March 1, 2018 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:

A change to a more progressive weather pattern occurred in mid February. This change brought an increase in storm activity during the second half of the month to the CBRFC forecast area. Near to above average precipitation was observed in parts of the Colorado River Basin for the first time in several months. However, the majority of the CBRFC forecast area observed below average precipitation, due in part to very dry conditions the first half of February.

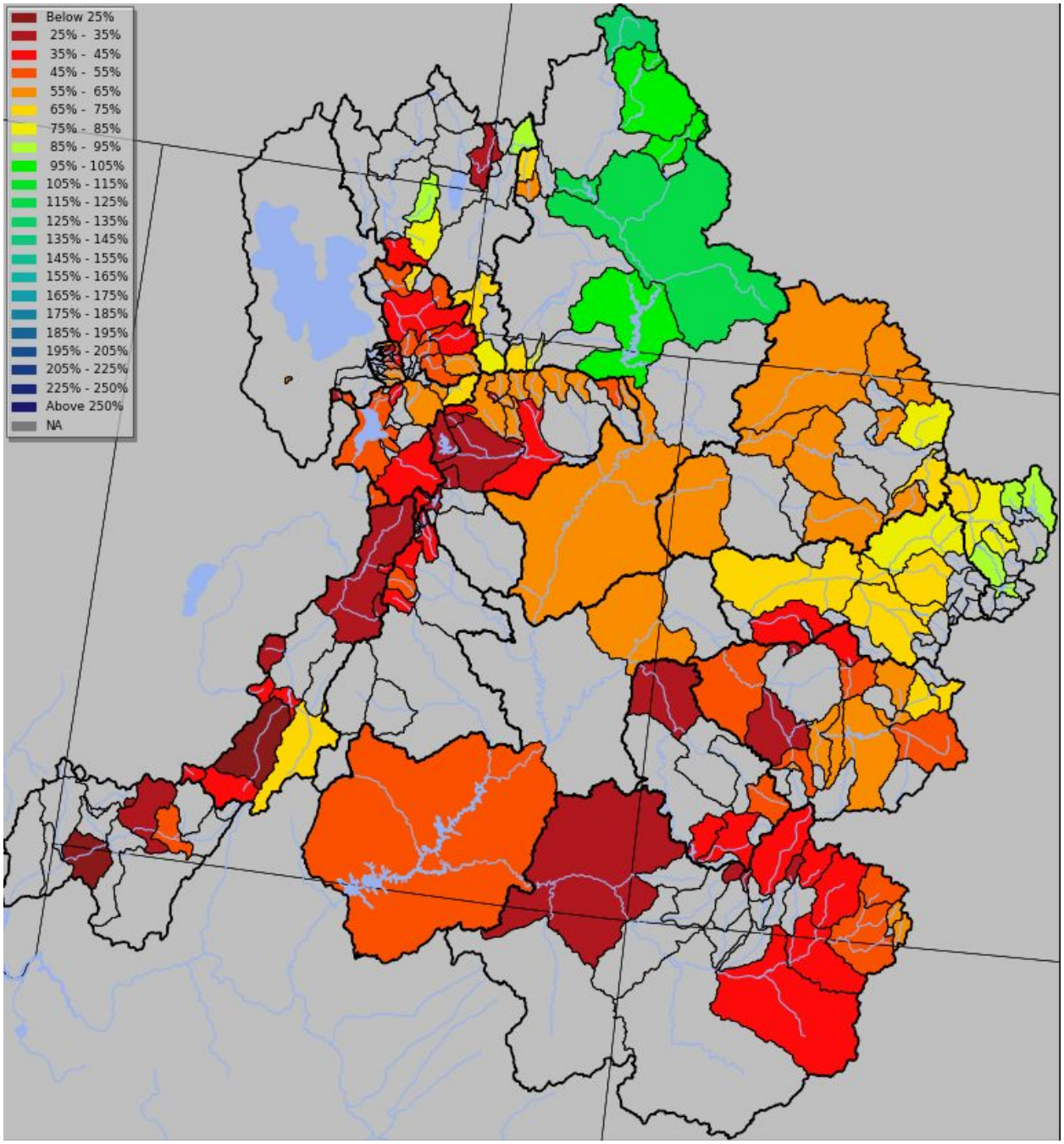
Some areas also experienced minor improvement in snowpack conditions but most areas still remain well below normal for this time of year. The Green River Basin of Wyoming and some headwater basins of the Colorado River mainstem continue to be the only areas with near or above median snow conditions. Snow conditions in most areas remain below 70 percent of median with below 50 percent of median extending from southwest Colorado into central and northeastern Utah.

Above average April-July streamflow volumes are expected in the Green River Basin headwaters above Fontenelle reservoir. Near to slightly below average volumes are forecast in some Colorado River headwaters basins above Kremmling, CO and in the Bear River Basin. Outside of these areas, below to much below average volumes are expected. The lowest forecasts with respect to average extend from the Sevier and Virgin River Basins of southwest Utah into the San Juan and Dolores River Basins of southwest Colorado and in parts of the Duchesne River Basin. Between early February and early March the largest increases in forecasts as a percent of average occurred in the Green River Basin above Fontenelle and largest decreases occurred in the Duchesne River Basin.

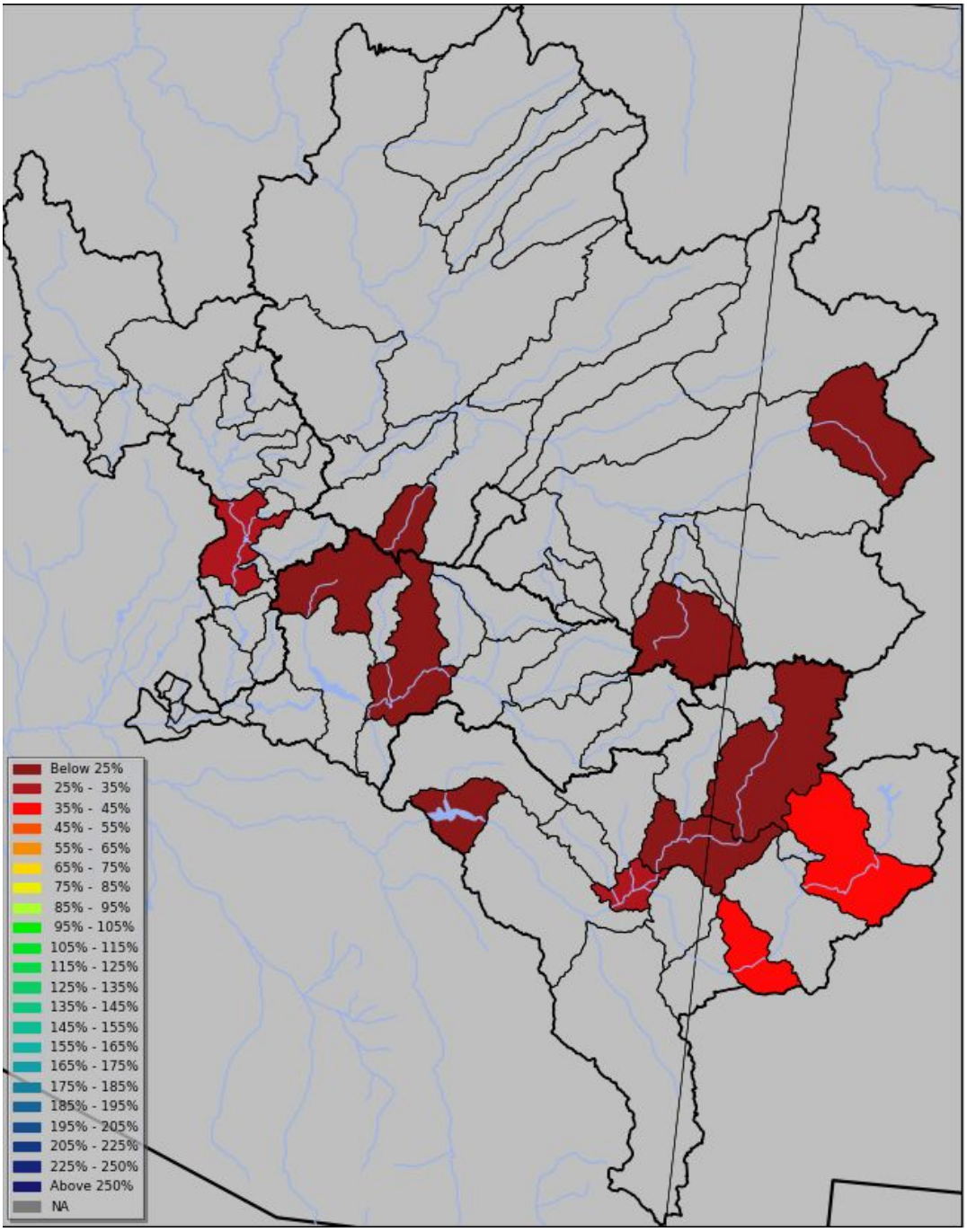
In the Lower Colorado River Basin of Arizona and New Mexico, March-May streamflow volumes are forecast to range from near 5 to 40 percent of the historical median. Dry conditions have persisted over much of this area for several months resulting in dry soil conditions. Despite much above average precipitation in the Gila River Basin in February, observed streamflow volumes in the Gila Basin were generally near to below median, in part due to the dry soils. This area will soon enter a climatologically drier part of the year with less likelihood of significant precipitation.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 840 KAF (116% of average), Flaming Gorge 940 KAF (96% of average), Blue Mesa Reservoir 395 KAF (59% of average), McPhee Reservoir 113 KAF (38% of average), and Navajo Reservoir 260 KAF (39% of average). The Lake Powell inflow forecast is 3.40 MAF or 47% of average.

Seasonal Water Supply Forecasts:



Upper Colorado, Great, Virgin River Basins: 2018 April-July forecast volumes as a percent of 1981-2010 average (50% exceedance probability forecast)



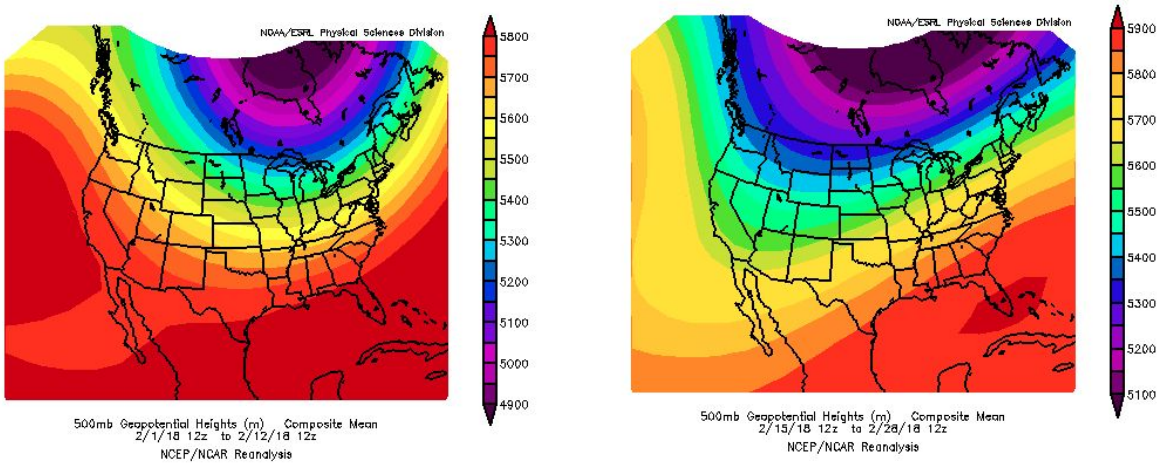
Lower Colorado Basin (AZ/NM): 2018 March-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

For specific site water supply forecasts click here

Water Supply Discussion

Weather Synopsis:

In mid February a weather pattern change occurred when a trough of low pressure replaced the high pressure ridge conditions that had dominated the western U.S. over much of the winter season. The switch to a more progressive pattern opened the door to storm systems moving through the CBRFC forecast area. Impacts varied with some higher elevation headwater locations in the Colorado River Basin experiencing some minor improvement in snowpack. Other areas remained quite dry, particularly in the Duchesne River Basin and much of the Lower Colorado River Basin. The progressive pattern continued into early March with the most recent storms impacting the northern Great Basin and upper Green River Basin greatest.

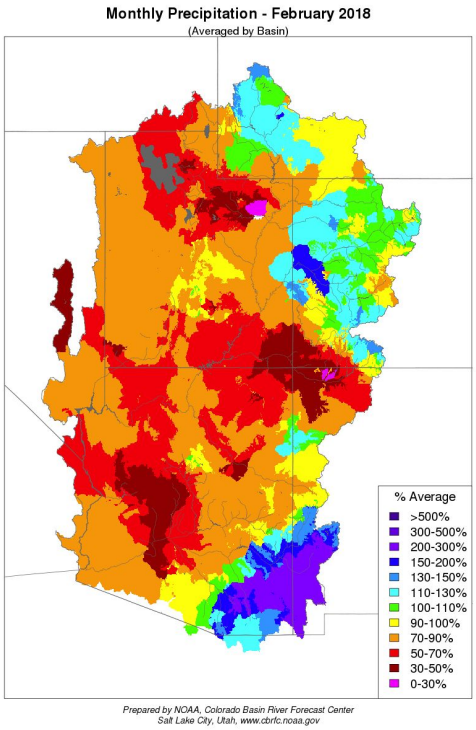


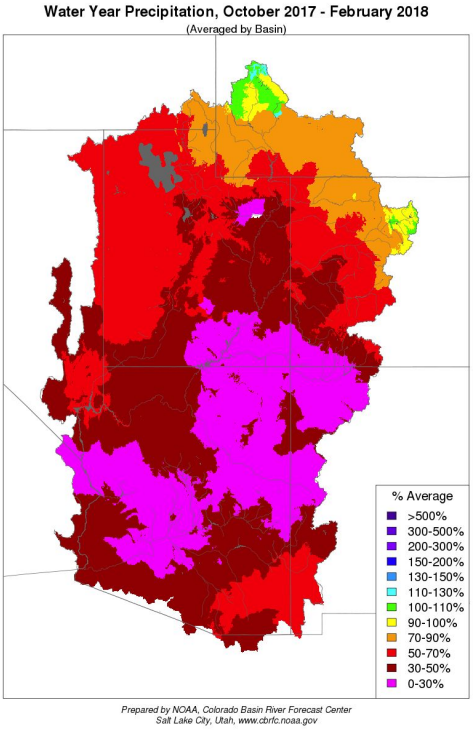
The mean atmospheric pattern during the month of February. The image on the left shows a high pressure ridge along the west coast for the first half of February that resulted in dry conditions. The image on the right shows the pattern for the second half of February with a trough of low pressure over the western U.S.

Precipitation and Temperature:

The eastern San Juan River Basin headwaters and parts of the Gunnison Basin and Colorado River mainstem that have received below average precipitation much of the winter, received near to above average precipitation in February. The Green River Basin of Wyoming continued to receive near or above average precipitation as it has most of the winter season. Headwaters of the Gila River Basin in New Mexico also received above average precipitation due to a storm system in mid February. Remaining areas were again below average with parts of the Duchesne River Basin and Lower Colorado River Basin reporting precipitation amounts less than 50 percent of average.

The water year (October-February) precipitation image below continues to show near or above average precipitation limited to the Green River Basin headwaters in Wyoming and the extreme eastern headwaters of the Colorado River mainstem. Elsewhere water year conditions are generally 70 percent of average or less.

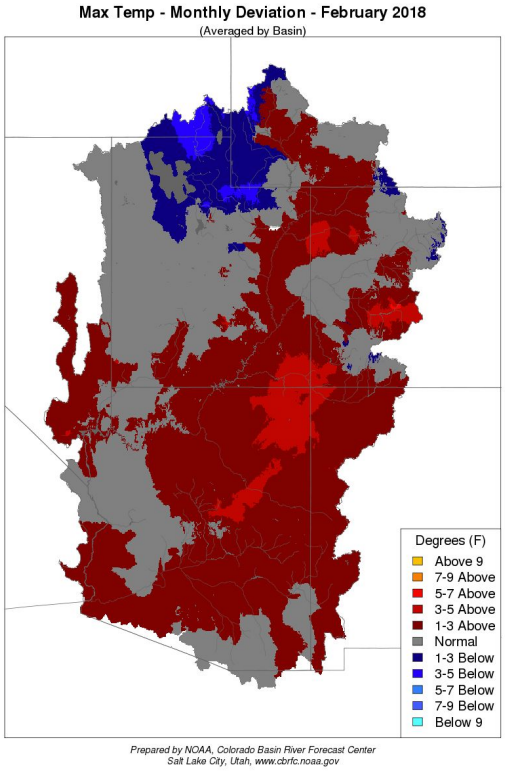




Images: February 2018 and water year (Oct 2017-Feb 2018) precipitation graphics
(Averaged by basins defined in the CBRFC hydrologic model)

Following three months with monthly mean maximum and minimum temperatures significantly above average, temperatures returned closer to seasonal values in many areas during February.

Maximum and minimum monthly temperature deviation from average are displayed in the images below.



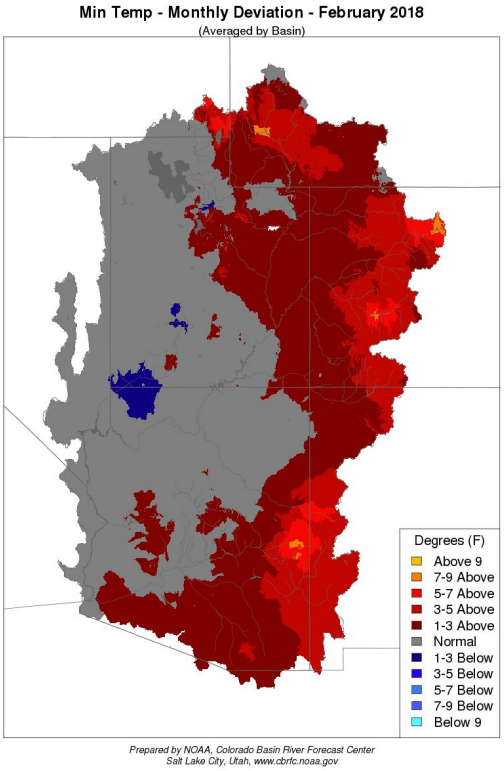


Image: Monthly maximum and minimum temperature departure from average for February 2018.
(Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

Record or near record low snowpack exists throughout much of the Upper Colorado River Basin and Great Basin as of early March. Exceptions include the headwaters of the Green River Basin in Wyoming which is near 110 percent of median, the headwaters of the Colorado River above Kremmling which is near 90 percent of median, and the Bear River Basin in northern Utah and southern Idaho which is near 75 percent of median.

While there was a small increase in the percent median snowpack in western Colorado between early February and early March, values are still much below median with the exception of the headwater areas mentioned above. Basins in southwest Colorado are reporting snowpack near 50 percent of median at this time. The Great Basin generally has a similar percent median snowpack now as it did in early February with sub-basins south of the Bear River Basin reporting near 50 percent of median.

The SNOTEL map image below indicates widespread poor snowpack conditions across the CBRFC forecast area. Sites depicted with a pink box have a snowpack below 30 percent of median at this time, while sites with a dark red box are below 50 percent of median.

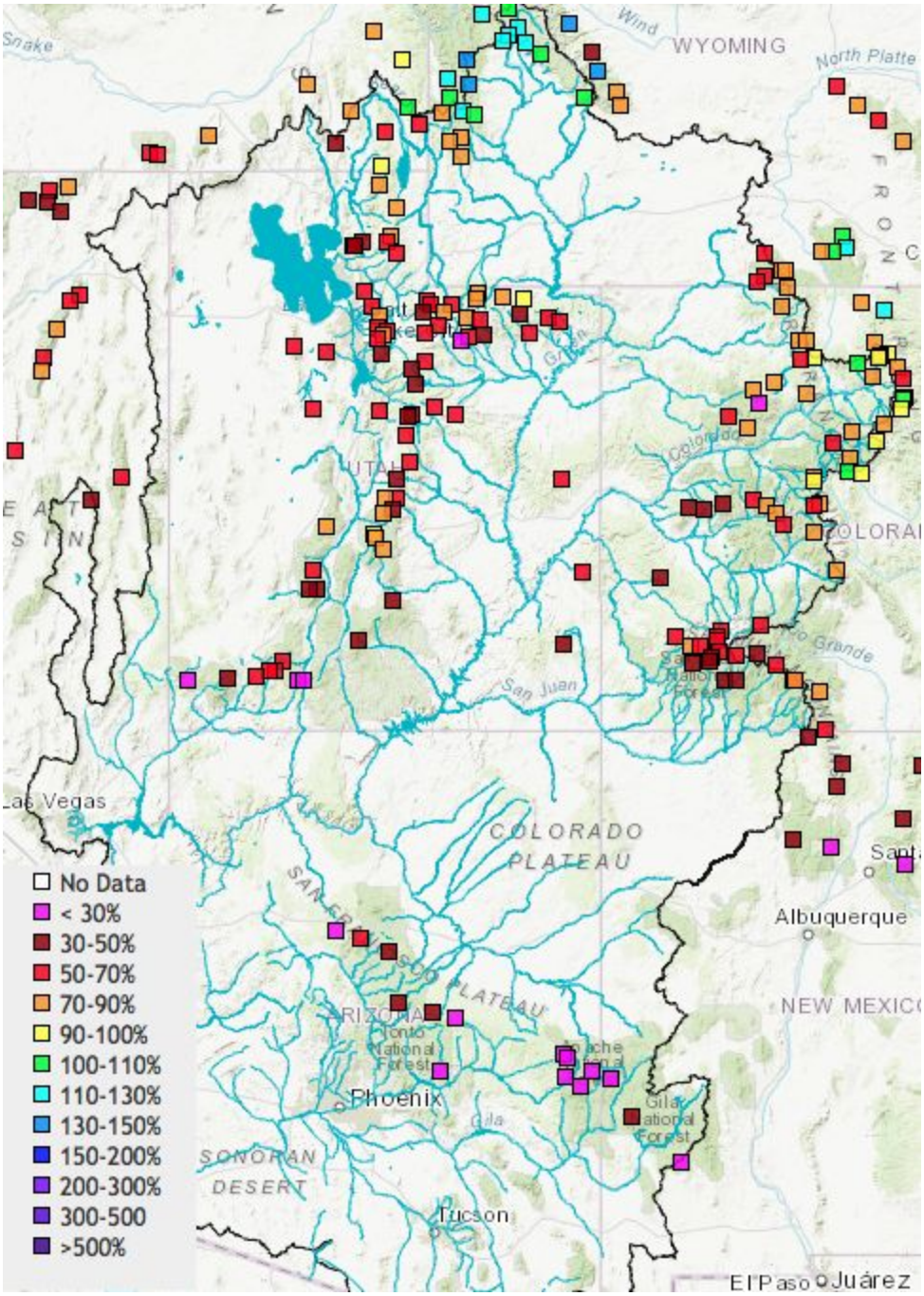
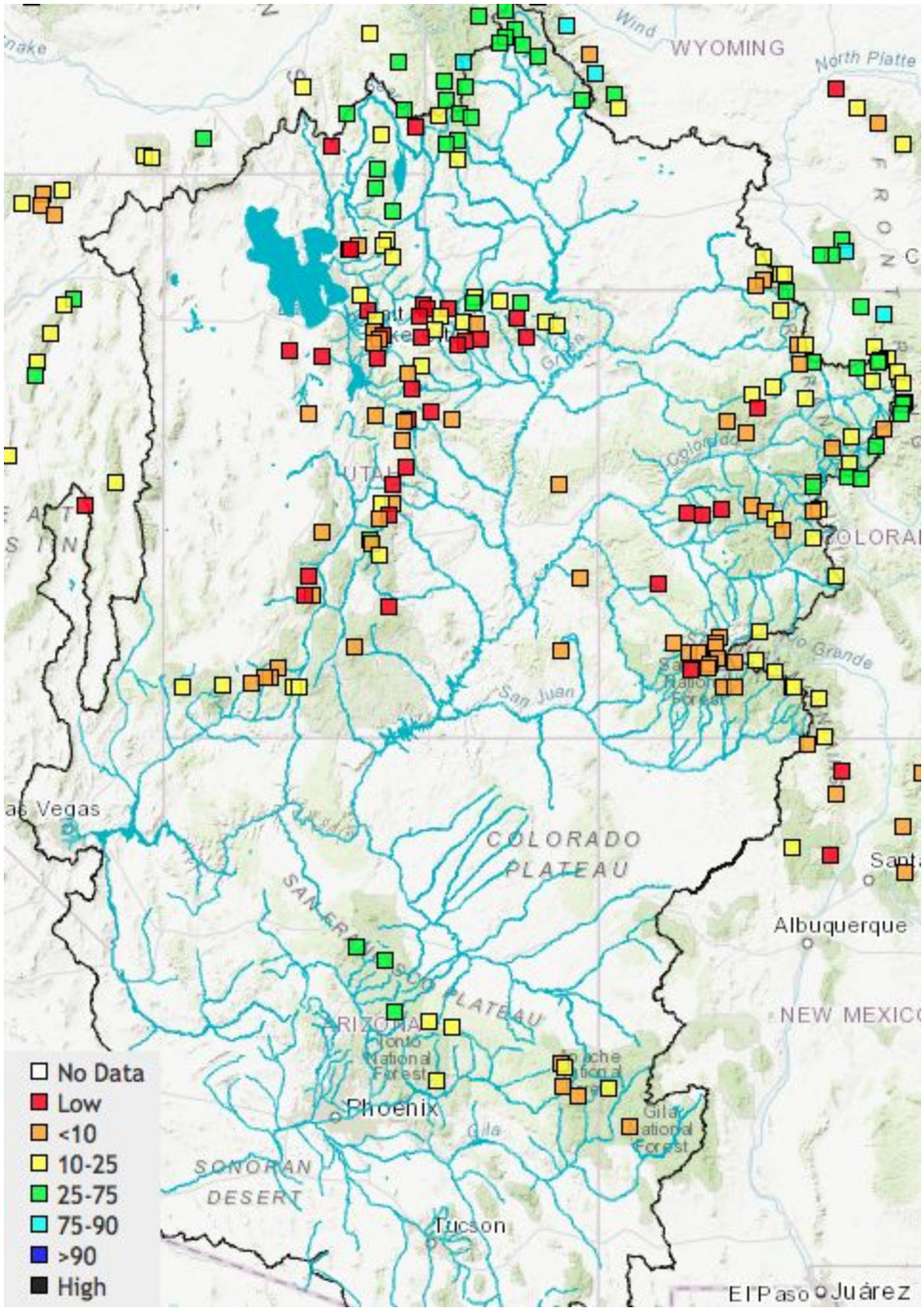


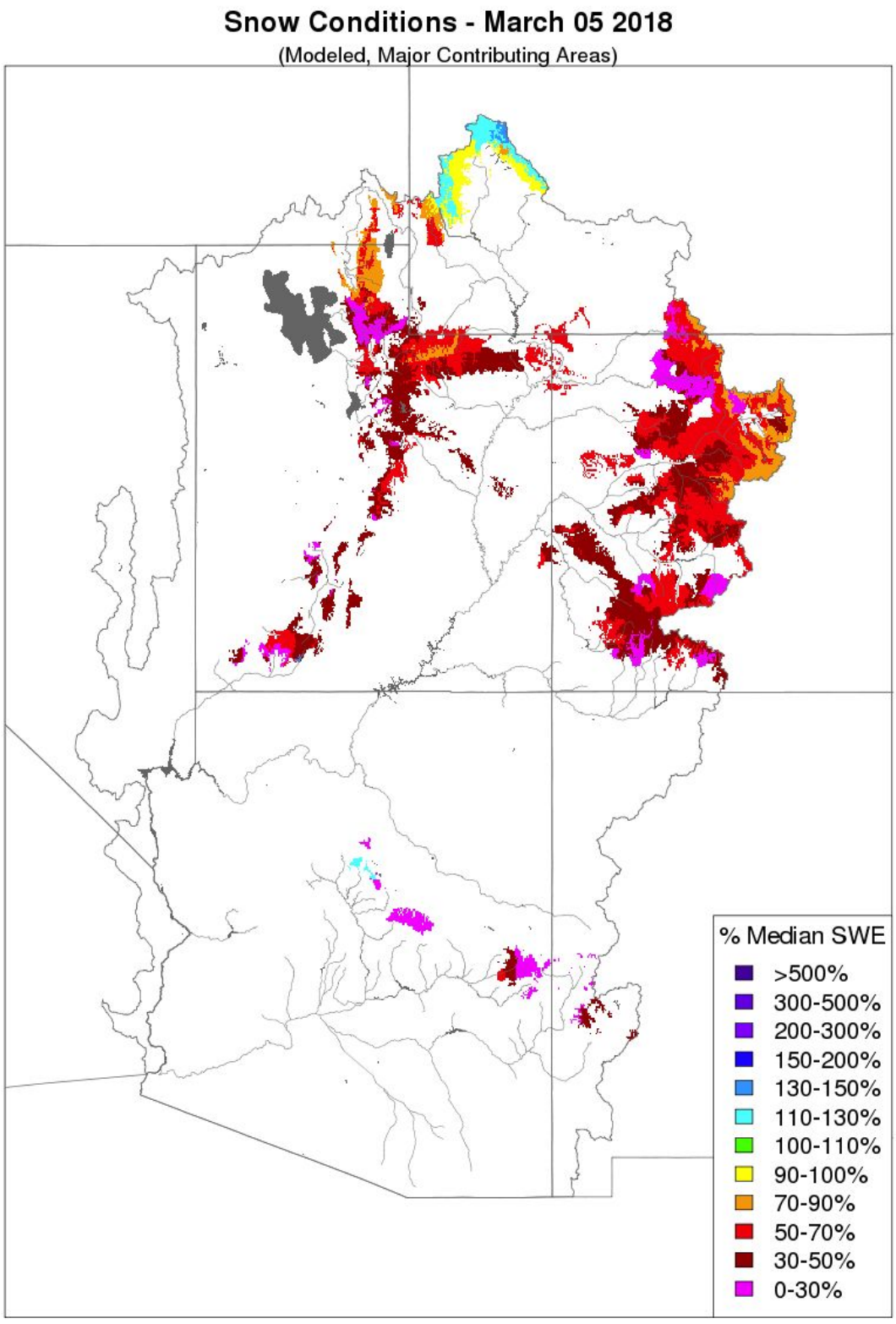
Image: Percent Median Snow Conditions as of March 5th, 2018

The snow percentile image displayed below indicates where the current snow measurement ranks in the historical record (typically 35-40 years) for each site. Many sites are depicted with red boxes, indicating the lowest values on record for this time of year. Sites with orange boxes are in the bottom 10 percent of the record, with many in Utah ranking as either the 2nd or 3rd lowest for this time of year. Many of the sites across the area with yellow boxes rank in the bottom five or six on record.



Snow Percentile Image: Historical SNOTEL ranking as of March 5th, 2018

The image below is the representation of snow in the CBRFC hydrologic model. Only those areas that provide the greatest contribution to the April-July runoff volumes are displayed. The snow represented in the model closely mirrors the SNOTEL image. The takeaway message is that poor snowpack conditions are widespread as indicated by the hydrologic model.



Modeled Snow: Snow representation from the CBRFC hydrologic model March 5th, 2018

For updated SNOTEL information, click here.
For CBRFC hydrologic model snow conditions, click here

Soil Moisture:

Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it influences 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 16th were above average over the Upper Green River Basin and Bear River Basin. Soil moisture conditions were near average in the Duchesne River Basin and the headwaters of the Colorado and Gunnison Rivers as well as the easternmost headwaters of the San Juan River. Elsewhere in both the Great Basin and Upper Colorado River Basin, the modeled soil moisture conditions were 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 are displayed and the areas in white are not included.

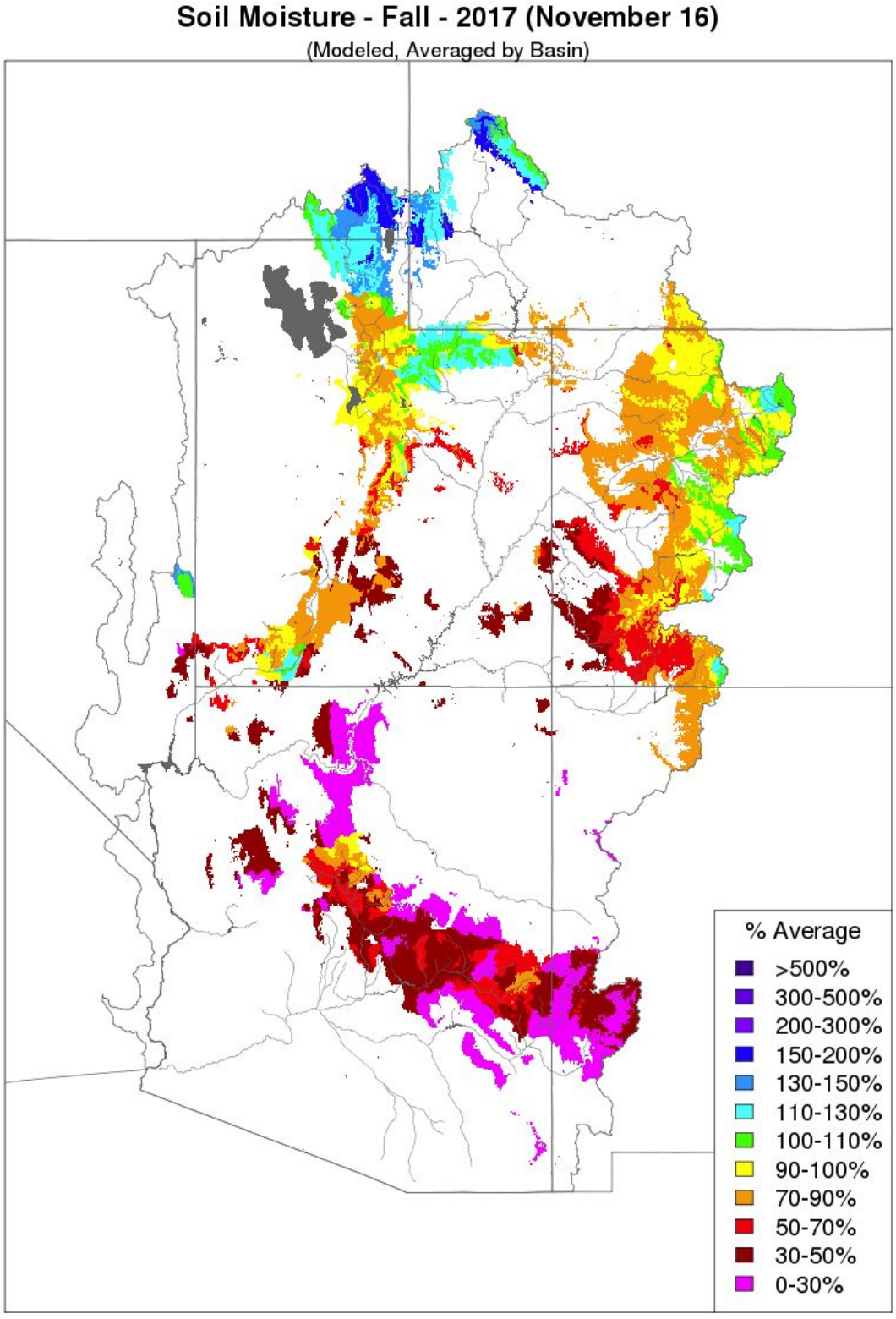


Image: Modeled soil moisture from the CBRFC hydrologic model entering the winter season

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.

Winter soil moisture conditions continue to be much below average in the Lower Colorado River Basin as shown in the image below. This generally means that it will take a few rain events before any significant runoff is generated and that much of any snow melt that occurs will be absorbed into the soil instead of contributing to increased streamflow. This scenario played out during February in the Gila River Basin when much above average precipitation occurred, but observed volumes for the month were still below median in the basin overall.

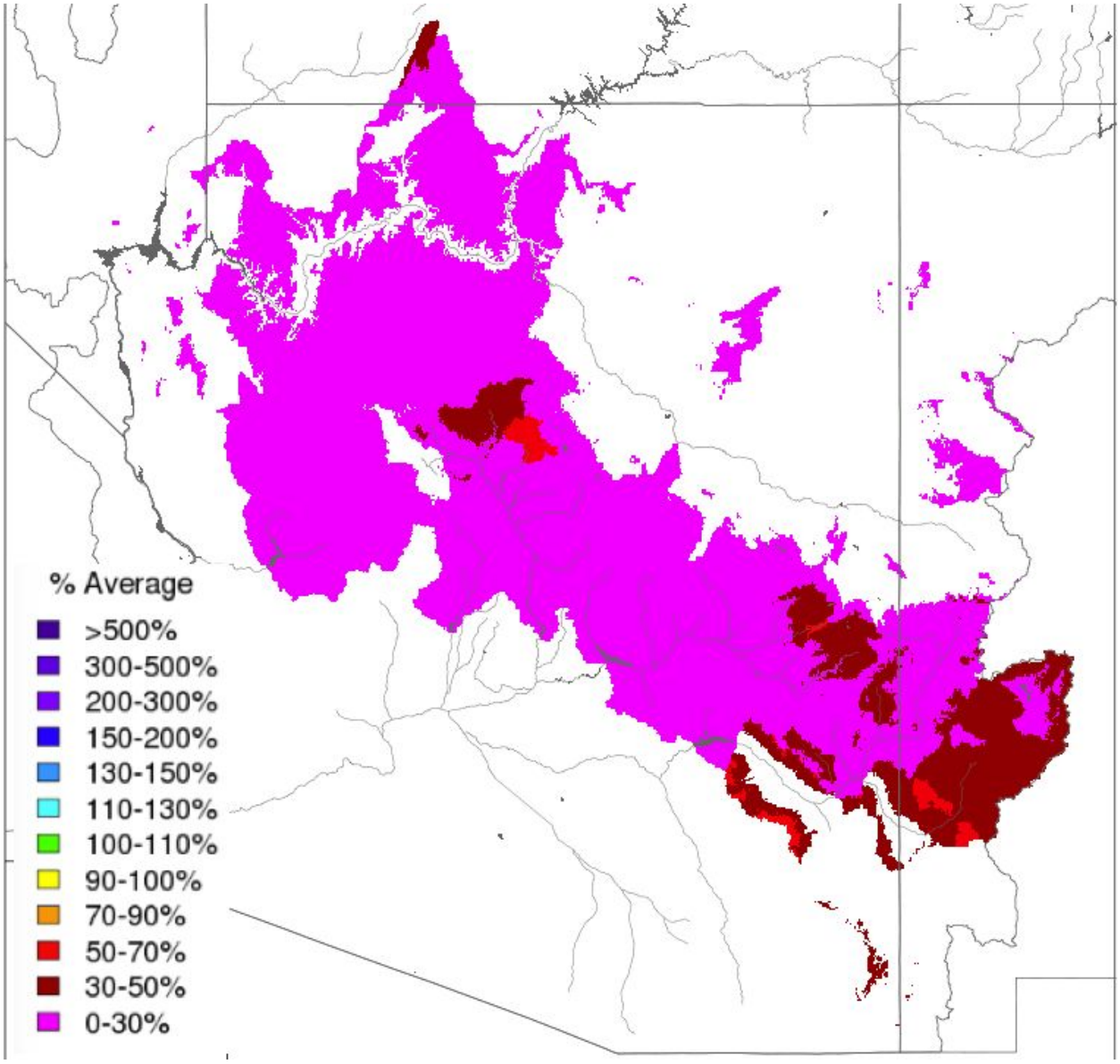


Image: Lower Colorado River Basin (AZ/NM) model soil moisture as of March 5th, 2018

Upcoming Weather:

In the near term the weather pattern is expected to transition to a more amplified pattern with ridging conditions over the CBRFC forecast area. This will lead to at least a brief period of warmer and drier weather. Additional storm systems begin to impact the CBRFC forecast area following the second weekend of March. While longer range meteorological guidance indicates favorable conditions for additional precipitation, confidence in the amount of moisture and strength of these storm systems remains low. From this point through the middle of March additional precipitation may be on the light side.

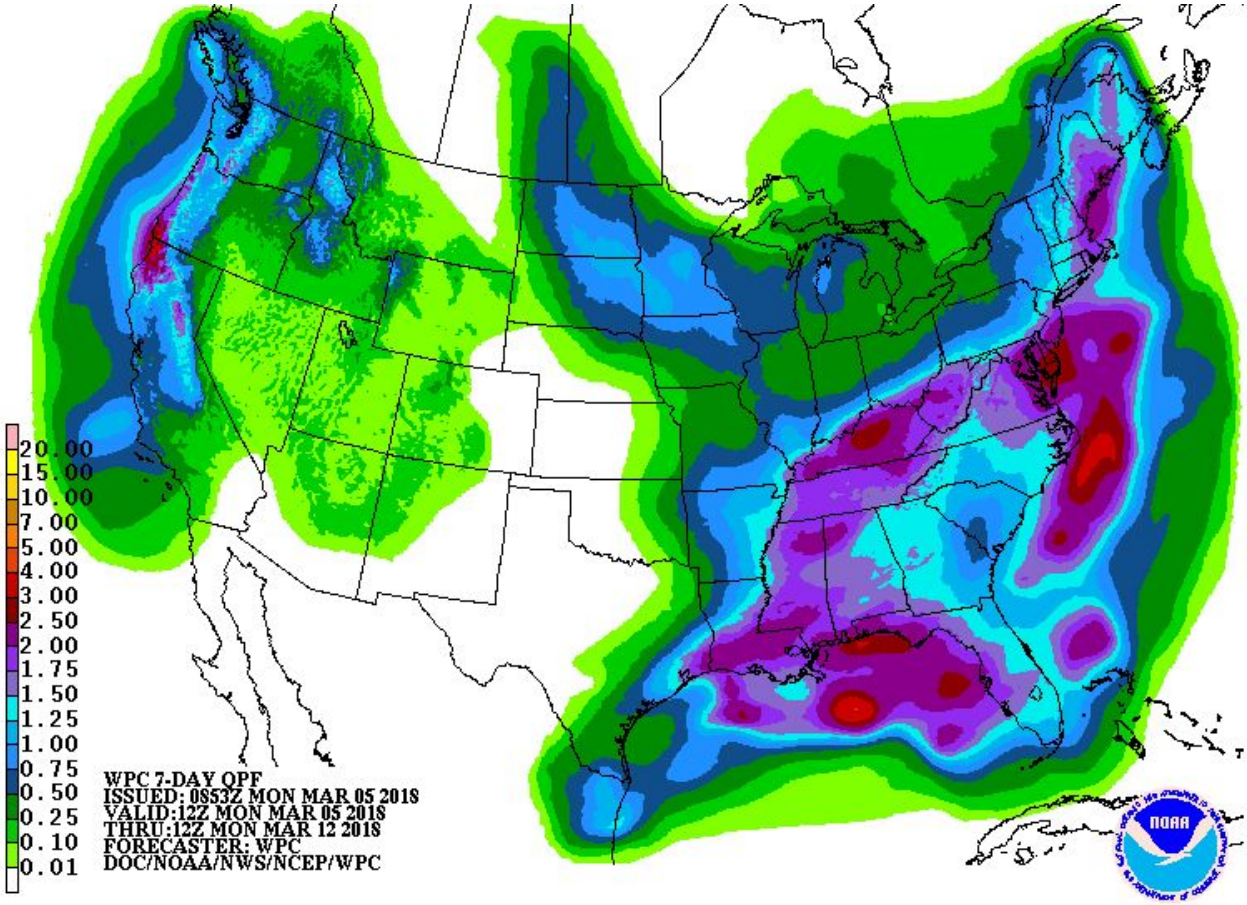


Image: NWS Weather Prediction Center precipitation forecast for Mar 5th - Mar 12th, 2018

End Of Month Reservoir Content Tables

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

Sevier Basin

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