Weather and Climate Summary and Forecast
October 2019 Report

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Summary:

- September was a stunner of a month for many locations in the west; with a rapid shift into more October like temperatures. The month was saw record-breaking precipitation amounts northward, while much of California and the southwest were dry.
- The cool month slowed heat accumulation to below the average of the last few years but remains above the long-term averages for most locations across the west. Harvest continues strong in some regions while slowly ending in others.
- The forecast through mid-month indicates continued much cooler than average conditions then warming to average conditions for October later in the month. The circulation over the North Pacific is likely to continue with on and off frontal passages with precipitation forecast to be slightly above average for the PNW, while the rest of the west will likely stay near average to drier than average.
- While October appears headed to a cooler than average month, the relative warmth of the North Pacific continues to influence forecasts the first half of winter, with the western US likely seeing a warmer than average period. The precipitation forecast calls for near-average conditions throughout the west, although there is some indication of a drier period for portions of northern California and southern Oregon.

October and even a little bit of November weather in September made for a whacky month and completely blew forecasts out the window! The cause is likely an impeachable offense, but I digress … a dominant high-pressure area in the southeastern US, lasting nearly all month and even continuing today, brought extreme temperatures from 3-8°F warmer than normal to the eastern US (not shown). Combined with a westerly-displaced high-pressure ridge in the North Pacific that together produced troughing over the eastern Pacific and western North America ushering in unexpectedly cold conditions along with record precipitation in some regions. The result, areas seeing September average[1] temperatures from 3°F below average (e.g., mountainous areas of northern California and southern Oregon) to some areas seeing nearly 3°F above average (e.g., central coast of California; Figure 1). The only near

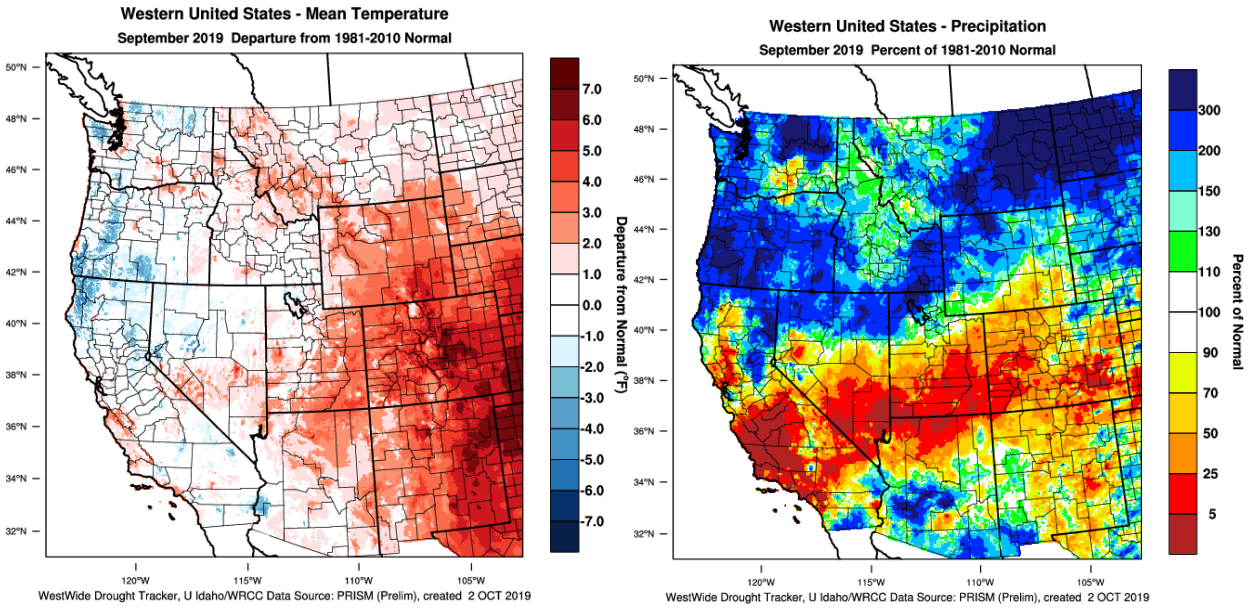

Figure 1 – Western US September 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[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.

average to below average temperatures for the month in the entire US was in the far western states. The western US precipitation pattern reflected the troughing out of the North Pacific with northern California throughout the PNW seeing 300% or more of average while further south in central California across into the Rockies was substantially drier than average (Figure 1). Contrast this to the eastern US where the dominant high-pressure area, mentioned above, resulted in less than 50% of average precipitation for Texas, the Gulf Coast and most of the eastern seaboard (not shown).

The final water year (October through September) ended with the western US largely near average (Figure 2). Some isolated locations ended up to 2°F above normal (e.g., Cascades in Washington, Southern Oregon, and north central California) while other areas were up to 2°F below normal (e.g., eastern Washington and southern California). The northern Rockies into the northern and central Plains have seen substantially colder than average conditions during this period (up to 6°F colder than average) and is one of the only places on the planet to see a cooler than average year to date. The rest of the country has largely stayed near average to warmer than average, especially in the southeast and into the Mid-Atlantic (not shown).

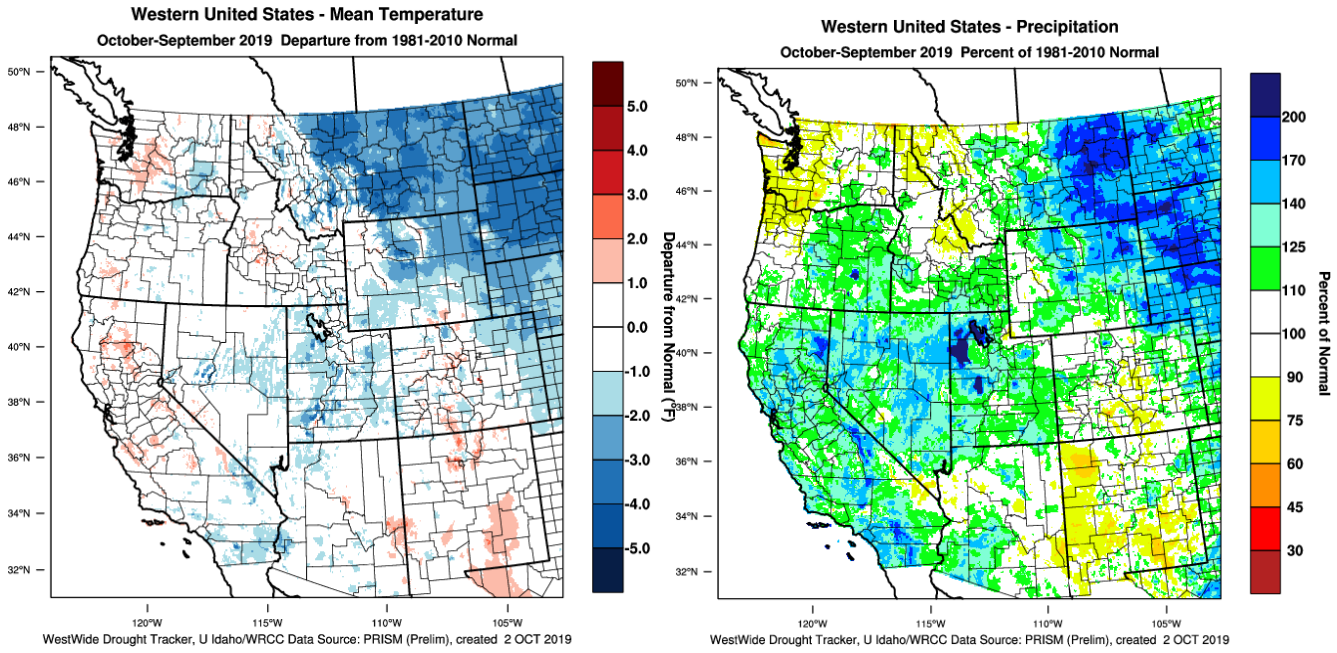

Figure 2 – Western US Water Year October 2018 - September 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Water year precipitation amounts ended up with the bulk of the country seeing moderately wetter than average conditions, especially in the Plains, upper Midwest and Mississippi River valley (not shown). For the western US the water year ended 110-200% above average in much of California, portions of the southwest, Great Basin and portions of the Rockies (Figure 2). A relatively dry water year was seen in northwestern Oregon and Washington and some scattered areas in the northern Rockies (60-85% of average; Figure 2). The only areas of the US seeing water year drier than average conditions were the PNW, portions of the Four Corners region, southern Texas, and portions of the southeastern US and south Florida (not shown, but see the drought discussion below).

Seasonal deviations in growing degree-days (GDD) mapped over the western US since March continues to show a mixed pattern (Figure 3). In general, higher elevation areas are seeing lower than average accumulations (e.g., the Cascades, the Trinity Alps, and some areas of the Sierra Mountains) while other less expected areas have lower accumulation as well (e.g., portions of the Central Valley and Southern California, and eastern Washington). Other wine regions are running up to 200-500 GDD above average (e.g., Willamette, Umpqua and Rogue valleys of Oregon, portions of the central coast and valley of California). In terms of the deviation in days, current conditions continue to place much of northern California, western Oregon, and western Washington 5-15 days ahead of normal for heat accumulation, while coastal areas in the North Coast, central to southern California, and eastern Washington are running 2-8 days behind in heat accumulation (not shown).

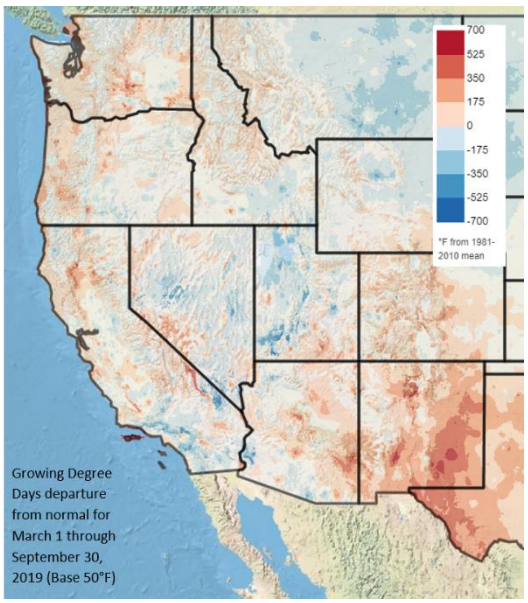

Figure 3 – Western US March through September 2019 growing degree-days departure from 1981-2010 normals (image from Climate Impacts Research Consortium, University of Idaho).

The 2019 harvest is going strong across many regions with fruit still coming in while others are seeing harvest winding up. Heat accumulation (GDD) amounts for four locations that I have tracked for many years in Oregon have clearly slowed with the cool September (see the flattening accumulation curve in Appendix Figure 1 for the four locations in Oregon) but continue to track near last year's numbers but below the last few years. Locations in the Willamette Valley, the Umpqua Valley, the Rogue Valley, and the Walla Walla Valley are currently 7-16% above the 1981-2010 normals for the months of April through September and from 3% higher to 6% lower than the same point in 2018 (Appendix Figure 1).

Drought Watch – drought conditions have expanded moderately over the US during the month (Figure 4, left panel). Much of the increase in drought concern has come from a dry monsoon season in the southwest and Texas along with the extreme heat in the southeastern portion of the US (mentioned above). There is still some concern for drought in the PNW, but the rains in September helped alleviate some of it. The US seasonal drought outlook shows a reduced concern for short to long-term drought in the PNW, as the October through December precipitation forecast would indicate as well (see the 90-day forecast below). Additional areas of drought concern have increased from previous months, with significant increases in the desert southwest and Texas due to low monsoon inputs this year and the southeast due to the extreme heat over the past month and in the leading forecast for the first half of winter (Figure 4, right panel).

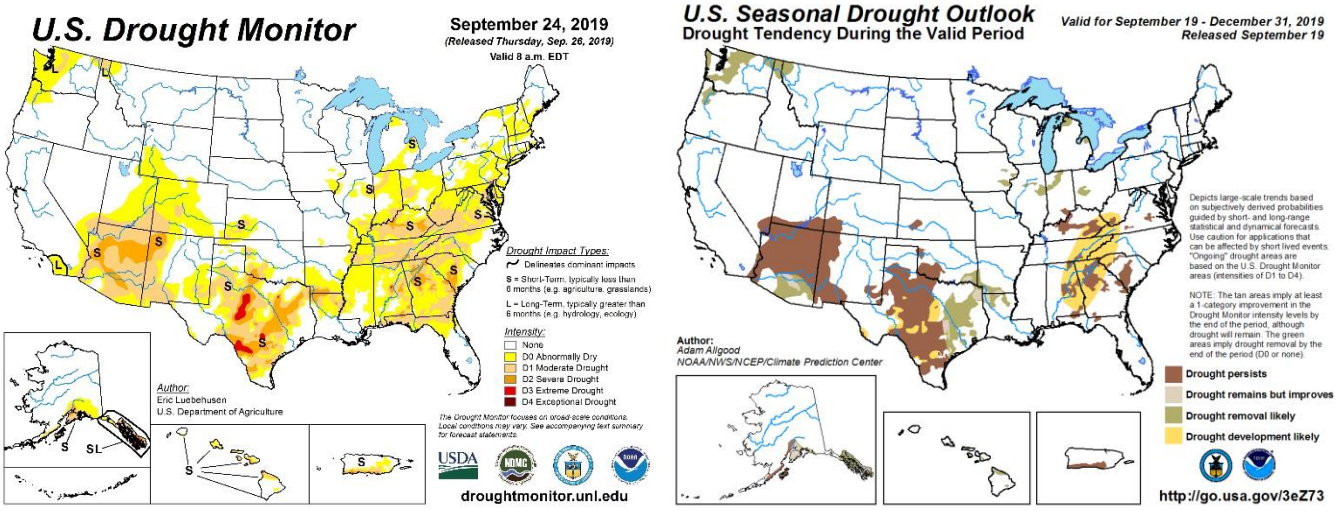

Figure 4 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – Conditions in the tropical Pacific have remained in neutral ENSO levels from last month through today. Sea surface temperatures (SSTs) in the key areas of the Tropical Pacific remain just slightly above average (Figure 5). Patterns in the key atmospheric variables over the Pacific are also showing ENSO-neutral conditions. Collective model forecasts generally favor ENSO-neutral through autumn, winter and into spring, with slightly higher chances for El Niño than La Niña. The official CPC/IRI outlook is consistent with these model forecasts. If these conditions continue to hold the weather across the western US this winter will likely be more variable with no dominant driving factors that might flip the forecast one direction or another. However, the broader warmth in the North Pacific will likely continue to carry some influence heading into the winter (see forecast periods below and Appendix Figure 1).

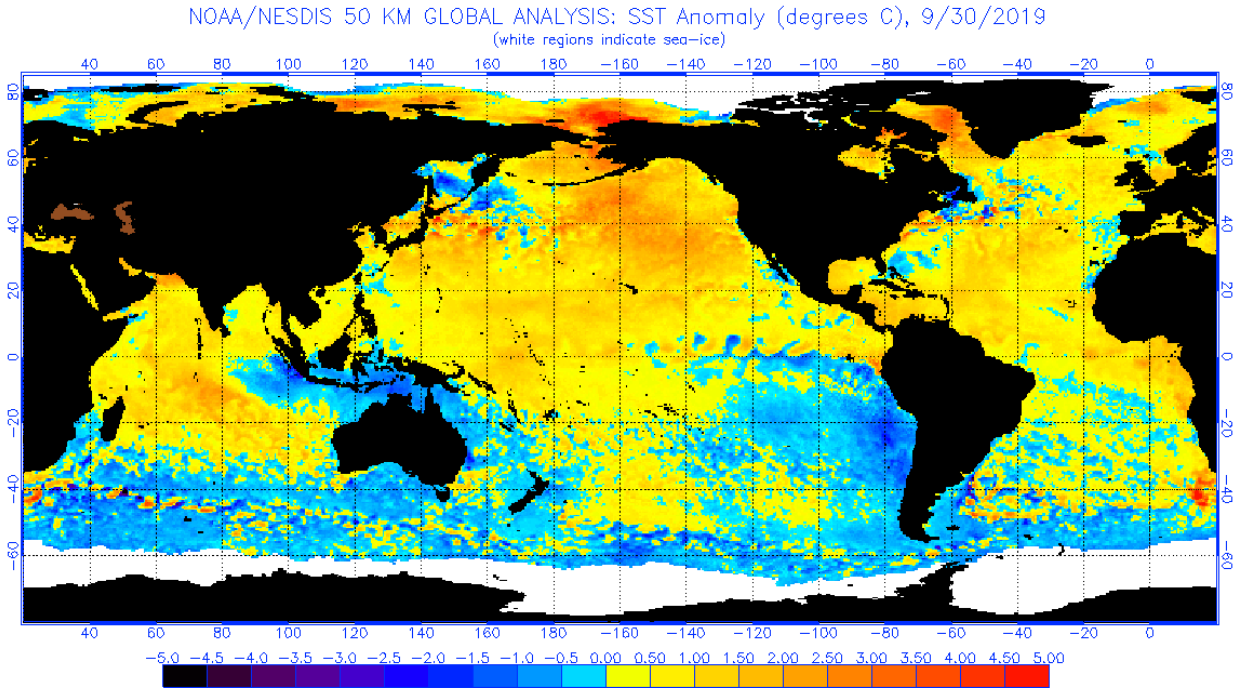

Figure 5 – Global sea surface temperatures (°C) for the period ending September 30, 2019 (image from NOAA/NESDIS).

North Pacific Watch – Warmer than average SSTs continue across nearly the entire North Pacific (Figure 5) and seasonal models are tilting the odds for the warmth to continue into winter. Again the 'blob' of extremely warm ocean temperatures in the North Pacific should be the main influence in the 90 day forecast (see below) with a likely warm overall October, November, December period for most of the west, but likely continued higher than average humidity and minimum temperatures. The issue with these warmer ocean temperatures during the last month has been the movement of cold air (troughing) over the warmer waters, picking up moisture and adding to thunderstorm activity and higher than average September precipitation in the PNW. With the tropics moving to a neutral ENSO phase (see above), the warm North Pacific should continue to play a larger role in the influence on the western US weather during the next 3-4 months.

Forecast Periods:

Next 5 days: the unseasonably cool conditions linger on for the next five days over pretty much all of the western US. The further south you go the closer the temperatures will be to seasonal averages or slightly above. Off and on rainfall events will drape across the PNW with probabilities and amounts the greatest in northwest Oregon and western Washington. Rainfall further south and east will likely be more showery with little broad accumulation.

6-10 day (valid October 7-11): an amplified ridge is positioned far from the west coast allowing for troughs to develop and bring continued cool conditions with off and on precipitation, especially in northwestern Oregon and western Washington. California should stay relatively warm and dry. The overall pattern for the US continues to show

the likelihood that the abnormally cool PNW will stay that way through the first two weeks of the month while the rest of the country will likely continue to be much warmer than normal. The central portion of the country is forecast to be dry during this period while the Gulf Coast and eastern seaboard are forecast to be wetter than average.

8-14 day (valid October 9-15): circulation conditions over the North Pacific and the western US continue with a high likelihood of a cooler than average period for much of the PNW across to western Montana and down into Northern California. The precipitation forecast calls for continued above-average amounts for the PNW and near average for central to southern California. Other than the forecast for a cool PNW, the forecast for the rest of the country is to remain above-average temperatures through mid-month. The bulk for the central portion of the country is forecast to remain dry through mid-month while the Gulf Coast and along the eastern seaboard is forecast to remain wetter than average.

30 day (valid October 1-31): the revised October forecast indicates that northern California, across the PNW and into the northern Rockies and Plains will likely stay below average for the month (see Appendix Figure 2). An area stretching from central California across the central Rockies and into the upper Midwest is forecast to see near average temperatures for the month while Texas across the south and north into the Great Lakes and the eastern seaboard is likely to see a substantially warmer month. The overall precipitation forecast for October is tilting the odds to a wetter than average month for the northern PNW across the entire northern tier of states. Southern Oregon south throughout California and into the Great Basin will likely be closer to seasonal averages for precipitation in October while the southeast is forecast to see drier than average conditions.

90 day (valid October-November-December): even with the forecast for a cool to average October in the western US, the longer term 90-day forecast is holding to a warmer start to winter for the entire US (see Appendix Figure 2). The areas with the highest likelihood are the desert southwest and the Four Corners region along with northern New England. Precipitation during the next 90 days is forecast to be below average for Northern California and Southern Oregon with the rest the western US having equal chances for slightly above, near-normal, or slightly below. The Rockies and Plains are forecast to see a wetter start to the winter, as is the eastern seaboard, while other areas are likely to be close to average. However, with the shift to more neutral ENSO characteristics the confidence in the long-term forecast is not as high at this time.

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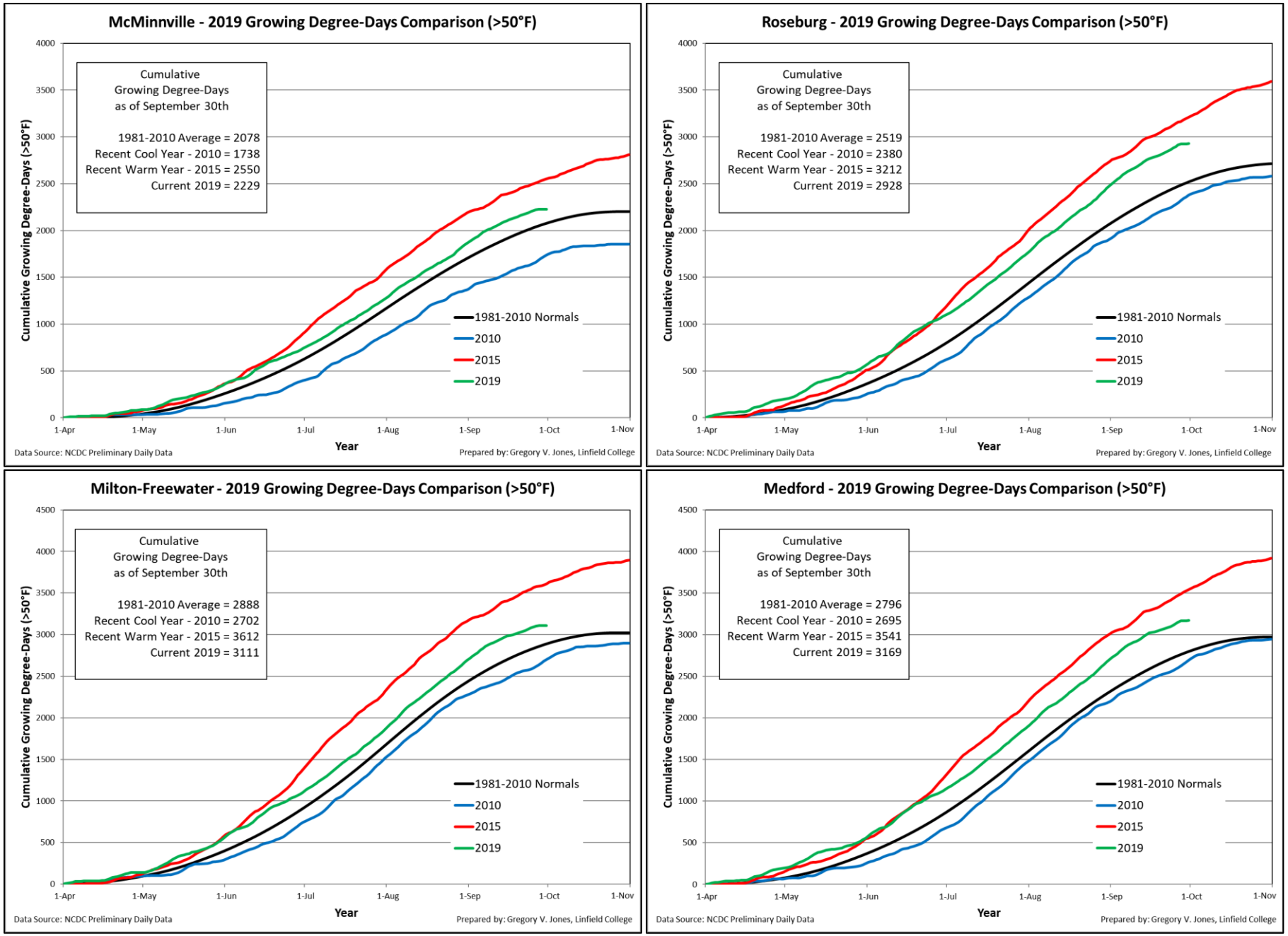
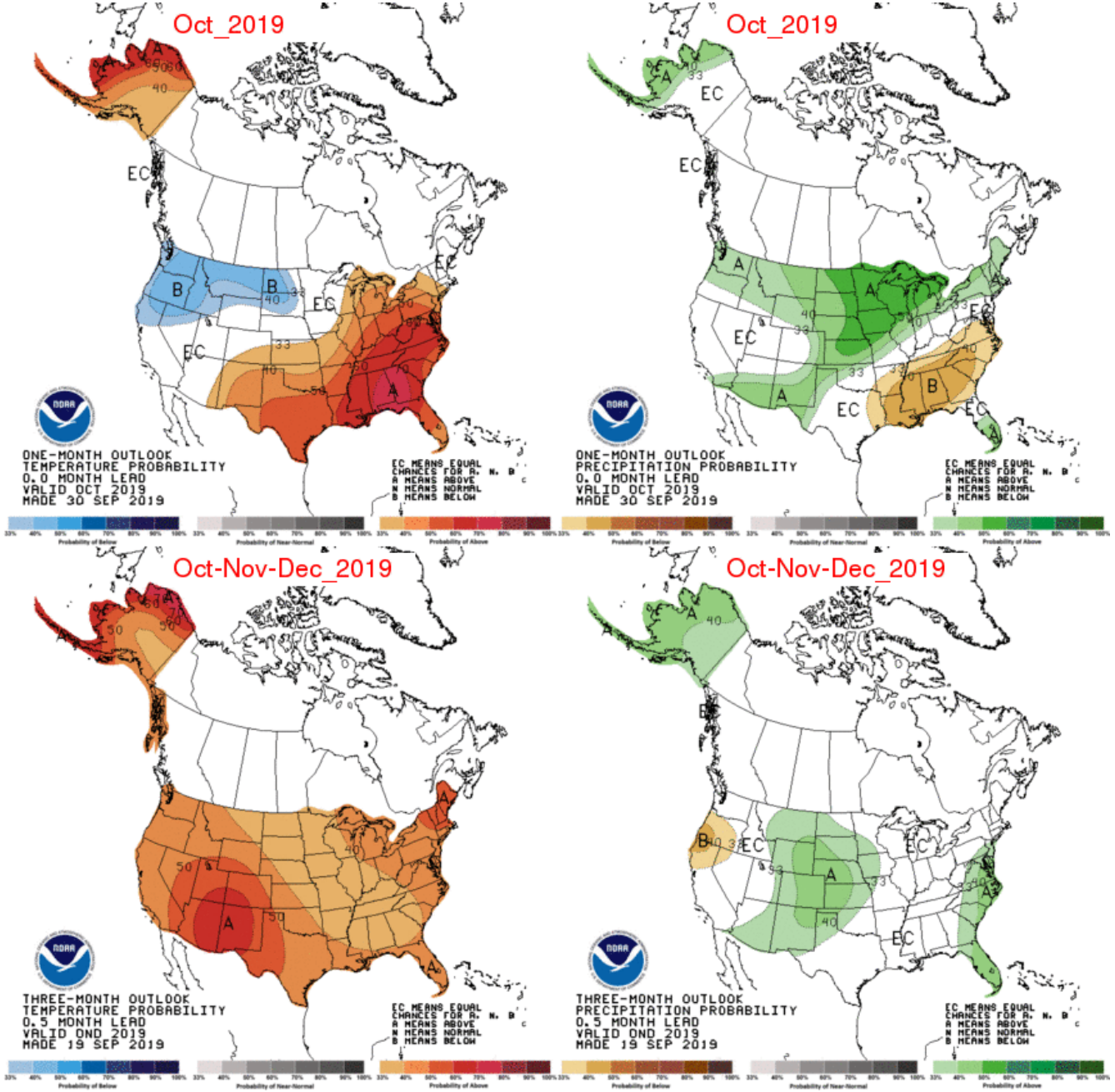


Appendix Figure 1 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2019) and a recent cool year (2010), a recent warm year (2015) and the 1981-2010 climate normals are shown (NCDC preliminary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



Appendix Figure 2 – Temperature (left panel) and precipitation (right panel) outlooks for the month of October (top panel) and October, November, and December (bottom panel) (Climate Prediction Center, climate.gov).