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

September 12, 2018

MEMORANDUM

TO: **Council members**

FROM: John Harrison
Information Officer

SUBJECT: Draft annual report to Congress for Fiscal Year 2018

PROPOSED ACTION: Approve draft report for 90 days of public comment

SIGNIFICANCE: The Northwest Power Act requires the Council to report annually to Congress and to make the draft report available for 90 days of public comment prior to submission to Congress. The draft report in your packet is for Fiscal Year 2018, which ends at the end of this month.

BUDGETARY/ECONOMIC IMPACTS
None.

BACKGROUND

Staff requests that you approve the draft report for public comment at this meeting, with any additional edits. The comment period would begin Friday, September 14, 2018, and end Friday, December 14, 2018.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

The State of the Columbia River Basin

DRAFT

Fiscal Year 2018
ANNUAL REPORT

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

October 1, 2017 - September 30, 2018

Document 2018-08

Submitted to the

Committee on Energy and Natural Resources
United States Senate

Committee on Energy and Commerce
United States House of Representatives

and

Committee on Natural Resources
United States House of Representatives

851 S.W. Sixth Avenue
Suite 1100
Portland, Oregon 97204
503-222-5161
Toll Free: 800-452-5161
www.nwcouncil.org

The Northwest Power and Conservation Council was established pursuant to the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501) by the states of Idaho, Montana, Oregon, and Washington. The Act authorized the Council to serve as a comprehensive planning agency for energy policy and fish and wildlife policy in the Columbia River Basin and to inform the public about energy and fish and wildlife issues and involve the public in decision-making.

This annual report has been developed pursuant to Section 4(h)(12)(A) of the Northwest Power Act. The Council's bylaws, which include its organizational structure, practices, and procedures, are available to the public at the Council's website as Document 2003-19.

Table of Contents

Energy, Fish, and Wildlife: The Columbia River Basin in Fiscal Year 2018

The state of energy and fish and wildlife policy in the Columbia River Basin in Fiscal Year 2018 was, in a word, turbulent. Change continues to rock the West Coast and Northwest energy markets as the transition continues away from coal-fired power plants to a broader mix of hydropower, wind, and solar, augmented by utility investments in energy efficiency, demand response, new and more efficient natural gas-fired plants, and experiments in energy storage to offset the intermittent output of sun and wind.

Large coal-fired generating plants are scheduled for retirement beginning with Oregon's Boardman and Washington's Centralia 1 plants in 2020 with efficient gas-fired generation being planned or built to take up the slack. And, the continued massive build-up of solar power in California means that electricity sales to California by Northwest utilities are reduced, thereby decreasing their revenues.

In addition, there are also signs that the entire Western electric transmission system is beginning to open. Utilities that have power to sell are accessing markets outside of their respective geographic areas that previously were inaccessible to them. Several electric utilities in the Northwest and other Western states, in seeking ways to reduce costs and increase revenues, have joined an energy imbalance market (EIM) that is coordinated by the California Independent System Operator (CAISO). The EIM is a mechanism through which utilities with less efficient power plants can purchase excess generation from utilities with more efficient power plants. This allows the purchasing utilities to serve their loads with less expensive power, thus decreasing their costs of operation.

This "sharing" of generating resources is proving to be highly successful and has saved participating utilities more than $400 million since November 2014. The success with the EIM has led to discussions aimed at the establishment of the CAISO as the West-wide transmission system operator that would coordinate the buying and selling of electricity among participating utilities on a day-ahead and real time (5 minute ahead) basis. This proposal is, however, quite controversial and would require California to enact legislation that would be acceptable to all participating Western states.

Another evolving issue is the abundance of inexpensive natural gas from hydraulic fracturing – fracking – that has encouraged the construction of new generating plants, which can provide peaking power and also help fill the gaps left by intermittent wind and solar output. California and Oregon are planning for 50-percent renewable power by the end of the next decade. California now has more than 10,000 megawatts of commercial solar power, compared to virtually zero in 2009.

Elliott Mainzer, administrator of the Bonneville Power Administration, told the Northwest Power and Conservation Council in March and again in June 2018 that as the result of waves of inexpensive renewable energy flooding the marketplace the federal power marketing agency's electricity is not priced competitively. He said he instructed his managers agency-wide to look for places to cut costs. While Bonneville's utility customers are locked into long-term power-sales contracts through 2028, he said it's not too early to begin thinking about how to cut costs to make Bonneville's power, primarily hydropower, and power services, attractive to buyers in the future.

Cutting costs to improve the agency's competitiveness is difficult for Bonneville, as the agency carries substantial long-term debt to both the federal Treasury and private bond-holders, and also a number of must-fund priorities including the region's robust energy efficiency programs and the largest program of its type in the nation to mitigate the impacts of hydropower dams on fish and wildlife (the Council's Columbia River Basin Fish and Wildlife Program).

Under the Northwest Power Act of 1980, the federal law that authorized the four Northwest states to form the Council, Bonneville funds the Council's Fish and Wildlife Program. The Program is directed at all fish and wildlife affected by hydropower in the Columbia River Basin.

Near the end of Fiscal Year 2018, Bonneville officials identified potential reductions in the agency's fish and wildlife budget totaling about $30 million from total annual fish and wildlife expenditures of about $300 million ($250.4 million for the Council's Fish and Wildlife Program in Fiscal Year 2017), but the cost reductions were very much a work in progress. Mainzer said he expected Bonneville would receive a lot of advice, assistance, and of course some complaints as decisions are made that lead to a reduced budget by the beginning of the new fiscal year on October 1.

Meanwhile, in 2018 the Council began its once-every-five-years revision of the Fish and Wildlife Program, last revised in 2014. The Council began the revision, by requesting amendment recommendations in a letter to the region. Anyone may submit recommendations, and the Council will address any recommendations it receives, but those of fish and wildlife agencies and Columbia River Basin Indian tribes receive special consideration under the Northwest Power Act. The letter suggested recommendations focus on certain aspects of the Program, which are described elsewhere in this report. However, recommendations on any part of the Program are welcome. The amendment process is expected to be complete in the fall of 2019.

While there is turmoil in the wholesale energy marketplace at present, utilities continue to improve the efficiency of the regional power system. Improving efficiency reduces demand for power and thereby reduces the risks utilities and consumers may face from volatile prices for wholesale power. In Fiscal Year 2018, the Regional Technical Forum, a committee of energy-efficiency experts that advises the Council, reported that in 2016 and 2017, the region exceeded the two-year benchmark for efficiency improvements in the Council's Seventh Northwest Power Plan (2016). We report in this accomplishment in more detail elsewhere in this report. This accomplishment, which saves 404 average megawatts, or enough electricity for 290,000 Northwest homes for a year, not only means consumers pay less for power but also that the emissions from generating that much power won't be released into the atmosphere.

If there is a constant in the current turmoil – the evolving energy marketplace, the competitiveness of Bonneville's power, the future financial health of the agency -- it is the knowledge that the energy market is continually changing and the future power supply, power markets, and wholesale power rates are not only uncertain but are almost certainly not going to be the same as they are today. Renewable power likely will continue to be built largely to satisfy aggressive state standards rather than to meet actual demand growth; distributed generation, notably residential rooftop solar power developed by community aggregators to lessen the cost to homeowners, likely will be

built, reducing demand for power from traditional utility sources; energy efficiency and other non-generating alternatives such as demand response, will reduce demand for energy at the same time new and evolving consumer uses, such as data centers, electric vehicles, and perhaps novel power uses such as cryptocurrency mining, increase it; and all of this could drive up the cost of electricity for consumers – or not, depending on how utilities respond to these challenges.

But consider the obvious benefits that the Northwest region has in this evolving marketplace turbulence – a huge base of carbon-free, inexpensive hydropower that is being "stretched" by aggressive energy efficiency Programs, saving consumers billions of dollars every year compared to the cost of new generating plants; and some of the lowest electricity costs in the country. Even if rates and bills increase, it's likely that Northwest consumers will continue to pay less for electricity than most others elsewhere in the nation. Investments in protecting and enhancing fish and wildlife also will continue, preserving an important heritage of environment quality in the Northwest. These investments are important to Northwest citizens who enjoy the benefits of hydropower and also support protecting our iconic fish and wildlife species.

Along with preserving and enhancing environmental quality for the benefit of fish, wildlife, and Northwest citizens, the Council's planning also has resulted in a regional power system that is efficient, economical, and reliable. Energy efficiency is the hallmark resource in the Northwest Power Act to meet future demand for power. Under the Power Act, which authorized the four Northwest states to form the Council, and through the resulting work of the Council, Bonneville, Northwest utilities and ratepayers over the last 35 years, the region has reduced power demand through efficiency improvements by around 6,600 average megawatts, an amount that has been growing by several hundred average megawatts per year. The savings total is roughly the electricity-use equivalent of five cities the size of Seattle.

These savings directly affect the people of the Northwest by reducing electricity bills. Improving efficiency has other benefits, as well. The cost of acquiring energy efficiency remains steady and low, a plus for utilities, and efficiency provides significant benefits for meeting the region's peak-power needs by reducing overall loads. Efficiency also reduces regional greenhouse gas emissions because it is not a generating resource. Reduced demand for power also reduces the strain on existing transmission lines.

Clearly, the increasing efficiency of the regional power system has multiple economic, environmental, and infrastructure benefits for the Northwest. An added benefit, one that is becoming increasingly clear, is that improved efficiency acts as a hedge against the uncertainty of the region's energy future.

And the future, while bright with the growing supply of zero-emission renewable resources, remains anything but certain.

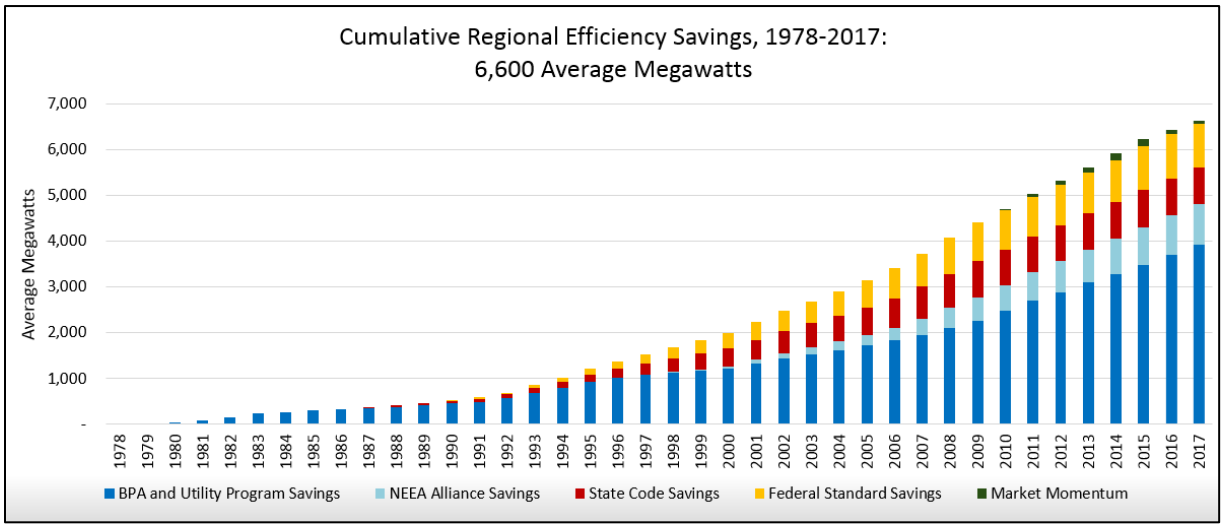
Energy Overview

Regional Power Supply Adequate Through 2020

The Northwest power supply is expected to remain adequate through 2020, but after that some actions will have to be taken to keep the power supply adequate, according to the latest annual analysis by the Council's Power Planning Division. The region's electric utilities are addressing the projected supply shortfall by identifying new power generating and energy efficiency resources in their integrated resource plans.

The Council considers the region's power supply adequate if the likelihood of a shortfall is 5 percent or less. A supply shortfall refers to conditions when utilities are forced to take emergency actions to maintain service and does not necessarily imply actual curtailment. According to a report on the analysis presented to the Council at its June meeting, the anticipated retirement of three coal-fired power plants in the Northwest in 2021 causes the shortfall probability to increase to about 6 percent in 2021 and to about 7 percent in 2022. The probability remains at 7 percent in 2023. These predictions assume the Northwest acquires 2,059 average megawatts of energy efficiency by 2023, called for in the Council's Seventh Northwest Power Plan. Energy efficiency has the effect of dampening demand because power is being used more efficiently.

The conclusion of the analysis is not surprising, and utilities are developing plans for new resources to account for the loss of generation. In aggregate, regional utilities have identified 1,340 megawatts of generation that can be developed by 2021, more than enough to cover the anticipated shortfall. It should be noted that the Council's analysis examines the adequacy of the aggregate regional power supply and recognizes that individual utilities will have varying mixes of generating and efficiency resources and therefore have varying needs for new resources.



Energy Efficiency

Two-year savings beat Seventh Power Plan benchmark

In 2016 and 2017, the Northwest region achieved 404 average megawatts of electric energy efficiency savings, enough power to equal the average annual electricity use of 290,000 homes, the Council reported in August 2018. This achievement exceeds

the first two-year efficiency target set in the Council's Seventh Northwest Power Plan (2016).

The achievement includes savings from efficiency programs run by regional electric utilities, the Bonneville Power Administration, Energy Trust of Oregon and the Northwest Energy Efficiency Alliance. This is the eighth consecutive year that the region met or exceeded the Council's targets in its power plans. Much of the regionwide savings for 2016 and 2017 came from conversion to efficient LED lighting, particularly in commercial buildings.

The survey is conducted by the Regional Technical Forum, an advisory committee to the Council established in 1999 to develop standards to verify and evaluate energy efficiency savings. The annual survey assesses energy efficiency savings and expenditures from the previous year compiled from reports submitted by utilities and energy efficiency organizations. The survey also helps the Council track progress toward energy efficiency goals in the Council's Northwest Power Plan, which provides a least-cost plan for meeting the Northwest's future electricity needs.

While currently on track, these initial results do raise some concern about whether the region will meet the six-year goal in the Seventh Plan of 1,400 average megawatts by 2021. There is concern because the Seventh Plan milestones increase over the next four years, but projections for 2018 and 2019 show that program budgets and savings are expected to be relatively flat. Additionally, the Bonneville Power Administration, the region's largest electricity provider, plans to reduce its spending on energy efficiency by approximately 10 percent in 2020 and 2021 as part of its agency-wide cost-cutting efforts to maintain its financial competitiveness.

However, there is significant untapped cost-effective potential in several electricity end-uses, specifically residential and commercial heating, ventilation, and air conditioning equipment and residential water heating. In order to meet the Council's 2021 regional energy efficiency goal, energy efficiency programs will need to capture savings from these markets.

Energy Efficiency Has Cut Regional Power Use By 25 Percent Since 1990

Since the Council published its first Northwest Power Plan in 1983, energy efficiency, also known as energy conservation, has been a primary resource to meet the electricity needs of the Northwest. In those 35 years, about 6,600 average megawatts of energy efficiency have been accomplished, reducing demand for power, saving consumers billions of dollars per year compared to the cost of building generating plants to produce that much power. Acquiring efficiency also eliminates the emissions that would have come with new generating plants. Six thousand average megawatts expressed as power consumption would be roughly equivalent to the average annual power demand of five cities the size of Seattle.

Now a draft analysis by the energy efficiency team in the Council's Power Planning Division demonstrates the economic impacts of that energy efficiency, concluding that overall per-capita energy use has decreased by about 25 percent in the region since 1990. According to the analysis, electricity demand in 2015 would have been about 13,600 average megawatts greater without the energy efficiency improvements if the region had the same energy-use intensities as in 1990. In very rough terms, about 42 percent of the difference (about 5,700 average megawatts) can

be attributed to improvements in energy efficiency, and about 58 percent is due to the impact of ongoing changes in the regional economic mix and efficiency improvements occurring independent of utility programs, building codes, and federal energy standards.

The savings accumulated through programs run by the Bonneville Power Administration and electric utilities, public and private, and through consumer product market-transformation initiatives of the Northwest Energy Efficiency Alliance, state building codes, and improved federal energy standards for products and equipment. According to the analysis, in 2015, as a result of the efficiency improvements, the Northwest produced almost twice the economic output from a megawatt hour of electricity than it did in 1990.

Expanding energy efficiency programs to hard-to-reach markets

One of the goals of the Council's Seventh Northwest Power Plan (2016) was to ensure that all cost-effective energy efficiency measures are acquired and identify ways to improve participation from underserved populations, such as rural, low-mid income ratepayers, and small businesses. The Council, working with the Bonneville Power Administration, Energy Trust of Oregon, several investor-owned utilities, and several public utilities, completed an analysis of prospective underserved markets in 2018.

The analysis concludes that in general, the region's utilities are doing a good job of reaching a wide variety of customer groups. Programs with specific targets groups, such as low-income households or manufactured homes, for example, are performing well as long as the programs continue operating. Multifamily dwelling units and small businesses are somewhat underserved, according to the data.

The study confirms the effectiveness of targeted programming and recommends expanding programs for multifamily dwellings and renters. The study also demonstrates that the data on demographic and service territory populations are readily accessible and can be used, along with program participant data, to understand and monitor how well programs are performing.

Renewable energy developments advance in region

Since 2005, when Montana, followed by Oregon and Washington, enacted renewable portfolio standards (RPS) to encourage renewable resource development, about 8,500 megawatts of wind and about 540 megawatts of solar power have been added to the grid. One megawatt of wind in the Pacific Northwest produces enough electricity for about 280 homes each year.

The RPS requirements, along with federal tax incentives, helped spur the growth, slowing down after 2012 as utilities began to meet their targets. Uncertainty over whether Congress would renew the federal tax incentives and California's stricter RPS rules, making it harder for out-of-state renewable providers to comply, also discouraged development. About a third of Northwest wind generation goes to California utilities.

Today, renewable development is again on the rise, thanks to a number of changes: Oregon adopted a more aggressive renewable portfolio standard in 2016; corporations like Apple and Microsoft and other large customers are developing or procuring renewable energy on their own; and perhaps most significantly, the cost of wind and solar energy continues to go down. Utilities in the region are contemplating developing more than 3,000 megawatts of new or re-powered generating resources.

Renewable energy costs have fallen so substantially that a new renewable energy project could be constructed to deliver energy at a lower cost than an existing gas-fired plant, according to the Council's Power Planning Division.

Transmission is still a major challenge. Right now, access to transmission is extremely limited, and yet new resources are often required to have long-term firm transmission rights. This can ultimately limit the amount of new renewable development, even as a source of low-cost energy.

Power-intensive digital currency mining comes to Northwest

The large electricity demand of computer-intensive operations that discover and verify cryptocurrencies like Bitcoin is causing a variety of responses among electric utilities in the Northwest, from concern to excitement. The Northwest, with its low-cost, environmentally clean electricity, easy access to telecommunication networks, and temperate climate that moderates the cost of cooling hundreds or thousands of computers, has attracted digital currency operations for the same reasons that Facebook, Apple, and others have located large data centers here.

Although the full magnitude of the impact of mining operations on the power grid is not known, it is well known that a single mining operation could put multiple megawatts of load on a utility system (a megawatt is 1 million watts, enough to power the average demand of 718 Northwest homes). A number of Northwest utilities including, for example, the Chelan County Public Utility District in Wenatchee, Washington, and the City of Cheney, Washington, municipal utility, have been approached by digital currency mining operators and have adopted different postures toward the requests. Chelan temporarily imposed a moratorium on new service to digital miners after having already served some digital mining load and as requests for service multiplied. Cheney required the companies to pay a fee for connection to ensure that other ratepayers aren't left paying for new infrastructure to serve the load if a digital mining operation closes.

It's hard to know now whether digital currency mining is a flash in the pan or a golden opportunity for currency mining businesses. The present Northwest electricity load of digital currency mining operations is estimated between 20 and 30 average megawatts – significant, but not huge. Based on what is known now about future potential load from currency mining operations, the region should be able to handle the influx of new demand.

Cannabis growers adopt energy-saving technologies

Cannabis growers consumed 112 average megawatts of electricity in Washington and Oregon in 2017, an amount equal to the average annual power demand of 80,400 Northwest homes, according to a survey of cannabis growers conducted by the Council.

The survey of licensed growers in the two states identified more than 29 million square feet of growing space dedicated to cannabis for medical and recreational purposes. Cannabis is legal in both states. The growth has been phenomenal. In just the last two to three years in Washington alone, the acreage dedicated to cannabis has grown from about 2 million square feet to about 12 million. This has led to

overproduction compared to demand, lower prices for the finished product, and a premium on cutting production costs.

One place where savings are possible is in energy use. While the electricity demand calculated from the survey is significant, it could have been much higher if many growers had not installed energy-saving technologies including efficient lights, pumps, motors, and heating/air-conditioning/ventilation equipment. Without those technologies, demand would have been more than three times as great, the Council estimated.

Based on the survey results, in which growers shared their production techniques, the Council found that replacing standard lights with LED bulbs would decrease power consumption by half. The Council also calculated that the energy-savings potential of cannabis operations was 826,814 kilowatt-hours for the facilities included in the survey. This represents an overall savings of 18.3 percent of total cannabis power consumption. About a third of the survey participants said they would like to work with their electric utilities to increase the energy efficiency of their operations.

Council studies potential demand from electrification of transportation

As much as 28 percent of all the energy consumed in the United States is for transportation, and over 90 percent of that is petroleum based -- fuels such as gasoline and diesel. As a result, total greenhouse gas emissions from transportation in the country has reached parity with emissions associated with electricity generation.

The electrification of transportation – such as moving to plug-in electric vehicles – can play a role in helping to reduce both the overall transportation energy consumption and greenhouse gas emissions. For instance, an electric vehicle can be as much as three to four times more efficient than a vehicle power by gasoline. And, an electric vehicle has no tailpipe emissions. Overall, less energy is used, even if the electricity to charge the batteries was generated with natural gas. Though sales of electric vehicles are relatively small right now – in 2016 there were 9,200 light-duty electric vehicles sold in the Northwest – sales are steadily growing. Therefore, there could be growing demand for electricity to power these vehicles in the future.

Accordingly, Council staff has been working to implement a transportation module into its long-term electricity demand forecast. The range that electric vehicles can cover on a single battery charge is increasing, and as charging infrastructure is added along travel corridors, electric vehicles could rapidly become popular. The Council estimated long-term demand from electric vehicles in the Seventh Northwest Power Plan, completed in 2016. The forecast at that time was that the average load from partially and completely electric vehicles in the Northwest would increase from about 10 average megawatts in 2014 to between 160 and 650 average megawatts by 2035. The transportation module now under development will help the Council update that forecast in the next version of the power plan, scheduled for completion in 2020.

How ‘real’ is solar power in the Northwest?

Pacific Northwest wind energy development, fueled in part by aggressive state renewable portfolio standards, has flourished for more than a decade. Wind energy now represents about 9,400 megawatts of electricity generating capacity, or about 15

percent of the region's total capacity, which is the maximum amount that can be generated in the region, currently about 63,500 megawatts. The cost of solar energy has dropped dramatically in recent years. The lower costs of photovoltaic solar panels, combined with state and federal tax credits and other financial incentives, have made large utility-scale solar projects more competitive and rooftop systems more affordable.

Over the past five years, about 500 megawatts of solar capacity has been built in the Northwest, with 330 megawatts from utility-scale solar systems. Among the four Northwest states, Idaho and Oregon are the leaders in utility-scale solar. While all the Northwest states are seeing an increase in residential and commercial rooftop systems, Montana and Washington have been slower in developing utility-scale solar.

The amount of solar power in development is significant. Oregon has enacted an aggressive renewable portfolio standard that requires half of investor-owned utilities' retail sales be renewable resources by 2040. One Oregon utility has 465 megawatts of power purchase agreements (PPAs) with solar developers and an additional 490 megawatts of proposed PPAs.

However, while the amount of utility-scale solar being proposed by developers in the Northwest is impressive, especially in Oregon, it's unclear how much will actually be constructed. Many issues need to be resolved to ensure that solar projects will be built economically and electricity ratepayers are protected from unnecessary costs.

Council supports Northwest for DOE study of pumped storage

In 2017, Congress directed the United States Department of Energy (DOE) to release a request for information on the effects and contributions of hydropower and pumped storage to grid resiliency and reliability. In a pumped storage power plant, water is pumped from a reservoir at the base of a hill to a reservoir at the top overnight when power costs and demand are low. Then, during the day when power costs and demand are higher, water is released from the upper reservoir through the same pipes to generate power in turbines at the lower reservoir. Often the turbine pumps that send water to the upper reservoir are reversed to generate power when the water is released.

As part of this directive, Congress requested that DOE fund a technical and economic analysis of pumped storage at two prospective sites near renewable resources that produce variable energy, like wind and solar generation. Several sites in the Northwest are being seriously considered for pumped-storage development.

The Council prepared a letter of support for developers to use when submitting applications to DOE's Notice of Opportunity for Technical Assistance(NOTA).

Extensive analysis has been done on valuing the power system benefits of pumped-storage hydropower (and other storage technologies), but overcoming the high initial capital investment cost has proven too great a barrier when the return on investment remains uncertain. Understanding the potential revenue streams from a specific pumped-storage hydropower project within the region would go a long way toward making pumped-storage a competitive option for future consideration and development.

Currently, the largest pumped storage project in the region is located at Grand Coulee Dam. Pumps that move water from Lake Roosevelt behind the dam up to Banks Lake, which supplies water to the Columbia Basin Project, can be reversed to generate power from water released from Banks Lake.

Council explores value of energy storage to the regional power system

In a draft white paper issued in the fall of 2017, the Council, in collaboration with a diverse group of stakeholders and subject matter experts, explored current and future expected regional energy-storage policy and development activity.

Energy storage using various types of large batteries and pumped hydropower storage is a topic of keen interest for consumers, utilities, regulators, and decision-makers in the Northwest and across the country. Recent generating plant retirements, regulatory changes, technology innovations, and strong year-over-year growth of variable-output resource generation, like wind and solar, have led policy-makers and system planners to investigate whether and how energy storage may be deployed to increase power system reliability and lower consumers' costs.

According to the paper, one type of energy storage, molten salt thermal storage, accounts for most of the approximately 1,000 megawatts of capacity and 5,400 average megawatts of energy added to the nation's energy-storage system in recent years. For comparison purposes, the sustained two-hour peaking capability of the Federal Columbia River Power System is 15 to 18 times larger. Across the nation, pumped hydropower storage accounted for nearly 96 percent of the total installed energy storage capacity in 2013 and 93 percent in 2016.

While nationwide the rate of newly commissioned projects increased more than 300 percent in 2015 compared to previous years, only about 200 megawatts of new storage was added to the nation's power supply. However, the cost of storage devices is falling, and this should spur more interest in the technology, according to the paper. Currently there are 17 operating energy storage projects in the Northwest totaling about 324 megawatts of capacity.

Mapping the Northwest's power supply

The Council developed an online mapping tool to help people learn about electric power resources and trends.

The hydropower system continues to be the foundation of the Northwest's power supply, providing roughly 50 percent of the region's generation. Energy efficiency supplies 20 percent and is the region's second largest resource. Because of this, the region's annual carbon emissions from the power system are lower compared to the rest of the country. As lower-cost natural gas has edged out coal as the preferred fuel for power generation, emissions have trended down in recent years.

Renewable resource development (renewables are now 10 percent of the region's power supply) has slowed since utilities met their near-term, state-imposed renewable standard obligations and the future of federal tax incentives for renewables was unclear.

Still, interest in solar photovoltaic (PV) development is strong for utilities wanting to diversify their resource mix. Costs for solar PV have dropped, making it competitive with wind and other resources, and areas in southern Idaho and eastern Oregon are favorable locations for solar. Battery energy storage pilot projects are also on the horizon, which will help to address the intermittency problems with renewables.

The mapping tool gives users access to the latest information about existing and planned resources and the ability to filter projects by resource, size, and initial operating

year. It can also show how the power supply has changed over time; what resources have been developed and where. The Council maintains a robust project database used by regional and national stakeholders, and the enhanced online map will help make the data even more useful to more people.

Fish and Wildlife Overview

Council begins amendment of 2014 Fish and Wildlife Program

In May 2018 the Council began a year-and-a-half long process to revise its Columbia River Basin Fish and Wildlife Program, which directs more than $250 million a year to address the impacts of hydropower dams on fish and wildlife. The Council began the process with a letter requesting recommendations to amend the Program. Recommendations initially were due in mid-September, but in August the Council agreed to multiple requests to extend the deadline for 90 days into December.

Under the Northwest Power Act of 1980, the federal law that authorized the four Northwest states to create the Council, the Fish and Wildlife Program is intended to "protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat, on the Columbia River and its tributaries …affected by the development, operation, and management of [any hydroelectric project] while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply." The Act also directs the Council to ensure widespread public involvement in the formulation of regional power and fish and wildlife policies.

The Power Act requires the Council to review the Program for revision at least every five years. The last revision was in 2014. Because the Program contains recommendations for operating the mainstem dams that take water away from hydropower generation, such as spill in the spring to help juvenile salmon and steelhead migrate to the ocean, the Program amendment is followed immediately by a revision of the Council's Northwest Power Plan. Among other things, the Power Plan replaces the lost hydropower, typically with new energy efficiency measures.

As a planning, policy-making, and reviewing body, the Council develops the Program and then monitors its implementation by the Bonneville Power Administration, the U.S. Army Corps of Engineers, the Bureau of Reclamation and the Federal Energy Regulatory Commission (FERC) and its licensees. Those federal agencies operate federal dams and, in the case of FERC, license non-federal dams in the Columbia River Basin. Most projects that implement the Program are carried out by fish and wildlife agencies and Indian tribes.

Major revisions of the Program begin with the Council requesting recommendations from the region's fish and wildlife agencies and tribes, as required by the Power Act. Once the period for recommendations closes, the Council invites public comments on the recommendations, then produces a draft Program for comment including public hearings in the four Northwest states. After closing the comment period and following a review and deliberation period, the Council adopts the revised Program.

In its letter requesting recommendations, the Council posed questions to guide recommendations including, for example, whether the Council should adopt a five-year action plan for the Program, whether strategies and actions in the Program should be changed to respond to potential threats from non-native species and climate change,

and whether there are areas of the Program that are no longer effective and should be revised or eliminated.

Bonneville cost cuts will hit fish and wildlife budget

In a sobering message at a time when inexpensive renewable resources are flooding the wholesale power market and driving down prices, executives of the Bonneville Power Administration told the Council in March and June of 2018 that all agency costs will be examined and reductions made in order to keep its power and power services competitive in the future.

Bonneville Administrator Elliott Mainzer said the cost reductions will include cuts in the Council's Columbia River Basin Fish and Wildlife Program, which directs more than $250 million a year of Bonneville revenues from power sales to address the impacts of hydropower dams. Bonneville sells the output of federal hydropower dams in the Columbia River Basin, the region's largest source of electricity. The fish and wildlife Program is the largest of its kind in the nation. With the added cost of the Lower Snake River Compensation Program, a series of fish hatcheries that mitigates the impacts of the four federal dams on the lower Snake River, Bonneville will be cutting a fish and wildlife budget that currently totals about $300 million annually beginning in Fiscal Year 2019, which begins October 1, 2018.

Potential reductions total about $30 million, but the cost reductions are very much a work in progress. Mainzer said that in developing Bonneville's 2018-2023 Strategic Plan, which the agency unveiled in January, agency officials asked themselves where Bonneville should be competitively in the next 10-years in order to sustain the provision of carbon-free, reliable electricity and continue to invest in important initiatives like transmission grid modernization, enabling demand response, and helping develop the emerging West Coast energy imbalance market to deal with the variable output of wind and solar power plants. He said Bonneville also is committed to "this incredibly important, and valuable, and morally obligated, work on fish and wildlife." See a video clip of Mainzer's March remarks here.

After reviewing Bonneville's current financial situation in light of its many obligations and the realities of the wholesale energy marketplace, where long-term low prices could pull some utility customers away from Bonneville, Mainzer said "we concluded that our trajectory of rate increases and programmatic cost increases wasn't sustainable, and we needed to start bending the cost curve."

Montana steps up fight against invasive mussels

In the war against two species of invasive, freshwater mussels, which can reproduce rapidly and clog water systems and submerged equipment with blankets of hard, calciferous shells, Montana is on the front line.

Montana's war on mussels has been aggressive in part because it is the only Northwest state where mussels, or more precisely their larvae, have been detected so far. The Council's Columbia River Basin Fish and Wildlife Program encourages a regional approach to establishing a defensive perimeter to keep invasive mussels out of Columbia River Basin waters. The mussel larvae discovered in Montana were in the Missouri River Basin, not in the Columbia Basin.

Lakes, rivers, and reservoirs in many parts of the United States, particularly the Midwest and Southwest, are infested with zebra and quagga mussels. The mussels and their larvae, which can live out of water for up to 30 days, adhere to watercraft and submerged structures. On watercraft, they can easily be transferred by trailer or vehicle from an infested lake or river.

Until October of 2016, the regional war on mussels was a matter of concern but not emergency. But then larvae from quagga and zebra mussels were confirmed in water samples from the Tiber Reservoir, located on a Missouri River tributary in eastern Montana, which is now considered to be 'positive' for invasive mussels. Ongoing sampling found more suspect samples in Montana water bodies east of the Continental Divide including the Canyon Ferry Reservoir, Missouri River, and Milk River. It is important to note that no adult mussels have been detected to date in either reservoir.

Since then the Montana Department of Fish, Wildlife and Parks, which leads the Aquatic Invasive Species Program in the state, has stepped up its inspections of watercraft and monitoring for invasive species in lakes and rivers, from fewer than 100 water bodies to more than 240 annually. The state also vastly increased the number of inspection stations.

Montana inspected more than 86,000 boats in 2017, up from 37,530 the previous year. The inspections have been effective at catching and cleaning infected watercraft. In 2017, mussels were found on 17 vessels, up from seven in 2016, and 80 citations and 300 warnings were given to watercraft owners.

It has been estimated that the combined economic impact of a Northwest-wide infestation (including British Columbia) could be nearly $600 million per year.

Fishery managers work to slow Northern Pike invasion of Lake Roosevelt

Northern Pike, an aggressive predator on other fish and a prohibited species in Washington, have taken hold in Lake Roosevelt, the Columbia River behind Grand Coulee Dam, where they may have been introduced illegally or drifted downriver from infested areas upstream. A collaborative effort to eliminate them using gillnets and a reward fishery is having some success, but all involved hope it's not too little too late. The evidence is not hopeful.

The Spokane and Colville tribes, which are using gillnets, electrofishing, and a reward fishery to remove pike from the reservoir, were seeing an increase of fish from different age classes in 2018, the third year of the removal effort. The fish are classified as an illegal species in Washington, and there is no limit on many can be caught. It is illegal to return a live fish to the water.

Salmon and steelhead recovery efforts downstream of Chief Joseph Dam, which has blocked salmon passage since 1955, would be jeopardized if the predator pike migrated into that area, where ocean-going species, including threatened and endangered salmon and steelhead, are present. Given the speed with which pike reproduce and spread, quick action is imperative.

The Kalispel Tribe has successfully reduced the Northern Pike population in the Pend Oreille River, a Columbia tributary in Northwestern Washington, using the same techniques that are being used in Lake Roosevelt – gill nets, electrofishing, and a bounty fishery. That success gives some encouragement to the work in Lake Roosevelt, but it is a much larger water body than the Pend Oreille River.

Funding for the pike suppression effort comes from variety of sources, including the Bonneville Power Administration, the tribes, Washington state, the Bureau of Indian Affairs, and two of the three public utility districts that own and operate five dams on the Columbia in Central Washington.

Sea lions hit Columbia steelhead hard in 2017, Corps reports

Sea lions took a big bite out of the winter and summer steelhead runs at Bonneville Dam in 2017, according to a report by the U.S. Army Corps of Engineers. The final report on sea lion predation on fish – salmon, steelhead, sturgeon, and lamprey – at the dam in 2017 is available here.

"The low run size and high percentage of steelhead consumed by pinnipeds in 2017 is alarming, and warrants particular attention from fish and wildlife managers," the report warns.

An estimated 322 summer and winter steelhead were consumed (the Corps did not break down the number by species), which equates to 9 percent of the run, nearly twice the impact in 2016. The run totaled 3,241 fish during the study period, which ran from January 1 through June 2, 2017.

The Corps documented a total of 92 individual California sea lions, 63 Steller sea lions, and one harbor seal in the tailrace areas of Bonneville Dam during the study period. In all, an estimated 5,384 adult salmonids (salmon and steelhead) were consumed by California and Steller sea lions in 2017, which equates to 4.7 percent of the salmonids that arrived at the dam during the study period. That's less than the 9,525 consumed in 2016 and 10,859 in 2015. But it is a significant portion of the overall run, which was smaller in 2017 than in previous years.

Oregon and Washington fish and wildlife personnel branded 92 California sea lions for potential removal if they continue to cause problems for fish, and also branded 12 of the larger Steller sea lions, which also were notably voracious.

Meanwhile, the Council supported bipartisan federal legislation to build upon existing laws to manage the sea lion population. The legislation was adopted in June by the full House of Representatives, and in August by the Senate Committee on Commerce, Science and Transportation. The legislation would give fishery managers more flexibility to address the small number of the most aggressive predatory sea lions in the Columbia River system.

BPA, Idaho reach agreement on Albeni Falls wildlife settlement

The state of Idaho and the Bonneville Power Administration have agreed on a settlement for the impacts of Albeni Falls Dam on wildlife around Lake Pend Oreille. The Council played an important role in bringing the parties together and helping negotiate the agreement.

Albeni Falls Dam, on the Pend Oreille River at the outlet of the lake, was built by the U.S. Army Corps of Engineers between 1951 and 1955. The dam regulates the levels of Lake Pend Oreille and also river flows downstream. Bonneville has an obligation in federal law to mitigate the fish and wildlife impacts of dams in the Columbia River Basin.

The agreement provides $23.89 million to Idaho to compensate for wildlife habitat that was affected due to impacts of the dam. The agreement mitigates for

construction of the dam and also for inundating the shoreline of Lake Pend Oreille, as well as for operational losses, which are losses due to the fluctuations of the water level as the result of the dam's operations. In addition, the agreement promises to provide ecosystem benefits for fish.

Under the agreement, Bonneville would provide $1.14 million for Idaho to operate and maintain 4,224 acres of mitigation properties previously acquired by Bonneville and managed by the Idaho Department of Fish and Game. This acreage addresses habitat losses caused by construction of the dam and inundation of shoreline around the lake. Bonneville would also provide funds for Idaho to restore and maintain 1,378 acres of riparian and floodplain habitat affected by dam operations, and also administrative funding for the 10-year implementation period of the agreement.

Effectiveness of the Fish and Wildlife Program

Section 4(h)(12)(A) of the Northwest Power Act directs the Council to submit an annual report to Congress that includes a description of *"the actions taken and to be taken by the Council under this* [Fish and Wildlife Program] *chapter, including this subsection, the effectiveness of the fish and wildlife Program, and potential revisions or modifications to the Program to be included in the plan when adopted."* Elsewhere in this report we describe the actions taken in Fiscal Year 2018 by the Council regarding fish and wildlife, and we discuss the beginning of the next revision of the Fish and Wildlife Program, which began in this fiscal year.

This section of the report deals with the effectiveness of the fish and wildlife Program. The Program describes strategies that provide structure to actions that protect, mitigate, and enhance fish and wildlife affected by hydropower dams in the Columbia River Basin. The Council solicits projects to implement the Program, vets them through the Independent Scientific Review Panel (ISRP), then recommends projects to the Bonneville Power Administration for funding. Bonneville contracts with the sponsors to implement the projects.

The Program's projects include land acquisitions to protect and preserve healthy habitats for fish and wildlife; restoration efforts to improve spawning and rearing habitats that have been damaged or blocked; research to learn how best to rebuild naturally spawning fish populations; and improvements to passage systems to assist fish movement through and around the dams.

A broad range of entities propose projects, including federal and state agencies, tribal governments, watershed groups, universities, private landowners, and environmental organizations. These groups also participate in the project review and selection process. To ensure accountability, all projects are required by law to undergo review by an independent scientific panel (the Independent Scientific Review Panel). The Council also uses a second, related panel of scientists to provide advice on key scientific issues, as well as an independent panel of economists to provide guidance on questions of cost-effectiveness.

While it is difficult if not impossible to attribute a single project or group of projects to the success or failure of particular populations of fish and wildlife, we do believe that fish and wildlife will do well and populations will increase as the result of the different kinds of efforts that are funded through the Program, including improving spawning and rearing habitat for fish, improving fish passage at dams, and carefully

releasing hatchery-bred fish into the natural environment in an attempt to rebuild weak or failing populations. We can say that, generally, the number of salmon and steelhead counted at Bonneville Dam, the first dam anadromous fish encounter when they return from the ocean to spawn, has increased over the past decade. We can show, for example, how many miles of riparian habitat have been improved for fish spawning, and how many water diversions have been screened to deflect juvenile fish migrating to the ocean, keeping them out of irrigation diversions and thus improving their chances of survival.

We know that degraded spawning and rearing habitat, high water temperatures, and the lack of clean spawning gravel will reduce the ability of fish to reproduce. These are what are called limiting factors. We believe that improving these poor conditions – eliminating or at least improving the limiting factors – should lead to improvements in fish health, reproduction, and fecundity. The Council is working on developing metrics that would measure improvements in limiting factors as a means of measuring fish response to habitat-improvement projects that implement the Program. This may be the most reasonable and accurate way to gauge the effectiveness of the Program, at least as it regards fish response to habitat improvements. That is a work in progress.

We also know that fish face numerous threats as they travel to and from the ocean. While we can reduce some of them by, for example, working to reduce predation by birds, marine mammals, and other fish, releasing fish from hatcheries to boost populations, and improving habitat, we can't alter other impacts, such as poor feeding ocean conditions in the ocean, harvest, and the impacts of ocean predators like orcas.

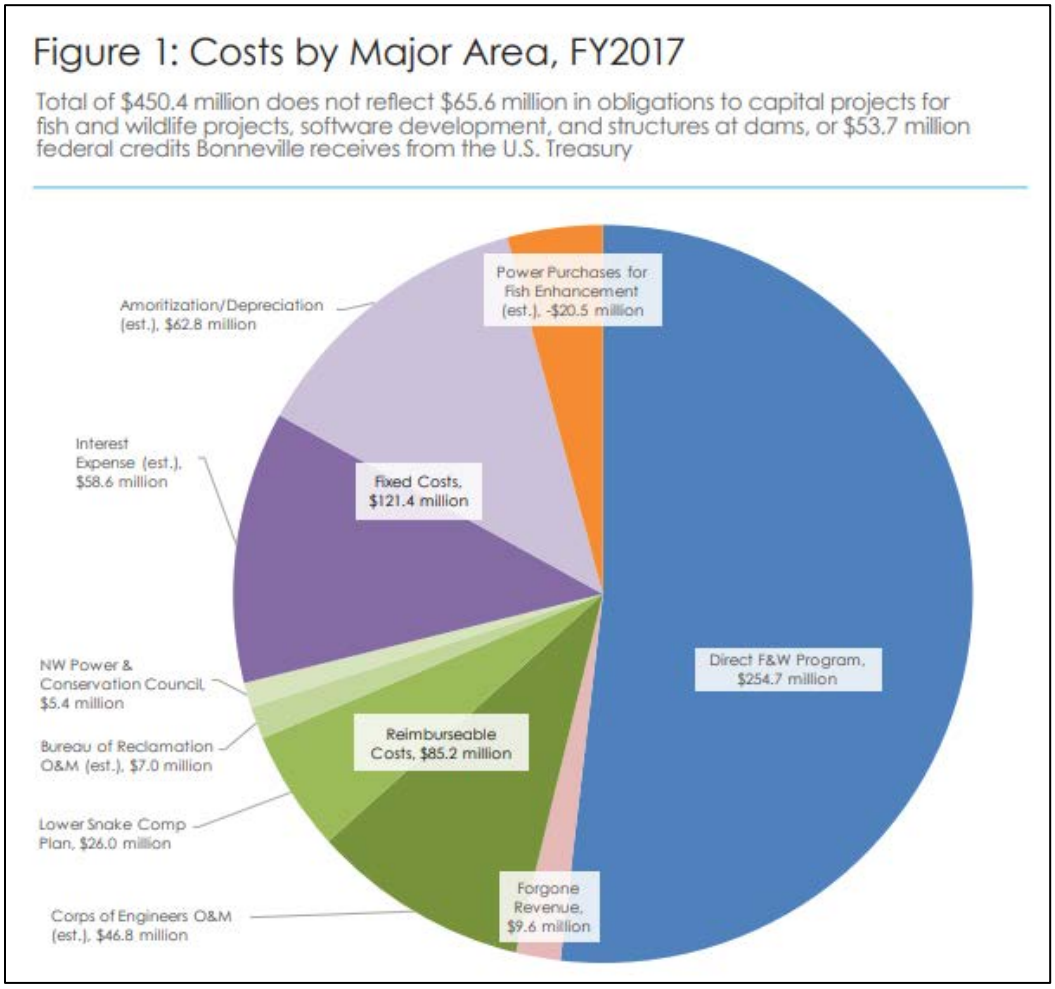
For now, then, the best way we can demonstrate effectiveness and progress is to compile project data collected through monitoring and evaluation and look for trends. The Council tracks progress of fish and wildlife efforts in the Columbia River Basin using three high-level indicators. Posed as questions, they are:

1. Are Columbia River Basin fish species abundant, diverse, productive, spatially distributed, and sustainable?
2. Are operations of the mainstem Columbia and Snake River hydropower dams meeting the fish-passage survival objectives of the Program?
3. What is being accomplished by projects that implement the Council's Fish and Wildlife Program?

The Council's high-level indicators are posted on the Council's website at www.nwcouncil.org/ext/hli.

The following charts illustrate investments and several key measurements of work accomplished through the Program. To assess the effectiveness of the Program it is important to understand what is being accomplished -- for example, acres acquired as habitat, stream miles protected, diversion screens installed, and barriers removed so fish can access streams for spawning. It also is important to understand the status of species affected by the Program. One way to do that is see how many adult fish of which species return from the ocean to spawn each year. It also is important to understand how much money is spent annually to implement the Program and how it is being spent, and to adjust spending to spend more in one area than others if necessary. For example, in the 1980s the Program directed the majority of funding to improving fish passage at dams, and as those projects were completed the Program shifted its major focus to improving spawning and rearing habitat.

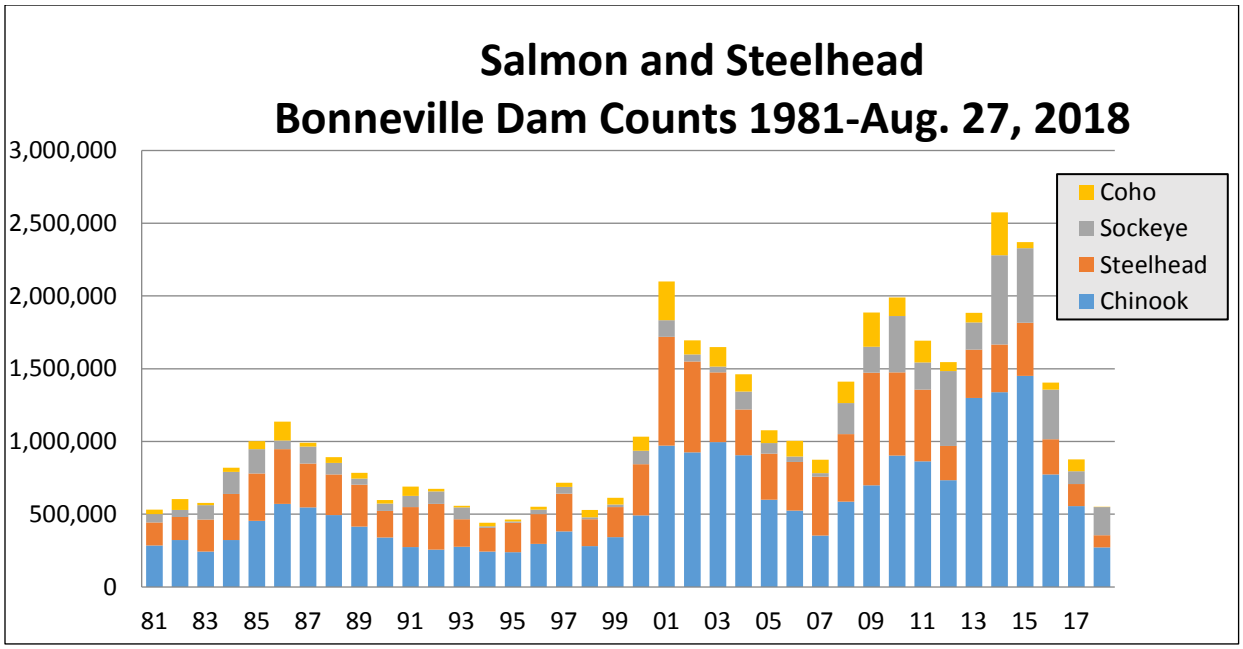
The first chart below shows Bonneville's fish and wildlife costs in Fiscal Year 2017, including for the Council's Program, the most recent year for which figures are available.

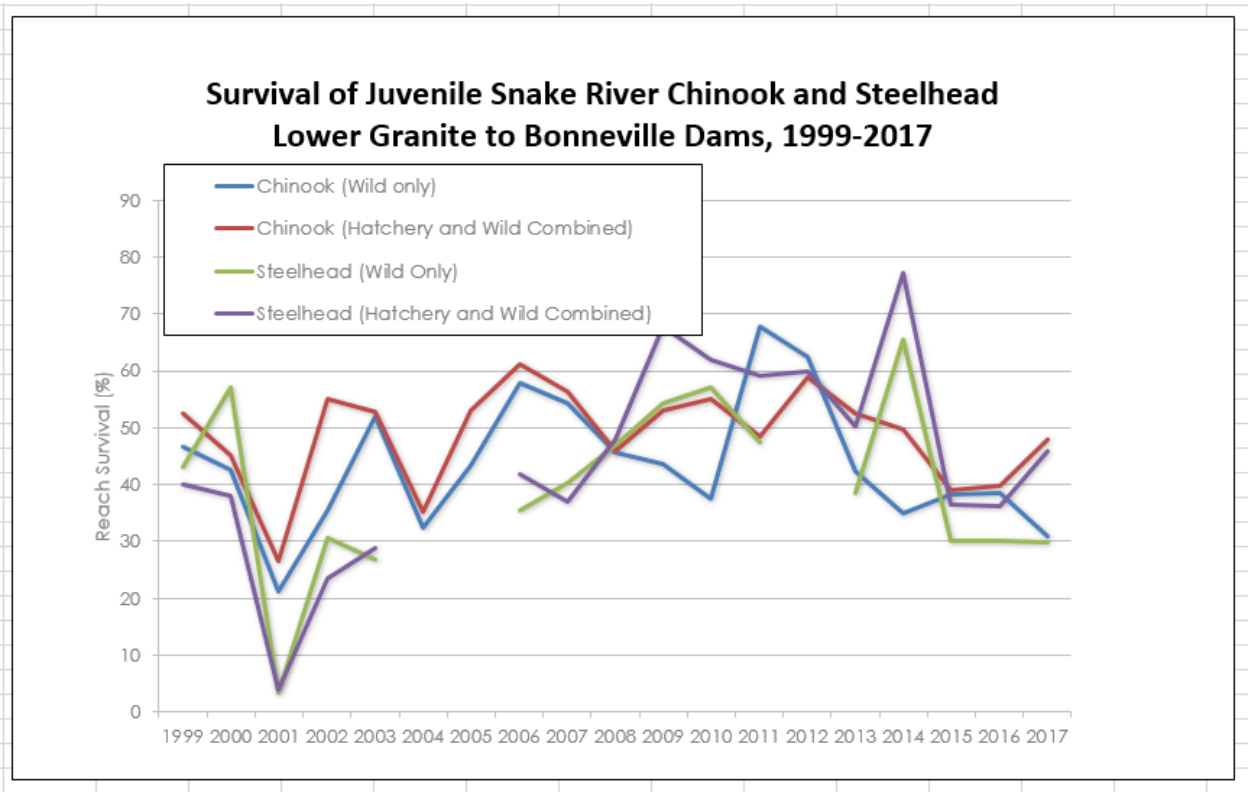


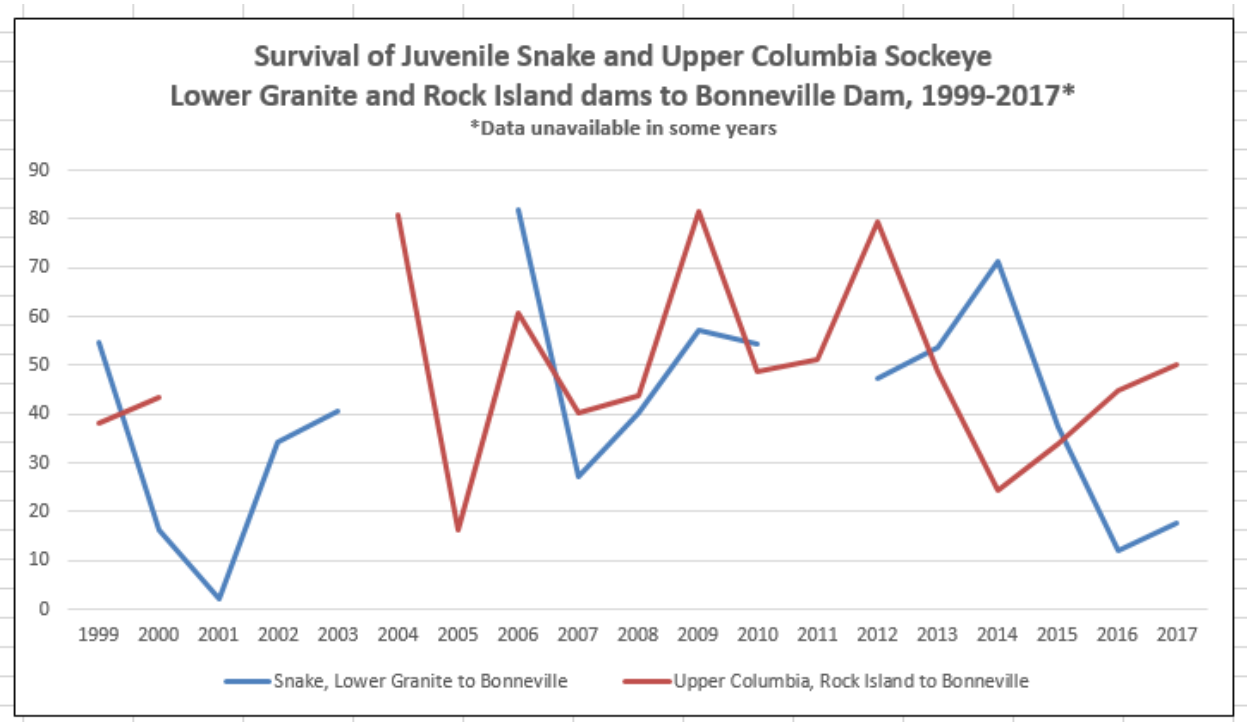
The negative $20.5 million for power purchases in 2017 is an anomaly. Power purchases and forgone revenue have a wide variance from year to year due to differences in stream flows, power prices, and operations. The 2017 Fiscal Year exhibited an unusual and unintuitive result for both replacement power purchases and forgone revenues. According to Bonneville, one of the reasons these "cost of fish operations" were lower in 2017 can be attributed to the modeled reservoir operations in the previous year as well as an unusual runoff. Bonneville's calculations show that operations for fish pushed some generation into months with higher power prices, and the value of that generation more than offset the fact that Bonneville lost approximately 210 average megawatts of generation due to operations for fish in 2017.

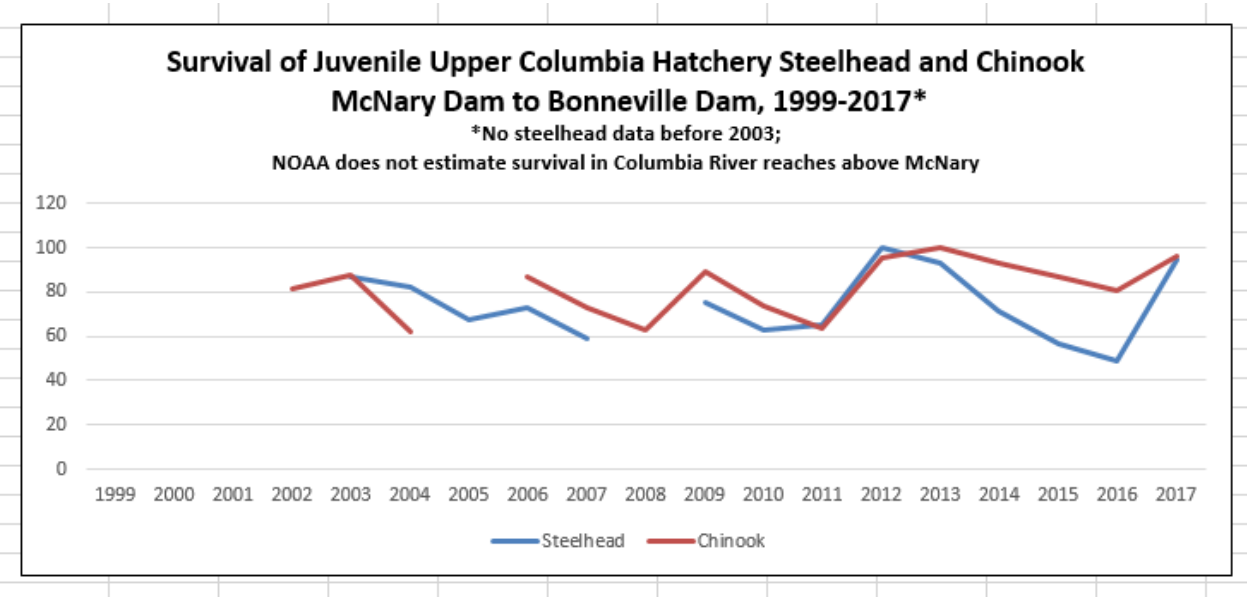
Bonneville Dam counts

Source: Fish Passage Center (www.fpc.org)

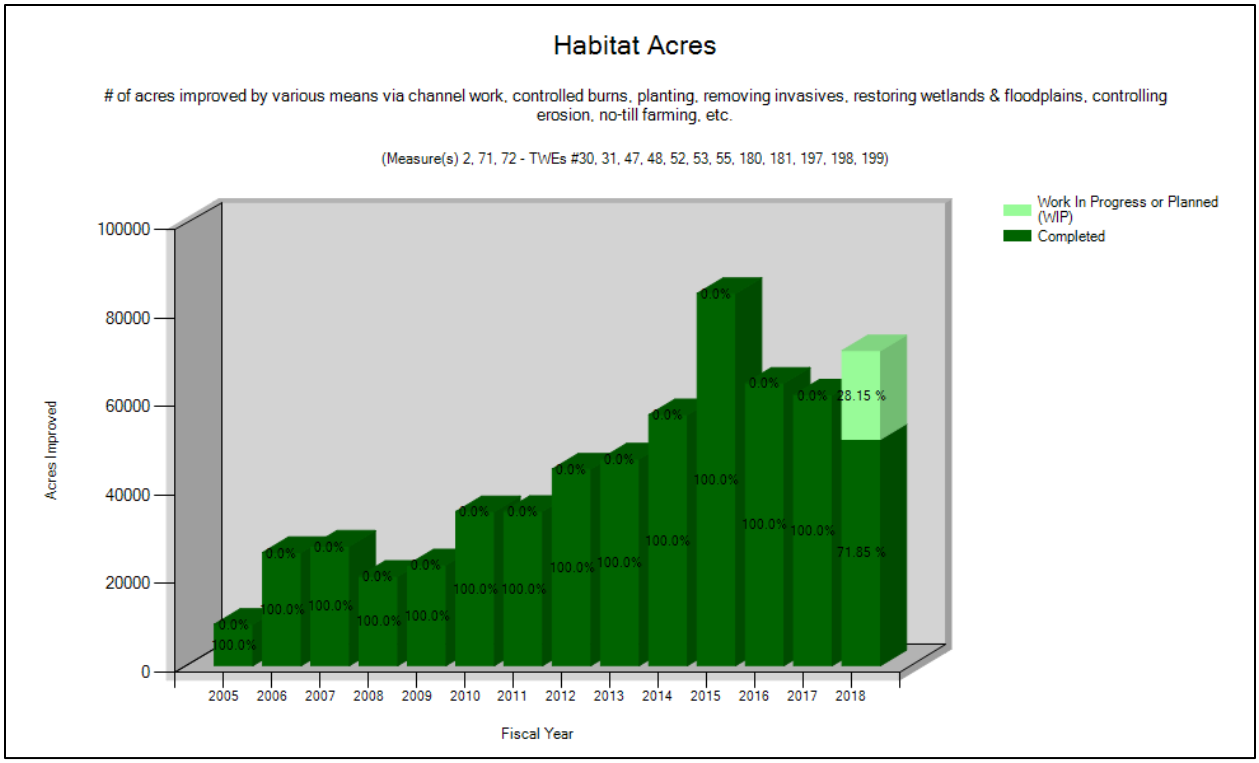

Salmon and Steelhead
Bonneville Dam Counts 1981-Aug. 27, 2018
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
81 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11 13 15 17
Coho
Sockeye
Steelhead
Chinook


Survival of Juvenile Snake River Chinook and Steelhead
Lower Granite to Bonneville Dams, 1999-2017
Chinook (Wild only)
Chinook (Hatchery and Wild Combined)
Steelhead (Wild Only)
Steelhead (Hatchery and Wild Combined)
Reach Survival (%)
90
80
70
60
50
40
30
20
10
0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

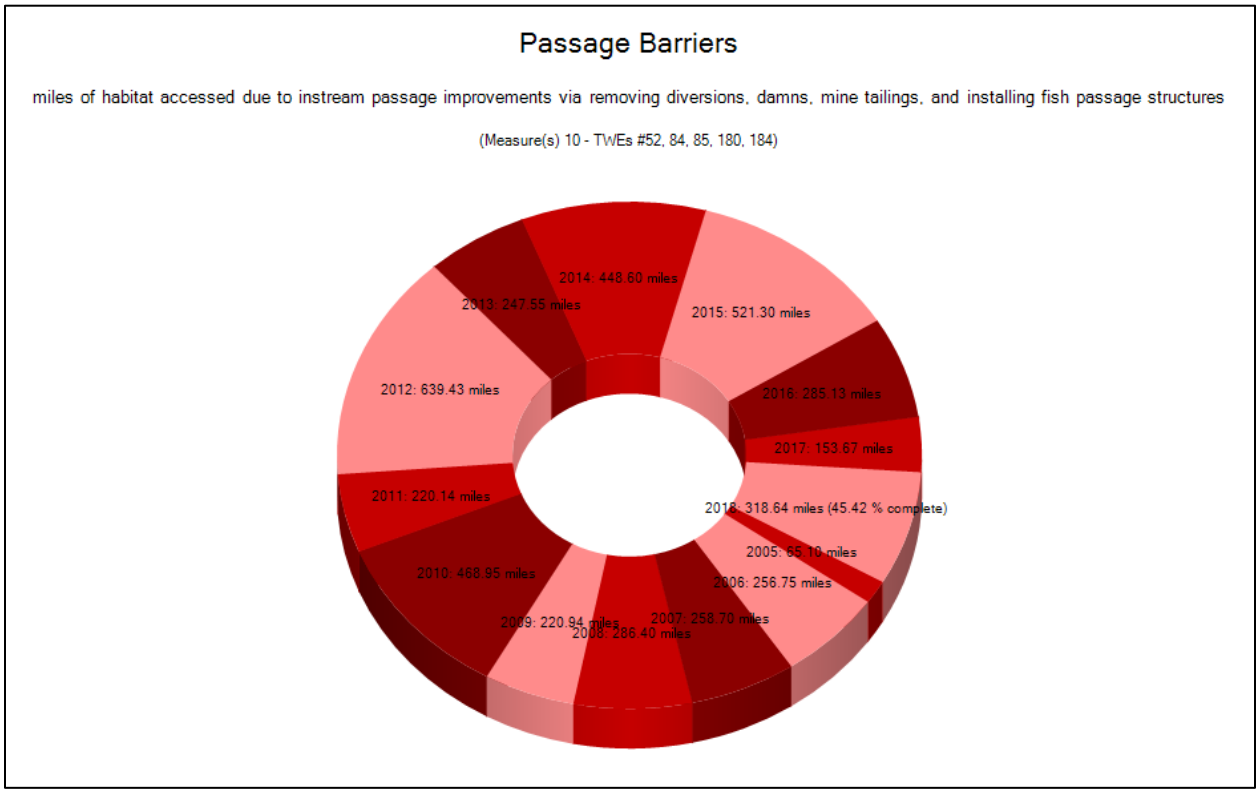




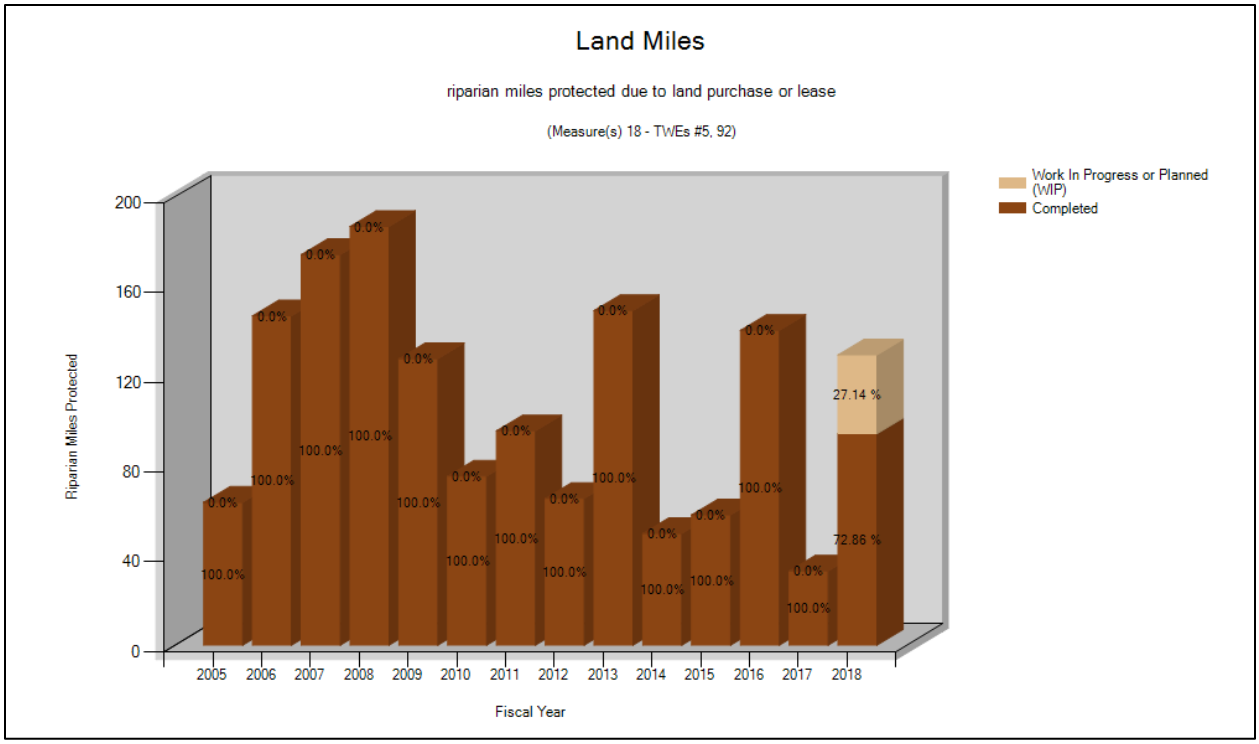
Source for the three fish-survival figures:
NOAA Fisheries: *Survival Estimates for the Passage of Spring-Migrating Juvenile Salmonids through Snake and Columbia River Dams and Reservoirs, 2016.*



Source: CBFish.org



Source: CBFish.org



Source: CBFish.org

Public Affairs Overview

Outreach, information, and communication

The Northwest Power Act directs the Council to provide for the participation and consultation of the Pacific Northwest states, tribes, local governments, consumers, electricity customers, users of the Columbia River System, and the public at large in developing regional plans and programs related to energy efficiency, renewable energy resources, other energy resources, and protecting, mitigating, and enhancing fish and wildlife resources. The Council's Public Affairs Division has the primary responsibility to implement this portion of the Act.

The Division uses a variety of communication tools to perform its mission, including printed and electronic publications, the Council's website, social media platforms, video, public meetings, and press releases that are posted as news items on the website and then linked to the news media and other interested parties via email and social media.

The Council's website, www.nwcouncil.org, functions as the hub of its outreach efforts and public information strategy. In 2017 the Council completed an update of the website, giving it a new look and making it faster to load and easier to use. The website contains myriad documents, publications, databases, and other forms of information. Included on the site are the current versions of the Northwest Power Plan and the 2014 Columbia River Basin Fish and Wildlife Program, and the Seventh Northwest Power Plan, as well as press releases, Council white papers, official public comment on Council documents, PowerPoint presentations, videos, Council newsletters, photos, and links to the Council's social media platforms.

Social media are used increasingly by the Council to communicate with the public. These include Facebook, Twitter, LinkedIn, Instagram, Vimeo, and Flickr accounts, all of which are available on the Council's News page.

The monthly Council Spotlight newsletter includes news about Council meetings and links to posts on the website.

The Public Affairs Division also has the responsibility of advancing the Council's mission and accomplishments with members of Congress and their staffs. In August 2018 the Council conducted its 11th annual congressional staff trip, this time to Southeastern Washington. The trip included visits to the Lyons Ferry National Fish Hatchery, Little Goose Dam, a wind power generating facility and several projects involving fish and wildlife habitat restoration, fish production, and water conservation. The purpose of these annual trips is to better acquaint House and Senate staff with the requirements of the Northwest Power Act, the work of the Council, and some of the priority issues relating to the Council's work.

Canadian relations

The Columbia River and several of its major tributaries begin in Canada and flow across the international border. Consistent with direction in the Northwest Power Act to treat the entire Columbia River as one system for planning purposes, the Council maintains regular contact with planning entities in British Columbia. This contact primarily is through the Public Affairs and Legal divisions.

The Columbia Basin Trust (CBT), a Crown corporation of the province, is the Council's closest counterpart agency in the Canadian portion of the Columbia River

Basin. Since 1996, Council members and staff have met at least once annually with the Trust Board of Directors to discuss Columbia River issues of mutual interest. In 2000, the two agencies formalized their relationship in a memorandum of understanding and designated official liaisons. The memorandum was revised in 2011.

In 2014 the Council and Trust co-sponsored their sixth major international conference on the Columbia River that attracted. The conference more than 300 participants from the United States and Canada. Because these conferences take place every five years, in 2018, the Council and Trust began working on a follow-up conference tentatively scheduled for September 2019 in Kimberley, BC.

Administrative Overview

Council cuts budget to help BPA reduce its costs

Recognizing the difficult financial situation of the Bonneville Power Administration, the federal power marketing agency that pays for the work of the Northwest Power and Conservation Council, the Council identified cuts of $206,000 in its budget for Fiscal Year 2019 and $428,000 in 2020. The budget is posted on the Council's website here.

The current realities of the West Coast electricity system – cheap natural gas, an abundance of renewable power, low prices – will challenge the Bonneville Power Administration in the future, perhaps as never before, the agency's administrator, Elliott Mainzer, told the Council in March. The proliferation of surplus renewable energy, particularly solar power from California, has pushed West Coast wholesale market prices down, often to below the cost of power from Bonneville and many other power wholesalers in the Northwest.

In response, Bonneville is looking for efficiencies in its budget, and the Council is offering to help by cutting its own budget. The Council's proposed Fiscal Year 2019 revised budget is $11,708,000 and the proposed Fiscal Year 2020 budget is $11,725,000. These budgets are both below the maximum amount established for the Council in the Northwest Power Act, the federal law that governs the Council. In past years the Council and Bonneville staff have entered into multi-year budget agreements in order to better plan and stabilize funding levels needed to perform the Council's work. In January 2017, the Council entered into a three-year budget agreement with Bonneville for fiscal years 2017-2019.

For the last 20 years the Council has held its budget growth to the rate of inflation or less. In addition, through ongoing efforts the Council has consistently underspent its budget and returned the unspent amount to Bonneville. The Council's 2019 revised budget of $11,708,000 is $206,000 lower than the Fiscal Year 2019 budget adopted last year. The 2019 revised budget reflects a slight increase in contracting costs, but that increase is offset by decreased personal services, travel and other operating costs. The proposed 2020 budget of $11,725,000 is a slight, $17,000, increase over the 2019 revised budget, but $428,000 lower than the 2020 budget proposed last year. The $17,000 increase reflects anticipated higher costs for personal services and benefits costs offset by reductions in anticipated travel, contracting, and other operating costs in Fiscal Year 2020.

Background

The Northwest Power Act

The Council was authorized by Congress in 1980 in the Pacific Northwest Electric Power Planning and Conservation Act (the Power Act), giving the states of Idaho, Montana, Oregon, and Washington a greater voice in how we plan our energy future and protect our fish and wildlife resources. The Act gives the four Northwest states a formal role in making decisions about the allocation of new energy resources for the region.

In the late 1960s and early 1970s, the years leading up to the congressional debate over the Act, the Bonneville Power Administration and many of the region's utilities were concerned that the region's expected growth would outstrip the power system's ability to meet electricity demand. As a result, Northwest utilities made decisions to build a number of new energy plants, including five nuclear power plants in the state of Washington. When the Act was passed in late 1980, many in the region had come to realize that those earlier decisions, based in part on inaccurate electricity load forecasts, were a disastrous mistake. Only one of the plants, the currently operating Columbia Generating Station, was completed. Due to exorbitant cost overruns, the other four plants were abandoned or mothballed prior to completion. Two of the unfinished plants were responsible for one of the largest bond defaults in the history of the nation, while the financing for the other three plants was backed by the Bonneville Power Administration. Even today, 36 years after the Northwest Power Act was enacted, Bonneville pays millions of dollars a year on debt service for two of the unfinished nuclear plants, plus the one that was completed. And, from 1978 to 1984, Bonneville was forced to raise its rates by 418 percent (adjusted for inflation) to pay for the cost of the three plants.

Congress concluded that an independent agency, controlled by the states and without a vested interest in selling electricity, should be responsible for forecasting the region's electricity load growth and helping determine which generating and conservation resources should be built. The Council does that in the Northwest Power Plan, which includes a component Columbia River Basin Fish and Wildlife Program to mitigate the impact of hydropower dams on fish and wildlife. The Act directs the Council to revise the plan at least every five years. The Act also directs the Council to ensure widespread public involvement in formulating regional fish and wildlife and energy policies.

The Northwest Power and Conservation Council

The governors of Idaho, Montana, Oregon, and Washington each appoint two members to the Council. The eight-member Council sets policy and provides overall leadership for Council activities.

The Council's work is performed, depending on the tasks, by the Council's professional staff (including staff in a central office in Portland and in each state), by consultants under contract, or by public agencies and Indian tribes under intergovernmental agreements. The Council's executive director is responsible for coordinating with the Council, supervising the central office staff, administering contracts, and overseeing the day-to-day operations of the Council. The Council approves major contracts and the overall work plan. The Council has 61 employees.

The central staff is organized into five divisions: Power Planning; Fish and Wildlife; Public Affairs; Legal; and Administrative. Professional staff in each state provide technical review and assistance to Council members in evaluating matters before the Council. State staff also participate in designing and developing public-involvement programs that focus on the implementation of the Power Plan and Fish and Wildlife Program in their particular states. This support is provided through existing state agencies or by individuals directly under Council member direction.

The Council, known until 2003 as the Northwest Power Planning Council, is an interstate compact agency authorized by Congress in the 1980 Power Act and created by the legislatures of Idaho, Montana, Oregon, and Washington. The Council's first meeting was in April 1981.

The Northwest Power Act gives the Council three distinct responsibilities: 1) to assure the region an adequate, efficient, economical, and reliable electric power supply; 2) to prepare a program to protect, mitigate, and enhance fish and wildlife, and related spawning grounds and habitat, of the Columbia River Basin affected by the development and operation of any hydroelectric project on the Columbia River and its tributaries; and 3) to inform the Pacific Northwest public regarding these issues and involve them in decision-making. This annual report is organized around the Council's key responsibilities and five divisions.

The Power Act created a special relationship between the Council and the federal agencies that regulate and operate dams in the Columbia River Basin and sell the electricity that is generated. The administrator of the Bonneville Power Administration, the federal power marketing agency that sells the output of the Federal Columbia River Power System (a system that includes 29 federal dams within the basin and two outside (in southern Oregon), and one non-federal nuclear power plant), is required to make decisions in a manner consistent with the Council's Northwest Power Plan and its Columbia River Basin Fish and Wildlife Program. Other federal agencies with responsibilities for federal and non-federal dams in the Columbia River Basin (the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Federal Energy Regulatory Commission) are required to take the Council's Power Plan and Fish and Wildlife Program into account "at every relevant stage of decision-making to the fullest extent practicable," in the words of the Act.

Despite its relationship to federal agencies, the Council is not a federal agency and its employees are not federal employees. The eight-member Council consists of two members from each state, appointed by their respective governors. The Council headquarters are in Portland.

The Columbia River Basin Fish and Wildlife Program

A key element of the Northwest Power Plan is a program to protect, mitigate, and enhance fish and wildlife, and related spawning grounds and habitat, of the Columbia River Basin that have been affected by hydropower dams – federal and privately owned. Consistent with direction in the Act, at least every five years the Council revises the Fish and Wildlife Program, followed by a revision of the Power Plan. That sequence is because the Act requires the Council to include measures in the program to improve survival of anadromous fish – those that are born in freshwater, spend most of their lives in the ocean, and then return to freshwater to spawn – at and between dams on

the Columbia and Snake rivers. Because these measures can take water away from hydropower generation – by spilling over dams, for example – the Council anticipates that hydropower generation will be reduced in a similar manner to past Power Plans as the result of implementation of the Program. This loss is made up by resources included in the Plan, primarily investments in energy efficiency.

The Act directs the Council to develop its Program and make periodic major revisions by first requesting recommendations from the region's federal and state fish and wildlife agencies, Indian tribes within the basin, and other interested parties. The Council also takes comment from designated entities and the public on those recommendations.

The Council then issues a draft amended Program, initiating a public comment period on the recommendations and proposed Program amendments that includes extensive written comments, public hearings in each of the four states, and consultations with interested parties. After closing the comment period and following a review and deliberation period, the Council adopts the revised Program. The Council develops its final Program on the basis of the amendment recommendations, information submitted in support of the recommendations, views and information obtained through public comment and participation, and consultation with the fish and wildlife agencies, tribes, Bonneville customers, and others. The Program amendments are not concluded until the Council adopts written findings as part of the Program explaining its basis for adopting or not adopting Program amendment recommendations.

The Program is implemented through projects financed by the Bonneville Power Administration and undertaken by federal agencies including the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Federal Energy Regulatory Commission and its licensees, and by state fish and wildlife agencies, Indian tribes, and occasionally private contractors. Every project proposed to the Council to implement the Program is reviewed by the 11-member Independent Scientific Review Panel to be sure is it based on sound scientific principles and is consistent with the Power Act.

The Northwest Power Plan

Following final approval of the Fish and Wildlife Program, the Council revises the Power Plan. Under the Power Act, the Fish and Wildlife Program is part of the Power Plan.

The Plan is a 20-year blueprint to meet future demand for power that includes an electricity demand forecast, electricity and natural gas price forecasts, an assessment of the amount of cost-effective energy efficiency that can be acquired over the life of the plan, and a least-cost generating resources portfolio. The Plan guides Bonneville's decision-making to meet its customers' electricity load requirements and also serves as a useful guide for investor-owned utilities in their own least-cost planning.

In the Northwest Power Act, a law that was ahead of its time, Congress concluded that energy efficiency should be the priority energy resource for meeting the region's future load growth. The Act includes a provision that directs the Council to give priority to cost-effective energy efficiency, followed by cost-effective renewable resources to meet future demand for power. In effect, for the first time, energy efficiency was deemed to be a legitimate source of energy on par with generating resources.

The rest is history. Since the release of the Council's first Northwest Power Plan in 1983, the region's utilities have acquired the equivalent of around 6,600 average megawatts of energy efficiency. Expressed as electricity, that is more than enough to power five cities the size of Seattle.

During the roughly two years after the revision of the Power Plan and the beginning of work on the next Fish and Wildlife Program, the Council and its staff monitor implementation of the two planning documents, meet with energy and fish and wildlife experts to discuss contemporary issues, and monitor progress toward goals in the Plan and Program.

Council Meetings Fiscal Year 2017

October 2017, Columbia Falls, Montana

November 2017, Coeur d'Alene, Idaho

December 2017, Portland

January 2018, Portland

February 2018, Portland

March 2018, Portland

April 2018, Portland

May 2018, Boise

June 2018, Portland

July 2018, Missoula

August 2018, Portland

September 2018, Eugene

Selected News Articles That Mention The Council

Trump Budget Proposes to Sell off Part of Northwest Power Transmission
Spokane Public Radio
May 25, 2017
http://spokanepublicradio.org/post/trump-budget-proposes-sell-part-northwest-power-transmission

High power rates still a risk as Trump proposes privatizing BPA
Tri-City Herald, Kennewick, Washington, July 24, 2018:
https://www.tri-cityherald.com/opinion/editorials/article215451910.html

White Sturgeon numbers decent; some upriver populations show decline
Chinook Observer, Long Beach, WA
April 24, 2018
http://www.chinookobserver.com/co/sports-fishing/20180424/white-sturgeon-numbers-decent-some-upriver-populations-show-decline

Treaty Talk: Americans and Canadians discuss hopes for new Columbia River Treaty
Spokesman-Review, Spokane
April 24, 2018
http://www.spokesman.com/stories/2018/apr/24/treaty-talk-americans-and-canadians-discuss-hopes-/

Efficiency Exchange Conference Highlights Role of Innovation, Collaboration in Energy Efficiency
May 14, 2018
Business Wire
https://www.businesswire.com/news/home/20180514005045/en/Efficiency-Exchange-Conference-Highlights-Role-Innovation-Collaboration

Surging northern pike population in Lake Roosevelt could threaten salmon, steelhead downstream
Spokesman-Review, Spokane
May 17, 2018
http://www.spokesman.com/stories/2018/may/17/surging-northern-pike-population-in-lake-roosevelt/#/0

Bitcoin under the Big Sky
Flathead Beacon, Kalispel, Montana
March 21, 2018
http://flatheadbeacon.com/2018/03/21/bitcoin-big-sky/

Budding marijuana sector brings big load growth, efficiency challenges for utilities

Utility Dive (online publication)
November 1, 2017
https://www.utilitydive.com/news/budding-marijuana-sector-brings-big-load-growth-efficiency-challenges-for/508267/

Council Members and Offices, Fiscal Year 2018

Northwest Power and Conservation Council	
Central Office 851 S.W. Sixth Avenue, Suite 1100 Portland, OR 97204-1348 **503-222-5161** 800-452-5161 regional toll-free FAX# 503-820-2370	Steve Crow – Executive Director Judi Hertz – Executive Assistant
Idaho **Jim Yost, Chair** Northwest Power and Conservation Council 450 W. State (UPS only) P.O. Box 83720 Boise, ID 83720-0062 **208-334-6970** FAX# 208-334-2112 Karen Dunn – Officer Manager/Administrator Shirley Lindstrom – **Policy Analyst** Jeff Allen – State Office Director/Policy Analyst 208-334-6972	**Bill Booth** Northwest Power and Conservation Council East 1677 Miles Ave, Suite 103 Hayden Lake, ID 83835 Cell: **208-660-4127** Office: 208-772-2447 FAX# 208-772-9254 Jeff Allen – State Office Director/Policy Analyst 208-334-6972
Montana **Tim Baker** Northwest Power and Conservation Council 30 West 14th Street, Suite 207 Helena, MT 59601 **406-603-4016** FAX# 406-442-1864 Kerry Berg – Policy Analyst 406-603-4050 Brian DeKiep – Energy Policy Analyst 406-603-4029 Pam Tyree – Administrative Secretary 406-603-4015	**Jennifer Anders, Vice Chair** Northwest Power and Conservation Council 30 West 14th Street, Suite 207 Helena, MT 59601 **406-603-4013 - office** FAX# 406-442-1864 Kerry Berg – Policy Analyst 406-603-4050 Brian DeKiep – Energy Policy Analyst 406-603-4029 Pam Tyree – Administrative Secretary 406-603-4015
Oregon **Richard Devlin** Northwest Power and Conservation Council 851 S.W. Sixth Avenue, Suite 1020 Portland, OR 97204 **503-229-5171** FAX# 503-229-5173 Leann Bleakney – Energy Policy Analyst Karl Weist – Fish and Wildlife Policy Analyst	**Ted Ferroili** Northwest Power and Conservation Council 851 S.W. Sixth Avenue, Suite 1020 Portland, OR 97204 **503-229-5171** FAX# 503-229-5173 Leann Bleakney – Energy Policy Analyst Karl Weist – Fish and Wildlife Policy Analyst

Washington

Guy Norman
Northwest Power and Conservation Council
315 W. Mill Plain Blvd, Suite 202
Vancouver, WA 98660
360-816-1173
Sara Mounts, Administrative Assistant
360-816-1172
Kendall Farley, Policy Analyst
Office: 360-816-1174
Cell: 425-244-8913
Elizabeth Osborne – Senior Energy Policy Analyst
WA Department of Commerce, Energy Office
1011 Plum St SE
PO Box 42525
Olympia, WA 98504-2525
Office: 360-725-3114

Tom Karier
Northwest Power and Conservation Council
668 N. Riverpoint, Suite 137
Spokane, WA 99202
509-828-1330
FAX# 509-828-1316

Stacy Horton – Biologist/Policy Analyst
668 N. Riverpoint Blvd., Suite 139
Spokane, WA 99202
509-828-1329

Comments of the Bonneville Power Administration

[Comments of Bonneville Administrator Elliot Mainzer will be added to the final version of this report in January 2019, following the Power Act-required 90-day public comment period on the draft report.]

More information

For additional information about the Northwest Power and Conservation Council's activities, budget, meetings, comment deadlines, policies, or bylaws, call 1-800-452-5161 or visit our website, www.nwcouncil.org. Copies of Council publications are available on the website or by calling the Council. All Council publications are free.