Weather and Climate Summary and Forecast
January 2024 Report

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Summary:

- December continued the warmer than average[1] start to the winter for the western US and likely helped cement 2023 as one of, if not the warmest years on record globally.
- December was also quite dry over much of the western US with only coastal zones in central California, portions of northern Oregon, and most of Washington receiving greater than normal precipitation for the month.
- While still drier than most would like, drought conditions have continued to improve over the western US.
- Mild to seasonal temperatures to start 2024, turning cold for most of the west through mid-month but January likely ending up near average for the west coast. Precipitation is forecast to be average to slightly above average for the month, although a little drier north and a little wetter south is anticipated.
- The Tropical Pacific remains in El Niño with a 54% chance of a "historically strong" event during the winter. These conditions are likely to persist into early summer and then transition to ENSO neutral. The North Pacific has warmed some but still remains out of phase with the warmth in the Tropical Pacific. The seasonal forecast is dominated by El Niño; however, I still think there is some wiggle room in the forecast for atypical conditions, especially later in the winter.

Past Month and for 2023:

Any day now we will be hearing from meteorology and climate agencies around the world that 2023 will end up as one of the warmest years on record and likely the warmest. December over the western US continued the overall trend ending up 1-7 degrees above average with portions of the northern Rockies and Plains 10-15 degrees above average (Figure 1). The month was also warmer than average for most of the country with only very isolated areas of the Gulf Coast and Florida seeing slightly below normal temperatures (not shown). December also ended up mostly drier than average with the majority of the west running less than 90% of average for the month (Figure 1). California north of Los Angeles to the North Coast, portions of southwest, and much of Washington had a wetter than average with upwards of 110-250% of average. However, the mountains across the west have started the water year with very low snowpacks. For the rest of the country, much of the Plains from northern Texas to the Canadian border was much wetter than average, followed to the east by drier than average conditions from south Texas to the Great Lakes, then a much wetter than average southeast to New England (not shown).

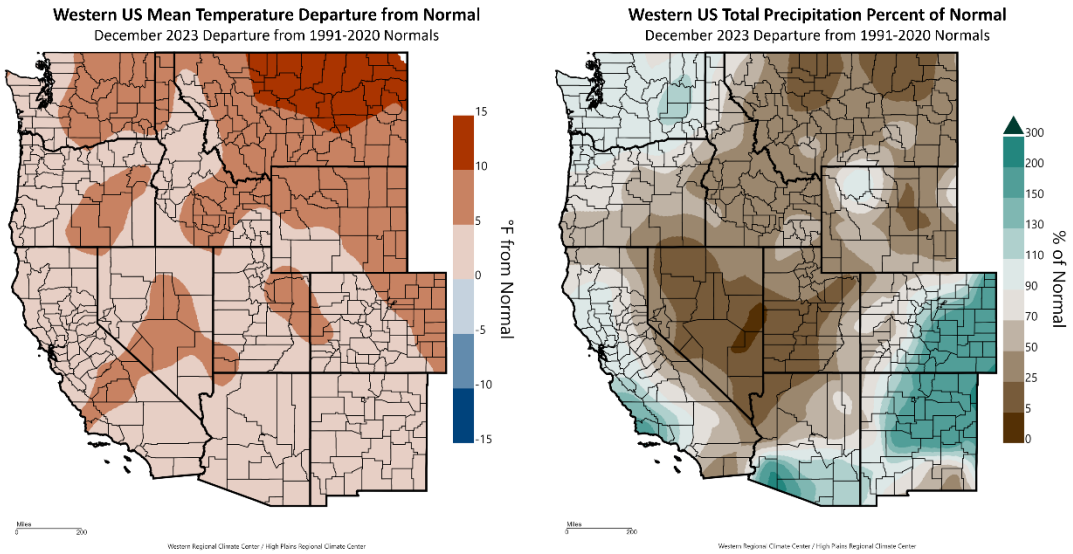

Figure 1 – Western US December 2023 temperature departure from normal (left) and percent of normal precipitation (right; images from Western Regional Climate Center, 2023: ACIS Climate Maps)

[1] Note that all references to normal or averages in this report are to the 1991-2020 climate normal for each weather/climate parameter unless stated otherwise. See this website (https://www.climateofwine.com/climate-normals) for more information on climate normal.

While 2023 will likely go down as one of the warmest years on record globally, portions of the western US ended up with a cooler than average year (Figure 2). A cool year was experienced from the Bay Area to southern California and toward the northeast into the Great Basin and Rockies with some areas as much as 2.5 degrees below average. Warmer than average temperatures were experienced in northern California, Oregon, and Washington across to western Montana with temperatures 0.5-3.0°F warmer than average for the year. East of the Rockies, the northern and central Plains experienced near average temperatures in 2023 while the rest of the eastern US from Texas to New England experienced annual temperatures 1-4 degrees above average (not shown). For the calendar year, precipitation amounts in the western US show a large area from southern to northern California, northeast into the Great Basin, Rockies, and Plains that experienced 110-220% of normal for 2023 (Figure 2). Northward and southward of this wetter than average area is the PNW and southwest, which in 2023 saw 50-90% lower than average precipitation. For the rest of the country, 2023 ended up wetter than average in portions of the Plains and Front Range of the Rockies while drier than average conditions left much of Texas, the Mississippi and Ohio river valleys into the mid-Atlantic in drought (see Drought discussion below). However, portions of the southeast, Florida, and New England ended up with a wetter than average 2023 (not shown).

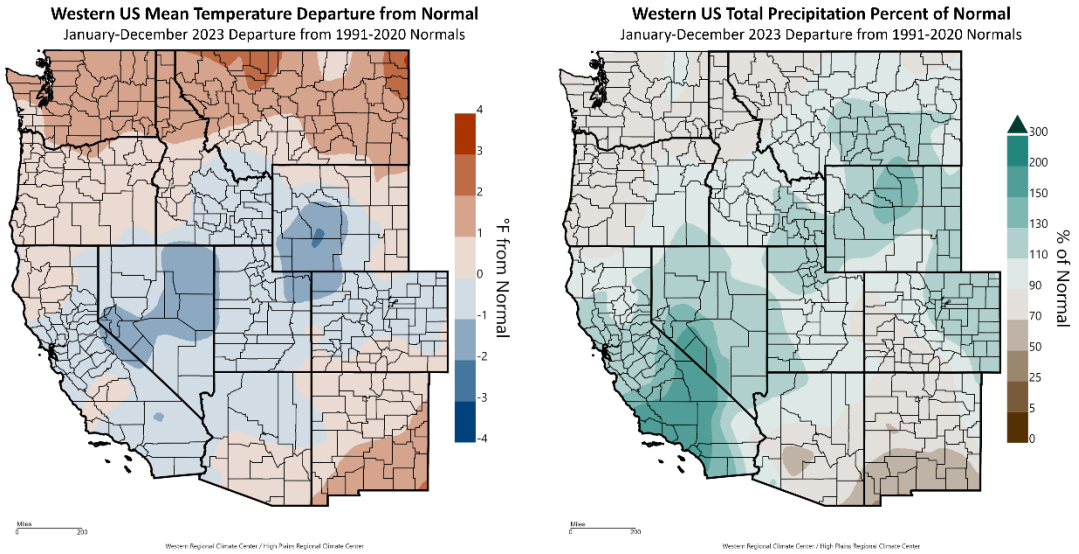

Figure 2 – Western US 2023 (January-December) temperature departure from normal (left) and percent of normal precipitation (right; images from Western Regional Climate Center, 2023: ACIS Climate Maps).

Drought Watch – The general pattern of drought in the continental US remains from last month, with strengthening in some places and reductions in others (Figure 1). A relatively wet month in some places (PNW) lowered the drought area and severity while drier conditions (Four Corners, Gulf states, and upper Midwest) resulted in some expansion and/or continuation of drought in the region (Figure 3). For the continental US, the overall drought footprint depicted in Figure 3 remains close to the same from last month with between 50-60% in drought and the most extreme drought categories remaining below 8%. For the western US, the overall drought footprint has risen slightly to just above 47% but the most extreme categories remain below 5%. Precipitation in December was enough to lower Washington's drought area to just below 58% of the state with the most extreme categories dropping below 2%. Similar to Washington, December precipitation in portions of Oregon (Figure 1) lowered the overall drought footprint to just under 53% and the extreme drought categories (severe, extreme, and exceptional) to just over 3%. Idaho saw a mixed month with the overall drought coverage increasing to just under 45% but with the most extreme drought categories (mostly in the northern portion of the state) dropping to roughly 5%. December precipitation in California was also spatially varied with some regions (south coast) getting substantial precipitation and the mountains seeing a very dry month. Overall, however, the drought level in California did not change much remaining just below 5% in some level of drought with no areas with the more extreme drought categories (Figure 3).

The seasonal drought outlook in Figure 3 continues to point to some regions of the US likely to have continuing drought concerns. The overall pattern of the seasonal forecast has not changed much from last month, although some improvement is forecast for many regions. Drought conditions remain in the south from Texas to the east coast (Figure

3; left panel) but improving conditions or complete removal from drought continues to be forecast for those regions. The Ohio River valley and upper Midwest is forecast to see drought develop and persist through the middle of winter. The desert southwest is forecast to remain in drought in the south and east of the area while the Four Corners and portions of the southern Rockies are forecast to improve or have drought declarations removed. The PNW is largely forecast to move out of drought but with portions of the northern Cascades and northern Rockies forecast to have drought persist or develop (Figure 3; right panel).

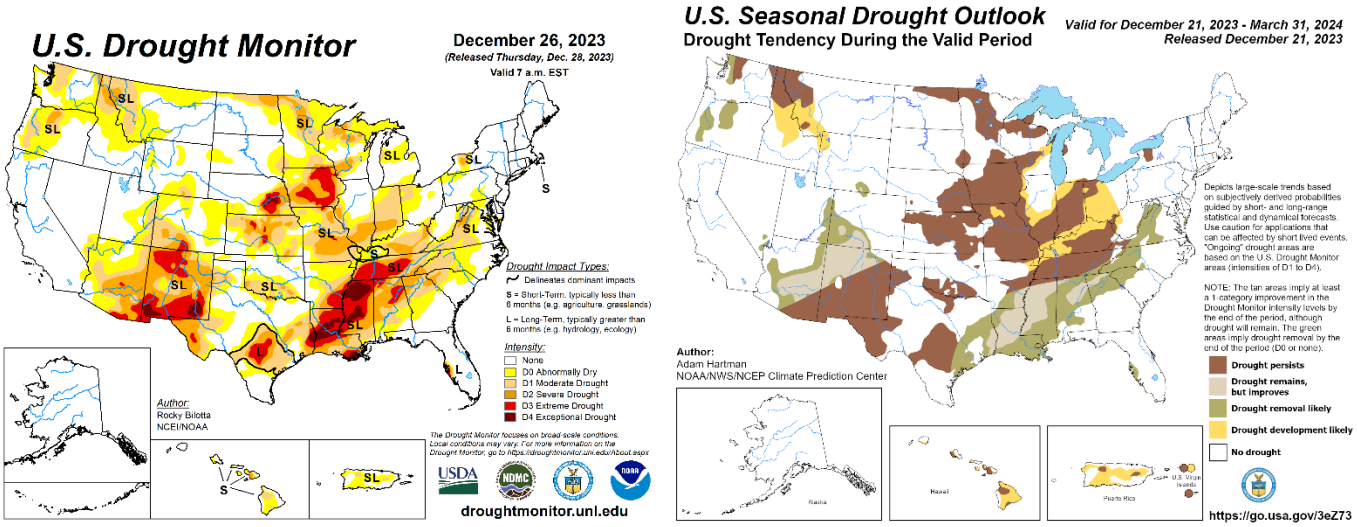

Figure 3 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – Sea surface temperatures (SSTs) remain above average in the central to eastern equatorial Pacific (Figure 4) along with a strongly negative Southern Oscillation Index (SOI; surface pressure anomalies) indicating that the coupled ocean-atmosphere system is reflecting a strong El Niño. The Climate Prediction Center (CPC) is continuing the El Niño Advisory and current modeling plumes forecast SSTs remaining above average during the first quarter of 2024, with a 54% chance of a "historically strong" El Niño during the Northern Hemisphere winter. Afterward, the forecast points to a return to ENSO-neutral levels during April to June 2024 (60% chance). The official outlook from numerous agencies confirms this forecast with the outlook calling for El Niño continuing with high probability. With this forecast holding for now, the current El Niño conditions are contributing to the seasonal model forecasts given below and applied research that both point to the PNW likely seeing a warmer/drier winter, while California has higher odds of being wetter during the winter and near average for temperatures (see the 90-day forecast below). However, I still believe that conditions in the North Pacific could influence the magnitude and spatial locations of the effects of this El Niño.

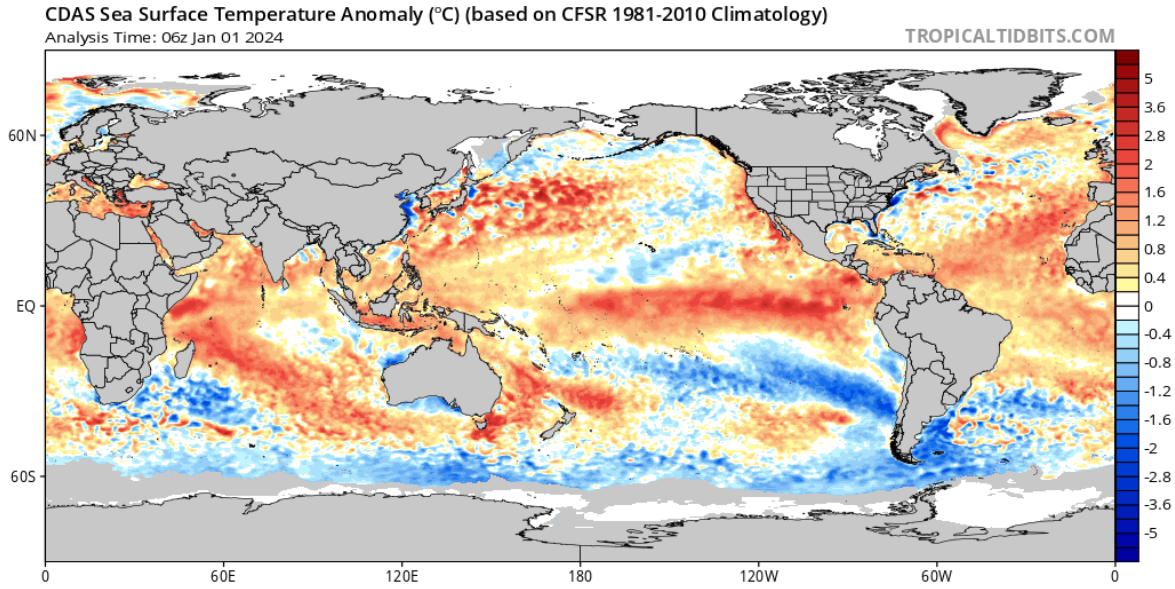

Figure 4 – Global sea surface temperatures (°C) for the period ending January 1, 2024 (image from Tropicaltibits.com).

North Pacific Watch – Warm SSTs continue to dominate most of the North Pacific (Figure 4), although cooler anomalies are still found in the same locations as they have for a few months now. Cooler surface waters continue in the near-shore areas of the Gulf of Alaska, off the west coast, and in an area southwest of Baja California to Hawaii. While these conditions keep the Pacific Decadal Oscillation (PDO) in a strong negative phase, I believe the next release of the data will lower the strength of the PDO somewhat. However, this type of pattern in North Pacific SSTs continues to be out of phase with the tropical Pacific, which is substantially warmer than average (see above). Given the forecast of a "historically strong" El Niño this winter, will the negative PDO remain strong enough to influence the expected patterns of the El Niño, or will the tropical influences dominate as the 90-day forecast below is indicating? I am still leaning to this not being a 'typical' El Niño.

Forecast Periods:

Next 5 Days: Cool and wet over the next few days, especially from northern California into the majority of the PNW. Cool to mild and dry south into the rest of California. Potential for some of the coldest air of the winter in the PNW by this weekend.

6-10 Day (valid January 7-11): Cold air looks to dominate during this forecast period with temperatures likely below average from the west coast to the Plains to Texas. The desert southwest is forecast to have the greatest chance of below average temperatures during this period. The south and southeast are forecast to be near normal while the Great Lakes and northeast are forecast to see above average temperatures. As a whole, the country is forecast to see near normal to above normal precipitation during this forecast period, with the southwest and southeast to mid-Atlantic having the greatest chance of above normal precipitation.

8-14 Day (valid January 9-15): The temperature outlook into mid-month is holding to a greater probability of the western two-thirds of the country experiencing below average conditions. The greatest likelihood for colder than average conditions is across the southwest and Rockies. The eastern seaboard from Florida to New England has a decent probability of seeing above average temperatures during this period. Generally, above average precipitation is forecast for the majority of the country with the eastern seaboard having the greatest probability of being wetter than average.

30 Day (valid January 1-31): The forecast for the first month of 2024 is pointing to the west coast having equal chances for slightly above to below temperatures with the coastal zones of northern California, Oregon, and Washington having the greatest chance of above normal temperatures (Figure 5). The southwest into the Rockies and Plains are forecast to experience a colder than average month of January. For the eastern US, the south and southeast are forecast to have equal chances for slightly above average to slightly below average temperatures, while the Great Lakes into New

England have the greatest chance for above average temperatures. Much of the country has a decent chance of a wetter than average month, including the west coast. The greatest probability for a wetter than average month is across the Gulf Coast and southeast. The northern states from the inland PNW across to the Great Lakes have equal chances for above to below average precipitation for the month of January (Figure 5).

90 Day (valid January-February-March): The seasonal forecast continues to be dominated by the expected conditions driven by the current El Niño (see ENSO Watch above). As such the 90-day forecast maintains a warmer than average northern tier of states (Figure 5) with the greatest probability for above average temperatures from central California northward into the PNW and northern Rockies. The seasonal forecast for the southern tier of states is holding to near normal temperatures or slightly above to slightly below. Precipitation over this period is forecast to also deliver the expected El Niño pattern of a great probability of being average to below average across the northern tier of states while California across the southern Rockies and the Gulf Coast and southeast are forecast to experience above average precipitation over the next 90 days (Figure 5).

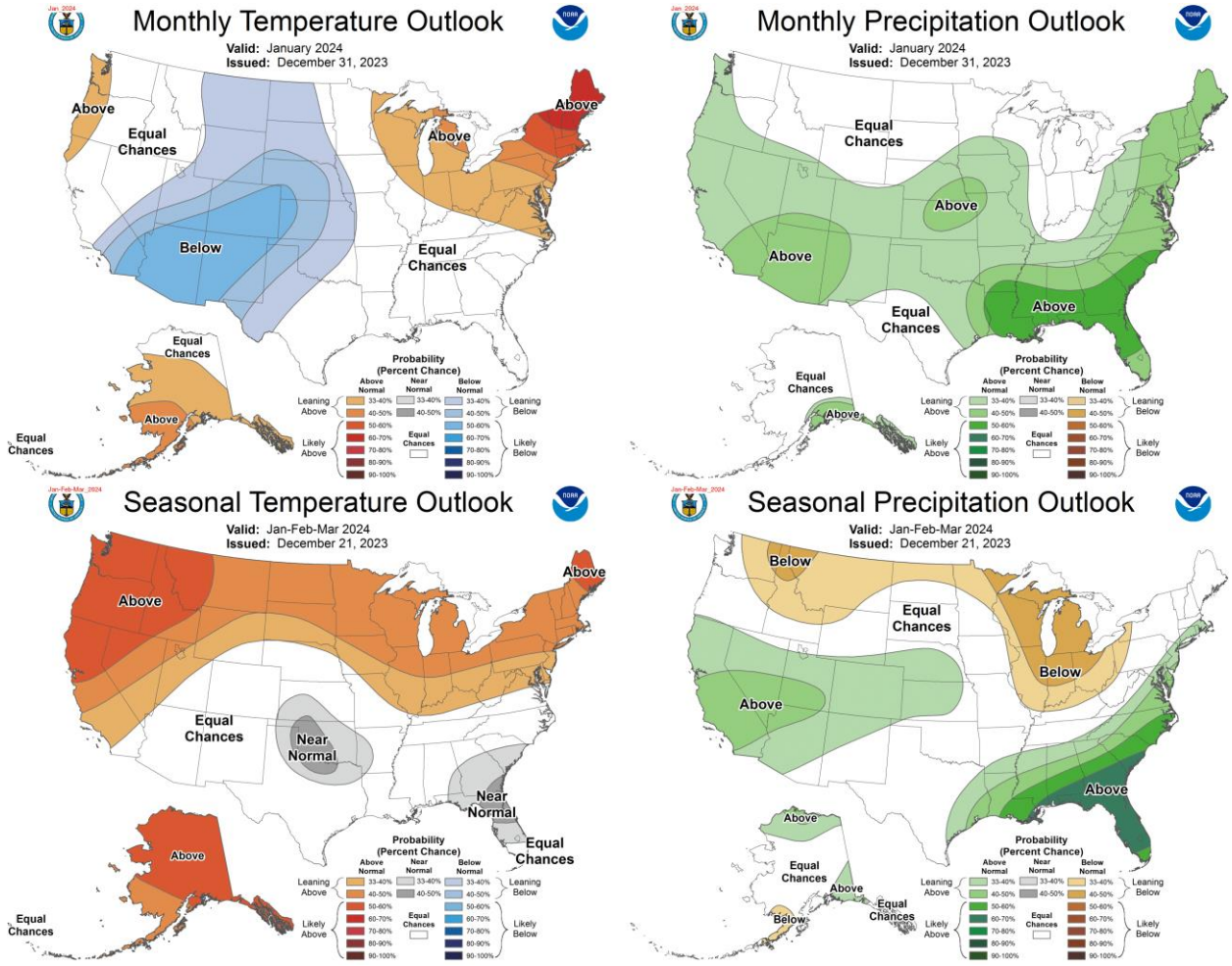

Figure 5 – Temperature (left panel) and precipitation (right panel) outlooks for the month of January (top panel) and January, February, and March (bottom panel) (Climate Prediction Center, climate.gov).

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