



Office of the Washington State Climatologist

April 7, 2015

March Event Summary

Mean March temperatures were much above normal statewide, marking a continuation of the warmer than normal temperatures seen all winter. For many stations, the average March temperatures rank as the warmest March since records began. Table 1 lists examples of weather stations where March was the warmest or second-warmest on record. The records occurred across the state, from Hoquiam to Bellingham and from Colville to Pullman. Precipitation was more of a mixed bag for the month of March, with areas of both below and above normal precipitation for the state.

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Station	March Avg Temperature (°F)	Ranking	Record (°F)/Year	Previous Record (°F)/Year	Records Began
SeaTac	50.5	1	-	50.3/1992	1945
Olympia	47.9	1	-	47.8/1992	1948
Bellingham	48.5	1 (tie)	48.5/1992	-	1949
Colville	46.7	1	-	44.5/1926	1926
Lind	51.0	1	-	47.8/1934	1931
Pullman	46.0	1	-	45.7/1992	1940
Priest Rapids Dam	52.7	1	-	52.3/1992	1956
Omak	47.0	1	-	46.7/1941	1931
Moses Lake	48.1	1	-	47.2/1986	1947
Quillayute	47.4	2	48.5/1992	-	1966
Ephrata	48.4	2	48.9/1992	-	1949
Hoquiam	49.9	2	50.6/1992	-	1953

Table 1: The average March temperature, ranking (descending), the current record and year, the record broken, and the year records began for selected WA stations.

Contrary to the average monthly statistics, March began on a dry and rather cold note with low temperatures about 5-10°F below normal in parts of eastern WA. That did not last long, however, as an upper level ridge dominated the weather pattern beginning on the 6th. High temperatures warmed into the 60s and 70s in eastern WA on the 9th, with high temperature records set at Yakima (74°F), Wenatchee (71°F), Ephrata (71°F), Omak (67°F), and Grand Coulee Dam (63°F). More daily records were set on the 10th, with Lind and Spokane reaching 71 and 67°F, respectively.

There was a shift in the weather pattern mid-month, and precipitation was more prevalent for the remainder of the month. Heavy precipitation kicked off the beginning of the pattern shift, and with the daily amounts being so impressive, it's a wonder whether the soothsayer was warning of precipitation in WA in 2015 when Caesar was told to "beware the ides of March". Maximum daily rainfall records were set on March 15th at SeaTac Airport (2.20"), Olympia (2.08"), Spokane Airport (1.33"), Bellingham (1.14"), Omak (0.76"), Ephrata (0.54"), Moses Lake (0.51"), Wenatchee (0.31"), among others. That was the wettest day of the month for most stations, though in general, it stayed damp for the remainder of the month.

Snowpack and Drought Update

While some snow fell in higher elevations in March, it was not enough to make a substantial improvement to the snowpack. The warmer than normal temperatures have caused an early start to the melting of the Cascade snowpack. Figure 1 shows an example hydrograph for Stevens Pass, showing decreasing snow water equivalent (SWE) since early February. Figure 2 shows the basin average SWE percent of average as of 1 April 2015 from the National Resources Conservation Service. The snowpack numbers are very bleak with much less than 40% of normal for a majority of the state. The Olympic, Central Puget Sound, and Upper Yakima basins have the incredibly low values of with only 3, 5, and 5% of normal snowpack, respectively. The Lower Columbia, South Puget Sound, Lower Yakima, and Spokane basins have 13, 17, 28, and 37% of normal, respectively. Both the North Puget Sound and Central Columbia basins have 42% of normal SWE which is nearly the highest basin average in the state. The Upper Columbia has the highest basin average SWE in the state, with 66% of normal, largely due to a couple sites on the western edge of the basin with near-normal SWE.

Station (791) WATERYEAR=2015 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
Mon Apr 06 13:09:49 PDT 2015

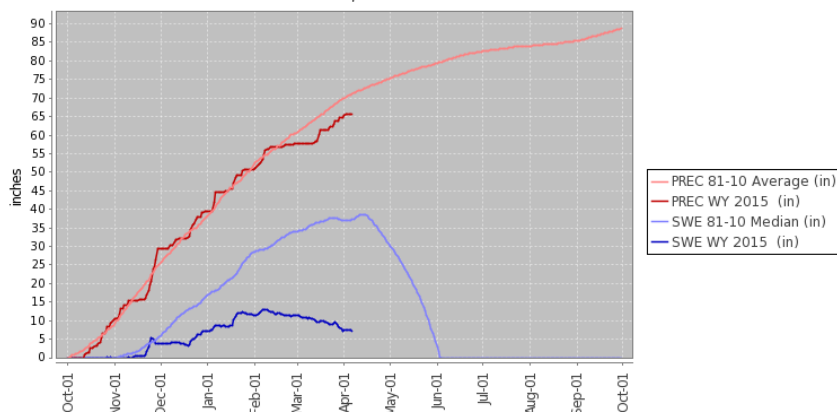


Figure 1: The 2014-15 accumulated SWE (dark blue) and accumulated precipitation (dark red) versus normal (1981-2010) for Stevens Pass.

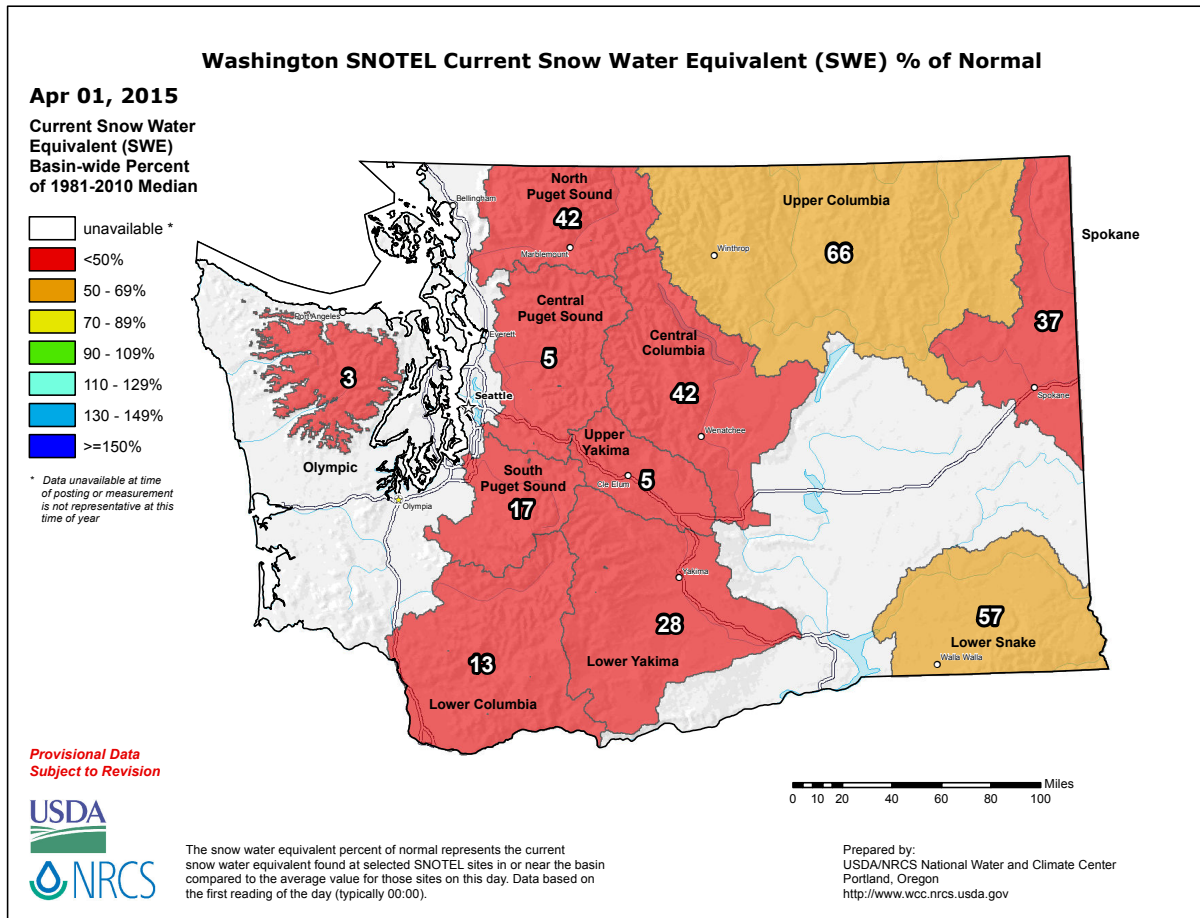


Figure 2: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of 1 April 2015 (from the National Resources Conservation Service).

The US Drought Monitor depiction (Figure 3) shows “D1” - moderate drought - through the areas where the SWE is the lowest. There have been some degradations to the Drought Monitor in north central WA to represent the low snowpack, and further degradations are expected as some of the repercussions of the low snowpack begin to manifest.

On the state level, Governor Inslee declared drought in 3 regions of the state on March 13 - the Olympic Peninsula, most of Chelan/Kittitas/Yakima counties on the eastern slopes of the central Cascades, and the Walla Walla region (see <http://www.ecy.wa.gov/drought/droughtmap.pdf>). Conditions are continuing to be monitored during this crucial spring period.

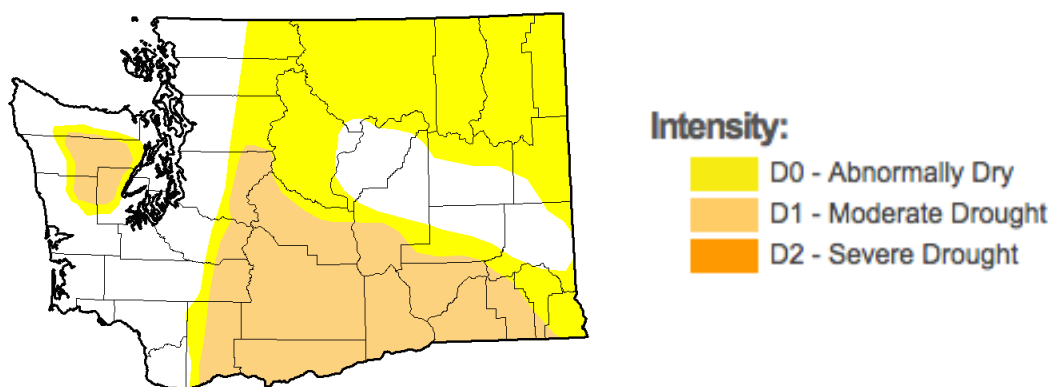


Figure 3: The 31 March 2015 edition of the US Drought Monitor (<http://droughtmonitor.unl.edu/>).

A Review of Winter 2014-15

A message from the State Climatologist

The annual winter summary that reviews the temperature and precipitation anomalies for WA and compares this past winter to others in the recent past will be posted on our website in the next week or so. It will be linked from our home page: www.climate.washington.edu, and will include consideration of the regional atmospheric circulation for this past winter.

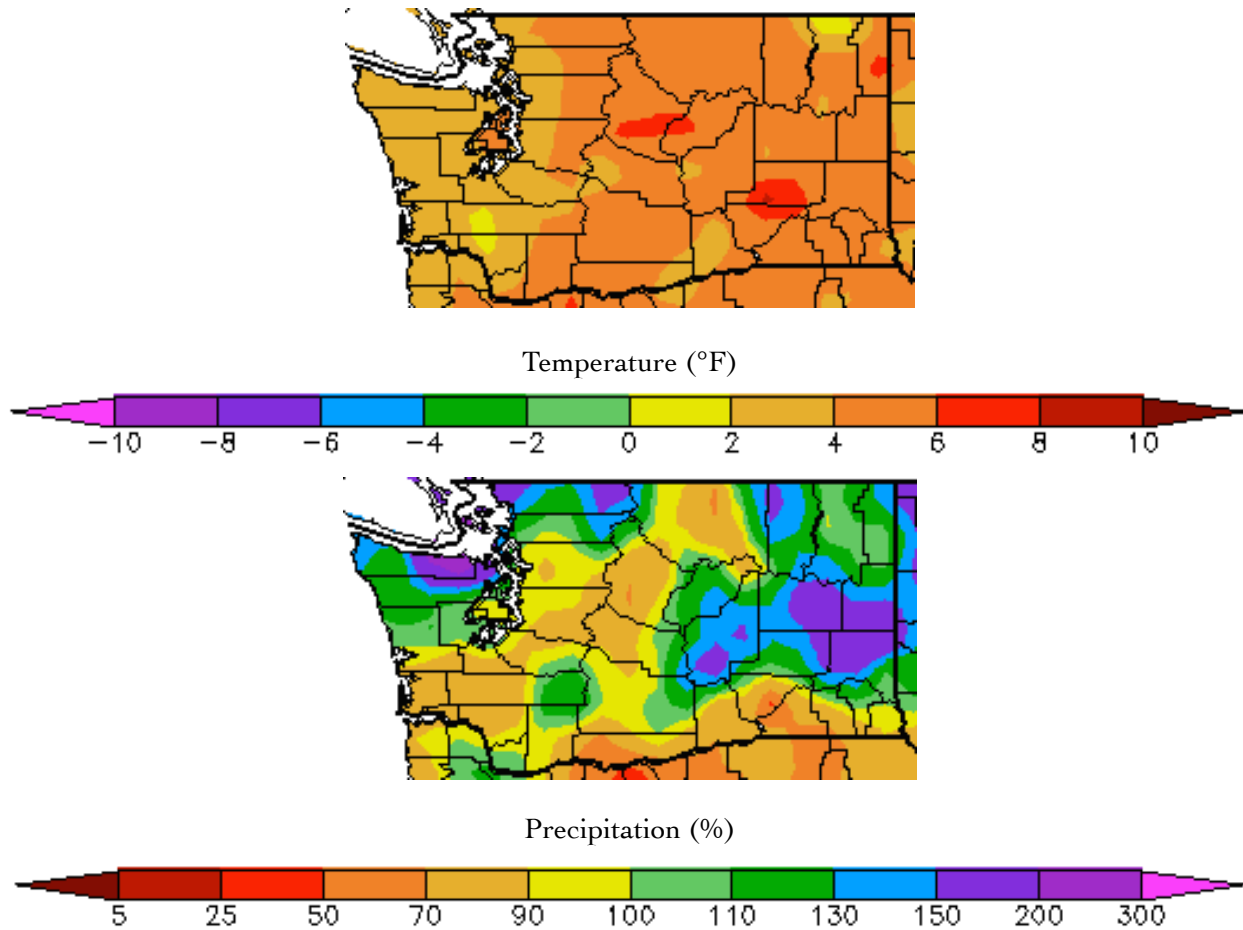
CoCoRaHS

Thank you, CoCoRaHS (Community, Collaborative, Rain, Hail, and Snow) observers, for continuing to measure precipitation! While WA did not place high on the annual CoCoRaHS March Madness competition (ranked 25th - right in the middle of the pack - for number of new observers), there is another opportunity to help recruit volunteers. A new cluster of NASA satellites, known as the Global Precipitation Measurement (GPM), has been launched, and a field campaign to help validate the satellite estimates of precipitation with real on-the-ground measurements is being kicked off in our own backyard - the Olympic Peninsula. You can read more about the effort here: <http://www.washington.edu/news/2015/04/02/uw-nasa-prepare-for-effort-to-measure-rain-snow-on-olympic-peninsula/>. CoCoRaHS measurements on the Olympic Peninsula will greatly help these efforts, so please continue to take your observations if you're located there, and pass the word along! Any questions about the program can be directed to wash.cocorahs@gmail.com.

Climate Summary

Similar to preceding months, mean March temperatures were warmer than normal throughout the entire state. Temperatures in the Cascade Mountains and east were generally between 4 and 6°F above normal, with a few places exceeding 6°F above normal (e.g., Wenatchee; Table 2). Western WA was also relatively warm, with many locations (Table 2) being about 3°F above normal.

Total March precipitation amounts relative to climatological means were variable across the state, though most locations were on the wetter side. Northeast WA, the Spokane area, parts of the lower Columbia Basin, the Olympic Peninsula, and the northern Puget Sound area all received above normal March precipitation, between about 110 to 200% of normal. Southwest WA, the central Cascades, Okanogan region, and southeastern WA received between 70 and 90% of normal precipitation. Pasco was a dry spot, only receiving 62% of normal.



March temperature (°F) departure from normal (top) and March precipitation % of normal (bottom).
 (High Plains Regional Climate Center (<http://www.hprcc.unl.edu>); 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	47.9	44.5	3.4	5.94	5.29	112	0	0.7	0
Seattle WFO	50.7	46.6	4.1	4.46	3.51	127	0	0	0
SeaTac AP	50.5	46.5	4.0	4.47	3.72	120	0	0.8	0
Quillayute	47.4	44.1	3.3	14.71	10.83	136	0	0.7	0
Hoquiam	49.9	46.0	3.9	6.74	6.99	96	0	0	0
Bellingham AP	48.5	44.2	4.3	4.77	3.22	148	0	0.7	0
Vancouver AP	50.8	48.0	2.8	4.78	3.57	134	0	M	-
Eastern Washington									
Spokane AP	45.5	40.2	5.3	2.43	1.61	151	0.9	3.5	26
Wenatchee	50.7	44.1	6.6	0.65	0.64	102	M	1.0	-
Omak	47.0	41.5	5.5	0.92	1.17	79	M	M	-
Pullman AP	45.5	40.6	4.9	2.50	2.05	122	M	M	-
Ephrata	48.4	43.0	5.4	1.01	0.68	149	M	0.8	-
Pasco AP	50.2	46.3	3.9	0.49	0.79	62	M	M	-
Hanford	51.6	46.5	5.1	0.65	0.57	114	0	0.4	0

Table 2: March 2015 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 NCDC's new normal release, as records for these station began in 1998 and 1986, respectively. M denotes missing data.

Climate Outlook

El Niño has arrived! After months of above normal equatorial sea-surface temperatures (SSTs), the tropical Pacific atmospheric pattern finally resembles that associated with El Niño, according to the Climate Prediction Center (CPC): <http://www.cpc.ncep.noaa.gov>. The CPC released an “El Niño Advisory” on 5 March to reflect the current El Niño conditions. The sea-surface temperatures (SSTs) averaged over the last 4 weeks are warmer than normal throughout the entire equatorial Pacific Ocean, and have warmed considerably in the eastern equatorial Pacific. Models are predicting between a 50 and 60% chance of Niño persisting through the remainder of the calendar year.

The Climate Prediction Center seasonal outlook for April is calling for equal chances of below, equal to, or above normal temperatures for a majority of WA State. The coast and Olympic Peninsula have increased chances of a continuation of the warmer than normal temperatures for April. The April precipitation outlook has equal chances of below normal, equal to, or above normal precipitation statewide.

The April-May-June (AMJ) CPC outlook shows higher chances of above normal temperatures statewide, with the highest odds of warmer than normal temperatures in the western half of the state. Precipitation is expected to be below normal for the western two-thirds of the state, while the eastern third has equal chances of below, equal to, or above normal precipitation.



April outlook for temperature (left) and precipitation (right) from the CPC.



April-May-June outlook for temperature (left) and precipitation (right) from the CPC.