

May 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:

Precipitation in April was quite variable across the CBRFC forecast area. The nature of the storm systems during the month of May resulted in some areas such as the Green River Basin headwaters above Fontenelle, Dolores River Basin, Sevier River Basin, and Bear River Basin below average. Most other areas were near to well above average.

The trend in April-July water supply forecasts was also highly variable across the upper Colorado River Basin and Great Basin. Forecasts trended higher in the Yampa River Basin, parts of the Colorado River mainstem and tributaries, the Gunnison River Basin, and Duchesne River Basin. Forecasts generally trended lower in Provo / Utah Lake Basins Bear River Basin, Sevier River Basin, and Virgin River Basin. Forecast trends were mixed, with some increasing and others decreasing in remaining areas. Forecasts in early May include May through July runoff expectations combined with April observed flows. Therefore April observed flows have some impact on the overall April-July runoff forecasts.

The highest April-July forecasts with respect to average exist in parts of the Yampa River Basin and Colorado River headwaters with near or above average runoff anticipated. Other areas where forecasts are only slightly below to near average include some southern sections of the Gunnison River Basin and parts of the Virgin River Basin. Elsewhere below average runoff volumes are forecast. The lowest forecasts with respect to average include the Spanish Fork River and western Duchesne River Basin, lower elevation basins of Six Creeks near Salt Lake, and parts of the Weber River Basin in northern Utah.

April-July inflow forecasts for some of the major reservoirs in the upper Colorado River Basin include Fontenelle Reservoir 530 KAF (73% of average), Flaming Gorge 770 KAF (79% of average), Blue Mesa Reservoir 525 KAF (78% of average), McPhee Reservoir 215 KAF (73% of average), and Navajo Reservoir 520 KAF (71 % of average). Lake Powell is forecast to receive 5.5 MAF (77% of average) during the April-July period. These forecasts referenced are for the 50 percent exceedance probability.

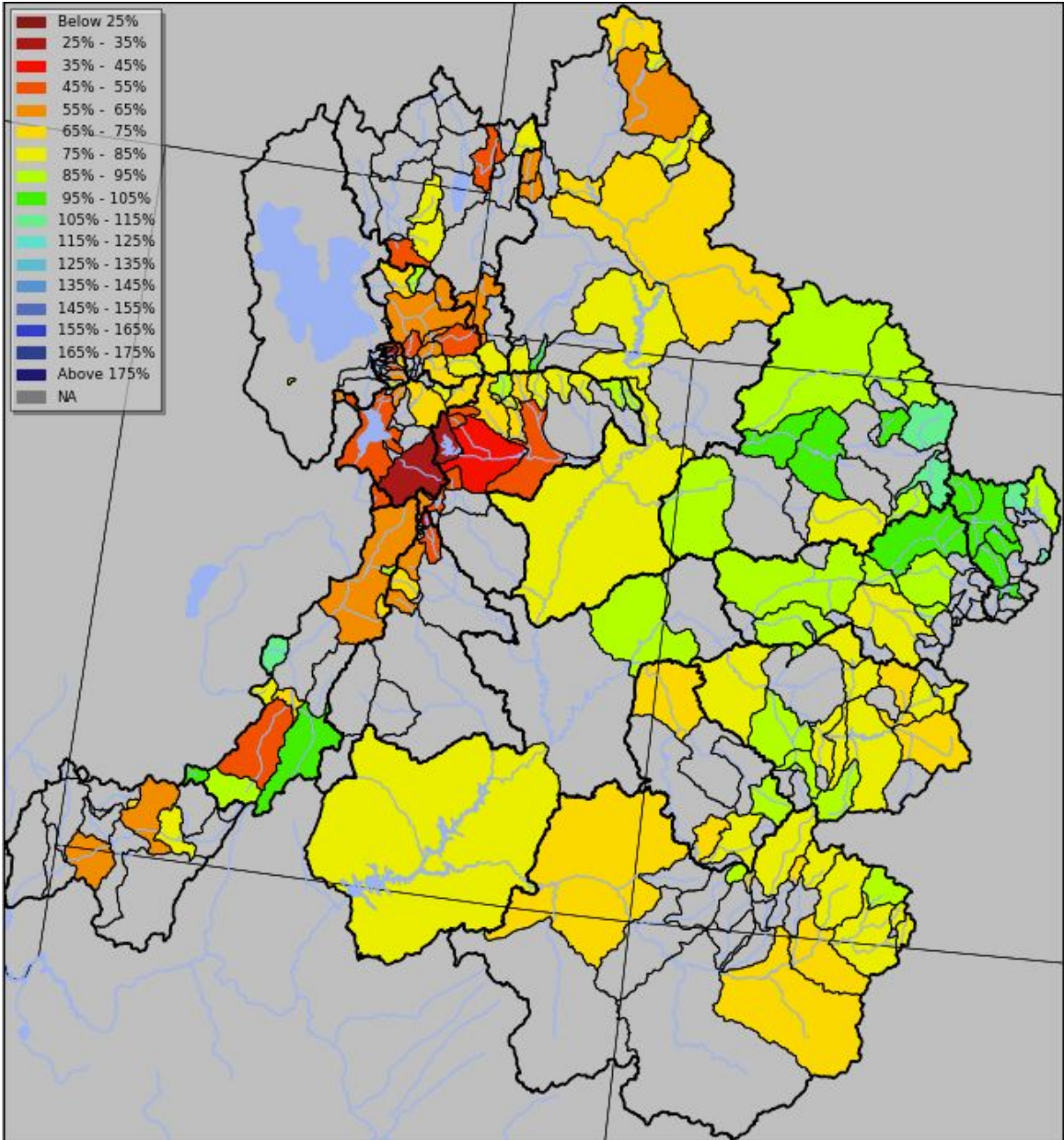


Image: May 1st 2016 April-July forecast volumes as a percent of 1981-2010 average
(50% exceedance probability forecast)

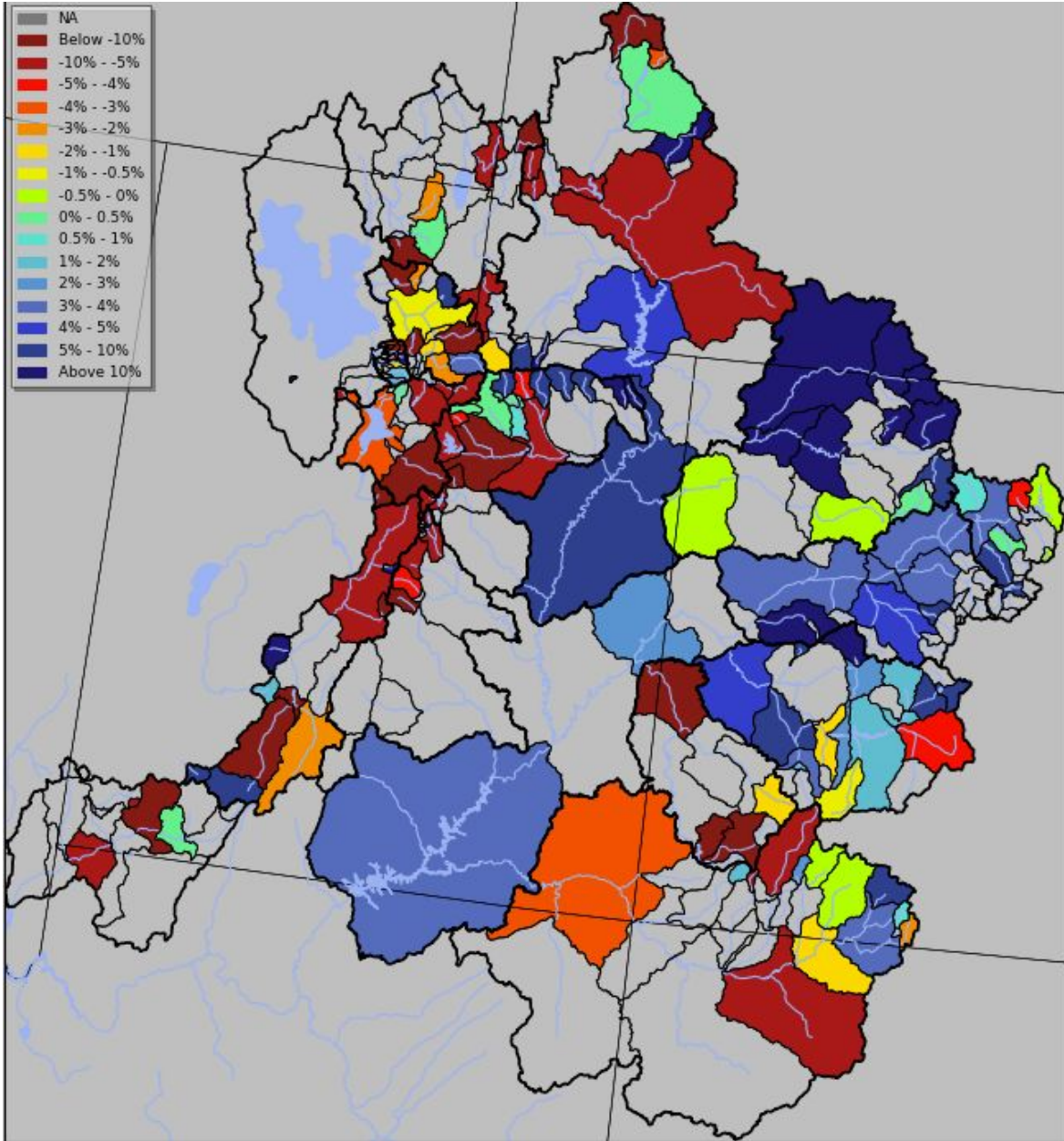


Image: Change in April-July volume forecast between April 1st and May 1st 2016
(Expressed as change in the percent of average)

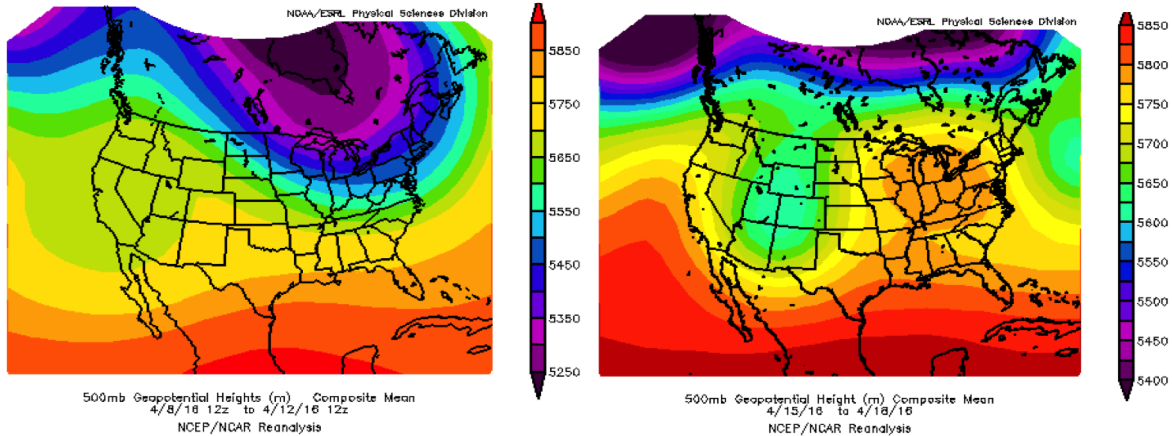
[Click here for specific site water supply forecasts](#)

Water Supply Discussion

Weather Synopsis:

April started dry and warm with a low pressure system off the southern California coast and a ridge of high pressure

over the northwestern U.S. This put much of the CBRFC forecast area in a dry pattern with little to no precipitation received in the Upper Colorado River and Great Basins during the first couple weeks of the month. Storm activity picked up during the second half of the month. These storms were slow moving closed low pressure systems and brought precipitation and colder temperatures with additional snow in higher elevations.



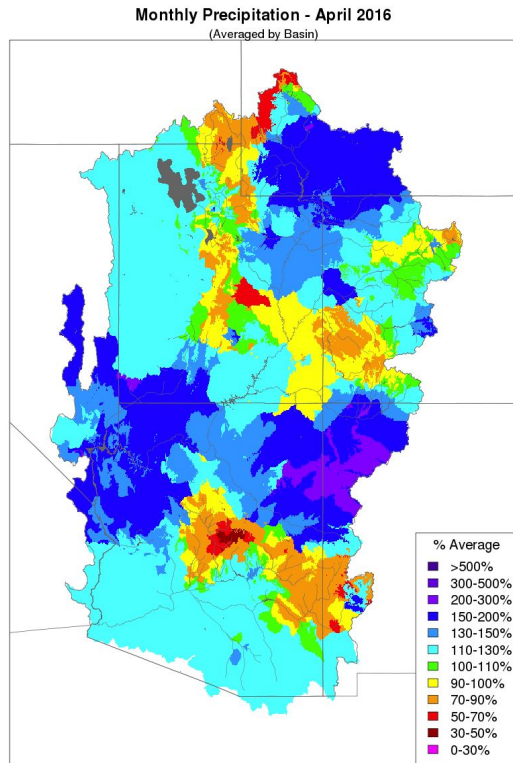
The upper atmospheric wind pattern at the 500 MB (~18,000 feet) level. A dry pattern during the first part of April (left) gave way to a stormy pattern the second part of the month (right). Large low pressure systems moved slowly through the area bringing a mix of rain, high elevation snow, and colder temperatures.

Precipitation and Temperatures:

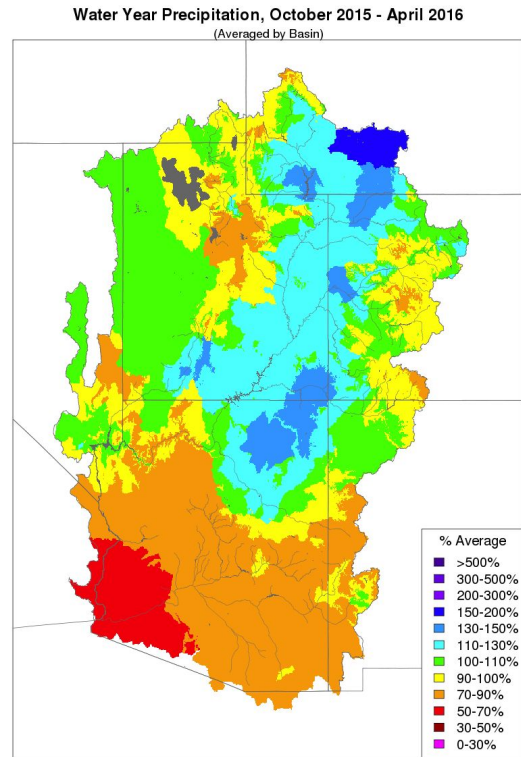
The precipitation pattern was highly variable during the month of April due to the nature of the closed low pressure systems that impacted the area. These type of storm systems with their meandering nature and shifting wind patterns tend to distribute precipitation in a very orographic nature. Areas where wind patterns were upslope for an extended period of time received the bulk of the precipitation while downslope areas received less. The monthly precipitation image (below left) depicts the precipitation distribution with above average precipitation fairly widespread particularly in parts of the Yampa, Little Snake, Gunnison, and Virgin River Basins. Below average precipitation was observed in the Green River Basin headwaters, parts of the Bear River, Sevier River, Utah Lake, and Dolores River Basins.

Water year precipitation (October-May) is generally above 90 percent of average over much of the Great Basin and upper Colorado River Basin. A few areas such as the Utah Lake Basin and western Duchesne River Basin are in the 70-90 percent of average category as of early May. Above to much above average water year precipitation covers much of the Colorado River and Green River mainstem areas, extending into parts of the Yampa River Basin and north slope of the Uinta Mountains which impacts flows into Flaming Gorge and the Bear River headwaters.

With the exception of the Little Colorado River Basin and Gila River Basin headwaters, much of the Lower Colorado River Basin in Arizona and western New Mexico remain below average for the water year.



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



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Image: Monthly and water year precipitation graphics
(Averaged by basins defined in the CBRFC hydrologic model)

The mean monthly maximum temperatures were close to average in April over much of the Great Basin and upper Colorado River Basin. However during the first part of April mean daily temperatures were as much as 15 degrees above average at times. Snow melt occurred at all but the highest elevations during this time. This was balanced out by cooler than average temperatures during the middle and end of the month. Mean monthly minimum temperatures were above average in the Great Basin and Green River Basin of Wyoming and closer to average in the upper Colorado River Basin.

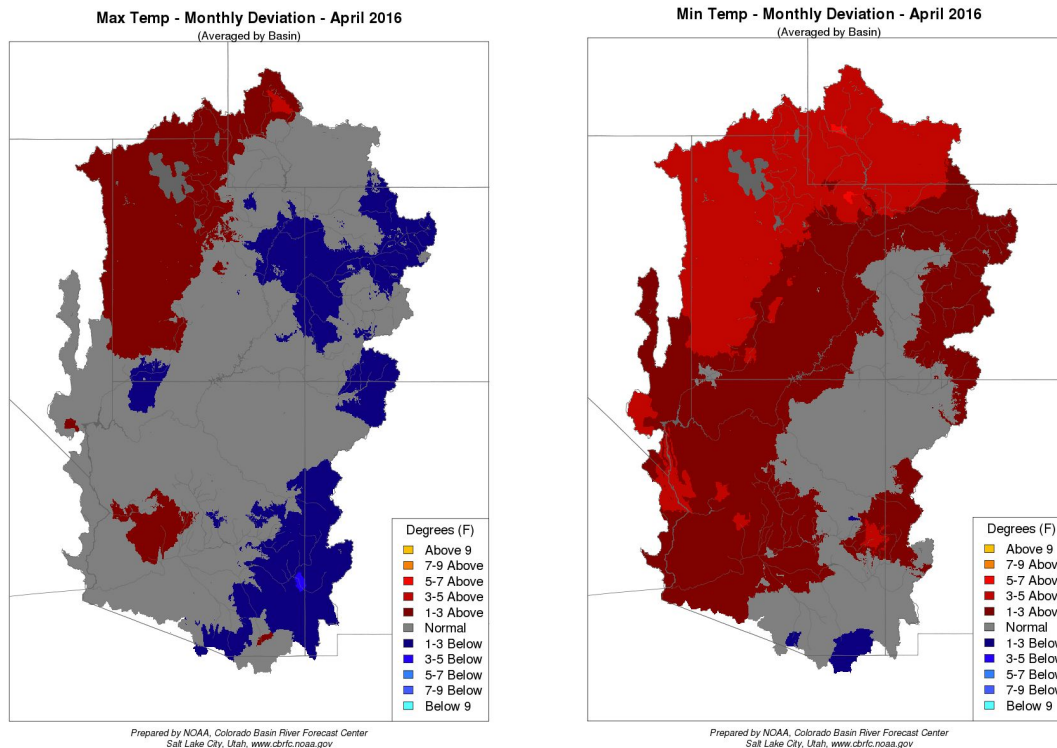


Image: Monthly maximum and minimum temperature departure from average for April 2016.
(Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

Now that we are in the snow melt period the snowpack conditions tend to be highly variable from place to place and even from day to day. The variation in daily snow measurements either due to melt or new snow from spring storms may cause the reading to drop below or rise above the historical median for the day. As the daily normal (or median) value becomes smaller these day to day fluctuations can be quite large. They may appear on the maps of current snow conditions as being significantly above or below what is considered normal for this time of year. Therefore care must be exercised during the melt period when evaluating the snow conditions. For example, snow conditions that are above median for early May do not suggest these locations ever reached the annual peak snow for the season. Many sites in fact did fall short of the seasonal peak that typically occurs in April.

Best snow conditions with respect to the historical median for early May exist in the Yampa River Basin, headwaters of the Colorado River and Gunnison River, and north slopes of the Uinta Mountains that drain into the Green River Basin in Wyoming. Elsewhere conditions are quite a mix with some of the lowest snowpack conditions with respect to median in central Utah in the Spanish Fork River and western Duchesne River Basins. Several of these sites that are below 9000 feet melted out two or more weeks early.

The image below shows conditions of SNOTEL sites across the CBRFC area as of May 4, 2016.

For more details and daily updates, please refer [here](#).

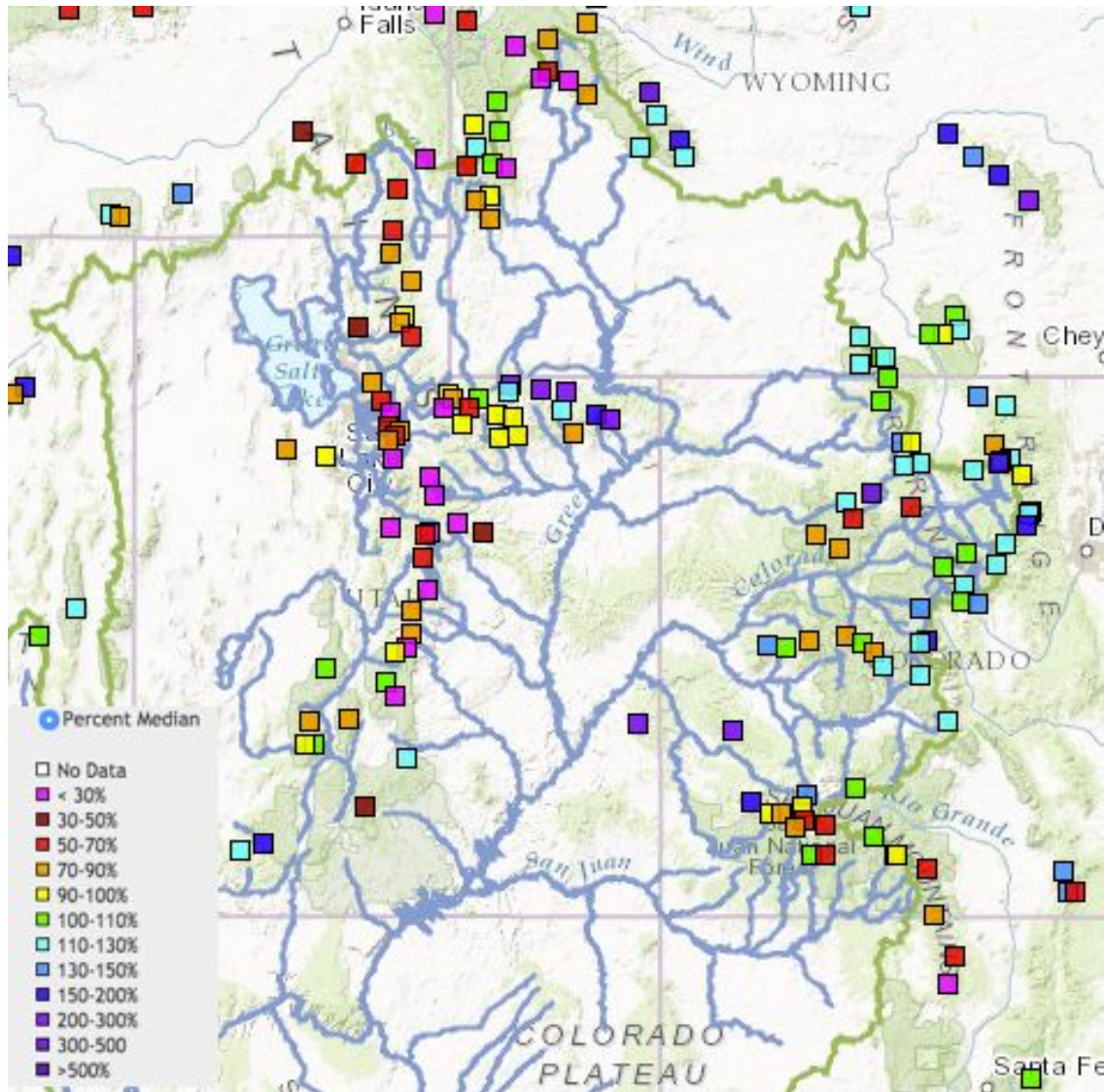
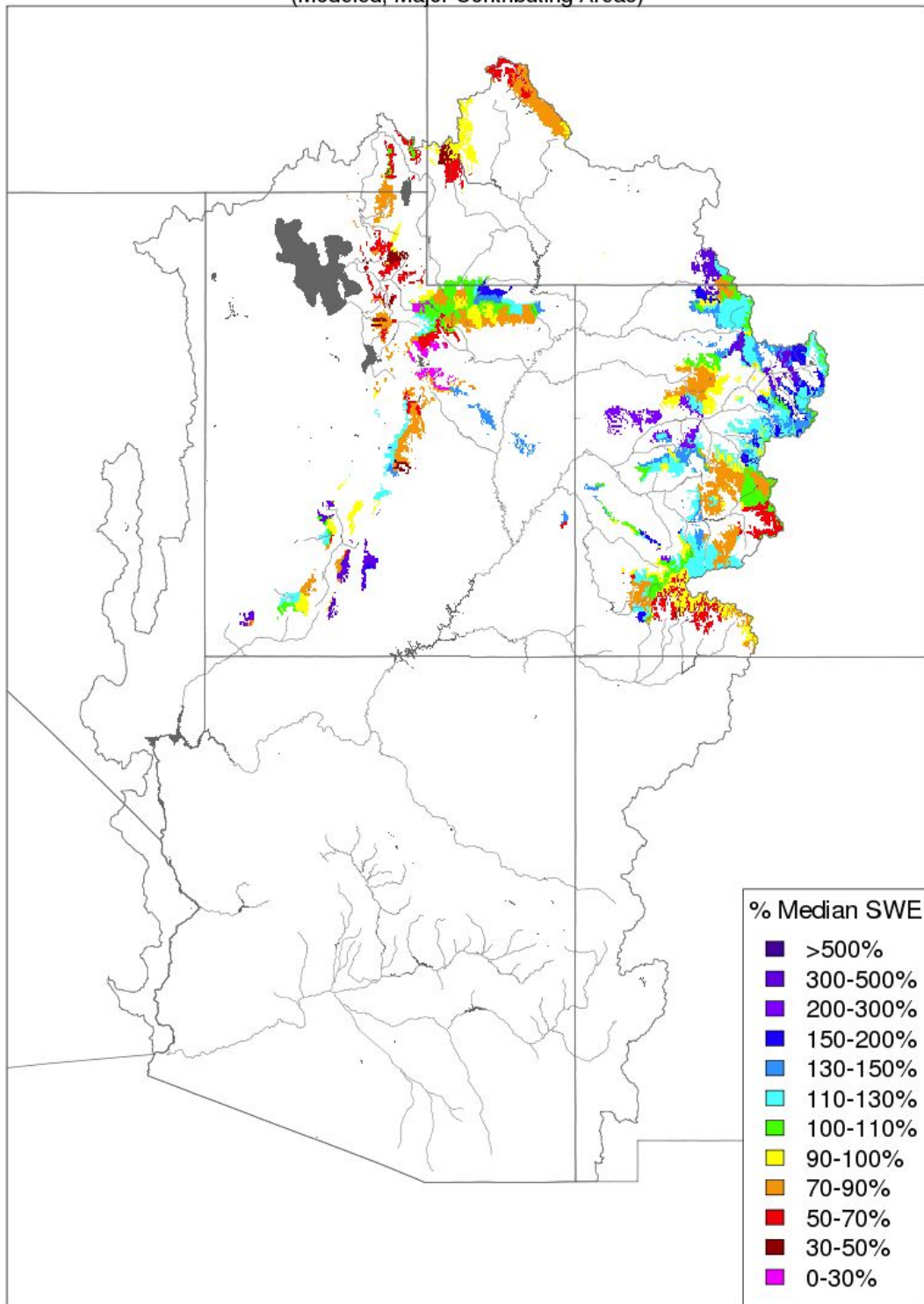


Image: Percent Median Snow Conditions as of May 4th 2016

The image below illustrates snowpack conditions from the CBRFC hydrologic model. Only those areas that provide the greatest contribution to the April-July runoff volumes are displayed. The areas in green to blue are where the model snow ranges from near to above median for this time of year. Those areas in the brown to red indicate below median conditions. This image is very similar to the SNOTEL map above in where the Yampa Basin, Colorado River headwater areas, north slopes of the Uinta Mountains, and southern Gunnison Basin have the most favorable snow conditions as of early May.

Snow Conditions - May 04 2016

(Modeled, Major Contributing Areas)



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Salt Lake City, Utah, www.cbrfc.noaa.gov

Modeled Snow: Snow representation from the CBRFC hydrologic model May 4th 2016

Soil Moisture:

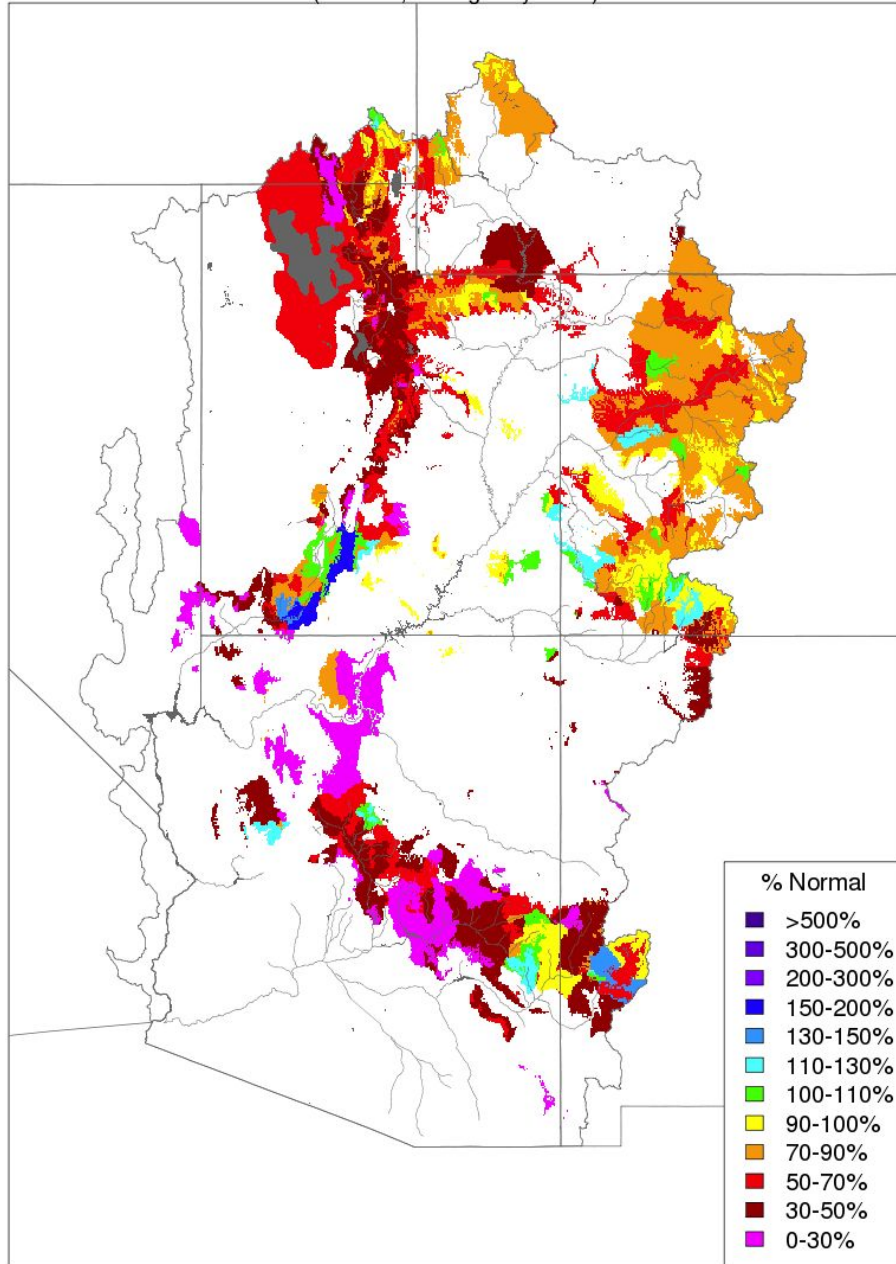
Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it influences the efficiency of the snowmelt runoff the following spring. Modeled soil moisture conditions as of November 15th were generally below or much below average. Soil moisture was exceptionally low in much of the Great Basin of central and northern Utah. Dry soil moisture conditions can result in less efficient runoff during snowmelt, even when snowpack conditions are above normal. Soil moisture conditions were more favorable in parts of the San Juan and Dolores River Basins 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 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)



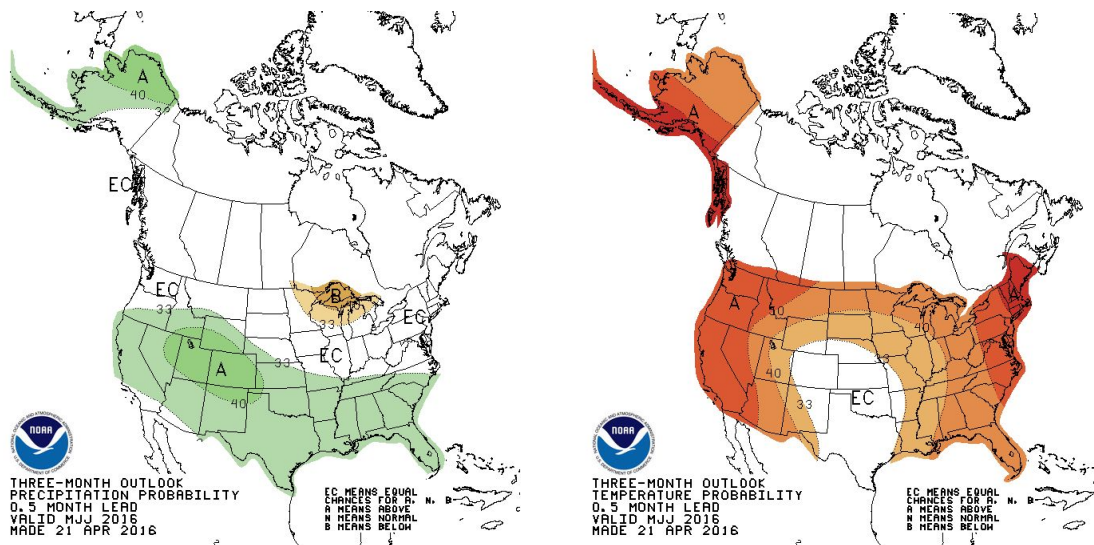
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

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

Climate Outlook: El Niño Southern Oscillation (ENSO) conditions currently exist and are weakening. Over the past four weeks positive sea surface temperature anomalies decreased in strength and negative anomalies have emerged in the eastern Pacific. A transition from El Niño conditions is likely by early summer with La Niña conditions likely by fall. The current state of the El Niño Southern Oscillation (ENSO) conditions do not have an impact on water supply forecasts outside of the Lower Colorado River Basin of Arizona and New Mexico. In those areas El Niño conditions

historically correlate with above average rainfall and streamflow during the winter season. La Niña conditions correlate with below average rainfall and streamflow during the winter season. Elsewhere in the Great Basin and upper Colorado River Basin there is not a significant correlation with winter snowfall or the April-July runoff.

The Climate Prediction Center outlooks are shown here for information only. This information is not incorporated into the water supply forecasts. The CPC guidance indicates enhanced chances of above average precipitation over the Colorado River and Great Basins during the May through July period. There is also enhanced chances for above average temperatures during this same period over the Lower Colorado River Basin, Great Basin, and Green River Basin of Utah and Wyoming.



Climate Prediction Center April-May outlooks as of April 21 2016

Left: Probability of above / below average precipitation Right: Probability of above / below average temperature

Conclusion:

Water supply forecasts for the April-July period generally changed little or trended higher in much of the Gunnison, Yampa, and Duchesne River Basins, and in the Colorado River headwaters compared to those issued in early April. Forecasts trended lower in many areas of the Great Basin, most notably in parts of the Bear River Basin, Utah Lake Basin, and lower elevations of the Weber River Basin and Six Creeks Basins.

April-July Water supply forecasts are near to above average in parts of the Yampa River Basin and Colorado River headwaters. Elsewhere forecasts are generally below average with some of the lower forecasts with respect to average in the Great Basin and Duchesne River Basin.

Best snow conditions for early May exist in parts of the Yampa River Basin, Colorado River headwaters, Gunnison River Basin, and north slopes of the Uinta mountains. Snow conditions elsewhere are generally lower than they typically are at this time of year. While additional precipitation is typical for May, significant snow accumulation from this point forward is not expected as we are now in the melt cycle for most areas. Significant changes to water supply forecasts over the next month are unlikely outside of extreme weather conditions developing.

Dry modeled soil moisture conditions were widespread entering the winter season, which is causing a negative impact to the forecasts in affected areas. This is prevalent in the Great Basin of northern Utah where some of the driest soils existed entering the winter season.

El Niño neutral conditions are anticipated by early this summer with La Niña conditions likely by this fall. The ENSO (El Niño Southern Oscillation) state only correlates with winter precipitation and streamflow in the Lower Colorado River Basin of Arizona and New Mexico and is only considered in the water supply forecasts in those areas.

End Of Month Reservoir Content Tables

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[Virgin River Basin](#)