

# Weather and Climate Summary and Forecast

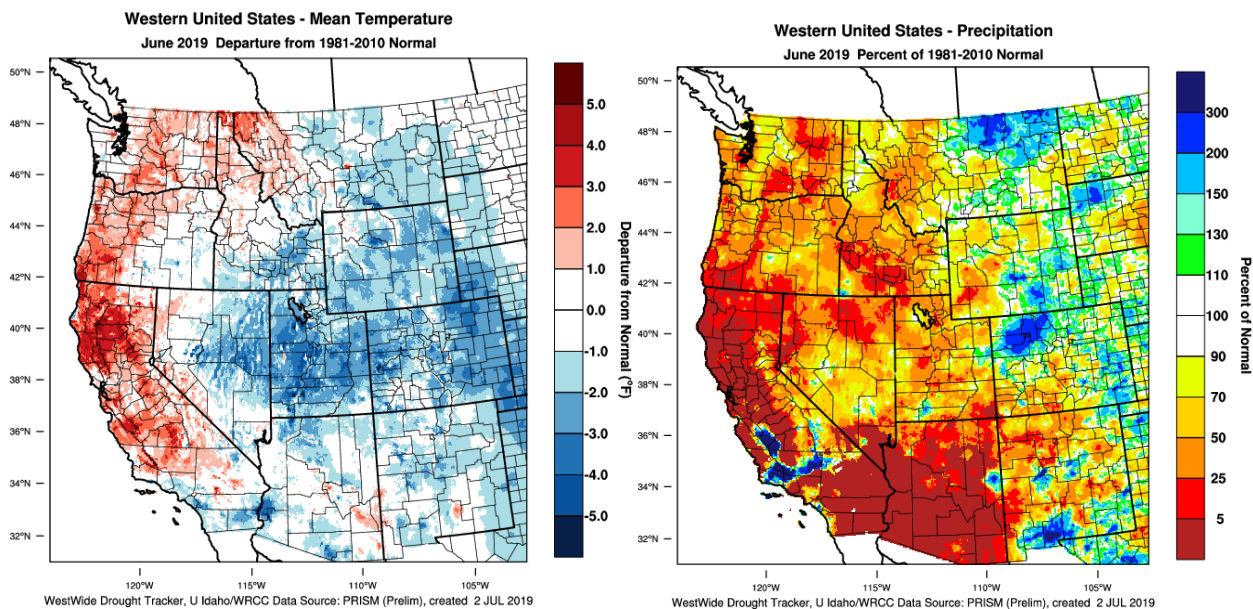
## July 2019 Report

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### Summary:

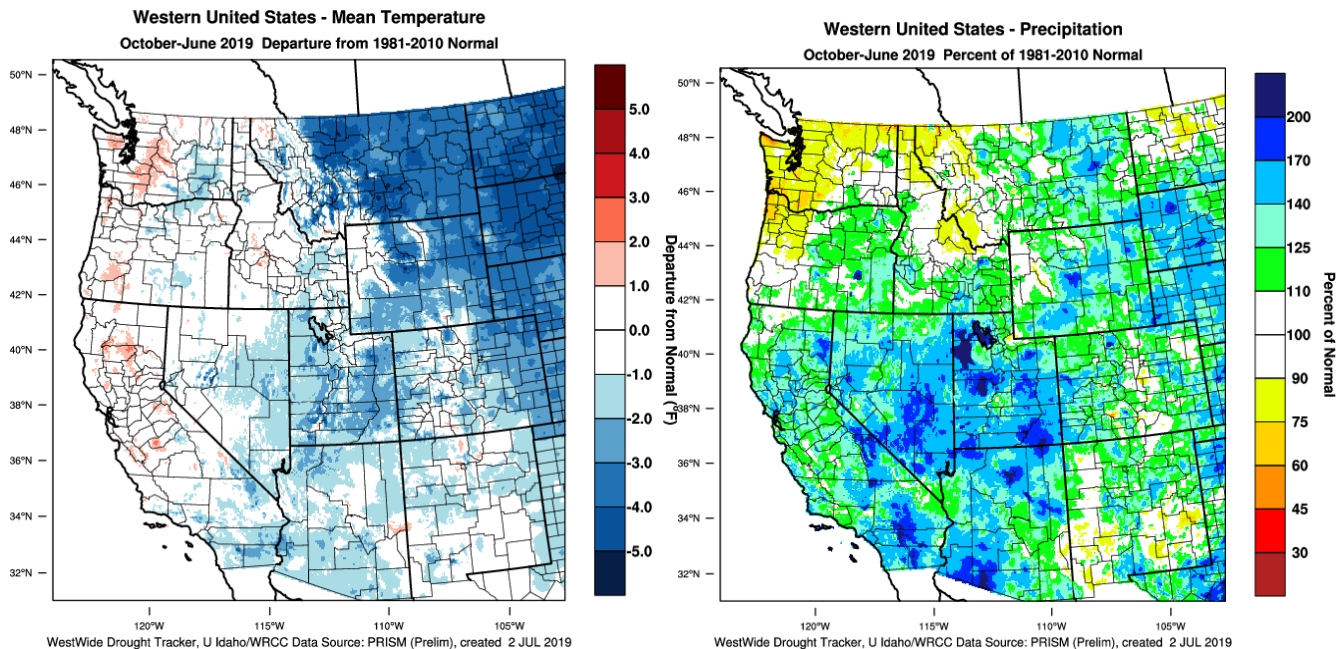
- June brought conditions that seesawed as May did with a very warm first half of the month, even record breaking in many locations, followed by near normal to cool second half of the month. However, overall June ended up warmer than average over most of the western US. The month also brought moderate to extremely dry conditions, increasing drought concerns in the PNW and concern for fire risk across the west.
- Growing degree-day accumulations are running 50-250 GDD above average in all but portions of the central coast and southern California, which are closer to average or slightly below average.
- The forecast through mid-month indicates a mild start to July gradually warming later in the month with no major heat events, or extreme fire weather conditions, or likely any precipitation over the vast majority of the western US.
- The forecast for July through September continues to point to the western US likely seeing a warmer than average second half of summer, much hotter than the first half. The precipitation forecast calls for near average most places (dry), especially in the PNW, with some inland thunderstorm potential mid-summer.

A very warm period (records were broken in many areas) in early to mid-June highlighted the month resulting in largely warmer than average conditions along most of the west coast (Figure 1). Portions of western and eastern Washington and the central coast of California were closer to the average for the month, while southern California and the interior Great Basin and Rockies were cooler than average. Similar to May, the conditions that produced this temporal and spatial pattern were a strong ridge early in the month, which shifted to the west allowing more onshore flow and a cooler second half of the month. The cool conditions in the Great Basin and Rockies extended across the rest of the country where most areas were below average for the month, the exception being the Gulf Coast, which was moderately warmer than average (not shown). The western US was largely seasonal in terms of precipitation in the month of June, with most regions dry to much drier than average (Figure 1). The exception was an area of southern California, which experienced a 'June gloom' period from the first day of summer that produced locally more than 200% of normal precipitation. The driest area in the country in June was the western US, while the rest of the country experienced near average to slightly higher than average precipitation for the month (not shown).



**Figure 1** – Western US June 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

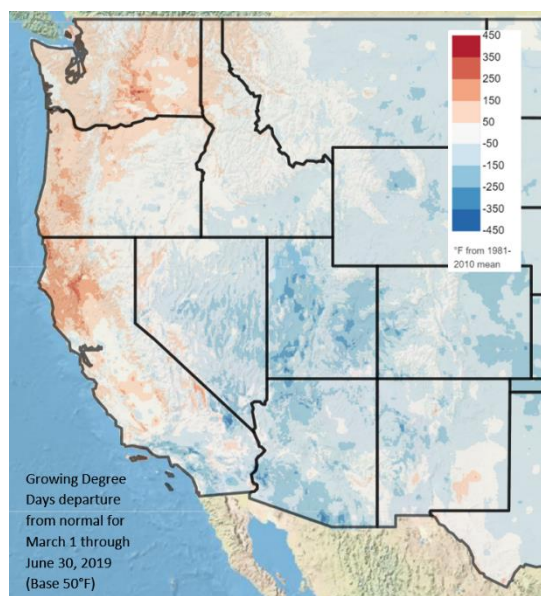
Water year temperature and precipitation through June are shown in Figure 2. The general pattern continues from previous months with the nine-month period showing near average temperatures in most of the western valleys, except for warmer than average conditions in scattered areas in Washington, Oregon, and California. Cooler than average conditions have held in eastern Washington and Oregon, portions of southern California and into the desert southwest, Great Basin, and Rockies. The northern Rockies into the northern Plains have seen substantially colder than average conditions during this period (up to 8°F colder than average). The colder than average conditions in the northern Rockies and Plains extends into the central portion of the country, Great Lakes, and northern New England, while the southeast has been moderately warmer than average (not shown).



**Figure 2** – Western US Water Year October 2018 - June 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Not much change from last month for the water year precipitation, with amounts continuing to be moderately wetter than average in much of California, the rest of the southwest, Great Basin and portions of the Rockies which have seen a wet water year period (115-200% of average)(Figure 2). A relatively dry water year to date continues in western Oregon and Washington and some scattered areas in the northern Rockies (60-85% of average; Figure 2). The central and eastern US has largely seen precipitation amounts running 110-200% or more of normal so far this water year (not shown), with only the southernmost portion of Texas and south Florida experiencing a drier than average conditions.

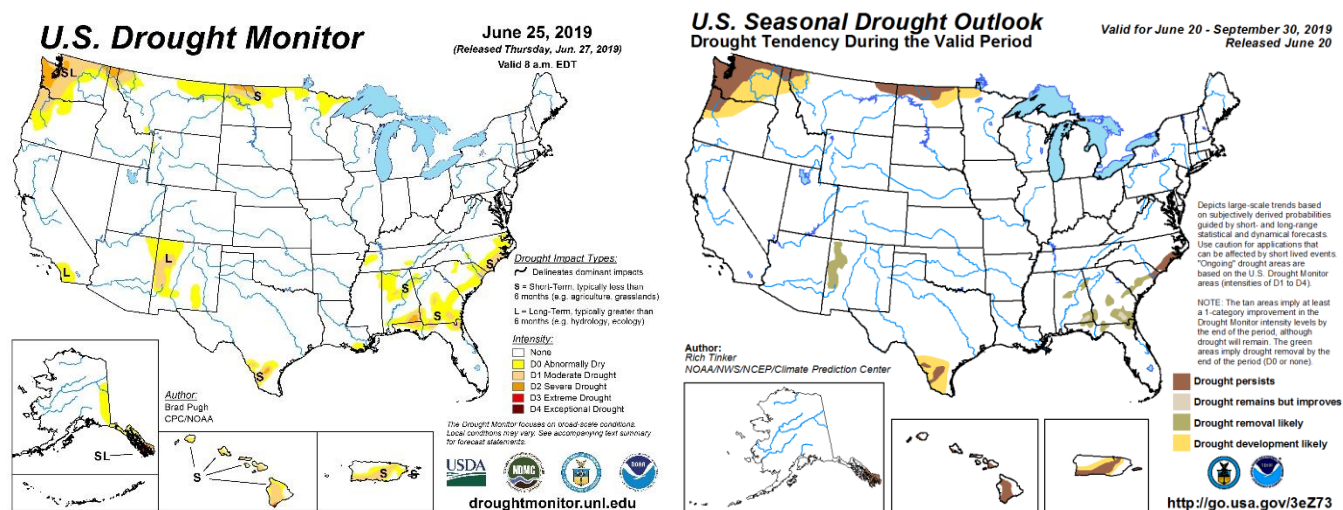
Seasonal deviations in growing degree-days (GDD) mapped over the western US since March shows that the majority of the western valleys are running 50-250 GDD above average (Figure 3). Coastal areas of central to southern California and portions of eastern Washington are closer to the average for this time of year. In terms of the deviation in days, current conditions put much of northern California, western Oregon, and western and eastern valleys in Washington 10-18 days ahead of normal for heat accumulation, while coastal areas in central to southern California are running 4-10 days behind in heat accumulation (not shown).



**Figure 3** – Western US March through June 2019 growing degree-days departure from 1981-2010 normals (image from Climate Impacts Research Consortium, University of Idaho).

Reports of fruit set and develop across the west appear close to normal to ahead of normal for most regions. Heat accumulation (GDD) amounts for four locations that I have tracked for many years in Oregon are currently 20-40% above the 1981-2010 normals for the months of April through June, from 4% lower to 10% higher than the same point in 2018, and slightly below 2015, the warmest year to date in the regions (see the Appendix Figure 1 for four locations in Oregon).

**Drought Watch** – The bulk of the US continues to see very limited drought conditions (Figure 4, left panel). The most significant area of drought concern continues to be western Washington, northwestern Oregon, and portions of the northern borders areas with Canada. Other areas experiencing dry conditions to moderate drought include the Four Corners, southern Texas, and portions of the southeast. The US seasonal drought outlook shows continued concern for short to long-term drought in the PNW, especially western Washington, northwestern Oregon, and the northern Cascades, as the July through September forecast shows (see the 90-day forecast below). Additional drought concerns continue in the northern Plains, western New Mexico, southern Texas, and the southeast (Figure 4, right panel).

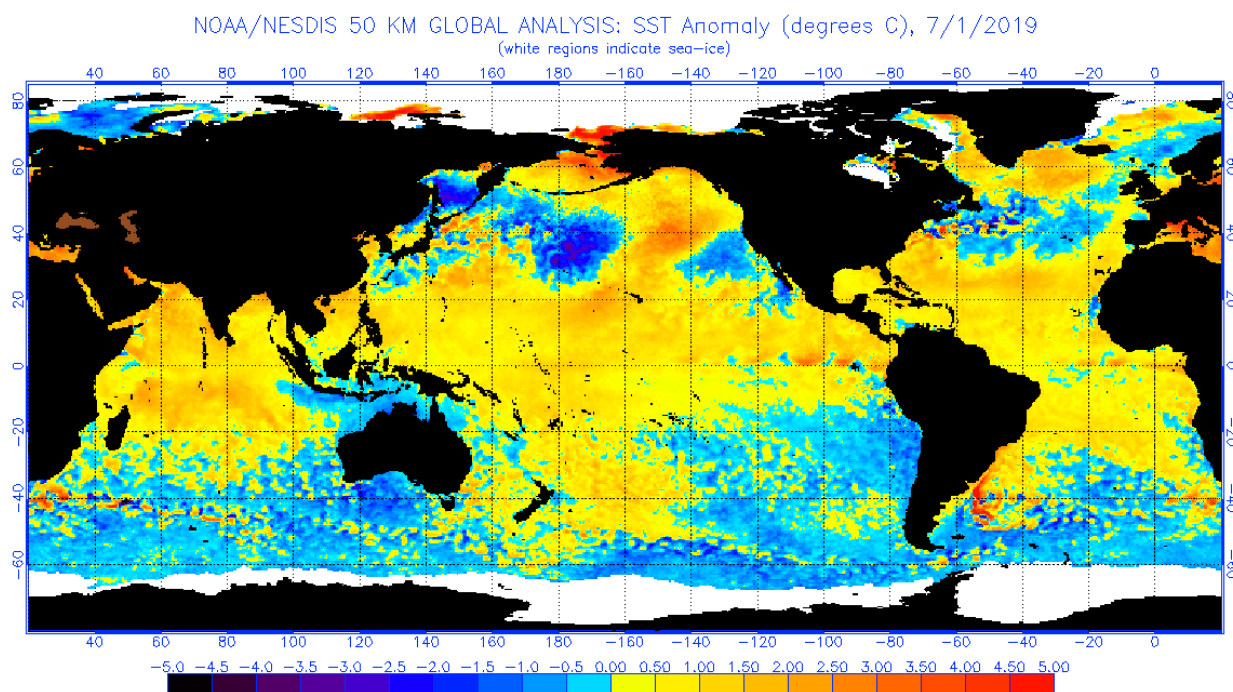


**Figure 4** – Current US Drought Monitor and seasonal drought outlook.

**ENSO Watch** – Conditions in the tropical Pacific continue to show weak El Niño conditions with warmer than average sea surface temperatures (SSTs) nearly basin-wide (Figure 5). El Niño-level SSTs in the tropical Pacific maintained at a weak level during May and early June, while temperature anomalies of subsurface waters were slightly above



average. Some patterns in the atmosphere show weak to intermittent El Niño conditions. Collective model forecasts show a continuation of at least weak El Niño-level SSTs lasting through 2019. The official CPC/IRI outlook, which contains a continued El Niño advisory, calls for an approximate 66% chance of El Niño-level SSTs continuing during July through September, decreasing to 50-55% through fall and winter. Continuing the story from previous months, if these conditions continue to hold the weather across the western US will still likely follow the slightly warmer and drier than average conditions in the 90-day forecast along the west coast and especially in the PNW (see forecast periods below and Appendix Figure 1). Areas across the central to eastern portions of the country will likely see a wetter than average late summer, which also appears in the 90 day forecast below.



**Figure 5** – Global sea surface temperatures (°C) for the period ending July 1, 2019 (image from NOAA/NESDIS).

**North Pacific Watch** – A similar pattern of SSTs continues in the North Pacific, although the area of warmer than average conditions has expanded over the Gulf of Alaska (Figure 5). A second colder than average SST area is over the western North Pacific and has expanded in size during the last 30 days. The warming of the Gulf of Alaska follows the forecast from previous months, however, coastal upwelling along the central California coast also continues. The overall effect would be for broadly warmer than average late summer temperatures, especially in the PNW (see forecast periods below) but likely near average to cooler than average coastal areas to the north and south of the Bay Area. Regional forecasting agencies are continuing to say that the overall warmth of the Pacific (see Tropics above) will likely enhance the normal weather/climate patterns across the US during weak to moderate El Niño years (see the JAS forecast below).

#### **Forecast Periods:**

**6-10 day (valid July 8-12):** once the low pressure area over the PNW moves out to the northeast, the western US should experience very nice conditions through the next couple of weeks. The western US is forecast to see above average temperatures over this period with the bullseye over the PNW. Coastal zones in California will likely be seasonal, while inland valleys will see the warmest temperatures. The northern tier of states from the Rockies eastward are forecast to see average temperatures for this time of year, while the southern tier of states will likely be warmer than average. Currently, there are no precipitation events forecast through this period, with the west coast staying seasonally dry. With the exception of forecasted dry conditions in the desert southwest and southern Texas, the rest of the country is likely to see above average precipitation during this period.

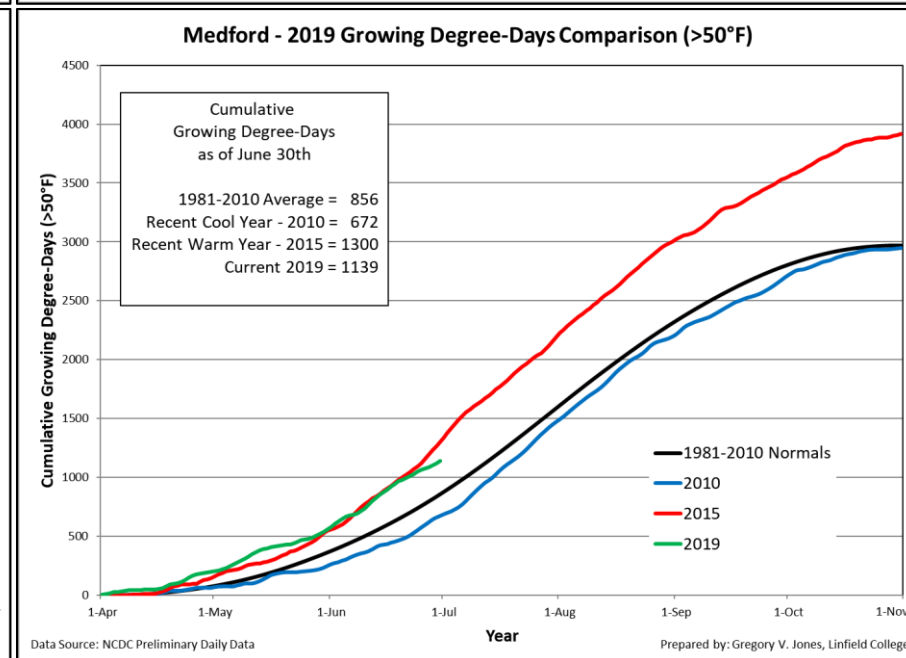
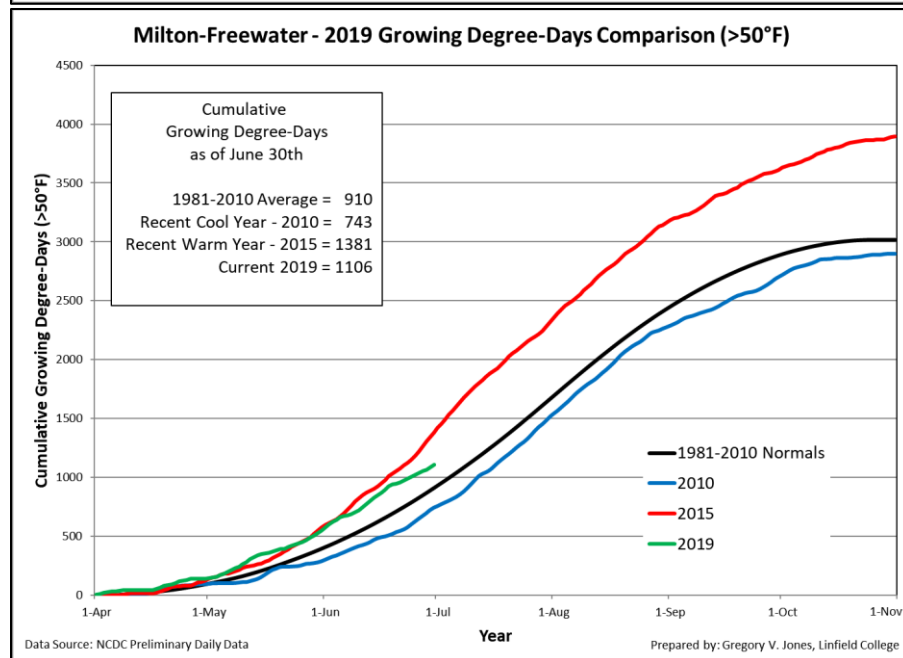
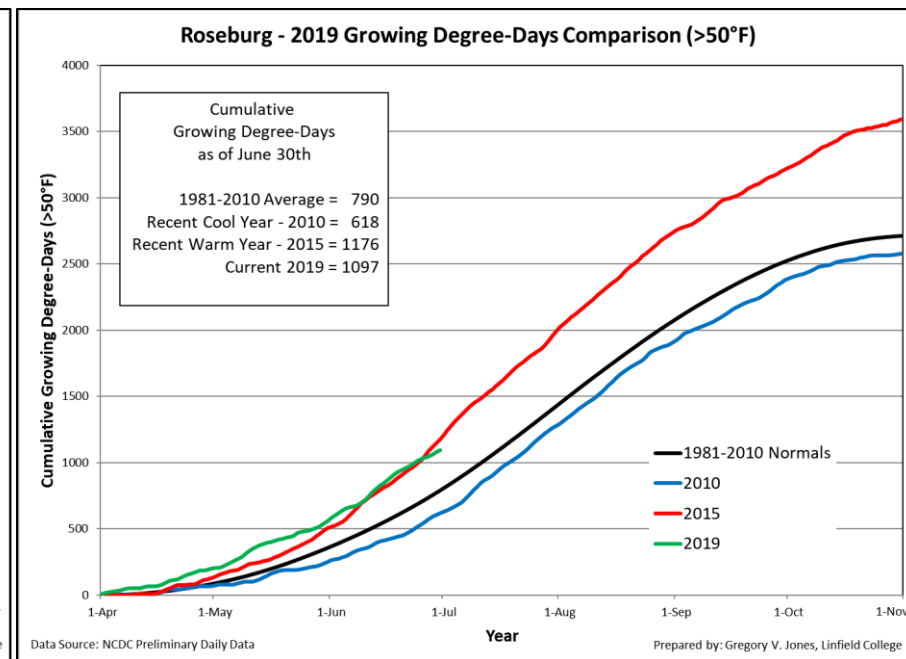
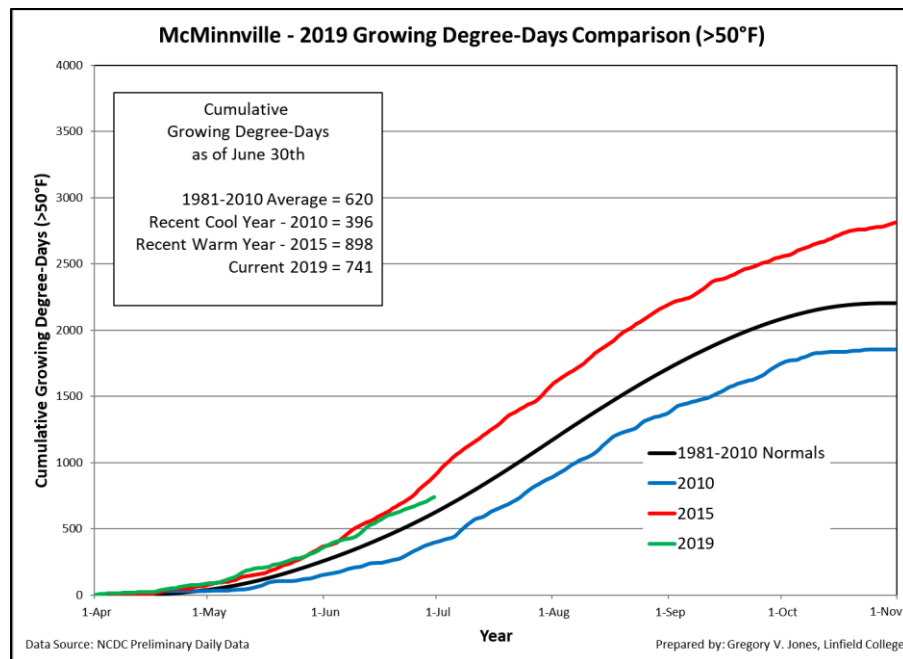
**8-14 day (valid July 10-16):** conditions in the 6-10 day forecast for the western US continue into mid-month with above average temperatures over the entire west. The greatest change from average is likely to be centered over Oregon and Washington. The warmer than average conditions extend across the southwest across the Gulf Coast states to Florida, while cooler than average conditions are forecast for the upper Midwest and Great Lakes region. Dry conditions should prevail over much of the western US, except for portions of inland northern California and eastern Oregon where thunderstorm potential is likely. The monsoon season in the southwest appears to be slow in developing this year, with dry conditions forecast through mid-month. The rest of the country is forecast to see average to slightly above average precipitation for this time of year.

**30 day (valid July 1-31):** the initial July forecast is calling for a largely above average temperatures for the month for northern California through the PNW, near average conditions in the desert southwest, cool conditions in the central Plains and upper Midwest, and a warmer than average month along the Gulf Coast and southeast. July is forecast to be seasonally dry in the western US with both the PNW and desert southwest expected to remain drier than average (see Appendix Figure 2). The central portion of the country is forecast to experience a wetter than average month, while the Gulf Coast and southeast are forecast to remain drier than average.

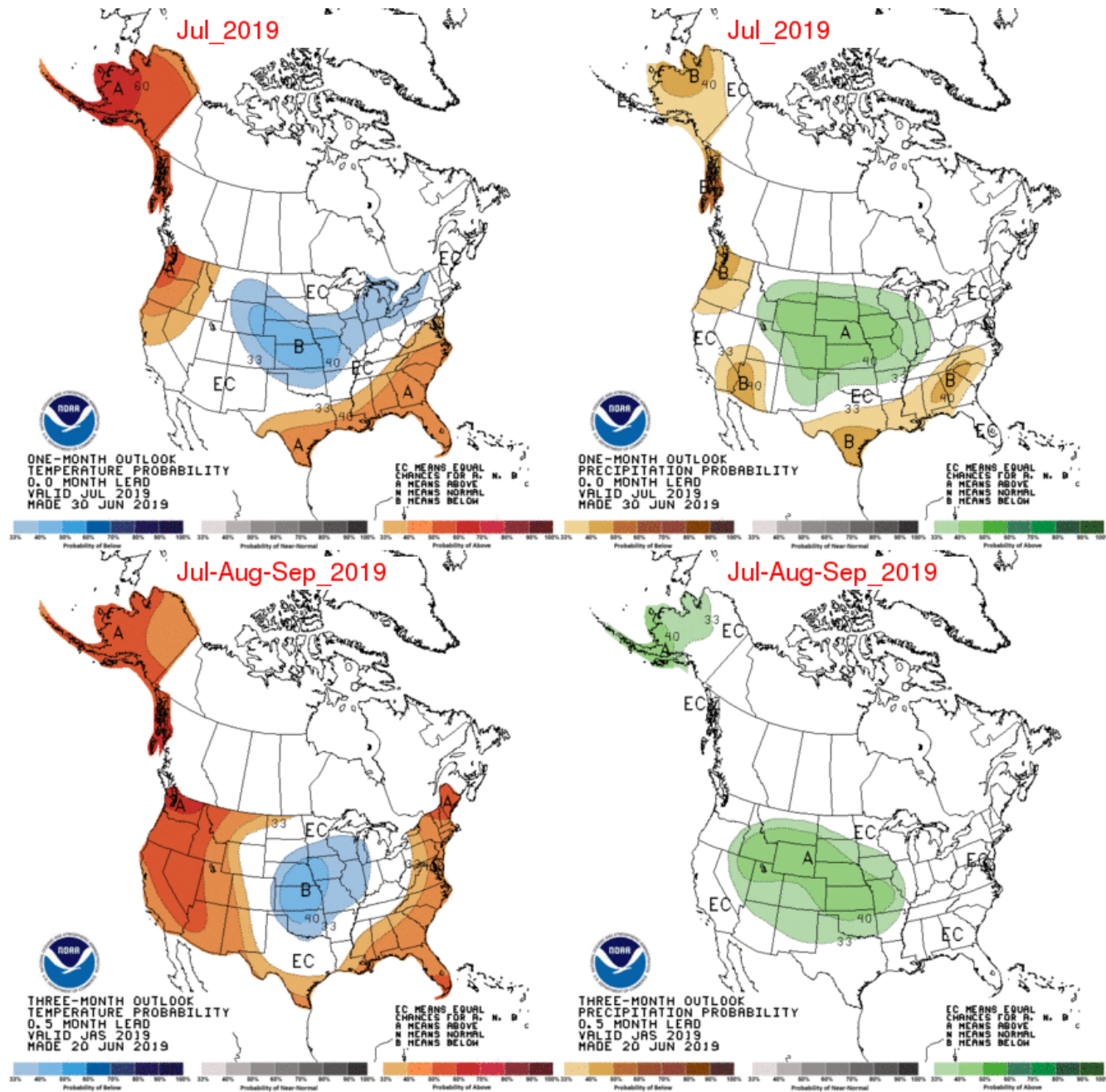
**90 day (valid July-August-September):** the initial forecast into the second half of summer and harvest is pointing to the western US staying warmer than average, with the PNW likely to see the greatest deviation from average (see Appendix Figure 2). The central portion of the country is likely to see a relatively cool summer, which continues the overall cool year in the region, while the south and eastern seaboard is likely to experience warmer than average conditions. Precipitation during the next 90 days is forecast to have equal chances for slightly above, near normal, or slightly below for most of the country, which for the west coast means the typical summer dry conditions. The only area likely to see wetter than average conditions is the northern and central Rockies across into the northern Plains.

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**Appendix Figure 1** – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2019) and a recent cool year (2010), a recent warm year (2015) and the 1981-2010 climate normals are shown (NCDC preliminary daily data).



**Appendix Figure 2** – Temperature (left panel) and precipitation (right panel) outlooks for the month of July (top panel) and July, August, and September (bottom panel) (Climate Prediction Center, climate.gov).