

April 1, 2017 Water Supply Forecast Discussion

The [Colorado Basin River Forecast Center \(CBRFC\)](#) geographical forecast area includes the Upper Colorado River Basin, Lower Colorado River Basin, and Eastern Great Basin.

Water Supply Forecast Summary:

The first three weeks of March were extremely dry across most of the CBRFC forecast area; the exceptions were the Green River Basin in Wyoming, parts of the Bear River Basin in northern Utah and southeast Idaho, and along sections of the Wasatch front in northern Utah. Storms during the last week of the month kept many areas from a record dry March, although some SNOTEL sites in northwest Colorado still ended up in the bottom three on record.

Above average temperatures during this period led to considerable melting of lower elevation, and some mid elevation snowpack. These temperatures combined with the high pre-existing snowpack led to record March streamflow volumes at many locations throughout the Upper Colorado River and Eastern Great Basins.

Upper elevation snowpack conditions remain quite significant in the Green River headwaters, Bear River Basin, Weber River Basin, Provo River Basin, Duchesne River Basin, Gunnison River headwaters, and Dolores River Basin.

Water supply volume forecasts for the April-July period generally decreased, some significantly, from those issued in early March. However, most points in the Green River Basin in Wyoming, Bear River Basin, and Duchesne River Basin had little change from last month.

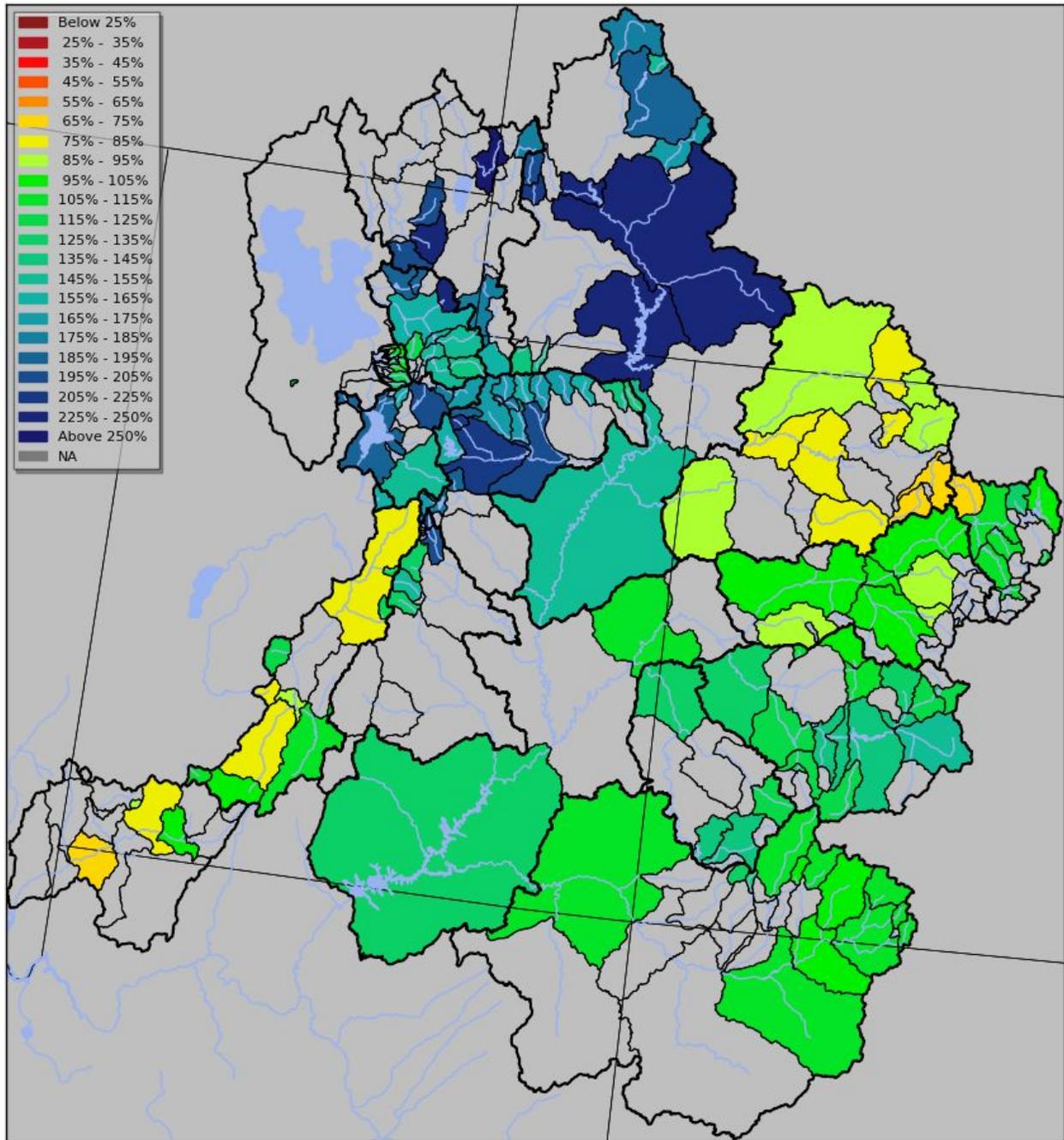
Current April-July forecast volumes are much above average in the Green River Basin of Wyoming, Bear River Basin, Weber River Basin, Provo River Basin, and Duchesne River Basin with some individual points forecast to exceed 200 percent of average. Runoff volume forecasts are also still above average in the Gunnison and Dolores River basins. The headwaters of the Colorado River mainstem and the San Juan Basin are currently forecast to receive near average runoff volumes, while the Yampa and White River basins now have forecasts for below average April-July runoff volumes.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 1.68 MAF (232% of average), Flaming Gorge 2.26 MAF (231% of average), Blue Mesa Reservoir 930 KAF (138% of average), McPhee Reservoir 420 KAF (142% of average), and Navajo Reservoir 760 KAF (103% of average). Lake Powell inflow is forecast at 9.30 MAF (130% of average).

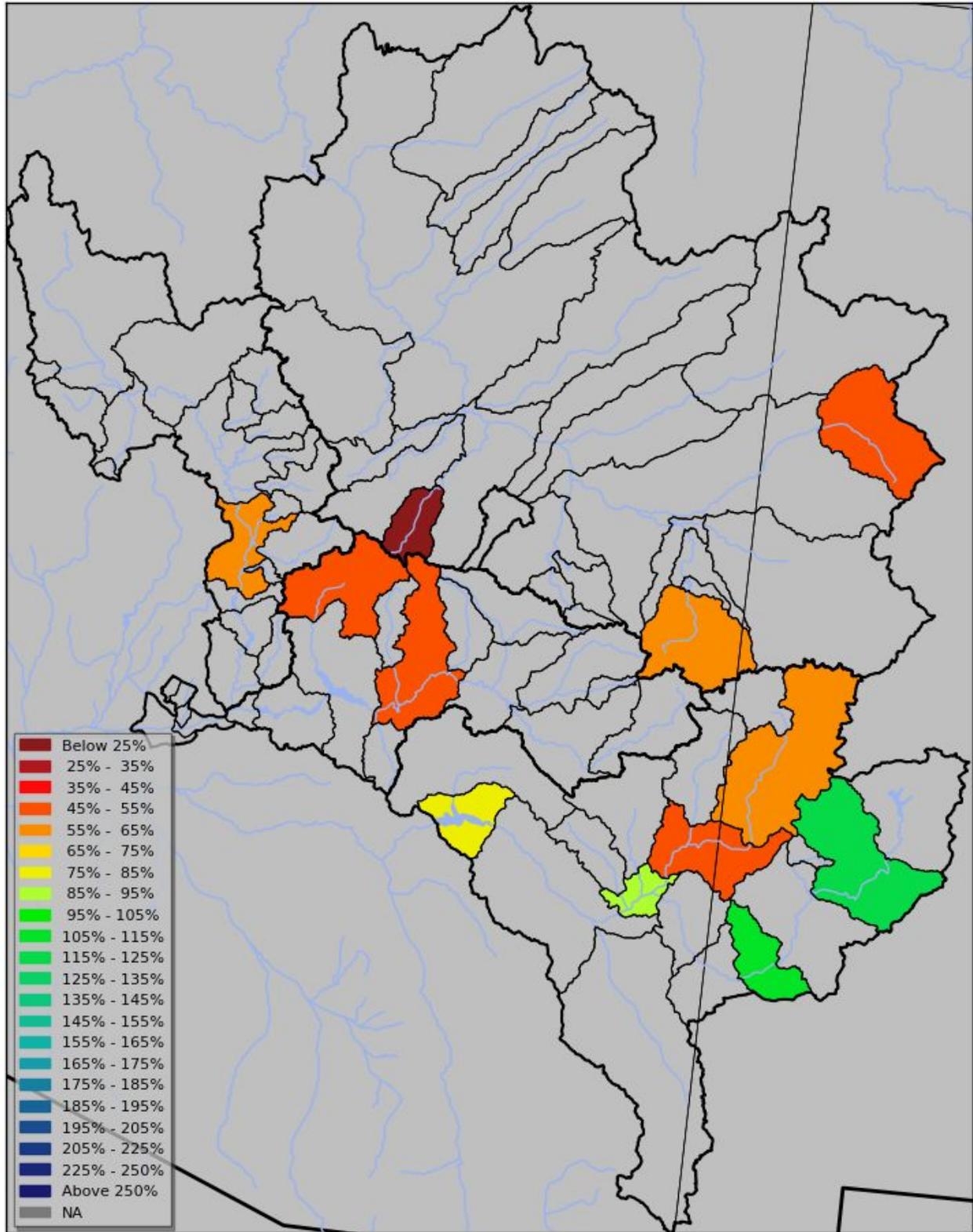
The Lower Colorado River Basin was also very dry in March with little to no precipitation until the last week of the month. Rapid snowmelt occurred during the month and little to no snow remains in the basins of Arizona and western New Mexico. Not much additional snowmelt runoff is expected in these basins for the April through May runoff period, but many points in the Verde River Basin, Salt River Basin, Gila River Basin, and Little Colorado River Basin have already observed much above median volumes for the January through March period. Total January-May forecast volumes for these areas are currently 150 percent to over 250 percent of median.

The Virgin River Basin was not quite as dry as the rest of the Lower Colorado River Basin during March and the snowpack is still near to above median in the higher elevations there. The April-July forecast runoff volumes have decreased from those issued in March and are now near to below average, but still above median.

Seasonal Water Supply Forecasts:



Upper Colorado, Great, Virgin River Basins: 2017 April-July forecast volumes as a percent of 1981-2010 average (50% exceedance probability forecast)



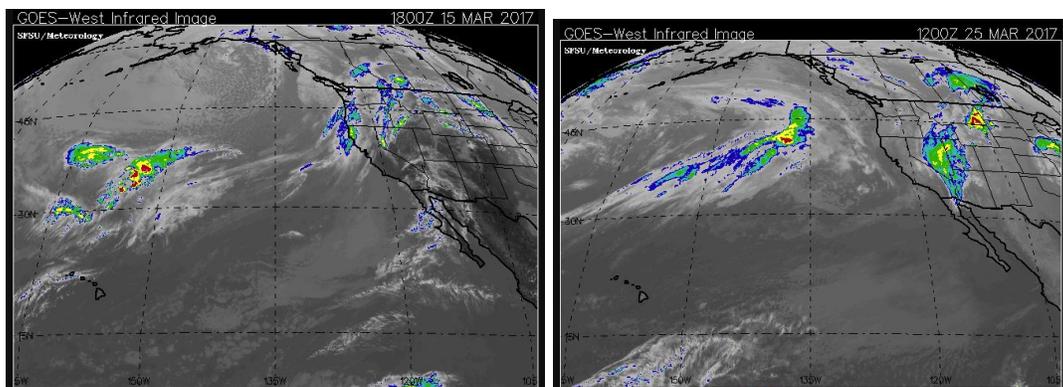
Lower Colorado Basin (AZ/NM): 2017 April-May forecast volumes as a percent of 1981-2010 median
(50% exceedance probability forecast)

For specific site water supply forecasts click [here](#)

Water Supply Discussion

Weather Synopsis:

A ridge of high pressure dominated the weather scene over the western U.S. the first 3 weeks of March. Storm systems were diverted north around the high pressure ridge and only impacted northern parts of the Bear and Green River Basins. Elsewhere very warm and dry conditions were prevalent. The atmospheric pattern changed after about March 20th with the ridge breaking down allowing storm systems back into the CBRFC forecast area. These systems brought significant precipitation in only a few days to much of the northern third of the forecast area. A storm system brought more widespread precipitation to the area as March ended. This system impacted areas farther south to include much of southern Utah and southwest Colorado.



Left Image: Satellite image from March 15th that shows a ridge of high pressure over the areas while storm systems were diverted to north. Right Image: Storm systems returned to the area bringing significant precipitation to some areas.

Precipitation and Temperature:

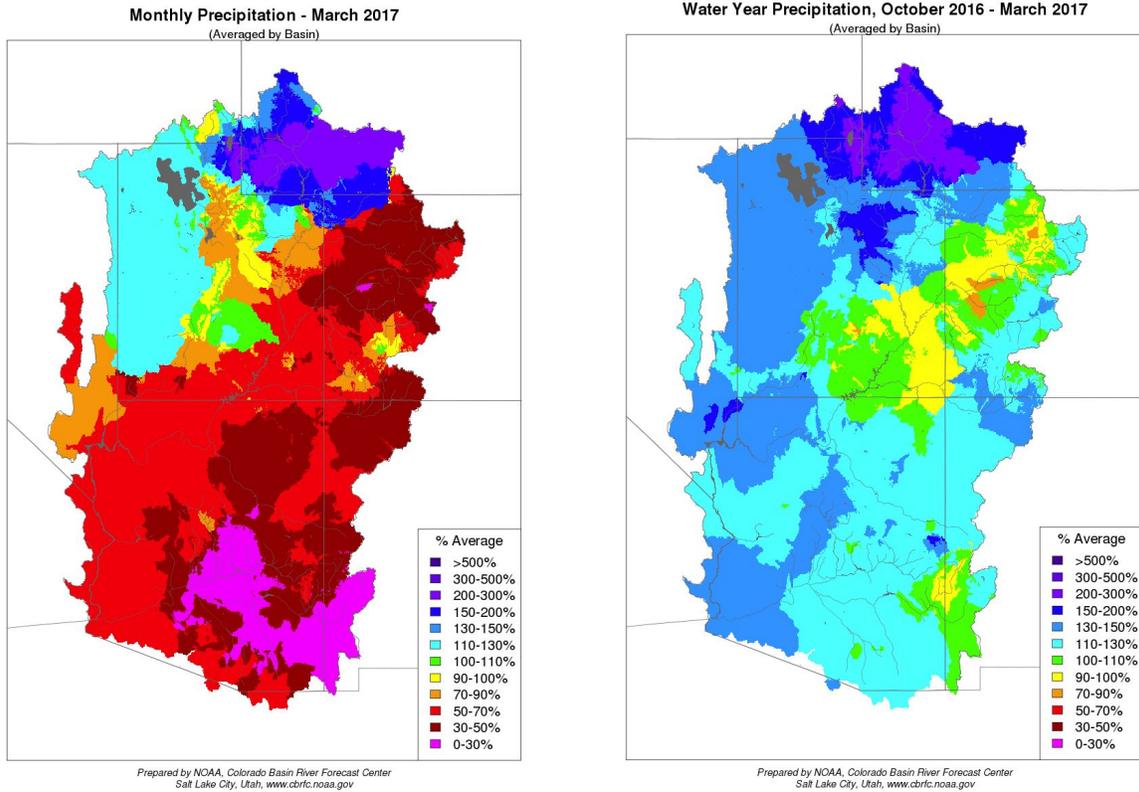
The March monthly precipitation image below indicates wet conditions once again over the Green River Basin in Wyoming, as well as in parts of the Bear River Basin and Duchesne River Basin. However, most of the CBRFC forecast area was very dry with less than 70% of average widespread and some areas with less than 50% of the monthly average precipitation.

Some individual SNOTEL sites in the Yampa, White, and Upper Colorado mainstem basins received amounts that rank in the bottom three on record for the month of March. However, the water year (October 2016 - March 2017) precipitation are still near to above average in these areas.

In contrast, with a few exceptions, most SNOTEL sites in the Green River Basin of Wyoming, Bear River Basin, Weber River Basin, Six Creeks drainages, Provo River Basin, and Duchesne River Basin have received December through March precipitation totals that rank as the highest on record. Most records for these sites range from 34-39 years in length. This is noteworthy since SNOTEL sites are high elevation sites and best represent the conditions where April-July runoff is generated. Water year precipitation is generally 130 to over 200 percent of average in these areas.

The Gunnison River Basin, Dolores River Basin, San Juan River Basin, as well as the Lower Colorado River Basin all

have water year precipitation totals that are above average, even with the dry March.



Images: March 2017 and water year (Oct 2016-Mar 2017) precipitation graphics (Averaged by basins defined in the CBRFC hydrologic model)

Overall, March was a warm month, as seen in the maps below displaying maximum and minimum monthly temperature deviations from average. From about March 10th to March 22nd temperatures were much above average with daily maximum temperature records broken at several places throughout the area. Mean daily temperatures exceeded 20 degrees above average at many locations. Higher elevation SNOTEL sites also experienced several days with both maximum and minimum temperatures above freezing during March.

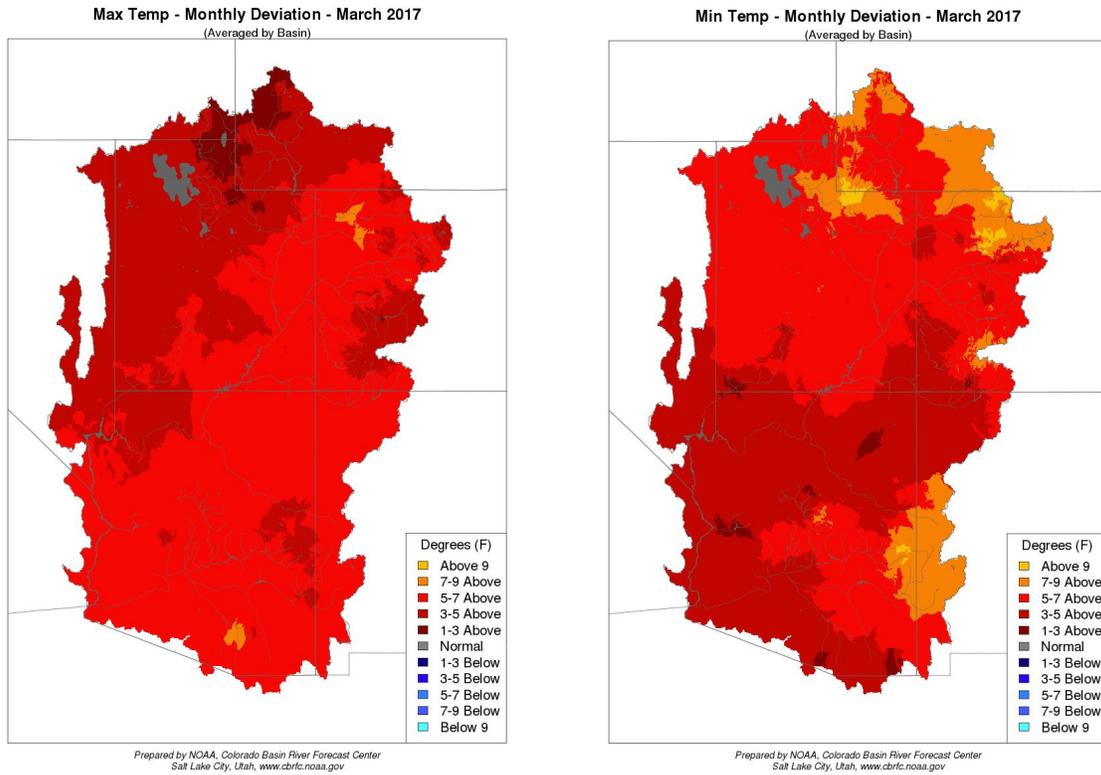
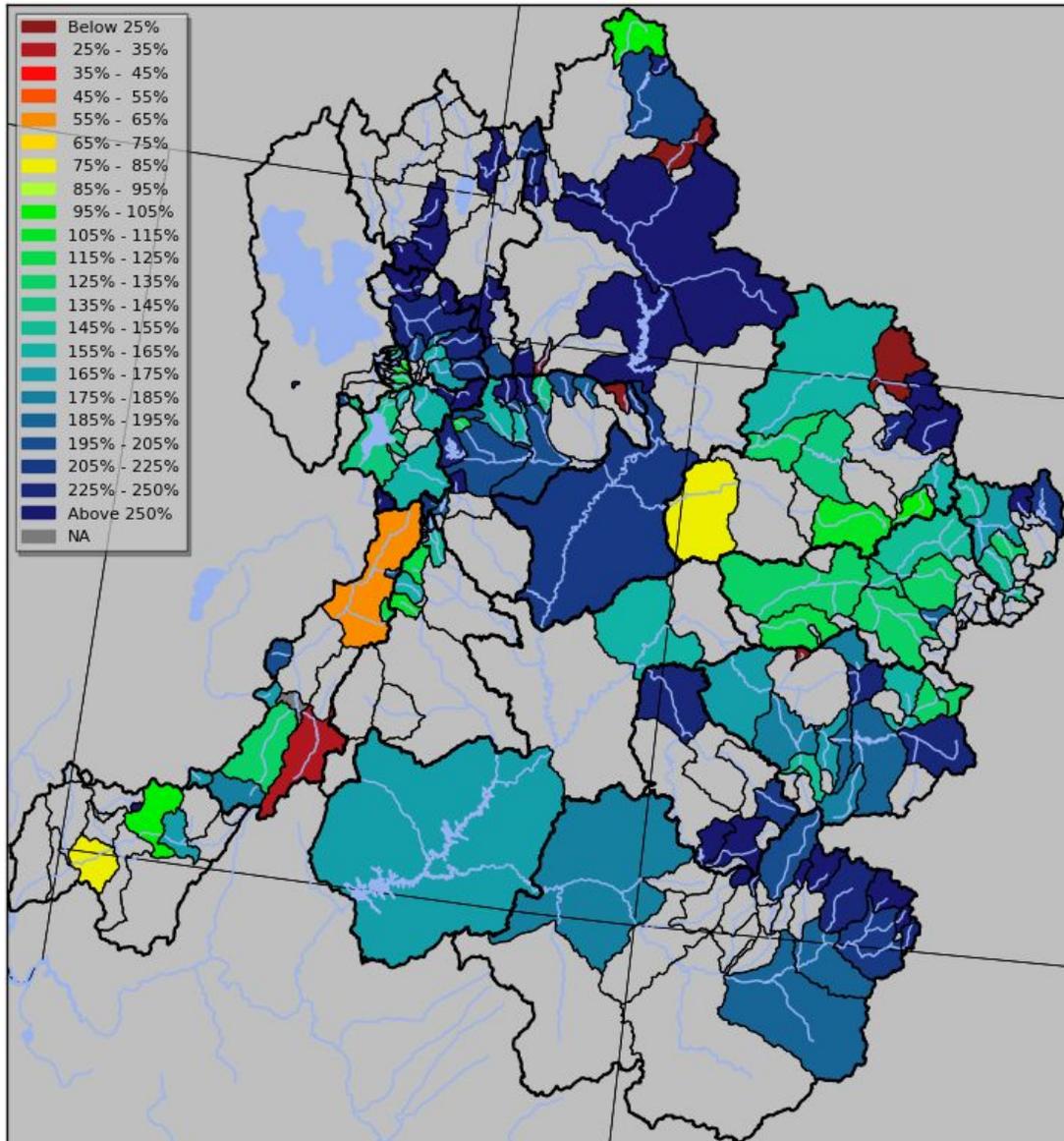


Image: Monthly maximum and minimum temperature departure from average for March 2017.
(Averaged by basins defined in the CBRFC hydrologic model)

Observed Flow:

The warm temperatures caused significant snowmelt at lower to mid elevations that resulted in many record monthly streamflow volumes being set throughout the CBRFC forecast area. The map below shows the March unregulated streamflow volumes as a percent of average. Most of the Upper Colorado River Basin and Eastern Great Basin had March volumes that exceeded 150 percent of average, with volumes over 200 percent of average in many areas.



Upper Colorado, Great, Virgin River Basins: 2017 March unregulated volumes as a percent of 1981-2010 average

Snowpack:

Upper elevation snowpack conditions remain quite significant in the Green River headwaters, Bear River Basin, Weber River Basin, Provo River Basin, Duchesne River Basin, Gunnison River headwaters, and Dolores River Basin. Several locations in the Green River Basin of Wyoming, Duchesne River Basin, and Bear River Basin range from 150 to 200 percent of the historical median. Snowpack conditions in the upper Gunnison River Basin range from near 140 to 180 percent of median. Significant melt occurred in March in the Yampa and White River Basins and the snow pack conditions are now below average in those basins. Elsewhere in the Upper Colorado River Basin and Great Basin, snowpack conditions are near to slightly above average.

In the Lower Colorado River Basin, rapid snowmelt occurred during the month of March and little to no snow remains in the basins of Arizona and western New Mexico.

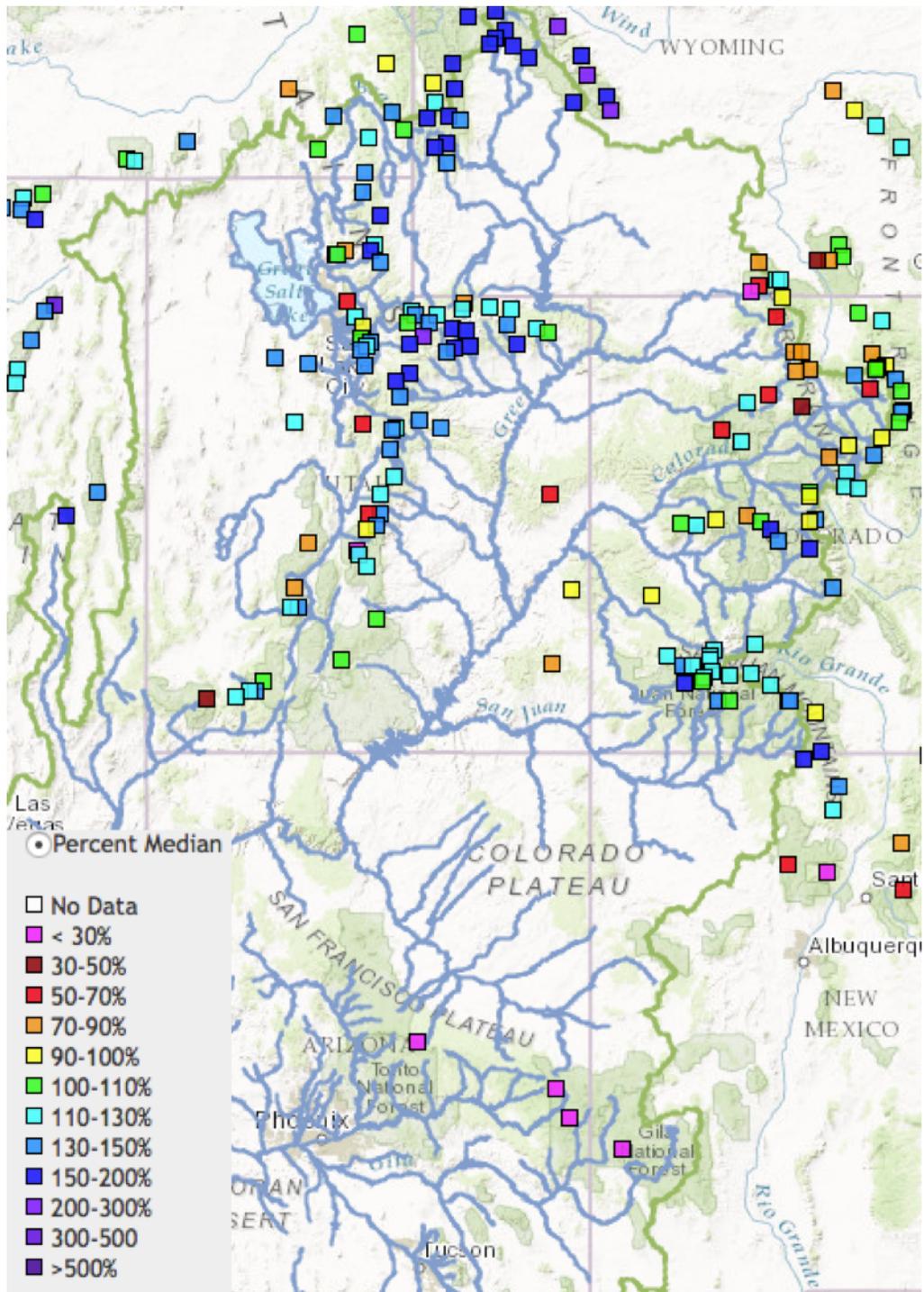
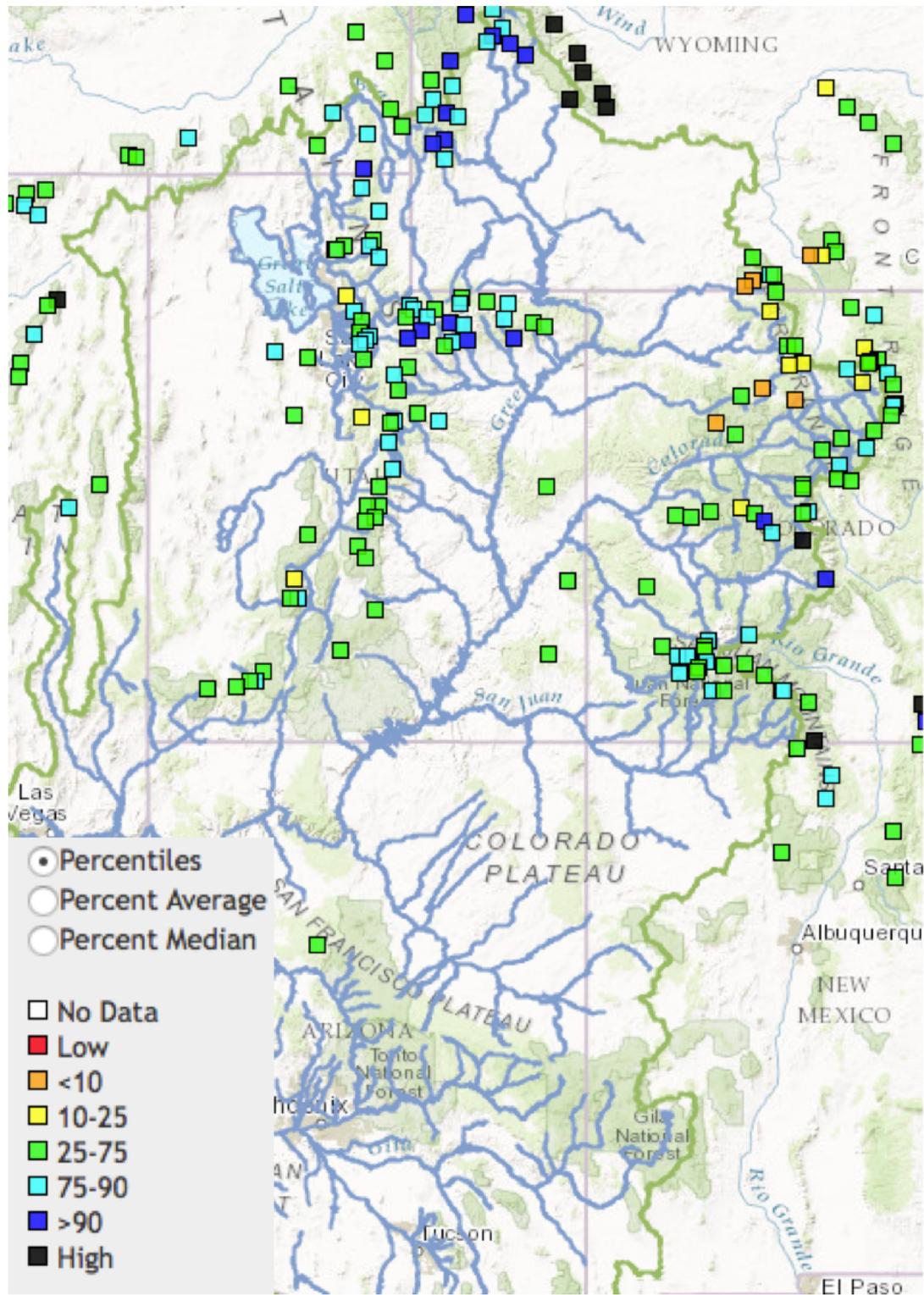


Image: Percent Median Snow Conditions as of April 5th 2017

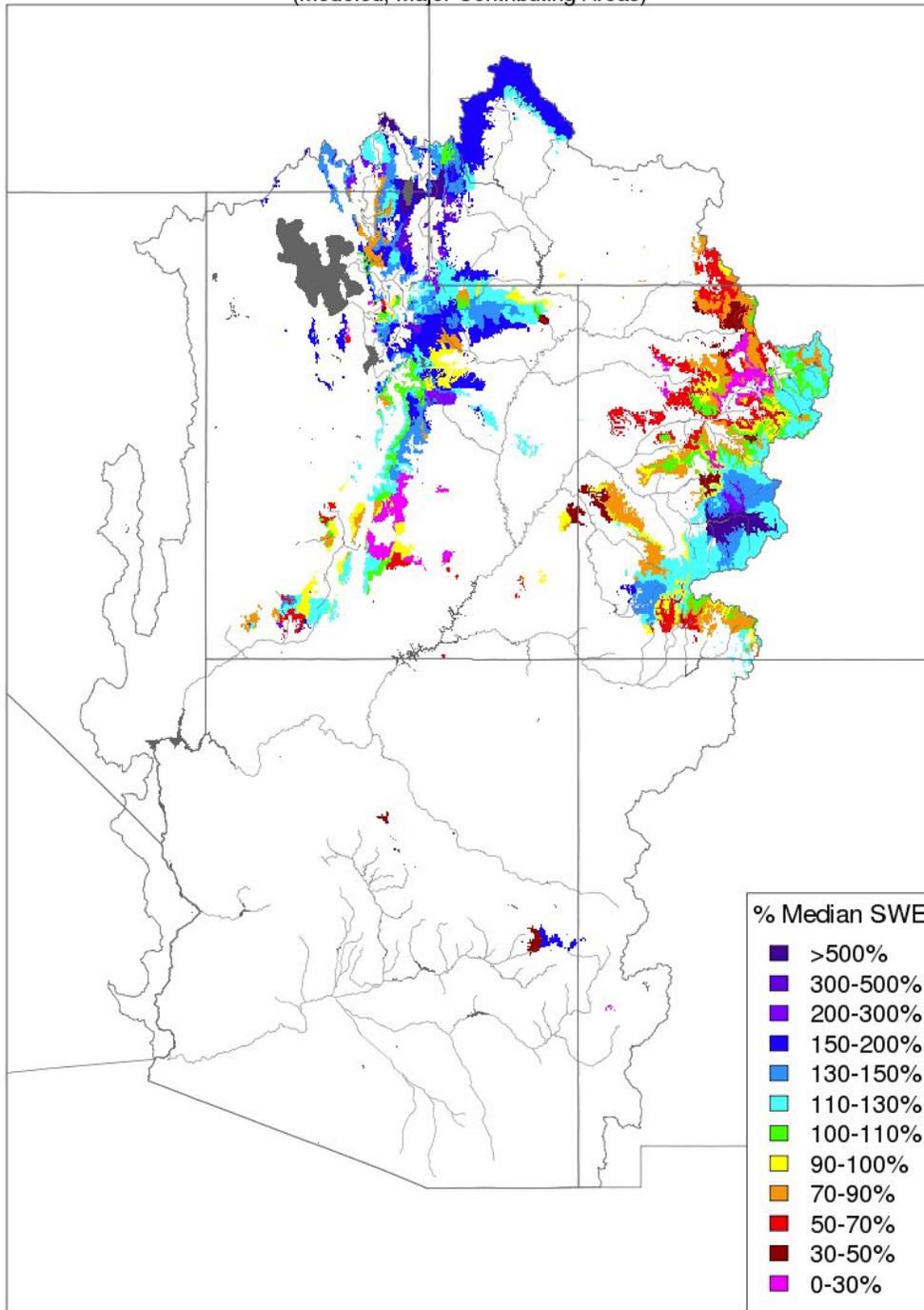
The snow percentile image displayed below indicates where the current snow measurement ranks in the historical record for each site. Only two sites within the CBRFC forecast area are now depicted with black boxes indicating these are the highest values on record for this time of year. Sites in the dark blue are in the top 10 of record (typically 34-39 years) with most ranking as either the 2nd or 3rd highest for this time of year.



Snow Percentile Image: Historical SNOTEL ranking as of April 5th 2017

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 significant snowpack at high elevations is widespread, with the exception of the Yampa River Basin as indicated by the hydrologic model. Largest snowpack areas compared to the historical median extend from central Utah through northern Utah into Wyoming and include primarily the Duchesne Basin, northern Great Basin, and the Green River Basin of Wyoming. Largest streamflow volumes with respect to average are forecast for these areas.

Snow Conditions - April 05 2017 (Modeled, Major Contributing Areas)



Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

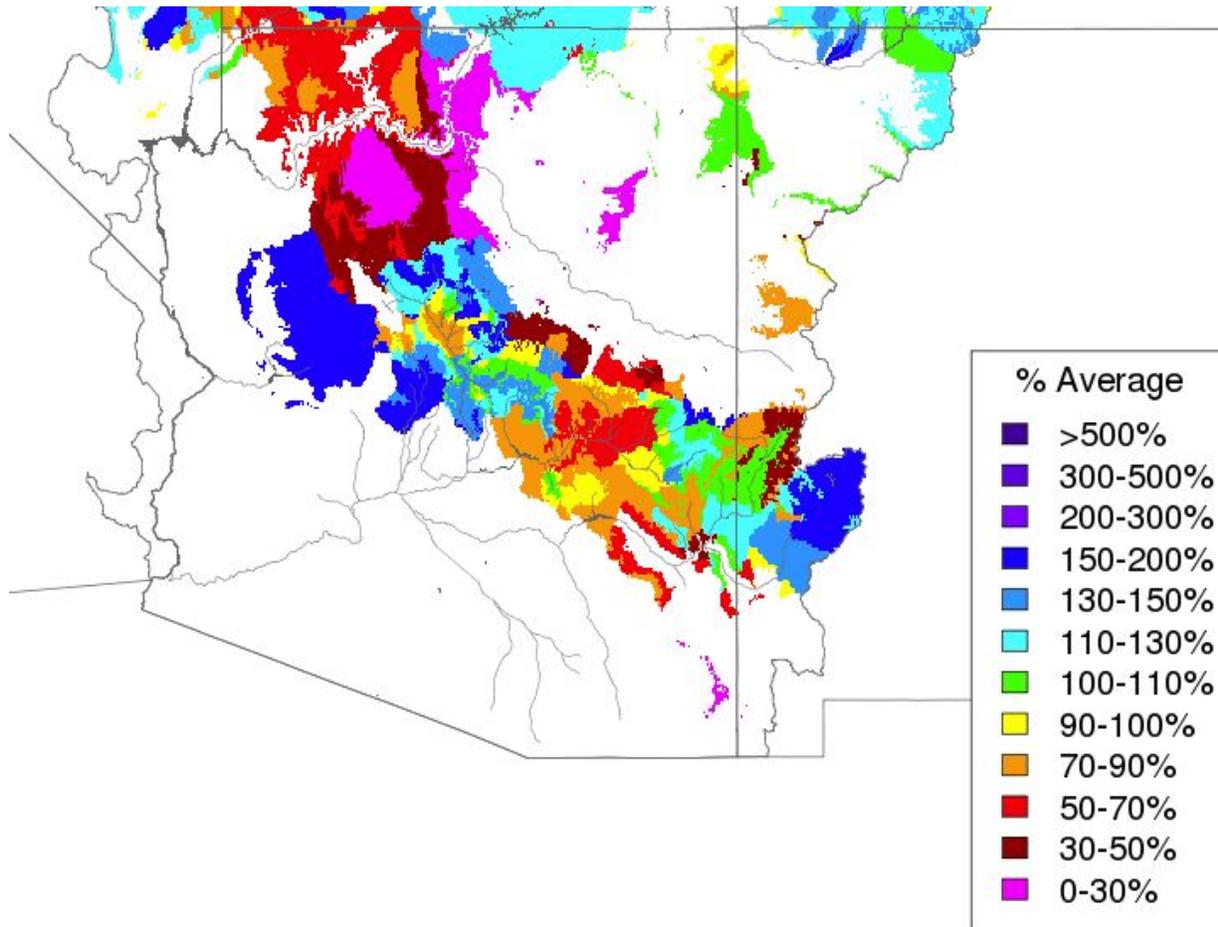
Modeled Snow: Snow representation from the CBRFC hydrologic model April 5th 2017

For updated SNOTEL information refer to click [here](#)

For CBRFC hydrologic model snow click [here](#)

Soil Moisture:

Soil moisture conditions tend to fluctuate 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. In the image below modeled soil moisture conditions are still near to above average in the upper Gila River Basin and parts of the Salt and Verde River Basins as of early April.



*Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov*

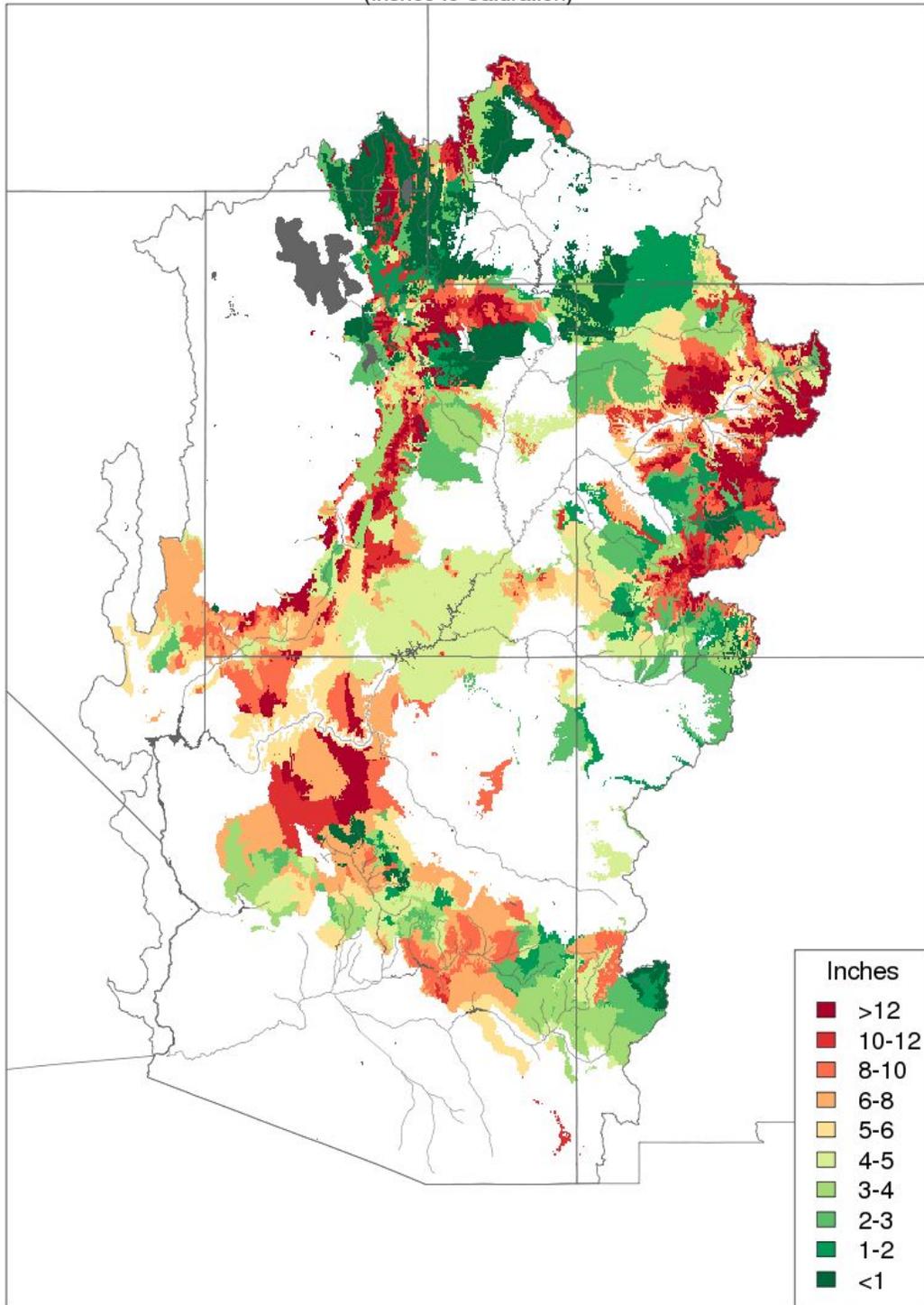
Image: Model soil moisture Lower Colorado River Basin (AZ/NM) as of April 5th 2017

The following image is from the CBRFC hydrologic model and it indicates where the model suggests soils are becoming saturated. Typically it does not have much meaning during the winter season in the Upper Colorado River Basin and Great Basin as soil conditions remain fairly static under the snowpack. Higher elevations typically fall into red and orange categories this time of year prior to snowmelt. Dark green areas indicated in the model suggest soils are becoming saturated and these areas would experience more efficient runoff from snowmelt or additional rain. The dark green areas across lower elevations of the Green River Basin in Wyoming, Bear River Basin, Duchesne River Basin and the Weber River Basin are saturated according to the model. Some of these areas have already experienced some flood related issues and will continue to experience very efficient runoff from additional snowmelt

or rainfall this spring.

Soil Moisture - April 05 2017

(Inches to Saturation)



Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Image: Model saturation as of April 5th 2017

Upcoming Weather:

The pattern through at least mid April is expected to be active with a series of Pacific storm systems moving through the western U.S. Periods of cooler and wetter weather will be intermixed with periods of dry weather and above average temperatures. Streamflow levels, while generally increasing through April, will also fluctuate with the warmer and cooler temperatures.

This type of weather pattern is typical of April and is not expected to have a large impact to existing water supply volume forecasts in the near term. Greatest impacts would result from an extended period with precipitation and temperature on one side or the other of climatological normals.

The map below, from NOAA's Weather Prediction Center, illustrates 7-Day forecasted precipitation totals from April 5th through April 12th.

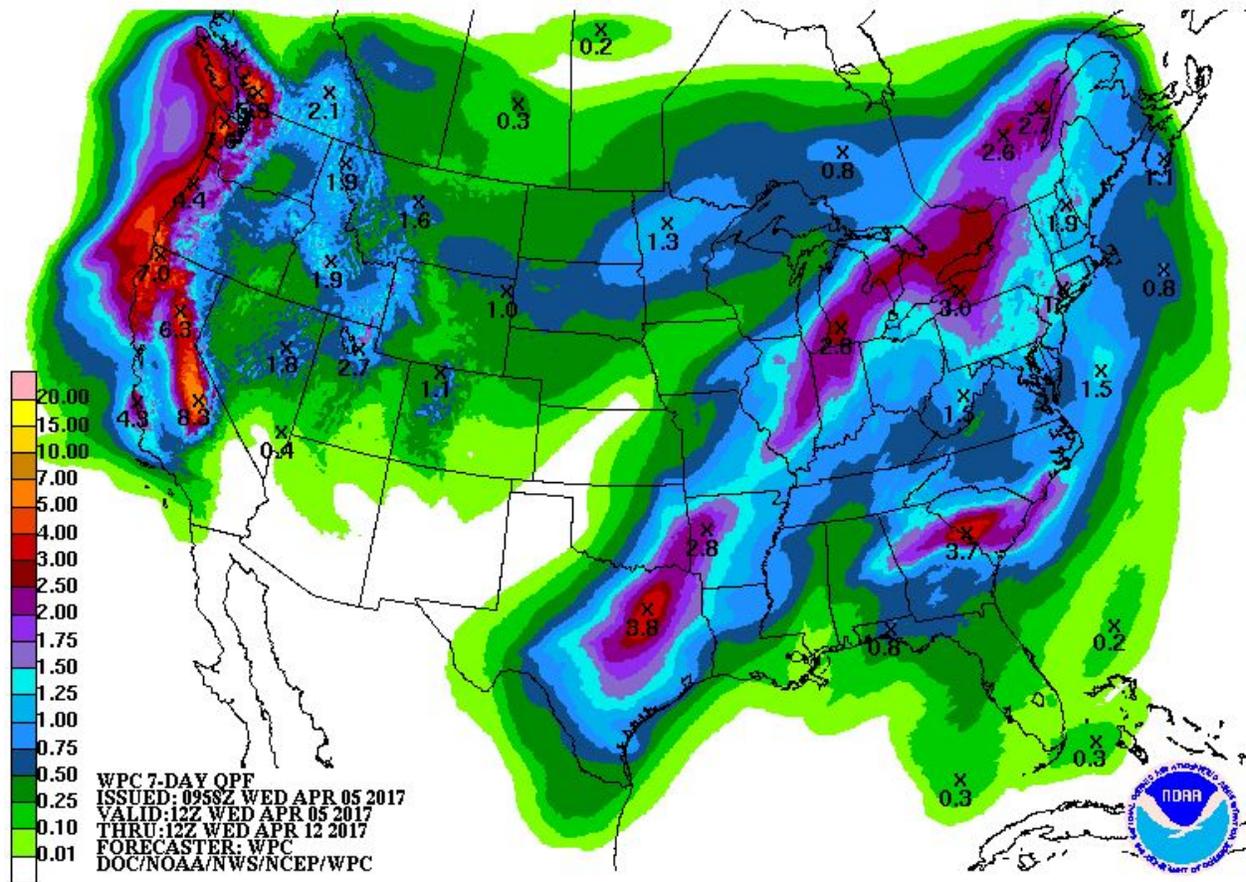


Image: NWS Weather Prediction Center precipitation forecast for April 5th - April 12th 2017

End Of Month Reservoir Content Tables

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Basin Conditions and Summary Graphics

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