January 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.

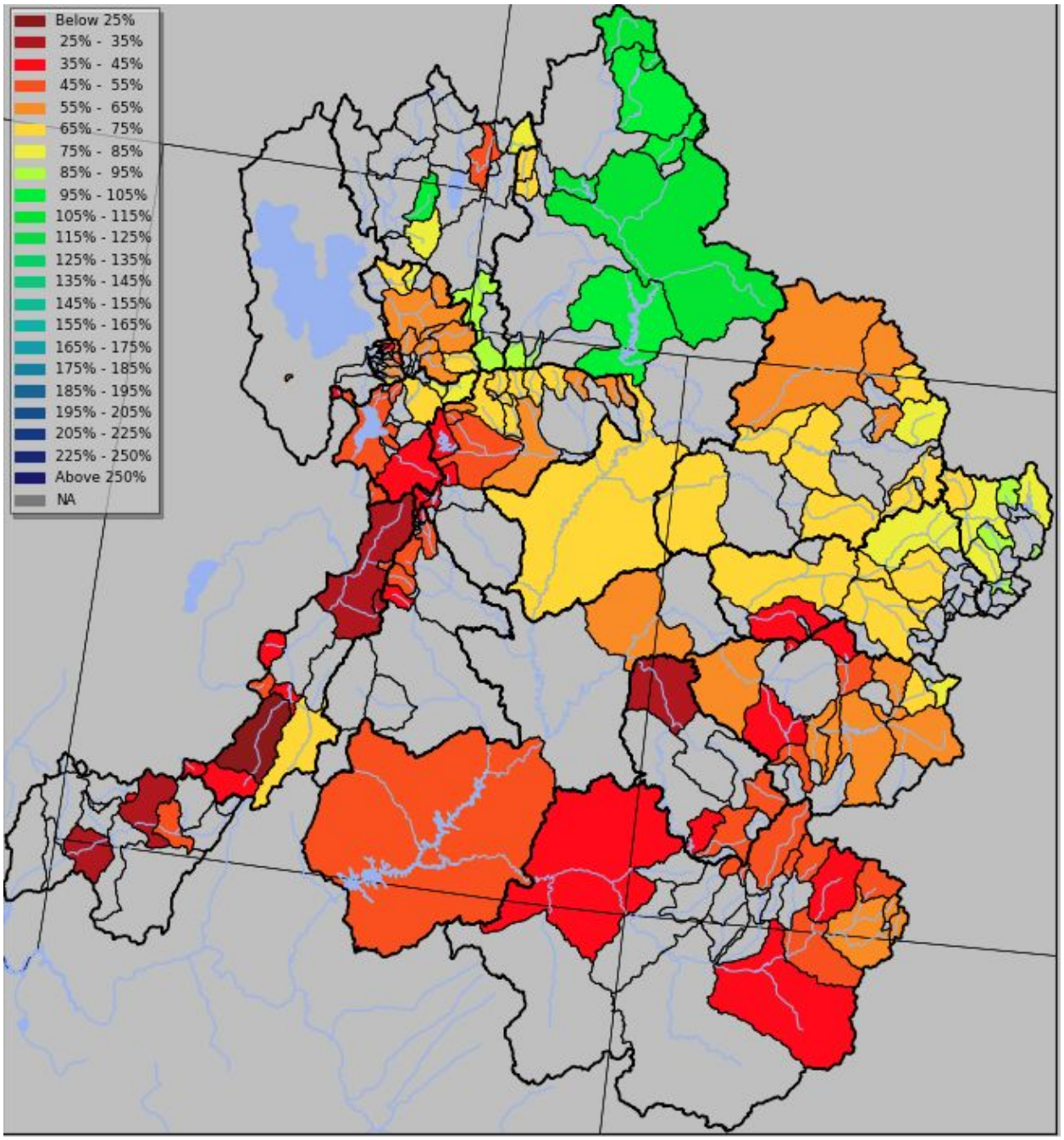
Water Supply Forecast Summary:

A very dry weather pattern resulting in record low precipitation throughout the fall and early winter period has resulted in minimal snowpack conditions over much of the CBRFC forecast area as of early January. Numerous high elevation locations in the Colorado and Great Basins recorded precipitation in the November-December period that was the lowest or among the lowest three years on record. Precipitation and snowpack conditions are more favorable in the Green River Basin of Wyoming, the Bear River Basin, and the Colorado River headwaters above Kremmling. These areas experienced a greater impact from storms that moved around a ridge of high pressure dominating the area through much of the fall and early winter.

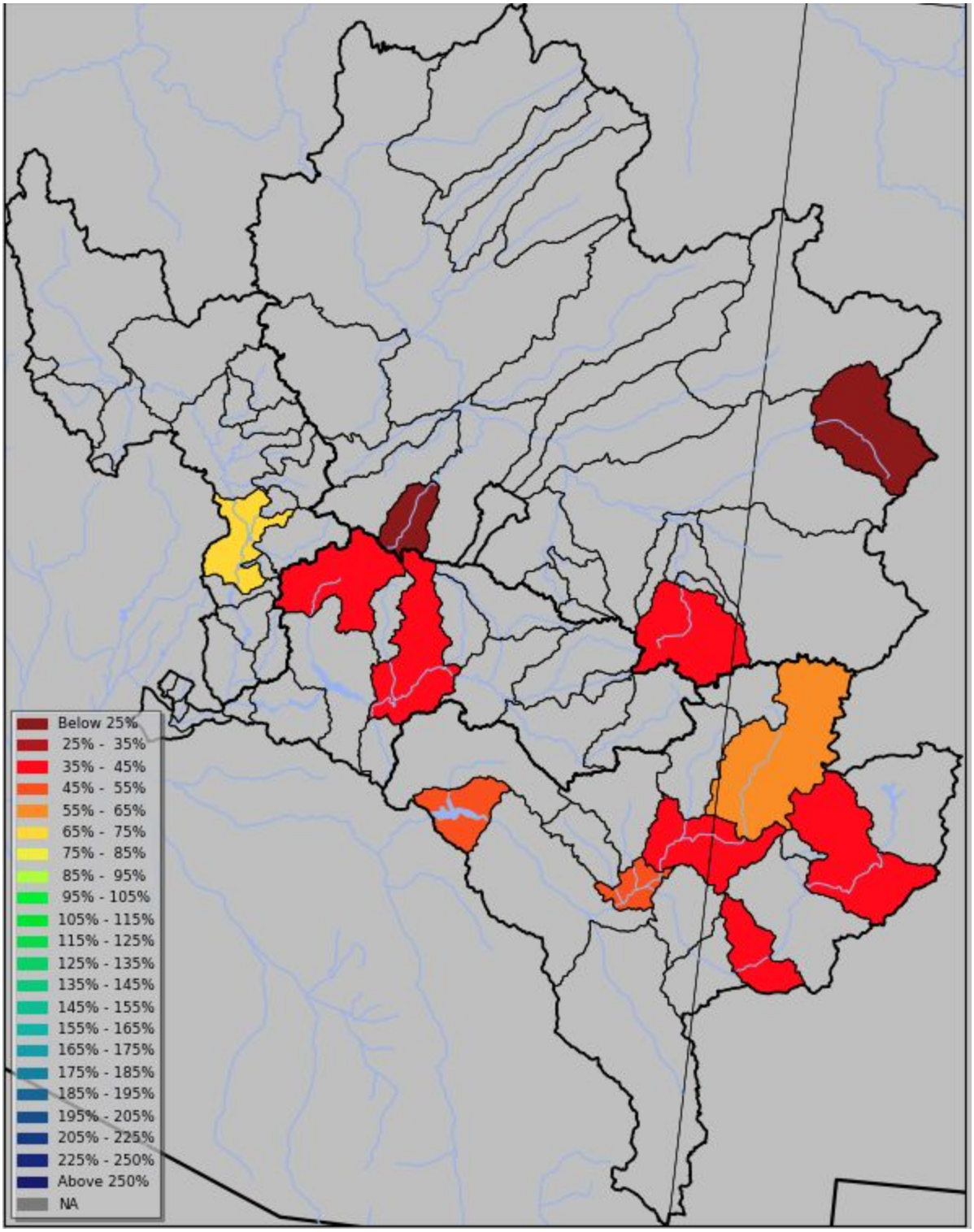
The lowest water supply forecasts extend from the Lower Colorado River Basins in Arizona and New Mexico into the Gunnison, Dolores, and San Juan Basins of southwest Colorado. Low forecasts also extend from southwest Utah north to include the Sevier, Provo, and Six Creeks Basins as well as smaller tributaries of the Green River and Colorado River Basins in Central Utah. In these locations, April-July streamflow volume forecasts are in the 30 to 60 percent of average range as of early January. For Lower Colorado River Basin sites January through May volume forecasts range from 20 to 65 percent of median. April-July streamflow volume forecasts are near or slightly below average in the Colorado River headwaters and Bear River Basins with near to above average forecasts in the Green River Basin above Fontenelle Reservoir.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 780 KAF (108% of average), Flaming Gorge 1.00 MAF (102% of average), Blue Mesa Reservoir 435 KAF (64% of average), McPhee Reservoir 130 KAF (44% of average), and Navajo Reservoir 350 KAF (48% of average). The Lake Powell inflow forecast is 3.90 MAF (55% 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)



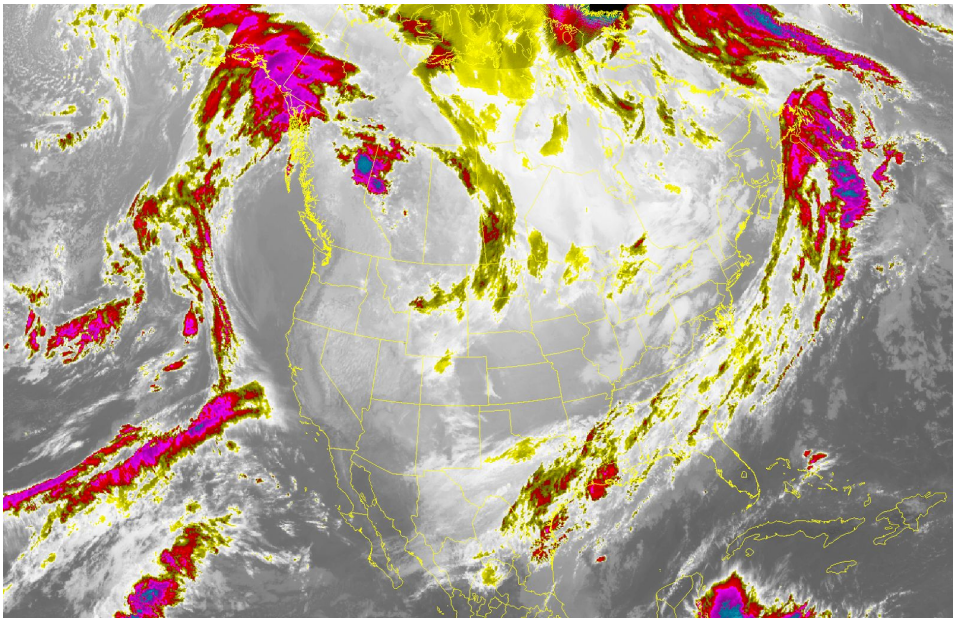
Lower Colorado Basin (AZ/NM): 2018 January -May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

For specific site water supply forecasts click here

Water Supply Discussion

Weather Synopsis:

A ridge of high pressure along the west coast has dominated the weather pattern during the late fall and early winter. This has resulted in very dry conditions over the vast majority of the Upper Colorado and Great Basins. Storm systems moving through this ridge position have weakened resulting in limited precipitation at times. As a result, the snowpack in many areas is near record low for early January. Storms moving around the periphery of the ridge have had a greater impact to the northern headwaters of the Green River Basin in Wyoming, parts of the Bear River Basin in northern Utah and Idaho, and the eastern Colorado River headwaters. Seasonal precipitation and snowpack in these areas have been closer to average.



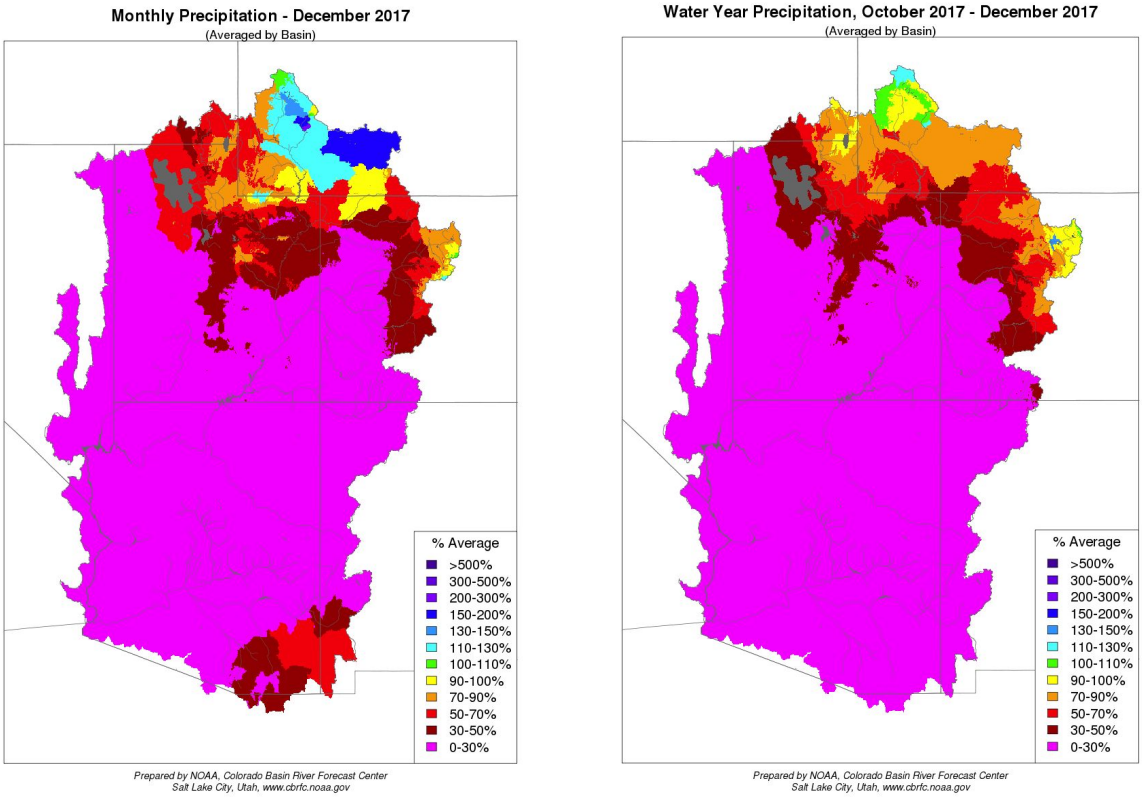
Infrared satellite image from December 7, 2017. This image is characteristic of the dominant weather pattern during November and December. A storm system circumventing a large high pressure ridge over the western U.S. is impacting the extreme northern and eastern edges of the CBRFC forecast area.

Precipitation and Temperature:

December was a very dry month with most higher elevation areas receiving less than 50 percent of average precipitation. The northern Green River basin headwaters in Wyoming, extreme eastern Colorado River headwaters, and north slopes of the Uinta Mountain range in the Bear and Green River Basins faired best with 70 to over 100 percent of average precipitation. Many locations farther south that include parts of the Gunnison, Dolores, and San Juan Basins, southwest Utah, and the Lower Colorado River Basin of Arizona and New Mexico received 15-30 percent of average precipitation. Several high elevation SNOTEL locations in these areas recorded their lowest December precipitation in their 35-40 year period of record.

The seasonal precipitation pattern has not been much different than what was observed in December. Many higher elevation SNOTEL sites in the aforementioned dry areas also recorded their lowest October-December precipitation in nearly 40 years of record. Areas to the north and east susceptible to storm systems rounding the ridge of high

pressure have received the highest percent of average precipitation with conditions much drier outside of those areas.



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

Overall, December was a warm month with mean monthly maximum and minimum temperatures between 5 and 10 degrees above average over much of the CBRFC area. Several daily maximum temperature records were established from late November through December. On several occasions daily mean temperatures ranged between 10 and 20 degrees above average.

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

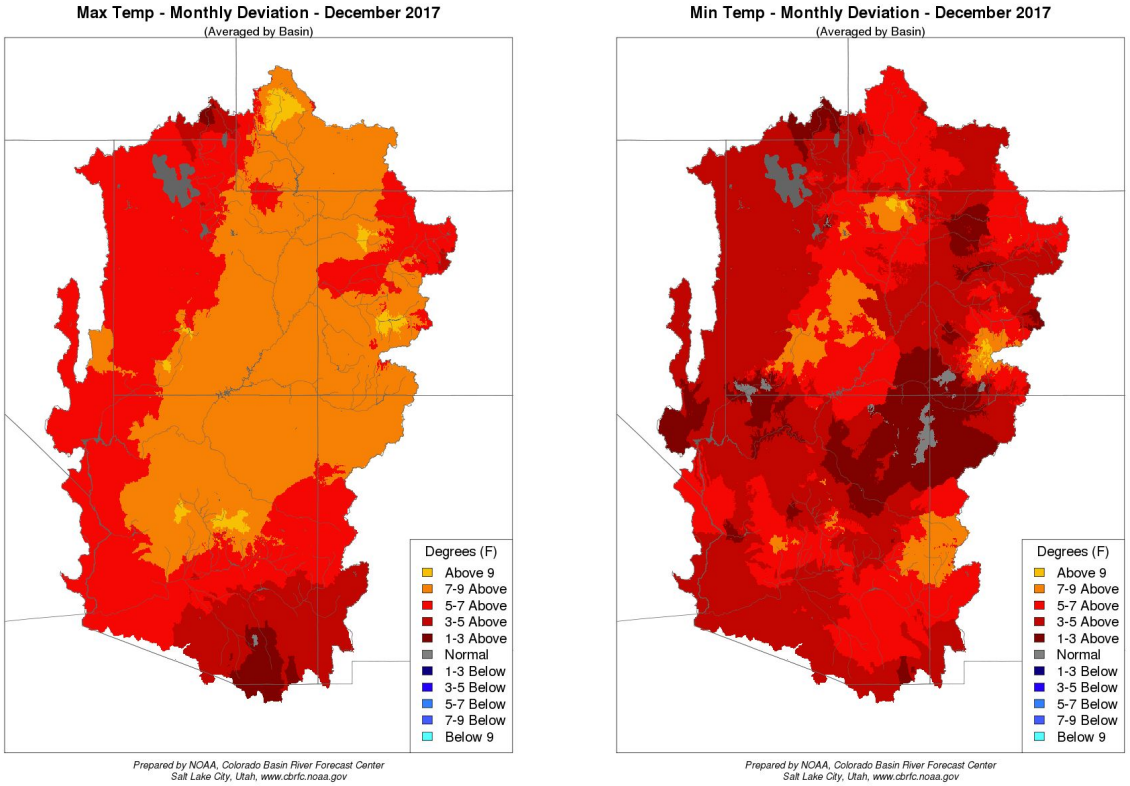


Image: Monthly maximum and minimum temperature departure from average for December 2017. (Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

Record or near record low snowpack exists throughout the majority of the Upper Colorado River Basin and Great Basin as of early January. The only area with near normal snowpack at this time is the headwaters of the Green River Basin in Wyoming. The snowpack in the Bear River in the northern Great Basin and the headwaters of the Colorado River above Kremmling is near 80 percent of median overall. Conditions deteriorate rapidly as you move south through the CBRFC area with most basins reporting snowpack less than 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.

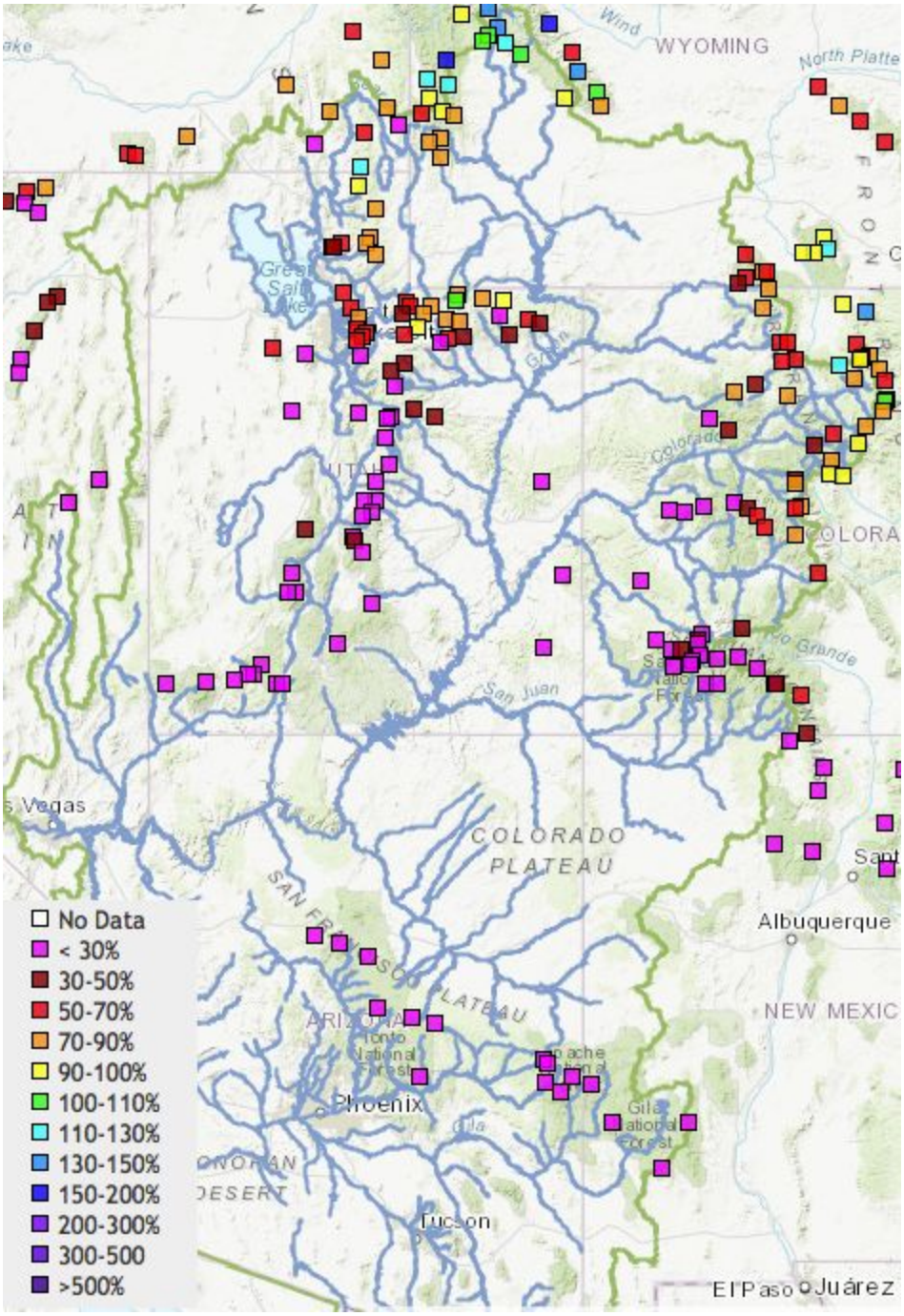
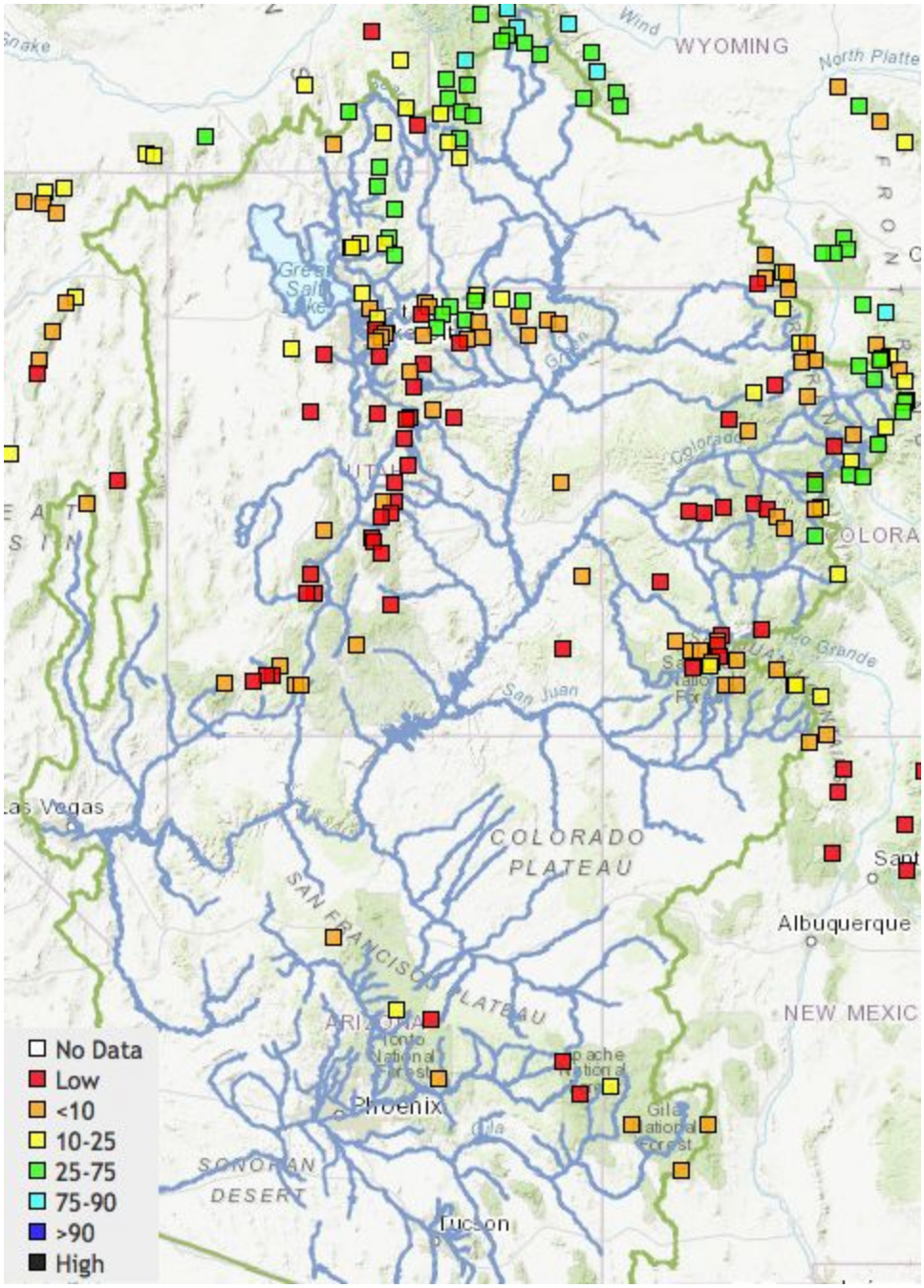


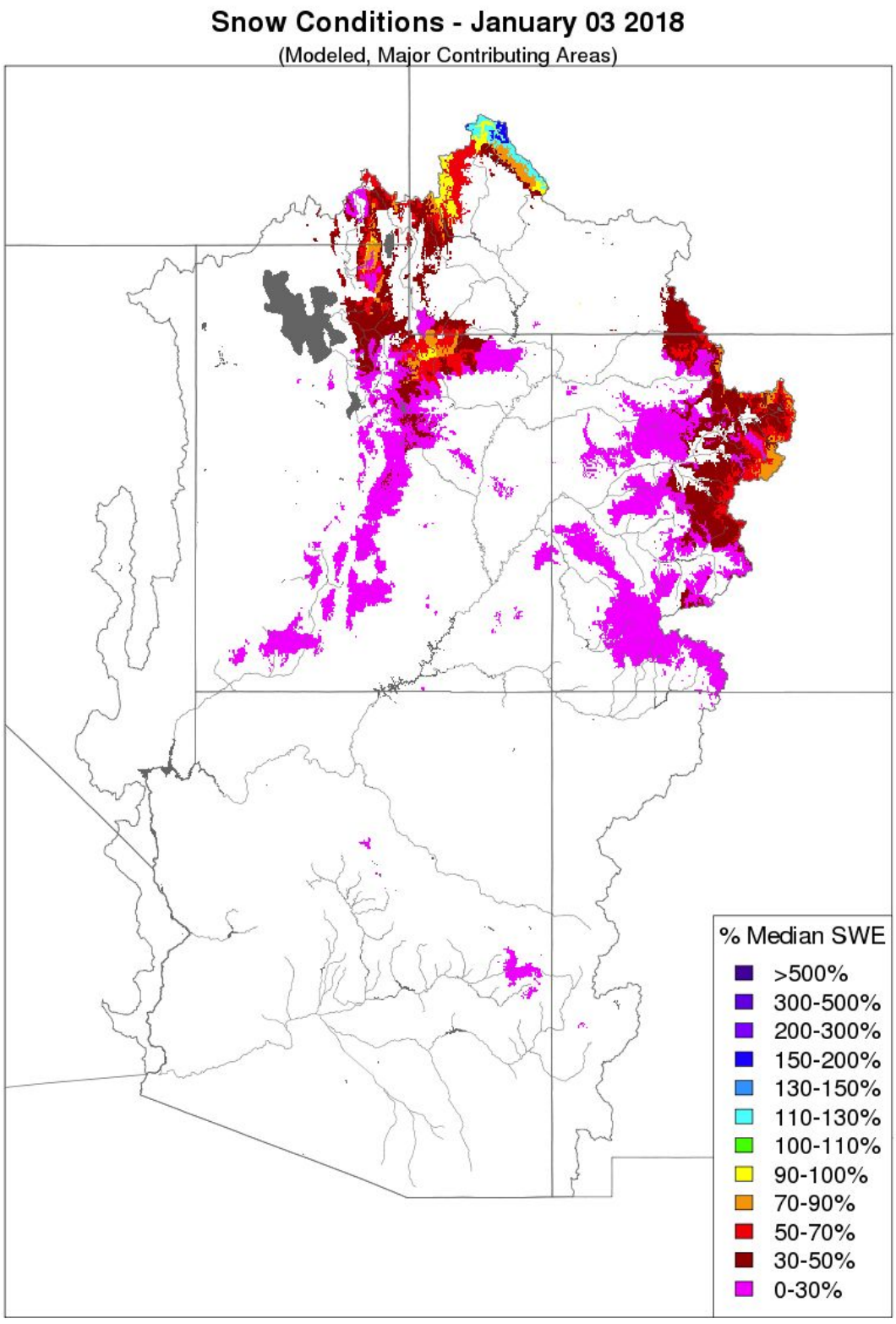
Image: Percent Median Snow Conditions as of January 3rd, 2018

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 most ranking as either the 2nd or 3rd lowest for this time of year.



Snow Percentile Image: Historical SNOTEL ranking as of January 3rd, 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 January 3rd, 2018

For updated SNOTEL information refer to click here
For CBRFC hydrologic model snow 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 with near average conditions 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.

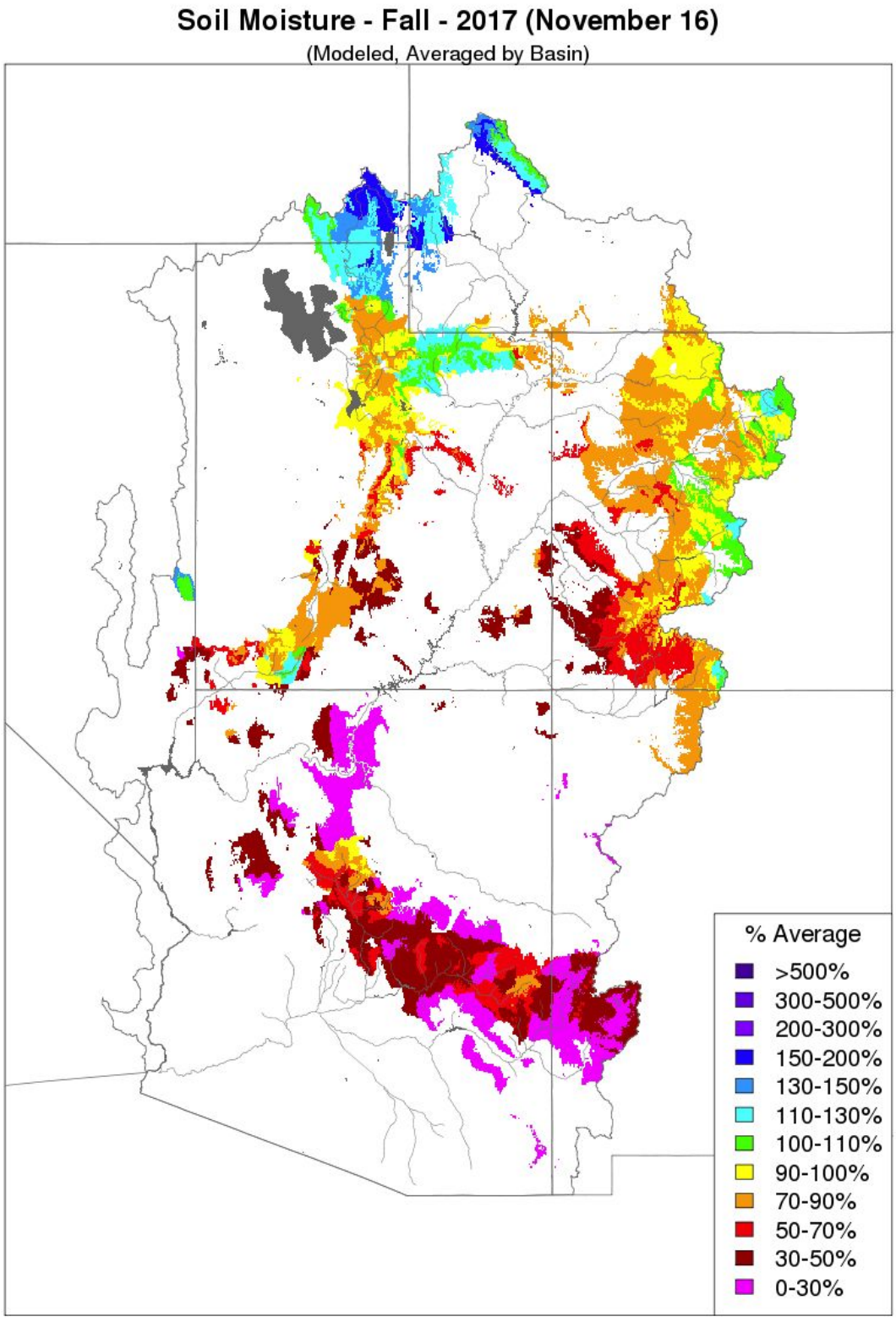


Image: Modeled soil moisture from the CBRFC hydrologic model entering the winter season

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 have continued to deteriorate in the Lower Colorado River Basin as shown in the image below, which indicates modeled soil moisture conditions much below average over the entire area. 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.

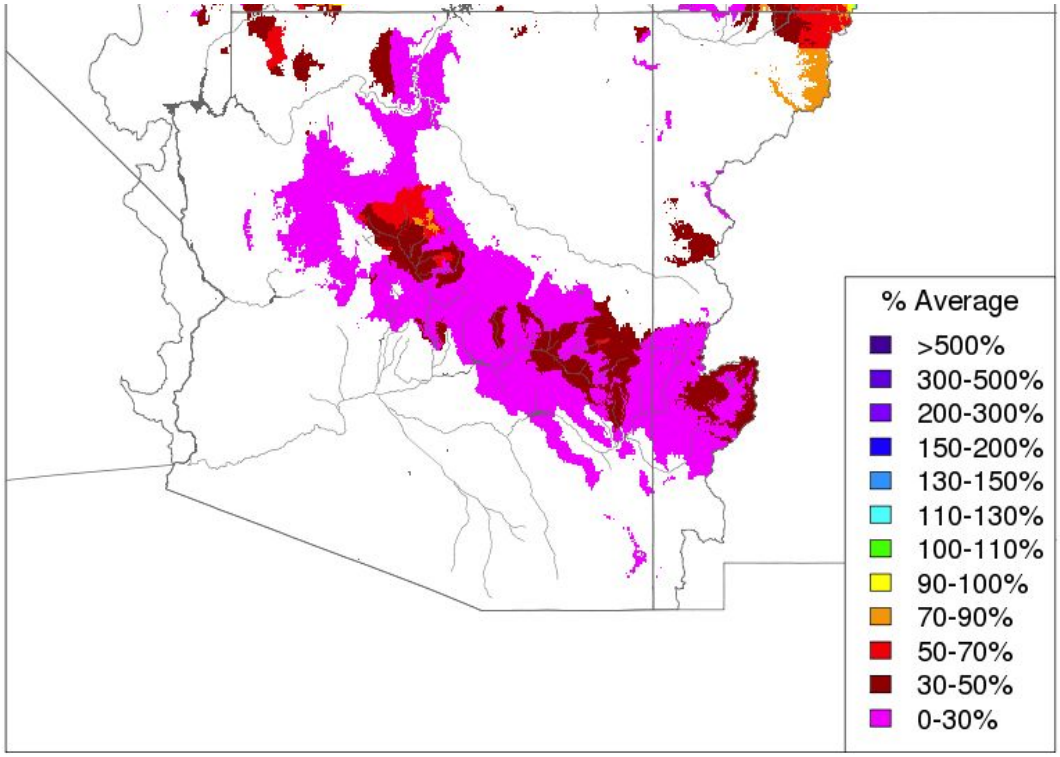


Image: Lower Colorado River Basin (AZ/NM) model soil moisture as of January 3rd, 2018

Upcoming Weather:

Although a couple of storm systems are expected to impact the CBRFC forecast area the first half of January, the high pressure ridge is expected to rebuild over the western U.S. and will be the dominant feature most likely into at least the third week of the month. How much precipitation is received from the early month storms will depend on how much they may weaken as they move through the mean ridge position. As of this publication date the storm with the

greatest potential is anticipated during the second week of January. Widespread precipitation may result with the most favorable locations for heavier precipitation in the southern half of the CBRFC forecast area. This includes the Lower Colorado River Basin extending north into southern Utah and southwest Colorado. These areas have seen little precipitation so far this winter and this could prove beneficial to water supply forecasts should it verify.

Dry weather is anticipated from the middle of January into at least the third week of the month over the entire area as the high pressure ridge is expected to rebuild.

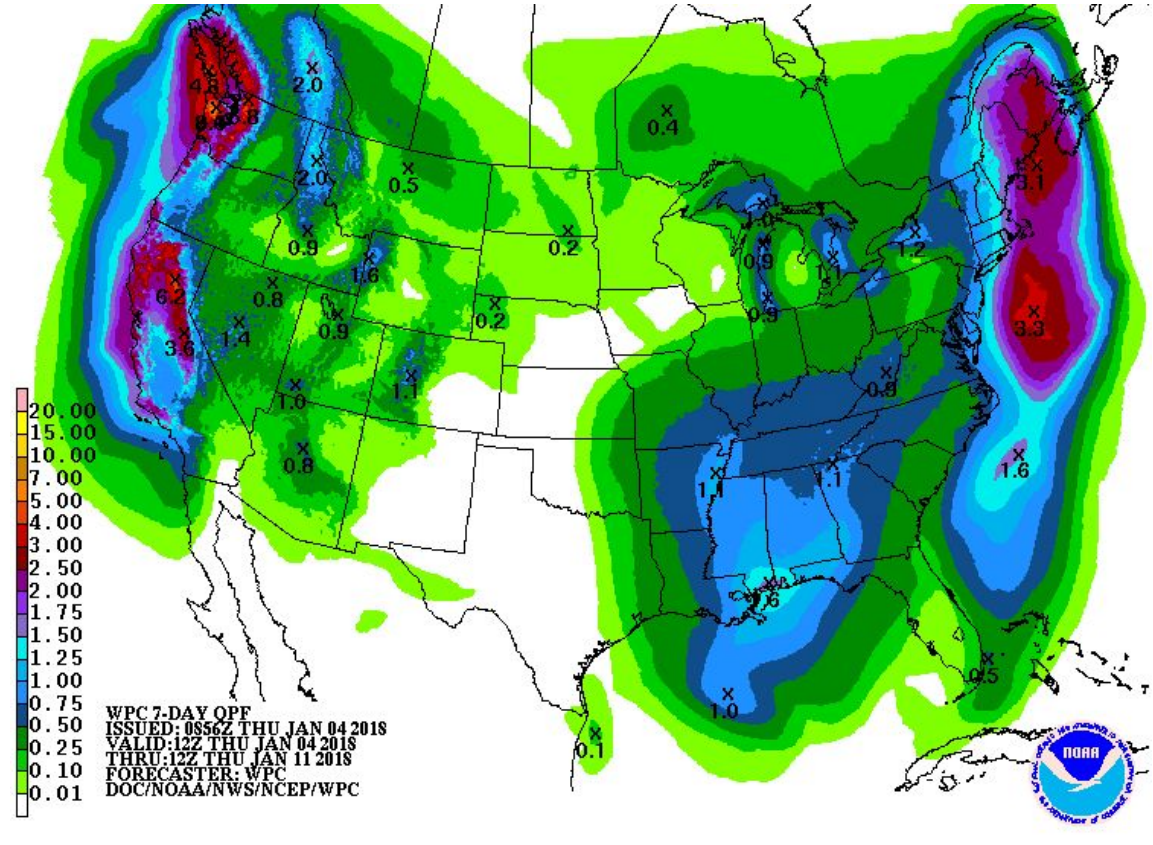


Image: NWS Weather Prediction Center precipitation forecast for Jan 4th - Jan 11th, 2018

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