

Weather and Climate Summary and Forecast November 2018 Report

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Summary:

- Overall a very nice October was had by the majority of the western US. A dominant ridge of high pressure brought a nearly three week stretch of moderately warm and dry conditions that allowed for a relaxed end to the vintage. Growing degree-day accumulations ended up normal to up to 6% below average for some coastal areas in California and portions of interior Oregon and Washington, and between 5-20% above average across the majority of the western US.
- While rain returned in late October and early November, the forecast calls for both the short-term (10-14 days) and the month to be slightly warmer and definitely drier than average for this time of year for the bulk of the western US. This is largely based on a return to quite warm North Pacific Ocean temperatures.
- The seasonal forecast for November through January is largely based upon the forecast of the development of moderate El Niño in the Tropical Pacific. Analog winters with moderate El Niño events tend to be warm and dry across the PNW and northern tier of states and moderately cool and wet across the southern tier of states.

The month of October brought some rain, but mostly a glorious period of nearly three weeks with moderately warm days, cool nights, and dry conditions. What started out looking like a wet month and a rapid rush to harvest, turned on a dime when a dominant ridge of high pressure set in mid-month. Temperatures were near normal to above normal across much of the western valleys and coastal areas in Washington, Oregon, and California in October (Figure 1), while the interior of the western US was near normal to colder than average. For the rest of the country, the northern Plains south into Texas were much cooler than average, while the southeast and mid-Atlantic was much warmer than average (not shown). The dry October is evident in Figure 1 with the majority of the western coastal areas and valleys seeing 90% or less of the month's normal precipitation. Portions of eastern Oregon and Washington were wetter than average, while the remnants of hurricane Rosa and some additional monsoon flow brought higher than normal rainfall to the southwest. The rest of the country was dominated by the wet conditions brought by hurricanes Rosa and Willa and the resulting nor'easter in the eastern US (not shown).

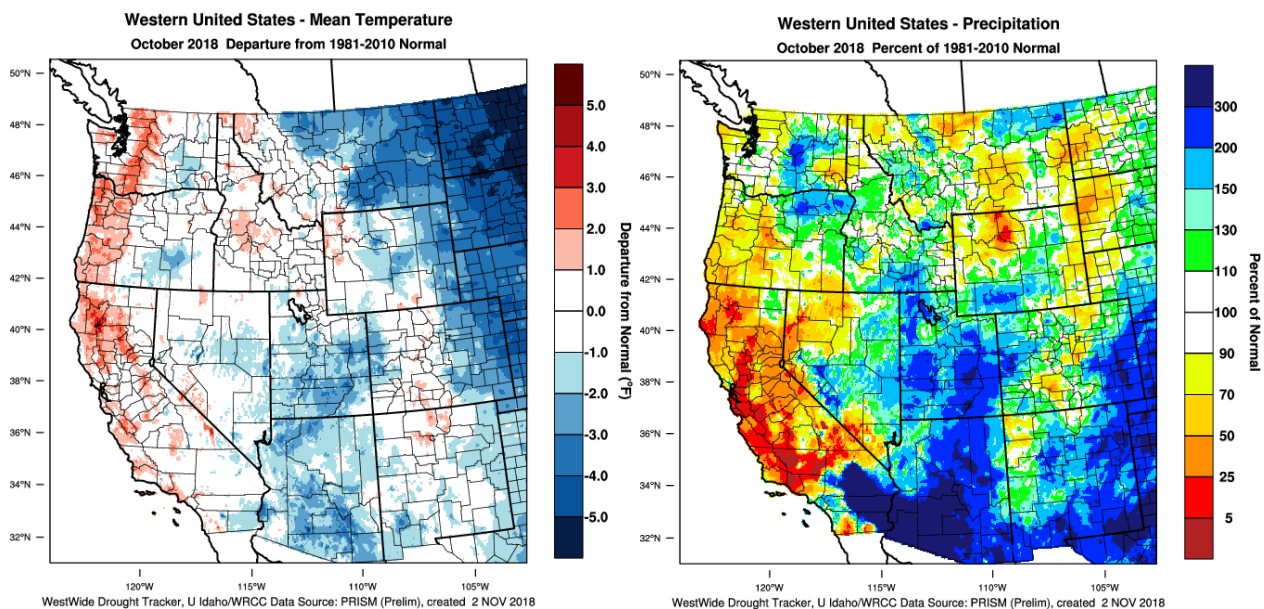


Figure 1 – Western US October 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

For 2018 temperatures to date have been largely warmer than average throughout the western US with a dominant transition to cooler than average east of the Rockies (Figure 2). Near normal temperatures have been seen south into Texas while the southeast and east coast have been warmer than average for the year to date (not shown). Year to date precipitation continues to show a flip-flop of a dry western US (Figure 2) to a wetter than average eastern US. The driest regions are Southern California across into the desert southwest and Four Corners region where 15-45% of normal has been seen (see the Drought Monitor below). Conditions to date in the eastern US are largely the result of an active and deadly hurricane season (not shown).

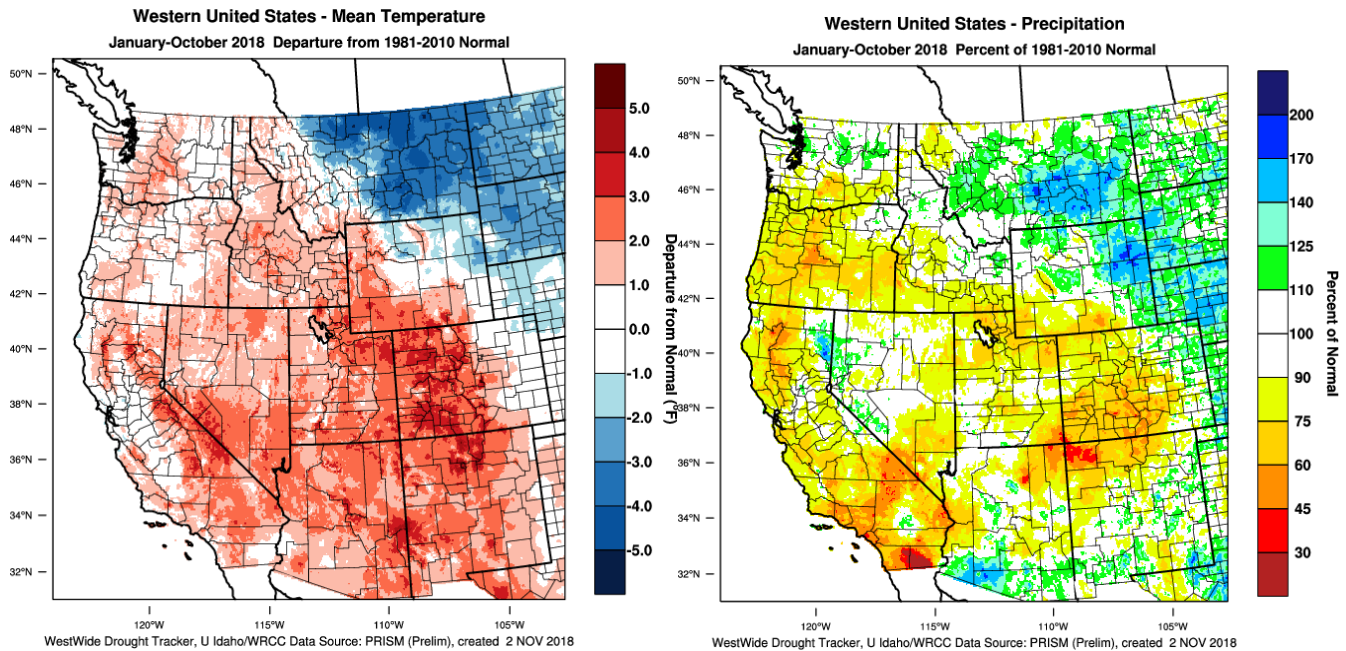


Figure 2 – Western US 2018 year to date temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

With the close of the 2018 growing season, heat accumulation numbers across the western US have been tallied. Overall the 2018 season resulted in a broad pattern of above normal growing degree-days (GDD), but with important regional differences (Figure 3). Lower than average GDD was seen in portions of eastern Washington and Oregon along with the North Coast and Central Valley of California (approximately 2-6% lower than average.) The lower GDD accumulated along the central California coast was the result of strong nearshore upwelling and lower SSTs which contributed to a stronger than average marine layer that kept heat accumulation slightly below normal to normal for

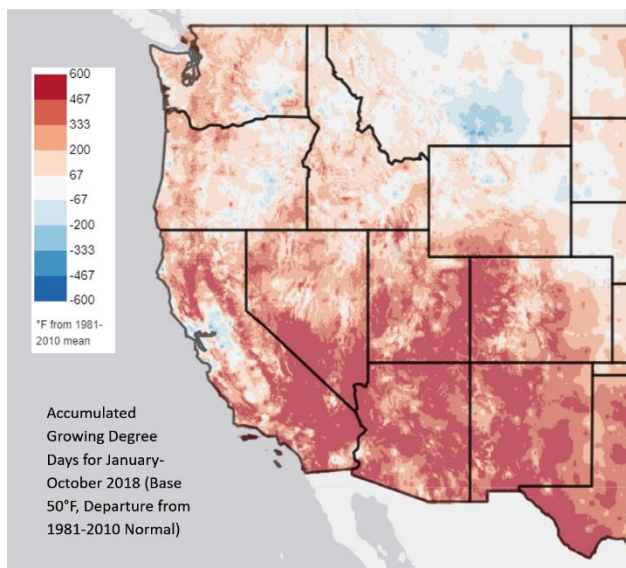


Figure 3 – Western US January-October 2018 growing degree-days departure from the 1981-2010 normals (image from Climate Impacts Research Consortium, University of Idaho).

the season. This pattern has appeared to dissipate over the last 30 days or so (see North Pacific discussion below). GDD amounts for four locations that I have tracked for many years in Oregon finished the year the same to slightly below 2017, near the 2012-2014 average, 1-8% above the average for the last 15 years, and 5-17% above the 1981-2010 normals (see the Appendix Figure 1 for four locations in Oregon).

Drought Watch – Moving into early winter the overall dry conditions over the vast majority of the western US are continuing from summer (Figure 4, left panel). The US Drought Monitor shows that the US drought footprint has declined some as much of the central to eastern US has received enough precipitation to have no widespread drought. However, the western US continues to see drought conditions with the main areas of severe to extreme drought over the Four Corners region and the desert southwest and further increases in severity seen in Oregon. The longer-term prognostic for the US through January shows some changes, especially in the PNW where portions of western Oregon, Washington, and Northern California will likely see some improvement or complete drought removal in the first half of winter. However, much of the long-term persistent drought seen in the rest of Oregon, portions of Washington, Idaho, southern California, and the Great Basin is expected to continue through to the end of the year (Figure 4, right panel). The eastern half of the US is largely free of any current or ongoing drought conditions.

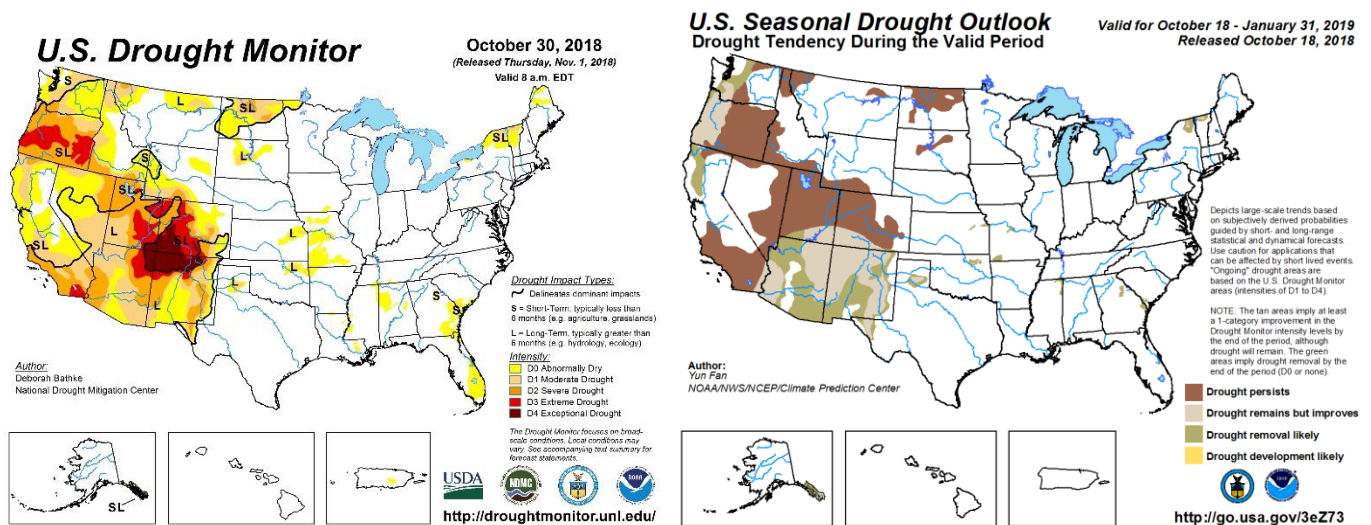


Figure 4 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – While ENSO-neutral conditions have prevailed into October, signs of El Niño increased as the month progressed as east-central tropical Pacific SSTs warmed to weak El Niño levels (Figure 5). In addition, low-level winds showed westerly anomalies over the last month and the subsurface water temperature continued to be above-average and increased further recently. The official outlook calls for a 70-75% chance of El Niño development during into November/December, continuing through the rest of winter 2018-19. Therefore, the Climate Prediction Center has an El Niño watch in effect. The latest forecasts of statistical and dynamical models collectively favor imminent El Niño development, most likely moderate in strength. If the conditions for El Niño development continue to hold, the weather across the western US will likely continue to follow the warmer and drier than average conditions in the 90-day forecast (especially in the PNW) and beyond (see forecast periods below and Appendix Figure 2).

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 11/1/2018
(white regions indicate sea-ice)

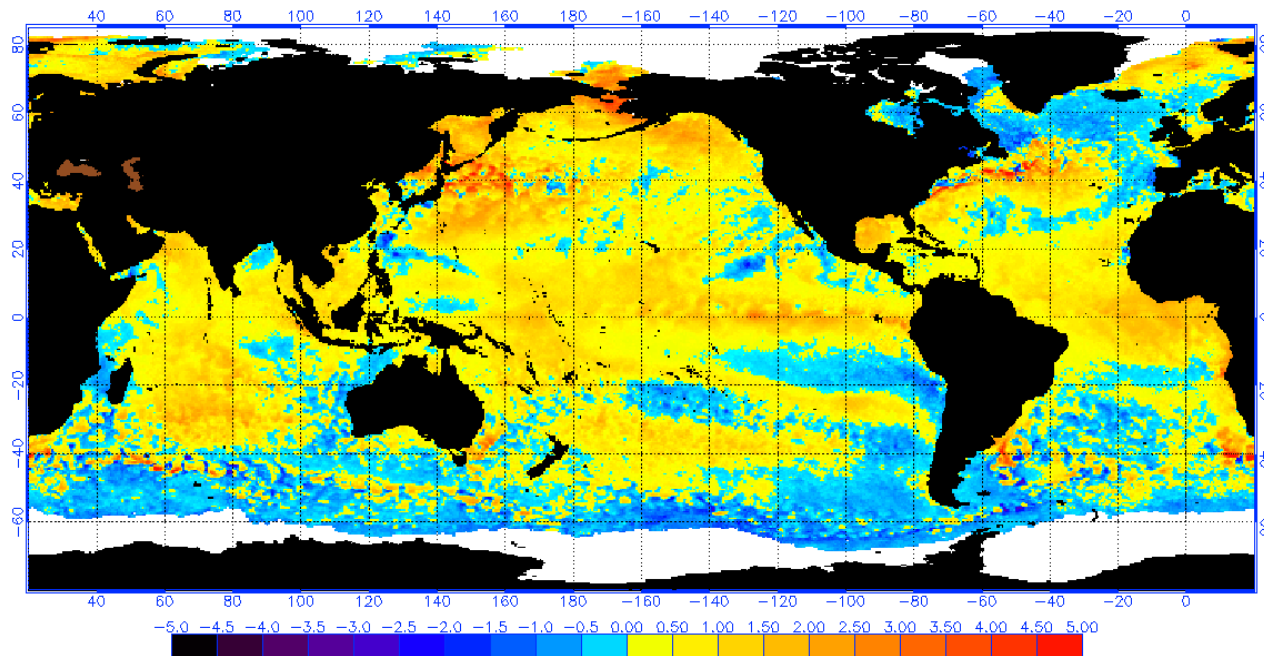


Figure 5 – Global sea surface temperatures (°C) for the period ending November 1, 2018 (image from NOAA/NESDIS).

North Pacific Watch – News of the return of the Blob is starting to circulate in the media! The Blob represents warmer than average temperatures in the Gulf of Alaska and along the western US and brings changes in the ecology of the ocean, whale deaths, and poor feeding for salmon. It is also connected to the “Ridiculously Resilient Ridge,” which played a large role in the drought that plagued the west from 2011 to 2016. However, while I believe that the current North Pacific sea surface temperatures (SSTs) are influencing a dry start to the winter, the spatial pattern is not quite what we saw in 2011-2016 (Figure 5). We will have to watch the evolution of the El Niño (see above) and the North Pacific SSTs over the next couple of months to better understand the long-term play of this effect on our weather/climate. What is clear from the current map is that the cooler than average SSTs off the west coast over the last six months or so, and driven by near-shore upwelling, has largely dissipated (Figure 5).

Forecast Periods:

6-10 Day (valid November 12-16): After trending to cooler and wetter the latter half of October and early November, the next 6-10 day period appears headed for slightly above average temperatures and definitely drier than average for the majority of the western US. A ridge of high pressure will create conditions of relatively clear days but cool nights and a cycle of daily fog development in the valleys. The exceptions are inland PNW and the Rockies which are likely to see near normal temperatures. The rest of the country from the Plains across to the east and south is forecast to be much colder than average over the short-term. In terms of precipitation, the long-term forecasted dry period should stay in place for the majority of the western US with a bulls-eye over the PNW. Dry conditions through mid-month are likely to hold into the Plains and western Great Lakes while the Gulf Coast and eastern seaboard states are forecast to be wetter than average during this forecast period.

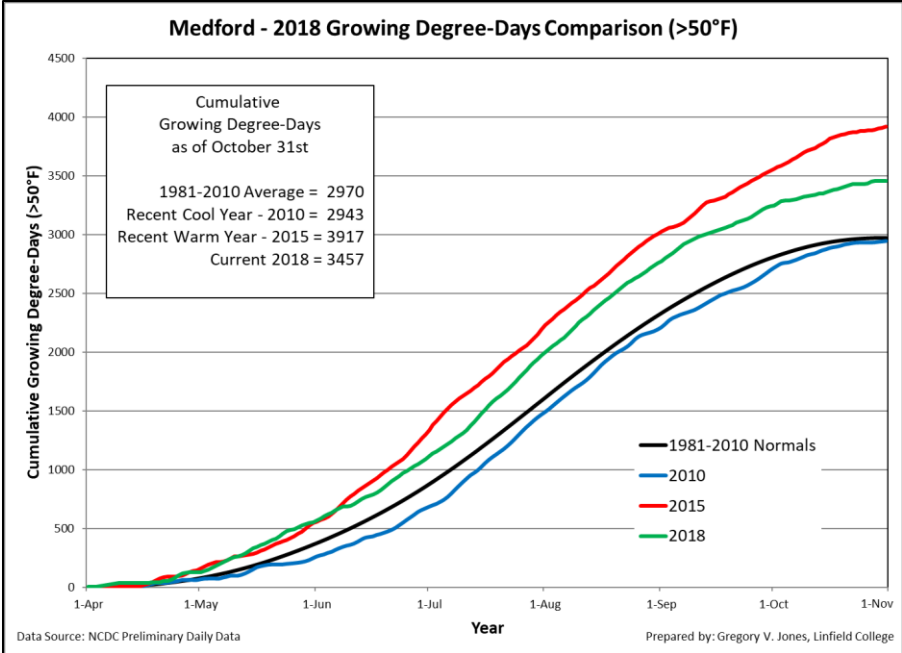
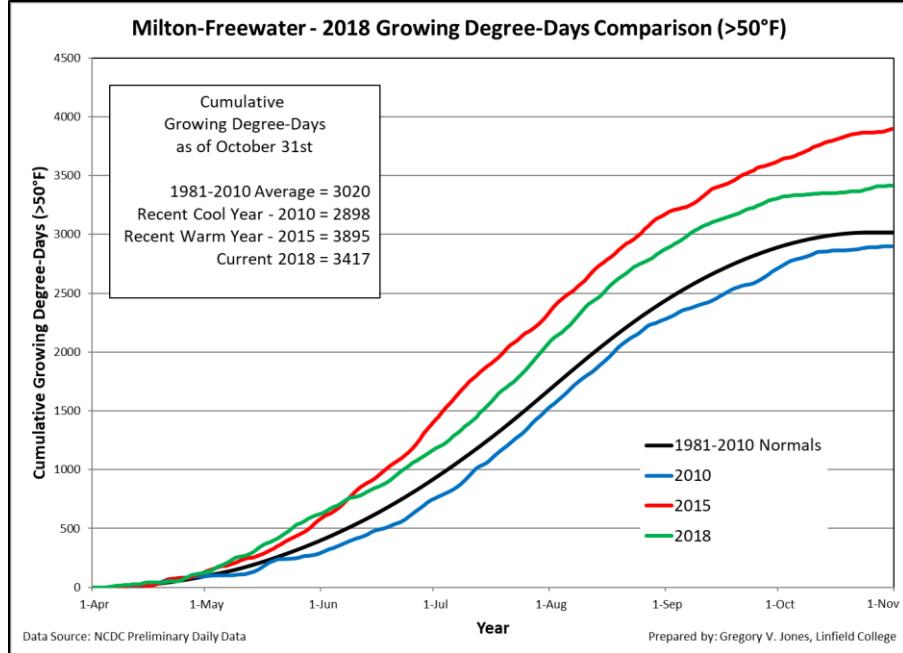
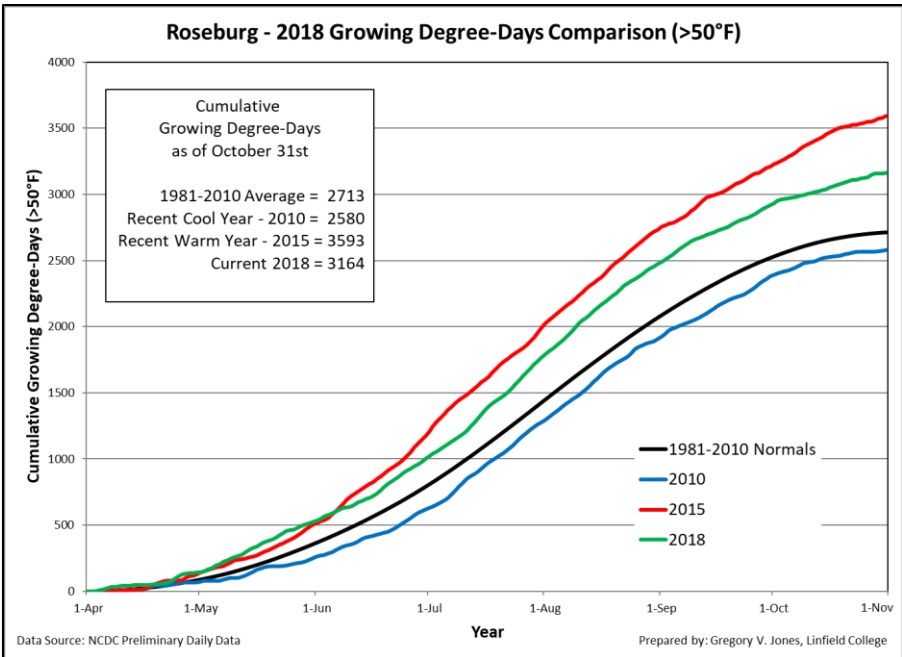
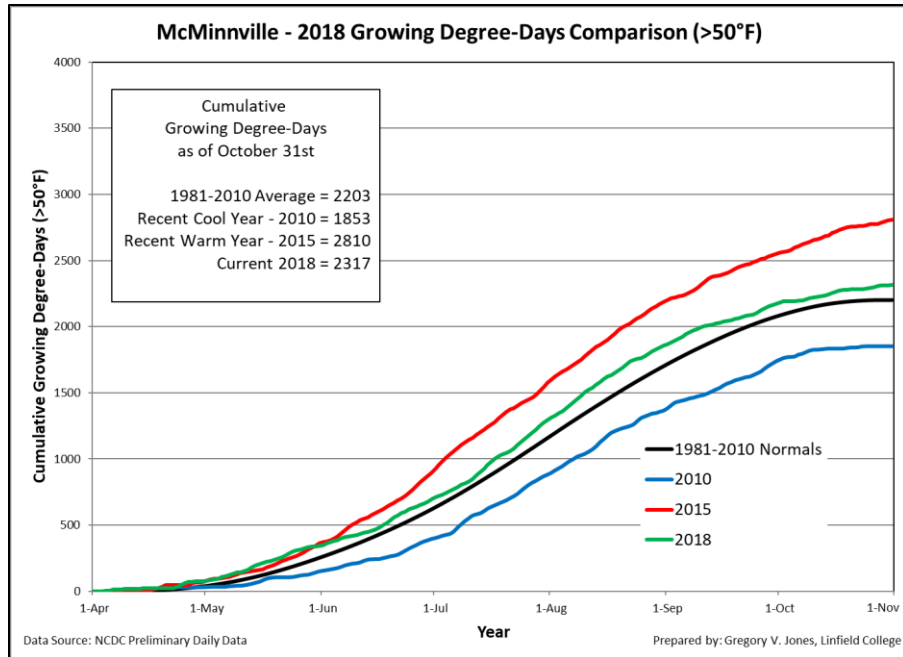
8-14 Day (valid November 14-20): The warmer than average west and colder than average east holds through the third week of the month. Warmer than average conditions expand over all of the west with the greatest likelihood centered over central to southern California. The colder than average zone in the eastern US shifts to the east and will likely be centered over the eastern seaboard. The main change for precipitation is that by mid-month nearly the entire US is forecast to see below average rain/snow. Only south Texas and Florida is likely to see average precipitation amounts. This continues the largely drier than average conditions in the PNW and California forecast in the Drought Monitor (see above).

30 Day (valid November 1-30): The previous within month forecasts for November appears to be holding to an overall warmer than average western US during the month (see Appendix Figure 2). The middle section of the country is forecast to see near average to cooler than average conditions in November while the eastern seaboard is forecast to end up slightly above normal. The November precipitation forecast tilts the odds for the northern PNW to be near normal to slightly above normal for the month, while the southern PNW is forecast to remain overall dry during the month. The rest of the country is forecast to see above normal to near normal precipitation for the month.

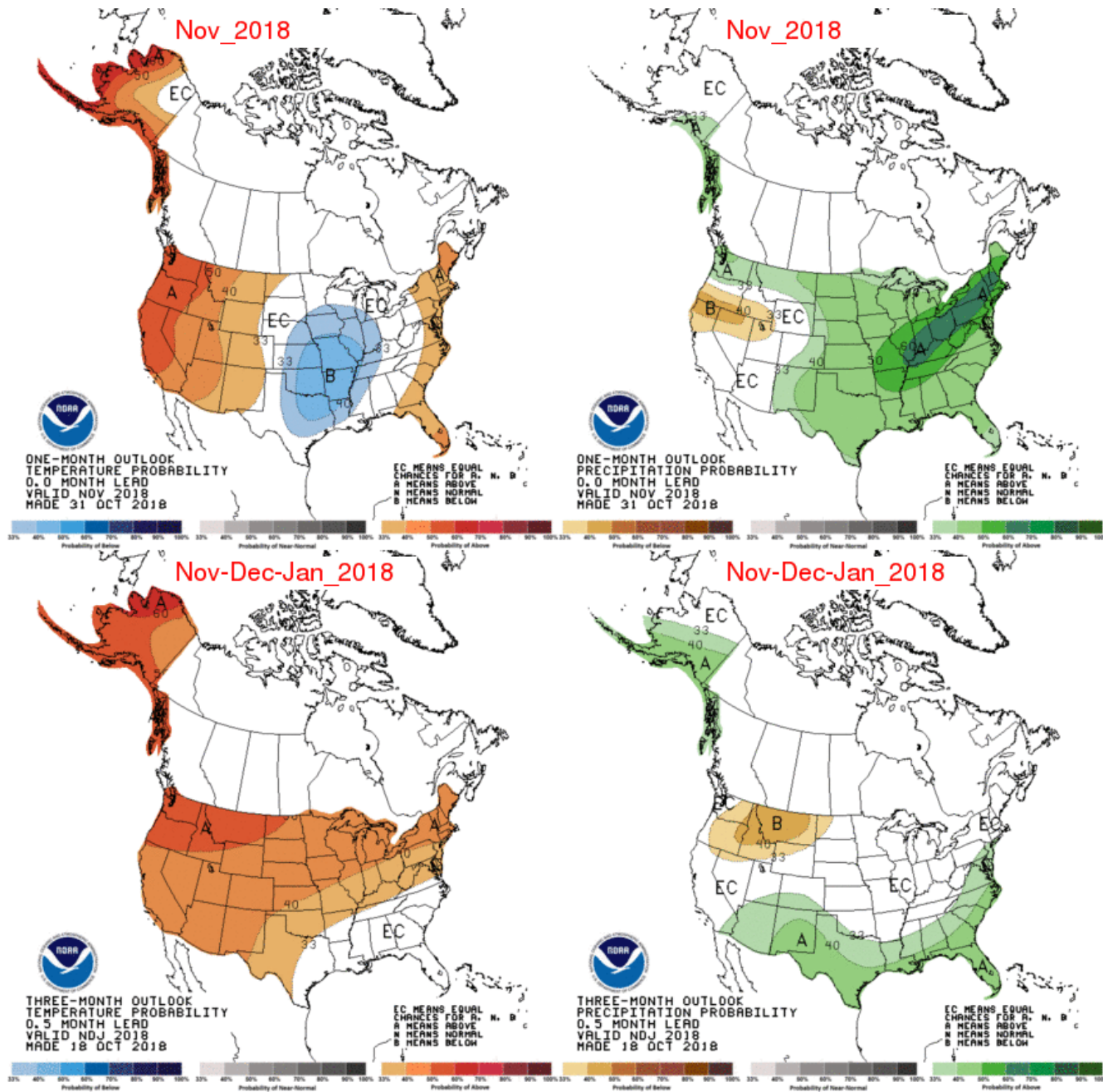
90 Day (valid November-December-January): The extended forecast into the first half of winter continues to hold from prior months and is largely based on the expected moderate El Niño developing the Tropical Pacific (see above). Conditions normally seen during El Niño winters and reflected in the NDJ forecast are a warmer than average PNW and Alaska. The difference with the current NDJ forecast is that much of the rest of the country is expected to be warmer than normal, except the southeast which is forecast to see near normal temperatures during this three-month period (see Appendix Figure 2). In terms of precipitation, the forecasted drier than average first half of the winter appears to be holding for the PNW, especially the inland PNW. The rest of the western US forecast has tilted toward an equal chance of being slightly above to slightly below, which carries across the northern tier of states. The southern states from the desert southwest to the southeast and extending up along the east coast are forecast to see a wetter than average first half of winter, which parallels the historic pattern seen during El Niño winters (see Appendix Figure 2).

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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 (2018) 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).