

Weather and Climate Summary and Forecast May 2018 Report

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Summary:

- Near normal temperatures were seen over the majority of the west in April, except Southern California and the desert southwest, which continue to run warmer than average. April also brought above average precipitation from Northern California into the PNW.
- Current conditions continue to show a similar pattern to this time last year, however the short to medium term forecasts are calling for warmer than average conditions for the majority of the western US. Short term forecasts do call for some rain in the PNW, but conditions for frost occurrence are not in the current models.
- The seasonal forecast for May through July tilts the odds to a warm up from the coolish spring conditions. The PNW will likely end up near average for this period, while the southern half of the west will likely stay warmer and drier than average. Longer term forecasts and analog years indicate that 2018 will ultimately end up close to the 2012-2017 averages for heat accumulation throughout the majority of the western US.

April had many wondering when the relatively cold and wet conditions would let up and a period in the third week in April did not disappoint. While the month felt cool, it was actually near normal to warmer than normal across the vast majority of the west (Figure 1) and ended up quite similar to the conditions seen in April 2017. Temperatures for the month were near normal to above normal for the Rockies westward, although portions of the Bay Area, northeastern Washington, and western Montana were slightly below average. While the west was normal to warmer than average, the bulk of the rest of the US from the Plains, across to the southeast, and into New England were much colder than average. The exception was south Florida, where conditions were warmer than average (not shown). Precipitation amounts in April were mixed over the western US with Northern California, portions of Nevada, Oregon, Idaho, and most of Washington being 110-200% of normal for the month (Figure 1). Dry conditions were seen throughout much of the southern tier of the west and into the Great Basin and southern Rockies where drought conditions and wildfire risk continues. Precipitation amounts were mixed across the rest of the country, with the dominant signature being a drier than average southwest into Texas and the central and southern Plains (not shown).

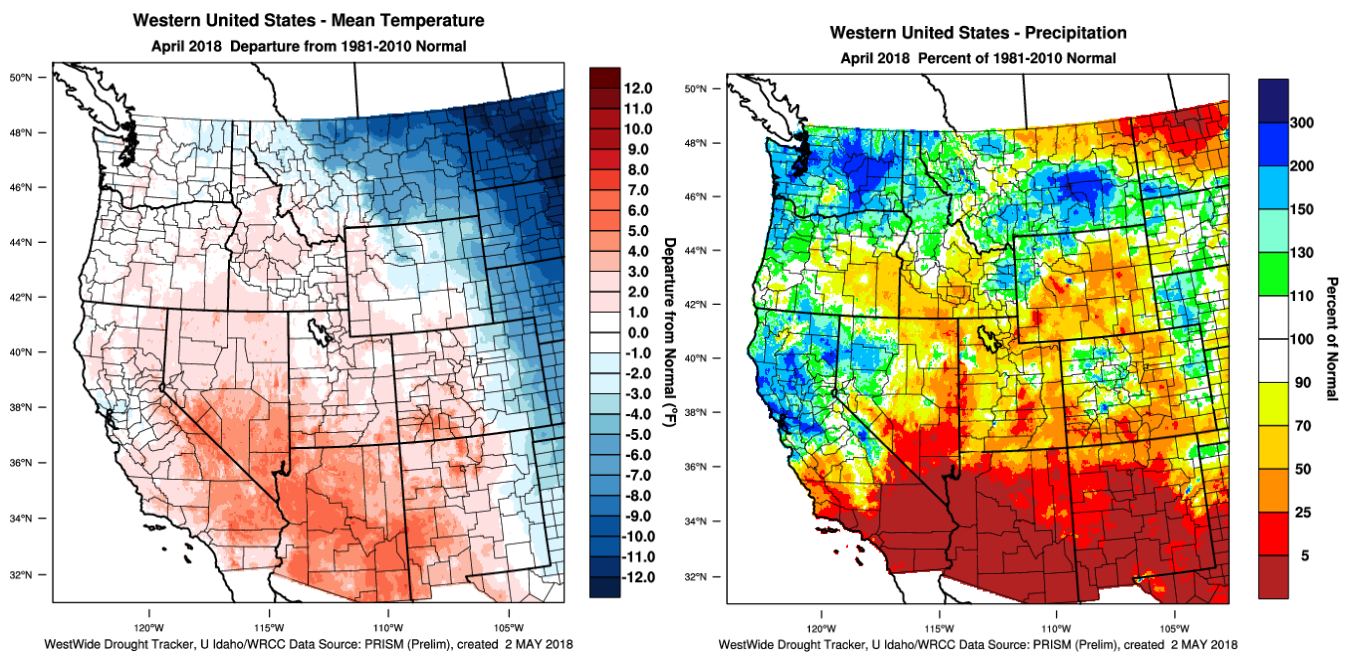


Figure 1 – Western US April 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

The cool March and April has brought the western US close to average temperatures (+1 to -1°F) for the winter (Figure 2). The Central Valley of California, Northern California, Oregon, and Washington are now running near normal temperatures for the water year. However, Southern California, across into the desert southwest and the Four Corners and the Rockies remain warmer than average (+1-5°F). The contrast with the Plains and eastern US can be seen in Figure 1 where eastern Montana eastward has experienced a very cold winter. While spring provided some much needed moisture, water year precipitation over the majority of the western US remains below average (Figure 2). Southern California across into the desert southwest and Four Corners region are running 20-40% of normal, while central to northern California and much of Oregon have been 60-90% of normal. Washington, northern Idaho, Montana and a small area of the northern Sierra Nevada's have seen 110-200% greater than average precipitation for the water year (Figure 2). The rest of the country has been mostly dry as well, especially the southwest and into Texas and the southern to northern Plains, while only Montana, the Great Lakes region, northern New England and the Ohio River valley have been slightly wetter than average (not shown).

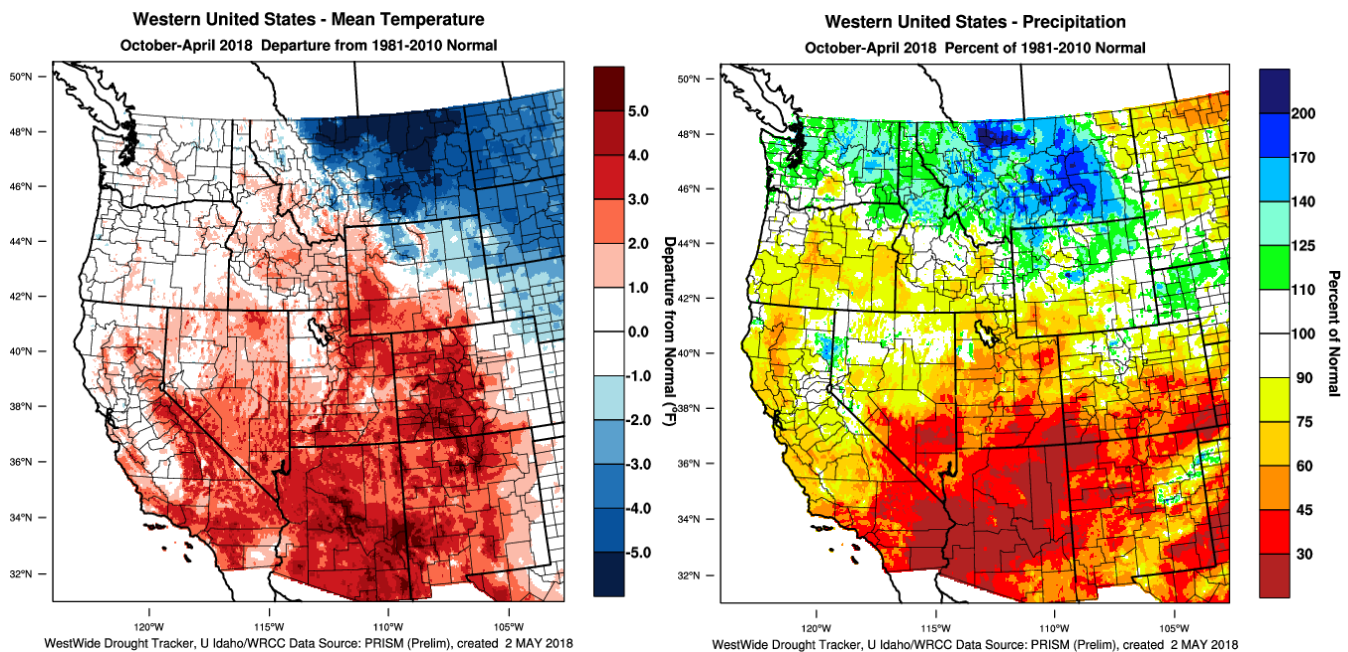


Figure 2 – Western US Water Year October 2017 - April 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

The first runs at growing degree-days over the western US show an April that was largely near normal in the PNW (Figure 3). California saw mixed conditions with much of the state above normal except in the Sierra Nevada's and far Northern California where near normal conditions were seen, and the Bay Area where marine cloud cover conditions keep heat accumulation slightly below normal for the month of April (Figure 3). The result was a budbreak that was normal to slightly behind normal throughout the west. Heat accumulation (GDD) amounts for four locations that I have tracked for many years in Oregon are all above the 1981-2010 normals for the month of April and are similar to what was seen in both 2015 and 2017 (see the Appendix Figure 1 for four locations in Oregon).

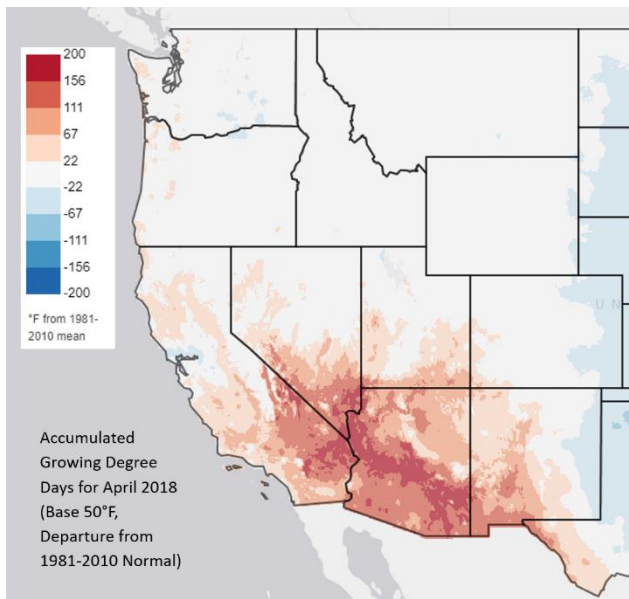


Figure 3 – Western US April 2018 growing degree-days departure from the 1981-2010 normals (image from Climate Impacts Research Consortium, University of Idaho).

Drought Watch – The broad drought pattern of the last 30-60 days has continued to the May 1st US Drought Monitor (Figure 4). The US drought footprint continues at near record levels due to the dry water year to date in the west (Figure 2) and over much southern Plains and Texas. The most extreme drought conditions are still found across the desert southwest, the Four Corners, through to the panhandles of Texas and Oklahoma. The US seasonal drought outlook though the end of July continues the forecast pattern from previous months with drought persistence or further develop for central to southern California across New Mexico and in eastern Oregon, but now shows some potential improvements in Texas and Oklahoma (Figure 4, right panel).

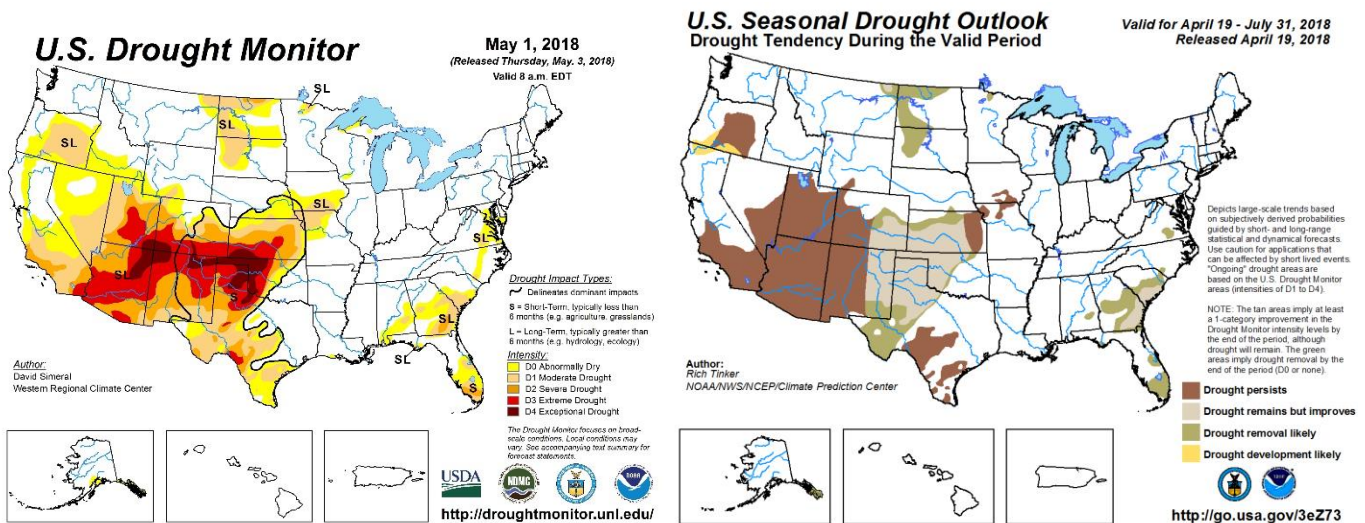


Figure 4 – Current US Drought Monitor and seasonal drought outlook.

La Niña Watch – In mid-April 2018, the east-central tropical Pacific waters were at warm-neutral to borderline La Niña levels. Most of the key atmospheric variables continued to indicate weak La Niña. The east Pacific subsurface water temperature has become moderately above average, indicating warming conditions away from La Niña to more neutral conditions. The official outlook continues to call for a transition from La Niña to neutral conditions during the April-June season, with a further warming tendency later in the year. All of the latest forecasts of statistical and dynamical models support this scenario with forecaster consensus across numerous agencies and countries favoring the transition to neutral. If the forecasted conditions for neutral conditions hold true, the weather

this summer across the US will likely follow the warmer than average conditions in the 90-day forecast and beyond (see forecast periods below and Appendix Figure 2).

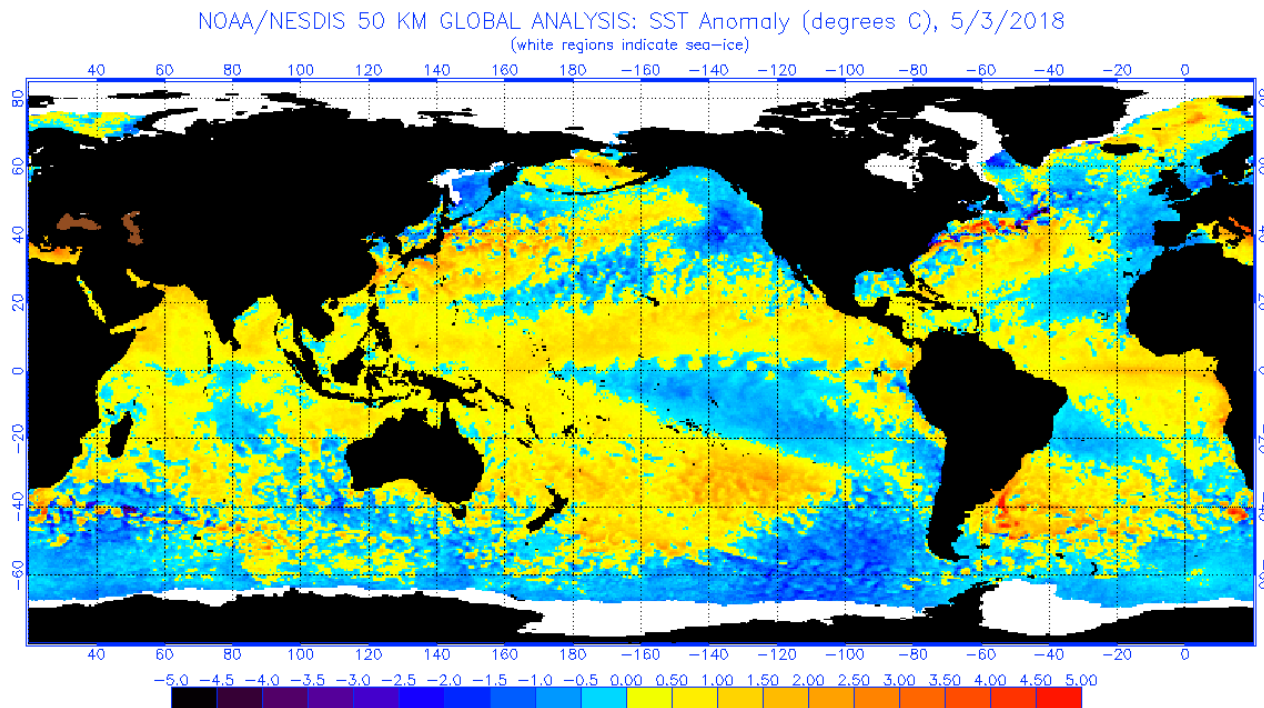


Figure 5 – Global sea surface temperatures ($^{\circ}\text{C}$) for the period ending May 3, 2018 (image from NOAA/NESDIS).

North Pacific Watch – The Pacific sea surface temperature patterns did not change much from March through April (Figure 5). There was some warming across the eastern tropical waters, ushering in what looks like neutral ENSO conditions (see above). There is still a fairly large area of colder than average SSTs in the Gulf of Alaska, along the coast of the western US and extending out to sea but the overall extent has declined slightly from last month. The moderately cool SSTs in the North Pacific has been a contributing factor in our cool March and April along with wetter conditions in some areas. Even with the slight shift we are still in the negative or cold phase of the Pacific Decadal Oscillation or PDO, a large-scale, long-term climate variability mechanism in the North Pacific Ocean that is closely associated with El Niño-La Niña cycles. The cold-PDO tends to have more prominent effects when it is matched by La Niña conditions in the Tropical Pacific. However, with the transition from La Niña to neutral conditions in the tropics we are likely to not see as strong of climate effects across the west. Even so, I would still expect the PNW to exhibit a slightly cool and wet spring into early summer (actually quite normal compared to the long term), while the rest of the western US and much of the rest of the country should see warmer than average conditions during the summer.

Forecast Periods:

6-10 Day (valid May 9-13): A decent stretch of weather across the western US. The forecast through mid-month calls for the entire western US to be above normal in terms of temperatures, with no indication of frost threats. The bullseye of the heat will be centered over the Four Corners region, but the entire western US should be warm. The rest of the country should also follow with average to warmer than average conditions. The only downside in the 6-10 day forecast is for a couple of rain events that are likely to bring rain from extreme Northern California throughout Oregon and Washington. Not soaking events, but just enough to keep things wet. California is not likely to see much if any from these events. For the rest of the country, Texas, the southern Plains and across the southeast into the mid-Atlantic and New England are likely to stay dry, while the Great Lakes and Florida are forecast to be wetter than average.

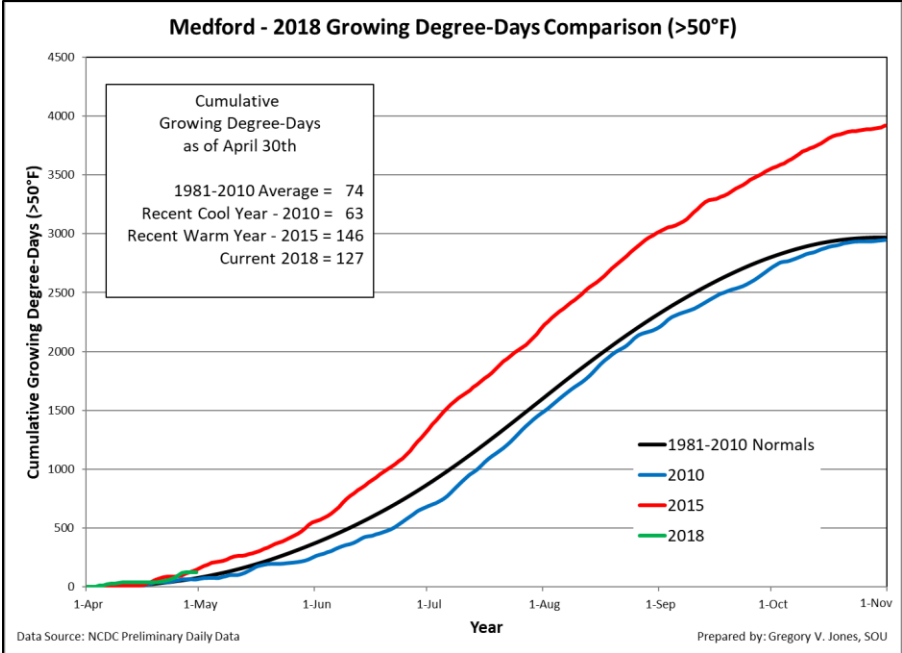
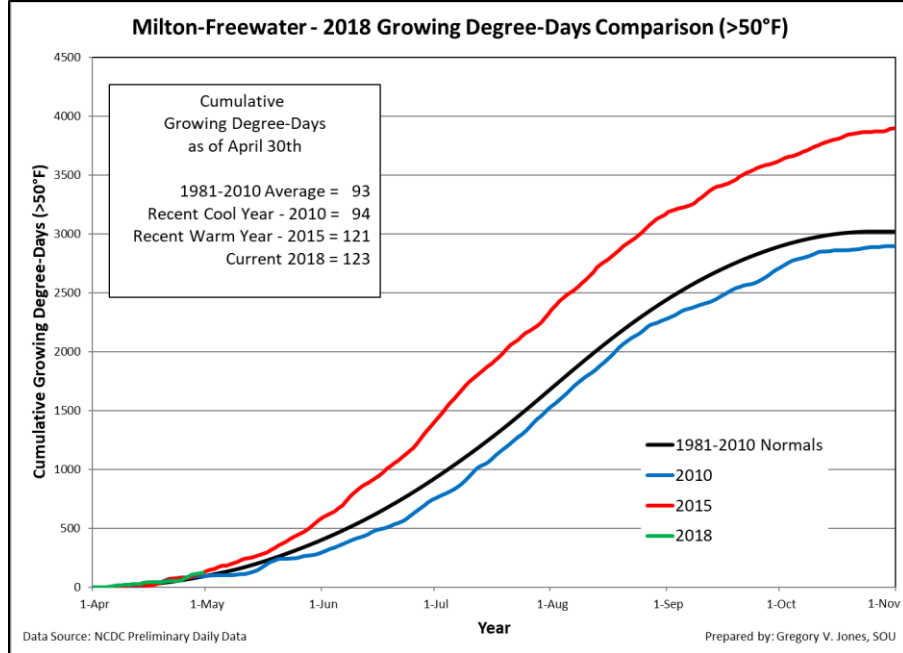
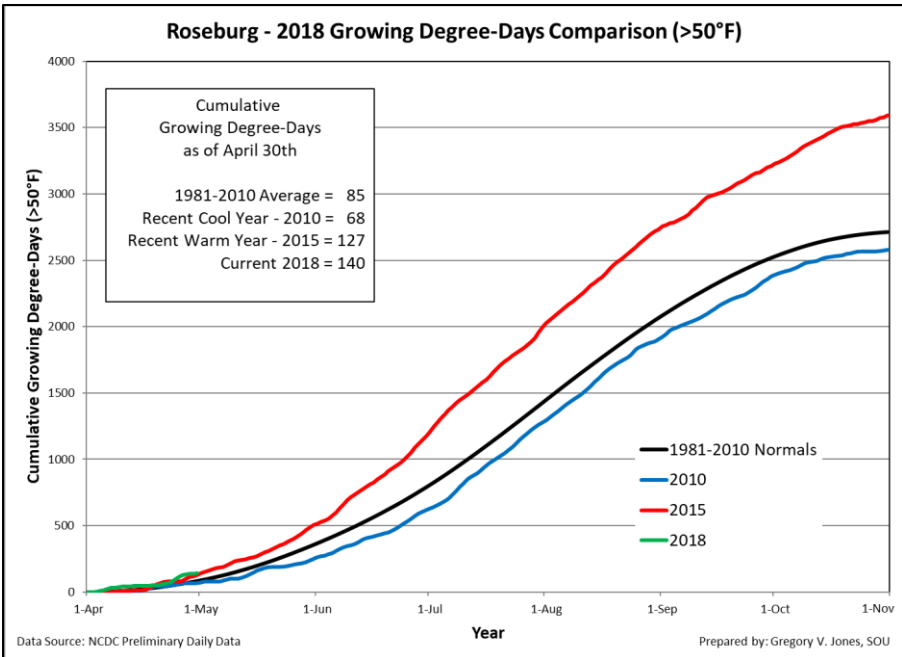
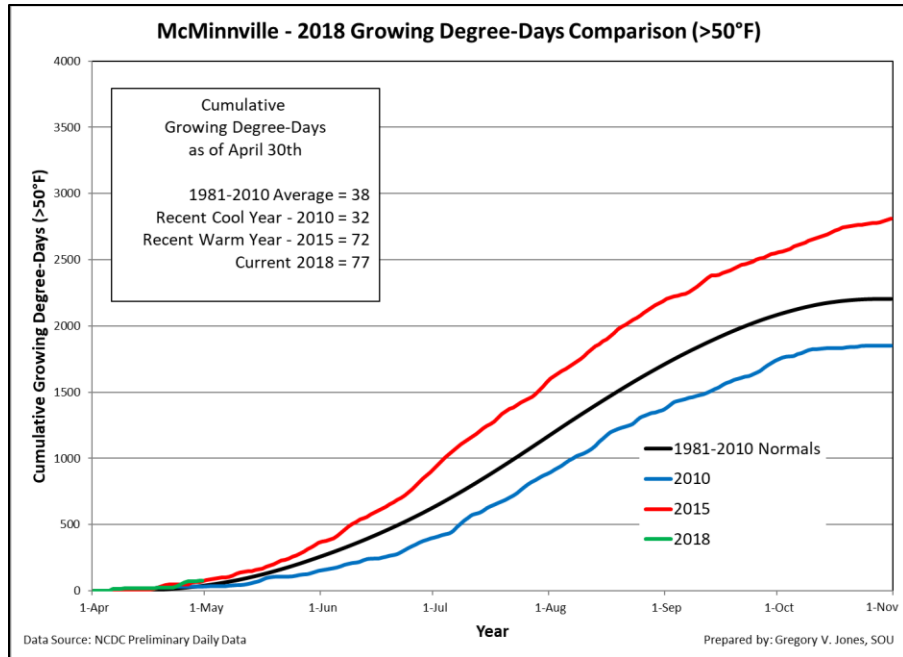
8-14 Day (valid May 11-17): In general, the forecast pattern from the 6-10 day period carries into the 8-14 day period across the vast majority of the US. The only exception is the PNW where frontal passages are likely to bring on again, off again rain and average to slightly cooler than average temperatures. No sign of frost in the forecasts.

30 Day (valid May 1-31): The current one-month lead forecast guidance is calling for the entire country to likely have a warmer than average May (see Appendix Figure 2). Even with the potential cool down in the PNW in mid-month, overall the forecast is pointing to warmer than average May in the PNW. The interior west and the desert southwest are likely to see the highest temperatures during the month. Precipitation for the month is forecast to be lower than average in the PNW even after early to mid-month rain events. The forecast across the rest of the country calls for Texas to get some relief from current drought conditions, the Plains and the Great Lakes to be above average and the interior southeast to be drier than average.

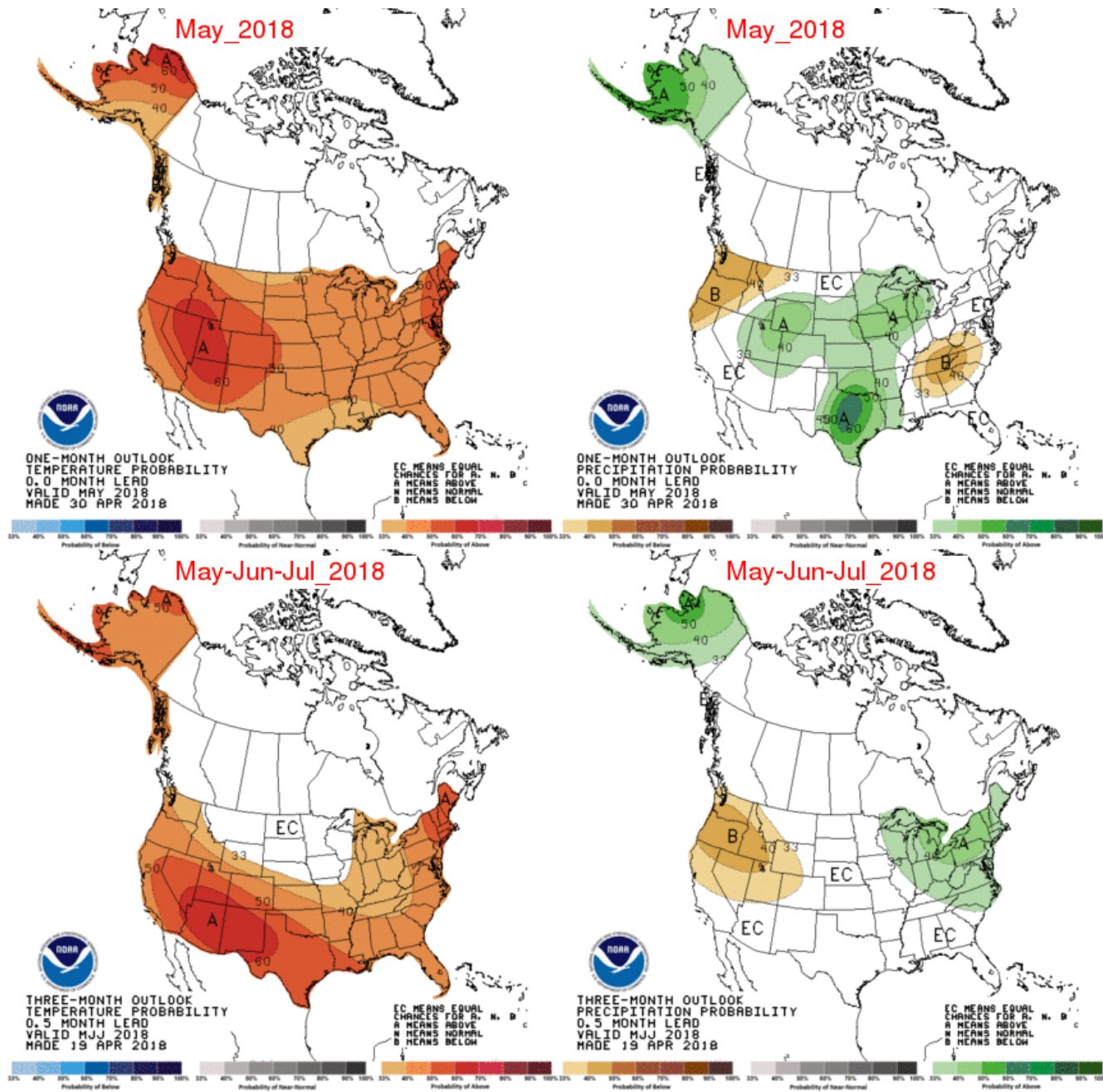
90 Day (valid May-June-July): The seasonal forecast for May through July is tilting the odds to a warmer first half of summer across the US with the exception of the northern Plains where near average temperatures are forecast (see Appendix Figure 2). The warmer than average conditions are most likely in the desert southwest. The precipitation forecast over the next 90 days hints at a dry down to below average conditions in the PNW, Northern California, and the interior northern Rockies. The Great Lakes across to the mid-Atlantic and New England are forecast to be wetter than average during this period while the rest of the county is forecast to have an equal chance of being slightly drier to slightly wetter than average.

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