BUREAU OF RECLAMATION

Navajo Unit Operations Coordination Meeting

August 24, 2021 1:00 PM

Microsoft Teams Virtual Meeting

Agenda

- Introductions
- Drought Response Operations – Katrina Grantz, Reclamation
- Weather Summary and Outlook– Aldis Strautins, NWS
- Streamflow Summary and Outlook – Ashley Nielson, CBRFC
- Review of operations to date WY 2021
- WY 2022 planned operations
- Comments and Reports

Weather Outlook

August 2021

Aldis Strautins

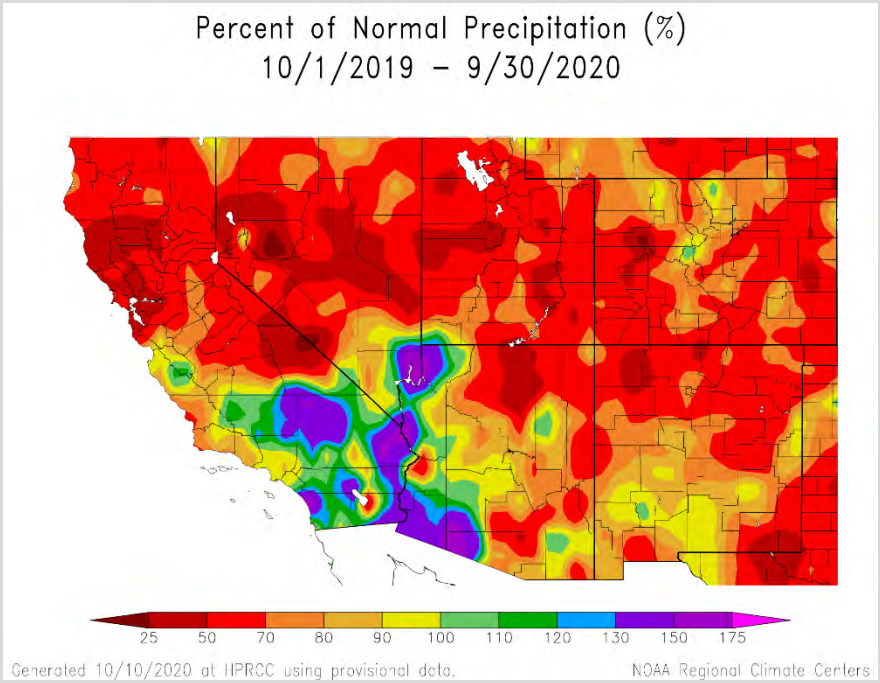
National Weather Service

Grand Junction, CO

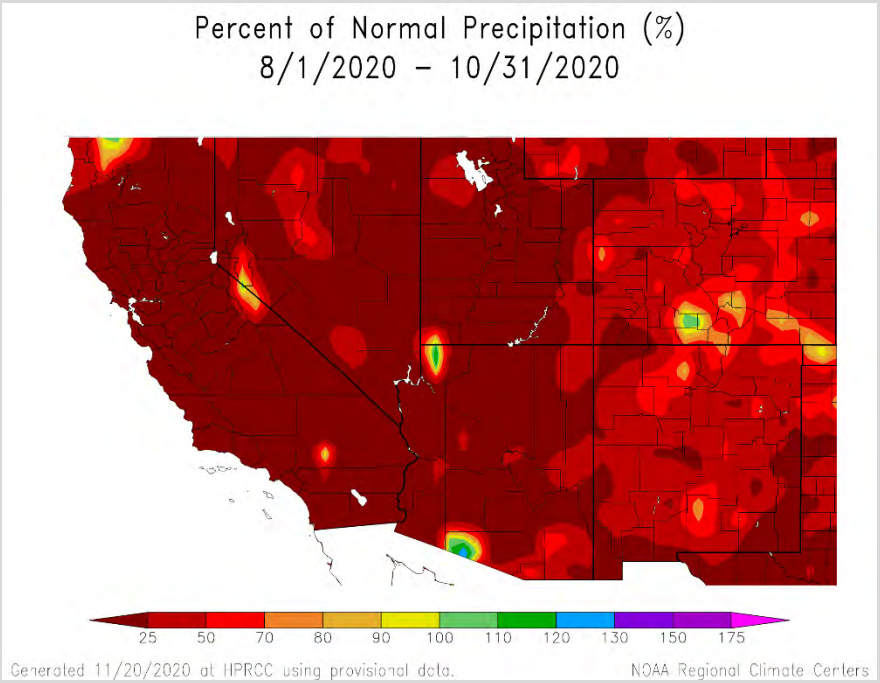
http://www.weather.gov/gjt

The Past
August 2021

Water year 2020



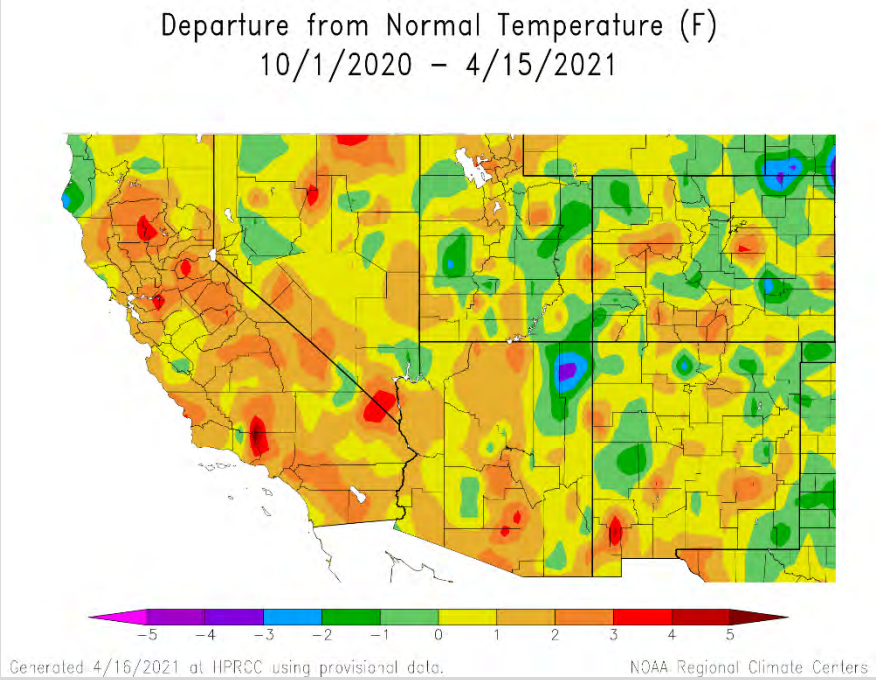
Aug – Oct 2020



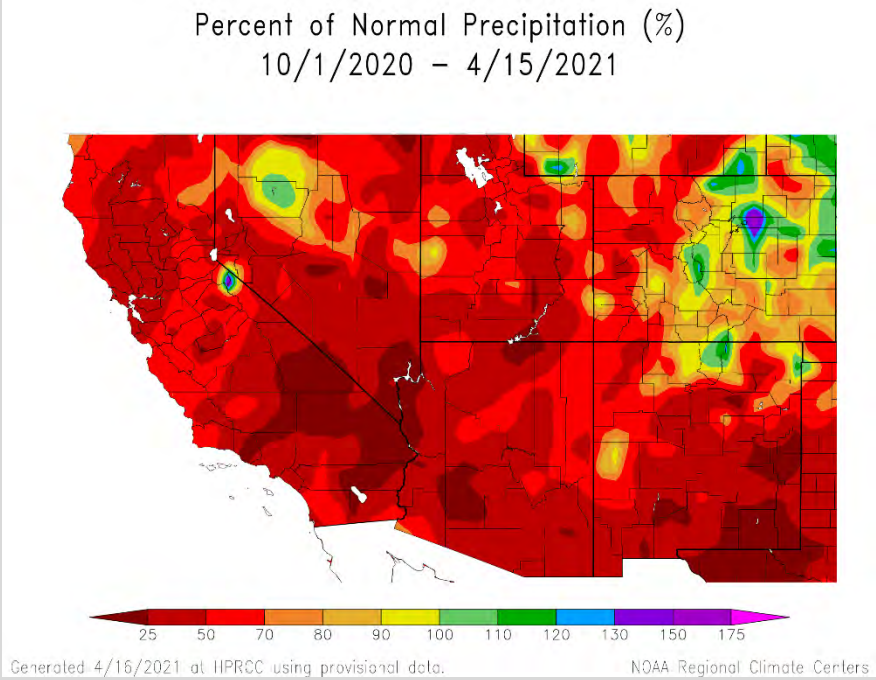
Precipitation - % of normal
Water Year 2020

The Past
August 2021

Temperature
Departure from normal



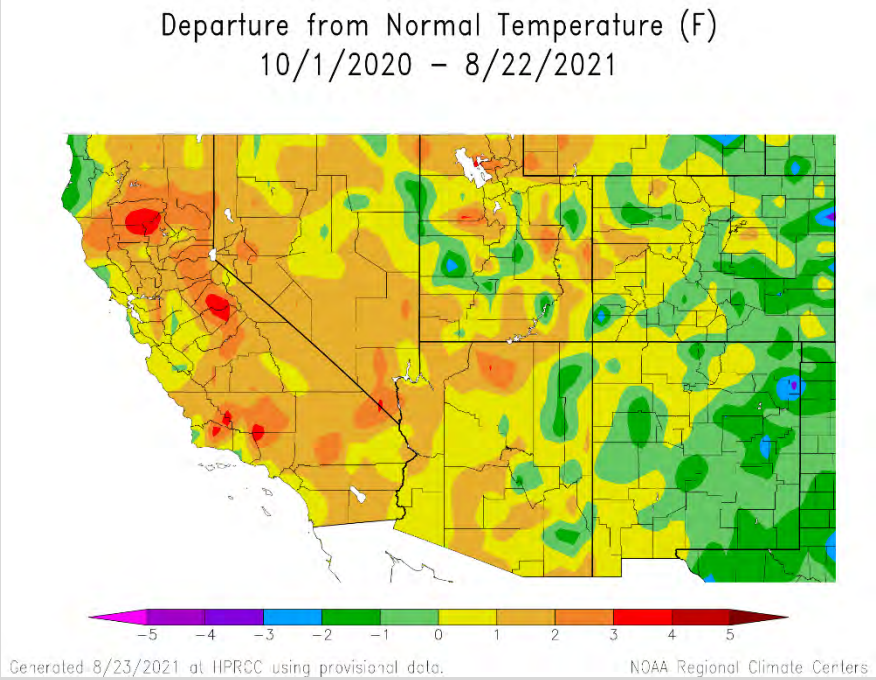
Precipitation
% of normal



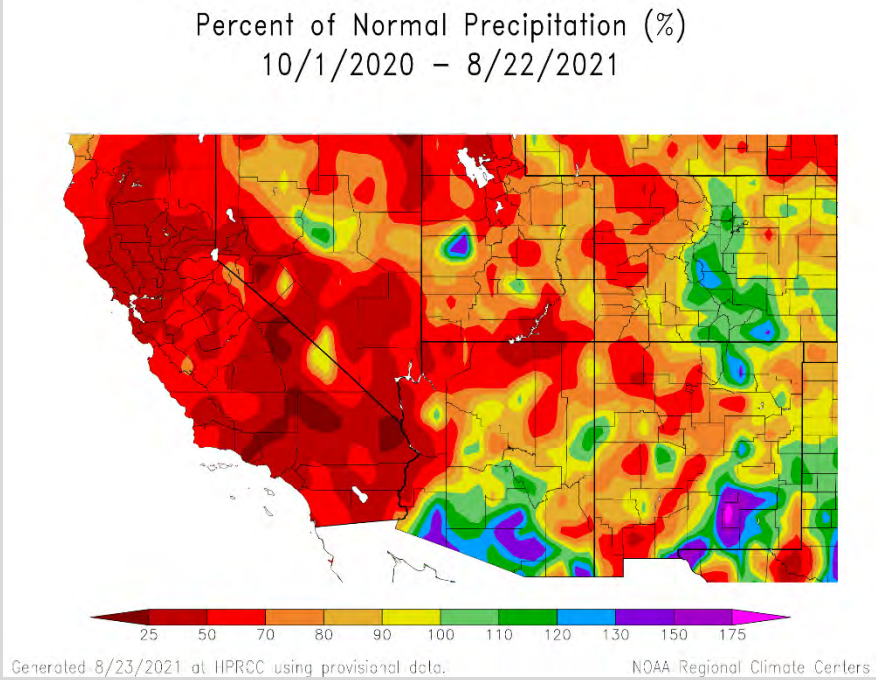
Water Year 2021 through April

The Past
August 2021

Temperature
Departure from normal



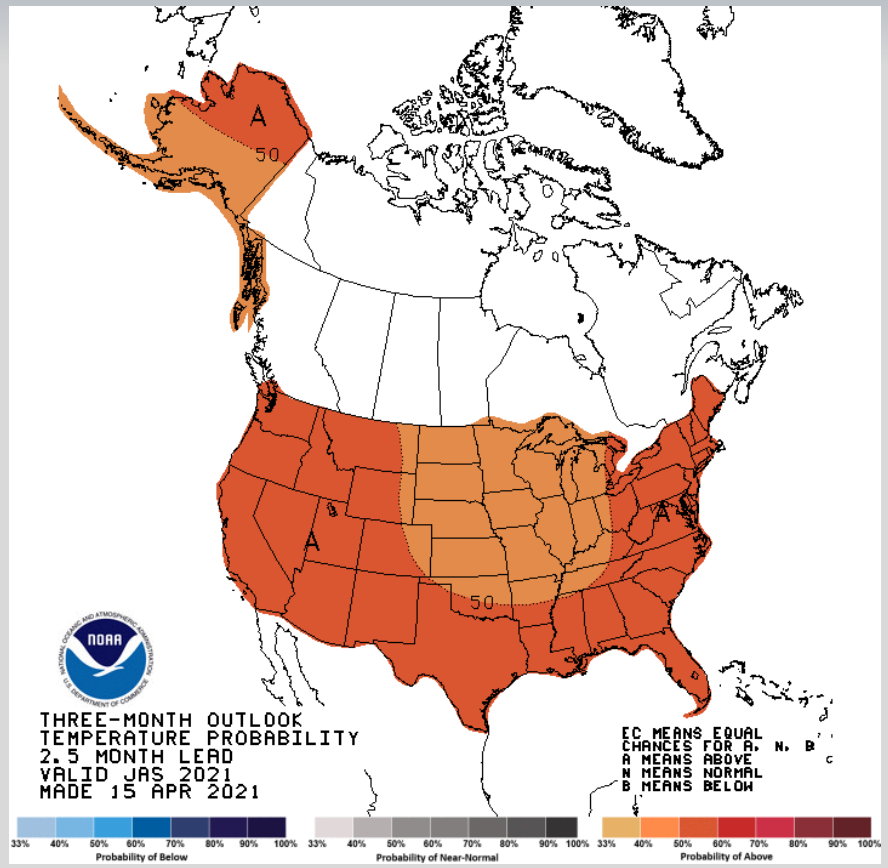
Precipitation
% of normal



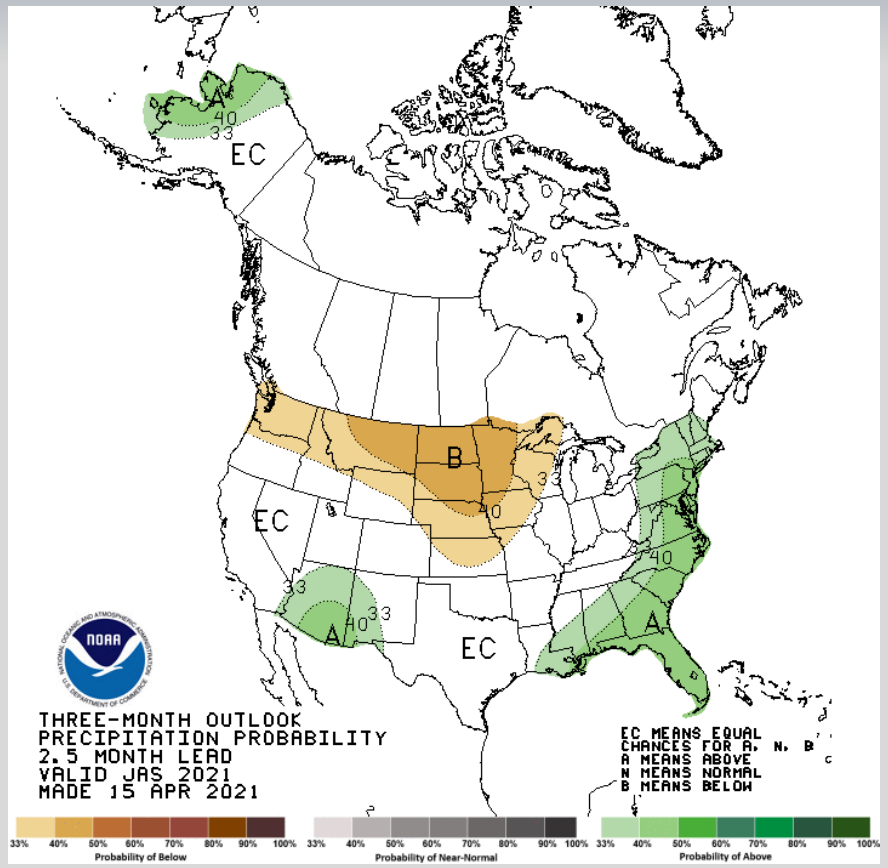
Water Year 2021

Past Outlook
April 2021

Temperature



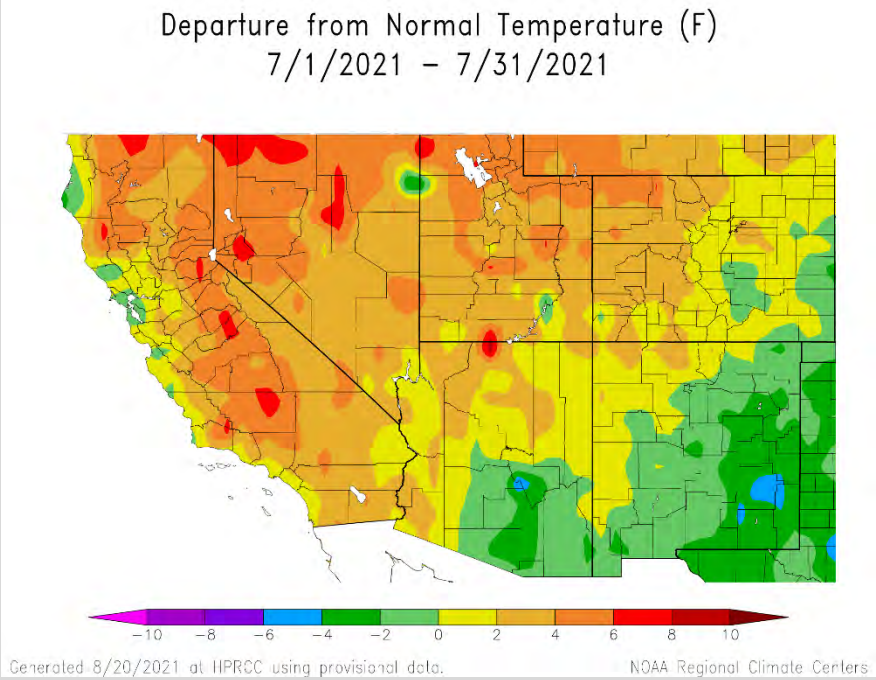
Precipitation



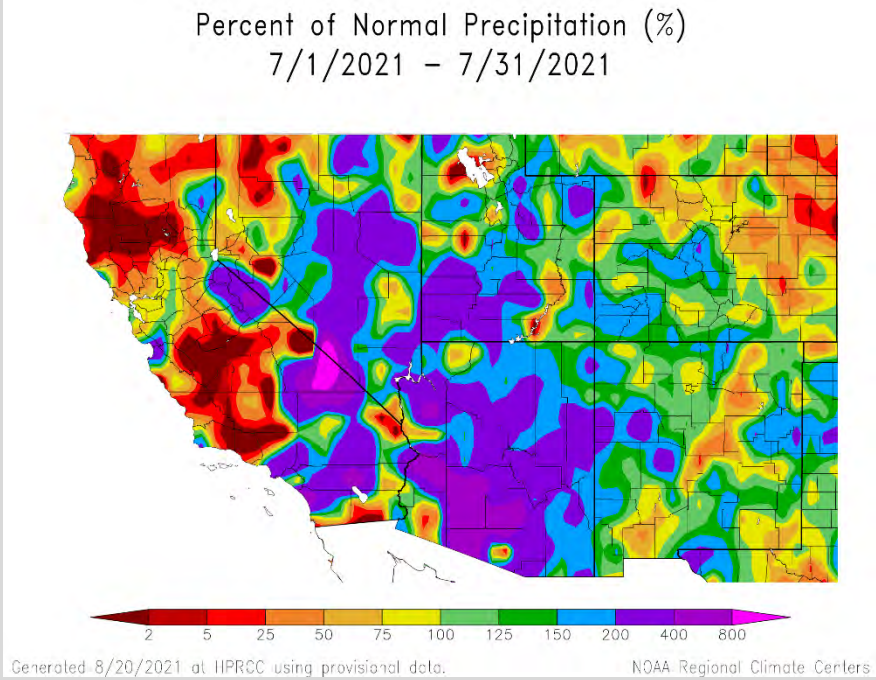
Jul/Aug/Sep – <u>April</u> Outlook

The Past
August 2021

Temperature
Departure from normal



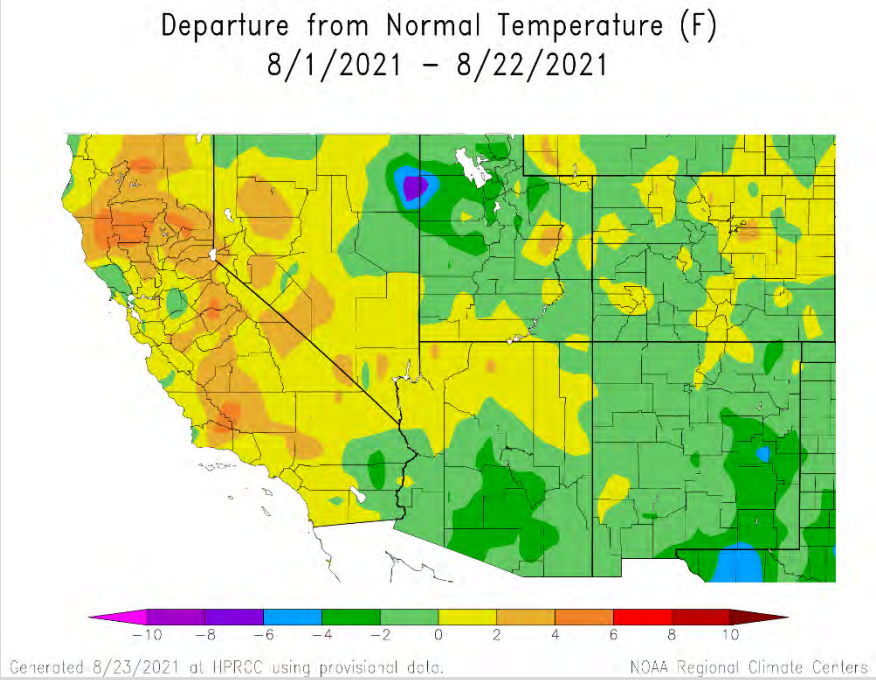
Precipitation
% of normal



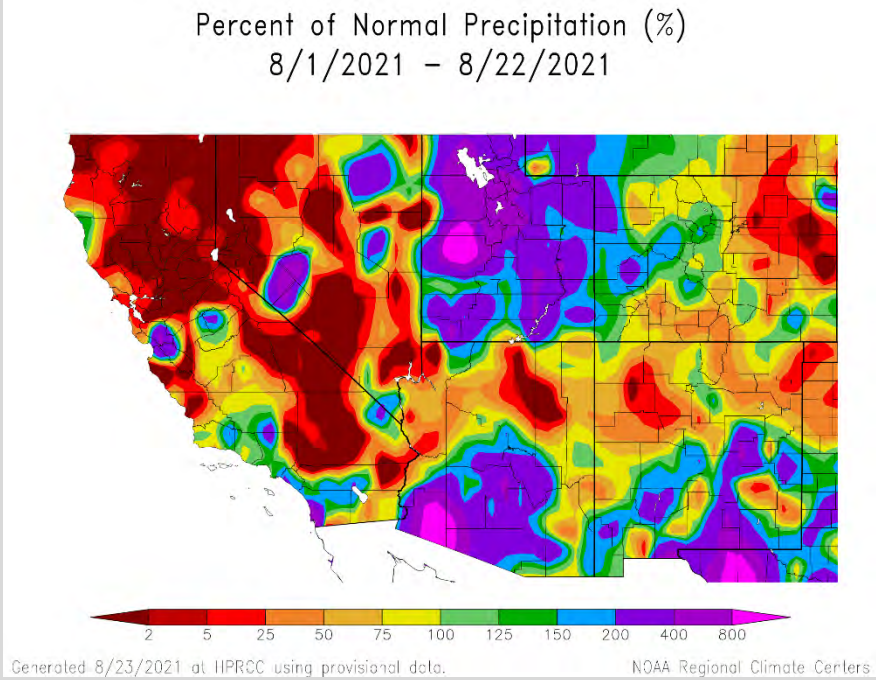
July 2021

The Past
August 2021

Temperature
Departure from normal



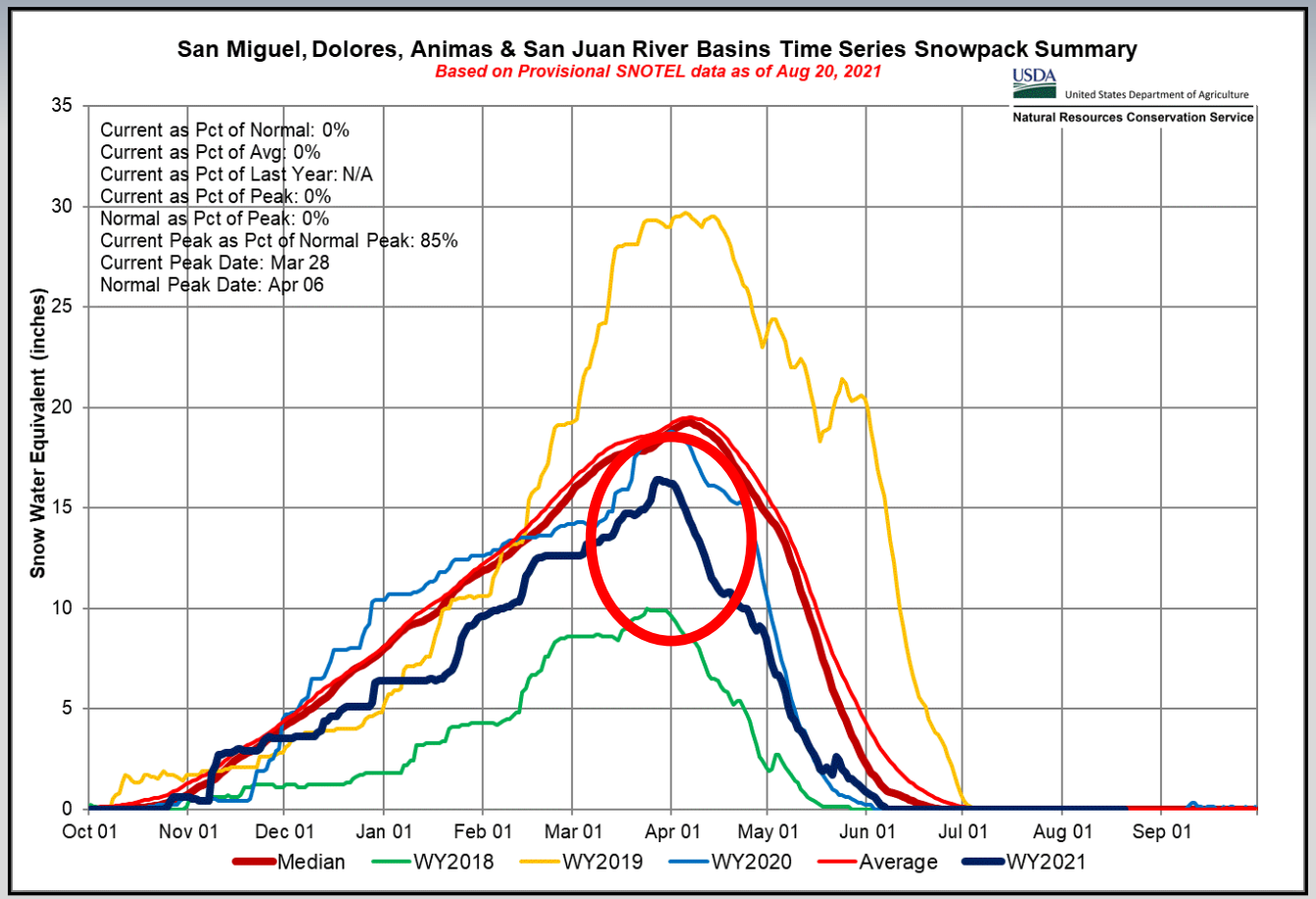
Precipitation
% of normal



August 2021 so far

Snow
August 2021

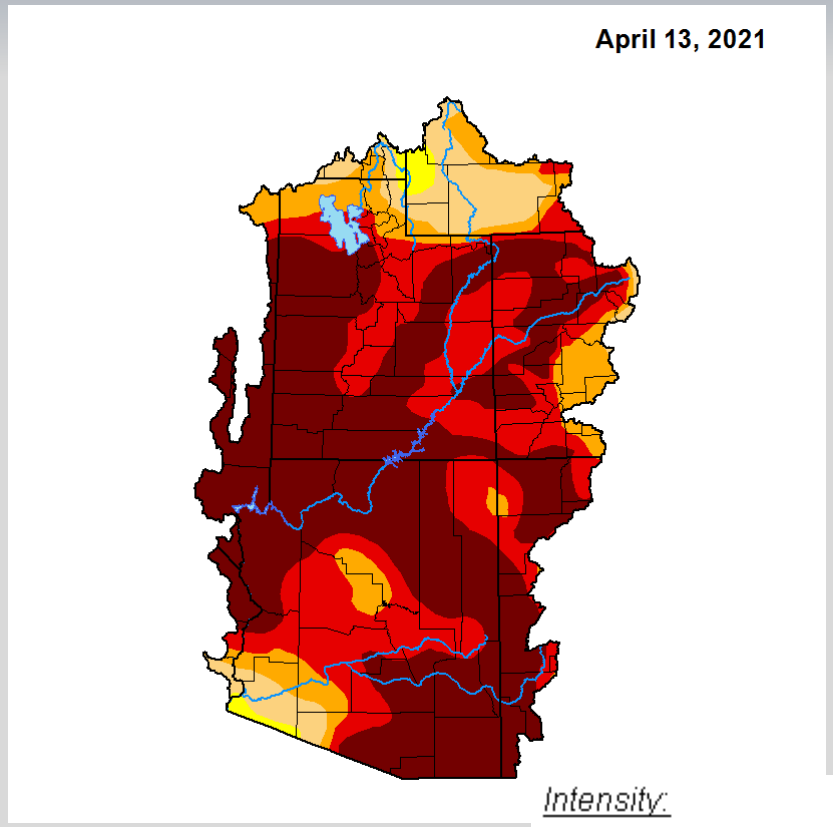
85% of Normal Peak



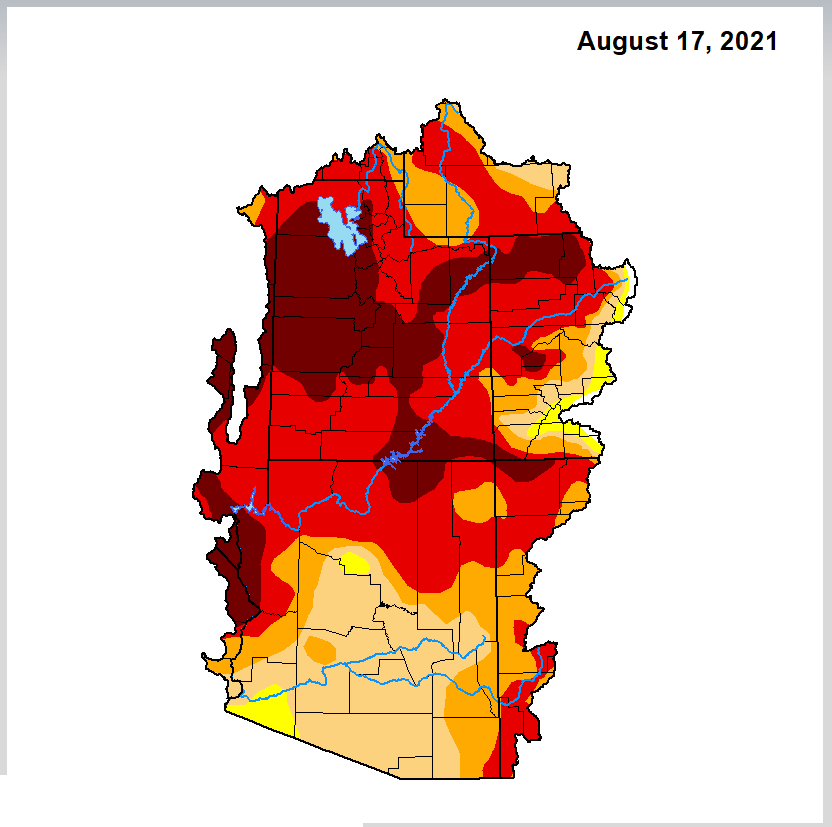
SNOTEL Snow Water Equivalent – NRCS Southwestern Colorado

Drought
August 2021

April 13, 2021



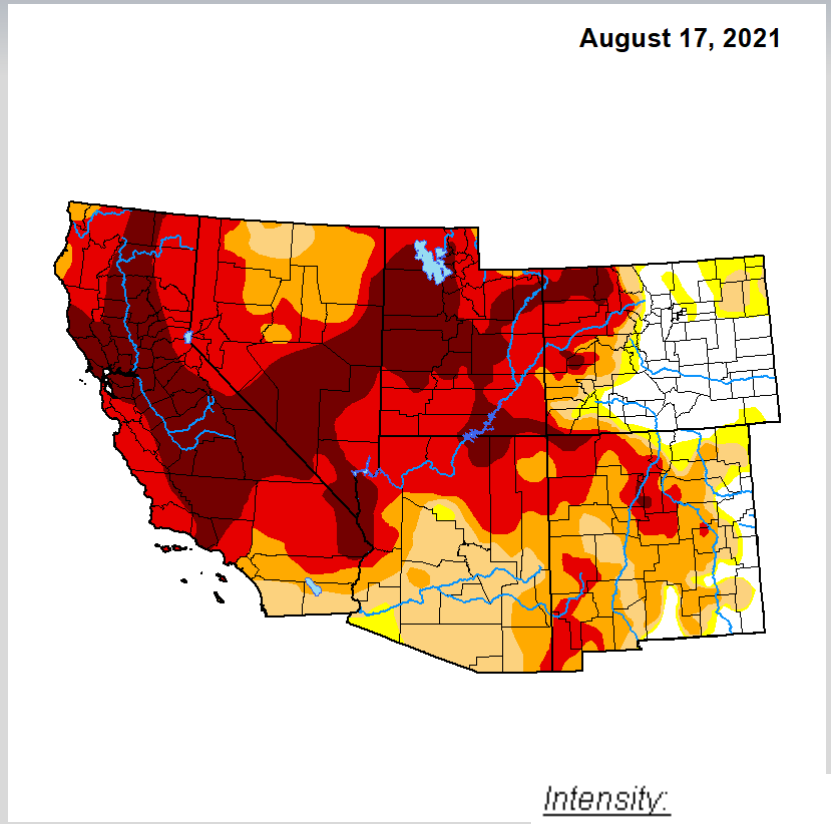
August 17, 2021



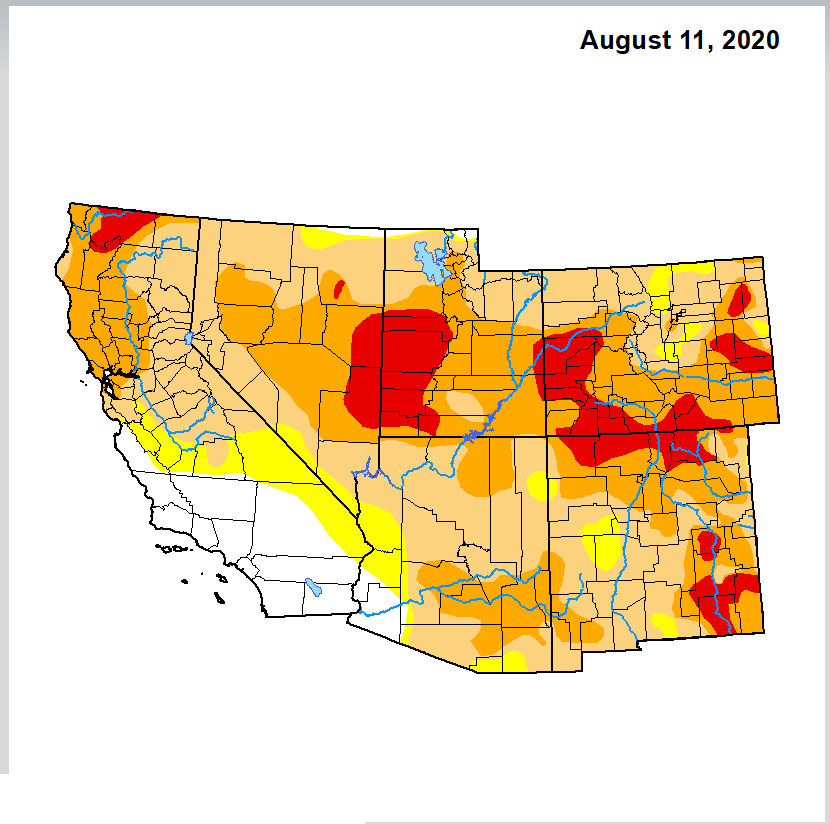
Drought – Monitor

Drought
August 2021

August 17, 2021



August 11, 2020



Intensity:

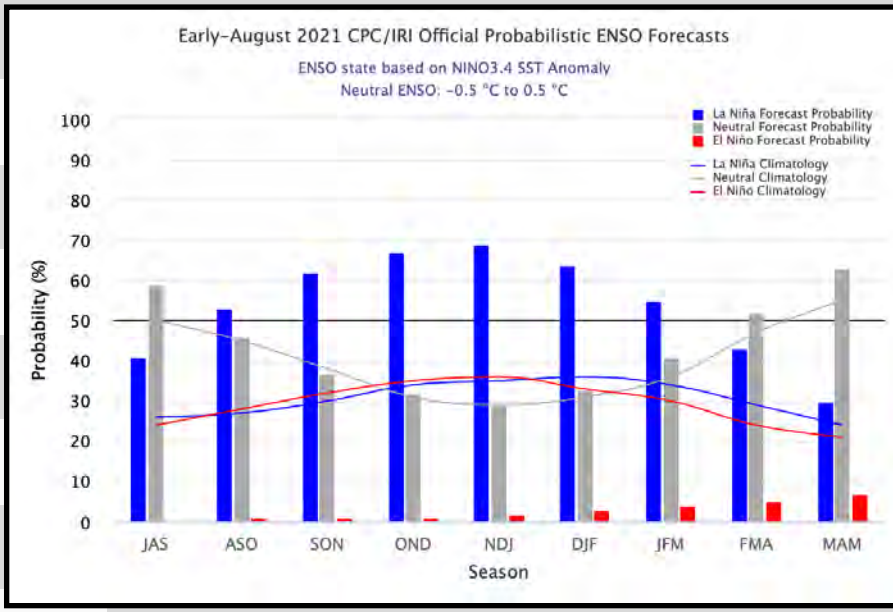
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Drought – Monitor

ENSO
August 2021

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

Season	La Niña	Neutral	El Niño
JAS	41	59	0
ASO	53	46	1
SON	62	37	1
OND	67	32	1
NDJ	69	29	2
DJF	64	33	3
JFM	55	41	4
FMA	43	52	5
MAM	30	63	7

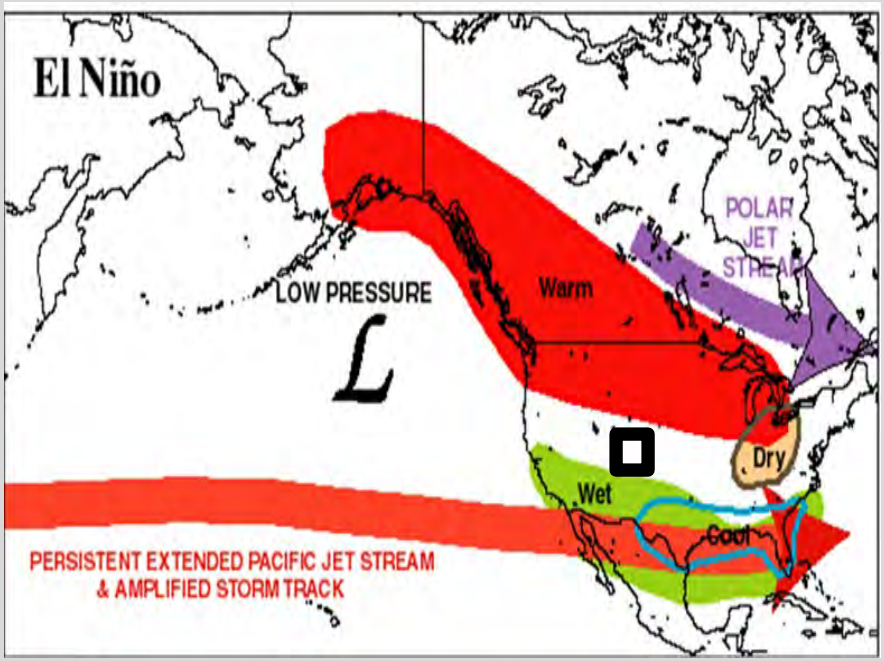


ENSO – Outlook

Neutral becoming La Nina this fall

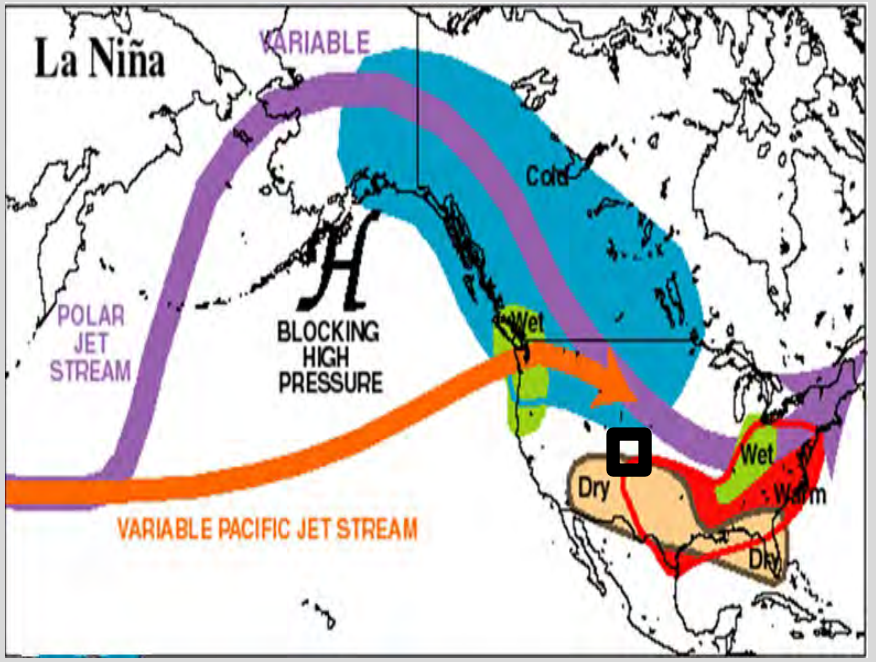
Weather Outlook
August 2021

El Nino



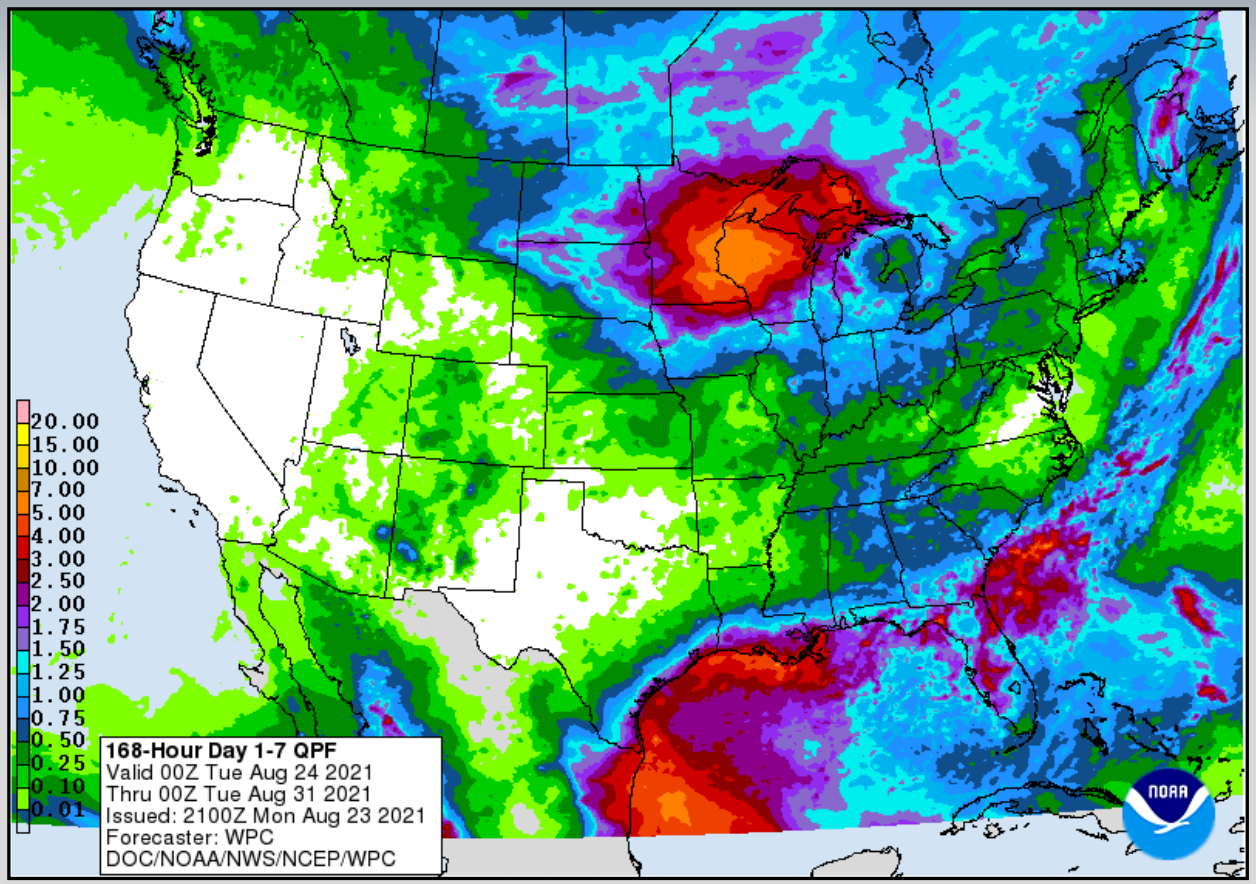
North of Colorado - Dry and Warm
South of Colorado - Wet and Cool

La Nina



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

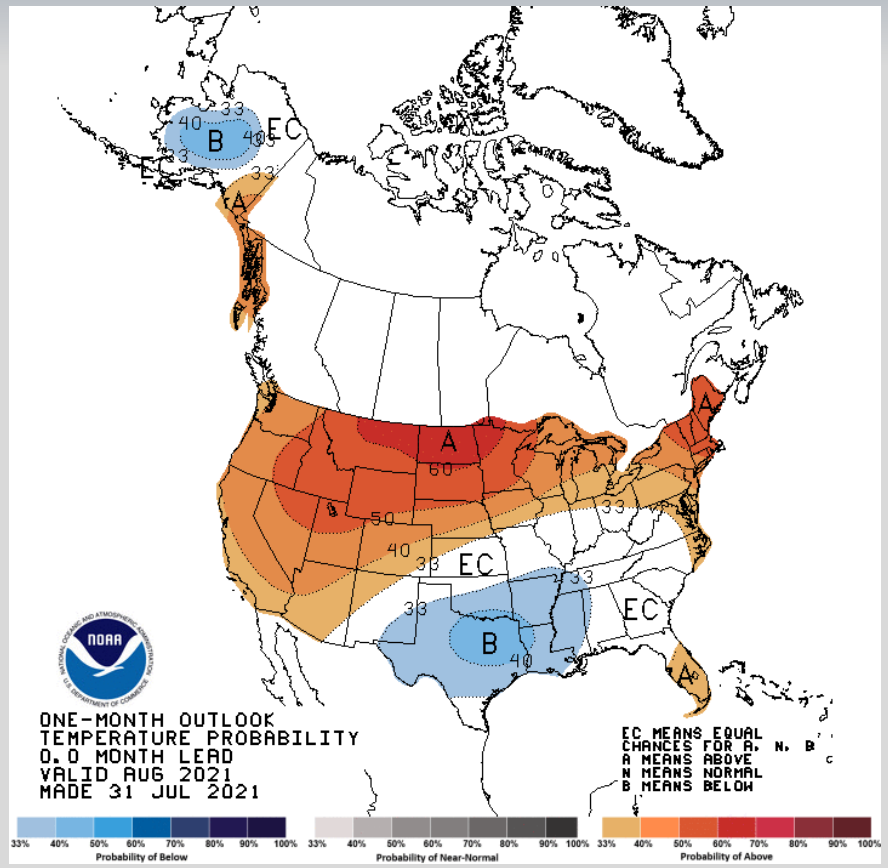
Weather Outlook
August 2021



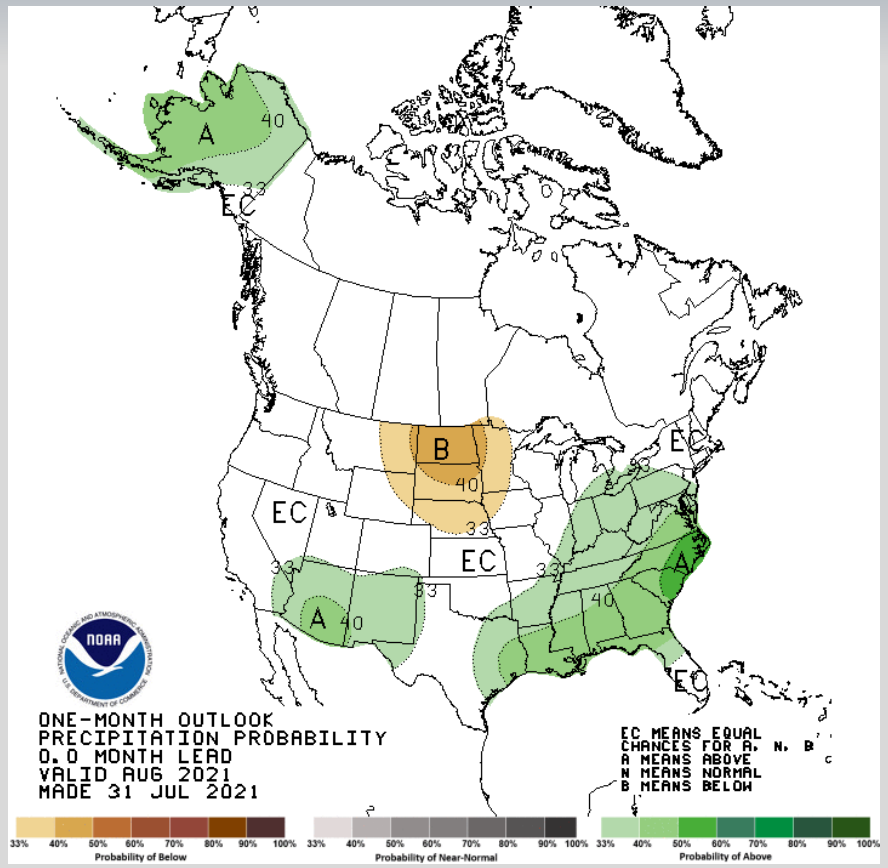
WPC 7-Day Precipitation Outlook
Accumulation period from Aug 24-31

Weather Outlook
August 2021

Temperature



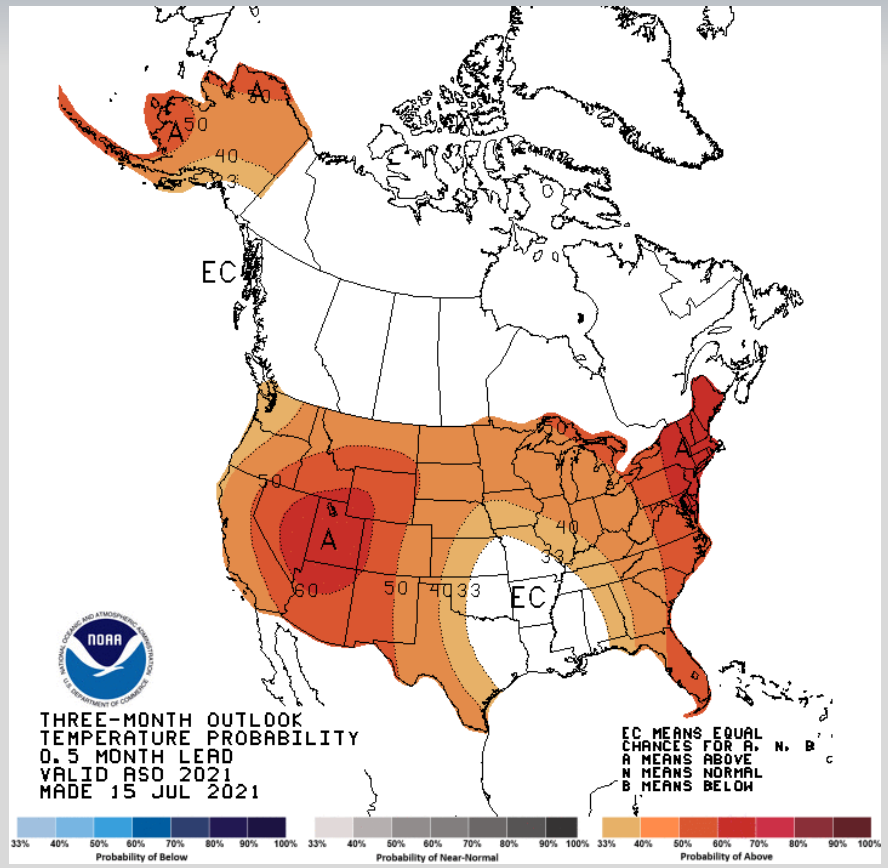
Precipitation



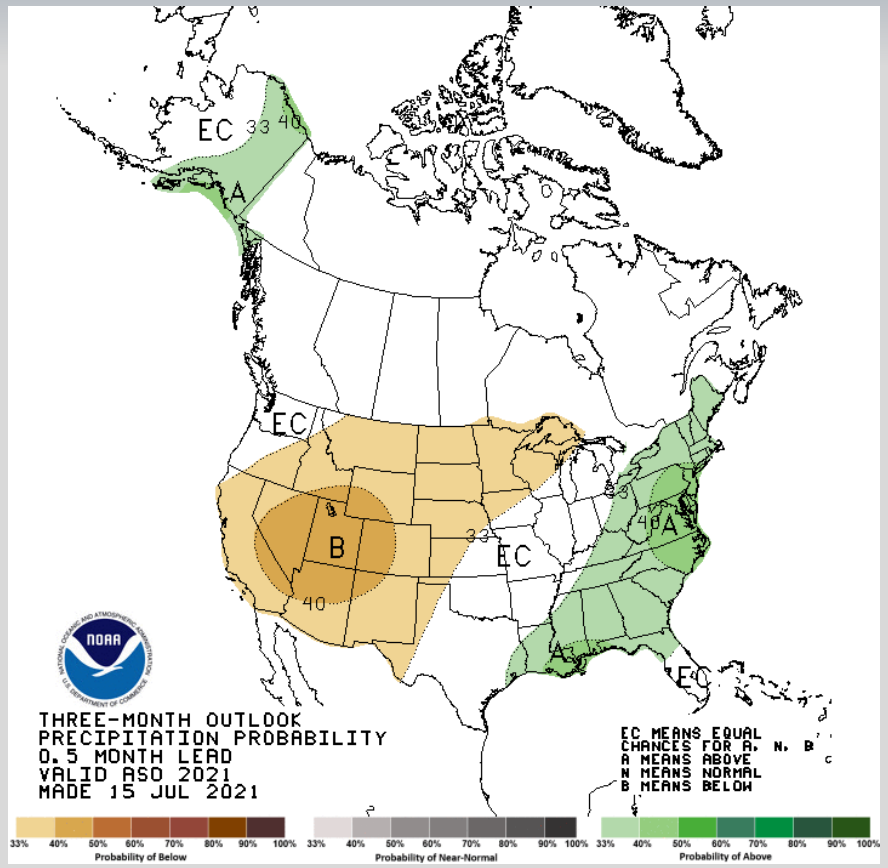
August – Outlook

Weather Outlook
August 2021

Temperature



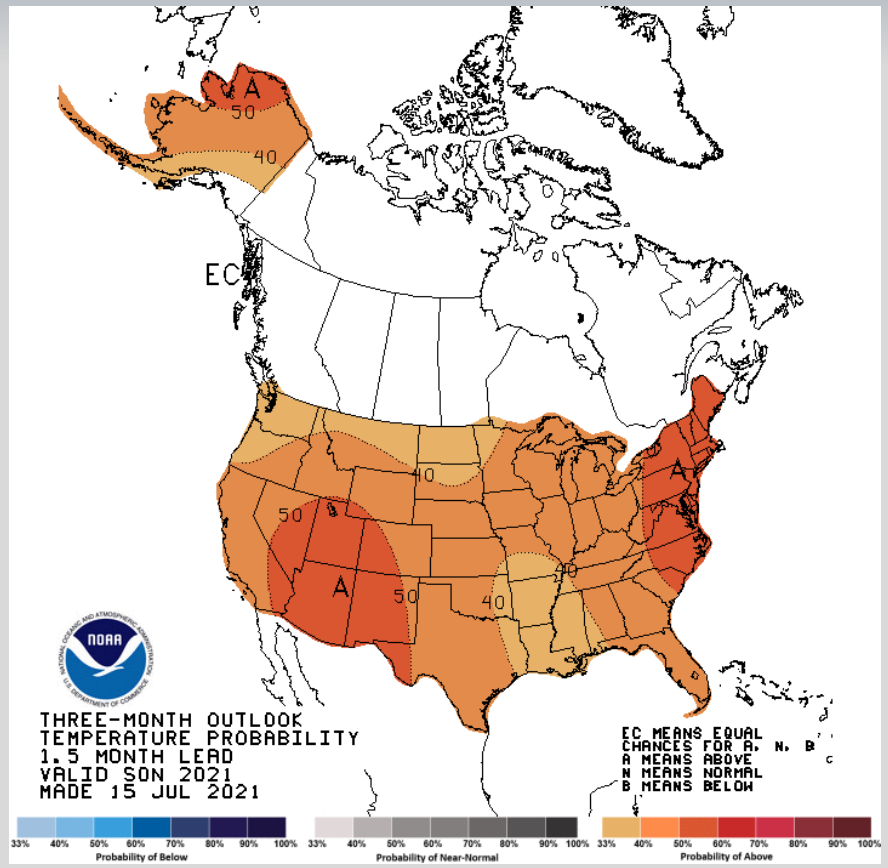
Precipitation



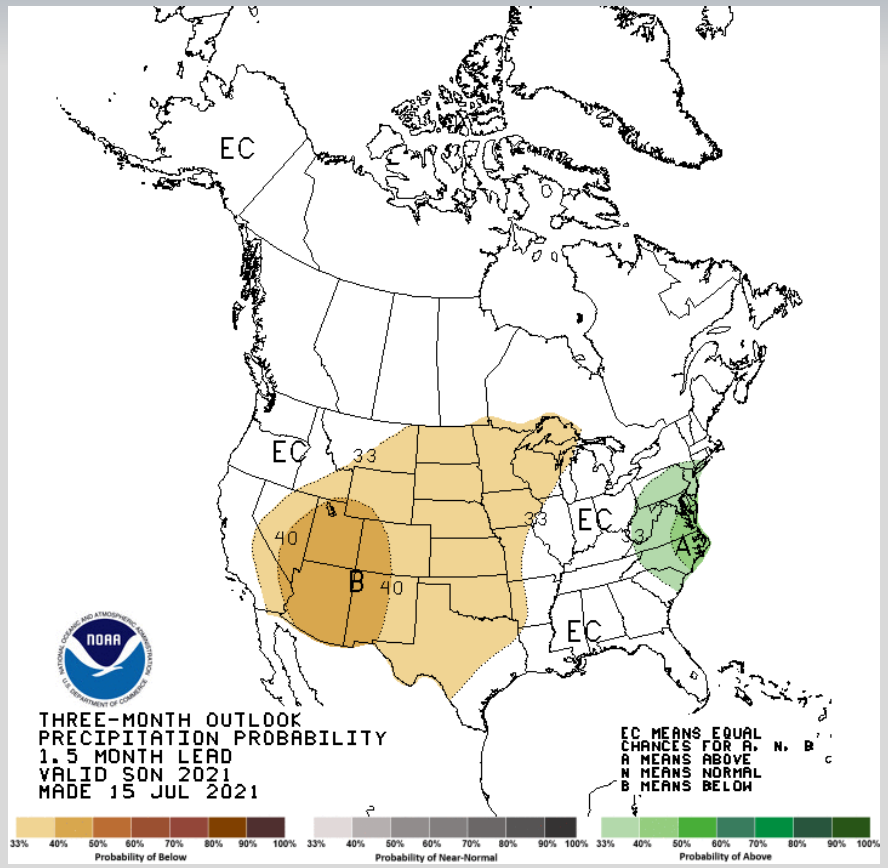
Aug/Sep/Oct – Outlook

Weather Outlook
August 2021

Temperature



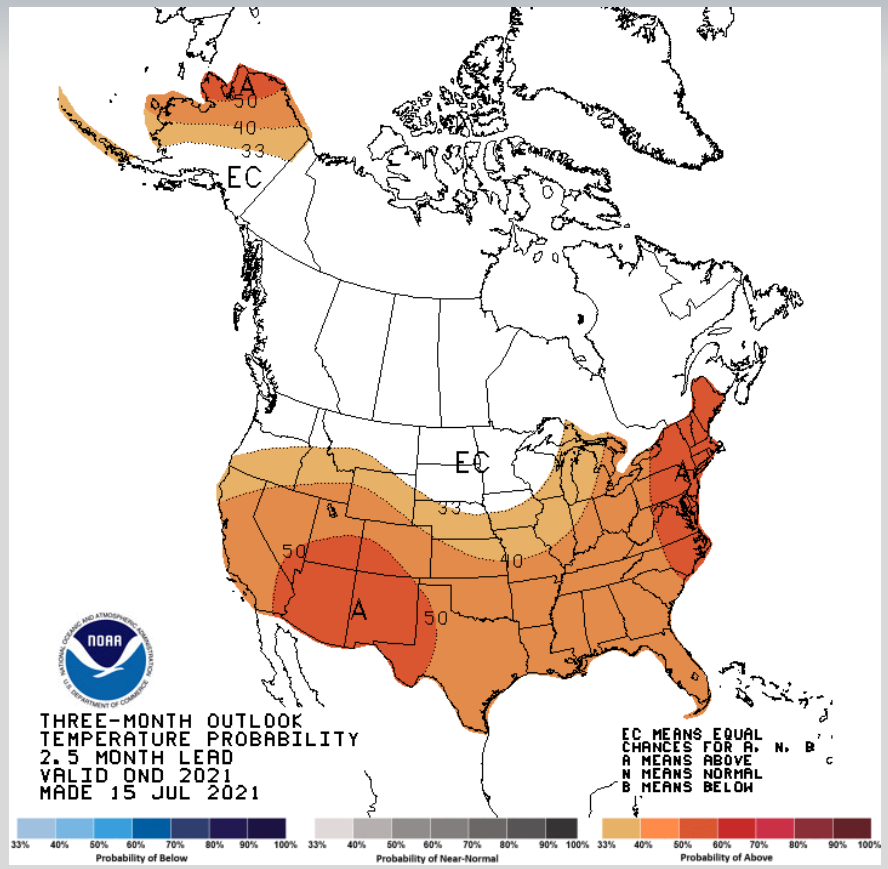
Precipitation



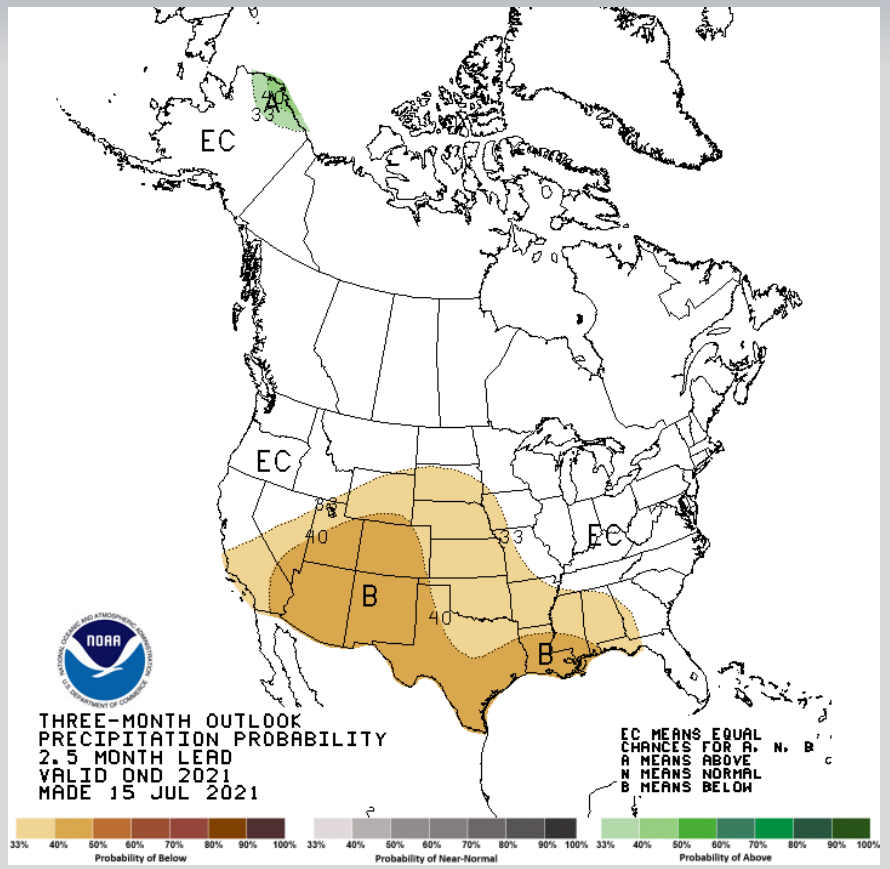
Sep/Oct/Nov – Outlook

Weather Outlook
August 2021

Temperature



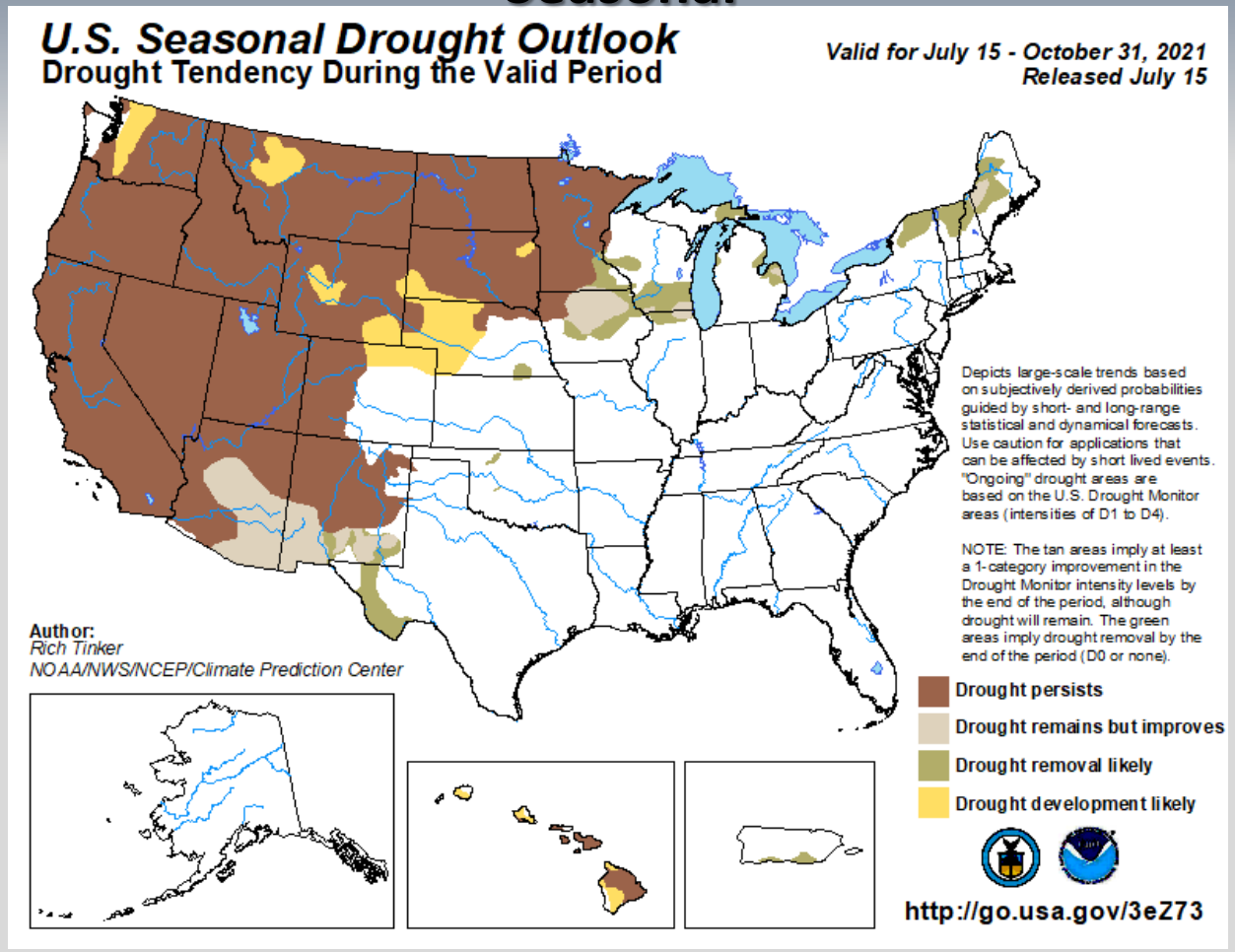
Precipitation



Oct/Nov/Dec – Outlook

Weather Outlook
August 2021

Seasonal



Drought– Outlook

Navajo Operations Meeting
August 24th, 2021

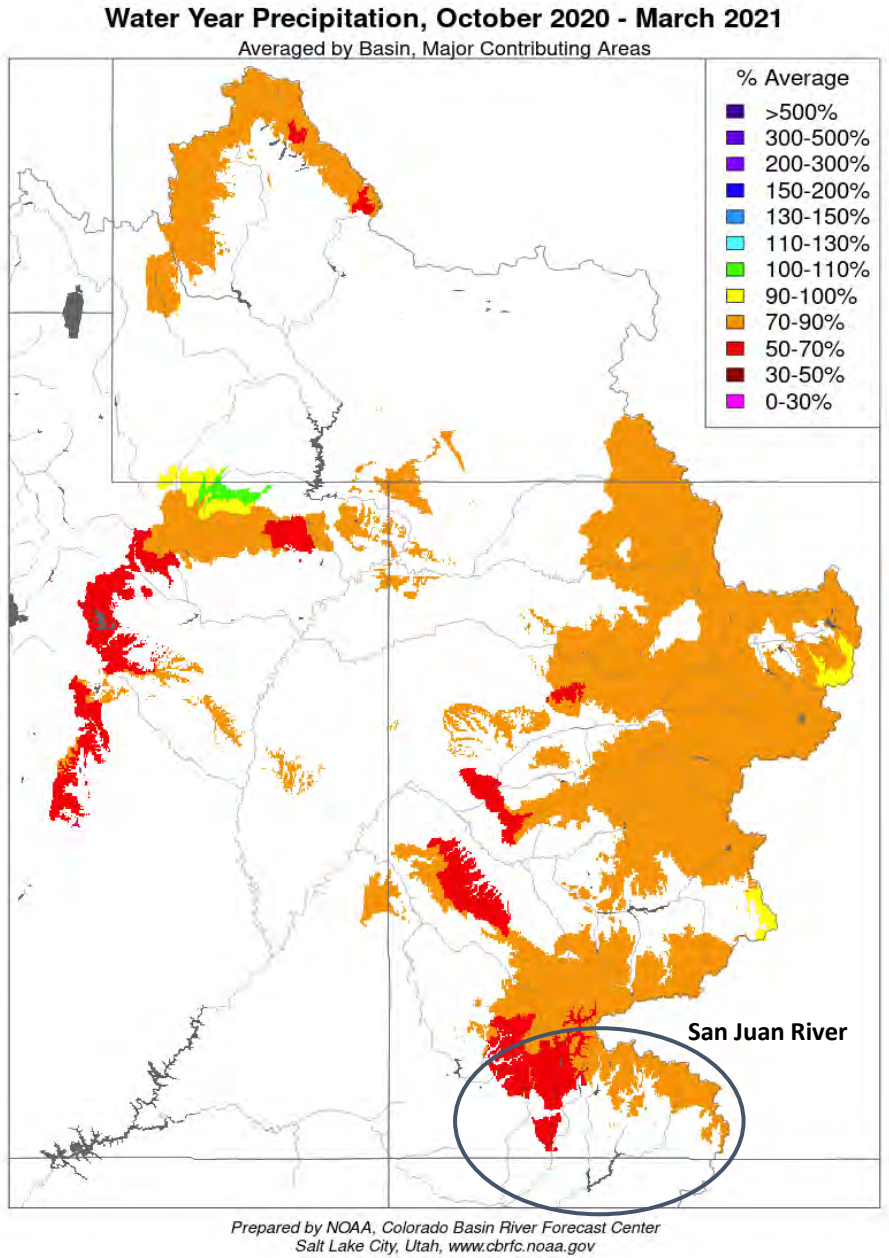
Water Year 2021
Spring Runoff Review

Ashley Nielson
Senior Hydrologist
Colorado Basin River Forecast Center
National Weather Service/NOAA

Outline

- Water Year 2021 Summary
  - Precipitation
  - Snow
- 2021 April-July Observed Volumes
- Water Supply Forecast Performance
- Summary
- Contact Information

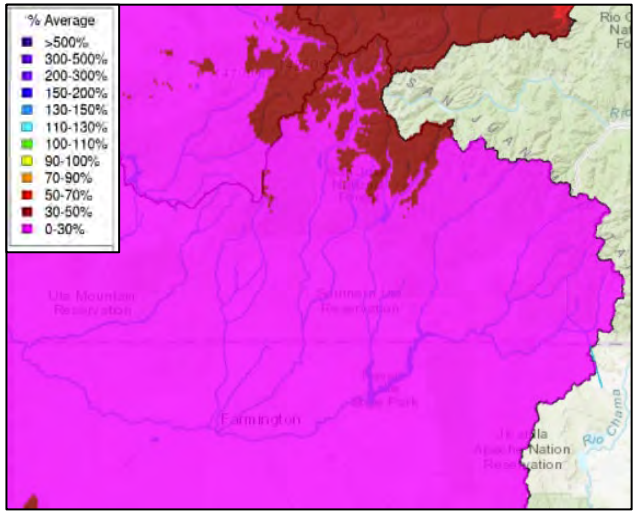
Precipitation: October-March



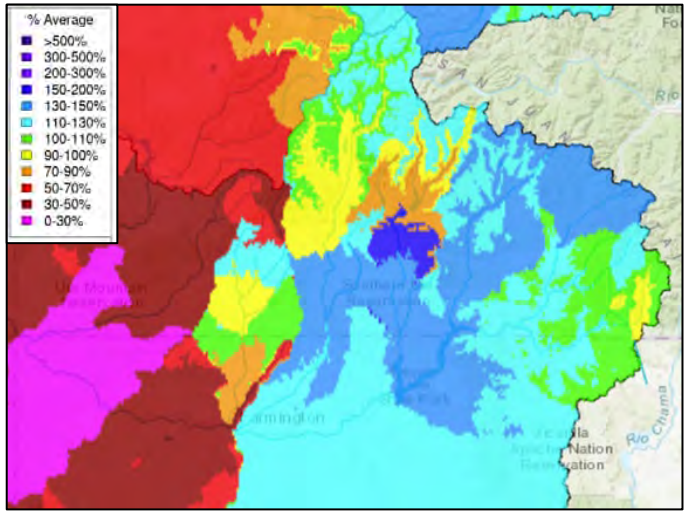
Basin Mean Precipitation as a % of Average		
	San Juan River above Navajo Reservoir	Animas River
Oct-Mar	85	70
October	50	15
November	120	85
December	90	75
January	90	85
February	60	65
March	80	85

Precipitation: April-July

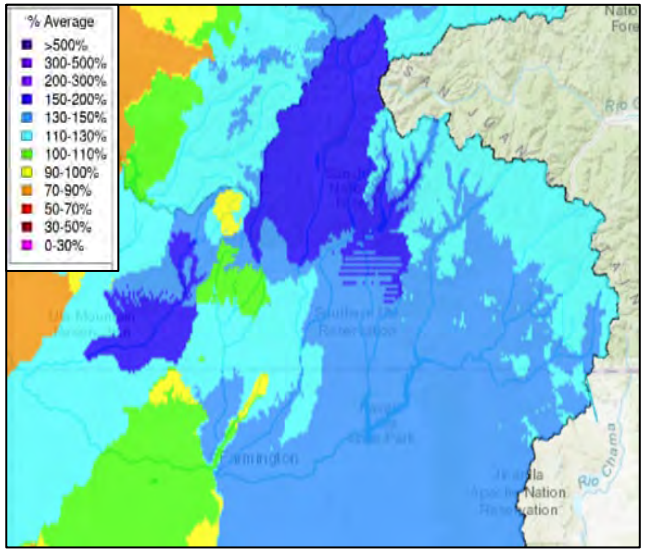
April



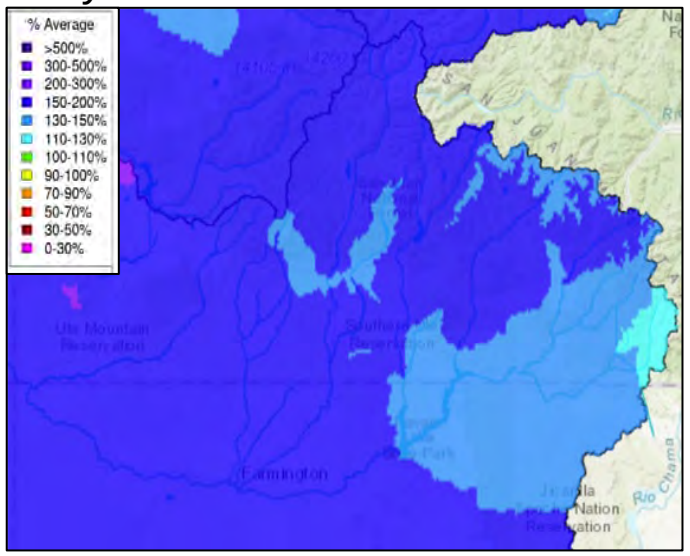
May



June



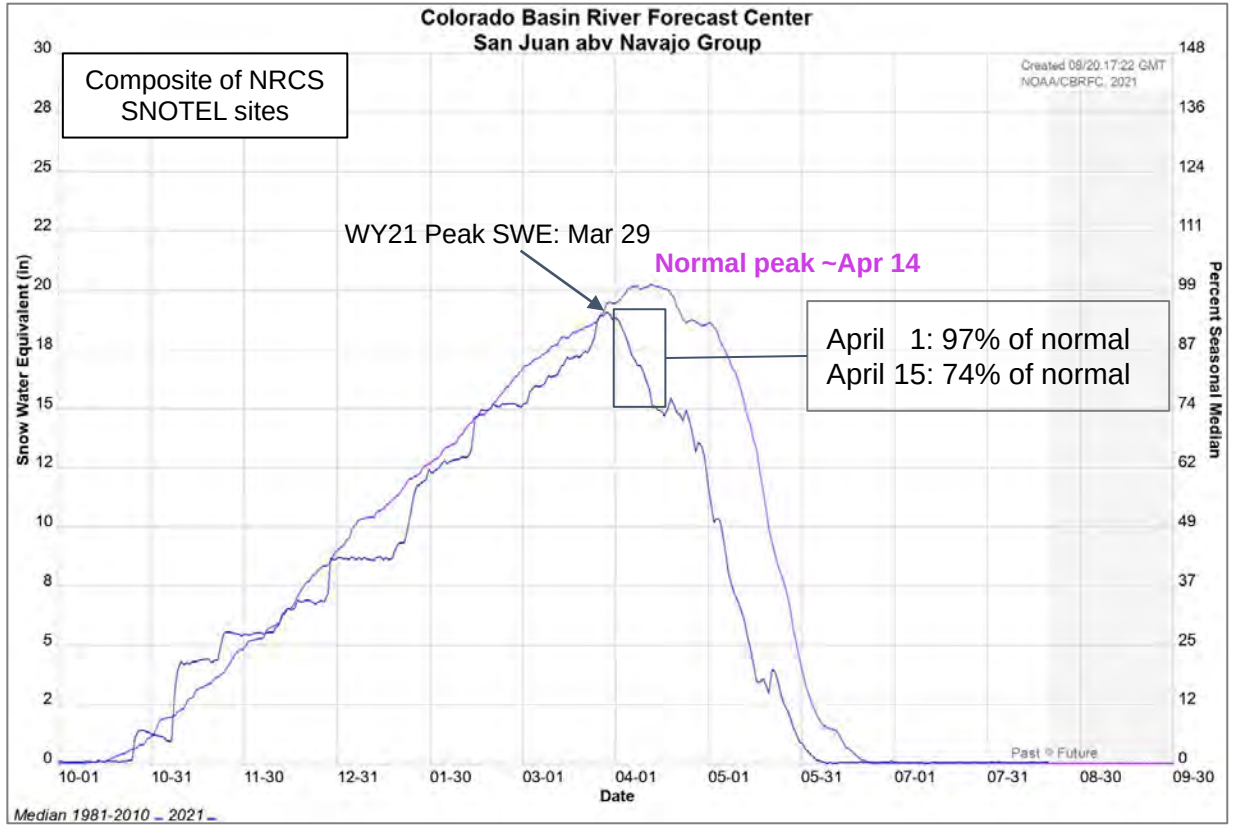
July



Basin Mean Precipitation as a % of Average		
	San Juan River above Navajo Reservoir	**Animas River**
Oct-Mar	85	70
April	30	30
May	120	100
June	125	170
July	150	160
Oct-Jul	85	80

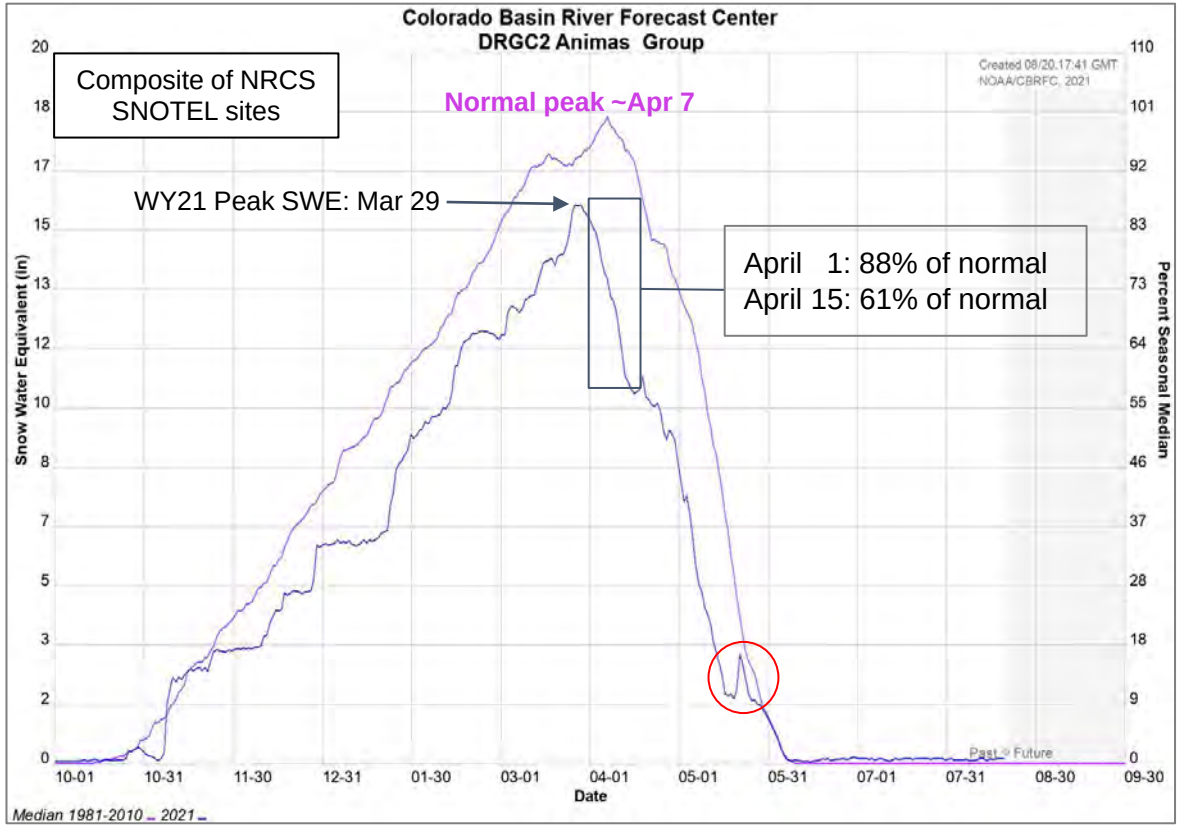
SNOTEL Snow Summary: Water Year 2021

San Juan River above Navajo Reservoir



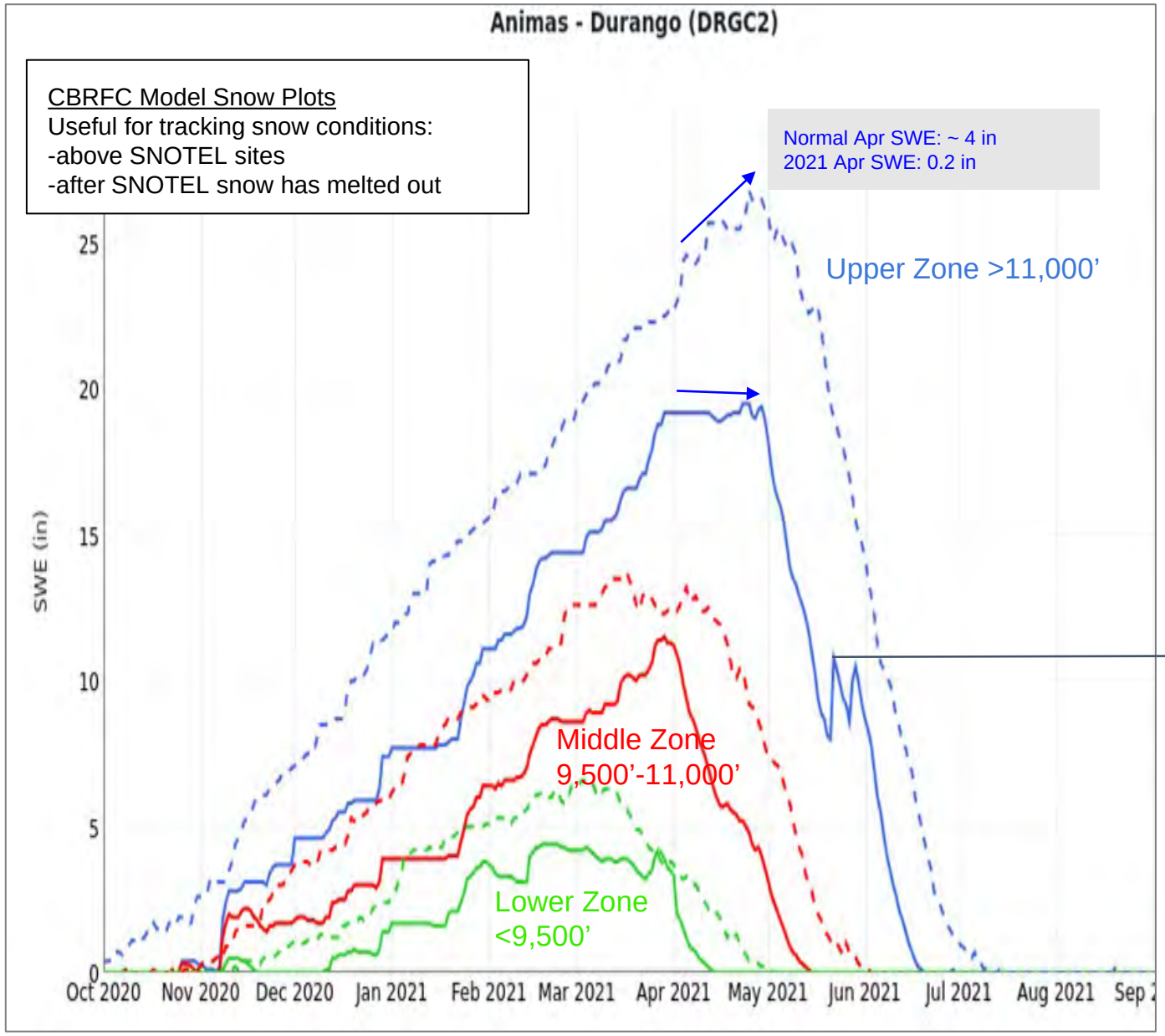
Peak Snow: Below normal; 95%
Peak Snow Timing: Early; ~2 weeks
Melt out: Early

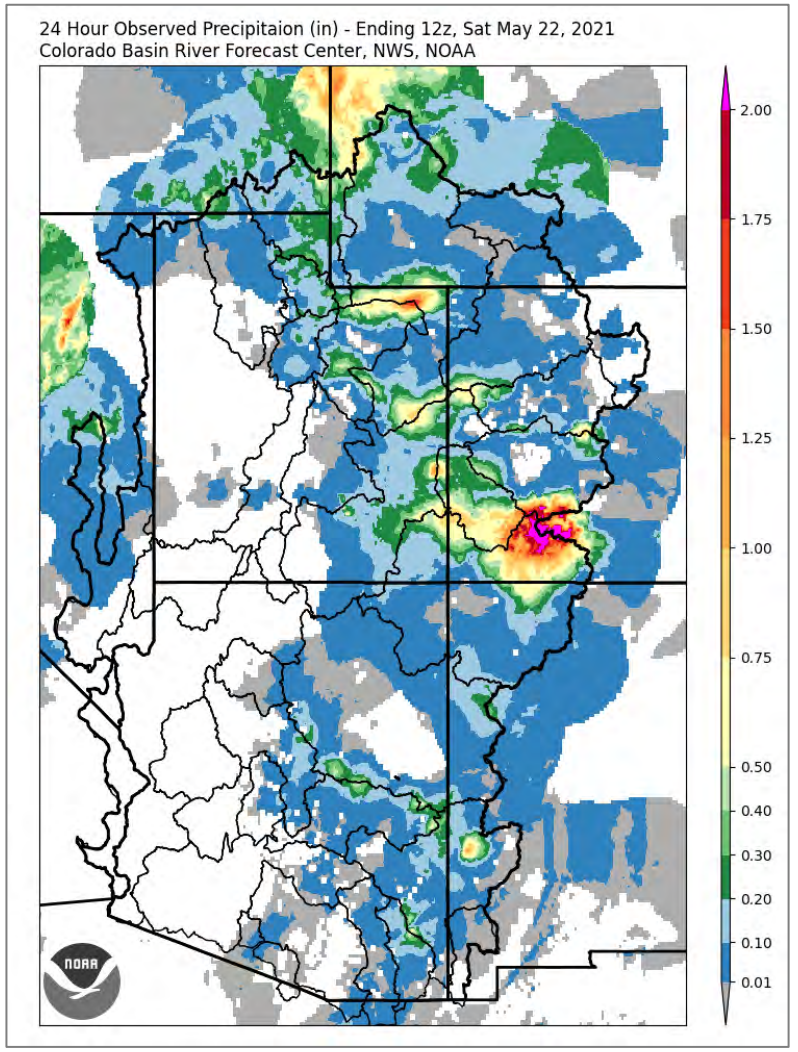
Animas River Basin



Peak Snow: Below normal: 92%
Peak Snow Timing: Early
Melt out: Early

CBRFC Model Snow: Animas-Durango

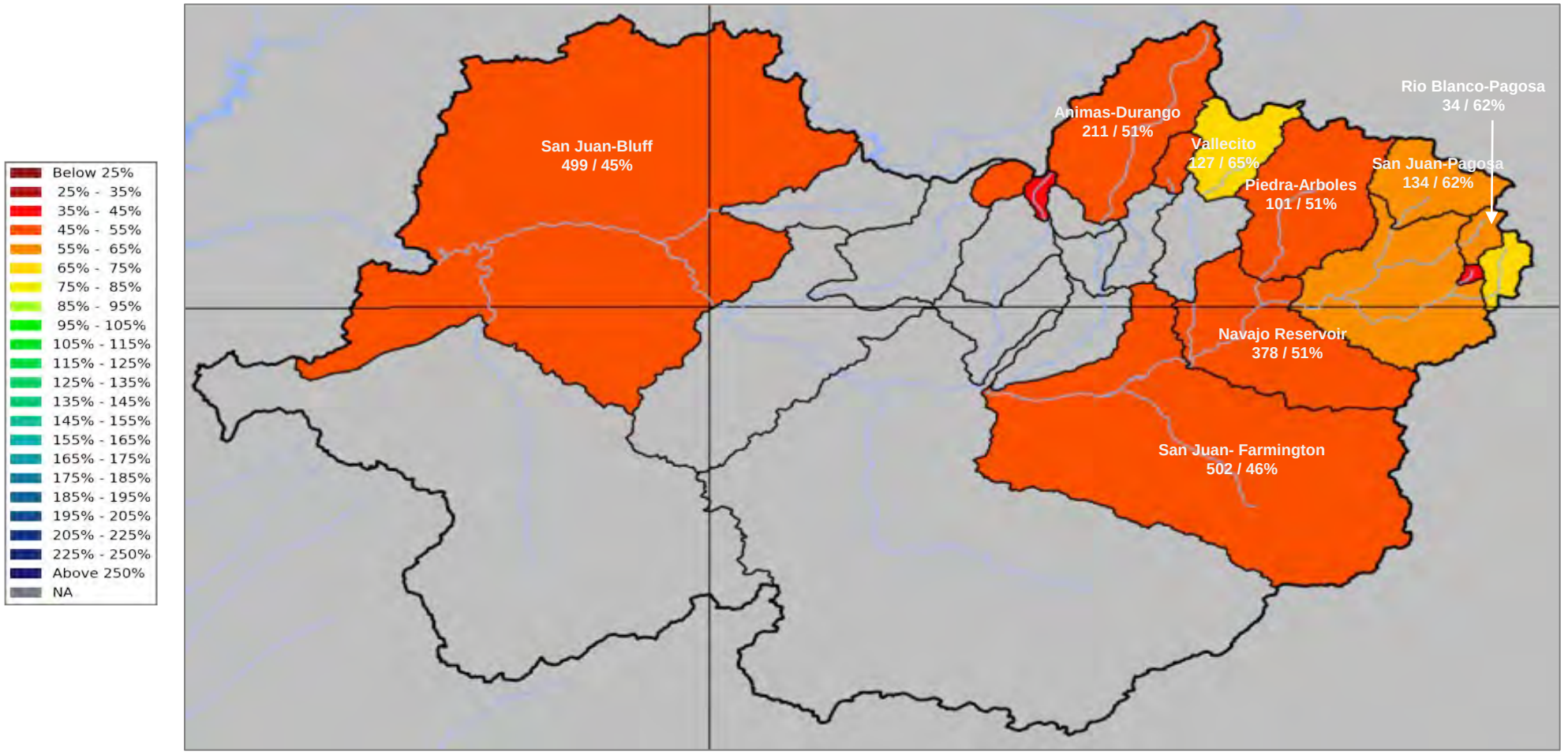




A significant storm on May 21 delivered widespread 1.0-2.0+ inches of precipitation which resulted in rain at the lower elevations and additional snow accumulation above 11,000'.

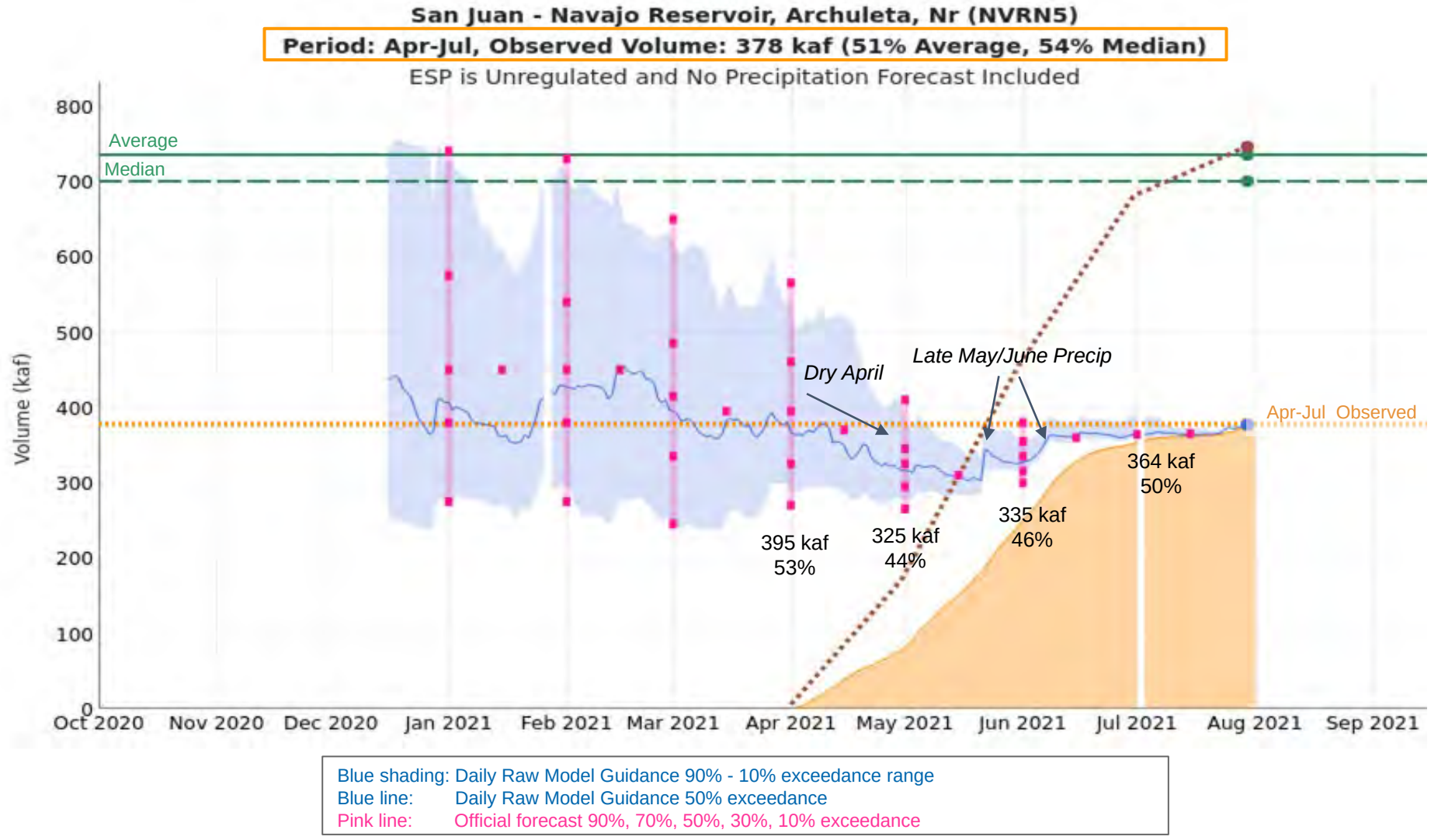
San Juan River Basin April-July Observed Volumes

April-July Unregulated Observed Volumes
Volume in 1000's acre-feet / Percent of 1981-2010 average



- April-July observed volumes ranged from 45-65% of average.

Water Supply Forecast Evolution: Navajo Reservoir Inflow



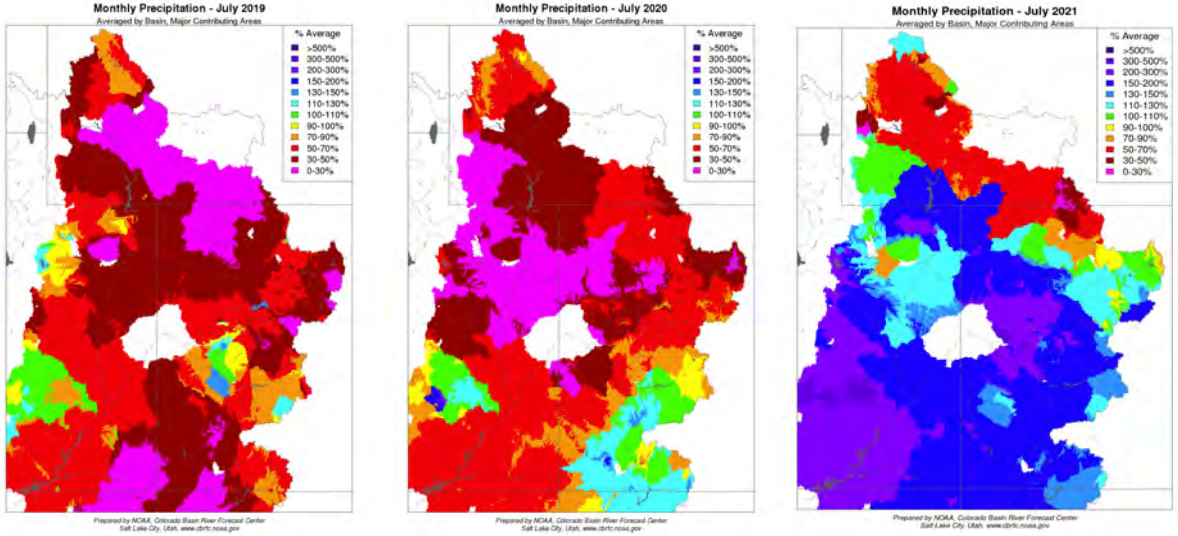
Blue shading: Daily Raw Model Guidance 90% - 10% exceedance range
Blue line: Daily Raw Model Guidance 50% exceedance
Pink line: Official forecast 90%, 70%, 50%, 30%, 10% exceedance

Forecasts were fairly steady until April 1. Forecasts decreased from April through mid-May due to below normal precipitation. Above normal precipitation during late May-July resulted in increases to the June and July forecasts.

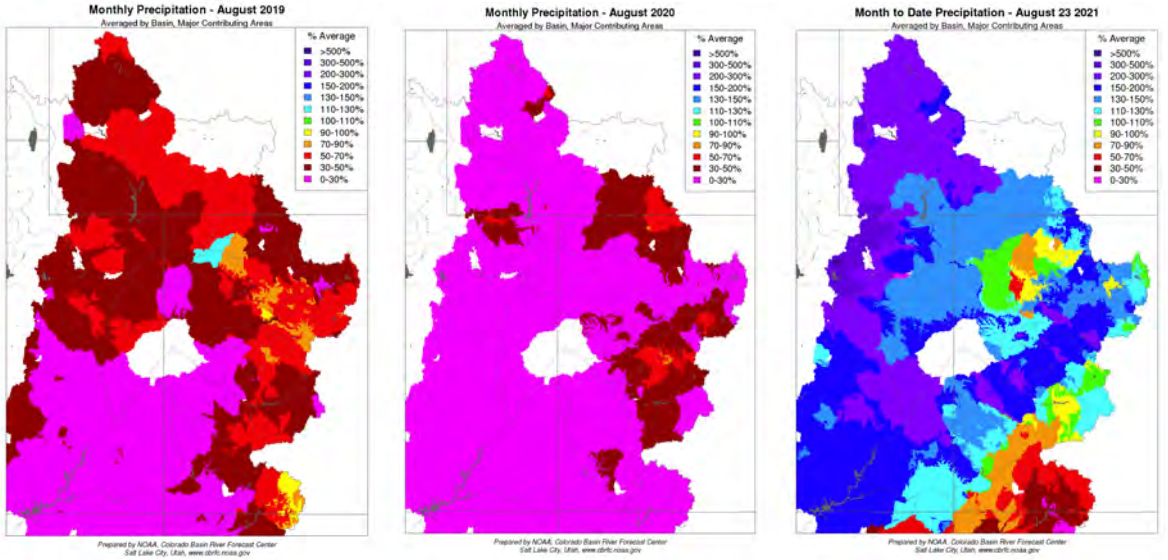
The observed April-July volumes fell within the forecasted range of possibilities suggesting the model was initialized correctly (soil moisture heading into the winter) and performed well through the season.

The Monsoon is back!

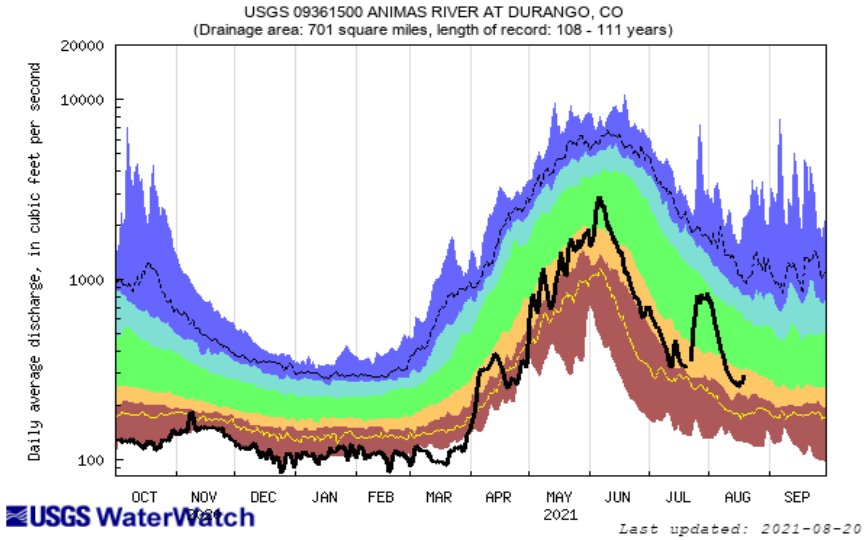
July Precipitation: 2019-2021

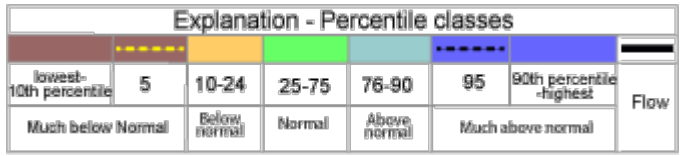


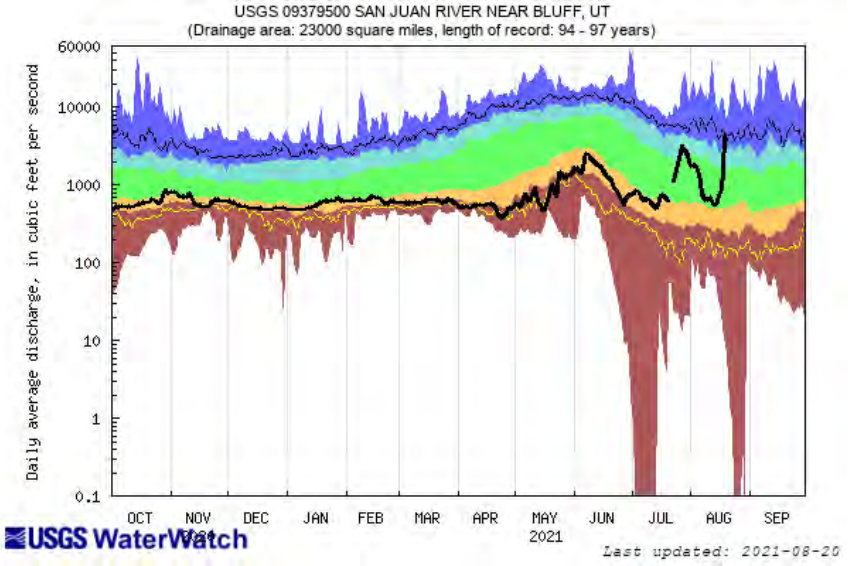
August Precipitation: 2019-2021



2021 Water Year Streamflow







Summary

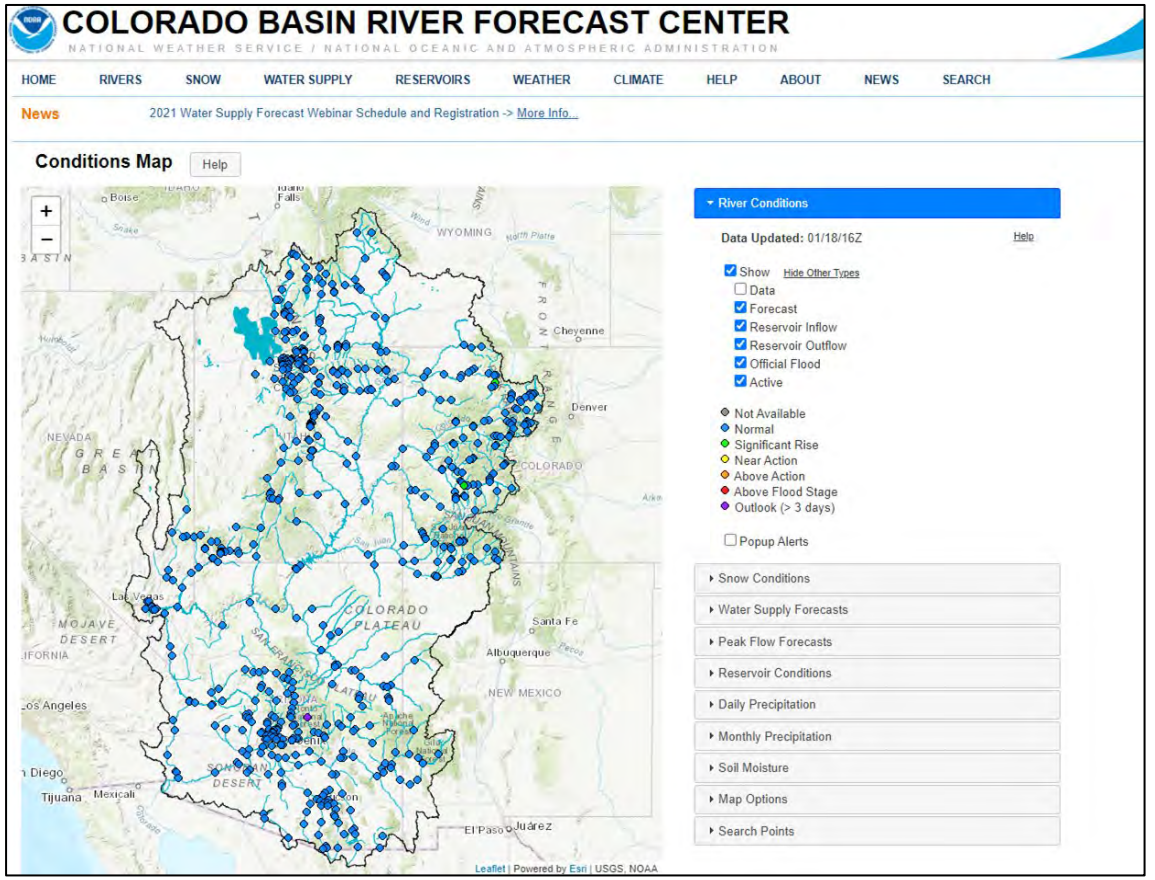
- Water Supply Conditions:
  - April -July observed unregulated runoff volumes ranged from 45-65% of average.
    - Below normal snow conditions and early melt
    - Warm and dry April and early May
    - Late spring and summer precipitation helped improve water supply conditions
      - Additional snow accumulation above 11,000’ in late May
      - Increased runoff efficiency
      - Lessened the impact of the dry antecedent soil moisture conditions

- Water Supply Forecasts
  - Forecasts decreased between April and mid-May due to near record dry conditions
    - Low runoff efficiency in April due to very dry soils despite significant snowmelt
  - Forecasts increased in both June and July due to above normal precipitation
  - CBRFC forecast model performed reasonably well this season
    - All forecast months (Jan-Jun) errors were better or similar to the historical model error

- July/August weather has brought precipitation and hydrologic relief to the region
  - Improvements to baseflow and soil moisture conditions

Contact Information

- Operational Hydrologist: in office
  - 801-524-4004
  - cbrfc.operations@noaa.gov
- Ashley Nielson - San Juan River Forecaster
  - ashley.nielson@noaa.gov
  - 801-524-5130 x333

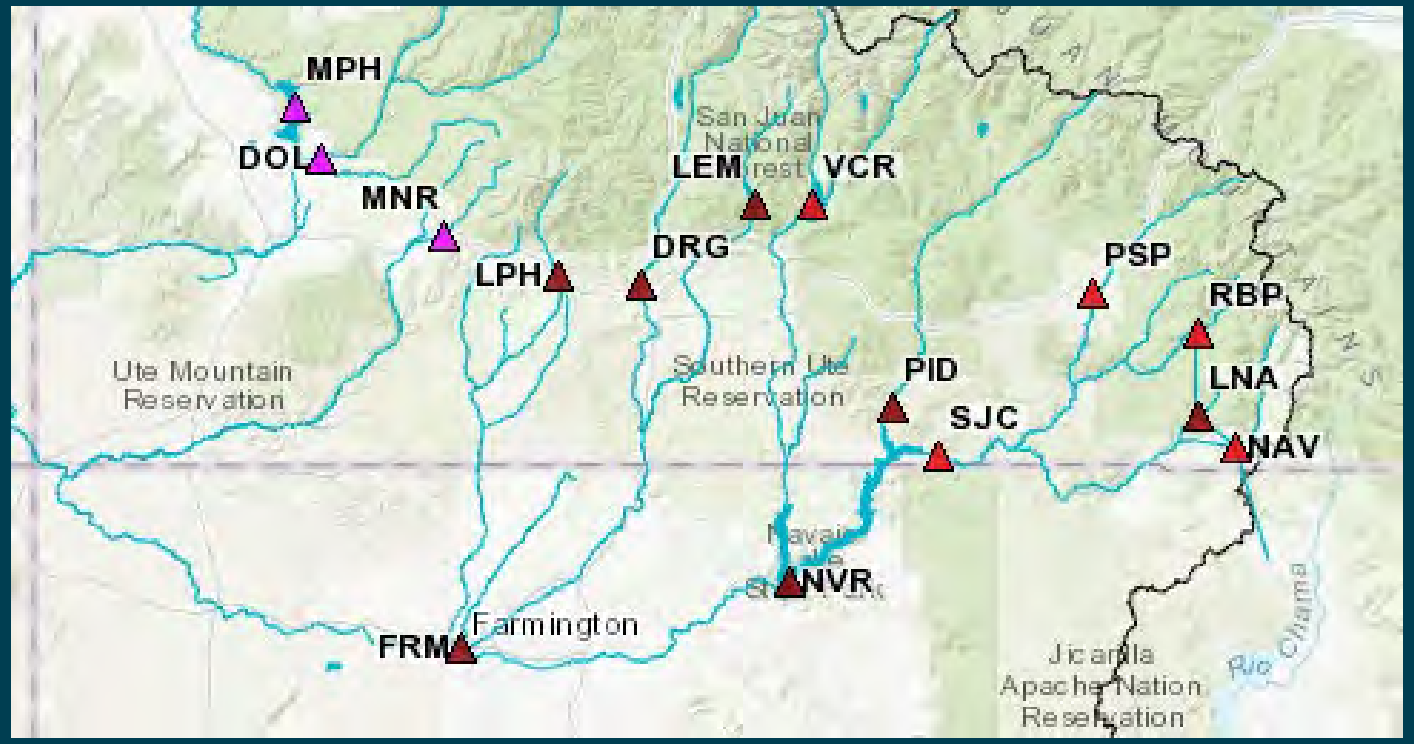


CBRFC Webpage
https://www.cbrfc.noaa.gov/

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

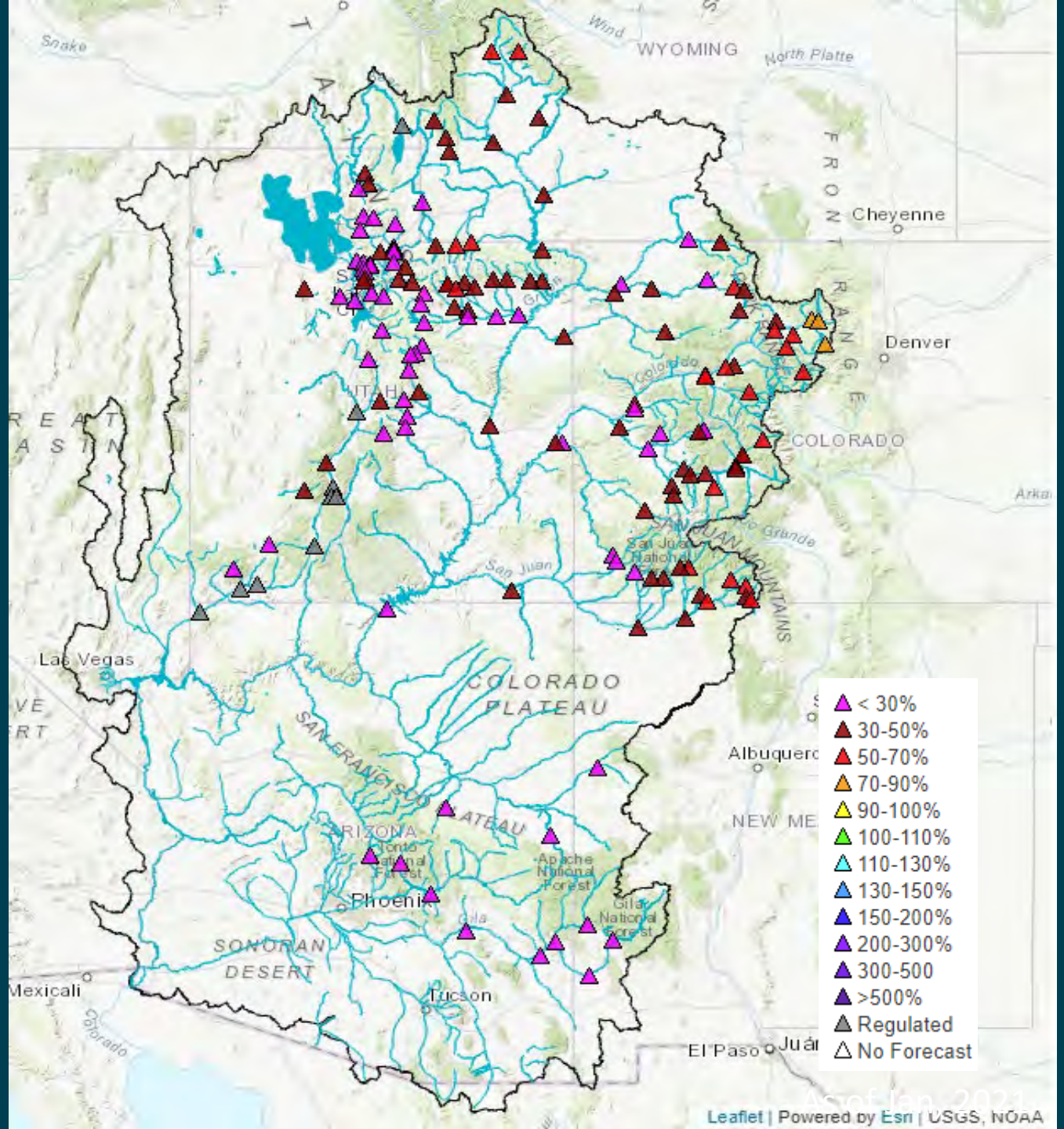
Final Water Supply (April-July)

Navajo:	378 kaf (51% avg)
Vallecito:	127 kaf (65% avg)
Lemon:	29 kaf (52% avg)
Animas:	211 kaf (51% avg)
McPhee:	84 kaf (29% avg)
Powell:	1,850 kaf (26% avg)

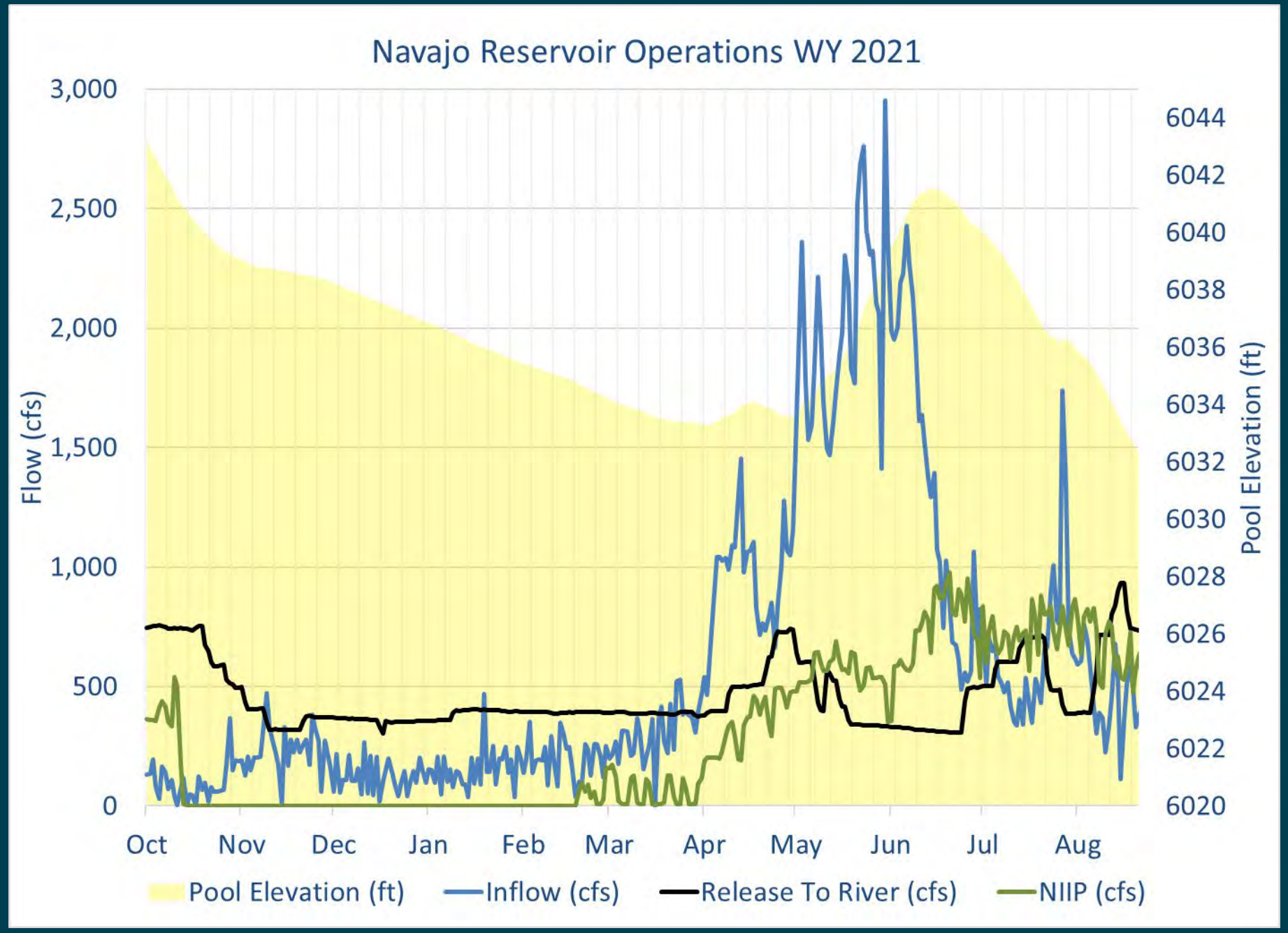


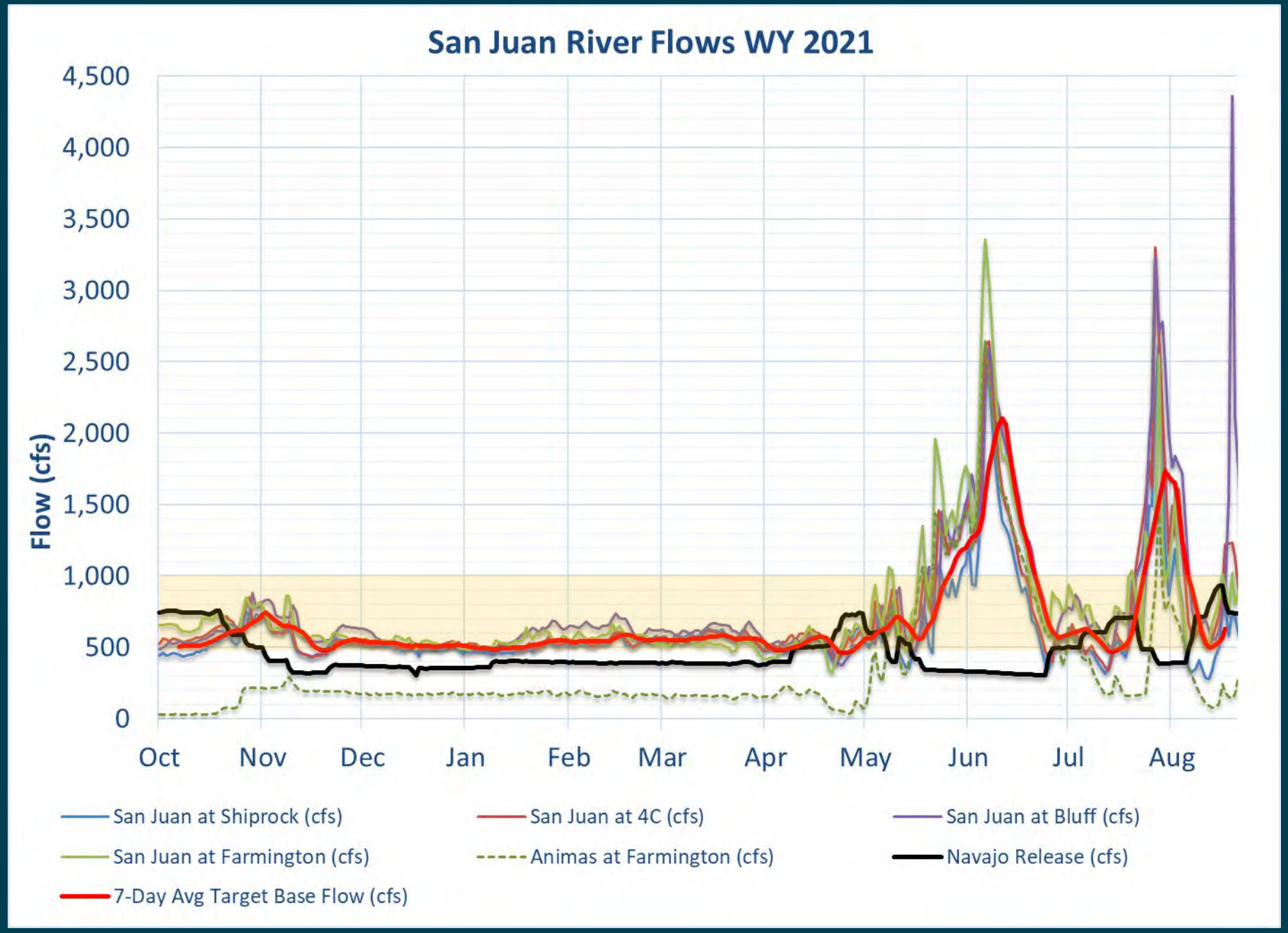
Final Water Supply (April-July)

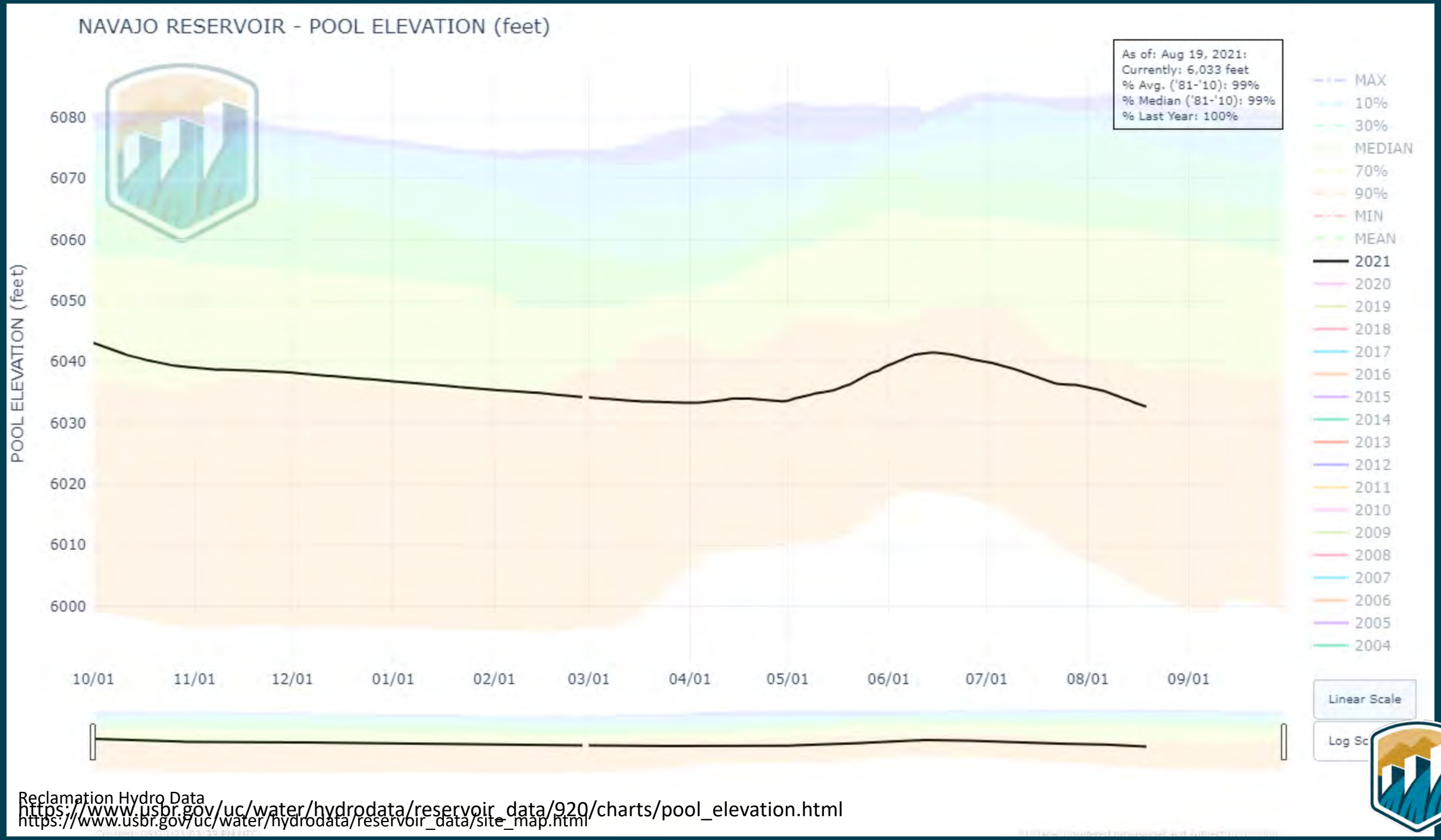
Colorado River Basin



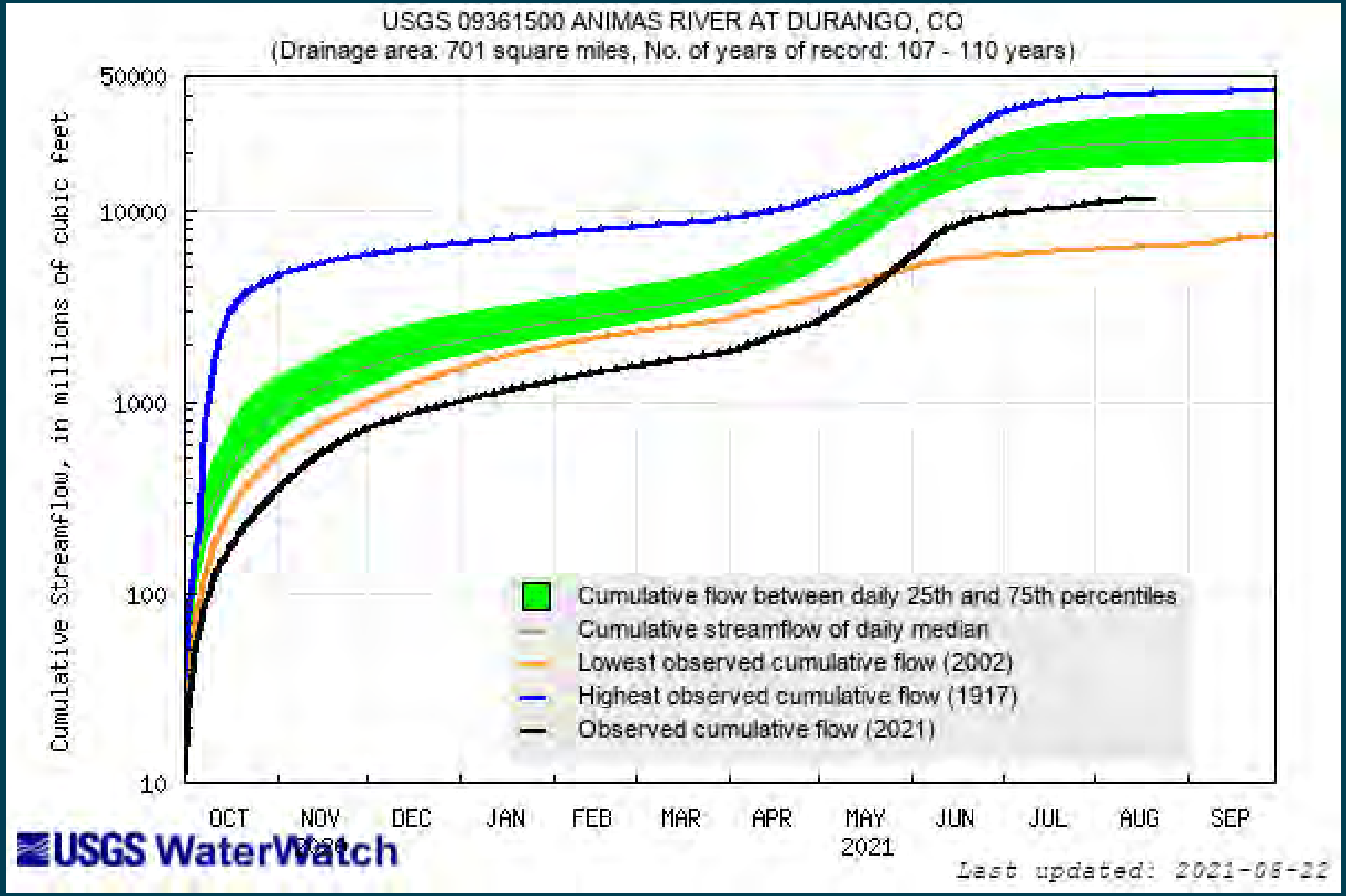
CBRFC Water Supply Forecasts
https://www.cbrfc.noaa.gov/


Navajo Reservoir Operations WY 2021
3,000
2,500
2,000
1,500
1,000
500
0
Flow (cfs)
6044
6042
6040
6038
6036
6034
6032
6030
6028
6026
6024
6022
6020
Pool Elevation (ft)
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Pool Elevation (ft)
Inflow (cfs)
Release To River (cfs)
NIIP (cfs)


San Juan River Flows WY 2021
Flow (cfs)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
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)

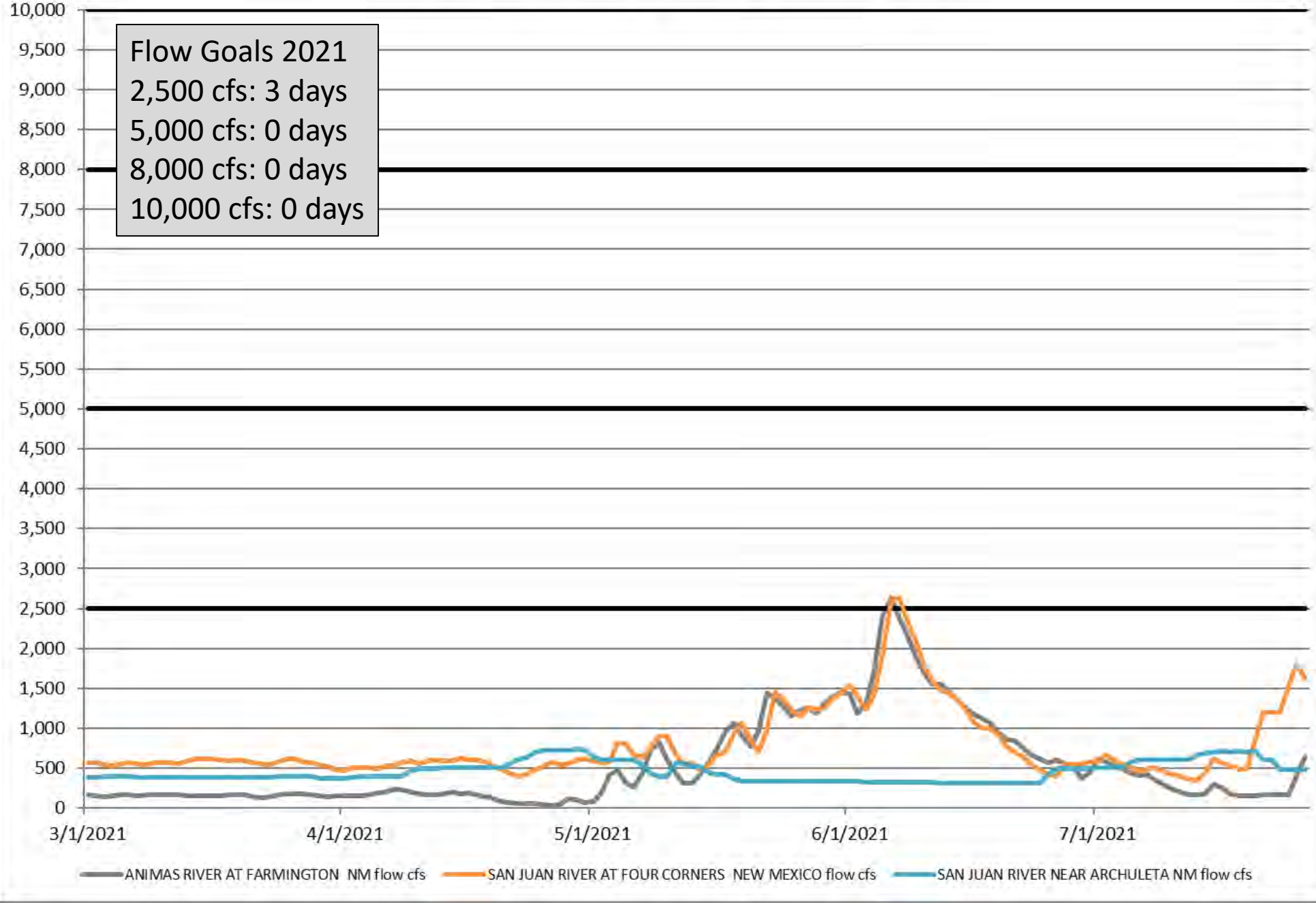


Reclamation Hydro Data
https://www.usbr.gov/uc/water/hydrodata/reservoir_data/920/charts/pool_elevation.html
https://www.usbr.gov/uc/water/hydrodata/reservoir_data/site_map.html

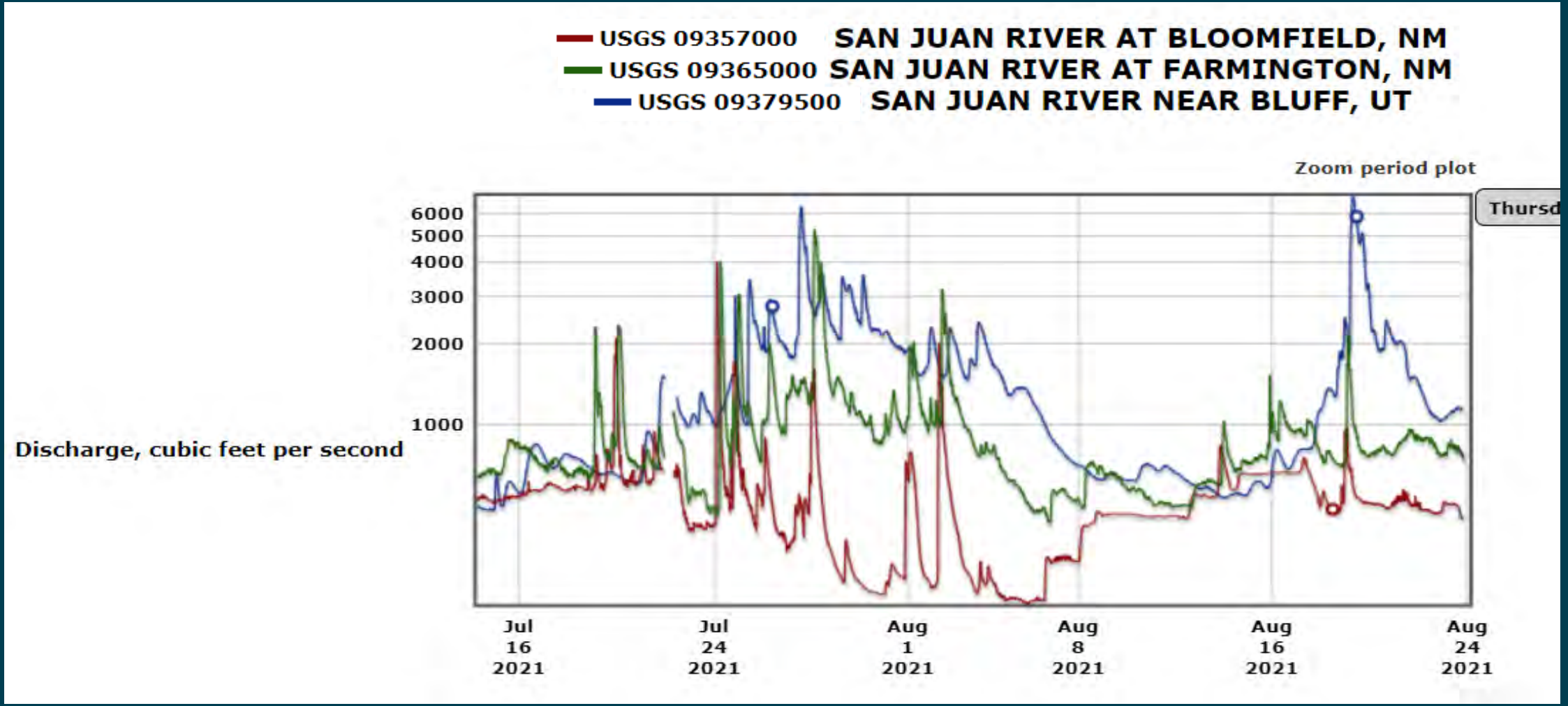


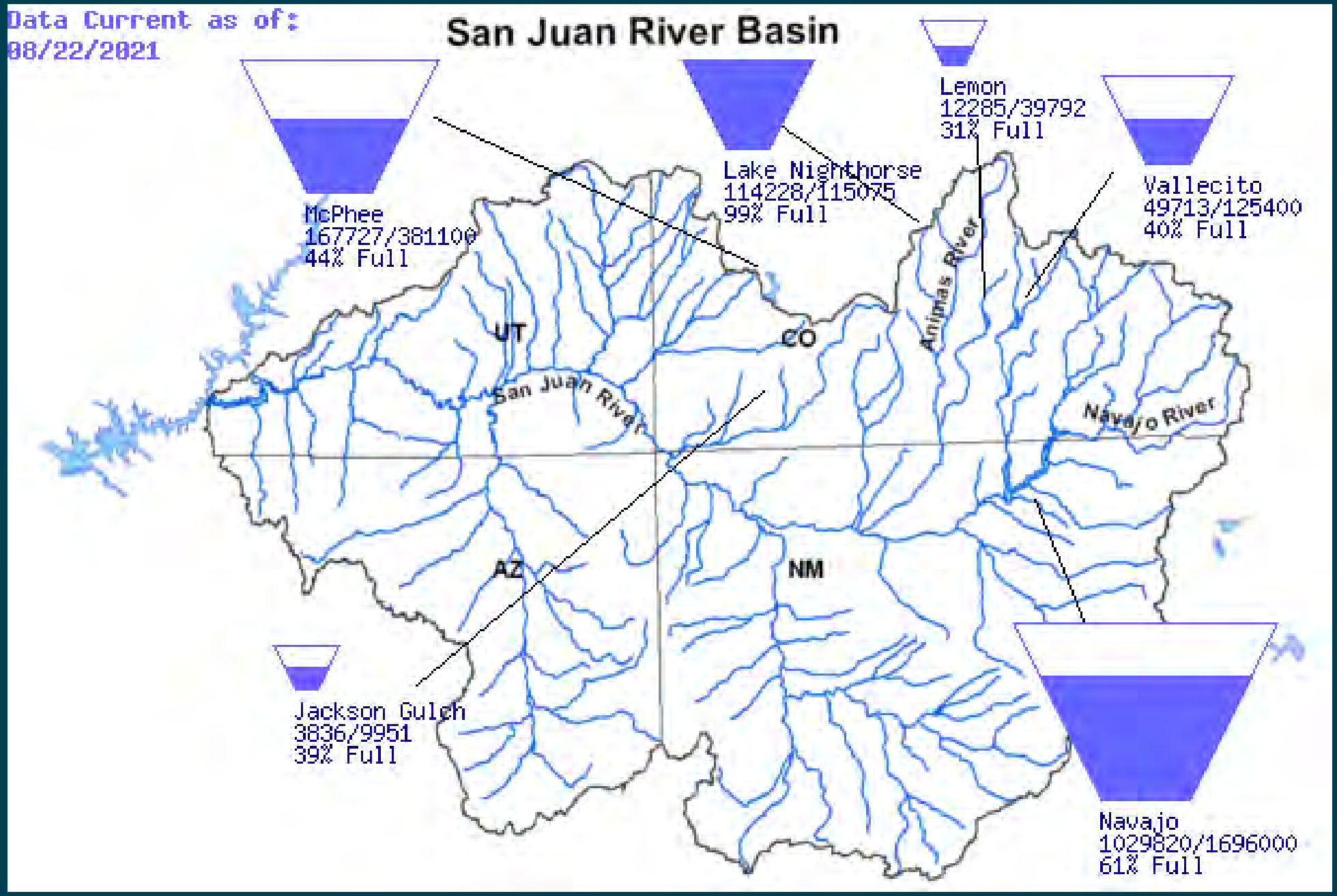
https://waterwatch.usgs.gov/index.php?id=wwdur_cumflow

Water Year 2021 Operations and Flows



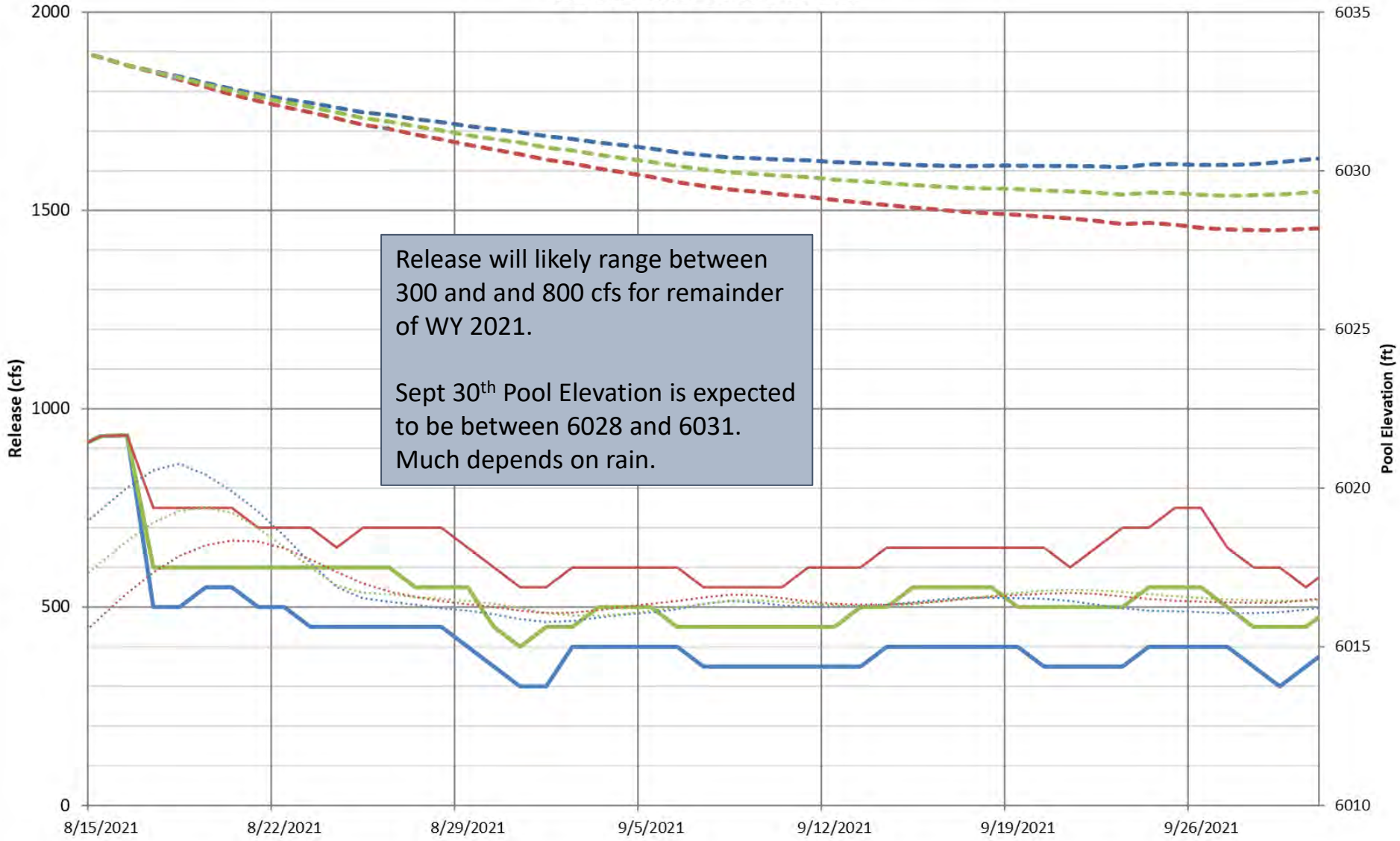
July – August 2021 Events





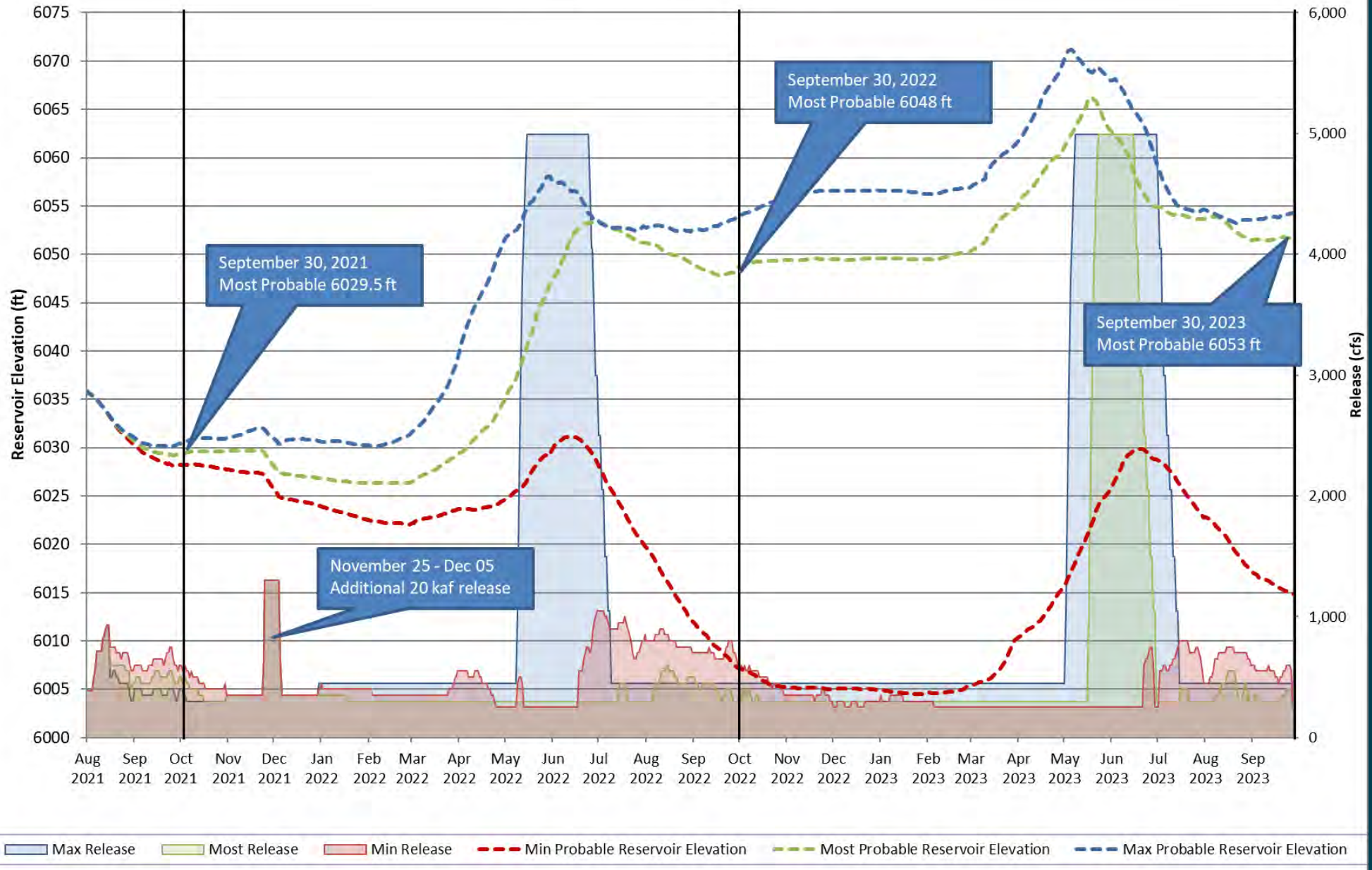
Reclamation Teacup Diagrams
https://www.usbr.gov/uc/water/basin/index.html

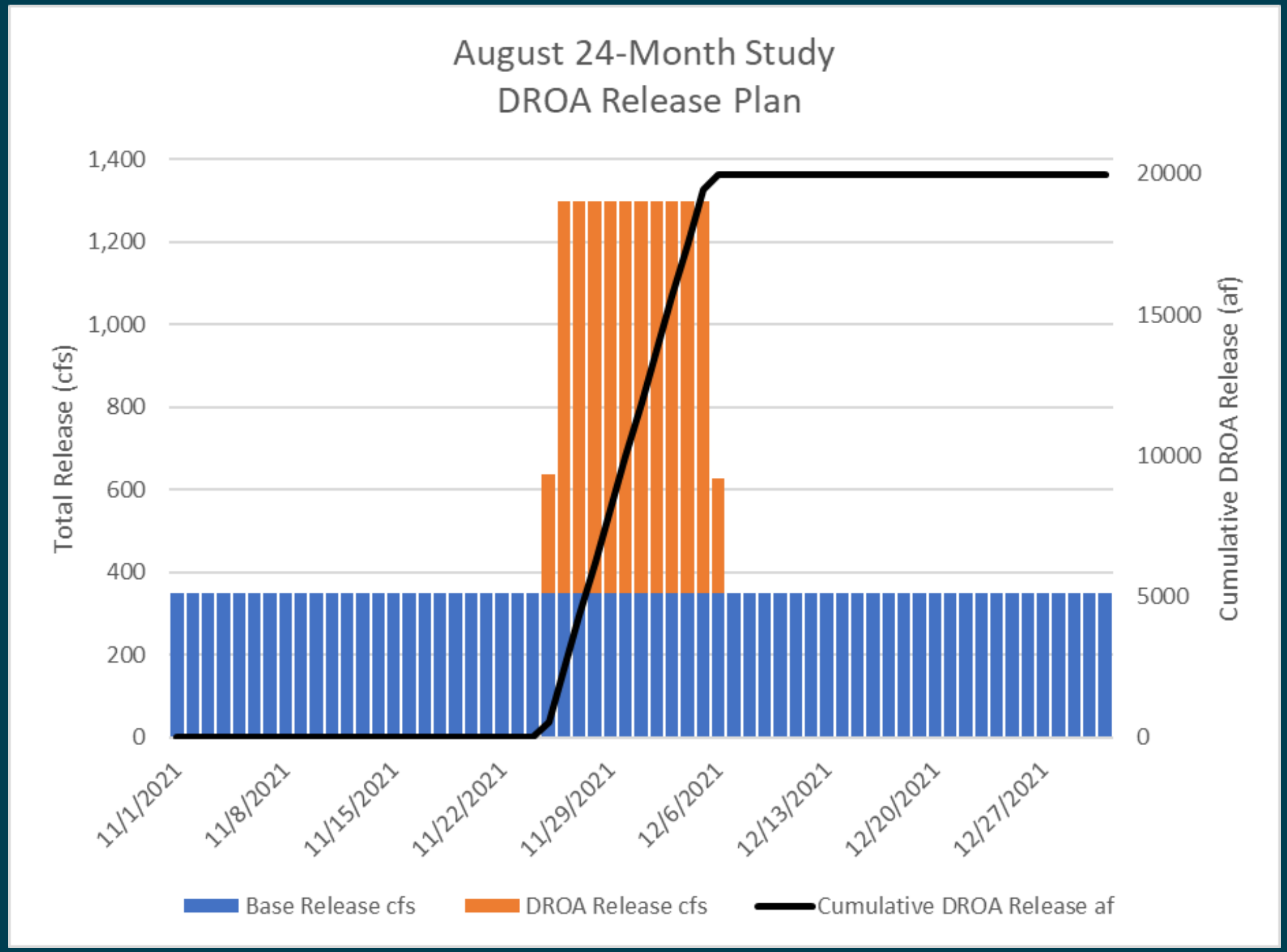
Navajo Reservoir Forecast Operations
Remainder of WY 2021



Navajo Reservoir Forecast Elevation and Release

as of August 2021 24-Month Study




August 24-Month Study
DROA Release Plan
Total Release (cfs)
Cumulative DROA Release (af)
1,400
1,200
1,000
800
600
400
200
0
20000
15000
10000
5000
0
11/1/2021
11/8/2021
11/15/2021
11/22/2021
11/29/2021
12/6/2021
12/13/2021
12/20/2021
12/27/2021
Base Release cfs
DROA Release cfs
Cumulative DROA Release af

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 300kaf (42% avg) – 1,130 kaf (153% avg) with a median projection of 615 kaf (83% avg).
- 25% chance of prescribed spring peak release
- 3% chance of falling below 5990 ft (min active storage)
- End of Water Year storage range 800 kaf (47% full) – 1,270 kaf (75% full) with a median projection of 1,210 kaf (71% full)

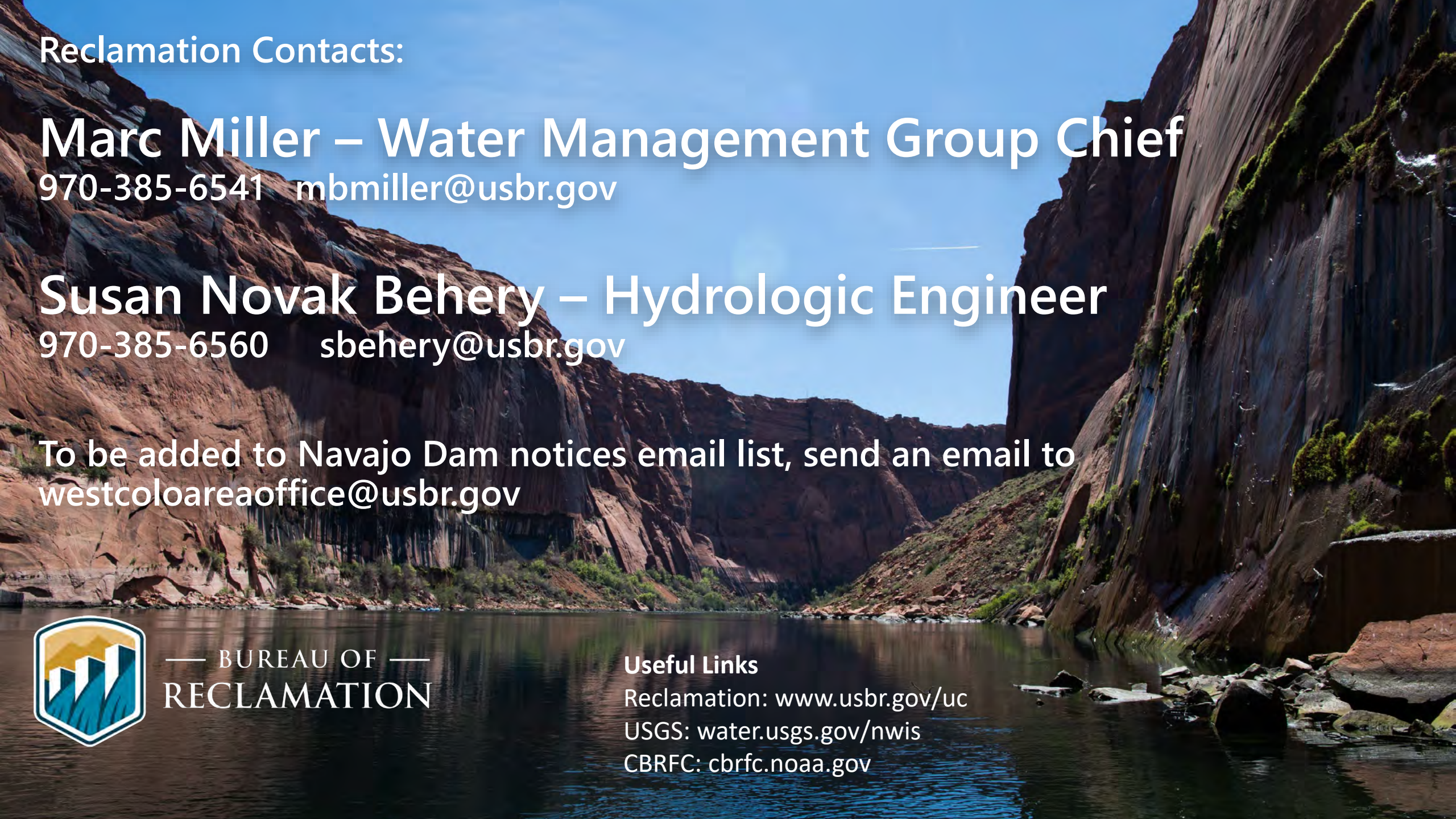
Statistical Average Update

- The 30-year average used across agencies progresses every decade
- The currently used 1981 – 2010 time period for statistics will be updated to 1991 – 2020 soon.
- Navajo April – Juy Modified Unregulated Inflow averages:
  - 1981 – 2010: 737 kaf
  - 1991 – 2020: 628 kaf
- What does this mean? WY 2021 April – July inflow of 378 kaf
  - 1981 – 2010: 51% average
  - 1991 – 2020: 60% average

Summary

Next Meeting January 18th 2022

- WY 2021 April-July runoff was poor throughout the San Juan River Basin. Navajo Modified Unregulated Inflow totaled 378 kaf which was 51% of average.
- There was no spring peak release. Releases varied from 300 – 900 cfs throughout WY 2021.
- Drought conditions have improved in the Four Corners due to rains but drought still persists and is still at its maximum D4 level in many places. Soil moisture has also improved due to rains.
- In November and December of 2021, releases are scheduled to increase in response to a continual declining dry hydrologic condition for the Colorado River system. This drought operation is implemented under the Upper Basin Drought Response Operations Agreement. The maximum flexibility within the Record of Decision will be used to release an additional 20,000 af on top of base releases. Notification of releases will occur prior to the scheduled release change.
- Based on current storage and streamflows and the statistical range of likely hydrologies for WY 2022, there is a 25% chance for a spring peak release. The median runoff forecast is for 83% of average.
- The statistical "average" range will soon be migrated from 1981 – 2010 to the 1991 – 2020.



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970-385-6560 sbehery@usbr.gov

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