



Office of the Washington State Climatologist

May 2019 Report and Outlook

May 8, 2019

<http://www.climate.washington.edu/>

April Event Summary

Mean April temperatures were near-normal to above normal throughout Washington state, with the Olympic Peninsula and the southern half of the state on the warmer side. Precipitation was above normal for most of the state, and was in record territory in parts of southern WA. Figure 1 shows the April precipitation percentile with southeastern WA and Klickitat county being among the wettest 10th percentile. April precipitation for Pullman, for example, ranked as the 4th wettest since records began in 1941. There were some locations with below normal April precipitation, however, and those are described in more detail in the “Climate Summary” section.

Figure 2 shows the daily April temperatures and precipitation for Spokane Airport. Its weather was typical of that across the state, with the first half on the wet side and the second half mostly warm and dry. In contrast to March, the first week of April started off with fairly active weather. A daily maximum rainfall amount was set at Bellingham Airport on the 3rd with 0.62”. Both the 5th and the 6th were breezy days, with gusts between 20 and 45 mph in western WA. In eastern WA, Wenatchee recorded a maximum

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daily rainfall amount of 0.32” on the 5th. Pullman Moscow Airport - one of the wet areas of the state for the month - recorded an impressive daily maximum rainfall record of 1.21” on the 9th.

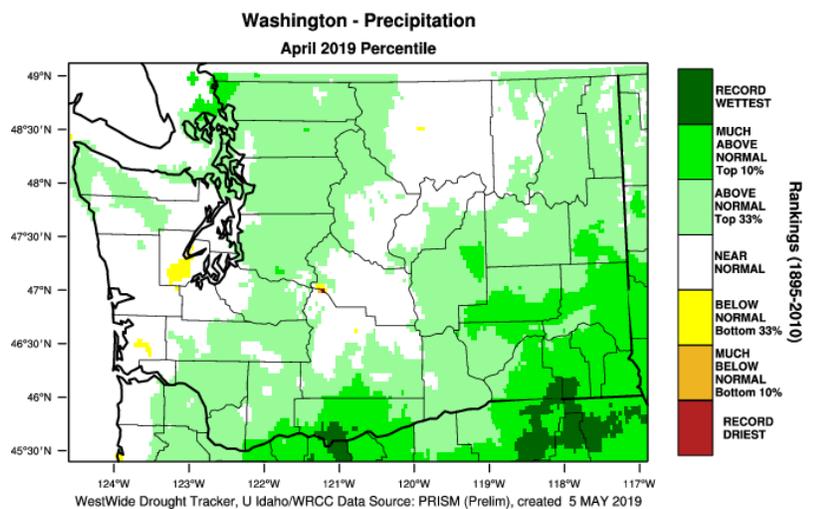


Figure 1: April 2019 precipitation percentiles compared to the 1895-2010 historical record (WWDT).

Bellingham Airport recorded another maximum rainfall record (0.84") on the 18th.

Aside from the wet start to the month and a handful of precipitation records, it was relatively quiet in terms of weather. The month did close with some isolated thunderstorms and associated rain on the 29th.

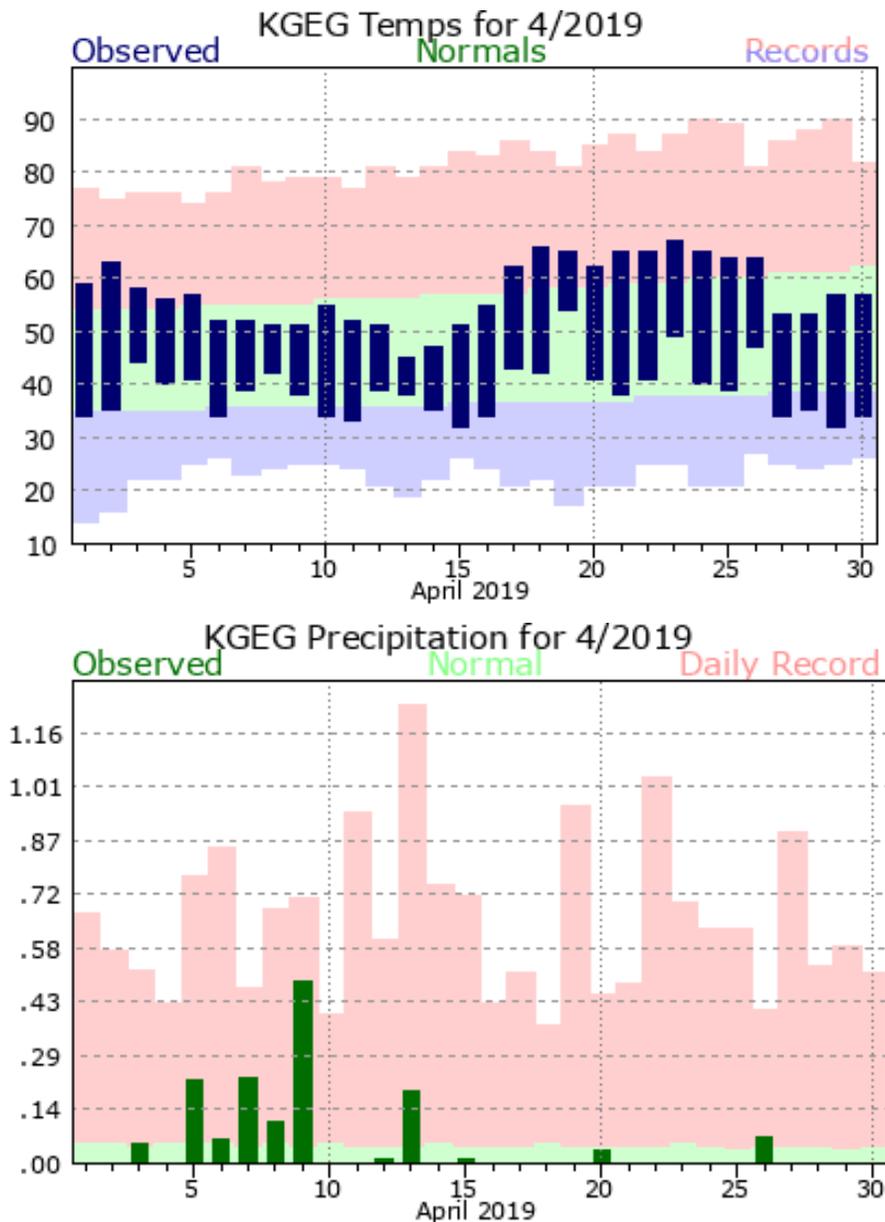


Figure 2: Daily April 2019 a) temperatures (dark blue bars) and b) precipitation for Spokane Airport compared to normal (green envelopes) and historical records (red and blue bars).

[NWS](#)

Snowpack and Drought Update

The weather of early April initially helped to preserve the snowpack that had built in the mountains over the course of the winter, with some new snow even falling early in the month, but the warmer than normal temperatures contributed to snowmelt beginning about mid-month in most basins. The May 1 basin average snow water equivalent (SWE) percent of normal from the Natural Resources Conservation Service is shown in Figure 3. Percentages of normal are lower than they were on April 1, indicating that snowmelt is occurring faster than usual in most of the state. The only exception is in the Lower Snake-Asotin basin, which has an average SWE of 127% of normal. The central Cascades are faring the worst with between 53 and 59% of normal snow water equivalent averaged for the Central Puget Sound and Central Columbia basins,

respectively. With warmer than normal temperatures in store for the first ten days of May, we expect the faster melt to continue.

The current U.S. Drought Monitor map (Figure 4) has increased “moderate drought” (D1) conditions in central WA, with much of western WA remaining in the “abnormally dry” category (D0).

📍
Report Your Drought Impacts

Are you experiencing a drought impact? Your on-the-ground observations are critical in helping us understand the broad picture of drought in the state. The National Drought Mitigation Center has developed a [Drought Impact Reporter](#) that allows the public to enter their observations regarding crops, water supply, fire, etc. in a short survey.

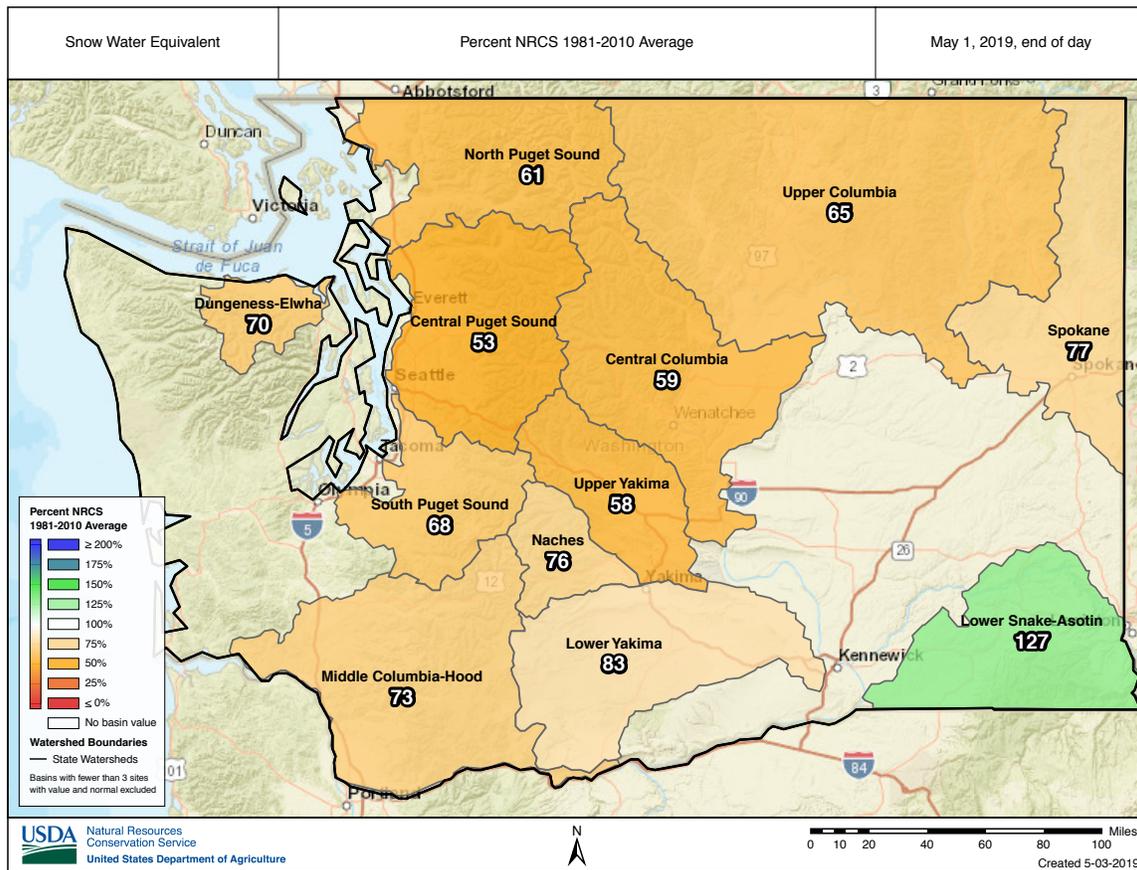
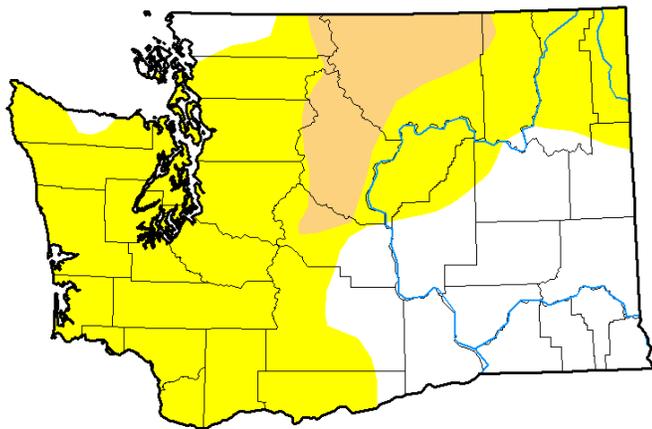


Figure 3: Snowpack (in terms of snow water equivalent) percent of normal for WA as of 1 May 2019 (NRCS).



Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Figure 4: The 30 April 2019 edition of the [US Drought Monitor](#).

A Review of Winter 2018-19

A message from the State Climatologist

Seasonal weather forecasts from the Climate Prediction Center made in fall 2018 for the winter of 2018-19 were generally indicating warm and dry conditions, in line with the expected El Niño development. Did that actually occur in WA State? Here we review the winter of 2018-19, defined as the 6 months from October through March.

Figure 5 shows the Oceanic Niño Index (ONI), a 3-month running mean of sea-surface temperatures (SSTs) in the Niño3.4 region, from January 2007 through February 2019. El Niño developed late in the season, with the Climate Prediction Center issuing an El Niño advisory in mid-February. Warmer than normal SSTs in the equatorial Pacific developed in early fall, as

indicated in Figure 5, but the atmosphere was slow to show signs of El Niño. The evolution of the SSTs during the “late blooming” El Niño was actually fairly similar to the one that occurred in 2014-15. The following year, 2015-16, was a strong El Niño event, which may portend another El Niño for next winter. The official forecasts reflect that, and indicate a higher likelihood (-50%) of El Niño conditions by Oct-Dec 2019 compared to neutral (-40%) or La Niña (-10%). There will be more confidence in the ENSO forecasts later this summer.

Because the El Niño developed later in the winter than expected, it is unlikely that the event had much influence on our local weather. Average statewide October-March temperatures were near

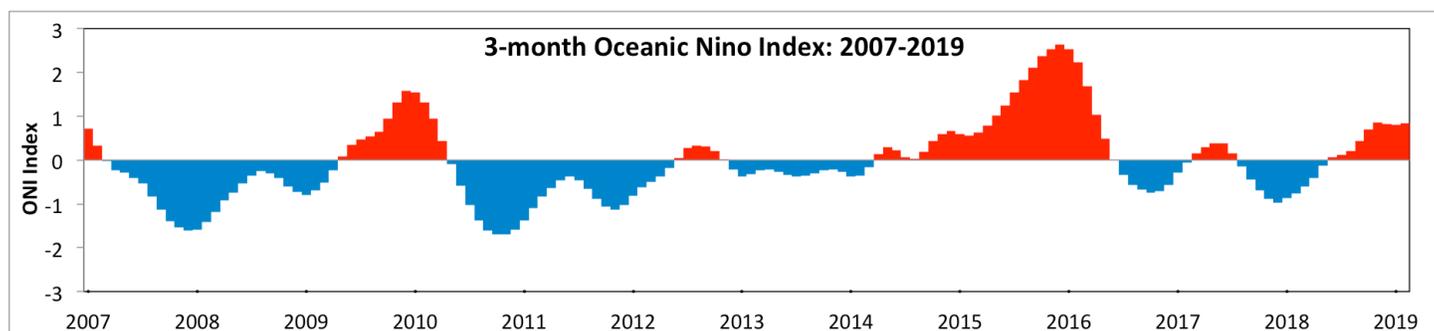


Figure 5: The 3-month Oceanic Niño Index centered over the middle month from January 2007 through February 2019.

normal (35.9°F; -0.8°F anomaly from 1981-2010), but on the cool side. Figure 6a shows a larger area of eastern WA with temperatures between 2 and 4°F below normal, while most of western WA was within 1°F of normal. For precipitation, most of the state was drier than normal (Figure 6b) and the average over the state was 5.41" drier than the 1981-2010 normal. The exception is eastern WA where precipitation was near-normal or above normal (in Benton and Franklin counties).

There was a substantial amount of variability in temperatures over the winter, and the distinction is worth noting here. The individual months from October to January were generally warmer than normal (+1.9°F anomaly), with the 4-month statewide average temperature ranking as the 12th warmest on record (since 1895). On the other hand, February and March were much colder than normal (-6.2°F anomaly), tying as the 5th coldest Feb-Mar averaged over the state. Figure 7 shows the temperature anomalies for these two periods.

The average winter conditions provide one perspective on the past winter, but it is also worthwhile to consider the progression of the weather over the course of the season, and the notable weather events. October temperatures were near-normal to above normal, while precipitation was quite variable throughout the state. November was warmer and drier than normal, with mountain snow starting off slowly. The weather pattern was more active in December (which included an EF2 tornado and a western WA wind storm), helping to build snowpack, though the values were still below normal by the end of the month. December temperatures were warmer than normal, especially in eastern WA, and the warmer than normal temperatures continued into January. January was

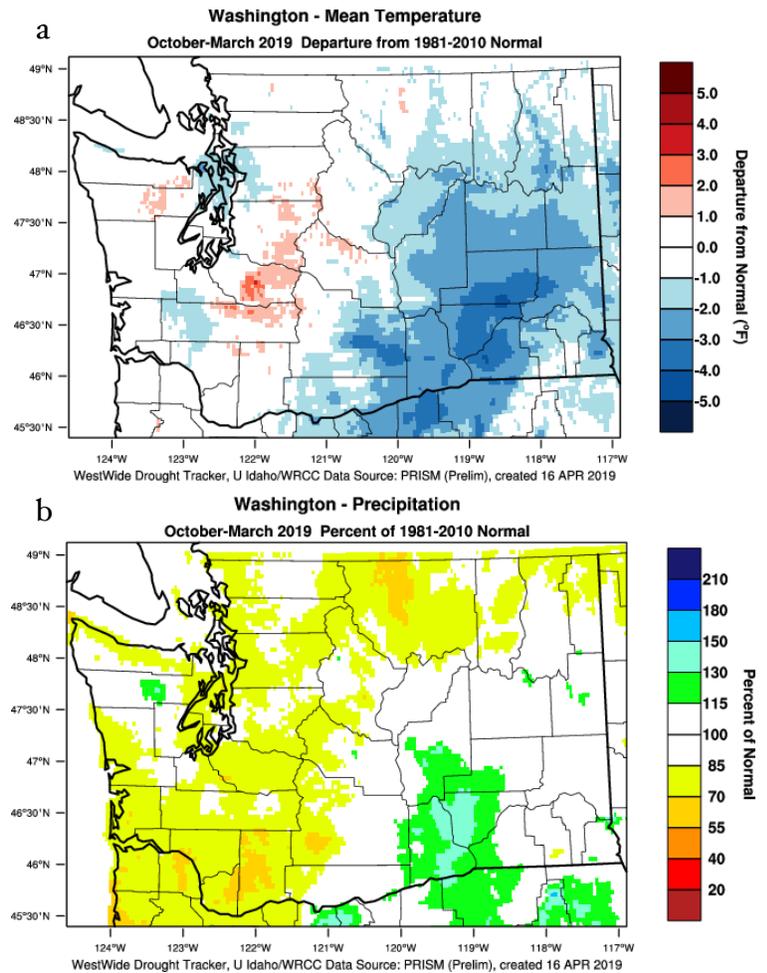


Figure 6: Oct-Mar 2018-19 (a) average temperature anomalies and (b) precipitation percent of normal compared to the 1981-2010 normal (WestWide Drought Tracker).

also dry for a majority of the state, except for parts of the Lower Columbia Basin where precipitation was above normal. Still, mountain precipitation was certainly below normal and snowpack was in poor shape by the end of the month. February produced some improvements with one heavy mountain snow week, in particular, that helped build our snowpack. [Lower elevation snow](#) was also plentiful during February and temperatures were much below normal statewide. But, precipitation was largely below normal with the exception again being most of the southern regions of eastern WA. In contrast, March precipitation was consistently below normal

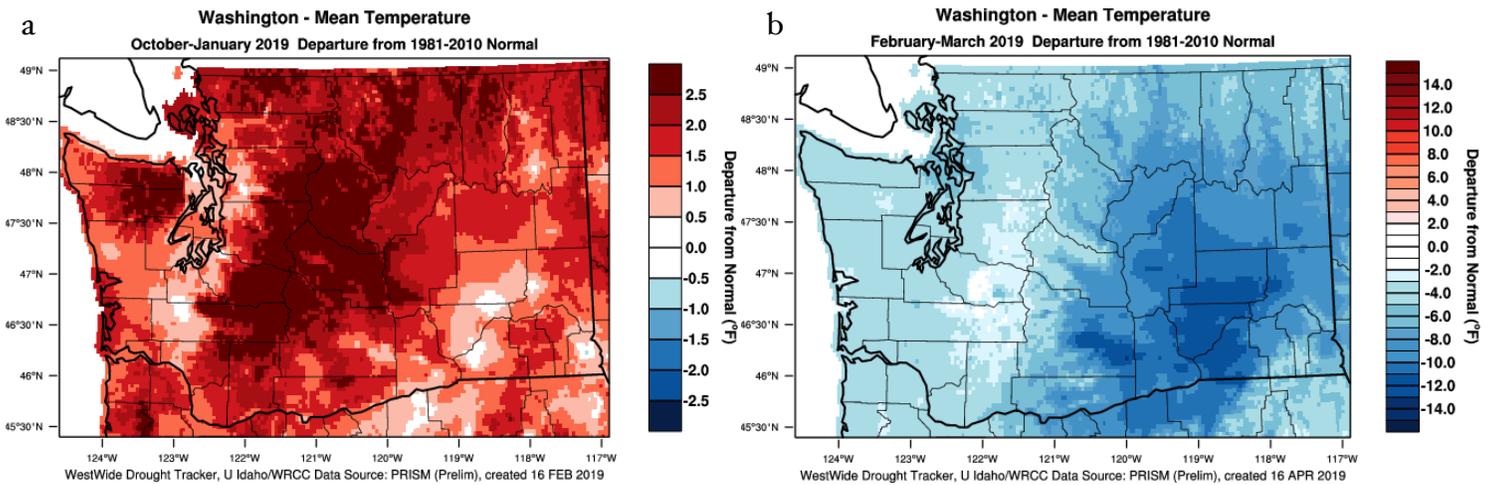


Figure 7: (a) October 2018-January 2019 average temperatures anomalies and (b) February-March 2019 average temperature anomalies (bottom) compared to the 1981-2010 normal (WWDT).

across the entire state. This dry period resulted in below normal snowpack by April 1, the traditional peak in snow accumulation for the season, despite the relatively cool conditions experienced statewide in March.

The April 1 basin-average snow water equivalent (SWE) percentages of normal are shown in Figure 8 from the Natural Resources Conservation Service. The basins with below normal SWE ranged from 66% of normal in the Central Puget Sound to 88% of normal in Spokane. The basins across southern WA were near-normal, ranging between 90 and 101% of normal. Given below normal precipitation and snowpack in parts of the state combined with dismal summer streamflow forecasts, Governor Inslee declared a drought emergency on April 4 in 3 watersheds: the Okanogan, Methow, and Upper Yakima. Despite some recent April precipitation, the Northwest River Forecast Center’s April-September water supply forecasts are still below normal for many of our streams. Figure 9 shows those forecasts as of April 18, and note that the water supply percentages of normal for north central WA are particularly low (between 56 and 71% of normal).

In summary, the seasonal forecasts did a good job of anticipating the warmer and drier than normal early winter, but missed the mark regarding the temperatures in February and March. Overall, precipitation was below normal for most of the state, as predicted, though perhaps not for the right reasons (since El Niño developed late in the season). Even though the snowpack accumulation season is officially over, we will continue to monitor conditions. As highlighted in the April newsletter, mountain temperatures are closely

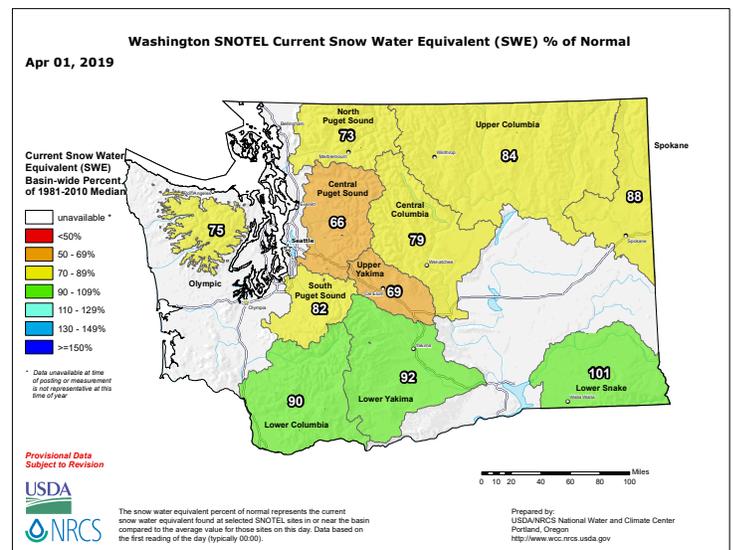


Figure 8: Snowpack (in terms of snow water equivalent) percent of normal for WA as of April 1, 2019 (NRCS).

related to the rate of snowmelt in spring and with the Climate Prediction Center forecasting a warmer and drier spring and summer, there are concerns that there may not be adequate water for agriculture, recreation, and fish later in the summer. Based on current conditions and forecasts, there will likely be unwelcome consequences of the dry winter in the Okanogan and Methow regions of the state.

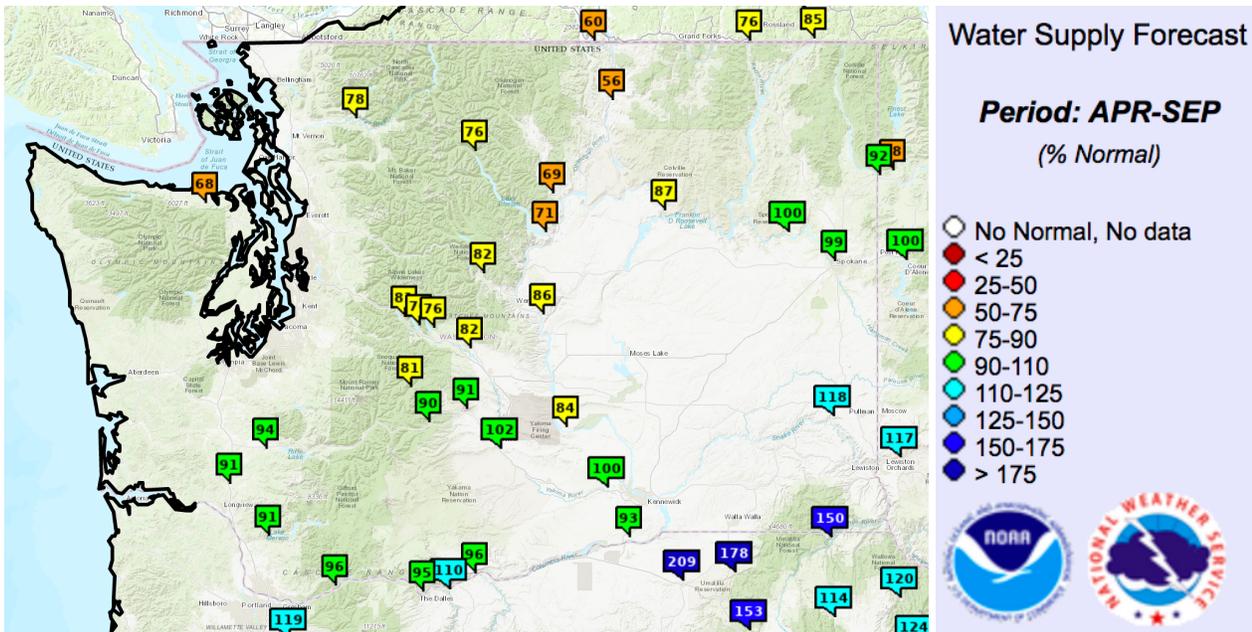
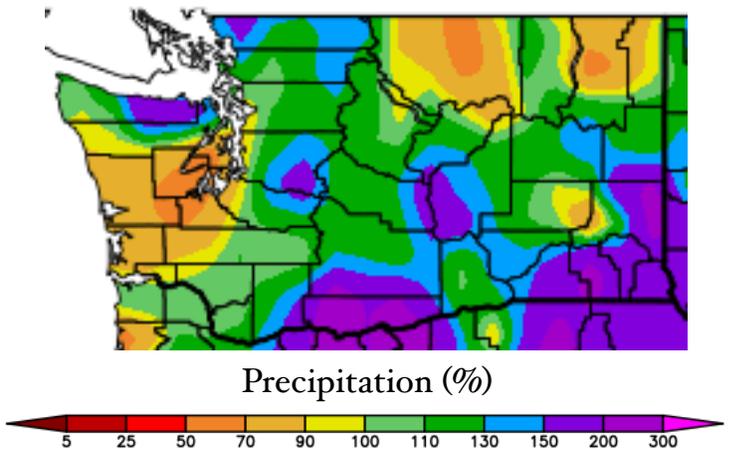
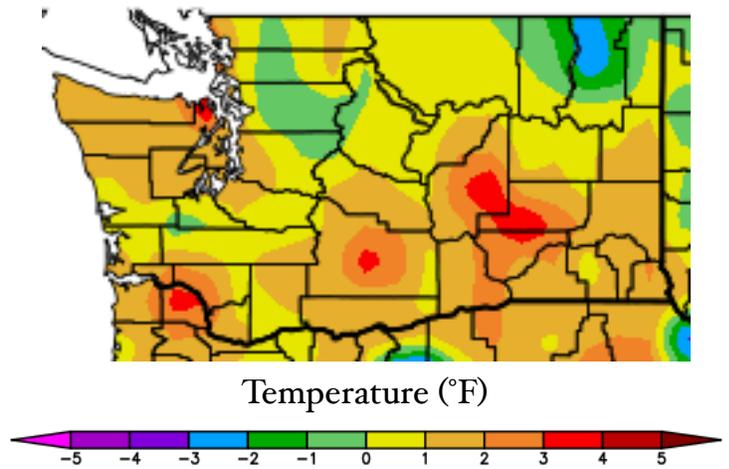


Figure 9: April through September 2019 water supply forecast in percentage of normal for WA as of April 18, 2019 from the NWS Northwest River Forecast Center. [Forecasts](#) are updated daily.

Climate Summary

Mean April temperatures were near-normal to above normal throughout WA State. According to the map from the High Plains Regional Climate Center (right), most of the central and north Cascades, northern Puget Sound, and north central WA had near-normal temperatures within 1°F of normal. Some coastal locations had normal temperatures as well, with Hoquiam coming in with a +0.9°F anomaly for April (Table 1). A few locations in northeastern WA were below normal, but otherwise the rest of the state experienced above normal temperatures. These anomalies were mostly between 1 and 2°F above normal. For example, Spokane, Olympia, and Pullman were 1.0, 1.2, and 2.0°F above normal, respectively (Table 1). The exception was Pasco, which was 4.1°F warmer than normal averaged over the month.

Total April precipitation was above normal for the majority of WA state, with parts of southern WA east of the Cascades, such as Klickitat county, receiving the most precipitation relative to normal with values between 150 and 300% of normal. Pullman, for example, received 234% of normal April precipitation (Table 1). SeaTac Airport and Bellingham Airport were wet spots on the west side, with 130 and 155% of normal precipitation, respectively. North central WA and the central Olympic Peninsula/southern Puget Sound were drier than normal, however, with precipitation ranging from 50 to 90% of normal. Omak, in a region where precipitation has been below normal all winter, only received 66% of normal April precipitation. Olympia missed out of some of its usual April precipitation as well, only recording 76% of normal (Table 1).



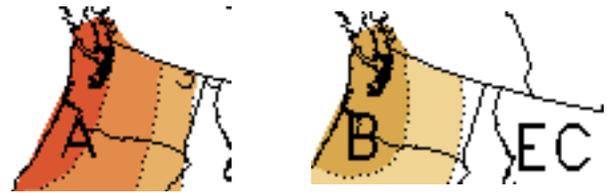
April temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	49.6	48.3	1.3	2.68	3.54	76
Seattle WFO	52.0	50.5	1.5	2.21	2.77	80
SeaTac AP	52.5	50.3	2.2	3.53	2.71	130
Quillayute	48.2	46.7	1.5	8.27	7.85	105
Hoquiam	49.6	48.7	0.9	4.28	5.10	84
Bellingham AP	50.5	48.4	2.1	4.16	2.69	155
Vancouver AP	53.4	52.1	1.3	M	3.01	M
Eastern Washington						
Spokane AP	48.0	47.0	1.0	1.47	1.28	115
Wenatchee	51.9	51.6	0.3	0.78	0.46	170
Omak	50.9	50.0	0.9	0.69	1.04	66
Pullman AP	48.1	46.1	2.0	3.65	1.56	234
Ephrata	52.8	50.4	2.4	0.65	0.48	135
Pasco AP	57.0	52.9	4.1	0.85	0.65	131
Hanford	55.5	53.5	2.0	0.71	0.55	129

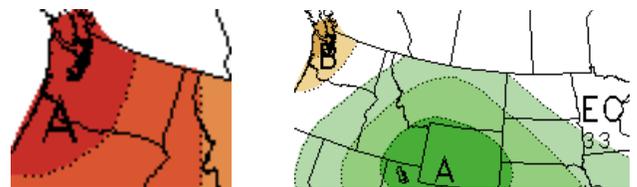
Table 1: April 2019 climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport and Seattle WFO 1981-2010 normals involved using surrounding stations in estimating the normal, as records for these station began in 1998 and 1986, respectively.

Climate Outlook

Weak El Niño conditions are still present in the tropical equatorial Pacific, with above normal sea surface temperatures persisting. The “[El Niño Advisory](#)” issued by the Climate Prediction Center on February 14 is also still in effect. There is about a 65% chance that the El Niño will last through the summer, but fall forecasts are less certain at this time. The chance of the El Niño persisting through fall is elevated to 53%, while the chance of neutral conditions is at about 38%. A La Niña is looking less likely, with only about an 8% chance for fall 2019. The odds for warmer than usual WA summers are slightly elevated when an El Niño persists, and that is reflected in the CPC outlooks below.



May outlook for temperature (left) and precipitation (right)



May-June-July outlook for temperature (left) and precipitation (right)

The CPC May temperature outlook calls for increased chances of above normal temperatures for all of WA state, with higher chances of warmer than normal temperatures in western WA. May precipitation is likely to be below normal statewide, and there are higher chances of below normal precipitation in western WA.

The CPC May-June-July seasonal temperature outlook calls for warmer than normal temperatures statewide, with the highest chances (exceeding 60% on the three-tiered system) for western WA. There are higher chances of below normal May-July precipitation for western WA. Most of eastern WA has equal chances of below, equal to, or above normal precipitation for the 3-month period.

([Climate Prediction Center](#))