March 4, 2021 Water Supply Forecast Discussion

The Colorado Basin River Forecast Center (CBRFC) geographic forecast area includes the Upper Colorado River Basin, Lower Colorado River Basin, and Eastern Great Basin.

Water Supply Forecast Summary

Early March water supply volume forecasts are below to much below normal throughout the Colorado River Basin and Great Basin. The water supply outlook is most favorable along the Continental Divide with conditions generally declining from north to south across the region. Upper Colorado River Basin water supply forecasts generally range between 35-80% of the 1981-2010 historical April-July average. Great Basin water supply forecasts are 10-80% of average. Lower Colorado River Basin March-May water supply runoff volume forecasts are 0-35% of the historical median. Water supply forecast ranges (percent of normal) by basin:

Basin	Water Supply Forecast Range
Upper Green	55-80%
Duchesne	30-60%
Yampa/White	55-75%
Upper Colorado Mainstem	40-75%
Gunnison	40-70%
Dolores	40-50%
San Juan	35-75%
Bear	35-85%
Weber	30-55%
Six Creeks	45-60%
Provo/Utah Lake	40-65%
Virgin	35-75%
Sevier	10-85%
Little Colorado	0-15%
Upper Gila	10-30%
Salt	10-20%
Verde	35%

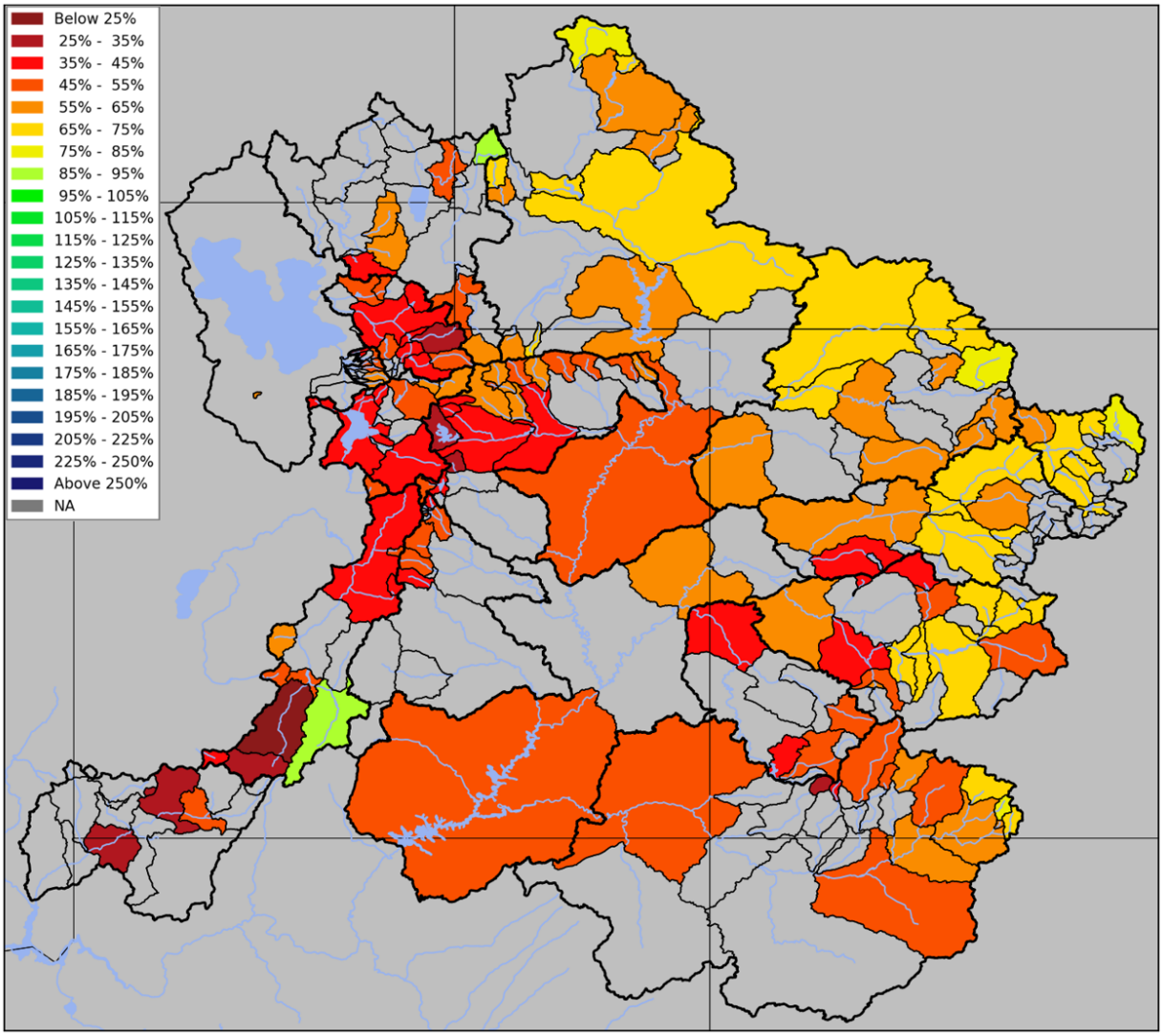
February precipitation generally exhibited wet conditions across the north and dry conditions across the south. The weather pattern in February featured multiple storm systems moving across the region in general west to northwesterly flow with efficient orographic precipitation across the mountains. These storms largely missed the Lower Colorado River Basin, with much lighter precipitation amounts across Arizona.

Snow conditions across the northern portions of the basin saw welcome improvements while conditions across the southern half of the basin remained the same or deteriorated. Unfortunately, even with improvements across many of the northern basins, early March snow water equivalent (SWE) conditions still remain mostly below to much below normal (median) throughout the CBRFC forecast area.

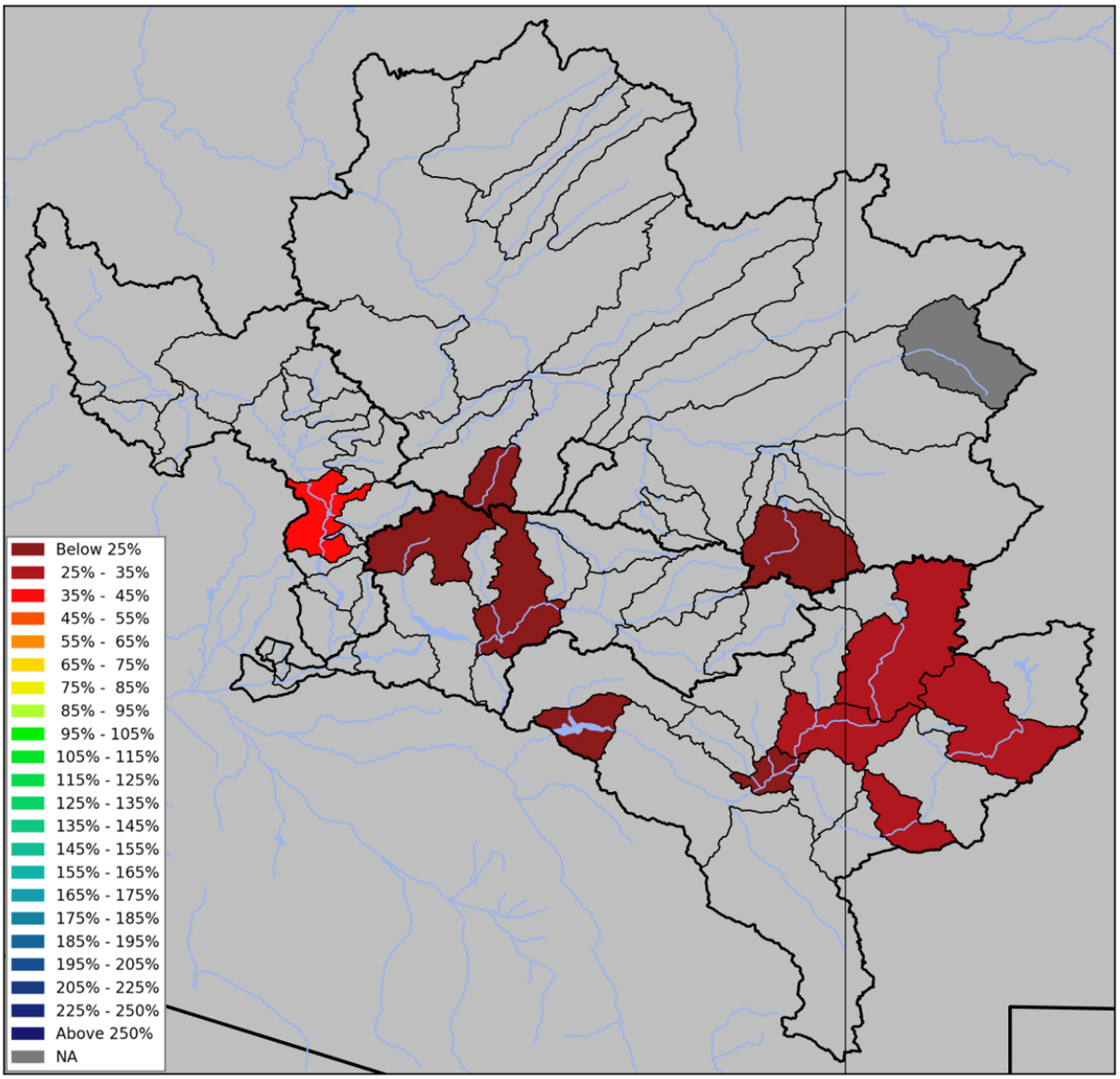
CBRFC hydrologic model soil moisture is generally in the bottom five across the Upper Colorado over the 1981-2020 40-year period. Given the dry conditions, an above normal snowpack or a wet spring will be needed to see near average water supply volumes. March weather is pivotal and can significantly impact spring runoff timing, magnitude, and efficiency.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle 480 KAF (66% of average), Flaming Gorge 555 KAF (57%), Green Mountain 180 KAF (65%), Blue Mesa 460 KAF (68%), McPhee 132 KAF (45%), and Navajo 415 KAF (56%). The Lake Powell inflow forecast is 3.4 MAF (47% of average), a 1.5% increase from February.

Seasonal Water Supply Forecasts



Upper Colorado, Great, Virgin River Basins: Mar 2021 April-July forecast volumes as a percent of 1981-2010 average (50% exceedance probability forecast).



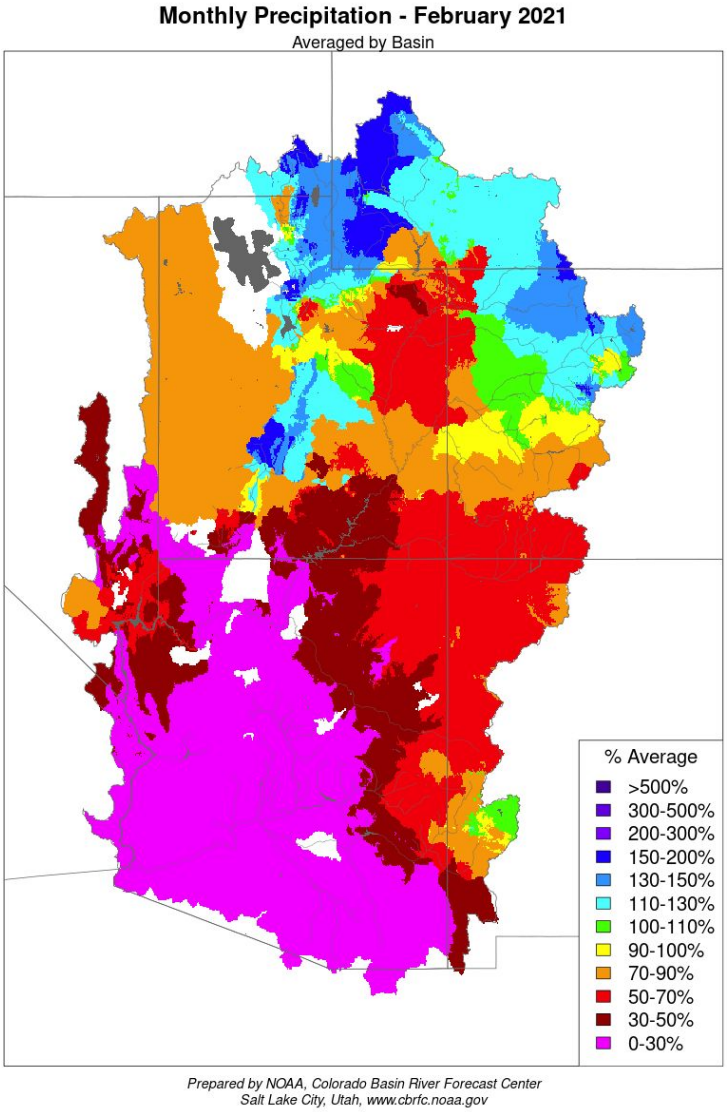
Lower Colorado Basin (AZ/NM): March 2021 March-May forecast volumes as a percent of 1981-2010 median. (50% exceedance probability forecast).

For specific site water supply forecasts click here

Water Supply Discussion

February Precipitation

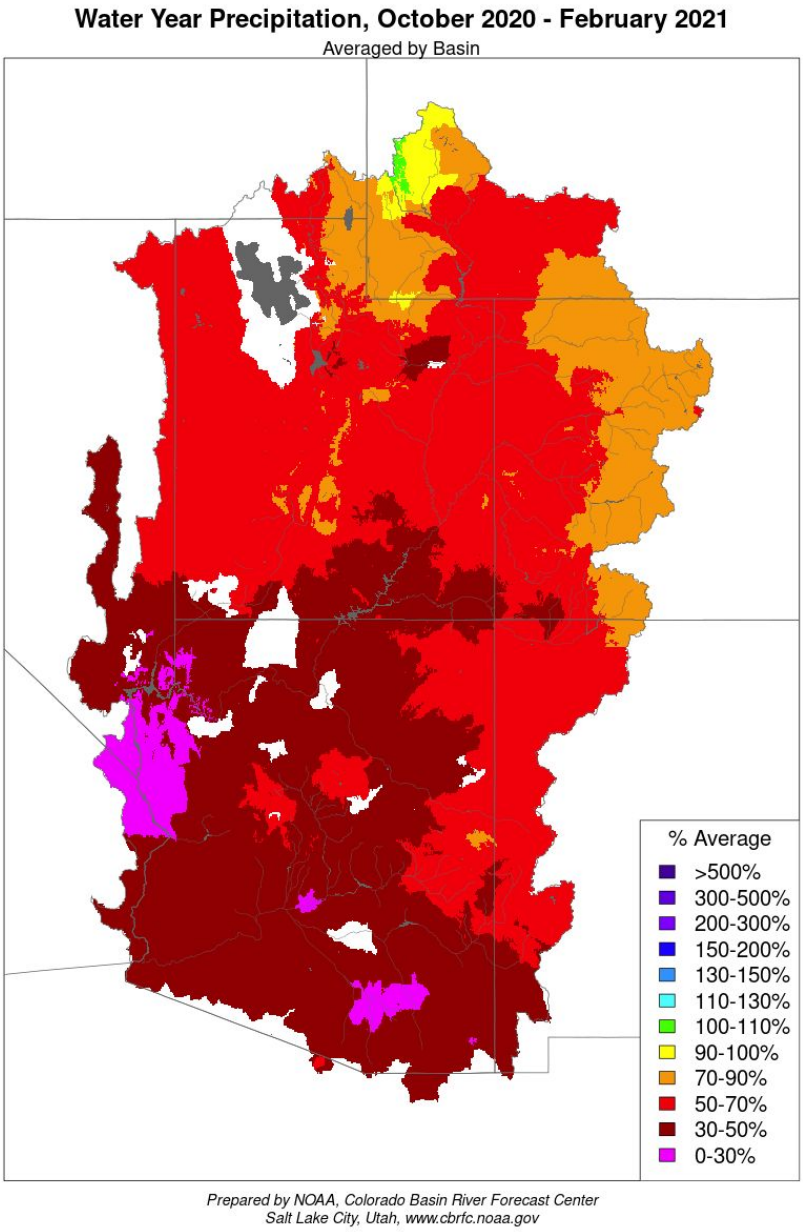
The precipitation for February generally exhibited wet (dry) conditions across the north (south), which was opposite the pattern from January. The above normal precipitation that occurred over the northern half of the Upper Colorado River Basin including Utah, Colorado, and Wyoming was very welcome with large precipitation deficits stretching back to last spring. Many of the SNOTELs in these areas were above the 75th percentile for monthly precipitation. The weather pattern in February featured multiple storm systems moving across the region in general west to northwesterly flow with efficient orographic precipitation across the mountains. These storms largely missed the Lower Colorado River Basin, with much lighter precipitation amounts across Arizona. The Virgin River Basin in southern Utah and San Juan and Dolores River Basins in southwest Colorado also saw below normal precipitation.



February 2021 percent of normal precipitation.
(Averaged by basins defined in the CBRFC hydrologic model)

Water Year Precipitation

With northern areas seeing above normal precipitation in February, water year precipitation deficits decreased some. Portions of the Upper Green are actually near normal for water year precipitation, however the remainder of the region remains below to well below normal. The conditions are particularly dire in the southern half of Utah/Colorado and the Lower Basin where many SNOTELs are below the 25th percentile. Although the wet February across the north was a welcome change, we still have not seen a prolonged period of large scale troughing and widespread very wet conditions (similar to Feb-Mar 2019) that could significantly alter the area-wide dry water supply outlook.



Water Year 2021 percent of normal precipitation.
(Averaged by basins defined in the CBRFC hydrologic model)

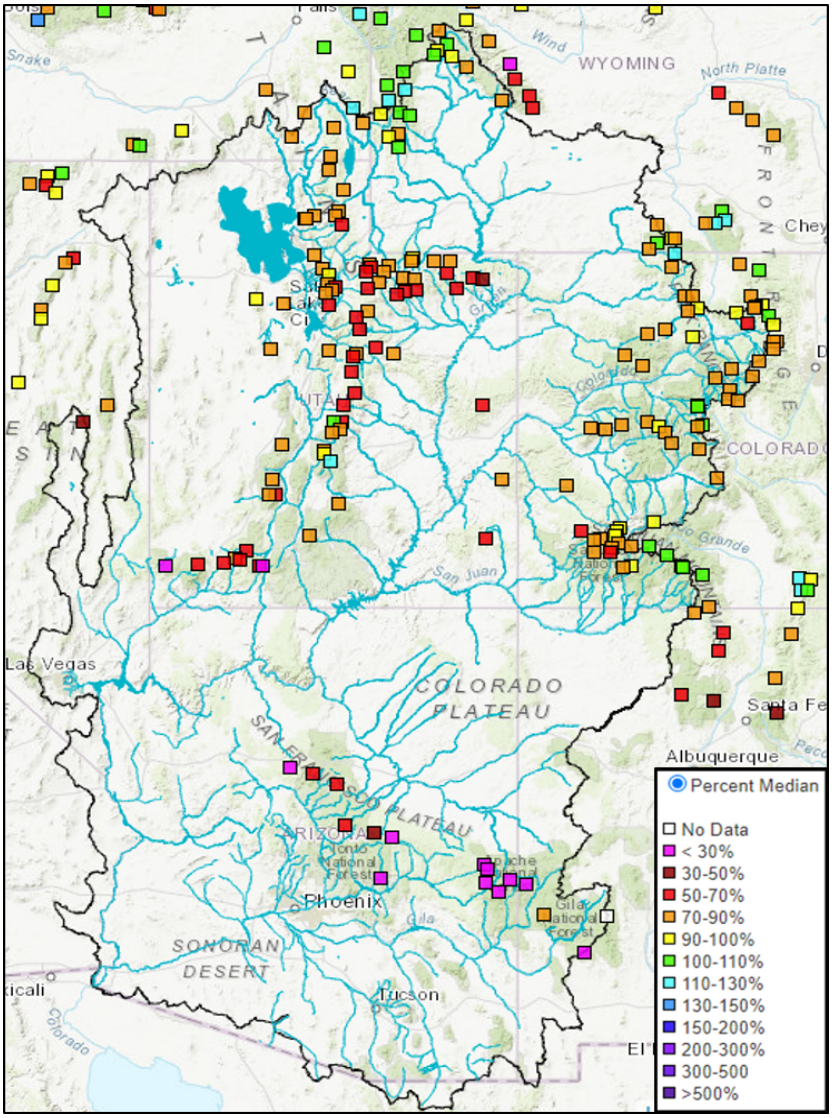
Snowpack

Similar to the February pattern of precipitation, snow conditions across the northern portions of the basin saw welcome improvements while conditions across the southern half of the basin remained the same or deteriorated. Unfortunately even with improvements across many of the northern basins, early March snow water equivalent (SWE) conditions still remain mostly below to much below normal (median) throughout the CBRFC forecast area with a few exceptions. SWE conditions are near normal in the Upper Green (100%) and Yampa (90%) and below normal elsewhere across the Upper Colorado River Basin. Conditions typically range from 75-85% of normal in Upper Colorado mainstem, Gunnison, Dolores, and San Juan River basins and range between 60-70% of normal in the Virgin and Duchesne basins. While the majority of SNOTEL sites across the region are reporting below normal SWE conditions, a few SNOTEL stations are reporting near to above normal snow conditions, most notably in parts of the Upper Green headwaters in Wyoming and the headwaters of the San Juan River Basin in southwest Colorado.

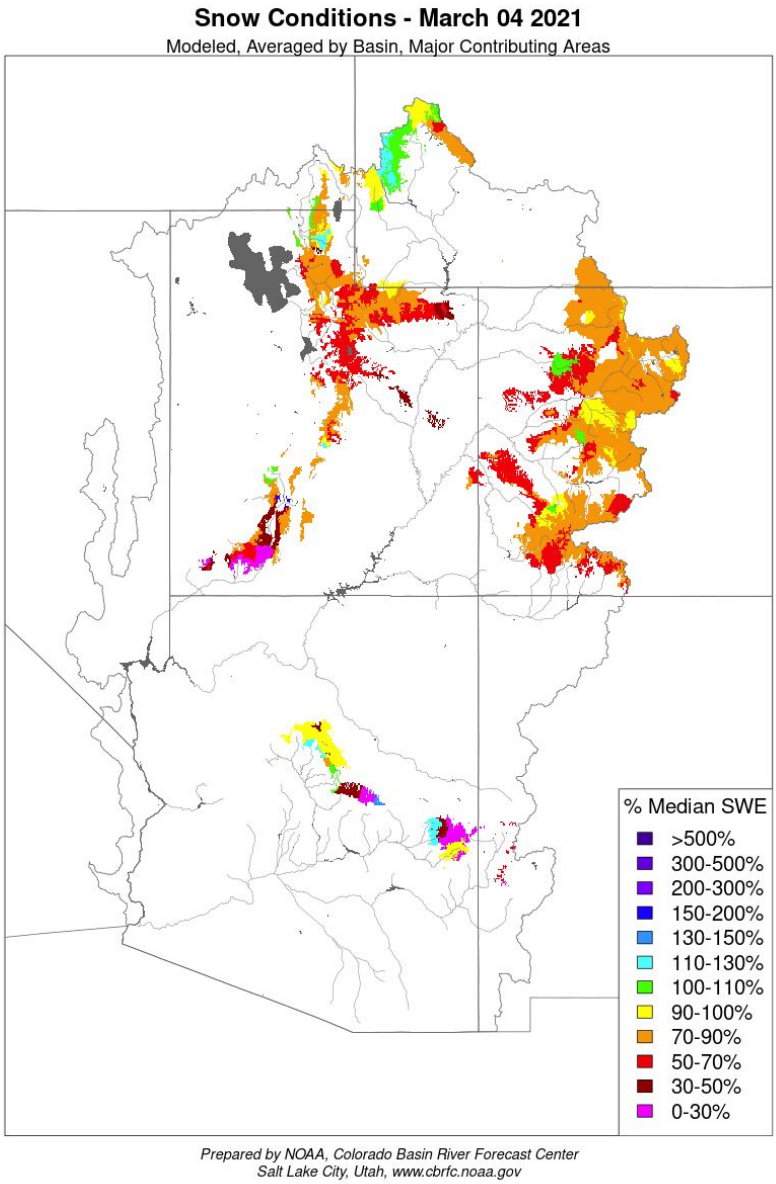
Great Basin snow conditions did see a boost in February particularly in the Bear, Weber, and Six Creeks basins. However conditions remain below normal and generally range between 65-85% of the 1981-2010 historical median. Conditions in the Bear and Six Creeks basins are near 85% of normal while conditions in the Sevier and Provo basins are near 65% of normal. SWE at many SNOTEL stations across the Great Basin remain in the bottom (driest) ten on record, with many stations having a 30 to 40 year period of record.

SWE conditions as a percent of the historical median have declined across the Lower Colorado River Basin since early February due to snowmelt and the lack of any significant snow accumulation during the month of February. SWE conditions remain well below normal across the entire Lower Colorado River basin. It should be noted that snowpack conditions in the Lower Colorado River Basin are more variable and tend to fluctuate more frequently over time.

The images below show the observed snow conditions and CBRFC hydrologic model snow conditions. Model snow conditions closely correlate to SNOTEL conditions throughout the Colorado River and Great Basins.



March 4, 2021 observed SNOTEL SWE conditions (percent of historical median).



March 4, 2021 CBRFC hydrologic model snow conditions (percent of median).

For updated SNOTEL information refer to click here

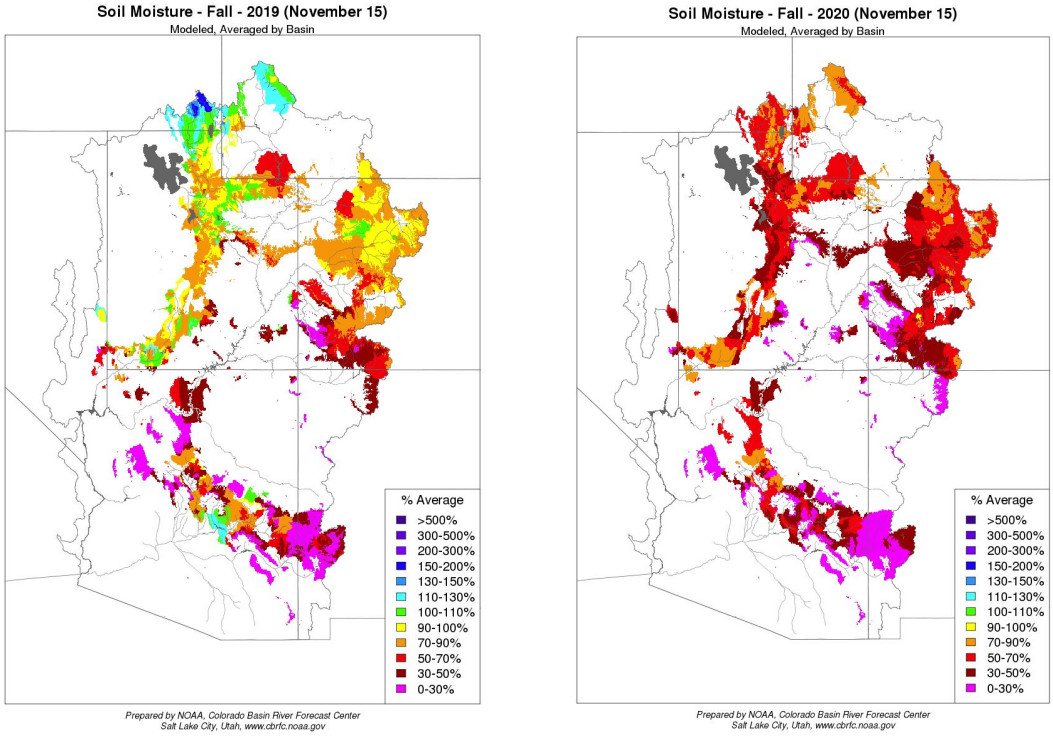
For CBRFC hydrologic model snow click here

Soil Moisture

CBRFC hydrologic model soil moisture states are adjusted in the fall after the irrigation season and prior to the winter snowpack accumulation to accurately reflect observed baseflow conditions. CBRFC model fall soil moisture conditions impact early season water supply forecasts and potentially the efficiency of spring runoff. Above average fall soil moisture conditions have a positive impact on early season water supply forecasts while below average conditions have a negative impact. The impacts are most pronounced when soil moisture conditions and snowpack conditions are both much above or much below average.

Modeled soil moisture conditions as of November 15th were below average across the entire Upper Colorado River Basin and Great Basin. Hydrologic model soil moisture conditions entering the winter are worse compared to a year ago due to record low April-October precipitation across the region and a below average runoff last spring. Modeled soil moisture is generally in the bottom five of the 1981-2020 40-year period across the Upper Colorado. San Juan and Dolores basins soil moisture conditions fall in the bottom three with some areas being record dry. Two consecutive years of poor monsoon seasons have exacerbated the dry conditions in southwest Colorado.

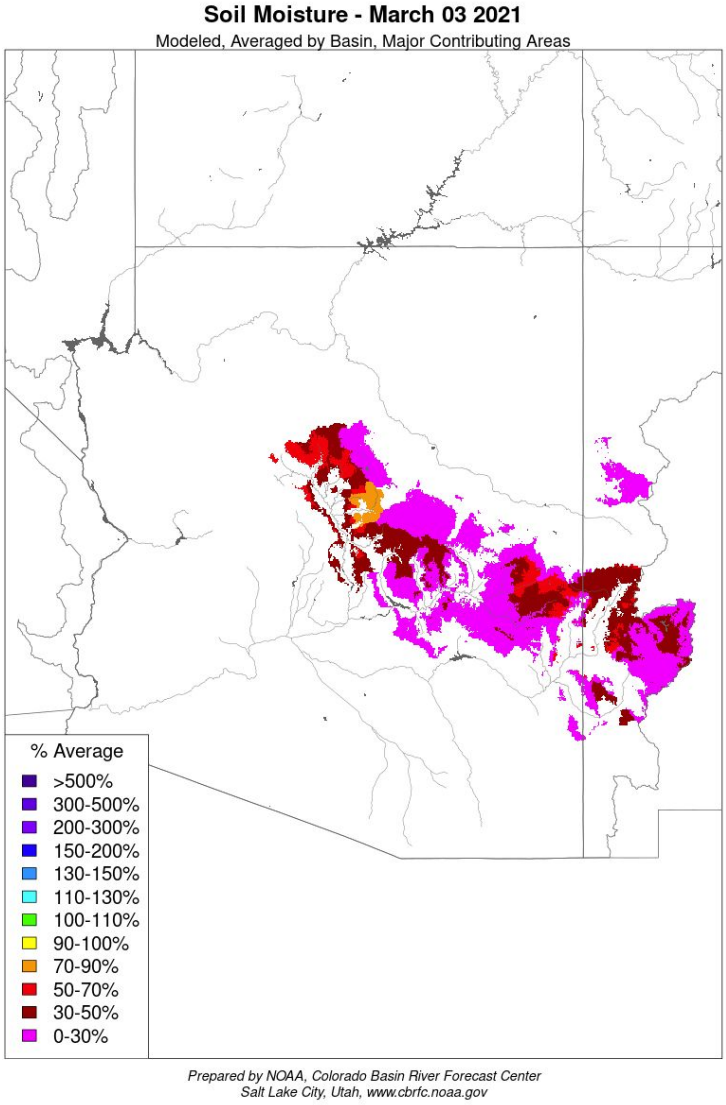
It is not often that such widespread poor soil moisture conditions exist across the region. Similar, but not as poor conditions, existed in the fall of 2002, 2012, and 2018. To produce average runoff, an above normal snowpack or a wet spring will likely be needed to overcome these large soil moisture deficits.



Comparison of November 2019 (left) and November 2020 (right) CBRFC hydrologic model soil moisture conditions entering the winter season.

Soil moisture conditions tend to fluctuate more in the Lower Colorado River Basin of Arizona and New Mexico in the winter due to the frequency of rain events and possibility of melting snow. Soil conditions in the fall are less informative than they are in the northern basins that remain under snowpack throughout the winter season.

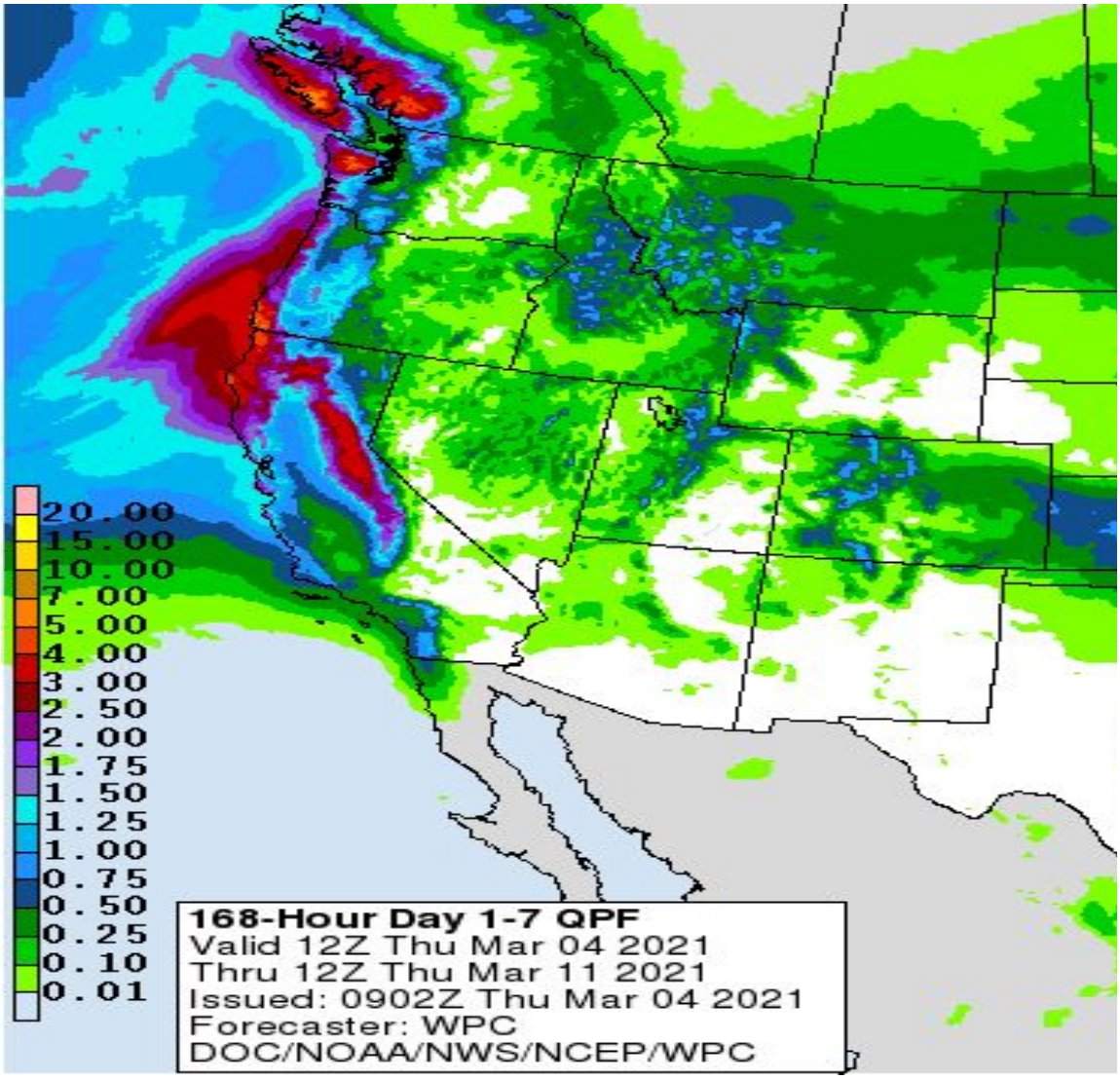
As a result of another dry month, winter soil moisture conditions have deteriorated across the majority of the Lower Colorado River Basin since early February. Exceptions include portions of the Verde and Upper Gila River basins where conditions are similar or slightly better than early February. Snowmelt over both basins and average February precipitation in the Upper Gila resulted in minor improvements to conditions. However, soil moisture conditions in the Lower Colorado River Basin still remain below to much below average, as shown in the image below. This generally means that a portion of any runoff that occurs from rainfall or snowmelt will be absorbed into the soil before contributing to streamflow.



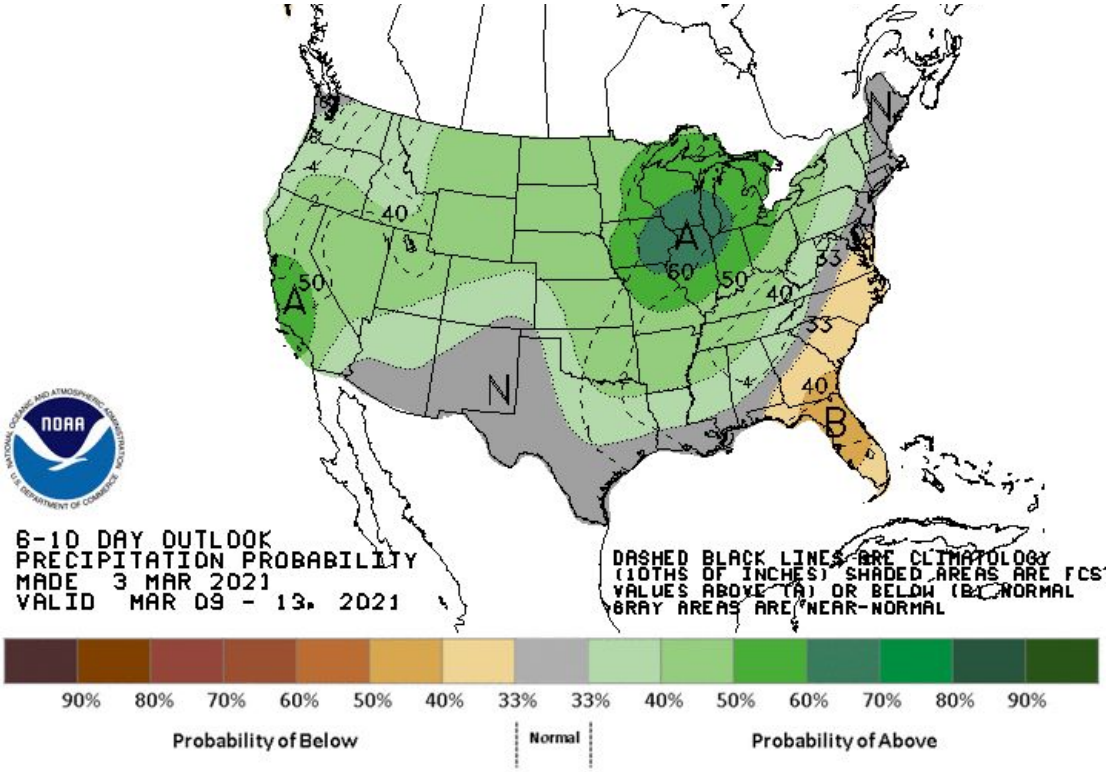
Lower Colorado River Basin (AZ/NM) model soil moisture as of March 3, 2021.

Upcoming Weather

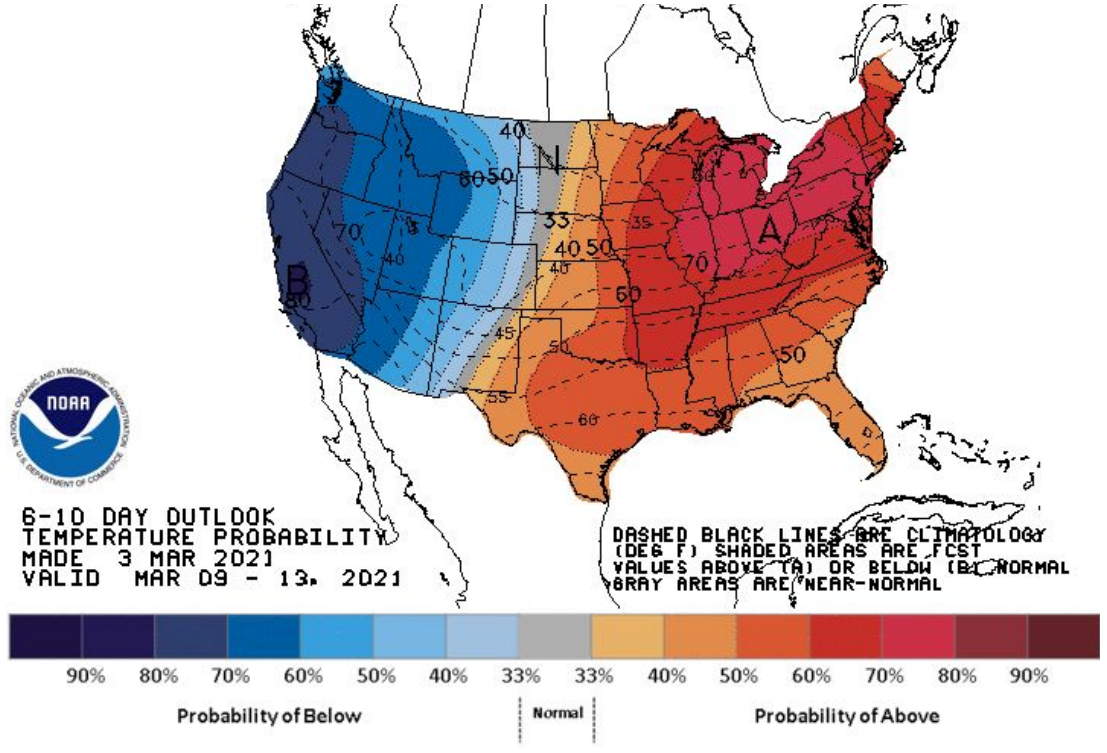
The weather pattern over the next week to 10 days will be a roller coaster that is typical of spring, with mostly above normal temperatures and light precipitation amounts through early next week, and then a transition to a large scale trough and cooler/wetter conditions by the middle to later part of next week. A weak cutoff low will move across Arizona and southern Utah/Colorado through today (March 4) with forecasted precipitation amounts of 0.5-1.0 inches over the Colorado mountains. The ridge will then build across the Intermountain West tomorrow and largely remain in place through next Monday (March 8), with mostly dry conditions and temperatures 5-10 degrees above normal. A dramatic change to troughing is forecasted by March 9-10, with temperatures dropping to below normal and widespread precipitation across the Upper Basin and Great Basin. As this precipitation event is still around a week away, forecasted precipitation amounts are more uncertain, however the Climate Prediction Center does indicate this pattern change in their outlook for March 9-13.



NWS Weather Prediction Center precipitation forecast for March 4-11, 2021.



NWS Climate Prediction Center precipitation probability forecast for Mar 9-13, 2021.



NWS Climate Prediction Center temperature probability forecast for Mar 9-13, 2021.

Basin Conditions and Summary Graphics

- Green River Basin
- Upper Colorado River Basin
- San Juan River Basin
- Great Salt Lake Basin
- Sevier River Basin
- Virgin River Basin

End Of Month Reservoir Content Tables

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- Upper Colorado River Basin
- San Juan River Basin
- Great Salt Lake Basin
- Sevier Basin