# Weather and Climate Summary and Forecast
# June 2023 Report

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**June 5, 2023**

**Summary:**

- High pressure over western Canada brought a May heat wave to the PNW, while continued onshore flow south into California kept temperatures cool there. May ended substantially above average[1] in the PNW, northern Basin, and Rockies, while coastal California was cooler than average, and elsewhere across the southern portion of the western US was near average.
- May saw a mixed bag in terms of precipitation in California with central to southern coastal and inland southern areas wetter than average while the central valley and northern coast were drier than average. The PNW west of the Cascades saw a dry May, while much of the eastern inland zones saw some much-needed precipitation.
- Short term forecast calls for mild conditions in the south and seasonal to warmer than average conditions in the north. Precipitation is most likely as thunderstorms build along the Sierra and Cascade mountains and eastside. A slight hint at a shift to a rain event later in June, but too early to detail further.
- SWE's are still up over the west but melting fast in the north, a little slower in California. Drought coverage and intensity continue at low levels, but our seasonally dry period will likely tilt some regions back into drought.
- The June forecast points to the PNW and northern states likely seeing above average temperatures while California and southern states are likely to see average to below average temperatures. Precipitation during June is forecast to be largely driven by thunderstorm activity and likely more located along the mountains and inland. The 90-day forecast is tilting the odds to a warmer than average summer for the western US. The dry season is likely to be near average for most areas, slightly below average for the PNW and desert southwest. El Niño is likely with us through the end of the year, while the PDO remains in a strong negative phase. Neither are dominant influences in the summer months … but watchful, nevertheless.

**Past Month and Year to Date:**

May saw temperatures much above normal across the PNW and northern portions of the western US, while California and other southern areas were near normal or below normal, especially along the coastal areas of California (Figure 1). A large mid-month high pressure area over western Canada resulted in temperatures 2-8°F above average for northern locations while onshore flow over cool coastal waters resulted in temperatures 2-5°F below average in the Bay Area and southern California coast. Precipitation amounts were mixed over the west with California wetter than average along the central to southern coast, inland southern California, and the northeastern Sierra, while the central valley, central to

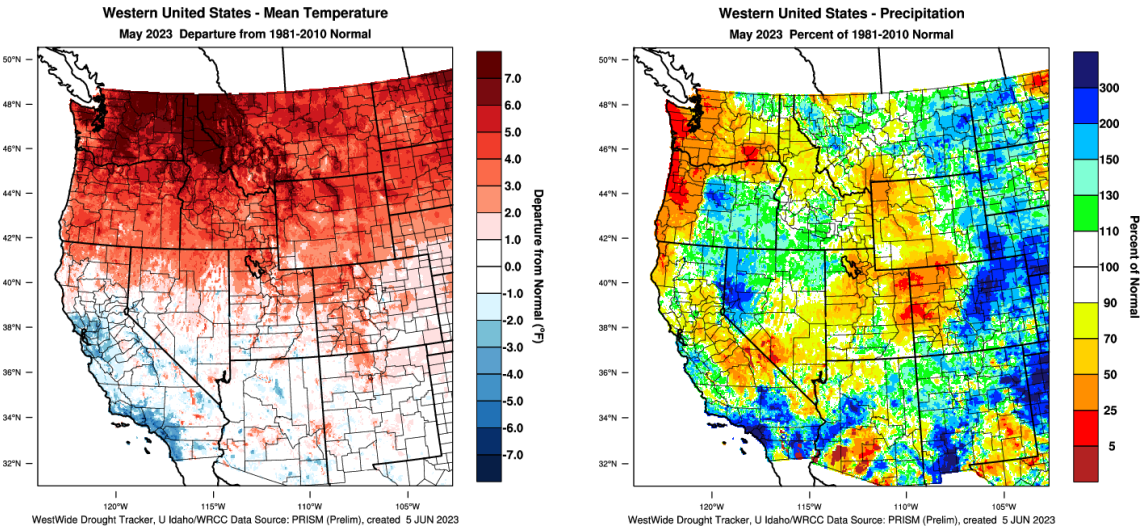


**Figure 1** – Western US May 2023 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[1] 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.

southern Sierra, and northern coast was drier than average (Figure 1). Oregon was drier than average in the western valleys and along the coast while wetter than average from the Cascade crest eastward. Washington saw a May that was largely drier than average, and Idaho was mostly dry north and slightly wetter than average south. For May the rest of the country saw closer to normal temperatures across the south, below average temperatures along the eastern seaboard, and warmer than average temperatures in the Plains and Great Lakes (not shown). A wetter than average month was seen from the northern Plains south into Texas, the region of the US with some of the driest conditions (see drought section), and wet conditions were seen across Florida and portions of the southeast. Otherwise, the rest of the eastern US experienced a moderately dry month of May (not shown).

A cool year-to-date continues over the western US, although the warm May in the PNW has moved it closer to average for the year (Figure 2). The coolest year-to-date temperatures are found in the Rockies (2 to 6°F below average), but much of the rest of the west has also seen temperatures 1 to 4°F below average. In terms of precipitation, the first five months of 2023 continue to show the pattern of atmospheric rivers and cut-off lows that impacted California. Except for dry conditions in southeastern California, most of the state has seen 115 to over 200% of normal precipitation since the start of the year (Figure 2). Although not seeing as much precipitation as California, the Great Basin and much of the Rockies have also had a wetter than average year-to-date. The PNW has largely stayed drier than average through May, with some areas of southeastern Oregon and Idaho running just above average (Figure 2). The amplified east-west temperature differences continue to hold with the eastern US running substantially above average (2 to 6°F) while the west has been cooler than average (not shown). Precipitation amounts for the water year continue to be mixed across the eastern half of the country with moderately drier than normal amounts experienced in the Plains, much of Texas, Florida, and the mid-Atlantic, while the mid-south, southeast, Great Lakes, and portions of the eastern seaboard have been closer to average or slightly wetter than average (not shown).

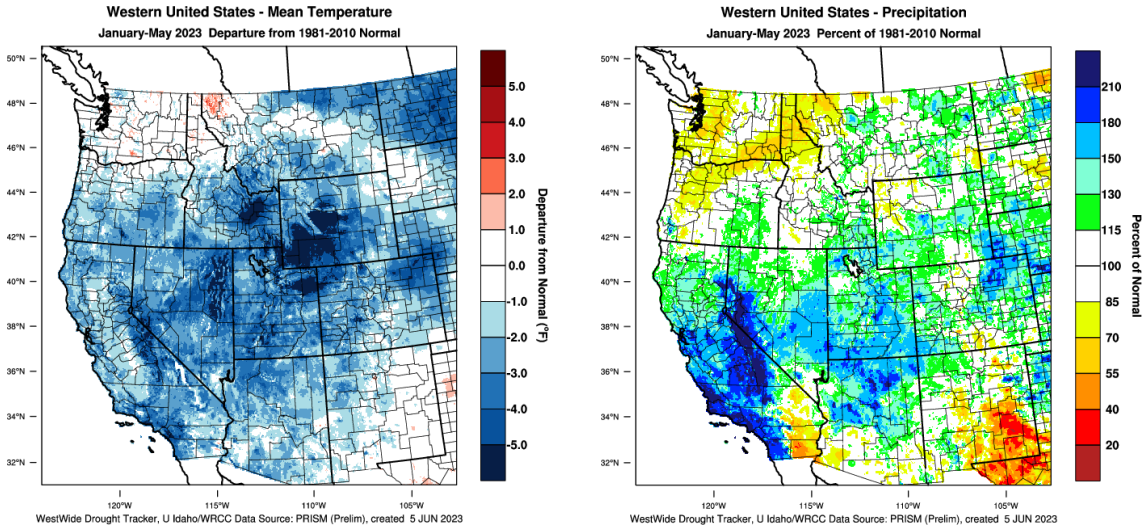


**Figure 2** – Western US 2023 year to date (January 1, 2023 to May 31, 2023) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

**Heat Accumulation:**

Growing degree-days (GDDs) over the western US for March through May 2023 shows a north-south difference with much of the PNW accumulating more heat compared to average than southern areas (Figure 3). This flip came about from the dominant troughing off the west coast in April and part of May, which brought more cloud cover and cooler temperatures to California and the desert southwest. The absolute March through May GDD numbers show that wine regions in the PNW are mostly above average, while from the north central valley and north coast south and east to the Four Corners region are mostly below average. Converting the mapped data in Figure 3 to days ahead or days behind normal finds the PNW mostly 7-21 days ahead of normal accumulation amounts at the end of May, while wine regions in California and Arizona are 7-21 days behind normal accumulation amounts at this point (not shown).

Growing degree-day amounts for four locations that I have tracked for many years in wine regions in Oregon are substantially above both the 1981-2010 and 1991-2020 climate normals for the March to May period (30-120%). The

exception is that eastern Oregon is closer to the 1991-2020 climate normal (5-7%). Also, these locations had between 100% to over 200% of what they accumulated in the same period in 2022.

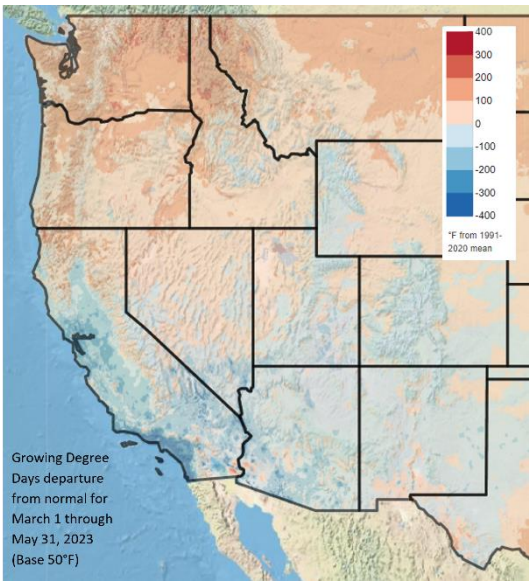


**Figure 3** – Western US March to May 2023 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).

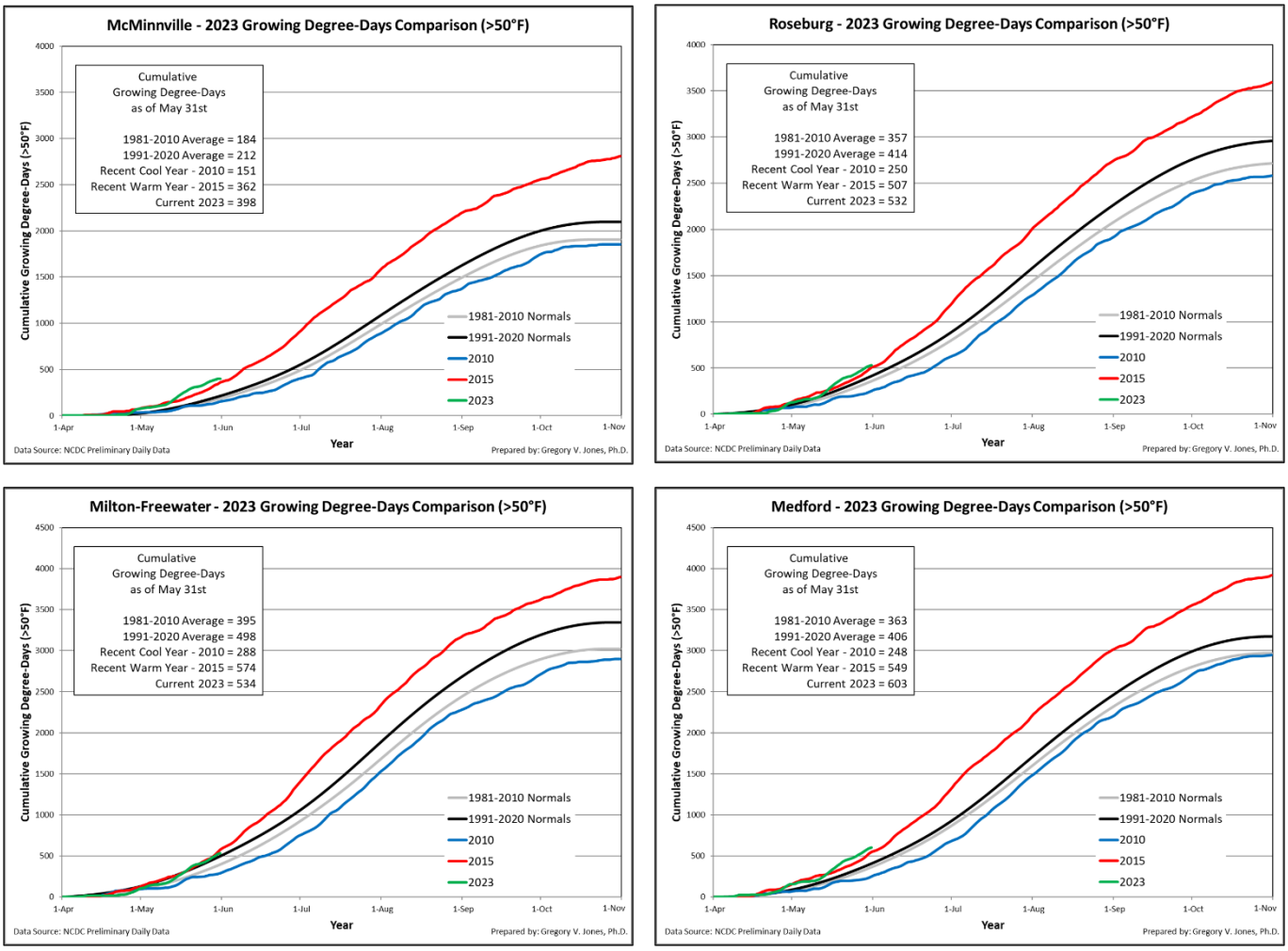


**Figure 4** – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2023) and a recent cool year (2010), a recent warm year (2015), and both the 1981-2010 and 1991-2020 climate normals are shown (NCDC preliminary daily data).

**Drought Watch** – While dry conditions are still evident over portions of the US, the overall area in drought continues at a multi-year low of close to 50%. The central Plains into Texas continue to show the greatest drought conditions with extreme to exceptional conditions currently (Figure 5). Winter into spring precipitation lowered drought concerns over much of the western US with over 50% of the region not listed in any of the four drought categories and less than 4% listed in the severe, extreme, or exceptional categories. Dry conditions in May (Figure 1) have put pressure on water availability, especially in the PNW, although most other areas are heading into the dry season in decent shape. By state in the west, the dry May moved Washington to nearly 55% of the state in the lowest levels of drought and 3% in the severe category. Similarly, the dry May increased the area of Oregon in all drought categories to nearly 85% now, although the area of extreme drought categories (severe, extreme, and exceptional) has dropped to just under 11%. Idaho has continued to see drought coverage drop from 70% in April to just under 50% today. Precipitation in May has held California to just less than 30% in some level of drought with the more extreme drought categories remaining off the map for four straight months.

The seasonal drought outlook is forecasting improvement across most of the US (Figure 5, right panel). Much of eastern Oregon and northern Idaho, and portions of Washington, southern California, southern Nevada, and central Utah are expected to remain in drought or improve as we move into summer. The area of the country seeing the driest conditions, from Texas northward into the Plains, is now forecast to see some improvement in drought over the next few months, although some regions will likely remain in some level of drought for the time being (Figure 5).

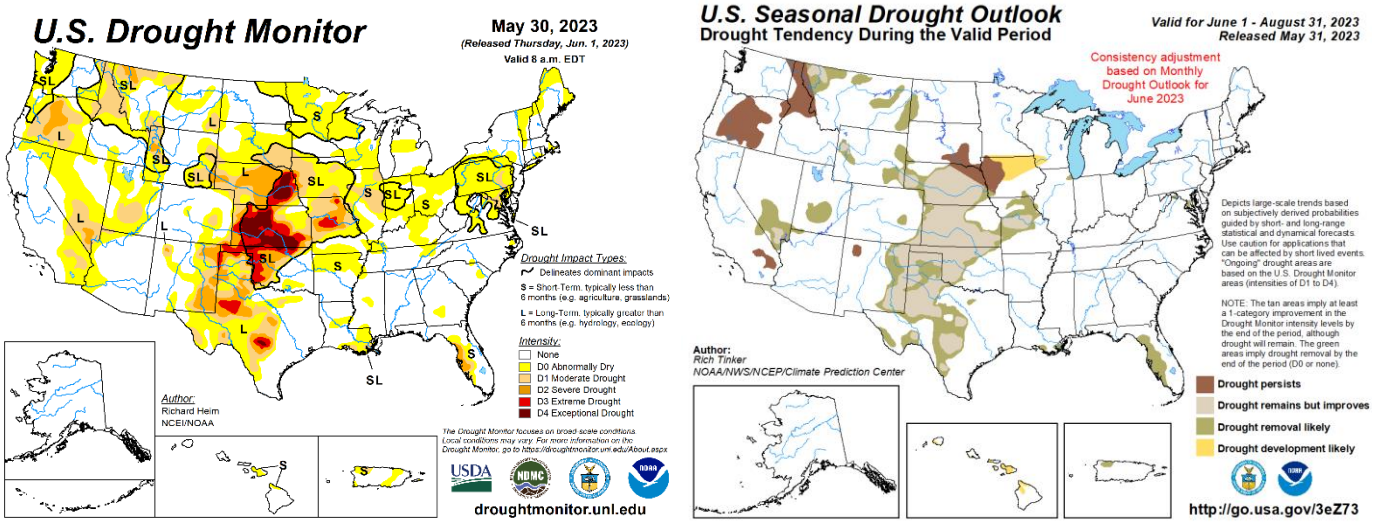


**Figure 5** – Current US Drought Monitor and seasonal drought outlook.

**ENSO Watch** – Negative sea surface temperatures (SSTs) anomalies in the central-eastern equatorial Pacific, associated with La Niña conditions, have completely dissipated (Figure 6). Warm SST anomalies now cover much of the eastern and central Pacific regions, while SSTs in the western Pacific are currently in the ENSO-neutral range. Many of the ocean and atmosphere variables across the tropics are now consistent with developing El Niño conditions. As of mid-May, the Climate Prediction Center (CPC) is holding their forecast to an El Niño watch, which typically signals the start of the warm phase of ENSO. Most models and forecasters are pointing to El Niño persisting (>85% chance) through the forecast period into fall and early winter.

**North Pacific Watch** – Sea surface temperatures in the North Pacific continue to show strongly negative Pacific Decadal Oscillation conditions (Figure 6). Much of the Gulf of Alaska and the North American coastal waters remain colder than average and continue to extend further west and southwest. Out in the central North Pacific, the pool of warmer SSTs has cooled slightly, but has expanded eastward and now is along a portion of the southern Alaska and Canadian coastal zones. The onset of more typical high pressure influences for this time of year might be providing a slight shift in the wind field and warming of surface water temperatures. Time will tell if this transition continues, but for now, the feedback between the atmosphere and ocean along the west coast, especially south into California, continues. These conditions add to the observations (Figure 1) and forecast (Figure 7) for warmer than average temperatures north and cooler than average temperatures south. The connection between the warming in the Tropical Pacific (El Niño) and

these conditions in the North Pacific is not as strong in the summer months but tends to strengthen into fall. As such, there is much interest in how things evolve over the next few months to influence the end of the vintage.

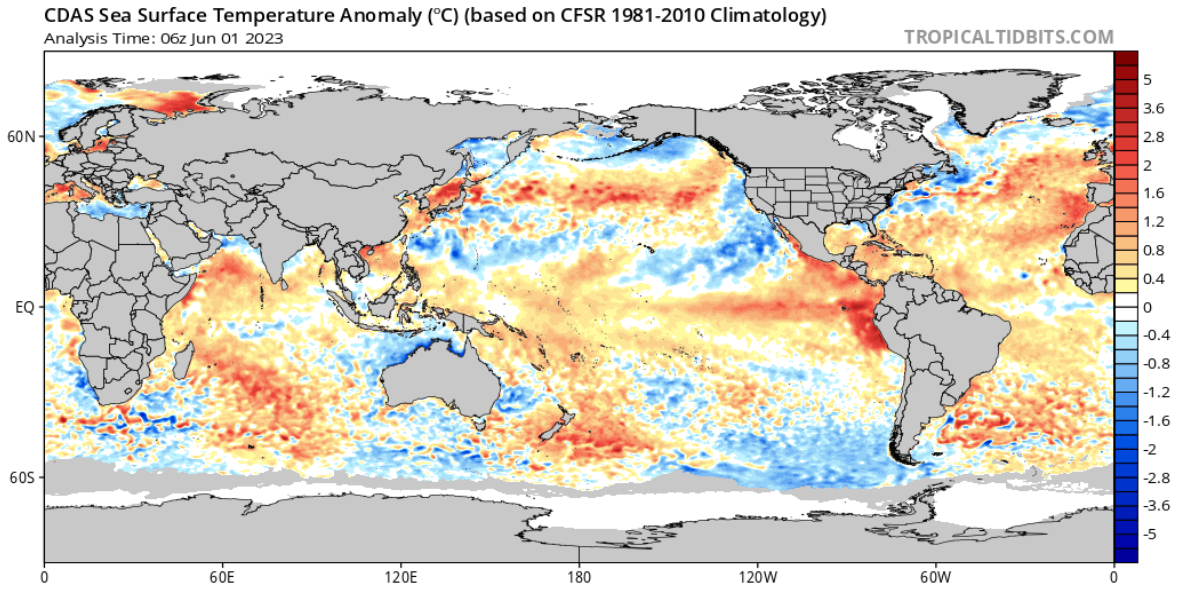


**Figure 6** – Global sea surface temperatures (°C) for the period ending June 1, 2023 (image from Tropicaltibits.com).

**Forecast Periods:**

**Next 5 Days:** Stable pattern with high pressure largely in control over the western US. The shifting position of the high pressure will bring off and on flow off the ocean interspersed with a day or two of higher temperatures as the onshore flow subsides. Cooler south into California, warmer north into the PNW. The only rain potential over the next few days is with possible thunderstorms in the mountains and eastside from central California north to Canada.

**6-10 Day (valid June 9-13):** North-south flip of warmer than average temperatures expected in the PNW and across the northern Rockies and Plains, while California across the desert southwest is forecast to see below average temperatures. Southern Texas and Florida are forecast to see above average temperatures while the eastern third of the country is forecast to be close to average or slightly below average. As we head deeper into the dry season in the west, coastal zones and western valleys from California to Washington will likely see a dry period while the mountains and inland areas of the west have elevated thunderstorm chances. The result is a forecast for this period is for above average precipitation in the intermountain west that extends east and south to Texas. The northern Plains and Great Lakes are forecast to see below average precipitation during this period while the rest of the east will be closer to average.

**8-14 Day (valid June 11-17):** Not much change from the previous forecast period with the PNW and northern states likely remaining warmer than average while California, the intermountain west to the central Plains are forecast to see below average temperatures. Gulf states are forecast to see above average temperatures, while the northeast is forecast to see below average temperatures. Precipitation amounts in the west continue to be dominated by inland and mountain thunderstorm activity due to onshore flow, but actual amounts will be relatively low and scattered. Below average in the northern Plains and western Great Lakes and near average elsewhere in the east.

**30 Day (valid June 1-30):** June appears headed to warmer than average temperatures across northern states from the PNW across to New England (Figure 7). The cooler conditions likely southward come from the anticipated early season monsoon flow with greater than normal cloud cover and the potential for thunderstorm activity in the Great Basin and surrounding mountain regions. The Gulf coastal areas are forecast to see warmer than average temperatures in June while the mid-south and mid-Atlantic should be closer to average for the month (Figure 7). The upper Midwest is forecast to see a dry June, while Texas and south Florida are forecast to see a wetter than average month.

**90 Day (valid June-July-August):** The core of the summer is forecast to see largely warmer than average temperatures across the US with the Plains, upper Midwest, and Great Lakes region likely to be closer to average (Figure 7). The desert

southwest is the bullseye with the greatest likelihood of seeing above average temperatures. The seasonal precipitation forecast is calling for most of the western US to have equal chances to see slightly above to slightly below amounts, while the northern PNW and desert southwest are forecast to see a drier than average period. Higher than average precipitation amounts are expected in the mid-south to southeast while near average precipitation is forecast elsewhere (Figure 7).

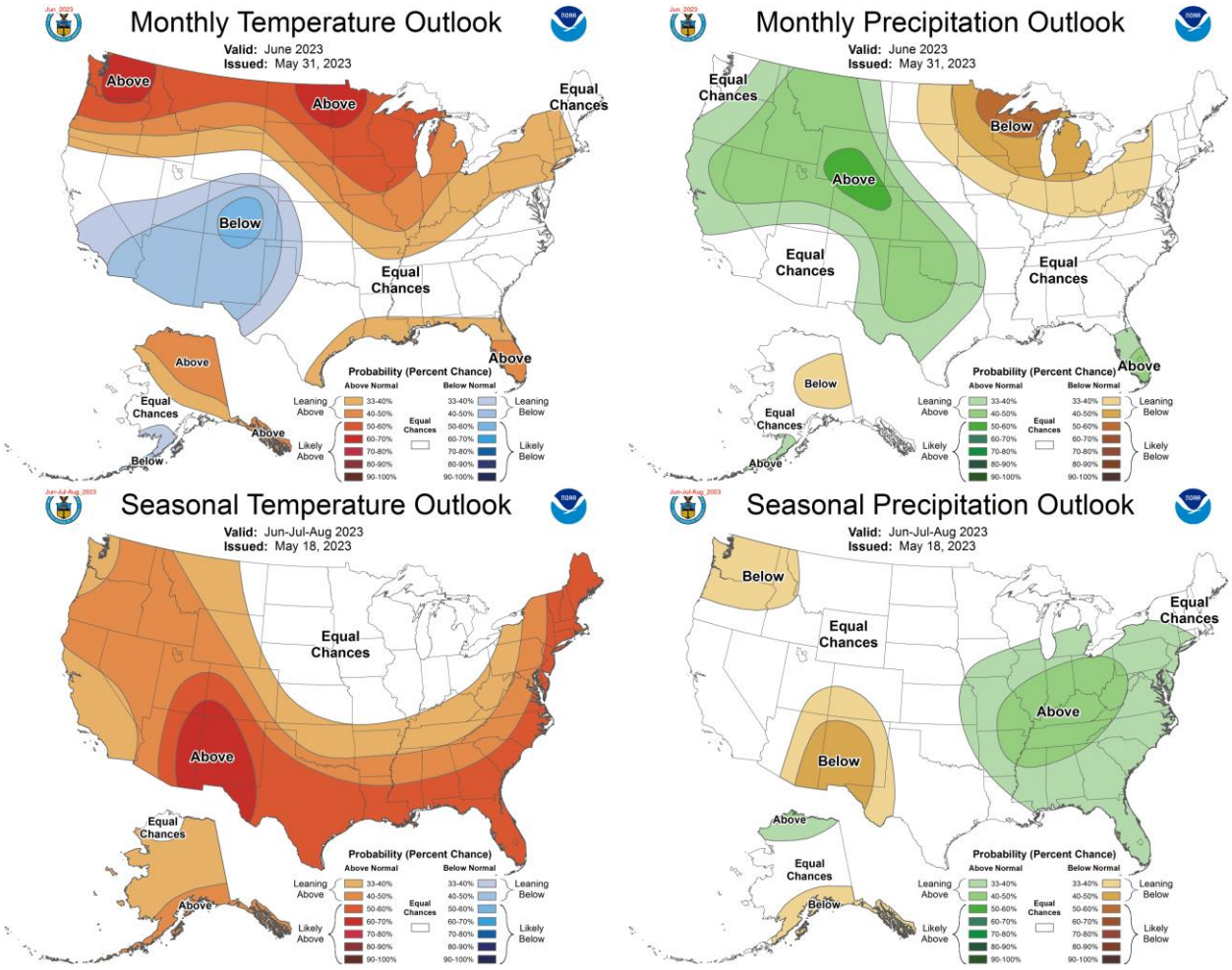


**Figure 7** – Temperature (left panel) and precipitation (right panel) outlooks for the month of June (top panel) and June, July, and August (bottom panel) (Climate Prediction Center, climate.gov).

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