



Office of the Washington State Climatologist

June 2018 Report and Outlook

June 8, 2018

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

May Event Summary

May 2018 was a very warm month for Washington State. Several weather stations across the state recorded their warmest May on record (e.g., SeaTac Airport, Wenatchee, Pasco) as shown in Table 1. The warm anomalies in coastal WA were not quite as large (Hoquiam had the 7th warmest May on record, for example), but the statewide ranking for May average temperatures is still noteworthy. Averaged statewide, May 2018 was the 2nd warmest May on record (since 1895) with temperatures 5.8°F warmer than the 1981-2010 normal. The record holder for the state is May 1958.

Total May precipitation was below normal for a majority of the state, except for several areas of eastern WA. Table 1 shows that the stations listed in western WA had an extremely dry May - with rankings in the top 3 - while the eastern WA stations did not rank among the top ten driest. Averaged statewide, May 2018 tied 1970 for the 12th driest on record, with precipitation 1.37" below normal (1981-2010 average) for the state.

The warmer than normal temperatures, in combination with the above normal precipitation for some regions of eastern WA, caused major

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flooding on many rivers in eastern WA that flooded homes and pastures. The warm temperatures melted snow in the mountains much

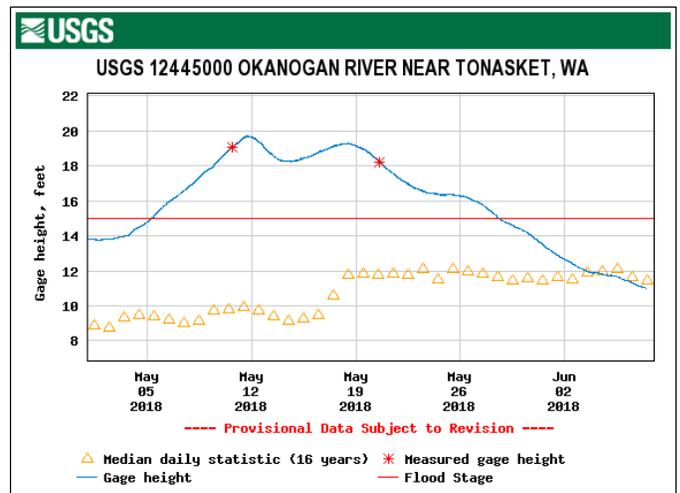


Figure 1: Daily stream gauge height at the Okanogan River near Tonasket USGS gauge for May 2018. The red line represents flood stage and the orange triangles are the normal height.

Station	May Temperature (Rank; Temperature in °F)	May Precipitation (Rank; Precipitation in inches)	Records Began
SeaTac	1; 61.0	1 (tie); 0.12	1945
Bellingham AP	3; 58.0	1; 0.17"	1949
Hoquiam	7; 55.7	2; 0.35"	1953
Olympia	4; 57.6	3; 0.24	1941
Wenatchee	1; 66.3	-	1959
Pullman	1; 59.2	-	1940
Republic	1 (tie); 57.6*	-	1899
Pasco	1; 66.1	-	1945
Spokane AP	5; 61.9	-	1881

Table 1: Average May temperatures and rank (warmest to driest), total May precipitation and rank (dries to wettest), and the year that records began for selected WA stations. The precipitation rankings denoted by “-” were not among the top ten driest. *1 missing day.

faster than usual (more in the “Snowpack Summary” section below). Figure 1 shows the gauge height on the Okanogan River near Tonasket, and the river was well above flood stage for a majority of May.

The warm May minimum temperatures are also notable. Figure 2 shows the daily temperatures at SeaTac Airport for the month, and the minimum temperatures were above normal for nearly the entire month. And this wasn’t just true for SeaTac: averaged statewide, May minimum temperatures were the warmest on record (since 1895) at 5.1°F above the 1981-2010 normal.

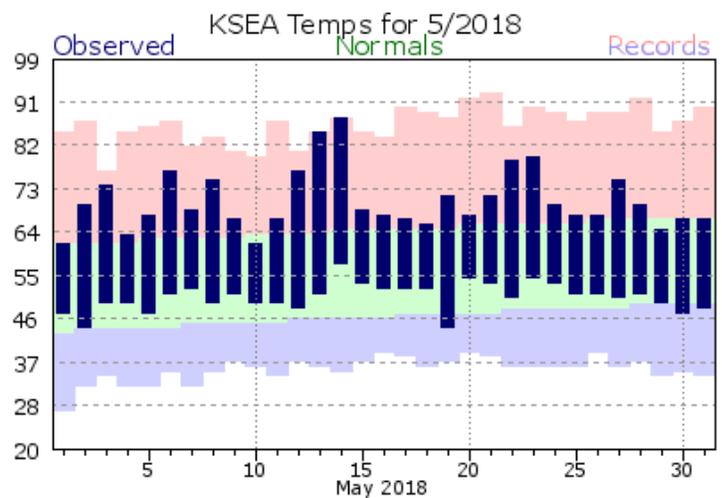


Figure 2: Daily May 2018 temperatures (dark blue bars) for SeaTac Airport with the normal range of temperatures (green envelope) and historical records (red and blue envelopes).

[NWS](#)

Snowpack Update

The warm May temperatures have caused the snowpack to melt much faster than usual. In last month's OWSC newsletter, we reported that the snow continue to build into mid-April, leaving the statewide snowpack numbers above normal. However, the warm May temperatures have caused a faster than usual snowmelt, and contributed to major flooding in eastern WA. The [flooding](#) prompted Governor Inslee to declare a state of emergency in 20 eastern WA counties which activated the assistance of emergency personnel. Figure 3 shows the 2017-18 snowpack at the Touchet Snotel station in the Walla Walla basin. Snow water equivalent (dark blue trace) was above normal in mid-April, but melted in a precipitous drop that resulted in meltout occurring 1-2 weeks early. This pattern was common at other lower elevation sites as well.

As a result of the warm and dry May for part of the state, the U.S. Drought Monitor introduced "abnormally dry" - Do - conditions into western WA in the June 7 edition of the map (Figure 4).

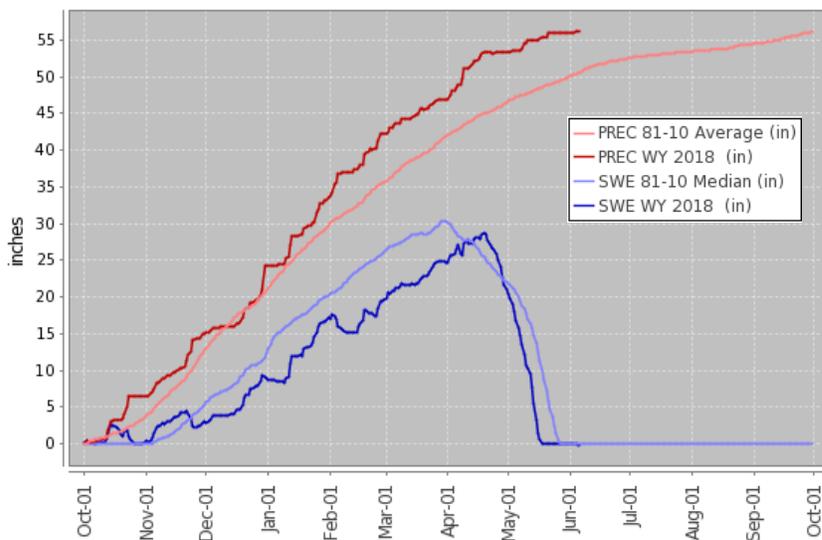


Figure 3: Daily snow water equivalent (dark blue trace) compared to normal (light blue) for the Touchet Snotel ([NRCS](#)).



photo by Henry Reges, CoCoRaHS

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

While our CoCoRaHS observers in western WA had very little to report during the month of May, we would still like to express our appreciation to our volunteers! It's also a good time to remind our volunteers that entering "zero" for no precipitation is also very important so we encourage that to continue as we enter our dry season.

CoCoRaHS is turning 20 in June! The program began in Colorado and has grown to over 20,000 active observers. Not only is it the national birthday for CoCoRaHS, but June also marks 10 years in Washington State! Thank you for being a part of this valuable program. We have some extremely dedicated volunteers that have been with us 10 years in WA, and we are grateful for their participation. More on the history of CoCoRaHS can be found [here](#).

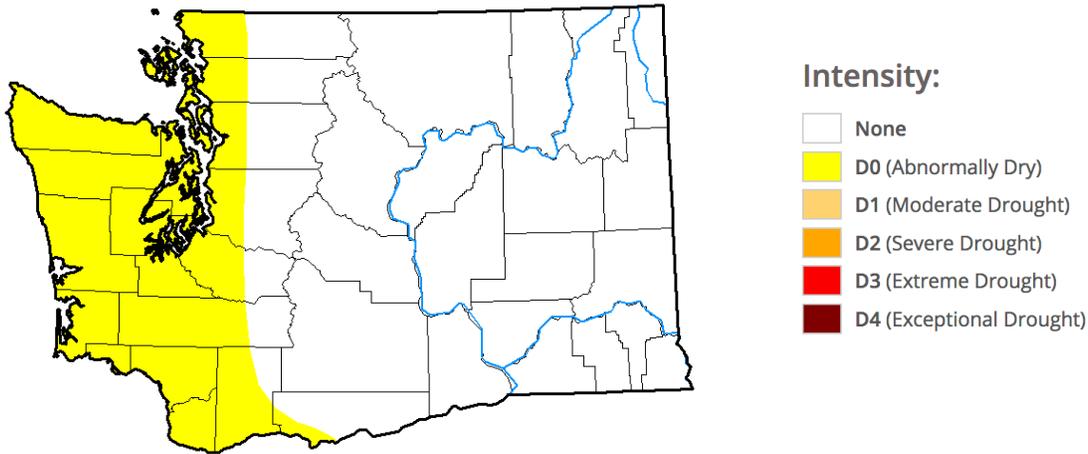


Figure 4: The June 7, 2018 version of the [U.S. Drought Monitor](#).

Experimental Potential Heat Risk Forecasts from the National Weather Service

A message from the State Climatologist

We have already had some warm weather in WA during the past May, and rest assured more is on the way for the upcoming summer. While our temperatures do not tend to get as high as those in many other parts of the country, it can certainly get hot enough to represent a health risk, especially for vulnerable groups – which include young children and elderly as well as those with some medical conditions. Those that work outside are also at a greater risk of heat illness. In addition, the prevalence of air conditioning, particularly in western WA, is much lower than in other parts of the country. In recognition of this public health problem, the National Weather Service (NWS) has developed an experimental product for forecasting heat risk.

The new HeatRisk forecast product consists of color-coded maps of potential heat risk for the

next 7 days available at the following web site: <https://www.wrh.noaa.gov/wrh/heatrisk/?wfo=sew>. This information is designed to supplement NWS heat advisories, watches and warnings because in some cases, actions should be taken before conditions are severe enough to warrant the issuance of those existing forecast products. The product also provides guidance for NWS forecasters when issuing heat advisories as it identifies which populations might be the most vulnerable in the specific situation. It is built from the NWS national gridded forecast database, and one value is assigned to each of the next 7 days. The factors that are taken into account are how large the warm anomaly is expected to be based on normal temperatures, the time of year (heat has been shown to have a greater impact on people early in the warm season), the duration of the warmer than normal temperatures, and

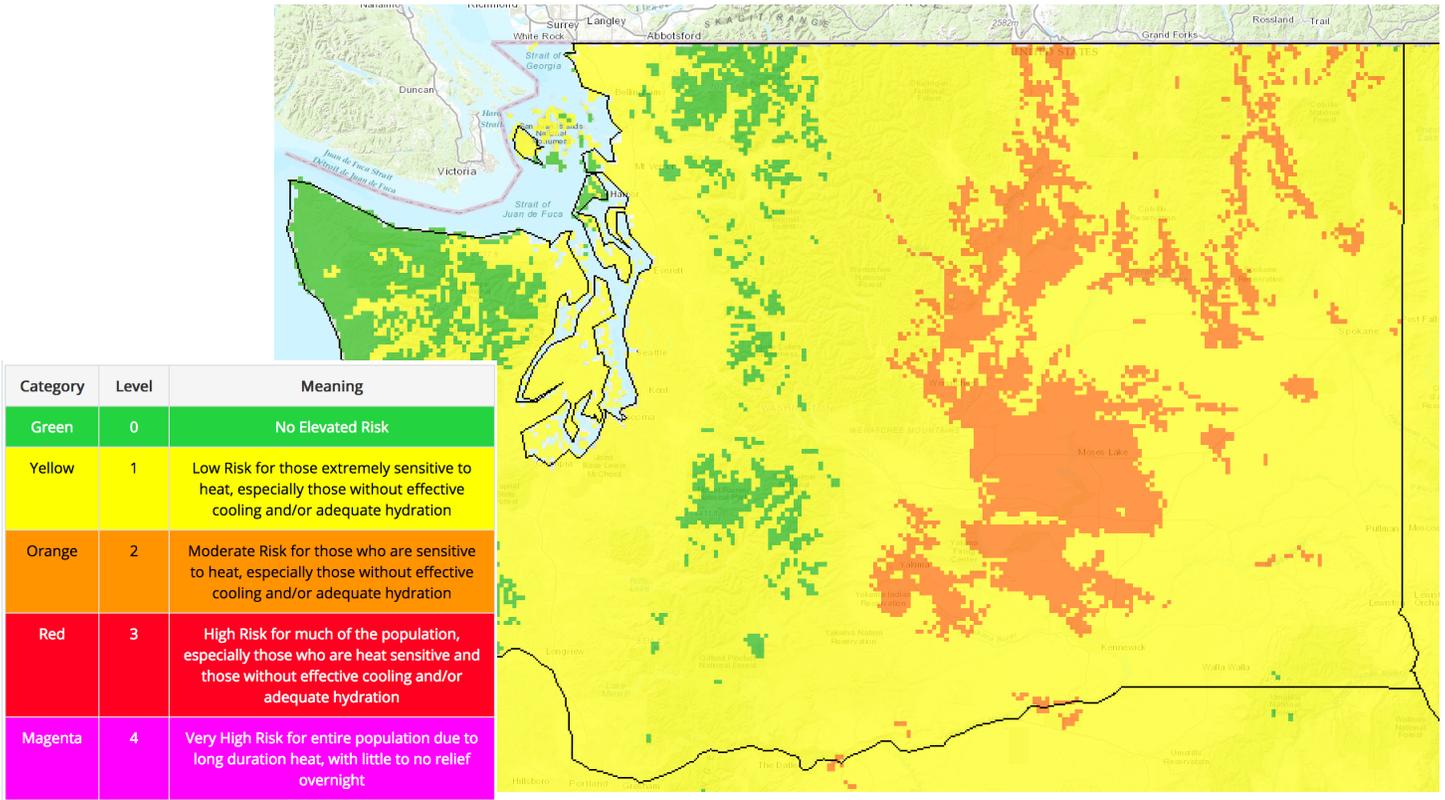


Figure 5: The experimental NWS Potential Heat Risk map issued on May 24, 2018 valid for May 28, 2018 (NWS).

whether or not temperatures will be low enough overnight to alleviate heat stress.

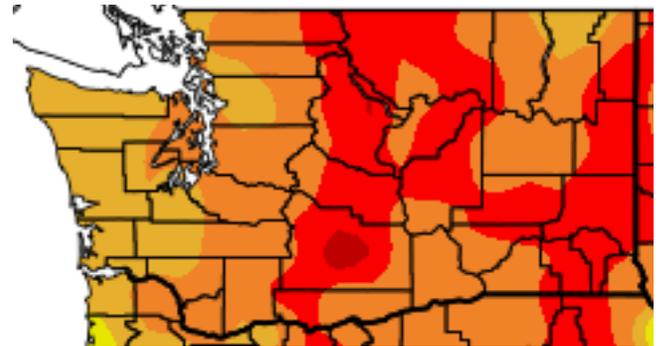
The HeatRisk product fits well with the “Integrate environmental forecasting services to support healthy communities and ecosystems” goal in the current NWS Strategic Plan. A cool (pun intended) feature of this new product is the ability to click on the map, and get a forecast for the next 7 days of the heat risk, maximum and minimum temperatures, and cloudiness/precipitation in pictorial form at the selected location. An example of a map from late May 2018 is shown in Figure 5; note the fine detail related to terrain. An important distinction between the heat risk maps provided and other products is that these maps account for local effects, specifically how unusual the expected conditions are for the time of year and location.

The website listed above includes a description of the method used and how it compares with other products, and links to various sources with more information on extreme heat from the human health perspective. While many of us are looking forward to some warm weather this summer, I think most of us also would agree that it would be good if this web application does not get too much of a workout.

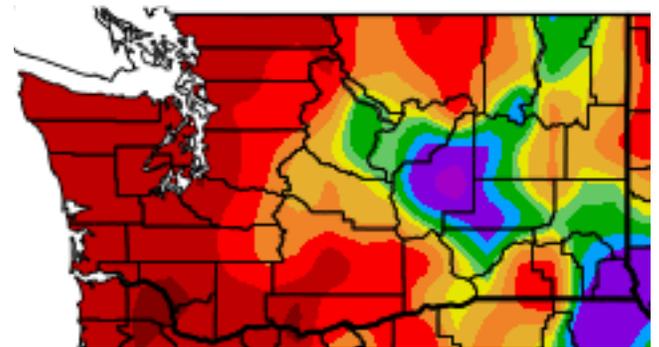
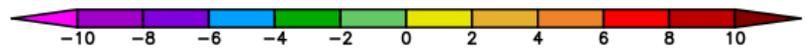
Climate Summary

Mean May temperatures were warmer than normal throughout all of WA State. Monthly anomalies were largest in parts of eastern WA where May temperatures were between 6 and 8°F above normal. Ephrata and Spokane were especially warm spots, with mean temperatures 6.8 and 7.7°F above normal, respectively (Table 2). Temperature anomalies were not as extreme in western WA, but were still consistently above normal. Quillayute, for example, was 2.0°F above normal (Table 2).

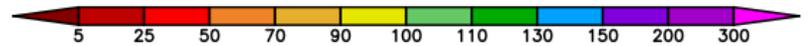
Total May precipitation was much below normal throughout western WA, with all of the locations listed in Table 2 receiving less than 15% of normal precipitation. SeaTac Airport and Vancouver received a mere 6% of their normal May precipitation (Table 2). Some locations in eastern WA did receive substantial precipitation, as denoted by the 150-200% of normal bullseyes on the map on the right-hand side. Pullman and Ephrata, for example, both received over an inch of May precipitation, resulting in 124 and 174% of normal precipitation, respectively (Table 2).



Temperature (°F)



Precipitation (%)



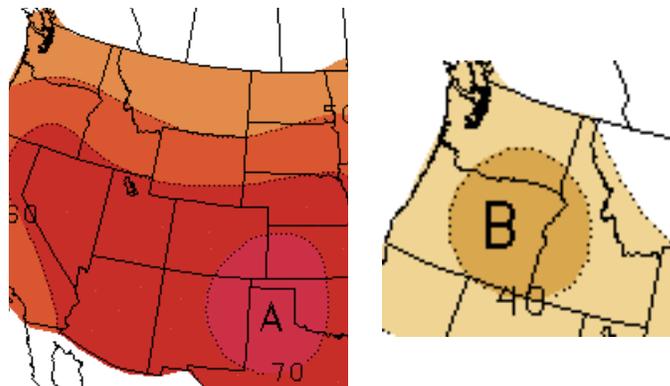
May temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	57.6	54.2	3.4	0.24	2.33	10
Seattle WFO	60.8	56.0	4.8	0.30	2.16	14
SeaTac AP	61.0	56.0	5.0	0.12	1.94	6
Quillayute	53.3	51.3	2.0	0.80	5.11	16
Hoquiam	55.7	53.0	2.7	0.35	3.29	10
Bellingham AP	58.0	53.8	4.2	0.17	2.48	7
Vancouver AP	61.7	58.1	3.6	0.14	2.47	6
Eastern Washington						
Spokane AP	61.9	55.1	6.8	1.45	1.62	90
Wenatchee	66.3	59.8	6.5	0.66	0.68	97
Omak	64.3	58.1	6.2	0.52	1.22	43
Pullman AP	59.4	53.2	6.2	1.93	1.56	124
Ephrata	67.0	59.3	7.7	1.13	0.65	174
Pasco AP	66.1	60.7	5.4	0.76	0.73	104
Hanford	68.7	62.1	6.6	0.81	0.51	159

Table 2: May 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.

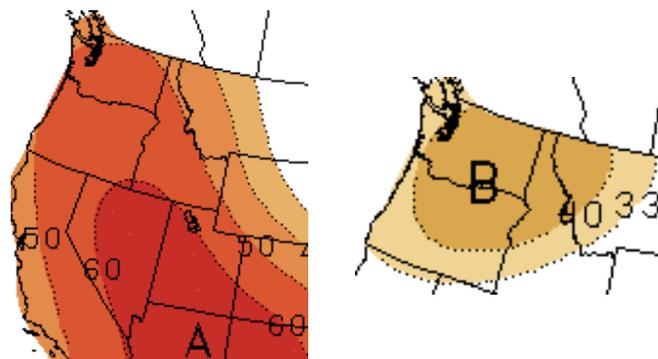
Climate Outlook

ENSO-neutral conditions are present in the tropical Pacific Ocean as the winter La Niña has dissipated. The CPC issued the final “La Niña Advisory” on May 10 as neutral conditions are expected through summer 2018. Over the last 4 weeks, sea surface temperatures (SSTs) were near normal throughout the equatorial Pacific. Currently, ENSO forecast models show a higher chance of El Niño conditions developing during the November-January 2019 period, but those forecasts will become more reliable later this summer. Longterm trends and the seasonal forecast models provide the guidance for the following warm and dry summer outlook.



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

The June temperature outlook from the CPC has higher chances of above normal temperatures for the entire state. The June precipitation outlook is consistent throughout the whole state as well, with increased chances of below normal precipitation for the month. Chances of below normal precipitation are highest in southeast WA.



June-July-August outlook for temperature (left) and precipitation (right)

The summer (June-August) CPC seasonal outlook is similar to the outlook for June. There are increased chances of above normal temperatures and below normal precipitation for the period.

(Climate Prediction Center)