BUREAU OF RECLAMATION

Navajo Unit Operations Coordination Meeting

August 23, 2022

1:00 PM

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Agenda

- Introductions
- Weather Summary and Outlook– *Aldis Strautins, NWS*
- Streamflow Summary and Outlook – *Ashley Nielson, CBRFC*
- Review of operations to date WY 2022
- WY 2023 planned operations
- Comments and Reports

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Navajo Operations Meeting
August 23rd, 2022

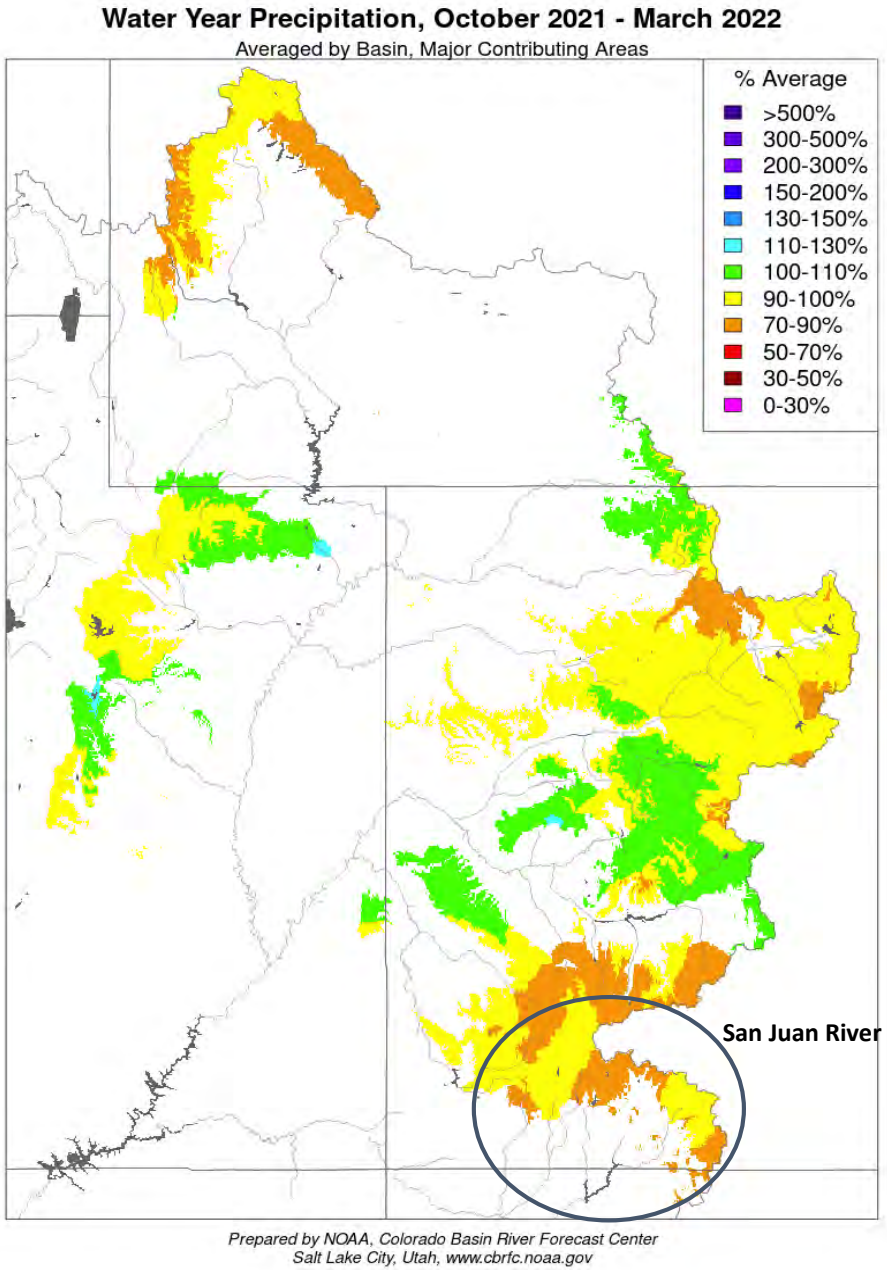
Water Year 2022
Runoff Review

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

Outline

- Water Year 2022 Conditions Summary
  - Precipitation
  - Snow
  - Streamflow
- 2022 April-July Observed Volumes
- 2022 Water Supply Forecast Performance
- Current conditions and outlooks
  - Soil Moisture
  - Streamflow
- Summary

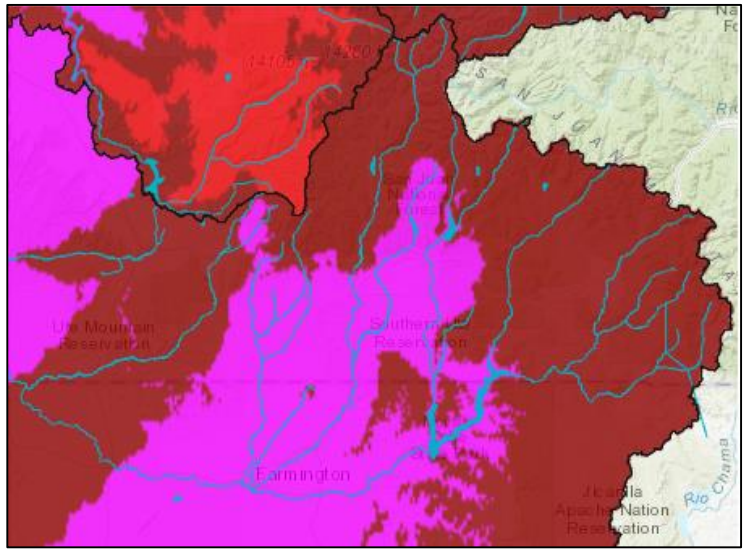
Precipitation: October-March



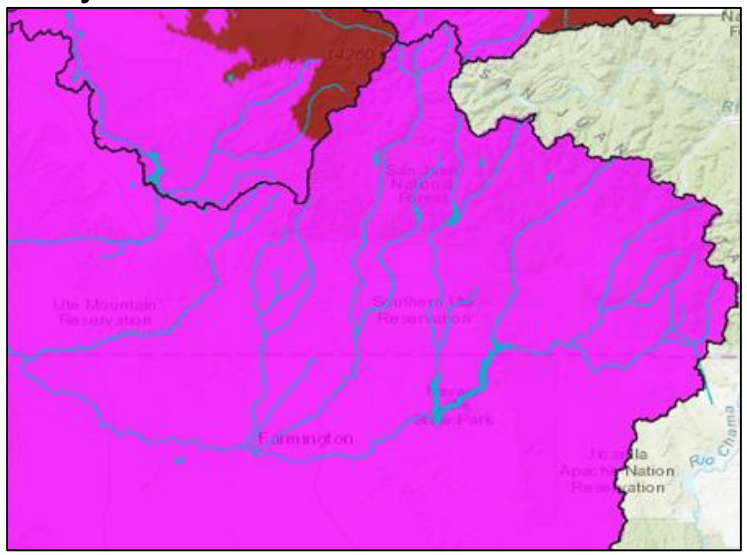
Basin Mean Precipitation as a % of Average		
	San Juan River above Navajo Reservoir	Animas River
Oct-Mar	90	90
October	100	105
November	10	20
December	230	235
January	25	15
February	95	90
March	80	90

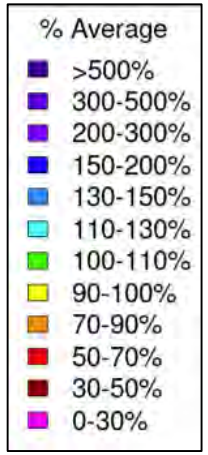
Precipitation: April-July

April

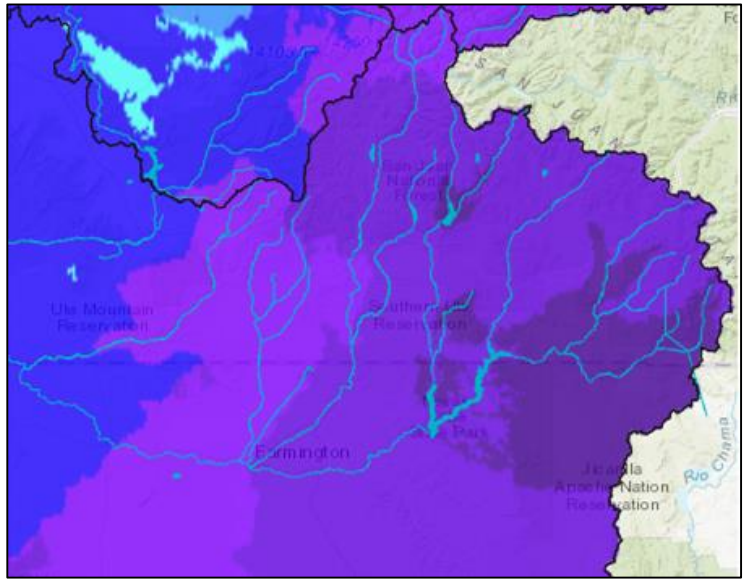


May

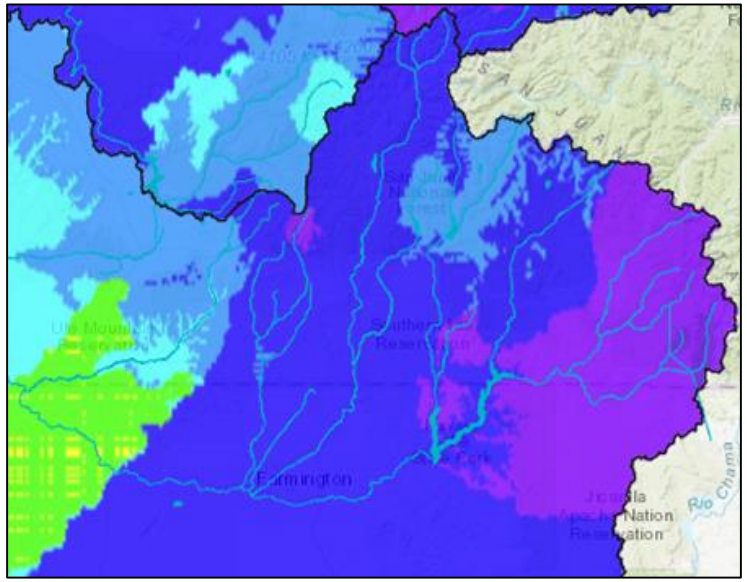




June



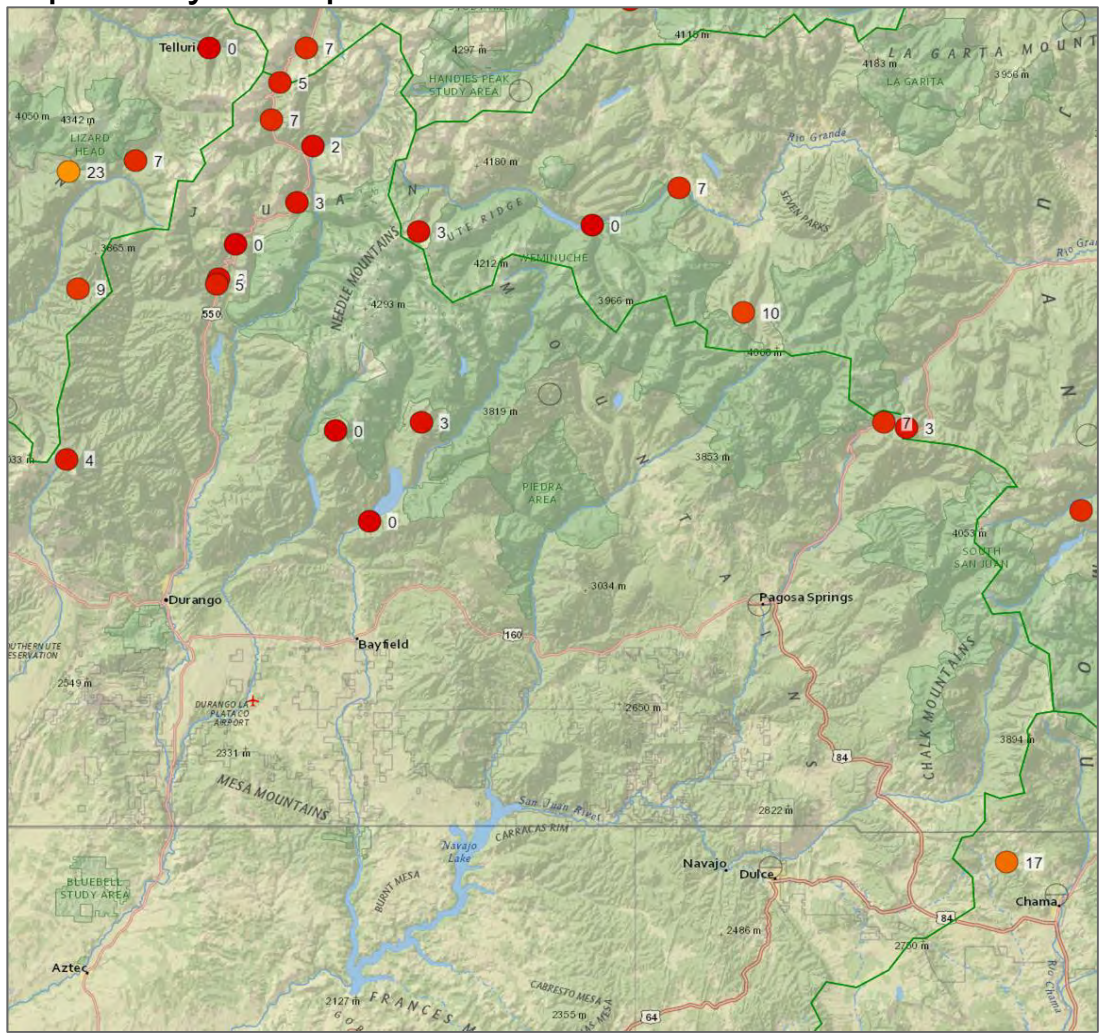
July

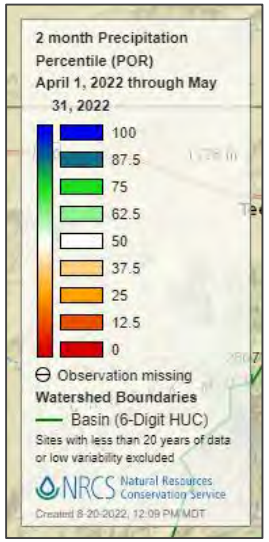


Basin Mean Precipitation as a % of Average		
	San Juan River above Navajo Reservoir	Animas River
Oct-Mar	90	90
April	40	35
May	15	8
June	450	370
July	220	165
Oct-Jul	105	100

Precipitation Percentile Rankings: NRCS SNOTEL

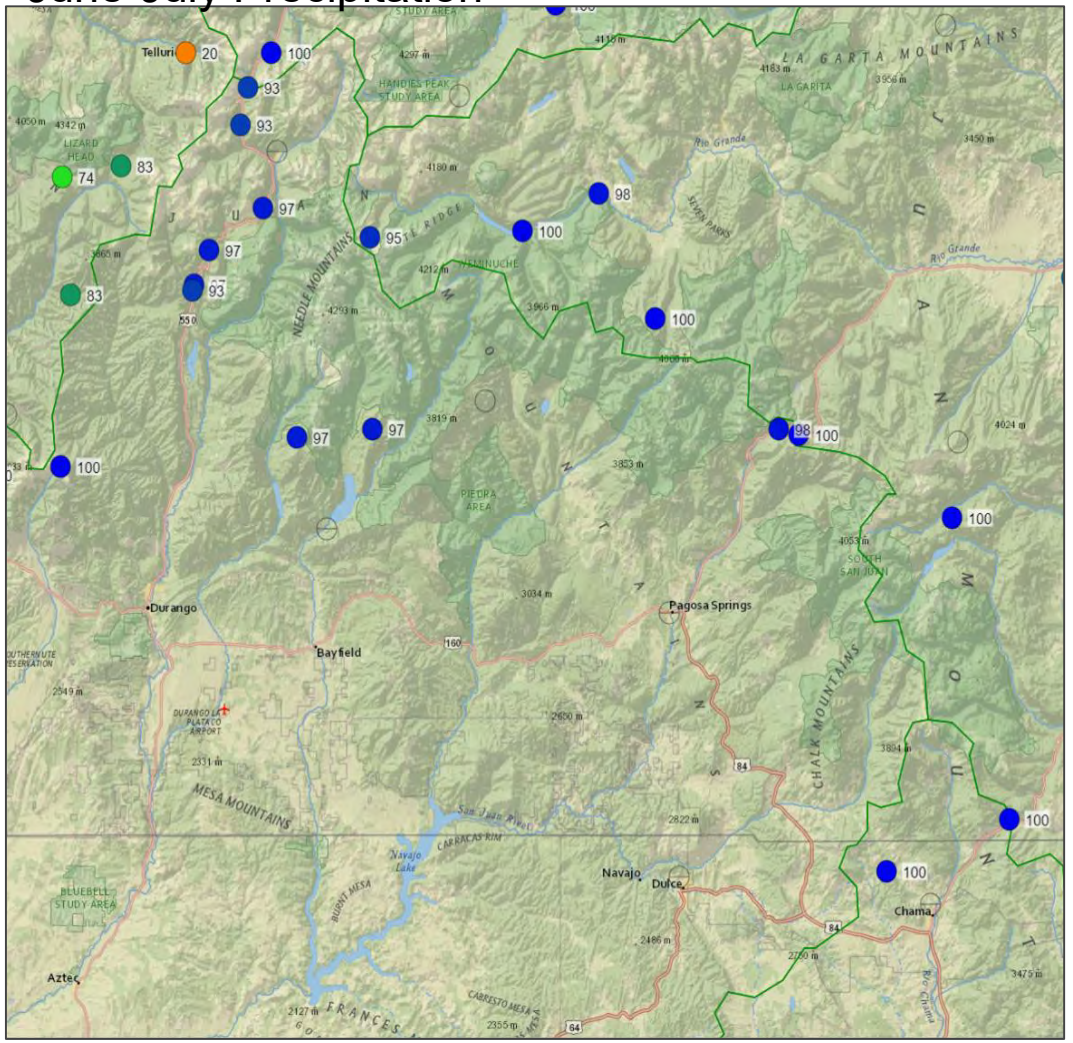
April-May Precipitation





Observed precipitation was in the ***bottom*** 5-10 years on record with a few locations having record dry conditions.

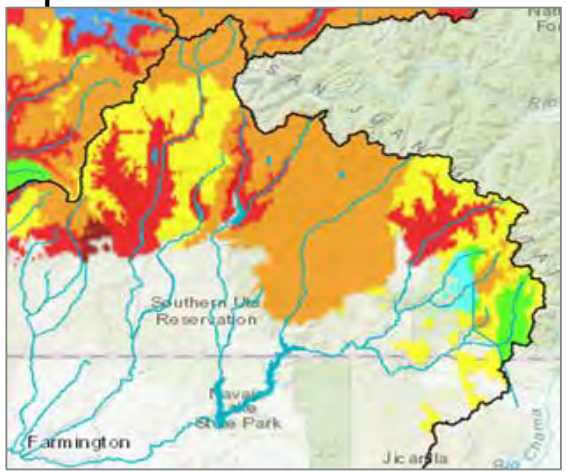
June-July Precipitation



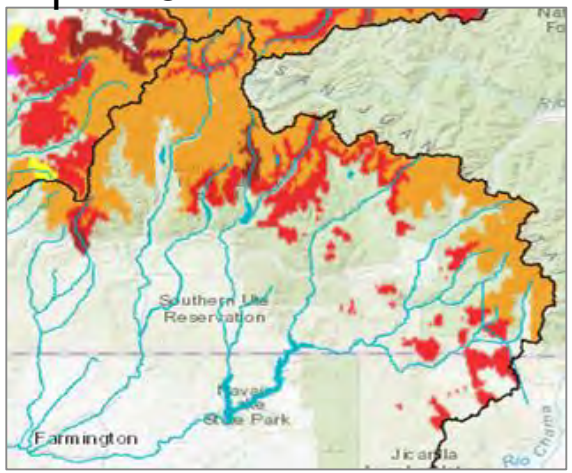
Observed precipitation was in the ***top*** 5 years on record with many locations having record wet conditions.

Snow Conditions: CBRFC Model Snow Water Equivalent

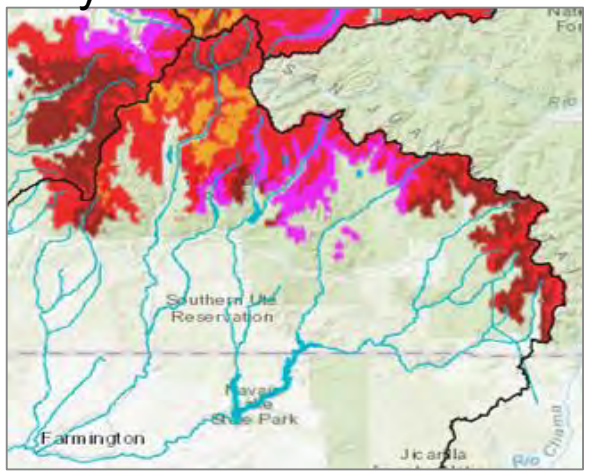
April 1



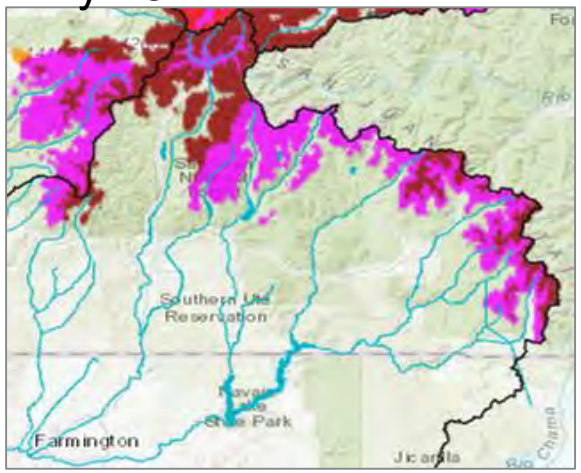
April 15

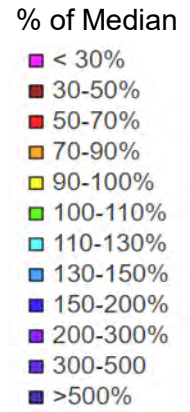


May 1

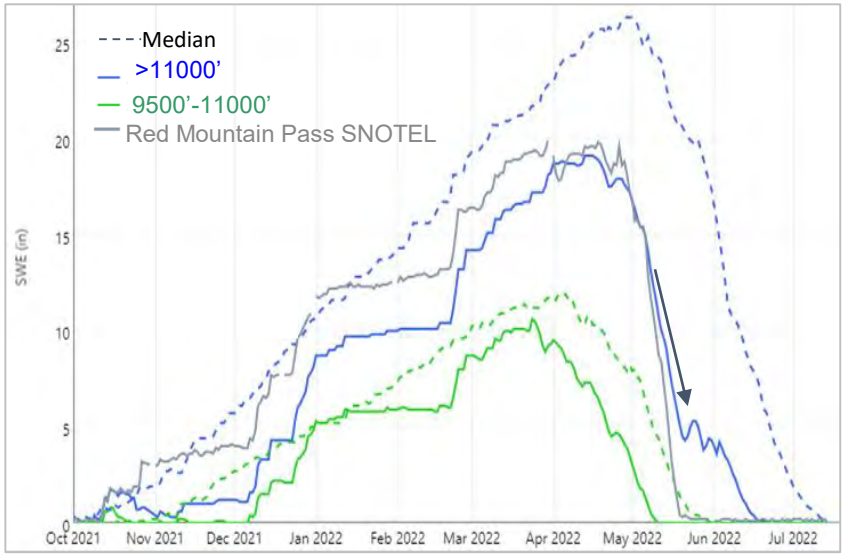


May 15

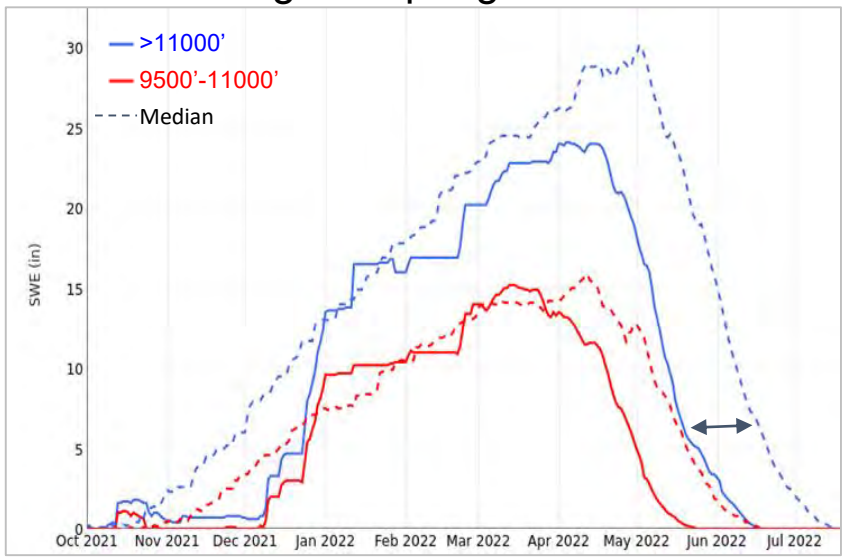




Animas below Silverton

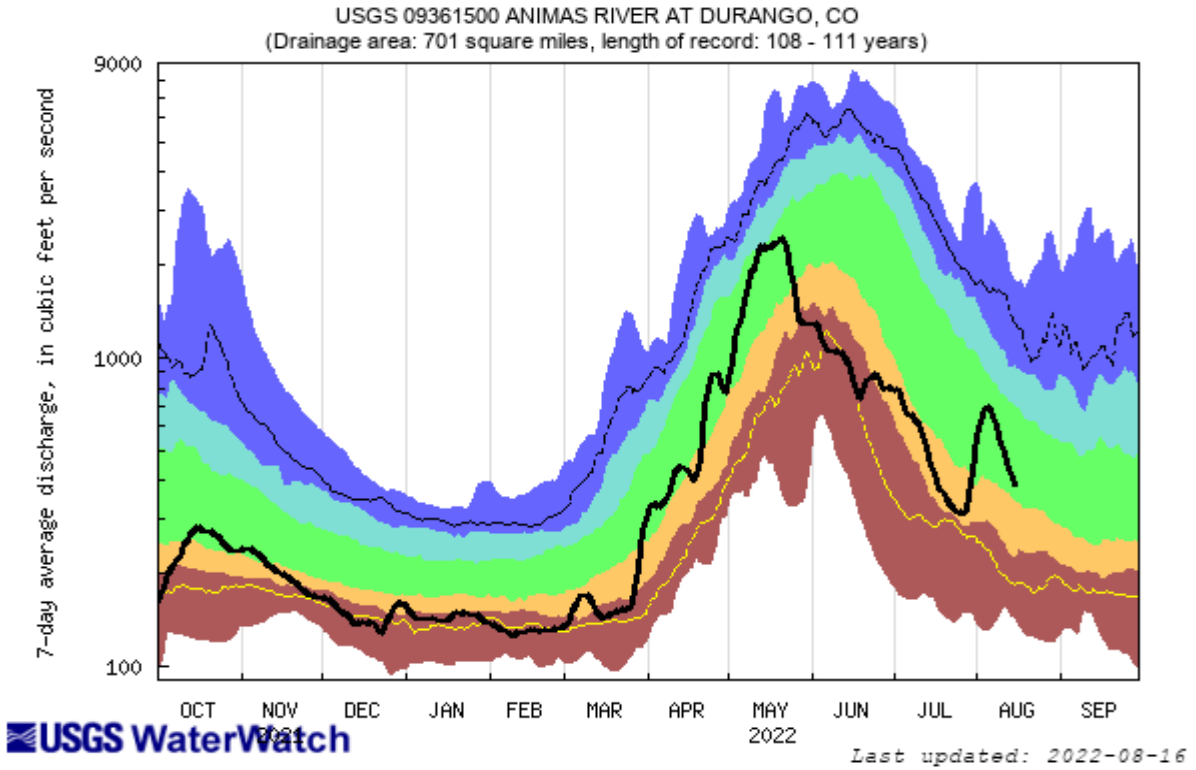


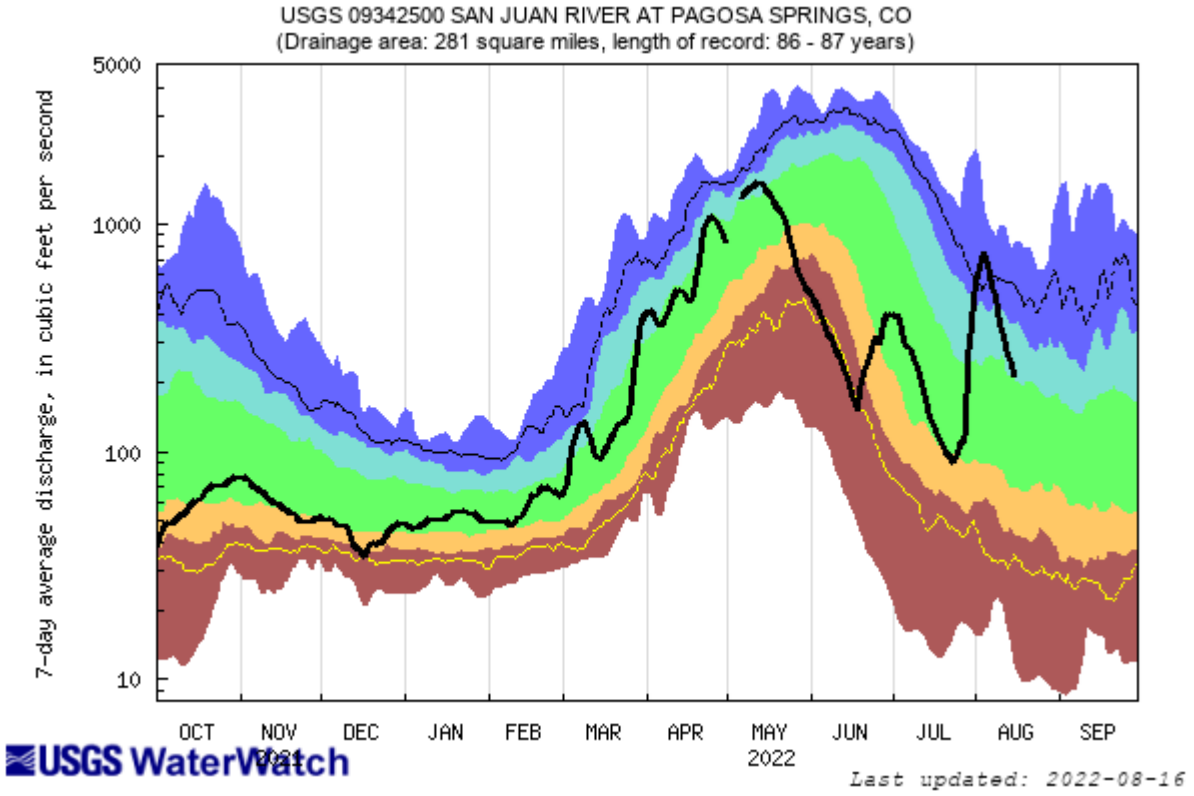
San Juan-Pagosa Springs

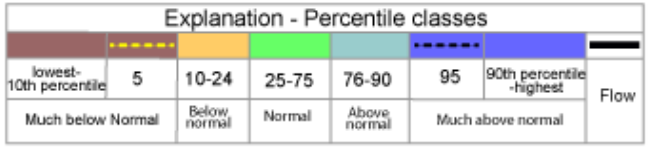


- Peak SWE
  - Below normal over the majority of the basin
  - Near normal conditions above Navajo Reservoir
- Peak SWE Timing
  - Early
- Melt Out
  - Accelerated melt rates due to warm temperatures, minimal precipitation, and above normal dust
  - Very early; 3-4 weeks

2022 Observed Streamflow: San Juan River Basin





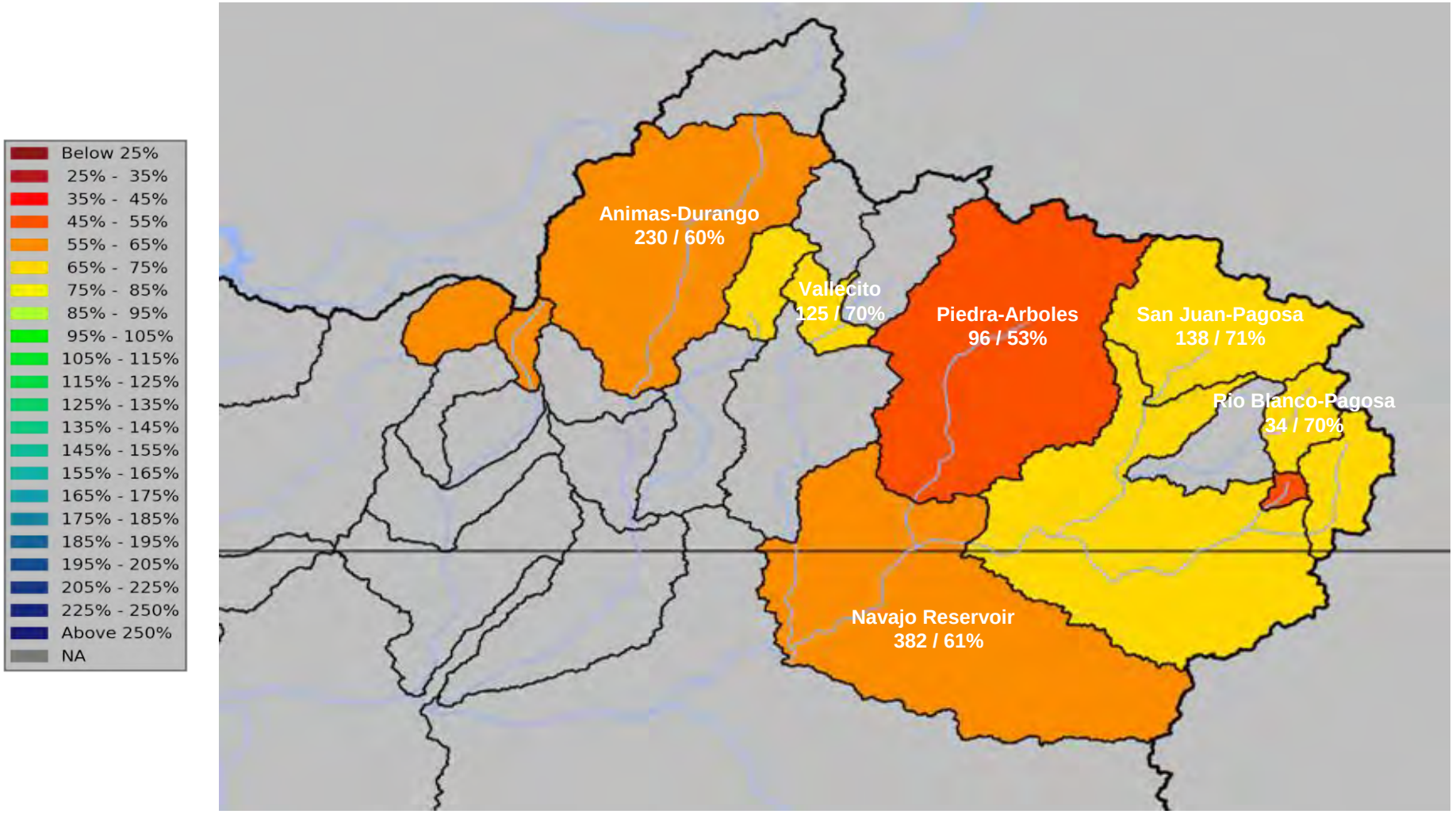


Spring and Summer Highlights:

- Below normal to normal baseflow conditions prior to Spring runoff.
- Snowmelt runoff peak flows were significantly earlier than normal and below normal in magnitude.
- Rapid decline to much below normal flows during the normal time of peak/high flows.
- June and July and rain increased flows to near or above normal.

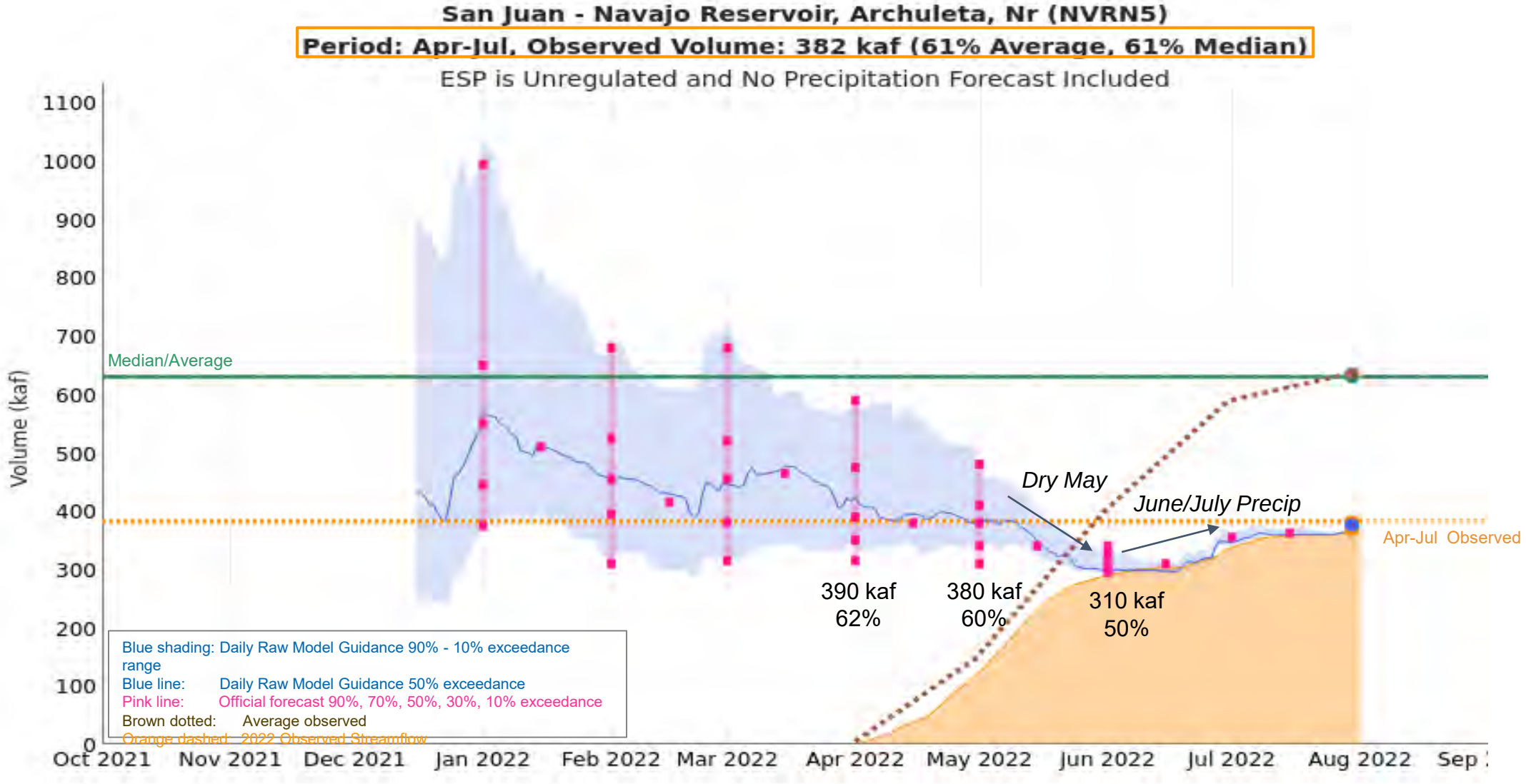
San Juan River Basin: April-July Observed Volumes

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



- April-July observed volumes ranged from 50-70% of average.

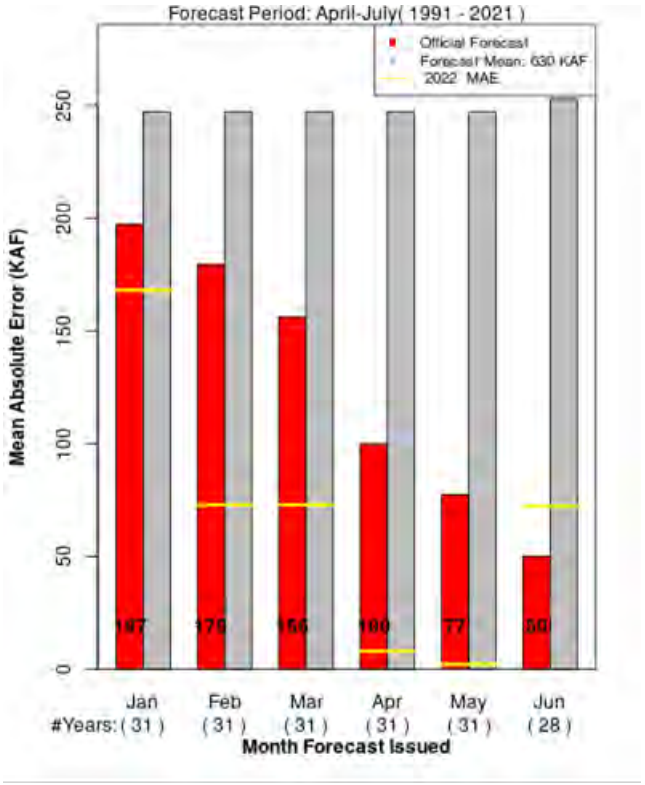
Water Supply Forecast Evolution: Navajo Reservoir Inflow



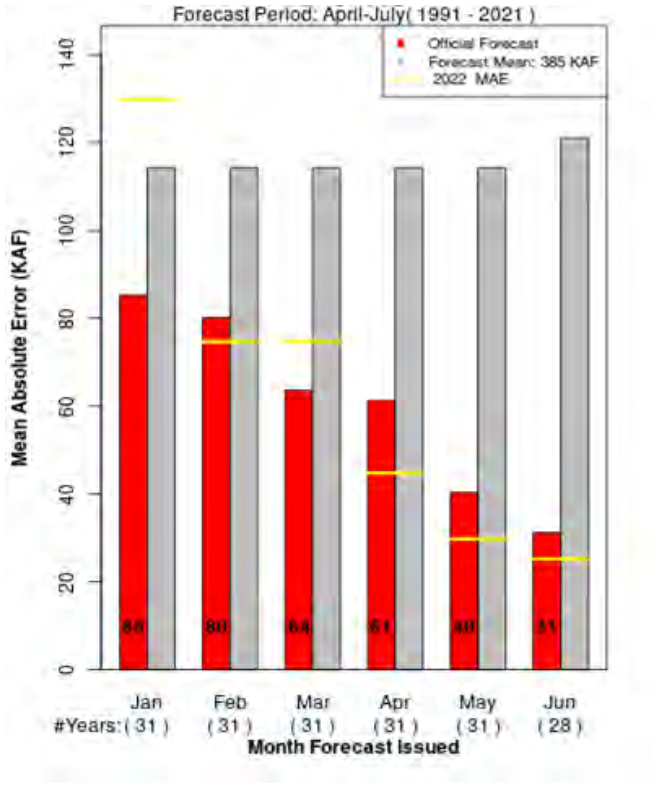
Forecasts decreased from May through June due to much below normal precipitation. Above normal June and July precipitation resulted in an increase to the forecast. The wet conditions in June and July helped to avoid what could have a been a much worse water supply outcome given another warm and dry spring with significant dust conditions.

Forecast Performance

Navajo Reservoir Inflow



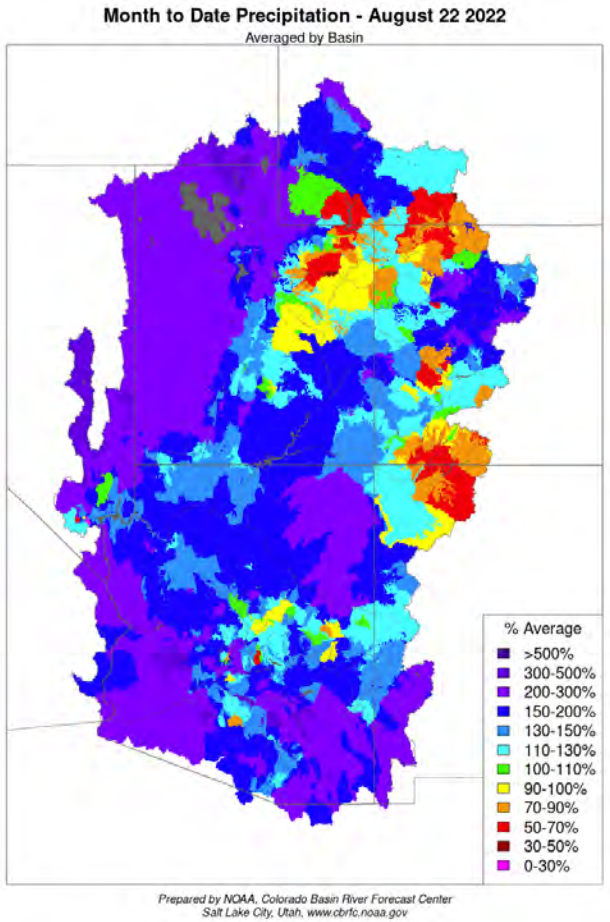
Animas-Durango



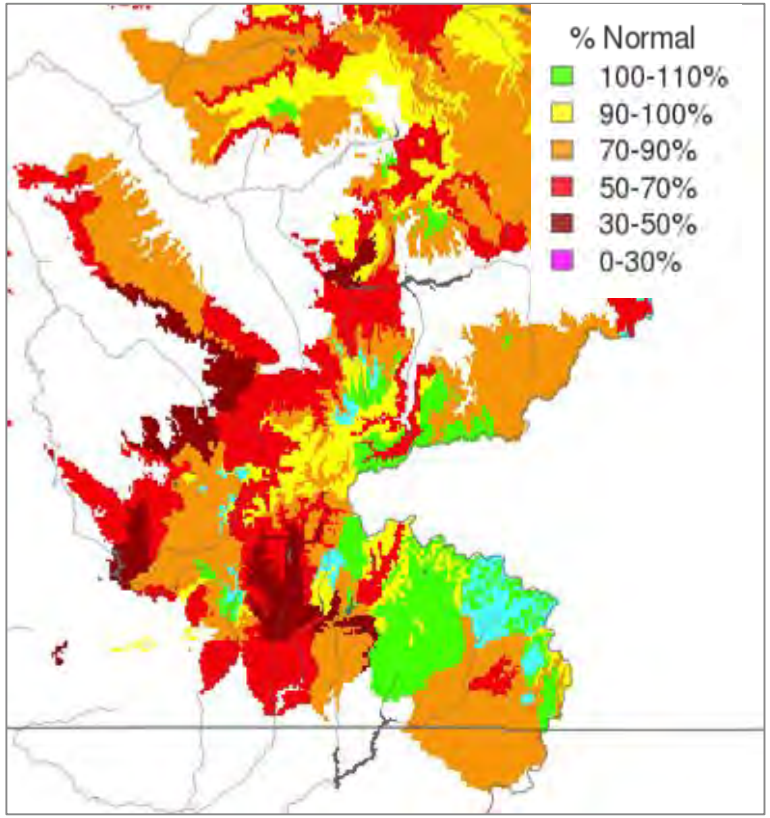
2022 Forecast Errors:

- Forecast errors fell into the normal range of errors for January-May forecasts for San Juan River Basin.
  - Exceptions include: Animas-Durango (January-March forecasts outside of normal error)
- June forecast error was higher than normal due to the above normal precipitation.
- Observed April-July volumes would most likely have been near or below the 90% forecast if June and July precipitation had been near normal.
- Model soil moisture and snow states seemed to be well representative.
- Model handled the above average dust conditions reasonably well with forecaster modifications.

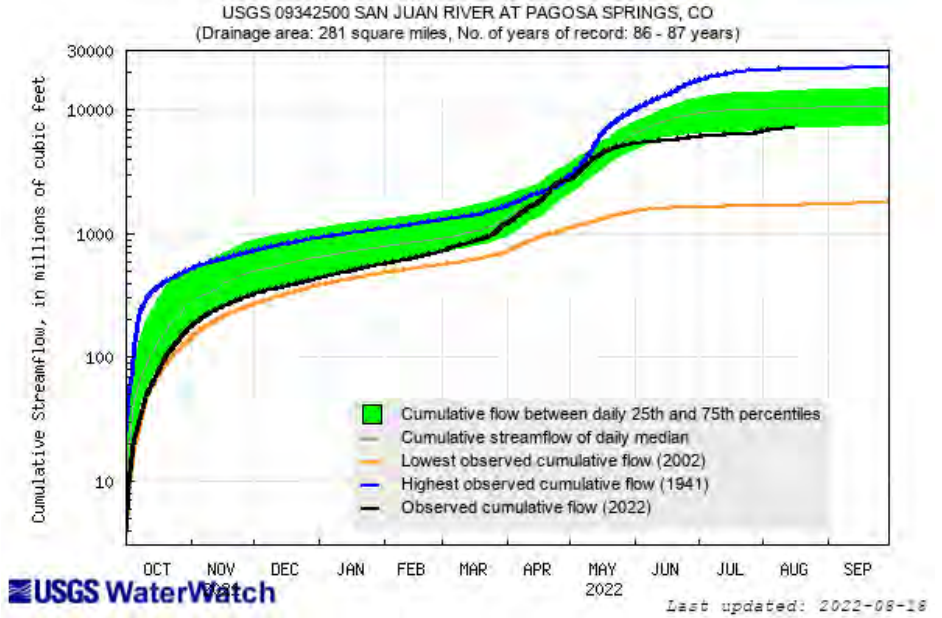
Late August Conditions

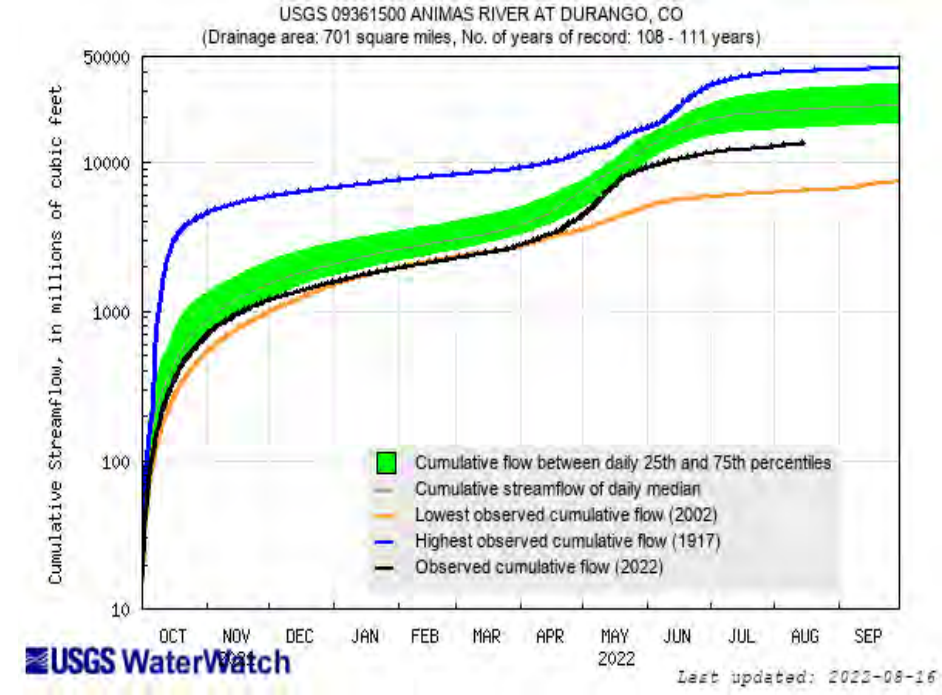


Modeled Soil Moisture: Aug 16 2022

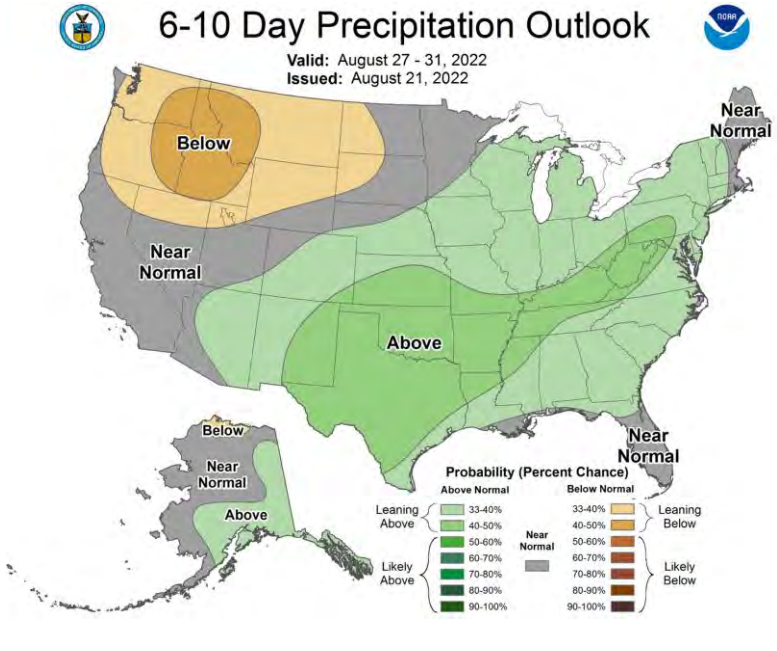


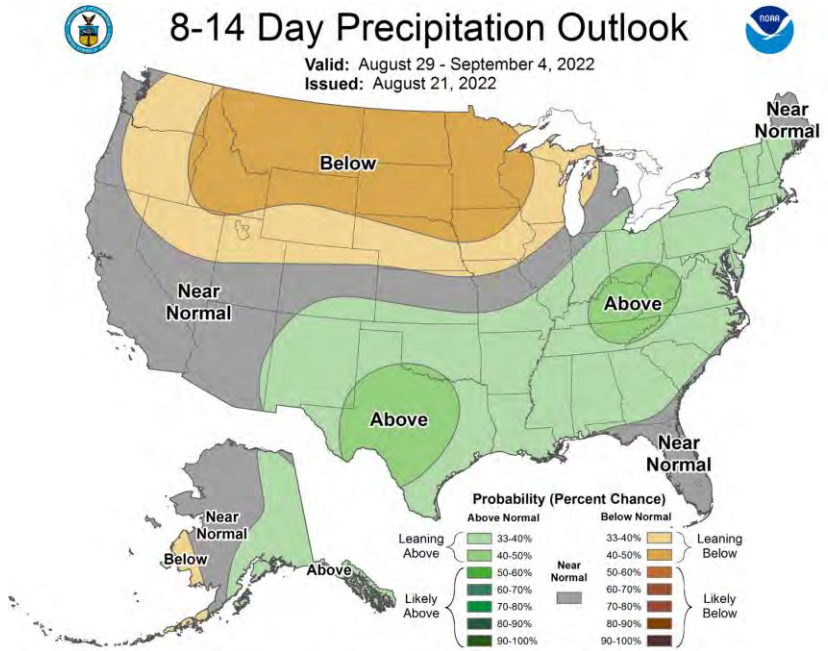
Model snapshot. Provisional data that will change

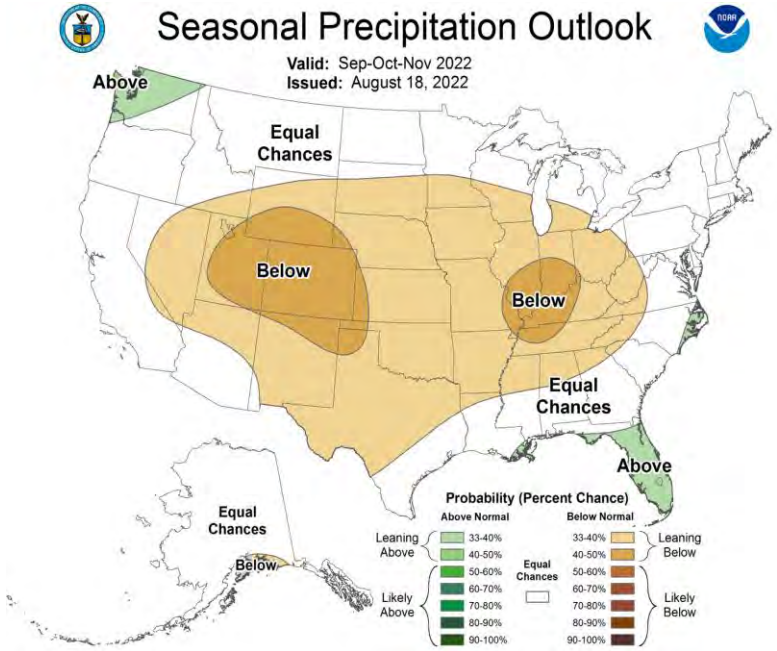


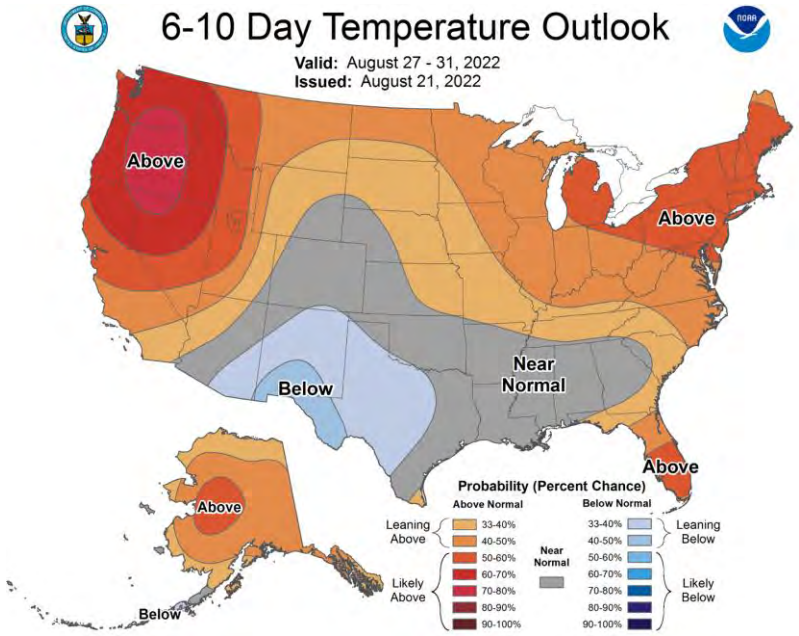


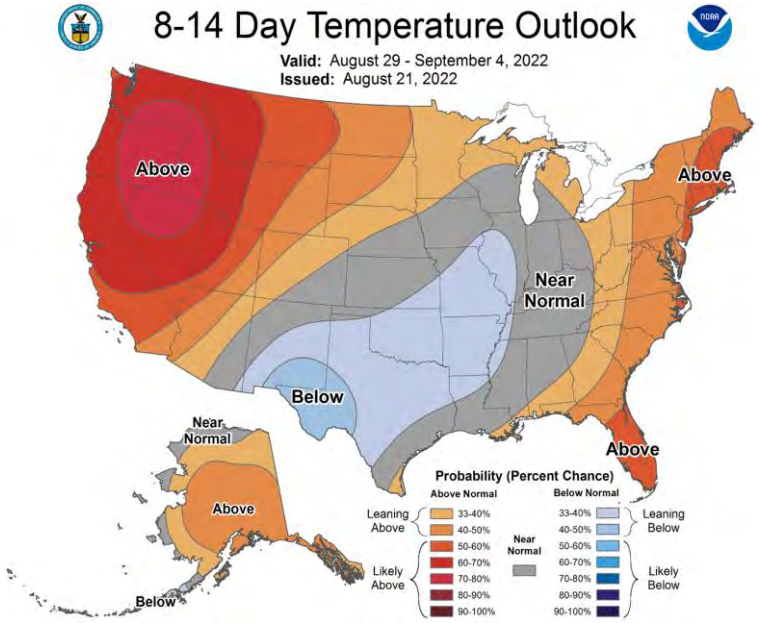
Weather Outlooks

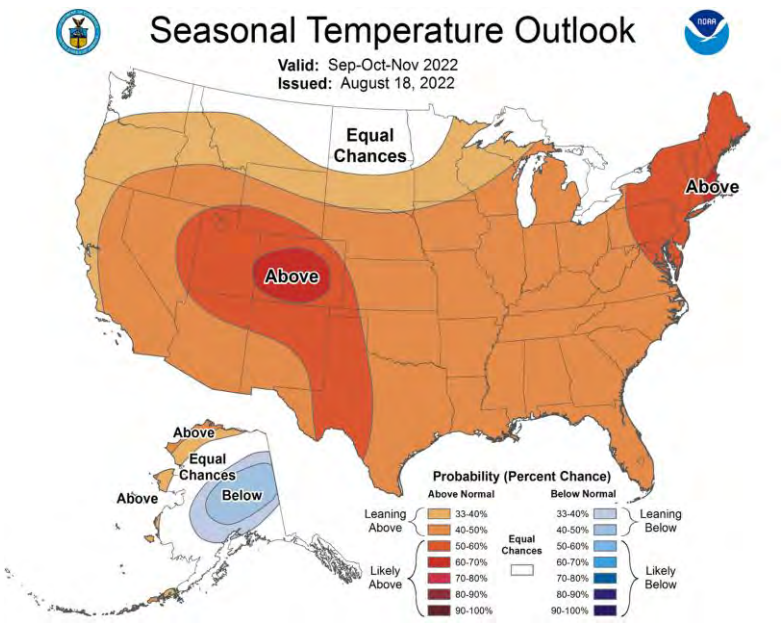












Summary:

- Water Supply Conditions:
  - Below normal soil moisture conditions entering the 2022 spring runoff season
  - April -July observed unregulated runoff volumes ranged from 50-70% of average.
    - Below normal snow conditions and very early melt
    - Warm and near record dry April and early May
    - Record wet June and July precipitation helped improve water supply conditions.
    - Spring weather has a significant impact on water supply conditions
  - Current conditions
    - Improved baseflow and soil moisture conditions
      - Eastern headwaters above Navajo have better conditions than the Animas.
      - Aug-Oct weather will determine final conditions prior to winter.

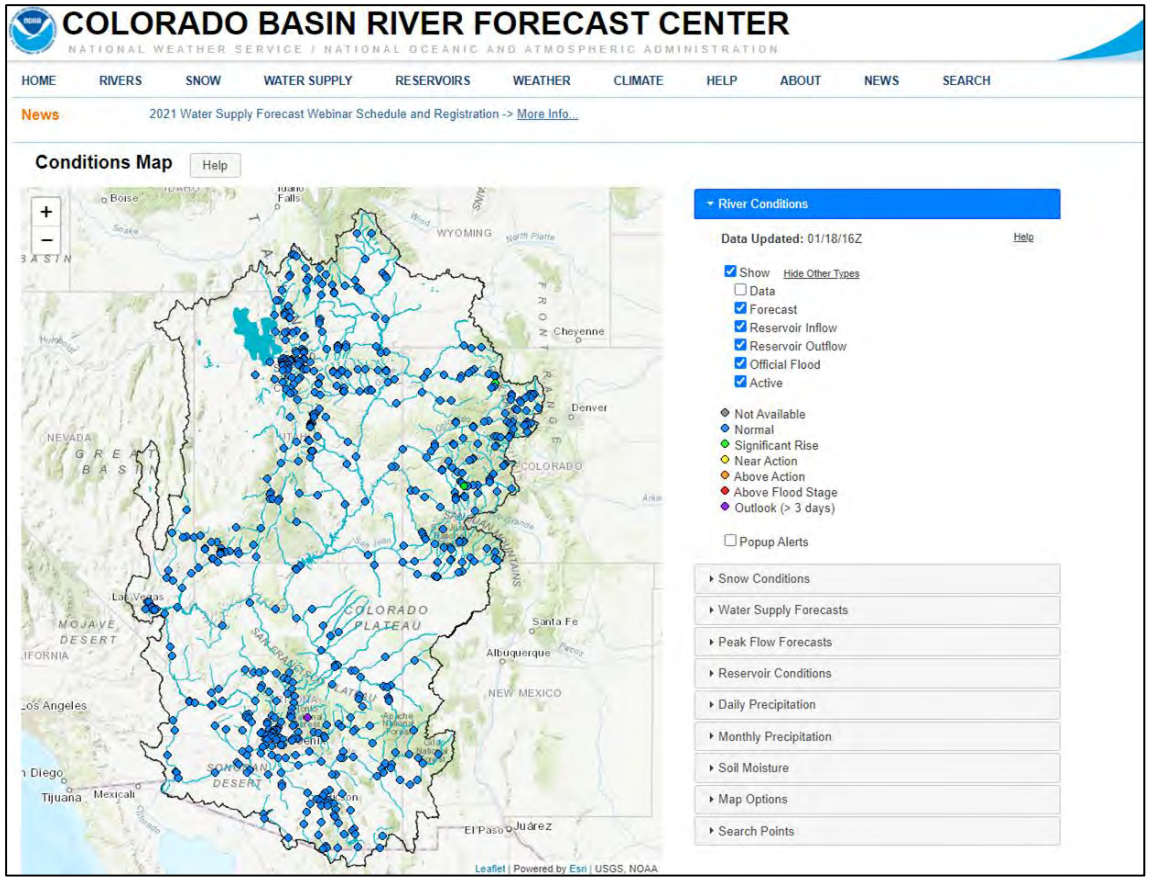
- Water Supply Forecasts
  - Forecasts decreased from May-June due record/near record May precipitation.
  - Forecasts increased in both mid-June and July due to above normal precipitation.
  - Observed volumes would have likely been near or below the 90% forecast without June/July precipitation.
  - CBRFC forecast model performed reasonably well this season.

- Weather
  - June-August weather has brought precipitation and hydrologic relief to the region.
  - Periods of monsoon precipitation will continue.

Contact Info:

Contact Information

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



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

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

Weather Outlook

Aldis Strautins

National Weather Service

Grand Junction, CO

http://www.weather.gov/gjt

Outline

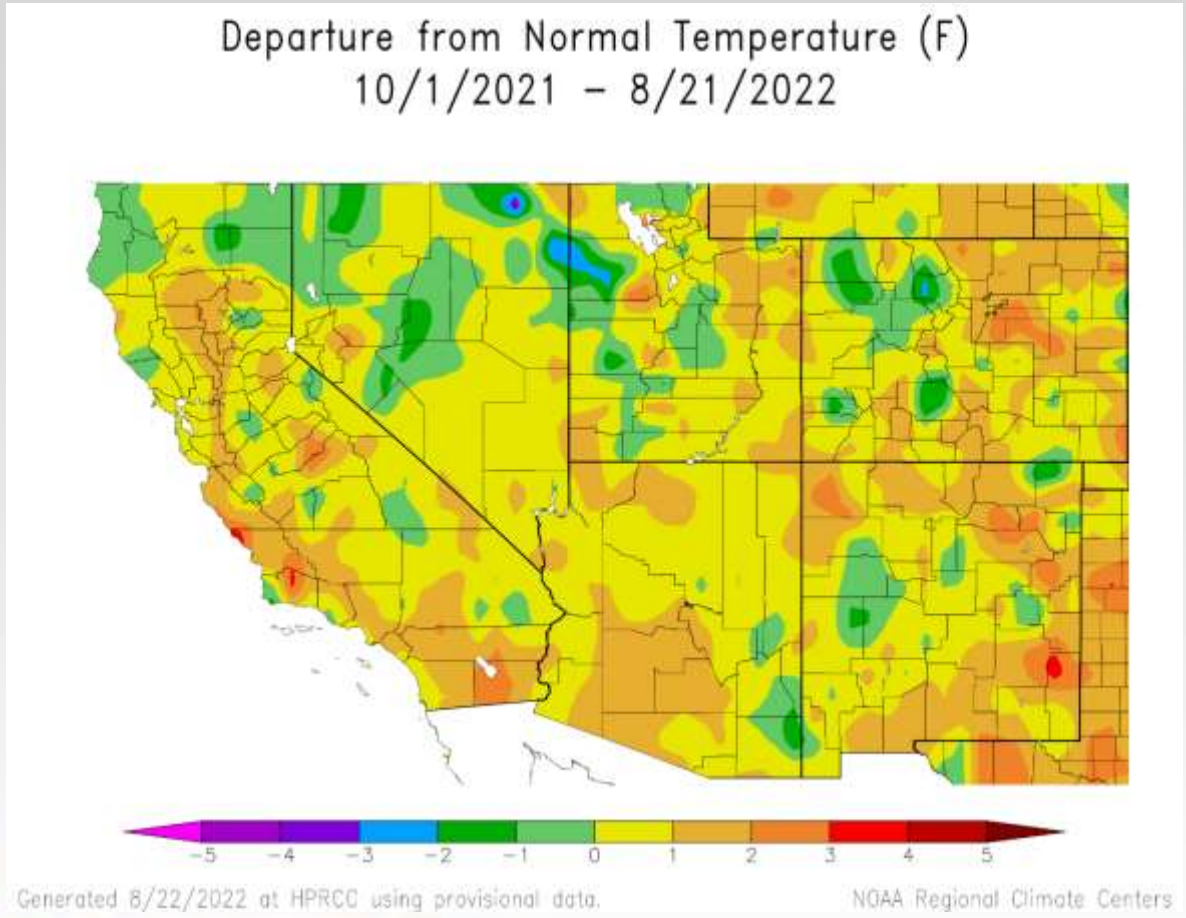
- Precipitation and Temperature
- Precipitation (SNOTEL)
- Drought
- ENSO
- Weather outlook

Water Year 2022 through mid August

August 2022

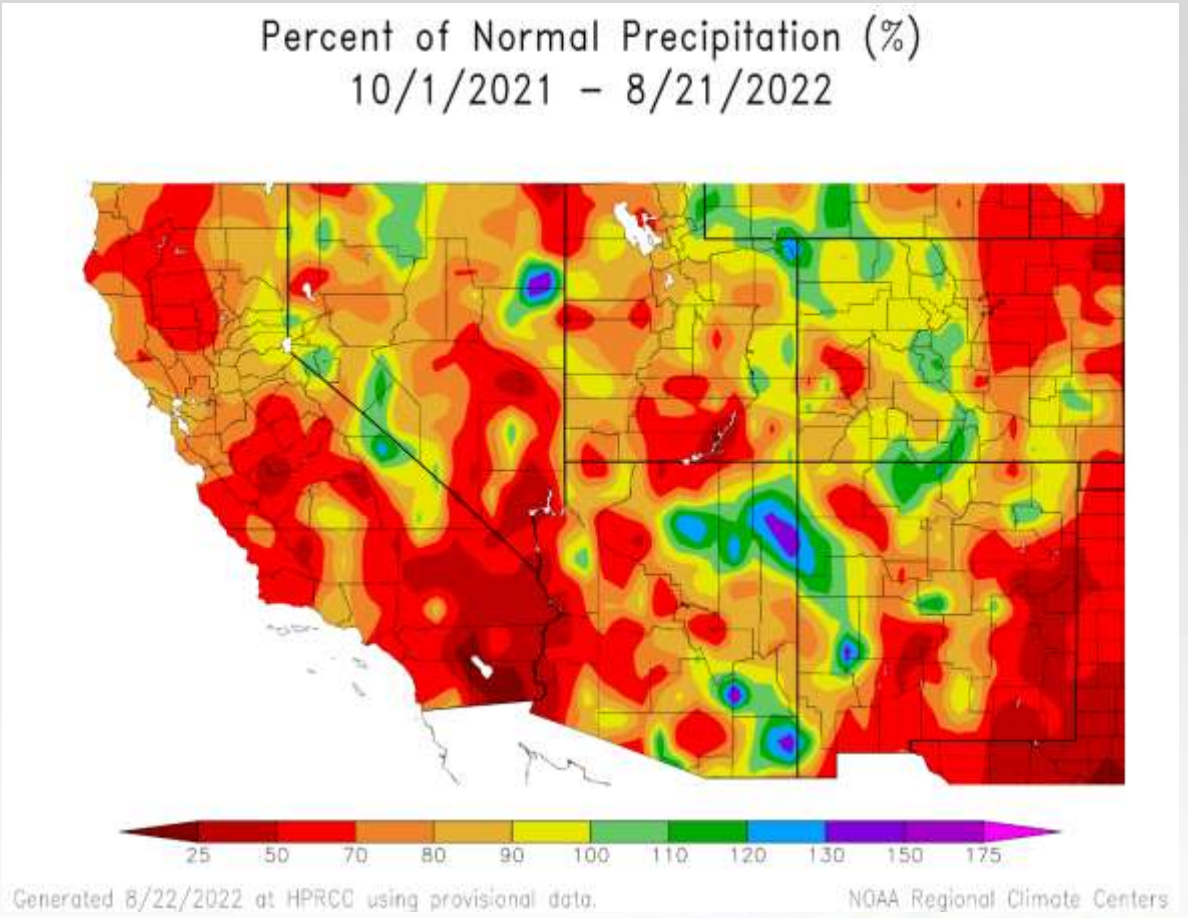
Temperature

Departure from normal



Precipitation

% of normal



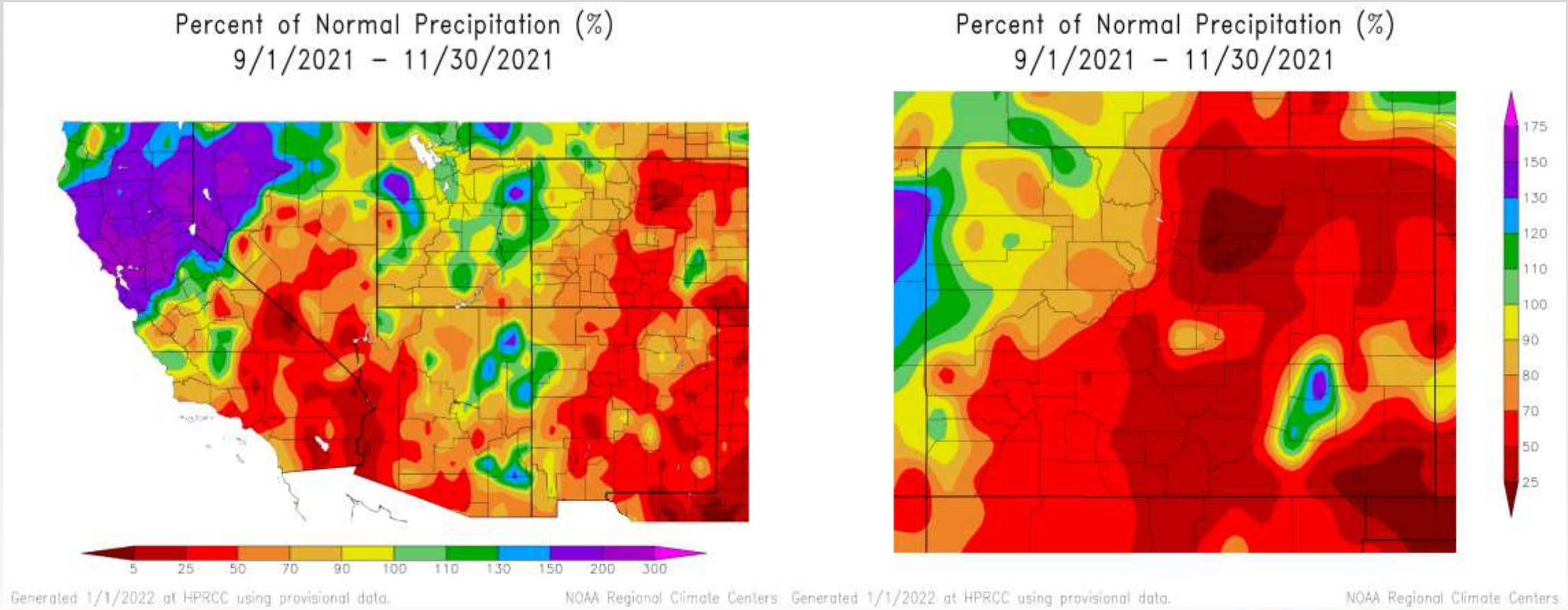
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

National Weather Service
Grand Junction, Colorado

Sep – Nov, 2021 - Precipitation

(percent of normal)

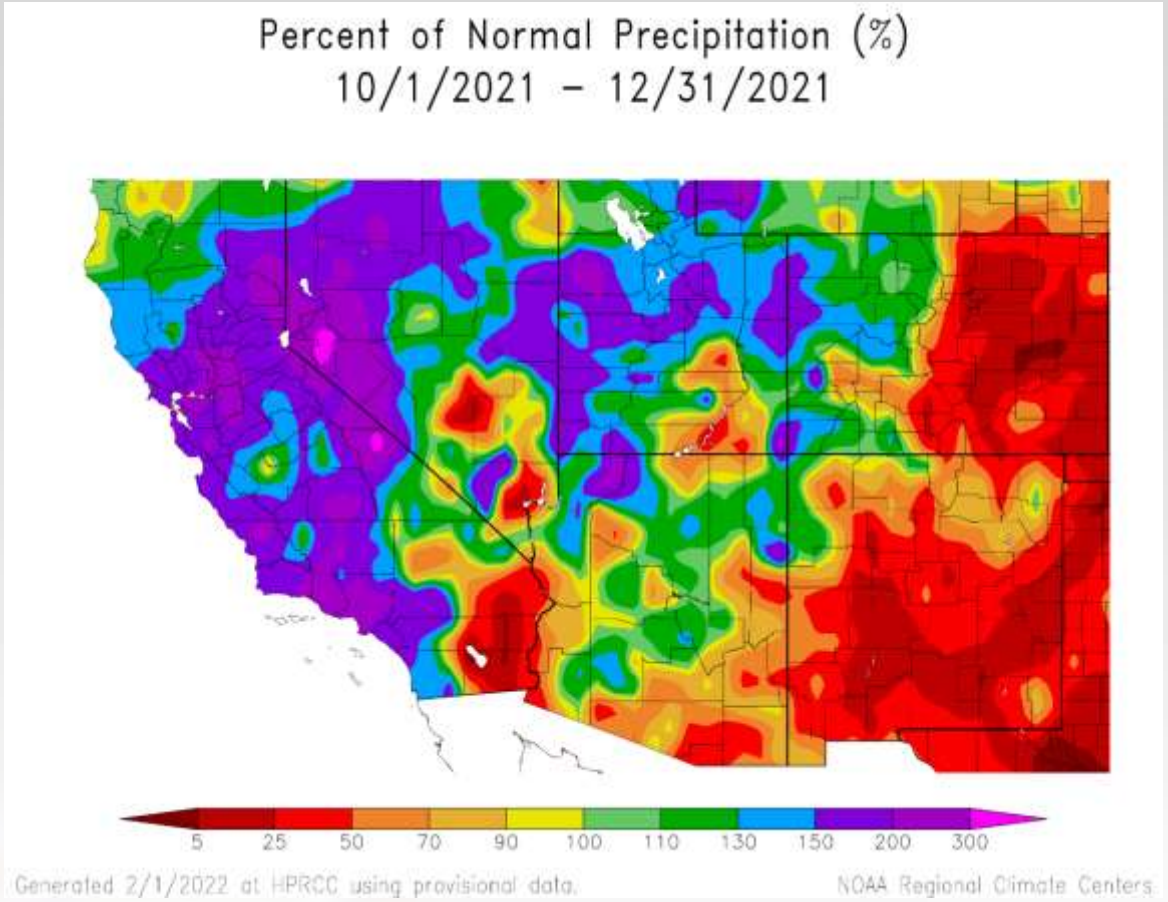
Dry fall for three quarters of the western slope going into the winter season



Water year Precipitation (different stories)

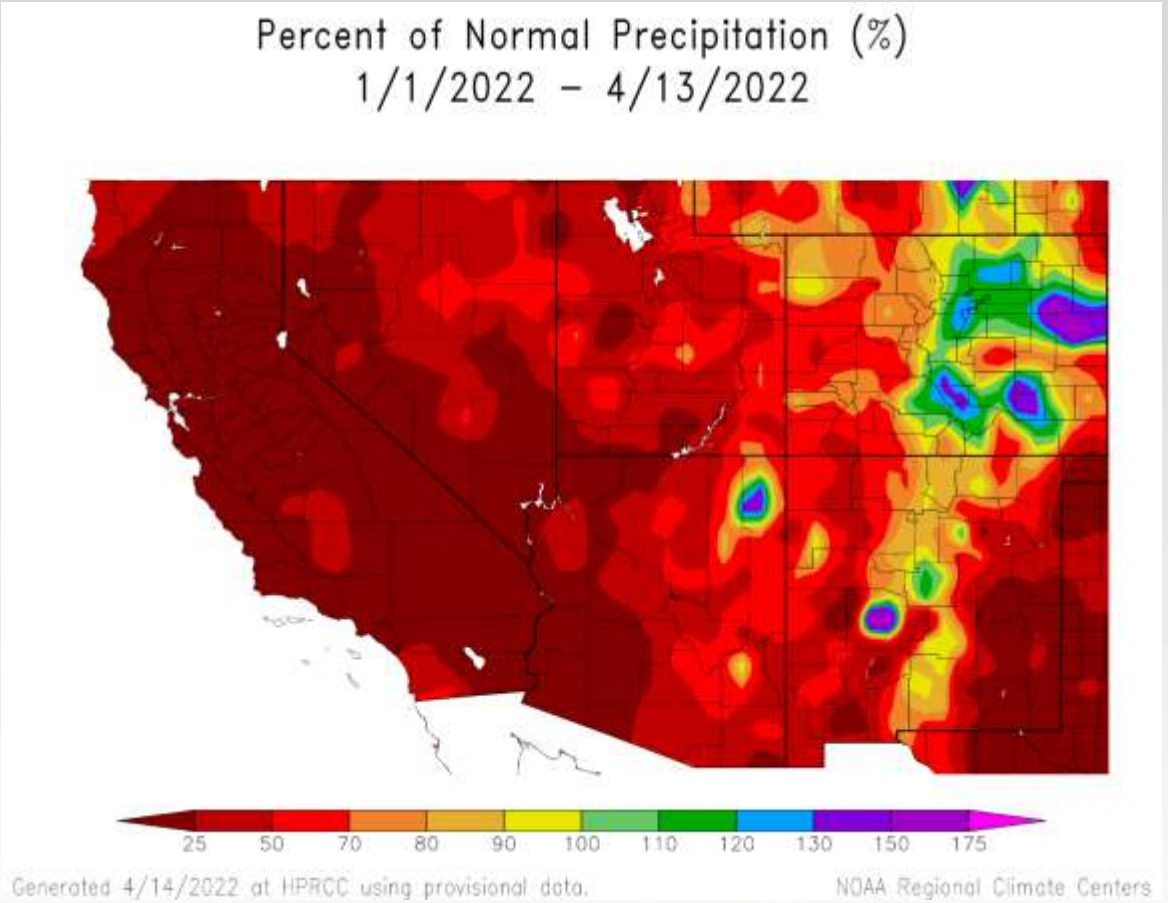
Oct 1 – Dec 31, 2021

Dry Nov and early Dec / Very wet late Dec



Jan 1 – Apr 13, 2022

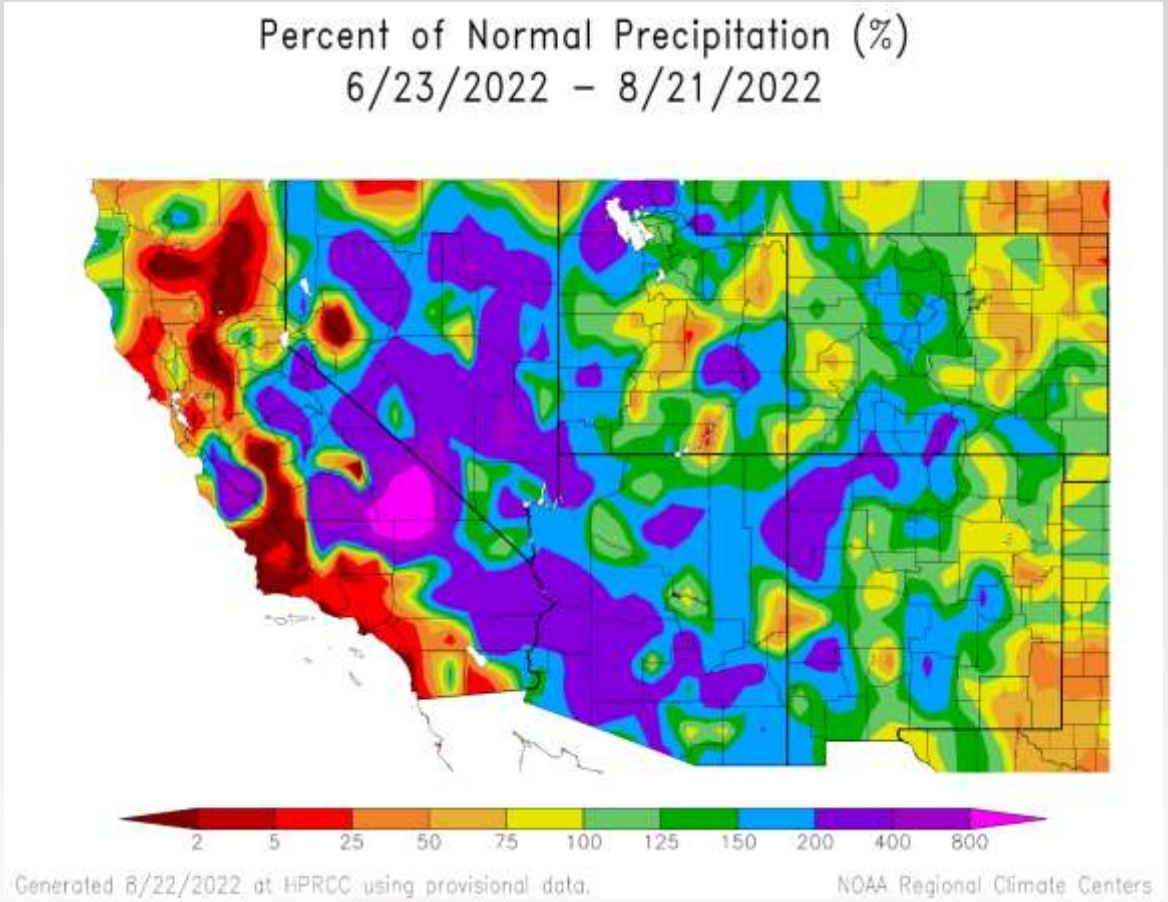
Below normal since Jan 1



Water year Precipitation (different stories)

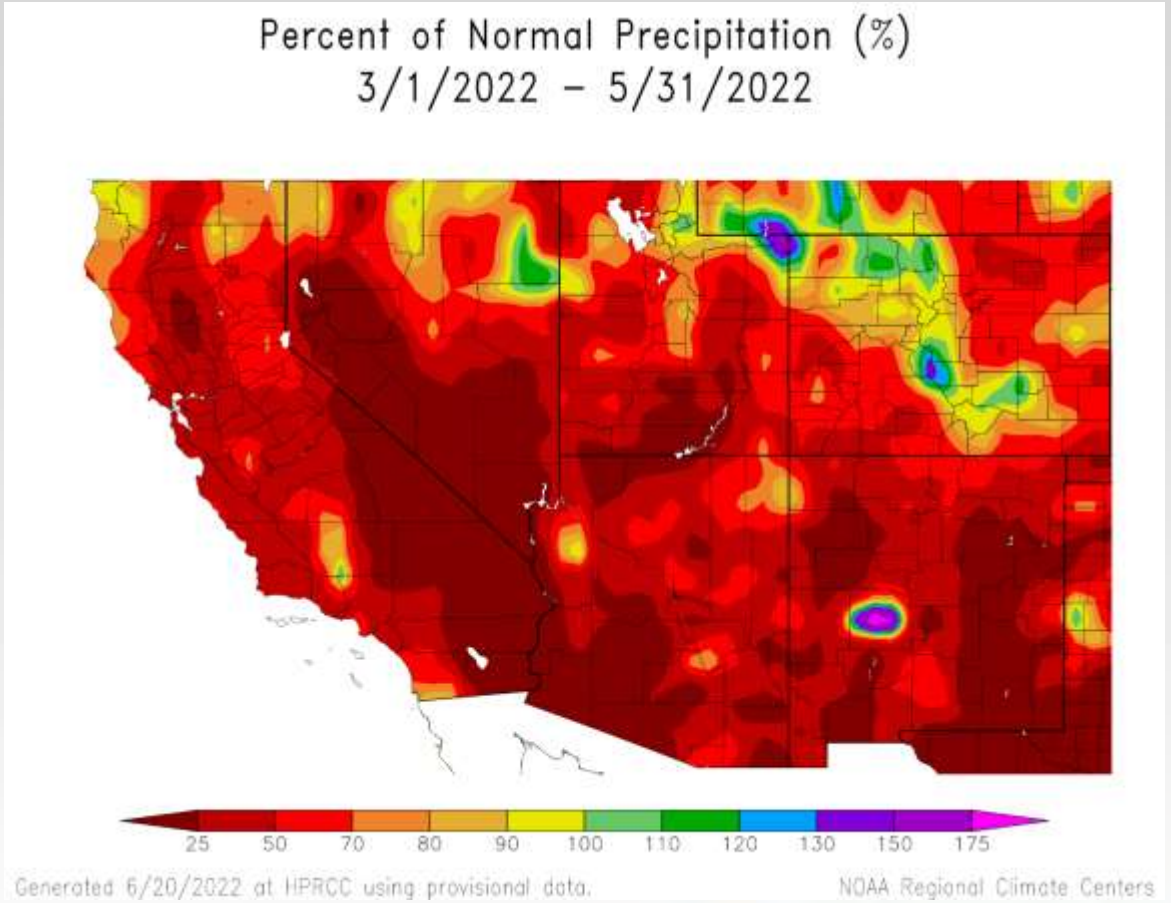
August 2022

Jun 23 – Aug 21, 2022



Mar 1 – May 31, 2022

Below normal

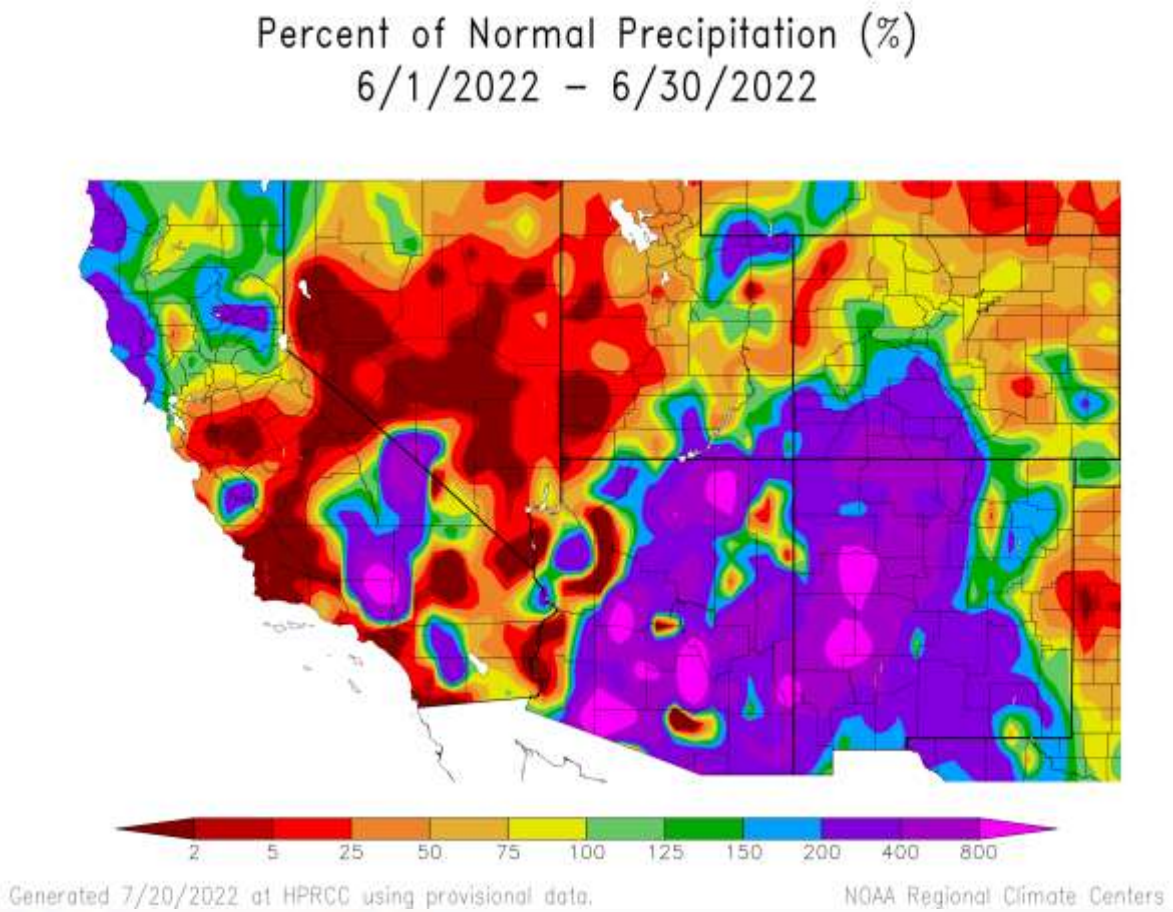


National Oceanic and Atmospheric Administration
U.S. Department of Commerce

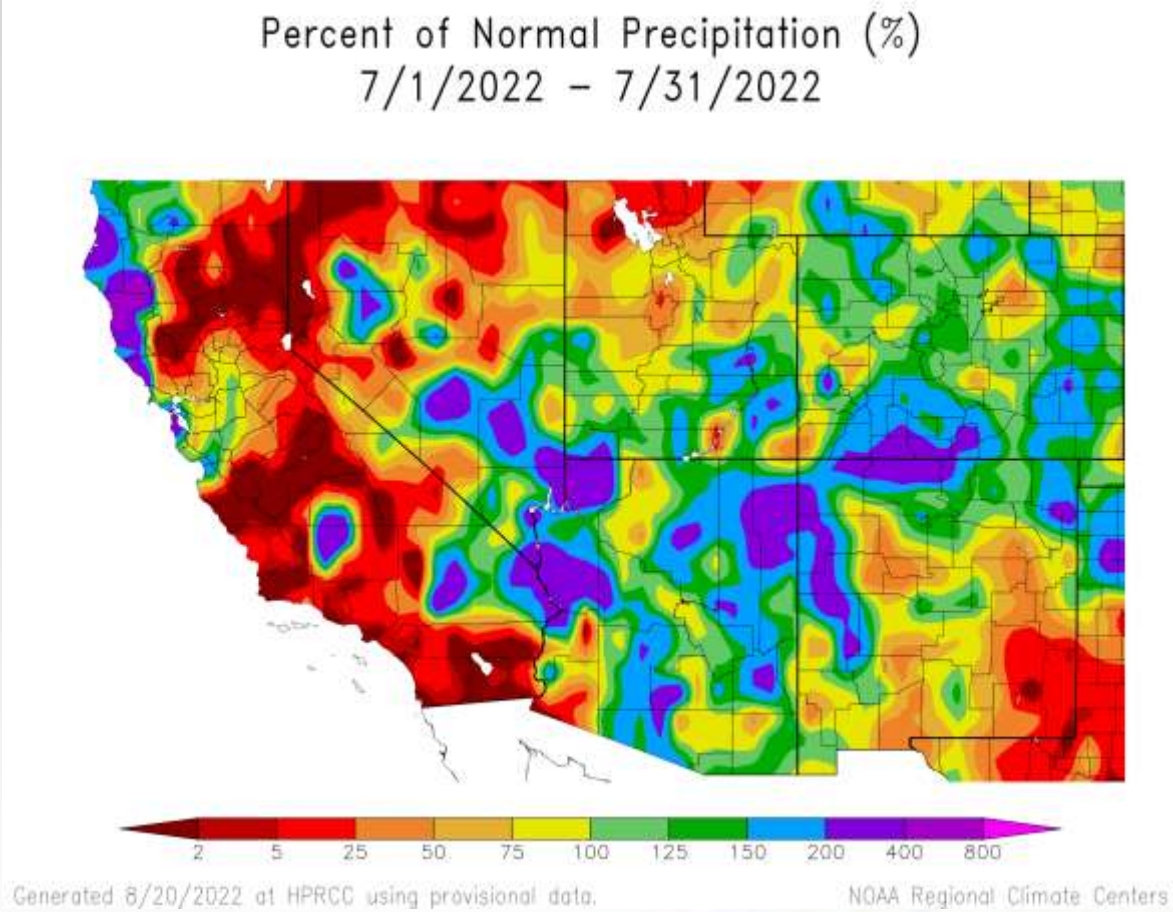
National Weather Service
Grand Junction, Colorado

June and July 2022

Precipitation
% of normal



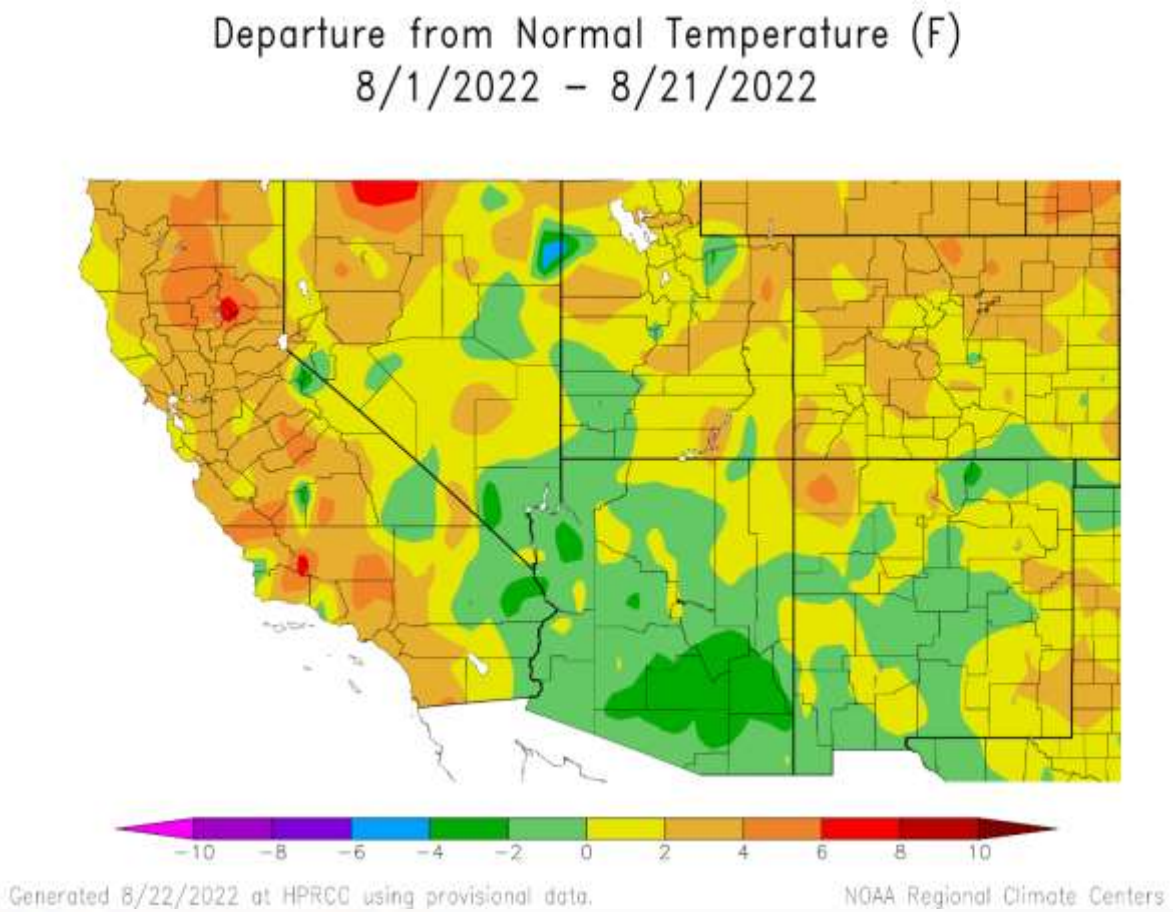
Precipitation
% of normal



August 2022

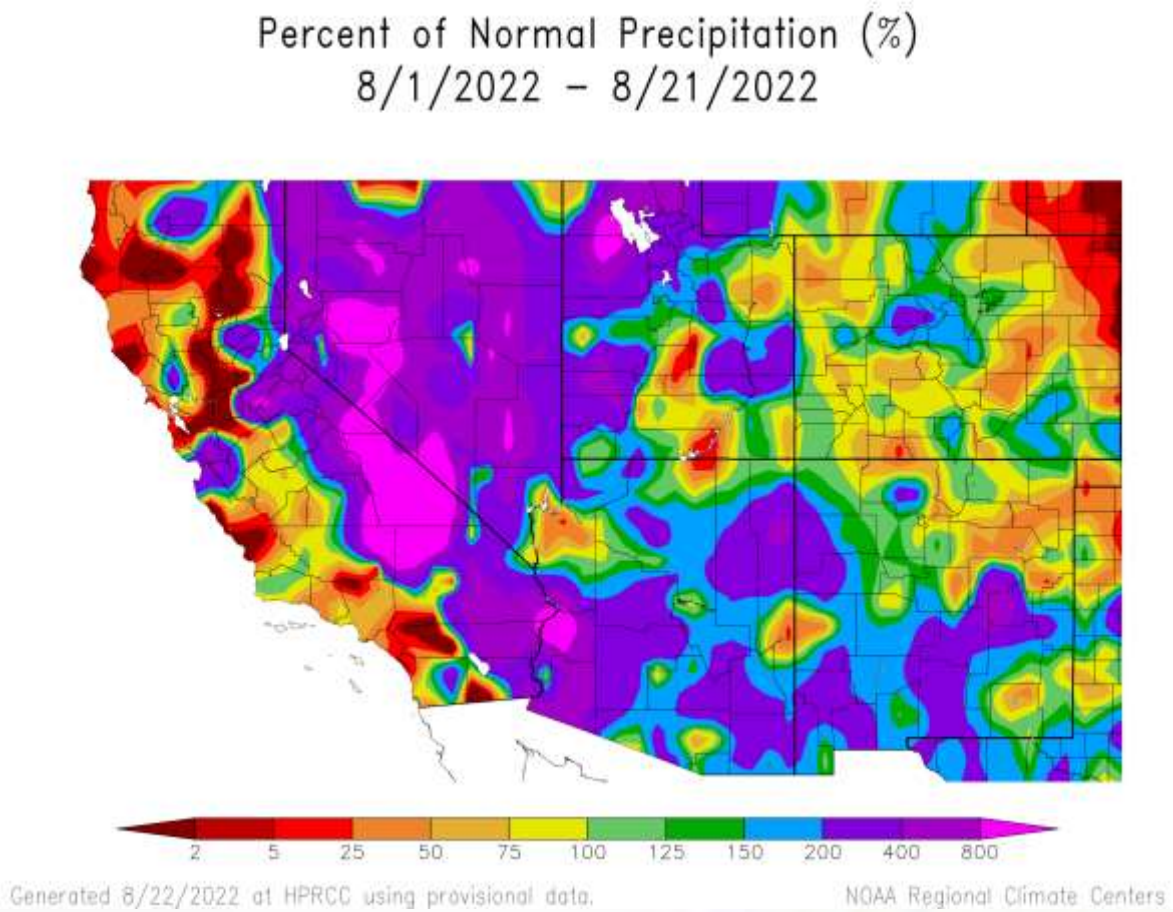
Temperature

Departure from normal



Precipitation

% of normal



SNOTEL Precipitation – NRCS

August 2022

Southwestern Colorado

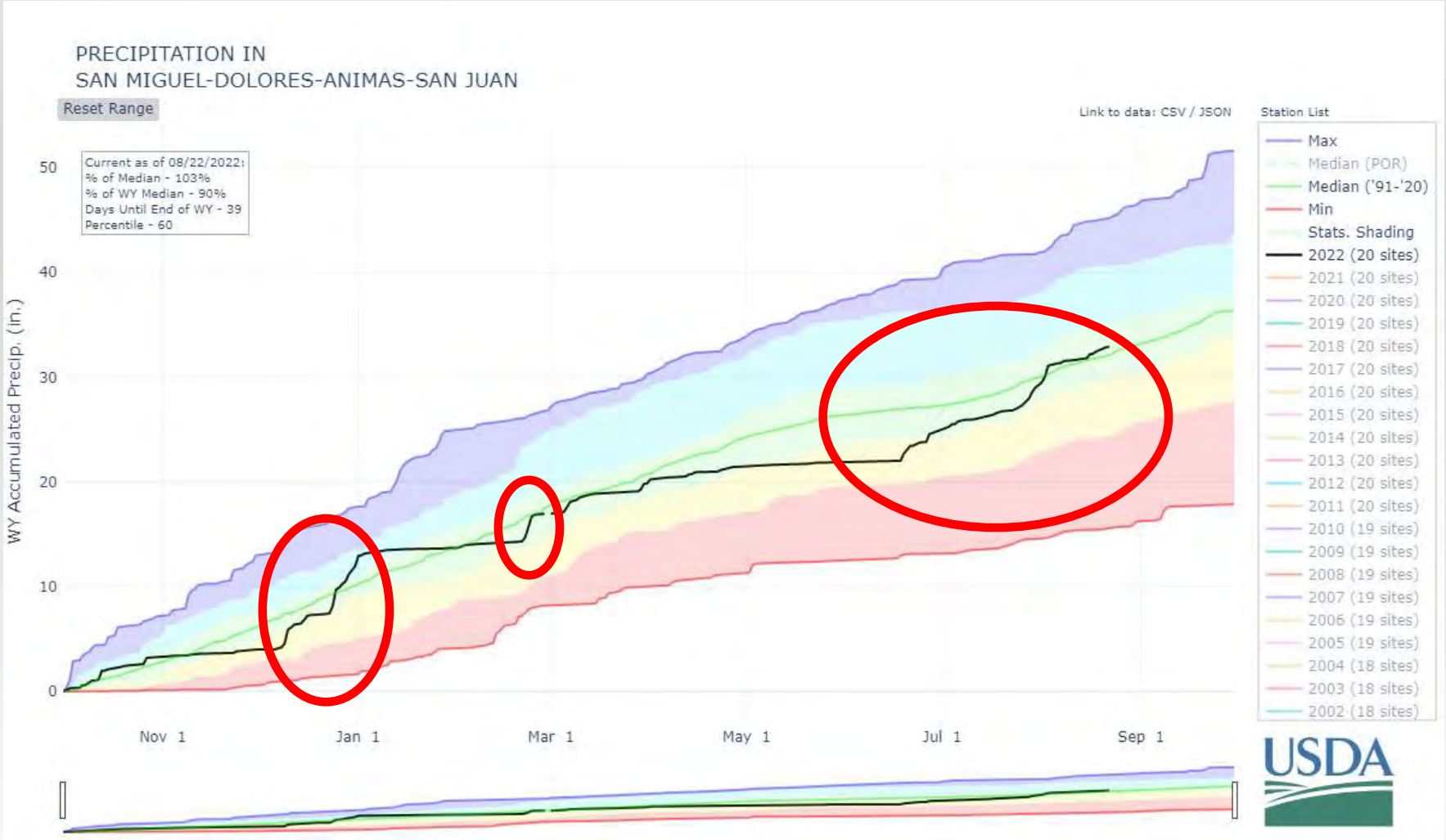
Precipitation

Yay…Late December Snow

Yay…Late February Snow

Ok…Some March Snow

Summer Rains started late June

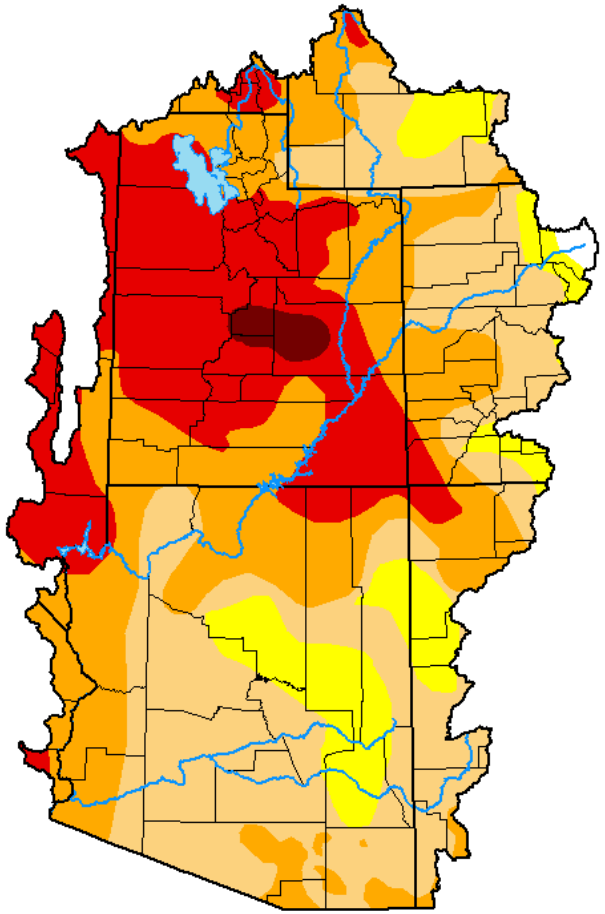


Drought

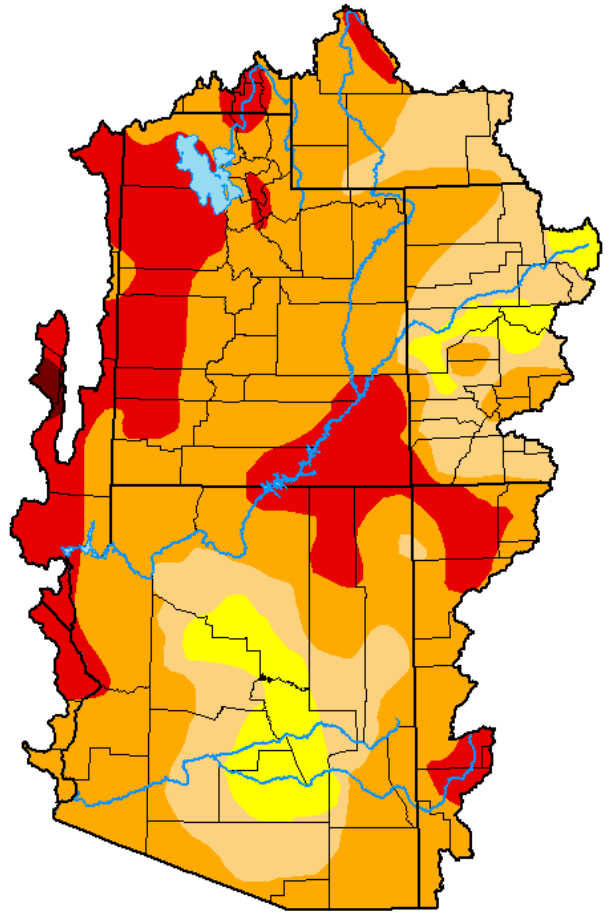
August 2022

Drought Monitor (Colorado Basin View)

August 16, 2022



April 12, 2022



Intensity:

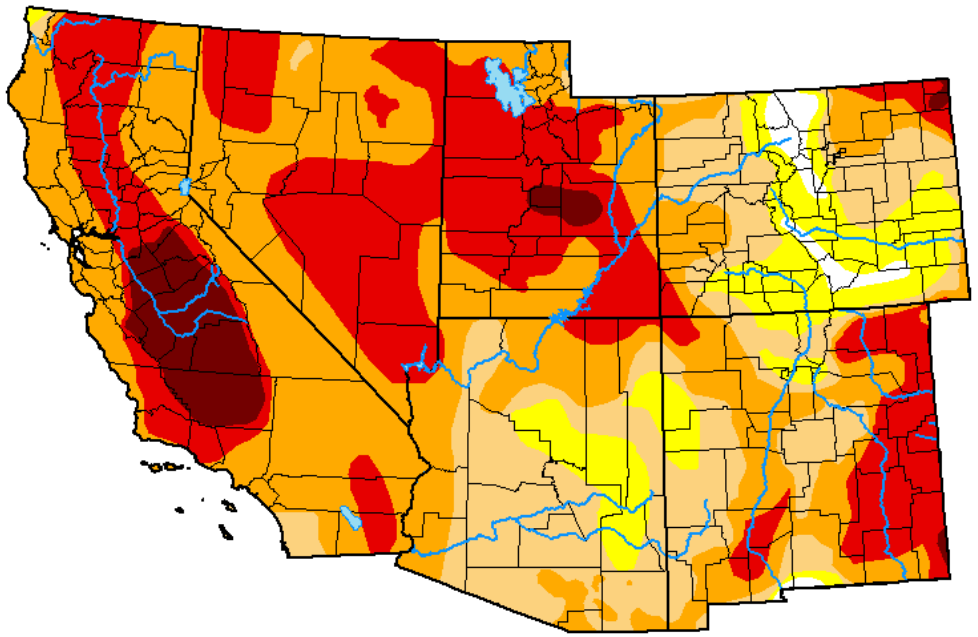
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Drought

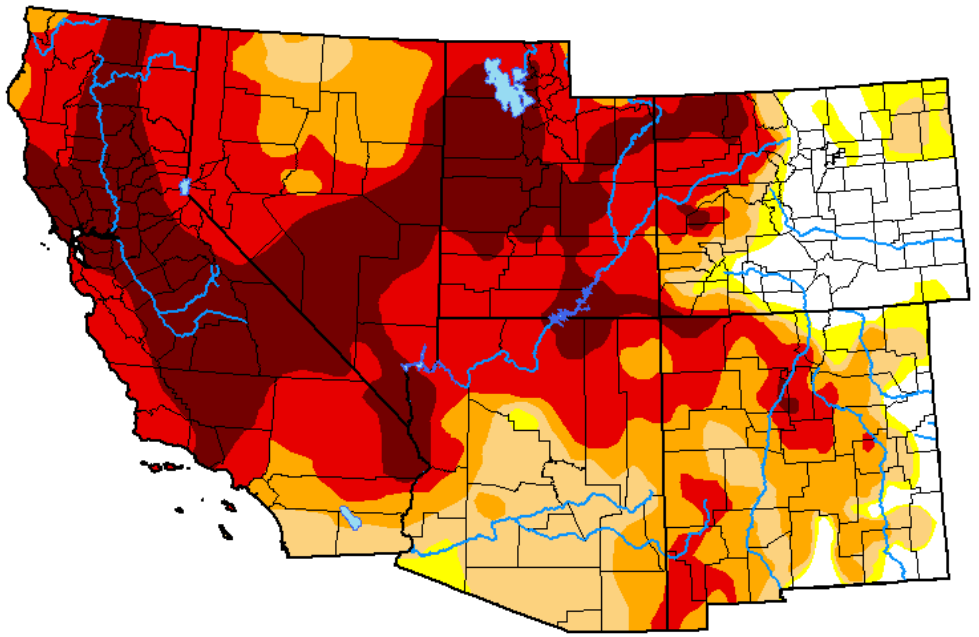
August 2022

Drought Monitor (Regional View)

August 16, 2022



August 17, 2021



Intensity:

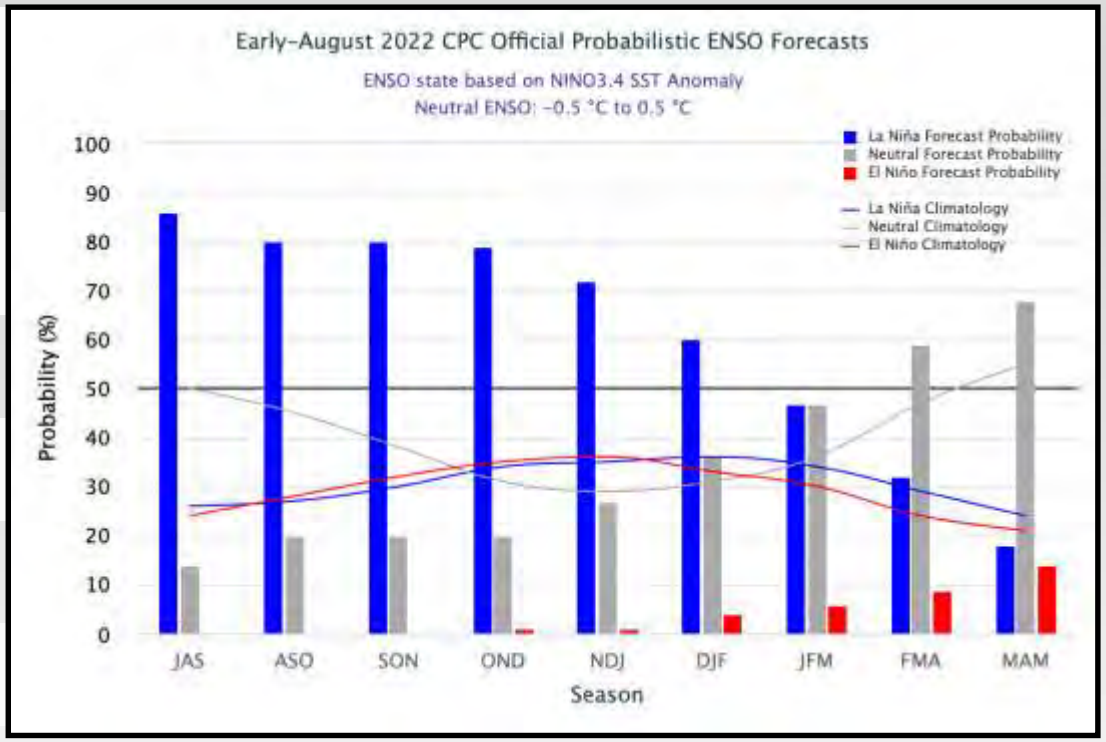
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

ENSO - Outlook

August 2022

La Nina this Spring - Maybe Neutral next Spring

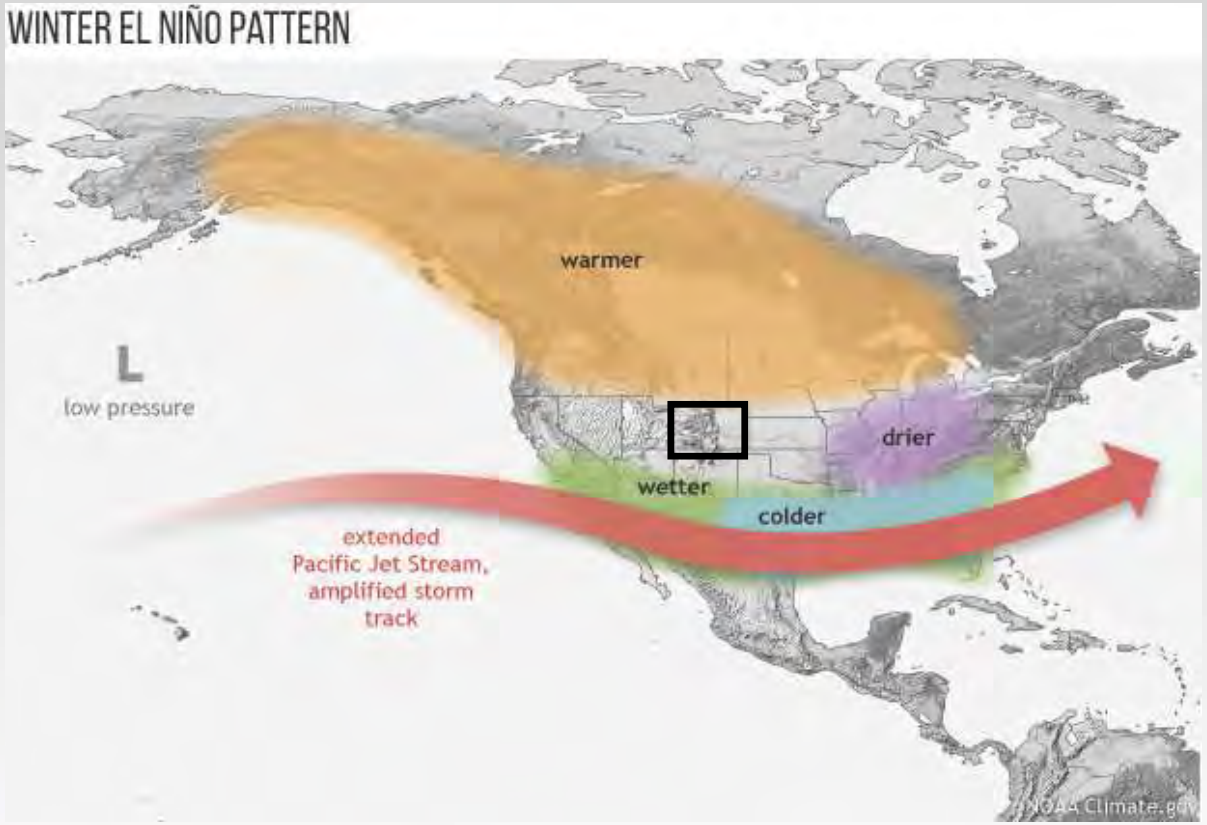
Season	La Niña	Neutral	El Niño
JAS	86	14	0
ASO	80	20	0
SON	80	20	0
OND	79	20	1
NDJ	72	27	1
DJF	60	36	4
JFM	47	47	6
FMA	32	59	9
MAM	18	68	14



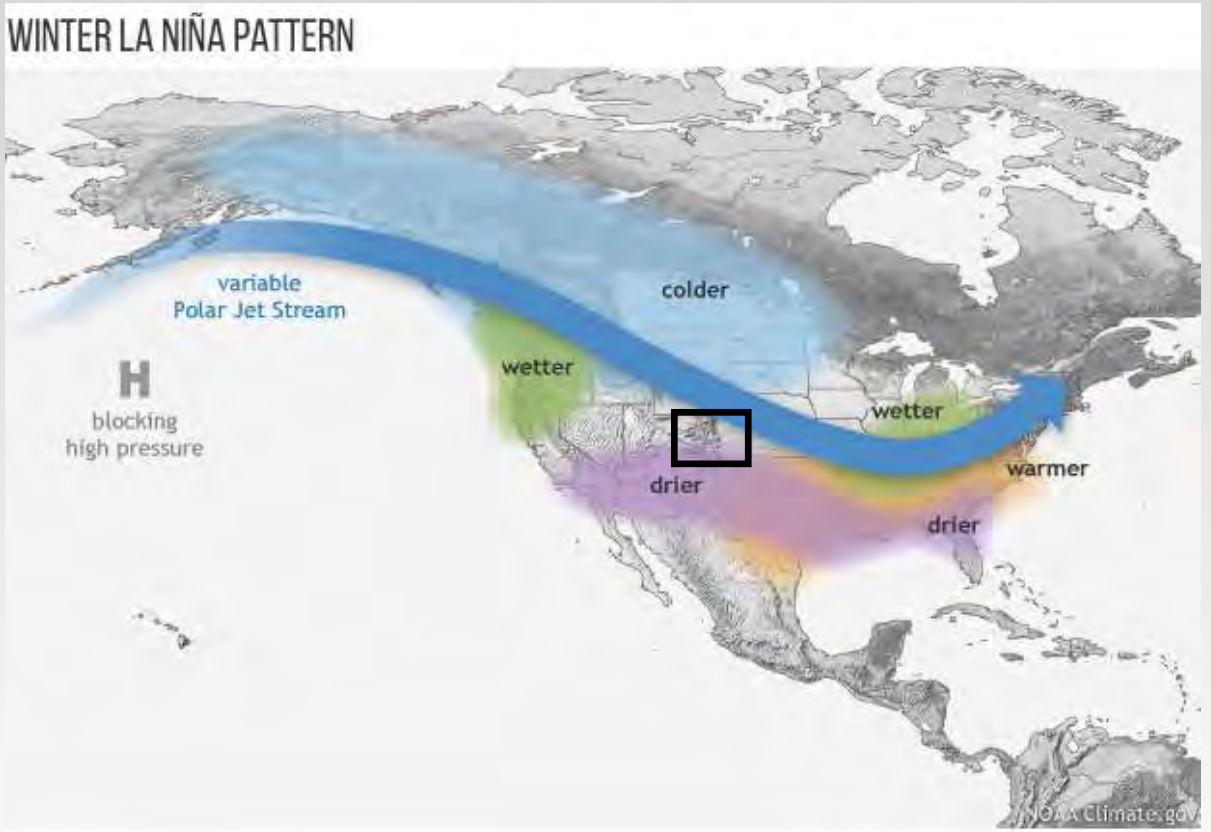
CPC/IRI Early-Month Consensus ENSO Forecast Probabilities
(using NWS CPC classification system)

ENSO

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



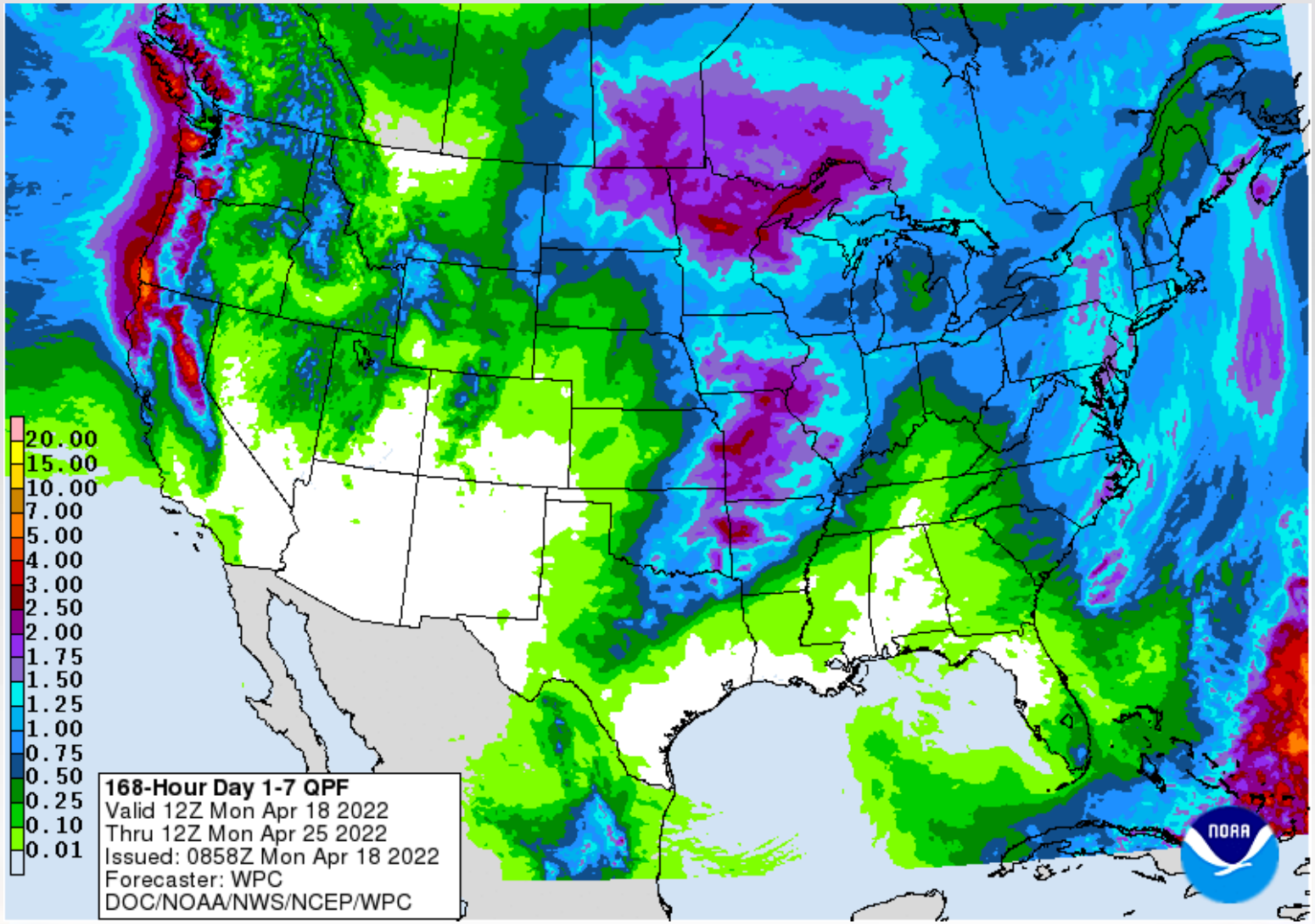
North of Colorado – Wet and Cool
South of Colorado – Dry and Warm



WPC 7-Day Precipitation Outlook

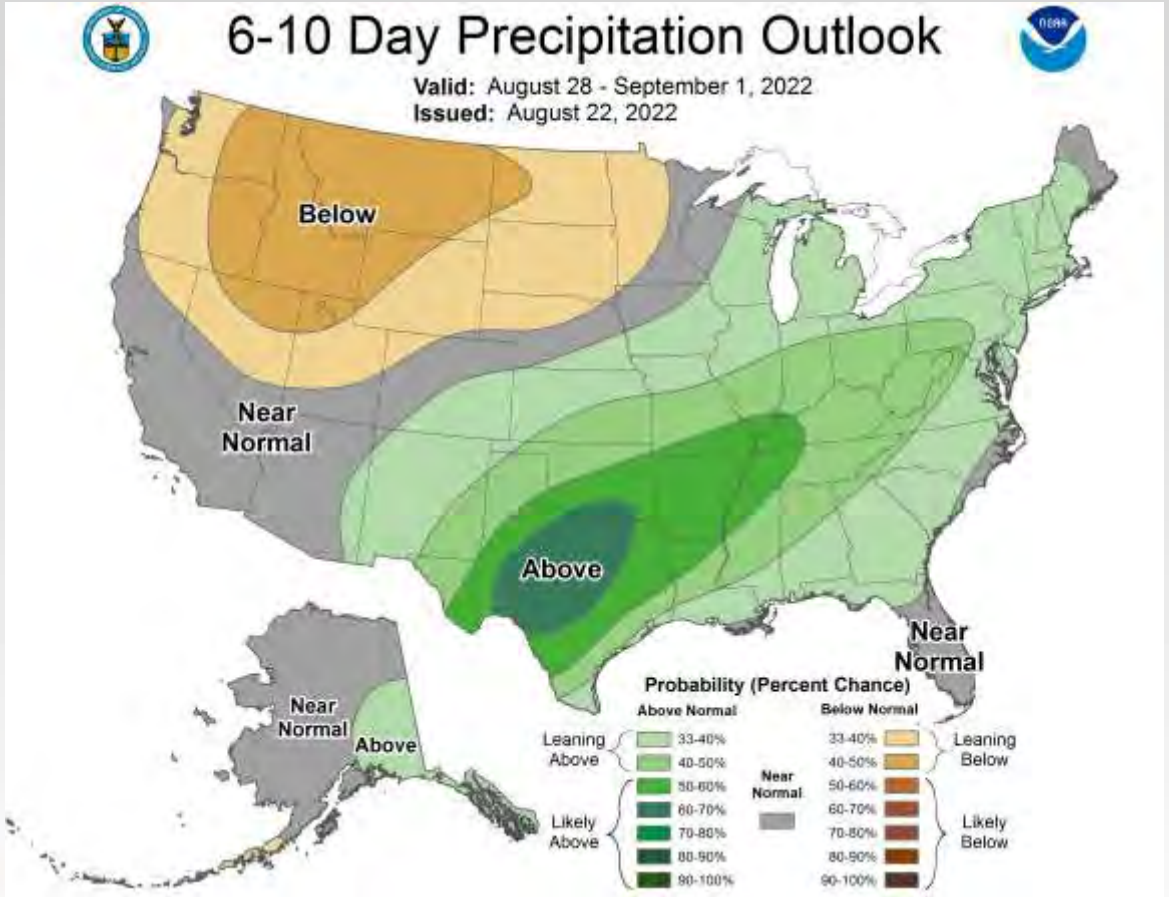
August 2022

Accumulation period from Apr 18-25

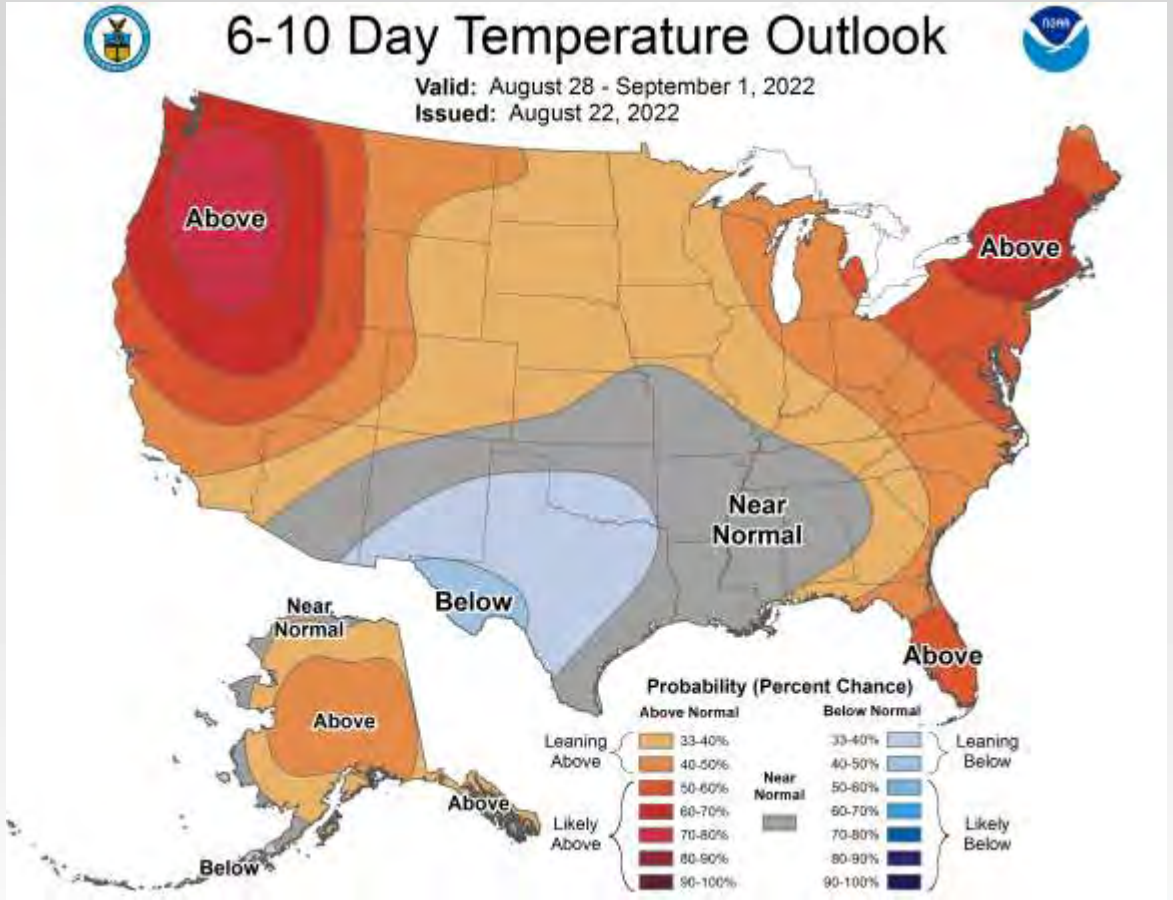


Outlook

August 28 – Sept 1

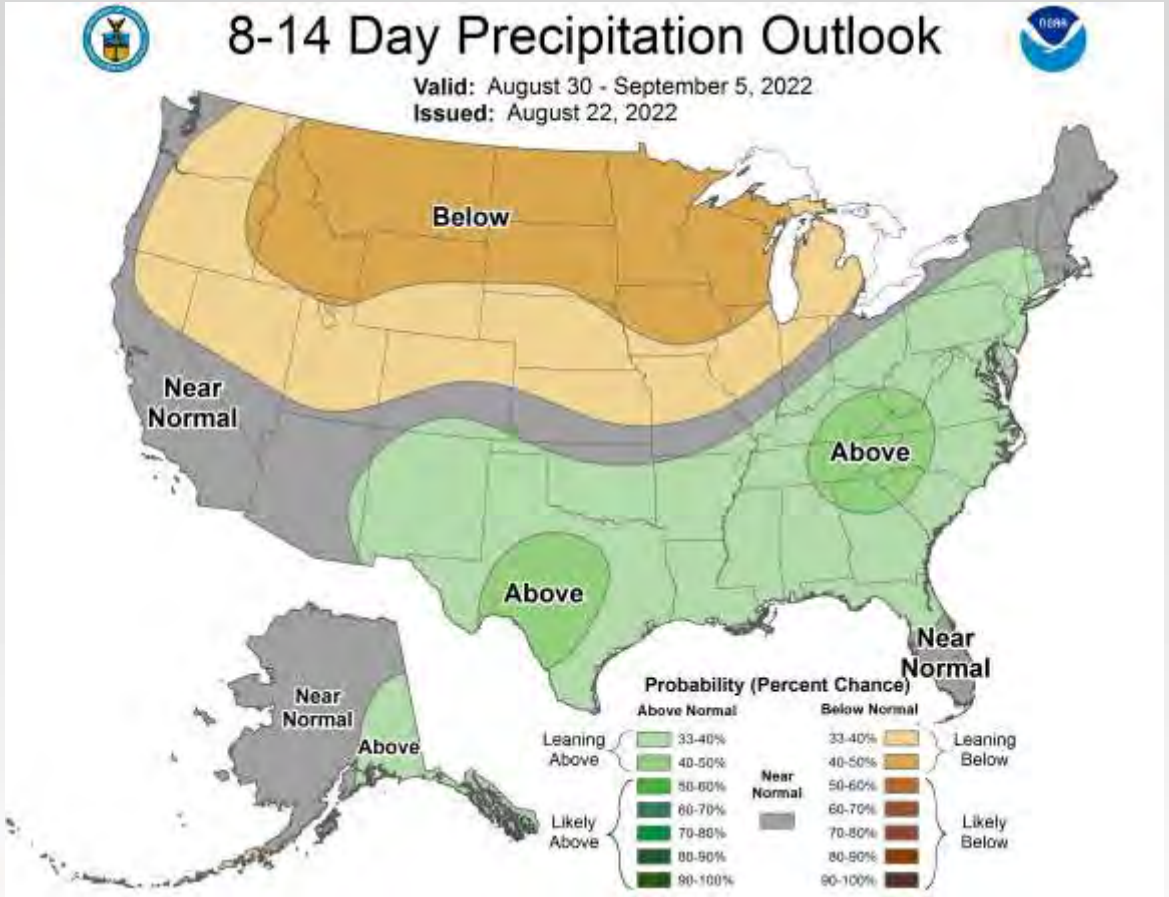


August 28 – Sept 1

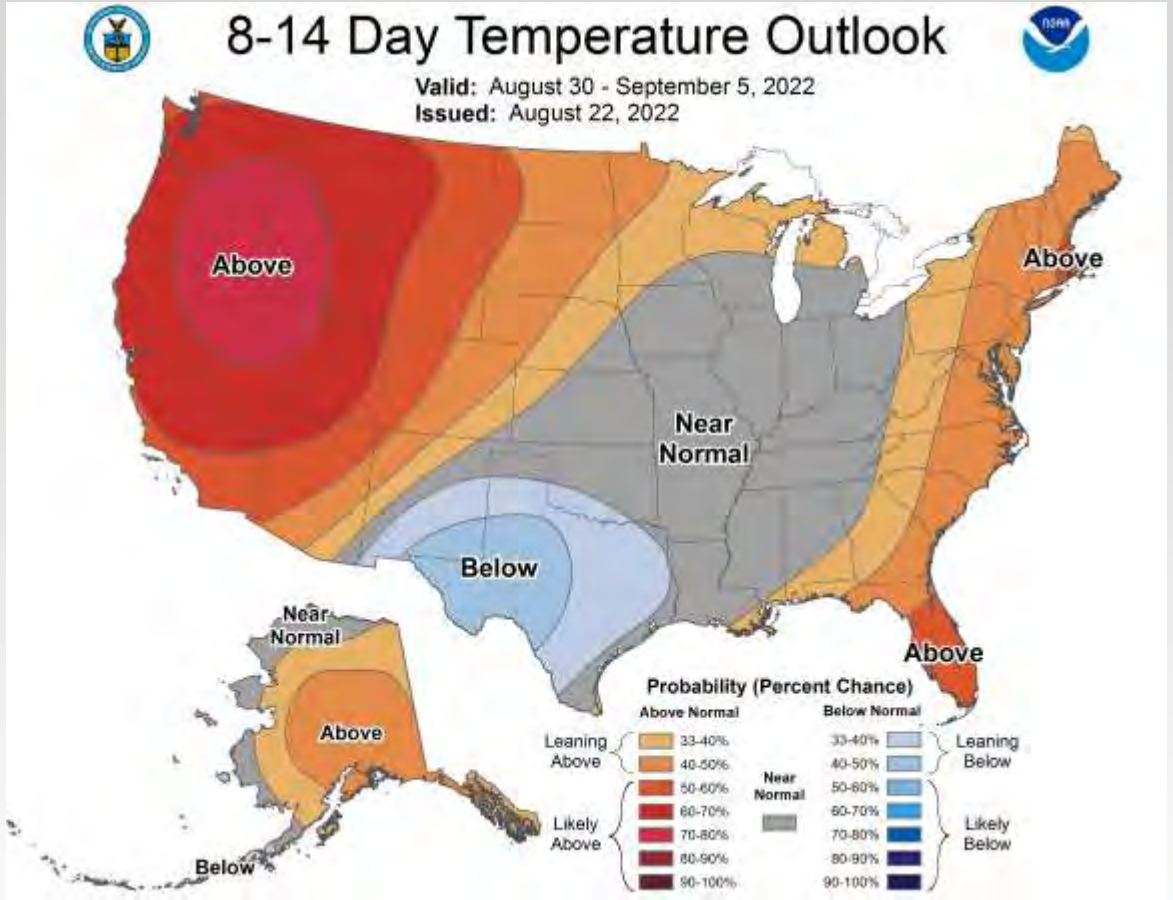


Outlook

August 30 – Sept 5



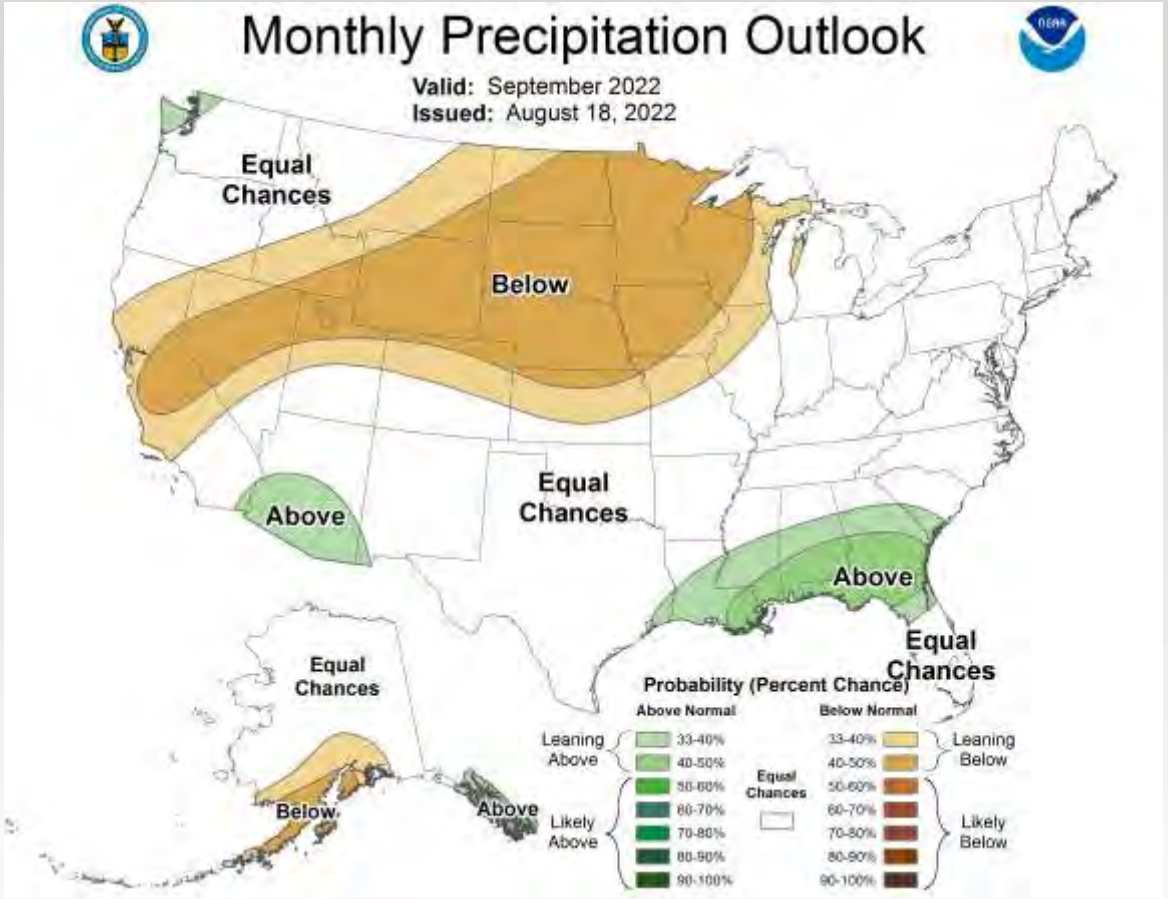
August 30 – Sept 5



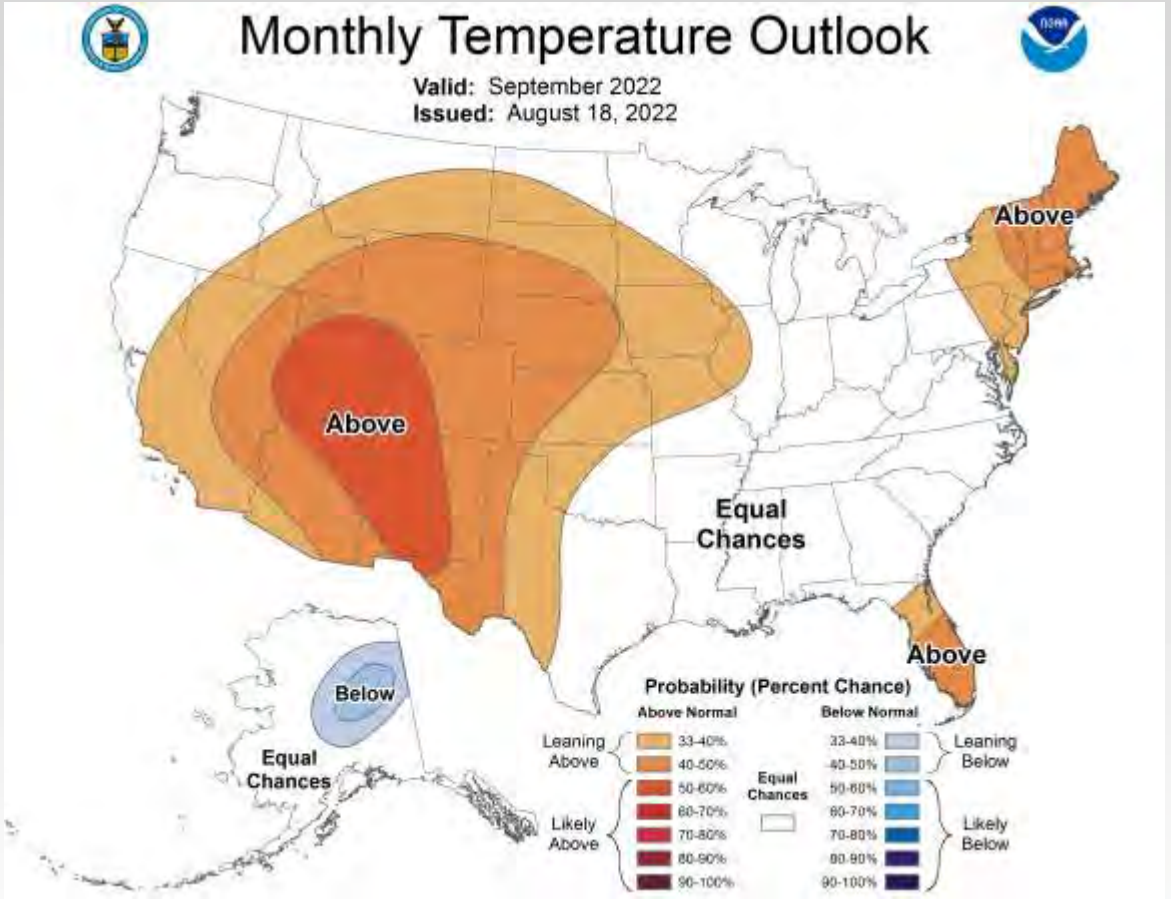
Monthly Outlook

August 2022

Precipitation
September



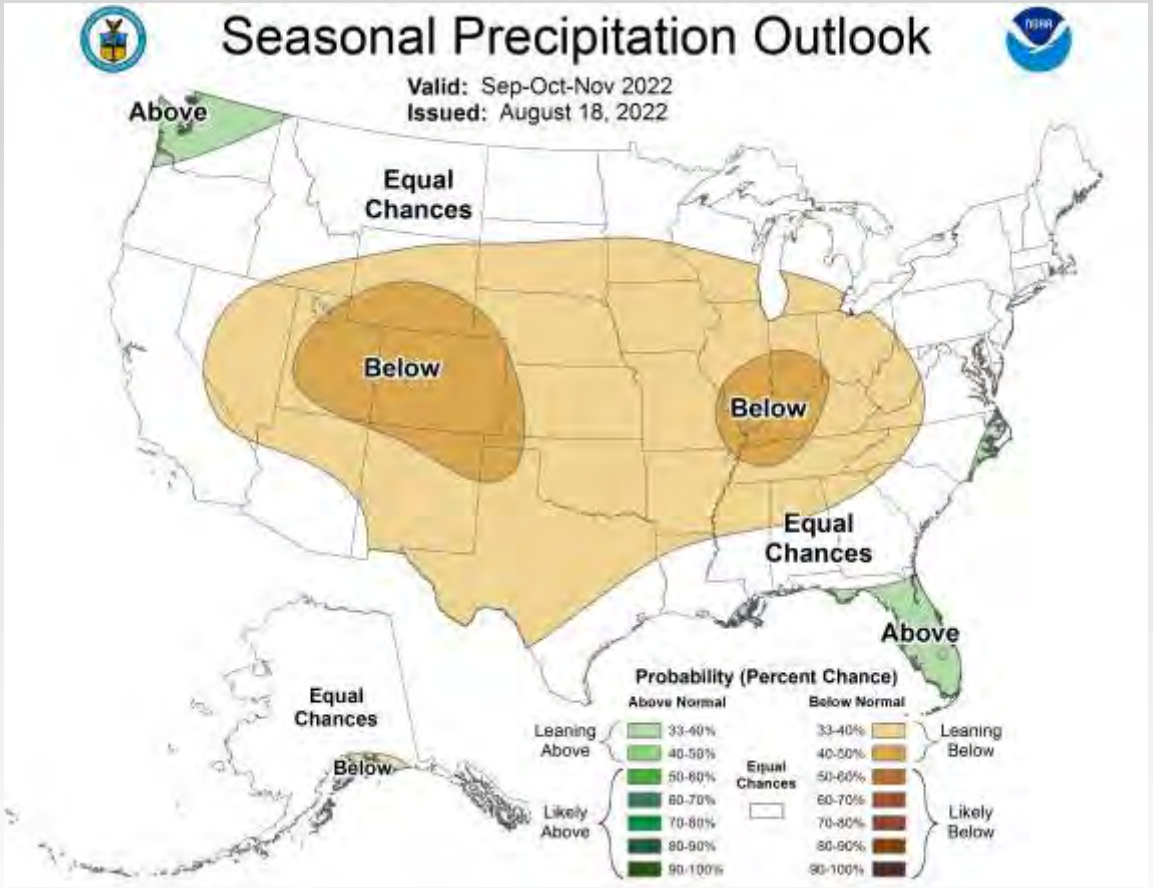
Temperature
September



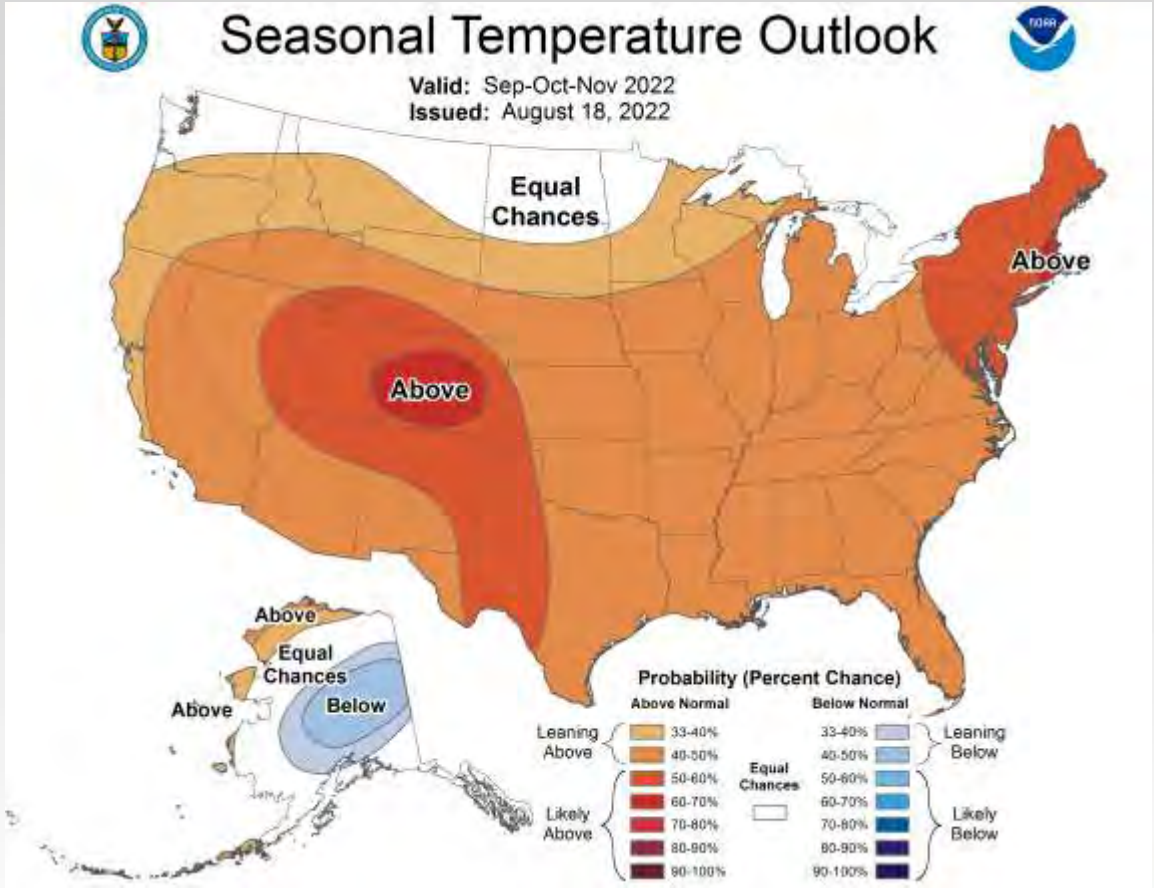
Seasonal Outlook

August 2022

Precipitation
Sep/Oct/Nov



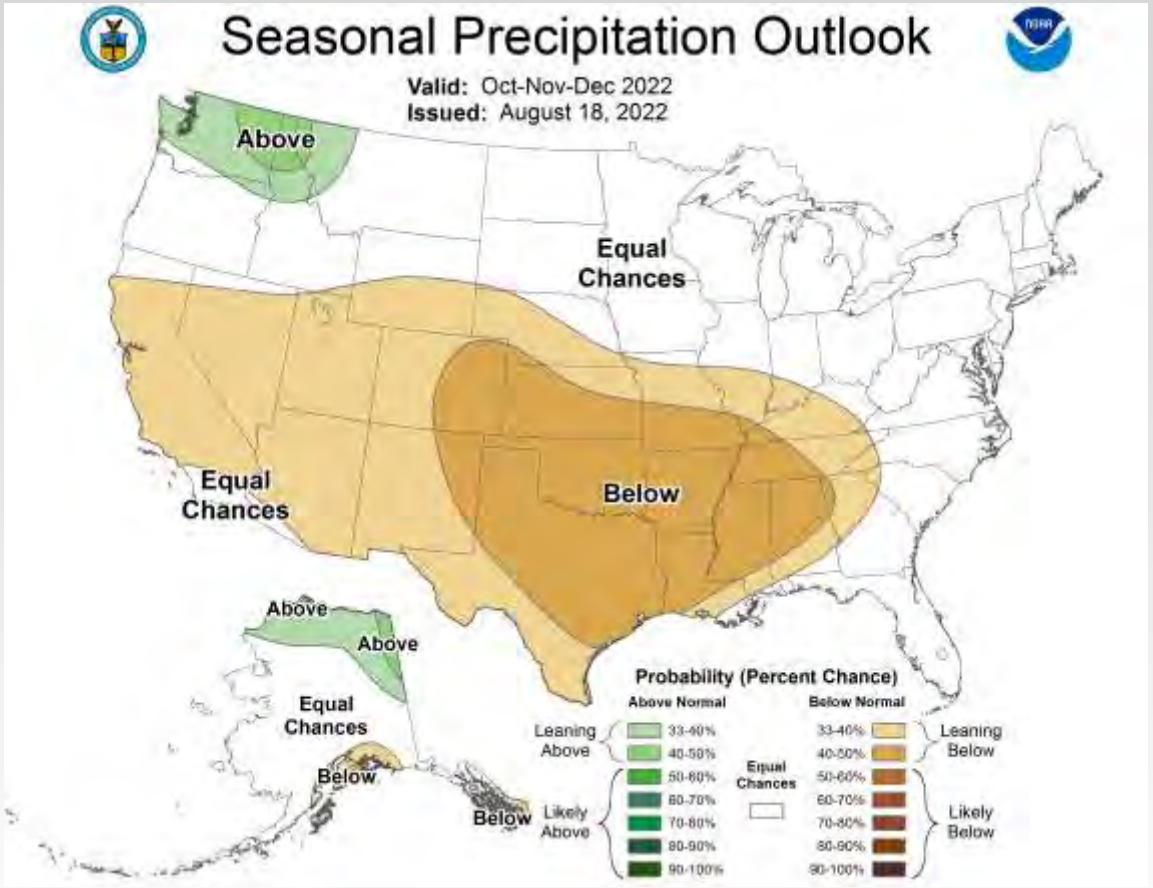
Temperature
Sep/Oct/Nov



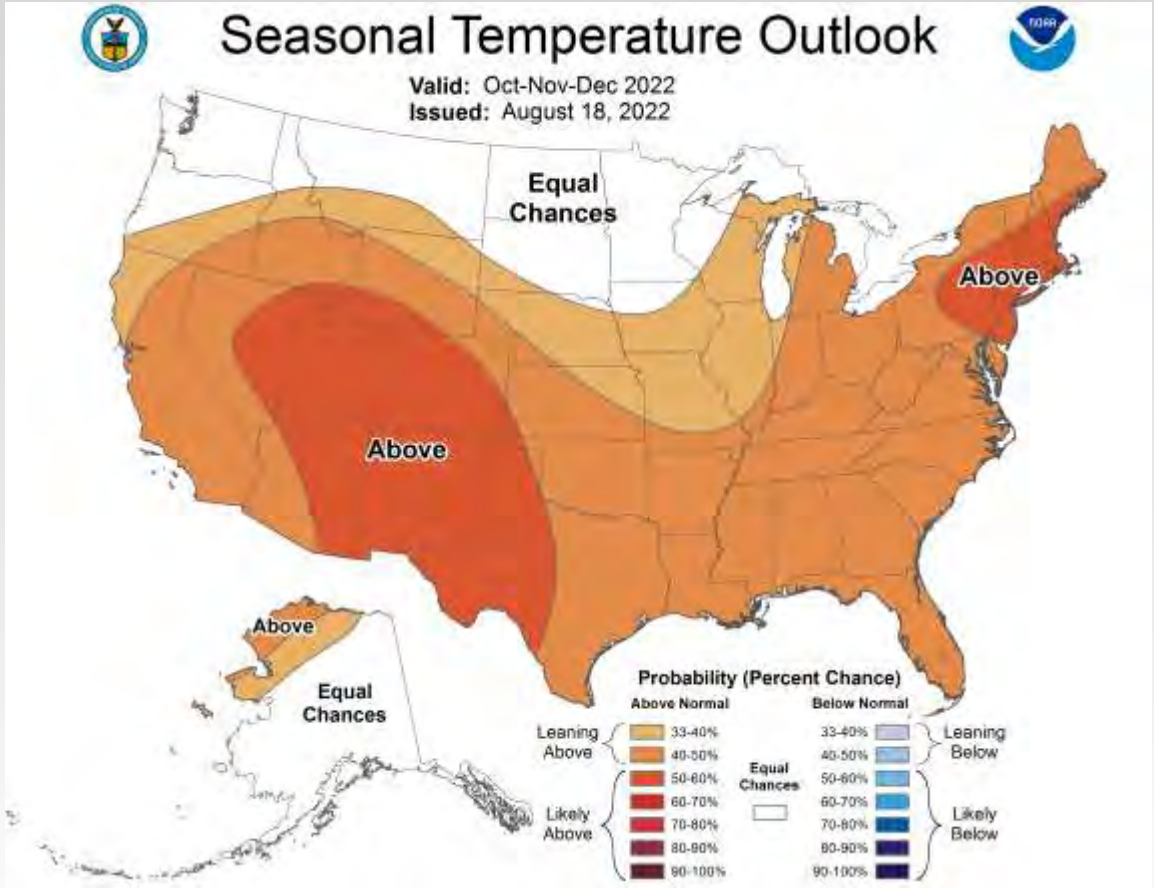
Seasonal Outlook

August 2022

Precipitation
Oct/Nov/Dec



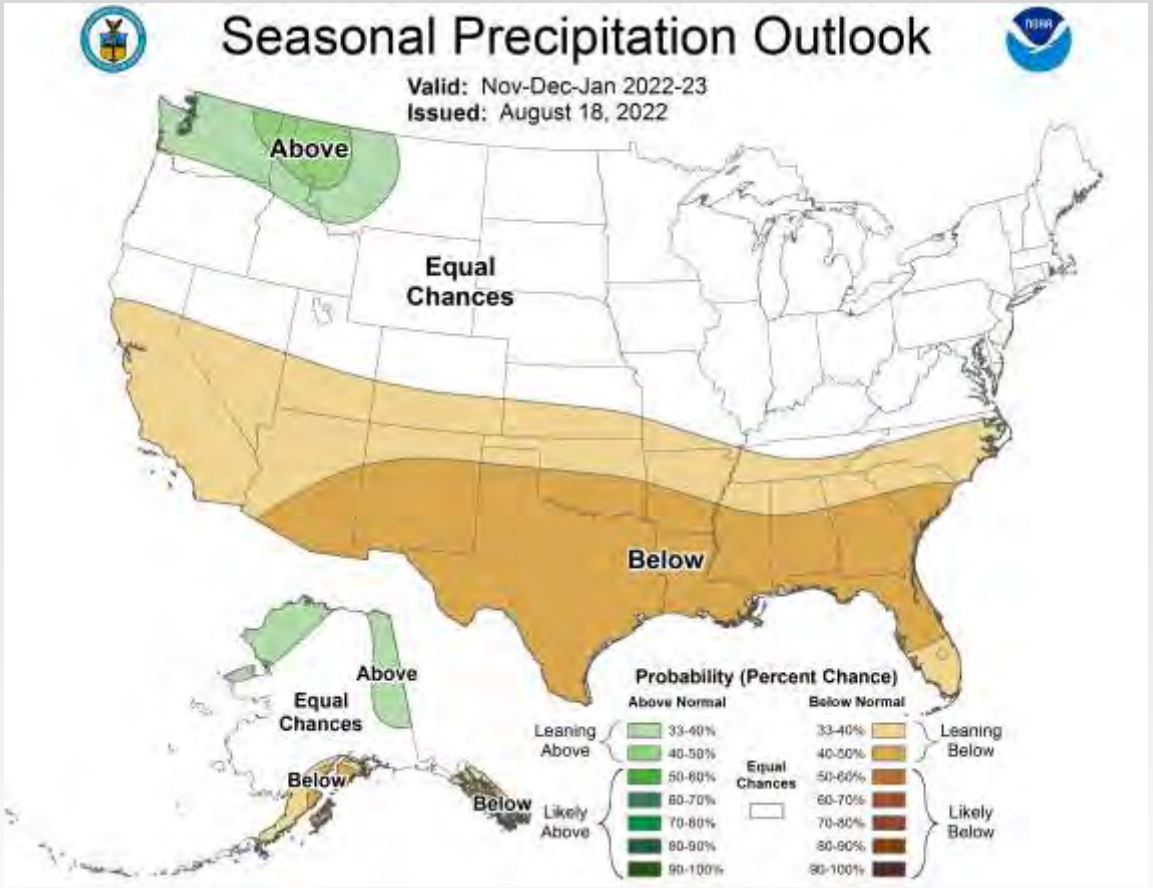
Temperature
Oct/Nov/Dec



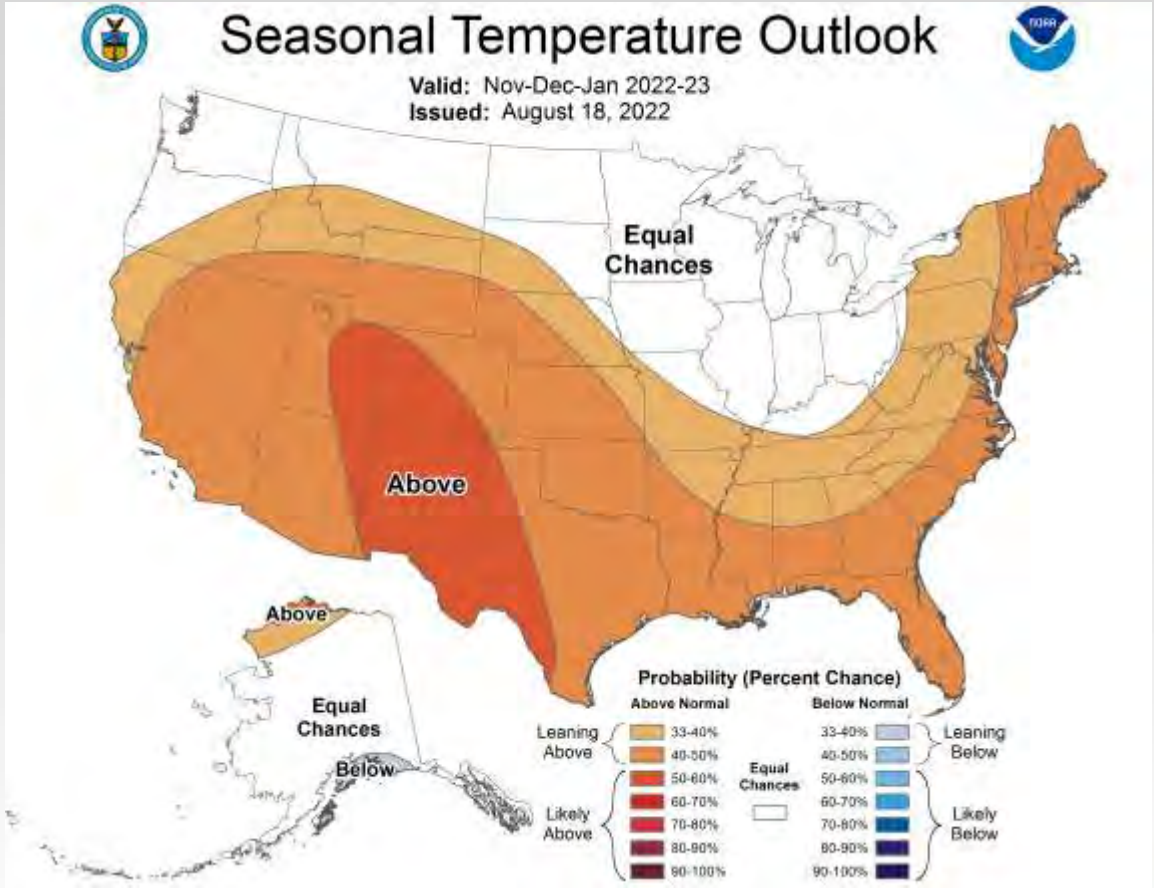
Seasonal Outlook

August 2022

Precipitation
Nov/Dec/Jan



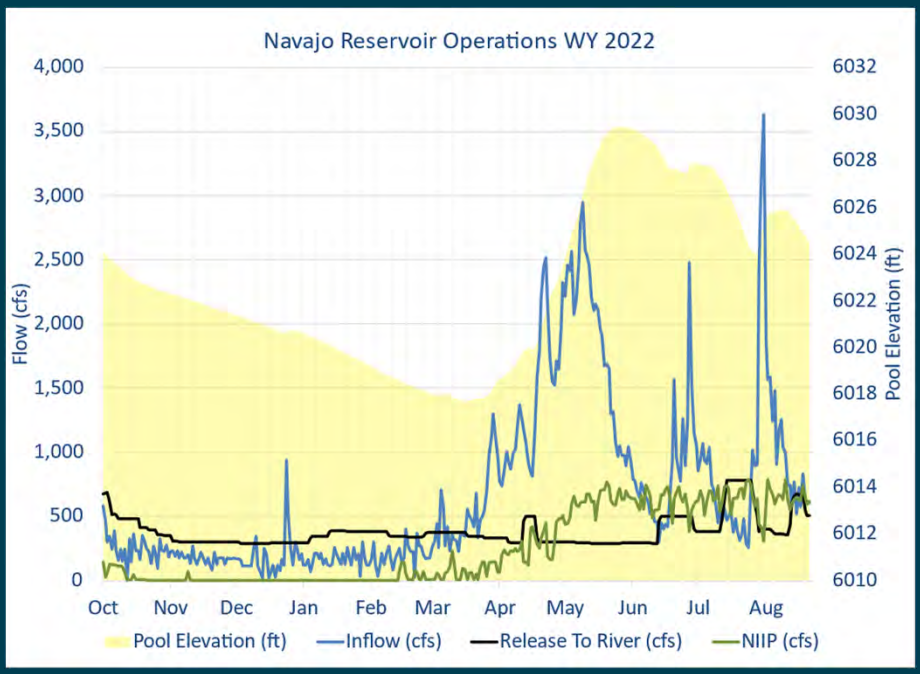
Temperature
Nov/Dec/Jan



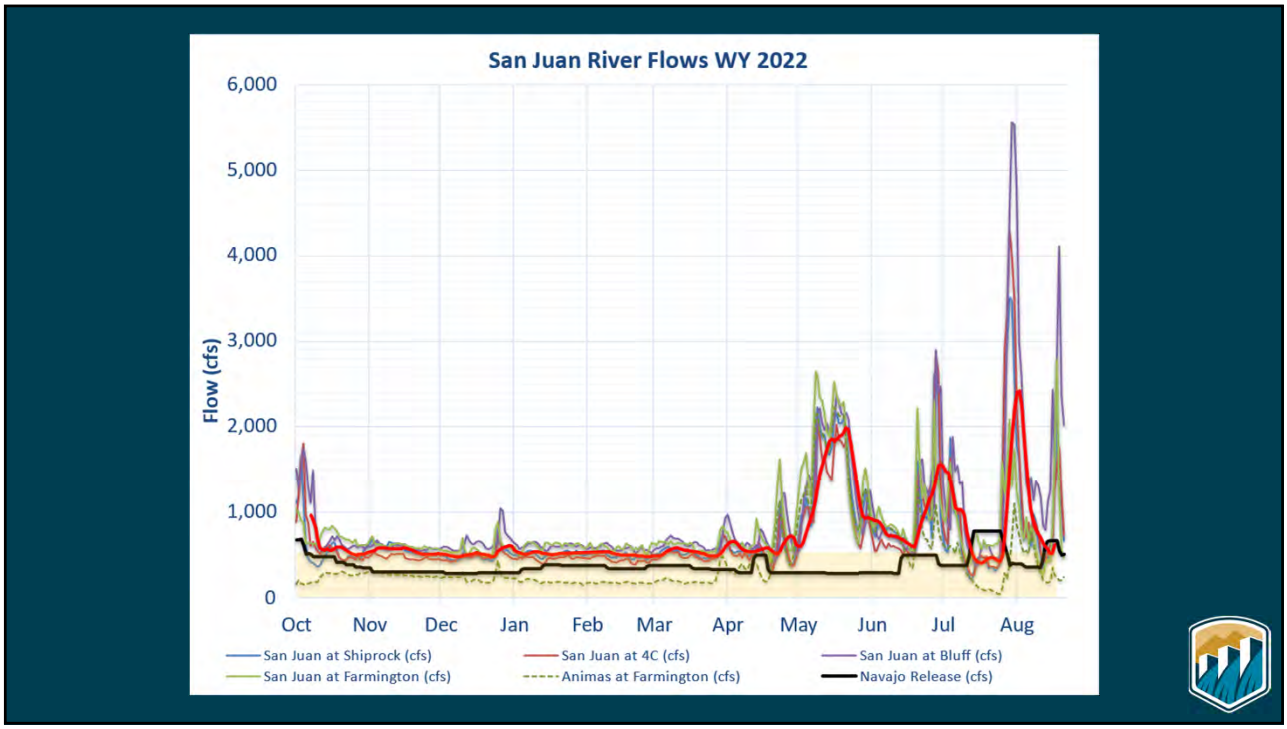
Final Water Supply (April-July)

Navajo:	381 kaf (60% avg)
Vallecito:	125 kaf (71% avg)
Lemon:	32 kaf (67% avg)
Animas:	230 kaf (60% avg)
McPhee:	144 kaf (56% avg)
Powell:	3,750 kaf (59% avg)

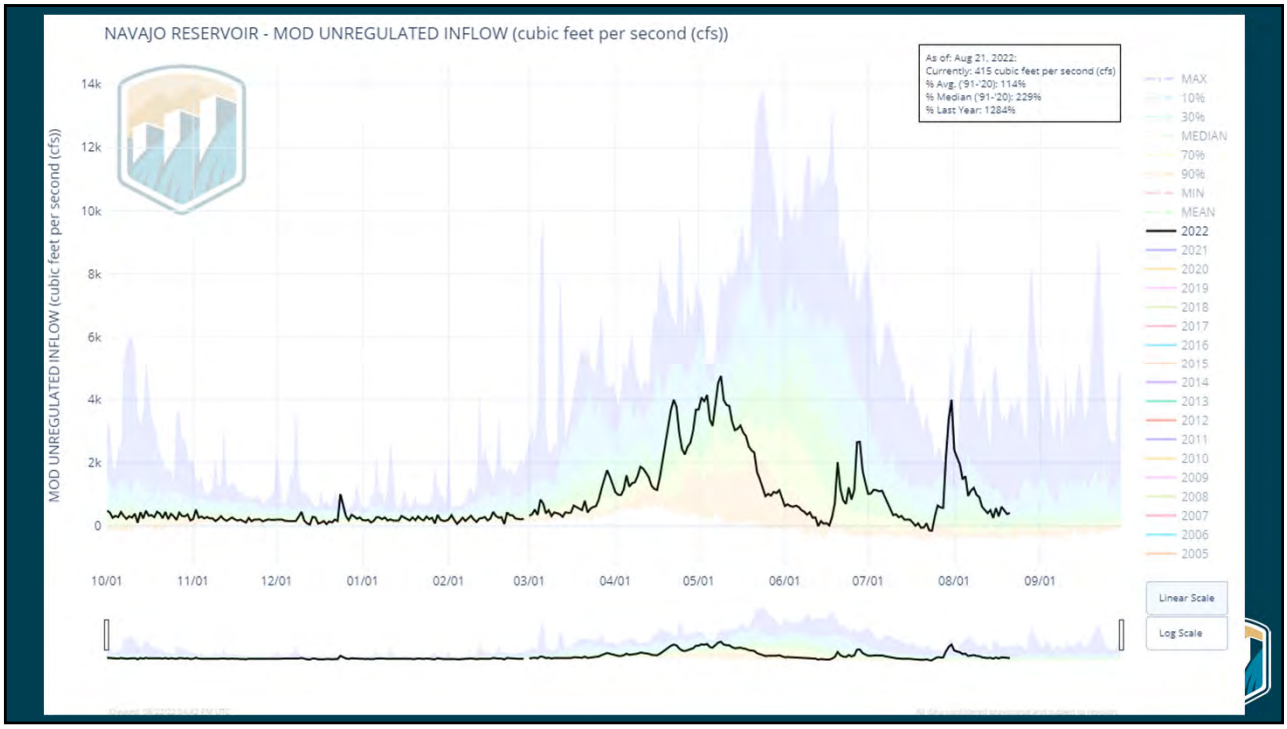
3



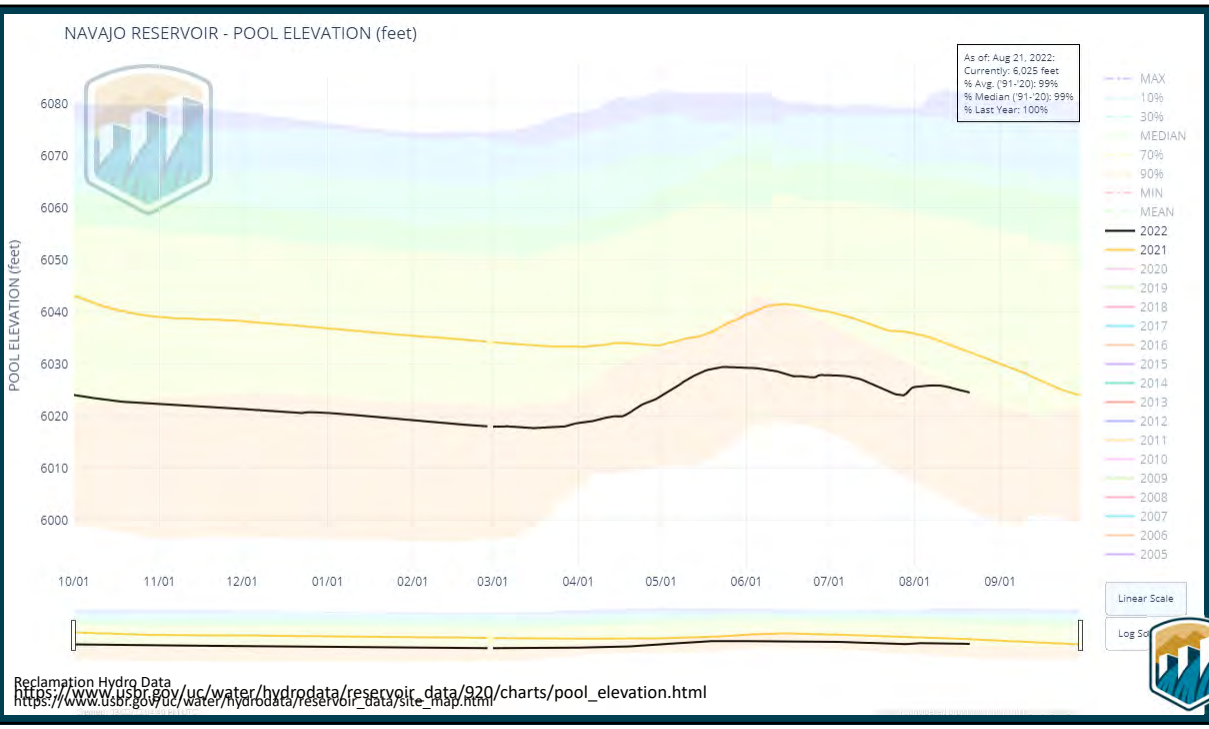
4


San Juan River Flows WY 2022
Flow (cfs)
6,000
5,000
4,000
3,000
2,000
1,000
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)

5

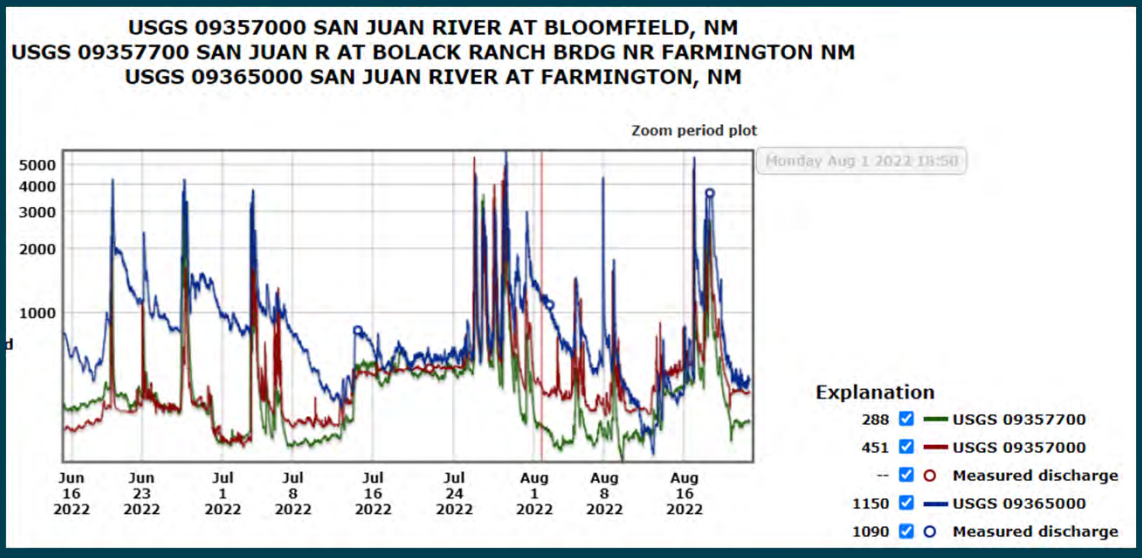

NAVAJO RESERVOIR - MOD UNREGULATED INFLOW (cubic feet per second (cfs))
MOD UNREGULATED INFLOW (cubic feet per second (cfs))
As of: Aug 21, 2022:
Currently: 415 cubic feet per second (cfs)
% Avg. ('91-'20): 114%
% Median ('91-'20): 229%
% Last Year: 1284%
14k
12k
10k
8k
6k
4k
2k
0
10/01
11/01
12/01
01/01
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
Linear Scale
Log Scale

6



7

June – August 2022 Events



https://waterdata.usgs.gov/nwis/uv?site_no=09357000%2C09365000%2C09357700&format=gif_mult_sites&PARAmeter_cd=00060&period=7

8

June – August 2022 Events

https://waterdata.usgs.gov/nwis/uv?site_no=09379500%2C09371010%2C09368000&format=gif_mult_sites&PARAmeter_cd=00060&period=7

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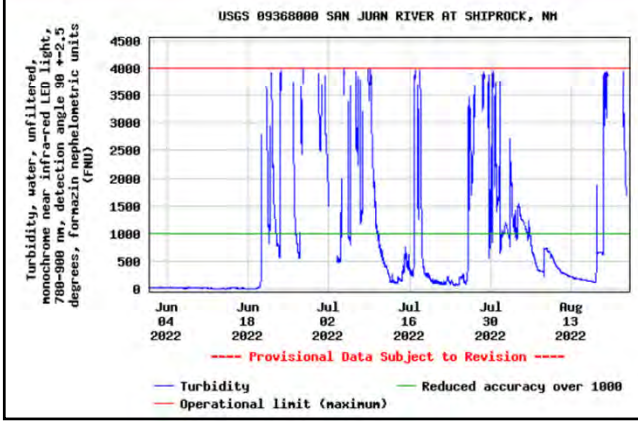
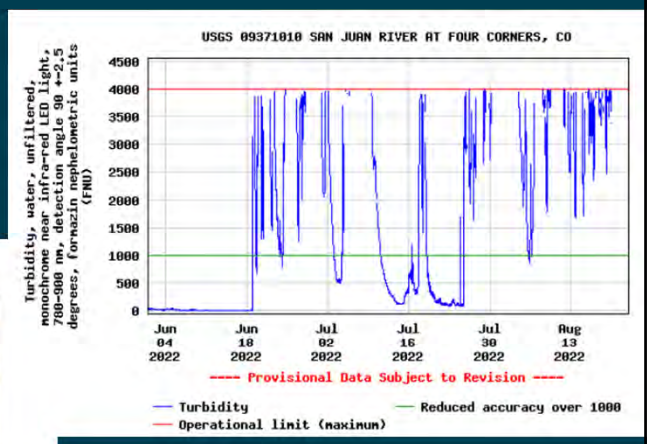
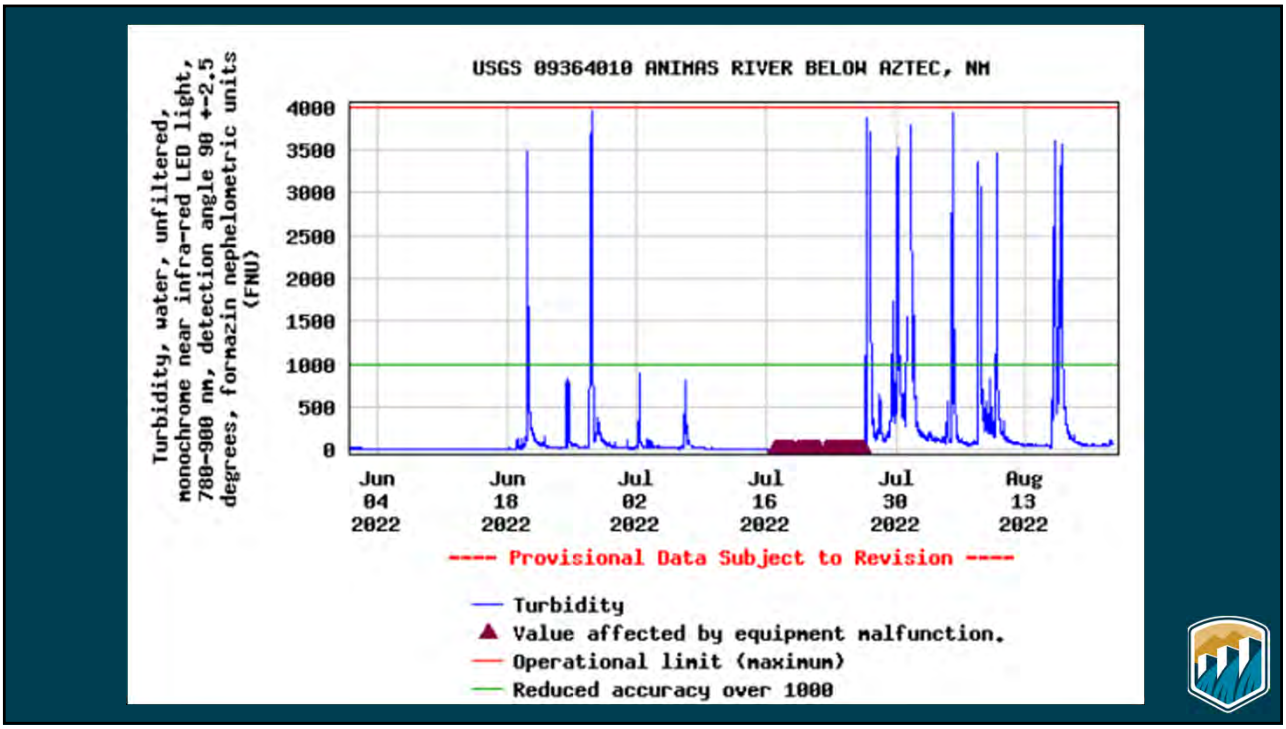
Turbidity

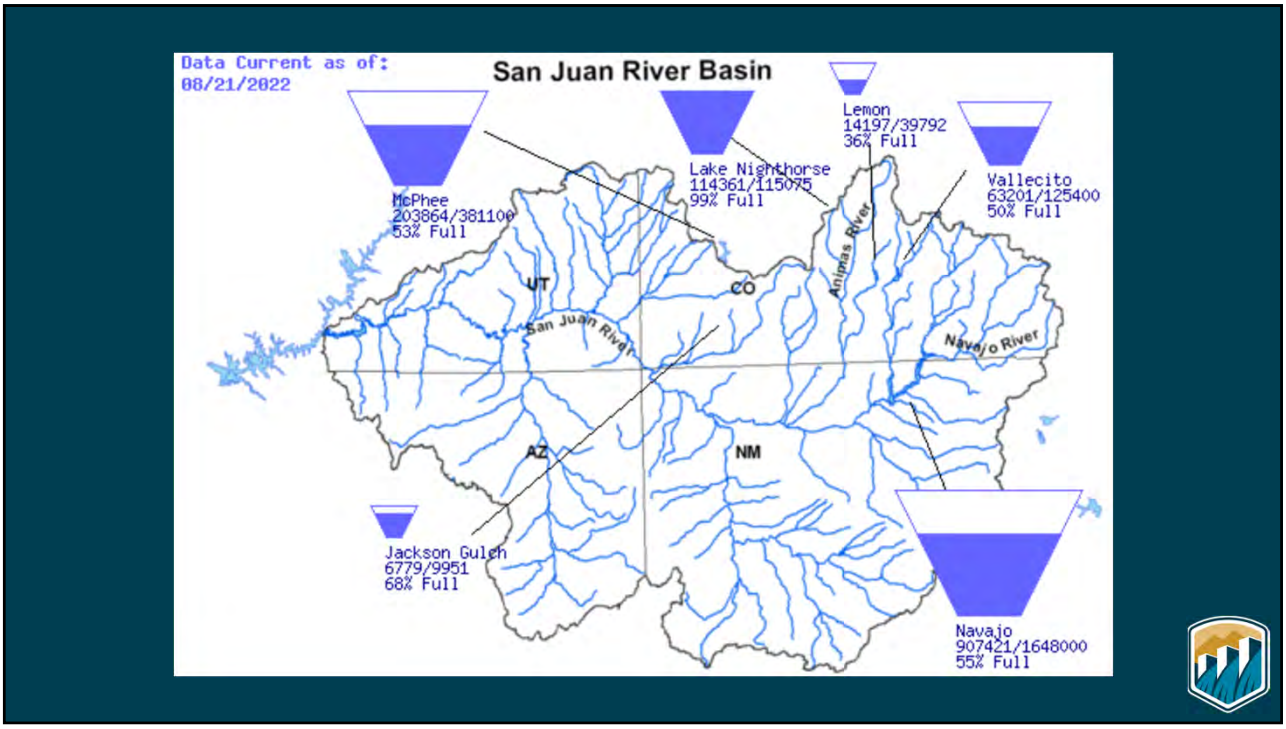




10


USGS 09364010 ANIMAS RIVER BELOW AZTEC, NM
Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU)
4000
3500
3000
2500
2000
1500
1000
500
0
Jun 04 2022
Jun 18 2022
Jul 02 2022
Jul 16 2022
Jul 30 2022
Aug 13 2022
---- Provisional Data Subject to Revision ----
Turbidity
Value affected by equipment malfunction.
Operational limit (maximum)
Reduced accuracy over 1000

11


Data Current as of:
08/21/2022
San Juan River Basin
McPhee
203864/381100
53% Full
Lake Nighthorse
114361/115075
99% Full
Lemon
14197/39792
36% Full
Vallecito
63201/125400
50% Full
Animas River
UT
CO
San Juan River
Navajo River
AZ
NM
Jackson Gulch
6779/9951
68% Full
Navajo
907421/1648000
55% Full

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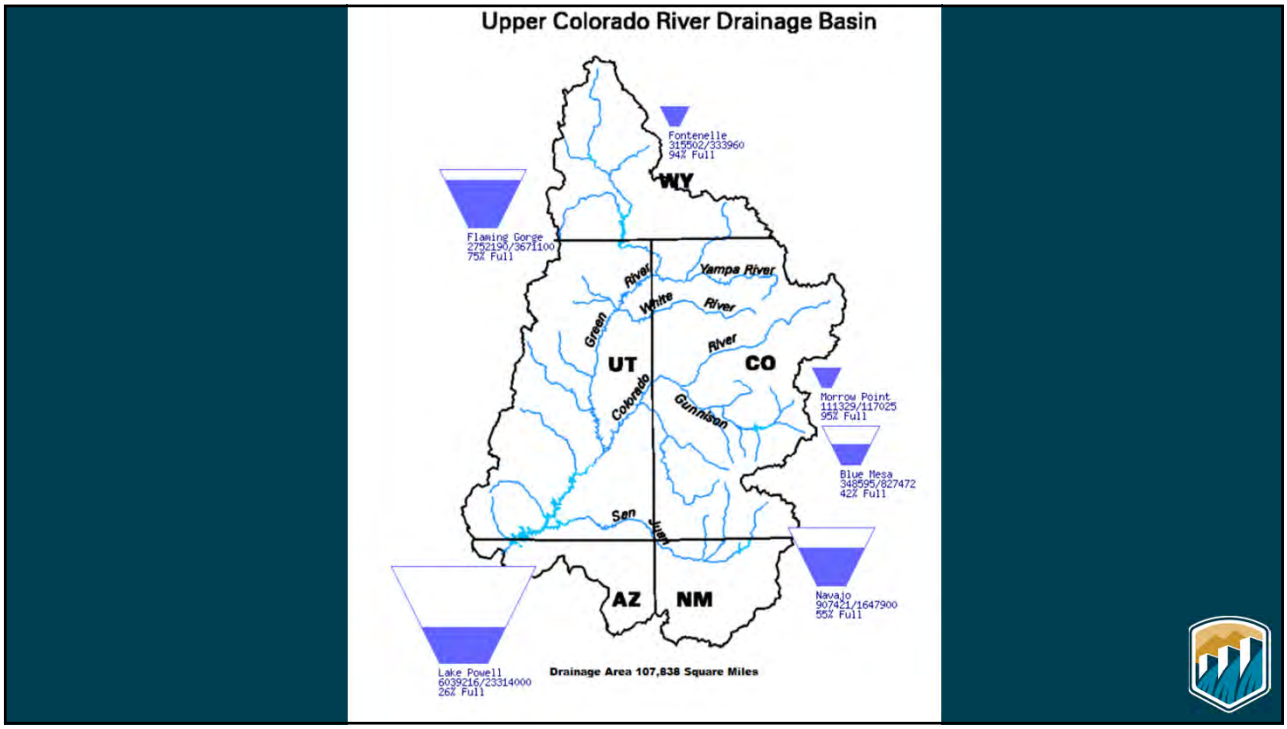
Upper Colorado River Drainage Basin
Fontenelle
315502/333960
94% Full
WY
Flaming Gorge
2752190/3671100
75% Full
Green River
White River
Yampa River
River
UT
CO
Colorado
Gunnison
Morrow Point
111329/117025
95% Full
Blue Mesa
348595/827472
42% Full
San Juan
Navajo
907421/1647900
55% Full
AZ
NM
Lake Powell
6039216/23314000
26% Full
Drainage Area 107,838 Square Miles

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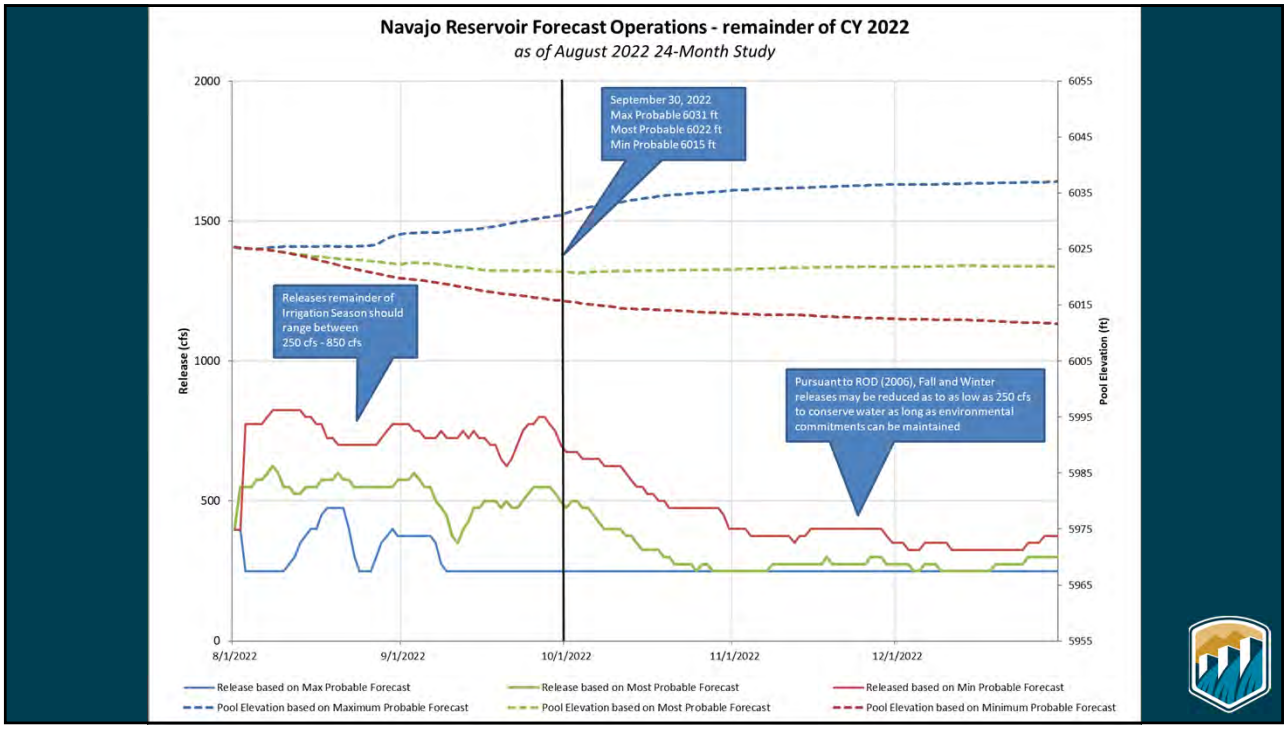
Navajo Reservoir Forecast Operations - remainder of CY 2022
as of August 2022 24-Month Study
September 30, 2022
Max Probable 6031 ft
Most Probable 6022 ft
Min Probable 6015 ft
Releases remainder of Irrigation Season should range between 250 cfs - 850 cfs
Pursuant to ROD (2006), Fall and Winter releases may be reduced as to as low as 250 cfs to conserve water as long as environmental commitments can be maintained
Release (cfs)
Pool Elevation (ft)
2000
1500
1000
500
0
6055
6045
6035
6025
6015
6005
5995
5985
5975
5965
5955
8/1/2022
9/1/2022
10/1/2022
11/1/2022
12/1/2022
Release based on Max Probable Forecast
Release based on Most Probable Forecast
Released based on Min Probable Forecast
Pool Elevation based on Maximum Probable Forecast
Pool Elevation based on Most Probable Forecast
Pool Elevation based on Minimum Probable Forecast

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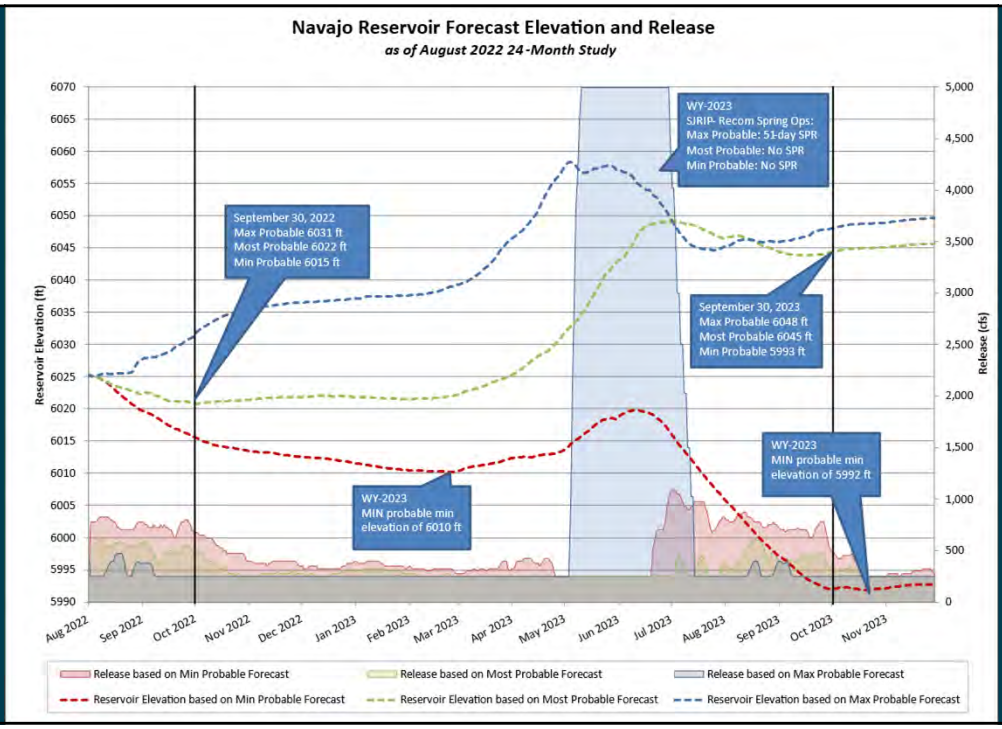

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Projected Operations WY 2023

Based on current streamflow conditions, storage levels, and statistical outlooks based on 30 years of historical hydrology,

- Runoff projections range from 430 kaf (47% avg) – 1,140 kaf (158% avg) with a median projection of 810 kaf (89% avg).
- 25% chance of prescribed spring peak release
- 7% chance of falling below 5990 ft (min active storage)
- A shortage was previously forecast in WY 2023 that has diminished due to recent rainfall and resulting reduced releases. A dry month or two could see a re-emergence.

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Summary

Next Meeting January 17th 2023

- WY 2022 April-July runoff was below average throughout the San Juan River Basin. Navajo Modified Unregulated Inflow totaled 381 kaf which was 60% of average.
- There was no spring peak release. Releases varied from 300 – 800 cfs throughout WY 2022.
- Drought conditions have improved in the Four Corners due to rains but drought conditions still persist especially in the western half of the basin. Rains likely helped soil moisture and releases.
- Based on current storage and streamflows and the statistical range of likely hydrologies for WY 2023, there is a 25% chance for a spring peak release and a 7% chance of shortage. The median runoff forecast is for 89% of average.

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Links

- Navajo Project Notices: https://www.usbr.gov/uc/wcao/water/rsvrs/notice/nav_rel.html
- Navajo Monthly Forecast Update: https://www.usbr.gov/uc/water/crsp/cs/nvd.html

- UC Water Operations Home: https://www.usbr.gov/uc/water/index.html
- Teacups: https://www.usbr.gov/uc/water/basin/index.html
- 24-Month Study: https://www.usbr.gov/uc/water/crsp/studies/index.html
- DROA: https://www.usbr.gov/dcp/droa.html

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Reclamation Contacts:
Marc Miller – Water Management Group Chief
970-385-6541 mbmiller@usbr.gov
Susan Novak Behery – Hydrologic Engineer
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

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