Weather and Climate Summary and Forecast
August 2023 Report

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August 3, 2023

Summary:

- July was warmer than average[1] over much of the western US, especially in the southwest. Growing degree-days continue to accumulate ahead of normal in the northwest and near to below average in most of California.
- Little precipitation over the western US in July, except for east side thunderstorms, some coastal zone drizzle, and light amounts in north-northwest Washington.
- Drought conditions in the west have a similar footprint as in June, however the PNW and the Four Corners region are forecast to see drought develop further this summer and potentially into the fall.
- Seasonal to warmer than average start to August for most of the west. Temperatures are forecast to warm up again mid-month. In the short-term, east side thunderstorms are the best chance for precipitation across the west.
- The August forecast has the western US likely to see a warmer than average month, especially in the PNW. Closer to average temperatures are likely in the central coastal zones of California. Precipitation in August is forecast to remain seasonally dry for the west, especially in the southwest where the monsoon season is in doubt.
- As harvest season rapidly approaches, the 90 day forecast is tilting the odds to warm and dry over the majority of the western US. However, I need to remind everyone that early to mid-September brings some of the first hints at fall circulation out of the Gulf of Alaska and forecasting beyond that time has more uncertainty, especially on the precipitation side. In addition, with El Niño conditions likely to strengthen and continue through the end of the year and some shifts in the PDO likely as well, seasonal forecasting would be expected to be a little more in flux. Next month's report should provide some more insights into the harvest season weather.

Past Month and Year to Date:

The heat wave in July resulted in an overall warmer than average month for the western US (Figure 1). Temperatures in July were 1-5°F above average for much of the west, while areas in the southwest were mostly 5-7°F above average. Coastal zones on the west coast and some isolated areas in the Basin and Rockies saw closer to average temperatures for the month. July was mostly true to the season with little to no precipitation over most of the west. The exceptions were isolated thunderstorms across the east side of the mountains and some precipitation in northern areas of the PNW (Figure 1).

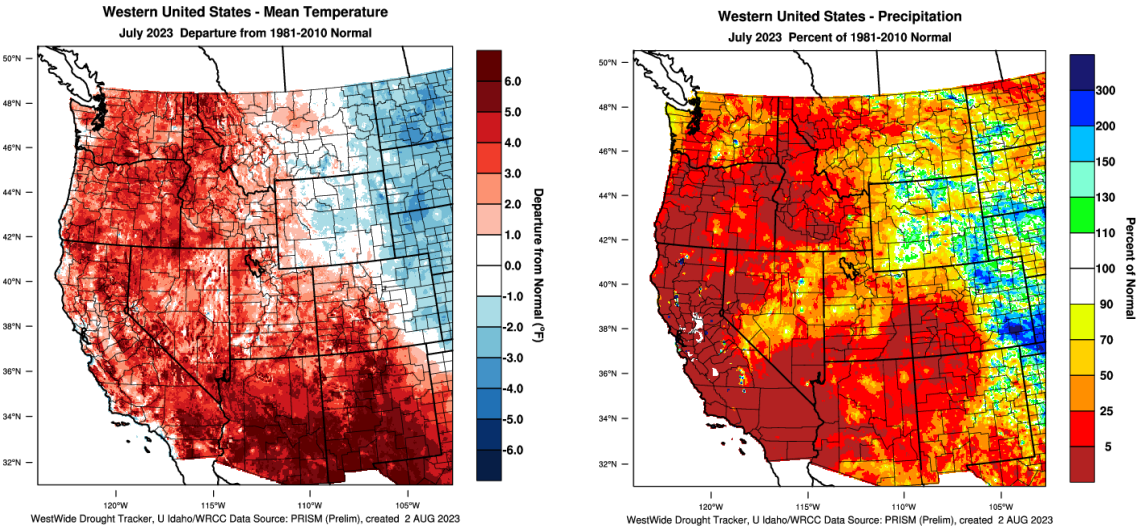

Figure 1 – Western US July 2023 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[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.

July saw temperatures across the south, up along the eastern coast, and throughout New England that were warmer than normal across the rest of the country. Cooler than average conditions were experienced in the northern to central Plains and upper Midwest (not shown). In terms of precipitation, the eastern half of the country was largely wetter than average during July, with the greatest amounts seen in the southern Plains, Ohio River Valley, eastern Great Lakes, and New England. Texas and portions of the Gulf Coast experienced a very dry July adding to drought concerns in these regions (see drought section).

The warm July moved the western US from year-to-date largely cooler or average, to closer to average for many areas (Figure 2). The Basin and Rockies have seen year-to-date temperatures 2-6°F below average, while the southern Sierra Nevada mountains and south coast of California have seen temperatures 2-3°F below average. Washington, northern and western Oregon, northern Idaho, and western Montana are now at or above average for the year (Figure 2). Year-to-date precipitation in 2023 is dominated by the winter precipitation that brought California largely out of drought. Except for dry conditions in southeastern California, most of the state has seen 110 to over 200% of normal precipitation since the start of the year (Figure 2). The Great Basin and much of the Rockies have also had a wetter than average year-to-date helping to reduce drought conditions in those regions as well. The PNW has continued to be drier than average through July, with some areas of southeastern Oregon and southern Idaho getting enough precipitation to move to just above average. Strong east-west temperature differences continue year-to-date with the eastern US running substantially above average (2 to 6°F; not shown) while the west has been cooler than average. Year-to-date precipitation amounts are quite variable across the eastern half of the country with moderately drier than normal conditions experienced in the Plains, much of Texas, the Midwest, Florida, and the mid-Atlantic, while the Front Range of the Rockies, mid-south, southeast, Great Lakes, and portions of the eastern seaboard have been closer to average or slightly wetter than average (not shown).

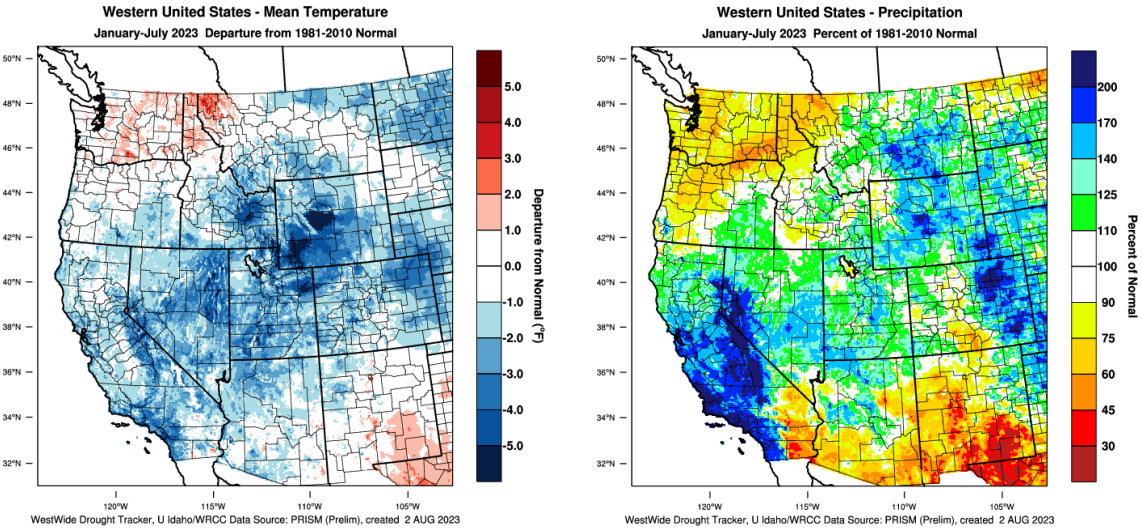

Figure 2 – Western US 2023 year to date (January 1, 2023, to July 31, 2023) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Heat Accumulation:

Growing degree-day (GDD) departures for March through July 2023 over the western US continues to show higher than average amounts in the PNW and northern states and lower than average amounts in California and central to southern states (Figure 3). Warmth across the west during July (Figure 1) added significant GDD to most areas that were running behind but has not made the deficit for the year. Continued onshore flow from northern California southward has kept heat accumulation lower than typical for southern portions of the west coast and inland areas of the central valley. Departures for the March through July period show wine region GDD amounts in the PNW are mostly above average, while from the north central valley and north coast across the south and east to the Four Corners region are mostly below average. In terms of days ahead or days behind normal, inland California is near average to 7 days behind normal and coastal California is 14-21 days behind at this point, while the PNW continues at roughly 7-24 days ahead of normal accumulation amounts at the end of July (not shown).

At the main weather stations in four of Oregon's main wine regions, each location I have monitored for many years is substantially above both the 1981-2010 (+18-42%) and 1991-2020 (5-29%) climate normal for the March to July period. These locations are also 7-12% over the average of the last 15 years and 22-31% over what they accumulated in the same period in the 2022 vintage.

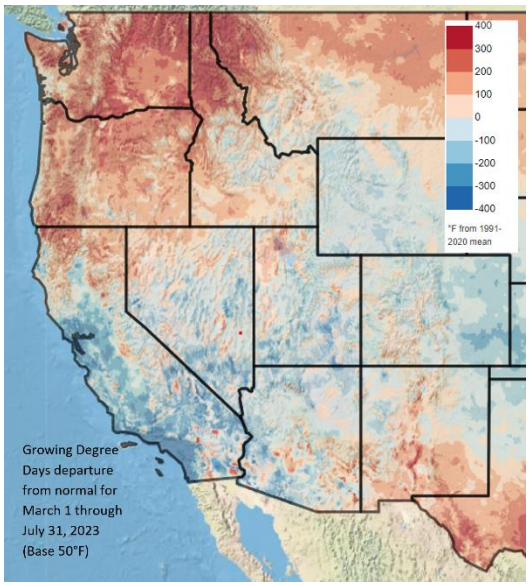

Figure 3 – Western US March through July 2023 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).

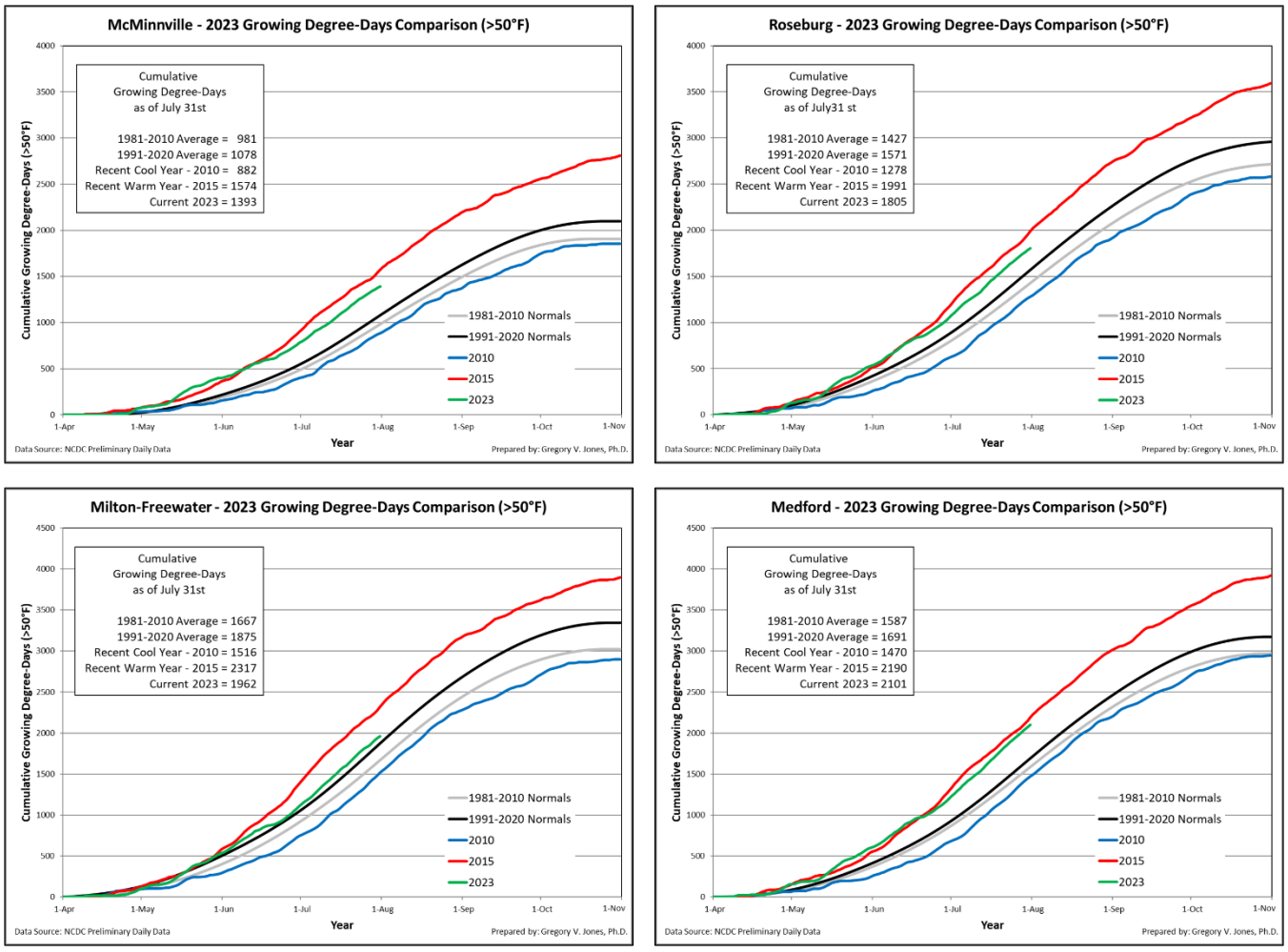

Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2023) and a recent cool year (2010), a recent warm year (2015), and both the 1981-2010 and 1991-2020 climate normals are shown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

Drought Watch – The month of July saw dry conditions and extreme heat that dominated the western US and the southern Plains (Figure 1). The result was an expansion of drought zones across these areas while the rest of the country continued to see drought conditions from the central Plains and upper Midwest to Texas. Dry conditions also extend across much of the Great Lakes but have lessened across New England and the mid-Atlantic (Figure 5). In the Pacific Northwest, most of the region saw continued dry weather, very warm temperatures, and higher evaporative demand with stream flows now at very low levels. Continued relatively cool conditions have kept most of California and portions of the southwest and Great Basin out of drought declarations. Drought conditions nationally continue running at roughly 52% of the continental US. For the western US, the region is roughly 50% in drought but with some large differences between states and regions. Washington has moved from nearly 70% in some level of drought in June to nearly 88% now but continues to have no areas in the more extreme categories. Oregon continued to see some slight improvement in drought conditions on the east side but no precipitation on the west side moved it further into drought. Over each of the drought categories, Oregon is just under 77% now, although there are now no areas of extreme drought categories (severe, extreme, and exceptional). Idaho has stayed at just over 40% drought coverage, also with no areas in the more extreme categories. Following the wet winter and cool spring, California continues at its lowest drought levels in years. Currently, the state is at just less than 26% in some level of drought with the more extreme drought categories not on the map (Figure 5).

The extreme warmth of July and little to no monsoonal flow has expanded the overall drought concerns in the seasonal outlook (Figure 5, right panel). While areas of the PNW, southern California, southern Nevada, and central Utah are expected to remain in drought, additional areas in these regions are expected to develop further. The forecast for monsoon rains is not looking good, which is expanding the drought development areas in the Four Corners region. However, much of California, the Great Basin, and northern Rockies is forecast to stay out of drought for now. Over the rest of the country, portions of Texas, New Mexico, and the Great Lakes are forecast to see drought persist or develop further, while the Midwest is forecast to see some improvement or removal (Figure 5).

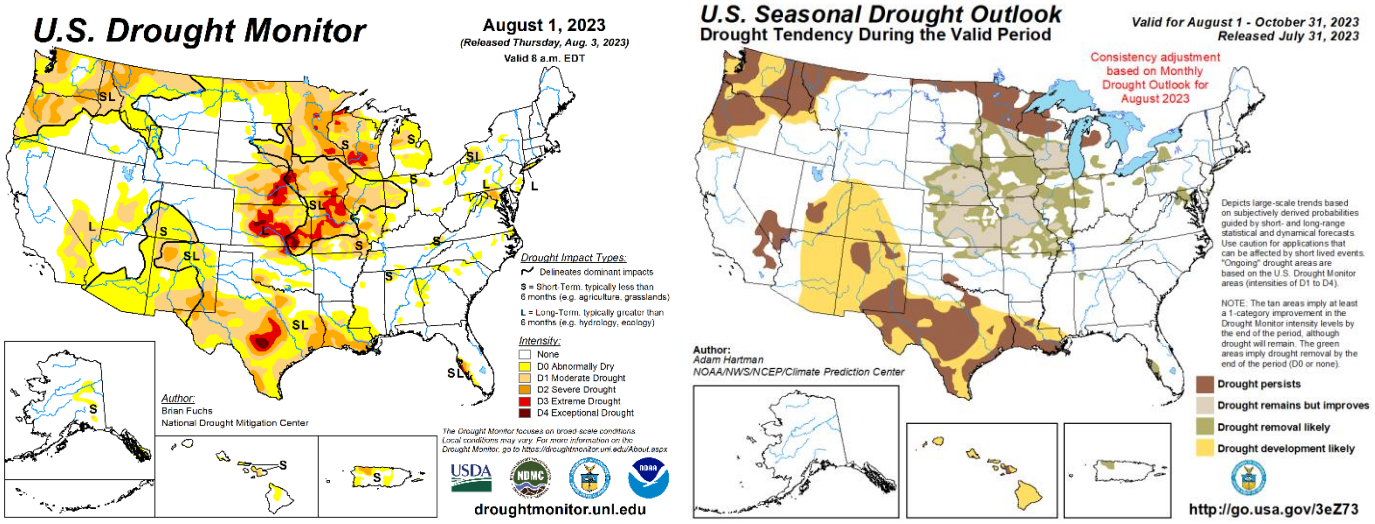

Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – Sea surface temperatures (SSTs) in the central-eastern Pacific have slowly strengthened over the last month to a weak to moderate El Niño (Figure 6). The majority of the key ocean and atmosphere variables across the tropics are now consistent with full-fledged El Niño conditions, although some of the atmospheric factors are still hovering in the neutral range. With these changes, the Climate Prediction Center continues to point to an El Niño advisory in July 2023, signaling the continuation of the warm phase of the ENSO. The vast majority of the models in the ENSO prediction plume forecast that the El Niño event will persist during the North Hemisphere summer and that it is highly likely (>90%) to continue into the winter 2023-24 and should peak this winter at moderate to strong intensity.

North Pacific Watch – The north Pacific has seen some shifting in sea surface temperatures (SSTs) over the last month or so but continues to be in a strong negative Pacific Decadal Oscillation situation (Figure 6). The changes include an expansion of warmer SSTs throughout most of the Gulf of Alaska and further south along the coast to California. As a

result, cooler coastal SSTs that have been in place over most of the west coast are now only off the central to southern California coast and are slightly warmer. The warm SSTs off the coast from northern California to Canada has elevated the temperatures in the PNW over the last few months (see the May and June reports). Cooler SSTs southward are likely to keep the central to southern California coast on the cooler side as shown in the forecast (Figure 7). As is normal during the summer, the connection between the warming in the Tropical Pacific (El Niño) and the SSTs in the North Pacific is not as strong in the summer months but tends to strengthen into fall.

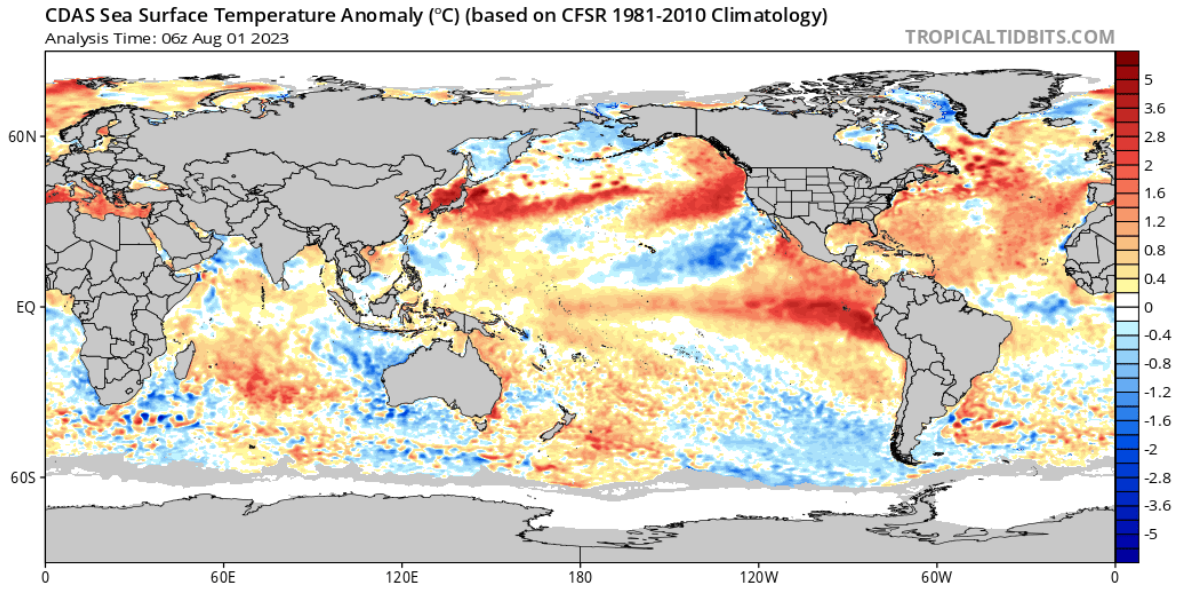

Figure 6 – Global sea surface temperatures (°C) for the period ending August 1, 2023 (image from Tropicaltibits.com).

Forecast Periods:

Next 5 Days: Warm start to the month for most, then dropping a little closer to average over the next few days. Typical summer pattern of warmer inland, cool along the coast with some fog and marine layers in the usual places. No precipitation in the forecast anywhere on the west side from BC to Baja, except maybe a little fog drizzle in a few places. Thunderstorm activity from the mountains eastward is likely to continue with rain amounts widely variable.

6-10 Day (valid August 8-12): Likely warmer than average from central California into the inland PNW, while onshore flow will keep the coastal to just inland zones of Washington, Oregon, and southern California near average. The southern tier of states from Arizona across to Texas, along the Gulf Coast, and into the mid-Atlantic are forecast to continue to see above average temperatures. The northern Rockies and Plains across to the Great Lakes and northern New England are forecast to see below average to average temperatures for this time of year. The precipitation forecast is calling for a slight chance of above average amounts in the PNW, but it is most likely to be seen on the eastside of the mountains and in the northern Basin. Monsoon rains are slow to start this year with the Four Corners region forecast to see below average precipitation as we head to mid-month. The rest of the country is forecast to have a slightly above average chance of precipitation in this period.

8-14 Day (valid August 10-16): Warmer than average temperatures are likely to hold over most of the western US with the inland PNW, Great Basin, and Four Corners likely to see the warmest conditions. Onshore flow along the coast is forecast to weaken slightly bringing warmers temperatures to most. The southern tier of states is likely to continue seeing above average warmth, while the northern Plains and Great Lakes are likely to see slightly below average temperatures. The precipitation forecast remains mostly near seasonal averages, which means dry, except for portions of the inland PNW and northern Rockies. The southwest is likely to remain drier than average through mid-month, while the majority of the rest of the country will likely experience slightly above average amounts through this forecast period.

30 Day (valid August 1-31): The forecast for August is tilting the odds for much of the western US to see a generally warmer than average month with the PNW having the greatest probability (Figure 7). Onshore flow in California is forecast to remain strong enough to keep the coastal zones north and south of the Bay Area closer to average. The warmth across the south is likely to remain for the month, with the southwest to the southeast likely to see a warmer

than average month. New England and the northern Plains are forecast to see a cooler than average month of August, while the rest of the northern states have equal chances of slightly above to slightly below temperatures. The August forecast for precipitation in most of the west is for seasonally dry conditions (Figure 7). The southwest across to the central Gulf is forecast to see a dry month, while the northern Rockies across the Plains and into the mid-Atlantic and New England are forecast for above average precipitation for the month.

90 Day (valid August-September-October): The 90 day forecast looks really good for wine country! However, I need to remind everyone that early to mid-September brings some of the first hints at fall circulation out of the Gulf of Alaska and forecasting beyond that time has more uncertainty. That being said, here is what I see from the seasonal forecast. Much of the country will likely see above average temperatures over the remainder of the summer and first push into fall (Figure 7). Regions with the greatest probability of warmer than average temperatures include the Four Corners region across the south and into New England. The central to northern Plains and western Great Lakes are forecast to see near average to slightly below average temperatures during this period. The 90 day precipitation outlook is largely showing equal chances for slightly above to slightly below (seasonal) for most of the country (Figure 7). The exceptions are the PNW and Four Corners having a greater chance of below average precipitation and the central Plains across the mid-south having a greater chance of above average precipitation.

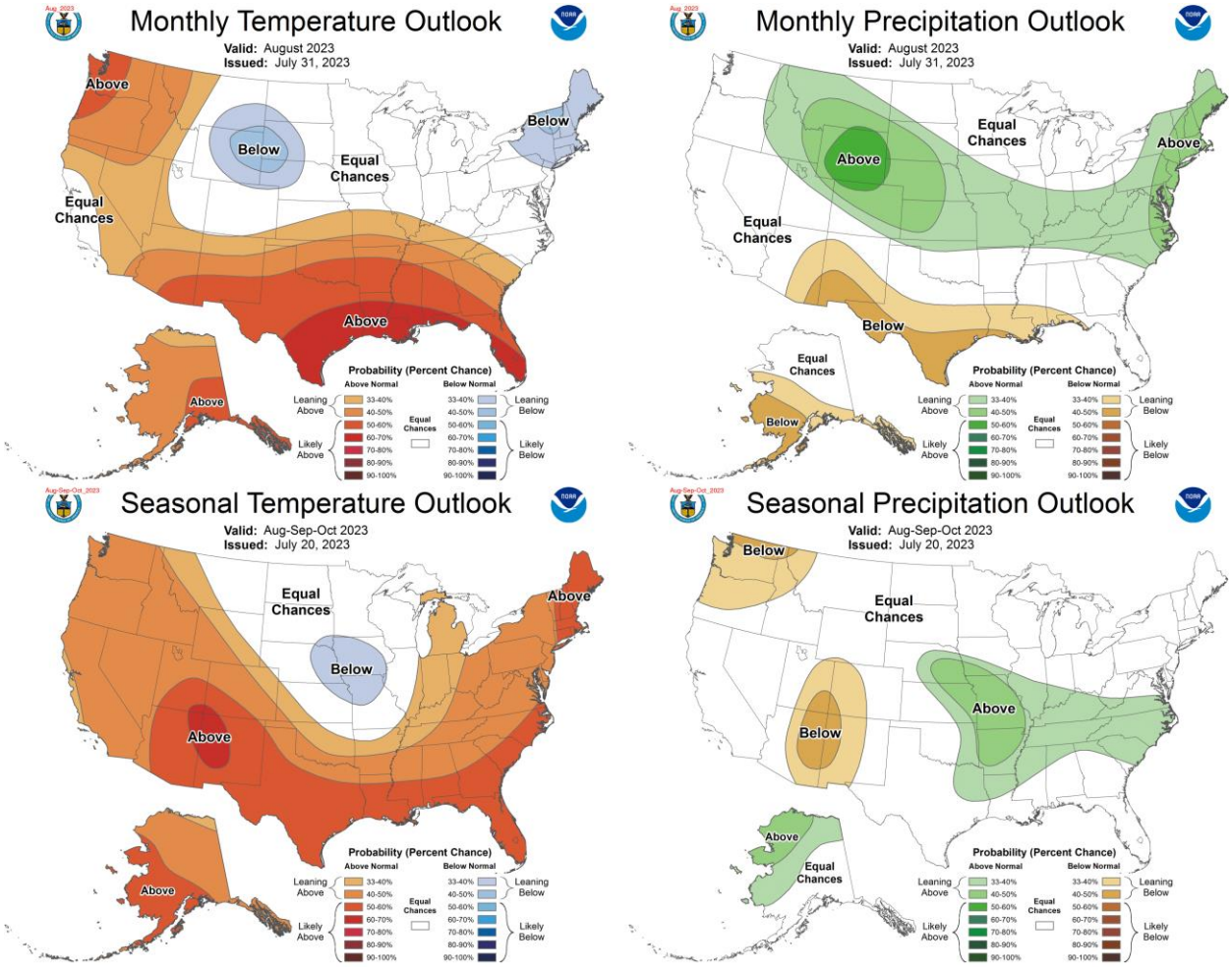

Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of August (top panel) and August, September, and October (bottom panel) (Climate Prediction Center, climate.gov).

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