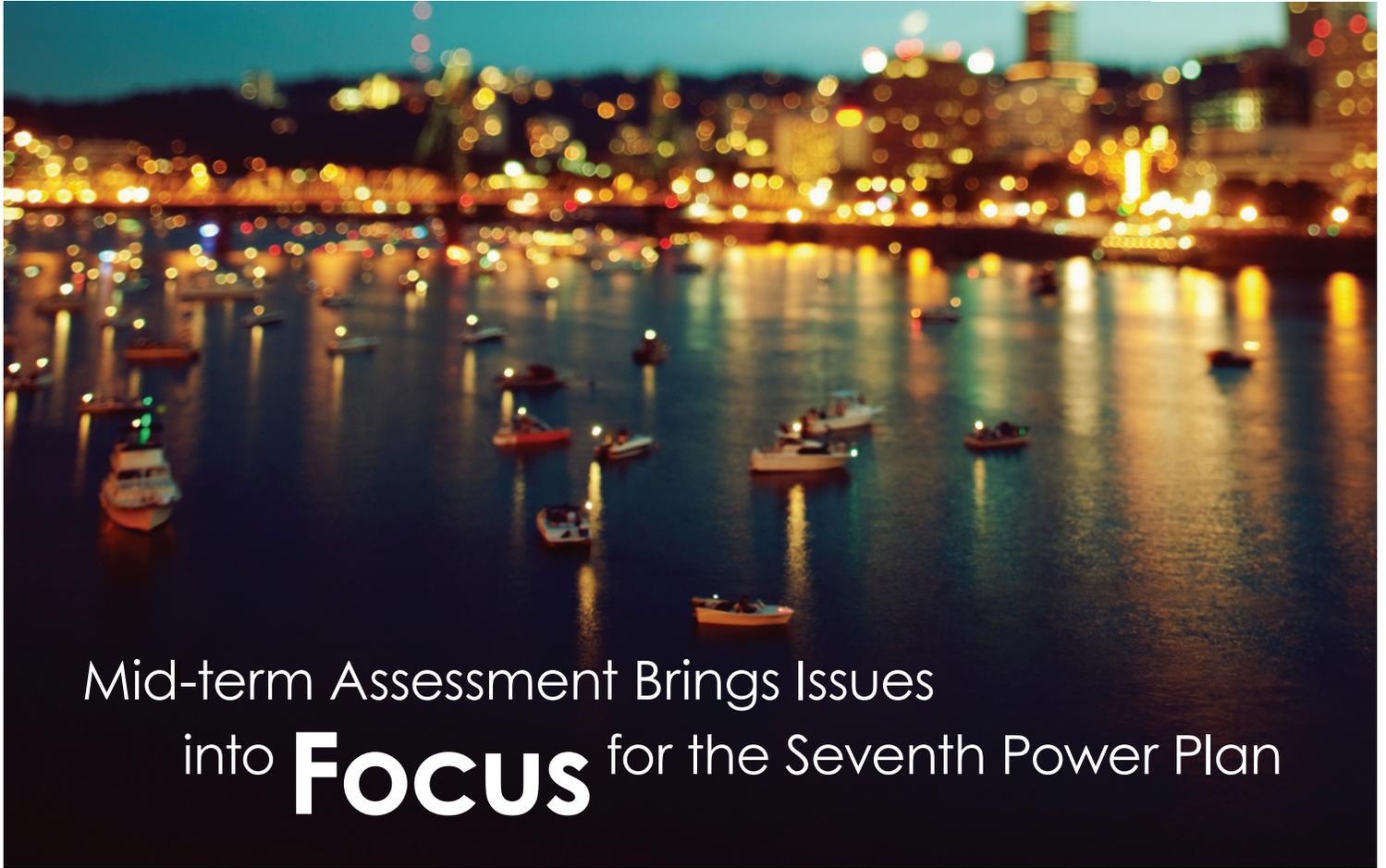


STRIKING A BALANCE BETWEEN ENERGY AND THE ENVIRONMENT IN THE COLUMBIA RIVER BASIN



Mid-term Assessment Brings Issues into **Focus** for the Seventh Power Plan

It's been nearly three years since the Council issued its Sixth Northwest Power Plan. The Council is required under the Northwest Power Act to develop a 20-year plan,

which is revised every five years, to ensure that the region will have an adequate, efficient, economical, and reliable power supply.

In order to check on the progress to implement the plan, the Council undertook a mid-term assessment, which was released for public comment in December. The Council is accepting comment through January 31 and expects to update the report after the comment period ends.

As a first step in the assessment process, the Council prepared a high-level survey of changes in the energy environment. Conditions in the region have not been static, and the assessment updates some key economic forecasts and identifies emerging issues. The process has been especially valuable in bringing people together to discuss issues of concern, especially as the Council prepares to develop its next power plan.

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After gathering and analyzing the latest information, and meeting with stakeholders to get their feedback, the Council made the following major conclusions in the draft report:

1. The region is making good progress implementing the Sixth Power Plan, and the region is well-positioned to meet the plan's five-year goal of 1,200 average megawatts of energy efficiency for 2010-2014. Actual costs for energy efficiency acquisitions have remained well below the cost of other types of new resources.
2. Development of renewable resources, mainly wind power, has continued, including for export out of the region, although changes in California's renewable policies should slow its pace. Efforts to mitigate wind oversupply events are proceeding.
3. Actual market and electric industry conditions during the first three years of the plan's implementation period have differed from expected-case assumptions: slower than anticipated economic and electricity demand growth and low market prices for natural gas and wholesale power, for example.
4. Conditions vary across the region and from utility to utility. Some have growing loads, others are flat or have lost large customers. Some have surplus resources and others face deficits. These differences affect utilities' incentives to acquire energy efficiency.
5. The Northwest power system has the lowest greenhouse gas emissions intensity of any region in the country. Recent announcements that the Boardman and Centralia coal plants will be closed indicate that the region's GHG emissions will become even lower.
6. An updated analysis shows that with existing resources and projected energy efficiency, the region's adequacy will fall short of the desired level by 2017. While new resources are expected to close this gap, the Council will continue to monitor regional resource adequacy.
7. The character of the region's power system is changing. Historically, needs for new resources were driven mostly by energy deficits. Today, however, needs for peaking capacity and system flexibility are also emerging, expanding the focus of the region's planning and development of new resources to address peaking capacity and system flexibility.
8. Updated information is needed about the patterns of consumer uses of electricity and how they affect power system needs for energy, peaking capacity, and system flexibility. Information is also needed about how different types of energy efficiency measures could help meet these needs.
9. Spot market prices for wholesale power continue to be quite low, due to increasing penetration of renewable resources with low variable operating costs and low natural gas prices, and do not provide an accurate representation of the avoided cost of new resources.
10. Regional power supply planning matters are becoming increasingly linked with electric transmission and natural gas matters requiring greater coordination.

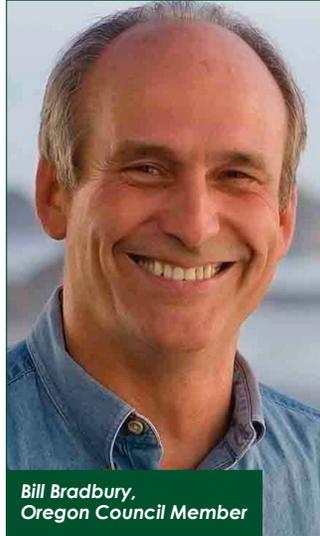


The draft report also notes potential topics for the Seventh Northwest Power Plan:

1. Making the power plan useful for all regional utilities
2. Regional needs for energy, peaking capacity, and system flexibility
3. Avoided cost benchmarks to evaluate new resources
4. Energy efficiency – how can different types of measures help meet needs for peaking capacity and system flexibility
5. Changing paradigm for energy efficiency; its impact on assessing cost-effectiveness
6. Renewable resources development and integration; impacts on the regional hydro system
7. Demand response
8. Distributed generation
9. Greenhouse gas – regional emissions outlook, regulatory and social costs
10. Incorporating intra-regional transmission constraints in regional power system planning
11. Growth in use of natural gas for electric generation; intersection of planning for the regional power and gas systems
12. Inter-regional linkages, including Northwest and California

The draft Sixth Power Plan Mid-term Assessment report is available at nwcouncil.org ■

Notes From the Chair



Bill Bradbury,
Oregon Council Member

This fall, the Council reviewed the progress made to implement the Sixth Power Plan. The plan, released in 2010, set an energy efficiency target for the region of 1,200 average megawatts by 2014, and it looks likely that we'll meet it.

The draft Mid-term Assessment covers the changes in the energy field and identifies key emerging issues to be addressed in the Seventh Power Plan. We've included a summary of its major conclusions in this edition of the CQ to help begin the conversation on our future energy needs.

We were also fortunate to interview Paul Kline, assistant chief of fisheries for Idaho Fish and Game, and a longtime leader in efforts to recover Snake River sockeye salmon. In explaining the importance of the fish, which had all but disappeared from the basin, Kline states "Sockeye salmon are a true legacy species in Idaho. Losing them is simply unacceptable." Through the combined efforts of state, federal, and tribal agencies, the storied fish have been brought back from the brink and given a chance to thrive once more.

Council Chair Bill Bradbury

Unraveling the Mysteries of an Ancient Fish

Among the many challenges facing fish biologists in the Columbia River Basin, one of the most daunting is understanding what's causing the lamprey population to decline.

The latest research, shared at a workshop this fall in Portland, is not encouraging and points to a long-understood major impact: hydropower dam passage. There are three species of lamprey in the Columbia River Basin: Pacific and river lamprey, which migrate to the ocean and return to fresh water to spawn; and Western brook lamprey, which don't go to the ocean.

For the ocean-going species, dam passage is difficult. Adult lamprey are a favorite prey of sea lions and sturgeon, and once lamprey reach a dam, they face the daunting task of swimming through the high-velocity fishways designed for salmon and steelhead, which are much larger fish and stronger swimmers. Little is known about dam passage of juvenile lamprey, other than that, like some juvenile salmon and steelhead, they can be drawn by the water current into irrigation intakes, hydropower turbines, and also impinged on turbine screens.

At Bonneville Dam, researchers have been studying lamprey for more than a decade. Adult lamprey are captured at the dam, fitted with tags, released a short distance downstream, and recorded as they try to pass the dam. The results show that while 84 percent of the fish entered a fishway, only 52 percent of those fish successfully passed the dam. That's an extremely low

percentage compared to salmon, whose passage success is above 90 percent.

"The populations at Willamette Falls and Bonneville Dam are the barometers for lamprey in the Columbia River Basin, and they have declined consistently for the past 15-20 years," said Brian McIlraith, lamprey project leader at the Columbia River Inter-Tribal Fish Commission. "There are so many possible reasons, and there are so many unknowns about lamprey."

Studies suggest that because juvenile lamprey migrate deep in the water column, they're more vulnerable than juvenile salmon or steelhead to being swept into turbines. Interestingly, however, they don't seem to react to the rapid decompression experienced in turbine passage, which is remarkably different than with salmon and steelhead.

"Just knowing where lamprey pass would be important — we don't know where or when they pass," McIlraith said.

Dams present a unique challenge to these eel-like fish. They're notable for their prominent oral disk, with which they adhere to smooth surfaces while resting. To move, they release their hold and burst forward. Research using cameras suggests



that lamprey free-swim through many slower segments of fishways, and that the hold-and-burst behavior is probably most important in areas of faster current — eight feet per second or higher. The chance of successful passage decreases as the length of passage increases.

The research at Bonneville is helping to focus passage improvements, such as the installation of specially designed, low-velocity ladders for adult lamprey. Four have been installed at Bonneville, and another is planned at John Day Dam this winter. The ladders work well as long as lampreys find them, but there are more passage routes than ladders.

Columbia River lamprey “do not seem to be recovering,” according to a report prepared by the Columbia River Basin Lamprey Technical Workgroup, a committee of experts convened by the U.S. Fish and Wildlife Service and the Portland-based Columbia Basin Fish and Wildlife Authority. A Fish and Wildlife Service report in 2011 also noted decreased lamprey abundance throughout their range. In short, lamprey abundance is lower today, and they’re found in fewer areas of the basin than they once were.

Dam passage is just one impact. Research is beginning to assess whether and how dam operations might affect lamprey spawning in reservoirs. Adult and juvenile lamprey face predation by sturgeon and other fish, marine mammals,

and birds; stream and floodplain degradation; disease; water pollution; and decline in their food supply. Ocean conditions may also affect lamprey survival.

In addition to the lamprey passage and behavior research at Bonneville, which is sponsored by the dam operator, the U.S. Army Corps of Engineers, projects funded through the Council’s fish and wildlife program are also underway to improve their habitat and our understanding of their lifecycle.

Why so much attention to lamprey?

According to the CRITFC, whose project aims to assess Pacific lamprey abundance and identify means of improving dam passage, the species is ancient, native to the Columbia River, and valuable to the ecosystems they inhabit because they deliver marine-derived nutrients. Lamprey are also a culturally important source of food, medicine, and ceremony to Northwest tribes.

“Tribes definitely want lamprey back in their ceded areas,” CRITFC’s McIlraith said. “Historically, lamprey probably migrated as far upriver as salmon and steelhead, and possibly farther into small tributaries because of their climbing ability. Pretty much anywhere a salmon can go, a lamprey can go.” ■



Adult lamprey climb a specially designed ladder at Bonneville Dam. The low-velocity water flow and smooth steel surface help the unusual fish cross the dam. Some species of lamprey, like salmon, are born in freshwater, live their adult lives in the ocean, and then return to freshwater to spawn. Photo: U.S. Army Corps of Engineers.

As Utilities Act on Plans to Add More Resources, Northwest Power Supply Should Be Adequate

In 2000-2001, the West Coast experienced an energy meltdown that brought the region to the brink of blackouts and caused electricity prices to soar. One of the causes behind the crisis was a pattern of lagging resource development and growing demand. Another factor was a lack of forward planning to ensure that power resources would be adequate on a regionwide basis.

In order to prevent a repeat of these events, the Council and the Bonneville Power Administration created the Northwest Resource Adequacy Forum to develop and apply a standard metric to assess the adequacy of the region's power supply. The forum, which is open to the public, includes utility planners, state utility commission staff, and other interested parties.

The Council uses the standard annually to look five years into the future at the region's power supply. In its latest assessment, the forum concluded that there is a good chance the region will need to add new resources by

2017 to maintain an acceptable level of system adequacy, probably in the range of 350 megawatts.

Currently, the region's utilities are taking steps to implement plans to acquire considerably more than that amount. As long as these acquisitions occur by 2017, the power system should have adequate resources.

As the region's power system has evolved over time, it has become much more dynamic and complex, and the need for comprehensive and timely information has become critical. Hydrosystem operations need to meet flow requirements for fish; increasing amounts of variable resources like wind are now part of the system; and more integrated Westwide electricity market have made planning more challenging.

The forum provides a key means to monitor the power supply so potential issues can be identified early on and addressed before they become serious problems. ■

How Will the Future Loss of Boardman and Centralia Coal Plants Affect the Region's Power Supply?

With the loss of the generation produced by the Boardman and the Centralia unit one coal plants in 2020, along with expected load growth (adjusted for targeted energy efficiency savings), it would take about 2,000 megawatts of additional resource capacity to bring the region's power supply back to an acceptable level of adequacy. While this may seem like a large amount of new resource capacity (enough to supply two cities the size of Seattle), the Council has identified over 3,000 megawatts of resource capacity in various stages of utility planning that could be developed by 2021 if the need arises.



Northwest Q & A: Paul Kline

Paul Kline has worked for the Idaho Department of Fish and Game since 1992, when only one sockeye returned to Redfish Lake that year.

In 1994, Kline became the department's first monitoring and evaluation biologist for its newly created sockeye salmon captive broodstock program, which he subsequently led from 1996 to 2006. Kline became the department's Columbia River policy coordinator in 2006, and currently holds the position of assistant chief of fisheries, responsible for managing fiscal matters for the Bureau of Fisheries, coordinating the Sport Fish Restoration (Dingell-Johnson) program, and serving as the department's liaison to the Northwest Power and Conservation Council.

Q. How did you become a key person involved with Snake River sockeye recovery?

When I joined the department in 1992, I worked in the fishery research section. At that time, research offices were located in one of the department residences at the Eagle Fish Hatchery near Boise, Idaho. The Eagle Hatchery had recently been called into action just the year before (after being mothballed for several years) to act as home base for the sockeye salmon captive broodstock effort. During the next year, I developed a first-hand awareness of the program and worked a bit with Dr. Keith Johnson, the department's team leader for sockeye recovery efforts. In 1994, a monitoring and evaluation biologist position was created to support the growing program. I applied for the position and was offered the job.

Continued on page 8

Q. What are the basic elements of the sockeye program?

The foundation of the program is the hatchery-based captive broodstock effort; essentially a gene rescue program to protect the gene pool by raising fish to maturation in the hatchery. New generations are produced annually to perpetuate the program in captivity. The focus is to maintain population genetic variability and minimize the risks associated with inbreeding and domestication selection. We've reintroduced eggs and fish to the habitat, but we've been limited by a general lack of fish production rearing space. With Columbia River Fish Accord funding, the program is currently constructing a facility capable of producing up to 1 million sockeye salmon smolts annually. The first smolt releases are expected in 2015. A rigorous monitoring and evaluation component has been in place since 1994 to assess both in-hatchery and post-release survival outcomes.

The program is very collaborative. In addition to the department, the National Marine Fisheries Service and the Shoshone-Bannock Tribes share program responsibilities. The department is responsible for developing and maintaining captive broodstocks and conducting monitoring and evaluation efforts to assess survival success. The department also provides comprehensive genetics support to the program, as well as monitoring and evaluation decisions. The National Marine Fisheries Service shares fish culture responsibilities. The Shoshone-Bannock Tribes provide habitat support and share field monitoring and evaluation responsibilities. All activities are coordinated through the Stanley Basin Technical Oversight Committee, a group of dedicated program representatives that convenes to provide technical support and coordination for annual activities. The committee is chaired by the Bonneville Power Administration.

Q. What are the long-term prospects for Snake River sockeye? Is there enough genetic diversity to sustain the run into the future? What other potential problems concern you?

These are excellent questions. For recovery to be possible, the population must retain its ability to survive and complete its lifecycle in the wild and cope with a host of environmental challenges. It's generally accepted that domestication selection and fitness loss (factors that affect hatchery fish) may place program-produced sockeye salmon at a competitive disadvantage when making the transition back to a natural environment. Because of this, survival and success are not certain. What we know is that we have

retained over 95 percent of the genetic variability we started with when the program was developed in the early 1990s. This is a high percentage when compared to programs for other at-risk animals, such as California condors and black-footed ferrets. We also know that full-term captive broodstock adults, as well as first generation ocean-returning adults spawn synchronously in Redfish Lake and produce about the same number of progeny per female. And finally, we know that adult sockeye produced from natural spawning return to Redfish Lake almost twice as successfully as adults from hatchery-produced smolt releases. This information is positive, and it suggests that the population has retained its adaptive potential. So they have the ability to repopulate vacant habitat at levels that we hope, at some point, will be self-sustaining.

Q. Snake River sockeye had all but disappeared and many people had written them off. Why didn't the state of Idaho give up?

The catalyst that stimulated stakeholders to take action was the 1990 petition produced by the Shoshone-Bannock Tribes to protect Snake River sockeye salmon under the Endangered Species Act. Prior to ESA listing, a decision was made by the department to collect out-migrating Redfish Lake sockeye salmon smolts and retain the four anadromous adults that returned in August of that year to begin a captive broodstock program. It's a virtual certainty that if the captive broodstock program had not been initiated, this ESA-listed endangered stock would be extinct. Sockeye salmon are a true legacy species in Idaho. Losing them is simply unacceptable.

Q. What other salmon and /or steelhead recovery success stories have you seen in Idaho?

Wow, this is a broad question. What immediately comes to mind is the increased degree of collaboration we see, among stakeholders and managers, in the Snake Basin. Respectful working relationships now form the foundation for collaboration among entities, and as a result, products that cross traditional management boundaries are being developed and are routinely accepted.

Other success stories that come to mind include the progress made to implement hatchery reform and our growing understanding of the risks and benefits associated with integrating hatchery- and natural-origin salmon and steelhead in the hatchery, as well as on spawning grounds; sustained salmon and steelhead sport fisheries in

the Clearwater and Salmon river systems (steelhead since 1990 and Chinook salmon since 1997); and the successful reintroduction of fall Chinook and coho salmon upstream of Lower Granite Dam.

Q. How would you describe the overall, multi-agency effort to rebuild salmon and steelhead runs in the Snake River Basin?

We've really come a long way in a relatively short period of time. In the basin, managers are implementing programs more effectively and successfully than in the past, collaborating more, and producing a growing number of common products that address shared objectives. For example, in the Salmon and Clearwater drainages, states, tribes, and the federal government now work together to produce annual operating plans to manage the disposition of hatchery-produced salmon and steelhead. Similar collaboration takes place through working groups to address basin run forecasting, harvest management, and run reconstruction. On the monitoring and evaluation front, new tools such as genetic stock identification and parentage-based tagging are being used by managers to more effectively identify the origin and identity of natural- and hatchery-produced salmon and steelhead.

In the Snake River Basin, we're protecting and restoring habitat more aggressively than in the past, continuing to emphasize the need to maintain and protect important wild fish production areas, and managing hatchery-produced fish more effectively and responsibly. ■



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Council Decisions

Aug. 2012

Council Approves Yankee Fork Habitat Restoration

The Council approved construction of a fish-habitat improvement project in the Yankee Fork tributary of the Salmon River in Idaho. The goal of the work, being undertaken by the Shoshone-Bannock Tribes, is to increase juvenile spring/summer Chinook salmon abundance and survival through improvements in spawning and rearing.

Sept. 2012

Draft Annual Report to Congress

The Council released its draft Fiscal Year 2012 annual report to Congress for public comment.

Oct. 2012

Regional Technical Forum Members Approved

The Council approved staff recommendations to update the membership of the Regional Technical Forum for 2013-2015. The Council approved a new charter and bylaws for the forum in June. The forum is a Council advisory committee that develops standardized methods and protocols for verifying and evaluating energy efficiency.

Nov. 2012

Council Approves Fish and Wildlife Program Evaluation and Reporting Committee Recommendations

The Council adopted recommendations that will help streamline the implementation of existing work and phase out low-priority work.

Council Supports Study of Demand Response at Data Centers

The Council will assist a pilot project to investigate the use of demand response at data centers for power system balancing. The Bonneville Power Administration's technology innovation program, Ecofys, U.S., Inc., Energy Focused Resources, Lawrence Berkeley National Laboratory, and Excipio are major participants.

Dec. 2012

Draft Sixth Power Plan Mid-term Assessment

The Council released its draft Sixth Power Plan Mid-term Assessment report for public comment. The report includes a survey of progress since 2010, forecast updates, emerging issues, and candidate topics that could be addressed by the Council in its upcoming Seventh Power Plan.



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