

Colorado River Basin Water Supply Briefing

April 5, 2024



Colorado Basin
River Forecast Center
National Weather Service



Presentation Overview

Soil Moisture Conditions

Precipitation Review

Snowpack Conditions

Water Supply Forecasts

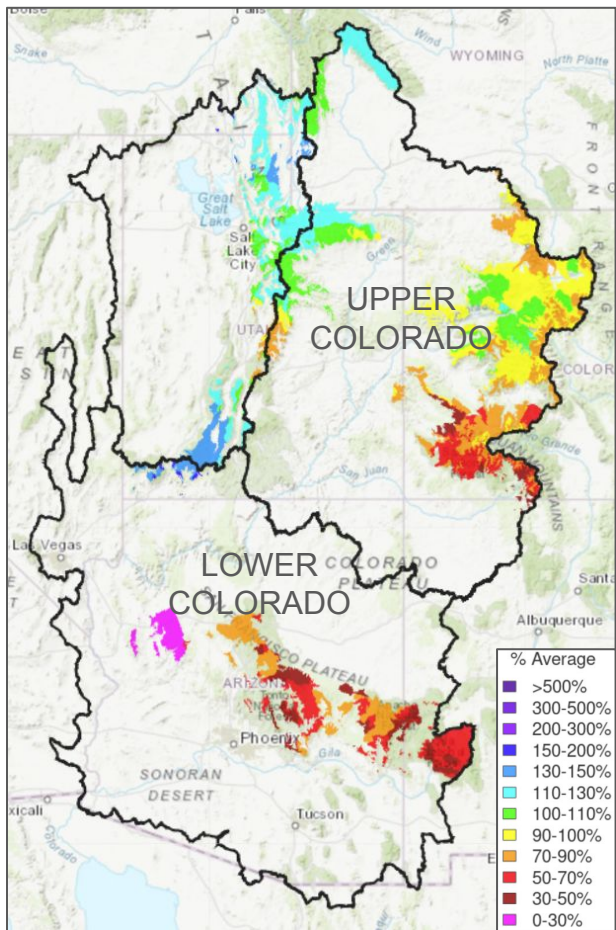
Water Supply Forecast Error

Upcoming Weather

Contacts & Questions

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

Fall 2023 Hydrologic Model Soil Moisture Conditions



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

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

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)

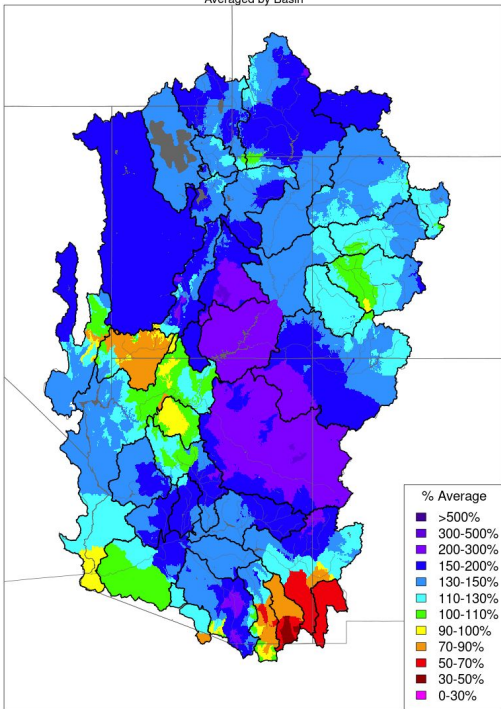
The timing and magnitude of spring runoff is ultimately a result of snowpack conditions, spring weather, and soil moisture conditions.

March 2024 Precipitation Summary

Active weather continued into March, making it the third consecutive month with near to above normal precipitation.

Monthly Precipitation - March 2024

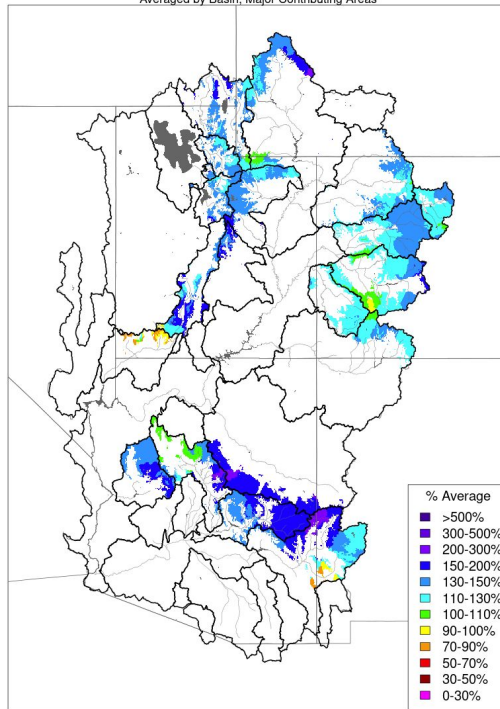
Averaged by Basin



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

Monthly Precipitation - March 2024

Averaged by Basin, Major Contributing Areas



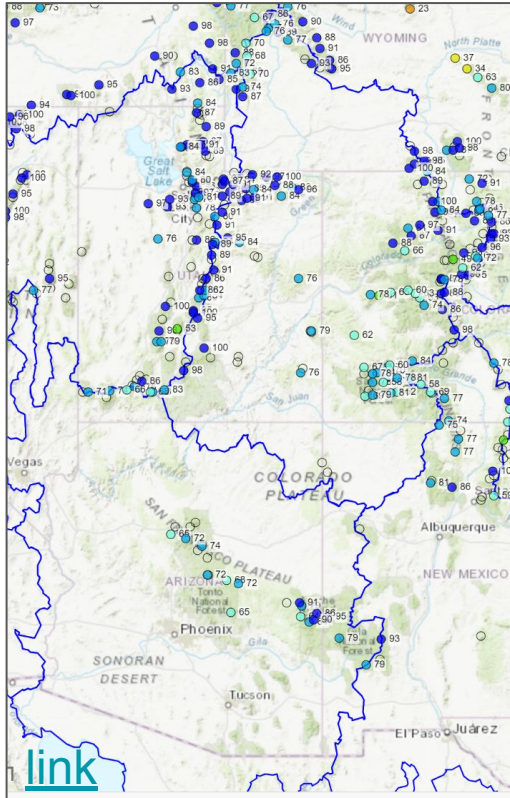
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Water Year 2024		
CBRFC Precipitation (Major Contributing Areas)		
Percent of 1991-2020 Average		
UPPER COLORADO RIVER BASIN		
	Mar	Oct-Mar
Above Lake Powell	130	102
Green River Basin		
Above Fontenelle	144	102
Above Flaming Gorge	141	107
Yampa/White	131	112
Duchesne	132	107
Price/San Rafael/Dirty Devil	157	113
Colorado River Headwaters		
Above Kremmling	127	102
Eagle	136	109
Roaring Fork	132	105
Above Cameo	130	104
Southwest Colorado		
Gunnison	119	99
Dolores	123	91
San Juan	127	90
LOWER COLORADO RIVER BASIN		
Virgin	97	86
Little Colorado	182	97
Verde	160	89
Salt	159	97
Upper Gila	153	100

January-March 2024 Precipitation

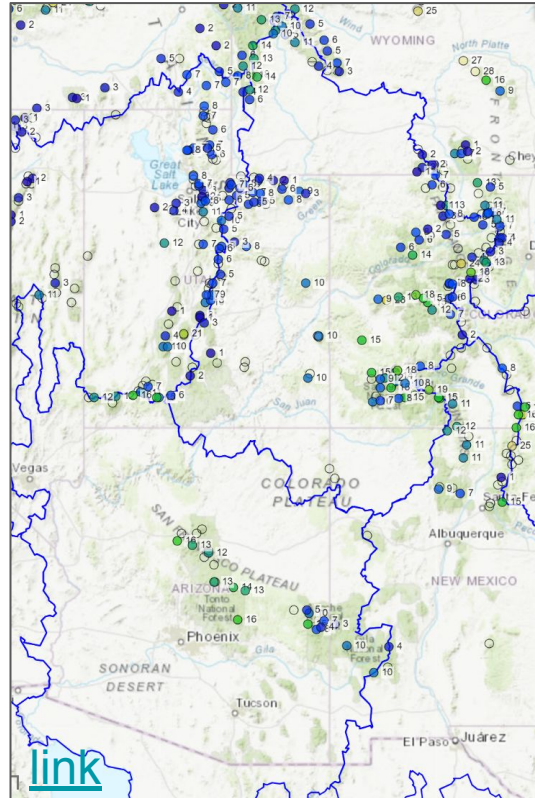
Percentile

Most SNOTEL sites
>70th percentile



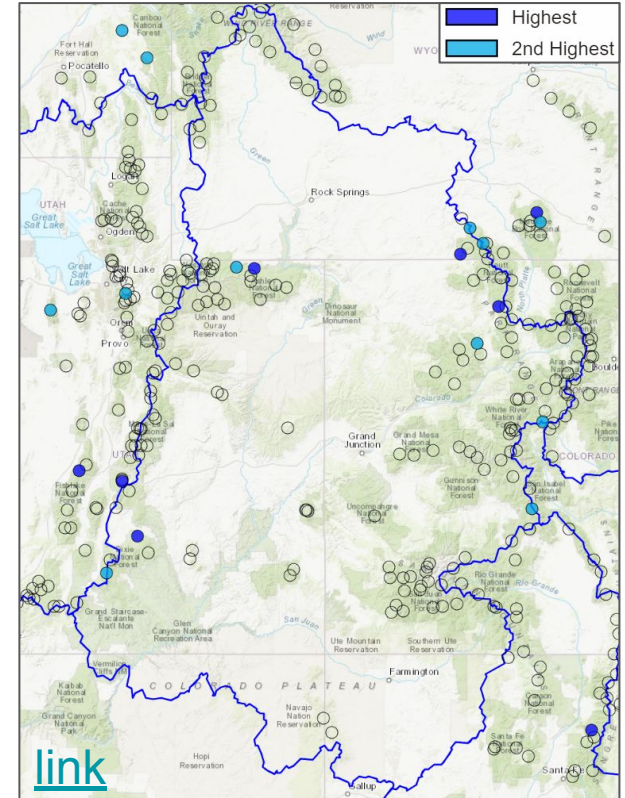
Rank

Many SNOTEL sites
Rank in 10 wettest



Records

A few SNOTEL sites
Record wet

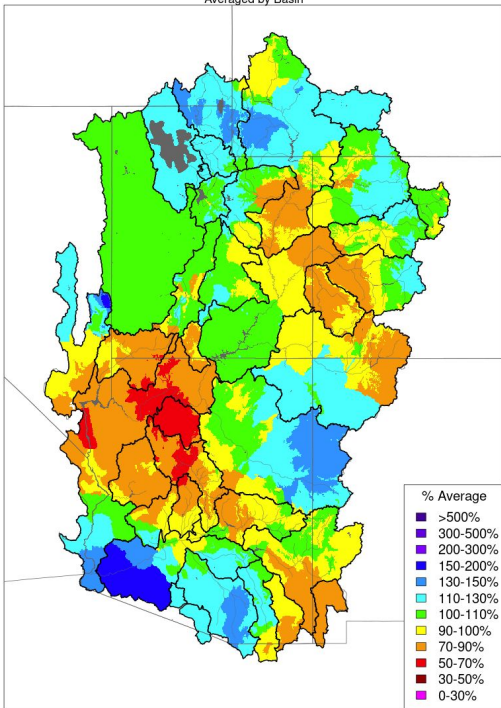


Water Year 2024 Precipitation Summary

Colorado River Basin water year 2024 precipitation is generally near normal across significant runoff producing areas.

Water Year Precipitation, October 2023 - March 2024

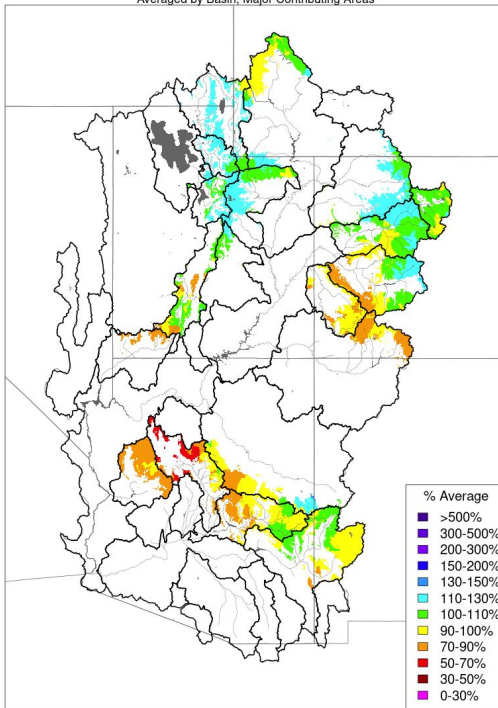
Averaged by Basin



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

Water Year Precipitation, October 2023 - March 2024

Averaged by Basin, Major Contributing Areas



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

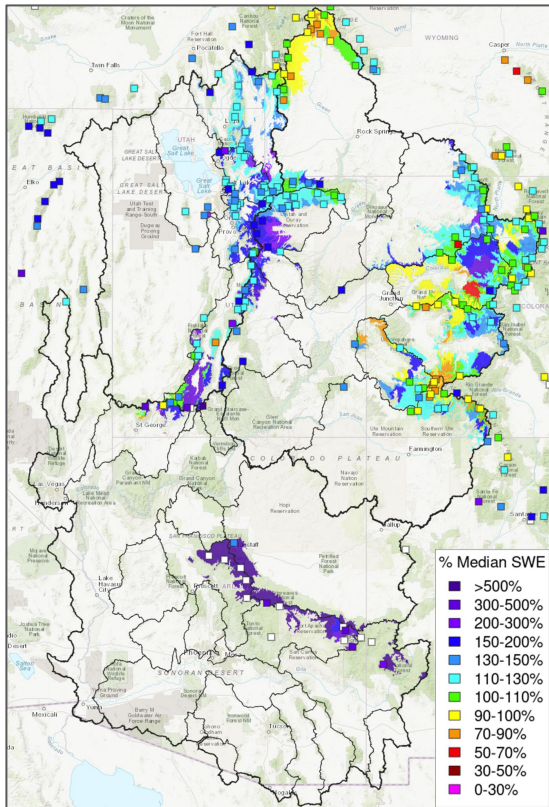
Water Year 2024 CBRFC Precipitation (Major Contributing Areas) Percent of 1991-2020 Average		
UPPER COLORADO RIVER BASIN		
	Mar	Oct-Mar
Above Lake Powell		
	130	102
Green River Basin		
Above Fontenelle	144	102
Above Flaming Gorge	141	107
Yampa/White	131	112
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Price/San Rafael/Dirty Devil	157	113
Colorado River Headwaters		
Above Kremmling	127	102
Eagle	136	109
Roaring Fork	132	105
Above Cameo	130	104
Southwest Colorado		
Gunnison	119	99
Dolores	123	91
San Juan	127	90
LOWER COLORADO RIVER BASIN		
Virgin	97	86
Little Colorado	182	97
Verde	160	89
Salt	159	97
Upper Gila	153	100

Snowpack Conditions

April 1 SWE Conditions

NRCS SNOTEL Observed (Squares)

CBRFC Model (Significant Areas)



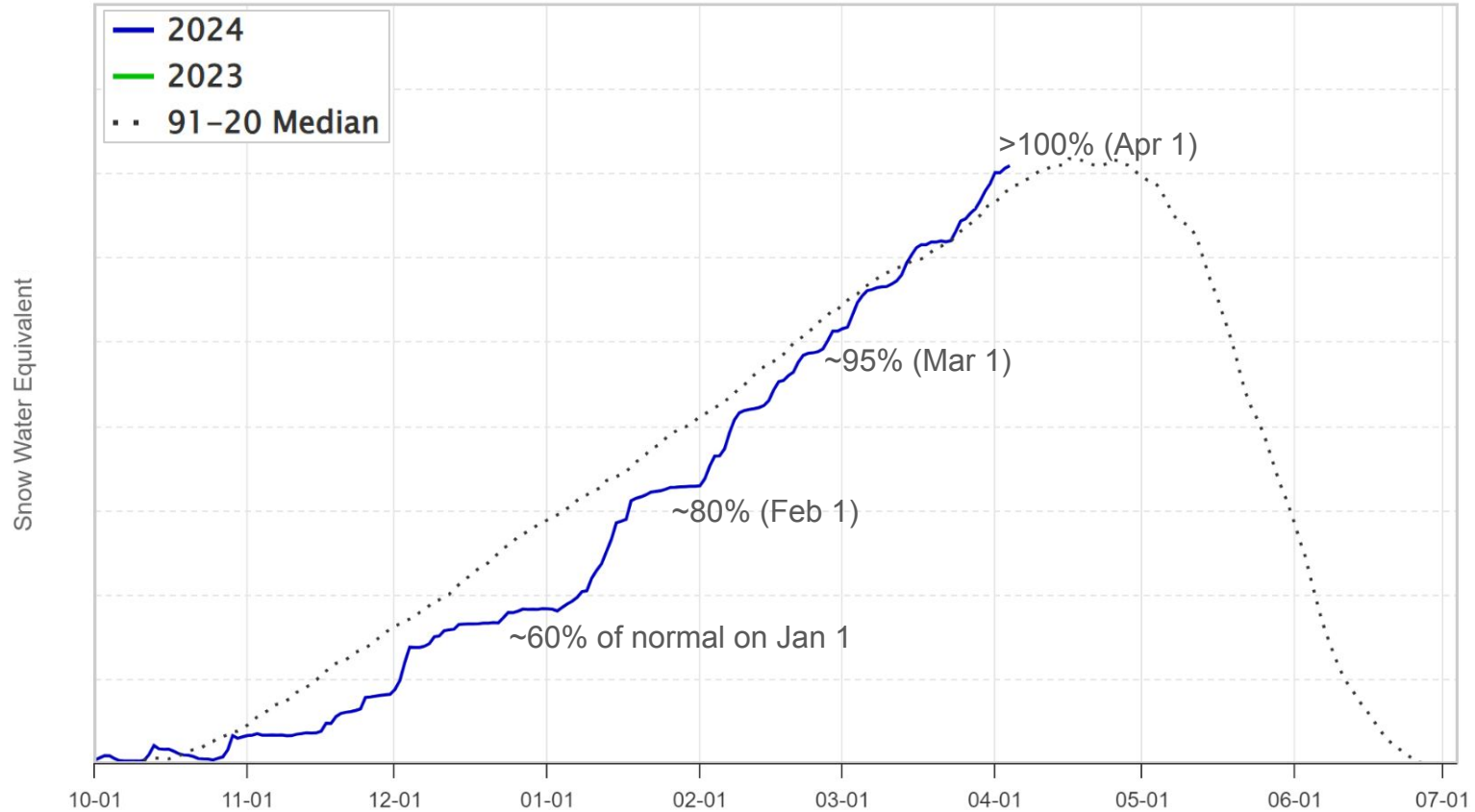
SWE = Snow Water Equivalent
The amount of water in snow.

Water Year 2024			
CBRFC Model SWE (Major Contributing Areas)			
Percent of 1991-2020 Median			
UPPER COLORADO RIVER BASIN			
	Mar1	Apr1	Change
Above Lake Powell			
	97	113	16
Green River Basin			
Above Fontenelle	81	95	14
Above Flaming Gorge	91	106	15
Yampa/White	108	121	13
Duchesne	110	128	18
Price/San Rafael/Dirty Devil	116	150	34
Colorado River Headwaters			
Above Kremmling	100	112	12
Eagle	98	109	11
Roaring Fork	92	108	16
Above Cameo	96	109	13
Southwest Colorado			
Gunnison	95	105	10
Dolores	84	109	25
San Juan	84	104	20

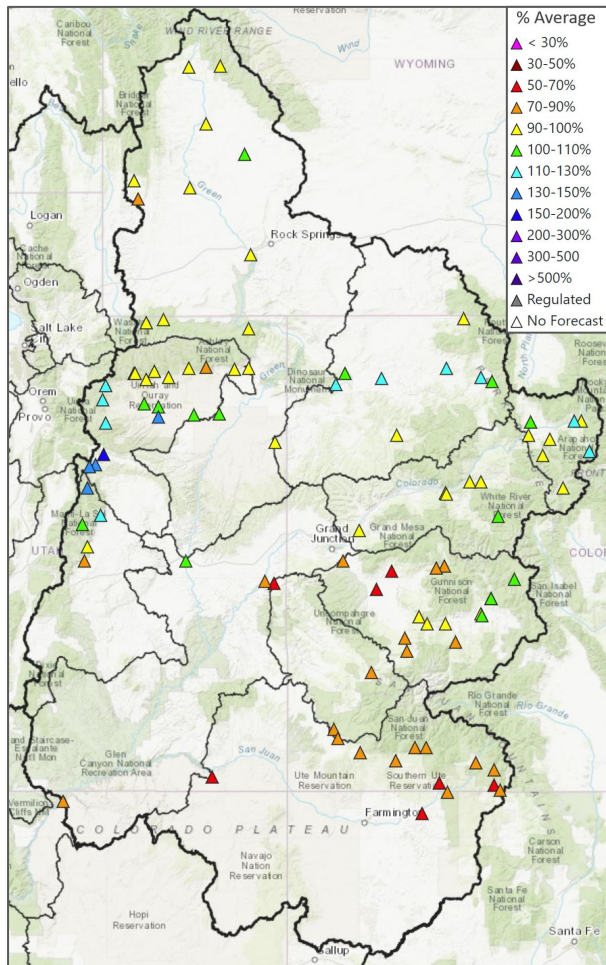
UCRB SWE conditions improved during March and are near to above normal, ranging from 95-150%.

UCRB Snowpack Evolution

SWE Above Lake Powell



UCRB Water Supply Forecasts: Overview



The water supply outlook has improved/remained steady due to above average March precipitation.

Central areas: near to above normal

Northern/southern areas: near to below normal

Colorado Basin River Forecast Center Water Supply Forecasts April 1, 2024

UPPER COLORADO RIVER BASIN

Basin	Volume (KAF)	%Normal (1991-2020)	Period
Lake Powell	5700	89	Apr-Jul
Green River Basin			
Green-Flaming Gorge Reservoir	960	99	Apr-Jul
Yampa-Deerlodge	1350	113	Apr-Jul
Duchesne-Tabiona	110	107	Apr-Jul
Colorado River Headwaters			
Colorado-Kremmling	870	100	Apr-Jul
Eagle-Gypsum	315	94	Apr-Jul
Roaring Fork-Glenwood Springs	600	92	Apr-Jul
Colorado-Cameo	2180	96	Apr-Jul
Southwest Colorado			
Gunnison-Blue Mesa Reservoir	600	94	Apr-Jul
Dolores-McPhee Reservoir	200	78	Apr-Jul
San Juan-Navajo Reservoir	420	67	Apr-Jul
Animas-Durango	300	78	Apr-Jul

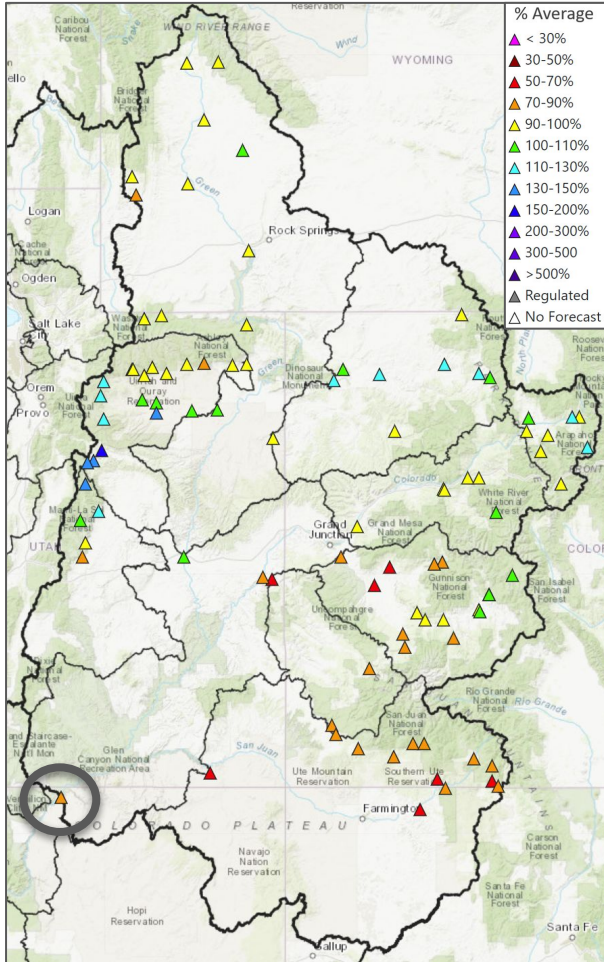
KAF
thousand acre-feet

Best conditions

Worse conditions

Lake Powell Water Supply Forecast

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



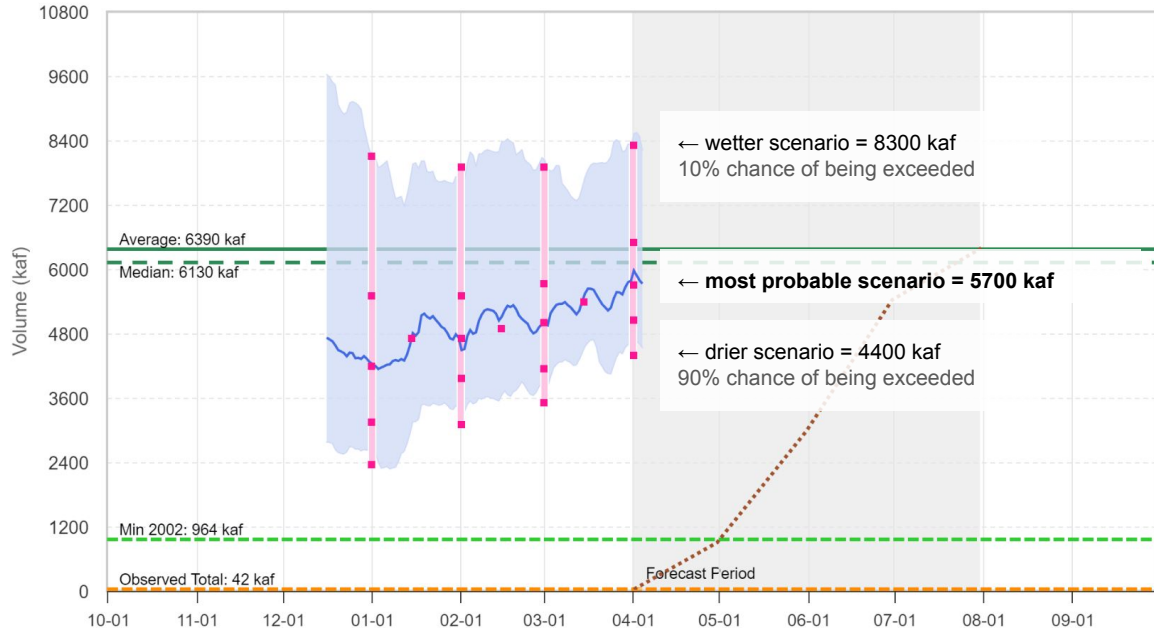
2024 Water Supply Forecast - Colorado - Lake Powell, Glen Cyn Dam, At (GLDA3)

ESP is Unregulated and No Precipitation Forecast Included

Official 50% Fcst (2024-04-01): 5700 kaf (89% Avg, 93% Med), (43% of Yrs Below Fcst, 35 Highest Flow / 60 Tot Yrs)

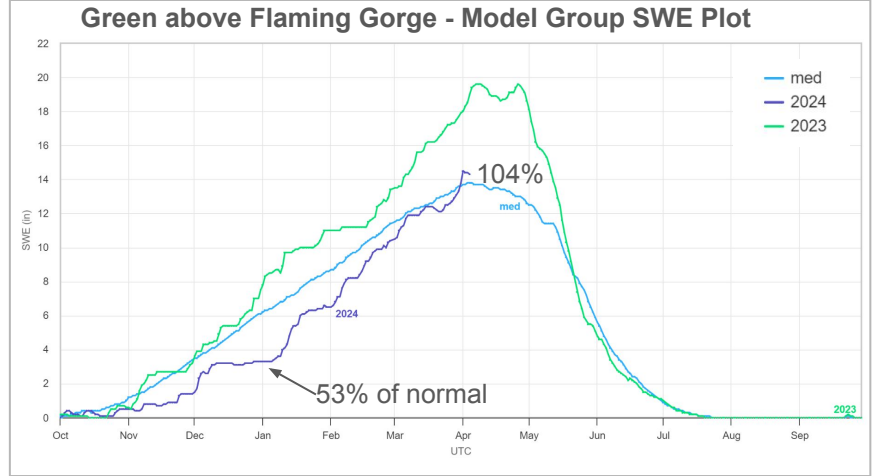
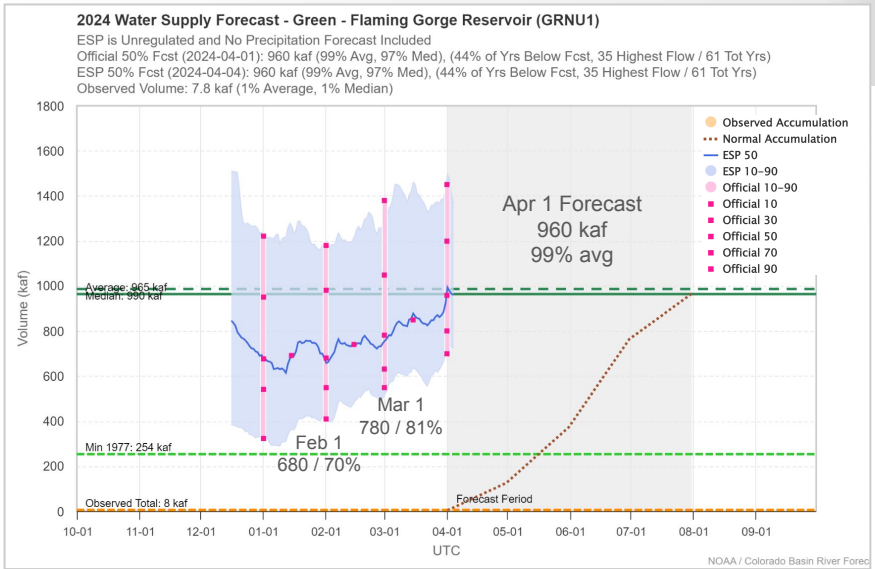
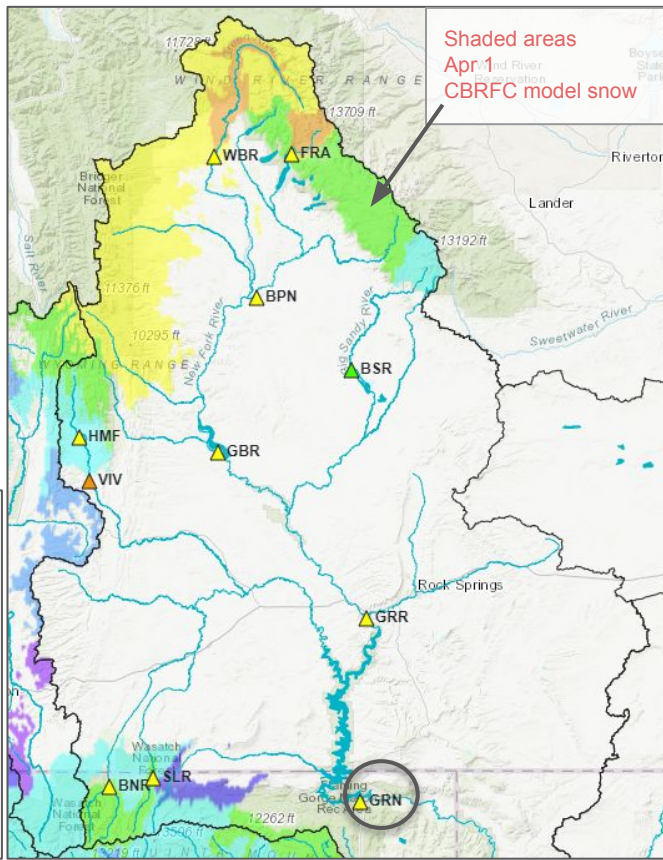
ESP 50% Fcst (2024-04-04): 5730 kaf (90% Avg, 93% Med), (43% of Yrs Below Fcst, 35 Highest Flow / 60 Tot Yrs)

Observed Volume: 42 kaf (1% Average, 1% Median)



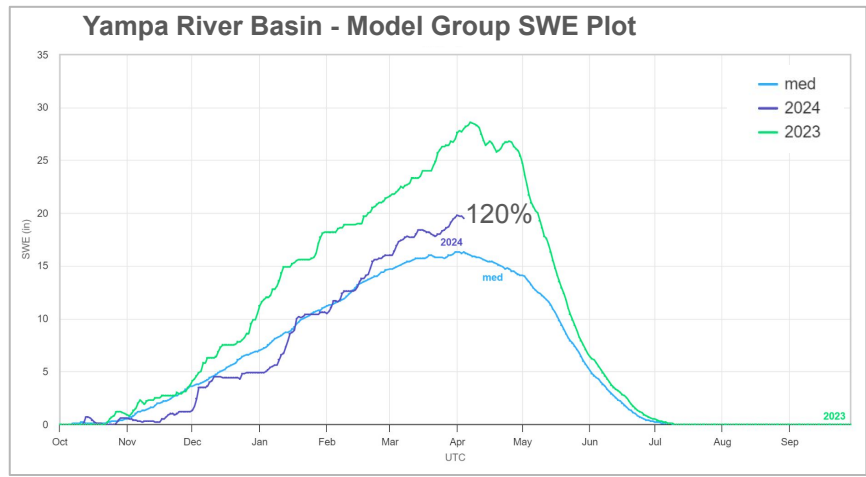
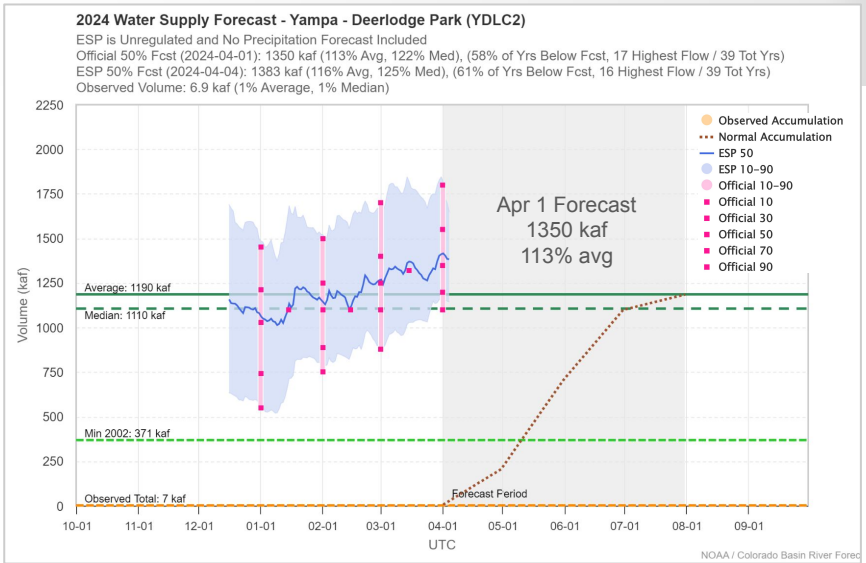
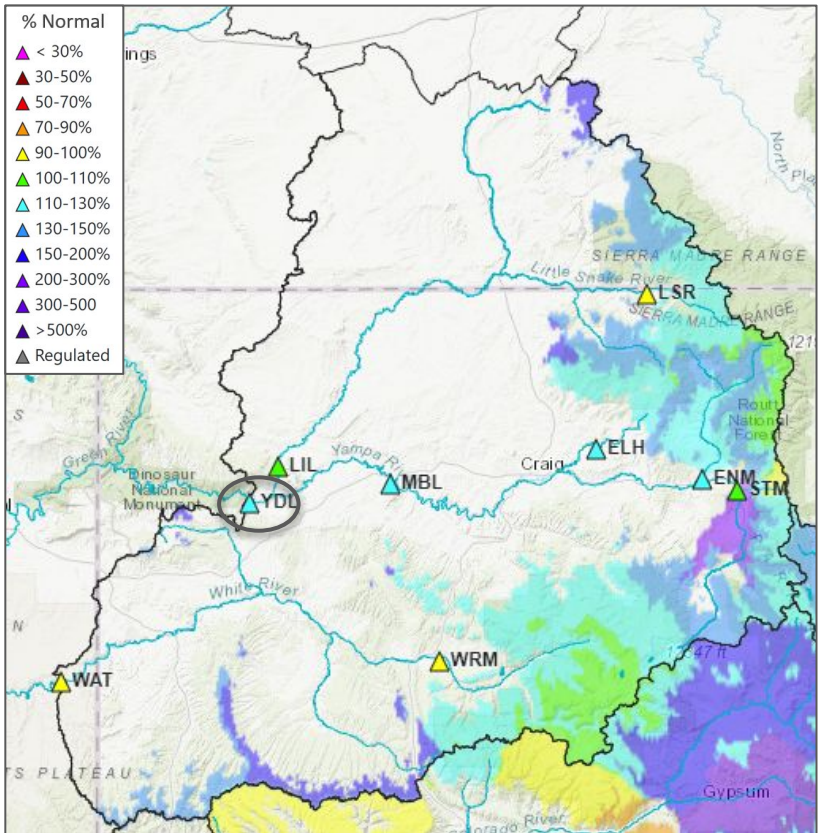
Upper Green River Basin

Forecast Range: 90-105%



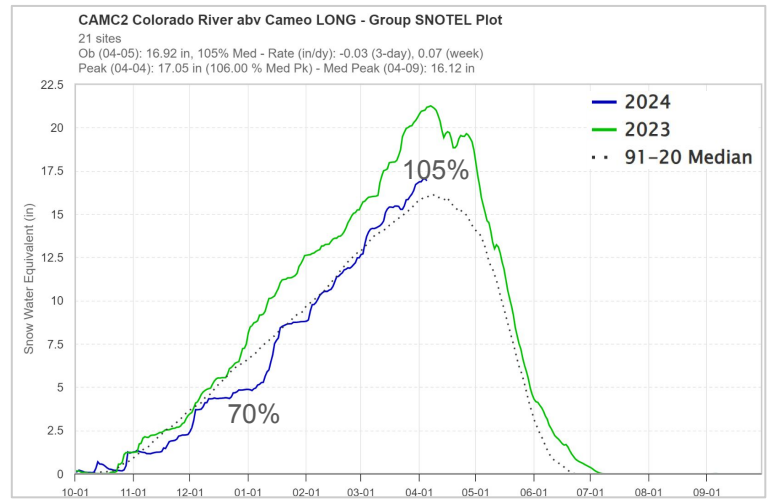
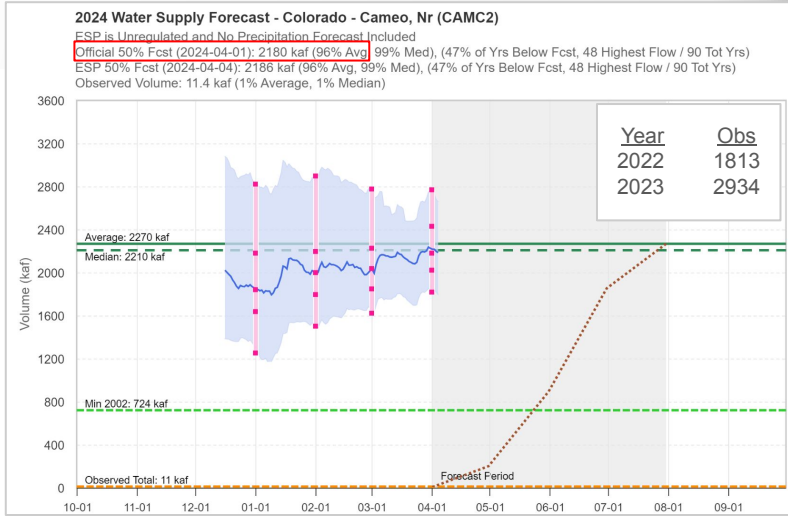
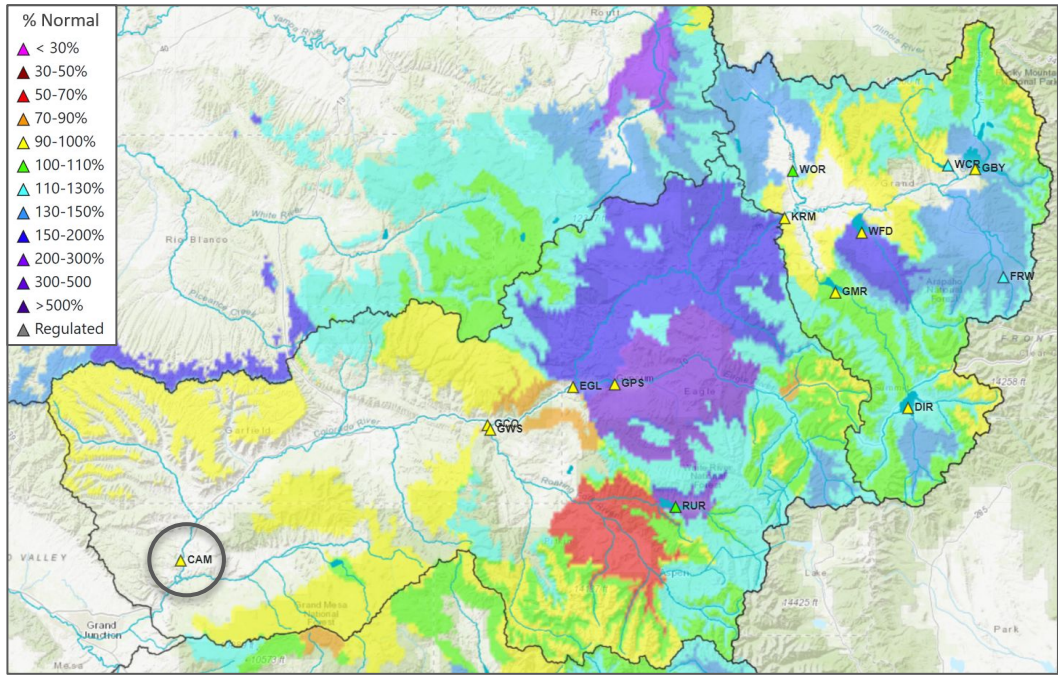
White/Yampa River Basin

Forecast Range: 100-115%



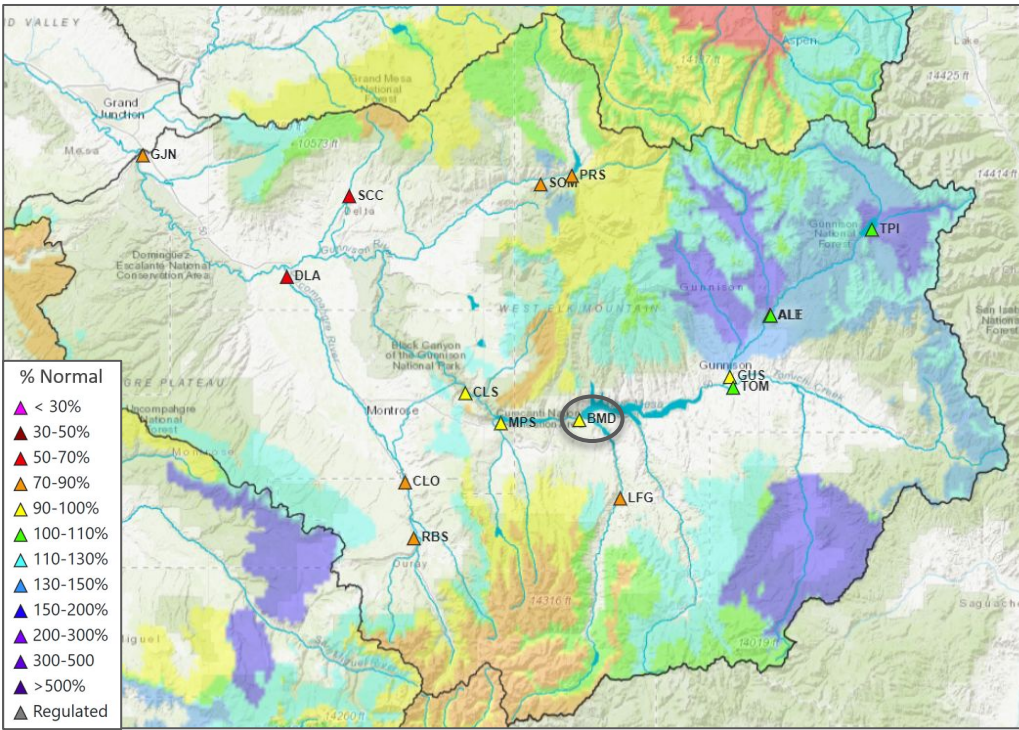
Colorado River Headwaters

Forecast Range: 90-120%



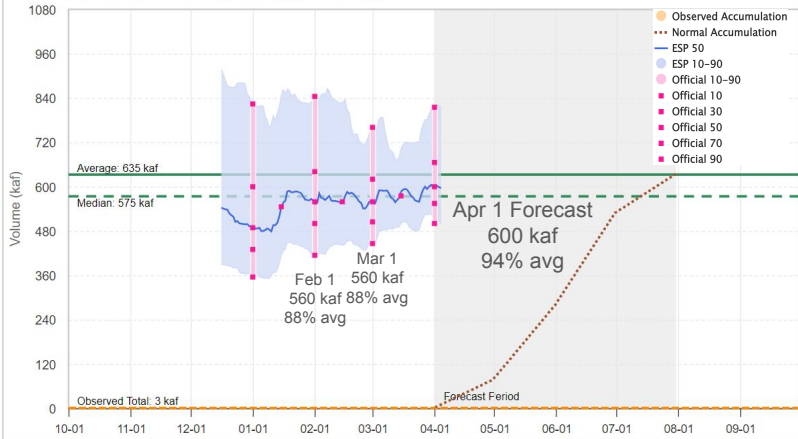
Gunnison River Basin

Forecast Range: 60-105%



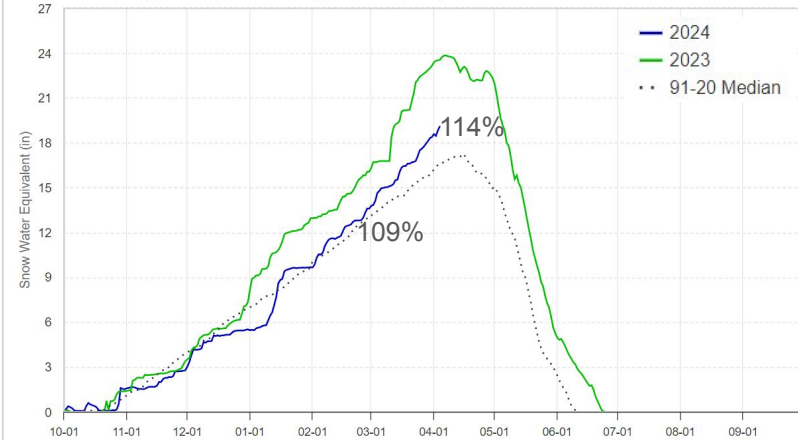
2024 Water Supply Forecast - Gunnison - Blue Mesa Reservoir (BMDC2)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-04-01): 600 kaf (94% Avg, 104% Med), (47% of Yrs Below Fcst, 30 Highest Flow / 55 Tot Yrs)
 ESP 50% Fcst (2024-04-04): 596 kaf (94% Avg, 104% Med), (47% of Yrs Below Fcst, 30 Highest Flow / 55 Tot Yrs)
 Observed Volume: 3.4 kaf (1% Average, 1% Median)



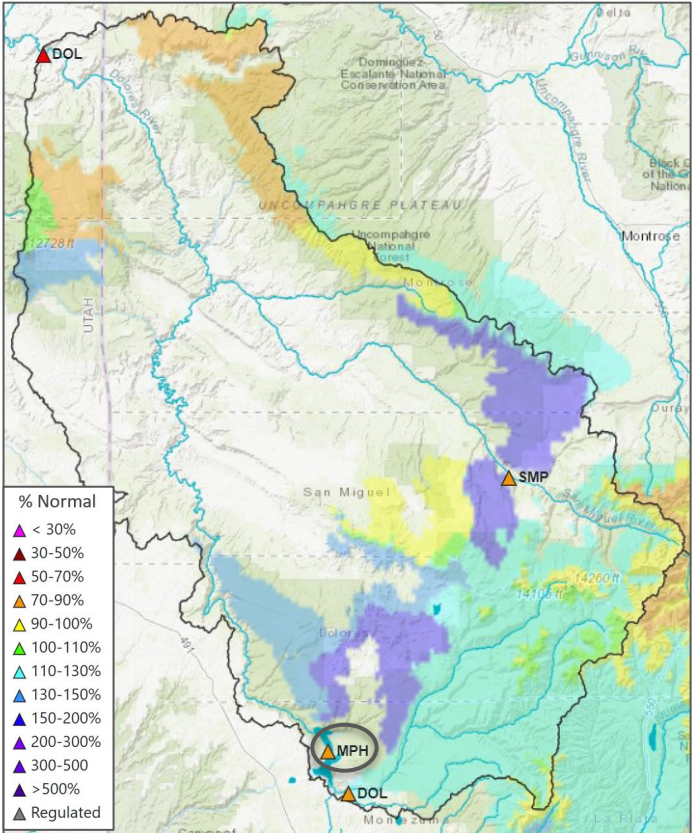
BlueMesa - Group SNOTEL Plot

BUTC2,PKKC2,PRPC2,SLMC2,SOSC2
 Ob (04-04): 19.12 in, 114% Med - Rate (in/dy): 0.22 (3-day), 0.34 (week)
 Peak (04-04): 19.12 in (111.00% Med Pk) - Med Peak (04-16): 17.19 in



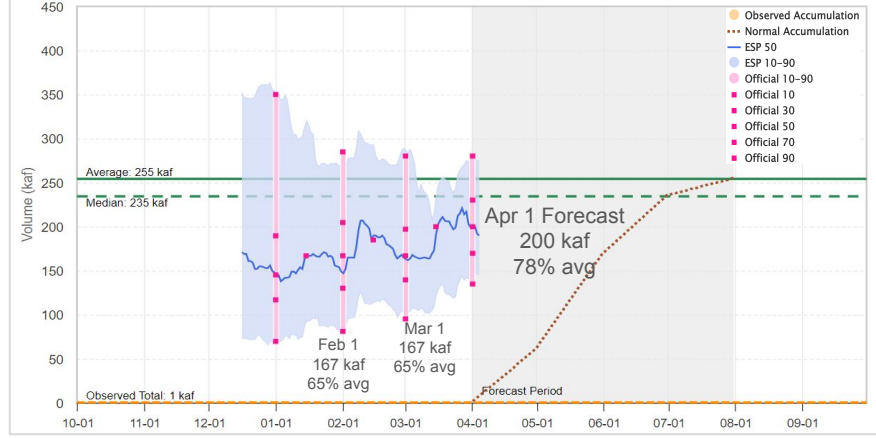
Dolores River Basin

Forecast Range: 55-80%



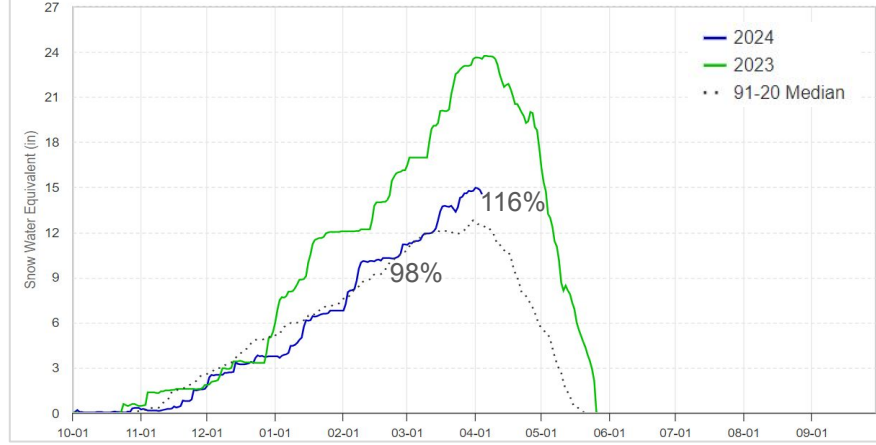
2024 Water Supply Forecast - Dolores - McPhee Reservoir (MPHC2)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-04-01): 200 kaf (78% Avg, 85% Med), (32% of Yrs Below Fcst, 30 Highest Flow / 43 Tot Yrs)
 ESP 50% Fcst (2024-04-04): 190 kaf (75% Avg, 81% Med), (30% of Yrs Below Fcst, 31 Highest Flow / 43 Tot Yrs)
 Observed Volume: 0.58 kaf (0% Average, 0% Median)



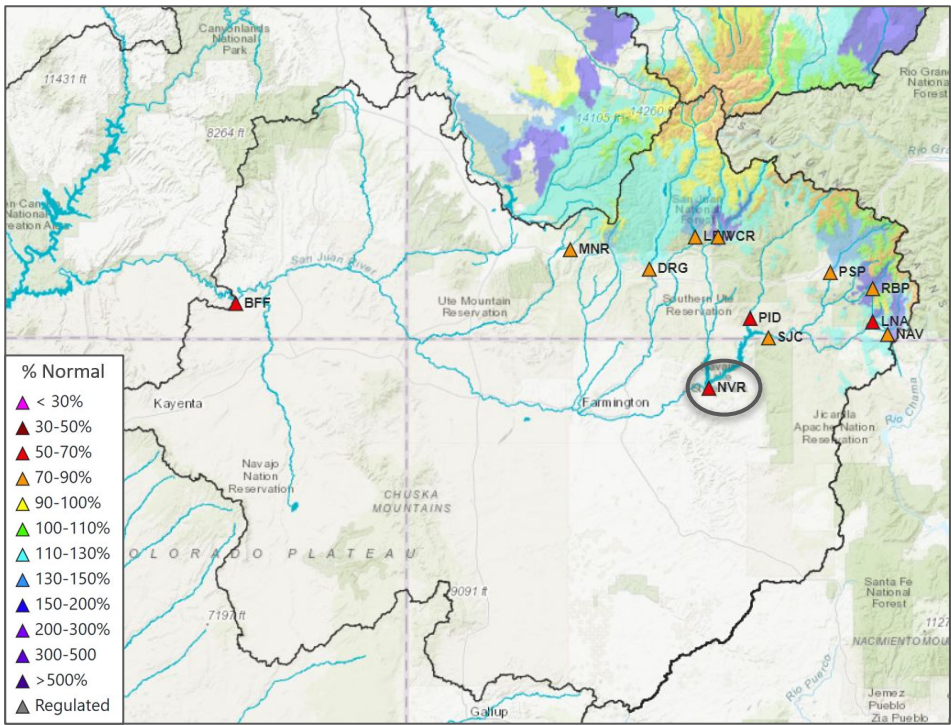
McPhee - Group SNOTEL Plot

EDSC2.LIZC2.SHSC2
 Ob (04-04): 14.53 in, 116% Med - Rate (in/dy): -0.13 (3-day), -0.08 (week)
 Peak (04-01): 14.97 in (117.00 % Med Pk) - Med Peak (03-31): 12.80 in



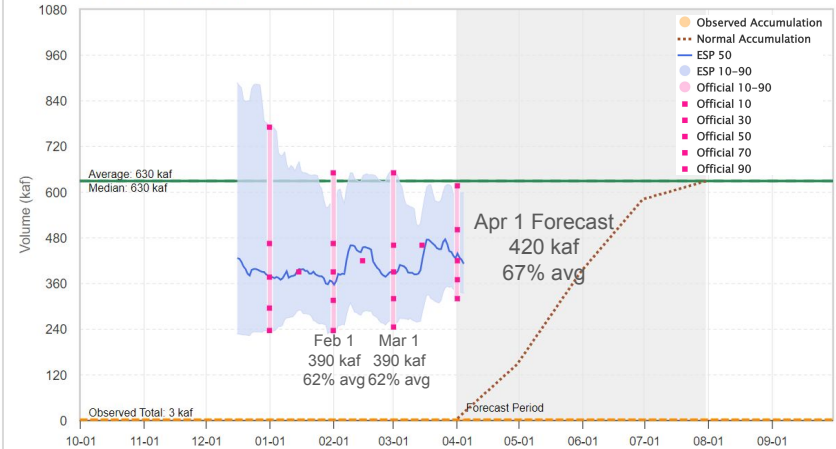
San Juan River Basin

Forecast Range: 65-80%

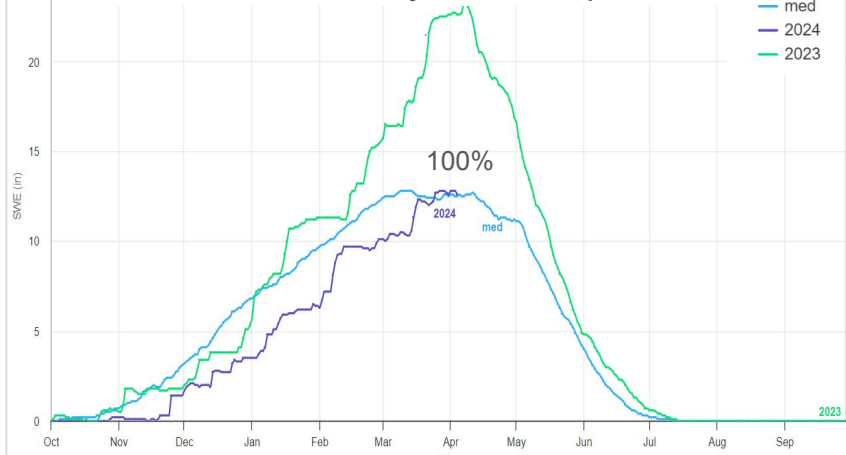


2024 Water Forecast - San Juan - Navajo Reservoir, Archuleta, Nr (NVRN5)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-04-01): 420 kaf (67% Avg, 67% Med), (30% of Yrs Below Fcst, 38 Highest Flow / 53 Tot Yrs)
 ESP 50% Fcst (2024-04-04): 411 kaf (65% Avg, 65% Med), (30% of Yrs Below Fcst, 38 Highest Flow / 53 Tot Yrs)
 Observed Volume: 3.4 kaf (1% Average, 1% Median)

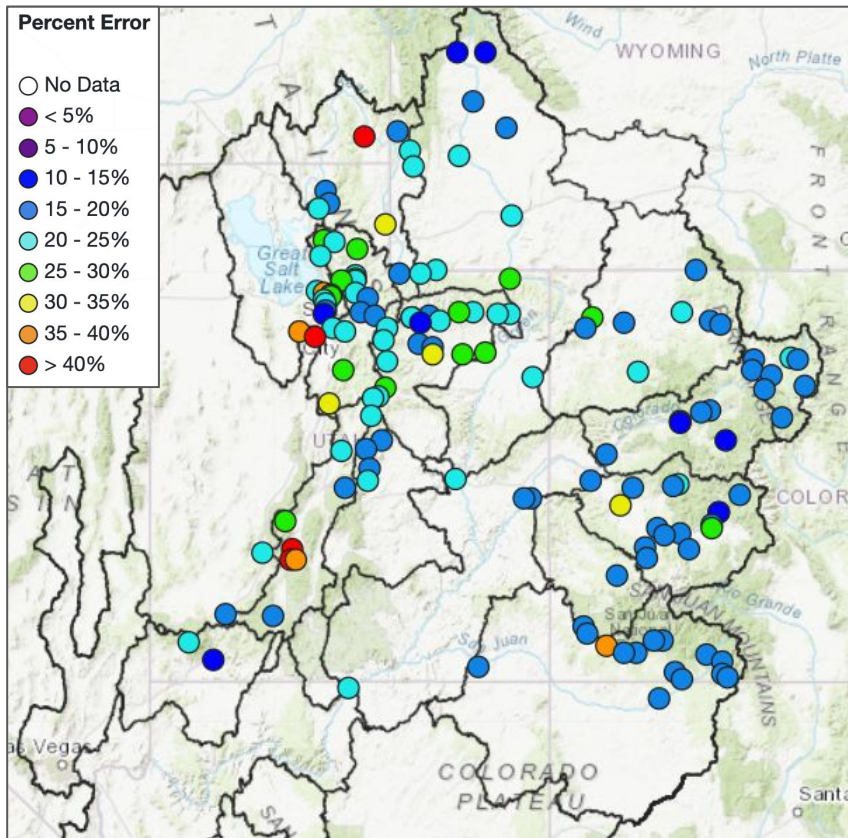


San Juan River Basin abv Navajo - Model Group SWE Plot



Historical Forecast Verification

April Forecast Error: April-July Volume



Location

Avg April Forecast Error

Green River - Warren Bridge	10%
Fontenelle Reservoir	21%
Yampa River - Deerlodge	19%
Blue River - Dillon Reservoir	15%
Colorado River - Cameo	17%
Blue Mesa Reservoir (Gunnison)	17%
McPhee Reservoir (Dolores)	17%
Navajo Reservoir (San Juan)	19%
Lake Powell	20%
Virgin River at Virgin	14%

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 water supply forecast error/uncertainty.

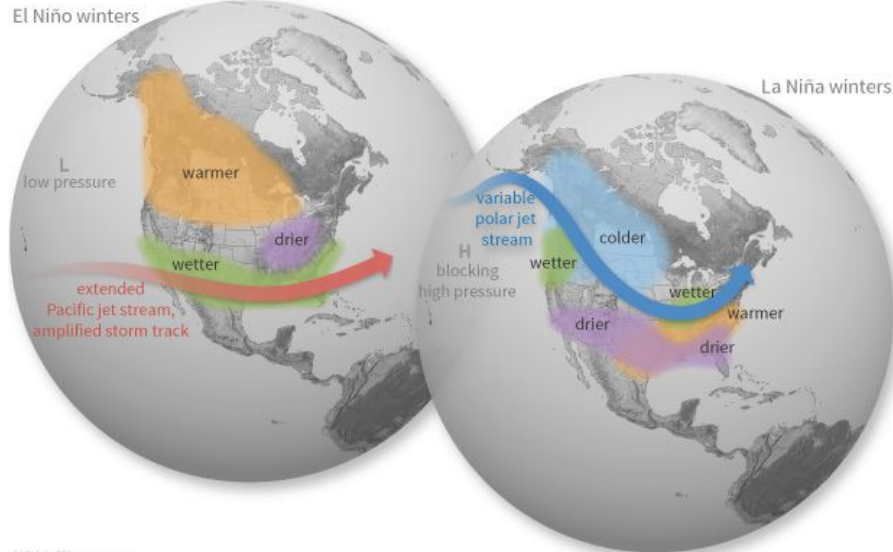
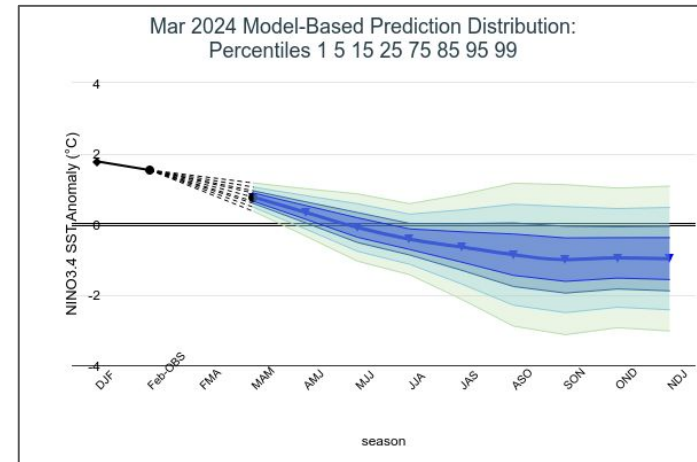
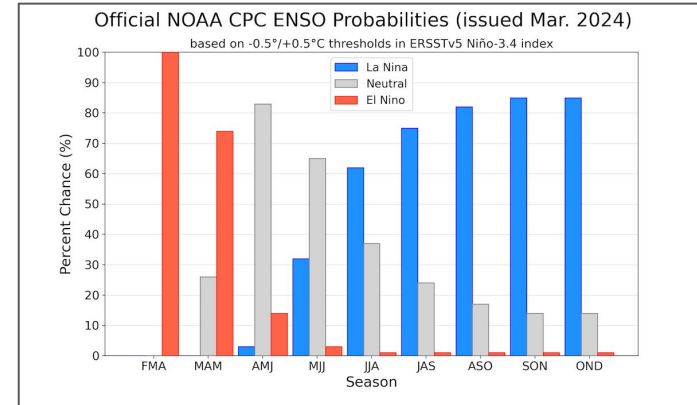
El Niño Southern Oscillation (ENSO) Status

EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by
CLIMATE PREDICTION CENTER/NCEP/NWS
14 March 2024

ENSO Alert System Status: El Niño Advisory / La Niña Watch

- A transition from El Niño to ENSO-neutral is likely by April-June 2024
 - 62% chance of La Niña developing by June-August 2024

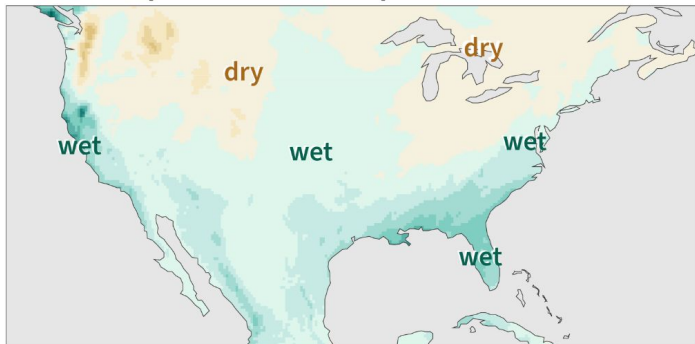


Winter 2023-2024 El Niño Summary

How well did winter precipitation match the typical El Niño pattern?

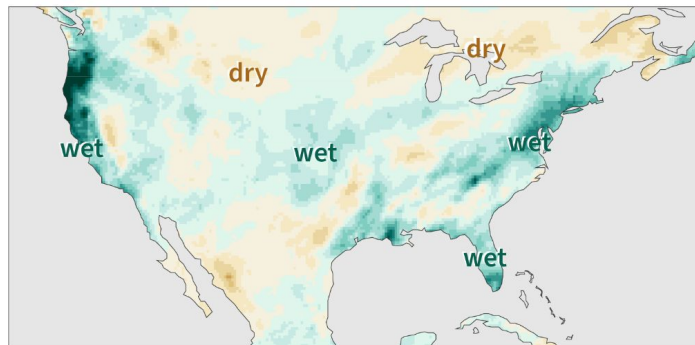
How much did El Niño influence precipitation over the United States this past winter?

Pattern expected based on past El Niños

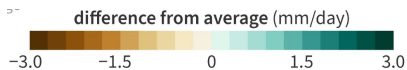


NOAA Climate.gov

Winter 2023-2024



Dec-Feb minus 1991-2020 average

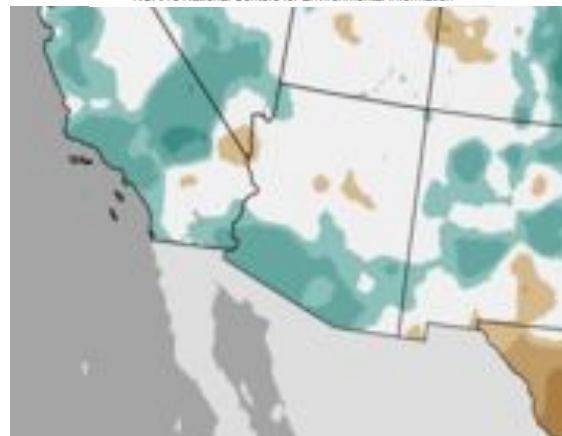


Precipitation Percent of Average

December 2023-February 2024

Average Period: 1901-2000

NOAA's National Centers for Environmental Information



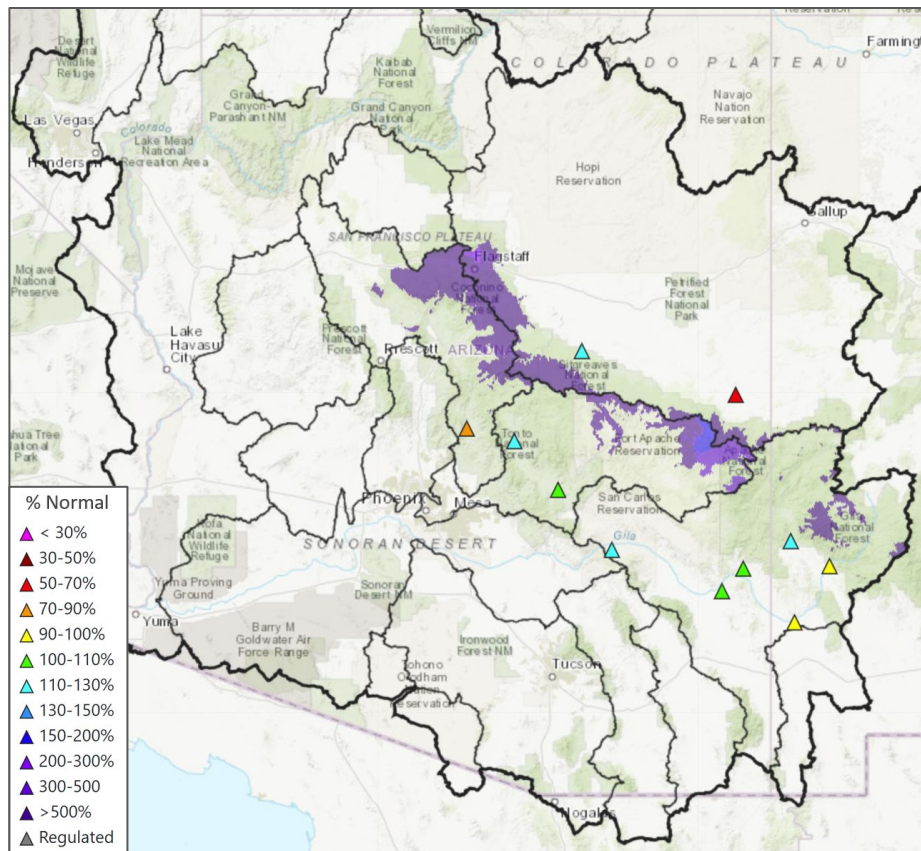
Created: Wed Mar 06 2024
Source: nClimGrid-Monthly

Percent

LCRB: Jan-May Water Supply Forecasts

Forecast Range: 55-130%

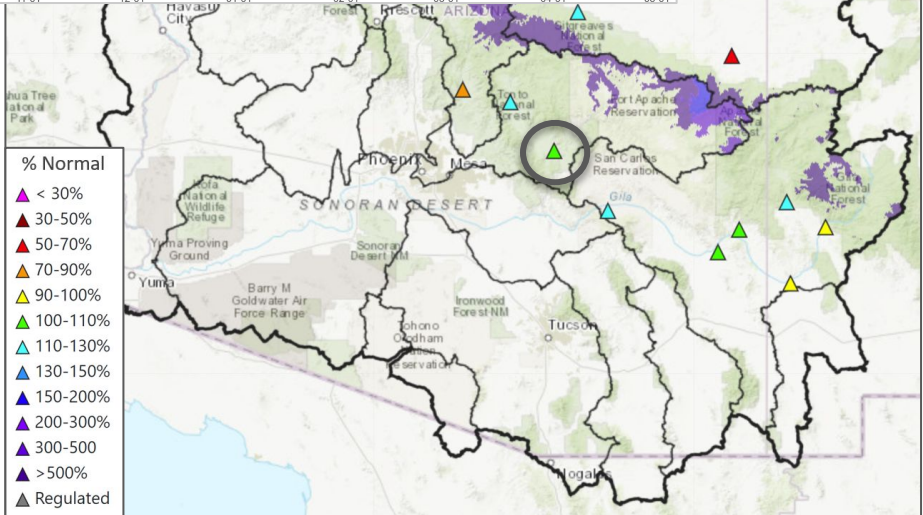
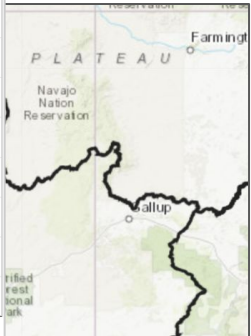
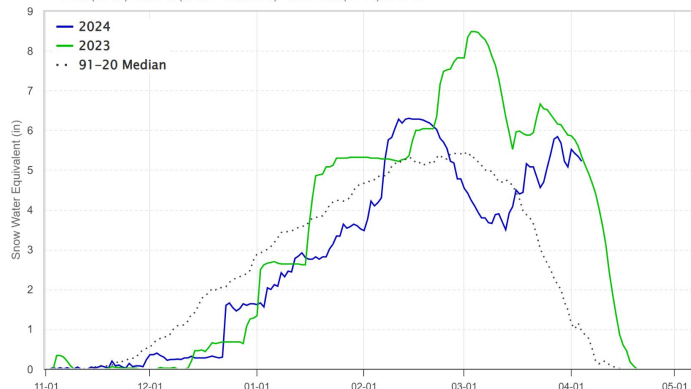
LCRB January-May volume forecasts improved during the last month due to above normal March precipitation.



ID	Vol	%Avg	%Med	%ile	Description
▲ CHWA3	18	96	129	54	Chevelon Ck - Winslow Nr Wildcat Cyn Blo
▲ CLDA3	83	42	114	52	Gila - San Carlos Reservoir Coolidge Dam At
▲ GILN5	51	72	98	56	Gila - Gila Nr
▲ GLHA3	107	49	101	51	Gila - Solomon Nr Head Of Safford Vly
▲ GSFN5	21	55	114	56	San Francisco - Glenwood Nr
▲ GVRN5	59	56	92	54	Gila - Virden Nr Blue Ck Blo
▲ LCLA3	3.3	41	56	36	Little Colorado - Lyman Lk Abv St. Johns Nr
▲ SFCA3	48	52	109	52	San Francisco - Clifton
▲ SLRA3	270	70	108	49	Salt - Roosevelt Nr
▲ TNRA3	50	62	128	55	Tonto Ck - Roosevelt Nr Gun Ck Abv
▲ VDTA3	126	46	81	45	Verde - Tangle Ck Blo Horseshoe Dam Abv

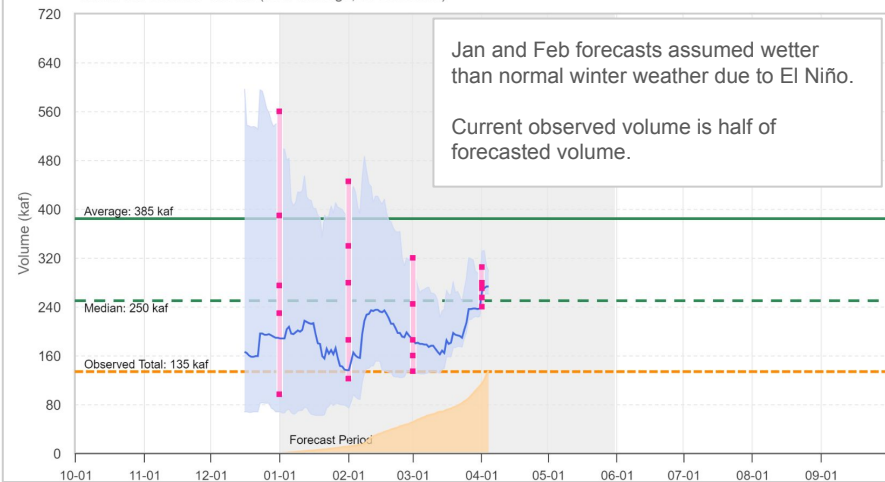
Salt River Basin

Salt River - Group SNOTEL Plot
 BLDA3,CNDA3,HNMA3,MVFA3,WCTA3
 Ob (04-04): 5.22 in, 549% Med - Rate (in/dy): -0.07 (3-day), -0.15 (week)
 Peak (10-14): 14.80 in (271.00 % Med Pk) - Med Peak (03-01): 5.46 in



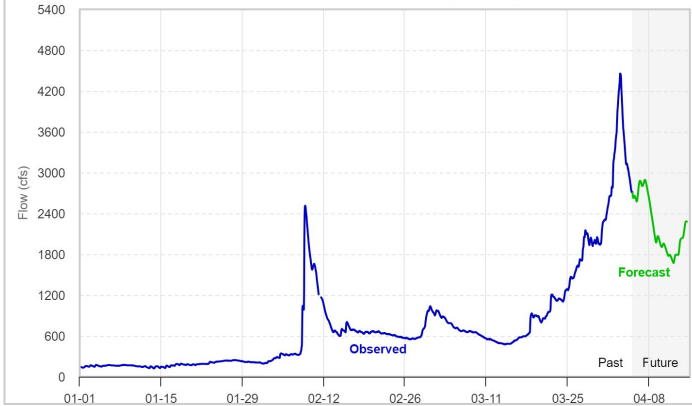
2024 Water Supply Forecast - Salt - Roosevelt, Nr (SLRA3)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-04-01): 270 kaf (70% Avg, 108% Med), (49% of Yrs Below Fcst, 57 Highest Flow / 110 Tot Yrs)
 ESP 50% Fcst (2024-04-04): 273 kaf (71% Avg, 109% Med), (50% of Yrs Below Fcst, 56 Highest Flow / 110 Tot Yrs)
 Observed Volume: 135 kaf (35% Average, 54% Median)



Forecast Hydrograph - Salt - Roosevelt, Nr (SLRA3) - NO

Fcst Date: 04/04/14Z - Latest Ob: 10.18 ft, 2713 cfs (04/05/02Z) - Flood: 30.0 ft, 124958 cfs - Ac



Upcoming Weather: 7-Day Precipitation Forecast

High pressure has been in place over the region the last several days, resulting in a period of dry and anomalously warm conditions.

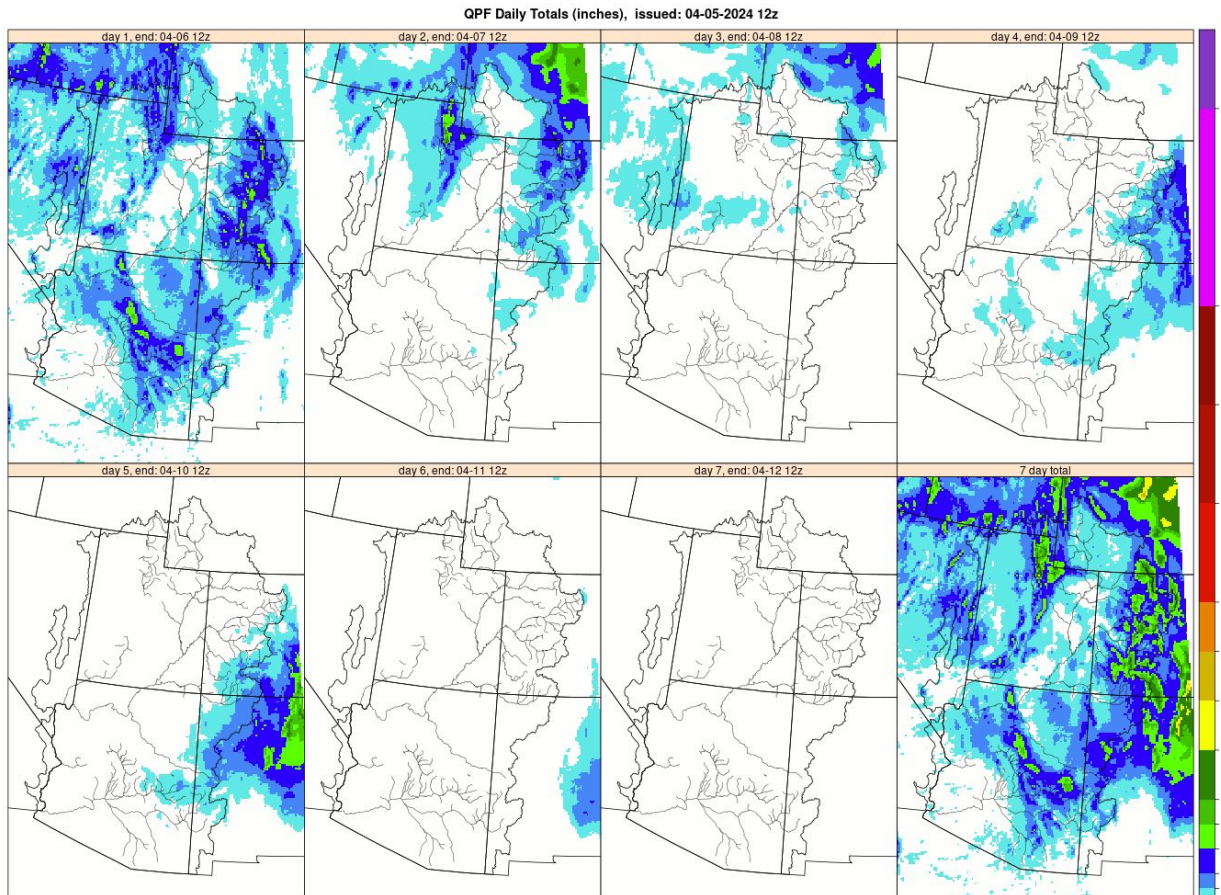
Cooler and wetter weather will impact the region this weekend/early next week.

Drier and warmer than average conditions are expected by the middle of next week into mid-April

7-Day Forecast Precipitation Totals

UCRB: 0.25" - 0.75"

LCRB: 0.10" - 0.25"



Upcoming Weather: 8-14 Day Outlook (April 12-18)

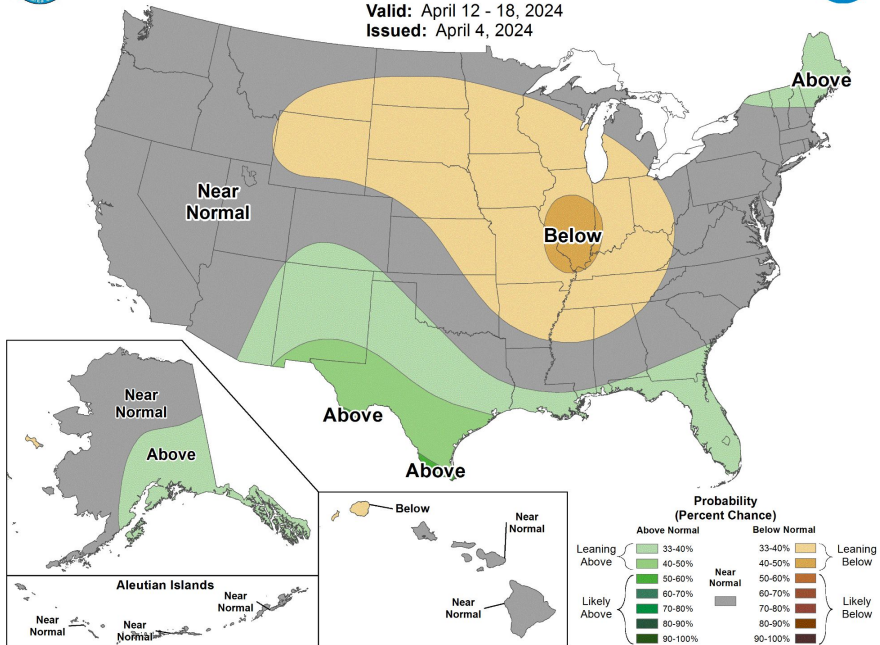
Near normal precipitation favored over most of the western US.

Above average temperatures likely.



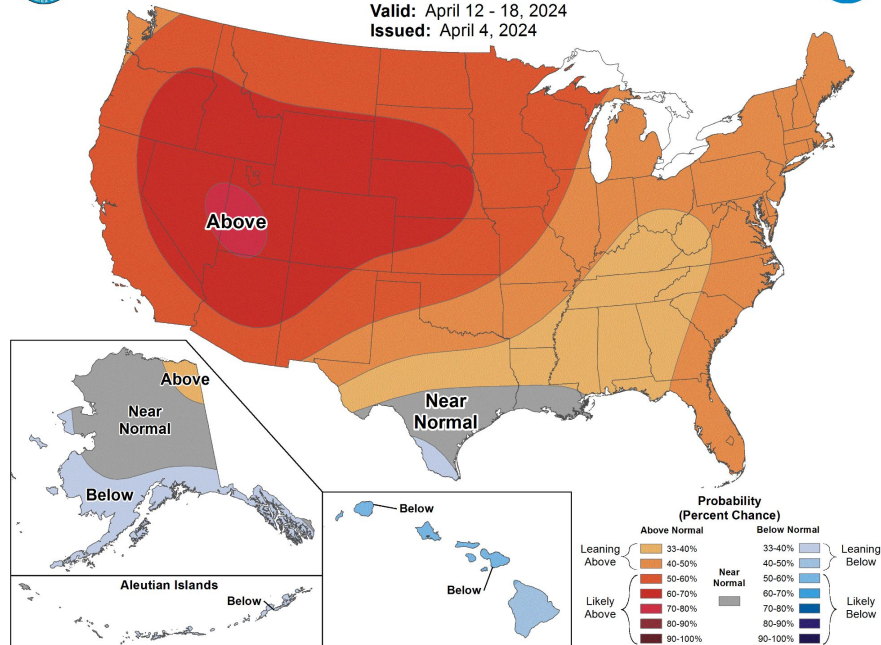
8-14 Day Precipitation Outlook

Valid: April 12 - 18, 2024
Issued: April 4, 2024



8-14 Day Temperature Outlook

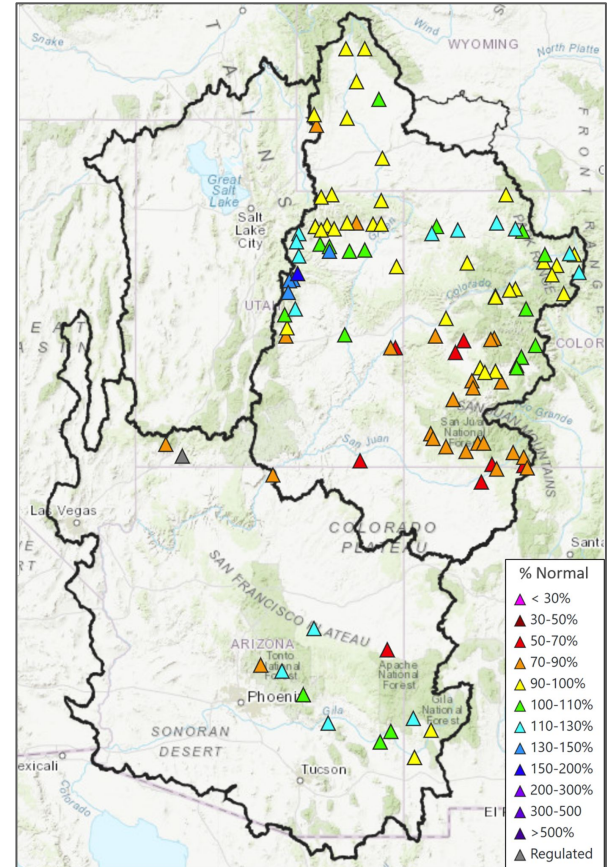
Valid: April 12 - 18, 2024
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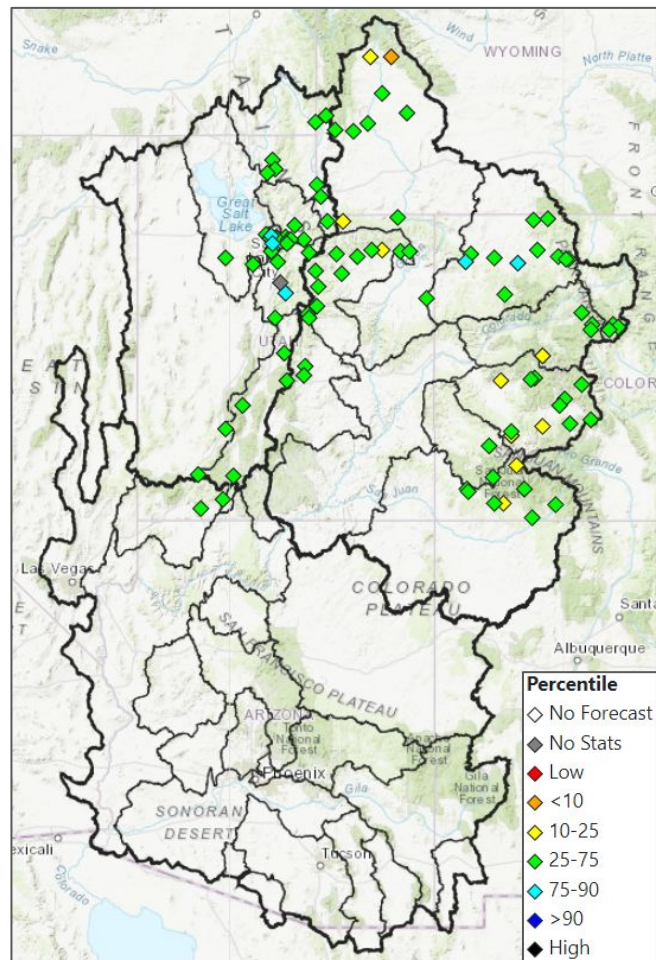
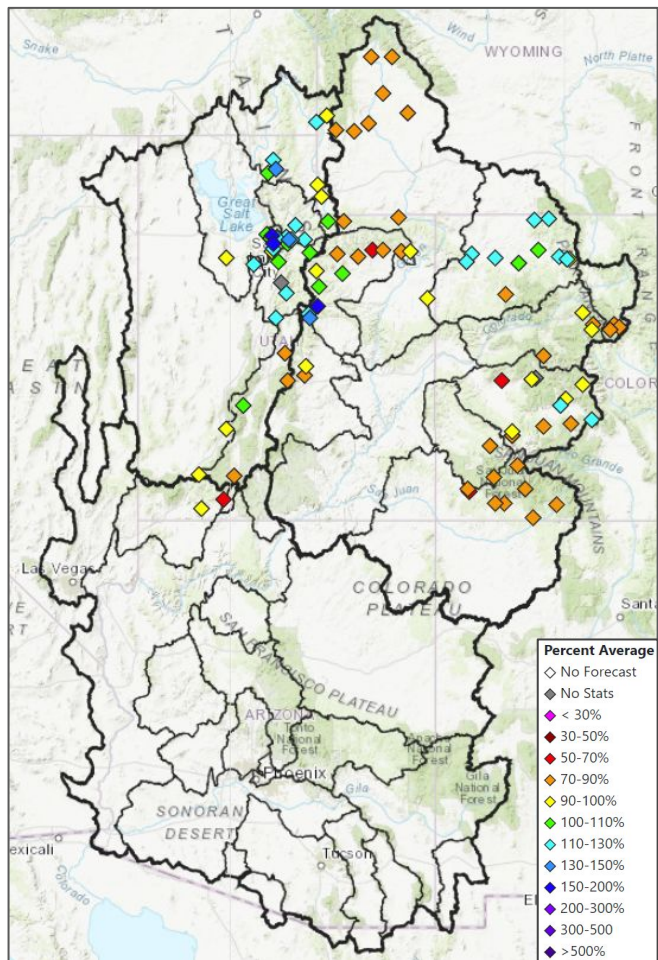
Summary

- **Above average Jan/Feb/Mar precipitation**
- **Upper Colorado**
 - Soil moisture:
 - Northern basins - near/above average
 - Southern basins - below average
 - Apr 1 SWE: 95-150%
 - April-July volume forecasts: 60-160%
- **Lower Colorado**
 - Soil moisture: below normal
 - Drier than normal El Niño across water supply areas
 - Apr 1 SWE: above normal
 - January-May volume forecasts: 55-130%
- **Weather forecast**
 - 7-day precipitation forecast (high elevations)
 - UCRB: 0.25" - 0.75"
 - LCRB: 0.10" - 0.25"

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



Peak Flow Forecasts



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

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

CBRFC Contacts & Water Year 2024 Basin Focal Points

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