

## January 1, 2017 Water Supply Forecast Discussion

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

### **Water Supply Forecast Summary:**

Early season water supply forecasts indicate near or above average conditions throughout much of the Great and Green River Basins of northern Utah, western Wyoming, and southeast Idaho. The highest forecasts of April-July runoff volumes, with respect to average, exist in parts of the Green River Basin, Bear River Basin, and Duchesne River Basin. Several forecasts in these areas range from 110 to 130 percent of average.

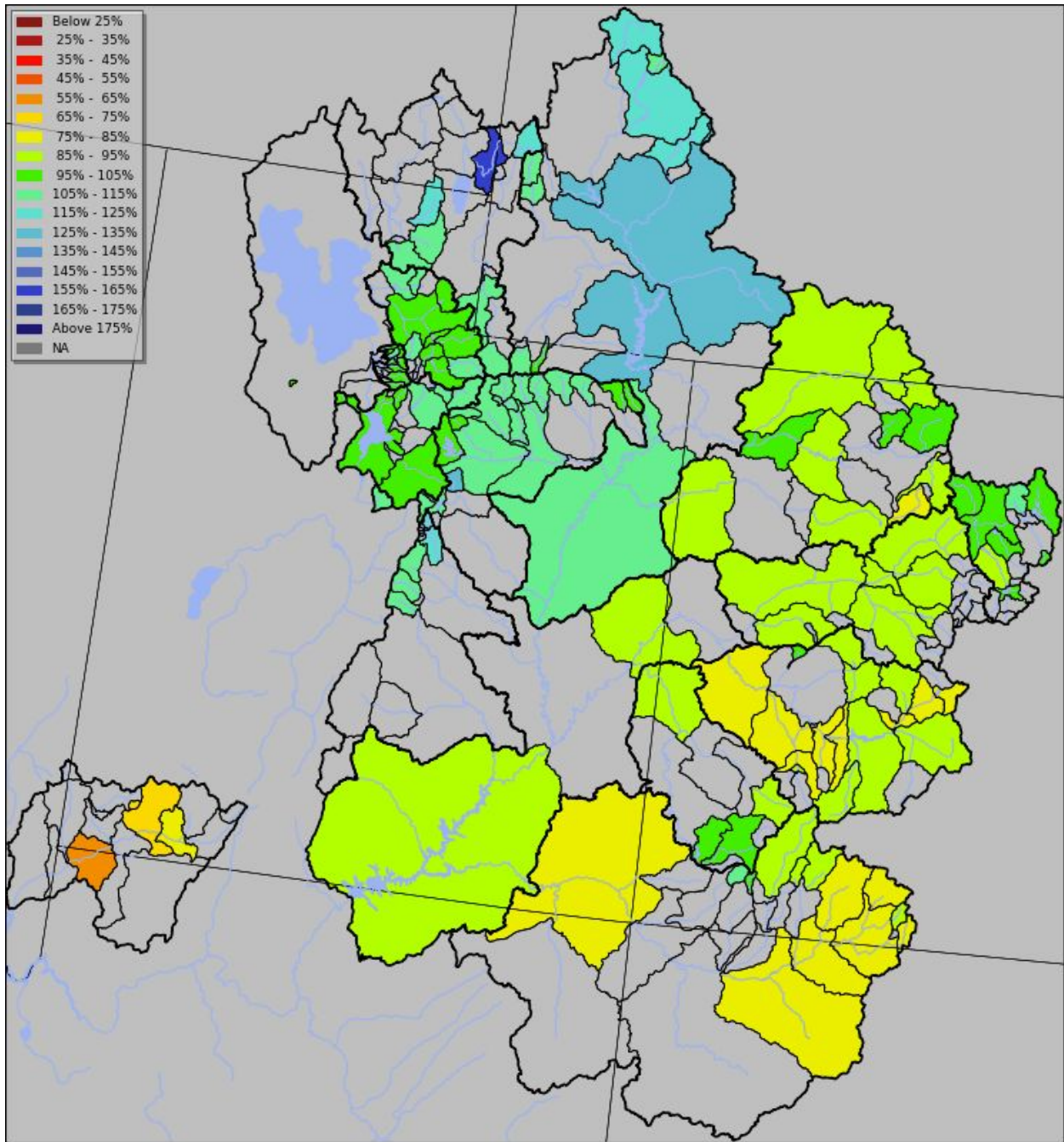
Conditions elsewhere in the Upper Colorado River Basin tend to be drier, particularly in southwestern Colorado, where conditions are more variable. Near average April-July runoff volumes are anticipated in the Colorado River headwaters above Kremmling, the Yampa River Basin, and parts of the Dolores River Basin. Near to below average runoff is anticipated in the Eagle, Roaring Fork, Gunnison and San Juan River Basins.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Lake Powell 6.5 MAF (91% of average), Fontenelle Reservoir 930 KAF (128% of average), Flaming Gorge 1.23 MAF (126% of average), Blue Mesa Reservoir 575 KAF (85% of average), McPhee Reservoir 625 KAF (84% of average), and Navajo Reservoir 580 KAF (79% of average).

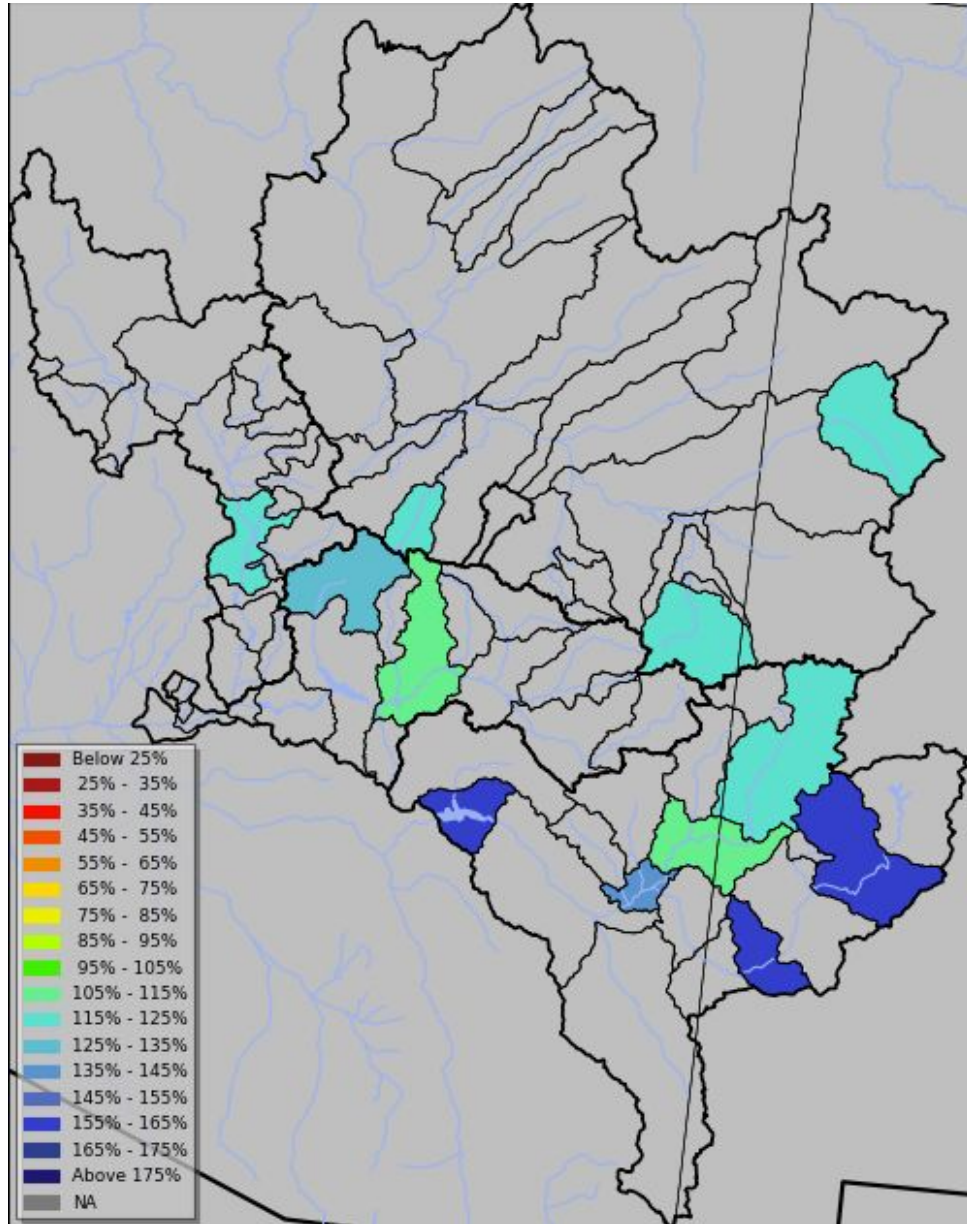
Forecasts in the Lower Colorado River Basin of Arizona are generally near historical median values. Note that forecasts in the Lower Colorado River Basin reference the historical median, as opposed to the historical average referenced in the Great Basin and Upper Colorado River Basin. Averages in these areas tend to be inflated by large scale rainfall events that are not typical in every year. January-May streamflow volume forecasts in the Verde River, Salt River, and Gila River Basins in Arizona are forecast to be near or above median. Recent rainfall events in the Lower Colorado River Basin have improved soil moisture conditions since the fall, which can impact runoff volumes in the area. In the Virgin River Basin of southwest Utah, the April-July forecasts are below average.

An active weather pattern is currently underway over much of the CBRFC's area of responsibility. Forecasts will continue to evolve as storm systems are realized. For the latest trends in the forecast guidance, refer to the CBRFC website.

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)



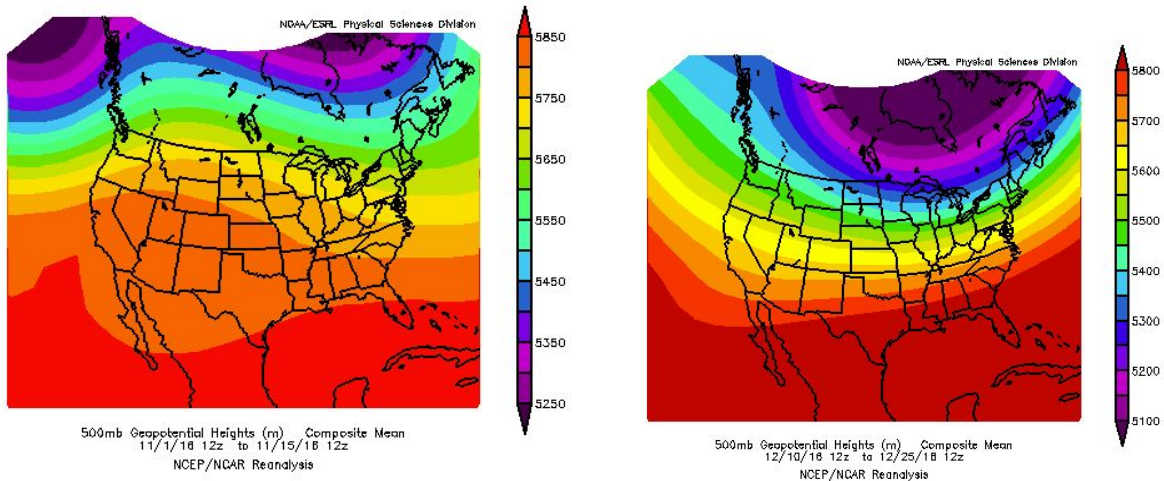
Lower Colorado Basin (AZ/NM): 2017 January-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

For specific site water supply forecasts, refer to: <http://www.cbrfc.noaa.gov/rmap/wsups/wsuplist.php>

## Water Supply Discussion

### Weather Synopsis:

Generally dry and warm conditions dominated much of the fall season, which led to low snowpack accumulation at high elevations and drying soils. Early season water supply guidance indicated below average conditions. A dramatic change in the atmospheric pattern occurred in late fall. A strong westerly onshore flow developed, bringing numerous storm systems into the CBRFC area of responsibility. As colder systems moved in from the north, conditions were favorable for tapping subtropical moisture. These atmospheric rivers brought heavy precipitation to the west coast of the U.S. with significant moisture also making it farther inland into parts of the Great and Colorado River Basins. The active pattern continued through the month of December with indications it will likely carry well into January.



**Mean upper air pattern at the 500 mb (Approx 18,000 feet) level.**

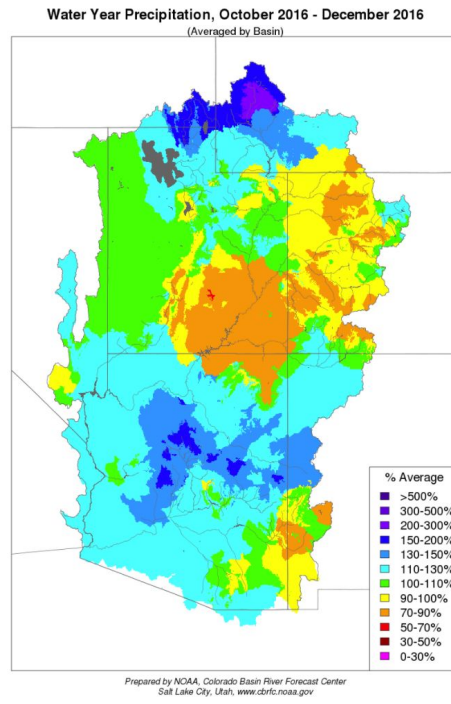
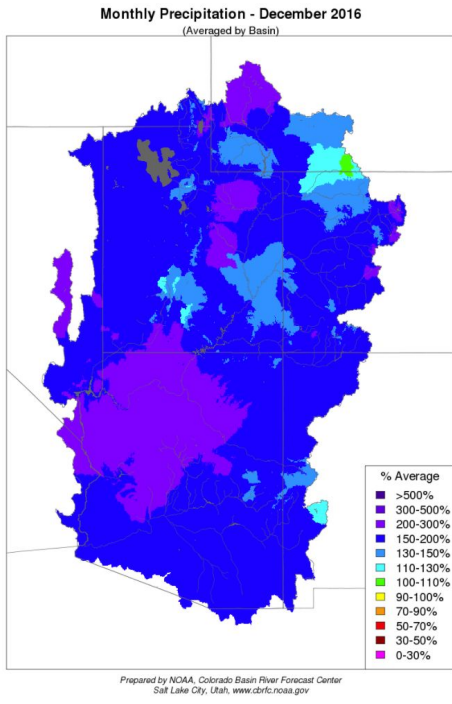
**Left: Mean upper air pattern during early November 2016. High pressure ridge, dry, warm.**

**Right: Strong onshore flow dominated most of December bringing significant moisture to the area.**

### Precipitation and Temperature:

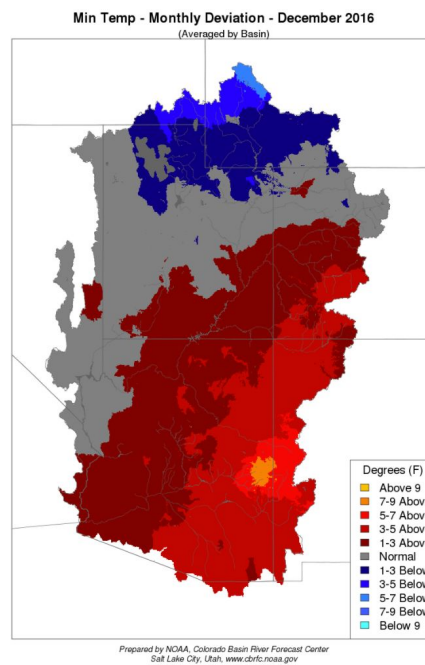
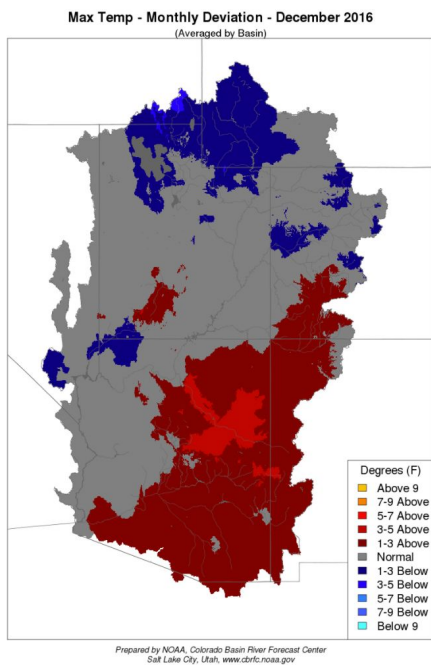
December was a very wet month across the entire Colorado River and Eastern Great Basins. Monthly precipitation averaged between 130 and 300 percent of average. The only exception was the headwaters of the Little Snake River Basin where monthly precipitation was near average.

Much above average seasonal precipitation conditions, in excess of 150 percent of average, exist in the Upper Green River Basin above Fontenelle reservoir, the Bear River Basin, and over parts of central Arizona in the Verde, Salt, and Little Colorado River headwaters. Elsewhere seasonal precipitation is generally near to above average.



The mean monthly maximum temperatures were slightly below average for the month of December in the far northern portions of the Colorado River Basin, and several degrees above normal through eastern Arizona and western New Mexico. The mean monthly minimum temperature showed the same pattern.

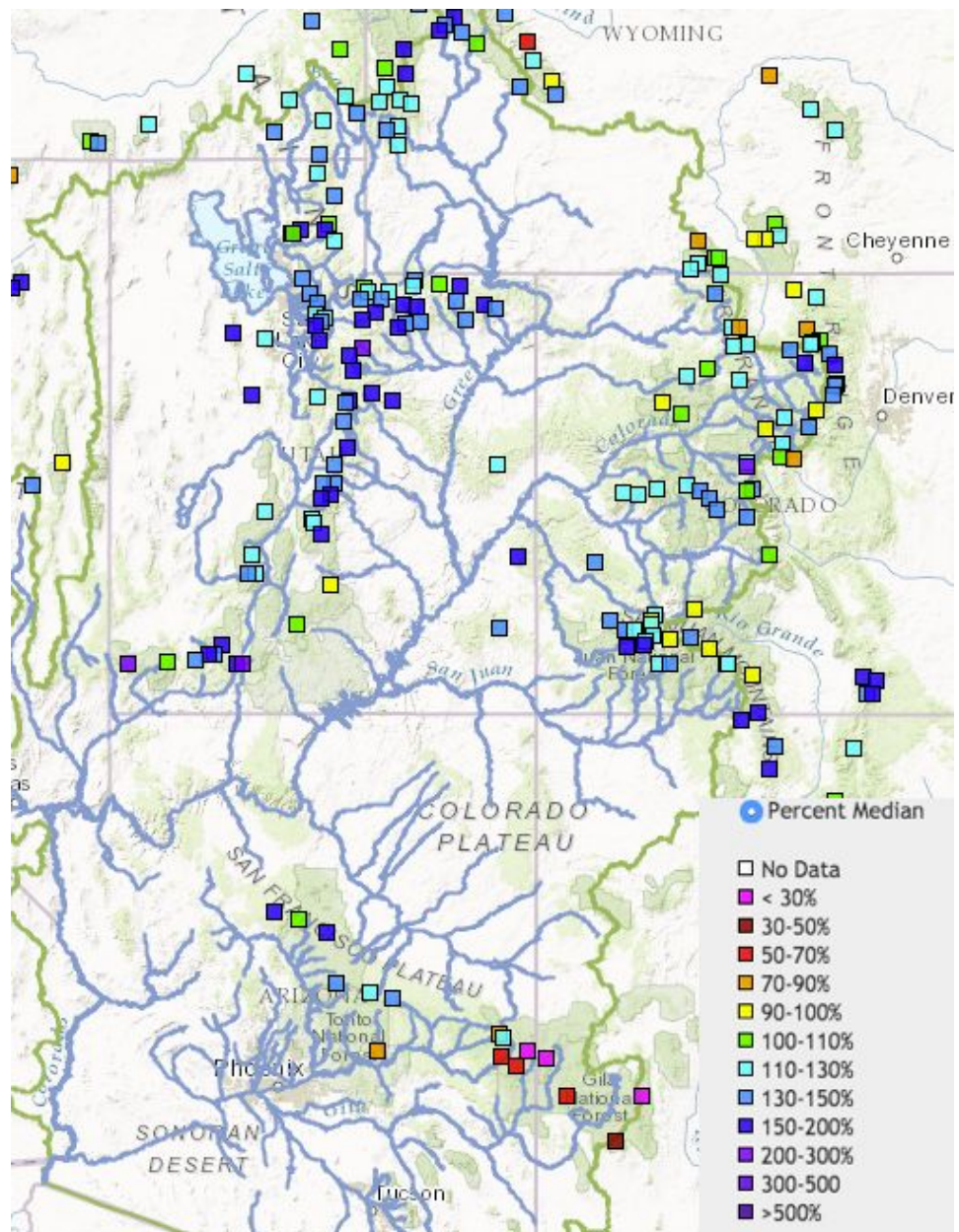
**Monthly and water year precipitation, averaged by modeled basins**  
These graphics are available at: <https://www.cbrfc.noaa.gov/rmap/grid800/index.php?type=monthly>



### Snowpack:

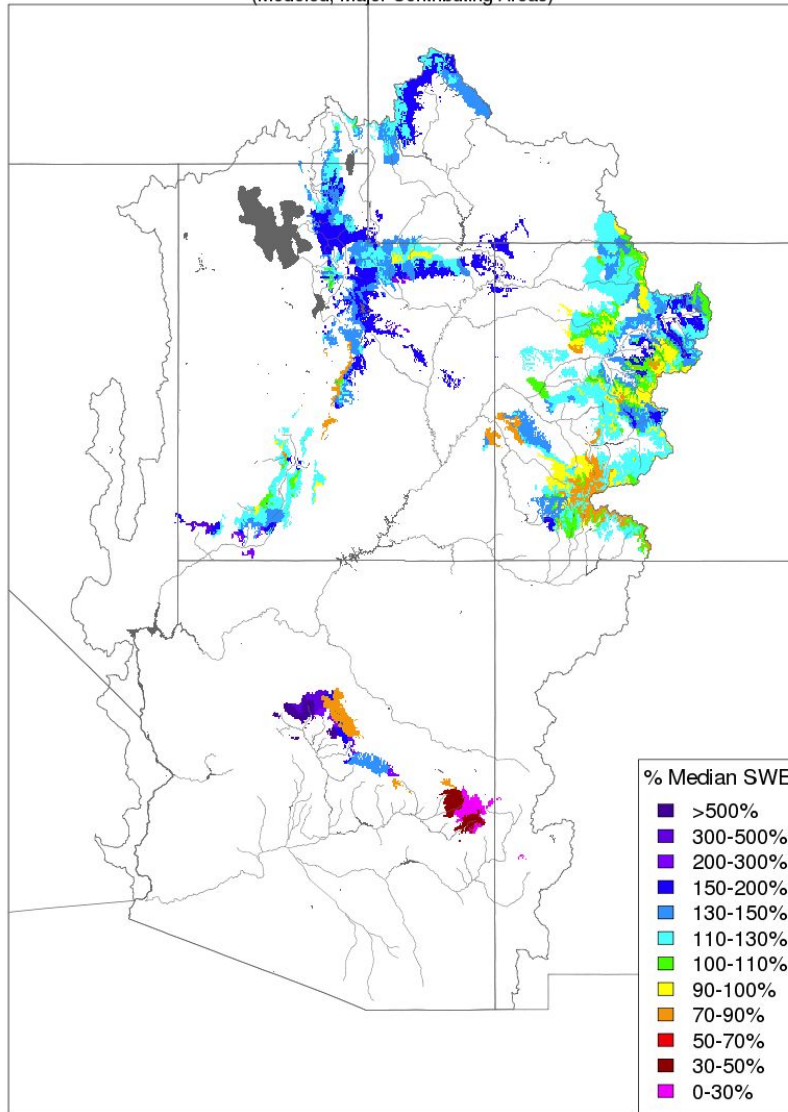
Snow conditions are generally above normal for early January throughout the CBRFC forecast area. The only exception is in the higher elevations of the Gila River Basin in Arizona and New Mexico where little snow has accumulated. The map to the right shows the location of SNOTEL stations over the CBRFC area, with colors that indicate how current snowpack conditions at the station compare to the historical median.

While the snowpack has been near or above normal over much of the Great Basin and Green River Basins of Utah, Wyoming, and Idaho throughout December, conditions were much drier in early December over other areas. Many SNOTEL sites in the Yampa River Basin, Colorado River mainstem, Gunnison River Basin, San Juan River Basin, and Virgin River Basin were indicating much below normal snowpack conditions just one month ago.



A very wet December has dramatically increased snowpack conditions across nearly all areas. Throughout the Great Basin and Upper Colorado River Basin, near to much above median snow conditions exist. Some of the more impressive snowpack conditions exist in parts of the Duchesne River Basin, Great Basin of northern Utah, and in tributaries of the Green River Basin in central Utah.

**Snow Conditions - January 04 2017**  
(Modeled, Major Contributing Areas)



Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

At higher elevations (above about 10,000 feet), parts of the Upper Colorado River Basin are less than, as a percent of median, corresponding lower elevations. While this is not indicated well in the previously shown SNOTEL map, it is in the CBRFC model representation of snowpack, presented to the left, particularly in southwest Colorado. The reason for this situation is due to the dry and warm October and November period. During this time, snow accumulation typically begins at these higher elevations. However, this season the snowpack accumulation was less than normal, and as a result these higher elevations are behind the lower elevation snowpack. This, combined with drier than normal soil moisture conditions, has resulted in below average runoff volume forecasts in some of these areas.

In the figure to the left, only those areas that provide the greatest contribution to the April-July runoff volumes are displayed. Snow at the higher elevations of several river basins are indicating lower values as a percent of median compared to lower elevations.

For more details and daily updates, refer to: <https://www.cbrfc.noaa.gov/lmap/lmap.php?interface=snow> for SNOTEL information, and <https://www.cbrfc.noaa.gov/rmap/grid800/index.php?type=monthly&area=cbrfc&year=2017&month=1&day=&hour=&type=snow> for model snowpack information.

## Soil Moisture:

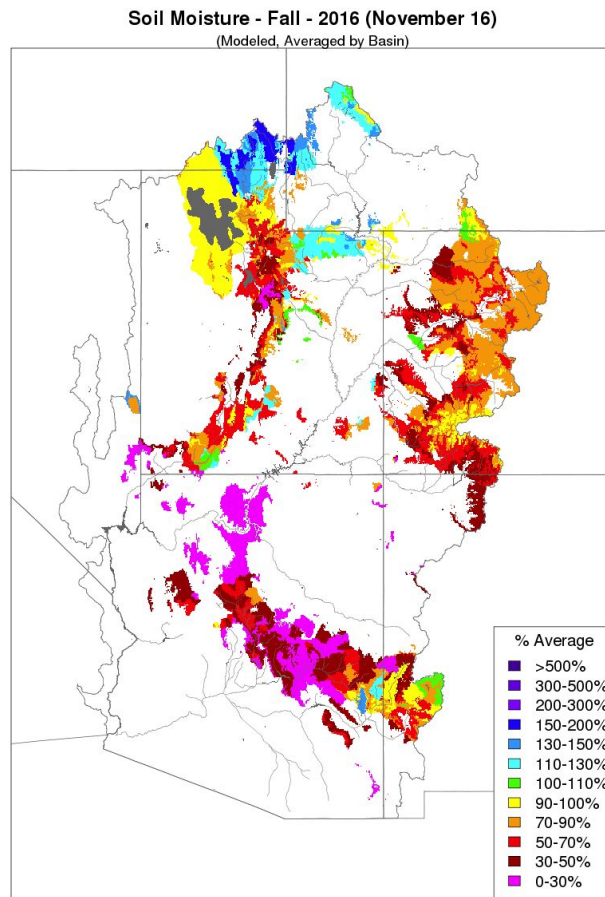
The CBRFC utilizes the Sacramento-Soil Moisture Accounting (Sac-SMA) hydrologic model to develop its water supply forecasts. Prior to the winter snowpack accumulation season, model soil moisture parameters within the Sac-SMA model are set, taking into account current baseflow conditions throughout the CBRFC's area of responsibility. For more detailed information refer to: [https://www.cbrfc.noaa.gov/wsup/sac\\_sm/sac\\_sm.php](https://www.cbrfc.noaa.gov/wsup/sac_sm/sac_sm.php).

Modeled fall soil moisture conditions impact early season water supply forecasts and potentially the efficiency of spring runoff. Above average modeled fall soil moisture conditions will have a positive effect on early season water supply forecasts while below average conditions will have a negative impact.

Modeled soil moisture conditions as of November 16th were above average over much of the Upper Green River Basin, Bear River Basin, and Duchesne River basins. Elsewhere in both the Great Basin and Upper Colorado River basin the modeled soil moisture conditions were below average.

In Arizona, conditions varied but most areas were below average. However, the January -May runoff volumes in those areas are primarily influenced by the frequency and magnitude of winter rain events and soil moisture conditions will change throughout the winter season and impact runoff efficiency during this forecast period.

In the map below areas 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.



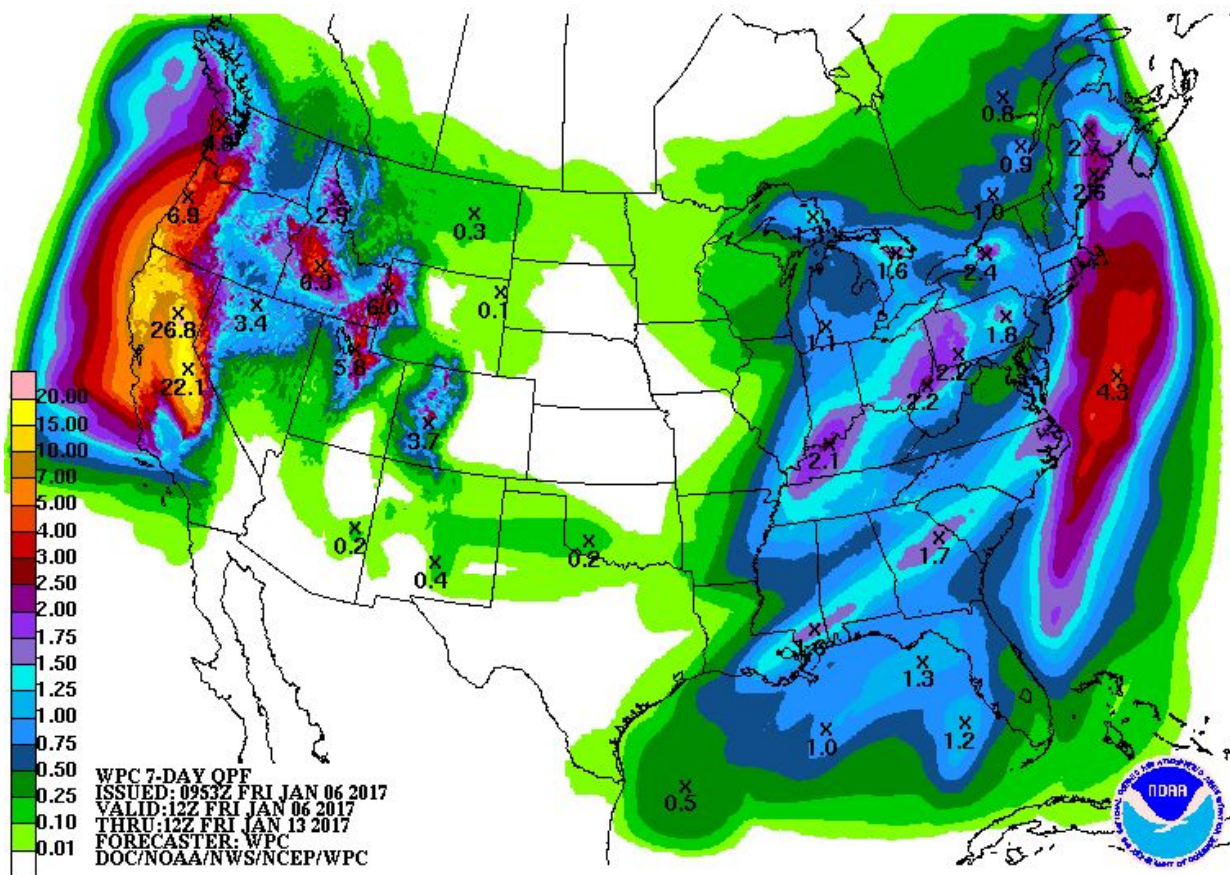
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)



### Upcoming Weather:

A large ridge in the Gulf of Alaska is driving a series of storm systems into the western U.S. These storm systems, referred to as “atmospheric rivers” due to their sub-tropical moisture source, have the potential to bring significant precipitation to the U.S. west coast and possibly inland to parts of the Great and Colorado River Basins. The impact to water supply forecasts may be greatest in northern parts of the Great Basin and Green River Basin and result in an increasing trend in these forecasts. These events are expected to occur through at least the middle of the month and possibly beyond.

The map below, from NOAA’s Weather Prediction Center, illustrates 7-Day forecasted precipitation totals from January 6th through January 13th.



## **End Of Month Reservoir Content Tables**

[Green River Basin: http://10.1.3.4/wsup/pub2/res/html/gn.1.2017.html](http://10.1.3.4/wsup/pub2/res/html/gn.1.2017.html)

[Upper Colorado River Basin: http://10.1.3.4/wsup/pub2/res/html/uc.1.2017.html](http://10.1.3.4/wsup/pub2/res/html/uc.1.2017.html)

[San Juan River Basin: http://10.1.3.4/wsup/pub2/res/html/sj.1.2017.html](http://10.1.3.4/wsup/pub2/res/html/sj.1.2017.html)

[Great Salt Lake Basin: http://10.1.3.4/wsup/pub2/res/html/sl.1.2017.html](http://10.1.3.4/wsup/pub2/res/html/sl.1.2017.html)

[Sevier Basin: http://10.1.3.4/wsup/pub2/res/html/sv.1.2017.html](http://10.1.3.4/wsup/pub2/res/html/sv.1.2017.html)

## **Basin Conditions and Summary Graphics**

[Green River Basin: http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=gn&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=gn&month=1&year=2017)

[Upper Colorado River Basin:  
http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=uc&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=uc&month=1&year=2017)

[San Juan River Basin:  
http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=sj&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=sj&month=1&year=2017)

[Great Salt Lake Basin:  
http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=sl&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=sl&month=1&year=2017)

[Sevier River Basin: http://www.cbrfc.noaa.gov/wsup/pub2/outlook3.php?region=sv&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook3.php?region=sv&month=1&year=2017)

[Virgin River Basin: http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=vg&month=1&year=2017](http://www.cbrfc.noaa.gov/wsup/pub2/outlook4.php?region=vg&month=1&year=2017)