



Office of the Washington State Climatologist

April 3, 2014

March Event Summary

Mean March temperatures were mixed across WA state, with above normal temperatures throughout the Olympic Peninsula, southern WA, and most of the Puget Sound region and near-normal to below normal temperatures for the remainder of the state. For precipitation, essentially the entire state - except for portions of the lower Columbia basin - experienced wetter than normal conditions. Western WA, the Cascade Mountains, and northeastern WA were especially wet, and many locations ranked among the top ten wettest Marches since records began.

Table 1 shows a sample of these stations. SeaTac Airport and the Seattle station at the Weather Forecasting Office (WFO) at Sandpoint both had the wettest March on record. Note that the Seattle WFO record is relatively short, beginning in 1986. On the other hand, the SeaTac record extends back to 1948, and its rainfall in March 2014 surpassed the previous March maximum (in 1950) by over an inch.

The month got off to an extremely wet start. Heavy snow and an avalanche closed Snoqualmie Pass on March 3 and SeaTac Airport received its normal amount of March precipitation within the first 6 days of March. March 5 was especially wet, setting daily maximum precipitation records at Quillayute (1.65"), Seattle WFO (1.43"), Vancouver (1.16"), Spokane Airport (0.78"), Omak Airport (0.49"), and Wenatchee (0.48"). Another especially soggy spell occurred in the middle of the month. Daily maximum precipitation records were common throughout the whole month. For example, Quillayute (2.70"), Olympia (1.77"), and SeaTac Airport (1.27") all recorded precipitation records on the 8th while Bellingham recorded one on the 19th (0.53").

A tragic landslide occurred on March 22 that devastated a small community east of Oso in Snohomish county. The frequent and heavy February and March precipitation likely contributed to the event occurring. OWSC tabulated some preliminary data and posted it on our website (<http://www.climate.washington.edu/events/2014landslide/>) that indicated that while the February and March recent precipitation was heavier than normal, the magnitude of the precipitation is not unprecedented in that area.

In this Issue

March Event Summary.....	1
CoCoRaHS.....	2
IPCC report.....	2
Snowpack Summary.....	3
Winter Review.....	4
Climate Summary.....	5
Climate Outlook.....	7

	March 2014 Precip	Rank	Record Precip/Year	Records Since
SeaTac AP	9.44	1	-	1948
Seattle WFO	8.42	1	-	1986
Colville	3.56	2	4.55/2012	1899
Arlington	8.70	2	9.23/2011	1922
Hoquiam AP	14.07	3	15.13/1997	1953
Bellingham AP	5.39	3	7.02/1950	1949
Olympia AP	9.17	4	11.79/1997	1948
Mazama	3.63*	5	5.24/2011	1950
Spokane AP	2.88	6	4.56/2012	1881
Pasco	0.76	7	1.43/2009	1945
Quillayute	15.81	8	23.23/2007	1966
Republic	2.06	8	5.10/2012	1899

Table 1: March 2014 precipitation for several weather stations around the state as well the ranking (wettest to driest), the year of the record wettest, and the year that records began at each station. *2 days are missing from the Mazama total precipitation.

CoCoRaHS March Madness

The annual competition among states to recruit new volunteers for the Community Collaborative Rain, Hail, and Snow network has come to a close. And the winners are... North Carolina and Wyoming! North Carolina won the “traditional count” contest with an impressive 155 new observers and Wyoming won the “per capita count”. Perhaps even more impressive is the 1,098 new volunteers nationwide - lets hope a good portion of those volunteers begin measurements soon. And to the 9 new volunteers in WA - welcome. The CoCoRaHS gauge at the OWSC office at the University of Washington received 8.29” of precipitation during March which is less than the totals at both SeaTac Airport and the Seattle Weather Forecasting Office at Sandpoint.

New Section of IPCC Report Released

The “Impacts, Adaptation, and Vulnerability” chapter of the Fifth Assessment Report (AR5) from the Intergovernmental Panel on Climate Change is now available: <http://www.ipcc.ch/report/ar5/wg2/>. This section of the report focuses on the observed impacts of climate change and opportunities for adaptation, and will be summarized in this newsletter at a later date.

Snowpack Summary

The wetter than usual March conditions were beneficial to the snowpack across the state. Figure 1 shows the snow water equivalent (SWE) percent of normal as of April 1 from the National Resources Conservation Service (NRCS). April 1 is typically the end of the accumulation period for snowpack in our mountains, and the snowpack on this date is indicative of summer water supply. According to the snow depth plot using observing sites that are maintained by the Northwest Weather and Avalanche Center (Figure 2), the snow depth at the lower elevation sites, such as the passes, has begun to level out or decrease.

As for SWE, the Upper Columbia, Central Puget Sound, South Puget Sound, Central Columbia, Upper Yakima, and Lower Yakima basins all have near-normal SWE that ranges between 99 and 107% of normal. Some basins even have above normal SWE - the average SWE for the North Puget Sound, Spokane, and Lower Snake basins ranges between 113 and 125% of normal. The Olympic and Lower Columbia basin are still lagging behind normal with 83 and 88% of normal SWE, respectively. Recent precipitation has led to improvements in the US Drought Monitor (Figure 3), with more improvements likely on the way. The remaining “severe drought” category is a response to longer-term precipitation deficits and low soil moisture contents in the lower Columbia Basin.

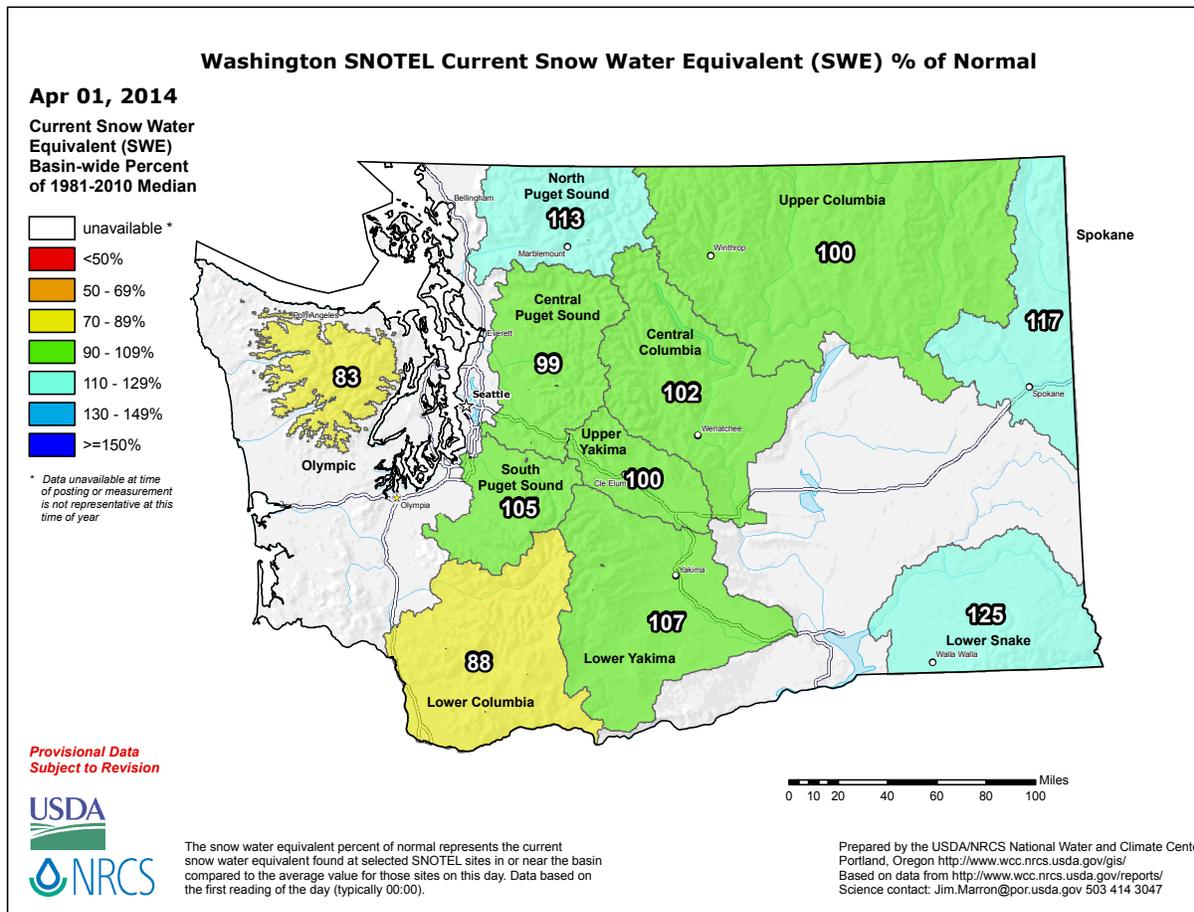


Figure 1: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of April 1, 2014. Image is from the National Resources Conservation Service (NRCS).

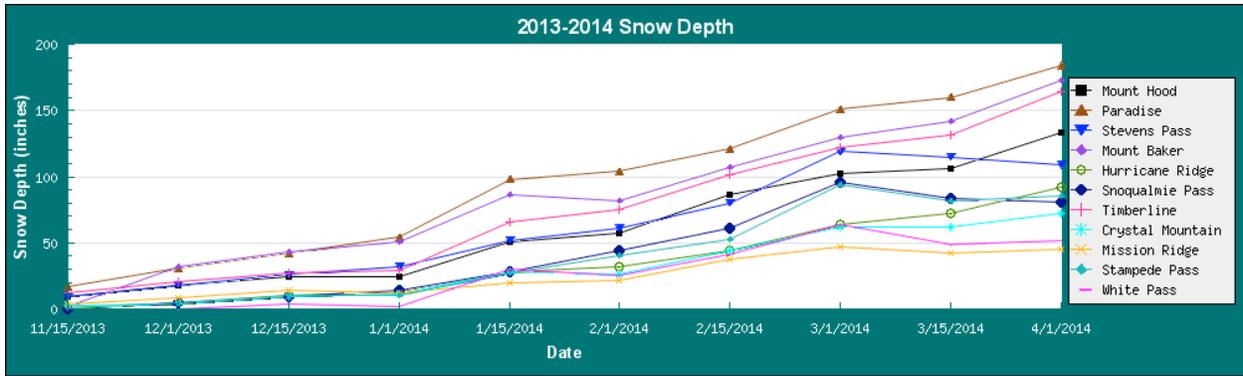


Figure 2: A line graph showing snow depth at the first and fifteenth of every month since Nov 15, 2013 through April 1, 2014 at the Northwest Weather and Avalanche Center sites in the WA and OR Cascade Mountains.

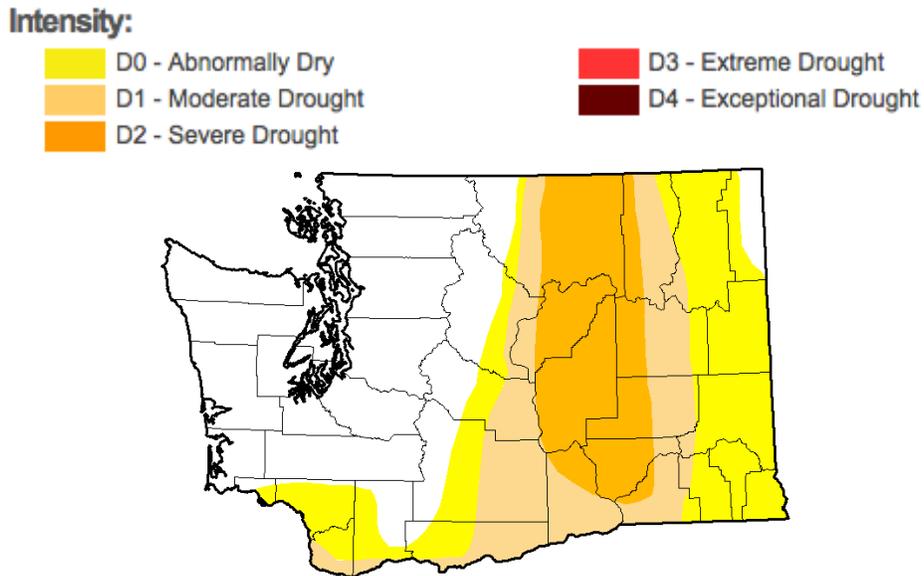


Figure 3: The March 25, 2014 edition of the US Drought Monitor (from the National Drought Mitigation Center).

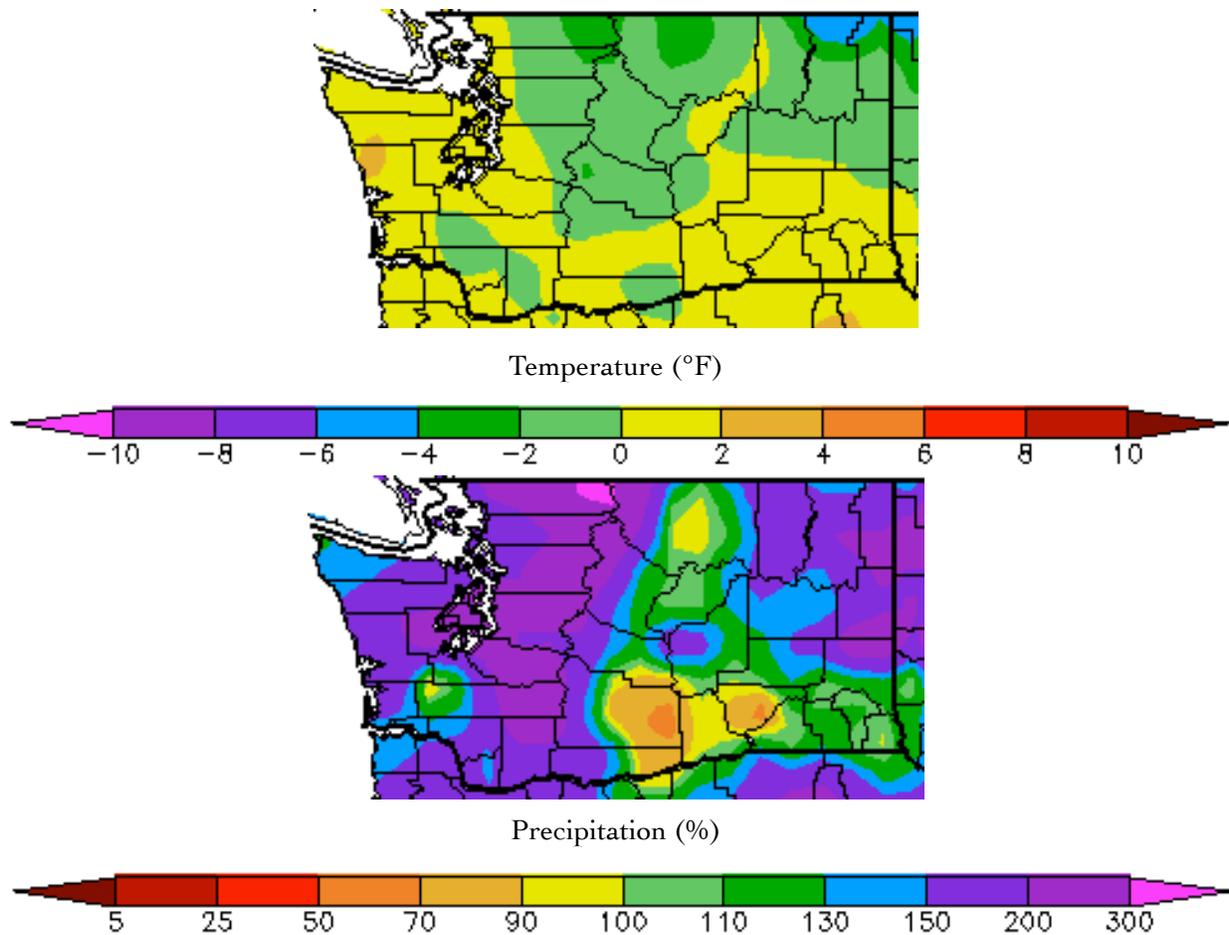
A Review of Winter 2013-2014

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 also examine the regional atmospheric circulation for this past winter.

Climate Summary

Mean March temperatures were mostly near-normal across WA state, as shown in the map from the High Plains Regional Climate Center below. The Olympic Peninsula, Puget Sound, and most of southern WA had above normal temperatures, and the mean monthly temperatures were within 2°F of normal for most locations (see Table 2). Central WA and much of northeastern part of the state had near-normal to below normal mean March temperatures that were largely within 1°F of normal.

Total March precipitation was much above normal for the Cascades, western WA, and north-eastern WA, exceeding 150% of normal and higher in these regions. Even central WA had near-normal to above normal precipitation (Table 2), with the exception of eastern Yakima and Franklin counties, where precipitation was between 70 and 90% 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	46.2	44.5	1.7	9.17	5.29	173	0	0.7	0
Seattle WFO	47.9	46.6	1.3	8.42	3.51	240	T	0	-
SeaTac AP	48.5	46.5	2.0	9.44	3.72	254	T	0.8	-
Quillayute	45.6	44.1	1.7	15.81	10.83	146	0	0.7	0
Hoquiam	47.5	46.0	1.5	14.07	6.99	201	0	0	0
Bellingham AP	45.6	44.2	1.4	5.39	3.22	167	M	0.7	-
Vancouver AP	48.0	48.0	0	6.52	3.57	183	M	M	-
Eastern Washington									
Spokane AP	39.6	40.2	-0.6	2.88	1.61	179	5.8	3.5	166
Wenatchee	43.9	44.1	-0.2	0.69	0.64	108	M	1.0	-
Omak	40.6	41.5	-0.9	1.16	1.17	99	M	M	-
Pullman AP	41.7	40.6	1.1	2.82	2.05	138	M	M	-
Ephrata	43.5	43.0	0.5	0.79	0.68	116	M	0.8	-
Pasco AP	46.8	46.3	0.5	0.76	0.79	96	0	M	-
Hanford	47.6	46.5	1.1	1.00	0.57	175	1.5	0.4	375

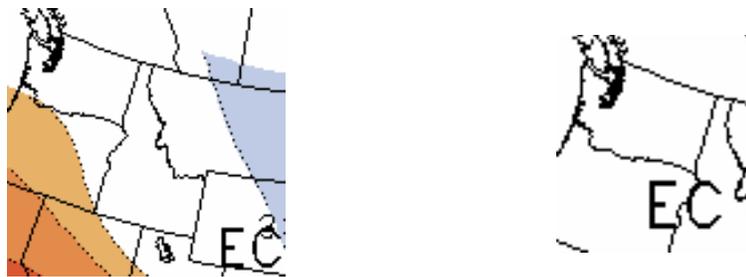
Table 2: March climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport and Seattle WFO 1981-2010 normals involved using surrounding stations in NCDC's new normal release, as records for these station began in 1998 and 1986, respectively.

Climate Outlook

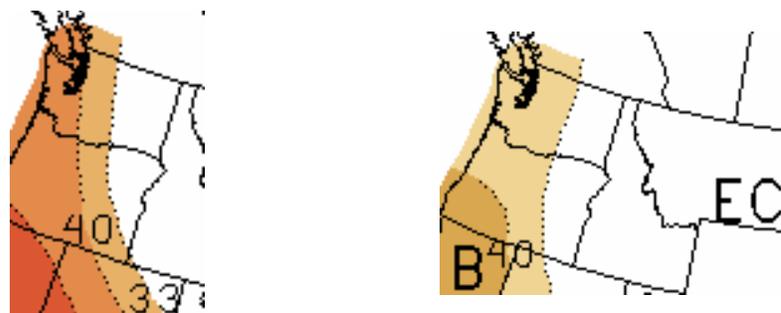
The conditions in the equatorial Pacific Ocean are ENSO-neutral, according to the Climate Prediction Center (CPC): <http://www.cpc.ncep.noaa.gov/>. Over the last 4 weeks, sea-surface temperatures (SSTs) have generally warmed in the equatorial Pacific Ocean. Averaged over the last month, SSTs are above normal in the western equatorial Pacific Ocean and near-normal in the central and eastern equatorial Pacific Ocean. There is a consensus among the model predictions that near-neutral ENSO conditions will persist through the spring 2014. Beyond that, the “El Niño Watch” released by the CPC on March 6 is still in effect, indicating an increased likelihood of El Niño development in the summer or fall.

The seasonal outlooks provided by the Climate Prediction Center do not give much indication of the sense of the climate anomalies for the month of April. The CPC three-class outlook for April has equal chances of below, equal to, or above normal temperatures and precipitation for the entire state.

The three-month spring (April-May-June; AMJ) temperature outlook has a higher chance of above normal temperatures for the western half of WA State, but the remainder of the state has equal chances of below, equal to, or above normal temperatures. The precipitation outlook for spring has higher chances of below normal precipitation for the western two-thirds of the state. For eastern WA, there are equal chances (“EC”) 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.