BUREAU OF RECLAMATION

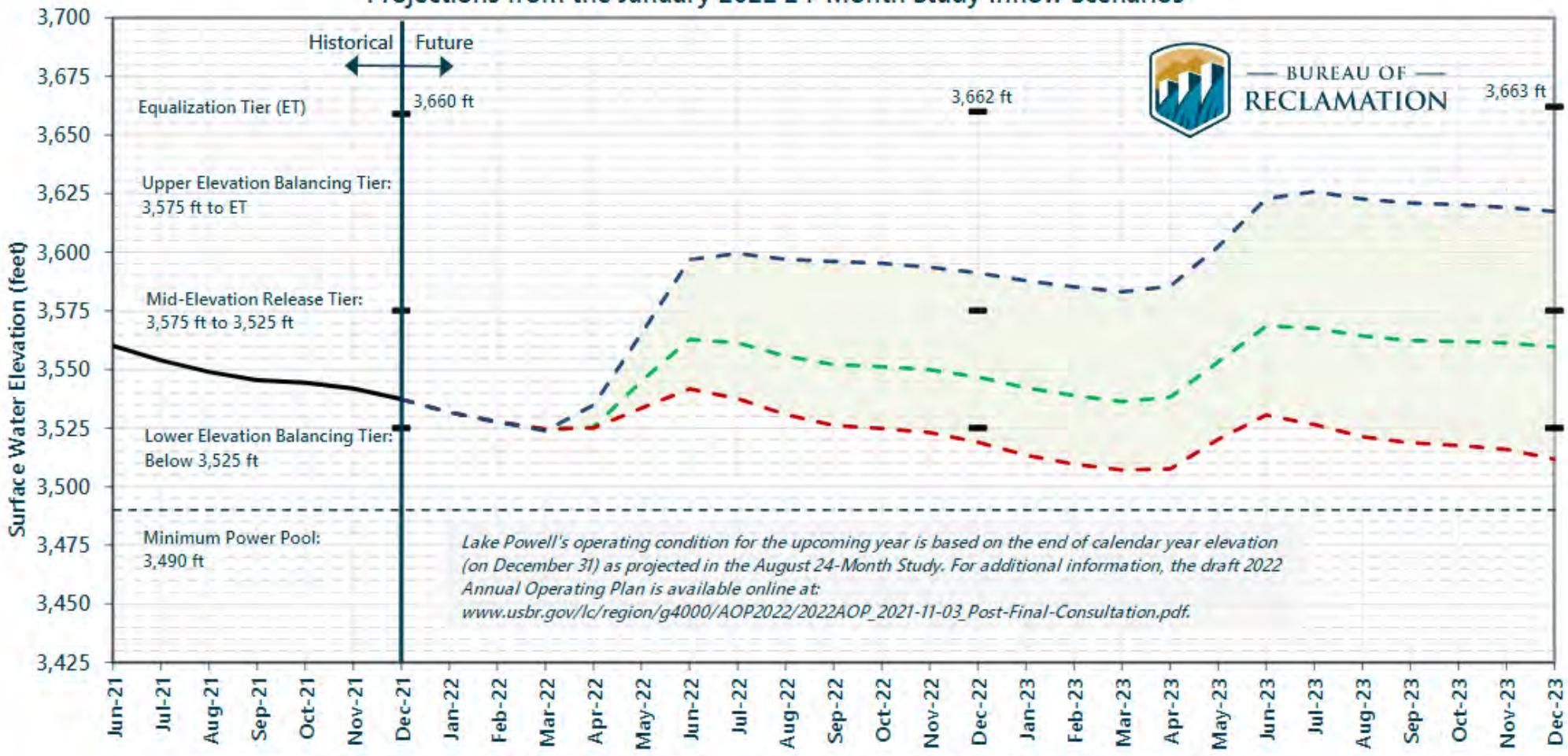
Navajo Unit Operations Coordination Meeting

January 18th, 2022 1:00 PM

Microsoft Teams Virtual Meeting

Lake Powell End of Month Elevations

Projections from the January 2022 24-Month Study Inflow Scenarios

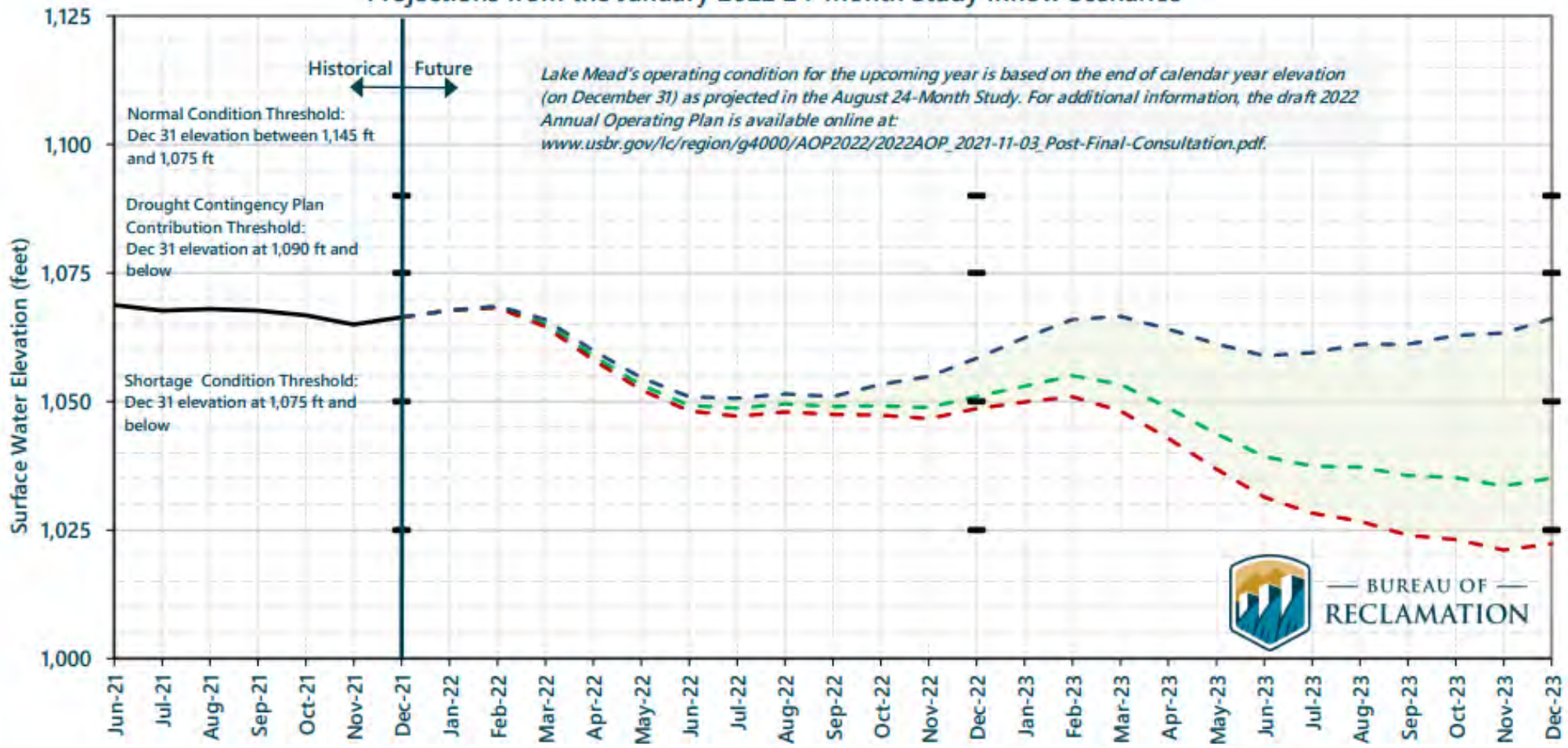


The Drought Response Operations Agreement (DROA) is available online at: https://www.usbr.gov/dcp/finaldocs.html.

See more about Glen Canyon Operations here: https://www.usbr.gov/uc/water/crsp/cs/gcd.html

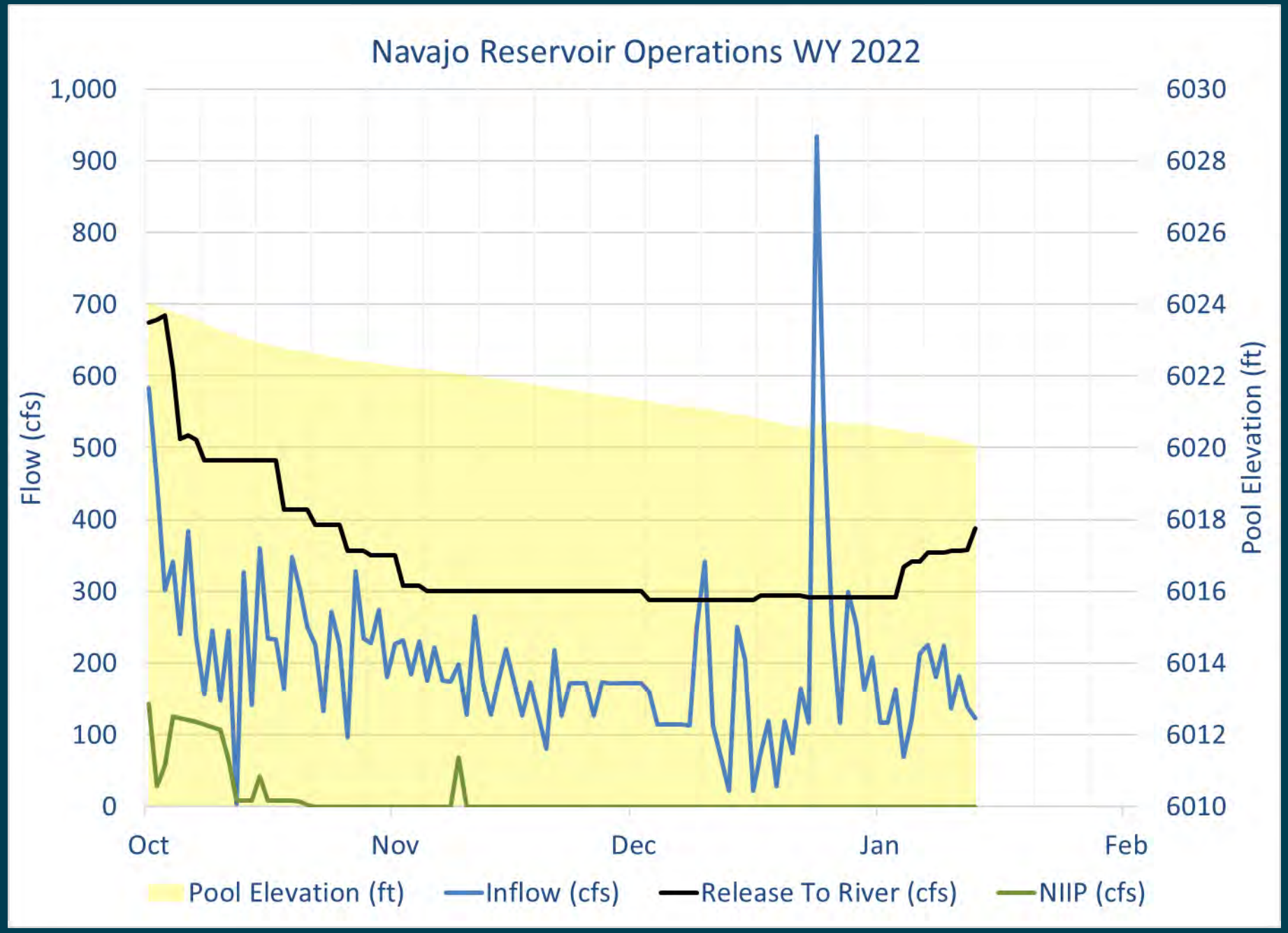
Lake Mead End of Month Elevations

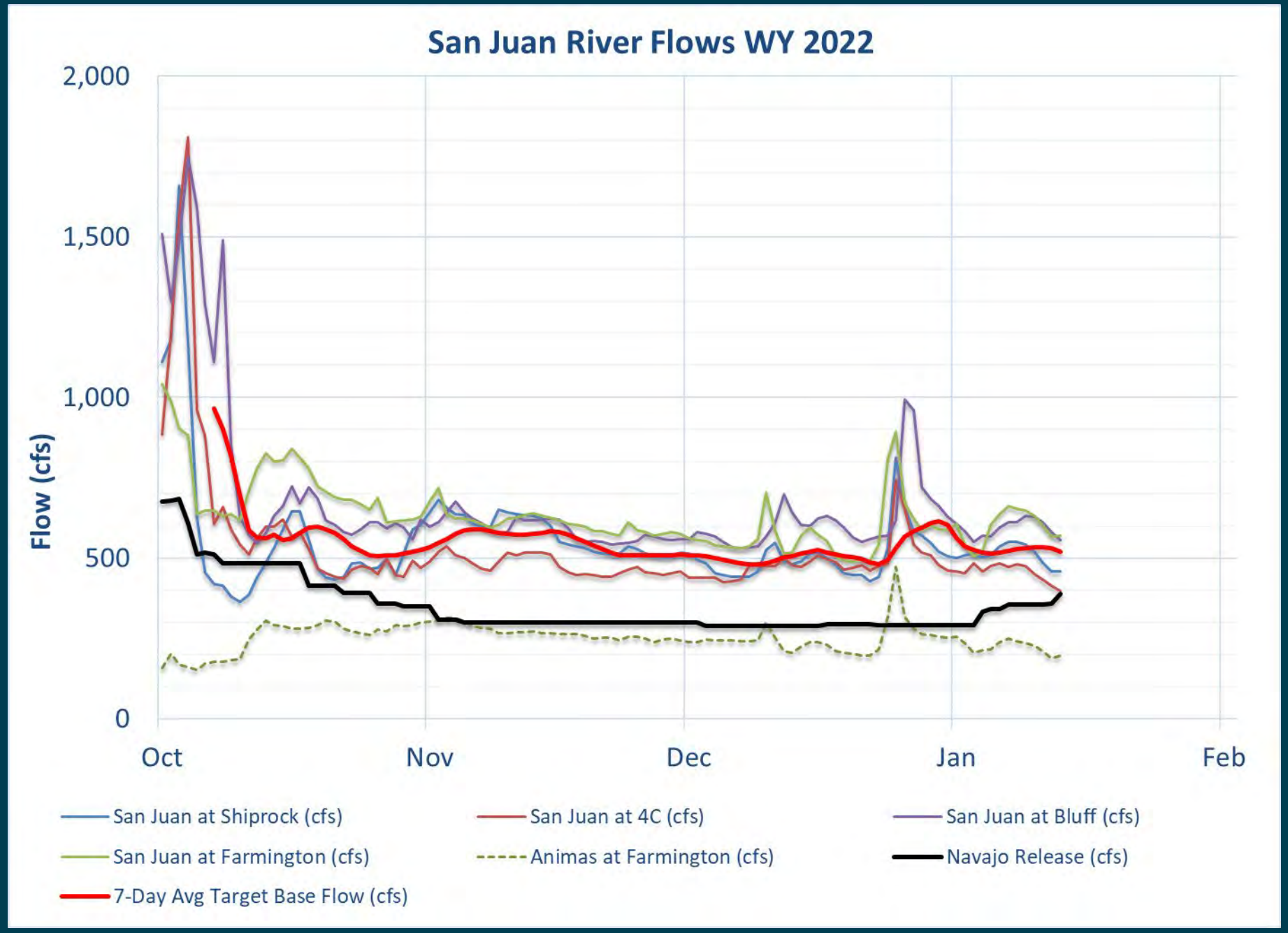
Projections from the January 2022 24-Month Study Inflow Scenarios

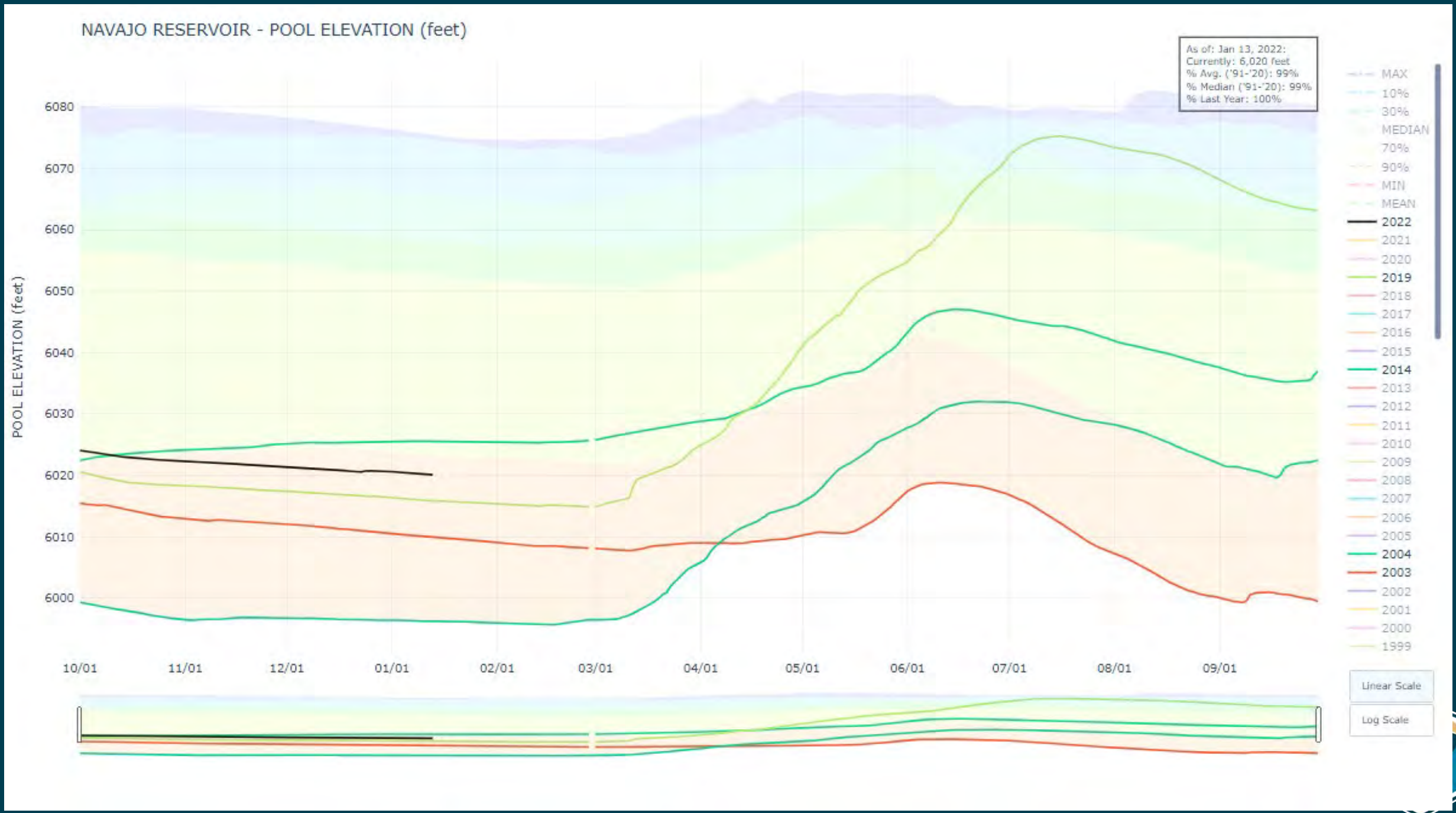


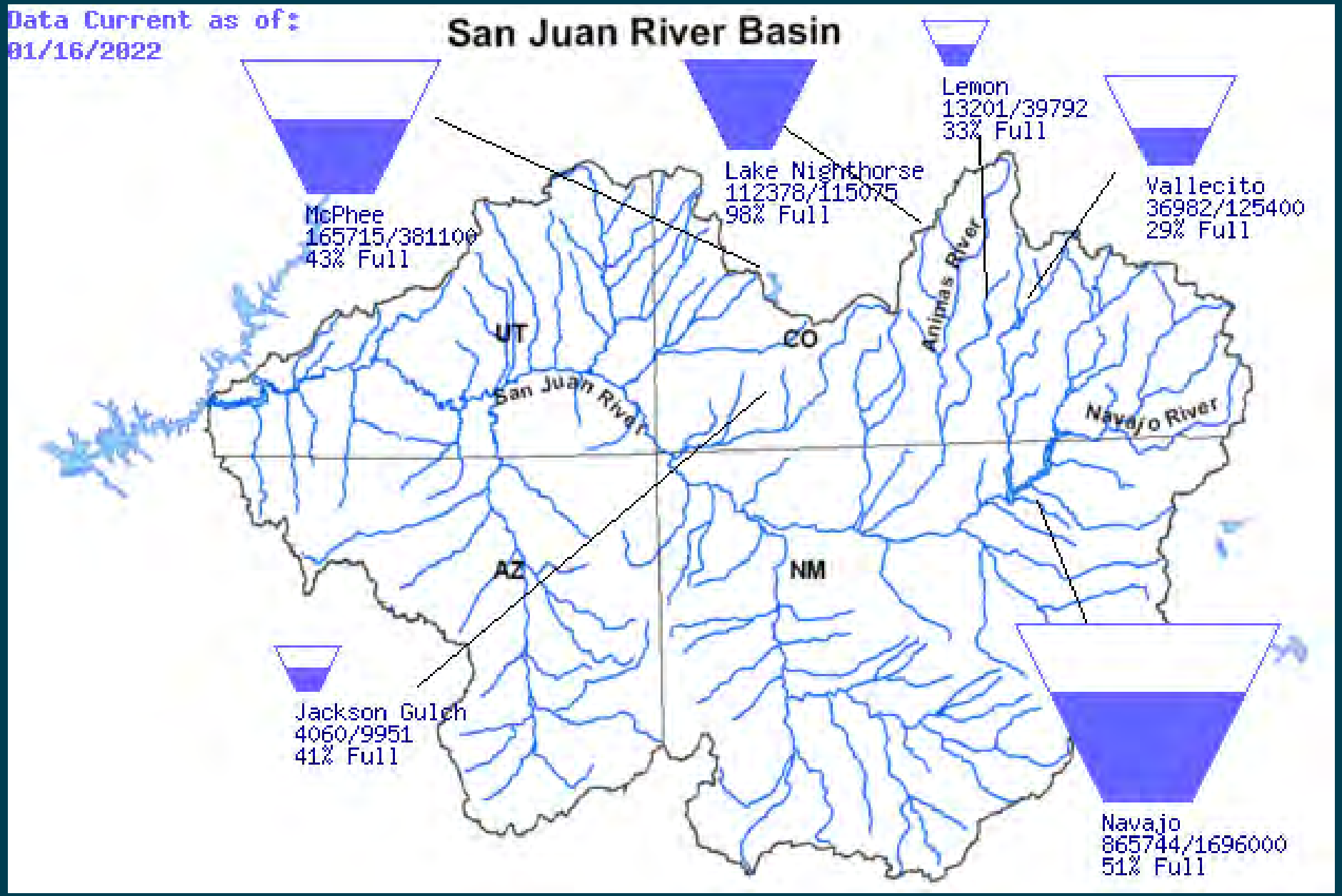
The Drought Response Operations Agreement (DROA) is available online at: https://www.usbr.gov/dcp/finaldocs.html.

See more about Lake Mead operations here https://www.usbr.gov/lc/riverops.html


Navajo Reservoir Operations WY 2022
1,000
900
800
700
600
500
400
300
200
100
0
Flow (cfs)
6030
6028
6026
6024
6022
6020
6018
6016
6014
6012
6010
Pool Elevation (ft)
Oct
Nov
Dec
Jan
Feb
Pool Elevation (ft)
Inflow (cfs)
Release To River (cfs)
NIIP (cfs)


San Juan River Flows WY 2022
2,000
1,500
1,000
500
0
Flow (cfs)
Oct
Nov
Dec
Jan
Feb
San Juan at Shiprock (cfs)
San Juan at 4C (cfs)
San Juan at Bluff (cfs)
San Juan at Farmington (cfs)
Animas at Farmington (cfs)
Navajo Release (cfs)
7-Day Avg Target Base Flow (cfs)


NAVAJO RESERVOIR - POOL ELEVATION (feet)
As of: Jan 13, 2022:
Currently: 6,020 feet
% Avg. ('91-'20): 99%
% Median ('91-'20): 99%
% Last Year: 100%
POOL ELEVATION (feet)
6080
6070
6060
6050
6040
6030
6020
6010
6000
10/01
11/01
12/01
01/01
02/01
03/01
04/01
05/01
06/01
07/01
08/01
09/01
MAX
10%
30%
MEDIAN
70%
90%
MIN
MEAN
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
2004
2003
2002
2001
2000
1999
Linear Scale
Log Scale



Reclamation Teacup Diagrams
https://www.usbr.gov/uc/water/basin/index.html

Weather Outlook

January 2022

Aldis Strautins

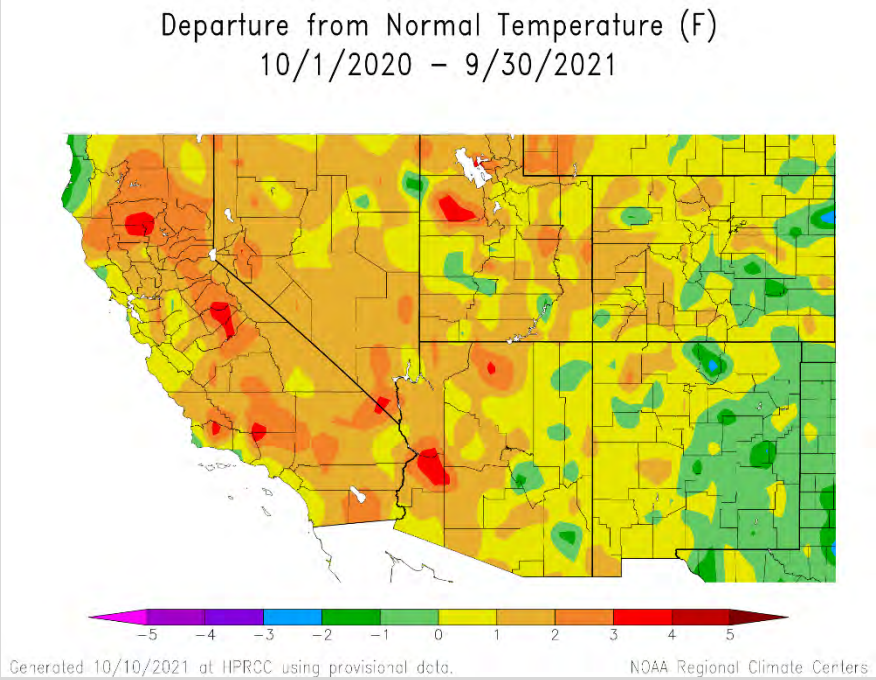
National Weather Service

Grand Junction, CO

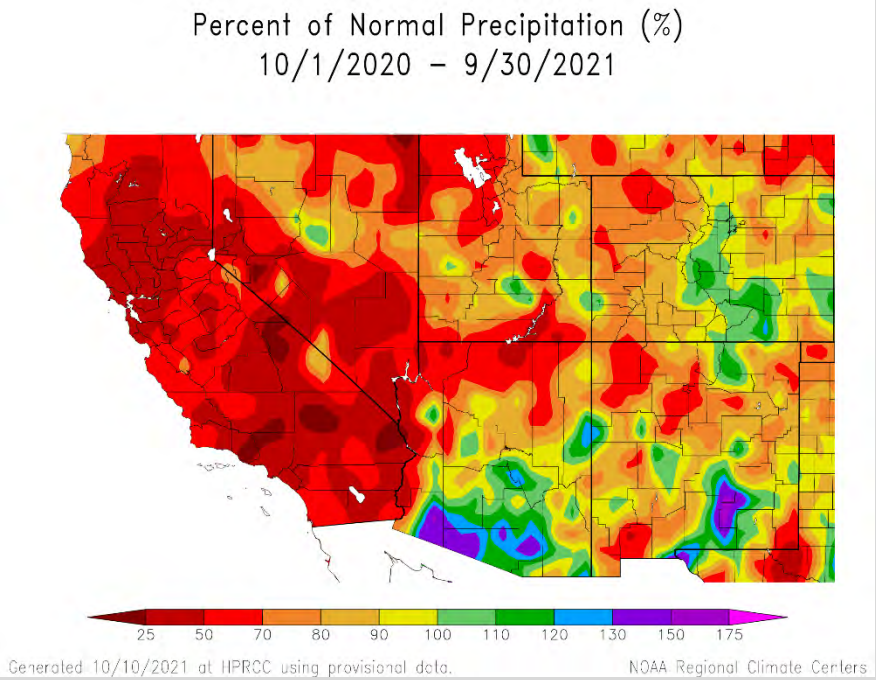
http://www.weather.gov/gjt

The Past
January 2022

Temperature
Departure from normal



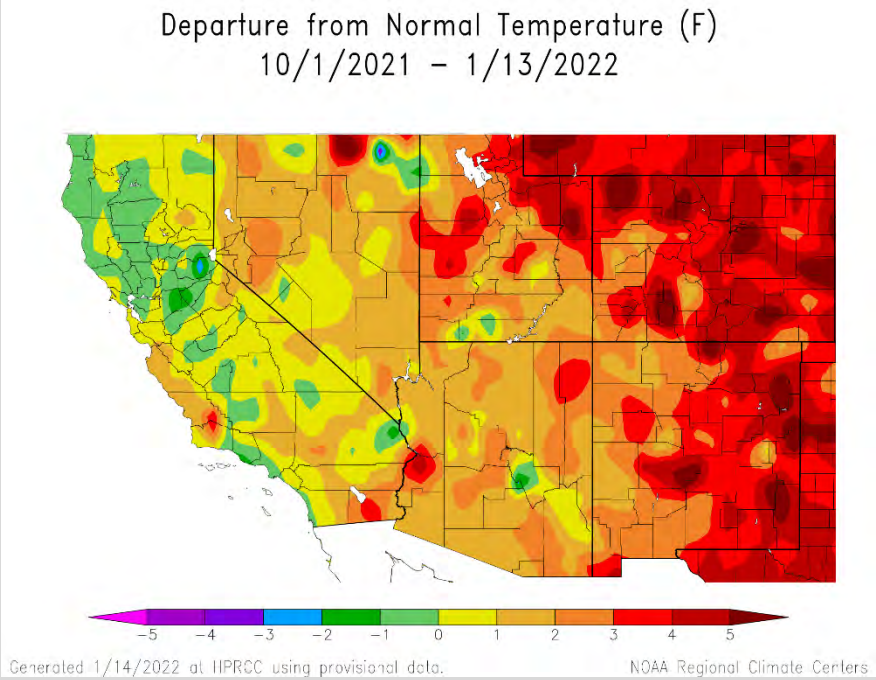
Precipitation
% of normal



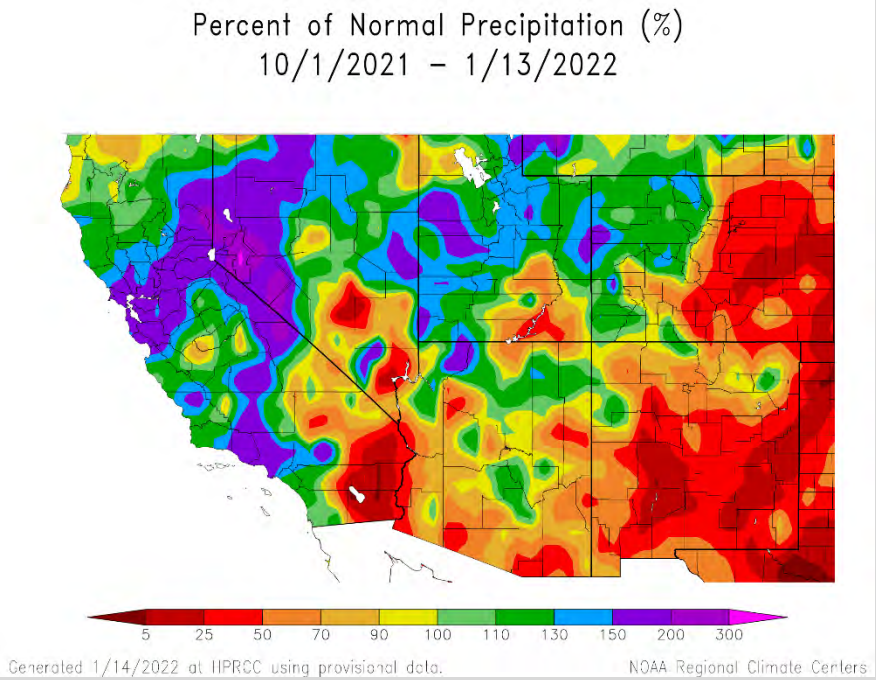
Water Year 2021

The Past
January 2022

Temperature
Departure from normal



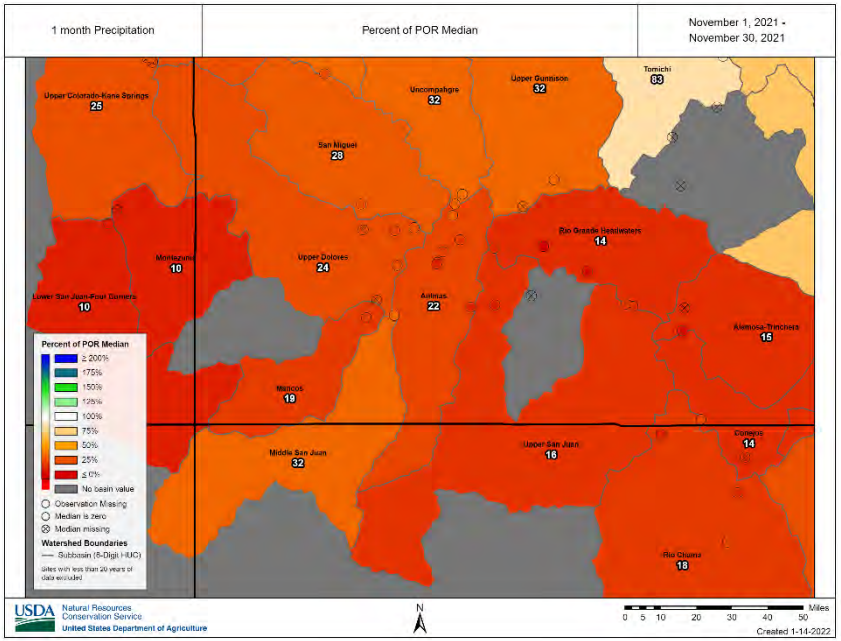
Precipitation
% of normal



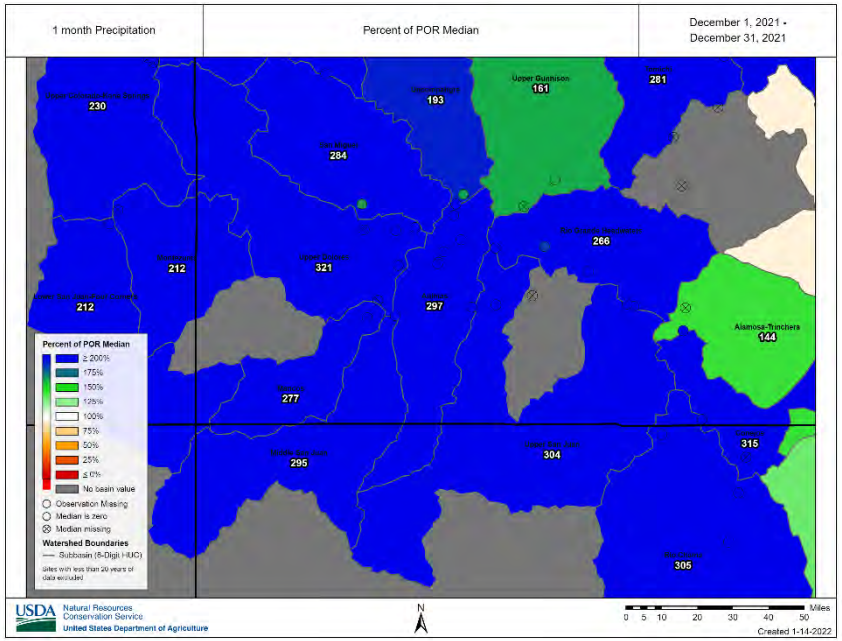
Water Year 2022 through mid January

The Past
January 2022

SWE
November 2021



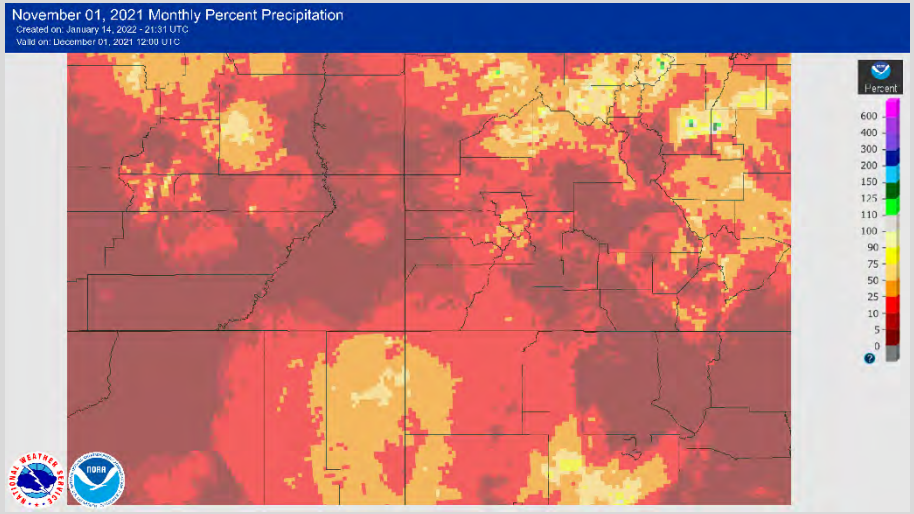
SWE
December 2021



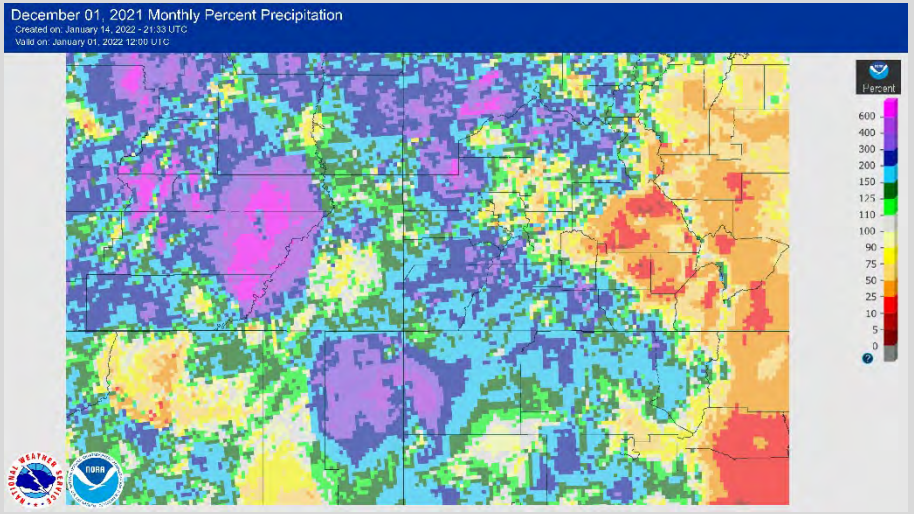
SNOTEL – Percent of Median

The Past
January 2022

Precipitation
November 2021



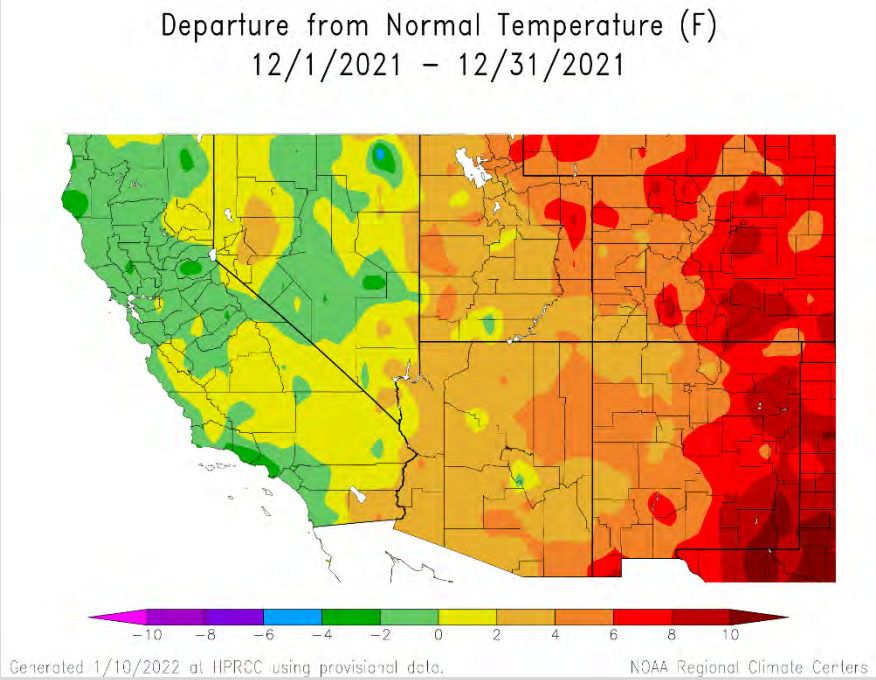
Precipitation
December 2021



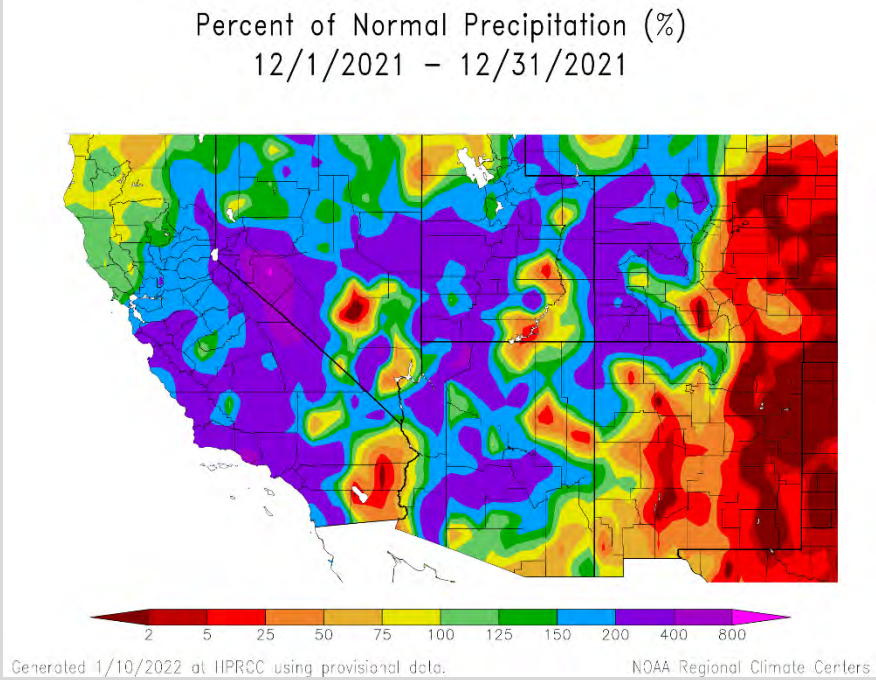
Percent of Normal - Monthly QPE

The Past
January 2022

Temperature
Departure from normal



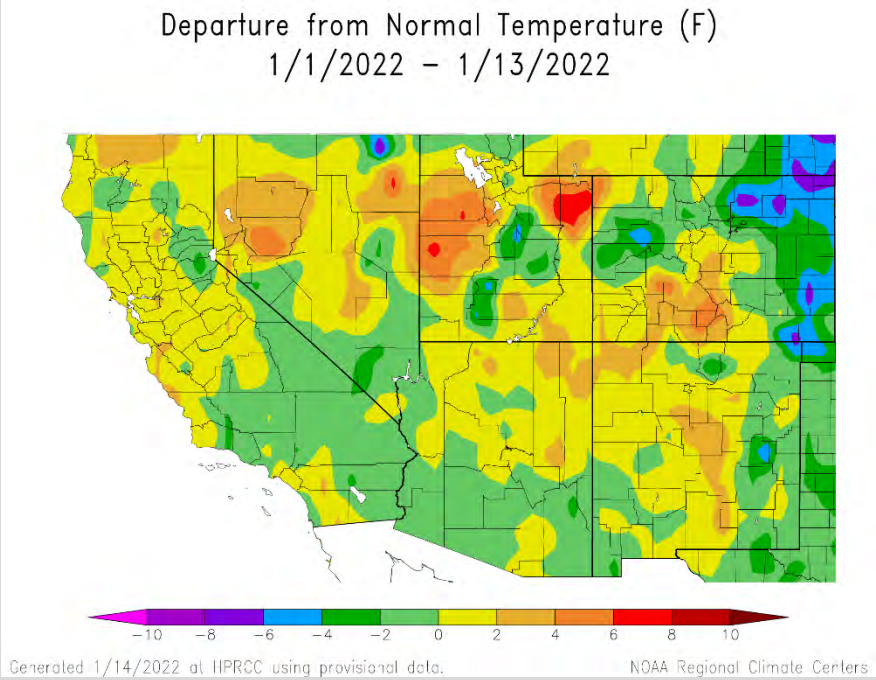
Precipitation
% of normal



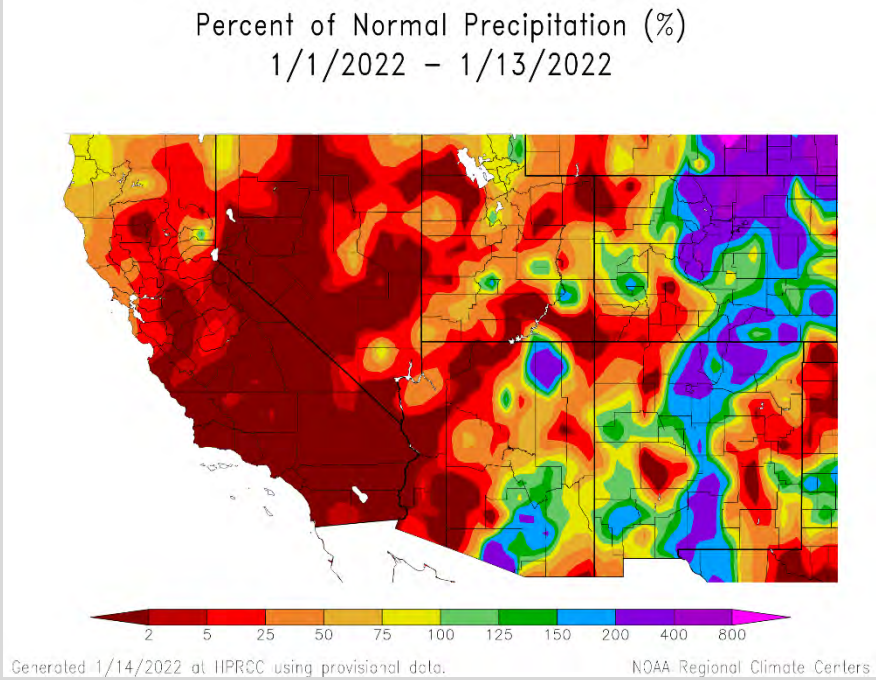
December 2021

The Past
January 2022

Temperature
Departure from normal



Precipitation
% of normal

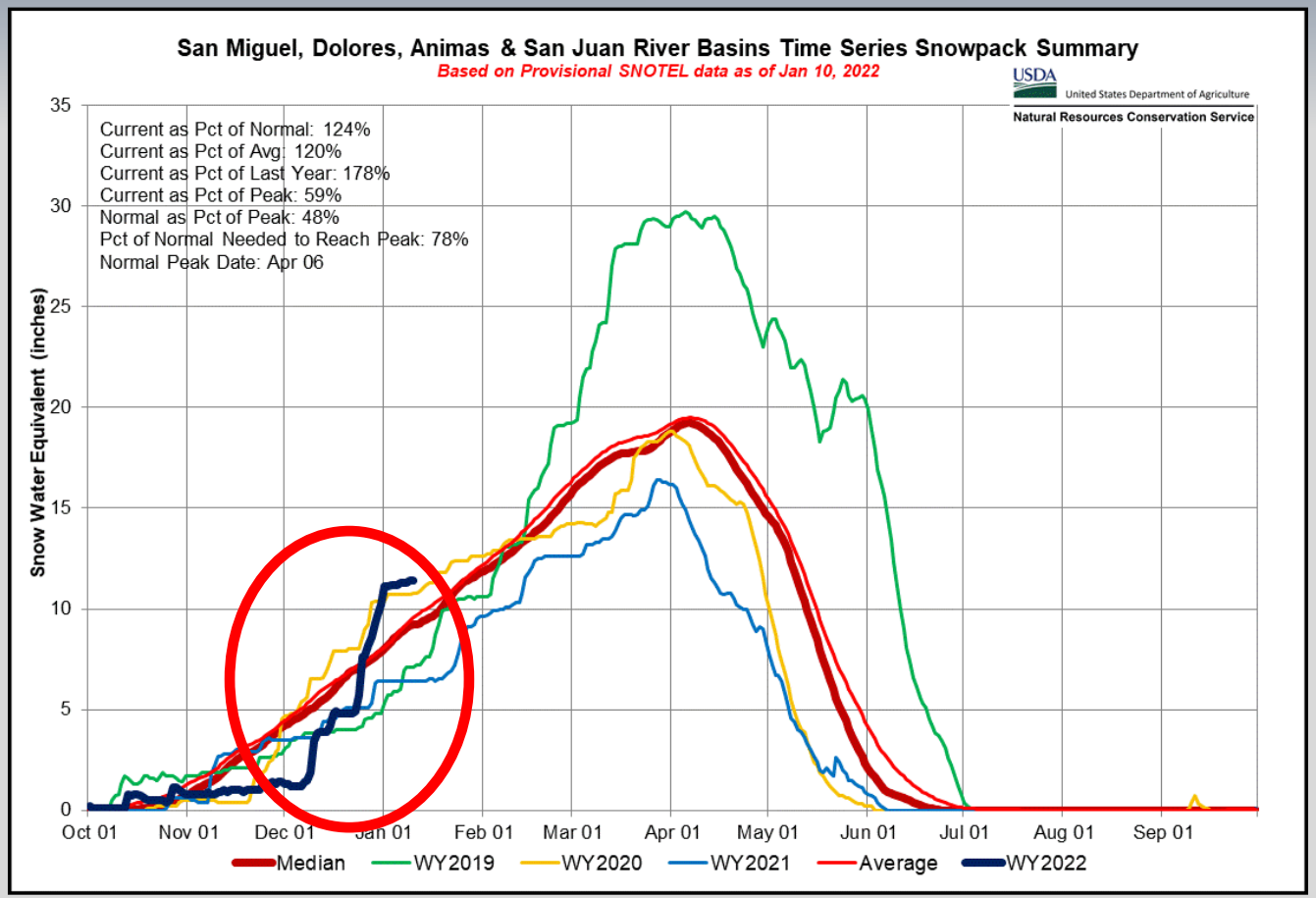


January 2022 so far

Snow
January 2022

124% of Normal

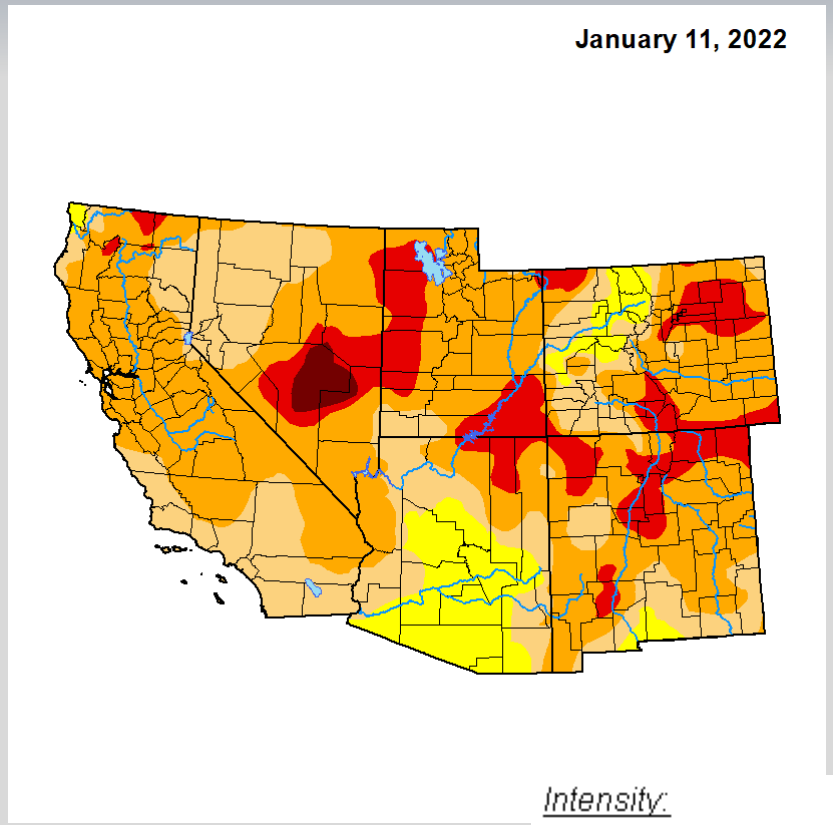
Yay…Late December Snow Increased from 5in to over 10in (SWE)



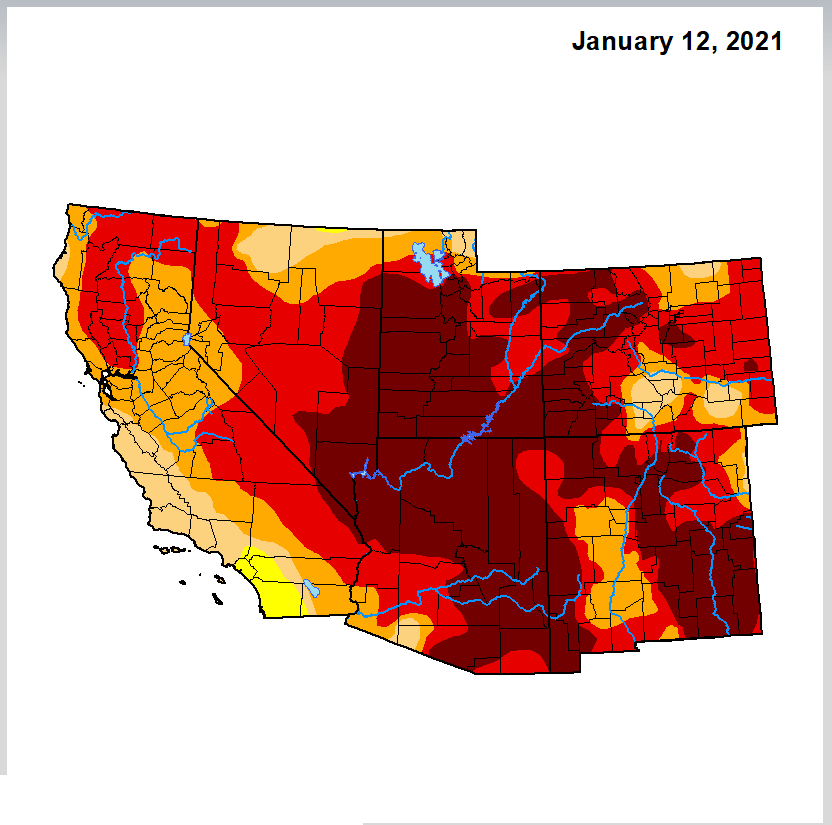
SNOTEL Snow Water Equivalent – NRCS Southwestern Colorado

Drought
January 2022

Jan 2022



Jan 2021



Intensity:

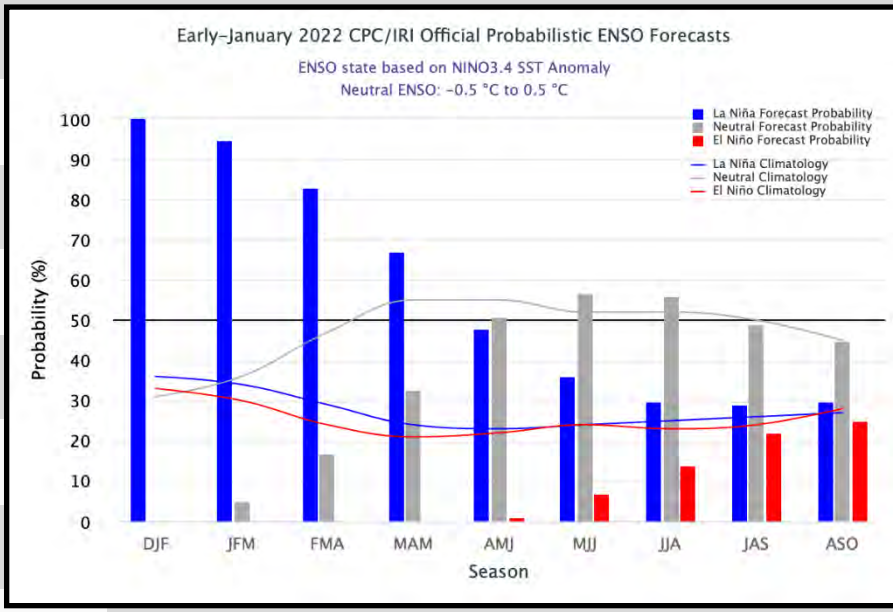
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Drought – Monitor

ENSO
January 2022

CPC/IRI Early-Month Consensus ENSO Forecast Probabilities
(using NWS CPC classification system)

Season	La Niña	Neutral	El Niño
DJF	100	0	0
JFM	95	5	0
FMA	83	17	0
MAM	67	33	0
AMJ	48	51	1
MJJ	36	57	7
JJA	30	56	14
JAS	29	49	22
ASO	30	45	25

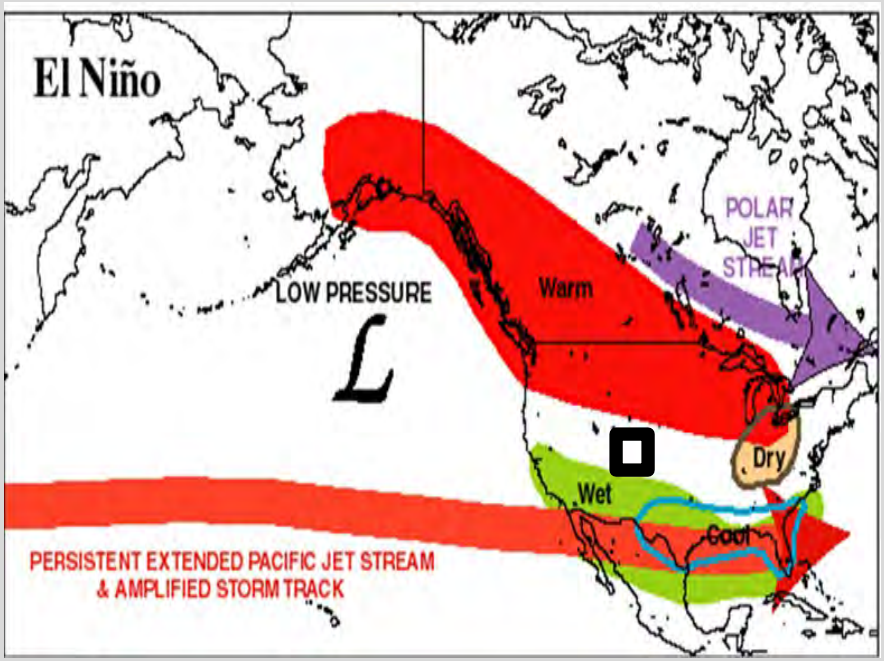


ENSO – Outlook

La Nina becoming Neutral this spring

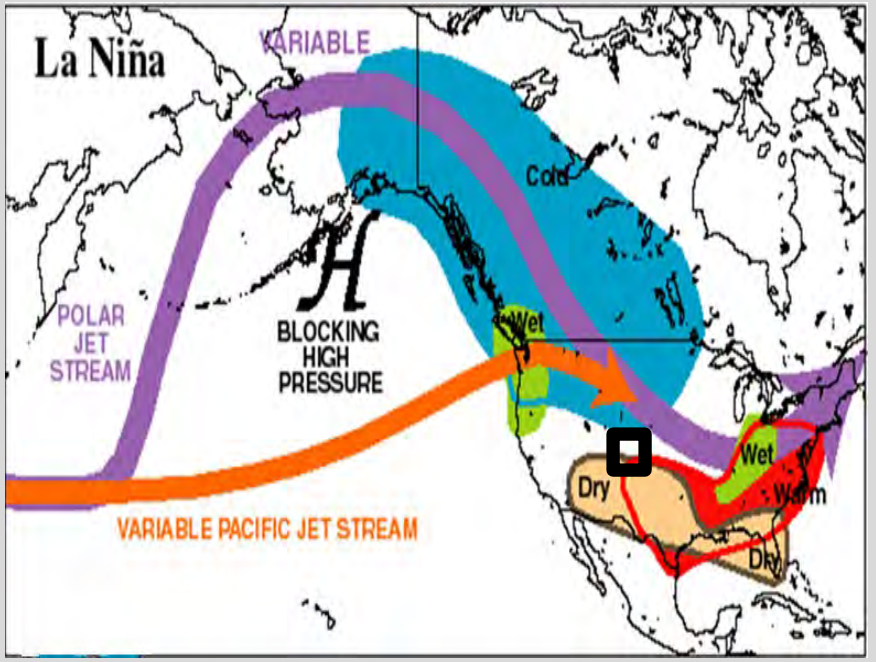
Weather Outlook
January 2022

El Nino



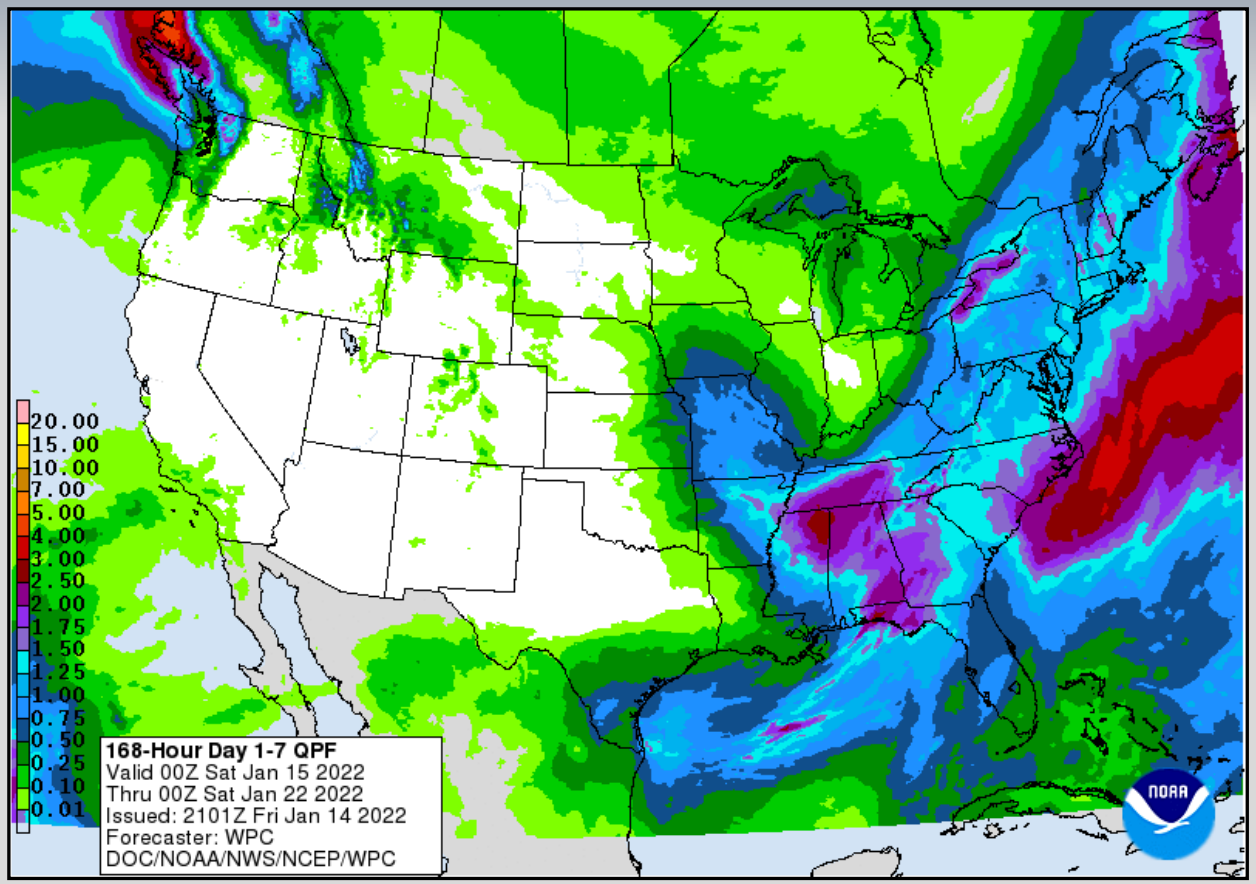
North of Colorado - Dry and Warm
South of Colorado - Wet and Cool

La Nina



North of Colorado - Wet and Cool
South of Colorado - Dry and Warm

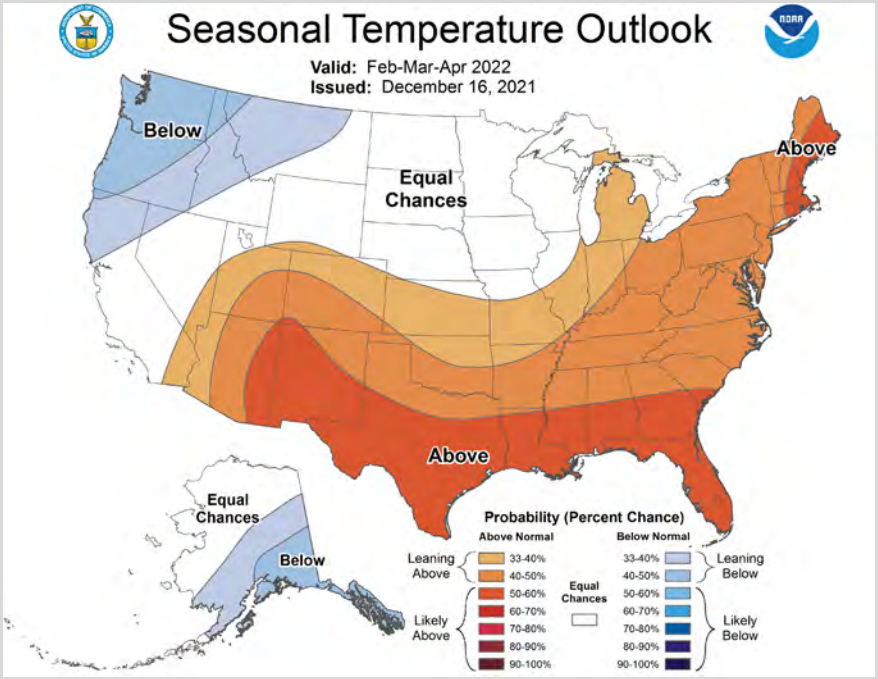
Weather Outlook
January 2022



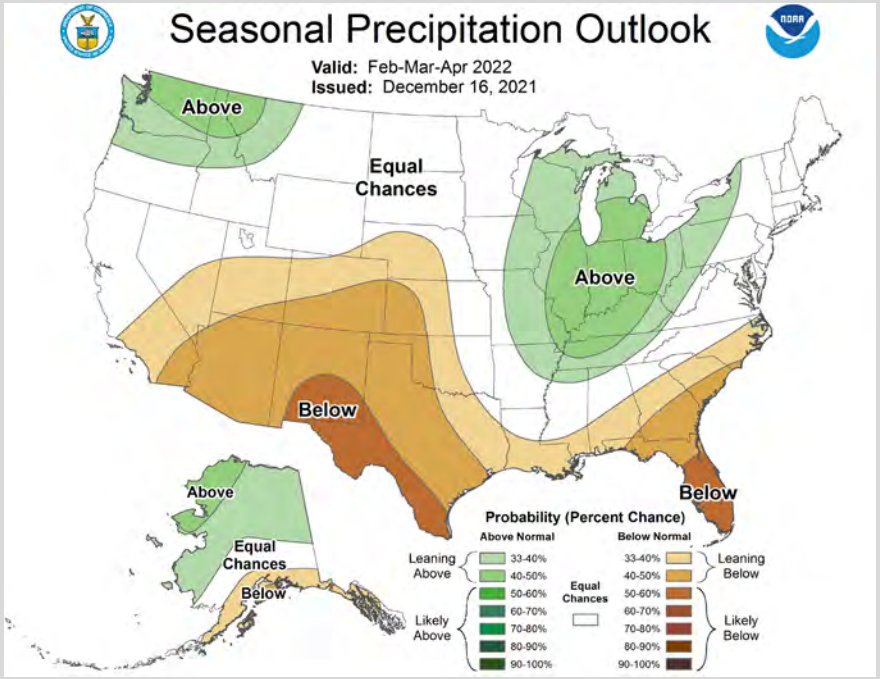
WPC 7-Day Precipitation Outlook
Accumulation period from Jan 15-22

Weather Outlook
January 2022

Temperature



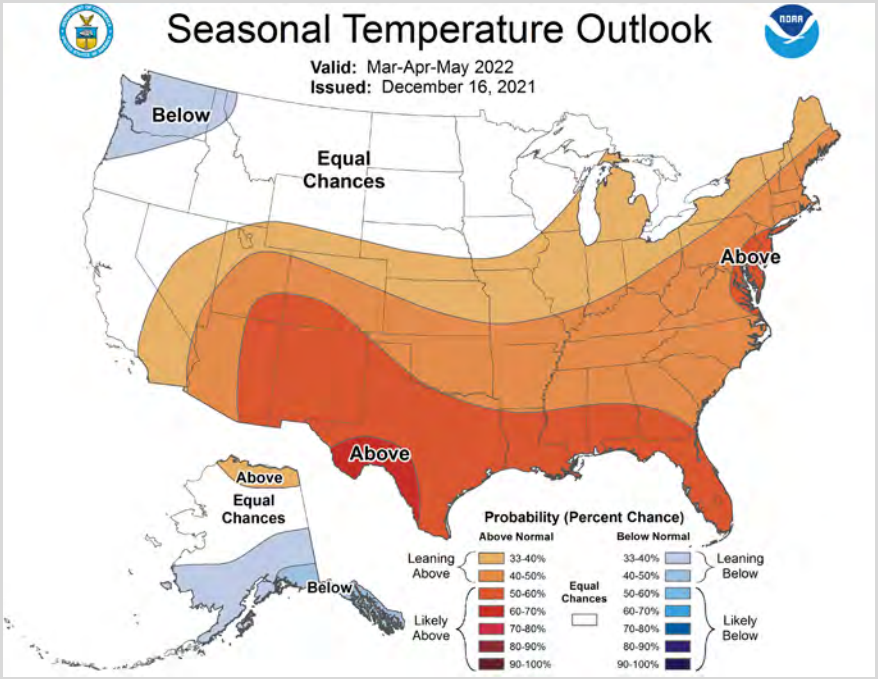
Precipitation



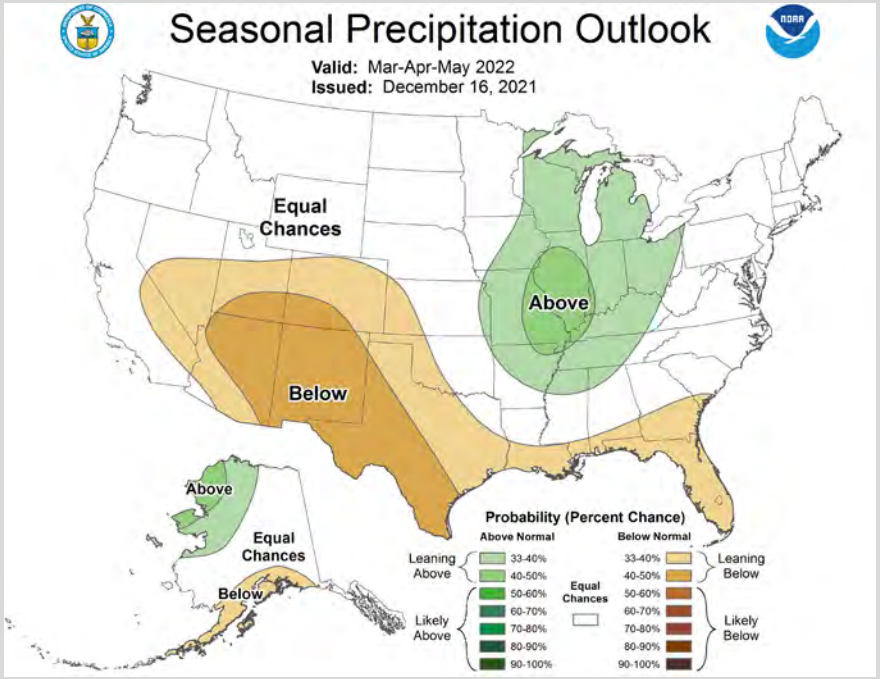
Feb/Mar/Apr – Outlook

Weather Outlook
January 2022

Temperature



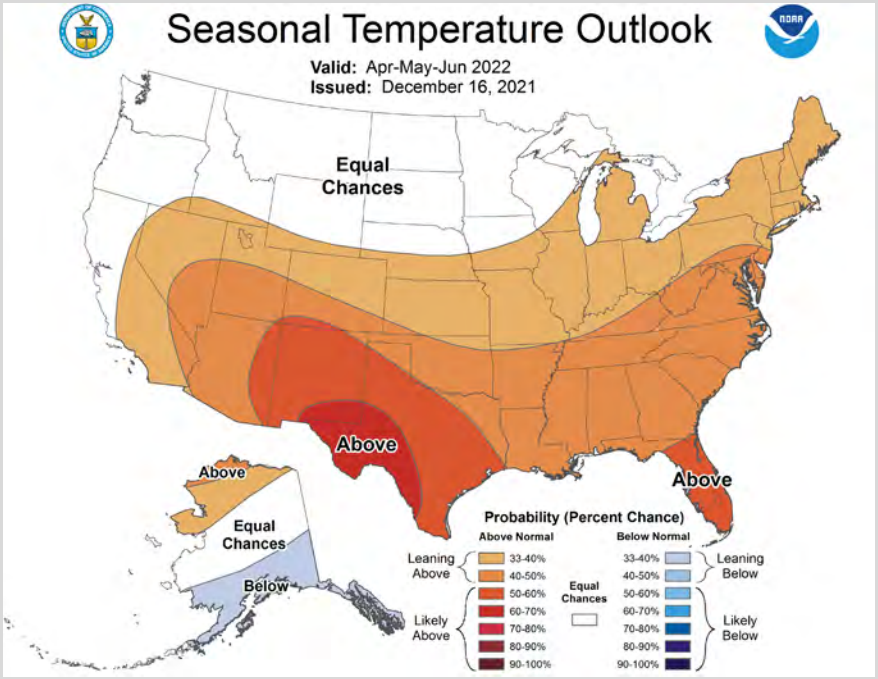
Precipitation



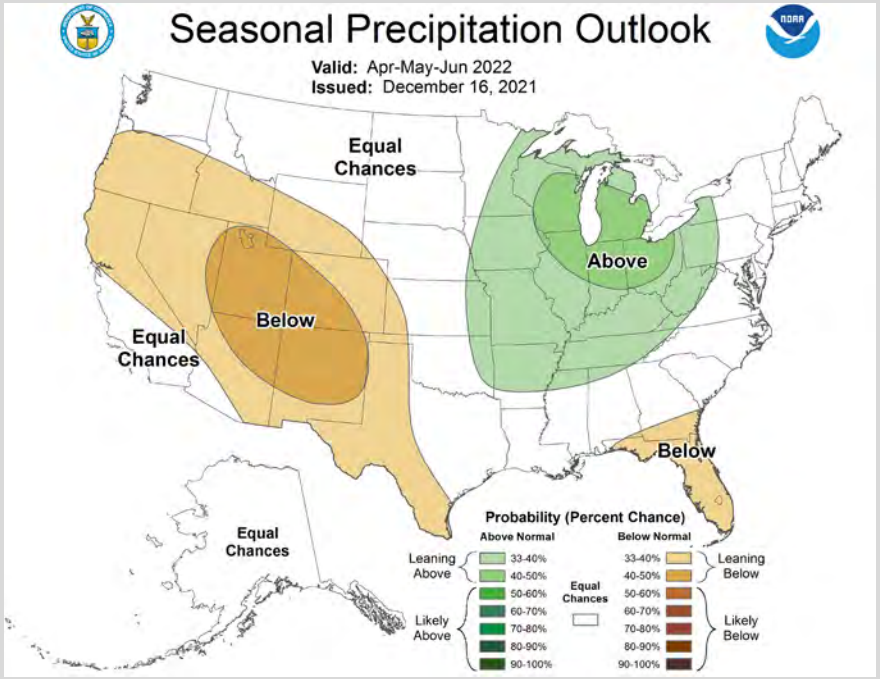
Mar/Apr/May – Outlook

Weather Outlook
January 2022

Temperature



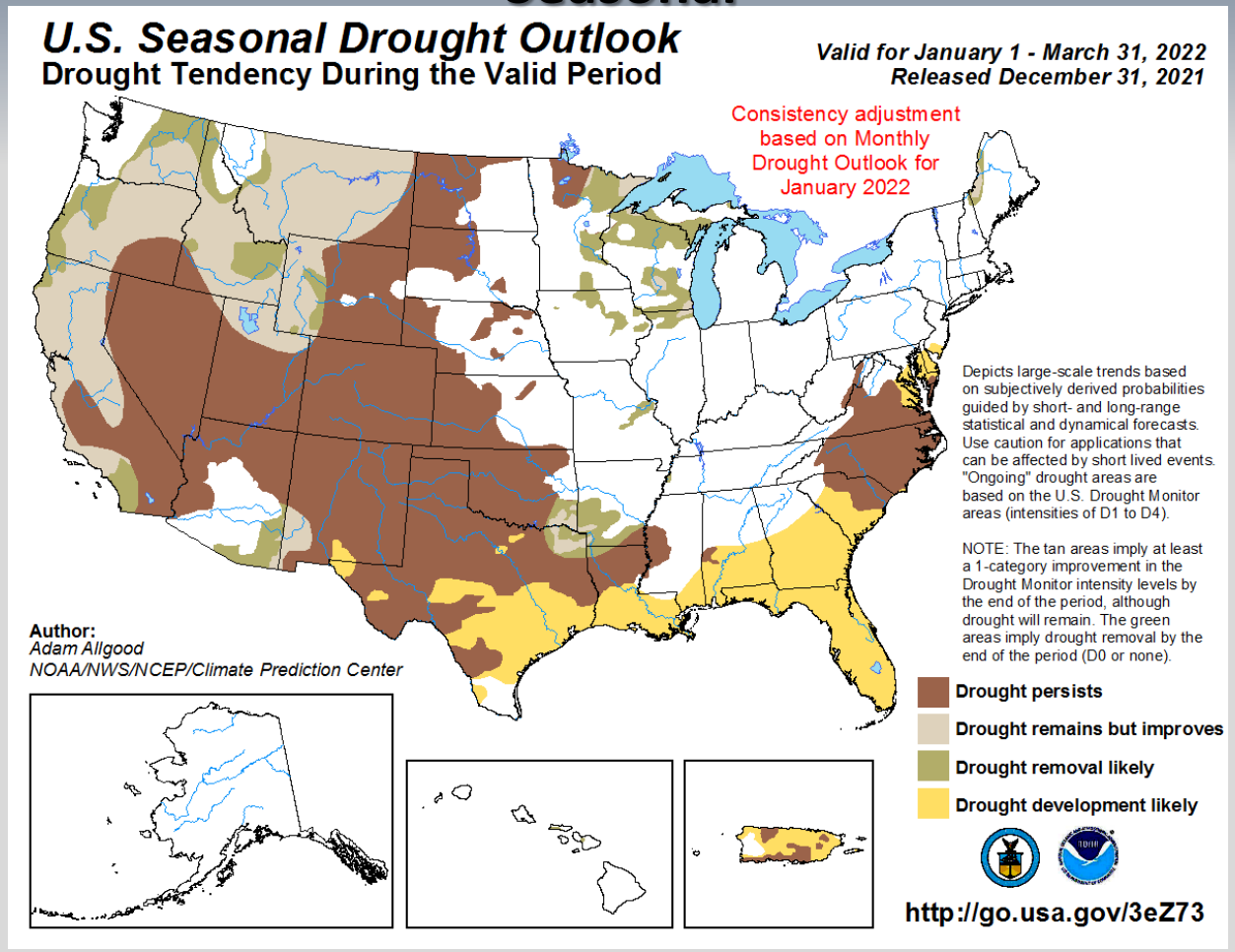
Precipitation



Apr/May/Jun – Outlook

Weather Outlook
January 2022

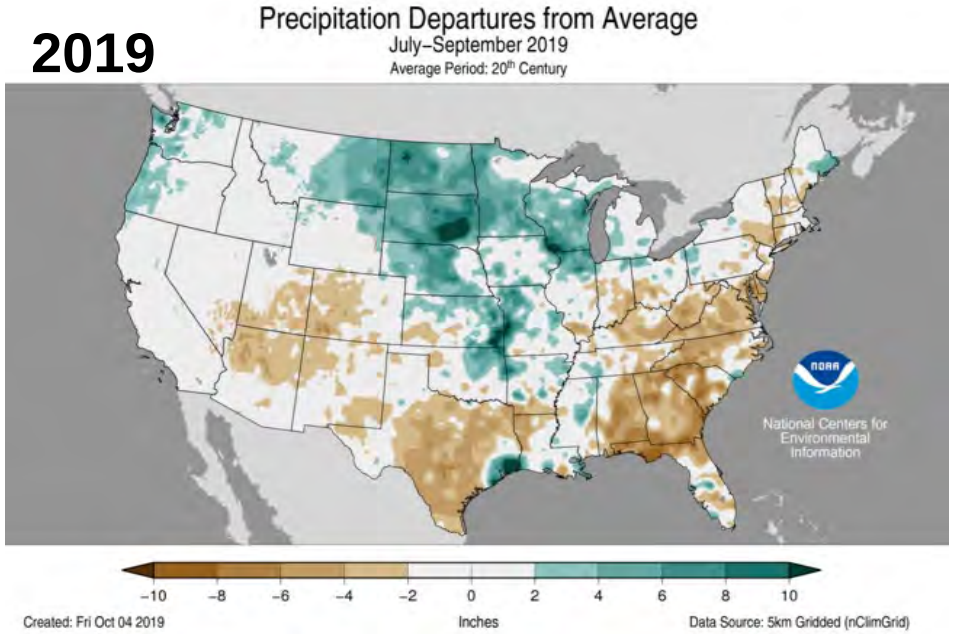
Seasonal



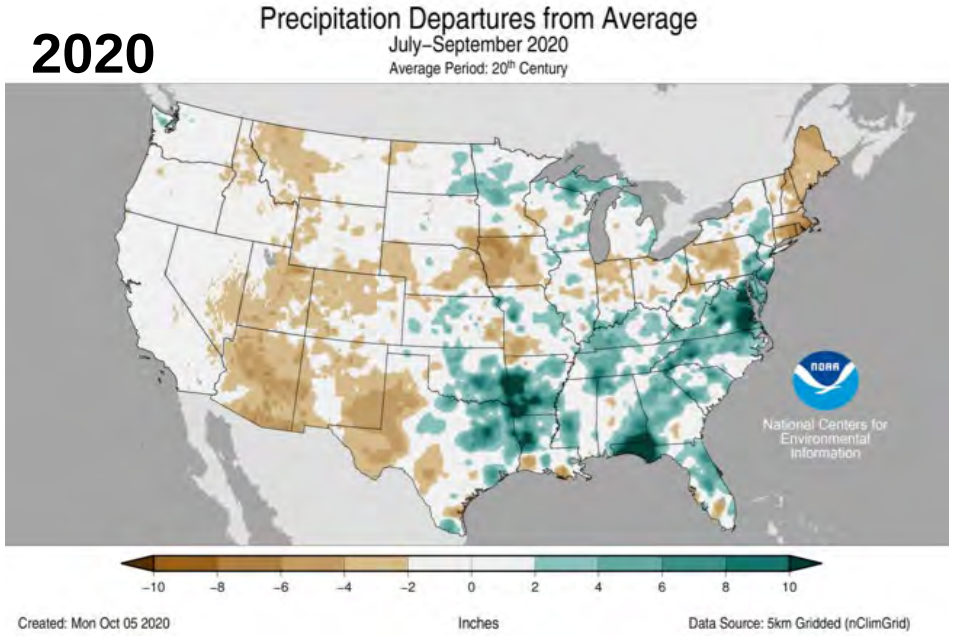
Drought– Outlook

Monsoon: July-September Precipitation

2019



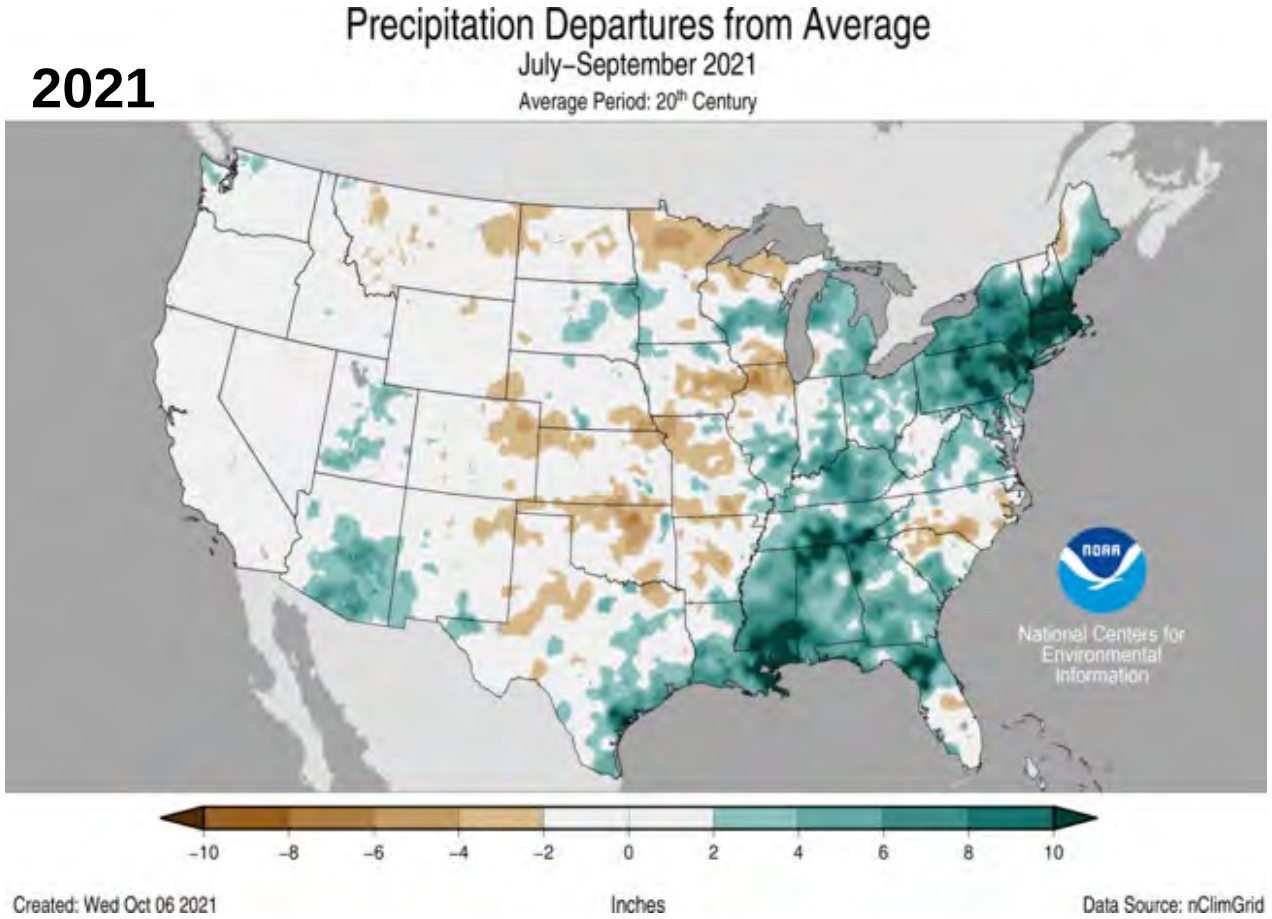
2020



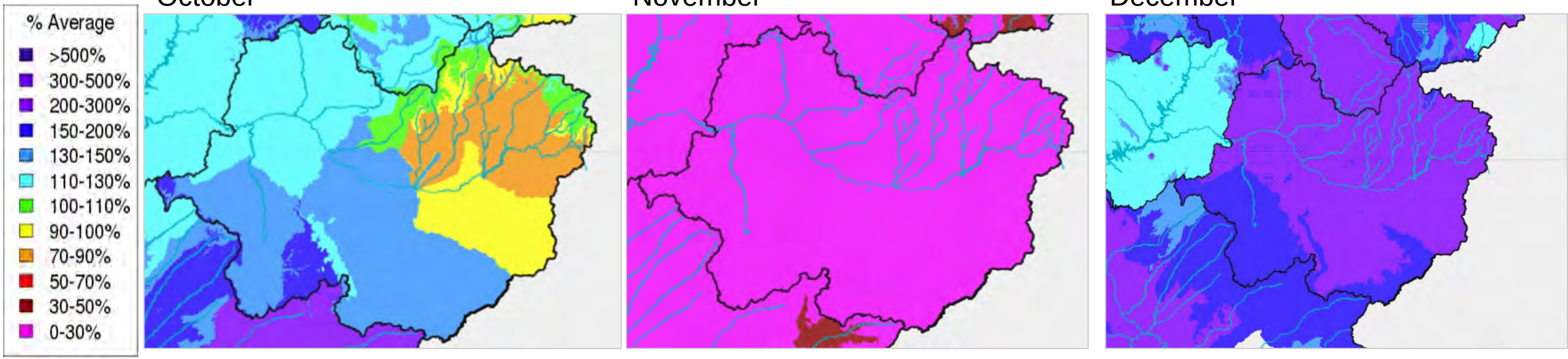
The 2021 monsoon season was much wetter than recent years, especially across southern Arizona and central Utah.

In the San Juan basin, the 2021 monsoon season was near to slightly below normal.

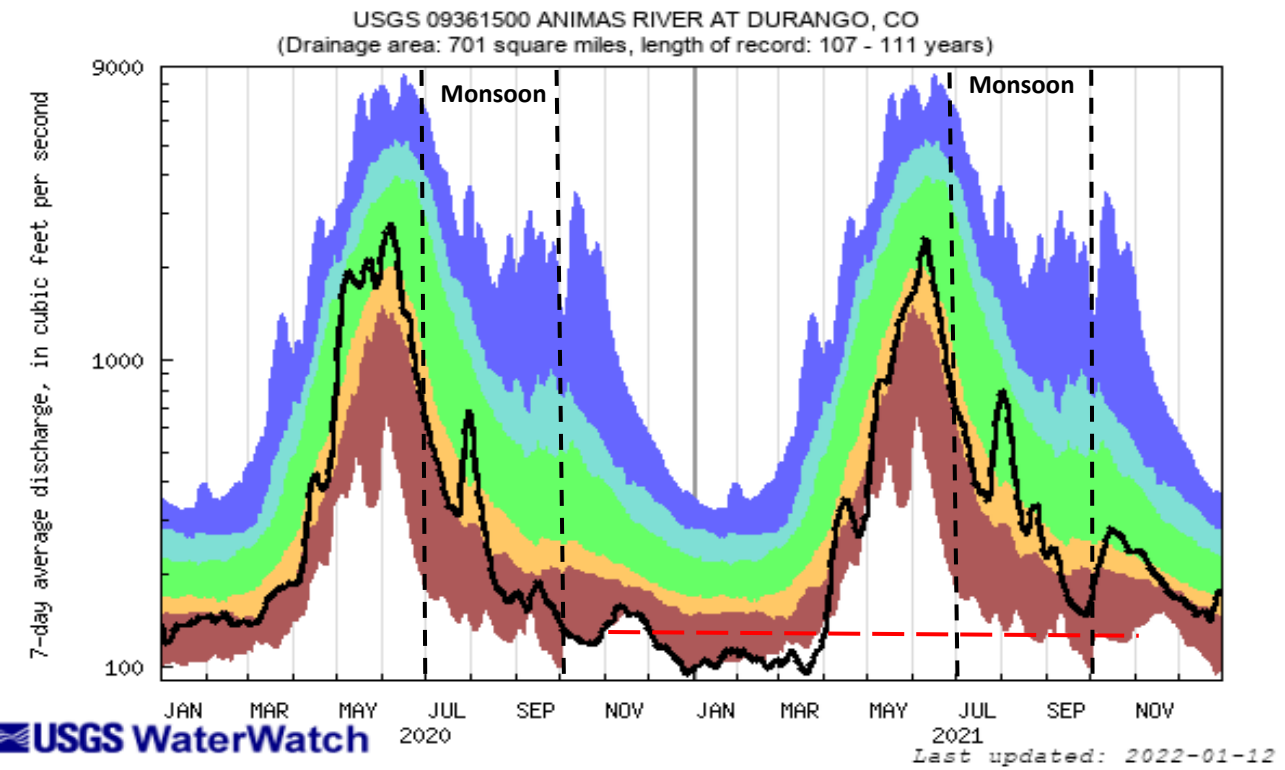
2021

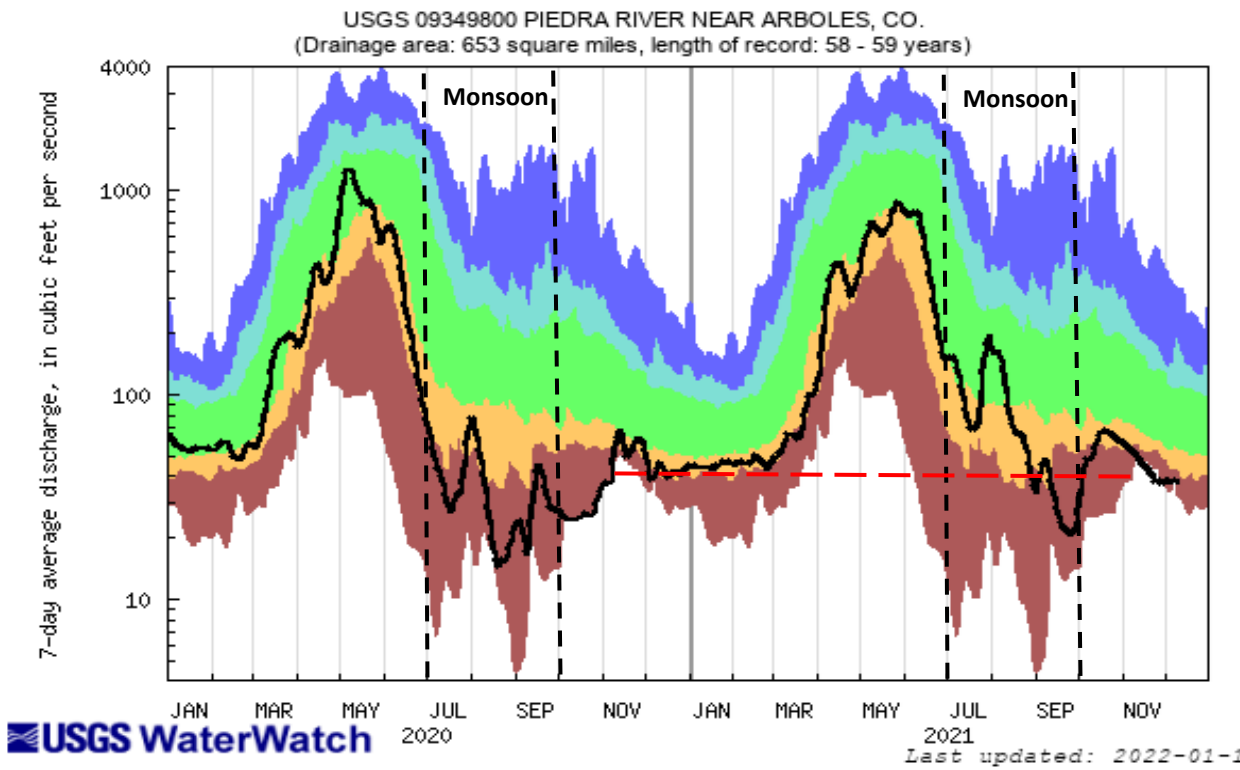


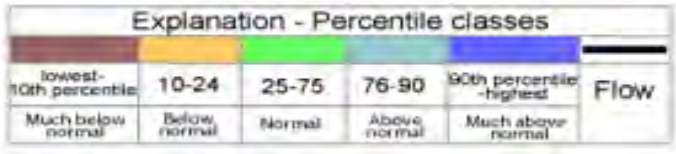
October-December Precipitation



Streamflow Conditions







- Two consecutive years of below normal spring runoff
- Some improvement to conditions from July and October precipitation.
- Streamflow conditions have improved from last year in most basins, with some exceptions, but are still below to much below normal.
- An average 2021 monsoon can not make up for multiple years of near/record dry conditions.

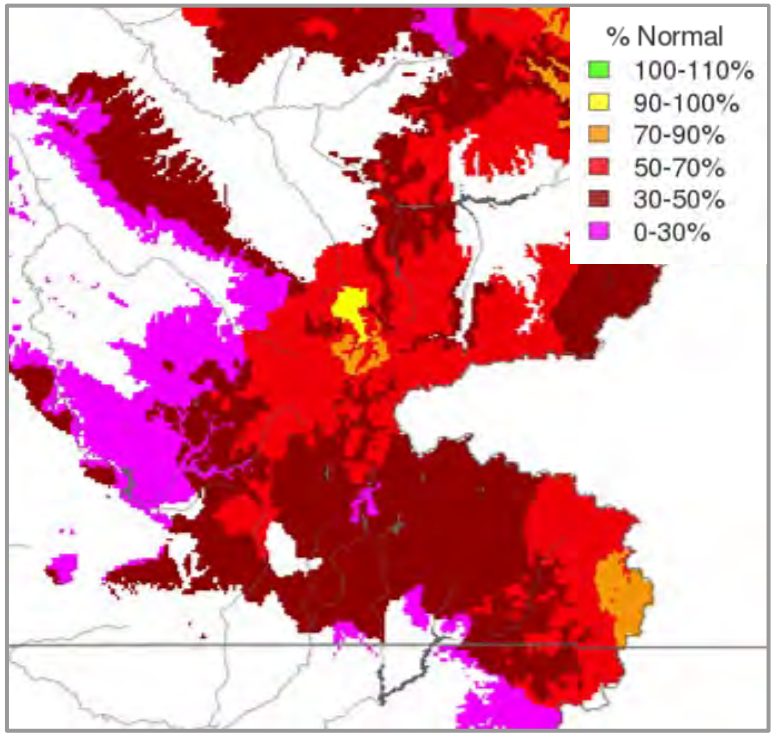
Fall Modeled Soil Moisture Conditions: 2020 vs. 2021

- Soil moisture conditions have improved from record/near record dry levels last year but remain below normal across the majority of the San Juan River Basin.

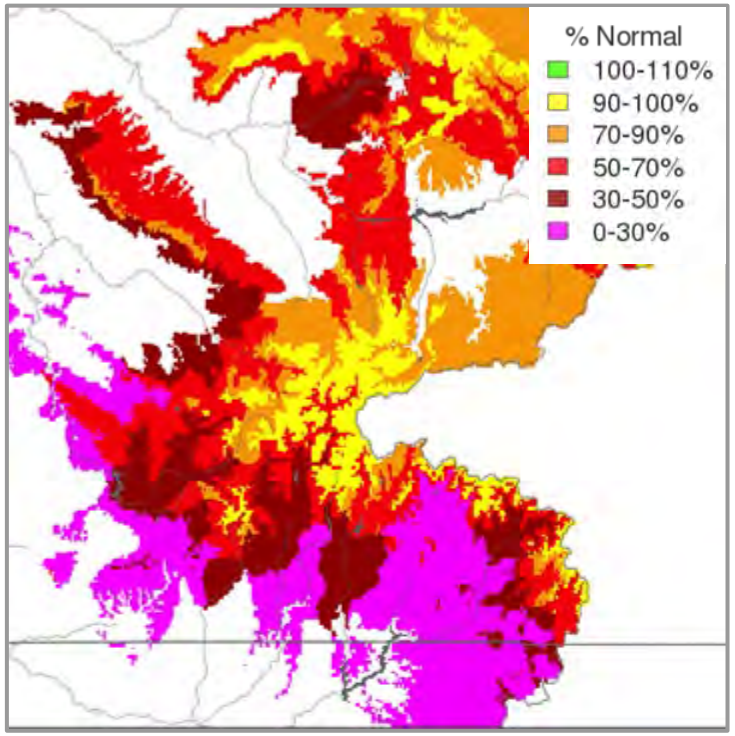
- Soil moisture conditions can impact spring runoff efficiency
  - Degree of impact is uncertain in every year
  - Timing/magnitude of runoff is ultimately a result of spring weather (precipitation/temperature), snow and soil moisture conditions.

CBRFC Modeled Soil Moisture:
- Represents the deep soil layer
- Source of longer-term (weeks to years) streamflow
- Impacts water supply forecasts
  - Below average conditions = lower forecasts
  - Above average conditions = higher forecasts

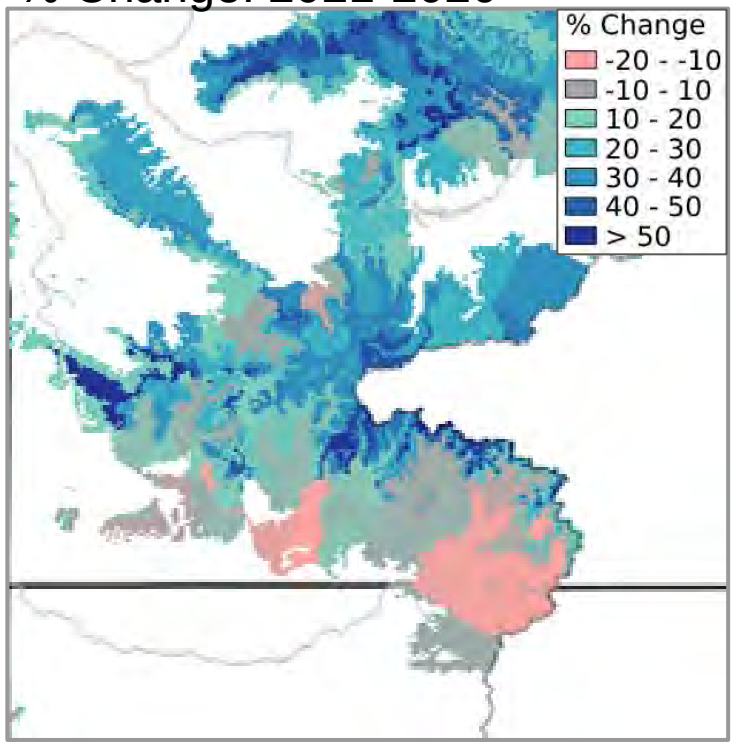
Fall 2020



Fall 2021

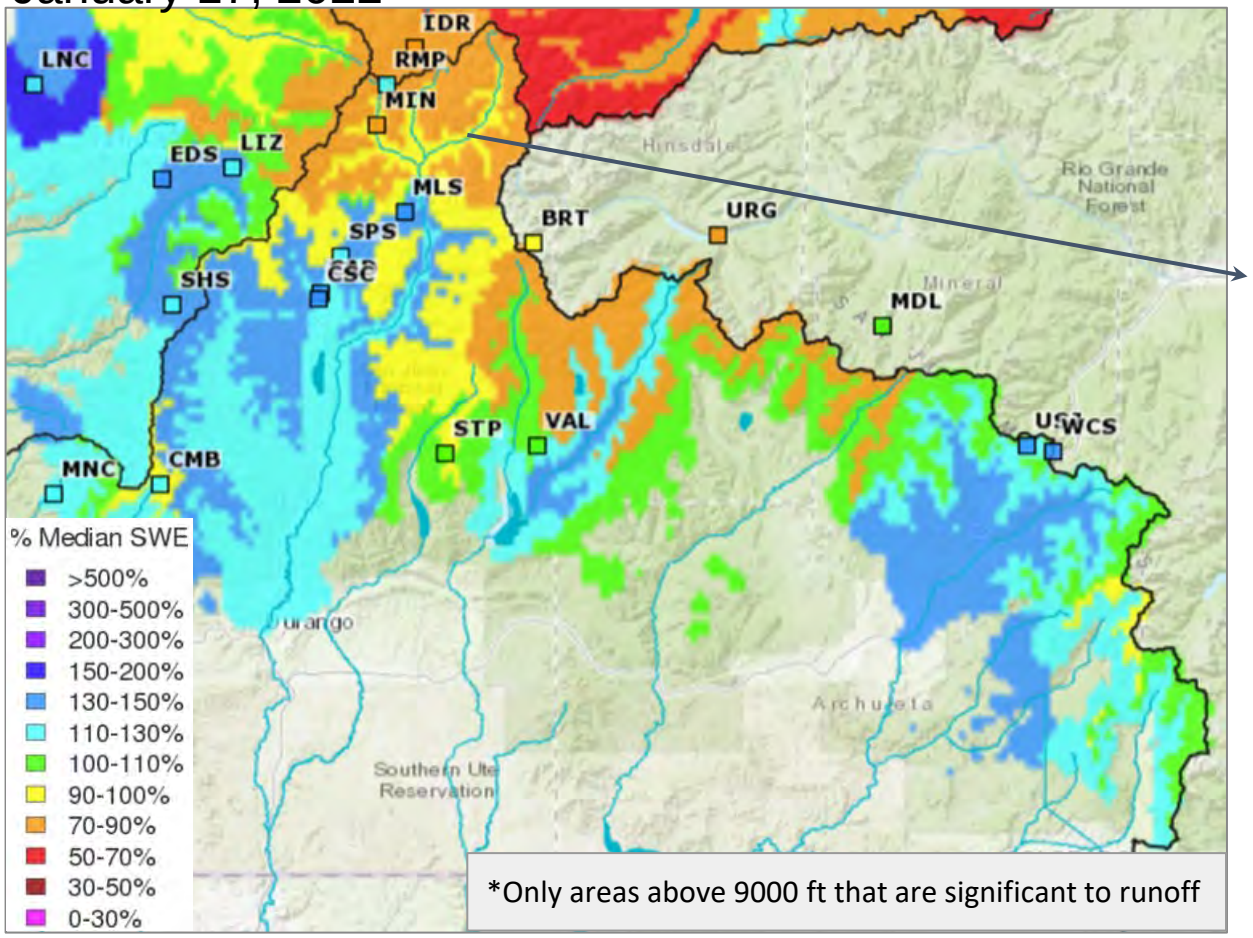


% Change: 2021-2020

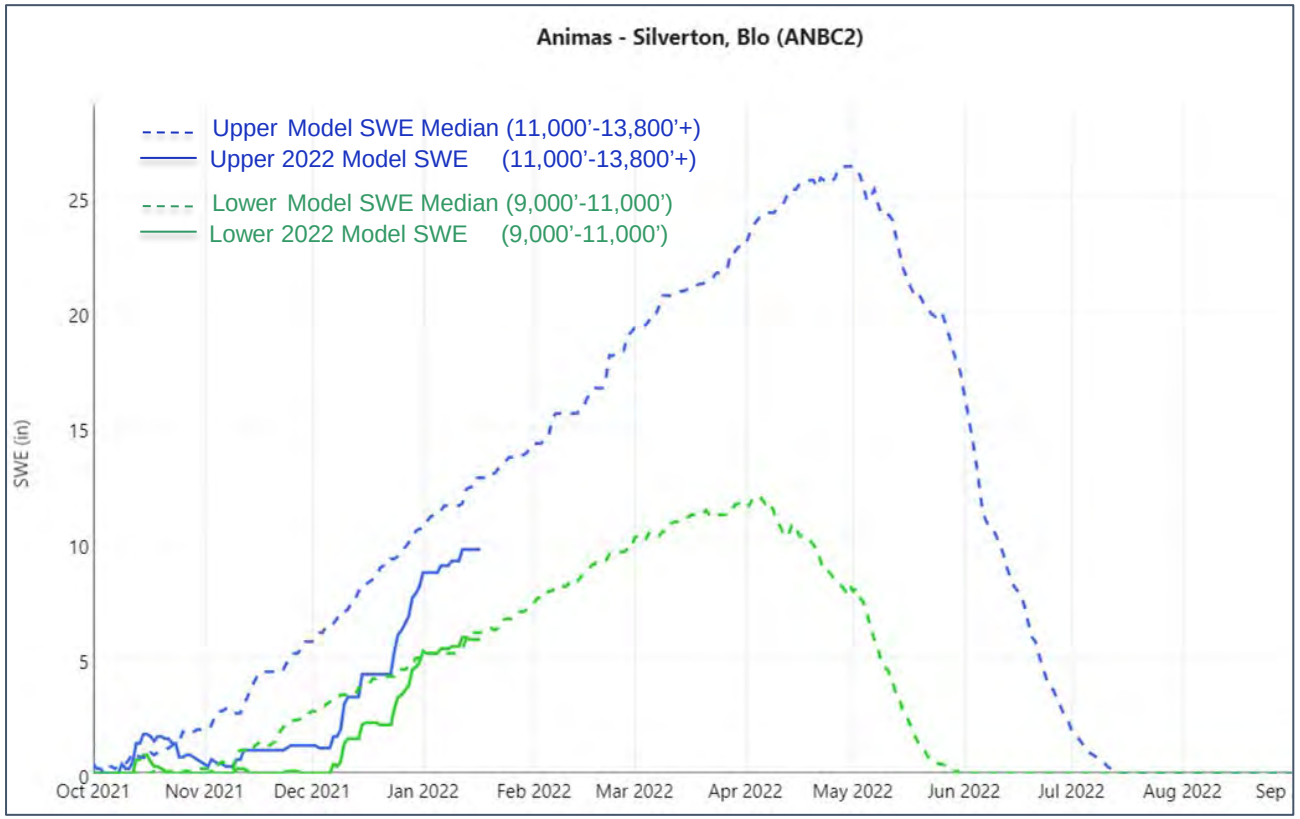


Snow Conditions: CBRFC Model Snow Water Equivalent

January 17, 2022



*Only areas above 9000 ft that are significant to runoff

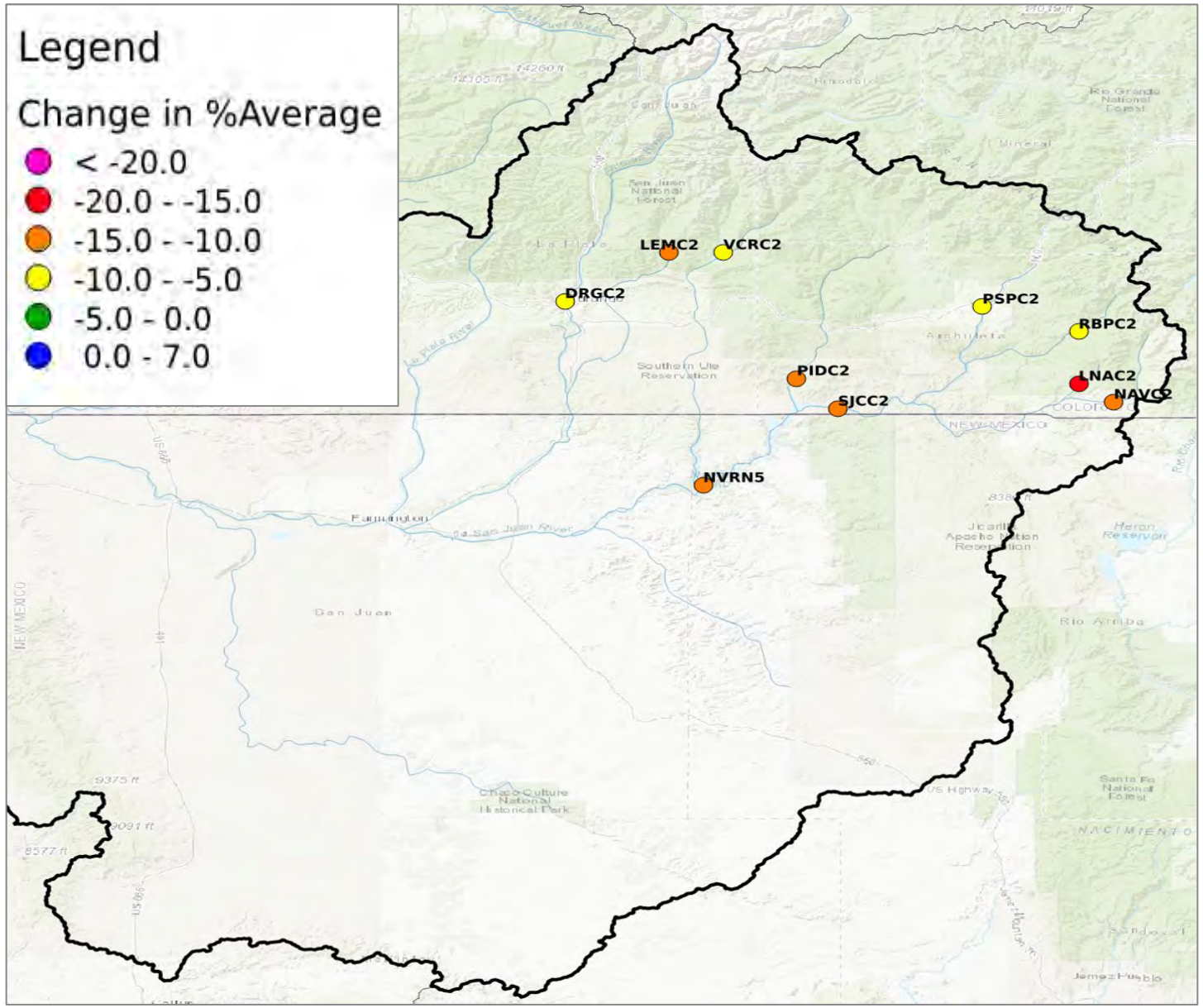


Model snow includes areas above and below SNOTEL sites.

- SNOTEL locations range from ~8,500-11,500'
- Some modeled basins extend to over 13,000'

- Snow accumulation had a slow start at all elevations
  - Warm and dry November
- SWE conditions above 11,000' are below normal
  - Eastern headwaters have near normal conditions above 11,000'
- SWE conditions below 11,000' are normal to above normal.
- Still early in the snow accumulation season.

1981-2010 vs 1991-2020 Averages: San Juan River Basin



- Averages are updated every 10 years
- Conforms to World Meteorological Organization standards
- New averages represent most recent trends

- Averages in the San Juan River basin decreased by 10-20%

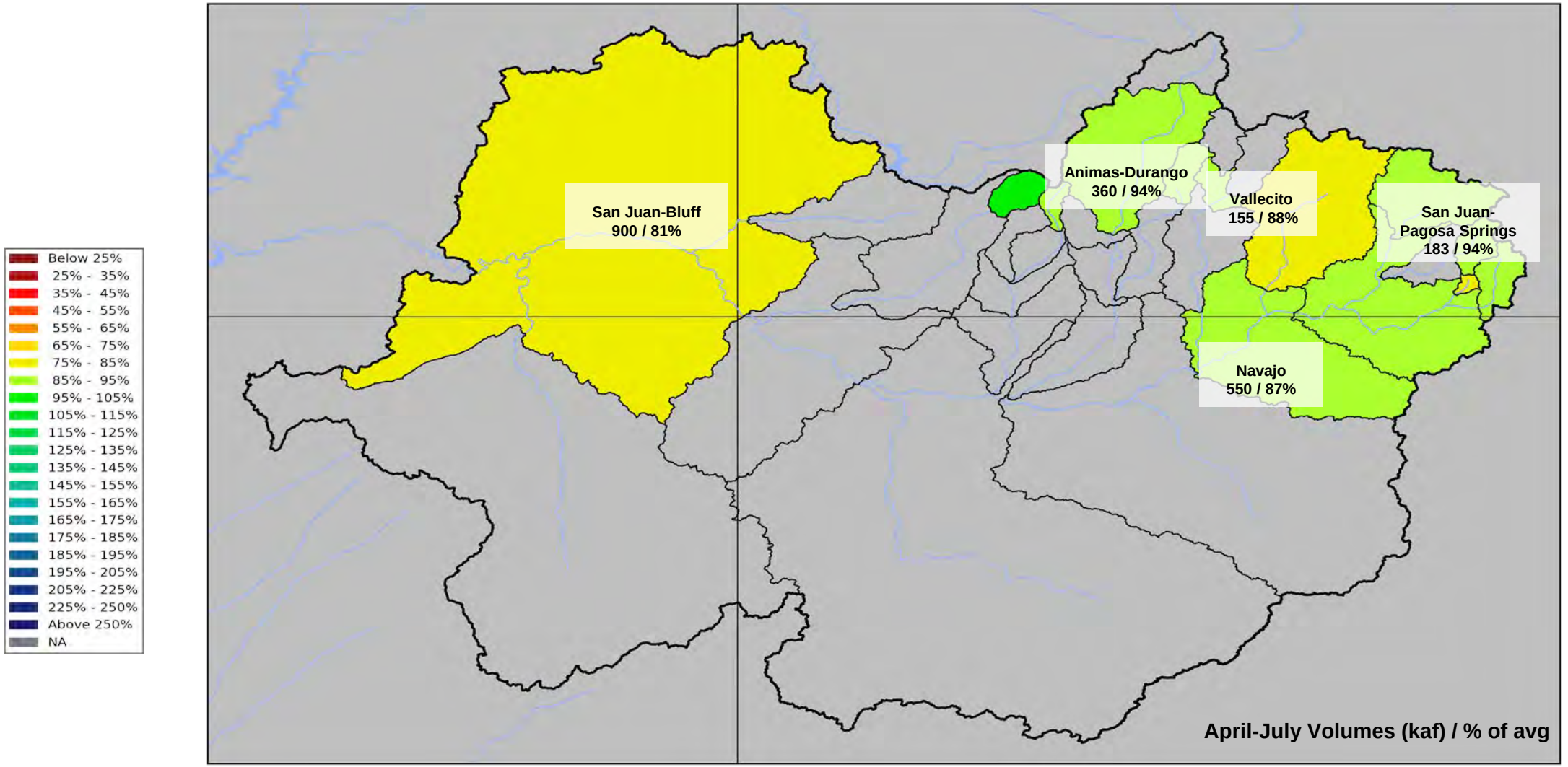
- Water supply forecasted/observed volumes will will be higher as a percent of average compared to the same volume last year.

Navajo Forecast - Comparison of Period Normal %Avg

	Apr-Jul Fcst (KAF)	1981-2010 (735 KAF)	1991-2020 (630 KAF)
10%	995	134%	158%
50%	550	75%	87%
90%	375	51%	60%

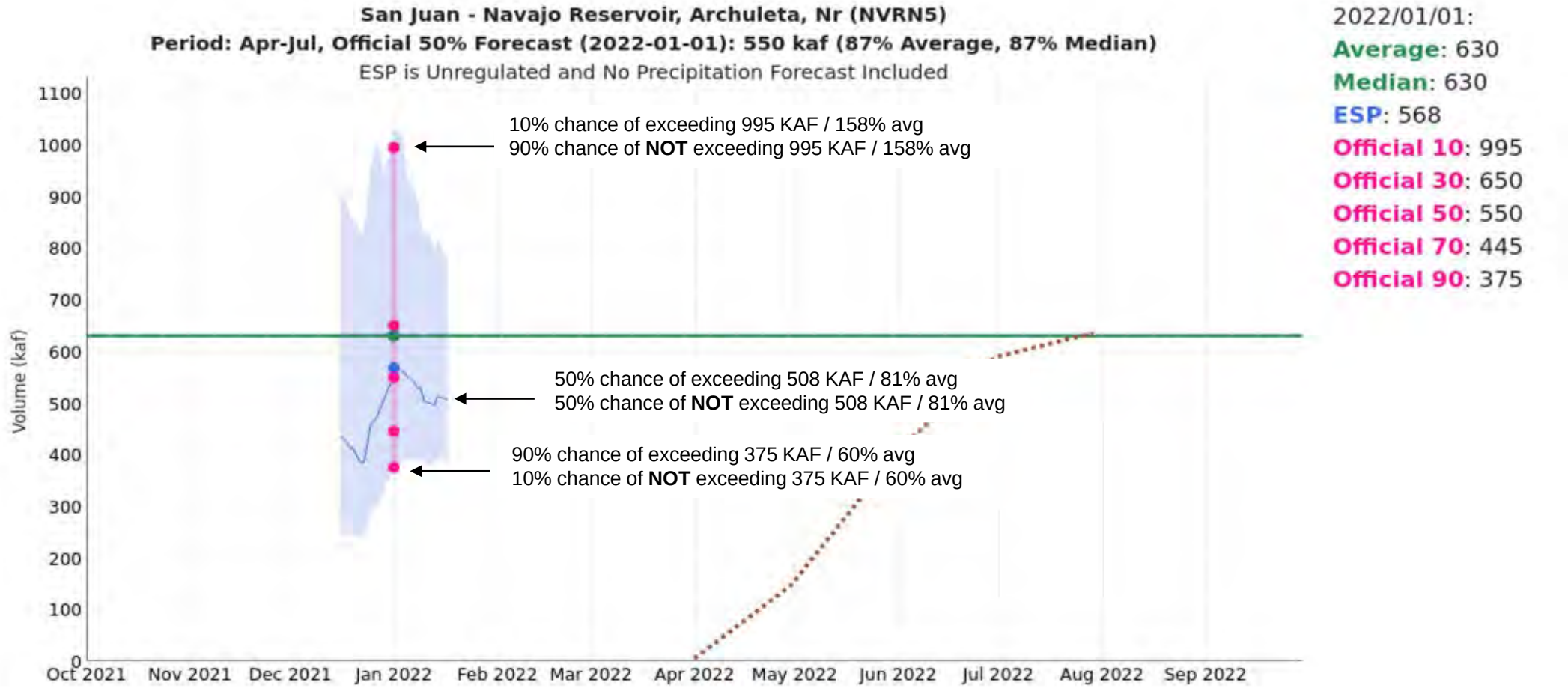
January 2021 Water Supply Forecasts: San Juan River Basin

April-July Forecasts
Volume in 1000's acre-feet / Percent of 1991-2020 average



Forecast Range is 85-90% of average

Forecast Progression: Navajo Reservoir Inflow



Blue shading: Daily Raw Model Guidance 90% - 10% exceedance range
Blue line: Daily Raw Model Guidance 50% exceedance
Pink line: Official forecast 90%, 70%, 50%, 30%, 10% exceedance

Green solid: 1991-2020 average April-July volume
Green dotted: 1991-2020 median April-July volume

Brown dotted: Average observed

- The forecast has decreased since Jan 1 due to dry conditions.
- The forecast will likely continue to decrease through the end of the month.

Navajo Inflow Forecast Plot Link

Early Season Forecast Uncertainty

January 1st Forecast:

What we know:

- ~40% of snowpack accumulation
- Fall soil moisture conditions

What we **DON'T** know:

- Jan-May weather (4 months)
- ~60% of snowpack accumulation

Average January Forecast Error: ~200 KAF

April 1st Forecast:

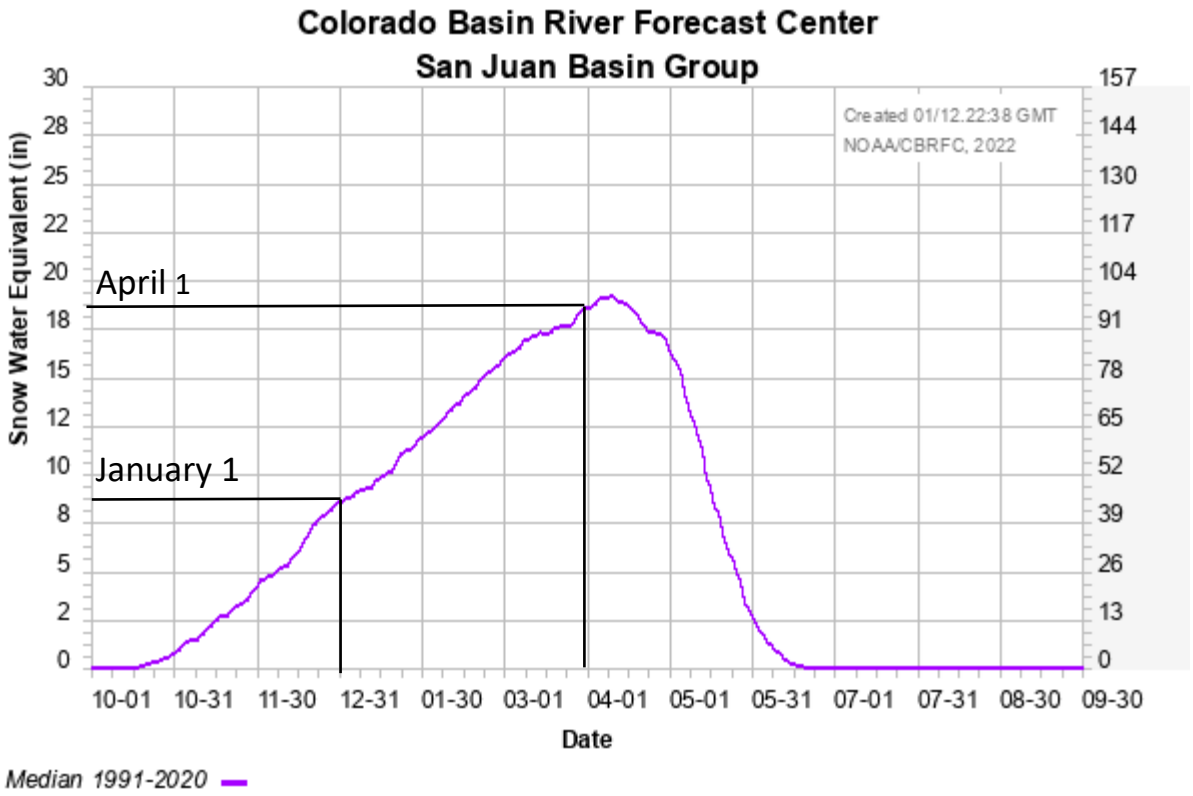
What we **KNOW**:

- ~98% of snowpack accumulation
- Dec-March weather

What we don't know:

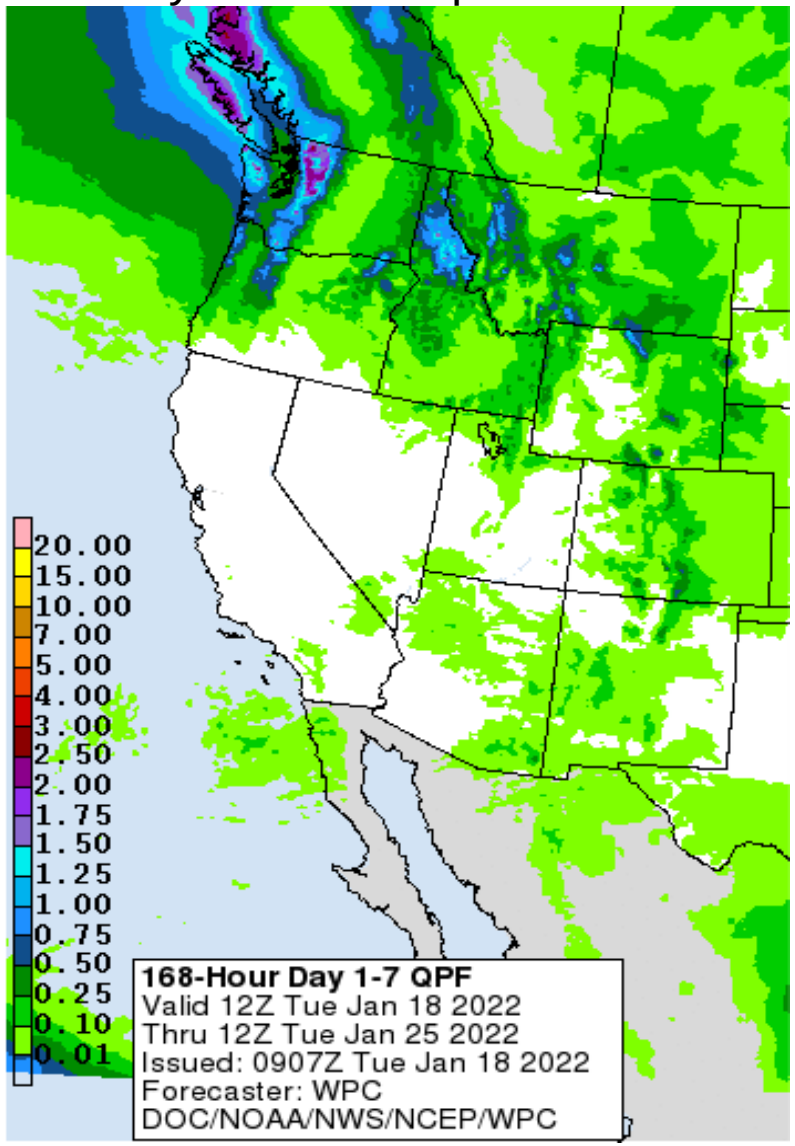
- April-May weather (2 months)
- Snowmelt pattern

Average April Forecast Error: ~100 KAF

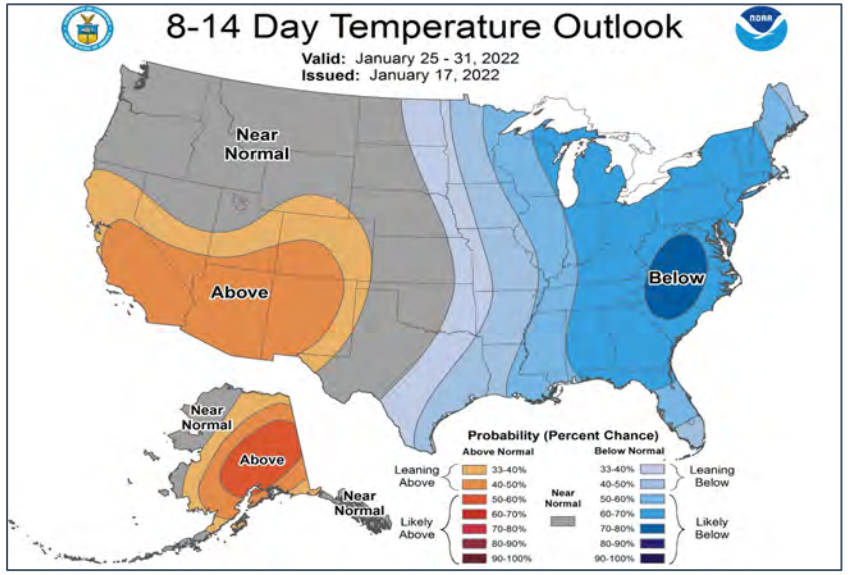


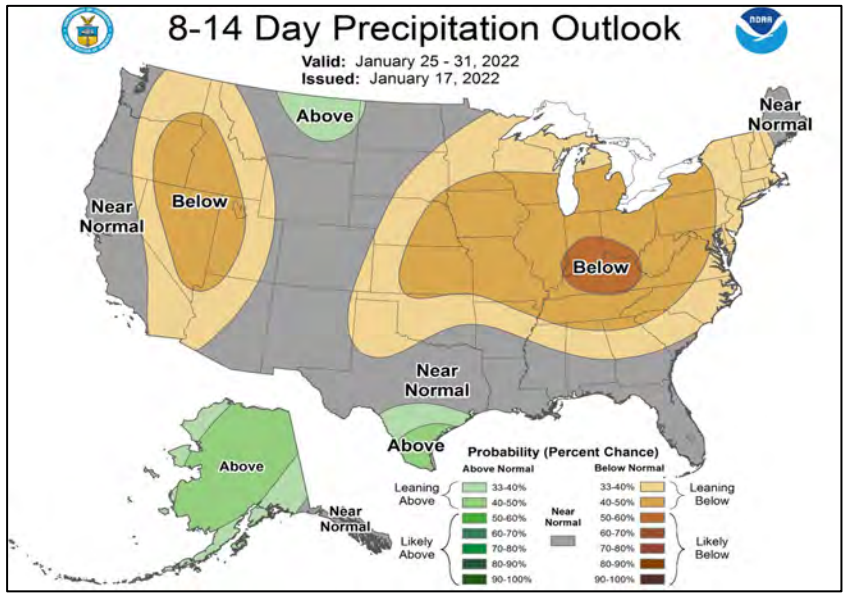
Upcoming Weather

January 18-25 Precipitation Outlook



8-14 Day Outlooks (January 25-31)





Summary

- **Soil moisture**
  - Conditions have improved from last year but are still below normal.
  - Soil moisture deficits still exists
  - Impact on runoff uncertain and will depend on spring weather and snow conditions.

- **Snow**
  - Slow start to the snow season
  - Conditions are mixed above 11,000’
  - Above normal conditions below 11,000’
  - Early January is a little less than halfway (~40-50%) through the snow accumulation season

- **Averages**
  - Moved from 1981-2010 to 1991-2020
  - 1991-2020 are 10-20% lower in the San Juan River Basin

- **January Water Supply Forecasts**
  - Range from 85-90% of average
    - Impacted by below normal modeled soil moisture conditions
  - Forecast guidance has decreased since early January
  - Expect lower February 1st forecasts

- **Upcoming Weather**
  - No significant storms through the end of the month

CBRFC Contacts & WY22 Basin Focal Points

Basin Focal Points (Forecasters)

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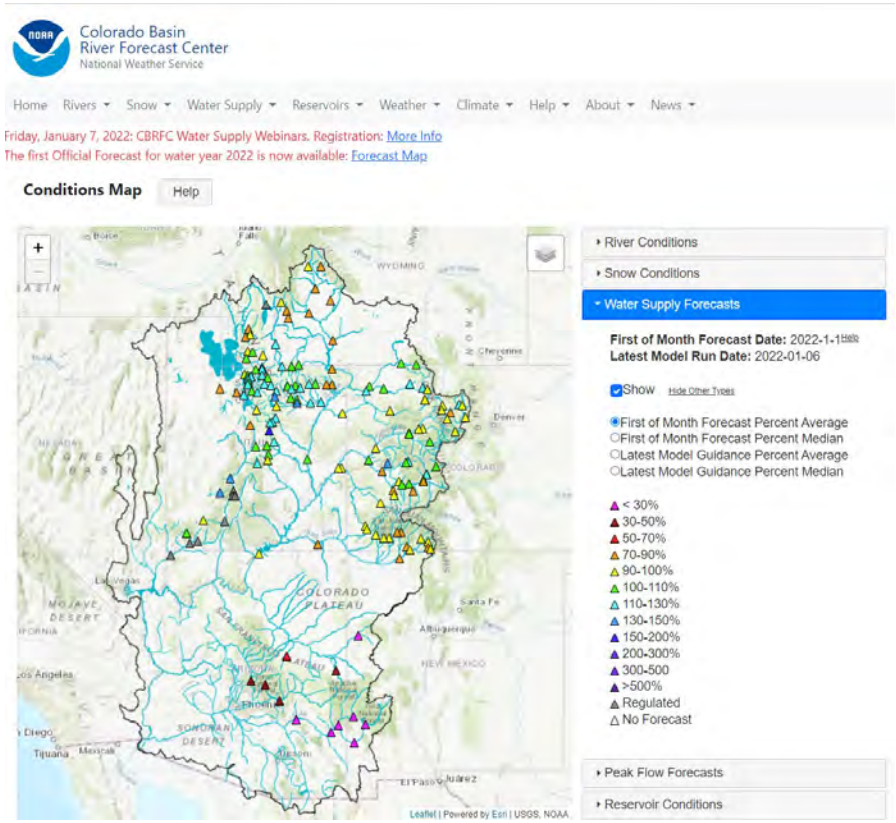
CBRFC Operations
cbrfc.operations@noaa.gov
801-524-4004

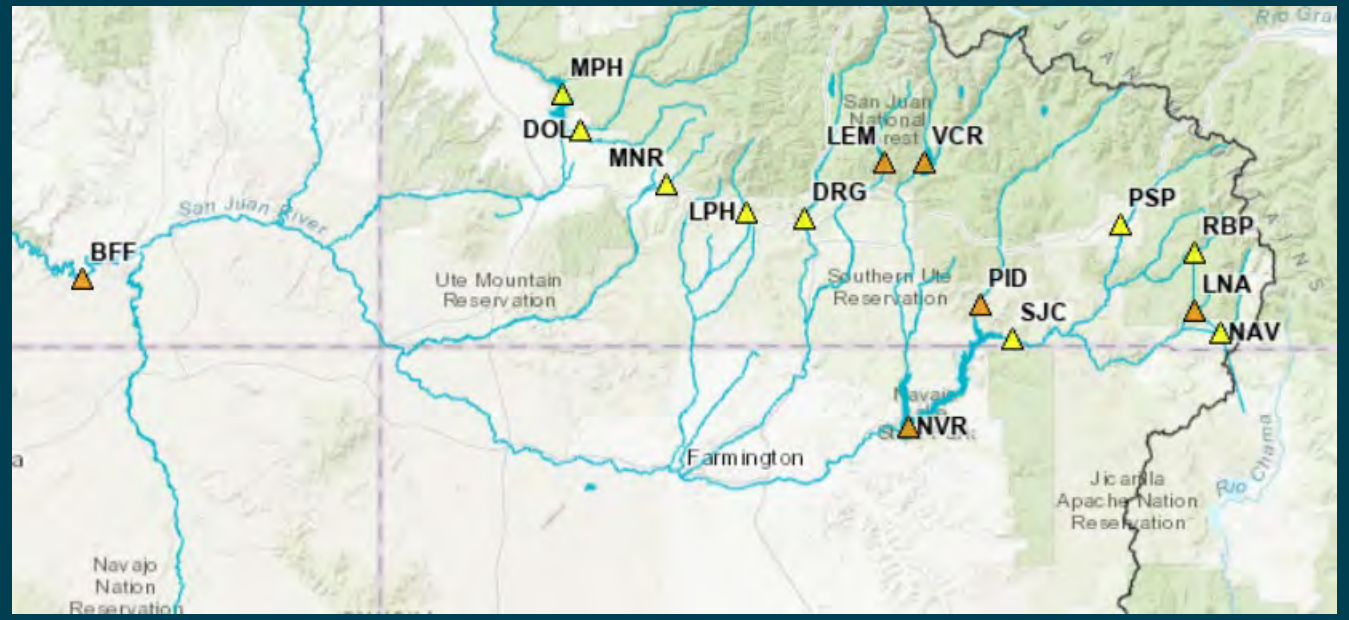
CBRFC Water Supply Presentations
https://www.cbrfc.noaa.gov/present/present.php



Official Water Supply Forecast (April-July)

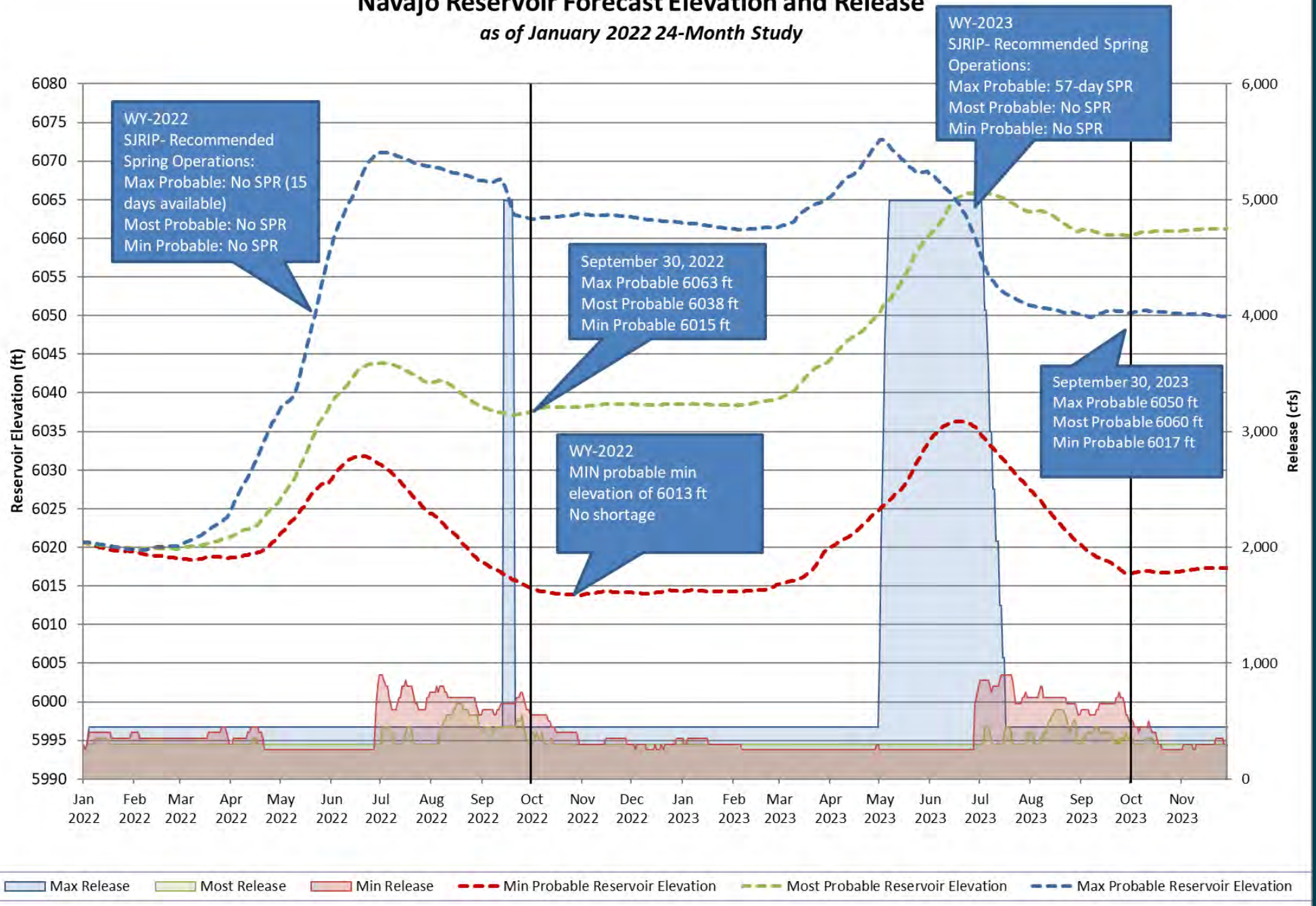
Navajo:	550 kaf (87%* avg)
Vallecito:	155 kaf (88% avg)
Lemon:	42 kaf (88% avg)
Animas:	360 kaf (94% avg)
McPhee:	235 kaf (92% avg)
Powell:	6,300 kaf (99% avg)

*1991 – 2020



Navajo Reservoir Forecast Elevation and Release

as of January 2022 24-Month Study



Projected Operations WY 2022

Based on current streamflow conditions, storage levels, and statistical outlooks based on 35 years of historical hydrology,

- Runoff projections range from 375 kaf (60% avg) – 995 kaf (158% avg) with a median projection of 550 kaf (88% avg).
- 8% chance of a SJRIP-prescribed Spring Peak Release
- 3% chance of falling below 5990 ft (min active storage)
- End of Water Year storage range 820 kaf (6015 ft, 50% full) – 1,326 kaf (6063 ft, 80% full) with a median projection of 1,034 kaf (6038 ft, 63% full)

Updates:

- Statistical Averages
  - The 30-year average used across agencies progresses every decade
  - The time period for statistics has been updated to 1991 - 2020
  - Navajo April – July Modified Unregulated Inflow averages:
    - 1981 – 2010: 737 kaf
    - 1991 – 2020: 628 kaf
  - What does this mean?
    - Averages for the same forecast will be higher than they have in previous years.
    - The forecasts will trend lower from the start, as the hydrology feeding the models is lower.
- Navajo Area-Capacity Tables were updated and implemented in October of 2021. Updated live storage is 1.65 maf (1.70 maf previously)

Reclamation Contacts:

Next Meeting: April 19, 2022

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To be added to Navajo Dam notices email list, send an email to westcoloareaoffice@usbr.gov

BUREAU OF RECLAMATION

Useful Links

Reclamation: www.usbr.gov/uc

USGS: water.usgs.gov/nwis

CBRFC: cbrfc.noaa.gov