

Weather and Climate Summary and Forecast

January 2018 Report

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Summary:

- A persistent ridge of high pressure over the west in December produced strong inversions and stagnant air resulting in cooler conditions in the valleys and warmer conditions in the mountains. Another result of the ridge is that the month will go down as one of the driest Decembers on record in many locations in the west.
- The persistent ridge appears to be close to breaking down as of this report and will likely usher in more seasonally normal precipitation patterns in the west and bring a much needed warm up to the east.
- The seasonal forecast from January through March continues to tilt the odds to winter being cool/wet in the PNW and cool to average and dry in California. However, it takes a lot to make up for a dry December and while a near normal snowpack could still arrive for many areas, the odds of a normal winter for precipitation decreases daily and is currently running around 20% for central to southern California, increasing to 50-70% in northern California and Oregon, and to 70-100% in Washington.

The development and longevity of the ‘ridiculously resilient ridge’ of high pressure over the west coast provided the signature for the weather conditions in December 2017. Across the west temperatures were largely cooler than normal in the valleys and warmer than normal in the higher elevations (Figure 1). This is due to higher pressure causing stagnant air, and an increased frequency and intensity of inversions throughout the region. Warmer than average conditions (2-7°F above normal) were seen across the west and especially in the Rockies and desert SW. Precipitation in December also showed the prominence of the ridge with the vast majority of the western US being substantially below average (Figure 1), with much of California and the desert SW seeing 25 percent of normal or less for the month further exacerbating drought conditions (see the drought section below). The only exception to this pattern was in the Northern Rockies where precipitation accumulations of 200% or more above normal were seen. For the rest of the US the Great Plains and southeast experienced above average temperatures in December while the Great Lakes and New England saw very cold conditions that have continued through to the first week of January

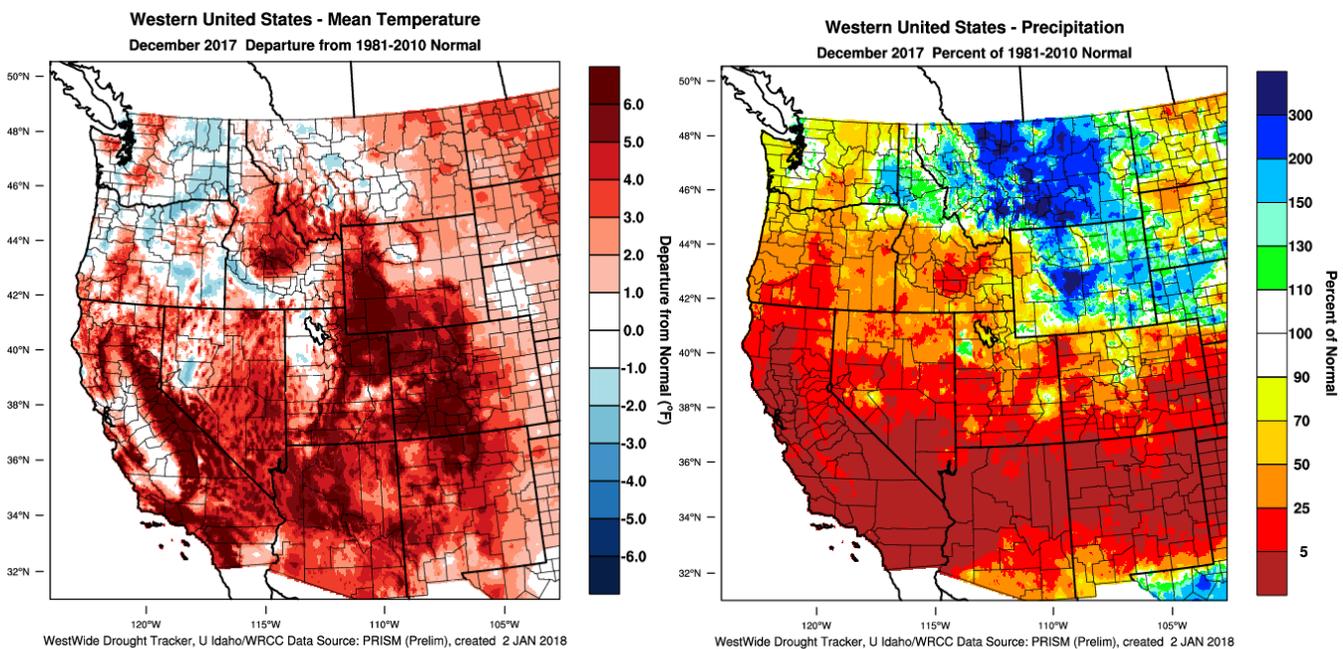


Figure 1 – Western US December 2017 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

(not shown). Precipitation amounts were mixed across the rest of the US with portions of Texas across to the southeast seeing wetter than average conditions while the Ohio River valley and into New England were drier than normal.

With the end of the year, the final 2017 temperature pattern for the western US shows a mostly warmer than average to near average year (Figure 2). These conditions extend across the entire US with the exception of Eastern Washington and Oregon, which have had the only cooler than average year in the entire country. Although the complete year end statistics have not been published yet (these will be detailed in February), early evidence points to 2017 being a top five warmest year in the US and globally, while likely ending up the most expensive weather year ever due to numerous impacts from hurricanes, heat waves, and fires! In terms of precipitation the year ended up wetter than average in central California north throughout most of Oregon, Washington, Idaho, Wyoming, and western Montana (Figure 2). Dry conditions in 2017 (30-80% of normal) were seen across eastern Montana along with Southern California, across the southwest, and into the Four Corners region. Nationwide, 2017 ended up wetter than average across much of the eastern half of the US (not shown). Drier than average conditions in 2017 were seen in the northern Plains, portions of west Texas, the central Mississippi River Valley and the mid-Atlantic (not shown).

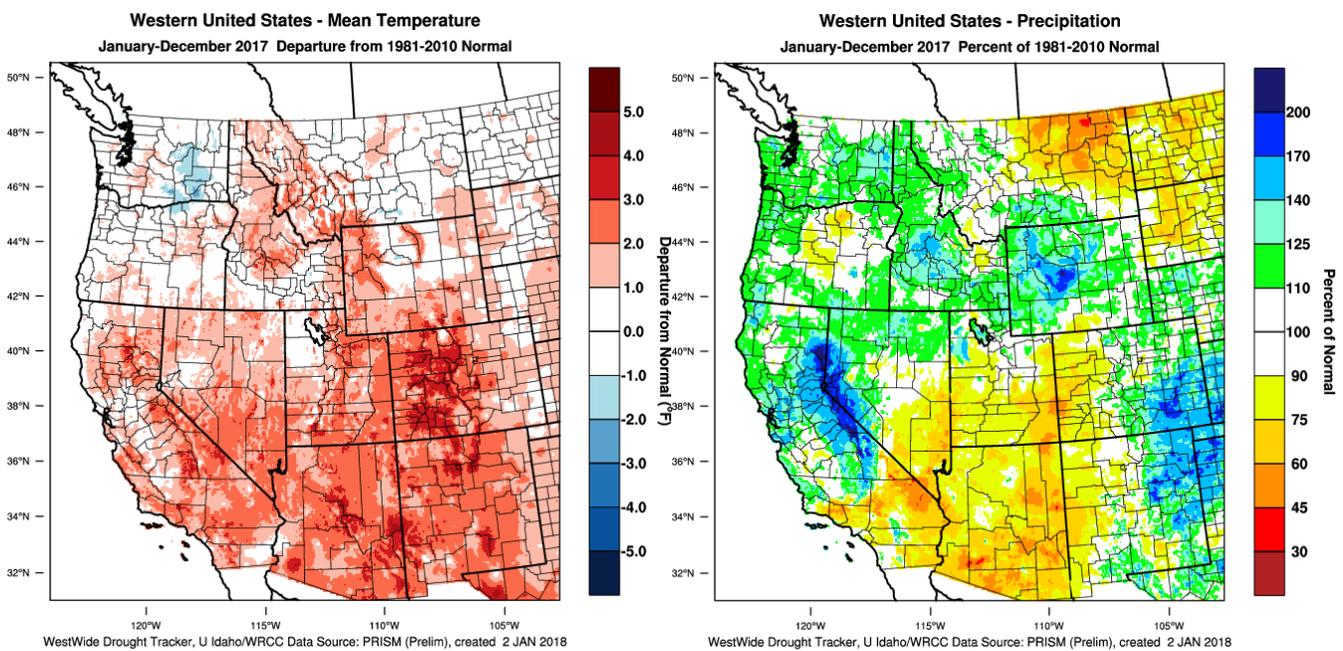


Figure 2 – Western US January-December 2017 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Drought Watch – December brought some changes in the broad observed and forecasted patterns of drought across the US. Due to the very dry conditions in the west, significant areas of Southern California, Arizona and the Four Corners region, and across Texas and the southeast have seen their drought conditions intensify and expand to show moderate to severe drought (Figure 3; left panel). The northern Plains also continue to show moderate to extreme drought while broad areas across the south and into the middle Atlantic states have seen drought develop. The US seasonal drought outlook (Figure 3, right panel) forecasts that the driest regions that remain in California and Arizona will likely persist through the end of March with additional area forecast to show drought development. The seasonal forecast is also showing drought development in large areas from Texas to the Gulf Coast that that is largely due to the current La Niña forecast (see below). The drought conditions are likely to get better in some areas of the northern Plains, but continue in the driest areas of eastern Montana and the western Dakotas.

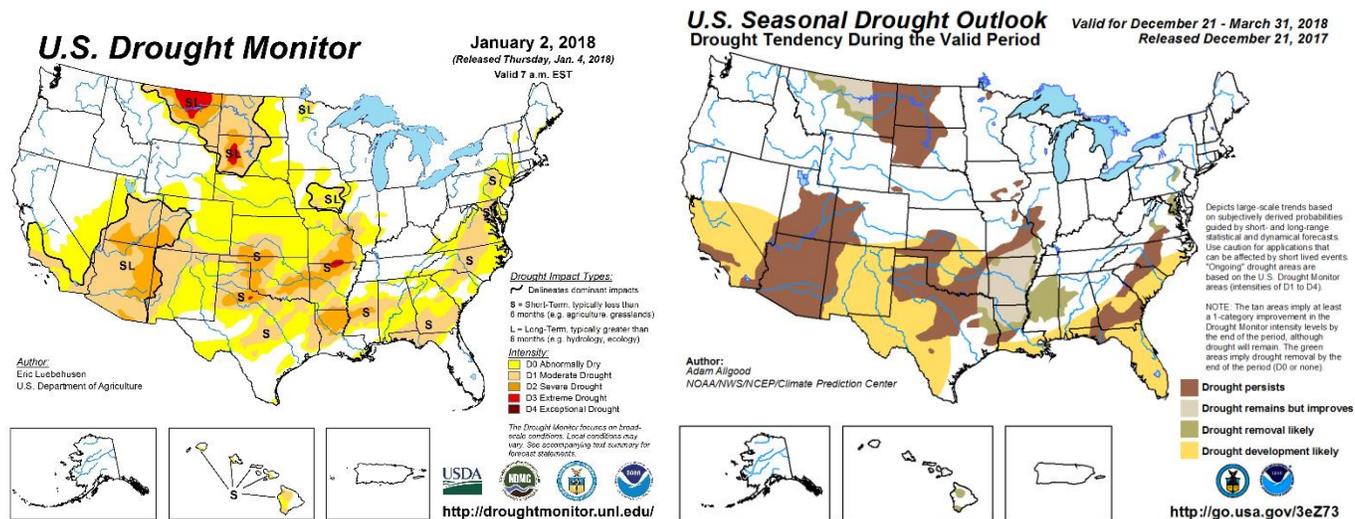


Figure 3 – Current US Drought Monitor and seasonal drought outlook.

La Niña Watch – In mid to late December 2017, the tropical Pacific continued to reflect La Niña conditions, with SSTs in the east-central tropical Pacific in the range of weak to moderate La Niña and all atmosphere variables showing patterns suggestive of La Niña conditions. The collection of latest ENSO prediction models indicates weak, but not far from the threshold of moderate, La Niña as the most likely scenario for the Northern Hemisphere winter, lasting into spring. The official CPC/IRI outlook favors continuation of La Niña through the middle or late spring. Given the current atmospheric and oceanic conditions (Figure 4), along with model forecasts, additional forecaster consensus favors the continuation of weak La Niña conditions through January-February-March. As mentioned in previous reports, I believe if the forecasted conditions hold true, the next few months will be warm and dry in the southern half of the US; wet and ‘coolish’ in the north (see forecast periods below and Appendix Figure 1).

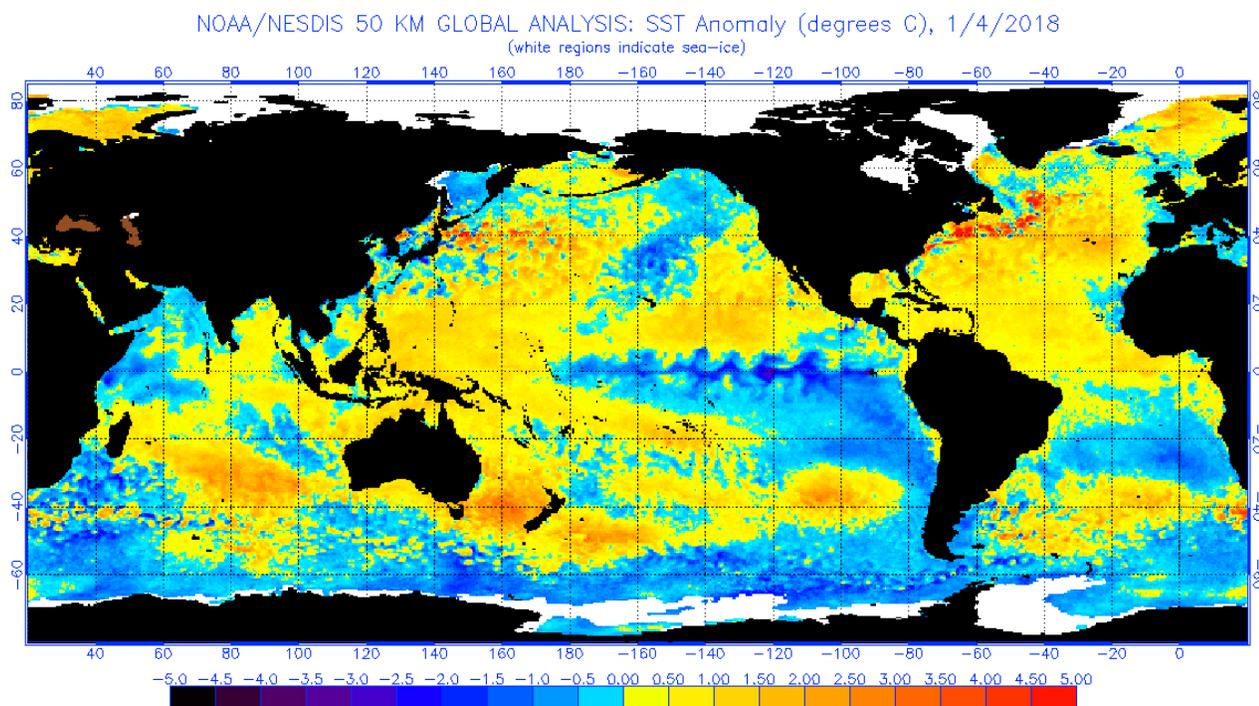


Figure 4 – Global sea surface temperatures (°C) for the period ending January 4, 2018 (image from NOAA/NESDIS).

North Pacific Watch – Cooler waters in North Pacific SST remains from the Gulf of Alaska southwest into the central ocean basin while warmer waters are found along the west coast (Figure 4). This pattern still resembles the negative or cold phase of the Pacific Decadal Oscillation or PDO, a large-scale, long-term climate variability mechanism in the

North Pacific Ocean that is closely associated with El Niño-La Niña cycles. These conditions continue to show a North Pacific that more in phase with the Tropical Pacific. During conditions like this the expected role that each mechanism plays is typically more enhanced. Locally derived analog years for this season using the state of ENSO and the PDO indicate increased chances for near to below normal temperatures across the PNW during DJF, with the greatest possibility of below normal temperatures for Oregon and Washington areas east of the Cascades (see forecast below). These analogous years indicate increased chances for near to above normal precipitation, with above normal probabilities for mountainous areas, the Cascades westward, Northern California, highest for interior western Oregon. Points south into California and the desert SW have warmer and drier conditions in analogous years with La Niña and a cold phase PDO.

Forecast Periods:

6-10 Day (valid January 10-14): The western US is forecast to be a warmer than average through mid-month. The middle portion of the country, especially the upper Midwest and Great Lakes, and northern New England will warm up from the deep freeze of the last two weeks but likely remain in cooler than average conditions. The southeast will likely see some additional warming during this period. The western US is forecast to be normal to slightly drier than normal during through the middle of the month. The majority of the rest of the country is expected to be wetter than average with the exception of the Gulf Coast which has a high likelihood of being drier than average.

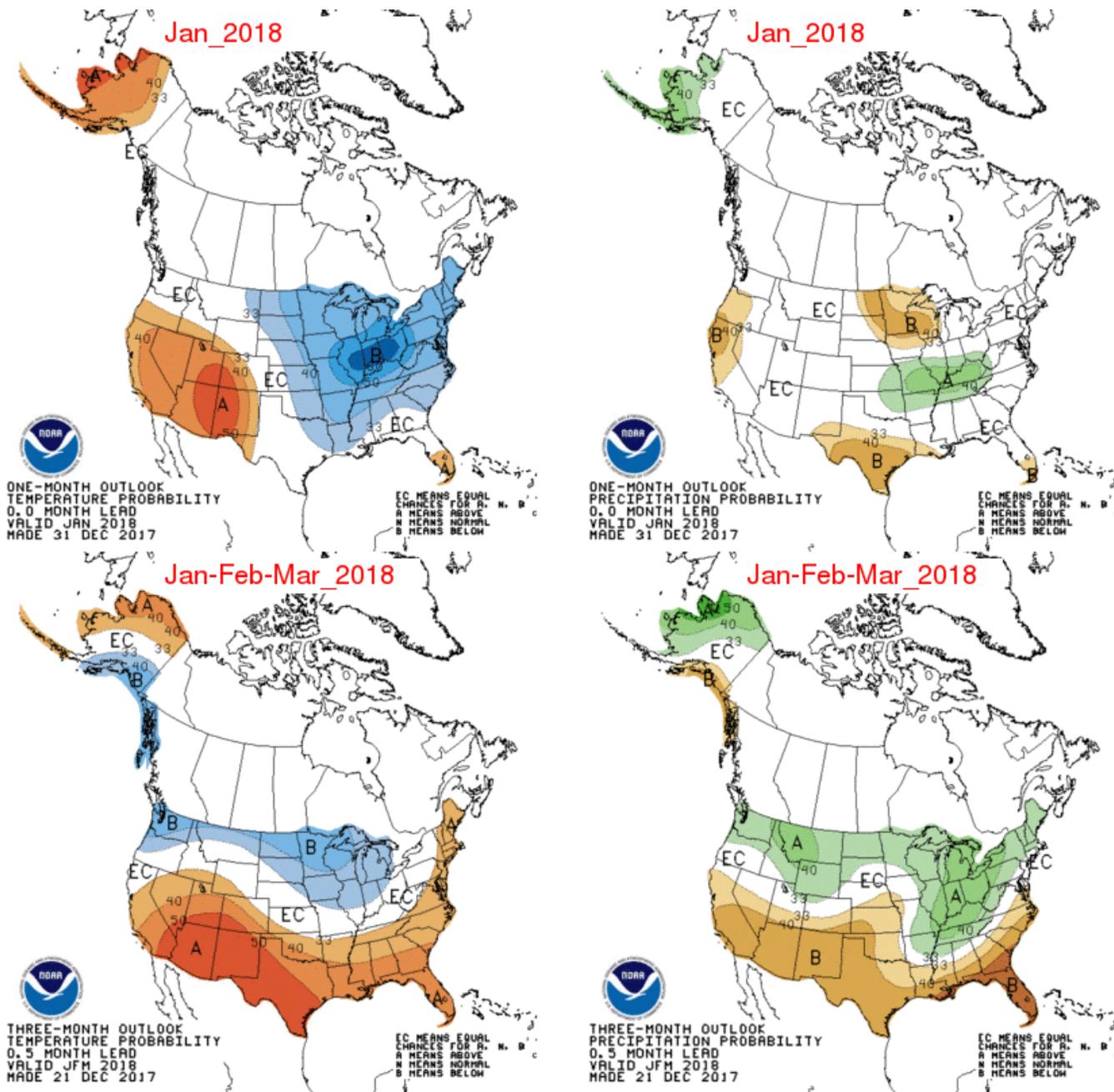
8-14 Day (valid January 12-19): Forecasted warmer than average conditions for the west coast increase in likelihood and magnitude while the area expected to be warmer than average expands to include the entire western half of the country. Moderate warming to normal or slightly above normal is forecast for the eastern half of the US. The PNW is forecast to see above-average precipitation during this forecast period, while California and the bulk of the Rockies into the Plains are forecast to be below normal for precipitation. The rest of the east coast if forecasted to see normal to slightly above normal precipitation.

30 Day (valid January 1-31): Dry conditions are likely to hold in California and the desert SW for the month, while the PNW is forecasted to have an equal chance of being slightly warmer to slightly cooler than average. Even with some warmer conditions later in the month, the entire eastern US is likely to end up being substantially colder than average for the month. Forecasted precipitation for the month is mixed nationwide with the majority of the country expected to end up near normal. Areas forecasted to likely be drier than normal include central California north into Oregon, southern Texas, and the western Great Lakes, while wetter than average conditions will likely be seen in the Ohio River Valley.

90 Day (valid January-February-March): The general forecast pattern of a warmer southern half of the US to cooler northern half of the US holds from previous long-term forecasts. Not much change through this 90 day forecast period for the west coast with a cooler than average PNW expected, equal chances to be slightly cooler to slightly warmer than average in Northern California and Southern Oregon, and warmer than average from central California south and eastward into the desert SW (see Appendix Figure 1). The precipitation forecast over the next 90 days includes the likelihood of the northern tier of states being above average transitioning to the southern tier of states likely being below normal. The west coast is expected to have a similar pattern with a wetter than average PNW and drier than average central to southern California. Northern California and Southern Oregon have an equal chance of being slightly wetter to slightly drier than average.

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