

Colorado River Basin Water Supply Briefing

January 8, 2024



Colorado Basin
River Forecast Center
National Weather Service



Presentation Overview

Precipitation Review

Soil Moisture Conditions

Snowpack Conditions

2024 Water Supply Forecasts

Early Season Forecast Error

Upcoming Weather

Contacts & Questions

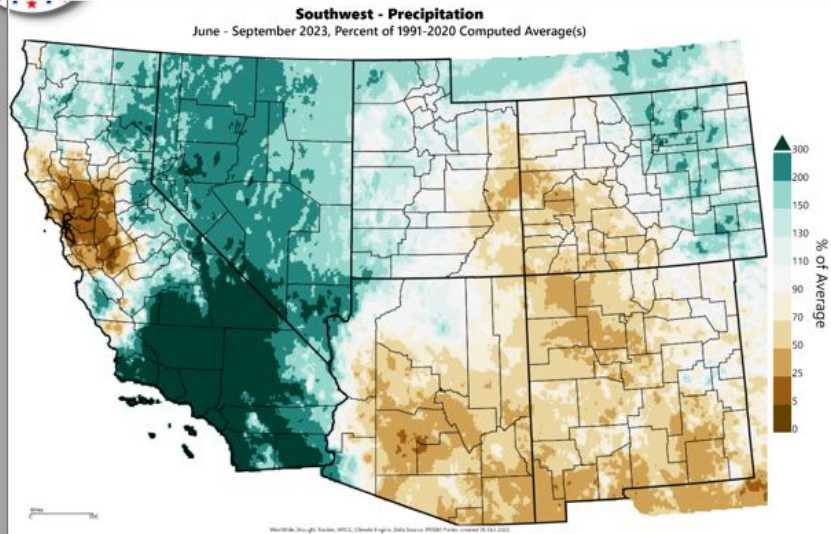
**Webinar recording & slides will be
made available on CBRFC webpage.**

2023 Monsoon Summary



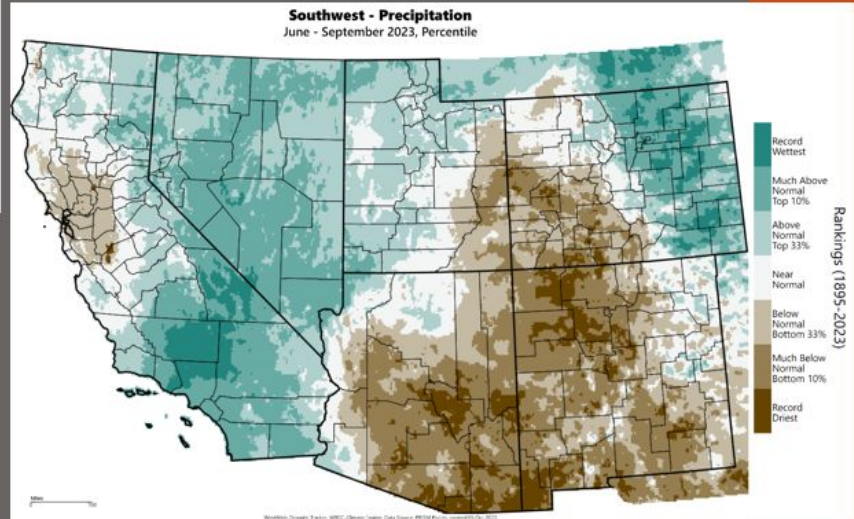
June-September 2023 Precipitation

Sources:
NWS
azwater.gov

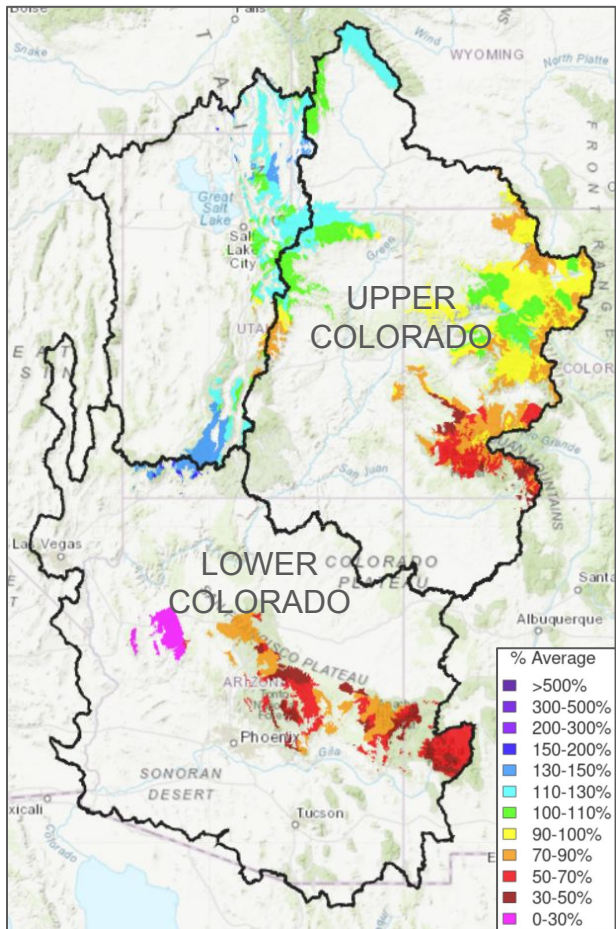


- With the exception of far western and northern Arizona, Monsoon 2023 was much drier than normal
- Much of the southeast half of the state received less than 50% of normal monsoon rainfall

- Summer rainfall was equally spotty and/or absent across the Upper Colorado basin
- Similar to southern Arizona, much of eastern Utah and western Colorado ranked in the lowest 1/3 of historical summer rainfall



Fall 2023 Hydrologic Model Soil Moisture Conditions



The map shows the model soil moisture conditions from the lower soil zone in CBRFC's hydrologic model, and is a result of past hydrologic conditions including but not limited to:

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

CBRFC hydrologic model soil moisture is adjusted (if necessary) every fall after irrigation season has ended and before winter.

Data used to make adjustments:

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

Soil Moisture Impacts on Water Supply / Runoff

Above normal soil moisture conditions → positive impact (increased runoff efficiency)

Below normal soil moisture conditions → negative impact (decreased runoff efficiency)

Colorado River Basin: near to below normal; improves from south to north

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

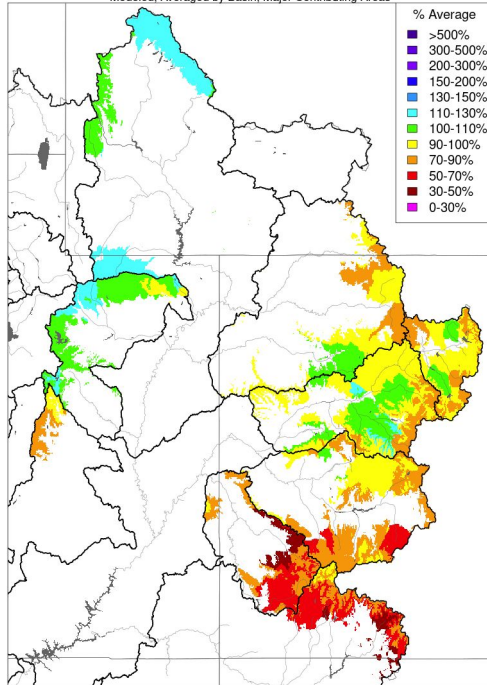
UCRB Fall Model Soil Moisture Conditions: 2023 vs. 2022

Northern basins: near/above average soil moisture, better/similar compared to last year

Southern basins: below average soil moisture, worse compared to last year

Soil Moisture - Fall - 2023 (November 15)

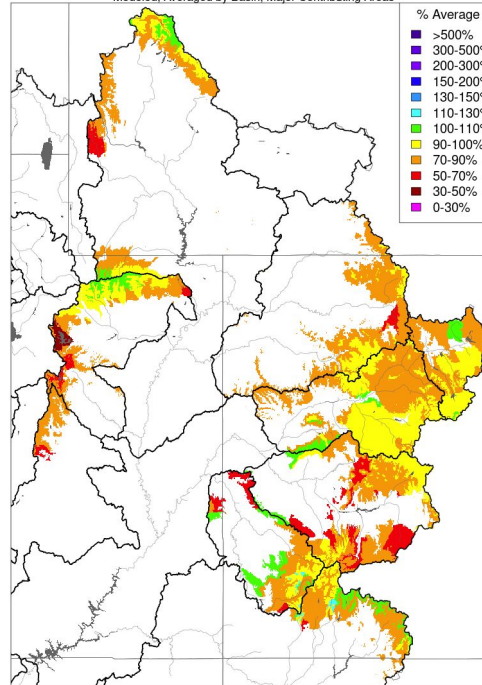
Modeled, Averaged by Basin, Major Contributing Areas



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

Soil Moisture - Fall - 2022 (November 02)

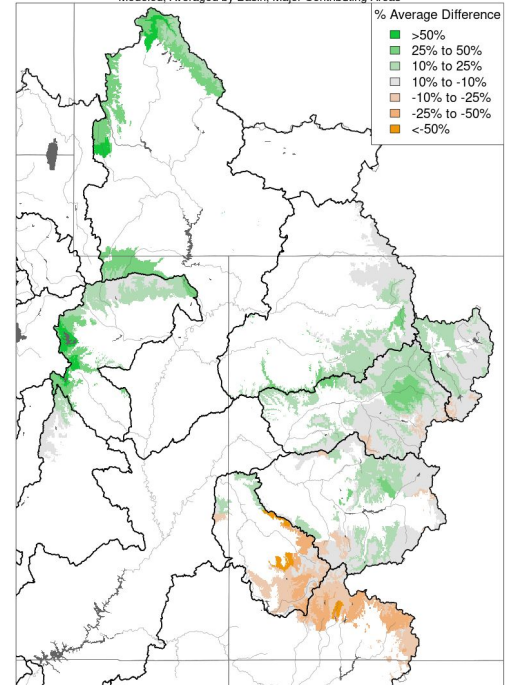
Modeled, Averaged by Basin, Major Contributing Areas



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

Soil Moisture - Fall - 2023 vs 2022

Modeled, Averaged by Basin, Major Contributing Areas



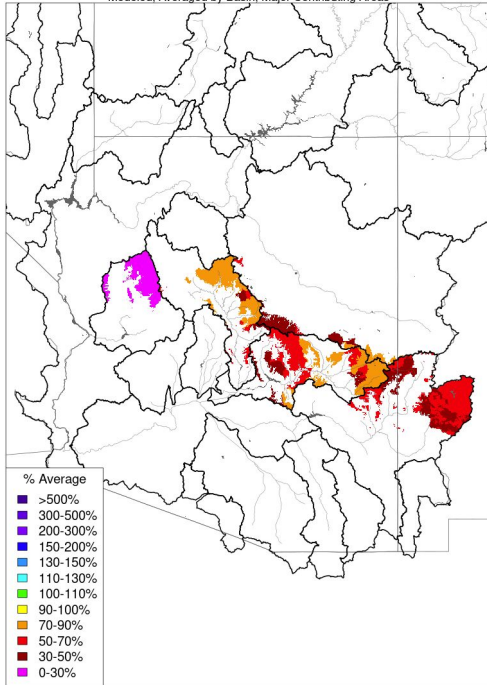
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

LCRB Fall Model Soil Moisture Conditions: 2023 vs. 2022

Below normal soil moisture conditions that are worse compared to a year ago.
Due to a much drier than normal Southwest monsoon season.

Soil Moisture - Fall - 2023 (November 15)

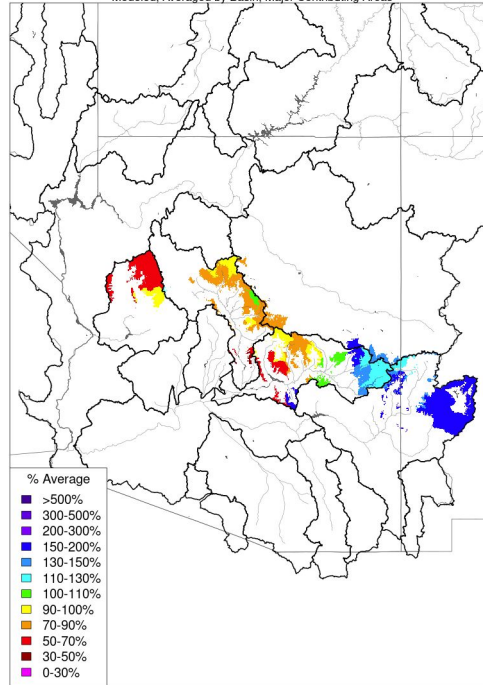
Modeled, Averaged by Basin, Major Contributing Areas



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

Soil Moisture - Fall - 2022 (November 02)

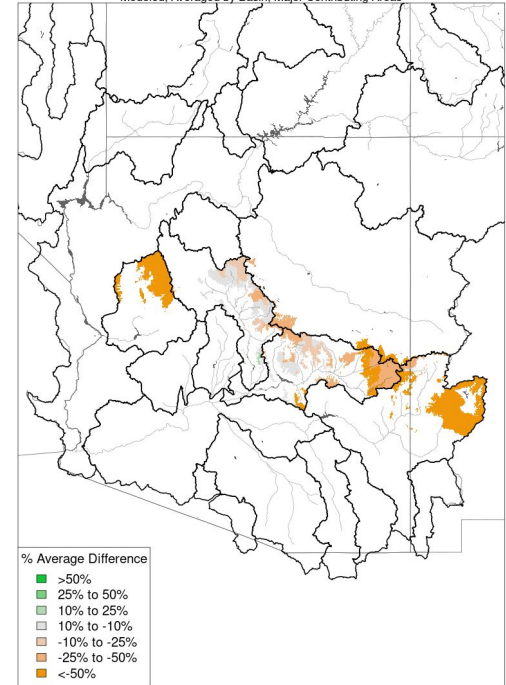
Modeled, Averaged by Basin, Major Contributing Areas



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

Soil Moisture - Fall - 2023 vs 2022

Modeled, Averaged by Basin, Major Contributing Areas

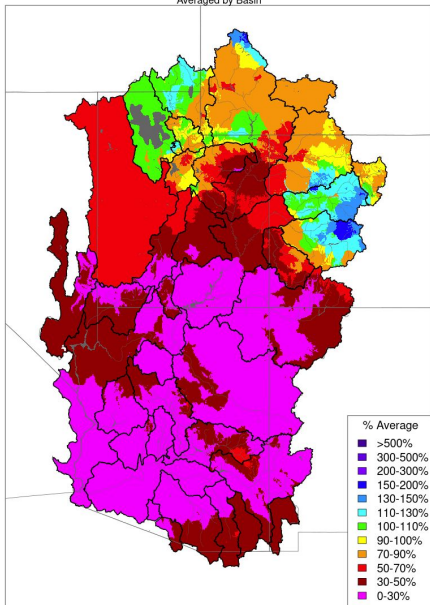


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Water Year 2024 (October-December) Monthly Precipitation Summary

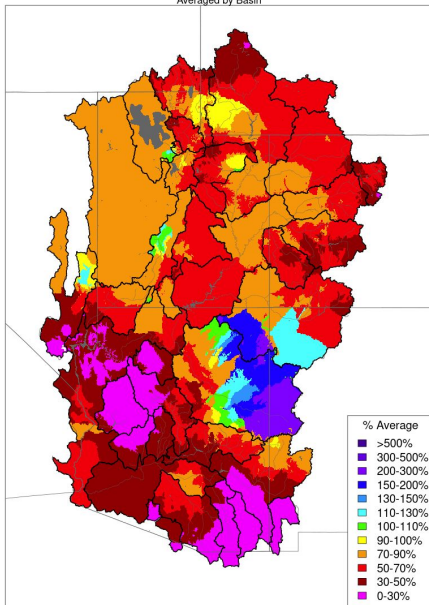
Below average start to Water Year 2024

Monthly Precipitation - October 2023
Averaged by Basin



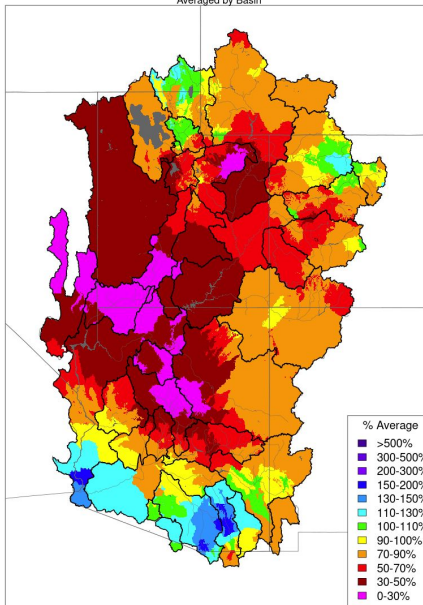
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Monthly Precipitation - November 2023
Averaged by Basin



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

Monthly Precipitation - December 2023
Averaged by Basin



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

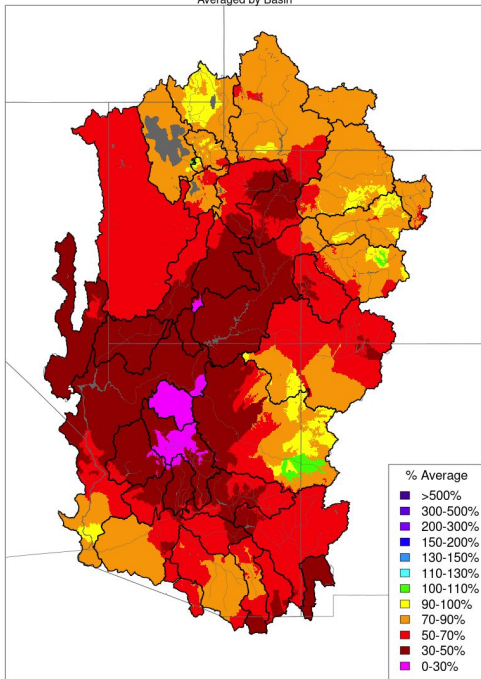
Water Year 2024
CBRFC Precipitation (Major Contributing Areas)
Percent of 1991-2020 Average

UPPER COLORADO RIVER BASIN				
	Oct	Nov	Dec	Oct-Dec
Above Lake Powell	92	56	76	74
Green River Basin				
Above Fontenelle	125	38	76	76
Above Flaming Gorge	108	47	81	77
Yampa/White	96	57	99	83
Duchesne	77	52	53	61
Price/San Rafael/Dirty Devil	77	60	72	70
Colorado River Headwaters				
Above Kremmling	93	45	90	75
Eagle	137	53	83	87
Roaring Fork	135	66	73	88
Above Cameo	116	56	82	82
Southwest Colorado				
Gunnison	113	59	73	81
Dolores	61	57	67	62
San Juan	46	57	70	58
LOWER COLORADO RIVER BASIN				
Virgin	26	77	19	40
Little Colorado	28	81	43	50
Verde	26	42	31	33
Salt	32	68	60	54
Upper Gila	28	67	82	59

Water Year 2024 (October - December) Precipitation

Water year precipitation can be used as a good indicator of early season water supply conditions, and is below average across the CRB.

Water Year Precipitation, October 2023 - December 2023
Averaged by Basin



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

Water Year 2024 CBRFC Precipitation (Major Contributing Areas) Percent of 1991-2020 Average				
UPPER COLORADO RIVER BASIN				
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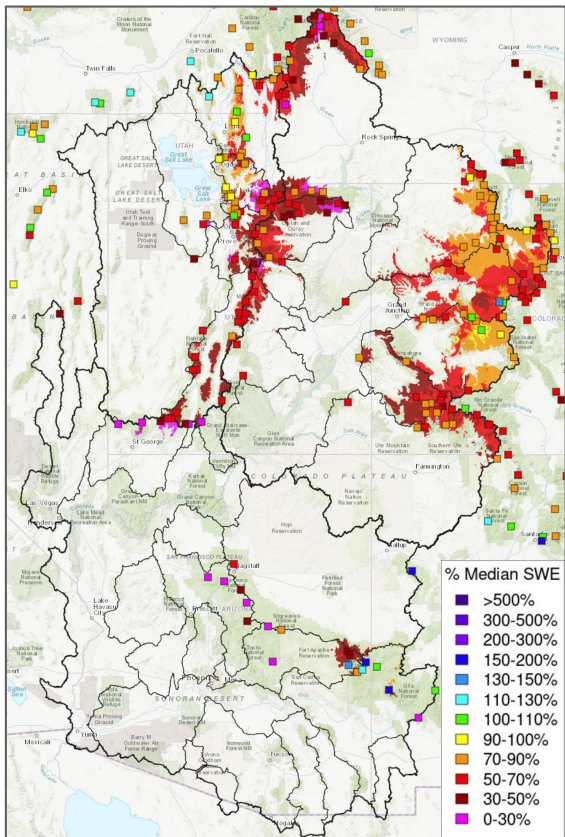
UCRB
60-90%

LCRB
35-60%

Snowpack Conditions

January 1 SWE Conditions

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



SWE = Snow Water Equivalent
The amount water in snow.

Water Year 2024
CBRFC Model SWE (Major Contributing Areas)
Percent of 1991-2020 Median

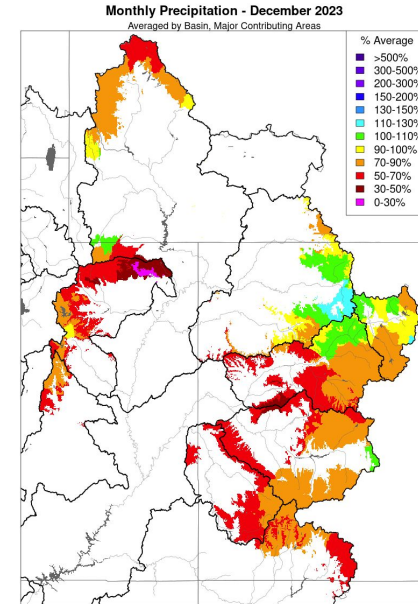
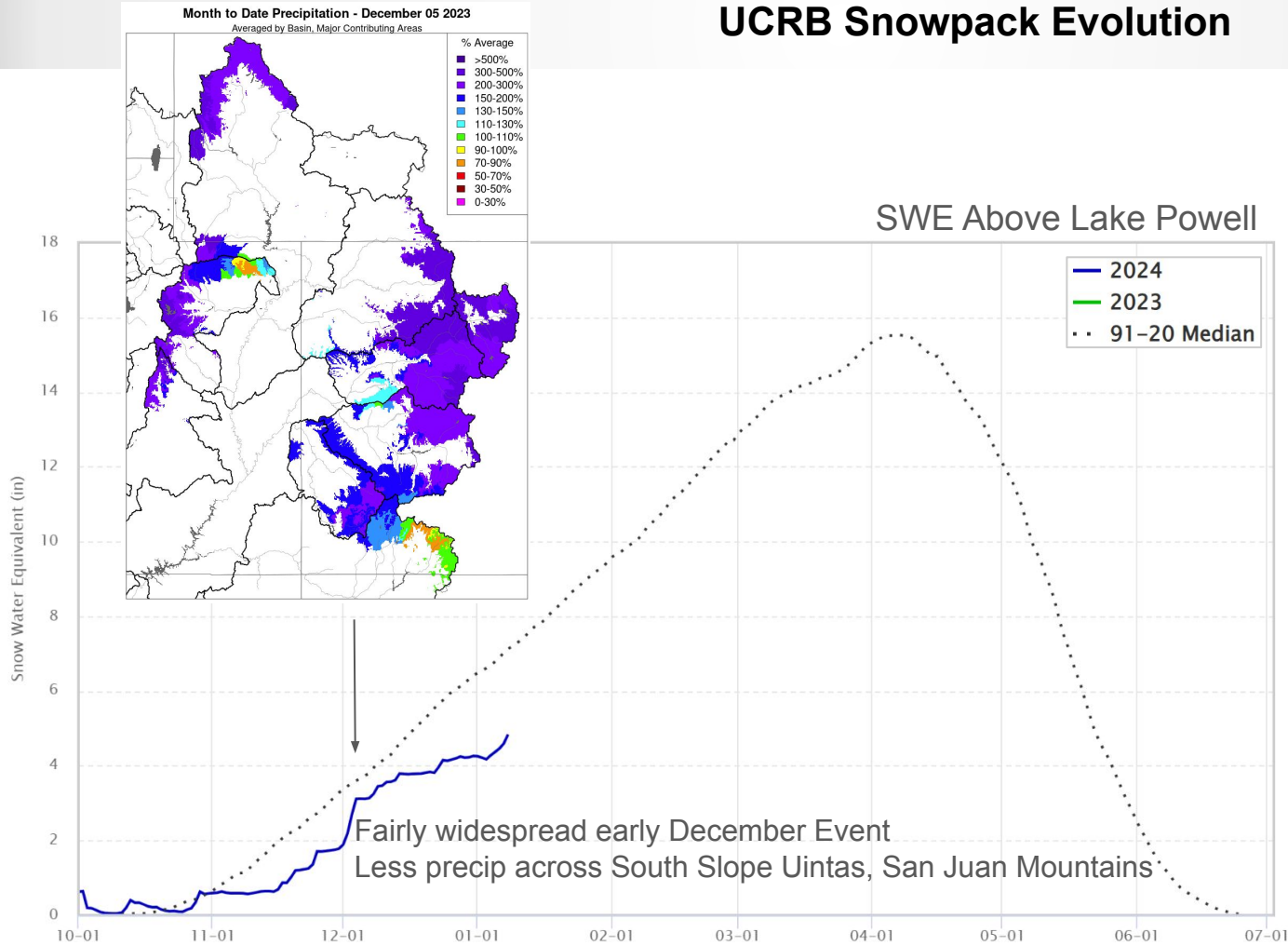
UPPER COLORADO RIVER BASIN	
Jan1	
Above Lake Powell	60
Green River Basin	
Above Fontenelle	49
Above Flaming Gorge	53
Yampa/White	71
Duchesne	42
Price/San Rafael/Dirty Devil	54
Colorado River Headwaters	
Above Kremmling	66
Eagle	68
Roaring Fork	69
Above Cameo	68
Southwest Colorado	
Gunnison	66
Dolores	52
San Juan	53
LOWER COLORADO RIVER BASIN	
Virgin	11
Little Colorado	6
Verde	0
Salt	33
Upper Gila	32

Colorado River Basin
January 1 SWE conditions
below to well below normal.

UCRB
40-70%

LCRB
0-35%

UCRB Snowpack Evolution

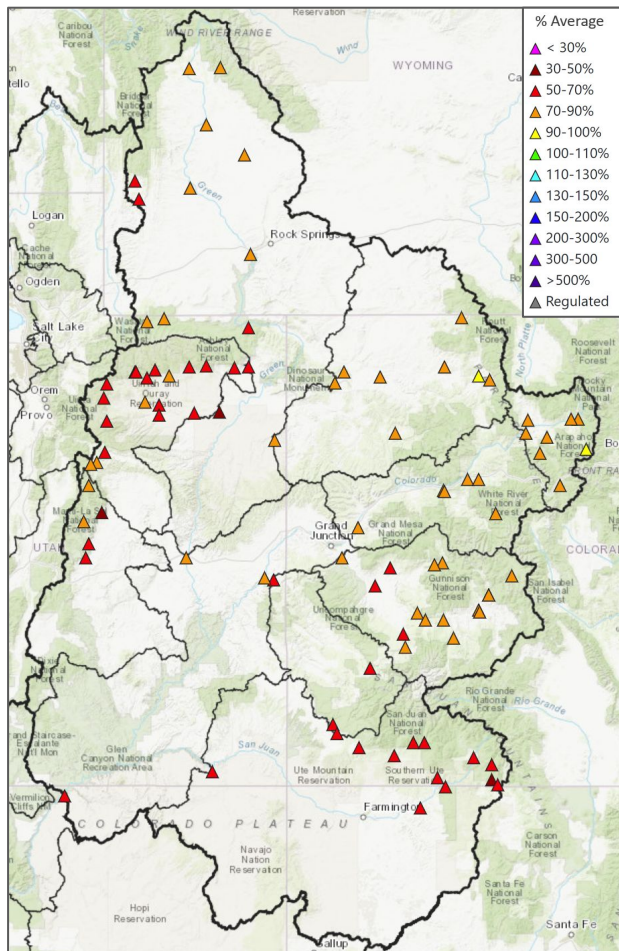


UCRB Water Supply Forecasts: Overview

UCRB April-July volume forecasts are below to well below normal.

Forecasts are more favorable in areas that have:

- better soil moisture conditions
- better snowpack conditions



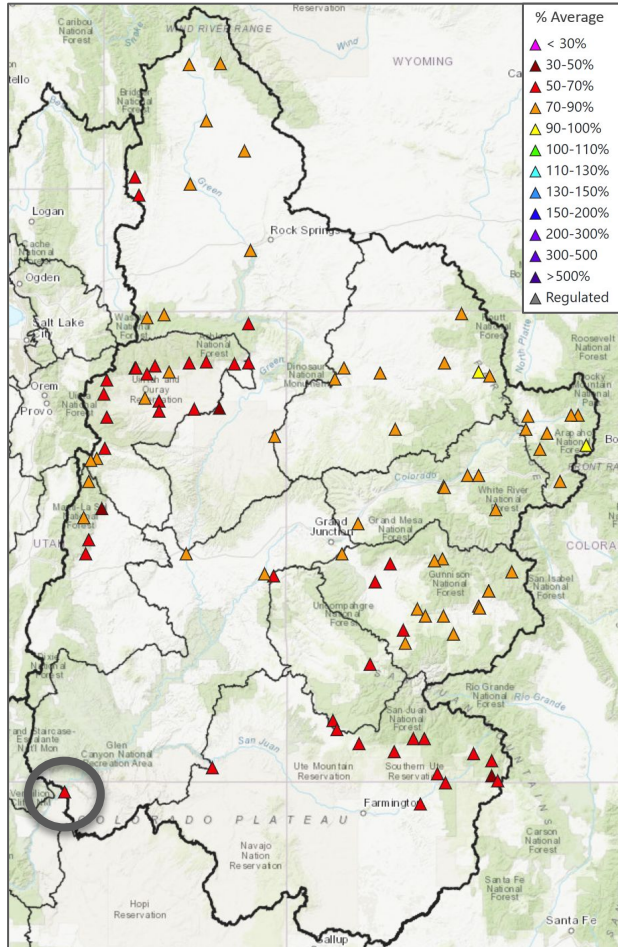
**Colorado Basin River Forecast Center Water Supply Forecasts
January 1, 2024**

UPPER COLORADO RIVER BASIN			
Basin	Volume (KAF)	%Normal (1991-2020)	Period
Lake Powell			
Lake Powell	4200	66	Apr-Jul
Green River Basin			
Green-Flaming Gorge Reservoir	675	70	Apr-Jul
Yampa-Deerlodge	1030	87	Apr-Jul
Duchesne-Tabiona	73	71	Apr-Jul
Colorado River Headwaters			
Colorado-Kremmling	710	82	Apr-Jul
Eagle-Gypsum	265	79	Apr-Jul
Roaring Fork-Glenwood Springs	520	79	Apr-Jul
Colorado-Cameo	1840	81	Apr-Jul
Southwest Colorado			
Gunnison-Blue Mesa Reservoir	490	77	Apr-Jul
Dolores-McPhee Reservoir	145	57	Apr-Jul
San Juan-Navajo Reservoir	375	60	Apr-Jul
Animas-Durango	265	69	Apr-Jul

KAF = thousand acre-feet

Lake Powell Water Supply Forecast

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



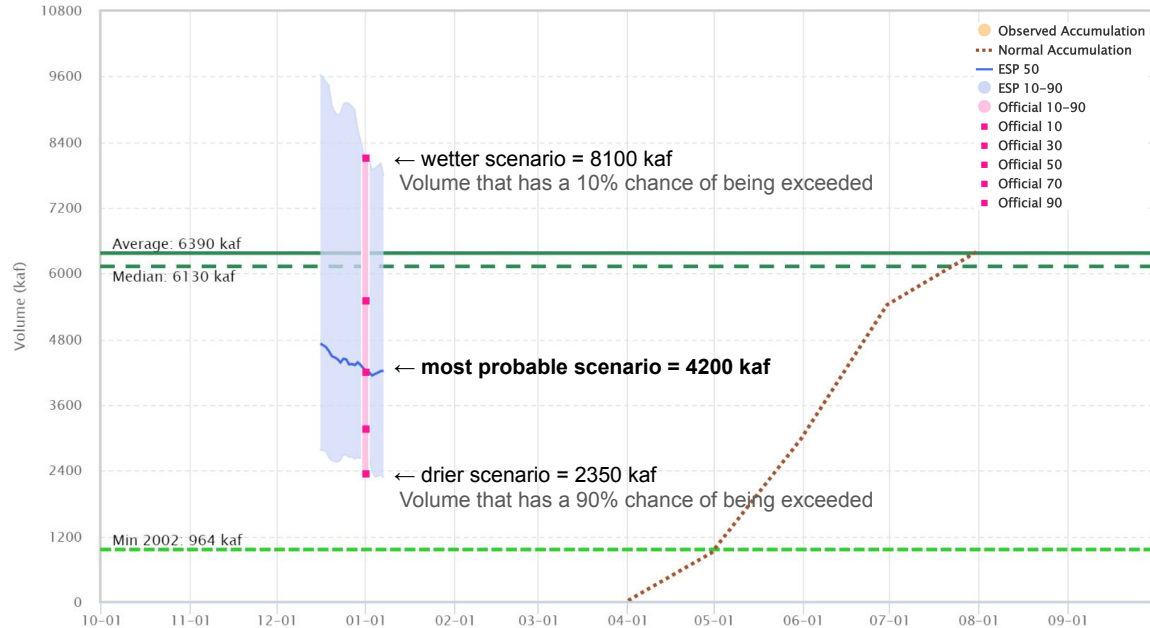
2024 Water Supply Forecast – Colorado – Lake Powell, Glen Cyn Dam, At (GLDA3)

ESP is Unregulated and No Precipitation Forecast Included

Official 50% Forecast (2024-01-01): 4200 kaf (66% Average, 69% Median), (23% of Years below forecast, 47 Highest Flow / 60 Total Years)

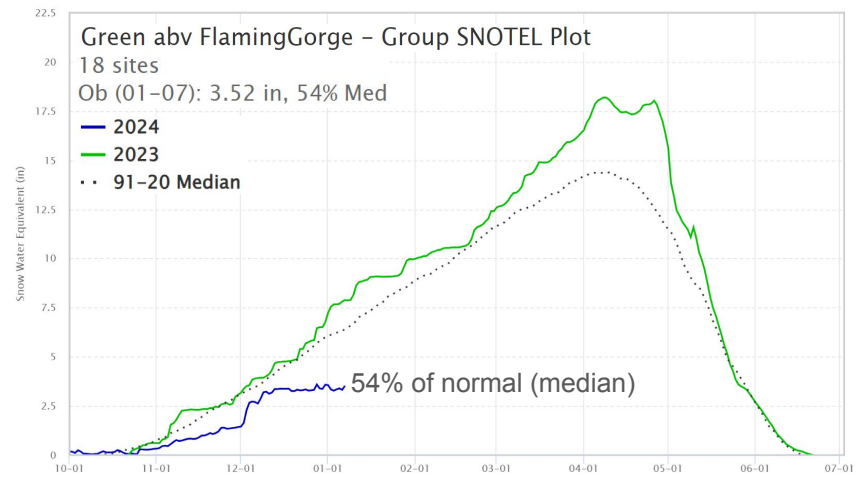
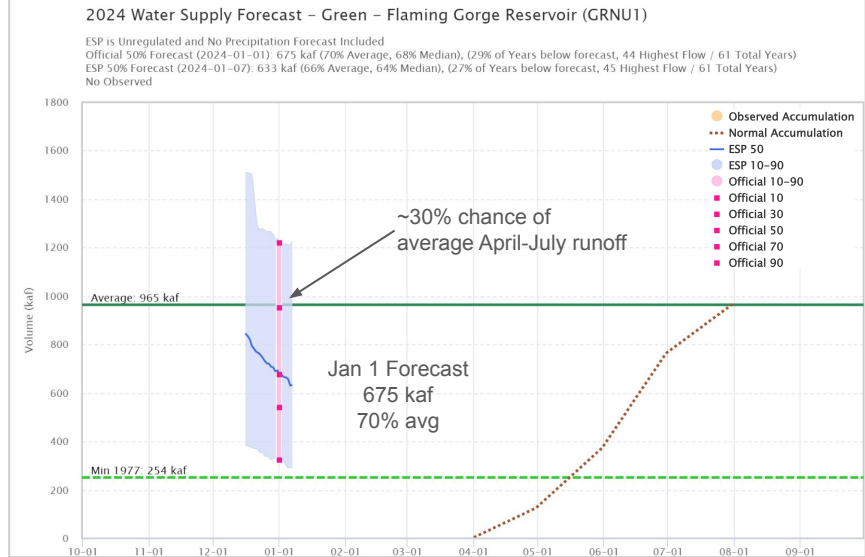
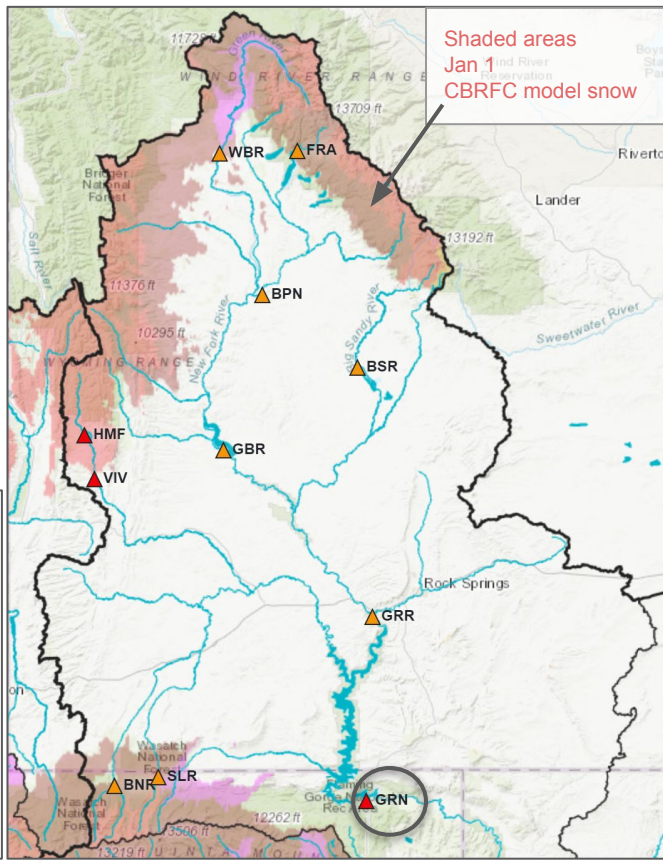
ESP 50% Forecast (2024-01-07): 4225 kaf (66% Average, 69% Median), (23% of Years below forecast, 47 Highest Flow / 60 Total Years)

No Observed



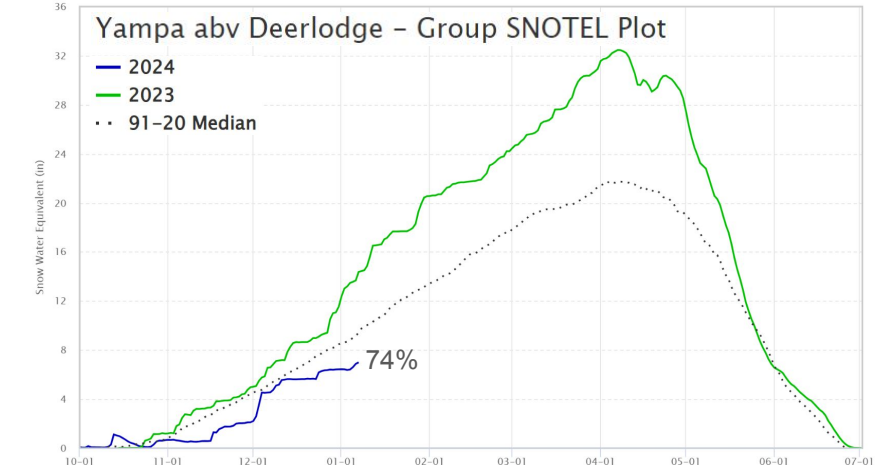
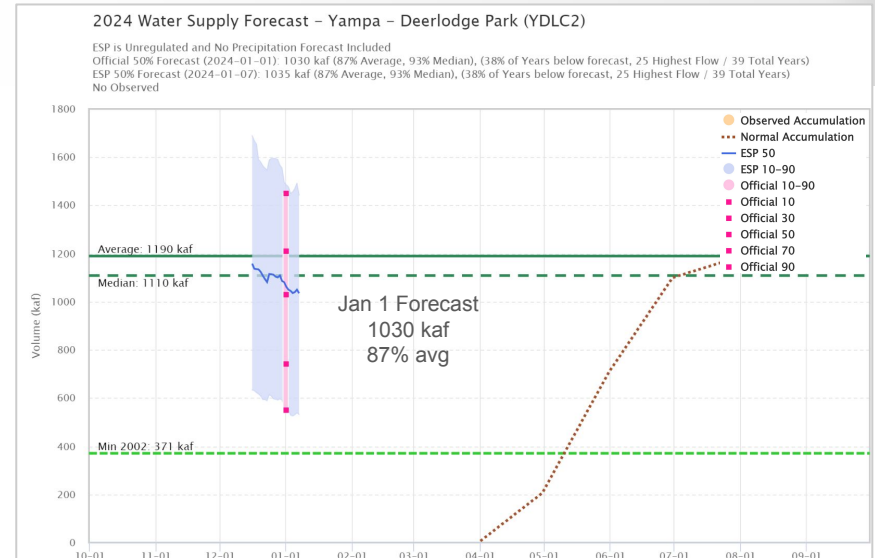
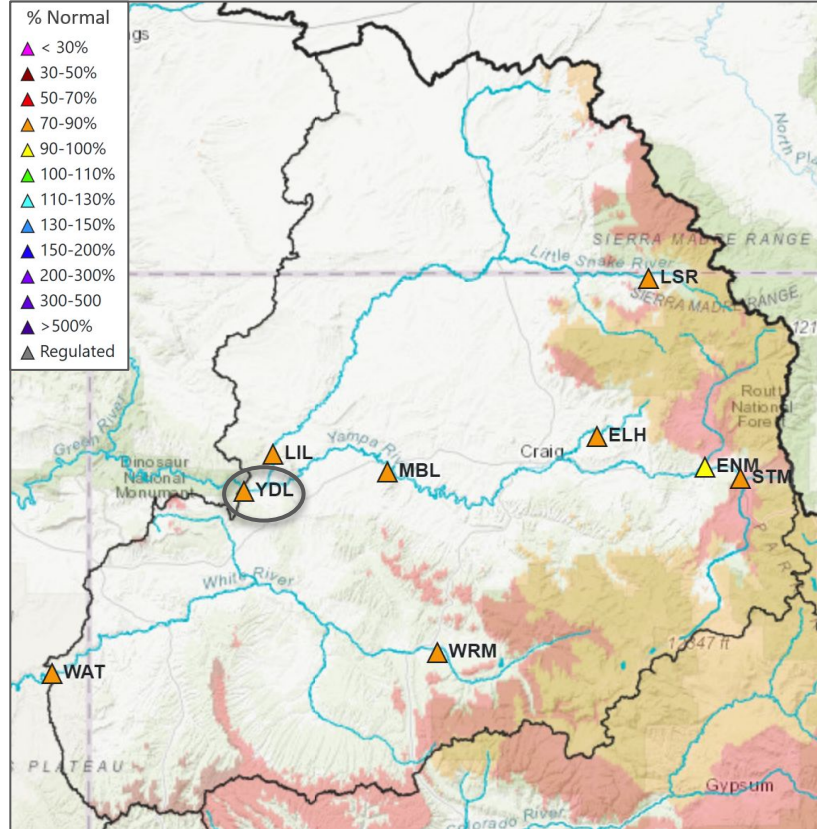
Upper Green River Basin

Forecast Range: 70-80%



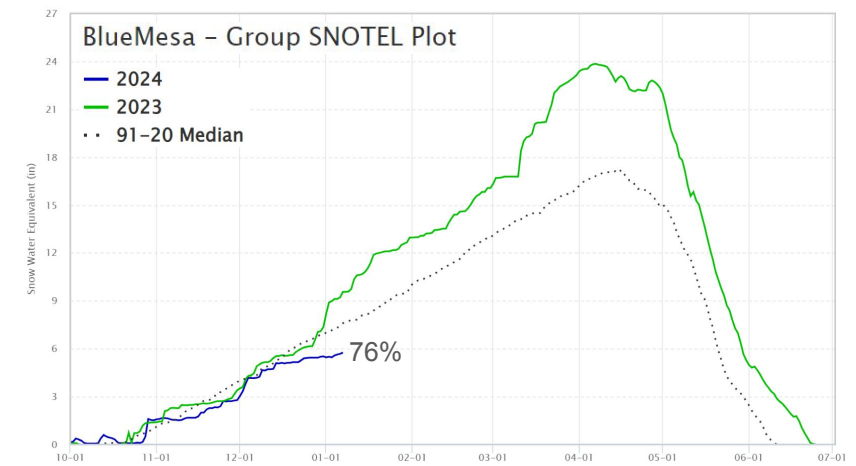
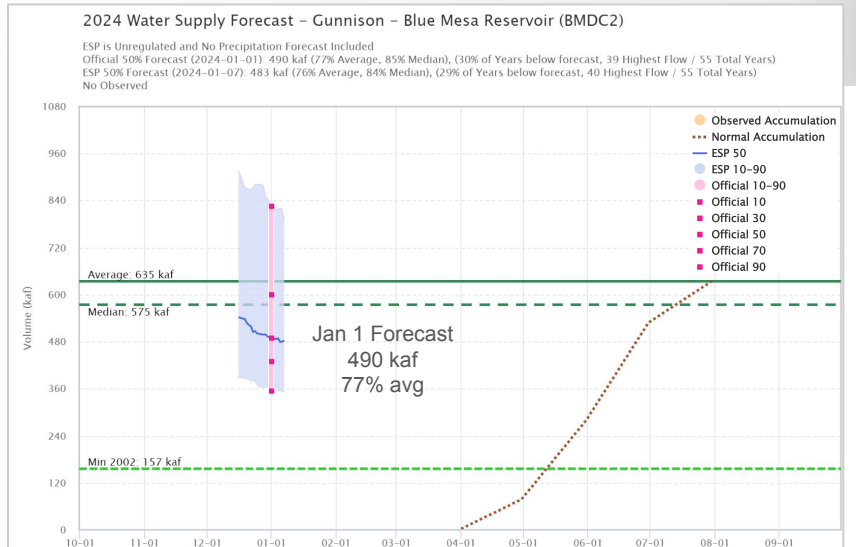
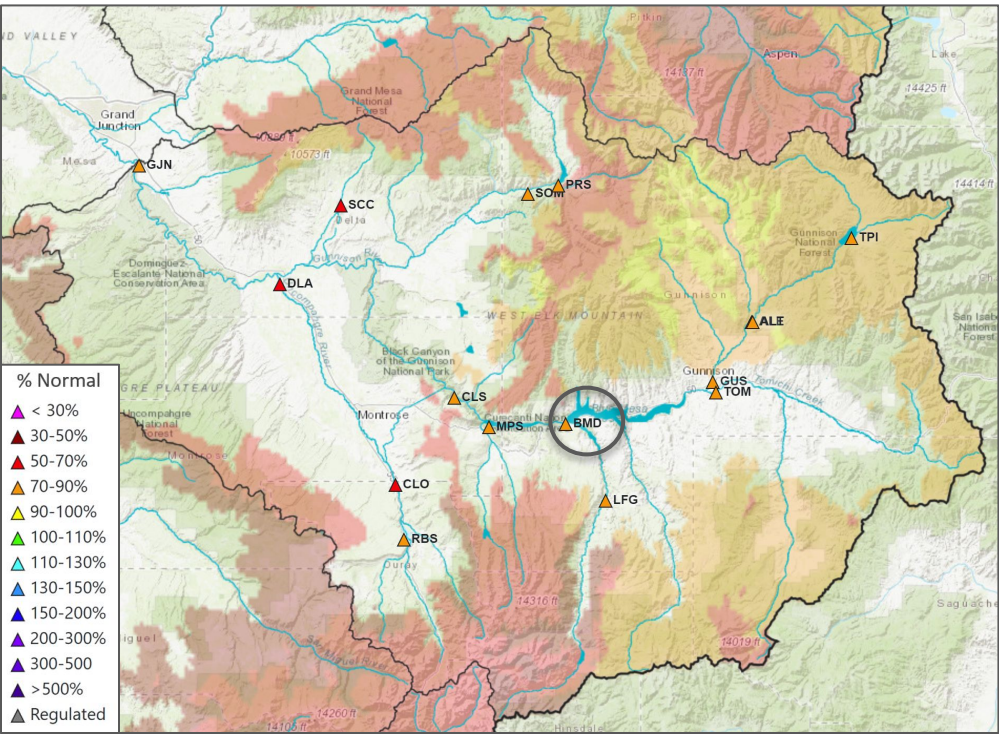
White/Yampa River Basin

Forecast Range: 70-80%



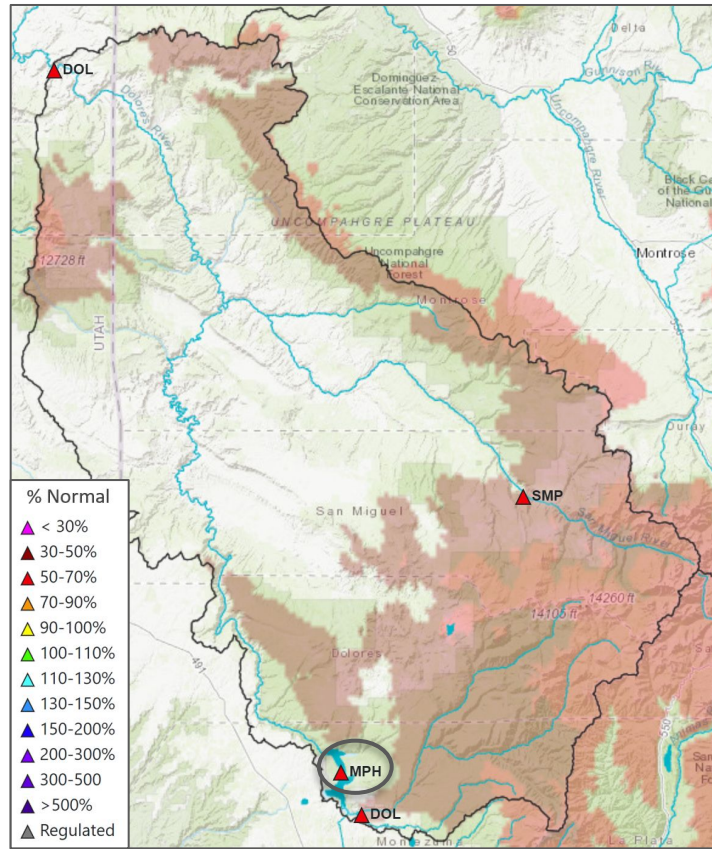
Gunnison River Basin

Forecast Range: 55-80%



Dolores River Basin

Forecast Range: 55-70%

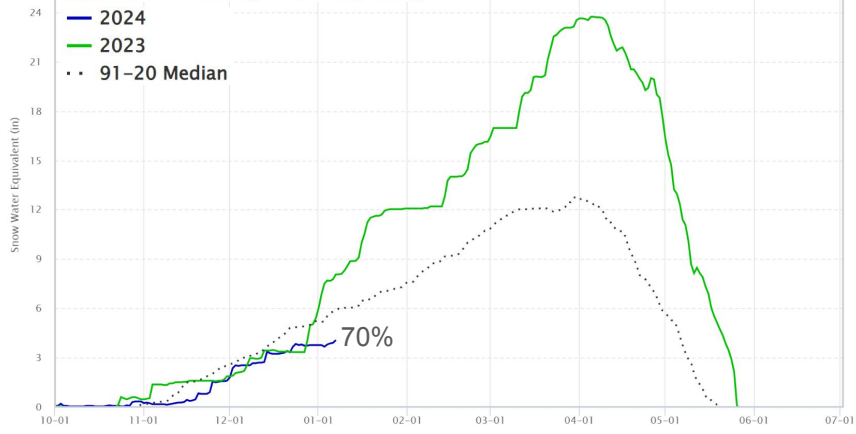


2024 Water Supply Forecast – Dolores – McPhee Reservoir (MPHC2)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Forecast (2024-01-01): 145 kaf (57% Average, 62% Median), (20% of Years below forecast, 35 Highest Flow / 43 Total Years)
 ESP 50% Forecast (2024-01-07): 143 kaf (56% Average, 61% Median), (18% of Years below forecast, 36 Highest Flow / 43 Total Years)
 No Observed

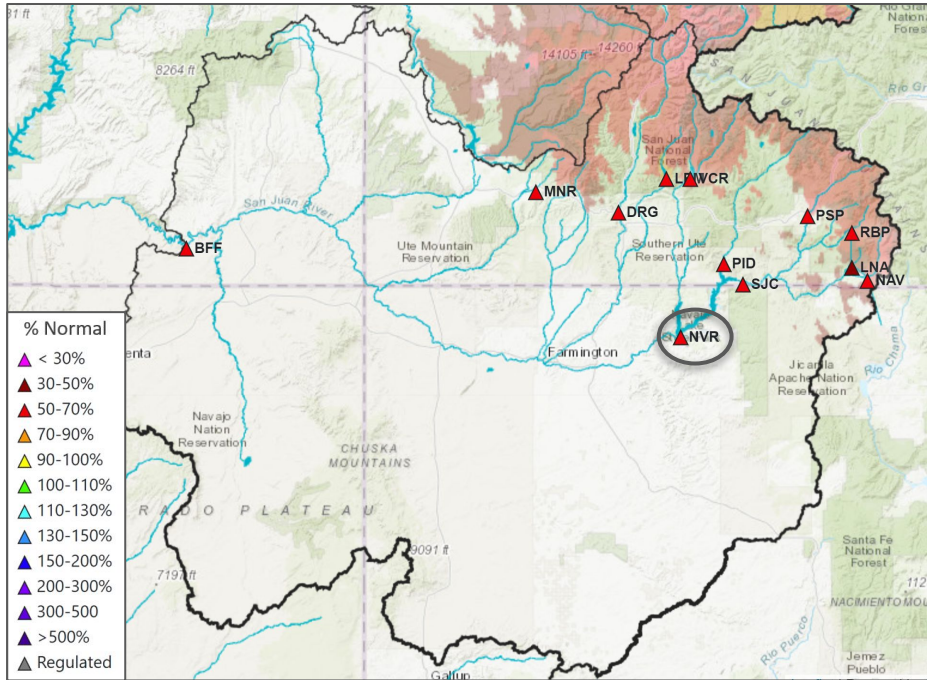


McPhee – Group SNOTEL Plot



San Juan River Basin

Forecast Range: 50-65%

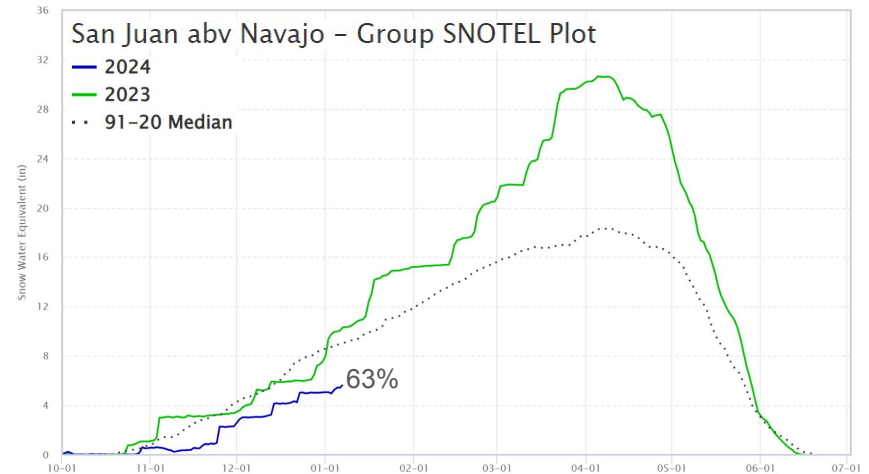


2024 Water Supply Forecast – San Juan – Navajo Reservoir, Archuleta, Nr (NVRN5)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Forecast (2024-01-01): 375 kaf (60% Average, 60% Median), (22% of Years below forecast, 42 Highest Flow / 53 Total Years)
 ESP 50% Forecast (2024-01-07): 373 kaf (59% Average, 59% Median), (22% of Years below forecast, 42 Highest Flow / 53 Total Years)
 No Observed



San Juan abv Navajo – Group SNOTEL Plot



El Niño Southern Oscillation (ENSO) Status

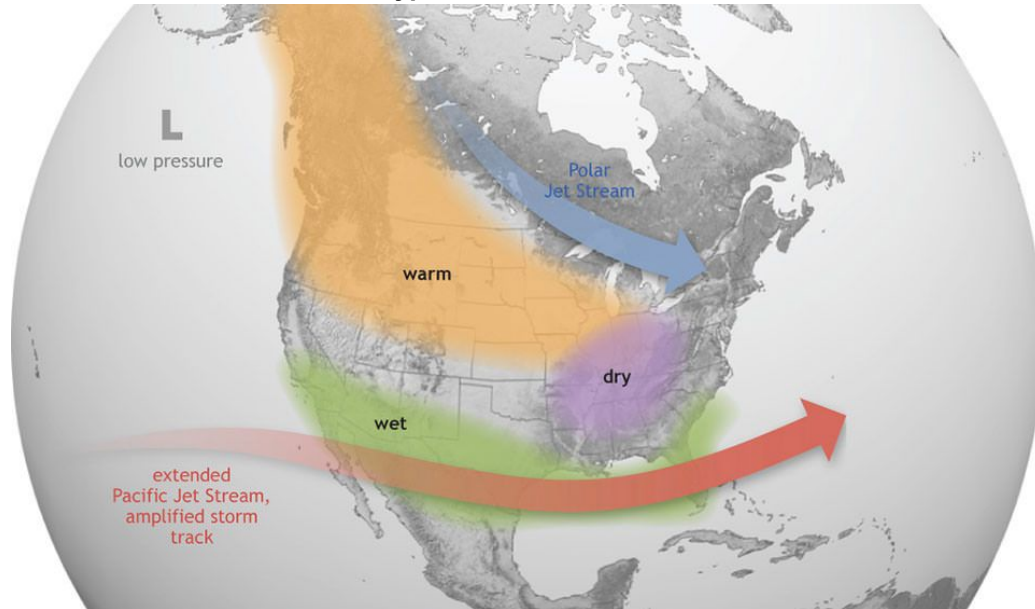
EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by
CLIMATE PREDICTION CENTER/NCEP/NWS
14 December 2023

ENSO Alert System Status: **El Niño Advisory**

- **El Niño** is expected to continue through the winter
 - Increased chances of wetter winter weather in Arizona/LCRB
 - Much weaker correlation/winter weather signal elsewhere in basin
 - Transition to ENSO-neutral favored during April-June 2024 (60% chance)

Typical El Niño Winters



Official NOAA CPC ENSO Probabilities (issued Dec. 2023)

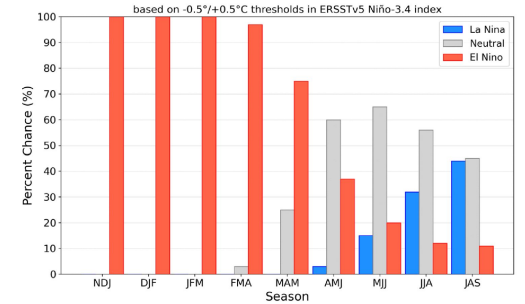
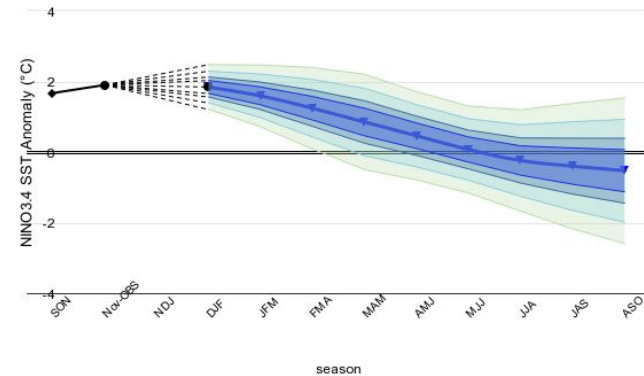


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 14 December 2023.

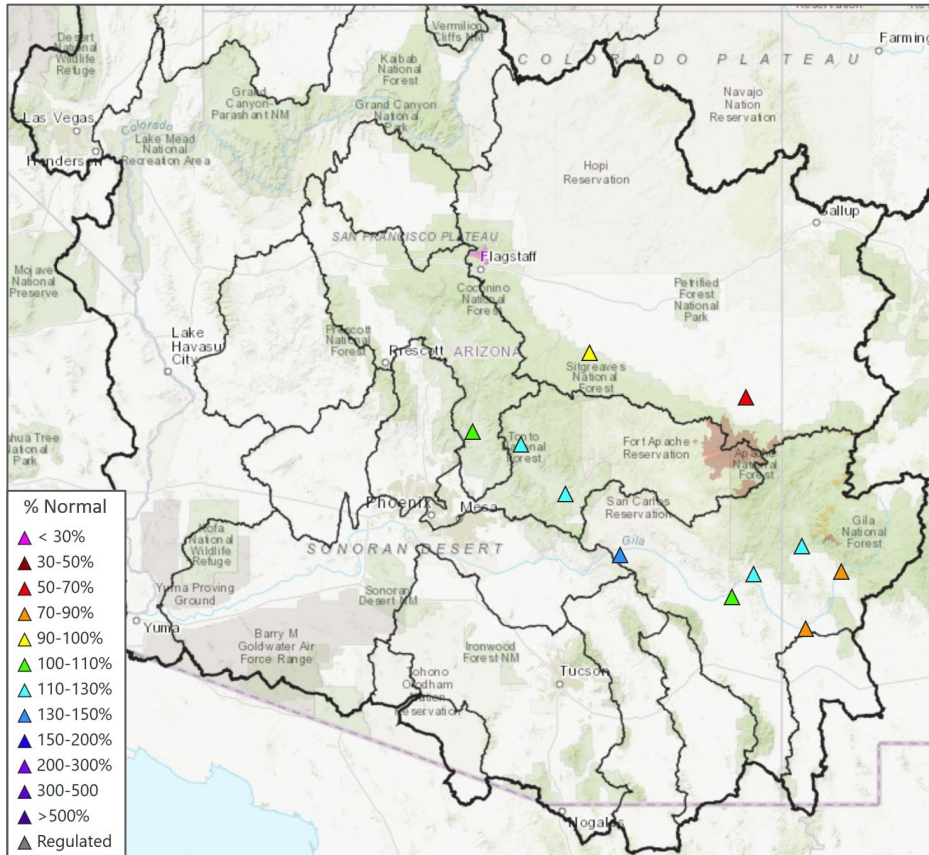
Dec 2023 Model-Based Prediction Distribution: Percentiles 1 5 15 25 75 85 95 99



Sources: NOAA, IRI

LCRB: Jan-May Water Supply forecasts

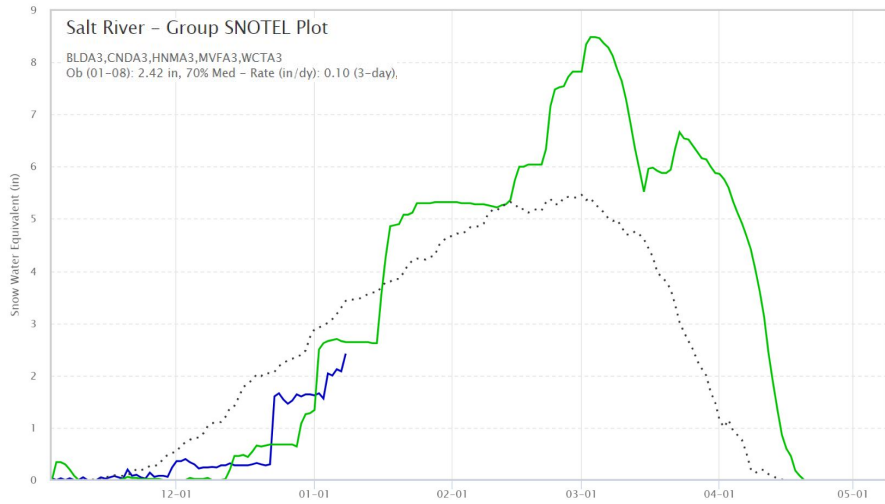
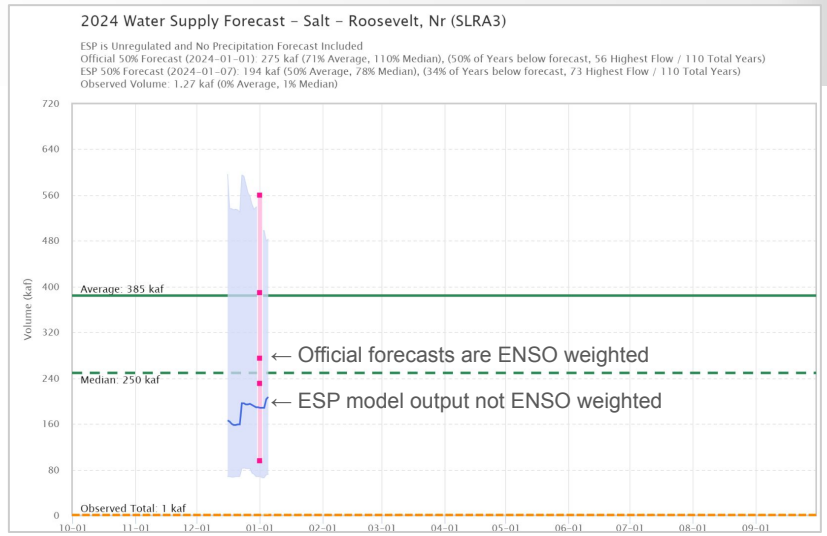
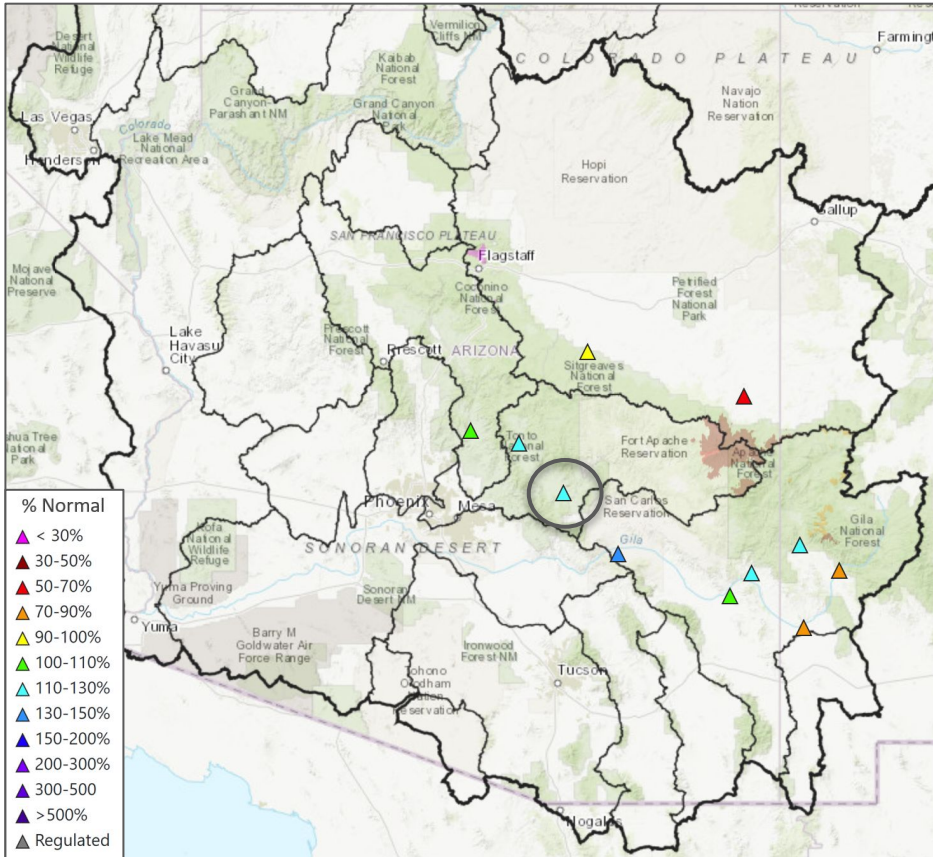
Forecast Range: 65-145%



LCRB January-May volume forecasts are generally closer to normal and take into account the current El Niño, which is expected to continue through the winter and typically results in increased chances of wetter winter weather across the LCRB.

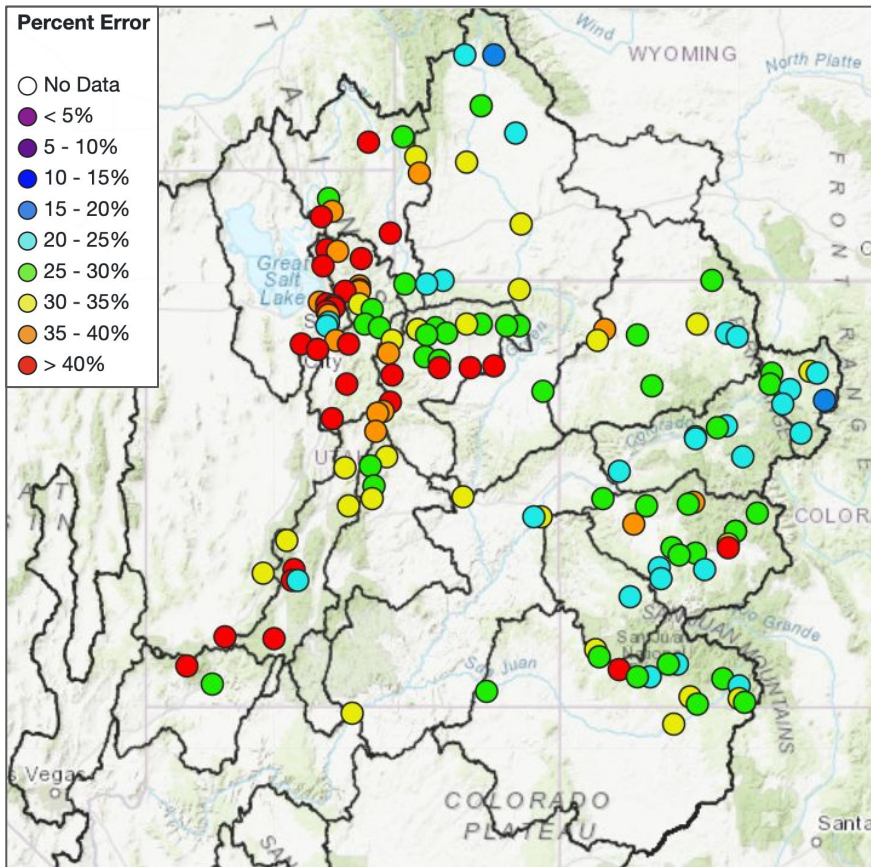
ID	%Med	%Avg	%ile	Description
▲ CHWA3	91	67	41	Chevelon Ck - Winslow Nr Wildcat Cyn Blo
▲ CLDA3	145	54	61	Gila - San Carlos Reservoir Coolidge Dam At
▲ GILN5	71	52	42	Gila - Gila Nr
▲ GLHA3	108	52	53	Gila - Solomon Nr Head Of Safford Vly
▲ GSFN5	119	58	59	San Francisco - Glenwood Nr
▲ GVRN5	78	48	47	Gila - Virden Nr Blue Ck Blo
▲ LCLA3	64	47	39	Little Colorado - Lyman Lk Abv St. Johns Nr
▲ SFCA3	111	53	52	San Francisco - Clifton
▲ SLRA3	110	71	50	Salt - Roosevelt Nr
▲ STCU1	100	64	50	Santa Clara - Pine Valley Nr
▲ TNRA3	115	56	54	Tonto Ck - Roosevelt Nr Gun Ck Abv
▲ VDTA3	109	61	53	Verde - Tangle Ck Blo Horseshoe Dam Abv
▲ VIRU1	131	84	48	Virgin - Virgin

Salt River Basin



Historical Forecast Verification

January Forecast Error: April-July Volume



Location

<u>Location</u>	<u>Avg January Forecast Error</u>
Green River - Warren Bridge	20%
Fontenelle Reservoir	31%
Yampa River - Deerlodge	30%
Blue River - Dillon Reservoir	23%
Colorado River - Cameo	23%
Blue Mesa Reservoir (Gunnison)	28%
McPhee Reservoir (Dolores)	30%
Navajo Reservoir (San Juan)	31%
Lake Powell	32%
Virgin River at Virgin	25%

Error tends to decrease each month into the spring

Where Forecasts are Better:

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

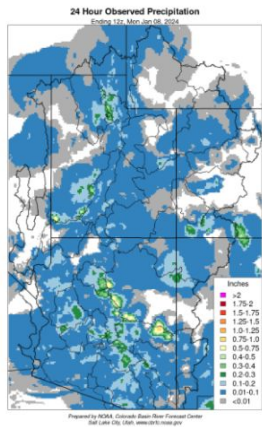
Where Forecasts are Worse:

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

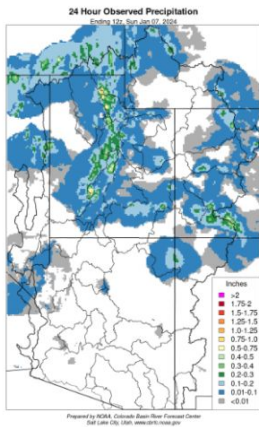
Future weather is the primary source of early season water supply forecast error/uncertainty.

January Observed Precipitation

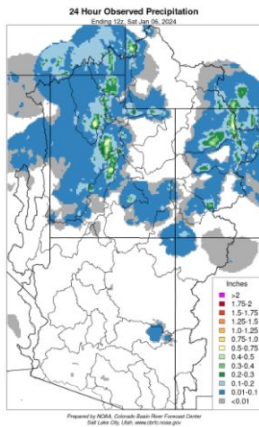
08



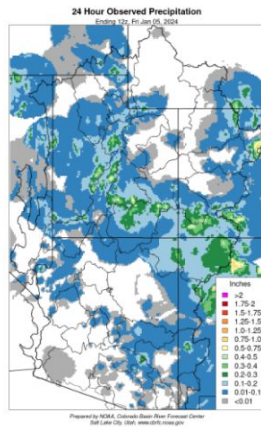
07



06



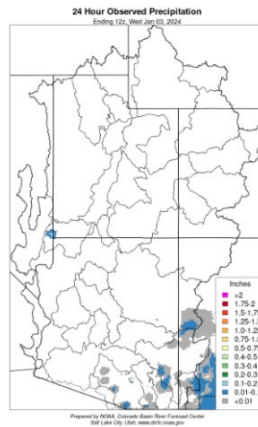
05



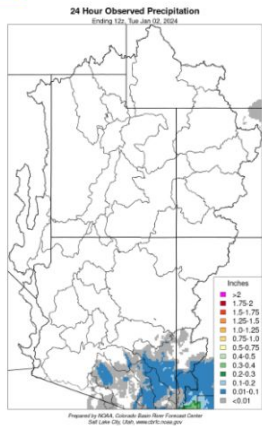
04



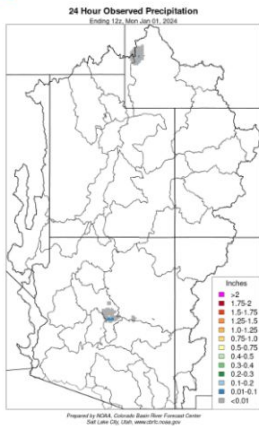
03



02



01



Active weather pattern

-series of storm systems

-colder temperatures

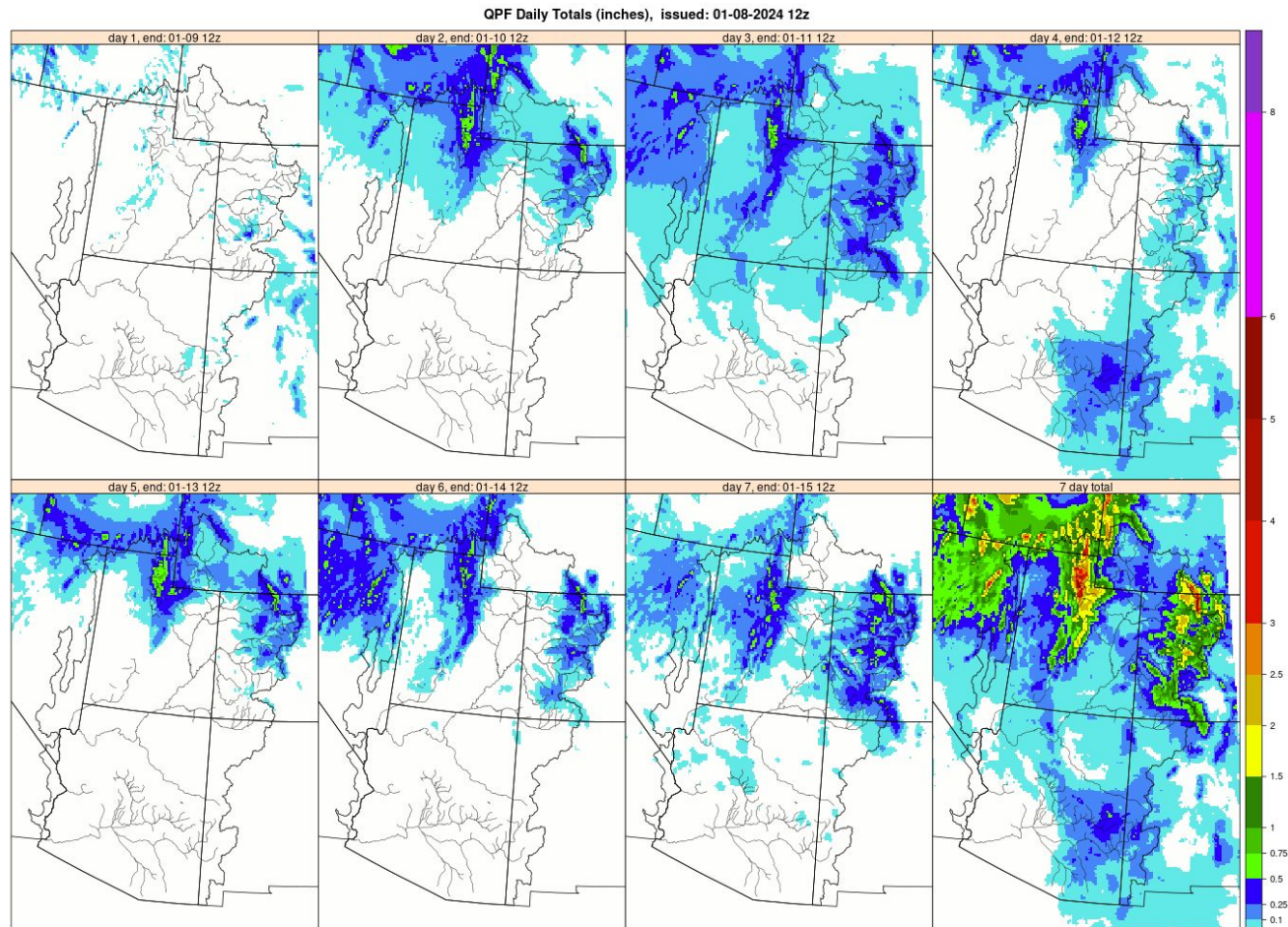
Upcoming Weather: 7-Day Precipitation Forecast

Active weather will continue this week.

Today - lingering/light precip

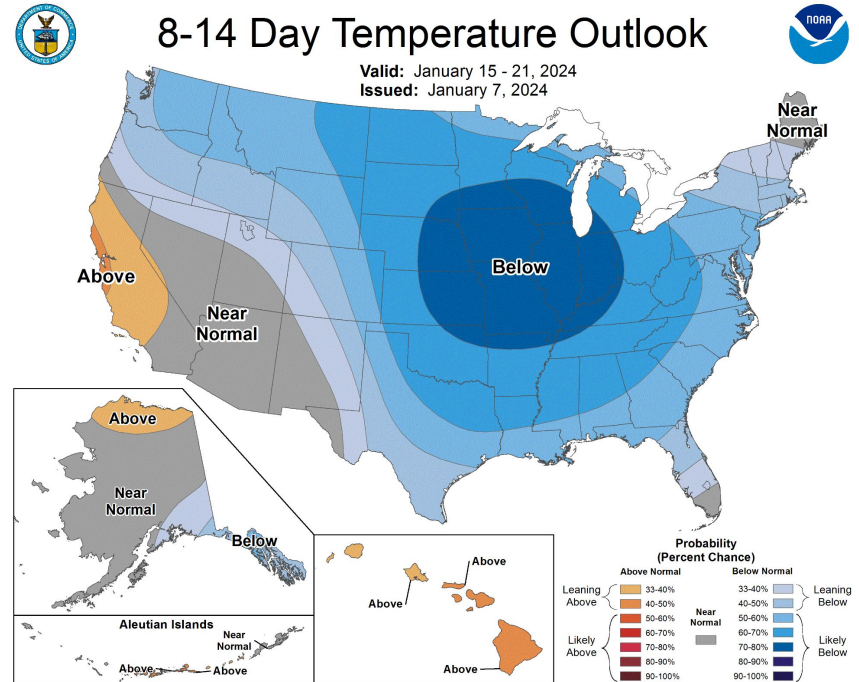
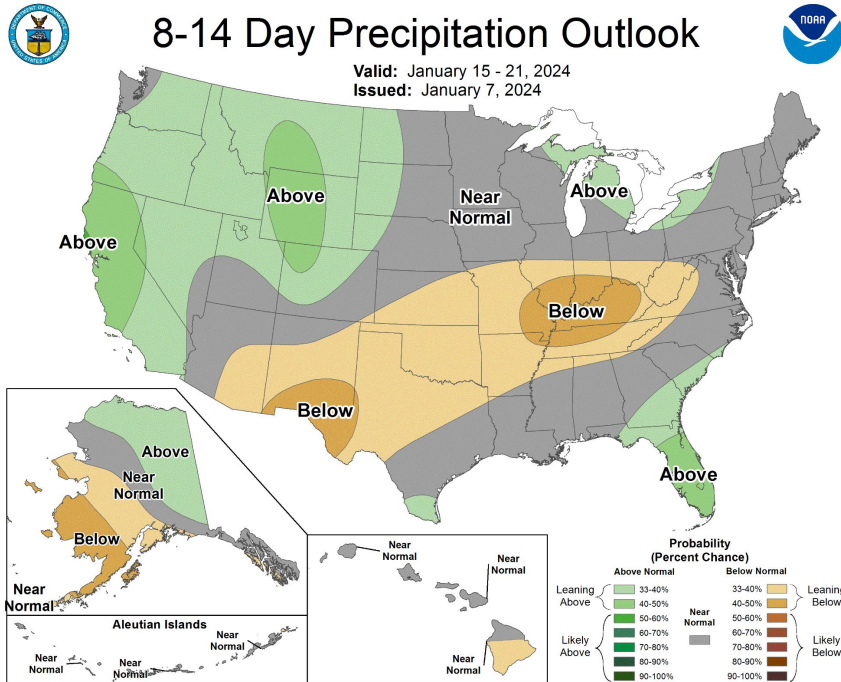
Periods of snow possible each day across higher elevations.

Higher precipitation amounts forecast across northern basins.



Upcoming Weather: 8-14 Day Outlook (January 15-21)

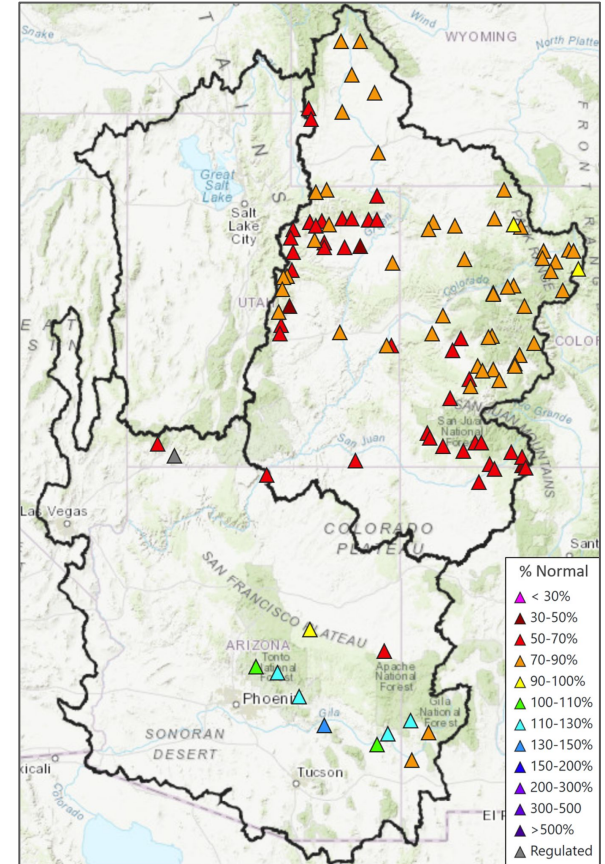
Northern basins: increased chances of above average precipitation & below average temperatures.



Summary

- **Upper Colorado**
 - Soil moisture:
 - Northern basins - near/above avg/better
 - Southern basins - below avg/worse
 - Jan 1 SWE: 40-70%
 - April-July volume forecasts: 50-95%
- **Lower Colorado**
 - Soil moisture: below normal/worse
 - Jan 1 SWE: 0-35%
 - January-May volume forecasts: 65-145%
- **Weather forecast**
 - Active weather will continue this week
- **El Niño conditions**
 - Increased chances of wetter winter weather across LCRB

January 1 Water Supply Forecasts
Percent of 1991-2020 Normal Seasonal Volume



2024 Water Supply Webinar Schedule

**All Times Mountain Time (MT)*

Colorado River Basin

Monday	Jan 8 th	10 am
Wednesday	Feb 7 th	10 am
Thursday	Mar 7 th	10 am
Friday	Apr 5 th	10 am
Tuesday	May 7 th	10 am

Utah/Great Basin

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

Peak flow forecast webinar Wednesday, March 20th, 10 am MT

Additional briefings scheduled as needed

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

CBRFC Webinar Registration & Email List



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

cbrfc.noaa.gov

Webinars

Email Updates

CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2024

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 13 @ 10:00 am MT](#)

Colorado River Basin Water Supply Webinars

- [Monday January 8 @ 10:00 am MT](#)
- [Wednesday February 7 @ 10:00 am MT](#)
- [Thursday March 7 @ 10:00 am MT](#)
- [Friday April 5 @ 10:00 am MT](#)
- [Tuesday May 7 @ 10:00 am MT](#)

Utah Water Supply Webinars

- [Monday January 8 @ 11:30 am MT](#)
- [Wednesday February 7 @ 11:30 am MT](#)
- [Thursday March 7 @ 11:30 am MT](#)
- [Friday April 5 @ 11:30 am MT](#)
- [Tuesday May 7 @ 11:30 am MT](#)

Peak Flow Webinar

- [Wednesday 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.

Email Updates


Available Email Lists

- General Stakeholders
- Water Supply: Green River Basin Forecasts
- Water Supply: Upper Colorado Mainstem Forecasts
- Water Supply: San Juan, Gunnison and Dolores River Basins Forecasts
- Water Supply: Eastern Great Basin Forecasts
- Special forecasts for the Dolores River Basin
- Special forecasts for the San Juan River Basin
- Special forecasts for CUWCD
- Upper Basin Reclamation Reservoirs
- Utah Reservoir Forecasts

Addition Requests

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

CBRFC Webpage Updates - Filter Points Option



Rivers ▾ Snow ▾ Water Supply ▾ Peak Flow ▾ Reservoirs ▾ Weather ▾ Climate ▾ Help ▾ About ▾ News ▾

CBRFC Hydrologist/Meteorologist Job Opening [Application Link \(Federal Employees\)](#)

CBRFC Hydrologist/Meteorologist Job Opening [Application Link \(Public\)](#)

Monday, January 8, 2024: CBRFC Water Supply Webinars [Registration](#)

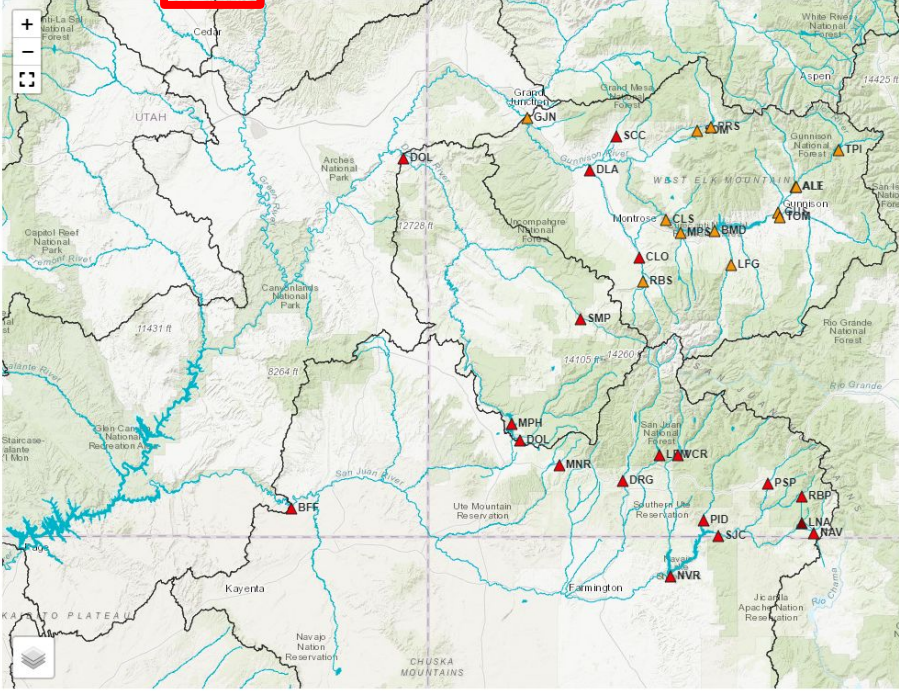
Select Data

Select Overlay

Filter Points

Show River Alerts

Help



Filter Points

Filter

Upper Region

- Col abv Kremmling
- Eagle-Roaring Fork
- Gunnison
- Dolores
- Lake Powell
- Upper Green
- White-Yampa
- Duchesne-Price
- San Rafael-Dirty Devil
- San Juan

Great Region

- Bear
- Weber
- Six Creeks-Jordan
- Provo-Utah Lake
- Salt Lake
- Sevier

Lower Region

- Virgin
- Little Colorado
- Lake Mead
- Muddy-Las Vegas
- Salt
- Verde
- Agua Fria
- Hassayampa-Centennial
- Upper Gila
- San Pedro
- Santa Cruz
- Whitewater-Vamori
- Lower Gila
- Bill Williams
- Lower Colorado Mainstem

32 Water Supply Points Found

ID	%Med	%Avg	%ile	Description
▲ ALEC2	84	77	21	East - Almont
▲ ALTC2	95	80	23	Taylor - Almont
▲ BFFU1	60	59	16	San Juan - Bluff Nr
▲ BMDC2	85	77	30	Gunnison - Blue Mesa Reservoir
▲ CLOC2	63	67	17	Uncompahgre - Colona
▲ CLSC2	83	75	29	Gunnison - Crystal Reservoir
▲ DLAC2	65	63	28	Uncompahgre - Delta
▲ DOLC2	64	61	18	Dolores - Dolores

CBRFC Webpage Updates - Data Plots

Some older data plots have been migrated to the same software as the updated hydrographs.

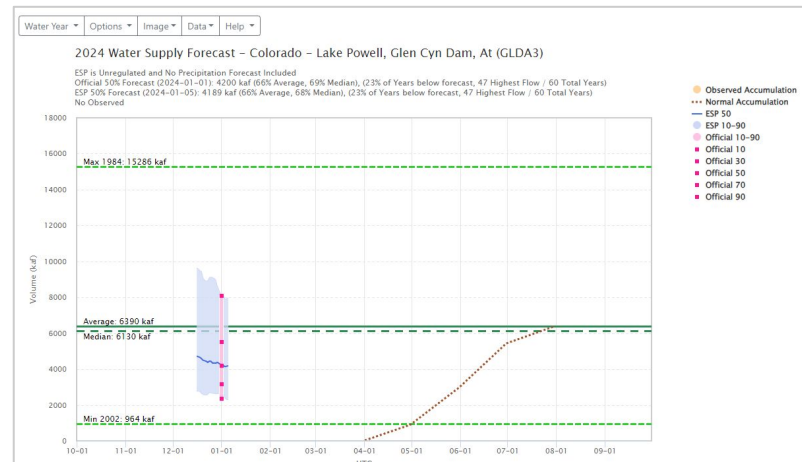
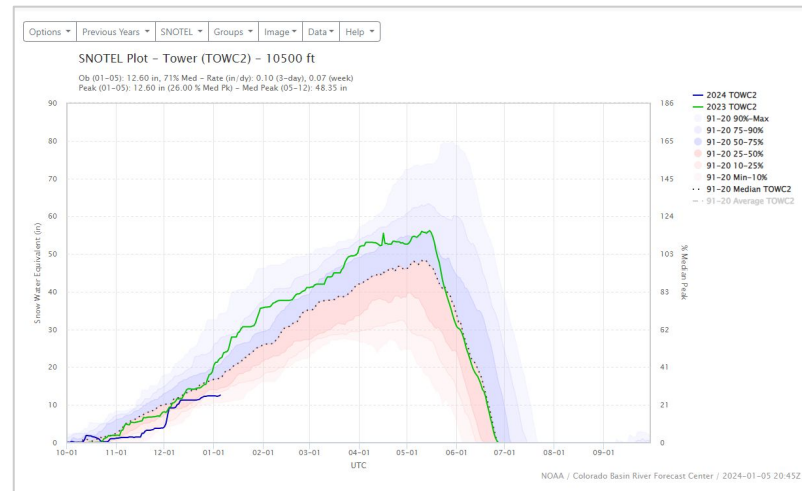
- Snow (SWE) plots
- Water Supply Forecast evolution plots

This allows for hover information capability, among other things. It also includes other updates to those pages, most notably the look and location of option menus.

Work is continuing on these plot pages as well as on some of the front page map options.

If you have any questions please feel free to contact one of us directly or send an email to:

cbrfc.webmasters@noaa.gov



CBRFC Contacts & Water Year 2024 Basin Focal Points

Basin Focal Points (Forecasters)

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CBRFC Webpage
<https://www.cbrfc.noaa.gov/>
CBRFC Water Supply Presentations
<https://www.cbrfc.noaa.gov/present/present.html>

[CBRFC Hydrologist/Meteorologist Job Opening](#)
2 Additional Job Openings Available Soon