

# **CBRFC**

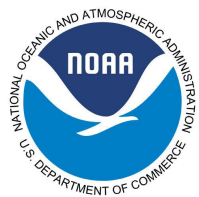
## **Water Year 2021**

### **Early Season Water Supply Outlook**

December 17, 2020

Cody Moser  
Hydrologist

**Please mute your microphone until the question period**



## 2021 Early Season Water Supply Outlook

Observed precipitation over the past several months

Soil moisture conditions entering winter

Current snow conditions

ESP method & water supply forecast evolution plot overview

2021 water supply - early season model guidance

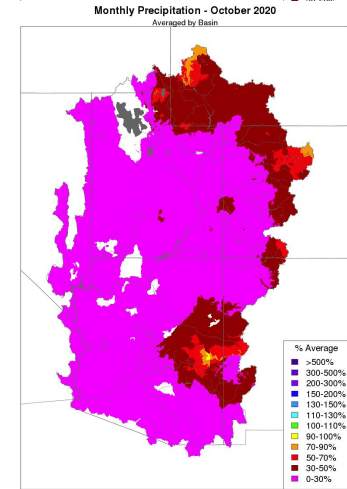
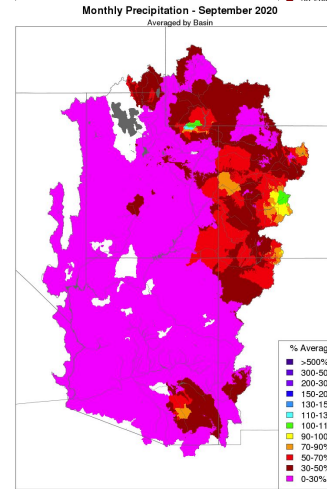
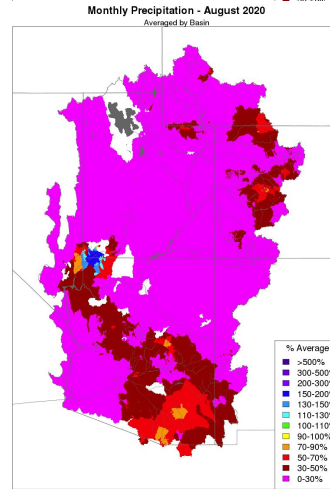
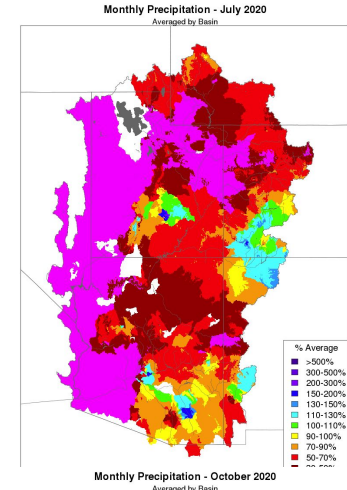
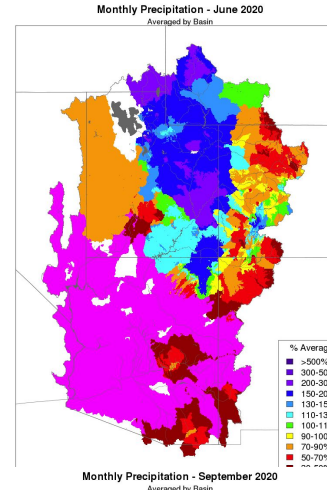
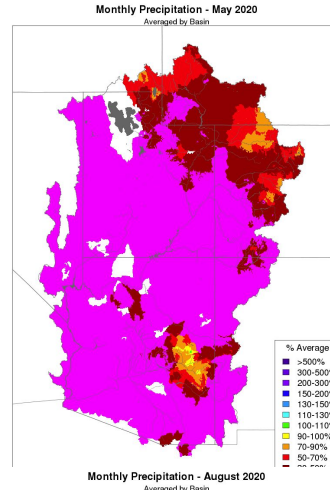
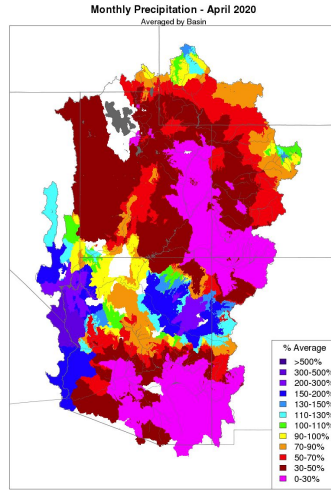
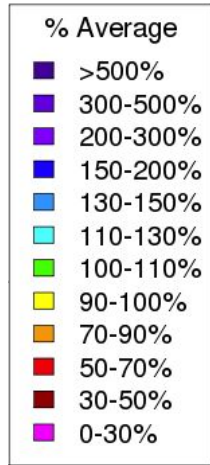
Upcoming weather outlook & ENSO status

2021 water supply webinar schedule

Forecast points of contact

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

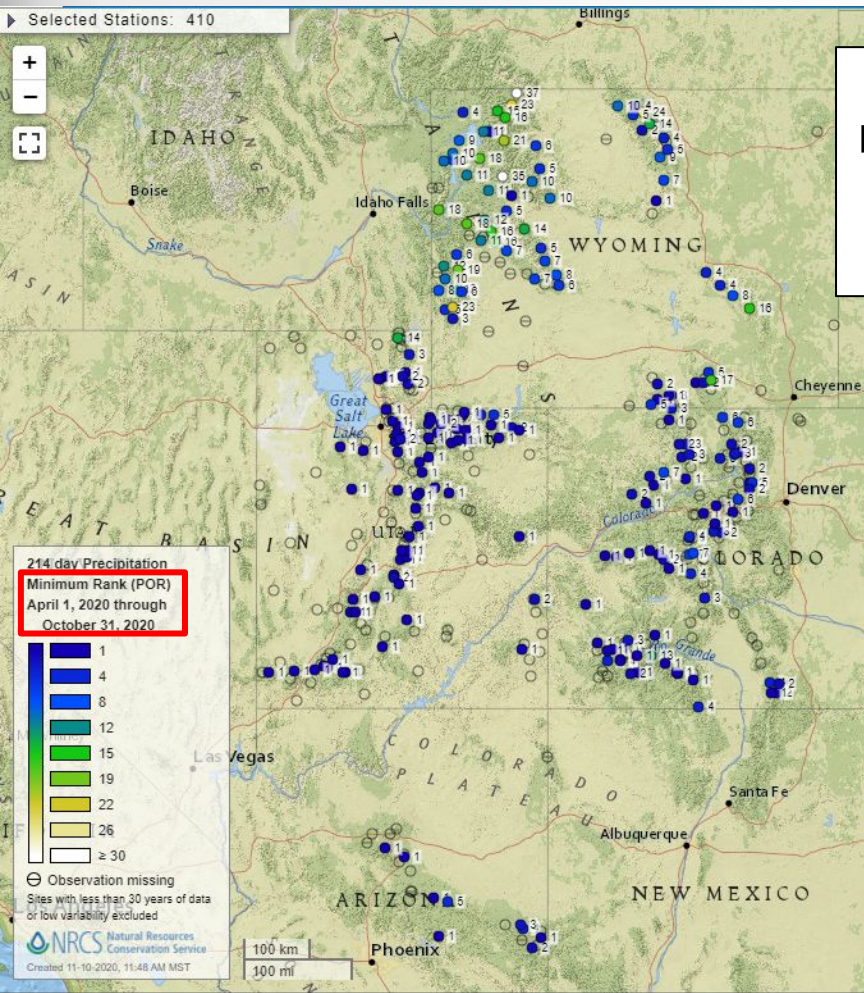
# April-October 2020 Observed Monthly Precipitation Summary



Anomalous ridging dominated the weather pattern from the late spring into the fall across the region.

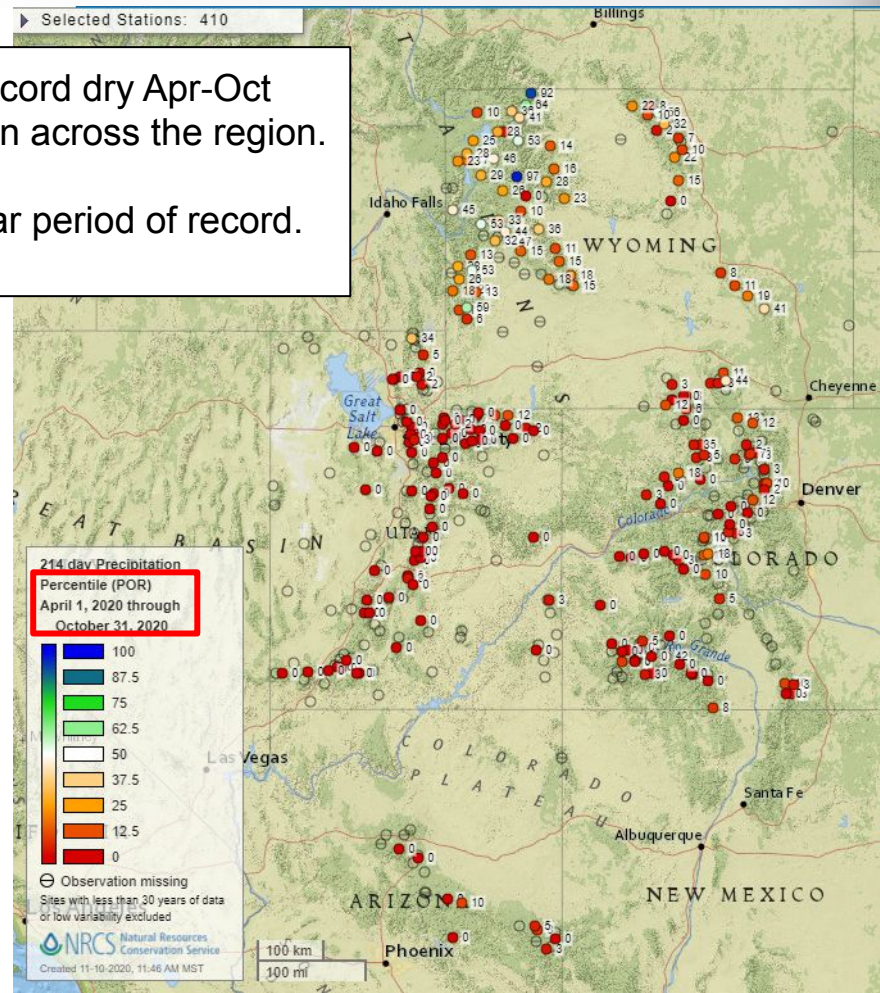


# April-October 2020 Observed SNOTEL Precipitation Statistics (NRCS)



Near/record dry Apr-Oct  
precipitation across the region.

35-40 year period of record.

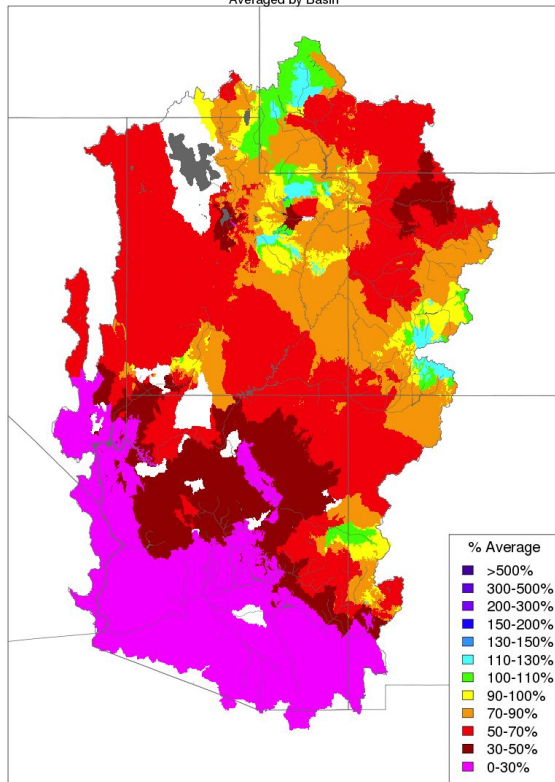


# November & December Precipitation

## Water Year 2021 Oct-Nov Precip Summary

Monthly Precipitation - November 2020

Averaged by Basin

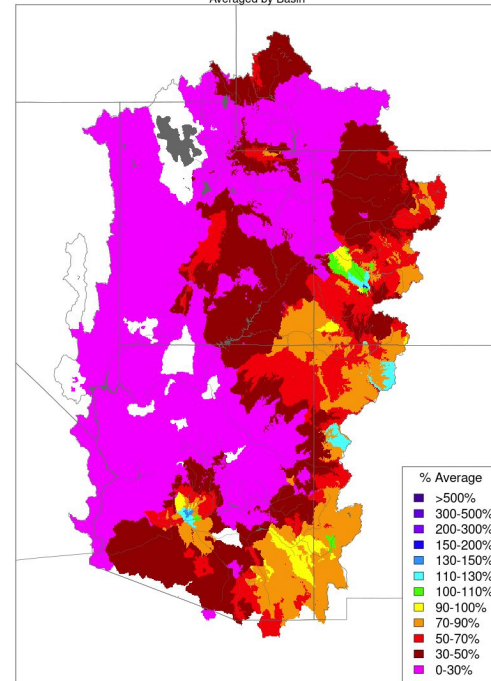


Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

<u>Basin</u>	<u>Precip (% Avg)</u>
Upper Green	80%
Duchesne	60%
Price/San Rafael	50%
Yampa/White	50%
Upper CO Mainstem	65%
Gunnison	65%
Dolores	55%
San Juan	70%
Lake Powell	65%
Virgin	45%
Verde	20%
Salt	50%
Little Colorado	45%
Upper Gila	45%
Bear	70%
Weber	55%
Six Creeks	50%
Provo/UT Lake	50%

Month to Date Precipitation - December 17 2020

Averaged by Basin



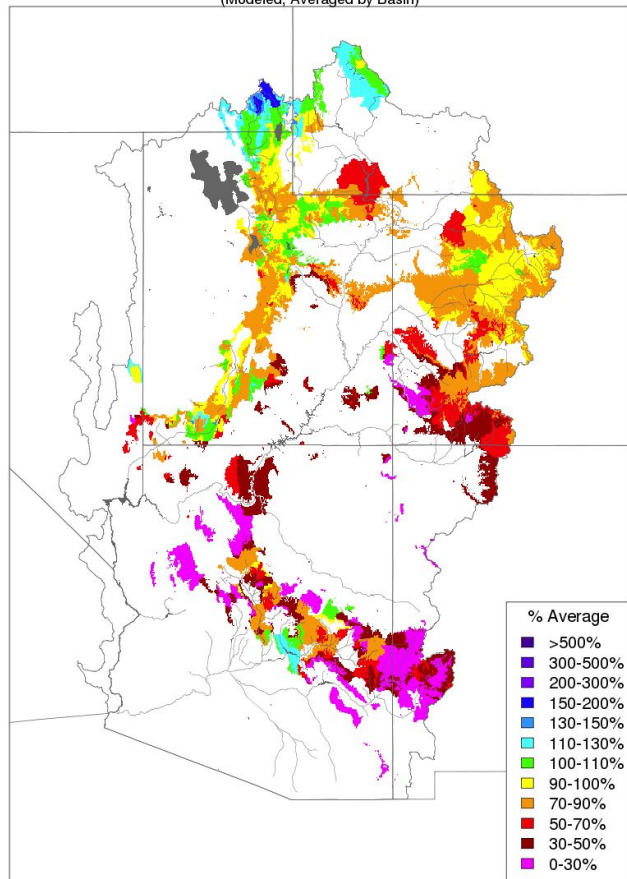
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)



# Fall Model Soil Moisture Conditions: 2019 vs. 2020

Soil Moisture - Fall - 2019 (November 15)

(Modeled, Averaged by Basin)



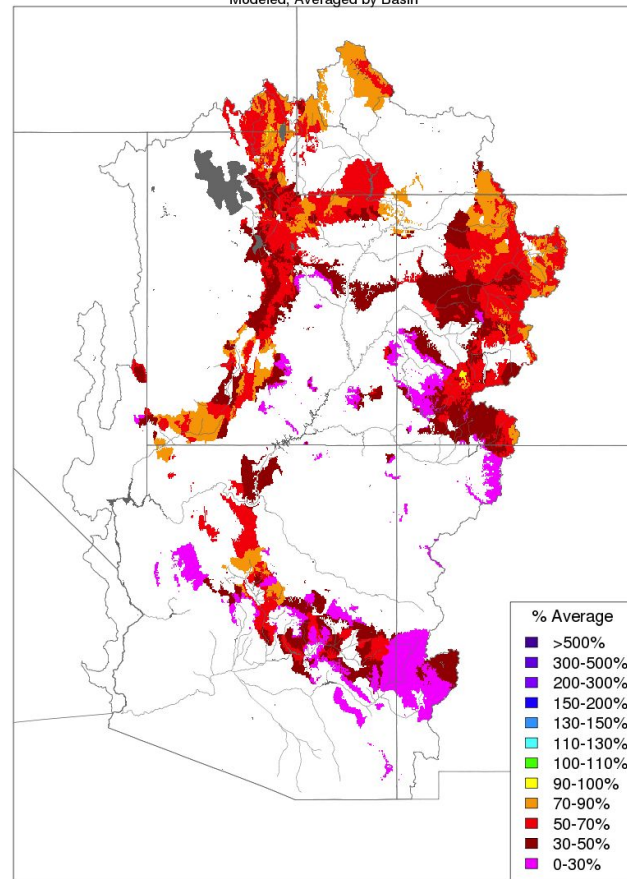
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

Current soil moisture conditions are worse off than they were a year ago due to near record low April-October 2020 precipitation across the region.

Model soil moisture is generally in the bottom 5 across the Upper Colorado over the 1981-2020 40-year period. The San Juan and Dolores are generally in the bottom 3 with some areas being record dry.

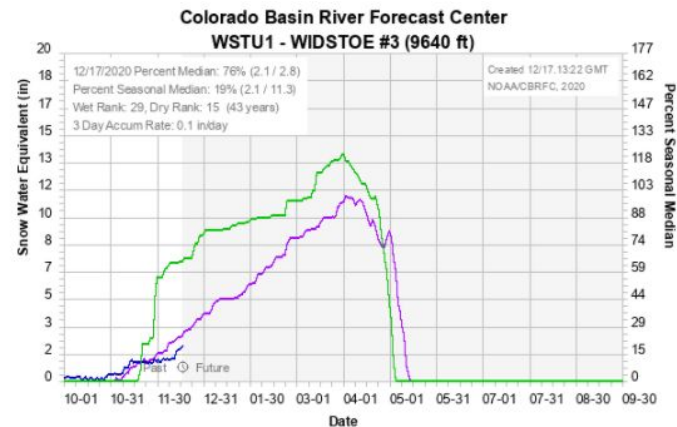
Soil Moisture - Fall - 2020 (November 15)

(Modeled, Averaged by Basin)



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

# Current Observed Snow Conditions - SNOTEL (NRCS)



Select multiple years and/or stations. Be sure to use your systems key-click combination to avoid inadvertent deselection.

Years	Stations	Y axis
median	WSTU1 WIDSTOE #3 (9640 ft)	Percent Seasonal Median
2021	AGUU1 AGUA CANYON (8900 ft)	Percent Median to Date
2020	APSC2 APISHAPA (10000 ft)	
avg	ARPC2 ARAPAHO RIDGE (10960 ft)	
2019	ATAI1 ATLANTA SUMMIT (7580 ft)	
2018	BAMN5 BATEMAN (9300 ft)	
2017	BASI1 BANNER SUMMIT (7040 ft)	
2016	BBSA3 BAKER BUTTE SUMMIT (7700 ft)	
2015	BBSW4 BLIND BULL SUM (8650 ft)	
2014	BCVC2 BEAVER CK VILLAGE (8500 ft)	
2013	BCZU1 BUCK PASTURE SNOWCOURSE (9700 ft)	
2012	BECI1 BEAR CANYON (7900 ft)	
2011	BENU1 BEVANS CABIN SNOWC NR TOOELE (6430 ft)	
2010	BERN2 BEAR CK (8040 ft)	
2009	BFTU1 BLACK FLAT-U.M. CK (9462 ft)	

☐ Show Tabular Data  
☐ High Resolution

**Similar/Historical Years**

Off  
Closest Pattern  
Peak to Date  
Current Observation  
Highest Year  
Lowest Year

## COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

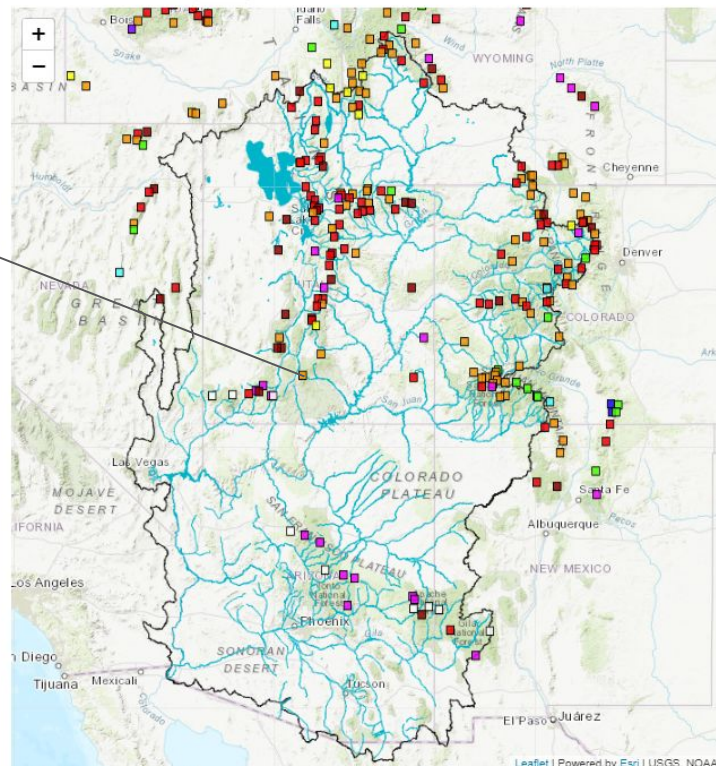
HOME RIVERS **SNOW** WATER SUPPLY RESERVOIRS WEATHER CLIMATE HELP ABOUT NEWS SEARCH

News

Thursday December 17, 2020, 1:00 pm MT: CBRFC Early Season Water Supply Outlook Webinar. Registration -> [More Info...](#)  
2021 Water Supply Forecast Webinar Schedule and Registration -> [More Info...](#)

### Conditions Map

Help



River Conditions

Snow Conditions

Points Grids Model

Data Updated: 2020-12-17

Help

☒ Show ☐ Hide Other Types

- ☒ No Data
- ☐ No Average
- ☒ < 7000 ft
- ☒ 7000-8000 ft
- ☒ 8000-9000 ft
- ☒ 9000-10000 ft
- ☒ > 10000 ft

- ☐ Percentiles
- ☐ Percent Average
- ☒ Percent Median

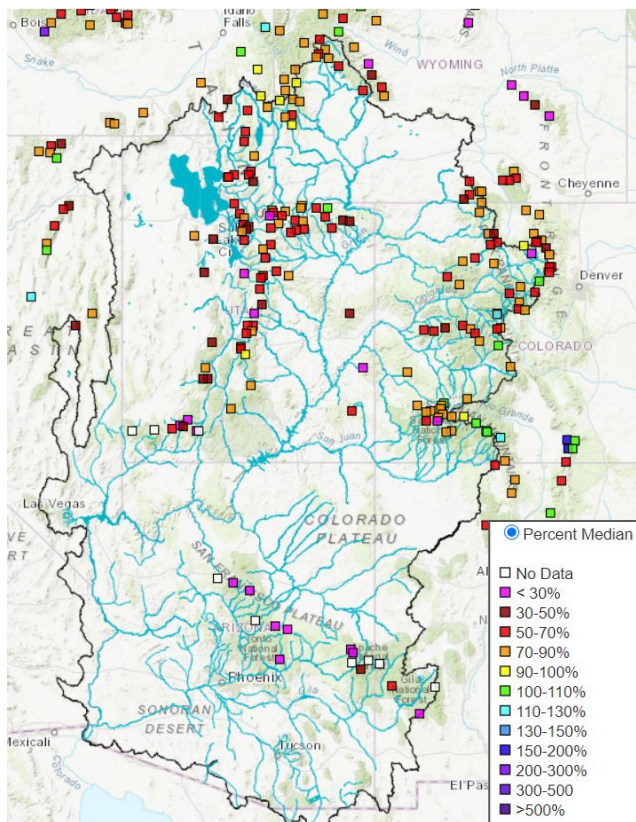
- ☐ No Data
- ☐ < 30%
- ☐ 30-50%
- ☐ 50-70%
- ☐ 70-90%
- ☐ 90-100%
- ☐ 100-110%
- ☐ 110-130%
- ☐ 130-150%
- ☐ 150-200%
- ☐ 200-300%
- ☐ 300-500
- ☐ > 500%

Water Supply Forecasts

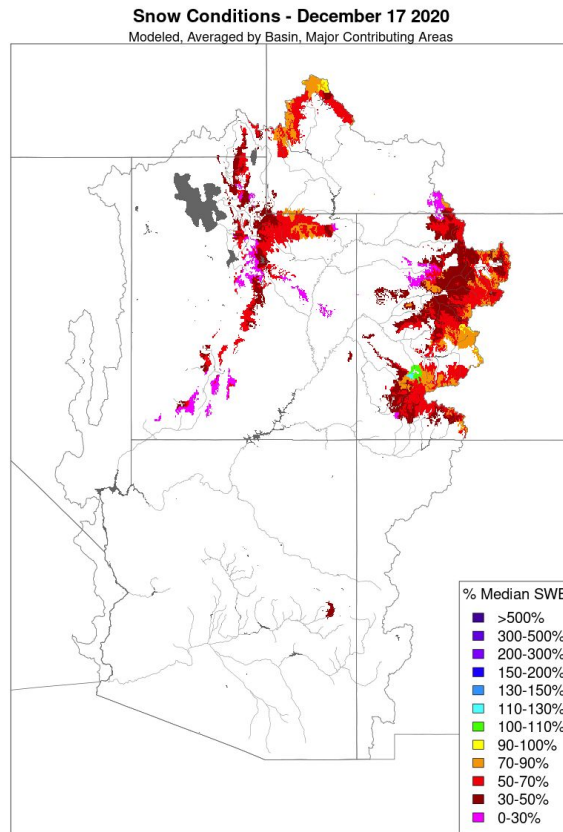
Peak Flow Forecasts

# Mid-December Snow Conditions

SNOTEL (Observed)



CBRFC (Model)



Dec 17 SWE Summary (SNOTEL)

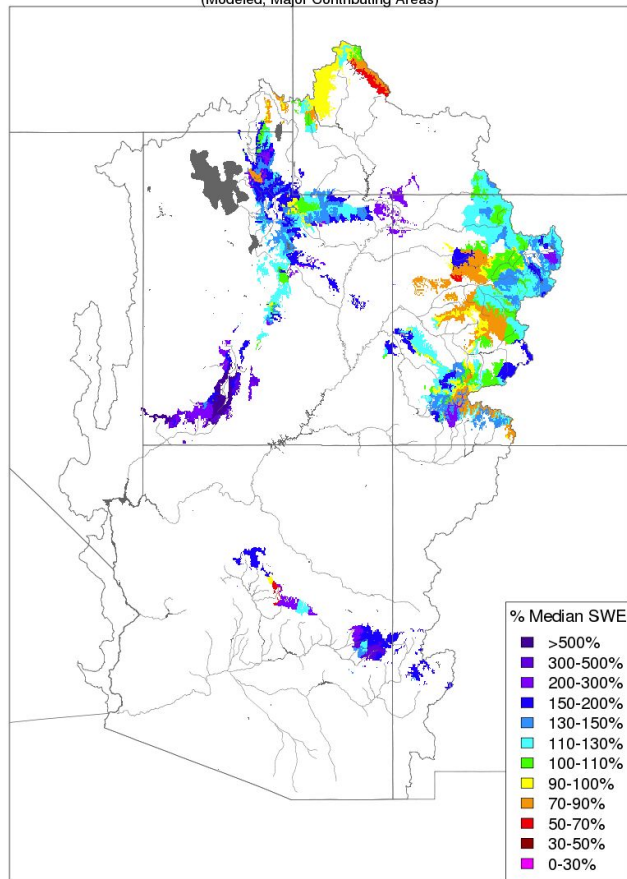
<u>Basin</u>	<u>SWE (% Median)</u>
Upper Green	75%
Duchesne	70%
Price/San Rafael	50%
Yampa/White	65%
Upper CO Mainstem	70%
Gunnison	70%
Dolores	75%
San Juan	90%
Lake Powell	70%
Virgin	45%
Verde	15%
Salt	30%
Little Colorado	20%
Upper Gila	35%
Bear	65%
Weber	60%
Six Creeks	65%
Provo/UT Lake	60%



# Mid-December CBRFC Model Snow Conditions - 2019 / 2020 Comparison

Snow Conditions - December 17 2019

(Modeled, Major Contributing Areas)



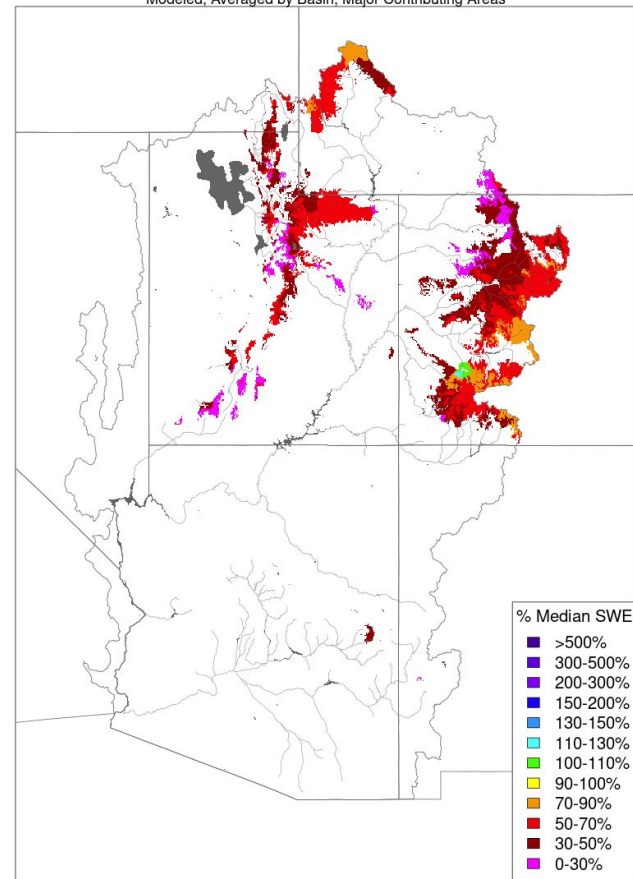
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

WY21 snow season off  
to a worse start  
compared to a year ago.

WY21 starting off with  
widespread much below  
average soil moisture and  
SWE conditions.

Snow Conditions - December 16 2020

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)

## Water Supply - Early Season Model Guidance

At this point in time...

- Ideally model soil moisture & snow states are accurate and representative of current conditions.
- ESP model guidance is still heavily influenced by soil moisture.
- Early season forecast errors are generally 20-40% and typically improve through the spring; the primary source of forecast uncertainty is future weather.
- Snowpack - don't put too much weight into mid-December conditions.
  - Typically around 30-35% of the seasonal snow has occurred by mid-December
  - Historical median (or normal) snowpack values are still small compared to later in the season

# Ensemble Streamflow Prediction (ESP) Overview

ESP Methodology:      current hydrologic model states (soil moisture, snow)  
+ future weather (precip/temp) scenarios based on historical (1981-2015) observations  
= April-July streamflow volume

## Example: Dillon Reservoir (Inflow)

2021 current model states + 1981 weather = 77 kaf (thousand acre-feet)

2021 current model states + 1982 weather = 141 kaf

2021 current model states + 1983 weather = 166 kaf

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2021 current model states + 2015 weather = 148 kaf

Final result is 35 different possibilities of April-July streamflow volume

-use statistical analysis to determine probabilistic outcomes:

-volume that has 50% chance of occurring (most probable) = 112 kaf

-volume that has 10% chance of occurring (less likely) = 172 kaf

-volume that has 90% chance of occurring (more likely) = 70 kaf

$$\% \text{ Average} = \frac{\text{Most Probable Volume}}{\text{Average Observed Volume (1981 - 2010)}}$$

*\*Updated Daily*



# CBRFC Water Supply Forecasts



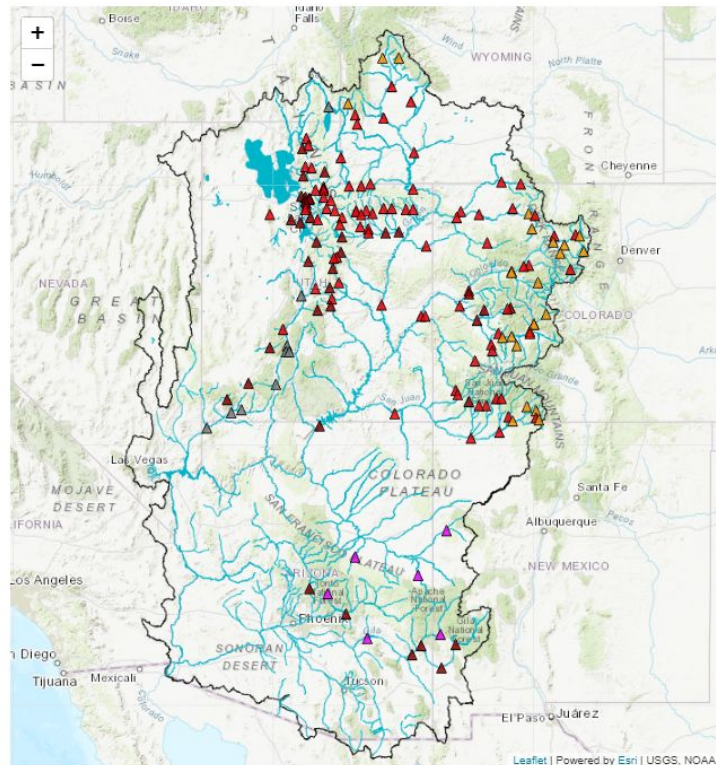
HOME RIVERS SNOW **WATER SUPPLY** RESERVOIRS WEATHER CLIMATE HELP ABOUT NEWS SEARCH

## News

Thursday December 17, 2020, 1:00 pm MT: CBRFC Early Season Water Supply Outlook Webinar. Registration -> [More Info...](#)  
2021 Water Supply Forecast Webinar Schedule and Registration -> [More Info...](#)

## Conditions Map

Help



► River Conditions

► Snow Conditions

▼ Water Supply Forecasts

[Help](#)

Latest Model Run Date: 2020-12-16

☒ Show [Hide Other Types](#)

☒ Latest Model Guidance Percent Average  
☐ Latest Model Guidance Percent Median

▲ < 30%  
▲ 30-50%  
▲ 50-70%  
▲ 70-90%  
▲ 90-100%  
▲ 100-110%  
▲ 110-130%  
▲ 130-150%  
▲ 150-200%  
▲ 200-300%  
▲ 300-500%  
▲ >500%  
▲ Regulated  
△ No Forecast

► Peak Flow Forecasts

► Reservoir Conditions

► Daily Precipitation

► Monthly Precipitation

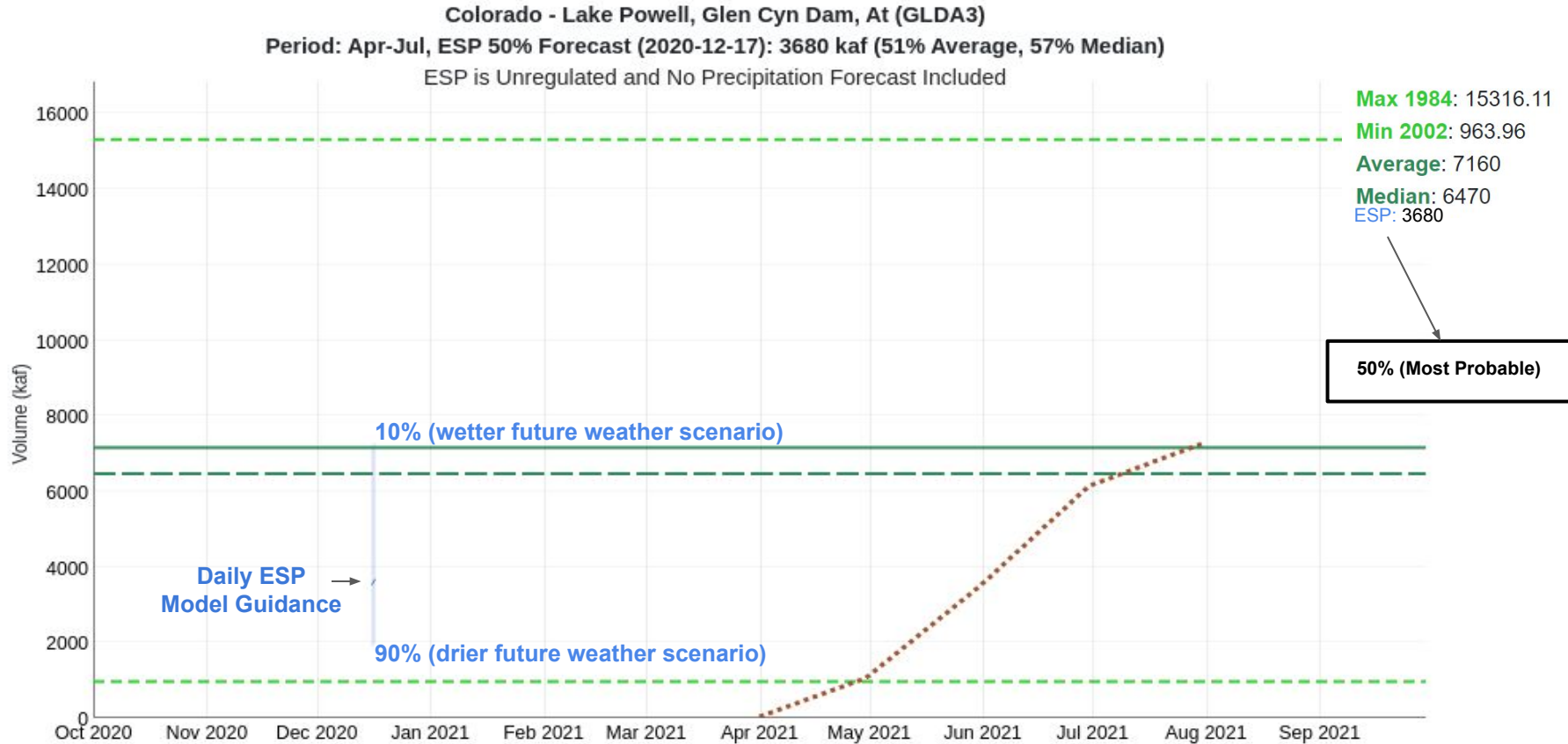
► Soil Moisture

► Map Options

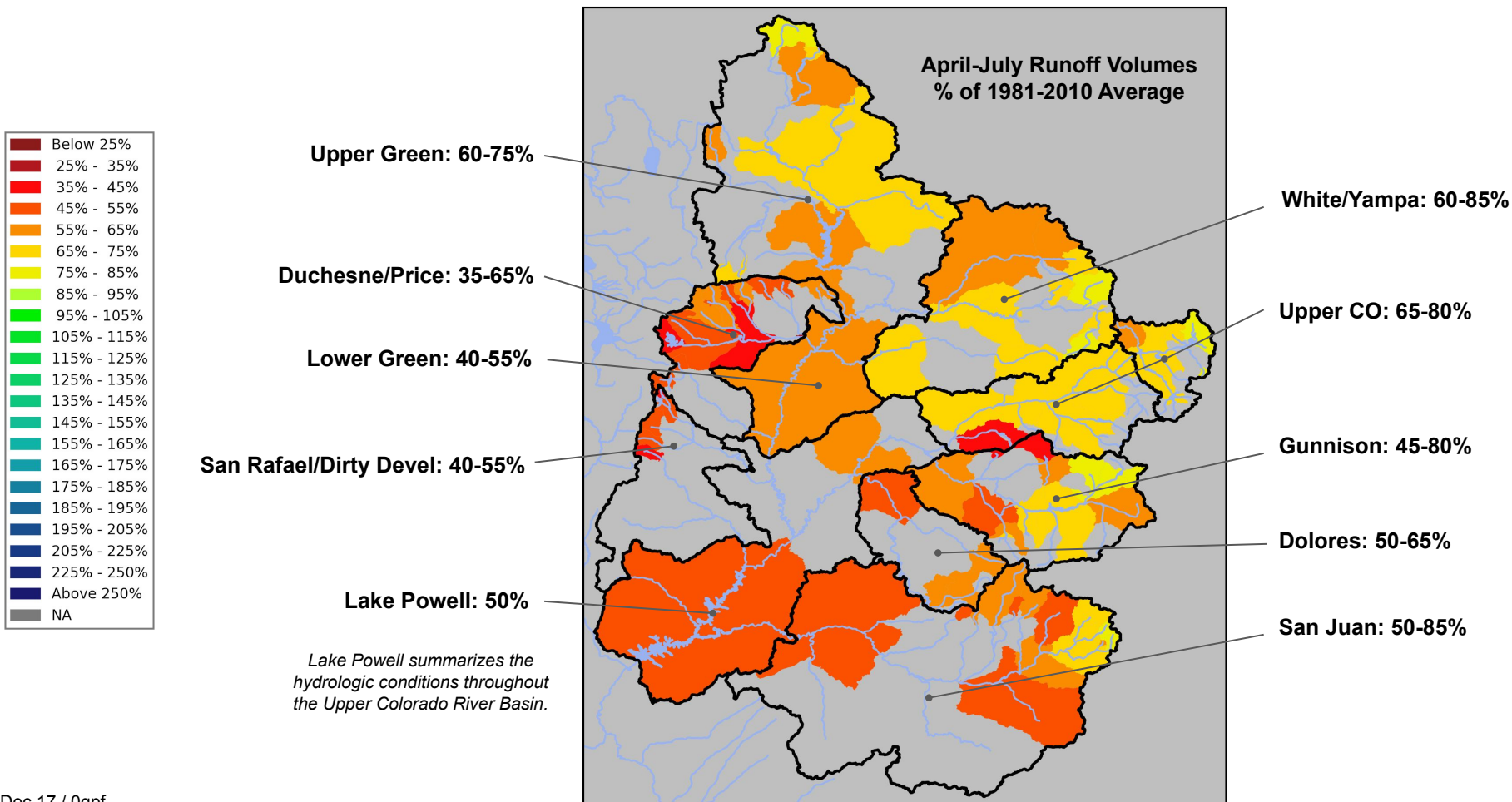
► Search Points

# Water Supply Forecast Evolution Plot Overview

## Water Supply Forecast



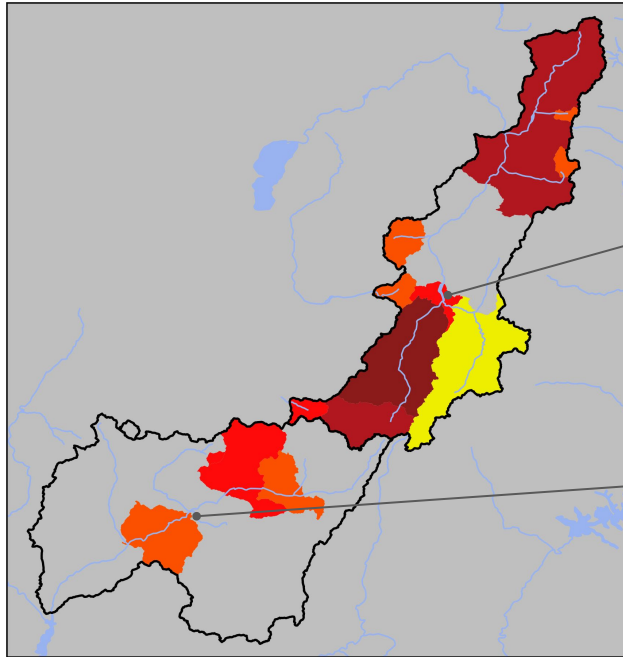
# ESP Model Guidance: Upper Colorado





# ESP Model Guidance: Sevier, Virgin, Lower Colorado

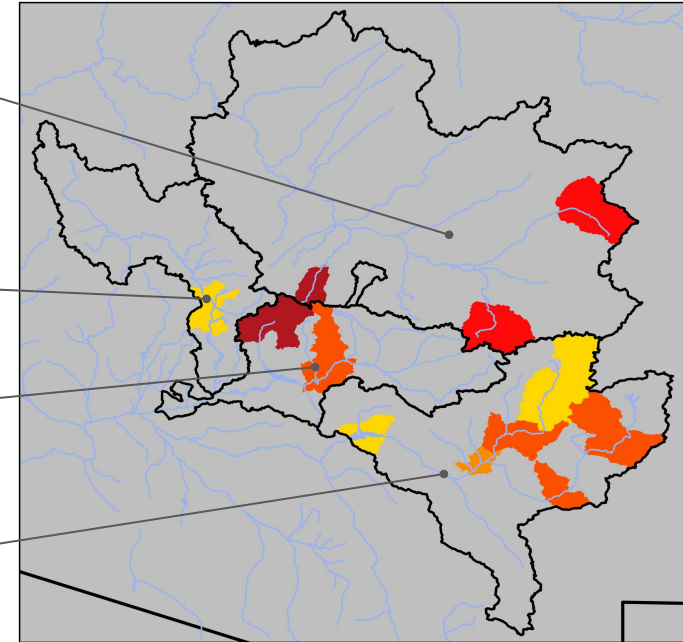
**Sevier & Virgin**  
**April-July** Runoff Volumes  
% of 1981-2010 **Average**



Sevier: 10-80%

Virgin: 35-50%

**Lower Colorado**  
**January-May** Runoff Volumes  
% of 1981-2010 **Median**



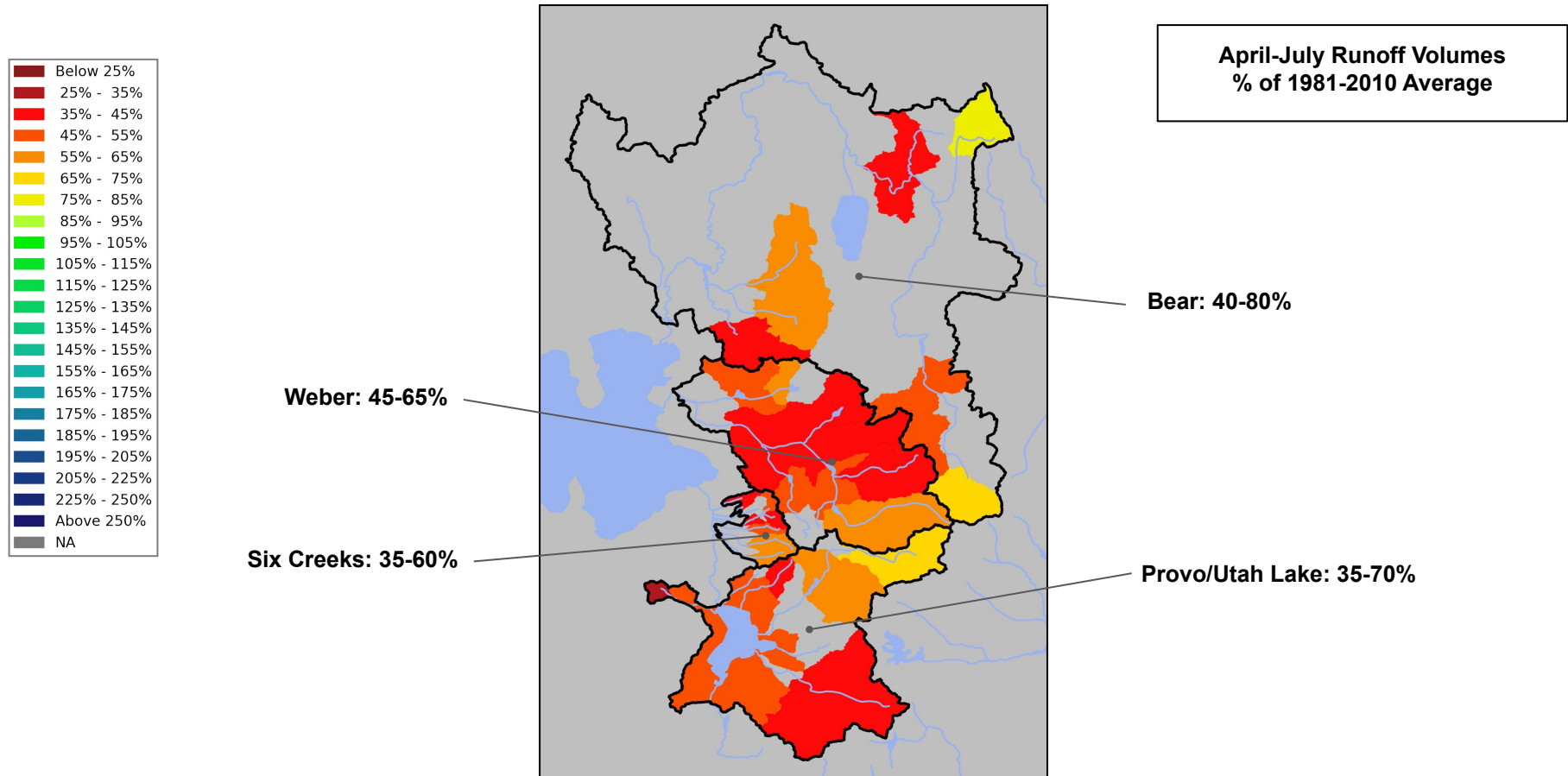
Little Colorado: 30-40%

Verde: 70%

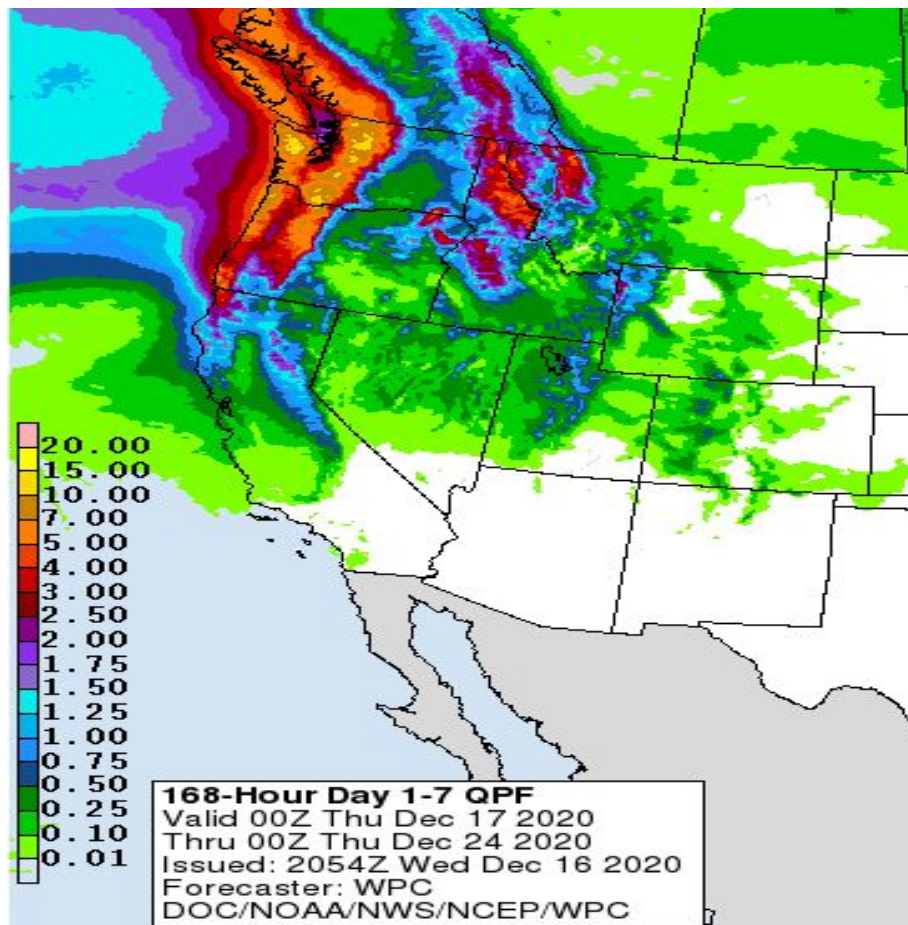
Salt: 35-50%

Upper Gila: 45-65%

# ESP Model Guidance: Great Basin



## Upcoming Weather: Precipitation Outlook December 17-23

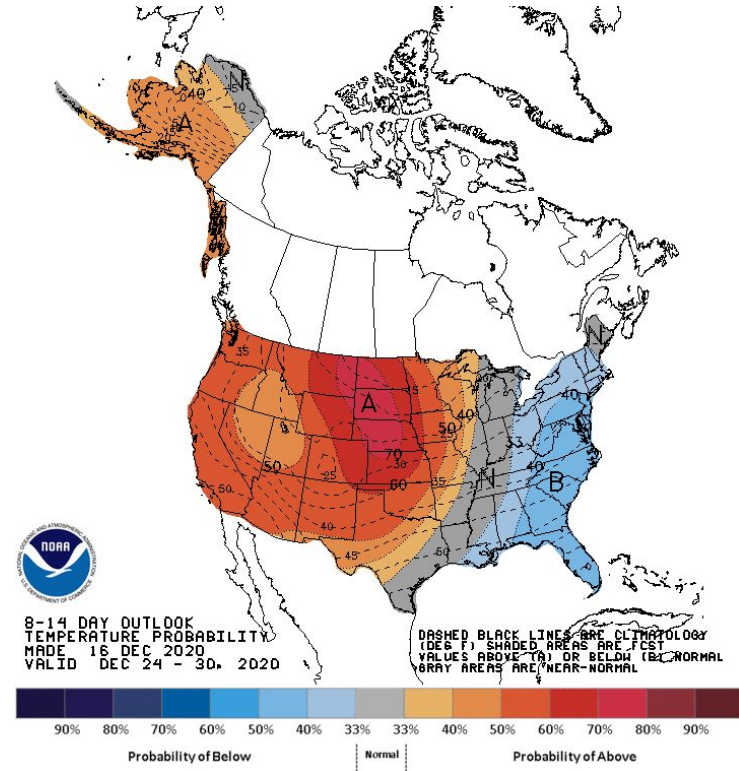
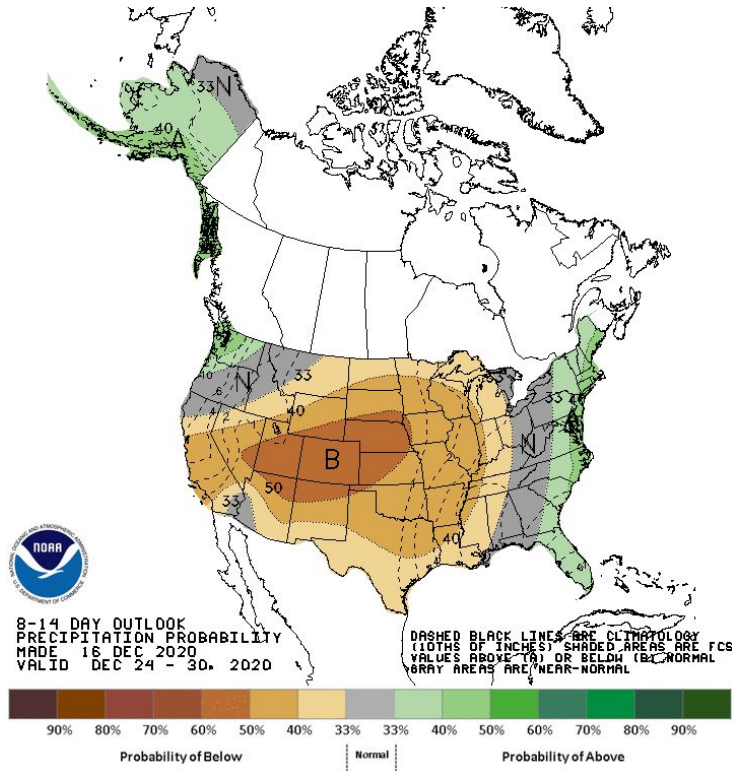


- A storm system will move across the Upper Basin today/tomorrow with 1-1.5 inches of precip over the mountains of northern Utah and Wyoming.
- Ridging/dry conditions return by this weekend and persist through much of next week.
- Unfortunately, the heaviest amounts over the next 7 days are across the Pacific Northwest and outside our area.



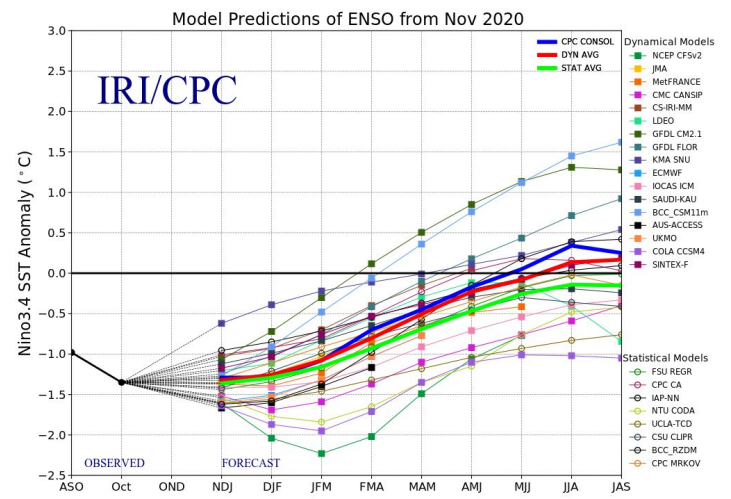
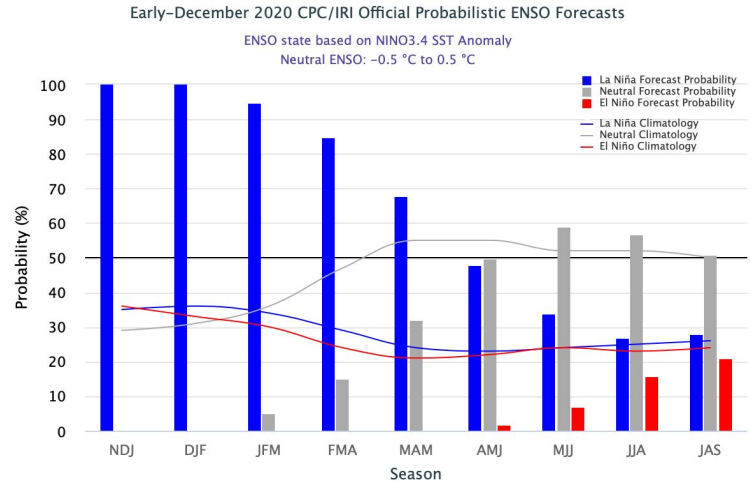
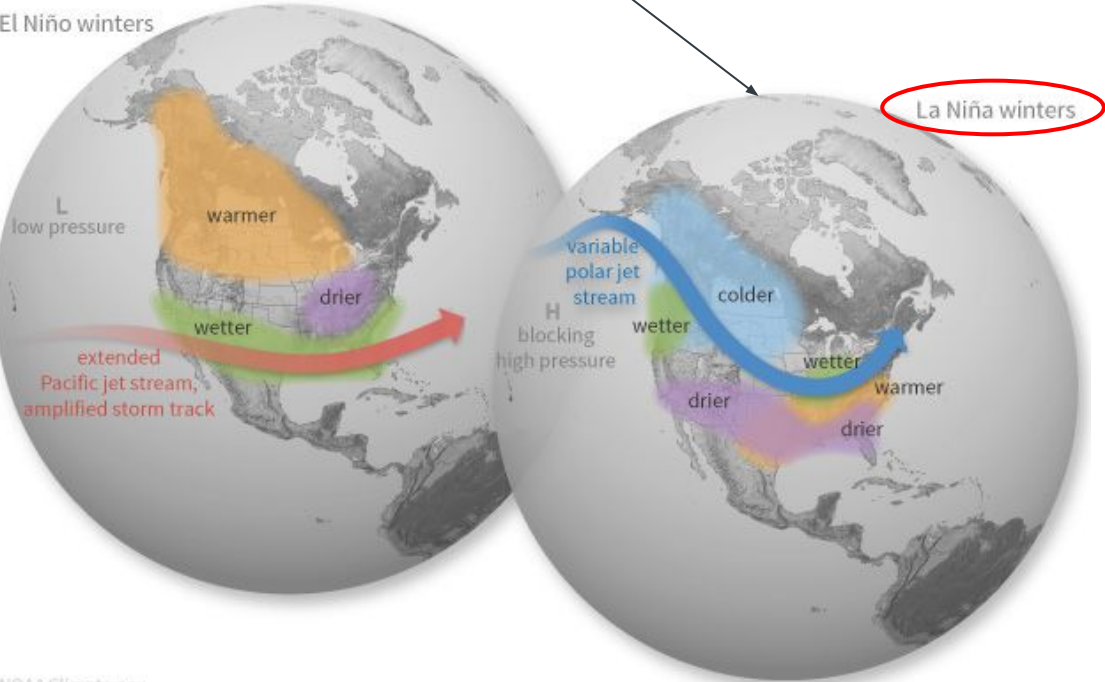
# Upcoming Weather: 8-14 Day Outlook (December 24-30)

Increased probability of below average precipitation with enhanced ridging across the Intermountain West. Would expect ESP volume guidance to decrease slightly at most points through the end of the year.



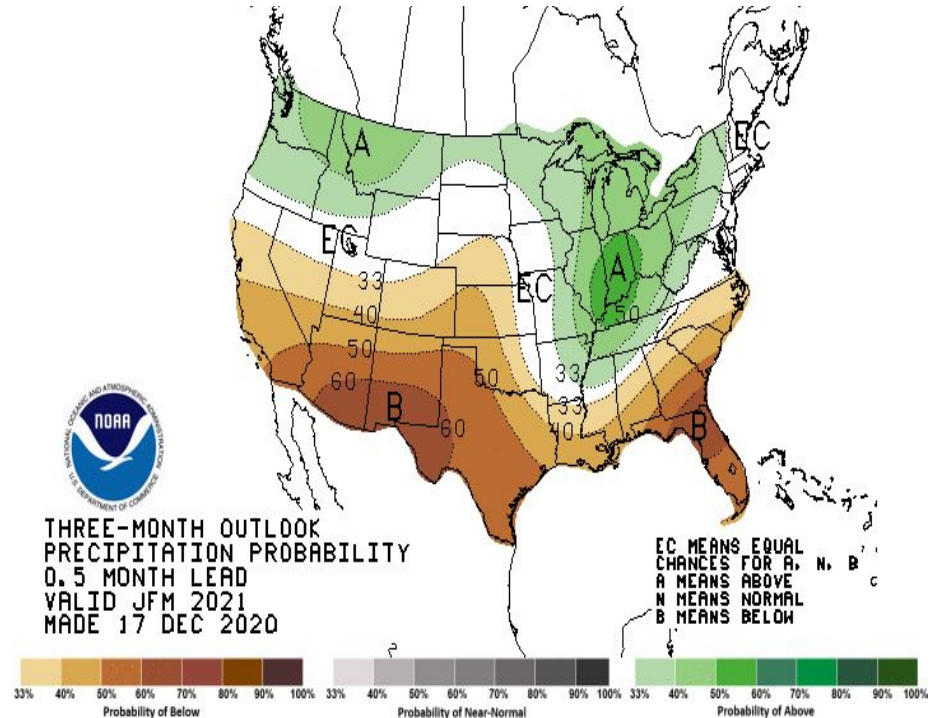
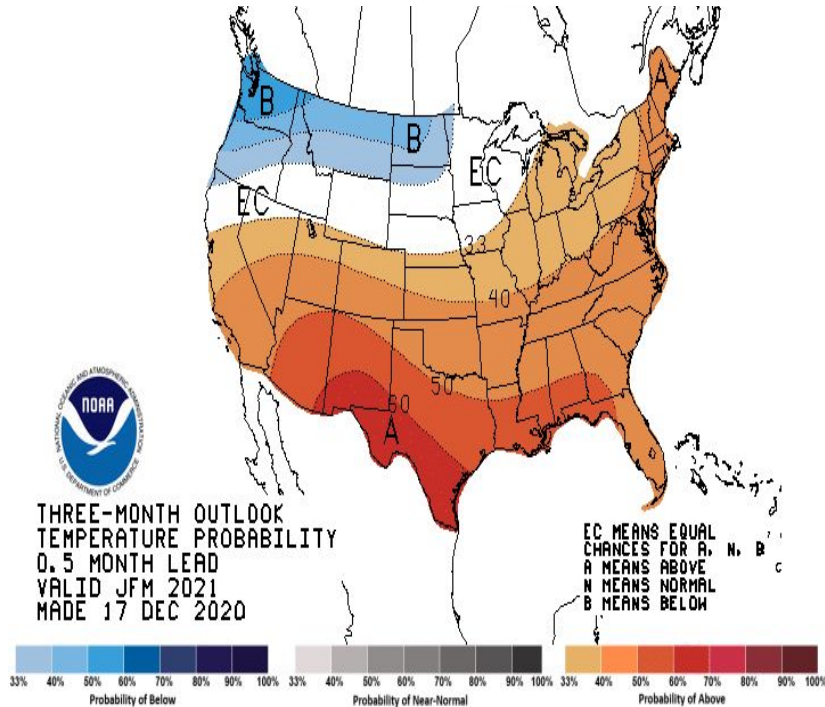
# El Niño Southern Oscillation (ENSO) Status

- **La Niña** is likely to continue through the Northern Hemisphere winter 2020-21 (~95% chance during January-March), with a potential transition during the spring 2021 (~50% chance of Neutral during April-June).
  - Increased chances of drier winter weather in Arizona/LCRB
  - Much weaker correlation/winter weather signal elsewhere in basin



# Climate Prediction Center Seasonal Outlook (JFM)

Best odds of below normal precipitation is across the Lower Basin, especially Arizona.  
Much of the Upper Basin has equal chances for above and below normal precipitation.

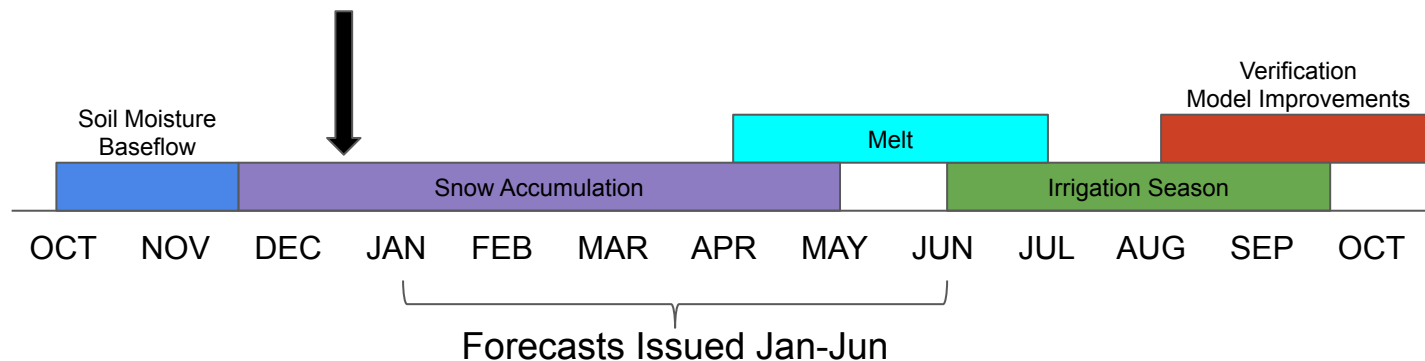


## Summary

- Near/record dry April-October 2020 period across the majority of the Colorado River/Great Basins
- Near/record low antecedent soil moisture conditions entering the water year 2021 snow accumulation & runoff season
- Slow start to the snow season
  - Current snowpack (SWE) conditions are below to well below normal across the majority of the region
- Current storm system having a positive impact to northern Utah/Great Basin and Upper Green water supply outlook
- Increased chances of below average precipitation for remainder of December across the region
  - ESP volume guidance expected to decrease between now and Jan 1
- Increased chances of drier winter weather in Arizona/LCRB due to La Niña conditions
- Most likely going to need above average snowpack to see near average water supply volumes given the dry conditions. Spring weather always a factor.



# CBRFC Operational Timeline



- ESP model guidance is now available on our website (forecast evolution plots).
  - Water supply forecasts are issued starting early January
  - Peak flow forecasts issued 2x/month starting early March
- Currently, soil moisture states (also represented by baseflow) in the model have a larger influence on hydrologic guidance compared to later in the season.
- As we progress into the winter, snowpack conditions will have a larger impact on forecasts in the Upper Colorado and Great Basins.
- Winter rain events will have largest impacts on Lower Colorado River Basin forecasts.

# 2021 Water Supply Webinar Schedule

*\*All Times Mountain Time (MT)*

## **Colorado River Basin**

Friday	Jan 8 <sup>th</sup>	10 am
Friday	Feb 5 <sup>th</sup>	10 am
Friday	Mar 5 <sup>th</sup>	10 am
Wednesday	Apr 7 <sup>th</sup>	10 am
Friday	May 7 <sup>th</sup>	10 am

## **Great Basin**

Friday	Jan 8 <sup>th</sup>	11:30 am
Friday	Feb 5 <sup>th</sup>	11:30 am
Friday	Mar 5 <sup>th</sup>	11:30 am
Wednesday	Apr 7 <sup>th</sup>	11:30 am
Friday	May 7 <sup>th</sup>	11:30 am

Peak flow forecast webinar Thursday, March 18<sup>th</sup>, 10 am MT

Additional briefings scheduled as needed

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



## COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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### News

Thursday December 17, 2020, 1:00 pm MT: CBRFC Early Season Water Supply Outlook Webinar. Register for the 2021 Water Supply Forecast Webinar Schedule and Registration -> [More Info...](#)

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### CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2021

The Colorado Basin River Forecast Center (CBRFC) produces water supply forecasts for the Colorado River Basin and the east. 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

[Thursday Dec 17 @ 1 pm MT](#)

#### Colorado River Basin Water Supply Webinars

[Friday January 8th @ 10 am MT](#)

[Friday February 5th @ 10 am MT](#)

[Friday March 5th @ 10 am MT](#)

[Wednesday April 7th @ 10 am MT](#)

[Friday May 7th @ 10 am MT](#)

#### Utah Water Supply Webinars

[Friday January 8th @ 11:30 am MT](#)

[Friday February 5th @ 11:30 am MT](#)

[Friday March 5th @ 11:30 am MT](#)

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

[Friday May 7th @ 11:30 am MT](#)

#### Peak Flow Webinar

[Thursday March 18th @ 10 am MT](#)

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

This list is used to provide notification when webinars are scheduled, water supply forecasts are updated, and for other news of interest to our stakeholders regarding CBRFC operations.

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

# CBRFC Contacts & WY21 Basin Focal Points

**Michelle Stokes**

*Hydrologist In Charge*

**Ashley Nielson**

*Upper Green, Yampa  
San Juan, Dolores, Powell*

**Brenda Alcorn**

*Senior Hydrologist*

**John Lhotak**

*Development and Operations Hydrologist*

**Craig Peterson**

*Senior Hydrometeorologist*

**Paul Miller**

*Service Coordination Hydrologist*

**Patrick Kormos**

*Lower Green, Duchesne  
Weber, Provo*

**Tracy Cox**

*Hydrometeorologist*

**Cass Goodman**

*Computer Systems Analyst*

**Cody Moser**

*Upper CO Mainstem, Gunnison*

**Brent Bernard**

*Bear, Sevier, Six Creeks*

**Valerie Offutt**

*Administrative Assistant*

**Zach Finch**

*Lower Colorado River Basin*

**CBRFC Webpage**

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

**CBRFC Operations**

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801-524-4004

**CBRFC Water Supply Presentations**

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

[firstname.lastname@noaa.gov](mailto:firstname.lastname@noaa.gov)