

February 1, 2016 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.

Seasonal Water Supply Forecasts:

Water Supply Forecast Summary:

April-July runoff forecasts increased in some areas while decreasing in other areas compared to those issued in early January. This was due to a highly variable precipitation pattern over the CBRFC forecast area during the month of January. Some of the larger increases in forecasts with respect to average occurred over the Great Basin particularly in the Weber River and Six Creeks Basins. A positive trend in the forecasts volumes also occurred in the Virgin and Sevier River Basins of southwest Utah. Some minor increases also occurred in the Yampa River Basin, tributaries of the Colorado River mainstem, and Dolores River Basin.

Forecast changes were minor in other areas, with some small decreases occurring in parts of the Duchesne River Basin, Green River Basin above Flaming Gorge, and eastern headwaters of the San Juan River Basin.

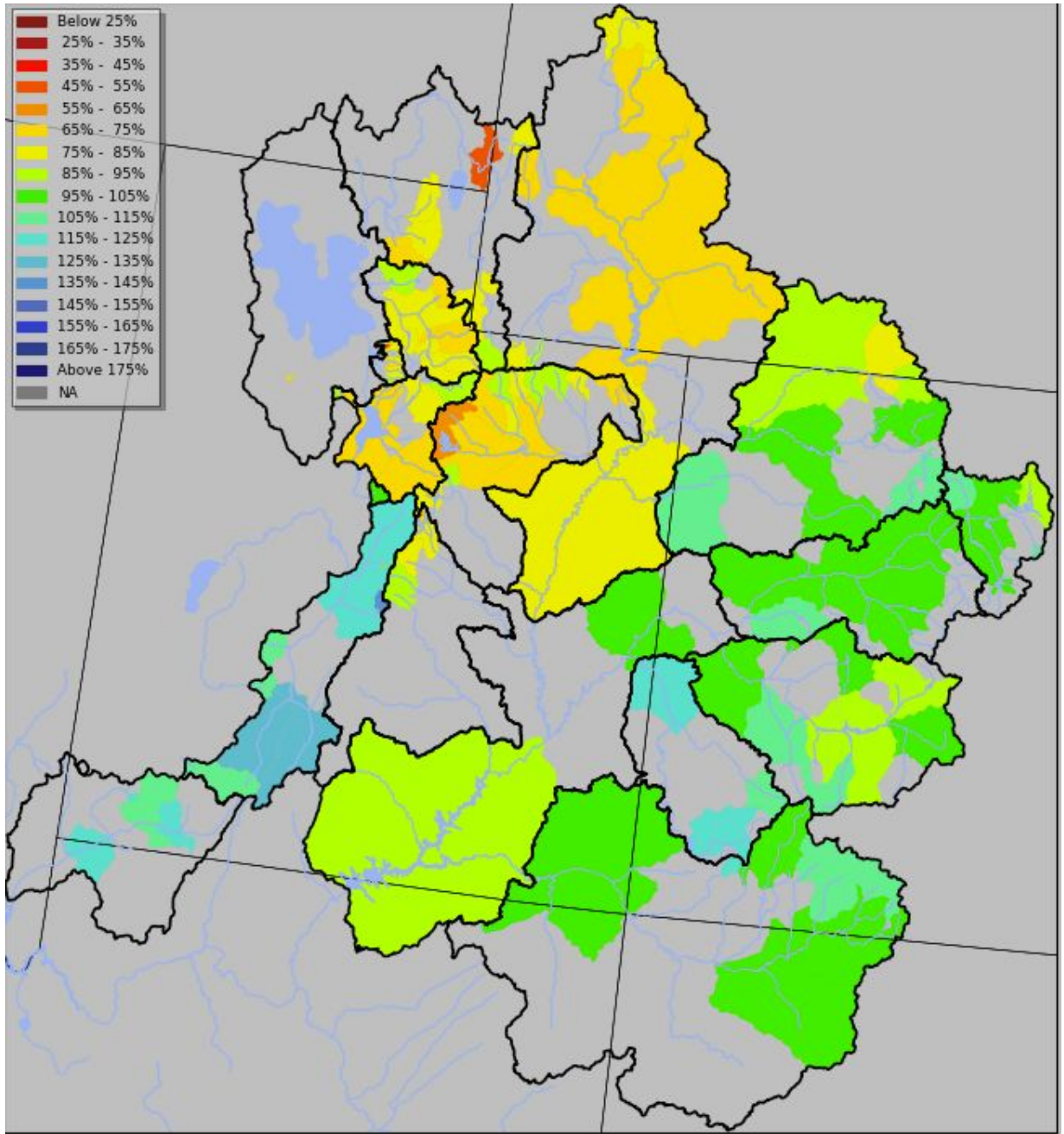
Highest forecast volumes with respect to average are in the Dolores, Sevier, and Virgin River Basins where many forecasts exceed 115 percent of average. Near to above average runoff conditions are anticipated throughout the San Juan River Basin. Favorable runoff conditions generally exist in the Gunnison River Basin, Yampa River Basin, and Colorado River above Kremmling although forecasts are a bit more variable and include mix of below and above average forecasts.

Despite improvement in much of the Great Basin, below average runoff volumes are still expected. This area had some of the lowest soil moisture conditions compared to normal entering the winter season and this is having a negative impact on forecasts. Below average runoff volumes are also expected throughout the Green River Basin above Flaming Gorge and in the Duchesne River Basin.

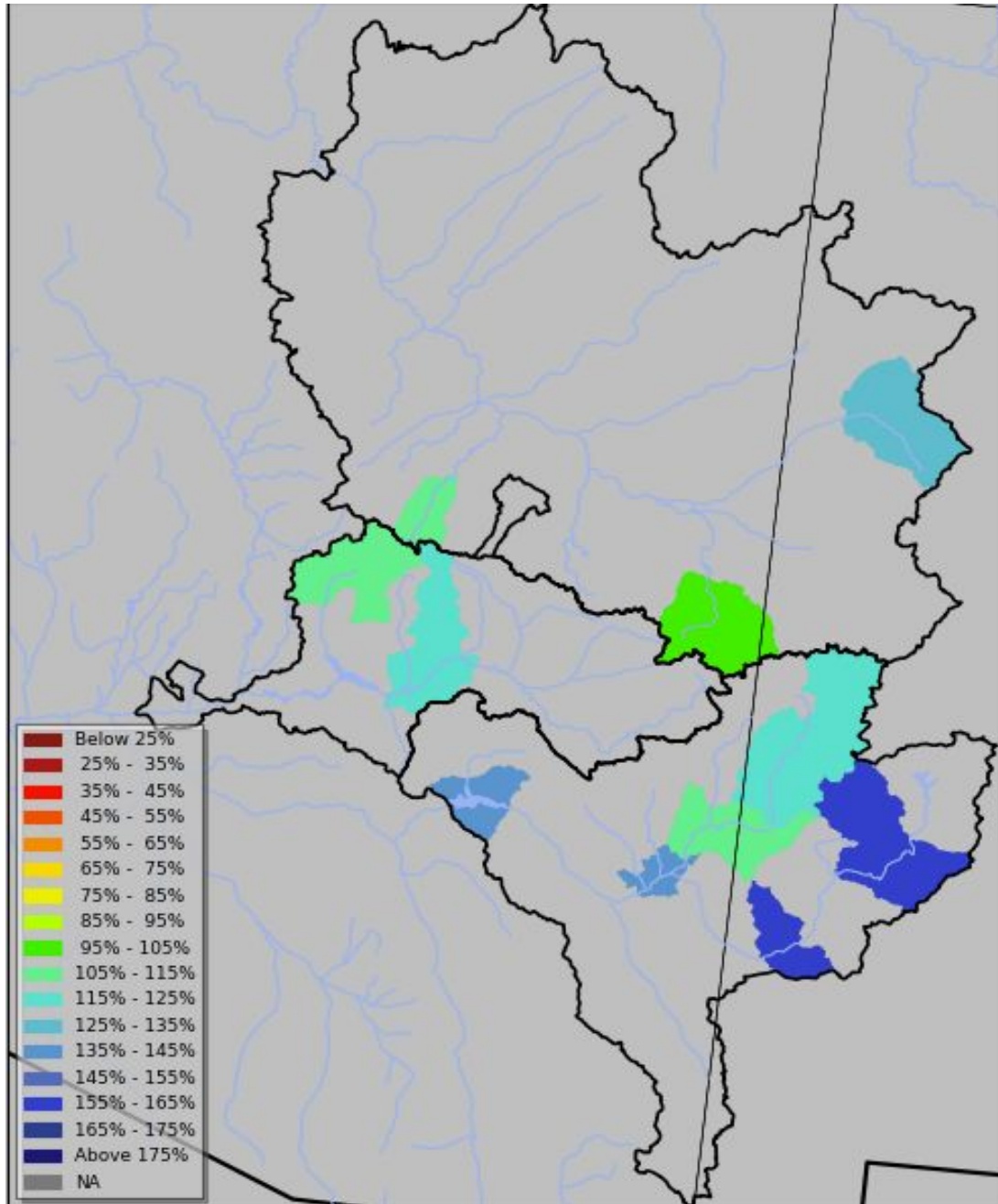
Above to much above median February-May volumes are forecast in the Lower Colorado River Basin of Arizona that includes the Salt, Verde, Gila, and Little Colorado River Basins. Above average January precipitation, favorable snow conditions in many areas, and the presence of El Niño conditions in the Pacific Ocean all contribute to expectations of above average runoff volumes in these areas.

April-July inflow forecasts for some of the major reservoirs in the upper Colorado River Basin include Lake Powell 6.7 MAF (94% of average), Fontenelle Reservoir 515 KAF (71% of average), Flaming Gorge 685 KAF (70% of average), Blue Mesa Reservoir 640 KAF (95% of average), McPhee Reservoir 365 KAF (124% of average), and Navajo Reservoir 735 KAF (100% of average).

The summary above references forecasts at the 50% exceedance probability level. A large range of forecast values exist between the 10% and 90% exceedance probability levels. This is due to the fact a significant part of the snow accumulation season remains ahead of us. It is also a reflection of the uncertainty in that snow accumulation amount.



Upper Colorado Basin: 2016 April-July forecast volumes as a percent of 1981-2010 average
(50% exceedance probability forecast)



Lower Colorado Basin (AZ/NM): 2016 February-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

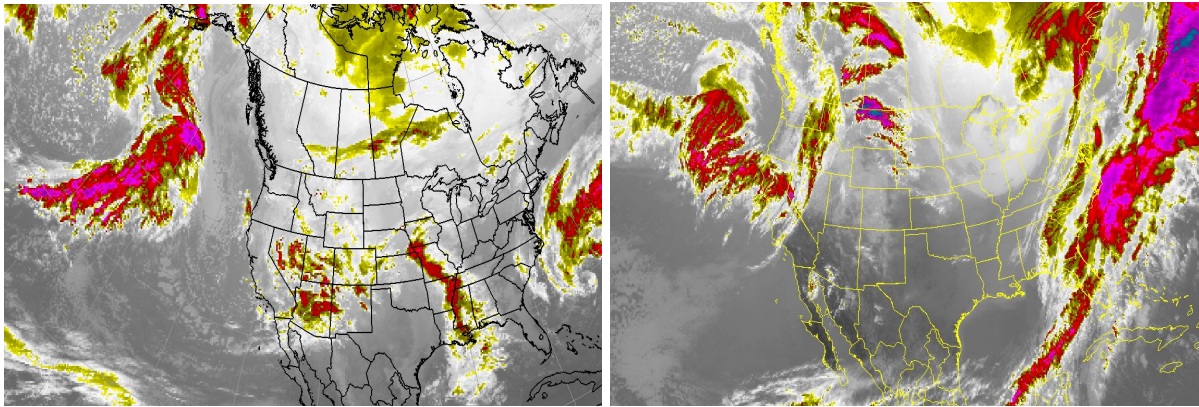
[Click here for specific site water supply forecasts](#)

Water Supply Discussion

Weather Synopsis:

January 2016 brought several storms into the CBRFC forecast area. Impacts varied as these systems encountered a high pressure system present during the first half of the month. The result was weakening and splitting storms with

much of the energy and precipitation impacting areas south of Lake Powell with lesser amounts in the northern half of the basin. Moisture increased later in the month as a strong zonal pattern brought significant moisture into the western U.S. As a large trough of low pressure developed and moved through the area, widespread precipitation occurred, especially over the southern half of the CBRFC forecast area.



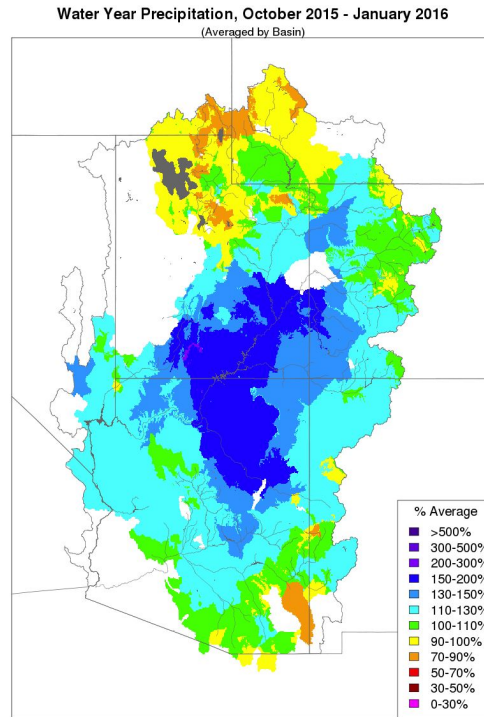
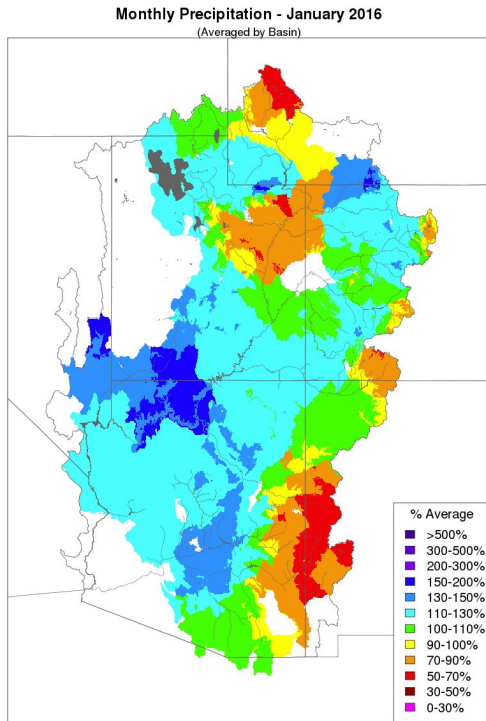
Left: Satellite image for January 7th 2016 showing a storm system impacting primarily the southern half of the CBRFC forecast area. Right: Satellite image for late January 2016 showing a storm system over the western U.S. that extends westward into the Pacific Ocean. This system brought significant moisture into the area.

Precipitation and Temperatures:

Weakening and splitting storm systems during January resulted in an interesting precipitation pattern for the month. Most areas in the southern half of the CBRFC forecast area received much above average precipitation, including the Virgin, Sevier and Verde River Basins. North of Lake Powell the pattern was highly variable with much above average precipitation in some areas (Great Basin and Yampa River Basin), and other areas with much below average precipitation (Duchesne River Basin and Green River Basin above Fontenelle).

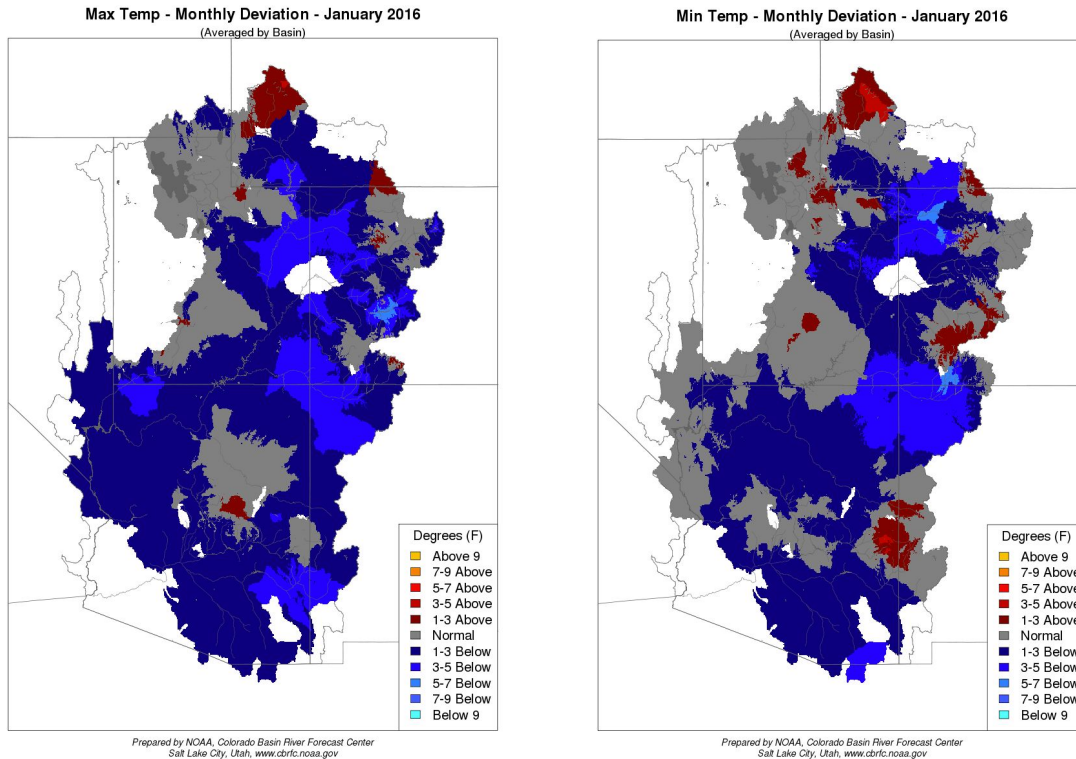
Storm activity from southwest Arizona moved towards the northeast, but missed some of the areas along the eastern boundary of the CBRFC forecast area. This pattern is apparent on the image of January precipitation with below average precipitation observed in the Salt and Gila River Basins, eastern headwaters of the San Juan and Gunnison River Basins and in the eastern Colorado River headwaters. Areas farther west, in the path of the storm system, received much closer to average precipitation for the month.

The water year precipitation (October-January) image indicates near to above average precipitation over the majority of the CBRFC forecast area. Lowest precipitation with respect to average continues to exist over the Green River Basin above Flaming Gorge extending into much of the Great Basin of northern Utah, Wyoming, and Idaho. However conditions in the Great Basin have shown improvement.



Monthly and water year precipitation graphics
(Averaged by CBRFC hydrologic modeled basins)

The mean monthly maximum temperatures were generally near or below average for the month. The Green River above Fontenelle, that was out of the storm track, recorded above average maximum temperatures for January. However, temperatures did fluctuate during the month. Temperatures started out cold early in the month with daily mean temperatures 10 to 20 degrees below average. That was followed by periods where mean daily temperatures reached 10 or more degrees above average. At times rainfall was observed at elevations up to 6000 feet. Since then temperatures have varied with both near and above average periods. Mean monthly minimum temperatures were also near or slightly colder than average over much of the forecast area.



Monthly maximum and minimum temperature departure from average.
(Averaged by CBRFC hydrologic modeled basins)

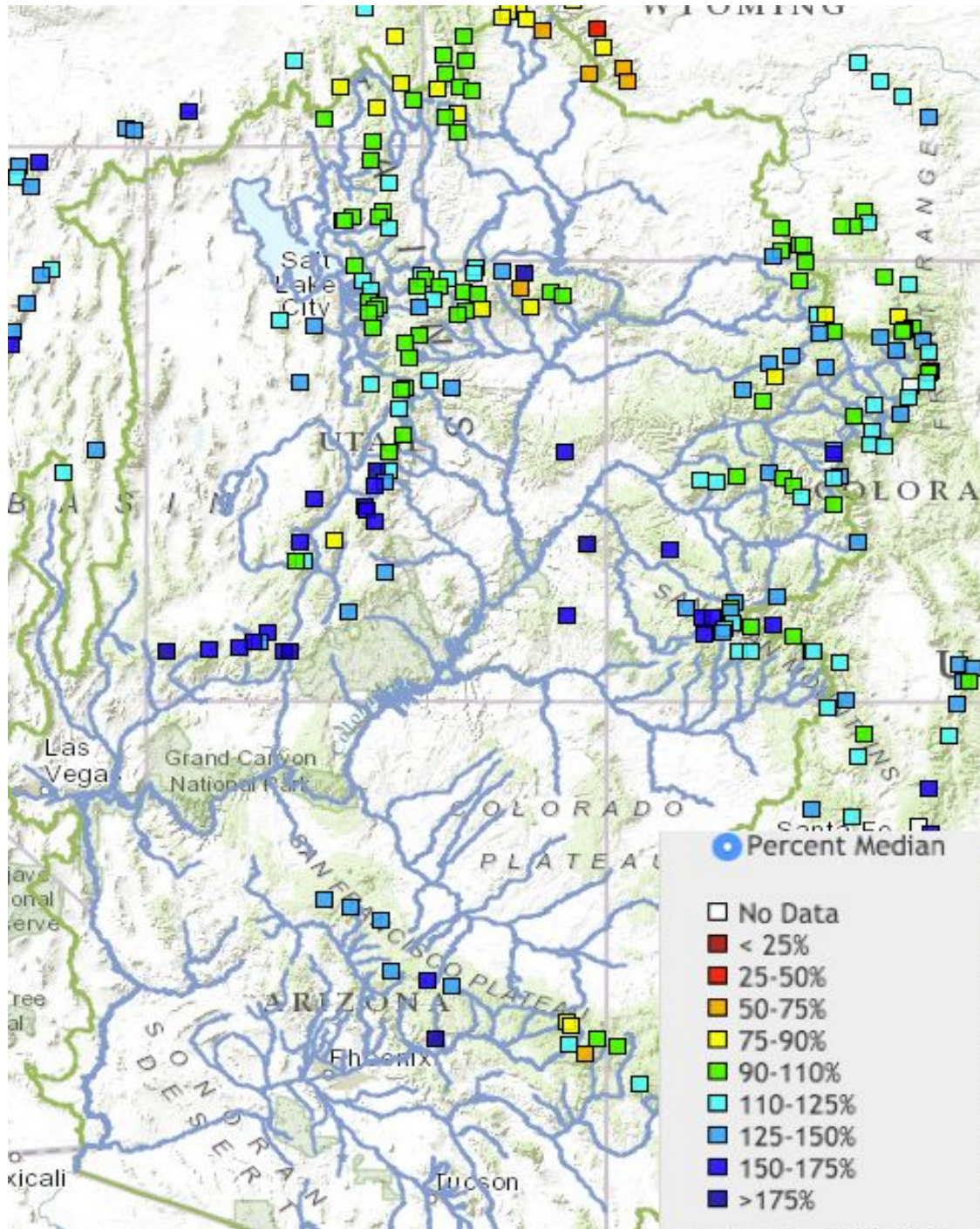
Snowpack:

Snowpack conditions are in good shape over most of the CBRFC forecast area with only a few exceptions. The Green River Basin above Fontenelle and parts of the Duchesne River Basin stand out with snowpack conditions much below their historical median for early February. Snow conditions are also much below median in the Salt River Basin of Arizona.

Snowpack conditions are a bit more mixed in the Great Basin of northern Utah and the Yampa River Basin. A few sites are below average but overall conditions improved since early January. Many SNOTEL sites are measuring from just below median to much above median for early February. Elsewhere throughout the CBRFC forecast area the snowpack is generally near or above median. The Sevier River and Virgin River Basins in southwest Utah, Dolores River Basin in southwest Colorado, and Verde and Tonto River Basins in Arizona have some of the highest amounts with respect to median for this time of year. Some sites in these areas have already reached or exceeded their historical seasonal peak snow for the year.

Much above average snow also exists at many lower elevation locations in the upper Colorado River and Great Basins at this time, however these areas typically don't contribute significantly to the April-July runoff volumes. These areas typically melt out prior to that period and primary impacts are likely to be some enhanced low elevation stream flows once melt does occur.

The image below shows conditions of snotel sites across the CBRFC area as of February 3, 2016. For more details and daily updates, please refer [here](#).

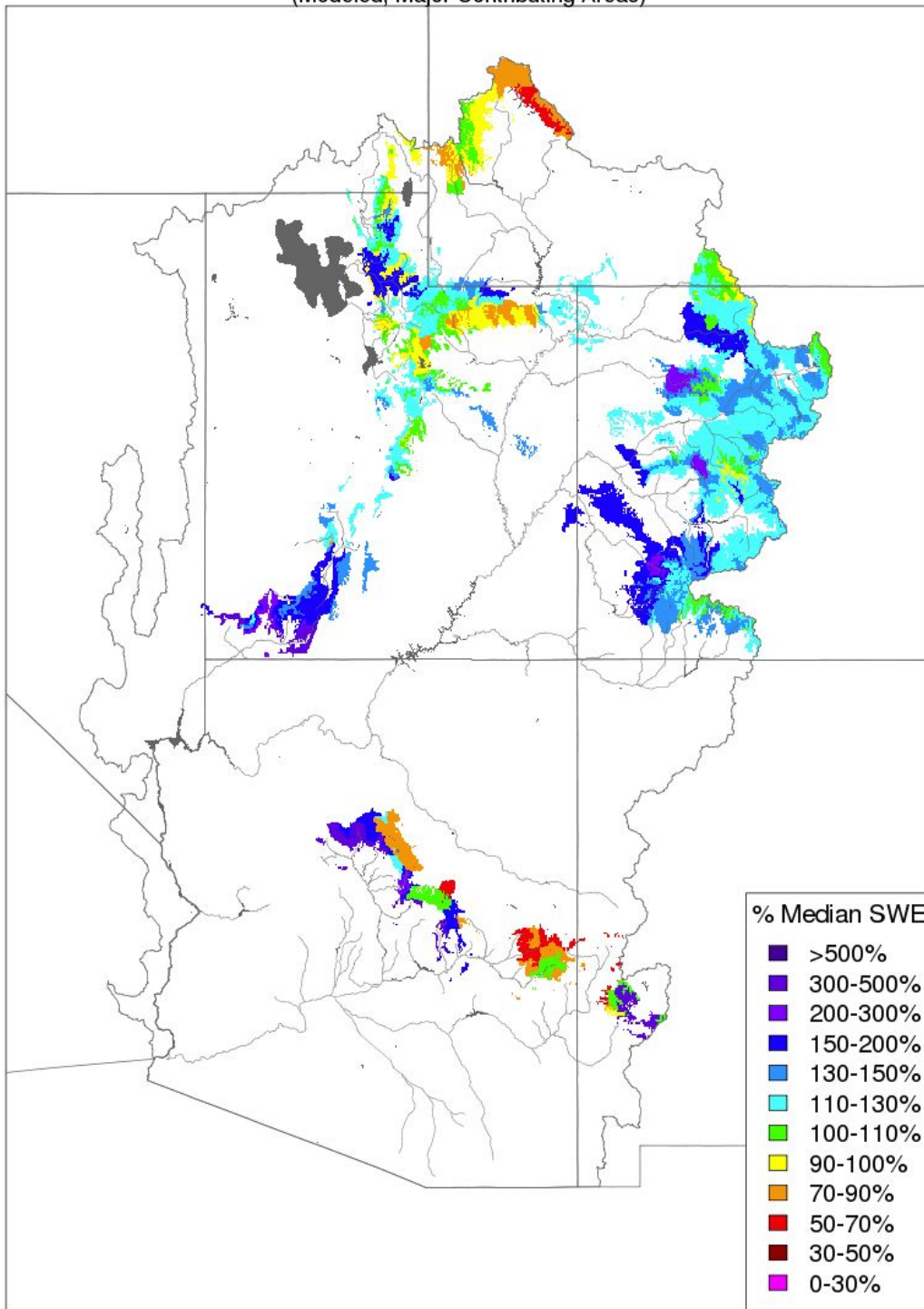


Percent Median Snow Conditions as of February 3rd 2016

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 below median snow in the Duchesne River Basin and Green River Basin above Fontenelle and the much above median snow in the Virgin, Sevier, and Dolores Basins are represented well in the model.

Snow Conditions - February 03 2016

(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 Feb 3rd 2016

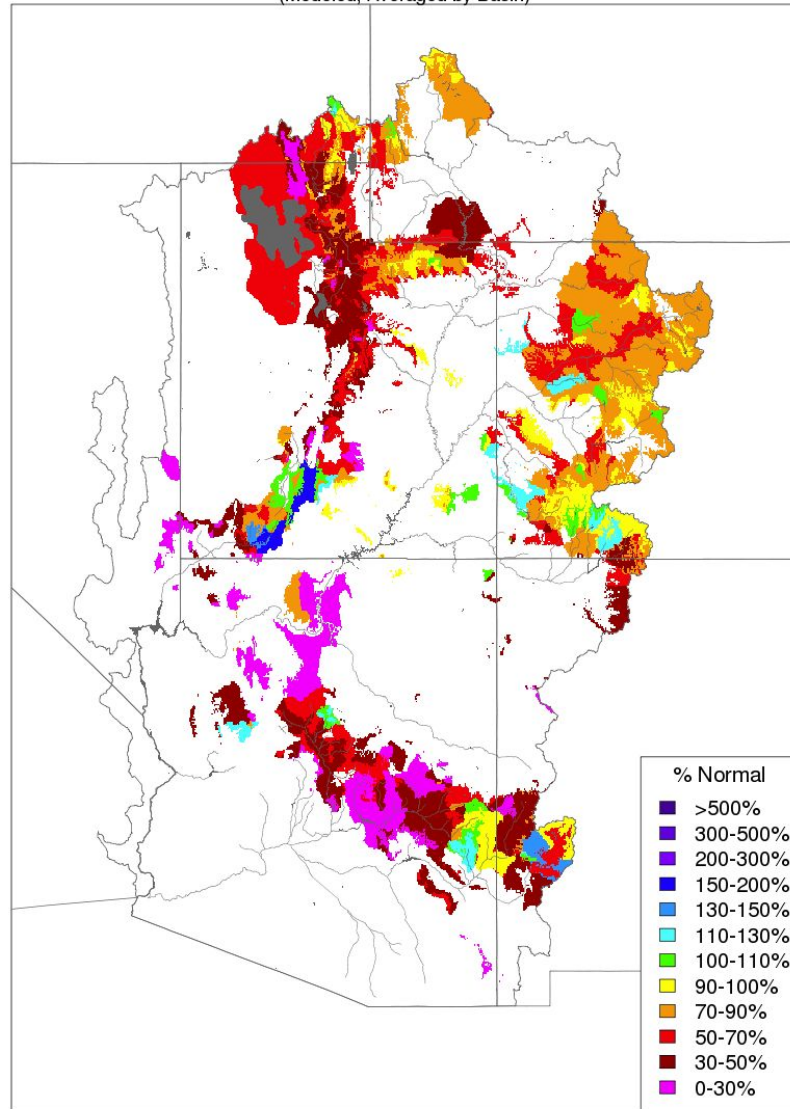
Soil Moisture:

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. Modeled soil moisture conditions as of November 15th were generally below or much below average. Soil moisture was exceptionally low in much of the Great Basin of central and northern Utah. The impact of this will be lower runoff volume forecasts even given good snow conditions. Soil moisture conditions were more favorable in parts of the San Juan and Dolores River Basin as well as parts of the Sevier and Virgin River Basins in southwest Utah. There were also a few isolated basins near or above average in the Bear, Duchesne, Gunnison, and White River Basins but generally conditions were not as favorable.

Soil moisture conditions tend to fluctuate more in the Lower Colorado River Basin 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 map below, areas in the blue are above the historical model soil moisture average while those in the yellow, orange, and red are below average. Only the higher elevation areas that have greatest impact to runoff volumes are displayed. The areas in white are not included.

Soil Moisture - Fall - 2015 (November 15)
(Modeled, Averaged by Basin)



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

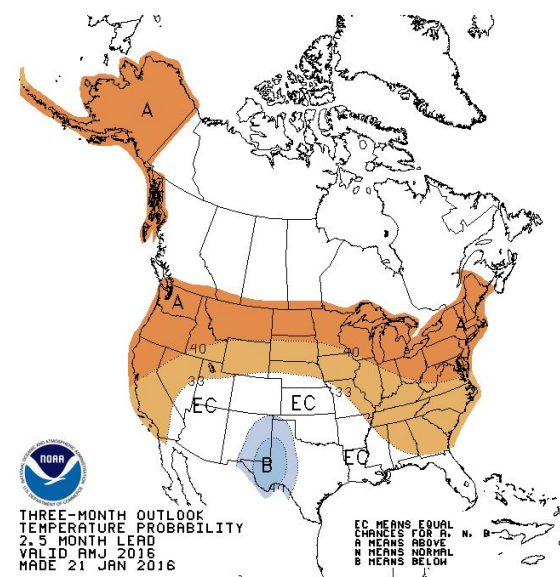
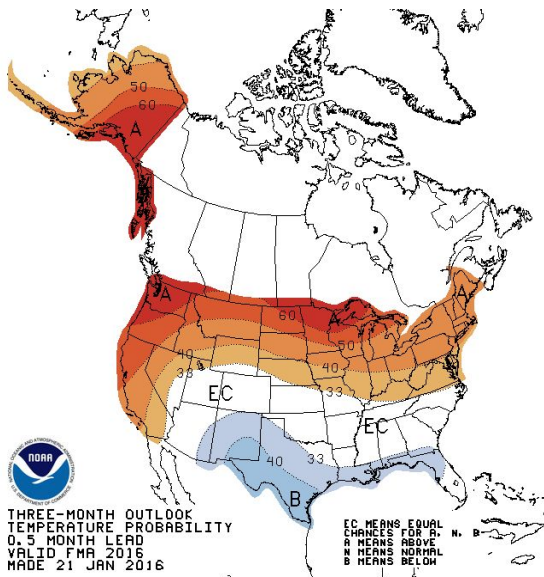
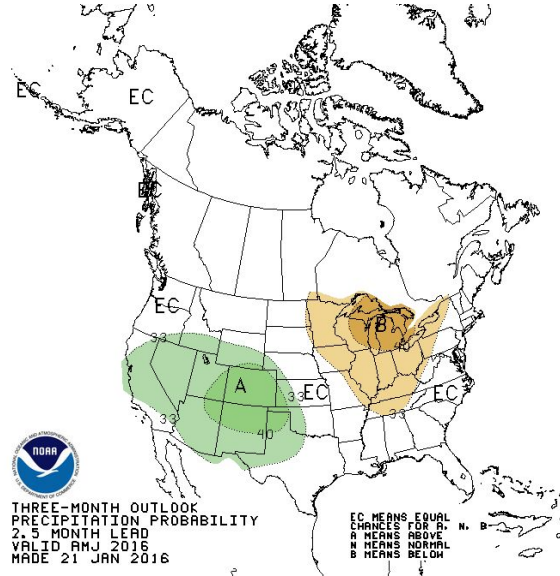
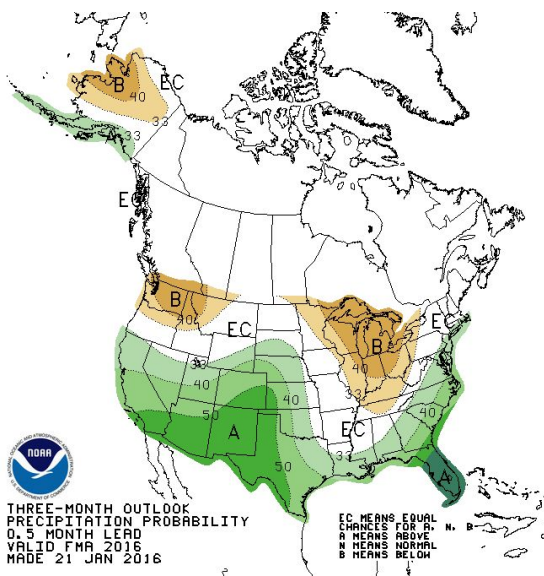
Modeled soil moisture from the CBRFC hydrologic model entering the winter season

Climate Outlook:

A strong El Niño Southern Oscillation (ENSO) condition currently exists. During January positive sea surface temperature anomalies persisted across most of the equatorial Pacific, with diminishing strength near South America. Most models indicate El Niño to gradually weaken through spring 2016, and to transition to ENSO-neutral conditions during late spring or early summer 2016, with the possibility of further transitioning to La Niña conditions in early fall 2016. The current El Niño is anticipated to be among the 3 strongest on record dating back to 1950.

The Climate Prediction Center indicates enhanced chances of above normal precipitation over most of the CBRFC forecast area during the February through April period. Equal chances for above or below average precipitation exist for the Green River Basin above Fontenelle during this time. The Climate Prediction Center indicates the entire CBRFC forecast area has enhanced chances for above normal precipitation during the April-June period. Enhanced

chances for warmer than normal temperatures exist throughout the spring which includes the Green River Basin above Fontenelle extending into the northern Great Basin of Utah and Idaho later in spring.



Climate Prediction Center outlooks as of Jan 21 2016

Upper Left: February-April precipitation probability. Upper Right: April-June precipitation probability
 Lower Left: February-April temperature probability. Lower Right: April-June temperature probability.

Conclusion:

Snowpack conditions remain favorable in many areas of the CBRFC as of early February, with some improvement since January in the Great Basin and parts of the Yampa River Basin. Significant snowpack conditions for early February exist in the Dolores River Basin of southwest Colorado, the Sevier and Virgin River Basins of southwest Utah, and Verde and Tonto River Basins of Arizona. Snow conditions are less favorable in the Green River Basin above Fontenelle reservoir and parts of Duchesne River Basin.

Very low modeled soil moisture conditions were widespread entering the winter season with the impact being lower forecasts in those areas affected. This is most prevalent parts of the Great Basin of northern Utah and southern Idaho where despite improving snowpack conditions runoff volumes are expected to be below average.

Areas where snowpack and soil moisture have combined to produce highest forecasts with respect to average include the Dolores River Basin, Sevier River Basin, and Virgin River Basin. Near to above average runoff is anticipated in the San Juan River Basin. Runoff expectations in remaining areas are more variable with a mix of below and above average forecasts. Most forecast in these areas fall in the 85 to 110 percent of average category.

The current strong El Niño underway also correlates with higher winter precipitation across the southern tier of the United States and historically has a positive impact on streamflow volumes in the Lower Colorado River Basin. Above median forecasts are anticipated throughout the Lower Colorado River Basin due to a combination of the strong El Niño event and favorable snowpack conditions.

End Of Month Reservoir Content Tables

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[Great Salt Lake Basin](#)

[Sevier Basin](#)

Basin Conditions and Summary Graphics

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[San Juan River Basin](#)

[Great Salt Lake Basin](#)

[Sevier River Basin](#)

[Virgin River Basin](#)