Office of the Washington State Climatologist

March 8, 2011

February Event Summary

The first few days of February were cold and dry. Moisture moved in on the 4th, bringing scattered precipitation across the state. Some of that precipitation fell as sleet, snow, and freezing rain east of the Cascades before changing to rain due to the cold air that was in place. The precipitation continued for several days as a cold front passed on the 7th bringing strong wind gusts to parts of south central and southeastern WA. The state dried out on the 8th for several days, but a shift to a more active weather pattern occurred on the 12th bringing precipitation, new mountain snow, and even some thunderstorms. Heavy rain fell on the 14th on the west side of the mountains (Seattle Weather Forecasting Office (WFO) set a daily precipitation record of 0.83") and on the east side of the mountains on the 15th (Pullman set a daily precipitation record of 0.65").

In this Issue

The most interesting weather of February occurred when colder air moved in around the 18th. The colder air in combination with moisture produced snow throughout the state, and even in the western WA lowlands. The snow mainly fell between the 22nd and the 24th. Figure 1 shows the CoCoRaHS 24-hr new snow observations ending at 7 am on the 24th. Note the heavy snow in Spokane and in Skagit County (approximately a foot). A record high daily snow amount was set for Spokane on the 23rd with 6.8". The cold, arctic air settled in during and after the event (see Figure 2 as one example) setting numerous low maximum and minimum temperature records. For example, on the 23rd, SeaTac had a record low minimum temperature of 27°F. On the 24th, record low minimum temperature records were set at SeaTac (24°F), Pullman (4°F), Ephrata (6°F), and Spokane (3°F). Record low **maximum** temperatures were also set on that day at Spokane (18°F), Ephrata (25°F), and Wenatchee (24°F). More examples include record low minimum temperatures set at Bellingham (16°F), Olympia (5°F), and SeaTac (20°F) on the 25th. Similar records were broken on the 26th. These cold temperatures helped to rank February as one of the top ten coldest for some western WA locations. For example, February 2011 ranks as the 2nd coldest for Quillayute (37.9°F), the 4th coldest for Olympia (37.1°F), the 5th coldest for Hoquiam (40.6°F), and the 7th coldest for SeaTac (39.2°F). The end of the month also saw some heavy snow in the WA mountains.

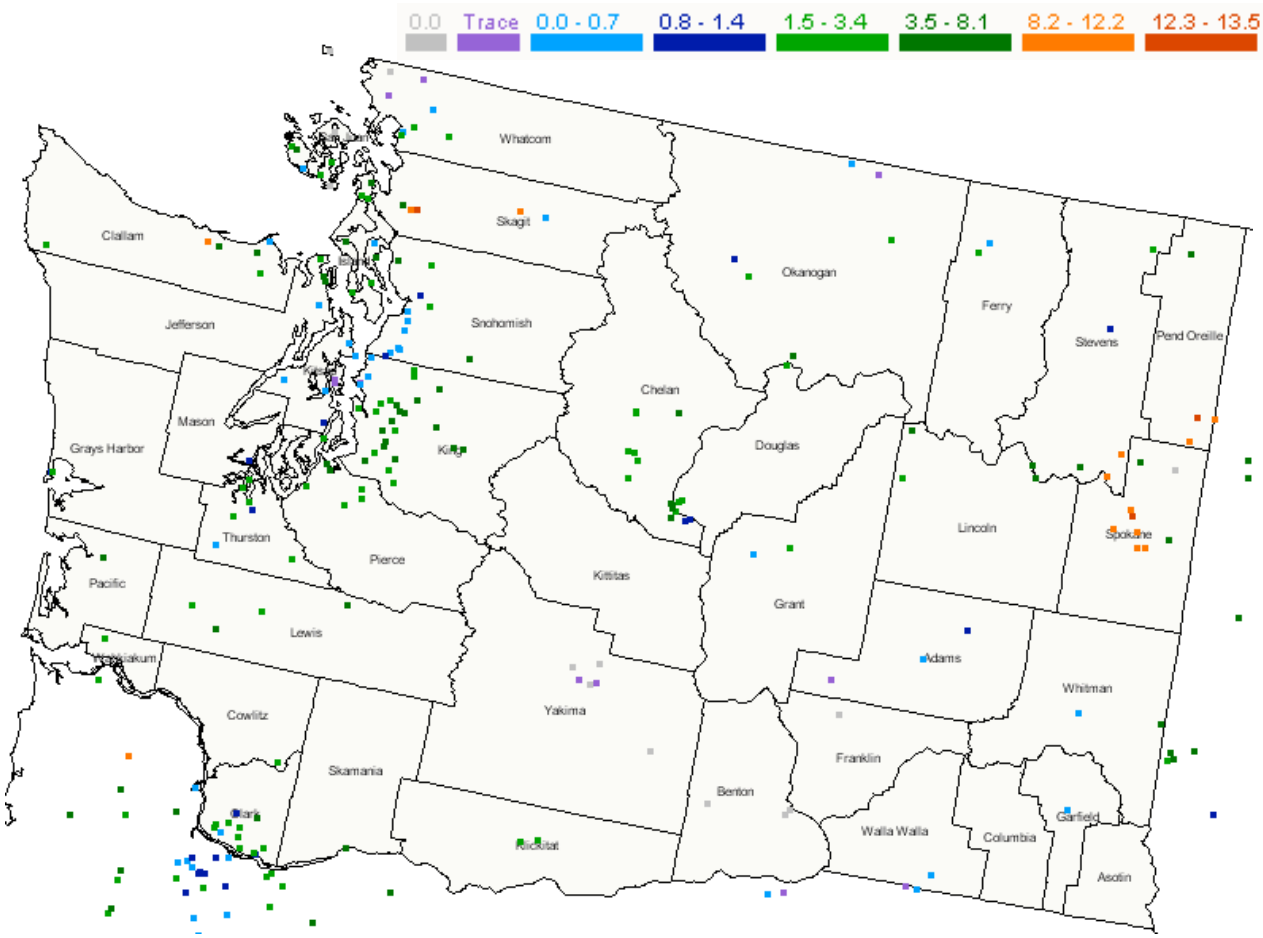


Figure 1: The 24-hour new snowfall ending at 7 am on February 24, 2011 from CoCoRaHS.

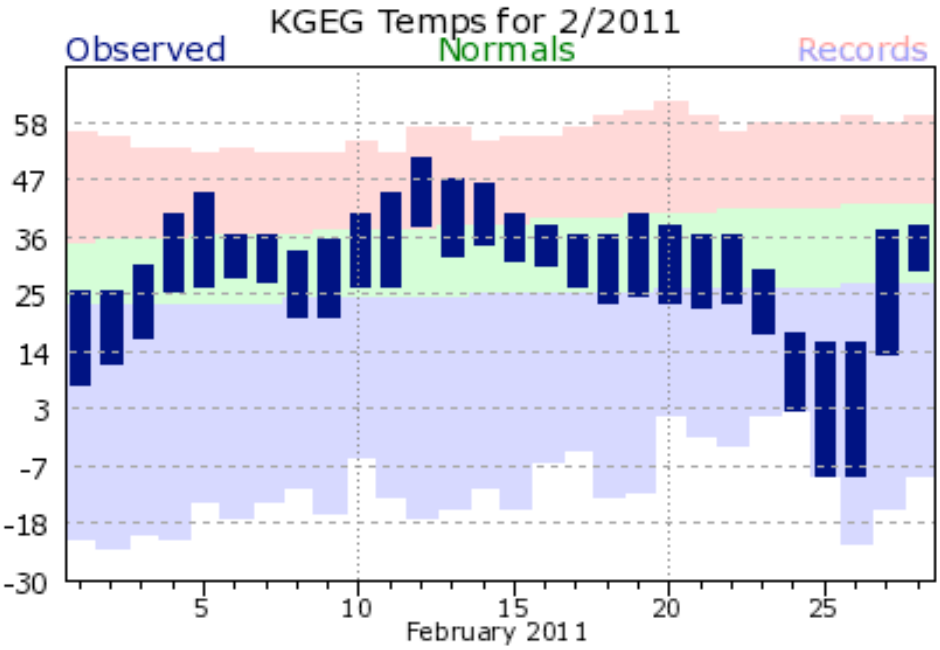


Figure 2: Daily high and low temperatures along with the daily normals and records for Spokane (from the National Weather Service).

CoCoRaHS March Madness

Once again, it's time for the friendly nationwide CoCoRaHS volunteer recruiting competition known as ("the other") March Madness. Each March, all 50 states compete against one another to recruit the most new volunteers. This year, there will be two winners: one with the most overall new observers, and one with the greatest number of new observers per one million residents. If you have friends or family that may be interested in becoming a volunteer, now is the time to pass along the information that can be found here: www.cocorahs.org.

Assessing One's Carbon Footprint

The issue of global warming may seem remote to many residents of the Pacific Northwest, especially as winter weather has returned with a vengeance at the time of this writing (late February). Nevertheless, global warming and climate change are real, and will have serious repercussions for the environment and human society. It is easy to become discouraged, and feel helpless to do anything about this problem, but there are actions that individuals can take. Collectively, even seemingly small changes can make a difference. In particular, we can all be more mindful of our own "carbon footprints", and the impacts of our personal choices.

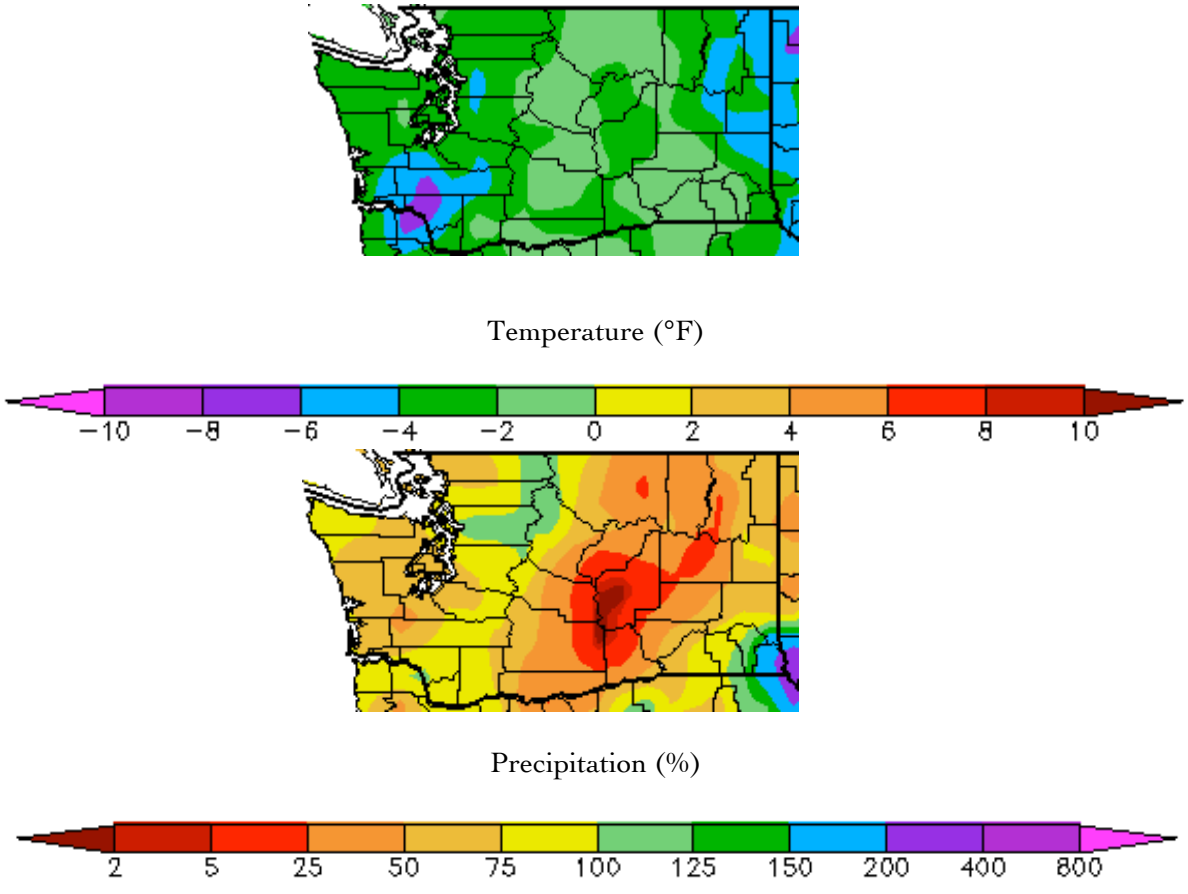
There are a variety of "carbon calculators" available on the web, and it is informative to use them to estimate one's own effective emissions of CO_2. An example is maintained by the University of California, Berkeley at http://coolclimate.berkeley.edu/uscalc (please use with Internet Explorer or Safari). Upon entering a few basic parameters, e.g., vehicle miles driven per year and MPG, the application provides an estimation of one's household carbon footprint, and how it compares with other households in the United States and the world. It is particularly interesting to explore trade-offs using the "Take Action" part of the application. For example, would there be a greater reduction in one's carbon footprint associated with switching from a 20 to 30 MPG driven 10,000 miles or forgoing a cross-country trip (4,600 miles round-trip) by air? The answer here is not obvious, but switching to the higher mileage car results in a slightly larger reduction. What about turning down the thermostat in winter versus drying one's laundry on a line? The answer depends on a variety of factors, and some choices are more practical than others. Admittedly, most folks are not going to want to start drying their laundry outside during the rainy season. Nevertheless, readers are encouraged to explore options using the website, which takes into account regional effects such as hydropower.

We want to emphasize that this short piece is not meant as a morality play. We merely wish to point out that there are convenient and interesting ways to estimate carbon footprints, and that some of these results may be surprising. It is becoming evident that we should do what we can to reduce our CO_2 emissions, and for that matter, preserve non-renewable resources such as fossil fuels, and there are now the means to make informed choices on a personal level.

Climate Summary

In contrast to the January conditions, mean temperatures in February were colder than normal. The map below from the High Plains Regional Climate Center (HPRCC) shows the temperature departures between 2 and 6°F below normal for most of the state. The largest departures from normal listed in Table 1 are for Pullman (4.6°F below normal) and SeaTac Airport (4.1°F below normal). The eastern slopes of the Cascades and parts of central WA had temperatures that did not deviate from normal as much, but were still below the 1971-2000 normal (e.g., Yakima was only 0.5°F below normal).

The total precipitation for February, expressed as a percentage of normal, was sub-par for the entire state except for a few locations in the northern Puget Sound and in the Blue Mountains of southeast WA that were at normal precipitation. Central WA was especially dry, only receiving between 5 and 25% of normal precipitation for the month. Ephrata, Wenatchee, and Omak, for example, only received 9, 15, and 28% of normal February precipitation (Table 1). The United State Drought Monitor introduced a D0 designation (abnormally dry) to this area on the March 1 edition due to this deficit as well as a precipitation deficit on longer time scales in this area (Figure 3).



February temperature (°F) departure from normal (top) and February precipitation % of normal (bottom). Source: High Plains Regional Climate Center (http://www.hprcc.unl.edu).

Figure 3: The March 1 edition of the United States Drought Monitor showing a D0 designation (abnormally dry) for parts of WA.

	Mean Temperature (°F)			Precipitation (inches)			Snowfall (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Norm	Total	Norm	% of Norm
Western Washington									
Olympia	37.1	40.5	-3.4	4.46	6.17	72	M	M	M
Seattle	40.1	43.0	-2.9	3.33	3.67	91	0.1	M	M
Sea-Tac	39.2	43.3	-4.1	3.05	4.18	73	2.0	1.3	154
Quillayute	37.9	42.2	-4.3	10.47	12.35	85	M	3.0	M
Vancouver	40.2	43.3	-3.1	4.45	3.51	127	M	M	M
Eastern Washington									
Spokane	28.9	32.5	-3.6	1.14	1.51	75	14.3	8.0	179
Wenatchee	32.5	34.2	-1.7	0.13	0.86	15	M	4.7	M
Omak	28.9	30.4	-1.5	0.35	1.24	28	M	2.8	M
Pullman	29.4	34.0	-4.6	1.94	2.10	92	M	M	M
Ephrata	31.8	34.6	-2.8	0.07	0.78	9	M	M	M
Yakima	34.6	35.1	-0.5	0.29	0.80	36	T	3.3	0

Table 1 - February climate summaries for locations around Washington. The climate normal baseline is 1971-2000 except for Seattle WFO (1986-2000) and Vancouver (1998-2010). Please be aware that the Seattle WFO and Vancouver climate normal periods are shorter than the 30-year period that is typically used for climatology. M denotes a missing value.

Snowpack

Despite the general lack of precipitation state-wide, the snow water equivalent (SWE) percent of normal has shown improvement thanks to a few storm systems that dumped heavy snow in the mountains. Figure 4 shows the snow water equivalent (SWE) percent of normal for 11 basins from the National Resources Conservation Service. The Central and South Puget Sound, Central and Upper Columbia, and the Upper Yakima are still lagging behind with only 69-83% of normal SWE for this time of year, while the other basins are at or above normal.

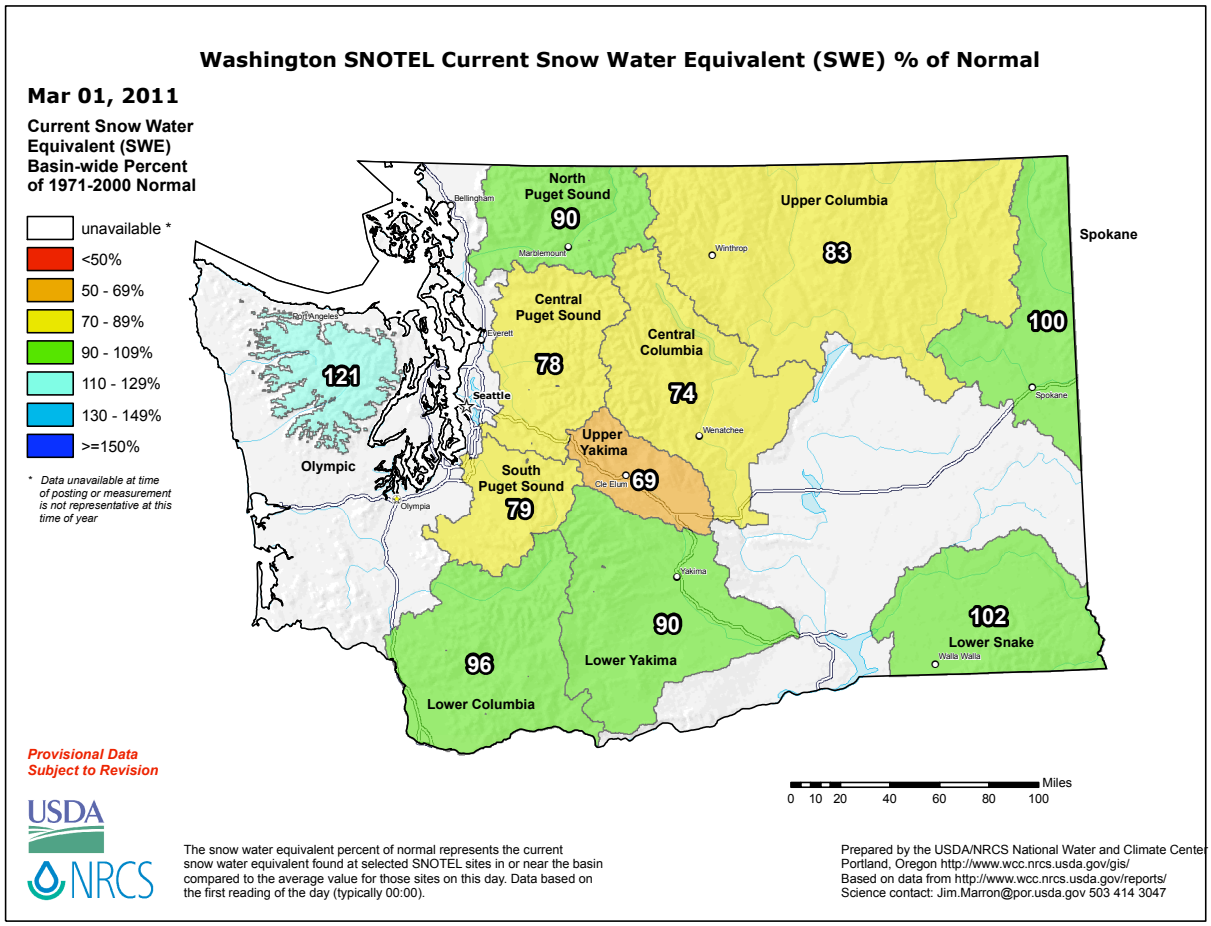


Figure 4: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of March 1, 2011. Image is from the National Resources Conservation Service.

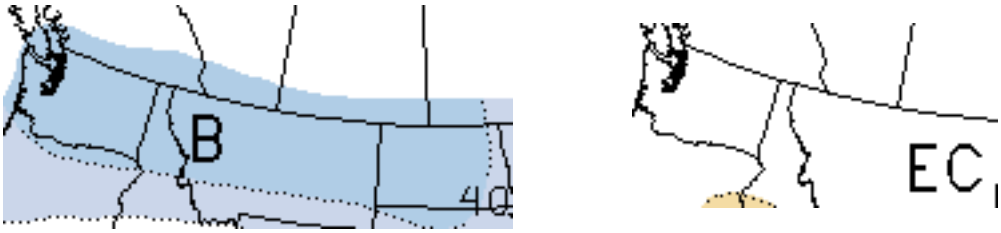
Climate Outlook

La Niña conditions are still present across the equatorial Pacific though the negative sea surface temperature (SST) anomalies are weakening, according to the Climate Prediction Center (http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml). The La Niña is expected to continue to weaken and a majority of models indicate near-neutral ENSO conditions by early summer. Still, the La Niña is reflected in the CPC seasonal outlooks for the upcoming spring featured below.

The March-April-May (MAM) outlook calls for chances of colder than normal temperatures for the entire state exceeding 40% using the three-class system. There are equal odds of below, equal to, or above normal precipitation for MAM.

The April-May-June (AMJ) CPC three-class outlook shows the same probabilities as the spring (MAM) outlook. The temperature outlook shows colder than normal conditions during AMJ while the outlook for precipitation continues the lack of an indication one way or another.

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



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