee Dam downstream to Oxbow Dam	NA
Oxbow Dam downstream to Hells Canyon Dam	NA

Upper Columbia River:

- Interim adult populations of 2,000 in the Canadian transboundary reach and 5,000 in the U.S. transboundary reach, which is also capable of sustaining subsistence and recreational fishery harvest, subject to review and agreement.

Kootenai River:

- Stable, self-sustaining, healthy populations within all available historical habitats. Adult abundance targets for hatchery-reared and wild fish will be developed over time as understanding of constraints is refined. Those constraints may change over time based on flow management, habitat, and nutrient restoration efforts. Until those targets are developed, contribute to achieving the USFWS recovery goal for Kootenai River white sturgeon, which is:
    - At least 250 wild Kootenai River white sturgeon mature to adults (age-25) annually, averaged over ten years.
    - The population includes at least 10,000 wild juveniles, ages 3 to 24 years.
    - The population demonstrates consistent natural production of at least 700 wild age-3 juveniles in at least three of ten consecutive years.
    - Offspring of hatchery-reared sturgeon will count towards the recovery criteria, because those offspring will have been naturally spawned and reared in the Kootenai River.

WS2 - Spatial Distribution:

- Stable, healthy populations within all available historic habitats. These habitats include the lower Columbia River and its estuary, the Willamette River downstream of Willamette Falls; the Bonneville, The Dalles, John Day, McNary, Priest Rapids, Wanapum, Rock Island, Rocky Reach, Wells, and Rufus Woods reservoirs; and the transboundary reach of the upper Columbia River from Grand Coulee Dam in Washington to Hugh Keenleyside Dam in British Columbia; the transboundary reach of the Kootenai River from Kootenai Falls, Montana, downstream to Corra Linn Dam at the outflow from Kootenay Lake in British Columbia; Ice Harbor, Lower Monumental, Little Goose, and Lower Granite reservoirs in the lower Snake River upstream to Shoshone Falls; and Oregon and Washington coastal rivers, bays, and estuaries.

WS3 - Genetic Diversity:

Columbia River populations:

- Maintain or attain genetic diversity within all populations similar to historical levels. Maintain diversity sufficient to respond to future conditions and permit population adaptation and persistence. This may be tracked using existing or new genetic tools.

Snake River populations:

- Preserve genetic integrity (including rare alleles) similar to current levels. This may be tracked using existing or new genetic tools for Lower Granite Dam to Brownlee Dam and for reaches between Brownlee Dam and Shoshone Falls as measured at 5-year intervals for Shoshone, Upper Salmon, Bliss, CJ Strike, Swan Falls) and ten-year intervals for Hells Canyon.

Kootenai River:

- Maintain genetic diversity similar to historical levels. In the interim, this may be achieved using artificial production and in the long term it may be achieved through sufficient levels of natural recruitment, which will be identified and defined by a USFWS Recovery Plan. Genetic diversity may be tracked using existing or new genetic tools.

WS4 - Productivity:

Lower Columbia River and Lower Snake River:

Annual recruitment and length-frequency distribution of wild white sturgeon populations in all impounded and non-impounded reaches indicates a balanced, robust, productive, and viable population capable of supporting societal needs. The below population-specific recruitment index objectives are provisional until full sturgeon loss assessments are completed.

- **Recruitment Index**: Three year running mean of proportion of positive sets (E_p)

Location	Recruitment Index (E_p)	Comment
Lower Columbia	$E_p \geq 0.52$	Wild
Bonneville Reservoir	$E_p \geq 0.51$	Wild
The Dalles Reservoir	$E_p \geq 0.53$	Wild
John Day Reservoir	$E_p \geq 0.22$	Wild and hatchery

McNary Dam to Priest Rapids Dam; Snake River below Lower Granite Dam	TBD	E_p when available based upon recruitment surveys

- **Length-Frequency Distribution**: (In conjunction with above objectives) ~95% juveniles (21-38" FL), ~4.5% sub-adult (38-65" FL), ~0.5% adult (≥ 66" FL)

Snake River:

6. Recruitment Index: Annual standardized YoY gill net sampling (CPUE) in Core Conservation populations (BLS to CJS and HCD to LGR) when available
7. Length-Frequency Distribution – numbers to be developed

Upper Columbia River:

- Naturally-produced recruitment and juvenile population sizes sufficient to support desired adult population sizes
- Stable size and age distribution
- Abundance and natural production rates are sufficient to support beneficial uses including subsistence and recreational harvest

Kootenai River:

8. Annual recruitment of Kootenai sturgeon reflects a balanced, self-sustaining, viable population. Productivity objectives are contained within abundance objectives above.

Pacific Lamprey (L)

As described above, in the absence of quantitative goals and objectives based in hydropower loss assessments, the Program objective is protect, mitigate, and enhance Pacific lamprey affected by the development and operation of the hydropower system. In doing so, contribute as appropriate to achieving the following adult abundance and other population targets for Pacific lamprey, based largely in Lamprey conservation and restoration plans throughout the region:

L1 - Contribute to achieving one million adult Pacific lamprey passing Bonneville Dam and one million adults passing Willamette Falls, consistent with historical counts from the 1950s-1960s.

L2 - In the long term, contribute to restoring adult lamprey populations across the historical distribution and range of Pacific lamprey in the Columbia basin, including across all six Pacific Lamprey Regional Management Units (RMU), which is measured every five years through the Pacific Lamprey Conservation Initiative (PLCI) Lamprey Status Assessment.

L3 - Continue to improve passage efficiency for adult Pacific Lamprey to an interim standard of at least 80 percent at each hydroelectric facility on the mainstem and tributaries of the Columbia, Snake, and Willamette Rivers.

L4 - Improve passage efficiency for larval and juvenile Pacific lamprey at each hydroelectric facility on the mainstem and tributaries of the Columbia, Snake, and Willamette Rivers, progressing toward standards used to measure juvenile salmonid survival until these can be confirmed as appropriate or replaced with an alternative.

Resident Salmonids (R)

Except for assessments of the impacts of Hungry Horse and Libby dams on resident fish, the Fish and Wildlife Program does not include quantitative loss assessments or related goals and objectives for the hydropower system's impacts on resident salmonids. In their absence, contribute to the following:

R1 - For bull trout, contribute to achieving self-sustaining populations geographically widespread and capable of migrating across their native range, providing for genetic integrity and exchange and with stable and/or increasing fish populations capable of sustaining harvest across that range.

R2 - For cutthroat trout, contribute to achieving self-sustaining populations, geographically widespread across their native range, providing for genetic integrity and exchange and with stable and/or increasing fish populations capable of sustaining harvest across that range.

R3 - For kokanee, contribute to achieving self-sustaining, broadly distributed populations in the 11 subbasins in which they are present, with stable and/or increasing populations capable of sustaining harvest where they are identified as a focal species.

R4 - For redband trout, contribute to achieving self-sustaining populations, geographically widespread across their native range, providing for genetic integrity and exchange and with stable and/or increasing fish populations capable of sustaining harvest across that range.

R5 - Hungry Horse Dam impacts on Westslope cutthroat and bull trout have been assessed and partially mitigated. Mitigation for these losses has been expressed and implemented under the Program primarily in terms of operations and habitat protection targets and not species numbers. A current mitigation target for these salmonids is to restore and protect 448 miles (721 km) of suitable stream habitat within the Flathead River watershed that is closely equivalent to the habitat blocked and inundated by Hungry Horse Dam.

R6 - Libby Dam impacts on Westslope cutthroat and bull trout have been assessed and partially mitigated. Mitigation for these losses has been expressed and implemented under the Program

primarily in terms of operations and habitat protection targets and not species numbers. A current mitigation target for these salmonids is to restore or protect 109 miles (175.42 km) of Kootenai River and 40 miles (64.37 km) of tributary stream that were inundated by Libby Dam and make accessible 60 miles or more of previously blocked suitable streams.

Other Native Aquatic Focal Species (NF)

The Fish and Wildlife Program does not include quantitative loss assessments or objectives for the hydropower system's impacts on other native aquatic focal species, including eulachon, burbot, Oregon chub and freshwater mussels. At this point, the program's biological objectives for these other native aquatic focal species are expressed in the goal statement. As objectives for these species become available externally to the Program, they may be incorporated into Program objectives, as appropriate.

NF1- Contribute to conservation and restoration of viable native freshwater mussel populations (including Western pearlshell mussels, Western ridged mussels, Oregon/ Western floater clade, and California/ Western floater clade) and their habitats, across their native range, providing for genetic integrity and exchange and with stable and/ or increasing populations of their host fish (trout, salmon, sculpin species, redside shiner, speckled dace, and three-spine stickleback) across that range.

Wildlife

Goal

Mitigate for wildlife losses caused by the development and operation of hydropower dams.

Mitigation Objectives (W)

Wildlife losses from dam construction and inundation (C&I) have been assessed and quantified and are displayed in Appendix D, Table D-4. Mitigation for the assessed C&I losses is nearly complete, through three decades of the acquisition and protection of properties. Operational losses, though assessed and mitigated in some areas, remain largely unassessed and unaddressed. Appendix D, Table D-4 remains the expression of C&I mitigation objectives.

W1 - Complete mitigation for construction and inundation losses over the next five-year period by acquiring lands or through settlement.

W2 - Assess and mitigate for losses due to the operation of the hydroelectric facilities. Mitigate for the assessed losses of wildlife associated with the ongoing operations of Hungry Horse and Libby at 26,321 acres for Hungry Horse Dam and 35,571 acres at Libby Dam. The objective for the next five-year period will be to complete loss assessments or begin settlement agreements at all facilities and initiate mitigation.

W3 - Ensure all parcels and/or management units operate under an approved management plan.

W4 - Maintain existing habitat mitigation values on the parcels and/or management units as described in their individual management plans.

Ecological

Goal

Contribute to providing environmental conditions and processes that support the ecosystem functions necessary to restore healthy, self-sustaining and harvestable populations of native anadromous and resident fish and wildlife adversely affected by the hydroelectric power system, including related spawning grounds and habitat.

Ecological Objectives (E)

E1 - Contribute to maintaining and improving habitat quantity, quality , connectivity, and functions (including cold-water refuges) while taking into account climate change.

E2 - Contribute to maintaining and improving water quantity and quality.

E3 - Provide flows through the hydrosystem of sufficient quality and quantity to improve production, migration, and survival of fish. The Program's objectives include flow objectives and reservoir elevation targets recognized in the Program and in most cases embedded in the federal system operating plans and intended to benefit both listed and key unlisted populations of anadromous and resident fish. These objectives include managing water through the hydroelectric system to attempt to achieve the following seasonal flow objectives at specified mainstem Columbia and Snake River dams, with limitations and adjustments on meeting these targets as described in relevant biological opinions, See Mainstem Hydrosystem Flow and Passage Operations strategy for details.

E4 - Contribute to significantly reducing avian, pinniped and fish predation levels that negatively impact the habitat and populations of focal fish species in order to improve abundance and survival of these fish species.

E5 - Contribute to management, prevention or eradication of non-native and invasive species in order to improve abundance and survival of focal fish and wildlife species.

E6 - Contribute to maintaining and improving habitat quality on land purchased or managed to mitigate for hydrosystem impacts on wildlife, resident fish, and/or anadromous fish by developing and using approved land management plans for all parcels purchased under the program.

E7 - To mitigate for hydrosystem impacts on estuary habitat, contribute to broader habitat restoration targets in the estuary, including recovering 30% of historically present (c. 1870) priority habitats by 2030 and 40% by 2050 and maintaining no net loss of the existing native habitats as of 2009.

Communication, Assessment and Coordination

Goal

Inform the public about the Council's Fish and Wildlife Program to encourage awareness and involvement, including consideration of the Program within an ecological and social context. Track and report on progress in Program implementation and performance. Secure improved access to all Program-related information and data.

Communication, Assessment, and Coordination Objectives (C)

C1 - Annually report on progress toward Program objectives, Program strategy performance indicators, and addressing research critical uncertainties.

C2 - Review progress toward achieving objectives and strategy performance indicators and refine Program objectives and Program strategy performance indicators as needed.

C3 - Improve access to information to inform decisions about Program investments, operation and maintenance, and factors that affect Program activities and success.

C4 - Track FERC hydroelectric project applications with respect to the Program's protected areas or hydroelectric licensing standards and inform the public if Commission (or licensee) actions impair the ability to implement the Fish and Wildlife Program.

C5 - Advance efforts to complete remaining loss assessments.

Part Four: Mitigation Strategies and Measures for Fish and Wildlife Affected by the Hydrosystem

The Fish and Wildlife Program contains hundreds of actions that are intended to protect, mitigate, and enhance fish and wildlife impacted by the hydrosystem. In the Program, these actions are called measures. Measures are then grouped into larger strategies, which articulate the long-term, Program-wide, or topic-specific approach to meet the Program's vision, goals, and objectives. Although each strategy is described independently of the others, they are designed to be implemented together – in a connected system. These strategies and measures have developed and evolved over the last 45 years based on the best available science.

There are currently eleven strategies in the Fish and Wildlife Program. The first strategy is Mainstem Hydrosystem Flow and Passage Operations, which includes onsite mitigation measures for the operation and configuration of the hydropower system that are intended to protect and mitigate fish from the effects of the system. This is followed by strategies and measures for offsite mitigation implemented as compensation for past and ongoing hydrosystem impacts from which fish and wildlife cannot be directly protected. These include Habitat Restoration and Protection, Wildlife Mitigation, Predator Management, Non-native and Invasive Species Management, Plume and Nearshore Ocean, and Artificial Production. Lastly, there are strategies spanning multiple programmatic topics. These include Anadromous Fish Mitigation in Blocked Areas, Protected Areas and Licensing Conditions and FERC Relicensing, Subbasin Plans, and Planning, Research, Monitoring, and Evaluation in support of multiple strategies.

Each strategy begins with a brief description, a rationale, general measures, and specific measures. Some include a section on research, monitoring, and evaluation (RM&E), where appropriate.

Program measures are designed to benefit all focal species, including salmon and steelhead, resident species (e.g., bull trout, cutthroat trout), eulachon, sturgeon, lamprey, and a range of wildlife focal species. Previous Programs called out strategies for resident species as a group, along with strategies for sturgeon, lamprey, and eulachon. This Program emphasizes a multi-species approach toward implementing strategies and measures, such that

implementation benefits the whole ecosystem and species are only called out in measures when they have unique needs. All measures associated with these species are indexed in Appendix B for easy reference.

Multiple entities are responsible for funding and implementing the measures in this Program. The Bonneville Power Administration funds the majority of implementation by state fish and wildlife agencies, tribes, and other relevant parties. Other federal agencies with responsibilities to the Program under the Act – the Corps of Engineers, Bureau of Reclamation, and the Federal Energy Regulatory Commission – implement a variety of hydropower system operations, dam modifications, habitat improvements, and licensing conditions to benefit Columbia River Basin fish and wildlife. The Council also has a role in the implementation of certain measures. The Program identifies responsible parties when a measure requires this specificity, but in general, measures describe actions to be implemented.

Mainstem Hydrosystem Flow and Passage Operations

Manage dams and reservoir operations to protect and restore ecosystem function and habitats, and to improve fish passage and survival through the hydrosystem to help achieve Program abundance and productivity goals. Analyze the power system effects of operations for fish and recommend adaptations to the power system so that these fish operations may be executed in a reliable manner while the region continues to have an adequate, efficient, economical, and reliable power supply.

Rationale

The mainstem of the Columbia and Snake rivers is that central portion of the Columbia River Basin linked by systemwide water management from the headwaters into the estuary and plume and by the large structural changes related to that systemwide water management. All Columbia River Basin anadromous fish use some portion of the mainstem for juvenile migration, rearing, resting, the biophysical transition from freshwater to saltwater, and adult migration. Significant populations also spawn in the mainstem, while some of the system's most productive core populations used to spawn and rear in the mainstem but have been extirpated by the inundation and blockage of more than half of the habitat area by the development of the hydrosystem. This loss of capacity is a major consideration in the Act's mitigation obligation. Mainstem hydrosystem development and systemwide water management have also impacted most of the other native fish important to the Program, including sturgeon in both the upper and lower Columbia River Basin, lamprey, and bull trout.

System operations for multiple purposes have a direct impact on fish habitat and overall fish survival, compromising habitat conditions for spawning, rearing, resting, and migration. For more than 40 years, the Program measures have led to changes in system operations for the benefit of improved habitat conditions and fish passage survival. As relevant to listed species, these measures have largely been incorporated into Federal Columbia River Power System (FCRPS) biological opinions. The Council's Program adds important consideration to the benefits for non-listed anadromous and resident species affected by hydrosystem operations. The region is also looking to the Council's Program to investigate the potential for additional gains in ecosystem function and floodplain connectivity. The Council develops the Program's hydropower measures for the benefit of salmon, steelhead, and other native fish, while also maintaining the benefits of the energy provided by the hydropower system and, if necessary, adding cost-effective resources compatible with that system to maintain an adequate and reliable power supply.

The mainstem hydrosystem section of the 2026 Program emphasizes three themes. First is the need for consistency. System operations, especially voluntary spill operations, have changed frequently in the last decade. The region needs to implement agreed-upon operations consistently over multiple years. These longer-term, consistent operations will provide a background for monitoring and assessing both the direct effects of these operations on juvenile and adult survival, and the ability to evaluate additional and emerging ecosystem effects (e.g. predation). Second is the need to prioritize operations that keep water flowing with minimal fluctuations during peak juvenile migration. Expected benefits would be increasing velocities and maintaining downstream flows to avoid ponding and juvenile fish disorientation. Other benefits may include decreasing temperatures and reducing encounters with predators. Steady flows are also important for adult migration and mainstem spawning, emergence, and rearing. Third is the need for asset management, a theme cutting across the Program. Much of the dam passage infrastructure is vulnerable or degrading. It is further stressed by the demands of current operations, especially large and constant amounts of spill and the associated spillway infrastructure. The Council is placing a priority on securing adequate funding for both recurring and non-recurring maintenance needs.

Most of the hydrosystem operations section concerns operations of the federal Columbia River power system. Implementation of the measures here is primarily the responsibility of the agencies operating and managing these dams and the system – the Corps of Engineers, the Bureau of Reclamation, and Bonneville. Where necessary, a specific agency is identified. The Program also contains measures for the operations of non-federal projects – the responsible entities to consider these measures are the Federal Energy Regulatory Commission and the relevant project licensee/operator.

General Measures

H 1. Prioritize operations and dam modifications that produce the flow, passage, and habitat conditions that best fit the natural behavior patterns of native fish.

H 2. Manage hydrosystem operations to support biological diversity by minimizing the artificial selection or limitation of life history traits.

H 3. The Council supports hydrosystem operations that ensure a resilient and healthy ecosystem-based function throughout the mainstem Columbia and Snake rivers while: (a) maintaining an acceptable level of flood risk; (b) assuring adequate, reliable, and economic hydropower benefits; and (c) recognizing and implementing the other authorized purposes of the individual dams of the Columbia River system.

H 4. The effectiveness of the flow and passage measures intended to improve in-river juvenile salmon and steelhead survival needs to be coupled with the implementation of measures intended to address other ecological threats to juvenile salmon as they migrate, especially management of in-river predators. See Predator Management strategy in Part Four.

H 5. Assess whether changes in climate are altering or are likely to alter critical river flows, water temperatures or other habitat attributes in a way that could significantly affect fish or wildlife important to this Program, either directly or by affecting the success of current mitigation efforts and if so, evaluate whether alternative water management scenarios, including changes in flood control operations, could minimize the potential effects of climate change on mainstem hydrology and water temperatures.

H 6. Following the principles of adaptive management, the federal action agencies, in collaboration with the Council, state and federal fish and wildlife agencies, tribes, and the utilities, shall continue to investigate, develop, and implement flow and passage measures that improve fish life-cycle survival.

H 7. The Council assumes that, in the near term, the breaching of dams in the mainstem Columbia and Snake rivers will not occur.

H 8. Improve in-river passage and water quality conditions consistent with the biological objectives of this Program, the performance standards of the FCRPS biological opinions, and state, tribal, and federal water quality standards under the Clean Water Act.

H 9. Protect a broader range of native species and their habitat than just for listed species. The Program is broader than the Endangered Species Act, both in terms of species affected by the hydrosystem and the ultimate objective of the Program that goes beyond just delisting endangered species.

H 10. The water management and fish passage actions, flow objectives, and passage standards proposed by the federal operating agencies and reviewed in the current biological opinions under Section 7 of the Endangered Species Act are baseline flow and passage measures for the Council's Program. The three most relevant biological opinions at this time are:

- 2020 Biological Opinion issued by NOAA Fisheries for the Continued Operation and Maintenance of the Columbia River System to offset adverse

effects on listed salmon, steelhead, southern resident killer whales, eulachon and green sturgeon.

- 2008 Biological Opinion issued by NOAA Fisheries for the Operation and Maintenance of U.S. Bureau of Reclamation Projects in the Upper Snake River Basin above Brownlee Reservoir.
- 2020 Biological Opinion issued by the United States Fish and Wildlife Service addressing Operations and Maintenance of the Columbia River System in Washington, Oregon, Idaho, and Montana, and its effects on bull trout and Kootenai River white sturgeon.

The proposed actions and biological assessments from the federal operating agencies underlying these biological opinions are the primary sources of these measures. Annual water management plans and other implementation plans developed by the federal agencies in coordination with the state fish and wildlife agencies and the region's tribes pursuant to these biological opinions are also sources of the specific implementation measures in the Program.

H 11. The rest of this strategy (a) repeats and emphasizes some of these measures in the context of key principles in the program; (b) in a few key places, recommends measures for implementation that differ with the measures in the biological opinion baseline; and (c) adds measures to the described baseline that are important for the benefit of both listed and non-listed anadromous and resident species affected by hydrosystem development and operations. The federal action agencies should collaborate with the Council, state and federal fish and wildlife agencies and tribes, and the utilities to implement flow and passage measures to protect habitat and improve survival of species not covered in biological opinions. This includes, for example, upper Columbia River summer and fall Chinook, upper Columbia sockeye, sturgeon, lamprey, and resident fish. The Council expects regular coordination and communication with the federal operating agencies about system operations.

H 12. **Power system considerations:**

- When recommending operational changes for fish and wildlife, the Council and the federal operating agencies must consider the adequacy, efficiency, economics, and reliability of the power system.
- The Council will work with federal and non-federal operating agencies, federal and state fish and wildlife agencies and tribes to review, update, and implement procedures that accommodate power system and dam operation

emergencies with the least impact on listed and non-listed fish and with consideration for protection, mitigation, and recovery objectives.

- Fish survival emergencies may require operations that temporarily reduce or curtail power production, which should be implemented in the most cost-effective manner possible by the federal action agencies and non-federal project operators.
- The Council will continue to investigate cost-effective power system strategies that improve ecosystem conditions for fish and wildlife, relax operational constraints adverse to fish and wildlife, and ensure the regional power system remains adequate, efficient, economical, and reliable.

Water Management and River Flows

Flow Objectives

H 13. Provide flows through the hydrosystem of sufficient quality and quantity to improve production, migration, and survival of fish. Provide streamflows with appropriate timing, quantity, and water quality to support productive populations of anadromous and resident fish, provide reservoir conditions to promote productive populations of native fish and wildlife, and manage water to protect and improve habitat conditions for all fish affected by the hydrosystem, not just listed species.

H 14. Where there are demonstrated benefits for fish, manage water to more closely approximate natural flow patterns in terms of quantity, quality, and timing to promote productive populations of anadromous and resident fish.

H 15. Continue to support the development of improved runoff forecasting methods and techniques for Columbia River Basin watersheds and seek to provide early (e.g. late fall or early winter) runoff forecasts. Complimentarily, identify and implement a strategic expansion of the network of stations for surface weather and streamflow observations in high-altitude mountainous areas of the Columbia Basin.

H 16. **Seasonal flow objectives**

Manage water through the hydroelectric system to attempt to achieve the following flow objectives during spring and summer management seasons at specified mainstem Columbia and Snake River dams, with limitations and

adjustments on meeting these targets as described in relevant federal implementation documents:

Location	Spring		Summer	
	Dates	Objective (kcfs)	Dates	Objective (kcfs)
Snake River at Lower Granite Dam	4/03 to 6/20	85 to 100[(1)]	6/21 to 8/31	55 to 55[(1)]
Columbia River at McNary Dam	4/10 to 6/30	220 to 260[(1)]	7/01 to 8/31	200
Columbia River at Priest Rapids	4/10 to 6/30	135	N/A	N/A
Columbia River at Bonneville Dam	11/1 to emergence	125 to 160[(2)]	N/A	N/A

(1) The kcfs objective varies according to value forecasts.

(2) The kcfs objective varies based on actual and forecasted water conditions.

Kcfs: thousand cubic feet per second

Seasonal flow objectives can mask the reality of flow fluctuations across the season. Two important considerations follow: One is that minimizing flow fluctuations and flow reductions is as important as trying to meet seasonal flow objectives (see below). Second, especially in years when there is not sufficient water to meet seasonal flow objectives, it is important to continue using in-season management to provide flows aligned with the spring and summer migration of juvenile salmon and steelhead. These coordinated flow releases have, and should continue to, benefit the bulk of the migrating fish or benefit important life-history components. These two considerations can be complementary. By minimizing fluctuations or reductions in flow, water continues to move downstream thereby encouraging juvenile migration, and, when there is limited water available, state and tribal fish managers should continue to work with the operators to strategically manage flow to benefit migration.

H 17. **Water transit time targets and further consideration of structural and operational changes related to water velocities and fish movement**

In the Program amendment process leading to the 2026 Fish and Wildlife Program, the Council received recommendations from a large number of state fish

and wildlife agencies and the region's tribes to include a set of water transit time (WTT) targets in the Program as objectives.

The Program's flow objectives and the measures related to them, including run-of-the-river pool elevations, were first introduced in 1994. They were and are designed to increase flow and water velocity, decreasing downstream migration time for juvenile anadromous fish and decreasing the quantity of habitat for predatory and competing fish.

Adding water transit time targets is a similar concept to flow objectives, which were originally expressed as flow velocity equivalents. The Program's flow measures described below, and current system operations as implemented, are intended to increase water velocities and decrease fish travel time through the system. However, neither current system operations as implemented nor the changes in operations represented in the measures achieve the monthly or seasonal flow objectives in most years or result in achieving the recommended water transit time targets.

Operations that would make measurable progress toward achieving flow objectives and decreased water transit times, such as operating the lower Columbia projects at lower pool levels, would require significant structural and operational changes. These changes would impact other river users, including effects on the power supply and transmission system stability, navigation, irrigation, and even affect operations intended to benefit fish, such as the optimal operation of adult fish ladders.

For this reason, the Council calls on the Corps of Engineers and the state and federal fish and wildlife agencies and tribes to work together and with river user stakeholders to investigate the structural and operational changes at the dams with the greatest potential to decrease fish travel time. This may include changes in pool operations (see measure H 44) and changes in flood risk management operations (see measure H 33). This group would assess the incremental benefits to fish and wildlife, the impacts and costs to other uses, and identify changes that would be beneficial and cost-effective to consider for implementation.

The Council is willing to facilitate such a forum. Based on the outcomes from this process, the Council will then decide whether to open a Program amendment process aimed at further altering system operations for this purpose.

Minimize ramp rates and daily flow fluctuations

H 18. Operate the system to minimize ramp rates (the rate of change) and daily flow fluctuations (minimum and maximum daily flows) in the Columbia and lower Snake rivers during the spring and summer migration periods to keep water flowing and juvenile fish moving downstream. Minimizing fluctuations is also important for mainstem spawning and rearing. Total outflows (powerhouse and spill discharge) at the eight run-of-river dams should be kept consistent with inflows taking into account the natural hydrograph through the water year. Reductions in flows should occur as slowly and steadily as possible to avoid ponding and other adverse environmental impacts.

H 19. At the four projects in the lower Snake River, reduce daily flow fluctuations and ramp rates during the bulk of the juvenile migration period to avoid ponding and slowing of water. In the interim, at the four projects in the lower Columbia River, prevent daily flow fluctuations and daily ramping during the bulk of the migration period from increasing significantly in magnitude from what occurs now under current average operations. The Council will continue to work with the fish and wildlife agencies and tribes, the federal operating agencies, and others to better identify the most biologically significant limits on flow fluctuations during migration.

Storage Reservoir Operations

H 20. **Annual sequence of storage project operations to benefit fish**

The annual sequence of system operations to benefit migrating salmon and steelhead and other native fish in the reservoirs and rivers is and should be generally as follows:

- The storage reservoirs should be at, but no lower than, their flood control minimum elevations in early April. Minimum elevations are based on the annual runoff forecast.
- Through the spring and summer migration seasons, keep the run-of-the-river project pools in the Columbia and lower Snake as low as possible – see below.

Spring:

- Store water in the storage reservoirs with a plan to refill the reservoirs by their early summer refill target dates while otherwise passing inflows to maximize flows for the spring outmigration of juvenile salmon.
- Aim to meet the spring flow objectives as often as possible.

- At Libby Dam: implement the spring releases intended to benefit sturgeon, and when feasible, regulate temperature to help induce spawning and improve ecosystem function.
- If possible, implement seasonal and daily water management that targets peaking spring flows that trigger white sturgeon spawn migration, and minimize within-day flow fluctuations, to achieve sufficient productivity throughout the Columbia Basin, with emphasis on the Snake River (Hells Canyon to Lower Granite reaches).

Summer:

- Prioritize the refill of storage projects by their early summer refill target dates.
- Draft water from the reservoirs through the summer and to the end of September in an effort to meet the summer flow objectives and water temperature targets, in a manner also consistent with the protection of fish in and immediately below the reservoirs. In-season management forums should adjust operations to best meet these needs with limited water available, with Dworshak in particular operated in part to provide cooling water for the Snake River in summer.
- Draft toward or to but not below end-of-summer reservoir elevation targets.

Further considerations in Summer:

- In-season management decisions in summer should prioritize operations that provide as much benefit as possible to the wide continuum of adult and juvenile salmon and steelhead migrants.
- Summer drafting from storage projects should be done in a manner to minimize fluctuations and mimic natural river processes – steady declining outflows and reservoir elevations.
- Operations should also attempt to minimize ramping rates and large daily swings and reductions in flows in the lower Columbia and Snake rivers, as described above in objectives.

Fall and Winter:

- In the fall and winter, operate to support two high priority operations:

- Storage project and Mid-Columbia run-of-the-river project operations to benefit Hanford Reach fall Chinook from spawning through emergence and rearing from the fall into the spring – see below.
- Fall flows to support lower Columbia chum spawning.

- Assure that whatever drafting occurs from the projects in fall and winter for power system operations will still allow the project to be no lower than the flood control minimum the following April.

H 21. **Details of operations**

Consistent with the above approach, continue to implement the details of current baseline operations, which can be found in the biological opinions and associated federal agency documents noted above (these details are Program measures), with certain elements described in the measures below.

H 22. **Hanford Reach fall Chinook**

The federal action agencies, in collaboration with the state, federal, and tribal agencies and the Mid-Columbia Public Utility Districts (PUDs), shall continue to reliably implement operations to protect spawning and emergence of fall Chinook in the Hanford Reach, consistent with the 2004 Hanford Reach Fall Chinook Protection Program Agreement. The parties to the agreement should report to the Council periodically to assure flow measures continue to be effective in protecting fall Chinook redds and juveniles from flow and river elevation fluctuations.

Libby and Hungry Horse operations

H 23. The Council continues to support the federal action agencies' current reservoir operations at Libby and Hungry Horse dams as set forth in the relevant biological opinions. These include VARQ as well as spring and summer operations developed as part of the 2003 Mainstem Amendments.

H 24. The Council also supports continued investigations to refine operations at Libby and Hungry Horse dams that improve conditions for fish in or near those reservoirs and do not adversely affect fish in the lower river, e.g., actions that help reservoir refill, reduce the potential for uncontrolled spill, reduce downstream flooding, and make operations mutually beneficial for the United States and Canada.

The Council will assist in these discussions as necessary. Any significant findings or proposed changes should be reported to the Council. Based on this principle of continued refinement, the Corps of Engineers and Bureau of Reclamation should

continue to work with the State of Montana, Confederated Salish and Kootenai Tribes, and Kootenai Tribe of Idaho, along with the State of Idaho, the U.S. Fish and Wildlife Service and NOAA Fisheries, to implement where feasible these refinements in operations to benefit fish and wildlife identified in the 2020 Addendum to the Council's Fish and Wildlife Program.

These improvements include, but are not limited to:

- Adjust summer draft targets more gradually when inflow forecasts are close to the driest 20-percentile threshold to smooth transitions as inflow forecasts vary.
- Use project-specific inflow forecasts to set draft and refill targets, rather than water supply forecasts for the mainstem Columbia River at The Dalles Dam.
- Adjust Storage Reservoir Diagrams to decrease reservoir drawdowns during dry water years.
- At Libby Dam integrate VarQ flood management with the White Sturgeon tiered-flow strategy.
- At Libby Dam, replace the variable end-of-December draft target with a fixed draft point (2420) every year.
- Investigate opportunities to use VarQ-like operations at other storage projects to help accommodate water variability among subbasins, improve the region's ability to monitor changing trends in snowpack, and better manage unforeseen rainstorms and drought.

H 25. **Albeni Falls Dam**

The Corps shall continue to implement the operational elements included in the Kalispel Tribe Accord intended to improve water temperature conditions and enhance habitat conditions for native fish.

Grand Coulee Dam operations

H 26. The Bureau of Reclamation should continue to operate Grand Coulee in the same stable manner as in the recent past, as described in the relevant biological opinion and federal implementation plans. A high priority should be to achieve refill by the end of June, subject to in-season management.

H 27. Another high annual priority for Grand Coulee operations that is not based on biological opinion operations for listed fish should be to continue to contribute to

the establishment and protection of the necessary spawning and rearing conditions in the Hanford Reach described above. Summer and fall operations should be consistent with these priorities.

H 28. As much as possible within operating constraints, manage the reservoir and dam discharges to minimize fluctuations and ramping rates and help produce steady flows in the lower Columbia River across the migration season and each day.

H 29. As described in the Blocked Area strategy, significant changes in operations at Grand Coulee could affect the ongoing study of the feasibility of the reintroduction of anadromous fish above Grand Coulee. Any proposals for changes in operations should be discussed with and evaluated by the parties to the reintroduction agreement, as well as discussed with other affected entities.

H 30. To the extent changes in Columbia River Treaty operations have the potential to significantly change Grand Coulee operations, the Bureau of Reclamation should consult with the Council and others to discuss how to alter operations in the most effective and least damaging way for the needs of fish and the power system.

H 31. At the same time, the Bureau of Reclamation and NOAA Fisheries should continue ongoing discussions with the relevant federal and state fish and wildlife agencies and tribes and others to identify and consider alternative operations at Grand Coulee. Along with the measures above, the following principles should guide this assessment:

- Explore the optimum operations at Grand Coulee to provide improved conditions and survival for all the fish important to the Program, including salmon and steelhead migration, spawning, incubation, emergence, and rearing needs in the lower Columbia River and the Hanford Reach, and fall Chinook and chum below Bonneville Dam.
- Explore the optimum operations for resident species in the reservoir that are critical to the protection and mitigation needs identified by the Spokane Tribe, Colville Confederated Tribes, Washington Department Fish and Wildlife and others.
- For the operation in August, subject to in-season management, draft Lake Roosevelt to the target elevations of 1,278 or 1,280 feet by the end of August. By the end of August, Lake Roosevelt may be drafted an additional 1.0 foot in non-drought years and by about 1.8 feet in drought years, as specified in Washington State's Columbia River Water Management Plan.

- Attempt to maximize water retention times year-round, with a particular focus on September through December to protect kokanee access and spawning without impacting other native resident species.

- Consider potential for managing reservoir elevations to impede spawning and proliferation of non-native piscine predators.

H 32. **Hells Canyon Complex project operations**

Idaho Power Company's Hells Canyon hydropower complex, consisting of three hydroelectric projects on the mainstem Snake River, is currently undergoing Federal Energy Regulatory Commission (FERC) re-licensing and ESA Section 7 consultation. The Council will review the outcome of the FERC proceeding and, as appropriate, include in the Program relevant provisions recognizing the operations to benefit fish below the Hells Canyon Complex as part of the baseline flow measures of the Program.

H 33. **Update local and system flood risk management operations to align with changes in runoff and hydrology and benefit resident and anadromous fishes**

Update the rule curves at flood control authorized projects throughout the Columbia River Basin and better incorporate anadromous and resident fish flow objectives into flood risk management operations. Building on the success of VarQ operations at Libby and Hungry Horse dams in Montana, the Council calls on the Corps of Engineers and the Bureau of Reclamation to work collaboratively with the state and federal fish and wildlife agencies and tribes, and other water managers and water users to modernize operational rules to better meet multiple system objectives, including but not only benefits to fish.

The Council commits to helping organize and facilitate this process, as part of the forum described in measure H 17 above. This process should result in modified flood control operations wherever possible that are adaptable to evolving hydrologic and meteorological patterns. This may provide additional water and faster water velocities during the spring and summer migration period for salmon and steelhead through the mainstem Columbia and Snake Rivers, and more natural seasonal patterns in river discharge for native, resident fishes. The state and federal fish and wildlife agencies and tribes will report to the Council annually on progress towards formulating and implementing rule curves that meet fish objectives while maintaining a reasonable level of flood risk, and maintaining or improving system and grid reliability, river transport, and irrigation supply. The first

step will be for the federal, state, and tribal agencies to develop their individual priorities and ideal timelines for submission to the Council for consideration.

Improve ecosystem function and floodplain connectivity

H 34. Continue to investigate the potential for and adjust system water management to improve ecosystem functions in the mainstem, estuary, and plume, with an emphasis on the following areas:

- Reconnected floodplains related to river flows
- Enhanced Columbia River plume and near-shore ocean habitat
- Reduced saltwater intrusion during summer and fall
- Fewer and shorter hypoxia and acidification events in the estuary
- Lower summer water temperatures

H 35. Elements of a coordinated approach should include:

- Continued investigations into how to best regulate river flows to enhance floodplain connections.
- Further developing the methods to assess the extent of physical and biological benefits that could be gained from changes in flows, floodplain connections, and flood-risk management.
- Improvements in hydrodynamic modeling, mapping, and investigations into sediment transport and budgets.
- Periodic assessment of how flow operations might be modified to capitalize on what is learned from the investigations recommended above.
- Continued search for alternative methods of flood risk management in high-value areas to reduce the demands on upriver storage and better balance the allocation of risk, costs, impacts, and benefits.

H 36. Estuary

Evaluate the effects of flow regulation on estuary habitat and food webs and near-shore plume characteristics to understand the effects on salmon and steelhead productivity, abundance, and diversity.

Sturgeon – Hydropower dam operations

H 37. Seek opportunities to operate the hydrosystem to provide flow consistent with the needs of sturgeon populations throughout the Columbia and Snake basins. This may include increased spring and summer flows, reduced flow fluctuations during spawning season, and spill where feasible, all of which support the volume, timing, and temperature of water in the system. These environmental factors support successful sturgeon spawning, egg development, and larval life stages. Recruitment in many lower Columbia River impounded areas has been positively correlated with high annual discharge during April through July.

H 38. Operate the hydropower system in a manner that balances needs of anadromous fish, Columbia River Basin sturgeon, and other native fish species in a way that improves the abundance and productivity of sturgeon.

H 39. Mainstem habitat: The action agencies, in coordination with the agencies and tribes, shall identify and address the specific aspects of hydrosystem operations, such as duration of fluctuations in water releases and of water levels, which affect natural spawning, reproduction, growth, and survival of larval and juvenile fishes, and overall recruitment success of sturgeon.

H 40. Continue ongoing operations at Libby Dam to benefit Kootenai River white sturgeon.

H 41. Monitor Snake River white sturgeon above and below Hells Canyon and assess any aspects of hydrosystem operations affecting the overall success of this population.

H 42. Evaluate whether alternative flow regimes might increase sturgeon productivity and recruitment in the lower Columbia (below McNary Dam) and if so, whether and how operations could be altered to provide those flow regimes without compromising protection for salmon, steelhead and lamprey.

Run-of-the-river Project Operations Related to Flows

H 43. Continue the current operation at the lower Snake and lower Columbia dams to achieve the following pool elevations:

Lower Snake River minimum operating pool operations

From April 3 through August 31 at Lower Granite Dam, and from April 3 through August 14 at Little Goose, Lower Monumental, and Ice Harbor dams, operate at

minimum operating pool (MOP) with a 1.5-foot forebay operating range as a hard constraint, limited to 1.0-foot range to the extent possible as a soft constraint. Minimum operating pools levels are at 437' elevation (Ice Harbor), 537' (Lower Monumental), 633' (Little Goose), and 733' (Lower Granite).

Lower Columbia pool operations

For the foreseeable future, from April 3 through August 14, operate these three lower Columbia projects within the following ranges, although endeavoring as much as possible to maintain the projects at a steady level within these ranges:

- McNary Dam: 337'-340'
- The Dalles Dam: 157' to 160'
- Bonneville Dam: 71.5' to 76.5'

At John Day Dam, operate within these ranges on these dates as follows, with the same recommendation to operate at a steady level within these ranges as much as possible:

- 262'-266.5' (3/1-3/14)
- 262.5'-266.5' (3/15-4/9)
- 264.5'-266.5' (4/10-6/1)
- 262.5'-266.5' (6/2-6/14)
- 262.5'-264.5' (6/15-8/31)

H 44. **Evaluate additional pool limitations**

As part of the forum to evaluate possible modifications to operations to increase flows and velocities (Measure H17 above), investigate the feasibility, impacts and benefits of:

- Changes in dam and pool operations at the lower Snake projects that improve the speed and continual movement of juvenile fish through the system without slowing.
- Operating the lower Columbia projects close to minimum operating pool as a hard constraint.
- Operating any of these projects during times identified to be biologically beneficial in the spring and summer migration at levels below the elevations described above, down to spillway crest.

Prior to implementing any modifications to operations, relevant parties must clearly identify and analyze any impacts or required updates to maintain water supply, irrigation, and navigation.

Juvenile and Adult Fish Passage

Passage Objectives

H 45. **Juvenile salmon and steelhead passage**

Continue to improve juvenile salmon and steelhead passage survival through the hydrosystem. Reduce powerhouse encounter rates (PITPH) below 1 to the extent possible.

H 46. **Adult salmon and steelhead**

Achieve the annual adult salmon and steelhead survival standards for the Bonneville Dam to Lower Granite Dam reach and the Bonneville Dam to McNary Dam reach (see Objective S4 for details):

Passage Measures

H 47. The federal action agencies, in collaboration with state and federal fish and wildlife agencies and tribes , shall (1) design mainstem fish passage actions to protect biological diversity by benefitting a broad range of species, stocks, and life-history types, not just listed species and not just salmon and steelhead, and (2) favor solutions that best fit natural behavior patterns and river processes and increase the likelihood of adult returns. To meet the diverse needs of multiple species and allow for uncertainty, multiple passage methods are necessary at individual projects.

H 48. Continue the development of improved turbine designs that eliminate blade strikes, eliminate pressure differentials, and minimize turbulence in draft tubes and downstream discharge areas. Also, explore turbines that provide electricity at lower hydraulic head. Evaluate effectiveness of newly installed turbines at reducing effects on and mortality of juveniles.

H 49. **Adult fish passage**

Continue to implement improvements to the adult fish passage facilities at mainstem dams to benefit salmon and steelhead, Pacific lamprey, white sturgeon,

and bull trout. In particular, cool water releases from storage reservoirs should continue to be used to facilitate adult migration. The Corps of Engineers should also improve fish ladder water temperature mitigation at all adult fishways. Emphasis should also be placed on research, monitoring, and evaluation; increased accuracy of fish counts; assessment of conversion rates of all adult fish species of interest, including lamprey, through key mainstem reaches; installation of PIT-tag and radio-tag detectors; evaluation of escapement numbers to spawning grounds and hatcheries; research into water temperature and spill effects on fish passage; and the connection between fish passage design and fish behavior.

As a priority, and consistent with H 49, for the Corps' capital construction program, adequately implement operations and maintenance of structural improvements to correct adult fish-passage problems and improve the reliability of adult passage facilities and report to the Council on progress.

H 50. **Maintenance and rehabilitation of dam infrastructure**

Seek increased funding and shorten timelines for maintenance and rehabilitation of dam infrastructure that impacts fish operations**.** The Corps of Engineers should work with the state and federal fish and wildlife agencies and tribes and Bonneville to develop, within one year, a comprehensive list of maintenance, repair, and rehabilitation needs for fish passage infrastructure, making use of existing work. The comprehensive list should then be further refined to include collaborative development of a 20-year infrastructure maintenance strategy to develop the necessary budget levels and priority schedule for implementation. The Council commits to working with the Corps, the state and federal fish and wildlife agencies and tribes and others to secure Congressional appropriations to implement the items on the list.

Juvenile Fish Passage

To maintain and improve juvenile fish passage survival, the Corps, in collaboration with state and federal fish and wildlife agencies and tribes shall select the most biologically effective combination of passage routes at each mainstem dam (including a spill level that does not exceed TDG standards or variances) which, when combined with other passage routes, maximizes juvenile fish survival and minimizes adult fish migration and fallback problems. The most effective passage routes and operations may vary from year to year, depending on prevailing environmental conditions, particularly as runoff timing and volumes change. As such, the role of in-season management and participation in that management by state and federal fish and

wildlife agencies and tribes will be increasingly important to be responsive to the changing needs of migrating fish and the complexity of meeting power system demands.

H 51. **Juvenile fish passage spill – general**

When making decisions regarding the timing and amount of spill, the federal action agencies should give priority to actions that minimize impacts on returning adult fish and minimize powerhouse encounters by passing as many smolts as safely through spillways as possible.

H 52. **Juvenile fish passage spill – consistent and steady operation**

The Council calls on the state and federal fish and wildlife agencies and tribes and the federal operating agencies to agree to a spill operation to be implemented consistently between years for as long as needed to compare biologically meaningful results over different water years and salmon generations. Spill operations and spill levels have changed constantly in the last decade. The Council emphasizes the need for settling on a spill level and implementing that operation fully and consistently. This should be monitored and assessed on a scale long enough to evaluate the effect of the operations on both juvenile and adult survival.

H 53. **Spring spill**

While stability and certainty of implementation and assessment is a priority, the Council also recommends:

- Long-term implementation of a spill operation that prioritizes spill to the 125% gas cap 24 hours a day from April to the middle of June.
- Monitoring and evaluation throughout the spring spill period to understand the benefits and impacts to juvenile salmon and steelhead across different water years. Operations should be adapted if adult delays or physical project impacts are observed.
- An exception to consistent operations should be allowed when the Corps of Engineers and Bonneville needs to reduce spill to address a possibly serious power system reliability event in the region.

From the introduction of the concept of this spring spill operation in 2013, the fish and wildlife agencies and tribes have hypothesized that the 125% TDG spill operation has the most promise of all operational elements of helping Chinook salmon and steelhead meet the SAR objectives in the program, especially for

weak Snake River runs. The ISAB found the concept to have merit, worth designing and implementing as an experiment. It seems an appropriate time to implement the operation and assess the effects, letting the operation run for enough years to identify effects on adult returns in particular.

H 54. **Fall/winter spill**

Maintain operation of surface spill levels (at least one spillway weir at each project, if not more) in the fall, winter and early spring.

H 55. **Juvenile fish transportation**

The Council recognizes the need to transport migrating juvenile salmon and steelhead under certain river conditions when there are demonstrated benefits for fish. Juvenile fish transportation should be implemented following adaptive management principles that consider and respond to new evidence regarding the relative life-cycle survival benefits when compared to in-river migration. Evaluation should include transportation effects on adult stray rates and the impacts of straying. Juvenile fish transportation should not degrade in-river conditions (i.e. require spill reductions or flow changes) except in the case of human safety considerations.

H 56. **Monitoring passage and survival - PIT Tags**

PIT tag monitoring has long been considered one of the most cost-effective and useful data inputs for tracking the passage, migration patterns, and survival rates at both the reach scale and system-wide of juvenile and adult salmon and steelhead in the Columbia River basin. These data are a priority for tracking mitigation progress across the region.

Use PIT tag technology to assess the effects of the hydrosystem by:

- Installing PIT tag detection systems at surface passage structures that are expected to yield the highest and most accurate detection rates by project.
- Beginning PIT tag detection improvements at those facilities most relevant to existing system survival monitoring and evaluation analyses, including Lower Granite Dam, McNary Dam, and Bonneville Dam.
- Pursuing opportunities to increase PIT tag marking and detection of upper Columbia salmon and steelhead populations, including transboundary sockeye.

And also:

- Prioritize increasing or expanding PIT tag array infrastructure at Willamette Falls and elsewhere in the Willamette River subbasin.
- Installing PIT Tag detection systems where feasible and effective at locations below Bonneville Dam and the estuary with the goal of maintaining PIT tag detection rates below Bonneville Dam at levels consistent with the current PIT tag trawl throughout the juvenile salmon and steelhead spring and summer downstream migration period.
- Installing PIT tag detection systems at tributary confluences or key locations where feasible.

H 57. **Passage at Mid-Columbia PUD dams**

The Program's baseline passage objectives and measures at the Mid-Columbia PUD dams include the performance standards and passage actions identified and agreed to by the operators of these projects in FERC licenses and associated habitat conservation plans and biological opinions. The Council recommends that the Mid-Columbia PUDs, with the assistance of FERC if necessary, confer with the relevant fish and wildlife agencies and tribes about their passage survival concerns and for all parties to work together toward agreement on the appropriate passage operations in the future, as well as associated monitoring and assessment protocols.

H 58. **Passage generally/Albeni Falls Dam**

Restore passage for native resident fish where feasible. This includes passage at Albeni Falls Dam. Continue to implement the commitments included in the Kalispel Tribe Accord regarding upstream passage of native fish at Albeni Falls Dam.

H 59. Enhance fish passage for bull trout, endemic cutthroat trout, and other native resident species at relevant dams within the Pend Oreille River system.

Fish Passage – Sturgeon

The action agencies, in coordination with agencies and tribes, should:

H 60. In general, evaluate the importance of connectivity among sturgeon populations. Assess whether the mainstem dams isolate sturgeon populations, and if so, evaluate the feasibility of mitigation through the mainstem Columbia and Snake Rivers.

H 61. Monitor downstream entrainment past dams to inform the feasibility of a translocation pilot project in the Snake River Basin where entrainment is known to be significant (i.e., translocate fish from Lower Snake reservoirs into the Lower Granite to Hells Canyon reach).

H 62. Study the effects of involuntary downstream passage through turbines versus spillways on the survival of sturgeon by size class.

H 63. Evaluate the costs, benefits, and risks of passage improvements for sturgeon relative to other potential strategies. This could include assessment of upstream and downstream volitional passage routes utilized, and barriers to passage (including screening requirements) by size class and life stage.

H 64. Evaluate opportunities for non-volitional passage by taking advantage of fish trapped in dewatered draft tubes or fish ladders during maintenance.

H 65. Continue to develop, refine, and implement protocols to prevent sturgeon entrainment, dewatering, and mortality during planned maintenance activities at passage facilities. This includes development of an operational protocol to block access by sturgeon to turbine draft tubes during turbine dewatering and start-up.

Fish Passage – Lamprey

The action agencies, in coordination with state and federal fish and wildlife agencies and tribes, should:

H 66. Evaluate adult, juvenile, and larval lamprey passage including the feasibility of transport, assess passage efficiency and direct mortality, and other metrics relating to migratory success of lamprey above and through dams with poor passage.

H 67. Specifically, at mainstem Columbia and Snake rivers and Willamette Basin hydropower dams, identify operations and lighting that delay, promote fallback, obstruct, or kill migrating adult and juvenile lamprey (e.g. ramping rates, water elevation changes).

H 68. Establish a passage standard for adult lamprey through accurate 24-hour daily passage counts at federal dams and through lamprey passage structures.

H 69. Continue to install lamprey-friendly passage structures for adult and juvenile lamprey.

H 70. Prioritize increasing or expanding tracking of lamprey passage in locations that yield the highest and most accurate detection rates by project.

H 71. Monitor and report predation on adult and juvenile lamprey during passage at mainstem dams.

H 72. Assess the impacts of dredging on lamprey around hydropower dams and navigation facilities.

H 73. Report passage counts at dams annually and map lamprey distribution every five years.

H 74. Planning, implementation, and monitoring of lamprey passage at non-federal projects should be done through collaborative assessment and adaptive management. This may include coordination, information sharing, or targeted studies, while remaining consistent with applicable project licenses and regulatory requirements.

Water Quality in the Mainstem Hydrosystem Related to Operations: Temperature and Dissolved Gas

The mainstems of the Columbia and Snake rivers are affected annually by elevated water temperatures and periodically by total dissolved gas (TDG) levels. Federal and non-federal project operators should:

H 75. Continue real-time monitoring and reporting of TDG and water temperatures measured at fixed monitoring sites in the Columbia River Basin.

H 76. Continue to develop and implement fish passage strategies that produce less TDG, such as spillway flow deflectors, spillway weirs and surface passage outlets, including updates and improvements to the System Total Dissolved Gas (SYSTDG) model to reflect ongoing modifications to spillways or spill operations.

H 77. Collaborate to complete the water temperature modeling capabilities in the mainstem Columbia River from Grand Coulee to McNary dams to better assess the effect of operations or flow depletions on summer and fall water temperatures.

The Corps should continue to:

H 78. Develop and use the SYSTDG model for estimating TDG production to assist in real-time decision making for spill operations, including improved wind forecasting capabilities, as appropriate.

H 79. Develop and use the CE-QUAL-W2 model for estimating mainstem Snake River temperatures and cold-water releases from Dworshak Dam on the North Fork Clearwater River to assist in real-time decision-making for Dworshak summer operations.

The federal action agencies, FERC, and the non-federal project operators, in cooperation with state agencies, the EPA and other federal, tribal, and regional agencies should:

H 80. Update and implement the Water Quality Plan for Total Dissolved Gas and Water Temperature in the Mainstem Columbia and Snake Rivers (WQP).

H 81. Monitor water quality parameters and implement water quality improvement measures to reduce water temperatures and TDG to meet state, EPA-approved tribal, and federal water quality standards to improve the health, condition, and survival of anadromous and native resident fish, as well as their related spawning and rearing habitat, in the Columbia Basin

H 82. Incorporate the provisions of various total maximum daily loads (TMDLs) as they are developed and approved into the regional WQP, particularly TMDL provisions containing allocations affecting federal hydropower projects in the Columbia River Basin.

Fish Passage Center

H 83. Continue to implement the Fish Passage Center. The center provides technical assistance and information to the region's fish and wildlife agencies and tribes, and the public, on matters relating to the Program's flow and passage measures. NOAA Fisheries and its Northwest Fisheries Science Center, the Corps, the Columbia River Data Access in Real Time (DART) Center at the University of Washington, the Pacific States Marine Fisheries Commission, and other entities also contribute and house information relevant to the implementation of the Program's mainstem measures.

H 84. The Fish Passage Center functions include:

- Provide technical assistance and information to the region's fish and wildlife agencies and tribes, and the public, on matters relating to the Program's flow and passage measures.
- Participate in the development of the annual Smolt Monitoring Program (SMP) implementation plan and assist in the implementation of the program.
- Coordinate the Comparative Survival Study (CSS) research.
- Assemble, organize, make publicly available, and maintain the primary archive of the smolt monitoring program data and CSS-generated life cycle survival estimates.
- Assemble, organize and make publicly accessible data from other primary sources, and conduct analyses as requested to meet the information needs of the fish and wildlife agencies, tribes, and public with respect to water management, spill, and fish passage.
- Provide technical information necessary to assist the agencies and tribes in formulating in-season flow and spill requests that implement the measures in the Council's program, while also assisting the agencies and tribes in making sure that operating criteria for storage reservoirs are satisfied.
- Provide the technical assistance necessary to coordinate recommendations for storage reservoir and river operations that, to the extent possible, avoid potential conflicts between anadromous and resident fish.
- Archive and make publicly accessible the data used in developing all analytical results in an empirical database, associating the specific data with the respective analyses. No information collected – and no analyses – shall be considered proprietary.
- Ensure that the database conforms to appropriate standards for data management, including periodic review of the database by an appropriate scientific or data-review group.
- Cooperate with the Independent Scientific Advisory Board to conduct an annual independent scientific review of analytical products.

H 85. Bonneville is to consult annually with the fish and wildlife agencies and tribes and the Council on the most effective and efficient way to contract and manage the Fish Passage Center and the associated SMP and CSS projects.

H 86. Operation of the center should include a person with expertise in analyzing storage reservoir operations and in-season impacts on resident fish from operations of the Federal Columbia River Power System. When carrying out its functions, the center should consult with fish and wildlife managers who have knowledge and expertise on reservoir operations and resident fish requirements.

Habitat Restoration and Protection

Protect, enhance, restore and connect aquatic and terrestrial habitat. Protecting existing quality habitat is as important as enhancing degraded habitats. Preserve, enhance, and restore native resident and anadromous fish in their habitats where feasible. The Program addresses habitat for fish and wildlife throughout the basin, from the headwaters to the estuary, including blocked areas and in tributaries.

Rationale

Habitat restoration and protection is a core component of the Program. The Power Act recognized that actions taken to improve fish passage at dams would not be sufficient to mitigate for the impacts of the hydrosystem, and authorized habitat measures in the mainstem and offsite to protect, restore, and enhance habitat throughout the basin to benefit fish and wildlife and improve species survival. Habitat restoration and protection occurs in headwater tributaries, the mainstem, larger tributaries, and the estuary.

Restoring and protecting habitat produces multiple benefits and improves ecosystem function for many fish and wildlife species, including resident native fish and other freshwater species. These benefits promote healthy and productive populations and improved survival of anadromous and native resident fish and wildlife. Habitat restoration and protection activities span a large array of actions and are guided by subbasin plans and other planning documents, which have been developed for most of the subbasins and the mainstem reaches in the Columbia River Basin. Habitat mitigation can also include large-scale, biologically targeted habitat improvement projects, including collaborative projects that address multiple strategies aimed at restoring ecosystem function.

This habitat restoration and protection strategy incorporates mainstem, tributary, and estuary habitat improvements; water quality and quantity measures; resident fish habitat agreements; and specific measures for sturgeon, lamprey, and mussels. Each of these topics includes measures for the Program. The habitat restoration and protection strategy ends with a set of specific research, monitoring, and evaluation measures that apply basin wide.

The Program contains thousands of both general and specific habitat measures, in the main text below and in the subbasin plans and other plans adopted into the Program. At any one time, Bonneville is implementing a set of habitat improvement and protection actions under the Act that represents a subset of the Program's habitat measures. Both the Bureau of Reclamation and the Corps of Engineers implement additional habitat actions that the Council considers part of Program implementation. The Council expects that arrangement to continue. Many other entities

in the basin, using federally appropriated, state, or other funds, implement additional habitat protection and improvement actions that work with the habitat actions implemented through the Program to improve conditions for the salmon, steelhead and other species of importance.

General Measures

This set of measures applies to all habitats in the entire Columbia Basin.

HAB 1. Build from strength. Protect habitat that supports existing populations that are relatively healthy and productive and expand into adjacent habitats that were historically productive or are likely to sustain healthy populations. Restore weak stocks by focusing first on habitat where portions of weak populations are doing relatively well and then extend to adjacent habitats.

HAB 2 Restore and enhance habitat areas that connect to productive areas to support expansion of productive populations, and to connect weaker and stronger populations to restore more natural population structures.

HAB 3. Restore ecosystems, not just single populations. Increasing the abundance of single populations may not, by itself, be sufficient. Focus on restoring habitats and developing ecosystem conditions and functions, including within blocked areas where reintroduction is being considered, that will allow for expanding and maintaining diversity within and among species. This will help sustain a system of robust populations in the face of environmental variation.

HAB 4. Restore habitat to support native species wherever feasible. Even in degraded or altered environments, native species in native habitats provide the best starting point and direction for restoring ecosystem function.

HAB 5. Address transboundary species. About 15% of the Columbia River Basin is in British Columbia, including the headwaters and several key tributaries. Restoration efforts should address transboundary stocks of fish, wildlife, and transboundary habitats. Where mitigation measures are designed to benefit fish and wildlife on both sides of the border, American ratepayer funding should be in proportion to the anticipated benefits to the American populations.

HAB 6. Restore connectivity by removing passage barriers, screening water diversions, and maintaining and/or increasing instream flow in tributaries of the Columbia and Snake rivers.

HAB 7. Protect and improve riparian habitats throughout the Columbia River Basin, from the headwaters to the estuary, to improve water quality, reduce contaminant transport, lower water temperature through shading, and reduce sediments through fencing, vegetation planting, erosion control, best land-management practices, and acquisition of land through conservation easements and other types of acquisition.

HAB 8. Restore floodplain function through passive and active improvements in channel structure and geomorphology to re-establish natural river processes.

HAB 9. Acquire and enhance terrestrial uplands for fish and wildlife habitat. Restore uplands and minimize unnatural rates of erosion and runoff by modifying or decommissioning existing trails or forest roads, promoting fuels management and restoring forest health and resilience to wildfire, restoring site-capable uplands vegetation, and implementing agricultural best management practices.

HAB 10. Provide adequate funding for annual and long-term operation and maintenance for fish screens and land acquisitions, which is critical to meeting their intended goals, and is consistent with Part Six.

Specific Measures

Tributary Habitat

The Program focuses much of its habitat efforts in the Columbia Basin tributaries, and these efforts are a cornerstone of the Program.

HAB 11. Continue the ongoing effort to improve tributary habitats for the benefit of salmon and steelhead, and other native anadromous and resident fish and wildlife.

Mainstem Habitat

Given the importance of mainstem habitat to salmon and other key species (like sturgeon), the Council supports increased investments in mainstem habitat improvements to increase the extent, diversity, connectivity, and productivity of mainstem habitats for mainstem spawning, rearing, migrating, and resting. Mainstem habitats include not only the mainstem and its reservoirs, but also tributary confluences, floodplains, and the estuary.

HAB 12. Coordinate actions with the flow measures intended to improve ecosystem function in the mainstem.

HAB 13. Enhance the connections between the mainstem sections of the Columbia and Snake rivers and floodplains, side channels, riparian zones, and uplands, where appropriate.

HAB 14. Continue to reconnect the river to its floodplains wherever possible in the mainstem, with special emphasis on the estuary and lower Columbia River.

HAB 15. Protect and enhance mainstem riparian areas and wetlands to protect aquatic conditions and form a transition to floodplain terrestrial areas and side channels.

HAB 16. Identify, protect, enhance, and restore the functions of alluvial river reaches in the mainstem.

HAB 17. Excavate, create and reconnect backwater sloughs, alcoves, and side channels to the main channel.

HAB 18. Where isolated, off-channel, ponded water along the mainstem above Bonneville Dam creates elevated water temperatures and excess predation, identify and implement corrective actions.

HAB 19. Dredge/excavate lateral channels that have silted in.

HAB 20. Create more shallow-water habitat for juvenile rearing.

HAB 21. Identify, protect, restore, and manage cold-water refuge for salmonid use during high water-temperature periods.

HAB 22. Acquire and protect lands adjacent to the mainstem critical to protecting habitat areas and local water quality.

HAB 23. Where feasible, reconnect protected and enhanced lower tributary habitats to protected and enhanced mainstem habitats, especially in areas of productive mainstem populations.

HAB 24. Increase the amount of spawning habitat for mainstem core populations of Chinook, coho, chum, sturgeon, and lamprey.

HAB 25. Study and implement projects to enhance and protect or provide additional cold water refuge habitat at tributary confluences with the mainstem. Actions include dredging, adding or removing dikes, riparian planting, and other restoration actions.

Sturgeon – Mainstem Habitat

Columbia River Basin sturgeon distribution, abundance, and productivity are severely limited by habitat changes, particularly those associated with the construction and operation of the hydropower system. The Council recognizes and supports efforts to restore, research, and monitor white sturgeon populations in the basin consistent with the 2013 White Sturgeon Planning Framework and the Kootenai White Sturgeon Biological Opinion.

HAB 26. 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.

HAB 27. Continue to identify, protect, and restore habitat areas and ecological functions that are associated with productive spawning, resting, rearing, and migrating sturgeon.

HAB 28. Conduct dredging operations in a manner minimizing operation-related mortality on sturgeon and their primary prey.

Lamprey – Mainstem and Tributary Habitat

The distribution and abundance of Pacific lamprey has been reduced in many river drainages due to habitat and passage impacts caused by the hydropower system. Rebuilding lamprey to self-sustaining numbers throughout the basin includes efforts to:

HAB 29. Identify, protect, and restore habitat areas and ecological functions, such as stream channel complexity and function, that are associated with productive spawning, resting, rearing, overwintering, and migrating for lamprey species.

HAB 30. Implement instream habitat projects in a manner that minimizes mortality to lamprey by consulting the best management practices for Pacific Lamprey (for additional background, see the Lamprey Technical Workgroup 2020 report, and CRITFC's 2025 Lamprey Restoration Plan).

HAB 31. Install appropriate and effective juvenile lamprey screening for tributary water diversions. Continue to evaluate the effectiveness, efficacy, and practicality of screening for larval lamprey.

HAB 32. Continue to support translocation of all life stages of Pacific lamprey into areas where they have severely declined or are extirpated, when volitional lamprey passage is limited or not feasible.

Native Freshwater Mussels

Freshwater mussels are ecologically and culturally important, and yet population abundance and distribution are declining due in part to degraded habitat and poor water quality conditions.

HAB 33. Develop and promote strategies for freshwater mussel restoration to ensure that planned activities complement overall species richness and abundance.

HAB 34. If feasible, survey and document the distribution of native mussels prior to implementing any aquatic habitat restoration project.

Water Quantity and Quality

These measures will provide flows and habitat conditions of adequate quality and quantity for improved survival of anadromous and native resident fish on the mainstem Columbia and Snake rivers, as well as improving water quality in tributaries, to promote healthy and productive populations of anadromous and native resident fish and wildlife.

The mainstems of the Columbia and Snake rivers and various tributaries are experiencing elevated water temperatures during certain times of the year. In addition, there is concern throughout the basin about toxic contaminants. Degraded water quality is having adverse effects on the health of native fish and wildlife populations and the ecosystems these populations depend on, thus impacting mitigation efforts in the Columbia Basin.

HAB 35. Implement measures to address decreased nutrient levels or nutrient imbalances for long-term ecosystem improvement.

HAB 36. Improve the amount, timing, and duration of instream flows through temporary and permanent water rights acquisitions and other incentive-based approaches and associated infrastructure projects (for example, irrigation efficiency projects and fish screening efforts). Co-locating water transactions and screening projects may increase their efficacy.

HAB 37. Acquire water and pursue water rights in subbasins where water quantity has been identified as a primary limiting factor and where flow targets have been identified.

HAB 38. Identify, protect, and enhance cold water sources and habitats in headwater tributaries by implementing habitat resiliency projects, water transactions and associated infrastructure projects, and conservation easements.

HAB 39. Where feasible, implement water quality improvement projects to reduce toxic contamination and incorporate pollution reduction and mitigation techniques into restoration projects when toxic contamination may impact the overall success of the project.

Estuary

The Columbia River estuary is an important ecological area that stretches from the mouth of the Columbia River to the Bonneville Dam tailrace and includes tidally influenced mouths of tributaries. The construction and operation of the hydropower system, as well as local habitat change, has altered ecological functions in the estuary. For example, the storage, release, and impoundment of water changes the pattern of flows and water temperatures downstream from dams, which then impacts the estuary. Habitat restoration can reconnect lost habitat and restore access and opportunity to rearing habitats and intact food webs. Research suggests that habitat-improvement actions in the estuary increase survival for fall and spring Chinook salmon, sockeye, chum, steelhead, and other resident and migratory species.

HAB 40. Continue to scope, develop and recommend habitat projects in the estuary intended to increase salmonid survival and contribute to Program objectives.

HAB 41. Continue to identify and implement floodplain reconnection and removal or lowering of dikes and levees that block access to habitat, or install fish-friendly tide gates for habitat reconnection, protection, and restoration of riparian areas and off-channel habitat.

HAB 42. The Council incorporates estuary actions in the Federal Columbia River Power System Biological Opinion (BiOp) as Program measures. However, the Program is broader than the Endangered Species Act both in terms of species affected by the hydrosystem and the ultimate objective of the Program that goes beyond delisting endangered species. The Columbia Estuary Ecosystem Restoration Program (CEERP), along with the Council's estuary and Lower Columbia subbasin plans and locally developed recovery plans, will guide implementation, monitoring, and evaluation of habitat actions in the estuary.

Resident Fish Habitat

Native resident fish and other freshwater species addressed in this section include freshwater mussels, threatened bull trout, burbot, Westslope cutthroat trout, redband trout, mountain whitefish, endangered Kootenai white sturgeon, and resident life histories of native anadromous species such as Columbia River white sturgeon and kokanee. Impacts from the construction and

operation of the hydropower system include losses in abundance, genetic diversity, life history diversity, spatial diversity, and movements of these species, and modifications of their habitat resulting from inundation. The Program recognizes the importance of all native resident fish and other freshwater species and relies on a diversity of strategies to address those losses, including:

HAB 43. Protect and improve habitat conditions to mitigate for the impacts to resident fish from the development and operation of the Columbia River Basin hydropower system. In most cases, the habitat measures above are as relevant to resident fish as to anadromous fish. Habitat improvement actions can be a form of direct protection from hydropower impacts, such as land purchases and habitat restoration to improve and protect riparian conditions for resident fish downstream of hydropower dams. Habitat enhancements can also be a form of offsite mitigation as compensation for losses to resident fish caused by dam impacts.

HAB 44. Protect land in perpetuity. Perpetual land protection efforts can be an effective way to address losses of resident fish and changes to other freshwater species. This includes conservation easements, land purchases, or other long-term measures. When purchasing land parcels, priority should be given to those that connect healthy riparian and stream habitat, as these will improve fish habitat resiliency as climate change and climate variability take effect.

HAB 45. Habitat restoration and protection actions as part of the mitigation for resident fish impacts can be and have been implemented on a case-by-case basis and in a site- and species- specific manner, in most instances without a formal quantitative loss assessment and without a mitigation or settlement agreement. A qualitative assessment of impacts and the potential to address those impacts should inform the actions. The Council expects Bonneville to continue to implement some habitat projects for resident fish in this way.

Loss assessments

Development and operation of the hydropower system have resulted in resident fish losses, both from initial construction and inundation impacts and ongoing hydropower operations. After more than 40 years of Program development and implementation, resident fish losses have yet to be calculated except for those adopted by the Council for Libby and Hungry Horse dams in 1993. Any newly developed loss assessments would need to be submitted to the Council as recommendations that would be considered during a Program amendment process.

HAB 46. Engage an independent third party to work with the Council and state and federal fish and wildlife agencies and tribes to develop a standardized approach to calculate resident fish losses due to construction and inundation and from impacts due to ongoing hydropower operations. The independent third party will:

- Evaluate existing information to determine if a desktop exercise could be utilized to calculate resident fish losses in areas where no assessment has been previously completed.
- Provide a list of the information needed for an evaluation.
- Identify areas of the basin where information is sufficient to calculate construction, inundation and operational losses. Where information is insufficient, identify the location and information needed.

Settlement agreements

HAB 47. The Council encourages resident fish mitigation settlement agreements as an umbrella for implementing resident fish mitigation activities under the Act. These agreements should be long-term and settle the hydropower loss impacts to resident fish habitat, whether those habitat losses have been quantitatively assessed or not. Resident fish habitat losses may be mitigated through restoring or acquiring interests in real property, of a total amount agreed upon by appropriate state fish and wildlife agencies and tribes and Bonneville.

HAB 48. Resident fish mitigation settlement agreements should be long-term in duration. The Council encourages Bonneville to negotiate settlement agreements that include:

- Measurable objectives, including the estimated resident fish habitat losses addressed by acquisitions.
- Demonstration of consistency with the policies, objectives, and strategies in the Council's Program.
- Adherence to the open and public process language found in the Northwest Power Act, including measures to address concerns over additions to public land ownership and impacts on local communities, such as a reduction or loss of local government tax base.
- When possible, protection for riparian habitat that can benefit both fish and wildlife, and protection for high-quality native habitat and species of special concern, including endangered, threatened, or sensitive species.

- Assurance of effective implementation of the agreement, with periodic monitoring and evaluation (including a periodic audit) and reporting of results; at a minimum, annual reports to Bonneville must continue for the Council to evaluate mitigation benefits.
- Provisions for adequate funding of annual and long-term operation and maintenance of the habitat to sustain the habitat values stated in the agreement for the life of the project (this is a requirement), along with a committed level of funding that provides a substantial likelihood of achieving and sustaining the resident fish mitigation objectives.
- Assurance that the project will not impact access to the usual and accustomed, traditional, or contemporary fishing, hunting, or gathering places of any tribe.
- A management plan for each parcel with clear objectives; a plan for action over time; a committed level of funding that ensures long-term maintenance to sustain the stated mitigation objectives; and provisions to ensure effective implementation with periodic monitoring and evaluation.

Additional Habitat Measures

In this Program amendment process, as in 2009 and 2014, a group of state fish and wildlife agencies and tribes recommended dozens of specific habitat actions in each of 22 (out of a total of 62) subbasins to be included as Program measures and implemented by Bonneville and the other federal agencies over the next 10 years. These recommended habitat actions mostly target salmon and steelhead but would also benefit other native species.

HAB 49. The Council considers these recommended actions to be Program measures, consistent with the measures in the habitat section of the Program and with the respective subbasin plans. These habitat measures can be found in Appendix G.

Bonneville and the other federal agencies should consider these habitat measures for near-term implementation, with these conditions:

- Not every fish and wildlife agency and tribe submitted a recommendation with specific priority habitat measures for implementation and not all subbasins have been included thus far. Any other state fish and wildlife agency or tribe may submit a list of specific habitat measures for any subbasin. These new lists of habitat actions will be organized by subbasin and added to the existing

lists linked in Appendix G for equal consideration for implementation under the Program.

- The second condition concerns the pace and scale of implementation and sources of funding. Bonneville currently implements a significant amount of habitat actions. The Council expects that Bonneville will continue to implement habitat actions at the same pace and scale, with funding adjusted for inflation to maintain capacity. To the extent the agencies and tribes seek to increase the amount, pace and scale of habitat restoration under the Program, at least a significant portion of the funding should come from the other federal agencies and non-ratepayer funding. Additional increases in Bonneville funding should be coupled with a clear understanding of the priority for this additional funding and the additional benefits to fish and wildlife expected to result.

Research, Monitoring, and Evaluation Measures

Potential research and monitoring questions related to habitat could include the following:

Habitat Related RM&E

HAB 50. Conduct monitoring (*e.g.,* genetic tagging and PIT tagging) to support VSP (viable salmonid population) life cycle monitoring, assess restoration effectiveness, and inform future restoration.

HAB 51. Improve understanding of how physical and biological factors influence fish populations to guide future restoration projects.

HAB 52. Conduct climate change risk analysis to inform restoration and protection efforts and to enhance and protect existing spawning and rearing habitat for native cold-water fish.

HAB 53. Assess climate change impacts on tributary hydrology, water quality, habitats, and native aquatic species through the collection and evaluation of long-term flow and water temperature data. Results from the data evaluation should be used to inform restoration and protection priorities and be incorporated in assessments of the effectiveness of restoration actions.

HAB 54. Inventory cold water sources to inform future restoration and protection efforts, with an emphasis on opportunities to design cold-water refuges.

HAB 55. Develop restoration plans, watershed assessments, and ecosystem models to inform management decisions and evaluate strategies and actions.

HAB 56. Identify and assess ecologically valuable, fragmented habitats across the landscape, likely to be impacted by climate change, to enable prioritization of parcels for protection.

HAB 57. Conduct action effectiveness monitoring using the Tributary Habitat RM&E Strategy coupled with fish survival models.

HAB 58. Consider newer and more technologically advanced monitoring techniques, such as eDNA and genetic tagging, and tribal assessments of restoration effectiveness.

HAB 59. Incorporate indigenous knowledge into monitoring approaches to improve restoration effectiveness and ecological understanding.

HAB 60. Continue to support projects directed at other native freshwater species and the progression of these projects from a research and assessment phase into a restoration and monitoring phase.

HAB 61. Inventory potential chum spawning sites and inform development of restoration projects. Near-term efforts may include construction of spawning channels as a priority for chum salmon restoration.

HAB 62. Evaluate environmental risk and management strategies for using shad carcasses to boost marine-derived nutrients in salmon spawning and rearing habitats.

Water Quality (Toxic Contaminants) RM&E

HAB 63. Support ongoing regional efforts to identify, assess, and reduce toxic contaminants and toxic contaminant hotspots and their effects on native fish, including sturgeon and lamprey, native freshwater mussels, and wildlife in the Columbia River Basin.

HAB 64. Initiate, participate in, support, and coordinate periodic science and policy forums related to toxic contaminant issues. Assist regional parties in advancing public education and information on toxics issues.

HAB 65. The Council shall urge Congress to continue to provide funding, like the funding provided to other Large Aquatic Ecosystems, for the Columbia River Basin Restoration Program and other regional efforts such as the Columbia River

Mainstem Fish Tissue and Water Quality Monitoring Program to protect and restore water quality in the Columbia River Basin, including efforts to:

- Develop sensitive diagnostic indicators of chemical exposure and native fish health, such as biomarkers, for use in field studies in the Columbia Basin.
- Determine the extent to which toxics limit prey quality and abundance in degraded habitats and otherwise affect the food web.
- Improve understanding of contaminants of emerging concern, such as endocrine-disrupting pharmaceuticals and chemicals in personal care products, and their effects on salmonids, sturgeon, and lamprey.

Estuary RM&E

HAB 66. Monitor and report on the physical and biological characteristics of the Lower Columbia River and estuary associated with suitable habitats and the survival, growth, and migration of critical fish species.

HAB 67. Research and evaluate the effects of dredging and water quality (including toxics) on estuary habitat and food webs to better understand the relationship between estuary ecology and salmon and steelhead productivity, abundance, and diversity.

HAB 68. Encourage the Corps of Engineers to monitor dredge spoil habitat remediation for impacts on fish survival and fluvial estuary function.

Sturgeon RM&E

HAB 69. Investigate physical habitat conditions in the mainstem and tributaries that affect the availability and suitability of spawning, egg settlement, and larval and juvenile rearing habitat.

HAB 70. Identify the specific aspects of hydrosystem operations, such as duration of fluctuations in water releases and of water levels, which affect natural spawning, reproduction, growth, and survival of larval and juvenile fishes, and overall recruitment success of sturgeon.

HAB 71. Develop a sturgeon spawning and rearing habitat model in the basin to quantify habitat throughout the year in conjunction with the FCRPS operations.

Wildlife Mitigation

Mitigate wildlife losses caused by the development and operation of hydropower dams in the Columbia River Basin.

Rationale

Development and operation of the hydrosystem resulted in wildlife losses, both from the initial construction and inundation (C&I) and from ongoing operations. The Program includes measures and implements projects to acquire and protect the lost habitats identified in the loss assessments [see Appendix D, Table D-5], as mitigation for C&I losses. The Program expressed wildlife losses caused by C&I through a measurement of affected and inundated acres and then a calculation of lost habitat area and quality for representative species on those acres called habitat units (HU), not through species numbers. Habitat units were established using a Habitat Evaluation Procedure (HEP), which is no longer funded or implemented, following the recommendation of the Council's Wildlife Advisory Committee. As a result, mitigation credits for properties acquired have been assessed in either HUs or acreage, with an agreement among the relevant entities that acquisition of these properties sufficed to mitigate for an understood portion of the losses.

Through three decades of acquisition and protection of properties, mitigation for the assessed C&I losses is nearly complete. Operational losses have been assessed and mitigated in some areas, largely through settlement agreements. In the 2020 addendum to the 2014 Program, operational losses were adopted for Libby Dam (35,571 acres) and Hungry Horse Dam (26,321 acres). For projects without settlement agreements, operational losses remain largely unassessed and unaddressed. The Program maintains a commitment to mitigate for operational losses that have not been estimated or addressed and accepts the terms of existing and new wildlife mitigation agreements.

The Council continues to support use of settlement agreements to resolve remaining C&I losses and operational losses, and these agreements may rely on acres rather than habitat units. Although habitat units provide a tool to determine the quality of mitigated habitat, a transition to using acreage reflects that wildlife managers are already considering habitat quality for focal species when they pursue acquisitions. Moreover, the Council recognizes that contemporary wildlife mitigation no longer relies on habitat units as the basis for tracking progress but rather relies on acreage. To align the Program with how mitigation is implemented, language on habitat units and the corresponding Habitat Evaluation Procedure used to derive them has been removed from the wildlife strategy. This in no way negates or alters past assessments of losses or

mitigation credits. Information on past efforts related to wildlife mitigation crediting are available from the Wildlife Advisory Committee, Wildlife Crediting Forum, and Regional HEP Team summary reports.

General Measures

W 1. Develop and implement habitat acquisition and enhancement projects to fully mitigate for identified losses.

W 2. Coordinate habitat restoration and acquisition activities throughout the basin with fish mitigation and restoration efforts to promote terrestrial and aquatic area connectivity.

W 3. Replace habitat types lost to hydropower dam development and operation through wildlife mitigation.

W 4. Bonneville and the fish and wildlife agencies and tribes will initiate, and complete, if possible, wildlife mitigation agreements for remaining construction and inundation losses by 2030. As an interim step, parties to the developing agreements should identify the facility and losses that will be addressed through the settlement.

W 5. Beginning in the 2000 Program, the Council called for these mitigation agreements to equal 200 percent of the unaddressed habitat losses (2:1 ratio). The Council adopted the 2:1 crediting ratio to address the inability to precisely determine the additional benefit resulting from acquiring an interest in property that already has wildlife value or the additional losses represented by annualization of the losses. However, when there is disagreement about loss assessments and that disagreement cannot be resolved through use of a different, cost-effective tool or approach approved by the Council, then the 2:1 ratio will not apply to remaining losses.

W 6. The Council will work with Bonneville and relevant fish and wildlife agencies and tribes to receive annual reports on progress toward completing settlement agreements for remaining construction and inundation losses.

W 7. Mitigation agreements should be considered to settle operational losses in lieu of precise assessments of impacts.

W 8. Provide resources to support scoping and developing settlement agreements to address wildlife losses.

W 9. The Council and Bonneville may provide assistance with developing these agreements, as requested.

W 10. Maintain the values and characteristics of existing, restored, and created habitat, and report results of mitigation efforts to the Council.

W 11. For existing wildlife agreements that do not already provide for long-term maintenance of the habitat, Bonneville and the applicable management agency will propose a management plan adequate to sustain the minimum credited habitat values for the life of the project.

W 12. The Council encourages wildlife agencies and tribes to monitor and evaluate habitat and species responses to mitigation actions and develop a more standardized approach to wildlife monitoring.

Specific Measures

Mitigation Priorities

W 13. Ensure that wildlife mitigation projects implemented in fulfillment of this Program consider the basinwide implementation priorities described in Appendix D, Tables D-1, D-2, and D-4. The Council adopted these habitat types and species priorities for wildlife mitigation in the 1994 amendments to the Program and added D-3 in this 2026 amendment. The Council recognizes that the mitigation priorities of the relevant agencies and tribes in specific areas may have shifted since the mid-1990s. The Council supports updating the priorities, if necessary, and reporting to the Council. Wildlife mitigation projects and settlement agreements should address the losses identified in the program and address existing or emerging priorities.

W 14. The extent of wildlife mitigation is of particular importance to agencies and tribes in blocked areas, where anadromous fish runs have been extirpated by development of the hydrosystem. Given the ecosystem-based approach in the Program, wildlife mitigation projects should be integrated with fish mitigation projects as much as possible. Where resident fish goals cannot be accomplished, additional wildlife mitigation may be implemented.

Tracking Mitigation

W 15. Parties to a wildlife mitigation agreement should evaluate potential mitigation actions that adequately take into account both habitat quantity and quality to mitigate for the identified losses.

W 16. Bonneville will work with the agencies and tribes for habitat acquired as mitigation for losses identified in Appendix D, Table D-5, which should be acquired in the subbasin where losses were located unless otherwise agreed by the fish and wildlife agencies and tribes in that subbasin.

W 17. Fish and wildlife agencies and tribes and Bonneville will reach agreement on how wildlife mitigation projects and fish mitigation projects should be credited toward identified losses.

W 18. Provide habitat enhancement credits to Bonneville when habitat management activities funded by Bonneville lead to a net increase in habitat value when compared to the level identified in the baseline habitat inventory and subsequent habitat inventories. This determination will be made through the periodic monitoring of the project site. Credit Bonneville for habitat enhancement efforts at a ratio agreed to by Bonneville and the wildlife managers conducting the habitat enhancement.

Elements of Long-term Agreements

W 19. Whenever possible, Bonneville should work with the agencies and tribes to ensure that wildlife mitigation takes place through long-term agreements that have clear objectives, a plan for action over time, a committed level of funding that provides a substantial likelihood of achieving and sustaining the stated wildlife mitigation objectives, and provisions to ensure effective implementation with periodic monitoring and evaluation.

Wildlife mitigation agreements shall include the following elements:

W 20. Measurable objectives, including acres of habitat types by species to be acquired, and a statement estimating the contribution to addressing the wildlife losses identified in Appendix D, Table D-5.

W 21. Demonstration of consistency with the wildlife policies, objectives, and strategies in the Council's program, including with the implementation priorities described in Appendix D, Tables D-1, D-2, D-3, and D-4.

W 22. Adherence to the open and public process language found in the Northwest Power Act including measures to address concerns over additions to public land ownership and impacts on local communities, such as a reduction or loss of local government tax base.

W 23. Protection for riparian habitat that can benefit both fish and wildlife, and protect high-quality native habitat and species of special concern, including endangered, threatened, or sensitive species.

W 24. Incentives to ensure effective implementation of the agreement, plan or action, with periodic monitoring and evaluation (including a periodic audit) and reporting of results. At a minimum, annual reports to Bonneville (which are then uploaded in CBFish) must continue in order for the Council to evaluate the mitigation benefits.

W 25. Provisions for funding long-term maintenance of the habitat adequate to sustain the minimum credited habitat values per the best available science for the life of the project to achieve and sustain the wildlife mitigation objectives guided by adaptive management strategies based in best available science.

W 26. Operation and maintenance funding for wildlife areas adequate to maintain wildlife habitat benefits at a rate commensurate with region and habitat type.

W 27. Assurances that the project will not impact access to the usual and accustomed, traditional, or contemporary fishing, hunting, or gathering places of any tribe.

W 28. For a project to be credited against construction and inundation losses it must be consistent with the Fish and Wildlife Program. Criteria include:

- Covenants, easements, fee title acquisitions or other appropriate agreements for the life of the hydroelectric project to ensure project areas are permanently protected and dedicated to wildlife benefits.
- A demonstration that projects will benefit priority wildlife habitat, species, or populations as defined by federal, state, or tribal wildlife management plans or subbasin plans.
- A completed project-area management plan.
- A long-term funding agreement adequate to support implementation of the management plan, including long-term maintenance and repair of existing structures (e.g., culverts, water structures, etc.).

Predator Management

Improve the survival of salmon and steelhead and other native focal fish species by managing and controlling predation rates.

Rationale

The construction and operation of the Columbia River Basin hydrosystem, as well as the disposal of dredge spoils in the lower Columbia River and estuary, have both altered historical habitats and created new artificial habitats. These altered habitats support a wide range of species, including native and non-native predatory fish species such as northern pikeminnow, walleye, and Northern pike, predatory birds such as Caspian terns, double-crested cormorants, several gull species, and pelicans, and marine mammals such as California and Steller sea lions. In many cases, these modified habitats encourage these species to thrive, which can exacerbate the rate and level at which predation occurs. Increased rates of predation in the last decade emphasizes the need for better understanding of this topic and increased management. Under the predator management strategy, relevant parties should work to identify the necessary thresholds to be met to effect change, determine measurable and specific actions, and prioritize strong coordination between entities. These steps are necessary to address both emerging and known predator issues in the Columbia Basin, support healthy populations of salmon, steelhead, and other native species, and preserve Program effectiveness.

The effort to manage predators should be the coordinated work of all the responsible entities, including Bonneville, the U.S. Army Corps of Engineers, Bureau of Reclamation, NOAA Fisheries, other federal agencies, the state fish and wildlife agencies and other state agencies, and the region's Indian tribes. Particular entities are noted in the measures where appropriate.

General Measures

PM 1. Adequately sustain and support ongoing efforts to reduce predation and, as described in this section, increase or modify those efforts as necessary.

PM 2. The Council will convene a workgroup comprised of individuals from federal and state agencies and tribes to develop both a short-term and long-term plan to address significant predators of salmon and steelhead and other native fish.

Tasks may include:

- Determining the effectiveness of predator-management actions while developing a more effective systemwide, ecosystem-based approach for assessing and addressing the impacts of fish, avian, and pinniped predation on species important to the Program. This includes identifying, if possible, what declines in predator abundance in any location are necessary to make a measurable and enduring difference in the survival of the target species and then determining if the actions necessary to achieve those declines are cost-effective compared to other actions to boost survival.
- If possible, developing common metrics to be able to predict, measure, and compare predation on target species that at least estimate additive versus compensatory effects. These metrics should also estimate the effects of management actions on reducing predation. Predator-management evaluations funded by the action agencies should include a determination of the effectiveness of such actions and the common predation metric in their reports. It is important to understand which management actions have the greatest effect on adult returns and SARs, and target actions for cost-effective predation management.

PM 3. The workgroup should report to the Council twice per year on its progress. This should include progress on developing and applying an approach to assess and compare cost-effectiveness of predator management actions, as well as agreed-upon paths to facilitate resolutions to management disagreements around predation management actions. At least one of these updates should address respective predator-management efforts in the region. This group should not duplicate existing workgroups. It should facilitate the sharing and incorporation of information and provide guidance as necessary.

PM 4. The Corps of Engineers and Bonneville shall monitor, evaluate, and control the extent of predation on lamprey to decrease impacts on all life stages and increase the overall population.

PM 5. All the relevant agencies should work together to expand predator management efforts, including actions that extend beyond dissuasion, if needed. These efforts should focus on predation hot spots that may include some tributaries, man-made structures, or vulnerable points in migration, such as post-hatchery release, at fish ladders, or in the tailrace of a dam.

Specific Measures

Management of Predator Fish

PM 6. In general, cooperatively advance and expand the piscine predator control program. The Program should emphasize the early detection and swift removal of newly emerging populations of predators to limit their impact. The Program should focus on other fish species, such as smallmouth bass, channel catfish, brook trout, lake trout, and walleye, where they are causing significant impacts on salmon and steelhead and other native fish. Also, when possible, it should strive to estimate species-specific and cumulative juvenile salmonid, lamprey, and other native fish consumption rates by non-native piscivorous fish using appropriate techniques (e.g., genetics or bioenergetic models) to prioritize impacts by species.

PM 7. Increased and new control methods are needed for walleye, including in tributaries, where predation is impacting the ability to meet regional goals. Specific actions to consider for near-term implementation include:

- Seek opportunities to identify management changes and infrastructure projects that could deter the introduction or movement of predator species.
- Study the magnitude and location of consumption of juvenile salmon and steelhead by walleye, starting with known locations (*e.g.,* the lower Snake River). Native resident salmonids, sturgeon, and lamprey should also be studied as capacity becomes available.
- Evaluate and implement walleye removals where predation is impacting the ability to meet program and other goals.
- Continue system-wide tracking of walleye and other piscine predators.
- Study the effects of introduced species on food web dynamics and Walleye diet shift.

PM 8. Bonneville should continue to annually implement the northern pikeminnow-control program and, where warranted based on known juvenile salmon and steelhead consumption rates, expand northern pikeminnow removals to other mainstem dams in the lower Columbia. Annually evaluate both the current program and any expanded efforts for the biological and cost-effectiveness of focused pikeminnow control, explore different methods to meet reduction

objectives, and implement removals if warranted. Scoping of focused pikeminnow removals at other mainstem dams in the Columbia or Snake rivers will be based on evaluations and adaptive management principles with input from NOAA Fisheries, the fish and wildlife agencies, tribes and the Council.

PM 9. Bonneville should fund and implement the Northern pike removal effort based on the comprehensive and subsequently approved proposal by the Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, Washington Department of Fish and Wildlife, and others. Bonneville should also continue working with the relevant state agencies and tribes on a strategy to solicit and obtain contributions to this effort from other affected entities as this is an issue broader than a federal hydrosystem responsibility. Bonneville and other relevant entities should support the ongoing northern pike removal efforts in subbasins of the Columbia River system that may serve as source areas to the downriver dispersal and establishment of northern pike populations.

PM 10. Encourage research and reporting into the upper extents of smallmouth bass and brook trout distribution, abundance, and diet. In tributaries, identify spawning locations and document potential spawning occurrence.

Management of Predator Birds

PM 11. Implement systemwide predator-bird management actions and research, monitoring, and evaluation in the Columbia River Basin in coordination with state and federal fish and wildlife agencies and tribes.

PM 12. Predation by double-crested cormorants, Caspian terns, and several other bird species continues to have a significant impact on listed juvenile salmon and steelhead in the Columbia and Snake rivers. The action agencies (Bonneville, Corps of Engineers, Bureau of Reclamation), working with state and tribal partners, should continue to provide adequate funding to implement activities, both in the estuary and inland to reduce avian predation on listed juvenile salmon and steelhead.

PM 13. Predation by American white pelicans on both juvenile and adult listed salmon and steelhead is a growing concern in the Columbia Basin. The action agencies (Bonneville, Corps of Engineers, Bureau of Reclamation), working with state and tribal partners, should provide adequate funding to implement activities, both in the estuary and inland, to reduce American white pelican predation on salmon, steelhead, and other native species.

The Corps of Engineers and others should use their existing authorities to the fullest possible extent to remove or manage avian predation by:

PM 14. Continuing to improve avian-deterrent programs at all lower Snake and Columbia River dams.

PM 15. Removing avian predators from bridges, towers, and navigation aids between the Columbia River estuary and Bonneville Dam.

PM 16. When necessary, providing year-round dissuasion or lethal removal of avian predators at all Lower Snake and Columbia River dams including alternative strategies such as the use of raptors or eagle nesting platforms.

PM 17. Developing and implementing predator hazing and removal in tributaries including the Grande Ronde, Imnaha, Salmon, and Clearwater subbasins and in the Lower Snake River with special attention to vulnerable locations and situations such as hatchery releases and past and current habitat restoration projects. These actions will require extensive coordination, permitting, and outreach and may require a stepwise approach.

PM 18. Developing a double-crested cormorant management plan and implementing warranted actions in the lower Columbia River and estuary.

PM 19. Implementing the avian management plans (for double-crested cormorants, Caspian terns, and other bird species) for Corps-owned lands and associated shallow-water habitats in the mid-Columbia area. This includes dredge spoils that have been developed through the Corps and other processes for predatory bird species in the Columbia River estuary. Sources of information for avian management plans are available here.

Management of Predator Seals and Sea Lions

The Corps of Engineers and others should use their existing authorities to the fullest possible extent to remove or manage pinniped predation by:

PM 20. Improving the exclusion of sea lions at all main adult fish ladder entrances and navigation locks at Bonneville Dam.

PM 21. Continuing to support land- and water-based harassment efforts by NOAA Fisheries, the Oregon and Washington departments of fish and wildlife, and tribes to keep sea lions away from the area immediately downstream of Bonneville Dam.

PM 22. Continuing to evaluate the extent of seal and sea lion predation on salmonids, sturgeon, and lamprey in the lower Columbia River from below Bonneville Dam to the mouth of the river.

PM 23. Fully implementing Section 120(f) permit in the existing permit area. For areas not included within the existing permit area, develop, fund, and implement baseline monitoring of sea lion management actions, and consider developing non-lethal sea lion deterrents. Monitoring information may inform future amendments to the Marine Mammal Protection Act.

PM 24. Fully implementing Section 120(f) permit at tributary locations through robust and effective predation management and monitoring actions in locations that may emerge as predation hot spots, such as the Cowlitz, Kalama, Lewis, or Sandy rivers.

Non-native and Invasive Species Management

Prevent the introduction of non-native and invasive species in the Columbia River Basin and suppress or eradicate non-native and invasive species.

Rationale

Non-native and invasive species can imperil native species in the Pacific Northwest's ecosystems through predation, competition for food, interbreeding, disease transmission, food web disruption, and physical habitat alteration. The Program defines invasive species as a species that establishes and reproduces rapidly outside its native range and non-native species as an introduced species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental.

The Council acknowledges that non-native and invasive species pose direct threats to the Program's fish and wildlife restoration efforts through competition, predation, and habitat modification. In addition, aquatic non-native species can invade and significantly threaten infrastructure at hydroelectric dams and fish passage facilities in the Columbia River Basin. The Council also acknowledges that the highly modified environment resulting from the construction and inundation of the hydrosystem can expedite the establishment of and exacerbate the effect of non-native and invasive species on native fish and wildlife. Currently, the greatest known threat in the Columbia River Basin from aquatic invasive species is the introduction of zebra, quagga, and other non-native mussels. Other aquatic threats include hydrilla, silver carp, flowering rush, and Eurasian watermilfoil. Terrestrial invasive species that compromise fish habitat and wildlife mitigation projects include rush skeletonweed, yellow starthistle, poison hemlock, and Japanese knotweed, among others. Once established in other locales, management actions have shown little success in removing or controlling these invasive non-native species. Non-native species that are also considered predators (northern pike, smallmouth bass, brook trout, lake trout, and walleye) are addressed in the Predator Management section.

The effort to manage non-native and invasive species that affect species of importance to the Program will need to be the coordinated work of all the responsible entities, including Bonneville, the Corps of Engineers, Bureau of Reclamation, NOAA Fisheries, other federal agencies, the state fish and wildlife agencies and other state agencies, the region's Indian tribes, non-federal project operators, local governments, land managers, and others. Particular entities are noted in the measures where appropriate.

To the extent the threat to salmon, steelhead and other native species from non-native and invasive species is caused or exacerbated by the dams and the hydropower system, the Council expects Bonneville and the dam-operating agencies – the Corps of Engineers, the Bureau of Reclamation and (with regard to non-federal dams) the Federal Energy Regulatory Commission and project licensees – to take the lead responsibility. The Council will look to those agencies to decide how to share this responsibility but has emphasized one or more of these agencies below where appropriate.

In other circumstances, non-native and invasive species that may not be directly affected by the hydrosystem are still a threat to the survival and welfare of native species affected by the hydrosystem and are addressed by measures under this Program. In those cases, understanding and addressing the threats posed by the non-native and invasive species is an appropriate form of offsite mitigation under the Program and the Act. However, the Council expects the burden of addressing these species to fall largely on other agencies and not the ratepayers, with Bonneville only playing a role as necessary.

General Measures

NNIS 1. Increase prevention efforts and reduce impacts from non-native and invasive species, both plant and animal, by:

- Enhancing early detection monitoring throughout the basin.
- Developing strategies and outreach tools to educate the public about regional prevention and management of invasive species.
- Providing assistance to the region from BPA and other federal agencies to prevent the establishment of zebra, quagga, and other non-native mussels.
- Prioritizing non-native species control actions to ensure Program funds are spent to address the most significant threats, including predation, competition, and hybridization. Actions should aim to address the most significant short-term threats while evaluating the effectiveness of long-term actions.
- Researching interactions between native and non-native species to inform management actions and measure their effectiveness.

Specific Measures

Aquatic Non-native and Invasive Species

NNIS 2. Focus efforts by building regional capacity for early detection monitoring and developing risk assessments to better understand likely waterbodies of first introduction of aquatic non-native and invasive species and probable downstream or human-mediated spread.

NNIS 3. Identify infrastructure projects that may deter the introduction or movement of aquatic non-native and invasive species in mainstem and tributary waters.

NNIS 4. Each of the four Northwest states should continue to implement the preventative strategies in their respective state aquatic invasive species management plans and coordinate their prevention efforts closely with the other Northwest states and British Columbia.

Mussels

NNIS 5. Increase inspection and decontamination of aquatic conveyances to protect water resources throughout the basin. This should include increased support for the development of ballast water monitoring and best practices to prevent the introduction of invasive species through contaminated equipment and materials.

NNIS 6. BPA and other federal agencies should assist the Northwest states' efforts to prevent the establishment of zebra, quagga, and other non-native mussels. This includes developing decision support tools and criteria to be met for the declaration of an invasive species emergency.

NNIS 7. Federal agencies shall conduct commercial vessel inspections for invasive species at federal projects.

NNIS 8. If zebra, quagga, or other non-native mussels become established in the Columbia Basin, Bonneville and other federal agencies, along with FERC-licensed utilities, shall support regional rapid-response efforts and monitoring at the hydropower projects for infrastructure impacts.

Fish

NNIS 9. If non-native fish species are to be used to achieve mitigation for hydropower system impacts, an environmental risk assessment of potential negative impacts

on native fish species shall be conducted prior to introduction. If non-native fish species are introduced, these shall be managed to maximize the use of available existing and improved habitats, consistent with state and local regulations, to provide a subsistence and sport-fishing resource without adversely affecting native fish populations.

NNIS 10. Apply existing and new scientific research to identify situations (species, times, sizes, and places) where increased removal of non-native fish would be most effective in increasing native fish populations.

NNIS 11. Where non-native species are limiting the growth, survival, or reproduction of native species, agencies and tribes shall minimize non-native fish impacts to native fish species by using appropriate invasive fish-removal methods (e.g., gill net, chemical control, electrofishing, changes in fishing regulations, sport reward programs, etc.) and monitor their effectiveness. Lethal take to control non-native predators or competitors, consistent with state and federal law, is appropriate when non-lethal methods of control are not successful and the adverse impacts to salmonids and native fish species or their habitat are significant.

NNIS 12. Develop and implement actions to substantially reduce American shad from passing upstream of Bonneville Dam.

NNIS 13. Continue to review, evaluate, develop, and implement strategies to reduce competition from non-native and invasive fish species with juvenile and adult salmonids.

NNIS 14. Remove non-native species where they are actively competing with and limiting the productivity of native salmon and steelhead or other native species, both in the mainstem and in tributaries.

Plants and Invertebrates

NNIS 15. Research strategies for removal, control, and elimination of aquatic non-native and invasive plants in Columbia River mainstem reservoirs and selected tributaries (e.g. fall Chinook spawning gravels in the lower Deschutes River).

NNIS 16. Map and track aquatic non-native and invasive species including Eurasian watermilfoil, other invasive riparian species, and non-native invertebrates in the Columbia Basin waters and develop treatment protocols accordingly.

NNIS 17. Research strategies and implement actions for the control, removal, and elimination of semi-aquatic and terrestrial plants that degrade Program-acquired wildlife habitat.

Communication, Coordination, and Outreach

The Council will:

NNIS 18. The Council will continue to assist with regional communication, coordination, and public outreach efforts between regional stakeholder groups in the Columbia Basin and will facilitate regional science/policy forums on non-native and invasive species issues, as appropriate.

NNIS 19. Coordinate with relevant parties and other federal, state, and tribal entities, and regional organizations such as the PSMFC 100th Meridian Initiative-Columbia Basin Team, to track and monitor data on existing non-native invasive species distribution and population trend assessments in the Columbia Basin and encourage regular reporting and regional data sharing on rapid response, prevention, containment, control, eradication, enforcement, and education and outreach efforts.

NNIS 20. Support the collaborative work of the PSMFC 100th Meridian Initiative-Columbia Basin Team and request regular reports from that group on the following items: current regional efforts for inspection and decontamination; early detection efforts and rapid response protocols; research priorities related to invasive species control, containment, and prevention; and opportunities for regional collaboration and lessons learned.

NNIS 21. Assist regional entities with legislative efforts to prevent the invasion and control the spread of non-native invasive species in the Columbia Basin.

Plume and Nearshore Ocean

Monitor ocean conditions and related salmon and steelhead survival and endorse mitigation and management actions that improve the survival, growth, and viability of Columbia River fish under varying ocean conditions.

Rationale

The survival, growth, and viability of anadromous populations in the Columbia River Basin are affected by physical, biological, and ecological conditions in the plume and nearshore ocean. These environments are an integral component of the ecosystem supporting Columbia River salmon and steelhead. Moreover, the experiences of salmon and steelhead in freshwater influence subsequent survival in the plume and ocean.

Physical and ecological processes in the Columbia River and plume continue to be impacted by the construction and operation of the hydrosystem. For example, the storage, release, and impoundment of water change the pattern of flows downstream from hydroelectric dams and changes the characteristics of the plume.

The ocean is not a static environment. As a result of varying ocean conditions, salmon and steelhead populations are constantly fluctuating and may pass through cycles of abundance, followed by cycles of scarcity. Anadromous species accommodate ocean mortality and variable ocean conditions through a sufficient level of productivity and by expressing a wide range of life history strategies.

Understanding how annual variations in ocean conditions affect Columbia River salmon and steelhead has been important to the Program since the late 1990s, consistent with the science review amendment to the Northwest Power Act and the completion of the first comprehensive science reviews. In recent years, the annual information delivered by the Program's ocean strategy and research efforts has become especially important, with unusual ocean conditions resulting in increased ocean temperatures, changes in food sources, changing predator-prey relationships, and subsequent reductions in survival for many stocks. The data produced annually through trend monitoring and addressing critical uncertainties provides the opportunity to further our understanding of the effect of ocean conditions on program performance. Moreover, it informs identifying which factors are most critical to survival, growth, and viability and which mitigation actions may provide the greatest benefit.

Research, monitoring, and evaluation to understand what is happening to Columbia River salmon and steelhead while they inhabit the plume and nearshore ocean is fundamentally consistent

with other research needs of the Program. The Council understands that much of the useful research is conducted by NOAA Fisheries and by academic researchers largely supported by government funds. Funds can and should come from several sources, but the Council also expects Bonneville, as it has for decades, to continue to contribute to sustain ocean research for the Program.

General measures

Research, Monitoring, and Evaluation

PNO 1. Evaluate the effects of flow regulation on plume and nearshore ocean characteristics and salmon and steelhead productivity, abundance, and diversity.

PNO 2. Continue long-term monitoring of the distribution, abundance, survival, and growth of juvenile salmon and steelhead in the plume and nearshore ocean along with the corresponding environmental conditions they experience while inhabiting those environments. Results from this research will improve understanding of how marine ecosystem changes affect Columbia River salmon and steelhead.

PNO 3. Distinguish ocean-related mortality from that caused in the freshwater part of the life cycle in order to assess the relative benefits of different mitigation actions taken in freshwater.

PNO 4. Continue to produce and report annually on a stoplight chart containing physical and biological indicators for ocean conditions experienced by juvenile Columbia River salmon and steelhead and hypothesized to correlate with growth or survival.

PNO 5. Develop and report on stock-specific ocean indicators (stoplight charts) for forecasting salmon and steelhead returns using a mechanistic ecosystem approach. These stock-specific indicators may help identify the most important ecological drivers of survival under variable ocean conditions.

PNO 6. Continue to produce an annual index of ocean survival from Bonneville Dam back to Bonneville Dam, and forecasts of survival.

PNO 7. Investigate predator and prey relationships for salmon in the plume and nearshore ocean.

PNO 8. Sustain implementation of nearshore ocean and plume monitoring and research at a level adequate to deliver useful information about salmon and steelhead survival in the nearshore ocean and plume as described above.

PNO 9. Describe and analyze patterns of larval Eulachon dispersal into the Columbia River plume associated with changes in the physical characteristics of the plume.

Freshwater Actions to Improve Ocean Survival

PNO 10. Continue to investigate links between actions taken in freshwater and the response of juvenile salmon and steelhead in the nearshore ocean and plume to identify which freshwater actions (e.g., such as those that improve smolt body size or affect run timing) affect marine growth and survival.

PNO 11. Identify key uncertainties and opportunities to improve in-river management to best allow fish to accommodate variable ocean conditions. Predicting future ocean conditions and anadromous fish returns allows for adjustments to inland actions and may lead to increased survival benefits.

Forum

PNO 12. The Council supports efforts by the Ocean and Plume Science and Management Forum and science/policy exchanges to encourage coordination and communication between ocean scientists and fish and wildlife agencies and tribes, meeting as often as needed.

Artificial Production

Use artificial production programs and associated infrastructure, such as hatcheries, acclimation, or other satellite sites, as tools to help meet the mitigation requirements of the Northwest Power Act.

Rationale

Hatcheries and artificial production programs throughout the Columbia River Basin serve the purpose of mitigating the impacts to fish from construction and operation of hydropower dams and general development of the basin. The Council supports hatchery mitigation to help meet Program objectives, including the replacement of fish losses as a result of the construction and operation of the hydropower system. The Council acknowledges the commitments made by federal, state, and tribal governments to implement artificial production actions consistent with the Northwest Power Act, Endangered Species Act, Indian treaty rights and other laws, including commitments associated with ongoing court cases such as *United States v. Oregon*.

Over the last 40 years, significant efforts to review and improve hatchery operations have occurred. Many of these comprehensive reviews were supported by the Council, state and federal agencies, Indian tribes, and independent science panels (for example - Integrated Hatchery Operations Team, Artificial Production Reviews, Hatchery Scientific Review Group, ad hoc supplementation monitoring and evaluation workgroups). Hatchery operations continue to be guided and adaptively managed by these prior reviews, in addition to requirements under the Endangered Species Act and compliance with relevant biological opinions, ongoing monitoring and evaluation of artificial production programs, and legal agreements.

While hatcheries and production programs serve the primary purpose of mitigation for dams and development in the basin, programs are managed to achieve dual objectives supporting both harvest and conservation. Segregated management programs are used to promote harvest of hatchery fish and managed to not impede recovery of natural populations. Integrated management programs are used for supplementation to prevent extirpation and support rebuilding natural production, and for reintroduction to restore extirpated populations, with many of these types of programs also contributing to harvest fisheries when appropriate. The Council's Program recognizes the dual management objectives of production programs to support both harvest and conservation. The Program emphasizes research, monitoring and evaluation, and using the best available science to adaptively manage hatchery facilities and programs for native fish populations affected by the hydrosystem. Through the Program, multiple hatcheries and their associated infrastructure are used to support production of anadromous salmon and steelhead,

several resident fish species, white sturgeon, and Pacific lamprey (Program Tracker). In areas where anadromous salmon and steelhead have been extirpated due to the construction and operation of hydropower facilities, and studies or other actions have not yet been taken to determine the feasibility of reintroduction, artificial production is one of the primary mitigation strategies along with habitat improvements to support natural production of native resident species. The feasibility of re-establishing salmon and steelhead populations in all areas within the basin where they have been extirpated should be assessed, and programs for re-establishment should be considered, where deemed feasible.

Recognizing that artificial production in the Columbia River Basin is interconnected as a system across multiple federal and non-federal mitigation programs, the Council supports continued efforts to compile Columbia River Basin artificial production information and data at a comprehensive basinwide scale. The Council defers to the agencies and tribes to define the scope and management objectives of artificial production programs, consistent with current and evolving scientific principles of the Program. These objectives, along with additional information on programs, continue to be compiled and reported on in various ways such as through compliance reporting, agency websites, and publicly accessible databases. The Council relies on Bonneville and the Coordinated Assessment partners (StreamNet data management) to continue efforts to collect and organize performance data needed to monitor the effectiveness of artificial production programs funded by Bonneville. The Council will ensure that research, data collection, and reporting methods allow for meaningful evaluation of hatcheries and fish propagation measures at both the local and landscape level, to ensure consistency with Program goals and objectives.

As noted in Part Six and the measures below, the Council also emphasizes adequate and dependable annual and long-term operation and maintenance funding to ensure the ongoing proper functioning of past infrastructure investments for hatcheries, fish screens, and land acquisitions made for the benefit of fish and wildlife. Adequate funding for operations and maintenance of hatchery infrastructure and associated artificial production programs is critical to meet their intended goals and mitigation obligations. Since 2017, both the Council and Bonneville coordinate plans to manage these asset investments, with dedicated annual funding with a reserved placeholder to address recurring maintenance needs for the Program's hatchery infrastructure. In addition, Bonneville allocated $50 million, on a one-time basis through the FY 2022 Reserves Distribution Clause (RDC), to address a backlog of high-priority maintenance needs of hatchery assets. These funds were divided evenly between the Lower Snake River Compensation Plan and the Council's Program hatchery infrastructure. While this recent progress has been made to address necessary maintenance of hatchery infrastructure, funding adequacy for annual and long-term maintenance of the Program's assets remains critical.

General Measures

AP 1. Bonneville shall continue to support the operation of propagation actions under the Program to complement the present and future management activities of state and federal fish and wildlife agencies and tribes, including production that works to complement habitat improvements. Fish propagation may support fisheries, supplementation, reintroduction of salmon and steelhead where feasible, native fish conservation, and within blocked areas, propagating other native species.

AP 2. Implement any hatchery program to:

- Produce fish in the quantity and quality needed to meet the production commitments underlying the Program (whether from *US v Oregon* Management Agreement or elsewhere), at a level that is adequate to effectively operate and maintain (annually and long-term) the hatchery facilities and production (see also Part Six), including support for new or modified infrastructure and operations for climate resiliency and/or to consider implementation of updated science standards and recommendations.
- Adequately monitor the risk and benefits associated with the production as identified in the decisions reviewing and authorizing the production.

Because artificial production efforts in the Columbia Basin are so interconnected – with each other and with other actions to improve abundance and productivity, the Council encourages all federal and non-federal funders and operators of hatchery programs outside the Power Act production programs to also implement their programs to the same level of sufficiency. Bonneville should coordinate with the other federal and non-federal hatchery operators to develop and report information on the adequacy of composite production of juveniles to meet underlying production commitments associated with the Program.

AP 3. The goals, objectives, timelines, benchmarks and experimental framework for reintroduced populations will be developed by the agencies and tribes and submitted to the Council for the step review process.

Specific Measures

Salmon and Steelhead

AP 4. **Existing production.** Continue to implement the activities under the Program that produce and release salmon and steelhead and coordinate that production as much as possible with other programs releasing salmon and steelhead in the basin. Specific information on the Program's hatchery facilities and production activities can be found in the subbasin plans and on the hatchery section of the Council's website. The website information also includes details for other hatchery mitigation programs throughout the Columbia River Basin.

In this amendment process, the Council received recommendations detailing specific release numbers and other specific actions expected in the near-term from many (although not all) of both Program and non-Program artificial production. It is not clear which details in the recommendations reflect activities that are already part of standard operations for these artificial production programs and which represent new directions for these programs. The implementers of these facilities and programs should consider these recommendations as they plan for future operations.

AP 5. Because production under the Lower Snake River Compensation Plan (LSRCP), authorized by the Water Resources Development Act of 1976 and administered by the U.S. Fish and Wildlife Service, is so intertwined with production under the Council's Program, and because of the continuing challenges with the status of Snake River populations, the Council encourages Bonneville, the U.S. Fish and Wildlife Service, and the states and tribes that are partners in the LSRCP to support hatchery modernization, upgrades, and long-term and annual maintenance needs at the LSRCP facilities and make progress in better meeting the goals and objectives of the LSRCP program.

Resident Fish

AP 6. Continue to implement the propagation of resident fish, study the effects of those propagated fish on other resident fish and the ecology of the area, and implement fishery monitoring for those propagated fish where native fisheries have been lost or are being recovered.

Sturgeon

AP 7. Where actions such as translocation, flow management, predator control, etc. will not be sufficient to meet sturgeon populations goals, consider hatcheries and repatriation techniques for sturgeon as a mitigation strategy to supplement populations with limited recruitment. When the strategy is implemented through the Council's step-review process for hatchery proposals, this strategy will:

- Use best available scientific information in establishing protocols for source populations and numbers of hatchery fish released.
- Build on knowledge gained from ongoing hatchery efforts in other areas.

AP 8. Continue interim hatchery production, including 100-percent PIT-tagging of hatchery sturgeon and 100-percent PIT-tagging and acoustic tagging of broodstock collected in the upper Columbia River.

AP 9. Continue to support artificial production to avoid extinction of endangered Kootenai River White Sturgeon.

AP 10. Continue to support artificial production planning and implementation, including hatchery facility construction, for White Sturgeon in lower Columbia River basin impoundments from Bonneville Dam to Priest Rapids and Lower Granite dams.

Lamprey

AP 11. Continue to support supplementation of Pacific lamprey populations by using adult translocation and reintroduction of all life stages into areas where they have severely declined or are extirpated, including artificial production with early life stage outplanting in relevant Columbia and Snake River tributaries to mitigate for lost lamprey production.

Native Freshwater Mussels

AP 12. Continue to support planning, restoration strategy development, and implementation for native freshwater mussel conservation, including research related to biology, artificial propagation, and population supplementation.

Additional Artificial Production Measures

AP 13. **Specific new artificial production actions.** In this Program amendment process, a group of state fish and wildlife agencies and tribes recommended dozens of

specific hatchery actions in select subbasins to be included as Program measures and implemented by Bonneville and the other federal agencies over the next 10 years. These recommended hatchery actions mostly target salmon and steelhead but some would benefit other native species.

The Council considers these recommended actions (Appendix G) to be Program measures, consistent with the measures in the artificial production section of the Program and with the respective subbasin plans.

Bonneville and the other federal agencies should consider these hatchery measures for near-term implementation, with these four conditions:

- Not every fish and wildlife agency and tribe submitted a recommendation with specific artificial production measures for implementation and not all subbasins have been included thus far. Any other state fish and wildlife agency or tribe may submit a list of specific artificial production measures. These new lists of artificial production actions will be added to the existing lists linked in Appendix G for equal consideration for implementation. Because not all entities may agree with specific measures as recommended, coordination and general consensus among relevant agencies and tribes should be part of the planning process prior to implementation.
- All new artificial production activities associated with the Program are subject to the planning, step review and project review requirements of the Program before full implementation.
- The third condition concerns the pace and scale of implementation and source of funding. Bonneville currently implements a significant amount of artificial production actions. The Council expects that Bonneville will continue to implement existing artificial production actions at a similar pace and scale, with funding adjusted for inflation to maintain capacity. To the extent the agencies and tribes seek to implement new artificial production measures under the Program, at least a significant portion of the funding should come from the other federal agencies and non-ratepayer funding. Additional increases in Bonneville funding should be coupled with a clear understanding of the priority for this additional funding and the additional benefits to fish and wildlife expected to result.
- Given the status of salmon and steelhead populations, implementation of new or increased artificial production should emphasize conservation and safety-

net production initiatives in the lower Snake River basin to benefit Snake River populations, as recommended by the relevant tribes and state fish and wildlife agencies. These conservation actions may also include preservation of genetic material and monitoring broodstock. While emphasis is specific to the lower Snake River basin, production initiatives for salmon and steelhead in other regions of the Columbia basin are also relevant, and included in the list of measures in Appendix G. Implementation of new production should not occur to the detriment of meeting the capital development and rehabilitation needs of existing production programs to meet production commitments.

Research, Monitoring, Evaluation, and Reporting Measures

Research, Monitoring, and Evaluation

AP 14. In consideration of best available scientific information, the Council will rely on information provided by the state and federal fish and wildlife agencies and tribes and the independent science panels regarding hatchery science and may reference the Council's Research Plan in identifying critical uncertainties related to hatchery performance. Research, monitoring, and evaluation is important in evaluating and improving hatchery effectiveness, and for adaptive management of programs to manage risk while meeting mitigation and conservation objectives.

AP 15. Bonneville should support various RM&E methods and the use of standardized performance measures by the state and federal fish and wildlife agencies and tribes to inform effectiveness and adaptive management of various propagation strategies in meeting intended hatchery goals.

AP 16. State and federal fish and wildlife agencies and tribes will continue to monitor their hatchery programs for compliance with federal, state, and other relevant requirements and will make this information readily available. When appropriate, adjustments to requirements on hatchery operations should also be considered given the need for operations to manage risk while also meeting mitigation and conservation objectives.

AP 17. Where feasible, assess productivity, distribution, and diversity of a supplemented population before, during, and after implementation of the production effort.

Reporting

AP 18. Make available hatchery program information for all species (for example - release numbers and locations), management plans, and publications/reports from associated research, monitoring, and evaluation plans associated with the Program through agency and/or data management websites, the Columbia Basin Fish and Wildlife Library, and/or the Council's website or Program Tracker.

AP 19. Include in reporting adaptive management actions implemented or planned to improve effectiveness in meeting intended hatchery goals or changes in goals to meet broader basin management strategies.

AP 20. The Council intends to use available reporting mechanisms where possible.

AP 21. Bonneville should support collection and organization of information and data on reintroduction hatchery program efforts and related research, monitoring, and evaluation that occur throughout the Columbia River Basin, and make this information available as a resource to agencies and tribes that are exploring new reintroduction programs.

Anadromous Fish Mitigation in Blocked Areas

Mitigate for the loss of salmon in blocked areas of the Columbia Basin that historically had runs of anadromous fish through a variety of actions that may include passage investigation, reintroduction of anadromous fish, habitat restoration and protection, and harvest opportunities. A flexible approach is needed to address anadromous fish losses, which includes the extirpation of important populations.

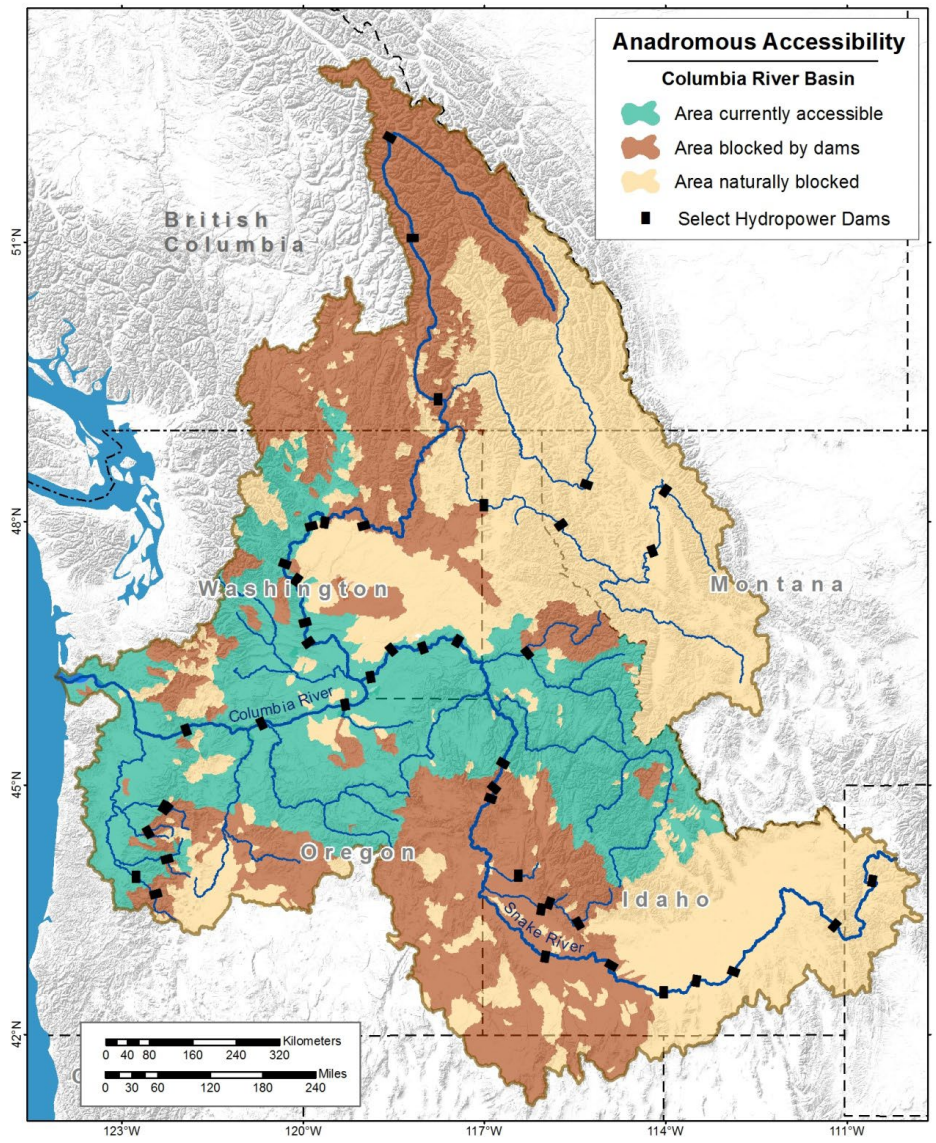

Figure 6. Areas blocked to anadromous fish in the Columbia River Basin. The hydropower system has blocked about 4,600 miles (or 31%) of previously accessible habitat for anadromous fish. More information on the development of this map is available in the ISAB Density Dependence Report.

Rationale

In some portions of the Columbia River Basin, the dams constructed as part of the hydropower system did not include fish passage facilities, therefore becoming complete barriers to anadromous fish. This includes the portion of the mainstem Columbia River above Grand Coulee and Chief Joseph dams, the portion of the Snake River above the Hells Canyon Complex historically accessible to salmon, the North Fork of the Clearwater River above Dworshak Dam, and other areas. The resulting huge loss of salmon capacity and productivity in these blocked areas is one of the key drivers of mitigation activities under the Northwest Power Act.

This strategy describes a suite of mitigation actions available in the blocked areas to mitigate for the loss of anadromous fish. These include habitat and production enhancements to resident fish, habitat improvements to enhance wildlife populations, anadromous fish released for ceremonial, subsistence, and educational fisheries, and investigations into the feasibility of reintroducing anadromous fish.

This strategy is about ensuring mitigation under the Northwest Power Act for direct losses of anadromous fish due to the development of hydropower facilities. Therefore, the Council expects the federal agencies with clear responsibilities under the Act to implement the measures in this strategy – Bonneville, the Corps of Engineers and the Bureau of Reclamation for impacts of federal dams that block anadromous fish, and the Federal Energy Regulatory Commission and its project licensees for the similar impacts of non-federal dams. At the same time, the Council understands that the success of an effort as complex as the investigation of the reintroduction of anadromous fish above Grand Coulee Dam, for example, will require the coordinated efforts of many governmental and non-governmental partners.

General Measures

BA 1. Mitigate for anadromous fish losses using actions such as habitat restoration and protection, land and water acquisitions, anadromous and resident fish reintroductions, resident fish enhancement, wildlife mitigation, artificial production, educational opportunities, harvest opportunities, predator and invasive species management, and other mitigation. Mitigation for anadromous fish losses attributable to the hydropower system generally should occur in the vicinity of the losses.

BA 2. Additional considerations include:

- Develop and increase opportunities for consumptive and non-consumptive resident fisheries aligned with state and tribal regulations for native,

introduced, natural- and hatchery-origin stocks that are compatible with the continued persistence of native resident fish species and their restoration to near historical abundance. Also, investigate opportunities for the release and harvest of anadromous fish for subsistence, ceremonial and educational purposes.

- Investigate restoration of anadromous fish to blocked areas as mitigation for the impacts of hydropower dams which blocked the historical passage of adult and juvenile fish.
- Consider passage projects to benefit native species.
- Expand and rebuild native fish numbers in blocked areas where habitat exists or can feasibly be restored or improved.
- Address anadromous fish losses with resident fish and wildlife, as appropriate, where full mitigation cannot be accomplished with resident fish alone.
- Protect and improve degraded fish habitat consistent with the habitat strategy.
- Consider watershed and landscape level mitigation approaches to secure habitat that supports ecosystem function for all resource categories (including water rights).

Specific Measures

Blocked Area Mitigation above Chief Joseph and Grand Coulee Dams

In the 2020 Addendum to the Fish and Wildlife Program, the Council called on Bonneville to implement a broad suite of actions to mitigate for the complete loss of anadromous fish and the losses of other fish and wildlife species in the Lake Roosevelt and Spokane River areas above Grand Coulee and Chief Joseph dams. Bonneville was to significantly increase the level of mitigation for these losses without compromising substantive protection and mitigation activities elsewhere in the basin.

BA 3. Consistent with this 2020 Program provision, Bonneville executed agreements in April and February of 2024 with the Spokane Tribe of Indians and the Coeur d'Alene Tribe with multi-year commitments to increase the range of mitigation activities funded and implemented in this portion of the Columbia Basin. The activities in these agreements are measures in the Program. Bonneville should continue to implement mitigation activities consistent with these agreements.

Bonneville should also consider as Program measures the broad suite of mitigation activities associated with the Colville Confederated Tribes Accord agreement and implement accordingly, whether or not that agreement formally continues.

Reintroduction of Anadromous Fish above Chief Joseph and Grand Coulee Dams to Mainstem Reaches and Tributaries in the United States

In the 2014 Fish and Wildlife Program, the Council called on Bonneville and the other federal agencies to pursue a science-based, phased approach to investigating the reintroduction of anadromous fish above Chief Joseph and Grand Coulee dams into mainstem reaches and tributaries of the United States, including juvenile and adult passage at the dams. Investigating reintroduction was to be one element in the broad suite of mitigation actions to be implemented in this blocked area. In the 2020 Addendum, the Council called on the same agencies to continue to make progress on the program's phased approach to evaluate the possibility of reintroducing anadromous fish above Grand Coulee and Chief Joseph dams.

Consistent with this measure in the Program, in September of 2023 Bonneville and other federal agencies executed a Memorandum of Understanding with the Spokane Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Coeur d'Alene Tribe that memorialized the federal agencies' 20-year "commitments regarding funding and implementation of the P2IP [Phase 2 Implementation Plan], a scientific and stepwise approach to test the feasibility of, and ultimately to implement, the reintroduction of anadromous salmonids in blocked area habitats in the Upper Columbia River Basin above Chief Joseph Dam." The activities funded and implemented under this agreement are Program measures.

BA 4. Bonneville, the Bureau of Reclamation, and other federal agencies are to continue implementing the phased approach to studying the feasibility of reintroduction consistent with this agreement and with the Program. Along with direct implementation of this agreement, this effort should include:

- Regular collaboration and coordination with other relevant entities as necessary, such as the Washington Department of Fish and Wildlife.
- Produce a public presentation or report to the Council on progress on at least a biennial basis.
- Periodic participation in a scientific review of results and next steps in a manner to be agreed upon between the Council and the implementing tribes

and other parties to the P2IP agreement. The Council recognizes that various funding sources, authorities and perspectives are combined in the approval, funding and implementation of the P2IP agreement. The Council's intent is to work with the implementing entities to agree to and implement a science review process at least once prior to the next Program Amendment process. The review process should provide value to the entities implementing this complex feasibility study; allows for transparency and accountability to the public for the use of public funds; and allows the Council to consider the review to be consistent with the intent of Section 4(h)(10)(D) of the Northwest Power Act for projects that receive funding from Bonneville to implement measures in the Council's Program.

BA. 5 To the extent decisions are made in this or a later phase to pursue large capital infrastructure improvements, such as artificial production and/or adult and juvenile passage facilities at the mainstem dams, participate as appropriate to the funding source in a science-based independent review of the concepts, design, benefits and costs of the proposed infrastructure development prior to a final decision to construct and operate. To the extent Bonneville Funding is to be used for this purpose, participation in the Council's step review process for large-scale capital infrastructure projects is expected.

BA 6. Operational changes that might have adverse effects on P2IP implementation, objectives, costs, and/or timelines should not be implemented without consultation with the parties to the P2IP Agreement, meaningful and timely consideration of their views, and evaluation of the potential effects of the changes on implementation of the P2IP. Emergency operational changes initiated by project owners or operators (e.g., to address power grid failure or imminent flood risk) would be exempt from this evaluation and consultation process.

Mitigation in the Blocked Area above the Hells Canyon Complex

Mitigation in General

The Hells Canyon Complex of dams, licensed by the Federal Energy Regulatory Commission in the 1950s and developed and operated by the licensee Idaho Power, completely blocked salmon and steelhead passage into the Snake River above Hells Canyon, a historically productive area of the Snake for Chinook and steelhead. Salmon and steelhead into that portion of the Snake had also already been adversely affected – and in places blocked from important tributary habitat – by federal dam development,

some of which produced power for the federal Columbia River power system. Mitigation efforts for these effects also began about the same time and has increased in intensity over time.

BA 7. Continue to implement a broad suite of actions to mitigate for the complete loss of anadromous fish due to the blockage first of tributaries in the Snake River by federal dams and then the mainstem Snake River by the Hells Canyon Complex. Relevant subbasin plans, the Hells Canyon relicensing proceeding underway with FERC, and mitigation plans of the states and tribes should be referenced for measures to consider for implementation. Idaho Power provides annual license compliance reports to FERC and stakeholders.

Proposals to Study Reintroduction of Anadromous Fish

The Upper Snake River Tribes recommended that the Council include a science-based, phased approach to investigating the reintroduction of anadromous fish above the Hells Canyon Complex, similar to the effort in the area above Chief Joseph and Grand Coulee dams.

BA 8. As noted in the general measures, assessing the feasibility of reintroduction above a blocked area is one of the legitimate elements to consider in any long-term plan for a comprehensive approach to mitigation in any blocked area. For that reason, a study of the feasibility of reintroduction of anadromous fish is an appropriate concept to consider for the area above the Hells Canyon Complex. However, beginning any effort to pursue such an assessment in this area will require the approval of the State of Idaho as well as close collaboration with the Idaho Department of Fish and Game.

The Council also encourages close coordination with the State of Oregon, the State of Washington, the federal fish and wildlife agencies, lower Columbia River tribes, and other relevant agencies and entities, as well as regular public engagement and demonstrations of public support. The effort should also include assessments of progress and lessons learned from the feasibility study in the area above Grand Coulee and Chief Joseph dams and other reintroduction projects in the basin.

Trap and Transport Fisheries

BA 9. The Program supports, in any blocked area, the consideration and use of collaborative efforts to restore ceremonial and subsistence fisheries through trap and transport operations, providing unlisted hatchery salmon and steelhead to

support these fisheries. The Council supports continuation of these and similar efforts aimed at enhancing cultural fisheries and educational release opportunities of hatchery-origin salmon and steelhead in the Snake River and tributaries above the Hells Canyon Complex. Investigation of a proposed hatchery program intended to produce fish dedicated for this purpose is included as a program measure (see AP 13, Appendix G - AP 13.20) and should be given consideration for implementation.

Reintroductions of Anadromous Fish above Projects in the Willamette River Basin

BA 10. The Corps and Bonneville should continue to support and implement:

- Anadromous fish passage measures prioritized through the Willamette River Basin Flood Control Project Biological Opinion.
- Pacific lamprey studies covering the reintroduction, passage, and monitoring of offspring through the U.S. Army Corps' Willamette Project dams into the blocked areas.
- Reintroduction of bull trout in the North Santiam River above Detroit Dam.

Protected Areas and Standards for Non-Federal Hydroelectric Project Licensing, Development and Operations

Protect fish and wildlife from the adverse effects of hydroelectric project construction and operations. As part of this strategy, the Council supports protecting streams and wildlife habitats from any hydroelectric development where the Council believes such development would have unacceptable risks to fish and wildlife.

Rationale

New hydroelectric development has the potential to cause further damage to the Columbia River Basin's fish and wildlife resources, as well as to negate ongoing efforts to protect against and mitigate for damage caused by the existing hydropower system. On that basis, 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 has designated certain river reaches as "protected areas." The Council found that new hydroelectric development in a designated protected area would have unacceptable risks of loss to fish and wildlife species of concern, their productive capacity, or their habitat.

This section of the Program combines two different but related elements – the "protected areas" provisions to protect fish and wildlife from any new hydroelectric development in certain areas, and a set of standards to apply to protect fish and wildlife when new hydroelectric projects are licensed and developed outside of protected areas. The same protection standards should also be applied when a licensed and developed project goes through relicensing.

Protected Areas

The Council supports protecting some streams from any hydroelectric development, where the Council believes such development would have major negative impacts on fish and wildlife that could not be reversed.

Beginning in 1983, the Council directed extensive studies of existing river habitat conditions and analyzed alternative means of protection. In 1988, the Council concluded that: 1) the studies had identified fish and wildlife resources of critical importance to the region; 2) mitigation techniques cannot assure that all adverse impacts of hydroelectric development on these fish and wildlife

populations will be mitigated; 3) even small hydroelectric projects may have unacceptable individual and cumulative impacts on these resources; and 4) protecting these resources and habitats from hydroelectric development is consistent with an adequate, efficient, economical, and reliable power supply. The Council, relying on these studies, designated 44,000 miles of river reaches as "protected areas." Information on the list of reaches and a map of their location is available here.

Most of the river reaches designated as protected areas are in the Columbia River Basin. The designations also include river reaches outside the Columbia River Basin, but within the service territory of Bonneville, and thus within the scope of the Pacific Northwest's regional power system. The designations are intended as an expression of the Council's authority under the Northwest Power Act to protect, mitigate and enhance fish and wildlife in the Columbia River Basin from the adverse effects of the development and operation of the region's existing hydroelectric facilities *and* as an expression of the Council's obligations under the same Act to give due consideration in the Council's regional power plans to the effects of new energy resources (including new hydroelectric resources) on fish and wildlife resources and environmental quality and to internalize the environmental costs and benefits of such new resources to the greatest degree possible in deciding whether to recommend their addition to the region's power supply.

Measures

Protected Areas List

HPL 1. River reaches to be protected are those reaches or portions of reaches listed on the "Protected Areas List" adopted by the Council on August 10, 1988, and subsequently amended. Each river reach listed on the Protected Areas List includes the fish and wildlife to be protected. The Council will also supply the Protected Areas List to any party free of charge.

Effect on Riparian Areas

This measure applies to river reaches or portions of river reaches, and also to river banks or surrounding areas only where such areas would be directly affected by a proposed hydroelectric project. In adopting this measure, the Council has not attempted to balance all the factors that may be relevant to land management.

Exemptions

The following are not affected by protected areas:

- Any hydroelectric facility or its existing impoundment that as of August 10, 1988, had been licensed or exempted from licensing by the Federal Energy Regulatory Commission.
- The relicensing of such hydroelectric facility or its existing impoundment.
- Any modification of any existing hydroelectric facility or its existing impoundment.
- Any addition of hydroelectric generation facilities to a non-hydroelectric dam or diversion structure.

Amendment to Protected Area Designation

Any party may recommend an amendment to the Program to change the designation of a river reach as protected or unprotected or to change the reason for a protected area. Before recommending a change in a protected area designation, the recommending party must notify the appropriate state and federal fish and wildlife agencies and tribes and consult with those agencies and tribes regarding the proposed change in designation.

Recommendations for a change to a designation must contain the following:

- The location of the affected river reach, including the reach number as listed in the Council's Protected Area List.
- A statement of the facts supporting the proposed change.
- 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.

The Council will decide whether to change the designation as recommended following the procedures and standards for a Program amendment process under the Northwest Power Act. The Council will not designate as protected a river reach that is not protected without the concurrence of the state in which the river reach is located.

Technical Corrections to Protected Areas List

The Council staff is authorized, on its own initiative or at the request of any party offering technically credible information, to make minor technical corrections in the Protected Areas List. Minor technical corrections include the correction of typographical errors, the correction of information regarding lengths of river reaches, and the inclusion of additional information regarding species present on a particular river reach. No technical correction

shall change the protected or unprotected status or the reason for protection of a river reach.

Implementing Protected Areas

Federal Energy Regulatory Commission

Under the Northwest Power Act, the Federal Energy Regulatory Commission, and all other federal agencies responsible for managing, operating, or regulating federal or non-federal hydroelectric facilities located on the Columbia River or its tributaries, are required to take protected area designations into account to the fullest extent practicable at all relevant stages of decision-making processes. The Council recognizes that the Federal Energy Regulatory Commission makes licensing and exemption decisions for nonfederal projects, and does not expect that the Commission will abandon its normal processes with regard to projects located in protected areas. Rather, consistent with Section 4(h)(11) of the Northwest Power Act, the Council expects that the Federal Energy Regulatory Commission will take the Council's judgment into account, and implement that judgment in licensing and exemption decisions unless the Federal Energy Regulatory Commission's legal responsibilities require otherwise.

Bonneville Power Administration

Bonneville shall not acquire power from hydroelectric projects located in protected areas. The Council believes that the Long-Term Intertie Access Policy's reliance on protected areas is consistent with the Council's Power Plan and Fish and Wildlife Program as they apply to fish and wildlife in the Columbia River Basin. The Council continues to recommend that Bonneville adopt a similar policy with respect to protected areas outside the Columbia River Basin.

Petitions for an Exception to the Protected Area Designation for Proposed Projects that will Provide Exceptional Benefits to Fish and Wildlife

Any party may file a petition with the Council for an exception to the effect of a protected area designation for a proposed project that will provide exceptional survival benefits as determined by the relevant fish and wildlife agencies and tribes for the fish, wildlife, or both that are the reason for the designation. Before filing a petition with the Council, the petitioner must notify the appropriate state and federal fish and wildlife agencies and tribes and consult with those agencies and tribes regarding the petition for exception.

Petitions must contain the following:

- The location of the affected river reach, including the reach number as listed in the Council's protected areas data base.
- A statement of the facts showing the anticipated benefits and the anticipated detriments of the proposed project.
- An explanation of how the project will affect the Council's Power Plan and Fish and Wildlife Program, or, if outside the Columbia River Basin, how the project will affect the Plan and relevant state and tribal comprehensive plans.
- An explanation of how the petitioner has determined that the project will achieve exceptional fish and wildlife benefits.
- A summary of consultations the petitioner has had with relevant fish and wildlife agencies and tribes regarding the petition, and the responses of the agencies and tribes.

The Council may seek independent scientific review of the petition. After review, and after an opportunity for public review and comment, the Council will make a decision on the petition. The Council will approve the petition only if the Council determines the proposed project will provide exceptional benefits to fish and wildlife.

Transition Projects

The Council recognizes that there existed, as of August 10, 1988, applications for hydroelectric projects that were in various stages of completion before the Federal Energy Regulatory Commission. In many cases the applicants made substantial investments and had completed, or nearly completed, agreements with all interested parties, including state fish and wildlife agencies. The Council recognized that the Federal Energy Regulatory Commission may be obligated to complete its processes on these applications but expects where possible that this measure will be taken into account to the fullest extent practicable.

The Council also recognizes that there may exist preliminary permits or applications for licenses or exemptions for hydroelectric projects at sites that were not previously within protected areas, but which may be included within protected areas as a result of amendments approved by the Council. An important purpose of protected areas is to encourage developers to site projects outside protected areas. The Council recognizes that from time to time the designation of an unprotected area may be changed to protected. This is accomplished through a formal process under the Northwest Power Act to amend the Program. If a project is moving ahead in an unprotected area – a permit has been granted, or a license or exemption is pending – at the time the Council enters the

formal process to change the designation to protected, that project is exempted from the protected areas rule. However, it is the Council's intention that the Federal Energy Regulatory Commission gives full consideration to the protection of fish and wildlife resources located at these project sites and provide suitable protection and mitigation for such resources in the event that a license or exemption is approved.

Effect on Water Rights

This measure should not be interpreted to authorize the appropriation of water by any entity or individual, affect water rights or jurisdiction over water, or alter or establish any water or water-related right. The Council does not intend this measure to alter or affect any state or federal water quality classification or standards, or alter any management plan developed pursuant to the national Forest Management Act, 16 U.S.C. 1601, et seq., or the Federal Land Policy Management Act, 43 U.S.C.1701, et seq., except to the extent planning decisions are directly related to hydropower licensing and development. Nor should this measure be interpreted to alter, amend, repeal, interpret, modify, or conflict with any interstate compact made by the states. If this measure is found by a court or other competent authority to conflict with any other interstate compact this measure will terminate with respect to the area involved, without further action of the Council.

Fish and Wildlife Protection Standards for Hydroelectric Project Licensing, Development and Operations

Outside of protected areas, ensure that hydroelectric development is licensed and carried out in a manner that protects the remaining fish and wildlife resources of the Columbia River Basin and the Pacific Northwest and does not add to the region's and ratepayers' mitigation obligation.

Standards for Hydroelectric Licensing, Development and Operations

HPL 2. The Federal Energy Regulatory Commission, Corps of Engineers, Bureau of Reclamation, and Bonneville shall not license, relicense, exempt from license, propose, recommend, agree to acquire or wheel power from, grant billing credits for, or otherwise support any hydroelectric development in the Columbia River Basin without specifically providing for the following development conditions. The same federal agencies shall ensure that all applications for licenses for hydroelectric projects or documents that propose, recommend, or otherwise support hydroelectric development explain in detail how these standards have

been addressed and the purposes of this section will be achieved or the reasons why any of these standards cannot be incorporated into the project.

Potential Effects on Fish

- Consultation with the fish and wildlife agencies and tribes and the Council throughout study, design, construction, and operation of the project.
- Development of specific plans for flows and fish facilities prior to construction.
- Use of the best available means for aiding downstream and upstream passage of anadromous and resident fish.
- Provision of Columbia and Snake River flows and reservoir levels of sufficient quantity and quality to protect spawning, incubation, rearing, and migration.
- Full compensation for unavoidable fish losses or fish habitat losses through habitat restoration or replacement, appropriate production, or similar measures consistent with the provisions of this program.
- Assurance that the project will not inundate or impact access to the usual and accustomed, traditional, or contemporary fishing places of any tribe without tribal approval.
- Assurance that the project will not degrade fish habitat or reduce numbers of fish in such a way that the exercise of treaty or executive-order tribal rights will be diminished.
- Assurance that all fish protection measures are fully operational at the time the project begins operation.
- Assurance that the project developer will collect data needed to monitor and evaluate the results of the fish protection efforts.
- Assurance that the project will not degrade water quality beyond the point necessary to sustain sensitive fish species (as designated in consultation with the fish and wildlife agencies and tribes).

Potential Effects on Wildlife

- Consultation with fish and wildlife agencies and tribes and the Council throughout study, design, construction and operation of the project.
- Avoiding inundation of wildlife habitat, insofar as practical.

- Timing construction activities, insofar as practical, to reduce adverse effects on nesting and wintering grounds.
- Locating temporary access roads in areas to be inundated.
- Constructing sub-impoundments and using all suitable excavated material to maintain as much existing habitat as possible, if appropriate, before the reservoir is filled.
- Avoiding all unnecessary or premature clearing of land before filling the reservoir.
- Providing artificial nest structures when appropriate.
- Avoiding construction, insofar as practical, within 250 meters of active raptor nests.
- Avoiding critical riparian habitat (as designated in consultation with the fish and wildlife agencies and tribes) when clearing, rip-rapping, dredging, disposing of spoils and wastes, constructing diversions, and relocating structures and facilities.
- Replacing riparian vegetation if natural revegetation is inadequate.
- Creating sub-impoundments by diking backwater slough areas, creating islands and nesting areas.
- Regulating water levels to reduce adverse effects on wildlife during critical wildlife periods (as defined in consultation with the fish and wildlife agencies and tribes).
- Improving the wildlife capacity of undisturbed portions of new project areas (through such activities as managing vegetation, reducing disturbance, and supplying food, cover and water) as compensation for otherwise unmitigated harm to wildlife and wildlife habitat in other parts of the project area.
- Acquiring land or management rights, such as conservation easements, where necessary to compensate for lost wildlife habitat at the same time other project land is acquired and including the associated costs in project cost estimates.
- Funding operation and management of the acquired wildlife land for the life of the project.
- Granting management easement rights on the acquired wildlife lands to appropriate management entities.
- Collecting data needed to monitor and evaluate the results of the wildlife protection efforts.

- Assuring that the project will not inundate or impact access to the usual and accustomed, traditional or contemporary hunting or plant gathering places of any tribe without tribal approval.
- Assuring that the project will not degrade wildlife habitat or reduce numbers of wildlife in such a way that the exercise of treaty or executive order tribal rights will be diminished.

General Implementation

Federal Energy Regulatory Commission Licensing Decisions

HPL 3. 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 hydroelectric development standards and protected areas designations into account to the fullest extent practicable. This includes a Council determination whether favorable or unfavorable on a petition for an exception to a protected area designation for a project proposed to have exceptional benefits for fish and wildlife. The Commission should implement the Council's decision in the Commission's licensing and exemption proceedings unless the Commission's legal responsibilities require otherwise.

Review of Multiple Applications in a Watershed

HPL 4. Federal project operators and regulators shall review simultaneously all applications or proposals for hydroelectric development in a single river drainage, through consolidated hearings, environmental impact statements or assessments, or other appropriate methods. This review shall assess cumulative environmental effects of existing and proposed hydroelectric development on fish and wildlife.

Procedures to Ensure the Council's Program is Taken into Account

HPL 5. The Federal Energy Regulatory Commission shall require all applicants for licenses (including license renewals, amendments, and exemptions) and preliminary permits in the Columbia River Basin to demonstrate in their applications how the proposed project would take this program into account to the fullest extent practicable. FERC also shall provide the Council with copies of all applications for licenses (including license renewals, amendments, and exemptions) and preliminary permits in the Columbia River Basin so that the

Council can comment in a timely manner on the consistency of the proposed project with this Fish and Wildlife Program. FERC shall also provide opportunity for Council review and comment. This provision is not intended to supplant review of such applications by the fish and wildlife agencies and tribes.

The federal and state fish and wildlife agencies and other federal resource agencies should incorporate pertinent elements of the fish and wildlife program in the terms and conditions they apply to projects exempted from licensing under Federal Energy Regulatory Commission exemption procedures. The Council also requests that federal land managers incorporate the development provisions of this program into their permit procedures related to hydroelectric development on lands they manage. And the Council requests that state agencies that grant permits for hydroelectric projects also apply these principles.

All federal and state agencies studying or proposing hydroelectric development in the Columbia River Basin shall provide opportunity for Council review and comment.

Subbasin Plans

In the early 2000s, the state and federal fish and wildlife agencies and tribes, and other partners developed plans for every subbasin in the Columbia Basin. The key elements of a subbasin plan are a 10-15 year management plan, an assessment of the subbasin's historical and existing conditions, and an inventory of past accomplishments. Each management plan contains a vision and biological objectives for that subbasin, and identifies specific actions necessary to protect, mitigate, and enhance fish and wildlife in that subbasin. The subbasin plans thus reflect local policies and priorities while remaining consistent with the basinwide vision, biological objectives, and strategies.

In 2004-05 and 2010-11, the Council adopted into the Program 59 subbasin management plans. The actions described within these management plans constitute measures in the Program. The Council expects that projects implemented through the Program will be consistent with the goals, limiting factors, and actions identified in the subbasin plans or other relevant or more recent planning documents that may have superseded them (e.g., Endangered Species Act Recovery Plans).

The Council intended the subbasin plans to house the specific habitat and production measures to draw from for implementation by Bonneville for offsite mitigation under the Northwest Power Act. They also included measures that help guide the habitat improvements taken by the Bureau of Reclamation and Corps of Engineers fulfilling their responsibilities under the Act. On the other hand, it was never the intent of the Council that Bonneville would fully implement every measure in the subbasin plans. The plans were designed to be a comprehensive look at the needs and opportunities within each subbasin, to allow the Council and its partners and project reviewers to understand how the projects implemented by Bonneville fit within the overall ecological needs in each subbasin and how the projects fit within the overall restoration and mitigation strategy for each subbasin.

Subbasin plans provide historical perspective for the project review process. The ISRP determines if projects support, and are consistent with, the Council's Program, which includes the subbasin plans. Subbasin plans also provide an opportunity to integrate and coordinate projects and programs funded by entities other than Bonneville, including Canadian entities in transboundary areas of subbasins.

In the two decades since subbasin management plans were adopted, continued restoration, recovery, implementation, and planning work has occurred. The Council recognizes that physical conditions and priorities may have changed, such as in areas where dams have been removed or where substantial restoration work has occurred. Some subbasin plans may be in need of

update, or updates may be ongoing, including development of implementation priorities. Where warranted, the Council will receive these updated plans and identify a path for scientific review and adoption into the Program.

Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies

This strategy includes measures on planning, research, monitoring, and evaluation (RM&E) that broadly support Program work and span multiple strategies. In contrast, previously listed RM&E measures apply specifically to the strategy in which they are listed.

Rationale

A substantial amount of regional planning, research, monitoring, and evaluation has been and is currently implemented under the Fish and Wildlife Program. At the programmatic scale, this work supports decision making, implementation, and evaluation of project and Program performance. Selection from among the following list of measures should reflect Program priorities and address the highest priority critical uncertainties. We recognize that implementation of this full list of RM&E measures may require additional funding partners and explicit consideration of the balance between on-the-ground mitigation and the need to address critical uncertainties through RM&E.

Measures

Regional Planning

PR 1. Develop vulnerability assessments for focal fish and wildlife species that review potential effects from future changes to precipitation, flow, and temperature in the basin, along with other ecosystem changes (including increased risk of predation) or human impacts.

PR 2. Based on the results of vulnerability assessments, develop and prioritize a portfolio of strategies and adaptation actions addressing current and predicted issues such as flow volatility, snowpack reduction, increased wildfire frequency, rising stream temperatures, and downstream estuarine and oceanic impacts.

PR 3. Continue to encourage project sponsors to consider and plan for different climate change scenarios that could affect their work. Planning efforts may benefit from access to information on predicted hydrologic or temperature conditions in the basin, or other technical resources. These and other publicly available resources are provided by the Council to sponsors at the beginning of a project review cycle.

PR 4. Future planning and implementation should incorporate identified adaptation strategies and actions, and be planned, implemented, monitored, and evaluated consistent with adaptive management principles.

General Monitoring

PR 5. The Council, Bonneville, and federal agencies should continue to support PIT tagging and detection, coded wire tagging and recovery, acoustic and radio tagging and tracking, and genetic tagging and recovery. These are critical for assuring adequate effectiveness monitoring, and other monitoring as necessary, throughout fish life cycles and across various environments.

Salmon and Steelhead RM&E

PR 6. Continue to support research and life cycle modeling (LCM) to inform decision makers of the biological benefits they could expect from implementing or synchronizing different suites of measures across the life cycle. State fish and wildlife agencies and tribes should identify appropriate sequencing for developing LCMs for different species and locations, based on which are the most critical to inform near term mitigation actions.

PR 7. Continue to support status and trend monitoring of fish with particular attention to tracking quantitative biological objectives, reporting on indicators, and informing statistical models such as life-cycle models to provide baseline information needed to track progress toward Program goals and objectives of key species.

PR 8. Implement efforts to collect viable salmonid population (VSP) information, including estimates of abundance, productivity, survival rates, and distribution for salmonids to help inform and adapt salmonid management.

PR 9. Support current salmon and steelhead harvest monitoring and consider expanding monitoring to other areas in the mainstem Columbia River, mainstem Snake River, and their tributaries.

White Sturgeon RM&E

PR 10. Report on the status of sturgeon throughout the basin on a regular basis.

PR 11. 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 in areas where harvest is warranted but where natural

recruitment is currently limited, and the subpopulation does not represent a unique component of the historical diversity.

PR 12. Conduct regular population assessments to monitor hatchery and natural-origin sturgeon populations (size, abundance of age classes, age/length frequency, recruitment rate, mortality, distribution, and migration patterns, life history, habitat use, etc.) throughout the Columbia Basin.

PR 13. Conduct baseline assessments of environmental factors limiting sturgeon abundance and effectiveness of recovery measures in Lake Roosevelt from Grand Coulee Dam to the international border, including the Spokane arm of Lake Roosevelt.

PR 14. Implement measures based on knowledge gained through assessments, limiting factors workshops, Upper Columbia White Sturgeon Recovery Initiative plans, and Lake Roosevelt sturgeon recovery plans.

PR 15. Continue to make progress in developing and implementing the Program's comprehensive approach to white sturgeon in the Columbia River Basin that involves assessing the factors limiting the recruitment and productivity of sturgeon and developing and implementing measures to address those factors. Within the Snake River, early emphasis should be placed on understanding limiting factors affecting the two core populations downstream of Hells Canyon Dam and Bliss Dam, which have natural production but are in decline.

PR 16. Increase sturgeon population monitoring between McNary and Priest Rapids dams and in the lower Snake River so that stock status is regularly reported for each area and pool.

PR 17. Assess the effects of climate change on Columbia River Basin sturgeon populations and develop adaptation strategies to address these impacts.

Lamprey RM&E

PR 18. Complete a loss assessment for lamprey, with emphasis on losses resulting from the construction and operation of the hydrosystem, relying on information provided by state fish and wildlife agencies, tribes, and the Corps of Engineers wherever available.

PR 19. The Council supports including Pacific lamprey in Upper Willamette Conservation and Recovery planning.

PR 20. Create a monitoring framework to report on the status of lamprey in the basin on a regular basis and initiate status and trend monitoring of Pacific lamprey throughout all life stages, particularly adults, to inform statistical models (such as life-cycle models) and to provide baseline information needed to track progress toward program goals and objectives.

PR 21. Develop a regional strategy for monitoring passage into tributaries to better understand differences in counts of adult lamprey between dams.

PR 22. Report passage counts adult, juvenile, and larval lamprey at dams annually, and map lamprey distribution every five years.

PR 23. Conduct occupancy and distribution surveys where lamprey abundance is unknown.

PR 24. Develop tags suitable for adult, juvenile, and larval lamprey monitoring and evaluation needs.

PR 25. Determine the potential effects of climate change on lamprey, including the effects of increasing water temperatures and changing runoff regimes on lamprey energetics and performance.

Eulachon RM&E

PR 26. Describe and analyze spatiotemporal patterns in freshwater egg, larval, and adult eulachon abundance associated with changes with physical conditions in the river (e.g., water levels, flow, temperature, salinity, turbidity) using any appropriate combination of sampling approaches.

PR 27. Maintain annual egg-larval spawning stock biomass surveys in the mainstem Columbia River to estimate annual abundance of spawning adults across the entirety of the run period.

Additional Planning and RM&E

PR 28. In this Program amendment process, a group of state fish and wildlife agencies and tribes recommended new planning and RM&E actions to be implemented as Program measures (Appendix G). These recommendations reflect changing conditions in the basin and the need to continue addressing critical uncertainties and conduct monitoring for new or existing Program measures. Recommended

actions target salmon and steelhead, sturgeon, lamprey, eulachon, and other native species.

The Council considers these recommended actions to be Program measures, consistent with the other measures in this strategy and the Council's Research Plan. Not every fish and wildlife agency and tribe submitted a recommendation with specific priority planning and RM&E actions. Any other state fish and wildlife agency or tribe may submit additional, specific measures. These new lists of actions will be organized by species and added to the existing lists linked in Appendix G for equal consideration for implementation under the Program.

Priorities for Near-Term Implementation

As noted elsewhere in the Program, Bonneville and the other federal agencies with responsibilities under the Northwest Power Act are funding and implementing protection, mitigation and enhancement actions and system operations consistent with the measures in the Council's Fish and Wildlife Program. While some of these actions have explicit multi-year funding and implementation commitments and some do not, the Council expects many will continue to be implemented as mitigation activities that are important to the Program and the region. These ongoing activities represent a set of priorities carried forward from earlier programs that largely continue into the new Program, although some have evolved to a certain extent. The Council expects this work of the Program to continue to be implemented.

At the same time, the Council's Program includes some existing measures that have not been implemented. The Council also received recommendations for many new measures that have been included in the 2026 Fish and Wildlife Program. Most of these new measures expand or direct existing elements and priorities. For example, the new measures that were recommended for specific habitat work, build on the Program's existing base of tributary and mainstem habitat restoration. *See* Measure HAB 49.

All measures that have not yet been implemented are subject to the same set of standards under the Act. The Council recommends specific focus be placed on the following set of priorities for near-term action. These priorities are connected in a systematic way, considering current Program implementation and how the Program needs to move forward. It remains an important priority to protect the existing Program's productive work and investments. Additionally, the Program's substantial set of hydrosystem operations needs to be consistently implemented and combined with more effective predator management to realize the survival potential of in-river migration. The continued emphasis on fish habitat enhancement and protection, a cornerstone of the Act and the Council's Program for decades, is essential to increase the continued survival and productivity of salmon and steelhead and other native fish to help compensate for hydropower system impacts.

Preserving Program integrity

1. Bonneville should provide the funding adequate to implement the ongoing work of the Program, including adequate and dependable funding for annual and long-term operation and maintenance of the direct Program's assets. This includes providing inflation adjustment factors for direct-funded projects. The Council similarly expects the Corps of Engineers to increase its efforts to protect and rehabilitate the dam infrastructure important for effective juvenile and adult passage. The Council will work with others to

help the Corps obtain the necessary funds from Congress (see Provisions for Program Implementation).

Hydrosystem operations

2. The Council is emphasizing mainstem operations in this Program. In particular, the Council recognizes the importance of consistent and stable operations over a longer period of time, including prioritization of operations that keep water flowing, increase velocities, and minimize fluctuations during peak juvenile migration. The Council is also committing to help establish one or more workgroups to investigate further changes in operations, including updating flood risk management for reservoir operations, evaluating the specific parameters of limiting or allowing system flexibility to alter flow regimes, considering additional changes to increase velocities, and plan for preserving and rehabilitating passage infrastructure (see Mainstem Hydrosystem Flow and Passage Operations).

Predator management

3. Effectively assess and manage predation in the areas most likely to increase salmon and steelhead survival. Consistent high spill and flow operations and a shift to nearly total in-river juvenile passage may not result in the desired benefits if the impacts of predation outweigh the gains. Additional, possibly substantial investments in predator management by the federal agencies are needed. This includes monitoring and taking actions to reduce piscivorous fish that have increased in abundance due to the availability of reservoir habitat in the lower rivers, with a special focus on reducing the newly identified predation impacts of smallmouth bass and walleye through the lower Snake reservoirs. The same actions need to be taken to address high concentrations of avian predation that take advantage of structures and narrow areas to concentrate predators or prey. This also includes a sustained effort to assess the relative predation rates of piscivorous fish and birds on salmon, steelhead, sturgeon, lamprey, and other focal species and evaluate opportunities for managing the most significant predators as part of a systemwide approach, and support for broad coordination for regional planning and decision-making for avian predation. The Council commits to helping convene a workgroup for this ongoing assessment and to facilitate coordination efforts (see Predator Management).

Habitat protection and restoration

4. It is also critical to continually improve the productivity and abundance of spawning and rearing habitats to support fish that are benefitting from improved passage. Bonneville should continue the habitat restoration and protection efforts under the Program in the tributaries, mainstem reaches, and estuary at the same pace and scale as over the last

decade at a minimum. The Council also supports work in the ocean in order to understand this critical environment and how it influences program effectiveness. The Council and others will also support obtaining additional non-ratepayer funding for the Corps of Engineers, the Bureau of Reclamation, and other federal agencies to implement their existing and additional habitat protection and restoration activities, including significant mainstem habitat restoration activities. The Council will convene and facilitate discussion to identify an order of new habitat actions to implement that have the best potential to effectively increase juvenile abundance and productivity (see Habitat Restoration and Protection and Plume and Nearshore Ocean).

The Council expects Bonneville to use its fund and authorities to implement a portion of the new work needed, and in particular to at least maintain the pace and scale of tributary and mainstem habitat improvements and possibly increase the level of implementation after discussion with the Council and other federal agencies. The Council also recommends Bonneville take the necessary steps to protect the productive integrity of the existing Program activities and not let that value degrade or erode.

The Council also expects all the relevant federal agencies to increase their efforts to help implement the Program's near-term priorities to the benefit of Columbia River salmon and steelhead and other fish and wildlife. The ratepayers continue to bear, appropriately, a large portion of the costs because of the scale of the impacts of the hydropower system. However, the recommendations and comments received for this Program, as well as other developments over the last few years, indicate a consensus across the region that other federal agencies with responsibility for Columbia River fish and wildlife, either under the Act or under other authorities, should take on a greater proportion of new actions and investments. The Council agrees with and embraces the recent emphasis on a "whole of government" approach to salmon and steelhead protection, mitigation and improvement, recognizing the shared responsibility of all the levels of governments for the impacts to and solutions for Columbia River salmon, steelhead and other native fish and wildlife.

As part of this approach, the Council expects that the Corps of Engineers and Bureau of Reclamation will consistently implement the system operations included in the Program. The Council will also work with the regional governments and others to help the Corps of Engineers obtain from Congress the needed appropriations to maintain and rehabilitate the dam infrastructure vital to effective dam operations and fish passage. The Council is further interested in seeing that all the federal agencies - the Corps, the Bureau, NOAA, Fish and Wildlife Service, and the land management agencies – obtain appropriations and use their authorities to implement much of the needed increase in habitat and predator management activities with non-ratepayer, non-reimbursed funds.

The Council commits to working with other governmental entities in the basin to seek authorizations and funding from Congress to the federal agencies to complement and help make more effective the efforts funded by the ratepayers. The Council expects in turn that Bonneville and the federal agencies will report and discuss and coordinate regularly with the Council about progress on implementing these and other on-going program priorities.

Part Five: Concepts Guiding Adaptive Management

Adaptive management is an iterative, structured process of planning, implementation, and evaluation, with a goal of improving outcomes based on information learned through implementation and evaluation.

The Council has recognized the need to apply an adaptive management approach since its 1982 Program. Each component of the adaptive management cycle has continued to develop through program amendments, culminating in the 2020 Addendum when additional objectives and a new set of Program performance indicators were identified. The adaptive management cycle applies at multiple scales – from the Program scale, where large-scale prioritization, planning, and evaluation guide future iterations of the Program, to the project scale, where planning and hypotheses feed into implementation, monitoring, reporting on results, and evaluation of whether to modify implementation in future iterations. Most of the adaptive management concepts in this section apply at the project scale, although some planning and evaluation concepts are also relevant at the Program scale. Additional details on Program-scale adaptive management are described in the Program performance section.

In the Fish and Wildlife Program, adaptive management concepts guide planning, monitoring, research (including effectiveness projects), data management, reporting on results, and evaluation leading to continued implementation or changes in approach.

Planning and Prioritization

Adaptive management begins by identifying a problem and a proposed management solution, in a situation where the source of the problem, the efficacy of the action, or both, are uncertain. Once the problem and proposed management solution are identified – in the Program or as part of Program implementation – the adaptive management cycle begins with planning. The point of planning is to design the management action as a form of research experiment. This is followed by implementation, monitoring, and then evaluation of the results, which are used to refine the management action through what is learned. Planning may occur at the Program scale (Program amendments and subbasin plans) or the project scale (e.g., project proposal). Information from evaluations, which are the last step of the adaptive management cycle, feeds into the planning step. Inherent in planning is prioritization – which actions to include in the Program or projects, which to implement first, and so on.

Multiple resources are available to guide planning and prioritization:

Program-scale:

- At times, new or innovative research questions may arise to provide timely information addressing critical uncertainties. At other times, research needs have been previously identified through the Council's Research Plan or other planning forums. To address emergent needs that are not part of existing plans, the Council encourages solicitation of proposals through a competitive grant process to provide an efficient and cost-effective approach to rapidly receive proposals and implement projects. Proposals would be evaluated by the ISRP and recommended by the Council for funding, consistent with existing project review protocols described in Part 6 of this Program.
- As part of planning and prioritization, establish and convene science and policy workshops on topics relevant to contemporary decision making, implementation, or identified critical uncertainties, and to coordinate discussions on best available science, knowledge gained, and logistical and technological advances for broad implementation. Near-term topics might include hydrosystem operations, predator management, invasive species, climate change and climate adaptation, or other Program topics.
- The Council's Research Plan, though not a part of the Fish and Wildlife Program, serves as guidance to the federal agencies with legal responsibilities under the Northwest Power Act in implementing the research measures and priorities of the Program. It corresponds with a database of critical uncertainties. The research plan should be used to prioritize critical uncertainties for the Program and guide funding recommendations. The following criteria may be used when prioritizing research uncertainties:
    - Program relevance – address hypotheses relevant to management decisions
    - Project relevance – assess whether types of actions implemented by projects are resulting in the intended biological benefit and include expected effectiveness outcomes
    - Legal relevance – address the Program's mandate to mitigate, protect, and enhance fish and wildlife affected by the hydrosystem
    - Cost – In the case of competing proposals, the least costly research that intends to produce the same information will receive priority

- The Council will, with federal and state fish and wildlife agencies and tribes, review and update its research plan every five years. The Independent Scientific Review Panel and the Independent Scientific Advisory Board will assist with updating the critical uncertainties, taking into account evolving topics and reporting on the results of past research.

Project scale:

- The likelihood of success of a measure should determine the appropriate level of research and monitoring required for each measure proposed. This assessment may be guided by the risk uncertainty matrix.

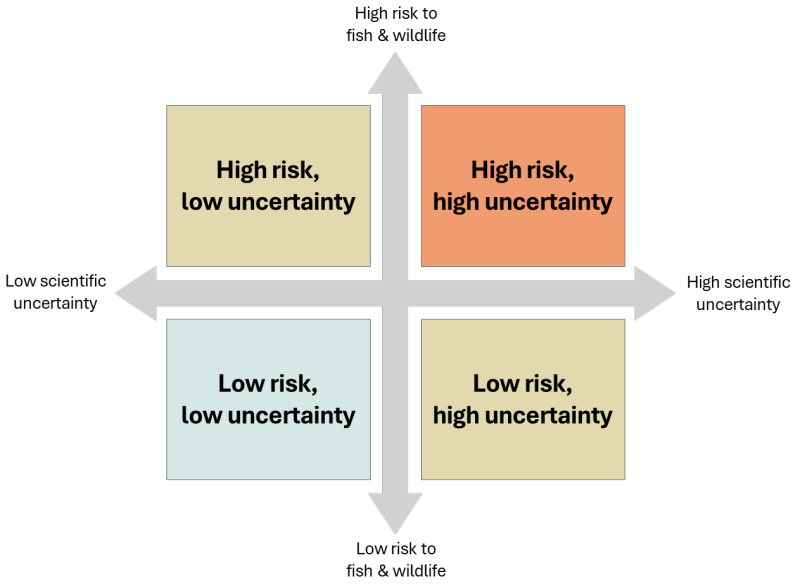

Figure 7. Risk-uncertainty matrix

The risk uncertainty matrix is a planning tool to ensure that the level of effort used to gather data is commensurate with the risk and uncertainty associated with a given action (Figure 7). In this approach, the intensity of monitoring associated with an action, environmental condition, or population characteristic aligns with the perceived risk of the activity to fish, wildlife and habitat and the level of certainty associated with the impact of the actions, environmental conditions, and population characteristics.

  - Risk is defined as the likelihood that an unintended, undesirable, outcome may occur.
  - Uncertainty is defined as the level of understanding around potential outcomes associated with a given action or a biological status, ranging from

thoroughly established evidence, to speculative or misleading (Council document 2000-12).

- Research, monitoring, and evaluation efforts in tributaries should be consistent with the Tributary Habitat RM&E Strategy. The Council encourages Bonneville to ensure that habitat RM&E projects are designed and implemented consistent with this strategy. This strategy describes where RM&E should be applied based on the degree to which anticipated results of an action are well understood. This strategy relies on the establishment and use of a consistent set of indicators to facilitate objective research, monitoring, and analysis. The strategy also relies on consistent reporting to address priorities and data gaps, while allowing for flexibility in monitoring methods. Consistent data reporting and data management standards help facilitate adaptive management while promoting Columbia River Basin-scale evaluation processes.

Monitoring

Monitoring ensures Program-funded projects and measures are implemented as designed for the intended duration and produce data that may be used in a variety of evaluations.

- Status and trend monitoring of fish, wildlife, and habitat, including monitoring used to develop life-cycle models, should inform efforts to track progress toward Program goals and objectives.
- Project-level monitoring should inform performance indicators when feasible and appropriate.
- Monitoring efforts should be coordinated geographically and topically.
- Monitoring data should be collected using a statistically robust sampling design such that results may be applicable at multiple scales and provided on timeframes that inform decision-making processes and Program performance evaluations
- Project sponsors should report the accuracy and precision of their data.
- Project sponsors who collect data relevant to regional decision making should collaborate to align methodologies for data collection as best as possible to facilitate data comparison and sharing.
- Bonneville and its funding partners should work with the region to explore whether a programmatic approach for certain categories of monitoring (e.g., predator management) would be more cost-effective and efficient. This programmatic

approach would also include agreements, data sharing, and funding strategies to align monitoring projects with regional goals.

Research

Research tests hypothesis and seeks to resolve critical uncertainties identified in the Council's Research Plan, along with assessing new methods and technologies to improve the Program.

- All research projects should address hypotheses relevant to management decisions, be consistent with the scientific method, consider potential impacts on and effects from other activities occurring within the same geographical area, and appear likely to produce an outcome within a designated time frame. Results should be submitted for publication in peer-reviewed scientific journals.
- On an annual basis, Bonneville will make available to the Council and region publications resulting from Program research. Where publications are not publicly available without a journal subscription, Bonneville will support access to those journals through the Columbia Basin Fish and Wildlife Library.
- Bonneville and its partners should continue to transform the effort to evaluate action effectiveness into a cost-effective, independent third-party, standardized, and statistically valid method for habitat projects, water transactions projects, and other action-effectiveness projects as appropriate.

Data Management

Data that are publicly accessible, easy to search, and easy to use is foundational to data management. Over the last 45 years of Program implementation, the data and data management needs of the Council and region have continued to evolve. Contemporary needs relate to assessing Program implementation and performance, in addition to continued support for long-term archiving and accessibility of the substantial amount of data that has been collected under the Program.

- Project sponsors should ensure data are adequately stored in internal databases, use regionally consistent formats, contain descriptive meta data, and undergo QA/QC.
- All Program data (e.g., databases, models, outputs) and other kinds of information (e.g., reports, publications, or past planning efforts) must be publicly discoverable, accessible, and shareable either through the individual project (unless data are

sensitive), or through a regional database, and archived or preserved beyond the longevity of the project.

- Spatial datasets (Geographic Information System [GIS] layers) should be developed for all data that has a spatial component. Data sets should include metadata and all required information on spatial reference systems. All spatial data that is not sensitive should be stored online in searchable databases (e.g., ArcGIS online) and easily accessible.
- Program reporting relies on coordinated data sharing that is facilitated using regional data systems that provide access to data from federal and state agencies and tribes, and other data-gathering entities in the Columbia Basin. To create the most complete regional databases possible, support better collaboration and data sharing between organizations by supporting data stewards, development and maintenance of project information systems and infrastructure, and agreements for data access and use across different projects.
- Identify data needs for the Program that are not currently met (e.g., habitat database, productivity, genetic diversity, etc.) and work with regional partners to identify associated data sets. In accordance with data management principles described above, work to secure access to these data and make them publicly available, wherever feasible.
- To avoid conflicts between databases that include similar Program data, the Program recognizes the Coordinates Assessment exchange system as the official record of fish population data. The Program recognizes Pacific States Marine Fisheries Commission GIS layers as authoritative boundaries for associated population data and subbasin boundaries.
- Improve coordination between fish, habitat, and water quality monitoring projects and facilitate data sharing across work that is focused on these topics.
- Development and refinement of project-level and regional data management systems should be guided by Program evaluation and reporting needs.
- Bonneville will support existing standardized database(s) for sharing high-level data that informs Program performance (e.g., Coordinated Assessment Exchange, Marine Fisheries Advisory Committee stock abundance dashboard, and associated data summary needs).
- Development of new databases (e.g., habitat restoration, bull trout, or sturgeon data), data exchange standards, and compilation of data in these databases will occur through regional collaboration.

Reporting

Information acquired under the Program will be organized, summarized, and reported to the public.

- Project sponsors should report annually on the results of their research, monitoring, and evaluation projects, including hatchery programs, by providing an electronic summary of their results and interim findings and the benefits to fish and wildlife. Research reports should address hypotheses and critical uncertainties whereas monitoring reports should provide data about implementation, status, and trends. Ensure that sponsors with reporting requirements also have the capacity to compile, standardize, and share the associated data either directly or through regional data management projects.
- For Bonneville-funded, or partially funded projects assessing species and habitat conditions in intensively monitored watersheds (IMW), project sponsors will be requested to report on the condition of these watersheds at the IMW workshop held approximately every five years and provide data in a format that can be used by the Council.
- Bonneville should continue implementing a concise, useful template for annual reports for research and monitoring projects that can replace other, more cumbersome, more costly, and less useful reports for individual projects. The Council will continue to work with Bonneville and the ISRP to identify and assemble the information needed to produce an annual summary of results for Council review.
- The Council, with the assistance of agencies, tribes and others, will maintain the Program Tracker. The Council expects others to provide data and reports to the Council on a regular basis and make them available to the public. Bonneville, the Corps of Engineers, and the Bureau of Reclamation, in collaboration with federal and state fish and wildlife agencies and tribes, shall report regularly to the Council and the region on the implementation of program measures, including identified Program priorities.
- Bonneville, agencies, tribes, and other entities receiving Bonneville funding will assist the Council in compiling data in the appropriate format to inform the annual reports to Congress and the Northwest Governors on Program expenditures.

Evaluation

Adapting to new information is an intrinsic part of the Program's adaptive management cycle and critical to ensuring measures are based on best available science. This cycle applies to multiple levels of the Program, ranging from Program amendments every five years, Program performance evaluations, project reviews, and other topic-specific forums.

- The region should work collaboratively through established forums to continue to refine metrics, methods, and indicators which can be used consistently to evaluate and report on program progress, focal species, and their habitats.
- The Council will evaluate implementation of all or part of the Program approximately every five years and provide results of the evaluation to the region 6 – 12 months prior to a Program amendment process to inform recommendations. See part 7 for details on Program Performance.
- The Council will continue working with the region to acquire datasets on existing or new performance indicators and will hold workgroup meetings to discuss the information and its interpretation. Performance indicators will be reported on Program Tracker and updated annually. See part 7 for details on Program Performance.
- The Council will report on progress toward reaching Program objectives and goals using Program Tracker and will present these results to the Council 6 – 12 months prior to the next Program amendment, or more often if requested. See part 7 for details on Program Performance.
- The Council, working with the ISRP and the region, will continue to review projects in a manner that is designed to lead to improvements in project design and implementation, where warranted. See Part 6 for details on Project review.
- The Council, with input from the ISAB and ISRP, may request project sponsors synthesize data gathered over several years to advance understanding and guide ongoing decision making on project planning and implementation. Additional funding from Bonneville or other sources may be required to support development of these syntheses.

Part Six: Provisions for Program Implementation

Program Measures and General Implementation Considerations

As summarized in the Introduction to Part Four, the Northwest Power Act calls for the Council's Fish and Wildlife Program to include "measures", and the Act uses the term "measures" in a way that means the actions or things to be done to protect, mitigate and enhance fish and wildlife affected by the development and operation of the Columbia River hydroelectric facilities. The Council's Program consists of a number of different types of "measures." The different types of measures, their location and sources, and who implements them, are described again here in some detail, as a prelude to Council Program considerations about implementation.

Basinwide and Program-wide Measures

Some of the Program measures are organized into broad strategies that apply basinwide or Program-wide. Examples include the strategies for habitat restoration and protection, wildlife mitigation, and artificial production. The general measures within those strategies guide the development and implementation of more specific measures across the Program. These broad Program-wide or basinwide strategies and measures are found in Part Four.

Mainstem Water Management and Passage Measures

Water management and passage measures for the mainstem Columbia and Snake rivers can be found in the Hydrosystem section in Part Four. As described in that section, some of the details for those measures are from other documents that are referenced and incorporated. This includes the biological opinions developed for implementation by the federal operating agencies to satisfy the needs of the Endangered Species Act (ESA), along with other planning and implementation documents associated with the biological opinions. The Council recognizes these actions as measures that the Corps of Engineers, the Bureau of Reclamation, and Bonneville have committed to implement and fund in part under Sections 4(h)(10)(A) and 4(h)(11) of the Act, even as these measures also address needs under other federal laws as well, such as the ESA. The Program measures also include the details of the system actions to protect fish and

wildlife implemented by the operators of the non-federal hydroelectric projects in the Columbia River Basin, as regulated by the Federal Energy Regulatory Commission under the Federal Power Act and by the federal resource agencies under the Endangered Species Act.

The mainstem actions found in these biological opinions and other documents are built on the mainstem protection foundations developed in the Council's Program over the past 40 years, beginning with the water management and passage measures in the original 1982 Program. Note that the Council is *not* adopting these biological opinions and other documents into the Program in their entirety, and the Council expresses no opinion as to their sufficiency for satisfying the requirements of other laws, such as the ESA. They are a catalog of actions and details to be implemented as part of the Program's specific mainstem measures, along with the other specific measures directly described in the Program.

Most of the Program's mainstem measures involve operations that are implemented by the federal operating agencies under their project authorizations and other authorities, including the Northwest Power Act and Endangered Species Act. Other measures involve structural changes at the dams to improve fish passage survival or other conditions for fish. These dam modifications are made by the federal agency operating the particular dam, via capital investments requiring Congressional appropriations to that agency. Bonneville is then obligated to reimburse the federal Treasury for the hydropower share of the capital improvement. Bonneville also usually directly funds, to the dam-operating agency, the hydropower share of operations and maintenance of fish passage facilities.

Hydroelectric facilities in the Columbia River Basin owned by non-federal entities also implement a set of operations and passage actions through their licenses from the Federal Energy Regulatory Commission (FERC). FERC has responsibilities toward the Council's Program under both the Northwest Power Act and Federal Power Act when reviewing proposed licenses and relicenses and imposing conditions to benefit fish and wildlife.

Other Specific Measures

More specific measures of other types are also found in the Program, including habitat protection and restoration, artificial production, wildlife, predator management, monitoring and evaluation, and more. These measures are found or referenced in several ways:

- Strategies can be found in Part Four, including both general and specific measures.
- The Part Four sections also include lists and details of new, specific measures for habitat, artificial production, planning and research, monitoring, and evaluation, and other

measures recommended to the Council in this 2025-26 amendment process, referenced in the appropriate sections in Part Four and Appendix G.

- Management plan sections of the 59 subbasin plans adopted into the Program in 2004-05 and 2010-11. *See* Part Four(4)(d) and the subbasin plans.
- Habitat, artificial production, and related measures found in long-term Program implementation commitments entered into by Bonneville and various tribes and states and referenced in the appropriate places above.
- Habitat, artificial production, and related measures recognized as Program measures and found in relevant ESA documents, such as the habitat and production measures in biological opinions and recovery plans for the Columbia River, with the same considerations as stated above for the mainstem measures found in these documents. With regard to the latter, the Council has recognized that the actions in these other plans and documents are built on the offsite-mitigation planning and implementation foundations developed in the Council's program over the past 30+ years and consistent with the subbasin plans and broader elements of the Program. Thus, the Council includes the actions as Program measures under Section 4(h) of the Northwest Power Act, even as they may also address needs under other laws as well. The Council has not adopted these other plans and documents in their entirety into the Program.

Most of the Program measures of this type are implemented by Bonneville under Section 4(h)(10)(A) of the Northwest Power Act, through Bonneville's direct program expenditures and capital investments. The other federal agencies with responsibilities to the Council's Fish and Wildlife Program under Section 4(h)(11) of the Northwest Power Act also implement a portion of the off-site mitigation measures of the Program using their own appropriated funds. An example is tributary habitat improvements implemented in certain subbasins by the Bureau of Reclamation, which has a foundation in the Program/Power Act and in later years were also incorporated into ESA implementation. Finally, the Federal Energy Regulatory Commission also protects and improves important fish and wildlife river habitat in the Columbia River Basin and throughout the Pacific Northwest by implementing the Protected Areas element of the Council's Program.

General Implementation Considerations for Program Measures

Bonneville and the other federal agencies have been funding and implementing many protection and mitigation projects and system operations consistent with the measures in the Council's Program. Some of these actions have explicit multi-year funding and implementation

commitments for the foreseeable future. Even for those that do not, many have been and will continue to be implemented as ongoing, multi-year mitigation and protection activities that are important to the Program. Implementation of these measures should continue. Significant changes in long-term protection or mitigation measures should be discussed with the Council, prior to implementation.

The fact that a specific measure is included in the Program does not necessarily guarantee near-term implementation or constitute an immediate implementation or funding obligation for the associated action or project. The Program contains more measures than the Council expects to be implemented in the near term – many of the measures are part of a pool of actions to benefit fish or wildlife to be drawn from over time for implementation. There are several ways a new measure becomes a priority for implementation. This includes the Council determining priorities for near-term or medium-term implementation, as discussed at the end of Part Four. In addition, for those measures to be implemented as projects by Bonneville, implementation involves further definition into proposed projects for review under Section 4(h)(10)(D) of the Act, discussed in the next section.

The Program's substantive measures and the implementation provisions and statements of priorities further describe the conditions under which measures will be implemented. For the Program to be effective in protecting and mitigating fish and wildlife affected by the hydrosystem, measures need to be considered as to how they work together within a system perspective. For example, if the goal of the hydrosystem operations measures is to improve migration in-river for juvenile salmon and steelhead, the effectiveness of this effort needs to be coupled with effective management of in-river predators that also benefit from the dam-altered ecosystem. For another example, the success of the Program's artificial production measures in assisting in rebuilding natural spawning populations also depends on coordination with corresponding habitat improvements and management of adverse effects.

Those responsible for implementing Program measures should regularly report the results of implementation. Reporting must clearly communicate the goals, objectives, and results of the actions and contribute to the Program's broader monitoring and evaluation framework and reporting of Program results and performance. Implementation of measures must also allow for an ongoing adaptive management approach and for future Program amendment processes in which measures are modified or discontinued if not performing or no longer identified as a priority.

Implementation Procedures – Project Review, Independent Science, and Program Coordination

There are three related aspects of program implementation within this section. The first section covers how projects are reviewed. There are hundreds of habitat, artificial production, and other projects funded and implemented by Bonneville under Section 4(h)(10) of the Northwest Power Act. The second section describes how the Council uses independent scientific review to help improve the individual and collective quality of the actions implemented under the program. The third section details mechanisms and procedures for Program coordination.

For the Program to be effective and accountable, procedures for implementation are necessary to: ensure scientific soundness of projects and of the collective strategies implemented by projects; track project and Program results to guide future decision making; coordinate within the Program and with other regional programs; and prioritize new work as funds become available. The Council will rely on the procedures in this section to coordinate project review and implementation.

The procedures for implementing the Program will ensure that planning results in effective on-the-ground actions, which will be assessed and reported on to guide future decisions. The Council will also use the procedures in this section to integrate Bonneville funding of projects to implement the Program with the implementation of Program measures by the other federal agencies with responsibilities under the Northwest Power Act, with ESA requirements, and with the collaborating programs of the states, tribes, federal agencies, and local governments.

Project Review Process

Many of the Program's measures are implemented through projects, which are reviewed by the Council under Section 4(h)(10)(D) of the Act. The 1996 amendments to the Northwest Power Act, which added Section 4(h)(10)(D), directed the Council to oversee, with the assistance of the Independent Scientific Review Panel (ISRP), a process to review projects proposed for funding and currently funded by Bonneville through the Council's Program. The ISRP reviews projects and makes recommendations to the Council. The Council's review process includes public comment on the ISRP's review.

The Council considers ISRP and public review comments in making final recommendations on projects to Bonneville, and must explain in writing wherever the Council's recommendations differ from the ISRP's. The Council considers the impact of ocean conditions on fish and wildlife

populations, and determines whether the projects employ cost-effective measures to achieve Program objectives. Section 4(h)(6)(C) of the Northwest Power Act requires the Council to adopt Program measures that "utilize, where equally effective alternative means of achieving the same sound biological objective exist, the alternative with the minimum economic cost."

The project review process is a required and critical component to implementing Bonneville's portion of the Council's Fish and Wildlife Program, including subbasin plans and other planning documents associated with the Program. These rigorous reviews have led to: clear documentation of each project's purpose, objectives, and results; project improvements through independent scientific review and feedback; facilitation of shared project data and information; increased transparency and accountability of the work that occurs under the Program; and the identification of project contributions to the Program.

The project review process has evolved over time and is periodically updated. Contemporary reviews recognize the differences in project types which support Program implementation in various ways, for example: administrative or coordination; operations and maintenance; research, monitoring, and evaluation; data management; habitat restoration and protection; and artificial production. Different types of projects may undergo different but integrated review paths. These reviews also allow the flexibility to incorporate Bonneville's ESA requirements and relevant agreements, including those identified in the biological opinions and accords, as consistent with the Northwest Power Act, section 4(h)(10)(D).

Project review occurs for:

- Projects that have had an initial review(s) and Council recommendation

The projects implementing the Program have grown in numbers and complexity through the years, and many have been reviewed and recommended by the Council numerous times. For these ongoing projects that have already gone through the review process, their basic premise and scientific soundness have been accepted. Future reviews for these projects will focus on an implementation check-in on project actions, with recommendations intended to provide considerations for further improvements to project implementation.

- Projects needing initial review and Council recommendation

Projects that have not been reviewed include both new projects and existing projects that are currently funded by Bonneville and are being implemented without a review and Council recommendation. Reviews for all projects associated with the Program are important for regional transparency and compliance with the Power Act. The Council will continue to work with Bonneville and project sponsors to review these projects in the most efficient and effective

manner. Solicitations for new work should take into account the priorities described in the Program.

- Step review for major investments

As one element of project review, the Council developed a three-step review process for major investments, such as new hatchery programs and facilities and other capital-type initiatives.

Step review calls for new hatchery programs and facilities and other major capital initiatives to follow a basic development process that has three main steps or phases: Step 1- conceptual planning, represented under the 1995 Program primarily by master plan development and approval; Step 2- preliminary design and cost estimation, and environmental (NEPA and ESA) review; and Step 3- final design review prior to construction. The three-step review process provides an orderly way to track the soundness, feasibility, and cost of capital-type initiatives proposed for funding by Bonneville. The Council has found that this process has provided an orderly way to develop complex or large projects. Linking funding commitments to specific phases allows the project sponsor and the Council to move from the concept development phase to final design and implementation in steps, avoiding overcommitment of resources at the early stages of a complex project, tracking and adjusting estimated costs, and identifying final costs and future operation and maintenance commitments. Projects may move to the next phase based on a favorable Council review and recommendation.

The Council intends the step review process to be flexible and time efficient. Bonneville and the sponsor, in collaboration with the Council, should plan and manage the initiative in a transparent and coordinated manner. Depending on the nature and status of the proposed project, the Council may allow for a review that combines two or more of the steps in a single submission and review, or for a submission and review that addresses just part of a step in the review process.

Independent Science Review

Independent scientific review is a critical part of fish and wildlife project implementation, research, and development in the Columbia River Basin. Independent scientific review can help decision-makers separate scientific variables from other considerations (political, economic, cultural, etc.) and help ensure environmental decision-making reflects the best scientific knowledge. Independent scientific review for the fish and wildlife program is done by two groups: the Independent Scientific Review Panel (ISRP) and the Independent Scientific Advisory Board (ISAB). The administrative procedures, member qualifications, appointment processes, and guidelines for conflicts of interest of the ISRP and ISAB are provided in the links below. Each group was established in 1996, has 11 members, and provides distinct services to the Program.

The Independent Scientific Review Panel (ISRP) – the ISRP and its Scientific Peer Review Group were established by the Council in response to the 1996 amendment to the Northwest Power Act. The ISRP reviews individual projects in the context of the Program and makes recommendations on matters related to those projects.

The ISRP evaluates projects using the basic criteria from the 1996 amendment, which are that the project 1) is based on sound scientific principles; 2) benefits fish and wildlife; 3) has clearly defined objectives and outcomes; and 4) has provisions for monitoring and evaluation of results. Recommendations from the ISRP are reached by consensus. The ISRP may enlist Scientific Peer Review Group members with the appropriate expertise to assist in reviews.

The ISRP has review responsibilities in three primary areas:

> **Review projects proposed for Bonneville funding to implement the Council's Program**: The 1996 amendment directs the ISRP to review annually projects that are proposed for Bonneville funding to implement the Council's Program. The ISRP provides this review as requested by the Council to inform the Council's recommendations to Bonneville. See project reviews and recommendations on the Council's website.
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> **Review Program results**: The 1996 amendment also directs the ISRP to annually review the results of prior-year expenditures based on the project review criteria and submit its findings to the Council. The retrospective review focuses on measurable benefits to fish and wildlife and summarizes major basinwide programmatic issues identified during project reviews.
>
> **Review projects funded through Bonneville's reimbursable program**: In 1998, the U.S. Congress' Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill directed the ISRP to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by Bonneville. These programs include the Corps' Columbia River Fish Mitigation Program and the Lower Snake River Compensation Plan.

The Independent Scientific Advisory Board (ISAB) – The ISAB was established by the Council and NOAA Fisheries, and its administration is overseen by representatives from the Northwest Power and Conservation Council, NOAA Fisheries, and the Columbia River Indian Tribes. The ISAB provides advice to the region on key scientific issues affecting Columbia River Basin fish and wildlife with the intent to avoid gridlock over scientific uncertainty, circumvent unnecessary additional research, and resolve conflicting advice and opinions on recovery issues and measures. ISAB reviews have covered the traditional aspects of fish and wildlife mitigation and recovery including hatcheries, harvest, hydrosystem, and habitat issues. In addition, the ISAB

evaluates topics that expand the region's perspectives on recovery including non-native species, predator management, climate resiliency, and landscape-scale restoration principles. The ISAB's general tasks for the Council, NOAA Fisheries, and Tribes are described in the ISAB Terms of Reference.

Program Coordination

Effective Program coordination is necessary at different levels, and includes:

- Coordination of efforts across the basin to implement and review Bonneville-funded projects.
- Coordination between the Council, the fish and wildlife agencies and tribes, and the implementation activities of all the federal agencies with responsibilities to the Program under the Northwest Power Act.
- Coordination of interested entities to address Program-wide issues, including during Program amendment processes.
- Coordination of activities under this Program with the activities of other programs implemented by governments and non-governmental entities intended to benefit the same Columbia River fish and wildlife as the Program.

The Council will continue to identify and provide regional leadership and coordination on a variety of fish and wildlife issues by bringing the appropriate expertise together and helping to craft strategic approaches to address these issues. This may include Council-organized science and policy forums that can inform the region about emerging information, innovative tools, and critical research uncertainties. When appropriate, the Council may also convene participants and interested parties to discuss and address relevant issues pertaining to Program implementation in the absence of an existing and ongoing forum. The Council and the broader region benefit from coordination and communication with program implementers, Bonneville, the Corps of Engineers, and the Bureau of Reclamation regarding the status of implementation of the Program measures. In addition, consistent with many measures outlined in various strategies in Part Four, the Council may periodically request that Bonneville and other federal agencies present to the Council on implementation of the Council's Program, including funding, challenges, and accomplishments. The Council further invites presentations and discussion by federal agencies on their other projects and priorities for the Columbia River basin. Continued coordination of various Program elements is expected, supported, and in some cases financed by Bonneville.

Coordination with State Fish and Wildlife Agencies and Tribes

State fish and wildlife agencies and tribes will continue to receive annual regional coordination funding to participate in activities relating to the Council's Program, including the Regional Coordination Forum, Council meetings, and Program performance work. These activities inform policy, program performance evaluation, and implementation decisions related to the Council's Fish and Wildlife Program, and are beneficial at a basinwide or regional scale. Annually, or more often as needed, the Council will convene a forum of these regional coordination representatives to discuss Program-related issues, and those receiving coordination funding should participate.

Coordination with the other Federal Agencies

The Corps of Engineers, Bureau of Reclamation, and Federal Energy Regulatory Commission also have responsibilities to the Program under the Act. They implement or oversee a variety of protection and mitigation actions that address the effects of the hydropower system on fish and wildlife - in the mainstem, estuary, and tributaries. The Council expects regular communication and coordination of these activities between the federal agencies and with the Council.

Coordination with other Regional Programs

The Council will continue to pursue opportunities to implement the Program in coordination with other federal, state, tribal, and Canadian fish and wildlife conservation and mitigation programs, as well as with national programs that influence our work in the basin. The Council will also continue to coordinate with organizations that track and monitor data, as it relates to the Program (for example, on non-native species distribution, climate change, status and trends in habitat quality, ocean conditions, and fish and wildlife). Continued coordination with these larger efforts, that span within and beyond the Program, is important as their products and reports can directly influence the Council's work in the basin and help to guide decision-making.

Program Investments

As described above, the Council's Program contains hundreds of measures at the basinwide, mainstem, and subbasin levels. Program measures are funded and implemented not just by Bonneville, but also through programs under the authority of the Corps of Engineers, the Bureau of Reclamation, and the Federal Energy Regulatory Commission as it licenses non-federal hydropower project operators.

The Program represents a substantial investment, both in terms of continued funding for ongoing protection, mitigation, and enhancement actions, and in terms of the assets associated with

passage structures, hatcheries, fish screens, and land acquisitions, investments by both the ratepayers of the Northwest and the nation's citizens. The Council recognizes that ratepayer funding requires some basic controls and that there is not unlimited funding to address every need for fish and wildlife affected by the federal hydrosystem. At the same time, the Council received recommendations highlighting concerns regarding the adequacy of funding to maintain the ongoing work under the Program and protect Program assets. In addition, many recommendations emphasized priorities for new or expanded work to be added to the Program.

To assure thoughtful use of Bonneville funding to maximize benefits to fish and wildlife, the Council has identified the following provisions to guide the funding and implementation of the program by Bonneville, the Corps of Engineers, the Bureau of Reclamation, project sponsors, and their partners.

Preserving Program Integrity

Funding needs to be adequate to implement the ongoing work of the Program, including adequate and dependable funding for annual and long-term operation and maintenance of the Program's assets (i.e., fish passage structures, hatcheries, fish screens, land acquisitions).

The Council recognizes that Bonneville has the authority and responsibility to manage its fund prudently, to decide how much to dedicate to fish and wildlife in any particular year, and to manage its costs, including fish and wildlife costs, so as to maintain the financial integrity of the agency and an affordable power supply. The Council expects a cooperative process that allows for improved communication and transparency regarding funding (e.g., start-of-year budget, placeholders, unspent funds, priorities) to track implementation of the Program. The Council also expects that just as important to Bonneville will be to fund and implement the protection and mitigation measures of the Program at a magnitude commensurate with the scale of the impacts of the system on fish and wildlife, and to manage its budget processes year-to-year so as not to undermine or put at risk the continued productivity of that work.

Funding and implementation decisions should ensure the Program is implemented broadly to address the impacts across the basin, including the following considerations:

- Program funding decisions should consider:
    - The level of impact across the landscape of the Columbia River basin caused by the hydropower system, understanding that some areas of the basin (e.g., blocked areas) were and are more impacted than others (e.g., areas currently accessible to anadromous fish).

    - The off-site protection and mitigation provisions of the Northwest Power Act enabling program investments in related spawning grounds and habitat.
    - The manner in which different measures might combine or need to combine more comprehensively across strategies to be effective.

- The Council supports fair and adequate treatment across the entire Program when cost management decisions are made. Bonneville's efforts to manage or reduce Program costs can, at times, be imposed on a small proportion of the total range of projects funded to implement the Program. The Council understands the value of the commitments made in long-term agreements and to that portion of the Program that addresses the needs of ESA-listed fish. On the other hand, the Program's core protection and mitigation activities are of equal priority under the Northwest Power Act whether included in a long-term implementation commitment or implemented year-to-year, and need to be treated equitably in program management, especially if proposed funding cuts begin to threaten the substantive work and ability to meet project objectives. Bonneville should work diligently with the Council and the project sponsors to equitably share cost management efforts throughout the Program.
- Bonneville should continue to target achieving funding allocation of anadromous fish (70%), resident fish (15%), and wildlife (15%).
- Ongoing efforts to find efficiencies and use available funds while maintaining productive work is always encouraged. To the extent a formal inquiry is needed, the Council and Bonneville will work together on developing an improved public process to find efficiencies and savings in the existing budget. The Council expects that at least most of the savings will be reinvested in the Program in a manner subject to Council recommendations.
- As new priorities emerge that need implementation and funding, the Council expects that Bonneville will fund any new activities from Program savings if possible, without compromising productive projects that address other needs and priorities identified in the program, and then with additional expenditures as necessary.

Adequate Annual Support for Projects, Including Maintenance Needs

Bonneville should ensure that project funding is at a level adequate to initiate and then maintain the integrity of the project, including adequate annual operation and maintenance funding to be engaged in the specified tasks while also maintaining and appropriately replacing Program tools

and assets. Adequate annual investments in recurring maintenance are important to help avoid or postpone more sizable needs for non-recurring maintenance and rehabilitation expenses.

Considerations include:

- Bonneville, the Corps of Engineers, the Bureau of Reclamation and FERC licensed projects should allocate sufficient funding to recurring and non-recurring ongoing operations and maintenance for projects and actions implemented to protect, mitigate and enhance fish and wildlife.
- Bonneville should implement an annual inflation adjustment factor to the Fish and Wildlife Program and its projects that keeps pace with the cost of living and program needs. Fish and wildlife managers and project sponsors continue to raise concerns with the Council over cost management techniques that hold certain projects at flat budgets for years, even though some of the costs of implementation rise over that time. This fiscal discipline can remove inefficiencies in spending and is a legitimate tool for Bonneville to apply. However, over time, persisting with flat budgets begins to force project sponsors to make cuts that undermine the ability to perform the substantive work and meet project and Program objectives. Bonneville should work with the Council and project sponsors to identify when project budgets need to increase to reflect the effects of inflation and preserve the substantive work.
- If Bonneville chooses to manage direct-funded Program projects by portfolio, the Council requests Bonneville to do so in a manner that focuses on efficiencies without undermining the ability of projects to address Program and regional priorities.
- Bonneville should work with the Council and project sponsors to ensure that budget management efforts and reductions in program expenditures are aimed at finding efficiencies without sacrificing productive work.

Bonneville shall provide timely notice to the Council when Bonneville implementation decisions result in a material change in the scope, desired outcomes or budget of a project. In 2024, Bonneville staff agreed to regular communication in this way, an approach that the Council expects to be implemented in a comprehensive way. The Council will review this information and assess whether further recommendations are warranted, including further ISRP review. The Council understands that much of Bonneville's responsibility to implement the Program occurs outside of the public's view. However, there are aspects of this effort that require Council involvement. Program efficiency and cost containment are laudable objectives, but they can have policy implications that warrant Council participation, particularly when reductions result in projects that are implemented in a manner that no longer reflects the original proposal that underwent science and project review and received a Council funding recommendation based on

that review. Bonneville shall provide regular public information to the Council on project implementation, so that the Council can understand whether and how implementation differs from the work recommended after project review.

Asset Management

Adequate and dependable funding is critical for recurring and non-recurring operation and maintenance to ensure past investments remain properly functioning to benefit fish and wildlife in the basin, as well as continuing to meet Bonneville's mitigation requirements. Adequate annual recurring maintenance is discussed in the section above, an important element to a proper asset management strategy. This section addresses the need to continue to develop and implement strategies to address the non-recurring maintenance and replacement needs for Program assets. Two different types of assets are important to consider: (1) direct Program assets funded by Bonneville, such as Program hatcheries, fish screens and land acquisitions; and (2) passage structures and other dam modifications important to fish survival that are installed, operated, and maintained by the operating agencies, primarily the Corps of Engineers.

Direct Program Assets – Hatcheries, Screens and Land Acquisitions

Funding for long-term maintenance of the Program's assets was the highest emerging priority in the 2014 Program. In 2018, the Council, in collaboration with Bonneville, developed and implemented an Asset Management Strategic Plan (Asset Management Plan) to address non-recurring maintenance needs for hatcheries, fish screens, and land acquisitions to ensure longevity and integrity of these past investments. The Asset Management Plan was also developed in collaboration with the Fish Screening Oversight Committee, state and tribal fish and wildlife managers, and independent contractors. Implementation of the Asset Management Plan is guided by a subcommittee made of representatives from Bonneville and the Council. An annual planning process is coordinated with state and tribal fish and wildlife managers and guided by assessments of priority needs for hatcheries and fish screens. Concurrent to the development of the Council's Asset Management Plan, Bonneville initiated a process to include hatcheries, fish screens, and land acquisitions in Bonneville's strategic asset management plans (SAMPs) which include an asset inventory, condition assessment, prioritization, and strategic planning.

Since 2017, both the Council and Bonneville annually coordinate these complementary plans to manage asset investments for hatcheries, fish screens, and land acquisitions. Previous actions to address asset management were implemented with funds from varying budgetary sources, including the cost savings budget placeholder, the Asset Management budget placeholder, rate case funds from BP-24, and FY 2022 and FY 2023 Reserve Distribution Clause (RDC) funds.

Currently, asset management actions have been identified and are funded through FY2027 for screens and priority non-recurring maintenance needs for hatcheries.

This asset management work needs to be formalized as an ongoing strategy. The past investments associated with hatcheries, fish screens, and land acquisitions that were made for the benefit of fish and wildlife need to continue to remain properly functioning to meet intended goals and objectives. Bonneville's financial responsibility for these assets should also continue over time, as this remains a critical part of Program implementation. The following provisions should guide funding and implementation related to the Program's assets:

- Biological benefits do not come to fruition with the completion of project construction (e.g., hatcheries) or fish or habitat protection (e.g., screens, land acquisition), but require annual and long-term ongoing maintenance to meet their intended goals and objectives. Therefore, Bonneville's financial responsibility for these assets continues over time.
- The Council and Bonneville should continue to coordinate and support the Strategic Asset Management Plan (SAMP) and its implementation for the Program's hatcheries, fish screens, and land acquisitions through a transparent and dependable annual process.
- The Council and Bonneville should develop and formalize a long-term funding strategy to protect the Program's assets.
- Federal agencies and non-federal project operators should also provide adequate funds for long-term maintenance for facilities that are implemented under other laws, but which integrate with, or support activities implemented under the Council's Program (e.g., facilities funded through the Mitchell Act or the Lower Snake River Compensation Plan).

Passage Structures and other Dam Modifications to Protect Fish

Structural fish passage improvements and other dam modifications intended to benefit fish moving through the system are some of the Program's earliest and most important assets. As noted in the Mainstem Hydrosystem Flow and Passage Operations in Part Four, there is reason to believe some of this infrastructure is stressed and needs additional work to maintain its functionality. For that reason, the Council calls on the Corps of Engineers in Hydro Measure H 48 to seek and apply increased funding and shorten the timelines for maintenance and rehabilitation of dam infrastructure that impacts fish operations. See that measure for further details.

In general, the Corps of Engineers and the Bureau of Reclamation for the federal projects, and FERC and its licensees for the non-federal projects, should work to ensure adequate and dependable funding for annual and long-term operation and maintenance of the Program's passage assets.

Also, funding through the Columbia River Fish Mitigation Program (CRFM) needed to operate, maintain and rehabilitate passage and other dam infrastructure in the mainstem Snake and Columbia rivers should not be reduced or become inadequate to the need because of competing priorities between districts of the Corps (e.g., between the Columbia/Snake hydropower projects and the Willamette Basin projects). The Council urges the federal agencies to separately meet their Willamette and the Columbia River system Biological Opinion implementation and mitigation obligations.

Part Seven: Provisions for Tracking and Reporting on Program Performance

The Council is working to assess the performance of the Program through three complementary efforts. First, the Program Retrospective described the history and context of the Program from its start in 1982 to the present. This was a one-time effort to review when, why, and how different goals, objectives, strategies, and measures appeared in the Program over time. The second effort is a regular assessment of how measures in the Program are being implemented. These assessments will be updated before every Program amendment process and rely on performance indicators. The third effort is to evaluate progress towards Program goals and objectives using a variety of data sources. Progress towards goals and objectives will be reported prior to beginning a Program amendment process and potentially more often. Results from tracking performance indicators and the status of Program objectives and goals may inform decisions about where to expand, decrease, or change implementation.

Project implementation of strategies and measures is an important component of Program performance. Projects may collect data used to track and assess changes in biological and ecological conditions or provide data and information that can inform and resolve critical uncertainties. Similarly, the project review process can provide information that may inform refinements to indicators or objectives.

The Council uses the Program Tracker website to report on the implementation of Program strategies and progress made toward achieving Program objectives and goals. Program Tracker is updated annually and includes detailed information on the objectives and strategy performance indicators, along with relevant contextual information such as environmental conditions.

Performance Indicators

In 2020, the Council worked with representatives of the state and federal fish and wildlife agencies and tribes to identify a preliminary set of indicators to track the performance of Program strategies. These indicators are used to assess progress in implementing program strategies, which should lead to improved ecological and population conditions for focal species. While a set of indicators are listed below, they are not formally adopted in the Program. The Council, in collaboration with others, will continue to develop and use the indicators as tracking tools that

can be refined and changed outside of an amendment process as better numbers or indicators become available. The Council compiles data on indicators and reports results annually using Program Tracker. In addition, a subset of indicators will be identified for regular tracking and reporting at Council meetings or with other workgroups, as appropriate.

In 2021, the Council convened a workgroup to provide guidance to the Council on compiling, assessing, tracking, and reporting on the strategy performance indicators. This workgroup included members representing state and federal fish and wildlife agencies and tribes. Other entities, such as the program's data management and information support project sponsors, also provided input.

The following table contains performance indicators, organized by program strategy, that contribute to achieving the objectives (**note: these indicators are not formally adopted in the Program**). The code in parentheses at the end of each indicator statement identifies the linkage between the objective and the indicator. Sources of information for performance indicators are available here.

Hydrosystem
1. Daily maximum water temperatures at fixed monitoring sites in the mainstem in reference to water quality targets. (E2)
2. Total dissolved gas (TDG) during voluntary spill events at Dworshak, Libby, Hungry Horse, Albeni Falls dams, and at Columbia and Snake River dams compared to the applicable standard. (E2)
3. Seasonal flows at specified Columbia and Snake River dams with associated target flows from the BiOp and Water Management Plan. (E3)
4. Travel time by release date for salmon and steelhead in Columbia and Snake River reaches. (E3)
5. Daily average flows and water temperatures downstream of McNary Dam in reference to flow and spawning temperature needs for Columbia River White Sturgeon. (E3)
6. Reservoir elevation at mainstem reservoirs. (E3)
7. SARs for salmon and steelhead in the Columbia and Snake Rivers. (S2)
8. Powerhouse encounter rates (PITPH) from Lower Granite to Bonneville. (S3)
9. Juvenile salmon and steelhead reach survival, by year. (S3)
10. Number of salmon and steelhead transported in the Snake River (S3)

11. Average mortality (%) of juvenile salmon and steelhead at Columbia and Snake River dams. (S3, S4)
12. Annual adult salmon and steelhead survival in select Columbia and Snake River reaches. (S4)
13. Number of days of streamflow at or above 30kcfs at Bonners Ferry to support White Sturgeon spawning migration. (WS1, WS4)
14. Number of wild female adult White Sturgeon with acoustic tags detected at or above RKM 246 of the Kootenai River (preferred spawning habitat). (WS1, WS4)
Habitat Restoration and Protection
15. Acres protected by purchase or conservation easement. (E1)
16. Miles of stream protected by purchasing or leasing land. (E1)
17. Miles of stream habitat accessed. (E1)
18. Miles of stream with improved complexity or improved channel form. (E1)
19. Acres of habitat improved. (E1)
20. Number of new fish screens installed, or number of screens improved. (E1)
21. Acres improved in riparian areas. (E1)
22. Acres of estuary floodplain protected or restored per hydrogeomorphic reach. Compare to target of no net loss of native habitats and recovery of 40 percent of historic extent for priority habitats. (E1)
23. Instream flow added (acre-feet of protected water). (E2)
24. Instream flow added (CFS). (E2)
Wildlife Mitigation
25. Location, acreage, and ownership of parcels acquired as mitigation for wildlife losses caused by construction, inundation, and operation of hydropower dams. (W1)
26. Number and percentage of parcels and/or management units being managed through an approved management plan. (W3)
27. Number and percentage of parcels or management units that report concerns related to meeting their habitat mitigation values. (W4)
Predator Management

28. The number of breeding pairs of Caspian Terns and availability of suitable nesting habitat on East Sand Island. Compare the breeding pairs to the target range of 3,125 to 4,375, and the suitable nesting habitat to the target of one acre. (E4)
29. Cormorant colony size at East Sand Island. Compare to management goal that colony size does not exceed management average of 5600 breeding pairs. (E4)
30. Estimated predation rate on ESA-listed juvenile salmonids by Caspian Terns in the Columbia Plateau region, compared to target of less than 2%. (E4)
31. Exploitation rate on Northern Pikeminnow measuring 200 mm (~eight inches) or greater in fork length. Compare the exploitation rate to the 10-20 percent annual target. (E4)
32. Range expansion, spatial distribution, and number of non-native Northern Pike removed from the Columbia River Basin. Evaluate trend to determine if the numbers and range are reducing over time. (E4)
33. Counts of sea lions observed at Bonneville Dam, the lower Columbia River/ estuary, and at Willamette Falls. Compare trends to determine if the impacts are decreasing over time. (E4)
34. Percentage of the adult spring Chinook salmon and winter steelhead runs consumed by sea lions below Bonneville Dam, in the lower Columbia River / estuary, and at Willamette Falls. (E4)
35. Number of adult spring Chinook salmon, winter steelhead, White Sturgeon, and Pacific Lamprey consumed by sea lions below Bonneville Dam, the lower Columbia River/ estuary, and at Willamette Falls. (E4)
36. Status of current-year juvenile and adult Lake Trout abundances (increasing, decreasing, stable) in the Pend Oreille, Priest Lake, Flathead Lake, and the Yakima subbasins, relative to the most recent 5-year average at each site. (R1, R3)
Non-Native and Invasive Species
37. Number of watercraft inspected and number of detections in the northwest states of the Columbia River Basin for zebra/quagga mussels. (E5)
38. Ratio of positive detections of zebra/quagga mussels to number of inspected watercraft. (E5)
39. Annual shad count at Bonneville Dam. (E5)
Plume and Nearshore Ocean
40. NOAA's stoplight indicator chart of ocean conditions. (S1, S2)
Artificial Production
41. Contribution of the Council's Columbia River Basin Fish and Wildlife Program toward the following regionally agreed-upon annual juvenile hatchery release targets for salmon and

steelhead. These targets were summarized by the NOAA Marine Fisheries Advisory Committee's (MAFAC) Columbia Basin Partnership Task Force, Table A-5. *See* Objective S1 above for the relationship of these targets to the program. (S1)

Group	Current Hatchery Juvenile Production	Future Total Hatchery Juvenile Production
Lower Columbia Chum	770,000	770,000
Lower Columbia Coho	12,108,600	12,239,000
Lower Columbia Fall Chinook (tules)	19,366,500	19,366,500
Lower Columbia Fall Chinook (brights)	0	0
Lower Columbia Fall Chinook (brights) Select Area	2,100,000	2,100,000
Lower Columbia Spring Chinook	4,120,000	6,340,000
Lower Columbia Winter Steelhead	1,381,000	1,381,000
SW Washington Winter Steelhead	223,000	223,000
Lower Columbia Summer Steelhead	1,307,000	1,307,000
Mid-Columbia Coho	5,200,000	5,200,000
Mid-Columbia Sockeye	0	0
Mid-Columbia Spring Chinook	6,380,000	6,930,000
Mid-Columbia Fall Chinook (tules)	10,700,000	10,700,000
Mid-Columbia Fall Chinook (brights)	11,000,000	12,000,000
Mid-Columbia Summer Steelhead	960,000	710,000
Snake River Fall Chinook	5,650,000	5,650,000
Snake River Sockeye	900,000	1,000,000
Snake River Spring/Summer Chinook	15,090,500	18,115,500
Snake River Summer Steelhead	10,328,000	10,328,000
Snake River Coho	1,550,000	1,550,000
Upper Columbia Fall Chinook	14,450,000	24,140,000
Upper Columbia Sockeye	4,500,000	14,100,000
Upper Columbia Spring Chinook	3,094,000	10,200,000
Upper Columbia Summer Chinook	4,286,000	14,400,000
Upper Columbia Summer Steelhead	935,300	2,750,000
Upper Columbia Coho	2,000,000	2,250,000
Upper Willamette River Spring Chinook	5,241,000	5,817,000
Upper Willamette River Summer Steelhead	600,000	550,000
Upper Willamette River Winter Steelhead	0	0

42. All program-funded hatcheries have a final management plan and a reviewed and approved master plan, with specific objectives to track performance. (S6)
43. Salmon and steelhead indicators for Bonneville-funded hatcheries tracked and compared to management goals as described in hatchery management plans and Hatchery Genetic Management Plans (HGMP). (S6)
44. Sturgeon hatchery objectives are tracked and compared to the hatchery management plan and a reviewed and approved master plan. (S6, WS1)
45. Cutthroat trout hatchery objectives are tracked and compared to the management plan and a reviewed and approved master plan. (S6, R2)
46. Redband trout populations' genetic integrity is protected from non-native hatchery trout by program-funded hatchery actions. (R4)
47. Pacific lamprey hatchery objectives are tracked and compared to a reviewed and approved master plan. (L1, L2)
48. Burbot hatchery objectives are tracked and compared to the management plan and a reviewed and approved master plan. (S6, NF)
Anadromous Fish Mitigation in Blocked Areas
49. Studies completed regarding fish passage, experimental pilot releases and testing interim fish passage facilities, fish reintroduction approaches, upstream/downstream passage options and costs, and habitat suitability. (S5)
50. The blocked-area reintroduction implementation plans are completed. (S5)
In blocked areas where the Program has committed to any or all of these anadromous fish reintroduction activities, track the following: 51. Increase in habitat access for anadromous fish in the blocked waters above the blockage including, but not limited to, miles of fish habitat made accessible and high-head dam interim fish passage facilities in operation. (S5) 52. Number of salmon passed above and below the blockage through interim fish passage facilities and trap and haul. (S5) 53. Number of salmon released in reintroduction pilot projects and selective releases. (S5)
Protected Areas and Hydroelectric Development and Licensing
54. Number of preliminary permits issued by FERC in protected areas; proposed exclusions from protected areas; and exclusions granted by the Council. (C4)
55. Draft license applications submitted to FERC for hydroelectric projects in protected areas. (C4)

56. Licenses granted by FERC in protected areas since 1988. (C4)

57. Proposed exclusions from protected areas and exclusions granted by the Council. (C4)

Salmon and Steelhead

58. Progress toward the following regionally agreed-upon adult abundance escapement targets for natural-origin salmon and steelhead. These targets were developed by the NOAA Marine Fisheries Advisory Committee's (MAFAC) Columbia Basin Partnership Task Force Table 8. *See* Objective S1 above for the relationship of these targets to the program. (S1, S5)

Group	Low, 10-year geometric mean	Med, 10-year geometric mean	High, 10-year geometric mean
Lower Columbia Spring Chinook	9,800	21,550	33,300
Lower Columbia Chum	16,500	33,000	49,500
Lower Columbia Coho	67,925	129,550	191,400
Lower Columbia Fall Chinook (tules)	28,050	54,100	82,000
Lower Columbia Fall Chinook (late brights)	11,100	16,700	22,200
Lower Columbia Fall (brights)	11,000	11,000	11,000
Lower Columbia Summer Steelhead	21,100	29,800	38,100
SW Washington Winter Steelhead	4,650	5,850	6,950
Lower Columbia Winter Steelhead	19,000	27,900	36,400
Mid-Columbia Coho	5,300	11,600	19,900
Mid-Columbia Sockeye	7,500	45,000	107,500
Mid-Columbia Spring Chinook	17,750	40,425	114,500
Mid-Columbia Summer/Fall Chinook	4,000	13,000	16,000
Mid-Columbia Summer Steelhead	21,500	43,850	69,150
Snake River Fall Chinook	4,200	10,780	23,360
Snake River Sockeye	5,500	15,750	26,000
Snake River Spring/Summer Chinook	33,500	98,750	159,500
Snake River Summer Steelhead	22,500	75,000	131,500
Snake River Coho	8,900	26,600	44,100
Upper Columbia Fall Chinook	9,200	62,215	87,835
Upper Columbia Sockeye	31,500	580,000	1,235,000
Upper Columbia Spring Chinook	11,500	19,840	30,135
Upper Columbia Summer Chinook	9,000	78,350	131,300
Upper Columbia Summer Steelhead	7,500	31,000	47,000
Upper Columbia Coho	7,500	15,000	26,000

Upper Willamette Spring Chinook	28,900	47,850	66,800
Upper Willamette Winter Steelhead	16,290	27,805	39,320

59. Abundance of populations tracked as identified through Coordinated Assessments Partnership. (S1)

60. Total Bonneville Dam, Lower Granite Dam and Willamette Falls adult counts. (S1)

61. Trends in genetic diversity measures (heterozygosity, allelic diversity, private alleles, etc.) (S7)

Resident Fish

62. Bull trout population abundance by subbasin. (R1)

63. Miles of stream occupied by core-conservation and conservation populations of cutthroat trout. (R2)

64. Number of core and conservation populations of cutthroat trout. (R2)

65. Status and trend of kokanee. (R3)

66. Redband trout stream length (kilometers) and lake area (hectares) occupancy within each of the five geographic management units (GMUs). (R4)

67. Percent of currently occupied habitat that contains genetically unaltered redband trout. (R4)

68. Percent of redband trout population that is hybridized. (R4)

69. Hungry Horse Dam mitigation for inundated lost habitat. (R5)

70. Number of acres of suitable stream or reservoir habitat in the Kootenai River Basin. (R6)

71. Number of accessible miles of previously blocked suitable streams in the Kootenai River Basin. (R6)

72. Status and trend of burbot. (NF)

73. Status, trend, and distribution of native freshwater mussels. (NF1)

74. Discussions with fish managers are undertaken to evaluate and identify the best approach to assess remaining native focal fish losses. (C5)

White Sturgeon

White Sturgeon population abundance:

Lower Columbia and Lower Snake (WS1, WS4):

75. Lower Columbia: Three-year running mean of sub-adults and adults.

76. Bonneville Reservoir: Three-event sampling mean of sub-adults and adults.

77. The Dalles Reservoir: Three-event sampling mean of sub-adults and adults.

78. John Day Reservoir: Three-event sampling mean of sub-adults and adults.

79. McNary Reservoir and Free-flowing section: Sub-adult and adult abundance when available.

80. Ice Harbor Reservoir: Sub-adult and adult abundance when available.

81. Lower Monumental Reservoir: Sub-adult and adult abundance when available.

82. Little Goose Reservoir: Sub-adult and adult abundance when available.

Middle Snake:

83. Population abundance (> 60 cm FL) and stock structure (juvenile, subadult, adult) recorded at 10-year sampling intervals for Brownlee Dam to Lower Granite Dam. (WS1)

Upper Snake:

84. Population abundance (> 60 cm FL) and stock structure (juvenile, subadult, adult) recorded at five-year sampling intervals for all Upper Snake reaches between Shoshone Falls and Brownlee Dam and 10-year intervals for Hells Canyon Dam to Lower Granite Dam. (WS1)

Kootenai River:

85. 10-year average of number of Kootenai sturgeon wild recruits (offspring that survive to sexual maturity at 25 years) that are added to the adult (25 years or older) population annually. Number of wild juveniles, ages 3 to 24 years. Production of wild age-3 juveniles in three of 10 consecutive years. (WS1, WS4).

    Offspring of hatchery-reared sturgeon will count towards the criteria, because those offspring will have been naturally spawned and reared in the Kootenai River.

Genetic Diversity:

86. The average number of alleles. (WS3)

Productivity:

Annual recruitment and length frequency distribution of wild white sturgeon populations in all impounded and non-impounded reaches.

Lower Columbia and Lower Snake:

87. Recruitment Index: Three-year running mean of proportion of positive sets (E_p). (WS4)

88. Length-Frequency Distribution: juveniles, sub-adult, adult. (WS4)

Snake River:

89. Recruitment Index: Annual standardized YoY gill net sampling (CPUE) in Core Conservation populations (Bliss Dam to C. J. Strike Dam and Hells Canyon Dam to Lower Granite Dam). (WS4)

90. Length-Frequency Distribution. (WS4) Kootenai River: (See indicator 88.)
Pacific Lamprey
91. Geographic distribution as indicated by total end-of-year counts at Willamette Falls, and Columbia and Snake River dams, along with tributary dams as data become available from new monitoring efforts. (L1)
92. Counts of juvenile and larval outmigration tracked at Bonneville Dam, John Day Dam, McNary Dam, Lower Monumental Dam, Lower Goose Dam, Lower Granite Dam, Rock Island Dam, and Rocky Reach Dam, along with Willamette Falls or other tributary dams as data become available from new monitoring efforts. (L1)
93. The Pacific Lamprey Conservation Initiative (PLCI) Risk Category, as reported in the Pacific Lamprey Assessment by Regional Management Unit (RMU) every four to five years. (L2)
94. RMU abundance and distribution indicators as reported every five years in the PLCI Pacific Lamprey Assessment. (L2)
95. Adult passage efficiency for each Columbia, Willamette, and Snake River dam. (L3)
96. Annual weighted average mortality rate for Pacific Lamprey larvae and juveniles at Bonneville, McNary and John Day dams, and other Columbia River, Snake River, or Willamette River dams as data become available. (L4)
97. Annual average injury rates for Pacific Lamprey larvae and juveniles at Bonneville, McNary, and John Day dams, and other Columbia River, Snake River, or Willamette River dams as data become available. (L4)
98. Juvenile and larval passage efficiency for each Columbia and Snake mainstem dam. (L4)
Eulachon
99. Spawning stock biomass of lower Columbia River eulachon. Columbia River Spawning Stock Biomass monitoring indicates a spawning abundance meeting or exceeding 229,500,000 spawners in 24 out of 30 years and must not dip below the 66,500,000 spawners in the remaining 6 out of 30 years. (NF)

Candidate Indicators

A set of new and refined indicators were proposed for the 2026 Program, and it is not yet clear if data exist to track these indicators or if any refinements will be needed to connect these

indicators to the measures that will appear in the completed Program. As such, all new indicators proposed for this amendment will be considered candidates and the Council will convene the workgroup to discuss the feasibility of adding these candidate indicators to the Program Tracker. In addition, the workgroup may be convened to identify, evaluate, and refine other indicators in the future. Candidate indicators cover the following topics: hydrosystem, predator management, artificial production, FERC relicensing, climate, lamprey, and eulachon, along with other topics that may be introduced by the workgroup.

Assessments of Program Implementation

Prior to each Program amendment process, the Council will produce a comprehensive assessment of Program implementation for strategies and measures. associated with the Hydrosystem, Habitat Restoration, Habitat Protection, Wildlife, Non-native and Invasive Species, Predator Management, Artificial Production, and other Program topics. These assessments are called "Implementation Assessments" and draw on data compiled for performance indicators, along with other data sources. The first draft of these assessments was presented to the Council in fall 2024. Subsequent drafts will be released approximately six months to one year before the beginning of an amendment process to provide sufficient time for discussion.

Tracking and Reporting on Program Goals and Objectives

Following the 2020 addendum and revision of Program goals and objectives, the Council developed a new section to Program Tracker that includes goals and objectives. Council staff presented the first update to the Council in December 2024 on progress toward reaching these goals and objectives. It is anticipated that results will be presented to the Council approximately six months to one year before the beginning of an amendment process to provide sufficient time for discussion. More regular reporting will occur for salmon and steelhead goals and objectives. Results will be updated on Program Tracker as they become available.

Other Reporting

The Council's annual Report on Bonneville Power Administration's Fish and Wildlife Expenditure is compiled by the Council from data provided by Bonneville.

The Council also submits an Annual Report to Congress.

Part Eight: Appendices

Appendix A. Glossary

Definitions available at this link are meant to be helpful for understanding the Fish and Wildlife Program, other Council documents, or terminology that appears on the Council's website. They are not a formal part of the Fish and Wildlife Program or of any Program measure or objective.

Appendix B. Index of Species and Measures

Program measures are designed to benefit all focal species, including salmon and steelhead, resident species (e.g., bull trout, cutthroat trout), eulachon, sturgeon, lamprey, and a range of wildlife focal species. The 2026 Program emphasizes a multi-species approach toward implementing strategies and measures, such that implementation benefits the whole ecosystem and species are only called out in measures when they have unique needs. In contrast, the 2014 Program and other previous Programs called out strategies for resident species as a group, along with strategies for sturgeon, lamprey, and eulachon. For ease of reference, objectives, measures, and indicators specifically associated with these species or groups of species are listed below, by strategy.

White Sturgeon

Goals and Objectives (page 31)

- Objective WS 1 – Abundance
- Objective WS 2 – Spatial distribution
- Objective WS 3 – Genetic diversity
- Objective WS 4 – Productivity

Mainstem Hydrosystem Flow and Passage Operations Strategy (page 49)

- Measure H 10 – General measures
- Measure H 11 – General measures
- Measure H 20 – Storage reservoir operations
- Measure H 24 – Libby and Hungry Horse operations
- Measure H 37 – Sturgeon- Hydropower dam operations
- Measure H 38 – Sturgeon- Hydropower dam operations
- Measure H 39 – Sturgeon- Hydropower dam operations
- Measure H 40 – Sturgeon- Hydropower dam operations
- Measure H 41 – Sturgeon- Hydropower dam operations
- Measure H 42 – Sturgeon- Hydropower dam operations
- Measure H 49 – Adult fish passage
- Measure H 60 – Fish Passage- Sturgeon
- Measure H 61 – Fish Passage- Sturgeon
- Measure H 62 – Fish Passage- Sturgeon
- Measure H 63 – Fish Passage- Sturgeon

- Measure H 64 – Fish Passage- Sturgeon
- Measure H 65 – Fish Passage- Sturgeon

Habitat Restoration and Protection Strategy (page 75)

- Measure HAB 24 – Mainstem spawning habitat- general
- Measure HAB 26 – Sturgeon- Mainstem habitat
- Measure HAB 27 – Sturgeon- Mainstem habitat
- Measure HAB 28 – Sturgeon- Mainstem habitat
- Measure HAB 63 – Water quality
- Measure HAB 65 – Water quality
- Measure HAB 69 – Sturgeon RM&E
- Measure HAB 70 – Sturgeon RM&E
- Measure HAB 71 – Sturgeon RM&E

Predator Management Strategy (page 93)

- Measure PM 7 – Management of predator fishes
- Measure PM 22 – Management of predator seals and sea lions

Artificial Production Strategy (page 107)

- Measure AP 7 – Sturgeon
- Measure AP 8 – Sturgeon
- Measure AP 9 – Sturgeon
- Measure AP 10 – Sturgeon
- Additional Measure AP 13.13 – Measures for new conservation and safety-net artificial production in the lower Snake River basin

Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies (page 134)

- Measure PR 10 – White sturgeon RM&E
- Measure PR 11 – White sturgeon RM&E
- Measure PR 12 – White sturgeon RM&E
- Measure PR 13 – White sturgeon RM&E
- Measure PR 14 – White sturgeon RM&E
- Measure PR 15 – White sturgeon RM&E
- Measure PR 16 – White sturgeon RM&E
- Measure PR 17 – White sturgeon RM&E
- Measure PR 28 – Additional planning and RM&E

- Additional Measure PR 28.3 – White sturgeon RM&E
- Additional Measure PR 28.4 – White sturgeon RM&E

Performance indicators (page 167)

- Indicators: 5, 13, 14, 35, 44, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90

Lamprey

Goals and Objectives (page 31)

- Objective L 1 – Abundance
- Objective L 2 – Distribution
- Objective L 3 – Adult passage efficiency
- Objective L 4 – Juvenile passage efficiency

Mainstem Hydrosystem Flow and Passage Operations Strategy (page 49)

- Measure H 11 – General Measures
- Measure H 42 – Sturgeon – Hydropower dam operations
- Measure H 49 – Adult fish passage
- Measure H 66 – Fish passage - Lamprey
- Measure H 67 – Fish passage - Lamprey
- Measure H 68 – Fish passage - Lamprey
- Measure H 69 – Fish passage - Lamprey
- Measure H 70 – Fish passage - Lamprey
- Measure H 71 – Fish passage - Lamprey
- Measure H 72 – Fish passage - Lamprey
- Measure H 73 – Fish passage - Lamprey
- Measure H 74 – Fish passage - Lamprey

Habitat Restoration and Protection Strategy (page 75)

- Measure HAB 24 – Mainstem spawning habitat- general
- Measure HAB 29 –Lamprey- mainstem and tributary habitat
- Measure HAB 30 – Lamprey- mainstem and tributary habitat
- Measure HAB 31 – Lamprey- mainstem and tributary habitat
- Measure HAB 32 – Lamprey- mainstem and tributary habitat
- Measure HAB 63 – Water quality
- Measure HAB 65 – Water quality

- Additional Measure HAB 49.18 – Specific habitat projects
- Additional Measure HAB 49.46 – Specific habitat projects
- Additional Measure HAB 49.53 – Specific habitat projects
- Additional Measure HAB 49.54 – Specific habitat projects
- Additional Measure HAB 49.111 – Specific habitat projects
- Additional Measure HAB 49.112 – Specific habitat projects
- Additional Measure HAB 49.113 – Specific habitat projects
- Additional Measure HAB 49.114 – Specific habitat projects
- Additional Measure HAB 49.116 – Specific habitat projects
- Additional Measure HAB 49.124 – Specific habitat projects

Predator Management Strategy (page 93)

- Measure PM 4 – General measures
- Measure PM 6 – Management of predator fishes
- Measure PM 7 – Management of predator fishes
- Measure PM 22 – Management of predator seals and sea lions

Artificial Production Strategy (page 107)

- Measure AP 11 – Lamprey
- Additional Measure AP 13.13 – Measures for new conservation and safety-net artificial production in the lower Snake River basin

Anadromous Fish Mitigation in Blocked Areas (page 115)

- Measure BA 10 – Reintroductions of Anadromous Fish above Projects in the Willamette River Basin

Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies (page 134)

- Measure PR 18 – Lamprey RM&E
- Measure PR 19 – Lamprey RM&E
- Measure PR 20 – Lamprey RM&E
- Measure PR 21 – Lamprey RM&E
- Measure PR 22 – Lamprey RM&E
- Measure PR 23 – Lamprey RM&E
- Measure PR 24 – Lamprey RM&E
- Measure PR 25 – Lamprey RM&E
- Measure PR 28 – Additional planning and RM&E

Performance indicators (page 166)

- Indicators: 35, 47, 91, 92, 93, 94, 95, 96, 97, 98

Eulachon

Goals and Objectives (page 31)

- Objective: Other Native Aquatic Focal Species (NF) – General

Mainstem Hydrosystem Flow and Passage Operations Strategy (page 49)

- Measure H 10 – General measures

Plume and Nearshore Ocean (page 104)

- Measure PNO 9 – General measures

Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies (page 134)

- Measure PR 26 – Eulachon RM&E
- Measure PR 27 – Eulachon RM&E
- Measure PR 28 – Additional planning and RM&E
- Additional Measure PR 28.5 – Eulachon RM&E
- Additional Measure PR 28.6 – Eulachon RM&E
- Additional Measure PR 28.7 – Eulachon RM&E
- Additional Measure PR 28.8 – Eulachon RM&E

Performance indicators (page 167)

- Indicator: 99

Resident Fish

Goals and Objectives (page 31)

- All other Native Aquatic Focal Species Goal – General
- Ecological Goal – General
- Objective R 1 – Bull trout
- Objective R 2 – Cutthroat trout
- Objective R 3 – Kokanee
- Objective R 4 – Redband trout

- Objective R 5 – Hungry Horse impacts
- Objective R 6 – Libby Dam impacts
- Objective E 3 – Provide flows
- Objective E 6 – Maintain habitat quality

Mainstem Hydrosystem Flow and Passage Operations Strategy (page 49)

- Measure H 10 – General measures
- Measure H 11 – General measures
- Measure H 13 – Flow objectives
- Measure H 14 – Flow objectives
- Measure H 31 – Grand Coulee Dam operations
- Measure H 33 – Flood risk management
- Measure H 58 – Passage generally/ Albeni Falls Dam
- Measure H 59 – Passage generally/ Albeni Falls Dam
- Measure H 81 – Water quality
- Measure H 84 – Fish Passage Center functions
- Measure H 86 – Fish Passage Center functions

Habitat Restoration and Protection Strategy (page 75)

- Measure HAB 11 – Tributary habitat
- Measure HAB 35 – Water quality
- Measure HAB 36 – Water quality
- Measure HAB 37 – Water quality
- Measure HAB 38 – Water quality
- Measure HAB 39 – Water quality
- Measure HAB 43 – Resident fish habitat
- Measure HAB 44 – Resident fish habitat
- Measure HAB 45 – Resident fish habitat
- Measure HAB 46 – Loss assessments
- Measure HAB 47 – Settlement agreements
- Measure HAB 48 – Settlement agreements

Predator Management Strategy (page 93)

- Measure PM 7 – Management of predator fishes

Artificial Production Strategy (page 107)

- Measure AP 6 – Resident fish
- Additional Measure AP 13.16 – Measures for new artificial production outside the lower Snake River Basin

Anadromous Fish Mitigation in Blocked Areas (page 115)

- Measure BA 1 – General measures
- Measure BA 2 – General measures

Protected Areas and Standards for Non-Federal Hydroelectric Project Licensing, Development and Operations (page 122)

- Measure HPL 2 – Standards for Hydroelectric Licensing, Development and Operations

Performance indicators (page 167)

- Indicators: 45, 46, 48, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74

Appendix C. Estimates of Hydropower-related Losses

"Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin" and "Numerical Estimates of Hydropower-Related Losses" from the 1987 Fish and Wildlife Program.

Appendix D. Wildlife Losses and Mitigation Priorities

Table D-1. Lower Columbia Wildlife Mitigation Priorities

Habitat Types – Target Species	Priority
Riparian/Riverine	
• Great Blue Heron	High
Old Growth Forest	
• Northern Spotted Owl	High
Wetlands	
• Great Blue Heron	High
• Band-tailed Pigeon	
• Western Pond Turtle	
Coniferous Forest	
• Ruffed Grouse	Medium
• Elk	
• American Black Bear/Cougar	

Table D-2. Upper Columbia Wildlife Mitigation Priorities

Habitat Types – Target Species	Priority
Riparian/River	
• Bald Eagle (breeding)	High
• Black-capped Chickadee	
• Peregrine Falcon	
Shrub-Steppe	
• Sharp-tailed Grouse	High
• Pygmy Rabbit	
• Sage Grouse	
• Mule Deer	
Wetlands	
• Mallard	High

- Redhead

Islands

- White Pelicans — High

Agricultural Lands

- Swainson's Hawk — Medium
- Ring-necked Pheasant

Table D-3. Kootenai River Basin Wildlife Mitigation Priorities

Habitat Type – Target Species	Priority
Riparian/Riverine	
• Bald Eagle (breeding)	High
• Bald Eagle (wintering)	
• Black-capped Chickadee	
• Peregrine Falcon	
• Harlequin Ducks	
• Common Loon	
Wetlands	
• Mallard	High
• Redhead	
• Northern Pintails	
• Wood Duck	
• Moose	
Native Grasslands and Shrubs	
• Mule Deer/Elk	Low
• White-tailed Deer	
• Western Bumble Bee	
Coniferous Forest	
• Elk	High
• Grizzly bear	
• Black bear	
• Great Grey Owl	
• Flammulated owl	
• Pygmy Nuthatch Northern Goshawk	
Old Growth Forest	
• Pileated woodpecker	High

• Fisher • Wolverine • Southern Mountain caribou Distinct Population Segment (DPS) • Canada Lynx • Flammulated owl	
Lowland Forest • White-tailed deer	Low
Peatlands/Bogs • Bog lemmings	Medium

Table D-4. Snake River Wildlife Mitigation Priorities

Habitat Type—Target Species	Priority
Riparian/Riverine	
• Bald Eagle (breeding) • Bald Eagle (wintering) • River Otter • Black-capped Chickadee • Peregrine Falcon • Ruffed Grouse	High
Wetlands	
• Mallard	High
Native Grasslands and Shrubs	
• Mule Deer/Elk • White-tailed Deer • Sharp-tailed Grouse	Medium
Coniferous Forest	
• Elk	Medium
Old Growth Forest	
• Pileated Woodpecker	Medium
Lowland Forest • White-tailed deer	Low

Mitigation for Wildlife Losses Due to Hydropower Construction and Inundation

The following tables represent the wildlife losses associated with the construction and inundation of the Columbia River hydrosystem, assessed in terms of lost units of habitat. The Council identified and adopted these losses into the Program in the late 1980s and 1990s, assessed in terms of lost units of habitat.

From its inception, the fish and wildlife Program's wildlife mitigation strategy has endorsed and encouraged the use of long-term agreements between wildlife managers and the Bonneville Power Administration as a primary mechanism to address identified wildlife losses. Several such agreements have been developed to mitigate for some or all of the wildlife losses associated with hydroelectric projects in the state of Montana, the Willamette Basin in Oregon and for Dworshak Dam in Idaho.

While the Program originally identified the losses in habitat units, the Council recognizes that wildlife mitigation agreements may use a different metric for mitigation. Thus, while the losses below are identified in habitat units, in settlement agreements for Dworshak, the Willamette, and Southern Idaho the parties have quantified and mitigated for those losses in acres of land.

Table D-5. Estimated Losses and Gains Due to Hydropower Construction and Inundation (losses are preceded by a "-", gains by a "+")

Species	Total Habitat Units
Albeni Falls	
• Mallard Duck	-5,985
• Canada Goose	-4,699
• Redhead Duck	-3,379
• Breeding Bald Eagle	-4,508
• Wintering Bald Eagle	-4,365
• Black-Capped Chickadee	-2,286
• White-tailed Deer	-1,680
• Muskrat	-1,756
• Yellow Warbler	+171
Lower Snake Projects	
• Downy Woodpecker	-364.9

- Song Sparrow -287.6
- Yellow Warbler -927.0
- California Quail -20,508.0
- Ring-necked Pheasant -2,646.8
- Canada Goose -2,039.8

Anderson Ranch

- Mallard -1,048
- Mink -1,732
- Yellow Warbler -361
- Black Capped Chickadee -890
- Ruffed Grouse -919
- Blue Grouse -1,980
- Mule Deer -2,689
- Peregrine Falcon -1,222 acres*

* Acres of riparian habitat lost. Does not require purchase of any lands.

Black Canyon

- Mallard -270
- Mink -652
- Canada Goose -214
- Ring-necked Pheasant -260
- Sharp-tailed Grouse -532
- Mule Deer -242
- Yellow Warbler +8
- Black-capped Chickadee -68

Deadwood

- Mule Deer -2080
- Mink -987
- Spruce Grouse -1411
- Yellow Warbler -309
- Yellow Rumped Warbler -2626

Palisades

- Bald Eagle -5,941 breeding

	-18,565 wintering
• Yellow Warbler	-718 scrub-shrub
• Black Capped Chickadee	-1,358 forested
• Elk/Mule Deer	-2,454
• Waterfowl and Aquatic Furbearers	-5,703
• Ruffed Grouse	-2,331
• Peregrine Falcon*	-1,677 acres of forested wetland
	-832 acres of scrub-shrub
	+68 acres of emergent wetland

* Acres of riparian habitat lost. Does not require purchase of any lands.

Willamette Basin Projects

- Black-tailed Deer -17,254
- Roosevelt Elk -15,295
- Black Bear -4,814
- Cougar -3,853
- Beaver -4,477
- River Otter -2,408
- Mink -2,418
- Red Fox -2,590
- Ruffed Grouse -11,145
- California Quail -2,986
- Ring-necked Pheasant -1,986
- Band-tailed Pigeon -3,487
- Western Gray Squirrel -1,947
- Harlequin Duck -551
- Wood Duck -1,947
- Spotted Owl -5,711
- Pileated Woodpecker -8,690
- American Dipper -954
- Yellow Warbler -2,355
- Common Merganser +1,042
- Greater Scaup +820
- Waterfowl +423

- Bald Eagle +5,693
- Osprey +6,159

Grand Coulee

- Sage Grouse -2,746
- Sharp-tailed Grouse -32,723
- Ruffed Grouse -16,502
- Mourning Dove -9,316
- Mule Deer -27,133
- White-tailed Deer -21,362
- Riparian Forest -1,632
- Riparian Shrub -27
- Canada Goose Nest Sites -74

McNary

- Mallard (wintering) + 13,744
- Mallard (nesting) -6,959
- Western Meadowlark -3,469
- Canada Goose -3,484
- Spotted Sandpiper -1,363
- Yellow Warbler -329
- Downy Woodpecker -377
- Mink -1,250
- California Quail -6,314

John Day

- Lesser Scaup +14,398
- Great Blue Heron -3,186
- Canada Goose -8,010
- Spotted Sandpiper -3,186
- Yellow Warbler -1,085
- Black-capped Chickadee -869
- Western Meadowlark -5,059
- California Quail -6,324
- Mallard -7,399
- Mink -1,437

The Dalles

- Lesser Scaup +2,068
- Great Blue Heron -427
- Canada Goose -439
- Spotted Sandpiper -534
- Yellow Warbler -170
- Black-capped Chickadee -183
- Western Meadowlark -247
- Mink Black-capped Chickadee -330

Bonneville

- Lesser Scaup +2,671
- Great Blue Heron -4,300
- Canada Goose -2,443
- Spotted Sandpiper -2,767
- Yellow Warbler -163
- Black-capped Chickadee -1,022
- Mink -1,622

Dworshak

- Canada Goose-(breeding) -16
- Black-capped Chickadee -91
- River Otter -4,312
- Pileated Woodpecker -3,524
- Elk -11,603
- White-tailed Deer -8,906
- Canada Goose (wintering) +323
- Bald Eagle +2,678
- Osprey +1,674
- Yellow Warbler +119

Minidoka

- Mallard +174
- Redhead +4,475
- Western Grebe +273
- Marsh Wren +207

- Yellow Warbler -342
- River Otter -2,993
- Mule Deer -3,413
- Sage Grouse -3,755

Chief Joseph

- Lesser Scaup +1,440
- Sharp-tailed Grouse -2,290
- Mule Deer -1,992
- Spotted Sandpiper -1,255
- Sage Grouse -1,179
- Mink -920
- Bobcat -401
- Lewis' Woodpecker -286
- Ring-necked Pheasant -239
- Canada Goose -213
- Yellow Warbler -58

Appendix E. List of Subbasin Plans and Adoption Dates

Table E-1. Geographic subbasins in the Columbia River Basin and year Subbasin Plan adopted.

Subbasin Name	Year Plan Adopted
Asotin	2004
Big White Salmon	2004
Bitterroot	2010
Blackfoot	2011
Boise	2005
Bruneau	2004
Burnt	2005
Clark Fork	
Clearwater	2005
Coeur d'Alene, including Coeur d'Alene Lake	2004
Columbia Estuary (Columbia River and tributaries from the ocean upstream to the Cowlitz River)	2005
Columbia Gorge (Columbia River and tributaries between, and including Bonneville and The Dalles dams)	2004
Columbia Lower (Columbia River and tributaries upstream of the Cowlitz to Bonneville Dam)	2005
Columbia Lower Middle (Columbia River and tributaries upstream of The Dalles including Wanapum Dam)	2005
Columbia Upper (Columbia River and tributaries from Chief Joseph Dam to the international border)	2004
Columbia Upper Middle (Columbia River and tributaries upstream of Wanapum Dam to Chief Joseph Dam)	2004
Cowlitz	2005

Crab	
Deschutes	2005
Elochoman	2005
Entiat	2005
Fifteenmile	2004
Flathead	2004
Grande Ronde	2005
Grays	2005
Headwaters of the Snake (Snake River and tributaries from the Heise gauging station upstream)	2005
Hood	2004
Imnaha	2005
John Day	2005
Kalama	2005
Klickitat	2005
Kootenai	2004
Lake Chelan	2004
Lewis	2005
Little White Salmon	2005
Malheur	2004
Methow	2005
Okanogan	2005
Owyhee	2004
Palouse	
Payette	2005
Pend Oreille	2004
Powder	2005

Salmon	2004
San Poil	2004
Sandy	
Snake Hells Canyon (Snake River and tributaries above the Clearwater River including Hells Canyon Dam)	2005
Snake Lower (Snake River and tributaries between the Columbia River and the Clearwater River)	2004
Snake Lower Middle (Snake River and tributaries upstream of Hells Canyon Dam to the Boise River)	2005
Snake Upper Middle (Snake River and tributaries from the Boise River upstream to Clover Creek)	2005
Spokane	2004
Tucannon	2004
Umatilla	2004
Upper Closed Basin (Snake River)	2005
Upper Snake (Snake River and tributaries from Clover Creek upstream to the Henry's Fork headwaters)	2005
Walla Walla	2005
Washougal	2005
Weiser	2005
Wenatchee	2005
Willamette	2004
Wind	2005
Yakima	2005

Appendix F. List of Focal Species

Focal species are identified in the subbasin plans. Below is a general list of the program's 275 focal species. However to verify that a species is considered a focal species in a given subbasin, please refer to the subbasin plans.

Table F-1. Anadromous Fish Focal Species	
Common Name	**Scientific Name**
Chinook salmon	*Oncorhynchus tshawytscha*
Chum salmon	*Oncorhynchus keta*
Coho salmon	*Oncorhynchus kisutch*
Pacific lamprey	*Entosphenus tridentatus*
Sockeye salmon	*Oncorhynchus nerka*
Steelhead	*Oncorhynchus mykiss*

Table F-2. Resident Fish Focal Species	
Common Name	**Scientific Name**
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Brook trout	*Salvelinus fontinalis*
Bull trout	*Salvelinus confluentus*
Burbot	*Lota lota*
Coastal cutthroat trout	*Oncorhynchus clarkii clarkii*
Cutthroat trout	*Oncorhynchus clarki*
Freshwater sponge	*Ephydatia cooperensis*
Green sturgeon	*Acipenser medirostris*
Kokanee	*Oncorhynchus nerka*
Largemouth bass	*Micropterus salmoides*
Mollusks	*Mollusca*

Mountain whitefish	*Prosopium williamsoni*
Oregon chub	*Oregonichthys crameri*
Redband trout	*Oncorhynchus mykiss gairdneri*
Smallmouth bass	*Micropterus dolomieu*
Walleye	*Stizostedion vitreum vitreum*
Westslope cutthroat trout	*Oncorhynchus clarkii lewisi*
White sturgeon	*Acipenser transmontanus*
Wood River sculpin	*Cottus leiopomus*
Yellow perch	*Perca flavescens*
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*

Table F-3. Wildlife Focal Species (209 species)	
Common Name	**Scientific Name**
Acorn woodpecker	*Melanerpes formicivorus*
Agapetus caddisfly	*Agapetus montanus*
American avocet	*Recurvirostra americana*
American beaver	*Castor canadensis*
American bittern	*Botaurus lentiginosus*
American crow	*Corvus brachyrhynchos*
American dipper	*Cinclus mexicanus*
American marten	*Martes americana*
American pika	*Ochotona princeps*
American white pelican	*Pelecanus erythrorhynchos*
Bald eagle	*Haliaeetus leucocephalus*
Banbury Springs lanx	*Lanx sp.*
Band-tailed pigeon	*Columba fasciata*
Barn owl	*Tyto alba*

Barrow's goldeneye	*Bucephala islandica*
Big brown bat	*Eptesicus fuscus*
Bighorn sheep	*Ovis canadensis*
Bitterroot mountainsnail	*Oreohelix amariradix*
Black bear	*Ursus americanus*
Black swift	*Cypseloides niger*
Black tern	*Chlidonias niger*
Black-backed woodpecker	*Picoides arcticus*
Black-chinned hummingbird	*Archilochus alexandri*
Black-crowned night heron	*Nycticorax nycticorax*
Black-tailed jackrabbit	*Lepus californicus*
Bliss Rapids snail	*Taylorconcha serpenticola*
Blue grouse	*Dendragapus obscurus*
Bobolink	*Dolichonyx oryzivorus*
Boreal owl	*Aegolius funereus*
Boreal toad	*Anaxyrus boreas*
Brewer's sparrow	*Spizella breweri*
Brown creeper	*Certhia americana*
Brown-headed cowbird	*Molothrus ater*
Bruneau hot springsnail	*Pyrgulopsis bruneauensis*
Burrowing owl	*Athene cunicularia*
Bushy-tailed woodrat	*Neotoma cinerea*
California bighorn sheep	*Ovis canadensis californiana*
California quail	*Callipepla californica*
Calliope hummingbird	*Stellula calliope*
Canada goose	*Branta canadensis*
Canada lynx	*Lynx canadensis*

Carinate mountainsnail	*Oreohelix elrodi*
Cascades frog	*Rana cascadae*
Caspian tern	*Hydroprogne caspia*
Cassin's finch	*Carpodacus cassinii*
Chipping sparrow	*Spizella passerina*
Clark's nutcracker	*Nucifraga columbiana*
Coastal tailed frog	*Ascaphus truei Stejneger*
Coeur d'Alene salamander	*Plethodon idahoensis*
Columbian black-tailed deer	*Odocoileus hemionus columbianus*
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
Common loon	*Gavia immer*
Common nighthawk	*Chordeiles minor*
Common snipe	*Gallinago gallinago*
Common tern	*Sterna hirundo*
Common yellowthroat	*Geothlypis trichas*
Cordilleran flycatcher	*Empidonax occidentalis*
Deer mouse	*Peromyscus maniculatus*
Dunlin	*Calidris alpina*
Elk	*Cervus canadensis*
Fender's blue butterfly	*Icaricia icarioides fenderi*
Ferruginous hawk	*Buteo regalis*
Fisher	*Martes pennant*
Flammulated owl	*Otus flammeolus*
Foster's tern	*Sterna forsteri*
Franklin's gull	*Leucophaeus pipixcan*
Fringed myotis bat	*Myotis thysanode*

Gillette's checkerspot	*Euphydryas gillettii*
Golden eagle	*Aquila Chrysaetos*
Golden-mantled ground squirrel	*Spermophilus lateralis*
Grasshopper sparrow	*Ammodramus savannarum*
Gray (Hungarian) partridge	*Perdix perdix*
Gray flycatcher	*Empidonax wrightii*
Gray wolf	*Canis lupus irremotus*
Gray-crowned rosy-finch	*Leucosticte tephrocotis*
Great Basin Spadefoot	*Spea intermontana*
Great blue heron	*Ardea herodias*
Great gray owl	*Strix nebulosa*
Great horned owl	*Bubo virginianus*
Greater sandhill crane	*Grus canadensis tabida*
Green heron	*Butorides virescens*
Green-tailed towhee	*Pipilo chlorurus*
Grey flycatcher	*Muscicapa griseisticta*
Grizzly bear	*Ursus arctos*
Gyrfalcon	*Falco rusticolus*
Hammond's flycatcher	*Empidonax hammondii*
Harlequin duck	*Histrionicus histrionicus*
Hoary bat	*Lasiurus cinereus*
Hoary marmot	*Marmota caligata*
Hooded merganser	*Lophodytes cucullatus*
Horned grebe	*Podiceps auritus*
Horned lark	*Eremophila alpestris*
House finch	*Carpodacus mexicanus*
Idaho springsnail	*Pyrgulopsis idahoensis*

Larch Mountain salamander	*Plethodon larselli*
Lark sparrow	*Chondestes grammacus*
Lazuli bunting	*Passerina amoena*
LeConte's sparrow	*Ammodramus lecontei*
Leopard frog	*Rana pipiens*
Lewis' woodpecker	*Melanerpes lewis*
Loggerhead shrike	*Lanius ludovicianus*
Long-billed curlew	*Numenius americanus*
Long-toed salamander	*Ambystoma macrodactylum*
Lyre mantleslug	*Udosarx lyrata*
Magnum mantleslug	*Magnipelta mycophaga*
Mallard	*Anas platyrhynchos*
Marbled Jumping-slug	*Hemphillia danielsi*
Marbled murrelet	*Brachyramphus marmoratus*
Merlin	*Falco columbarius*
Millipede	*Austrotyla montani*
Millipede	*Corypus cochlearis*
Mink	*Mustela vison*
Montane vole	*Microtus montanus*
Moose	*Alces alces*
Mountain goat	*Oreamnos americanus*
Mountain quail	*Oreortyx pictus*
Mule deer	*Odocoileus hemionus*
Northern alligator lizard	*Elgaria coerulea*
Northern bog lemming	*Synaptomys borealis*
Northern goshawk	*Accipiter gentilis*
Northern harrier	*Circus cyaneus*

Northern Idaho ground squirrel	*Spermophilus brunneus brunneus*
Northern pocket gopher	*Thomomys talpoides*
Northern pygmy-owl	*Glaucidium gnoma*
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
Northern spotted owl	*Strix occidentalis caurina*
Nuttall's cottontail	*Sylvilagus nuttallii*
Olive-sided flycatcher	*Contopus cooperi*
Oregon slender salamander	*Batrachoseps wrighti*
Oregon spotted frog	*Rana pretiosa*
Peregrine falcon	*Falco peregrinus*
Pileated woodpecker	*Dryocopus pileatus*
Preble’s shrew	*Sorex preblei*
Pronghorn antelope	*Antilocapra americana*
Purple martin	*Progne subis*
Pygmy nuthatch	*Sitta pygmaea*
Pygmy rabbit	*Brachylagus idahoensis*
Raccoon	*Procyon lotor*
Red squirrel	*Tamiasciurus hudsonicus*
Red tree vole	*Arborimus longicaudus*
Red-eyed vireo	*Vireo Olivaceus*
Redhead	*Aythya americana*
Red-legged frog	*Rana draytonii*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked pheasant	*Phasianus colchicus*
River otter	*Lontra canadensis*
Rocky Mountain elk	*Cervus elaphus nelsoni*

Rocky Mountain mule deer	*Odocoileus hemionus hemionus*
Ruffed grouse	*Bonasa umbellus*
Rufous hummingbird	*Selasphorus rufus*
Sage grouse	*Centrocercus urophasianus*
Sage sparrow	*Amphispiza belli*
Sage thrasher	*Oreoscoptes montanus*
Sandhill crane	*Grus canadensis*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Sharptailed snake	*Contia tenuis*
Sheathed slug	*Zacoleus idahoensis*
Silver-haired bat	*Lasionycteris noctivagans*
Smoky taildropper	*Prophysaon humile*
Snake River physa	*Physa natricina*
Snowshoe hare	*Lepus americanus*
Snowy owl	*Nyctea scandiaca*
Snowy porter	*Charadrius alexandrinus*
Sora	*Porzana carolina*
Southern alligator lizard	*Elgaria multicarinata*
Southern red-backed vole	*Myodes gapperi*
Southwestern Willow flycatcher	*Empidonax traillii adastus*
Spalding's catchfly	*Silene spaldingii*
Spotted bat	*Euderma maculatum*
Spotted frog	*Rana luteiventris*
Spotted owl	*Strix occidentalis*
Spotted skunk	*Spilogale gracilis*
Swainson's hawk	*Buteo swainsoni*
Taylor's checkerspot butterfly	*Euphydryas editha taylori*

Three-toed woodpecker	*Picoides tridactylus*
Townsend's big-eared bat	*Corynorhinus townsendii*
Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*
Trumpeter swan	*Cygnus buccinator*
Tundra swan	*Cygnus columbianus*
Turkey vulture	*Cathartes aura*
Utah valvata snail	*Valvata utahensis*
Vaux's swift	*Chaetura vauxi*
Veery	*Catharus fuscescens*
Vesper sparrow	*Pooecetes gramineus*
Washington ground squirrel	*Spermophilus washingtoni*
Western bluebird	*Sialia mexicana*
Western Grebe	*Aechmoporus occidentalis*
Western grey squirrel	*Sciurus griseus*
Western meadowlark	*Sturnella neglecta*
Western pond turtle	*Clemmys marmorata*
Western rattlesnake	*Crotalus viridis*
Western skink	*Eumeces skiltonianus*
Western toad	*Bufo boreas*
Western wood-pewee	*Contopus sordidulus*
Western yellow-billed cuckoo	*Coccyzus americanus*
White-breasted nuthatch	*Sitta carolinensis*
White-faced ibis	*Plegadis chihi*
White-headed woodpecker	*Picoides albolarvatus*
White-tailed ptarmigan	*Lagopus leucura*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Willow flycatcher	*Empidonax traillii*

Winter wren	*Troglodytes troglodytes*
Wolverine	*Gulo gulo*
Wood duck	*Aix sponsa*
Yellow pine chipmunk	*Neotamias amoenus*
Yellow warbler	*Dendroica petechia*
Yellow-breasted chat	*Icteria virens*

Appendix G. Additional specific subbasin measures related to Habitat, Artificial Production, and Planning, Research, Monitoring, and Evaluation

In this Program amendment process, a group of state fish and wildlife agencies and tribes recommended dozens of specific habitat, artificial production, and planning, research, monitoring, evaluation, and reporting actions to be included as Program measures and implemented by Bonneville and the other federal agencies over the next 10 years. The Council considers these recommended actions to be Program measures, consistent with those described in the three respective strategies.

Habitat Strategy

HAB 49. Additional habitat measures can be found here.

Artificial Production Strategy

AP 13. Additional Artificial Production measures can be found here.

Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies

PR 28. Additional planning and RM&E measures can be found here.

Appendix H. Assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply (AEERPS)

Section 4(h)(5) of the Northwest Power Act requires that the Council's fish and wildlife program consist of measures that protect, mitigate and enhance fish and wildlife affected by the development, operation and management of the Columbia River hydroelectric facilities "*while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply*." At the conclusion of a program amendment process the Council signifies in some manner that it has considered (a) how the collection of measures to be adopted as part of the program might affect the region's power supply; (b) the many other factors currently affecting or expected to affect the adequacy, efficiency, economics and reliability of the region's power supply; (c) and the requirements of the power planning process the Council will engage in under the Act following the completion of the amended fish and wildlife program. And with those considerations, the Council also signifies an appropriate level of confidence that the region may implement the revised fish and wildlife program while assuring an adequate, efficient, economical, and reliable power supply. This is what is known variously as the "AEERPS" analysis or consideration or conclusion or statement, documented here.

The Council began analyzing the relationship of the fish and wildlife program decision to these aspects of the region's power supply in the first fish and wildlife program decision in 1982. In 1994, as the program grew in scope and extent, the Council produced an extensive analysis explaining its understanding as to what it means to maintain these elements of the power supply in the context of approving the fish and wildlife program. This became Appendix C to the 1994 Fish and Wildlife Program, "Assuring an Adequate, Efficient, Economical and Reliable Power Supply and the Ability to Carry Out Other Purposes of the Power Act" (1994 FWP App C AEERPS), combined in the analysis and AEERPS conclusion with Appendix B, "Summary of Hydropower Costs and Impacts of the Mainstem Passage Actions" (1994 FWP App B Hydro). The Council has understood and applied the statutory AEERPS provision in a consistent way both before and after the 1994 explanation. See, e.g., Appendix A to the 2003 Mainstem Amendments, "Analysis of the Adequacy, Efficiency, Economy, and Reliability of the Power System" (2003 FWP Mainstem App A AEERPS); Appendix R to the 2014 Fish and Wildlife Program, "Assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply" (2014 FWP App R AEERPS); "AEERPS Statement" (2020 FWP Addendum at 173-76). These documents remain source documents for understanding the Council's approach. Staff briefed the Council on the AEERPS considerations near the beginning of the Council's consideration of the recommendations in this amendment process, another consistent source of the Council's understanding of this provision

of the Act. (Council AEERPS staff briefing March 2025 agenda; Council AEERPS staff briefing March 2025 outline; Council AEERPS staff briefing March 2025 recording.)

Any AEERPS considerations and conclusions during a fish and wildlife program amendment process are tentative or preliminary, necessarily so. Following the program amendment process that resulted in the Council's 2026 Fish and Wildlife Program, the Council continues with and completes the separate statutory process under Sections 4(d) to 4(g) of the Northwest Power Act to review the Council's regional conservation and electric power plan, a process which will result in the Ninth Northwest Power Plan and of which the fish and wildlife program is but one element. The adequacy, reliability, efficiency and economics of the region's power supply can be fully gauged only in the context of a comprehensive review of the power system during the power planning process, especially as (a) fish and wildlife measures are but one of many factors and developments affecting the region's power supply and (b) the power plan's strategy for what cost-effective resources to add to the region's power supply is the vehicle intended under the Act for addressing the effects of the fish and wildlife program and other developments on the power system and maintaining an adequate, reliable and economical power supply.

Thus, the AEERPS considerations in this fish and wildlife program decision assume that the Council will adhere to the Power Act requirements in developing the power plan. This means approving a conservation and generating resource strategy to guide Bonneville and the region in acquiring cost effective resources as necessary to meet or reduce demand for electricity *and* to "assist in meeting the requirements of section 4(h) of this Act." Section 4(h) is the section of the Act with the fish and wildlife program requirements. The idea is that cost-effective resource acquisitions will allow the power supply to remain adequate, reliable and economical while the federal agencies reliably implement hydrosystem operations and other actions that reduce system generation while they protect, mitigate and enhance fish and wildlife affected by the hydroelectric facilities.

See the documents from past programs noted above for further explanation of the background and details of the AEERPS considerations and how the Council understands and applies the relevant terms, incorporated here for reference. Nothing that follows is inconsistent with that basic framework.

2026 Fish and Wildlife Program flow and passage measures affecting the power supply

The primary way the fish and wildlife program affects the region's power supply is through the system operational measures in the fish and wildlife program intended to improve river conditions for spawning, rearing and migration. The program is required to have water management, flow, and passage measures to increase the survival and productivity of anadromous fish adversely affected by the hydroelectric system; it also contains the same for resident fish. The measures are aimed at the run-of-the-river passage dams, at the upriver storage projects, and at the operation of both as a system. The program measures when implemented shift and reduce the generation output of the system as compared to what would be the operation optimal for power system needs. The program's operations to benefit fish thus by definition make the system less adequate, efficient, and reliable and more costly than it would be without them – Congress expected that and built it into the Act and the Council's mission in adopting the program.

System operations to benefit fish have built up step-by-step over 45 years. Some of the development and increase in intensity has come through the program itself; in other cases, implementation of an increased amount of the program's operational categories has occurred through other processes, such as ESA decision-making and implementation, and is then reflected back into the program's baseline measures. The operations called for in the 2026 Program are a combination of these.

The 2026 Program largely continues current operations in most ways. The 2026 Program calls for continuity, not explicit change, in what has been for years the baseline storage project operations, consistent. with the storage project measures in the Council's 2014/2020 Program.

The focus in this amendment process has been more on the operation of the run-of-the-river projects in the lower Columbia and Snake rivers. But even here, the program calls for continuity in how the Corps of Engineers operates these dams to result in target pool elevations across the spring and summer migration period. Based on program amendment recommendations, the Council analyzed different pool elevation operations but decided that the region needed to continue to explore those further, given the obvious difficulties in implementation and the expected impacts on other system purposes.

That said, there are two ways that the 2026 Program calls for operations that differ from the 2014 Program and also from the current suite of operations. One concerns spill. Spill regimes in spring, summer and fall have bounced around considerably in the last decade. The program calls for settling on a consistent and steady set of spill operations to be implemented long enough to test their efficacy over multiple water years and salmon generations.

While overall consistency of implementation is the main priority, the Program also calls for the consistent implementation of specific spring spill operation - "Long-term implementation of a spill operation that prioritizes spill to the 125% gas cap 24 hours a day from April to the middle of June." This operation represents a substantially greater amount of spill than the baseline spring spill operation recognized in the 2014 Program. However, it is the same operation implemented in 2024 and 2025, agreed to by the federal agencies and a set of states and tribes as part of a 2023 settlement agreement (the "2023 RCBA settlement"). It is also the spring spill operation being implemented in 2026 via a court order. And a version of the "125% TDG" operation was implemented at least 16 hours a day from 2020-24, via an earlier federal/state/tribal "flex spill" agreement.

The other new operational element introduced in the 2026 Program are the measures calling on the federal agencies to operate the system to minimize ramp rates (the rate of change) and daily flow fluctuations (minimum and maximum daily flows) in the Columbia and lower Snake rivers during the spring and summer migration periods, to keep water flowing and juvenile fish moving downstream. The general concept to minimize ramping and fluctuations has been in the program for a long time, but the 2026 Program added more detail and substance by calling for the federal agencies, at the four projects in the lower Snake River, to "reduce daily flow fluctuations and ramp rates during the bulk of the juvenile migration period to avoid ponding and slowing of water," and at the four projects in the lower Columbia River, to "prevent daily flow fluctuations and daily ramping during the bulk of the migration period from increasing significantly in magnitude from what occurs now under current average operations."

That last point is the key to assessing the effect of these measures on the power system. The intent of the Council was not to unduly limit current operations, recognizing the value to the system of the current level of flexibility if implemented prudently and with an effort to avoid slowing the river flow as much as practical in spring and summer. The system operates today with a certain level of fluctuations in storage and run-of-the-river dam discharges and flows and it is an important part of system operations. But, system modeling for the 2021 Power Plan began to show that the system could in the future, if allowed, fluctuate flows in the lower Columbia River dramatically across a day, especially in summer, as the region's power system transitions to greater loads and additional renewable resources. The Council is planning now for operations and resource additions that can prevent a potentially adverse situation for spring and summer migrants from developing, while allowing the operators to maximize system flexibility at other times of the year.

These, in summary, are the operational measures in the 2026 Program that the Council calls on the federal agencies to implement, and thus the impacts to the power system the Council has had to assess and consider in order to conclude these operations can be implemented reliably

and – assuming the Council's power plan also develops the right cost-effective new resource strategy in the Ninth Power Plan – still assure that the region may continue to have an adequate, efficient, economical and reliable power supply.[1]

[1] Another aspect of the program that affects the economic impact of the program is the extent to which the program's habitat, production and other mitigation measures impose costs on the ratepayers that increase the cost of power along with resource costs. This element will be discussed further below.

Context: Other developments affecting the region's power supply and the analysis of all these factors for the Ninth Power Plan

Any analysis of the impact of these fish and wildlife measures in the 2026 Fish and Wildlife Program on the region's power supply must be understood in the context of the ongoing major disruption that is occurring in the region's power system.

The Council's 2021 Power Plan recognized the challenge presented by a transition already set in motion: Policies and economic trends that were reducing fossil-fueled generation and adding significant amounts of renewable resources with different power system characteristics. This combined with policies, economic trends, and changing climate patterns that were increasing energy and capacity needs in both winter and summer, with the biggest uncertainty being the true extent and pace of electrification of significant sectors of the economy. In that plan, the Council provided a broad strategy for resource development to ensure an adequate, efficient, economical, and reliable power supply, including at least 3,500 MW of renewable development, a range of cost-effective energy efficiency, targeted low-cost and readily deployable demand response, and increasing regional reserves.

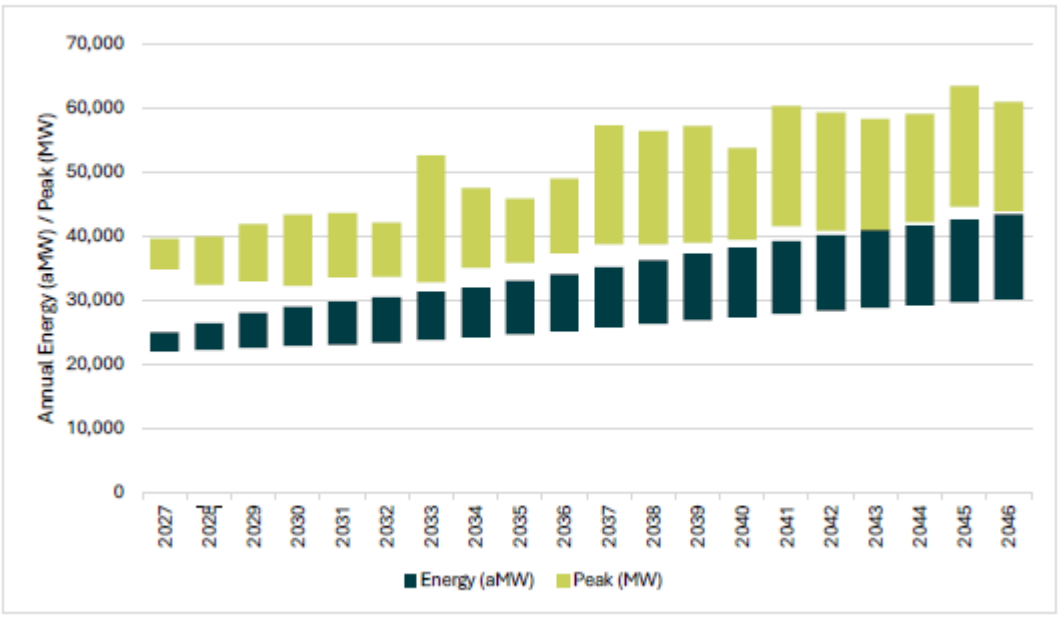
Following the release of the 2021 Power Plan, the Council monitored changes in the power system, tracking new resource development, and conducting annual assessments of resource adequacy to provide updated information to the region in advance of the coming Ninth Power Plan. The trends noted above largely continued or accelerated. Of particular concern was the rapid increase in planned data center and other high-tech sector loads in the region. Transmission expansion in the west and a number of announced coal-to-gas conversions (reversing earlier decisions regarding resource retirement) promised to alleviate the issues to some extent.

In the Council's regional adequacy assessment for 2029 (https://www.nwcouncil.org/reports/2024-4/) and its mid-term assessment of the 2021 Power Plan (https://www.nwcouncil.org/2021-northwest-power-plan/mid-term-assessment/), both published in 2024, the Council found that implementing the resource strategy in the 2021 Power Plan – specifically achieving energy efficiency consistent with the high end of the Council's target, pursuing renewable resource deployment of around 6,600 MW by 2029, and ensuring sufficient balancing resources and demand response – would provide for an adequate system assuming loads consistent with the 2021 Power Plan. But areas of risk remained. If load growth accelerated at the higher end of some recent projections, or conservation and generation development slowed, the resource strategy would not be sufficient to maintain adequacy. These risk areas and other changing system dynamics highlighted the importance of the Council's upcoming Ninth Power Plan to provide new guidance to the region in support of an adequate, efficient, economical, and reliable power supply

The Council has been working on technical analyses for the Ninth Power Plan and has also been engaged in the process to consider recommendations and comments for a revised fish and wildlife program. The demand forecast for the Ninth Power Plan for the years 2027-2046, finalized in mid-2025, shows significant uncertainty around future load growth. From an energy perspective, the Council forecasts the potential for loads to grow to over 40,000 average megawatts regionwide (current average is roughly 22,000 aMW) as soon as the early 2040s in a high-growth trajectory. That would roughly double the size of today's demand – an unprecedented rate of energy load growth in the Council's history of implementing the power plan. Even at the lower end represented by the "low growth" pathway, the Council still forecasts load to grow to around 30,000 average megawatts regionwide by the end of the 20 years. The Council also anticipates significant growth in the system's peak requirements. In particular, the analyzed pathways with high forecasted transportation loads such as the high growth and late growth trajectories with significant electric vehicle growth are likely to drive future system peaks. These peaks are also weather sensitive. The variability seen year to year in the forecast stems from the variability in the underlying climate model data informing loads.

Figure 3 - 12 shows the full range of both energy and peak forecasts for the Ninth Plan period:

Figure 3 - 12: Ninth Plan Demand Forecast, Annual Energy and Peaks



The Council also completed several iterations of a "needs assessment" (in later 2025 and early 2026), in which a study combined (1) the forecasted demand for 2031, (2) what might be expected out of the existing power system over this period; and (3) the system adequacy metrics used to assess system resource adequacy. The needs assessment is something the Council

uses to help show what "needs" for new conservation and generating resources are estimated to remain after taking into account the possible output of the existing system.[2]

The results of the needs assessment showed a significant gap between where the region's power system is today and where it needs to be in the future. The results were driven by the forecasted growth in loads - consistent across all sensitivities studied, regardless of any assumed differences in hydropower operations or other existing system outputs (more on that below). There is a need to develop a significant amount of resources for capacity, with modeling showing large events with high peak needs across all months of the year. There is similarly a need to develop a significant amount of resources for energy, particularly to meet winter and summer energy demands. While the system is constrained throughout the year, the biggest challenges occur in winter. Based on the demand forecast described above, the results were not surprising.

The Council is not alone in noting that the region will need significant new resources soon to remain adequate. This has been a consistent message from studies across the energy sector for the last few years, including recent adequacy warnings from the North American Electric Reliability Corporation (NERC), the Western Electricity Coordinating Council (WECC), and energy consultants engaged by utilities and government agencies. It is unclear at this point how much of these demands and needs will fall on Bonneville and the federal system, as Bonneville sells power from its system to its public customers, acquires cost-effective conservation on an ongoing basis to reduce load and continue to stretch the value of the hydrosystem, and *may* need to acquire additional resources to the extent its customers decide to place the coming load growth on the federal system. But the region as a whole will need to add significant resources and reserves to maintain an adequate system and cover the risk of these demand projections.

As the Fish and Wildlife Program amendment process neared a final decision, Council staff engaged in the next step of the Ninth Power Plan analysis – assessing what new resources in combination might meet these needs and allow the region to continue to have an adequate system. The analysis tested different strategies across a set of scenarios and sensitivities and began identifying the elements a new resource strategy might contain to be robust enough to meet these unusually large needs in a cost-effective manner. At the time of drafting this appendix, the Council is still deciding on a resource strategy for the plan. Early indications show that a combination of new resources in substantial amounts (multiple 1000s of MW in some

[2] The "need" is not defined, for the power plan analysis, in terms of missing nameplate capacity or needed aMW of energy. Rather, it is translated into a planning reserve margin for capacity and an adequacy reserve margin for energy. These reserve margins act as a percentage above load that the region's resources should satisfy to account for adequacy in extreme load and temperature conditions. In other words, enough new resources must be added to the system to meet loads, as well as these reserve margins.

cases) may be the most effective approach - conservation, demand response, voltage regulation, a balance of wind and solar renewables, battery storage, solar + storage, and natural gas (primarily simple cycles) – rather than heavy emphasis on any particular resource. Such a portfolio of new resources will be needed to ensure adequacy, meet policy requirements, and provide economic benefits. What the recommended resource strategy in the plan might be for Bonneville's share of the regional load is still under analysis.

Analysis of the program's hydrosystem operations within this framework

The Council used this framework of analysis for the power plan to also assess how different hydrosystem operations affect or might affect the needs assessment, new resource choices, and system adequacy, reliability, and cost. The question is not whether the region has an adequacy challenge – it does, and the region faces that challenge no matter what the 2026 Program called for in terms of hydrosystem operations for fish. The challenge for the power plan is how to add resources in a responsible manner and ensure the supply remains adequate. The analysis here is whether the operations called for in the program may be implemented reliably without undermining the ability of the region to take the right steps to maintain an adequate system. These analyses included:

Modeling recent changes in the hydrosystem operations (2024). In preparation for its regional adequacy assessment in 2024, the Council modeled the effect of the changes in hydrosystem operations agreed to in the 2023 RCBA settlement noted above, as compared to those established in the 2020 EIS/Biological Opinion review. The RCBA agreement brought an increase in spring spill (from "flex spill" of 125% TDG spill 16 hours a day to 125% spill 24 hours a day) and an earlier reduction in summer spill (from August 15 to August 1). The results of the analysis, as would be expected, showed reduced spring and early summer generation (an average of roughly 300 MW in April and May and closer to 100 MW in May and June); an increase in hydro generation in August (an average of roughly +200 MW); minor generation reductions in fall and winter; and minor changes in daily hydro flexibility. The study concluded:

> "While hydropower is slightly reduced, based on the limited subset of studies used for this analysis, the commitments do not lead to a significantly different regional adequacy result. Offsetting the reduced hydropower is a small increase in regional thermal generation and net imports throughout most of the year, especially at night. These system implications seem to result in a small regional cost savings. However, further analysis would be needed to better understand full system impact."

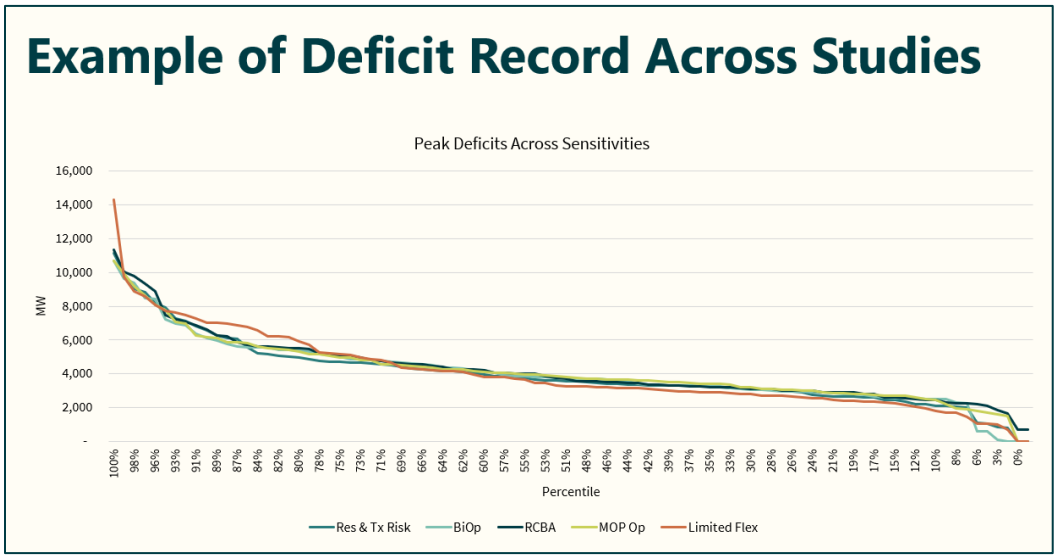
Regional Adequacy Assessment for 2029 (2024). This was followed in 2024 by the Council's regional Adequacy Assessment for 2029. The baseline hydrosystem operation thus now included the spill regime agreed to in late 2023 and implemented in 2024 – pairing the 125% TDG spill 24 hours a day in spring with an allowed reduction in summer spill occurring on Aug 1. As noted above, that adequacy assessment showed that, assuming the region implemented the high end of the ranges in the resource strategy in the 2021 Power Plan, the region should be able to maintain system adequacy. What risks remained centered around the higher projections of load growth. The Council's analysis did not compare another option for hydrosystem operation to the established operation in the adequacy assessment analysis. But the addition of the new

elements of spill that reduced the expected output of the system at one time and increased expected output at another did not by itself introduce any adequacy issues with regard to the plan's resource strategy.

Needs assessment for the Ninth Power Plan (2025-26). In the next step, in developing the needs assessments for the Ninth Power Plan described above, the Council modeled several different hydrosystem operations to see how they might affect needs otherwise driven heavily by load growth projections. The different hydrosystem operation sensitivities were based on the recommendations for amendments to the Fish and Wildlife Program and on the Council's own observations. These sensitivities included:

- The operation implemented under the 2020 EIS/2020 Biological Opinion - including the spring "flex spill"; summer spill reducing on August 15; and normal pool elevations.
- The operation agreed to and implemented in the 2023 RCBA settlement agreement (and thus the "current" operations in 2025) - including the spring "125% TDG" spill operation; summer spill reducing on August 1; normal pool elevations.
- An operation based in recommendations for lowered pool elevations (pool elevations held closer to minimum operating pool in the lower Snake than current; operating within a narrow limit above a minimum operating pool in the lower Columbia); plus a max spill operation spring (125%) and summer (to August 31).
- A "limited flexibility" operation that limited year-round the amount the system could fluctuate on a daily basis, not just during spring and summer migration.
- The operation in the draft 2026 Program: spring spill to 125%; elevated levels of summer spill reducing to surface spill on August 1 in the lower Snake and on August 15 in the lower Columbia; normal pool elevations; limits on any increases in system fluctuations from current operations but only during the spring and summer migration period. This was the operation consistently modeled across a set of additional sensitivities involving resource and transmission risks.

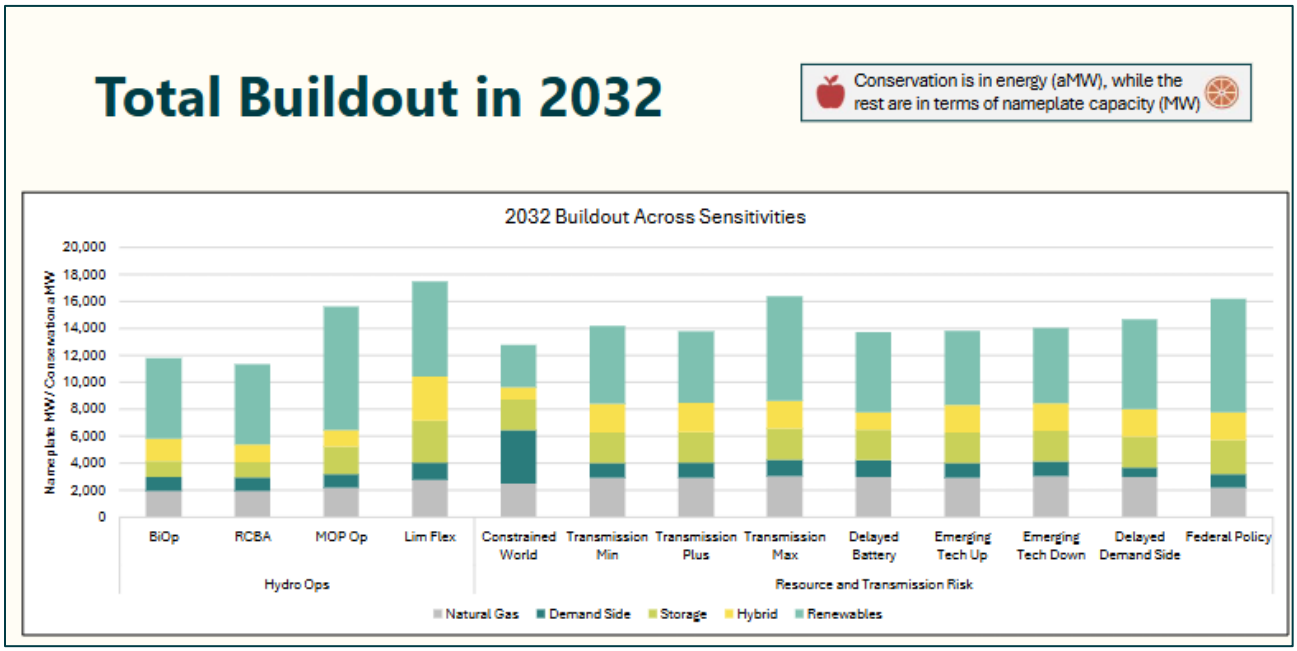
The results were as described above for the needs assessment generally: The modeling showed the system has substantial energy and capacity needs. Essentially all of the need was driven by projected growth in demand, dwarfing any differences in existing system output resulting from the different hydrosystem operation scenarios. The hydrosystem operations differed in output, but (with the exception perhaps of the year-round "limited flex" operation) not in a meaningful way that threatened system adequacy and reliability in the absence of the substantial growth expected in loads. The analysis with the operations in the draft 2026 Program – relatively the same as the final Program measures - was no outlier in effects. An illustration:



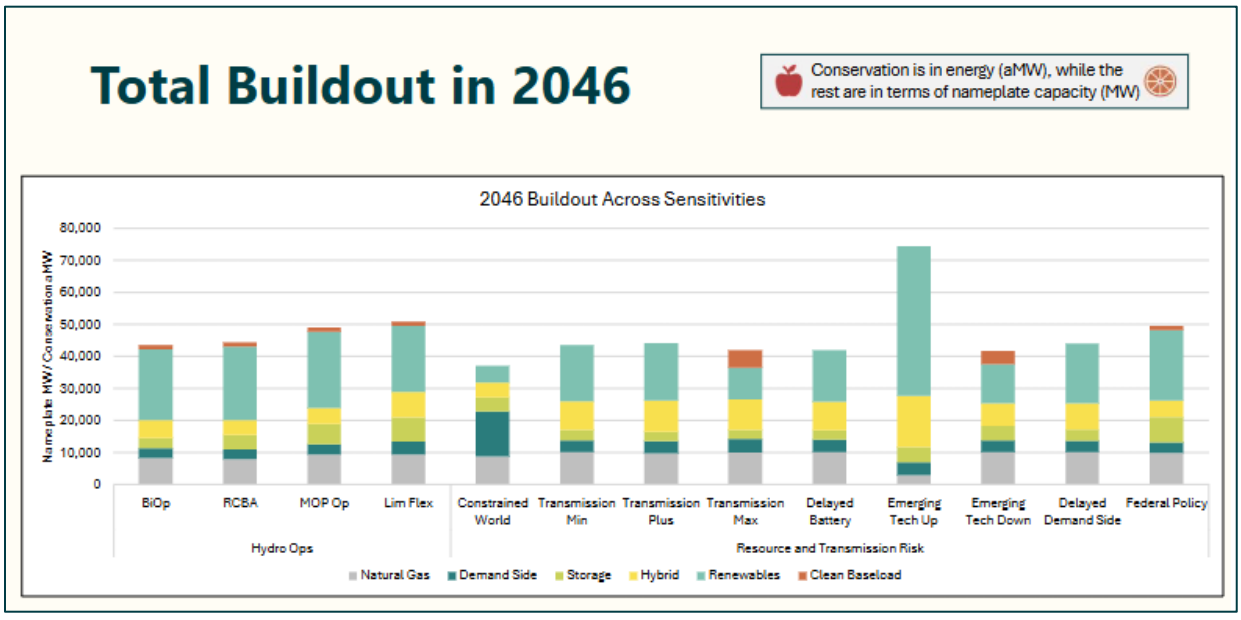
The needs assessment looked out to 2031, when substantial load growth and a significant need for new resources is expected. The needs assessment was not a comparison of the effects of different hydrosystem operations on the existing system in the near term, nor did it analyze what the cost of those operations would be if implemented now. Thus, the needs assessment should not be understood as a comparison of the effects and costs of different hydrosystem operations in the near-term and in the context of the existing adequate system. On the other hand, the needs assessment was another indication that the adequacy issues the region faces in the future are driven by factors other than the different effects of incremental system operations for fish.

Resource build-out modeling to meet needs (2026) In the modeling of resource buildouts as described above, staff carried through the five different hydrosystem operation sensitivities that were used for the needs assessment. This analysis provided a better look at the impacts of different hydrosystem operations because with the buildout of new resources, the system as modeled was now adequate and not constrained, and so the optimal use and impact of the different hydrosystem operations can be seen more clearly. Again, the differences between scenarios were not substantial. This is especially so if looking at the comparison between the scenarios that incorporated the draft 2026 Fish and Wildlife Program (all the resource and transmission risk scenarios) as compared with the two already implemented operations that the draft Program was built on: the 2020 Biological Opinion operation (with less spring spill and more summer spill than the draft Program operations, as summer spill continues to August 15 in both the Columbia and Snake) and the RCBA operation (same spring spill as the draft Program, somewhat less summer spill, as it allows spill to reduce on August 1 in both the Columbia and Snake Rivers).

The total buildout for 2032 showed some differences, discussed below:



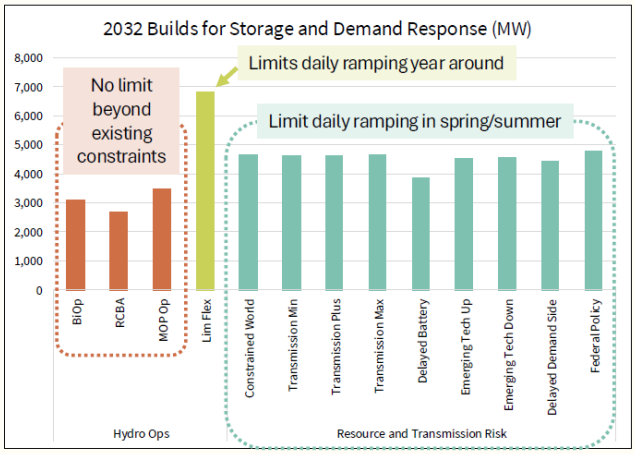
while even those differences moderated in the latter years of the study:



The differences that can be seen in the 2032 buildout appear to stem not from the differences in spill regime, but from the expected effect of future limits on the extent to which the flexibility of the system is allowed to increase in the spring and summer migration seasons:

Key Theme: Hydro Flexibility

- Model is picking up differences in hydro operations, particularly those seeking to minimize daily ramping of the system
- This shows:
  - Hydro system can play an important role in overall power system flexibility
  - When needed to limit that flexibility for the benefit of fish, other resources can be developed that provide those same attributes
  - The investment cost differences for those new resources is relatively minimal (more on costs later)



The key to understanding this chart is to keep in mind that the Council's hydrosystem model (GENESYS) leverages year-round daily flexibility in the system beyond how the system is currently being operated. For example, the model ramps more on a daily basis under the BiOp and RCBA operations than the actual operations during those periods. The draft 2026 Program hydrosystem operations that sit under the resource and transmission risk sensitivities limit this daily ramping in the spring and summer, bringing the model to current operating levels, while allowing it to flex more in the winter.

As noted in the summary results above, other resources can be developed to provide those attributes, and the investment cost differences between the hydrosystem sensitivities do not appear significant. The Council is cautiously optimistic at this point that the new measures to limit system flexibility at key moments during juvenile and adult salmon and steelhead migration, while allowing the system flexibility to increase substantially at other times of the year, will prove an ideal accommodation benefitting both the salmon runs and the power system.

The resource buildout analysis included cost estimates. Estimates for 2032 showed that the system costs for the sensitivities that included the 2020 BiOp hydrosystem operations, the RCBA operations, and the draft Program operations (such as Tx Min, Tx Plus, Fed Policy, etc.) differed little in total regional costs. The cost estimates for 2046 differed even less.

Testing possible resource strategy for resource adequacy (2026). In one more analytical step, the Council staff developed an example or representative resource strategy out of the resource buildout results and ran that strategy in a limited test back through the resource adequacy model GENESYS. The primary purpose was to test the example resource strategy for adequacy in 2032

under the most conservative high-load trajectory, not to test different hydrosystem operations. The primary model run included the hydrosystem operations in the draft Program (spring spill to 125% TDG; summer spill ending on August 1 in the Snake and August 15 in the Columbia; a fall surface spill regime four hours a day, and the limits on increasing system flexibility in spring and summer), as well as the high load trajectory. The staff also ran a study with the same resources and the same high load trajectory, but with the summer spill operations required in 2026 by the court order, which extend elevated levels of summer spill to August 31. The purpose of that alternative run was to be additionally conservative – to see if the system could be adequate under those conditions. The results indicated that the example resource strategy was at least close to adequate, with possible adequacy issues of a relatively minor nature in winter. The different hydrosystem conditions affected the study in the sense that the shortfall events in summer were different for the two studies, but neither was significantly different with regard to overall resource adequacy. More analysis will occur during the power plan process to examine the adequacy and costs of new resource strategies added to the existing system (including the hydrosystem operations in the Program), but those will occur after the completion of the fish and wildlife program.

Further discussion and conclusions

Conclusions and explanation

The operational measures specified in the 2026 Fish and Wildlife Program are substantially within the range of operations called for and implemented over the last decade. And as noted above, the Council's analysis of these program operations in the context of the overall system challenges does not show they produce substantially different or greater impacts on system adequacy, reliability and costs going forward than the existing operations. This should not be a surprising result. The storage reservoir operations and the run-of-the river project pool elevations remain the same. The spring spill operation called for is at the uppermost end of the spring spill considerations – to 125% TDG 24 hours a day, for reasons explained in the Program. This was the operation recently agreed upon by federal state and tribal entities in 2023 and implemented in 2024 and 2025, following four years of implementing 125% spring spill at least 16 hours a day at some projects and more at others. And spring is not the seasonal peak for the system. The 2026 Program is silent on a specific spill operation in summer, other than the general spill measure that emphasizes the need to decide on and implement a consistent spill operation over many years to evaluate the effects of the operations. The Council recognized and modeled a backdrop of summer spill operations that for 20 years have shifted the time for a reduction in spill across the dates in August. A fall surface spill operation has been in place for a number of years; the Council included a program measure to support this continuing concept, but not the specific fall operation included in the recent court order. The Program's notable new measure to limit future increases in system flexibility in spring and summer is focused on potential *future* impacts, which can be accommodated with new resources over time.

The end result is that the operations in the 2026 Fish and Wildlife Program, when implemented, will alter the generation patterns of the system to some extent, but not to an extent significantly different than the impacts the system and the region have accommodated in the recent past. There is no indication in the Council's analysis that the hydrosystem operations in the Council's Program represent an adequacy and reliability issue by themselves, in the near-term or long-term, for either the region's power supply as a whole or for the federal system marketed by Bonneville. And what effects there are on the generation capacity of the system can be accommodated through the addition of new conservation and generating resources – that is the point of the Northwest Power Act and the interplay of the Council's Fish and Wildlife Program with its follow-on Northwest Power Plan. There is also no indication that the program operations, when implemented, would substantially reduce the revenue expected by Bonneville or the costs of the expected new resource strategy compared to the operations implemented in recent years.

The Council's power plan analyses do show the region has significant resource needs and a clearly looming adequacy issue if action is not taken to add significant resources in the next five years and beyond – an assessment not unique to the Council, as noted above. The adequacy dilemma is driven by projections of increased demand much greater than the Council has seen in 45 years of power planning, at the same time policies and economics are resulting in the retirement of system resources and influencing the available resource mix. The characteristics and stability of hydropower generation are of high value in this transition. The Council has no reason to doubt that its power plan will be able to include an appropriate resource strategy that will add sufficient cost-effective resources to the region's existing power supply to meet these needs and maintain an adequate system, allowing both the use of the hydrosystem and the way in which reserves are planned and held to adapt within reason to better suit the evolved power supply. Adding new resources at the rate needed will be a challenge, but the Council has reason to believe the region's utilities, governments, institutions, and the regional economy will be up to the challenge. The Council is similarly confident that the measures in the Fish and Wildlife Program will protect, enhance fish and wildlife while also being able to assure the region it will continue to enjoy an adequate, efficient, economical and reliable power supply.

Additional considerations

Court-ordered operations in 2026. Bonneville and the utilities have raised serious adequacy and cost concerns with the operations ordered in 2026 by the federal district in a preliminary injunction. Their primary focus has been on the spill order for August (elevated spill to August 31) and September (surface spill from one spill bay 24 hours a day). Bonneville estimates these spill operations to result in a loss of generation capacity of 1,000 aMW this August and 500 aMW in September, increasing the risk of a loss of load event to 6% in August and 13% in September. Bonneville is also estimating a loss in revenue on a planning basis of a significant portion of $100 million compared to what had been the expected revenue operation from the 2023 RCBA settlement (in which elevated spill reduced on August 1, and September surface spill occurs only 4 hours a day).

The Council has not independently and directly analyzed the court-ordered operation but understands the value to the power system of summer generation in August and September, which provides substantial energy and capacity at the time of the seasonal peak, and the value of generating revenue to help Bonneville cover its other costs. The Council expects Bonneville, if truly facing risks of this magnitude late this summer, to be taking steps now to hedge that risk. The impact of increased operations for fish has not by itself led Bonneville to consider itself in a position of risk compared to sales obligations necessary to seek additional long-term resources.

The post-2028 contracts and the tiered rate and cost structure, as well as the possibility that some of its customers may bring projected load growth to Bonneville, are the factors pushing Bonneville to consider acquiring new generating resources.

More importantly, the summer and fall spill operation ordered by the federal court is *not* an operation the Council included in the 2026 Program, and thus not the system operations that are considered a default basis for the Council's conclusions about the ability to implement the Program's operations and maintain the adequacy, reliability, and affordability of the power supply. The Council did analyze a range of operations that included the summer spill elements in the injunction order, and some of the sensitivities did show more impacts on needs and costs than others, as noted above. But, there is nothing about the short-term effects of the operations ordered for this year that alters the Council's longer-term planning perspective about needs, resources and investment costs.

Energy costs and affordability in general. The region's utilities and others are also concerned about energy costs and affordability in general, not just adequacy issues and the costs of the summer spill order. Energy costs are increasing fast in this region, as they are elsewhere in the country, and are expected to rise further as needed resources are added. This is true even as energy costs remain competitive in this region compared to other parts of the nation. The Council understands all the pressures on the system that are raising energy costs and will be developing a resource strategy that is as conservative and cost-effective as possible to meet the needs and maintain adequacy. But the key point here is that the most substantial cost pressures are not the hydrosystem operations to benefit fish. The Council was careful to craft a package of operations that do not substantially alter the costs of this system or the investment costs needed to reshape this system to meet higher loads with resources that have different characteristics. The Council is doing so while also emphasizing operations that provide real benefit to the fish in the river and certainty to the power system - consistent and stable operations over a longer period of time, with a priority on operations that keep water flowing, increase velocities, and minimize fluctuations during peak juvenile migration.

It is true that if the system operations to benefit fish were less than currently implemented, and less than what the Council calls for in the 2026 Fish and Wildlife Program, that would mean incrementally more hydropower would be available, an increment of additional revenue would be generated by hydropower sales, and an incrementally less amount of new resources would need to be added to the system to meet load growth and maintain system adequacy – a less costly path. This dynamic has always been true of system operations for fish under the Act. The Act acknowledges that the operations are expected to, and do, reduce generation and cost more. It does not mean these operations by themselves prevent the Council and the region from maintaining an adequate, reliable, and affordable power supply – it means the Council has to

engage in responsible fish program planning and power resource planning to chart a reasonable and cost-effective path to add the resources necessary to maintain system adequacy and reliability. The Council is persuaded that the extent of operations built up in the Program over 45 years is appropriate and not unreasonable, and the impacts and costs can continue to be accommodated by the region's power system and economy.

Non-operational fish and wildlife mitigation measures and costs. Bonneville also funds a substantial set of habitat, production and other mitigation projects and associated monitoring and evaluation activities to implement measures in the Council's program. Funding is by direct expenditure and, in some cases, capital investments. Bonneville also reimburses the hydropower share of capital investments by Congress in dam modifications to improve fish passage and similar measures. The total of these costs has remained relatively stable over the last decade, at somewhere between $350 and $400 million annually.

The revised Program includes a number of additional habitat, production and other mitigation measures. The Council explicitly provides in the revised Program that it expects Bonneville to implement habitat actions and other actions in most program areas at the same pace and amount as at present. Increases in Bonneville implementation and funding is a topic for continuing regional discussions in the future. The Council does have some expectations for additional Bonneville financial assistance to help preserve the integrity of ongoing Program investments and actions – allowing the projects to maintain productive activities in the face of inflation and to maintain and rehabilitate passage and hatchery and other infrastructure. The Council also has expectations for an increase in the amount of activity in one particular area – predator management – paired with increased emphasis on operations to improve the survival of fish migrating through the system. How responsibility for funding and implementing the increase in predator management activities might be divided and allocated has also been reserved for conversations following the approval of the Program.

In short, the Council foresees Bonneville expenditures on fish and wildlife due to the revised Program as increasing over the next five years by modest amounts. The Council expects that expenditures on program measures and on reimbursement of appropriations will remain relatively stable, valuing stability and certainty. The Council also expects some of the capital rehabilitation investments to be opportunistic, taking advantage of years with better financial conditions. The Council concludes that it expects the financial impact of the mitigation costs on Bonneville's portion of the regional power supply to be reasonably related to current cost impacts, adjusted for inflation, and not increase so greatly as to render the power supply uneconomical within the context of the strength of the regional economy.

Totality of circumstances and resource additions. Bonneville, in its comments on the draft Program in particular, takes issue with the Council's basic approach to understanding and engaging in the AEERPS analysis. Bonneville faults the Council for taking an incremental approach – focusing each time on the increment of impact of additional measures and changed operations – and assuming a static baseline of past operations for fish and a static power system that need not be examined. And yet the region's power system has changed and will be changing ever so dramatically in the next decade, presumably stressing and changing the way the hydropower system would be most optimal to run within the context of a system with very different characteristics and facing different pressures and large demand forecasts. In this view, it is time for the Council to look instead at, and make some new judgments on, the whole of the operations for fish and wildlife and their collective current impact on system adequacy, reliability, efficiency and affordability, for both the region as a whole and the federal system and Bonneville's system integrity and financial health.

The Council agrees that the broader and complete picture is important too, and does not take just a narrow incremental view. The Council is well aware of the complicated dynamics and stresses of the changing power system, and how the value and use of the hydropower system will be adapting to some extent to fit. The Council has wrestled with these new dynamics to a significant extent in this combined inquiry into describing operations beneficial for fish in the fish program while also understanding how a new resource strategy in the power plan might combine differently with hydropower system characteristics to the region's advantage. The Council's inquiry into the benefits and potential impacts of the system's flexibility in this transition has been one example.

At the same time, there is nothing about the changing power system characteristics that has anyone fundamentally rethinking storage and run-of-the-river project operations to benefit fish, nor the way in which the power supply has adapted to and accommodated these changes in fish operations over time and will continue to need to do so. That's precisely the analysis and considerations that the Council has engaged in here. The Council has minimally but importantly reshaped the operational measures for fish in light of its awareness of the demands on a power system that is on an apparently extraordinary path of transition in character and growth in demand. And so while the scale and extent of the program's operations are within the range of past operations that have been accommodated, the Council has revised them to better fit the new emerging power system context, while the accompanying power planning process is analyzing in a sophisticated and responsible way how to add new resources and make this transition in a cost-effective manner while remaining adequate. The approach here combines an analysis and understanding of what incremental change is being placed on the system through the new program, and yet doing that analysis within the context of understanding the effect of the entire set of operations on system dynamics that are evolving.

On the other hand, asserting that the program's system operations for fish need to be assessed in their entirety for impacts on the AEERPS characteristics also misunderstands the purpose and impact of power planning and resource acquisitions under the Northwest Power Act over 45 years. The Council is expected in every power plan to analyze the way the measures in the fish and wildlife program will change and reduce the output of the hydropower system along with other changes that have occurred or will occur to the existing power supply, and combine that information from the demand forecasts and uncertainty risk considerations. The Council then devises a new resource strategy that Bonneville is to act consistent with as it acquires conservation and generating resource output to both meet Bonneville's power sales obligations *and* help implement the fish and wildlife program. To the extent that the original set of fish operations in the 1982 Fish and Wildlife Program derated the output of the system, and to the extent each step in the further development of fish operations in the program further derated the system, the Council has used each follow-on power plan to develop a resource strategy to Bonneville in adding resources to maintain the system, meet power sales obligations, and be able to implement the operations as changed in a reliable fashion. These new resources – especially in the case of the thousands of aMW of conservation added to the system over 45 years – were needed and added to the system to accommodate the impacts of the fish operations as much as to meet sales obligations - and their energy impacts and costs have been internalized. That is precisely the point of the Act. And so what really matters at this current moment is not the embedded impacts and costs of adapting the power system and adding resources in the past to accommodate the past changes in operations to benefit fish – those are indeed embedded. What matters most are the incremental impacts of new fish operations, and also whether the power system as a whole is evolving and adapting and stressing in ways that require a different type of consideration of the impact of these changes in system operations. The Council is comfortable it has engaged in just such a reasonable approach under the Act in considering how the measures in the 2026 Fish and Wildlife Program can be implemented and the region can continue to enjoy an adequate, efficient, economical, and reliable power supply – assuming of course the power planning effort concludes successfully in identifying the right new resource strategy for the Ninth Power Plan.

Appendix I. Findings on Recommendations and Response to Comments

Findings on recommendations and response to comments will be included in final Program.

The Northwest Power and Conservation Council was established pursuant to the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501) by the states of Idaho, Montana, Oregon, and Washington. The Act authorized the Council to serve as a comprehensive planning agency for energy policy and fish and wildlife policy in the Columbia River Basin and to inform the public about energy and fish and wildlife issues and involve the public in decision-making.

Cover image:
Salmon River, Riggins, Idaho
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