

# Colorado River Basin Water Supply Briefing

April 7, 2022

Brenda Alcorn - Hydrologist  
Colorado Basin River Forecast Center



# Today's Presentation

Precipitation Review

Soil Moisture Conditions

Current Snowpack

2022 Water Supply Forecasts

April Forecast Error

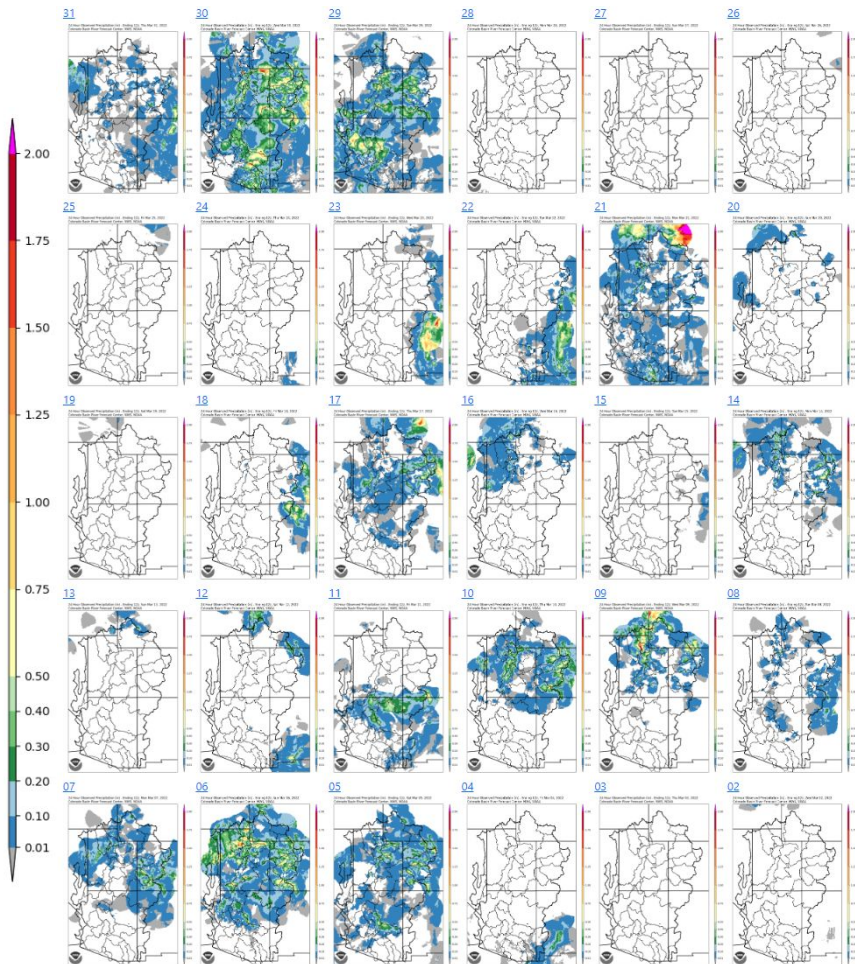
Recent/Upcoming Weather

CBRFC Snow Operations Overview

Contacts & Questions

**Webinar recording & slides will be  
made available on CBRFC webpage**

# March 2022 Precipitation



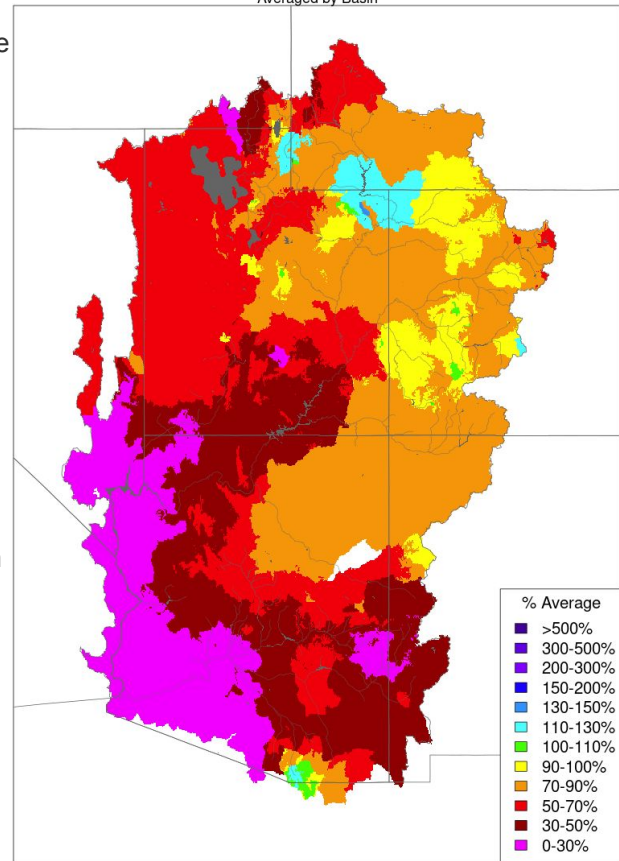
March weather was more active than it was during January and February, but total monthly precipitation was still below to much below normal across much of the area.

The areas that fared the best, with near normal precipitation, were parts of the Duchesne, Yampa, Gunnison and Dolores River Basins.

The Upper Green River Basin had yet another month of much below normal precipitation. Much of Arizona also received much below normal precipitation.

## Monthly Precipitation - March 2022

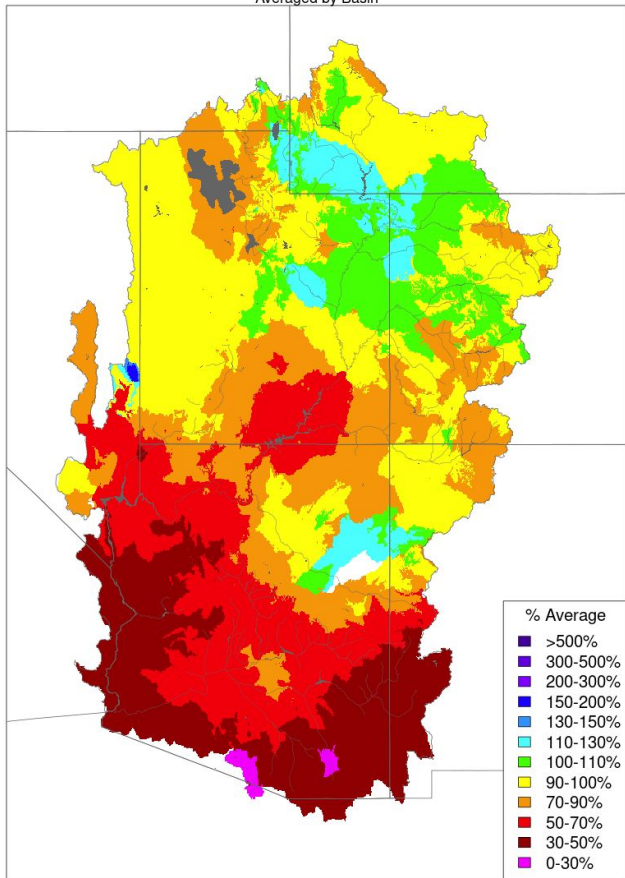
Averaged by Basin



[Link to CBRFC Observed Daily Precip.](#)

# Water Year 2022 (October-March) Precipitation

Water Year Precipitation, October 2021 - March 2022  
Averaged by Basin



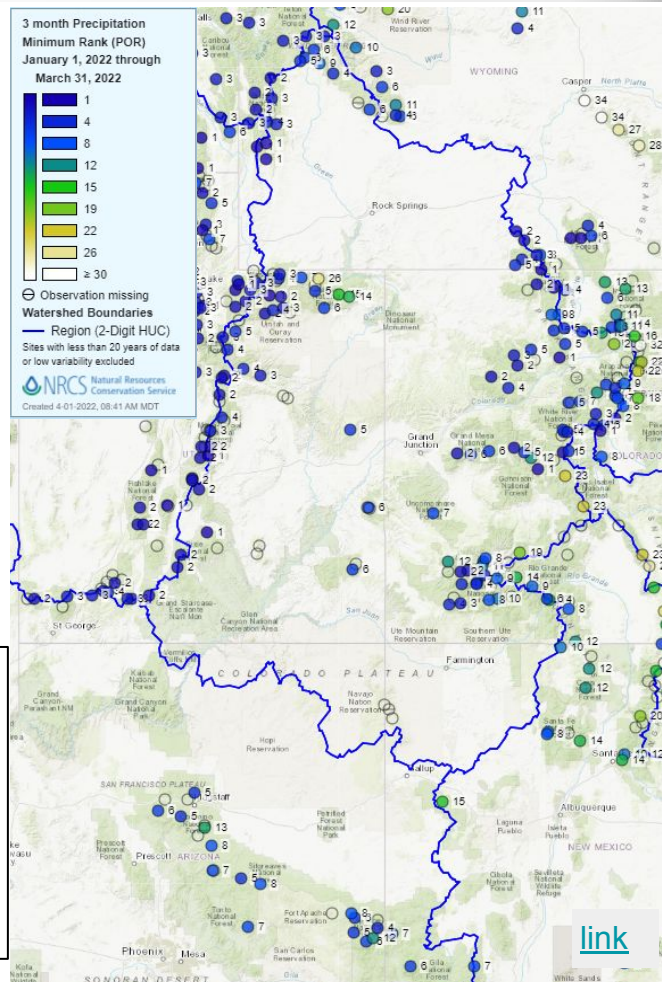
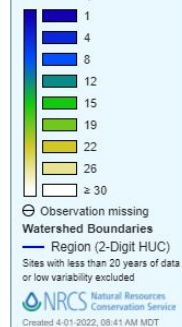
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

## Water Year 2022 Oct-Mar Precip Summary

<u>Basin</u>	<u>Precip (% Avg)</u>
Upper Green	90%
Duchesne	100%
Price/San Rafael	105%
Yampa/White	95%
Upper CO Mainstem	95%
Gunnison	95%
Dolores	90%
San Juan	90%
Lake Powell	95%
Virgin	90%
Little Colorado	75%
Verde	70%
Salt	65%
Upper Gila	45%

Water Year Precipitation totals are near average across the Upper Colorado River Basin due to much above average precipitation during October and December. However, January-March has been very dry across the region with precipitation ranking in the bottom five at most SNOTEL sites across Utah, southwest Wyoming, and western Colorado during that time.

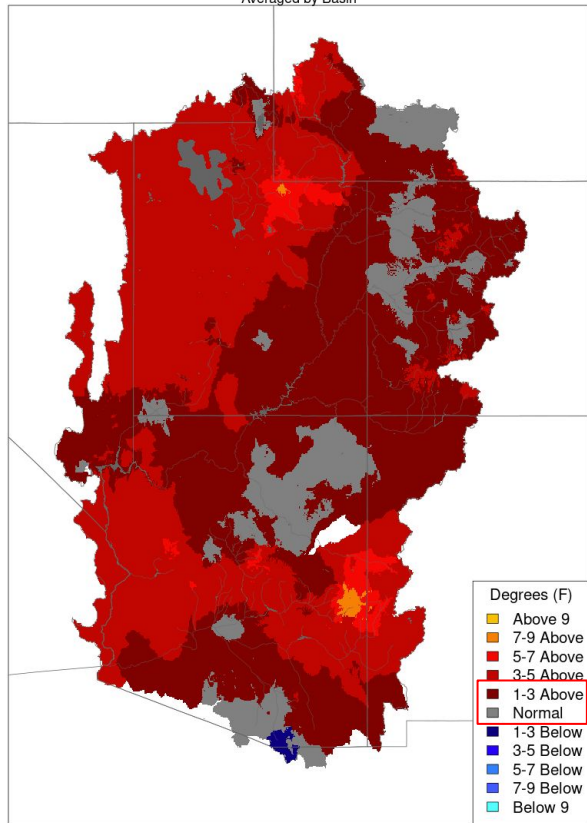
3 month Precipitation  
Minimum Rank (POR)  
January 1, 2022 through  
March 31, 2022



# March Temperature Summary

## Min Temp - Monthly Deviation - March 2022

Averaged by Basin



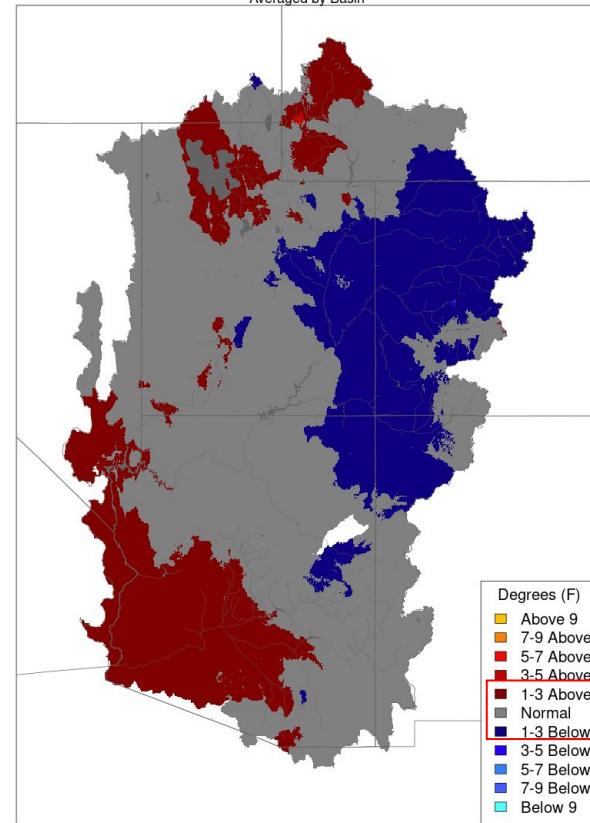
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

March minimum temperatures were near to slightly above average in the Upper Colorado Basin while March maximum temperatures were near average.

Two periods of above normal temperatures near the beginning (March 1-3) and end (March 26-29) of the month led to snowmelt below around 9,500 feet, which is not uncommon for this time of year.

## Max Temp - Monthly Deviation - March 2022

Averaged by Basin

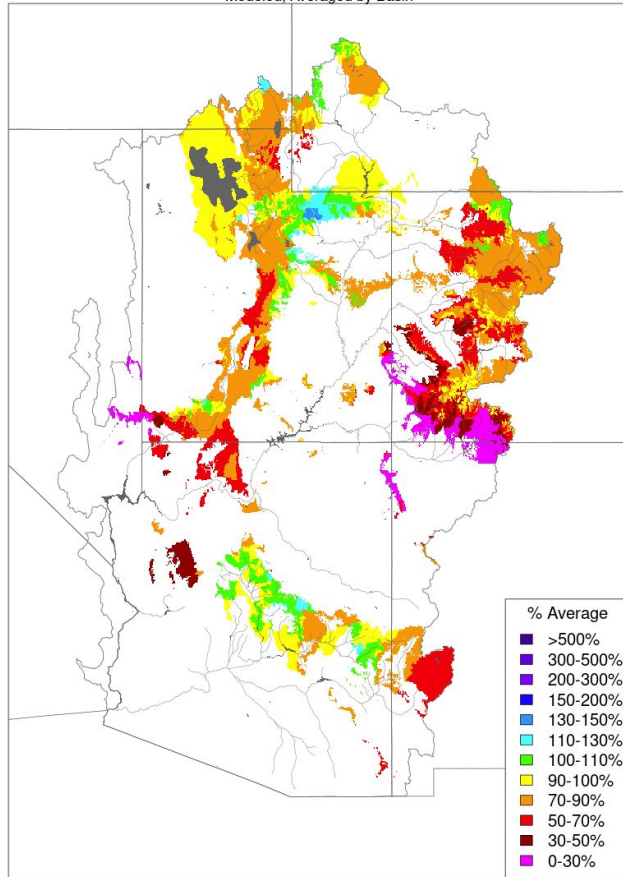


Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

# Fall Model Soil Moisture Conditions: 2020 vs. 2021

Soil Moisture - Fall - 2021 (November 15)

Modeled, Averaged by Basin



Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

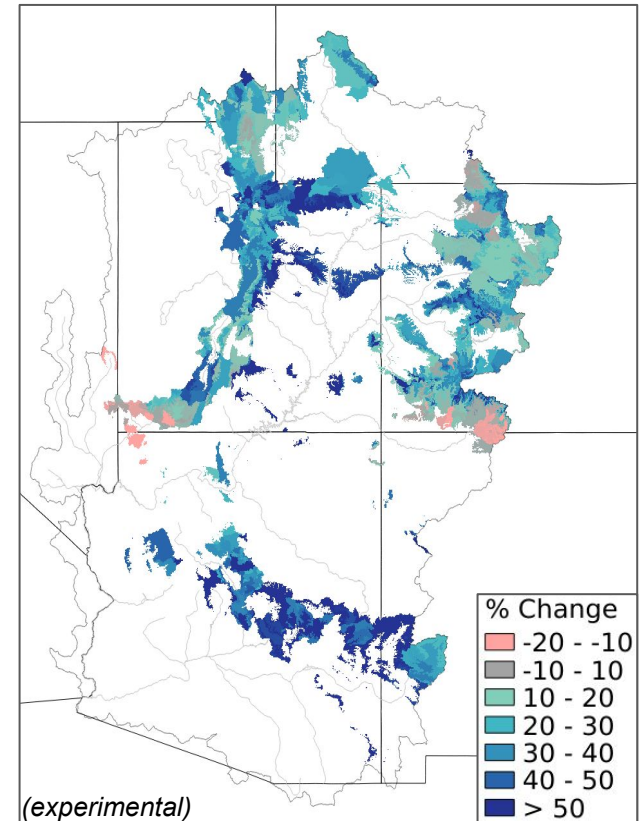
The timing and magnitude of spring runoff is ultimately a result of snow conditions, spring weather, and antecedent soil moisture conditions.

CBRFC fall model soil moisture conditions are improved from their record/near record dry levels a year ago but remain below to well below normal across many of the major runoff producing areas, notably western Colorado.

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.

Soil Moisture - Fall (November 15)

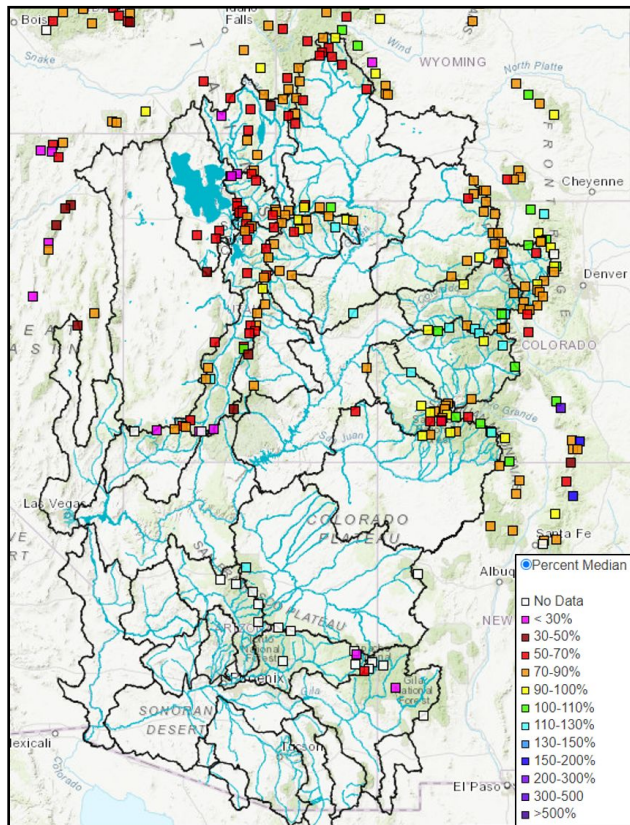
Modeled, %Change  
(2021-2020)



# Early April Snow Conditions

## SNOTEL (Observed)

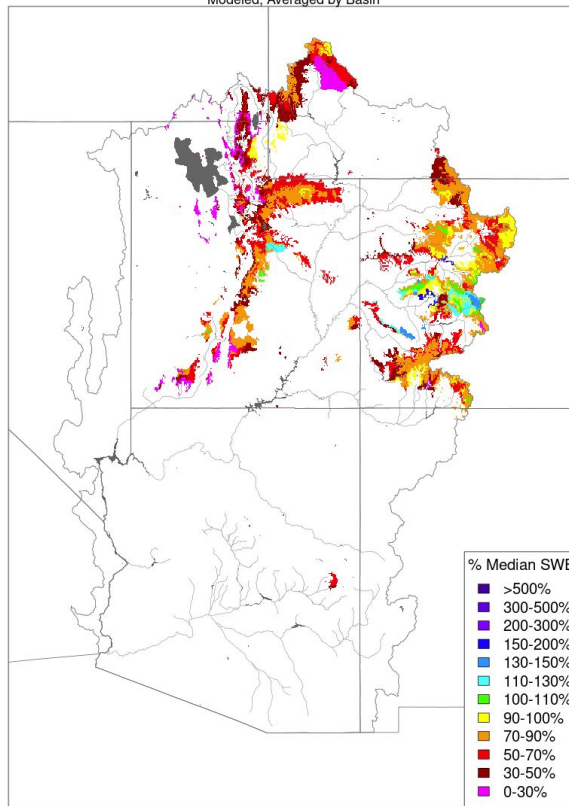
April 6, 2022



## CBRFC (Model)

Snow Conditions - April 06 2022

Modeled, Averaged by Basin

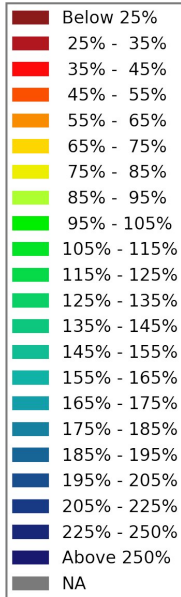


## Apr 6 SWE Summary (SNOTEL)

<u>Basin</u>	<u>SWE (% Median)</u>
Upper Green	70%
Duchesne	85%
Price/San Rafael	75%
Yampa/White	85%
Upper CO Mainstem	90%
Gunnison	100%
Dolores	85%
San Juan	95%
Virgin	70%

# April 1<sup>st</sup> Water Supply Forecasts: Upper Colorado

Water supply forecast volumes decreased over the past month across most of the Colorado River Basin as a result of below normal March precipitation.



**Upper Green: 40-75%**

**Duchesne: 50-85%**

**San Rafael/Dirty Devil: 60-80%**

**Lake Powell: 64%**

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

**April-July Runoff Volumes  
% of 1991-2020 Average**

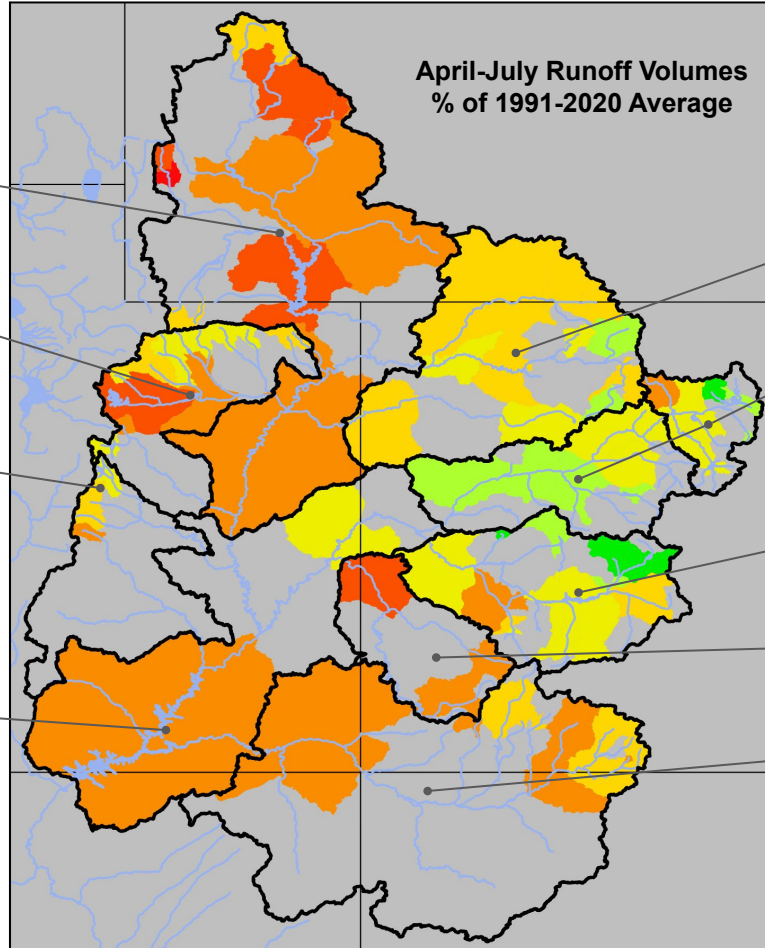
**White/Yampa: 65-85%**

**Upper CO: 60-95%**

**Gunnison: 70-100%**

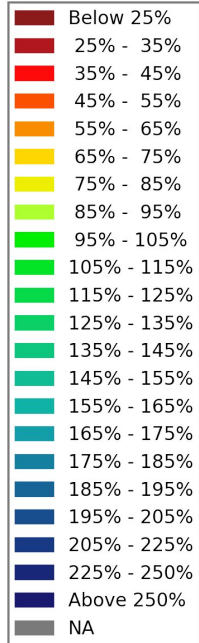
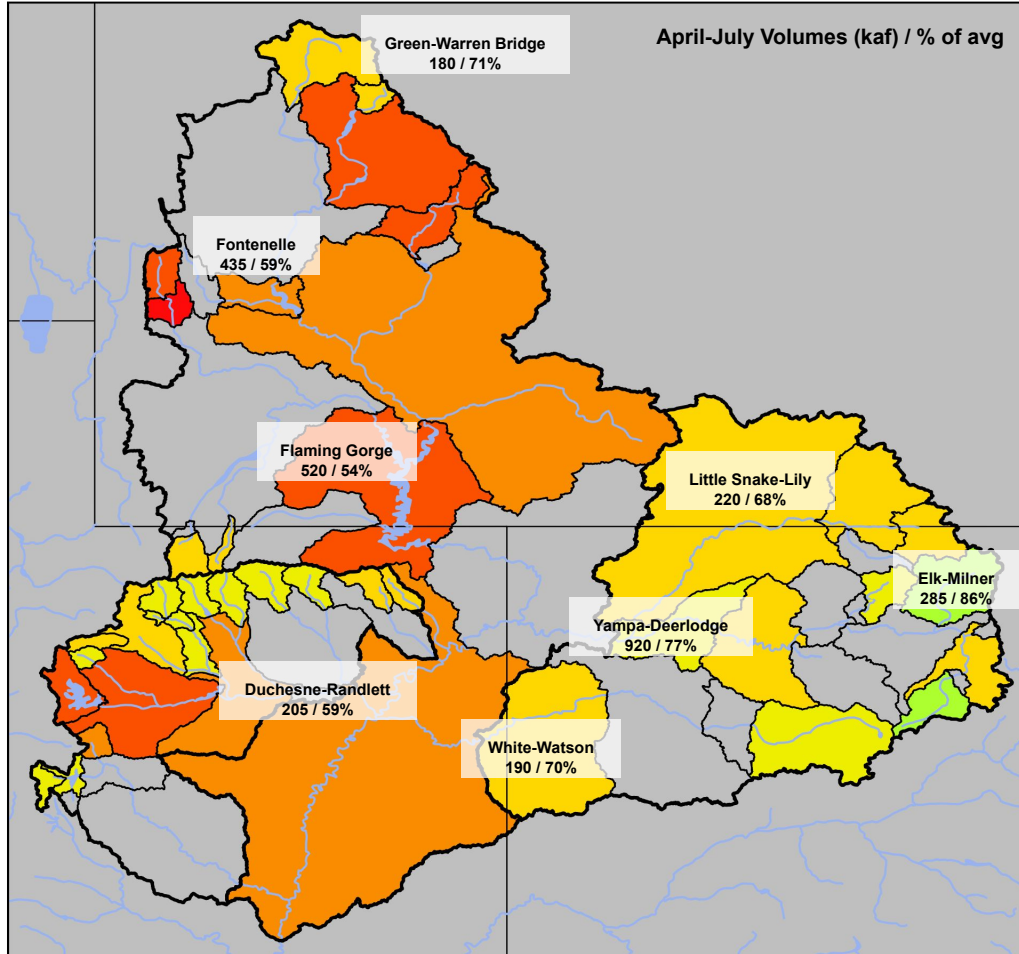
**Dolores: 50-65%**

**San Juan: 55-75%**





# Apr 1<sup>st</sup> Water Supply Forecasts: Green, Yampa, White, Duchesne



April 1<sup>st</sup> 2022 Forecasts

Volume (kaf) / % of 1991-2020 avg

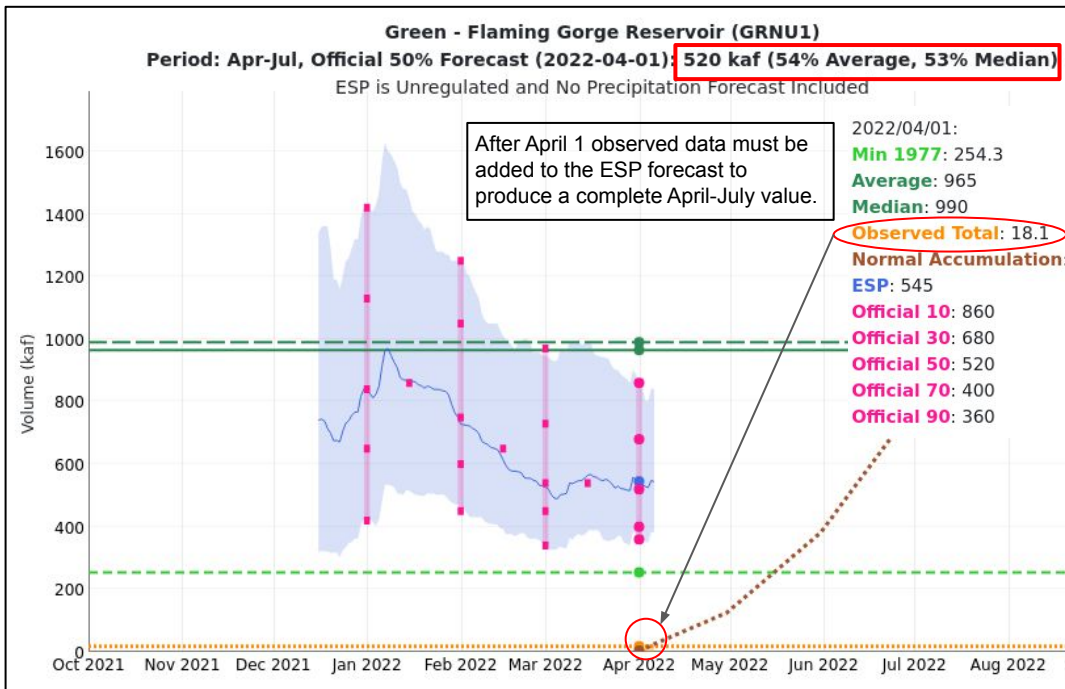
## Forecast Ranges & (1-month Trend)

**Upper Green:** 40 - 75%  
(5-10% decrease)

**Yampa/White:** 65 - 85%  
(5-20% decrease)

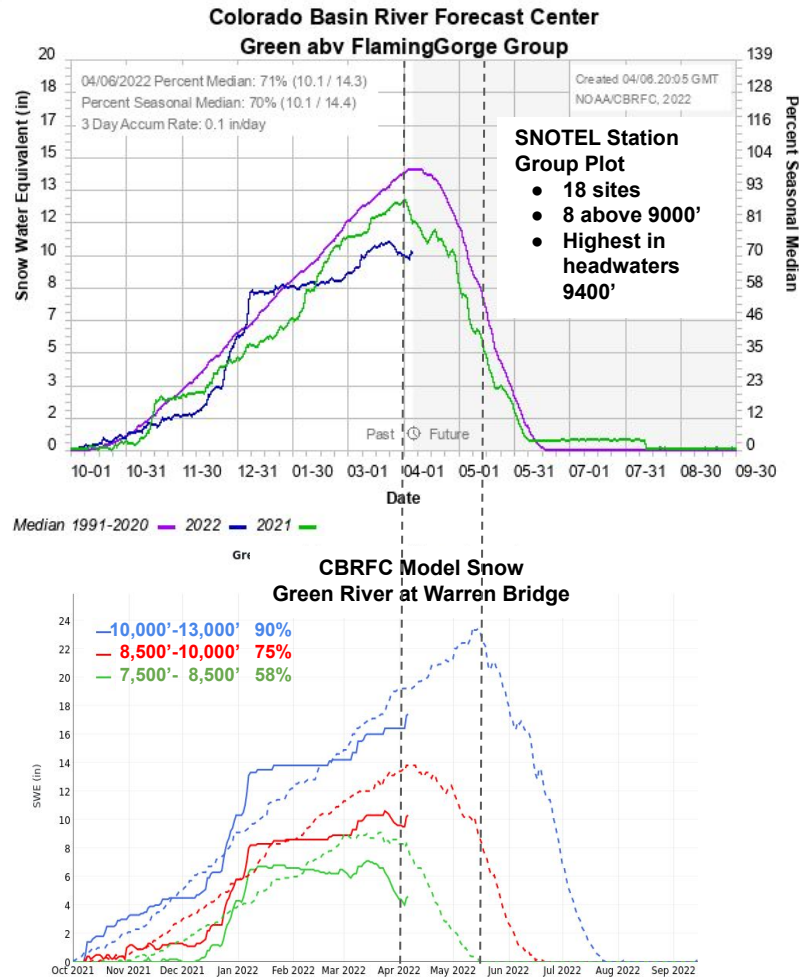
**Duchesne:** 50 - 85%  
(0-15% decrease)

# Upper Green Water Supply Forecasts & Snow Conditions



Model guidance held somewhat steady during March after two months of steady decline.

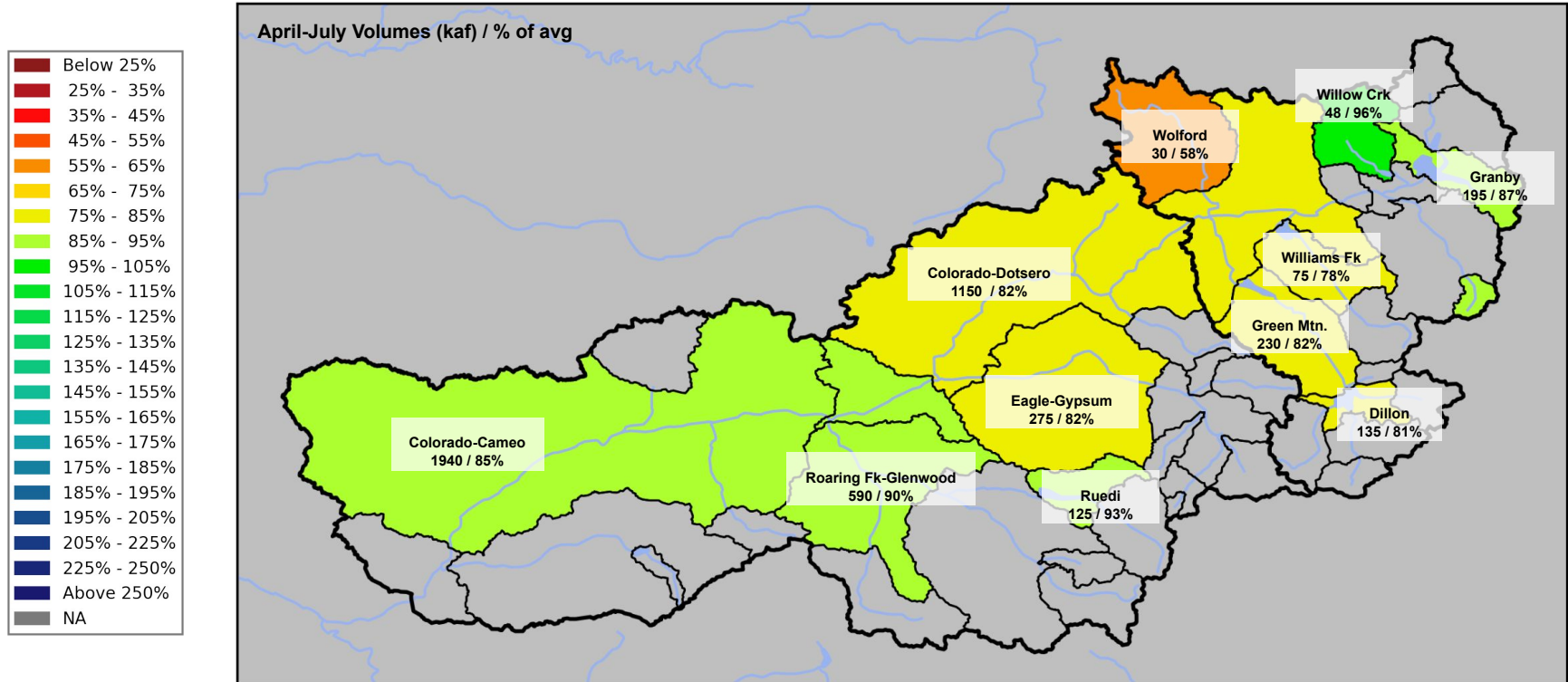
Some snowmelt occurred during the warm period at the end of the month, but it was limited to elevations below ~9000'. Highest elevations in the basin generally accumulate snow into the middle of May.



# Apr 1<sup>st</sup> Water Supply Forecasts: Upper Colorado River Mainstem

## Forecast Ranges & (1-month Trend):

Granby to Kremmling: 60 - 95% of average (0-10% decrease)  
Kremmling to Cameo: 80 - 95% of average (0-5% decrease)

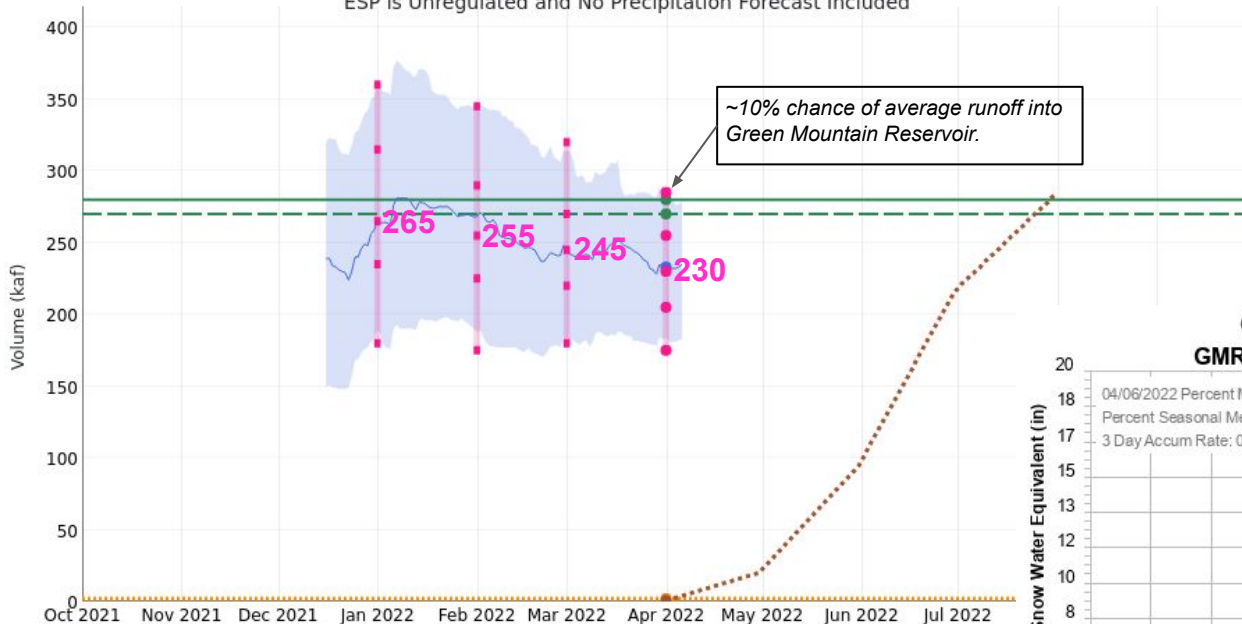


# Upper Colorado Mainstem Water Supply Forecasts & Snow Conditions

## Blue - Green Mtn Reservoir (GMRC2)

Period: Apr-Jul, Official 50% Forecast (2022-04-01): **230 kaf (82% Average, 85% Median)**

ESP is Unregulated and No Precipitation Forecast Included



2022/04/01:

**Average:** 280

**Median:** 270

**Observed Total:** 2.05

**Normal Accumulation:** 0.67

**ESP:** 233

**Official 10:** 285

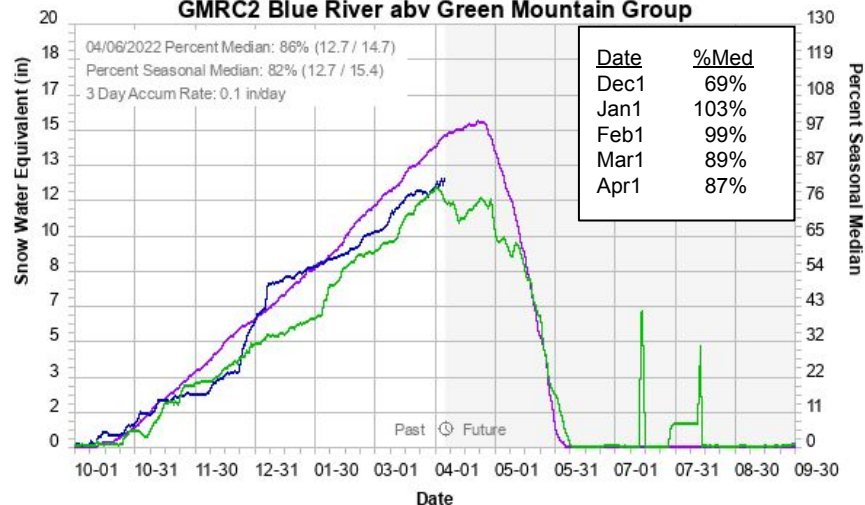
**Official 30:** 255

**Official 50:** 230

**Official 70:** 205

**Official 90:** 175

## Colorado Basin River Forecast Center GMRC2 Blue River abv Green Mountain Group



Water Year	AMJJ (kaf)
2020 obs	244
2021 obs	162
2022 fcst	230

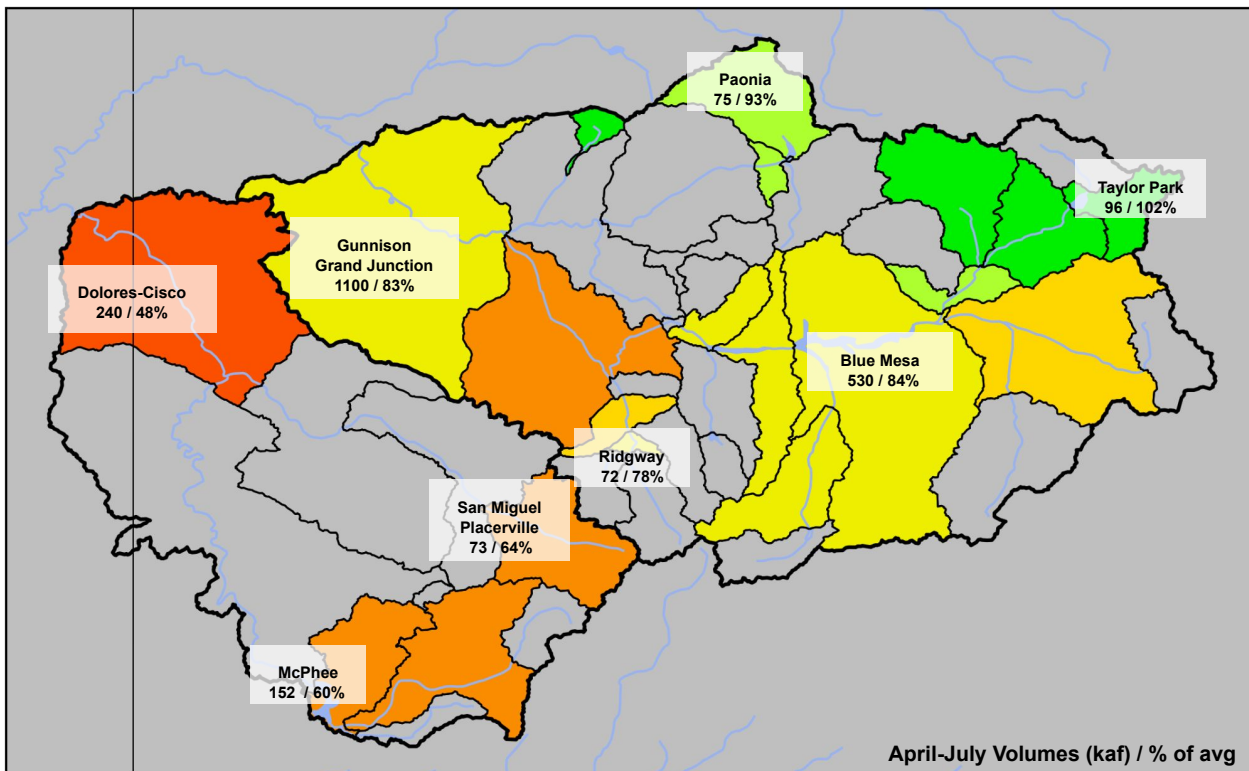
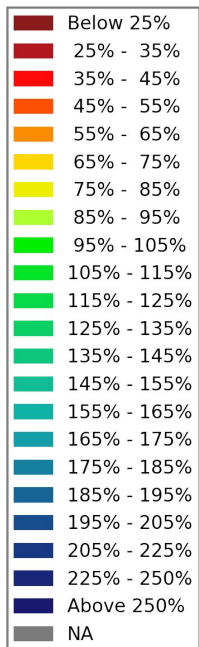
Median 1991-2020 2022 2021

# Apr 1<sup>st</sup> Water Supply Forecasts: Gunnison, Dolores

## Forecast Ranges & (1-month Trend):

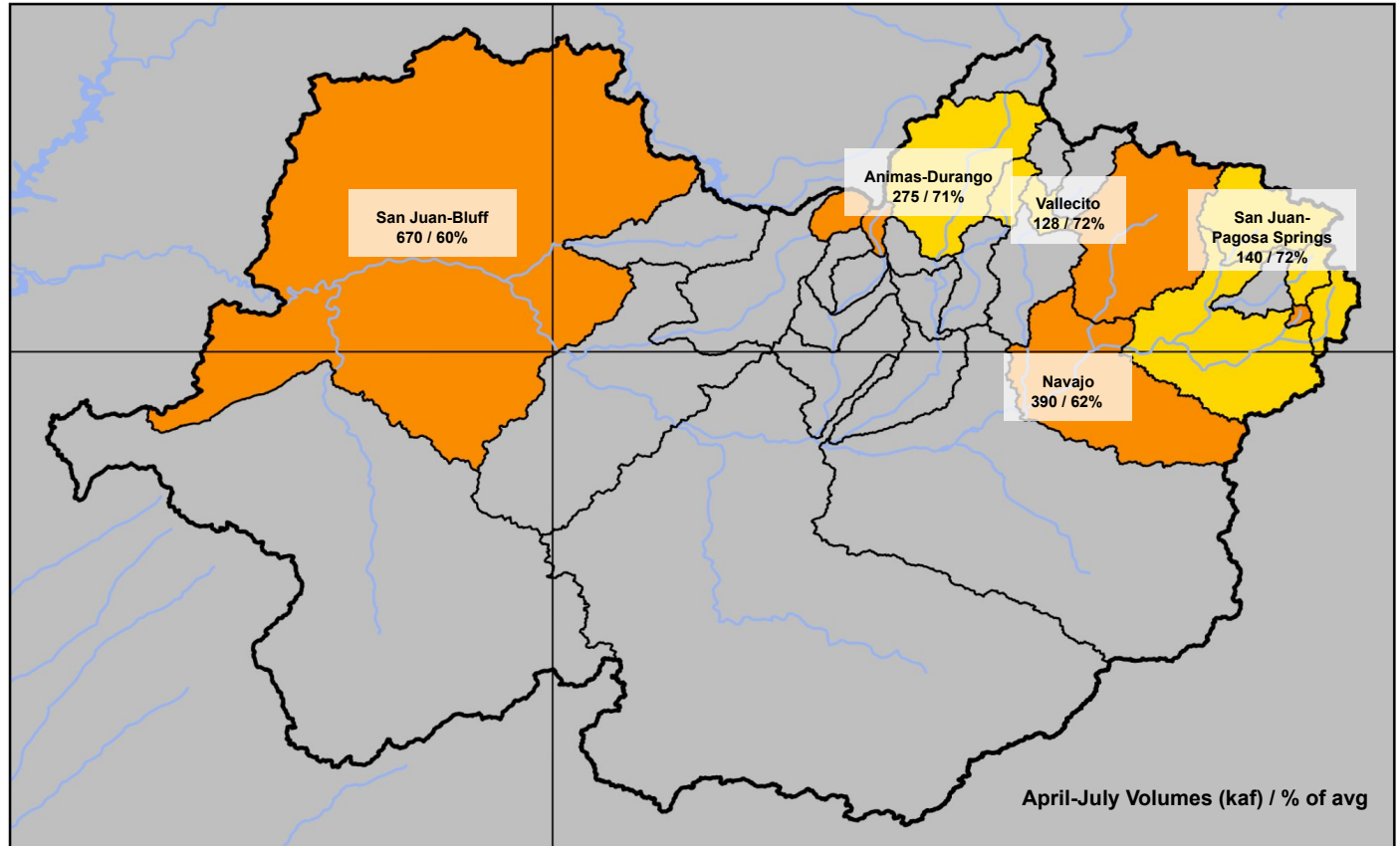
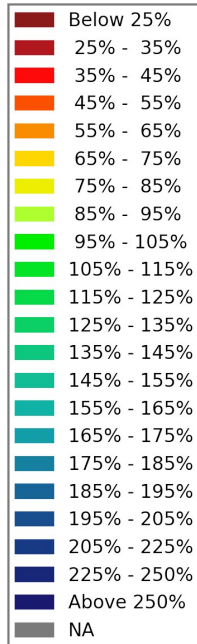
Gunnison: 70 - 100% of average (0-5% decrease/increase)

Dolores: 50 - 65% of average (5-10% decrease)



# Apr 1<sup>st</sup> Water Supply Forecasts: San Juan

**Forecast Range & (1-month Trend):**  
55 - 75% of average (5-15% decrease)

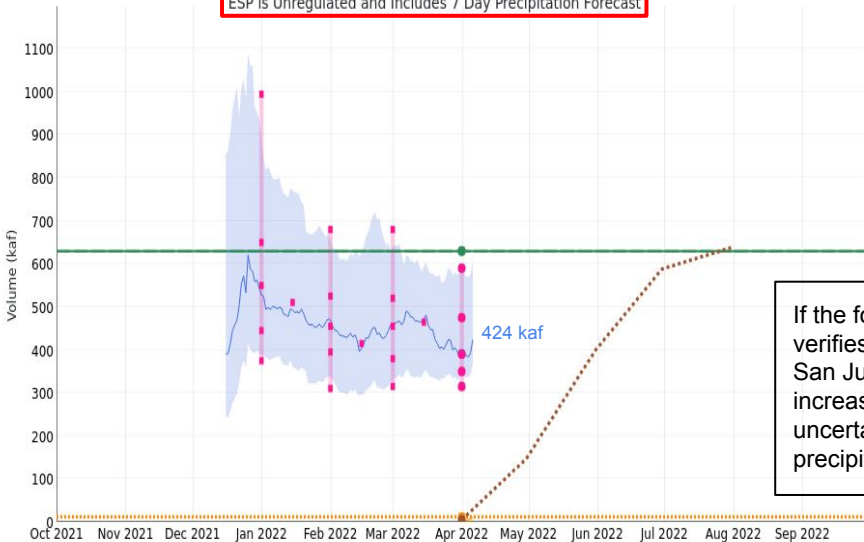


# Southwest Colorado Water Supply Forecasts & Snow Conditions

San Juan - Navajo Reservoir, Archuleta, Nr (NVRN5)

Period: Apr-Jul, Official 50% Forecast (2022-04-01): 390 kaf (62% Average, 62% Median)

ESP is Unregulated and Includes 7 Day Precipitation Forecast



2022/04/01:

Average: 630

Median: 630

Observed Total: 11.6

Normal Accumulation: 4.9

ESP: 391

Official 10: 590

Official 30: 475

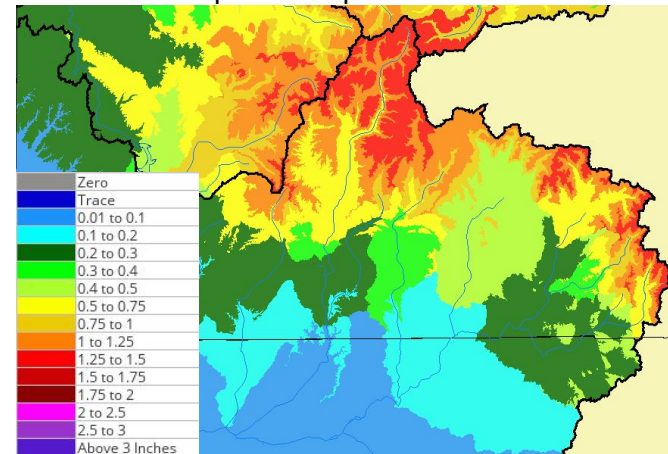
Official 50: 390

Official 70: 350

Official 90: 315

If the forecast precipitation verifies, forecast guidance in the San Juan river will slightly increase. There is still a lot of uncertainty in forecast precipitation.

## Forecast Precipitation: April 6-13

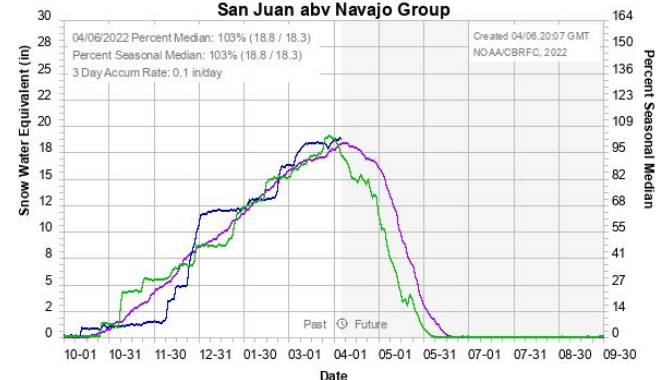


Navajo Res Inflow  
 Apr Fcst: 390 kaf / 62%  
 Decreased 10% of average since March fcst

Water Year	AMJJ (kaf)
2020 obs	348
2021 obs	378
2022 fcst	390

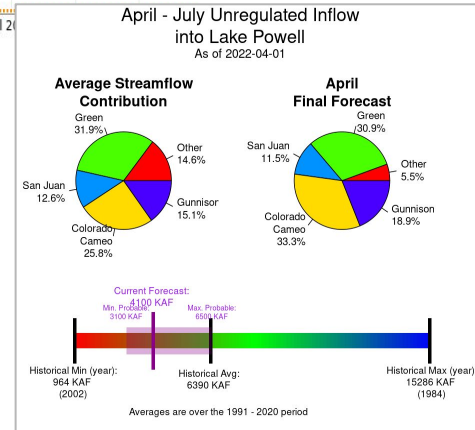
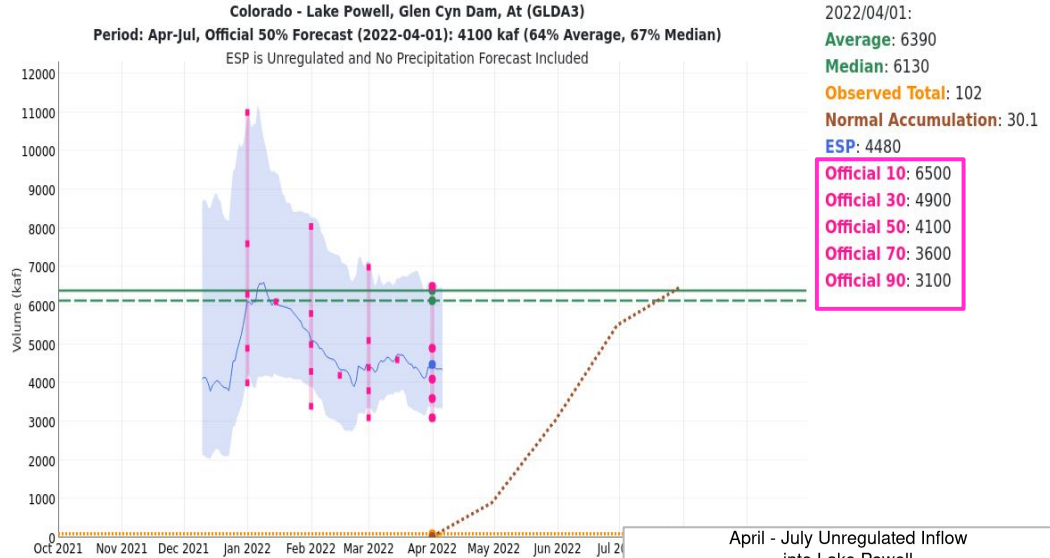
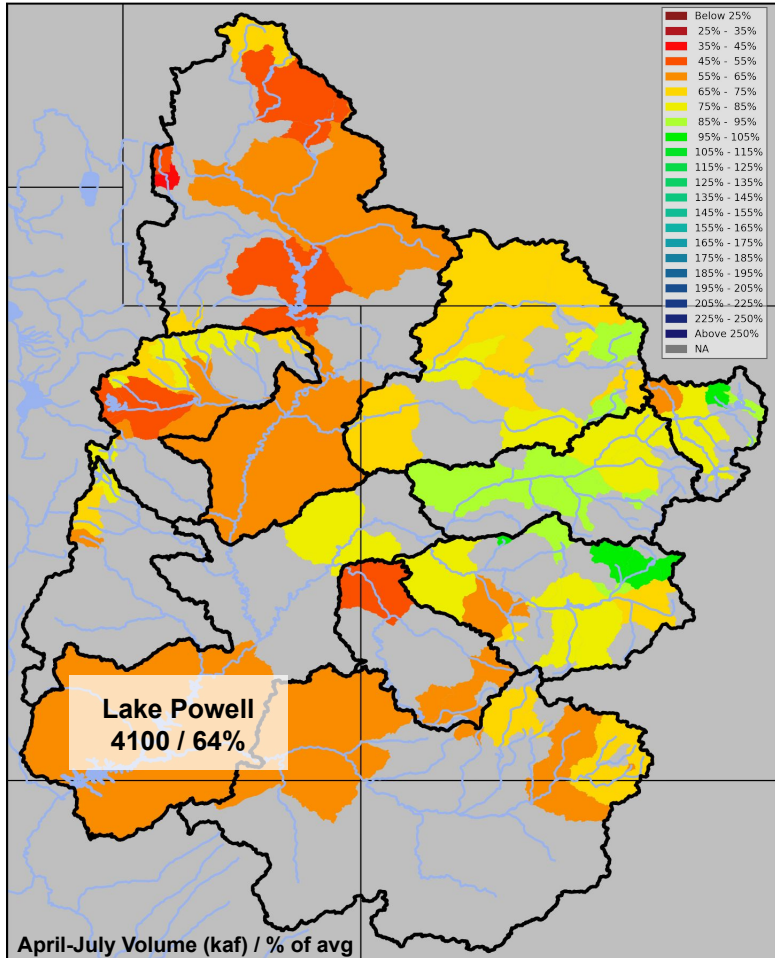
## Colorado Basin River Forecast Center

### San Juan abv Navajo Group



Median 1991-2020 — 2022 — 2021 — 2020

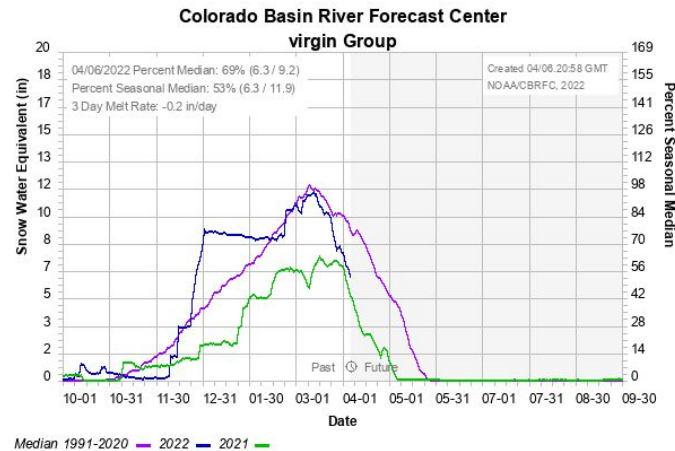
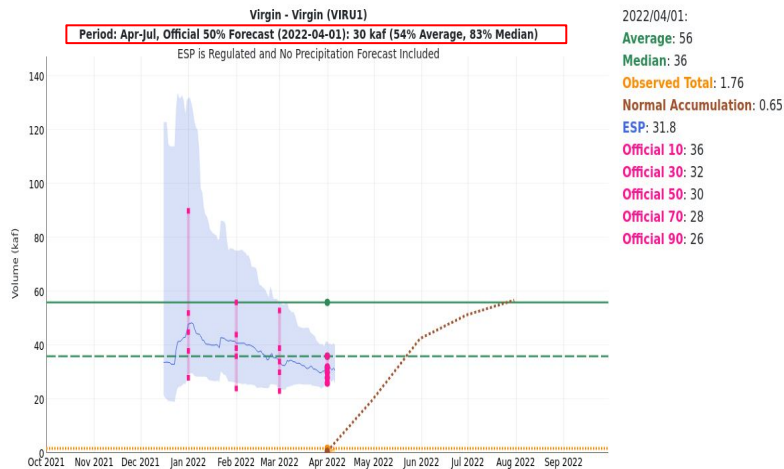
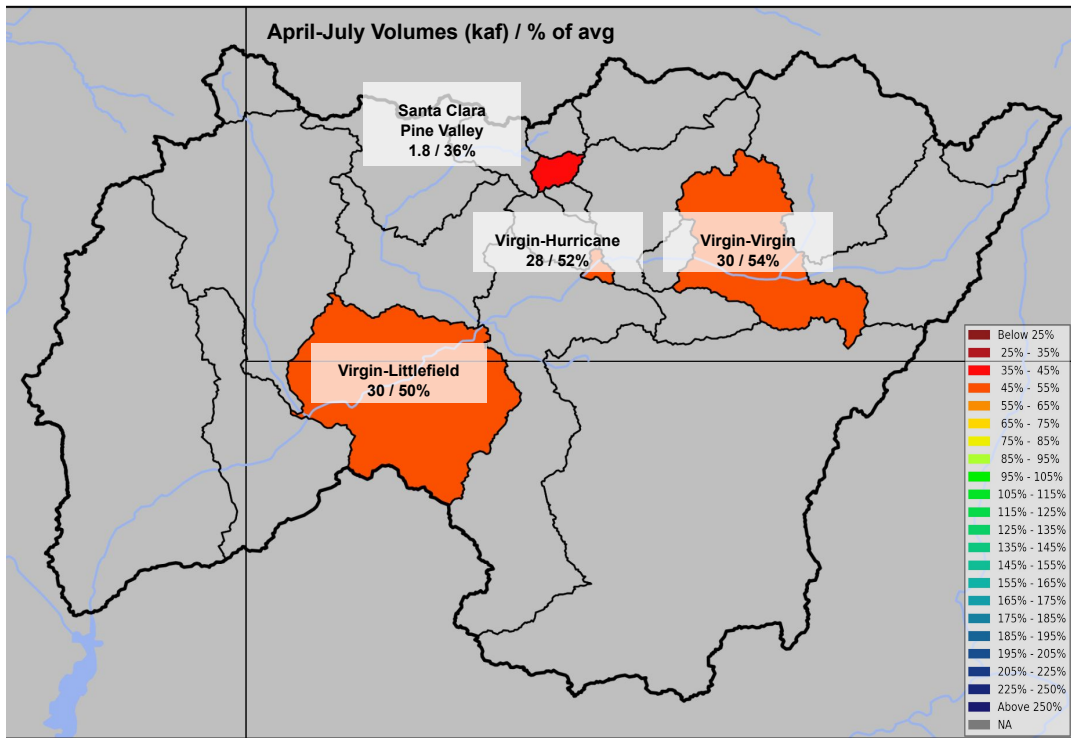
# Apr 1<sup>st</sup> Water Supply Forecasts: Upper Colorado (Lake Powell)



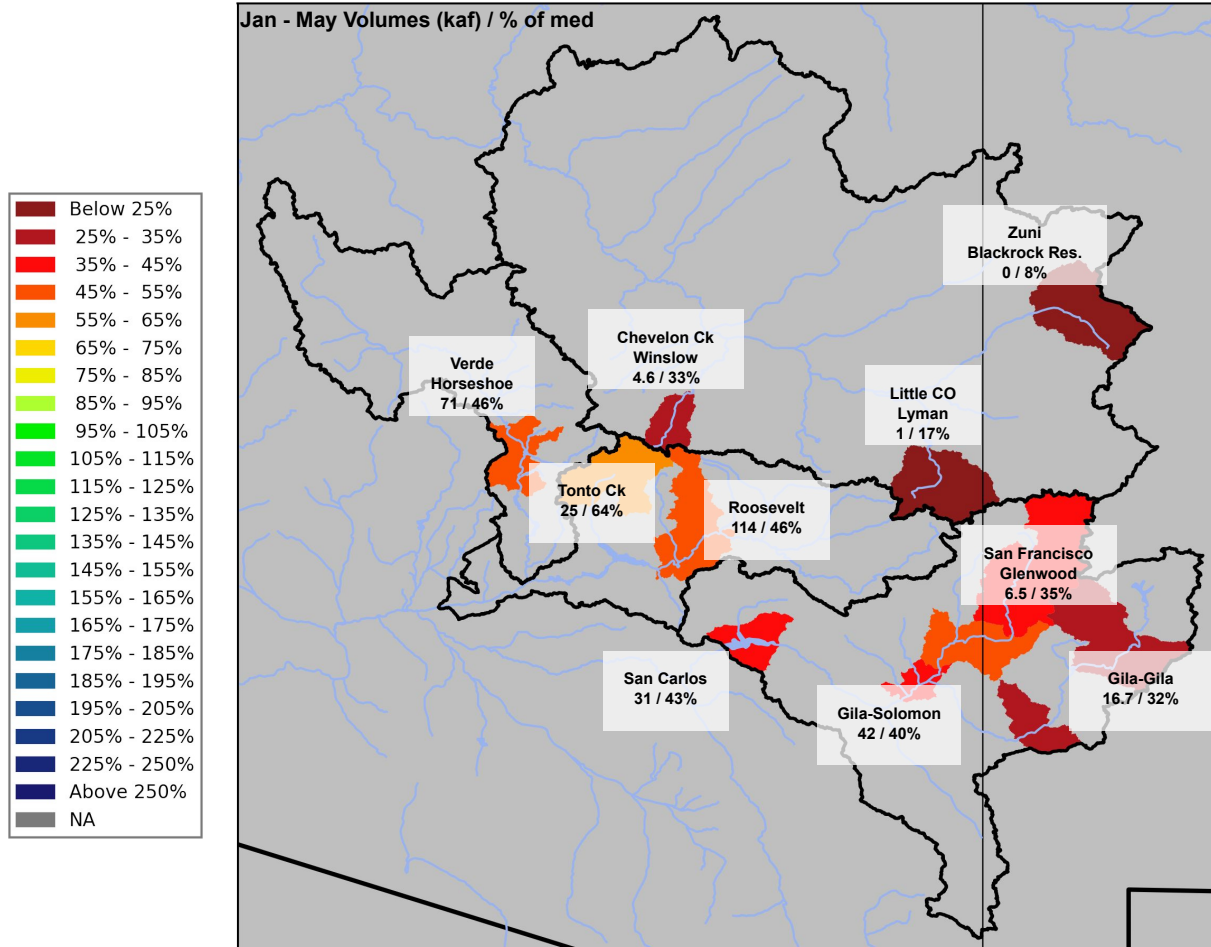


# Apr 1<sup>st</sup> Water Supply Forecasts: Virgin River Basin

**Forecast Range & (1-month Trend):**  
 35 - 55% avg (5-25% decrease)



# Apr 1<sup>st</sup> Water Supply Forecasts: Lower Colorado River Basin



January - May Forecast Period  
% of 1991-2020 Median

## Forecast Ranges

**Little Colorado:** 10% - 35%

**Upper Gila:** 30% - 50%

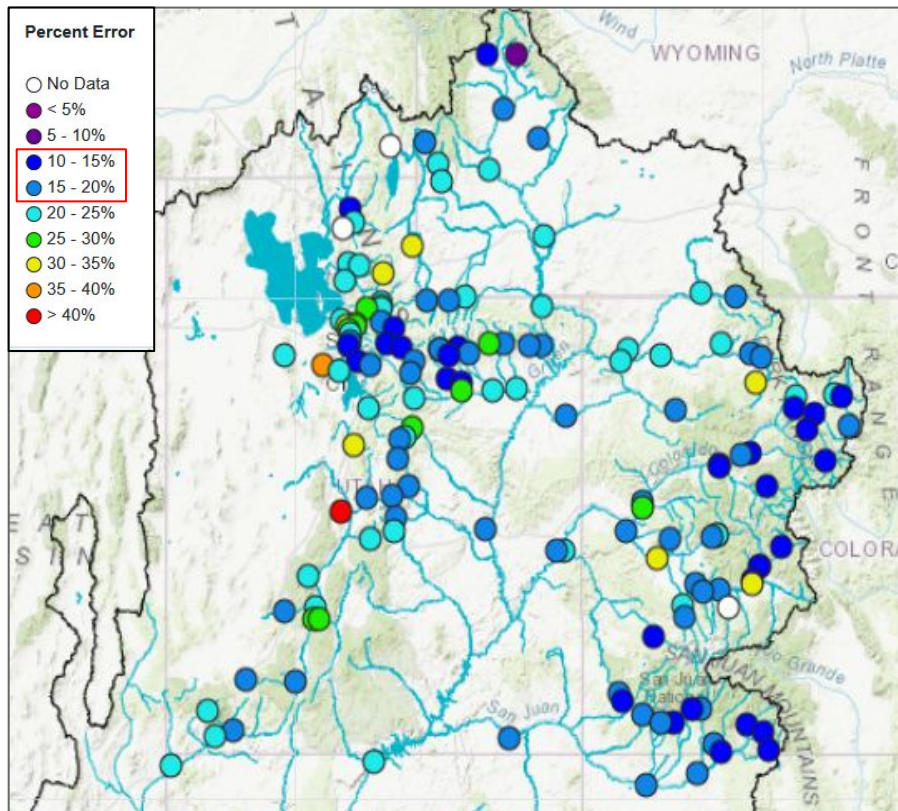
**Salt:** 45% - 65%

**Verde:** 45%

La Niña conditions generally result in warmer/drier than normal conditions across the LCRB

# Historical (1981-2010) Forecast Verification

## April Forecast Error: April-July Volume



### Location

<u>Location</u>	<u>Avg Apr Forecast Error</u>
Green River - Warren Bridge	12%
Fontenelle Reservoir	21%
Yampa River - Deerlodge	20%
Blue River - Dillon Reservoir	14%
Colorado River - Cameo	16%
Blue Mesa Reservoir (Gunnison)	15%
McPhee Reservoir (Dolores)	16%
Navajo Reservoir (San Juan)	18%
Lake Powell	20%

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

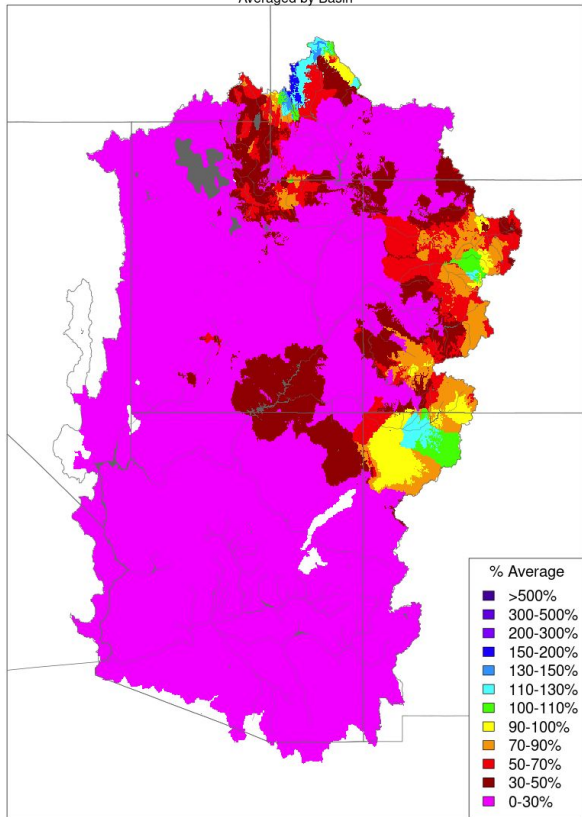
### Where Forecasts are Worse:

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

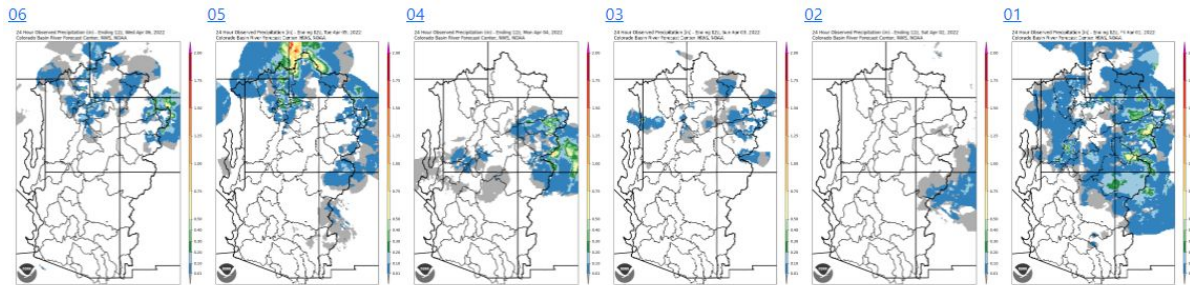
# April 2022 Month-To-Date Precipitation

## Month to Date Precipitation - April 06 2022

Averaged by Basin

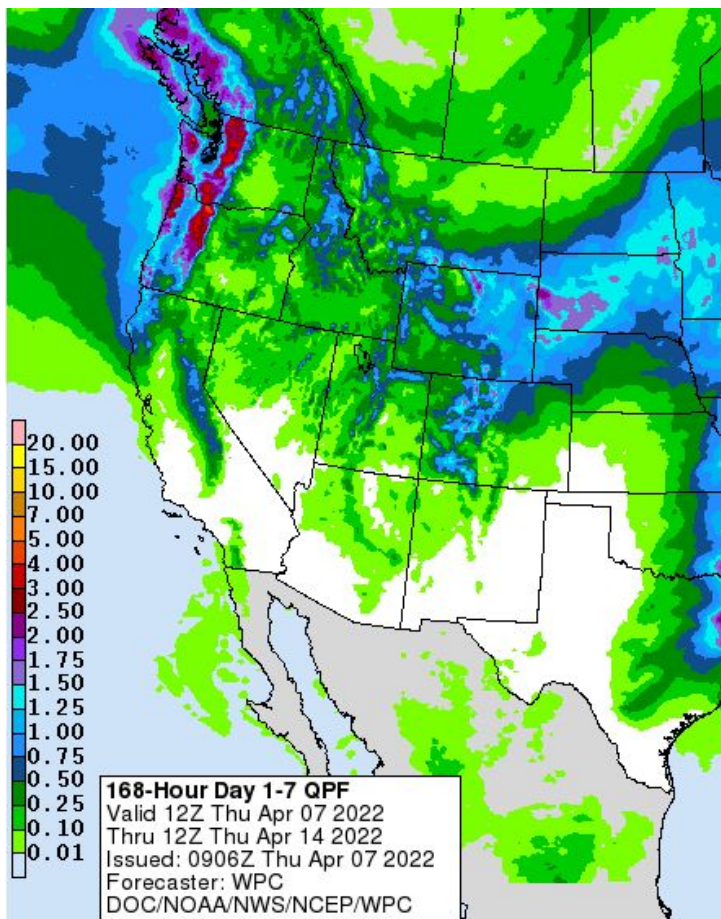


Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)



Early April has had some precipitation in the northern half of the basin, most notably the Upper Green River headwaters.

## Upcoming Weather: WPC April 7-14 Precipitation Outlook



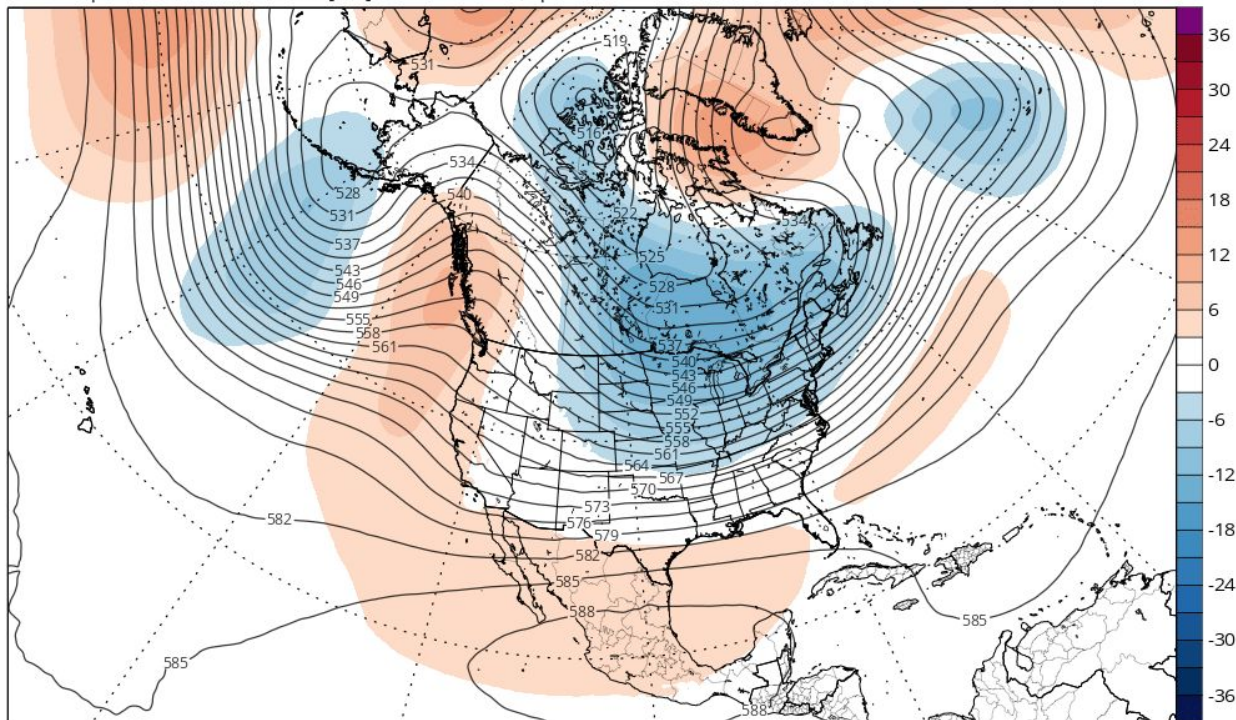
- Dry and warm conditions to start the forecast period
- A pattern change starting this weekend will bring precipitation and below average temperatures next week
  - Around 1" expected for the high terrain
  - Generally around 0.10" - 0.50" elsewhere
- Best chances of precipitation are Monday through Wednesday, with another round possible at the end of the week

# Upcoming Weather: April 14-20

GEFS 500mb Geopotential Height & Anomaly (dam) (based on CFSR 1981-2010 Climatology)

Init: 06z Apr 07 2022 Forecast Hour: [246] valid at 12z Sun, Apr 17 2022

TROPICALTIDBITS.COM



- Chances of precipitation will come to an end by next weekend
- Ridging will likely occur over the Eastern Pacific, and remain in place for the rest of the forecast period

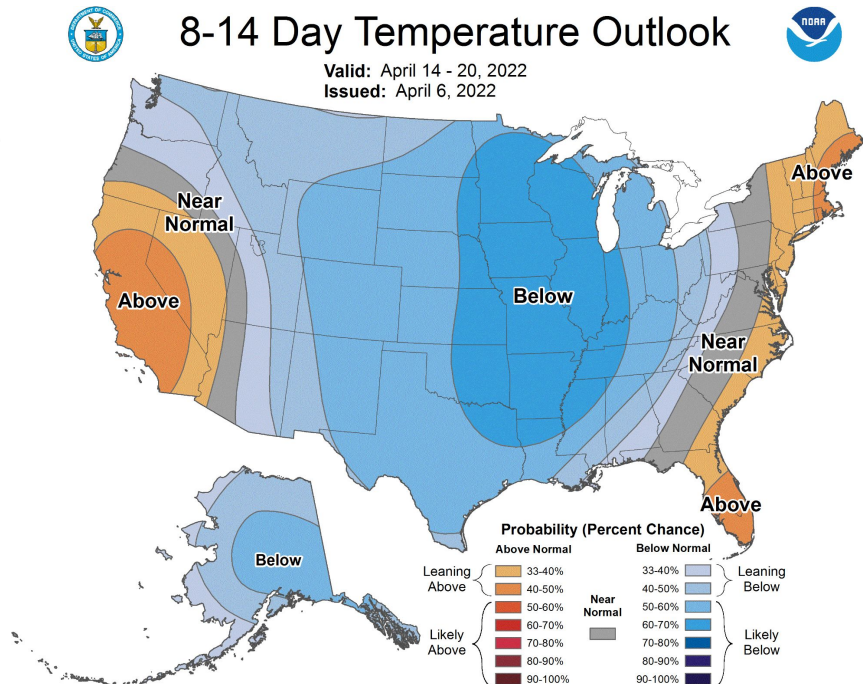
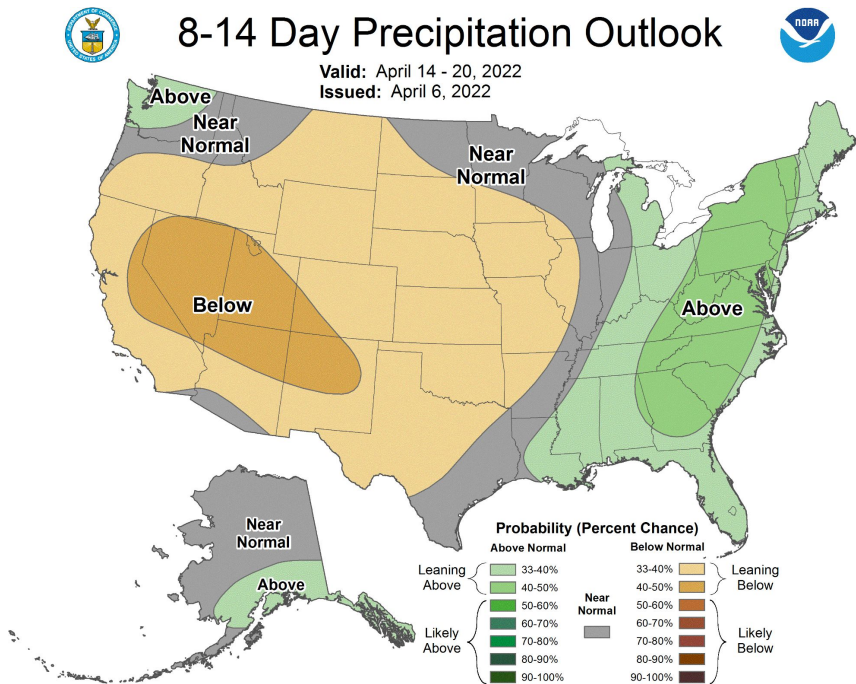
# Upcoming Weather: 8-14 Day Outlook (April 14-20)

Elevated odds of below average precipitation across all basins.

Near average temperatures likely in western regions, to below average temperatures in eastern regions.

## Precipitation Outlook

## Temperature Outlook



# Summary

- A wet monsoon season helped soil moisture conditions, which are improved from a year ago but soil moisture deficits are still out there, notably across much of western Colorado
- March precipitation:
  - Below to much below normal across the majority of the region for the third month in a row
  - Some near normal areas in the Duchesne, Yampa, Gunnison and Dolores basins (but not widespread)
- Current (April 6) SWE Conditions:
  - Upper Colorado: 70-100%    worst conditions Upper Green; best conditions SW CO
- April water supply forecasts (% of normal):
  - Upper Colorado: 40-100%
  - Lower Colorado: 10-65%
- Weather outlook
  - Precipitation expected the first part of next week, with additional chances the end of the week
  - Likely drier and cooler than normal overall in the 8-14 day window





# CBRFC Winter/Spring Snow Operations Overview



- Twice monthly CBRFC model snow update based on NRCS SNOTEL precipitation during snow accumulation season
  - Long (~30-40 years), reliable observed precipitation dataset at mid/high elevation points across western US
  - Crucial component of CBRFC hydrologic model calibration process
- CBRFC model SWE vs. ASO Inc. SWE analysis (select basins in Colorado)
  - High resolution snapshot of estimated SWE
  - Newer dataset (<5 years) with limited and inconsistent coverage
  - Ongoing evaluation
- CBRFC model snow vs. satellite snow: areal extent/snow covered area analysis
  - Data collection/reliability requires days with no/few clouds
  - CBRFC used historical (2000-2020) satellite snow covered area data during latest snow model calibration
  - Used qualitatively in real time model to help validate model snow states
- Awareness of current dust on snow conditions
  - Dust on snow conditions impact snowmelt rate/timing/magnitude
- Awareness of ice/backwater impacts, field measurements of flow post river ice, rating curve adjustments
  - Observed streamflow rises and fluctuations due to snowmelt help validate model snow states
- Quality control of event precipitation type (rain vs. snow) and amount across various elevation bands
- Hydrologic model review to ensure high quality forecasts of both daily streamflow and seasonal volumes
  - Validation of CBRFC hydrologic model states (snow and soil moisture)



# 2022 Water Supply Webinar Schedule

*\*All Times Mountain Time (MT)*

## Colorado River Basin

Friday	Jan 7 <sup>th</sup>	<del>10 am</del>
Monday	Feb 7 <sup>th</sup>	<del>10 am</del>
Monday	Mar 7 <sup>th</sup>	<del>10 am</del>
Thursday	Apr 7 <sup>th</sup>	10 am
Friday	May 6 <sup>th</sup>	10 am

## Great Basin

Friday	Jan 7 <sup>th</sup>	<del>11:30 am</del>
Monday	Feb 7 <sup>th</sup>	<del>11:30 am</del>
Monday	Mar 7 <sup>th</sup>	<del>11:30 am</del>
Thursday	Apr 7 <sup>th</sup>	11:30 am
Friday	May 6 <sup>th</sup>	11:30 am

Additional briefings scheduled as needed

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



Home Rivers ▾ Snow ▾ Water Supply ▾ Reservoirs ▾ Weather ▾ Climate ▾ Help ▾ About ▾ News ▾

Thursday, April 7, 2022: CBRFC Water Supply Webinars. Registration: [More Info](#)

Webinars  
Email Updates

email [cbrfc.webmasters@noaa.gov](mailto:cbrfc.webmasters@noaa.gov)  
subject line: **email notification list**

## CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2022

The Colorado Basin River Forecast Center (CBRFC) produces water supply forecasts for the Colorado River Basin and the eastern Great Basin. CBRFC conducts December through May webinars explaining the forecasts and current conditions.

Follow the links below to register for a webinar.

### Early Season Water Supply Outlook Webinar

Wednesday December 15 @ 10 am MT

### Colorado River Basin Water Supply Webinars

Friday January 7 @ 10 am MT

Monday February 7 @ 10 am MT

Monday March 7 @ 10 am MT

[Thursday April 7 @ 10 am MT](#)

[Friday May 6 @ 10 am MT](#)

### Utah Water Supply Webinars

Friday January 7 @ 11:30 am MT

Monday February 7 @ 11:30 am MT

Monday March 7 @ 11:30 am MT

[Thursday April 7 @ 11:30 am MT](#)

[Friday May 6 @ 11:30 am MT](#)

### Peak Flow Webinar

Monday March 21 @ 1:00 pm MT

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 on the [CBRFC presentations page](#) soon after each briefing.

## 2022 Presentations

Overview of the 1991-2020 Normal Period and Model Impacts Presentation during Reclamation's October 24-Month Study Rollout Slides (.pdf)

2022 Early Season Water Supply Outlook Slides (.pdf)  
Recording (.mp4)

# CBRFC Contacts & WY22 Basin Focal Points

## Basin Focal Points (Forecasters)

Brenda Alcorn - Green, Duchesne, White/Yampa  
[brenda.alcorn@noaa.gov](mailto:brenda.alcorn@noaa.gov)

Ashley Nielson – Gunnison, San Juan, Dolores, Lake Powell  
[ashley.nielson@noaa.gov](mailto:ashley.nielson@noaa.gov)

Cody Moser – Upper Colorado Mainstem  
[cody.moser@noaa.gov](mailto:cody.moser@noaa.gov)

Patrick Kormos – Great Basin/Sevier  
[patrick.kormos@noaa.gov](mailto:patrick.kormos@noaa.gov)

Trevor Grout - Virgin, Lower Colorado  
[trevor.grout@noaa.gov](mailto:trevor.grout@noaa.gov)

Tracy Cox - Hydrometeorologist  
[tracy.cox@noaa.gov](mailto:tracy.cox@noaa.gov)

Nanette Hosenfeld - Senior Hydrometeorologist  
[nanette.hosenfeld@noaa.gov](mailto:nanette.hosenfeld@noaa.gov)

Wolfgang Hanft - Hydrometeorologist  
[wolfgang.hanft@noaa.gov](mailto:wolfgang.hanft@noaa.gov)

Michelle Stokes – Hydrologist In Charge  
[michelle.stokes@noaa.gov](mailto:michelle.stokes@noaa.gov)

Paul Miller– Service Coordination Hydrologist  
[paul.miller@noaa.gov](mailto:paul.miller@noaa.gov)

John Lhotak – Development and Operations Hydrologist  
[john.lhotak@noaa.gov](mailto:john.lhotak@noaa.gov)

**CBRFC Webpage**  
<https://www.cbrfc.noaa.gov/>

**CBRFC Operations**  
[cbrfc.operations@noaa.gov](mailto:cbrfc.operations@noaa.gov)  
801-524-4004

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

