Weather and Climate Summary and Forecast
June 2019 Report

Gregory V. Jones
Linfield College
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Summary:

- May brought a first half that was quite warm over the entire western US, followed by cool and wet conditions in the south and warm and dry conditions in the PNW during the second half of the month. A stuck pattern in the jet stream created a trough over the western US allowing systems to push further south than typical for this time of year.
- Growing degree-day accumulations are running 6-15 days ahead of normal north and 6-15 days later than normal south. Reports of bloom in many areas indicate that plant growth is slightly behind to close to average.
- Short-term forecasts through mid-month are indicating a mild to slightly warmer and drier than average next two weeks for much of the western US.
- The temperature forecast for June through August is holding to the western US likely seeing a warmer than average summer, while precipitation is forecast to be near average most places (which means seasonally dry) and lower than average in the PNW.

For the western US, May brought a first half that was quite warm and dry, and a second half that was relatively cool and wet. There was also a prominent north-south difference with California and the southwest being moderately to substantially below normal (2-8°F) and the PNW that was moderately to substantially above normal (1-6°F)(Figure 1). The conditions that produced this temporal and spatial pattern were a strong ridge early in the month, then a prominent trough that allowed the storm path to dip further south than normal for this time of year. The cool conditions in the southwest extended across the Rockies and into the northern Plains across to northern New England, while the southeast and Mid-Atlantic States were much warmer than average (not shown). Precipitation amounts in May were mixed across the western US with most of California, the Great Basin, and Four Corners wetter than average and the western valleys and Cascades of Oregon and Washington drier than average (Figure 1). Precipitation amounts over the country in May were near normal to substantially above normal, especially in the central Plains were dramatic flooding has been prevalent across the region. The driest area is the country in May was the southeast, which has been under a strong high-pressure ridge for much of the month (not shown).

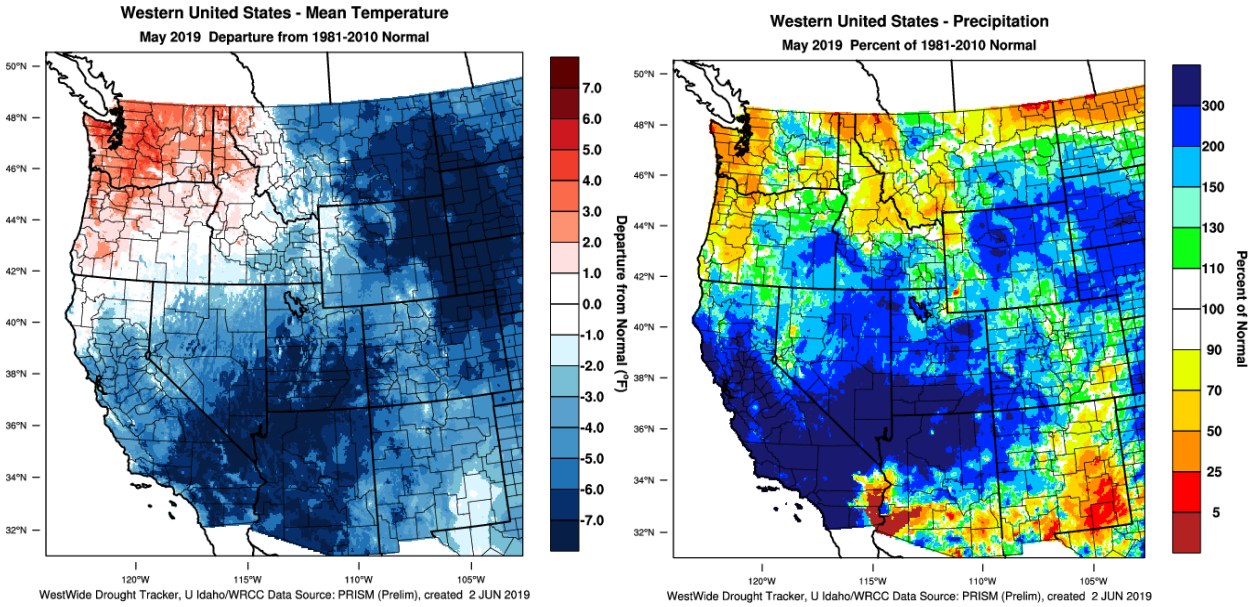


Figure 1 – Western US May 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Figure 2 shows temperature and precipitation during the water year for October 2018 through May 2019. During this eight-month period the western US was from 2 degrees below to 2 degrees above average. The western valleys have been warmer than average during this period while eastern Oregon and Washington along with the Great Basin and Rockies have been overall cooler than average (Figure 2). 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).

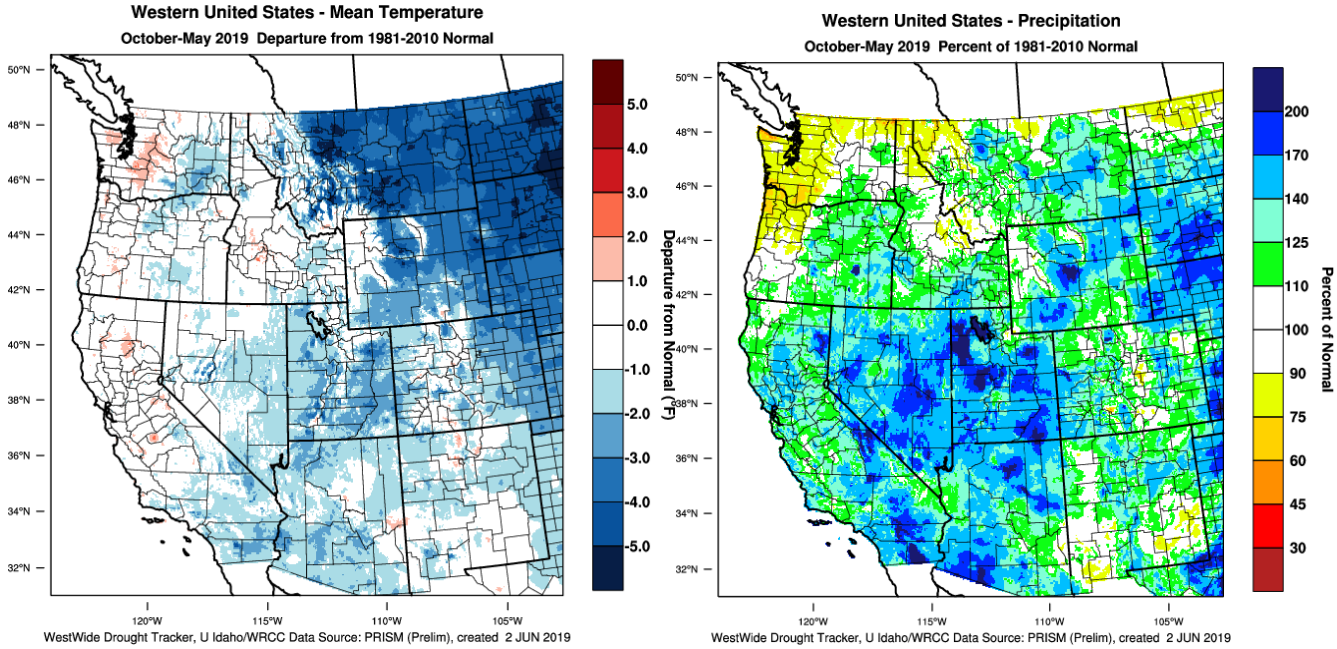


Figure 2 – Western US Water Year October 2018 - May 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

The water year precipitation amounts are moderately wetter than average in much of California, especially the areas which experienced strong atmospheric rivers this winter and spring (Figure 2). The rest of the southwest, Great Basin and portions of the Rockies have also seen a wet water year period (115-200% of average). A relatively dry water year to date has been experienced 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% of normal so far this winter (not shown), with only the southernmost portion of Texas and south Florida experiencing a drier than average winter.

March through May growing degree-days (GDD) mapped over the western US shows the expected accumulation from south to north (Figure 3) with areas in the Central Valley of California approaching 1000 GDD. Much of northern California, western Oregon, and western and eastern valleys in Washington are running 6-15 days ahead of normal for heat accumulation, while coastal areas in central to southern California are running 6-15 days behind in heat accumulation.

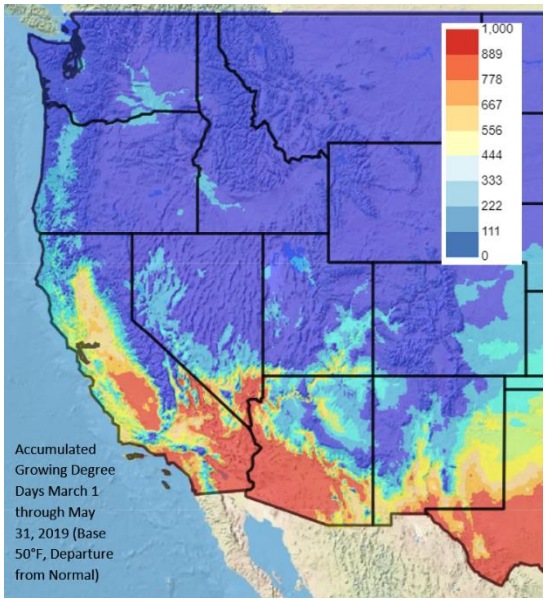


Figure 3 – Western US March through May 2019 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).

Reports of bloom have come in from eastern Washington and Oregon, and many regions in California, while western Oregon is not far behind. The timing appears to be close to normal for most regions. Heat accumulation (GDD) amounts for four locations that I have tracked for many years in Oregon are all 40% or more above the 1981-2010 normals for the month of May, roughly the same at this point in 2018, and similar to what was seen in 2015 (see the Appendix Figure 1 for four locations in Oregon).

Drought Watch – The low drought footprint in the US continues from previous months with only three areas with drought concerns (Figure 4, left panel). The PNW continues to experience a relatively dry first half of 2019 with abnormally dry to moderately dry conditions. The strong ridge over the southeastern US over the last 45 days or so has brought high temperatures and an elevated drought concern. In addition, a portion of the Four Corners region has returned to moderate drought concern. The US seasonal drought outlook shows continued concern for short to long-term drought in the PNW, especially western Washington and the northern Cascades, as the June through August forecast shows (see the 90-day forecast below). The current Four Corners drought area is expected to get better as the summer monsoon season sets in and the current dry conditions in the southeast are also expected to improve in all but coastal South Carolina and Georgia (Figure 4, right panel).

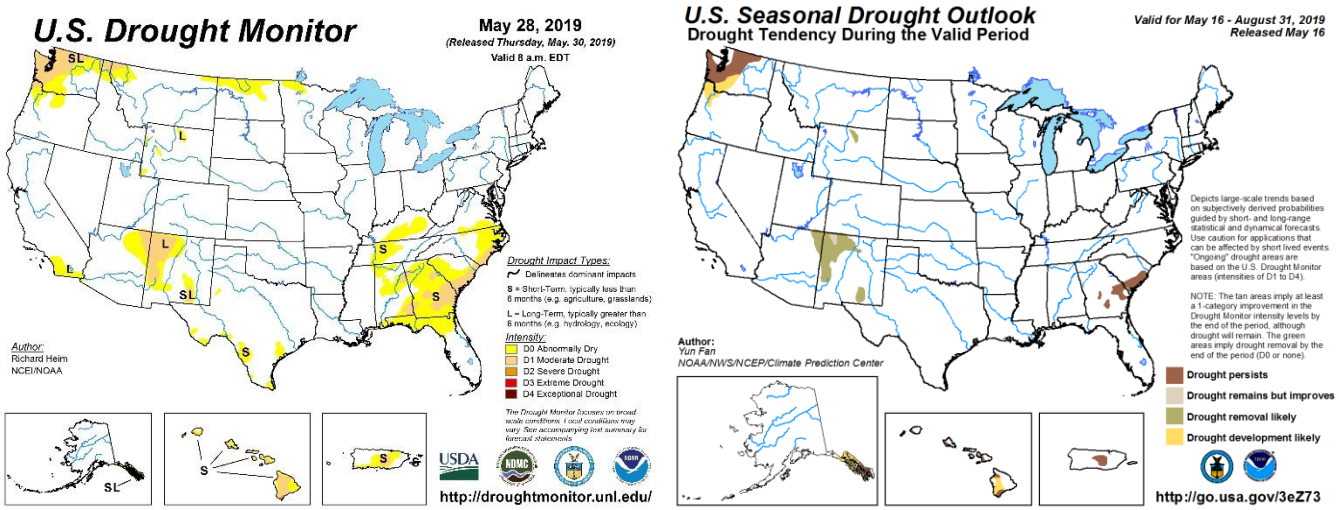


Figure 4 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – El Niño continues to be in play in the tropics with warmer than average conditions nearly basin-wide (Figure 5). El Niño-level SSTs in the tropical Pacific maintained at a weak level during April and early May, while

temperature anomalies of subsurface waters decreased markedly to just slightly above average. Some patterns in the atmosphere show weak 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 70% chance of El Niño continuing during June through August, decreasing to 55-60% for September through November. 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 spring and early summer, which has already played out with record-breaking tornado activity and extreme flooding.

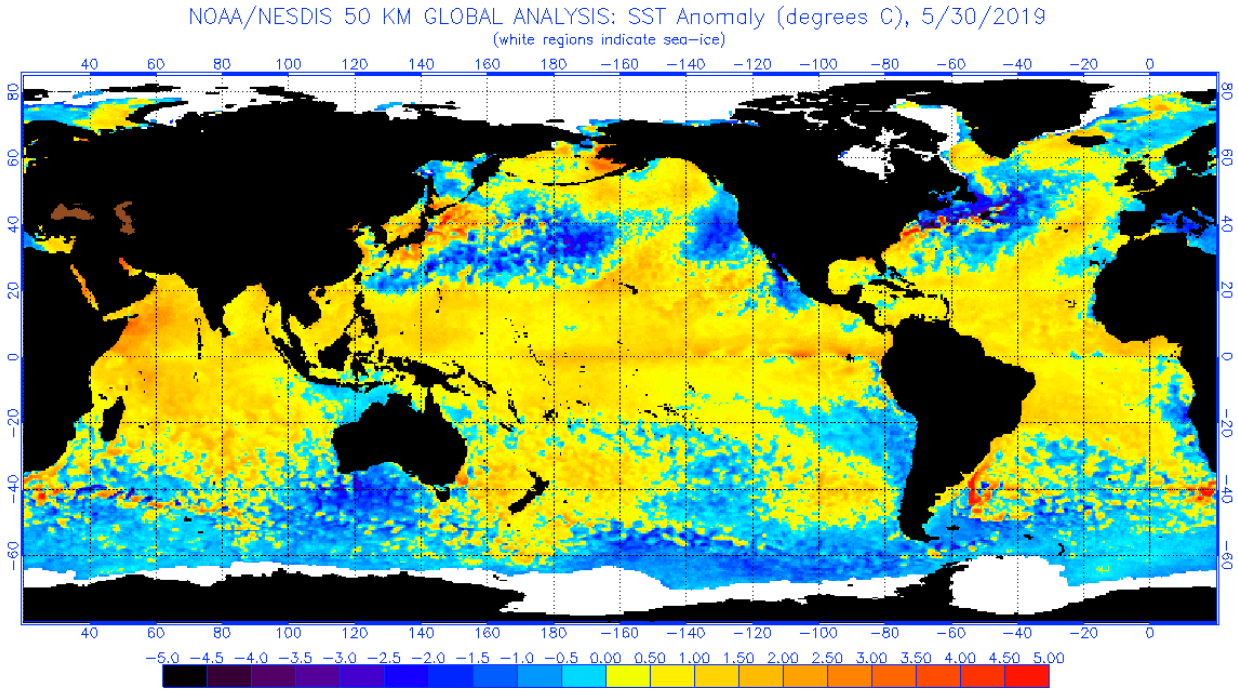


Figure 5 – Global sea surface temperatures (°C) for the period ending May 30, 2019 (image from NOAA/NESDIS).

North Pacific Watch – Overall the Pacific continues to remain much warmer than average, especially across the tropics (see Tropics discussion above). However, two areas of relatively cold surface waters have developed, one is a moderately sized area off the western US that has been colder than average for the last 60 days or so (Figure 5). It appears that the colder surface waters have contributed to a more active trough over the western US. However, there continues to be some indication that the colder conditions off the west coast are mostly near the surface and might rebound as we head further into summer. 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 JJA forecast below). However, if coastal upwelling persists along the central California coast then there remains the potential for coastal valleys to see slightly cooler conditions into the summer.

Forecast Periods:

6-10 day (valid June 5-9): the short-term forecast is pointing to delightful temperatures and only light precipitation through the first ten days of the month. A ridge of high pressure is forming just off the west coast but its position will allow for marine layer push that will bring cool starts to each day, then warming to average to slightly above average temperatures over most of the western valleys. The ridge position will allow some incursions of low pressure and potential rain, but these will be mostly confined to northwest Oregon, western Washington, and points north. However, the western ridge of high pressure will couple with another one in the southeastern US to maintain the extreme thunderstorm, tornado, and flooding potential in the middle of the country for at least this forecast period.

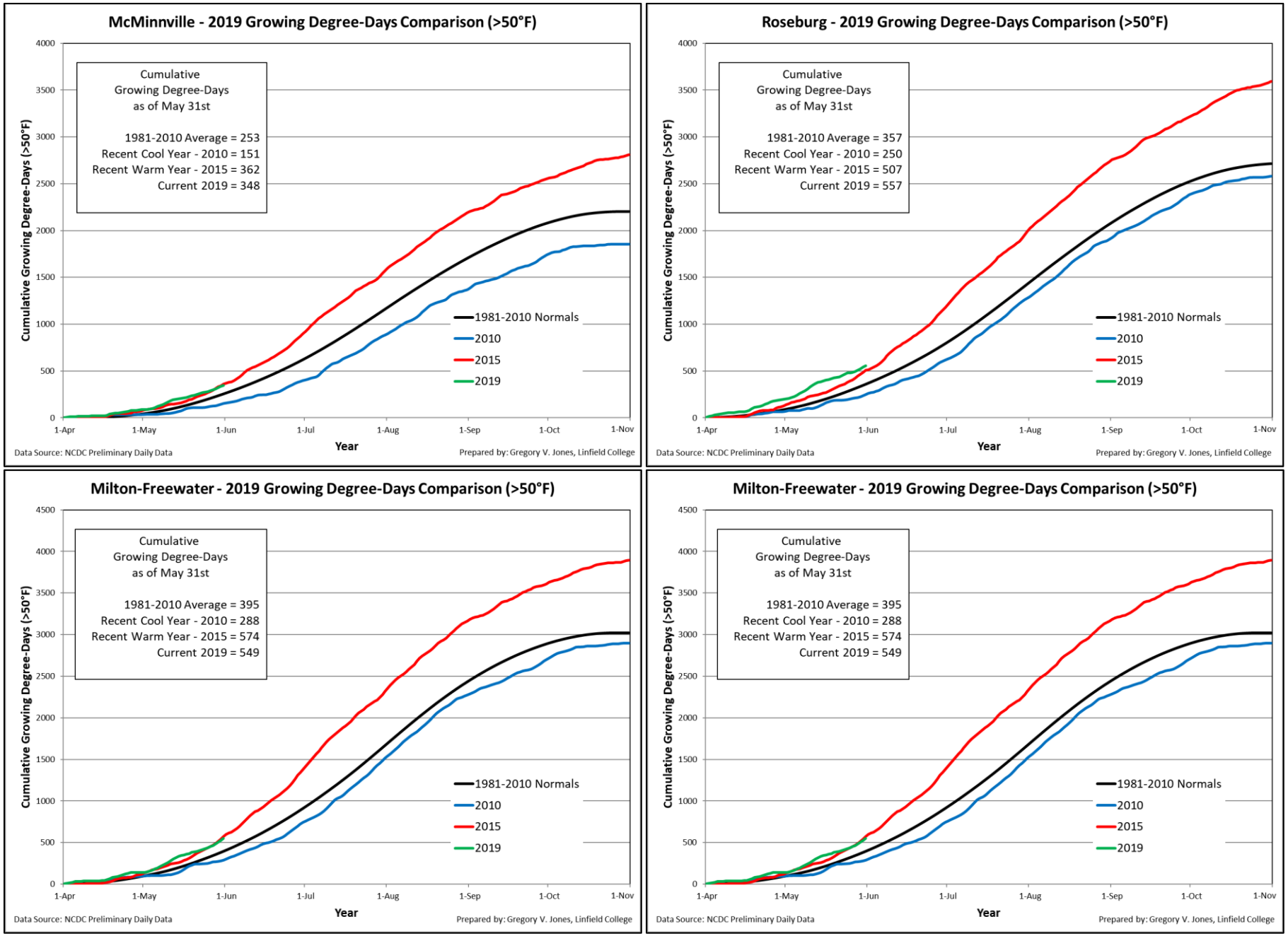
8-14 day (valid June 7-13): this forecast period does not deviate much from the 6-10 day period with a continued forecast of near average to slightly above average temperatures in the western US (especially in central to southern California), cooler than average temperatures in the central portion of the US, and warmer than average period for the eastern US. The precipitation forecast is also similar with a slight chance of rain in the PNW and then wetter than average throughout much of Great Basin, into the Rockies, and across the middle of the US, with a much wetter than average southeastern US.

30 day (valid June 1-30): the initial June forecast is calling for a largely near average month for most of the country. The exception is the far western US and the far eastern US, which are both forecast to see above average temperatures for the month, while the central portion of the country is forecast to be cooler than average. The temperature forecast for the middle of the US follows from the ridge, trough, ridge positioning and the increased likelihood of thunderstorm activity and heavy precipitation in the same areas that have seen tornadoes and flooding in the second half of May (see Appendix Figure 2).

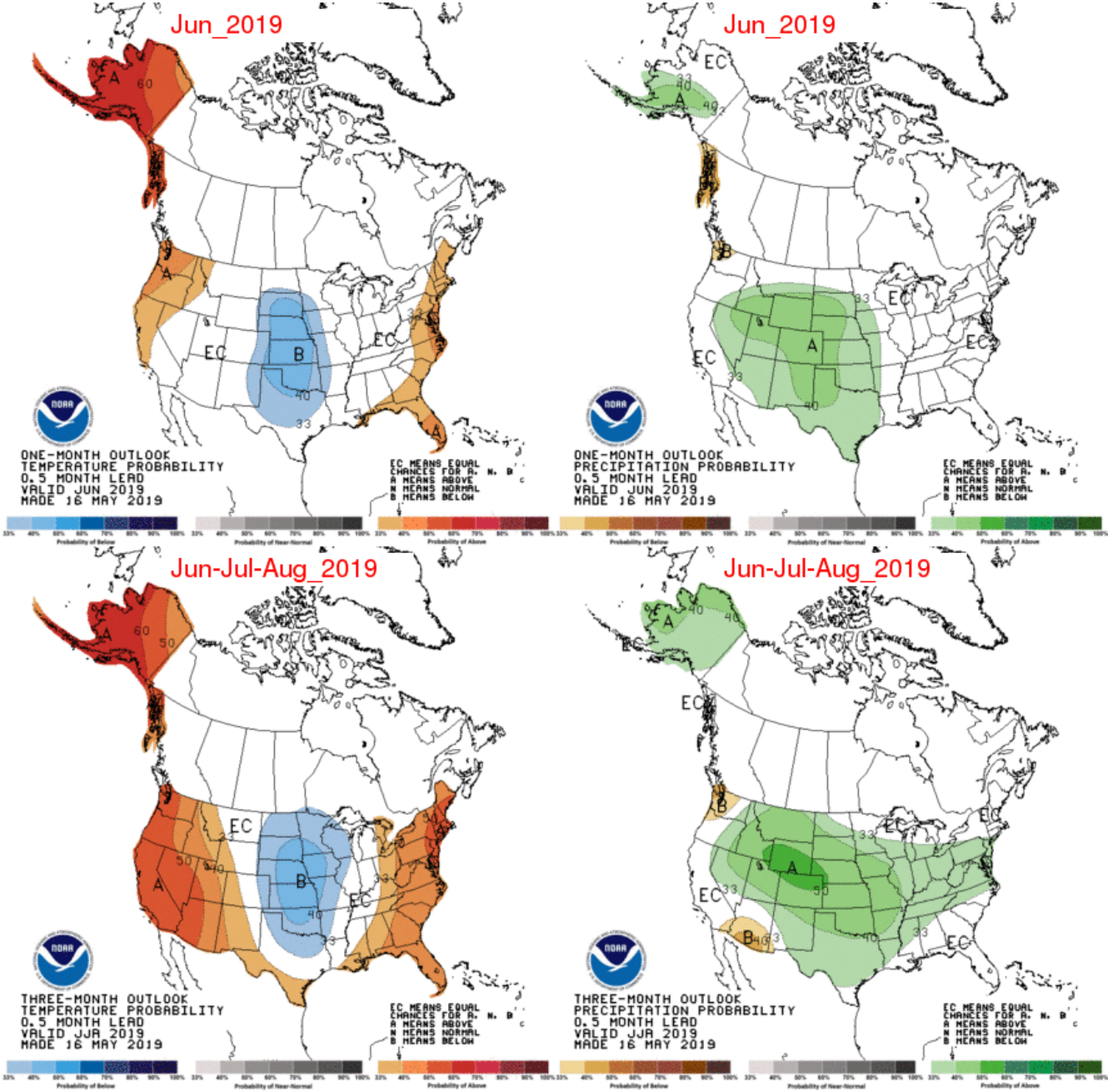
90 day (valid June-July-August): the three-month outlook through August appears to be holding to the 30-day forecast above with a warmer than average western US, cooler than average central US, and warmer than average eastern US (see Appendix Figure 2). Precipitation during the summer months is forecast to be largely above average over most of the country, with the exception of the PNW and desert southwest which are expected to stay drier than average. The rest of the western coastal areas to inland valleys are forecast to see near average precipitation for this time of year (which means not much).

Gregory V. Jones, Director
Evenstad Center for Wine Education
Evenstad Chair in Wine Studies
Linfield College
900 SE Baker Street
McMinnville, OR 97128-6894
503-883-2218
gjones@linfield.edu

Linfield College



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 June (top panel) and June, July, and August (bottom panel) (Climate Prediction Center, climate.gov).