

Weather and Climate Summary and Forecast

April 2018 Report

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Summary:

- A near 'Miracle March' played out bringing cooler and wetter conditions to the majority of the western US. A complete shift from the dominant ridge pattern in the first half of the winter to troughs over the eastern Pacific allowed for a more typical storm track. Decent snowpack development lowered drought conditions temporarily but not enough to make up the dry winter so far.
- The current conditions mirror those of this time last year with April forecasted to be near average to cooler than average over the west and especially in the PNW. Short term forecasts call for continued spring rains and snowpack additions at least through the third week of the month.
- The April through June seasonal forecast continues to stay the course with the odds tilted to seeing a cool/wet spring in the PNW warming into May and June, along with average to warmer than average and dry conditions in California. Some drought recovery has happened and we will likely see more, but still not likely to end up average for the water year.

While March Madness played out on the court, a near 'Miracle March' played out over the western US in terms of rainfall/snowpack deficit recovery. Fears of a continuing dry winter gave way in late February to wetter conditions that persisted throughout the month of March. The change came from a shift in the dominant ridging that the western US saw for the first half of the winter to an unsettled trough over the eastern Pacific that allowed a more consistent storm path into the west. The result was significant rain and snow for much of California, Nevada and portions of Oregon and Idaho (Figure 1). Temperatures remained cooler than average throughout the month with temperatures 1-5°F below average for much of the west. For the rest of the US the coldest area of the country was the Great Plains through the Great Lakes and throughout the northeast (not shown). Precipitation amounts were mixed across the rest of the country, with the dominant signature of a drier than average southeast, Great Lakes and the panhandle region of Texas (not shown).

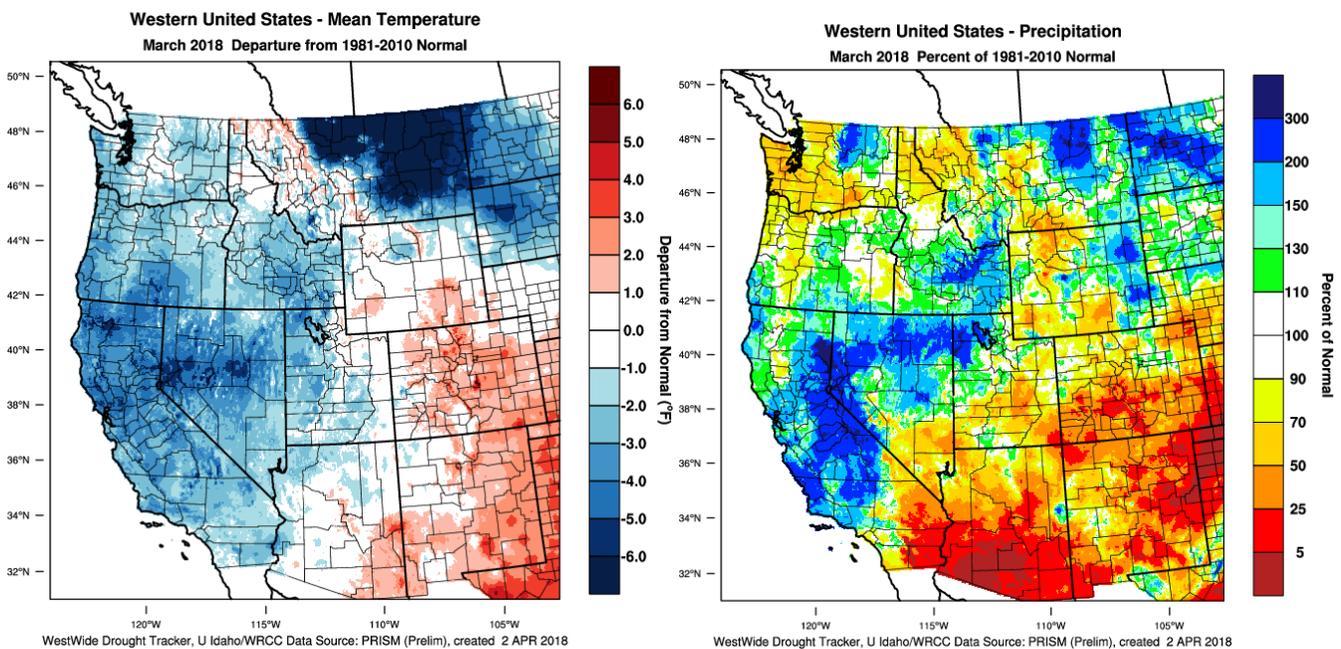


Figure 1 – Western US March 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

The cooler than average March brought much of the west to near average temperatures (+1 to -1°F) for the winter (Figure 2). Central to southern California and across into the desert southwest remain warmer than average while eastern Montana into the northern Plains have experienced a very cold winter. For the rest of the US, the current water year period is running near average to warmer than average everywhere except in the Great Plains to the northern Great Lakes which remain below average (not shown). Even with the March catch up, the water year precipitation remains below average for the majority of the western US (Figure 2). Southern California across into the desert southwest and Four Corners region are running 20-60% of normal, while central to northern California and much of Oregon have been 55-85% of normal. As a result, current snow water equivalents are running 64% of average in Oregon, 52% in California, near average in Washington, and 50% or more below average in the southern Rockies with only the northern Rockies running more than 100% of average (not shown). The rest of the country has been mostly dry as well, especially the southwest and into Texas and the southern Plains, while only Montana, the Great Lakes region, northern New England and the Ohio River valley have been slightly wetter than average. As mentioned here previously, the pattern in both temperature and precipitation for the winter so far has followed what was forecasted back in October from the moderate La Niña conditions in the tropics (see section below).

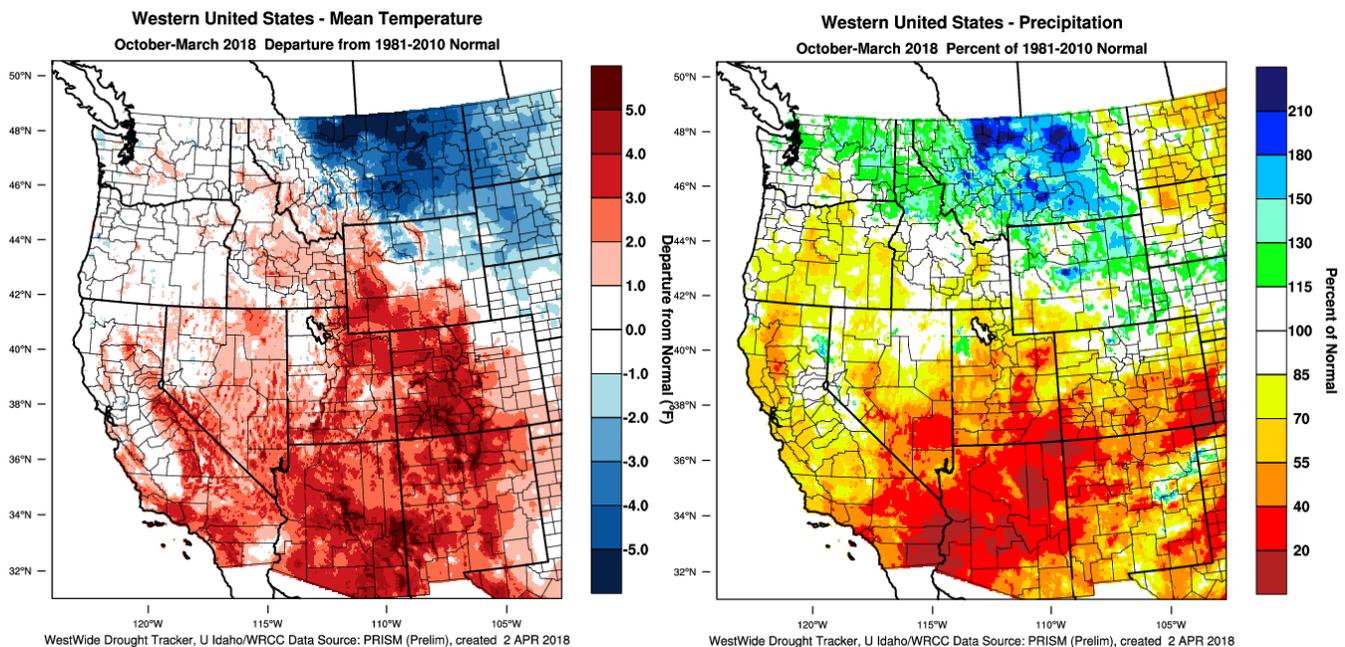


Figure 2 – Western US Water Year October 2017 - March 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Drought Watch – Even with the wet March, the US drought footprint continues at near record levels due to the continued dry water year to date in the west (Figure 2) and over much of the country (Figure 3; left panel). Except portions of the central Gulf Coast, nearly the entire southern tier of the US is now under moderate to extreme drought conditions with the Four Corners through to the panhandles of Texas and Oklahoma being the most extreme. The most recent drought monitor (Figure 3) shows some minor recovery in northern California and Oregon from last month, but the rest of the regions of central to southern California and Nevada remain abnormally dry to being in severe drought. The US seasonal drought outlook though the end of June continues to show a similar forecast pattern of drought persistence or further develop for central to southern California across to Texas and eastern Oregon (Figure 3, right panel) while Northern California, western Oregon, Washington and Idaho do not show any drought tendency.

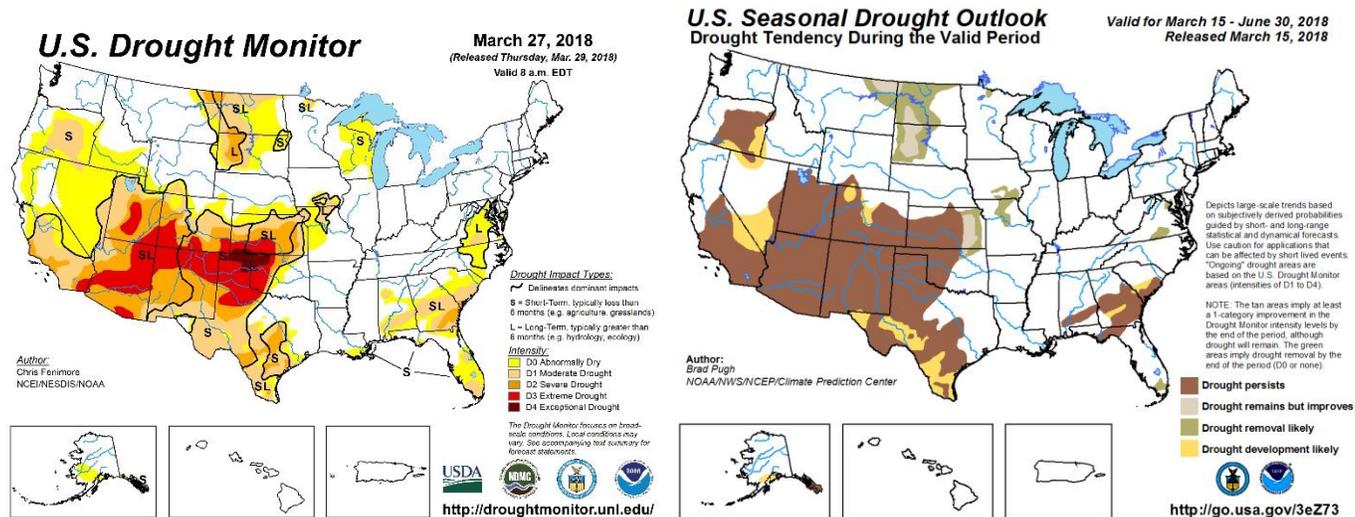


Figure 3 – Current US Drought Monitor and seasonal drought outlook.

La Niña Watch – In late March 2018, the tropical Pacific still reflected weak La Niña conditions. Most of the key atmospheric variables, however, no longer show patterns suggestive of La Niña, and the east Pacific subsurface water temperature has warmed back to average. The official outlook calls for a transition from La Niña to neutral conditions during the March-May season. The latest forecasts of statistical and dynamical models support this scenario (Figure 4). Forecaster consensus across numerous agencies and countries favors the continuation of weak La Niña conditions and transition to neutral. If the forecasted conditions for the weak La Niña transitioning to neutral hold true, the next few months will likely continue to be warm and dry in the southern half of the US and transition to average to warmer than average across the north (see forecast periods below and Appendix Figure 1).

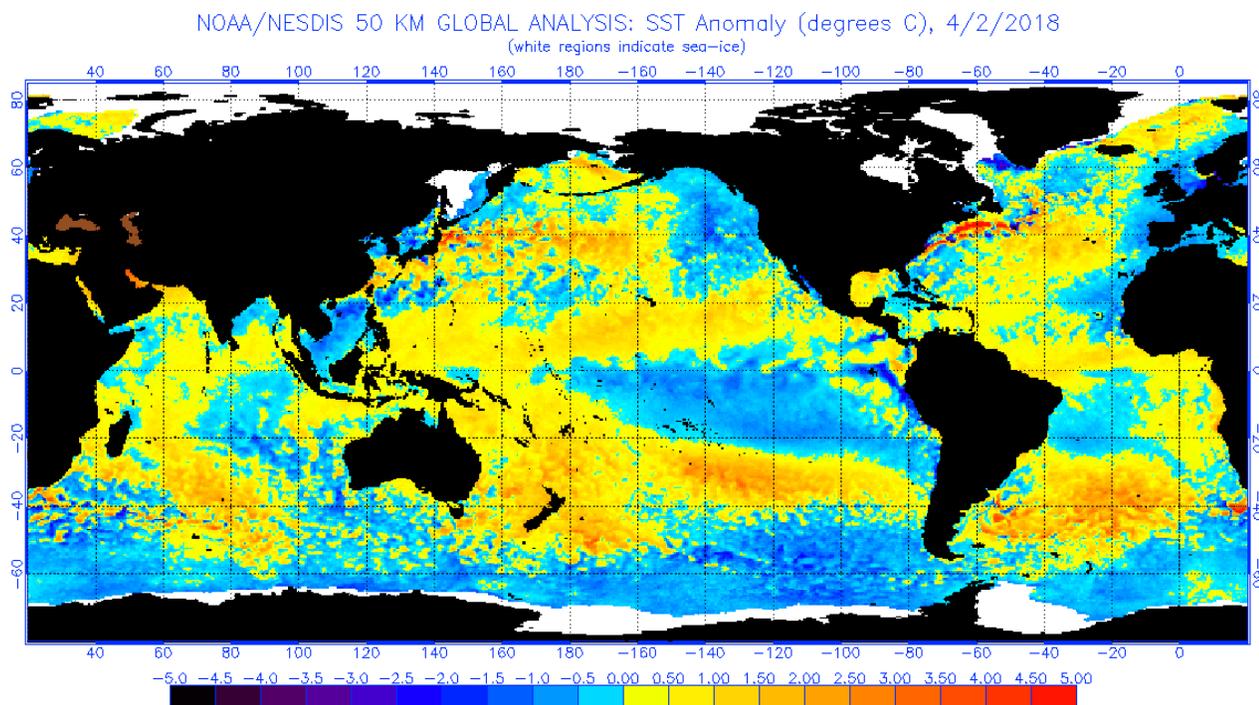


Figure 4 – Global sea surface temperatures (°C) for the period ending April 2, 2018 (image from NOAA/NESDIS).

North Pacific Watch – March saw North Pacific SSTs shifting cooler across the Gulf of Alaska, along the coast of the western US and extending out to sea more than it has in the last six months or so (Figure 4). The moderately cool SSTs likely contributed to our March shift to more dominant trough environments off the west coast that brought cooler and wetter conditions. The overall pattern has strengthened to 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. The expected effects include a cool and wet PNW and warm and relatively dry California and across the southwest. The Southern Oregon-Northern California region is the transition zone between these conditions. Although the La Niña is waning to neutral this spring I would expect our spring to play out like analog years with an increased chance for near to below normal temperatures across the PNW during April and warming into May and June (see forecast below). Similar years indicate increased chances for near to slightly above normal precipitation, with above normal probabilities highest for mountainous areas, the Cascades westward, Northern California, and interior western Oregon. Points south into California and the desert SW have warmer and drier conditions in analogous years with La Niña and a cold phase PDO.

Forecast Periods:

6-10 Day (valid April 9-13): Unsettled pattern continues across the western US. The current forecast calls for Northern California, Oregon, Washington and Idaho to be near average to cooler than average through mid-month. Southern California across to Texas and into the southern Rockies is likely to stay substantially warmer than average while the northern Plains across to New England and into the southeast are forecast to remain much colder than average. The precipitation forecast through mid-month calls for areas from Northern California throughout the entire PNW to be wetter than average. Dry conditions are forecast in the desert southwest across into Texas with the rest of the country expected to near average to wetter than average over the ten-day period.

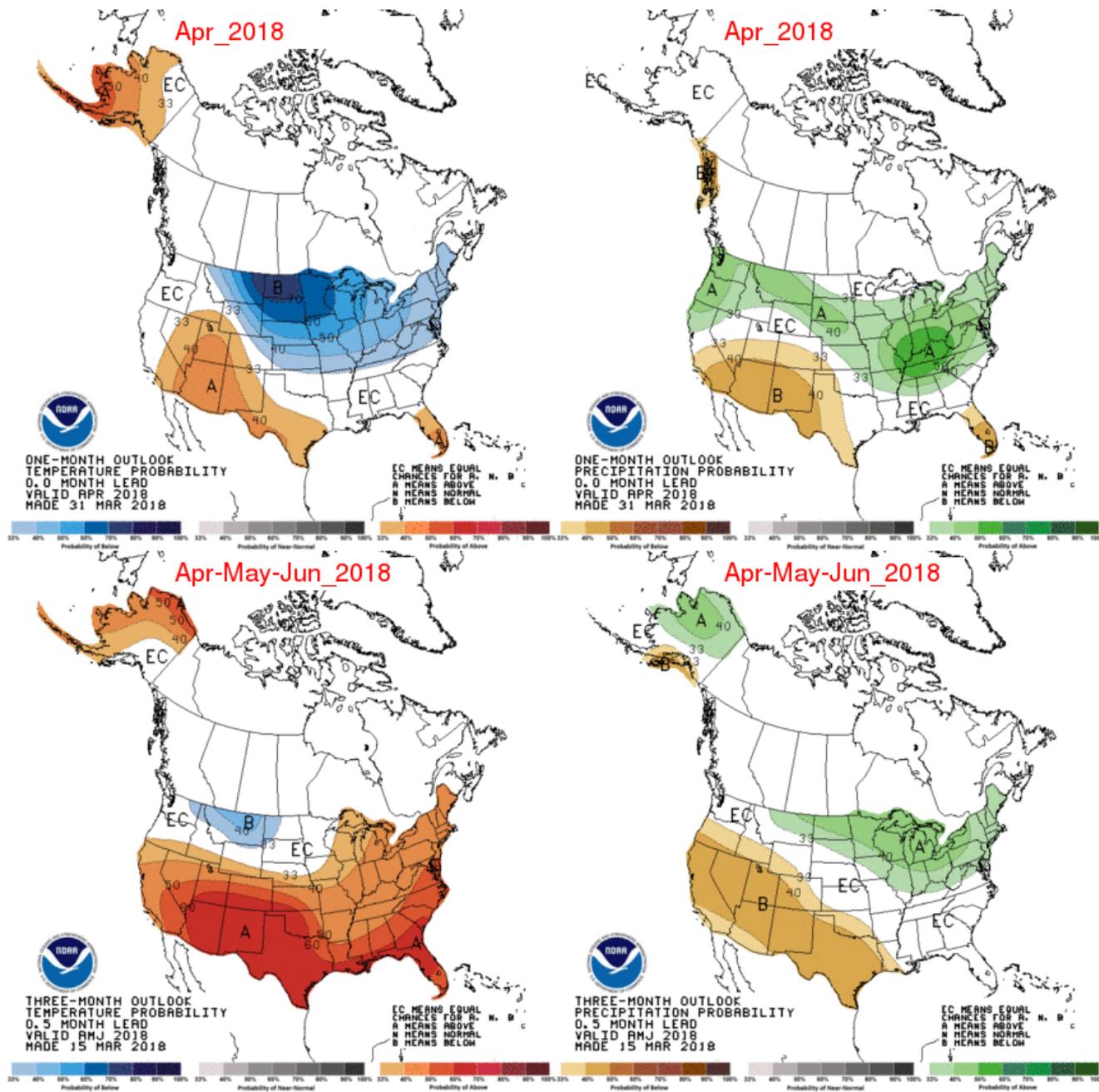
8-14 Day (valid April 11-17): Not much difference from the 6-10 day forecast with continued cooler than average conditions from Northern California, into the entire PNW and across the northern tier of states all the way to New England. Warmer than average conditions are forecast to remain in place from Southern California across the south all the way to Florida. The western US precipitation forecast heading into the third week of April maintains the bullseye in Northern California and the PNW with a high likelihood of wetter than average conditions. Most of the rest of the country is forecast to be wetter than average with only Texas and Four Corners region likely to remain dry.

30 Day (valid April 1-30): Given the short term forecasts above, the month of April is forecasted to be wetter than average across Northern California and the PNW while likely ending up near average in terms of temperatures. It should be noted that average April temperatures will feel quite cool to most and will likely be similar to last spring. Much cooler than average conditions are likely to remain in place across the northern tier of states from the Plains into New England (see Appendix Figure 1). The desert southwest across into Texas and up into Colorado will likely stay on the dry side during the month while the Ohio River valley and portions of northeast are forecast to be wetter than average.

90 Day (valid April-May-June): The general forecast for the spring looks very similar to last year at this time. The bulk of the country is forecast to experience a warmer than average April through June (see Appendix Figure 1). The exception is the PNW across into the northern Plains where average to cooler than average conditions are forecasted. The precipitation forecast over the next 90 days hints at a dry down to below average conditions in the western US across through Texas. Portions of the Great Lakes and the northeast are forecast to have a wetter than normal spring while Washington, the northern Rockies, across to the southeastern US has an equal chance of being slightly drier to slightly wetter than average.

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Appendix Figure 1 – Temperature (left panel) and precipitation (right panel) outlooks for the month of April (top panel) and April, May, and June (bottom panel) (Climate Prediction Center, climate.gov).