



Office of the Washington State Climatologist

November 2018 Report and Outlook

November 8, 2018

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

October Event Summary

Mean October temperatures were near normal for most of WA state though there were some areas on the warmer side. Averaged throughout the state, mean October temperatures were 0.8°F above the 1981-2010 normal. Precipitation was variable throughout the state with most of the state receiving normal to above normal precipitation, while others (coastal WA, north central WA, and southeastern WA) received below normal precipitation. Averaged statewide, October precipitation was near-normal (98% of normal) masking the regional variability.

October began with a cool period throughout WA state. Figure 1a shows the daily minimum and maximum temperatures for SeaTac Airport, showing below normal maximum temperatures for the first week and a half of October. The maximum temperature on the 5th was actually the coldest recorded for that particular date at SeaTac Airport (53°F), Vancouver (54°F), and Olympia (50°F).

A pattern shift occurred around the 10th, when a large ridge of high pressure built into the region, keeping the state dry and causing many days with dense fog. Olympia had 16 days with fog in

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October, for example. Typically these situations bring colder than normal temperatures to the lowlands and warmer temperatures in the mountains due to a temperature inversion, but the fog mixed out on many of those days, making way for sunny afternoon skies and warmer than normal maximum temperatures in the lowlands. For example, SeaTac Airport (72°F), Quillayute (80°F), and Bellingham (71°F; tie) set or tied record high maximum temperatures on the 16th. On the 17th, Hoquiam (75°F), Quillayute (74°F), and Bellingham (70°F) recorded more record daily maximum temperatures.

Some rain finally started moving into Washington at the end of the month, with several wetting rains at SeaTac Airport, for example (Figure 1b). Rain

fell east of the Cascade crest at well and Wenatchee Pangborn recorded a daily maximum precipitation record of 0.44” on the 27th.

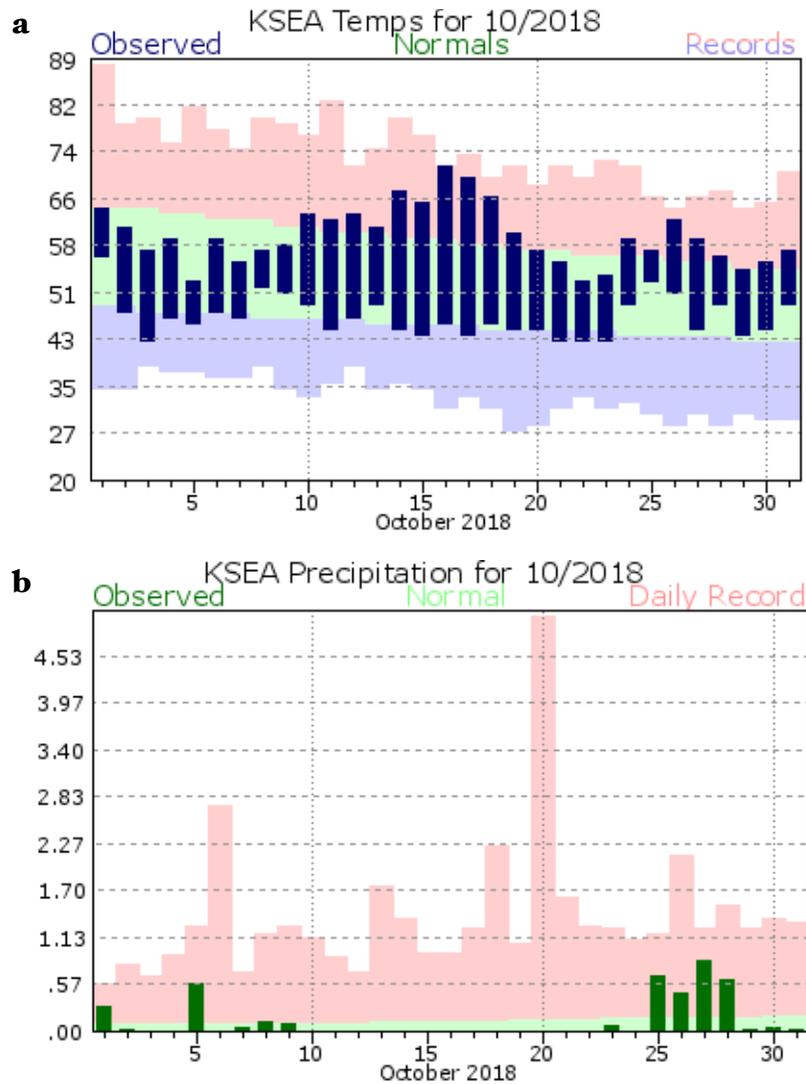


Figure 1: October 2018 daily (a) maximum and minimum temperatures (blue bars) and (b) precipitation (green bars) compared to the 1981-2010 normal (green envelope) for SeaTac Airport. The maximum temperature and precipitation records are denoted by the red envelope. The blue envelope represents the daily minimum temperature records (from [NWS](#)).

Drought Monitor and Streamflow Update

The U.S. Drought Monitor map (Figure 2) has shown improvement in drought conditions around WA since our last newsletter. There are now parts of western WA without any drought designation, due to precipitation from September through early November and increased streamflows. While the streamflows suffered during the dry spell in the middle of October, there has been overall improvement by the time of this writing. Figure 3 shows the average 28-day streamflow through November 7, showing normal to above normal streamflow throughout most of the state. There is some “moderate drought” - D1 - in southwestern WA and north central WA due to streamflows that have yet to completely rebound and the longer term deficits in precipitation. There is little snow in the mountains at the time of this writing; we will continue to monitor our snowpack as winter approaches.

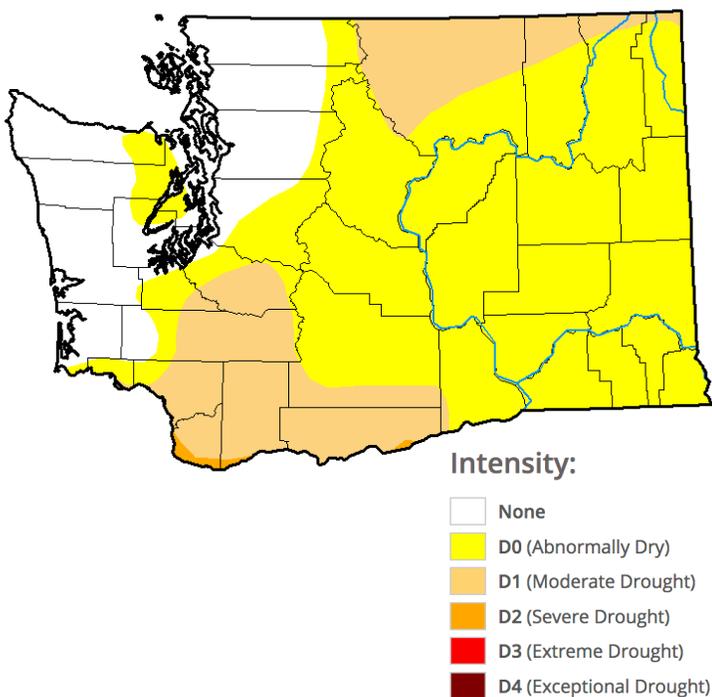


Figure 2: The November 8, 2018 version of the [U.S. Drought Monitor](#).



photo by Henry Reges, CoCoRaHS

Community, Collaborative Rain, Hail, and Snow (CoCoRaHS) Network

Greetings, CoCoRaHS observers! Now that we are well into the 2019 Water Year (October 1, 2018-September 30, 2019), the 2018 Water Year Summary Reports are available on the CoCoRaHS website. As observers, you can view your statistics for the water year, including the number of days you reported, your total precipitation, and the break down of daily versus multi-day reports. Observers can also view their monthly data in comparison to local climatology from PRISM. Check it out here: <https://cocorahs.org/WaterYearSummary/State.aspx?state=WA&year=2018>.

As always, please help us spread the word about CoCoRaHS. You can guide friends and family to sign up to volunteer at www.cocorahs.org.

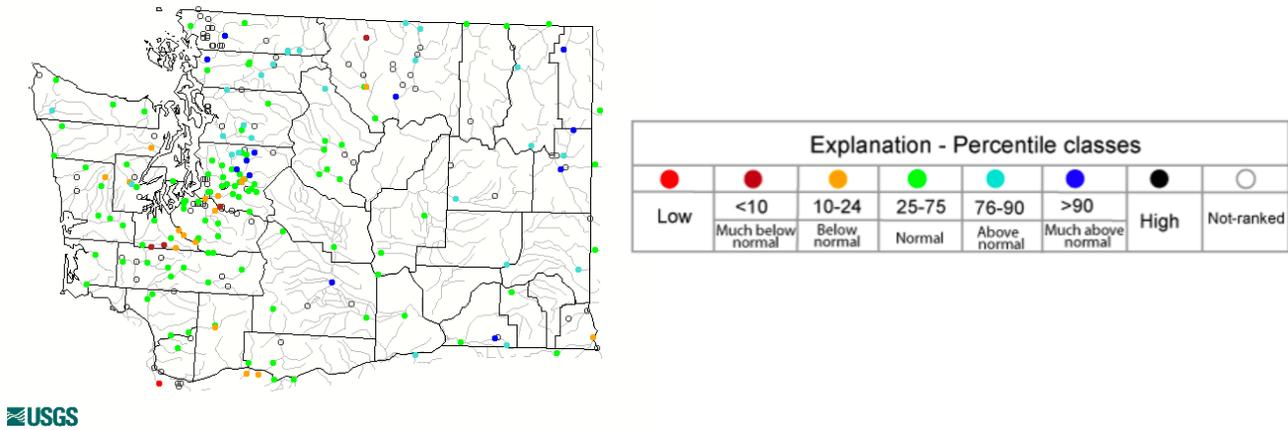


Figure 3: WA State 28-day average streamflow ending November 7, 2018 from [USGS](#).

El Niño Flooding: Flashback to November 2006

A message from the State Climatologist

The “El Niño watch” issued by the Climate Prediction Center is still in effect, with the expectation that a weak or moderate El Niño will develop this winter. Appropriately, media reports have focused on the increased odds of a warmer and drier winter due to El Niño, with the warmer than usual temperatures being more likely to occur. Sometimes it gets lost in the reporting, but there are plenty of nuances here. For example, even though seasonal mean precipitation is often below normal and April 1 snowpack is lower than normal in WA state during El Niño events, there is still a risk of significant flooding.

A potent reminder of this risk is the extreme event that occurred 12 years ago at Mt. Rainier National Park in early November 2006. The winter of 2006-07 included a weak El Niño, yet an atmospheric river brought warm temperatures, high snow levels, and heavy rain throughout western WA and the Cascade Mountains on Nov 6-7. Temperatures were very mild during the event, typical of this atmospheric set up, with

SeaTac Airport reporting a high of 60°F and an impressive 3.29” of rain on the 6th. That rain, in addition to a several other days with 1”+ of rain, lead to SeaTac recording its wettest month on record (of any month of the year) with 15.63”. It is worth mentioning that this atmospheric river event was forecast extremely well. On Saturday, November 4, two days before the event, the National Weather Service Seattle office stated in their Area Forecast Discussion:

“The 00Z MM5-GFS shows 24-hour [quantitative precipitation forecast] values in excess of 10” over the windward side of the Olympics with a large area of 5-10” rainfall over the Cascades. Even the lowlands (outside of rain shadow country) could see 2-4” with this system. **This does not look like a run-of-the-mill flood.** It is looking like the kind of flood event that is seen only every few years.”

Even though this flood event occurred 12 years ago, the streamflow on many of our area rivers still

stands out today. Figure 4 shows the annual peak streamflow at the Cowlitz River at Packwood and the Nisqually River at National with November 6, 2006 ranking as the highest streamflow recorded in their 97-year and 75-year records, respectively.

This event caused major damage to roads, campgrounds, and buildings within Mt. Rainier National Park as the National Park Service reported 18" of rain fell within the park over November 6 and 7. Figure 5 shows the Nisqually River undercutting the foundations of buildings in Longmire. The National Park Service (NPS) [initially estimated](#) that the damage within the park totaled \$36 million, but later [revised](#) that to \$24-27 million. Still, the entire park was closed for 6 months as repairs were made, many by volunteers. In response to this damage and more flooding damage throughout the state, WA State Governor Gregoire requested federal disaster aid for 12 counties.

The November 2006 flood is considered a highly unusual event for the region, and certainly not something we expect to see every year. Still, it's important to recognize that there is potential for serious flooding in any year, despite the status of ENSO. Moreover, while there is also the weak tendency for fewer windstorms in El Niño winters, they still can, and do, happen in those conditions. A notable example occurred again in late 2006, specifically the Hannukah Eve Storm of December 14-15 that produced widespread damage and a number of fatalities in the Pacific Northwest.

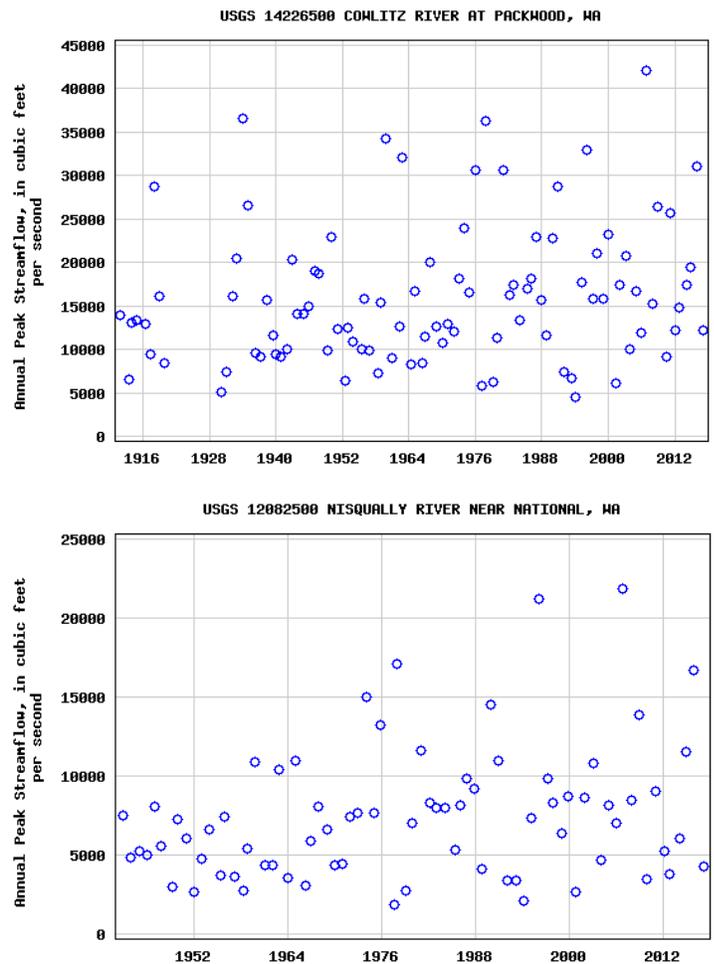


Figure 4: Annual peak streamflow for the Cowlitz River at Backwood (top) and Nisqually River near National (bottom) for their periods of record (from [USGS](#)).

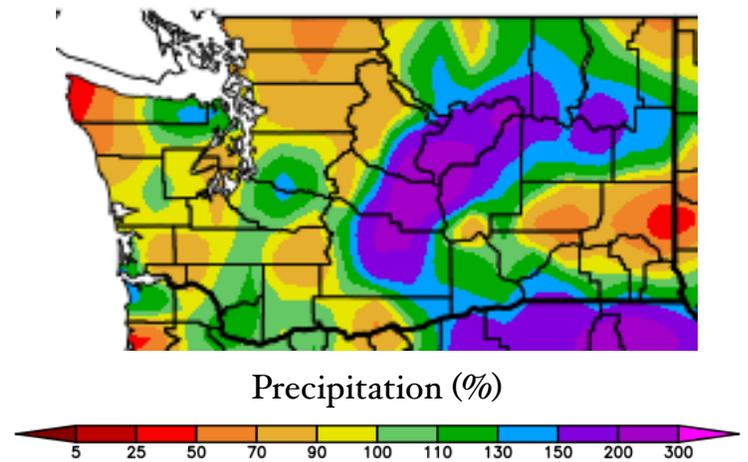
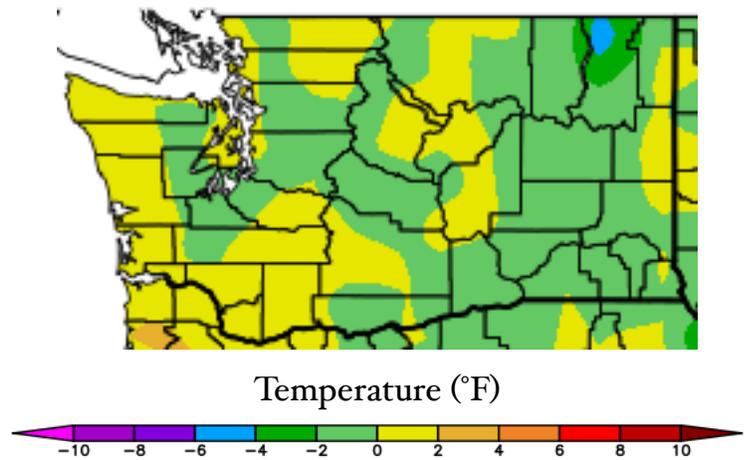


Figure 5: Nisqually River rushing past buildings in Mt. Rainier National Park during November 2006 flooding (photo credit: <https://www.nps.gov/mora/learn/news/november-2006-flooding.htm>).

Climate Summary

October mean temperatures were near-normal to above normal throughout the state, as shown in the map from the High Plains Regional Climate Center on the right-hand side. Temperatures tended to be on the warmer side west of the Cascade Mountains, with Hoquiam and Vancouver both 1.4°F above normal (Table 1). On the other hand, Wenatchee and Pasco were both -0.8°F below normal for the month. Regardless, the anomalies are relatively small indicating mostly near-normal temperatures for the month.

Total October precipitation varied throughout the state with some regions much below normal and others much above normal. The northwestern Olympic Peninsula received much below normal precipitation with Quillayute only receiving 44% of normal for the month. The northern Puget Sound (e.g., Bellingham with 82% of normal) and the Pullman area (43% of normal) were also drier than usual. On the other hand, central eastern WA received above normal precipitation with Wenatchee recording 275% of normal, for example.



October 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	49.9	50.3	-0.4	4.34	4.60	94
Seattle WFO	53.4	53.3	0.1	3.43	3.41	101
SeaTac AP	53.8	52.8	1.0	3.78	3.48	109
Quillayute	50.7	50.0	0.7	4.65	10.49	44
Hoquiam	53.6	52.2	1.4	6.70	6.53	103
Bellingham AP	51.0	49.8	1.2	3.03	3.68	82
Vancouver AP	55.2	53.8	1.4	3.38	3.07	110
Eastern Washington						
Spokane AP	48.1	47.6	0.5	1.64	1.18	139
Wenatchee	50.1	50.9	-0.8	1.21	0.44	275
Omak	48.9	48.9	0.0	1.15	1.08	107
Pullman AP	48.1	47.5	0.6	0.58	1.34	43
Ephrata	50.7	50.5	0.2	1.00	0.53	189
Pasco AP	51.1	51.9	-0.8	0.80	0.65	123
Hanford	52.5	53.1	-0.6	0.93	0.49	190

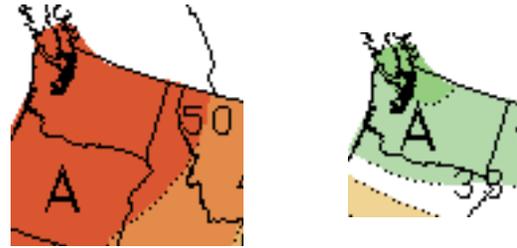
Table 1: October 2018 climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport and Seattle WFO 1981-2010 normals involved using surrounding stations in estimating the normal, as records for these station began in 1998 and 1986, respectively.

Climate Outlook

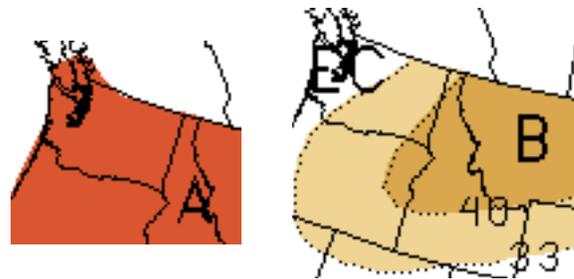
ENSO-neutral conditions are still present in the tropical Pacific Ocean, but sea surface temperatures have warmed substantially throughout the equatorial Pacific over the last month. The Climate Prediction Center (CPC) issued an “El Niño Watch” in August that is still in effect, and ENSO models favor development of El Niño by winter, with chances of about 75% for the November-January and December-February periods.

The November temperature outlook from the CPC has increased chances of above normal temperatures for the entire state. The chances are relatively high, exceeding 50% on the three-tier system. The November precipitation outlook indicates increased chances of above normal precipitation for all of WA, with a higher likelihood of above normal precipitation in the northwestern portion of the state.

The November-December-January CPC seasonal outlook is influenced by the expected development of El Niño. The CPC outlook is calling for increased chances of above normal temperatures statewide, with odds exceeding 50%. For precipitation, below normal precipitation is expected for the eastern half of the state while equal chances of below, equal to, or above normal precipitation is expected for the remainder of the state.



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



November-December-January outlook for temperature (left) and precipitation (right)

([Climate Prediction Center](#))