February 1, 2018 Water Supply Forecast Discussion

The <u>Colorado Basin River Forecast Center (CBRFC)</u> geographic forecast area includes the Upper Colorado River Basin, Lower Colorado River Basin, and Eastern Great Basin.

Water Supply Forecast Summary:

Below average precipitation continued to be the norm and not the exception for the month of January. January marks the fourth consecutive month of the 2018 water year with widespread below average precipitation. As a result snowpack conditions continue to rank among the lowest on record for this time of year throughout much of western Colorado, extending into the southern two-thirds of Utah and throughout the lower Colorado River Basin of Arizona and New Mexico. Snow conditions improve farther north in the Bear River Basin of northern Utah and southern Idaho, the Green River Basin of Wyoming, and in the highest elevations of the eastern Colorado River headwaters.

April-July water supply volume forecasts remained the same at only a few sites in the Green River and Colorado River Basin headwaters from early January, while decreases were noted everywhere else in the Great Basin and Colorado River Basins. The most significant decreases as a percent of the 1981-2010 average occurred in the San Juan River Basin, the Weber River Basin, and in lower elevation basins throughout the CBRFC forecast area.

Lowest forecasts with respect to average extend from southwest Colorado in the Dolores and San Juan River Basins, across central and southern Utah including the Virgin, Sevier, and San Rafael River Basins. Many April-July runoff forecasts in these areas have now fallen below 40 percent of the 1981-2010 average. The highest forecasts continue to be in the Green River Basin headwaters of Wyoming with near or slightly above average runoff volumes expected.

In the Lower Colorado River Basin, where dry conditions date back to August of 2017, February-May runoff volumes are generally forecast to be less than 30 percent of median.

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle Reservoir 750 KAF (103% of average), Flaming Gorge 890 KAF (91% of average), Blue Mesa Reservoir 400 KAF (59% of average), McPhee Reservoir 110 KAF (37% of average), and Navajo Reservoir 260 KAF (35% of average). The Lake Powell inflow forecast is 3.40 MAF or 47% of average.

Seasonal Water Supply Forecasts:



Upper Colorado, Great, Virgin River Basins: 2018 April-July forecast volumes as a percent of 1981-2010 average (50% exceedance probability forecast)



Lower Colorado Basin (AZ/NM): 2018 February-May forecast volumes as a percent of 1981-2010 median (50% exceedance probability forecast)

For specific site water supply forecasts click here

Water Supply Discussion

Weather Synopsis:

Although precipitation was more widespread over the CBRFC forecast area in January compared to December, the strong ridge of high pressure over the western U.S. continued to dominate the weather pattern during the month. Storm systems either moved around the periphery of the ridge impacting primarily the extreme northern and eastern boundaries of the forecast area, or they weakened as they encountered the high pressure ridge resulting in below average precipitation.



The mean atmospheric pattern during the month of January indicates a ridge of high pressure as the dominant feature over the western U.S.

Precipitation and Temperature:

With few exceptions precipitation was below average for the month of January. Those areas with near to above average precipitation were small in areal extent or outside of the primary water supply producing areas.

The water year (October-January) precipitation image below shows near average precipitation limited to the Green River Basin headwaters in Wyoming and the extreme eastern headwaters of the Colorado River mainstem. Elsewhere conditions have been very dry with many areas below 50 percent of average for the period.



Images: January 2018 and water year (Oct 2017-Jan 2018) precipitation graphics (Averaged by basins defined in the CBRFC hydrologic model)

January marks the third consecutive month with mean monthly temperatures above average.

Maximum and minimum monthly temperature deviation from average are displayed in the images below.



Image: Monthly maximum and minimum temperature departure from average for January 2018. (Averaged by basins defined in the CBRFC hydrologic model)

Snowpack:

Record or near record low snowpack exists throughout much of the Upper Colorado River Basin and Great Basin as of early February. Exceptions include the headwaters of the Green River Basin in Wyoming which has above median snowpack at this time, and the headwaters of the Colorado River above Kremmling which is near 90 percent of median overall. Elsewhere, basins are reporting below to much below median snowpack. Conditions deteriorate rapidly as you move south through the CBRFC area with many basins reporting overall snowpack less than 50 percent of median.

The SNOTEL map image below indicates widespread poor snowpack conditions across the CBRFC forecast area. Sites depicted with a pink box have a snowpack below 30 percent of median at this time, while sites with a dark red box are below 50 percent of median.



Image: Percent Median Snow Conditions as of February 5th, 2018

The snow percentile image displayed below indicates where the current snow measurement ranks in the historical record (typically 35-40 years) for each site. Many sites are depicted with red boxes, indicating the lowest values on record for this time of year. Sites with orange boxes are in the bottom 10 percent of the record, with most ranking as either the 2nd or 3rd lowest for this time of year.





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. The takeaway message is that poor snowpack conditions are widespread as indicated by the hydrologic model.



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 5th, 2018

For updated SNOTEL information, click <u>here</u>. For CBRFC hydrologic model snow conditions, click <u>here</u>

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. The effects are most pronounced when soil moisture conditions and snowpack conditions are both much above, or much below average. In areas where the soil moisture was below average entering the winter and the current snowpack is also much below median, spring runoff may be further reduced.

Modeled soil moisture conditions as of November 16th were above average over the Upper Green River Basin and Bear River Basin. Soil moisture conditions were near average in the Duchesne River Basin and the headwaters of the Colorado and Gunnison Rivers as well as the easternmost headwaters of the San Juan River. 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.



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.

Winter soil moisture conditions have continued to deteriorate in the Lower Colorado River Basin as shown in the image below, which indicates modeled soil moisture conditions much below average over the entire area. This generally means that it will take a few rain events before any significant runoff is generated and that much of any snow melt that occurs will be absorbed into the soil instead of contributing to increased streamflow.



Image: Lower Colorado River Basin (AZ/NM) model soil moisture as of February 5th, 2018

Upcoming Weather:

With the axis of the high pressure ridge off the western U.S. coast a more progressive weather pattern is expected to develop during the first part of February over the eastern Great and Colorado River Basins. A series of storm systems are likely to move through the area but they appear to be weak at this point in time. Precipitation may be on the light side with impacts primarily over the northern half of the CBRFC forecast area as has been the case most of the winter. Confidence in this scenario is not very high at this time as meteorological models have been inconsistent beyond the second week of February. Some of these models have indicated a low pressure system over the southwestern U.S. which would bring much needed precipitation to parts of the Lower Colorado River Basin and possibly southwest Colorado.



Image: NWS Weather Prediction Center precipitation forecast for Feb 5th - Feb 12th, 2018

End Of Month Reservoir Content Tables

<u>Green River Basin</u> <u>Upper Colorado River Basin</u> <u>San Juan River Basin</u> <u>Great Salt Lake Basin</u> <u>Sevier Basin</u>

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