

Weather and Climate Summary and Forecast

March 2021 Report

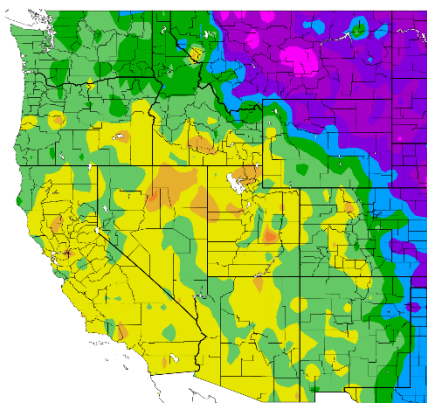
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March 4, 2021

Summary:

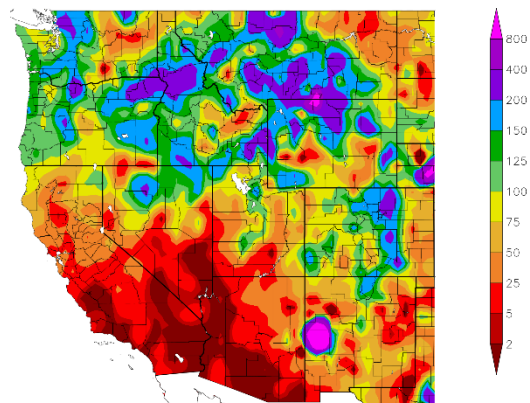
- February was the coolest month of the winter so far in the west yet was still warmer than average¹ into California, the Great Basin, and the southwest. The extreme cold in the mid-section of the county made February one of the coldest months in years in many areas.
- February was wetter than average north, while continued drier than average south.
- Drought concerns continue over the west with over 65% of the region in severe to exceptional drought. Winter precipitation has provided enough to lower concerns in some areas of the PNW, but longer-term concerns continue for inland portions of the PNW, California, and the desert southwest.
- A mild start to March will give way to what looks like a cool month for most of the west. Some precipitation in play for everyone, including California, although amounts are not expected to be much more than close to average for the month. The big flip from the past couple of months, the east is forecast to be warm while the west is cool.
- We continue to see influences from the La Niña conditions in the Tropical Pacific, but also the relatively warm North Pacific. Even with the La Niña expected to dissipate in late spring, the forecast continues to tilt the odds of the PNW and northern states to be near average to slightly cool and wet, and California and the central to southern states are forecast to be relatively warm and dry.

February played out to the forecast with largely cooler than average conditions north and warmer than average south (Figure 1). The PNW was generally 2-3°F below average for the month, while California, the Great Basin, and the southwest was close to 1-4°F warmer than average. The extreme cold from the northern Plains to Texas is partly evident in Figure 1, where temperatures were an amazing 6-15°F below average for the month. The rest of the eastern US was slightly below average, to warmer than average in Maine and Florida (not shown). Precipitation for the month of February was also close to forecast with higher than average amounts across the PNW and northern Rockies and continued dry conditions in California and the southwest (Figure 1). Much of the rest of the country was also moderately dry in February, except for the snow in Texas and the central to southern Plains, and the southeast and mid-Atlantic which was quite wet for the month (not shown).

Departure from Normal Temperature (F)
2/1/2021 – 2/28/2021



Percent of Normal Precipitation (%)
2/1/2021 – 2/28/2021



Generated 3/2/2021 at: HPRCC using provisional data.

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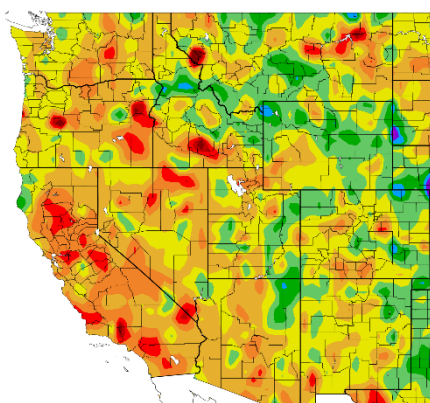
NOAA Regional Climate Centers

Figure 1 – Western US February 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from the High Plains Regional Climate Center, ACIS Climate Maps, Provisional Data).

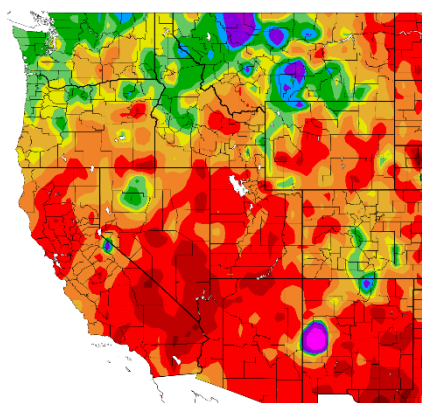
¹ Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise.

For the water year starting October 1st, the majority of the western US has seen a warmer than average winter so far (Figure 2). Temperatures are currently 0.5 to 4.5°F for most locations, with California and scattered locations over the west showing the greatest warm departures. Areas in the Four Corners, Rockies, and Plains are experiencing a moderately cool winter to date, influenced strongly by the very cold month of February (see above). February also flipped Texas and portions of the Mississippi River valley to a colder than average water year so far, while the rest of the eastern portions of the country are running warmer than average (not shown). Precipitation amounts for the water year so far show that the western US has been very dry with most regions seeing between 5-85% of normal (Figure 2). Portions of western Oregon and the Cascades, much of Washington, and portions of Idaho and Montana are seeing a near average to wetter than average winter so far, which matches the forecasts over the last few months. Snowpacks have recovered some across these same regions in the north. However, snowpacks in California and southern regions continue to run below average and the pattern in Figure 2 continues to be reflected in Figure 3 for the current and projected drought concerns in the west (see Drought section below). The dry conditions in the west extend across the Rockies and into the northern Plains south into Texas while the bulk of the eastern third of the country is currently experiencing a near average to wetter than average water year to date (not shown).

Departure from Normal Temperature (F)
10/1/2020 - 3/3/2021



Percent of Normal Precipitation (%)
10/1/2020 - 3/3/2021



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Figure 2 – Western US water year October 2020 through March 3, 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from the High Plains Regional Climate Center, ACIS Climate Maps, Provisional Data).

Drought Watch – Drier than average conditions continue to be favored across the west and, with the lack of any clear wet signal for the western US during March, coupled with dryness expected across parts of the Southwest, drought conditions are likely to persist (Figure 3). In fact, drought may even expand in parts of central Texas and across much

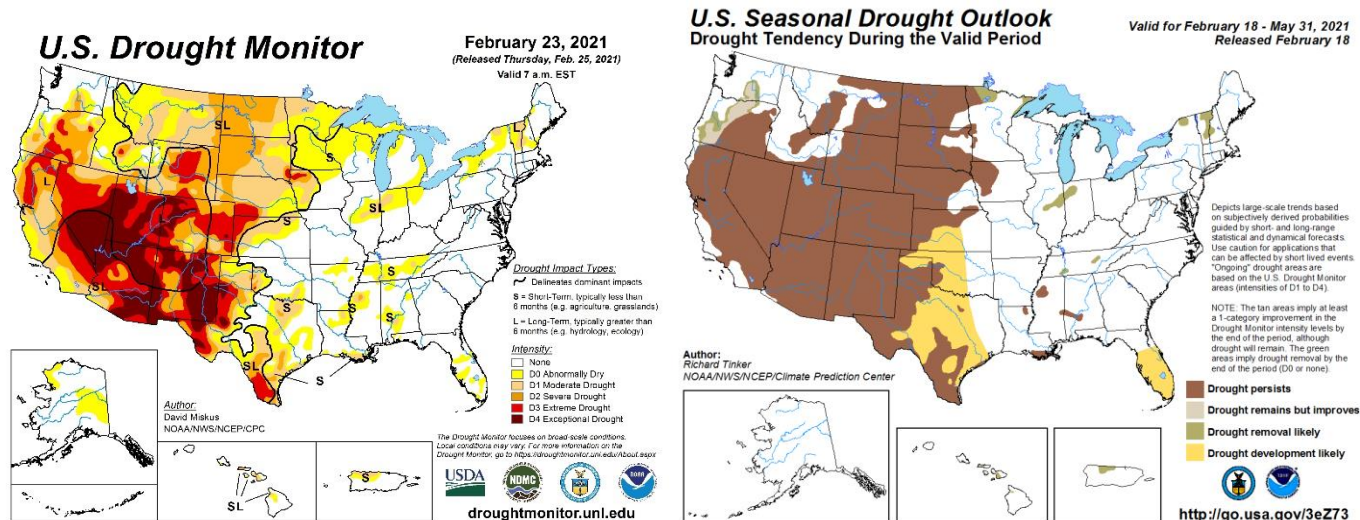


Figure 3 – Current US Drought Monitor and seasonal drought outlook.

of the northern Plains. Early season precipitation in the PNW has lowered the drought severity, as did the late January precipitation event in California. But over 90% of the western US continues in some category of drought with over 65% in severe to exceptional drought conditions. Western Washington, northwestern Oregon, eastern Washington, and isolated areas in Idaho and Wyoming are the only regions of the west that are not currently listed in a drought category. The longer-term outlook for the US through May is as it has been for months now, forecasted dry conditions for much of the west with further development expected in the southern Plains, Texas, and even south Florida. Winter precipitation in the PNW has lowered drought concerns in the PNW, with the dividing line with California and the drier conditions southward continuing (Figure 3, right panel). The Four Corners region continues to be the bullseye for the western drought, with the conditions being the result of a dry winter that comes on top of a weak monsoon season and record-high temperatures during 2020.

ENSO Watch – La Niña conditions are still in play in the Tropical Pacific, but forecasters estimate that neutral conditions are likely to return by late spring (Figure 4). As of mid-February, the Climate Prediction Center (CPC) reported that SSTs in the east-central Pacific remain approximately 1.1°C (2.0°F) below average, with patterns in all key atmospheric variables consistent with La Niña conditions. A large majority of model forecasts point to the Tropics exceeding the threshold of La Niña SST conditions through winter and likely dissipating into spring. The official CPC/IRI outlook and other agency outlooks are consistent with these model forecasts, calling for an 82% chance of La Niña through the MAM three-month period, then dissipating into the AMJ three-month period; as such they are continuing the La Niña advisory. So far, this winter has brought some of the typical La Niña conditions to the west with a wet-north and dry-south pattern (see Figure 2). Nothing has altered my view that we will likely continue to see the forecast pattern in the three-month forecast in Appendix Figure 1 where the PNW has a greater chance of being wetter than average (roughly 50-70%), while California and the southwest have a greater chance to remain dry. Continuing what we have seen so far, and contrary to average La Niña conditions, which are typically much cooler than average over the entire west, the current forecast is calling for warmer than average to average conditions, which I think continues to reflect more influence from the North Pacific (see below).

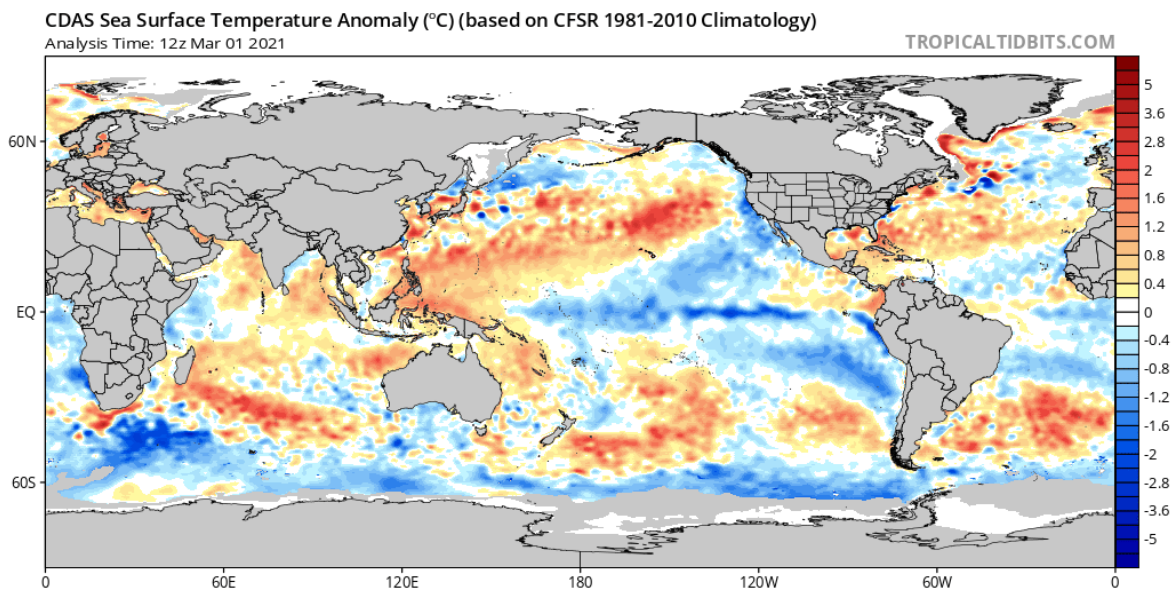


Figure 4 – Global sea surface temperatures (°C) for the period ending March 1, 2021 (image from TropicalTidbits.com).

North Pacific Watch – While the vast area of warmer than average North Pacific SSTs continues in place, some moderate cooling within the coastal zones from the Gulf of Alaska southward along the coast to Baja California has occurred in the last 30 days. This cooling is likely due to the wind field helping to drive coastal upwelling. The large area of anomalously warm water in the North Pacific is running 2-4°F above average (Figure 4). The North Pacific continues to remain closer to neutral or the warm phase of the Pacific Decadal Oscillation, which puts it out of phase with the Tropics (see above). As has been the case most of the winter so far, the effect here is that the current warmth in the North Pacific will likely continue to mute the La Niña effect somewhat, making the magnitude of the impact lower. The result is that the PNW will likely be in for near average to slightly warmer second half of winter

than would be expected with a La Niña but is likely to stay wet over the remainder of the winter, while California would likely be slightly warm and moderately dry.

Forecast Periods:

Next 5 Days: March has started off quite nice, the proverbial coming in like a lamb. Mild temperatures and dry conditions over most of the west will give way to a slight cool down at the end of the week and chances for rain from central California to the Canadian border.

6-10 Day (valid March 8-12): The western US has a high probability of being cooler than average during the second week of the month. Unsettled conditions will bring clouds and rain potential even down into central and southern California. Overall amounts of precipitation do not appear to be much, but something is better than nothing. While the west will likely be cool, the eastern US from the Rockies eastward has a high probability of being warmer than average, with the greatest likelihood being in the Great Lakes. Precipitation during the period is forecast to be above average in much of the country, with the southeast and eastern seaboard with a high probability of being dry during this forecast period.

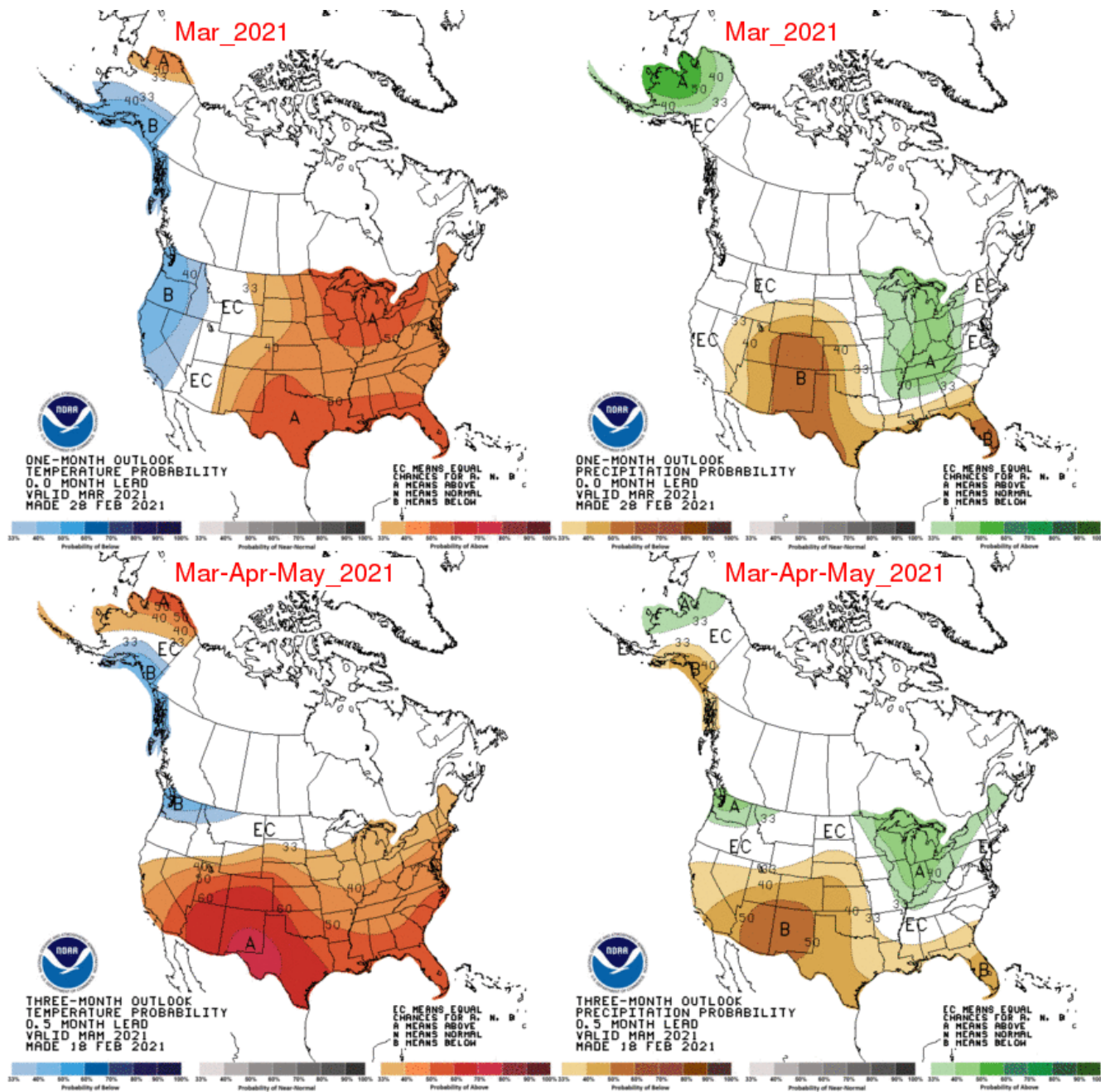
8-14 Day (valid March 10-16): The broad temperature pattern forecast from the previous period continues through to mid-month with the western US likely to stay cooler than average while the east has a high probability of being warmer than average. Precipitation during this period will likely continue to be in play for California, across the Rockies, and into the Great Lakes where the highest probability is indicated. Portions of the desert southwest, Texas, and Florida have a moderate percent chance of being drier than average during this period.

30 Day (valid March 1-31): On balance, the outlook for March is tilting the odds to a cooler than average western US and a warmer than average eastern US. This is a big change from previous months where the west was warm, and the east was cold (see Appendix Figure 1). The month of March appears to be bringing continued drier than average conditions in the southwest and across the Gulf Coast to Florida. In contrast, an area of the northern United States from the Great Lakes through the Tennessee Valley is slightly favored to see an above-average amount of precipitation during the next month. The west coast and the northern Rockies have an equal chance in March, likely being closer to average in terms of precipitation.

90 Day (valid March-April-May): As was last month, the general pattern from previous three-month forecasts continues the expected temperature and precipitation outlooks given the current La Niña (see Appendix Figure 1). As such the northern PNW is forecast to see a cooler than average to average period through May, with Oregon across to the northern Plains likely to be near normal, while the central to southern portion of the country are forecast to see above average temperatures. The precipitation pattern forecast also continues the classic La Niña influence with the northern tier of states, Great Lakes, and Ohio River valley forecast for a wetter than average three-month period while the southern tier of states and central Plains forecast to see a drier than average period.

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