Office of the Washington State Climatologist

September 6, 2012

August Event Summary

In this Issue

August was warmer and drier than normal throughout the state. The positive temperature anomalies for the month as a whole were due to the relatively warm weather during the first half; there was a cool-down for the second half of the month. Inland western WA saw two periods of widespread temperatures above 90°F - August 4-5 and August 16-17. It was the extremely dry conditions statewide that made most of the headlines during the month. Some locations, such as Seattle, Vancouver, Yakima, Ephrata, and Pullman, did not record any measurable precipitation throughout the entire month. August is typically dry throughout the state, and while zero recorded precipitation is not unprecedented, it is rather unusual for the locations west of the Cascade Mountains. Table 1 lists the total August precipitation for several WA stations (including "traces": recorded when precipitation is visibly falling from the sky but the accumulated amount is less than 0.01 inches). The table also includes the precipitation ranking, the year the record began at each station, and examples of past years where August was drier than this year. It is worth noting how dry Augusts are more common east of the Cascades. The "trace" recorded for Yakima last month was recorded during 10 other years, for example.

At the time of this writing, the dry spell is continuing in many locations across the state. Some "consecutive dry day" records look to be in jeopardy west of the Cascade Mountains. SeaTac's record, for example, is 51 consecutive dry days ending on August 26, 1951. If that record is broken (which looks possible), we will surely let you know about it in the next newsletter.

The dry conditions did not bode well for fire danger, and currently Garfield, Asotin, Benton, and Columbia Counties are categorized as having "very high/extreme" fire danger by the Department of Natural Resources (http://fortress.wa.gov/dnr/firedanger/BurnRisk.aspx). The most significant fire that occurred in August was the Taylor Bridge Fire. This human-started fire began on the 13th about 4 miles southeast of Cle Elum, burning about 20,000 acres, destroying 60 structures, and forcing about 900 evacuations. A state of emergency was declared for Yakima and Kittitas Counties on the 14th to make extra fire fighting resources available, and the Washington National Guard assisted in fighting the fire. It was finally 100% contained on August 28th.

Station	August Total Precipitation	Ranking	Records Began	Examples of Drier Years
SeaTac	Trace	1	1948	-
Vancouver COOP	0.00	1 (tie)	1898	-
Bellingham AP	0.01	2	1949	1986
Yakima AP	Trace	2 (tie)	1947	1955
Pullman COOP	Trace	2 (tie)	1948	1955
Everett	0.02	3	1895	1967, 1915
Olympia AP	0.04	5	1948	1998, 1967, 1986, 1955
Omak	Trace	7 (tie)	1909	2010, 1969, 1955, 1940
Hoquiam Bowerman AP	0.16	8	1953	1998, 1986, 1973, 2002
Ellensburg	0.02	25 (tie)	1893	2011, 2006, 1967, 1993

Table 1: The total August precipitation for several WA locations. The ranking (in terms of the driest), period of record, and example of years that have had drier Augusts are also listed for each station.

On the Flavors of El Niño

A message from the State Climatologist

It may seem that the climate community is often making a fuss about the phenomenon of El Niño-Southern Oscillation (ENSO), and this impression is correct. Why is there such an emphasis? ENSO represents the primary source of predictability in seasonal weather in many parts of the world, including the Pacific Northwest. But not all ENSO events, i.e., El Niño (or their La Niña counterparts) play out similarly over the North Pacific Ocean and North America. The intrinsic variability of the atmospheric circulation at mid-latitudes is probably the primary reason, but there is increasing appreciation that differences between the tropical Pacific characteristics of individual events may be important, too.

The longitude of peak anomalies in sea-surface temperature (SST), and especially in rainfall, appears to be a key determinant of the mid-latitude response to El Niño (Chiodi and Harrison, Journal of Climate, 2012). This may seem obvious, but is at least somewhat at odds with the results from idealized models developed by Branstator and others in the 1980s and 1990s to diagnose how ENSO impacts the atmospheric circulation in the mid-latitudes. These models indicated that the sensitivity was greatest to the NINO 3.4 region of the tropical

Pacific, and a SST index based on that became widely used. More recently, D.E. Harrison et al. and others examined response to events with anomalies largest in eastern versus central Pacific and found considerable differences. Following up on this idea, we illustrate here the composite temperature (Fig. 1) and precipitation (Fig. 2) anomalies for the US in October through March during the last 5 central Pacific El Niño events (1987-88, 1994-95, 2002-03, 2006-07, and 2009-10). Note that the average temperature anomalies for the October-March period during these conditions has been about one-half of a standard deviation (equivalent to about 0.5 to 1°F). In terms of precipitation, most of the Pacific Northwest has been on the dry side, but generally only slightly so, and some climate divisions in the eastern part of WA have even recorded above normal precipitation. By way of comparison, during the east Pacific El Niño events of the last few decades (1982-83, 1986-87, 1991-92, and 1997-98) the temperature signal has been about twice as large (not shown). The 1982-83 and 1997-98 El Niño events were also very strong, which is an important additional consideration.

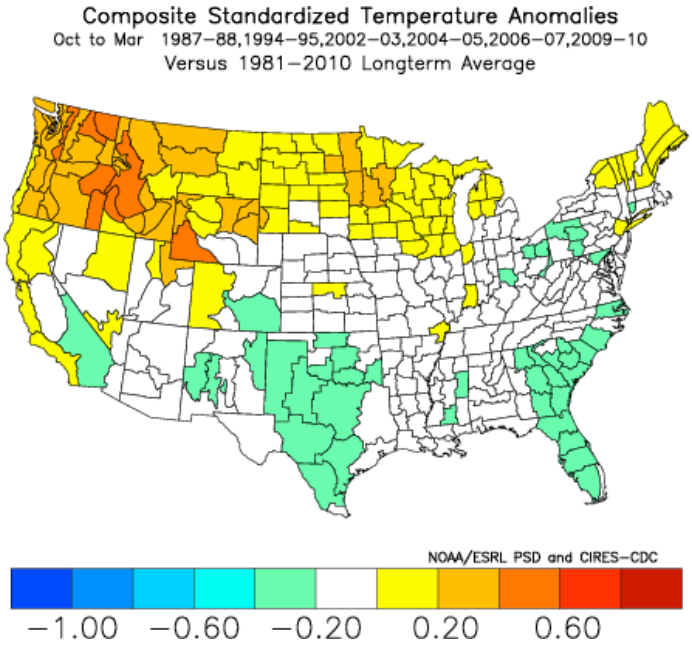


Figure 1: Composite temperature anomalies for the last 5 central Pacific El Niño events.

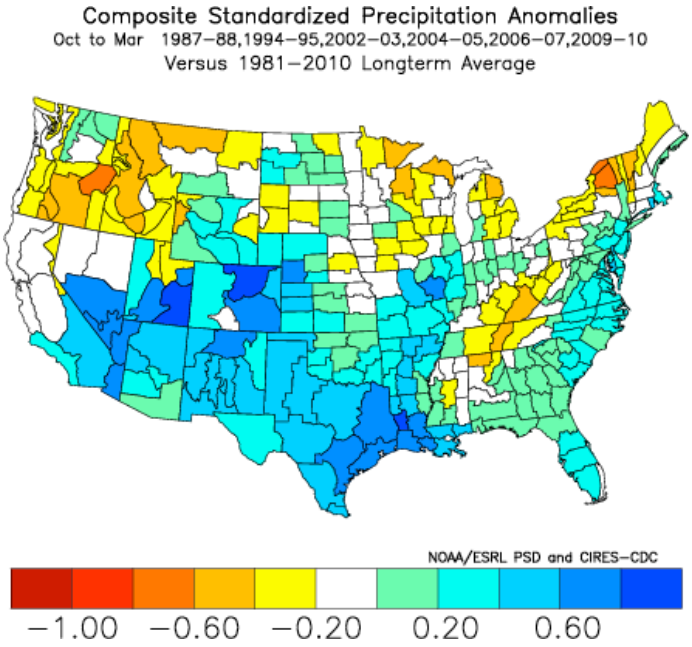


Figure 2: Same as Figure 1, except for precipitation anomalies.

This piece has been motivated by the weak-moderate El Niño that appears to be in offing for the winter of 2012-2013. At the time of this writing, the SST is warmer than normal in the central and eastern tropical Pacific, with the greatest anomalies between 150W and 140W. Recent simulations from one of the state-of-the-art models used in operational ENSO forecasting, NOAA's Coupled Forecast System (CFS) model, indicate that the SST anomalies will strengthen in the central Pacific and farther west towards the dateline (Fig. 3). It is unknown the degree to which other models used to forecast ENSO are indicating a similar outcome for the upcoming winter (many of these

models do not make distinctions with respect to longitude). The CFS model predictions for the tropical Pacific, in particular the lack of strongly positive SST anomalies in the far eastern Pacific, suggest that this El Niño might not be that big of a deal for the Pacific Northwest. On the other hand, the temperature and precipitation prediction from the CFS for the Pacific Northwest indicate warm and dry relative to seasonal norms, especially after the first of the year (not shown). It is possible that the CFS is picking up on other potential sources of predictability such as current patterns in mid-latitude upper ocean temperature, soil moisture, and sea ice cover. Perhaps the winter of 2009-10 represents a reasonable analog, from an overall perspective, for the upcoming winter. The winter of 2009-10 also featured a central Pacific El Niño of weak to moderate intensity on the heels of back-to-back La Niña events. It ended up being warmer and drier than normal, but not extremely so, in part due to substantial snowfall in the mountains from late March into April 2010, and hence the repercussions were mostly modest. It bears mentioning that the winter of 2009-10 included a pronounced cold snap in early December. So while the deck may be stacked, it is still possible to get virtually any kind of deal of the weather cards.

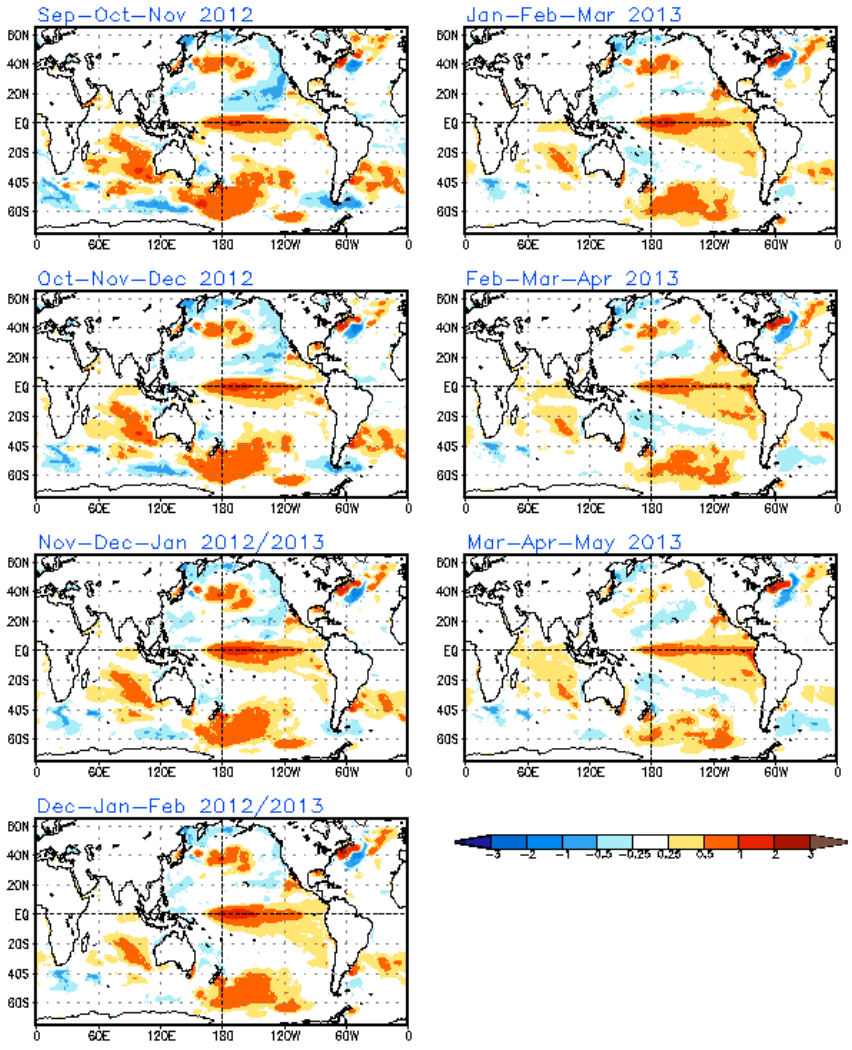
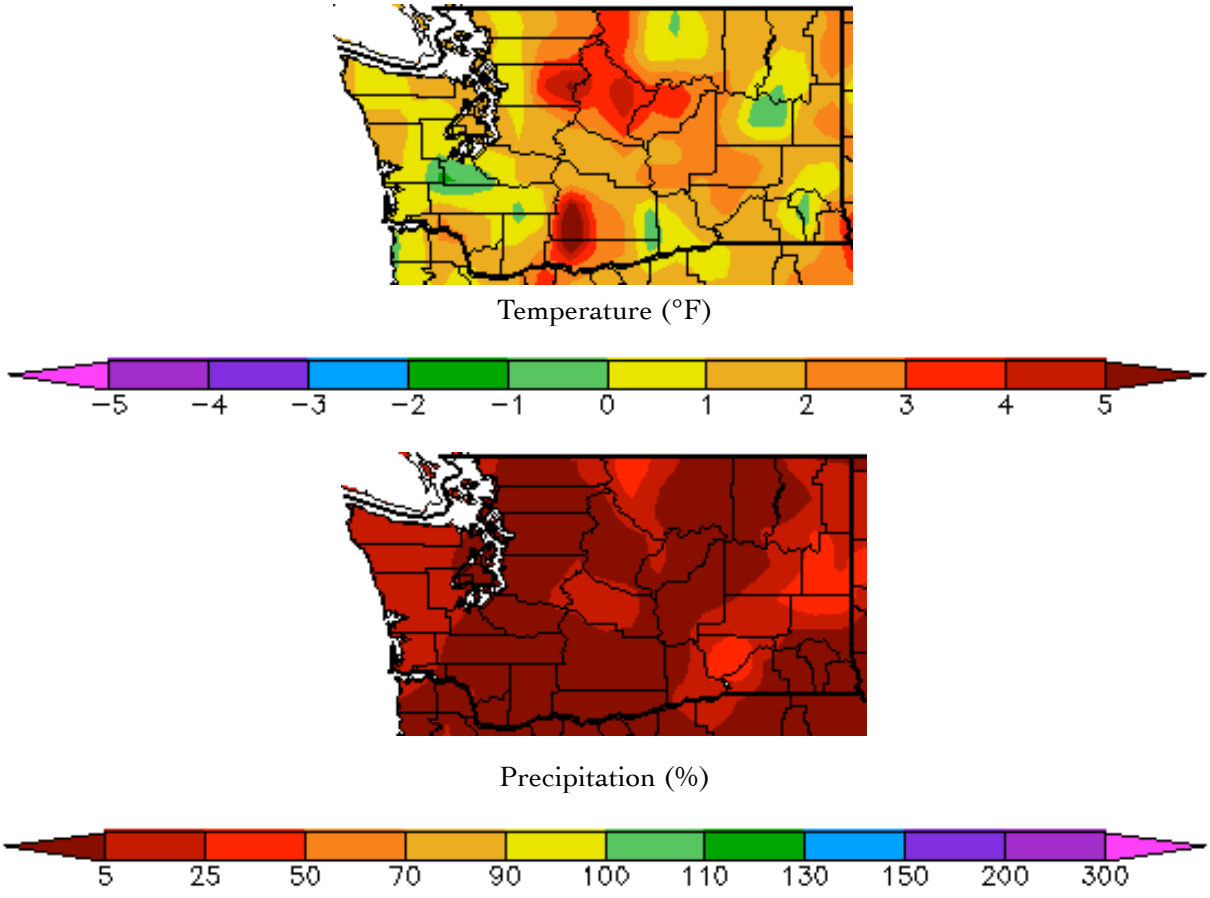


Figure 3: The CFS ENSO forecast initialized in August (from CPC).

Climate Summary

Average August temperatures were generally above normal throughout the state, as illustrated by the High Plains Regional Climate Center (HPRCC) temperature departure from normal map below. The were some locations, namely southern western WA through the Olympic Peninsula and a few pockets east of the Cascades that were close to normal (within 1°F of normal in either direction) for the month. On the other hand, the rest of the state was between 1 and 4°F above normal (i.e., Ephrata, Spokane, Yakima, SeaTac, etc.; Table 2). A couple stations (1 in Klickitat County and 1 in Chelan County) were much above normal, exceeding 5°F above normal.

August was very dry across the state, with many locations not receiving any precipitation during the month (Table 2). The percent of normal precipitation map below shows most of the state received less than 5% of normal August precipitation. Even most of the wetter locations received August precipitation less than 50% of normal. One of these "wet" spots was normally dry Pasco, which received 74% of its normal precipitation (Table 2), most of which fell in one day (21 August). It is important to note that precipitation normals for August are low, as August is one of the two driest months statewide (the other is July).



August temperature (°F) departure from normal (top) and August precipitation % of normal (bottom). (High Plains Regional Climate Center (http://www.hprcc.unl.edu); relative to the 1971-2000 normal).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	64.5	64.1	0.4	0.04	0.94	4
Seattle WFO	67.7	66.5	1.2	0.00	0.97	0
Sea-Tac	67.9	66.1	1.8	0.00	0.88	0
Quillayute	61.2	59.6	1.6	0.52	2.49	21
Bellingham AP	63.9	62.5	1.4	0.01	1.23	1
Vancouver	70.6	69.2	1.4	0.00	0.77	0
Eastern Washington						
Spokane AP	71.6	69.3	2.3	0.13	0.59	22
Wenatchee	76.7	73.5	3.2	0.00	0.20	0
Omak	73.1	72.4	0.7	0.00	0.46	0
Pullman AP	66.3	65.7	0.6	0.00	0.63	0
Ephrata	75.5	72.9	2.6	0.00	0.19	0
Pasco AP	73.9	72.8	1.1	0.20	0.27	74
Yakima AP	72.5	69.3	3.2	0.00	0.26	0

Table 2: August 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 continue to be ENSO-neutral, with the expectation that El Niño will develop by boreal autumn, as mentioned above. The Climate Prediction Center (CPC) released an "El Niño Watch" in early June (updated in August): http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html. In the last 4 weeks, sea-surface temperature (SST) anomalies have continued to warm in the Pacific Ocean, according to the CPC. There is still a chance of neutral conditions lasting throughout the winter, but a majority of the models suggest continued El Niño development.

The CPC three-class temperature outlook for September is a toss up: there's equal chances of below, equal to, or above normal temperatures throughout the whole state. The exception is the very far eastern sliver of WA which has slightly increased chances for above normal temperatures. September precipitation, on the other hand, is likely to be below normal statewide.

The CPC 3-month seasonal outlook for September-October-November (SON) has equal chances of below, equal to, or above normal temperatures for most of the state. The Olympic Peninsula has increased chances of below normal temperatures, mostly due to below normal SSTs off the coast. SON precipitation is expected to be below normal for the state.

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

September-October-November outlook for temperature (left) and precipitation (right) from the CPC.