

# Weather and Climate Summary and Forecast

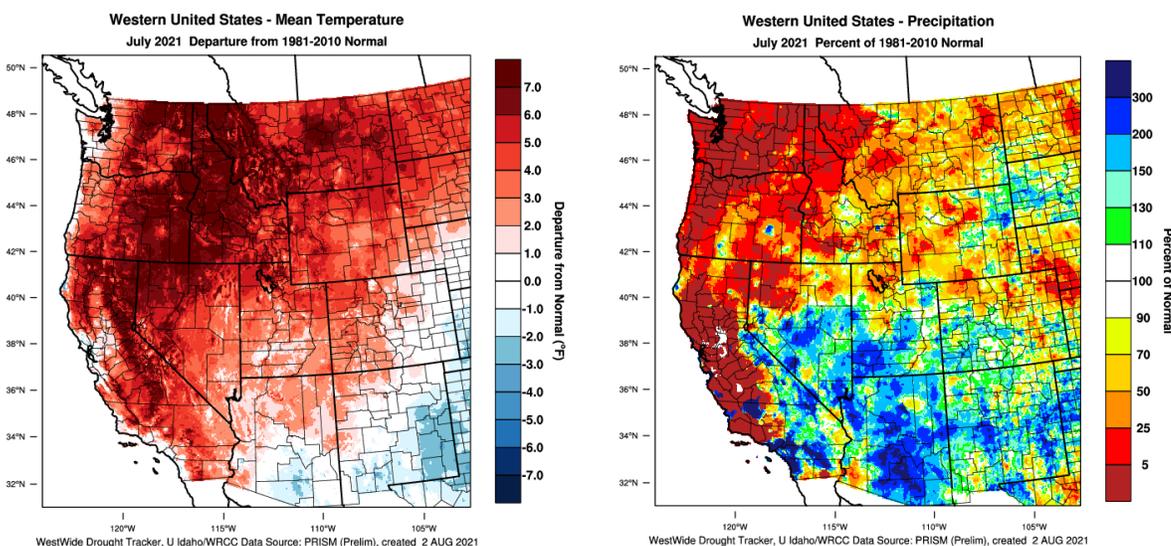
## August 2021 Report

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August 3, 2021

### Summary:

- July was warmer than average<sup>1</sup> for the west with elevated humidity; cool to average for most in the east.
- Monsoon flow brought welcomed rain to the southwest and Great Basin, but July remained dry elsewhere.
- Drought continues to encompass most of the west, although monsoon rains have lowered levels in the southwest. Short- and long-term indicators point to drought conditions continuing into fall for most of the western US, with the only exceptions being some additional monsoon flow in the southwest and thunderstorms from the crest of the Cascades and Sierra Nevada mountains eastward.
- August is forecast to start with seasonal conditions in the PNW to warm south and east into California and the Great Basin. An early month frontal system might settle the dust in the PNW, but otherwise seasonally dry conditions are forecast for the month over most of the west. Continued monsoon flow in the southwest and eastside thunderstorms up into the PNW remain in play for the month.
- ENSO-neutral continues in the tropics while the North Pacific remains in the negative phase of the PDO, tilting the odds to a warm end of the vintage. Coastal zone SSTs along the west coast have flipped back to cool but are projected to warm slightly through the summer. Short-term this means continued coastal zone marine layer influences waning into late summer. The overall summer forecast continues to tilt the odds to warmer than average temperatures and remaining seasonally dry for the western US.

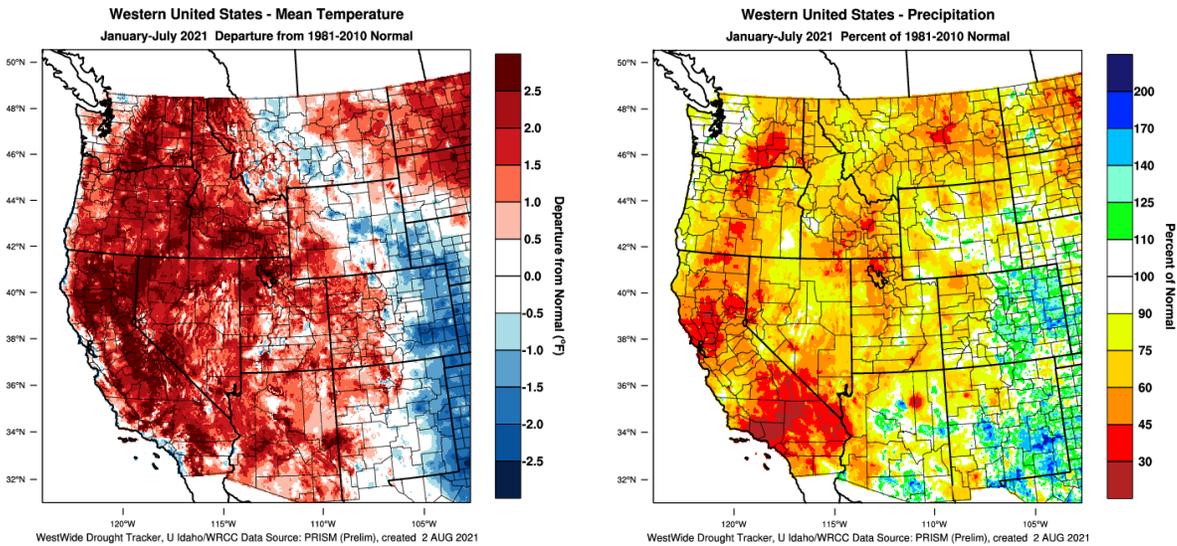
July continued the overall warm conditions experienced this summer with the bulk of the western US above average (Figure 1). High pressure dominated the month with heat dome events elevating daytime temperatures and enhanced monsoon flow elevating humidity levels and nighttime temperatures. Temperatures were 2-8°F above average for the month for much of the west. Coastal zones in Washington, Oregon, the Bay Area, and southern California continued to beat the heat with enhanced marine layers due to cooler than normal ocean temperatures in the coastal zone. While the west was warm in July, most of the eastern US was near average to slightly cooler than average, especially Texas and the southern Plains (not shown). The forecast for monsoon flow in July held, bringing widespread precipitation to southern California and Nevada along with the southwest and Four Corners region (Figure 1), otherwise dry conditions prevailed over the rest of the west. Dry conditions were also seen across the central to northern Plains, while most of the rest of the country experienced wetter than average conditions (not shown).



**Figure 1** – Western US July 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

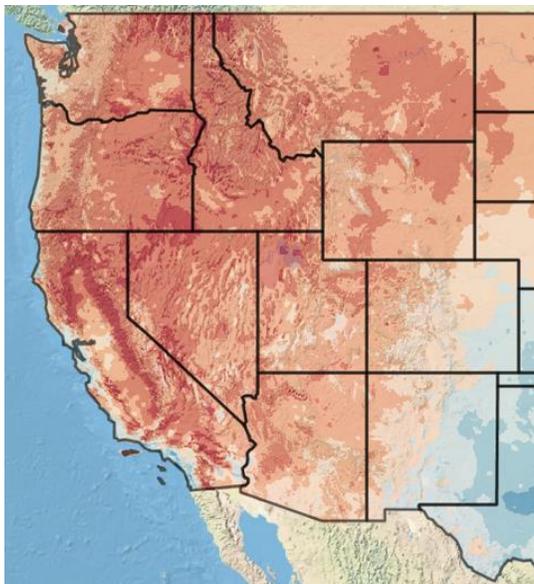
<sup>1</sup> Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise. Also, note that the 1991-2020 climate normals are starting to become available across reporting agencies and will be used in this report when possible.

Year-to-date temperatures across the western US are running mostly above average (Figure 2), although coastal zones have been closer to average year-to-date due to cooler coastal ocean temperatures and stronger than normal marine layers and fog. The area from the Front Range of the Rockies south into the southern Plains and Texas has been cooler than average year-to-date (Figure 2), while the southeast has been near average and Florida, New England, the northern Plains, and the Great Lakes have been warmer than average (not shown). Year-to-date precipitation amounts in the western US continue to show most areas seeing 90% or less of normal rainfall, reflecting the ongoing drought (Figure 2). Monsoon flow has flipped portions of the southwest to positive for the year, a welcomed sight after a couple of years of little to no monsoon effect in the region. Even with some monsoon rains, dry conditions have overall expanded in the west and continue to reflect ongoing and projected drought concerns (see Drought section below). Year-to-date dry conditions continue across the northern Plains, portions of the Great Lakes, and into northern New England, while the central portion of the country and southeast has largely been near average to wetter than average (not shown).



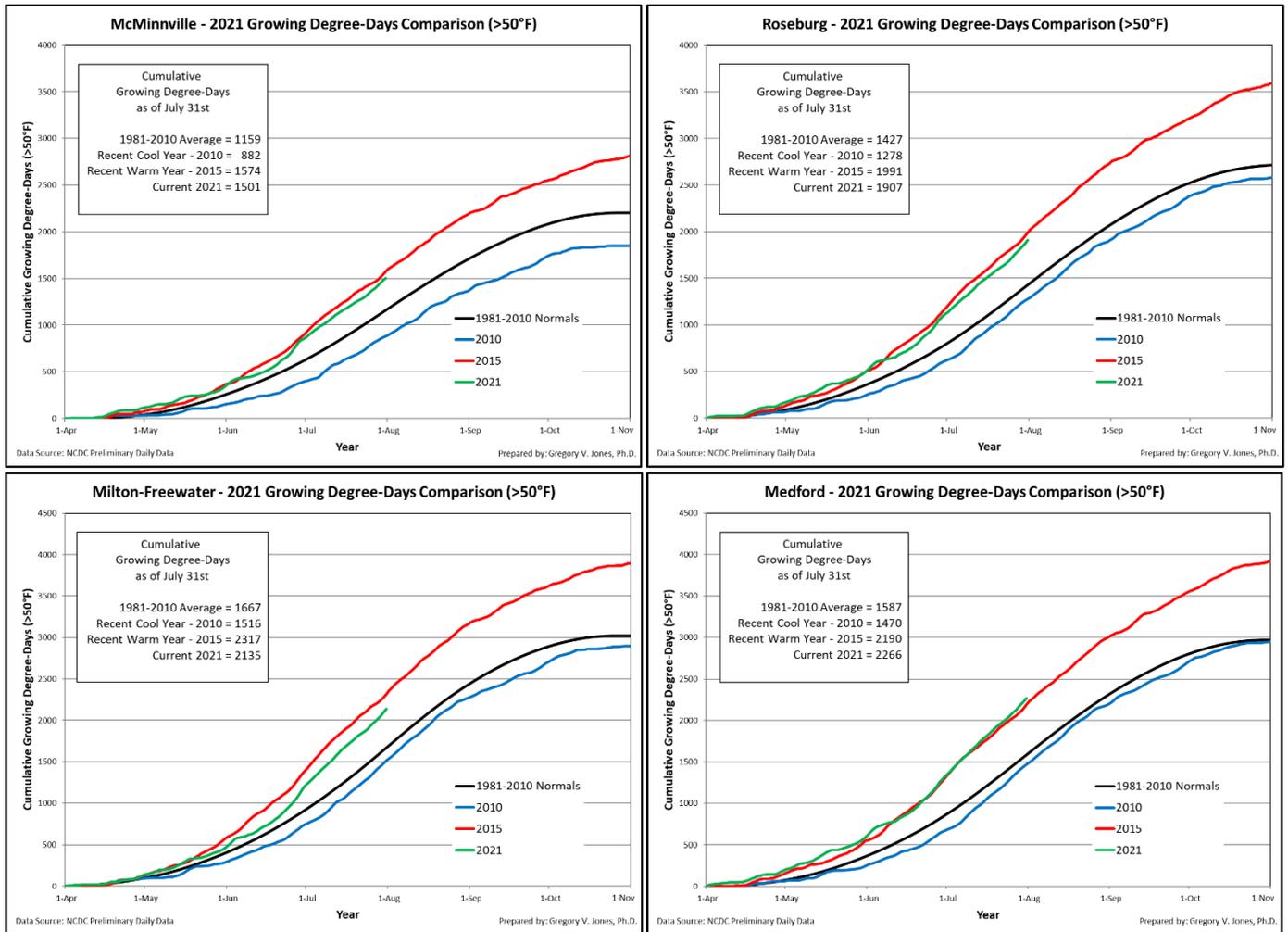
**Figure 2** – Western US year to date (January-July 2021) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

March through July growing degree-days (GDDs) for the western US reflect the warm conditions in June and July with accumulations moderately above average in most of the western regions of California, Oregon, Washington, and Idaho (Figure 3; note that this data is now referenced to the 1991-2020 climate normals). Coastal zones from the Bay Area southward in California have been slower accumulating heat due to cooler coastal ocean temperatures driving stronger marine layers. Most inland areas continue running 5-20 days ahead of normal growing degree-day accumulations, while the coastal zones in central to southern California are near average to seven days behind.



**Figure 3** – Western US March through July 2021 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho). Note that this data is now referenced to the 1991-2020 climate normals.

As we head into the home stretch for the last few months of the 2021 vintage, growing degree-days for four locations that I have tracked for many years in wine regions in Oregon are all substantially above the 1981-2010 normals through July (28-43%) and above the average of the last 16 years for the sites (16-22%). Compared to the 2015 vintage, one of the warmest years on record in Oregon, Medford is now above the 2015 vintage while Roseburg and McMinnville are now within a percent or two of 2015, and Milton-Freewater is roughly 8% below the GDD accumulated during the 2015 vintage (Figure 4). The four locations are currently 9 to 29% above the 2020 vintage at this point.



**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 (2021) and a recent cool year (2010), a recent warm year (2015), and the 1981-2010 climate normals are shown (NCDC preliminary daily data).

**Drought Watch** – Sorry for the broken record, but the western US continues to be dominated by drought conditions (Figure 5). Currently over 99% of the west is in some level of drought. The highest drought categories, extreme and exceptional, now make up roughly 65% of the western US. There has been some improvement in southwest as monsoon flow developed over the last 30-60 days. The drought zones continue to extend into the northern Plains and across to the western Great Lakes, while much of the central portion of the US, Gulf Coast, southeast, and northeast are largely drought-free currently. Both short- and long-term drought indicators along with the seasonal outlook (Figure 5, right panel) point to the western US being highly likely to continue dry conditions into the start of the fall. Some improvement in the southeast will likely continue due to monsoon flow.

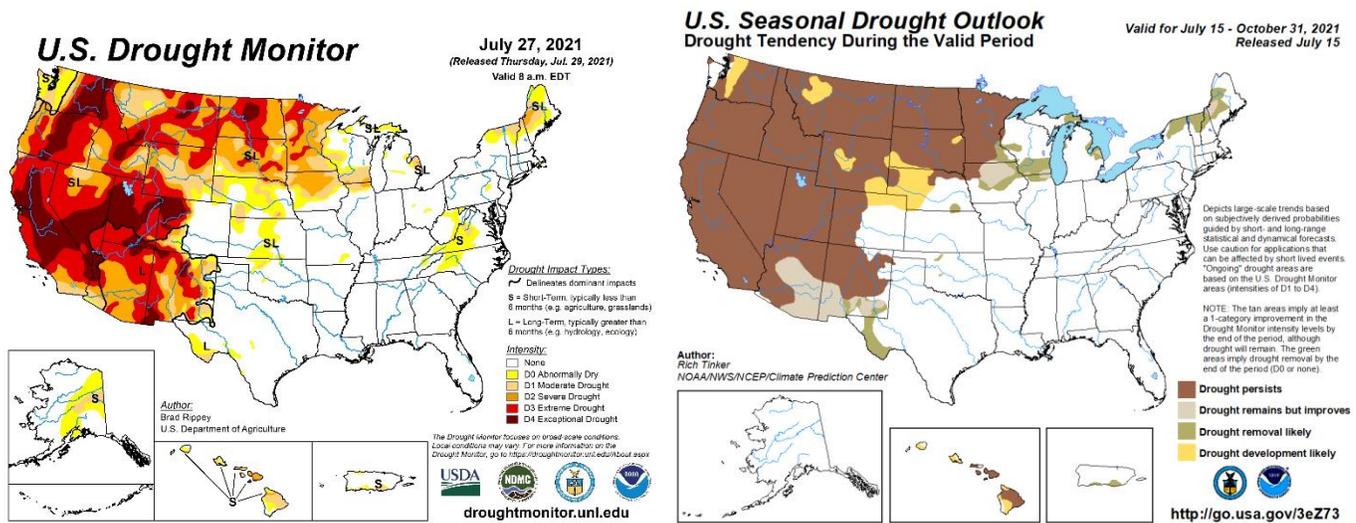


Figure 5 – Current US Drought Monitor and seasonal drought outlook.

**ENSO Watch** – As forecast over the last couple months, the Tropical Pacific is now neutral (Figure 6). As of mid-July, the Climate Prediction Center (CPC) reported that SSTs in the east-central Pacific have dropped to average, with patterns in all key atmospheric variables consistent with neutral ENSO conditions. Model forecasts are split with roughly 50% pointing to the Tropics being ENSO-neutral and the other half indicating cooling through boreal summer. Heading into fall and winter the models are showing some uncertainty. The official CPC/IRI outlook and other agency outlooks are consistent with these model forecasts. ENSO-neutral in summer typically does not bring much influence on the weather in the western US, although the increased monsoon flow was a welcome sign for many bringing rain to the southwest and Great Basin, but also fire-starting thunderstorms to many areas.

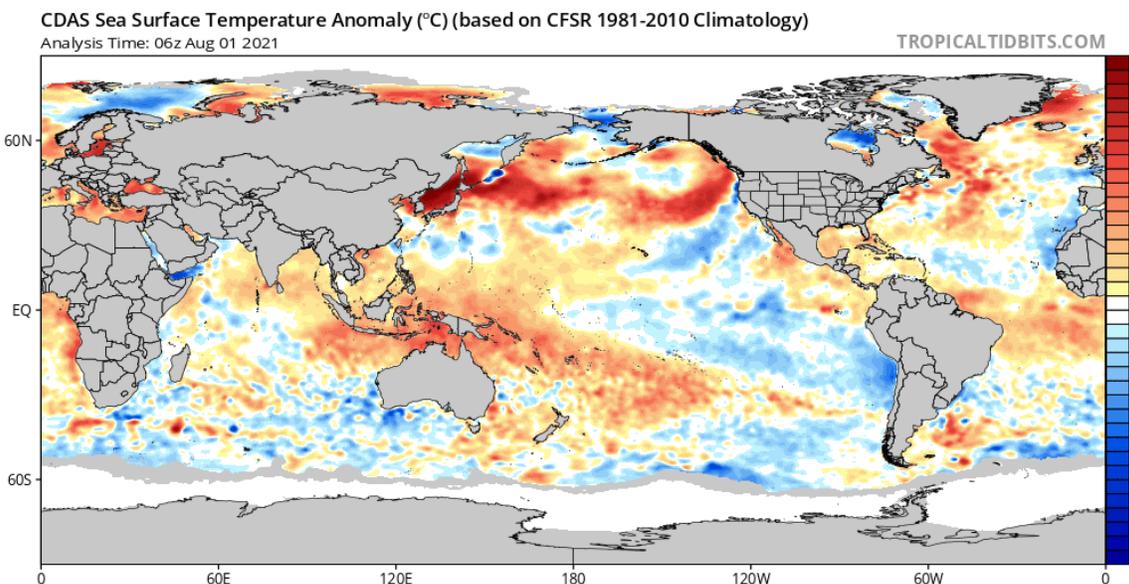


Figure 6 – Global sea surface temperatures (°C) for the period ending August 1, 2021 (image from Tropicaltidbits.com).

**North Pacific Watch** – Shifting patterns of warming and cooling in the surface waters of the North Pacific Ocean have been the rule over the last 60 days or so (Figure 6). While a large area of the North Pacific continues to show moderate to higher-than-average temperatures, the coastal zones of the western US have turned cooler again with a plume of cooler than average temperatures extending southwest toward Hawaii. This shift has the Pacific Decadal Oscillation moving slightly more to the positive phase, but still within the neutral range. Cool surface temperatures remain in the center of the Gulf of Alaska, but the magnitude and extent have declined in this area as well (Figure 6). Conditions in the North Pacific have likely contributed to our warm June and July, although the cooler coastal waters have continued to

support a strong marine layer. With the Tropics likely to stay ENSO-neutral, which has less effect on west coast weather, shifts in the PDO along with monsoon flow strength and patterns both will likely continue to play an outsized role as we move into the fall.

#### **Forecast Periods:**

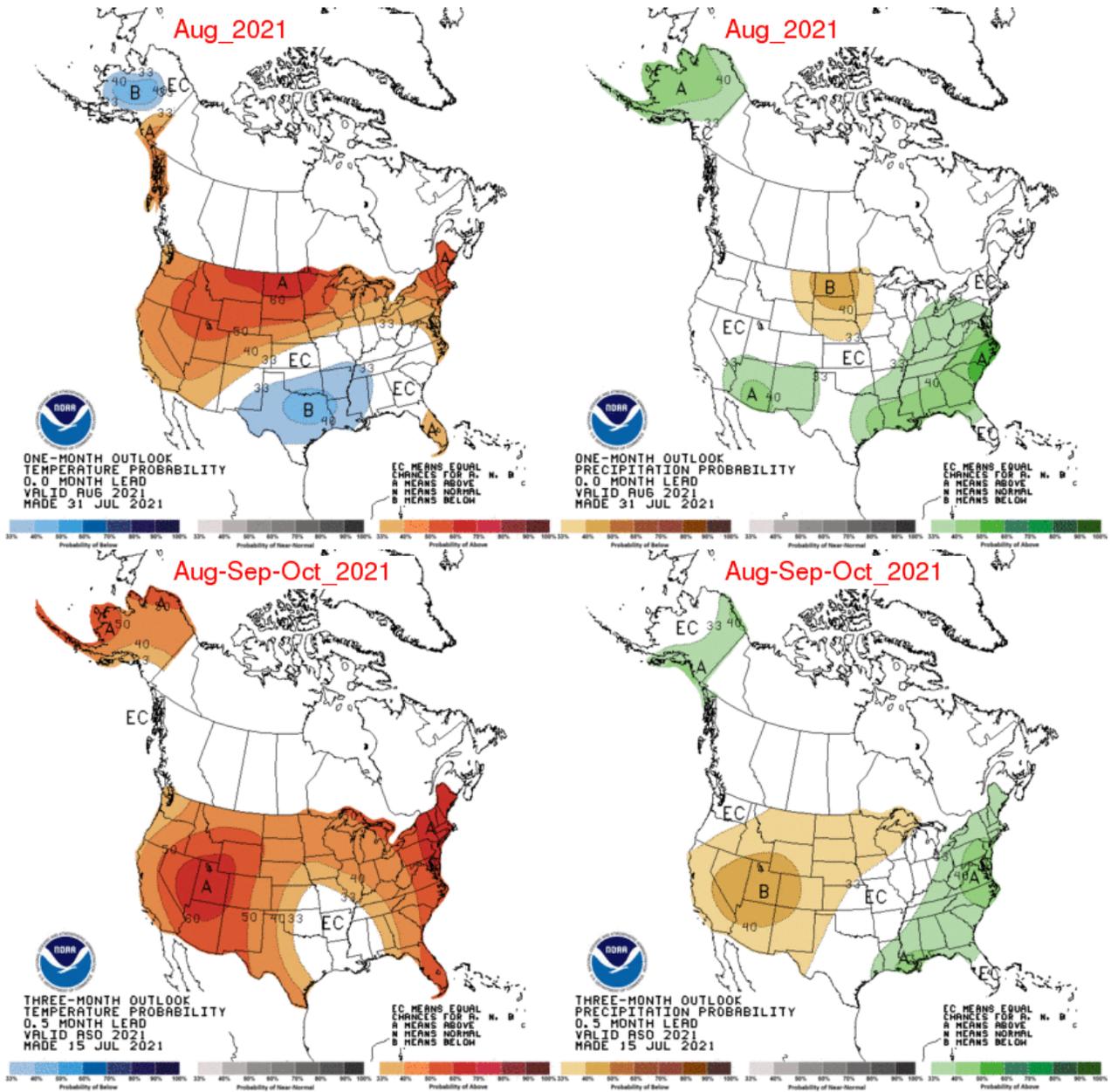
**Next 5 Days:** High dew points and humidity from monsoon flow in the southeast will subside for much of the west. First frontal passage out of the Gulf of Alaska will dip down into the PNW dropping temperatures and bringing a hint of rain into the weekend. The front is not strong enough to push very far south, so the effect will diminish into California, and the rain potential fizzles out from Portland southward. Eastside winds and lightning potential continue.

**6-10 Day (valid August 8-12):** Seasonal temperatures through mid-month are forecast for the western US with interior areas of the Great Basin and Rockies likely seeing the coolest conditions. Coastal to western valley areas from Northern California to Washington are likely to see slightly above average temperatures. While we cool down, the east is forecast to see above average temperatures during this period. After a tease with some rain in the PNW earlier in the month, dry conditions are forecast for this period. Monsoon flow keeps the desert southwest in the mix for some rain, while Texas to the mid-Atlantic states are likely to stay dry. The only area of the country expected to see above average precipitation during this forecast period is the Great Lakes.

**8-14 Day (valid August 10-16):** The cool down to more seasonal conditions is forecast to give way to warmer temperatures mid-month. The PNW is likely to see the greatest departures from average, while further south the continued monsoon flow is forecast to bring clouds and rain that should keep temperatures below average for the southwest. The eastern US will likely continue to see above average temperatures during this forecast period. The bulk of the western US is forecast to stay dry into mid-month, except for isolated eastside thunderstorms and the continuation of monsoon flow in the southwest increasing rainfall chances. The Gulf Coast states are forecast to see below average to normal precipitation while the Great Lakes to New England are forecast to see above average rainfall.

**30 Day (valid August 1-31):** The general forecast pattern continues from June and July with the western US, across the northern Plains, into the Great Lakes and New England likely to see a largely warmer than average August, while the southern Plains and Gulf Coast region are likely to see below-average to normal temperatures for the month (Figure 7). The precipitation forecast for August in the west is showing equal chances of slightly above to slightly below average, but remember this month is very dry to begin with, so remaining dry is highly likely. Again, monsoon flow will keep the desert southwest in the mix for a wetter than average month. Dry conditions are also forecast across the Northern Rockies and Plains, while the Gulf Coast up into southern New England is forecast to see a wetter than average month.

**90 Day (valid August-September-October):** The forecast for the end of the summer and start of fall is holding from previous months with the western and eastern US likely seeing an overall warmer than three-month period (Figure 7). The greatest above-average likelihood is centered over the western US and eastern seaboard, with the central portion of the country from Texas into the Plains likely seeing closer to average temperatures during the second half of summer. The precipitation pattern forecast through ASO indicates that dry conditions are likely over most of the west. Near-average precipitation is forecast for northern California into the PNW, while this forecast indicates that the monsoon season will likely subside into the end of the summer. The bulk of the Gulf Coast and up into New England and the eastern seaboard are forecast to see above-average precipitation for the season.



**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).