Colorado River Basin Water Supply Briefing

May 7, 2021

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Please mute your phone until the question period



Today's Presentation

April Weather Review

April Observed Streamflow

Current Snowpack

2021 Water Supply Forecasts

May Forecast Error

Upcoming Weather

CBRFC Model Snow Plots

Contacts & Questions

Webinar recording & slides will be made available on CBRFC webpage

Precipitation Summary





Water Year 2021 Oct-Apr Precip Summary

<u>Basin</u>	<u>Precip (% Avg)</u>
Upper Green	85%
Duchesne	70%
Price/San Rafael	65%
Yampa/White	70%
Upper CO Mainstem	75%
Gunnison	75%
Dolores	65%
San Juan	70%
Lake Powell	75%
Virgin	55%
Verde	50%
Salt	50%
Little Colorado	55%
Upper Gila	50%

Another month of generally below to well below normal. Water year precipitation deficits continue to grow.

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

Just How Dry Was April?



2021







Several SNOTELs in Colorado were below the 15th percentile for April precipitation. This April was similar to the very dry conditions of last April. In fact, for much of the Upper Basin, one can argue that this April was slightly worse.

April Temperatures



April Observed Unregulated Volumes



Location	Historical Rank / # of Years
Yampa River -Steamboat Springs	1 / 114
Yampa River- Maybell	1 / 105
Little Snake- Lily	2 / 100
White River- Watson	1 / 93
Green River- Green River, Utah	2 / 116
Gunnison River-Grand Junction	2 /105
Dolores River- Dolores	4 / 107
Animas - Durango	5 / 110
Willow Creek - Granby	91/102*
	*Burned by East Troublesome Fire

Despite low and mid elevation snowmelt, April unregulated streamflow volumes were record or near record low at many locations.

Early May Snow Conditions

CBRFC (Model)





May 6 SWE Summary (SNOTEL)

<u>Basin</u>	<u>SWE (% Median)*</u>
Upper Green	75%
Duchesne	50%
Price/San Rafael	15%
Yampa/White	65%
Upper CO Mainstem	75%
Gunnison	55%
Dolores	2%
San Juan	55%
Lake Powell	71%

Lower Colorado River Basin SWE has melted out

*Percent normal (median) snow water equivalent (SWE) can be misleading and vary significantly day to day in the spring after peak snowpack has passed and during the snowmelt season.

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

May 1st Water Supply Forecasts: Green, Yampa, White, Duchesne



Upper Green Water Supply Forecasts & Snow Conditions





Green River Headwater: Pine Creek (Wind Rivers) CBRFC Model Snow: 10,500'-13,000+'



Yampa River Water Supply Forecasts & Snow Conditions



Yampa River Headwater: Elk River nr Milner CBRFC Model Snow



- Forecast decreased by 22% of average from April to May
 - April precipitation = 35% of normal
 - April streamflow volumes were record low
- Greater than 10% chance for below record low volumes

Hist	orical \	/olumes					
Year Volume		Volume	Upper Elevation	April 1 SWE	May 1 SWE	Change	
1	2002	366.16	(>10,000')	(inches)	(inches)	(inches)	
2	2012	417.74	Normal	33.4	40	+6.6	
3	2021	5 1 0.00	2021	30.4	31.5	+1.1	
4	1992	596.24					

5 1989 627.27

May 1st Water Supply Forecasts: Upper Colorado River Mainstem

Forecast Ranges & (1-month Trend):

Granby to Kremmling: 45 - 75% avg (5-15% decrease) Kremmling to Cameo: 25 - 60% avg (10-15% decrease)



Upper Colorado Mainstem Water Supply Forecasts & Snow Conditions



May 1st Water Supply Forecasts: Gunnison, Dolores

Forecast Ranges & (1-month Trend):

NA

Gunnison: 25 - 60% avg (10-20% decrease) Dolores: 15 - 40% avg (15-25% decrease)



May 1st Water Supply Forecasts: San Juan

Forecast Range & (1-month Trend): 25 - 60% of average (5-15% decrease)



NA

Southwest Colorado Water Supply Forecasts & Snow Conditions



May 1st Water Supply Forecasts: Upper Colorado (Lake Powell)





Lake Powell summarizes the hydrologic conditions throughout the Upper Colorado River Basin.

<u>5 Lowest Historical Years: April-July Volume / % avg</u> 2002: 946 KAF / 13% 1977: 1208 KAF / 17% **2021 FCST: 2000 KAF / 28%** 2012: 2063 KAF / 29% 2013: 2558 KAF / 36% 2018: 2602 KAF / 36%

Lake Powell Forecast Inflow Distribution



Averages are over the 1981 - 2010 period

May 1st Water Supply Forecasts: Virgin River Basin



Median 1981-2010 - 2021 - 2020 -

Historical (1981-2010) Forecast Verification

May Forecast Error: April-July Volume



Location	Avg May Forecast Error
Green River - Warren Bridge	12%
Fontenelle Reservoir	17%
Yampa River - Deerlodge	15%
Blue River - Dillon Reservoir	11%
Colorado River - Cameo	11%
Blue Mesa Reservoir (Gunnison)	11%
McPhee Reservoir (Dolores)	12%
Navajo Reservoir (San Juan)	15%
Lake Powell	15%

Forecasts are better than just going with average Error tends to decrease each month into the spring

Where Forecasts are Better: -Headwaters

- -Primarily snow melt basins
- -Known diversions / demands

Where Forecasts are Worse:

- -Lower elevations (rain or early melt)
- -Downstream of diversions / irrigation
- -Little is known about diversions / demands

Upcoming Weather: May 7-14 Precipitation Outlook



- Warm and windy today with above normal temperatures expected.
- Storm system will move across Wyoming over the weekend through Monday.
- Cooler temperatures and scattered showers are expected, heaviest over northern Colorado. 0.75-1.25 inches is forecasted over the Upper Colorado headwaters.

Upcoming Weather: 8-14 Day Outlook (May 14-20)

There are slightly elevated odds for below normal precipitation and above normal temperatures. There are currently no signs of a prolonged period of anomalously wet conditions.

Precipitation Outlook



Temperature Outlook



Summary

- April precipitation
 - Below to much below normal across the region
- Early May snowpack (SWE) conditions
 - Below to much below normal
 - Rapid melt has occurred in southern basins.
 - Only significant snow remains at the highest elevations.
- April Observed Streamflow
 - Below to much below normal; record low in some areas despite low and mid elevation snowmelt.
 - Reflects extremely dry soils and low baseflow conditions.
 - Slower melt rates recharge baseflow.
 - Higher melt rates have a better chance of producing streamflow.
- April water supply forecasts (% of normal):
 - Upper Colorado: 15-75%
 - Record low April-July volumes are possible in many areas
- The current weather forecast is not showing any sign of an extended wet period.
- Time has run out for any significant improvements in water supply conditions.

Model daily snow water equivalent (SWE) for each basin elevation zone in CBRFC model

- each river point in the model is called a segment
- each segment is broken into 2-3 elevation zones based on similar land cover/vegetation and snow accumulation/melt characteristics

Zoom Areas

• downstream segments only model the 'local' area below the upstream segment

View total segment areas by turning on 'Basin' Boundaries



View segment connections in stick diagrams: https://www.cbrfc.noaa.gov/wsup/guide/sticks.php

Segment naming convention:

- headwater ends in 'H'
- local (downstream) ends in 'L'



Model snow is what drives CBRFC water supply, peak flow and daily streamflow runoff forecasts

- model is able to track snow above and below SNOTEL locations
- very few SNOTEL's above 11,000 feet, but a large percentage of snowmelt runoff comes from these areas
- just because SNOTEL's are dry does not mean there is no snow left in a basin

Examples of highest SNOTEL in a basin vs. highest model elevation zone





Model Snow



- Model snow data/plots are most relevant in headwater basins
- Use cautiously in downstream (local) basins
 - model snow only represents the snow within each basin elevation zone of CBRFC hydrologic model
 - For downstream/lower elevation basins, it's likely better to view snow conditions in upstream/higher elevation basins since that's the more likely source of water/runoff making it downstream
 - Assumes users have some hydrologic knowledge within their area of interest
- Lots of development ideas/additions yet to be implemented

2021 Water Supply Webinar Schedule

*All Times Mountain Time (MT)

Colorado River Basin

FridayJan 8th10 amFridayFeb 5th10 amFridayMar 5th10 amWednesdayApr 7th10 amFridayMay 7th10 am

<u>Great Basin</u>

Friday	Jan 8th	11:30 am
Friday	Feb 5 th	11:30 am
Friday	Mar 5th	11:30 am
Wednesday	Apr 7 th	11:30 am
Friday	May 7 th	11:30 am

Additional briefings scheduled as needed

Webinar schedule & registration information has been posted to the CBRFC web page

CBRFC Contacts & WY21 Basin Focal Points

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Upper Green, Yampa San Juan, Dolores, Powell

Patrick Kormos Lower Green, Duchesne Weber, Provo

Cody Moser

Upper CO Mainstem, Gunnison

Brent Bernard

Bear, Sevier, Six Creeks

Zach Finch

Lower Colorado River Basin

Brenda Alcorn

Senior Hydrologist

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CBRFC Webpage https://www.cbrfc.noaa.gov/

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CBRFC Water Supply Presentations https://www.cbrfc.noaa.gov/present/present.php

CBRFC Webinar Registration & Email List

COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME	RIVERS	SNOW	WATER SUPPLY	RESERVOIRS	WEATHER	CLIMATE	HELP	ABOUT	NEWS	SEARCH	
News	News Thursday December 17, 2020, 1:00 pm MT: CBRFC Early Season Water Supply Outlook Webinar. Reg 2021 Water Supply Forecast Webinar Schedule and Registration -> More Info					Contact Us Organization		CBRFC News			
CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2021 The Colorado Basin River Forecast Center (CBRFC) produces water supply forecasts for the Colorado River Basin and the east CBRFC conducts December through May webinars explaining the forecasts and current conditions.						Cooperatir Papers and Presentatio Projects	d dons	RSS			
Early Seaso Thursday De Colorado R Friday Janua Friday Febru	on Water Sup ec 17 @ 1 pm iver Basin Wa ary 8th @ 10 a jary 5th @ 10	ply Outlook We MT ater Supply Wel am MT am MT	binar					email cbrf o	c.webmast	ers@noaa.gov	
Friday March 5th @ 10 am MT Wednesday April 7th @ 10 am MT Friday May 7th @ 10 am MT Utah Water Supply Webinars Friday January 8th @ 11:30 am MT Friday February 5th @ 11:30 am MT Friday March 5th @ 11:30 am MT Friday March 5th @ 11:30 am MT Friday March 5th @ 11:30 am MT Friday May 7th @ 11:30 am MT Friday May 7th @ 11:30 am MT						This list is used to provide notification when webinars are scheduled, water supply forecasts are updated, and for other news of interest to our stakeholders regarding CBRFC					
Peak Flow	Webinar arch 18th @ 1	<u>0 am MT</u>									

A notification email will be sent if a date or time change occurs. Additional webinars are scheduled as needed. The webinar slides will be available from the <u>CBRFC presentations page</u> soon after each briefing.