

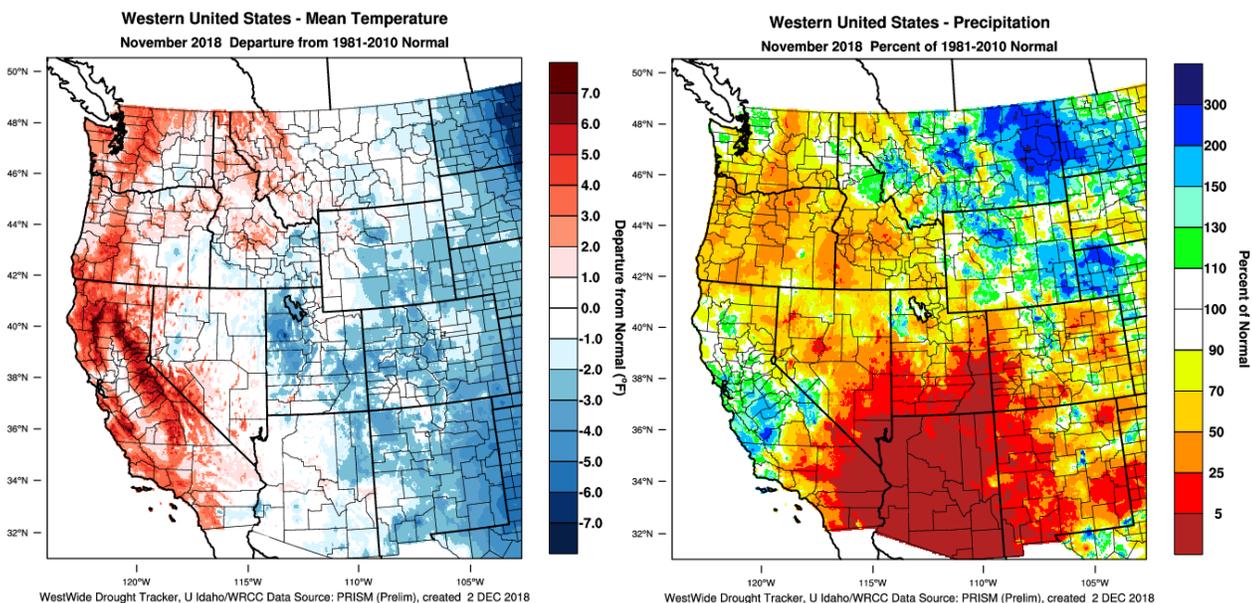
# Weather and Climate Summary and Forecast November 2018 Report

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## Summary:

- A mild November was experienced over much of the west, while the east shivered in substantially colder than average temperatures for the month.
- The rainy season continued its slow start for the majority of the western US. While portions of central California, the northern Cascades, and the Olympics saw average to above average rainfall during November, the majority of the west remained dry.
- The seasonal forecast for December through February continues to reflect the influences of a weak to moderate El Niño in the Tropical Pacific and very warm North Pacific. Given these conditions, the odds are tilted toward a warmer and near average to drier than average winter across the PNW and northern tier of states and near average temperatures and wetter than average conditions across the southern tier of states.

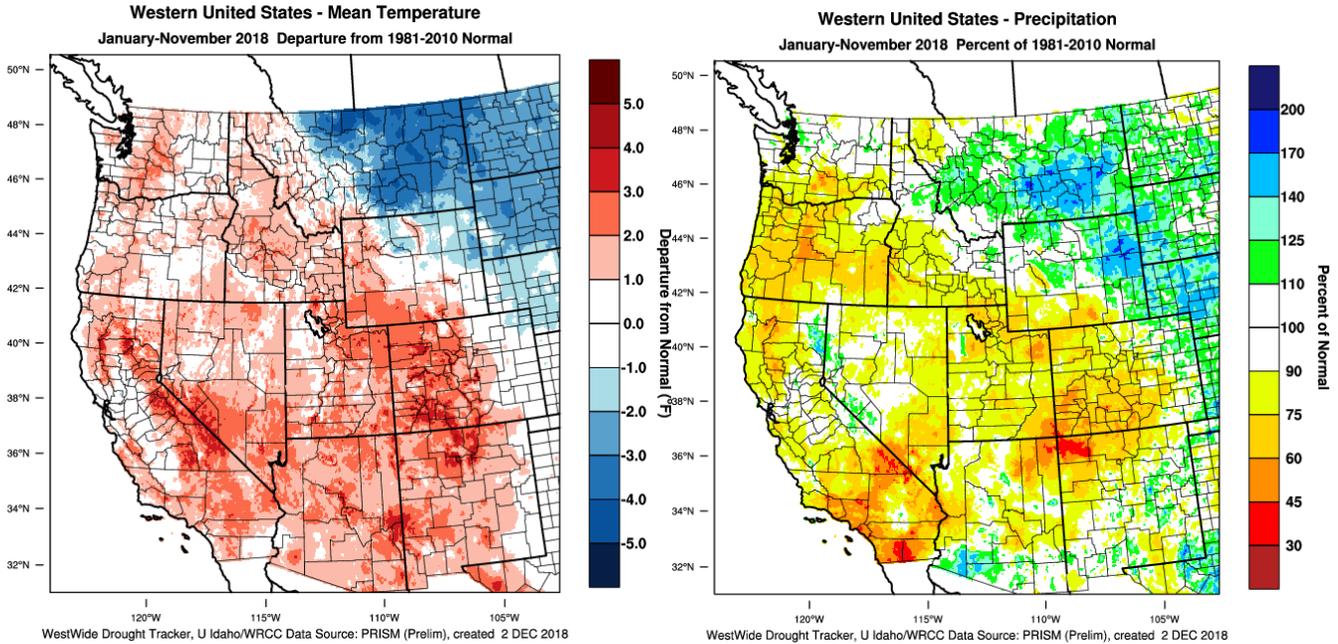
November brought relatively mild conditions to the western US with much of the coastal areas, western valleys, and Sierra Nevada and Cascade mountains seeing temperatures 0.5-4.8°F above normal (Figure 1). The interior west from eastern Washington south through Oregon, Idaho, and Nevada was closer to average for the month, while the Rockies were largely colder than average. Except for south Florida, the rest of the country was much cooler than average (not shown). The collective anticipation for a sustained start to our winter season precipitation did not fully materialize in November with the bulk of the western US moderately to substantially drier than average (Figure 1). However, portions of central California from the coast across the central valley and into the foothills, along with the Olympics and the northern Cascades did see above normal precipitation for the month. Portions of the rest of the country saw moderately dry conditions from the southwest into the Great Lakes while the northern Plains, the south, southeast and into New England were much wetter than average for the month of November (not shown).



**Figure 1** – Western US November 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

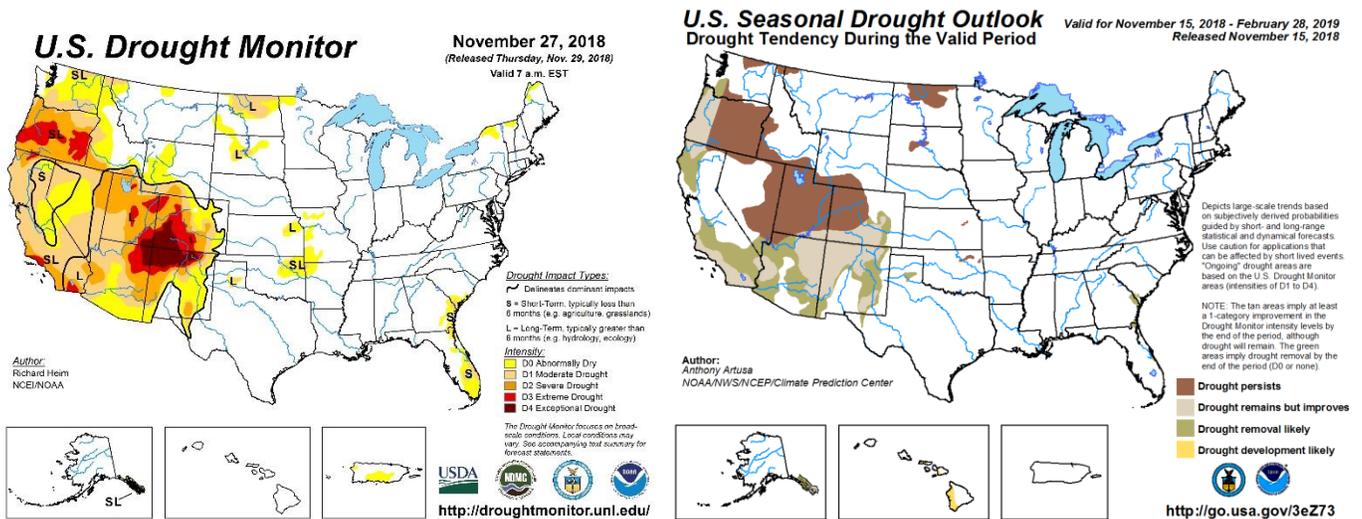
Year to date temperatures for 2018 temperatures have been largely warmer than average throughout the western US (0.5 to 3.5°F) with a striking transition to cooler than average east of the Rockies (Figure 2). The northern Plains and western Great Lakes will likely end up having a cooler than average year as the region is currently running 1-3°F below normal (not shown). Near normal temperatures have been seen south into Texas while the southeast and east

coast have been warmer than average for the year to date (not shown). Year to date precipitation continues to show a flip-flop of a dry western US (Figure 2) and a wetter than average eastern US. The driest regions are Southern California across into the desert southwest and Four Corners region where 15-45% of normal has been seen (see the Drought Monitor below). Wetter than average conditions to date in the eastern US are largely the result of an active hurricane season (not shown).



**Figure 2** – Western US 2018 year to date temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

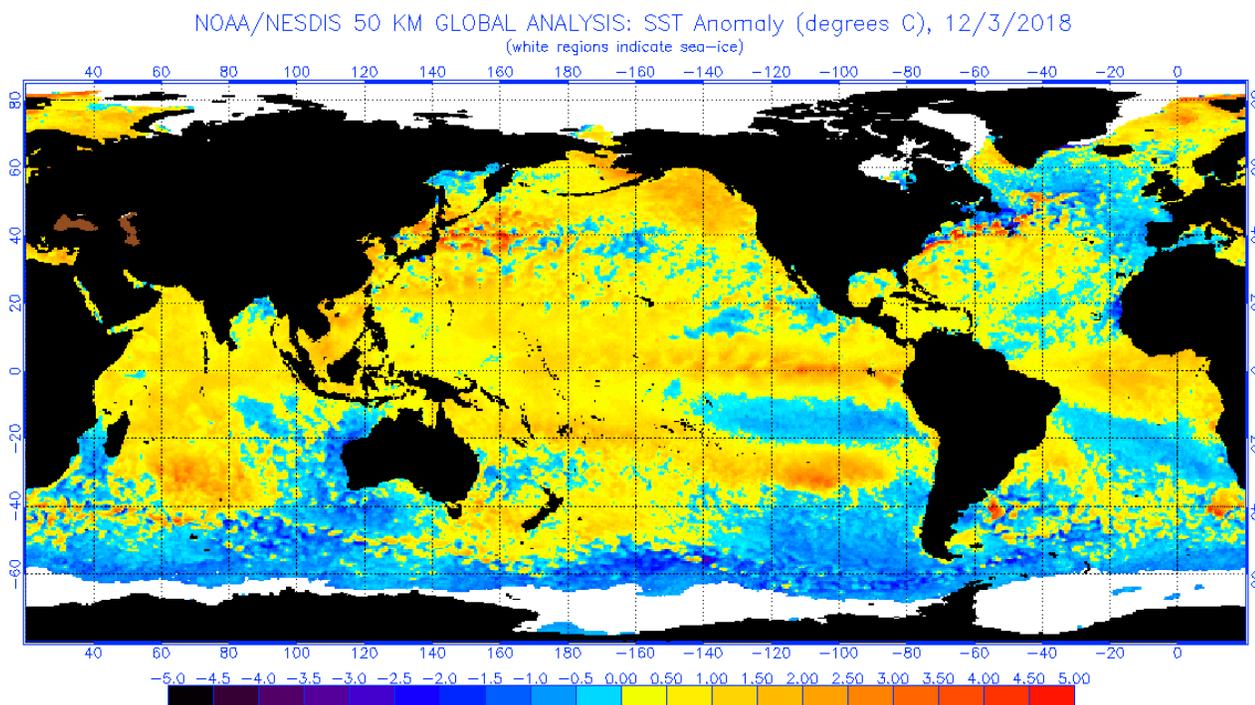
**Drought Watch** – As winter continues to unfold with the hope for plenty of rain and snowpack development in the mountains, the overall dry conditions for the vast majority of the western US are unfortunately continuing (Figure 3, left panel). The current US Drought Monitor shows that the drought footprint has continued its decline as much of the central to eastern US has received enough precipitation to have no widespread drought. However, the western US continues to see drought conditions with the main areas of severe to extreme drought over the Four Corners region and the desert southwest with further increases in severity seen in Oregon. The longer-term outlook for the US through February shows some changes, especially in the western valleys of the PNW and much of California which



**Figure 3** – Current US Drought Monitor and seasonal drought outlook.

will likely see some improvement or complete drought removal in over the next three months. However, much of the long-term persistent drought seen in eastern Oregon, Idaho, and the Great Basin is expected to continue (Figure 3, right panel). The eastern half of the US is largely free of any current or ongoing drought conditions.

**ENSO Watch**—Signs of El Niño development continue as we progress further into winter with east-central tropical Pacific SSTs warming to El Niño levels (Figure 4). Both surface and subsurface waters also continued to be markedly warmer than average, however, the atmospheric variables over the region have shown mainly ENSO-neutral patterns. Only lower-level wind anomalies averaged weakly westerly in the eastern Pacific providing a suggestion of El Niño conditions in the atmosphere. The official Climate Prediction Center (CPC) outlook calls for an 80% chance of El Niño prevailing during winter, and a 55-60% chance of continuing into spring 2019. As such the CPC has indicated that an El Niño watch is in effect. New forecasts of statistical and dynamical models collectively show continuing El Niño-level SSTs, most likely weak to moderate in strength, continuing through spring. If these conditions for El Niño development continue to hold, the weather across the western US will likely continue to follow the warmer and drier than average conditions in the 90-day forecast (especially in the PNW) and beyond (see forecast periods below and Appendix Figure 1).



**Figure 4** – Global sea surface temperatures (°C) for the period ending December 3, 2018 (image from NOAA/NESDIS).

**North Pacific Watch** – The North Pacific and the Gulf of Alaska continue to warm to record levels with the upper 300ft of the North Pacific Ocean north of 40°N now warmer (relative to normal) than at any time in the modern data record (1980-present). The current North Pacific sea surface temperatures (SSTs) have had a strong influence over our fall and start of winter conditions, but the spatial pattern is not quite what we saw with the ‘Blob’ in 2012-2016 as the bulk of the warmth is a little further to the west (Figure 4). I also think that the warming North Pacific will likely interact with the warming Tropical Pacific (see above) to enhance the normal weather/climate patterns in the west during El Niño years (see the DJF forecast below).

#### **Forecast Periods:**

**6-10 Day (valid December 3-13):** Current conditions are favoring a colder than average week due to a split flow in the atmosphere with the PNW being cooler than average while California is near average. Conditions should warm to average or slightly above average through the 13<sup>th</sup> for the PNW and coastal California while the interior Great Basin is likely to trend cooler than average. The split flow will bring a wet week to most of California, but keep the PNW dry

through the 8<sup>th</sup>, then wetter through the 13<sup>th</sup>. The northern and central Rockies into the Great Plains and the Great Lakes is forecast to be warmer than average over the short-term while the bulk of the south, southeast and eastern seaboard are forecast to be cooler than average. In terms of precipitation, the northern tier of the country is forecast to be drier than average for this time of year, while the south and southeast are forecast to be wetter than average during this period.

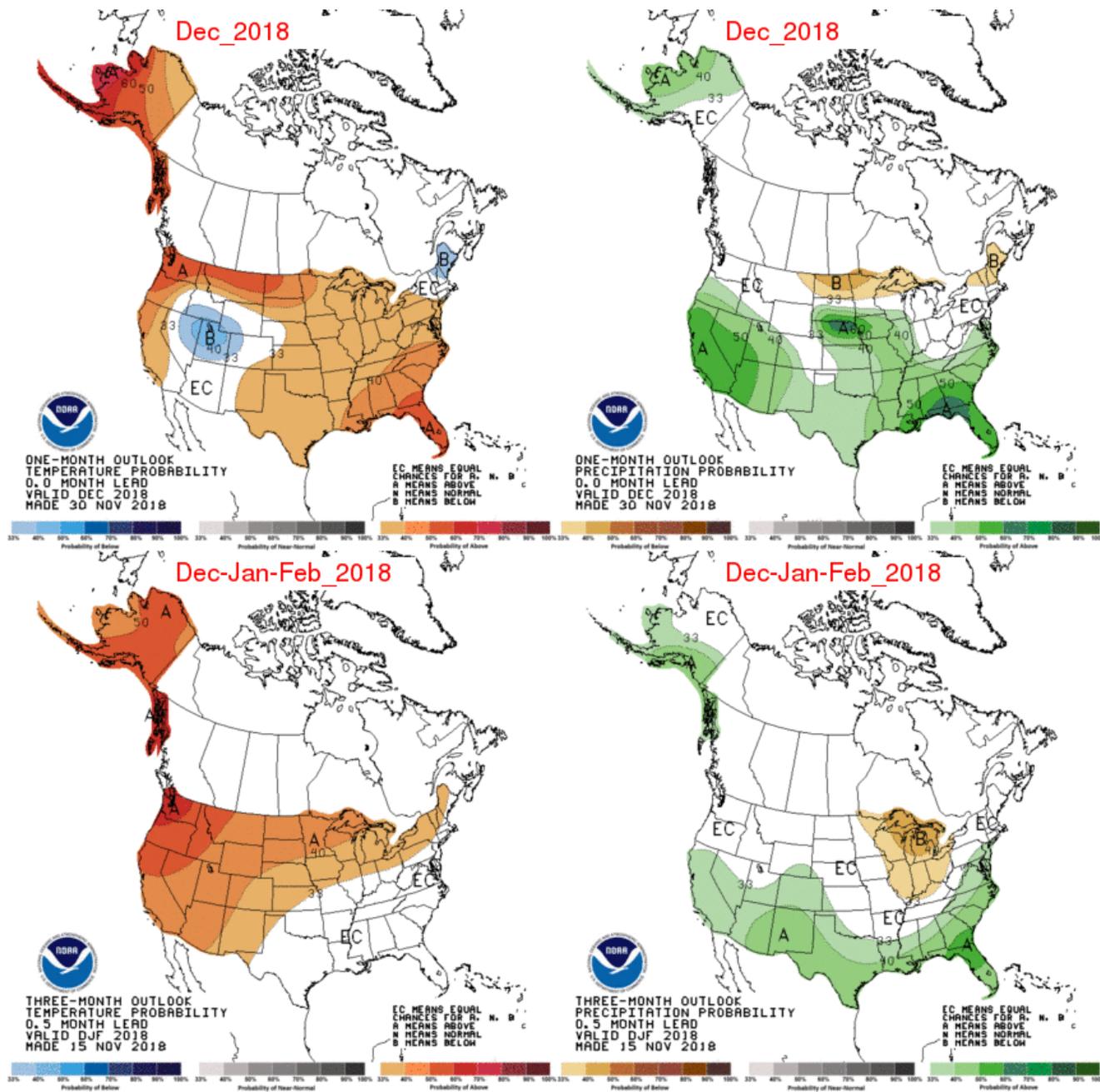
**8-14 Day (valid December 11-17):** Temperatures through mid-month are forecast to be near normal to slightly warmer than average along the west coast and into the PNW. The intermountain west and Four Corners region is forecast to remain cooler than average while the rest of the country is expected to see warmer than average temperatures, especially in the Great Lakes. The main change for precipitation through mid-month is that the entire country is likely to see near normal to above normal precipitation for this time of year. The PNW is forecast to have a greater chance of above normal precipitation, while California is forecasted to be closer to average.

**30 Day (valid December 1-31):** The broader pattern forecasted for the entire month follows closely the expected conditions through mid-month (see above). Except for the intermountain west and Four Corners region, the rest of the United States is forecasted to see a warmer than average December. The PNW and Florida are forecasted to have the greatest chance to see a moderately warmer than average month. The December precipitation forecast tilts the odds for the northern PNW to be near normal for the month, while the southern PNW and all of California and the desert southwest is forecast to experience a wetter than average month. The majority of the rest of the country is forecast to see above normal to near normal precipitation for the month, except the northern Plains and northeastern New England which is forecast to see a drier than average month.

**90 Day (valid December-January-February):** The extended forecast into the heart of winter continues to hold from prior months and continues to be largely based on the developing El Niño in the Tropical Pacific (see above). Conditions normally seen during El Niño winters and reflected in the DJF forecast are a warmer than average PNW and Alaska. The difference with the current DJF forecast is that much of the rest of the country is expected to be warmer than normal, except the southeast which is forecast to see near normal temperatures during this three-month period (see Appendix Figure 1). In terms of precipitation, much of the northern tier of states from the PNW across into New England are forecasted to have an equal chance of being above, normal, or below, except for the Great Lakes which is forecast to be drier than average. The southern states from Southern California across the desert southwest to the southeast and extending up along the east coast are forecast to see a wetter than average middle of winter, which parallels the historic pattern seen during El Niño winters (see Appendix Figure 1).

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**Appendix Figure 1** – Temperature (left panel) and precipitation (right panel) outlooks for the month of December (top panel) and December, January, and February (bottom panel) (Climate Prediction Center, climate.gov).