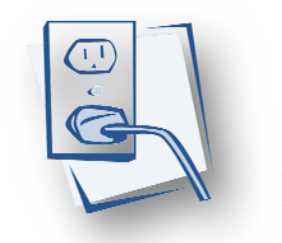
PNUCC REPORT Council



Northwest Power and Conservation Council
March 11-12, 2014

The Council, meeting in Portland, had a chat with newly minted BPA Administrator Elliot Mainzer, who said the agency has a lot of competing capital needs but will do what it can to meet the Council's conservation targets. February and March brought a significant uptick in the region's snowpack, and cutting-edge analyses from California show the value of wind declines as the penetration increases and a 50-percent renewable portfolio standard could result in significant overgeneration that would have to be mitigated. Next meeting: April 8-9 in Spokane.

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The Agenda

Mainzer's Meet and Greet with the Council

Council chair Bill Bradbury introduced Elliot Mainzer as the 15th BPA Administrator and one of the most qualified in the agency's history. We look forward to advancing the collaboration we have enjoyed with BPA in the future for the benefit of the region, he stated.

Mainzer responded by saying he'd been looking forward to the opportunity to get out and meet with friends and colleagues. BPA's relationship with the Council has been very important, and I'm committed to continuing that relationship, he stated.

Mainzer recounted that his first collaboration with the Council addressed wind integration, a highly technical topic. Today I will talk

"big picture," and I want to walk away with a clear understanding of your priorities, he said.

I am deeply influenced by the history of BPA and what we have accomplished going back to the 1930s to put together a power system for the public's benefit, Mainzer told the Council. He recalled several eras in the agency's history, including World War II and the "productive and innovative years" of the 1960s under the leadership of Administrator Charles Luce that still benefit the region.

Administrator Peter Johnson in the 1980s "stepped in to make excruciatingly difficult decisions" and put BPA and the region on sound financial footing; he elevated the level of public discourse, Mainzer said. When I think of the lessons through history, I want to stay true to the historic mission of preserving and enhancing the power system and to bring long-term thinking to this work, he said. Preserving the economic vitality of the region, that's what I want to continue, Mainzer stated.

One of the big issues for the Council is energy efficiency, he acknowledged. "Some signals from BPA's Capital Investment Review have left the wrong impression" about BPA's commitment to energy efficiency, Mainzer said. We will do what we can to meet the Council targets, he stated. We need to be realistic about the challenges we face in the region, and there are "a ton of competing demands" on our resources, Mainzer said. We have to be smart and collaborative to meet all of them, he added.

BPA has $10 billion in demand on capital in the next decade, Mainzer explained. We need to stay ahead on the transmission system to modernize our assets and meet reliability requirements and physical security issues, he said, adding "those are not free." There are fish and wildlife demands and investments needed to our technical systems, and we have the energy efficiency commitments, Mainzer said. We need to meet multiple objectives and carry on a huge tradition, he added.
In concluding, Mainzer acknowledged he "wouldn't have scripted" his path to Administrator in the way it happened. "It's been a tragic situation," he said. But I am excited about the job and I see tremendous opportunity, Mainzer wrapped up.

Swapping Views on Efficiency

Tom Karier said he appreciated the reminder of what BPA and the Council have accomplished for the region with fish and wildlife and on the power side, with a "phenomenal amount" of wind integration and lots of energy efficiency to maintain a low level of carbon emissions in the system. The energy efficiency target is not just for the Council, it is for the region, he stated. It is the lowest cost, lowest risk way to meet the needs, Karier said. We'd like to see a customer role in energy efficiency, but with obligations tied to it; maybe "a BPA backstop" if the customer approach doesn't work, he suggested. Working together, the Council and BPA can solve that problem, Karier added.

Henry Lorenzen said the challenge for electricity co-ops is lining up the motivation for conservation with the reality for retail utilities. As loads fall off, it puts pressure on rates, and co-op boards hate to increase customer rates, he added. While the region and utility customers benefit from aggressive conservation, it affects rates and that is one of the big challenges, Lorenzen said. There may be a way of twisting the incentives so utilities see conservation in the best interests of customers, the region, and their bottom line, he stated.

We need to get general managers to talk about and figure out how to address this issue,

Mainzer agreed. While we all understand the economics of conservation, they see their fixed costs go up and their revenues go down, he said.

Bill Booth asked if Mainzer expects to see changes in terms of centralizing BPA functions within the Department of Energy. The most important thing is to get the problems in our human capital organization fixed, Mainzer responded. At the end of the day, if we aren't completely compliant, it's a problem, he said. BPA has worked through 51 percent of the cases in which hiring practices came into question, and we are well along the path to get the hiring functions delegated back to BPA, Mainzer reported.

I've heard concerns about centralization and greater DOE influence on policy, he continued. The DOE secretary and deputy secretary understand that and want us to run a compliant operation, Mainzer said. We could see more centralization of human resources at DOE, but policy and other decisions reside in the Northwest, he stated.

Pat Smith asked for an update on the Columbia River Treaty. Mainzer complimented the Council representation on Treaty issues and participation on the Sovereign Review Team. We came up with a recommendation that "found a sweet spot" among the interests, he indicated. We hear that we are likely to see some signal from the State Department at the end of April, Mainzer said. I don't know what the process will look like, but things are slowly revving up again, he added. The next phase will be very different from what has gone on, and we will see how the State Department gets involved and "how we choreograph" with them, Mainzer said, adding that it is important to continue to coordinate in the region.

Phil Rockefeller said in his recent trip to Vietnam he saw "an alternate universe" with water quality and air pollution. The Vietnamese also intend to extend their reliance on coal, he said. We have a different approach here, with coal in this region becoming increasingly obsolete, Rockefeller noted. This leads to new challenges for transmission and meeting resource adequacy standards, he said. Rockefeller asked whether BPA is thinking about a scenario that phases out and replaces fossil fuel.

We have a lot of interest in these issues because of changes they mean for the grid, Mainzer replied. When discussions about phasing out Boardman and Centralia were going on, we were working to understand the grid impacts, he said. The greatest hedge against problems is continuing to support more collaboration among balancing authorities, working through entities like the Northwest Power Pool, Mainzer said. As we decrease these generating resources, we need to plan for grid expansion and balancing services; we need flexibility and we are planning for it, he stated.

Jennifer Anders said she has been impressed by projections for population growth in the region. That presents challenges, with increased demand on our resources, including the power system, she added.

Mainzer said the increased pressure on resources is a growing theme. When we add 4,700 megawatts (MW) of wind onto the transmission grid, it puts great pressure on the dams, he said. We have gotten to the end of the capability of the dams to provide flexibility for ramping, so we are trying to bring non-federal resources into the system to complement hydro, Mainzer explained. We have been procuring those resources, and we are seeing demand response show up, he added. We were historically dependent on

hydro, but we are opening up the supply-side capability, Mainzer said. The resource opportunities are tremendous, and we need to go out and harness them, he concluded.

Outlook Improves for Water

The 2013-2014 water year started out with extremely low precipitation, staffer Jim Ruff told the Council. But things turned around in the past month, and precipitation in February and early March was 130 to 180 percent of normal in most of the Columbia River Basin, he said. Overall for the year, precipitation in the basin remains below normal, particularly in the southern portion, Ruff stated.

Late-season precipitation has increased the snowpack, which is now normal overall for the basin, he continued. The highest measurements are coming from the eastern areas, Ruff said, adding that the snowpack in western Montana is at 130 percent of normal. Conditions remain below normal in Idaho at 95 percent, Washington at 89 percent, and Oregon at 65 percent, he reported.

Things are still very bad in southern Oregon, where the snowpack is the lowest in the basin, Ruff stated. The February and March storms were tracking north and missed the southern part of the region, he said. The Governor of Oregon could declare a drought emergency for southern Oregon, Ruff added.

The peak snowpack is usually reached April 1, and it is tracking toward 100 percent above The Dalles, which is better than 2013, he went on. In February alone, there was a 14 percent increase, Ruff said.

The runoff forecast has improved since January 1 in many parts of the basin, although there has been little change in southern Oregon and southern Idaho, he noted. There was a large increase in the forecast in the eastern basin, in northern Idaho and western Montana, where things are at or above normal, Ruff said. The highest forecasts are along the Continental Divide, he pointed out.

Ruff highlighted the runoff forecast in several basins, noting the forecast at The Dalles is right at average. Conditions in the Wenatchee and Yakima are above average, but in some of Oregon's major Columbia River tributaries, the Umatilla, John Day, and Willamette, the runoff forecast is below average, he said. According to NOAA, warmer than normal temperatures are expected in the southern Columbia basin, and the current oceanic conditions are average, Ruff concluded.

While the snowpack in the basin is normal overall, there is still lots of uncertainty, staffer John Fazio said. The NOAA forecast assumes average precipitation going forward, he said. While there is good news lately, there is still uncertainty, Fazio stated.

He presented the January-July runoff forecast at The Dalles for recent years, noting the 2014 forecast is 100 million acre-feet (MAF), which is right at average. A probability curve shows the runoff is very unlikely to be less than 80 MAF or more than 120 MAF, Fazio said. The range of potential runoff outcomes narrows as we approach September and the end of the water year, he said.

Fazio also plotted historical flows and the 2014 forecast for Lower Granite and McNary dams, the measuring points for fish flow targets. The analysis shows the region can expect average flow conditions, he said. In other words, there's almost no chance of having a really bad year, Fazio added.

Staffer Charlie Black pointed out that the farther south you go in the basin, the worse the water conditions. California is in a drought emergency so there will likely be a strong market for export power, he said.

There is a consensus that with extraordinarily low flows, fish suffer, Karier said. But otherwise, the role of flows is controversial, he added. It would be interesting to see what happens to fish in the tributaries under various flow conditions, Karier said. Fish in many of the tributaries are being tagged so data on the smolt-to-adult returns will be available, Ruff responded.

Jim Yost said Idaho's reservoirs went empty last year, but will likely refill with this year's water conditions. Idaho is likely to be able to add its 487,000 acre-feet to augment flows, he said. The soil is saturated, too, so there won't be a need for early irrigation, Yost stated.

More Wind, Less Value

Andrew Mills of the Lawrence Berkeley National Laboratory (LBNL) made a presentation on analyses he is doing to find "the right mix" of generating resources that minimizes costs while meeting needs. This "social planning" perspective is different from a utility perspective, he said. In general, the question being addressed by LBNL is how much renewable energy (RE) should be added to the system, he said. There are lots of constraints to finding the right balance, but there is a right mix, according to Mills.

The objective of social planning models is to minimize costs, and the LBNL research is exploring how much costs change with RE, he said. We look at the savings, which are the reduced costs from not needing to burn fuel and build other power plants, compared with the costs of building a new RE plant, Mills explained. If the savings are greater than costs, then adding more RE will bring down costs and help meet the objective, he said.

We want to keep adding RE until the savings are less than the costs, and the logic of the social planning models is to compare the costs and savings, Mills continued. It is never easy to find just the right mix since there are uncertainties about costs, he said.

Mills pointed out the challenge of estimating the value of variable renewables since there is a limited ability to forecast their output. The LBNL research is focusing on the value side of the question, he said. We are quantifying the economic value of variable renewables, such as wind and solar, understanding what causes changes in the value, and finding ways the changes can be mitigated, Mills added.

He explained results from various iterations of the model, including adding variable renewables in California and adding Wyoming wind in the Rocky Mountain area. The model shows us what happens as we add RE and what we get in terms of savings, Mills said. In both the California and Rocky Mountain case, the economic value of wind decreases with increasing penetration levels, he reported.

The next step in the research is to find out what contributes to the decline in value, Mills explained. In the California scenario, with the higher levels of wind, we start to displace less costly fuels and the value declines, he said. In the Rocky Mountain area, forecast errors drive the decrease in RE value, Mills noted. Researchers conducted the same analysis using solar instead of wind and found that at low penetration levels, solar has great value, he said. But the marginal value is less as the

penetration increases because of the need to add more capacity, Mills added.

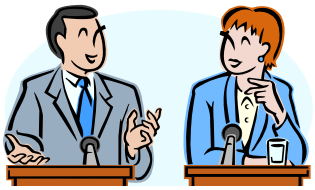
LBNL researchers looked at the options for mitigating the decline in the economic value of RE, he continued. There are several mitigation strategies, including geographic diversity of wind installations, real-time pricing, and low cost storage, Mills said. There are a range of options to slow the decline in the value, he added.

In conclusion, Mills listed the following: the marginal economic value of variable renewables decreases as the penetration increases; the changes in value are driven primarily by changes in the value of capacity and energy in California; a concentration in wind sites and day-ahead forecasting errors can also contribute to the decline in value; and several measures can help stem the decline, although the value still decreases with increasing penetration.

Anders asked how the LBNL findings translate to other regions. Mills acknowledged reluctance to analyze the Northwest because of hydro. In the Northwest, the analysis is dominated by the flexibility of hydro, he said. The analysis can be translated to other regions, but you will get a different story, Mills added.

Booth asked several questions about how resource costs are treated in the analysis. I would hope if we develop new models, we focus on fully depreciated resource costs, not just fuel costs, he said. Also, the analysis should take into account a region's ability to regulate wind and include real-life circumstances, like the availability of transmission for wind, so the model is less theoretical, Booth stated.

Our focus was to compare the value, and we didn't look at costs, Mills replied.



NEEA Planning Stirs Overlap Debate

The Council's Power Committee has approved draft comments on the Northwest Energy Efficiency Alliance's (NEEA) strategic and business plans, reported staffer Charlie Grist. The strategic plan lays out the vision and goals, and the business plan guides implementation going forward, he explained.

The issue of NEEA's overlap with some of its members' efforts arose as the plans were being developed, and the Council's draft comments encourage NEEA to resolve the issue, Grist told the Council. As NEEA expanded its role and utilities moved into the area of transforming markets, "the staffs have bumped into each other," and NEEA is trying to figure out how to manage that overlap, he elaborated. One option under consideration is for NEEA members to opt in or out of various market transformation efforts, Grist said. He noted the need for NEEA to be very careful in this area in order to maintain its value in negotiating for the entire region with large retailers like Wal-Mart.

Grist highlighted other areas of the draft comments, including strong support for NEEA's activities to scan for new measures and practices to keep the efficiency pipeline filled with new things. NEEA has $17 million in its budget to develop opportunities that come along as a result of the scanning, he said.

With regard to NEEA governance, Grist said the Council offered suggestions. NEEA's board has gone through a lot of turnover and as a result, there has been a slowdown in activity, he noted. Attention needs to be given to maintaining continuity on the board and to changing its makeup, Grist said. A lot

of the strategic plan development has been done by the board without a lot of public input, he added. That is an oversight and having strong public interest representation on the board would assure that input, Grist stated.

Bradbury asked if NEEA would have to amend its bylaws to incorporate the governance recommendations, and Grist said it would. Black pointed out that the expansion of NEEA's role since the Sixth Power Plan has brought about 50 MW of energy efficiency at a cost of $40 million. That indicates the value of NEEA's work, he said.

NEEA has done a lot of good work in the last five years to expand into its larger role, Grist said. "There have been bumps along the way" and that's where the overlap issues emerged, he added.

A Word from Idaho

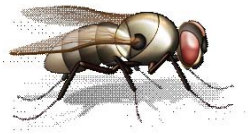
There's agreement that NEEA does great work, but I would be remiss if I didn't say there were problems, Yost stated. Idaho will take the position that there should be a reduction in the budget of 10 to 20 percent, he said. As for the overlap issue, Idaho has a problem with it in the irrigation sector, Yost said, adding that "it is a big problem that NEAA ought to resolve."

There should be a way for members to opt in or out of NEEA activities, he continued. NEEA should provide a basic service, and if it wants to expand its level of service, utilities should have the opportunity to opt in to provide it, Yost stated. The reason behind the hold-up on the business plan is only partly due to turnover on the board, he added. Some of the problem is within NEEA, Yost said. The internal problems need to be addressed and fixed, he said.

NEEA will have a special board meeting March 21 to adopt a new draft of the strategic and business plans, and there are four public meetings scheduled after that, Grist said.

Rockefeller asked about the proposed reduction in NEEA's industrial sector activities. I thought this was an area in which NEEA excelled and it accounted for significant gains in efficiency, he said. Grist confirmed the November version of NEEA's budget plan cuts market transformation activities by $3.7 million. The recommendation to scale down NEEA's role in the industrial sector came from funders who want to see NEEA focus on residential and who are tired of overlap with their activities, he said.

The Council voted to approve the draft comments and send them to NEEA.



Overgeneration: The Fly in RPS Ointment

Black introduced Arne Olson of Energy+Environmental Economics (E3), a California company that has been in the midst of the analyses on California's policies to reduce greenhouse gas (GHG) emissions. "California is pushing the envelope on greenhouse gas reduction," Black said, adding that the E3 work is instructive for the Council's Seventh Power Plan. E3 has investigated California's goal of moving to a large reduction in GHG emissions by 2050, and renewables are a big part of that, he continued. The effect of California policies is inseparable from the Northwest because of the interconnection of the power systems, Black pointed out.

The effort to investigate a 50 percent renewable portfolio standard (RPS) is the first time the state's five major utilities – publics

and investor-owned – have been joint sponsors in such a study, Olson said. He recounted California's RPS achievements to date, noting that the state is on track to achieve a 33 percent reduction in GHG emissions by 2020. The estimated rate impact of the reduction is between 6 and 8 percent, Olson reported.

The state is now thinking of going beyond the 33 percent, he said. A lot of work is being done on how that might be achieved, Olson explained. "Zero-carbon electricity is key" and meeting such a goal also requires decarbonizing other sectors of the economy, he said.

There are zero-carbon options for the electricity sector, including nuclear, carbon sequestration, and renewables technologies, Olson said, adding that there are many questions about the permanent underground sequestration of carbon. The question is, how far we can push before the costs are prohibitive, he stated.

Olson spelled out the key study questions as: what are the requirements, operational challenges, potential solutions, costs, and consequences of integrating 50 percent RPS by 2030 in California? The renewables industry is saying not to have a slowdown and to keep the pipeline flowing, and the utilities are asking what that means for operations, he explained.

A 50 percent RPS is a new challenge, Olson said. The state does not yet have operating experience at 33 percent, and no other state or country anywhere in the world has achieved an equivalent RPS, he noted. Olson pointed out that California is "neck and neck" with Germany and Spain, which had 22 to 24 percent renewables in 2012, but Denmark, with 30 percent wind, is not a good example because it relies heavily on interconnections with Germany and Norway to maintain system operations.

The question is whether California can make room for all of the renewables, he said, listing the integration challenges as downward and upward ramping capability, minimum generation flexibility, peaking capability, and sub-hourly flexibility. E3 built a model called REFLEX to look at operating conditions and see how often there would be conditions that pose problems, Olson explained.

The study scenarios were a 33 percent RPS plus five high RPS scenarios up to 50 percent, he said. All of the scenarios include 7,000 MW of behind-the-meter solar photovoltaic that does not count toward the RPS, Olson added. The study assumes all renewable generation is balanced by California grid operations, he said. "We wanted to see if California can accommodate that level of RPS without leaning on its neighbors," Olson stated.

The study also assumed retirement of 19,000 MW of coal, nuclear, and gas plants that use once-through cooling by 2013, he continued. Up to 1,500 MW of exports was allowed in the base case, Olson added.

The study found that the capacity value of renewables declines significantly over 33 percent, he reported. If you keep adding solar above 33 percent, there is no increase in load-carrying capability, Olson said. We have to think about pure capacity, he stated.

Curtail Renewables to Manage Grid

The main integration challenge is overgeneration, Olson went on, and there is increasing overgeneration with RPS over 33 percent. Overgeneration is very high under the 50 percent large-solar scenario on some days in the study, he said. In the large-solar

case, overgeneration is extensive and can occur in any month; in spring months, overgeneration could be 8,000 to 10,000 MW at midday, Olson said. We have to find a way to manage this energy flow onto the grid, he stated.

"We have to be able to curtail renewables," Olson said. It is a critical strategy to maintaining reliability in the high RPS scenarios, he added.

The potential integration solutions include a managed and compensated curtailment of renewables, Olson continued. The E3 study analyzed five potential integration solutions cases, he said: diverse portfolio, enhanced regional coordination, conventional demand response, advanced demand response, and energy storage. The model tested 5,000 MW of each solution by 2030, Olson explained.

According to the results, only solutions that provide downward flexibility reduce overgeneration, he said. According to a table of results, regional coordination provides the largest reduction, from 12,000 MW of overgeneration to 4,700 MW.

The E3 study also analyzed costs, Olson said, noting the assumptions made for the analysis. The 50 percent RPS scenarios resulted in a 9.1 percent to 23.4 percent increase in average system rates relative to a 33 percent RPS in 2030, he reported. His graphs show the largest rate increases are associated with the small solar and rooftop solar scenarios; the smallest increase is the diverse portfolio. The flexibility solutions reduce the cost of meeting a 50 percent RPS in 2030, but they result in higher average rates relative to the 33 percent RPS, Olson pointed out.

Electricity sector carbon emissions decrease by 2030 in all of the RPS scenarios, and there are greater reductions with the 50 percent RPS, he continued. The cost of the reduction, according to the analysis, is $300 to $500 per ton of GHG, Olson said.

In conclusion, integrating 50 percent renewable energy in California appears to be technically feasible with only one tool, renewable curtailment, needed, he stated. The integration challenges include overgeneration during the daylight hours, which is likely to be significant under a higher RPS, Olson said. There are a number of promising renewable integration solutions, he stated.

We need to have the solutions in place before we implement the higher RPS, Olson told the Council. The most promising is the diversity in the Western Interconnection; it is more and more important to coordinate across regions, he wrapped up.

The transmission system in the Northwest works to integrate wind that goes to serve California, Lorenzen said. Does our system suffer as a result? he asked.

The more wind you have on line, the less capability you have to integrate without building new flexibility resources, Olson responded. BPA and others are providing the integration service for wind and charging for it, he said. In the analysis, California wanted to address integration itself and didn't want to export the problem, Olson stated.

How much did you lean on the Northwest? Karier asked. The way we did the study is to model California "as a bubble," Olson replied. For example, we didn't assume you could go from 12,000 MW of imports to 12,000 MW of exports in an hour; we looked at the historical data and limited the ramp accordingly, he said. For the regional coordination scenario, we relaxed the ramping, Olson explained. We worked on load shapes in the Northwest and Southwest,

and it looks like there might be a 6,500 MW export possibility, he added.

Runs Could Set "High Water Mark"

Bill Tweit of the Washington Department of Fish and Wildlife and Ed Schriever of the Idaho Department of Fish and Game briefed the Council on forecasts for the 2014 salmon and steelhead runs. We are still in "a sweet spot" for salmon returns, although the numbers for steelhead are not as good, Tweit said. For stocks that spend time in the Gulf of Alaska, "we are looking good," he added.

The 2014 forecast for spring chinook returns is 227,000, which represents an average year and an improvement over last year, Tweit said. "We have been bedeviled in forecasting that stock," he acknowledged, and because of the variability in the spring returns, we will be conservative in our fisheries management. Tweit also noted that the peak timing of the spring run is a week later than it has been historically.

The 2014 sockeye forecast is 347,100 fish compared to an actual 2013 return of 186,100, with good strength in returns for both the Wenatchee and Okanogan, he reported. As for upriver summer steelhead, the 2014 forecast is 281,000 compared to an actual 2013 return of 231,400, Tweit said.

The 2014 forecast for the upriver fall chinook is 1,399,000, he continued. The 2013 forecast was 539,300, but the actual return of 1,078,500 "was unprecedented," Tweit stated. Here, you see the most effect of the ocean, he said, explaining that these fish spend lots of time in the Gulf of Alaska. Many of these falls will go to the Hanford Reach, and "if you ever want to see Hanford with lots of spawners," this is the year, Tweit stated.

Rockefeller asked about the impact of drawdown at Wanapum Dam on 2014 spawning. The situation is better viewed as a longer-term problem, Tweit said. We have a series of agreements with the dam operators and flows are managed to avoid dewatering redds, he said. Once we see emergence, the agreement shifts to operations that focus on avoiding stranding, Tweit explained.

The primary tool for the operation has been Wanapum pool, which is a large pool, he said. In the 24-hour operating cycle, Wanapum pool is important, Tweit stated. As long as the pool is down significantly, it can't produce that needed water, he said. We are urging other PUDs and BPA to cooperate as much as possible to address the situation, Tweit added.

In summary, the 2014 forecast is for 2,566,600 fish, and if we are correct, this could be "a high water mark" for returns, he stated. In the larger context, which is more relevant to the Council's long-term goal of 5 million fish, the 2013 return was 2,261,000, Tweit said, adding that "we are in a positive part of the cycle."

Schriever reported on the Snake River runs, a subset of the upriver stocks. The Snake River fall chinook are experiencing the benefits of ocean conditions, as well as hatchery supplementation, he said. The 2014 forecast is over 57,000, and the natural origin fish numbers will be higher than those for hatchery fish, Schriever said.

Idaho sockeye is on "a life-support program," he said. While it is difficult to accurately forecast such small run sizes, we expect more than 1,000 fish over Lower Granite Dam in

2014, and fewer will make it to the Stanley Basin, Schriever said.

He noted that Idaho's summer steelhead run for 2013-14 isn't complete since fish that passed Bonneville Dam last summer and fall are still making their way to Idaho. The run will end up with about 24,000 natural and 76,000 hatchery steelhead, Schriever said, adding that it is difficult to forecast steelhead because they spend only one year in the ocean. We expect to see an increase in the natural return at Lower Granite in 2014-15, with about 45,000 fish, which is a little higher than the 10-year average, he reported.

The spring/summer chinook run in 2013 was a little disappointing and there wasn't much of a fishery, Schriever said. In 2014, the forecast is for over 45,000 natural spring chinook above Lower Granite Dam, which is about twice the 10-year average, he said.

Booth pointed out that two Idaho hatchery programs have done quite well: the Nez Perce with fall chinook and the effort with the Redfish Lake sockeye. Why are those two programs successful while others are not? he asked.

With the sockeye program, we had no alternative, Schriever said. It was a life-saving measure and we took all of the genetic information we had into protection, he said. The science behind the program has allowed us to maintain the genetic diversity, Schriever added. With fall chinook, there could have been a lot of homogenization before there was protective action, he said, but "we can't paint hatchery programs with a single brush." There are a lot of reasons and no easy answers, Schriever said.

NW Arms for Mussel Fight

Stephen Phillips of the Pacific States Marine Fisheries Commission briefed the Council on Columbia River vulnerability assessments and rapid response preparedness for quagga and zebra mussels. Infestations of the mussels have cost an estimated $5 billion in the United States, and in 2013, the mussels were found in Lake Powell in Utah, he said.

Phillips described the region's rapid response plan, starting with the control options and the permitting process required for the use of chemicals such as copper sulfate in the water. While copper is the best option for eradicating the mussels, it is very bad for salmon and steelhead, which poses a big obstacle in the Columbia River, he pointed out.

An effort has been undertaken to assess the vulnerability of various facilities in the Northwest to mussel infestations, Phillips reported. A recent survey shows not many assessments are completed, although the Bureau of Reclamation reports that it will conduct vulnerability assessments at Minidoka and Palisades, he said. These are important projects for an assessment because of the high calcium levels in the Snake River, an environment in which the mussels can survive, Phillips explained.

Southern Idaho and western Montana are at high risk, but the risk west of the Cascades is low, he added. The price tag for completing the assessments is estimated at $475,000, Phillips said.

Smith asked if the U.S. Park Service is decontaminating all boats coming out of Lake Mead in Nevada. It has been a struggle, Phillips responded. The Park Service was

unable to decontaminate boats to our satisfaction, he added. We would still like to see all watercraft that are moored long-term at Lake Mead and Lake Powell decontaminated, Phillips said.

More funding is needed to carry out enforcement activities, he noted. The Water Resources Development Act in Congress is the best hope for increased funding, Phillips told the Council.

Yost said there is an order in Idaho for any boat coming from Nevada to be pulled over and decontaminated. We found many contaminated boats coming from Lake Mead and they had to be decontaminated in Idaho, he said. We are continuing to do inspections and hope to increase the days and hours at inspection stations, Yost added.

I've always felt we need to be ready for that moment when we discover mussels in the region, Booth commented.

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