

# Weather and Climate Summary and Forecast

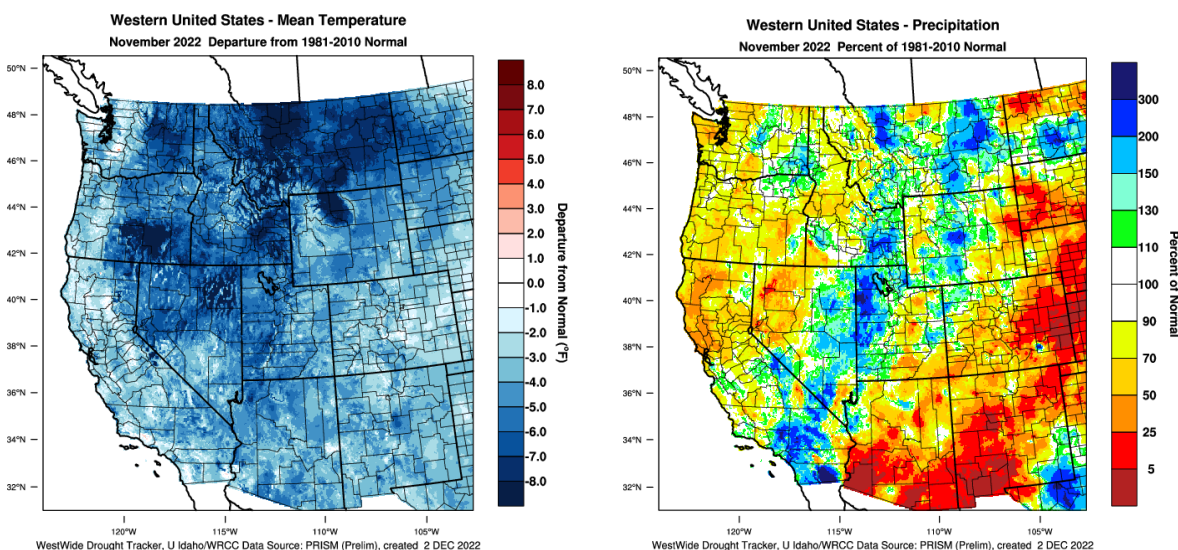
## December 2022 Report

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December 3, 2022

### Summary:

- Winter arrived with a much colder than average<sup>1</sup> November across the western US.
- After a wet start to November, precipitation amounts ended up largely below average for much of the west, although some areas in the inland PNW, southern California, the Great Basin, northern Rockies, and Plains did see a wetter than average month.
- Drought conditions have improved slightly, but the western US remains over 90% in some level of drought. The winter forecast points to drought improvement for the PNW but little change elsewhere in the west.
- The December forecast favors a continuation of the colder than average to average temperatures seen in the second half of November. The storm track does favor a wetter than average month for most of the west, but drier conditions are forecast the further south one goes.
- La Niña conditions continue in the Tropical Pacific with models pointing to the conditions staying in place through late winter to mid-spring, then transitioning back to neutral in late spring to early summer. With La Niña conditions in place and the negative phase of the PDO in place, the overall forecast continues to point to the PNW likely seeing a cooler/wetter winter, while California is more likely to be drier with near-average temperatures during the winter. The transition line is unknown, but it appears that the southern Oregon and northern California zone is the likely pivot point.

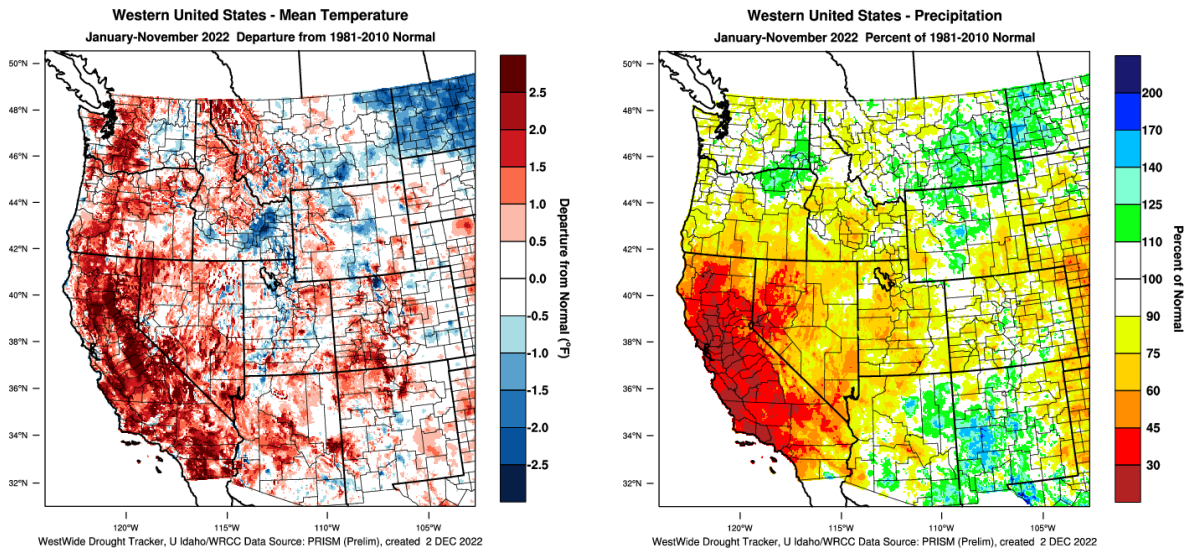
After a very warm end of the vintage, November produced much colder than average conditions with temperatures 1-8 degrees below average, especially in the inland and northern portions of the western US (Figure 1). Temperatures were closer to average or 1-2 degrees cooler than average west of the Cascades and Sierra Nevada mountains. While many areas saw some precipitation during the month, much of the west saw continued dry conditions with less than 70% of average for the month (Figure 1). A wetter than average month (110-250%) was experienced from southern California northeast through portions of the Great Basin, northern Rockies, and into the Plains. After an active monsoon season, the southwest saw an extremely dry month. While the west was colder than average, the east was warmer than average with the southeast, mid-Atlantic, and New England seeing temperatures 1-6°F above average for the month (not shown). In terms of precipitation, most of the rest of the country was drier than average with only portions of the northern Plains, western Great Lakes, Texas, and Florida seeing above-average rainfall during the month (not shown).



**Figure 1** – Western US November 2022 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

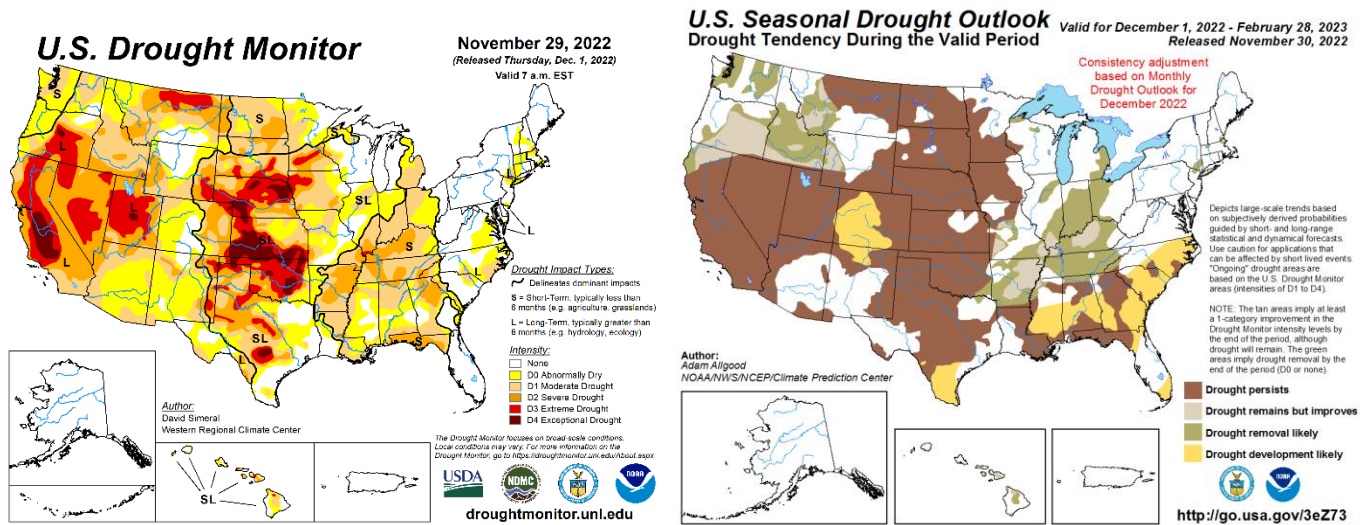
<sup>1</sup> Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise. Also, note that the 1991-2020 climate normals are starting to become available across reporting agencies and will be used in this report when possible.

Year-to-date the western US is running largely above average (Figure 2), although northern coastal zones, portions of the inland PNW, and areas throughout the Great Basin and Rockies remain closer to average or cooler than average. East of the Rockies the northern Plains into the western Great Lakes have seen a colder than average year-to-date with temperatures running 1-3 degrees below average (not shown). The rest of the eastern US from Texas across the south, southeast, and up the east coast has had a largely warmer than average year so far. Year-to-date precipitation amounts in the western US show that a substantial area has seen 90% or less of average which has continued the broader drought conditions in the west (see Drought Watch). Portions of the inland PNW, northern Rockies and Plains, along with Arizona and New Mexico have experienced a near-average to roughly 150% of normal precipitation for the year. For the rest of the country, year-to-date drier than average conditions continue for many regions adding to the broader drought issues for the country (see the Drought discussion below). However, many areas across the northern Plains, portions of the Great Lakes, the mid-South, and into Florida have largely been near average to wetter than average for the year (not shown).



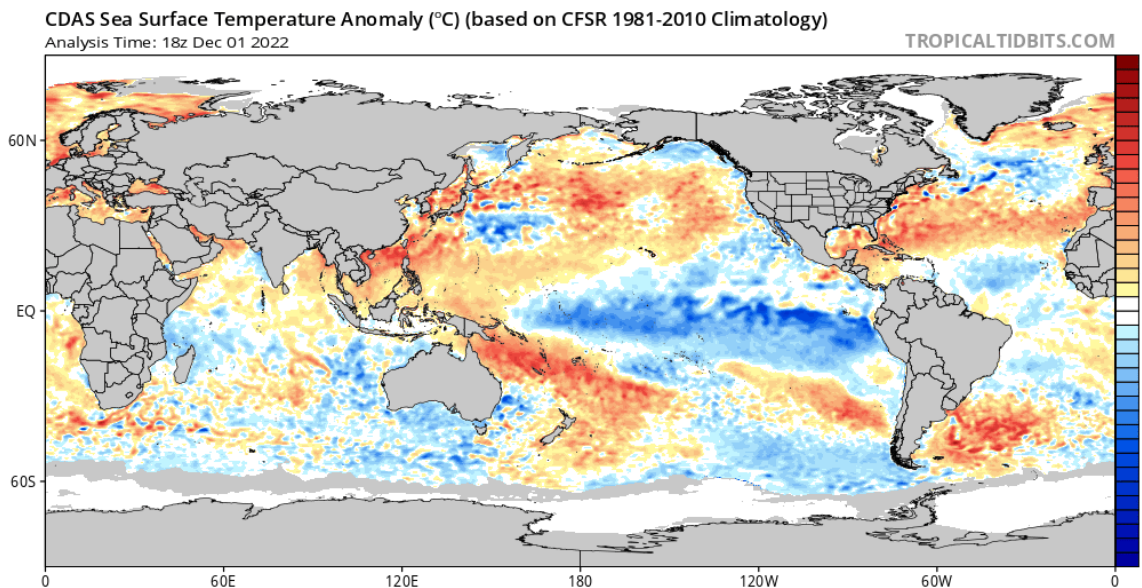
**Figure 2** – Western US year to date (January-November 2022) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

**Drought Watch** – Moving into the winter months the current drought map of the United States (Figure 3) continues to depict a significant portion of the country is in some level of drought. Currently, nearly 80% of the country in some level of drought with over 30% of the country in severe, extreme, or exceptional drought conditions. These are slight improvements from the start of fall. While November saw some precipitation in the west from the active jet stream pattern, blocking did keep amounts below average for many in the west. The result is that drought conditions are still holding to record area coverage with the overall drought footprint in the western region continuing to be over 90%. Fortunately, the most extreme categories of drought (extreme and exceptional) continue to remain under 20%. Washington has over 90% of the state in some level of drought, but still has no areas in the state in the most extreme drought categories. Oregon also continues with over 90% of the state in some level of drought with the eastern and southern portions of the state remaining in extreme categories (>25%). California continues to have 100% of the state in some level of drought with the most extreme drought conditions decreasing slightly to just over 40% during the last 30 days. Drought levels have also worsened over much of the Great Basin of Nevada and Utah. The seasonal drought outlook for the middle of winter (Figure 3, right panel) shows some potentially good news but continues to show both short and long-term drought issues for significant areas of the west. A wet first half of winter forecast for the PNW (see forecasts below) has the outlook lowering the severity or removing drought altogether in the region. Drought levels in Arizona and New Mexico have improved, although other areas of the southwest remain dry or are forecast to move into drought conditions through winter (Figure 3 and see forecast section below). The Plains are forecast to see drought persist during this period while portions of the southeast are forecast to see drought develop, however, the Ohio River valley is forecast to see some drought improvement or removal during this period.



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

**ENSO Watch** – The tropical Pacific continues in a La Niña state with SSTs in the central-eastern equatorial Pacific remaining below average (Figure 4). Following from these cool SSTs, the evolution of other key oceanic and atmospheric variables is consistent with La Niña conditions. As such the Climate Prediction Center (CPC) is continuing the La Niña Advisory. Modeling efforts also continue to predict SSTs remaining below average during winter, and then returning to ENSO-neutral levels during late spring to early summer. The official outlook from numerous agencies confirms this forecast with the outlook calling for La Niña continuing with high probability during December through February but decreasing thereafter. La Niña conditions are contributing to the model forecasts and applied research that point to the PNW likely seeing a cooler/wetter winter, while California has higher odds to be drier during the upcoming winter and near average for temperatures (see the 90-day forecast below).



**Figure 4** – Global sea surface temperatures (°C) for the period ending December 1, 2022 (image from Tropicaltidbits.com).

**North Pacific Watch** – The pattern in North Pacific SSTs has remained spatially consistent over the last month (Figure 4). The near-shore areas of the Gulf of Alaska continue cooler than average with circulation over the region helping to mix cooler waters to the surface. Warm SSTs still exist over a large area in the central North Pacific, and cooler SSTs are occurring southwest from California and across the ENSO zone showing a classic La Niña pattern in tropical SSTs (see above). These conditions have the Pacific Decadal Oscillation in a strong negative phase, where it has been for many months now. This type of pattern in cooler North Pacific SSTs supports the seasonal forecast showing the tendency for a



cooler/wetter PNW, transitioning to cool and near average precipitation in northern California and to slightly cool and dry overall during the winter in most of the rest of California.

#### **Forecast Periods:**

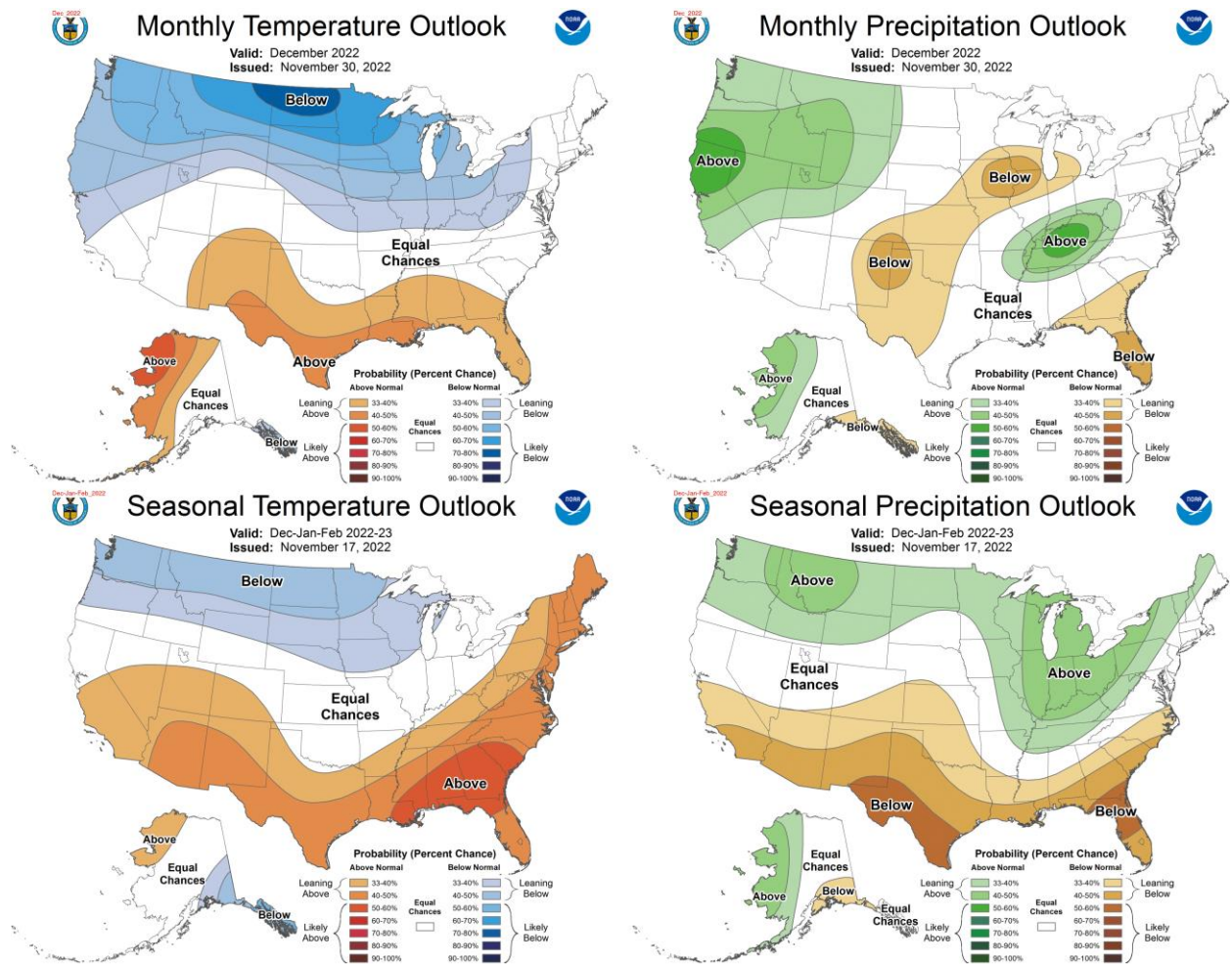
**Next 5 Days:** Cold and wet over the next five days up and down the west coast. Rain and snow chances are off and on over the next few days, extending from the Puget Sound to at least central California. Temperatures in most locations will be cold enough for mid to even low-level snow in many areas. Cold temperatures will likely bring off and on fog across much of the western valleys in between storms.

**6-10 Day (valid December 8-12):** Continued colder than average temperatures are highly likely over the entire western US. Precipitation during this forecast period is expected to be near to above average for most of the western US with central California, Oregon, and Nevada having the greatest chance for wetter than average conditions. While the west is colder than average, the south and southeast are forecast to see a warmer than average period with the Great Lakes into New England expected to see closer to normal temperatures. Shifting eastward, above-average precipitation is forecast across Texas and into the Midwest, while the eastern seaboard is expected to see near average precipitation.

**8-14 Day (valid December 10-16):** Overall pattern continues from the last forecast period into mid-month with cold conditions likely across the west with the greatest likelihood in the inland PNW and northern Rockies. Precipitation amounts are forecast to shift to near normal or drier for the PNW and a slight chance of seeing above-average amounts in California. Temperatures are likely to shift to below average in the east, with closer to normal or above average temperatures from Texas across to Florida. The precipitation forecast for the east is pointing to a wetter than average central US and New England, near normal eastern US, and a drier than average period in Florida.

**30 Day (valid December 1-31):** Both the December and the December-January-February forecast (Figure 5) are showing what most are pointing to ... a classic La Niña pattern for temperatures and precipitation. For December the forecast points to the PNW across the northern tier of states to the Great Lakes likely staying below average to average in terms of temperatures, while the middle to southern states from California across to the mid-Atlantic are likely to experience a closer to average to a warmer than average month. For precipitation, the forecast for the month is calling for above average amounts from central California into the PNW and across into the northern Rockies. Southern California across into the southwest, and up into the northern Plains and Mississippi river valley are forecast to see near average to below average precipitation for the month. Above average precipitation is anticipated in the Ohio River valley while Florida and the southeast is expected to see a drier than average month (Figure 5).

**90 Day (valid December-January-February):** As mentioned above, the seasonal forecast for winter continues to hold from previous forecasts and reflects the expected influences of the triple dip La Niña and negative PDO on precipitation and temperatures (Figure 5). The PNW across to the northern Plains is expected to see below-average temperatures, while just southward of these areas near average temperatures are forecast, which then gives way to the rest of the country likely experiencing a warmer than average DJF period (Figure 5). For precipitation, the pattern of a drier southern tier of states, then equal chances of slightly above to slightly below for the central zone of the country, then above average for the PNW across the northern Plains and Great Lakes to New England holds from December through to February (Figure 5).



**Figure 5** – 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).

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