Office of the Washington State Climatologist

January 6, 2010

December Summary

After a wet and warm November, December was the opposite: dry and cold. A high pressure system dominated our region in the beginning of the month, bringing in cooler air temperatures and clear skies. A weak cold front moved through on the 4th, causing some freezing drizzle, fog, and flurries in parts of northeastern WA and overcast conditions for the remainder of the state. By December 5th, however, an arctic air mass moved into the region, and the clear skies returned. Daily low temperature records were broken around the state, and a few examples are shown in Table 1.

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Date	Station	Low Temp (F)	Previous Record; Year	Date	Station	Low Temp (F)	Previous Record; Year
12/5	Quillayute	23	24; 1984	12/9	Quillayute	17	20; 1972
12/7	Goldendale	9	10; 1922	12/9	SeaTac AP	18	21; 1972
12/8	Seattle WFO	19	27; 2007	12/9	Yakima	-3	1; 1972
12/8	Goldendale	-3	6; 1932	12/9	Goldendale	-3	-2; 1932
12/9	Hoquiam	15	19; 1972	12/10	Wenatchee	2	7; 1972
12/9	Olympia	6	10; 1972	12/10	Omak	-3	1; 1972

Table 1: A sampling of daily low temperature (°F) records broken during the December cold spell.

December 10th was the turning point for temperatures in western WA, as temperatures gradually returned to normal. On the east side of the Cascades, however, temperatures stayed below normal and the southern portion of the state received snow with a low pressure system that moved mainly through Oregon. By the 14th, temperatures were near-normal for the state

(and even above normal in some cases; SeaTac had a record high daily temperature of 57°F on 12/20), and a series of low pressure systems moved through that actually brought some rain to the west side, snow to the mountains, and rain and a wintry mix to the eastern lower elevations. The state dried out by Christmas Eve, however, and continued on that path until another system moved through the 30th. Snow fell in the mountains, and moved into eastern WA just in time for a white New Years Eve. Figure 1 shows the new snow measured by CoCoRaHS observers on the morning of January 1.

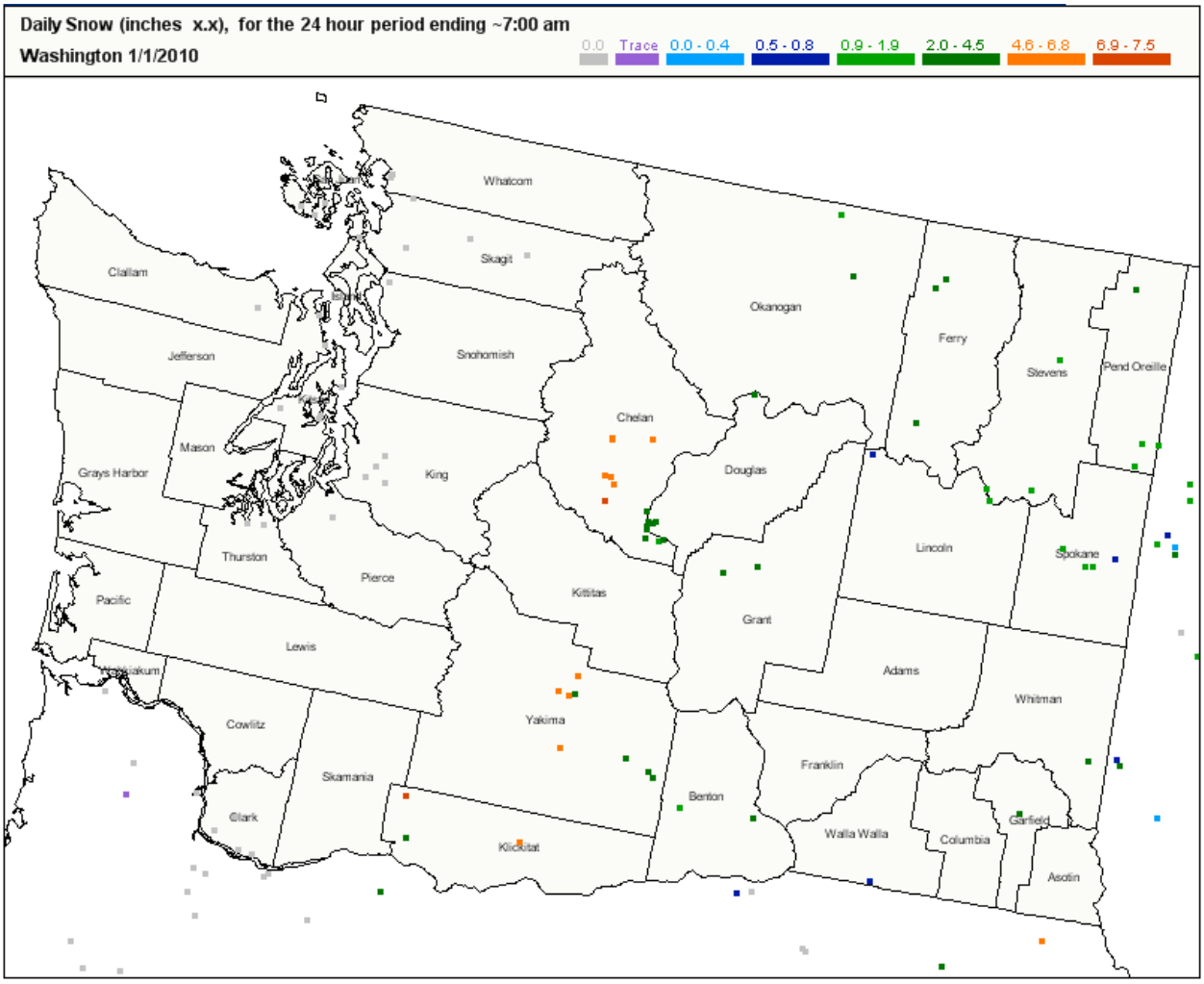
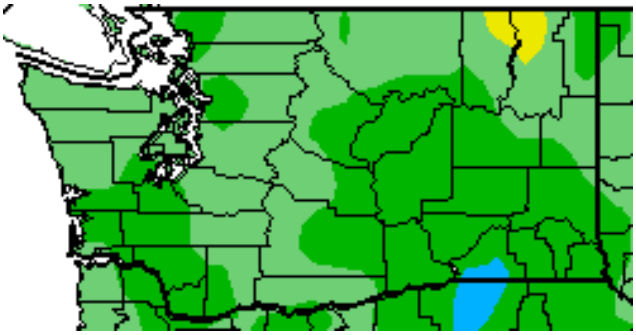


Figure 1: New snow measured by CoCoRaHS observers on January 1, 2010. Parts of Chelan county got 5-7" and Wenatchee recorded between 2 and 4". Snow totals in Yakima county ranged from 2 to 6.5", one observer measured 7.5" in Klickitat county, the northeastern counties measured about 2", and Spokane county measured between 0.5 and 2".

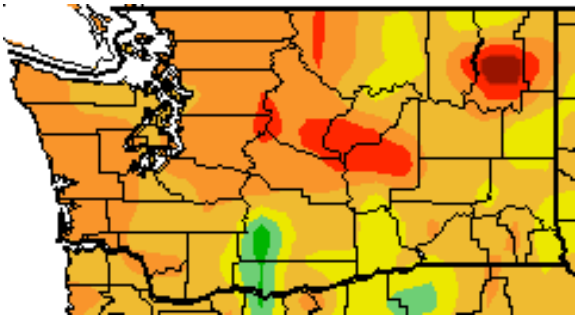
Climate Summary

December temperatures were below normal for a majority of the state as illustrated by the maps below from the High Plains Regional Climate Center. While most of the temperature departures from normal fall in the -3 to 0°F bracket, Table 2 shows that most stations are closer to 3°F below normal (i.e. Seattle, SeaTac, Quillayute, and Spokane). Some of the monthly average temperatures were between -6 and -3°F below normal for the month (Table 2; Olympia, Vancouver, Ephrata, and Yakima). Pasco, on the other hand, was a cold spot for the state, with the average monthly temperature of 26.3°F falling 8.3 degrees below normal (Table 2).

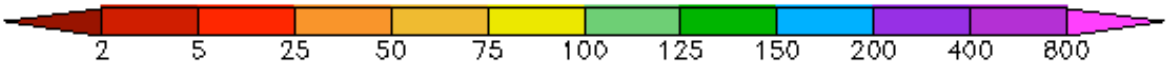
December precipitation was much below normal, with the majority of the state receiving only 25-75% of normal for the month. Some areas only received between 5 and 25% of normal, like Ephrata (Table 2) with 15% of normal. One of the wettest spots in the state was still dry: Spokane with 84% of normal precipitation for the month. When we look at just snowfall, Spokane only received 50% of normal snowfall which is a stark contrast to December 2008 (recall that Spokane received 61.5" of snow last December, 449% of normal). Yakima, on the other hand, received 3.2 inches more snow than the December normal this year.



Temperature (°F)



Precipitation (%)



December temperature (°F) departure from normal (previous page) and December precipitation % of normal (this page). Source: HPRCC (http://www.hprcc.unl.edu).

	Mean Temperature (°F)			Precipitation (inches)			Snow (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Normal	Total	Norm	% of Normal
Western Washington									
Olympia	33.7	38.0	-4.3	4.58	7.89	58	M	M	M
Seattle	38.1	40.7	-2.6	2.29	5.45	42	M	M	M
Sea-Tac	37.9	40.7	-2.8	2.75	5.62	49	0	2.5	0
Quillayute	38.6	40.6	-2.0	6.91	14.50	48	M	M	M
Vancouver	36.2	39.4	-3.2	4.88	6.38	76	M	M	M
Eastern Washington									
Spokane	24.4	27.2	-2.8	1.88	2.25	84	6.7	13.7	49
Omak	23.0	25.0	-2.0	1.33	1.82	73	M	7.9	M
Ephrata	24.7	28.5	-3.8	0.18	1.19	15	M	7.7	M
Pasco	26.3	34.6	-8.3	0.77	1.16	66	M	M	M
Yakima	23.8	28.8	-5.0	0.97	1.38	70	12.7	9.5	134

Table 2 - December Climate Summaries from around Washington from NWS (climate normal baseline is 1971-2000). M denotes missing data.

Snowpack

While the majority of the state had started on a good foot with snowpack in November, the dry December has put the snow water equivalent for most of the state below normal for this time of year. Most of the basins have snow water equivalent between 70 and 89% of normal (see Figure 2). The Spokane Basin in the northeastern portion of the state only has 69% of normal. The Lower Yakima Basin has average snowpack, however, with 94% of normal. The Olympic Peninsula is also still above normal, with 127% of normal.

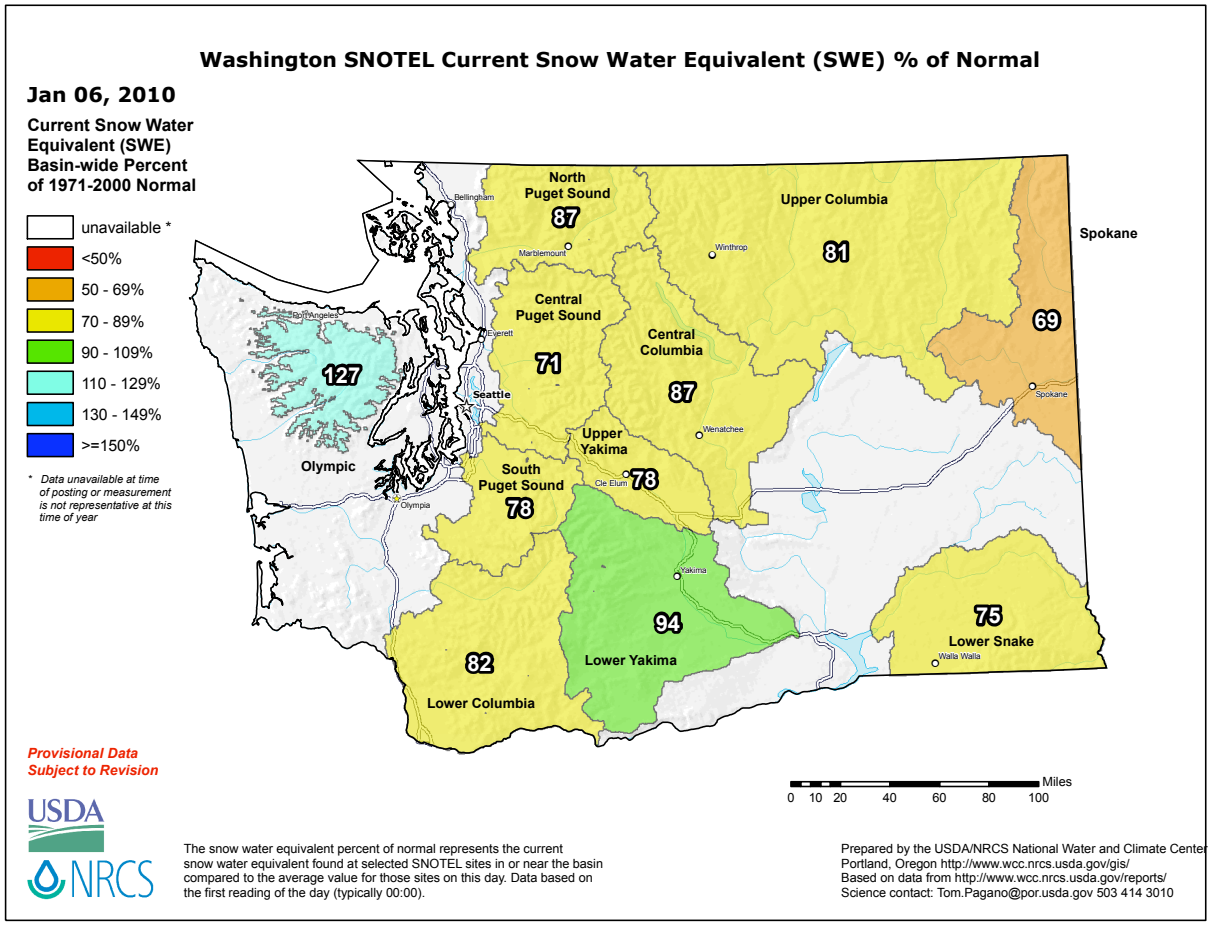


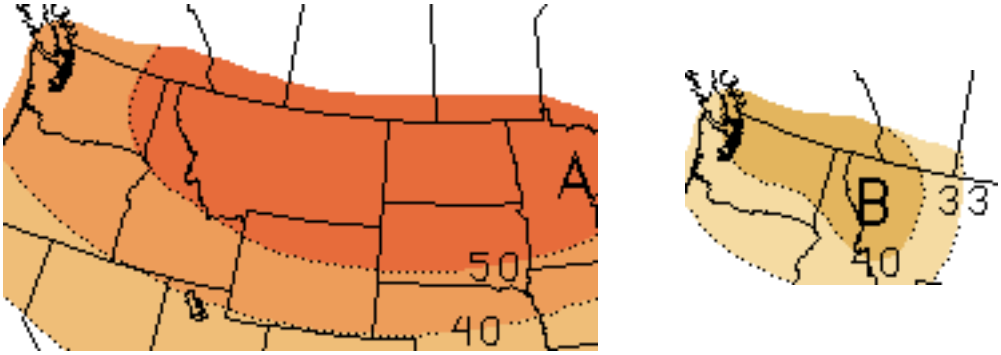
Figure 2: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of January 6, 2010. Image is from the National Resources Conservation Service.

Climate Outlook

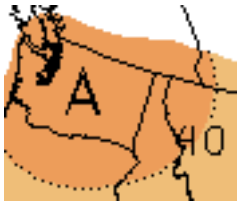
The El Niño conditions have strengthen in the tropical Pacific Ocean as the most recent 4-week equatorial sea-surface temperature (SST) anomalies were more than 2°C. The Climate Prediction Center (http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml) forecasts that the El Niño will last through spring. This situation provides some skill in predicting the winter season in the Pacific Northwest and much of North America. On average, winters during El Niño years are warmer and drier than typical conditions for WA state. This is not always the case, however, as some El Niño winters have been near normal, or cooler and wetter than average. This December was cool and dry, and while only one month of the winter season, only the dry characteristic of the month fits with the typical conditions. Consequently, the seasonal prediction should be interpreted as a tilting of the odds towards a warm, dry winter.

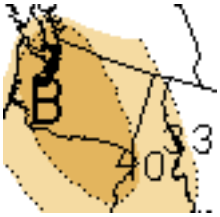
The January-February-March (JFM) outlook has the chances of above normal temperatures exceeding 50% in a small portion of northeastern and eastern WA and exceeding 40% for the remainder of the state. There is at least a 40% chance of below normal precipitation for the northern portion of the state and at least a 33% chance of below normal precipitation for the southern portion, including the Olympic Peninsula.

The outlook for February-March-April (FMA) calls for at least a 40% chance of above normal temperatures for the entire state. The precipitation outlook calls for at least a 40% chance of below normal precipitation for a majority of the state, and a 33% chance of below normal precipitation for the northeastern corner.



(January-February-March outlook for temperature (left) and precipitation (right) from the CPC).





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

CoCoRaHS

Thank you, CoCoRaHS volunteers, for your observations, and especially for those tricky snow and snow water equivalent measurements! Feel free to contact us, your local coordinator (http://www.cocorahs.org/Content.aspx?page=coord_WA), or consult the CoCoRaHS webpage (www.cocorahs.org) if you have any questions regarding measurement techniques. If you would like to sign up to volunteer then please visit www.cocorahs.org. We still do not have any volunteers in Asotin, Columbia, Franklin, or Wahkiakum counties, and volunteers from those under-represented areas will qualify for a free rain gauge. To see if you qualify, email wash.cocorahs@gmail.com after you sign up.