



## PRESIDENT’S NOTES:

### Jason McCormick, McCormick Water Strategies, AWRA-WA Section President

Your AWRA-WA Chapter has been hard at work in 2018! We hosted dinner meetings, selected an annual scholarship recipient, recruited corporate sponsors, and set to work planning the State Conference, scheduled for October 16<sup>th</sup> at our usual gathering pool – The Mountaineers in Seattle’s Sand Point Neighborhood. As summer is upon us, I encourage each of you to sit creekside with your Summer 2018 AWRA-WA Newsletter, reflecting on water resources happenings around the state and, of course, **register for AWRA-WA’s Annual Conference. [REGISTRATION IS OPEN NOW!](#)**

While spring weather resulted in a strong snowpack, and early snow water equivalent modeling indicated that 2018 would see above average water supplies for much of the state, the climate threw us a curveball. Above-normal temperatures and high-pressure ridges between May and July have resulted in sudden drops in water supplies. Many areas of the state are now grappling with drought conditions, particularly in Western Washington, and predictions for high fire activity across the state are bearing out. The 2018 water year is teaming up with the “post-Hirst” reality to confirm what we all already suspected: water resources are highly dynamic and increasingly uncertain, from case law to physical water availability. Rest assured, though. AWRA-WA is on the job, giving you the most timely and relevant discussions pertaining to H<sub>2</sub>O in Washington State.

Of course, the best place to get the scoop on Washington water issues is the **October 16, 2018 AWRA-WA Annual State Conference, “Hirst, Foster, Boldt, and Beyond: A New Era of Water Management?”**, held at The Mountaineers in Seattle, WA on October 16<sup>th</sup>. See additional information on pages 2-3.

**AWRA-WA FALL NEWSLETTER  
ARTICLES NEEDED**  
It’s easy, and you get to see your name in print! Next deadline is October 31<sup>st</sup>, so email your ideas to [greg@washingtonwatertrust.org](mailto:greg@washingtonwatertrust.org)

We also hosted three dinner meetings in the second quarter of 2018. In April, we joined Washington Water Trust in support of the Wild and Scenic Film Festival at the Egyp-

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tian Theatre in Seattle, attended by over 300 people. In May, Carrie Sessions of Washington Department of Ecology Water Resources Program provided a legislative update highlighting the lead up to the 2018 Streamflow Restoration Act, or ESSB 6091 (the “Hirst Fix Legislation”). In June AWRA-WA board member Jenny Saltonstall provided a presentation on geomorphic considerations in stormwater bioretention cells. Looking ahead, we are excited to continue our dinner meeting partnership with Naked City Brewing Company for our September 19 meeting, a 5:30-8:00 pm presentation and networking event on Aquatic Species Habitat Modeling by Paul Craig of Dynamic Solutions International. Also, stay tuned for a fall dinner meeting in Ellensburg in late October or early November. Finally, **mark your calendars now for the annual AWRA-WA meeting, December 19 at Naked City Brewery in Seattle’s Greenwood neighborhood.**

AWRA-WA supports university students each year with two \$2,500 cash scholarships and a complimentary AWRA National membership. We will have an update on our 2018 winner in the Fall Newsletter.

Also, check out our featured articles in the Summer 2018 Newsletter. On page 5, AWRA-WA board member John Chandler summarizes his work with Puget Sound Energy (PSE) on flood control and water supply management in a hydropower system amidst climate change. On page 6-7, state Climatologist Nick Bond reviews the Winter 2017-2018 climate predictions and compares this with what actually happened, as El Niño teams up with climate change to decide which way the winds blow and how much the streams flow.

### SAVE THE DATE: SEPT 19 DINNER MEETING:

There will be no August Dinner Meeting. Join us at **Naked City Brewery September 19<sup>th</sup>**, where Paul M. Craig, President of Dynamic Solutions International, will be discussing Aquatic Species Habitat Modeling at 7 pm. There will be a social hour starting at 5:30 and dinner at 6:30. Cost is \$30 for member and \$35 for non-members. Register at [WAAWRA.ORG](http://WAAWRA.ORG).

# 2018 AWRA-WA Annual Conference

## HIRST, FOSTER, BOLDT AND BEYOND: A NEW ERA IN WATER MANAGEMENT?

OCTOBER 16, 2018 THE MOUNTAINEERS SEATTLE CONFERENCE ROOM

By Dave Christiansen and Felix Kristanovich

AWRA-WA welcomes you to join us for an interdisciplinary investigation of Washington water resource management. This year's conference will delve into several key Washington State Supreme Court decisions as well as recent legislation to evaluate how water management in our state may be required to adapt to meet stresses from development pressures, existing and shifting water demands, and climate change.



Tom Ring Photo

Conference registration opened July 9<sup>th</sup>, so [register now at the AWRA-WA's website](#). This year's conference keynote speaker will feature **Leon Szeptycki**, from the Stanford Woods Institute (See Inset for biography). Leon's work includes streamflow restoration challenges in the context of western water law and increasing human water demands.

AWRA-WA's 2018 conference program features five informative sessions:

**Session 1** – Focusing on the ridged application of water law from legal cases that preceded the adoption of ESSB 6091 in the 2018 Legislative session, with speakers including State, Tribal and environmental attorneys.

**Session 2** – Covering implementation of ESSB 6091 from three different watersheds, with speakers from three different lead agencies who have been tasked with updating watershed plans and getting agreement from planning participants.

**Session 3** – A technical session focused on the concept of "Net Ecological Benefits" (NEB). ESSB 6091 requires that plans meet the net ecological benefit standard, but did not define specifically what the NEB

standard is. Panelists will talk about the interrelationship between water quantity, water quality and fish habitat.

**Session 4** – Explores current scientific and technical understandings of potential impacts to water resources and shifting water demands because of shifting climatic baselines. Panelists will talk about climate modelling, predicted groundwater response, and changes we have already seen in our surface water systems.



**Panel Session - In the final session**, panelists will discuss future considerations and policy issues related to water resource management. This panel will include our Keynote speaker, Leon Szeptycki (see biography on page 3) as well as state and Tribal water resource managers to talk about what changes to policy might be needed to respond to new era of water management.



Lodge Creek 2014\_01\_04 Tom Ring

## CONFERENCE REGISTRATION

Early-bird registration is open now through September 16<sup>th</sup>. To register, go to our website: [www.waawra.org](http://www.waawra.org). [OR CLICK HERE.](#)

Registration Pricing is summarized in the following table:

| Type of Registration                       | Early-Bird Rate (before Sept. 16 <sup>th</sup> ) | Regular Rate (after Sept. 16 <sup>th</sup> ) |
|--|--|--|
| Standard                                   | \$185  | \$205  |
| Agency/Non-Profit/Unemployed               | \$150  | \$170  |
| Student/Recent Graduate (Looking for Work) | \$40   | \$60   |
| Student Volunteer                          | \$0  | \$0  |
| Speakers and Awardees                      | \$0  | \$0  |
| Sponsor Registrations                      | \$0  | \$0  |

Please contact Conference Chair **Felix Kristanovich** at [fkristanovich@ramboll.com](mailto:fkristanovich@ramboll.com) with any questions.

### THANKS TO OUR 2018 CONFERENCE SPONSORS!

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## KEYNOTE SPEAKER: Leon Szepycki



Leon Szeptycki is a Professor of the Practice and Executive Director of Water in the West at the Stanford Woods Institute for the Environment. Water in the West is an interdisciplinary research program that engages Stanford in developing solutions to water scarcity and water management challenges in the American West.

Leon is an attorney who specializes in water quality, water use and watershed restoration. His work includes issues related to stream flow restoration in the context of the western appropriative rights system, sustainable groundwater management, and restoration of aquatic species. Over his career, Leon has worked on a broad range of matters related to the restoration of river health and water quality on a landscape scale.

From 2006 until 2012, Leon taught at the University of Virginia School of Law, where he ran the Environmental Law and Conservation Clinic and helped create an interdisciplinary course in conservation for students in the environmental sciences department and the law school. Prior to that, he spent 10 years with Trout Unlimited, a national conservation organization devoted to the protection and restoration of trout and salmon rivers. While at Trout Unlimited, Leon helped develop innovative legal and policy tools

for voluntary watershed restoration by a variety of means, include dam removal and reclamation of abandoned mine sites. He has also worked in private law practice and at the U.S. Department of Justice.

Leon received his B.A. from the University of Kansas and his J.D. from Yale Law School.

In 2016, Leon was appointed by California Governor Jerry Brown to the Board of Directors of the [Klamath River Renewal Corporation](#), an organization formed in 2016 whose sole purpose is to oversee the removal of four dams on the upper Klamath river.

## REVIEW OF APRIL-JUNE DINNER MEETINGS:

### APRIL: 2018 WILD AND SCENIC RIVER FESTIVAL *A Screening Success*

By Hannah Kennedy, Washington Water Trust

For its April meeting, AWRA-WA joined Washington Water Trust's (WWT) 5<sup>th</sup> Annual Wild and Scenic Film Festival in Seattle. WWT is celebrating their 20<sup>th</sup> year as a leading flow restoration organization in Washington State, in 2017 adding over 3,500 acre feet to Washington's most threatened rivers and streams, enough water to fill Seattle's Green Lake 12 times! AWRA-WA's outreach support helped over 300 people experience happy hour, raffle prizes and 14 eye-opening films celebrating adventure and conservation. The event also raised nearly \$18,000 to support flow restoration work in fish-critical basins across Washington State! This year's film selection took us paddling down the Yellowstone River, octopus gleaning off the coast of Madagascar, and mountaineering in Nepal and beyond. A complete list of this year's films, some of which are available online, can be found [here](#).

### MAY: LEGISLATIVE UPDATE – ESSB 6091

#### *Dissecting the Elephant in the State Water Code*

Carrie Sessions, Legislative and Policy Analyst for the Department of Ecology, shared the story of the genesis of Washington's biggest change (arguably) to water resource management in the last 40 years. The "Hirst Fix", aka ESSB 6091, aka the Washington Streamflow Restoration Act, aims to define solutions following the 2016 Supreme Court Decision on the "Hirst Case", and Carrie explained how Ecology plans to implement this new law.

### JUNE: GEOLOGIC, SOIL AND GROUNDWATER CONSIDERATIONS WITH BIORETENTION CELLS

#### *Retaining Water to Survive the Storms*

Jennifer Saltonstall, Associated Earth Sciences, Inc.

Jenny presented geologic, soil and groundwater considerations for design of bioretention cells and the results of hydrogeologic assessments and hydrologic performance monitoring on ten cells located throughout the Puget Lowlands. The work was in support of a regional study of bioretention infiltration effectiveness conducted as part of the Stormwater Action Monitoring (SAM) Program. The bioretention cells are infiltration (artificial recharge) basins designed with a layer of compost-amended sand (bioretention soil) to provide water quality treatment. The design of these cells uses a hydrologic model to size the facility based on inflow data and hydrogeologic parameters for the bioretention soil and native subsurface geologic unit.

### 2018 AWRA-WA BOARD MEMBERS

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## Water Management Adaptation in A changing climate

### A CASE STUDY IN THE BAKER RIVER BASIN

By John Chandler, Puget Sound Energy

The Baker River Hydroelectric Project is a two-reservoir, 200-megawatt hydroelectric project in northwestern Washington. Puget Sound Energy (PSE), the State's largest utility, owns and operates the project. The Baker River is a major tributary to the Skagit River, accounting for approximately 20% of the water downstream of the confluence of the two rivers.

PSE and other entities have recorded daily average inflows for the upstream reservoir, Baker Lake, since 1926. The data quality improves starting in 1960, shortly after PSE completed the 312 foot high Upper Baker Dam in 1959.

The biggest water management risk in the Baker River Basin relates to major storms striking between September and November, when Baker Lake transitions from its high recreation pool to a low pool designed for flood management. The largest floods typically occur in October and November, before the reservoir reaches full storage volume according to the normal drawdown schedule. Are risks associated with these flood events increasing over time?

In this system, daily average inflow exceeding 15,000 cfs (6.7 million gpm) represents a significant management threshold for PSE operations, while daily average flows exceeding 20,000 cfs (9 million gpm) create major operational challenges for the reservoir. Using the inflow data from 1960 – 2017, the Baker River Basin Case Study compared two periods, 1960 to 1988 and 1989 to 2017, to determine whether or not flow events above the 20,000 cfs management threshold were occurring more often. The results, plotted below, compare 15,000 – 20,000 cfs (blue) average daily flows with average daily flows exceeding 20,000 cfs (red).

# of Days >15,000 cfs:

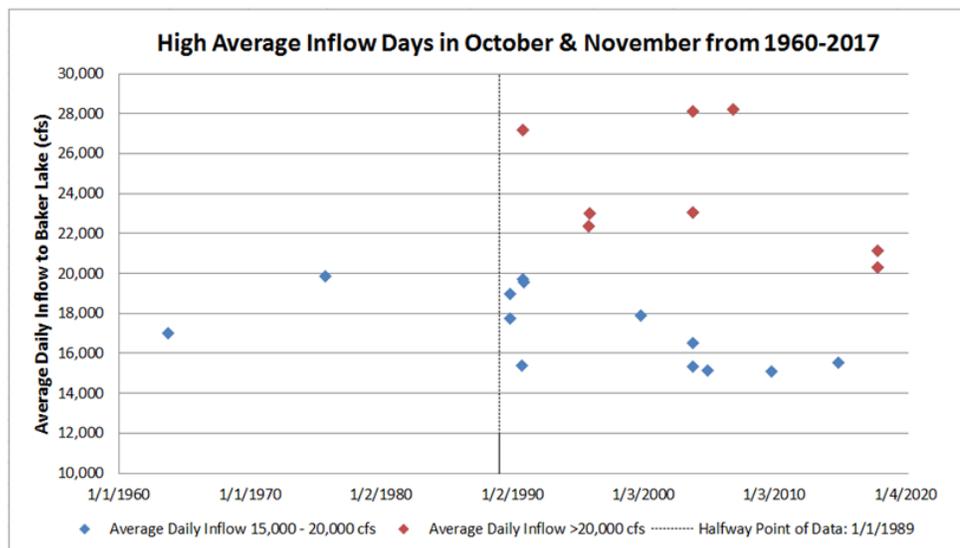
1960 – 1988: 2

1989 – 2017: 19

# of Days >20,000 cfs:

1960 – 1988: 0

1989 – 2017: 8



From 1960 to 1988 there were only two days where the average inflow exceeded of 15,000 cfs. From 1989 to 2017 this occurred nineteen times, a significant increase from the previous period. Another way to consider this contrast is that in the first half of the record the probability of exceeding a daily average inflow of 15,000 cfs during the drawdown period in a given year was about 6.9%. In the second half it increased to nearly **66%**. In terms of 20,000 cfs days, there were none in the first 29 years and eight in the second half (**28% probability each year**).

To offset this increased risk of high flow events, PSE changed its drawdown curve in 2017 (within the limits of its federal operating license) to provide more storage capacity during October and November. This strategy was ultimately tested on Thanksgiving Day 2017 - the worst storm in eleven years to hit the Skagit Valley. The Baker River Project was able to reduce its discharge to 1,200 cfs (538,000 gpm) during the peak flow period when the Skagit River at Concrete reached 106,000 cfs (47,500,000 gpm). According to the Army Corps of Engineers (the Corps), the combined efforts of the Corps, Seattle City Light, and PSE reduced the peak stage on the Skagit River by eight feet. This reduction likely spared potentially extensive flood damage throughout the Skagit Valley, including the areas protected by the levee systems in local municipalities, including Mount Vernon and Burlington.

While the extra storage capacity due to the drawdown adjustment was only a fraction of the eight-foot reduction, this process of A) identifying changing risks and B) taking appropriate actions to modify operations is an important example of how water managers can and should adapt their operations in a changing climate.

Going forward, more analysis is planned for other aspects of hydrologic risk in the basin including the rest of the flood season, snowmelt season, and low flow periods during the summertime. **To see more of this analysis, please attend the annual conference of the AWRA-WA chapter on October 16<sup>th</sup> at the Mountaineers in Seattle.** I am looking forward to seeing you there!

# A CLIMATE REVIEW OF WINTER 2017-2018

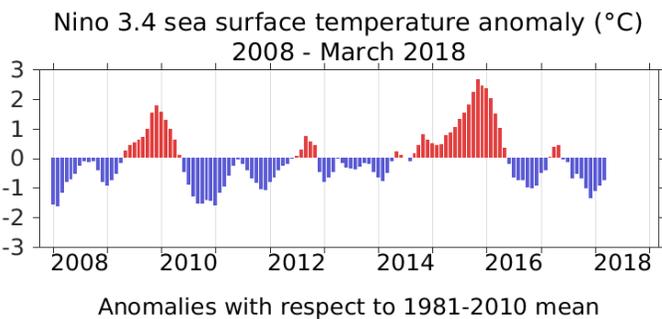
## A MESSAGE FROM THE STATE CLIMATOLOGIST

**By Nick Bond, Associate Professor of Atmospheric Sciences – University of Washington**

Seasonal weather forecasts from the Climate Prediction Center in the fall of 2017 for the winter of 2017-18 generally predicted cool and wet conditions, in line with an expected La Niña development. Did that actually occur in Washington State? Here we review the winter of 2017-18, defined as the six months from October through March.

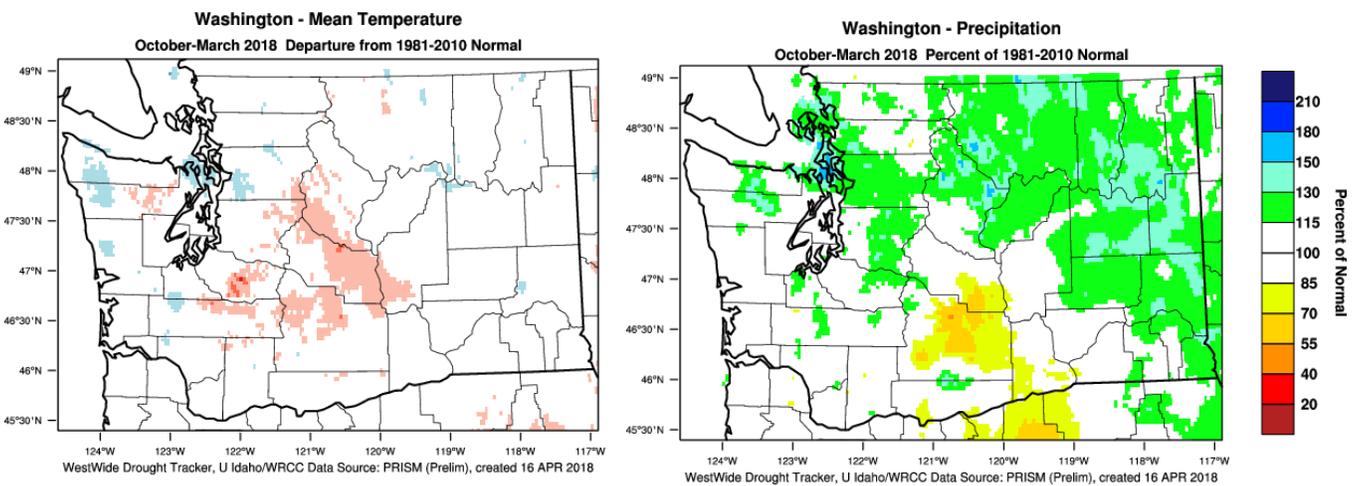
Figure 1 shows the sea surface temperature (SST) anomalies from January 2008 through March 2018 in the Niño 3.4 Region of the equatorial Pacific Ocean. SST anomalies were more than 1°C below normal for the winter, classifying it as a La Niña winter. It was a stronger La Niña than the winter of 2016-17; it turns out that it is fairly common to have two back-to-back La Niña winters. La Niña is currently weakening in terms of both its atmospheric and oceanic signatures, and near-neutral conditions were expected for the spring and summer of 2018. At the time of this writing, there was about an equal chance (40-45% each) of either neutral conditions or El Niño conditions for Fall 2018. There will be more confidence in the El Niño/Southern Oscillation (ENSO) forecasts in late summer of 2018.

**Figure 1: SST anomalies Jan 2008 - Mar 2018 in the Niño 3.4 region of the tropical Pacific (Todd Mitchell).**



Average statewide October-March temperatures were exactly normal (36.7°F; 0.0°F anomaly from 1981-2010), and most regions were near normal as well. Figure 2a shows a few areas in central Washington with warmer than normal temperatures, but otherwise October-March temperatures were within 1°F of normal. For precipitation, most of the state was wetter than normal (Figure 2b) and the average over the state was 3.11" wetter than the 1981-2010 normal. A notable exception was the vicinity surrounding Yakima County, where winter precipitation was below normal.

**Figure 2a and 2b: Oct-Mar 2017-18 temperature anomalies (2a-left) and precipitation percent of normal (2b-right) compared to the 1981-2010 normal (WestWide Drought Tracker).**



The average winter conditions provide one perspective on the winter of 2017-2018, but it is also worthwhile to consider the progression of the weather over the course of the season, and the notable weather events. October was colder and wetter than normal, with the interesting distinction that the above-normal precipitation was largely due to a few very wet days. Regardless, the precipitation helped alleviate some of the areas of dryness depicted on the United States Drought Monitor resulting from the warm and dry summer of 2017. Wetter than normal conditions continued in November, and any areas of dryness depicted on the Drought Monitor were absent by mid-month. Overall, November had near-normal temperatures, but consisted of a very cold start (with lowland snow to boot!) and an anomalously warm ending. For December, an area of high pressure set up over the region causing an inversion, bringing cooler temperatures to the lowlands and warmer temperatures at higher elevations. The pattern

was so persistent that the resulting temperature pattern was evident on the monthly scale. December was also drier than normal due to the blocking ridge suppressing the usual parade of storms making landfall. The inversion moved out of the region in time for a return to more active winter weather, including snow on Christmas Day for nearly the entire state – a rare occurrence, especially for western Washington. January was warmer and wetter than normal for a majority of the state while February’s precipitation was variable and temperatures were colder than normal. There were also several occurrences of lowland snow during February, and in many parts of Washington State the coldest temperatures of the season occurred in late February. The colder than normal conditions persisted through March, which was also drier than normal except for north central Washington.

**Figure 3: Snowpack (snow water equivalent) percent of normal for WA as of April 2, 2018 (NRCS).**

The winter conditions were consistently favorable for high elevation snow as well (aside from the stagnant air conditions in December), and the April 1 snow water equivalent (SWE) was normal to above normal throughout the state (Figure 3).

Mountain snows can cause closures of the state’s highways crossing the Cascades due to avalanche risk and control, but fortunately, these types of closures were minimal during the winter of 2017-18. The healthy snowpack has aided in a favorable April-September water supply forecast from the Northwest River Forecast Center. Figure 4 shows the forecast made on April 27 indicating normal to above normal streamflow throughout WA state.

Apr 02, 2018

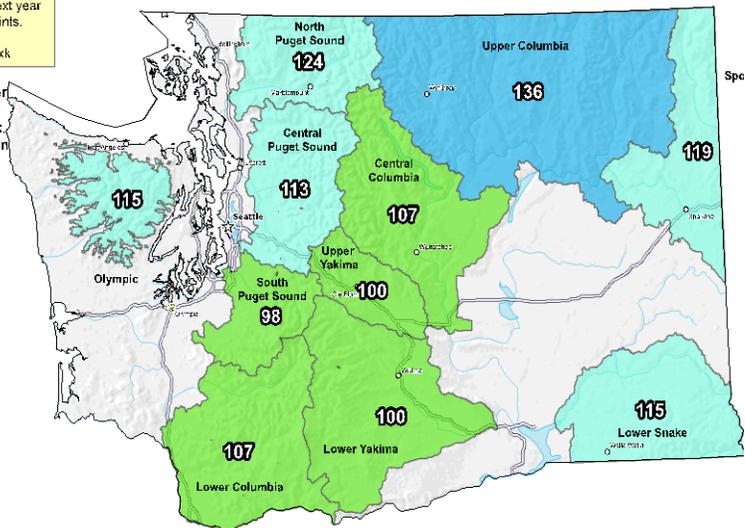
Notice: We anticipate this map will not be available next year due to staffing constraints. Alternate maps: <https://go.usa.gov/xnzsk>

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median

- Unavailable \*
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >=150%

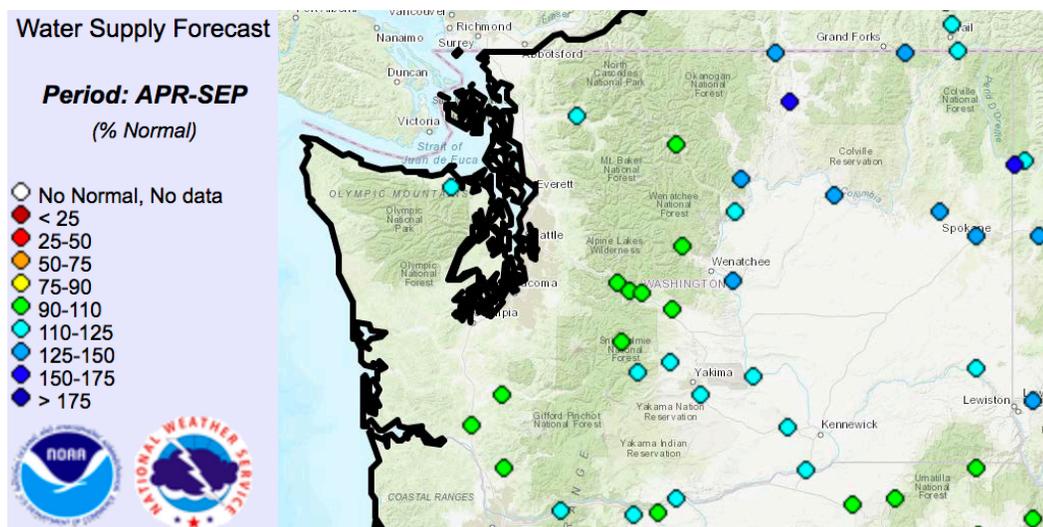
\* Data unavailable at time of analysis or stream network is not representative of this time of year

Provisional Data



In conclusion, overall winter WA conditions included near-normal temperatures and above normal precipitation. La Niña in the tropical Pacific Ocean is often accompanied by a relatively wet and cool winter in WA state, but the below normal temperatures did not come into fruition. Importantly, a healthy snowpack indicates there should be plenty of water for the upcoming summer.

**Figure 4: April through September 2018 water supply forecast for WA as of April 27, 2018 from the NWS Northwest River Forecast Center.**



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