

# Colorado River Basin Water Supply Briefing

March 7, 2023

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Colorado Basin  
River Forecast Center  
National Weather Service



# Today's Presentation

Weather Review

Soil Moisture Conditions

Current Snowpack Conditions

2023 Water Supply Forecasts

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

March Water Supply Forecast Error

Recent/Upcoming Weather

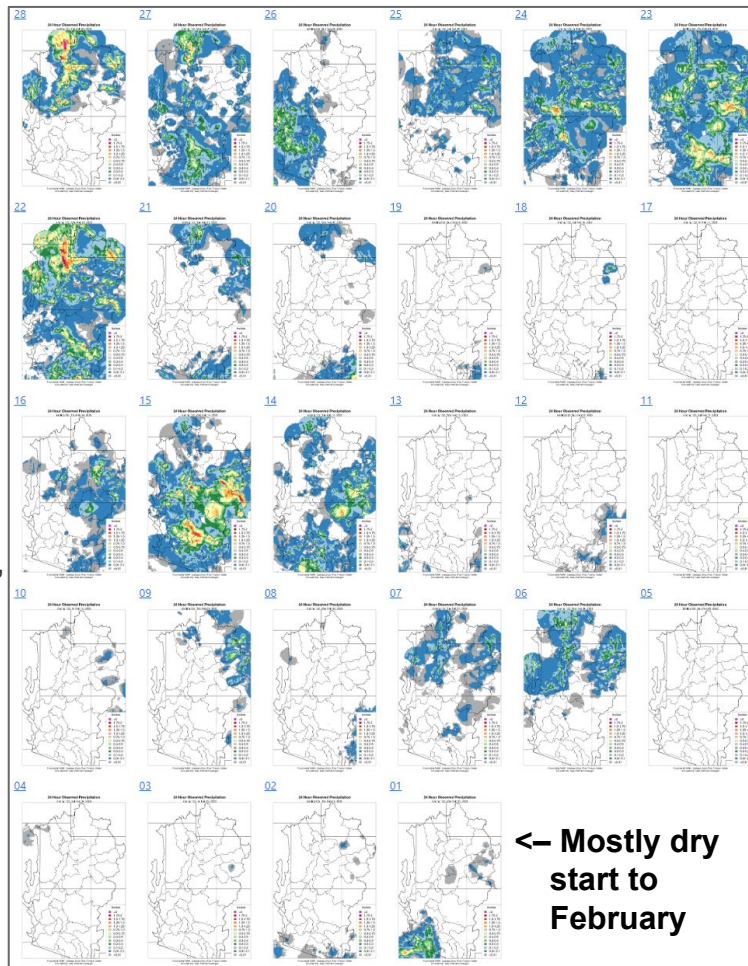
Contacts & Questions

# February Weather Summary

**Wet end to →  
February**

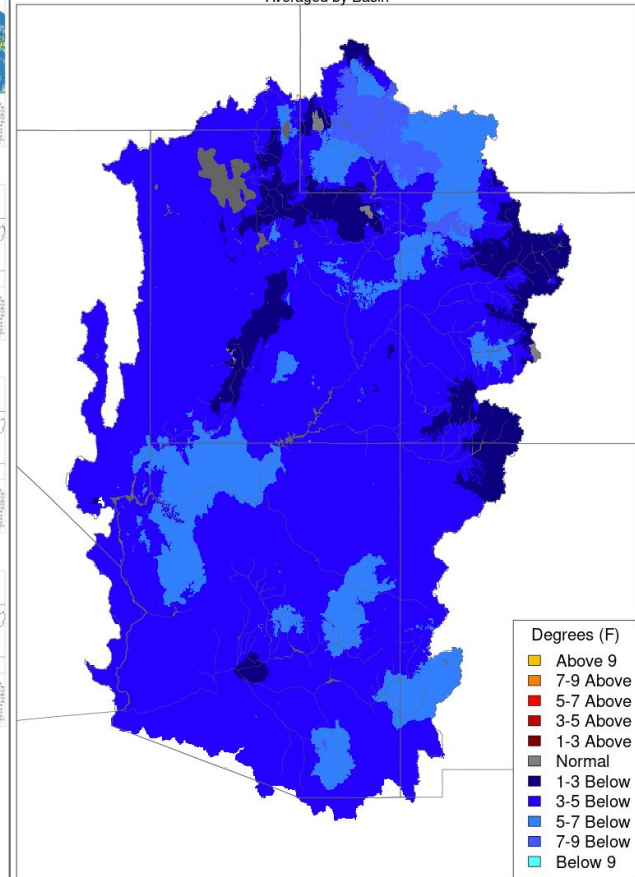
The weather pattern became more active around the middle of February, with a series of wet storms impacting most areas.

Colder than normal temperatures, with most of the precipitation falling as snow, even across majority of LCRB.



**Max Temp - Monthly Deviation - February 2023**

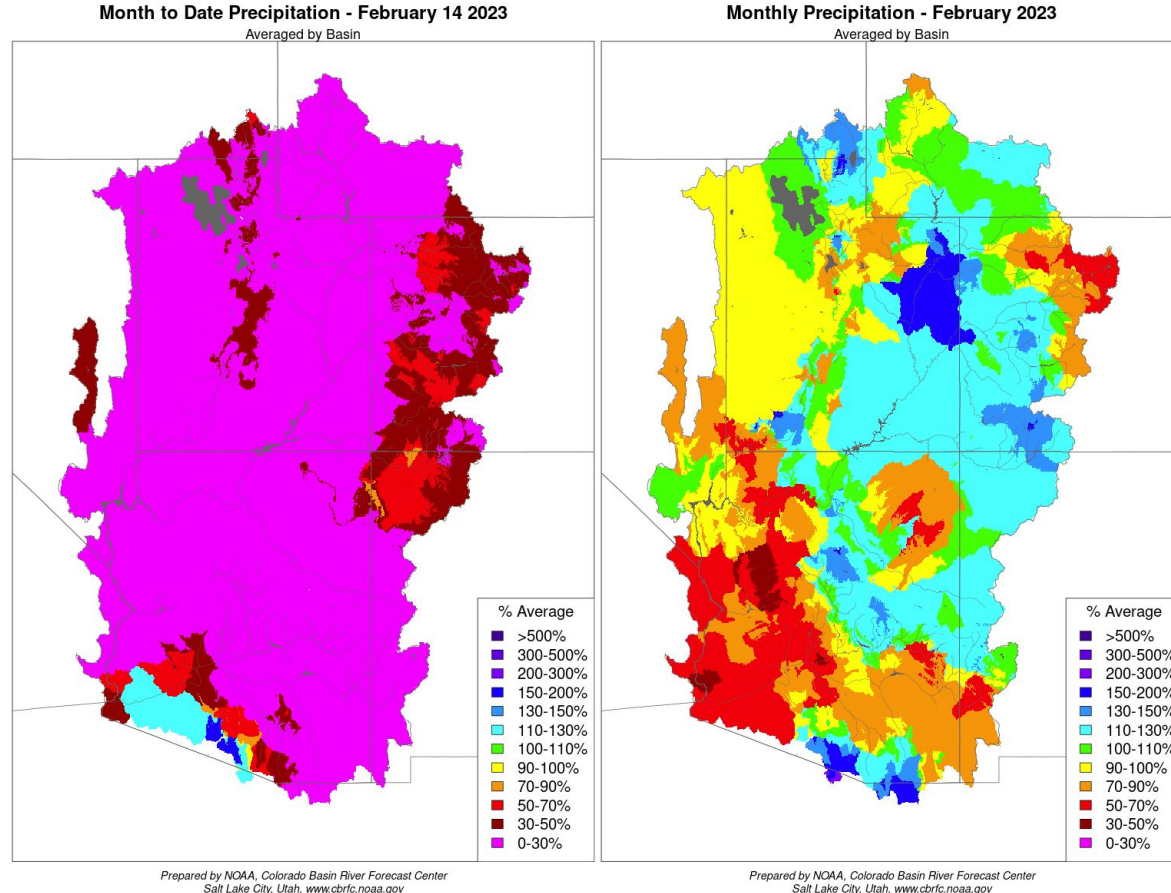
Averaged by Basin



# February Precipitation - First Half vs. Last Half

February started out unusually dry, with most basins receiving less than 30% of normal precipitation during the first half of the month.

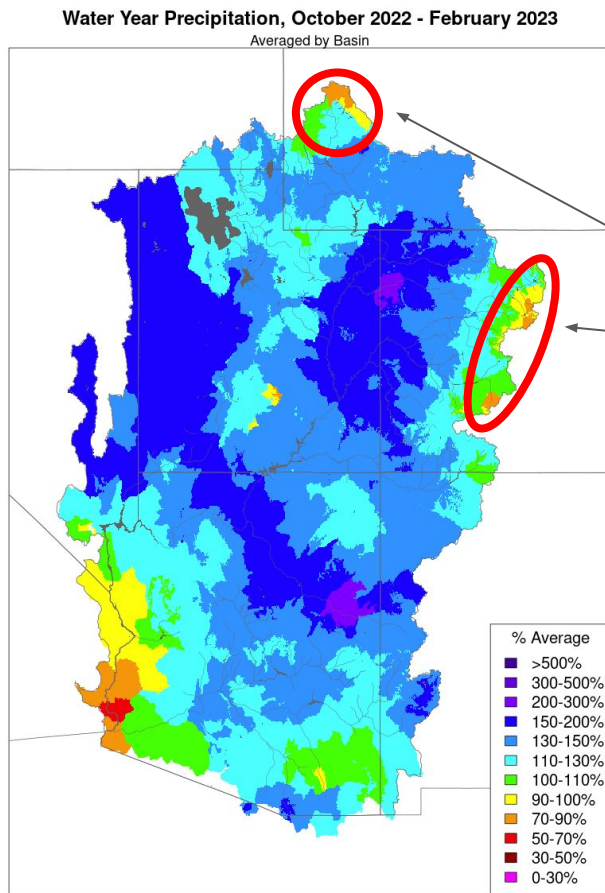
Most basins ended February with near to slightly above normal precipitation as a result of moisture during the last half of the month.





# Water Year 2023 Precipitation (October-February)

Water Year 2023 CBRFC Precipitation (Significant Runoff Areas) Percent of 1991-2020 Average		
UPPER COLORADO RIVER BASIN		
	Feb	Oct-Feb
Above Lake Powell	102	118
Green River Basin		
Above Fontenelle	91	96
Above Flaming Gorge	95	107
Yampa/White	86	129
Duchesne	95	124
Price/San Rafael/Dirty Devil	100	133
Colorado River Headwaters		
Above Kremmling	66	99
Eagle	74	103
Roaring Fork	103	113
Above Cameo	86	108
Southwest Colorado		
Gunnison	112	117
Dolores	127	131
San Juan	127	120
LOWER COLORADO RIVER BASIN		
Virgin	129	157
Little Colorado	127	141
Verde	116	144
Salt	114	129
Upper Gila	104	132



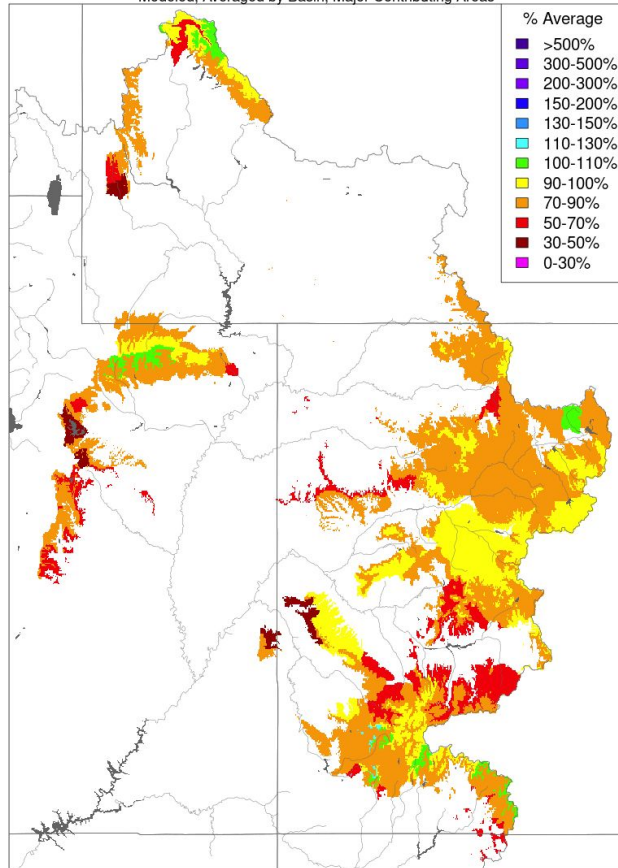
Water year precipitation can be used as a good indicator of water supply conditions, and is near to above average across the region.

Parts of the northern Upper Green River Basin above Fontenelle Reservoir and areas along the Continental Divide have received less precipitation compared to surrounding basins.

# UCRB Fall 2022 Model Soil Moisture Conditions

## Soil Moisture - Fall - 2022 (November 02)

Modeled, Averaged by Basin, Major Contributing Areas



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

CBRFC Hydrologic Model soil moisture conditions from the lower soil zone (LZ)

Modeled LZ soil water content

-a result of past hydrologic conditions including but not limited to:

- previous year(s) runoff
- summer/fall precipitation

Soil moisture content is adjusted every fall

- during a dry period
- after irrigation season has ended
- before winter

Data used to make adjustments:

- Early November streamflow observations (baseflow)
- Reservoir inflows
- July-October precipitation
- Past season(s) runoff conditions

**CBRFC model soil moisture conditions near to below normal across many of the major runoff producing areas.**

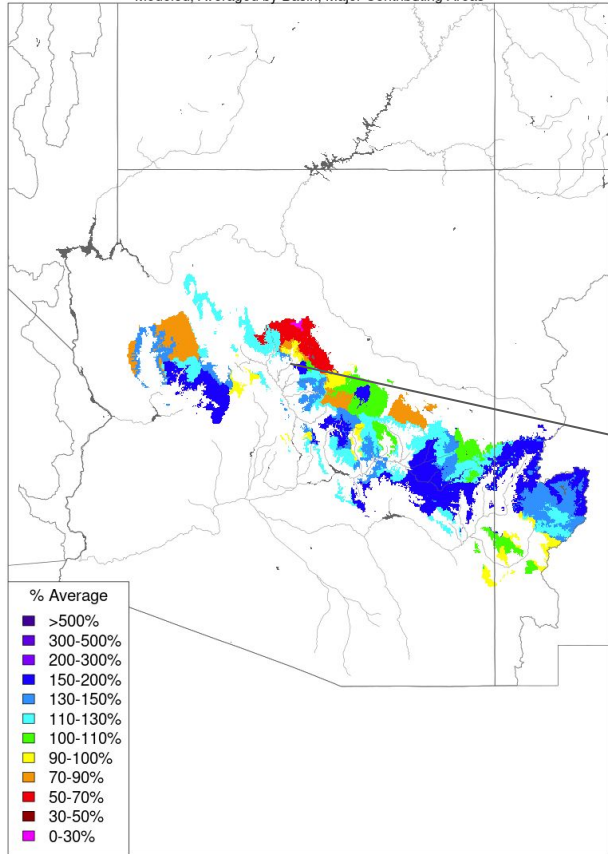
**Spring runoff timing/magnitude components:**

- SWE conditions
- Spring weather
- Soil moisture conditions

# Lower Colorado River Basin Soil Moisture Conditions

Soil Moisture - March 06 2023

Modeled, Averaged by Basin, Major Contributing Areas



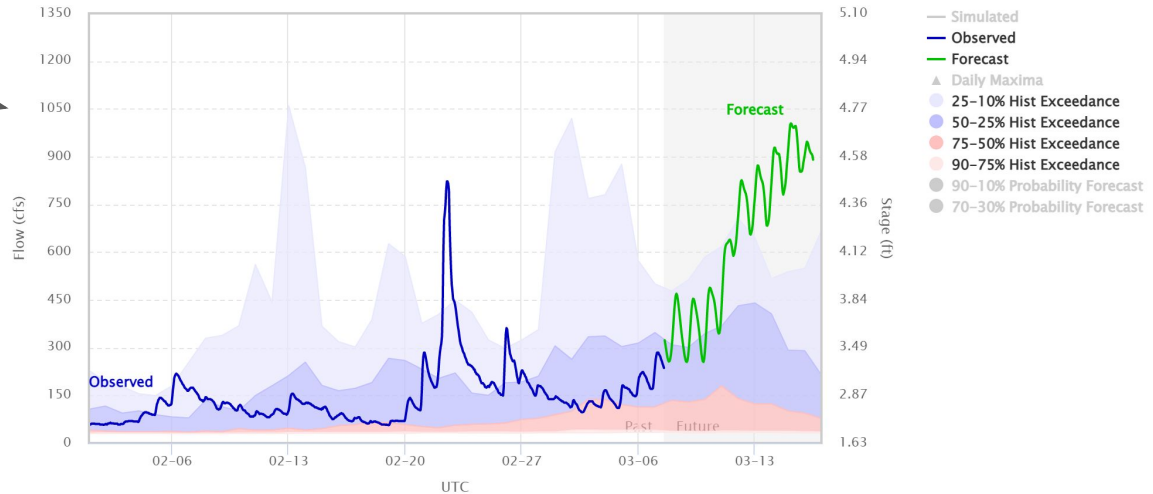
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

LCRB model soil moisture conditions generally improved during February in most basins as a result of rainfall runoff and snowmelt occurring.

Early February model soil moisture is above average in most basins.

Forecast Hydrograph – Oak Ck – Sedona (OAKA3)

Colorado Basin River Forecast Center

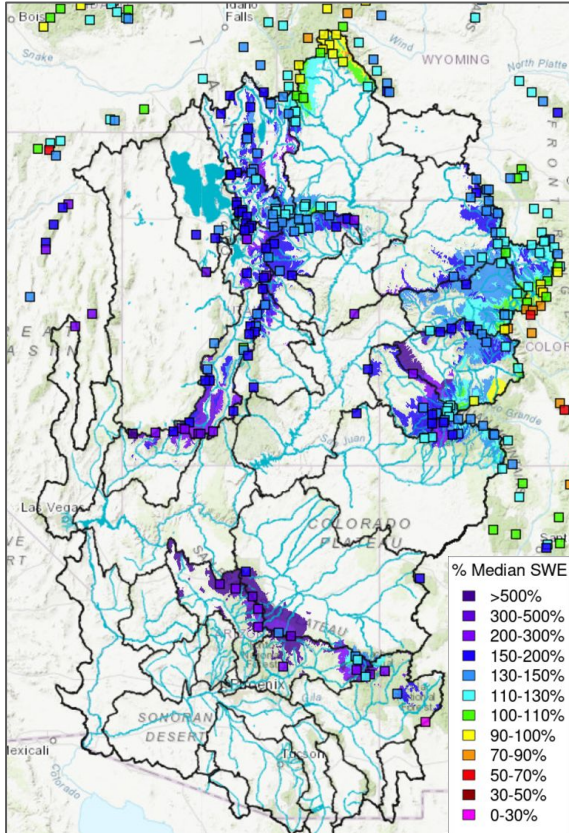


Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

# Water Year 2023 Snowpack Conditions

## March 1 SWE Conditions

NRCS SNOTEL Observed (Squares)  
CBRFC Model (Significant Areas)



**SWE** = Snow Water Equivalent  
The amount water in snow.

Early March SWE conditions are mostly above normal across the Colorado River Basin.

Water Year 2023 CBRFC Model SWE (Significant Runoff Areas) Percent of 1991-2020 Median			
UPPER COLORADO RIVER BASIN			
	Feb1	Mar1	Change
<b>Green River Basin</b>			
Above Lake Powell	144	135	-9
<b>Colorado River Headwaters</b>			
Above Kremmling	126	111	-15
Eagle	120	109	-11
Roaring Fork	126	119	-7
Above Cameo	129	117	-12
<b>Southwest Colorado</b>			
Gunnison	137	133	-4
Dolores	165	157	-8
San Juan	124	129	5
<b>LOWER COLORADO RIVER BASIN</b>			
Virgin	263	239	-24
Little Colorado	269	342	73
Verde	541	486	-55
Salt	168	175	7
Upper Gila	215	206	-9

Most UCRB areas saw modest declines in percent of normal SWE conditions during February.

Generally smaller declines in percent normal SWE conditions during February across southwest CO.

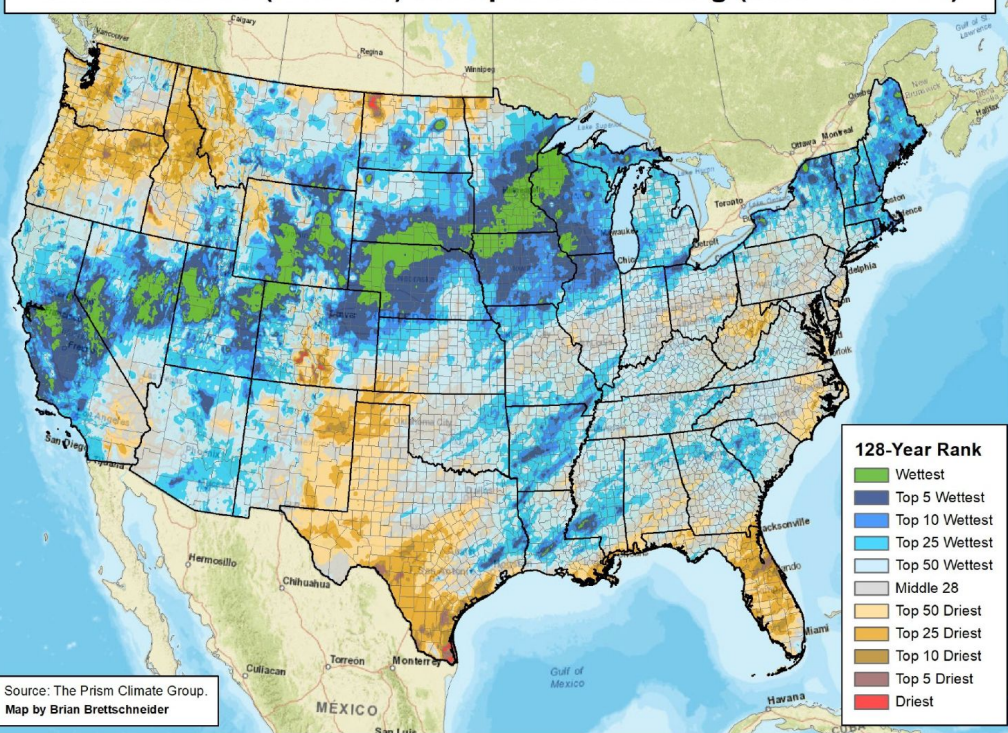
More variable - percentages computed using smaller values.

Exceeding expectations because La Niña conditions usually result in drier than average winter weather across the SW US.



# Near/Record Winter Precipitation / Early March SNOTEL SWE

Winter 2022-23 (Dec-Feb) Precipitation Ranking (Since 1895-96)



**Snow Water Equivalent Records (POR)**  
March 5, 2023, end of day

- Highest
- 2nd Highest
- 2nd Lowest
- Lowest

⊖ Observation missing

**Watershed Boundaries**

— Region (2-Digit HUC)

Sites with less than 20 years of data or low variability excluded

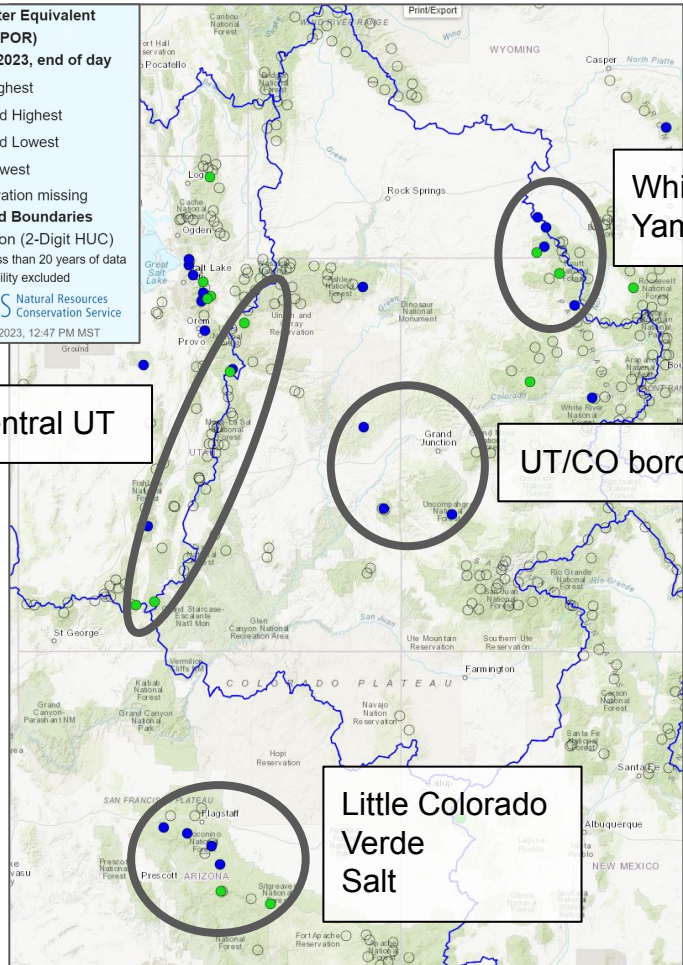
**NRCS** Natural Resources Conservation Service

Created 3-06-2023, 12:47 PM MST

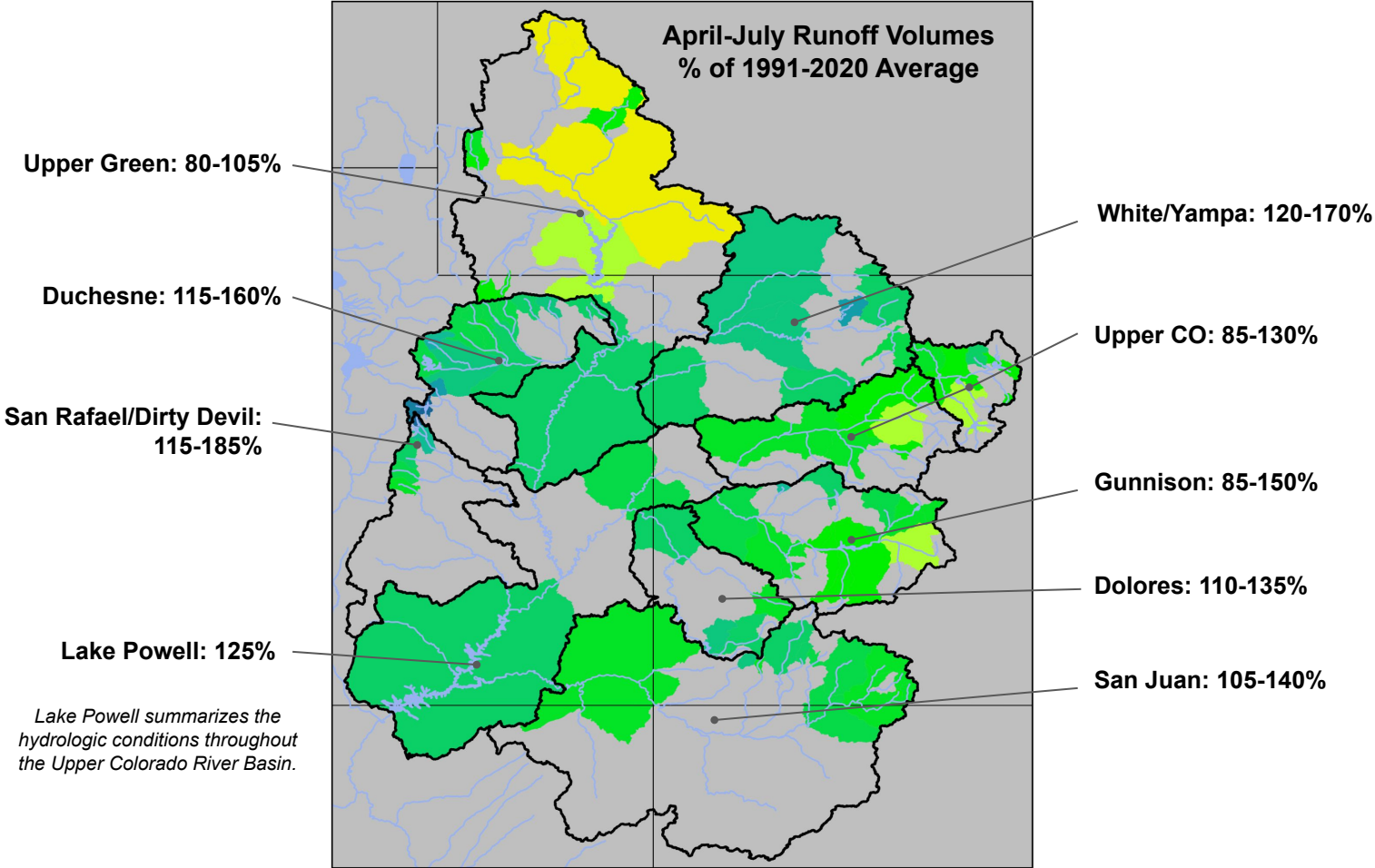
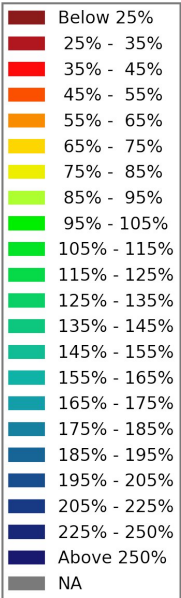
Central UT

White Yampa

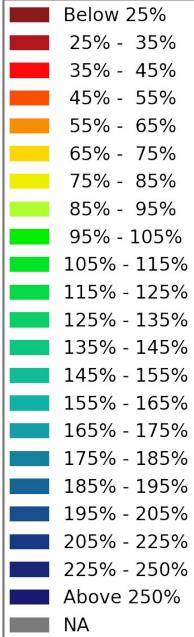
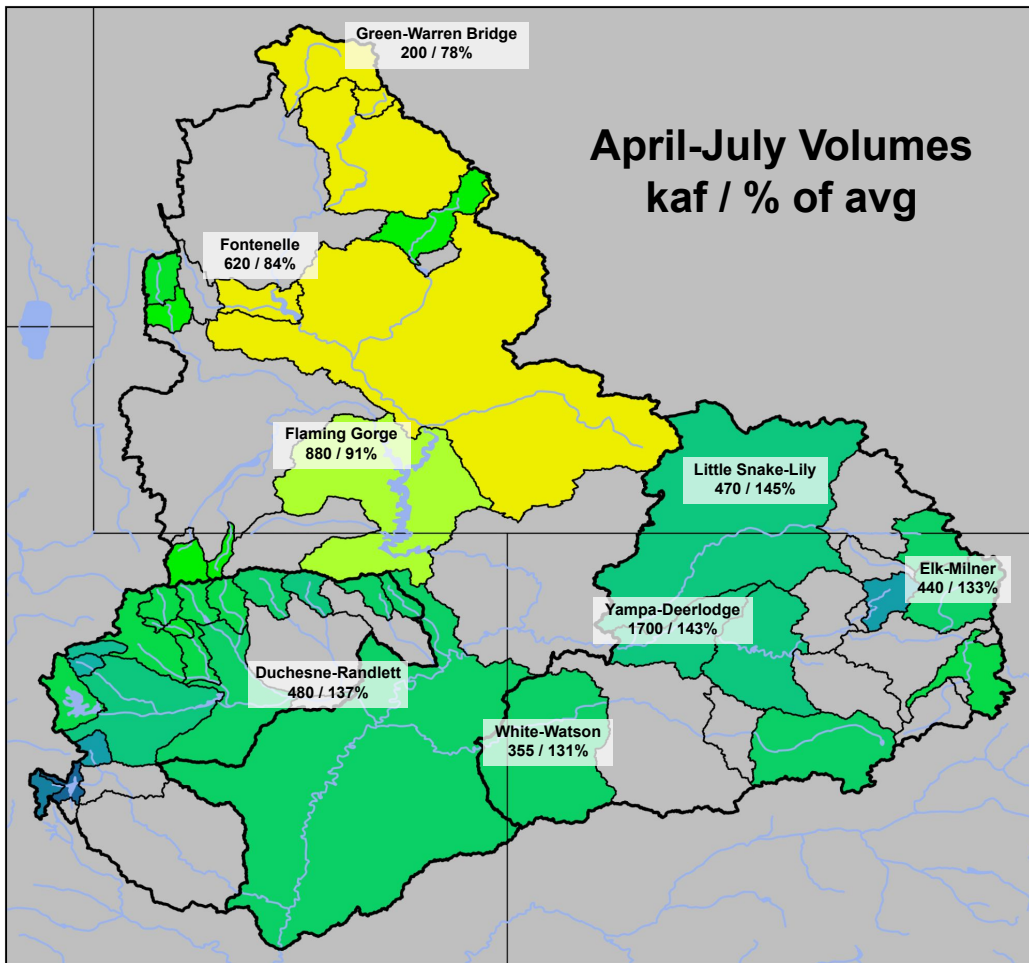
UT/CO border



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



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



kaf = thousand acre-feet

March 1<sup>st</sup> 2023 Forecasts  
% of 1991-2020 avg

## Forecast Ranges & (1-month Trend)

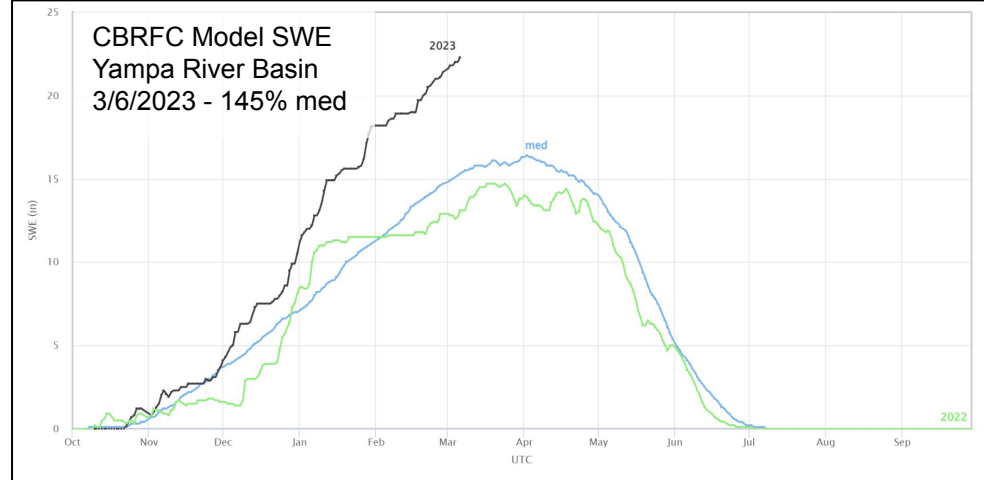
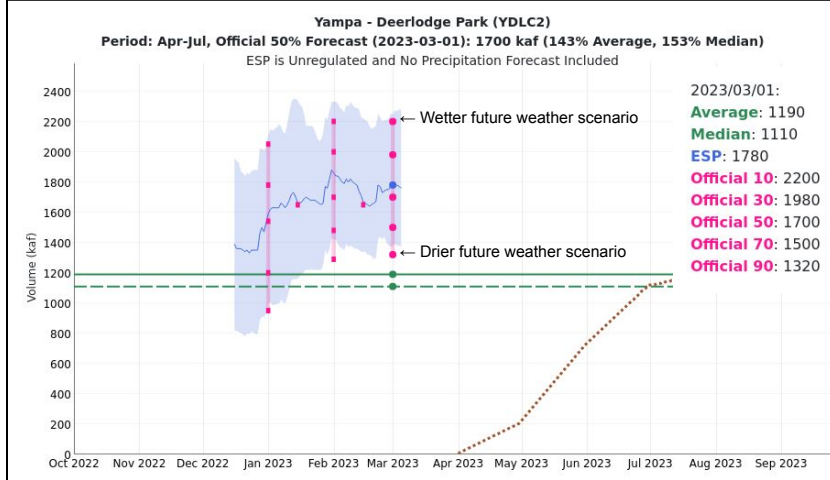
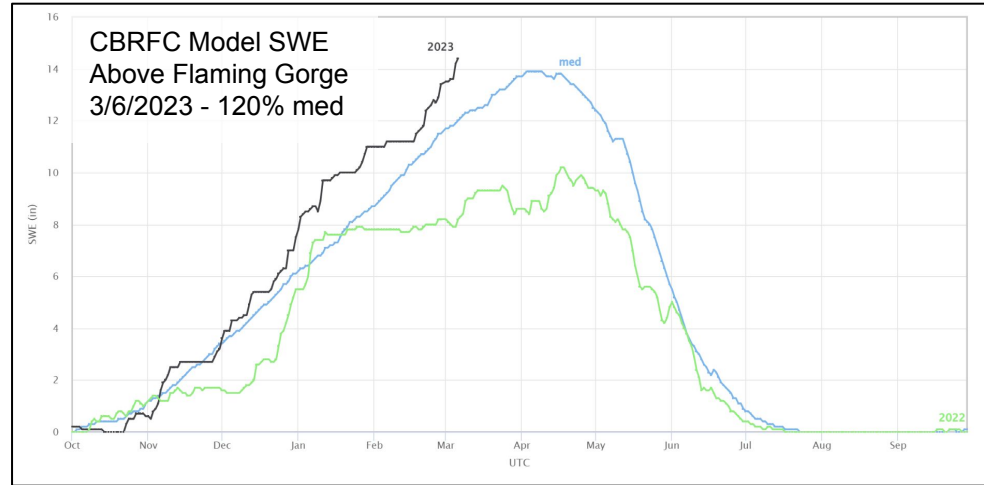
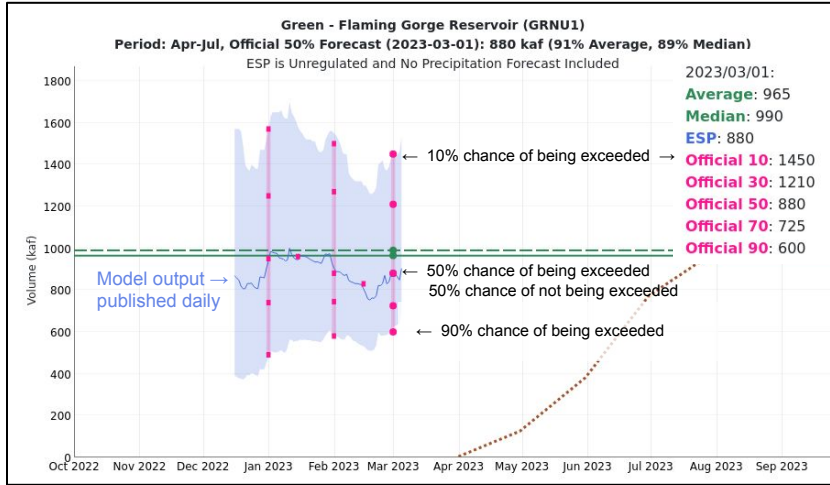
**Upper Green:** 80 - 105%  
(0-10% decrease)

**Yampa/White:** 120 - 170%  
(-15 - +10% change)

**Duchesne:** 115 - 160%  
(0-10% increase)



# Upper Green Water Supply Forecasts & Snow Conditions



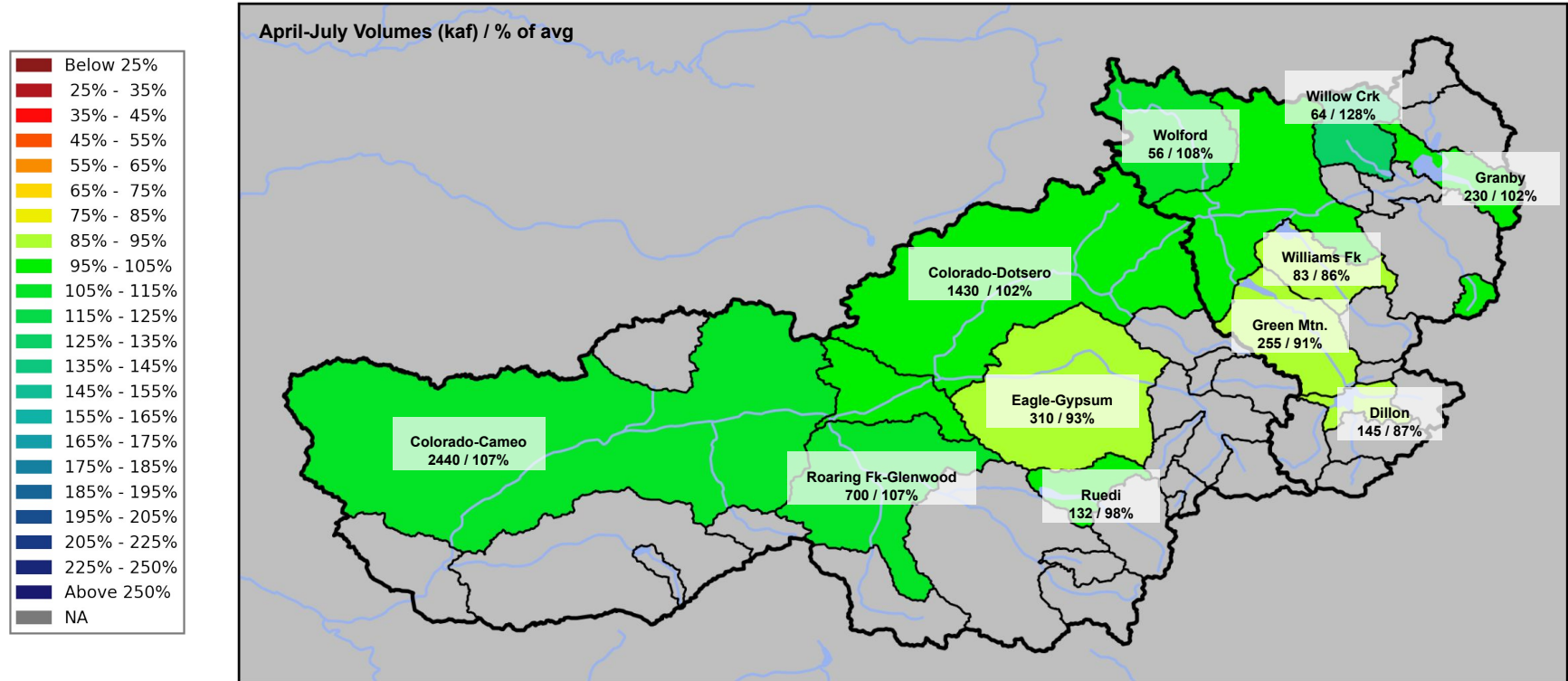


# Mar 1<sup>st</sup> Water Supply Forecasts: Upper Colorado River Mainstem

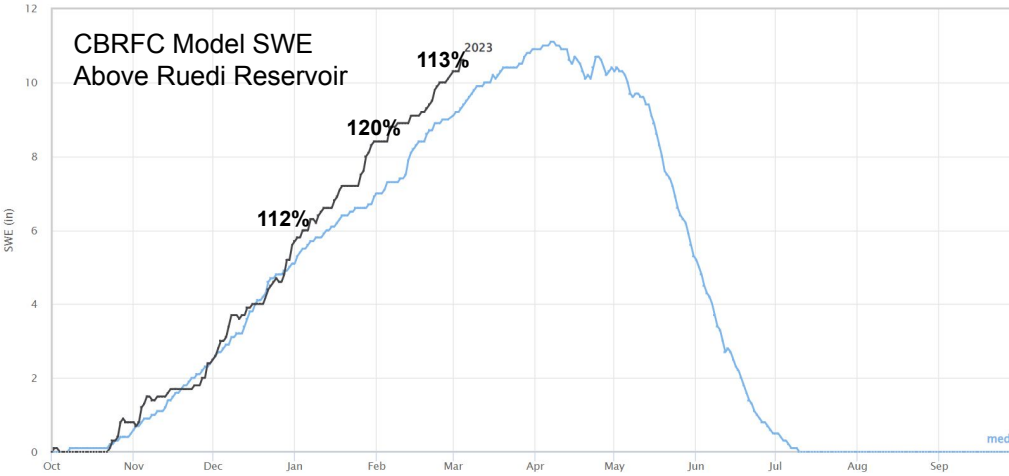
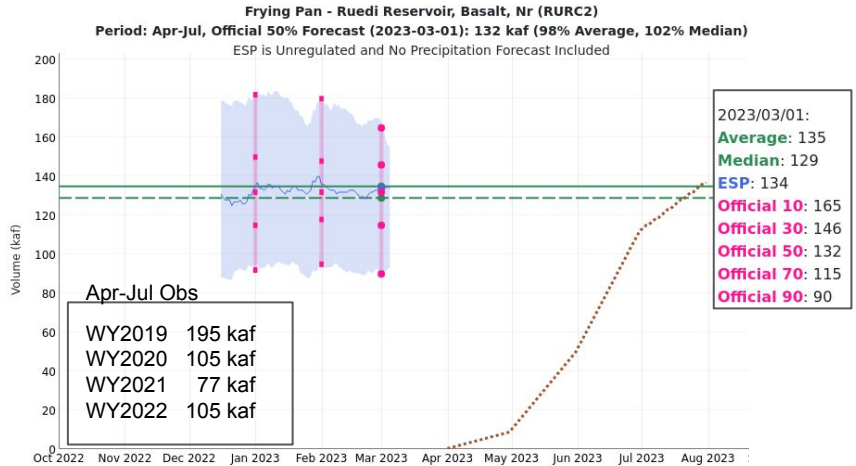
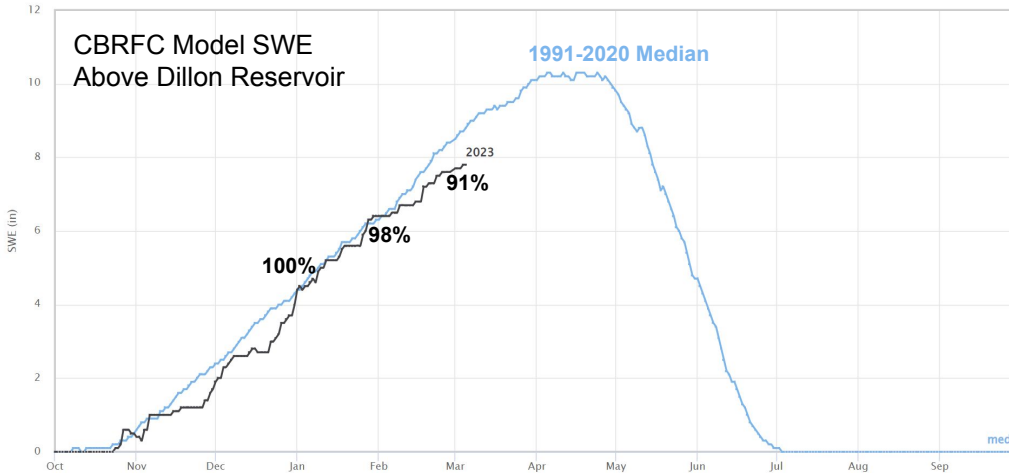
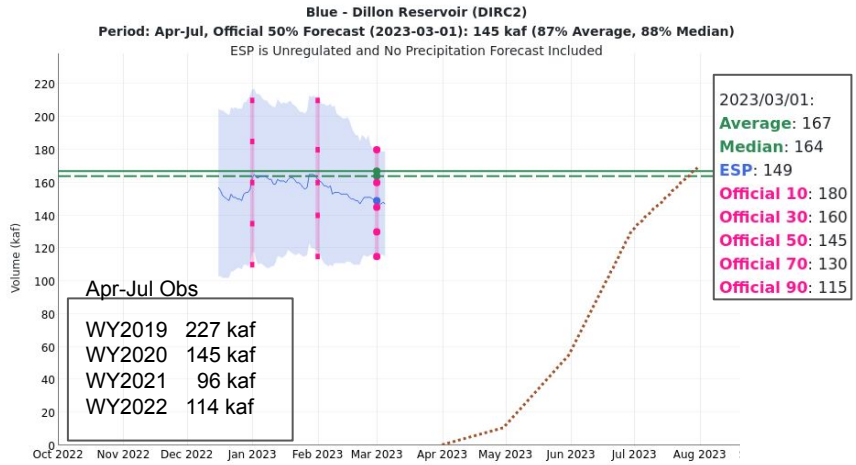
## Forecast Ranges & (1-month Trend):

Granby to Kremmling: 85 - 130% of average (0-10% decrease)

Kremmling to Cameo: 95 - 105% of average (0-5% decrease)



# Upper Colorado Mainstem Water Supply Forecasts & Snow Conditions

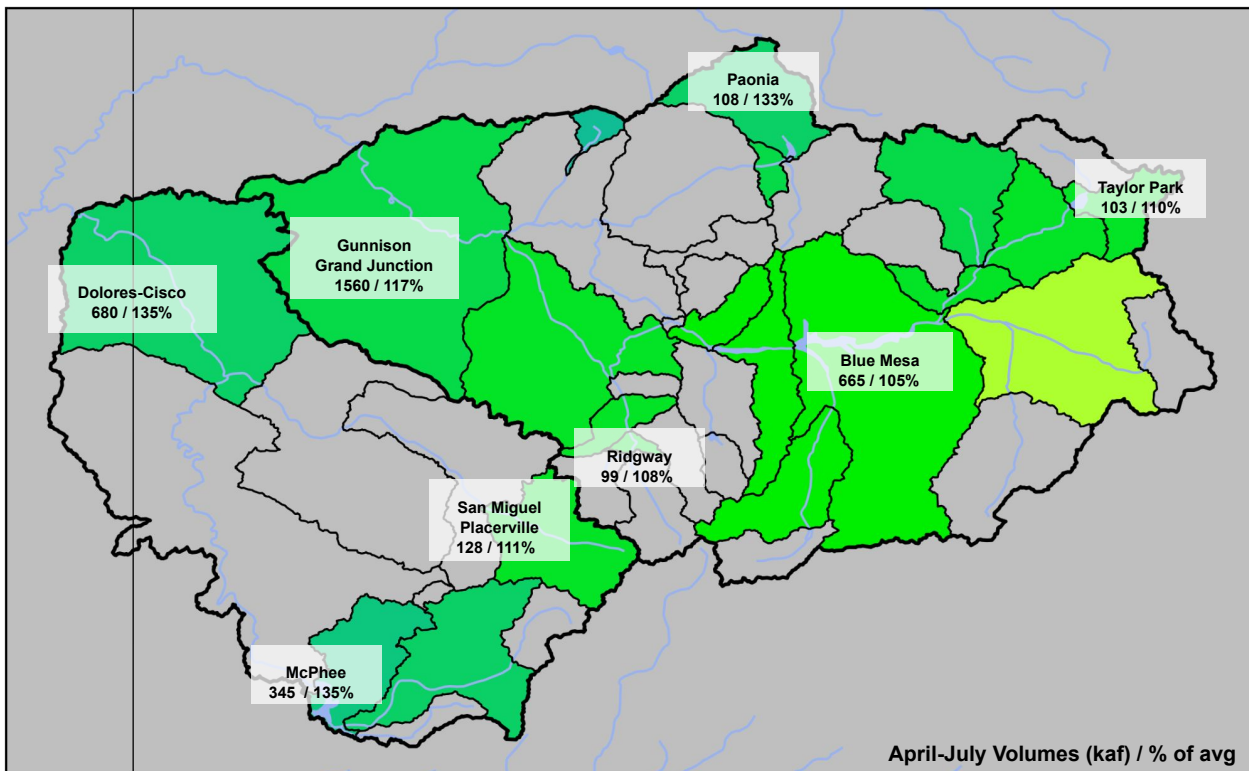
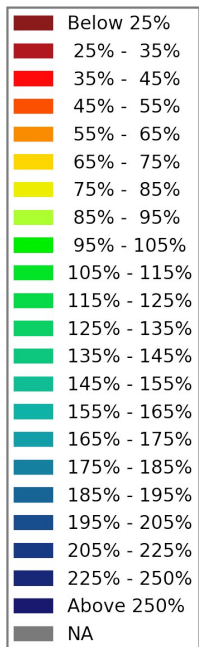


# Mar 1<sup>st</sup> Water Supply Forecasts: Gunnison, Dolores

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

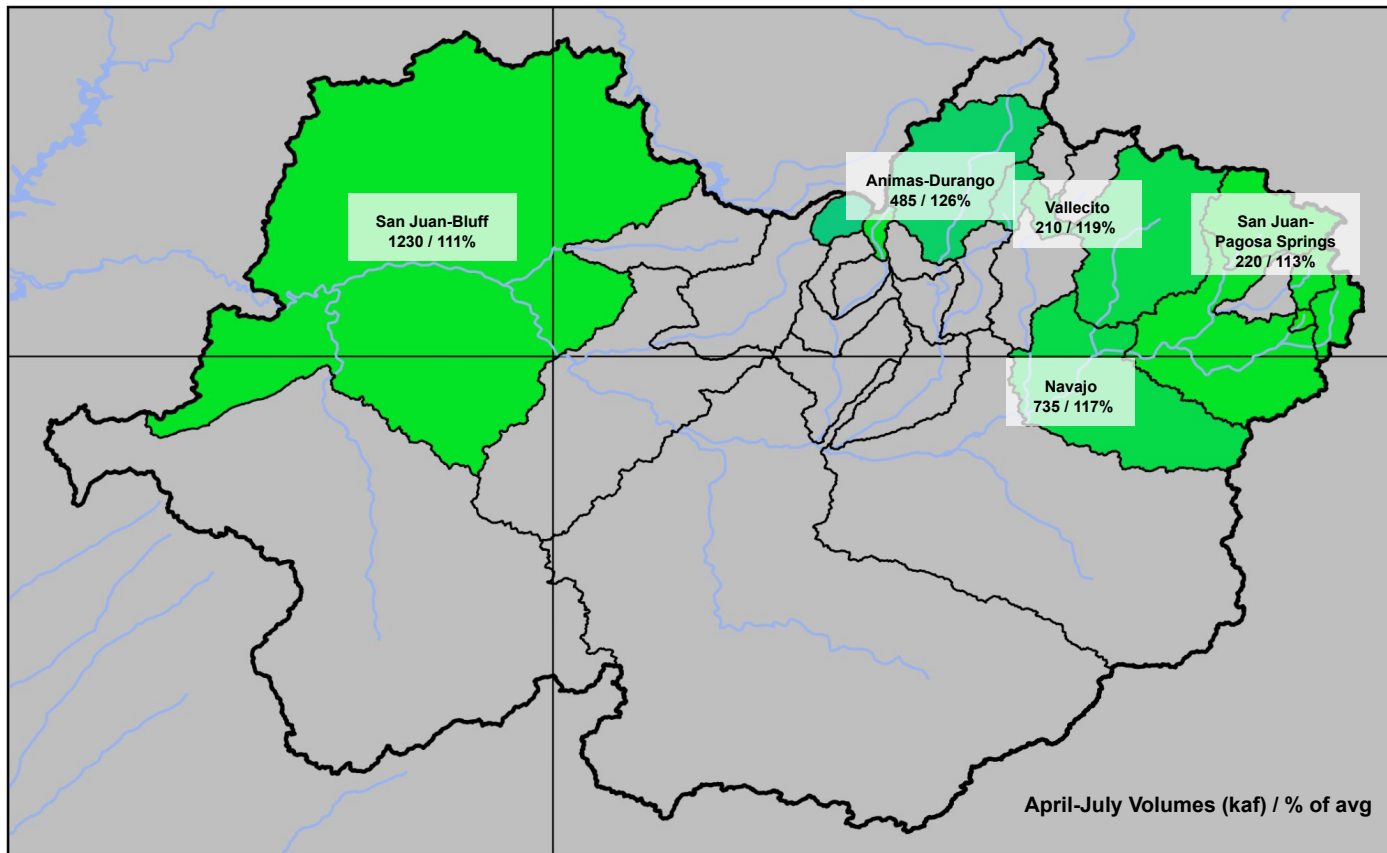
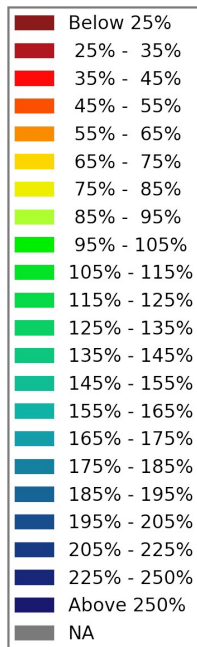
Gunnison: 85 - 150% of average (-5 - +10% change)

Dolores: 110 - 135% of average (5-15% increase)



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

**Forecast Range & (1-month Trend):**  
105 - 140% of average (10-15% increase)

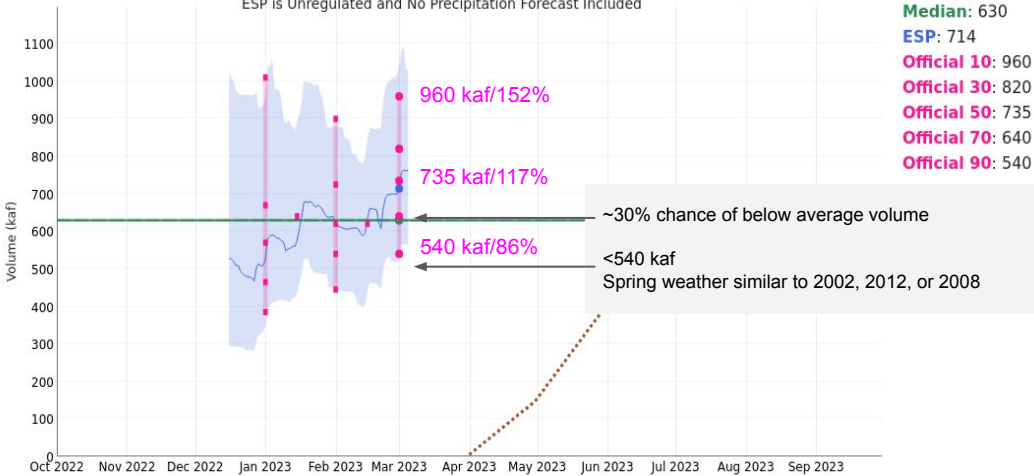




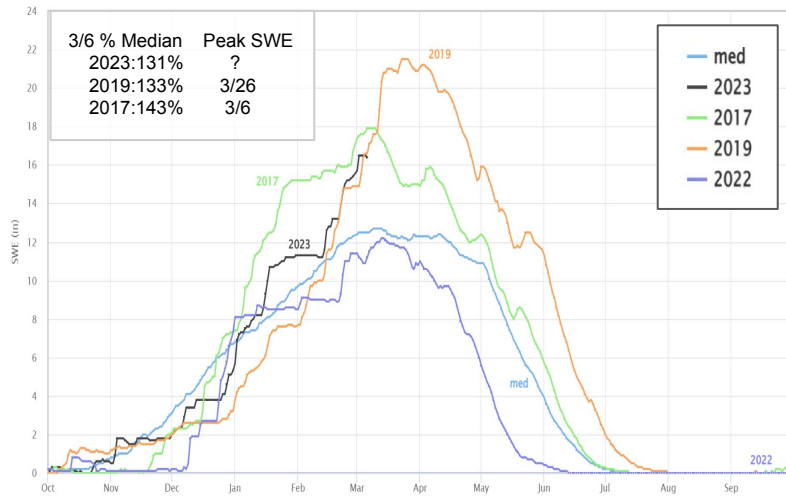
# Southwest Colorado Water Supply Forecasts & Snow Conditions

**San Juan - Navajo Reservoir, Archuleta, Nr (NVRN5)**  
 Period: Apr-Jul, Official 50% Forecast (2023-03-01): 735 kaf (117% Average, 117% Median)  
 ESP is Unregulated and No Precipitation Forecast Included

2023/03/01:  
**Average:** 630  
**Median:** 630  
**ESP:** 714  
**Official 10:** 960  
**Official 30:** 820  
**Official 50:** 735  
**Official 70:** 640  
**Official 90:** 540



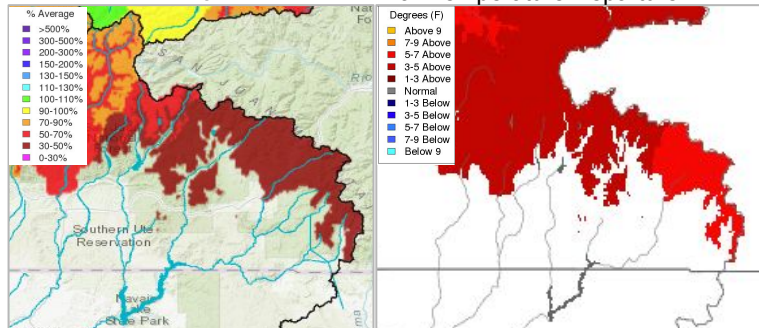
**San Juan River abv Navajo Reservoir Model Group SWE Plot**



## March 2017: Warm and Dry

Precipitation % avg

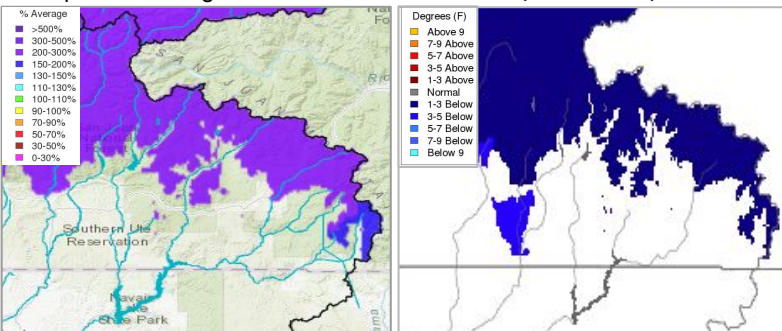
Max Temperature Departure



## March 2019: Cold and Wet

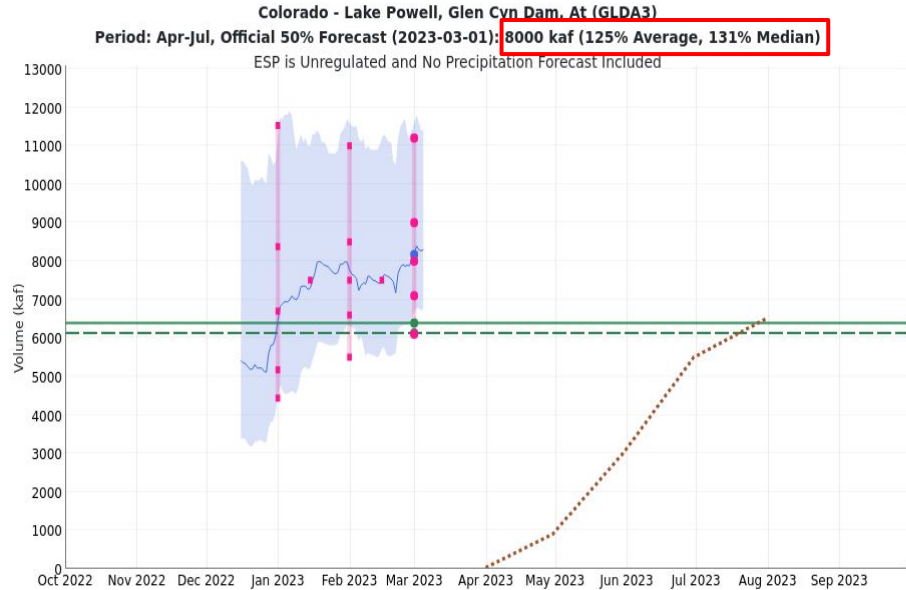
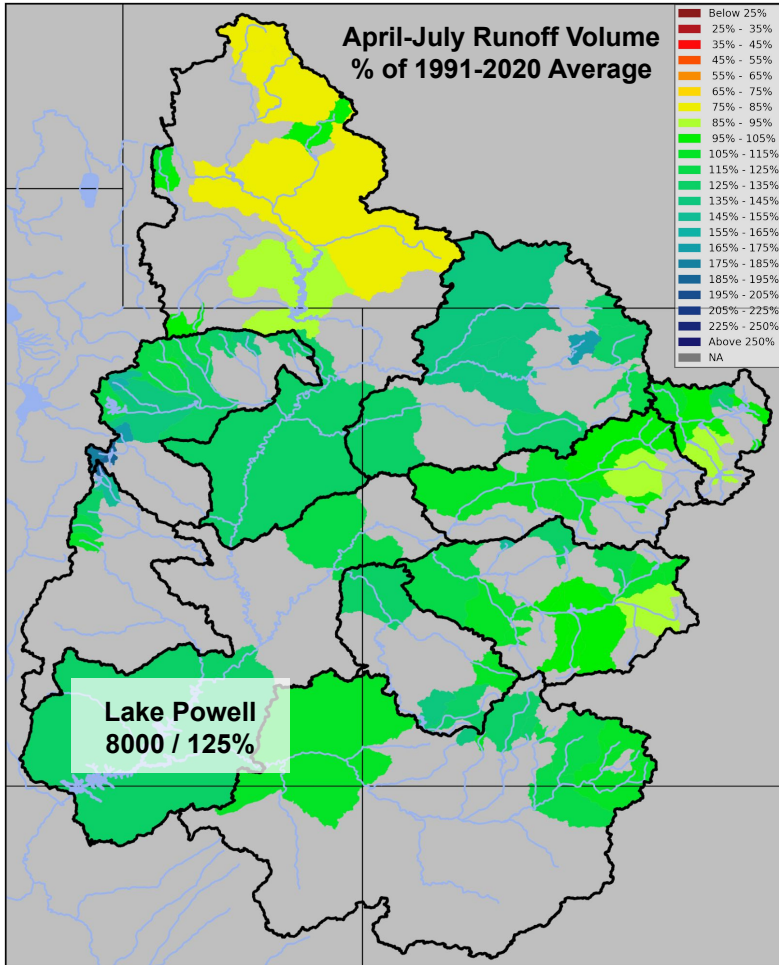
Precipitation % avg

Max Temperature Departure



March is an important month for water supply conditions.

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



2023/03/01:  
**Average:** 6390  
**Median:** 6130  
**ESP:** 8170  
**Official 10:** 11200  
**Official 30:** 9000  
**Official 50:** 8000  
**Official 70:** 7100  
**Official 90:** 6100

## Data

[Graph Data](#)

[Forecasts](#)

[Observations](#)

[Historical Volumes](#)

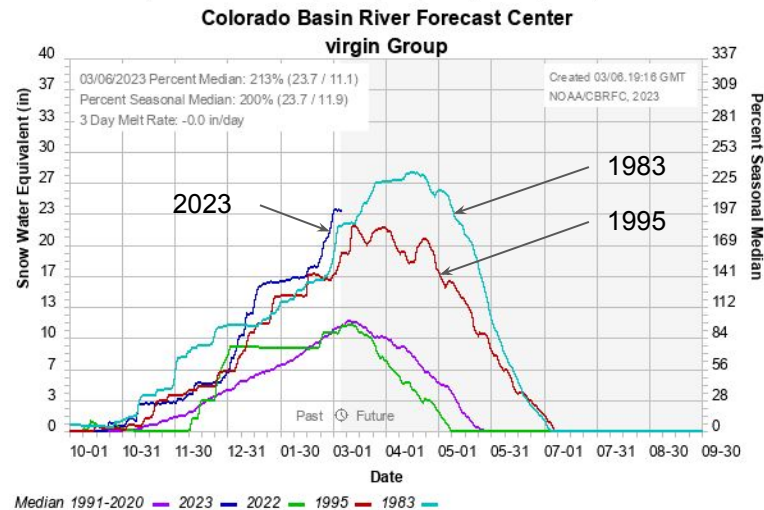
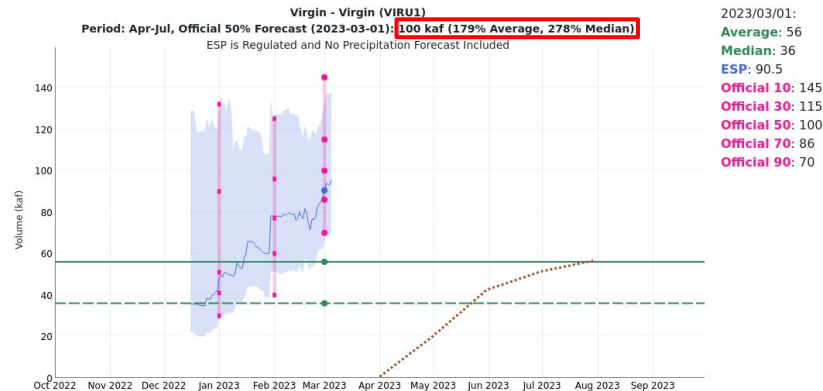
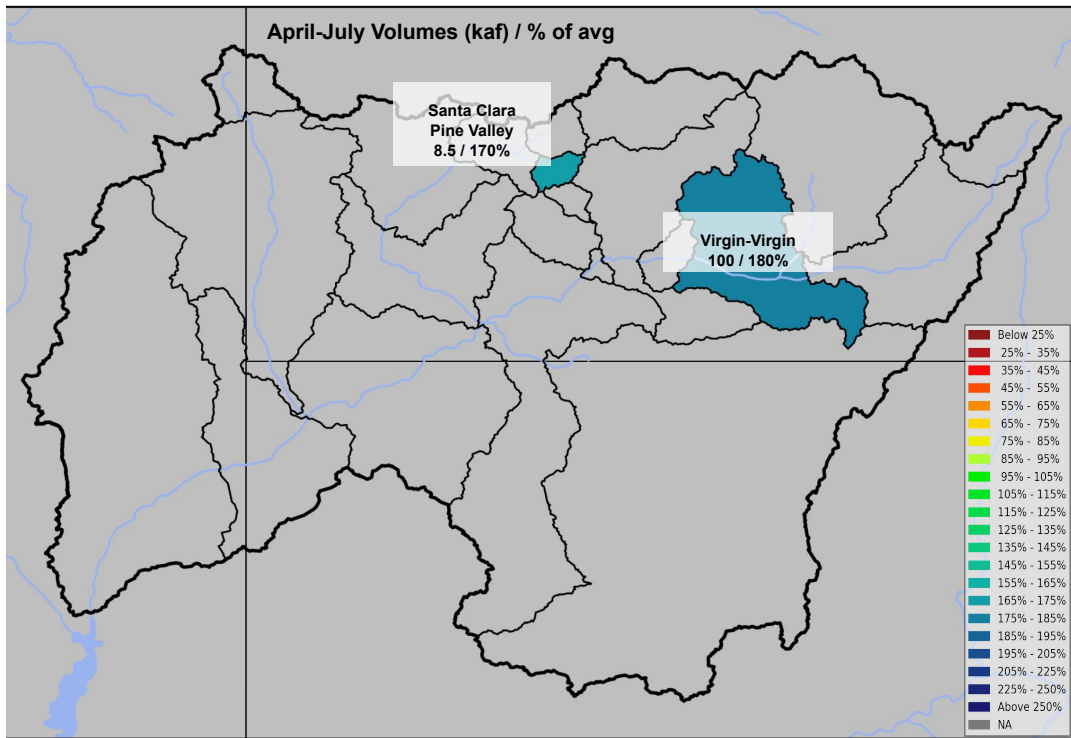
[Verification](#)

[Snow](#)

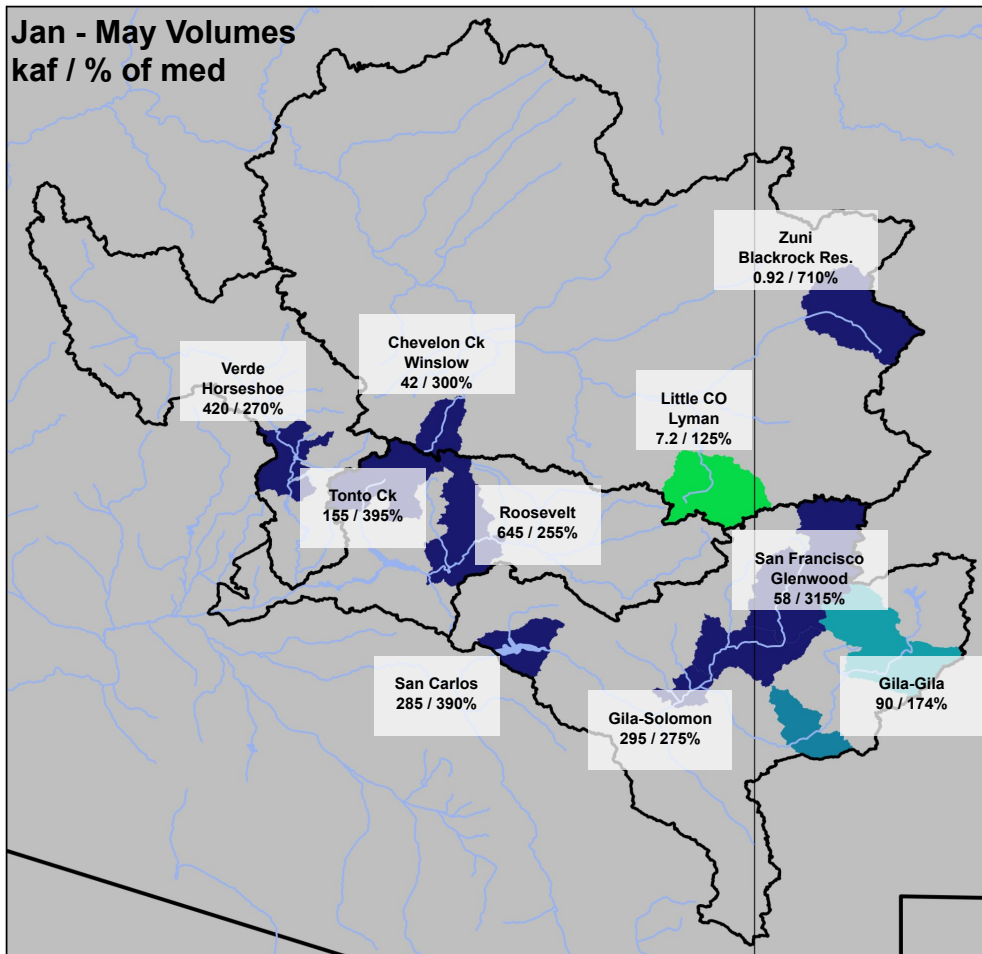
1987	7729.35		
1999	7840.89		
1971	7908.83		
2023	8000.00	FORECAST	3/2023
1969	8012.73		
2017	8173.57		
1982	8205.74		

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

**Forecast Range & (1-month Trend):**  
 170 - 180% of average (20-40% increase)



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



January - May Forecast Period  
% of 1991-2020 Median

## Forecast Ranges

**Little Colorado:** 125% - 710%

**Upper Gila:** 175% - 390%

**Salt:** 255% - 395%

**Verde:** 270%

Jan-Feb observed volumes  
generally normal to well above normal.



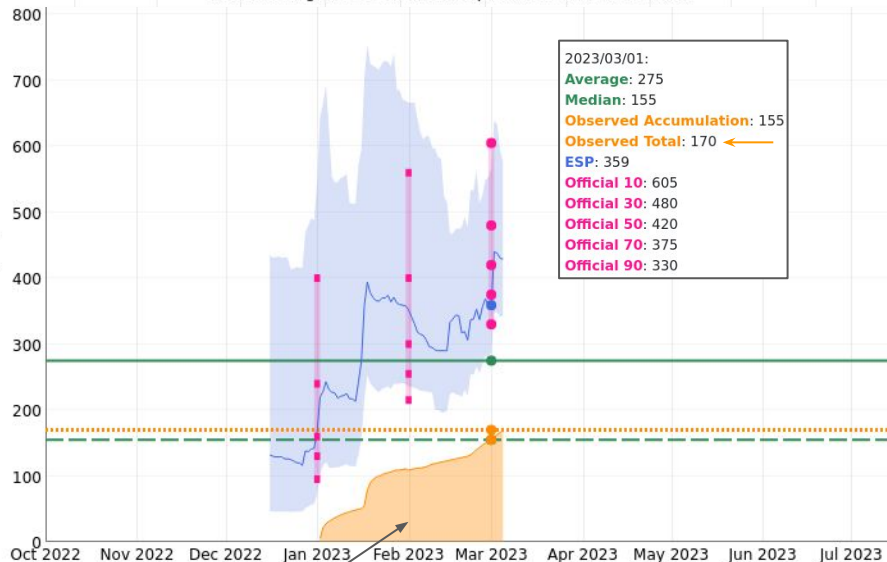
# Lower Colorado Water Supply Forecasts & Snow Conditions

SNOTEL SWE typically peaks around March 1

Verde - Tangle Ck, Blo, Horseshoe Dam, Abv (VDTA3)

Period: Jan-May, Official 50% Forecast (2023-03-01): 420 kaf (153% Average, 271% Median)

ESP is Unregulated and No Precipitation Forecast Included



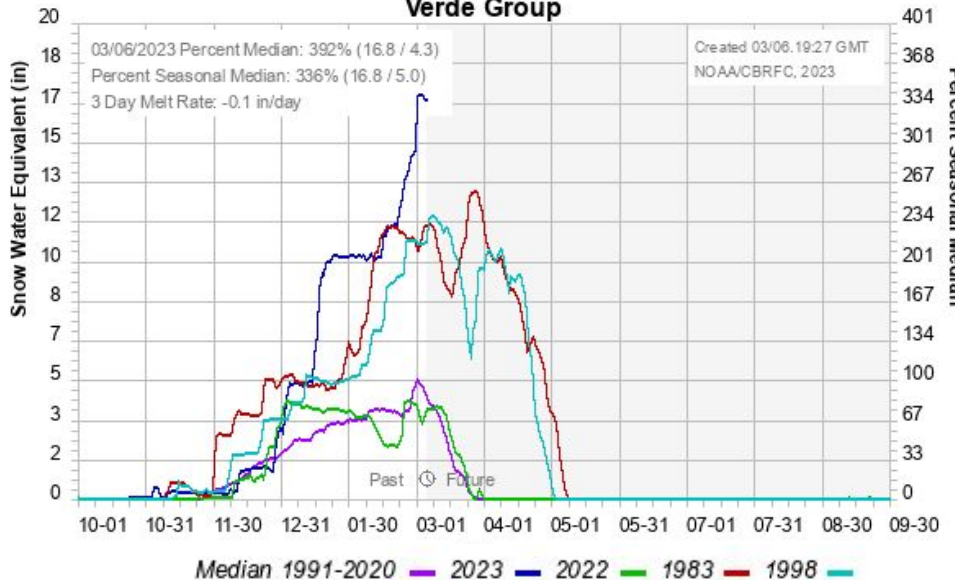
Data

- [Graph Data](#)
- [Forecasts](#)
- [Observations](#)
- [Historical Volumes](#)
- [Verification](#)
- [Snow](#)

id,espid,espped,bmon,emon,c_dtime,v1_dtime,obs,notes
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-01-02,2023-01-02, 5.151
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-01-03,2023-01-03, 21.493
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-01-04,2023-01-04, 28.045
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-03-03,2023-03-03, 162.862
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-03-04,2023-03-04, 166.299
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-03-05,2023-03-05, 170.104
VDTA3,VDTA3L_H,QCVFUZZ,1,5,2023-03-06,2023-03-06, 175.000

Colorado Basin River Forecast Center

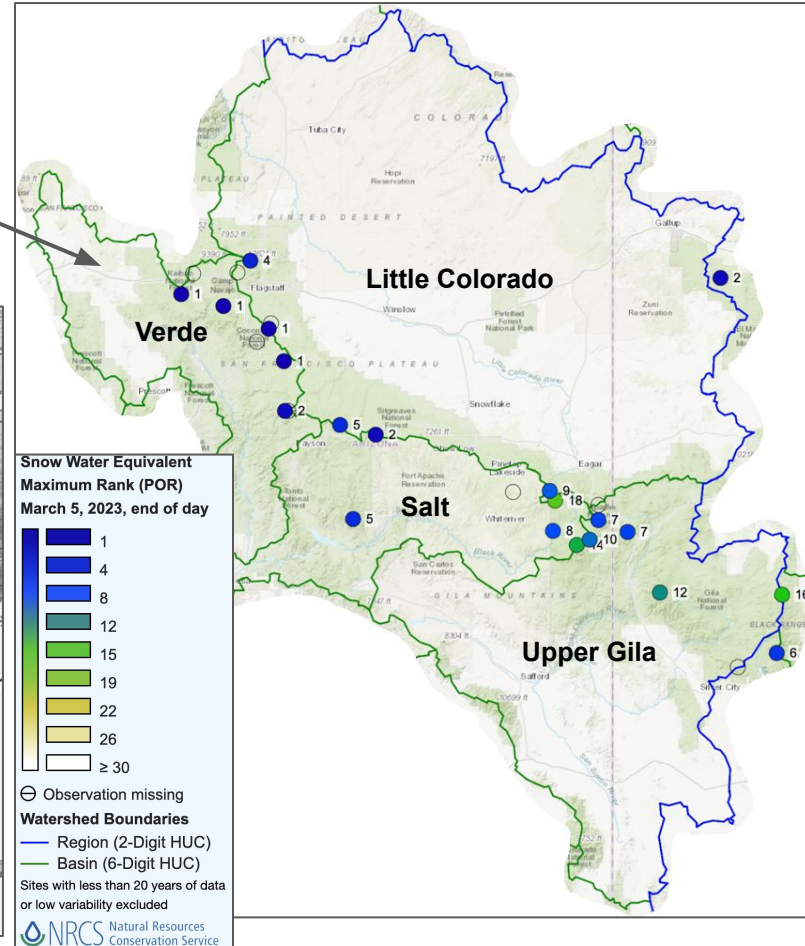
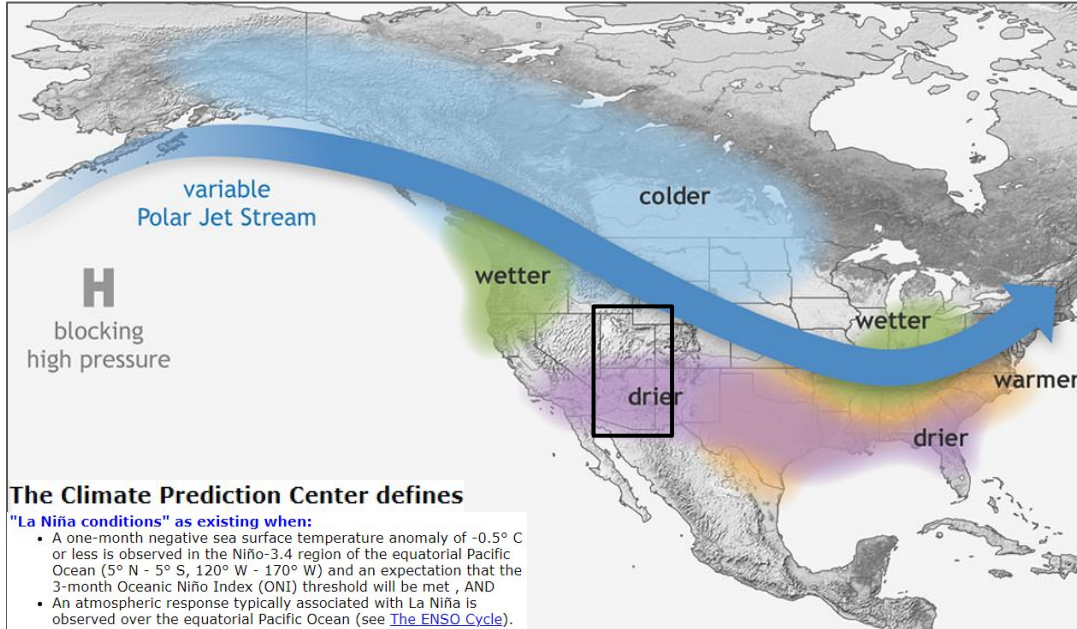
Verde Group



# El Niño Southern Oscillation (ENSO) Status & LCRB Snowpack

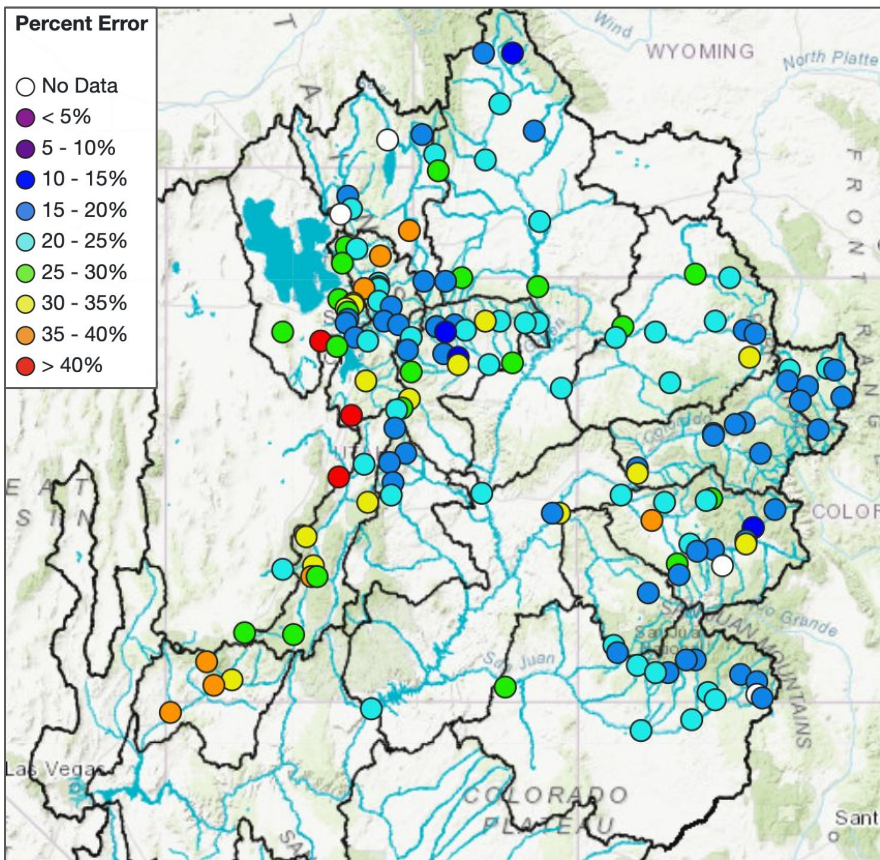
- **La Niña Advisory**
  - Sea surface temperatures weakened further during February
  - A transition from La Niña to ENSO-neutral is anticipated this Spring
- Has not been a typical La Niña winter across the LCRB
  - Near/record early March SWE conditions across parts of central AZ

## La Niña - Typical Winter Weather Pattern



# Historical Forecast Verification

## March Forecast Error: April-July Volume



### Location

### Avg Mar Forecast Error

Green River - Warren Bridge	15%
Fontenelle Reservoir	22%
Yampa River - Deerlodge	23%
Blue River - Dillon Reservoir	16%
Colorado River - Cameo	17%
Blue Mesa Reservoir (Gunnison)	18%
McPhee Reservoir (Dolores)	22%
Navajo Reservoir (San Juan)	22%
Lake Powell	24%
Virgin River at Virgin	31%

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:

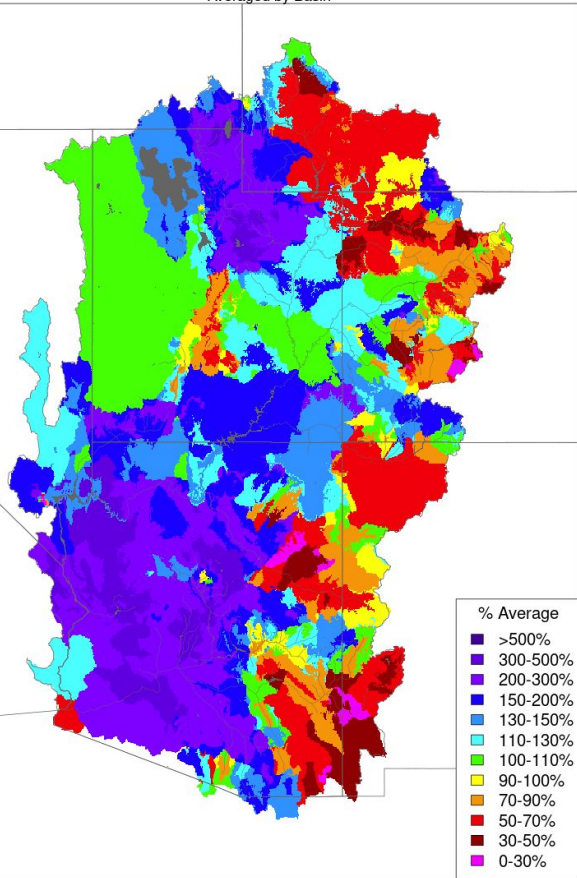
- Lower elevations (rain or early melt)
- Downstream of diversions / irrigation
- Little is known about diversions / demands

Future weather is the primary source water supply forecast error/uncertainty.



# March 2023 Precipitation (Month-To-Date)

Month to Date Precipitation - March 06 2023  
Averaged by Basin

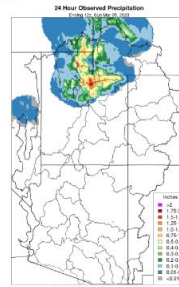


Prepared by NOAA, Colorado Basin River Forecast Center  
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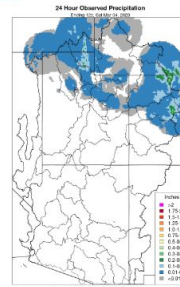
06



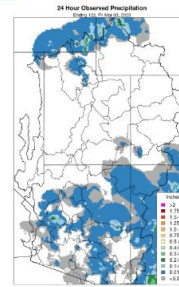
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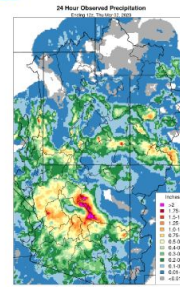
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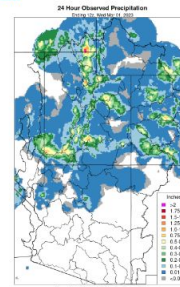
03



02



01



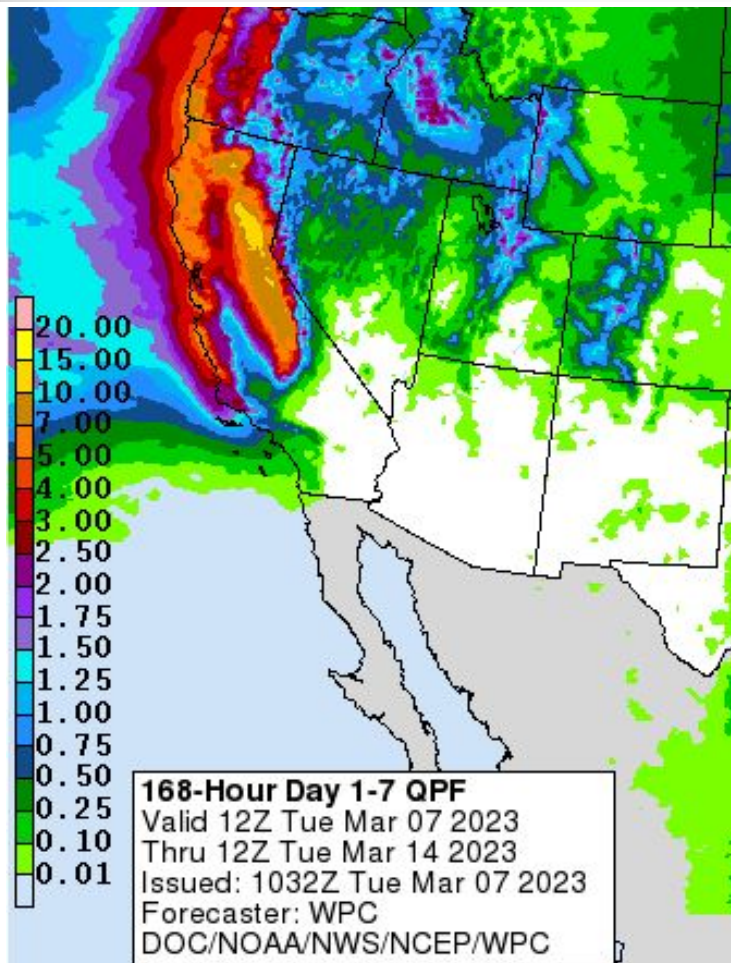
Water Year 2023 CBRFC Model SWE (Significant Runoff Areas) Percent of 1991-2020 Median			
<b>UPPER COLORADO RIVER BASIN</b>			
	<b>Mar1</b>	<b>Mar6</b>	<b>Change</b>
Above Lake Powell	135	137	2
<b>Green River Basin</b>			
Above Fontenelle	99	102	3
Above Flaming Gorge	116	120	4
Yampa/White	148	148	0
Duchesne	157	168	11
Price/San Rafael/Dirty Devil	183	184	1
<b>Colorado River Headwaters</b>			
Above Kremmling	111	108	-3
Eagle	109	107	-2
Roaring Fork	119	117	-2
Above Cameo	117	115	-2
<b>Southwest Colorado</b>			
Gunnison	133	132	-1
Dolores	157	161	4
San Juan	129	135	6
<b>LOWER COLORADO RIVER BASIN</b>			
Virgin	239	242	3
Little Colorado	342	520	178
Verde	486	925	439
Salt	175	200	25
Upper Gila	206	241	35

Active weather has continued into March.

Largest precipitation amounts / SWE gains  
-AZ / LCRB  
-Parts of northwest/southwest CO  
-Uinta Range

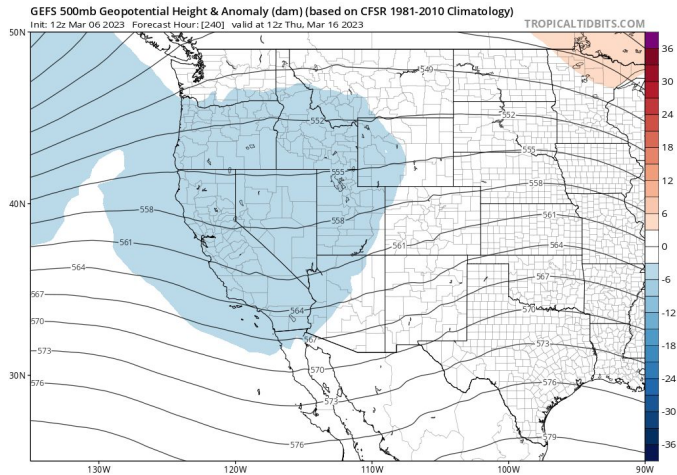


## Upcoming Weather: WPC March 7-14 Precipitation Outlook



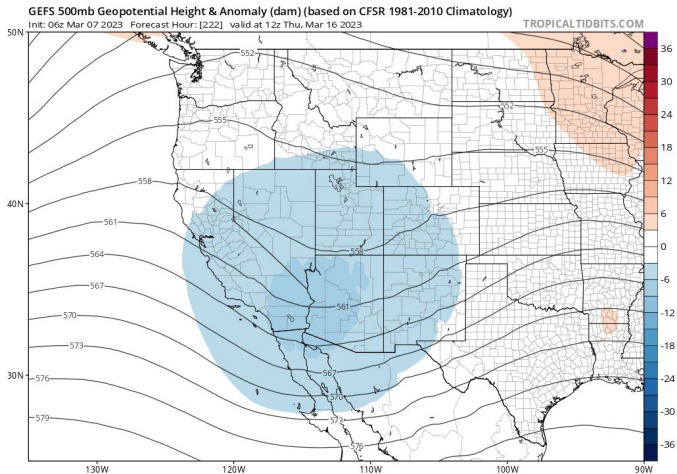
- Two shortwave troughs will move across the northern half of the Colorado River Basin this week
  - Timing: Wednesday/Thursday, and Friday/Saturday
  - Potential for an inland penetrating atmospheric river with the Friday/Saturday trough
  - Highest 7-day precipitation totals in UCRB
    - 1-2" of precipitation across higher terrain
- Ridging will take place to start next week
  - A break in precipitation
  - Warming temperatures

# Upcoming Weather: March 14-21



← Weather model run yesterday for Thursday, March 16

- Another period of troughing over the Western US is likely
  - Westerly flow will allow for troughs that move across the region to have higher moisture content
- High uncertainty in precipitation amounts and locations, as ensembles vary with trough depths and timing



← Weather model run this morning for Thursday, March 16

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

Elevated odds of above average precipitation across the Colorado River Basin.

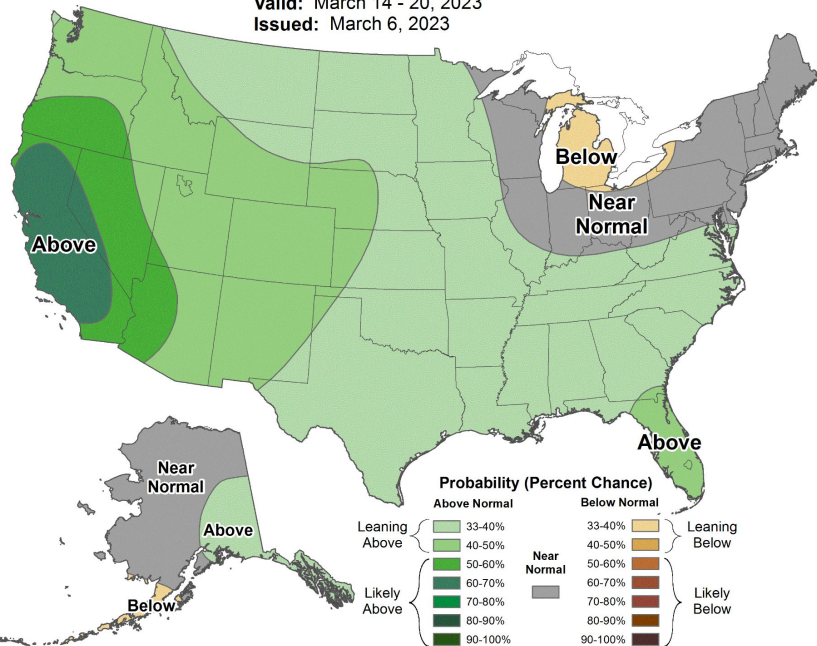
Slightly elevated odds of below average temperatures across northern basins, above average temperatures across southeastern basins.



## 8-14 Day Precipitation Outlook



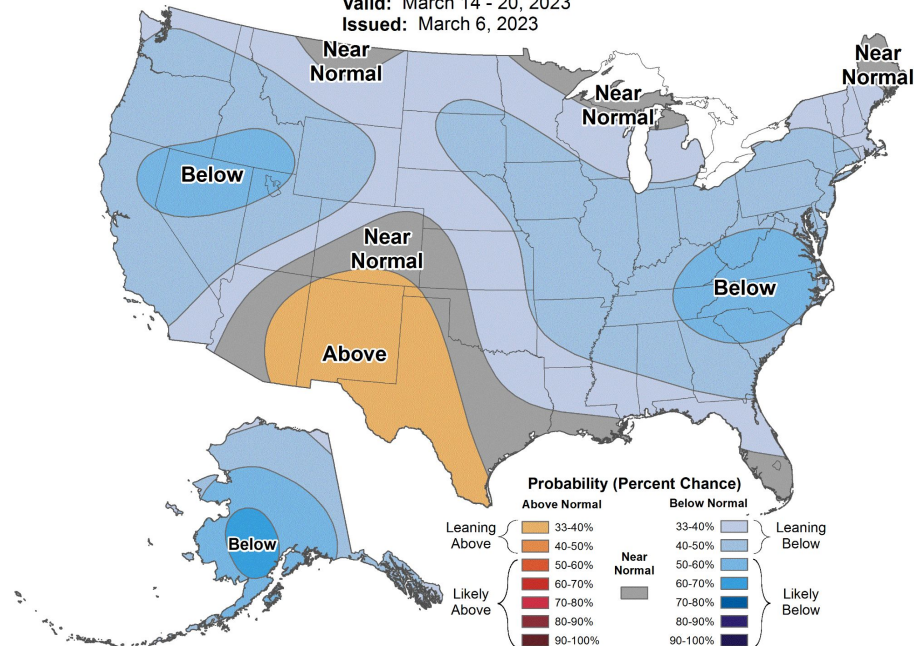
Valid: March 14 - 20, 2023  
Issued: March 6, 2023



## 8-14 Day Temperature Outlook



Valid: March 14 - 20, 2023  
Issued: March 6, 2023



# Summary

- CBRFC Model Soil Moisture Conditions
  - UCRB (Fall 2022) - near to below normal across many of the major runoff producing areas across
  - LCRB (Current) - mostly above average
- February Weather
  - Dry first half, wet last half
  - Most basins ended February with near to slightly above normal precipitation
  - Colder than normal - most precipitation fell as snow, even across much of LCRB
- Current (March 6) CBRFC Model SWE Conditions (%Normal)
  - Upper Colorado: 100-185%
  - Lower Colorado: >200%
- March Water Supply Forecasts (%Normal)
  - Upper Colorado: (Apr-Jul): 80-190%
  - Lower Colorado: (Jan-May): 125-395%
- Weather Outlook
  - Active weather pattern/precipitation expected to continue during the next two weeks



# 2023 Water Supply Webinar Schedule

*\*All Times Mountain Time (MT)*

## Colorado River Basin

Monday	<del>Jan 9<sup>th</sup></del>	<del>10 am</del>
Tuesday	<del>Feb 7<sup>th</sup></del>	<del>10 am</del>
Tuesday	Mar 7 <sup>th</sup>	10 am
Friday	Apr 7 <sup>th</sup>	10 am
Friday	May 5 <sup>th</sup>	10 am

## Utah/Great Basin

Monday	<del>Jan 9<sup>th</sup></del>	<del>11:30 am</del>
Tuesday	<del>Feb 7<sup>th</sup></del>	<del>11:30 am</del>
Tuesday	Mar 7 <sup>th</sup>	11:30 am
Friday	Apr 7 <sup>th</sup>	11:30 am
Friday	May 5 <sup>th</sup>	11:30 am

**Peak flow forecast webinar Monday, March 20<sup>th</sup>, 10 am MT**

Additional briefings scheduled as needed

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



- Home
- Rivers ▾
- Snow ▾
- Water Supply ▾
- Reservoirs ▾
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- News ▾**

- Webinars
- Email Updates

### Email Updates

**Available Email Lists**

- General Stakeholders
- USBR Water Year and MTOM Forecasts
- Lake Mead Local Forecasts
- Green River Basin Forecasts
- Upper Colorado Mainstem Forecast
- San Juan, Gunnison and Dolores River Basins Forecasts
- Weber Basin PAO
- Special forecasts for the Dolores River Basin
- Special forecasts for the San Juan River Basin
- Special forecasts for CUWCD
- Utah reservoir forecasts
- CRFS
- Eastern Great Basin Water Supply
- Upper Basin Reclamation Reservoirs

**Addition Requests**

- [Request](#) to be on one of our lists by emailing [cbrfc.webmasters@noaa.gov](mailto:cbrfc.webmasters@noaa.gov)

## CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2023

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 14 @ 10:00 am MT](#)

**Colorado River Basin Water Supply Webinars**  
[Monday, January 9 @ 10:00 am MT](#)  
[Tuesday, February 7 @ 10:00 am MT](#)  
[Tuesday, March 7 @ 10:00 am MT](#)  
[Friday, April 7 @ 10:00 am MT](#)  
[Friday, May 5 @ 10:00 am MT](#)

**Utah Water Supply Webinars**  
[Monday, January 9 @ 11:30 am MT](#)  
[Tuesday, February 7 @ 11:30 am MT](#)  
[Tuesday, March 7 @ 11:30 am MT](#)  
[Friday, April 7 @ 11:30 am MT](#)  
[Friday, May 5 @ 11:30 am MT](#)

**Peak Flow Webinar**  
[Monday, March 20 @ 10:00 am 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.

## 2023 Presentations

### 2023 Early Season Water Supply Outlook

- [Slides \(.pdf\)](#) | [Recording \(.mp4\)](#) | [YouTube](#)

### January 2023

- Colorado River Basin [Slides \(.pdf\)](#) | [Recording \(.mp4\)](#) | [YouTube](#)
- Utah / Great Basin [Slides \(.pdf\)](#) | [Recording \(.mp4\)](#) | [YouTube](#)

# CBRFC Contacts & WY23 Basin Focal Points

## **Basin Focal Points (Forecasters)**

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<https://www.cbrfc.noaa.gov/present/present.php>

