

February 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:

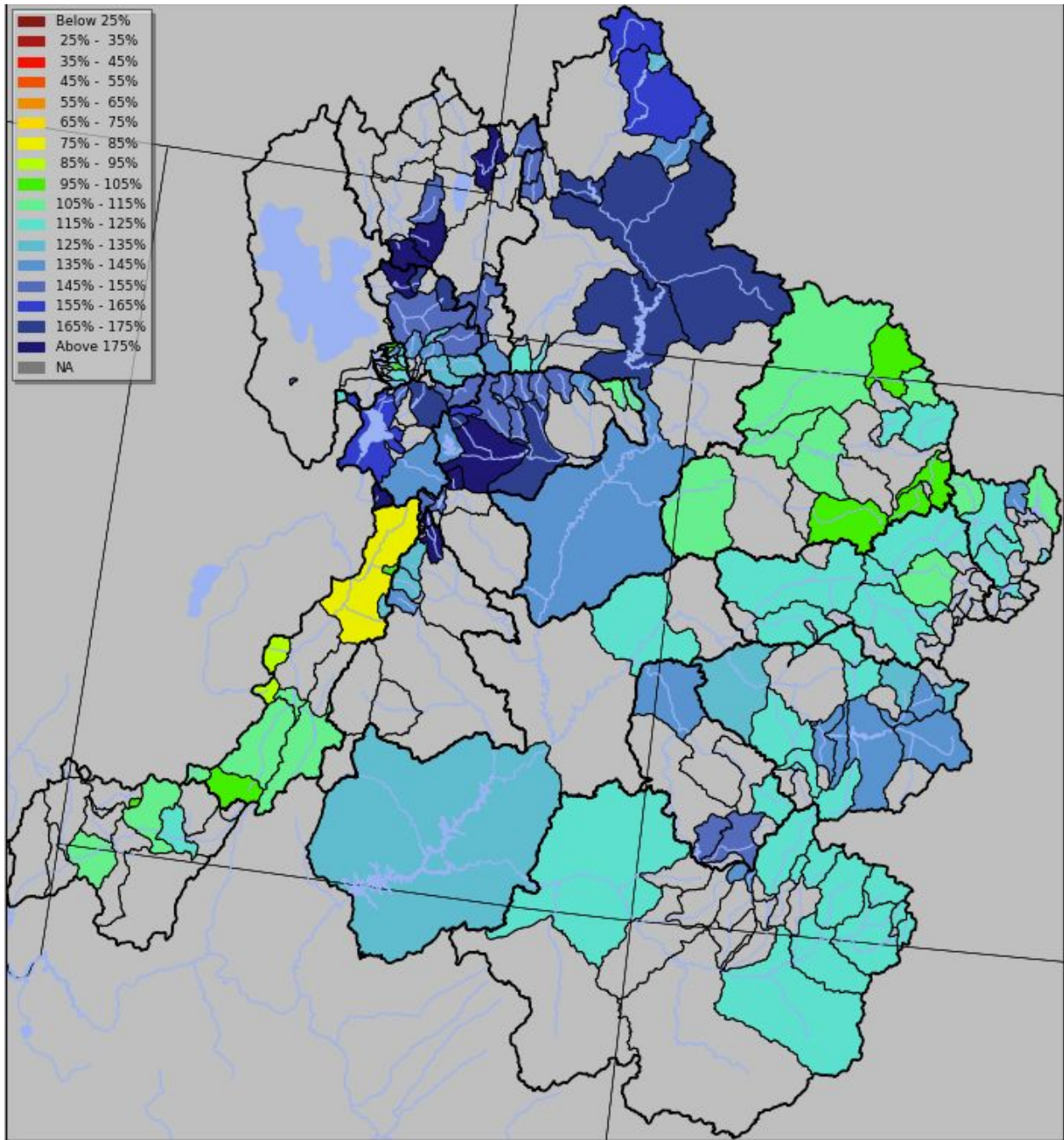
Record setting precipitation occurred in many areas throughout the Upper Colorado River Basin and Great Basin in January. Snowpack in several areas now exceeds the annual seasonal peak that typically occurs later in the spring months of April or May. As a result many locations noted dramatic increases in water supply streamflow volume forecasts over those issued in early January.

As of early February above average April-July streamflow volumes are expected throughout the Upper Colorado River Basin and Great Basin. Largest volumes with respect to average are forecast in the Green River Basin of Wyoming, Duchesne River Basin, tributaries of the Green River in central Utah, Bear, Weber, and Provo River Basins. Several forecasts in these areas exceed 150 percent of average with some locations as high as 180 percent of average. Elsewhere forecasts are also much above average particularly in the Dolores River Basin and headwaters of the Gunnison River Basin where forecasts generally range from 125 to 150 percent of average. In the Colorado River headwaters forecasts generally range between 110 and 120 percent of average.

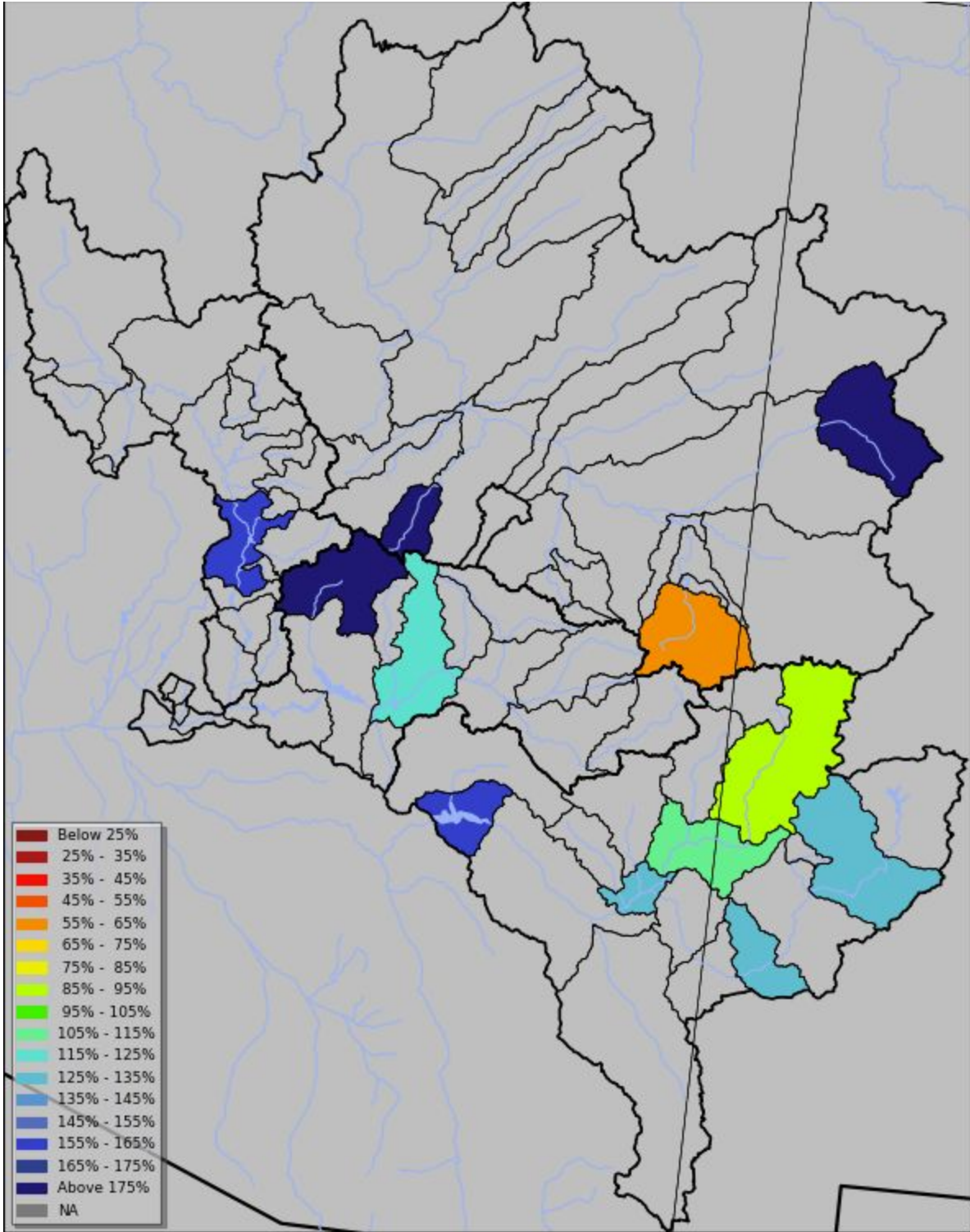
April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Lake Powell 9.60 MAF (134% of average), Fontenelle Reservoir 1.20 MAF (166% of average), Flaming Gorge 1.65 MAF (168% of average), Blue Mesa Reservoir 925 KAF (137% of average), McPhee Reservoir 440 KAF (149% of average), and Navajo Reservoir 880 KAF (120% of average).

The Lower Colorado River Basin also experienced much above average precipitation in many areas and some locations in the Virgin River Basin, Salt River Basin, and Verde River Basin have already exceeded peak snowpack that typically occurs in March or April. April-July runoff volumes in the Virgin River Basin are forecast to range from 100 to 120 percent of average (150 to 170 percent of median). February-May runoff volumes in the Salt, Verde, and Gila River Basins range from 90 to 185 percent of median while the Little Colorado River Basin forecasts range from 55 to 185 percent of 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)



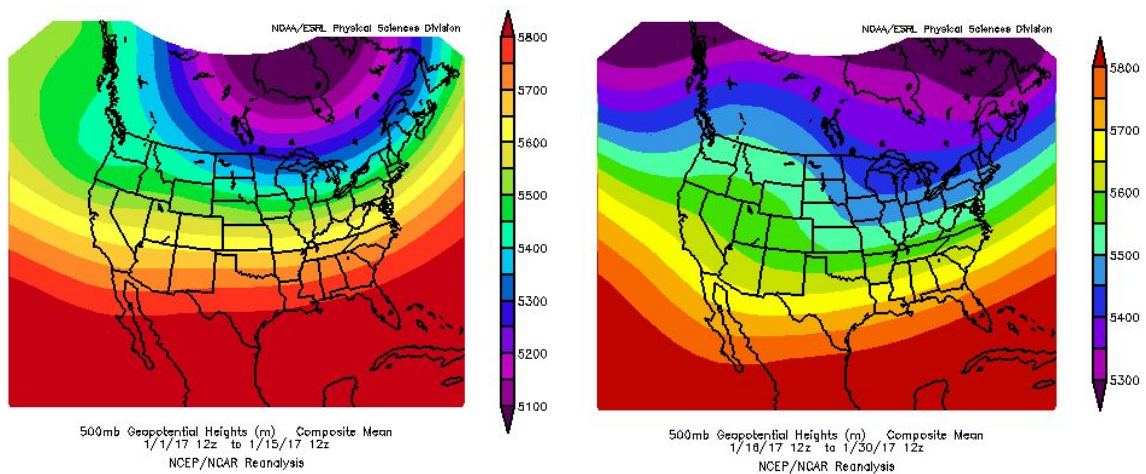
Lower Colorado Basin (AZ/NM): 2017 February -May forecast volumes as a percent of 1981-2010 median
(50% exceedance probability forecast)

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

Water Supply Discussion

Weather Synopsis:

A very strong onshore flow with moisture sources in the sub-tropical regions dominated the first 3 weeks of January 2017. Significant moisture impacted the western U.S. and extended inland to much of the Great and Colorado River Basins. During the first half of the month these storm systems had greatest impacts in the northern half of the CBRFC forecast area with significant rain and snow in the Upper Colorado River Basin and Great Basin. Greatest storm impacts then shifted south into parts of Arizona and New Mexico during the second half of the month. The final ten days of January were dominated by high pressure ridge conditions that brought a respite from the wet pattern that started in early December.



Upper Air Pattern (approximately 18,000 feet) during January 2017

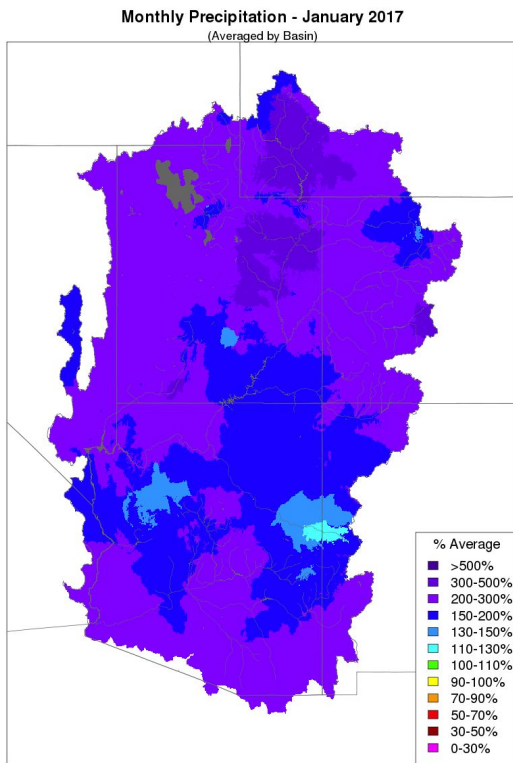
Left: Strong onshore flow brought significant moisture to the area the first half of January

Right: A somewhat drier weather pattern resulted the second half of January due to a high pressure ridge

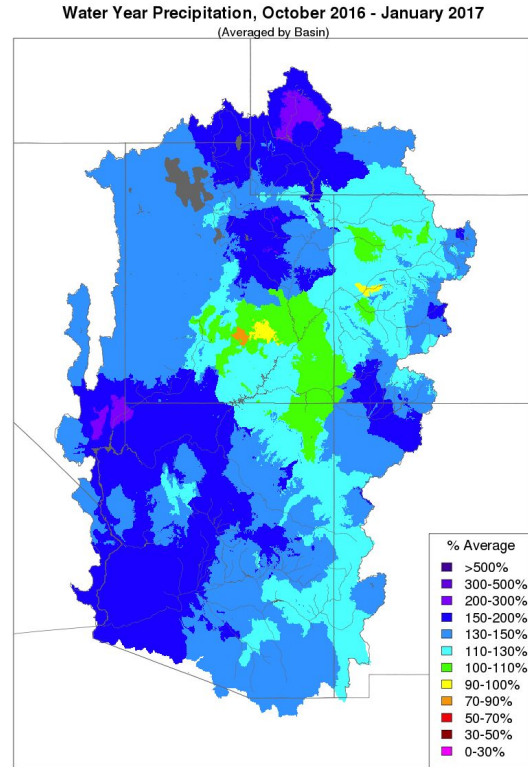
Precipitation and Temperature:

Precipitation received in January was a game changer and had a significant impact on water supply forecasts. Numerous higher elevation mountain precipitation sites in the Upper Colorado River Basin and Great Basin recorded their highest January precipitation in 30-38 years of record. The remaining sites all ranked in the top 2 or 3 of their historical record. Precipitation was also significant in the Lower Colorado River Basin of Arizona and New Mexico with several high elevation sites ranking in the top 5 of record for January.

Precipitation exceeded 150 percent of average throughout the CBRFC forecast area. The majority of the upper Colorado River Basin and Great Basin received in excess of 200 percent of average with many locations in the 250 to 450 percent of average precipitation. Several sites recorded between 10 and 20 inches of water during the month. Lower Colorado River Basin sites in Arizona and New Mexico generally received 110 to 280 percent of average for January.



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



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Image: January 2017 and water year (Oct 2016-Jan 2017) precipitation graphics
(Averaged by basins defined in the CBRFC hydrologic model)

January monthly mean maximum temperatures were below average throughout the CBRFC forecast area due to the frequent storms. Monthly mean minimum temperatures were more variable throughout the forecast area with areas of both above and below average depending on cloud cover and snow depth. Northern valleys were generally cooler than many mountain locations toward the end of January due to inversions that became established under a high pressure ridge. This was particularly notable in areas with deep snow cover.

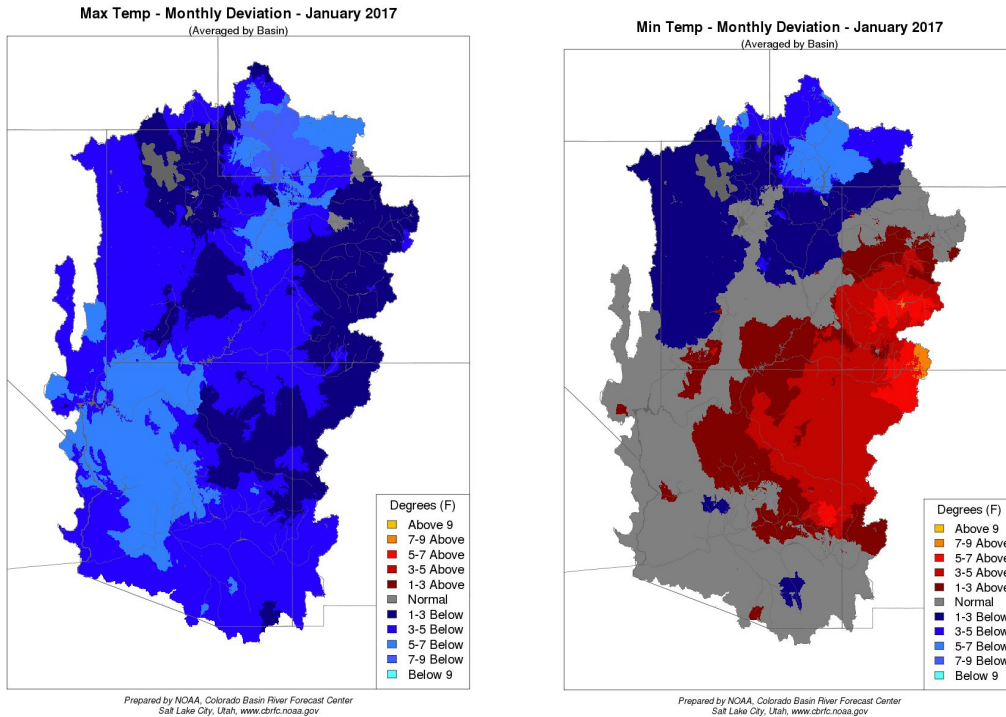


Image: Monthly maximum and minimum temperature departure from average for January 2017.
(Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

A very significant snowpack exists for early February across most of the Upper Colorado River Basin, Great Basin, and higher elevations in the Lower Colorado River Basin of Arizona. Exceptions include parts of the Yampa River Basin where conditions are closer to the historical median and in the headwaters of the Gila / San Francisco River Basins where below median conditions exist. There are numerous SNOTEL sites where snowpack conditions are well in excess of 200 percent of median for this time of year. These sites in addition to several others have already exceeded the annual peak snowpack levels that typically occur in April or May.

Some of the largest snowpack conditions with respect to median (or normal) exist in the Duchesne River Basin, Bear River Basin, tributaries of the Green River in north central Utah, and the Dolores River Basin.

The SNOTEL map image below indicates a widespread heavy snowpack across much of the CBRFC forecast area. Those sites depicted by a dark blue or purple marker have a snowpack ranging from 150 to 300 percent of median for early February.

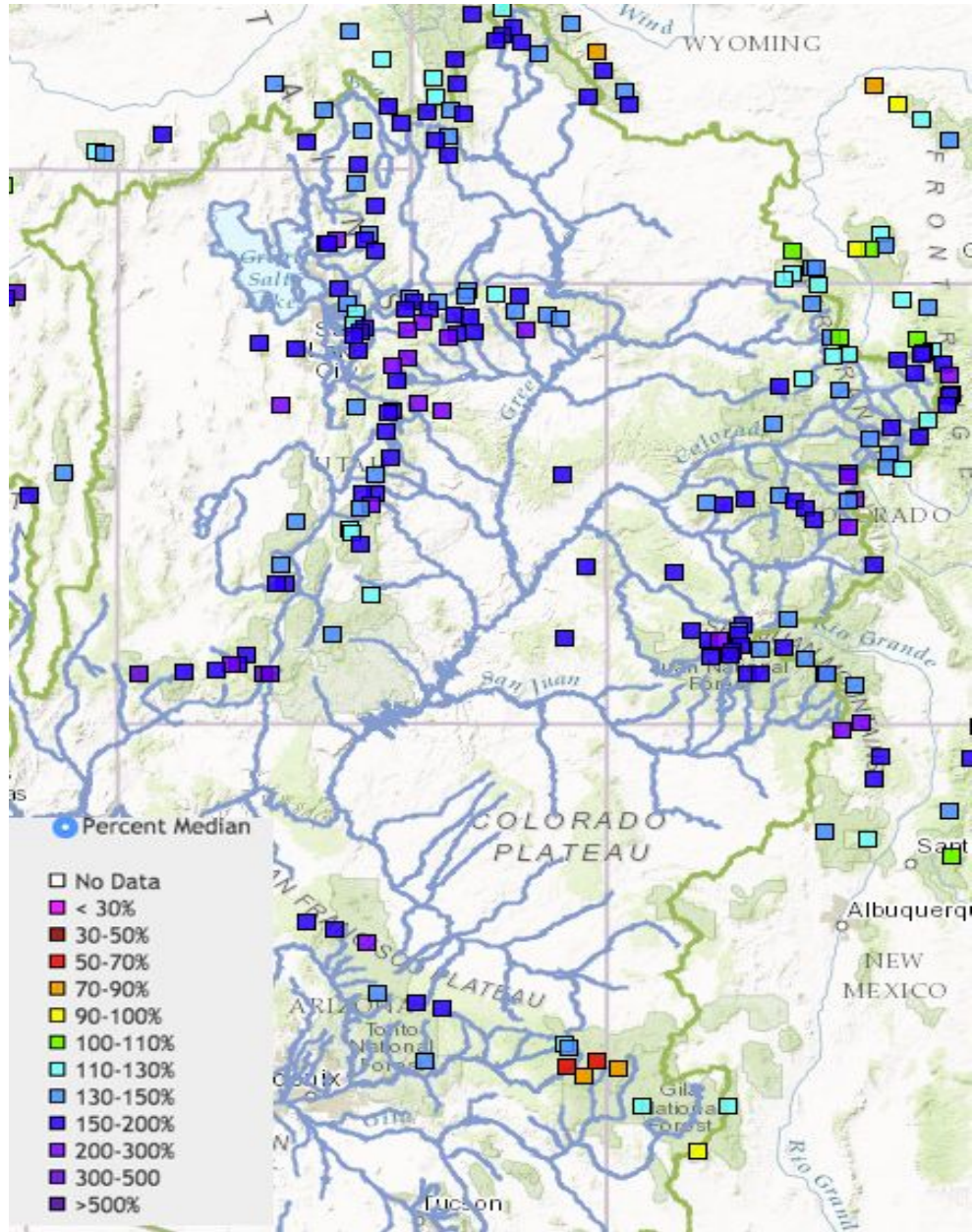
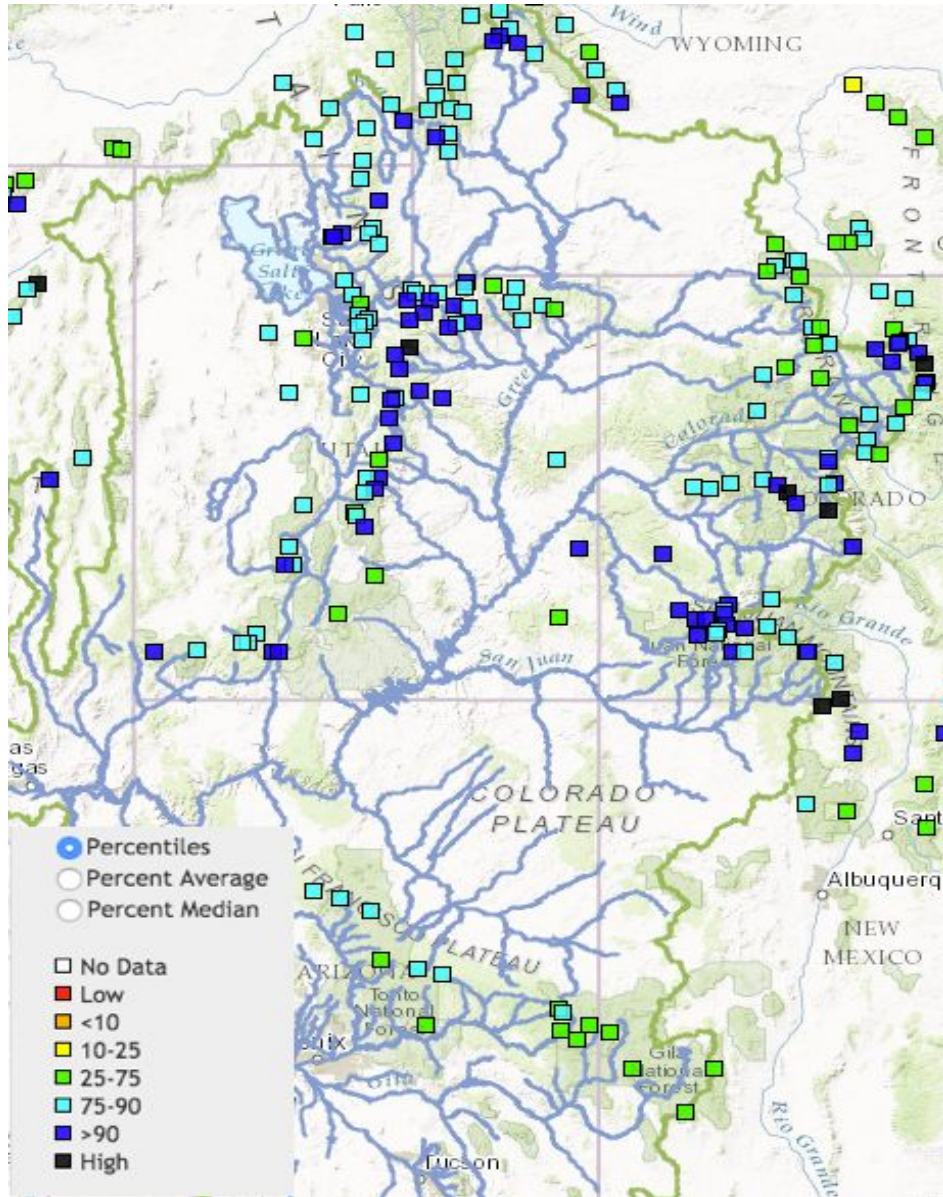


Image: Percent Median Snow Conditions as of February 2nd 2017

The snow percentile image displayed below indicates where the current snow measurement ranks in the historical record for each site. Many sites are in the 10 percentile of record (typically 34-39 years). Most of these sites are at the 2nd or 3rd highest for this time of year. A few sites, in the Gunnison Basin and Duchesne River Basin are at their highest on record for this time of year.

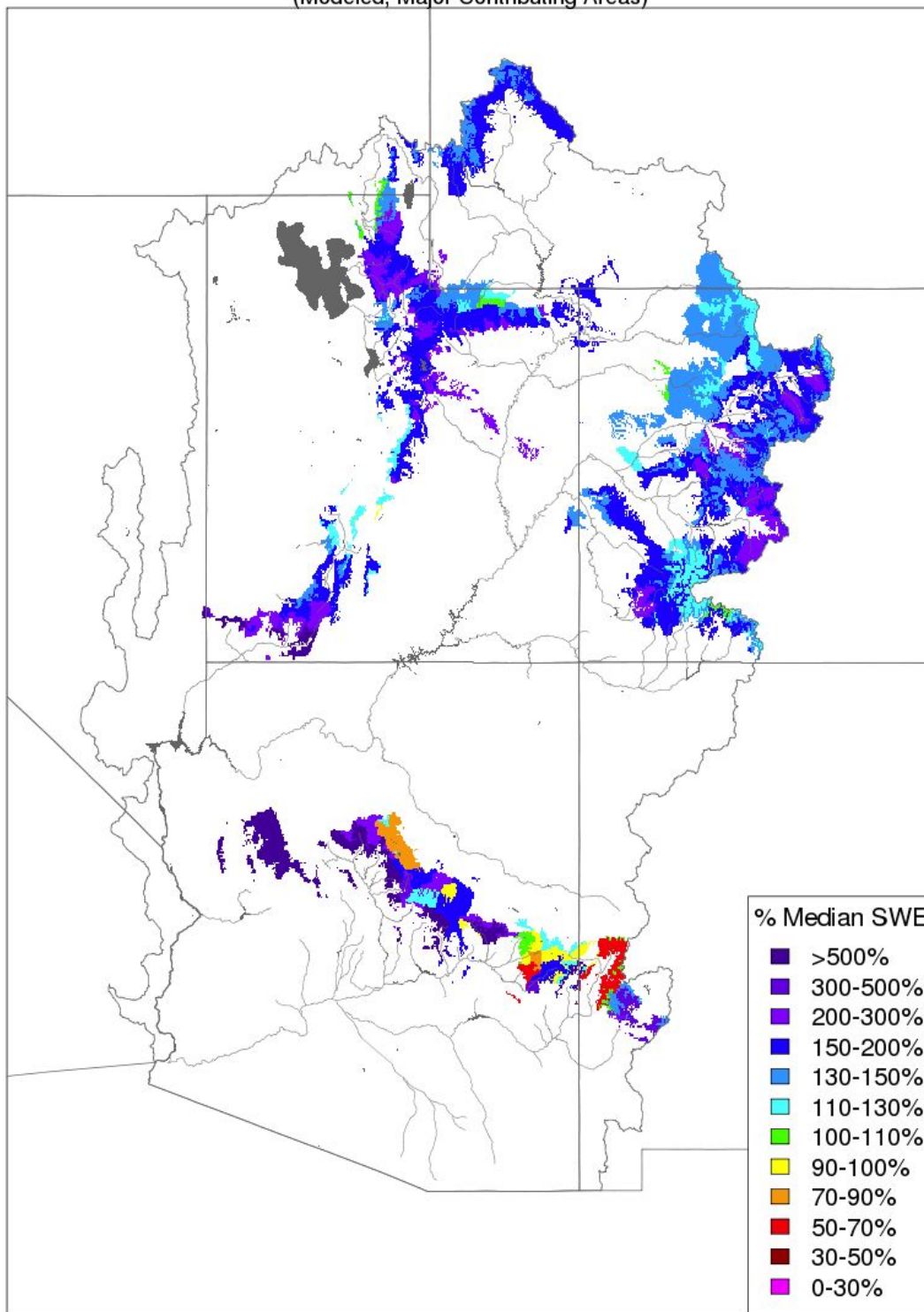


Snow Percentile Image: Historical SNOTEL ranking as of February 2nd 2017

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. Significant snowpack is widespread with snowpack conditions exceeding 200 percent of median over parts of the northern Great Basin, Duchesne River Basin, Virgin River Basin, Gunnison River Basin, Dolores River Basin, and middle elevations in some headwaters of the Colorado River mainstem. Although future weather conditions will ultimately determine the runoff scenario, current snowpack conditions suggest significant spring runoff is likely in these areas.

Snow Conditions - February 02 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 February 2nd 2016

For updated SNOTEL information refer to: <https://www.cbrfc.noaa.gov/lmap/lmap.php?interface=snow>

For CBRFC hydrologic model snow refer to:

<https://www.cbrfc.noaa.gov/rmap/grid800/index.php?type=monthly&area=cbrfc&year=2017&month=1&day=&hour=&type=snow>

Soil Moisture:

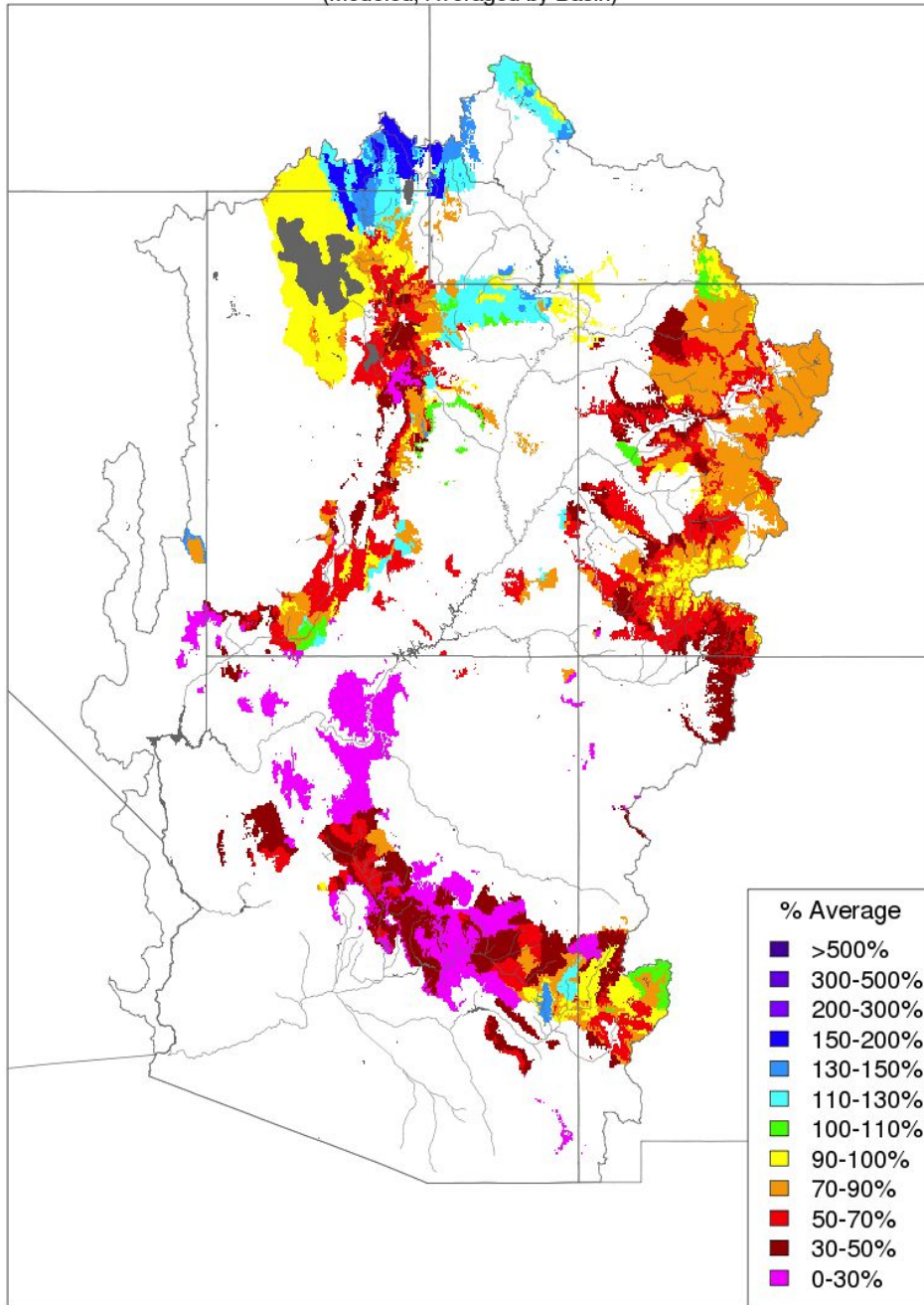
Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it influences the efficiency of the snowmelt runoff the following spring. Modeled soil moisture conditions as of November 16th were above average over much of the Upper Green River 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 the map below areas in 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.

A significant snowpack, that exists in several areas this year, can lessen the impact of dry soils on spring runoff volumes compared to years with a snowpack that is near or below normal. Similarly those areas that entered the winter season with above average soil moisture that also have a significant snowpack may experience enhanced runoff conditions this spring.

Soil Moisture - Fall - 2016 (November 16)

(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

Soil moisture conditions tend to fluctuate more 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 above average in the upper Gila River Basin and parts of the Little Colorado, Salt and Verde River Basins as of early February. These areas are likely to experience more efficient runoff due to additional rainfall or snowmelt.

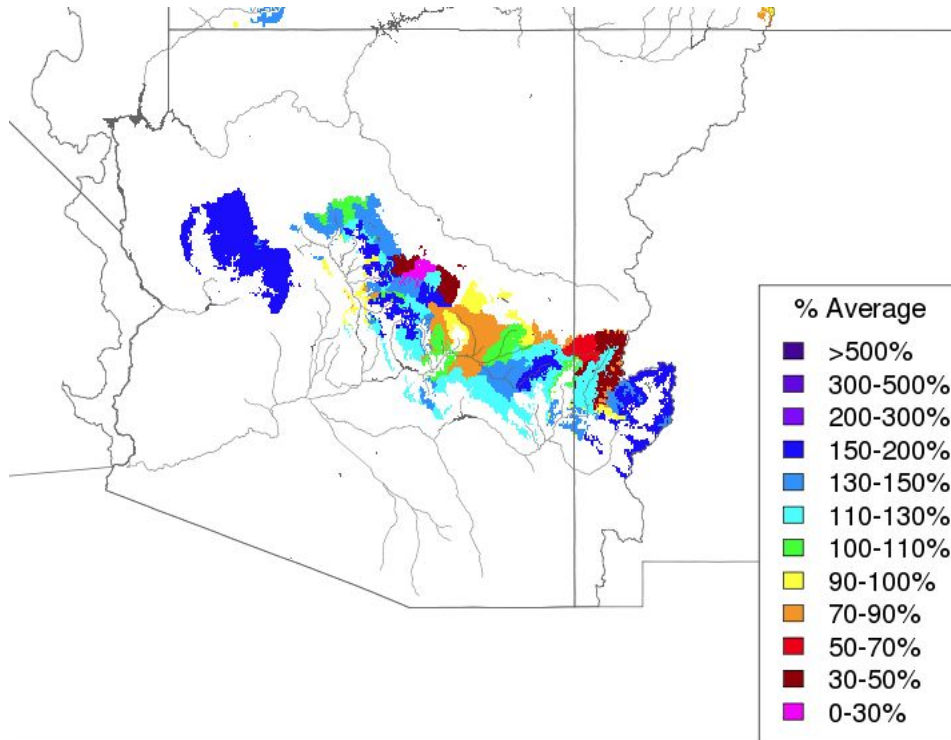


Image: Model soil moisture Lower Colorado River Basin (AZ/NM) as of February 2nd 2017

Upcoming Weather:

The ridge of high pressure that has been over the area the last week of January will give way to a more active pattern for the first part of February. Greatest impacts are likely to be across higher elevations of the northern Great Basin and Green River Basin of Wyoming eventually impacting a larger portion of the CBRFC forecast area. Southern Basins including the San Juan, Virgin, and Lower Colorado River Basins should experience less of an impact from these early February storms. Lower Colorado River Basins are likely to experience some snowmelt as ridging and warm temperatures will build in this area.

The impact on water supply forecasts from the early February pattern may result in increases in parts of the Great Basin, Duchesne, and Green River Basin of Wyoming if precipitation materializes as models suggest.

The map below, from NOAA's Weather Prediction Center, illustrates 7-Day forecasted precipitation totals from February 3rd through February 10th.

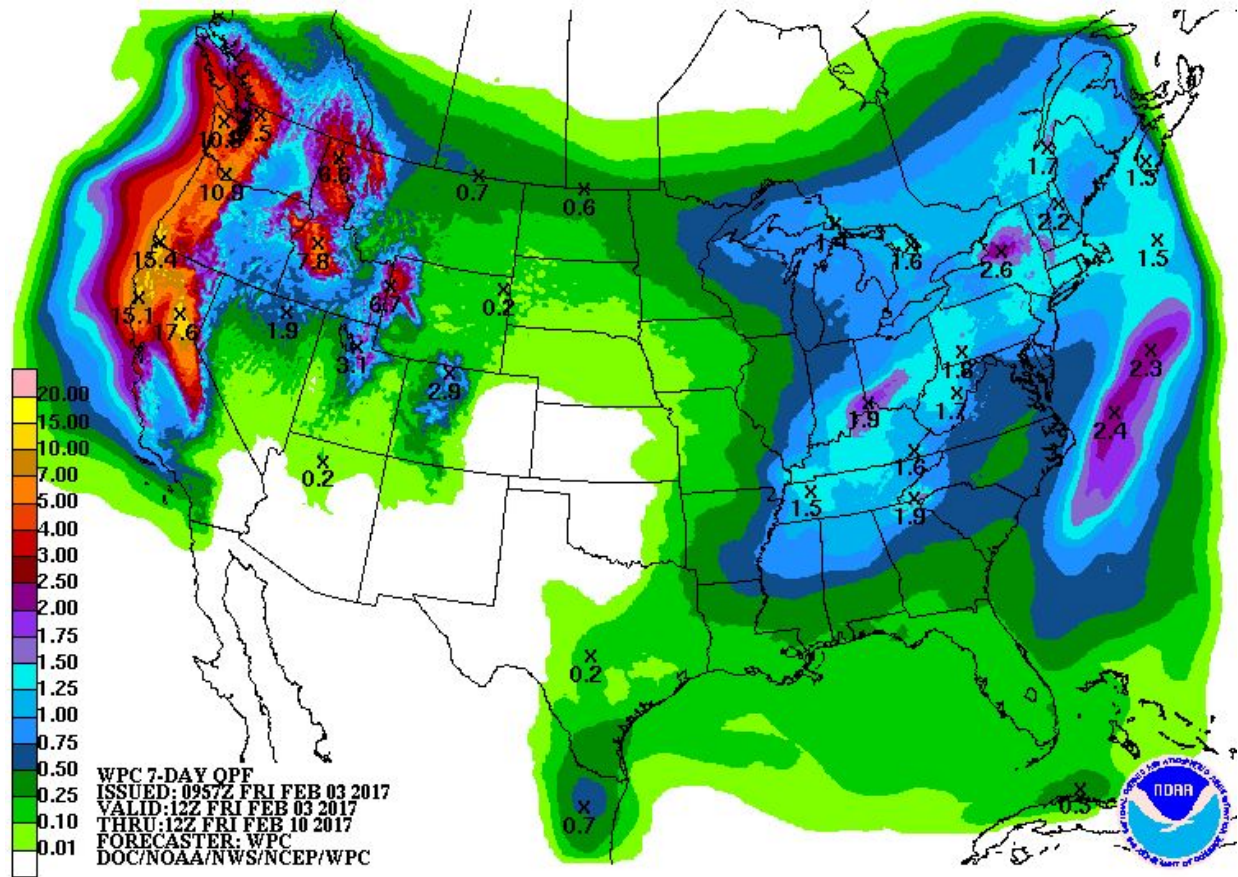


Image: NWS Weather Prediction Center precipitation forecast for Feb 3rd - Feb 10th 2017

End Of Month Reservoir Content Tables

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Basin Conditions and Summary Graphics

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