Office of the Washington State Climatologist

February 3, 2011

January Event Summary

In this Issue

The new year started out clear, cold, and dry throughout the state as the high pressure aloft that built at the end of December continued to influence our weather. That pattern didn't last long, however, as a system started to move in on the 4th, bringing precipitation throughout the state in the days that followed. Warm, moist air brought heavy rain to parts of the state before the cold frontal passage on the 7th (western WA)/ 8th (eastern WA). Quillayute recorded a new maximum daily rainfall amount on the 5th of 3.05". Temperatures were below normal after the passage of the front, causing some of the precipitation to fall as snow through the next week. Even the western WA lowlands received snow between the 10th and the 12th. The precipitation quickly changed to rain as temperatures rose, however, causing some minor flooding in several western WA counties, as well as avalanche warnings for the mountains. A wet and warm pattern persisted throughout the state for several days and caused more flooding - mainly in western WA but at some eastern WA locations as well. Landslides also continued to be a concern due to some locations, like the Olympic Peninsula, having extremely wet soils. Many daily high temperature records were broken during the wet period. Here are some examples: Jan 14 record daily high temperatures at Wenatchee (57°F) and Yakima (62°F); Jan 16 at SeaTac AP (55°F), Seattle WFO (56°F), Olympia (56°F), Spokane AP (51°F), Pullman (55°F), and Yakima (60°F). The last week of January essentially dried out, however, but temperatures remained mild. Olympia, for example, recorded another daily record high temperature of 58°F on the 26th.

2010 in Review

The average temperature over WA State for the 2010 calendar year was warmer than normal, according to the National Climatic Data Center's (NCDC) Climate-at-a-Glance utility. 2010 came in at 49.0°F, 0.73°F warmer than the 1971-2000 normal and 1.03°F warmer than the 20th century (1901-2000) normal. Averaged statewide precipitation was also above normal with a value of 41.22 inches. The 2010 value is 2.44 inches above the 1971-2000 normal and 4.38 inches above the 20th century normal. Figure 1 below shows maps generated by the NCDC utility with the historical record of average statewide temperature and precipitation compared to the more-recent normal (1971-2000).

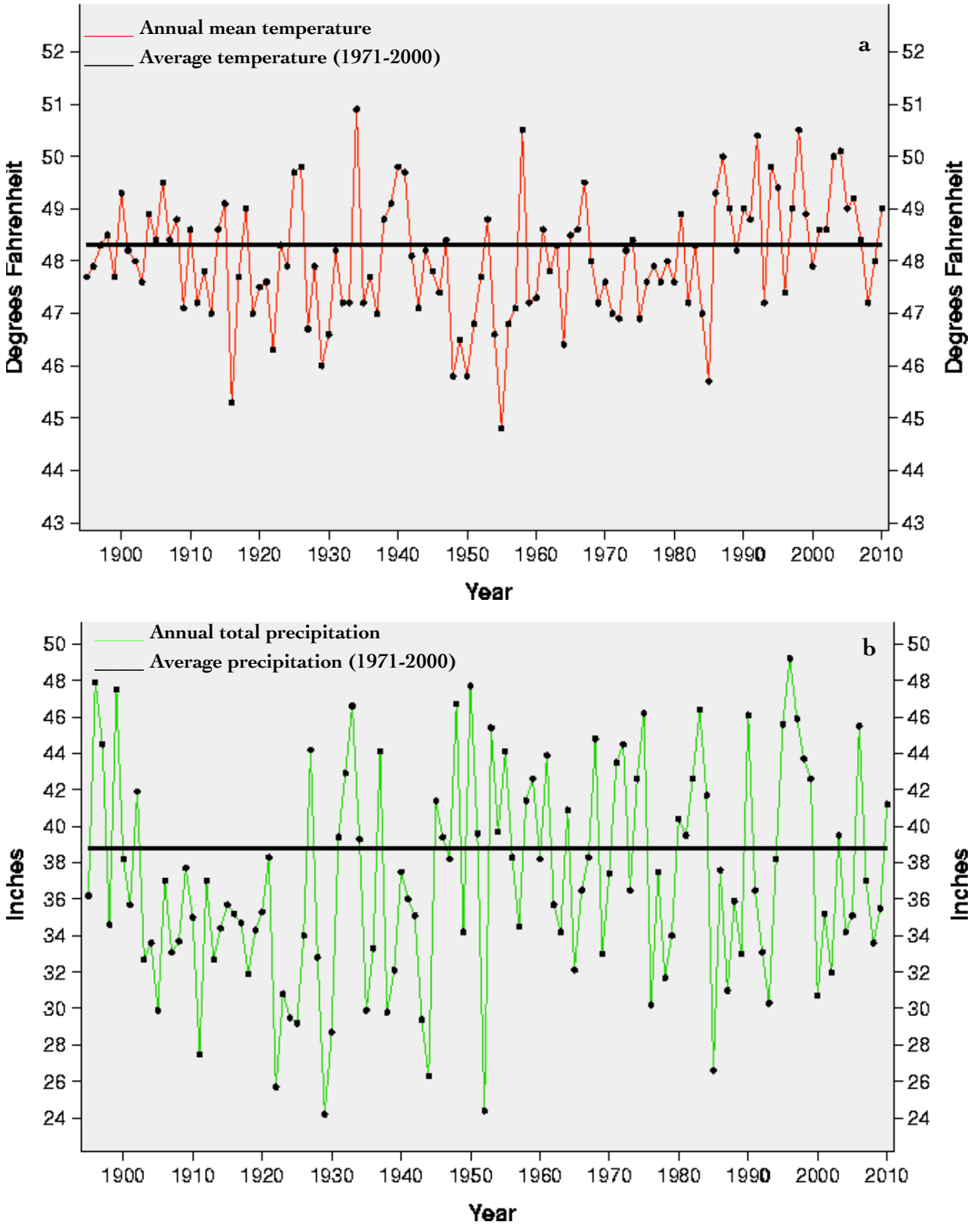


Figure 1: The annual (a) mean temperature and (b) total precipitation averaged for the entire state of WA for 1895 through 2010 compared to the 1971-2000 mean.

Snowpack

The current snowpack situation is not the most desirable, but with still plenty of opportunities for additional snow in the mountains this season, it is not a concern quite yet. Figure 2 shows the snow water equivalent (SWE) percent of normal for 11 basins from the National Resources Conservation Service. The Olympic Mountains and the basins in eastern WA are in good shape, all having close to or above normal SWE. The Cascade Mountains, however, have below normal SWE. The central Cascades are especially low, with only about 60-69% of normal.

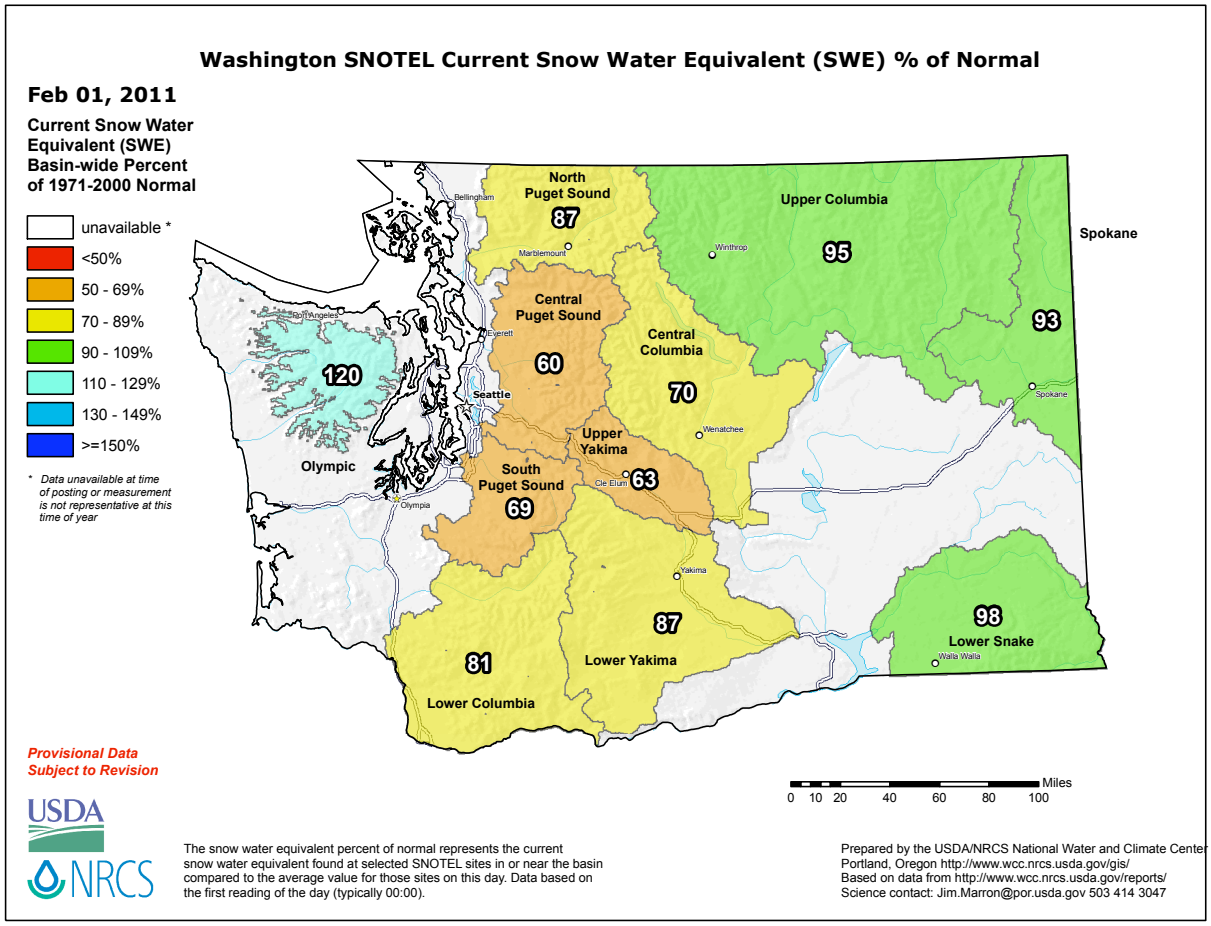


Figure 2: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of February 1, 2011. Image is from the National Resources Conservation Service.

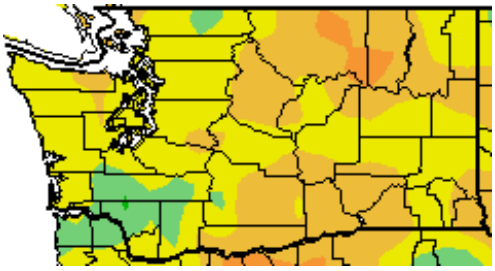
WeatherFest a Success

WeatherFest (http://www.ametsoc.org/meet/annual/weatherfest.html), held on Sunday, Jan 23, was a success! Over 4,000 people attended, and OWSC Staff were very pleased to meet many of you. We forgot our camera, but were sent a few pictures that are now posted on our Facebook page. We held a meeting for our CoCoRaHS volunteers on the same day that was also a huge success. Thanks to everyone that attended - it was wonderful to meet you.

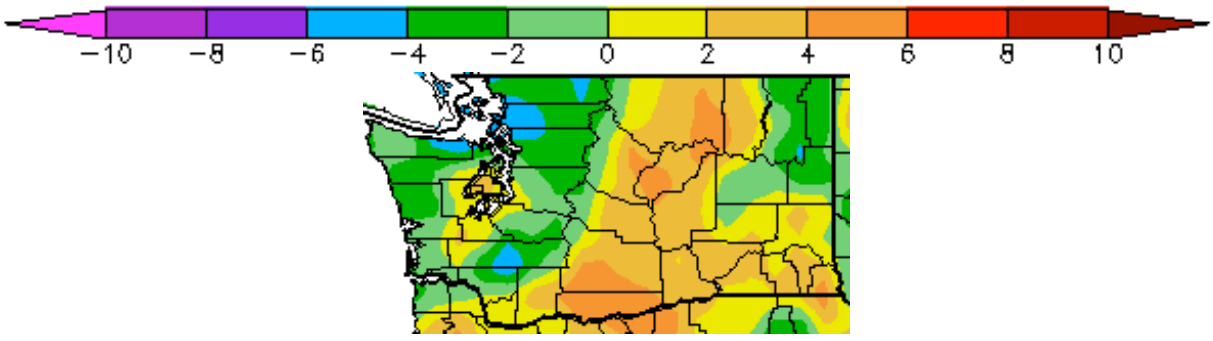
Climate Summary

For most of the state, average January temperatures were warmer than normal. The High Plains Regional Climate Center (HPRCC) map below shows temperatures between 2 and 4 degrees above normal in parts of central and eastern WA (e.g., Yakima and Omak both 3.7°F above normal - Table 1). The rest of the state had temperatures that were within 2°F of normal, with some locations close to normal (SeaTac, Quillayute, Vancouver, Ephrata - Table 1) and others on the higher end of the range (Olympia, Wenatchee, Spokane - Table 1). Only the southwest region of the state had slightly below normal average January temperatures.

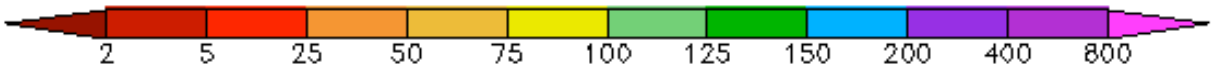
The precipitation during January, expressed as a percentage of normal, varied across the state. Most of western WA and northeastern WA received above normal precipitation for the month. Quillayute and Spokane are the wet spots in Table 1, showing 129 and 134% of normal precipitation, respectively. The southern Puget Sound region, however, received below normal precipitation. Central and eastern WA were even drier, receiving only about 50% of normal precipitation (Table 1). Regarding the few stations with reliable snowfall measurements, the two eastern WA stations were below normal (Spokane and Yakima - Table 1) due to the warmer than normal temperatures while SeaTac was above normal, as a result of one storm.



Temperature (°F)



Precipitation (%)



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

	Mean Temperature (°F)			Precipitation (inches)			Snowfall (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	% of Norm	Total	Norm	% of Norm
Western Washington									
Olympia	40.2	38.1	2.1	7.27	7.54	96	M	M	M
Seattle	42.6	40.8	1.8	4.85	4.49	108	2.4	M	M
Sea-Tac	41.8	40.9	0.9	4.99	5.13	97	2.8	2.4	117
Quillayute	41.4	40.7	0.7	17.58	13.65	129	0	M	M
Vancouver	41.5	41.2	0.3	4.68	5.54	84	M	M	M
Eastern Washington									
Spokane	29.2	27.3	1.9	2.43	1.82	134	7.0	12.5	56
Wenatchee	29.7	27.9	1.8	0.60	1.14	53	M	M	M
Omak	26.7	23.0	3.7	0.62	1.16	53	M	M	M
Ephrata	28.9	28.0	0.9	0.49	0.83	59	M	M	M
Yakima	32.8	29.1	3.7	0.61	1.17	52	4.4	6.7	66

Table 1 - January climate summaries for locations around Washington. The climate normal baseline is 1971-2000 except for Seattle WFO (1986-2000) and Vancouver (1999-2010). 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.

On the Interannual Variability of the Costliest Weather Events in Washington State

WA gets its fair share of nasty weather, and these weather events can cause millions of dollars in damages. The types of events that have the biggest impacts, however, vary markedly from year to year (and do not always make headlines). This note explores the costliest weather events since the turn of the century. We define the "big events" as a single event that caused more than $1 million in damage.

Figures 3 and 4 show statistics for each water year (October 1-September 30) from the National Climatic Data Center's Storm Database. Each water year (WY) uses four indicators

to judge the severity of the weather: weather-related property damage, crop damage, deaths, and injuries. The figures illustrate the high variability of these costly events. Water years 2000 and 2010, for example, have a low amount of property damage reported and less than $1 million in crop damage (Fig 3). WY 2008, on the other hand, had $128 million in property damage and $105 million in crop damage – the highest of the years sampled.

Some of the more interesting findings came from looking at the big events for each WY. Water years 2003 and 2006 had roughly the same amount of total damage to crops, but the damage resulted from completely different types of weather hazards. Extremely cold temperatures in early November harmed the apple crop in the Yakima region in 2003, and most ($37.7 million) of the crop damage in 2006 was due to 1.25-in diameter hail throughout several eastern WA counties in early July. The damage reported in WY 2008 was mainly from one event; the high wind, heavy rain, record flooding in western WA on December 2-3, 2007 that totaled $161.2 million in property damage. A similar situation occurred in WY 2007, in which 61% of the total property damage can be attributed to heavy rain on November 2-7 2006 in western WA, with much of the damage occurring Mt. Rainier National Park. On the other hand, some years did not have a defining event that accounted for most of the property or crop damage. WY 2004, for example, had

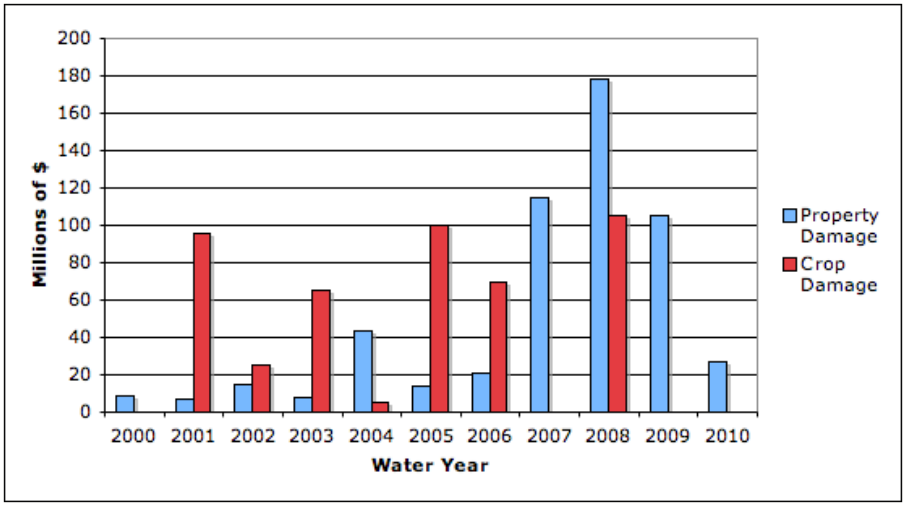


Figure 3: Monetary value of property (blue) and crop (red) damage done by weather events for the last decade (from NCDC's Storm Database).

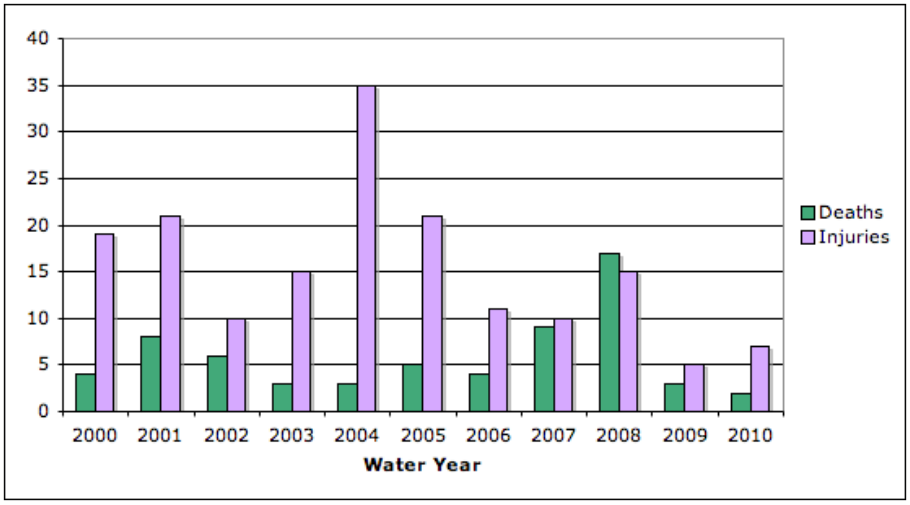


Figure 4: Number of deaths (green) and injuries (purple) resulting from weather events during the last decade (from NCDC's Storm Database).

more than $40 million in property damage (Fig 3) that came from many different instances of flooding and high winds, with a heavy snow event thrown in for good measure.

Interestingly, the pattern of deaths and injuries, shown in Figure 4, does not match the Figure 3 pattern. There is a clear disparity between the low property and crop damages and the high number of injuries for WY 2004. 20 of the 35 injuries were due to a dust storm near Prosser on Oct 28 causing a traffic pileup. No monetary value to the damages was assigned. WY 2001 also had a high number of injuries that weren't associated with the water year's big events – they resulted from a variety of less costly events including wildfires, high winds causing trees to fall, low visibility due to fog, etc. WY 2008 is the exception, in which most of the deaths and injuries resulted from the costliest event during the water year. WY 2008 also has both the highest number of deaths and the most property damage.

Finally, we want to again emphasize both the wide range of types of costly events and the range of personal and property damage experienced in WA from year-to-year. From this perspective, the 2010 WY was docile, with only $27.1 million in property damage (nearly all caused by landslides near Naches on Oct 11, 2009), 2 deaths (the least in the entire period examined), and 7 injuries. It also worth noting, as a final example of the different kinds of high impact events, that 86% of the relatively small property damage in WY 2005 was from a drought declaration made by the governor, an often-overlooked high cost weather phenomenon.

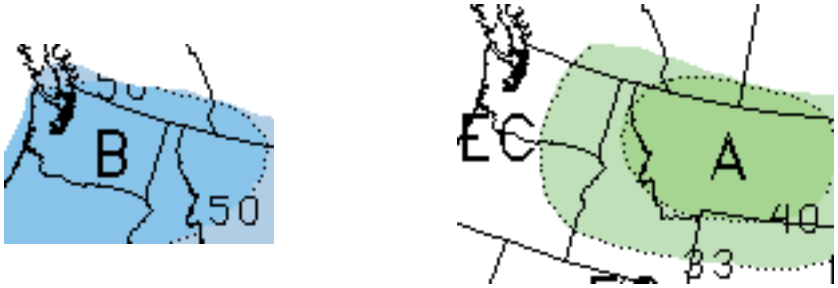
It bears emphasizing that the impacts discussed here involve only the direct effects of the weather. Less directly, the weather influences a range of other variables such as hydropower generation/utility costs, salmon productivity, human health, etc. It is safe to say that the weather is a big deal, and that unusual and disruptive episodes are the rule rather than the exception. There is an increasing effort to understand how the climate modulates the frequency and severity of weather events, and here's hoping that we will become better at anticipating them as a result of this ongoing work.

Climate Outlook

La Niña conditions are still present across the equatorial Pacific. According to the Climate Prediction Center (http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml), the La Niña is near its peak, but is still expected to last through spring. The La Niña is reflected in the CPC seasonal outlooks featured below.

The February-March-April (FMA) three-class outlook calls for colder than normal temperatures for the entire state. With regards to precipitation, eastern WA is relatively likely to be wetter than normal (i.e., at least a 33% chance using the three-class system).

The spring (March-April-May) CPC three-class outlook indicates colder than normal temperatures with chances exceeding 40% using the three-class system. The precipitation outlook does not tilt the odds in either direction; there is an equal chance of receiving below, equal to, or above normal precipitation in MAM.



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

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

The winter in WA has not been exactly like a typical La Niña, as we have had some warmer than normal and drier than normal conditions in several locations. We will wait to do a complete analysis at the close of the winter, but in the meantime, there is a brief mid-winter summary posted on our website: http://www.climate.washington.edu/events/2011midwinter/.