Office of the Washington State Climatologist

October 4, 2011

September Event Summary

Summer-like weather extended into September with average temperatures warmer than normal statewide. The average September temperature ranked in the warmest top ten for many WA locations. For example, at SeaTac Airport the average temperature of 64.0°F tied 1989 and 1995 as the third warmest September since records began in 1948. At Spokane AP, September was the 6th warmest (65.0°F) since 1881. Bellingham (60.8°F), Olympia (60.9°F), and Yakima (64.8°F) ranked as the 3rd, 5th, and 6th warmest Septembers, respectively, among many other examples.

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September was an active month for fires in WA, with one even damaging homes and other structures. The "Monastery Complex Fire", northeast of Goldendale in Klickitat County, was started on the 7th, burning a total of 3,626 acres and forcing evacuations. The fire was contained on the 16th, and FEMA funds were authorized to assist in fighting the fire. A less threatening fire to humans burned in the eastern portion of Olympic National Park. Known as the "Big Hump" fire, it burned a total of 1,280 acres but also aided in impressive sunsets for folks in the Puget Sound area due to the smoke.

To summarize the month in more detail: sunny skies and warm temperatures marked the first half of September in WA State, with temperatures much above normal from about the 3rd to the 14th, depending on the location. SeaTac Airport had 9 consecutive days above 80 (3rd-11th), breaking the all-time record for the longest stretch in September. Other western WA locations were warmer, with areas near Vancouver, WA over 90 on the 11th and 12th. Daily record high temperatures were broken statewide during this string of warm days, with daily high temperature records broken in Wenatchee (97°F), Ephrata (98°F), Yakima (98°F), and Omak (99°F) on the 9th, for example. Other examples include daily high temperature records set at Moses Lake (100°F) on the 10th, and Olympia (88°F) and the Seattle WFO (86°F) on the 11th. The whole state cooled down by the 15th, however, with western WA blanketed in clouds a few days before that. A cold front moved through on the 17th, bringing rain to western WA, especially the coast. Figure 1 shows the CoCoRaHS 24-hr precipitation measurements ending at 7 am on 9/18 from our many new Grays Harbor County volunteers (welcome!).

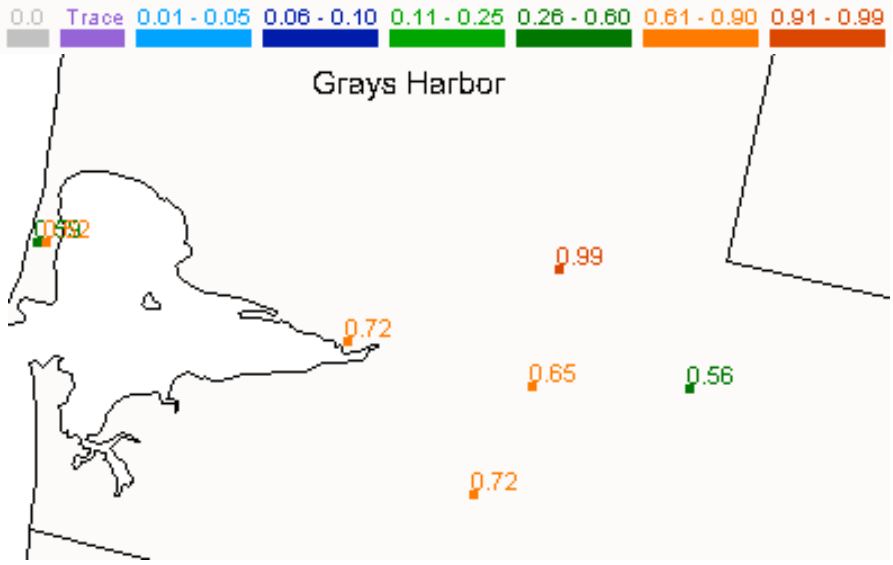


Figure 1: 24-hr precipitation measurements ending at 7 am on 9/18 from CoCoRaHS volunteers in Grays Harbor County.

Warmer temperatures returned on the 21st for the whole state. This warm spell was accompanied by relatively high dewpoint temperatures and warm nights, especially west of the Cascades. In fact, record high minimum temperatures were set at Quillayute (60°F), Hoquiam (61°F), Bellingham (61°F), and SeaTac Airport (63°F) on the 23rd. Finally, the last notable September event was a cold front with considerable rain and high winds that moved in on the 26th, just in time for the beginning of Autumn and the onset of a new water year (starting Oct 1). Over 3 inches of precipitation fell in Mason County, according to CoCoRaHS reports, and daily precipitation records were broken in Hoquiam (1.31") and Quillayute (2.08").

Back-to-Back La Niña and the Weather of the Pacific Northwest

A message from the State Climatologist

There are increasing indications that La Niña conditions will be present in the tropical Pacific during the upcoming winter. As most of the readers of this newsletter are aware, this is right on the heels of a La Niña event during the previous winter and spring of 2010-11. Here we will examine the weather we have experienced in Washington State during the latter half of previous back-to-back La Niña events. Please feel free to either cheer or boo these findings.

It is worthwhile to first consider the predictions for La Niña itself. As recently as a couple of months ago, our crystal ball was showing that near-neutral conditions for the upcoming winter were most likely, based on real-time observations and forecast models of various types for the tropical Pacific. Expectations have changed, however. In particular, NOAA's Climate Prediction Center is now projecting a La Niña of weak to moderate intensity. To an extent, this reflects the simulations from its own Coupled Forecast System (CFS) model, which is showing stronger cooling than most of the other models. But it is also based on what the different models are indicating as a group, which is much more of a tendency towards La Niña in recent versus earlier runs. That being said, there is still a large amount of spread in the individual model forecasts, as illustrated in Figure 2. At the time of this writing, it is probably safe

to say that there will not be El Niño. But we are not as confident as we were last year that there will be La Niña of a magnitude that could be expected to have impacts on the seasonal weather of the Pacific Northwest.

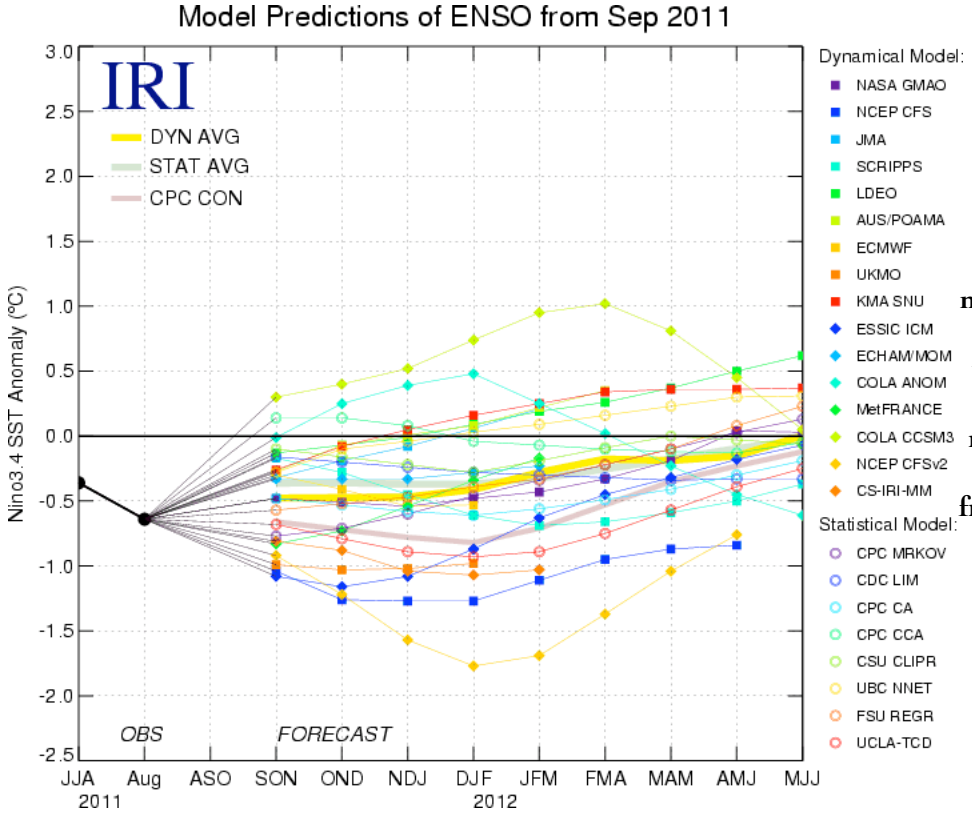


Figure 2: Various statistical and dynamical model predictions of sea surface temperature anomalies in the NINO3.4 region of the equatorial Pacific Ocean from the International Research Institute (IRI).

Under the premise that La Niña will be in place, we now examine how the weather of Washington has turned out during past events, with the objective of showing ranges as well as typical outcomes. One way to do this is through maps of the temperature and precipitation anomalies that have occurred in the early portion (Oct-Dec) and late portion (Jan-Mar) of past cool seasons featuring La Niña doubleheaders. The distributions of anomalous temperature and precipitation for October through December are shown in Figures 3a and 3b, respectively; their counterparts for January through March are shown in Figures 4a and 4b. From the perspective of Washington State as a whole, the second year has a comparable mean signal, and degree of variability in this signal, as the first year of these multiple year events. As for La Niña in general, there is a tendency for wetter than normal weather before (but not much of a systematic effect in temperature) before the first of the year, and a tendency for colder and somewhat wetter than usual weather after the first of the year. The magnitude of La Niña, as gauged by the NINO3.4 index, on average has been about half as strong during the second winter than during the first winter of the past events, and the present case appears that it will play out similarly. It is interesting that this difference in the intensity of La Niña does not seem to matter much in terms of its impacts on our weather, but this is an uncertain result because of the small sample size. It is also worth mentioning that La Niña, and other phenomena influencing our climate, are manifested on seasonal and longer time scales. In other words, we cannot anticipate anything about the timing of floods, wind storms or cold-

air outbreaks. For example, the weather during January 2011 was on the quiet side and many folks were wondering what happened to the rough conditions that were predicted. It was later in February and into spring that we had the chance to experience La Niña's usual charms. On the other hand, La Niña does not usually influence our weather significantly in late spring and early summer, and so we should not necessarily expect a repeat of the damp and chill that occurred during May through mid-July of 2011.

In summary, the dice are loaded for the next six months or so to be on the wet and cool side. That may not sound like good news, but that kind of weather brings some real benefits to the region, even if you are not a winter sports enthusiast. In particular, one of the more robust signals associated with La Niña is the snowpack at the end of winter. We rely on that "water in the bank" for municipal and agricultural uses and hydropower generation, and for healthy streams and forests. Perhaps that idea will provide scant comfort as we slog our way through winter, especially if this one turns out on the nasty side. There is a silver lining: at least in the observational record three La Niña winters in a row are quite rare!

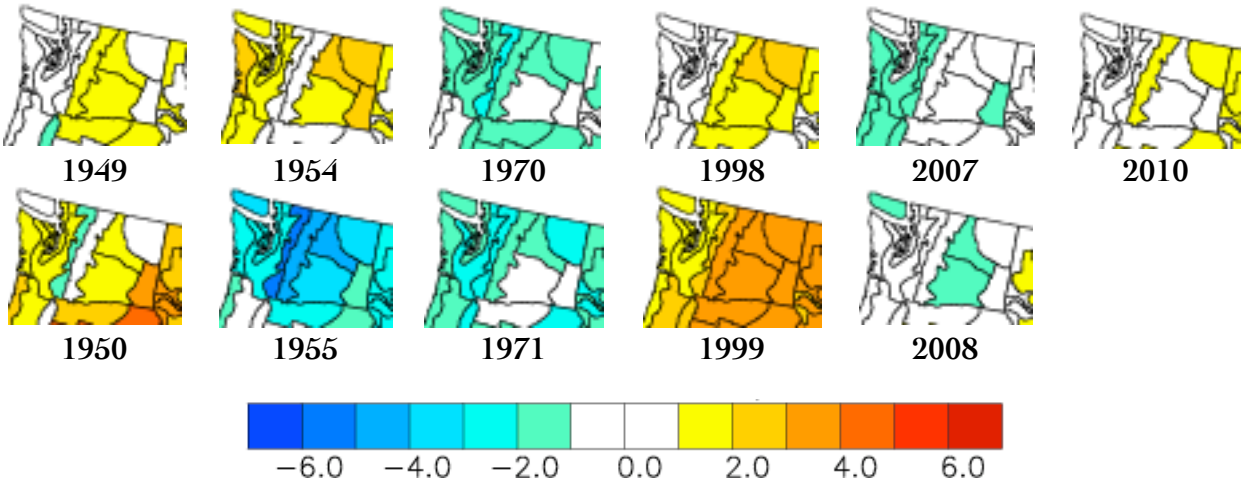


Figure 3a: October-November-December temperature anomalies (compared to the 1981-2010 normal) for back-to-back La Nina events. The 1st year events are on the top and the 2nd year events on the bottom.

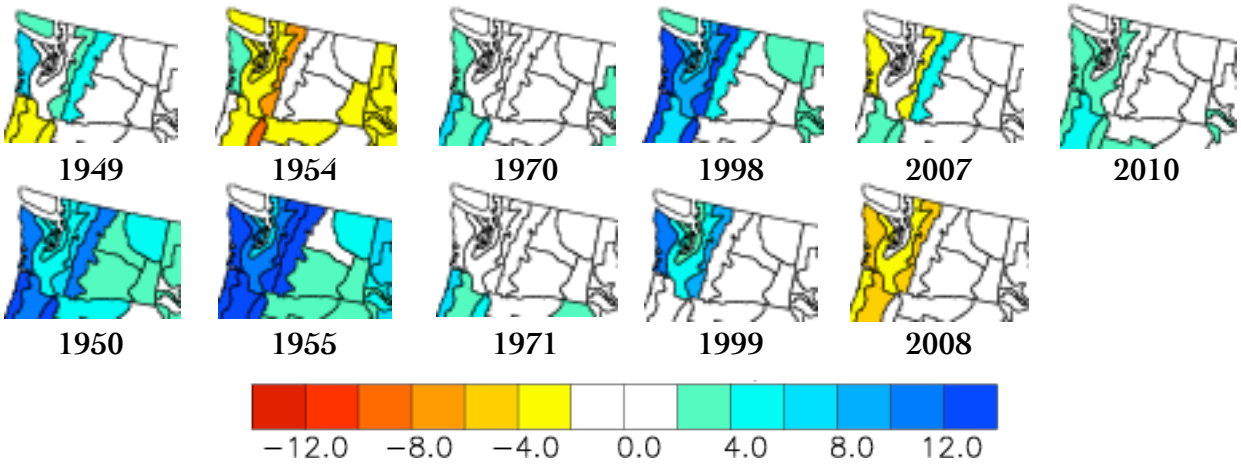


Figure 3b: October-November-December precipitation anomalies (compared to the 1981-2010 normal) for back-to-back La Nina events. The 1st year events are on the top and the 2nd year events on the bottom.

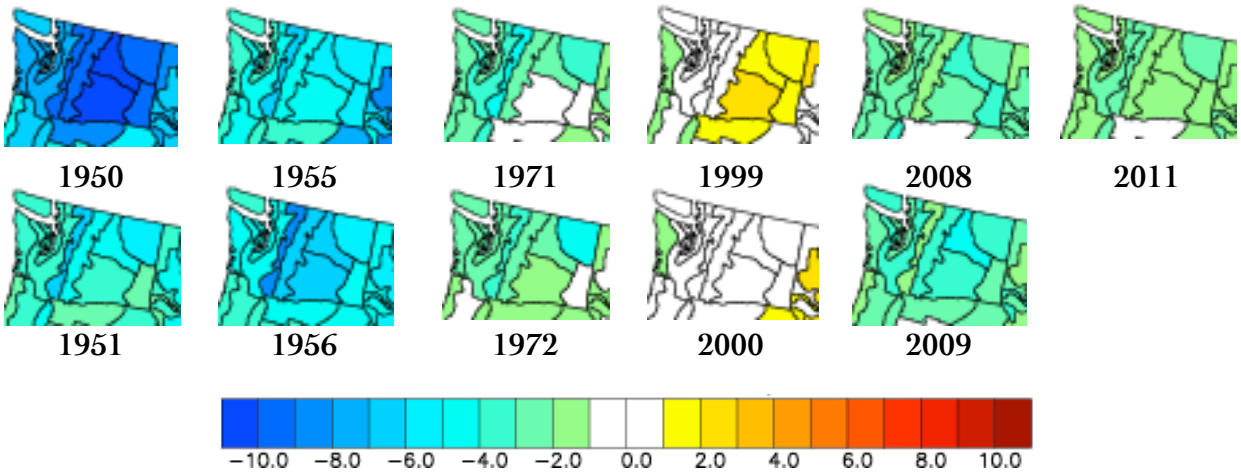


Figure 4a: Same as Figure 3a, except for January-February-March.

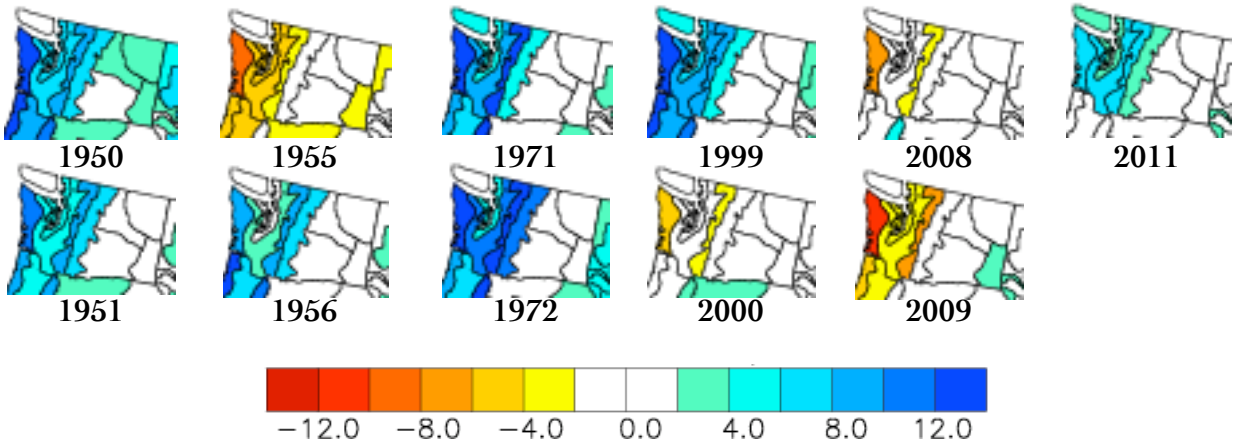


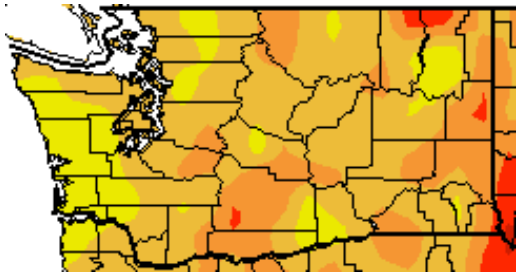
Figure 4b: Same as Figure 3b, except for January-February-March.

Climate Summary

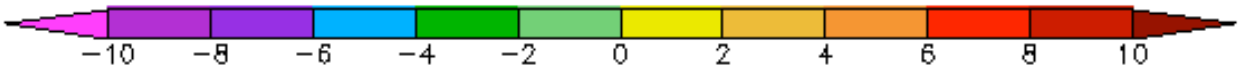
Average September temperatures were warmer than normal throughout the whole state, as illustrated by the temperature departure from normal map below. Most of the state had average temperatures between 2 and 4°F above normal with some areas in eastern WA exceeding 4°F above normal (e.g., Spokane and Pullman; Table 1).

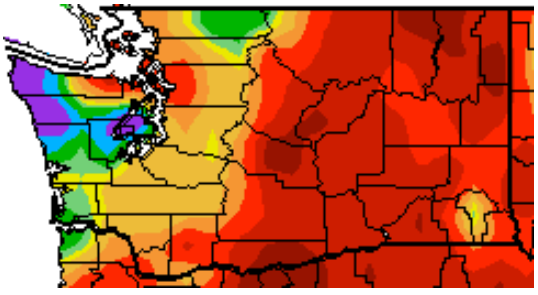
Total September precipitation was below normal for nearly the entire state, with most locations east of the Cascade Mountains receiving between 5 and 25% of normal precipitation. Areas west of the Cascades were also drier than normal, especially Island County. Although the percentages of normal vary statewide depending on the location's September normal precipitation value, the precipitation departure was fairly consistent in the dry areas: not exceeding about 1 inch (precipitation departure map also shown below). In contrast, the Olympic Peninsula was wetter than normal, with Quillayute receiving about 200% of their normal September precipitation.

For additional monthly summaries using data from WSU's Agricultural Weather Network (AWN) and focusing on agricultural regions of the state, please see: http://www.weather.wsu.edu/awn.php?page=awn_news.

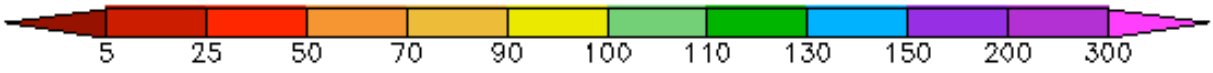


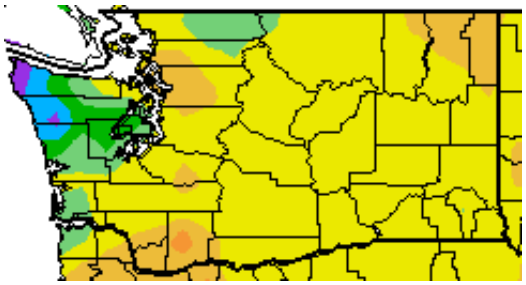
Temperature (°F)





Precipitation (%)





Precipitation (in)

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

New Radar & Upgrades

The long-awaited new coastal radar is now operational! The Langley Hill radar, located in Grays Harbor County, gives a better picture of what is approaching from the Pacific Ocean. The main radar used in western WA, located on Camano Island, has always had a "blind spot" due to the Olympic Mountains blocking the radar signal from reaching the coast. The new radar makes up for this deficiency and will greatly help local forecasters. Images from the new radar can be viewed on the UW Atmospheric Science webpage (one of many locations): http://www.atmos.washington.edu/weather/radar.shtml.

In addition, the Camano Island and Spokane radars will be undergoing an upgrade to dual polarization (dual-pol) technology. Dual-pol technology will allow the radar to transmit and receive both a vertical and a horizontal signal. This technology will give a better estimate of the total and type of precipitation along with other benefits described here: http://www.wrh.noaa.gov/wrh/faq/dualpol.php?wfo=sew. Each radar will be out of operation for approximately 2 weeks while the upgrades are made, and this technology has already been implemented at the new Langley Hill radar.

CoCoRaHS

As we gear up for our wet season, now is a good time to get back into the habit of checking our CoCoRaHS rain gauges daily. Remember: every drop counts and CoCoRaHS has proved again and again that precipitation does vary greatly across small distances in our state. With the new Langley Hill Radar now operational and the dual-polarization improvements occurring statewide, more CoCoRaHS observers will help the National Weather Service in calibrating the new technology by providing more ground observations. If you're interested in signing up, please do so at www.cocorahs.org. Questions about CoCoRaHS? Please contact our office: 206-543-3145.

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western Washington						
Olympia	60.9	58.9	2.0	1.62	1.71	95
Seattle WFO	64.6	61.6	3.0	0.91	1.52	60
Sea-Tac	64.0	61.3	2.7	1.29	1.50	86
Quillayute	58.5	56.6	1.9	7.68	3.82	201
Bellingham AP	60.8	57.2	3.6	0.89	1.78	50
Vancouver	66.9	63.6	3.3	0.62	1.56	40
Eastern Washington						
Spokane AP	65.0	60.2	4.8	0.14	0.67	21
Wenatchee	67.6	64.4	3.2	T	0.34	0
Omak	64.3	62.6	1.7	0.07	0.58	12
Pullman	62.7	58.2	4.5	0.22	0.78	28
Ephrata	67.4	63.8	3.6	0.03	0.36	8
Pasco AP	66.2	63.4	3.0	0.03	0.40	8
Yakima AP	64.8	60.8	4.0	0.07	0.36	19

Table 1 - September climate summaries for locations around Washington with a climate normal baseline of 1981-2010. Note that the Vancouver Pearson Airport 1981-2010 normal involved using surrounding stations in NCDC's new normal release, as records for this station began in 1998.

Climate Outlook

Moderate La Niña conditions are developing throughout the equatorial Pacific Ocean, as described in the La Niña highlight above. According to the Climate Prediction Center (http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml; CPC), sea-surface temperature (SST) anomalies have been at least 0.5°C below normal for most of the equatorial Pacific in the last 4 weeks.

*Note: we will now be highlighting the Climate Prediction Center's one-month outlook and only the nearest seasonal (3 months combined) outlook rather than both of the seasonal outlooks.

For October alone, the CPC is calling for equal chances of below, equal to, or above normal temperatures for all of WA. For precipitation, there is at least a 33% chance of higher than normal precipitation for the whole state with chances exceeding 40% for a wet October for the western two-thirds of the state.

The CPC seasonal outlook for October-November-December (OND) is similar. The temperature outlook calls for equal chances of below, equal to, or above normal temperatures for the entire state. The OND precipitation forecast indicates a higher chance of above normal precipitation for the whole state, again with higher odds on the west side of the Cascade Mountains.

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

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