

## **Part Seven: Appendices**

The appendices that follow in this volume are legally part of the fish and wildlife program. The provisions of the appendices have been formally adopted by the Council, and changes to the appendices require formal amendment of the fish and wildlife program.

The contents of the appendices are:

### **[Appendix A.](#)**

Glossary

### **[Appendix B.](#)**

Estimates of hydropower-related losses: “Compilation of Information on Salmon and Steelhead Losses” and “Numerical Estimates of Hydropower-Related Losses”

### **[Appendix C.](#)**

Wildlife mitigation priorities, construction and inundation loss assessments, and dam licensing considerations

### **[Appendix D.](#)**

Program goals and objectives

### **[Appendix E.](#)**

Council high-level indicators

### **[Appendix F.](#)**

Future hydroelectric development and licensing, and protected areas

### **[Appendix G.](#)**

Climate change impacts in the Columbia River Basin

### **[Appendix H.](#)**

Fish Passage Center

### **[Appendix I.](#)**

Grand Coulee operations

### **[Appendix J.](#)**

Wildlife Crediting Forum

### **[Appendix K.](#)**

Resident fish mitigation settlement agreements

**[Appendix L.](#)**

Reporting

**[Appendix M.](#)**

List of subbasin plans and adoption dates

**[Appendix N.](#)**

Species

**[Appendix O.](#)**

Subbasin and basinwide measures

**[Appendix P.](#)**

Maintenance of fish and wildlife program investments

**[Appendix Q.](#)**

Administration and procedures of the Independent Scientific Review Panel, scientific peer review groups, and the Independent Scientific Advisory Board

**[Appendix R.](#)**

Assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply

**[Appendix S.](#)**

Responses to recommendations and comments, including findings on recommendations not adopted into the 2014 Fish and Wildlife Program

## **A. Glossary**

**Accuracy** - The accuracy of a measurement is the degree of closeness of measurements of a quantity to that quantity's actual (true) value, i.e., how close a measurement is to the “true value.”

**Action agencies** - U. S. Army Corps of Engineers, the Bonneville Power Administration and the U.S. Bureau of Reclamation that own, operate, or manage the Federal Columbia River Power System dams and related infrastructure.

**Adaptive management** - A scientific policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing fish and wildlife program actions (projects) as vehicles for learning. Projects that implement the program are designed and implemented as experiments so that even if they fail, they provide useful information for future actions. Monitoring and evaluation are emphasized so that the interaction of different elements of the system is better understood.

**Alluvial** - Detrital material, such as clay, sand, and gravel that is deposited along the river or stream channel.

**Anadromous fish** - Fish that hatch in freshwater, migrate to the ocean, mature there and return to freshwater to spawn; for example, Chinook salmon, Pacific lamprey, and steelhead salmon.

**Anadromous fish substitution** - The protection, mitigation, or enhancement of resident fish and wildlife to address losses of salmon and steelhead in those areas currently blocked to anadromous fish as a result of hydroelectric dams.

**Baseline** - Historical or current conditions against which change can be measured. When referring to a baseline passage or flow measure in the mainstem, the baseline indicates the starting point as described in the Federal Columbia River Power System Biological Opinion.

**Basinwide** - An activity or an issue that extends over the entire Columbia River watershed.

**Biological diversity** - Biological diversity within and among populations of salmonids is generally considered important for three reasons. First, diversity of life history patterns is associated with a use of a wider array of habitats. Second, diversity protects a species against short-term spatial and temporal changes in the environment. And third, genetic diversity is the so-called raw material for adapting to long-term environmental change. The latter two are often described as nature’s way of hedging its bets – a mechanism for dealing with the inevitable fluctuations in environmental conditions – long and short term. With respect to diversity, more is better from an extinction-risk perspective.

**Biological indicators** - The general measures of success for the regional effort that in some cases will extend beyond the narrow responsibility of the federal hydropower system. These indicators will focus on fish populations, productivity, fish survival, hatcheries, predation, harvest, and wildlife habitat.

**Biological objectives** - Biological objectives should clearly describe physical and biological changes needed to achieve the vision in a quantifiable fashion. They will serve as a benchmark to evaluate progress toward the subbasin vision and should have measurable outcomes. Biological objectives should 1) describe and quantify the degree to which the limiting factors will be improved, and 2) describe and quantify changes in biological performance of populations that will result from actions taken to address the limiting factors.

**Biological opinion** - A document that is the product of formal consultation under Section 7 of the Endangered Species Act (ESA), stating the opinion of the U.S. Fish and Wildlife Service or National Oceanic and Atmospheric Administration on whether or not a federal action is likely to jeopardize the continued existence of ESA-listed species or result in the destruction or adverse modification of critical habitat.

**Biological performance** - The responses of populations to habitat conditions, described in terms of capacity, abundance, productivity, and life history diversity.

**Biological potential** - The biological potential of a species means the potential capacity, productivity, and life history diversity of a population in its habitat at each life stage.

**Blocked areas** - Areas in the Columbia River Basin where hydroelectric projects have created permanent barriers to anadromous fish runs. These include the areas above Chief Joseph and Grand Coulee dams, the Hells Canyon Complex and other smaller locations.

**Bonneville Power Administration (Bonneville)** - The sole federal power marketing agency in the Northwest and the region's major wholesaler of electricity. Created by Congress in 1937, Bonneville sells power to public and private utilities, direct-service customers, and various public agencies in the states of Washington, Oregon, Idaho, Montana west of the Continental Divide, (and parts of Montana east of the Divide) and smaller adjacent areas of California, Nevada, Utah, and Wyoming. The Northwest Power Act charges Bonneville with additional duties related to energy conservation, generating resource acquisition, and fish and wildlife.

**Bureau of Reclamation, U.S. Department of the Interior** - An agency that administers some parts of the federal program for water resource development and use in western states. The Bureau of Reclamation owns and operates a

number of dams in the Columbia River Basin, including Grand Coulee, Hungry Horse, and several projects on the Yakima River.

**Bypass system** - A channel or conduit in a dam that provides a route for fish to move through or around the dam without going through the turbine units.

**Carrying capacity** - The number of individuals of one species that the resources of a habitat can support. That is, the upper limit on the steady-state population size that an environment can support. Carrying capacity is a function of both the populations and their environments.

**Clean Water Act** - A federal law, the Act employs a variety of regulatory and non-regulatory tools to regulate direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The goal is to restore and maintain the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

**Climate** - The average weather (usually taken over a 30-year time period) for a particular region and time period. Climate is not the same as weather, but rather it is the average pattern of weather for a particular region. Weather describes the short-term state of the atmosphere. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hail storms, and other measures of the weather.

**Climate change (also referred to as "global climate change")** - The term "climate change" is sometimes used to refer to all forms of climatic inconsistency, but because the Earth's climate is never static, the term is more properly used to imply a significant change from one climatic condition to another. In some cases, climate change has been used synonymously with the term, "global warming;" scientists, however, tend to use the term in the wider sense to also include natural changes in climate.

**Columbia River Basin** - The Columbia River and its tributaries.

**Columbia Basin Fish Accords** - The accords are agreements between the action agencies, several tribes, and some states that are 10-year action-agency commitments for projects to benefit fish affected by the FCRPS. The focus is on ESA-listed anadromous fish and actions to support the FCRPS Biological Opinion. The accords also include some other actions for non-listed fish.

**Columbia River Treaty** - The *Treaty between the United States of America and Canada Relating to Cooperative Development of the Water Resources of the Columbia River Basin*, 1964. The Canadian Entity (B.C. Hydro) and the U.S. Entity (represented by the U.S. Army Corps of Engineers and Bonneville Power Administration) are responsible for ensuring the provisions of the Columbia River Treaty are fulfilled. It became effective on September 16, 1964. The treaty also

authorized the construction of Libby Dam on the Kootenai River in Montana, which creates a reservoir that extends into British Columbia.

**Conservation easement** - A deed in which a property owner (grantor) grants a real-property interest to another entity (grantee) to conserve natural values of the property such as water quality or unique native habitats. The grantor retains all rights not restricted by the easement. Conservation easements often have perpetual terms and offer the grantee the right to enforce the easement's terms against both the grantor and successor owners.

**Construction and Inundation Losses** - The wildlife losses that occurred as a direct result of construction of a dam and the flooding of the area upriver of the dam.

**Consultation** - All federal agencies must consult with the U.S. Fish and Wildlife Service or National Marine Fisheries Service (NOAA Fisheries) when any activity permitted, funded, or conducted by that agency may affect a listed species or designated critical habitat, or is likely to jeopardize proposed species or adversely modify proposed critical habitat. There are two stages of consultation: informal and formal.

**Conversion rate** - The survival rate of adult salmon as they migrate upstream past dams and reservoirs.

**Coordination** - Within the program, coordination is not an action or a subject by itself -- it is incidental to the need to make progress on a substantive program area that requires the coordinated work of more than one entity. What type of "coordination" needs to occur in any particular instance is wholly dependent on the work that needs to be accomplished and the particular entities identified that need to work together to accomplish it.

**Corps of Engineers, U.S. Department of the Army (the Corps)** - An agency with the responsibility for design, construction, and operation of civil works, including multipurpose dams and navigation projects.

**Cost-effective** - As defined in the Northwest Power Act, with regard to actions that implement the Council's fish and wildlife program, where equally effective alternative means of achieving the same sound biological objective exist, the cost-effective alternative is the one with the lowest economic cost.

**Critical uncertainties** - Critical research uncertainties are questions concerning the validity of key assumptions implied or stated in the program.

**Direct mortality** - Direct mortality is that which occurs directly from some event along the downriver passage through (or around) the hydropower system, that is, mortality directly associated with the hydropower system.

**Dissolved gas** - The amount of chemicals normally occurring as gases, such as nitrogen and oxygen, which are held in solution in water, expressed in units such as milligrams of the gas per liter of liquid. Supersaturation occurs when these solutions exceed the saturation level of the water (beyond 100 percent).

**Distinct population segment** - A vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The smallest division of a taxonomic species permitted to be protected under the U.S. Endangered Species Act.

**Drawdown** - The distance that the water surface of a reservoir is lowered from a given elevation as water is released from the dam for various purposes. It can also refer to the act of lowering reservoir levels below their normal operating elevations.

**Ecological function** - The role, or function, that species have within the community or ecosystem in which they occur.

**Ecosystem** - The set of species and biological communities, including all biotic and abiotic factors and their interactions, existing in a particular environment and geographic area.

**Ecosystem Function** - The ability of a river to sustain healthy populations of fish, wildlife, and plants, that is enhanced by environmental conditions that support healthy populations.

**Effectiveness monitoring** - Assessing whether certain actions and projects are having the intended affect and contribute to overall mitigation, protection, enhancement, and recovery efforts in the basin. This may require establishing a causal relationship or a correlation between the action and the change observed; i.e. statistical cause-and effect and correlation relationships. This can be at one of two scales: to detect a localized effect (project or stream reach level effect), and to detect a watershed level effect (intensively monitored effect).

**Endangered** - The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

**Endangered Species Act** - Federal legislation, as amended in 1973, intended to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and provide programs for the conservation of those species, thus preventing extinction of native plants and animals.

**Environmental characteristics** - The environmental conditions or changes sought to achieve the desired changes in population characteristics.

**Environmental risk assessment** - Process to identify and evaluate the potential negative impacts of proposed actions on the environment.

**Escapement** - The numbers of salmon and steelhead that return to a specified point of measurement after all natural mortality and harvest have occurred. Spawning escapement consists of those fish that survive to spawn.

**Estuary** - The part of the wide lower course of a river where its current is met and influenced by the tides. In both the vertical and horizontal planes, the estuary is a complex transitional zone without sharp boundaries between freshwater and marine habitats.

**Evolutionarily Significant Unit (ESU)** - A distinct population segment for Pacific salmon (the smallest biological unit considered to be a “species” under the Endangered Species Act). A population will be considered an ESU if: 1) it is substantially reproductively isolated from other co-specific units, and 2) it represents an important component in the evolutionary legacy of the species.

**Extirpated** – The loss of a discrete subpopulation within a species.

**Extinction** - The loss of an entire species.

**Federal Columbia River Power System (FCRPS)** - The Federal Columbia River Power System comprises 31 federal dams and one non-federal nuclear power plant located primarily in the Columbia River Basin. The Bonneville Power Administration sells the output of the FCRPS and also constructed and operates a regional transmission system. Fourteen federal multipurpose hydropower projects are at the core of the FCRPS. Twelve of the projects are operated and maintained by the U.S. Army Corps of Engineers: Bonneville, The Dalles, John Day, McNary, Chief Joseph, Albeni Falls, Libby, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak dams. The Bureau of Reclamation operates and maintains the Hungry Horse Project and the Columbia Basin Project, which includes Grand Coulee Dam. The FCRPS also includes the mainstem effects of other Reclamation projects in the Columbia and Snake basins, Corps projects in the Willamette River Basin, and other power-producing federal projects in the Northwest.

**Federal Energy Regulatory Commission (FERC)** - The Commission issues and regulates licenses for construction and operation of non-federal hydroelectric projects and advises federal agencies on the merits of proposed federal multipurpose water development projects.

**Fish and wildlife agencies** - This category includes the Fish and Wildlife Service, U.S. Department of the Interior; the Idaho Department of Fish and Game; Montana Fish, Wildlife & Parks; the National Marine Fisheries Service of



NOAA Fisheries, a division of the U.S. Department of Commerce; the Oregon Department of Fish and Wildlife; and the Washington Department of Fish and Wildlife.

**Fish and wildlife agencies and tribes** – The federal and region’s state fish and wildlife agencies and Indian tribes.

**Floodplain** - Land adjacent to a stream or river that is periodically flooded.

**Flow(s)** - The rate at which water passes a given point in a stream or river, usually expressed in cubic-feet per second (cfs).

**Flow augmentation** - Increased flow from release of water from storage dams.

**Focal species** - A species that has ecological, cultural or local significance or protected legal status, and is used to evaluate the health of the ecosystem and the effectiveness of management actions. A set of focal species is established for each subbasin plan [see [Appendix N](#)].

**Forebay** - The part of a dam’s reservoir that is immediately upstream of the powerhouse.

**Genetic diversity** - All of the genetic variation within a species. Genetic diversity includes both genetic differences among individuals in a breeding population and genetic differences among different breeding populations.

**Habitat** - The locality or external environment in which a plant or animal normally lives and grows. As used in this program, habitat includes the ecological functions of the habitat structure.

**Habitat unit (HU)** - A value derived from multiplying the Habitat Suitability Index (HSI) for an evaluation species by the size of the areas for which the HSI was calculated (HU = HSI x size of habitat)

**Harvest** - The total number or poundage of fish caught and kept from an area over a period of time. Note that landings, catch, and harvest are different.

**Harvest management** - The process of setting regulations for the commercial, recreational, and tribal fish harvest to achieve a specified goal within the fishery.

**Harvest rates** - The portion of an evolutionarily significant unit (ESU) that is expected to be harvested based on the management goals set by the fish and wildlife agencies and tribes.

**Hatchery** – Generally refers to an artificial production facility designed to produce fish for harvest or spawning escapement. A conservation hatchery

differs from a production hatchery in that a conservation hatchery specifically seeks to supplement or restore natural-origin populations. In this program, “hatcheries” may also refer to any of a suite of activities that includes assistance provided by human technology to animal reproduction. In the context of Pacific salmon, this assistance may include, but is not limited to, spawning and rearing in hatcheries, stock transfers, creation of spawning habitat, egg bank programs, captive broodstock programs and cryopreservation of gametes.

**Hatchery population** - A population of fish that depends on spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility.

**Hydroelectric power or hydropower** - The generation of electricity using falling water to turn turbo-electric generators.

**Hydrosystem** - The federal and non-federal hydroelectric dams on the Columbia River and its tributaries.

**Implementation monitoring** - Monitoring conducted to determine whether an activity was performed and completed as planned. All actions under the program must have implementation monitoring that must be reported to Bonneville. In some cases this may be as simple as a photo point and a brief description.

**Invasive species** – A species that establishes and reproduces rapidly outside its native range. It may threaten the diversity or abundance of native species through predation, competition, parasitism, hybridization with native populations, introduction of pathogens, or the physical or chemical alteration of the invaded habitats.

**Irrigation** - Water diverted from surface-water bodies or pumped from groundwater and applied to agricultural lands through ditches, canals, dikes, pumps, pipes, and other water conveyance systems for the purpose of raising crops in areas that do not have sufficient moisture under natural conditions.

**Juvenile salmon** - Fish from approximately one year of age until sexual maturity.

**Kelt** - Steelhead that return to the sea after spawning and may return to natal streams to spawn again.

**Kokanee** - A land-locked form of sockeye salmon.

**Lamprey or Pacific lamprey** - Pacific lamprey are dark bluish gray or dark brown in color and can reach 30 inches in length and weigh over a pound. Pacific lamprey are anadromous. They enter freshwater streams of the Columbia River Basin from July to October and spawn the following spring. Juvenile lamprey will stay burrowed in the substrate of the streams for 4 to 6 years, During the ocean phase of two to three years, Pacific lamprey are scavengers, parasites, or predators on larger prey such as salmon and marine mammals.

**Life history** - The multitude of physical stages and behaviors exhibited by a species in the completion of its life cycle.

**Limiting factors** - Physical, biological, or chemical features (for example, inadequate spawning habitat, high water temperature, insufficient prey resources) experienced by fish that result in reductions in abundance, productivity, spatial structure, or diversity. Key limiting factors are those with the greatest impacts on a population's ability to reach its desired status.

**Listed species** - A species, subspecies, or distinct vertebrate population segment that has been added to the federal lists of endangered and threatened wildlife and plants as they appear in sections 17.11 and 17.12 of Title 50 of the Code of Federal Regulations (50 CFR 17.11 and 17.12).

**Mainstem** - Refers to the main channels of the Columbia and Snake rivers. The program includes a mainstem plan with 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.

**Mainstem passage** - The movement of salmon and steelhead around or through the dams and reservoirs in the Columbia and Snake rivers.

**Mid-Columbia Public Utility Districts** - PUD No. 1 of Grant County, PUD No. 2 of Chelan County, and PUD No. 1 of Douglas County.

**MPG (Major population group)** – A set of populations that shares genetic, geographic (hydrographic), and habitat characteristics within an evolutionarily significant unit.

**Native species** - A species whose presence in a region or ecosystem is due to natural processes and not to human activities.

**Natural-origin fish** – Populations of fish that have completed their entire life cycle in the natural environment and may be the progeny of wild, hatchery, or mixed parentage

**Natural production** - Spawning, incubating, hatching, and rearing fish in rivers, lakes, and streams without human intervention.

**Non-native species** – An introduced species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental. These species can have a distinct advantage in competing with native species because they escape a large percentage of the pathogens and parasites from their native range and are slow to pick up new infections in their

newly invaded range. There is convincing evidence that non-native species are continuing to increase in the Columbia Basin aquatic habitats, and climate change is likely to further accelerate their expansion, often at the expense of native species.

**Northern Pikeminnow** - A giant member of the minnow family, the Northern Pikeminnow is native to the Columbia River and its tributaries and a known predator of young salmon.

**Northwest Power Act** - The Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. 839 et seq.), which authorized the creation of the Northwest Power and Conservation Council. The Act directs the Council to develop the Columbia River Basin Fish and Wildlife Program to protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries, to establish an Independent Scientific Review Panel to review projects implementing this program that are proposed for funding by the Bonneville Power Administration, and to make final recommendations to Bonneville on implementation of projects.

**Nutrient cycling** - Process by which nutrients are continuously transferred between organisms within an ecosystem.

**Objectives** – The biological and non-biological changes needed to achieve the program vision in a quantifiable fashion. This is a broader term that includes biological objectives, defined above. Objectives serve as a benchmark to evaluate progress toward the vision and should be, as feasible, specific, measurable, achievable, relevant, and time-bound.

**Off-site mitigation** - The improvement in conditions for fish or wildlife species away from the site of a hydroelectric project that had detrimental effects on fish and wildlife, as part or total compensation for those effects. An example of off-site mitigation is the fish passage restoration work being conducted in the Yakima River Basin for the detrimental effects caused by mainstem hydroelectric projects.

**Passage** - The movement of migratory fish through, around, or over dams, reservoirs, and other obstructions in a stream or river.

**Passage efficiency** - The percentage of the total number of fish that pass a dam without passing through the turbine units.

**Passage survival** - The proportion of anadromous fish that survive passage through the dams and reservoirs while migrating in the main channels of the Columbia and Snake rivers.

**Performance measures** - Performance measures are metrics that are monitored and evaluated relative to performance standards (benchmarks) and performance targets (longer-term goals) to assess progress of actions and inform future decisions.

**PIT-tags** - Passive Integrated Transponder tags are used for identifying individual salmon for monitoring and research purposes. This miniaturized tag consists of an integrated microchip that is programmed to identify individual fish. The tag is inserted into the body cavity of the fish and decoded at selected monitoring sites.

**Plume** - The area of the Pacific Ocean that is influenced by discharge from the Columbia River, up to 500 miles beyond the mouth of the river.

**Population** - A group of organisms belonging to the same species that occupy a well-defined locality and exhibit reproductive continuity from generation to generation.

**Precision** - The degree to which repeated measurements show the same results. It is also called reproducibility or repeatability.

**Predator** - An animal that lives by killing and eating other animals for food.

**Productivity** - A measure of a population's ability to sustain itself or its ability to rebound from low numbers. The terms "population growth rate" and "population productivity" are interchangeable when referring to measures of population production over an entire life cycle. Productivity can be expressed as the number of recruits (adults) per spawner or the number of smolts per spawner.

**Rearing** - The juvenile life stage of anadromous fish spent in freshwater rivers, lakes, and streams or hatcheries before they migrate to the ocean.

**Recovery** - The re-establishment of a threatened or endangered species to a self-sustaining level in its natural ecosystem to the point where the protective measures of the Endangered Species Act are no longer necessary.

**Recovery plan** - A strategy for conserving and restoring a threatened or endangered species. An Endangered Species Act recovery plan refers to a plan prepared under section 4(f) of the Act and approved by the Secretary of the relevant federal agency, including: (1) A description of site-specific management actions necessary for recovery; (2) objective, measurable criteria that can be used as a basis for removing the species from threatened or endangered status; and (3) estimates of the time and cost required to implement recovery. (For Pacific salmon, "Secretary" refers to the U.S. Secretary of Commerce.)

**Recruitment** - The number of young-of-year fish entering a population in a given year.

**Reference stream** - Reference streams are similar in physical and biological character to streams in which an integrated production effort will take place. No new supplementation should occur in reference streams.

**Removable Spillway Weir** - A fish passage technology that is an overflow structure installed in a dam's spillway bay. It provides a more surface-oriented passage route with less delay and stress for juvenile anadromous fish.

**Reservoir** - A body of water collected and stored in an artificial lake behind a dam.

**Resident fish** - Fish that spend their entire life cycle in freshwater. For program purposes, resident fish include landlocked anadromous fish (for example, sturgeon, kokanee, and coho), as well as traditionally defined resident fish species. For example, freshwater mussels, threatened bull trout, burbot, Westslope cutthroat trout, mountain whitefish, endangered Kootenai white sturgeon, green sturgeon, and resident life histories of the native anadromous species, e.g. kokanee [see [Appendix N](#)].

**Riparian** - Riparian areas and wetlands are habitats along the banks of streams, lakes, or rivers where terrestrial and aquatic ecosystems are most closely linked. They are among the most diverse and dynamic habitats on the Earth, and are especially important sources of plant and animal species diversity in arid areas such as the interior Columbia River Basin. These habitats are critical to a broad range of wildlife.

**Run** - A population of fish of the same species consisting of one or more stocks migrating at a distinct time.

**Salmonid** - A fish of the Salmonidae family, which includes soft-finned fish such as salmon, trout, and whitefish.

**Section 7** - The section of the Endangered Species Act that requires all federal agencies, in "consultation" with NOAA Fisheries or the U.S. Fish and Wildlife Service, to insure that their actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat.

**Self-sustaining population** - A population of fish or wildlife that exists in sufficient numbers to replace itself through time without supplementation with hatchery fish or other type of human intervention. It does not necessarily produce surplus fish or wildlife for harvest.

**Settlement** - An agreement between natural resource trustees and responsible parties that specifies the terms under which liability is resolved.

**Smolt** - A juvenile salmon or steelhead migrating to the ocean and undergoing physiological changes (smoltification) to adapt its body from a freshwater to a saltwater existence, typically in its second year of life.

**Smolt to Adult Return (SAR) rate** - A measure of survival from smolt outmigration to adult return. Depending upon the species, tag type, and research/management question, smolt outmigration and adult returns may be enumerated at various locations (e.g., Bonneville to Bonneville, Dworshak Hatchery to Lower Granite, or tributary to tributary). Therefore, SARs must be explicitly defined based on the enumeration points. The SAR indicator incorporates all sources of mortality between the smolt and adult life stages.

**Spatial** - Spatial, in the context of the program, refers to the geographic distribution of individuals in a population unit and the processes that generate that distribution.

**Spawn** - The act of fish releasing and fertilizing eggs.

**Species** - A group of individuals of common ancestry that closely resemble each other structurally and physiologically and that can interbreed, producing fertile offspring. For purposes of the Endangered Species Act (ESA), a species is defined to include “any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” A population (or group of populations) will be considered “distinct” (and hence a “species”) for purposes of the ESA if it represents an evolutionarily significant unit (ESU) of the biological species. A population must satisfy two criteria to be considered an ESU: (1) It must be reproductively isolated from other conspecific population units, and (2) it must represent an important component in the evolutionary legacy of the species.

**Spill** - Releasing water through spillways at a dam rather than through the turbines.

**Spillway** - The channel or passageway around or over a dam through which excess water is released or “spilled” past the dam without going through the turbines. A spillway is a safety valve for a dam and, as such, must be capable of discharging major floods without damaging the dam, while maintaining the reservoir level below some predetermined maximum level.

**Stacking** - A procedural step used to calculate the relationship between wildlife species and their habitat in the course of calculating Habitat Units (HUs) for the purposes of mitigating for wildlife losses. Stacking can produce varied results if inconsistent species or habitat types are used in the calculation.

**Status and Trend Monitoring** - Used to assess status over time of fish, wildlife, and habitat that informs program evaluation and reporting needs. This type of monitoring is intended to span a time-period adequate to understand the trend and be able to detect a negative change that would require a change in program implementation to rectify.

**Stock** - A population of fish spawning in a particular stream during a particular season. Stocks of fish generally do not interbreed with stocks spawning in a different stream or at a different time.

**Straying** - The act of a fish breeding in a population other than that of its parents.

**Strongholds** - Generally characterized as large and relatively intact areas that support abundant, diverse, genetically strong populations of native salmonids that can serve as “anchor recovery areas” to help re-establish and re-build core populations in the basin. The concept of native fish strongholds is further defined as conservation reserves to protect remaining areas of high-quality habitat supporting abundant populations and a diverse number of native fish species.

**Subbasin** - A set of adjoining watersheds with similar ecological conditions and tributaries that ultimately connects, flowing into the same river or lake. Subbasins contain major tributaries to the Columbia and Snake rivers. There are 62 subbasins in the Columbia River Basin.

**Subbasin management plans** - Management plans set forth the desired direction for the subbasin taking into account the science, local conditions, concerns, treaty rights, and applicable law and policy. It is where the science and the social aspects come together. Management plans begin with a *vision* for the subbasin, then outlines *biological objectives* describing the desired environmental conditions, and then identifies a set of *strategies* to achieve the objectives. In addition, management plans include a *monitoring and evaluation plan* for the strategies that may be implemented. Plans should have a 10-15 year horizon recognizing that additional information and analysis may indicate the need for periodic refinement.

**Subbasin planning** - A coordinated systemwide approach to planning in which each subbasin in the Columbia system is evaluated for its potential to produce fish in order to contribute to the goal of the overall system. Subbasin planning emphasizes the integration of fish and wildlife habitat, fish passage, harvest management, and production.

**Subyearling** - A fish that is less than 1 year old.



**Supplementation** - The use of hatcheries to re-establish or increase the abundance of naturally reproducing populations through the release of hatchery fry and juvenile fish in the natural environment.

**Tailrace** - The canal or channel that carries water away from a dam.

**Tailwater** - The water surface immediately downstream from a dam.

**Target species** - A species singled out for attention because of its harvest significance or cultural value, or because it represents a significant group of ecological functions in a particular habitat type.

**Terminal Fishery**- A fishery created to provide a significant degree of spatial separation from stocks bound for other streams. The terminal fishery targets a hatchery stock of fish to avoid harvest of listed and weak stocks.

**Terrestrial** - Of or relating to the earth or its inhabitants; non aquatic.

**Threatened** - The classification provided to an animal or plant likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Transboundary** - Refers to the United States and Canadian border.

**Transboundary stocks/species** – Stocks or species whose range or migratory routes cross the United States/Canada border.

**Transportation** - Collecting migrating juvenile fish and transporting them around dams using barges or trucks.

**Treaty rights** - Rights of Indian tribes that were reserved by the 1855 Stevens Treaties between certain Northwest Indian tribes and the United States government. These reserved rights include the right of “taking fish at all usual and accustomed grounds and stations” as well as the “privilege of hunting, gathering roots and berries and pasturing horses on open and unclaimed lands.” Certain of these rights have been well defined by judicial decisions, such as those pertaining to treaty fishing.

**Tribes** - In the Council’s fish and wildlife program, these include the Burns-Paiute Tribe; the Coeur d’Alene Tribes; the Confederated Tribes of the Colville Reservation; the Confederated Tribes of the Grand Ronde; the Confederated Salish-Kootenai Tribes of the Flathead Reservation; the Confederated Tribes of the Umatilla Reservation of Oregon; the Confederated Tribes of the Warm Springs Reservation of Oregon; the Confederated Tribes and Bands of the Yakama Nation; the Kalispel Tribe of Indians; the Kootenai Tribe of Idaho; the Nez Perce Tribe of Idaho; the Shoshone-Paiutes of the Duck Valley Reservation;

the Shoshone-Bannock Tribes of the Fort Hall Reservation; the Spokane Tribe of Indians; the Confederated Tribes of the Siletz Indians of Oregon; and the Cowlitz Indian Tribe.

**Turbidity** - A measure of light penetration in a body of water. Higher turbidity indicates murkier water conditions.

**United States v Oregon** - The 1969 federal court decision that reaffirmed Indian treaty rights to fish. The decision only applies to Washington and Oregon treaty tribes and is the basis for allocating harvest of salmon in the Columbia River to those tribes.

**Uplands** - Land at higher elevations than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones.

**VARQ** - Variable outflows for flood control from a storage reservoir during the spring which are tied to the water supply forecast, which can provide additional water releases for fish requirements and improve a project's refill probability.

**Water right** - A legal authorization to use a certain amount of public water for specific beneficial use or uses.

**Watershed** - The area that drains into a stream or river. A subbasin is typically composed of several watersheds.

**Weak stock** - A stock of fish of which the long-term survival is in doubt. Typically this is a stock in which the population is small and is barely reproducing itself or is not reproducing itself. While ESA-listed stocks are considered weak stocks, the term also includes other populations that would not yet qualify for ESA listing.

**Wild fish** - Fish that have maintained successful natural reproduction with little or no hatchery influence.

**Wildlife** - Animals living in a natural state, unimpeded and undomesticated by humans.

**Wildlife management** - The application of scientific or technical principles to the practice of manipulating wildlife populations, either directly through regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

***B. 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](#).

**C. Wildlife mitigation priorities, construction and inundation loss assessments, and dam licensing considerations**

**1. Mitigation priorities**

**a) Bonneville and wildlife agencies and tribes**

Ensure that wildlife mitigation projects implemented in fulfillment of this program consider the basinwide implementation priorities described in Tables C-1, C-2 and C-3, below. The Council adopted these habitat types and species priorities for wildlife mitigation in the 1994 amendments to the program. 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 requests the Wildlife Advisory Committee revisit and update the priorities, if necessary, and report to the Council. Wildlife mitigation projects and settlement agreements should address the losses identified in the program (see the next section) and address the following priorities or any changed priorities resulting from advice by the Wildlife Advisory Committee and Council action.

<b>Table C-1 Lower Columbia Wildlife Mitigation Priorities</b>	
<b>Habitat Types--Target Species</b>	<b>Priority</b>
<b>Riparian/Riverine</b> <ul style="list-style-type: none"> <li>• Great Blue Heron</li> </ul>	High
<b>Old Growth Forest</b> <ul style="list-style-type: none"> <li>• Northern Spotted Owl</li> </ul>	High
<b>Wetlands</b> <ul style="list-style-type: none"> <li>• Great Blue Heron</li> <li>• Band-tailed Pigeon</li> <li>• Western Pond Turtle</li> </ul>	High
<b>Coniferous Forest</b> <ul style="list-style-type: none"> <li>• Ruffed Grouse</li> <li>• Elk</li> <li>• American Black Bear/Cougar</li> </ul>	Medium

**Table C-2 Upper Columbia Wildlife Mitigation Priorities**

<b>Habitat Types--Target Species</b>	<b>Priority</b>
<b>Riparian/River</b> <ul style="list-style-type: none"><li>• Bald Eagle (breeding)</li><li>• Black-capped Chickadee</li><li>• Peregrine Falcon</li></ul>	High
<b>Shrub-Steppe</b> <ul style="list-style-type: none"><li>• Sharp-tailed Grouse</li><li>• Pygmy Rabbit</li><li>• Sage Grouse</li><li>• Mule Deer</li></ul>	High
<b>Wetlands</b> <ul style="list-style-type: none"><li>• Mallard</li><li>• Redhead</li></ul>	High
<b>Islands</b> <ul style="list-style-type: none"><li>• White Pelicans</li></ul>	Medium
<b>Agricultural Lands</b> <ul style="list-style-type: none"><li>• Swainson's Hawk</li><li>• Ring-necked Pheasant</li></ul>	Low

**Table C-3 Snake River Wildlife Mitigation Priorities**

<b>Habitat Type--Target Species</b>	<b>Priority</b>
<b>Riparian/Riverine</b> <ul style="list-style-type: none"><li>• Bald Eagle (breeding)</li><li>• Bald Eagle (wintering)</li><li>• River Otter</li><li>• Black-capped Chickadee</li><li>• Peregrine Falcon</li><li>• Ruffed Grouse</li></ul>	High
<b>Wetlands</b> <ul style="list-style-type: none"><li>• Mallard</li></ul>	High
<b>Native Grasslands and Shrubs</b> <ul style="list-style-type: none"><li>• Mule Deer/Elk</li><li>• White-tailed Deer</li><li>• Sharp-tailed Grouse</li></ul>	Medium
<b>Coniferous Forest</b> <ul style="list-style-type: none"><li>• Elk</li></ul>	Medium

<b>Old Growth Forest</b> <ul style="list-style-type: none"><li>• Pileated Woodpecker</li></ul>	Medium
<b>Lowland Forest</b> <ul style="list-style-type: none"><li>• White-tailed deer</li></ul>	Low

## 2. 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.

<b>Table C-4 Estimated Losses and Gains Due to Hydropower Construction and Inundation</b> <i>(losses are preceded by a “-”, gains by a “+”)</i>	
<b>Species</b>	<b>Total Habitat Units</b>
<b>Albeni Falls</b>	
• 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
<b>Lower Snake Projects</b>	
• 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
<b>Anderson Ranch</b>	
• Mallard	-1,048
• Mink	-1,732
• Yellow Warbler	-361

<ul style="list-style-type: none"> <li>• Black Capped Chickadee -890</li> <li>• Ruffed Grouse -919</li> <li>• Blue Grouse -1,980</li> <li>• Mule Deer -2,689</li> <li>• Peregrine Falcon -1,222 acres*</li> </ul> <p>* Acres of riparian habitat lost. Does not require purchase of any lands.</p>
<p><b>Black Canyon</b></p> <ul style="list-style-type: none"> <li>• Mallard -270</li> <li>• Mink -652</li> <li>• Canada Goose -214</li> <li>• Ring-necked Pheasant -260</li> <li>• Sharp-tailed Grouse -532</li> <li>• Mule Deer -242</li> <li>• Yellow Warbler +8</li> <li>• Black-capped Chickadee +68</li> </ul>
<p><b>Deadwood</b></p> <ul style="list-style-type: none"> <li>• Mule Deer -2080</li> <li>• Mink -987</li> <li>• Spruce Grouse -1411</li> <li>• Yellow Warbler -309</li> </ul>
<p><b>Palisades</b></p> <ul style="list-style-type: none"> <li>• Bald Eagle -5,941 breeding -18,565 wintering</li> <li>• Yellow Warbler -718 scrub-shrub</li> <li>• Black Capped Chickadee -1,358 forested</li> <li>• Elk/Mule Deer -2,454</li> <li>• Waterfowl and Aquatic Furbearers -5,703</li> <li>• Ruffed Grouse -2,331</li> <li>• Peregrine Falcon* -1,677 acres of forested wetland -832 acres of scrub-shrub +68 acres of emergent wetland</li> </ul> <p>* Acres of riparian habitat lost. Does not require purchase of any lands.</p>
<p><b>Willamette Basin Projects</b></p> <ul style="list-style-type: none"> <li>• Black-tailed Deer -17,254</li> <li>• Roosevelt Elk -15,295</li> <li>• Black Bear -4,814</li> <li>• Cougar -3,853</li> <li>• Beaver -4,477</li> <li>• River Otter -2,408</li> <li>• Mink -2,418</li> <li>• Red Fox -2,590</li> <li>• Ruffed Grouse -11,145</li> <li>• California Quail -2,986</li> <li>• Ring-necked Pheasant -1,986</li> </ul>



• 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
<b>Grand Coulee</b>	
• 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
<b>McNary</b>	
• 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
<b>John Day</b>	
• 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
<b>The Dalles</b>	
• Lesser Scaup	+2,068
• Great Blue Heron	-427
• Canada Goose	-439

<ul style="list-style-type: none"> <li>• Spotted Sandpiper -534</li> <li>• Yellow Warbler -170</li> <li>• Black-capped Chickadee -183</li> <li>• Western Meadowlark -247</li> <li>• Mink Black-capped Chickadee -330</li> </ul>
<b>Bonneville</b> <ul style="list-style-type: none"> <li>• Lesser Scaup +2,671</li> <li>• Great Blue Heron -4,300</li> <li>• Canada Goose -2,443</li> <li>• Spotted Sandpiper -2,767</li> <li>• Yellow Warbler -163</li> <li>• Black-capped Chickadee -1,022</li> <li>• Mink -1,622</li> </ul>
<b>Dworshak</b> <ul style="list-style-type: none"> <li>• Canada Goose-(breeding) -16</li> <li>• Black-capped Chickadee -91</li> <li>• River Otter -4,312</li> <li>• Pileated Woodpecker -3,524</li> <li>• Elk -11,603</li> <li>• White-tailed Deer -8,906</li> <li>• Canada Goose (wintering) +323</li> <li>• Bald Eagle +2,678</li> <li>• Osprey +1,674</li> <li>• Yellow Warbler +119</li> </ul>
<b>Minidoka</b> <ul style="list-style-type: none"> <li>• Mallard +174</li> <li>• Redhead +4,475</li> <li>• Western Grebe +273</li> <li>• Marsh Wren +207</li> <li>• Yellow Warbler -342</li> <li>• River Otter -2,993</li> <li>• Mule Deer -3,413</li> <li>• Sage Grouse -3,755</li> </ul>
<b>Chief Joseph</b> <ul style="list-style-type: none"> <li>• Lesser Scaup +1,440</li> <li>• Sharp-tailed Grouse -2,290</li> <li>• Mule Deer -1,992</li> <li>• Spotted Sandpiper -1,255</li> <li>• Sage Grouse -1,179</li> <li>• Mink -920</li> <li>• Bobcat -401</li> <li>• Lewis' Woodpecker -286</li> <li>• Ring-necked Pheasant -239</li> <li>• Canada Goose -213</li> <li>• Yellow Warbler -58</li> </ul>

### **3. Mitigation considerations in dam licensing decisions**

#### **a) Federal Energy Regulatory Commission**

Non-federal hydroelectric projects are licensed by the Federal Energy Regulatory Commission. The Northwest Power Act and the Electric Consumers Protection Act of 1986 require the Federal Energy Regulatory Commission to give equal consideration to the protection, mitigation of damage to, and enhancement of wildlife in licensing and relicensing decisions. In developing license conditions, take into account to the fullest extent practicable the policies established in this section, and the measures taken by Bonneville and others to implement this section. In particular, it is important to take into account the mitigation efforts at federal projects undertaken pursuant to this section, to ensure that license conditions are consistent with and complement these wildlife mitigation projects and contribute fully and proportionately to regional wildlife mitigation goals.

#### **b) Council**

The Council will monitor the Federal Energy Regulatory Commission licensing and relicensing proceedings and comment or intervene where appropriate.

## ***D. Program goals and objectives***

### **Theme One: Protect and Enhance Habitat to Provide a Home for Species**

- 1. Goal:** Provide environmental conditions that support ecosystem functions necessary to restore healthy, self-sustaining and harvestable populations of native resident and anadromous fish and wildlife. This includes areas above and below Hungry Horse and Libby dams, and in and adjacent to Lake Roosevelt.
    - a) Objectives: remain to be identified and adopted
      - Strategies: habitat, non-native and invasive species, predator control, future hydroelectric development and licensing and protected areas, water quality, climate change, mainstem hydrosystem flow and passage operations, estuary, plume and near-shore ocean, adaptive management
      - Indicators: to be developed under the ecosystem health and Council actions categories
  
  - 2. Goal:** Enhance conditions in the estuary and near-shore plume to support habitat diversity, and productive, abundant, and diverse salmon and steelhead populations
    - a) Objectives: remain to be identified and adopted
      - Strategies: habitat, water quality, climate change, mainstem hydrosystem flow and passage operations, estuary, plume and nearshore ocean, adaptive management
      - Indicators: to be developed under the ecosystem health and Council actions categories
  
  - 3. Goal:** Reestablish a more natural hydrological pattern that reflects seasonal fluctuations, rate of fluctuations, peaks, and temperature.
    - a) Objectives: remain to be identified and adopted
      - Strategies: habitat, water quality, mainstem hydrosystem flow and passage operations, adaptive management
      - Indicators: to be developed under the ecosystem Health and council actions categories
  
  - 4. Goal:** Provide adequate water quality and quantity to support targeted species
    - a) Objective: Projects do not exceed the interim total dissolved gas (TDG) standards during spill events<sup>9</sup>:
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<sup>9</sup> For details about total dissolved gas standards consult Hydropower Strategy 1—*Operate the FCRPS to Provide Flows and Water Quality to Improve Juvenile and Adult Fish Survival*, RPA #4, Table 1 of the FCRPS Biological Opinion (BiOp); consult the FCRPS BiOp Implementation plan and the *Water Quality Plan for Total Dissolved Gas and Water Temperature in the Mainstem Columbia and Snake Rivers* (WQP) for periodic updates to the TDG standards.

Project(s)	TDG standard
Dworshak	110% as set by Idaho State
Libby	110% as set by Montana State
Grand Coulee	Operate to minimize TDG production
Hungry Horse	110% as set by Montana State
Albeni Falls	None
Columbia River and Snake River Dams	In general, meet established TDG levels .Either 110 percent TDG standard, or as modified by State water quality waivers, currently up to 115 percent TDG in the dam forebay, and up to 120 percent TDG in the dam project tailwater.

- Strategies: water quality, mainstem hydrosystem flow and passage operations, adaptive management
    - Indicators: [Hydrosystem Passage and Survival](#); [Council Actions](#)
- 5. Goal:** Hydrosystem projects will rely on local inflows for drawdown and refill; maintain biological productivity in the reservoirs; and release water or dampen flow fluctuations to benefit fish in reservoirs and downstream.
- a) Objectives: remain to be identified and adopted
- Strategies: water quality, mainstem hydrosystem flow and passage operations, adaptive management
    - Indicators: to be developed under the ecosystem health and Council actions categories
- 6. Goal:** Coordinate aquatic and terrestrial actions
- a) Objectives: remain to be identified and adopted
- Strategies: wildlife mitigation, adaptive management
    - Indicators: to be developed under the ecosystem health and Council actions categories
- 7. Goal:** Improve and expand the habitat function, structure, complexity and range of aquatic habitats in mainstem and tributaries of the basin, including riparian, wetland, floodplain, alluvial reaches, estuary, and near-shore ocean, to enhance life history and species diversity that are impacted by the hydrosystem.
- a) Objectives: As interim habitat objectives, increase the amount of: acre-feet of water protected; stream miles with improved complexity; acres of riparian habitat treated or improved; fish screens installed or addressed for fish protection; and miles of improved access to fish habitat
- Strategies: habitat, non-native and invasive species, predation control, future hydroelectric development and licensing and protected areas, water quality, climate change, mainstem hydrosystem flow and passage operations, estuary, plume, and nearshore ocean, adaptive management
    - Indicators: [Council Actions](#); could be developed under the ecosystem health category

- 8. Goal:** Protect, enhance, reconnect, and restore fish populations in mainstem and tributary areas
- a) Objectives: remain to be identified and adopted
- Strategies: habitat, non-native and invasive species, predation control, future hydroelectric development and licensing and protected areas, water quality, climate change, mainstem hydrosystem flow and passage operations, estuary, plume, and nearshore ocean, adaptive management
  - Indicators: to be developed under the ecosystem health and Council actions categories
- 9. Goal:** Improve natural populations by connecting stronger populations with weaker populations
- a) Objectives: remain to be identified and adopted
- Strategies: future hydroelectric development and licensing and protected areas, strongholds, adaptive anagement
  - Indicators: to be developed under the ecosystem health and Council actions categories
- 10. Goal:** Reconnect side channels, floodplains, riparian areas, and uplands to improve and maintain aquatic conditions, especially in the Columbia and Snake river mainstems
- a) Objectives: remain to be identified and adopted
- Strategies: habitat, non-native and invasive species, predation control, future hydroelectric development and licensing and protected areas, water quality, climate change, mainstem hydrosystem flow and passage operations, estuary, plume and nearshore ocean, adaptive management
  - Indicators: to be developed under the ecosystem health and Council actions categories
- 11. Goal:** Restore and protect thermal refuge areas for salmonids
- a) Objectives: remain to be identified and adopted
- Strategies: water quality, climate change, mainstem hydrosystem flow and passage operations, adaptive management
  - Indicators: to be developed under the ecosystem health and Council actions categories
- 12. Goal:** Mitigate for wildlife losses
- a) Objectives: Acquire habitat units (HU) to offset losses or fulfill settlement agreements
- Strategy: wildlife mitigation
  - Indicators: HUs acquired and maintained or settlements established

## Theme Two: Ensure Species Survival by Promoting Abundance, Diversity and Adaptability

**13. Goal:** Achieve full mitigation for anadromous fish, native resident fish, and wildlife losses by restoring healthy<sup>10</sup>, self-sustaining, and harvestable, natural-origin anadromous fish, especially salmon, steelhead, eulachon, lamprey species, resident fish, including sturgeon and bull trout

- a) Objective: Halt declining trends in Columbia River Basin salmon and steelhead populations
  - Strategies: wild fish, lamprey, eulachon, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- b) Objective: Consistent with ESA efforts, increase total adult salmon and steelhead runs, with an emphasis on those above Bonneville Dam, by 2025 to an average of 5 million annually
  - Strategies: wild fish, , adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- c) Objective: As an interim population objective , increase total adult runs for listed lower Columbia salmon and steelhead to meet NOAA Fisheries' FCRPS Biological Opinion.
  - Strategies: wild fish, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- d) Objective: As an interim population objective for pacific lamprey populations, continue to maintain a stable and increasing population trend
  - Strategies: wild fish, lamprey, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- e) Objective: As an interim population objective, maintain a stable and increasing population trend for sturgeon and bull trout
  - Strategies: Resident fish mitigation, wild fish, sturgeon, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- f) Objective: As an interim population objective, maintain a stable and increasing population trend for kokanee, cutthroat trout and other resident fish focal species
  - Strategies: Resident fish mitigation, wild fish, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)

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<sup>10</sup> Healthy is defined as having abundance, productive, diverse and spatially distributed populations.

- 14. Goal:** Achieve full mitigation for anadromous fish and native resident fish
- a) Objective: As an interim objective, increase total adult salmon and steelhead runs to an average of 5 million annually by 2025 in a manner that emphasizes the populations that originate above Bonneville Dam and supports tribal and non-tribal harvest.
- Strategies: hatchery, wild fish, , anadromous fish mitigation strategy in blocked areas of the basin, adaptive management
    - Indicators: [Abundance of Fish and Wildlife](#); [Hydrosystem Passage and Survival](#)
- b) Objective: As an interim objective, achieve smolt-to-adult return rates in the 2-6 percent range (minimum 2 percent; average 4 percent) for listed Snake River and upper Columbia salmon and steelhead.
- Strategies: hatchery, wild fish, , , anadromous fish mitigation strategy in blocked areas of the basin, adaptive management
    - Indicators: [Abundance of Fish and Wildlife](#); [Hydrosystem Passage and Survival](#)
- 15. Goal:** Encourage biologically diverse species that are resilient to environmental variability
- a) Objective: Within 100 years, achieve population characteristics that, while fluctuating due to natural variability, represent full mitigation for losses of fish.
- Strategies: wild fish, propagation and hatchery programs, adaptive management, resident fish mitigation, lamprey, sturgeon, eulachon, anadromous fish mitigation in the blocked areas
    - Indicator: [Abundance of Fish and Wildlife](#)
- 16. Goal:** Achieve the delisting and recovery criteria for ESA-listed species in the biological opinions, including for listed salmon and steelhead in NOAA Fisheries' 2008 FCRPS, Upper Snake and Willamette River biological opinions, and those for listed Kootenai River White Sturgeon, bull trout, and Oregon chub in the U.S. Fish and Wildlife Service's FCRPS (2000), Libby Dam (2006) and Willamette River (2008) biological opinions (see footnote).
- a) Objective: Restore the widest possible set of healthy, naturally reproducing and sustaining populations of salmon and steelhead in each relevant geographic level.
- Strategies: sturgeon, wild fish, adaptive management
    - Indicator: [Abundance of Fish and Wildlife](#)
- b) Objective: As an interim population objective for Kootenai River white sturgeon, bull trout, and other ESA-listed species tracked by program indicators, continue to maintain a stable and increasing population trend



- Strategies: sturgeon, wild, adaptive management
  - Indicator: [Abundance of Fish and Wildlife](#)

**17. Goal:** Achieve anadromous fish inriver migration and passage survival that approximates natural survival during inriver migration

a) Objective: Achieve the four juvenile and adult fish passage performance standards consistent with the most recent NOAA Fisheries FCRPS Biological Opinion<sup>11</sup>. As of 2009 these consist of:

- Annually achieve juvenile fish dam passage performance standards at each Snake River (SR) and lower Columbia River dam:


ESU	Juvenile Standard
spring Chinook and steelhead (spring migrants)	Achieve at least 96 percent dam passage survival
SNAKE RIVER fall Chinook subyearlings (summer migrants)	Achieve at least 93 percent dam passage survival

- Annually achieve the adult fish performance standards for each of the salmon and steelhead evolutionarily significant units (ESU) listed below for the specified reaches between Bonneville Dam (BON), Lower Granite Dam (LGR), and McNary Dam (MCN):

ESU	Adult Standard	Reach
SR Fall Chinook	81.2%	BON to LGR
SR Spring – Summer Chinook	91.0%	BON to LGR
SR Sockeye	Use SR spring/summer Chinook salmon and steelhead as surrogate until a standard is developed.	BON to LGR
SR steelhead	90.1%	BON to LGR
UCR spring Chinook	90.1%	BON to MCN
UCR steelhead	84.5%	BON to MCN
MCR steelhead	Use SR steelhead as surrogate until a standard is developed.	Variable
CR chum	None, assume survival is adequate if SR fall Chinook BON to LGR standard	None

<sup>11</sup> For more details consult the Reasonable and Prudent Alternative No. 52 - *Hydrosystem Research, Monitoring and Evaluation Strategy 2* of the NOAA Fisheries 2008 FCRPS Biological Opinion, including Table 7.

	is met	
LCR Chinook	None, assume that survival for spring and fall populations is adequate if SR spring/summer Chinook and SR fall Chinook standards are met.	None
LCR coho	None, assume that survival is adequate if SR fall Chinook BON to LGR standard is met.	None
LCR steelhead	None, assume that survival is adequate if SR steelhead BON to MCN standard is met.	None
UWR Chinook	None, not expected to migrate upstream of Bonneville Dam	None
UWR steelhead	None, not expected to migrate upstream of Bonneville Dam	None

- Strategies: water quality, mainstem hydrosystem flow and passage operations, adaptive management
  - Indicator: [Hydrosystem Passage and Survival](#) 

### **Theme Three: Compensate for a Wide Range of Impacts Caused by the Hydrosystem**

**18. Goal:** Enhance harvest of anadromous fish including salmon, steelhead, and lamprey, and resident fish

a) Objective: remains to be identified and adopted

- Strategies: resident fish mitigation , anadromous fish mitigation strategy in blocked areas of the basin, hatchery, non-native and invasive species, wild fish, adaptive management
  - Indicators: to be developed under the abundance of fish and wildlife and Council action categories

**19. Goal:** Reintroduce anadromous fish extirpated from areas blocked by the construction and operation of the Columbia River Basin's hydrosystem

a) Objectives: remain to be identified and adopted

- Strategies: anadromous fish mitigation strategy in blocked areas of the basin, adaptive management
  - Indicators: to be developed under the abundance of fish and wildlife and Council action categories

## Theme Four: Public Engagement

- 20. Goal:** Inform the public about the program to encourage involvement
- a) Objective: As an interim public engagement objective, update the indicator graphics on the program's High-level Indicator website and dashboards and produce the report to governors and Congress
    - Strategies: public engagement, adaptive management
      - Indicators: to be developed under the Council action category
- 21. Goal:** Encourage considering the program within a social and ecological context.
- a) Objectives remain to be identified and adopted
    - Strategies: public engagement, adaptive management
      - Indicators: to be developed under the Council action category
- 22. Goal:** Achieve open public access for all program-related data.
- a) Objectives remain to be identified and adopted
    - Strategies: public engagement, adaptive management
      - Indicators: to be developed under the Council action category

## *E. Council high-level indicators*

The Council recognizes that it is only one among many entities invested in mitigating, protecting and enhancing the basin's species and habitat. The Council defines the program's responsibility as consisting of mitigating, protecting and enhancing for the hydrosystem impacts described by the [Northwest Power Act](#).

The Council approved during its October 2009 meeting three high-level indicators (HLI) that will be used to monitor the status and trend of the program's focal species and the progress of the Council's fish and wildlife program. The Council chose to postpone its decision on the fourth HLI, ecosystem health, until it is defined more clearly. [see [motion](#) and [presentation](#)]. These HLI will be used to report to Congress and the Northwest's governors:

1. Abundance of fish and wildlife
2. Hydrosystem survival and passage; and
3. Council actions.

During the October 2009 meeting, to guide the Council's HLI and their supporting fish and wildlife program indicators (FWIs), the Council also approved these fish and wildlife program management questions as a working list that is refined as needed:

- Are Columbia River Basin fish and wildlife abundant, diverse, productive, spatially distributed, and sustainable?
- Are the actions implemented by the Council fish and wildlife program having the expected biological effect on fish and wildlife and their habitat?
- Are Columbia River Basin ecosystems healthy?
- Are ocean conditions affecting Columbia River Basin anadromous fish?
- Is climate change affecting fish and wildlife in the Columbia River Basin?
- Are operations of the Columbia River Basin's hydropower dams supporting fish-passage survival objectives?
- Is harvest consistent with the fish and wildlife program's vision?
- Do hatcheries complement resident and anadromous recovery and harvest goals within the Columbia River Basin?
- Are the fish and wildlife losses associated with the development and operation of the Columbia River Basin's hydrosystem being mitigated as described by the Council's fish and wildlife program?
- What has been accomplished under the Council's fish and wildlife program?

The HLI graphics are reported on the Council's [High-Level Indicator report](#) and the supporting FWI graphics are reported on the Council's [subbasin dashboard](#). The development and refinement of the indicators, questions, and graphics are done in collaboration with fish and wildlife agencies and tribes. The information used to populate these indicator graphics is provided by program-funded projects as well as non-program-funded information gathered by fish and wildlife agencies and tribes. See the [Table of Indicators](#) on the Council's website for the current list and reporting status of the Council's questions, HLI, and supporting FWI.

## ***F. Future hydropower electric development and licensing, and protected areas***

The overarching sub-strategy and a summary of key provisions are in the main text of the program. Appendix F contains the substantive provisions of this portion of the program, in three parts; (a) future hydroelectric development and licensing standards and implementation; (b) protected areas and implementation; and (c) general implementation measures.

### **a) Future Hydroelectric Development and Licensing**

#### **Sub-strategy**

Ensure that new hydroelectric development is 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.

#### **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.

#### **General Measures - Standards for new hydroelectric development and licensing:**

- Potential effects on fish
  - The Federal Energy Regulatory Commission, Corps of Engineers, Bureau of Reclamation and Bonneville shall not license, exempt from license, relicense, 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 these development conditions:
    - 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 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
  - 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 these development conditions:
    - Consulting 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 create islands, 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-

- apping, 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 the usual and accustomed, traditional or contemporary hunting 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
- Ensure that all licenses for hydroelectric projects or documents that propose, recommend, or otherwise support hydroelectric development explain in detail how the provisions of this section will be accomplished or the reasons why the provisions cannot be incorporated into the project.

## **b) Protected areas**

### **Sub-strategy**

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

### **Protected Areas List**

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. For each river reach listed on the



Protected Areas List, the fish and wildlife to be protected are those on the list. Information on [protected areas](#) may be accessed through the Council's website. The Council will also supply a list of the protected areas to any party free of charge.

### **Rationale**

Beginning in 1983, the Council directed extensive studies of existing habitat and has 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 certain river reaches as "protected areas," where the Council believes hydroelectric development would have unacceptable risks of loss to fish and wildlife species of concern, their productive capacity or their habitat.

Most of the river reaches designated as protected areas are in the Columbia River Basin. But the designations also include river reaches outside the Columbia River Basin but within the service territory of the Bonneville Power Administration 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.

### **General Measures - Implementing protected areas:**

- **Bonneville Power Administration**
  - 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.

- **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.

### **Exemptions**

- The Council adopts conditions for exemptions to this policy.
  - 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, and
    - Any addition of hydroelectric generation facilities to a non-hydroelectric dam or diversion structure

### **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 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.

### **Effect on riparian areas**

This measure applies to river reaches, or portions of river reaches, and 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 determinations.

### **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 Indian 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 areas data base
  - 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 data base**

The Council staff is authorized, on its own initiative or on the request of any party offering technically credible information, to make minor technical corrections in the protected areas data base. 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.

#### **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 Indian 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 Indian 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.

**c) General implementation measures**

- **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.

**Ensure consistency with this program**

- **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. This provision is not intended to supplant review of such applications by the fish and wildlife agencies and tribes.

- **Federal land managers, federal and state fish and wildlife agencies and other state agencies**

- Federal and state fish and wildlife agencies and federal resource agencies shall 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.

- **Corps of Engineers, Bureau of Reclamation, and any other federal agency studying or proposing hydroelectric development in the Columbia River Basin**
  - Shall provide opportunity for Council review and comment.

## ***G. Climate change impacts in the Columbia River Basin***

The purpose of this appendix is to identify possible future climate change impacts in the Columbia River Basin, based on literature review and available climate change studies. Most predicted impacts are associated with projected increases in air and water temperatures and include increased stress on coldwater fisheries sensitive to a warming aquatic habitat, potentially improved habitat for invasive Dreissenid mussels having implications for maintenance of hydraulic structures, and increased risk of watershed vegetation disturbances due to increased fire potential. Drought and hot, dry weather have led to an increase in outbreaks of insects in the Columbia Basin, especially mountain pine beetle, and insect outbreaks are likely to become more common and widespread. Other warming-related impacts include pole-ward shifts in the geographic range of various species, impacts on the timing of arrival and departure of migratory species, amphibian population declines, and effects on pests and pathogens in ecosystems. Climate change can also trigger synergistic and cascading effects in ecosystems and exacerbate non-native and invasive species problems.

Changes in hydrologic flow regimes and warming stream and reservoir temperatures caused by a warming climate will pose significant threats to aquatic ecosystems and are expected to alter key habitat conditions for salmon and other cold water aquatic species such as trout. For example, bull trout require very cold headwater streams for spawning, and a warming climate may disproportionately affect this species. Salmonids and other cold water species currently living in conditions near the upper range of their thermal tolerance will be particularly vulnerable to increased mortality and susceptibility to disease from higher water temperatures.

Anticipated climate change effects in the Northwest include specific hydrologic changes such as increased frequency and severity of winter flooding in mixed rain-snow basins. Region-wide increases in winter flows and summer temperatures, combined with lower summer flows, will threaten many freshwater species, particularly salmon, steelhead, and trout. Higher winter water temperatures also could accelerate embryo development and cause premature emergence of fry in basin tributaries. Rising temperatures will also increase disease and mortality in several salmon species such as spring/summer Chinook and sockeye, especially in interior Columbia and Snake river basins. Some Northwest streams have already warmed, on average, over the past three decades, contributing to changes such as earlier Columbia River sockeye migration.

As species respond to climate changes in various ways, there is also a potential for ecological mismatches to occur, such as the timing of emergence of predators and their prey. For example, increases in stream temperature are expected to result in greater habitat overlap between juvenile Chinook salmon and predatory

non-native species such as bass in the early summer, as well as greater abundance of bass and other warm water predator species.

Climate change could also have significant effects on mainstem Columbia and Snake river flows and habitat in terms of runoff timing, water quantity, and temperature, impacting salmon in various ways. It is believed that mainstem temperature increases would accelerate the rate of egg development of fall Chinook, which spawn in the mainstem of the Snake and Columbia rivers, leading to earlier emergence at a smaller size than historically. Smaller-sized fry are likely to have lower survival due to increased vulnerability to predators, and predation rates would also likely increase. Potential impacts of increased water temperatures on adult salmon migration in the mainstem include delays in dam passage, failure to enter (or exit) fish ladders, increased fallback, and loss of energy reserves due to increased metabolic demand. Increased adult salmon mortality may also be caused by fish pathogens and parasites, as these organisms often do not become injurious until the host becomes thermally stressed.

Changes in freshwater flow into the Columbia River estuary caused by climate change are expected to be less than those caused by the hydrosystem. However, some changes in estuary habitats may occur. For example, sea level rise, in conjunction with higher winter river flows, could cause the degradation of estuary habitats created by sediment deposition from increased wave damage during storms. Numerous warm-water adapted fish species, including several non-indigenous species, normally found in freshwater have been reported in the estuary and might expand their populations and range with warmer water and seasonal expansion of freshwater habitats. Climate change also may affect the trophic dynamics of the estuary due to upstream extension of the salt wedge in spring/early summer caused by reduced river flows. The upriver head of the salt wedge is characterized by a turbulent region known as the estuary turbidity maximum, an area with high concentrations of fish food organisms. Changes in the upstream extension of the salt wedge will influence the location of this zone, but it is difficult to forecast the effect this change will have on juvenile salmon.

Scientific evidence strongly suggests that global climate change is already altering marine ecosystems. Physical changes associated with warming include increases in ocean temperature, increased stratification of the water column, and changes in the intensity and timing of coastal upwelling, as well as increases in ocean acidification and hypoxia events. These changes will alter ocean productivity, the structure of marine communities, and, in turn, the growth, productivity, survival, and migration patterns of anadromous fish.

The possible changes in regional snowpack, river flows, temperatures, and reservoir elevations due to climate change could have a profound impact on the success of habitat restoration efforts under the program and the status of Columbia River Basin fish and wildlife populations. The Independent Scientific



Advisory Board produced a report on potential climate change impacts in the Columbia River Basin. See [ISAB Report 2007-2, \*Climate Change Impacts on Columbia River Basin Fish and Wildlife\*](#).

## ***H. Fish Passage Center***

The Council has established an oversight board for the Center, with representation from NOAA Fisheries, state fish and wildlife agencies, tribes, the Council, and others to ensure that the functions are implemented consistent with the Council's program. The oversight board will conduct an annual review of the performance of the center and develop a goal-oriented implementation plan to assure regional accountability and compatibility with the regional data management system, as well as program consistency. The oversight board will also work with the center and the ISAB to organize a regular system of independent and timely science review of analytical products. The oversight board shall determine the requirements for peer review of analytical products. The center shall prepare an annual report to the oversight board and the council, summarizing its activities and accomplishments. There will be no other oversight board or board of directors for the center.

Implementation shall include funds for a manager and for technical and clerical support necessary in order to perform the stated functions. The fish passage manager will be selected based on his or her knowledge of the multiple purposes of the regional hydropower system, and of the water needs of fish and wildlife, as well as the ability to communicate and work with fish and wildlife agencies, tribes, the Council, project operators, regulators, and other interested parties, including members of the public. The manager shall be supervised by the contracting entity selected by Bonneville, and the contractor shall have the authority and obligation to conduct an annual performance review of the manager, after consultation with the oversight board.

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.

The center shall continue to provide an empirical data base of fish passage information for use by the region, not just by fish and wildlife managers. No information collected -- and no analyses -- shall be considered proprietary. The oversight board and the fish and wildlife managers will ensure that the data base conforms to appropriate standards for data management, including review of the data base by an appropriate scientific or data-review group. The Council may revise the center's fish-passage data collection functions as the region develops a comprehensive data management system.

## ***I. Alternative operations at Grand Coulee***

Operate Grand Coulee Dam from July through December consistent with the following considerations:

- Subject to in-season management, draft Lake Roosevelt to the target elevations of 1,278 or 1,280 feet by the end of August. As specified in Washington’s *Columbia River Basin Water Management Program*, 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 much as possible within current operating constraints, manage the reservoir and dam discharges to minimize fluctuations and ramping rates and produce steady flows across each season and each day
- From September through December, attempt to maximize water retention times and protect kokanee access and spawning. Federal action agencies, fish and wildlife agencies and tribes, and others should consult within the in-season management process to determine how to provide the biological benefits above while meeting biological opinion requirements, including chum flows, and operating to protect flows for the Hanford Reach.
- Two high priorities for Grand Coulee through the year should be to contribute to the establishment and protection of the necessary spawning and rearing conditions in the Hanford Reach described above and to refill by the end of June, subject to in-season management. Summer and fall operations should be consistent with these priorities.

<b>Period</b>	<b>Minimum Mean Minimum Elevation</b>	<b>Water Retention Time</b>
January	1,270 ft above sea level	45 days
February	1,260	40 days
March-April 15	1,250	30 days
April 16	1,255	30 days
May	1,265	35 days
June	Fill to 1,290	40-60 days or maximum historically achievable for each month

## ***J. Wildlife crediting forum***

In 2010 the Council chartered the Wildlife Crediting Forum to provide advice on the crediting and accounting of wildlife habitat mitigation associated with the construction and inundation impacts of the Federal Columbia River Power System (FCRPS). The forum submitted its [final report](#) to the Council in September 2011. It was accepted by the Council and published on the Council's website. The forum agreed on the following protocols and standards:

- Establishment of a ledger depicting the current status of Bonneville-funded wildlife mitigation activities
- Development of standard operating procedures for future applications of HEP
- Development of protocols for determining the amount of credit Bonneville should receive for management actions that occur on federal lands
- Development of protocols for determining the amount of credit that Bonneville should receive for fish mitigation projects that benefit wildlife
- Acceptance of the fish and wildlife program loss assessments as the agreed-upon measure of wildlife losses

Future wildlife mitigation efforts should rely on these protocols and standards as the basis for determining the amount of mitigation credit that Bonneville should receive for mitigation activities.

## ***K. Resident fish mitigation settlements***

Perpetual land protection efforts are one of the most effective ways 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.

### **General measures**

- In areas of the basin where quantitative assessments of native resident fish losses have been completed, and mitigation based on native resident fish is not feasible, perpetual land acquisitions should be used, at a minimum ratio of 1:1 mitigation to lost distance or area, to benefit fish habitat as a primary tool for mitigation and settlement.
- Whenever possible, resident fish mitigation through habitat acquisitions should take place through settlement 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 mitigation objectives, and provisions to ensure effective implementation with periodic monitoring and evaluation. Resident fish mitigation agreements should be permanent or span multiple years and be long-term in duration. These agreements should 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 or the local economic base, and consistency with local governments' comprehensive plans
  - When possible, provide 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 for 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 in order for the Council to evaluate the mitigation benefits
  - Assurance of long-term maintenance of the habitat adequate 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
  - Adequate funding for operation and maintenance

- Resident fish mitigation agreements may include the protection of undegraded or less degraded habitat or, in appropriate circumstances may include protection and improvement of degraded habitat when necessary for effective mitigation. In the latter case, any mitigation agreements with Bonneville should include sufficient funding to enhance, restore, and create habitat functions and values for the target species of resident fish on acquired lands that are degraded.
- Resident fish mitigation agreements may represent incremental mitigation based on individual habitat acquisitions. However, where a resident fish loss assessment has been developed for a particular hydropower facility or for an entire subbasin using the best available scientific methods and the loss assessment has been accepted as part of the program, the Council encourages mitigation settlement agreements.
- The Bonneville Power Administration will require, wherever possible, that resident fish mitigation agreements through habitat acquisitions include a management plan 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.

#### **Management plan and operation and maintenance funding**

- Resident fish mitigation agreements shall include a management plan agreed to by Bonneville and the management entity adequate to sustain the minimum credited habitat values for the life of the project. Agreements shall include sufficient funding for operation and maintenance over the long term to demonstrate a substantial likelihood of achieving and sustaining the mitigation objectives.

## ***L. Reporting***

The [Council's annual report to Governors and Congress](#) (for example, the 2013 Columbia River Basin Fish and Wildlife Program Costs Report) provides an accounting of fish and wildlife expenditures and hydropower operation costs, and how program projects are being adapted to focus on high-priority limiting factors and focal species in priority areas. The report will include a discussion of any data gaps, redundancies and recommended changes to achieve greater efficiencies. The report is compiled by the Council from data provided by Bonneville.

**Science/policy exchanges:** These exchanges inform the region about emerging information, innovative tools, and critical research uncertainties that may have program policy implications such as updating its priority research uncertainties. These exchanges are organized by Council in collaboration with the Independent Scientific Advisory Board (ISAB) and other interested parties, as needed, and serve to inform the Columbia River Basin's Fish and Wildlife agencies and tribes (agencies and tribes), researchers, and policy-makers.

**Council topic-specific tracking:** This tracking will include: (1) starting in 2015 annual anadromous fish forecasts and results; (2) Annual reports by Bonneville and the hatchery managers on the number of juvenile fish released each year; the number of adults that contribute to harvest, are used for broodstock, and are present on the spawning grounds for all hatchery programs that receive Bonneville funding. The first report should be submitted in December 2014. Council staff, Bonneville, fish and wildlife agencies and tribes and other experts will prepare these topic-specific reports as requested by the Council for informing the Council and policy-makers.

**Council's high-level indicator report:** This is a web-based report of highly synthesized information that is conveyed graphically, related to the program's objectives and funded actions, supported by the dashboard's content, and is collaboratively updated as new information is made available. This report is produced annually by the Council in collaboration with the data providers, including agencies and tribes, to inform policy-makers and ratepayers.

**Council's dashboard:** This is a web-based report providing synthesis of information representing the scope of the program's mitigation, protection, and enhancement efforts related to the program's focal species and their habitat. The dashboards are updated as needed by the Council.

**Action effectiveness report:** This report from Bonneville assesses and reports on the status of evidence for the effectiveness of actions in altering physical habitat conditions, and as feasible, fish populations. This report will be compiled in collaboration with agencies and tribes and project sponsors who contribute data informing this assessment. Each report will provide an assessment of a

subset of action categories<sup>12</sup> implemented under the current program since the last one was adopted. These are produced by Bonneville one year prior to the start of each program amendment process to inform the Council, the Columbia River Basin fish and wildlife agencies and tribes and researchers, and ratepayers.

**[Annual project progress reports](#)**<sup>🔗</sup>: These reports will be produced by project sponsors and submitted electronically to Bonneville in a format and with content requested by Bonneville consistent with the following guidelines:

- Bonneville should require all research, monitoring and evaluation projects to report annually, providing an electronic summary of their results and interim findings as well as describing benefits to fish and wildlife.
- Reports for monitoring and research activities will include as a minimum: clear objectives and hypothesis, linkage to program priorities, description of any treatments applied, scientific methods including designs and protocols, statistical analyses, statistical results, conclusions, summary of accomplishments to-date, and implications for fish, wildlife, and their habitat.
- At a minimum, all projects must have implementation monitoring that must be reported to Bonneville within six months of completion of the project or annually in the case of multi-year projects.
- Bonneville, in its contracting process, should ensure that each project adheres to the relevant protocols and methods and satisfies the reporting and data-management criteria described in this program or as adopted by the Council.
- An annual project progress report will be a stand-alone, complete document that does not rely on other documents, such as past annual project progress reports, to provide information needed to assess what has been done.

The Council expects that the organization and content of these reports will evolve over time to make them more comprehensive and accessible for the purpose of addressing information needs of Bonneville, the Council, and the ISRP including, for example, the ISRP's project reviews and program retrospective reports.

**[ISAB review of the fish and wildlife program](#)**<sup>🔗</sup>: This review evaluates the program on its scientific merits to inform the Council, agencies, tribes, and researchers.

**[ISAB topic-specific reports](#)**<sup>🔗</sup>: **These reports** provide independent scientific advice and recommendations regarding [scientific issues](#)<sup>🔗</sup> as requested by the


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<sup>12</sup> Action category refers to groups of identical actions implemented under the program, such as hatchery releases, riparian plantings, invasive species removal, and instream large wood-debris additions.



ISAB's administrative oversight panel and serves to inform the Council, NOAA Fisheries, agencies, tribes, and researchers.

**ISRP recommendations based on the review of projects directly funded under the program:** The ISRP provides this review as requested by the Council, following a specific set of criteria, to inform the Council's recommendations to Bonneville. The Council will ask Bonneville to assist in extracting relevant information from annual project reports for the ISRP's review process. This review informs the Council, agencies, tribes, researchers, and Bonneville.

**ISRP  retrospective review of program accomplishments:** The ISRP with assistance from the scientific peer review groups reviews annually the results of prior-year expenditures based on the project review criteria, focusing on measurable benefits to fish and wildlife, and submits its findings to the Council. This report informs the Council, Bonneville, agencies, tribes, and rate-payers. As part of this report, the ISRP should summarize (1) major basinwide programmatic issues identified during project reviews, and (2) findings from Bonneville's summary of monitoring research and findings.

**ISRP  recommendation based on the review of projects funded through Bonneville's reimbursable program:** The ISRP is responsible to review the fish and wildlife projects, programs, or measures included in federal agency budgets that are reimbursed by Bonneville, using the same standards and making recommendations as in its review of the projects proposed to implement the Council's program. This review is produced as requested by the Council and serves to inform the Council, Bonneville, and project sponsors.

In addition, for this review the Council suggests the use of the reporting and project management standards of relevant NOAA Fisheries' biological opinions for projects intended to meet the goals and objectives of those biological opinions.

## ***M. List of subbasin plans and adoption dates***

**Table 1.** Geographic subbasins in the Columbia River Basin and their adoption dates

<b>Subbasin Name</b>	<b>Year Plan Adopted</b>
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

## ***N. 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](#).

### **Anadromous Fish Focal Species (6 species)**

<b>Common Name</b>	<b>Scientific Name</b>
Chinook salmon	<i>Onchorynchus tshawytscha</i>
Chum salmon	<i>Oncorhynchus keta</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Pacific lamprey	<i>Entosphenus tridentatus</i>
Sockeye salmon	<i>Oncorhynchus nerka</i>
Steelhead	<i>Oncorhynchus mykiss</i>

### **Resident Fish Focal Species (22 species)**

<b>Common Name</b>	<b>Scientific Name</b>
Black crappie	<i>Pomoxis nigromaculatus</i>
Bluegill	<i>Lepomis macrochirus</i>
Brook trout	<i>Salvelinus fontinalis</i>
Bull trout	<i>Salvelinus confluentus</i>
Burbot	<i>Lota lota</i>
Coastal cutthroat trout	<i>Oncorhynchus clarki clarki</i>
Cutthroat trout	<i>Oncorhynchus clarki</i>
Freshwater sponge	<i>Ephydatia cooperensi</i>
Green sturgeon	<i>Acipenser medirostris</i>
Kokanee	<i>Oncorhynchus nerka</i>
Largemouth bass	<i>Micropterus salmoides</i>
Molluscs	<i>Mollusca</i>
Mountain whitefish	<i>Prosopium williamsoni</i>
Oregon chub	<i>Oregonichthys Crameri</i>
Redband trout	<i>Oncorhynchus mykiss gairdneri</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Walleye	<i>Stizostedion vitreum vitreum</i>
Westslope cutthroat trout	<i>Oncorhynchus clarki lewisi</i>
White sturgeon	<i>Acipenser transmontanus</i>
Wood River sculpin	<i>Cottus leiopomus</i>
Yellow perch	<i>Perca flavescens</i>
Yellowstone cutthroat trout	<i>Oncorhynchus clarkii bouvieri</i>

### **Wildlife Focal Species (209 species)**

<b>Common Name</b>	<b>Scientific Name</b>
Acorn woodpecker	<i>Melanerpes formicivorus</i>
Agapetus caddisfly	<i>Agapetus montanu</i>
American avocet	<i>Recurvirostra americana</i>
American beaver	<i>Castor canadensis</i>

American bittern	<i>Botaurus lentiginosus</i>
American crow	<i>Corvus brachyrhynchos</i>
American dipper	<i>Cinclus mexicanus</i>
American marten	<i>Martes americana</i>
American pika	<i>Ochotona princeps</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Banbury Springs lanx	<i>Lanx</i> sp.
Band-tailed pigeon	<i>Columba fasciata</i>
Barn owl	<i>Tyto alba</i>
Barrow's goldeneye	<i>Bucephala islandica</i>
Big brown bat	<i>Eptesicus fuscus</i>
Bighorn sheep	<i>Ovis canadensis</i>
Bitterroot mountainsnail	<i>Oreohelix amariradix</i>
Black bear	<i>Ursus americanus</i>
Black swift	<i>Cypseloides niger</i>
Black tern	<i>Chlidonias niger</i>
Black-backed woodpecker	<i>Picoides arcticus</i>
Black-chinned hummingbird	<i>Archilochus alexandr</i>
Black-crowned night heron	<i>Nycticorax nycticoras</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
Bliss Rapids snail	<i>Taylorconcha serpenticola</i>
Blue grouse	<i>Dendragopus obscurus</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Boreal owl	<i>Aegolius funereus</i>
Boreal toad	<i>Anaxyrus boreas</i>
Brewer's sparrow	<i>Spizella breweri</i>
Brown creeper	<i>Certhia americana</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Bruneau hot springsnail	<i>Pyrgulopsis bruneauensis</i>
Burrowing owl	<i>Athene cunicularia</i>
Bushy-tailed woodrat	<i>Neotoma cinerea</i>
California bighorn sheep	<i>Ovis canadensis californiana</i>
California quail	<i>Callipepla californica</i>
Calliope hummingbird	<i>Stellula calliope</i>
Canada goose	<i>Branta canadensis</i>
Canada lynx	<i>Lynx canadensis</i>
Carinate mountainsnail	<i>Oreohelix elrod</i>
Cascades frog	<i>Rana cascadae</i>
Caspian tern	<i>Hydroprogne caspia</i>
Cassin's finch	<i>Carpodacus cassinii</i>
Chipping sparrow	<i>Spizella passerina</i>
Clark's nutcracker	<i>Nucifraga columbiana</i>
Coastal tailed frog	<i>Ascaphus truei Stejneger</i>
Coeur d'Alene salamander	<i>Plethodon idahoensis</i>
Columbian black-tailed deer	<i>Odocoileus hemionus columbianus</i>

Columbian sharp-tailed grouse	<i>Tympanuchus phasianellus columbianus</i>
Columbian white-tailed deer	<i>Odocoileus virginianus leucurus</i>
Common loon	<i>Gavia immer</i>
Common nighthawk	<i>Chordeiles minor</i>
Common snipe	<i>Gallinago gallinago</i>
Common tern	<i>Sterna hirundo</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cordilleran flycatcher	<i>Empidonax occidentalis</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Dunlin	<i>Calidris alpina</i>
Elk	<i>Cervus canadensis</i>
Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>
Ferruginous hawk	<i>Buteo regalis</i>
Fisher	<i>Martes pennant</i>
Flammulated owl	<i>Otus flammeolus</i>
Foster's tern	<i>Sterna forsteri</i>
Franklin's gull	<i>Leucophaeus pipixcan</i>
Fringed myotis bat	<i>Myotis thysanode</i>
Gillette's checkerspot	<i>Euphydryas gillettii</i>
Golden eagle	<i>Aquila Chrysaetos</i>
Golden-mantled ground squirrel	<i>Spermophilus lateralis</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray (Hungarian) partridge	<i>Perdix perdix</i>
Gray flycatcher	<i>Empidonax wrightii</i>
Gray wolf	<i>Canis lupus irremotus</i>
Gray-crowned rosy-finch	<i>Leucosticte tephrocotis</i>
Great Basin Spadefoot	<i>Spea intermontana</i>
Great blue heron	<i>Ardea herodias</i>
Great gray owl	<i>Strix nebulosa</i>
Great horned owl	<i>Bubo virginianus</i>
Greater sandhill crane	<i>Grus canadensis tabida</i>
Green heron	<i>Butorides virescens</i>
Green-tailed towhee	<i>Pipilo chlorurus</i>
Grey flycatcher	<i>Muscicapa griseisticta</i>
Grizzly bear	<i>Ursus arcto</i>
Gyr Falcon	<i>Falco rusticolus</i>
Hammond's flycatcher	<i>Empidonax hammondii</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Hoary bat	<i>Lasiurus cinereus</i>
Hoary marmot	<i>Marmota caligata</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Horned grebe	<i>Podiceps auritus</i>
Horned lark	<i>Eremophila alpestris</i>
House finch	<i>Carpodacus mexicanus</i>
Idaho springsnail	<i>Pyrgulopsis idahoensis</i>
Larch Mountain salamander	<i>Plethodon larselli</i>

Lark sparrow	<i>Chondestes grammacus</i>
Lazuli bunting	<i>Passerina amoena</i>
LeConte's sparrow	<i>Ammodramus leconteii</i>
Leopard frog	<i>Rana pipiens</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Long-billed curlew	<i>Numenius americanus</i>
Long-toed salamander	<i>Ambystoma macrodactylum</i>
Lyre mantleslug	<i>Udosarx lyrat</i>
Magnum mantleslug	<i>Magnipelta mycophag</i>
Mallard	<i>Anas platyrhynchos</i>
Marbled Jumping-slug	<i>Hemphillia danielsi</i>
Marbled murrelet	<i>Brachyramphus marmoratus</i>
Merlin	<i>Falco columbarius</i>
Millipede	<i>Austrotyla montani</i>
Millipede	<i>Corypus cochlearis</i>
Mink	<i>Mustela vison</i>
Montane vole	<i>Microtus montanus</i>
Moose	<i>Alces alces</i>
Mountain goat	<i>Oreamnos americanus</i>
Mountain quail	<i>Oreortyx pictus</i>
Mule deer	<i>Odocoileus hemionus</i>
Northern alligator lizard	<i>Elgaria coerulea</i>
Northern bog lemming	<i>Synaptomys boreali</i>
Northern goshawk	<i>Accipiter gentilis</i>
Northern harrier	<i>Circus cyaneus</i>
Northern Idaho ground squirrel	<i>Spermophilus brunneus brunneus</i>
Northern pocket gopher	<i>Thomomys talpoides</i>
Northern pygmy-owl	<i>Glaucidium gnoma</i>
Northern sagebrush lizard	<i>Sceloporus graciosus graciosus</i>
Northern spotted owl	<i>Strix occidentalis caurina</i>
Nuttall's cottontail	<i>Sylvilagus nuttallii</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Oregon slender salamander	<i>Batrachoseps wrightorum</i>
Oregon spotted frog	<i>Rana pretiosa</i>
Peregrine falcon	<i>Falco peregrinus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Preble's shrew	<i>Sorex preblei</i>
Pronghorn antelope	<i>Antilocapra americana</i>
Purple martin	<i>Progne subis</i>
Pygmy nuthatch	<i>Sitta pygmaea</i>
Pygmy rabbit	<i>Brachylagus idahoensis</i>
Raccoon	<i>Procyon lotor</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Red tree vole	<i>Arborimus longicaudus</i>
Red-eyed vireo	<i>Vireo Olivaceus</i>

Redhead	<i>Aythya americana</i>
Red-legged frog	<i>Rana draytonii</i>
Red-naped sapsucker	<i>Sphyrapicus nuchalis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-necked pheasant	<i>Phasianus colchicus</i>
River otter	<i>Lutra canadensis</i>
Rocky Mountain elk	<i>Cervus elaphus nelsoni</i>
Rocky Mountain mule deer	<i>Odocoileus hemionus hemionus</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Rufous hummingbird	<i>Selasphorus rufus</i>
Sage grouse	<i>Centrocercus urophasianus</i>
Sage sparrow	<i>Amphispiza belli</i>
Sage thrasher	<i>Oreoscoptes montanus</i>
Sandhill crane	<i>Grus canadensis</i>
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>
Sharptailed snake	<i>Contia tenuis</i>
Sheathhead slug	<i>Zacoleus idahoensis</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Smoky tailedropper	<i>Prophyaon humil</i>
Snake River physa	<i>Physa natricina</i>
Snowshoe hare	<i>Lepus americanus</i>
Snowy owl	<i>Nyctea scandiaca</i>
Snowy porter	<i>Charadrius alexandrinus</i>
Sora	<i>Porzana carolina</i>
Southern alligator lizard	<i>Elgaria multicarinatus</i>
Southern red-backed vole	<i>Myodes gapperi</i>
Southwestern Willow flycatcher	<i>Empidonax traillii adastus</i>
Spalding's catchfly	<i>Silene spaldingii</i>
Spotted bat	<i>Euderma maculatum</i>
Spotted frog	<i>Rana luteiventris</i>
Spotted owl	<i>Strix occidentalis</i>
Spotted skunk	<i>Spilogale gracilis</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Taylor's checkerspot butterfly	<i>Euphydryas editha taylori</i>
Three-toed woodpecker	<i>Picoides tridactylus</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Trumpeter swan	<i>Cygnus buccinator</i>
Tundra swan	<i>Cygnus columbianus</i>
Turkey vulture	<i>Cathartes aura</i>
Utah valvata snail	<i>Valvata utahensis</i>
Vaux's swift	<i>Chaetura vauxi</i>
Veery	<i>Catharus fuscescens</i>
Vesper sparrow	<i>Poocetes gramineus</i>
Washington ground squirrel	<i>Spermophilus washingtoni</i>
Western bluebird	<i>Sialia mexicana</i>



Western Grebe	<i>Aechmoporus occidentalis</i>
Western grey squirrel	<i>Sciurus griseus</i>
Western meadowlark	<i>Sturnella neglecta</i>
Western pond turtle	<i>Clemmys marmorata</i>
Western rattlesnake	<i>Crotalus viridis</i>
Western skink	<i>Eumeces skiltonianu</i>
Western toad	<i>Bufo boreas</i>
Western wood-pewee	<i>Contopus sordidulus</i>
Western yellow-billed cuckoo	<i>Coccyzus americanus</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-faced ibis	<i>Plegadis chihi</i>
White-headed woodpecker	<i>Picoides albolarvatus</i>
White-tailed ptarmigan	<i>Lagopus leucura</i>
Williamson's sapsucker	<i>Sphyrapicus thyroideus</i>
Willow flycatcher	<i>Empidonax traillii</i>
Winter wren	<i>Troglodytes troglodytes</i>
Wolverine	<i>Gulo gulo</i>
Wood duck	<i>Aix sponsa</i>
Yellow pine chipmunk	<i>Neotamias amoenus</i>
Yellow warbler	<i>Dendroica petechia</i>
Yellow-breasted chat	<i>Icteria virens</i>

## ***O. Subbasin and basinwide measures***

### **Fish and Wildlife Program measures**

The Council received recommendations containing extensive lists of specific action measures for implementation in the next 5-10 years in these tributary subbasins, specific mainstem reaches, and the estuary. These specific measures cover an extensive array of habitat, production, and monitoring, evaluation and research activities. [Part Six, section I](#) includes conditions under which all such measures will be implemented.

#### **1. Subbasin measures**

##### ***Columbia Estuary Subbasin***

Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Lower Columbia Fish Recovery Board [2009](#) and [Plan, 2014](#)  
Lower Columbia River Estuary Partnership [2009](#) and [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

##### ***Cowlitz, Elochoman, Grays, Kalama, Lewis, Little White Salmon, Lower Columbia Mainstem, Washougal, Wind Subbasins***

Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Lower Columbia Fish Recovery Board [2009](#) and [Plan, 2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)  
Natural Solutions [2009](#)

##### ***Willamette Subbasin***

Columbia Basin Fish Accords-[Warm Springs](#)  
The Confederated Tribes of Grande Ronde [2009](#) and [2014](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Willamette Biological Opinion [2008](#) (section 9)  
City of Portland [2009](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

##### ***Sandy Subbasin***

Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan

##### ***White Salmon Subbasin***

Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Fifteenmile Subbasin***

Columbia Basin Fish Accords-[Warm Springs](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Hood Subbasin***

Columbia Basin Fish Accords-[Warm Springs](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Hood Watershed Group [2009](#) and [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Klickitat Subbasin***

Columbia Basin Fish Accords - [Yakama](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Columbia Gorge mainstem subbasin***

Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Northwest Sportsfishing Industry Association [2009](#) and [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Crab Subbasin***

Washington Department of Fish and Wildlife [2009](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Deschutes Subbasin***

Columbia Basin Fish Accords-[Warm Springs](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Deschutes Basin Board of Control [2009](#)  
Deschutes River Conservancy [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***John Day Subbasin***

Columbia Basin Fish Accords -[Umatilla](#)  
Columbia Basin Fish Accords-[Warm Springs](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Palouse Subbasin***

Washington Department of Fish and Wildlife [2009](#)

FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Tucannon Subbasin***

Nez Perce Tribe [2009](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Snake River Salmon Recovery Plan for Southeast Washington [2009](#) and [plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Umatilla Subbasin***

Columbia Basin Fish Accords -[Umatilla](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Walla Walla Subbasin***

Columbia Basin Fish Accords -[Umatilla](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Snake River Salmon Recovery Plan for Southeast Washington [2009](#) and [plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Yakima Subbasin***

Columbia Basin Fish Accords - [Yakama](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Yakima steelhead recovery plan [2009](#) and [plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Lower Middle Columbia/Lower Snake Subbasins***

Columbia Basin Fish Accords - [Yakama](#)  
Nez Perce Tribe [2009](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Snake River Salmon Recovery Plan for Southeast Washington [2009](#) and [plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Entiat Subbasin***

Columbia Basin Fish Accords - [Yakama](#)  
Columbia Basin Fish Accords - [Colville](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Board [2009](#)  
and [Plan](#)

Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Lake Chelan Subbasin**

Washington Department of Fish and Wildlife [2009](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Methow Subbasin**

Columbia Basin Fish Accords - [Yakama](#)  
Columbia Basin Fish Accords - [Colville](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Board [2009](#)  
and [Plan](#)  
Methow Conservancy [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Okanogan Subbasin**

Columbia Basin Fish Accords - [Colville](#)  
Washington Department of Fish and Wildlife [2009](#)  
Upper Columbia United Tribes [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Board [2009](#)  
and [Plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Wenatchee Subbasin**

Columbia Basin Fish Accords - [Yakama](#)  
Columbia Basin Fish Accords - [Colville](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Board [2009](#)  
and [Plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Upper Middle Columbia Subbasin**

Columbia Basin Fish Accords - [Colville](#)  
Columbia Basin Fish Accords - [Yakama](#)  
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Board [2009](#)  
and [Plan](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### **Coeur d'Alene Subbasin**

Coeur d'Alene Tribe [2009](#)

Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
Upper Columbia United Tribes [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Pend Oreille Subbasin***

Coeur d'Alene Tribe [2009](#)  
Columbia Basin Fish Accord - [Kalispel](#) and Kalispel Tribe [2009](#) and [2014](#),  
Kootenai Tribe of Idaho recommendation [2009](#)  
Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
Upper Columbia United Tribes [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***San Poil/Lake Rufus Woods/Upper Columbia Mainstem Subbasins***

Columbia Basin Fish Accords - [Colville](#)  
Spokane Tribe of Indians [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#)  
Upper Columbia United Tribes [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Spokane Subbasin***

Coeur d'Alene Tribe [2009](#) and [2014](#)  
Spokane Tribe of Indians [2009](#) and [2014](#)  
Upper Columbia United Tribes [2014](#)  
Washington Department of Fish and Wildlife [2009](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Flathead Subbasin***

Columbia Basin Fish Accords - [Montana](#) and Montana Fish Wildlife and Parks [2009](#) and [2014](#)  
Confederated Salish and Kootenai Tribes [2009](#) and [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Kootenai Subbasin***

Columbia Basin Fish Accords - [Montana](#) and Montana Fish Wildlife and Parks [2009](#) and [2014](#)  
Kootenai Tribe of Idaho recommendation [2009](#) and [2014](#)  
Confederated Salish and Kootenai Tribes [2009](#) and [2014](#)  
Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
Upper Columbia United Tribes [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Libby Dam [biological opinion](#), Libby Dam Biological Opinion [settlement agreement](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Asotin Subbasin***

Nez Perce Tribe [2009](#)  
Washington Department of Fish and Wildlife [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Snake River Salmon Recovery Plan for Southeast Washington [2009](#) and [plan](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Grande Ronde Subbasin***

Columbia Basin Fish Accords -[Umatilla](#)  
Nez Perce Tribe [2009](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Imnaha Subbasin***

Nez Perce Tribe [2009](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Snake Hells Canyon Subbasin***

Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Clearwater Subbasin***

Columbia Basin Fish Accords ([Shoshone-Bannock](#)) and Shoshone-Bannock Tribes [2009](#)  
Nez Perce Tribe [2009](#)  
Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

### ***Salmon Subbasin***

Columbia Basin Fish Accords ([Shoshone-Bannock](#)) and Shoshone-Bannock Tribes [2009](#)  
Nez Perce Tribe [2009](#)  
Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
Oregon Department of Fish and Wildlife [2014](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

***Boise/Payette/Weiser, Bruneau, Burnt, Malheur, Middle Snake, Owyhee, Powder, Upper Snake Subbasins***

Burns Paiute Tribe [2009](#) and [2014](#)  
Columbia Basin Fish Accords ([Shoshone-Bannock](#)) and Shoshone-Bannock Tribes [2009](#)  
Shoshone-Paiute Tribe [2009](#)  
Columbia Basin Fish Accord - [Idaho](#) and Idaho Department of Fish and Game/Office of Species Conservation [2009](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009a](#), [2009b](#)

**2. Basinwide and mainstem measures**

To the extent the recommendations listed here include specific actions proposed for implementation, they are included as basinwide and mainstem measures. General principles and strategies provided in the recommendations are not included here as measures.

***Research monitoring and evaluation, data management, coordination***

Columbia Basin Fish Accords - [Colville](#)  
The Confederated Tribes of Grande Ronde [2014](#)  
Kalispel Tribe [2009](#) and [2014](#), [Columbia Basin Fish Accord \(Kalispel\)](#)  
Kootenai Tribe of Idaho recommendation [2009](#) and [2014](#)  
Nez Perce Tribe [2009](#)  
Columbia Basin Fish Accords ([Shoshone-Bannock](#)) and Shoshone-Bannock Tribes [2009](#)  
Spokane Tribe of Indians [2009](#) and [2014](#)  
Columbia Basin Fish Accords - [Umatilla](#)  
Columbia Basin Fish Accords - [Warm Springs](#)  
Columbia Basin Fish Accords - [Yakama](#)  
Columbia River Inter Tribal Fish Commission [2014](#)  
Upper Columbia United Tribes [2009](#) and [2014](#)  
Idaho Department of Fish and Game/Office of Species Conservation [2009](#),  
Columbia Basin Fish Accord ([Idaho](#))  
Columbia Basin Fish Accords ([Montana](#)) and Montana Fish Wildlife and Parks [2009](#) and [2014](#)  
Oregon Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Department of Fish and Wildlife [2009](#) and [2014](#)  
Washington Governors Office/Department of Ecology/Washington Department of Fish and Wildlife recommendation [2009](#)  
Washington Governors Salmon Recovery Office [2014](#)  
Yakima Basin Fish and Wildlife Recovery Board [2014](#)  
Columbia Basin Fish and Wildlife Authority [2009](#), [resident fish section](#)  
FCRPS Biological Opinion [2014](#) implementation plan  
U.S. Environmental Protection Agency [2009](#) and [2014](#)  
U.S. Fish and Wildlife Service [2009](#) and [2014](#)  
U.S. Geological Survey [2009](#) and [2014](#)



Ad Hoc Supplementation Work Group [2009](#)  
Pacific States Marine Fisheries Commission [2009a](#), [2009b](#) and [2014](#)  
Columbia Basin Water Transaction Program [2009](#) and [2014](#)  
Washington Monitoring Forum [2009](#)  
Lower Columbia Fish Recovery Board [2009](#) and [Plan](#), [2014](#)  
Stewardship Partners [2009](#)  
Kintama [2009](#)  
Northwest Habitat Institute [2009](#)

## ***P. Maintenance of Fish and Wildlife Program Investments***

### **Sub-strategy**

The Council has determined adequate and dependable operation and maintenance support is needed to ensure ongoing proper functioning of past infrastructure investments by Bonneville and the action agencies intended to benefit fish and wildlife in the Columbia River Basin.

### **Rationale**

Adequate funding for operation and maintenance will ensure the existing program-funded infrastructure remains properly functioning and will continue to benefit fish and wildlife in the basin as well as continuing to meet Bonneville's mitigation requirements.

There are several types of program-funded projects that require a long-term financial maintenance plan to ensure their longevity and integrity, including fish screens, fishways and traps, hatcheries, lands, and habitat actions.

Over time, changing regional priorities may result in the need to decommission or upgrade some fish or wildlife infrastructure emplacements. An adequately funded plan will help ensure that decommissioning will occur as necessary.

### **Principles**

- Many projects' biological benefits do not come to fruition with the completion of project construction or habitat protection, but require long-term maintenance to realize the biological potential. Thus, Bonneville's financial responsibility for these projects continues over time. Bonneville, the Corps, the Bureau of Reclamation and FERC licensed projects must allocate sufficient funding to ongoing operations and maintenance, and also to decommissioning infrastructure when it is no longer useful or necessary.


### **General Measures**

- The Council will work with Bonneville and the other action agencies to ensure that past fish-and-wildlife-related investments are kept current or properly decommissioned.
- The federal action agencies shall define the comprehensive maintenance costs by fish and wildlife investment types for both the direct and reimbursable aspects of the program. Anticipated costs should be developed year by year within a 20-year timeframe and be provided annually to the Council.
- The Council will convene a work group comprising action agencies and agencies and tribes with expertise in fish screens, fishways and traps, hatcheries, lands, and habitat actions, to define and develop a long-term maintenance plan and process. This work group will be assisted by the IEAB, the Wildlife Advisory Committee, Fish Screening Oversight Committee, and federal action agencies. The work group shall report to the Council quarterly on its progress toward developing a long-term plan for protecting fish and wildlife

investments. The long-term plans shall be completed at the end of one year from the initial meeting of the work group. The plan will be presented to the Council for review and recommendation to Bonneville and the action agencies. Bonneville shall fund the long-term maintenance plan as reviewed and recommended by the Council.

- The Council and the federal action agencies will work together to ensure that federal agencies provide adequate funds for long-term maintenance for facilities where they have responsibility (such as NOAA Fisheries for Mitchell Act hatcheries).
- Annual symposiums will be convened by the Council to ensure collaboration and efficiencies are achieved by all parties seeking to protect past investments in fish and wildlife by Bonneville and the action agencies under the program.

### **Link to Subbasin Plans**

See the Council's [subbasin plans](#)  for subbasin-level measures pertaining to program-funded facilities.

## ***Q. Administration and procedures of the Independent Scientific Review Panel, the Scientific Peer Review groups, and the Independent Scientific Advisory Board***

### **ISRP Review Procedures**

The ISRP is a standing group that conducts reviews throughout the year. The ISRP evaluates projects with the basic criteria from the 1996 amendment of the Northwest Power Act, 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 Peer Review Group members to assist in reviews. From the pool of Peer Review Group members, the ISRP selects reviewers who have the appropriate expertise for the review at issue. The ISRP develops guidelines for reviews that describe lists of materials needed, site-visit protocols, and limits to reviewer and project sponsor communication.

### **ISAB Administrative Oversight Panel**

The oversight panel consists of the chair of the Northwest Power and Conservation Council, the regional administrator of NOAA Fisheries, and the director of the Northwest Fisheries Science Center as joint participants; a senior representative of the Columbia River Basin Indian tribes provides administrative oversight for the ISAB and approves the annual work plan and budget. The panel makes appointments to the ISAB from a list of nominees developed by the National Academy of the Sciences. Final selection of ISAB members is made by majority vote of the three members of the Administrative Oversight Panel.

### **ISAB Review Procedures**

The ISAB is a standing group that meets regularly throughout the year. ISAB recommendations are reached by consensus. The ISAB may enlist ad-hoc members to assist in reviews. Ad-hoc members may include ISRP and Peer Review Group members. The ISAB conducts reviews in a manner consistent with its terms of reference and procedures policy.

The ISAB's general tasks for the Council, NOAA Fisheries, and tribes are described in the [ISAB Terms of Reference](#). In addition to these tasks, the ISAB provides scientific advice on topics and questions requested from the region or the ISAB itself and approved by the Oversight Panel by majority vote. Fish and wildlife agencies and others may submit questions to the ISAB through the Oversight Panel. The ISAB may also identify questions and propose reviews. The Oversight Panel, in consultation with the ISAB, reviews these questions in a timely manner and decides which are amenable to scientific analysis, are relevant to the Tribes', Council's, and NOAA Fisheries' programs, and fit within the ISAB's work plan. Many questions pertaining to the recovery of the Columbia River ecosystem contain both scientific and policy aspects. The ISAB should confine itself to dealing only with scientific aspects of issues.

## **ISAB and ISRP Membership**

The ISRP and the ISAB shall each be composed of 11 members. Peer Review Groups shall be composed of a pool of scientists sufficient in size and expertise to assist the ISRP in its review responsibilities. To ensure coordination and avoid redundancy of efforts between the ISRP and the ISAB, at least two members of the ISRP shall be on the ISAB. Other ISAB members should be considered for appointment to the Peer Review Groups.

Membership shall include, to the extent feasible, scientists with expertise in Columbia River anadromous and resident fish ecology, statistics, wildlife ecology, ocean and estuary ecology, fish husbandry, genetics, geomorphology, social and economic sciences, and other relevant disciplines. There should be a balance between scientists with specific knowledge of the institutions, history, geography, and key scientific issues of the Columbia River Basin and those with more broad and diverse experience. Members should have a strong record of scientific accomplishment, high standards of scientific integrity, the ability to forge creative solutions to complex problems, and a demonstrated ability to work effectively in an interdisciplinary setting.

ISRP and ISAB membership terms are normally for three years, not to exceed two terms. Term limits of the members are staggered to ensure continuity of effort. Peer Review Group members do not have specific terms, but the ISRP and the Council will periodically review the pool of Peer Review Group members and update it when appropriate.

## **Appointment procedures**

The appointment procedures to fill vacancies on the ISAB and the ISRP, and to augment the pool of Peer Review Group members, follow three steps. The first two steps are the same for each group. First, the Council, in cooperation with the ISAB Administrative Oversight Panel, invites the region to submit nominations. Second, the National Academy of Sciences, assisted by the National Research Council, evaluates the credentials of the nominees, submits additional nominees if necessary, and recommends a pool of qualified candidates for potential appointment. This pool of candidates should span the areas of needed expertise and meet the membership criteria for the ISRP and ISAB. The pool should be robust enough to last through several rounds of appointments. The third step, the appointment procedure, varies for the ISAB and ISRP. The ISAB Oversight Panel appoints ISAB members. The Council alone appoints ISRP and Peer Review Group members.

## **Conflict of interest**

ISAB, ISRP, and Scientific Peer Review Group members are subject to the conflict of interest standards that apply to scientists performing comparable work for the National Academy of Sciences. At a minimum, members with direct or indirect financial interest in a project shall be recused from review of, or recommendations associated with such a project. The Council has approved a conflict of interest

policy that satisfies the needs of the program, applies to the ISRP and the ISAB, and is based on the National Academy of Science's standards.

## ***R. Assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply***

### **Introduction**

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 (1) it has considered the fish and wildlife measures to be adopted as part of the program and their potential effect on the region's power supply, and (2) has an appropriate level of confidence that the region may implement the revised fish and wildlife program while maintaining an adequate, efficient, economical, and reliable power supply. This is known as the "AEERPS" consideration or conclusion, documented here. And as explained more fully below, the Council concludes here that the region's power supply can remain adequate, reliable, economical, and efficient as the region implements the protection, mitigation, and enhancement measures in the 2014 Columbia River Basin Fish and Wildlife Program.

Under the Northwest Power Act, subsequent to the fish and wildlife program amendment process, the Council begins the separate statutory process to review and revise it by reviewing the Council's regional electric power and conservation plan. The AEERPS conclusion in the fish and wildlife program decision recognizes and assumes that the Council will adhere to the Power Act requirements in developing the regional power plan, including approving a conservation and generating resource strategy to guide Bonneville and the region in acquiring the least-cost resources necessary to meet the demand for electricity and to "assist [Bonneville] in meeting the requirements of section [4\(h\)](#) of this Act," that is, to implement the Council's fish and wildlife program.

The relevant terms -- adequate, reliable, efficient, and economical -- are not defined in the Act. The legislative history of the Act provides only general guidance. The Council began analyzing the relationship of the fish and wildlife program decision to these aspects of the 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*, combined in the analysis and AEERPS conclusion with Appendix B, *Summary of Hydropower Costs and Impacts of the Mainstem Passage Actions*. The Council has understood and applied the statutory AEERPS provision in a consistent way both before and after the 1994 explanation, although that has been the most extensive discussion. See Appendix A to the 2003 Mainstem Amendments, *Analysis of the Adequacy, Efficiency, Economy, and Reliability of the Power*

*System*, and for the 2009 Program, the *Analysis of Adequacy, Efficiency, Economy, and Reliability of the Pacific Northwest Power System* (analysis before the Council at the time of the program decision and included in the administrative record). The documents noted above remain source documents for understanding the Council's approach. Each element of the AEERPS conclusion is discussed below.



## Adequate and reliable power supply

### *General principles*

“Adequate” and “reliable” have specific meanings in the power industry. Adequacy is a component of reliability. A power system is “reliable” if it is:

- Adequate - the electric system can supply the aggregate electrical demand and energy requirements of the end-use customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.
- Secure - the electric system can withstand sudden disturbances, such as electric short circuits or unanticipated loss of system elements.

“Adequacy” refers to having sufficient resources – generation, efficiency, and transmission – to serve loads. To be adequate, the power supply must have sufficient energy across all months, sufficient capacity to protect against the coldest periods in winter and the hottest periods in summer, and sufficient flexibility to balance loads and resources within each hour. In determining adequacy, the Council uses a sophisticated computer model that simulates the operation of the power system over many different futures. Each future is simulated with a different set of uncertainties, such as varying water supply, temperature, wind generation, and thermal resource performance. The adequacy standard used by the Council deems the power supply inadequate if the likelihood of curtailment five years in the future is higher than five percent. The Council uses probabilistic analysis to assess that likelihood, most often referred to as the loss of load probability.

“Security” of the regional power supply is achieved largely by having sufficient reserves and transmission capability to bring power on line quickly in the event of a system disruption. These reserves can be in the form of generation or demand-side curtailment that can take load off the system quickly. The North American Electric Reliability Corporation (NERC) and the Western Electricity Coordinating Council (WECC) establish reserve requirements, frequently expressed in terms of a percentage of load or largest single contingency. An additional resource requirement for the region is thus maintaining the reserves required by NERC and WECC for security and thus for a reliable power system.

Implementing dam operations for the benefit of fish that alter or reduce hydropower generation is one of the power system changes that may affect the adequacy and reliability of the power supply. This is not a surprise -- that this should happen to some extent is one of the premises underlying the Northwest Power Act. The generation effects of the operations that the Council adopts into the fish and wildlife program then become one of the many factors the Council has to take into account in its subsequent power planning when making decisions on the new resources necessary to maintain an adequate and reliable power supply. In the context of power planning, adequacy and reliability are as much a matter of

time and cost as anything. That is, in the event of changes that threaten the standards, adequacy and reliability can be maintained to the standards with enough lead time to develop the necessary resources and with the investment of enough dollars in those resources.

Decisions on the resource actions necessary to ensure adequacy and reliability take place within the context of the subsequent power plan. But even before that, at the time the Council makes a decision on fish and wildlife program amendments, the Council is able to estimate the effects of the fish operations on hydropower generation from existing projects, including the incremental effects of any new operations for fish and wildlife. The Council combines that information with other information relevant to the adequacy and reliability of the power supply and, with an assumption that the subsequent power planning will function as it should, the Council is able to make a determination whether it can adopt the fish and wildlife program and still maintain an adequate and reliable power supply.

In the past the Council had to undertake extensive technical analysis of the adequacy and reliability of the power system in the fish and wildlife program amendment process itself. Now the Council, with the assistance of its [Regional Adequacy Advisory Committee](#) (originally, the Resource Adequacy Forum), regularly [assesses](#) the adequacy of the region's power supply, evaluating the resources available to the region against a resource adequacy standard for the Pacific Northwest that the Council adopted in 2011. The Advisory Committee and the Council most recently [assessed](#) the adequacy and reliability of the power supply at the end of 2012 and then again in [2014](#).

#### *2010, 2012, and 2014 adequacy assessments*

In the recent adequacy assessments -- for the Sixth Power Plan in 2010 and then in 2012 and 2014 -- the contribution of hydropower generation to overall system generation incorporated the effects of the operations for fish found in the 2008/10 biological opinions and the Columbia Basin Fish Accords -- and thus also included the baseline measures in the Council's 2009 Fish and Wildlife Program. The 2012 and 2014 assessments also factored in the generation effects of the additional spill ordered by the federal district court in Oregon.

Since 1980, implementation of operations to benefit fish has reduced hydroelectric generation on average by about 1,200 average megawatts relative to an operation without any constraints for fish and wildlife. For perspective, this energy loss represents about 10 percent of the hydroelectric system's firm generating capability (that is, the amount of energy the system can be expected to generate under the lowest runoff conditions). Most of the 1,200 aMW reduction occurred gradually over a 30-year period, and the system has had ample time to adjust. The recent changes in hydroelectric generation considered in the most recent adequacy assessments were small in comparison to the 1,200 aMW as a whole.

After factoring in all the information relevant to power supply adequacy, of which the fish and wildlife operational effects were but a small part, the most recent adequacy assessment did show the potential for a power supply adequacy problem in 2019, with a loss-of-load probability of about 6 percent, if the region relies only on existing generating plants (those that are expected to be operational in 2019) and new energy-efficiency savings outlined in the Council's 2010 Sixth Power Plan. The majority of potential future problems seen were short-term capacity shortfalls, with the most critical months being January and February. The analysis also suggested that there were a number of reasonable actions the region's utilities and Bonneville can take well before 2019 -- new generation, new energy efficiency, or a combination -- to result in 400 megawatts of additional capacity and bring the adequacy estimate to the minimum acceptable level by 2019. And the recent assessment also adds 670 megawatts of planned thermal resource capacity that should be operational before 2019. Looking ahead over the next 10 years, the region's utilities show about 1,800 megawatts of additional planned generating resources (in aggregate), with a mixture of wind and gas-fired generation. These resources are not included in the most recent adequacy assessment because they may not yet be sited or licensed or may not be expected to be operational by 2019. Obviously, not all of these planned resources are needed by 2019 to meet the Council's adequacy requirement, but it is a good indication that the region is on track to maintain an adequate supply. Most important here, the operations for fish and wildlife were not seen as a particular impediment to our ability to make the power system adaptations needed to assure the region a continued adequate and reliable power supply.

The adequacy assessments do not directly assess the ability of the system to balance loads and resources within the hour, a growing regional concern in the last decade due to the addition of significant amounts of variable generation, primarily wind. However, assuring that the system has the necessary balancing capability is reflected in the adequacy assessment. This is because the system holds in reserve sufficient amounts of generating capacity (commonly referred to as incremental and decremental reserves) to be able to balance variable generation and loads on short-term notice. The adequacy determination includes an inquiry into whether the region has sufficient resources not only to meet all regional loads but also to provide sufficient flexibility for within-hour balancing needs.

The operations to benefit fish can affect the flexibility of the system to balance loads and resources within hour, especially to the extent that fish benefit from reducing the short-term fluctuations in hydroelectric generation that might be optimum for power system balancing. As with other aspects of adequacy, the power planning work of the Council and the region has to take these constraints into account and, if necessary, add resources to make sure the system has adequate resources for this purpose and others.

*2014 Fish and Wildlife Program measures and adequacy and reliability*

The operational measures to benefit fish included in the 2014 Fish and Wildlife Program amendments have not changed materially from the operations included as part of the 2012 adequacy assessment. The operations specified in the NOAA Fisheries' 2014 FCRPS Biological Opinion similarly have not changed dramatically from those in the 2008/2010 FCRPS Biological Opinion, and the biological opinion operations along with the Columbia Basin Fish Accords remain the baseline operational measures of the Council's 2014 Program.

The operational provisions added by the Council to this baseline -- such as the call to investigate potential refinements to Libby and Hungry Horse operations to benefit resident fish in the upper river and reservoirs -- are not sufficiently specific at this time to model the possible effects. Even so there is no indication that the refinements contemplated will significantly alter current operations to such a degree as to alter the most recent adequacy assessment. A spill experiment proposal recommended to the Council could in theory alter system generation to such a material extent as to necessitate a further adequacy assessment in this process. The Council concluded that proposal was not sufficient to consider for implementation, for a number of reasons. If and when a new operation is proposed that is sufficient to consider, there will be time to evaluate the power system implications as well as the biological implications before making a decision on implementation.

For these reasons, the Council concludes that the measures in the 2014 Fish and Wildlife Program will not alter system generation materially from the measures included in the most recent adequacy assessment. The Council's conclusion in that 2012 assessment was that the region would be able to take the necessary steps to maintain system adequacy. The Council thus concludes that adopting the 2014 Fish and Wildlife Program measures will not preclude the Council from developing a regional power supply that assures the region an adequate and reliable power supply.

## **Efficient power supply -- and cost-effective fish and wildlife measures**

### *Efficient power supply and the addition of cost-effective energy resources*

One objective of planners and operators of the Pacific Northwest power system is to provide a system that is as efficient as possible *given that* its largest component -- the hydroelectric dams -- have equally important non-power uses, including physical modifications and operational changes to benefit fish and wildlife. From the single objective of power operations, the power system is less efficient than it was at the time of the passage of the Northwest Power Act in 1980. This is the result of many factors, some of which are related to characteristics of the new resources available to meet growth and some related to the effects of fish mitigation and protection measures that reduce the optimum generation of the system to meet loads. Even so, the region continues to have an efficient system relative to systems elsewhere.

The Northwest Power Act clearly expected the region to meet both fish and power objectives, that is, to operate the system to meet multiple objectives. Congress in the Power Act thus did not mean the term “efficient” to establish an absolute standard for the power supply alone. Instead, the system must be operated efficiently given all the constraints under which it must operate. The consequences of being inefficient are economic -- additional costs to supply a given amount of power. The Council’s least-cost planning requirements encourage the development of efficient resources to serve the electricity needs of the region while meeting other objectives as well, including fish and wildlife.

As noted in the discussion of adequacy and reliability, the measures added to the program in this amendment cycle will not significantly change the operation of the system compared to the measures adopted and analyzed before. System efficiency faces many challenges in the current era, including how efficient the system can be as it integrates intermittent resources. Even so, the Council is able to conclude that it can adopt the 2014 Fish and Wildlife Program while still assuring the region a power supply produced efficiently while meeting multiple system objectives.

### *Efficient and cost-effective fish and wildlife measures*

Fish and wildlife objectives should also be met as efficiently and as cost-effectively as possible. Given the high cost of some measures and the uncertainty regarding their effectiveness in meeting biological objectives, it is imperative that continual efforts be made to assess and improve the effectiveness and cost-effectiveness of these measures. Section [4\(h\)\(6\)\(C\)](#) of the Northwest Power Act in particular 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.” Cost effectiveness more

generally is an important consideration in all aspects of the Council's fish and wildlife and power planning. The following discussion, conclusions and recommendations regarding cost-effectiveness and efficiency in the implementation of the fish and wildlife program are not part of the formal conclusions required by the statute with regard to efficiency and the region's power supply. This is, however, a useful place in the program to consider these broader issues of fish and wildlife implementation, efficiency, and cost-effectiveness.

### *Quantitative cost-effectiveness comparisons of fish and wildlife measures*

A quantitative cost-effectiveness comparison of alternative energy resources is a cornerstone of the Council's power plan, made possible by our ability both to estimate the total costs of alternative measures and to use a singular metric of benefits -- megawatts generated or saved -- for the comparison. Useful quantitative cost effective comparisons of alternative fish or wildlife measures have proven far more difficult to achieve, for a number of reasons. The Council periodically considers the potential for quantitative cost effectiveness analysis in the fish and wildlife program. A notable early effect came in a report produced by the Council staff in 1997 with the assistance of the Council's newly-formed Independent Economic Advisory Board, "Methods of Economic Analysis for Salmon Recovery Programs," [Council Document No. 97-12](#) (July 1997). The "methods analysis" continues to guide the Council today. And at the other bookend is the most recent report from the IEAB -- a March 2014 review of the Council's fish and wildlife program: "Recommendations related to amendments for the 2014 Fish and Wildlife Program," [IEAB 2014-1](#). The following discussion is drawn from these and other sources.

Several factors make it difficult for the Council and the region to undertake a quantitative cost-effectiveness comparison among different fish and wildlife measures for the program. The most important has been the inherent difficulty of developing a single measure of ultimate biological effectiveness for different types of actions, so as to be able to determine if two measures "achieve the same sound biological objective" and then choose the one with the least cost. The complex life-cycles of fish and wildlife, especially anadromous fish, and the many human and environmental factors that affect their survival, make it difficult to isolate and determine the ultimate biological benefits of any particular activity or to compare the different biological effects of different activities in a rigorously quantitative manner.

At best the region has been able to compare the immediate biological effects of very similar activities on specific quantitative terms that are something less than life-cycle survival. This includes, for example, comparing the immediate passage survival of juvenile spring Chinook from different passage methods; or comparing the amount of habitat that might be protected per dollar for different land

acquisitions in the same subbasin or the different amounts of habitat that might be opened per dollar through the removal of passage barriers in a particular subbasin; or roughly estimating the different gains in productivity of juvenile habitat or survival of juveniles that might result from different riparian habitat improvements in a particular subbasin. Even these types of comparisons, as limited as they have been, have made the program more cost-effective over the last 30 years.

The region's use of these quantitative comparative techniques has been improving and increasing every year. The Council encourages continued efforts in this direction. So does the Independent Economic Advisory Board (IEAB): Its most recent review report began with the recommendation that the Council "[c]onsider funding a science initiative to assess the state of achievement metrics, methods to standardize metrics, the value of comparing metrics across types of projects, and research needs to develop standard metrics." The Council will consider this and other approaches for making further progress in standardizing the metrics of benefits; supporting the development of improved analytical and modeling techniques for relating individual activities to life-cycle benefits; and in pushing for the increasing use of metrics and techniques of this nature in cost-effectiveness comparisons of different measures.

#### *Other ways of improving the cost-effectiveness of fish and wildlife measures*

Still, our ability to undertake quantitative cost-effectiveness comparisons is limited at this time. So the Council and the IEAB have also focused on other ways to increase the region's confidence that program measures and the projects that implement them are effective and the costs appropriate, and thus that the region's expenditures are as cost-effective as can be. Much can be done and had been done to review the efficiency of projects; to improve the likelihood that measures and projects selected will be the most cost effective; to improve project management; to monitor, report, and review results; to develop better and more cost-efficient techniques for monitoring and evaluating improvements in habitat and population characteristics; and to emphasize accountability for results and effectiveness.

Most notably the Council has focused significant resources on an ongoing and rigorous review of both the projects implementing the program and of the broader biological premises and uncertainties underlying the program. This work has particularly involved the use of independent scientific review of both individual projects and of larger scientific questions, assumptions, decisions, and reports underlying the program. The Council's work in this regard has improved the quality, effectiveness and efficiency of the projects that implement the program, and ultimately of the program measures that are the underlying basis for these projects. Early in this effort, in the late 1990s and early 2000s, the Council also focused significant attention on: improving the quality of the information generated

on the costs of individual projects and of the program as a whole; significantly improving the biological and fiscal review of major capital investments (such as the Council's "three-step review"); increasing attention on ongoing operation and maintenance obligations; and improving contract management procedures.

In recent years, the Council has focused increasing attention on four areas: (1) improving the state of the monitoring and evaluation elements of the program to make them more effective, relevant, and cost-effective, pushing for the results from monitoring and evaluation to be used more often in decision-making; (2) calling for more regular reporting and review of results and for the standardization of what is reported; (3) requiring improved study designs and review of program research, including bringing research projects to effective conclusions; and (4) improving the annual reporting to the public and decision-makers on program costs, program activities, and the biological indicators of results. More can be accomplished in all four areas, and the Council will continue its efforts.

Finally, the IEAB included a number of other recommendations for the Council to consider, in the IEAB's review of the Council's fish and wildlife program for the 2014 program amendment process. The IEAB's first recommendation called for continued efforts to develop better and more standardized metrics and methods to estimate benefits, so as to allow for more of a quantitative approach to cost-effectiveness, discussed above. A number of IEAB's other recommendations are in the nature of further improvements in cost information and in non-quantitative techniques that could help assure a more effective and efficient program. These include:

- Projects and project proposals should include not only a discussion of expected outcomes but also an efficient "exit strategy" if the project is not performing as planned.
- Program measures and project proposals with important cost implications and investments that are not reversible or recoverable should include and analyze an appropriate range of alternatives, including the implications of a "do nothing" alternative.
- New project proposals that require future operations, maintenance, replacement or decommissioning costs should provide information on expected life-cycle costs by year, including the expected life of depreciable assets, and a discussion on how future costs will be paid.
- Existing projects that have unfunded needs for future maintenance or replacement should provide such cost information for review and consideration as soon as practical.
- The Council should consider an external review of the future financial needs, the ability to meet those needs, and alternatives for financing those needs, for the entire fish and wildlife program that includes operation and maintenance, disaster management, and expected hydrosystem revenue base.



As part of the implementation of the 2014 Program, the Council will consider whether and how to implement these recommendations from the IEAB.

## Economical power supply

### *General principles*

The final aspect of the AEERPS conclusion is that the Council adopts the fish and wildlife program while assuring the region an “economical” power supply. As with the other terms, the Northwest Power Act does not define an “economical” power supply. One of the expectations of the Power Act is that the power system is to bear the cost of managing the hydroelectric system to improve conditions for fish and wildlife. This means the regional power system absorbs both the financial effects of fish operations that reduce the output and revenue of the system as well as expenditures on other measures to implement the fish and wildlife protection and mitigation program. In order to do so, the power system must generate sufficient revenue to cover these financial requirements. This necessarily makes the region’s power supply more expensive, intentionally so. This is the point of the provisions in the Power Act requiring the Council to assure that the power supply remains economical or affordable to the region even while the revenues are used to meet the fish and wildlife and other objectives of the Act.

### *Fish and wildlife program costs in total*

The first step is to estimate what the fish and wildlife program costs are that the power system is to bear. The Council did not develop program cost estimates in the amendment process itself. The Council produces an annual report to the region’s governors on Columbia Basin Fish and Wildlife Program Costs, based mostly on information produced by Bonneville. The Council issued the most recent report, for [Fiscal Year 2013](#), in September 2014. The Council has drawn on the FY 2012 cost report for the information and conclusions here; the figures in the draft FY 2013 cost report are not significantly different.

Bonneville uses well-defined methods for calculating the costs of the fish and wildlife program. For Fiscal Year 2012, Bonneville reported its fish and wildlife program costs as follows:

- \$248.9 million in direct expense costs
- \$73.0 million in direct costs and reimbursements to the federal Treasury for expenditures by the Corps of Engineers, Bureau of Reclamation, and U.S. Fish and Wildlife Service for investments in fish passage and fish production, including direct funding of operations and maintenance expenses of federal fish hatcheries; also includes one-half of the Council’s annual approximately \$10 million budget
- \$131.5 million in fixed costs (interest, amortization, and depreciation) of capital investments for facilities such as hatcheries, fish passage facilities at dams, and some land purchases for fish and wildlife habitat
- \$152.2 million in forgone hydropower sales revenue that results from dam operations that benefit fish but reduce hydropower generation

- \$38.5 million in power purchases during periods when dam operations reduce generation to protect migrating fish

The FY 2012 costs totaled \$644.1 million, including the forgone revenue. The \$644.1 million total does not include annual capital investments in 2012 totaling \$57.5 million for program-related projects, and \$114.5 million for associated federal projects, including capital investments at dams operated by the Corps of Engineers and Bureau of Reclamation. These latter investments are funded by congressional appropriations and then repaid by Bonneville. Including them in the same total as fixed costs would double-count some of the capital investment. The total also does not reflect a credit of \$77.0 million from the federal Treasury related to fish and wildlife costs in 2012. Adding in the credit reduced the total fish and wildlife costs to \$567.1 million. The fish and wildlife costs for FY 2012 (with the addition of the forgone revenue figure to the expenditures) represented over 20 per cent of Bonneville's total costs for its power business.

The costs Bonneville reported for FY 2012 are in line with the range of costs for program implementation that Bonneville has reported in recent years and that Bonneville anticipates in the near future. The financial effects of operations in particular can fluctuate significantly from year to year depending on runoff conditions and market prices. This means FY 2012 costs are in the lower end of a range that Bonneville estimates can be as high as \$900 million before subtracting the credit. Similarly, the FY 2013 costs reported by the Council in September 2014 total \$682.4 million. This amount is also in the lower end of the range of Bonneville's estimated annual fish and wildlife costs.

The Council realizes that how and why Bonneville reports forgone revenue is controversial with some. The controversy is not relevant here, because as noted below the Council concludes that even as the fish and wildlife costs are reported by Bonneville, the region's power supply remains affordable. The Council has not limited the measures in the program based on either the costs of individual measures or on the basis of total program costs.

#### *Effects of the 2014 Program on fish and wildlife costs*

In past fish and wildlife program decisions over the last 32 years, the Council has determined each time, as the program grew in scope and extent, that the costs of implementing the program could be absorbed by the power system and maintain an economical power supply. So particularly important in any program amendment decision, including this one, is whether the newly amended program represents an *additional* increment of costs to the power system, and if so, whether and how that changes the consideration of the economical nature of the region's power supply.

As noted in the adequacy discussion above, the Council does not expect the operations for fish in the 2014 Fish and Wildlife Program to be materially different

from the operations in the recent past. And thus the financial effects of operations should remain stable over at least the next few years, within the expected range.

Bonneville (and Congress) decide in any particular year how much to budget and expend on measures to protect, mitigate and enhance Columbia River Basin fish and wildlife in a manner consistent with the Council's program. Even so, the Council expects that expenditures on program measures and on reimbursement of appropriations will remain relatively stable over the next few years. Based on the fish and wildlife recommendations to the Council, the 2014 Program does contain additional measures in certain areas, with an expectation that expanded work in these areas will take place in the next few years. This includes, for example, additional measures to deal with toxic contaminants, blocked area mitigation, non-native species, and passage. Even so, the Council concludes that the additional investments in these areas are unlikely to change significantly the scope of power system expenditures over the next few years. This is in part because the Council intends program implementation to move carefully into these areas; in part because the Council considers a number of these activities to be the shared responsibility and investment of a number of sectors of the economy, not just the power supply; and in part because the Council is aware Bonneville has entered into stable multi-year funding commitments with many program implementers that continue to 2018.

For all these reasons the Council's expectation is that fish and wildlife program costs will not differ significantly -- certainly not a significant difference in magnitude or scale -- as a result of the decision to approve the measures in the 2014 Fish and Wildlife Program. The general conclusion that the power supply remains affordable at this level of fish and wildlife investments should remain valid.

*Different perspectives for considering an "economical" power supply and conclusions*

Understanding what the fish and wildlife program costs are is the beginning, not the end, of the consideration as to whether the power supply is economical. There are at least three perspectives to consider.

One perspective is at the regional scale, in comparison to the regional economy as a whole and in comparison to other regions. The per-kilowatt-hour costs of the Pacific Northwest power supply have increased significantly over time, because of fish and wildlife expenditures as well as other reasons, and in this sense the power supply is less economical than it was in the past. Even so, the Pacific Northwest still ranks as one of the lowest-cost regions in the nation, and the region's electrical energy costs remain a relatively steady percentage of the region's overall economy.

An aggregate regional perspective, however, does not capture the potential impacts of energy costs on specific sectors of the economy and particular local areas within the region. Electricity-intensive industries and industries subjected to global economic pressures, such as aluminum smelting, are proportionately more affected by increases in electricity costs than the region's economy as a whole. The same is true for local areas within the region that lag behind in economic vitality compared to the region as a whole. All increases in costs, including energy costs and including the portion of energy costs related to the fish and wildlife program, contribute to difficulties for these sectors and areas. Even so, there is no indication that the fish and wildlife cost obligations of the power system are such a particular drag on these aspects of the economy to cause the Council to conclude the fish and wildlife program measures in the 2014 Program have unbalanced the economical nature of the region's power supply.

Finally, the question of whether the power supply is economical has to be seen within the perspective of whether the demands of the fish and wildlife program are consistent with the financial health of the agency primarily dependent upon for these continuing investments -- the Bonneville Power Administration. Bonneville must be able to implement the program while also meeting the other financial purposes of the Power Act and other laws relevant to Bonneville, including being able to cover all of its costs and make timely repayments of Bonneville's debt to the United States Treasury. Bonneville always has to be diligent in protecting its financial status to maintain a viable operation. But the agency is not currently in difficult financial circumstances, and the implementation of the 2014 Program will not change those circumstances. Still, fish and wildlife costs are a significant contributor to Bonneville's overall cost structure and must be reviewed periodically.

Longer-term questions about assuring the region an economical power supply into the future will be addressed by the Council in the Seventh Power Plan. The issues in that setting relate not to fish and wildlife costs, but to whether the region can add the least-cost resources needed to meet energy demands while adequately hedging risks, conforming to environmental constraints on new resources, and meeting all system costs -- and in the end maintain a power supply that is economical within the region.

In conclusion, the Northwest Power Act recognizes that the region's power system has an obligation to address the adverse effects of the hydrosystem on fish and wildlife. The Council is adopting a program with substantial measures to protect, mitigate and enhance fish and wildlife. The Council recognizes that these actions to do so impose significant costs on the region's ratepayers. Despite these costs, the power system remains economical in the broad sense that power rates remain affordable within the context of the region's economy.

***S. Responses to recommendations and comments, including findings on recommendations not adopted into the 2014 Fish and Wildlife Program***

***March 2015***

In this section of the fish and wildlife program (Appendix S), the Council explains its disposition of the program amendment recommendations the Council received at the outset of this program amendment process. This includes explanations that are part of the program as to the “basis for [the Council’s] finding” not to adopt recommendations, consistent with the requirements of Section 4(h)(7) of the Northwest Power Act (often referred to as “the findings”).

In explaining how the Council used and responded to the recommendations in developing the final program, this appendix also provides a response to comments that the Council received on the recommendations and on the draft program amendments released by the Council for public review. The document also describes how the Council conducted a program amendment process consistent with the requirements of Section 4(h) of the Act.

## Introduction and program amendment process

Pursuant to Section 4(h) of the Northwest Power Act, in March 2013 the Northwest Power and Conservation Council requested in writing that state and federal fish and wildlife agencies, the region's Indian tribes, and others submit recommendations for amendments to the Council's *Columbia River Basin Fish and Wildlife Program*. ("Request for Recommendations to Amend the Columbia River Basin Fish and Wildlife Program"; <http://www.nwcouncil.org/media/6658706/Amendment-Letter-Council-approved-032213-f.pdf>). By the deadline for submitting recommendations (extended to September 17, 2013), the Council had received nearly 1,700 pages of recommendations and supporting information from 68 entities and 412 individuals. (Fish and Wildlife Program Amendment Recommendations; <http://www.nwcouncil.org/fw/program/2013amend/recs>). As required by Section 4(h)(4), the Council then sought and received extensive written public comment on the program amendment recommendations. (Comments on Fish and Wildlife Program Amendment Recommendations; <http://www.nwcouncil.org/fw/program/2013amend/comments>).

In this period – from the release of the letter calling for recommendations in March 2013 until the release of a draft revised fish and wildlife program in May 2014 – the Council or its four-member fish and wildlife committee discussed in public the fish and wildlife program, the program amendment process, the program recommendations, the comments on the recommendations, and proposed program amendments. The Council's discussions included discussions among the members and with staff and discussion involving other participants, at all of the Council's regularly scheduled monthly meetings and at dozens of specially called and publicly noticed committee and Council meetings. The Council also organized two ad hoc working committees to focus on two aspects of the program amendment process – one focused on recommendations regarding toxic contaminants and their effects on fish and wildlife and one concerning recommendations received on the research, monitoring and evaluation and biological objectives elements of the program. These two ad hoc committees met in public at least a half-dozen times through this period.

In May 2014, after reviewing the recommendations, the supporting information received with the recommendations, the written comments on the recommendations, and other information in the administrative record (including oral comments to the Council at the Council's regular monthly meetings), the Council released for public review a draft revised Fish and Wildlife Program. (*Public Review Draft, Columbia River Basin Fish and Wildlife Program 2013/2014*; <http://www.nwcouncil.org/media/7076544/2014-3.pdf>; see also <http://www.nwcouncil.org/fw/program/2014-03/> (draft F&W Program page); <http://www.nwcouncil.org/fw/program/2014-03/invite> (letter inviting comment on draft)).

By the close of the written comment period on the draft program at the end of July 2014, the Council had received 1500 pages of substantial written comments on the draft program amendments from entities and individuals. (Comments on Draft Fish and Wildlife Program; <http://www.nwcouncil.org/fw/program/2014-03/comments>). The Council also took oral testimony at ten public hearings around the region and at regularly scheduled Council meetings. Transcripts of these hearings and meetings are in the administrative record along with the written comments. See <http://www.nwcouncil.org/fw/program/2014-03/>. As specified in Section 4(h)(5), Council members also held a number of consultations on the recommendations and draft amendments with representatives of state and federal fish and wildlife agencies, Indian tribes, federal agencies responsible for managing, operating, or regulating Columbia hydroelectric facilities, and the regional utility customers of the Bonneville Power Administration. Notes from these consultations are also in the administrative record.

Following the lengthy public review process required by the Northwest Power Act, and after deliberations in public over the course of dozens more regularly scheduled and special Council meetings throughout the middle of 2014, the Council adopted the final revised Fish and Wildlife Program in October 2014 at a regularly scheduled Council meeting in Pendleton, Oregon. The Council based its decisions on the recommendations, supporting documents, and the views and information obtained through public comment and consultations with the agencies, tribes, and customers. *2014 Columbia River Basin Fish and Wildlife Program* (<http://www.nwcouncil.org/fw/program/2014-12/>.)<sup>13</sup>

As described in the 2014 Program, the Council's Fish and Wildlife Program also includes detailed plans for nearly 60 subbasins of the Columbia River Basin, most originally adopted in 2004-05. The Subbasin Plans themselves were not revised in this process. See <http://www.nwcouncil.org/fw/program/2014-12/program/>; [http://www.nwcouncil.org/fw/program/2014-12/program/partfive\\_subbasin\\_plans/](http://www.nwcouncil.org/fw/program/2014-12/program/partfive_subbasin_plans/); <http://www.nwcouncil.org/fw/subbasinplanning/home/>.

As noted at the outset, in what follows the Council explains its disposition of the program amendment recommendations that the Council received to begin this program amendment process. This includes an explanation as part of the program for "the basis for [the Council's] finding" not to adopt a recommendation as part of the program, consistent with the requirements of Section 4(h)(7) of the Northwest Power Act (often referred to as "the findings"). If recommendations were found by the Council to be inconsistent with each other, the Council, in consultation with

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<sup>13</sup> All references to the 2014 Fish and Wildlife Program in these findings, including all specific page citations, are to the "Pre-publication version," Council Document No. 2014-12 (October 2014) in pdf form, at <http://www.nwcouncil.org/media/7148624/2014-12.pdf>.



appropriate entities, resolved these inconsistencies giving due weight to the recommendations, expertise, and legal rights and responsibilities of the federal and state fish and wildlife agencies and Indian tribes. When the Council rejected all or part of a recommendation, these findings explain how the Council's decision comports with the standards in the Northwest Power Act for rejecting recommendations.

In explaining how the Council used and responded to the recommendations in developing the final program, this appendix also provides a response to comments that the Council received on the recommendations and on the draft program amendments released by the Council for public review. This includes comments received in writing, through oral testimony at public hearings or at Council meetings, or during formal or informal consultations under Section 4(h)(5) of the Northwest Power Act. Nearly all of the comments reiterated, supported, objected to, or elaborated on the recommendations received or on how the Council dealt with the subject matter of the recommendations in the draft. For that reason, there is no separate section summarizing the comments and responses to comments; responding to the recommendations also responds to the related points made in the comments. To the extent the comments on the recommendations or on the draft program amendments raised new or different issues regarding the recommendations or draft program language, or provided special emphasis on points already made, the Council has tried to identify those comments here and provide a response along with the findings on the related recommendations. Even if not identified explicitly here, the Council carefully considered all recommendations and comments in making its final decisions, as indicated in the administrative record.

In this way the document also serves as the "statement of basis and purpose" called for in Section 553 of the federal Administrative Procedures Act (APA) to accompany agency decisions on final rules. Along with the requirements in the Power Act, the Council largely follows the notice-and-comment rulemaking procedures of the APA in developing and adopting amendments to the fish and wildlife program.

The program amendment recommendations contained hundreds of individual recommendations. The Council considered each one in shaping the final revised program. The Council's obligation under Section 4(h)(7) of the Northwest Power Act is to produce a written finding as part of the program only for those program amendment recommendations the Council decided *not* to adopt. The Council is providing explanations below for how it handled a number of the recommendations and the issues posed by these recommendations, even when the Council adopted or largely adopted the underlying recommendations. This is because (a) the Council has a separate, general responsibility to respond to comments and controversies on key issues raised in the amendments process, even when the Council followed the recommendations and (b) because in certain circumstances the Council modified recommendations to fit the provisions into the

program, requiring some explanation even if in the Council's view it largely followed the substance of the recommendations. Even so, not all recommendations are discussed in the following findings, by any means. All recommendations (and comments) were considered by the Council in shaping the program. If a program amendment recommendation is not mentioned here that is because the Council concluded that the final program provisions are consistent with the recommendation and the process did not develop a significant set of comments or issues or controversy around the subject to require an explanation.

The discussion of recommendations and comments that follows has been organized to match the organization of the final program. This means that the recommendations have been grouped or organized into categories by topic and portion of the program that the recommendations address. Most of the comments on the recommendations and on the draft amendments fell into these same topical or issue categories. The recommendations and comments largely focused on a discrete set of topics, and so the focus of the discussion that follows is on the set of topics that dominated the amendment process. One key point to make at the outset is that with some few exceptions, the Council maintained the body of strategies, principles, measures, and objectives built up over thirty-four years of program development. This is true even as the Council reorganized and to some extent refocused the program. The recommendations simply did not put at issue the bulk of the program. As will become clear below, most of the key issues and controversies raised in the amendment process concerned recommendations and comments about what the Council and the participating entities recognized as new or emerging issues for the region fish and wildlife program, or expansion of certain under-emphasized areas – again, with some exceptions discussed in the findings.

## Contents

1. Program framework, program organization, and scientific foundation and principles
2. Program goals and objectives
3. Ecosystem function and habitat protection and improvement
4. Non-native and invasive species, especially aquatic nuisance species and quagga and zebra mussel interdiction
5. Predator management
6. Protected areas and future hydroelectric development
7. Water quality – toxic contaminants
8. Climate change
9. Mainstem water management, flow and passage measures and objectives, including recommendations relating to the FCRPS Biological Opinions under the Endangered Species Act and the Columbia Fish Accords
10. Proposed experiment to increase spill for juvenile fish passage
11. Estuary, near-shore ocean and freshwater plume, ocean
12. Wildlife mitigation
13. Fish propagation and hatcheries, wild fish protection, strongholds, and quantitative objectives for anadromous fish
14. Anadromous fish mitigation in blocked areas, including anadromous fish reintroduction and passage
15. Resident fish mitigation, assessments, settlement agreements and crediting
16. Specific species other than salmon and steelhead, especially sturgeon, lamprey and eulachon
17. Willamette River subbasin issues
18. Adaptive management, including monitoring, evaluation, research, reporting, and data management
19. Subbasin plans
20. Implementation procedures, including program funding, program scope and funding priorities; long-term funding for operation and maintenance; “in lieu” expenditures; project review; program and regional coordination
21. Renewable energy development and the effects on wildlife and fish
22. Determination as to the power supply’s adequacy, efficiency, economical nature, and reliability, including information on the costs of the fish and wildlife program

## **(1) Program framework, program organization, and scientific foundation and principles**

In the 2000 Fish and Wildlife Program, the Council comprehensively revised the program around a framework that linked a program vision to biological objectives to basinwide measures, tied together by an explicit scientific foundation and a underlying habitat-based approach, a framework then replicated at different geographic levels including the mainstem Columbia and Snake rivers and the tributary subbasins, estuary and specific mainstem reaches. 2000 Fish and Wildlife Program, at 9-20, 35-43 (<http://www.nwcouncil.org/fw/program/2000/2000-19/>). The Council retained this program framework at the conclusion of the 2009 program amendments. See 2009 Fish and Wildlife Program, at 3-4, 6-14, 27-40, 57-58 ([http://www.nwcouncil.org/media/115273/2009\\_09.pdf](http://www.nwcouncil.org/media/115273/2009_09.pdf)).

In this amendment process the Council did not receive recommendations to change the program framework in any fundamental way. And so the program framework remains fundamentally the same. See 2014 Fish and Wildlife Program, at 10-13 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

The Council did receive recommendations to revise or restructure certain aspects of the program framework. The Council's own internal review suggested others. This included a coordinated set of recommendations from a number of the state fish and wildlife agencies and tribes to emphasize adaptive management as the principle or purpose for linking together the different elements of the program framework (Oregon Department of Fish and Wildlife Washington Department of Fish and Wildlife; Washington State Governor's Salmon Recovery Office; Nez Perce Tribe, Burns Paiute Tribe, Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, Upper Snake River Tribes). Along with that came recommendations to better incorporate the estuary, plume and near-shore ocean into the main strategy of the program. Another related set of recommendations and subsequent comments sought to make improving ecosystem function an underlying substantive organizing principle or strategy, rather than improving habitat (see #3 and #9 below). The Independent Scientific Advisory Board recommended certain revisions in the program's scientific foundation and principles, and others supported those revisions (described in more detail below). Other recommendations called for the Council to group measures relating to certain topics together and make those topics into more explicit and distinct sections of the program, such as a section that organizes all the measures relating to sturgeon or lamprey or predator management. The Council's own review identified, among other things, a need to better integrate the mainstem water management, flow, and passage strategies into the overarching ecosystem function strategy, and that the geographic level of "ecological provinces" has not proven a useful planning, implementation or evaluation layer for the program.

Based on these recommendations, comments and considerations the Council did revise and reorganize the program framework elements to a certain extent. The

Council integrated an adaptive management approach into the program framework, to recognize how the work done under the program to monitor and evaluate progress should feed back into decisions to refine objectives and measures. 2014 Fish and Wildlife Program, at 10-11, 101-07 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The “basinwide strategies” in the previous programs were reshaped into an overarching strategy to protect and restore ecosystem functions, a companion program strategy on fish propagation, and a set of other policies or strategies for how these two large-scale strategies come into play in different contexts. *Id.*, at 4, 10, 37-38, 76, 80 (for more on the ecosystem function concept, see #3 and #9 below). The Council revised the scientific principles. *Id.*, at 27-29 (more immediately below). The Council revised the geographic structure of the program; eliminated “ecological provinces” as a specified, functional planning level for the program, replaced by recognition that a variety of subregional groupings may make more sense for different circumstances; better integrated mainstem water management and passage and the estuary, plume and near-shore ocean considerations into the overarching ecosystem function strategy (*and see #9 and #11 below*), and retained the subbasin structure and subbasin plans. *Id.*, at 11-13, 60-71, 108-09.

With regard to the scientific principles in particular, the Independent Scientific Advisory Board recommended certain revisions in the program’s scientific foundation and principles. In the ISAB’s view the principles could be improved by being more explicit about enhancing resilience and adaptability of ecosystems, incorporating a landscape perspective, and better describing the role of human engagement in ecosystem. *Review of the 2009 Fish and Wildlife Program*, at 4-6, ISAB No. 2013-1 (March 2013) (<http://www.nwcouncil.org/fw/isab/isab2013-1/>). The ISAB’s recommendations on revising the scientific principles were then supported by others either in their program recommendations (in some cases, recommending to the Council the entirety of the ISAB’s recommendations from the review report) or in subsequent comments. This includes recommendations or comments from the Washington Department of Fish and Wildlife; NOAA Fisheries; Washington State Governor’s Salmon Recovery Office; Trout Unlimited; Native Fish Society and Wild Steelhead Coalition. Comments from the Columbia River Inter-Tribal Fish Commission and Yakama Nation did not object to revising the principles, but did make clear that the views on the scientific principles from the independent science panels must be balanced with the practical knowledge, recommendations and perspectives from the fish and wildlife agencies and tribes, especially as the agencies and tribes applied these scientific principles in management decisions. And they commented that the program’s scientific foundation should recognize the significant ecological and environmental modifications that have occurred in the Columbia River and its tributaries and that a combination of habitat restoration and hatchery implementation is necessary to maintain healthy populations of salmon and steelhead for the foreseeable future.

The Council revised the scientific foundation and principles along the lines recommended by the ISAB and those who supported those revisions. *Id.*, at 27-28.

At the same time the Council recognized elsewhere in the program (consistent with the comments) the significantly altered state of the Columbia ecosystem and the challenges that presents for successful protection and mitigation of key fish and wildlife species. The program does rely heavily on the practical management knowledge and judgments of the fish and wildlife agencies and tribes in applying these principles and deciding how best to implement and combine the strategies and tools available. See *Id.*, at 16, 17, 37, 76-77.

## **(2) Program goals and objectives**

The Council received an extensive set of recommendations regarding the program's goals and objectives, primarily from the state and federal fish and wildlife agencies and tribes but also from other state and federal resource agencies, Bonneville, the Bonneville customer groups, and a number of the conservation groups. Agency and tribal recommendations came from NOAA Fisheries, U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Montana Fish Wildlife and Parks, Columbia River Inter-Tribal Fish Commission, Nez Perce Tribe, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Kootenai Tribe of Idaho, Spokane Tribe, Colville Confederated Tribes, Upper Columbia United Tribes, Burns Paiute Tribe, Upper Snake River Tribes, Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, Pacific Fishery Management Council, Washington State Governor's Salmon Recovery Office, Yakama Basin Fish and Wildlife Recovery Board, and Bonneville. Bonneville customer group recommendations and comments came from Northwest RiverPartners, Public Power Council, PNGC Power, and Northwest Requirements Utilities. Conservation, fishing and environmental groups that provided recommendations and comments on goals and objectives included the Save Our Wild Salmon coalition, American Rivers, Trout Unlimited, Northwest Sportfishing Industry Association, Association of Northwest Steelheaders, Native Fish Society, and the Wild Steelhead Coalition. A number of the fish and wildlife agencies and tribes and conservation groups also recommended to the Council for the program the recommendations about biological objectives from the Independent Scientific Advisory Board in the ISAB's review of the 2009 Fish and Wildlife Program. Specific recommendations by specific entities will be identified below only as necessary.

The Council was aided in its deliberations on these recommendations (and subsequent comments to the same effect by many of the same entities) by the use of an ad hoc committee of its members to sift through and consider the recommendations on program goals and objectives and on the monitoring, evaluation and research elements of the program in shaping the draft program provisions (see also #18 below for the latter elements) and by a series of consultations with agency and tribal representatives that combined issues about the hatchery and wild fish provisions of the draft and issues about the direction the program should take in terms of organizing, assessing, and further developing the quantitative objectives of the program for adult salmon and steelhead (see #13 below).

The final program provisions are in 2014 Fish and Wildlife Program, at 29-36, 153-61 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>), summarized as follows:

A number of recommendations called for the Council to reorganize the program's goals and objectives in some fashion. This included gathering the program's goals, objectives and biological objectives together rather than spread through disparate parts of the program (for example, bring the biological objectives of the mainstem together with the program objectives). It also included recommendations to organize the material so as to display in a better way the relationships between the qualitative goal and objective statements, quantitative objectives, program strategies, and the indicators used in reporting, as a better basis for adaptive management. The Council significantly restructured the program's discussion of goals and objectives consistent with these recommendations. *Id.*, at 29-30, 153-62. It is a work in progress to link all these elements satisfactorily, but the Council made good progress in this amendment process. The provisions on adaptive management, of which the objectives are a part, are at 101-07, 162, and 180-82.

As recommended especially by a number of the fish and wildlife agencies and tribes and conservation groups, the Council retained the program's two broad quantitative goals for salmon and steelhead – increase total abundance to an annual average of five million adults by 2025 with an emphasis on the populations that originate above Bonneville Dam, and contribute to achieving smolt-to-adult return rates in the two-to-six percent range for listed spring Chinook and steelhead in the Snake River and upper Columbia. Bonneville also explicitly supported the continuation of the total “five million” goal. As part of an effort to refine the program's quantitative objectives (see below), the Council did ask the region to consider the ISAB's recommendation to refine the 2- to 6-percent smolt-to-adult return ratio to reflect the survival levels that populations need to achieve both recovery and harvest goals. *Id.*, at 29, 156-57.

The Bonneville customer groups recommended that Council remove the smolt-to-adult return rate goal as beyond the scope of the Northwest Power Act, as these rates incorporate all sources of mortality throughout the fish's life-cycle and not just that caused by the development and operations existence and operation of the hydrosystem. In their view, the smolt-to-adult return rate goal serves no useful function in the program and would be an inappropriate basis for a program decision by the Council. As noted above, the Council did not adopt this recommendation. The Council's recognizes that there a number of factors that contribute to low smolt-to-return rates in salmon and steelhead, not just the effects of the hydrosystem, and that achieving this goal will depend on the coordinated actions of many entities and programs in the basin. *Id.*, at 14-15, 29. At the same time the consensus recommendations of especially the agencies and tribes has been that the ultimate touchstone of success is sustained improvement in adult returns, and that means not just abundance but also sustained increases in productivity represented by the higher smolt-to-adult return rate goal. Thus it makes sense to display that goal in the program, revise it as appropriate, and work to see that the protection and mitigation measures implemented under the Act contribute their share to meeting this objective.



Beyond continuing in the program the goals noted above, the Council received a wide variety of recommendations for further developing the quantitative objectives of the program, including:

- refine the goal of five million salmon and steelhead by 2025 by specifying proportions of wild and hatchery fish; or refine to distinguish contributions of adults to harvest, spawning, and hatchery broodstock
- refine and expand the smolt-to-adult return rate goal into productivity objectives that reflect differences among species and populations
- retain the long-term goal of achieving abundance numbers and other population characteristics that represent full mitigation even while recognizing populations fluctuate due to natural variability
- refine, expand and develop the program's quantitative objectives at the appropriate subregional levels, including provinces, subbasins, ESUs, and populations, as a more appropriate scale
- align the program's objectives with the ESU/DPS/MPG/population approach to objectives used in the ESA planning
- expand quantitative objectives to include sustainable and useable abundance, distribution, and generic viability objectives as interim quantitative performance objectives for upper Columbia basin salmon and steelhead populations
- develop quantitative objectives for the initiative to reintroduce anadromous fish above blockages (see #14 below)
- as blocked areas are opened, establish escapement objectives in tributaries where fish passage and access to spawning and rearing habitat has been restored
- add biological objectives for lower river salmon and steelhead populations directly affected by hydrosystem operation – the program currently includes and emphasizes only upper river populations
- refine the five million goal and other salmon and steelhead abundance goals by removing the emphasis on populations above Bonneville Dam (or others would recommend retaining that emphasis)
- consider establishing quantitative goals for habitat, flow, hatchery performance, and harvest at the population scale
- establish quantitative objectives for biological diversity and population structure for key species and habitats by 2025
- maintain the 2009 program language for the qualitative objectives for environmental characteristics
- develop quantitative objectives for the ecosystem characteristics and functions that are needed to achieve the biological objectives for population performance
- develop an ecosystem-based function goal or goals for a restored, resilient and healthy Columbia River basin ecosystem, to match an overarching ecosystem function strategy; or to match an ecosystem function for river flow and reservoir operations

- establish quantitative objectives and timelines for floodplain restoration and for changes in flood risk management
- establish spawner abundance goals and escapement objectives for each species and race in each watershed based on an estimate of the carrying capacity of each watershed; refine over time with additional monitoring and evaluation and with better information that accounts for a range of biological processes related to adult salmon spawning and dying
- establish a conservation target or wild fish objective for each watershed and each population
- establish a carrying capacity target or objective for key watersheds
- establish nutrient enrichment targets for watersheds from naturally spawning wild salmonid carcasses as specific criteria to increase the productivity of watersheds for salmonids, riparian areas, and wildlife
- develop quantitative objectives for other species of fish and wildlife in addition to salmon and steelhead, including quantitative objectives of various types for lamprey, sturgeon, eulachon, bull trout, and other resident fish important to the program – or recognize relevant objectives that already exist in other plans and programs, such as for lamprey
- establish quantitative objectives for resident fish mitigation based on resident fish loss assessments – and develop indicators for tracking
- add quantitative objectives and indicators for wildlife, including related to operational and secondary losses
- develop quantitative objectives for improving habitat and ecosystem functions for wildlife
- incorporate into the program or recognize as program objectives the quantitative goals, objectives and standards in the biological opinions and recovery plans adopted under the Endangered Species Act
- incorporate or recognize as program objectives the quantitative goals and objectives in a range of other plans and programs, including a number of the tribal plans and programs
- add a goal to achieve 75% of the ESA recovery goals by 2025 as part of the quantitative biological objectives
- incorporate into the program the performance standards for juvenile salmon and steelhead passage through the hydrosystem salmon and steelhead in the biological opinion – could be considered interim quantitative milestones
- incorporate into the program performance standards for Pacific lamprey, white sturgeon, and bull trout from various biological opinions
- develop hydrosystem performance standards and flow objectives for non-listed salmon and steelhead anadromous species, and for sturgeon, lamprey and other species
- to the extent the Council sees the need to develop additional quantitative objectives for the program – beyond what already exists in the program and in other plans and programs – the Council should work with and largely defer to the expertise of the fish and wildlife agencies and tribes in developing the biological goals for the program

- make clear that the program’s goals and objectives for protection and mitigation under the Northwest Power Act are broader and greater than the quantitative goals set under ESA to recover and delist species – or conversely, recognize that the recovery plans have also included broad-scale recovery goals (and incorporate those into the program), goals that take into account abundance and harvest factors that already reflect the broader protection and mitigation responsibilities of the Power Act and the vision of the fish and wildlife program
- develop geographical-based program objectives to ensure that mitigation activities and investments are fairly distributed across the basin
- adopt objectives that focus new mitigation activities in the area above Grand Coulee and Chief Joseph dams as having sustained the greatest loss with less mitigation to date
- assure that any quantitative objectives established for the program are based in sound science, and not just aspirations, and reflect and are limited by the adverse effects of the hydrosystem
- revise and refine the language of the narrative or qualitative objectives in various ways
- add timelines and more definition to many objectives, quantitative and qualitative
- link quantitative biological objectives and the program’s High Level Indicators (HLIs) to track and report on progress

This was a varied and complicated and not entirely consistent set of recommendations. And except for the few recommendations that sought to maintain existing program objectives, and those that sought to have the Council simply recognize or incorporate the goals and objectives in another plan, few of the recommendations included specific quantitative objectives as much as call for their development. And even an effort to describe how that might happen became a subject of controversy, as provisions in the draft program about assessing and establishing quantitative objectives for naturally spawning and artificially produced adult salmon and steelhead became part of the long series of comments and consultations with agency and tribal representatives and comments from conservation groups and others. The nature of the issues, the consultations, and the outcome are described and explained below (#13).

In this light, the Council decided to retain most of the existing goals and objectives from the 2009 program for a range of anadromous fish, resident fish and wildlife, most but not all them qualitative. The Council did reshape and reorganize these; many are labeled interim; and some of the qualitative statements about environmental change became principles and even measures for the ecosystem function, habitat and mainstem strategies rather than objectives for environmental characteristics. See *Id.*, at 29-30, 38-39, 42-43, 60-62, 64-65, 153-61. The Council also recognized that helping to achieve the quantitative objectives and goals in the biological opinions and recovery plans should be seen as at least interim goals for the regional protection and mitigation program as well, and the Council

incorporated into the program as baseline objectives in the mainstem the performance standards, flow objectives and water quality objectives for juvenile and adult survival through the hydrosystem that are in the biological opinions. *Id.*, at 60-62, 153-54, 157-59. Recommendations about objectives that were really part of the broader sets of recommendations regarding program provisions on certain topics are addressed below, including mainstem water management, flow and passage (#9); wildlife mitigation (#12); mitigation for anadromous fish losses in blocked areas (#14); resident fish assessments and mitigation (#15); and species specific recommendations for lamprey, sturgeon, eulachon and bull trout (#16).

Beyond that, the Council deferred major changes in the existing goals and objectives. The Council will work with the state and federal fish and wildlife agencies and tribes, other state and federal agencies, the independent science panels, and others to refine program goals and quantitative objectives, with an emphasis on surveying a wide swath of plans and programs in the region and from those collecting, identifying and refining a realistic set of quantitative objectives for focal species and habitat. *Id.*, at 30-31. The Council agreed with the fish and wildlife agencies and tribes to work together on an initiative that will begin in 2015 to collect, organize, assess and report on what quantitative objectives already exist in the region with regard to adult salmon and steelhead, both natural origin and produced in or intended for hatcheries, and listed and non-listed. This effort will include defining the most effective and efficient way to track progress on the objectives and identifying specific indicators for hatchery programs to track progress on meeting the range of objectives represented by propagation efforts. Presumably another result could be identifying what important gaps exist in quantitative objectives for salmon and steelhead and then deciding together how to fill those gaps. *Id.*, at 33.

Following that, the Council will work with the agencies and tribes and others to survey, organize and assess what quantitative goals and objectives exist in the region to relate to the losses of lamprey, sturgeon, eulachon, bull trout, cutthroat trout, kokanee and other fish species important to the program. The Council will use this information to decide at least in an informal way which of these objectives to consider as possible program objectives; what modifications may need to be made to the existing goal statements, objectives, and indicators in the program; and if and when to initiate a program amendment process to incorporate revised and expanded objectives into the program. *Id.*, at 34. The Council will do the same for goals and quantitative objectives for ecosystem function, habitat and hydrosystem objectives. *Id.*, at 34.

The Council will ensure that the process to assess and develop further quantitative objectives is science based, and subject to independent scientific review at appropriate moments. *Id.*, at 31. And cognizant of the comments of the Bonneville customer groups in particular, the Council will relate these program goals and quantitative objectives, and the measures that address them, to the fundamental goal set in the Northwest Power Act to protect, mitigate and enhance

fish and wildlife for the adverse effects the development and operation of the hydrosystem only. Where goals and objectives represent losses or aims greater than the hydrosystem is responsible for, the program will be clear as to that fact and the shared nature of the responsibility with other programs and entities.

### **(3) Ecosystem function and habitat protection and improvement**

As noted in #1 above, the Council received recommendations to incorporate as a central or key goal of the program to improve and restore ecosystem functions that are healthy and resilient for the species important to the program. The most extensive recommendations and subsequent comments on this came from the Columbia River Inter-Tribal Fish Commission, Upper Columbia United Tribes, and the US Geological Survey. But recommendations and comments in support came from a broad array of agencies, tribes, conservation organizations and others. This included NOAA Fisheries; Kootenai Tribe of Idaho; Upper Snake River Tribes; Burns Paiute Tribe; Washington State Governor's Salmon Recovery Office; Upper Columbia Salmon Recovery Board; Seattle City Light; the combined comments of the conservation group coalition (such as American Rivers, Save Our Wild Salmon coalition and others); Trout Unlimited; Wild Salmon Center; Native Fish Society and Wild Steelhead Coalition; and others, including a number of individuals. The Inter-Tribal Fish Commission submitted a definition and set of principles for ecosystem-based function adopted by all of the Columbia River tribes participating in the U.S. Columbia River Treaty review. The focus of the Independent Scientific Advisory Board's recent large-scale review reports to the Council – the ISAB's 2013 review of the Fish and Wildlife Program and its 2011 review reports on food webs as a broader scientific foundation for fish and wildlife restoration and on a comprehensive landscape approach to conservation – pointed to the same concept: Improving habitat characteristics may be an important component of an ecosystem that functions for the desired species. But other elements are important, too, including food webs, invasive species, predators, climate change, contaminants, physical river structures, and other influences – all interrelated aspects of an ecosystem that functions best for productive and abundant populations of key species.

Two entities in particular (Western Montana Electric Generating and Transmission Cooperatives and Idaho Irrigation Pumpers Association) commented with concerns about incorporating this concept. They were concerned that such a broad ecosystem function strategy strays too far in too broad a language from the obligation under the Northwest Power to protect, mitigate and enhance fish and wildlife affected by the development and operation of the hydroelectric facilities. That is the obligation of the Council, not generally improving the ecosystem functions of the entire basin, altered through many different causes.

Based on the recommendations and comments especially from the agencies and tribes, the Council revised the program to state a fundamental, overarching strategy to protect and restore natural ecosystem functions. A set of sub-strategies was then organized within the ecosystem function strategy, all aimed at contributing to protecting and restoring the complex of ecosystem functions that best serve to protect and mitigate anadromous and resident fish and wildlife affected by the Columbia hydrosystem. Protecting and restoring habitat conditions remains a critical part of this overarching strategy, in what is still essentially a

habitat-based program. 2014 Fish and Wildlife Program, at 26-28, 30, 35, 37-75 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

The Council understands the concerns expressed by the Western Montana Electric Generating and Transmission Cooperatives and Idaho Irrigation Pumpers Association. The Council agrees that the obligation under the Power Act has not changed – the responsibility of the program is to protect, mitigate and enhance fish and wildlife adversely affected by the Columbia River basin hydroelectric facilities. What the Council has done here is recognize that the best scientific and management advice is that taking actions across a broad range of factors, if done effectively and efficiently, can improve the functions of the ecosystem and bring about the desired protection and mitigation to address hydrosystem impacts. The Council also recognizes that other human actions have also altered the environment to the detriment of desired native fish and wildlife. The Council's obligation is not to mitigate for the losses from the other sources, although enhancing functions by addressing problems caused in other ways is, in appropriate circumstances, an off-site mitigation opportunity allowed under the Act as part of the program. At bottom, improving ecosystem conditions for fish and wildlife basin is a responsibility the program and the ratepayers share with other programs throughout the region. What the program does is describe the objectives, strategies, tools and measures by which the hydrosystem and its ratepayers bear its portion of the responsibility. See *Id.*, at 14-15, 37-38, 114-15.

A number of fish and wildlife agencies and tribes then recommended a host of topics relating to habitat and ecosystem function that should be incorporated and addressed in the habitat strategies of the program. This included protect habitat infrastructure investments, encourage long term funding agreements, use ecosystem concepts, work with local organizations, rehabilitate mainstem habitat, fully incorporate the estuary, plume and near-shore ocean, reduce toxic contaminants, integrate climate change, implement predator control, address large woody debris, prioritize habitat restoration work, maintain the water transaction program, develop an understanding of risks associated with habitat restoration work, and consider how hatcheries integrate with habitat efforts. Nearly all of these are addressed in the topics that follow. A few miscellaneous are addressed here:

The Council received a number of recommendations emphasizing the need to focus program resources on improving habitat and functions in the mainstem portion of the river to support spawning, rearing, resting and migration, and not just consider habitat improvements as a program concept or emphasis in the tributaries. Some version of recommendations of this type came from (among others) Columbia River Inter-Tribal Fish Commission, Cowlitz Tribe, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, US Geological Survey, Upper Columbia United Tribes, US Fish and Wildlife Service, and Native Fish Society. The Council revised provisions on mainstem habitat from the prior

programs and made clear the importance of mainstem habitat improvements and measures in the ecosystem function strategy and the sub-strategies related to habitat improvement, mainstem water management and passage, and estuary. *Id.*, at 38-39, 42-43, 6-61, 64-65, 68-69 (see also #9 and #11 below).

The Council also received recommendations and comments to maintain the commitment to the water transactions program, an important tool for improving habitat conditions in the tributaries. Recommendations of this nature came from the Idaho Water Resources Board, Deschutes River Conservancy, the Clark Fork Coalition, and the Columbia Basin Water Transaction Program itself. The Council did so, as a general measure in the habitat sub-strategy. *Id.*, at 42. The recommendations included a certain amount of detail that the Council did not include. To the extent refinements are needed in how the water transaction program is implemented – and the Council is not sure any are needed – it would be more effective to address these within the water transaction project itself and among its partners and participants, in contracting and implementation and in yearly planning and evaluation.

Finally, the Council received a recommendation from the Washington State Governor’s Salmon Recovery Office and the Upper Columbia Salmon Recovery Board (and later comments from them and from the Snake River Salmon Recovery Board) to develop standards or guidance on the use of large wood in increasing habitat complexity. They emphasized that issues of liability and responsibility for maintaining restoration projects with large wood components have not been completely resolved, in part because while these structures are designed to re-create natural conditions and processes and thus appear to part of the natural environment, in reality these are artificial structures that require maintenance over time to ensure continued safety and function. The recovery office and boards noted that Council is in an important leadership position to develop standards or guidance to address the issues with regard to the use of wood, increasing awareness of the importance of wood in the habitat improvement work and supporting the investments needed to support these efforts. The Yakama Nation separately recommended that the program support and implement habitat actions that include large woody debris restoration. The Yakama Nation also recommended more broadly that the Council initiate a regional discussion and outreach program to educate project sponsors, stakeholders, and landowners on the values and risks associated with habitat restoration actions, including the placement of large woody debris.

The Council agrees in the value of the restoration and recruitment of large wood as one of the many habitat actions and habitat characteristics important to functioning river ecosystems. The program’s ecosystem function and habitat measures are more general, *Id.*, at 38-43, and so the Council did not mention large woody debris projects specifically (nor any other specific techniques). But placing and maintaining wood structures, and making other improvements to increase natural wood recruitment are certainly techniques that are part of the



core of habitat work in the basin. As for issues of responsibility and liability to maintain, the Council concluded that at first blush, these issues seem best resolved at this level of specificity in contracting and implementation. But to the extent a general problem exists that others around the region recognize, the Council is willing help. One suggestion might be to schedule a policy discussion on this topic, as part of program implementation and coordination. The Council has also called on Bonneville and the other federal action agencies to work with the fish and wildlife agencies and tribes to ensure that funds are provided for the long-term maintenance of program investments, something the Council considers a high priority for program implementation in the next five years. *Id.*, at 114-16, 199-200 (*and see* #20 below). This effort may be a place to raise the issue of responsibility for long-term maintenance of large wood structures as well as other significant habitat investments.

#### **(4) Non-native and invasive species, especially aquatic nuisance species and quagga and zebra mussel interdiction**

The Council's 2009 Fish and Wildlife Program included a general strategy and then both mainstem and subbasin measures to evaluate and control non-native and invasive species. The 2009 program recognized that these species represent direct threats to the fish and wildlife protection and mitigation efforts through competition, predation and habitat modification, and that besides the direct threats to species and habitat, aquatic invasive species in particular can also invade and significantly threaten infrastructure at hydroelectric dams and fish passage facilities in the Columbia River basin. The program labeled the possible introduction into the basin of quagga and zebra mussels the greatest known threat to the FCRPS, with particular focus on efforts to monitor and prevent their appearance in the basin. 2009 Fish and Wildlife Program, at 18, 53 ([http://www.nwcouncil.org/media/115273/2009\\_09.pdf](http://www.nwcouncil.org/media/115273/2009_09.pdf)). The program also recognized that in certain particular circumstances, the introduction and enhancement of non-native resident fish species in highly altered habitats (such as in the blocked areas) might be an appropriate mitigation option, preceded by an environmental risk assessment of potential negative impacts on native fish species. *Id.*, at 18, 24.

Non-native and invasive species issues were again a significant topic in the current amendment process. In particular, nearly all of the fish and wildlife agencies and tribes and other related state and federal resource agencies submitted recommendations addressing the threat of non-native and invasive species. Most of them called for the fish and wildlife program and the Council to play a leadership role in coordinating at a basinwide level the myriad of state, federal, tribal and local efforts at effective management, control, prevention and eradication of invasive species, connecting and overseeing strategies, forging and facilitating partnerships. Many recommended that the Council engage in a coordinated regional effort with what is known the 100th Meridian Initiative-Columbia Basin Team, an inter-agency team particularly focused on preventing aquatic nuisance species from taking hold in the basin

In addition, a number of the agencies and tribes recommended specific measures to address a variety of non-native and invasive species efforts. This included continued and increased support for the efforts to prevent introduction and establishment of invasive species, particular aquatic nuisance species, and for measures to address the adverse effects of invasive, non-native species already in the basin on native populations of fish and wildlife and their habitats. Many of these recommendations particularly called for Bonneville to fund or support particular measures, or for the federal actions agencies to support. Some also recommended Bonneville funding for monitoring of invasive species, research on innovative control and eradication methods, and research on the effects of invasive species on fish and wildlife program restoration efforts. The Council also received recommendations to make clear that the requirement of conducting

environmental risk assessments concerning the possible use or management of non-native fish should apply in any location where management of non-native invasive fish overlaps with native fish conservation and endangered species listings.

Recommendations of one or both types – general coordination or specific evaluation and control measures – came from the Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Montana Fish Wildlife & Parks, Confederated Salish and Kootenai Tribes, Coeur d'Alene Tribe, Spokane Tribe, Kootenai Tribe of Idaho, Colville Confederated Tribes, Upper Columbia United Tribes, Burns Paiute Tribe, Upper Snake River Tribes, Nez Perce Tribe, Columbia River Inter-Tribal Fish Commission, Confederated Tribes of the Grand Ronde Community of Oregon, Cowlitz Tribe, U.S. Fish and Wildlife Service, U.S. Geological Survey, Washington Invasive Species Council, Washington State Governor's Salmon Recovery Office, Lower Columbia Fish Recovery Board. A number of these agencies and tribes – and others, such as the Upper Columbia Salmon Recovery Board – commented subsequently in support of the recommendations and of provisions in the draft program based on the recommendations.

The only real issue with regard to the non-native and invasive species recommendations was the issue of responsibility. No recommending or commenting entity questioned the seriousness of threat of invasive and non-native species, or the need for a coordinated regional effort to address the threat or even the fact that the Council could be useful in helping to coordinate this effort. Especially with regard to the infrastructure threat posed by aquatic invasive species such as quagga and zebra mussels, the Bonneville customer groups (Public Power Council, Northwest RiverPartners, PNGC Power, and Northwest Requirements Utilities) recommended that the Council resist expansion of the fish and wildlife program and the ratepayer obligation to deal with threats not directly caused by or related to the development and operation of the federal hydrosystem and perhaps only indirectly a threat to fish survival in any event. In their view, this and other expansions of the fish and wildlife program were inconsistent with and a distraction from the requirements and goals of the Act and the program, and had the potential to dilute the effect of available funding from Bonneville and its ratepayers. Others such as the Idaho Irrigation Pumpers Association commented in similar fashion. The Association commented that that expanding the fish and wildlife program to address non-native and invasive species may be necessary, but that because the problems are not related to or caused by the dams or by hydropower generation, the costs should not be borne solely or even significantly by the ratepayers. The Association emphasized its support for the Council's intent to form partnerships in the region and share costs. Bonneville, in its recommendations and comments, noted its similar concerns over expecting the fish and wildlife program to carry much if any of this burden and saw a more appropriate source of responsibility and funding in the hydropower facility operation and maintenance funding by project operators. The best role for

Bonneville and the Council was to coordinate with regional partners on invasive mussel prevention and response strategies. Even a number of the agencies and tribes commented that the threat of the most serious aquatic invasive species was an ongoing maintenance issue for the project operators and not a fish and wildlife mitigation obligation to be funded out of the fish and wildlife program.

On this record, the Council included in the 2014 program a sub-strategy on “non-native and invasive species” based on and consistent with the fish and wildlife agency and tribal recommendations and comments. The substance of the sub-strategy is not significantly different than the provisions in the 2009 fish and wildlife program, yet more detailed and expanded in certain ways, with a shift in emphasis towards prevention and response and towards the need for regional coordination of efforts to address the problems caused by invasive and non-native species. The Council also included “aggressively addressing non-native and invasive species” as one of the emerging program priorities. 2014 Fish and Wildlife Program, at 46-48, 116 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The separate “strongholds” areas strategy to help protect and conserve stronghold habitats and populations of native wild fish also has a component calling for efforts to eradicate non-native and invasive species (or prevent their introduction) in these areas. *Id.*, at 44-45.

The Council also agreed with the cautions about shared responsibility and funding. With specific regard to what was identified as the greatest known threat from aquatic invasive species – introduction of quagga and zebra mussels – the Council made clear that monitoring and prevention is a regional effort led by states and federal resource agencies and regional inter-agency organizations. The role of Bonneville and the other federal action agencies under the fish and wildlife program is to assist the states and regional efforts to prevent the establishment of these species, not to lead and not to bear much if any of what could be a substantial funding and implementation burden. Suppression or eradication of other harmful non-native and invasive species already in the basin is also noted as a shared effort of state and federal fish agencies and tribes and others. To the extent non-native species are a limiting factor or threat to the success of the program’s efforts at protection and mitigation, and taking action to suppress those species can protect or enhance fish or wildlife survival, then clearly there is an appropriate role for the program and for possible funding support from Bonneville in appropriate circumstances, as well as implementation support from the other federal action agencies, all consistent with the Northwest Power Act. But the Council’s most appropriate contribution is to focus on coordination and public awareness of all the needs and efforts in the region to address non-native species that pose the greatest risk to the Columbia ecosystem and hydropower system, and not to lead or recommend a ratepayer-funded effort to address all these risks.

## (5) Predator management

A set of the state and federal fish and wildlife agencies and tribes submitted a relatively coordinated set of recommendations to support and expand the program's efforts to control predators that are a significant source of mortality not just for juvenile and adult salmon and steelhead but also sturgeon, lamprey and resident species of importance. This included recommendations from the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, NOAA Fisheries, Colville Confederated Tribes, Confederated Salish and Kootenai Tribes, Confederated Tribes of the Grand Ronde Community of Oregon, Cowlitz Tribe, Upper Snake River Tribes, and the Lower Columbia Fish Recovery Board. Recommendations cover predation by other fish (piscivorous), by birds (avian), and by marine mammals (pinniped). Not every agency and tribe in the list submitted every recommendation, but collectively the recommendations included:

- continue implementing the existing piscivorous predator-control program and expand northern pikeminnow removals to other mainstem dams in the lower Columbia River
- evaluate the effectiveness of pikeminnow removals expand efforts as warranted
- Bonneville and the other federal action agencies should work cooperatively with NOAA Fisheries, US Fish and Wildlife Service, states, tribes and the Council to develop and implement systemwide strategies to manage and reduce non-native fishes that compete and feed on native fish (both anadromous and resident) in the mainstem and in tributaries
- support and Bonneville funding for additional research into the overall magnitude of the impacts of non-native predators and food- web interactions to improve management of non-native species
- adopt into the program management plans developed in other processes to reduce the effects of avian predation in the Columbia River, including in the estuary and in the mid-Columbia River area; prioritize actions for implementation (some recommended explicitly that Bonneville and the action agencies should fund implementation)
- Corps of Engineers (or Bonneville) should fund federal, tribal and state agencies to evaluate the extent of pinniped predation on salmonids, sturgeon, and Pacific lamprey in the lower Columbia River from Bonneville Dam to the mouth of the river
- Corps of Engineers should improve the exclusion of sea lions at all main adult fish ladder entrances and locks at Bonneville Dam
- identify opportunities to reduce fish losses through pinniped predator management in the lower Columbia River
- fund federal, tribal and state agencies to implement strategies resulting from the evaluation above to manage and reduce pinniped predation on salmonids, sturgeon and lamprey

NOAA Fisheries added the recommendation for the development of a common metric (such as adult salmon equivalents) to measure and compare the effects of the different types of predation on salmonids with each other and with other limiting factors, and to evaluate the effectiveness of measures to reduce predation. The US Fish and Wildlife Service supported the development and implementation of a comprehensive regional, multi-species management approach by the states, tribes, and federal agencies to address avian predation while also ensuring the long-term sustainability of migratory bird populations. Bonneville recommended that the program encourage collaborative policies and efforts to address the adverse effects of non-native species and predators, with particular emphasis on Bonneville's longstanding pikeminnow reduction efforts. Bonneville also subsequently commented that expansion of the pikeminnow removal program to other dams (as recommended by agencies and tribes) was not warranted at this time. Grant County PUD recommended that the program endorse and advocate for the removal of Caspian tern colonies in the mid-Columbia region, as called for in the inland Avian Predation Management Plan.

Note also that the FCRPS biological opinion on salmon and steelhead and the Columbia Fish Accords include actions to address predation, actions that overlapped with the existing and newly recommended measures for the program. As explained below in the discussion of mainstem water management, flow and passage measures (#10), a broad range of fish and wildlife agencies and tribes and others recommended those biological opinions and Columbia Fish Accord actions be included as measures for the program as well.

The Council approved an expanded predator management section of the final fish and wildlife program based on the recommendations. 2014 Fish and Wildlife Program, at 49-51 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). Certain provisions in the separate section on the control and removal of non-native species also reflect these recommendations. *Id.*, at 46-48 (see also #4 above). The separate sections in the program regarding sturgeon and lamprey refer back to the predation management section. *Id.*, at 90, 92, 94, 95 (see also #16 below). And biological opinion and Columbia Fish Accord actions to reduce the effects of predation are also measures in the program. *Id.*, at 60-62 (see also #10 below).

Consistent with the agency and tribe recommendations, but mindful of the comment from Bonneville, the final program calls for Bonneville to expand the pikeminnow removal program to other dams only "where warranted," based on evaluation and adaptive management principles with input from NOAA Fisheries, the state fish and wildlife agencies, the tribes and the Council. *Id.*, at 49-50. The Council did not include an explicit reference to ensuring the long-term sustainability of migratory bird populations when collaboratively managing avian predation, as recommended by the US Fish and Wildlife Service. Sustaining migratory bird populations over the long term is not the responsibility or within the scope of the fish and wildlife program. It is within the scope of the responsibilities

of others under other laws and treaties, such as the Fish and Wildlife Service. And so the Council recognizes that considerations about protecting the long-term health of migratory bird populations will be and should be part of avian predation management.

## **(6) Protected areas and future hydroelectric development**

The Future Hydroelectric Development/Protected Areas element of the Council's Fish and Wildlife Program was the subject of significant attention during the program amendment process, with particular focus on the issue of whether to add back the possibility of an exception to the protected areas provisions for any proposed hydropower project that will have exceptional benefits for fish and wildlife. The Council did not receive recommendations asking the Council to rethink or make fundamental changes to the protected areas policy established first in 1988 and maintained in the fish and wildlife program (and power plan) ever since. To the contrary – the recommendations overwhelmingly supported maintaining the protected areas. E.g., NOAA Fisheries recommended that the “protected areas remain a critical component of the Program,” preventing unacceptable risks of further loss of fish and wildlife, an importance only “increased by the emerging threat of climate change.” Nor did the Council receive recommendations to remove any areas from protected status or to change any particular protected area designation at this time.

Instead the Council received recommendations and comments relating mostly to two issues. The issue that garnered the most attention concerned whether to include in the program again a process allowing for an exception to a protected area designation for a proposed new hydroelectric project that will provide exceptional benefits to fish and wildlife. The other issue concerned whether the protected areas database and designations remain consistent with information about fish and wildlife resources developed since the Council's original designations in 1988.

The first issue in more detail: The original protected areas policy approved by the Council in 1988 included a provision allowing any interested party to “file a petition with the Council for an exception to a protected areas designation for a project with exceptional fish and wildlife benefits.” Protected Areas Amendments (1988), at 6-8 ([http://www.nwcouncil.org/media/63794/88\\_22.pdf](http://www.nwcouncil.org/media/63794/88_22.pdf)). The “exception” provision was part of a section that also included a provision allowing an interested party to petition for a change in a protected areas designation, and a provision allowing the Council staff to make technical corrections to the protected areas database as needed.

The Council amended the language of these three provisions in a number of ways in subsequent program amendments. But all three provisions – including the “exception” provision – remained in the program until the Council's comprehensive revision of the fish and wildlife program in 2000. At that time the section containing all three provisions dropped out of the program. This happened due to an oversight and not because the Council intended to change that element of the protected areas policy. In fact, the Council's intent in developing the 2000 program was not to change or affect the protected areas element of the program in any way. See 2000 Fish and Wildlife Program



(<http://www.nwcouncil.org/media/115340/FullReport.pdf>.) The omission of three provisions went unnoticed for more than a decade – an indication of how little these provisions had been used – until shortly before the beginning of the amendment process that led to the 2014 Fish and Wildlife Program.

As the program amendment process began the Council was already engaged in discussions with staff about whether to consider adding back in the “exception” provision and the other two missing provisions to the protected areas part of the program. The Council then received a program amendment recommendation from Public Utility District No. 1 of Snohomish County, requesting the Council reinsert the provisions allowing an interested party to petition the Council for a change in status of a protected area to enable new hydropower development; and seek an exceptional benefits exception to the prohibition on new hydropower development in a protected area when the proposed project would enhance fish and wildlife resources. The Council received a similar recommendation from Black Canyon Hydro LLC.

The Council also received recommendations from the U.S. Fish and Wildlife Service, the Snoqualmie Tribe, dozens of conservation and public interest groups (including American Whitewater, American Rivers, the Save Our Wild Salmon coalition of groups, Idaho Rivers United, Conservation Northwest, Pilchuck Audubon Society, The Lands Council, Trout Unlimited, Water Watch of Oregon, and a letter jointly signed by more than twenty of these and other conservation groups) and more than 350 individuals all recommending the Council *not* reinsert any exception process into the program and thus preserve the protected areas provisions of the program as they were in the 2009 Program. Many of these groups and individuals – and others – made the same comments both orally and in writing to the Council following the recommendations and then following the release of the draft fish and wildlife program.

The Washington Department of Fish and Wildlife recommended that the Council maintain the integrity and structure of the protected areas program and “[s]trengthen exemption standards to ensure ‘exceptional benefits to fish and wildlife.’” American Whitewater, The Lands Council and others recommended – and subsequently commented – that *if* the Council was inclined to add back in an “exception” provision (something they opposed), the Council should strengthen the provision by including a definition as to what constitutes “exceptional benefits to fish and wildlife” and strengthened provisions for public participation and Council decisionmaking on a petition for an exception. Additional comments *supporting* the reinsertion of an exemption process included the National Hydropower Association, the Northwest Hydropower Association, Northwest RiverPartners and the Tulalip Tribes.

In the draft and then the final program amendments, the Council decided to reinsert into the protected areas portion of the program provisions similar to the three excised in 2000. This included a provision allowing project developers to

petition the Council for an exception to the protected areas policy for a proposed project in a protected area that will provide exceptional benefits for fish and wildlife. The Council also added back in provisions allowing, under different circumstances, for substantive amendments and technical corrections to protected areas designations. 2014 F&W Program, at 52-53, esp. 53, 163-71, esp. 168-70 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The Council did so not because the recommendation from one utility in some way outweighs the recommendations, comments and views of the hundreds who opposed re-including the exception, as was the concern of some of these commenters. It did so because the concept underlying the exception is an integral part of the underlying premise of the protected areas policy. The point of the protected areas was to prevent new hydroelectric development that would add to the fish and wildlife mitigation burden of the region that the program is otherwise intended to address. If a new hydroelectric project met what is a truly high standard of not just posing no adverse impact on fish and wildlife and instead actually providing not just benefits but “exceptional” benefits to fish and wildlife, then the purpose of the program’s protected areas policy has been fully satisfied. Also, it is critically important to the Council that it have control over a determination of this nature, and not the Federal Energy Regulatory Commission. That is why the Council included an explicit statement calling on FERC in its licensing decisions to take into account in the appropriate way any Council decision on a petition for an exception, whether favorable or unfavorable to the petition. *Id.*, at 53.

The Council greatly appreciates the participation and recommendation and views of the many hundreds concerned about this issue. And cognizant of and consistent with certain aspects of those recommendations and views, the Council added provisions to be more clear as to how fish and wildlife will be protected as compared to the original exception provision from 1988. The most important addition was to clarify what constitutes “exceptional benefits”: An exception may be allowed 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.*” *Id.*, at 169 (emphasis added). Other provisions added include:

- the need to document in the petition filed with the Council the interactions with and determinations of the agencies and tribes;
- the Council may ask for independent scientific review of the petition
- a provision for public review and comment as part of the Council’s consideration of a petition
- a clear statement that it is the Council that will make the final decision on the petition

*Id.*, at 169-70. The Council concludes that what it adopted into the program in this regard is more effective in the protection of fish and wildlife than other alternatives offered in the recommendations and comments.

The Council also received substantial recommendations and comments from conservation groups and individuals asking for continued protection for the Sunset Falls reach on the Skykomish River, currently within a protected area but also the locale for a proposed hydroelectric development by Snohomish PUD. The proposed project at Sunset Falls was the spark for the extensive controversy over the possibility of reinserting the exception process into the program. This area retains its protected areas status – that was never at issue in this amendment process. Whether Snohomish PUD will file a petition seeking an exemption and, if so, whether a review of such a petition results in a determination by the relevant fish and wildlife agencies and tribes and the Council that the proposed project will provide exceptional survival benefits to fish are unknown and outside the scope of this amendment process. The Council also received comments asking the Council to reverse or revoke an exception approved decades ago for a proposed project on the Bear River in Idaho, a proposal never developed and which may no longer be live. This request was also outside the scope of the amendment process.

The second set of issues raised in this process concerned whether the protected areas database and designations remain consistent with information about fish and wildlife resources that has developed since the Council made the original survey and designations in 1988 – or whether the Council should update the database and revise the protected areas designations to match.

Recommendations of this type included:

- review whether and how the protected areas database and designations overlap with areas designated as critical habitat for bull trout under the Endangered Species Act (Montana Fish Wildlife and Parks , Snoqualmie Tribe, American Rivers, American Whitewater, Conservation Groups, Idaho Rivers United, Save Our Wild Salmon, and Trout Unlimited)
- review whether and how the protected areas relate to rivers and stream reaches that can serve as a migration corridors or valuable habitat in light of climate change impacts (American Rivers, Conservation Northwest, NOAA Fisheries, Pilchuck Audubon Society, Save our Wild Salmon, Lands Council, and Trout Unlimited)
- investigate the relationship of protected areas designations to areas above barriers that have been removed, such as the White Salmon River above the removed Condit Dam (Columbia River Inter-Tribal Fish Commission, Yakama Nation, American Rivers, American Whitewater, and the Snoqualmie Tribe)
- investigate the relationship of protected areas to the habitat needs of new ESA listings and to such areas as Pacific flyways (Water Watch of Oregon)
- support for technical upgrades to the database if the substance of the designations and policy remain intact (Conservation Groups and Idaho Rivers United)

Subsequent comments from some of these groups and others echoed the recommendations.

As part of the consideration of these ideas, the Council's Fish and Wildlife Committee invited StreamNet (the entity that maintains the protected areas database) to brief the Council both on possible technical updates to the database and on what StreamNet could inform the Council as to how the protected areas database and designations relate to a number of the factors identified in the recommendations, such as the recent bull trout critical habitat designations. See <http://www.nwcouncil.org/news/meetings/2014/04/>; <http://www.nwcouncil.org/media/6954980/f1.pdf>; <http://www.nwcouncil.org/media/7078496/minutes.pdf>. Council staff also presented information to the Committee and full Council on these matters at various points in the amendment process.

After review of the recommendations and comments and a review of the information presented by StreamNet and the staff following their preliminary investigation into the relationship of the protected areas designations to these other factors, the Council's working conclusion was that the current protected areas designations continue to represent an excellent overlap of unimpounded stream reaches and valuable fish and wildlife resources. Where differences may or do exist due to new ESA designations or barrier removals or other factors, the stream reaches not in a protected area designation appear to have sufficient protection for the foreseeable future from new hydroelectric development based on other considerations. To do such an assessment of all the protected areas designations in a detailed way would take a substantial amount of time – more than the year available in the amendment process (it took several years to develop the original database before entering into the 1988 amendment process to add the protected areas to the program) – and would also require substantial dedication of resources. For these reasons the Council concluded there was no need to initiate or act immediately within this amendment process to review the protected areas database and consider additional areas for protected areas designations. Committing substantial Council, contractor, and agency and tribal resources and funds to such an assessment at this time was not a cost-effective use of resources or a priority for the program. Outside of the amendment process the Council will consult with the fish and wildlife agencies and tribes, conservation organizations, utilities and others in the hydropower industry and determine whether and when it makes sense to begin a reassessment of the protected areas database. The Council finds that its decision not to adopt these recommendations in the 2014 Fish and Wildlife Program and defer consideration of the reassessment of the protected areas database is more effective than the alternatives in allowing for the continued protection of important fish and wildlife resources from new hydroelectric development while allowing for program resources to be dedicated to higher priority protection and mitigation activities.

The Council also received comments seeking to protect fish and wildlife in rivers and streams from threats other than new hydroelectric development. An example is a comment from Wild Washington Rivers to “include into the Protected Areas Program all additional rivers and streams that are in areas where mineral compositions pose a threat to salmon and human health.” This is outside the scope and concept of the protected area policy and the interaction under the Northwest Power Act of electric resource development and protection and mitigation for fish and wildlife affected by hydroelectric development.

On the other hand, Northwest RiverPartners commented with regard to legislation and administration actions promoting renewable energy, including hydropower, that the “Council should review the criteria behind the Protected Areas designation to determine whether the current list of areas makes sense in light of new state and federal policies promoting renewable energy and specifically hydropower development. The Council would then need to reassess the impact of Protected Area designation on the supply curve of new hydropower available for meeting future power needs for the Council’s next Power Plan.” There was no other support in the amendment process – and certainly none from the fish and wildlife agencies and tribes – for a wholesale review of the policy, criteria and designations of the protected areas. The Council believes the basic premises of the protected areas policy and designations remain sound and an effective approach to fish and wildlife protection and mitigation in the Pacific northwest. Most of the focus of recent hydroelectric development in the northwest has been the addition of hydropower at existing dams and structures. This is something that has always been appropriate under the Council’s future hydroelectric development provisions, assuming appropriate review procedures and safeguards.

Finally, a number of the entities (the Washington Department of Fish and Wildlife, American Whitewater, a coalition of Conservation Groups, and Idaho Rivers United) included within their recommendation a provision that that the Council send a letter to hydropower developers within 30 days after a preliminary permit is issued for a project proposed to be located in a protected area. The provision is unnecessary, as it is covered by routine agency procedures and has been since 1988. The Council has lodged with FERC each successive fish and wildlife program and power plan – including the future hydroelectric development and protected areas measures and the protected areas designations – as comprehensive plans for the waterways in the Pacific Northwest to be considered by FERC under the Northwest Power Act and Federal Power act in all its licensing decisions. FERC (and others) notify the Council of any filing for consideration of its protected areas status. And the Council staff routinely notifies by letter FERC and other interested entities of confirmation that a project proposal lies either within or without a protected area. The Council has not had any experience with a project developer or FERC not being aware that a proposed project area is in a designated protected area.

## **(7) Water quality – toxic contaminants**

The issue that dominated water quality considerations in this program amendment process concerned toxic contaminants in the river, particularly in the mainstem Columbia. The Council received a suite of recommendations calling for an increase in the attention the Council's fish and wildlife program gives to assessing the extent of toxic contaminants in the river and the extent to which toxins may be or are adversely affecting fish survival, and, if so, taking actions to reduce toxic contaminants or their effects. Some of the recommendations focused on the hydropower system itself, calling for an evaluation of the extent to which the development and operation of the hydrosystem contributes to a toxic contamination problem or exacerbates the effects of toxic contamination on fish survival. These included recommendations that the federal agencies operating the system investigate how anoxic conditions in the reservoirs may mobilize contaminants, particularly mercury. Other recommendations called for increased efforts to assess the extent to which toxic contaminants are present in general in the river and affecting fish survival and possibly undermining the program's efforts to increase the survival of fish through the program's other direct and off-site protection and mitigation actions. This included recommendations to assess and map the location and types of contaminants in the Columbia River basin; summarize and advance the state of the science related to toxics and the effects on fish in a far-reaching manner; develop methods and models for identifying contaminants of emerging concern; identify and fund toxics-reduction efforts around the basin; and implement the recommendations of the Independent Scientific Advisory Board's recommendations with regard to toxic contaminants (actively investigate the impact of chemicals on mitigation and restoration activities and implement an inter-agency toxic reductions plan).

The most extensive set of recommendations on toxic contaminants came from the Columbia River Inter-Tribal Fish Commission, NOAA Fisheries (and its Northwest Fisheries Science Center), the U.S. Environmental Protection Agency, and the Save Our Wild Salmon environmental and fishing group coalition. Significant recommendations also came from the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, U.S. Geological Survey, Nez Perce Tribe, Yakama Nation, Confederated Tribes of the Grand Ronde Community of Oregon, Spokane Tribe, Coeur d'Alene Tribe, Upper Columbia United Tribes, Upper Snake River Tribes, Lower Columbia Estuary Partnership, Pacific Fishery Management Council, American Rivers, Northwest Sportfishing Industry Association, Association of Northwest Steelheaders, Conservation Northwest, and close to 50 individuals. Many entities and people commented further throughout the amendment process in support of these recommendations. Topics covered in the recommendations included:

- support for regional coordination on toxic contaminants
- characterizing the state of the science related to toxics

- support for basin-wide monitoring and characterization of toxic contaminants
- monitor and assess effects of toxic contaminants on fish and mitigate impacts
- assess effects of toxic contaminants on native fish and wildlife and food webs
- assess the extent to which the development and operation of the dams, reservoirs and coordinated hydropower system contributes to or exacerbates toxic contamination problems or their effects
- incorporate toxics into ongoing efforts to restore and improve habitats
- reduce and prevent toxic contaminants and their effects on fish survival
- a call on the federal agencies to help implement the Columbia River Toxics Reduction Action Plan
- reduce spills and leakage of toxic contaminants at FCRPS dams
- develop models to extrapolate toxicity effects to the population scale
- anticipate and minimize future pollution threats

A number of these recommending entities called directly for Bonneville funding in support of efforts to assess and reduce toxic contaminants. Others called on the federal action agencies operating the hydropower projects and the hydrosystem (Bonneville, Corps of Engineers and the Bureau of Reclamation) to take on responsibility for certain tasks collectively. Other recommendations simply described the needs without identifying the particular agencies to be responsible, and many recognized the inter-agency nature of the problem and the collective role and responsibilities of governments and agencies at all levels to deal with this emerging problem.

On the other hand, in recommendations and subsequent comments, Bonneville and a number of the Bonneville customers and customer groups (including Public Power Council, Northwest RiverPartners, PNGC Power, and Northwest Requirements Utilities) called on the Council to resist expanding the fish and wildlife program to assess and address any problems not caused by or related to the development of the Columbia River hydrosystem, with particular concern about the recommendations related to toxic contaminants, and with the greatest concern about the notion of Bonneville having a funding responsibility to address toxic contaminants in the river. In their view, toxic contaminants in the river and their effects on fish survival were not caused by and have no relationship to the development and operation of the FCRPS, and thus research and actions to address toxic contaminants are not the responsibility of the FCRPS or the system's ratepayers. These entities raised concerns about the program moving into this area as inconsistent with the requirements, limitation and goals of the Northwest Power Act, as a distraction from attention to the core responsibilities, measures and objectives of the fish and wildlife program under the Act, and as having the potential to dilute or misuse the funding available from ratepayers intended to address the effects of the hydrosystem on fish and wildlife.

Supporters of the toxic contaminant recommendations – most notably the Columbia River Inter-Tribal Fish Commission – commented in response that the Council did have authority under the Northwest Power Act to include measures based on these recommendations in the program. And that Bonneville and the other federal action agencies have authority under certain circumstances to fund and implement measures within this category.

The Council established an ad hoc working committee as part of its efforts to understand and sort through the issues related to this extensive set of recommendations and comments on toxic contaminants. The committee met a number of times over the months of January to March 2014, deliberating on the recommendations and comments and listening to the views of various participants. The toxics subgroup eventually approved a set of recommendations for the fish and wildlife committee and then the full Council to consider in developing the draft fish and wildlife program. The Committee and Council then continued to review the recommendations, comments on the recommendations and, eventually, comments on the draft program provisions.

On this record, the final program amendments approved by the Council recognized the “growing concern about toxic contaminants in the mainstem Columbia and Snake rivers and tributaries,” as one of the key issues of degraded water quality that “may be having adverse effects on the health of both our native fish and wildlife populations and the ecosystem these populations depend upon, thus impacting mitigation and recovery efforts in the Columbia River Basin.” 2014 Fish and Wildlife Program, at 54 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). This recognition was obviously highlighted by the extensive and essentially consensus views of the federal and state fish and wildlife and resource agencies and Indian tribes as to the seriousness of the problems and the need for provisions in the region’s fish and wildlife program to recognize and help address the problems. Consistent with those recommendations and comments, and the comments of many others in support, and then shaped by consideration of the entire record before it, the Council adopted a set of “general measures to address toxic contaminants,” *Id.*, at 55-56. These measures were approved as part of an overarching water quality strategy aimed at providing flows and habitat conditions of adequate quality for improved survival of anadromous and native resident fish populations and at improving water quality to promote healthy and productive populations of anadromous and native resident fish and wildlife, *Id.*, at 54. The toxic measures adopted included, among other matters:

- support for ongoing regional efforts to identify, assess and reduce toxic contaminants in the Columbia River basin; for science/policy workshops on characterizing the state of the science related to toxic contaminant issues; and for efforts by regional parties to advance public education and information on toxics issues



- support for implementation of the regional Columbia River Basin Toxics Reduction Action Plan and its water quality monitoring, research, and preventive, remedial and improvement measures
- support for efforts to monitor water quality parameters and implement water quality improvement measures in the basin to reduce toxic contaminants to meet water quality standards and improve the health, condition, and survival of anadromous and native resident fish, as well as their related spawning and rearing habitat
- a call for the federal action agencies in particular to partner with and support ongoing federal, state, tribal, and regional agencies' efforts to:
- monitor, assess and map high priority toxic contaminant hot spots in the Columbia River basin and evaluate their relationship to the development and operation of the hydrosystem
- identify and assess the effects of toxic contaminants on native fish, wildlife, and food webs in toxic hot spots in the basin
- conduct targeted monitoring in the basin of vulnerable native fish and wildlife species for specific, high-priority toxic contaminants and other priority contaminants of emerging concern and evaluate if toxic contaminants limit the reproductive success of native fish
- a call for the federal and non-federal project operators at each project to (a) monitor and report oil spills and leakages; (b) replace all lubricating oils and fluids containing PCBs with non-PCB oils and fluids; and (c) develop and implement best practices for reducing spills and leakages of oils and lubricating fluids
- a call to Bonneville and the other federal action agencies to continue to identify areas where aquatic habitat restoration projects implemented under the fish and wildlife program may be affected by toxic contaminants and incorporate pollution reduction and mitigation techniques into restoration projects when toxic contamination is a concern
- support for regional efforts to persuade Congress to provide funding similar to the funding provided to other large aquatic ecosystem areas to protect and restore water quality in the Columbia River basin, including efforts to identify and reduce toxic contaminants affecting fish survival

The Council was carefully attentive to the concerns appropriately expressed by Bonneville and the Bonneville customers about expecting the ratepayers to bear a large share of the burden to address toxic contamination problems in the Columbia River basin. The Council does believe it is appropriate under the Northwest Power Act for Bonneville and the federal hydrosystem action agencies to share in the responsibility for assessing how toxic contaminants are adversely affecting fish health and fish survival and for supporting and helping to address those effects if and where deemed to be serious. To the extent that development and operation of the hydrosystem contributes to a toxic contamination problem that affects fish survival, there is of course a direct protection and mitigation obligation under the Act. The Council recognizes, however, that most toxic contamination problems in the river that affect fish survival are neither caused by

nor exacerbated by the development and operation of the hydrosystem. That itself does not bar inclusion of protection and mitigation measures regarding toxic contaminants in the fish and wildlife program. The Northwest Power Act authorizes the inclusion of off-site mitigation and protection measures to improve fish survival, and measures to deal with toxic contamination problems that affect fish health and fish survival and jeopardize the success of our mitigation and protection efforts are in one sense just another category of off-site mitigation. *All* off-site mitigation efforts aimed at addressing problems that affect fish survival address problems not caused by the hydrosystem – that’s the inherent nature of off-site mitigation, and there is nothing unusual about using this authority in the right circumstances to address toxic contaminants that are a serious impediment to fish survival. For these reasons, the Council did include the toxic contamination measures in the fish and wildlife program, assumes that Bonneville and the other federal action agencies have a role to play in their implementation, and even identified certain aspects of the toxic measures as an emerging program priority for the program’s investment strategy with certain expectations for Bonneville funding, *Id.*, at 115-17.

However, the Council also recognized, in concert with the comments from Bonneville and its customers, that the origin and extent of the toxic contamination problems in the river basin make this a problem that is the collective responsibility of all governments and agencies at all levels to address, and that it would be inappropriate for Bonneville and the FCRPS ratepayers to bear a large portion of this burden. Rather than try to parcel out responsibility, the Council was careful in all its general toxics measures – even those in which Bonneville and the other federal FCRPS agencies may be called out for some role or support – to be clear that the responsibilities for implementation are shared by federal action agencies, the U.S. EPA and a host of other federal, tribal, regional, and state agencies. The Council believes the best result would be a continued inter-agency collaboration – which the Council will help support – to identify and address these problems, with each agency participating and contributing to an appropriate extent as determined in these ongoing implementation forums. And the Council also believes, and expressed in the program, that Congressional appropriations ought to be the source for major funding support at least for research efforts, as it is with similar water quality programs in other large aquatic ecosystem, such as the Great Lakes, Chesapeake Bay, and Puget Sound.

## **(8) Climate change**

The Council received a substantial number of recommendations seeking to have the Council expand its consideration of climate change in the fish and wildlife program. This included a coordinated set of recommendations from a number of the state fish and wildlife agencies and tribes calling for better integration of assessments and planning for climate change and its effects, as well as implementation of long-term habitat protections to combat expected climate change impacts on the basin's fish and wildlife resources. Recommendations also called for implementation of various specific assessments and actions to understand and mitigate for climate change impacts in the mainstem, the estuary, plume and the near-shore ocean, and for consideration of impacts on specific species, such as salmon and steelhead, lamprey, sturgeon, and forage fish. Specific actions recommended included measures such as:

- promoting system operational flexibility to be able to respond to climate change effects on runoff and flows
- reassessment of flood risk management and water management for flood risk
- particular attention given to changes in mid- to late-summer streamflows and temperatures, with research directed toward how various species may be affected
- maintaining key hydrologic monitoring stations in the basin, improved runoff forecasting, and planning for changes to reservoir operation and refill curves under altered precipitation.
- establishing a framework for prioritizing flow restoration actions in light of expected flow changes due to climate change
- integrating climate change considerations into future water use assessments
- identifying, preserving, and if possible expanding the number and size of cool-water refugia
- increased research on the effects of higher temperatures on run migration, timing, and spatial distribution as well as approaches to lowering those temperatures
- identifying interactions between chemical and non-chemical stressors, and reducing pollution threats, which will be important under future climate change conditions
- strengthening the Protected Areas designations to ensure protections are in place in light of hydrologic changes expected under a changing climate

A number of agencies and tribes and others recommended that the program incorporate the ISAB's recommendations addressing climate change, which dovetailed with the subjects covered above.

Recommendations of this nature from the state fish and wildlife agencies, tribes and tribal groups, federal fish and wildlife agencies and other agencies included

those from the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Montana Fish Wildlife and Parks, Cowlitz Tribe, Columbia River Inter-Tribal Fish Commission, Nez Perce Tribe, Upper Snake River Tribes, Upper Columbia United Tribes, Kootenai Tribe of Idaho, the Confederated Salish and Kootenai Tribes, NOAA Fisheries, NOAA's Northwest Fisheries Science Center, Washington Governor's Salmon Recovery Office, US Geological Survey, US Environmental Protection Agency, and Bonneville. Not every agency or tribe submitted every recommendation, of course, but collectively and in a somewhat coordinated fashion they covered the topics above. Similar recommendations came from American Rivers, the Save Our Wild Salmon coalition and associated conservation groups, and 20 individuals.

At bottom what most of the recommendations (and subsequent comments) focused on was the systematic integration of considerations about climate change into program planning and decisions of all types, to ensure our efforts to protect, mitigate, enhance and restore fish and wildlife and functional habitat are not undermined by climate change effects. Commenters recognized that the program should continue to focus on improving habitat, but with a need to review existing as well as new habitat work to assess how sustainable those habitat improvements will be as the climate changes. A number of entities thus recommended the need for flexibility, adaptive management and operational tools to mitigate for the expected effects of climate change. They also recommended that the Council expand its leadership role in identifying fish recovery and mitigation actions to address the effects of climate change, and that the Council recognize that the work already ongoing under the program – habitat protection and restoration actions, such as creation of riparian buffers, managing water withdrawals to increase tributary flows, and restoring and connecting wetlands and floodplains to store water – already represents significant work to limit the effects of increasing temperatures on fish and wildlife and their habitats in the face of climate change.

The only significant cautions the Council received in the comments was to recognize that climate change is not caused by the development and operation of the hydrosystem, and the purpose of the program is not to protect, mitigate and enhance the region's environment from the effects of climate change. The purpose is to protect, mitigate and enhance fish and wildlife affected by the hydrosystem, with the effects of climate change a potentially significant consideration in managing that responsibility successfully.

Based on the recommendations and comments, the Council included a climate change strategy in the final program, as well as a discussion in an appendix of climate change impacts in the Columbia River basin. 2014 Fish and Wildlife Program, at 57-59, 172-74 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). A number of other provisions in the final program are also relevant to dealing with climate change impacts, including the core ecosystem function principles and measures; mainstem habitat measures, including thermal refugia;

water quality measures regarding summer water temperatures; mainstem water management measures; wild fish protection considerations, and the principles and strategies of adaptive management. *Id.*, at 38-39, 42-43, 54-55, 60-65, 81, 101-07.

The final program provisions may not be as extensive as the complete set of recommendations, but they are consistent in substance with the main themes and specifics of the recommendations. And the program measures are focused primarily on ensuring that future planning and implementation of measures to protect, mitigate and enhance fish and wildlife include explicit consideration of the possible effects of climate change on populations and their habitats and key ecosystem functions, and the use of adaptive management and flexible planning and implementation tools to adapt as successfully as we can to climate change effects.

The Council will follow the completion of the 2014 Fish and Wildlife Program with the development of the region's Seventh Power Plan. The power plan will include significant consideration of the effects of climate change and climate change policy on both the existing power system and the appropriate selection of new conservation and generating resources.

## **(9) Mainstem water management, flow and passage measures and objectives, including recommendations relating to the FCRPS Biological Opinions under the Endangered Species Act and the Columbia Fish Accords**

NOAA Fisheries, a number of the region's Indian tribes and tribal organizations (Colville Confederated Tribes, Kalispel Tribe, Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Yakama Nation, the Columbia River Inter-Tribal Fish Commission), the Bonneville Power Administration, the U.S. Bureau of Reclamation, and a number of the Bonneville customer utilities and customer groups (Public Power Council, Northwest RiverPartners, PNGC Power, and Northwest Requirements Utilities) recommended that the Council continue to recognize the reservoir management, spill and passage measures and performance standards in the FCRPS biological opinions adopted pursuant to the federal Endangered Species Act as the Program's baseline or starting-point for the measures and objectives for mainstem hydrosystem water management and passage. Most of these recommendations also included the mainstem water management and passage provisions in the Columbia Fish Accords. A number of other recommending entities – e.g., the Kootenai Tribe of Idaho, Montana Fish, Wildlife and Parks, Washington Department of Fish and Wildlife – recommended tweaks to the FCRPS operations (noted below) that make sense only in the context of acceptance of the operations in the FCRPS biological opinions as a starting point for the program's mainstem measures. Most of these entities reiterated these viewpoints in subsequent comments on the recommendations and on the Council's draft fish and wildlife program.

At the same time a number of these and other entities recommended refinements, adjustments or additions to the baseline operations. Montana and the Kootenai Tribe of Idaho recommended adjustments in operations at Libby Dam, and Montana also at Hungry Horse, to improve conditions for sturgeon and other fish in and below the reservoirs, adjustments they recommended as consistent with the flexibility in operations built into the FCRPS biological opinions for salmon and steelhead and bull trout as well as the Libby Dam biological opinion for sturgeon. The Spokane Tribe recommended the Council continue to include in the fish and wildlife program an altered set of operations at Grand Coulee that the Spokane Tribe considers important for improving conditions for fish in Lake Roosevelt. Washington recommended continued adherence to the Vernita Bar operations that benefit Columbia upriver fall Chinook in the Hanford Reach. The Oregon Department of Fish and Wildlife, the Nez Perce Tribe, the Pacific Fishery Management Council and environmental and fishing groups and many individuals recommended implementing increased spill for juvenile passage as an experiment. The Bonneville customer groups (Public Power Council, Northwest RiverPartners, PNGC Power, and Northwest Requirements Utilities) anticipated the recommendation for an experiment in increased spill and adamantly opposed it in their recommendations and comments (see #10 below). The Oregon

Department of Fish and Wildlife's recommendations and subsequent comments emphasized more generally the need for mainstem measures and objectives that will result in continued improvements in adult returns whatever the starting point or baseline. Oregon's recommendations and comments dovetailed with a broader set of recommendations and comments from a number of federal and state agencies, tribes, environmental and fishing groups and individuals that the Council's mainstem provisions incorporate an explicit focus on improving ecosystem function and restoring more natural river and floodplain functions and habitats, and more natural hydrograph, all along the mainstem from the headwaters through the estuary and plume. This recommendation included providing the flexibility to take advantage of any potential for improved flows and habitat for fish that may come from a modernized Columbia River Treaty. Of the "ecosystem function" recommendations and comments, the most extensive came from the Columbia River Inter-Tribal Fish Commission, the Upper Columbia United Tribes and the U.S. Geological Survey. And many of the state and federal agencies and tribes also included recommendations and comments on a set of topics with elements across the fish and wildlife program but each with a distinct mainstem element. These included recommendations regarding:

- lamprey (mainstem passage, operations, hydrosystem performance standards)
- sturgeon (passage and hydrosystem operations measures and assessments of effects)
- eulachon (assessing hydrosystem impacts and potential improvements)
- expanded and updated bird/fish/mammal predation provisions
- increased regard for the plume/estuary/near-shore environment and the flow effects on that environment
- toxic contaminants (recognize connection to hydrosystem and assess problems and potential improvements in the mainstem, led by an extensive recommendation from CRITFC and NOAA Fisheries, and also recommended by the environmental and fishing groups and individuals)
- climate change (review and adapt hydrosystem operations to anticipated flow changes)
- reintroduction and passage of anadromous fish above blockages (Grand Coulee and Chief Joseph in the mainstem, with quite specific provisions from the Spokane Tribe and the Coeur d'Alene Tribe – environmental and fishing groups and individuals particularly echo this recommendation)

Bonneville and the Bonneville customer groups in turn expressed concern, in recommendations and comments, with the idea of expanding the mainstem measures and objectives of the program beyond the collective set of mainstem measures agreed to in a broad collaboration as part of the FCRPS biological opinions and Columbia Fish Accords.

Finally, a number of the fishing and environmental groups recommended that the Council completely disconnect its Fish and Wildlife Program from the FCRPS

biological opinions as well as pursue additional flow and passage actions, including operating the John Day pool and other lower Columbia reservoirs at minimum operating pool. A set of these groups along with the Nez Perce Tribe recommended a new evaluation of the removal of the four dams in the lower Snake River.

On this record, in the 2014 Fish and Wildlife Program the Council embedded its mainstem water management, passage, flow and habitat measures and objectives as part of a explicit and broader program strategy to improve ecosystem function: “to protect and restore natural ecosystem functions, habitats, and biological diversity wherever feasible consistent with biological objectives in the program.” This program-wide emphasis is then reflected in the general strategy to which all mainstem water management and passage measures relate (“manage dams and reservoir operations to protect and restore ecosystem function and habitat, and to improve fish passage and survival through the hydrosystem”) and the general strategy to which all mainstem habitat measures relate (support for “increased investments in mainstem habitat improvements to increase the extent, diversity, connectivity, and productivity of mainstem habitats for mainstem spawning, rearing, and resting”). 2014 F&W Program, at 38-40, 42-43, 60-62, 64-65 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

As for the specific mainstem passage and water management measures, the Council began by recognizing as the baseline or starting point the hydrosystem actions and performance standards called for by the federal agencies and analyzed in the FCRPS biological opinions as well as the mainstem hydrosystem actions agreed to in the Columbia Basin Fish Accords. The Council’s decision is described at, among other places, *Id.*, at 22, 60-62, 110-12.

The Council first confronted the relationship of the Fish and Wildlife Program to the actions analyzed under the federal Endangered Species Act in the context of adopting the 2003 Mainstem Amendments to the Fish and Wildlife Program, after the federal agencies adopted the 2000 FCRPS Biological Opinion. In the findings for the 2003 amendments, the Council explained at length how and why it handled these ESA developments within the context of the Northwest Power Act’s protection and mitigation program. See [http://www.nwcouncil.org/media/28433/2003\\_11b.pdf](http://www.nwcouncil.org/media/28433/2003_11b.pdf), pp. 58-66. The Council followed the same approach in its decision on the 2009 Fish and Wildlife Program. [See [http://www.nwcouncil.org/media/29717/2009\\_09F.pdf](http://www.nwcouncil.org/media/29717/2009_09F.pdf), pp. 5-9. The Council remained consistent in its approach in developing the 2014 Fish and Wildlife Program, as described above and in the pages from the 2014 program cited above. Thus the explanations from the 2003 and 2009 findings also remain valid and are incorporated here.

To summarize: The Council has been careful not to adopt or incorporate the FCRPS Biological Opinions or the Accords themselves into the program. Nor is



the Council making any conclusion as to whether these actions or performance standards satisfy the requirements of the ESA, nor adopting or commenting in any way on the jeopardy analysis relevant to the ESA documents. Those matters are once again in litigation, and they are not within the Council's purview in any event. Instead, what the Council is recognizing and incorporating into the program are the specific hydrosystem actions and performance standards from the FCRPS biological opinions and the actions in the Columbia Fish Accords, as a starting point for the Council measures and objectives. These are already baseline implementation commitments of the federal agencies to address the needs of species adversely affected by the Columbia hydrosystem and in need of protection and mitigation under the Northwest Power Act – incorporating them into the program simply recognizes this basic point. No entity recommended or commented *not* to incorporate or implement these measures and objectives – the issue is and has always been whether the Council should include *additional* mainstem measures in the program. And the biological opinion actions are largely built on the mainstem planning and implementation work developed under the Council's program over its first 20+ years, and are consistent with and based in the program's general strategies and biological objectives. Perhaps most important, recognizing these actions and standards as the program's baseline mainstem measures and objectives is consistent with the recommendations and views of the large majority of the federal and state fish and wildlife agencies and tribes in the amendment process to which the Council owes deference under the Northwest Power Act.

Commenters also again questioned the Council's link in particular to the FCRPS salmon and steelhead biological opinion because it is the subject again of litigation. The context in 2003 and 2009 also included the possibility that a federal court might rule that the FCRPS biological opinion did not fully satisfy the requirements of the ESA, and remand or vacate that opinion, which is what in fact happened with the 2000, 2004 and 2008 FCRPS biological opinions for salmon and steelhead. We are in a possibly similar situation now – the federal district court has under review challenges to the 2014 FCRPS Supplemental Biological Opinion. The possibility that federal courts may find fault with some aspects of the ESA decisions associated with the 2014 FCRPS Supplemental Biological Opinion does not affect the Council's decisions here. As noted above, the Council has been careful not to adopt or incorporate the FCRPS biological opinions into the Council's program, nor make any conclusions with regard to the sufficiency of the biological opinion under the ESA. The Council is instead simply recognizing the *actions* reviewed in the opinion as baseline measures in the Council's program as well. These measures are now independently part of the Council's program. The Council has no reason to believe that these measures will not continue to represent the basic core of the mainstem actions implemented by the federal agencies and their partners in the near future for listed salmon and steelhead. It may again be that if the litigation is successful, the court or the federal agencies may reassess or order additional measures under the ESA to benefit salmon and steelhead in the mainstem, tributaries or estuary. But no party is arguing in the

litigation not to implement these actions, asking for a court order not to implement these actions, or arguing that they do not provide some benefit for listed species. To the extent the litigation produces a dramatically different context for action, the Council will need to revisit its program decisions.

Moreover, the Council included these elements in the program with explicit recognition that 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,” and the explicit condition that the federal agency commitments to implement the biological opinions and the Columbia Fish Accords “must not come at the expense of sufficient funding for other program priorities.” The program’s “[mainstem] strategy is thus designed to protect a broader range of species and their habitat.” Based on the recommendations and comments summarized above, the Council “add[ed] important considerations to the benefit of non-listed anadromous and resident species affected by hydrosystem operations” and provisions to “investigate the potential for additional gains in ecosystem function and floodplain connectivity.” 2014 F&W Program, at 60-61, 112

(<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). These additional measures include, among others:

- Continued reliable implementation of operations to protect spawning and emergence of unlisted and abundant fall Chinook in the Hanford Reach, consistent with the 2004 Hanford Reach Fall Chinook Protection Program Agreement, with periodic assessment as to whether these flow measures continue to be effective in protecting fall Chinook redds and juveniles from flow and river elevation fluctuations.
- A collaborative effort among the federal agencies, the Council state, federal and tribal entities to protect habitat and improve survival in the mainstem for important anadromous fish species that are not listed, including upper Columbia River summer and fall Chinook, upper Columbia sockeye, sturgeon, and lamprey, as well as important species of resident fish, including investigating whether the baseline flow and passage operations in the FCRPS biological opinions are optimum for the needs of these non-listed fish important to the Council’s program, as well as a specific measure to continue to investigate ways to reduce descaling in juvenile sockeye during dam passage.
- Continued investigations to refine operations at Libby and Hungry Horse dams that improve conditions for listed and non-listed resident fish near those reservoirs and do not adversely affect fish in the lower river, including continued discussion of proposals for adjustments to winter and spring operations and assessment of the impacts on the recovery of native fish species, food web, and fish and wildlife habitat restoration efforts.
- Investigation by the Corps of Engineers into infrastructure changes at Albeni Falls Dam and habitat enhancements in areas impacted by the dam, to benefit native resident and anadromous fish.

- A collaborative evaluation and report to the Council on alternative operations at Grand Coulee recommended again by the Spokane Tribe to benefit resident fish in the reservoir; coupled with a general measure calling for the action and fish agencies and tribes to 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 and rearing needs in the lower Columbia River, Hanford Reach fall Chinook spawning and emergence, and resident species in the reservoir and above the reservoir, and a call to manage the reservoir and dam discharges to minimize fluctuations and ramping rates and produce steady flows across each season and each day, as much as possible within current operating constraints.
- Research, monitoring, evaluation and protection and mitigation efforts aimed at understanding and addressing the effects of mainstem flow regulation on survival and habitat conditions in the estuary and near-shore ocean plume, for all species of importance using the estuary and near-shore during some part of their life cycle.
- A set of flow, water management and passage measures to improve survival and habitat conditions in the mainstem for sturgeon and lamprey.
- A collaborative effort to assess and address the biological requirements of eulachon in the mainstem, including an inquiry into the relationship of those requirements to the current flow regulation and dam operation regime.
- A collaborative, phased effort to investigate the feasibility of reintroduction of anadromous fish above, and passage at, Grand Coulee and Chief Joseph dams in the upper Columbia mainstem (see Finding 6 below).
- A set of predation, climate change, water quality, and toxic contaminant measures aimed at investigating conditions in the mainstem related to each; assessing the relationship of each to hydrosystem development and operations and flow regulation; and addressing adverse effects through protection and mitigation activities.
- An ongoing, collaborative, adaptive management effort to investigate, develop, and implement flow and passage measures that will improve fish life-cycle survival, for listed and non-listed species alike.
- And related, a collaborative effort to investigate and adjust system water management and implement mainstem habitat measures to improve ecosystem functions in the mainstem, estuary, and plume, with an emphasis on improvements to reconnect and enhance floodplains and floodplain connections through both flow and structural measures, enhance plume and near-shore ocean habitat, reduce salt water intrusion during summer and fall, fewer and shorter hypoxia and acidification events in the estuary, lower summer water temperatures, and investigate alternative methods of flood risk management to reduce demands on river operations to provide this benefit to the detriment of ecosystem functions.
- An investment strategy for emerging program priorities, including additional funding to cover these priorities if not possible through savings – priorities that include a number of these key mainstem measures (e.g., to support

expanded management of predators, mapping and determining hotspots for toxic contaminants, investigation of blocked area mitigation options through reintroduction, passage and habitat improvement, implementation of additional sturgeon and lamprey passage and research measures, and continued efforts to improve floodplain habitats and connections, especially in the lower river).

*Id.*, at 60-66 (mainstem passage and flow measures), 39-40 (general measures on improving and protecting ecosystem function, several with relevance to mainstem flow regulation and habitat conditions); 42-43 (mainstem habitat measures); 49-51 (predation measures, including in the mainstem); 54-56 (mainstem water quality measures as well as toxic contaminant measures that relate to the mainstem reaches and the mainstem hydroprojects); 57-58 (climate change provisions, including relevance to mainstem river flows, operations and conditions); 68-70 (estuary and near-shore ocean plume measures, including assessment of river flow regulation effects); 84-85 (measures to investigate the feasibility of reintroduction above and passage at Grand Coulee and Chief Joseph in the mainstem); 90-91 (sturgeon measures, including those focused on mainstem flow, passage and habitat conditions); 95 (lamprey mainstem flow, passage and habitat measures); 97-98 (eulachon measures that relate to mainstem flow regulation), 115-17 (funding and investment strategy for emerging program priorities, including several related to mainstem measures).

The Council received comments, especially from Bonneville customers concerned that the additional mainstem measures the Council called for might be inconsistent with or put at risk implementation of the FCRPS biological opinion actions in the mainstem. That is not the Council's intent, and it would not make sense if it was – the Council recognizes that the federal action agencies could not implement actions inconsistent with the biological opinions without further ESA inquiry. As noted above, many of the mainstem measures called for by the Council are in addition to and not directly inconsistent with what are the baseline mainstem measures taken from the FCRPS biological opinions, and are intended to benefit both listed and non-listed species consistent with the Council's protection and mitigation responsibilities under the Northwest Power Act. Principles and conditions for implementation of these additional measures are covered in, among other places, the program's implementation and investment strategies as well as the mainstem strategy. See *Id.*, at 60-62, 110-17. Inconsistency with implementation of the biological opinion-based measures is not an issue in these instances. And where measures intended to benefit non-listed species do or might conflict with the current biological opinion actions, the Council does not mean that the federal operating agencies should act contrary to the biological opinions in order to implement strategies in the Council's program. The Council intends instead that the federal operating agencies make every effort practicable to use the operational flexibility and adaptive management provisions built into the FCRPS biological opinions (and the flexibility of the ESA itself) to meet both the biological opinion requirements and implement the other strategies in the

Council's program to benefit non-listed anadromous and resident fish. The Council is confident these improvements can be made over time consistent with the flexibility built into the biological opinions without adverse effects on listed species and will lead to a more broad-based, sustainable, and cost-effective protection and recovery of fish and wildlife in the Columbia Basin. The Council expects the federal operating agencies and fish and wildlife agencies to consult closely in implementation with the Council, the states and tribes, and other important participants in this effort, including the Bonneville customers.

In summary, the Council concludes that the mainstem hydrosystem water management, passage and habitat measures included in the 2014 Fish and Wildlife Program are consistent with nearly all of the extensive recommendations received by the Council on the subject, particularly those from the federal and state fish and wildlife agencies and the region's Indian tribes, and especially as the Council integrated them into a coherent program and system approach. The program provisions and these findings also indicate appropriate consideration of the comments on the recommendations and on the draft program. The Council rejected the recommendation from a number of environmental groups and individuals to disconnect the program from the biological opinion actions for the reasons noted. The Council also did not accept the recommendation from the Nez Perce Tribe and the environmental and fishing groups to call for a study again of the possible removal of the four lower Snake River dams. No other state or federal fish and wildlife agency or tribe or federal action agency raised this issue in the amendment process. Snake River dam removal has been studied in the past, and that information remains available to the action agencies, fish and wildlife agencies, and tribes for future consideration. This includes information from the Council's Sixth Power Plan, in 2010, in which the Council analyzed the power system effects of a dam removal scenario. Mainstem dam removal issues are otherwise outside the scope of the Council's considerations in the fish and wildlife program under the Northwest Power Act. The Council also did not accept the recommendation of the environmental and fishing group coalition to call for operation of the John Day reservoir and other lower Columbia reservoirs at minimum operating pool. No state or federal fish and wildlife agency or Indian tribe recommended or supported this action at this time.

The Council also received recommendations to maintain the Fish Passage Center and its functions. The Council did so. *Id.*, at 62-63, 175.

The only key mainstem issue not addressed here concerns the recommendations for implementation of an experiment to increase spill for juvenile fish passage. This is addressed in a finding that comes next. Also note that the subject of the reintroduction of anadromous fish into blocked areas above dams, both mainstem and tributary, is the subject of a separate discussion below (#14).



## **(10) Proposed experiment to increase spill for juvenile fish passage**

As noted above, the Oregon Department of Fish and Wildlife, the Nez Perce Tribe, the Pacific Fishery Management Council, a set of environmental and fishing groups, and a number of individuals recommended implementation of increased juvenile passage spill as an experiment. The Council also received a briefing from the Comparative Survival Study team that developed the proposal in September 2013 just as the amendment process was beginning. See <http://www.nwcouncil.org/news/meetings/2013/09/>; <http://www.nwcouncil.org/media/6877229/2.pdf>; [http://www.nwcouncil.org/media/6925421/2013\\_09minutes.pdf](http://www.nwcouncil.org/media/6925421/2013_09minutes.pdf) (January 2013 Council meeting agenda, packet memo and meeting minutes). The hypothesis underlying the proposal was that significant further increases in spill targeted at passing juvenile salmon could lead to significant increases in smolt-to-adult returns. The Council received substantial oral and written comments in favor of the proposal, particularly from representatives of environmental and fishing groups, following the submission of the recommendation.

A set of the Bonneville customers and customer groups anticipated and adamantly opposed the increased spill experiment in their own recommendations to the Council, and later in oral and written comments to the Council. Bonneville also commented in opposition to the recommendation, arguing that an experiment at increasing spill was not warranted by the science, with a hypothesis dependent on unwarranted assumptions. Both Bonneville and the Bonneville customers placed emphasis on the fact that NOAA Fisheries itself did not support the spill experiment proposal at this time. In its draft 2014 FCRPS Biological Opinion issued in September 2013, and then in the final 2014 FCRPS Biological Opinion issued in January 2014, NOAA commented explicitly on the proposed increased spill experiment, explaining over several pages why the agency decided not to include the spill experiment in the biological opinion's hydrosystem passage RPAs. NOAA found that "several substantial weaknesses in the analysis exist that would need to be resolved prior to further consideration of any operational study of this magnitude," with extensive detail about its concerns. NOAA concluded that it was not "dismissing the results of these modeling efforts and appreciates the progress made in the CSS modeling," and agreed to continue to monitor the effects of project operations on juvenile survival and adult returns" as reported by the CSS team and others and to "continue to consider opportunities to make further improvements to hydrosystem operations or configurations." NOAA recommended that any future spill-test proposals explicitly address seven factors: legal requirements and permitting timelines; biological effects, especially with regard to dissolved gas effects; effects on the energy system that would affect the authorized project purposes; monitoring/information constraints; logistical constraints; comparison of adult returns with a number of factors, not just spill; and "[i]ndependent review of (a) data to address potential spurious correlations and (b) alternative experimental design proposals (by the ISAB or other qualified entities)."

2014 FCRPS Biological Opinion, at 380-82 ([http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/2014\\_supplemental\\_fcrps\\_biop\\_final.pdf](http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/2014_supplemental_fcrps_biop_final.pdf)); see also [http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/2013\\_draft\\_fcrps\\_biological\\_opinion\\_090913.pdf](http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/2013_draft_fcrps_biological_opinion_090913.pdf), at 355-56 (draft 2014 biological opinion).

Given this record, the Council, in December 2013, decided to also ask the Independent Scientific Advisory Board (ISAB) to review the spill experiment proposal. See [http://www.nwcouncil.org/media/6925473/2013\\_12minutes.pdf](http://www.nwcouncil.org/media/6925473/2013_12minutes.pdf), at 5-6 (minutes of December 2013 Council meeting). The ISAB issued its review report in late February 2014, "Review of the Proposed Spill Experiment," ISAB 2014-2 (<http://www.nwcouncil.org/media/6939290/ISAB2014-2.pdf>), and made a presentation on its review report to the Council at the Council's April 2014 meeting, see <http://www.nwcouncil.org/news/meetings/2014/04/>; <http://www.nwcouncil.org/media/6954971/9.pdf>. The ISAB concluded that the proposal for an increased spill experiment did not yet include a study design adequate to review or implement the proposed experiment, listing a number of elements that would need to be included to make a valid study design for a scientific experiment. The ISAB noted that information underlying the proposal indicated that the hypothesis about a relationship between increased spill and increased adult returns had "worthwhile merits," but also that the spill test may not result in increased smolt-to-adult ratios "as the justification for the proposed test is based on correlative models that do not establish causality." The ISAB noted that the spill test could instead result in a host of unintended adverse consequences for salmon survival, and the information was not yet adequate to justify the proposal "due to study design limitations and lack of a detailed study and monitoring plan." Besides the need for an adequate study design, the ISAB noted (as many others did as well) that the spill proposal could not be considered for implementation unless and until the water quality standards for total dissolved gas established by the states of Oregon and Washington under the Clean Water Act were modified by these states to allow for spill of the magnitude proposed, modifications that would also require concurrence by NOAA Fisheries and the US Environmental Protection Agency.

Based on this record, the Council, in the draft 2014 Fish and Wildlife Program, decided not to include a call for implementation of the proposed increased spill experiment as recommended. Instead, the Council included a provision that "continues to recognize the value of an experimental approach to salmon recovery in the Northwest," and "support[ing] the development of adaptive management experiments that address critical uncertainties related to species survival." The Council then detailed a set of requirements that proposals for such large-scale experiments would need to have to be eligible for consideration, a list essentially developed from the ISAB review reports and other reviews and comments on the spill experiment proposal. The Council then concluded, with specific reference to spill experiments, that "[f]urther work on proposals for mainstem spill experiments should fully engage the



technical expertise in the region, including scientists from NOAA Fisheries, universities in the Northwest, fish and wildlife managers, federal agencies, and private consultants. The Council is interested in seeing future proposals for improving spill and other mainstem operations that meet these criteria and contain all the elements of a viable experiment as identified by the ISAB in report 2014-2.” Draft 2014 Fish and Wildlife Program, at 63-64 (<http://www.nwcouncil.org/media/7076544/2014-3.pdf>).

Comment on the provision in the draft was comparatively muted compared to the debate on the spill experiment when the recommendations first came to the Council. The Oregon Department of Fish and Wildlife – one of the original recommending entities – supported the provision in the draft, “appreciate[ing] the Council’s call to continue development of experimental spill proposals and adaptive management experiments that address critical uncertainties related to species survival.” The Nez Perce Tribe, the only other entity from the group of fish and wildlife agencies and tribes that recommended the spill experiment, did not mention the issue in its comments on the draft program (even as the Tribe expressed a general concern that the Council, in the draft, had not advanced and supported hydro operations that would fully mitigate for the effects of the hydrosystem by relying too much on the FCRPS biological opinion actions). NOAA Fisheries commented in support of the provision on spill experiments in the Council’s draft. The US Fish and Wildlife Service commented on the provision simply to add the Service as one of the agencies that should be involved in any future work to develop spill experiment proposals. None of the other state fish and wildlife agencies or tribes commented in writing on this provision. Bonneville and the Bonneville customers and customer groups supported the way the Council proposed in the draft to resolve debate over the spill experiment recommendation. The main coalition of environmental and fishing groups did comment to oppose the provision in the draft, continuing to comment that the record showed that the increased spill proposal was just the type of promising step the Council and the region needed to implement to be able to achieve salmon and steelhead adult return ratios sufficient to meet the program’s goals and rebuild salmon stocks.

After consideration of this record, the Council retained the spill experiment provision in the final 2014 Fish and Wildlife Program, with only minimal editing from the provision in the draft (including adding in an explicit reference to the US Fish and Wildlife Service). 2014 F&W Program, at 65-66 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The Council thus did not adopt the spill experiment proposal as originally recommended. The Council concludes that what it did adopt is a modified version of the recommendation that is a more effective science-based approach to handling this and future spill experiment proposals and consistent with the best available scientific knowledge, given the information indicating that the spill proposal as recommended was not yet in a form to be reviewed and implemented as a scientific experiment, and faced substantial regulatory hurdles at this time as well. The support for the program provision from one of the main proponents of the proposal in the

recommendations – the Oregon Department of Fish and Wildlife – as well as the support or lack of objection from the other fish and wildlife agencies and tribes was also a key factor in the Council’s final decision.

## **(11) Estuary, near-shore ocean and freshwater plume, ocean**

The Council received substantial recommendations to enhance the attention the program gives to the estuary, lower Columbia River, the river's freshwater plume, and the near-shore ocean environment. This included a coordinated set of recommendations from fish and wildlife agencies and tribes (Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, the Upper Snake River Tribes, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, NOAA Fisheries) to, in their words, fully incorporate the estuary, plume and near-shore ocean into the fish and wildlife program. Recommendations included matters such as:

- add language to the program to recognize the critical importance of the estuary, plume, and near-shore ocean to the Columbia river ecosystem and ecosystem functions and to the survival of salmon, steelhead and other important fish species; recognize how management of the hydrosystem directly affects the estuary, plume, and near-shore ocean environment; and recognize how releases of large numbers of hatchery fish for hydrosystem mitigation may have density dependent effects in this portion of the ecosystem
- continue basic monitoring to increase understanding of the role of estuary, plume and near-shore ocean habitats, functions and processes in anadromous fish survival, to assist inland management decisionmaking
- fund a collaborative forum of scientists and fish and wildlife managers to identify key management and research questions related to the estuary, plume, and near-shore ocean environments; existing research and monitoring relevant to these management questions; baseline monitoring and research priorities; opportunities for information sharing between scientists and managers; and ways to improve the usefulness of ongoing and proposed ocean, estuary and plume research
- ensure complete consideration of anadromous fish life cycle and critical habitat needs, including the estuary, plume and near-shore ocean, when making management decisions
- assess and integrate the effects of future climate change into knowledge and decisions about the estuary, plume and near-shore ocean; develop adaptation strategies to address effects
- based on evolving knowledge about the estuary, near-shore ocean and plume, plan and implement adaptive management experiments to improve survival of anadromous fish, including experiments on variable release timing and evaluation of stock-specific growth and survival in the ocean compared to freshwater management
- continue research on the effects of hydrosystem management on anadromous fish habitat, considering life histories and productivity
- continue and expand efforts to improve habitat conditions in the estuary, including improving and connecting floodplain habitats, and including

important habitat areas in the lower Columbia tributaries as well as mainstem portion of the estuary

- at the same time, continue to assess, address uncertainties in, and improve the effectiveness of estuarine restoration projects of varying habitat types and their contribution to juvenile survival and increased adult returns
- include the needs of lamprey, sturgeon and eulachon as well as salmon and steelhead in estuary, plume, and near-shore considerations
- key information needs include: estimates of residence time in rearing habitat; quantity and quality of rearing habitat; movement between rearing habitats; importance of habitat connectivity and spatial distribution quantity and quality of fish habitat; fish use of habitat by habitat type; distribution of habitat by type in the Lower Columbia River and estuary; status and trends of the ecosystem functions
- support research on the role and importance of forage fish in the lower estuary and near-shore area through a set of measures

Recommendations similar to some of the above if less detailed also came from the Lower Columbia River Fish Recovery Board, Nez Perce Tribe, Yakama Nation, Upper Columbia United Tribes, US Geological Survey (with particular emphasis on floodplain flows and habitats and on forage fish), and Pacific Fishery Management Council. Bonneville recommended the program particularly acknowledge that estuary habitat restoration actions have been shown to benefit to juvenile salmonids, and acknowledge the strategies, priorities, and benefits identified in the federal agencies' Columbia Estuary Ecosystem Restoration Program. The Native Fish Society recommended recognition of the importance of the estuary and near-shore in a coordinated strategy at habitat protection and restoration investments designed to maintain the chain of habitat requirements for each species of wild salmon and steelhead to complete their life history requirements in freshwater.

The Lower Columbia Estuary Partnership in particular provided an extensive set of recommendations for the estuary, in substance similar to what came from the fish and wildlife agencies and tribes and other agencies summarized above. This included:

- emphasis on the importance of the estuary, plume and near-shore ocean environments to the Columbia River ecosystem and healthy ecosystem functions for salmon, steelhead and other important species
- the need for biological objectives specific to the lower Columbia river salmon and steelhead on par with those above Bonneville Dam
- increased attention both to habitat restoration actions in the estuary and to needed improvements in evaluating the effectiveness of habitat actions
- an increased emphasis on providing normative hydrologic or environmental flows to the estuary and plume, including allowing overbank or flood flows

The Estuary Partnership, NOAA Fisheries and the Native Fish Society in particular also recommended to the Council the recommendations about the estuary that came from the Independent Scientific Advisory Board. These meshed in substance with the recommendations from the agencies and tribes:

- develop detailed strategies and a coordinated plan for the estuary in conjunction with the mainstem and ocean
- develop methods to measure the potential increase in survival of Chinook and steelhead that benefit from estuary restoration
- develop methods to monitor diversity in the estuary to track diversity over time
- develop a comprehensive plan for monitoring long-term effectiveness of estuary restoration for adaptive management
- reassess factors limiting production in the estuary, including contaminants, in light of new research
- update and peer review the Estuary Module developed during recovery planning
- consider redefining estuary boundaries to include the tidal regions at the mouth of tributaries draining into the estuary

With regard to the ocean in general, the coordinated recommendation from the fish and wildlife agencies and tribes included adding as the program's key "ocean strategy" to identify the effects of ocean conditions on anadromous fish survival and use this information to evaluate and adjust inland management actions. They also recommended continued work to improve the forecasting of adult salmon and steelhead returns, including continued support for ocean research such as the work by NOAA Fisheries and Canada's Department of Fisheries and Ocean to develop ocean indicators to be used to improve salmon run forecasting.

NOAA Fisheries provided the most extensive recommendations regarding the ocean. NOAA recommended that the program be updated to reflect important recent advances in scientific understanding of the effects of ocean conditions on salmonid survival; recognize that the Columbia River and the ocean are linked ecosystems that together determine the survival and growth of anadromous fishes in freshwater and ocean; emphasize the importance of healthy Columbia River ecosystems during poor ocean condition cycles; and confirm and support the importance of monitoring and understanding ocean conditions and establishing management systems that can adapt accordingly. NOAA commended the Council for establishing the ocean and plume science and management forum and urged its continuance. A number of other commenters echoed that last point.

NOAA Fisheries, the Estuary Partnership and others also recommended to the Council the views of the ISAB with regard to the ocean as well as the estuary. The ISAB recommended to the program the following considerations about the ocean:

- emphasize in the program that the productivity of anadromous populations in all subbasins of the basin are affected by physical, biological, and ecological conditions in the ocean
- expand the program's primary strategy beyond the relation of the ocean to anadromous fish survival to include ocean effects on growth and viability (abundance, productivity, spatial structure and diversity) and recognize interaction effects among these processes.
- organize the program's ocean strategies to emphasize: a) first priority, to understand and isolate effects of ocean conditions on anadromous fish survival and growth to increase the power of analyses to detect the effects of restoration actions in freshwater; b) second priority, to determine limits to restoration potential or the effectiveness of actions taken in the basin given the variability of ocean conditions that affect anadromous fishes; and c) third priority, to predict future ocean conditions with a view to adjusting actions in the basin to achieve greater benefits and/or efficiencies

Many of these same entities also commented on the provisions in the Council's draft program to express continued support for the recommendations and to support provisions based on the recommendations. Of the more extensive comments, the Washington Department of Fish and Wildlife commented seeking stronger support for research into the impacts of system FCRPS operations on the plume and near-shore ocean environment, with the intent of eventually informing operational changes to increase survival of anadromous species and for Bonneville funding for operation and maintenance funding for salmon restoration projects in the estuary. NOAA Fisheries commented to appreciate the support for the Bonneville-funded plume and near-shore research program; to encourage further collaboration with the Council's ocean and plume forum; and to recommend the Council explicitly incorporate into the program the four "Management Uncertainties, Questions and Potential Actions" developed in the forum. The Lower Columbia Estuary Partnership called on the Council to integrate the Estuary Partnership's Comprehensive Conservation and Management Plan within the estuary section of the program, including the Estuary Partnership's quantifiable conservation targets and geographic priorities. And the US Geological Survey expressed support for the measures in the draft program to assess estuary habitat benefits resulting from modification of existing flood control structures and systems, such as through removal or alteration of levees, and for assessment of flow and other measures to improve the amount and connection of floodplain habitats and functions.

The Bonneville customer groups (Northwest RiverPartners, Public Power Council, PNGC Power, and Northwest Requirements Utilities) recommended and commented that the Council exclude from the program as outside the scope of the Northwest Power Act measures regarding the ocean in particular that have no relationship to the Columbia River basin and to addressing the adverse effects of the hydrosystem on fish and wildlife. This would include, in their view, most ocean-based studies; coded wire tagging for catch-sampling and harvest management;

ocean-based research; and provisions for mitigation, protection, or enhancement measures in or related to the ocean, including measures attempting to address ocean conditions such as acidification.

The Council developed final program provisions for the estuary, freshwater plume, near-shore and ocean based on the recommendations and comments. The program contains an estuary sub-strategy and a plume and near-shore ocean sub-strategy, as part of the overarching ecosystem function strategy. 2014 Fish and Wildlife Program, at 68-69 (estuary sub-strategy), 70-71 (plume and near-shore ocean sub-strategy) (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The program also has provisions scattered around in other topic areas relevant to the estuary, plume and near-shore ocean, either explicitly or because of the context. *Id.*, at 38-39 (ecosystem function strategy and measures, including recognition of estuary and near-shore and plume), 42-43 (mainstem habitat measures, including estuary), 49-51 (predator management), 55-58 (toxic contaminant and climate change measures, some with relevance to estuary), 60-61, 64-65 (mainstem water management and flow measures, with explicit relevance to ecosystem function and floodplain habitat in estuary and plume), 90-96 (sturgeon and lamprey measures, relevant in part in estuary), 97-98 (eulachon provisions specific to estuary), 108-09, 111 (subbasin plans, including lower Columbia and estuary plan as source of specific measures and objectives), 153-55 (program goals and objectives relevant to estuary), 173 (climate change impacts and estuary), 191 (estuary measures).

As is true in other areas of the program, the provisions adopted by the Council in this area may differ in wording from the recommendations, or are condensed and consolidated versions of disparate recommendations, or the recommendations have been adapted or modified in certain respects to be integrated into the program format. But the Council is comfortable the final program provisions are consistent with the substance of the recommendations.

The Council agrees with the Bonneville customer groups that all program measures must be relevant to helping the Council and the federal agencies fulfill their responsibilities under the Northwest Power Act to protect, mitigate and enhance fish and wildlife affected by the Columbia hydrosystem. The Council is comfortable that the program measures it has adopted are within the scope of that authority. The Council avoided adopting any measures that seek knowledge about the ocean for the sake of knowledge or to help agencies makes decisions about fish management unrelated to improving the protection and mitigation of fish and wildlife affected by the Columbia River hydrosystem.

## (12) Wildlife mitigation

The Council received a substantial number of recommendations regarding the wildlife mitigation section of the program, nearly all of them from state fish and wildlife agencies, tribes and tribal groups, and Bonneville. As a general summary, many of the recommendations support completion of wildlife program mitigation, including support for the continued use of wildlife settlement agreements for that purpose, a call to ensure Bonneville properly funds long-term operation and maintenance needs, and continued support for a 2:1 crediting ratio for mitigation of the remaining unmitigated habitat units lost due to construction and inundation. Bonneville recommended that the program retire the use of habitat units, and rely on acres instead. Recommendations also called for the assessment of wildlife losses resulting from the operation of the hydrosystem, as well as secondary losses resulting from the elimination of anadromous and resident fish. Recommendations called for the Council to continue the use of the Wildlife Advisory Committee to advise on issues of wildlife policy and implementation, including assistance to the Council and Bonneville on the issue of operational and secondary losses. Some of the tribes recommend wildlife mitigation an appropriate substitute for anadromous fish blocked by the construction of dams. And many recommendations called for the funding of monitoring and evaluation including data management and reporting to assess the program's progress in meeting wildlife mitigation objectives.

What follows is a summary of recommendations and subsequent comments and how the Council responded in the final program. For the final wildlife mitigation strategy, see 2014 Fish and Wildlife Program, at 72-75 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). Further details on mitigation priorities; assessed habitat unit losses due to hydroproject construction and inundation; information on mitigation for these losses, and provisions on wildlife mitigation in FERC licensing proceedings, see *Id.*, at 145-47 (priorities), 148-51 (losses/mitigation), 152 and 164-65 (wildlife mitigation in FERC licensing). Provisions regarding mitigation crediting incorporated from the work of the Wildlife Crediting Forum are at 177.

The Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Montana Fish Wildlife and Parks, Coeur d'Alene Tribe, Upper Columbia United Tribes, and Bonneville all recommended support for the completion of wildlife program mitigation – and the resolution of outstanding issues with regard to wildlife mitigation – through negotiations to develop additional settlement agreements. This was something recommended in the Wildlife Crediting Forum report prior to the amendment process as well as encouraged already in the 2009 Fish and Wildlife Program. Idaho particularly called for the Council to reinforce the conclusions of the Wildlife Crediting Forum's report, including maintaining a consistent system for tracking and maintaining a wildlife mitigation crediting ledger. Bonneville also emphasized its support for the recommendations from the Wildlife Crediting Forum, especially encouragement for subregional efforts and



agreements to resolve the remaining areas where resource managers and Bonneville disagree on remaining mitigation. The Upper Columbia United Tribes commented in support of flexible, negotiated approaches to wildlife mitigation.

Consistent with the program amendment recommendations and comments – and the recommendations out of the Wildlife Crediting Forum – the Council continues to encourage Bonneville and the relevant fish and wildlife agencies and tribes to complete long-term agreements by 2016 as the basis for implementing wildlife mitigation to address the remaining construction and inundation losses included in the program and to resolve other issues. The program provides significant guidance on mitigation for wildlife losses and on what an appropriate long-term agreement must contain, while allowing the agencies and tribes and Bonneville the flexibility to develop agreements suited to particular areas and circumstances. *Id.*, at 72, 73, 74. The Council also endorsed and incorporated into the program the recommendations of the Wildlife Crediting Forum to determine who mitigation crediting occurs and is accounted for. *Id.*, at 72, 177.

The Idaho Department of Fish and Game, Coeur d'Alene Tribe, Spokane Tribe, and Upper Columbia United Tribes recommended that the program specify that wildlife habitat losses are fully mitigated only when mitigation agreements include operation and maintenance funding to protect these mitigation investments over the life of the project or in perpetuity. Bonneville recommended the program support the use of stewardship funding for long term O&M financing. Related, many of the agencies and tribes –Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Confederated Salish and Kootenai Tribes, Spokane Tribe, Nez Perce Tribe, Upper Snake River Tribes, Confederated Tribes of the Grand Ronde Community of Oregon, Cowlitz Tribe – recommended that Bonneville funding at levels adequate to complete and implement wildlife area management plans.

The program specifies that wildlife mitigation agreements must have provisions for management plans and long-term implementation and maintenance plans to sustain the credited habitat values for the life of the project. *Id.*, at 73, 74.

The Washington Department of Fish and Wildlife and the Burns Paiute Tribe urged the Council to maintain the program's commitment to a 2:1 crediting ratio for habitat units remaining after 2000. In subsequent comments a number of the agencies and tribes expressed concern about what they saw as the erosion of the 2:1 ratio for wildlife losses resulting from wildlife settlements in many areas of the basin. Washington also recommended that the Council revise or remove language regarding unresolved "stacking" issues that negate 2:1 crediting.

The final wildlife strategy continues to endorse the 2:1 crediting ratio for the remaining habitat units. The reference to the "stacking" issue remains – the provision specifies its own method for resolving such issues to be able to retain the 2:1 crediting ratio. *Id.*, at 72, 177.

Another set of recommendations and comments concerned the use of – or transition away from the use of – habitat units and the Habitat Evaluation Procedure (HEP) to another assessment and crediting method. The Idaho Department of Fish Game recommended that as the use of HEP is phased out of the program in relation to construction and inundation impacts, the Council, with the wildlife managers and Bonneville, should investigate and adopt into the program alternative habitat assessment methodologies that better enumerate and define ecological functions and conditions necessary for sustaining healthy and resilient wildlife populations and habitats. Bonneville recommended transitioning to the use of acres and away from habitat units and HEP in mitigation agreements. The Northwest Habitat Institute recommended changing from the use of HEP to a particular different approach, the Combined Habitat Assessment Protocols. In subsequent comments the Northwest Habitat Institute opposed Bonneville’s recommendation that the Council retire the use of habitat units and switch to using acres, as not based upon the best available science nor consistent with past independent science review reports. The Upper Columbia United Tribes commented in support of flexible, negotiated approaches to wildlife mitigation that can rely on any agreed upon metric or base.

The final wildlife strategy continues to endorse habitat units as the preferred unit of measurement for mitigation accounting and the HEP methodology as the preferred method for estimating habitat units lost and acquired. The long history of the use of HEP, including the fact that the wildlife loss assessments that are the basis for mitigation crediting represent an application of HEP, makes it unreasonable to abandon the methodology completely. Even so, consistent with recommendations and comments, the program also allows parties to a wildlife mitigation agreement to develop and use other metrics and methods for evaluating mitigation actions as long as the alternative mechanism takes into account both habitat quantity and quality adequate to mitigate for the identified losses. *Id.*, at 73. The program recognizes that some of the mitigation agreements have applied assessment and crediting methodologies that allowed the parties to quantify and mitigate for lost habitat units in acres of land. *Id.*, at 148. The Council also noted and endorsed standard operating procedures for future use of HEP recommended in the final report of the Wildlife Crediting Forum, *Id.*, at 177, while at the same time tasking the Wildlife Advisory Committee to provide recommendations on both the need for additional HEP reports and funding and on the diminishing need for HEP as Bonneville completes mitigation for construction and inundation losses and thus the proper transition to other methodologies, *Id.*, at 75.

Operational and secondary losses of wildlife were also a significant source of recommendations and comments. The Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Nez Perce Tribe, Confederated Salish and Kootenai Tribes, Spokane Tribe, Coeur D’Alene Tribe, Burns Paiute Tribe, Nez Perce Tribe, Upper Snake River Tribes, Confederated Tribes of the Grand Ronde Community of Oregon, and Cowlitz Tribe all recommended

operational impact and loss assessments by 2015, using methods that provide a systematic approach to characterize active physical and biological processes in watersheds and describes spatial distributions, histories and linkages among important ecosystem components. A few of these entities – e.g., the Confederated Salish and Kootenai Tribes and the Grand Ronde Tribe – called on the Council to use its Wildlife Advisory Committee to convene the wildlife managers and BPA to develop protocols for assessing operational impacts.

Another set of state fish and wildlife agencies and tribes – e.g., Washington Department of Fish and Wildlife, Confederated Salish and Kootenai Tribes, Nez Perce Tribe, Coeur d’Alene Tribe, and Upper Columbia United Tribe – recommended that Bonneville fund assessments of the ecological impacts and losses of wildlife resulting from the loss of anadromous and resident fish due to the development and operation of the hydrosystem. Washington noted that existing and future habitat actions implemented to benefit anadromous fish may be suitable mitigation and contribute towards crediting for some of these secondary impacts. The Upper Columbia United Tribes recommended priority for these assessments and funding for impacts in the blocked areas of Chief Joseph and Grand Coulee. In recommendations and subsequent comments, many of the state fish and wildlife agencies and tribes called for more specific or precise definitions in the program for operational impacts and secondary wildlife losses, and expressed a general opinion that operational and secondary losses remain unaddressed.

In comments Bonneville questioned the validity of the recommendations and draft program provisions on both operational and secondary losses. With respect to operational losses, Bonneville commented that mitigation is taking place for habitat losses due to construction and inundation up to full reservoir pool levels. This limits the operational impacts to exceptional pool operations and to effects at locations above or below reservoirs where operations contribute to habitat erosion or depletion – and the latter are already being addressed by a wide range of operational constraints, habitat actions, and other actions providing mitigation. Bonneville questioned what value would be added by separate operational loss assessments for wildlife. Bonneville also commented that the entire concept of “secondary impacts” is lacking supporting documentation, and also that most areas in the altered ecosystem are occupied by fish and wildlife species, gains that would have to be used to offset any secondary losses.

The final wildlife strategy retains the commitment to mitigate for operational and secondary losses to wildlife, not just mitigation for the construction and inundation losses. *Id.*, at 72. It may be that Bonneville’s comments prove accurate in that dam operations do not add significantly to the construction and inundation wildlife losses already assessed and in the process of mitigation, and thus further assessment of operational losses is not a program priority, at least not in a general sense. But the wildlife agencies and tribes disagree with Bonneville at this point, and it remains an open question to be investigated further. Recognizing all

the difficulties in addressing operational losses, the Council tasked the Wildlife Advisory Committee to examine the existing options for assessing and addressing operational losses – using what has been learned from pilot projects – and provide a recommendation to the Council by October 2015 for resolving the issues. *Id.*, at 75. The program also calls on Bonneville and the wildlife agencies and tribes to complete loss assessments for operational losses in circumstances where there is agreement on the priority and methodology. *Id.*, at 73. And the Council recognized that negotiated mitigation agreements can be used to settle operational losses and other wildlife issues in lieu of precise assessment of losses. *Id.*, at 72, 74. The Council did not further define what is meant by operational or secondary losses. The basic concepts seem well understood, and otherwise the Council left the Wildlife Advisory Committee free to develop a recommended approach.

The Council also received a set of recommendations from the state fish and wildlife agencies and tribes and others related to monitoring, evaluation, data management and reporting on wildlife mitigation. The main focus of the agencies and tribes' recommendations was for Bonneville to fund adequate monitoring, data management and reporting on wildlife mitigation, with varying details and priorities specified. A number of the agencies and tribes particularly recommended that the Council use the Wildlife Advisory Committee to identify and support specific monitoring and reporting requirements for wildlife and wildlife projects under the program. Another set of the agencies and tribes recommended that a programmatic evaluation of the wildlife element of the program take place before the next program amendment process, to assess the extent to which implementation of the wildlife measures is achieving the wildlife mitigation objectives of the program and Act. Recommendations of these types came from the Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, Cowlitz Tribe, Nez Perce Tribe, Upper Snake River Tribes, Spokane Tribe, and the Coeur d'Alene Tribe. The Idaho Department of Fish and Game recommended the Council develop a broader integrated framework to address a range of related matters, including wildlife habitat improvement project needs, growing operation and maintenance needs, and monitoring and evaluation, data management and reporting requirements.

In related recommendations, the Washington Governor's Salmon Recovery Office recommended that the development of tools necessary for coordinated data management and reporting that included wildlife information and indicators along with anadromous and resident fish. The Northwest Habitat Institute recommended (and later supported in comments) that the Council call for compliance monitoring conducted by independent evaluators to avoid any possible conflict-of-interest. The Institute also recommended continued mapping of habitat condition and land cover and use throughout the Columbia River basin, to have an ongoing census of environmental conditions for key parameters and assess baseline habitat conditions in the subbasins. The Kalispel Tribe commented in opposition to the recommendations of the Northwest Habitat Institute, seeing no need for third party

assistance or centralized coordination of efforts. The Upper Columbia United Tribes similarly commented on the need for flexibility in determining what are the appropriate requirements for monitoring and evaluation of wildlife in particular areas, as long as the methods and protocols have been endorsed out of the independent scientific review, such as the UCUT Wildlife Monitoring and Evaluation Program (UWMEP) methods and protocols.

Consistent in a general sense with the recommendations and comments on this topic, especially of the agencies and tribes, the final wildlife strategy encourages the wildlife agencies and tribes to monitor and evaluate habitat and species response to wildlife mitigation actions, and to develop more standardized approaches to monitoring. *Id.*, at 73. The requirements for an appropriate mitigation agreement include provisions for periodic monitoring and evaluation of mitigation benefits and the annual reporting of results, including a periodic independent audit. *Id.*, at 74. The program's adaptive management provisions include ongoing efforts to develop indicators and regular reporting on the status of wildlife resources and wildlife mitigation achievements from a programmatic perspective. *Id.*, at 101. Beyond that, the Council concluded it would not be effective to be more prescriptive in the program as to the appropriate monitoring and evaluation requirements.

Remaining recommendations included a recommendation from Bonneville to include in the program the agreement with the State of Oregon on wildlife habitat protection and enhancement in the Willamette subbasin. The program recognized the agreement. *Id.*, at 148, *see also* #17 below.

In a different part of the basin, the Confederated Salish and Kootenai Tribe noted that the Hungry Horse and Libby wildlife impact assessments were completed using methods that were neither approved nor adopted by the program, and thus recommended that Bonneville fund the reassessment of wildlife impacts from construction and inundation at the Hungry Horse and Libby projects utilizing HEP methodology. The Salish and Kootenai Tribes raised the same issue in the 2009 program amendment process. At that time the Council concluded that this was too specific a measure for the basinwide wildlife strategy, and recommended instead that the Salish and Kootenai Tribes raise this issue with Bonneville, Montana and the other wildlife managers. 2009 Fish and Wildlife Program, Findings and Response to Comments, at 81 ([http://www.nwcouncil.org/media/29717/2009\\_09F.pdf](http://www.nwcouncil.org/media/29717/2009_09F.pdf)). The Council came to the same conclusion this time, especially given that the wildlife strategy is so strongly based in flexibility of approach and resolving issues with discussions and negotiations within subregions. To the extent there seems to be a need for assistance in addressing and resolving this point, the Council recommends that it be raised at the Wildlife Advisory Committee.

The Spokane Tribe and Upper Columbia United Tribes recommended that wildlife improvements should, under certain circumstances, be allowed as part of

compensation for anadromous fish losses in blocked areas. The blocked-area mitigation provisions recognize the use of wildlife enhancement as one of many tools available as part of a flexible approach to mitigation for anadromous fish losses in these areas. *Id.*, at 83, 84, see also #14 above.

A number of federal and state fish and wildlife agencies and tribes recommended a region-wide assessment of the site-specific and system-wide effects of renewable energy development on wildlife and fish. The Council did not adopt this recommendation, explained at #21 below.

The Washington Department of Fish and Wildlife and the US Fish and Wildlife Service recommended assessing and accounting for the ongoing wildlife impacts and losses from operating, maintaining and constructing transmission lines. The Council did not adopt this recommendation. Bonneville commented in response to the recommendation that the Council resolved this issue 25 years ago. In the 1987 Fish and Wildlife Program, the Council called on Bonneville to negotiate agreements with the states regarding transmission corridors and their impacts on wildlife. 1987 Fish and Wildlife Program, Section 1003(c), at 133 (<http://www.nwcouncil.org/media/6843101/1987Program.PDF>). During the program amendment process in 1988-89 to add the wildlife loss assessment and mitigation provisions to the program, Bonneville alerted the Council that it had completed these agreements with the states. Based on that fact, the Council decided not to add a provision to the 1989 wildlife mitigation amendments calling for assessments and mitigation relating to the transmission system. [add cite]

That has been the situation ever since. The impacts of transmission corridor development and maintenance on wildlife have been addressed through state siting and land use procedures and requirements, federal NEPA review of proposed transmission developments, and various FERC requirements. In its explanation in 1989, the Council noted that it could always review at any time how well these arrangements are working and what problems they pose, without committing to a particular approach in that event. The recommendations here did not detail that these other avenues are not adequately addressing the transmission impacts on wildlife. The Council concluded that the information it had at this time did not warrant a decision to devote program resources to a review of transmission impacts on wildlife. One avenue for further consideration is that the Council, in the Seventh Power Plan, will be considering the environmental impacts of renewable energy development, and that will include to some extent the effects of the transmission system developments related to those resources. See #21 below.

### **(13) Fish propagation and hatcheries, wild fish protection, strongholds, and quantitative objectives for anadromous fish**

The Council's 2009 Fish and Wildlife Program recognized and supported the use of artificial production for certain purposes as necessary mitigation for system losses. It did so while also calling for artificial production to be implemented consistent with a set of principles intended to protect and even benefit the recovery of naturally spawning native fish in improved habitats. "Artificial Production Strategies," 2009 Fish and Wildlife Program, at 18-19 ([http://www.nwcouncil.org/media/115273/2009\\_09.pdf](http://www.nwcouncil.org/media/115273/2009_09.pdf)). A number of the state fish and wildlife agencies, Indian tribes, the Columbia River Inter-Tribal Fish Commission, NOAA Fisheries (to a significant extent), the Pacific Fishery Management Council, Bonneville and others recommended continued support for the artificial production provisions of the program and for the continued use of artificial production as part of the program's mitigation strategies. This included recommended support for the use of artificial production to supplement depressed natural stocks, reintroduce extirpated stocks, and provide alternative and additional fisheries. The Columbia River Inter-Tribal Fish Commission and the Idaho Department of Fish and Game provided the most extensive recommendations and justifications for the value of artificial production and supplementation under the program as critical to mitigation for continued losses and to help recover and rebuild the basin's salmon runs.

Setting aside for the moment provisions relating to the Hatchery Scientific Review Group (HSRG), none of the state or federal fish and wildlife agencies recommended significant revisions to the language on artificial production in the 2009 Program. A number of the agencies and tribes did recommend *additional* language or provisions consistent with the existing provisions – see below. The Idaho Department of Fish and Game commented in particular on the soundness of the provisions on artificial production in the 2009 Program. NOAA Fisheries recommended a few relatively minor changes in the existing language, mostly to add language referencing consistency with recovery plans and other decisions made by NOAA and others agencies under the federal Endangered Species Act. NOAA's recommendations in this regard were echoed by other agencies and tribes, at least in part, seeking to make sure production programs included in the Council's program are evaluated for consistency with regional recovery plans as well as with the Council's subbasin plans. NOAA also recommended the Council replace a reference to "carrying capacity" with "ecosystem capacity," and revise a provision on "Harvest Hatcheries" to emphasize concerns about stray rates and harvest effects on weak stocks. And NOAA Fisheries along with many of the state and tribal entities recommended allowing for the use of artificial production to help replace extirpated salmon and steelhead anywhere, not just in blocked areas.

A number of the state fish and wildlife agencies and tribes and tribal organizations also recommended (and later commented in support of) the continuation and

improved implementation of and funding for specific production programs and facilities, including:

- Montana Department of Fish, Wildlife and Parks (Sekokini Springs and westslope cutthroat trout, along with provisions stating that hatcheries can be used appropriately to conserve remaining genetic diversity to help restore sensitive native fish species, including the protection of replicate populations for redundancy in case a key population is lost due to disturbance)
- Oregon Department of Fish and Wildlife (the SAFE program and other off-channel fisheries opportunities – a recommendation echoed by the Northwest Sportfishing Industry Association and Association of Northwest Steelheaders)
- Columbia River Inter-Tribal Fish Commission and its member tribes (Columbia Fish Accord production projects)
- Colville Confederated Tribes (Columbia Fish Accord production projects)
- Nez Perce Tribe (Clearwater and Salmon production projects)
- Spokane Tribe (Lake Roosevelt area production initiatives)
- Kootenai Tribe of Idaho (sturgeon and burbot conservation aquaculture program)
- A number of state and federal fish and wildlife agencies and tribes recommended expanding the role of artificial production to benefit lamprey and sturgeon

A number of the recommendations from the fish and wildlife agencies, tribes and others concerned review products from what is known as the Hatchery Scientific Review Group (HSRG) and review reports from the Independent Scientific Advisory Board. With regard to the work of the HSRG in particular, the Washington Department of Fish and Wildlife and a number of other Washington state agencies recommended that the Council adopt or in some way use the principles, strategies, and recommendations of the HSRG to guide the management of hatcheries in the program and in the basin in an adaptive management style. NOAA Fisheries recommended that the Council, in the program, call for consideration of the HSRG principles on a case-by-case basis in distinct processes that evaluate artificial production programs and reforms, such as through the development and approval of Hatchery Genetic Management Plans (HGMPs). The Columbia River Inter-Tribal Fish Commission and two of its member tribes recommended that the Council not adopt the HSRG recommendations into the program (as part of either the artificial production or harvest strategies), and that the Council, if it did decide to incorporate or make use of the HSRG recommendations in some way, ensure that artificial production strategies are also consistent with *US v. Oregon* management agreements, tribal trust and treaty rights, recovery plans and other legal obligations; do not discriminate against tribal programs; and are not imposed without the comprehensive review by and consultation with the fishery co-managers. These tribal entities also recommended that the Council defer instead to the process by



which the co-managers develop the HGMPs for review and approval by NOAA Fisheries. Bonneville also supported recognition in the program of the process in which the HGMPs are developed, noting that the HGMPs already incorporate consideration of HSRG principles as well as ESA and recovery needs. Bonneville also supported recognition of the production commitments and analyses in the *U.S v. Oregon* management agreements, Columbia Fish Accords, and biological opinions. The Idaho Department of Fish and Game recommended that the Council not force a decision to adopt or not adopt the recommendations of the HSRG into the Council's program – and simply delete references to the HSRG – noting that the artificial production principles already in the program capture the HSRG's key principles and recommendations, and that specific metrics and objectives from the HSRG are already being integrated where appropriate into operations and evaluations by production managers.

The Native Fish Society and Wild Steelhead Coalition, Trout Unlimited, and Bonneville customer groups (Public Power Council, Northwest RiverPartners, PNGC Power, and Northwest Requirement Utilities) endorsed the incorporation of the HSRG recommendations into the program and their implementation at hatcheries in the basin. So too did the Independent Scientific Advisory Board. In its review report on the Council's 2009 Fish and Wildlife Program, the ISAB recommended the development of quantitative objectives for each artificial production program based on HSRG recommendations. *Review of the 2009 Fish and Wildlife Program*, at 26-34, ISAB No. 2013-1 (March 2013) (available at <http://www.nwcouncil.org/fw/isab/isab2013-1/>). The entirety of the ISAB's views on artificial production in that report were recommended to the Council for inclusion in the program by the Washington Department of Fish and Wildlife along with Trout Unlimited and the joint recommendation from the Native Fish Society and Wild Steelhead Coalition.

In its report on the program, the ISAB expressed particular concern about carrying capacity and density-dependence issues that, in the ISAB's view, could cause artificial production to limit the system's capacity to support natural production and have adverse effects over the long term on the recovery and sustainability of natural populations. Based on these conclusions, the ISAB recommended implementing the HSRG principles as noted above, as well as:

- explicitly addressing carrying capacity for juvenile salmonids when integrating and prioritizing plans for artificial propagation and habitat restoration
- conducting empirical investigations and developing bioenergetic models to estimate demands on food supplies by native and non-native competitors of juvenile salmonids
- evaluating whether the multiple objectives of recovering ESA-listed species, establishing healthy natural populations, and mitigating harvest opportunity using artificial production can be reconciled and address any trade-offs explicitly

- quantifying the cumulative impacts of artificial production on natural production and ecosystem processes at population, subbasin, and basin scales
- treating integrated supplementation (for conservation) and harvest as distinct programs requiring their own standards of operation
- specifying that segregated artificial production requires removal of hatchery fish before they reach spawning grounds to maintain the genetic integrity of local populations
- committing to establishing more empirical evidence concerning the effect of supplementation on rebuilding natural populations and improving integration between artificial production supplementation and habitat restoration programs
- evaluating limiting factors by life-stage, including density-dependent effects of artificial production fish on production of natural-origin adult fish
- developing quantitative goals and basin-scale monitoring for artificial production.

The Columbia River Inter-Tribal Fish Commission in turn cautioned in its recommendations that the ISAB's views about the risk of hatchery programs to natural production are not quantified and do not consider all the risks facing salmon across their life-cycle. The ISAB also did not recognize the extent to which these principles are already being considered and embedded in individual programs, as programs are reviewed. The Commission concluded that the ISAB's view are too broad to apply the same in every situation, and thus should not be incorporated generally into the program, and instead considered on a case-by-case basis.

Dovetailing at least in part with the ISAB's views, the Idaho Department of Fish and Game, the Washington State Governor's Salmon Recovery Office, and the Upper Columbia Salmon Recovery Board recommended that the Council be cautious especially about the long-term use of supplementation. These recommendations noted the importance of using supplementation to address imminent demographic risks in the short-term, but also that the growing opinion in the scientific literature is that the benefits are not sustainable long-term, pose risk to natural spawning recovery over the long-term, contribute to carrying capacity and density dependence problems, and need to be combined with and yield to other recovery strategies for long-term recovery. NOAA Fisheries similarly recommended an additional strategy for the program recognizing that significant critical uncertainties remain about the effects of integrating hatchery fish with wild populations, which must be addressed in a prioritized manner on a species to species and case-by-case basis. NOAA also recommended that the Council include the testing of different integration strategies across the basin; require that artificial production decisions be made within the context of objectives and strategies at different scales, including species, major population groups, and populations; and identify and prioritize research, monitoring and evaluation to address knowledge gaps that contribute to the policy disagreements about the

effects of artificial production on the viability of listed species. The US Fish and Wildlife Service also recommended the need for additional research on the relative contribution of hatchery and naturally-spawning populations to steelhead production in the Clearwater River in particular.

The recommendations from a number of the environmental and conservation groups incorporated the same concerns about the potential adverse effects of hatchery production on natural production and species recovery. Trout Unlimited recommended to the Council both the ISAB and HSRG recommendations (as noted above), and then TU added specific recommendations that echoed the ISAB's concerns. American Rivers, Conservation Northwest and a number of allied individuals similarly and briefly recommended that the Program and fish managers focus on habitat protection and restoration and improvements to dam operations to increase and sustain wild populations and thereby reduce the need for hatcheries, and ensure that hatcheries that do continue to operate are run in such a manner that minimizes negative effects on wild fish populations.

The Native Fish Society and Wild Steelhead Coalition provided the most extensive set of recommendations along these lines. Along with recommending the ISAB and HSRG recommendations to the Council in their entirety, the Native Fish Society and Wild Steelhead Coalition recommended:

- developing a conservation requirement for every subbasin and wild salmonid stock based on an estimate of habitat capacity and full utilization of that habitat by natural spawners
- provisions for evaluating the effects of and limiting artificial production that might interfere with meeting these conservation goals
- determining ecological and genetic impacts on natural production from releases of hatchery fish
- genetic and life history inventories and baselines and stock transfer policies that maintain genetic and ecological integrity for natural production
- ramped-up efforts to determine the hatchery impacts on wild salmonids and set appropriate standards for different types of hatcheries to maintain genetic, life-history and ecological integrity of locally-adapted natural populations
- including at least one watershed for each population group that is managed solely for wild fish and excluding hatchery fish
- designation of larger hatchery-free watersheds (including Wind River, Asotin Creek, Joseph Creek, John Day River, and Molalla River)
- determining through empirical evidence the effect of supplementation on actually rebuilding natural populations
- setting stray rate standards that are protective of wild salmonids, using the assistance of independent science panels
- develop quantitative objectives for natural production and improved basin-wide monitoring and evaluation of the effects of hatchery production on natural production

- completing cost evaluations, cost-effectiveness assessments, and economic review of the benefits of hatchery programs, including evaluating the fishery contribution of hatchery steelhead

Besides endorsing the HSRG recommendations, the Bonneville customer groups recommended that the Council promote hatchery production that supports and does not conflict with conservation and recovery objectives; explicitly incorporate adaptive management strategies for program-funded hatchery programs; support additional selective harvest methods and policies to reduce incidental catch of ESA-listed fish and increase catch of hatchery fish; and call for an assessment of the extent to which harvest slows recovery of naturally-reproducing populations, and implement adaptive management harvest strategies.

Finally with regard to artificial production, a number of the state agencies and tribes recommended identical language for the program calling on Bonneville to fund comprehensive hatchery effectiveness monitoring and reporting for Columbia basin hatcheries. The Idaho Department of Fish and Game and Washington Department of Fish and Wildlife specifically recommend that the Program push for the funding and implementation of what is known as the CHREET project to establish basinwide monitoring, evaluation and reporting standards for hatchery effectiveness, IDFG noting that the CHREET concept evolved out of the work of the Ad Hoc Supplementation Workgroup and that the Council needs to provide guidance to get this effort moving forward. Bonneville similarly and more generally recommended support for the development of a basinwide programmatic approach to hatchery research, monitoring and evaluation.

And finally with regard to concerns about wild native fish and habitats, a number of agencies (e.g., NOAA Fisheries and Montana Fish Wildlife and Parks) and conservation groups recommended that the program retain and expand its support for the recognition, designation and protection for “stronghold areas” that emphasize the preservation and restoration of habitat for wild native fish. Subsequent comments of support came from the Wild Salmon Center and the conservation group coalitions. Significant support for the stronghold concept also came from other state fish and wildlife agencies and from a number of tribes, along with cautions about the need for collaboration with and agreement by the states and tribes in the identification and management of stronghold areas, and support for stronghold and wild fish policies that work with and do not undermine production strategies necessary for effective mitigation for hydrosystem losses.

Based on these recommendations – and similar comments on the recommendations – the Council proposed two strategies in the draft fish and wildlife program. One was a revised version of the artificial production strategy (renamed a hatcheries strategy), and the other a wild fish strategy (along with a proposed “stronghold” strategy). The draft hatcheries strategy retained the support for the use of hatchery production as a tool to help meet the mitigation

requirements of the Northwest Power Act, and also retained a basic set of principles to guide production decisions and implementation that have been in the program since 2000. The draft expanded on the artificial production strategy included in the 2009 program by being more detailed and specific about the principles and general measures to guide the use of hatcheries for three different purposes (segregated programs devoted to fisheries, integrated programs, and for the purpose of reintroduction), mostly aimed at ensuring that production programs do not adversely affect naturally spawning populations and the capacity to increase natural populations. The draft hatcheries strategy also included a set of measures for comprehensive research, monitoring, assessment and reporting on hatchery effectiveness. The Council did not call in the draft for changes in any particular production program. The separate wild fish strategy in the draft emphasized the need to protect and enhance native, wild and naturally spawning fish and the ecosystems they rely on, including limits or constraints on the use of hatcheries (and harvest) to that end. Draft 2014 Fish and Wildlife Program, at 75-83 (<http://www.nwcouncil.org/media/7076544/2014-3.pdf>), with a proposed strongholds strategy at 43-44. The draft program also included a set of provisions intended to produce quantitative program objectives in the near future for adult naturally spawning salmon and steelhead and similar objectives for hatchery salmon and steelhead. *Id.*, at 31-32.

The hatcheries and wild fish strategies and the provisions regarding anadromous fish objectives in the draft program generated a significant amount of comment and controversy, raising particular concerns among representatives of a number of the tribes and fish and wildlife agencies that manage salmon and steelhead. The concerns expressed from the agencies and tribes (and from individuals and non-profit organizations with the same concerns) emphasized that, in their view, the Council had been too prescriptive in terms of the requirements for implementing and reporting on hatchery performance; divided production programs into a couple of “purposes” in a manner that did not account for a much broader range of actual hatchery and fish management, practices, purposes and contexts in the basin; failed to recognize and give effect to the case-by-case assessments of production programs already under way that integrated the latest concerns and science on hatchery effectiveness and effects on natural production; called for the reporting of information that was either already reported (although perhaps in a different way) or would be difficult or expensive to report, without clarity on the value of the information sought; and in general encroached too greatly on the management responsibilities of the agency and tribes with authority to manage salmon and steelhead.

The concerns about the draft expressed by tribal and agency representatives spawned an on-going consultation under Section 4(h)(5) of the Northwest Power Act between Council members and staff and these agency and tribal representatives that began in May 2014 after the release of the draft and continued until a meeting at the Council’s offices on September 8, 2014, just prior to a September Council meeting to begin considering final program amendments.

The state and federal fish and wildlife agencies and tribes also began working together to see if they could develop and submit to the Council a consensus approach on these matters for the final program.

Written comments on the draft program thus included a joint submission from nearly all the agencies and tribes that manage salmon and steelhead intended as a complete replacement for the sections in the draft program containing the hatchery and wild fish strategies, the salmon and steelhead quantified objectives and reporting requirements, and a description of “program challenges” concerning the use of hatcheries. Entities supporting the comments (either completely, or with certain minor reservations) included the Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Yakama Nation, Columbia River Inter-Tribal Fish Commission, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife; Washington Department of Fish and Wildlife, and NOAA Fisheries. The tribes and agencies’ proposed replacement used the provisions in the Council’s draft as a base, but then revised those provisions substantially in line with the concerns expressed already, especially with regard to what they renamed a “propagation” strategy as well as the provisions for anadromous fish quantitative objectives. The US Fish and Wildlife Service commented in support of revisions to the draft program similar to what the others presented. And the Kootenai Tribe of Idaho commented to make sure that the hatchery and wildlife fish provisions in the draft would not inadvertently limit the Kootenai Tribe’s implementation of the Conservation Aquaculture portion of its programs. Bonneville, representatives of the Bonneville customer groups, and others such as the Northwest House Republicans, commented to support the efforts of the Council and the agency and tribal representatives to work out the differences over the draft, with particular emphasis on allowing the case-by-case consideration of the best conservation and hatchery practices and native fish and protection, such as through the development and review of HGMPs. The Native Fish Society and Wild Steelhead Coalition, on the other hand, commented in support of – and to strengthen, in their view – the provisions in the draft program.

The Council returned to its review and discussion of these sections of the program at special Council meetings on August 18 and 21 devoted to the fish and wildlife program, having reviewed and considered all of the recommendations and the comments received on the draft, including the replacement provisions jointly submitted by the tribes and agencies. The Council decided to begin its work on these provisions for the final program by accepting as the starting base the replacement provisions submitted jointly by the agencies and tribes. The Council then worked through the propagation and wild fish strategies of the replacement section, making certain working edits in the propagation strategy in particular and one in the wild fish strategy, edits the Council considered largely for clarity, coherence and emphasis without materially changing the substance of the provision submitted by the tribes and agencies. This included making clear the need for continued research, inquiry and reporting on the effectiveness of

production programs and their effects on natural production, and considerations for the use of hatcheries for supplementation and conservation in areas of good native fish habitat.

As of early September 2014 the Council had yet to work through the companion sections on anadromous fish objectives and “program challenges.” The Council central and state staff, working in coordination with individual Council members, developed in late August and early September proposed edits to the tribes and agencies’ replacement section on objectives and program challenges, for consideration by the Council at its regularly scheduled Council meeting Sept 8-10. Concerned by certain aspects of the working and proposed edits to the propagation, wild fish and objectives provisions, representatives of the agencies and tribes requested a further consultation with the Council on the morning of September 8, and provided the Council members with another joint set of comments on September 5 in preparation for that meeting. The joint comments were submitted on behalf of the Oregon, Washington and Idaho fish and wildlife agencies, NOAA Fisheries, and the Columbia River Inter-Tribal Fish Commission and its four member tribes. The agency and tribal comments raised a small set of issues with the working edits to the replacement propagation and wild fish strategies that the Council had discussed in August, seeking mostly clarity, refinements, and revised emphasis. At the same time, the agency and tribal representatives made it clear that the proposed revisions to, especially, the section on anadromous fish objectives would, in their view, represent a repudiation of the joint submission of the agencies and tribes, burden the agencies and tribes with substantial reporting obligations the purposes of which were unclear to them and without the promise of the needed financial and staff resources, separate anadromous fish into two categories for the purposes of objectives and reporting (hatchery and non-hatchery) that does not match agency and tribal research and management realities and was biased to hatchery risk.

The Council and agency and tribal representatives met on the morning of September 8 in a long consultation and working session at the Council central offices in Portland. The Council members listened to the concerns of the agencies and tribes, responded with their own concerns especially about the need for significant program objectives and oversight to ensure that progress on the mutually agreed-to goals of mitigation, hatchery effectiveness, and wild fish protection and rebuilding are taking place – what to many Council members seemed an appropriate role for the Council under the program. While the differences between Council and the fish and wildlife agencies and tribes included matters of substance, it became clear the remaining disconnect was more about whether and how new monitoring and reporting demands and burdens might be placed on the agencies and tribes, what information concerning hatcheries and wild fish protection made the most sense to collect and who was to decide, and how that information might be used and by whom to establish performance indicators and objectives. The Council members and agency and tribal representatives discussed further possible revisions to the various provisions that

could satisfy both perspectives, especially with regard to the section on anadromous fish objectives. The agency and tribal representatives submitted the results of that conversation to the Council on September 10 as the consensus language of the fish and wildlife agencies and tribes on anadromous fish objectives.

As the Council completed its final work on the fish and wildlife program, it incorporated into the program with certain minimal edits the results of this evolving consultation with the agencies and tribes that manage anadromous fish – a consultation process that also sparked a significant level of consensus agreement among these managers – on the propagation and wild fish strategies and the anadromous fish objectives. The resulting strategy on the use of “fish propagation including hatchery programs” combined the continued recognition of and support for the use of hatcheries in a myriad of ways to help meet the mitigation goals of the Northwest Power Act with a requirement for consideration and implementation on a case-by-case basis of the best possible practices for hatchery effectiveness and for protection for rebuilding of wild and naturally spawning fish populations. This section also included an extensive set of measures for comprehensive research, monitoring, assessment and reporting on hatchery effectiveness, contributions to mitigation and recovery, and protection of natural-origin fish. The new wild fish strategy is of particular importance on this record simply for recognizing explicitly that native wild fish and the ecosystems they rely on must be protected and enhanced as an important and genetically diverse biological resource for the basin, especially given that protecting and enhancing ecosystem functions and fish and wildlife habitat is a core strategy in the program. The final provisions in the program regarding quantitative objectives for anadromous fish began by recognizing that information on and objectives for healthy and harvestable populations already exist to a great extent. The Council will work with the state and federal agencies and tribes to review and report on those existing quantitative objectives by the end of 2015. The Council will then define a method for tracking the region’s progress on enhancing salmon and steelhead population status in the context of the quantitative objectives defined in the final report, with reliance by the Council on the agencies and tribes to identify “best source” locations of population status information. The Council will also work with the agencies and tribes to identify specific indicators for hatchery programs that could be tracked and reported on to inform progress on meeting program objectives. This includes possibly tracking adult contributions to hatchery spawning; natural spawning and harvest; in-hatchery survival (egg to smolt); juvenile production/releases; hatchery smolt-to-adult returns and hatchery recruits per spawner. The Council also included reporting requirements for Bonneville related to the monitoring of propagation projects consistent with the program’s goals and objectives, and called on Bonneville to provide sufficient support to the managers of these programs so they have the capacity to collect the data and support for regional efforts to standardize the data, facilitate reporting, and make the information publicly available. See 2014 F&W Program



(<http://www.nwcouncil.org/media/7148624/2014-12.pdf>), at 22-24 (program challenges with regard to habitat and hatcheries and anadromous fish objectives), 31-33 (refining program goals and quantitative objectives, including objectives for adult salmon and steelhead); 38-41 (ecosystem function strategy and habitat sub-strategy); 44-45 (“strongholds” areas strategy to designate and conserve stronghold habitats and populations of native, wild and natural-origin fish); 76-79 (strategy on fish propagation including hatchery programs); 80-81 (wild fish strategy); 102-03, 105, 180-81 (monitoring and reporting principles and measures).

The Council made its final program decisions on these portions of the program giving appropriate weight and deference to the recommendations, comments, expertise and management responsibilities of the state and federal fish and wildlife agencies and tribes. And it did so in consideration of the entire record on these matters, including the recommendations and comments and views of others such as the Native Fish Society and Wild Steelhead Coalition, Trout Unlimited, and Bonneville and its customers, and the host of scientific and policy analyses and reviews of artificial production that have occurred over the past 25 years (referenced in the program itself – see 2014 F&W Program, at 76 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>; <http://www.nwcouncil.org/fw/program/2014-12/hatchery-reviews>)). The Council obviously did not adopt each of the recommendations of the Native Fish Society and Wild Steelhead Coalition, nor each recommendation on artificial production from the ISAB’s review of the 2009 program that had been recommended to the Council. To the extent the Council did not, it is because the Council decided to give greater weight to the consensus views of the fish and wildlife agencies and tribes that developed over the amendment process as to the best way to resolve these issues. But the Council did so only after it was satisfied that the provisions developed for the program incorporated significant measures intended to help improve hatchery effectiveness and assess, conserve and protect native wild and naturally spawning fish. Perhaps the best indication of this is the fact that the Washington Department of Fish and Wildlife, the agency expressing the most concern with production policy and recommending to the Council both the HSRG and ISAB principles, also fully supported the eventual program measures jointly developed by the agencies and tribes and then further revised and incorporated into the program through the consultation process with the Council.

## **(14) Anadromous fish mitigation in blocked areas, including anadromous fish reintroduction and passage**

The Council's fish and wildlife program has always had a policy and provisions for mitigation in areas where dams have blocked anadromous fish from historic habitat. This portion of the program and policy has been called "Resident Fish Substitution," representing the concept that mitigation for anadromous fish losses in these areas would take place through (or largely through) enhancement of resident fish populations. See, e.g., 2009 Fish and Wildlife Program, at 23-24. This has been true even though since 2000 one of the general measures in this portion of the program has been to "[i]nvestigate reintroduction of anadromous fish into blocked areas." *Id.*, at 24. Program measures implemented in the blocked areas so far have largely involved mitigation for anadromous losses through resident fish enhancement measures of various types.

In the program amendment process this time, the Council received extensive recommendations addressing both concepts: (1) recommendations calling on the Council to strengthen or increase the program's efforts at mitigation in the blocked areas through an array of mitigation strategies, including resident fish enhancement measures, including (2) a significant set of recommendations to advance the concept of investigating reintroduction of anadromous fish into a more detailed, higher priority and implemented element of the mitigation efforts in these areas. The recommendations and comments especially focused on the idea of reintroduction of anadromous fish into the upper Columbia mainstem above the combined blockage of the Grand Coulee and Chief Joseph dams.

A significant number of the basin's Indian tribes and state fish and wildlife agencies recommended more specific, detailed and strengthened program measures for mitigation in blocked areas. Measures, objectives, and principles recommended by some or all included:

- revising the name of the policy and/or the introductory language to make clear the underlying principle is mitigation for anadromous fish losses, in part through resident fish substitution;
- explicit recognition that the loss of anadromous fish in blocked areas has not been and is not being adequately mitigated through program actions so far;
- emphasizing three objectives for mitigation in the blocked areas (investigate and take action to reintroduce anadromous fish in blocked areas where feasible; restore and increase abundance of native resident fish when appropriate conditions exist; and develop and administer opportunities for consumptive and non-consumptive resident fisheries);
- Bonneville is to provide adequate funding for projects such that these objectives are achieved
- Council is to work closely with the fish and wildlife agencies and tribes to clarify the program's goals and objectives and the methodology for

addressing anadromous fish losses through resident fish substitution, in order to evaluate the implementation and effectiveness of this portion of the program

- measures for investigation and implementation of passage and reintroduction of anadromous fish above dams that block passage, either recommended generally for all blocked areas, or specifically targeted at certain dams (e.g., a detailed, phased approach at Grand Coulee and Chief Joseph dams in the upper Columbia mainstem; the Willamette River headwaters projects; the Hells Canyon Complex); or both

The most extensive set of recommendations for strengthening the blocked area mitigation program came from the Spokane Tribe, Coeur d'Alene Tribe, and Upper Columbia United Tribes. A relatively coordinated set of recommendations similar to if less extensive than what came from these upriver tribes came from the Upper Snake River Tribes, Nez Perce Tribe, Burns Paiute Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, Cowlitz Tribe, Washington Department of Fish and Wildlife, Washington State Governors Salmon Recovery Office, and Oregon Department of Fish and Wildlife.

Additional recommendations particularly focusing on the specific element of anadromous fish reintroduction came from the Columbia Inter-Tribal Fish Commission, Yakama Nation, U.S. Fish and Wildlife Service, and Kalispel Tribe (focused on bull trout passage at Albeni Falls, not anadromous fish). Reintroduction and passage recommendations also found strong support from American Rivers and other conservation groups and from dozens of individuals.

Related to these recommendations were a set of recommendations from a number of the agencies and tribes calling on the Council to maintain and assure implementation of the allocation of 15% of the Bonneville fish and wildlife budget to "resident fish" mitigation (part of the fish and wildlife program since 1994), at least a significant portion of which is in essence a geographic allocation to the blocked areas for their suite of mitigation measures. The Spokane Tribe, the Coeur d'Alene Tribe, and the Upper Columbia United Tribes recommended that adequate funding for blocked area mitigation become a much higher priority for the program and Bonneville, and include sufficient funding for native fish enhancement, anadromous fish reintroduction, and fisheries and harvest opportunities as program priorities. They also recommended that the entire amount allocated to "resident fish" be used to fund mitigation in the habitats above the blocked areas until harvest opportunities in the blocked areas are commensurate with combined anadromous fish and resident fish harvest opportunities in non-blocked areas, and that the program allocate not 15% but at least 45% of program funding for the geographic area above Chief Joseph and Grand Coulee dams, based on argument that this is an area in which 40% of documented losses have occurred and nearly 50% of the federal system's electricity is produced.

In written comments on the recommendations and then written and oral comments on draft program provisions, the tribes and fish and wildlife agencies reiterated their support for the blocked area mitigation and reintroduction recommendations. With regard to the reintroduction of anadromous fish into blocked areas, so too did a number of the conservation groups, individually (such as the Deschutes River Conservancy, with experience at passage and reintroduction at Pelton/Round Butte) and in joint comments (e.g., a comment submitted by American Rivers and signed by 15 environmental and fishing organizations, many of them coalitions of dozens more). Many individual commenters added their support for reintroduction, as did a resolution from the Spokane City Council.

NOAA Fisheries and the Upper Columbia Salmon Recovery Board took no particular position on whether the program should include the reintroduction provisions recommended by the other agencies and tribes. But they did emphasize that reintroduction actions must be guided by science and careful investigations aimed at better understanding the feasibility and benefits of passage and the role that reintroduced species will play basinwide in terms of effects on the efforts to recover listed species, on harvest, and system operations, and on other protection and mitigation measures.

Bonneville, the Bureau of Reclamation (the agency responsible for operating Grand Coulee Dam), a number of the Bonneville customers and customer groups and other utilities, and a few other entities expressed caution and serious concerns with or outright opposition to additional provisions on reintroduction in the program. Bonneville, the Bureau of Reclamation, and nearly all of the utilities, utility groups and others who commented on this topic (e.g., Public Power Council, PNGC Power, Northwest Requirements Utilities, Northwest RiverPartners, Seattle City Light, Flathead Electric Cooperative, Western Montana Generating and Transmission Cooperative, Fall River Electric Cooperative, City of Cheney, Washington, Northwest U.S. House Republicans) emphasized the fact that reintroduction of anadromous fish above Grand Coulee inherently raises the issue of reintroduction into a foreign nation (Canada) *and* that the issue of reintroduction and passage at Chief Joseph and Grand Coulee dams had been the subject of recent policy recommendations from federal agency, state, and tribal representatives to the State Department out of the U.S. Columbia River Treaty Review – the Treaty Review recommendations called for the United States to explore with Canada a joint effort at reintroduction of fish to Canadian spawning grounds, with the work and costs shared. In the view of these commenters, reintroduction into the upper Columbia above Grand Coulee is an international issue that should be dealt with by the federal government in diplomatic discussions with Canada and that it was wrong and premature of the Council to become involved through the fish and wildlife program. The comments submitted under American Rivers' name on behalf of more than a dozen conservation groups also noted that the issue of passage into the blocked areas overlaps with the recommendations out of the Columbia River Treaty review, but emphasized an opposite conclusion from that fact: They celebrated the policy recommendation to

pursue seriously the issue of reintroduction and passage, and urged the Council to do the same – that is, to join in and work with the Treaty processes and participants to make passage and reintroduction a reality.

A number of the utilities and utility groups (e.g., Mason County PUD #1, Mason County PUD #3, Washington PUD Association, Grand Coulee Project Hydroelectric Authority, Power and Light, Northwest RiverPartners, Northwest Requirements Utilities) also commented that provisions calling for the reintroduction of anadromous fish exceeded the authority and responsibility of the Council and Bonneville under the Northwest Power Act and would require Congressional authorization. These comments were echoed by representatives of the City of Cheney, Washington, and a collection of Republican members of the U.S. House of Representatives from the region. The Bureau of Reclamation added that “[a]ll congressionally mandated fishery mitigation activities for Chief Joseph and Grand Coulee Dams are already being implemented by the federal Action Agencies making additional mitigation activities discretionary and potentially subject to additional congressional authorization and/or appropriations.”

Bonneville emphasized that decisions and implementation efforts at upper Columbia reintroduction and passage at Grand Coulee should be understood to be a responsibility of either the agencies that manage Chief Joseph and Grand Coulee dams (the Corps of Engineers and Bureau of Reclamation) or the nation as a whole – and of both nations sharing this border – and certainly not a financial responsibility that Bonneville and its ratepayers should be expected to bear. This was especially so, Bonneville commented, because the fish and wildlife program and ratepayers were already heavily invested in efforts to remove barriers throughout the basin and to enhance and reintroduce important species of fish in areas where populations had been seriously degraded or extirpated. A number of the utilities and utility groups echoed that it is not appropriate to expect funding to come from Bonneville for this work, and also that that the costs would be impractical and expensive and far outweigh the biological benefits. (e.g., Northwest RiverPartners, PNGC Power, Mason County PUD #1, Mason County PUD #3, Washington PUD Association, Grand Coulee Project Hydroelectric Authority, Power and Light, Idaho Irrigation Pumpers Association, Bureau of Reclamation). Chelan PUD and Northwest RiverPartners commented that passage efforts at other dams in the region should be assessed first before any further investments are made, especially major investments at Grand Coulee Dam passage and upper Columbia reintroduction.

The Spokane Tribe, the Upper Columbia United Tribes, the Columbia River Inter-Tribal Fish Commission, the conservation group coalition, and others responded to counter the comments of the Bonneville customers, Bonneville, Reclamation and others with regard to issues of authority and responsibility. In their view, the recommendations at issue – including those calling for an investigation into reintroduction – were squarely within the authority of the Council under the Northwest Power Act to include in the program as measures to protect, mitigate

and enhance fish affected by the development and operation of the hydrosystem. They also commented that Bonneville and the other federal action agencies had authority to implement these provisions; that the system's ratepayers should bear a significant responsibility for the costs of these measures, given they had benefitted from the power produced from the dams blocking passage; and that Congressional approval or authorization was not needed before the investigation could begin.

On this record, and in particular respecting and giving appropriate weight to the essentially consensus recommendations and views of the fish and wildlife agencies and tribes, the Council adopted a section of the program on "anadromous fish mitigation in blocked areas" that represented a significant revision of what had been the resident fish substitution provisions in previous programs. 2014 Fish and Wildlife Program, at 83-86 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). This strategy emphasizes the importance of mitigation for the huge loss of capacity for salmon and steelhead in upper Columbia and other blocked areas. Flexibility in approach is important, and all mitigation tools should be used in this effort, in appropriate and prudent fashion, including habitat improvements, resident fish enhancements, anadromous fish reintroduction efforts, harvest opportunities, wildlife enhancements, and hatcheries. The Council calls on Bonneville and the other federal action agencies, in collaboration with the state fish and wildlife agencies and tribes, to provide sufficient funding and implementation for mitigation of anadromous fish losses in the blocked areas, "including strategies relying on habitat improvements, reintroductions, hatcheries, harvest opportunities, and other mitigation." *Id.*, at 84. And the Council identified blocked area mitigation actions, including investigation of reintroductions, as an emerging program priority for the investment strategy, accompanied by certain expectations for Bonneville funding, *Id.*, at 115-17. The Council maintained the program funding allocation of 70% for anadromous fish programs, 15% for resident fish, and 15% for wildlife, while also committing to "evaluate the distribution of funding to provide fair and adequate treatment across the program. *Id.*, at 115.

With regard to the specific issue of the reintroduction of anadromous fish, the Council included mitigation through passage investigations and reintroduction of anadromous fish as an equal element of the strategy and measures for mitigating the loss of anadromous fish in all blocked areas. *Id.*, at 83, 84 ("Restoration of anadromous fish to blocked areas should be investigated as mitigation for the impacts of hydropower dams that blocked historic passage of adult and juvenile fish. The abundance of native fish species should be restored throughout blocked areas where original habitat conditions exist.").

With regard to the blocked area in the upper Columbia above Grand Coulee and Chief Joseph dams in particular, the Council noted that a number of agencies and tribes recommended that "the region intensify its efforts to explore the possibilities

of reintroducing anadromous fish,” *Id.*, at 83, and then based on the recommendations, the Council adopted a set of provisions specifically focused on that area, *Id.*, at 84-85. Based on consideration of all the recommendations and comments, including the cautions and concerns, the Council adopted a careful, science-based phased approach to considering the issue of the reintroduction of anadromous fish above Grand Coulee dam. Phase 1 is to involve investigating habitat suitability and availability and survival potential above Grand Coulee; investigating the scientific feasibility and possible cost of upstream and downstream passage; the evaluation of information from passage studies at other blockages and past assessments at Grand Coulee and Chief Joseph; and broad discussions with others in the region on the purpose and scope of possible reintroduction and progress on the investigation into its feasibility. Only if the results of this first phase of investigation are promising will the Council, in collaboration with the other participants, recommend that effort proceed to the next phase.

The Council called on Bonneville and the other federal action agencies, in collaboration with the fish and wildlife agencies and tribes, to begin the Phase 1 investigation with regard to the possibility of reintroduction into the mainstem reaches and tributaries within the United States. Cognizant of the comments about the international, transboundary aspect of reintroduction, the Council added a provision mirroring the recommendations of the federal, state and tribal representatives in the U.S. Columbia River Treaty Review, calling for the United States to pursue a joint program with Canada, with shared costs, to investigate in a phased approach the possibility of reintroduction of anadromous fish on the mainstem Columbia to Canadian spawning grounds. *Id.*, at 85.

The Council also included a provision of support for implementing the anadromous fish passage measures already in the Willamette River biological opinion, as recommended and supported in comments by the Oregon Department of Fish and Wildlife, the Confederated Tribes of the Grand Ronde Community of Oregon, and others. *Id.*, at 86. The Council did not include specific reintroduction provisions relating to any of the federal and non-federal dam blockages, relying instead on the general measure included that reintroduction is to be considered as one of the possible mitigation options to be considered in all blocked areas. *Id.*, at 84.

Although largely following the recommendations of the fish and wildlife agencies and tribes with regard to blocked area mitigation and anadromous fish reintroduction, the Council appreciates and gave careful consideration to the comments and concerns of Bonneville, the Bureau of Reclamation, the Bonneville customers and others. Section 4(h) of the Northwest Power Act and the Council’s fish and wildlife program are premised on the idea of mitigation for the loss of anadromous and resident fish due to the development and operation of the federal and non-federal hydroelectric facilities, including of course Grand Coulee and Chief Joseph dams. There is no legal reason that the investigation and, if warranted, implementation of reintroduction and passage measures cannot be

considered one of the many tools in the program's mitigation, protection and enhancement toolbox, to be evaluated and used where appropriate to meet the mitigation obligations under the Act. Thus the Council concludes that provisions of this nature are appropriate and within the authority of the Council to include in the fish and wildlife program and the general authority of Bonneville and the other federal agencies to implement. Precisely how the provisions are to be implemented, funds made available, and responsibility decided upon and shared were not subjects for the amendment process but for follow-on implementation discussions and decisions. The Council agreed that it is important to proceed carefully, prudently, in a cautious step-wise, and science-based fashion in making decisions to invest program resources in what could be an expensive and difficult reintroduction and passage effort. Congressional authorization and appropriations are always welcome and encouraged, and may be necessary for certain elements and phases (such as major passage modifications to federal dams). On the other hand, the Council did not see any indication that it was legally necessary that Congress has to act before at least Bonneville and possibly other federal agencies can fund and begin the reintroduction and passage investigations in the first phase. At the same time, the Council agrees that responsibility for the complete investigation and implementation of passage and reintroduction at these major blockages is ultimately a major policy decision for the region and nation and a shared responsibility that should not fall just on Bonneville and the ratepayers.

Finally, the Council shaped its reintroduction provisions with full understanding of the parallel considerations that had taken place in the Columbia River Treaty review and the resulting recommendation to explore a joint effort with Canada on reintroduction into Canada. The Council does not see how this recommendation and the possibility of those international discussions bars inclusion of provisions on reintroduction in the basin's fish and wildlife mitigation program or the beginning of investigations on the domestic aspects of reintroduction. The Treaty review recommendations are policy recommendations, not a legal decision that changes anything about how under the Northwest Power Act the Council is to consider the recommendations of the fish and wildlife agencies and tribes and others and develop program measures in response. In sum, the Council is confident that a careful collaborative effort that involves the fish and wildlife agencies, tribes, Bonneville and the other federal actions agencies, the Bonneville customers and other affected utilities, and the broader public can allow for the implementation of these mitigation provisions in a lawful, cost effective, scientifically sound, and prudent fashion.



## **(15) Resident fish mitigation, assessments, settlement agreements and crediting**

Issues relevant to mitigation for resident fish impacts are addressed in the explanations for other topics above and below, including mainstem water management, passage, non-native and invasive species, blocked area mitigation, species-specific recommendations, and climate change. The state fish and wildlife agencies and tribes also submitted a coordinated set of recommendations about the program's general approach to mitigation for resident fish losses. In part the recommendations simply called for existing measures in the program to be maintained and implemented, with continued Council and Bonneville support and prioritized funding to address a host of limiting factors affecting the survival and productivity of resident fish affected by the hydrosystem. Added to that were recommendations that Bonneville fund the agencies and tribes to develop a methodology for and complete resident fish loss assessments, proposing that a framework for this be in place in 2015. Coupled with that were recommendations to maintain, expand and implement program provisions allowing for the use of long-term funding and settlement agreements, crediting mechanisms, long-term operation and maintenance funding, and multi-year funding commitments for projects to address resident fish mitigation losses in particular areas. Recommendations also included expanded use and funding of mechanisms for perpetual land protection of habitat, including conservation easements, land purchases and other long-term measures.

Recommendations of this nature came from Montana Fish Wildlife and Parks, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Confederated Salish and Kootenai Tribes, Upper Snake River Tribes, Burns Paiute Tribe, Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, although not every agency or tribe submitted each facet of the coordinated recommendation. Most of these entities reiterated support for these recommendations in subsequent comments on the recommendations and draft program, with additional general support from the Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and the Columbia River Inter-Tribal Fish Commission. Bonneville recommended that the program continue support for the planning and review processes needed for Bonneville to be able to make final decisions on substantial resident fish mitigation projects, including resident fish artificial production facilities currently in the proposal or planning stages.

The Council adopted final program provisions consistent with the recommendations and supporting comments. This includes provisions recognizing clearly the importance of protection and mitigation for resident fish impacts and losses due to the construction and operation of the hydrosystem; the continuation of a diversified approach to mitigation for losses; and provisions relating to loss assessments, long-term settlement agreements, and the use of land acquisitions

in appropriate circumstances. 2014 Fish and Wildlife Program, at 87-89, 178-79 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

Two issues require further discussion. The Council did not specify precisely as recommended that Bonneville is simply to fund the agencies and tribes to complete resident fish loss assessments, with a target for the development of a unified approach in 2015. The Council recognizes the potential value of quantified losses in particular areas. They also may be difficult, expensive and resource intensive to undertake, so when and how an assessment occurs depends greatly on particular circumstances and priorities. On this basis, the Council called for the formation of a workgroup of agency, tribal and Bonneville representatives to:

“develop a standardized methodology for habitat loss assessments to assist areas that currently do not have the capacity to complete this assessment and do not have a mitigation settlement agreement, and to ensure a consistent level of accuracy across the basin. This task force shall consider past efforts and will report to the Council quarterly on its progress toward developing a methodology.” *Id.*, at 88.

This and the following provisions on settlement agreements makes it clear the Council would like to resolve this outstanding issue, but without dictating a particular approach to funding and completing resident fish loss assessments.

The second issue is that a number of the agencies and tribes (Montana Fish Wildlife and Parks, Washington Department of Fish and Wildlife, Confederated Salish and Kootenai Tribes, Upper Snake River Tribes, Burns Paiute Tribe, Cowlitz Tribe, Confederated Tribes of the Warm Springs Reservation of Oregon, Columbia River Inter-Tribal Fish Commission) commented on the draft program that the Council ought to specify that where property acquisitions are being used to mitigate for loss of important resident fish habitat, mitigation should be in a 2:1 ratio of habitat acquired to habitat lost. The commenters proposed this as a parallel to the provision in the wildlife portion of the program in which the Council calls for mitigation of remaining lost habitat units on a 2:1 basis. The wildlife provision has a long history particular to the circumstances of the program’s efforts at implementation of mitigation for wildlife losses (nearly all of it by land acquisitions), and it is bound up in the concept of assessing and then mitigating for lost “habitat units.” The program recognizes a number of methods or tools for the protection and mitigation of resident fish impacts, of which property acquisitions to replace lost habitat are but one. And whether the same approach to crediting is automatically appropriate for those limited circumstances in which property acquisitions are one element of the approach to resident fish mitigation is not known at this time. It may be that crediting of replacement habitat at something greater than 1:1 in acreage may be appropriate, but that is still to be determined, and it may not be determined as a general rule. For this reason, the Council specified only that when property acquisitions are an appropriate tool to

replace lost habitat that has been quantified, crediting should occur “at a *minimum* ratio of 1:1.”*Id.*, at 87, 88, 178.

## **(16) Specific species other than salmon and steelhead, especially sturgeon, lamprey and eulachon**

The Council received a coordinated set of recommendations from the fish and wildlife agencies and tribes calling for an expansion of the program's protection and mitigation measures addressing white and green sturgeon and Pacific lamprey, and for the Council to set these apart from the program's general provisions on habitat and production perceived as too oriented toward salmon and steelhead. The Council also received another relatively coordinated set of recommendations seeking to add measures to the program for the protection and mitigation of eulachon, newly listed under the Endangered Species Act. Recommendations of this nature came from the Oregon Department of Fish and Wildlife (sturgeon, lamprey, eulachon); Washington Department of Fish and Wildlife (sturgeon, lamprey, eulachon); Montana Fish Wildlife and Parks (sturgeon); Lower Columbia Fish Recovery Board (sturgeon, eulachon); Kootenai Tribe of Idaho (Kootenai River white sturgeon); Confederated Tribes of the Umatilla Indian Reservation (lamprey); Yakama Nation (lamprey); Columbia River Inter-Tribal Fish Commission (sturgeon, lamprey, eulachon); Colville Confederated Tribes (sturgeon); Spokane Tribe (sturgeon); Confederated Tribes of the Grand Ronde Community of Oregon (sturgeon, lamprey, eulachon); Cowlitz Tribe (sturgeon, lamprey, eulachon); NOAA Fisheries (lamprey, eulachon); and US Fish and Wildlife Service (lamprey, sturgeon). Many of the same entities commented to the same effect in subsequent stages of the amendment process, including comments in support of provisions in the draft fish and wildlife program while seeking further refinements in the language.

Measures recommended relative to sturgeon, lamprey and eulachon included habitat improvements; dam operations and passage improvements; review of water management and flow measures; water quality considerations; hatchery considerations; monitoring of populations and habitat conditions; research into population conditions, habitat needs and potential, and how hydrosystem development and operation has affected survival, growth and migration. The recommendations were based to a large degree in developments that occurred in the years immediately preceding the amendment process, during planning and project review processes. This included the development of the 2013 White Sturgeon Planning Framework; the Kootenai white sturgeon and Libby Dam biological opinions and the Kootenai Tribe's integrated habitat, ecosystem and aquaculture plans; the Tribal Pacific Lamprey Restoration Plan, Conservation Agreement for Pacific Lamprey, and the comprehensive review and synthesis of Pacific lamprey work in the project review process; and the listing decision and other ESA assessment work with regard to eulachon.

While not going into the details here, the Council adopted expanded program measures for lamprey and sturgeon, and a new program section specifically for eulachon, based on the recommendations and comments and all in sub-strategies of their own. 2014 Fish and Wildlife Program, at 90-98

<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The Council also called out the implementation of “additional sturgeon and lamprey measures (passage and research)” as one of the emerging program priorities in the investment strategy. *Id.*, at 116. The Council also included a provision stating the Council will work with the fish and wildlife agencies and tribes to survey and organize what quantitative objectives exist already for white sturgeon, lamprey, and eulachon (and various species of trout), assess whether it might make sense to adopt or revise or expand program objectives and goals for these species, and conduct an amendment process to that end if warranted. *Id.*, at 34.

There was little comment or controversy in the amendment process about whether all these actions were good things to do for these species. Bonneville and Northwest RiverPartners did express concerns about whether it made sense to expand the program and its investments in these and other emerging areas at the risk of diluting available resources and the program’s core set of work to date. With regard to lamprey, Bonneville commented that lamprey actions consistent with the program are already being funded by Bonneville, the Corps of Engineers and Reclamation, largely through the Columbia Basin Fish Accords through 2018, a linkage that should be expressly noted. Bonneville questioned the need in that light for further expanded lamprey provisions, and also commented that a principle in the draft program noting that “[l]amprey throughout their historic range should be self-sustaining and harvestable” is broader than mitigation for hydrosystem effects, given that lamprey are affected by the altered state of the environment in the basin resulting from many actions, not just hydropower development and operation.

The Council recognized in other sections of the program that the actions in the Accords are measures in the Council’s program, and this includes the lamprey measures. *Id.*, at 61-62, 94-96, 110-11, 191-98. The principle that lamprey should be self-sustaining and harvestable throughout their historic range seems no different than the vision and goals in the program for all key species in the basin adversely affected by the hydrosystem. Although not caveated expressly in the lamprey section itself, the program makes clear elsewhere that protection and mitigation to address effects and compensate for the losses resulting from the development and operation of the hydrosystem remains the legal touchstone for measures in the program and actions implemented under the program. The development and operation of the hydropower system is only one factor in the loss of fish and wildlife (including lamprey) 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, its program and Bonneville shares with citizens, private entities, and government agencies throughout the region. E.g., *Id.*, at 14-15. The Council concluded that the program measures regarding lamprey – and implementation of the program measures for lamprey to date – have not gone outside those boundaries.

Bonneville and others also expressed particular concern with whether the hydrosystem (and thus Bonneville and the ratepayers) bore much if any responsibility for the degraded population status of eulachon. Given these comments, the geographic location of eulachon when in the river system, and how early the agencies and tribes are in even understanding the problems with eulachon and how to address those threats, the eulachon measures the Council approved are limited to assessing how eulachon and its habitat in the lower river have been affected by the development and operation of the hydrosystem and then identifying what measures might be available to address those impacts, with the help of a science/policy forum organized by the Council in collaboration with the federal action agencies and the fish and wildlife agencies and tribes. And as noted above (in #9), Northwest RiverPartners and other Bonneville customer groups also expressed concern about whether any of the measures calling for consideration of how current mainstem dam operations and flows affect these and other species and whether other flow and passage measures might be inconsistent with or put at risk implementation of the FCRPS biological opinion actions in the mainstem required under the Endangered Species Act. The Council responded to those comments above, in #9.

The Council also received recommendations from a few of the agencies and tribes for program measures and program emphasis for other species, including bull trout, freshwater mussels, and burbot. See recommendations of US Fish and Wildlife Service (bull trout, burbot); Oregon Department of Fish and Wildlife (bull trout); Kalispel Tribe (bull trout passage at Albeni Falls); Columbia River Inter-Tribal Fish Commission (mussels); Confederated Tribes of the Umatilla Indian Reservation (freshwater mussels); Spokane Tribe (mussels); Kootenai Tribe of Idaho (burbot).

With regard to bull trout, the final program recognizes the importance of mitigation for bull trout losses and the need to collect, assess and possibly improve the quantitative objectives and goals in the region for bull trout mitigation, protection and recovery. 2014 Fish and Wildlife Program, at 29, 34, 87 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). Most of the recommendations and comments with regard to bull trout were to make sure the species' needs are considered and addressed in mainstem system operations, flow measures, and dam passage. The mainstem water management and passage strategy recognizes bull trout as one of the key species to benefit from these measures. The program recognized the actions in the FCRPS biological opinions for bull trout, salmon and steelhead, and Libby Dam are the baseline or starting measures for the mainstem operations, and that includes reservoir operations intended to be of benefit to bull trout. The program also recognizes the continuing need to assess whether mainstem operations are optimum for important species other than salmon and steelhead, including resident fish generally with bull trout as one of the key native species in particular. This includes flow measures, reservoir operations, passage facilities at run of the river

projects, and passage investigations at Albeni Falls. *Id.*, at 60-62, 63, 64. The program also generally recognizes in the basinwide provisions on resident fish mitigation the need for a broad array of mitigation and protection measures for bull trout in the mainstem and tributaries. *Id.*, at 87, 139. Specific strategies and objectives relating to bull trout in specific locations are in the subbasin plans, maintained in the 2014 program.

With regard to freshwater mussels, the recommendations were essentially to recognize the importance of freshwater mussels to ecosystem diversity and function, provide a framework to allow for assessment and improvement where appropriate, and ensure that the existing mussel projects are maintained and allowed to evolve. The program recognizes freshwater mussels as one of the key species to be addressed through the array of resident fish mitigation measures. *Id.*, at 87, 137. Specific strategies in subbasin and mainstem reach plans have been maintained. The Council's decision does not affect or hamper the specific projects underway. Specific measures recommended with regard to freshwater mussels are recognized as part of the program as with other recommended measures (see the discussion of measures at 110-12, 191 and at #19 below).

With regard to burbot, the program again recognizes the importance of burbot and burbot fisheries as part of resident fish mitigation and in particular as an important element of blocked area mitigation *Id.*, at 84, 87.

The resulting program provisions are not precisely as recommended. But the Council concluded that the program is substantively consistent with the recommendations and comments received on these topics.

## (17) Willamette River subbasin issues

The Willamette River subbasin got particular attention in the recommendations. Recommendations from the Confederated Tribes of the Grand Ronde Community of Oregon, Oregon Department of Fish and Wildlife, NOAA Fisheries, and US Fish and Wildlife Service included:

- incorporating the actions and performance standards in the two biological opinions on the Corps of Engineers' Willamette River Basin projects, one from NOAA Fisheries (salmon and steelhead), one from the Fish and Wildlife Service (bull trout and Oregon chub) as program measures and objectives
- incorporating the detailed actions in the Upper Willamette Recovery Plan as program measures
- incorporating the ESA delisting goals and broader goals in the Upper Willamette Recovery Plan as program objectives
- program support for funding and implementation of actions in the NOAA Fisheries biological opinion, including the capital investments in passage facilities and other structural measures and long-term operation and maintenance funding for the passage facilities, collection facilities, hatcheries and other structures
- continued recognition in the program of population, habitat and production measures recommended for and included in the 2009 program (including measures for Pacific lamprey reintroduction; evaluating the effects of hydrosystem operations on lamprey spawning and rearing; evaluating the re-programming of anadromous fish production in Willamette westside tributaries; coordination funding; and reintroduction of anadromous fish in blocked areas)
- incorporate the Willamette River Basin Memorandum of Agreement Regarding Wildlife Protection and Enhancement into the wildlife section of the program

Bonneville recommended the last measure. In subsequent comments, Bonneville noted that numerous plans cover the mitigation work in the Willamette subbasin, including the Wildlife Memorandum of Agreement. If the recommendations seek *additional* funding for habitat acquisitions or operations and maintenance funding for habitat acquisitions, those recommendations would be inconsistent with the Agreement. Bonneville also commented that past program measures provided the underpinning for the project operations and other measures in the biological opinions, which now represent the federal hydrosystem's full implementation of the Northwest Power Act's protection and mitigation requirements in the Willamette subbasin as well as ESA compliance.

The final program provisions included the following with regard to the Willamette subbasin recommendations: The Council recognized the actions and performance standards in the two Willamette biological opinions as part of the program's



baseline measures and objectives for hydrosystem operations to benefit fish. 2014 Fish and Wildlife Program, at 60-62, 62 fn.5 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>) (see #9 above). The program's investment strategy urges the action agencies to meet their obligation to implement the Willamette biological opinion, including not to let actions go unfunded because of competing priorities between the Columbia and the Willamette, *Id.*, at 115, and to support and implement anadromous fish passage measures consistent with the biological opinion, *Id.*, at 86 (see #14 above). The program also recognizes the Willamette biological opinions, the Upper Willamette Recovery Plan, and the recommended measures from the agencies and tribes all as sources of program measures for possible implementation in the Willamette subbasin, subject to all the conditions regarding implementation of measures noted in the program and consistency with the Willamette subbasin plan. *Id.*, at 110-13, 191, and at 108-09, <http://www.nwcouncil.org/fw/subbasinplanning/willamette/plan> (Willamette subbasin plan). Finally, the Council continued to recognize that settlement agreements are an appropriate vehicle for mitigation to address wildlife losses, *Id.*, at 72-74, with specific recognition of the agreement reached in the Willamette, *Id.*, at 148.

The Council did not directly recognize the ESA-delisting and broader goals in the Upper Willamette Recovery Plan, as recommended by the Oregon Department of Fish and Wildlife and the Confederated Tribes of the Grand Ronde Community of Oregon. As discussed above (see #13), what to do about the program's quantitative objectives for anadromous fish was a source of controversy during the amendment process, for the basin as a whole and not just the Willamette subbasin. Working with a collective group of fish and wildlife agencies and tribes, the Council agreed to final provisions for collecting, organizing and reporting on existing quantitative objectives for anadromous fish (one source of which will be the Upper Willamette Recovery Plan) and then for resident fish. At that point the Council will consult with the agencies and tribes (and others) on whether and how to incorporate additional quantitative objectives in the program in the future. *Id.*, at 33-34. The Council concludes its final program measures are an effective resolution of this matter, and one that is more reflective of the views, recommendations and comments of the fish and wildlife agencies and tribes as shaped through the amendment process consultation process, than the original recommendation regarding goals for the Willamette specifically.

With regard to Bonneville's comments, the Council is comfortable at this time with program implementation in the Willamette subbasin based on the biological opinion measures to benefit fish and the Willamette wildlife agreement. The Council is not deciding at this time, however, whether the biological opinion measures also "fully implement" the protection and mitigation responsibilities under the Northwest Power Act in the Willamette subbasin, as Bonneville commented. The program contains strategies and measures for the Willamette subbasin that are recommended by the state fish and wildlife agencies and tribes

for the protection, mitigation and enhancement of fish species, measures that are not necessarily in the biological opinions. It is also entirely possible that the mitigation goals and objectives under the program may transcend the actions needed to fulfill the goals and objectives of the biological opinions. Those questions are not and need not be settled in this amendment process.

## **(18) Adaptive management, including monitoring, evaluation, research, reporting, and data management**

The Council received a substantial set of recommendations with regard to the monitoring, evaluation, research, data management and reporting elements of the program. Most came from the state and federal fish and wildlife agencies, tribes, tribal groups, and other state and federal resource agencies, some extensive, some focused on a small set of specific issues. Recommendations include those from NOAA Fisheries, US Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, Montana Fish Wildlife and Parks, Columbia River Inter-Tribal Fish Commission, Nez Perce Tribe, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Kootenai Tribe of Idaho, Spokane Tribe, Coeur d'Alene Tribe, Upper Columbia United Tribes, Confederated Salish and Kootenai Tribes, Burns Paiute Tribe, Upper Snake River Tribes, Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, US Geological Survey, US Environmental Protection Agency, Pacific Fishery Management Council, Washington State Governor's Salmon Recovery Office, Upper Columbia Salmon Recovery Board, Lower Columbia Fish Recovery Board, Yakama Basin Fish and Wildlife Recovery Board, and StreamNet. Bonneville was another source of recommendations, as were the Bonneville customer groups – Northwest RiverPartners, Public Power Council, PNGC Power, and Northwest Requirements Utilities. And conservation, fishing and environmental groups and others also provided recommendations relating to monitoring, evaluation, research and related matters, including the Native Fish Society, Wild Steelhead Coalition, Save Our Wild Salmon coalition, American Rivers, Trout Unlimited, Northwest Sportfishing Industry Association, Association of Northwest Steelheaders, Northwest Habitat Institute, and Snake River Salmon Solutions. A number of the fish and wildlife agencies and tribes and conservation groups also recommended the Council follow the recommendations on these topics from the Independent Scientific Advisory Board – from the ISAB's review of the 2009 Fish and Wildlife Program and other ISAB review reports.

Many of the recommendations called for research, assessments, studies, evaluations and monitoring linked to specific substantive topics of interest. These have been addressed in other topics above and below, including non-native and invasive species (#4); predator management (#5); toxic contaminants (#7); climate change (#8); mainstem water management and passage (#9), including the proposed experiment at increasing spill for juvenile fish passage (#10); estuary, plume and ocean considerations (#11); wildlife mitigation (#12); anadromous fish propagation, hatcheries and wild fish (#13); anadromous fish reintroductions above blockages (#14); resident fish assessments and mitigation (#15); research, assessments and monitoring for specific species such as lamprey, sturgeon, eulachon and freshwater mussels (#16); and assessments of the effects of renewable energy development on wildlife and fish (#21).

Another set of recommendations related to the goals and biological objectives for the program. This is a topic addressed above in the discussions of program goals and objectives (#2) and fish propagation and wild fish strategies (#13), the latter regarding the specific issue of quantitative objectives for naturally spawning and artificially produced adult salmon and steelhead, and associated monitoring and reporting.

The focus here is on the program elements and recommendations regarding monitoring, evaluation, research, data management, reporting, and indicators more generally. As noted in the discussion of program goals and objectives (#2 above), the Council asked an ad hoc committee of its members to organize and consider the recommendations on the research, monitoring, and evaluation elements of the program and on the goals and biological objectives. The Council relied on the work of this committee and its Fish and Wildlife Committee in shaping the draft program provisions. The Council also considered the comments received on the draft program provisions before settling on the final provisions.

What became an important aspect of this review involved a coordinated set of recommendations from a number of the state fish and wildlife agencies and tribes to emphasize adaptive management as the principle or purpose for linking together the different elements of the program framework. This included an emphasis on how information and insights from monitoring, evaluation and research should be managed and reported and then used to inform and improve decisions on substantive habitat and production measures. Many who were not part of the coordinated recommendation similarly recommended that the Council reorganize and restructure these program elements to link in a better way the program's biological objectives, monitoring and evaluation, research, data management, reports and indicators. The purpose would be to better inform the region about program progress, and describe more clearly how the results will be used to improve decisionmaking.

Based on these recommendations and related recommendations, comments and considerations, the Council integrated an adaptive management strategy into the program framework (see also the discussion of the program framework above, at #1). As part of this effort the Council reorganized and revised the monitoring, evaluation, research and related elements of the program into an overarching and explicitly titled Adaptive Management strategy. The purpose is to guide how the work done under the program to research key questions and monitor and evaluate progress is reported effectively to the region and feeds back into decisions to refine the program's substantive objectives and measures. The Adaptive Management strategy includes principles and general measures with regard to monitoring, effectiveness, research, data management, reporting, evaluation, and the use of a risk-uncertainty matrix. 2014 Fish and Wildlife Program, at 10-11, 101-07 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). Council high-level indicators are further discussed in an appendix, *Id.*, at 162, and a list and description of reporting requirements and reports in is another appendix, *Id.*, at

180-82. The program's scientific foundation and principles and the provisions on goals and biological objectives are also part of the program's adaptive management approach. *Id.*, at 27-36, 153-61 (see #1 and #2 above).

Within this framework, the Council received dozens and dozens of recommendations from the entities noted above with regard to specific elements and features. Recommendation topics included, among many others:

- priorities for monitoring
- standardization (or not) of monitoring and data management
- monitoring methods
- incorporating monitoring guidance from other sources
- evaluate existing and new methods for monitoring fish population performance
- continue monitoring and evaluation of fish populations status and trends
- update information on population status and trends
- monitor, assess and report on natural-origin and hatchery salmon steelhead and on their interaction
- monitor and evaluate juvenile anadromous fish carrying capacity
- expand monitoring for different species of anadromous and resident fish
- ecosystem and habitat monitoring, status and trends, effectiveness and indicators
- hatchery monitoring, effectiveness and indicators
- continue and expand monitoring and evaluation of hydrosystem survival
- develop and implement ways to monitor and evaluate food webs
- monitor sediment transport
- monitor large woody debris recruitment
- contaminant monitoring
- monitoring of estuary restoration
- wildlife response monitoring and indicators
- harvest monitoring
- innovative tools and methods for research
- research on uncertainties with regard to habitat effectiveness, fish population status, artificial production, hydrosystem survival, and harvest
- assessing levels of uncertainty and the evidence needed to resolve uncertainties
- assessing the relevance of and prioritizing all research, and ceasing the less relevant research projects
- revising the program's research plan
- develop and evaluate models for effectiveness evaluations
- develop and assess methods for evaluating effectiveness of habitat restoration and population response, hatchery performance, and anadromous fish migration and survival through the hydrosystem
- develop and employ methods for life-cycle evaluation and life-cycle effectiveness
- continue to fund Coordinated Assessments

- expand Coordinated Assessments to cover other fish species
- continue to develop, evaluate and adapt high level indicators
- expand indicators for other fish and wildlife species, including non-salmonid anadromous fish
- incorporate guidance on data management from other programs
- coordinate data management
- develop or connect to networks for data sharing
- evaluate viability of long-term data sets
- evaluate minimum sets of data needed for specific issues
- fund database maintenance and updates
- support data management for indicators
- develop new databases and indicators for hatcheries, fish and wildlife genetic data, lamprey, sturgeon
- refine priorities for data management
- data sharing agreements
- recommended reports and reporting requirements
- support for funding of reporting efforts
- develop information and report on the economic benefits of fishing
- inventory, organize and regularly report project information
- use of science-policy workshops and forums
- increase public education and citizen participation
- support for adequate and sustained funding for monitoring, data management and related functions
- scrutinize and reduce the costs of program monitoring and evaluation, including through more rigorous efforts to prioritize and streamline program monitoring and evaluation
- increase efficiency and effectiveness of program monitoring and evaluation
- clearly define and estimate the costs of current research, monitoring and evaluation efforts, and work to reduce costs

With regard to the latter points, the Bonneville customer groups in particular recommended that while the Council should work to ensure a robust and efficient research, monitoring and evaluation portion of the program, the Council should also work to reduce the overall costs of this portion of the program. Prioritizing the most effective and relevant monitoring, evaluation and research, and ceasing the less relevant, is critical.

Specifics of these recommendations and the program response are not detailed here. Information on each topic can be found in the administrative record. The Council certainly did incorporate the specifics of every recommendation in the final program. In essence, the recommendations all called for more specificity and measures in the program – more monitoring and evaluation and funding, expanded monitoring of species and their habitat, more methods to evaluate program effectiveness, more data gathering and more coordinated data sharing and management, more prioritizing and streamlining in order to reduce costs of

research, monitoring and evaluation, and so forth. Through the assistance of especially the agencies and tribes and Bonneville, and the other participants as well, the Council shaped the adaptive management section (*Id.*, at 101-07) to provide sufficient guidance and principles for monitoring, program effectiveness, research, data management and reporting. This section incorporates the substance of the program recommendations and comments and should help to ensure program accountability and cost-effectiveness while maintaining the flexibility to incorporate new information and changes in methods and scientific understanding. The Council concluded that it revised the adaptive management provisions of the program in a way consistent with the key themes in the recommendations and comments.

## (19) Subbasin plans

After an intensive and expensive planning process that ran from 2002-05, the result was the inclusion of nearly 60 subbasin management plans as part of the program, including plans for the estuary and mainstem reaches as well as many dozens of tributaries. The subbasin plans are the home for the program's specific objectives and habitat and production measures (except for the specific water management and passage objectives and measures for the Columbia and Snake rivers). In the 2009 Fish and Wildlife Program, the Council continued to recognize the subbasin plans as part of the program. The Council also included in the program hundreds of quite specific measures for implementation recommended by agencies, tribes and others, presumably consistent with the strategies of the subbasin plans and subject to implementation under certain conditions. 2009 Fish and Wildlife Program, at 28-30, 58-61, 91-95 ([http://www.nwcouncil.org/media/115273/2009\\_09.pdf](http://www.nwcouncil.org/media/115273/2009_09.pdf)).

One of the issues going into this amendment process was whether, when and how to update, revise and replace the subbasin plans, as they grow older and possibly stale. One thing that became clear in the recommendations and comments is that no one had much interest in another full-blown subbasin planning process or any distinct planning process to update or revise the subbasin plans. This is in part because a significant amount of additional planning has taken place in the basin in the last decade, just in other forums or for other purposes, including recovery plans developed under the ESA, other plans specific to certain species such as lamprey, sturgeon, Kootenai white sturgeon, plans specific to certain subjects such as a regional toxics reduction plan, and others. On that basis, the program amendment recommendations and comments (not detailed here by recommending entity) included matters such as:

- incorporate the ESA recovery plans into the fish and wildlife program, either as replacements or in addition to the subbasin plans
- incorporate into the program others types of plans, such as the Tribal Pacific Lamprey Restoration Plan, on similar terms
- continue to recognize the subbasin measures recommended for the 2009 Program and advocate for their implementation
- additional measures for implementation consistent with the subbasin plans
- development and funding of multi-year implementation plans in those subbasins without Columbia Fish Accords, or long-term implementation plans in all basins that go beyond ESA requirements and represent full mitigation plans under the Northwest Power Act
- regular reporting on the progress in implementing the subbasin plans or in implementing the program's subbasin measures
- support for future planning to address the ISAB's recommendations regarding the importance of food webs and landscape scale approaches to conservation



- support for revising or developing new subbasin plans only in areas that have undergone significant change, such as in White Salmon River subbasin following the removal of Condit Dam
- funding and implementation of projects in the newest subbasin plans, for the Blackfoot and Bitterroot subbasins
- better organization and display of the key elements of the subbasin plans and subbasin measures

The Council maintained the subbasin plans as a key component of the program, as the planning foundation for implementation of measures in the subbasins, mainstem reaches and estuary. The Council also retained the specific subbasin implementation measures from the 2009 program and added those measures recommended in this amendment process, subject to the same procedures and conditions for implementation. As sources for these specific measures, the program recognizes the ESA recovery plans, biological opinions, Columbia Fish Accords, and other plans such as the tribal lamprey plan. The Council recognized, in its investment strategy, that there is a bank of subbasin measures to be considered for implementation. The Council also recognized that rather than a general approach to updating subbasin plans, circumstances may dictate the need to update a particular subbasin plan in a certain subbasin. The Council will work with the fish and wildlife agencies and tribes and others to identify what plans are priorities for updating. The Council determined that funding to update a plan in those circumstances should be a priority. Finally, the Council has developed and is improving a set of “subbasin dashboards” on its website, for the purpose of more useful display of information about the subbasin plans, limiting factors, subbasin measures, and projects that implement subbasin measures. 2014 Fish and Wildlife Program, at 11-12, 108-09, 110-13, 116, 183-84, 191-98, (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>; <http://www.nwcouncil.org/fw/subbasinplanning/home/>; <http://www.nwcouncil.org/ext/dashboard/species.asp?9> ).

The Council did not actually adopt or incorporate the recovery plans themselves (or the other plans) as part of or as replacements for the subbasin plans – just recognized the actions in these other plans as program measures. Given the specific planning process that resulted in the program’s subbasin plans – management plans linked to limiting factors identified in technical assessments, subject to independent scientific review – and given the different underlying purpose and scope of plans developed under the program and the Power Act as compared to plans developed under the ESA, it is difficult simply to plunk the entirety of recovery plans into the program as replacements for the subbasin plans. More important, it does not seem necessary. What the subbasin plans did was provide a sound planning foundation to justify implementation of specific measures. The Council recognizes that recovery plans and certain other plans have been developed under similar circumstances, and that many are based on the Council’s subbasin planning effort or were spurred into development by topic syntheses generated out of project reviews under the program. The program

recognizes that these other plans have been developed to provide sound planning foundations similar to the program's subbasin plans. Also, in many cases these other plans are more recent or up-to-date than the program's subbasin plans and largely if not completely consistent with what is in the subbasin plans. This justifies the inclusion of the actions in these plans as program measures with a sound planning foundation.

**(20) Implementation procedures, including program funding, program scope and funding priorities; long-term funding for operation and maintenance; “in lieu” expenditures; project review; and program and regional coordination**

Recommendations and comments raised a set of other issues with regard to program implementation and funding. A number are addressed here in summary fashion:

**Program funding, program scope and funding priorities.** In recommendations and subsequent comments, nearly every state fish and wildlife agency, tribe, and tribal group had something to say about program funding. Without detailing the specifics here, recommendations and comments called for the program to receive adequate funding for implementation, ranging from making just the general point to specific recommendations about program areas that need funding and implementation. This included ensuring that funding stays strong for on-going production and habitat work to ensuring adequate funding for program measures not yet implemented, resident fish mitigation, blocked-area mitigation, long term operation and maintenance, emerging program areas such as invasive species, toxic contaminants, anadromous fish reintroduction, climate change, and other topics. Many recommendations also called for the Council to establish priorities for Bonneville funding, often focused on specific topical or geographic areas. Some recommendations focused on making sure the program continued to emphasize funding and implementation of the current biological opinions and Columbia Fish Accords to assist in recovery for listed species. Others focused on having the Council make sure the program places a similarly high priority on funding and implementation of important program areas not covered by biological opinions and accords, including many of the topic and geographic areas noted above. Some entities recommendations asked the Council continue the principle that calls on Bonneville to allocate 70 percent of the available funding for anadromous fish, 15 percent for resident fish, and 15 percent for wildlife. No one suggested less of an allocation to the non-anadromous categories; the Council did receive recommendations to increase the allocation of program funding to blocked areas (see #14 above). A proposed “investment strategy” in the draft program received support from a number of these same agencies and tribes. Fishing and conservation groups also provided recommendations or comments in support of many of these same points.

Bonneville and Bonneville’s customer utilities and utility groups also submitted extensive recommendations and comments related to program funding. The main point was to encourage the Council to continue the same general scope and scale of the program, with emphasis on implementing the actions committed to by the federal agencies in current biological opinions and Columbia Fish Accords and the other ongoing areas of an already large mitigation and protection program. The Council should amend the program to add additional measures only in ways that clearly address unmet needs of fish and wildlife directly affected by the federal or

non-federal hydroelectric projects. The Bonneville customer groups in particular emphasized that the region's ratepayers shoulder a significant burden of costs for the region's fish and wildlife mitigation and protection – one-third of Bonneville's wholesale power rate, with a program budget that has nearly doubled in a decade –and that in their view the program is close to or at its fiscal, management and legal capacity in terms of full implementation of efforts at mitigation for the effects caused by the hydrosystem. Financial resources are not infinite, and given a finite program budget, the Council has an obligation to carefully consider new measures proposed in the amendment process, and to prioritize measures to select those offering the greatest benefit to fish and wildlife, retiring measures and finding savings when work is less effective or has outlived its usefulness. The Council should establish a methodology to prioritize potential projects and areas of the program, and reach agreement on the projects of highest priority prior to recommending them to Bonneville. New work and new priorities should be funded from savings. The Council should also work harder to maximize program benefits and cost-effectiveness and minimize process costs. Bonneville and the Bonneville customers particularly urged the Council to include only those measures that have a clear connection or nexus to mitigating for the impacts of the federal hydropower system, so that Bonneville customer funds are not diverted or used for actions that will not achieve the goals of the Act and that are inconsistent with the law. Particular concerns about moving away from a hydrosystem nexus were noted with recommendations and draft program provisions that would move program funding and implementation more deeply into issues about toxic contaminants, invasive species, species such as eulachon, broad-scale objectives for rebuilding populations affected by many factors, and more. A number of the agencies and tribes and conservation groups provided counter legal and policy comments to argue that these program areas were within the authority of the Council and Bonneville to address under the Act.

Based on its consideration of these recommendations and comments, the Council included an extensive "investment strategy" in the final program, with a goal of assuring that funding will match identified program priorities in order to maximize the biological response from measures funded by ratepayer and cost-shared investments. 2014 Fish and Wildlife Program, at 114-17 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). In that section and in an introductory section of the program, *Id.*, at 14-16, the Council recognized the Northwest Power Act's legal requirements and limitations on funding to protect, mitigate and enhance fish and wildlife affected by the development and operation of the basin's hydroelectric facilities, including both what are the ratepayers' responsibilities and the fact that this responsibility is shared with the region as a whole. The Council called on Bonneville to fulfill its commitments to provide adequate funding to meet all of its fish and wildlife obligations, with program funding levels designed to take into account the level of impacts caused by the federal hydrosystem and the authority and need for both direct measures and off-site protection and mitigation measures to address those impacts. The Council recognized that the program already represents a substantial investment by the

ratepayers and citizens of the northwest, that funding and implementation capacity is not unlimited and cannot address every protection and mitigation need for fish and wildlife at once, and that basic controls on spending and vigilance is important to maximize biological response and cost-effective investments. Based on ongoing efforts by the Council and recommendations from the Independent Economic Analysis Board, the Council included a discussion as to the steps that the Council has taken and recommendations for additional steps to improve the cost-effectiveness of individual fish and wildlife measures and the program as a whole. *Id.*, at 212-14.

The Council also recognized that Bonneville had made substantial long-term commitments to funding certain areas of the program, especially prioritizing work to address ESA-listed species, and that Bonneville also funds elements of the program to address non-listed species as well. At the same time, the existing budget commitments limit the flexibility to fund important new work, constrain the expansion of ongoing work, limit the capacity to maintain past investments, and may limit the funding of the priorities of state and federal fish and wildlife agencies and tribes expressed through the amendment process. The Council then identified a set of principles and expectations for and guidance to Bonneville and others on program funding and implementation. This includes a description of the Council's funding priorities for the program, some of them long-time priorities that have developed over the decades of the program's development and implementation and some of them emerging priorities that need to be integrated over time into the program funding commitment. *Id.* at 114-17.

The Council also carefully considered the issues of authority and links to hydrosystem impacts raised in the comments. The Council is comfortable that all of the program areas included in, for example, the list of emerging priorities, *Id.* at 116, are within the authority of the Council to include in the program under the Northwest Power Act and for Bonneville and the federal action agencies to share in the responsibility to implement under the Act. This is not the same as concluding that the ratepayers bear full responsibility to address these matters, and the levels and limits of responsibility and authority and opportunity under the Act may differ in the different contexts. The Council provided brief explanations as to how the Council understands these matters of authority in a general sense, *Id.*, at 14-15, 114-16, while specific issues will need to be addressed on a case-by-case basis by Bonneville and the Council and others. Specific issues about authority, responsibility and funding priorities raised in this program amendment process have been addressed in discussion on specific topics and program areas above. See among others the discussions of non-native and invasive species (#4); predator management (#5), toxic contaminants (#7); climate change (#8); mainstem water management and passage (#9); estuary and ocean (#11); blocked-area mitigation and anadromous fish mitigation (#14); specific species such as eulachon measures (#16).

**Long-term operation and maintenance funding.** One specific issue about program funding received a significant amount of attention. The Council received a coordinated set of recommendations from fish and wildlife agencies and tribes recommending that the Council ensure that adequate long term funding for operation and maintenance be available for fish screens, hatcheries, wildlife area management plans, and other major program investments and capital improvements for resident and anadromous fish. Underlying the recommendations were views that operation and maintenance budgets have become stagnant and are not adequate. A number of the recommendations invoked a “stewardship” concept, asking the Council and Bonneville to develop a better approach to long-term stewardship of the program’s protection and mitigation investments. Many of the recommendations described specific infrastructure investments made to date and recommended that Bonneville and the Council work with the fish and wildlife agencies and tribes to create a process for maintenance and refurbishment over the next ten years. Recommendations also called for a Council-sponsored forum to address this topic. Recommendation on this topic of various types came from, among others, the Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Washington State Governor’s Salmon Recovery Office, Upper Columbia Salmon Recovery Board, Confederated Salish and Kootenai Tribes, Coeur d’Alene Tribe, Kootenai Tribe of Idaho, Spokane Tribe, Upper Columbia United Tribes, Upper Snake River Tribes, Nez Perce Tribe, and the Confederated Tribes of the Grand Ronde Community of Oregon.

Comments supporting the same points came from many of the same entities and others (such as the US Fish and Wildlife Service) in later stages of the amendment process, including support for provisions in the draft program identifying this as the highest of emerging priorities for the program. The comments included a concern about the absence of identified funds dedicated to program maintenance or stewardship. No comments opposed the recommendations to address long-term operation and maintenance funding needs. But Bonneville and the Bonneville customer utilities did express concern in comments about the Council becoming too prescriptive in its investment strategy, and calling for more flexibility in the approach to solving some of the emerging program priorities. Some of the customer utilities in particular expressed concerns about the overall costs of the program and the burden on ratepayers, called for spending to be better controlled and effective, and called for new priorities, including increased attention to funding operation and maintenance needs, to be funded out of savings from cuts in other areas of the program and not new expenditures.

Based on the recommendations and comments, the Council recognized a growing need to protect or upgrade the substantial investments in a fish and wildlife protection and mitigation that have been made by the ratepayers and others over the last three decades. 2014 Fish and Wildlife Program, at 114 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). Thus one of the

principles guiding the program's investment strategy became providing adequate funding for ongoing operation and maintenance costs associated with existing investments and securing long-term maintenance of program investments. *Id.*, at 115. The Council identified providing for long-term maintenance of the assets that have been created by prior program investments as the top emerging priority for the program. *Id.*, at 116. The program then contains a set of measures for how to go about assuring adequate long-term maintenance of these investments. *Id.*, at 199-200. The principles and measures also recognize that ratepayer funding for the fish and wildlife program is already substantial and needs to be used efficiently and effectively, and that there are not unlimited funds to address all needs all at once – needs that include continuing ongoing habitat, production and passage programs; initiating new or expanded work identified in the recommendations; providing for substantial program monitoring and evaluation; and ensuring long-term operation and maintenance funding. *Id.*, at 114, 116. Among other matters the Council called for Bonneville to fund the emerging program priorities and new fish and wildlife obligations from savings identified within the program that do not compromise productive projects, and from new expenditures only as necessary. *Id.*, at 116-17.

**“In lieu” expenditures.** Another funding topic that received attention involved what is known as the “in lieu” provision of the Northwest Power Act. Section 4(h)(10)(A) of the Act provides that Bonneville’s expenditures to protect, mitigate and enhance fish and wildlife in a manner consistent with the Council’s program “shall be in addition to, not in lieu of, other expenditures authorized or required from other entities under other agreements or provisions of law” A coordinated set of recommendations – from the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Montana Fish Wildlife and Parks, Burns Paiute Tribe, Cowlitz Tribe, Kootenai Tribe of Idaho, Upper Snake River Tribes – called on the Council to clarify and even establish the policy for the program as to when and how the “in lieu” restrictions apply to limit expenditures. The recommendations also called on the Council to review “in lieu” decisions by Bonneville in a public process to ensure to critical mitigation efforts receive the necessary funding from Bonneville for successful and timely implementation and also that the in-lieu provisions do not work to prevent project sponsors from establishing equitable cost-share arrangements with other entities that are responsible for similar on-the-ground actions.

Bonneville commented in response to the draft program that further elaboration in the program of the Council's views on Bonneville’s funding authorities – including the “in lieu” provision – appears unnecessary, considering Bonneville remains willing to continue engaging the Council and others when Bonneville must make these decisions and considering that Congress directed Bonneville to make decisions to ensure that Bonneville’s mitigation expenditures do not run afoul of the in lieu restrictions as a legal matter, decisions that necessarily must be made on a case-by-case basis. Northwest RiverPartners commented similarly that the

“in lieu” provisions of the Act are intended to ensure that Bonneville’s customers do not pay for the mitigation responsibilities of others. In lieu determinations are legal decisions for Bonneville to make under the Act, decisions not subject to concurrence by the Council. It is appropriate for Bonneville to notify and discuss with the Council and the public when a measure may be subject to an “in lieu” determination. But Bonneville is not responsible for working with the Council on an appropriate application of the “in lieu” provision. The Oregon Department of Fish and Wildlife and others commented favorably on provisions in the draft program that explicitly address the topic of “in lieu expenditures” and present a clear definition and process for reviewing “in lieu” determination.

The final program contains a provision on “in lieu expenditures, in a section explaining the legal and social context of the program. 2014 Fish and Wildlife Program, at 15-16 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>). The Council recognizes that “in lieu” determinations are legal decisions assigned by the Act to Bonneville to make, not the Council, and that the provision is an important protection to ensure that program expenditures accomplish additional protection and mitigation and do not simply substitute for the expenditures of others. At the same time, the Council had to grapple with the concerns of many in the fish and wildlife agencies and tribes about how and why “in lieu” determinations are made and explained by Bonneville. So the Council stated its understanding and expectations for how Bonneville should apply the “in lieu” provision and asked Bonneville to continue to inform and discuss with the Council in lieu considerations before making final decisions.

**Project review.** The Council did not receive recommendations to fundamentally change the project review provisions of the program, presumably because those provisions largely follow the requirements of the statute. Still, the Council did receive a number of recommendations and subsequent comments related to the project review process, largely from fish and wildlife agencies and tribes but also from Bonneville, the Bureau of Reclamation, and the Bonneville customer groups. Recommendations included:

- Council should work with the fish and wildlife agencies and tribes and with Bonneville and the other federal action agencies to develop jointly the new project review process
- streamline the project review process generally – standardize and simplify the information requested and coordinate the information request with information needs of other entities
- jointly develop a review process that treats new and ongoing projects differently – well-established and often-reviewed projects, including established Columbia Fish Accord projects, need significantly less review less often; project recommendations following review of established projects should cover the project for multiple years before review is needed again



- especially for established projects and ongoing habitat work, take advantage of project review that occurs through existing subregional review frameworks and umbrella processes, such as what Bonneville and the fish and wildlife agencies and tribes have evolved for review and selection of habitat work within existing project areas
- support Bonneville’s approach to habitat project selection as a way to move from opportunistic habitat work to more strategic implementation
- take advantage of annual or regular project management and technical conferences and workshops that report on and discuss progress with regard to existing projects
- review current projects to ensure their resiliency under climate scenarios
- focus the regular ISRP review mostly or solely on new projects or expanded project proposals
- Council should solicit for, review and recommended new projects for parts of the basin and parts of the program that are not covered by accords or biological opinions and have not been able to initiate new work for some time – both as a general principle and with specific emphasis on new work in the area above Chief Joseph and Grand Coulee dams
- direct the ISRP to focus its review and comments on the science elements of projects and avoid policy issues
- continue to provide a rigorous scientific review of all measures under the program, as the program’s credibility is supported in large measure by rigorous scientific review of each project funded by Bonneville
- establish a methodology to prioritize potential projects and reach agreement on the projects of highest priority prior to recommending them to Bonneville
- initiate a collaborative multi-party discussion about how the independent science review function can best serve the needs of the program

The Council revised the project review provisions of the program in minor ways responsive to the recommendations and comments. 2014 Fish and Wildlife Program, at 119-20 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf> ). The Council continues to agree that rigorous project review, including the use of the Independent Scientific Review Panel, is not only required by the Act but does in fact improve the quality of the projects implemented and the results achieved, and thus bolsters the program’s credibility significantly. The Council also agrees that the program is a collection of different project types that will benefit from different types of review, with different levels of scrutiny and frequency of review, and with different questions asked of a long-established program and a new proposal, or a habitat project and a data management project. The Council committed to work with Bonneville, the fish and wildlife agencies and tribes and project sponsors and others in the development of the next project review processes. Multi-year project recommendations for established projects have already been a part of the project review process, and will be again. The Council also agreed to use existing subregional organizations and their frameworks and annual science workshops to assist with project reviews, and in general streamline review processes as much

as possible. Finally, for the program areas that do not yet carry long-term Bonneville funding commitments, the Council will work with Bonneville, the sponsors and others to develop targeted solicitations for new work. Any solicitations for new program work should take into account the priorities described in the investment strategy, see *Id.*, at 114-17.

**Program and regional coordination.** The Council received a coordinated set of recommendations on program coordination from state and federal fish and wildlife agencies, other state and federal agencies, and tribes and tribal groups. The main focus of the recommendations – and subsequent comments – was that the Council needed to do something to fill the vacuum in regional program coordination created by the dissolution of the Columbia Basin Fish and Wildlife Authority. Most recommended that the Council commit in the program to convene an annual forum of the state, tribal and federal representatives to discuss current issues in program development and implementation, including matters such as an annual work plan and priorities for program implementation; coordination of work to improve and standardize monitoring and evaluation, data management, research, coordinated assessments, and reporting; coordination of efforts on habitat project effectiveness; discussion of issues in the implementation of emerging program areas such as toxics, and non-native and invasive species; progress on addressing long-term operations and maintenance costs; ocean and estuary issues; and sponsoring and convening science/policy workshops. Entities also sought to ensure continued Bonneville funding for program coordination. Recommendations, supporting comments, or (in most cases) both came from the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Montana Fish Wildlife and Parks, Washington State Governor’s Salmon Recovery Office, Columbia River Inter-Tribal Fish Commission, Nez Perce Tribe, Yakama Nation, Upper Columbia United Tribes, Coeur d’Alene Tribe, Kootenai Tribe of Idaho, Confederated Salish and Kootenai Tribes, Cowlitz Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, Upper Snake River Tribes, Burns Paiute Tribe, NOAA Fisheries, Pacific Fishery Management Council, and the Pacific States Marine Fisheries Commission. Support also came in the recommendations of the Northwest Sportfishing Industry Association and the Association of Northwest Steelheaders.

The section on program coordination in the final fish and wildlife program is based on the recommendations and comments. Among other things, the program provides that the Council will convene an annual forum of regional coordination representatives and others to discuss issues of regional significance in program implementation. Without detailing the specific issues raised in the recommendation, the issues identified for the coordination forum cover the range of subjects provided in the recommendations. The Council also retained the provisions for program coordination funding. 2014 Fish and Wildlife Program, at 121 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

The Council received recommendations on the need for increasing coordination with other regional programs, agencies and organizations involved in work in the Columbia basin that affect or work to protect and improve fish and wildlife and habitat. The Columbia River Inter-Tribal Fish Commission in particular recommended that the Council develop a system for tracking the activities of, and similarities and differences between, the plans and actions of other agencies in the basin and in particular subbasins. The point would be to increase our ability to identify, cooperate with and integrate program mitigation actions and funding with similar efforts being implemented by other organizations. A related recommendation came from the Regional Fisheries Enhancement Group Coalition in the State of Washington and from other entities involved in recovery and enhancement work in that state and elsewhere. The Council continued a provision from the 2009 program on regional coordination that covers these recommendations. *Id.*, at 121-22. The challenge will be to implement this provision effectively.

Finally, the Clark Fork Coalition recommended that the Council establish a framework for supporting local organizations in Montana that are working to achieve habitat improvements and ecological outcomes that overlap with the objectives of the Council's fish and wildlife program. The Council did not adopt that recommendation. The Council and Bonneville did not maintain any of the ad hoc subbasin organizations formed to coordinate the activities of many participants to develop the program's subbasin plans. In a perfect world it would be useful to maintain ongoing coordinating entities or frameworks in every subbasin or region to do as the Clark Fork Coalition recommends. But the program resources just do not sustain such a level of subbasin organization, at least not without diverting resources from other, priority needs. Instead, the Council relies primarily on the coordination functions provided by its program partners – the state fish and wildlife agencies and other state resource agencies and tribes and tribal groups. The Coalition should look to those entities to fill the supporting function described in the recommendation. If significant enough in a regional sense, this could also become an issue for discussion at the annual coordination forum.

## **(21) Renewable energy development and the effects on wildlife and fish**

The Washington Department of Fish and Wildlife, Confederated Tribes of the Umatilla Indian Reservation, Upper Snake River Tribes, and US Fish and Wildlife Service submitted a coordinated recommendation to include in the program provisions for assessing and reducing the impacts of renewable energy development (and associated transmission) on terrestrial and aquatic resources.

In more detail, these agencies and tribes recommended that the Council develop and Bonneville fund:

- programs and processes to evaluate the impacts of fish and wildlife resources of all renewable energy sources (past, proposed and potential) and associated transmission infrastructure
- a region-wide assessment of suitability for siting of terrestrial (e.g., wind and solar) and aquatic (e.g., wave energy) renewable energy projects, in which possible sites for development are prioritized and then examined for potential site-specific and system-wide impacts to wildlife and fish (e.g., effects on sage grouse)
- outputs from the region-wide assessment should include a map of priority power generation development sites and power generation exclusion zones or protected areas, akin to the Council's protected areas provisions for new hydropower development
- explicit evaluation of transmission system expansion and its potential to impact fish and wildlife as part of assessing the effects of renewable energy development
- identification, assessment and analyses of appropriate fish and wildlife mitigation, where development has occurred or is allowed to occur in the future

These agencies and tribes reiterated support for the recommendation in subsequent comments. The Columbia River Inter-Tribal Fish Commission and Yakama Nation added their support in comments. The Commission attached to its comments its 2013 Energy Vision for the Columbia River to underscore, among other things, the importance of the need for creative and protective thinking regarding the effects of the region's energy development on fish and wildlife, on the basin's ecosystem functions, and on the hydropower system, including renewable energy development, the use of the hydropower system for peaking and to balance the output from intermittent energy sources, the environmental effects of the expanded development of natural gas for generation, and the transport of oil, natural gas, and coal.

Bonneville commented in response that protection and mitigation for the development of new renewable resources (other than hydropower) and their integration into the regional transmission grid was beyond the scope of the

Council's fish and wildlife program intended to address the effects of the development and operation of hydropower facilities. Bonneville also commented that renewable energy development is already governed by environmental protection, energy regulatory, and land use siting laws, procedures, and agencies. It was unclear what value the Council would add through its program and plans. Bonneville also noted that it complies with similar environmental laws and procedures when it works with energy resource developers to assess and decide on whether and how to integrate a new resource into the regional transmissions system.

The Council decided not to amend the program as recommended. Under the Northwest Power Act, the fish and wildlife program is to consist of measures to protect, mitigate and enhance fish and wildlife affected by the development and operation of the hydropower facilities. Bonneville is then to use its fund for the same purpose, in a manner consistent with the program. As noted elsewhere in the program and in these findings, in certain circumstances it is appropriate for the Council to include measures in the program – and for Bonneville to fund implementation of those measures – that enhance fish or wildlife by addressing problems *not* caused by the hydrosystem, as offsite mitigation to compensate for hydropower losses. That is not what was asked of the Council here. Instead the recommendations called for the Council to use the fish and wildlife program to embark on what would be essentially a parallel comprehensive program to assess region-wide the impacts on fish and wildlife from the development and operation of non-hydro renewable energy resource, and then develop and include protection and mitigation measures related to those losses in the program, with expectations that Bonneville would fund the assessment and the mitigation and protection measures. The Council concludes that such recommendations are outside the scope of the fish and wildlife program called for by Congress in Section 4(h) of the Act.

The subject matter underlying these recommendations is appropriate for consideration when the Council develops the regional conservation and generation power plan under Sections 4(d-g). The power plan provisions of the Act direct the Council to assess and compare the total system costs of different new resources that might be added to the region's power system. The estimated system costs of a resource must include whatever environmental costs and benefits can be quantified. And when the Council develops the power plan's conservation and generation resource strategy, it must do so with due consideration for "environmental quality", "compatibility with the existing regional power system", and "protection, mitigation, and enhancement of fish and wildlife and related spawning grounds and habitat." Northwest Power Act, Section 4(e)(2). Under those standards, the Council will need to consider the effects of possible new energy resources (including renewable generating resources) on the environment and on wildlife and fish when developing the Seventh Power Plan. The Council will work with the fish and wildlife agencies and tribes and others to that end, even if not through the specific measures recommended here.

## **(22) Determination as to the power supply’s adequacy, efficiency, economical nature, and reliability, including information on the costs of the fish and wildlife program**

Section 4(h)(5) of the Northwest Power Act provides that the Council’s fish and wildlife program is to consist of measures to protect, mitigate, and enhance fish and wildlife affected by the development, operation and management of the river’s hydroelectric facilities “while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply.” As it has in the past, the Council’s explained its determination in this regard as part of the program itself, although not required to by the Act. 2014 Fish and Wildlife Program, 18-19 and App R, 204-18 (<http://www.nwcouncil.org/media/7148624/2014-12.pdf>).

The “AEERPS” determination in the draft fish and wildlife program drew comments from the environmental and fishing group coalition and from Ed Chaney in his capacity as the Northwest Resource Information Center, Inc. These commenters did not object to the Council’s determination that the region can maintain an adequate, efficient, economical and reliable power supply while implementing the measures in the amended fish and wildlife program. What they objected to is the Council’s consideration of one set of information in making this determination. They objected in particular to the way in which the Council relies on the information reported by Bonneville on its costs of implementing the fish and wildlife program, believing that Bonneville overstates its costs.

As explained in the AEERPS determination itself, one aspect – but just one aspect – of the determination as to whether the Council can approve the program’s measures while assuring the region an economical power supply is to collect information on what costs the fish and wildlife program imposes on the power system. *Id.*, at 215-18. Pursuant to Section 4(h)(10) of the Northwest Power Act, Bonneville is the agency largely responsible for funding the implementation of the fish and wildlife program. Bonneville reports annually on its costs for implementing the program. This is the only source of most of the information on fish and wildlife program costs – any other reporting of the bulk of fish and wildlife program costs (and the Council does not know of any) would be derivative of and based on what Bonneville reports, as the agency actually incurring the costs. So it make sense that the Council uses what Bonneville reports on fish and wildlife program costs as one input into assessing whether the program can be implemented and still assure the region an economical power supply.

What the commenters particularly object to is that Bonneville includes in its costs a “foregone revenue” amount, an amount that represents hydropower sales revenue that is foregone because of dam operations that benefit fish but reduce hydropower generation or shift generation to a time of less value compared to the system if it were operating without such constraints and optimized for power generation and revenue. Because a decision by Bonneville to implement system operations to optimize power generation and revenue (the basis for the foregone

revenue calculation) would violate Bonneville's obligations under the Northwest Power Act and the Endangered Species Act, and because the power system has adapted over time to each incremental reduction in generation and revenue resulting from an increase in operations to benefit fish and wildlife, in the commenters' view it is wrong for Bonneville to include the total amount of foregone generation and revenue as an annual "cost" of the fish and wildlife program. Doing so, the commenters conclude, overstates the costs of the fish and wildlife program. (Bonneville reports a foregone revenue amount of \$150 million in Fiscal Year 2012. The financial effects of operations can fluctuate significantly from year to year depending on runoff conditions and electricity market prices, and so the foregone revenue amount can range significantly higher in certain years. *Id.*, at 215-16.)

Others, most notably Bonneville and its utility customers and customer groups, commented that the reduction in generation and revenue is a real cost to the system and its ratepayers, even if operations to benefit fish and wildlife are required by law. This is not different, in their view, from Bonneville's direct expenditures to benefit fish and wildlife, measures also required under law but which also impose costs, annual costs that are reported by Bonneville. And so it is appropriate to report the total costs of both kinds.

This dispute over foregone revenue is not new to the Council or the region. And it is not hidden in the reported costs. If an entity or person believes in the value of reporting on foregone revenue in the way Bonneville does, and in considering that total amount as part of annual fish and wildlife costs, the number is visible and reported. If an entity or person does not believe the foregone revenue amount represents a real annual cost to the power system, as the commenters do not, the foregone revenue value is separately itemized in the report and can be discounted. No one is misinformed, especially as the issue has been debated in the region for decades.

The Council acknowledged the controversy over how Bonneville reports the costs of the fish and wildlife program in the Council's discussion of the "economical" power supply aspect of its AEERPS determination. But the Council also explained why the controversy is *not* relevant to the Council's determination:

"The Council realizes that how and why Bonneville reports forgone revenue is controversial with some. The controversy is not relevant here, because as noted below the Council concludes that even as the fish and wildlife costs are reported by Bonneville, the region's power supply remains affordable. The Council has not limited the measures in the program based on either the costs of individual measures or on the basis of total program costs." *Id.*, at 216.

The fish and wildlife program contains substantial measures to protect, mitigate and enhance fish and wildlife, based mostly on the recommendations of the fish and wildlife agencies and tribes as expected under the Act. The program

acknowledges that these measures impose significant costs on the region's ratepayers. The program also recognizes that it is expected and appropriate under the Northwest Power Act for the ratepayers to bear the costs of a substantial fish and wildlife program. The Council then considered the question of the affordability of the power system – which includes costs from many sources, not just fish and wildlife – from a number of perspectives, including that of the regional economy and certain sectors of the regional economy in addition to the financial health of the agency that bears the bulk of the costs of implementing the program. The Council concluded that the region's power system remains economical in the broad sense that power rates remain affordable within the context of the region's economy. *Id.*, at 216-18; *see also* at 116-18.

The determination the Council was required to make is not whether Bonneville has used the correct method to report the costs of the fish program, or whether there are other or better ways for Bonneville to account for and report the costs of implementing the fish and wildlife program. Instead, what the Council is required to determine is whether the financial and physical effects of implementing the program to benefit fish and wildlife can be absorbed by Bonneville, the ratepayers and the regional economy so as to maintain an economical – that is, affordable – power supply from a regional perspective. Many factors go into that assessment and determination, not just the projected costs of the fish and wildlife program. Using a fish and wildlife program cost estimate that is *lower* because of the absence of the foregone revenue amount would not alter the Council's determination that the power system remains economical.

The commenters assume that if the Council considered a lower cost estimate for implementing the fish and wildlife program than what Bonneville reports, the Council would include additional fish and wildlife measures in its program, and Bonneville would have to fund those additional fish and wildlife measures. There is nothing in the record to indicate that this is true – that the Council limited the scope and scale of the recommended measures it decided to adopt into the program based on the magnitude of the program's projected costs or the possible costs of any particular measure. The Council developed the program almost wholly out of the measures and objectives recommended by the state and federal fish and wildlife agencies and tribes and an assessment of their expected benefits to fish and wildlife, not based on an assessment of the costs of individual or collective measures.

The commenters particularly called for the removal of the four lower Snake River federal dams as necessary to rebuild salmon runs in the Columbia basin. They imply here that one reason the Council has not agreed to adopt this measure in the program is because of the way the Council has accepted Bonneville's method of reporting of the costs of the fish and wildlife program and does not want to add the significant costs of Snake River dam removal. There are a number of reasons the Council has not included in the program a measure calling for removal of the four lower Snake dams (*see, e.g.*, the discussion in topic #9 above). The Council



did *not* make that decision based on the projected costs of the measure, nor on the basis of the projected total costs of the program without that measure. And the Council certainly did not make a decision not to include a measure calling for the removal of the dams – or make a decision on any other recommended measure – based on the *method* that Bonneville uses to account for and report its costs of implementing the fish and wildlife program.

The NRIC comments also argued that the region’s power supply is actually uneconomical. This is not because of the costs to implement the fish and wildlife program but because of the economic value of the salmon and steelhead and other fish and wildlife harmed by the development and operation of the existing hydroelectric system, costs that should be calculated and added to the total estimate of the costs that the system bears and which, in the commenter’s views, would make the power supply substantially uneconomic compared to elsewhere in the nation. That is a policy position and perspective of the commenter not shared by anyone else in the amendment process. The comment does not change or inform the Council’s responsibilities under Section 4(h) for considering and either incorporating into the program or rejecting the recommendations of the agencies and tribes and others, nor how the Council is to do so while assuring the region retains an adequate, efficient, economical and reliable power supply. In the Power Act Congress assumed, in the face of the system’s adverse effects on fish and wildlife, that the region’s power supply was economical in the context of the region’s overall economy. The obligation Congress put on the Council and its partners is to develop and implement measures to protect, mitigate and enhance the fish and wildlife affected by the hydrosystem while retaining for the region an affordable power supply from that regional economic perspective. That is what the Council has done here.