

April 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:

March resulted in quite a discrepancy over the CBRFC forecast area when describing observed precipitation and water supply forecast trends.

The northern third of the CBRFC forecast area received above average precipitation and some improvement in snowpack conditions. This resulted in a general increase in April-July runoff streamflow volume forecasts from those issued in early March. Those areas that made out best with precipitation included parts of the Great Basin, Green River Basin of Wyoming, Yampa River Basin, Colorado River headwaters, and to a lesser extent the Duchesne River Basin.

Outside of these areas, March precipitation was below average with several areas receiving less than 50 percent of average precipitation. Snow conditions decreased as a percent of median for April 1st and April-July runoff volume forecasts also generally decreased.

April-July inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 565 KAF (78% of average), Flaming Gorge 740 KAF (76% of average), Blue Mesa Reservoir 515 KAF (76% of average), McPhee Reservoir 255 KAF (86% of average), and Navajo Reservoir 530 KAF (72 % of average). Lake Powell is forecast to receive 5.3 MAF (74% of average) during the April-July period. These forecasts referenced are for the 50 percent exceedance probability.

In the Lower Colorado River Basin of Arizona and New Mexico conditions were even drier during March. Less than 10 percent of average precipitation was widespread with some locations reporting zero precipitation. April-May streamflow volumes are expected to be much below median.

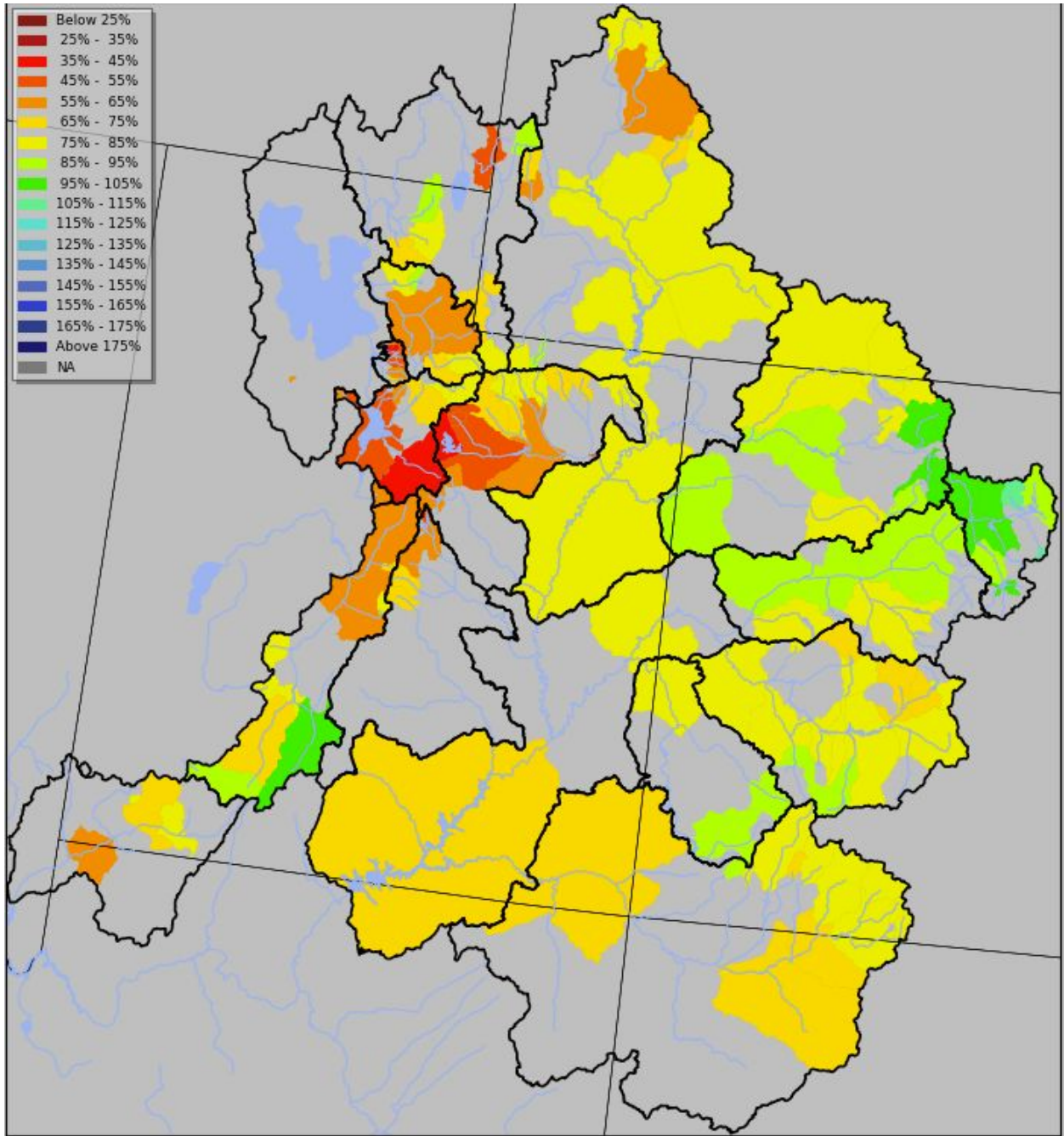


Image: April 1st 2016 April-July forecast volumes as a percent of 1981-2010 average
 (50% exceedance probability forecast)

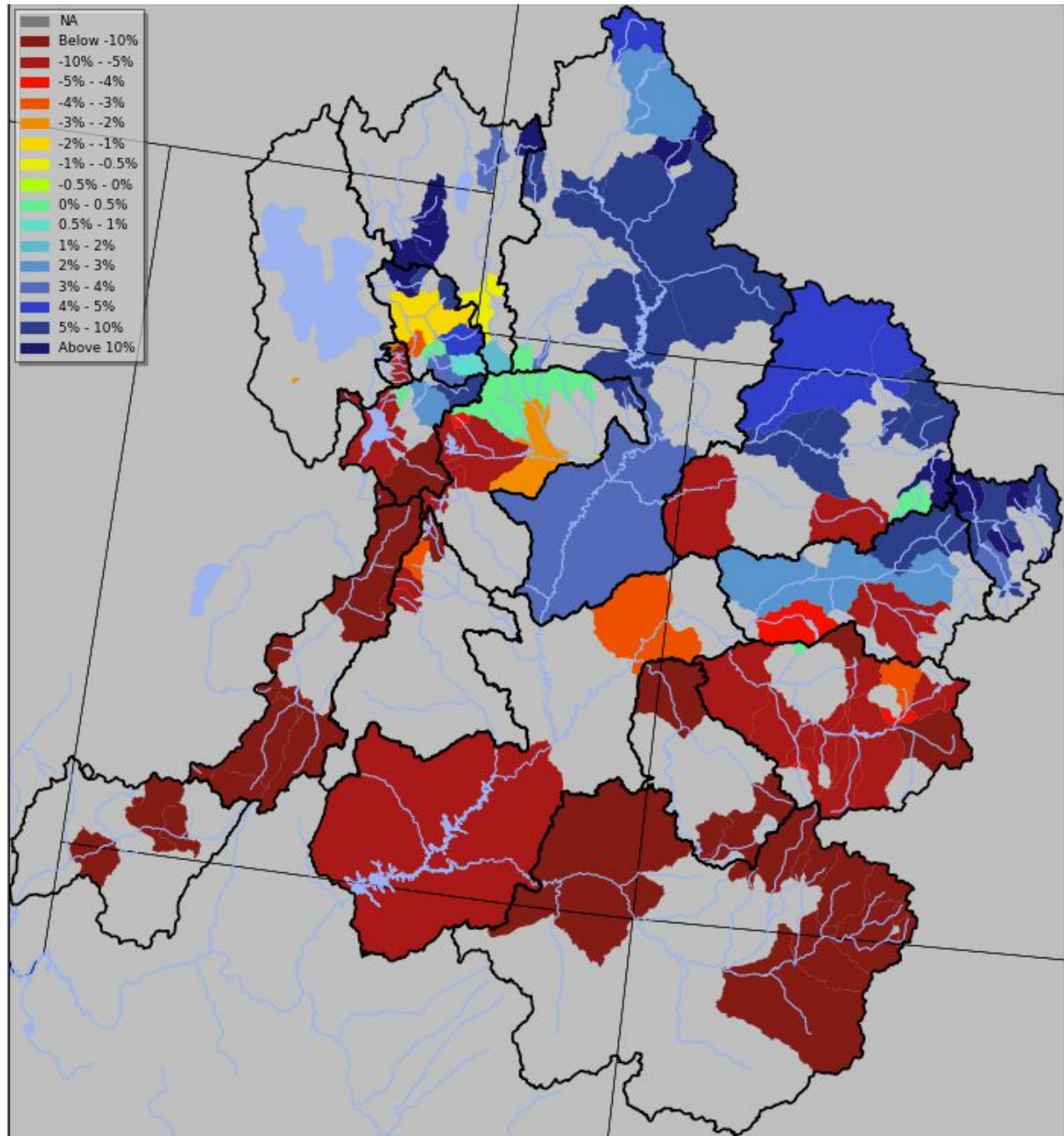


Image: Change in April-July volume forecast between March 1st and April 1st 2016
 (Expressed as change in the percent of average)

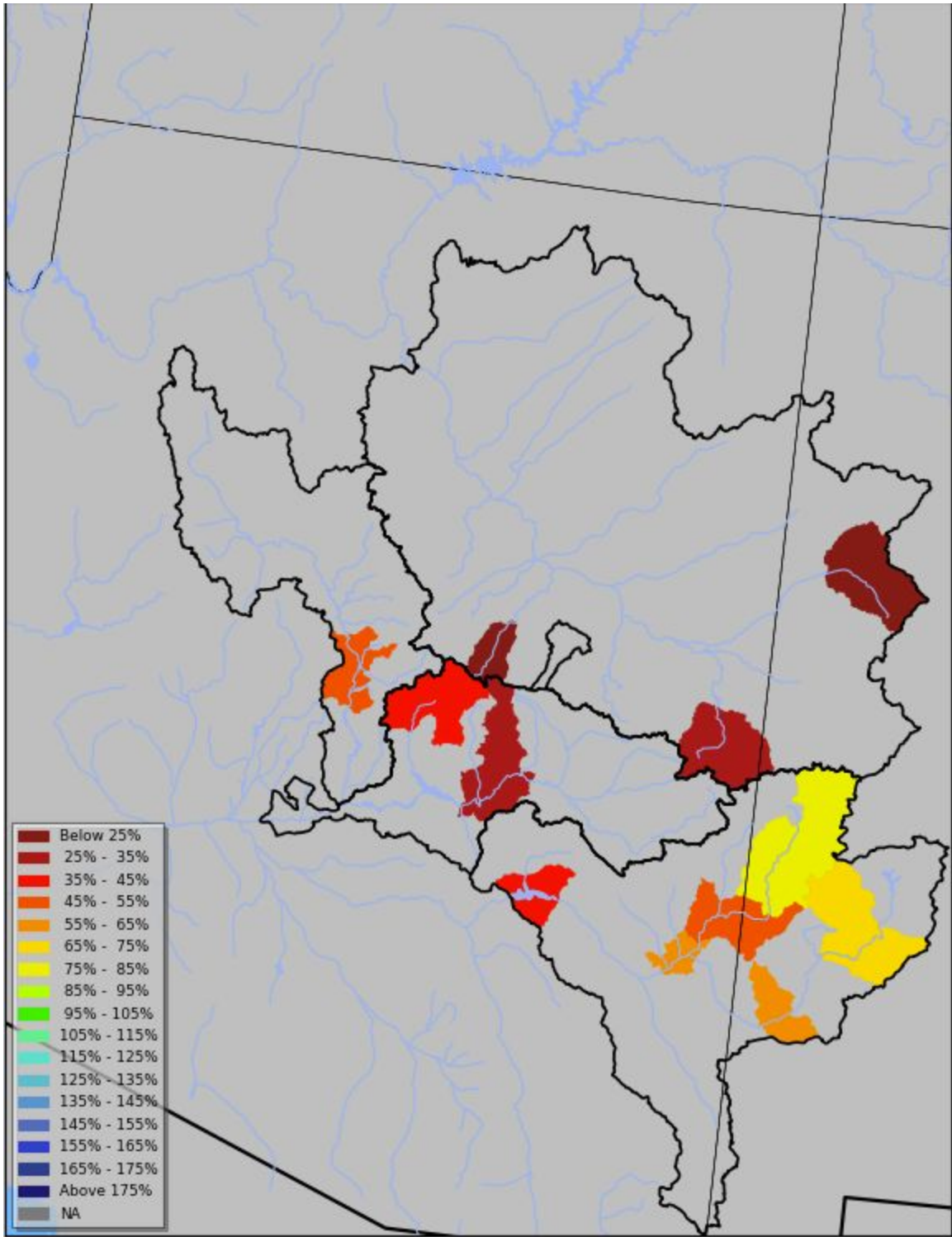


Image: Lower Colorado Basin (AZ/NM): 2016 April-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

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

Water Supply Discussion

Weather Synopsis:

The weather pattern for March was progressive with several quick moving and weakening storm systems moving through the forecast area during the month. These quick moving systems only brought light precipitation amounts particularly to the southern part of the CBRFC forecast area. Larger storm systems during the first and last week of the month had greatest impact over the northern third of the forecast area.

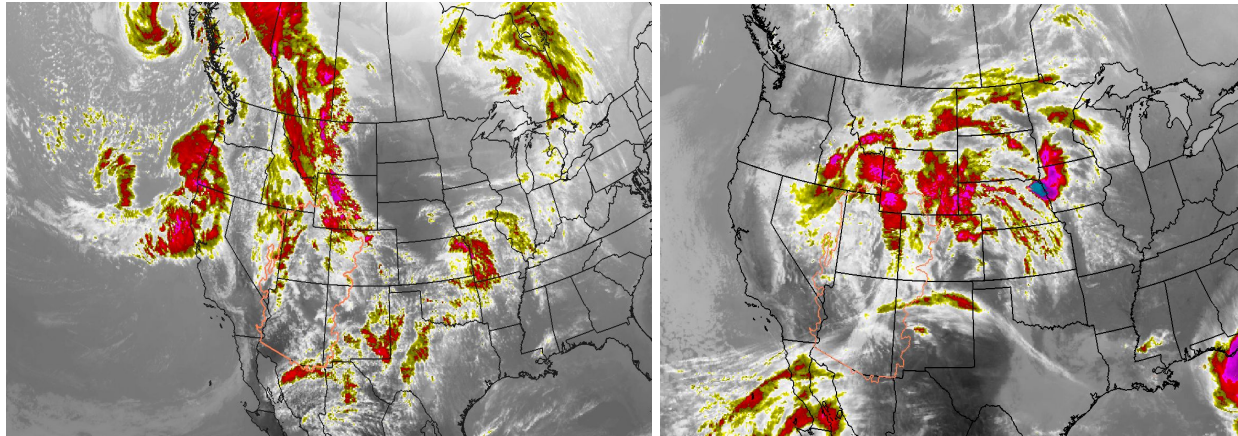


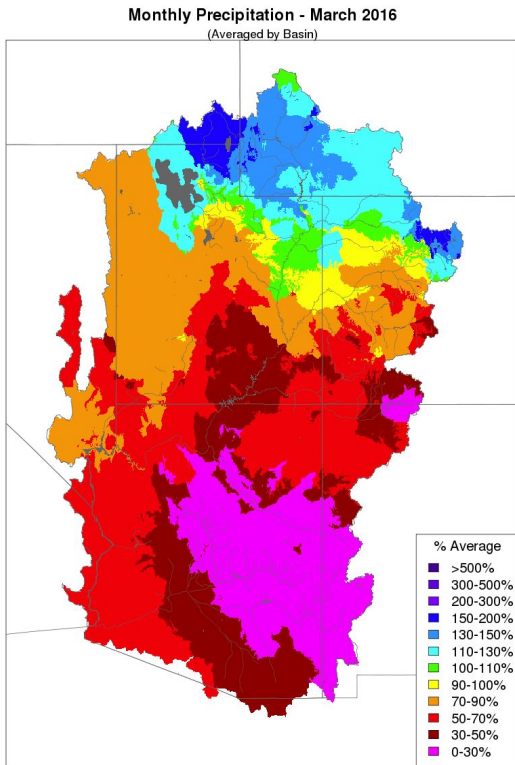
Image: Left: Satellite image from March 6th with an active storm system impacting the northern part of the CBRFC forecast area. Right: Satellite image of a storm system over the area at the end of the month - March 29th 2016.

Precipitation and Temperatures:

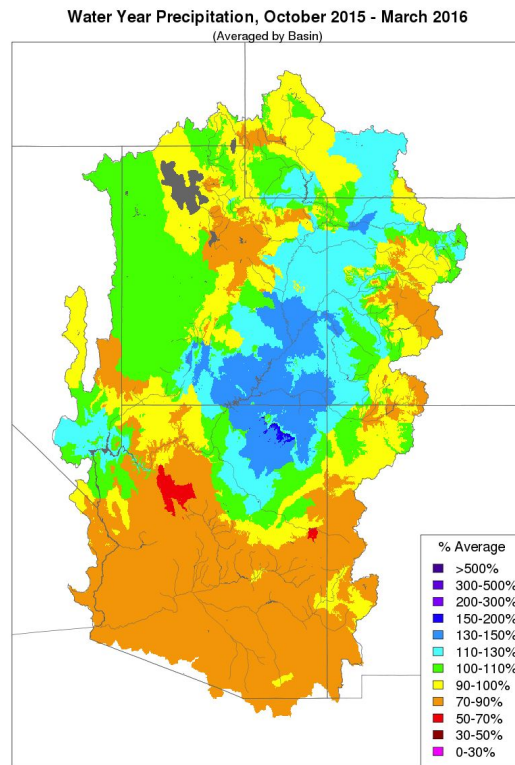
Near or above average precipitation occurred in the Green River Basin of Wyoming, some of the Colorado River headwaters basins, parts of the northern Great Basin, Duchesne River Basin, and the Yampa River Basin. Areas to the south including the Roaring Fork and Eagle River Basins, the Gunnison River Basin, San Juan River Basin, and throughout central and southern Utah had below average precipitation. These areas were also dry in February and numerous SNOTEL sites recorded the driest or 2nd driest February-March in over 35 years of record. This was most prevalent in the San Juan Basin.

In the lower Colorado River Basin of Arizona and New Mexico less than 10 percent of average precipitation for March was common with several locations not receiving any measurable precipitation.

Water year precipitation (October-March) is still above 90 percent of average over much of the Great Basin and upper Colorado River Basin. A few areas have dropped into the 70 to 90 percent of average range due to the past couple of dry months. These areas include the eastern Gunnison and San Juan River Basins and much of the lower Colorado River Basin in New Mexico and Arizona. While some improvement occurred over the past month the Duchesne and part of the Provo River / Utah Lake Basins remain below average for water year precipitation.



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 March over much of the Great Basin and Upper Colorado River Basin. In the lower Colorado River Basin of Arizona and New Mexico mean monthly maximum temperatures for March were above average. The mean monthly minimum temperatures were generally above average throughout the CBRFC forecast area. The warmest period was during the first couple weeks of the month when temperatures were greater than 15 degrees above average in many areas. Near to below average temperatures were more common during the second half of the month. Snow melted at higher elevations near 9000 to 10,000 feet in southern river basins that included the Sevier, Virgin, and San Juan Basins. Farther north in the Great Basin and Upper Colorado River Basin some snow melt occurred at lower elevations generally below 8500 feet.

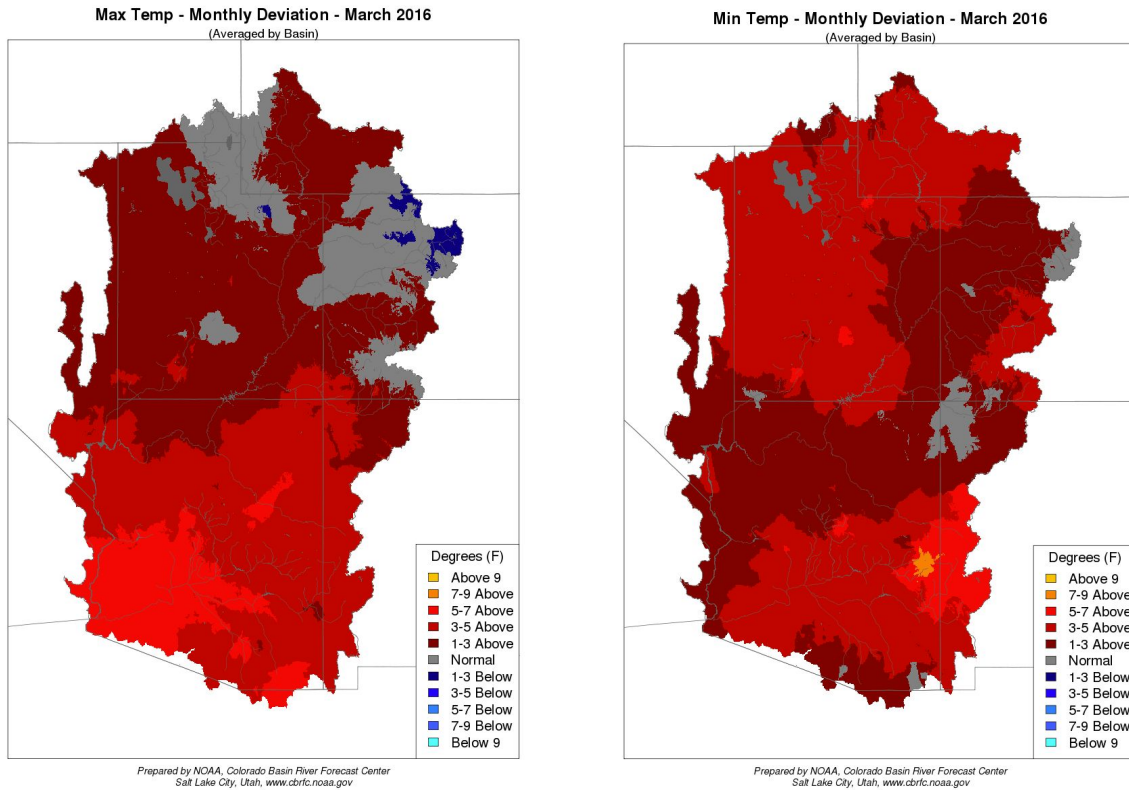


Image: Monthly maximum and minimum temperature departure from average for March 2016.
(Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

Snowpack conditions are highly variable throughout the CBRFC forecast area as of early April. Improvement occurred to the higher elevation snowpack conditions in areas that received above average precipitation during March. This was most prominent in the Bear River Basin, Green River Basin of Wyoming, some Colorado River headwaters, and parts of the Yampa River Basin. There was also some improvement in the snowpack in the Duchesne River Basin, Six Creeks, and parts of the Weber River Basin, however most SNOTEL sites in these areas still indicate below median conditions.

Snowpack conditions dropped compared to the historical median in many southern basins, particularly the San Juan and Dolores River due to the dry March and melting snow. Snow melt was observed at sites up to near 10,000 feet in these areas.

The image below shows conditions of SNOTEL sites across the CBRFC area as of April 5, 2016.

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

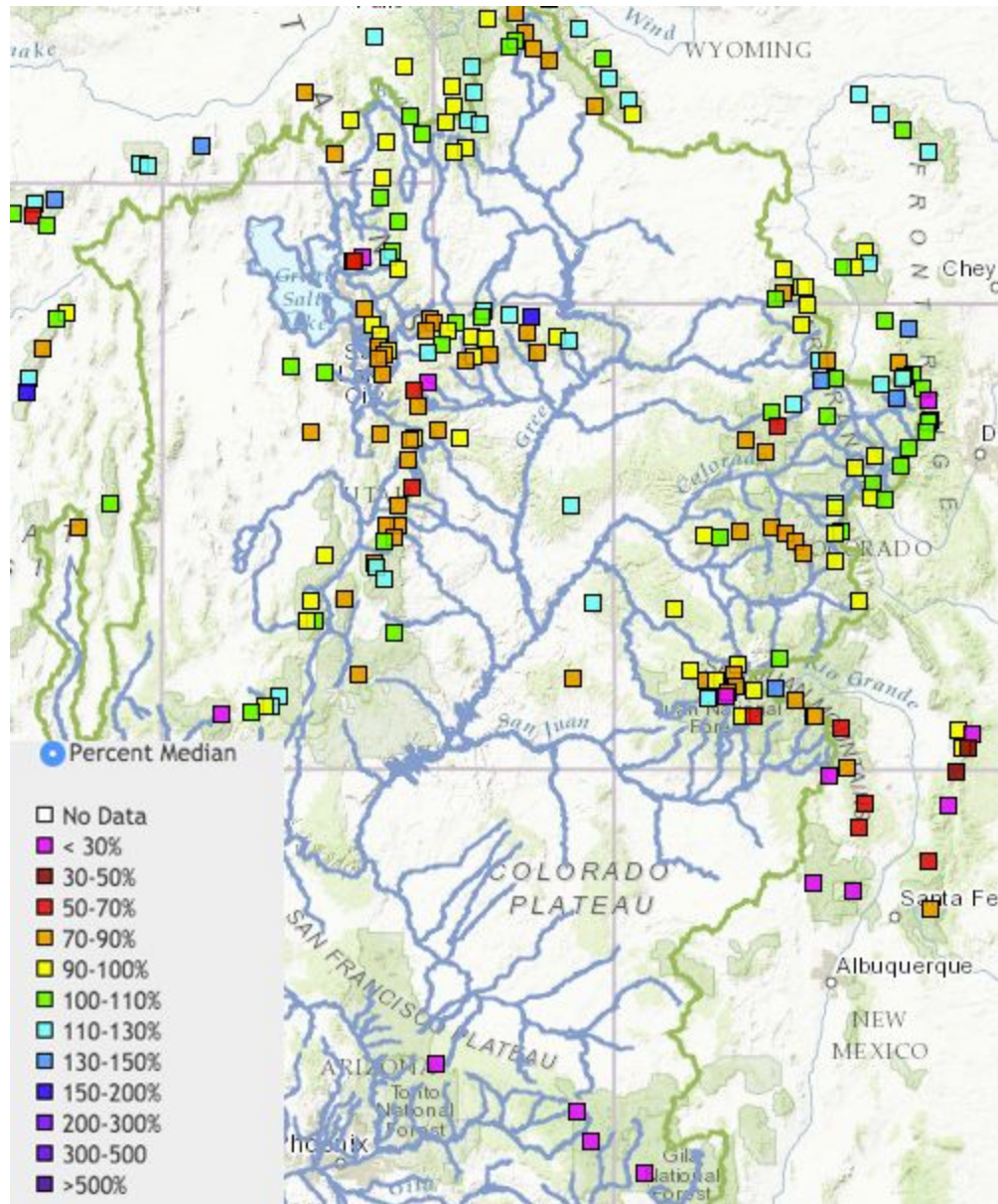
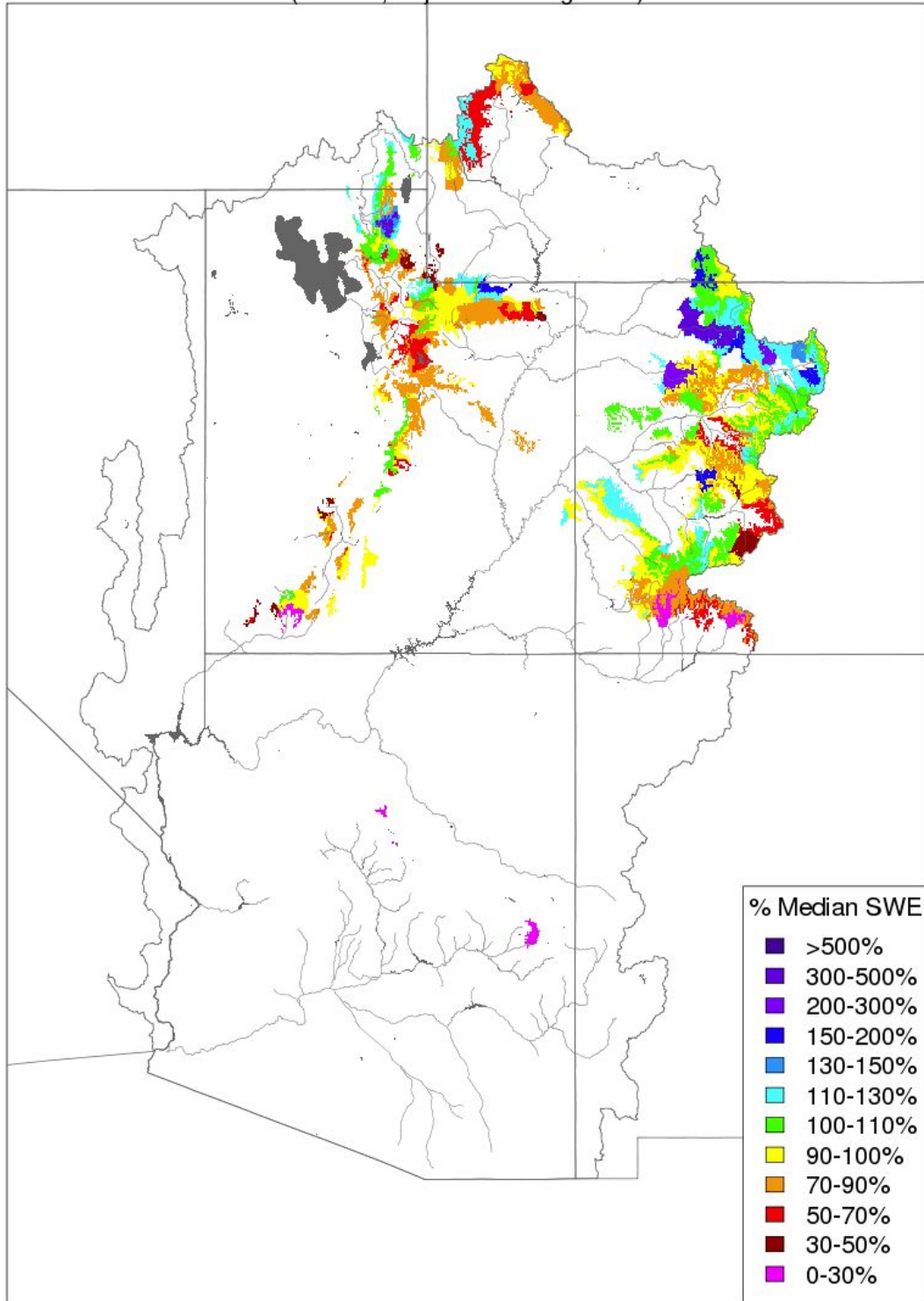


Image: Percent Median Snow Conditions as of April 5th 2016

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. The best snow conditions with respect to the historical median exist in the Bear River Basin, much of the Yampa River Basin and Colorado River headwaters. Southern river basins of the Gunnison Basin also have near or above median model snow conditions. Even though improvement occurred in the Green River Basin of Wyoming the snow representation in the CBRFC model indicates below median conditions. The San Juan River Basin and parts of the Duchesne River Basin are also far below median for early April.

Snow Conditions - April 05 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 April 5th 2016

Soil Moisture:

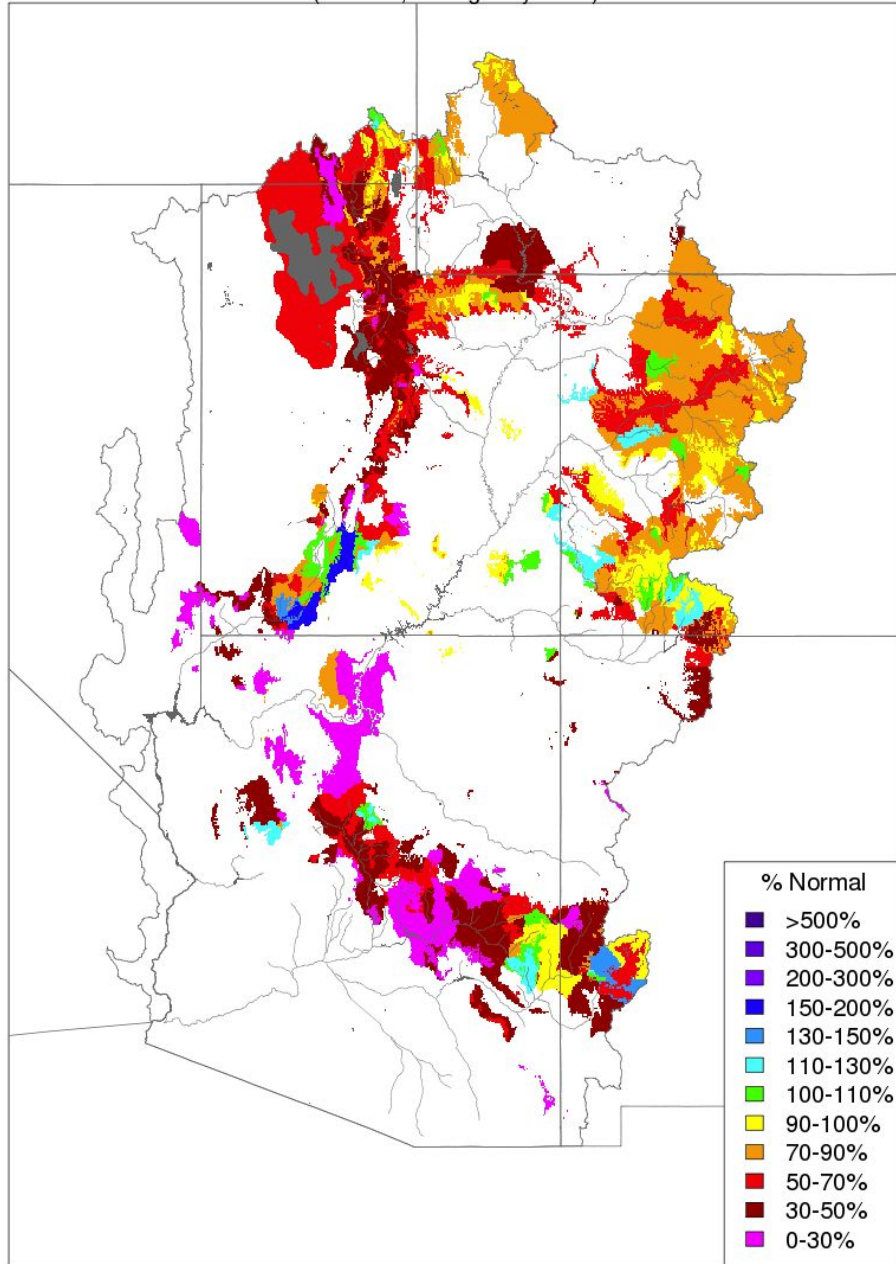
Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it influences the efficiency of the snowmelt runoff the following spring. Modeled soil moisture conditions as of November 15th were generally below or much below average. Soil moisture 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

The image below is an indication of areas where soils have become increasingly saturated in the CBRFC hydrologic model due to snowmelt, rainfall, or a combination of both. In this image for early April areas depicted in the green colors are where recent snowmelt has occurred and soils have become more saturated. The lower the values the closer the basin is to reaching a sufficient state of saturation for the hydrologic model to produce runoff from

additional rain or snowmelt. While this image is primarily intended to assess runoff efficiency in the Lower Colorado River Basin during winter rain events, it does provide some information in snowmelt basins in the spring months. The Gila River Basin headwaters, lower elevations in the San Juan River Basin, and the Dolores River Basin have become increasingly saturated as significant snow melt has occurred in those areas. This has also occurred in lower elevations of the Bear, Yampa, and Gunnison River Basins as snow has started to melt. Large deficits in the northern snowmelt basins, as seen here, are typical during the winter and early spring until the snowmelt begins in earnest.

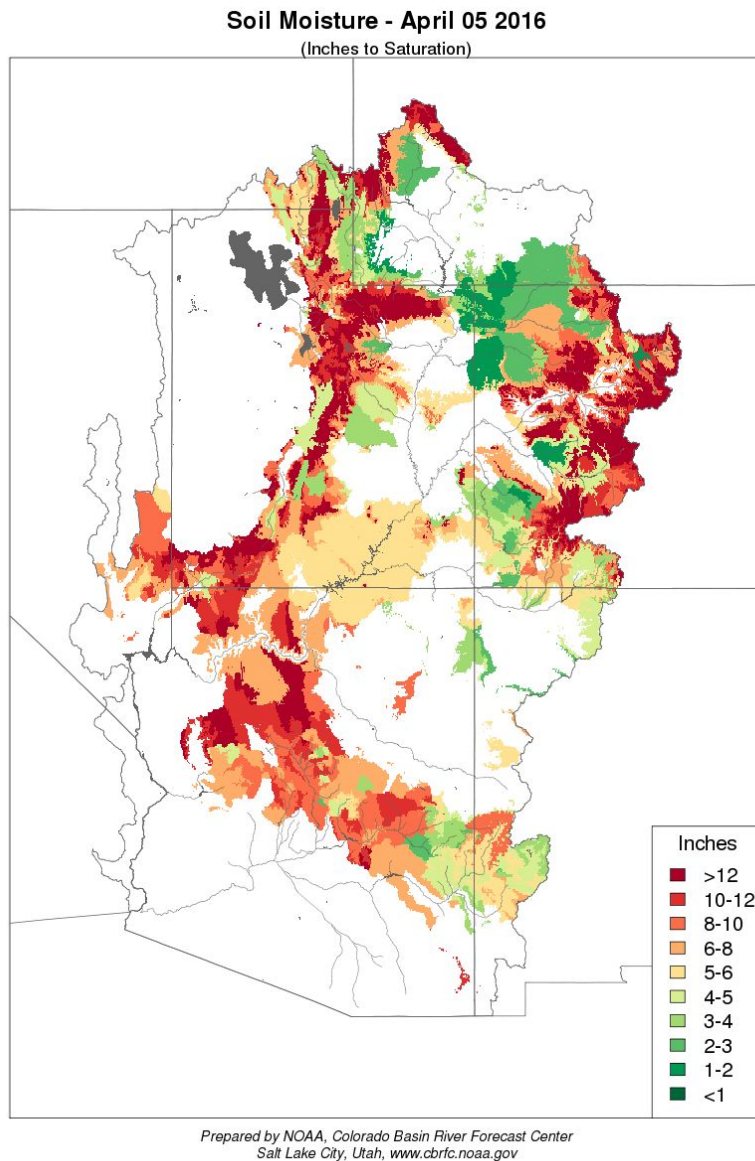
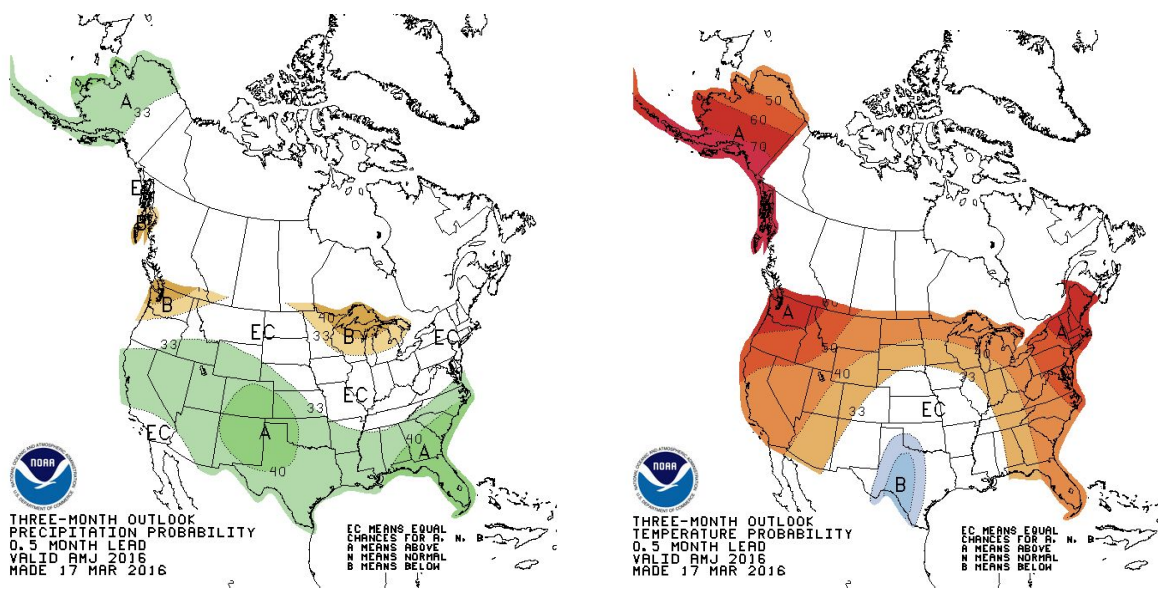


Image: Levels of saturation from the CBRFC hydrologic model. Areas in green indicate where soils have become increasingly saturated more efficient runoff may result with additional rain or snowmelt.

Climate Outlook: El Niño Southern Oscillation (ENSO) conditions currently exist. Over the past four weeks positive sea surface temperature anomalies persisted across most of the equatorial Pacific Ocean. El Niño conditions have been weakening and ENSO neutral conditions are expected by late spring or early summer.

Models indicate the chance of La Niña conditions developing increasing to 50% in the September-October-November 2016 period. 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 average precipitation over entire the Colorado River and Great Basins during the April through May period. There is also a enhanced chances for above average temperatures during this same period over the Colorado River and Great Basin.



Climate Prediction Center April-May outlooks as of March 17 2016

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

Conclusion:

Water supply streamflow runoff volume forecasts improved in parts of the northern Great Basin, Green River Basin of Wyoming, Yampa River Basin, and Colorado River headwaters from those issued in early March. The opposite occurred for many southern basins where forecasts were reduced. These include forecasts in the Gunnison, Dolores, San Juan, and Virgin River Basin. Forecasts were also reduced in the western Duchesne River Basin and for many small drainages in central Utah.

The trend in water supply forecasts can be attributed to a wet March over the northern third of the CBRFC forecast area while dry conditions were the predominant weather trait over the southern two-thirds of the forecast area. For some of these southern areas the driest February-March period in 35-38 years of record was observed.

Snowpack conditions improved in the areas with above average precipitation and decreased with respect to median

in the dry areas. However the snowpack conditions remain quite variable with a mix of near, above, and below median conditions throughout the upper Colorado River and Great Basin. Highest snow conditions with respect to median exist in parts of the Yampa and Colorado River headwaters. Lowest snow conditions with respect to median exist in the San Juan River Basin and parts of the Duchesne River Basin.

Highest April-July runoff volumes with respect to average are expected in the Colorado River headwaters above Kremmling and parts of the Yampa River Basin. A few basins in these areas are expecting near or above average runoff volumes. Elsewhere below average runoff volumes are anticipated with lowest volumes with respect to median in the western Duchesne River Basin, lower elevation basins in the Provo / Utah Lake, and Six Creeks Basins.

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.

In the Lower Colorado River Basin below median April-May volumes are expected. March precipitation was dismal with less than 10 percent of average precipitation observed at many locations.

The strong El Niño event underway continues to weaken. Conditions are expected to become neutral by later this spring with an increasing chance of La Niña conditions by this fall.

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](#)