Weather and Climate Summary and Forecast
September 2020 Report

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Summary:

- August was warmer than average[1] across the vast majority of the western US.
- August was also seasonally dry, although remnants of a tropical storm brought intense thunderstorms and a record number of lightning strikes along the California coast, unfortunately starting numerous wildfires.
- The drought footprint continued to expand over the west and is forecast to stay in place through the first half of winter except for western Oregon and central Washington which is expected to see some seasonal improvement.
- Moderate to extreme heat event through at least September 10th with some models pointing to a rapid cool down and others saying seasonal to the end of the month. No precipitation forecast through mid-month; the second half is also anticipated to be dry but forecasts out more than two weeks in September are fickle.
- The forecast for September through November points to the likelihood of a warmer than average period for much of the western US. The overall precipitation outlook is pointing to near average conditions for California and Oregon, and slightly wetter than average in Washington and the inland PNW.

The August forecast for a moderately warm month for the western US was realized with temperatures ending up 1-6°F above average (Figure 1). While heat extremes were relatively low, higher humidity was in play for much of the month. The PNW was closer to normal with areas of Puget Sound and inland Washington actually slightly below normal for the month. The desert southwest and Four Corners saw the warmest conditions over the western US. The forecast for a cooler month in the southern Plains and Mississippi River valley held true, largely due to tropical moisture and cloud cover, while the southeast and eastern seaboard experienced a near-average month (not shown). While August was seasonally dry in the western US, the remnants of an eastern Pacific tropical storm brought very intense thunderstorms and lightning that set off numerous wildfires that continue to burn to varying degrees. Not much precipitation occurred in these storms, but what did can be seen in the spotty pattern along the coast in California in Figure 1. For the rest of the country, the central to northern Plains, the central Gulf Coast, and southeast to mid-Atlantic experienced a wetter than average month (not shown).

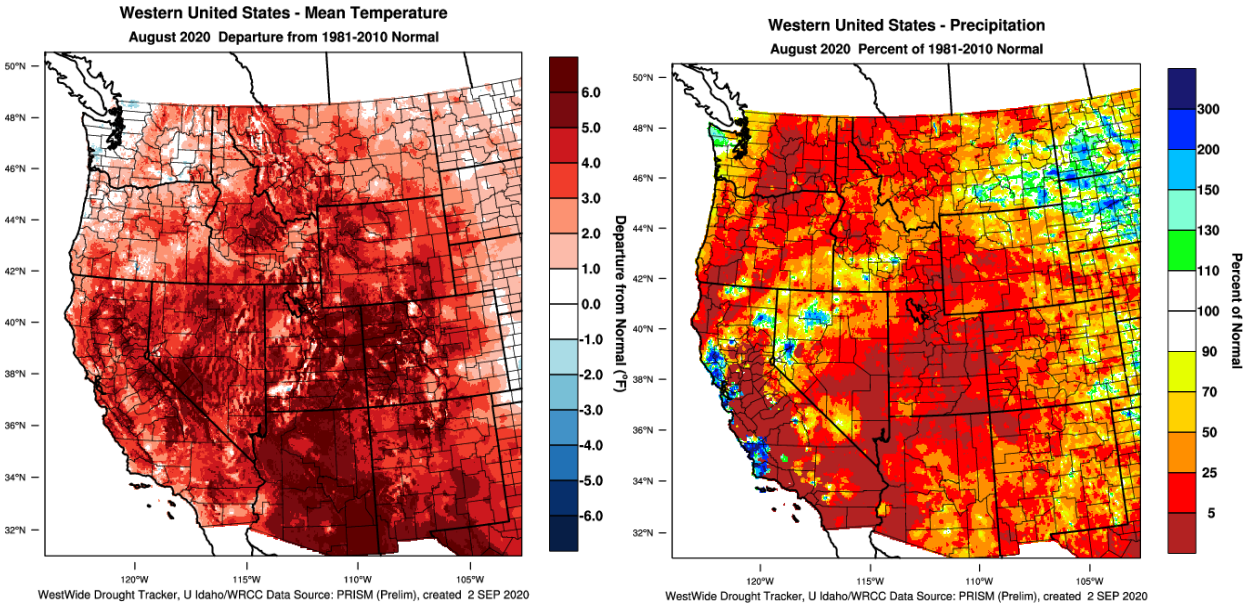

Figure 1 – Western US August 2020 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[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.

Temperatures during 2020 in the western US are running largely near average to above-average year to date. California, Nevada, the southern Rockies, and the southwest have seen the warmest conditions, while areas in southern California, western and eastern Washington across to the northern Rockies are near average to cooler than average (Figure 2). Washington and Oregon continue to show prominent spatial differences with the western portion of the states near average to slightly warmer than average while the central portion of the states is mostly warmer than average, and the far eastern portion of the states cooler than average or average. The northern Rockies, the northern Cascades in Washington, and northern to central Plains are the only areas of the country running colder than average (1-2°F below normal) while Texas, the Gulf Coast states, and the eastern third of the US have been seeing temperatures 1-3°F above normal (not shown). Precipitation amounts during 2020 have also been mixed across the western US with most of California, the eastside of the Cascades, and the bulk of the Great Basin and Four Corners region continues to run 20-70% of average rainfall (Figure 2). Portions of western Oregon are closer to average year to date, while western and eastern Washington, the Blue Mountains of Oregon, much of Idaho, and the California-Arizona border have seen 105-220% of average rainfall. The relatively dry year to date for 2020 continues to add to longer-term drought concerns for much of this area (see Drought section below). On the other hand, the majority of the eastern third of the country has seen wetter than average conditions since the first of the year, while dry conditions have been seen from the Panhandle region into the Plains and in northern New England (not shown).

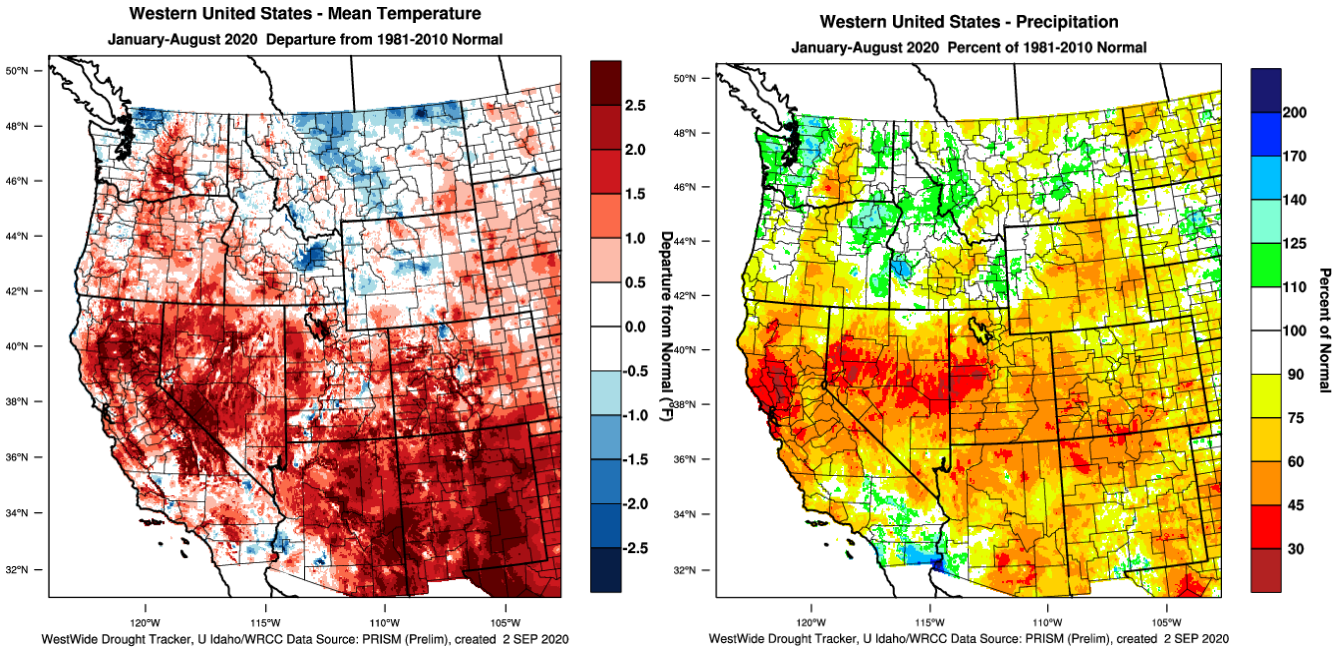

Figure 2 – Western US year to date (January-August) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Heat accumulation (GDD) for the western US from March through August shows the vintage is heading to a near normal to above normal ending (Figure 3). GDD amounts over most of California, Oregon, and Washington are currently 5-10% above normal or one to two weeks ahead of average for this time of the season. Some areas, however, are slightly behind in heat accumulation with eastern Washington, eastern Oregon, and Idaho 5-10% down or about one week behind. In California, the north and central coast continue to show near average to slightly above average heat accumulation while isolated inland areas of Southern California remain below average.

Growing degree-day amounts for four locations in Oregon's main wine regions reflect the broader regional patterns seen in Figure 3. Medford, Roseburg, and McMinnville are running above the 1981-2010 normals for the months' March through August (4 to 20%), while eastern Oregon (Milton-Freewater and the Walla Walla region) is right at the long-term average (see Appendix Figure 1). Similarly, compared to the average of the 2004-2019 period for the sites, Medford and Rosburg are 5 and 8% up, respectively, while McMinnville is 2% below average, and Milton-Freewater is 8% down. Compared to 2019, Medford is 5% higher, Roseburg is roughly the same, McMinnville is 5% down, and Milton-Freewater is 10% below (see Appendix Figure 1 for four locations in Oregon).

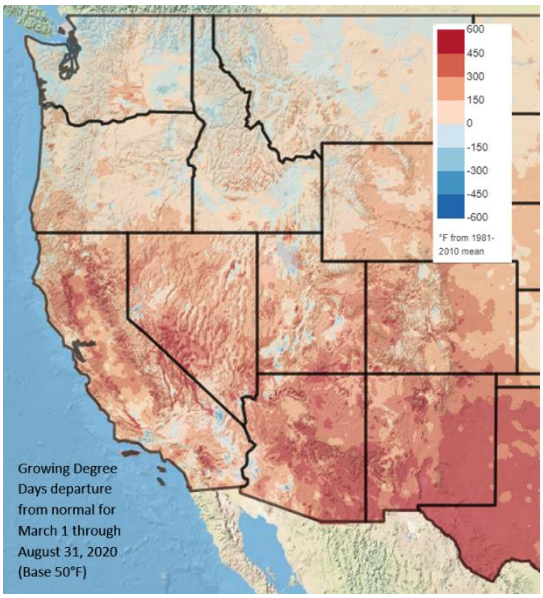

Figure 3 – Western US March through August 2020 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).

Drought Watch – August brought relatively warm and dry conditions over the western US (Figure 1) adding to the intensification of drought across much of the region (Figure 4). These conditions have influenced an active fire season with numerous uncontained fires across many states. During August, drought concerns further developed in central to west Texas, while the majority of the Gulf Coast and southeast saw drought concerns lessen, and areas from the Great Lakes into New England have continued to head into drought. The longer-term outlook for the US through November continues to show the forecasted dry conditions for much of northern California and central to southern Oregon, while central Washington and western Oregon are forecast to see some improvement with fall rains. The Four Corners region continues to be the bullseye for the western drought, with additional areas in the Rockies, Plains, New Mexico, Texas, and the panhandle region likely to see drought conditions develop further (Figure 4, right panel).

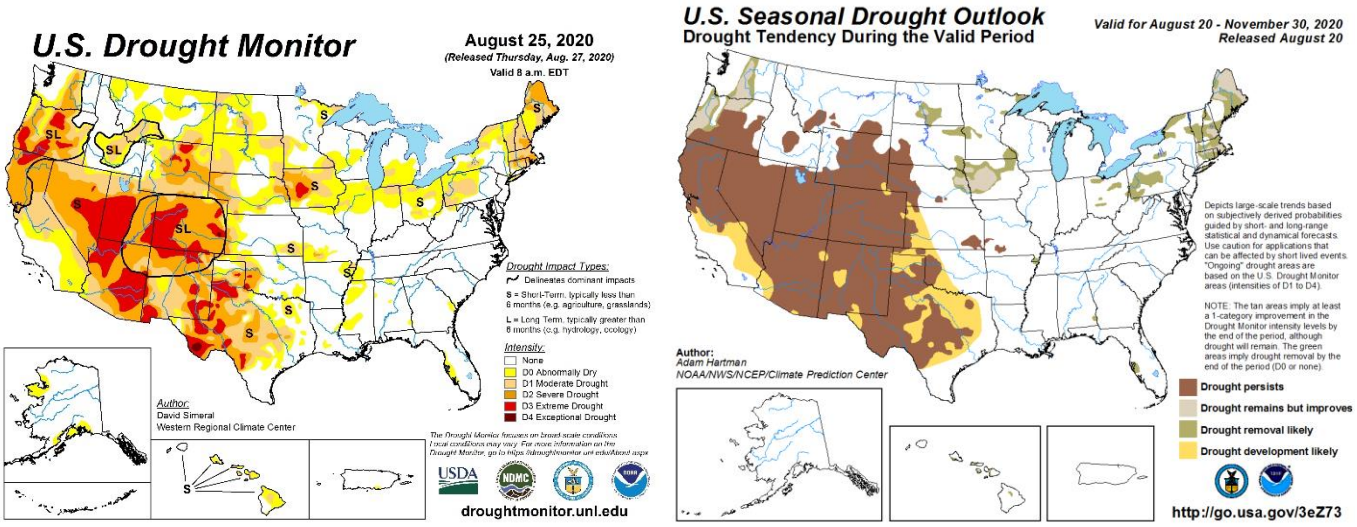

Figure 4 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – As we move into fall the tropical Pacific continues to show signs of developing La Niña (cold event) conditions (Figure 5). In mid-August, the Climate Prediction Center (CPC) report indicated that SSTs in the east-central Pacific are somewhat below average indicating borderline La Niña conditions. In addition, patterns in atmospheric variables are also indicating mostly neutral to weak La Niña conditions. Most model forecasts hover near the borderline of weak La Niña SST conditions through fall, becoming slightly weaker beginning in early winter. The official CPC/IRI outlook and other agencies outlooks are consistent with these model forecasts, calling for a 60%

chance of La Niña for fall and a 55% chance for continuing through winter. As such a La Niña watch has been posted. The move into La Niña conditions in the fall might mean an early onset of precipitation from northern California north into the PNW. At least over the short term, the current conditions along with the changes in the North Pacific (see below) are keeping the average conditions in place (see forecast periods below and Appendix Figure 2).

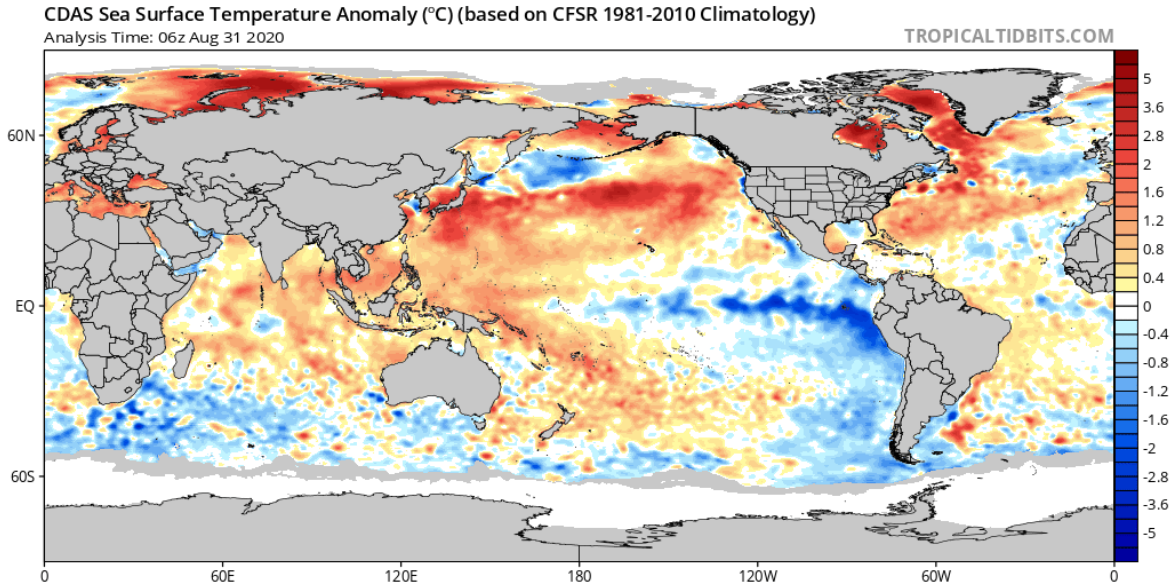

Figure 5 – Global sea surface temperatures (°C) for the period ending August 31, 2020 (image from Tropicaltibits.com).

North Pacific Watch – The North Pacific continues to show a large area of anomalously warm water across a wide area running 2-3°F above average (Figure 5). However, changes in near-shore temperatures are evident with locations from the Gulf of Alaska, Oregon, and California showing cooling. This could indicate stronger short-term upwelling or a longer-term move to the cold phase of the Pacific Decadal Oscillation (PDO). The good thing is that this is likely to tamp down temperatures over a portion of the California coast, somewhat helping with fire concerns. However, if the Pacific Decadal Oscillation (PDO) continues to develop further in the negative phase we could be in for a relatively cold and wet winter in the PNW. Current forecasts for North Pacific SSTs show continued warmth in the central portion of the basin with likely coastal cooling. No real clues toward the atmospheric play on all of this right now, other than some models hinting at an early onset of fall rains, while others are calling for continued dry conditions into the first half of winter. Hopefully, some of this will become clearer as we move further into September.

Forecast Periods:

Next 5 Days: Unseasonably warm due to the eastward shift, and NW to SE elongation, of an anomalous ridge of high pressure over the western US. Record heat is forecast from British Columbia south into the desert southwest, with the warmest days between September 6-10. Dry conditions will continue as well. Fires will potentially ramp back up after recent cooler conditions allowed some containment gains. Areas with mid to high levels of smoke may see lower than expected daytime maximum temperatures.

6-10 Day (valid September 8-12): The heat event setting in now shows signs of hanging on through this forecast period with the entire western US likely to see substantially warmer temperatures. While the west bakes, the central portion of the country is forecast to see quite cold temperatures for this time of year. In contrast, the eastern seaboard is forecast to see warmer than average temperatures. Precipitation over the western US is forecast to be average to below-average during this forecast period, which is normally dry to begin with. The rest of the country is forecast to see greater than normal precipitation, with New England likely being the wettest.

8-14 Day (valid September 10-16): Relatively consistent pattern holding for both temperature and precipitation heading into mid-month with the heat event likely hanging on in the west. There is some model disagreement here,

with some showing a dramatic cool-down start mid-month, while others point to continued warmer than average. The precipitation forecast remains seasonally dry into mid-month over the western US and extending out into the entire central portion of the country while the southeast into New England is forecast to see above-average precipitation through mid-month.

30 Day (valid September 1-30): While the second half of September currently appears headed to seasonal temperatures, the heat of the first half will likely leave the month much warmer than normal over the western US (see Appendix Figure 2). For the rest of the country, the central US is expected to flip from a cool first half of the month to average to slightly warmer than average overall while the eastern seaboard and New England is forecast to be near average. Precipitation for September is forecast to be below average over much of the western US with the inland PNW and the northern Rockies likely to see the driest conditions. For the eastern half of the country, average to above-average precipitation is expected during the month of September.

90 Day (valid September-October-November): The three-month outlook for fall and into early winter continues to indicate that the bulk of the country will likely see a warmer than the average period (see Appendix Figure 2). The Four Corners region is likely to see the warmest conditions through November, adding to already high drought concerns due to a nearly complete bust of the monsoons this year. The 90-day outlook for precipitation continues to show some areas of likely dry conditions, mostly across the southern Rockies, southern Plains, and Texas. The PNW is mixed with some indication of wetter than average conditions in Washington eastward, while Oregon and California have an equal chance of being slightly above to slightly below average. For the eastern US, portions of the Gulf Coast and Southeast are forecast to see wetter than average conditions through October which is a continuation of the expected active tropical storm season.

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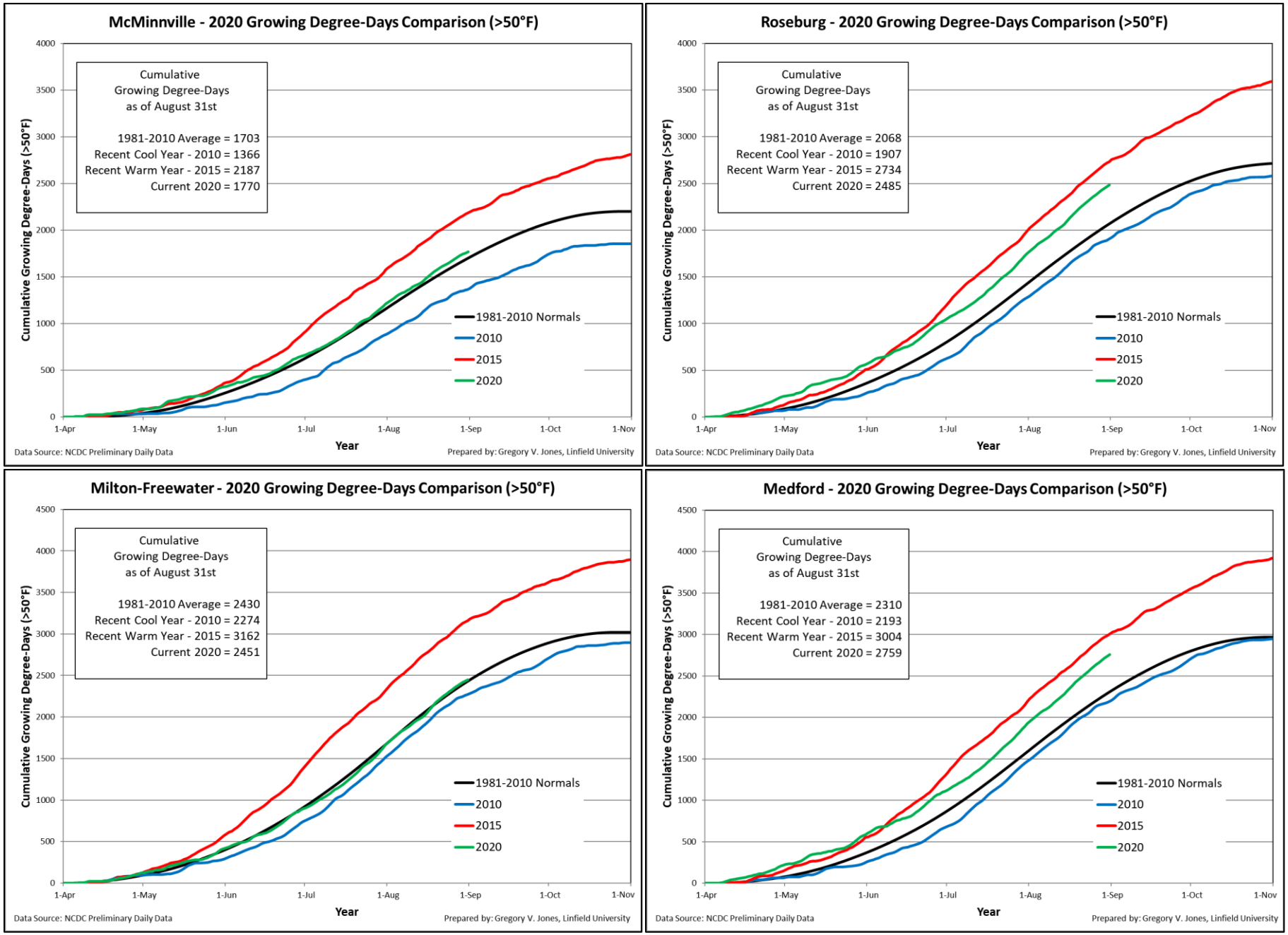
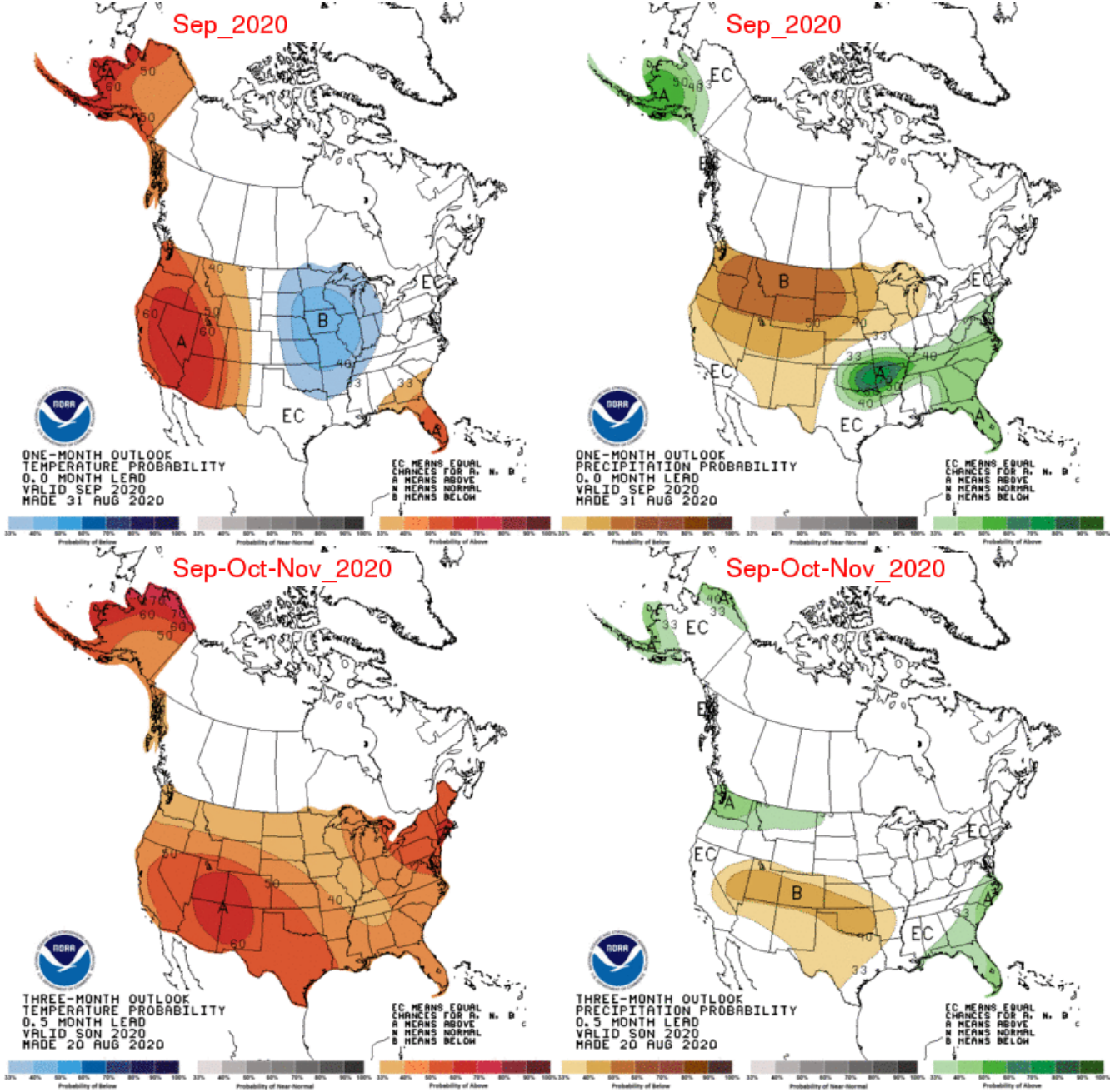


Appendix Figure 1 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2020) and a recent cool year (2010), a recent warm year (2015) and the 1981-2010 climate normals are shown (NCDC preliminary daily data).



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