Oregon Water Coalition
Member Newsletter

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The Power of Hydro

by Jennifer Brown

Although hydropower is not seen universally as renewable, it continues to meet the energy needs of the NW.

In 2012, hydropower generated more than 177 million megawatt-hours in six western states and Alaska. In some cases, hydropower accounted for more than half of the states' electricity generation.

However, when it comes to statewide mandates, water goes down the drain in the Northwest, where—except in limited situations—hydro is not considered a qualifying renewable resource.

Increasing Renewables

The term renewable energy generally refers to electricity supplied from renewable energy sources, such as wind and solar power, geothermal, hydropower and forms of biomass. These sources are considered renewable because they are continuously replenished on the earth.

Yet when talk turns toward utilities' renewable energy mandates—more than 30 states have renewable portfolio standards that require utilities to generate a percentage of their power from renewable sources—hydropower does not always make the cut.

This is partly due to the impact dams have on wildlife. Some large dams pose a challenge to fish trying to reach their spawning grounds. Reservoirs affect the flow, temperature and silt loads of rivers or streams. The result is a reduced fish population.

Also, by limiting what qualifies as renewable, states are forced to invest in other technologies, such as wind and solar. Since much of the Northwest already receives a substantial amount of power from hydro, states such as Oregon and Washington easily meet their RPS requirements without additional effort.

Umatilla Electric Cooperative in Hermiston, Oregon, faces a unique challenge as it tries to meet RPS requirements. Because large data centers have moved in UEC's territory and created massive loads, the co-op is required to have 25 percent of its power be renewable by 2025—the same level as large investor-owned utilities.

"The massive loads were never anticipated," says Oregon Rural Electric Cooperative Executive Director Ted Case. "It's not equitable for Umatilla to have the same obligation."

However, during the most-recent Oregon legislative session, a bill was introduced that, once passed, will allow UEC to use renewable energy certificates to meet RPS requirements.

"This brings some fairness to the unintended consequences of the data centers moving into Umatilla," Case adds.

In Washington state, Initiative 937 requires electric utilities with 25,000 or more customers to supply 15 percent of their power from eligible renewable resources by 2020. Klickitat county Public Utility District in Goldendale—although under that size—endorsed the initiative from the start. But the PUD has gained some perspective since the initiative was adopted by voters in 2006.

"I-937 has definitely created a significant amount of renewable energy development," says KPUD General Manager Jim Smith. "However, after several years of industry experience, some of the issues with market changes of this magnitude are apparent.

"I encourage legislators to engage utility experts more fully so that utilities can more fully support the mechanisms to help achieve targets and development in a more efficient manner."

Hydropower Education

For the second year in a row, Northwest RiverPartners—an alliance of farmer, ports, businesses and other members in Idaho, Montana, Oregon and Washington—is raising awareness about the multiple benefits the rivers provide to the Northwest economy.

Last year, the CleanHydro campaign introduced hydropower and the river system to Northwest residents who benefit from them, but who may not fully understand their value. This year, CleanHydro is building on that momentum.

In polling done following the 2013 campaign, 77 percent of Northwest residents identified hydropower as a clean, renewable source of energy, up from 72 percent. Public support for congress and state legislators to identify hydro as a renewable resource in law grew by 6 percent. The results also showed residents want to see more hydro in their future.

"We are eager to continue this effort to educate people about the important commerce that flows from our Northwest rivers," says Roman Gillen, co-chairman of the CleanHydro campaign, and CEO and president of ConsumersPower Inc., headquartered in Philomath, Oregon. "The fact that hydropower provides more than 90 percent of our renewable energy is a compelling story that needs to be shared."

According to Northwest RiverPartners:

- Barges on northwest rivers keep 700,000 trucks off the highways each year. Because hydropower produces no carbon emissions, the Northwest's carbon footprint is half that of other parts of the country.
- Northwest dams provide nearly 60 percent of the region's electricity. It would take two nuclear, there coal-fired or six gas-fired power plants to replace the average annual power produced by the four lower Snake River dams.
- Because the rivers always flow in the Northwest, hydropower is also used as a tool to back up intermittent generators such as wind or solar. Hydro generation can be quickly adjusted to follow changes in wind production and keep the transmission system reliable.

As hydropower continues to fuel the local economy, it will remain a growing energy source for decades to come.

According to the National Hydropower Association, the U.S. hydropower industry could install 60,000 megawatts of new capacity by 2025 depending on policy changes. That is only 15 percent of the total untapped hydropower resource potential in the U.S.

Jennifer Brown, The Ruralite

March storms lift water supply forecast to 104 percent of 1981-2010 average

"March was a great month for the Pacific Northwest" as regards the collection of mountain snowpack that will feed the Columbia and Snake rivers and their tributaries this spring and summer, according to Joanne Salerno, a senior hydrologist for the Northwest River Forecast Center.

Precipitation was at or above 150 percent across much of the Columbia basin in March, even soaking areas in southwest Idaho and southern Oregon that still are considered to be amidst severe drought following a dry 2012-2013 season and meager start to the current water year (October-September).

The March storm systems followed wet weather that prevailed in February to balance what had been a relatively dry early winter. The end result, as the snow melting season begins, is a cache of stored water that is slightly above average.

The expected runoff volume expected to pour down the Columbia past The Dalles Dam from April through September is 95.5 million acre feet, which would be 104 percent of the 1981-2010 average. The Dalles, located on the lower Columbia (river mile 191.5), passes water from the mid and upper Columbia and the Snake and their tributaries.

The January-July water volume forecast for The Dalles is up by 5 percent over the past month, according to the water supply forecast released April 9 by NOAA Weather Service's NWRFC.

All legs of the water supply stool are above average. The forecast for flows past central Washington's Grand Coulee Dam is 104 percent of the 30-year average for the January-July period, which is up by 8 percent over the past month. All of the water coming from the upper Columbia in British Columbia, northwest Montana and Idaho flows past Grand Coulee.

The forecast at Lower Granite Dam on the lower Snake River is for 106 percent of average flows, up by 1 percent from the previous month. Southeast Washington's Lower Granite Dam passes flows from the upper Columbia and such tributaries as the Clearwater, Salmon, Imnaha, Grande Ronde, Owyhee, Malheur and Boise rivers. The Snake, which feeds into the Columbia, typically provides about one-third of the overall Columbia River flow.

The Clearwater, as measured at Spalding in west central Idaho, is expected to produce 122 percent of average runoff, which would be the 10th best total in the past 54 years, according to the NWRFC. The most likely runoff scenario for the North Fork of the Clearwater, as mea-

sured at the U.S. Army Corps of Engineers' Dworshak Dam, is 128 percent of average. The North Fork, and Dworshak's reservoir, provides cooling flows for the Clearwater and lower Snake in summer that help improve conditions for migrating salmon and steelhead.

The "wettest" runoff forecasts (above 110 percent of the recent 30-year average) are in Columbia River basins draining the Bitterroot Range of Montana, the Rockies, and the Blue Mountains of northeast Oregon.

The April-September runoff forecast for the Kootenai River as measured at northwest Montana's Libby Dam is 109 percent of normal. The Clark Fork River as measured at Plains, Mont., is expected to see 128 percent of its average runoff this year. The Clark Fork flows into the Pend Oreille in north Idaho, which in turn flows into the Columbia.

April-September runoff forecasts for most areas of the Columbia-Snake river basin are normal to above normal. Forecasts for basins in southeast Oregon, and southwest Idaho, however, are well below normal.

Most forecasts west of the Cascades are near to below normal.

The Clearwater and Salmon drainages as of Wednesday boast snowpacks at 128 percent of average through April 9, according to Natural Resources Conservation Service automated SNOTEL measuring sites. Both rivers flow into the lower Snake River.

The Owyhee and Malheur river drainages, which also feed the lower Snake, were at the bottom of the scale at 64 percent of average "snow-water equivalent" as of April 9. Both flow across the southeast corner of Oregon into the Snake.

The Deschutes, Crooked and John Day drainages in aggregate has accumulated only about 63 percent of their SWE as of April 9, and the Willamette drainage was at 52 percent of average. Central Oregon's Deschutes, Crooked and John Day rivers feed the Columbia. The Willamette joins the lower Columbia at Portland.

Columbia Basin Bulletin

Wanapum: Multiple fracture causes ruled out, pressure on spillway a factor

Central Washington's Grant County Public Utility District announced that the foundation below Wanapum Dam was not a factor in creating the fracture discovered Feb. 27 on the dam's spillway pier monolith No. 4.

The discovery of the fracture caused Grant to immediately draw down the Columbia River reservoir upstream of Wanapum by about 26 feet to reduce water pressure on the structure. It has since been conducting examinations of the dam to determine the cause of the fracture, and what might be needed to repair it.

The team of engineers and analysts employed by Grant has determined that the fracture was not caused by:

- Seismic activity.
- Foundation settlement or uplift.
- Activities at U.S. Army's Yakima Training Center.
- Operation of the spillway gates.

"Data is showing that a contributing factor to the fracture was tension from water pressure on the face of the spillway pier monolith," according to a Grant press release. Grant PUD is working to determine how the tension caused the fracture. The fracture was detected by divers on Feb. 27, three days after a worker at the dam noticed that the top of the spillway pier had shifted slightly downstream. When the reservoir behind the dam was drawn down, the pressure on the spillway was reduced and the fracture closed, stabilizing the monolith.

Grant PUD will continue to evaluate and examine the spillway. Six holes have been drilled into the monolith and more holes are planned to determine the geometry of the fracture. The drilling has been temporarily suspended while the utility assesses the best way to complete the task. When finished, the drilling will identify the reach of the fracture into the monolith.

It is anticipated that the drilling and the root cause analysis will be completed by June. These tasks must both be accomplished before necessary repairs are made to stabilize the spillway. Grant PUD will not raise the reservoir to an intermediate level before the stabilizing repairs.

The Wanapum reservoir shoreline will remain closed to the public until the water level is elevated to the intermediate level. All Grant PUD and Department of Fish and Wildlife shoreline access points on the Wanapum shoreline are closed, including boat launches and recreation areas. The closure is necessary to protect sensitive cultural areas and for public safety. The utility continues to work on modifications to the fish ladders at Wanapum Dam. The modifications are on track for a completion

date of April 15. Upon request from stakeholders, including tribes and agencies, Grant PUD will trap migrating spring chinook salmon at Priest Rapids Dam and then haul them in trucks to release them in the Wanapum reservoir until the fish-ladder modifications have been evaluated under working conditions. Grant PUD continues to provide information for irrigators affected by the drawdown as they seek permits to modify their irrigation systems. Wanapum Dam is generating electricity at between 50 to 60 percent of its capacity. The dam will be able to accommodate spring runoff flows in coordination with other dams operating on the Columbia River.

Columbia Basin Bulletin

Proposed instream flow rule protects water rights

by Matthew Weaver

The Washington Department of Ecology doesn't expect a proposed instream flow rule in the Spokane River to impact existing water right holders.

Ecology representatives Rusty Post and Keith Stoffel spoke at a meeting of the Citizens Alliance for Property Rights about the proposed rule.

The rule establishes measuring points on the river and the flow required at various times during the year.

Stoffel said the rule is intended to provide Washington with legal standing in the event of an interstate dispute with Idaho over ownership of water in the Spokane River and Spokane Valley Rathdrum Prairie aquifer system, shared by the two states.

Idaho has an instream flow rule and has nearly completed its adjudication process, in which the state determines the validity of water rights. Washington's efforts are farther behind, Stoffel said, and the adjudication process is at least two years from beginning.

"We think the Spokane River and aquifer in Washington needs a voice, and the way you get that voice for the river is passing an instream flow rule, which is essentially a water right for the river," Stoffel said. "All water rights out there today will be senior to the instream flow rule, and the rule will not apply to them."

The rule does not apply to individuals with existing wells in their yard, Stoffel said.

The rule only applies to properties within the boundaries of the aquifer. There are 20 municipal water districts providing water to people within the footprint of the aquifer. Stoffel doesn't expect to issue any new water rights for agricultural use after the rule is put in place. The municipal districts have plenty of water on their existing water rights that they could use to serve someone who wants to put in a new well for agricultural use, he said.

"Anyone who owns a parcel of ground on the footprint of the Spokane aquifer should be able to get water from the existing water rights," he said, citing the water rights in the portfolio held by municipal water providers.

For the few pieces of property not served by those providers, the department hopes to acquire enough water rights to offset future use of permit-exempt wells, he said.

The department hopes to present the proposed rule to the public shortly, Stoffel said. It would be subject to public review, meetings and comment. The process takes a year. Ecology ultimately will decide whether to implement the rule.

Stevens County Commissioner Wes McCart says he has experience with instream flow rules from his county.

"If they craft it in a way that addresses exactly the pictures they've showed today, I am confident that ag will be protected," McCart said. "But the devil's in the detail — let's look at the language (of the rule) and make sure. But I'm comfortable we're headed in the right direction."

McCart recommends farmers review the draft rule language and make sure their questions are answered, making changes to allow any area agriculture to remain viable.

Matthew Weaver, Capital Press

Study: Crude oil spills cause defects in developoing hearts of marine fish

Crude oil from the 2010 Deepwater Horizon disaster causes severe defects in the developing hearts of bluefin and yellowfin tunas, according to a new study by a team of NOAA and academic scientists.

The findings, published in the Proceedings of the National Academy of Sciences on the 25th anniversary of the Exxon Valdez oil spill, show how the largest marine oil spill in United States history may have affected tunas and

other species that spawned in oiled offshore habitats in the northern Gulf of Mexico.

Atlantic bluefin tuna, yellowfin tuna, and other large predatory fish spawn in the northern Gulf during the spring and summer months, a time that coincided with the Deepwater Horizon spill in 2010. These fish produce buoyant embryos that float near the ocean surface, potentially in harm's way as crude oil from the damaged wellhead rose from the seafloor to form large surface slicks.

The new study shows that crude oil exposures adversely affect heart development in the two species of tuna and an amberjack species by slowing the heartbeat or causing an uncoordinated rhythm, which can ultimately lead to heart failure.

"We know from the 1989 Exxon Valdez spill in Prince William Sound that recently spawned fish are especially vulnerable to crude oil toxicity," said Nat Scholz, Ph.D., leader of the ecotoxicology program at NOAA's Northwest Fisheries Science Center in Seattle. "That spill taught us to pay close attention to the formation and function of the heart."

"The timing and location of the spill raised immediate concerns for bluefin tuna," said Barbara Block, a study coauthor and professor of biology at Stanford University. "This spill occurred in prime bluefin spawning habitats, and the new evidence indicates a compromising effect of oil on the physiology and morphology of bluefin embryos and larvae."

Recent studies are increasingly painting a more detailed picture of how oil-derived polycyclic aromatic hydrocarbons (PAHs) act on the heart. Earlier this year, the Stanford-NOAA team showed in a related paper published in Science (Brette et al. 343: 772) that Deepwater Horizon crude oil samples block excitation-contraction coupling -- vital processes for normal beat-to-beat contraction and pacing of the heart -- in individual heart muscle cells isolated from juvenile bluefin and yellowfin tuna.

"We now have a better understanding why crude oil is toxic, and it doesn't bode well for bluefin or yellowfin embryos floating in oiled habitats." said Block. "At the level of a single heart muscle cell, we've found that petroleum acts like a pharmacological drug by blocking key processes that are critical for cardiac cell excitability."

This mechanism explains why the team observed a range of cardiac effects in the developing hearts of intact embryos in the present study. "We directly monitored the beating hearts of living fish embryos exposed to crude oil," said John Incardona, NOAA research toxicologist and the study's lead author. "The tiny offspring of tunas and other Gulf species are translucent, and we can use digital microscopy to watch the heart develop."

The major difficulty facing the researchers was access to live animals. Tunas are difficult to raise in captivity and few facilities exist worldwide with spawning fish. In the open ocean, fragile fish embryos and larvae are mixed with many other types of plankton, and they usually don't survive the rough conditions in a net towed near the surface. This made it close to impossible to assess developmental cardiotoxicity in samples collected near the Deepwater Horizon surface oil slicks.

To work around this challenge, the international team brought the oil to the fish. Samples of crude oil were collected from the damaged riser pipe and surface skimmers. The samples were then transported to the only land-based hatcheries in the world capable of spawning tunas in captivity.

This approach allowed the scientists to design environmentally relevant crude oil exposures for bluefin tuna and yellowfin tuna at marine research facilities in Australia and Panama, respectively. Luke Gardner, an Australian native post-doctoral associate from Stanford University and co-author on the PNAS paper, was vital in helping the team investigate the bluefin.

"It is challenging to maintain bluefin in culture and we were privileged to have successfully tested the crude oil in Australian facilities, the only on-land hatchery that has bluefin tuna in culture. This gave us access to tuna embryos and allowed us to study the developmental toxicity of oil," said Gardner. The pioneering effort to develop new testing methods was also led by Martin Grosell at the University of Miami.

The new research adds to a growing list of fish that are affected by crude oil. "This fits the pattern," said Incardona. "The tunas and the amberjack exposed to Deepwater Horizon crude oil were impacted in much the same way that herring were deformed by the Alaska North Slope crude oil spilled in Prince William Sound during the Exxon Valdez accident."

Crude oil is a complex mixture of chemicals, some of which are known to be toxic to marine animals. Past research has focused in particular on PAHs, which can also be found in coal tar, creosote, air pollution and stormwater runoff from land. In the aftermath of an oil spill,

PAHs can persist for many years in marine habitats and cause a variety of adverse environmental effects.

Developmental abnormalities were evident in bluefin and yellowfin tunas at very low concentrations, in the range of approximately one to 15 parts per billion total PAHs. These levels are below the measured PAH concentrations in many samples collected from the upper water column of the northern Gulf during the active Deepwater Horizon spill phase.

Severely affected fish with heart failure and deformed jaws are likely to have died soon after hatching. However, the NOAA team has shown in previous work that fish surviving transient crude oil exposures with only mild effects on the still-forming heart have permanent changes in heart shape that reduce later swimming. "This creates a potential for delayed mortality," said Incardona. "Swimming is everything for these species."

The nature of the injury was very similar for all three pelagic predators, and similar also to the response of other marine fish previously exposed to crude oil from other geologic sources. Given this consistency, the authors suggest there may have been cardiac-related impacts on swordfish, marlin, mackerel, and other Gulf species. "If they spawned in proximity to oil, we'd expect these types of effects," said Incardona.

The research was funded by NOAA as part of the ongoing Natural Resource Damage Assessment for the Gulf ecosystem following the April 20, 2010 Deepwater Horizon oil spill. Contributing to the findings in addition to NOAA and Stanford University were researchers from the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences and the University of the Sunshine Coast in Queensland, Australia.

Columbia Basin Bulletin

Oversupply rate decision, BPA will allocate costs based on transmission use

After a lengthy rate proceeding, BPA officials have decided to allocate oversupply costs to generators within its balancing authority area based on their scheduled use of transmission during oversupply events.

The costs occur when BPA uses its Oversupply Management Protocol to displace generation in its balancing authority area with federal hydropower and compensates generators for certain costs related to the displacement.

The release of the final record of decision March 27 concluded the formal rate proceeding, which began in November 2012. BPA will submit the rate to the Federal Energy Regulatory Commission for approval.

The rate, which will be effective through the fiscal year 2014-2015 rate period, also will recover the costs incurred since 2012, when BPA established the protocol.

In 2012, the agency incurred $2.7 million in displacement costs. BPA did not have to implement the oversupply protocol in 2013.

BPA officials say there are many perspectives on who should pay the costs of oversupply. One argument is that the costs are caused by BPA's fish and wildlife obligations and the inability to sell excess power, and that these costs must be borne by power customers.

Others argue that, because BPA didn't incur these costs when it managed high water occurrences before open access and the influx of wind energy, the displacement cost should be borne by wind generators or transmission customers.

Another view is that the displacement costs are caused by both BPA's fish and wildlife obligations and its integration of significant amounts of new wind generation that will not voluntarily curtail for zero-priced power.

"I understand and respect the perspectives of the many parties to this case," said Administrator Elliot Mainzer in his preface to the record of decision. "I have taken into account all of their submissions, including those filed in response to the draft record of decision.

I have selected an alternative that I believe is consistent with our multiple statutory responsibilities, is rooted in the basic principles of cost causation and fairness that underlie BPA's rate directives, and reflects the guidance we have received from FERC."

All generators on line in BPA's balancing authority area during oversupply contribute to costs of displacement. Therefore, BPA says it is reasonable to allocate costs to those generators on line during oversupply events proportional to their scheduled generation, which represents their contribution to the magnitude of the event.

This methodology, suggest BPA, could also encourage generators to minimize generation during oversupply events, increasing BPA's ability to dispose of excess fed-

eral hydropower. While oversupply is most likely to occur during the spring runoff, the need to implement the Oversupply Management Protocol depends on a combination of factors, such as the shape of the runoff and the demand for power in California.

BPA says it will monitor forecasts throughout the spring and manage oversupply conditions with the most operationally feasible and cost effective means available.

If oversupply conditions appear imminent, BPA will host a Spring Operations Forum conference call, which gives generators the opportunity to learn about the potential for oversupply as well as the steps BPA is taking to mitigate the risk of implementing the Oversupply Management Protocol.

BPA says it is committed to mitigating oversupply by first taking other available actions, such as marketing strategies that allow BPA to shift generation out of light-load hours (10 p.m. to 6 a.m.) into hours when there is greater demand for power.

BPA uses the protocol only as a last resort to balance energy supply and demand, and reduce the amount of total dissolved gas in the river to protect fish and other aquatic species.

"To me, the oversupply issue has been somewhat disheartening," Mainzer stated, "because it pits two clean energy resources — hydro and wind — and their respective interests against each other at a time when we should be working collaboratively to find ways to better leverage and harmonize our zero-carbon resources."

Mainzer said he looks forward to working with regional interests to identify a long-term solution to the oversupply issue that enables the region's zero-carbon hydro and wind energy resources to operate together more harmoniously.

PA established the Oversupply Management Protocol to reconcile several objectives: to preserve reliability of the electric system; protect aquatic species, including threatened and endangered salmon; and continue the commitment to supporting renewable resource development.

Compensating renewable generators for energy that is displaced with federal hydropower under the protocol allows BPA to meet those objectives.

The protocol is also an important tool to limit cost exposure to the displaced generators' actual costs, rather than subjecting ratepayers to a volatile negative market.

Under the protocol, the agency reimburses renewable generators within its balancing authority area only for payments they would otherwise receive for producing power, including (1) production tax credits, (2) renewable energy credits unbundled from the sale of energy, and (3) losses with respect to contracts executed before March 6, 2012, for the bundled sales of renewable energy credits and energy.

In addition, renewable generators must provide auditable cost information, and are displaced in order of least cost.

Columbia Basin Bulletin

April telebriefing: Analysis of new Klamath Basin water agreement

The Klamath Tribes, irrigation interests in the Upper Klamath Basin, and the State of Oregon are expected to sign the Upper Klamath Basin Comprehensive Agreement (Upper Basin Settlement) shortly to address water, natural resource, and economic development issues in the areas tributary to Upper Klamath Lake in Oregon.

The Upper Basin Settlement provides terms to settle water rights disputes (particularly those related to instream water rights for fisheries), restore habitats, and support economic development for the Klamath Tribes.

This one-hour telebriefing will provide expert analysis of the new settlement and how it is likely to impact all water users in the Klamath Basin. To register for this live event, call (206) 567-4490.

- The relationship between riparian restoration and instream flow mandates.
- Details and conditions for economic development aid to the Klamath Tribes.
- The impact on both irrigators and other additional junior water rights' holders.
- The staged implementation approach to transitioning to the final settlement.
- Proposed regulations impacting groundwater users.

Panelists include:

Paul S. Simmons, Esq., *Moderator*	Sacramento, CA
Greg D. Corbin, Esq.	Portland, OR
David L. Gover, Esq.	Boulder, CO
Ronald S. Yockim, Esq.	Roseburg, OR

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