February 1, 2019 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:

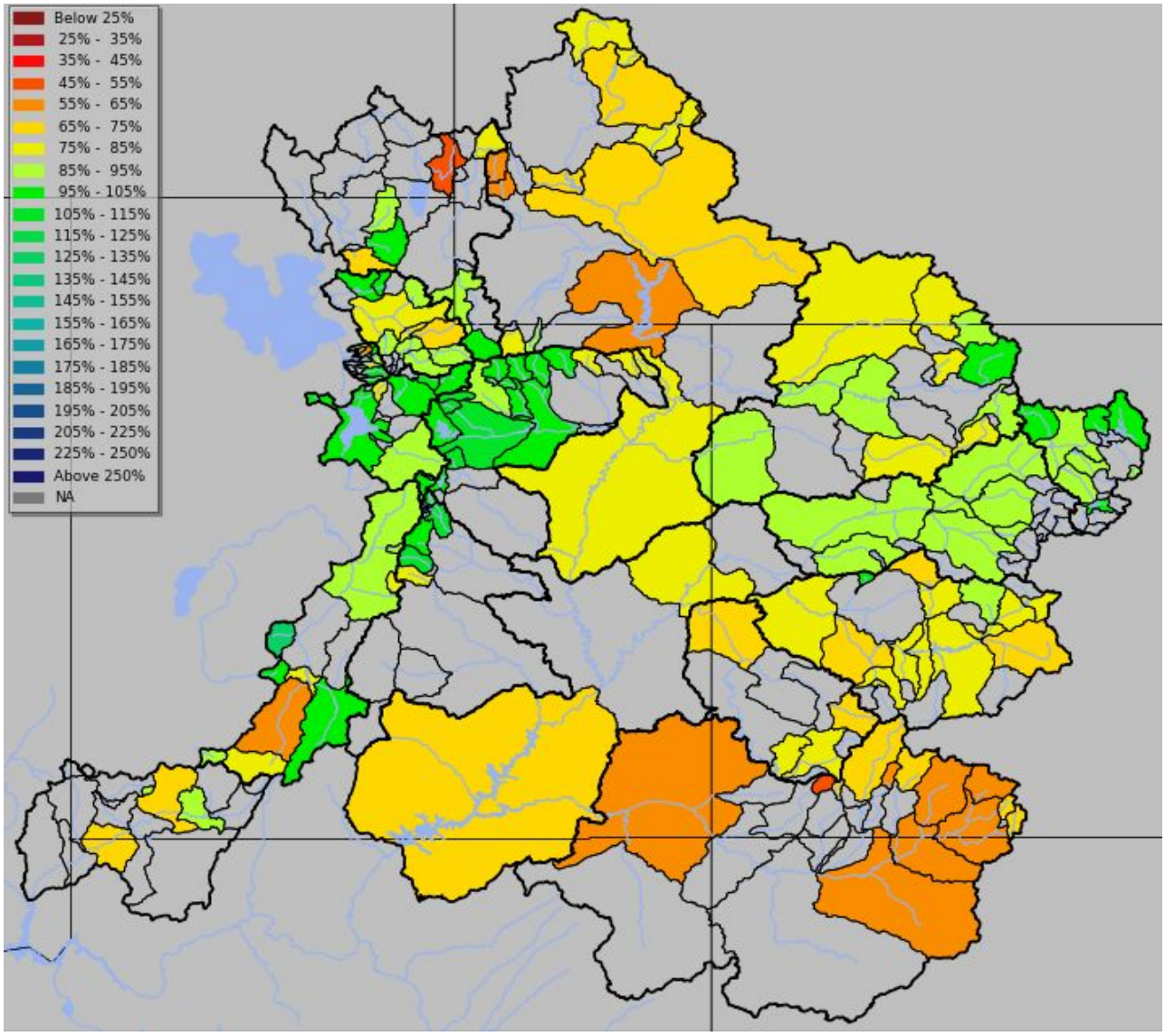
April-July water supply volume forecasts increased in much of the Upper Colorado River Basin and Great Basin since early January. In some areas, such as the Duchesne, Provo, and Six Creeks River Basins increases were significant and exceeded 30 percent of average (1981-2010). The improved water supply outlook was due to above average precipitation in January, wet conditions in early February, and anticipated active weather through at least mid February.

There has also been a general improvement in the snowpack over the Upper Colorado River and Great Basins although parts of the Green River Basin in Wyoming and San Juan Basin in southwest Colorado still remain below normal for this time of year. In these areas forecasts either remained the same or increased only slightly. Dry soil conditions and very low base flows entering the winter season continue to impact forecasts as well. Near to above average April-July runoff volumes are forecast for parts of the Duchesne, San Rafael, and Provo River Basins. Near average runoff volumes are anticipated in the Colorado River headwaters. Elsewhere forecasts vary but are generally below average. Lowest runoff volume forecasts with respect to average continue to be in the Green River Basin of Wyoming and San Juan River Basin.

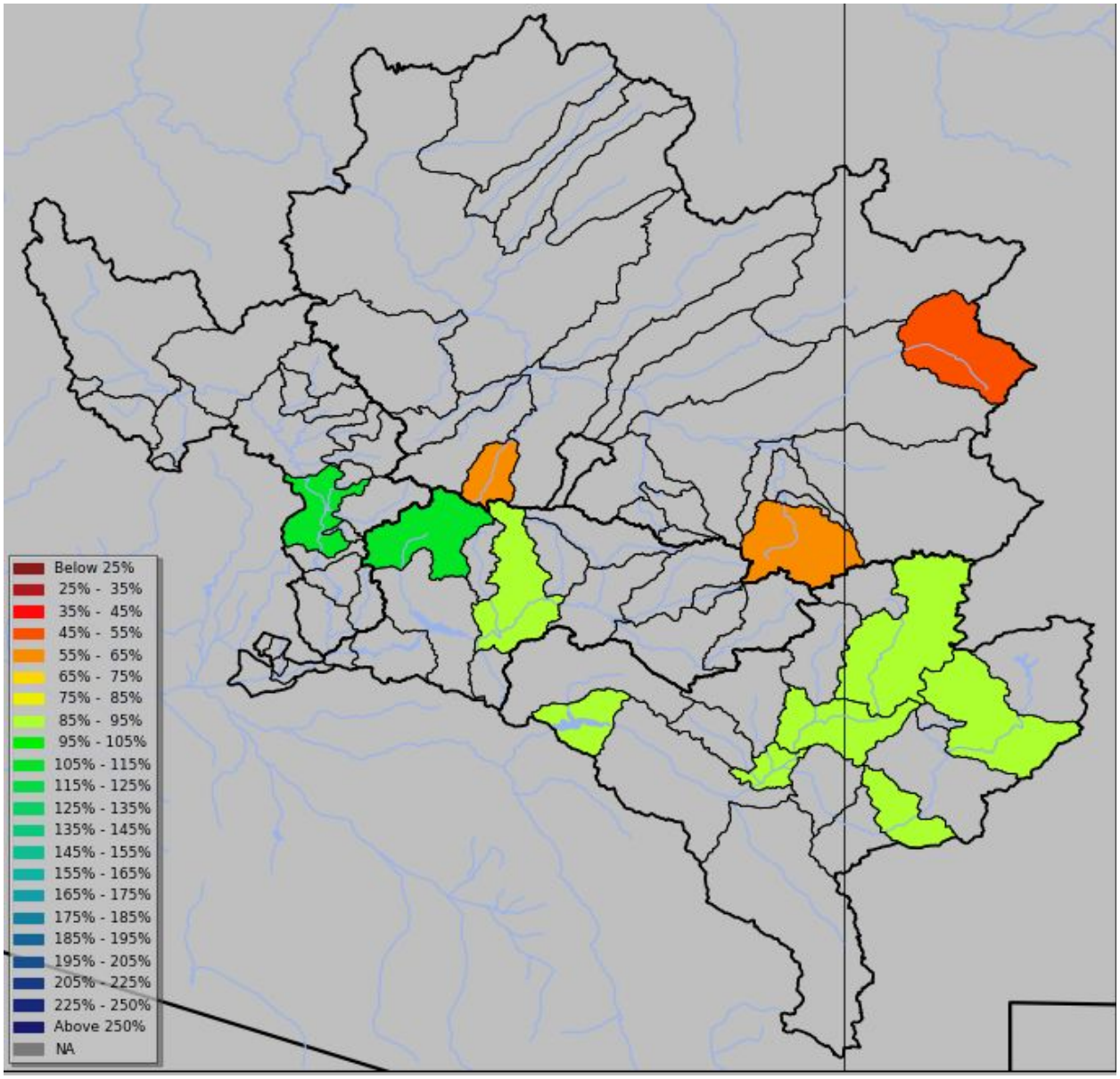
April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 500 KAF (69% average), Flaming Gorge 630 KAF (64% of average), Blue Mesa Reservoir 550 KAF (81% of average), McPhee Reservoir 230 KAF (78% of average), and Navajo Reservoir 430 KAF (59% of average). The Lake Powell inflow forecast is 5.30 MAF (74% of average).

In the Lower Colorado River Basin of Arizona and New Mexico January was very dry. Early February has been wet in parts of the Salt, Verde, and Gila River Basins and less so in the Little Colorado River Basin. January-May runoff forecasts increased slightly in Verde, Salt, and Gila River Basin headwaters and decreased slightly elsewhere. January-May volume forecasts are near to above the 1981-2010 historical median in the Verde and Salt River Basins and below median elsewhere. The Virgin River Basin in southwest Utah received above average precipitation in January and has been very wet in early February with a notable improvement in snowpack conditions. April-July runoff forecasts improved in this area 20-30 percent of the 1981-2010 average.

Seasonal Water Supply Forecasts:



Upper Colorado, Great, Virgin River Basins: 2019 April-July forecast volumes as a percent of 1981-2010 average (50% exceedance probability forecast)



Lower Colorado Basin (AZ/NM): 2019 January-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

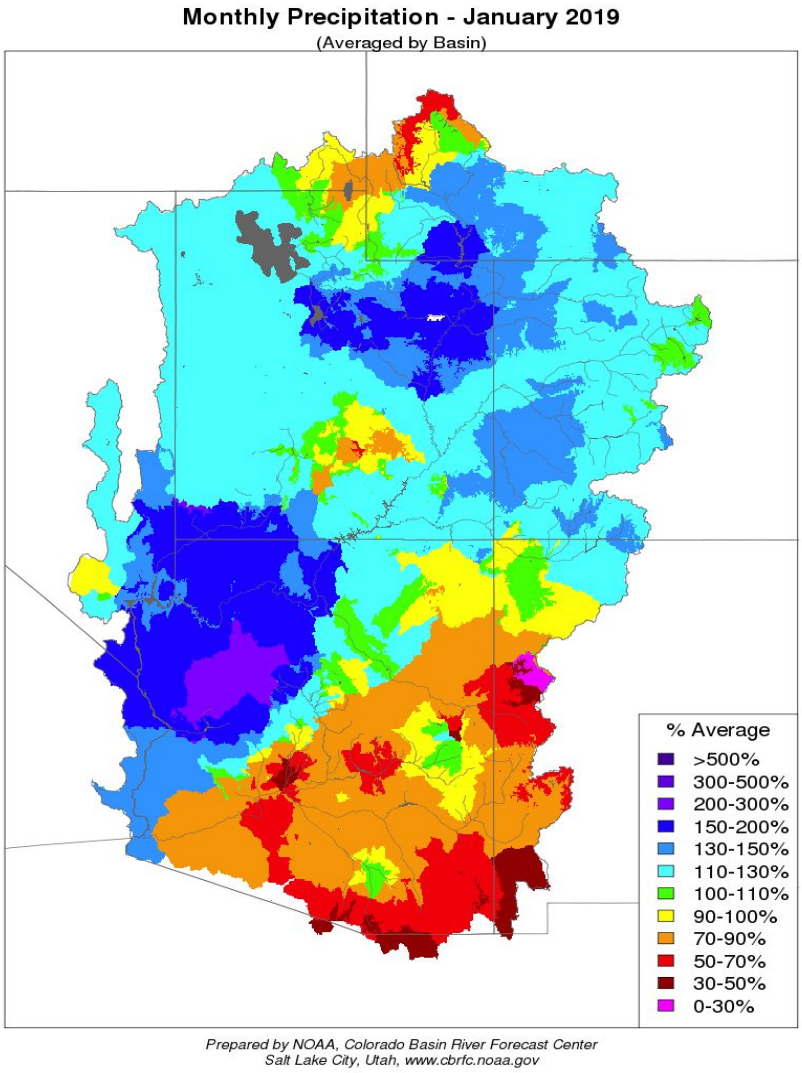
For specific site water supply forecasts, refer to: https://www.cbrfc.noaa.gov/rmap/wsup/wsuplist.php

Water Supply Discussion

January Precipitation:

A rather active storm pattern existed through much of January across the Western U.S. with anomalous troughing off the West Coast. The wettest period was around mid-month (from Jan 15-21) where two potent storms resulted in widespread heavy snow across much of the Utah/Colorado mountains. For the month, these storms produced at or

above normal precipitation over much of the Upper Colorado and Great Basin region. The wettest area was across northern Utah where 130-180% of average precipitation was observed over the Provo and Duchesne River basins. The Upper Colorado and San Juan basins generally saw 110-140% of average precipitation. The story was more mixed across the Lower Colorado basin. The month was quite wet over southwest Utah (Virgin River) and over much of northwest Arizona (Bill Williams River), in contrast to the much drier southeastern half of Arizona (Salt/Gila River).



January 2019 Percent of Normal Precipitation
(Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

The SNOTEL map image below indicates above normal (median) snow conditions across much of the Great Basin, Duchesne River Basin, Virgin River Basin, and Price / San Rafael River Basins in Utah. Near to above normal snowpack is also scattered throughout the Colorado River headwaters and parts of the Gunnison River Basin. Although there has been some improvement since early January, snow conditions are still below normal in much of the San Juan River Basin as well as the Green River Basin of Wyoming and northern Bear River Basin in southern Idaho.

Warm storm systems in early February resulted in snow melt at most locations below 9000 feet in elevation in the Lower Colorado River Basin. Snow conditions are now much below normal for early February as a result of precipitation falling as rain even at higher elevations.

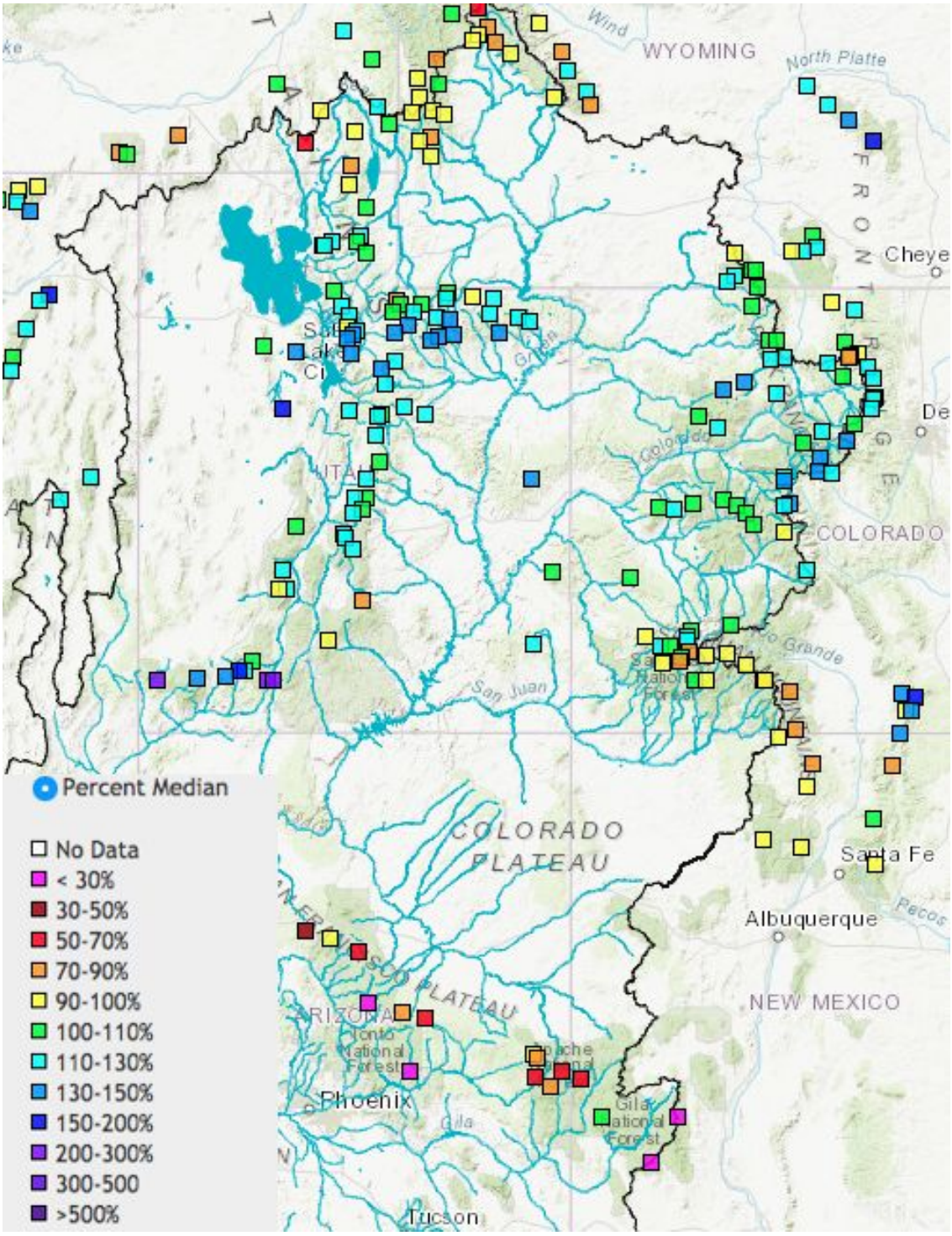
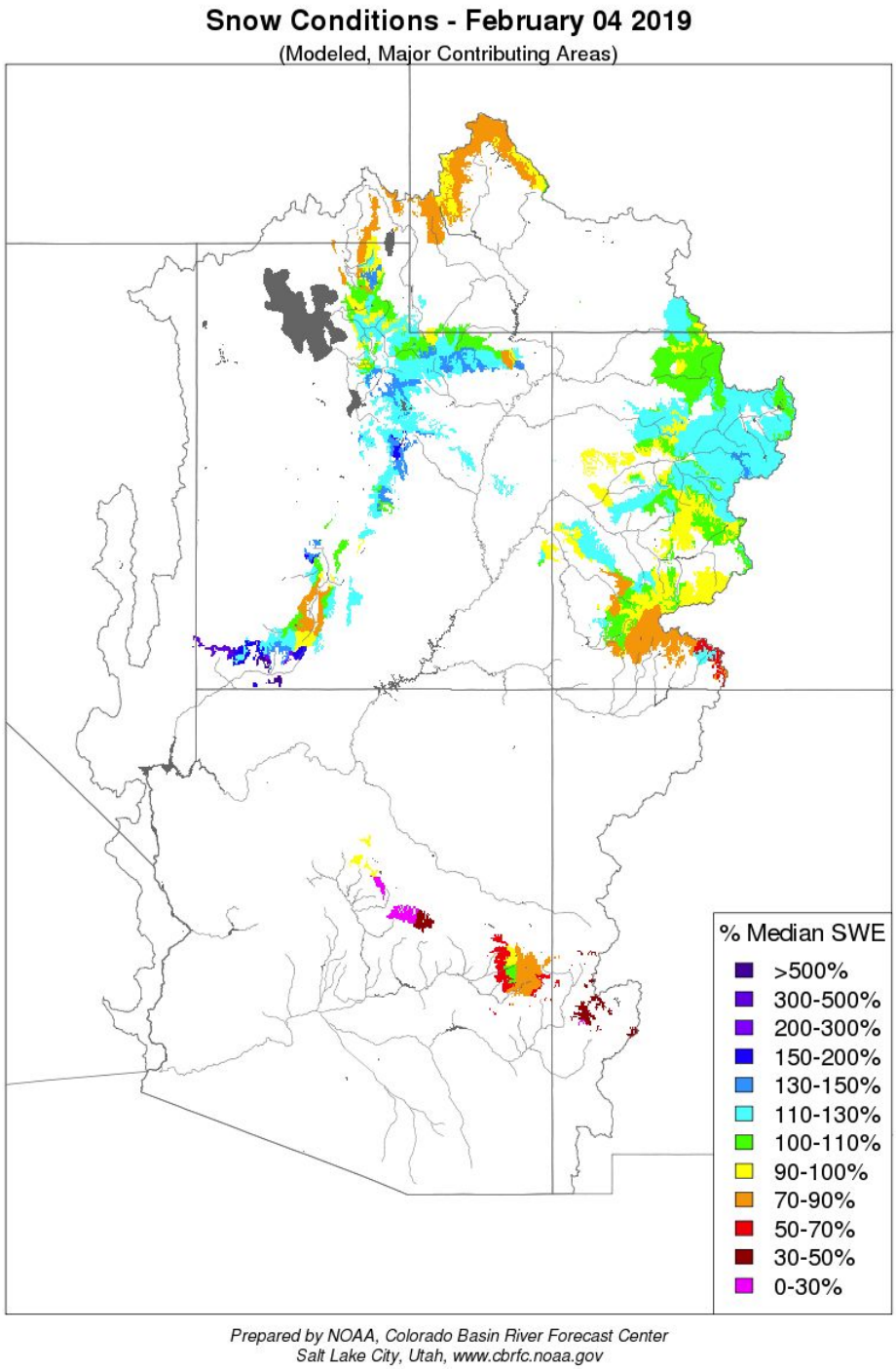


Image: Percent Median Snow Conditions as of February 5th 2019 (SNOTEL)

The image below is the representation of snow in the CBRFC hydrologic model.

Throughout the Upper Colorado River Basin and Great Basin model snow conditions correlate very closely to what SNOTEL sites indicate.



Modeled Snow: Snow representation from the CBRFC hydrologic model February 4th, 2019.

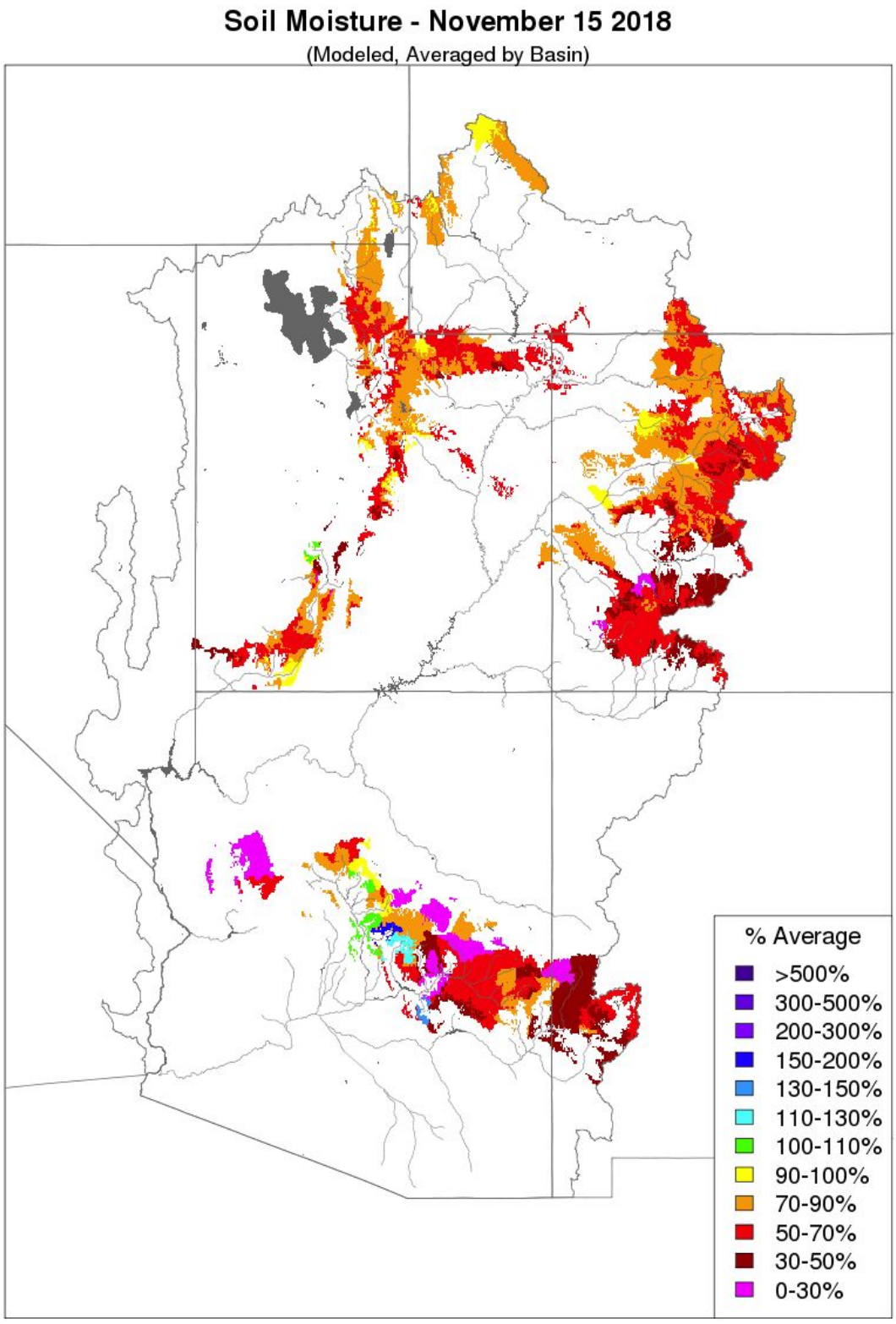
For updated SNOTEL information refer to: https://www.cbrfc.noaa.gov/lmap/lmap.php?interface=snow
For CBRFC hydrologic model snow:
https://www.cbrfc.noaa.gov/rmap/grid800/index.php?type=monthly&area=cbrfc&year=2017&month=1&day=&hour=&type=snow

Soil Moisture:

Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it can influence the efficiency of the snowmelt runoff the following spring. The effects are most pronounced when soil moisture conditions and snowpack conditions are both much above or much below average. In areas where the soil moisture was below average entering the winter and the current snowpack is also much below median, spring runoff may be further reduced.

Modeled soil moisture conditions as of November 15th were below average over most of the Upper Colorado River Basin and Great Basin. In the Upper Colorado River Mainstem River Basin, soil moisture conditions were below average in headwater basins along the Continental Divide, and closer to average downstream. Soil moisture conditions in the Gunnison, Dolores, and San Juan basins were much below average.

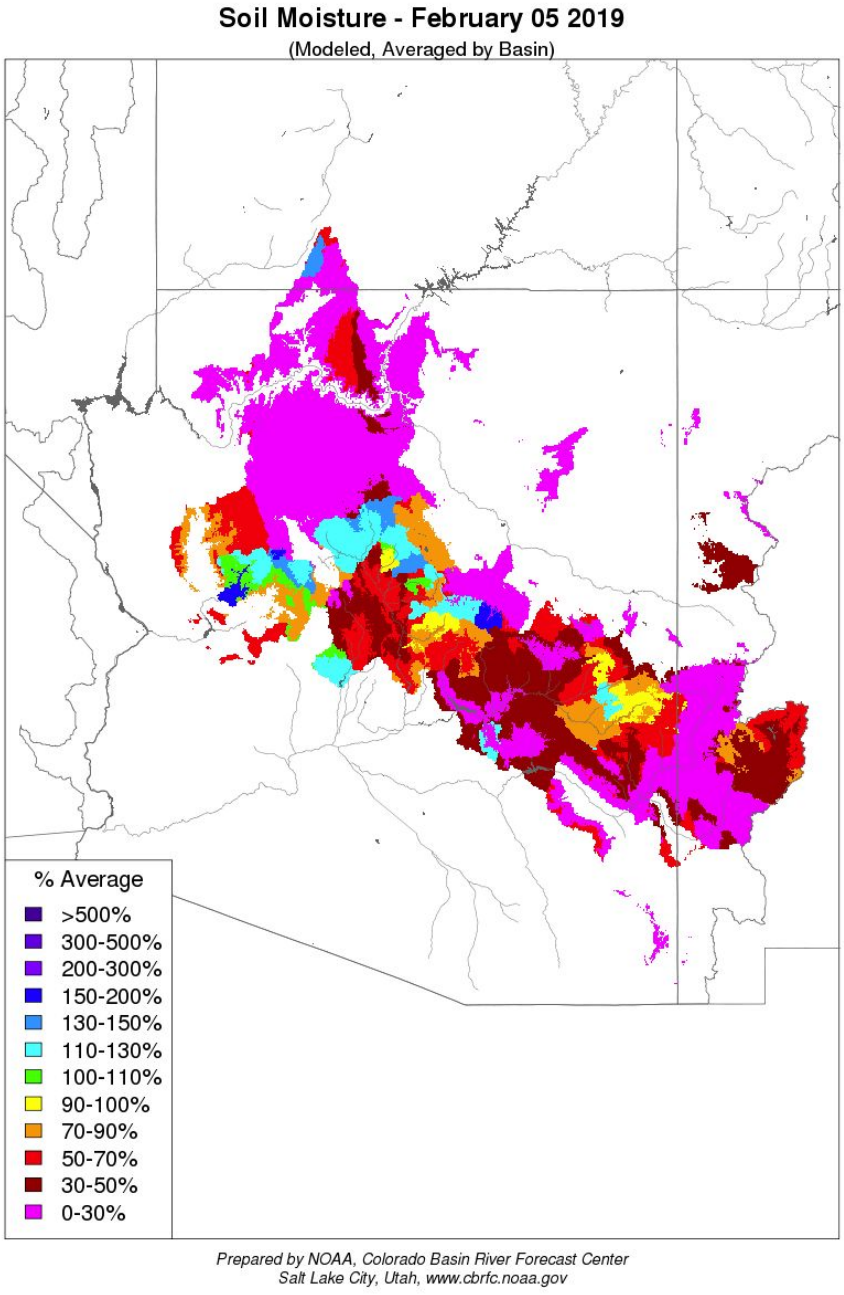
In the map below areas in cool colors (e.g blue and purple) are above the historical model soil moisture average while those in the warm colors (e.g red and orange) indicate below average conditions. Only the higher elevations which contribute the most to runoff are displayed.



Modeled soil moisture from the CBRFC hydrologic model 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.

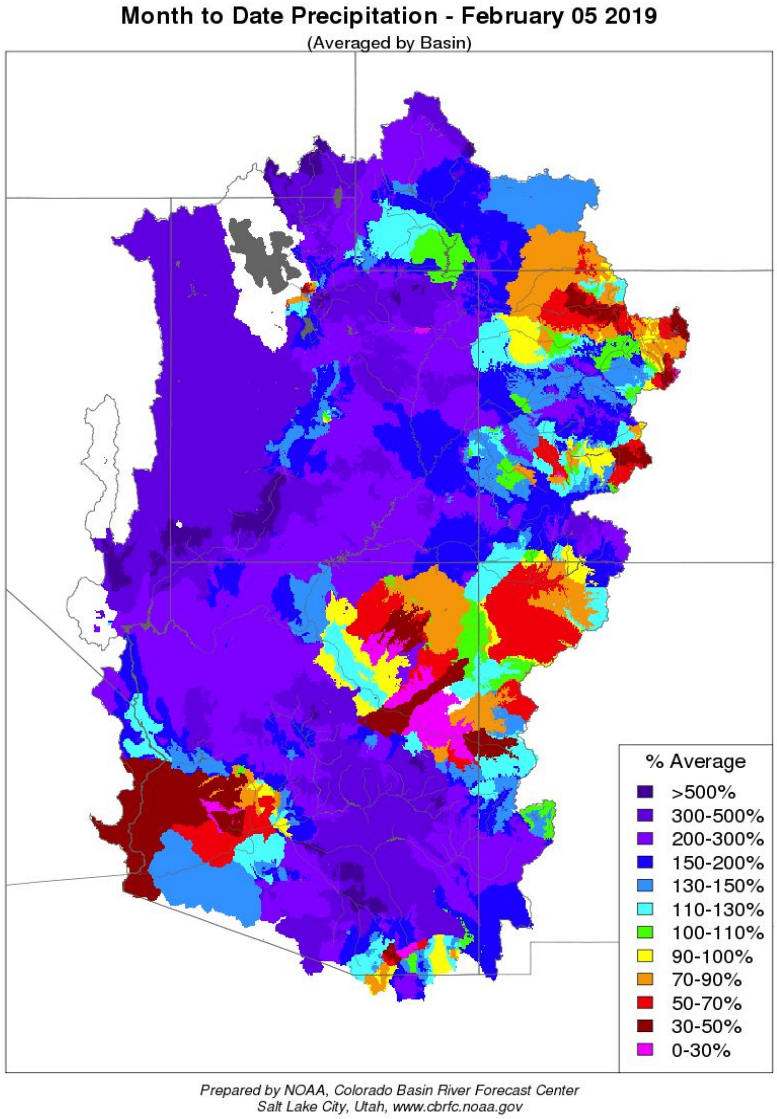
Although winter soil moisture conditions have improved since early January and are now near to above average in parts of the Lower Colorado River Basin, soil moisture conditions in much of the Lower Colorado River Basin still remain below to much below average, as shown in the image below. This generally means that a portion of any runoff that occurs from rainfall or snowmelt will be absorbed into the soil before contributing to streamflow.



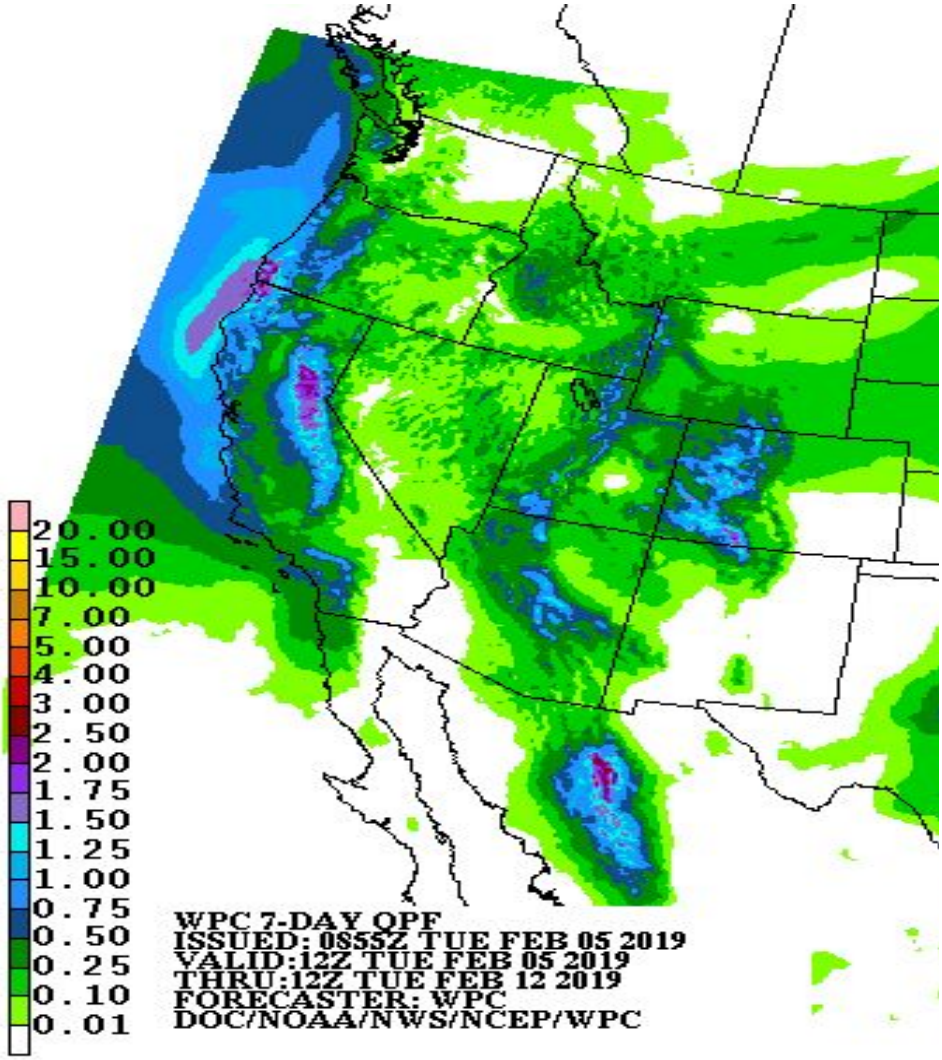
Lower Colorado River Basin (AZ/NM) model soil moisture as of February 5, 2019.

Upcoming Weather:

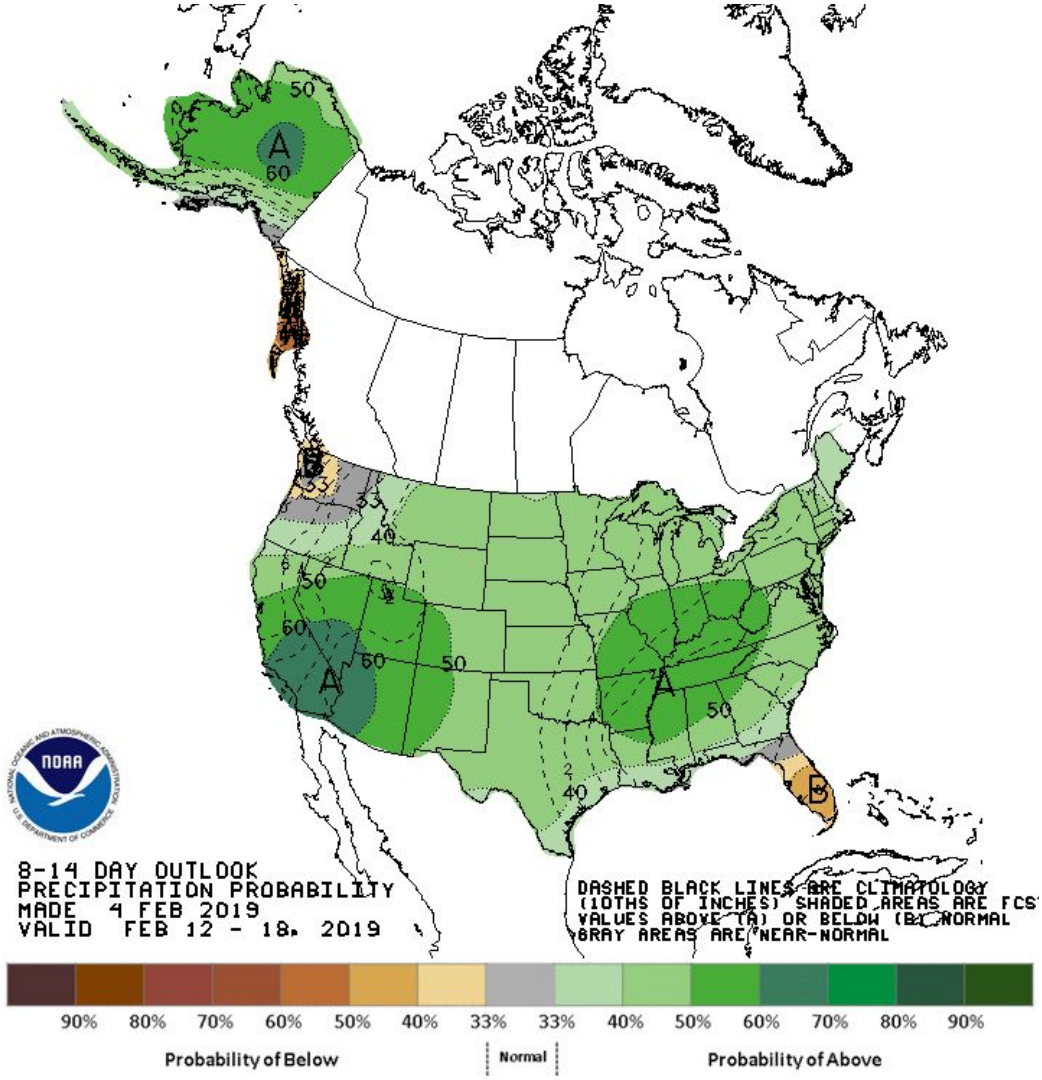
After a wetter than normal January over much of the region, the month of February is starting out very unsettled. A storm system with good subtropical moisture produced heavy precipitation amounts on Feb 2-3, especially across Utah and Arizona. This storm system is being replaced by another system that will impact much of the Colorado River Basin from February 4-6. Due to the persistent precipitation caused by these successive storms, it is quite possible that many mountain areas of the Upper Colorado will receive a good portion of their average monthly precipitation within the first week of February. Overall, there is good agreement that the anomalous trough that has existed over the Western U.S. over the past week is forecasted to remain in place through mid-month. Another weaker, quick-moving system will impact mainly the Upper Colorado on February 10-11. While there is more uncertainty in the weather pattern for next week, a mean trough in the vicinity of the West Coast tilts the odds toward above average precipitation, particularly across the Lower Basin.



Month-to-date precipitation through February 4, 2019.



NWS Weather Prediction Center precipitation forecast for Feb 5-12, 2019.



NWS Climate Prediction Center precipitation probability forecast for Feb 12-18, 2019.

For our online publication that contains basin conditions, summary graphics, and end of month reservoir content tables, refer to: https://www.cbrfc.noaa.gov/wsup/pub2/map/html/cpub.php