

# Weather and Climate Summary and Forecast

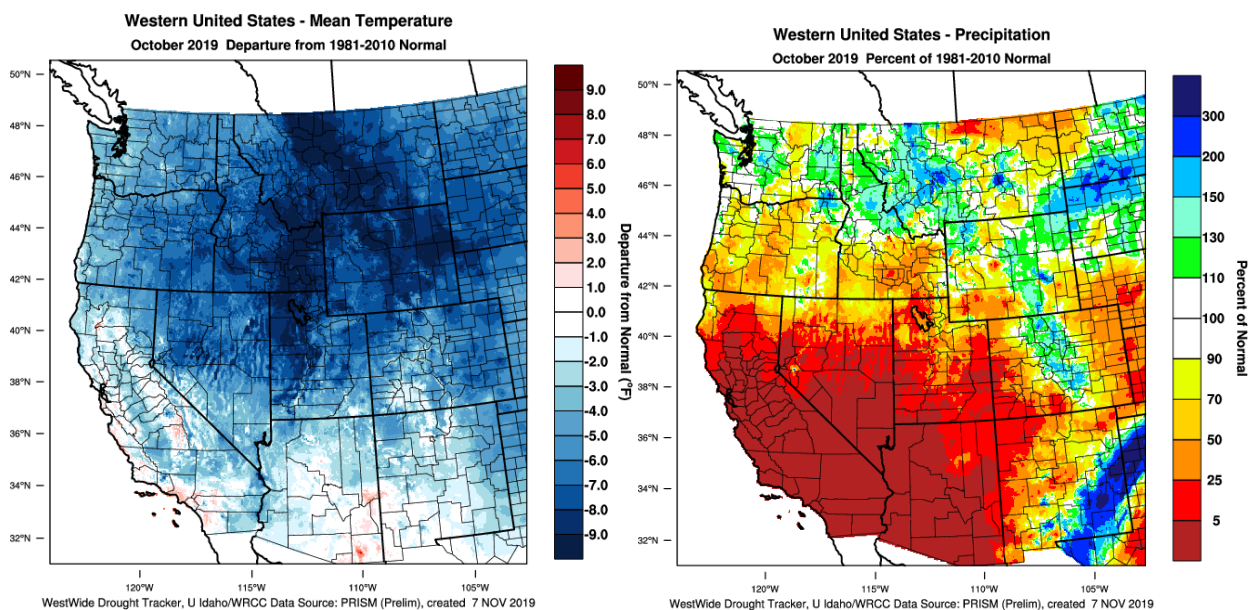
## November 2019 Report

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### Summary:

- The cool circulation pattern experienced in September continued in October ushering in one of the coldest Octobers in a long time. However, contrary to the wet September experienced in much of the west, October was moderately dry (PNW) to extremely dry (California).
- The cool September and October added little no heat accumulation and was one of the coolest endings to a vintage in roughly 30 years. Overall accumulation ended above the long-term averages for most locations across the west, albeit near the average of the last 15 years or so.
- The forecast through mid-month indicates the continued dominance of high pressure over the region that has brought clear skies, cold nights, foggy mornings, and air stagnation to many in the PNW. Winds in California should remain below the extremes of the last month or so, but drought concerns continue due to prolonged lack of rain and little forecasted through the month of November.
- The first half of winter forecast hints at a near normal to slightly warmer than normal western US while the eastern half of the country will likely be much colder than normal. The precipitation forecast for DJF is indicating near-average conditions in the PNW while tilting the odds for portions of California and Southern Oregon to remain dry during the first half of winter.

As we close the books on the calendar end of the growing season, we can reflect on what was a very odd September followed by a recording-breaking cold October. The month of October 2019 ended up ranking as a top-four coldest Octobers for PNW states (Idaho 1, Washington 2, and Oregon 4) while California saw it 44<sup>th</sup> coldest month in the 125-year record. All of this comes as the Earth just experienced it's warmest October ever on record ... go figure! Temperatures ranged from 2-9°F below average<sup>1</sup> in the PNW and 2°F above to 3°F below average in California (Figure 1) while the eastern third of the country was 2-7°F warmer than average (not shown). Circulation over the western US and eastern Pacific ushered in consistent northwesterly to northerly flow bringing with it much colder than normal air for most of the month. Precipitation amounts for the month of October were down significantly from

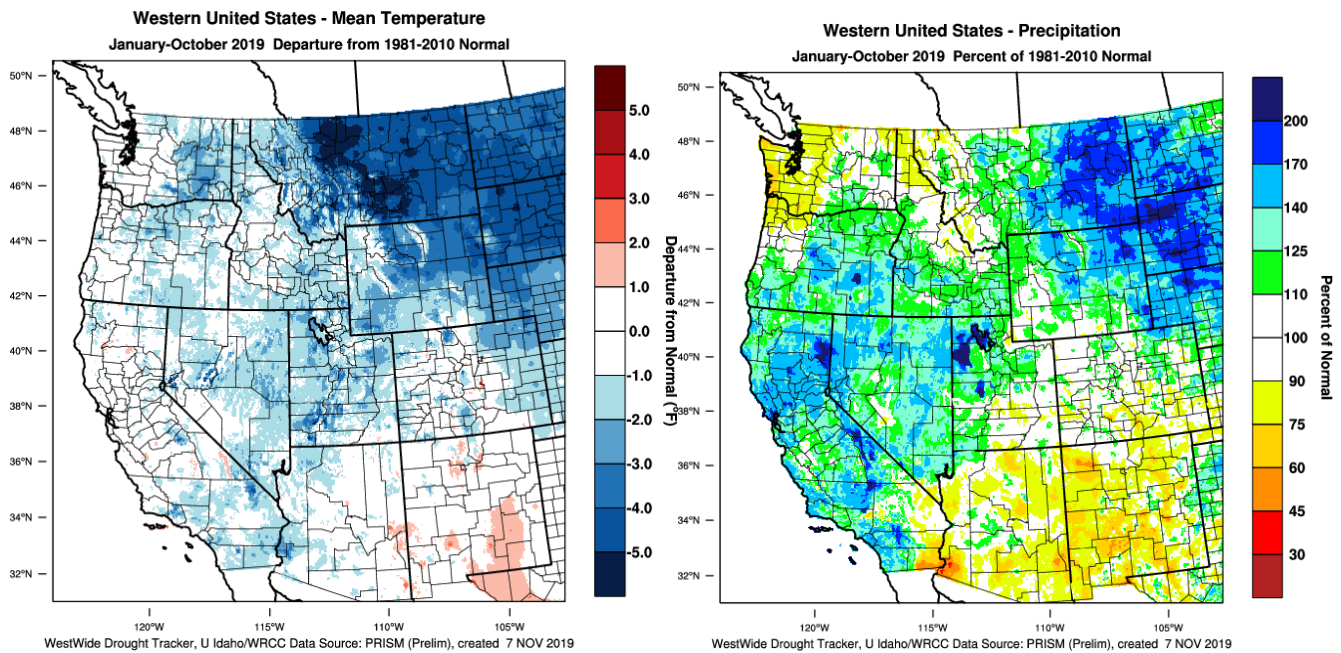


**Figure 1** – Western US October 2019 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

<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.

September. The PNW was slightly wetter than average in western and eastern Washington, the Blue Mountains of Oregon and across Northern Idaho while the rest of Oregon saw 30-80% of normal precipitation for the month (Figure 1). From the Oregon/California border south and across into Nevada and the Four Corners states mostly saw 25% or less precipitation for the month. While portions of Texas, Colorado, and the northern Plains were also very dry in October, the Gulf Coast, southeastern US, and New England were substantially wetter than average (not shown), breaking a late summer heat and drought spell (see Drought discussion below).

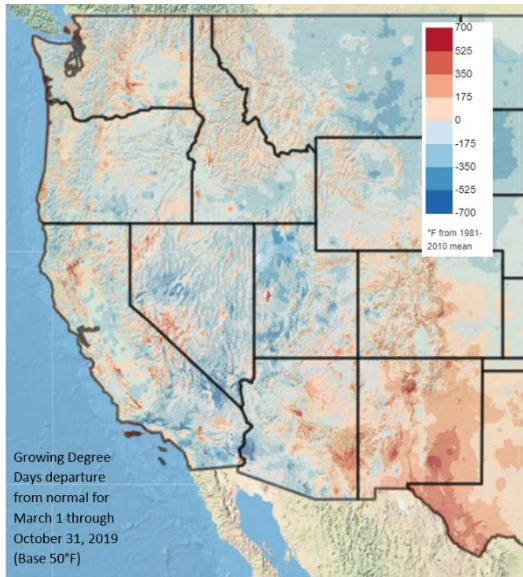
Year to date conditions (January through October) shows that the western US is running close to average to slightly cooler than average (Figure 2). The northern Plains and the western Great Lakes have experienced much below average temperatures year to date while the southern tier of states and into New England has been much above average (not shown). The warmest year to date area is in the southeast where it has been the warmest period so far in the 125-year data record. Furthermore, the generally cool year to date conditions in the western and north-central US stands out as one of the only cool regions in an otherwise top five warmest years to date globally.



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

Precipitation year to date is running mostly above average in the western US with amounts in California, southern and eastern Oregon, southern Idaho, Nevada, and Utah 110-180% above average (Figure 2). Dry regions in the west include western Washington and NW Oregon along with the Four Corners region where 60-80% of normal has been experienced year to date. However, most of the longer-term drought concern has eased in the PNW while continuing in the Four Corners region (see Drought discussion below). The bulk of the rest of the country has seen moderately wetter than average conditions, especially in the Plains, upper Midwest, Great Lakes, and Mississippi River valley, many of which have seen their record wettest period ever (not shown).

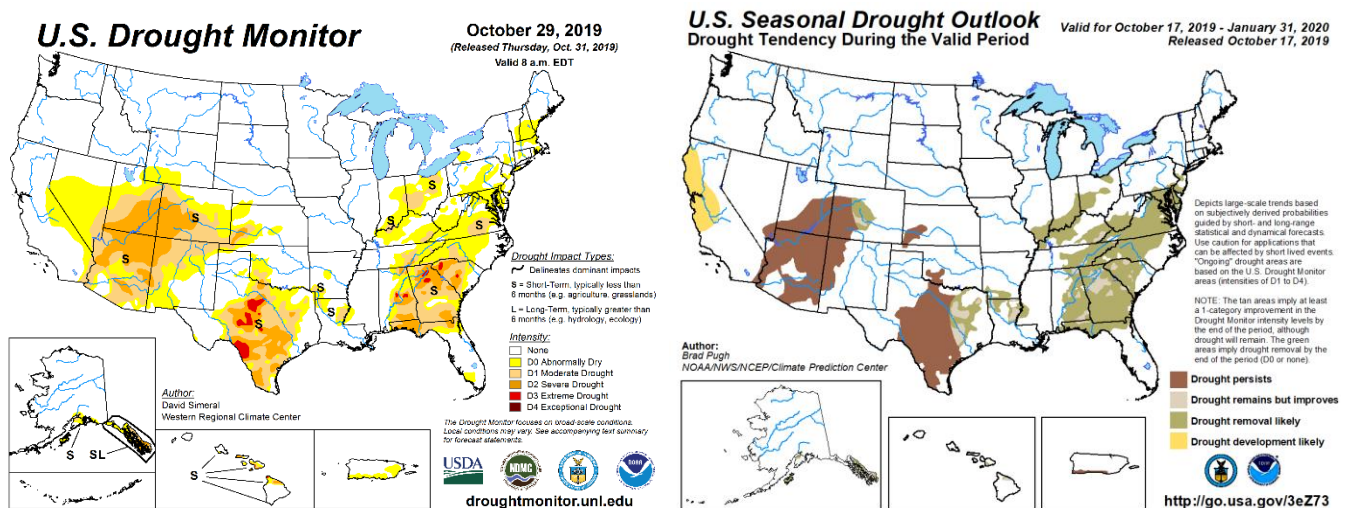
The 2019 harvest has mostly wrapped over the western US. Conditions varied tremendously with the PNW tending very cool and wet in the final months to cool and dry in California. Heat accumulation (GDD) across the western US was spatially variable with many regions 5-10% down while others nearby were 5-10% up (Figure 3). In general, many higher elevation areas experienced 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). Many of the other western valleys ended the season up in GDD, but closer to the average of the last fifteen years (e.g., Willamette, Umpqua and Rogue valleys of Oregon, portions of the central coast and valley of California).



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

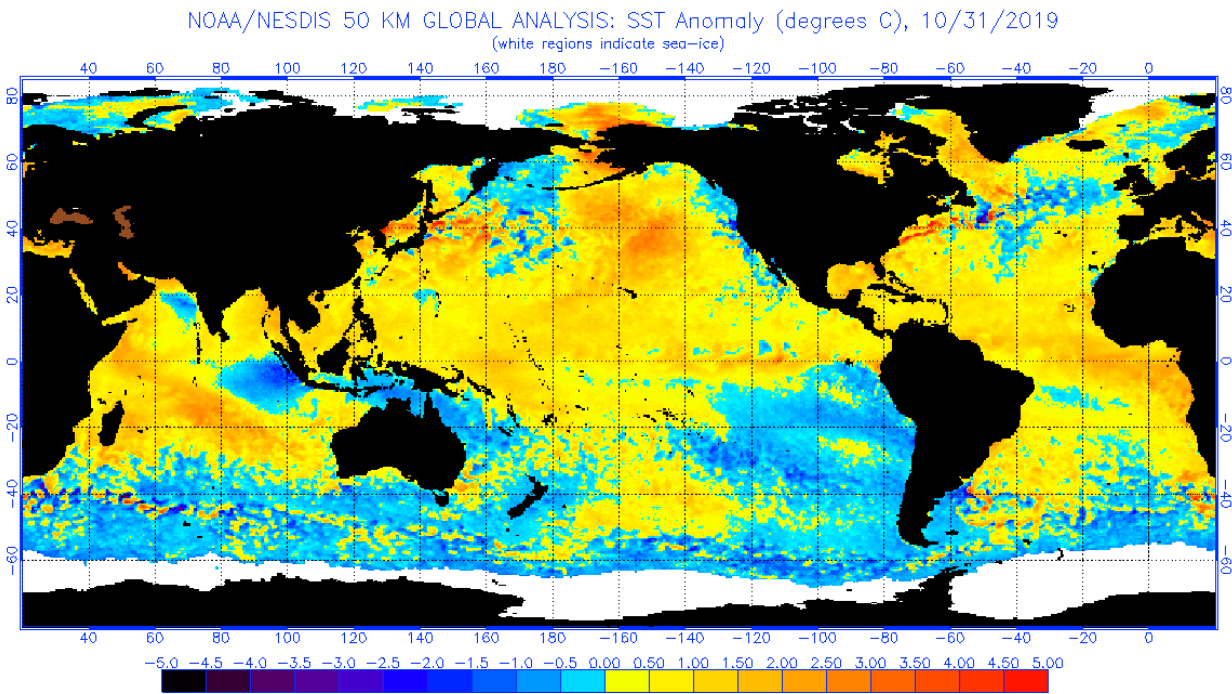
GDD amounts for four locations that I have tracked for many years in Oregon ended with very little additional heat accumulation in September and October (see the flattening accumulation curves in Appendix Figure 1 for the four locations in Oregon). For locations in the Willamette Valley, the Umpqua Valley, the Rogue Valley, and the Walla Walla Valley the September and October GDD were the lowest seen since the mid-1980s. The vintage ended 3-12% above the 1981-2010 normals for the months of April through October, 2-3% lower the last fifteen years, and from 2-6% lower than the 2018 vintage (Appendix Figure 1). Growing season temperatures in these regions ended 0.5-1.6°F warmer than the 1981-2010 normals.

**Drought Watch** – Drought conditions have expanded slightly over the US during October (Figure 4, left panel). The dry monsoon season in the southwest shows up in the moderate to severe drought currently centered over the Four Corners region. Texas and the southeastern portion of the US are continuing to show the effects of the last few months of extreme heat and little to no precipitation. The concern for drought in the PNW has disappeared with a fairly wet September. The US seasonal drought outlook has removed drought concerns in the PNW, but added drought development in the central to northern coastal areas of California (see the 90-day forecast below). Additional areas of drought concern have continued from previous months, with the desert southwest and Texas forecast for drought conditions to persist. The southeast is forecast to see drought conditions to improve into the winter (Figure 4, right panel) with removal for most areas showing drought impacts currently (Figure 4, left 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 the last couple of months but have shown some warming in the latter half of October. Sea surface temperatures (SSTs) in the key areas of the Tropical Pacific remain just slightly above average (Figure 5). Patterns in some atmospheric variables show weak El Niño conditions, but this is attributed to intra-seasonal variability and the collective assessment is for ENSO-neutral conditions. Model forecasts generally favor ENSO-neutral through autumn, winter, and 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 October 31, 2019 (image from NOAA/NESDIS).

**North Pacific Watch** – The main development in the last 30 days is coastal cooling from the southern peninsula of Alaska south to Baja (Figure 5). This is due to stronger and more consistent wind flow generating stronger upwelling of cooler water than we have seen for many months now. The broader North Pacific continues to remain much warmer than average and seasonal models are tilting the odds for the warmth to continue into winter. The ‘blob’ of extremely warm ocean temperatures in the North Pacific appears to continue to be the main influence in the 90-day forecast (see below) with a likely warm overall November, December, and January period for most of the west. However, this did not play out as forecast in October so maybe something else is going on at this time. With the tropics moving to a neutral ENSO phase (see above), the warm North Pacific appears likely to 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:** Air stagnation will continue over the next five days as high pressure dominates the western US. Moderately cool conditions at night will prevail due to clear skies, producing fog in the normal places that takes until mid-day or afternoon to burn off. Temperatures will remain on the cool side in northern areas and near average to warmer than average in southern areas. No precipitation is currently in the forecast, except for far northwestern Washington.

**6-10 day (valid November 11-15):** High pressure is forecast to stay in place through the 15<sup>th</sup> with air stagnation, cool nights, fog in the valleys, and no precipitation. Again, northern areas should be cool to average while southern areas

should remain average to warmer than average. The rest of the country from the plains eastward is likely to be quite cold for this time of year. 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.

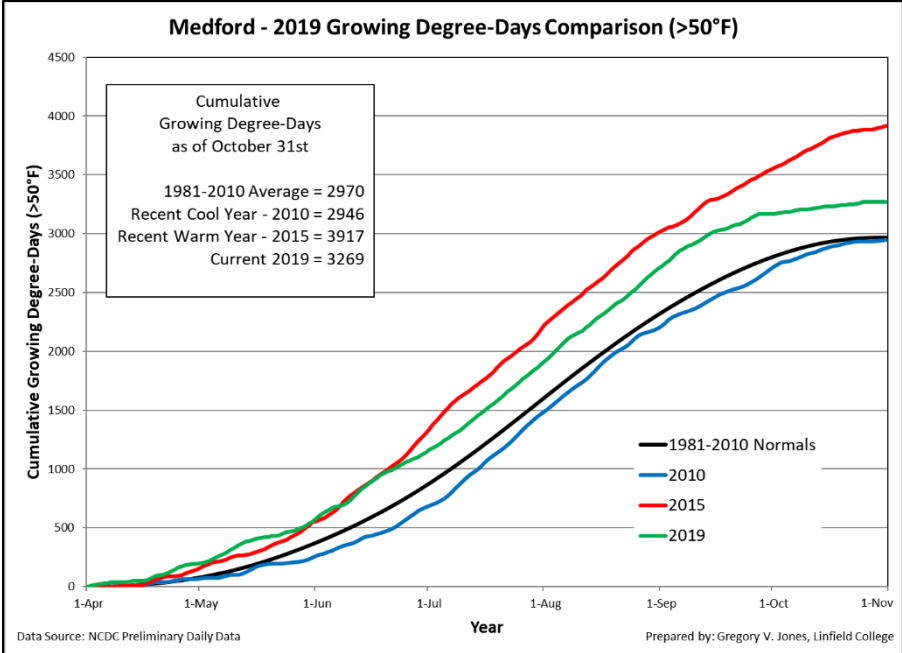
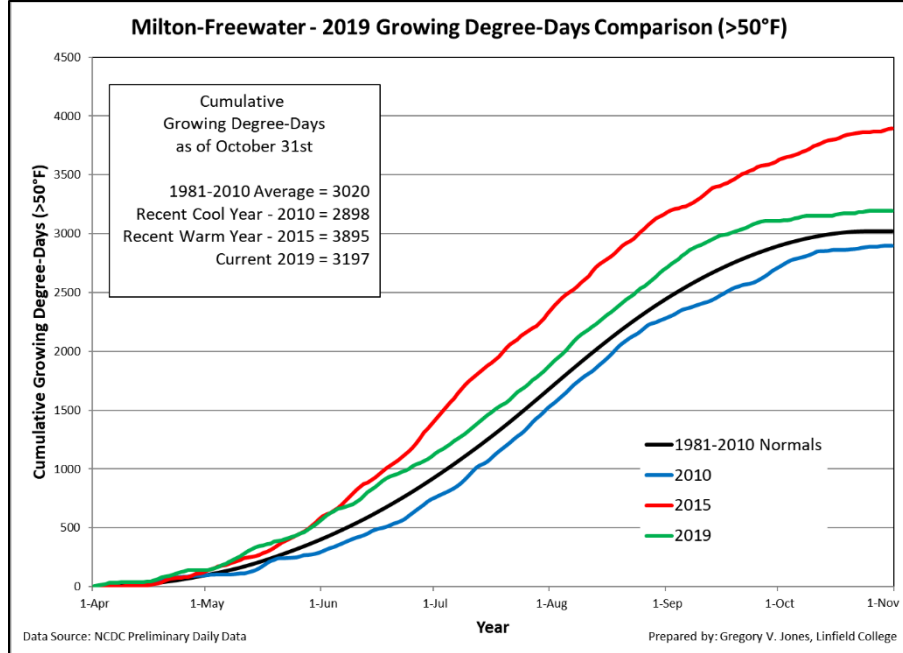
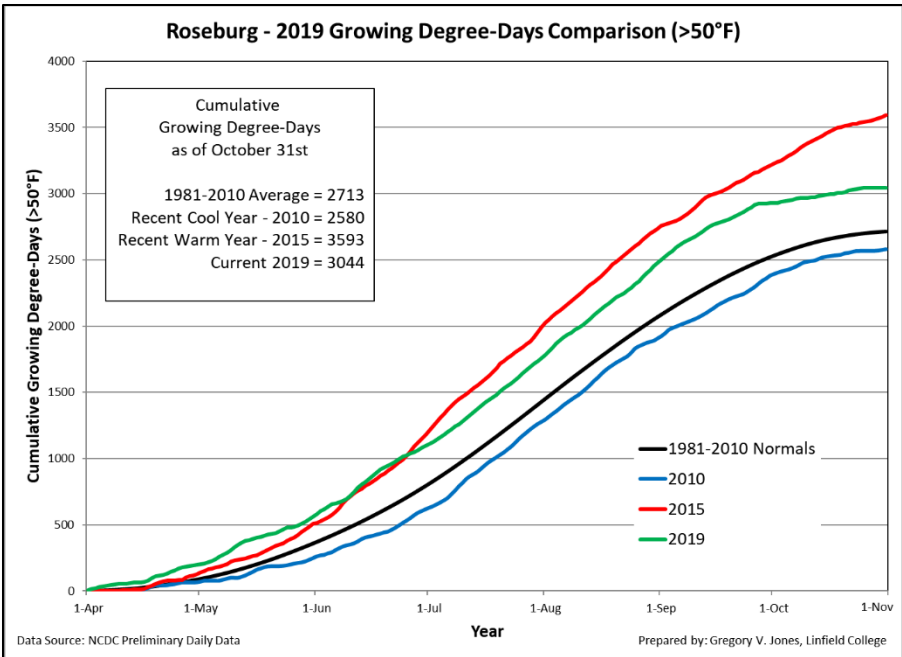
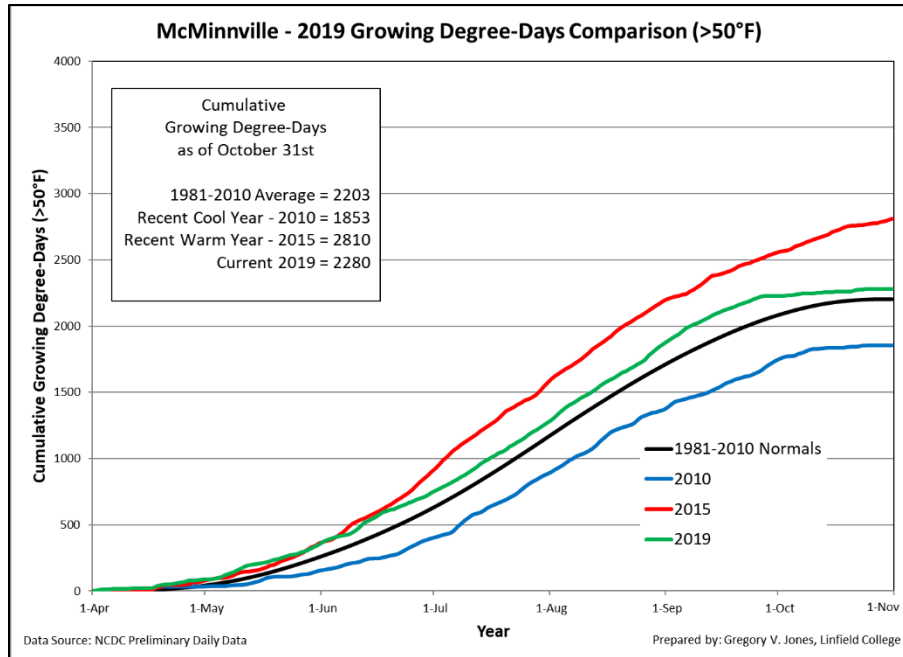
**8-14 day (valid November 13-19):** Indicators are pointing to the high-pressure ridge breaking down after the 15<sup>th</sup> ushering in increased chances of precipitation, which will remain higher in the PNW and lower in California. Temperatures are forecast to be near average to slightly above average over the western US while the entire eastern US is likely to remain significantly colder than average during this period. The bulk of 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 November 1-30):** Even with the relatively cool start to the month, the 30-day forecast tilts the odds of the western US being slightly warmer than average in the PNW to moderately warmer than average in California and the southwest (see Appendix Figure 2). The Midwest, Great Lakes, New England, and the Mississippi River valley are forecast to be below-average temperatures for the month. The overall precipitation forecast for November is leaning to near average amounts for the PNW and portions of the west coast and southwest while the Great Basin is forecast to remain dry for the month. The rest of the country will likely see a close to average month in terms of precipitation (see Appendix Figure 2).

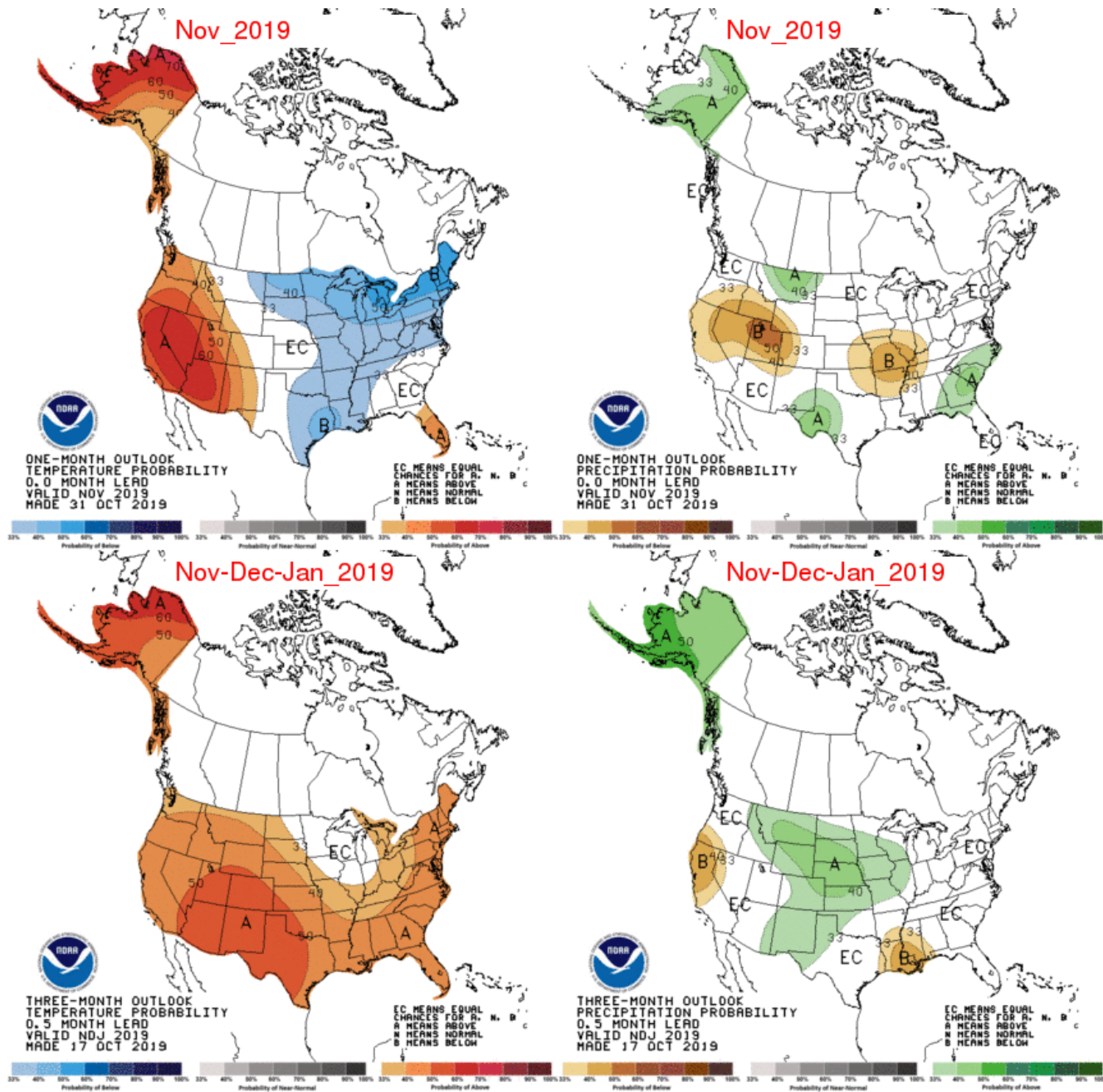
**90 day (valid November-December-January):** The early winter forecast is currently pointing to a generally warmer than average pattern for most of the country, the exception being the Great Lakes and the upper Midwest (see Appendix Figure 2). However, there is currently disagreement in the long-term forecasts as controlling mechanisms such as ENSO may waver one direction or the other. This is especially true for precipitation where portions of California and Southern Oregon are forecast to remain dry during the first half of winter. The rest of the country is forecast mixed with the center portion of the country likely to be wetter than average, the Gulf Coast drier than average, and everywhere else near 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 November (top panel) and November, December, and January (bottom panel) (Climate Prediction Center, climate.gov).