



Office of the Washington State Climatologist

January 2019 Report and Outlook

January 4, 2019

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

December Event Summary

Mean December temperatures were warmer than normal throughout the state, with greater anomalies in eastern WA. December precipitation was variable throughout the state with the Olympic Peninsula, northern Puget Sound, and parts of the central and southern Puget Sound, and southeastern WA receiving above normal precipitation. On the other hand, the Lower Columbia Basin and parts of southwestern WA received below normal precipitation for the month (more details in the “Climate Summary” section).

December can be categorized as an active weather month despite a relatively quiet start with dry conditions. Precipitation began after the first week and persisted for most locations in the state. Quillayute was one of the wetter than normal locations for the month, including a maximum daily precipitation amount on the 11th of 2.54”.

Temperatures were rather mild mid-month (Figure 1); for example, Yakima measured a record high on the 13th of 58°F. More record high temperatures were recorded on the 14th at Bellingham (63°F), Hoquiam (57°F), and Quillayute (56°F). A strong mountain wave event that resulted from southerly

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winds quickly descending over the Olympics contributed to this warmth on the 14th, bringing strong, damaging winds, warm temperatures, and low dewpoints to the north side of the Olympic Mountains. Scott Sisteck, of KOMO news, posted a nice summary of this unique weather event on KOMO’s weather [blog](#), noting the power outages and downed trees that it caused throughout the area.

But certainly even more unusual was a rare EF2 (winds 120-130 mph) tornado that touched down near Port Orchard (Kitsap County) on the 18th, associated with some post frontal convection after a storm dumped snow in the mountains the day before. While severe thunderstorms were not necessarily expected with the particular weather set up, there was enough instability in the

atmosphere to support isolated thunderstorms. Figure 2 shows the preliminary results from the damage survey conducted by the National Weather Service. Tornadoes are rare in WA, especially in December. Our tornado activity usually occurs in the spring. Additionally, the Port Orchard tornado was the strongest in the state since 1986; fortunately, no serious injuries were reported.

Finally, the last notable weather to report on for December was a western WA wind storm on the 20th. Another colleague, Wolf Read - the author of OWSC's "Storm King" event page - has more details on the track and set up of this storm on his Canadian [blog](#), but we'll mention some of the highlights here. The Seattle area saw gusts between 45 and 59 mph, while Bellingham recorded a 66 mph gust. Even more impressive are the mountain observations: 117 mph gust reported at Mt. Baker and a 72 mph gust reported at Hurricane Ridge.

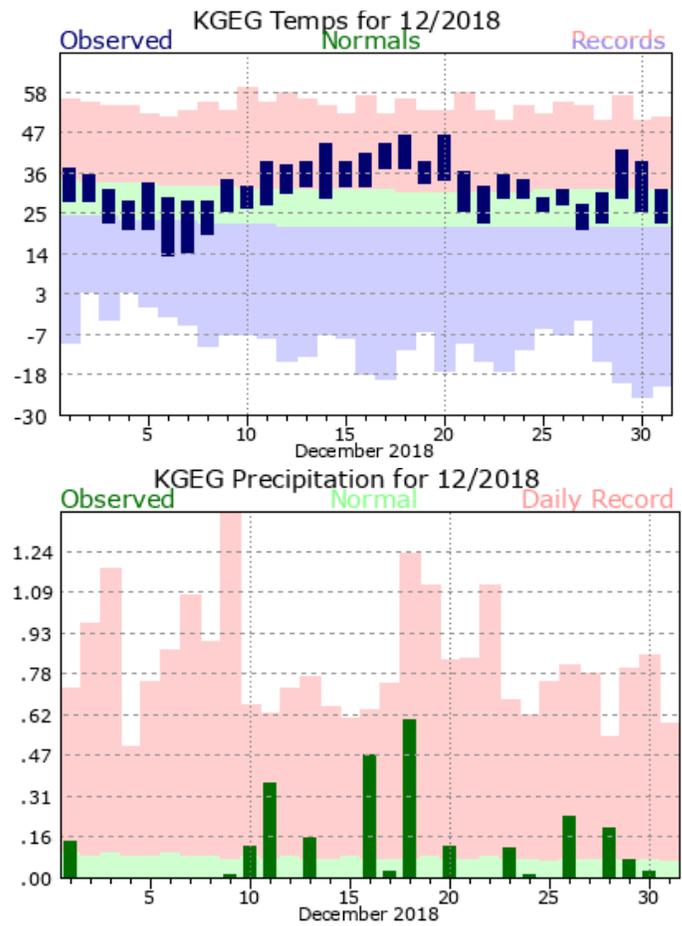


Figure 1: December 2018 daily (a) maximum and minimum temperatures (dark blue bars) and (b) precipitation (green bars) compared to the 1981-2010 normal (green envelope) for Spokane Airport. The historical daily records are denoted by the red and light blue envelopes (from NWS).

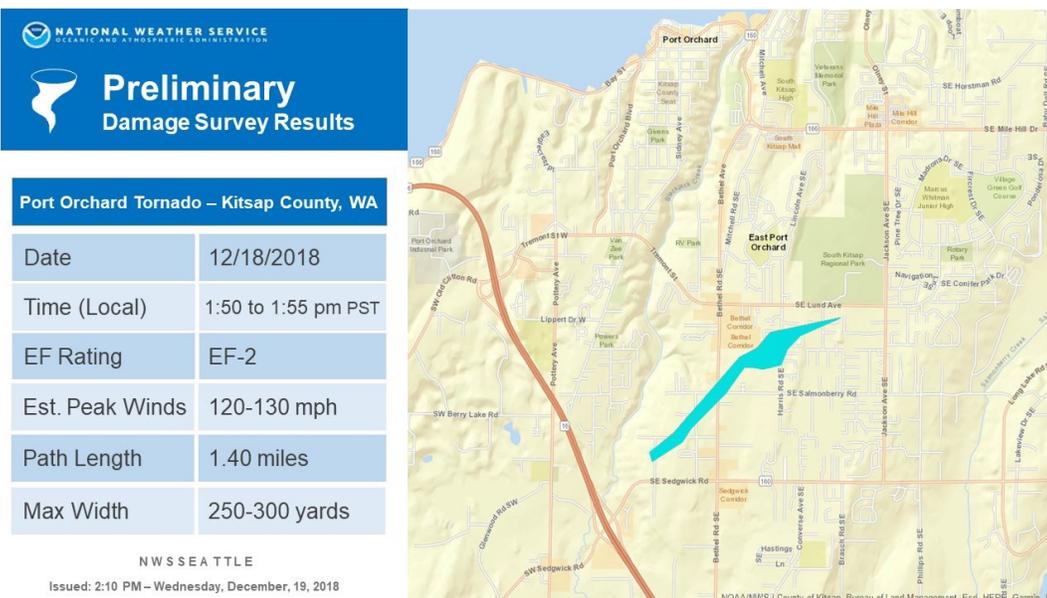


Figure 2: Preliminary results from NWS Seattle's damage survey (from NWS).

Snowpack and Drought Monitor Update

Despite the warmer than normal temperatures throughout the state, snowpack built substantially in December, particularly at the higher elevation locations where the freezing level tended to stay below them. The wetter than usual conditions in the Olympics and the north Cascades also contributed to building our snowpack. The basin average snow water equivalent (SWE) percent of normal from the Natural Resources Conservation Service as of January 1 is shown in Figure 3. The North Puget Sound, Central Columbia, and Lower Snake-Asotin basins are all doing the best, with near-normal SWE. The Dungeness-Elwha, Central Puget Sound, South Puget Sound, Upper Yakima, Naches, Lower Yakima, Upper Columbia, and Spokane basins have improved since December 1, but are still below normal, with average SWE ranging from 81 to 87% of normal. Finally, the Middle-Columbia Hood basin is further behind

with 70% of normal SWE. One caveat to add here is that the basin averages tend to gloss over some nuances, which in this case is that there are still some lower elevation sites that are much below normal (examples: Spencer Meadow at 3400' - 52% of normal; Dungeness at 4010' - 53% of normal) due to the warmer than normal temperatures. Figure 4, however, shows the Stampede Pass snow water equivalent to illustrate the improvement seen over the month of December, particularly the second half.

The U.S. Drought Monitor map (Figure 5) has shown improvement in WA as longterm precipitation deficits lessen, snowpacks grow, and streamflows return to near-normal over longer time scales. There is some remaining moderate drought (D1) and abnormally dry (D0) conditions across the state representing longer term conditions.

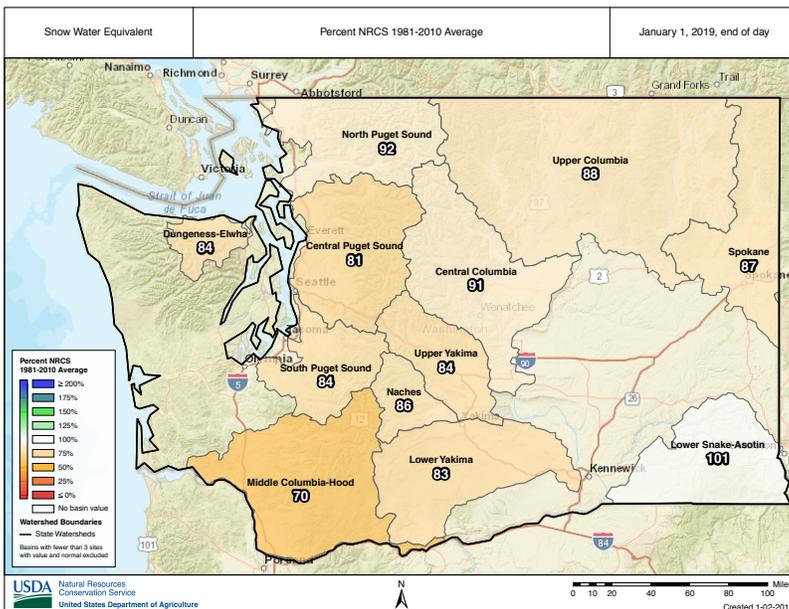


Figure 3: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of January 1, 2019 (from [NRCS](#)).

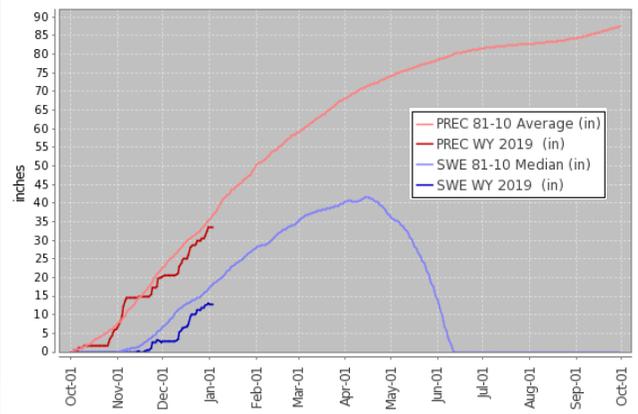


Figure 4: Stampede Pass Snotel 2019 water year SWE (dark blue line) compared to normal (light blue) and precipitation (dark red line) compared to normal (light red) (from [NRCS](#)).

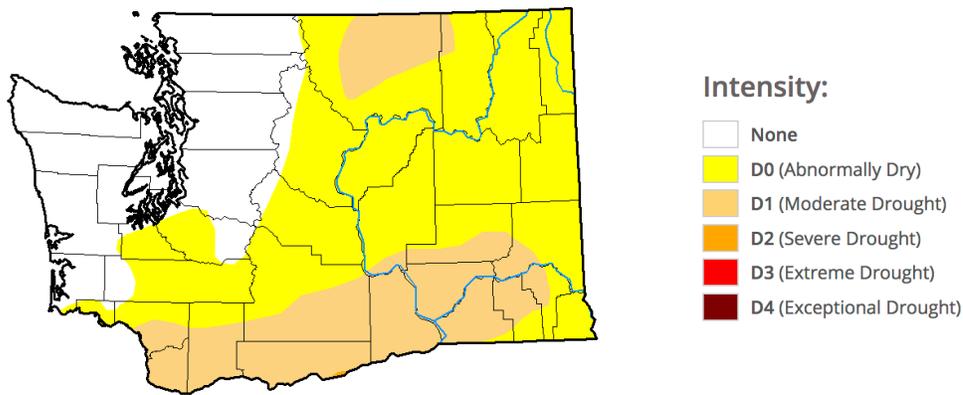


Figure 5: The January 3, 2019 version of the [U.S. Drought Monitor](#).

January 1953: Largest Positive Monthly Temperature Anomaly in WA State History

A message from the State Climatologist

Considering statewide averages, what would constitute a large monthly anomaly in temperature? And would we expect to see the largest monthly anomaly in winter or summer? At OWSC, these are the sorts of questions that we ask ourselves as we begin a new calendar year. January 1953 takes the top spot in terms of the largest monthly warm anomaly of any month on record (since 1895), checking in with a hefty 8.8°F above normal (1901-2000) across WA state. In second place is a month that might be easier to recall for many of our readers – June 2015 – which was 7.8°F above the 20th century normal. But for this summary, we’ll focus on the monthly weather of January 1953.

The January 1953 monthly average temperature departures from normal (using 1981-2010) are shown in Figure 6a, indicating warmer than normal temperatures for the entire state. Anomalies were much larger in eastern WA, where monthly temperatures were between 6 and 10°F above normal. Spokane Airport, for example, did

not have a single day during January 1953 in which average daily temperatures were below normal. High temperatures were remarkably consistent across the state, with 40s and even 50s common.

The month was also a wet one. Figure 6b shows the percent of normal (1981-2010) precipitation for January 1953. The month ranks as WA state’s wettest January on record (since 1895) with 14.09”, about 8” above normal. A majority of the state received about double the usual amount of precipitation for the month. We dug up records from the Seattle downtown station, where 27 of the 31 days in the month included measurable precipitation.

It was also a very cloudy month. The same Seattle downtown station reported a gloomy total of only about 11 hours of sunshine for the entire month, with many of the daily entries indicating only 10 or 15 minutes when the clouds parted at all. Of course we expect January to be a cloudy month anyway, but that was especially the case in 1953,

for which the 11 hours represents about 10% of normal sunshine. Spokane, in comparison, had about 40% of its normal duration of sunshine.

All of these observations are consistent with what the 500 hPa geopotential height anomaly map shows for the month (Figure 7). The month featured anomalous flow from the southwest and hence a much greater import than usual of balmy air masses originating from the subtropical northeast Pacific. Not surprisingly, this was a poor recipe for mountain snow, with both January snow water equivalent (SWE) and end of season SWE below normal that year.

The 1950s were generally a cool decade throughout the Pacific Northwest, and include many of our cold and snow records on various time scales. But, as shown here with the January 1953 warm anomaly, large fluctuations can occur within an overall long-term tendency. The winter of 1952-53 included a weak El Niño as well, which likely played a role in the warmer than normal temperatures experienced that January. Fortunately, your current state climatologists were not around (as in not yet born) to suffer through the unremitting gray skies, copious rains, and amazingly mild temperatures that prevailed during that historic month.

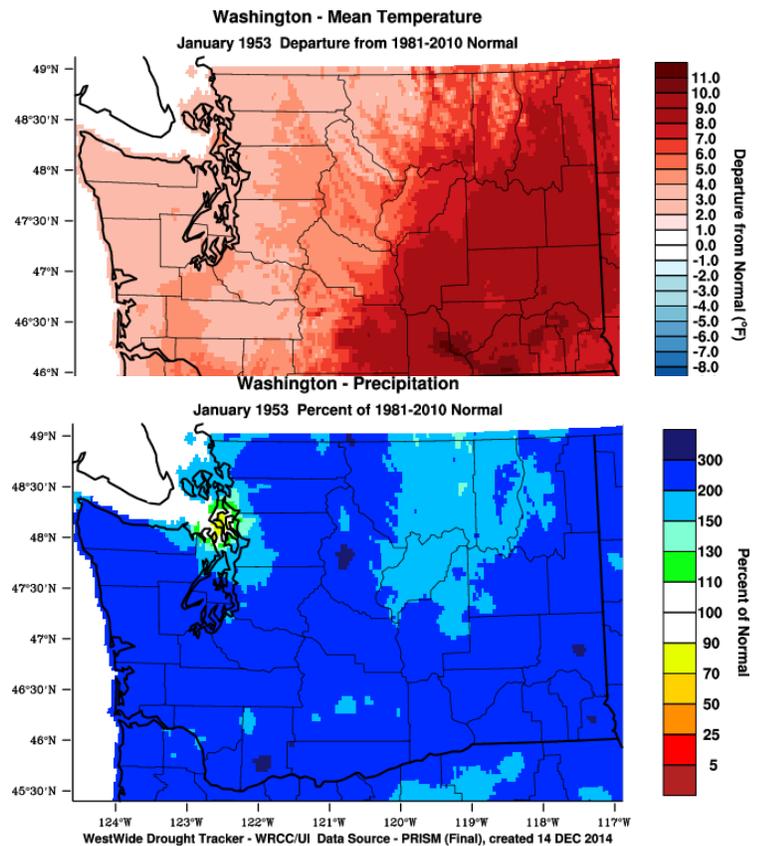


Figure 6: January 1953 a) departure from 1981-2010 normal temperatures and b) percent of normal precipitation across WA State (WWDT).

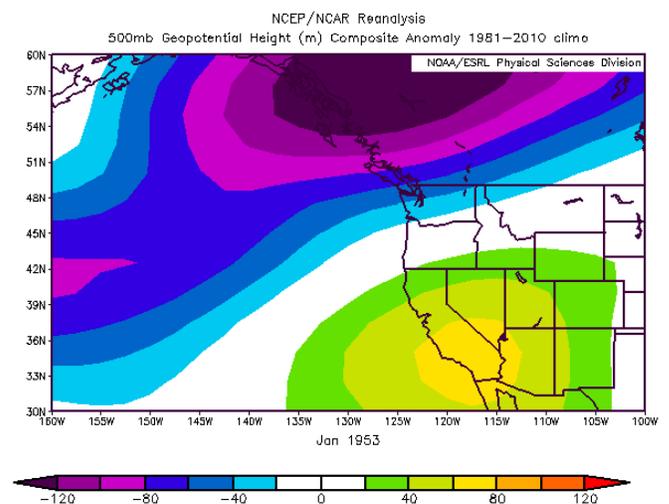


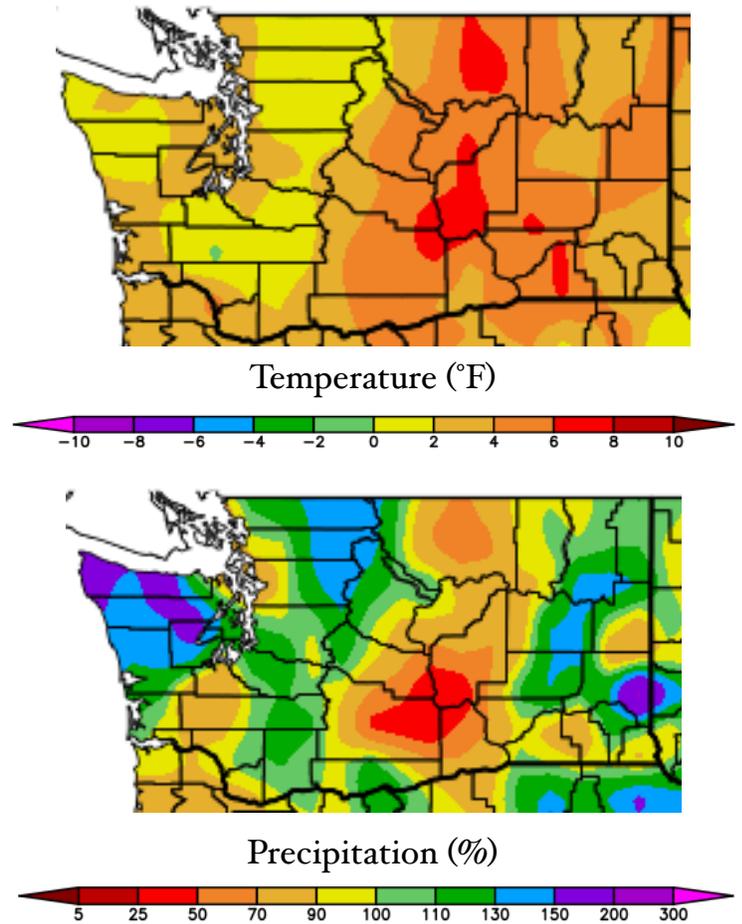
Figure 7: Mean 500 hPa geopotential height anomalies from the NCEP/NCAR Reanalysis during January 1953 (ESRL).

Climate Summary

December average temperatures were above normal for a majority of Washington state, as shown in the map from the High Plains Regional Climate Center shown to the right. Eastern WA temperature anomalies were the largest relative to normal, with most areas between 4 and 8°F above normal. For example, Omak and Ephrata were both 6.5°F above normal for December (Table 1). Temperatures in western WA were also on the warm side, but to a lesser extent (mostly between 1 and 4°F above normal). Hoquiam and Bellingham were both at 3°F above normal for December.

Total December precipitation was variable throughout the state, with the Olympic Peninsula and pockets in both western and eastern WA receiving above normal precipitation. Quillayute and Hoquiam had 176 and 125% of normal precipitation, respectively (Table 1). Pullman, for example, had more than double their usual amount, with 229% of normal. The Lower Columbia Basin and the Okanogan Valley received below normal precipitation, however, with Omak and Hanford measuring only 64 and 54% of normal, respectively.

December lowland snow was also below normal, with Spokane Airport and Hanford recording only 83 and 37% of normal, respectively.



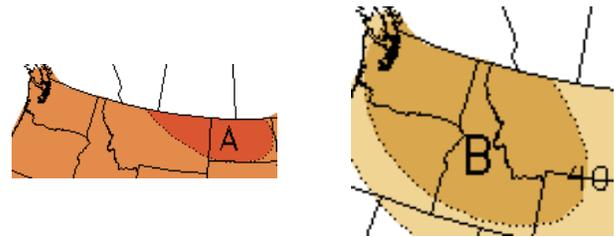
December temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)			Snowfall (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Norm	Total	Norm	% of Norm
Western Washington									
Olympia	40.4	38.4	2.0	7.50	7.46	101	M	2.6	-
Seattle WFO	43.5*	41.1	2.4*	5.23*	5.43	96*	0*	2.3	0*
SeaTac AP	44.2	40.6	3.6	6.08	5.35	114	M	1.7	-
Quillayute	42.2	40.4	1.8	22.92	12.99	176	M	2.1	-
Hoquiam	44.5	41.6	2.9	12.42	9.96	125	M	0.4	-
Bellingham AP	41.1	38.1	3.0	3.88	4.22	92	M	2.9	-
Vancouver AP	42.9	40.6	2.3	4.91	6.77	73	M	M	-
Eastern Washington									
Spokane AP	31.8	27.4	4.4	2.62	2.30	114	12.1	14.6	83
Wenatchee	32.7	27.9	4.8	0.94	1.40	67	M	12.9	-
Omak	32.2	25.7	6.5	1.41	2.20	64	M	M	-
Pullman AP	32.9	30.1	2.8	3.59	1.57	229	M	M	-
Ephrata	33.9	27.4	6.5	0.97	1.24	78	M	7.6	-
Pasco AP	37.5	33.1	4.4	0.88	1.21	72	T	0.4	0
Hanford	36.2	31.1	5.1	0.65	1.20	54	2.2	5.9	37

Table 1: December 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. *One day (12/23) is missing from this record.

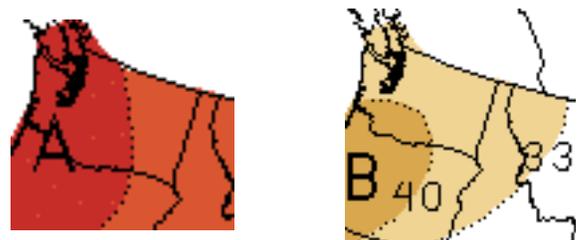
Climate Outlook

ENSO-neutral conditions are still present in the tropical Pacific Ocean, and sea surface temperatures (SSTs) have actually cooled over the last month. The SSTs are still warm relative to normal, but not to same extent that they were earlier in the water year. The atmospheric signature of El Niño in the tropics remains elusive as conditions remain near-normal. Still, the Climate Prediction Center (CPC) “El Niño Watch” is still in effect, and ENSO models favor development of a weak El Niño this winter with chances at about 90% for the December-February period.



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

The seasonal outlooks from the CPC reflect the likelihood of El Niño’s effects kicking in and also considers recent seasonal forecast model guidance and the state of the Madden-Julian Oscillation (MJO). The January outlook calls for increased chances of above normal temperatures and increased chances of below normal precipitation for the entire state.



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

The January-February-March (JFM) CPC seasonal outlook is similar to the January outlook. There are relatively high chances of above normal temperatures for the western two-thirds of the state, with chances exceeding 60% on the three-tiered scale of equal probability of below, equal to, or above normal. Temperatures are likely to be above normal for the rest of the state as well, but with a bit less certainty. For precipitation, there are higher chances of below normal precipitation statewide, with the highest chances of below normal precipitation in southwestern WA.

(Climate Prediction Center)