



Office of the Washington State Climatologist

November 2017 Report and Outlook

November 3, 2017

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

October Event Summary

Average October temperatures were near-normal in much of western WA and below normal in eastern WA. The cooler temperatures finally broke a stretch of 5 months with warmer than normal temperatures throughout most of the state. October precipitation was above normal for a majority of state, though there were a few locations with below normal monthly totals (more information can be found in the “Climate Summary” section below).

An interesting aspect of October 2017 is that the above normal monthly precipitation fell on a few very wet days (Figure 1), as opposed to there being many rainy days. In contrast, October 2016 set records for the number of days with measurable precipitation at SeaTac Airport. The record wet October 2016 had 25 rainy days at SeaTac AP while this past month had about half as many (12 days). Olympia had 11 rainy days in October 2017 versus 28 days in October 2016. East of the Cascades, Spokane Airport and Wenatchee recorded 8 and 5 rainy days this past month, respectively, and had 22 and 15 rainy days for October 2016, respectively. All of this is to note that while on the wet side overall, the past month had some dry and sunny stretches.

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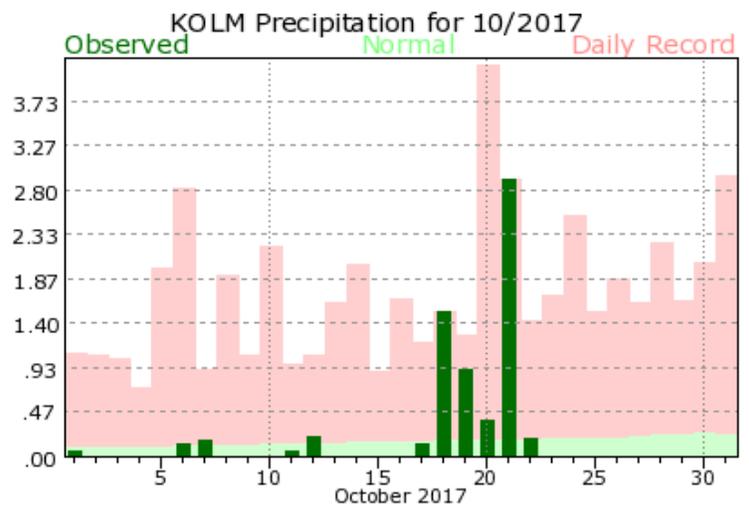


Figure 1: Daily October 2017 precipitation (green bars) for Olympia Airport and historical records (red bars). [NWS](#)

With that said, the daily records set for the month are all related to precipitation. On the 12th, a maximum precipitation record was set at Walla Walla (0.53"). A stormy period on the 17th to the 22nd brought winds on the 18th and precipitation from several low pressure systems. Maximum daily precipitation records were set at Bellingham Airport (1.44"), Hoquiam (2.12"), and Quillayute (2.93") on the 18th. More daily rainfall records were set on the 21st (SeaTac Airport - 1.61", Olympia - 2.91", Hoquiam - 2.63", Wenatchee - 0.67", Yakima - 0.38") and 22nd. (Yakima - 0.40", Goldendale - 1.10").

October ended on a warm note with the temperatures above normal on the 24th through the 30th for most of the state, resulting in pleasant temperatures in the 60s and 70s.

Drought and Streamflow Update

The switch to cooler and wetter conditions for October has provided some relief from the dry conditions throughout the state at the end of the summer. Since the last edition of the newsletter, there have been several improvements made to the US Drought Monitor (Figure 2). The “moderate drought” category has shrunk to only include an area in northeastern WA that has had precipitation deficits both in October and on longer time scales. The depiction for western WA has also improved.

The 28-day average streamflows ending on November 1 from USGS are depicted in Figure 3. As expected, the return of fall rain has greatly improved our streamflows, with the 28-day average streamflow normal to above normal for nearly the entire state.

Legend for US Drought Monitor categories:

- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

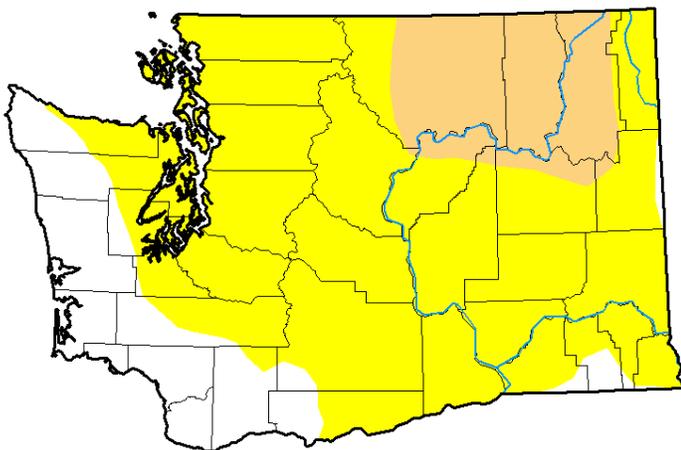


Figure 2: The 2 November 2017 edition of the US Drought Monitor.

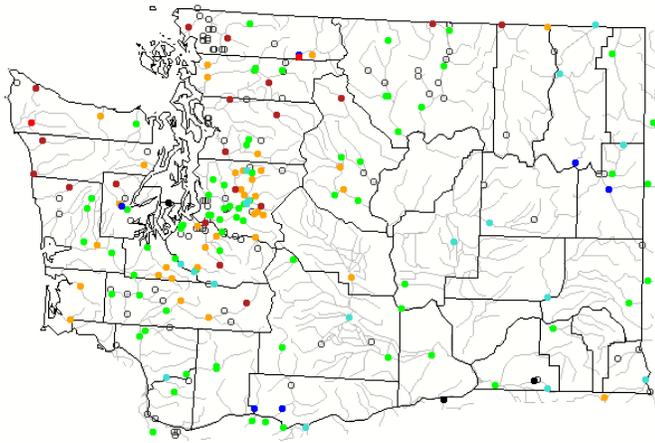


photo by Henry Reges, CoCoRaHS

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

Every CoCoRaHS observer now has the ability to enter a new type of report: a “condition monitoring” report. These reports are weekly, are descriptive, and help assess the environment’s response to unusually wet or dry conditions.

You can learn more about this report by watching this [video](#) or viewing these [slides](#). There is also a new map feature that shows these reports (and overlays the current Drought Monitor map for context). You can view the map here: <https://www.cocorahs.org/Maps/conditionmonitoring/>. Let us know if you have any questions about this new CoCoRaHS feature!



Explanation - Percentile classes							
●	●	●	●	●	●	●	○
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked



Figure 3: The 28-day average streamflow as of 1 November 2017 for WA (from USGS).

Two Online Applications for the US Climate Community

A message from the State Climatologist

There are all kinds of options for gathering and plotting historical weather data online. Regular consumers of this kind of data are liable to have their favorite sources and in this regard, familiarity comforts (rather than breeds contempt, as the saying goes). Nevertheless, we thought that readers of this newsletter might appreciate learning about a couple of slick web sites, one that has been around for a while and one that is relatively new, for not just extracting US surface weather data, but also examining these records in convenient and interesting ways.

We begin with the web resource maintained by the Midwestern Regional Climate Center (MRCC), specifically the MRCC Application Tools Environment (Cli-MATE). This data portal (<http://mrcc.isws.illinois.edu/CLIMATE/>) represents an easy way to download and graph weather and climate data from US

stations; users must register but access is free. Both daily and hourly data are available; the latter type of historical data tend to be more difficult to find but this website makes it easy. Hourly data is only available here from the airport stations (SeaTac Airport, Spokane Airport, etc.). There are additional networks such as Agrimet, AgWeatherNet and RAWs with high-temporal resolution weather data available, of course, but those data are not available on either on the sites featured here. Returning to the Cli-MATE web site, one of its strong points is the intuitive interface for selecting station(s). One can specify the state and county or climate division of interest, see what stations are available, and then grab or graph time series of the variables of interest. The website also has some built-in capabilities to place daily data in historical contexts, as shown in this screenshot (Figure 4) from a

Daily-Observed Data	
Daily Data (Daily-Observed Data → Daily)	
Between Two Dates	<ul style="list-style-type: none"> o Raw historical station data o Plot data or download in a csv file
Degree Days	<ul style="list-style-type: none"> o Full suite of degree day data, including Heating Degree Days, Cooling Degree Days, Growing Degree Days, Modified Growing Degree Days, Stress Degree Days and Freezing Degree Days. o Customizable to include non-standard degree day bases and start dates. o Tabular data and data plots available
This Date In History	<ul style="list-style-type: none"> o See all data available for one day or a holiday in a sortable table
Almanac for a Day	<ul style="list-style-type: none"> o Average and record highs & lows o Daily 1981-2010 NCDC Climate Normals
Threshold Search	<ul style="list-style-type: none"> o Find all dates a certain temperature, precipitation or snowfall threshold criterion is met for one or two criteria o Gives a chronological list of dates, monthly counts, or a runs of Days meeting the threshold
Multi-Day Extremes	<ul style="list-style-type: none"> o Find extreme periods of temperature, snowfall and precipitation
Ranking	<ul style="list-style-type: none"> o Search the ranking of temperature precipitation and snowfall data in ascending or descending order for an individual date.
Keetch-Byram Drought Index (KBDI)	<ul style="list-style-type: none"> o Get the KBDI for an individual days in a sortable table o Graphs also available

Figure 4: A list of the capabilities on the Cli-MATE application utilizing daily data.

help page (<http://mrcc.isws.illinois.edu/CLIMATE/productGuide.pdf>). We find the threshold and multi-day options to be especially useful for characterizing extended periods of unusual weather. This brief discussion of Cli-MATE does not do justice to all of its goodies. Readers of this newsletter are encouraged to explore for themselves. But be forewarned, one may spend more time doing so than anticipated since such explorations are liable to be so interesting.

The more recent web resource is also provided by a regional climate center, specifically the Southeast Regional Climate Center. The new tool is called the Southeast Climate Perspectives Map (<http://www.sercc.com/perspectives>), which

may not sound very promising for those of us interested in the weather and climate of the Pacific Northwest, but actually includes data for the entire country. Moreover, it provides not just a tab for “Regional Map Perspectives” but also tabs for “Station Perspectives” and “Streaks & Thresholds Perspectives”. Its focus is on recent weather observations, and features a variety of ways of putting the recent weather in historical and geographic contexts. A good way to start is to simply go to the following easily navigable web site: <http://www.sercc.com/perspectivesmap?region=conus>. Use the Google interface to zoom in on the area of interest, and it’s off to the races. Here we do not attempt to describe all of the available features; those interested are

advised to visit the product guide (<http://www.sercc.com/climper/about.php#climpermap>), or just rummage around. We feel that an especially intriguing feature is with the Station Perspective. Clicking on an individual station yields a table of how the average, minimum, or maximum temperatures or total precipitation over time scales ranging from 1 day to 2 years compare with historical records, including what days of the year they most closely resemble in the climatological record, and the most similar US city in terms of the climatological averages. This kind of query can be made for any day in the last 3 months. For example, the maximum temperature at Sea-Tac Airport (SEA) on 12 October 2017 was 50°F, which seems quite chilly. The

application shows indeed that this value represents an anomaly of -11°F and was the third coldest 12 October on record. The most similar day of the year from a climatological standpoint based on maximum temperature is 19 November, and the most similar city in terms of the weather for the day is Juneau, AK. A partial view of the table of information that is provided is shown in Figure 5.

We encourage our readers to check out the different kinds of information on these websites for themselves. But please don't hesitate to let us know if you have questions about the information provided or can't find what you need. We're happy to assist!

**Past Climatological Periods
At Seattle Area in Seattle, WA (SEAttr)**

Period of record: 1948-01-01 to 2017-10-27 (current) - 70 Year(s)
Normals values based on 2010 normals data from Seattle Tacoma Ap in Seattle, WA (457473, 0.0 mi SSE)
This data was pregenerated on Thursday, October 19th, 2017 at 3:30 PM EDT

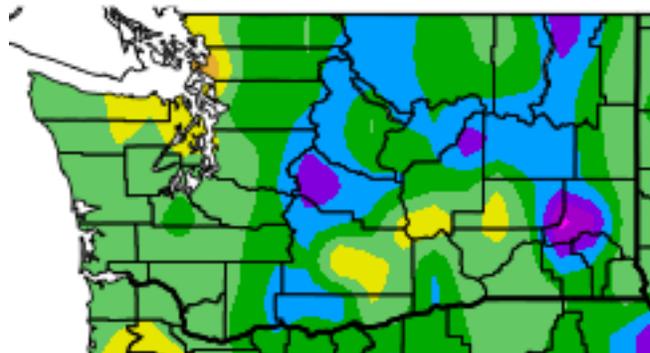
Date(s)	Data (%) # of Obs Used		Avg High Temp (°F)	Avg Low Temp (°F)	Avg Mean Temp (°F)	Total Precip (in)	Most similar city ?
Thursday Oct. 12th, 2017 <small>View History</small>	100% 1 Daily	Value	50 °F	45 °F	47.5 °F	0.38 in	Juneau, AK Max: 48.5 °F Min: 39.3 °F
		DFN	-11.0 °F	-1.5 °F	-6.2 °F	+0.3 in	
		Ranking	3rd coldest	T-22nd coldest	T-5th coldest	4th wettest	
		Similar DOY ?	Nov 19	Oct 19	Nov 7	-	
Past 2 Days 10/11/17 - 10/12/17 <small>View History</small>	100% 2 Daily	Value	53.5 °F	44 °F	48.7 °F	0.55 in	Juneau, AK Max: 48.7 °F Min: 39.5 °F
		DFN	-7.7 °F	-2.6 °F	-5.1 °F	+0.4 in	
		Ranking	T-4th coldest	T-18th coldest	T-5th coldest	5th wettest	
		Similar DOY ?	Nov 4-Nov 5	Oct 25-Oct 26	Oct 31-Nov 1	-	
Past Week 10/06/17 - 10/12/17 <small>View History</small>	100% 7 Daily	Value	60.1 °F	45.3 °F	52.7 °F	0.58 in	Buffalo, NY Max: 61.5 °F Min: 44.8 °F
		DFN	-2.0 °F	-1.8 °F	-1.9 °F	-0.0 in	
		Ranking	28th coldest	17th coldest	T-21st coldest	33rd wettest	
		Similar DOY ?	Oct 11-Oct 17	Oct 15-Oct 21	Oct 13-Oct 19	-	
Month to Date 10/01/17 - 10/12/17 <small>View History</small>	100% 12 Daily	Value	62.6 °F	45.7 °F	54.1 °F	0.58 in	Buffalo, NY Max: 62.5 °F Min: 45.7 °F
		DFN	-0.5 °F	-2.0 °F	-1.2 °F	-0.4 in	
		Ranking	32nd warmest	T-17th coldest	T-29th coldest	T-27th driest	
		Similar DOY ?	Oct 2-Oct 13	Oct 10-Oct 21	Oct 5-Oct 16	-	
Past 2 Weeks 09/29/17 - 10/12/17 <small>View History</small>	100% 14 Daily	Value	63 °F	46.7 °F	54.9 °F	0.66 in	Milwaukee, WI Max: 63.2 °F Min: 46.6 °F
		DFN	-0.5 °F	-1.1 °F	-0.8 °F	-0.4 in	
		Ranking	T-33rd warmest	T-23rd coldest	29th coldest	27th driest	
		Similar DOY ?	Sep 30-Oct 13	Oct 4-Oct 17	Oct 2-Oct 15	-	

Figure 5: Example of daily to 14-day temperature and precipitation statistics and comparisons using the SeaTac AP site from the SERCC “Climate Perspectives” application.

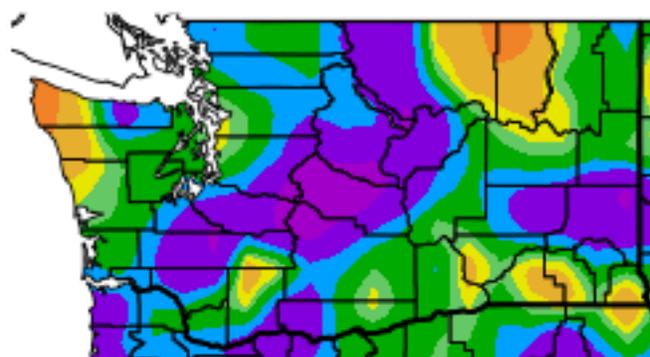
Climate Summary

Mean October temperatures were near-normal or below normal throughout most of WA state. Table 1 shows the October temperature anomalies within 1°F of normal for all of the western WA stations listed. Temperatures were generally cooler relative to normal in eastern WA, as shown by both the map from the High Plains Regional Climate Center and Table 1. For example, Wenatchee and Ephrata were cool spots, with October temperature anomalies 2.3 and 1.8°F below normal, respectively. It's worth pointing out that Pullman's average temperature was equal to the 30-year normal for the month (Table 1) - an event that is unusual to see but always fun for a climatologist (and hopefully some readers, too!).

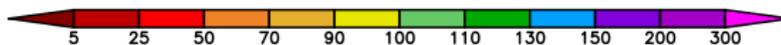
Total October precipitation was above normal for a majority of the state. Kittitas County was much wetter than usual, receiving between 150 and 300% of normal precipitation. On the other hand, other locations received much closer to normal precipitation. For example, Hoquiam, Spokane, and Omak received 112, 119, and 103% of normal precipitation for the month (Table 1). Finally, there were a few locations that were drier than usual as well. Quillayute, for example, only received 69% of normal precipitation (Table 1).



Temperature (°F)



Precipitation (%)



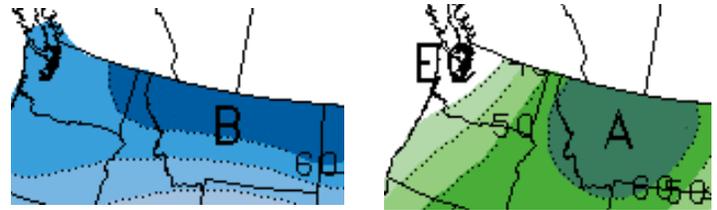
October temperature (°F) departure from normal (top) and precipitation percent of normal (bottom). (High Plains Regional Climate Center; relative to the 1981-2010 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	49.4	50.3	-0.9	6.58	4.60	143
Seattle WFO	53.2	53.3	-0.1	3.72	3.41	109
SeaTac AP	53.2	52.8	0.4	4.80	3.48	138
Quillayute	50.3	50.0	0.3	7.26	10.49	69
Hoquiam	52.3	52.2	0.1	7.30	6.53	112
Bellingham AP	50.2	49.8	0.4	5.33	3.68	145
Vancouver AP	53.4	53.8	-0.4	4.55	3.07	148
Eastern Washington						
Spokane AP	46.6	47.6	-1.0	1.40	1.18	119
Wenatchee	48.6	50.9	-2.3	0.81	0.44	184
Omak	47.6	48.9	-1.3	1.11	1.08	103
Pullman AP	47.5	47.5	0.0	2.48	1.34	185
Ephrata	48.7	50.5	-1.8	0.75	0.53	142
Pasco AP	51.5	51.9	-0.4	0.34	0.65	52
Hanford	51.9	53.1	-1.2	0.72	0.49	147

Table 1: October 2017 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.

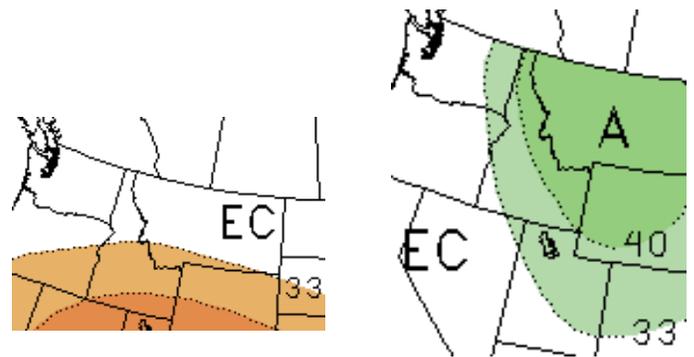
Climate Outlook

According to the Climate Prediction Center (CPC), ENSO-neutral conditions are still present in the equatorial Pacific. Sea-surface temperatures (SSTs) have been below normal throughout the region, and have been that way for several weeks. The “La Niña Watch” that was issued by the CPC in mid-September is still in effect. There is currently a 55-65% chance that a La Niña will develop in the fall and persist through winter 2017-18.



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

The CPC seasonal outlook for November is calling for increased chances of below normal temperatures across the entire state. For November precipitation, the odds are tilted toward higher than normal precipitation for the eastern half of WA State. Western WA has equal chances of below, equal to, or above normal precipitation for November.



November-December-January outlook for temperature (left) and precipitation (right)

The November-December-January (NDJ) CPC outlook shows little indication of how the average seasonal temperature will turn out: there are equal chances of below, equal to, or above normal temperatures. On the other hand, there are increased chances of above normal precipitation for some of eastern WA for NDJ. The remainder of the state has equal chances of above, below, or equal to normal precipitation for the period.