

James Yost
Chair
Idaho

W. Bill Booth
Idaho

Guy Norman
Washington

Tom Karier
Washington



Northwest Power and Conservation Council

Jennifer Anders
Vice Chair
Montana

Tim Baker
Montana

Ted Ferrioli
Oregon

Richard Devlin
Oregon

Council Meeting January 9 & 10, 2018 Portland, Oregon

Tuesday, January 9, 2018

Council Chair Henry Lorenzen brought the meeting to order at 1:30 p.m. All members were in attendance.

Reports from Fish and Wildlife, Power and Public Affairs committee chairs

Fish and Wildlife Committee

Fish and Wildlife Committee Chair and Council Member Jennifer Anders reported on six items:

1. The committee heard a report from the O&M subcommittee, which met yesterday. It's making progress implementing essential needs for screens and hatcheries in the Basin. It's also identifying needs for screens and hatcheries in 2019 and 2020. The group is looking to provide an overall strategic plan by March.
2. We will be going into the Fish and Wildlife Amendment process soon, Member Anders said. Staff is teeing up issues relating to that process. This process is only one of many taking place in the Basin. There is the ongoing NEPA process, Biological Opinion development, court decisions, the Columbia Basin task force and the Columbia River Treaty, all of which are in play. Some of the questions to be thinking about include how much potential exists for improvements in survival, productivity and capacity through additional actions; and what impacts such as threats from warming temperatures, contaminants, predation and non-native species have on our goals. The ISAB is looking at this and will have their report in February or

March.

3. There was a report on the Columbia Basin Partnership task force. This is a group organized under the NOAA Marine Fisheries Advisory Committee (MAFAC). A wide range of sovereigns and stakeholders are participating, including many Council Members. The group identified a number of issues relating to the future of salmon and steelhead, including habitat, capacity, reintroduction and harvest. The task force is working on making a recommendation to MAFAC on common goals for long-term recovery of salmon and steelhead in the basin. The report is scheduled for completion in January 2019.
4. The Committee received a briefing on the proposed Albeni Falls settlement from Idaho Department of Fish and Game. It's a pending agreement between Bonneville and Idaho to mitigate the impact of construction and inundation at Albeni Falls. The agreement includes a stewardship fund for O&M funding and restoration work to address operational losses. Operational losses are a new thing, Anders said. It will go out for public comment in a couple of days.
5. There was an update on emerging priorities. It includes the O&M workgroup, adaptive management and an inquiry into screw traps. They are pervasive in the Basin and are a significant cost to BPA, but they are working well and sponsors are deploying and managing them efficiently. A summary of that effort will be completed this spring.
6. There was a Committee discussion on edits to the polycyclic aromatic hydrocarbons (PAH) story map, with a recommendation to post the map on the Council's website. The full Council will get a look at it tomorrow.

Council Member Tom Karier asked how much money was involved in the Albeni Falls settlement. Member Anders replied she didn't know the amount, but in terms of acreage, it's about 6,000 combined for C&I. Member Karier asked, "We don't know how much it is?" Member Anders said it wasn't a part of the presentation. Member Booth added that there are still details to work out and fact sheet should be ready in a couple of days. Then, there will be a 30-day comment period, he said. Idaho Fish and Game will come back before the Committee and the full Council with a presentation.

Member Karier asked, "Is there a plan for staff or the independent economic board to review it? I was asked by a utility. They described it as a multimillion-dollar settlement, it's a big deal — a big contract for fish and wildlife. The question was, does the Council review that? Utilities are worried about BPA's potential insolvency in 2028, and a lot of debt they're carrying into that. The concern by the utility was, do these kinds of settlements help or hurt their ability to make payment in 2028? I don't know the answer, but the question was, are we reviewing this settlement? If we're not reviewing it, it's good to know that. If we are, it's not a bad thing to take a look at. I don't know if anyone on the Committee or the staff are doing that kind of work."

Member Booth said the Council doesn't have an approval/disapproval role in this. He added that even though it's not a Council decision to approve or disapprove, "we'll make sure it's well vetted through the comment period, and that Council members have an opportunity to get those questions answered."

Member Lorenzen said, "To be taken up later."

Power Committee

Power Committee Chair and Council Member Karier said the meeting started off with a presentation from Tim Johnson, counsel for BPA. In the 7th Power Plan, the Council identified several opportunities for lower-cost generation in the Northwest. Many IOUs are closing baseload coal in the next five to 10 years and need to replace that with some firm power, Member Karier said. They could build gas plants, which cost \$60-80 per MWh, or to buy contracts from Bonneville, which is hydro generation with low carbon costs. It would be a better sale for BPA at \$20-\$30 in the short-term market. The question is, can BPA do that? It has a number of restrictions under federal law. Johnson provided the nuts and bolts. BPA can do this with up to five-year rolling contracts, Member Karier said. They can sell any surplus energy or savings that is created through energy efficiency or demand response. Interested parties should review the details in the meeting minutes.

Staff brought a question regarding some of the comments about the Department of Energy's request for comments. One was about their current process for regulating energy efficiency and setting standards for it. The other was about the process and alternatives to that process. Council staff has developed detailed comments, and the Committee is going to provide any final suggestions by Monday. Staff will revise that and send it out to the rest of the Council. Those two documents will be reviewed at the Council meeting in February.

Staff also brought a question about the development for the 8th Power Plan. One key strategic decision is will it continue to focus just on the region or Bonneville as well? Some presentations make it clear that in the Power Act that there's an expectation that the Council will do both. In past years, we have done both, but the emphasis has been on the region, and less emphasis on the Bonneville part. The message from the Committee is that we need to increase the focus on the Bonneville component. We'll continue to do both, he said. Certainly we need more data and more models to incorporate BPA into it. We'll be directing staff in that direction.

Last, there was a study by John Ollis and others to estimate the marginal release of carbon emissions. That's on our full Council agenda today.

Public Affairs Committee

Public Affairs Committee Chair and Council Member Jim Yost said the group did not meet last month. There was a letter requesting committee support for a \$10,000 fee to support an energy efficiency effort with NEEA. Committee members need to let Mark Walker know how they feel about that. There is no meeting today.

1. Council decision to release the Avoided Rate of CO2 Emissions Study for public review and comment.

The cost of future carbon dioxide regulation has been a significant factor in the region's resource planning. To avoid making higher-cost resource choices, a direct evaluation of carbon risk requires an estimate of the carbon dioxide emissions avoided by purchasing conservation or another resource.

John Ollis, power system analyst, gave a presentation that also was given to the Power Committee. Everything flows toward California, he said. These major transmission paths are why we're seeing avoided carbon dioxide emissions rates.

In April 2017, there was robust stakeholder response to the first draft of the study in that they wanted to be more involved with the methodology. After meeting with the System Analysis Advisory Committee, staff settled on an updated methodology that is easier to calculate and produces similar results, but there are larger ranges. The study is different enough so it's almost as though staff is releasing a first draft with this new methodology. Therefore stakeholders should get a look at this methodology for public comment.

The result is an annual avoided emission rate. It's an estimate of the marginal CO2 emissions rate. Whole point is that it's a proxy for estimating the emissions rate of a resource.

The existing policy aligns with the 7th Plan. The 7th Plan's build-out is reflected in the years of 2016, 2021, 2026 and 2031. The social cost of carbon is discussed as it applies everywhere across the West, not just the region. The only carbon penalty in the existing policy is the cost in California. In 2020-2021, there's a decrease. With the social cost of carbon, the rates are a little lower. In general the range broadened and then went down.

Why was there a methodology change? There wasn't as much stakeholder involvement. The SAAC provided direction on a methodology change. They suggested taking a WECC-wide look at avoided carbon emissions rate.

Ollis and Ben Kujala, Power Division director, provided detail about the methodology.

When we reduce output by 100 MW, it doesn't necessarily correspond to a 100 MW output reduction in the WECC, Ollis said.

Council Member Guy Norman said, "I assume it equates to a higher output loss."

Kujala said that when we reduce load by 100 MW, generation reduces by 80 to 90 percent most of the time. The reason is where we're reducing the load. If it's reduced elsewhere, we may get a different result. When you look at generation changes, you're not getting a one-for-one trade.

It's mostly a transmission loss, Ollis said. Even though we're dropping 100 mw, you can see that the emission change and output change is very small in WECC's case. We're measuring something that is a pretty good estimate of what a marginal rate would be.

Looking at different months, sometimes fuel goes up and down. Most of the fuel usage ends up being broadly the same, except in the Pacific Northwest and Arizona. In Arizona, most of the fuel changes are coal and, in the Northwest, it's natural gas. It's a pretty big story.

There is a huge variation in coal use in Arizona based on the water year, Ollis explained. When I started looking at these results, I saw a bunch of stuff going on in Arizona, Colorado and Utah. When you drop load in the Northwest, you hike exports to California. That's the tradeoff we're seeing here.

The monthly average regional exports are about 3,000 MW to California, he explained. You're not ever seeing a hydro year where we're not on average exporting. If you reduce by 100 MW, you're impacting your exports. The 100 MW you're reducing is coming out of a particular part of the stack.

So what are we optimizing?

- The optimization in AURORA is focusing on meeting load at the lowest cost. There's nothing to tell you to keep that gas plant on. If it's better to leave the coal plant on, that's what it will do.
- Optimizing for the lowest CO2 emissions would be a different objective.
- Since part of the resource stack is filled with varied fuel types, big rate swings may happen hour to hour. But in general, there seems to be an avoided carbon rate that is similar to that of a CCCT.

Looking at the WECC fuel stack, at a high level, the hour demand range varies between \$30 and \$90 per MWh on marginal units. It's almost all coal and baseload natural gas.

Kujala said the takeaway is that you see gas and coal intermixed. Looking at a least-cost solution, you're not always going to have less carbon by reducing load. When you run the system with a cost on carbon, emissions follow as you expect. The social cost of carbon produces a different result.

There's some stickiness in the power system: when you commit a plant, it might have to be on for a while. There is less flexibility in terms of fuel requirements.

Member Karier said, so that's a fourth of the generation in the system that is sitting on the bottom in the model. Does that ring true in the real world?

Ollis replied this is just fossil fuels. Variable generation doesn't have this. Fossil fuel plants are only running on the minimum if they have to provide reserves. If you have to commit to a coal plant for a week, or gas for a day, you might have a couple hours

where you're out of the money. You might want to back down to minimum generation if you don't need it. Most of the time, they're not hanging out with minimum generation.

To sum up, as coal plants are retired in these model runs, the annual avoided emissions rate goes down. Where there's carbon costs applied equally across the WECC, you'll see that the avoided emissions rate is diminished.

Member Karier said the Committee unanimously supported releasing this study for public comment and review.

Member Lorenzen asked that when you indicate the cost of plants when they're dispatched, is it an all-in or variable cost? The plants are dispatched on a variable-cost basis, replied Ollis.

Council Member Tim Baker asked about the composition of the SAAC. Kujala replied that it's a broad group of modeling experts and he will provide a list. Member Baker added that he can see the difference in the hydro stack from the low 30s to about 25. He can't see how it changes anything else. Ollis said that just represents capability. We're unique in WECC in terms of hydro. There's 6,100 MW of scheduled coal retirements between 2016 and 2021 in the WECC. Only 1,500 MW are in the Northwest. Then another 3,000 MW of coal retirements between 2021 and 2026, and then another 2,000 MW between 2026 and 2031. I was shocked.

Kujala said the source is the WECC 2026 Common Case; a consensus of the region.

Member Anders asked about the significance of the end product. Kujala – study done in 2008 at the Council, useful in talking about potential impact of carbon reductions from various things. It is not a part of any power plant. We had our own carbon modeling. Mostly it's been picked up in regulatory forums to understand the implications of making a change for carbon. In Oregon, there is a docket at the OPUC to look at a combined heat and power plant, and this is one of the studies used for that.

Member Yost said when we reduce power generation in the Northwest by 100 MW, the impact is felt elsewhere such as Colorado, Arizona, Utah or California, but it might increase or decrease emission there, depending on the price structure of coal and gas. So maybe it's not a benefit to the region unless you get larger reductions. Maybe we should make reductions so it increases emissions in California, Arizona and Utah; they deserve it. If it doesn't have any impact on the Northwest, we're free to do that. However, I have a problem if we use this information to establish a price for carbon. But I have no problem sending it out and having people take a look at it. Some may find it useful, but I don't think it's a proper application for the Northwest to try and establish a price for carbon.

Kujala said it's not their intention to establish a price for carbon. The Power Plan is our basis because we had that scenario there. We wouldn't produce something like that unless we had a lot more process than this.

Member Lorenzen remarked, "Jim, I don't think carbon stops at the border."

"You don't give up do you?" Member Yost replied.

"Not for another day," Member Lorenzen countered.

Council Member Tom Karier explained that it's easy to get lost in the details, but when you reduce load in Northwest, you reduce the overall carbon in the system. It's a good we provide for California that we're not necessarily being compensated for, he said.

Ollis said the next steps are to:

- Continue stakeholder involvement;
- Meet with System Analysis Advisory Committee to vet methodology and assumptions, and discuss results;
- Produce an updated report to reflect stakeholder feedback, revised methodology and results; and
- Put a study out for a second round of public comment.

Northwest Power And Conservation Council Motion to Release Avoided Rate of CO2 Emissions Study for Public Review and Comment

Member Booth moved that the Council approve the release of the revised Avoided Rate of CO2 Emissions Study for public review and comment for a period of 30 days, as presented by staff.

Member Baker second.
Approved without objection.

2. Chinook salmon survival in the midst of increasing marine mammal predation

Laura Robinson, program liaison coordinator, introduced Brandon Chasco, Oregon State University. Dr. Michelle Wargo Rub also was scheduled to present, but she was unable to attend.

Chasco discussed a paper looking at the impacts of marine mammals on protected fish. The paper has generated quite a bit of press, with about 100 news outlets reporting on its findings.

Chasco said the study began looking at the populations of killer whales, and why Southern Residents are showing no signs of recovery. They used a spatio-temporal bioenergetics model of the Northeast Pacific Ocean to quantify how pinniped and killer whale predation has impacted Chinook salmon returns, and to compare the resulting estimates with salmon fisheries.

They took information from 400 different articles, studies and reports, using research that's been conducted over the past 40-50 years. They used a lot of unpublished data as well.

The primary takeaway is that predation of Chinook salmon by these predators has increased by 150 percent over the past 40 years. In the meantime, the capture of Chinook salmon by West Coast fisheries has decreased by 41 percent.

The predators examined are killer whales, harbor seals, California sea lions and stellar sea lions.

There are four resident killer whale populations. The southern are the only ones who haven't been increasing. It's a pretty critical situation, Chasco said. They're also trying to assess how many salmon the predators are eating. They used a bioenergetics model, which is based on the food needed to grow and how much waste is produced.

Killer whales need a lot of energy each day, between 150,000 and 280,000 calories. For stellar sea lions, it's about 25,000 calories. How much of that energy is coming from Chinook salmon? Killer whales prefer to eat Chinook. Pinniped are less selective.

Chasco explained the distribution of adult fish in the ocean during each month. Chasco told the Council that killer whales are only eating larger, adult fish. Harbor seals eat juvenile smolts right when they come out of the river. Sea lions enjoy a banquet of both smolts and larger fish.

He ran through the aggregate findings for the Columbia River:

Numbers and biomass of Chinook consumed by predators. The harvest from fisheries has declined from 4 to 2 million. Predation has gone from 1.3 million to 3 million.

Predation of Columbia River fish: the consumption of Columbia River throughout the West Coast has been increasing over the last 35-40 years. While the Salish Sea has been pretty restrictive in fishery harvest, predation is high.

Chasco said that harbor seals are eating 25 percent of the juveniles before they mature. We don't know what the marine survival of the juveniles are the first year, he said. The problem with juvenile surveys is there aren't any.

Conclusion: marine mammal consumption of salmon is likely increasing, compared to 30 years ago.

This was an accounting exercise, Chasco said. They want to move toward a model and create a feedback loop. That requires including catch and escapement data in the model. Another caveat is a lack of ocean survival data. There are no solutions right now. Chasco said he will start work at NOAA in a few months assuming the government hasn't been shut down.

Member Norman asked about trying to connect specific stock abundance in particular regions with stock abundance in particular mammals. Is it a similar model to getting marine mammal location by month and connecting that with a stock location by month?

Yes, that's what this does, Chasco replied. Fish availability to those predators in those months are similar to what would be captured by a fishery at that location. Marine mammals in the northern region have more diversity in their diet than in the southern region. The Columbia River feeds most of the predators up and down the West Coast. Next is the Salish Sea. Hatcheries there are pumping out a lot of fish.

Member Norman said when you showed the chart of individual predation from individual regions, I assume that models several different populations and combining them. You could split it out by the Snake and Lower Columbia, and assume there's a ration of different populations in the Columbia River are being consumed. Chasco said he didn't go into that detail.

Member Booth said this has been eye opening. He asked how Chasco determined the numbers of harbor seals and their amount of predation. Chasco described how they model that information. He added that after talking with Steve Jefferies, there are about 6,000 harbor seals at mouth of Columbia River. In Puget, the number is about 15,000, up from a few thousand. Some are specialists. Some don't eat salmon, just squid.

Member Karier referred to the question of what happened to the southern resident killer whales. He said perhaps there are implications that they rely on Chinook and there are less available. Are harbor seals robbing them of their food? Chasco said it's a story a lot of people might want to tell, but it's not that easy yet. I'm not a killer whale or marine mammal biologist. Recent work suggests that no matter how many salmon there are, that's not the issue. The killer whales are so few and so inbred right now that they're in terminal drop. A lot of work is going into that right now. But I don't think anyone would argue that there are fewer Chinook salmon coming back from Puget Sound. I don't know if that is a downstream problem (when the fish come right out of the river) or is it upstream from the southern residents that there are too many northern killer whales creating a curtain for their primary food source, which is adults returning? Yes, the harbor seals are eating a lot of juvenile Chinook salmon. But does that mean that the birds and spiny dogfish are eating that much less salmon? The same number of juvenile Chinook are making it out into the Gulf of Alaska, and the real problem is that there are adult Chinook that are not making it back. Or, is it the juvenile consumption by harbor seals is an additive problem, and there are just enough adult salmon making it to the northern residents, but if you just got rid of the harbor seals, there'd be more adults making it past the northern populations. I don't know that yet and would hate to speculate. But killer whales can eat an enormous amount of food, he said.

Member Karier said, "You raised two hypothesis. You know both marine mammals are eating more salmon than they used to."

Member Lorenzen said there is an Executive Committee meeting at 8:30 a.m., and that next, there is a reception to honor a couple of outstanding members.

Meeting recessed at 3:17 p.m.

Wednesday, January 9

Chair Lorenzen called the meeting to order at 9:30 a.m.

3. Update on ocean conditions

Patty O'Toole, program implementation manager, introduced Laurie Weitkamp from the Northwest Fish Science Center. O'Toole said it's a good time for a more comprehensive look at the marine environment where salmon and steelhead spend a number of years. A memo was sent by the Science Center to the assistant regional administrator, Michael Teehan, in August 2017 that said, "Our data, collected during the summer of 2017, suggests very poor ocean conditions for salmon, which follow on the heels of unusually warm surface temperatures, the warm blob and a strong El Niño event. There is a high potential for these adverse conditions to negatively impact salmon returns to the Columbia River for the next few years."

Weitkamp reviewed recent physical conditions in the areas of the Columbia River Plume and near ocean where Columbia River salmon reside for one to three years. She reviewed

1. Columbia Salmon use of marine waters
2. Physical conditions across the North Pacific
3. Biological response to physical conditions
4. Forecasts

Weitkamp discussed Columbia River salmon's use of marine waters – each stock uses the ocean differently. They enter at different sizes, ages, and times; go to different places, eat different things; and return after different amounts of time. Collectively, these factors determine their marine survival. When we have strange ocean conditions, how does it impact stock?

There are three main patterns for Columbia River salmon entering the ocean:

1. Rapid northward movement on the shelf of the Gulf of Alaska (spring Chinook, chum, sockeye, some coho)
2. Remain in local waters (fall Chinook and some coho)
3. Move rapidly offshore and have the widest distribution (steelhead)

This initial period is when most mortality occurs.

Weitkamp discussed the high seas distribution for Chinook, coho, sockeye & chum (most come from abundant Fraser River populations) and steelhead.

Member Booth asked about the harvest of Columbia River fish near Vancouver Island. Coho (silver salmon) don't head up too much along the coast so they are not subject to Alaska sport and commercial fisheries. How much impact does Alaska fisheries have on Columbia River Chinook?

They catch a lot of Columbia River Chinook, Weitkamp said. I'm told 30 percent of the Chinook caught in Alaskan waters originate there. She's on the Pacific Salmon Commission, which implements the treaty. She's on the Coho TEC, and they're renegotiating the treaty. She said that the Chinook TEC is much more contentious because they swim through Alaskan waters. Member Booth said in Alaska they have length rules, not wild fish rules, and wondered if we're missing the boat by not paying more attention. Weitkamp said the management is such that Columbia River is paying closer attention. We need our fish back. There was a big closure last year to protect British Columbia, Washington and Columbia River populations. You don't want to close things down until your own population is impacted, and they had record low returns up there. So they have their own problems.

Member Booth said there's a large Russian commercial fishery up there too. That's a different matter, Weitkamp said.

Weitkamp said there are three patterns to adults returning to the Columbia River:

1. Southwards movement along the shelf
2. Northwards along the California and Oregon coasts
3. More rapidly onshore or unknown.

Columbia River Coho come up from the south. Those are caught along the Oregon and California coast. They have a southern approach. Most people aren't out fishing in the ocean this time of year, so we don't know what's out there.

Weitkamp discussed sea surface temperatures. The blob has had a huge impact. There's still a hangover effect because of it. In 2013/14, there was a ridiculously resilient ridge. It blocked storms and kept heat in the ocean from getting transferred up and down. It kept nutrients from getting to the surface waters. By July 15, there was a strong El Niño — one of the three strongest in 100 years. In spring 2016, things cooled down for a La Niña event. Now there's a La Niña that started in November 2017.

Member Anders asked at what point do those cycles equalize themselves? Over time, looking out over 100 years, things generally even out, or do these phenomenon raise the threshold to a different level? Weitkamp replied that the blob has raised things to a different level. They keep thinking it's dropping down, but we're waiting for it to get to more-typical conditions. It tends to be a colder ocean with La Niña. There's never a day where the North Pacific looks average. It's extremely dynamic. Also, there are major ocean currents moving things around.

Weitkamp outlined the biological response to physical conditions in the ocean. This includes extremes across the North Pacific, observations from the California current, and adult salmon returns from Alaska to California. She said we pay close attention to how many salmon come back, and they're good samplers of the ocean environment.

Looking at extremes across the North Pacific:

In 2015 and 2016, we saw tropical species in the ocean off of Washington and California, dramatic changes in food webs, skinny Chinook and coho, red plegic crabs off the coast of Oregon, anchovies invaded the Salish sea, and the presence of domoic acid, which causes amnesic shellfish poisoning, continues to close crab and clam fisheries from Alaska to California.

On the positive side, in 2017 there was an increase in lamprey counts at Bonneville Dam. Also, swordfish were seen off of Vancouver and there was low Pacific cod abundance in the Gulf of Alaska, which is attributed to the blob. Plus, crab and clam fisheries continue to be closed.

Weitkamp said bad conditions elsewhere can affect our area. California sea lions left Southern California for greener pastures at the Columbia River.

Observations from the California current include an unusual abundance of many fishes in NWFSC Salmon Surveys. These include pompano, rockfish and mackerel. Rockfish are juvenile salmon prey, and in a year or two, they'll be predators of salmon. It's a cause for concern, particularly the jack mackerel. There's also an unusual abundance of squid and other creatures.

Looking at salmon returns, extremely low juvenile salmon abundances in 2017 will likely result in poor adult returns in 2018 and 2019, Weitkamp said.

Unusual adult salmon observations in 2015:

- Interior Fraser and Salish coho were in extremely low abundance, small body size and low fecundity.
- Columbia and Oregon Coast coho had the lowest returns since the 1990s.

Unusual adult salmon observations in 2016:

- Alaska Pinks had the lowest returns in memory and Fraser sockeye had the lowest returns on record.
- Fraser chum had the highest in 20 years, and there were high chum returns in the Washington and Oregon coasts and the Columbia.

Initial salmon observations in 2017:

- Fishery closures for Chinook in British Columbia, Washington and Oregon.
- Fishery closure for Klamath Chinook.
- In Alaska, they had the highest chum harvest ever, and high pink and sockeye returns (the best in western Alaska). In eastern Alaska and British Columbia, they had dismal Chinook returns.
- Second-lowest Fraser sockeye on record, and the second-lowest Fraser pink return ever.
- Lowest steelhead returns to the Oregon Coast. Coho returns also look pretty dismal, Weitkamp said.

Member Booth asked how far out do they sample on the Columbia. Weitkamp said the juvenile sample goes from Cape Flattery to the Newport line. They sample a grid for juvenile salmon. Member Booth asked if they segregate the plume from the remainder of the data. Weitkamp said, yes, but they don't see big differences. They start in May to focus on fish that just come into the ocean. In May 2017, they couldn't find fish anywhere. In 2015 and 2016 they did find some fish out front.

"So the juveniles are disappearing from Bonneville out?" Member Booth asked. Weitkamp replied she got very normal abundances from Bonneville to the mouth. "They're getting to the mouth, then they disappeared. That's what's puzzling. There's a real dramatic change in stocks. Normally we get the full string of Chinook stocks. We were seeing that in 2015 and 2016.

Member Yost said, "It seems to me we should be able to draw a comparison to remove the Lower Snake River dams if that's case."

"You're so subtle," Member Booth said.

Member Lorenzen asked, "Is there a motion?"

Forecasts: Weitkamp reviewed Bill Peterson's stoplight table. It looks at a number of indicators.

In 1998, at the tail end of the previous El Niño, they had some bad years (2003, 2004 and 2005), when the juvenile salmon were going into the ocean. Then there were some mixed years in 2013 and 2014, and then 2015-2016 were was horrible. 2017 is a mixed bag. A few indicators look better, but the juvenile Chinook and coho are the lowest on the series. It's pretty bad for salmon outmigrating to the ocean this year. Although we're getting to more-normal conditions, there is still a lot of warm water out there, particularly in the Bearing Sea. The cold water is dissipating. For salmon going out next spring it looks pretty good, but next summer, not so good.

Summary:

- Warm ocean waters present since 2014 still continue across large parts of the North Pacific Ocean.
- The biological response to warm ocean conditions has been huge (effects observed at all levels of marine ecosystem).
- Expect biological effects of warm ocean conditions to continue for several years
 - Big concern for 2018 coho and 2019 Chinook returns because of low 2017 juvenile abundances.
 - Big recruitment of hake and mackerel off Washington and Oregon (will they stay?).
 - Residual effects on other species (e.g., crab, groundfish) are uncertain.
- Cooler coastal waters forecast for spring 2018 should be good for salmon entering the ocean.

Member Norman asked, "When you look at Chinook forecasts for 2019, it's about 95 percent spring Chinook?"

"Yes, falls come out later," Weitkamp said. "We don't have surveys then. We used to do a survey in September and had to stop it. So we're not seeing them at all. First we wondered if we trust this. A colleague in the Gulf of Alaska normally catches Chinook, but this year, he didn't catch any. As far as we can tell, they're gone. It's puzzling."

Member Norman said you're getting the same answer up the coast. Weitkamp said, yes, off Vancouver Island. There are low catches for a lot of species.

Member Norman said it will be interesting to see what the jack count will be. Coho jack are back, said Weitkamp. "The numbers aren't horrible as we thought they would be, but the percent of precocious males isn't what it used to be. We were getting huge numbers, so a grain of salt there."

Member Karier had specific questions on the stoplight chart. Is that specifically for spring Chinook?

It is tuned for salmon, Weitkamp said. We do it before salmon get out there and then the first of summer. We found it works for other species as well.

"Why not develop a customized one?" Member Karier asked.

We are. If you do it too specific to stock, there's enough local noise that you end up with nuisance data, Weitkamp replied. It captures the big drivers. It works for sable and rockfish well. If you run it for sardines, a warm-water species, the graph is the other way. Bad for salmon, good for sardines. It captures the variability that's important for the entire ecosystem.

"When you calibrate the returns two years later, it's designed for spring Chinook," Karier observed.

"It was originally put together for spring and fall Chinook, and Coho," Weitkamp said. "I don't think these variables would change between them because they're all going out into the ocean within a couple months of each other. It's not that specific."

"So when you calibrate it, you have to regress it against a particular series," Karier said. "Is that series the spring Chinook series?"

"There's a separate graph for all three of those," Weitkamp answered.

"So you add them all together?" Karier asked.

"I don't know all the nuts and bolts," she replied. "Ask Brian Burke. This is a general picture of what we think is going on in the Northwest and how it affects salmon. And it really captures a major component of the ecosystem."

"I've been trying to track these forecasts based on this," Karier said. "NOAA presents this. In recent years, I haven't been able to get the data from state agencies. Some of the traditional forecasts were better from fishing agencies in Washington and Oregon. So I'm curious. It's useful, but doesn't solve that problem of the ocean index yet."

"Laura Zimmerman with WDFW provides the coho forecasts for Puget Sound and it doesn't work very well at all, because there's a lot of action within Puget Sound that affects survival before they even go out," Weitkamp said. "She's developed her own indicators that apply much better to Puget Sound stocks. This is on our website. All the data is there. Our idea is take it and run. We think these are important. For your stocks, other things might be more important. Some years are more challenging. Some indicators are red. Others are yellow. You need to go back and see. That's where Brian Burke excels and picks it apart."

Member Booth thanked Weitkamp for her excellent work. When I came on to the Council 11 years ago, this was a fresh idea to determine impact of the ocean. From a 30,000-foot perspective, the Council's mandate is to mitigate impact of dams. We've been doing that by hatcheries, improve passage, habitat work, but when it comes down to it, if success is to be judged by SARS returns to Bonneville Dam, we're doing a pretty good job of getting the baby fish down to Bonneville dam. But we're discovering that they're disappearing in the ocean. So that's part of the puzzle. It's also predation. We're discovering we have harbor seals eating the juveniles by the thousands, harvest in Alaska and other places. What happens in the estuary and the plume and the ocean, after we get the baby fish to Bonneville is where we're losing stocks. Maybe we need to think about different ways to evaluate what we do: getting smolts to Bonneville Dam and hydro improvements. You did a good job but it's not the whole answer. It would be nice to see NOAA take a more broad approach and look at predation.

Weitkamp said with the lifecycle models, they are looking at that. She said in her work with the estuary is to look at what the experience of salmon as they move downstream and when they get out into the ocean. Hatchery fish get out early. As soon as they hit the ocean, they get big. They have a size benefit to fish that get there later. A lot of predation is size selective. All these factors are interrelated.

O'Toole said that is something the Council recognized in the 2011 RME project review. They wanted to look at the management implications of ocean impacts, and how it could use that information. We developed an ocean and plume management forum, currently chaired by Member Norman. It's met nine times, once or twice a year. We try to get managers from states and tribes to hear what the changes in timing and size can affect their survival in the ocean. The last one was in October. There continues to be strong interest in the information and access to great scientists like Laurie. The charter expired in December. They want to continue, without a charter, if we can provide a room.

Member Norman said he appreciates his participation in the ocean and estuary forum. He's learned a lot. The information is exciting and advancing quickly. I see a number of connections to our program here, he said. Member Booth mentioned the relationship between passage and ocean survival. This kind of information can shed a light to provide more-detailed information on how to separate passage measures in the

mainstem from the variability in estuary and ocean survival. Perhaps it can provide a deeper understanding of the latent mortality question — how much is associated with hydro operations and how much is associated with variability in the ocean.

4. PNW Resource Update and Demonstration of Enhanced Website Mapping Tool

Gillian Charles, energy policy analyst, discussed resource activity in the Pacific Northwest over the past 20 years, which has seen a large growth in wind and natural gas generation.

Wind began appearing in 1999. It took off in 2001 due to the California energy crisis. In 2005, 2006 and 2007, renewable portfolio standards were enacted. Those states had to meet a percentage of their generation with renewables. At the time, wind was the choice to fulfill that obligation. She mentioned wind development in the Gorge and current efforts in Montana.

Since 2013, there hasn't been a lot of development except for the two PGE natural gas projects, Westport and Carty. Charles talked about solar projects coming online, most in the 20-MW range, although Idaho has a 40-MW project.

Energy storage has started to come online in the last few years. Will see more of that coming up, according to recent utility IRPs. The price of solar has dropped significantly and is now competitive with wind and other resources.

Charles reviewed the region's history of hydro as the primary resource, followed by coal and natural gas. Wind made inroads into the stack.

Hydropower is still the reigning champion in the Pacific Northwest. The remaining resource dispatch is highly dependent on the type of hydro year experienced. The baseload fossil fuel generation dynamic between coal and natural gas is changing.

Renewables are making a greater contribution to energy. Wind now accounts for about 10 percent of the energy generated (however not all of this is designated for the Pacific Northwest).

Energy efficiency is the region's second largest resource.

Member Booth said that a third of wind is exported. Is it still a requirement to provide firm for that power? Ben Kujala said some projects have been taken off of BPA's balancing authority and are with other balancing authorities. It's dynamic.

Member Booth said, "So some are out of state." It's a mix, Kujala replied.

Member Tim Baker asked if those balancing contracts are profitable. Kujala said he didn't know if he could represent that, but imagined that IOUs do make money off that.

Member Baker asked is it a profit center for BPA? Kujala replied that it's a steady revenue stream, with some advantages. But gets into the weeds in terms of their rates.

Charles discussed carbon emissions from power production in the region since 2000. In 2016, there was about 45 million metric tons. When it's a good hydro year, emissions drop, she said.

Fossil-fuel production is changing. In 2002, the region was 75 percent coal, 25 percent gas. Since, there has been a steady increase of gas. Why is that important? Coal produces twice the emissions that natural gas does. Today, it's more of a 50/50 relationship. In 2016, gas produced more energy than coal did.

Member Booth asked, looking at national carbon emissions from power production, how would Northwest states compare percentagewise on a per capita basis?

Looking at the carbon intensity of the power system for the Pacific Northwest versus the U.S. The U.S. is at the 60 percent coal and natural gas. The Pacific Northwest is much lower due to hydro. Member Booth said he was looking for some different information and specify it at a later date.

Trends in carbon emissions: Charles said 3,000 MW of coal is slated to retire in the next 10-12 years. The number is greater looking at WECC. We're starting to see some economic closures of coal across the nation as well, she said.

Member Baker asked how she factored Colstrip in, since half of it stays in Montana. This analysis doesn't account for that energy, she replied.

What's coming next? A lot of solar PV activity, and hundreds of MWs in proposed QF projects. Wind projects under construction include the Montague project (220MW), an Apple project with Avengrid, and Montana projects totaling about 185 MW.

RFPs are out for renewables for PGE and PacifiCorp. The Oregon RPS was amended to 50 percent by 2040.

Hydro upgrades are ongoing. Sometimes those bring the machines to where they were. Sometimes adding capacity with new turbines.

Charles said that a future Power Committee/Council Meeting presentation is planned on anticipated aggregated resource supply needs from the region's Integrated Resource Plans (IRPs). She's combing through them right now to see what resources utilities need to meet their load.

Next Charles demonstrated the new Power Generation Map:
<https://www.nwcouncil.org/energy/powersupply/home/>

In addition to resource type, the interactive map has a timeline feature to filter projects based on service date. Users can take a historical look at how the projects have been added to the region over time.

5. Council decision to make final edits and post the Polycyclic Aromatic Hydrocarbons (PAH) story map on the Council's website

Tony Grover, Fish and Wildlife Division director, and Leslie Bach, senior program manager, told Council Members that the toxics workgroup has compiled all the readily available data on PAHs in the Basin, and has incorporated the data and general information into a PAH story map for the Council's website.

The information is geared to a lay audience. It was shown to the Fish and Wildlife Committee, there were improvement ideas, they made revisions, and now it's being brought to the full Council for a decision on whether to post on the Council's website. A sentence will be added on why this is important to salmon.

It features recent work from NOAA Fisheries Center and includes the impacts of low levels of PAHs on salmon. It also includes information on what everyone can do to prevent PAHs.

They looked at the Portland Harbor area where there are some real significant PAHs. It shows the overlap where salmon are using the system and where PAHs are, and tells the story of the relationship between the two.

Member Karier said it's interesting and useful. "How much has the Council spent and how much did the EPA?" he asked.

The cost was \$22,000 from start to finish, Bach said, and could not speak to the EPA contribution. They did the legwork with the data. All these data sets were somewhere else and they put it together.

Member Lorenzen asked if they could track who visits the website? Grover said it's a great idea. Others in the toxics workgroup said they want to link to it as well.

Member Bill Bradbury said he played with it and found it fascinating. You can follow links to figure out what you want to do. It's a remarkable result of a cooperative effort.

Member Anders said they looked at this twice in committee. We recommended it go to full Council. There is some room to fine-tune it if need be. For the most part, everyone's comfortable and would like to see this move forward today.

Member Booth recognizes that the toxics workgroup has worked on this for three years and it came to the Committee last month. He said we have to be careful when we launch ourselves into something like this. Toxics aren't our statutory responsibility. If we're going to use ratepayer dollars, we have to focus on the hot spots with a nexus to our program. We need additional scientific rigor with this, he said. There's a problem with trying to get the magnitude to size on the map. We have an expert on staff to give us that. I know there's a desire to move this forward and to get this posted. There's a commitment on the part of chair to continue to work on this, to do the vetting and they're open to making it better. I still see some issues.

Northwest Power And Conservation Council Motion to Make Approve for Posting on the Council's Website the Polycyclic Aromatic Hydrocarbons Story Map

Member Booth moved that the Council approve for posting on the Council's website the Polycyclic Aromatic Hydrocarbons story map, as presented by staff and recommended by the Fish and Wildlife Committee.

Member Bradbury second.
Motion carries without objection

Council Business

Northwest Power and Conservation Council Motion to Approve the Minutes of the December 12-13, 2017, Council Meeting

Member Booth moved that the Council approve for the signature of the Vice-Chair the minutes of the December 12-13, 2017, Council Meeting held in Portland, Oregon.

Member Anders second.
Motion carries without objection

Member Lorenzen had some parting remarks:

"Now I'm going to have the opportunity to talk before we go. I still control the gavel and I control it for however long I'm willing to talk and people are willing to listen.

I want to mention just a couple of things I perceive as trends that I think have a significant impact upon what the Council does and its work in the future. Going back to 1980, we are here and we exist as a Council and the Act was passed because the region had made a major error, committed a major error in decisions with regard to resources to be acquired. WPPSS Plants 1 through 5. It had a dramatic impact and it continues to have a dramatic impact upon ratepayers and the Bonneville Power Administration's competitiveness. The Act anticipated that we would exist and we would have a staff and a mission to develop a more rigorous methodology with regard to planning resources for the area. Over the last many years our staff, an incredibly capable staff, has developed a state-of-the-art methodology by which to anticipate and determine the least-cost, least financial risk resources in order to meet needs based upon probabilistic modeling, taking into account a wide variety and wide range of variables.

My concern is that as we've moved forward and we have developed these very rigorous models that have been recognized as state of the art, the traditional people and entities making decisions with regard to acquisition of resources are no longer doing so. As a result, I'm not certain whether the methodologies we've developed are in fact being

taken into account to the extent they should be when resource decisions are being made. If you look back at our Power Plan, the 7th Power Plan, the conclusion was very stark with regard to additional renewable resources necessary in order to meet the Obama Clean Power Plan regionally. But very shortly after the release of our Power Plan, decisions were made to substantially increase renewables that were to be developed within the Northwest. That was done by the legislature and through other political activities.

Our challenge, I believe, is to make certain in the future, to the best we can, that the methodologies that we have developed also are taken into consideration by those entities, those persons who are making those decisions, whether it be the traditional utility managers or the legislators.

That's a tough task because this is a complicated area. These are complicated matters. On the surface it sounds as if many of us are not concerned about carbon. I am one who is very concerned about environmental issues, very concerned about carbon. But we have to bring the same methodology that we used in planning for generating resources into the area of environmental protection, including carbon reduction. By doing so we marshal our resources and we achieve a greater good, I believe, ultimately with regard to these matters that are so critically important.

Another thing, just a tangential matter, has to do with carbon reduction. I was very struck by Steve Wright's presentation to us when he complimented us, which is always nice to have a compliment from somebody like Steve Wright, on the methodology used for developing the resource acquisition analysis in the 7th Power Plan. But he then lamented the fact that we were not using the same rigor in looking at how to go about reducing carbon. Our Council staff has methodologies, used in the 7th Power Plan, available to assist those who are making resource and carbon-related decisions. The question is how do we go about making the inter-connect with those people that are doing the decision-making?

That's my caution, my look forward. I hope that the Council can determine how to be successful in promoting and also making our tools available and used by the whole range of people who make those decisions with regard to power planning as well as carbon reduction.

So, with that, my parting shot, I will now soon give up the gavel."

Decision to Release Fiscal Year 2017 Annual Report to Congress following public comment.

This was deferred to the next Council Meeting.

Election of officers

Member Lorenzen said it gives him great pleasure to nominate Member Jim Yost to serve as Chair of the Northwest Power and Conservation Council.

Member Baker second.

Member Lorenzen asked if there were any other nominations. Hearing none, he declared the nominations closed.

He asked for an oral vote. All those present voted "aye."

The motion carried.

Chair Yost asked for nominations for Vice Chair.

Member Booth nominated Member Jennifer Anders for Vice Chair of the Northwest Power and Conservation Council.

Member Norman second.

Chair Yost asked for an oral vote. All those present voted "aye."

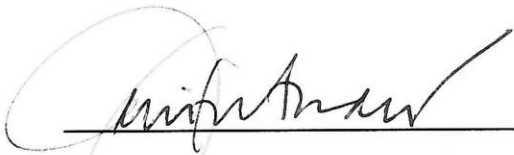
The motion carried.

Public Comment

There was none.

The meeting was adjourned at 11:38 a.m.

Approved February 14, 2018.

A handwritten signature in dark ink, appearing to read "Jennifer Anders", is written over a horizontal line.

Vice-Chair