Office of the Washington State Climatologist

July 2020 Report and Outlook

July 8 2020

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

June Event Summary

Most areas in Washington state experienced near normal June temperatures. The central basin did experience isolated areas of above normal temperatures while the North Cascades and NE Washington were largely cooler than normal. Precipitation featured far more variability with rainshadowing causing below normal precipitation on the eastern slopes of Cascades, though pockets of above normal precipitation existed in both eastern and western Washington. Looking at figure 1, areas that received below normal precipitation for June already had below normal precipitation for the first half of the year.

The first half of June was largely characterized by onshore flow, which transported moisture from the Pacific and created fairly consistent cloud cover that kept daily high temperatures below normal. Rain was recorded at SeaTac Int'l, Bellingham and Olympia everyday between June 6th to the 13th. Most rainfall during these days were generally light aside on the 10th, when Olympia broke their daily rain record with 0.8" shown in figure 2b. Interestingly enough, this was the sole June precipitation record noted by the National Weather Service (NWS) for sites in Washington, indicating a relatively uneventful month.

In this Issue

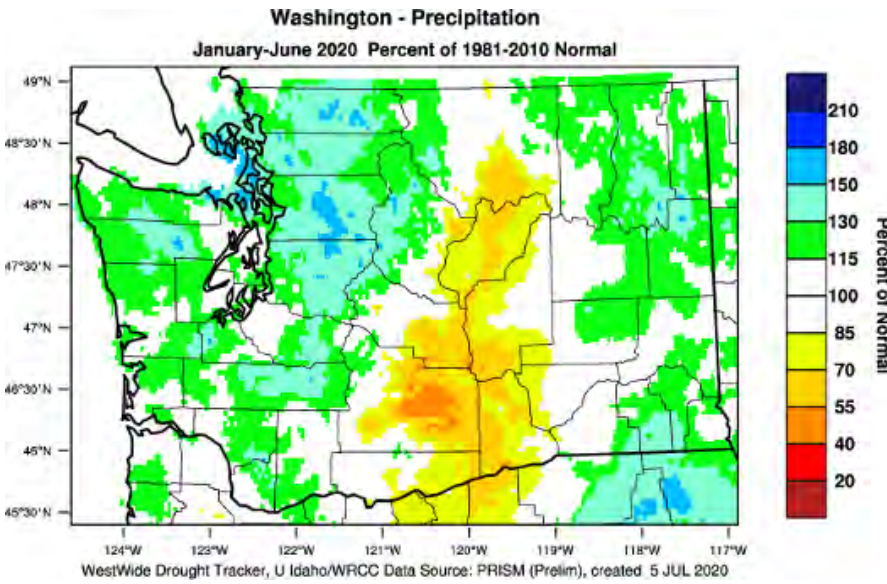

Figure 1: January to June 2020 total precipitation as percentage of normal for WA state based on rankings from 1981-2010 (from Westwide Drought Tracker).

High pressure moved closer to the coast of Washington, blocking the consistent flow of moisture on the 17th. Less cloud cover allowed for temperatures to rise to above normal for the succeeding ten days with a few showers centered around the 20th in western Washington. The flow reverted back to onshore starting the 26th, reintroducing cloud cover and isolated showers in both eastern and western Washington. Precipitation was particularly more intense at SeaTac on the 27th, which came 0.05" short of its daily precipitation record of 0.61". This June's weather reinvigorated the moniker of "June gloom" largely described by Figure 3, showing quite a few days of below normal daily maximum temperatures even though some of these areas overlap with above normal average temperatures.

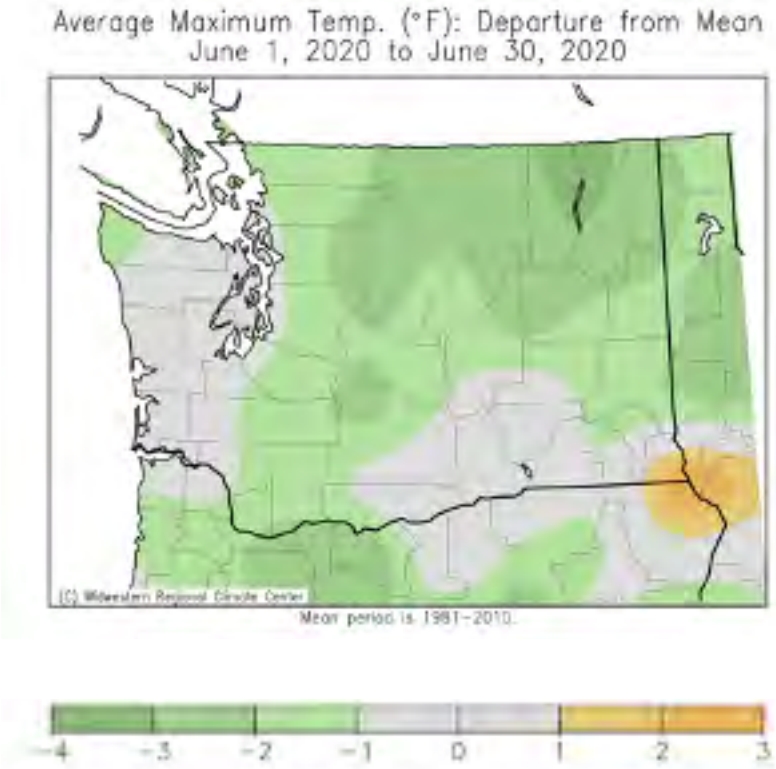

Figure 3: Average of the departure from the normal daily maximum temperature for June (Cli-MATE).

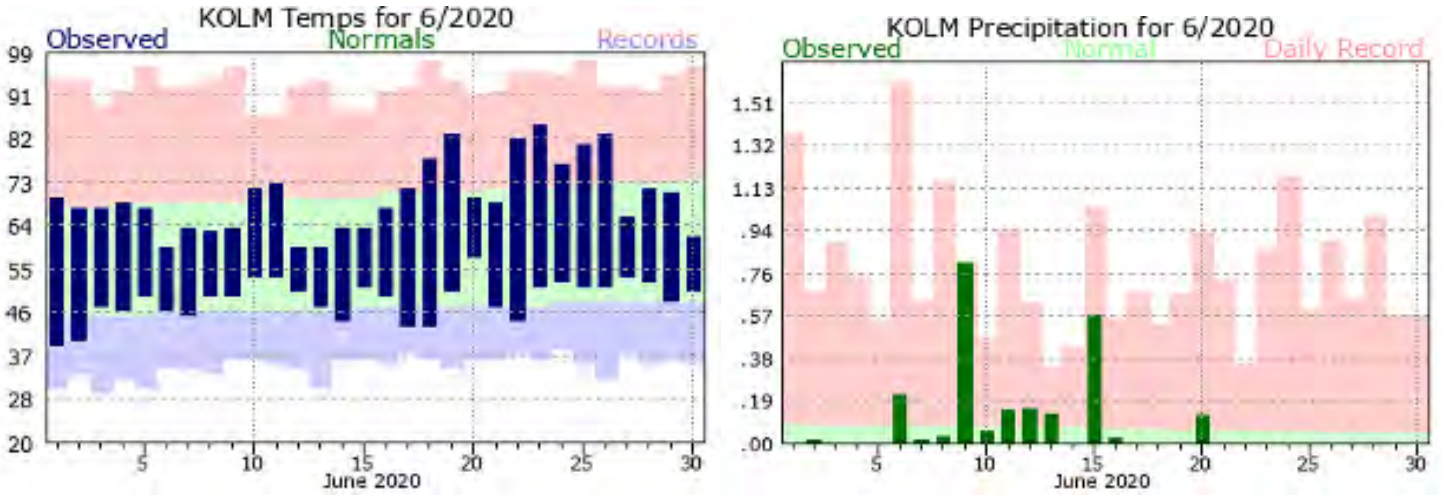

Figure 2: Daily June 2020 (a) maximum and minimum temperatures and (b) precipitation compared to normal (green envelope) and records (red and blue bars) for Olympia Airport (NWS).

Stream Flow and Drought Monitor Update

The beginning of July tends to mark the end of significant snowpack at all SNOTEL sites aside from Paradise- for which July 1st of 2020 ranks as the 15th highest Snow Water Equivalent (SWE) during its 40 years of maintained records. June streamflows, according to figure 4 from the USGS, were largely near normal statewide. Streamflows in the Yakima Basin are consistently below normal. The Klickitat and Yakima rivers are currently at 60 and 72% of normal flow volume, respectively. The Skokomish and Newaukum rivers in western Washington benifitted from a wet June and are well above normal flow in the top 10% percentile for this time of year.

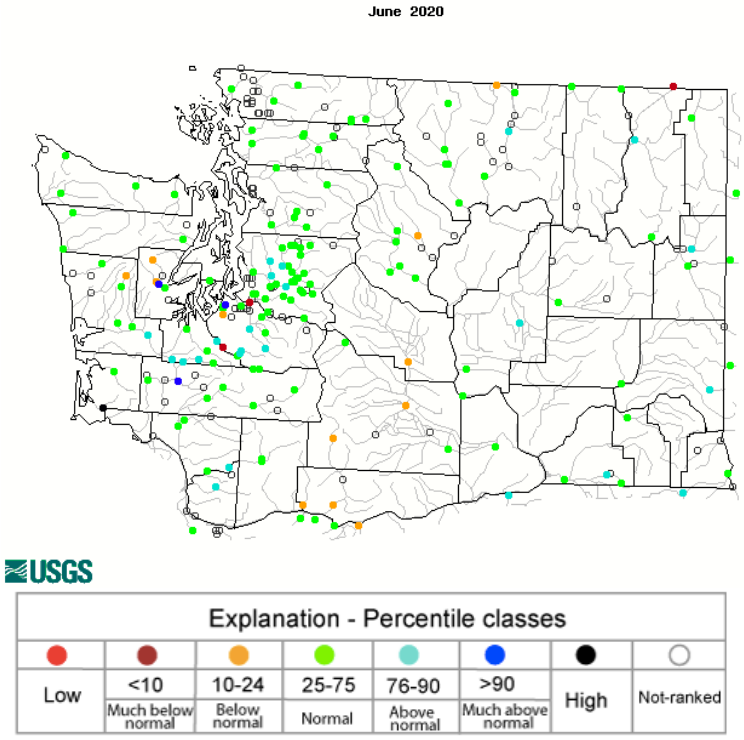

Figure 4: June averaged streamflows for WA (from USGS).

Despite a June featuring wide precipitation extremes, the US Drought Monitor's map has undergone few changes since last month. Areas of "Abnormally Dry" (D0) conditions have shrunk in SW Washington and in Walla Walla and Ferry counties. The band of "Severe Drought" (D2) conditions along the Columbia River Basin in central Washington has remained in place, reflecting the below normal precipitation seen last month.

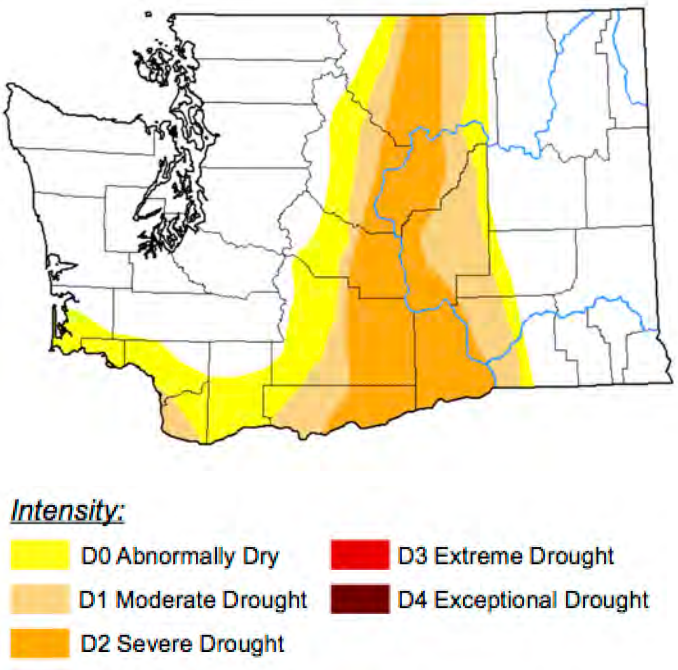

Figure 6: The June 2020 edition of the U.S. Drought Monitor.

Top 10 Weather and Climate Events of 2019

A message from the State Climatologist

In a reprise of previous lists of this sort, here we review the top weather and climate events in WA state for the year of 2019. To be sure, we are halfway through 2020, but hopefully these events are not yet into the dustbin of history and their mention here will bring back some memories, fond or otherwise.

#10 Thunderstorm of 7 September – The early evening of 7 September featured an estimated 2200 lightning strikes in the Puget Sound region accompanied by torrential rain. The storm moved over Seattle during a University of Washington home football game, necessitating a 2+ hour delay in the game while participants and attendees took shelter.

#9 Dust devil of 1 May – While dust devils would seem to be at the low end of the meteorological Richter scale, what must have been a particularly intense example occurred in Zillah, WA on 1 May 2019. It lifted up an occupied "bounce house" and tossed it over 200 feet, leading to 5 children being injured, one critically. About as fluky as it gets in terms of the weather posing a hazard.

#8 Heavy rains in western WA in late December – Skies really opened up on 20 December with numerous stations in Puget Sound region receiving 24-h totals of about 3" (including Sea-Tac with 3.25"). Even greater downpours on the west flank of the Cascade Mountains resulted in widespread flooding. The Snoqualmie River at Carnation, for example, had streamflows about 10 times greater than usual for this high flow time of year.

#7 Lack of snow in Cascades late in the calendar year – Winter sports enthusiasts must have been quite antsy. There was a fair amount of precipitation at times (see item above) but not much snow. On 1 January 2020, snow water equivalent (SWE) totals around the state were typically on the order of 40 to 60% of normal, with particularly low values for the lower Columbia basin including a portion of southwest WA.

#6 Snow near Spokane 26 November – While there was a deficit of snow in the mountains, there was still some wintry weather at times in various locations in WA state. A sudden snow squall just west of Spokane led to a slippery roadway and lack of visibility that resulted in 35 crashes involving 127(!) vehicles on I-90.

#5 Early season snow in Spokane – Speaking of snow in the vicinity of Spokane, some heavy and wet snow fell on 28 September, which is remarkably early in the cool season for that area. Broken tree limbs resulted in power outages. Mother Nature delivered a second, stronger punch on 8 October with localized intense snow showers and even more power outages. It was enough of a disruption for the Spokane Public School System to call a snow day for 9 October.

#4 Spring/Early Summer drought – We have had some quite warm springs in recent years. It is evident that even with healthy mountain snowpacks at the end of winter, a warm spring can cause that snow to melt faster than usual, leading to streamflow deficits in summer. The year of 2019 represents an example, with May and June combined checking in with a statewide temperature that was the 7th highest in the entire record, specifically 2.3 °F greater than the 1981-2010 mean. It was also generally drier than normal, especially in the western part of the state, where many locations had precipitation totals that were in the bottom 10% (Fig. 6).

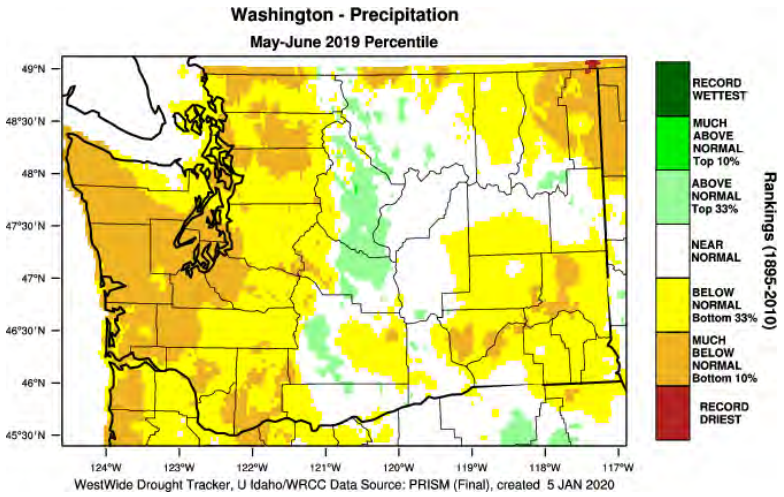

Figure 6: May-June 2019 precipitation percentiles based on 1895-2010 data (from Westwide Drought Tracker) .

#3 Flash flood in Pullman 9 April – A multi-day period of copious rains in southeast WA resulted in flash flooding that inundated the business district of North Grand Avenue in Pullman with up to 4 feet of water. This caused flooding of businesses, parked cars to float away and required water rescues of stranded people. The property damage tab totaled about 1.1 million dollars, but thankfully there were no injuries.

#2 Mild temperatures and quiet wildfire season summer – The residents of WA state experienced relatively smoky summers in 2017 and 2018, and given the rapid drying of the landscape in late spring 2019, some of us feared a repeat. Instead, the summer was noticeably milder and damper than in recent years. While August 2019 was on the warm side, the months of July (Fig. 7) and September were 0.9 °F and 0.7 °F cooler than normal, respectively, relative to 1981-2010 averages. Seattle and Spokane had only 2 and 11 days of 90+ °F maximum temperatures, which is about one-half their usual annual totals this century. An important upshot was that only about 170,000 acres burned in wildfires in 2019, as compared with an average of about 530,000 acres during the years of 2014-2018, which was a particularly bad period for fires in the Pacific NW.

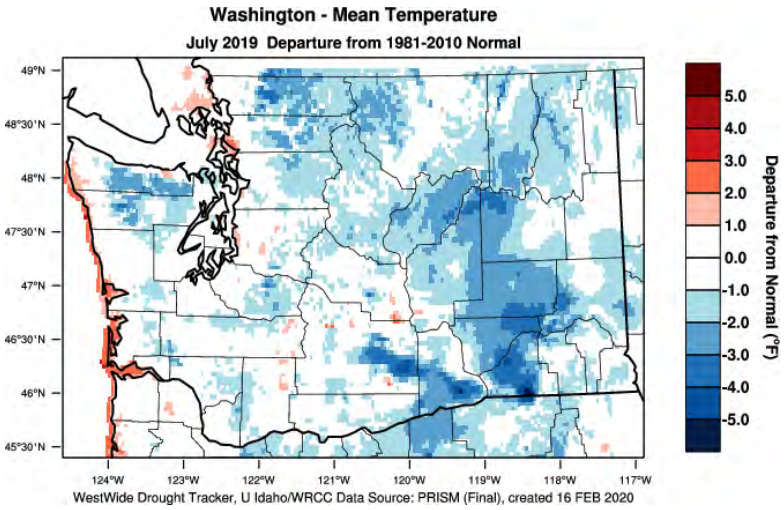

Figure 7: July 2019 temperature anomalies in F relative to 1981-2010 norms (from [Westwide Drought Tracker]).

#1 Cold and snow statewide in February extending into March – The winter of 2018-19 got off to a slow start, with statewide temperature anomalies of +3.0 °F in December 2018 and +2.5 °F in January 2019. Given the weak-moderate El Nino in place at the end of January, which tilts the odds towards warmer than normal temperatures in the Pacific NW, fans of wintry weather around here must have been discouraged. But then came February. The cold arrived right after the beginning of the month and stuck around not just through February but also well into March without relief, as shown in the time series of daily temperatures in Seattle and Spokane plotted in Figure 8. Early March was particularly cold in the Columbia basin portion of eastern WA. We are unsure what is more striking, the statewide anomaly of -9.2 °F for February, or the -6.5 °F anomaly for February and March combined. We have not had a late winter so frigid since 1956. Plenty of snow accompanied the cold, with all sorts of impacts, including the deaths of at least 1600 dairy cows in the Yakima area on 12 February 2019. A much more complete account of this amazing stretch of cold weather is in the March and April 2019 editions of this newsletter.

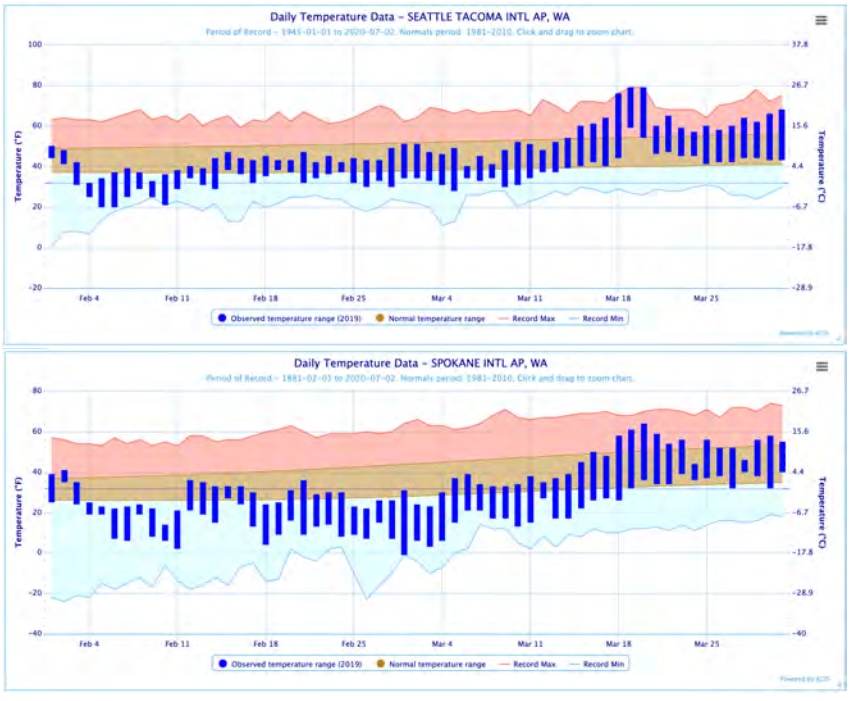

Figure Z: Time series of daily temperatures during February and March 2019 for Sea-Tac (KSEA) at top and Spokane International Airport (KGEG) at bottom. Daily normals and records are also shown.

Climate Summary

Mean June temperatures were near normal for most areas of Washington falling between -1 to 1 °F, according to the map from the High Plains Regional Climate Center. Central Washington featured two separate warm anomalies of 2 to 3 °F above normal- one anomaly occurred near the Pasco Airport, which saw temperatures 1.8 °F above normal. The Cascade Range was mostly near normal with slightly below normal temperatures west of the Crest and slightly above normal temperatures east of the Crest. The North Cascades were primarily between -2 to -1 °F below normal, but it was on the warm side for coastal Puget Sound areas. Stations in the populated lowlands such as Olympia, SeaTac AP, and Bellingham saw temperatures 0.7, 0.9, and 1.0 °F above normal, respectively. The cold anomaly in the northeast portion of the state is a reappearing feature ranging back from February through June, and should be taken with a grain of salt.

Mean precipitation varied widely across the state with large pockets of significantly above normal precipitation on the western and eastern thirds, and band of well-below normal precipitation in the center of the state. Western Washington experienced almost entirely above normal precipitation with two bull's eyes in the 150-200% of normal range. The Seattle WFO is in the southern portion of the bull's eye, reporting 3.06" of precipitation, which accounted for 188% of normal. Southwest Washington also received anomalously high precipitation with the Vancouver Airport recording 190% of normal (3.40") through June. Greater variability existed in eastern Washington. Rainshadowing from the Cascades brought only 0.16" to Wenatchee, but further east in Ephrata, 0.76" of precipitation was recorded. The 3.94" of rain that fell in Republic accounted for its 2nd highest ever June precipitation.

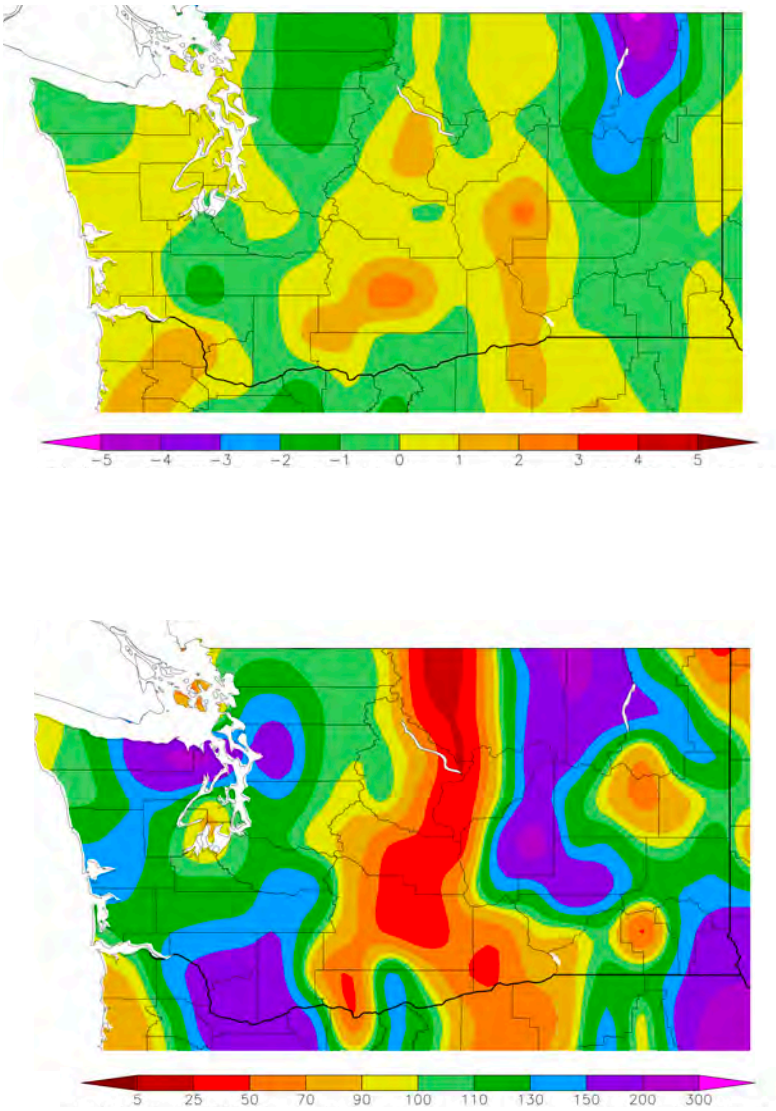

Figure 12: June temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Norm
Western Washington						
Olympia	59.8	59.1	0.7	2.24	1.76	127
Seattle WFO	61.5	61.0	0.5	3.06	1.63	188
SeaTac AP	61.8	60.9	0.9	2.28	1.57	145
Quillayute	55.5	55.3	0.2	3.56	3.50	102
Hoquiam	57.3	56.8	0.5	3.30	2.24	147
Bellingham AP	59.5	58.5	1.0	2.05	1.86	110
Vancouver AP	63.9	63.3	0.6	3.40	1.79	190
Eastern Washington						
Spokane AP	61.7	62.1	-0.4	0.88	1.25	70
Wenatchee	66.8	66.7	0.1	0.16	0.60	27
Omak	66.0	65.5	0.5	1.36	1.23	111
Pullman AP	59.1	58.6	0.5	1.70	1.08	157
Ephrata	67.2	66.6	0.6	0.76	0.61	125
Pasco AP	69.3	67.5	1.8	0.55	0.68	81
Hanford	67.9	69.6	-1.7	0.49	0.51	96

Table 1: April 2020 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), neutral El Niño Southern Oscillation (ENSO) conditions are still present in the equatorial Pacific. Sea Surface Temperatures (SST) have continued to cool in the central and eastern equatorial Pacific since early May creating cold -1 °C anomalies. The cooler SSTs in the east-central Pacific nearly reach the threshold of a weak La Niña, but the tropical atmospheric circulation still agrees with neutral ENSO conditions. Forecast models place a 52% chance of neutral ENSO conditions persisting through September. The odds of La Niña creep up during the fall, and are essentially equally favored with neutral conditions. Since neither the odds of La Niña or neutral conditions are above 50%, substantial uncertainty remains whether equatorial Pacific oceanic SSTs will continue cooling and trigger La Niña. Historically speaking, El Niño and La Niña events tend to develop in April through June and reach peak strength from October to February.

The CPC July temperature outlook posted on 30 June has slightly increased chances of below normal temperatures aside for the Olympic Peninsula and the North Cascades, which are given equal chances of above, below, and equal to normal temperatures. The precipitation outlook provides little insight for the upcoming month with equal chances of above, below, and near to normal precipitation.

The 3-month CPC temperature outlook for the bulk of the summer (July-August-September) has increased chances of above normal temperatures for the entire state. The outlook is fairly confident with chances of above normal temperatures in the 60-70% range except for the northeastern third of the state, which is in the 50-60% range. The precipitation outlook shows slight chances of below normal precipitation statewide with highest chance of below normal precipitation in the eastern third of Washington at 40-50%.

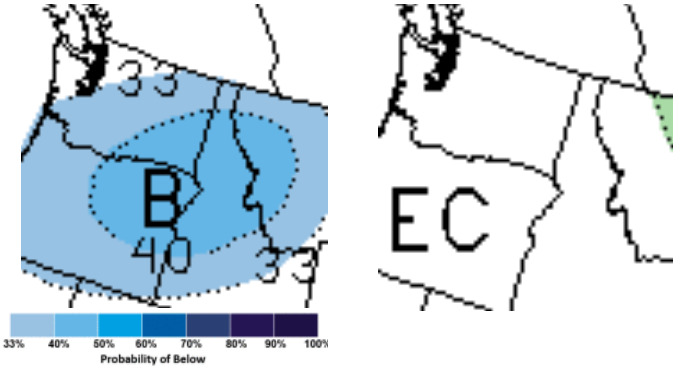

Figure 12: July outlook for temperature (left) and precipitation (right).

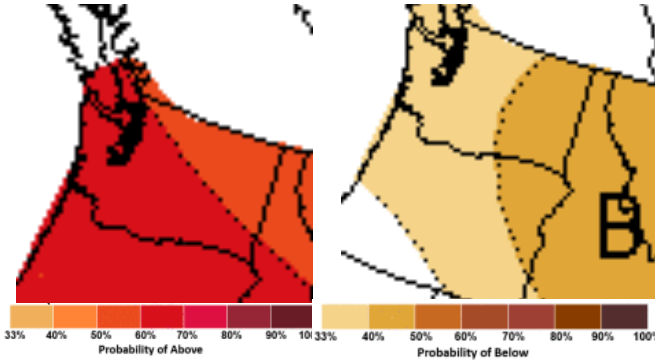

Figure 11: July-August-September outlook for temperature (left) and precipitation (right) (Climate Prediction Center).