



Office of the Washington State Climatologist

February 2018 Report and Outlook

February 6, 2018

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

January Event Summary

Mean January temperatures were warmer than normal throughout the entire state, with average temperatures between 2 and 6°F above normal in most locations. The daily temperatures for SeaTac Airport are shown in Figure 1, and both minimum and maximum temperatures were warmer than normal for most days of the month. Precipitation was above average for most of the state, though there were some areas near-normal (e.g., southeastern WA) or below normal (e.g., east slopes of the southern Cascade Mountains). Regardless, precipitation fell frequently for most of the state. Figure 2 shows daily precipitation for SeaTac Airport, indicating that only 6 days of the month were **without** measurable precipitation for that station.

January 11th was particularly wet around the state, as shown in the 24-hr precipitation map from CoCoRaHS (Figure 3). The heaviest precipitation was in the Olympia area, but other locations set daily maximum precipitation records. For example, maximum daily precipitation records were set at Bellingham (0.93”), Pullman-Moscow Airport (0.80”), and Wenatchee (0.43”). Another very soggy day was the 29th, especially on the coast. Quillayute set a daily maximum

In this Issue

-
- January Event Summary.....1
- Snowpack Update.....3
- CoCoRaHS Note.....3
- Wettest Month in State History.....4
- Climate Summary7
- Climate Outlook9

precipitation record on the 29th with 4.21”. While impressive, this daily total doesn’t even break in to the top 20 wettest days in the relatively short

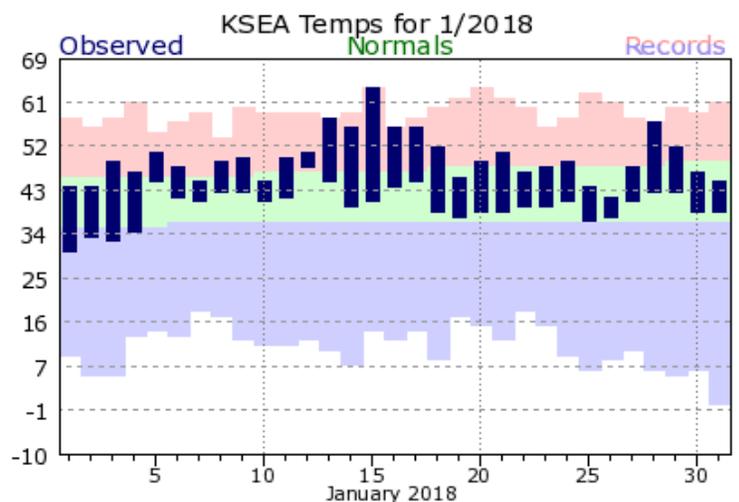


Figure 1: Daily January 2018 temperatures (dark blue bars) for SeaTac Airport and historical records (red and blue bars). [NWS](#)

record length (~50 years) at that station, which is a reminder of just how wet it can be on the coast.

The final January weather period noted here is the warmth (relative to normal) experienced mid-month, especially west of the Cascade Mountains. Several record high temperatures were set from the 13th to the 17th (see Fig 1). For example, maximum daily temperature records were set at SeaTac Airport (58°F) and Hoquiam (56°F) on the 13th, at Quillayute (58°F; tie) on the 14th, and at Bellingham (62°F) and Walla Walla (66°F) on the 17th. The daily maximum temperature measured at SeaTac Airport on the 15th (64°F) also tied the highest January maximum temperature since records began in 1945. A balmy maximum temperature of 64°F was also recorded on January 20, 1981. There have been only 8 January days during which SeaTac’s temperature has exceeded 60°F in the 1945-2018 record.

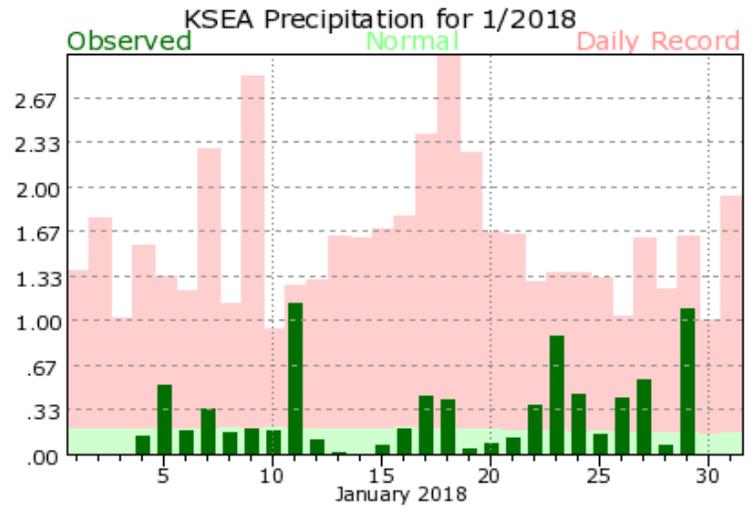


Figure 2: Daily January 2018 precipitation (green bars) for SeaTac Airport and historical records (red bars). [NWS](#)

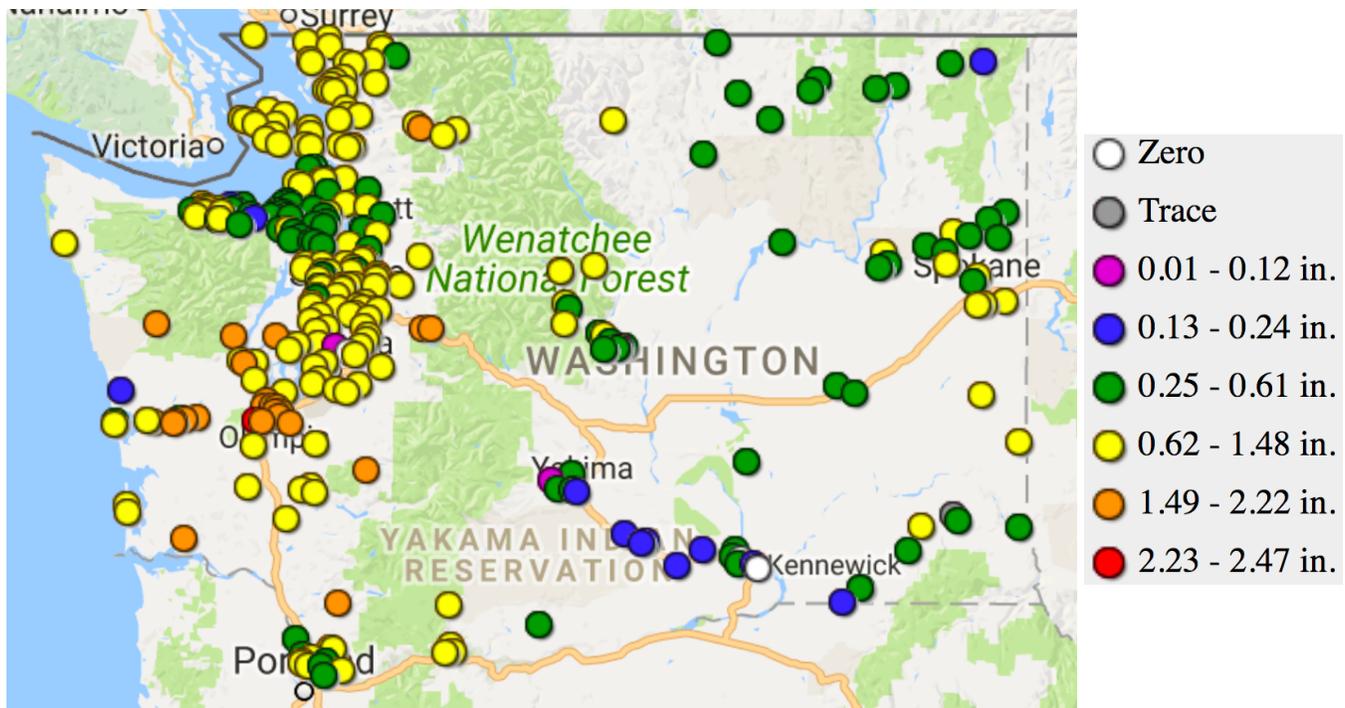


Figure 3: 24-hr precipitation observations ending between 7 and 9 am on January 12, 2018 from [CoCoRaHS](#) observers.

Snowpack Update

The wet January helped build snowpack despite the warmer than normal temperatures. The basin average snow water equivalent (SWE) percent of normal from NRCS is shown in Figure 4 for WA. As of February 1st, many of the basins that were lacking in early January have gained snowpack and are now near-normal. The exceptions to this are the South Puget Sound and Lower Columbia Basins with 85% and 89% of normal snowpack, respectively. In addition, some of the lower elevation sites are below normal as well. Conversely, the Olympic, North Puget Sound, and Upper Columbia Basins are now well above average with between 116 and 132% of normal.

The U.S. Drought Monitor expanded “Do”, or abnormally dry conditions, to include parts of the Lower Yakima and Lower Columbia basins (Figure 5). The term “abnormally dry” is meant to distinguish areas that are showing dryness but are not yet in drought. In this case, the “Do” conditions are a result of below normal precipitation on the monthly time scale and longer. We will continue to monitor this region.

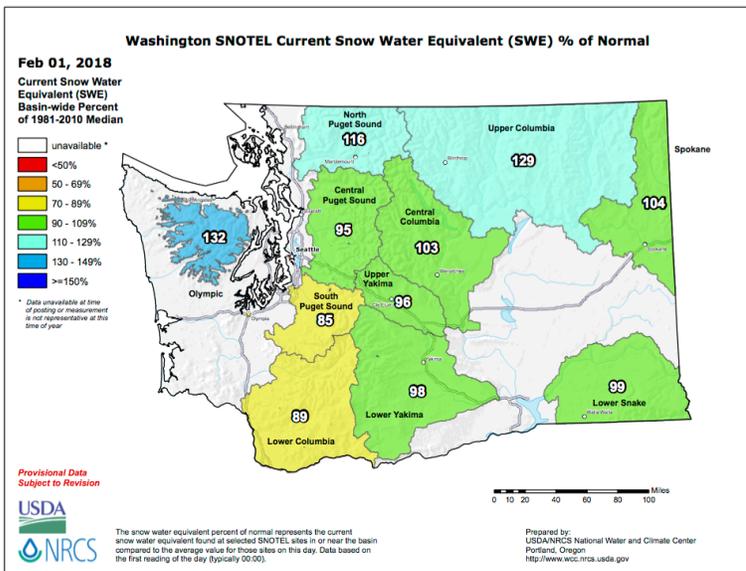


Figure 4: Snowpack (in terms of snow water equivalent) percent of normal for WA as of 1 February 2018 (NRCS).

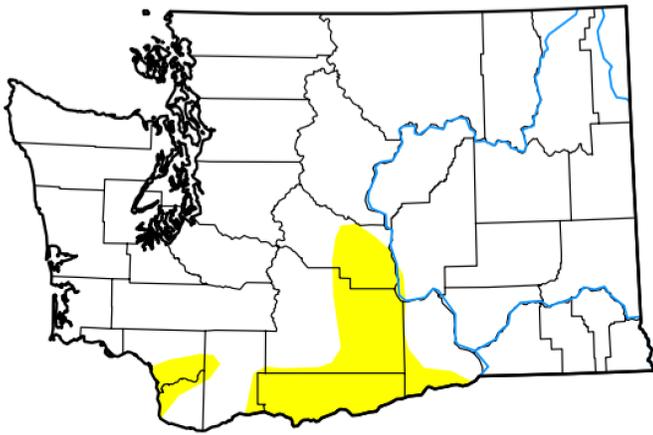


photo by Henry Reges, CoCoRaHS

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

With a small area of “abnormally dry” conditions creeping in on the Drought Monitor, we wanted to remind our CoCoRaHS observers about the “condition monitoring” report. Every CoCoRaHS observer now has the ability to enter this report (shown [here](#)). These reports are weekly, are descriptive, and help assess the environment’s response to unusually wet or dry conditions. Several observers have been entering them this winter, and we at OWSC find them extremely useful as we assess conditions around the state. Please keep up the great work!

You can learn more about this report by watching this [video](#) or viewing these [slides](#).



Intensity:



Figure 5: The 30 January edition of the [US Drought Monitor](#).

Wettest Month in State History - December 1933

A message from the State Climatologist

In three previous newsletters we’ve reviewed the warmest (July 1985), coldest (January 1950), and driest (July 1960) months over the last 100 years for WA State. Here we complete the series with a look back at the wettest month in WA State history dating back to when modern records began in the 1890s: December 1933.

Averaged over WA State, total precipitation for December 1933 was 10.48” above the 1981-2010 normal with a total of 16.61”. The top ten wettest months for WA are listed in Table 1. December 1933 recorded nearly 2” more than the 2nd wettest month on the list (Dec 1917) and nearly 3” more than the wettest month in the last two decades (Nov 2006). Since we’re comparing precipitation averaged over the state, it is interesting to examine the variability throughout different regions of the state. Figure 6 shows the Dec 1933 precipitation anomalies for the 10 climate divisions in WA. An incredible amount of precipitation pounded down on western WA. The West Olympic Coastal climate division received 37.87” of precipitation, a whopping 22.20” above

the 1981-2010 normal. The climate division making up the western slopes of the Cascades also had nearly 20” more precipitation than usual. Eastern WA was wetter than normal as well, but the anomalies were not nearly as large. The

Month	Total Precipitation (in)
Dec 1933	16.61”
Dec 1917	14.63”
Jan 1953	14.09”
Nov 2006	13.51”
Nov 1909	12.87”
Jan 2006	11.78”
Dec 1996	11.63”
Dec 2015	11.42”
Nov 1897	11.32”
Nov 1983	11.21”

Table 1: The top ten wettest months for WA State since 1895.

Central Basin climate division, for example, received 2.97” for the month, on average, which is 1.32” above normal.

Examining the daily precipitation records for several stations shows that the month was characterized by both heavy and frequent rain. Figure 7 shows the daily precipitation for Spokane Airport, Olympia Priest Park, and Aberdeen stations during December 1933. In addition to a handful of 2”+ days on the coast and in the Puget Sound, it rained practically every day of the month. There was only 1 day without measurable precipitation on the coast, while Olympia and Spokane only saw 2 and 9 days, respectively, without measurable precipitation.

Using [20th Century Reanalysis data](#), we are able to construct a map of the 500-hPa geopotential height anomalies during Dec 1933 to get an idea of the regional circulation (Figure 8). A southwest to northeast trough of lower than normal heights extended from offshore of British Columbia into western Canada, resulting in anomalous southwesterly flow aloft over WA State. This is a classic pattern for wet conditions. Both the statewide average temperatures for the month (+5.7°F above normal) and the station temperature data indicate that the month was warmer than usual. While there were a few days with snow recorded at Spokane Airport, it was generally a mild month with higher snow levels and a lot of rain. Warmer than normal temperatures accompanying very wet months in WA is typical, but not the rule. Of the top ten wettest months itemized in Table 1, there were seven with above normal temperatures. This was especially the case for January 1953, which checked in with the

NOAA/NCEI Climate Division Precipitation Anomalies (in)
Dec 1933
Versus 1981–2010 Longterm Average

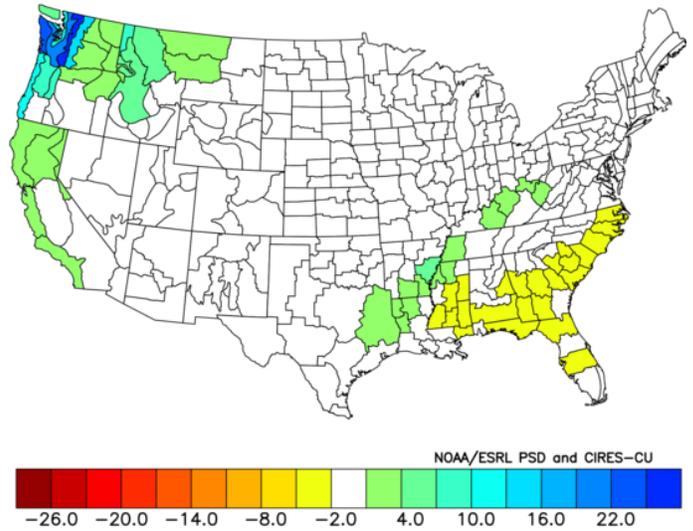


Figure 6: Climate division precipitation anomalies compared to the 1981-2010 normal for December 1933 (ESRL).

warmest mean temperature for the month in the historical record with an anomaly of +5.5°F.

Looking at the bigger picture, the winter of 1933-34 appears to have been in the moderate La Niña category. According to [HadISST1](#), the NINO_{3.4} index was -1.21°C but the other variables such as winds are likely to have been somewhat less anomalous. WA State does tend to see more precipitation during La Niña winters, so this does not come as a big surprise. It is worth noting, however, that tropical Pacific observations are not as complete and as reliable prior to about 1950, and so there is some uncertainty in the state of ENSO during late 1933. Six of the top ten wettest months appear to have occurred during La Niña events (of variable intensity) and the others occurred during both neutral and El Niño conditions. In other words, we should not expect a strong correspondence between ENSO and extreme precipitation on a monthly time scale in WA.

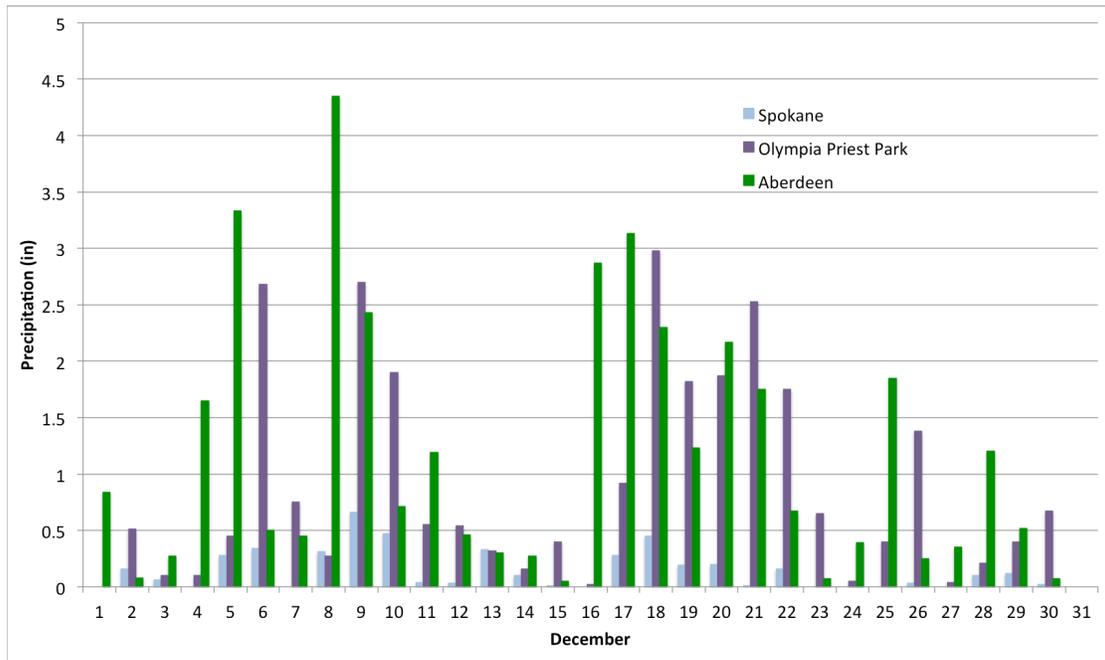


Figure 7: Daily total precipitation (inches) for Aberdeen, Olympia Priest Park, and Spokane Airport for December 1933.

In summary, averaged across the state, December 1933 ranks as the wettest month since records began in the 1890s. While the entire state was wetter than average, the anomalies were much larger for locations west of the Cascade crest. The month was characterized by both heavy and frequent rain, but also had above normal temperatures. There are several historical accounts of severe flooding during the month as well, from the Yakima River, to the Cedar River, to the coast, and in between. Several descriptions of the flooding can be found online ([here](#), [here](#), and [here](#)), and is perhaps another topic of a future newsletter highlight.

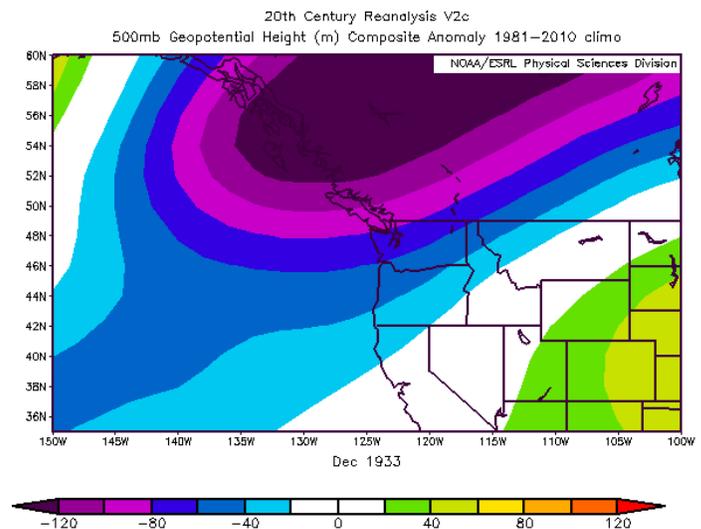
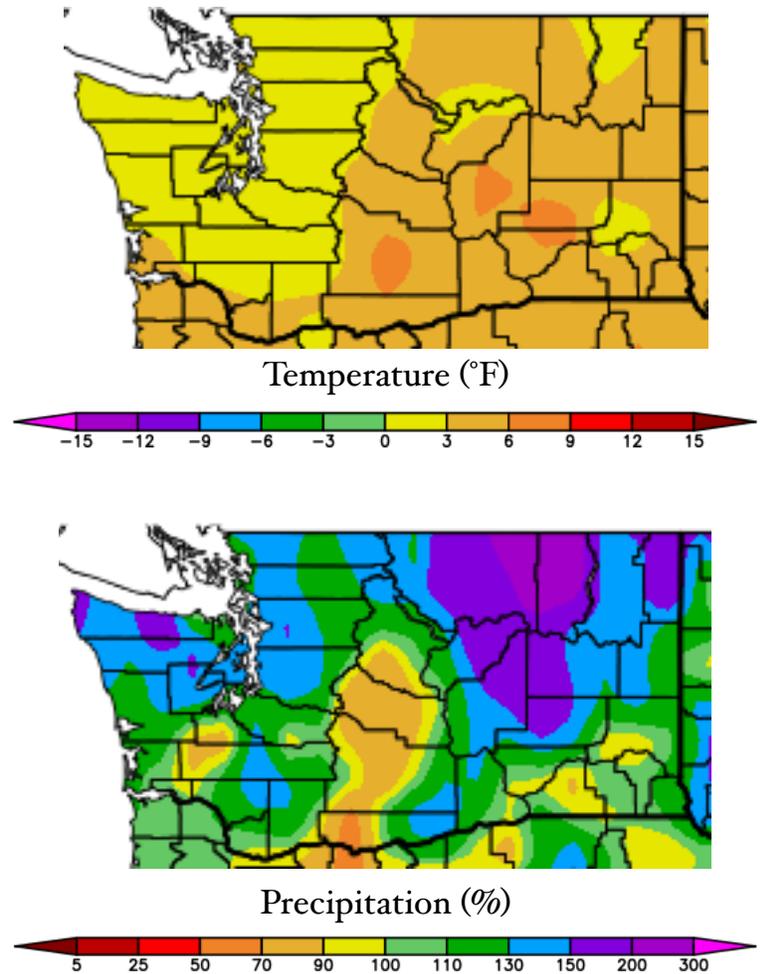


Figure 8: 500 hPa height anomalies for December 1933 from the 20th Century Reanalysis.

Climate Summary

Mean January temperatures were above normal throughout the state. The temperature anomalies were larger in eastern WA, as shown in the map on the right-hand side from the High Plains Regional Climate Center, though the absolute temperatures were warmer in Western WA in accordance with the climatology. Temperatures west of the Cascades Mountains were mostly between 1 and 3°F above normal. SeaTac Airport, for example, was 3.0°F above normal (Table 2). Anomalies in eastern WA, however, were as large as 6.5°F (Ephrata; Table 2) but generally between 3 and 6°F above normal.

Total January precipitation was above normal for most of the state. North central and northeastern WA, the Olympic Peninsula, and the northern Puget Sound had the most precipitation relative to normal, with between 130 and 200% of normal for the month. Other locations, such as Vancouver and Wenatchee, had near-normal precipitation with 102% of normal precipitation. In contrast, the eastern slopes of the southern and central Cascades were drier than usual, and Pasco only received 80% of normal.



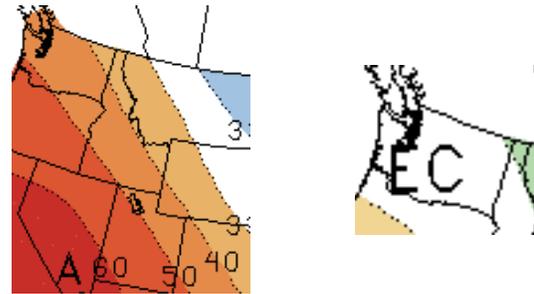
January temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)			Snowfall (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Norm	Total	Norm	% of Norm
Western Washington									
Olympia	42.6	39.8	2.8	9.87	7.84	126	0	1.9	0
Seattle WFO	44.9	42.1	2.8	8.42	4.81	175	0	0.4	0
Sea Tac AP	45.0	42.0	3.0	8.12	5.57	146	0	1.4	0
Quillayute	44.0	41.6	2.4	22.10	14.61	151	0	2.0	0
Hoquiam	45.5	42.6	2.9	12.93	10.33	125	0	1.3	0
Bellingham AP	42.6	39.2	3.4	5.00	4.67	107	0	3.4	0
Vancouver AP	44.8	41.6	3.2	5.59	5.50	102	0	M	-
Eastern Washington									
Spokane AP	33.8	29.5	4.3	2.55	1.79	142	8.1	11.4	71
Wenatchee	32.3	29.5	2.8	1.08	1.06	102	M	M	-
Omak	30.1	26.8	3.3	3.20	1.89	169	M	M	-
Pullman AP	37.4	31.6	5.8	2.19	1.82	120	M	M	-
Ephrata	35.3	28.8	6.5	1.41	0.91	155	M	M	-
Pasco AP	38.9	34.9	4.0	0.97	1.22	80	T	M	-
Hanford	37.7	33.4	4.3	1.10	0.94	117	0	4.6	0

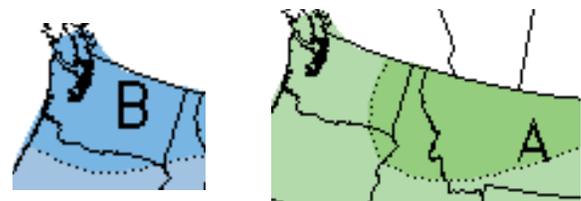
Table 2: January 2018 climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport and Seattle WFO 1981-2010 normals involved using surrounding stations in estimating the normal, as records for these station began in 1998 and 1986, respectively.

Climate Outlook

La Niña conditions persisted throughout the last month as indicated by a pattern of below-average sea-surface temperatures across the central and eastern equatorial Pacific Ocean. Nearly all models used to forecast El Niño Southern Oscillation show it likely (85%-95% chance) for La Niña conditions to continue through the Northern Hemisphere winter 2017-18. Outlooks with these conditions generally favor above average temperatures and below average precipitation across the southern tier of the United States as well as below average temperatures and above average precipitation across the northern United States. According to the latest observations and forecast guidance made by the Climate Prediction Center (CPC), weak-to-moderate La Niña is currently peaking and is expected to weaken going into the spring.



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



February-March-April outlook for temperature (left) and precipitation (right)

The CPC predicts February to have a higher chance of above normal temps across the entirety of Washington. The highest probability of warmer than normal temperatures is in southwestern Washington, with the probability decreasing across the state. February precipitation outlook calls for an equal chance of being above, equal to, or below normal for the state of Washington.

The outlook for (February-March-April; FMA) remains in accordance with what we would expect when La Niña conditions are present in the equatorial Pacific Ocean. The seasonal temperature outlook for Washington calls for below normal temperatures statewide. The seasonal precipitation outlook for Washington calls for above average precipitation with a higher probability of this occurring in the eastern-most regions of the state.

(Climate Prediction Center)