

Washington State Weekly Drought Monitoring Report

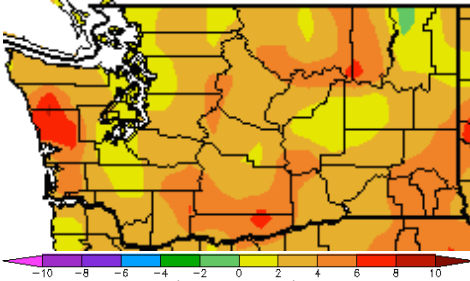
Thursday, September 17, 2015

Issue 22

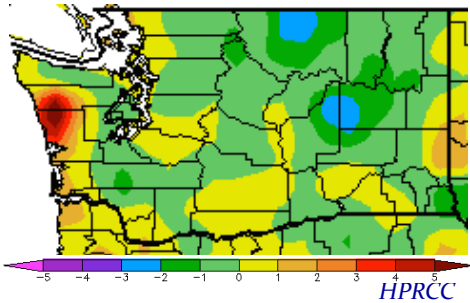
Statewide Overview

Mean Temperature Anomalies (°F)

Weekly (9/9-9/15):

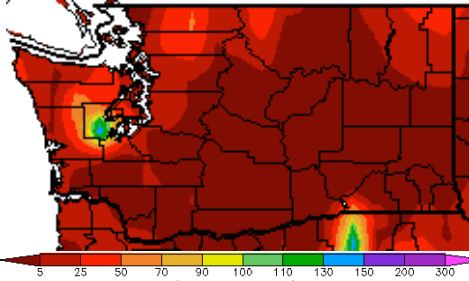


Last 30 days (8/17-9/15):

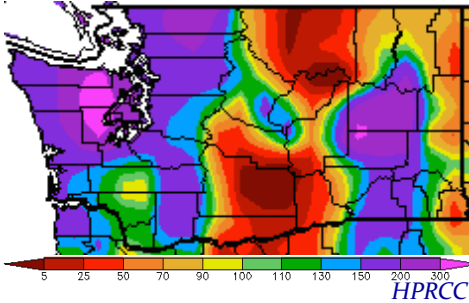


Precipitation Percent of Normal (%)

Weekly (9/9-9/15):

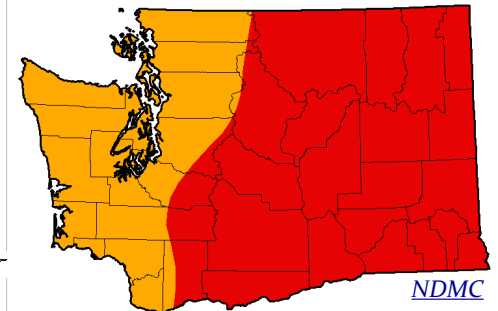


Last 30 days (8/17-9/15):

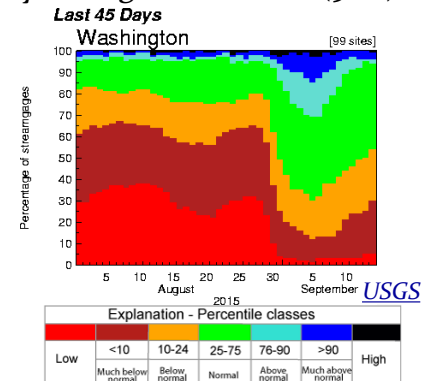


Drought Monitor, Streamflow, and Soil Moisture Changes

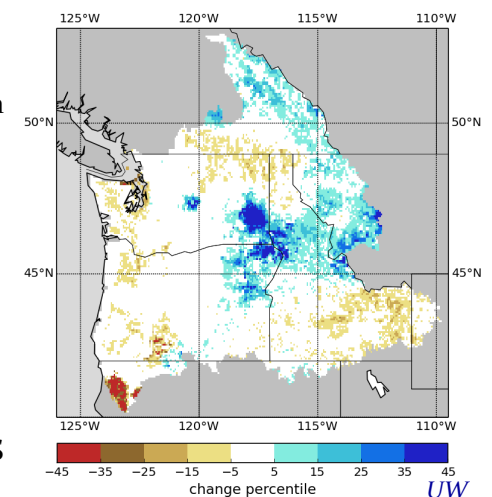
US Drought Monitor (9/15):



7-day Average Streamflow (9/16):



Change in Soil Moisture (9/14): sm percentile change in last 1 week 2015-09-14



Recent temperature, precipitation, streamflow conditions and soil moisture changes are shown here for WA State. The last 7-days (9/9-9/15) were between 2 and 6°F warmer than normal for most of the state, as a high pressure built in and brought warm and sunny weather from the 9th through the 12th. There was little precipitation over the last week, aside from some scattered showers statewide on the 14th and some localized precipitation in Snohomish and King on the 13th and over Mason and Grays Harbor counties on the 15th from an upper level area of low pressure that moved into the region. Despite the showers, the weekly precipitation map shows that most of the state is below normal. That isn't the case for precipitation over the last 30 days (8/17-9/15), where western WA and parts of eastern WA received above normal precipitation. The recent rain has helped streamflow in the state, as shown in the 7-day average streamflow time series plot on the right. About 60% of streams statewide were much below normal in late July/early August. After several wet days at the end of August, that percentage dropped to about 10% of streams in early September. With the impact of the precipitation fading, nearly 30% of streams have "much below normal" or worse streamflow at the time of this writing. Trends in soil moisture have also reversed. The plot on the bottom right shows the change in modeled soil moisture values over the last week. Previously, western WA had increased soil moisture in response to past precipitation, but the last week has brought some drying. Southeastern WA is still seeing a moistening in soil moisture. No changes to the federal US Drought Monitor map were made this week.

Contacts: Karin Bumbaco (kbumbaco@uw.edu)
 Nick Bond (nab3met@uw.edu)
 Jeff Marti (jema461@ecy.wa.gov)

Statewide Drought Declared

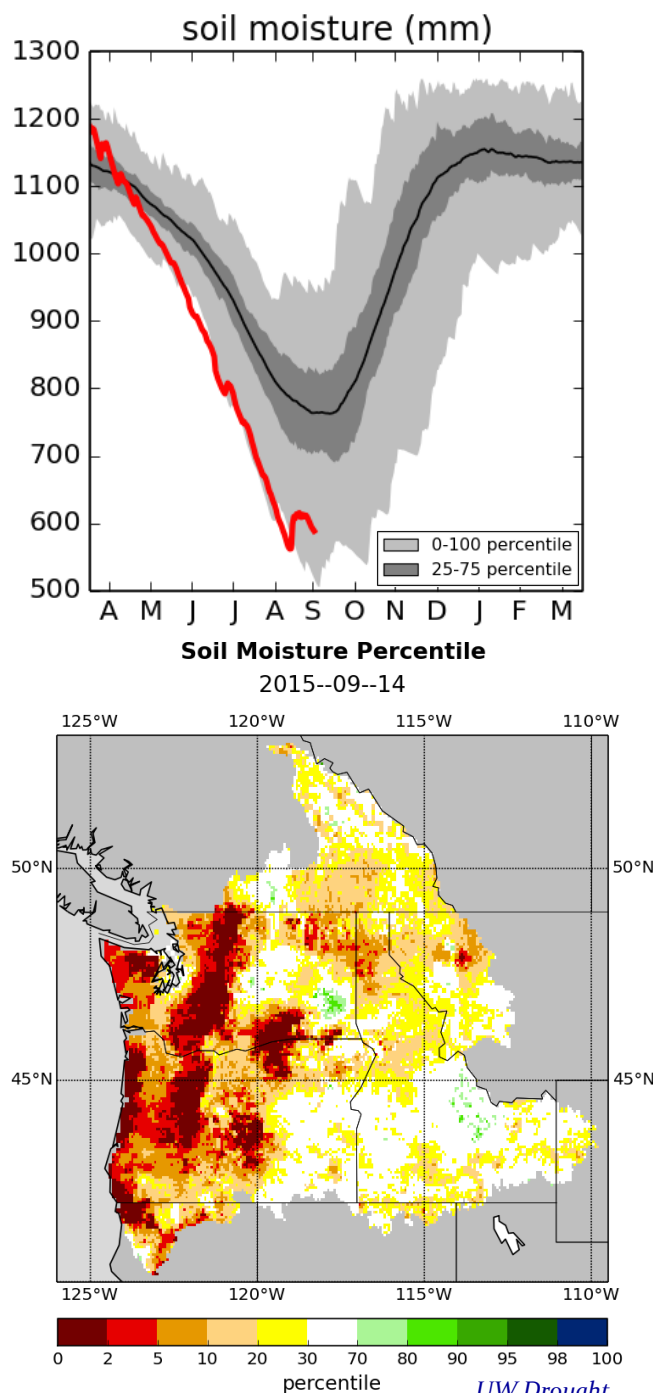
On May 15, Governor Inslee declared a statewide drought; more information can be found at WA State [Department of Ecology](#). This section will focus on a few areas of the state in a little more detail, but will first review the water year temperature and precipitation.

Olympic Peninsula

Little precipitation fell on the Olympic Peninsula over the last week. Forks received 0.18" of precipitation over the last week (below normal), but 1.82" so far this month, which is on track for normal September rainfall. Despite this rainfall, the [city of Forks has issued mandatory water restrictions](#) on the 11th for inside and outside city limits. Voluntary water restrictions were in place in late June, but with water levels in wells still dropping, more action was needed. Because Forks relies on wells, and doesn't draw water from streams, the recent precipitation hasn't helped the situation much - more consistent rain over a longer time period is needed to recharge groundwater. The plot on the right shows the soil moisture time series from the Hoh-Quillayute basin - on the western Olympic Peninsula including the location of Forks - since April from the [UW Drought Monitoring System](#). In late August, the soil moisture increased from the rain, but then started decreasing shortly thereafter (red line). Note that the soil moisture is still much below what is typical for the time of year (black line) and close to the lowest percentiles (light grey envelope). The weekly change in soil moisture map is shown on page 1, and included here is the soil moisture percentile from the same monitoring system, showing values below the 10th percentile for most of western WA. There are some locations in eastern WA with normal to even above normal soil moisture for the time of year, but the weekly changes are small in the context of a larger picture.

Yakima Area

In last week's edition, we reported that the Roza Irrigation District in the Yakima Valley had shut off water deliveries for 3 weeks in May to save water for later in the season. Some good news has been reported for the district, as cooler weather (within 1°F of normal over the last 30 days) and earlier conservation is has [allowed water deliveries to be maintained longer than expected](#). More water than planned will be delivered through September 21 (but still less than a normal year) and the deliveries will also be extended through at least October 5 at a lower rate. Normally, water is delivered through October 20. Water is important at this time of year to help perennial crops withstand the winter cold. There are also adverse impacts being reported in the district, such as smaller apples and some "[hop shattering](#)" (if too dry, they can fall apart when picked). The [Bureau of Reclamation](#) has announced that the Yakima system as a whole is expecting to have only 135,000 acre-feet of storage left by October 20, which is about 50% lower than usual going in to a new water year. As we look toward a new season, the Roza Irrigation District is discussing potentially [increasing assessments by \\$4 per acre](#) to pay for canal sealing to help minimize leakage throughout the distribution system.



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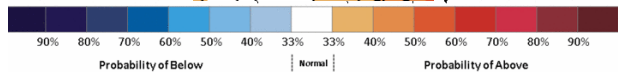
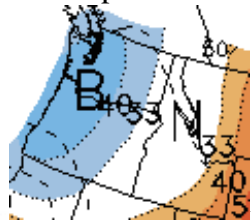
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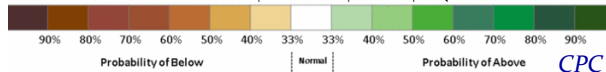
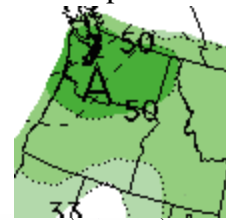
Extended Outlook

Temperature



8-14 Day CPC Outlook

Precipitation



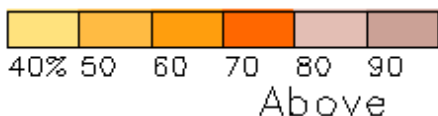
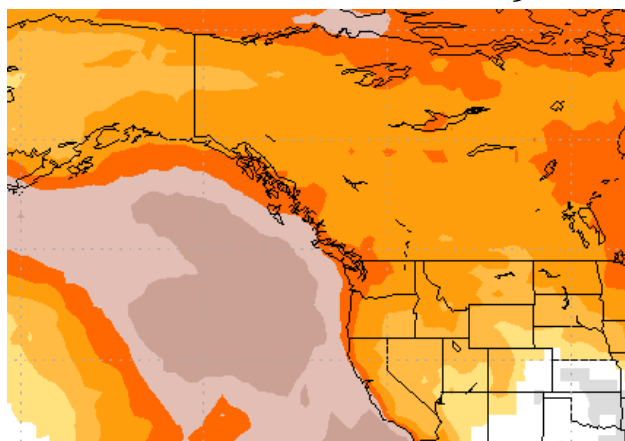
The 8-14 day forecast from NOAA/CPC for 24-30 September indicates below normal temperatures, and above normal precipitation for WA state. This weather is associated with predictions of an unusually deep upper-air trough for this time of year, centered west of Vancouver Island. Some of the simulations from the numerical weather prediction (NWP) models used in making these forecasts indicate that this trough will be weaker and located farther west during the latter part of the period considered here. This implies the potential for the return of warmer and drier weather near the end of September.

The previous week's newsletter (dated 10 September) reviewed some forecasts of precipitation available from the National Multi-model Ensemble (NMME). Here we follow up with temperature forecasts from the NMME, but from a different perspective. To be specific, presented below are maps of the probabilities of temperature in a three-tier system, i.e., for the categories of below, near-normal and above, relative to climatological norms. The periods shown are for October through December 2015 on the left, and January through March 2016 on the right. The probabilistic forecast for autumn 2015 indicates about a 70% chance of temperatures in WA state being in the upper-third of the distribution for the three month period as a whole, with greater (lesser) odds in the western (eastern) part of the state. The higher likelihood of above normal temperatures in the vicinity of the coast reflects in part the influence of warmer than normal upper ocean temperatures in the NE Pacific Ocean.

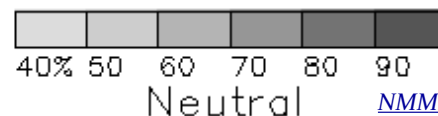
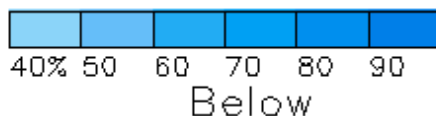
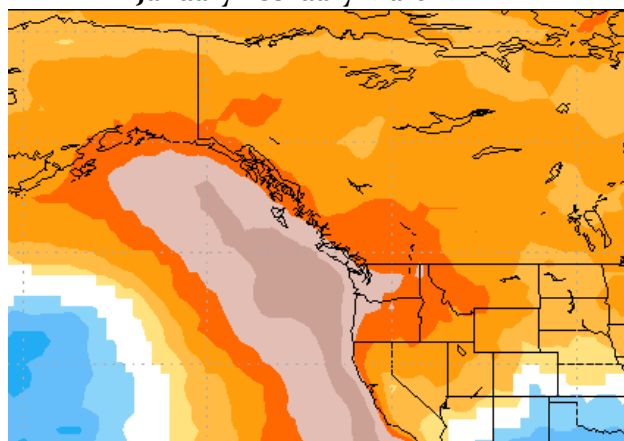
The forecast for January-March 2016 indicates somewhat higher odds of WA experiencing temperatures in the above normal category, with a certainty exceeding 80% in the western part of the state. This prediction is consistent with the historical record during previous El Niño winters, which indicates a more robust signal of positive temperature anomalies after the first of the calendar year. From a temperature anomaly perspective, the latest set of predictions from the NMME are indicating air temperatures on the order of 2°C (3.6°F) greater than normal during January through March 2016. By comparison, in 2015 average temperatures were 2.6°C (4.8°F) above normal (1982-2010) for the same months.

NMME Probability Forecast for Temperatures

October-November-December 2015



January-February-March 2016



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