



Office of the Washington State Climatologist

August 2019 Report and Outlook

August 2, 2019

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

July Event Summary

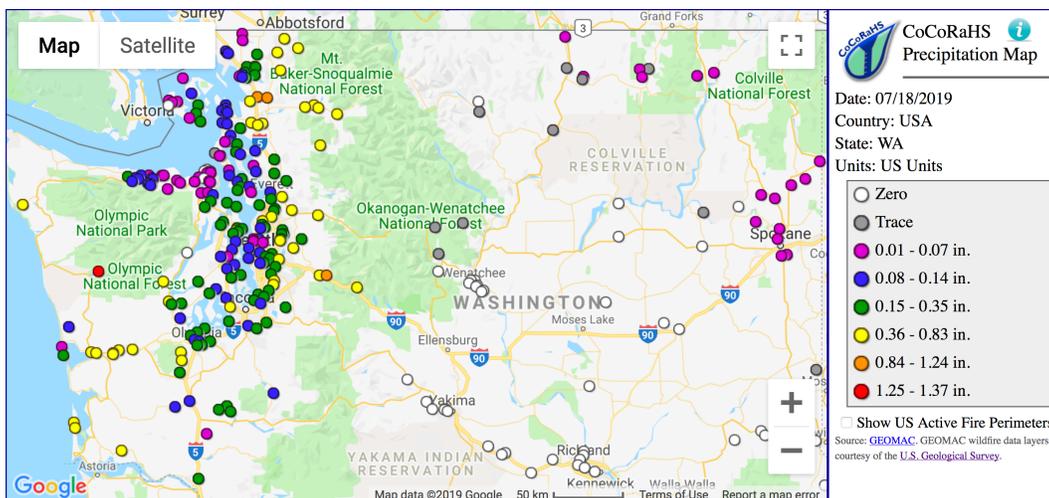
Mean July temperatures were near-normal through most of WA state with a tendency to be on the cooler side, especially east of the Cascade Mountains. July precipitation was more mixed with eastern WA receiving below normal precipitation and western WA generally receiving above normal precipitation. Neither the wet or dry precipitation anomalies were near record territory for stations around the state.

Overall, July was a pretty quiet month when considering weather and climate records. It started off on a welcomed wet note with precipitation on the 2nd nearly everywhere in the state (except for southeastern WA).

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The more interesting rain event was the one on the 17th and 18th. Both Bellingham (0.24”) and Quillayute (0.96”) recorded maximum daily rainfall records on the 17th. Figure 1 shows the 24-hr precipitation ending on the morning of 18th



from CoCoRaHS observers. Note the impressive 1.37” in the SW Olympics. This rain and cooler weather was brought on by a particularly strong jet stream over WA for summer. In fact, the wind speed was 160 mph at 250 hPa (high up in the atmosphere at about

Figure 1: 24-hr precipitation totals ending on the morning (between 7 and 9 am) of July 18, 2019 (CoCoRaHS).

35,000') from the Quillayute sounding early on the 18th. This value is the [greatest ever recorded at Quillayute](#) during summer (records go back to 1966), and would still be considered strong if recorded during winter.

Figure 2 shows the daily July temperatures for Spokane International Airport; note that high temperatures never approached record territory during the month, though minimum temperatures were often elevated relative to normal. The exception is the record low minimum temperatures set at Pullman-Moscow Airport (40°F) and Walla Walla (48°F) on the 20th. Figure 2 indicates below normal minimum temperatures for Spokane AP as well during that time period.

Finally, some thunderstorms moved through eastern WA on the 23rd and 24th, sparking a few forest fires that have grown since. The Devore Creek (3 miles SW of Stehekin), Left Hand (17 miles NW of Naches), and Kusshi Creek (37 miles S of Yakima) fires were all lightning-started and in various stages of containment at the time of the this writing. Thankfully, as of August 2, the [air quality](#) throughout WA is “good” and we have yet to see the severe smoke impacts that were common in 2015, 2017, and 2018.

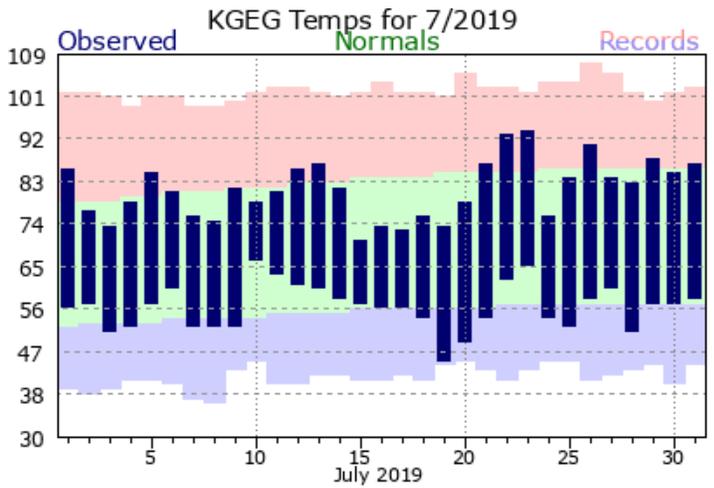


Figure 2: Daily July maximum and minimum temperatures for Spokane International Airport compared to normal (green envelope) and historical records (red and blue envelopes).

[NWS](#)

Drought Update

The weather conditions in July were quite variable around the state, with some definite winners and losers regarding precipitation. The coast, southern and central Puget Sound, and parts of north central and northeastern WA, received above normal precipitation for the month which was welcome news in the midst of the drought declaration in 27 WA watersheds. Still, with July being our driest month climatologically, even double our usual amount of rain couldn't make a large dent in the longer-term precipitation deficits over the last couple of months, or since the start of the water year (October 1, 2018).

With that said, there were some small improvements made to the U.S. Drought Monitor (DM) over the last month. Figure 3 shows the latest DM map released on August 1. Two areas of severe drought ("D2") were reduced to moderate drought ("D1") in the central and southern Puget Sound as well as in northeastern WA. This is due

to the short-term precipitation surpluses and the subsequent response in streamflows in these regions. Note the green dots on Figure 4, which show normal average streamflow over 28-days ending on July 31. Overall, streamflows have improved relative to normal compared to June for much of the state. But even with improvements, many of streams remain in the "much below normal" category (below the 10th percentile).

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 and we would appreciate your input.

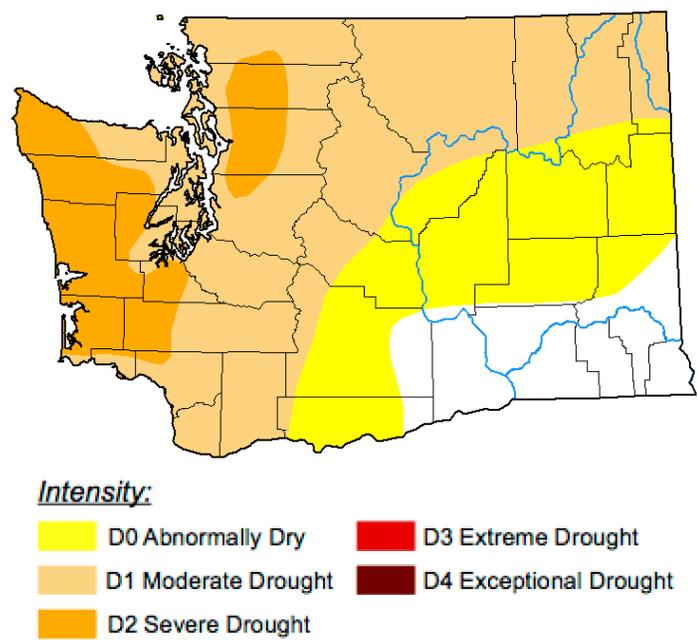


Figure 3: The 1 August 2019 edition of the [U.S. Drought Monitor](#).

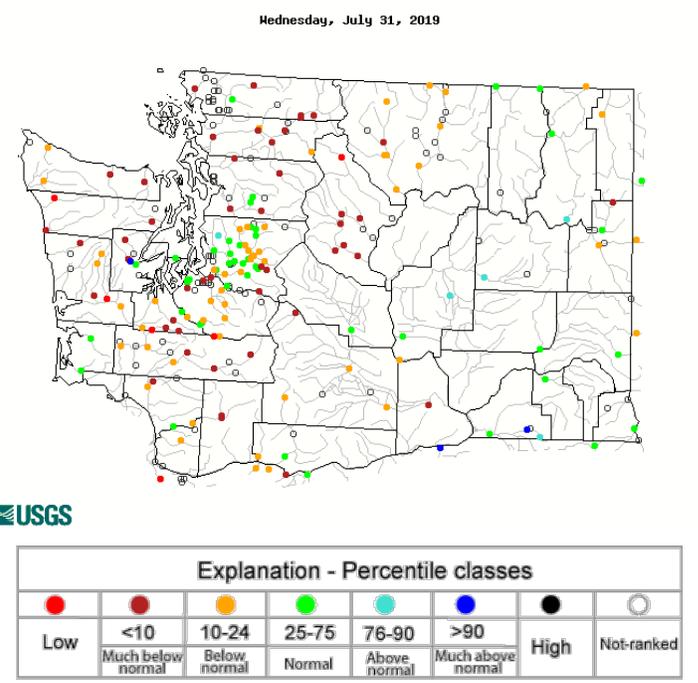


Figure 4: 28-day average streamflow percentile ending July 31 ([USGS](#)).

Climatology of WA's NE Olympic-San Juan Climate Division (#2)

A message from the State Climatologist

This is the second installment of the “Climate Divisions of WA” series, and we will focus on Climate Division 2 – the NE Olympic-San Juan Climate Division (Climate Division 1 is featured in the [August 2018 edition](#) of our newsletter). Figure 5 shows the geographical extent of the division, encompassing the farthest northeast portion of the Olympic Peninsula, a small western portion of Skagit county, and the entirety of Whidbey Island, Camano Island, and the San Juan Islands. It is the smallest climate division in area in WA, but the elevation ranges from sea level to 2,398' on Mt. Constitution in Orcas Island. Principal municipalities include Anacortes, Coupeville,

Friday Harbor, Langley, Oak Harbor, Port Angeles, Port Townsend, and Sequim. It also includes Native American reservations for the Jamestown S'Klallam, Samish, and Swinomish tribes.

The 1981-2010 monthly climatologies for maximum temperature, minimum temperature, and total precipitation are shown in Figure 6. Typical of all Washington climate divisions, there is a distinct seasonality to the precipitation with the wettest month, on average, being November, and the driest month, on average, being July. With an annual average total precipitation of only 28.61”, climate division 2 is the driest division in

western WA. This is a result of the rainshadow phenomenon caused by the Olympic Mountains. Similar to the Cascade Mountains, the Olympic Mountains receive copious precipitation on the windward side, and much scantier precipitation on the leeward side in association with the warming and drying of descending air. Western Washington's wettest periods tend to be during southwesterly flow and in these situations, Sequim in particular experiences the protection of the higher terrain of the Olympics. It is often remarkably dry relative to locations only 10-20 miles

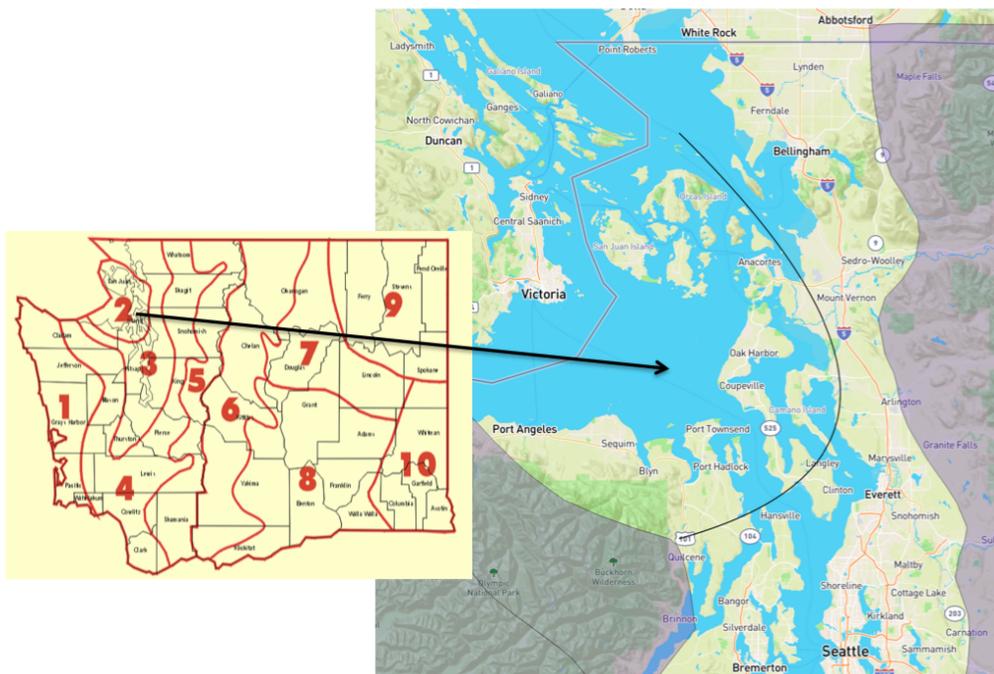


Figure 5: A semicircle (black line) encompassing Climate Division 2 - the NE Olympic-San Juan - overlaid onto a topographical map. Note that all of Whidbey Island and Camano Island are included in Climate Division 2, though not showed completely on the map. Map of all of the WA State climate divisions is from the [Climate Prediction Center](#).

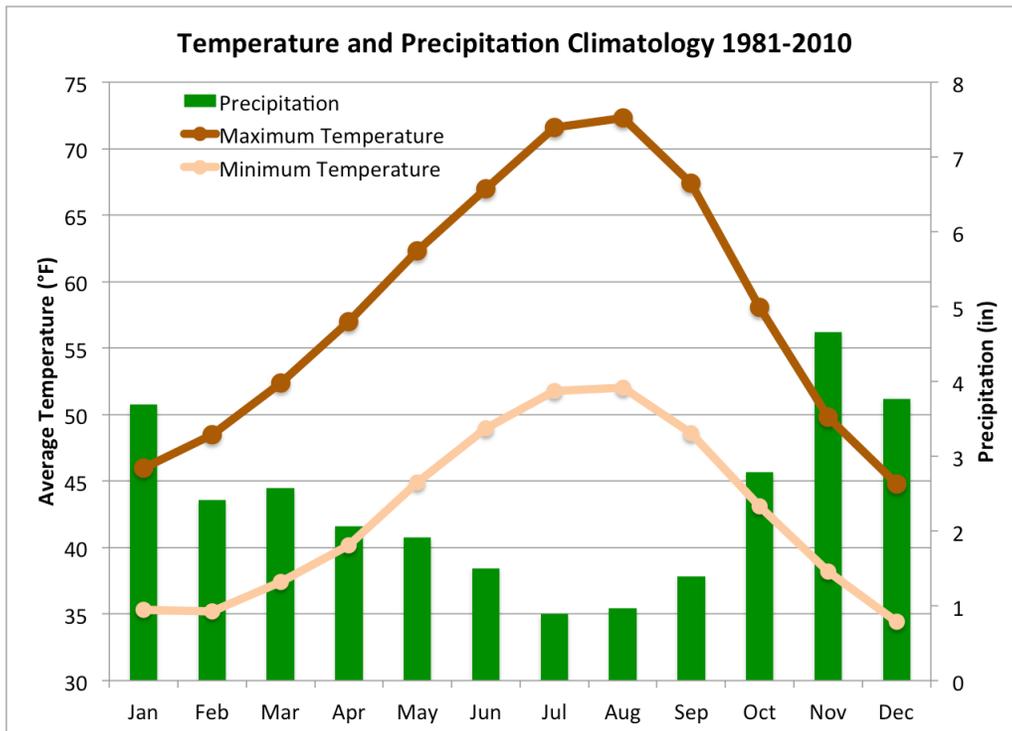


Figure 6: Monthly maximum temperature (°F), minimum temperature (°F), and total precipitation (inches) climatology for the 1981-2010 period for Climate Division 2.

away, receiving a meager 16” of precipitation annually. The effect of the rainshadow extends well out over the water, resulting in a local minimum in average rainfall in the vicinity of Coupeville. There are exceptions, of course. During our rare cold-air outbreaks, notably when the low-level flow is from the northeast, Sequim and Port Angeles often receive considerably more snowfall than other lowland locations in western Washington, as experienced during February 2019.

The maximum and minimum average temperatures follow the same seasonality as the remainder of WA state with the warmest month, on average, being August, and the coldest month, on average, being December (Figure 6). The temperature difference between the monthly maximum temperatures and the monthly minimum temperatures is smaller than was seen in Climate Division 1, for example, due to the

moderating effect that the surrounding water has on the temperatures. In fact, if you don't like extreme temperatures, you may want to look into buying some real estate. The average December through February winter temperatures averaged from 1981 to 2010 are actually the warmest (40.7°F) for any division in the state. Similarly, the all-time maximum high temperatures in summer are surprisingly low for a sampling of stations within the division. The all-time high temperatures for Friday Harbor (97°F), Port Townsend (96°F), Sequim

(94°F), and Whidbey Island Naval Air Station (88°F) seem mild, especially considering that even Forks on the west side of the Olympic Peninsula has exceeded the century mark.

On the topic of extremes, Table 1 shows the warmest, coldest, wettest, and driest months for the climate division since 1895. The warmest (July 1958), coldest (January 1950), and driest (July 1922) months are the same months that were identified as those records for Climate Division 1, which is no surprise considering the large scale regional weather patterns that need to be in place to produce these extremes. The January 1950 anomaly is especially impressive for this climate division, with average temperatures a whopping 16.4°F below normal for the month. The record wettest month for the climate division (December 1917) occurred some time ago, with an anomaly of

	Value (Anomaly)	Month
Warmest	65.6°F (+3.9°F)	July 1958
Coldest	24.2°F (-16.4°F)	January 1950
Wettest	10.79" (7.02")	December 1917
Driest	0.00" (-0.89")	July 1922

Table 1: The warmest, coldest, wettest, and driest month for Climate Division 2 using the period of record (1895-2019).

+7.02" that corresponds with some historically high streamflows in western WA.

Seasonal wind rose charts for the Whidbey Island Naval Air Station are shown here as an example of the wind climatology for the climate division (Figure 7), though of course it only really represents one location. This station in particular is a windy one, thanks to its location on the

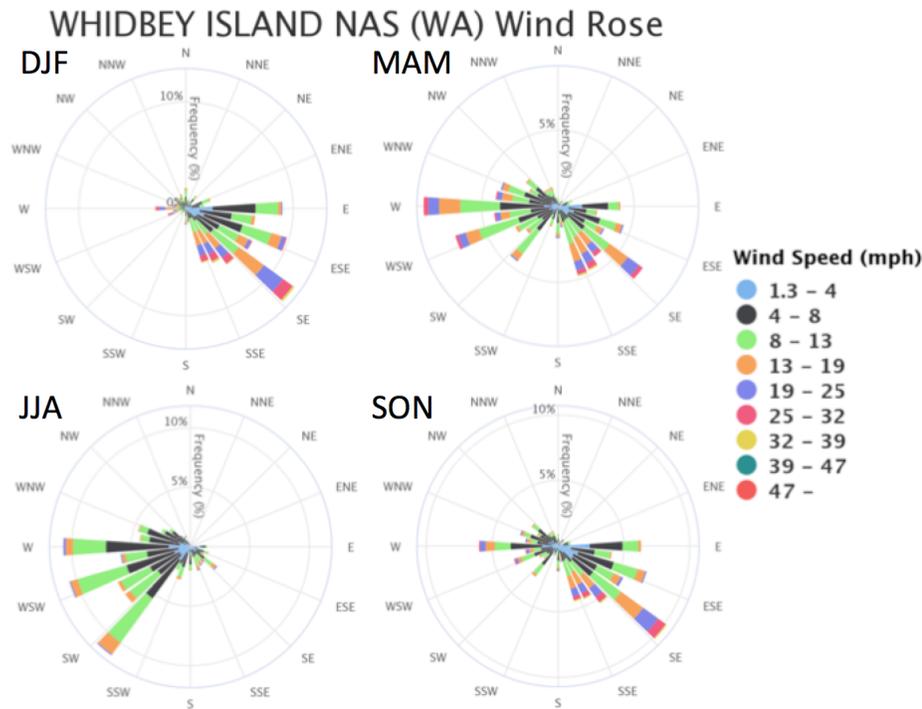


Figure 7: Whidbey Island Naval Air Station (NAS) seasonal (DJF, MAM, JJA, SON) winds for the period of record (1945-2019) from MRCC's [cli-MATE](#).

northern NW coast of Whidbey Island (northwest of Oak Harbor), which exposes the station to westerly winds at the east exit of the Strait of Juan de Fuca. Those westerly winds are common in spring into early fall and are especially consistent during the summer due to high pressure off the coast of WA. Winter features winds almost exclusively from the south-southeast through east, in association with lower pressure over the ocean and higher pressure over the inland Pacific NW. Landfalling storms can be accompanied by prominent mesoscale pressure and wind perturbations, with especially rough conditions often occurring in Admiralty Inlet between Port Townsend and Whidbey Island.

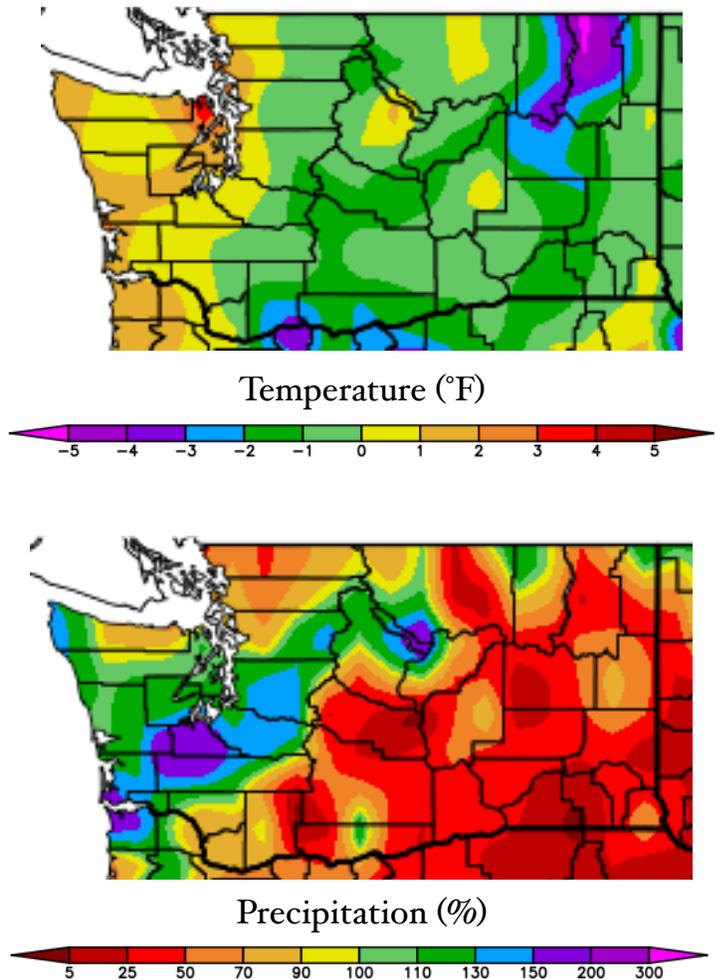
In summary, the smallest climate division in WA state – the NE Olympic-San Juan division – also happens to have the warmest average winter temperatures in the state, is the driest division in western WA, and has relatively mild summer high temperatures. This is all thanks to the Olympic Mountain rainshadow and moderation by the surrounding waters. Please feel free to provide feedback on our Climate Division Series. Is there any special topic you'd like to see in subsequent series? Email/tweet/Facebook us (climate@atmos.washington.edu; @WAStateClimate).

Climate Summary

Mean July temperatures were near-normal for a large portion of WA state. In eastern WA, average temperatures tended toward the cooler side of normal, and there were a few areas, such as northeastern WA, that were substantially below normal. Wenatchee was one of the locations with a larger cool anomaly of -1.6°F (Table 2).

Otherwise, Spokane, Omak, Pasco, and Pullman all had near-normal July average temperatures. It was a similar story west of the Cascades with Olympia, Seattle, and Vancouver measuring near-normal July temperatures. On the other hand, there were a few western WA locations with above normal temperatures such as Hoquiam, which was 2.7°F above normal.

Total July precipitation was generally below normal in eastern WA and above normal in western WA, with some exceptions. In eastern WA, most of the region received very little precipitation, specifically between only 5 and 50% of normal. Pullman, Wenatchee, and Pasco, for example, received 13, 19, and 21% of normal, respectively (Table 2). Parts of north central to northeastern WA received normal precipitation, however. In western WA, Olympia, SeaTac Airport, and Quillayute all received above normal precipitation of 195, 164, and 150% of normal, respectively (Table 2). Northern Puget Sound was an exception, receiving between 50 and 70% of normal. Bellingham, for example, only recorded 62% of normal for the month.



July temperature ($^{\circ}\text{F}$) 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	64.2	63.8	0.4	1.23	0.63	195
Seattle WFO	65.5	65.9	-0.4	1.50	0.79	190
SeaTac AP	67.5	65.7	1.8	1.15	0.70	164
Quillayute	60.6	58.9	1.7	2.97	1.98	150
Hoquiam	62.6	59.9	2.7	1.20	1.14	105
Bellingham AP	64.0	62.3	1.7	0.73	1.18	62
Vancouver AP	68.6	68.4	0.2	0.98	0.69	142
Eastern Washington						
Spokane AP	69.4	69.8	-0.4	0.52	0.64	81
Wenatchee	72.6	74.2	-1.6	0.05	0.27	19
Omak	72.9	72.7	0.2	0.17	0.81	21
Pullman AP	65.6	65.6	0.0	0.09	0.69	13
Ephrata	73.1	74.2	-1.1	0.12	0.40	30
Pasco AP	74.2	73.5	0.7	0.06	0.28	21
Hanford	75.8	77.1	-1.3	0.36	0.23	157

Table 2: July 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

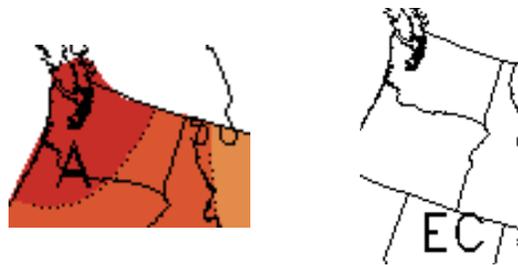
According to the Climate Prediction Center (CPC), weak El Niño conditions are still present in the tropical equatorial Pacific, but equatorial sea surface temperature (SST) anomalies have weakened over the last few weeks, particularly in the eastern equatorial Pacific where there are actually now some areas of below normal SSTs. Low level westerly wind anomalies over the equatorial Pacific are no longer present as they were in May 2019, yet another sign of El Niño weakening. CPC expects a shift to ENSO-neutral conditions in the next month or two. Neutral ENSO conditions are favored to persist into the upcoming fall and winter. Currently, there is a 50% chance of neutral ENSO conditions, 41% chance of El Niño, and 9% of La Niña for the September through November 2019 period.

The CPC August temperature outlook calls for increased chances of above normal temperatures statewide, with the odds exceeding 60% on the three-tier system for most of the state. August precipitation is uncertain, as there are equal chances of below, equal to, or above normal precipitation.

The CPC August-September-October seasonal temperature outlook calls for warmer than normal temperatures statewide, with fairly high chances (between 60 and 70%) for the western two-thirds of the state. Similar to the August outlook, the precipitation outlook for the longer August-October period indicates equal chances of either below, equal to, or above normal precipitation statewide.



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



August-September-October outlook for temperature (left) and precipitation (right)

[\(Climate Prediction Center\)](#)