

Colorado Climate Update

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Climatologist

Water Availability Task Force

July 25, 2023



ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Current Conditions

Drought Update

Outlook



Condition Update

Precipitation

Temperature

Evaporative Demand

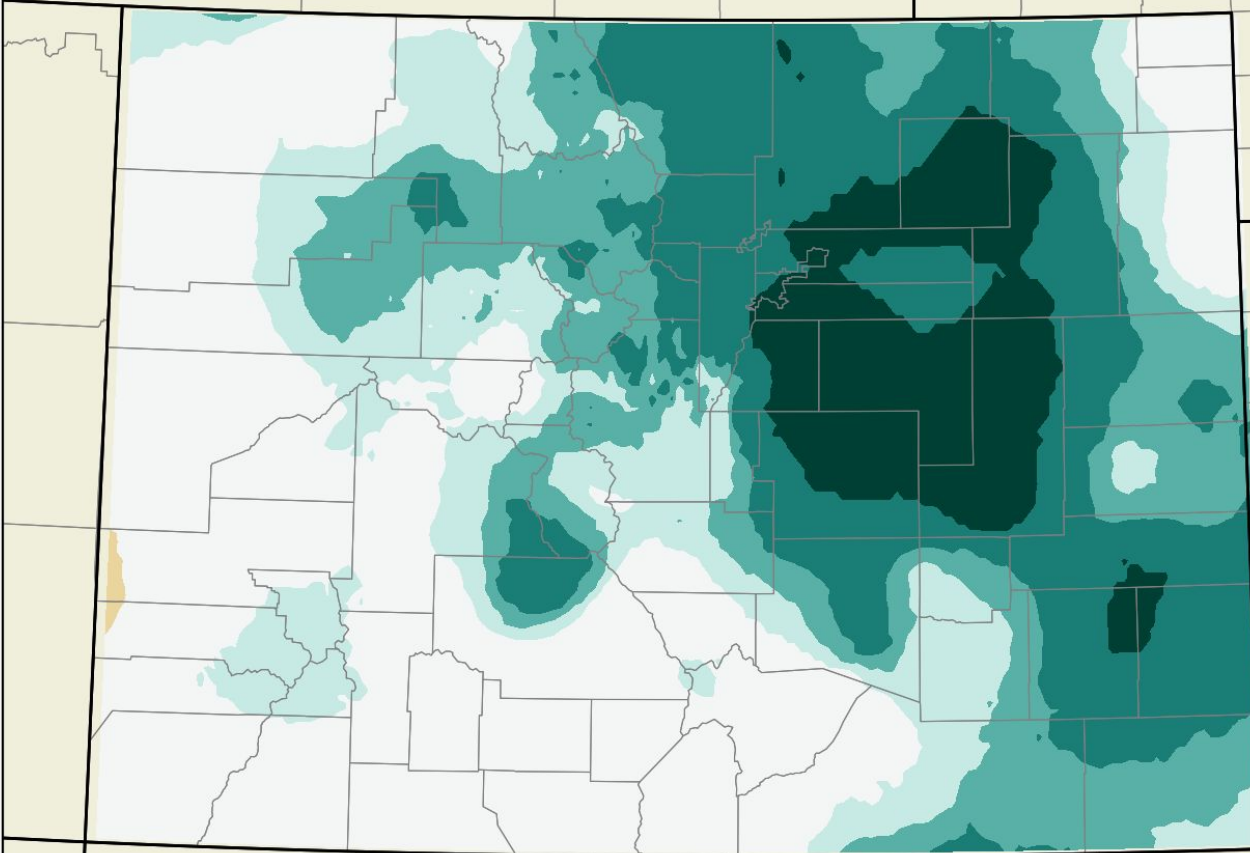
Soil Moisture

Vegetation

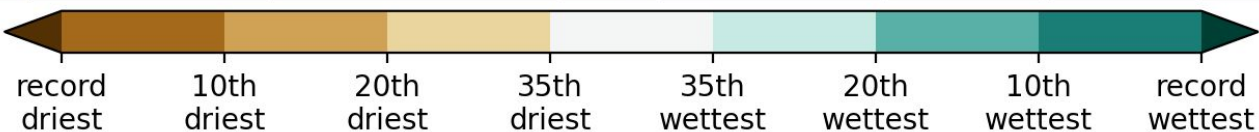


precipitation rank: June 2023

statewide anomaly from 1901-2000 avg: +1.29 inches
statewide rank: 124th driest/6th wettest



source: NOAA/NCEI nclimgrid
map: Colorado Climate Center/Colorado State University
map generated 11 July 2023



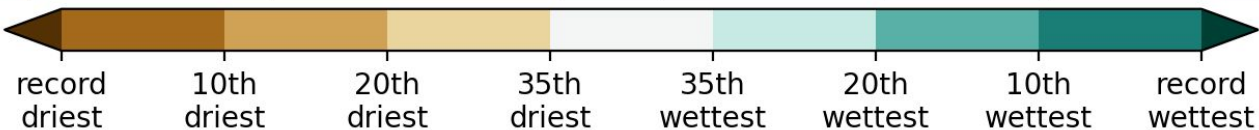
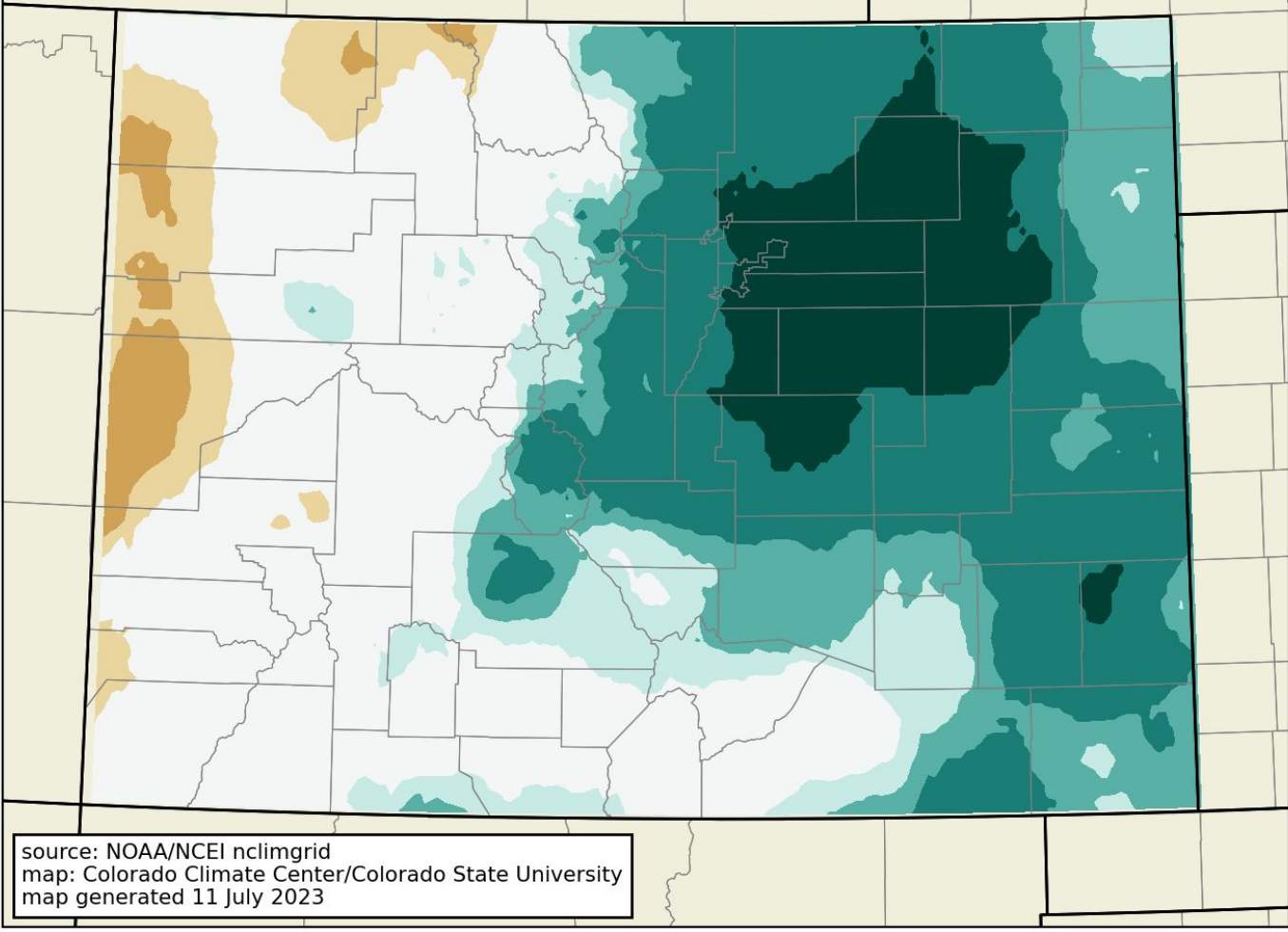
precipitation rank out of 129 years (1895-2023)

https://climate.colostate.edu/co_cag/rank_maps.html



precipitation rank: 2 months ending June 2023 (May-Jun)

statewide anomaly from 1901-2000 avg: +1.98 inches
statewide rank: 122nd driest/8th wettest



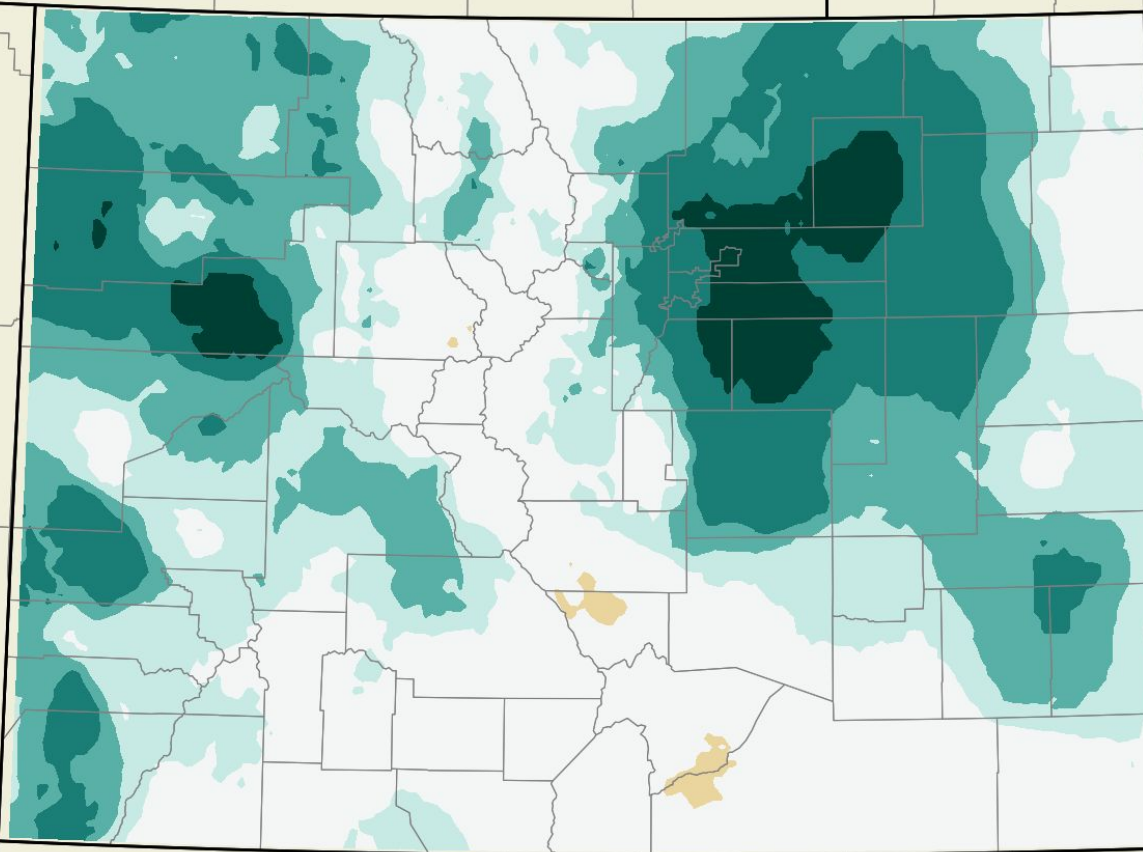
precipitation rank out of 129 years (1895-2023)

https://climate.colostate.edu/co_cag/rank_maps.html

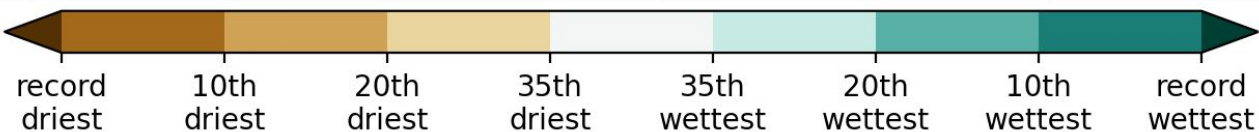


precipitation rank: 9 months ending June 2023 (Oct-Jun)

statewide anomaly from 1901-2000 avg: +2.75 inches
statewide rank: 113th driest/16th wettest



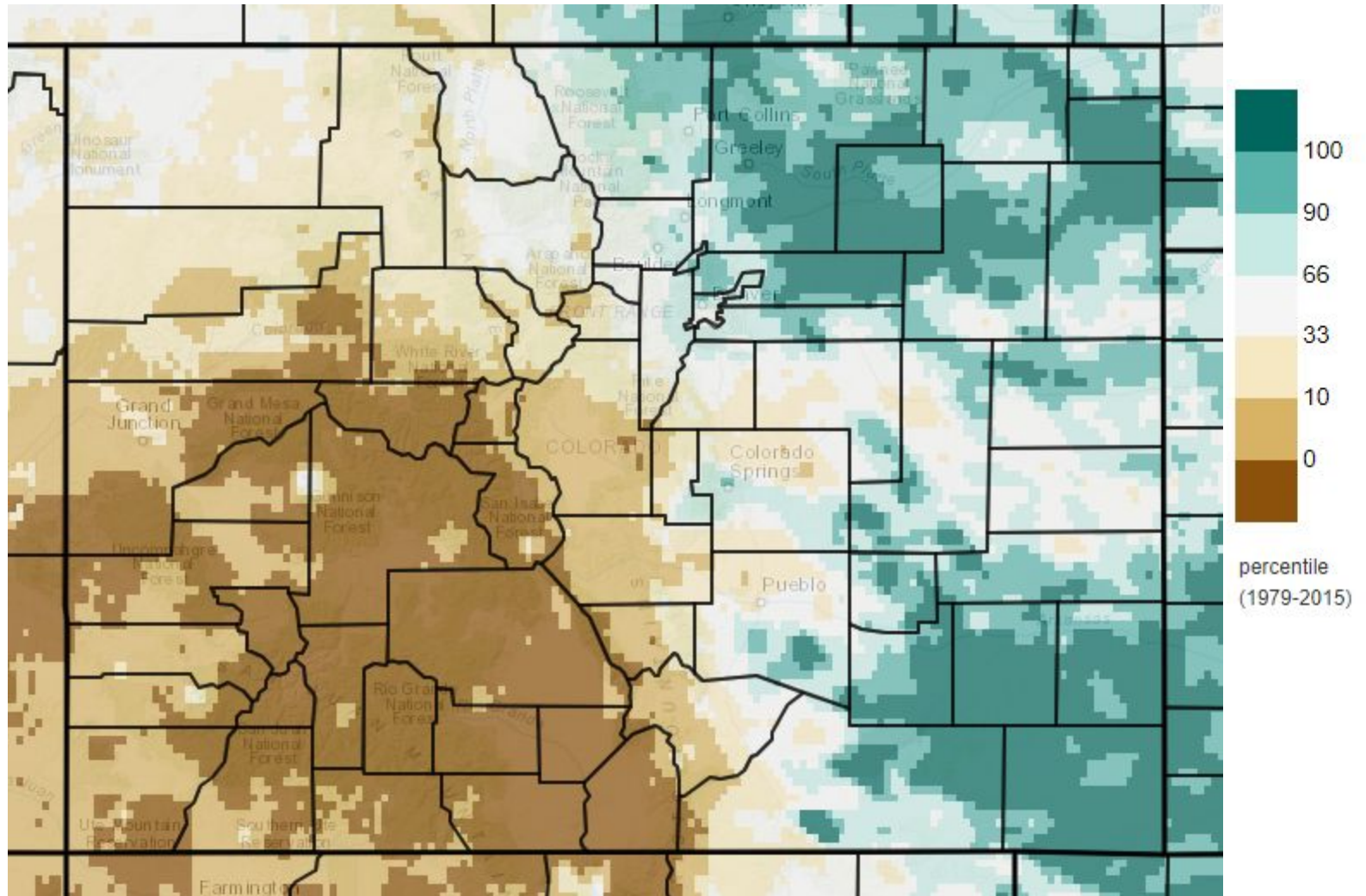
source: NOAA/NCEI nclimgrid
map: Colorado Climate Center/Colorado State University
map generated 11 July 2023



precipitation rank out of 128 years (1896-2023)

https://climate.colostate.edu/co_cag/rank_maps.html

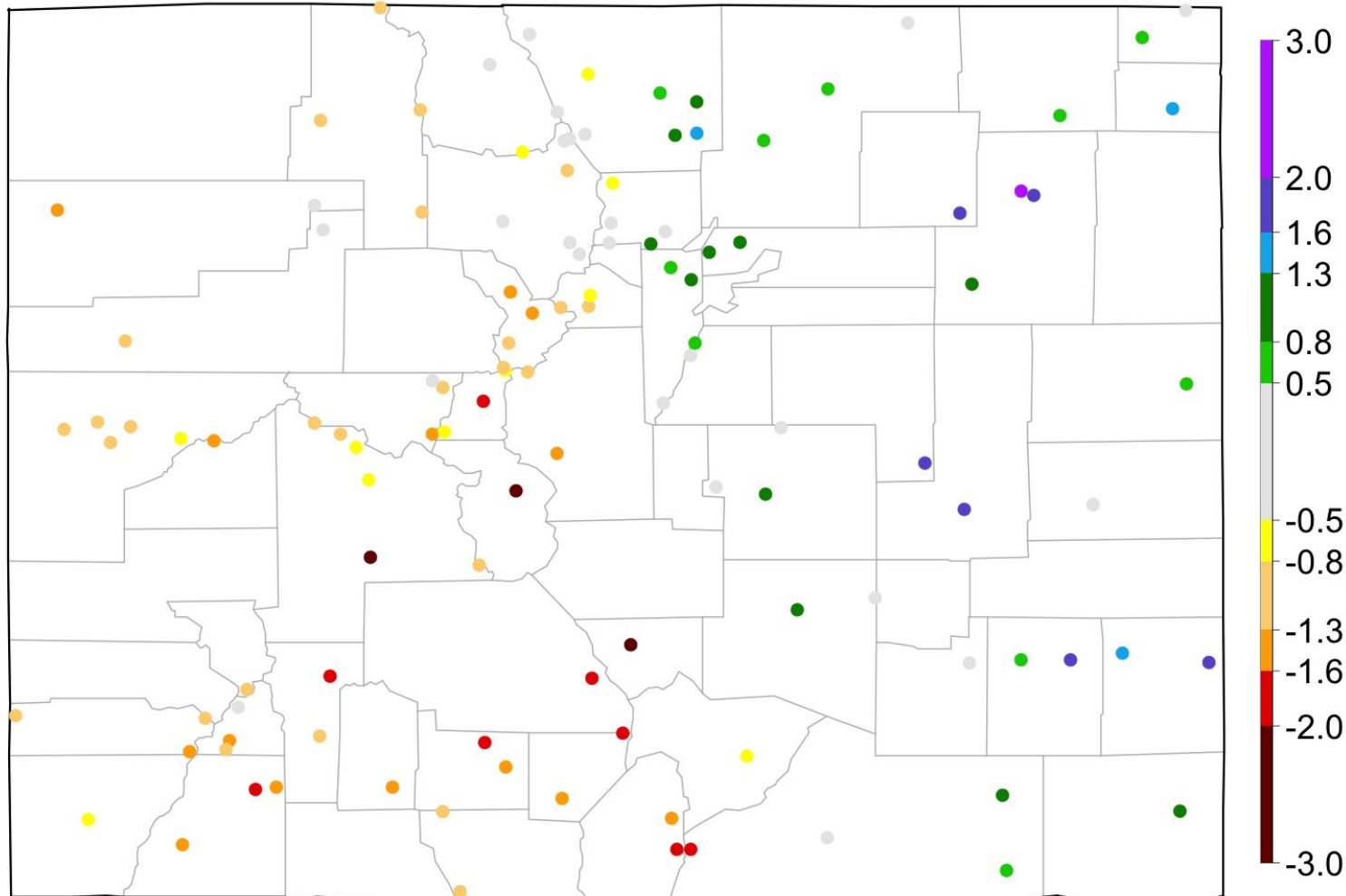
6/23-7/22 Precipitation Percentile



<https://climatetoolbox.org/tool/Climate-Mapper>



30-day SPI: 2023/06/17 - 2023/07/16

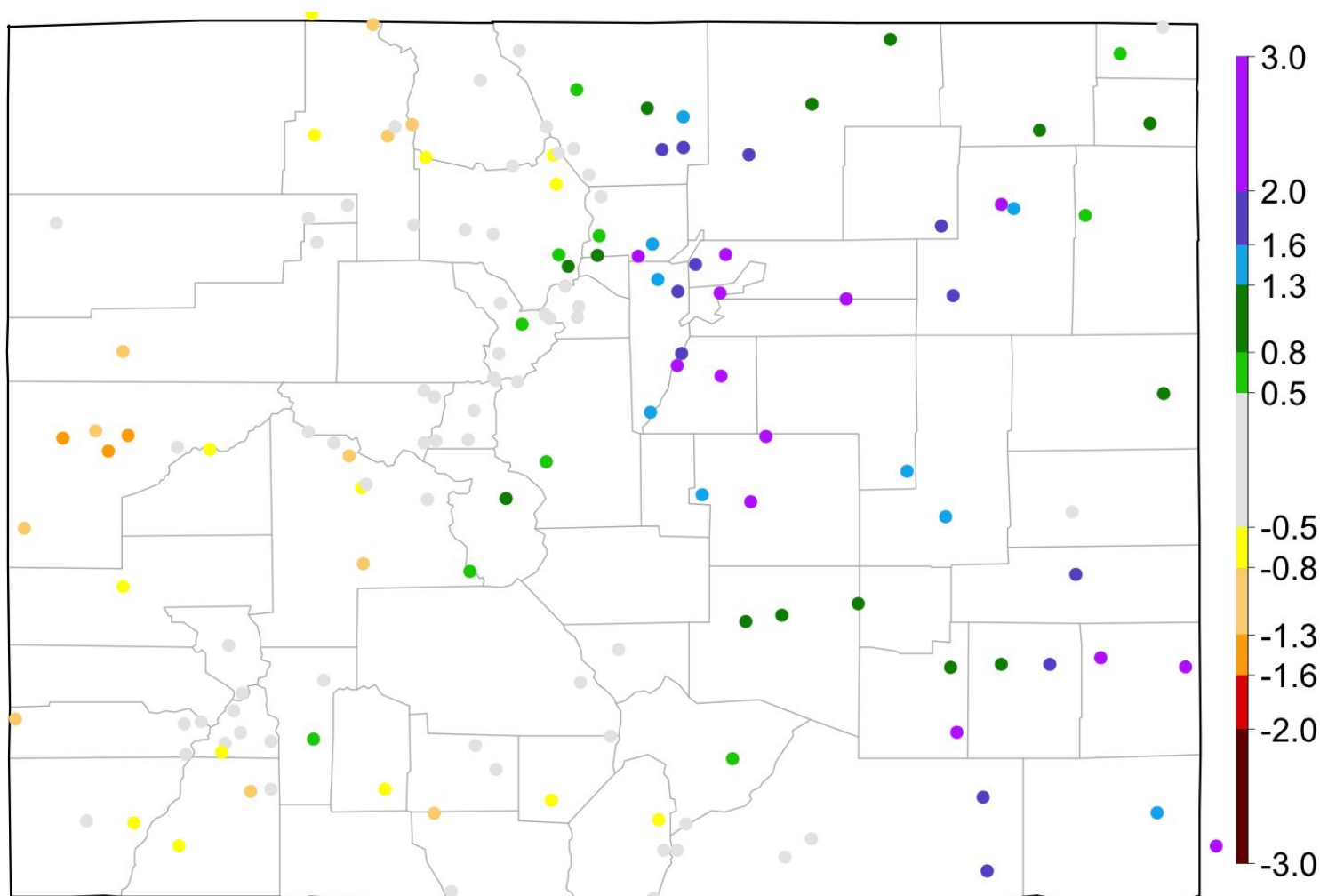


Data from High Plains Regional Climate Center and ACIS

<https://climate.colostate.edu/drought/>



90-day SPI: 2023/04/18 - 2023/07/16

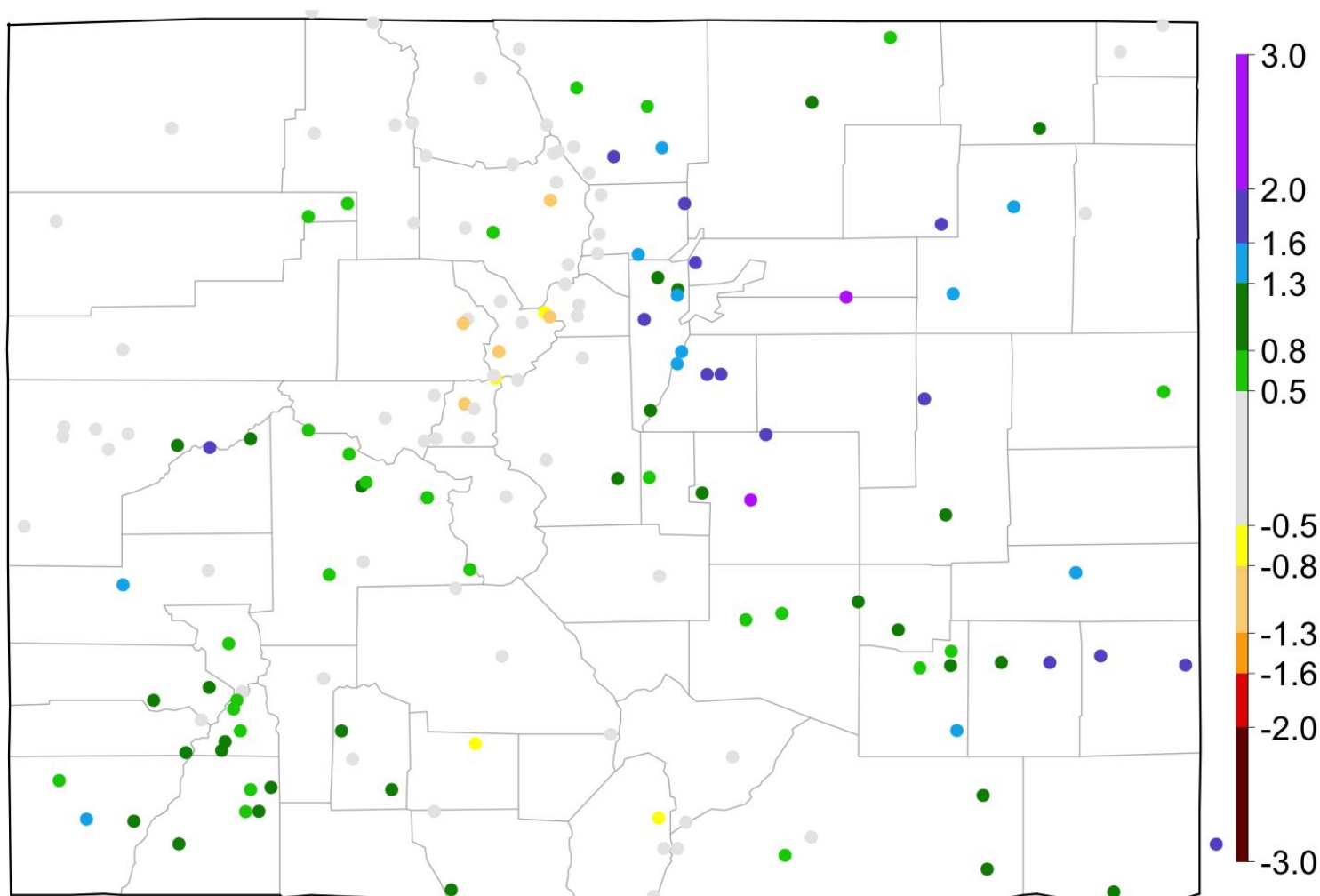


Data from High Plains Regional Climate Center and ACIS

<https://climate.colostate.edu/drought/>



6-month SPI: 2023/01/17 - 2023/07/16

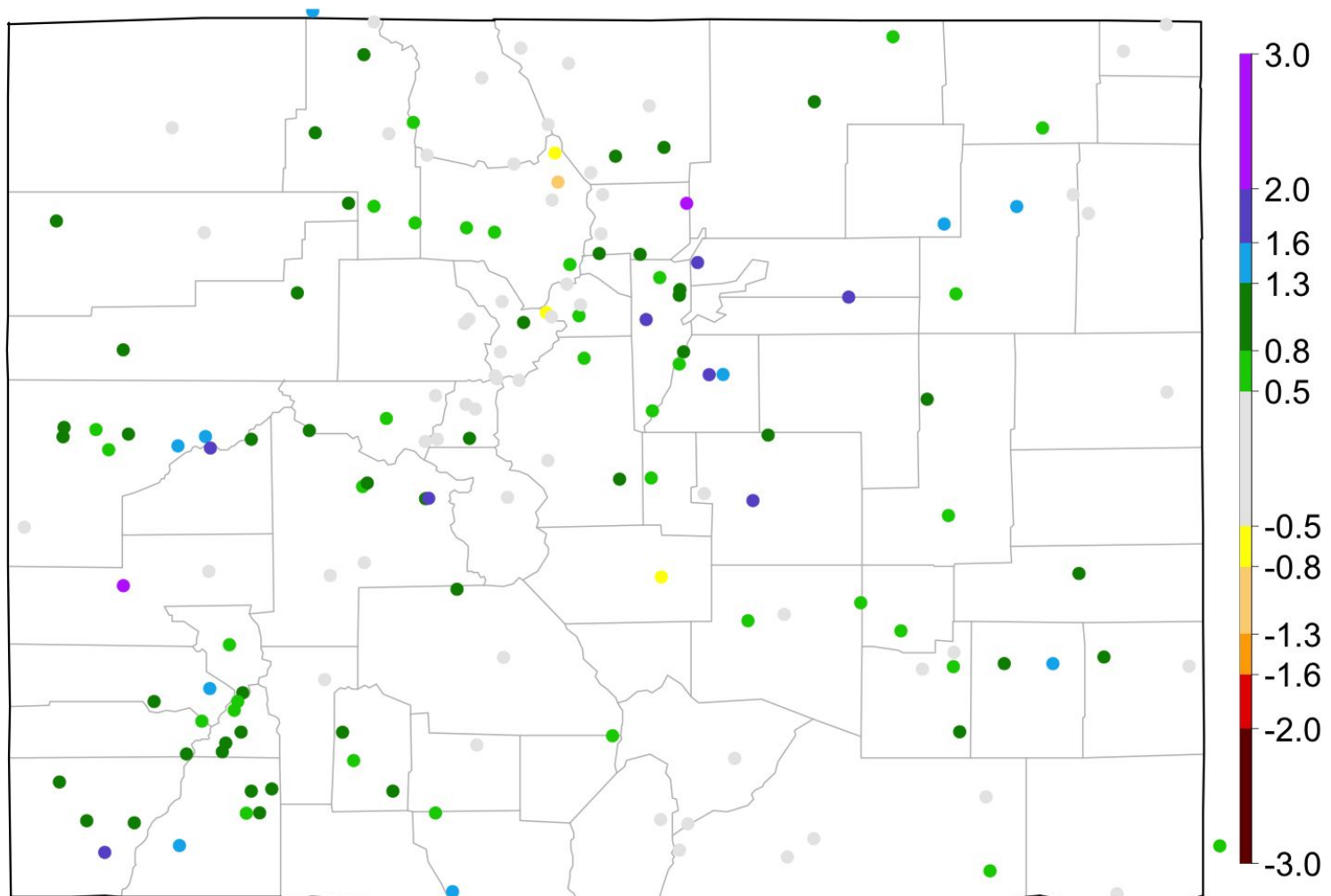


Data from High Plains Regional Climate Center and ACIS

<https://climate.colostate.edu/drought/>



12-month SPI: 2022/07/17 - 2023/07/16



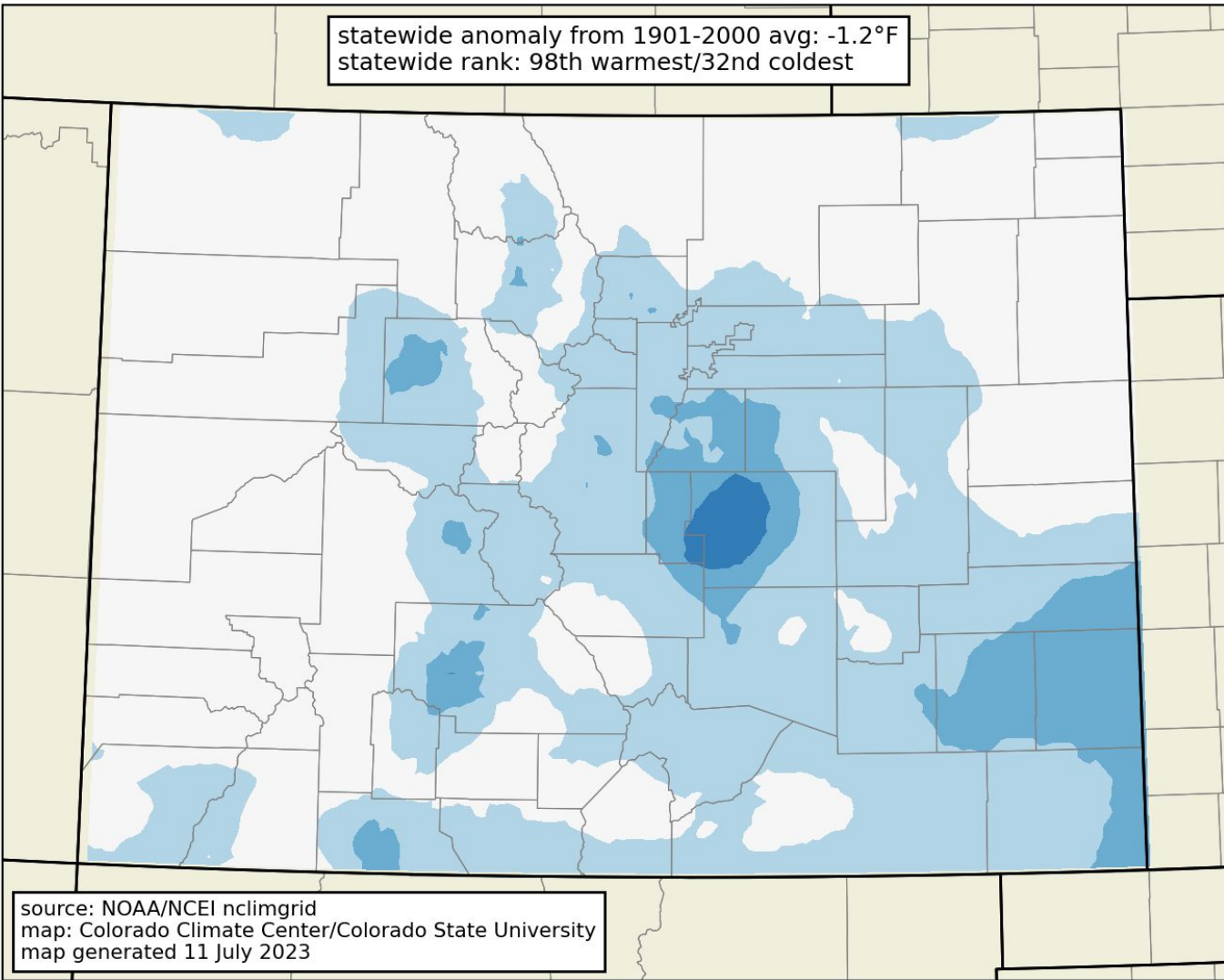
Data from High Plains Regional Climate Center and ACIS

<https://climate.colostate.edu/drought/>



average temperature rank: June 2023

statewide anomaly from 1901-2000 avg: -1.2°F
statewide rank: 98th warmest/32nd coldest



temperature rank out of 129 years (1895-2023)

https://climate.colostate.edu/co_cag/rank_maps.html



average temperature rank: 9 months ending June 2023 (Oct-Jun)

statewide anomaly from 1901-2000 avg: -0.5°F
statewide rank: 85th warmest/44th coldest

The last time Colorado experienced a water year below the 20th century average was 1993

2023 will be close. We are much below 1991-2020 averages

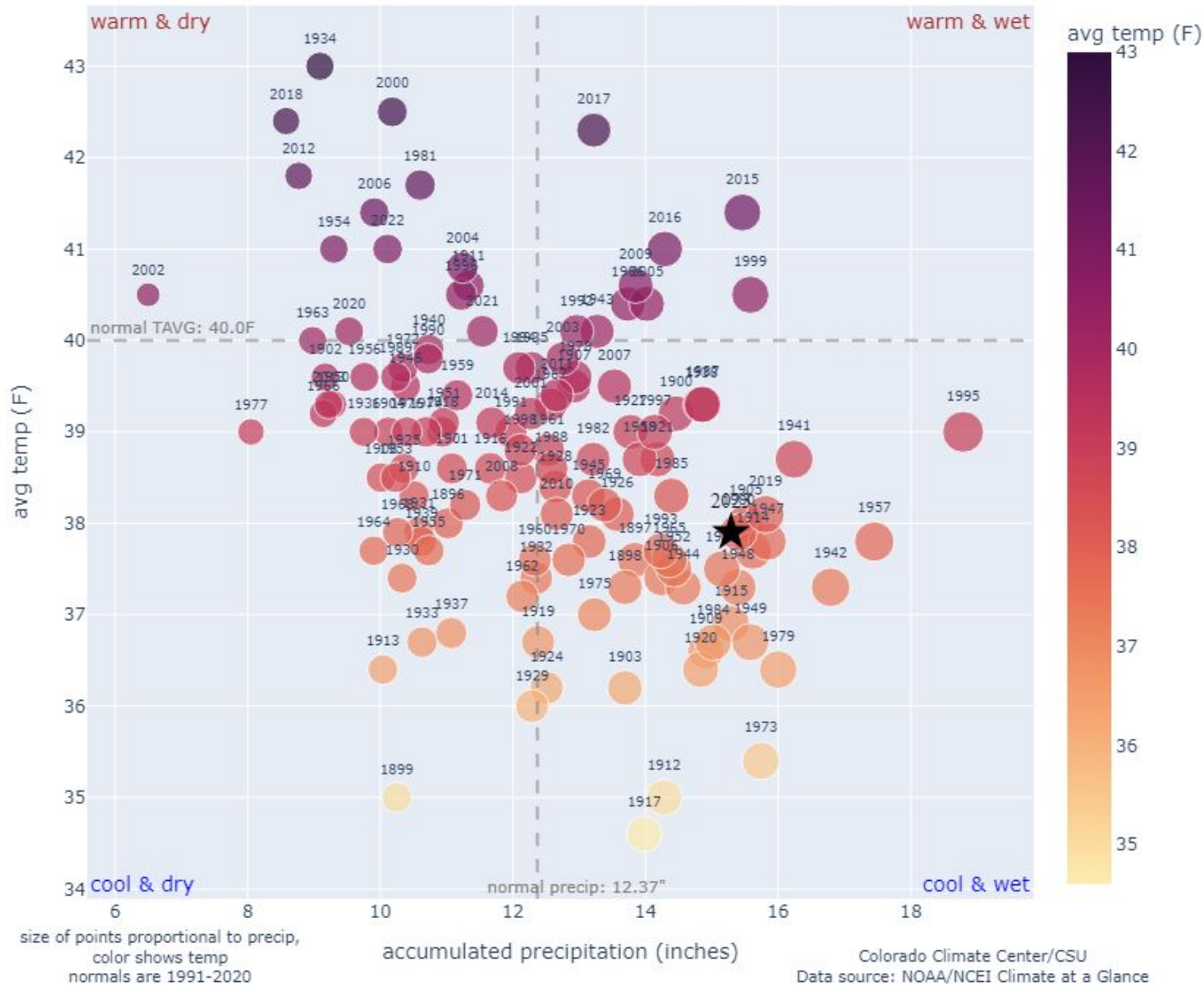
source: NOAA/NCEI nclimgrid
map: Colorado Climate Center/Colorado State University
map generated 11 July 2023



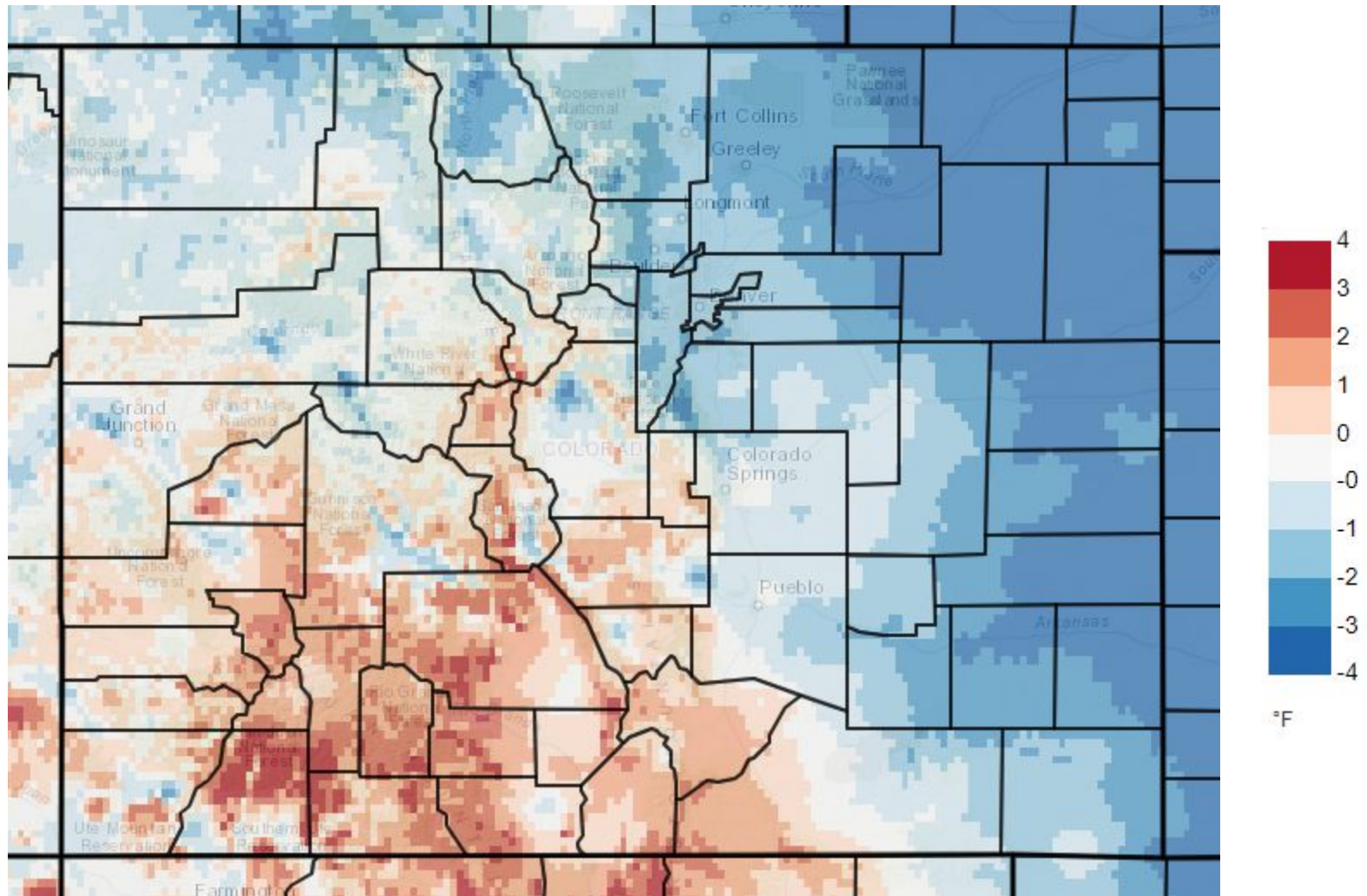
temperature rank out of 128 years (1896-2023)

https://climate.colostate.edu/co_cag/rank_maps.html

Colorado statewide average temperature and precipitation, October - June



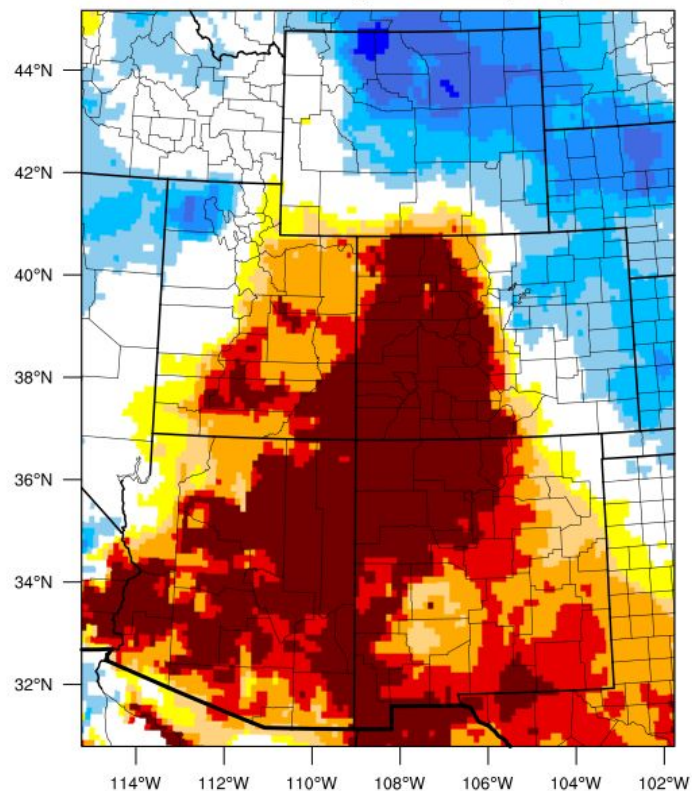
6/23-7/22 Departure from Normal Temperature



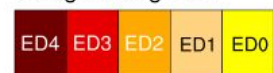
<https://climatetoolbox.org/tool/Climate-Mapper>



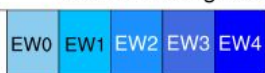
1-month EDDI categories for July 19, 2023



Drought categories



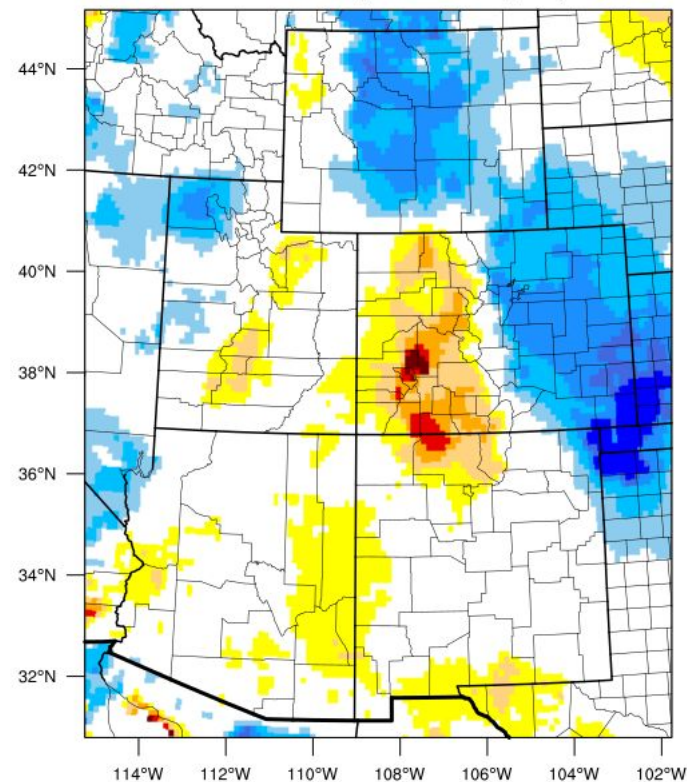
Wetness categories



100% 98% 95% 90% 80% 70% 30% 20% 10% 5% 2% 0%
(EDDI-percentile category breaks: 100% = driest; 0% = wettest)

Generated by NOAA/ESRL/Physical Sciences Laboratory

3-month EDDI categories for July 19, 2023



Drought categories



Wetness categories

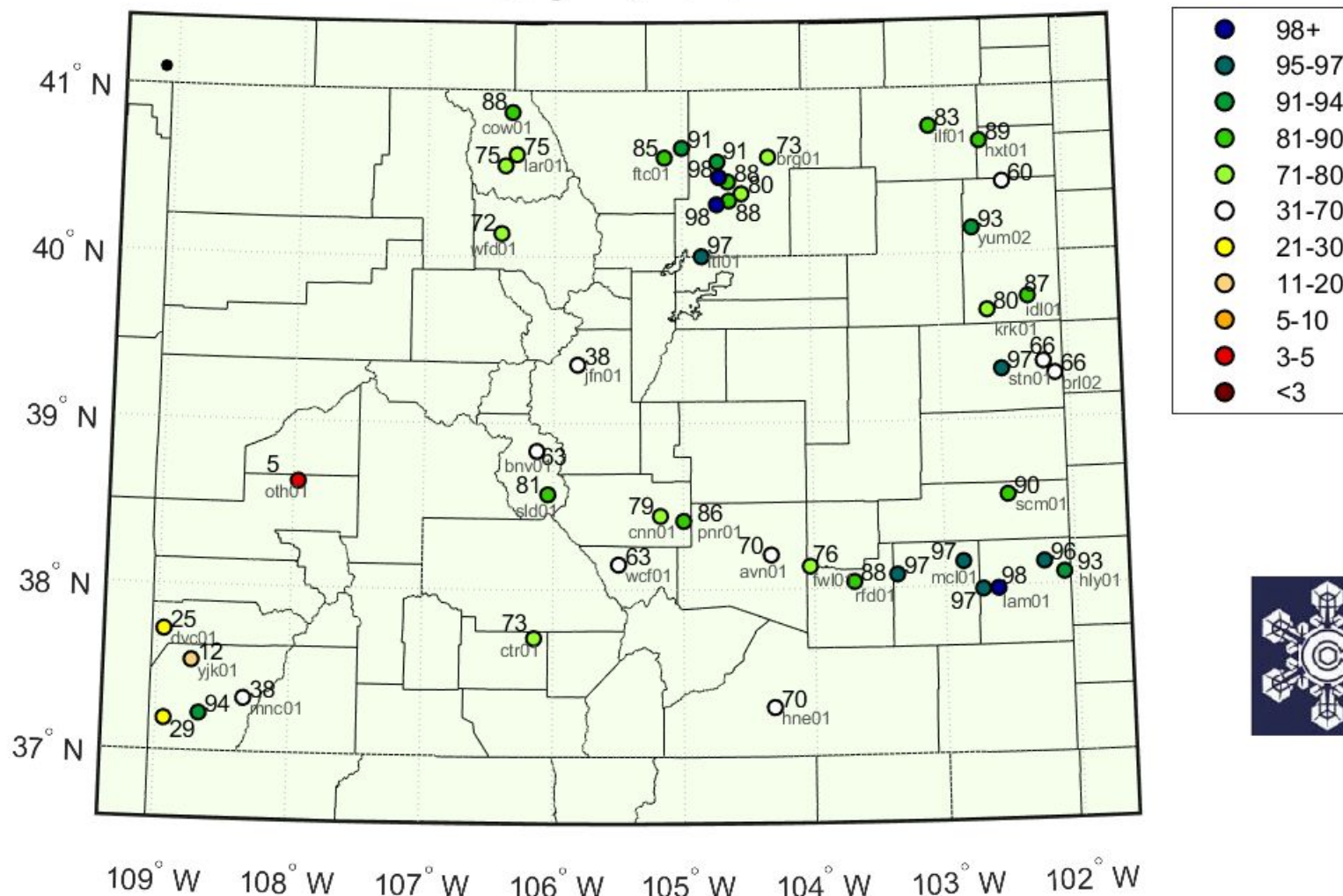


100% 98% 95% 90% 80% 70% 30% 20% 10% 5% 2% 0%
(EDDI-percentile category breaks: 100% = driest; 0% = wettest)

Generated by NOAA/ESRL/Physical Sciences Laboratory

<https://climate.colostate.edu/drought/>

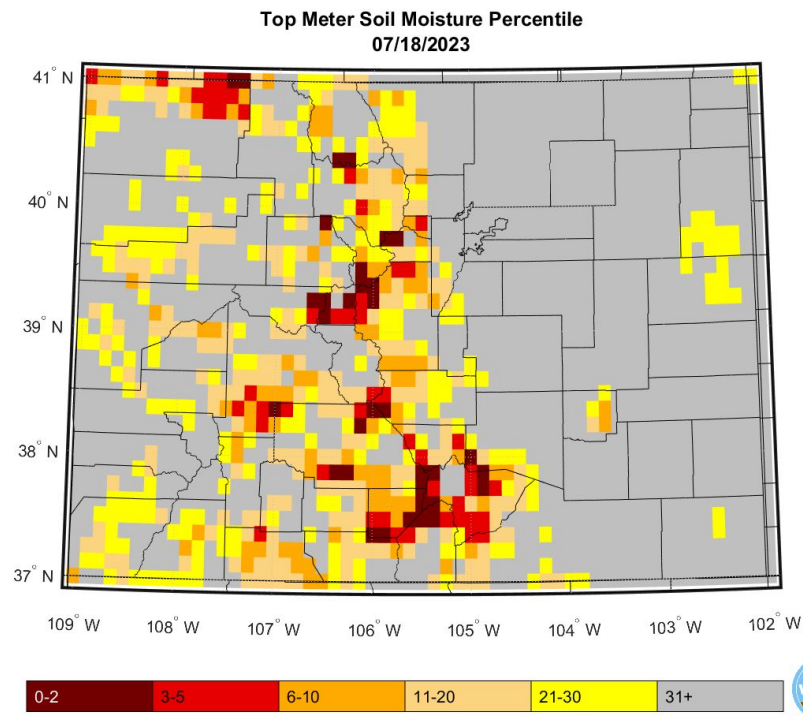
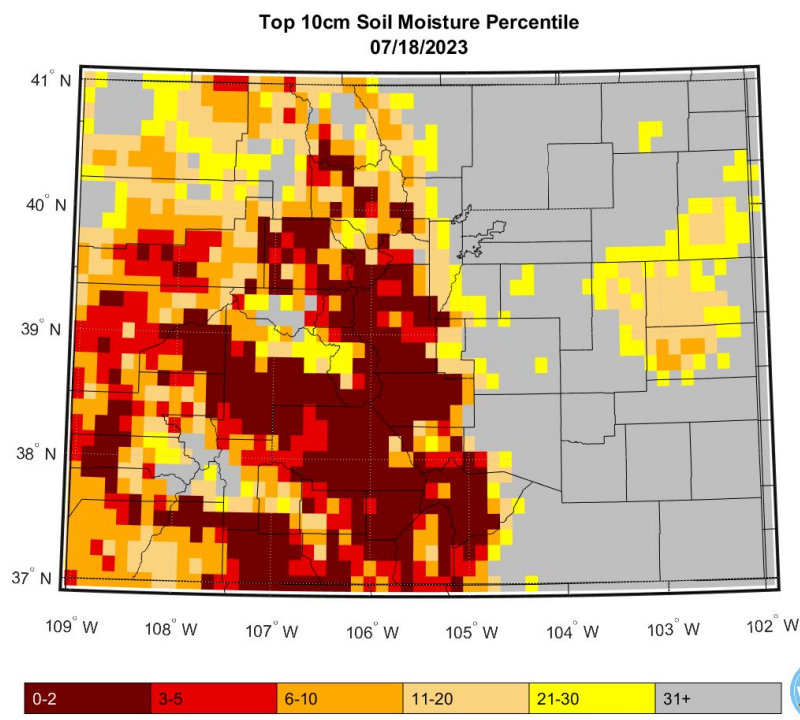
Growing Season Water Balance (P/PET) Percentiles July 21, 2023



<https://climate.colostate.edu/drought/>



Soil Moisture



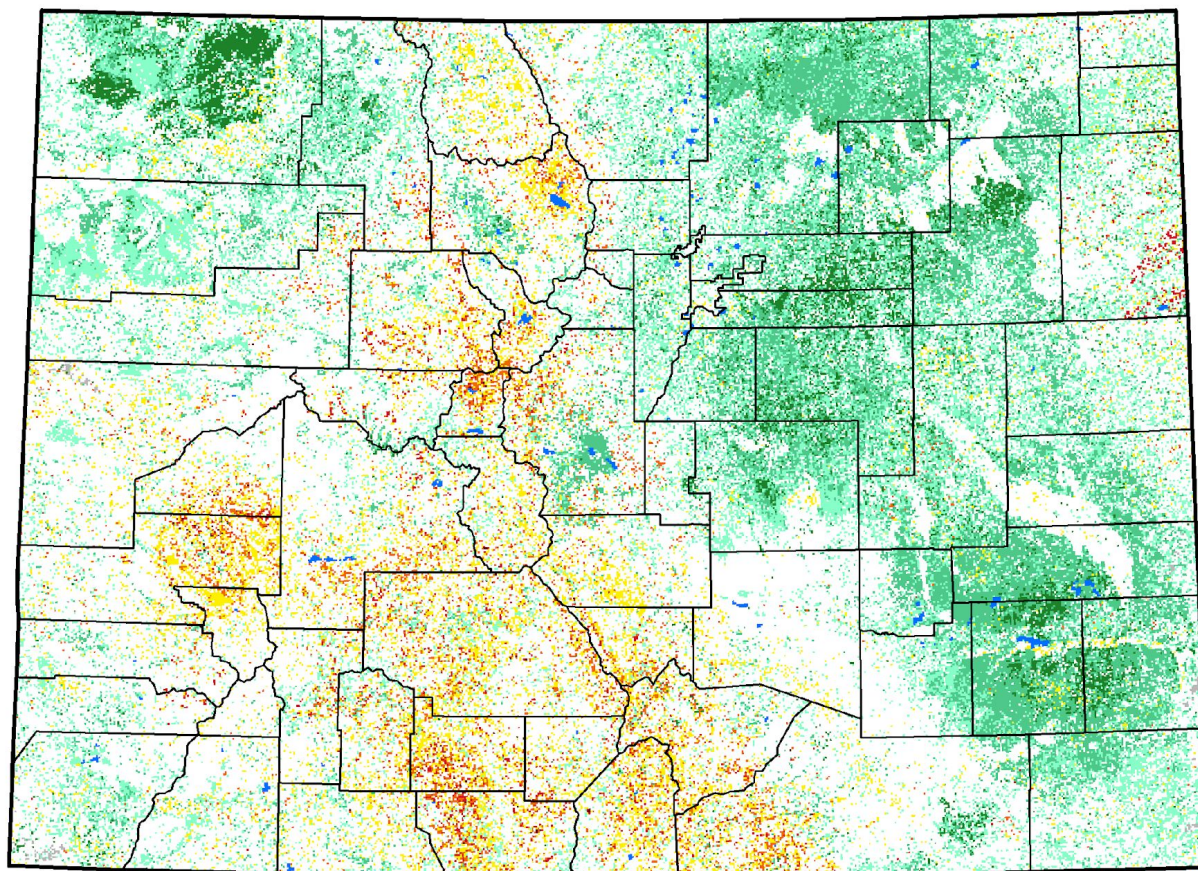
Shallow soil moisture has dried to much below normal levels in western Colorado with the delayed monsoon. Top meter soil moisture remains above average for much of eastern Colorado, but is slipping below average on the west slopes

<https://climate.colostate.edu/drought>

Vegetation Drought Response Index

Complete: Colorado

July 16, 2023



Vegetation Condition

- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-drought stress
- Near Normal
- Unusually Moist
- Very Moist
- Extreme Moist
- Out of Season
- Water



<https://climate.colostate.edu/drought>





Drought

National Drought

Colorado Drought

Some Drought Facts



U.S. Drought Monitor Colorado

July 18, 2023

(Released Thursday, Jul. 20, 2023)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	79.95	20.05	0.00	0.00	0.00	0.00
Last Week 07-11-2023	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 04-18-2023	44.07	55.93	44.01	14.50	4.52	0.43
Start of Calendar Year 01-03-2023	39.97	60.03	33.83	12.28	1.91	0.01
Start of Water Year 09-27-2022	15.46	84.54	45.65	15.47	3.73	0.57
One Year Ago 07-19-2022	2.78	97.22	82.26	40.36	4.91	0.00

Intensity:

 None	 D2 Severe Drought
 D0 Abnormally Dry	 D3 Extreme Drought
 D1 Moderate Drought	 D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

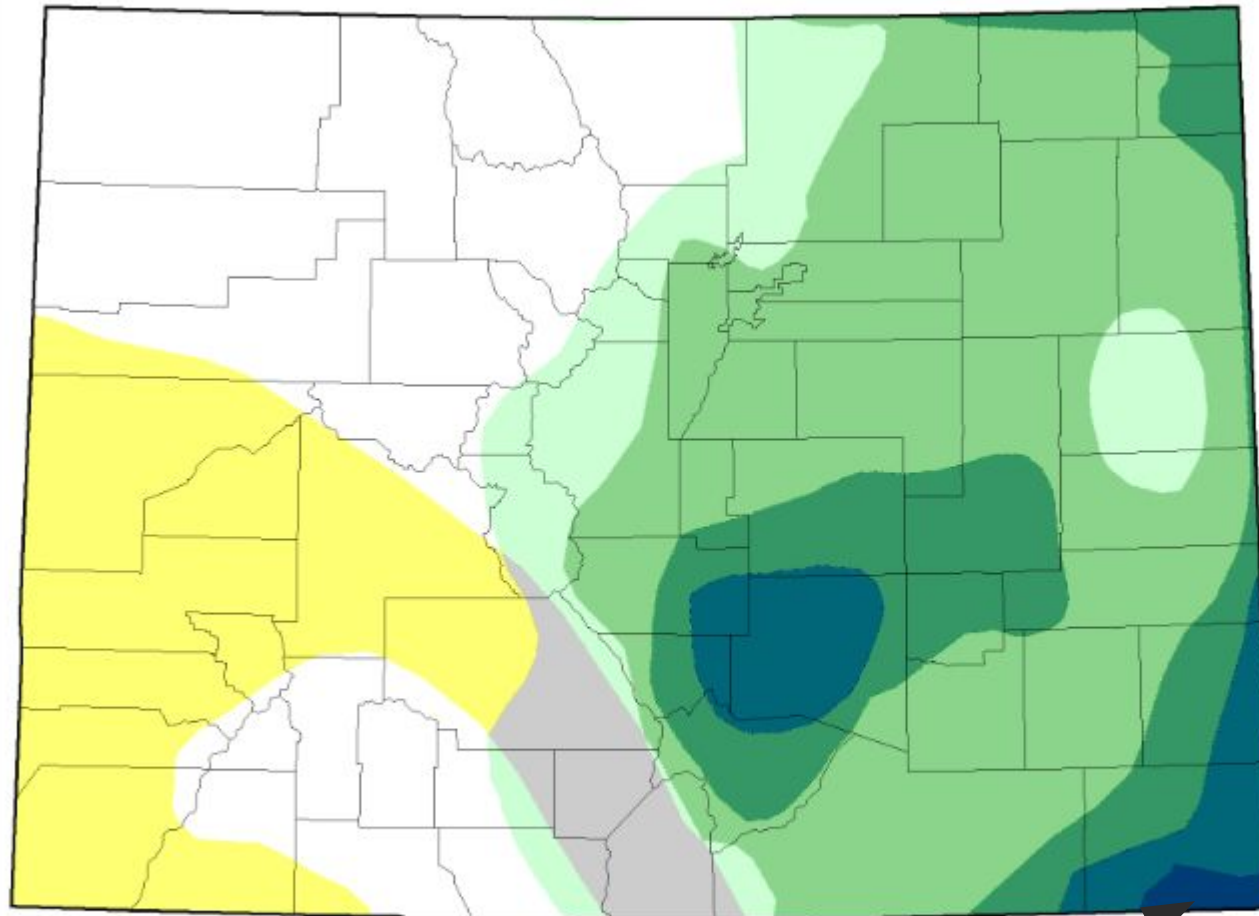
Richard Tinker
CPC/NOAA/NWS/NCEP



droughtmonitor.unl.edu



U.S. Drought Monitor Class Change - Colorado 12 Week



- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

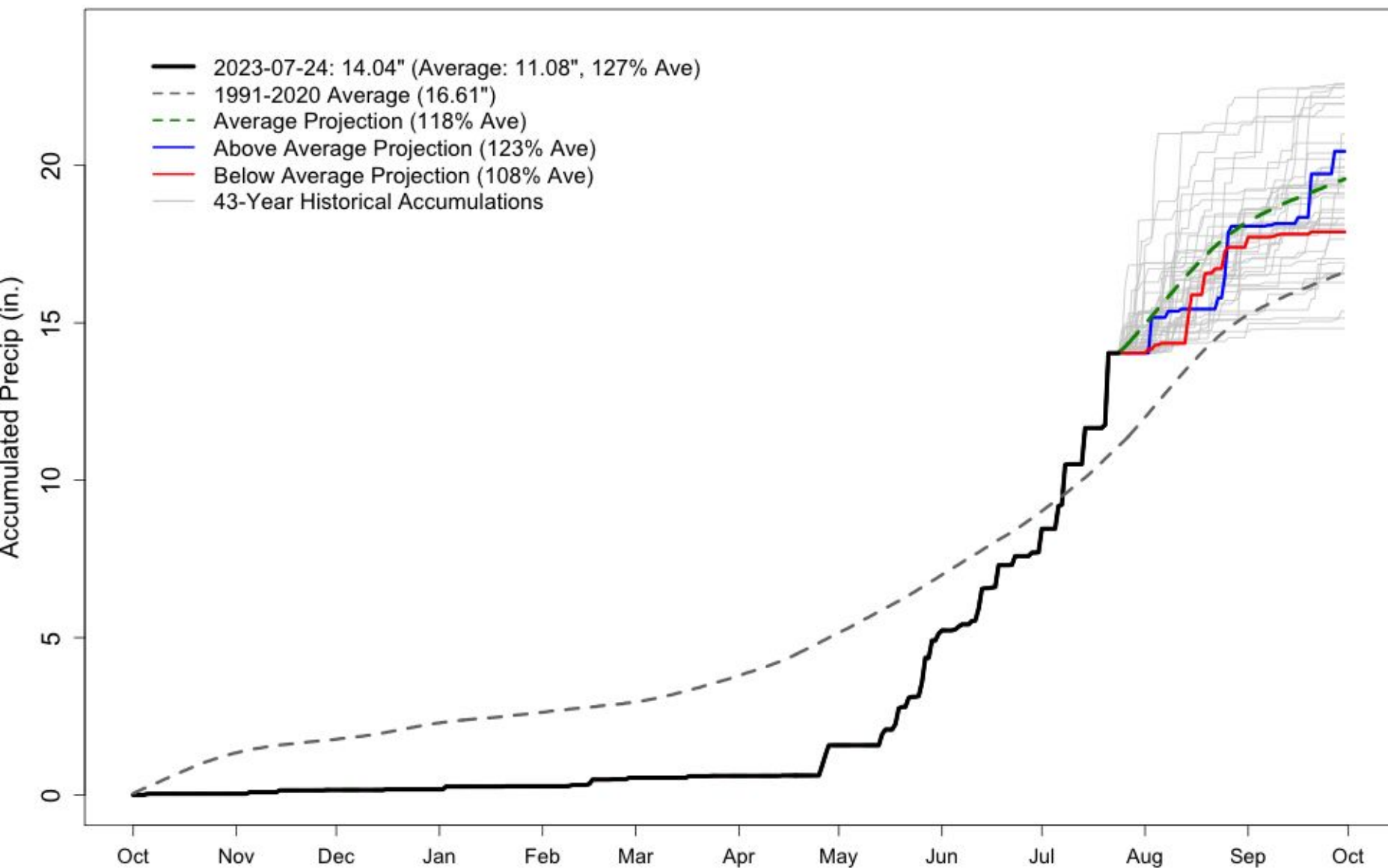
July 18, 2023
compared to
April 25, 2023

droughtmonitor.unl.edu

5-class improvement!



CAMPO 7 S WY2023 Precipitation Projections





Outlook

Next 7 days

8-14 day Outlook

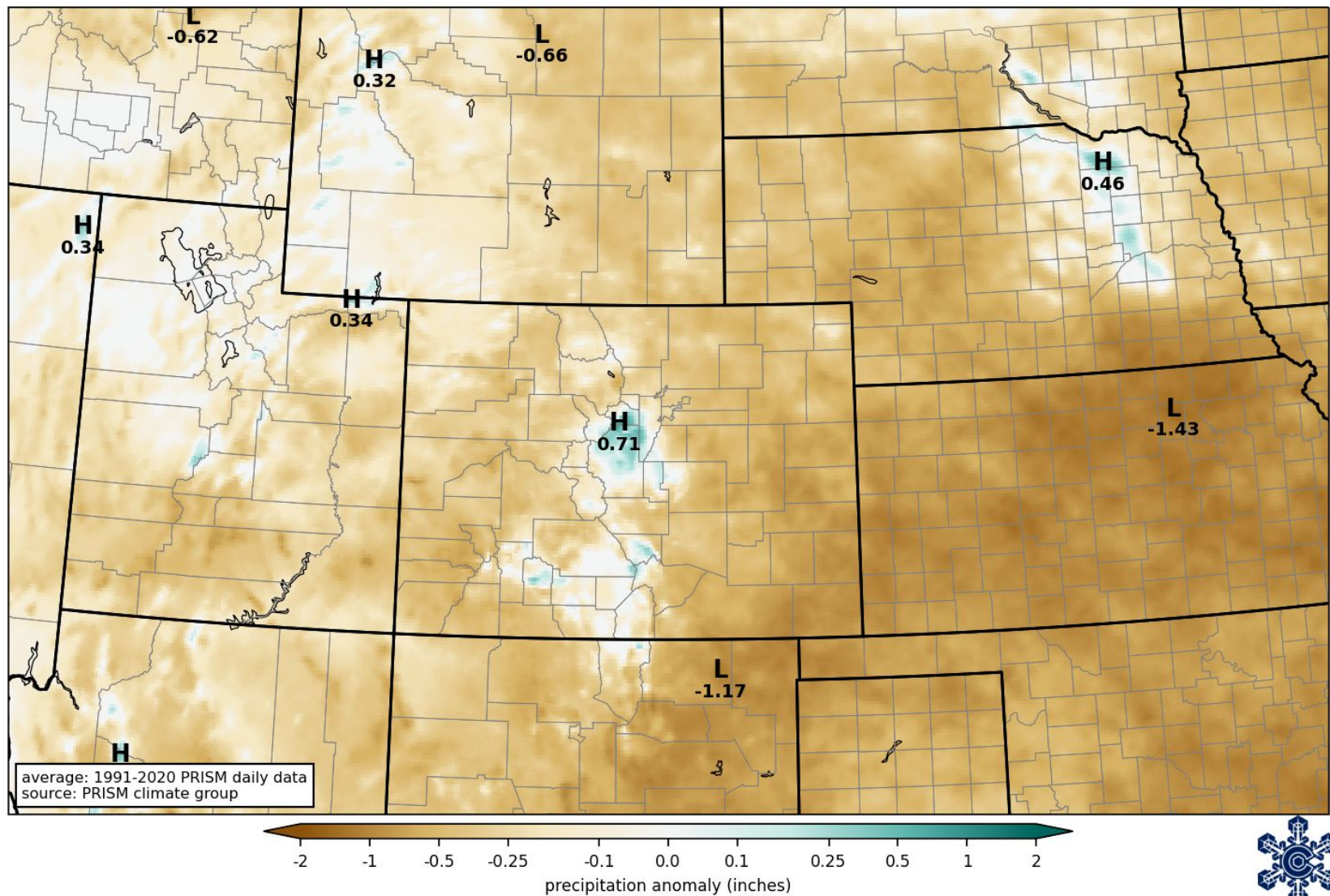
CPC Outlooks

El Niño

NOAA 7-day precip forecast

NOAA Weather Prediction Center
7-day precip forecast departure from average

forecast issued 1200 UTC Mon 24 Jul 2023
precipitation in 168 hrs ending 1200 UTC Mon 31 Jul 2023



<http://schumacher.atmos.colostate.edu/weather/>

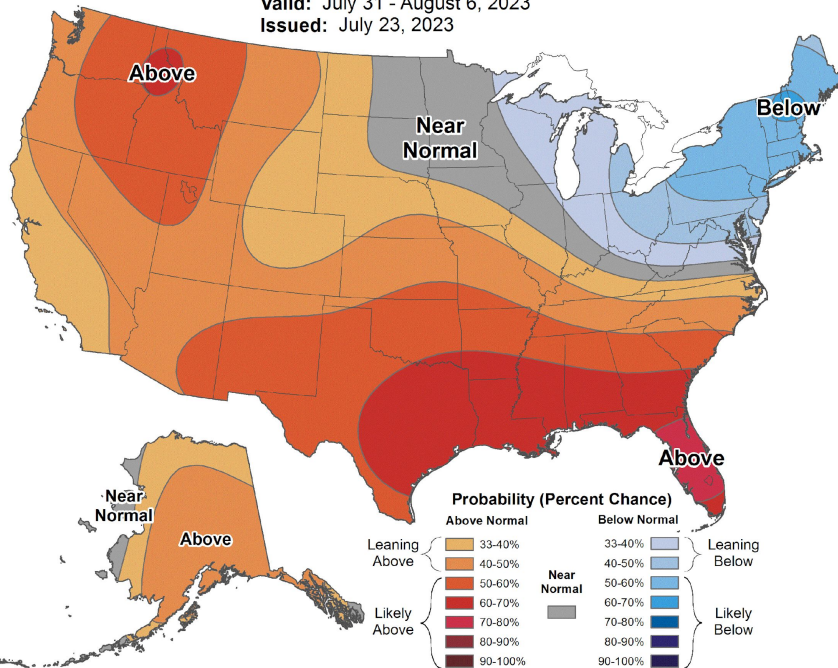


8-14 day outlook



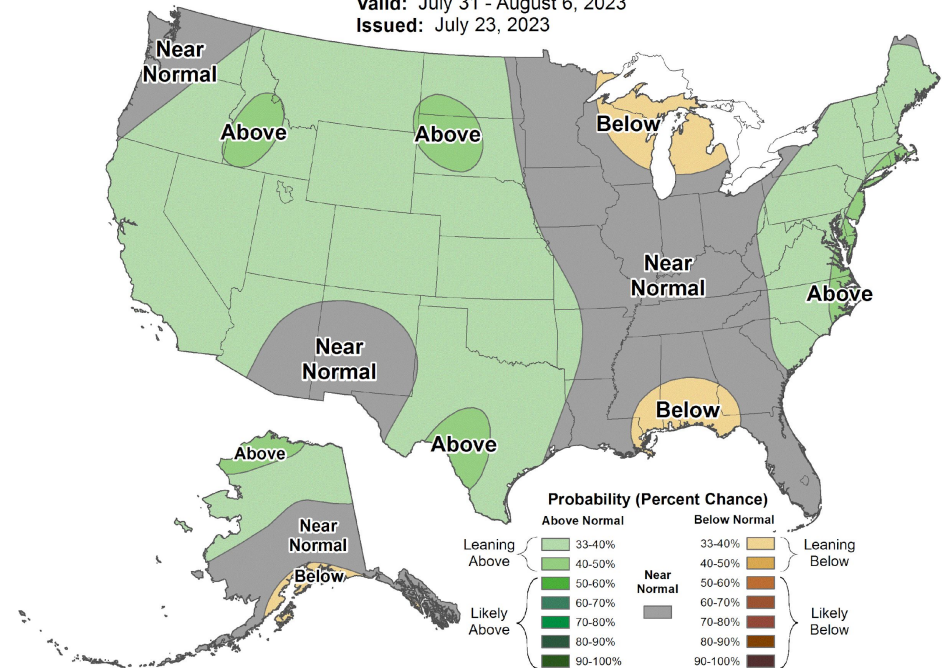
8-14 Day Temperature Outlook

Valid: July 31 - August 6, 2023
Issued: July 23, 2023



8-14 Day Precipitation Outlook

Valid: July 31 - August 6, 2023
Issued: July 23, 2023



Above average temperatures likely to persist. Could see cool front dip down from northeast bringing some moisture from the central US. Perhaps some monsoonal moisture?

<https://www.cpc.ncep.noaa.gov>



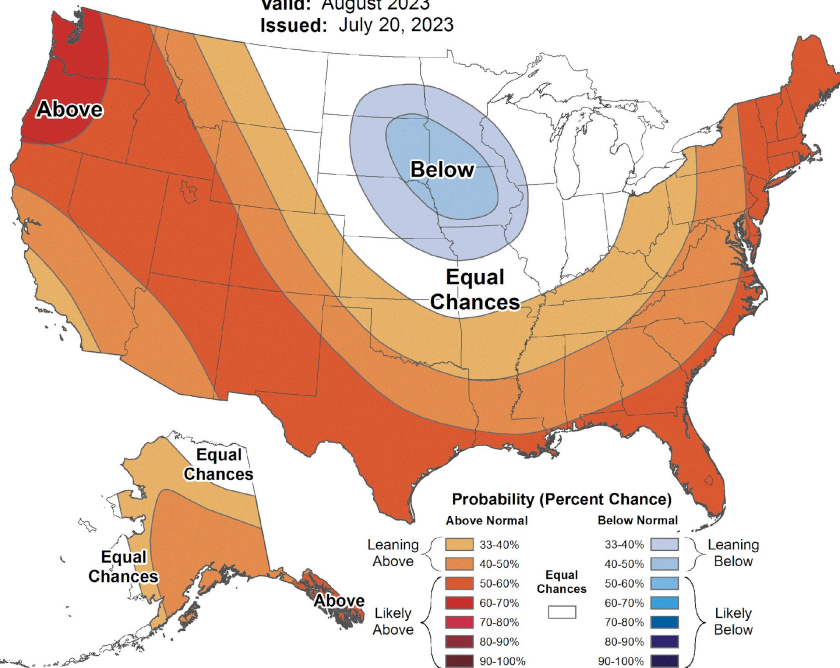
Seasonal outlook



Monthly Temperature Outlook



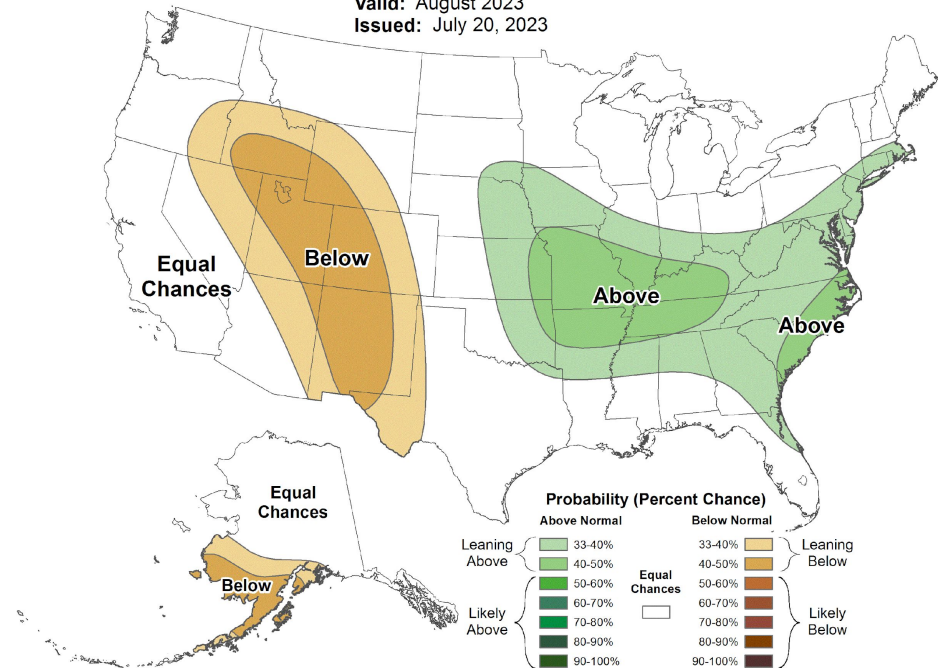
Valid: August 2023
Issued: July 20, 2023



Monthly Precipitation Outlook



Valid: August 2023
Issued: July 20, 2023



<https://www.cpc.ncep.noaa.gov>



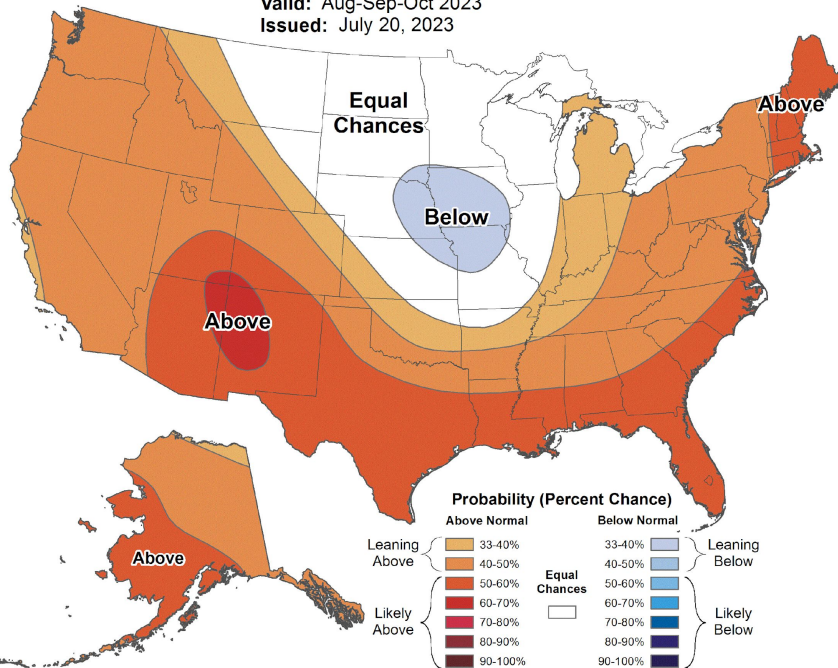
Seasonal outlook



Seasonal Temperature Outlook



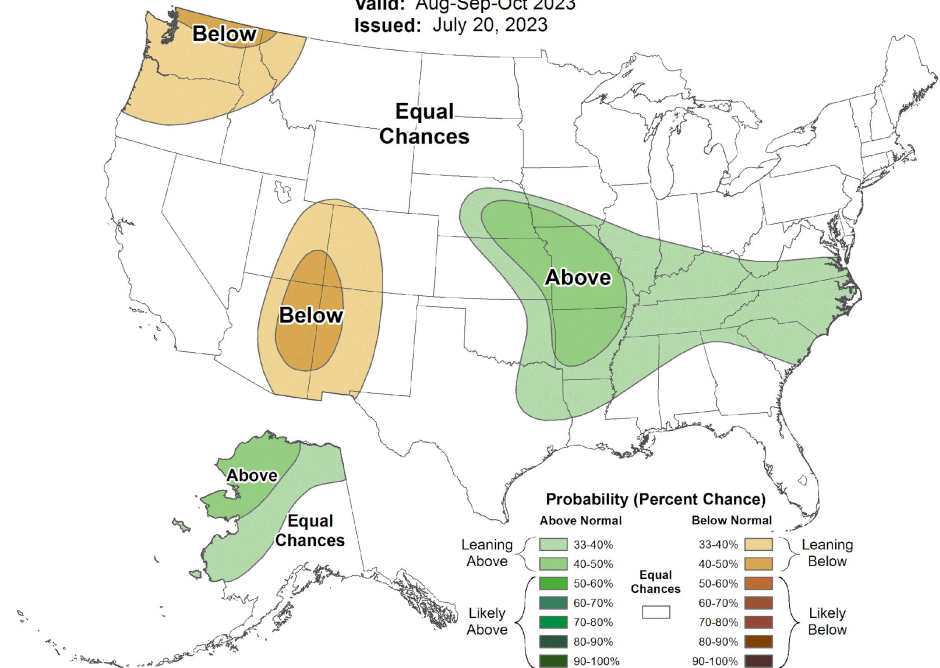
Valid: Aug-Sep-Oct 2023
Issued: July 20, 2023



Seasonal Precipitation Outlook



Valid: Aug-Sep-Oct 2023
Issued: July 20, 2023



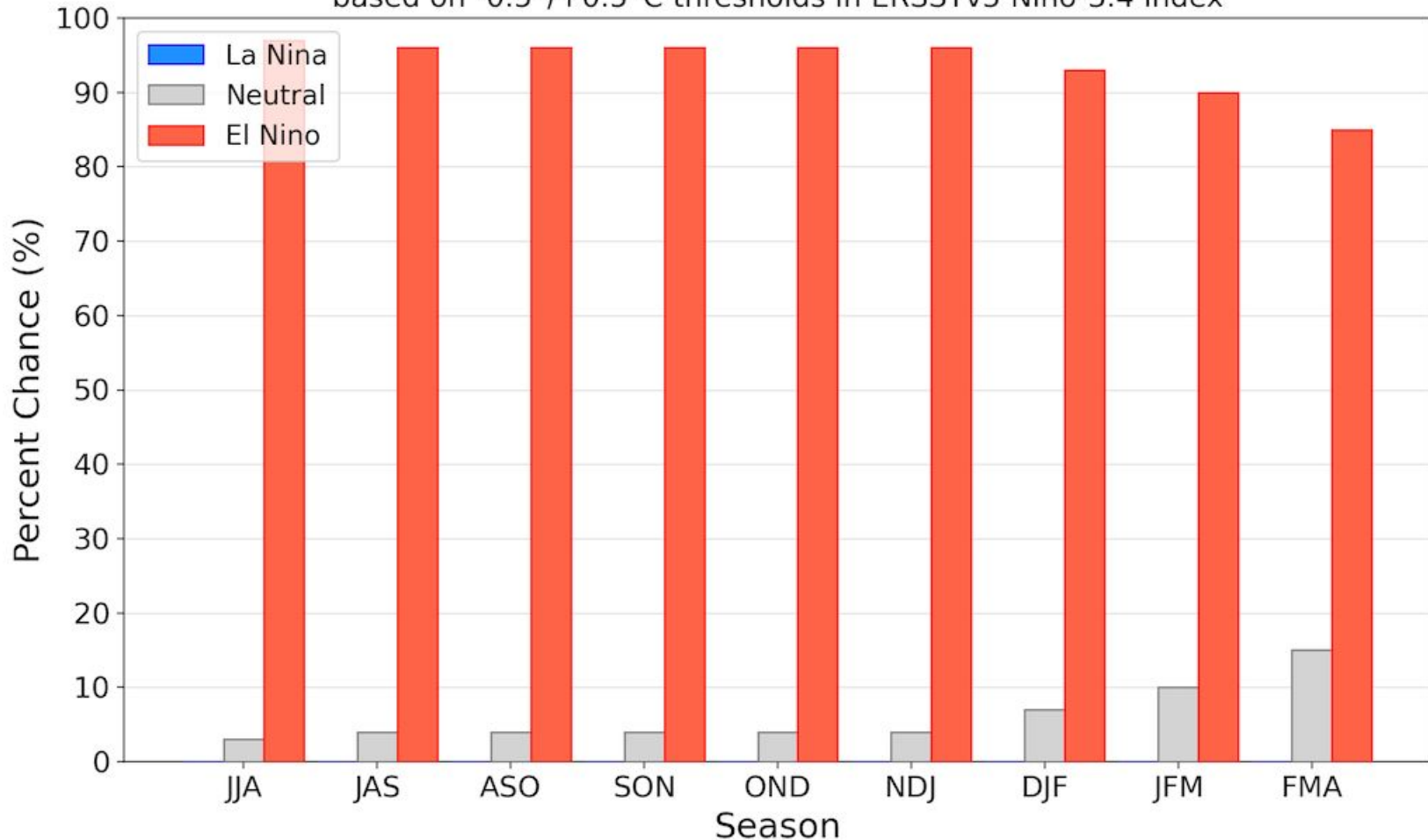
<https://www.cpc.ncep.noaa.gov>



What's the ENSO forecast?

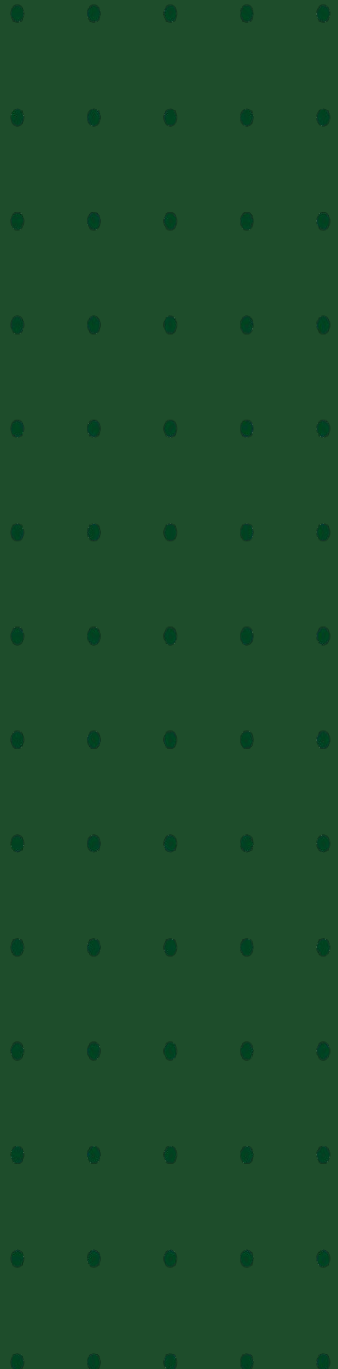
Official NOAA CPC ENSO Probabilities (issued July 2023)

based on $-0.5^{\circ}/+0.5^{\circ}\text{C}$ thresholds in ERSSTv5 Niño-3.4 index



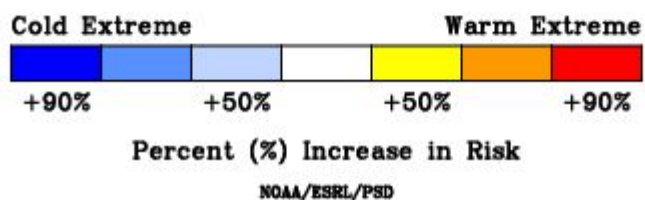
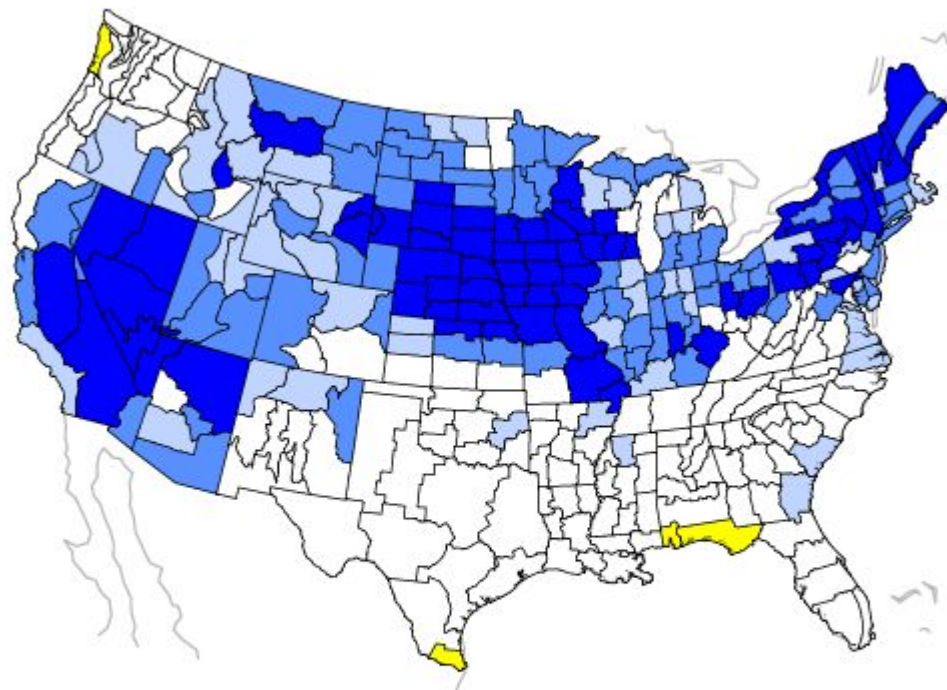
<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>



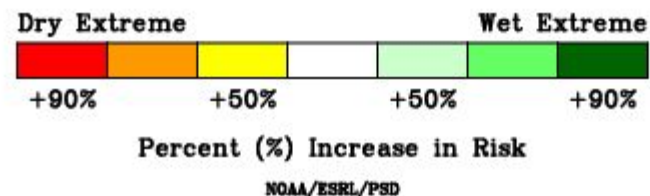
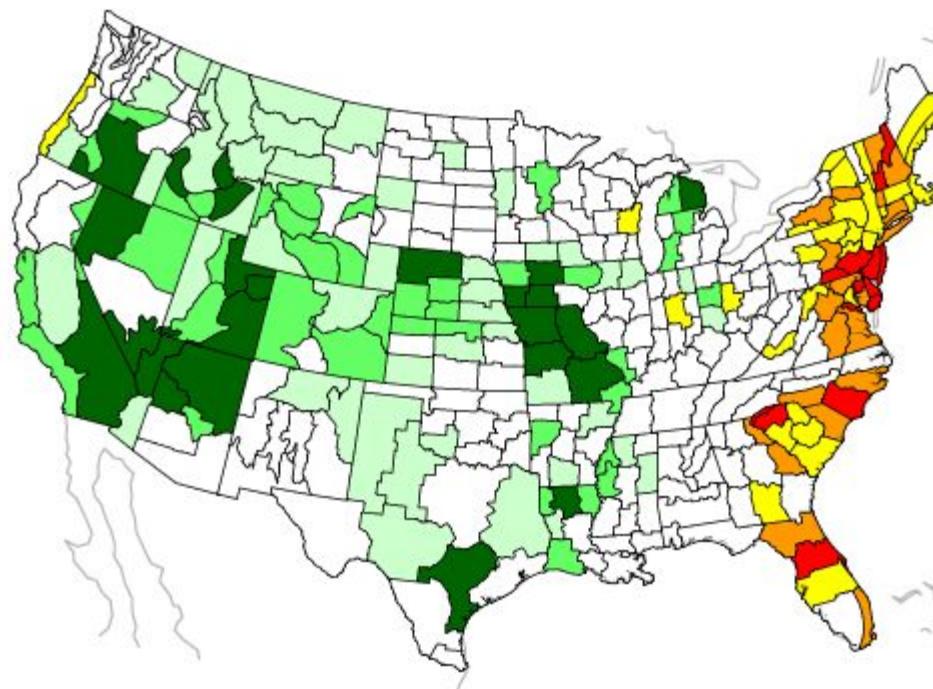
A decorative graphic on the left side of the slide, consisting of a grid of small, dark green dots arranged in 10 rows and 5 columns.

What does El Niño
mean for the fall?

ASO Temperature During El Nino
Increased Risk of Warm or Cold Extremes



ASO Precipitation During El Nino
Increased Risk of Wet or Dry Extremes

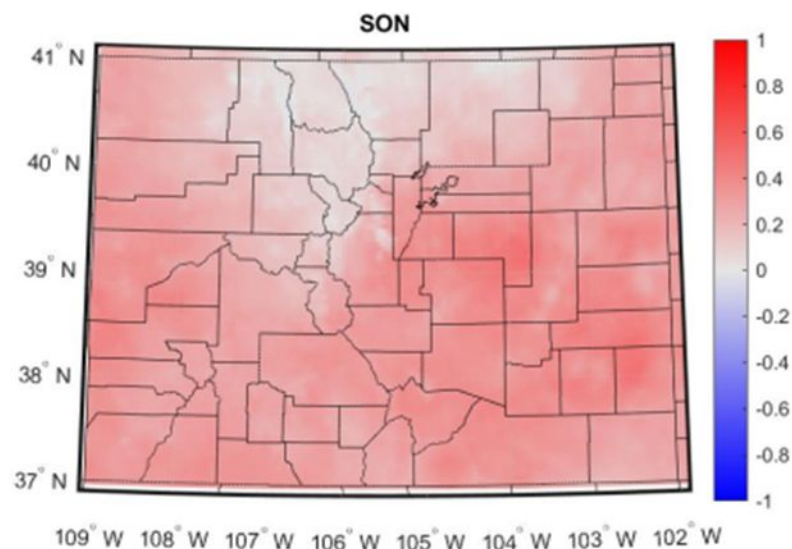
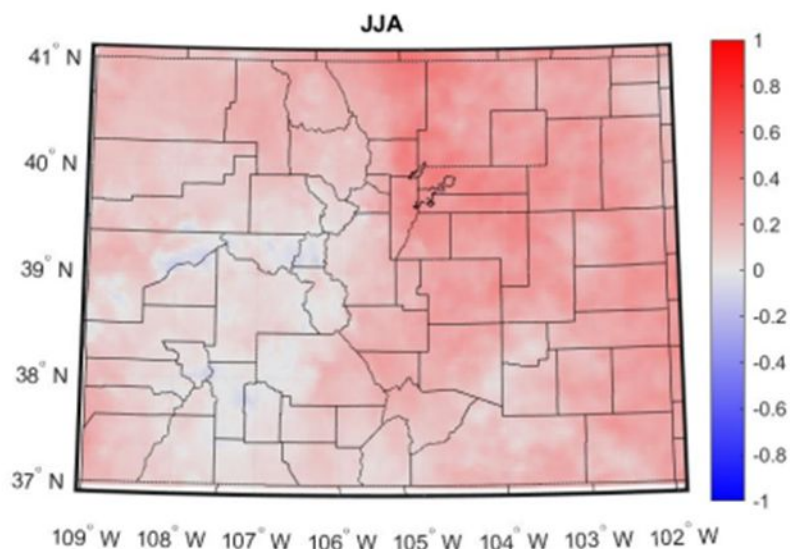
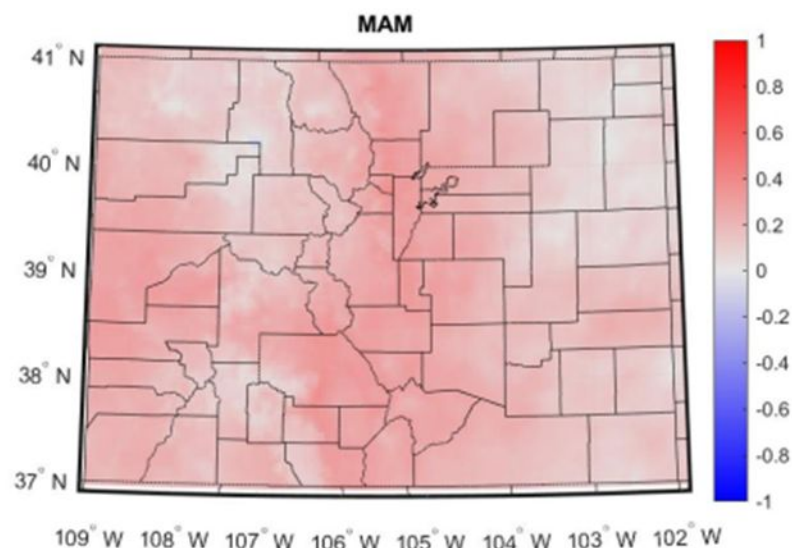
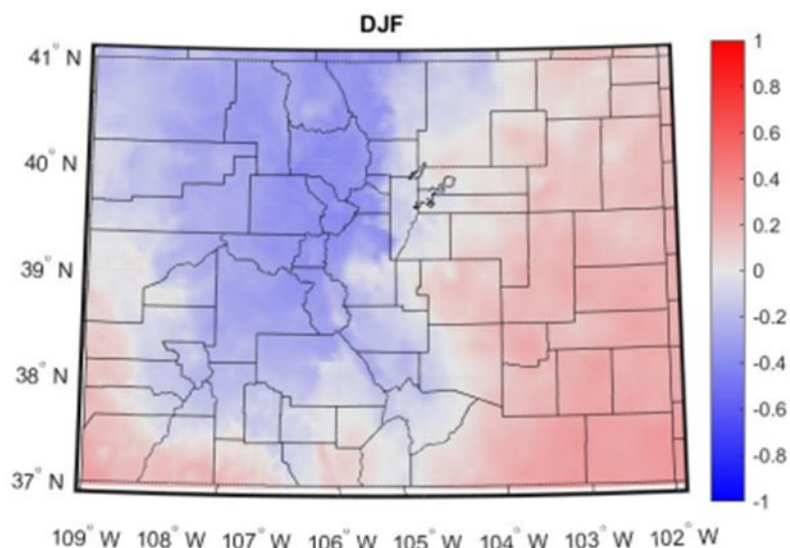


Risk of extremes during a El Niño, from <https://psl.noaa.gov/enso/climaterisks/>

The region is generally more likely to see cool and wet extremes in the fall during a El Niño. A languishing monsoon complicates this picture, especially for southwestern CO



Correlation Between ENSO ONI and Seasonal Precipitation in Colorado (1951-2020)



Blue = La Niña wetter Red = El Niño wetter



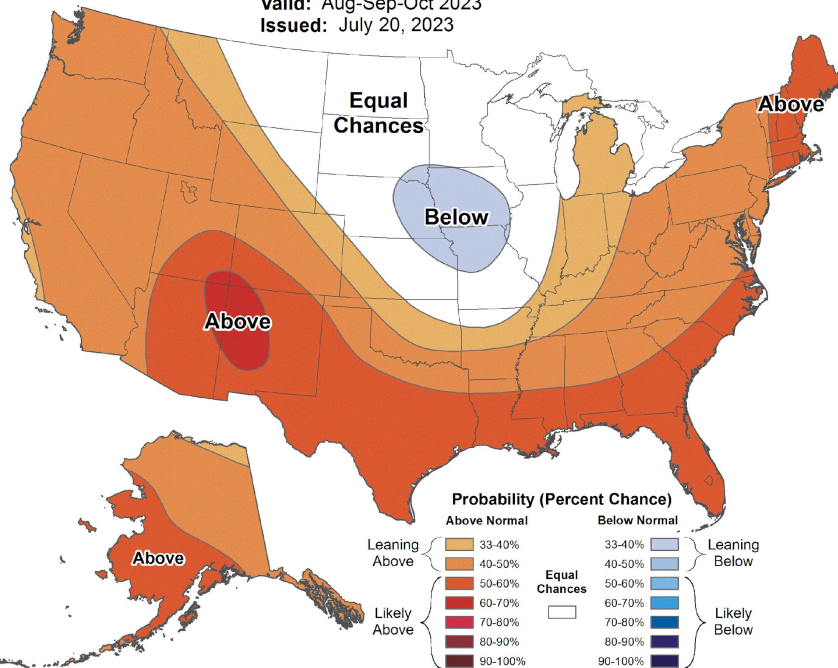
Seasonal outlook



Seasonal Temperature Outlook



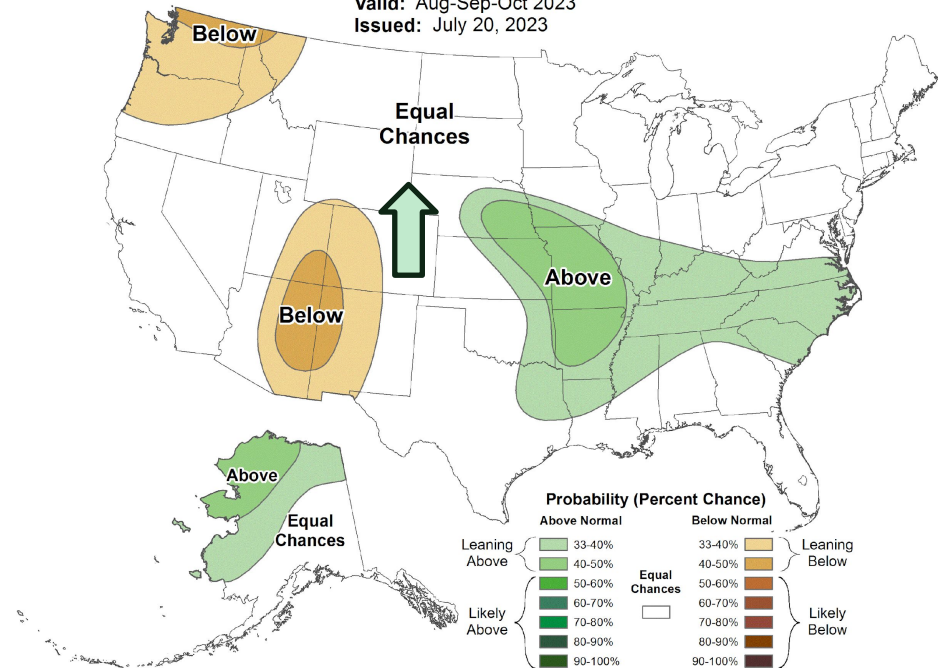
Valid: Aug-Sep-Oct 2023
Issued: July 20, 2023



Seasonal Precipitation Outlook



Valid: Aug-Sep-Oct 2023
Issued: July 20, 2023



<https://www.cpc.ncep.noaa.gov>



Key Takeaways

- ❑ June was much wetter than normal for eastern Colorado. Some stations received their all-time wettest month
- ❑ Moisture-laden air and thunderstorms kept daytime temperatures down, which lead to a cooler than normal June
- ❑ Dry conditions have crept back in for western Colorado, leading to reintroduction of short-term D0
- ❑ Below average monsoon is expected to continue, but El Niño conditions do raise our likelihood of cool and wet conditions during fall
- ❑ We will be hosting at Climate Services Summit at the CSU SPUR Hydro building on August 8-9th Registration is open!
https://climate.colostate.edu/climate_summit.html



Thanks!

To view this and other presentations:
https://climate.colostate.edu/ccc_archive.html