March 1, 2022 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

February precipitation was near to slightly below normal across southwest Colorado and below to much below normal elsewhere across the region. Northern areas including the Green River Basin and north Great Basin had a very dry February with monthly precipitation values at many SNOTEL sites ranked as the driest in the past 40 years. March 1 snow water equivalent (SWE) conditions generally range between 80-110% of normal across the Upper Colorado River Basin and 70-100% of normal across the Great Basin. Lower Colorado River Basin SWE conditions are 50-105% of normal.

Water supply forecast volumes decreased over the past month across most of the Great Basin and Colorado River Basin as a result of below normal February precipitation. A near record dry February across northern Utah, southwest Wyoming, and northwest Colorado led to large declines in the spring water supply outlook in the Green River Basin and northern Great Basin. Water supply volume declines were smaller in the Gunnison, Dolores, and San Juan basins as a result of near to slightly below normal February precipitation across southwest Colorado.

Upper Colorado River Basin water supply forecasts generally range between 45-105% of the 1991-2020 historical April-July average. Great Basin water supply forecasts are 35-85% of average. Lower Colorado River Basin January-May water supply runoff volumes are 20-65% of the 1991-2020 historical median.

March 1 water supply forecast ranges (percent of normal) by basin:

Basin	Water Supply Forecast Range
Upper Green	45-75%
Duchesne	60-90%
Yampa/White	70-95%
Upper Colorado Mainstem	70-100%
Gunnison	70-105%
Dolores	60-70%
San Juan	60-85%
Bear	35-80%
Weber	35-75%
Six Creeks	55-85%
Provo/Utah Lake	55-80%
Sevier	65-85%
Virgin	55-60%
Little Colorado	20-25%
Upper Gila	30-45%
Salt	40-65%
Verde	45%

April-July unregulated inflow forecasts for some of the major reservoirs in the Upper Colorado River Basin include Fontenelle 450 KAF (61% average), Flaming Gorge 540 KAF (56%), Green Mountain 245 KAF (88%), Blue Mesa 560 KAF (88%), McPhee 168 KAF (66%), and Navajo 455 KAF (72%). The Lake Powell inflow forecast is 4.4 MAF (69% of average), which is a nine percent decrease from February.

Widespread precipitation is expected across the Colorado River Basin and Great Basin through this weekend as a series of weather disturbances move through the area. An active weather pattern is expected to remain in place for the next ten to fourteen days, with the northern half of the area trending wetter than southern areas.



Seasonal Water Supply Forecasts

Upper Colorado, Great, Virgin River Basins: Mar 2022 April-July forecast volumes as a percent of 1991-2020 average (50% exceedance probability forecast).



Lower Colorado Basin (AZ/NM): March 2022 January-May forecast volumes as a percent of 1991-2020 median. (50% exceedance probability forecast).

For specific site water supply forecasts click here

Water Supply Discussion

February Weather/Precipitation

Very dry weather persisted over the region the last three weeks of January through mid-February, with precipitation at SNOTEL sites falling below the 5th percentile and ranking as the driest on record at most stations during this period. Precipitation during the first half of February fell below the 15th percentile and ranked in the driest three on record at most SNOTEL stations across the Great Basin and Colorado River Basin. The only moisture worth noting during the first two weeks of February was 0.50-1.50" of precipitation along parts of the Continental Divide within Colorado, notably across San Juan River headwater basins above Navajo reservoir.

The weather pattern shifted to favor a more active pattern around mid-February with a series of weather disturbances impacting Utah, western Colorado, and Arizona the last half of the month. Much of the region received precipitation on February 16 with many SNOTEL stations receiving 0.25-0.50" and some locally higher amounts across central Utah (Sevier River Basin), central Arizona (Salt), and central Gunnison River Basin in southwest Colorado.

A wetter system with a Pacific moisture tap brought widespread precipitation to the region during February 21-23. Largest precipitation amounts (2-3+ inches) occurred over higher elevations across southwest Colorado near the divide of the San Juan/Dolores/Gunnison River Basins. Southwest Utah and central Arizona received 0.5-2.0" of precipitation while 0.5-1.0" of precipitation was observed across northwest Colorado and central Utah. Northern areas including the Green River Basin and the north Great Basin received little to no precipitation during this event.

Precipitation during the last half of February was above average (normal) across southwest Colorado and near average across the southern half of Utah and central Arizona. However, only a small portion of southwest Colorado ended February with near normal precipitation. February precipitation was much below normal across the majority of the region. Northern areas including the Green River Basin and north Great Basin had a very dry February with monthly precipitation values at many SNOTEL sites ranked as the driest in the past 40 years.



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

February 2022 percent of normal precipitation. (Averaged by basins defined in the CBRFC hydrologic model)

Water Year Precipitation

Water year precipitation has been highly variable from month-to-month. October and December precipitation was above to much above average over most of the region while November, January, and February precipitation was below to much below average. February's below average precipitation led to declines in water year precipitation across the region. Water year precipitation is generally near to slightly below average across the Upper Colorado River and Great Basins. Lower Colorado River Basin water year precipitation is variable - near average conditions across southwest Utah and northeast Arizona, and below to much below average precipitation elsewhere across the Lower Colorado River Basin.



Water Year Precipitation, October 2021 - February 2022

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

Water Year 2022 percent of normal precipitation. (Averaged by basins defined in the CBRFC hydrologic model)

Snowpack

March 1 snow water equivalent (SWE) conditions are generally near to below normal across the Colorado River and Eastern Great Basin and are summarized in the below table. Below average February precipitation led to declines in percent of normal SWE values across most basins over the past month, with the largest declines occurring in northern basins. Basins across southwest Colorado and parts of Arizona had smaller declines in percent of normal SWE conditions due primarily to precipitation during February 21-23.

Upper Colorado River Basin March 1 SWE conditions range from 80-110% of normal and generally increase from north to south. Upper Green, Duchesne, and White/Yampa basins saw the largest declines in percent of normal SWE conditions during the past month due to a very dry February. West-central and southwest Colorado had smaller declines in SWE during February with snow conditions remaining steady in the San Juan River Basin.

SWE across much of the Great Basin is now below normal after a mostly dry February. The exception is the Sevier River Basin in south-central Utah, where March 1 SWE is near normal. SWE ranges from 70-80% elsewhere across the Great Basin.

Snowpack conditions in the Lower Colorado River Basin are more variable and tend to fluctuate more frequently over time. March 1 Lower Colorado River Basin SWE conditions range from 50-105% of normal, with near normal snowpack conditions in the Virgin and Verde River Basins and below normal snowpack conditions in the Little Colorado, Salt, and Upper Gila basins. Precipitation during the last half of February did help to sustain SWE conditions across parts of central and southeast Arizona.

Basin	Feb1 %Median SWE	Mar1 %Median SWE
Upper Green	99	80
Duchesne	117	90
White/Yampa	102	85
UC Headwaters	105	93
Roaring Fork	124	108
Gunnison	116	106
Dolores	99	93
San Juan	99	101
Bear	104	78
Weber	90	71
Provo/UT Lake	91	74
Sevier	109	95
Virgin	132	103
Little Colorado	80	65
Verde	103	100
Salt	65	61
Upper Gila	44	51

February 1 - March 1 basin SWE summary (NRCS SNOTEL):

The images below show observed snow conditions and CBRFC hydrologic model snow conditions.



SNOTEL percent median observed SWE - March 3, 2022.



Snow Conditions - March 03 2022

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

CBRFC hydrologic model percent median SWE - March 3, 2022.

For updated SNOTEL information refer to click <u>here</u> For CBRFC hydrologic model snow click <u>here</u>

Soil Moisture

CBRFC model fall soil moisture conditions impact early season water supply forecasts and the efficiency of spring runoff. Above average fall soil moisture conditions have a positive impact on early season water supply forecasts while below average conditions have a negative impact. The impacts are most pronounced when soil moisture conditions and snowpack conditions are both much above or much below average. The timing and magnitude of spring runoff is ultimately a result of SWE conditions, spring weather (precipitation/temperature), and antecedent soil moisture conditions.

A wet monsoon season and above average October precipitation improved soil moisture conditions, especially across Utah and Arizona. Fall (antecedent) soil moisture conditions are improved from a year ago but remain below average across many of the major runoff producing areas. Larger than normal antecedent soil moisture deficits exist across much of western Colorado and are expected to negatively impact early spring runoff efficiency. Fall model soil moisture conditions are closer to normal across southwest Wyoming and Utah and even above normal in parts of the Duchesne River Basin.



Comparison of November 2020 (left) and November 2021 (right) CBRFC hydrologic model soil moisture conditions 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. Basins with above average soil moisture conditions can be expected to experience more efficient runoff from rainfall or snowmelt while basins with below average soil moisture conditions can be expected to have lower runoff efficiency until soil moisture deficits are fulfilled.

Model soil moisture conditions across the Lower Colorado River Basin have improved considerably from a year ago as a result of above average monsoon season precipitation and storm activity that has occurred during the water year. However, below normal February precipitation across Arizona and southwest New Mexico led to declines in soil moisture conditions over the past month. Lower Colorado River Basin early March model soil moisture conditions are mostly below normal.



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

Lower Colorado River Basin (AZ/NM) model soil moisture - March 3, 2022.

Upcoming Weather

Widespread precipitation is expected across the Colorado River Basin and Great Basin through this weekend as a series of weather disturbances move through the area. The upper elevations of the Bear, Upper Green, White/Yampa, Upper Colorado, Gunnison, San Juan, Verde, Salt and Upper Gila basins will see around an inch of precipitation, with locally higher amounts possible across favored locations. Elsewhere, precipitation will generally be between 0.25 and 0.50 inches. An active weather pattern is expected to remain in place for the next ten to fourteen days. Because storms will move into the area from the north, the northern half of the area will trend wetter than southern areas. Temperatures will generally be above normal through the middle of March, though brief periods of below normal temperatures will accompany storms.



NWS Weather Prediction Center precipitation forecast for March 4-9, 2022.



NWS Climate Prediction Center precipitation and temperature probability forecasts for March 10-16, 2022.

Basin Conditions and Summary Graphics

<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 River Basin</u> <u>Virgin River Basin</u>

End Of Month Reservoir Content Tables

Green River Basin Upper Colorado River Basin San Juan River Basin Great Salt Lake Basin Sevier Basin