Weather and Climate Summary and Forecast
September 2024 Report

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September 2, 2024

Summary:

- August was warm early and late but cool in the middle … the result was slightly below average[1] to slightly above average conditions for most, with the southwest seeing the warmest temperatures for the month.
- Dry to wet mix across the west. Monsoon moisture in the Four Corners and Rockies, wet northern California, western Oregon and Washington, dry central to southern California and into the Great Basin. Humidity levels were elevated during August due to periods of southwesterly and onshore flow.
- Growing degree-day accumulations remain above average for most with coastal areas of California and some inland areas of the PNW closer to average.
- The September forecast has a short burst of onshore flow out of the Gulf of Alaska, then warm, warm, warm till mid-month at least. Many locations could hit the high 90s or low 100s. No widespread precipitation in the forecast through mid-month or later, although a slight chance exists in the far northwestern areas of the PNW later in the month but too early to have confidence in the when, where, and how much.
- The 90-day seasonal forecast has the western US titled toward warm for most of the region. Precipitation amounts are forecast to be near average to slightly above in the PNW and below average in the south and southwest.
- It looks more likely that ENSO-neutral is with us most of this winter and that any La Niña development might be on the weak side or a bust. The Pacific Decadal Oscillation continues in a strongly negative state, adding to a warm fall potential, but also increasing the likelihood of a cold, wet winter.

Past Month and Year to Date:

August brought a mixed bag of early and late warmer than average temperatures with a fall-like storm and very cool temperatures during the third week of the month that resulted in mountain snow across portions of the Cascades and Sierra Nevada mountains. Overall, the month had below average temperatures across northern California, much of Oregon, and portions of Nevada, Washington, and the northern Rockies (Figure 1). The rest of the west saw a generally

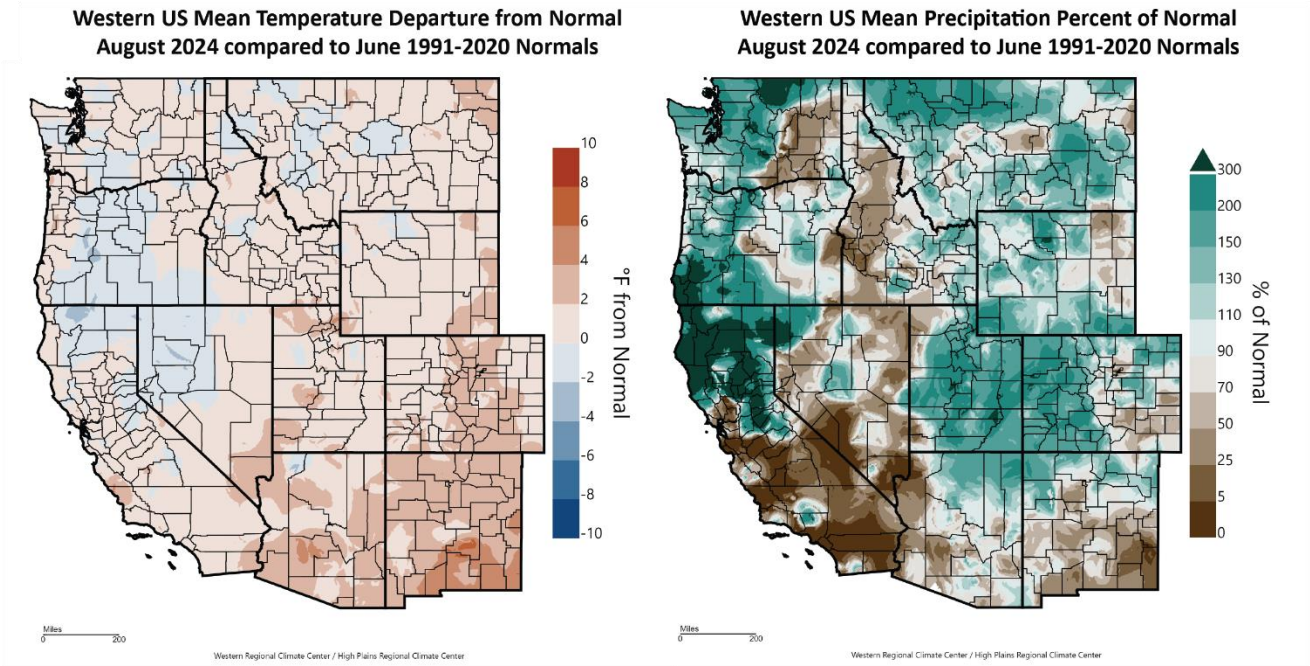

Figure 1 – Western US August 2024 temperature departure from normal (left) and percent of normal precipitation (right; images from Western Regional Climate Center, 2024: ACIS Climate Maps)

[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.

warmer than average August with portions of the southwest 4-8 degrees above average. The southwest across Texas and the Gulf Coast saw the warmest conditions during August, while portions of the southeast, mid-Atlantic, and New England experienced temperatures 1-2 degrees below average (not shown).

In terms of precipitation, August brought a wide range of conditions across the west. Monsoon flow brought moisture northward into the Four Corners and Rockies, including some extreme flooding, while central to southern California and Nevada were very dry (Figure 1). Northern California, much of Oregon, and western Washington experienced two rain events that brought much more precipitation than average to the region. The first came from thunderstorms streaming south to north with the month's normal amount of rainfall occurring in one day. The second was a week later, when a mid-fall type low pressure area streamed southward out of the Gulf of Alaska dropping one day rainfall totals that exceeded records across much of the region. This storm also helped firefighting efforts on wildland fires throughout the region. Precipitation across the rest of the country was dominated by higher than normal amounts across the northern Plains and eastern seaboard, while Texas, much of the Gulf Coast, and the Ohio River valley were substantially drier than average (not shown).

For the first eight months of the year temperatures have been warmer than normal across most of the western US (Figure 2), averaging 0.5-4.5 degrees above average even after the coolish August. Areas still running cooler than average include small areas in the southwest, the south coast of California, north-central Oregon, eastern Washington, and portions of Montana where temperatures 0.5-2.0 degrees below average have been experienced (Figure 2). These cooler areas in the west are the exception to the pattern across the rest of the continental US where temperatures have been 2-6 degrees warmer than average year-to-date (not shown). The warmest conditions continue to be seen across the northern Plains, the Great Lakes, the upper Midwest, and New England.

Through August, year-to-date precipitation for the western US is largely near to above normal with values ranging from 90-200% (Figure 2). The wettest conditions have been over much of coastal to inland California and especially the south coast, along with much of Arizona and New Mexico. Portions of Oregon and the Great Basin have seen 90-130% of average precipitation so far this year. The driest regions have been across much of eastern Washington and the northern Rockies of Montana and Idaho, which have experienced 50-90% of normal precipitation (Figure 2). The rest of the country has largely seen a wetter than average year-to-date, with eastern Texas, the Gulf States, northward into the Great Lakes and into New England seeing the greatest departures, while the driest area of the country remains southern New Mexico, west Texas, and portions of the central and northern Plains (not shown).

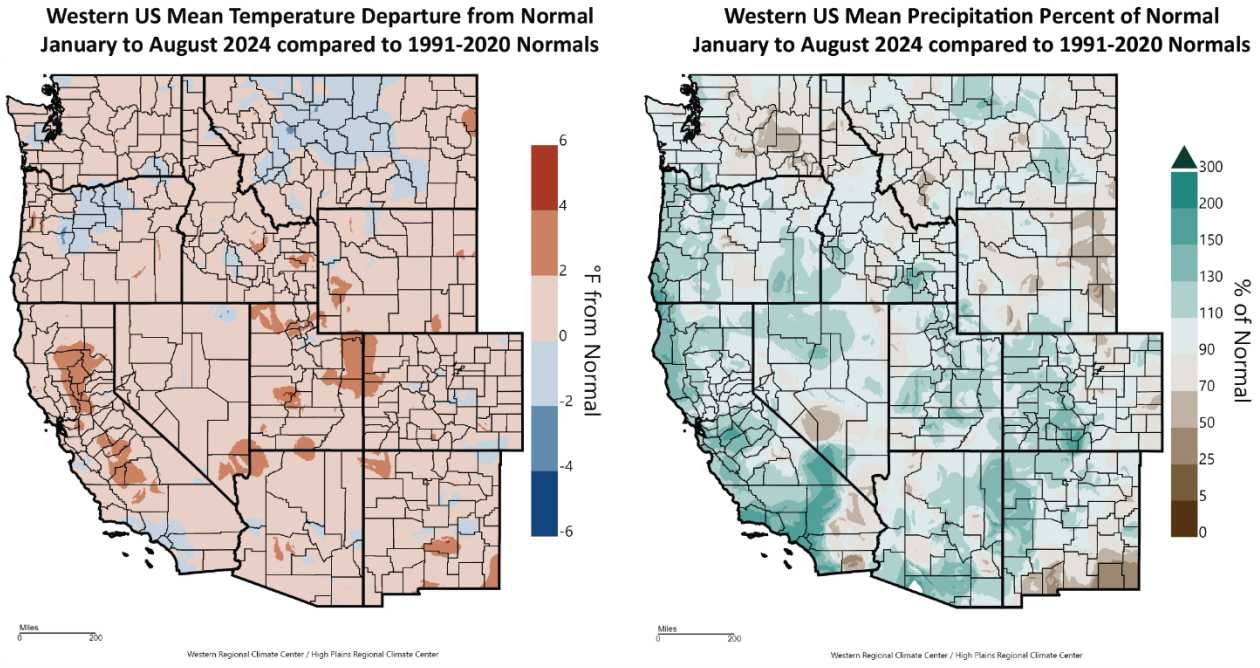

Figure 2 – Western US year-to-date (January 1 through August 31, 2024) temperature departure from normal (left) and percent of normal precipitation (right; images from Western Regional Climate Center, 2024: ACIS Climate Maps).

Heat Accumulation:
August brought cooler temperatures and lower heat accumulation for much of northern California, Oregon, and portions of Washington and Idaho, while central California into the southwest experienced higher than average heat accumulation. The cool month lowered growing degree-days totals over the western US, but most of the west remains above the 1991-2020 average accumulation (Figure 3). Coastal zones from southern California to western Washington remain near average to slightly lower than average GDD as onshore flow has continued to moderate temperatures along the coast. Inland wine regions in Oregon, Washington, and Idaho along with portions of southern Arizona and New Mexico are close to average or below average after August. In terms of days ahead or behind normal heat accumulation, the majority of the western US is still mostly 2-20 days ahead of normal accumulation during the 1991-2020 period. The cooler coastal and inland areas continue mostly 2-10 days behind normal GDD for the March through August period (not shown).

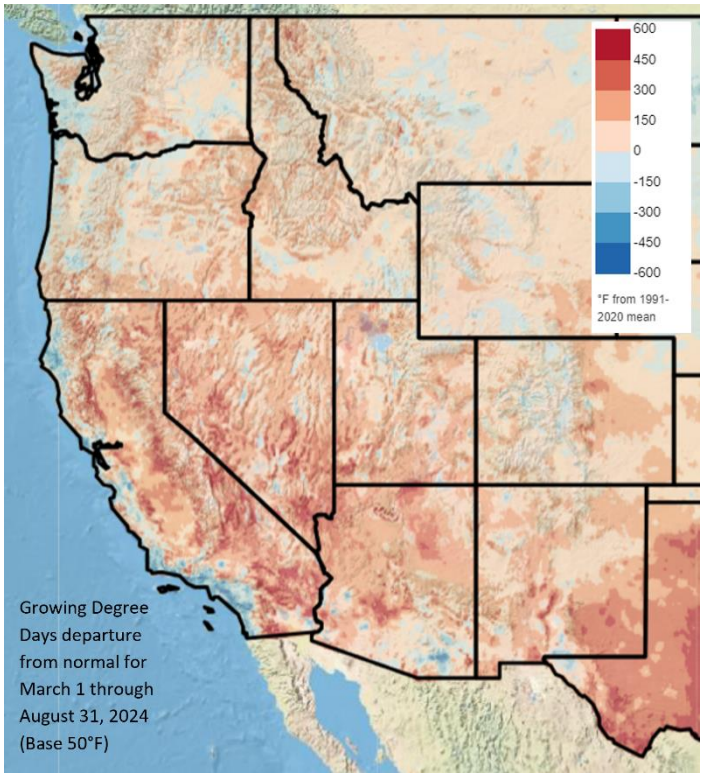

Figure 3 – Western US March through August 2024 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).

For the four main wine regions in Oregon, despite the coolish August, growing degree-days the Willamette, Umpqua, and Rogue valleys remain moderately above both the 1981-2010 and 1991-2020 climate normals, while eastern Oregon continues to run behind the 1991-2020 climate normals. For the March through August period, Roseburg, McMinnville, and Medford are now 9%, 13%, and 14% above the 1991-2020 climate normals while Milton-Freewater is 6% below (Figure 4). Compared to the last 15 years, the three western Oregon regions are 1-5% above average while Milton-Freewater is 4% lower than average. Compared to the August 2023 GDD, the 2024 vintage is now running 5-11% below last year.

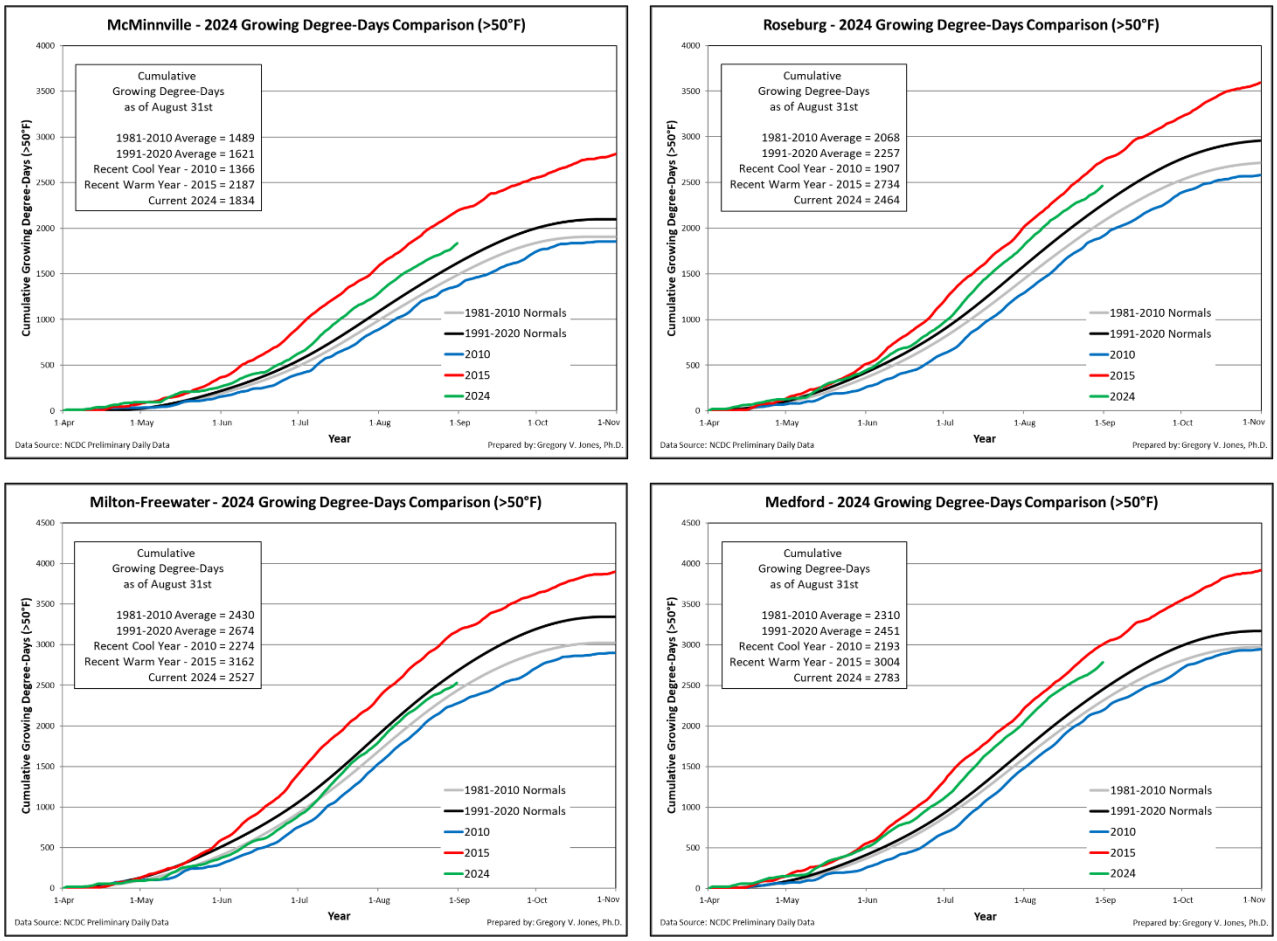

Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2024) and a recent cool year (2010), a recent warm year (2015), and both the 1981-2010 and 1991-2020 climate normals are shown (NCDC preliminary daily data).

Drought Watch – A relatively cool and wet August, especially from northern California into the PNW, helped keep drought severity from increasing over those regions. However, dry conditions over the broader western US have brought drought conditions to the largest extent so far this summer (Figure 5). Across the US existing drought regions either stayed the same or expanded during the month. This month's heat and abnormal dryness continued to expand or intensify drought in portions of the northern Rockies, southern Plains, and Appalachian regions. The overall drought footprint for the continental US increased over the last 30 days to nearly 65% in drought with the most extreme drought categories rising to just over 9%. Over the western US, the overall drought footprint rose to just over 81% with the most extreme categories also increasing slightly to just over 10%. Even with some rain during the month of August, the PNW saw drought concerns rise with Washington seeing an increase to close to 92% of the state in drought and nearly 16% of the state in moderate to extreme drought. Oregon also saw the drought footprint increase to nearly 97% of the state, jumping from none of the state in the more extreme drought categories in July to nearly 9% now. The mountains of northern Idaho and western Montana continue to be one of the driest regions in the west. Montana continues to have drought covering 100% of the state, while Idaho has increased to nearly 84% of the state in some level of drought and over 11% in moderate to extreme drought. Over the past few months, California has risen from no areas in drought to nearly 42% of the state in some level of drought but fortunately, the extreme categories remain near zero (Figure 5).

The 90-day drought outlook heading into fall has largely the same footprint as it does today, although areas of the PNW are now forecast to see conditions improve or be completely removed from drought (Figure 5; right panel). Over the western US, drought is anticipated to persist across the northern Rockies and southwest. Drought persistence or further development is likely in the central to southern Plains and across the Ohio River valley. Areas of the mid-south, which had been in moderate drought, are now forecast to see improvement, largely based on the forecast for an active tropical storm season, which has been muted so far this year (see Forecast section).

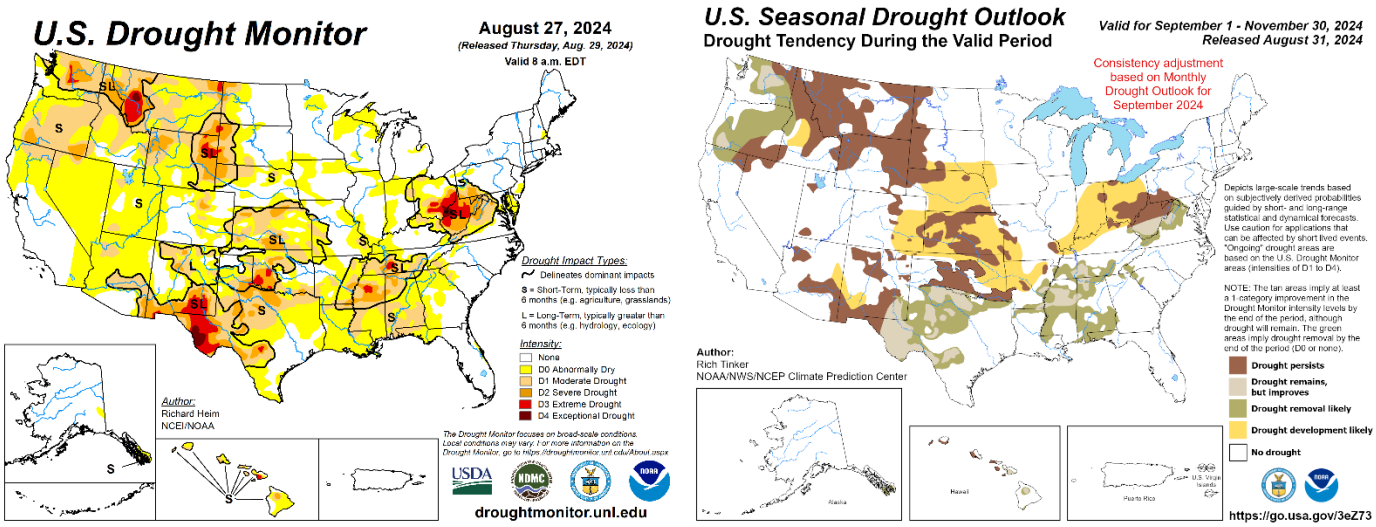

Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – A similar pattern in sea surface temperatures (SSTs) in the Tropical Pacific from last month with cold upwelling off South America and extending across the eastern ocean basin (Figure 6). ENSO-neutral conditions are still in place over the region with atmospheric indicators also consistent with neutral conditions. Current predictions from NOAA and the Climate Prediction Center (CPC) have pushed back the anticipated shift to La Niña. The forecast now has ENSO-neutral conditions persisting through September-November 2024, with borderline La Niña conditions now forecast for the October to December or November to January periods. The models also now indicate that La Niña will likely be very weak and transition quickly back to neutral later in the winter to spring of 2025. One aspect of the relationship with the Tropical Pacific status is the hurricane season in the Atlantic, which so far has not been as active as forecast. Observations show that it might be La Niña's cousin, the Atlantic Niña between Africa and South America that might be responsible. Interesting research is looking into dynamics and relationships to learn more.

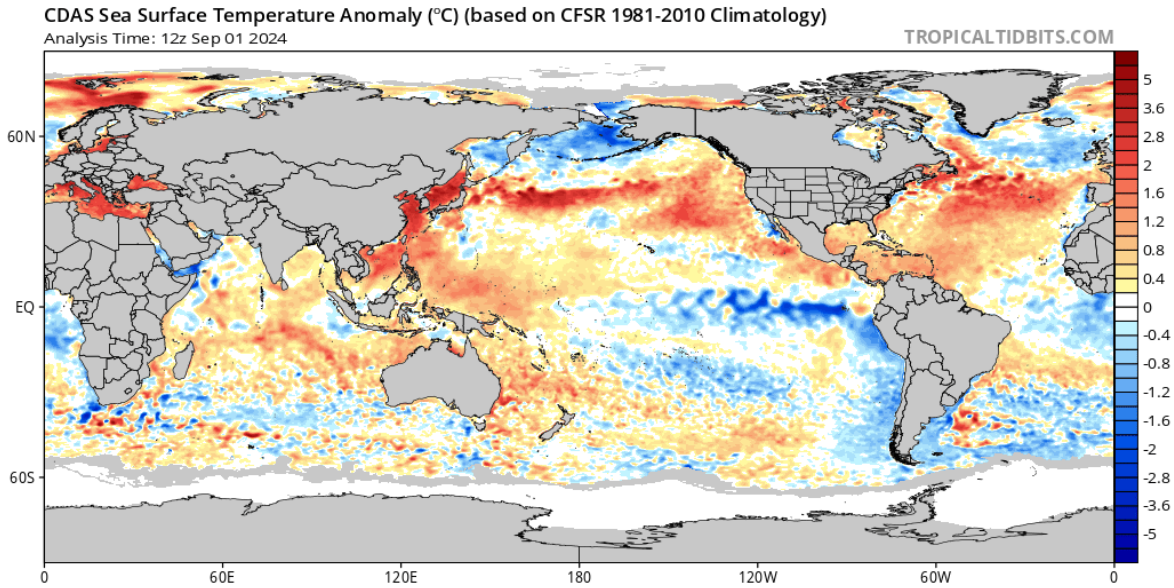

Figure 6 – Global sea surface temperatures (°C) for the period ending September 1, 2024 (image from Tropicaltibits.com).

North Pacific Watch – Broad warming of SSTs over central portions of the North Pacific and into the Gulf of Alaska over the last month. This reversed a cooling trend over the last couple of months with slight warming and a larger footprint of the warm surface temperatures over the central North Pacific extending from Japan to the west coast (Figure 6). Cooler SSTs continue to evolve in the Bering Sea. Warming of coastal waters from southern Alaska to southern California and a smaller area of cooler water in and around Baja California has also occurred. The Pacific Decadal Oscillation (PDO) continues in a strong negative phase due to anomalously warm SSTs in the interior North Pacific and sea level pressures

above average over the North Pacific. The warming coastal zones and above average sea level pressures support the current forecast of warmer than average temperatures heading into the end of summer and the first hint at fall (see Forecast below).

Forecast Periods:

Next 5 Days: Onshore flow north starts the week off with relatively cool conditions and drizzle to light rain in northwest Oregon and western Washington. Some monsoon flow in the Great Basin will bring thunderstorm potential to the higher elevations. Coastal zones remain on the cool side south into California. Inland areas will stay warmer than average and will ramp up to near record breaking temperatures over the next few days. An elevated fire risk is likely.

6-10 Day (valid September 7-11): Above average temperatures in the western US and below average temperatures in the eastern US. A ridge of high pressure builds over the west bringing a heatwave from the southwest all the way into British Columbia. Temperatures are likely going to be 10-20 degrees above average even along the coast and may break records in some valleys on the west side and inland areas during this period. Shortwave troughs might push through the ridge along its northern limits bringing a slight chance of rain in the NW and along the coast. Likely dry over the middle of the country and wetter than average along the eastern seaboard.

8-14 Day (valid September 9-15): Not much change into mid-month with a ridge dominating the west with warmer than average temperatures likely. Toward the end of this forecast period, the ridge shifts eastward, bringing elevated temperatures over the Rockies and slight relief to the western valleys and coastal zones. Continued potential for some PNW and coastal zone rain from low pressure areas pushing in from the northwest, but no evidence of much more than light rain or drizzle at this point. The eastern US is likely to remain slightly below average in terms of temperatures, with the Midwest likely to see drier conditions while the southeast is forecast to see above average precipitation.

30 Day (valid September 1-30): Overall above average temperatures are forecast for the month for the west, although the mid-month shift of the ridge inland will likely keep the western valleys closer to average (Figure 7). Onshore flow from troughing offshore will likely keep coastal temperatures lower in the second half of the month and bring slightly elevated chances for precipitation from Northern California northward into British Columbia. The eastern US is likely to experience near average temperatures in September with the upper Midwest and Great Lakes likely seeing a drier than average month while the south and southeast are forecast to see above average precipitation (Figure 7).

90 Day (September-October-November): Seasonal predictions heading into fall have consistently indicated a high chance of warmer than average temperatures across the West. The current 90-day shows that the bulk of the country is likely to see above average temperatures for most of the autumn (Figure 7). Coastal zones and western valleys in the west have equal chances of above to below average temperatures, which are driven by the likelihood of continued onshore flow. The seasonal forecast for precipitation is calling for elevated chances for above average amounts in the PNW, equal chances south into California and east into the inland PNW, and dry across the south and southwest. The eastern seaboard has an above average chance of seeing more precipitation than average for the autumn while temperatures are likely to above average, especially in New England and Florida (Figure 7).

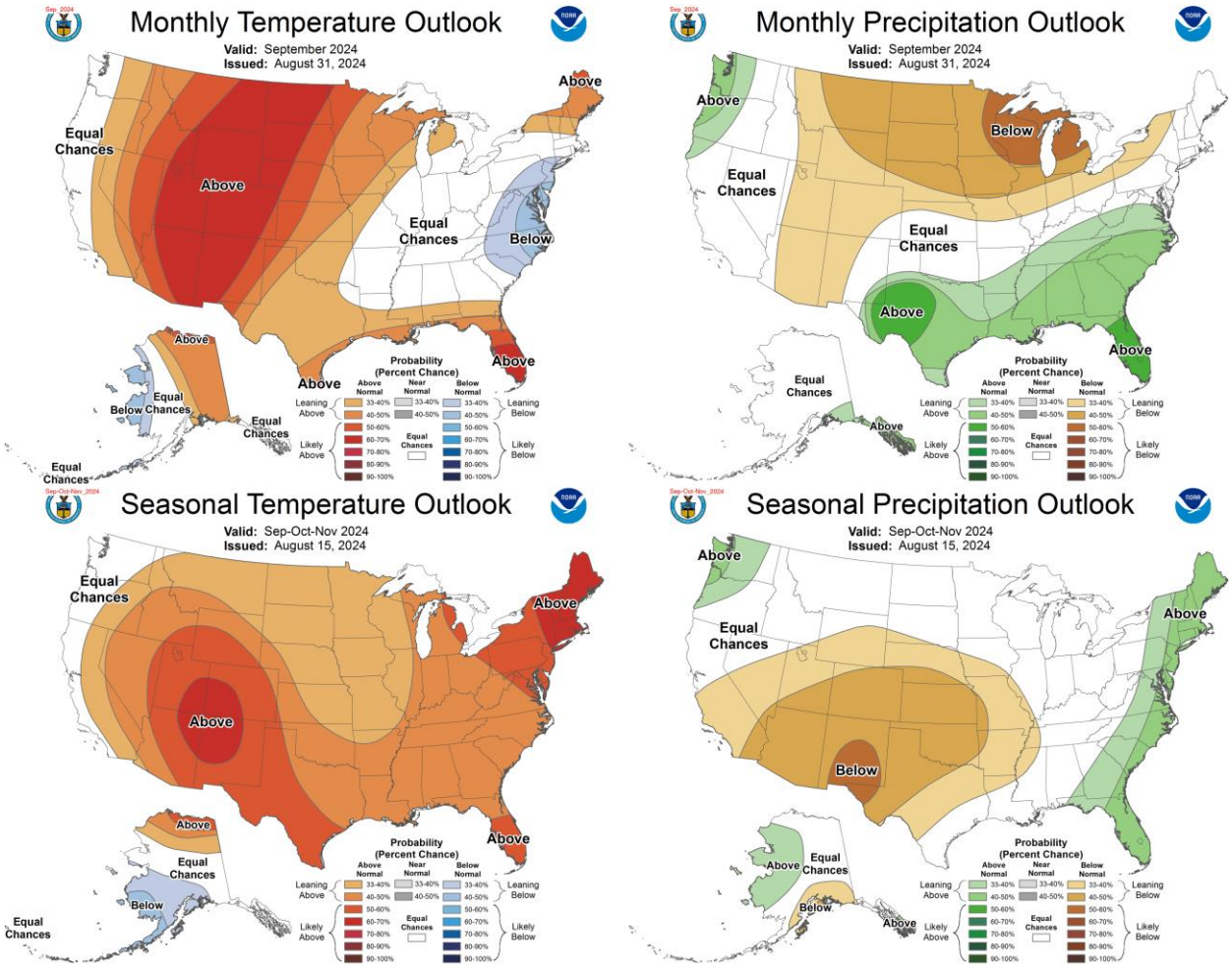

Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of September (top panel) and September, October, and November (bottom panel) (Climate Prediction Center, climate.gov).

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