

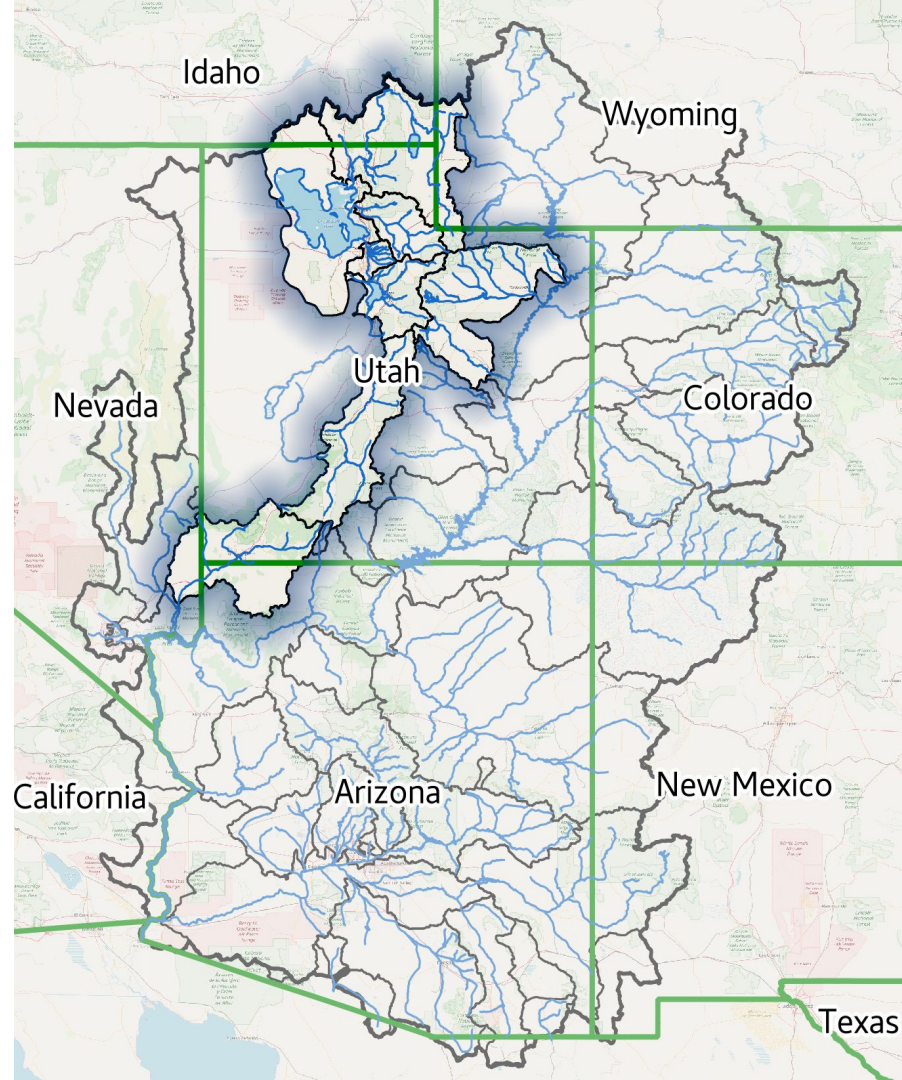
Utah Water Supply Briefing

Colorado Basin River Forecast Center

March 7, 2024

Presenter: Trevor Grout

Utah Forecasters: Brenda Alcorn
Trevor Grout
Wolfgang Hanft
Nanette Hosenfeld
Cody Moser



Presentation Overview

- Model Soil Moisture Conditions
- Precipitation Review
- Model Snow Conditions
- 2024 Water Supply Forecasts
- Early Season Forecast Error
- Upcoming Weather
- Contacts & Questions

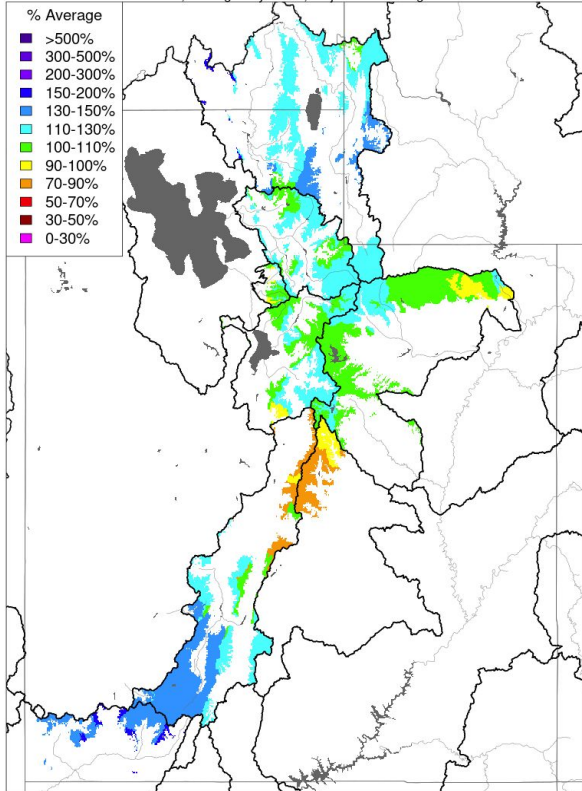
Webinar recording & slides will be made available on CBRFC webpage.

Fall Model Soil Moisture Conditions: 2023 vs. 2022

Near to above normal soils moisture conditions and better or similar conditions to last year.

Soil Moisture - Fall - 2023 (November 15)

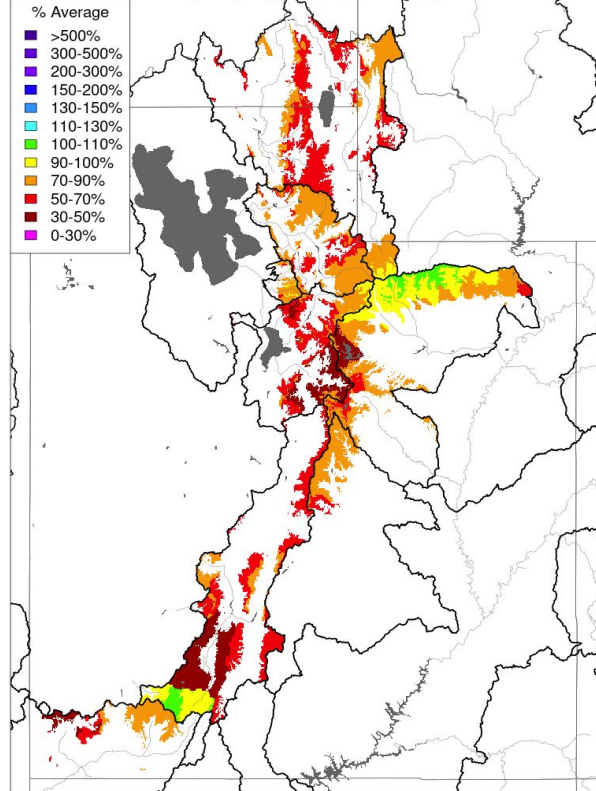
Modeled, Averaged by Basin, Major Contributing Areas



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

Soil Moisture - Fall - 2022 (November 02)

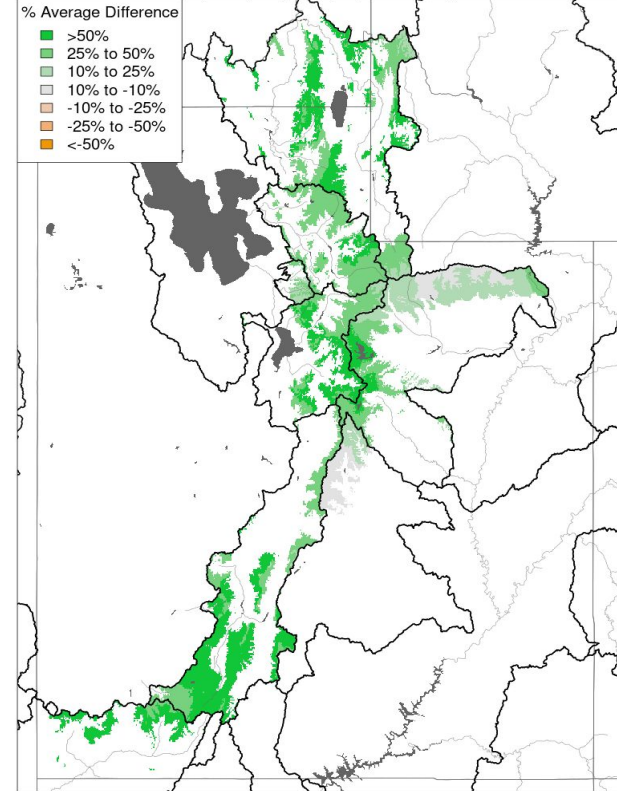
Modeled, Averaged by Basin, Major Contributing Areas



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Salt Lake City, Utah, www.cbrfc.noaa.gov

Soil Moisture - Fall - 2023 vs 2022

Modeled, Averaged by Basin, Major Contributing Areas

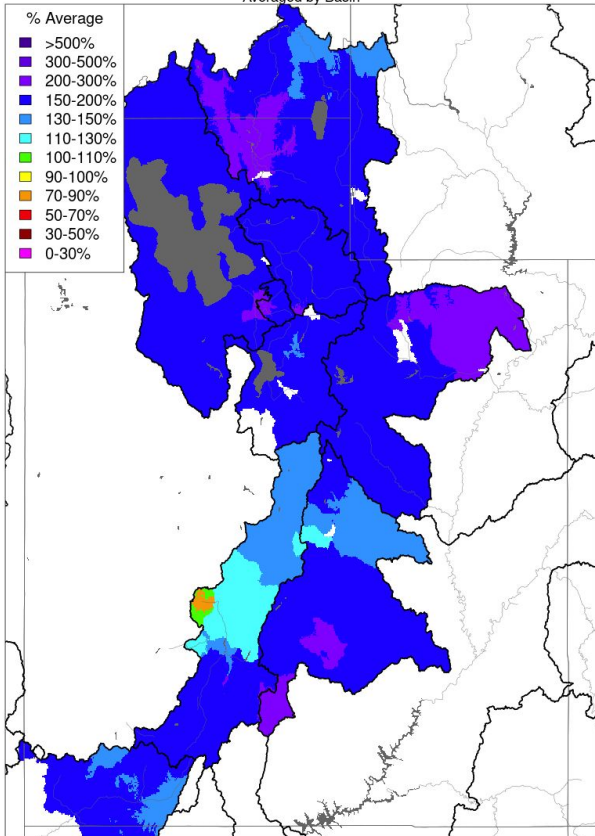


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

February 2024 Precipitation Summary

Monthly Precipitation - February 2024

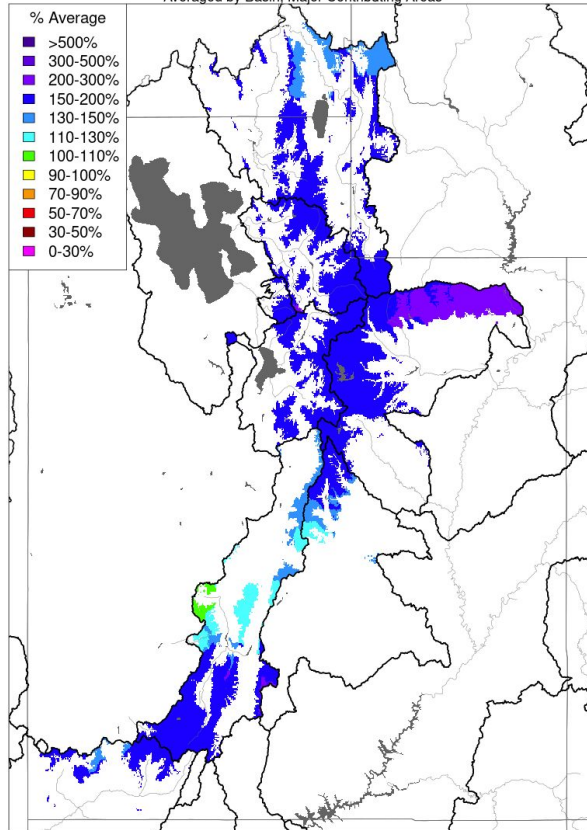
Averaged by Basin



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

Monthly Precipitation - February 2024

Averaged by Basin, Major Contributing Areas

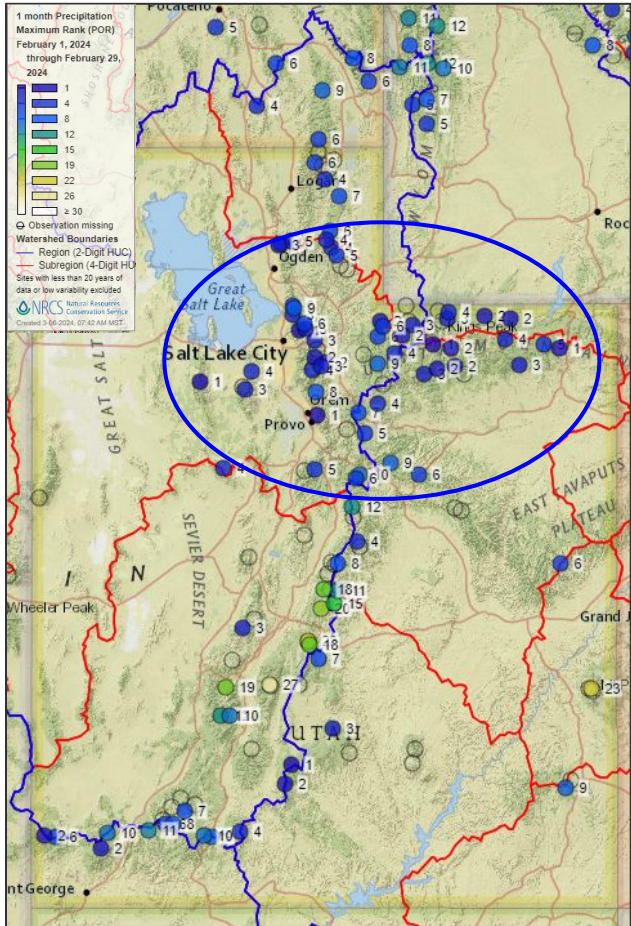


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

An active weather pattern during February resulted in above average (143%-199%) monthly precipitation across most of Utah high elevation areas

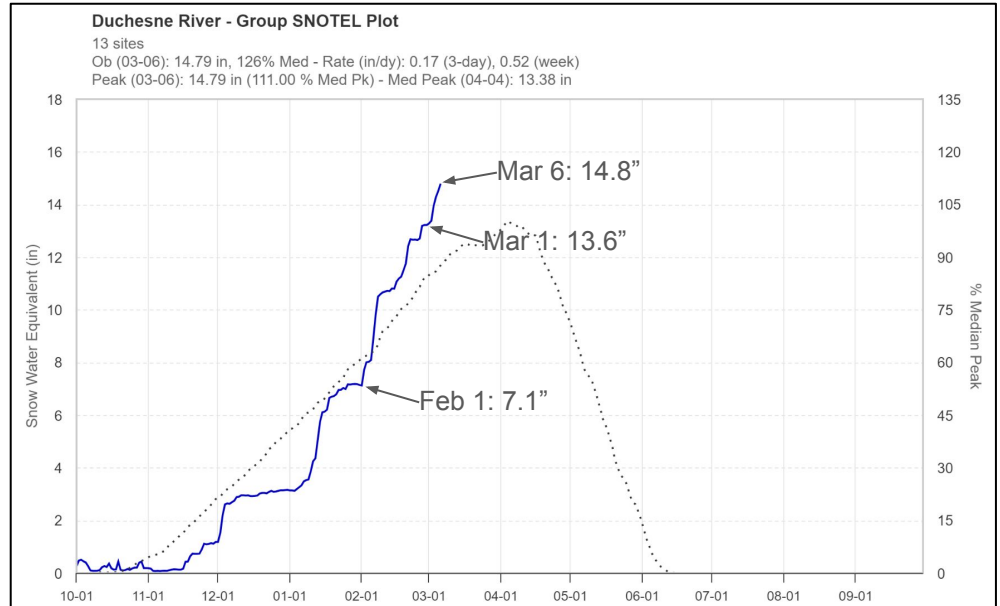
Water Year 2024 CBRFC Precipitation (Major Contributing Areas) Percent of 1991-2020 Average		
UTAH		
	Feb	Oct-Feb
Bear	163	111
Weber	181	111
Six Creeks	178	113
Provo/Utah Lake	170	106
Duchesne	199	102
Price/San Rafael	154	104
Sevier	143	87
Virgin	154	83

February 2024 Precipitation Summary



Many SNOTEL stations received February precipitation totals that rank in the top 5 of their period of record.

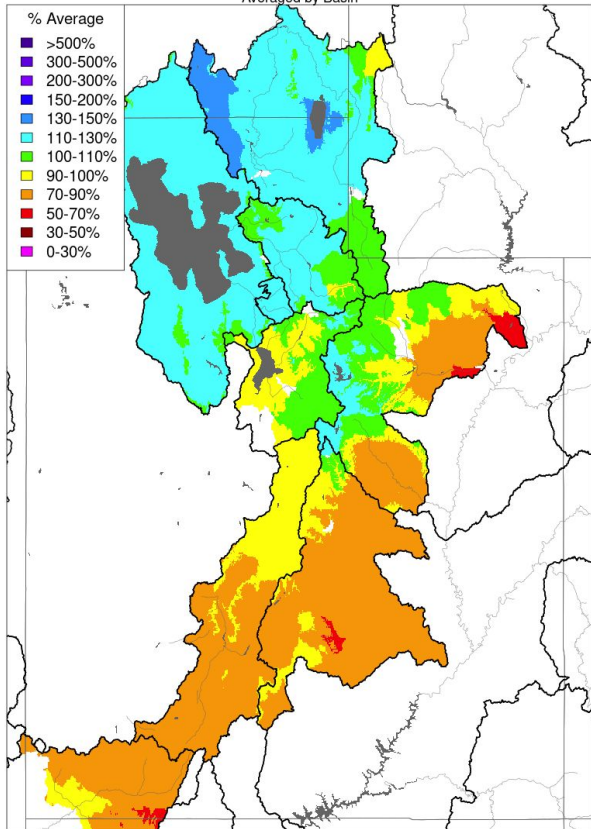
Most of these stations are located along the Wasatch Front and the Uinta Mountains.



Water Year 2024 Precipitation Summary

Water Year Precipitation, October 2023 - February 2024

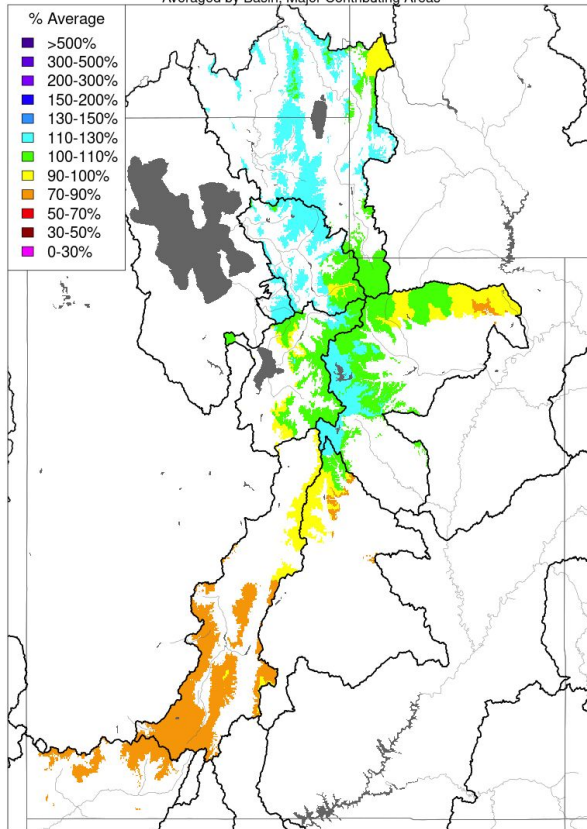
Averaged by Basin



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

Water Year Precipitation, October 2023 - February 2024

Averaged by Basin, Major Contributing Areas



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

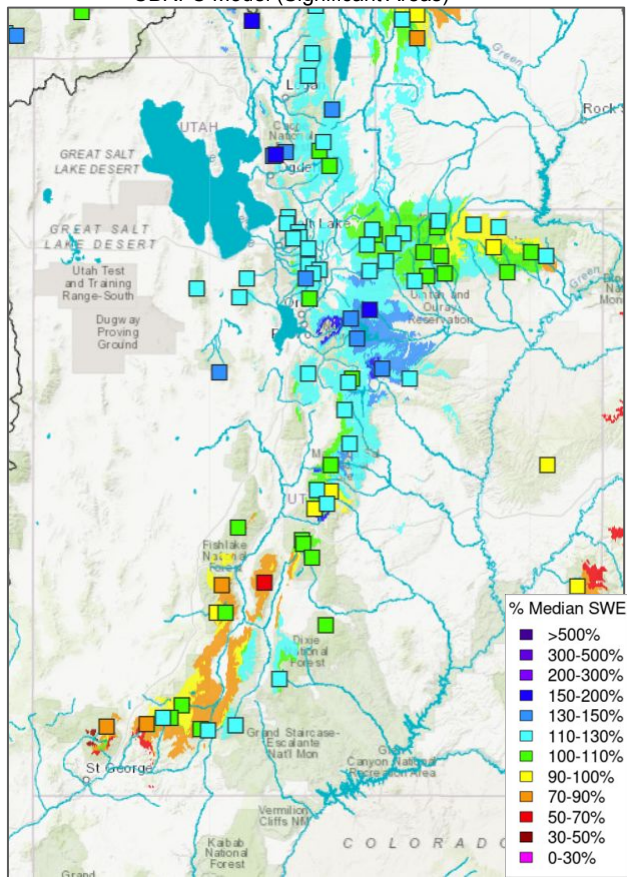
Water year 2024 precipitation (October-February) is slightly below normal to above normal (83% - 113%)

Water Year 2024 CBRFC Precipitation (Major Contributing Areas) Percent of 1991-2020 Average		
UTAH		
	<u>Feb</u>	<u>Oct-Feb</u>
Bear	163	111
Weber	181	111
Six Creeks	178	113
Provo/Utah Lake	170	106
Duchesne	199	102
Price/San Rafael	154	104
Sevier	143	87
Virgin	154	83

Snowpack Conditions

March 1 SWE Conditions

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



Utah river basins had improved SWE conditions during February. Many areas were above normal (83% - 119%).

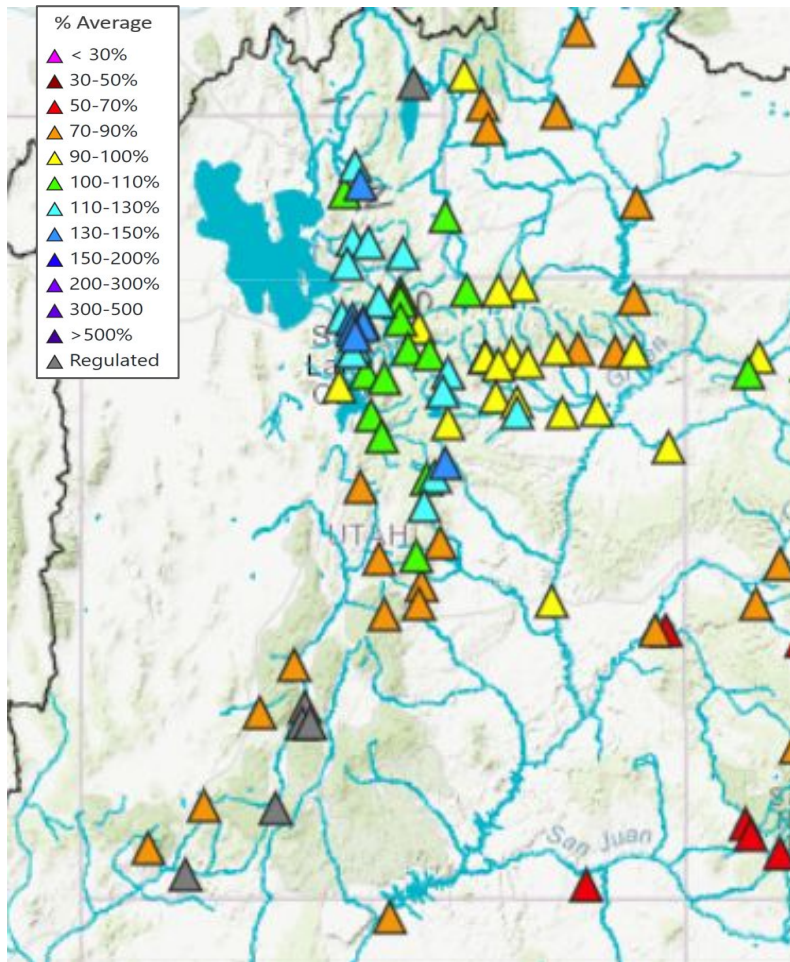
Water Year 2024 CBRFC Model SWE (Major Contributing Areas) Percent of 1991-2020 Median

UTAH

	<u>Feb1</u>	<u>Mar1</u>	<u>Change</u>
Bear	92	111	19
Weber	86	115	29
Six Creeks	90	113	23
Provo/Utah Lake	85	119	34
Duchesne	70	110	40
Price/San Rafael	95	116	21
Sevier	81	98	17
Virgin	43	83	40

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

Utah Water Supply Forecasts: Overview



Utah April-July volume forecasts are range from slightly below normal to above normal.

Forecasts are more favorable in areas that have:

- better soil moisture conditions
- better snowpack conditions

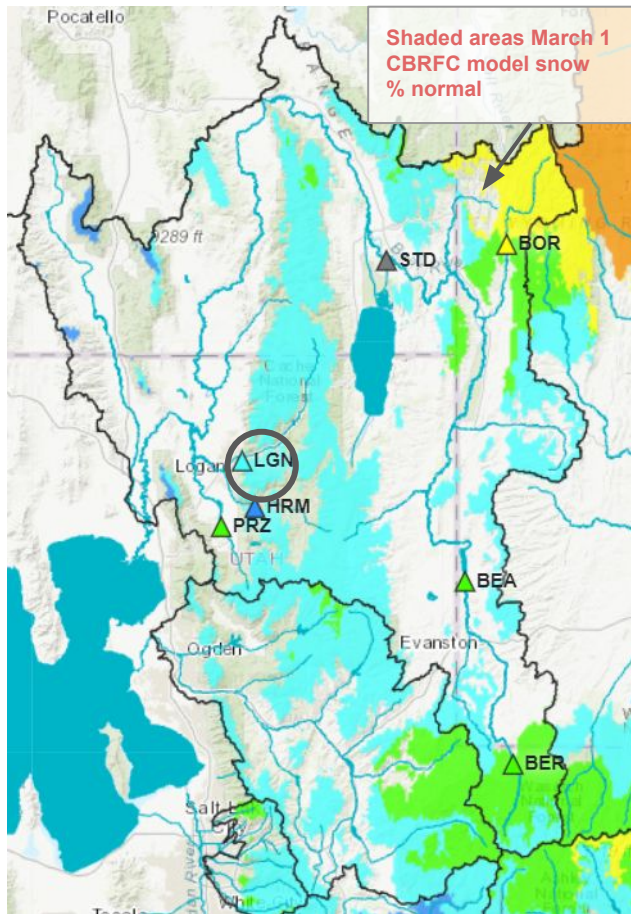
Colorado Basin River Forecast Center Water Supply Forecasts March 1, 2024

UTAH			
Basin	Volume (KAF)	%Normal (1991-2020)	Period
Bear-UT/WY State Line	110	101	Apr-Jul
Weber-Oakley	111	100	Apr-Jul
Big Cottonwood Creek	38	112	Apr-Jul
Provo-Woodland	100	104	Apr-Jul
Duchesne-Tabiona	100	97	Apr-Jul
Sevier-Hatch (*Regulated)	42	88	Apr-Jul
Virgin-Virgin (*Regulated)	50	89	Apr-Jul

KAF = thousand acre-feet

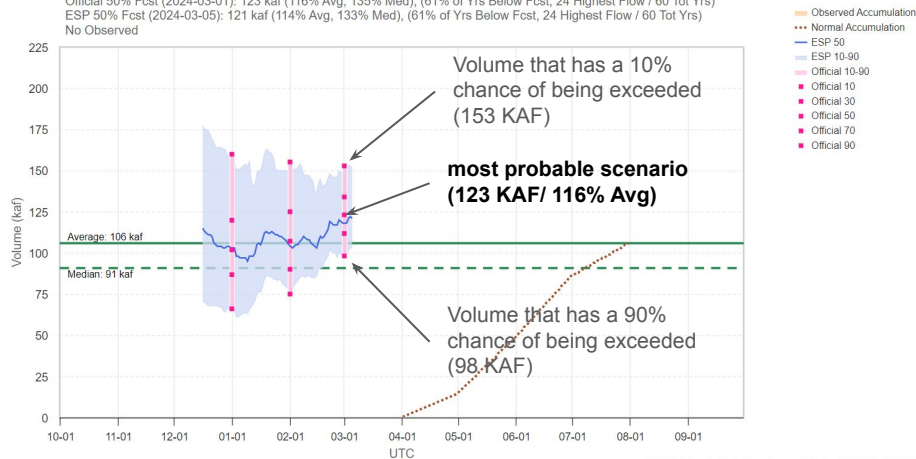
Bear River Basin

Forecast Range: 98% -135%



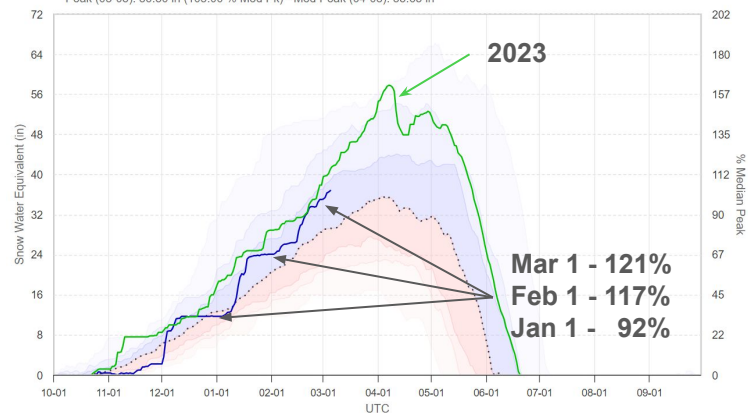
2024 Water Supply Forecast - Logan - Logan, Nr, State Dam, Abv (LGNU1)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 123 kaf (116% Avg, 135% Med), (61% of Yrs Below Fcst, 24 Highest Flow / 60 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 121 kaf (114% Avg, 133% Med), (61% of Yrs Below Fcst, 24 Highest Flow / 60 Tot Yrs)
 No Observed



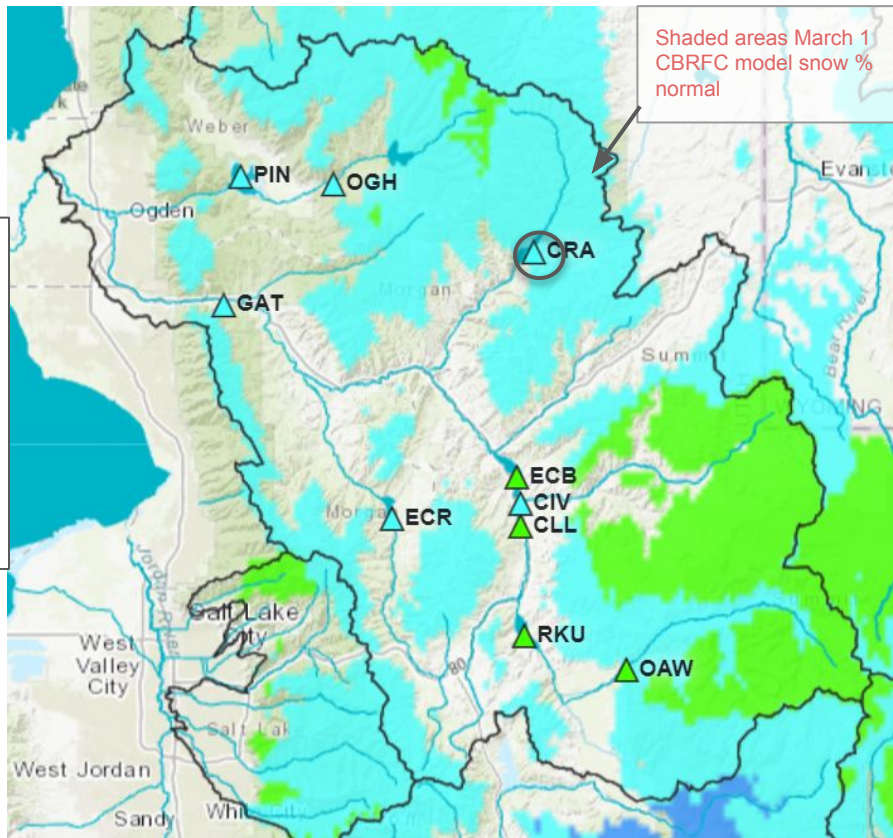
SNOTEL Plot - Tony Grove Lake (TGLU1) - 8386 ft

Ob (03-05): 36.80 in, 125% Med - Rate (in/day): 0.17 (3-day), 0.60 (week)
 Percentile: 69, Wet Rank: 14, Dry Rank: 33, Tot Yrs: 46
 Peak (03-05): 36.80 in (103.00% Med Pk) - Med Peak (04-03): 35.65 in



Weber River Basin

Forecast Range: 100% -122%



- % Average
- ▲ < 30%
- ▲ 30-50%
- ▲ 50-70%
- ▲ 70-90%
- ▲ 90-100%
- ▲ 100-110%
- ▲ 110-130%
- ▲ 130-150%
- ▲ 150-200%
- ▲ 200-300%
- ▲ 300-500
- ▲ >500%
- ▲ Regulated

2024 Water Supply Forecast - Lost Ck - Lost Ck Reservoir, Croyden, Nr (CRAU1)

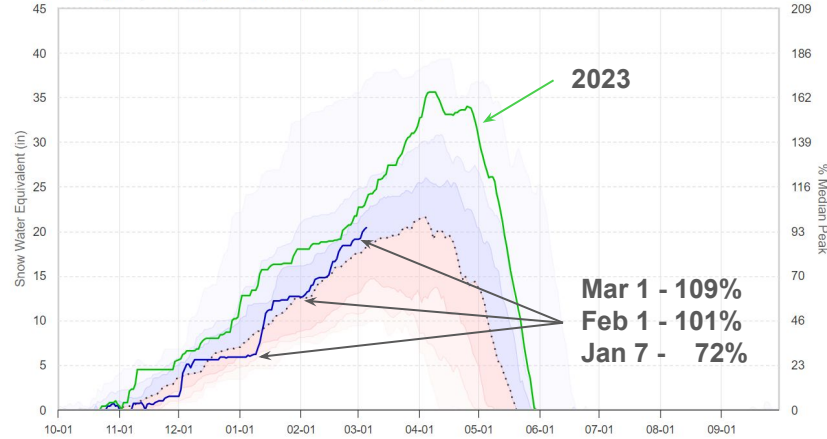
ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 14.5 kaf (113% Avg, 153% Med), (80% of Yrs Below Fcst, 18 Highest Flow / 43 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 15.1 kaf (118% Avg, 159% Med), (82% of Yrs Below Fcst, 17 Highest Flow / 43 Tot Yrs)
 No Observed



- Observed Accumulation
- ... Normal Accumulation
- ESP 50
- ESP 10-90
- Official 10-90
- Official 10
- Official 30
- Official 50
- Official 70
- Official 90

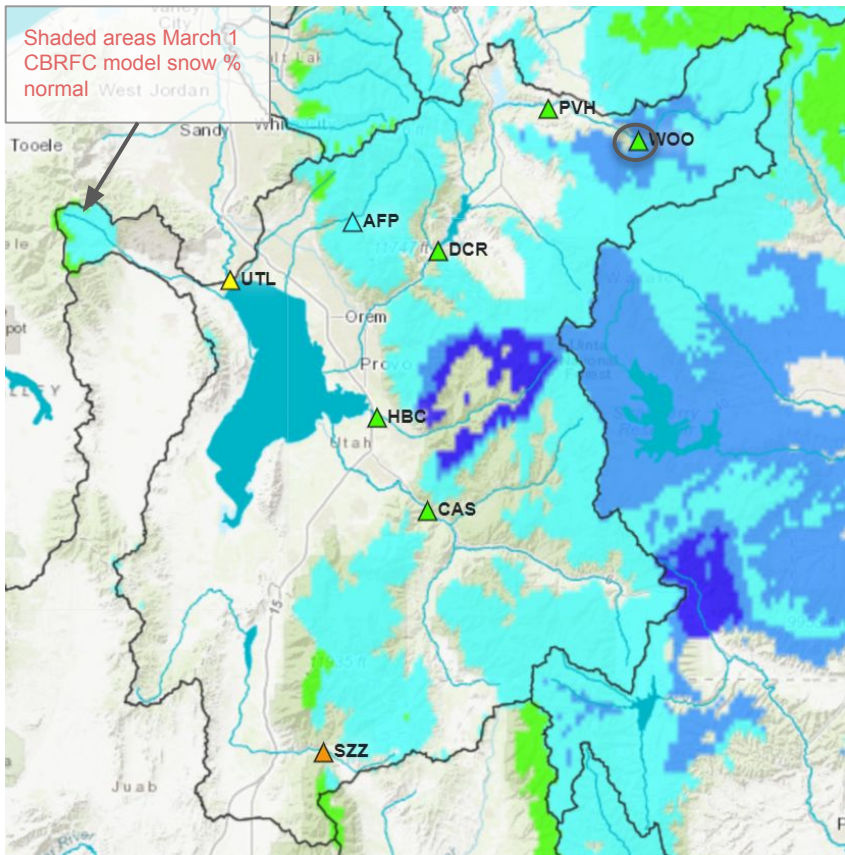
SNOTEL Plot - Horse Ridge (HRGU1) - 8160 ft

Ob (03-05): 20.40 in, 111% Med - Rate (in/day): 0.17 (3-day), 0.43 (week)
 Percentile: 56, Wet Rank: 20, Dry Rank: 27, Tot Yrs: 46
 Peak (03-05): 20.40 in (95.00 % Med Pk) - Med Peak (04-03): 21.55 in



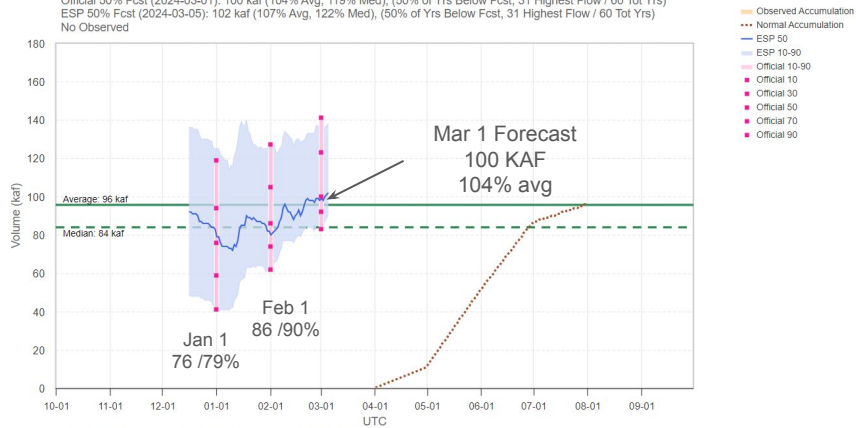
Provo River Basin

Forecast Range: 82% -108%



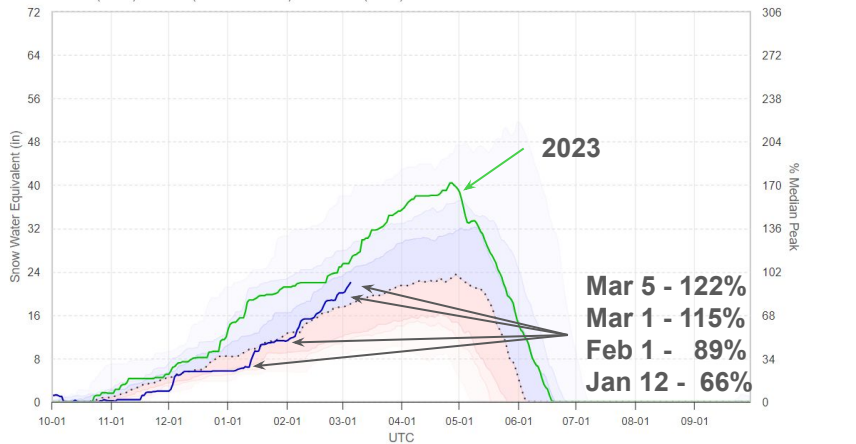
2024 Water Supply Forecast - Provo - Woodland, Nr (WOOU1)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 100 kaf (104% Avg, 119% Med), (50% of Yrs Below Fcst, 31 Highest Flow / 60 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 102 kaf (107% Avg, 122% Med), (50% of Yrs Below Fcst, 31 Highest Flow / 60 Tot Yrs)
 No Observed



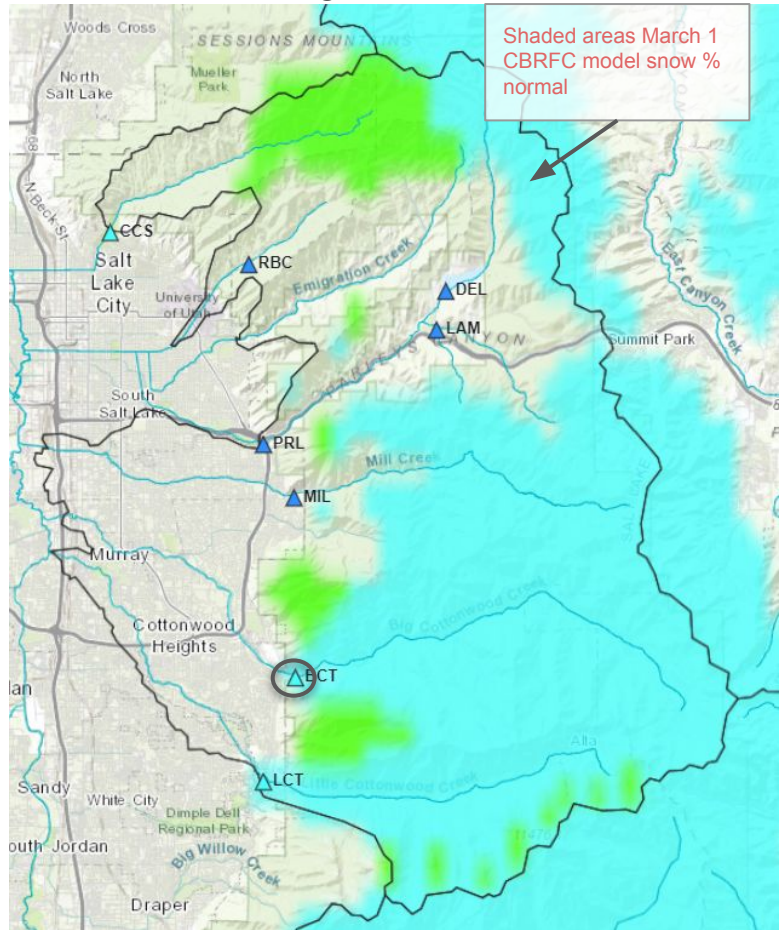
SNOTEL Plot - Trial Lake (TRLU1) - 9992 ft

Ob (03-05): 22.00 in, 121% Med - Rate (in/dy): 0.33 (3-day), 0.63 (week)
 Percentile: 69, Wet Rank: 14, Dry Rank: 33, Tot Yrs: 46
 Peak (03-05): 22.00 in (94.00 % Med Pk) - Med Peak (04-29): 23.50 in



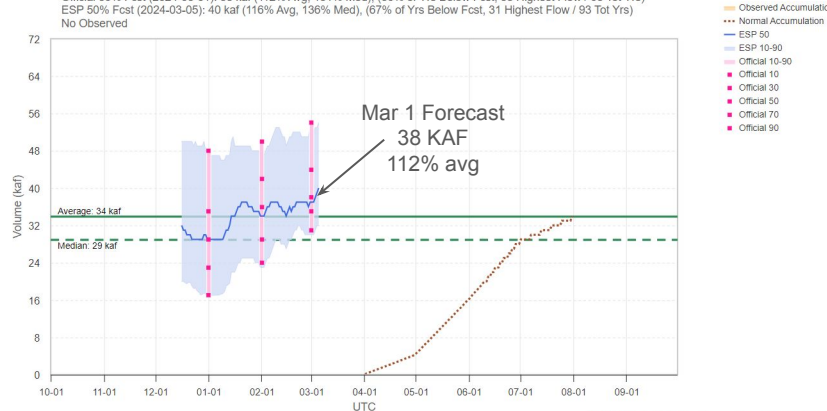
Six Creeks Basin

Forecast Range: 111% - 135%



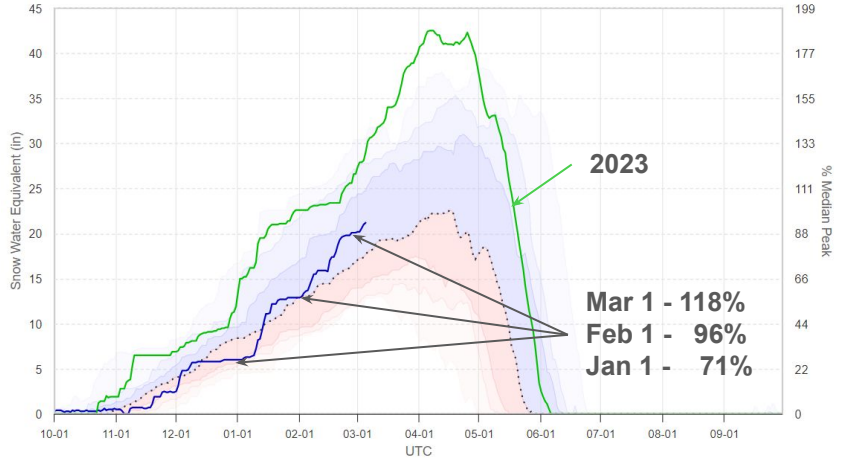
2024 Water Supply Forecast - Big Cottonwood Ck - Salt Lake City, Nr (BCTU1)

ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 38 kaf (112% Avg, 131% Med), (60% of Yrs Below Fcst, 38 Highest Flow / 93 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 40 kaf (116% Avg, 136% Med), (67% of Yrs Below Fcst, 31 Highest Flow / 93 Tot Yrs)
 No Observed



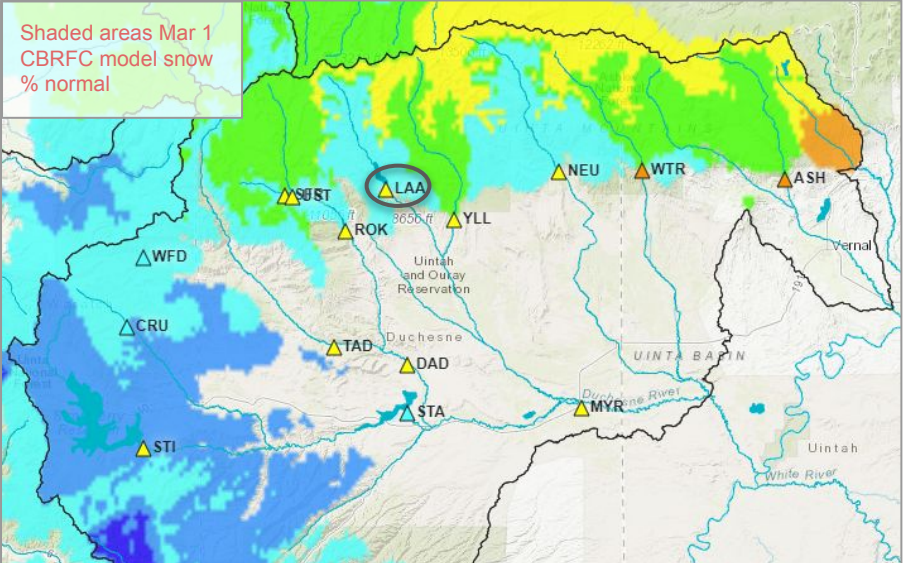
SNOTEL Plot - Brighton (BRIU1) - 8750 ft

Ob (03-05): 21.20 in, 119% Med - Rate (in/dy): 0.20 (3-day), 0.37 (week)
 Percentile: 63, Wet Rank: 14, Dry Rank: 25, Tot Yrs: 38
 Peak (03-05): 21.20 in (94.00 % Med Pk) - Med Peak (04-16): 22.60 in



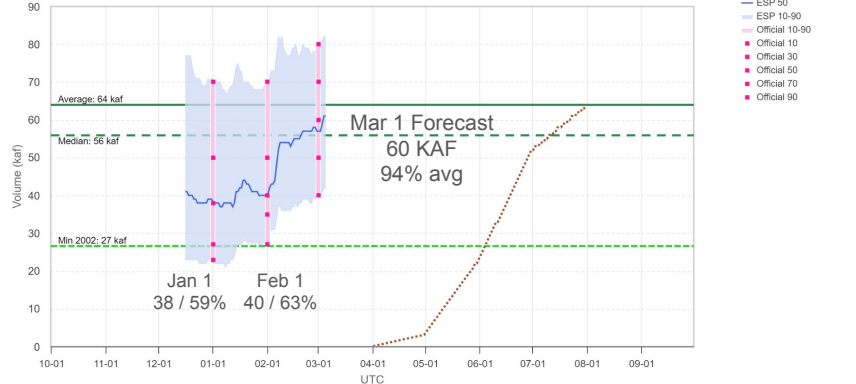
Duchesne River Basin

Forecast Range: 90% -115%



2024 Water Supply Forecast - Lake Fork - Moon Lake Reservoir, Mtn Home, Nr (LAAU1)

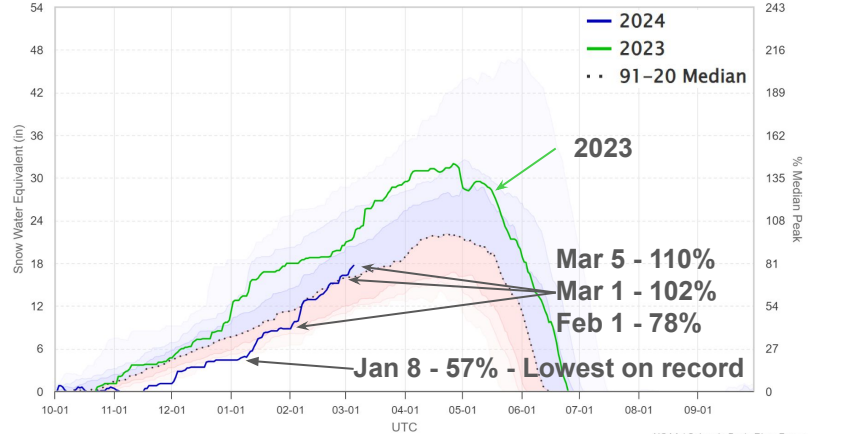
ESP is Unregulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 60 kaf (94% Avg, 107% Med), (44% of Yrs Below Fcst, 46 Highest Flow / 81 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 61 kaf (95% Avg, 108% Med), (46% of Yrs Below Fcst, 44 Highest Flow / 81 Tot Yrs)
 No Observed



NOAA / Colorado Basin River Forecast Center / 2024-03-05 23:20Z

SNOTEL Plot - Lakefork Basin (LBNU1) - 10966 ft

Ob (03-05): 17.70 in, 110% Med - Rate (in/day): 0.20 (3-day), 0.47 (week)
 Percentile: 59, Wet Rank: 15, Dry Rank: 23, Tot Yrs: 37
 Peak (03-05): 17.70 in (80.00 % Med Pk) - Med Peak (04-23): 22.20 in



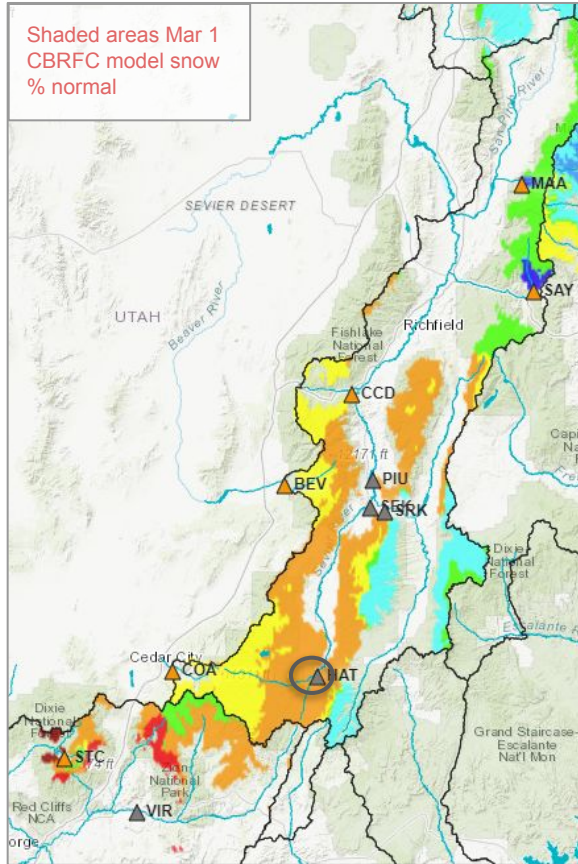
NOAA / Colorado Basin River Foreca

Virgin and Sevier River Basins

Forecast Range: 75% -125%

Shaded areas Mar 1
CBRFC model snow
% normal

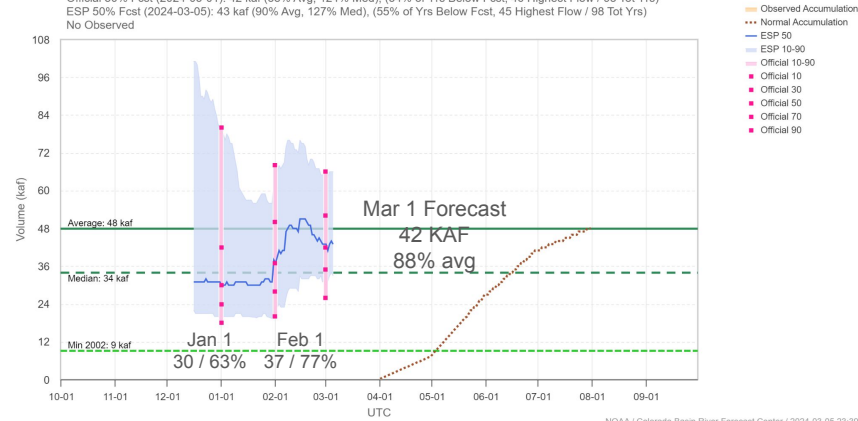
- ▲ % Average
- ▲ < 30%
- ▲ 30-50%
- ▲ 50-70%
- ▲ 70-90%
- ▲ 90-100%
- ▲ 100-110%
- ▲ 110-130%
- ▲ 130-150%
- ▲ 150-200%
- ▲ 200-300%
- ▲ 300-500%
- ▲ >500%
- ▲ Regulated



*Regulated Forecasts

2024 Water Supply Forecast - Sevier - Hatch (HATU1)

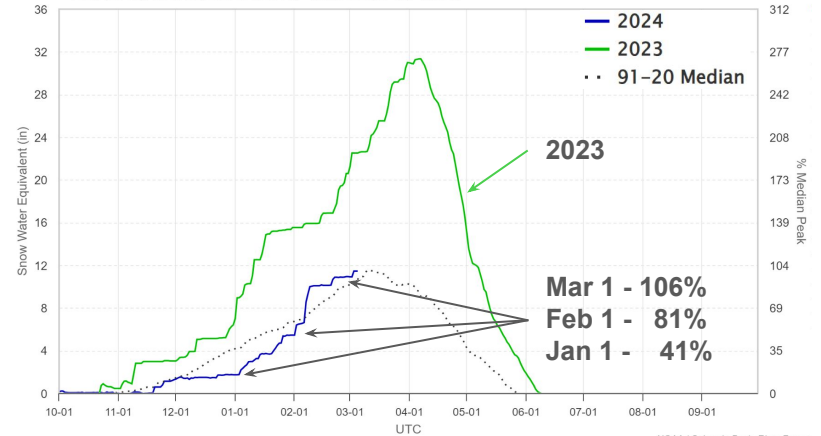
ESP is Regulated and No Precipitation Forecast Included
 Official 50% Fcst (2024-03-01): 42 kaf (88% Avg, 124% Med), (54% of Yrs Below Fcst, 46 Highest Flow / 98 Tot Yrs)
 ESP 50% Fcst (2024-03-05): 43 kaf (90% Avg, 127% Med), (55% of Yrs Below Fcst, 45 Highest Flow / 98 Tot Yrs)
 No Observed



NOAA / Colorado Basin River Forecast Center / 2024-03-05 23:39Z

Sevier River Basin Headwaters - Group SNOTEL Plot

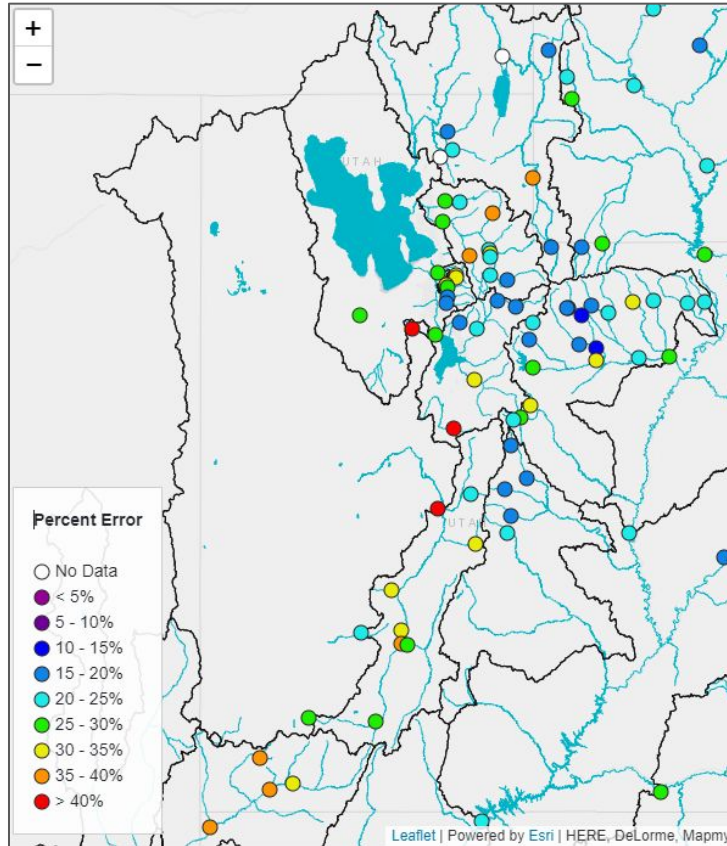
CVYU1,HRSU1,LVJU1,MDVU1,WFLU1
 Ob (03-05): 11.46 in, 106% Med - Rate (in/dy): 0.00 (3-day), 0.17 (week)
 Peak (03-03): 11.46 in (99.00% Med Pk) - Med Peak (03-10): 11.55 in



NOAA / Colorado Basin River Foreca

Historical Forecast Verification

March Forecast Error: April-July Volume



Location

BEAR - UTAH-WYOMING STATE
BEAR - WOODRUFF NARROWS
LOGAN - LOGAN- NR
WEBER - OAKLEY- NR
WEBER - ROCKPORT RES
BIG COTTONWOOD CK
PROVO - WOODLAND- NR
PROVO - DEER CK RES
VIRGIN - VIRGIN

Mar 1 Forecast Error

18%
36%
19%
17%
24%
19%
16%
23%
31%

Error tends to decrease each month into the spring

Where Forecasts are Better:

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

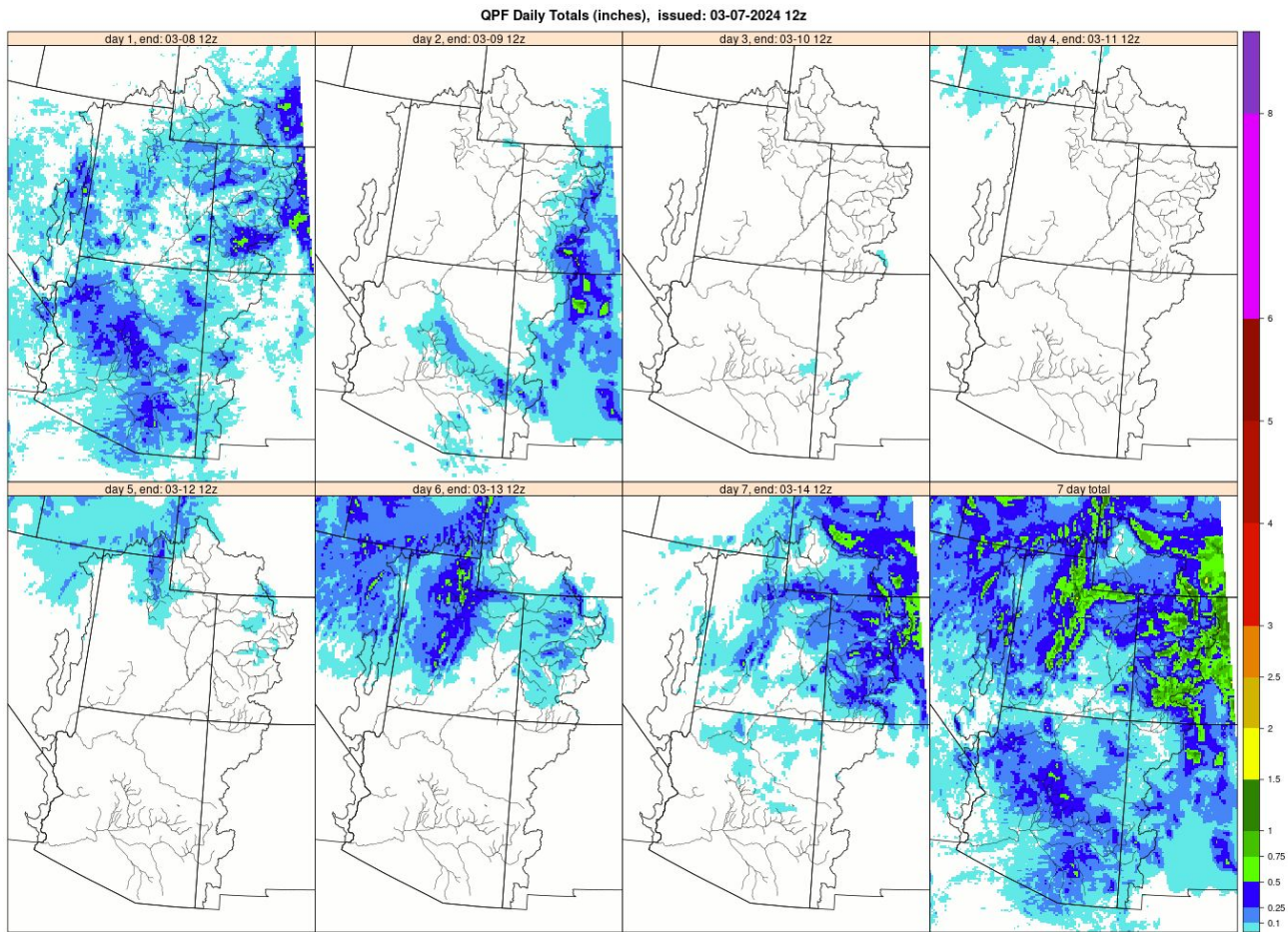
Where Forecasts are Worse:

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

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

Upcoming Weather: 7-Day Precipitation Forecast

Unsettled weather pattern
with multiple weather
systems over the next week



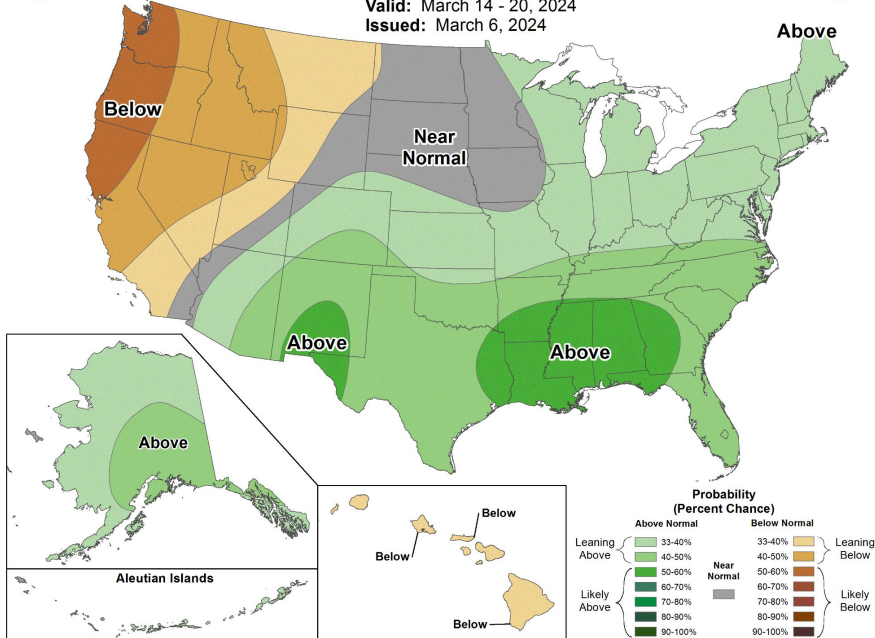
Upcoming Weather: 8-14 Day Outlook (March 14-20)

Slightly increased chances of below normal precipitation over most of Utah
Slightly increased chances of above normal temperatures across much of Utah



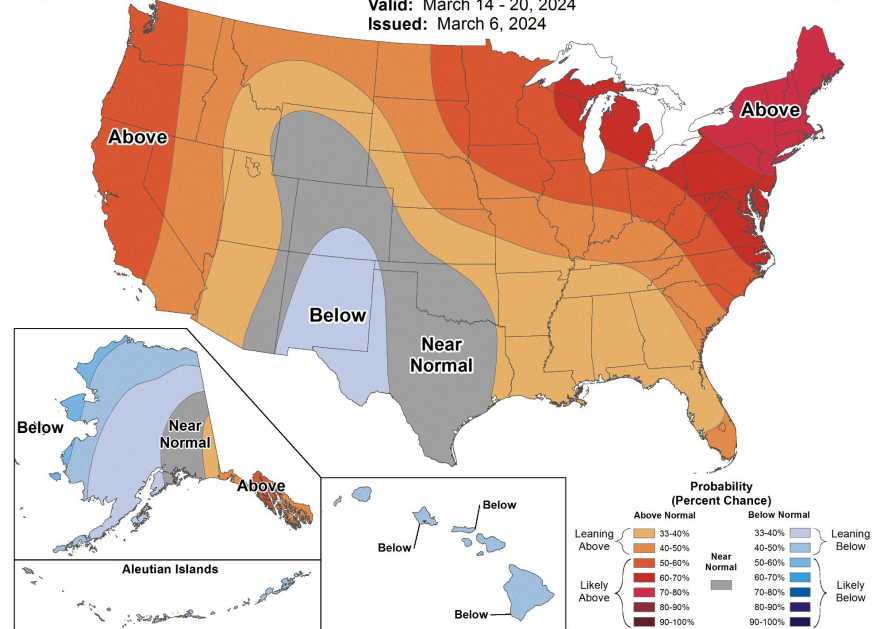
8-14 Day Precipitation Outlook

Valid: March 14 - 20, 2024
Issued: March 6, 2024



8-14 Day Temperature Outlook

Valid: March 14 - 20, 2024
Issued: March 6, 2024



Summary

- Soil Moisture:
 - Near to above normal for most of Utah
 - Better conditions than last year
- Model SWE (March 1):
 - Improvement from Feb 1
 - Many areas now normal to above normal (98%-119%)
 - Virgin watershed below normal (83%)
- Water Supply Forecasts (March 1)
 - Improvement from Feb 1
 - Many areas near normal to above normal
 - Virgin/Sevier watersheds slightly below normal

Water Supply Forecasts (April - July) Summary			
Watershed	March 2024 Median	Feb 2024 Median	Jan 2024 Median
Bear River Basin	102%	84%	80%
Weber River Basin	107%	87%	74%
Six Creeks Basin	133%	107%	92%
Provo River Basin	104%	88%	75%
Duchesne River Basin	98%	73%	62%
Virgin and Sevier River Basins	87%	83%	68%

2024 Water Supply Webinar Schedule

**All Times Mountain Time (MT)*

Colorado River Basin

Monday	Jan 9 th	10 am
Tuesday	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 9 th	11:30 am
Tuesday	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 Contacts & Water Year 2024 Basin Focal Points

Basin Focal Points (Forecasters)

Brenda Alcorn - Green, Duchesne, White/Yampa
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Ashley Nielson – Gunnison, San Juan, Dolores, Lake Powell
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Cody Moser – Upper Colorado Mainstem, Sevier
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Trevor Grout - Great Basin
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Nanette Hosenfeld - Virgin, Lower Colorado
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Wolfgang Hanft - Virgin, Lower Colorado
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Michelle Stokes – Hydrologist In Charge
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Paul Miller– Service Coordination Hydrologist
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John Lhotak – Development and Operations Hydrologist
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Cass Goodman - Computer Systems Analyst
cass.goodman@noaa.gov

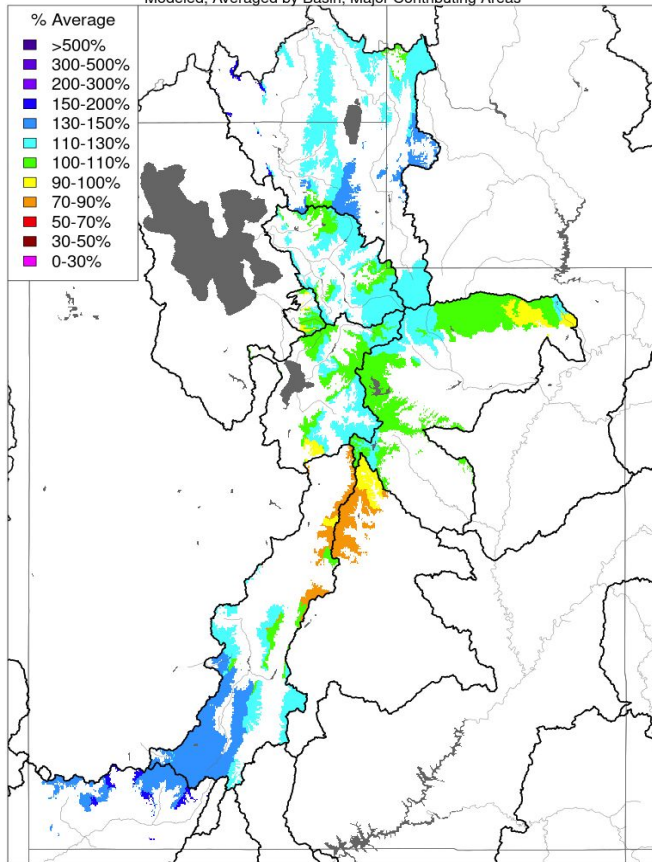
CBRFC Operations
cbrfc.operations@noaa.gov
801-524-4004

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

Fall 2023 Hydrologic Model Soil Moisture Conditions

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

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)

Great Basin / Utah: near to above normal

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