Colorado Climate Update

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Water Availability Task Force

September 19, 2023

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ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

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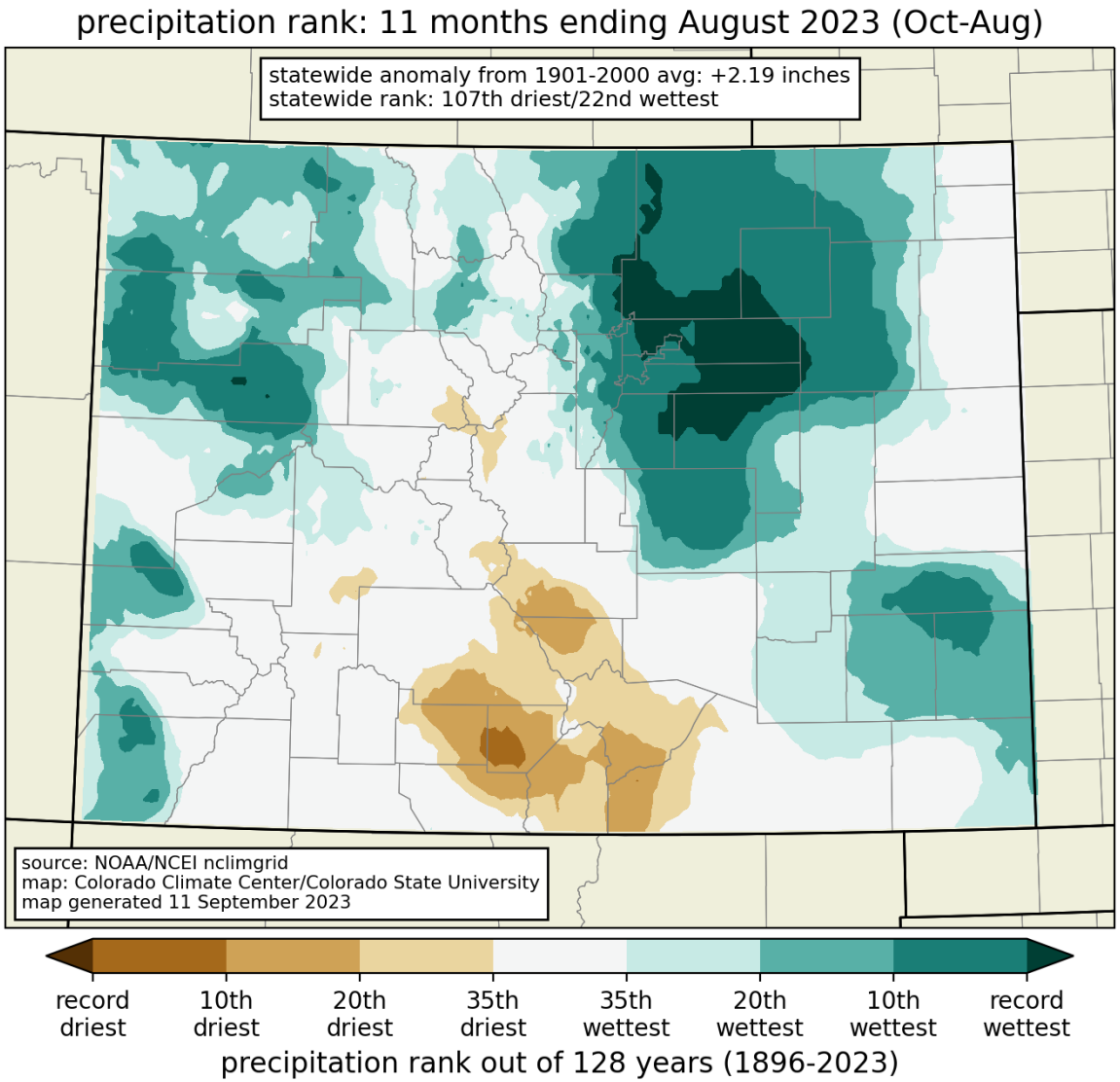
2023 Water Year to Date

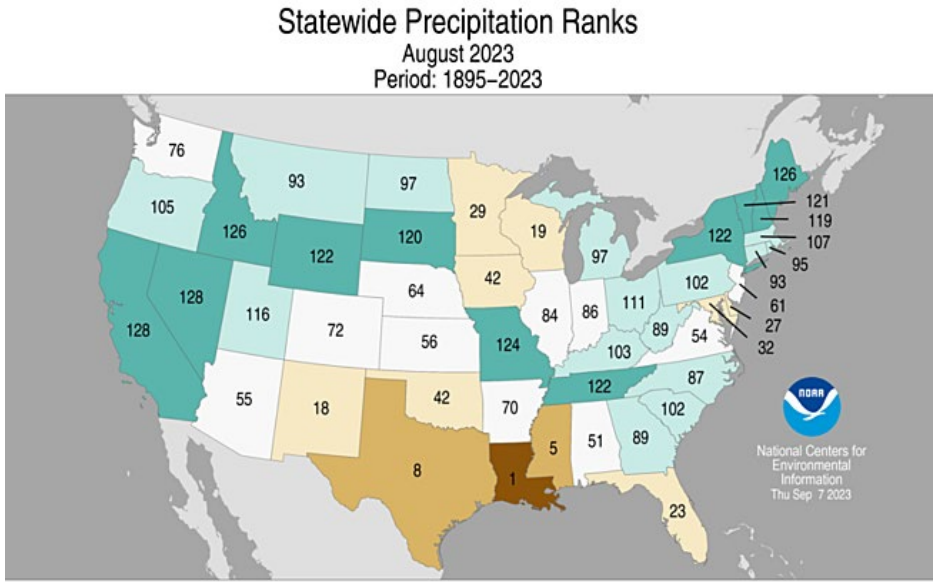
A look at Summer 2023

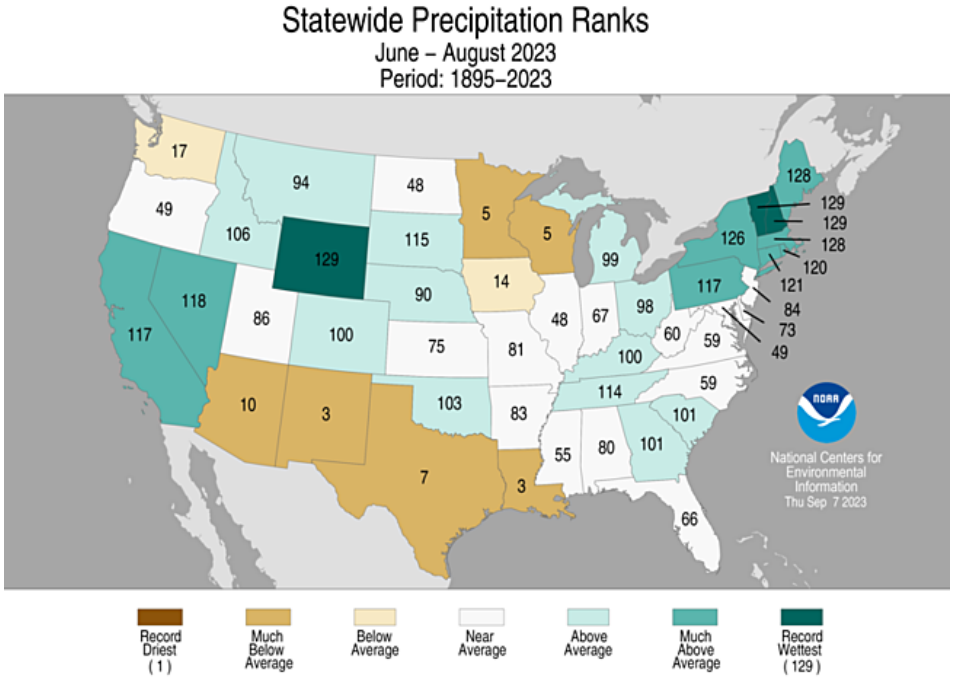
Water Year 2023 has been wetter than average for many areas, and at least near average for most of the state.

Record wet conditions in the northeast plains. Dry conditions around the Sangre de Cristos and San Luis Valley.



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

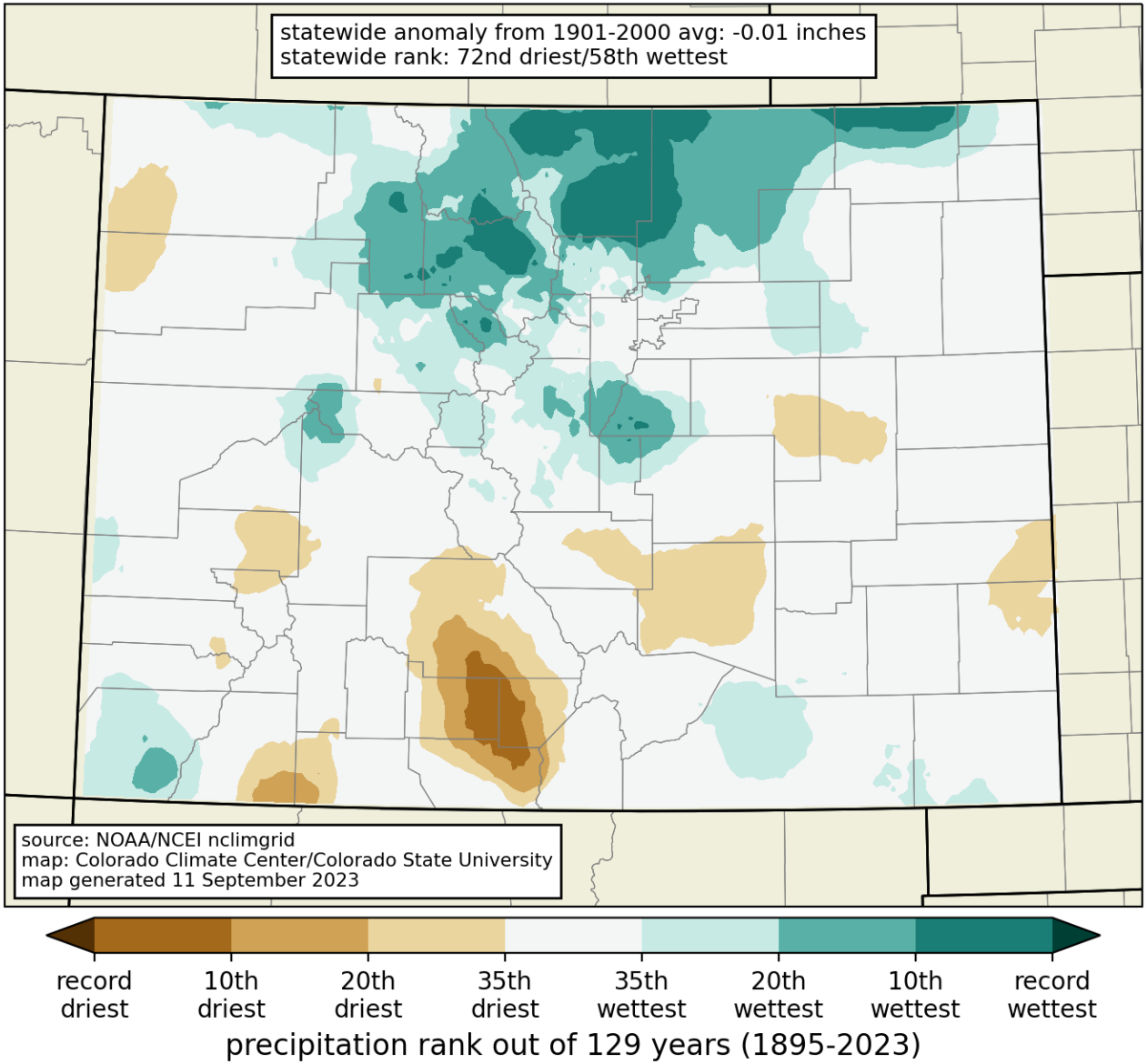




Month	P Rank (of 129 years)	Above, below, or near 20th century avg?
Oct	62nd driest	near avg
Nov	52nd driest	near avg
Dec	20th wettest	above
Jan	10th wettest	much above
Feb	62nd wettest	near avg
Mar	32nd wettest	above
Apr	37th driest	below
May	22nd wettest	above
Jun	8th wettest	much above
Jul	30th driest	below
Aug	58th wettest	near avg
Sep		

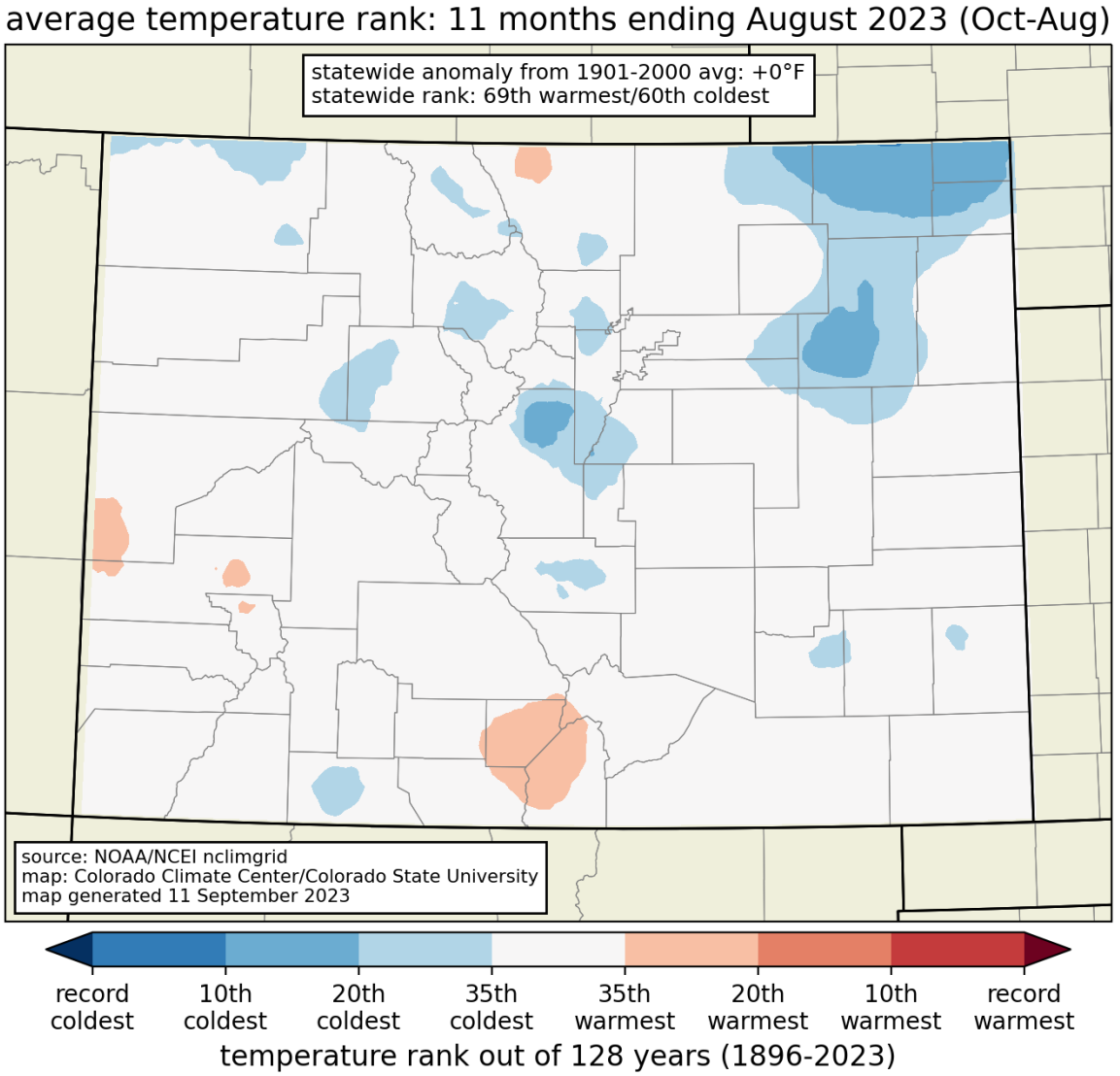
https://www.ncdc.noaa.gov/temp-and-precip/us-maps/

precipitation rank: August 2023



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

Water Year 2023 has been near average for temperature for most of the state.



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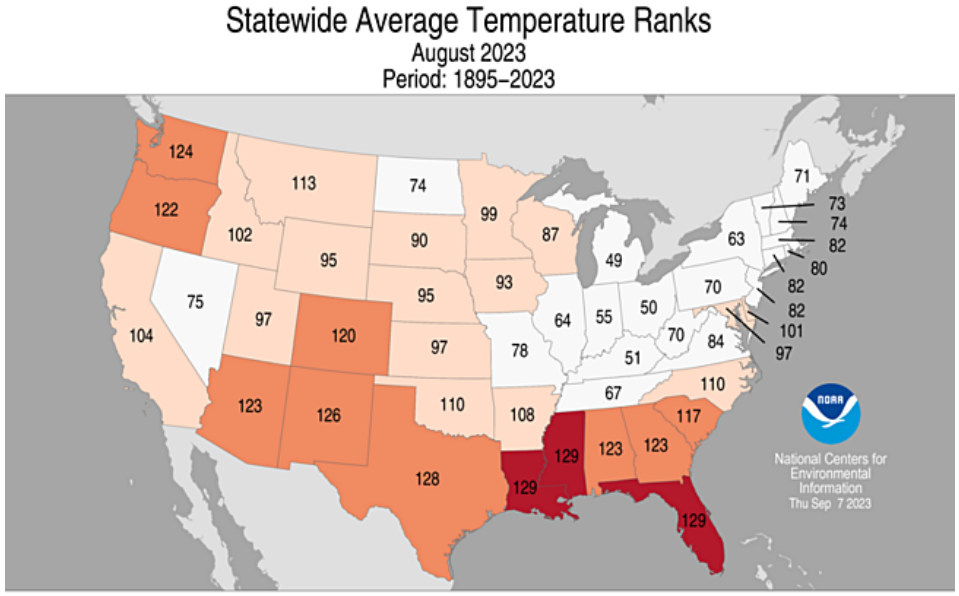
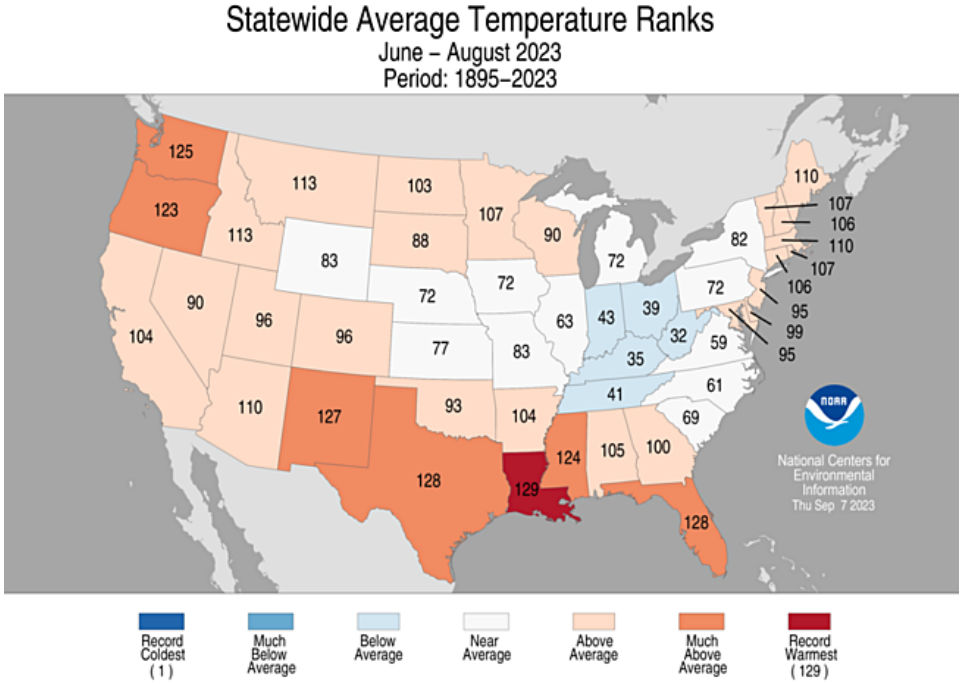
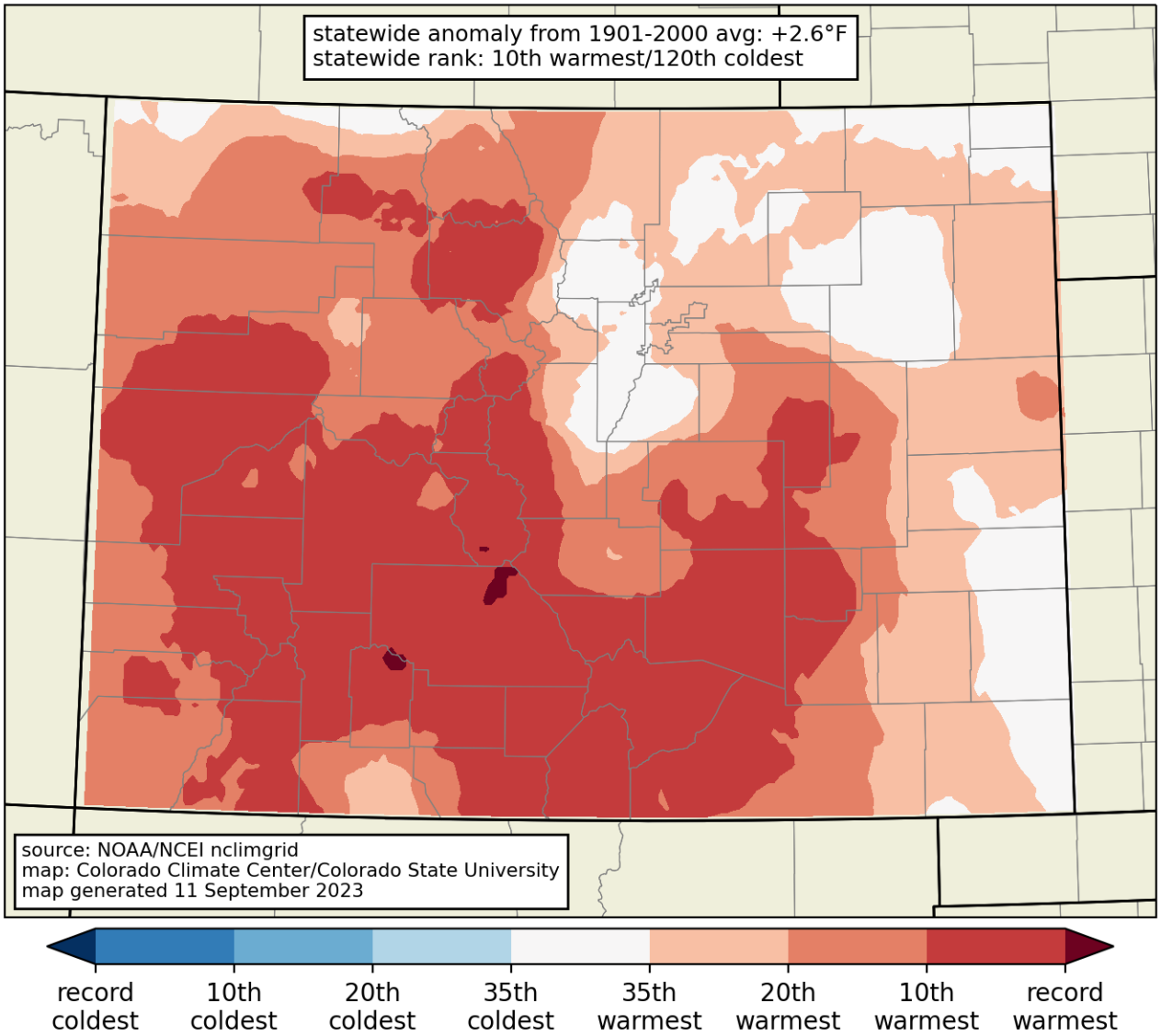




Month	T Rank (of 129 years)	Above, below, or near 20th century avg?
Oct	45th warmest	near avg
Nov	29th coolest	below
Dec	57th coolest	near avg
Jan	55th coolest	near avg
Feb	40th coolest	below
Mar	22nd coolest	below
Apr	41st coolest	below
May	18th warmest	above
Jun	30th coolest	below
Jul	21st warmest	above
Aug	10th warmest	much above
Sep		

https://www.ncdc.noaa.gov/temp-and-precip/us-maps/

average temperature rank: August 2023



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

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Current Conditions

Temperature

Precipitation

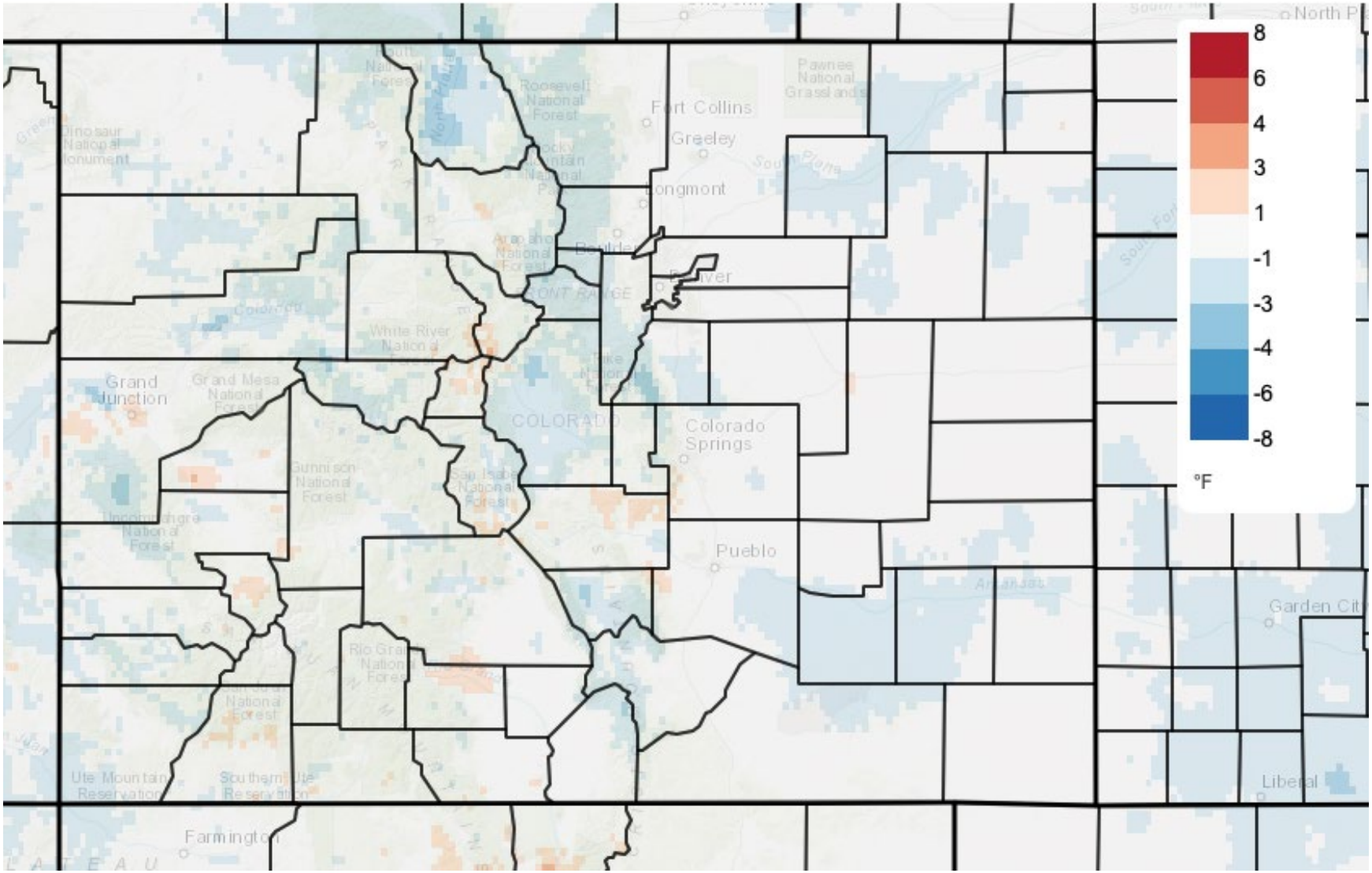
Evaporative Demand

Soil Moisture

Vegetation

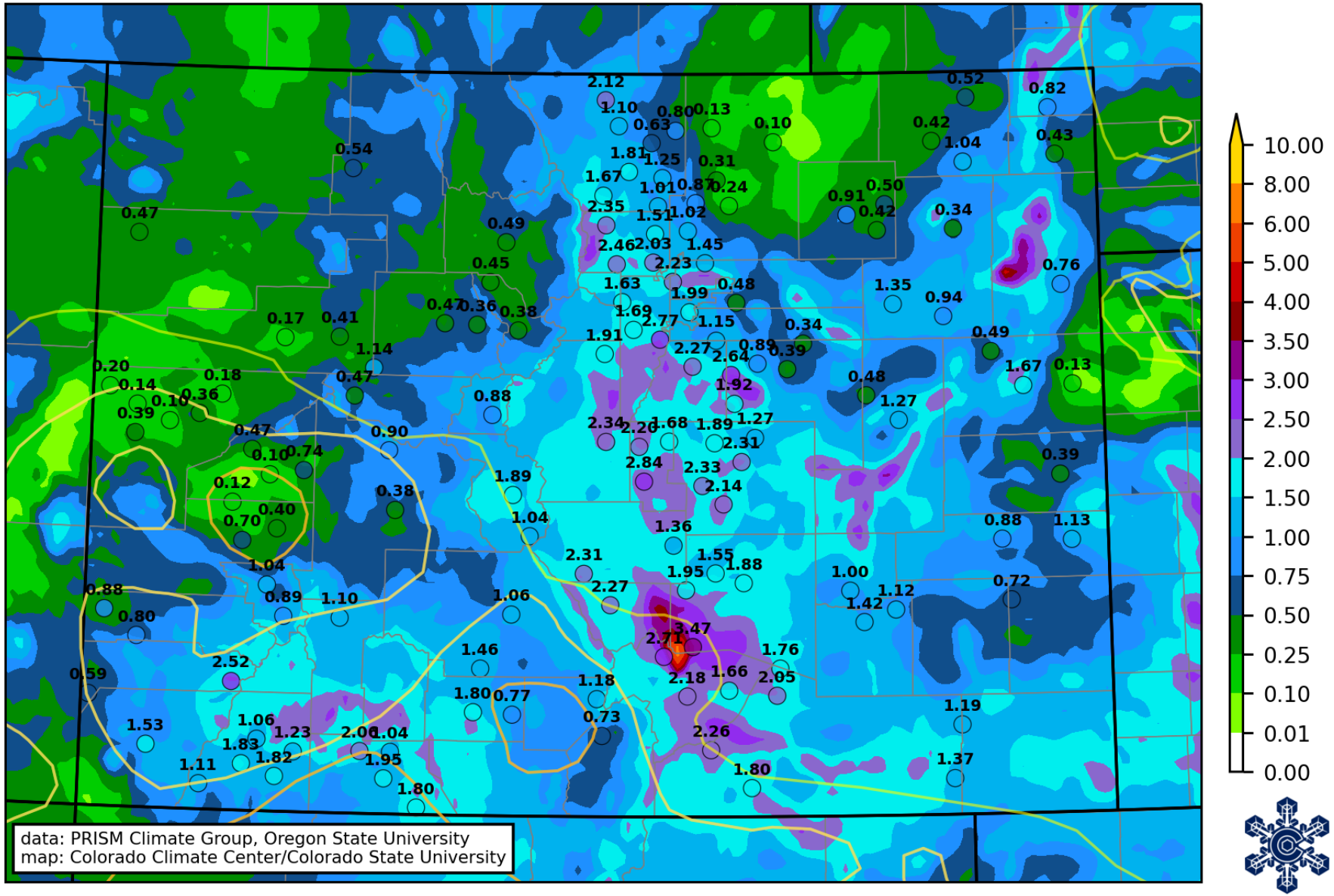
Mean Daily Temperature Anomaly, Last 15 Days

2023/09/03 - 2023/09/17



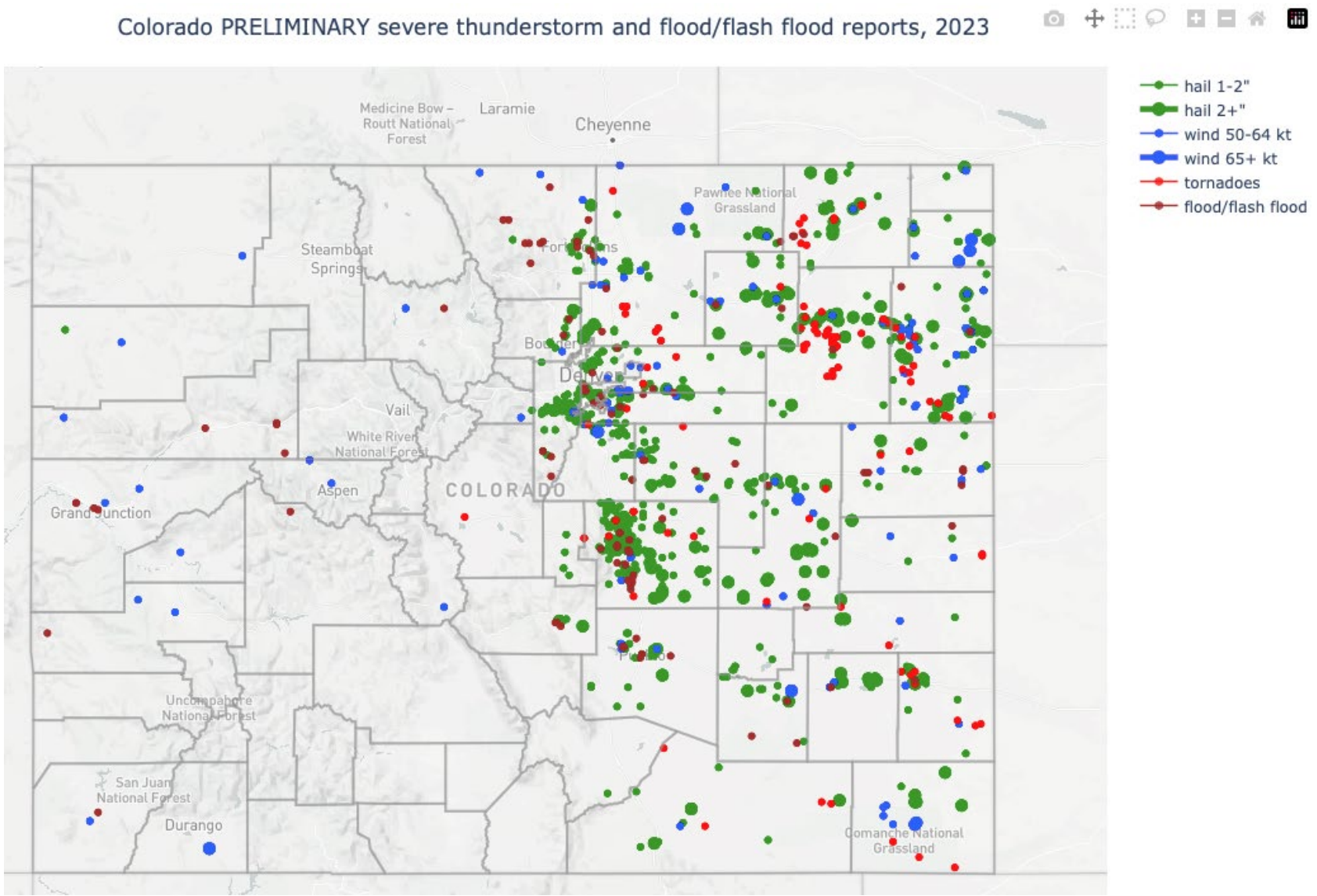
https://climatetoolbox.org/tool/Climate-Mapper

PRISM and CoCoRaHS month-to-date precipitation, US Drought Monitor through 5:00am MST Sun 17 September 2023



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

A very active summer thunderstorm season!



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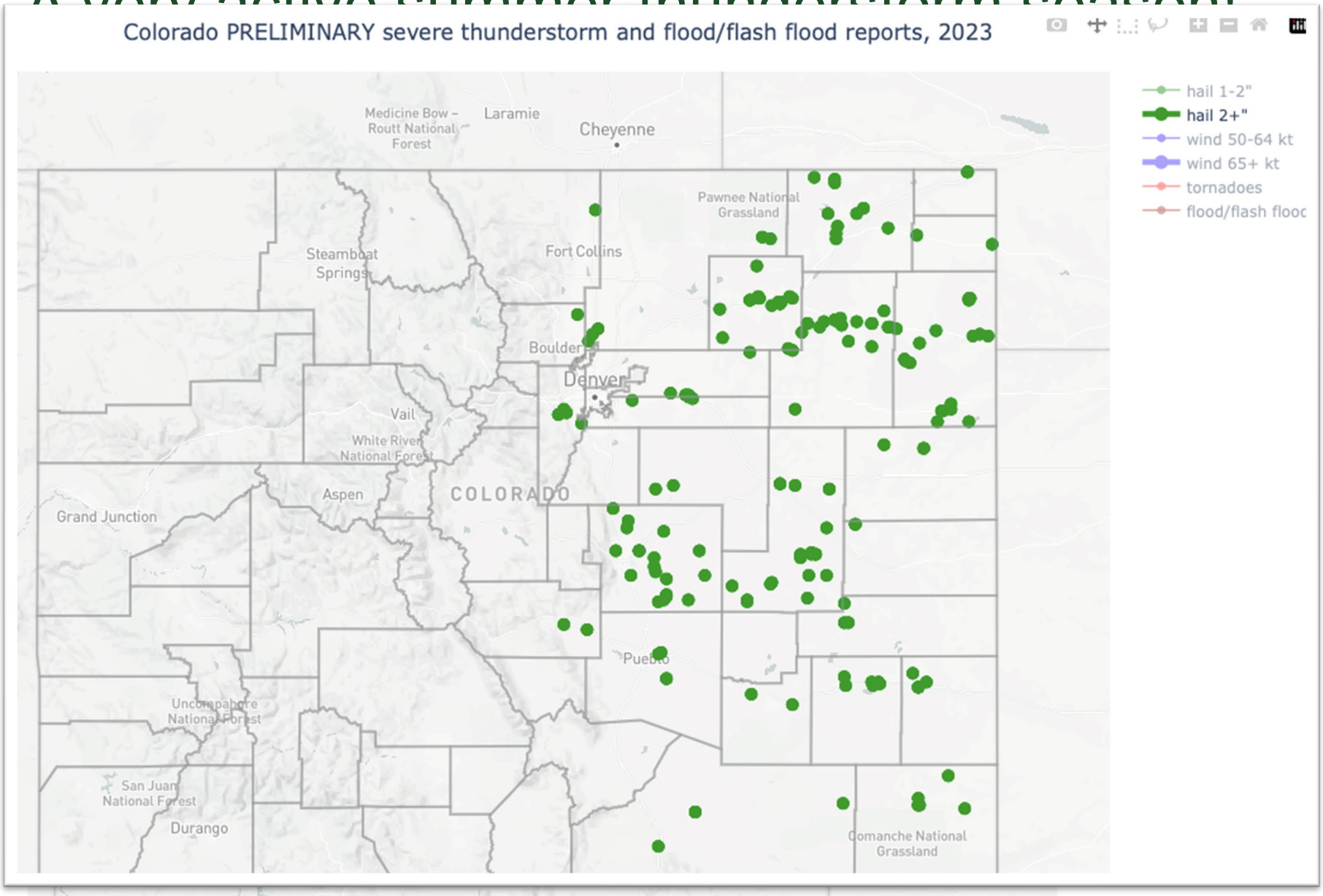
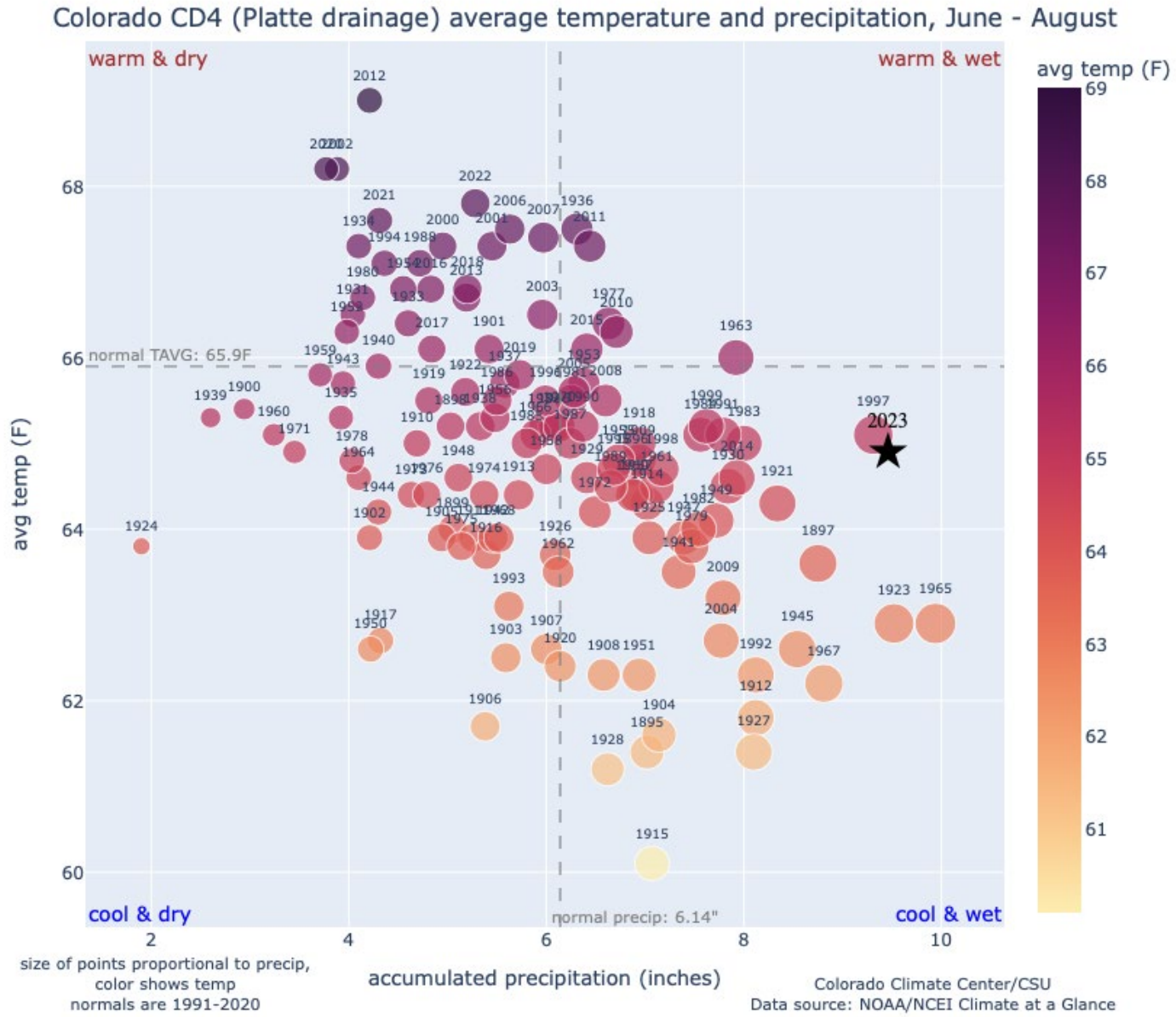


Some severe weather stats for the season

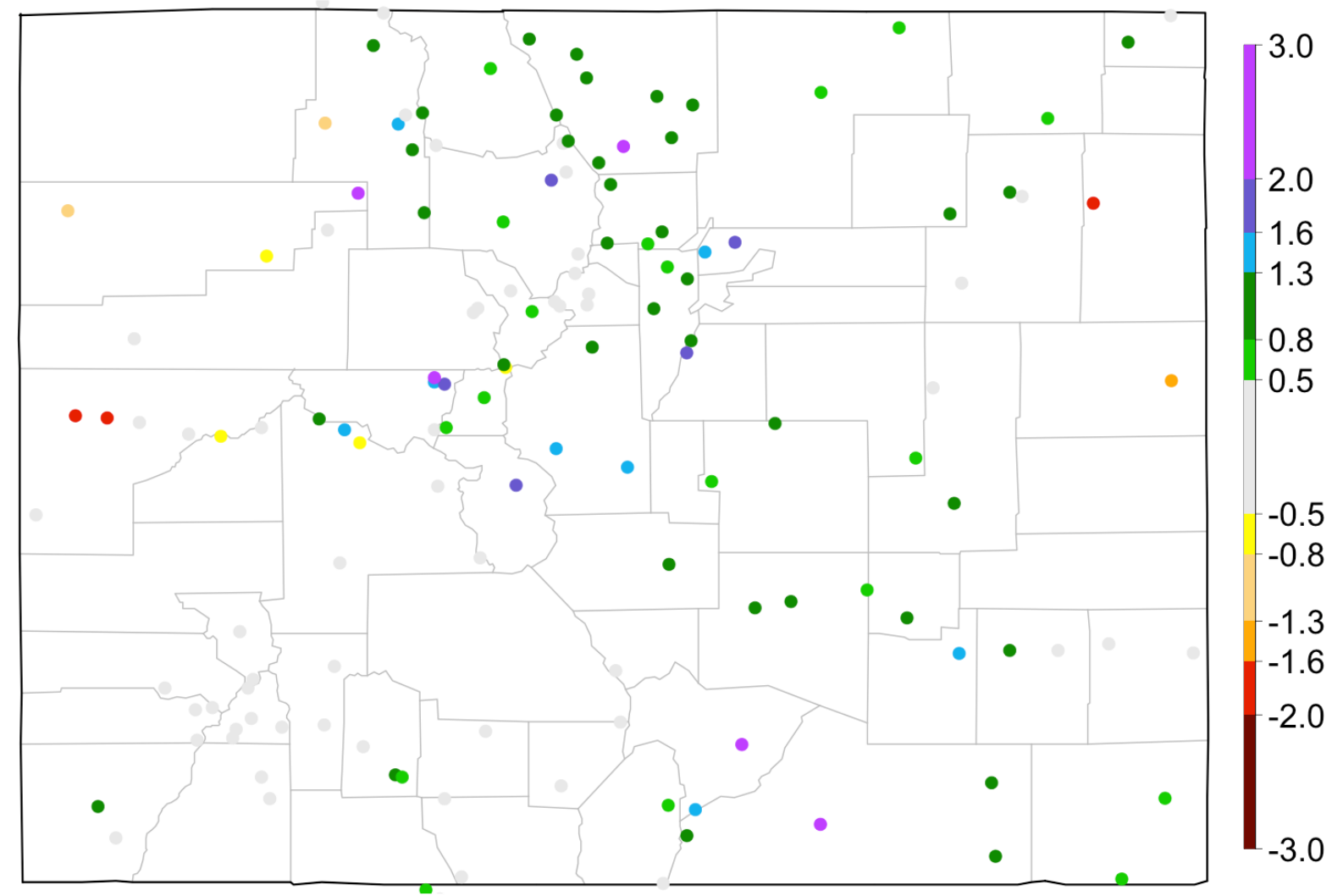
- 796 severe hail reports this year (previous record high was 561 in 2018)
- New large hail report records
  - 176 2”+ (previous record of 91 in 2018)
  - 37 3” (previous record of 12 in 2019)
  - 15 4” (previous record of 5 in 2005)
- New record hailstone diameter of 5.25” in Yuma County
- June 2023 had the most severe weather reports of any month on record with 310
- July and August will likely end up in the top 10, and May in the top 15

- Severe Weather Climatology for Colorado
- Severe Weather Reports for 2023



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

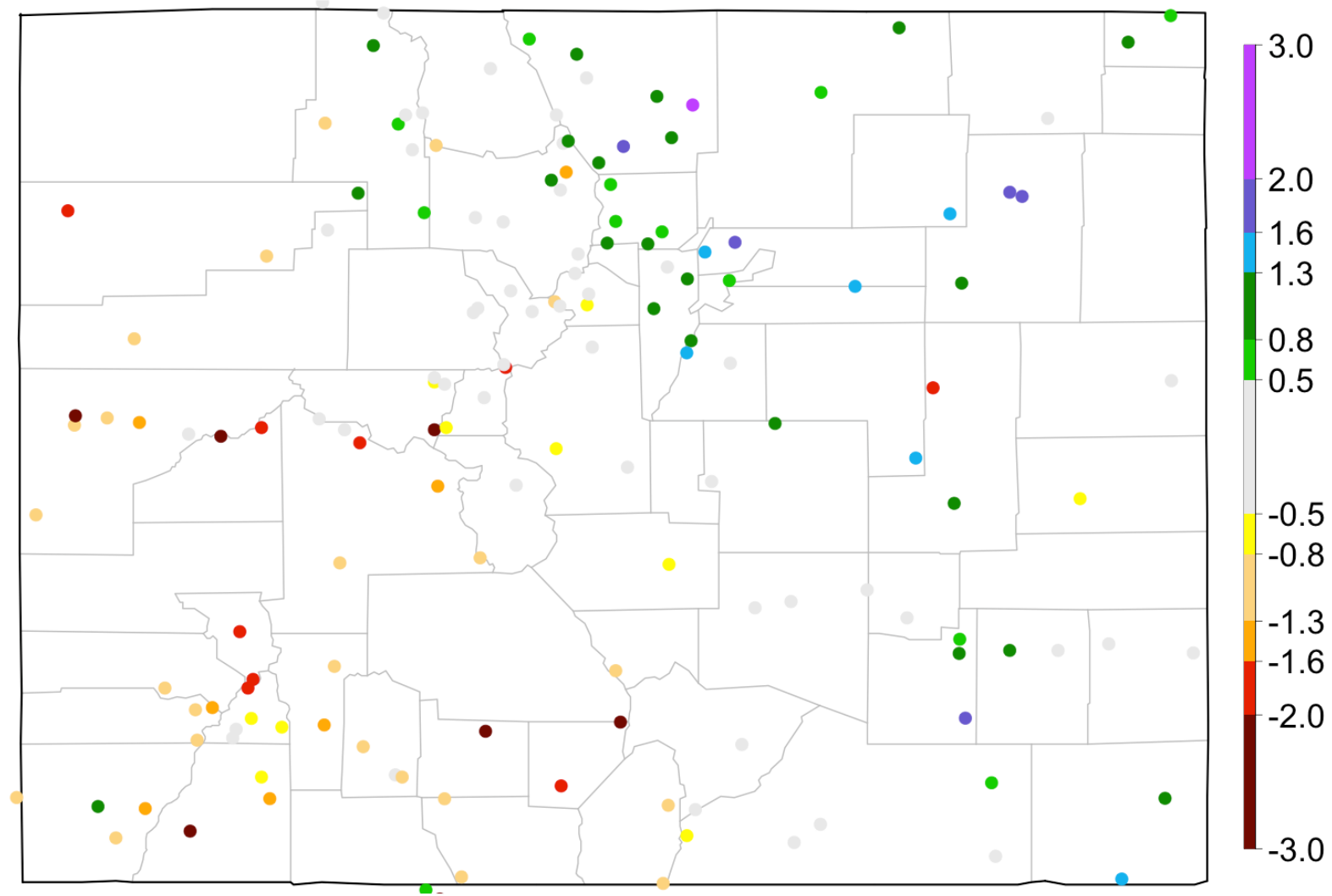
30-day SPI: 2023/08/19 - 2023/09/17



Data from High Plains Regional Climate Center and ACIS

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

90-day SPI: 2023/06/20 - 2023/09/17



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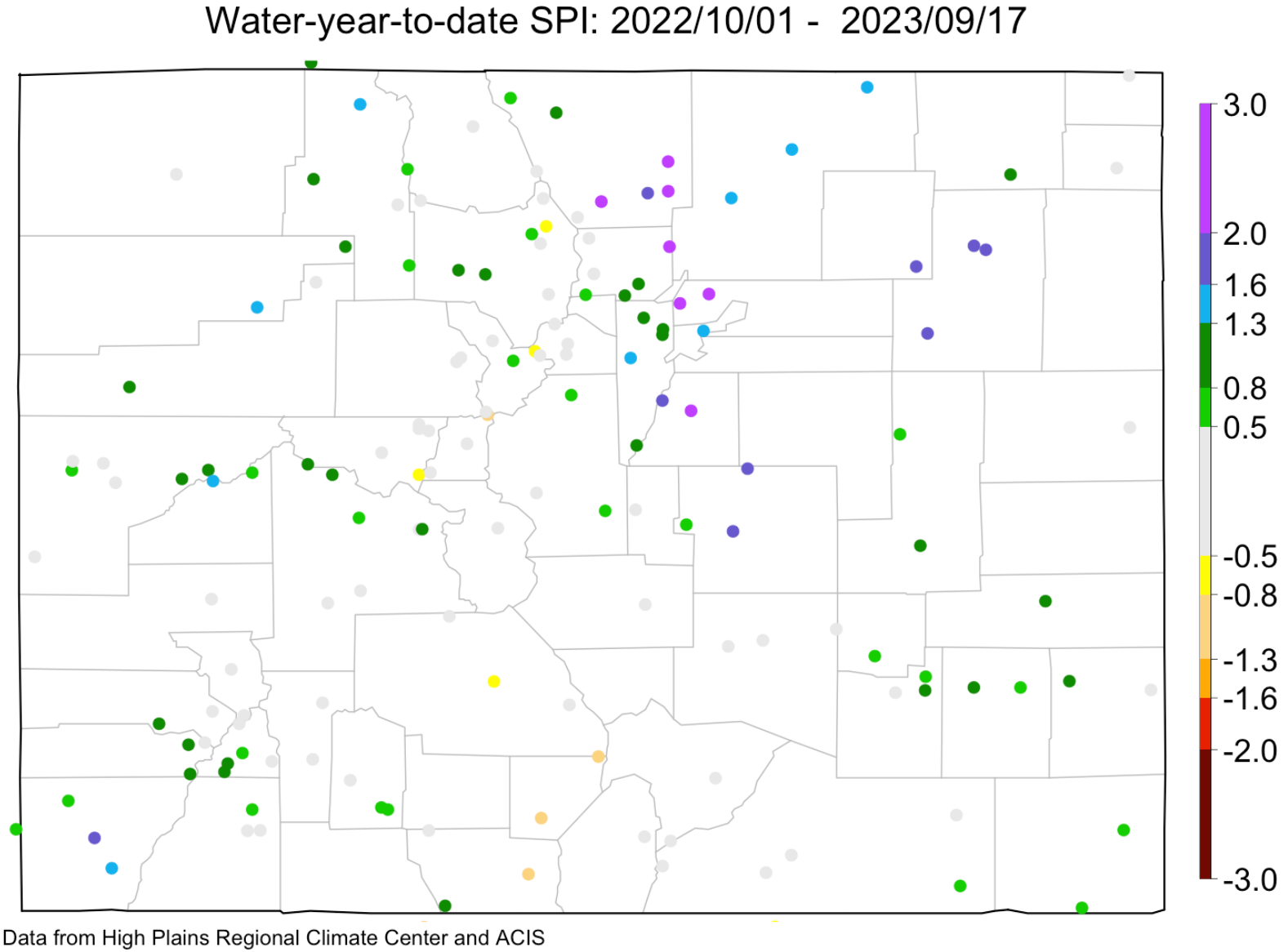

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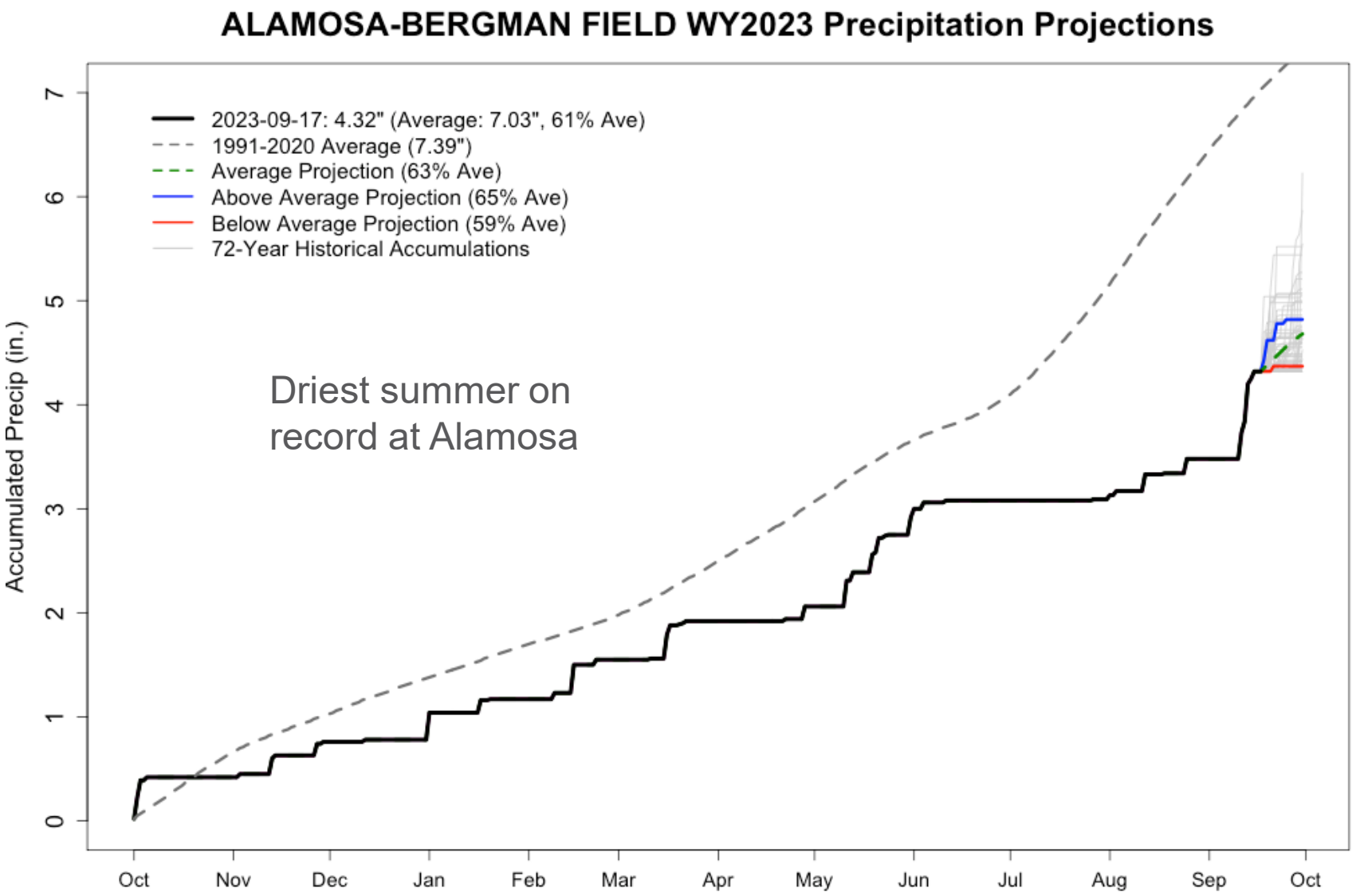
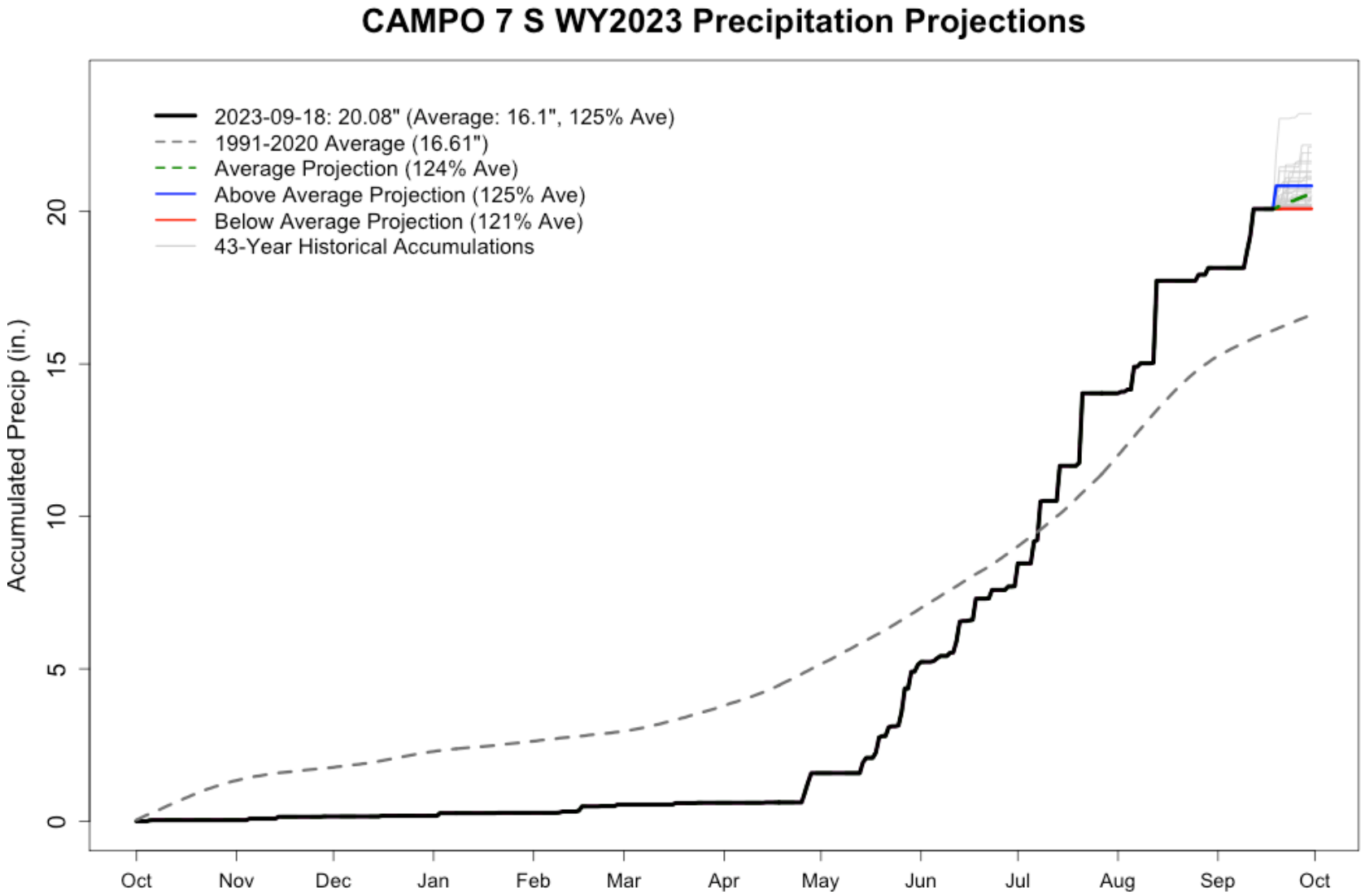


https://climate.colostate.edu/precip_proj.html



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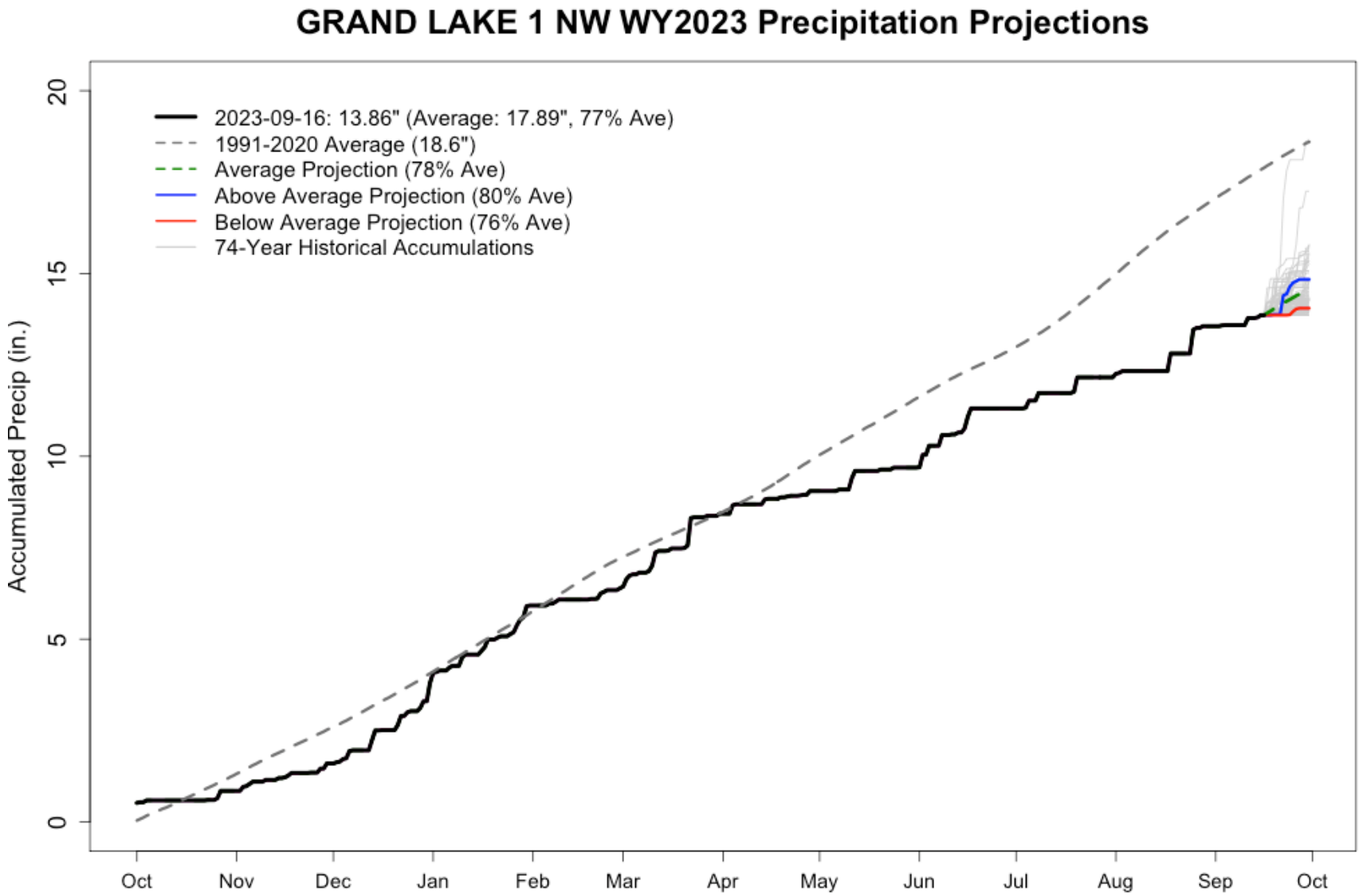

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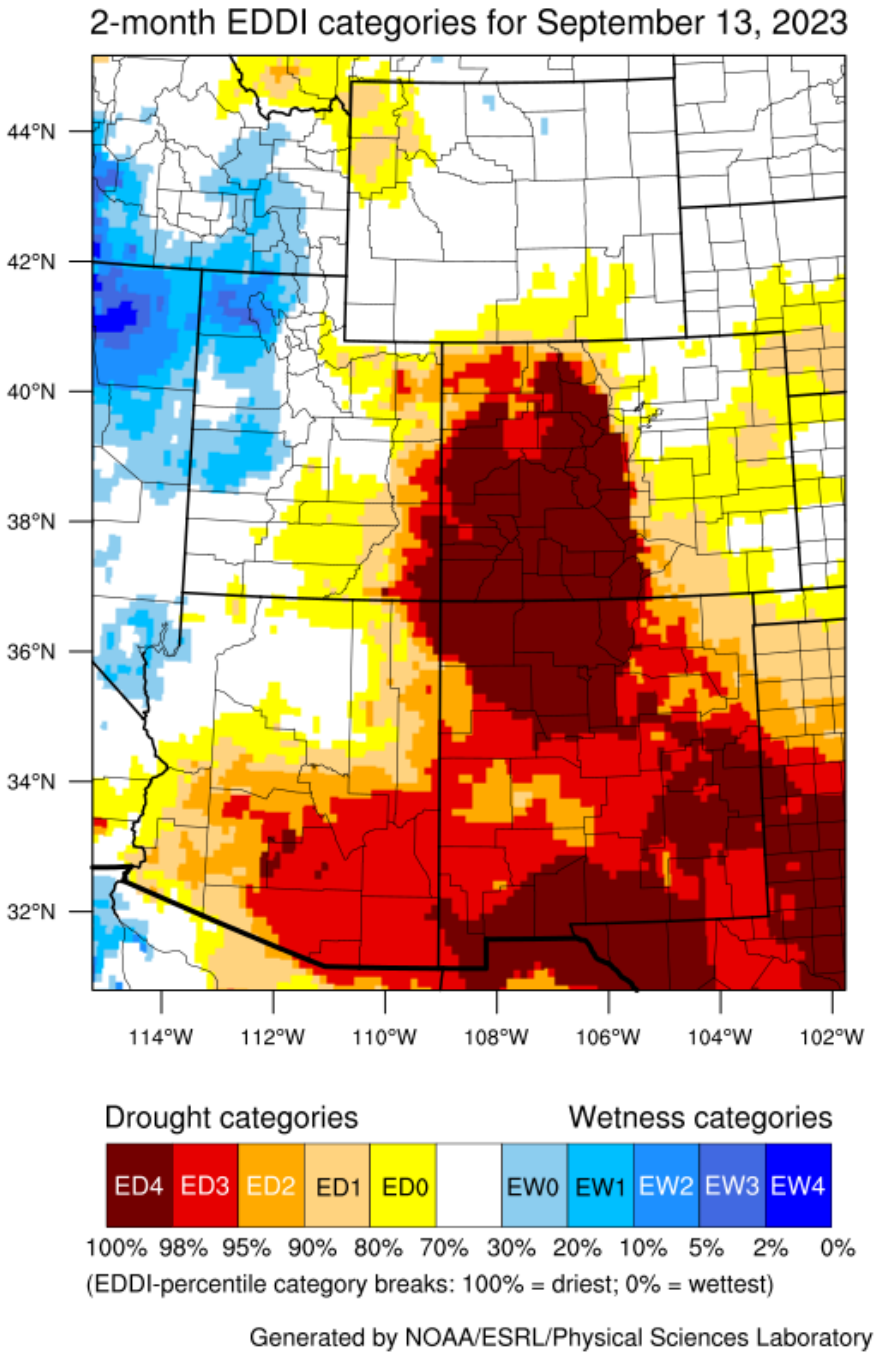


Warmer temperatures and drier relative humidities have increased evaporative demand over western CO.

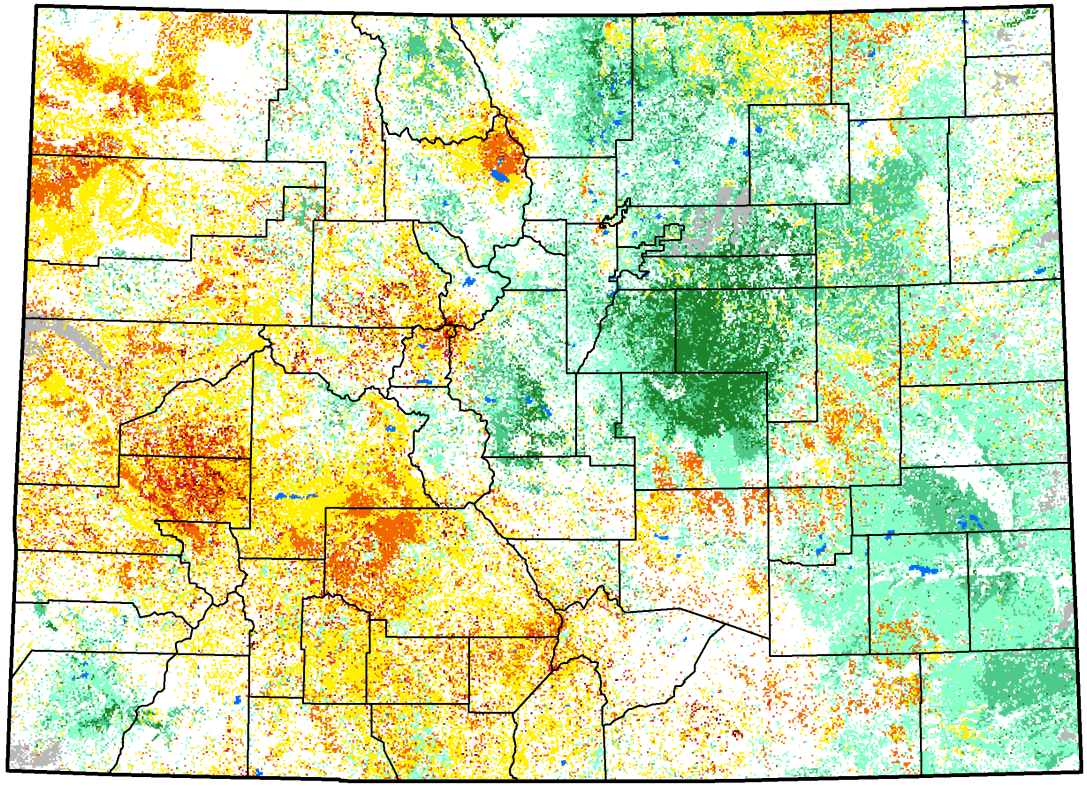
For most of the summer, evaporative demand has been near normal or low for much of the Eastern Plains.

https://psl.noaa.gov/eddi

Vegetation Drought Response Index

September 17, 2023

Complete: Colorado



Vegetation Condition

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

Lack of precipitation, drier air, warmer temperatures have started to stress vegetation

https://vegdri.unl.edu

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Drought

National Drought

Colorado Drought

Some Drought Facts

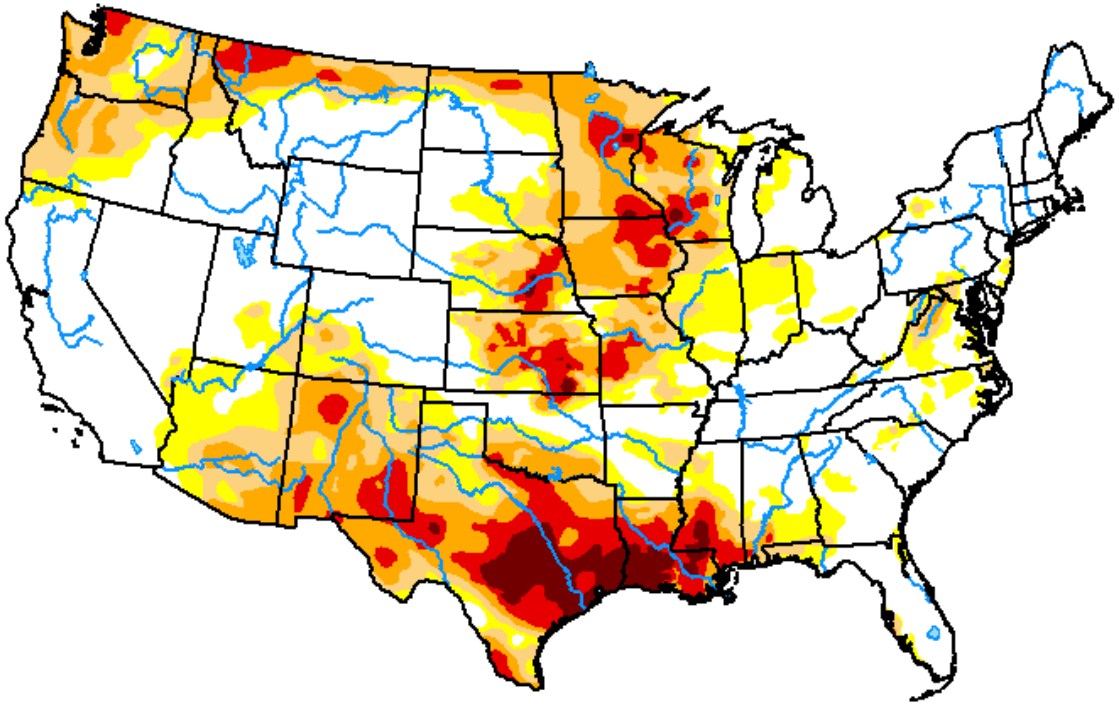
U.S. Drought Monitor

Contiguous U.S. (CONUS)

September 12, 2023

(Released Thursday, Sep. 14, 2023)

Valid 8 a.m. EDT



Intensity:

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

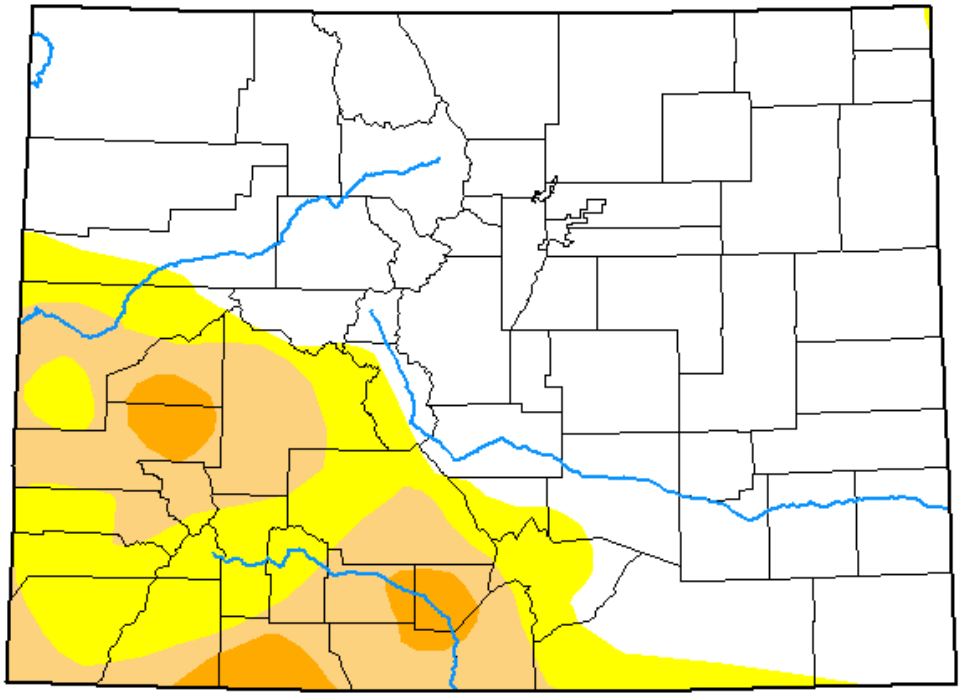
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:

Brad Pugh
CPC/NOAA

droughtmonitor.unl.edu

U.S. Drought Monitor
Colorado



September 12, 2023
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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	68.92	31.08	15.77	2.77	0.00	0.00
Last Week *09-05-2023*	68.94	31.06	15.77	2.77	0.00	0.00
3 Months Ago *06-13-2023*	92.94	7.06	0.42	0.00	0.00	0.00
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 *09-13-2022*	15.72	84.28	46.41	16.97	3.91	0.57

Intensity:

- None
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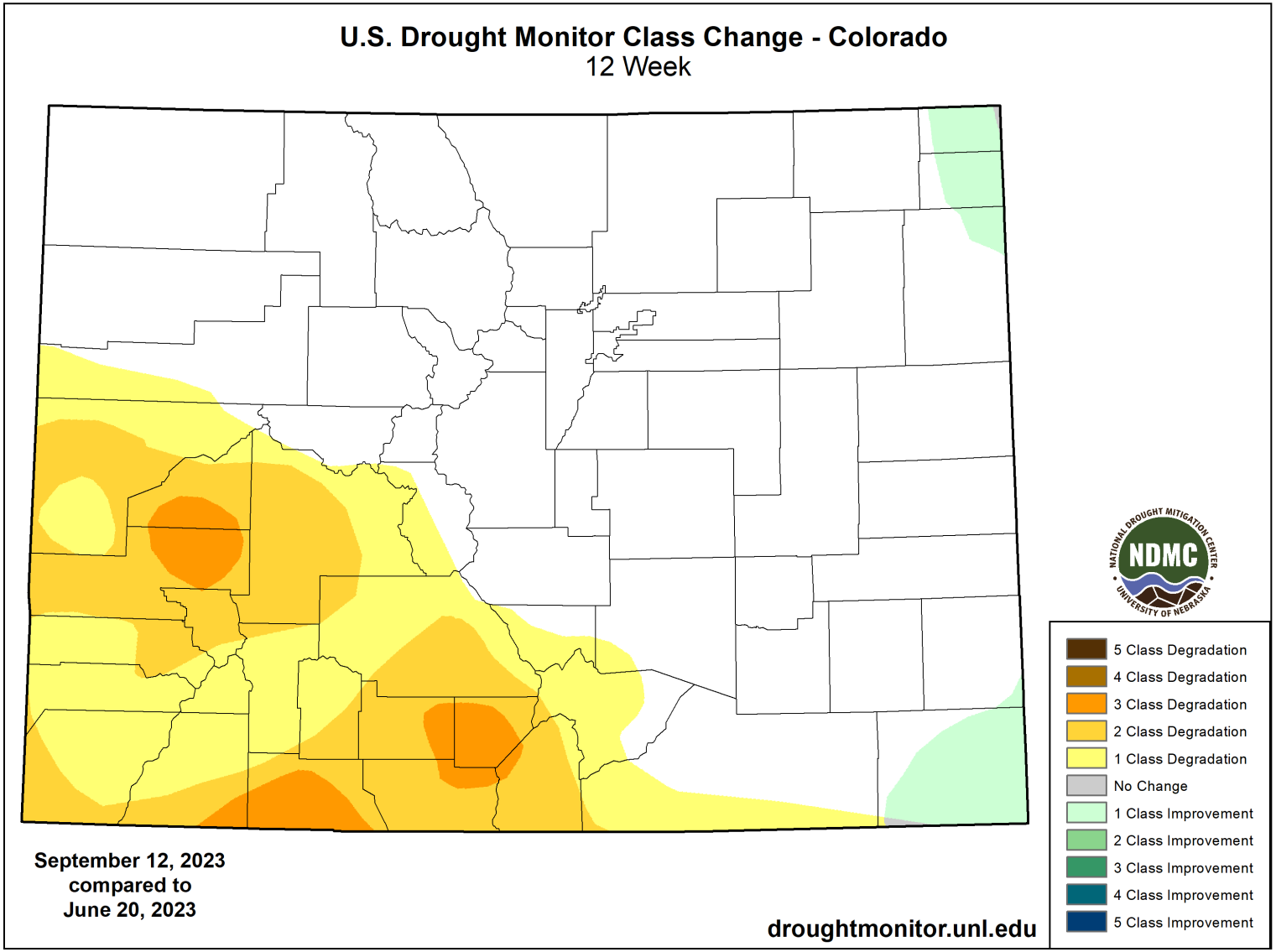
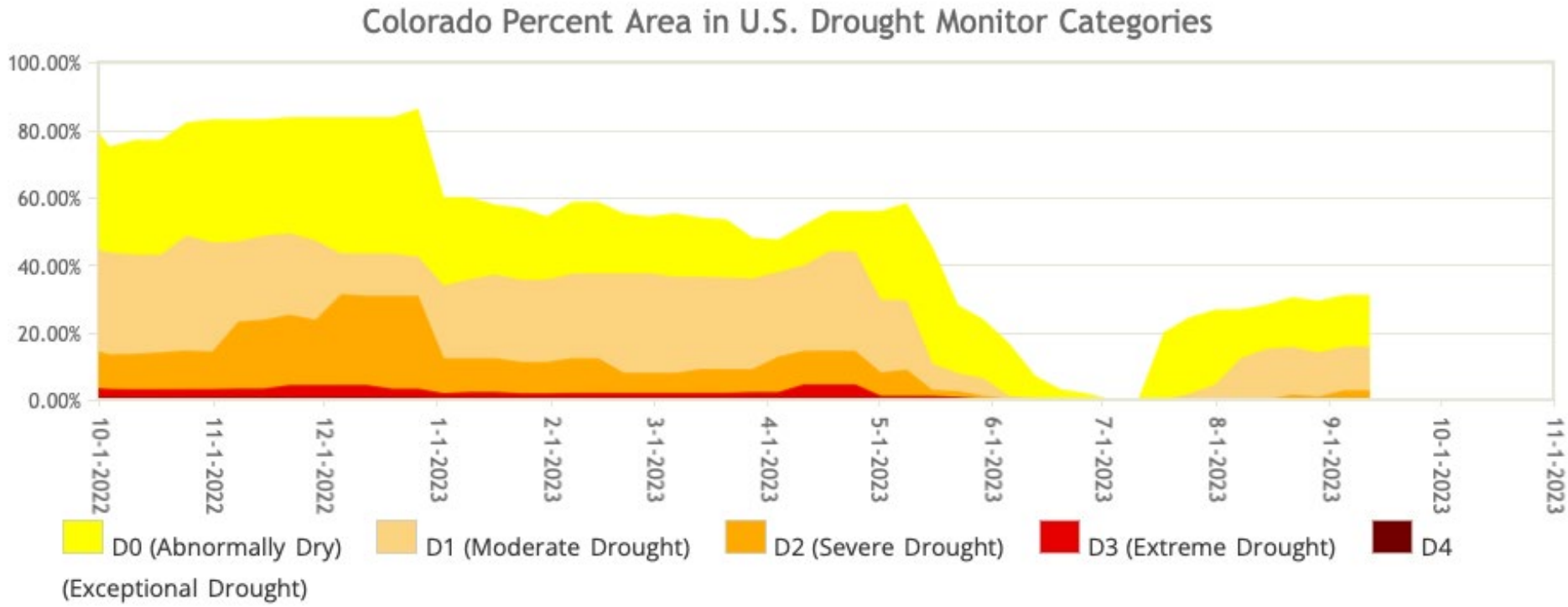


Since the beginning of summer, we've seen the remaining drought removed from eastern CO. Drought was introduced and expanded across southwest CO.



Progression of drought conditions across Colorado for Water Year 2023

Outlook

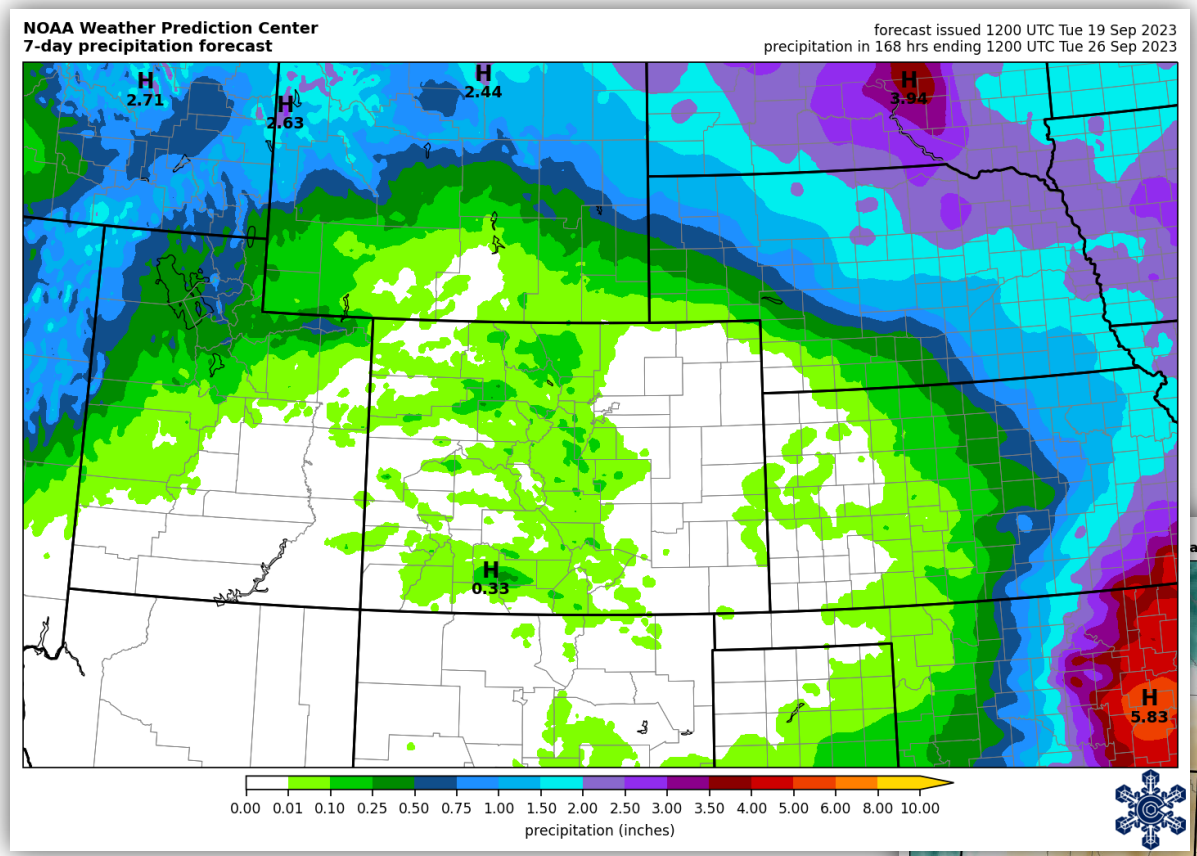
Next 7 days

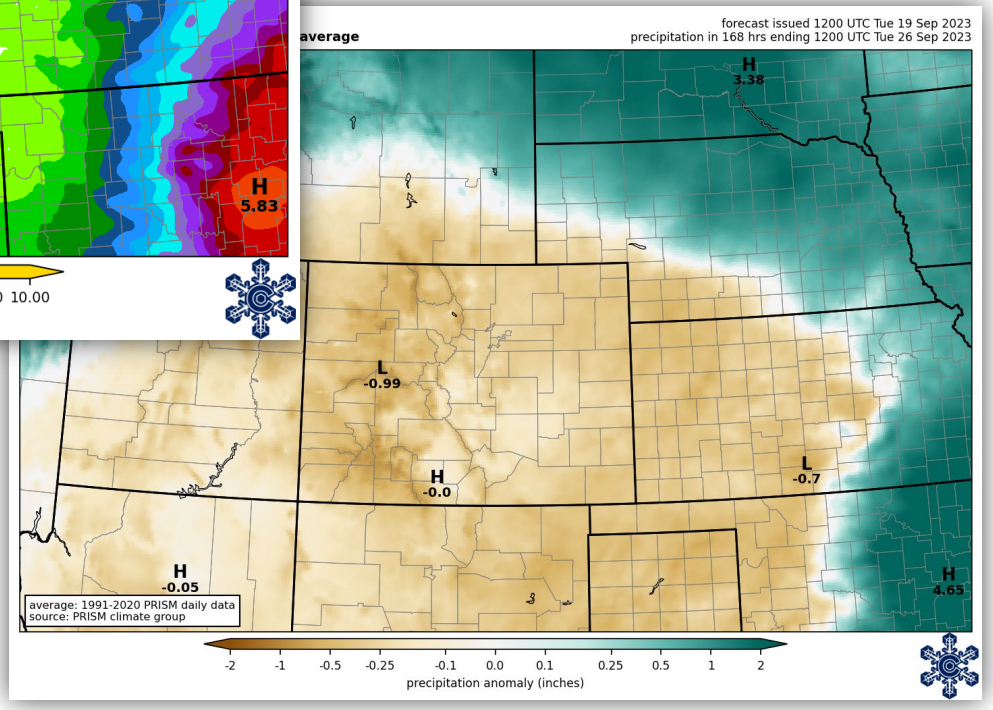
8-14 day Outlook

CPC Outlooks

El Niño

NOAA 7-day precip forecast

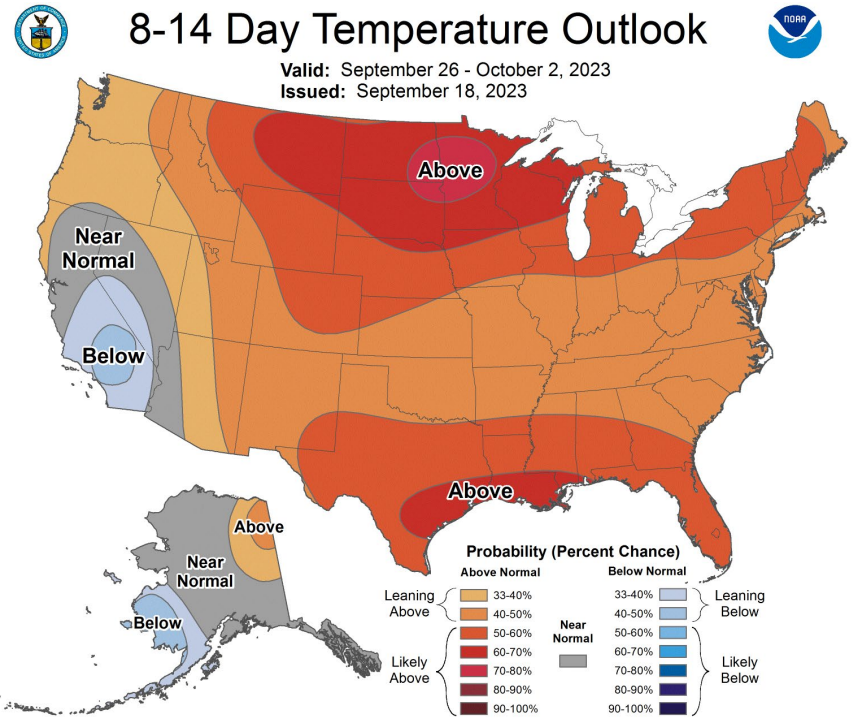


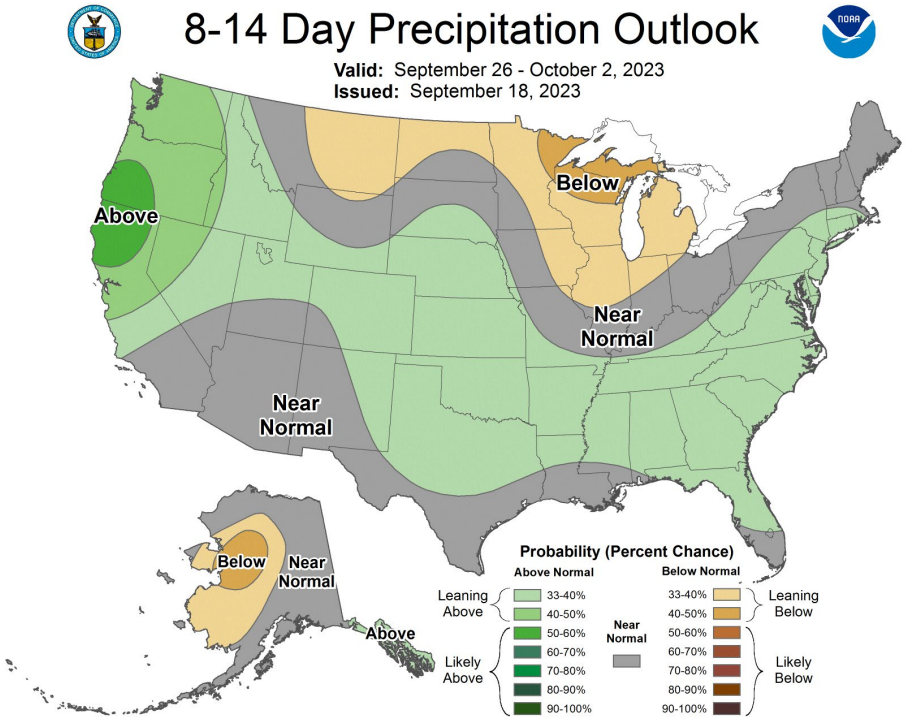


Dry over the next week, with fairly seasonal temperatures

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

8-14 day outlook

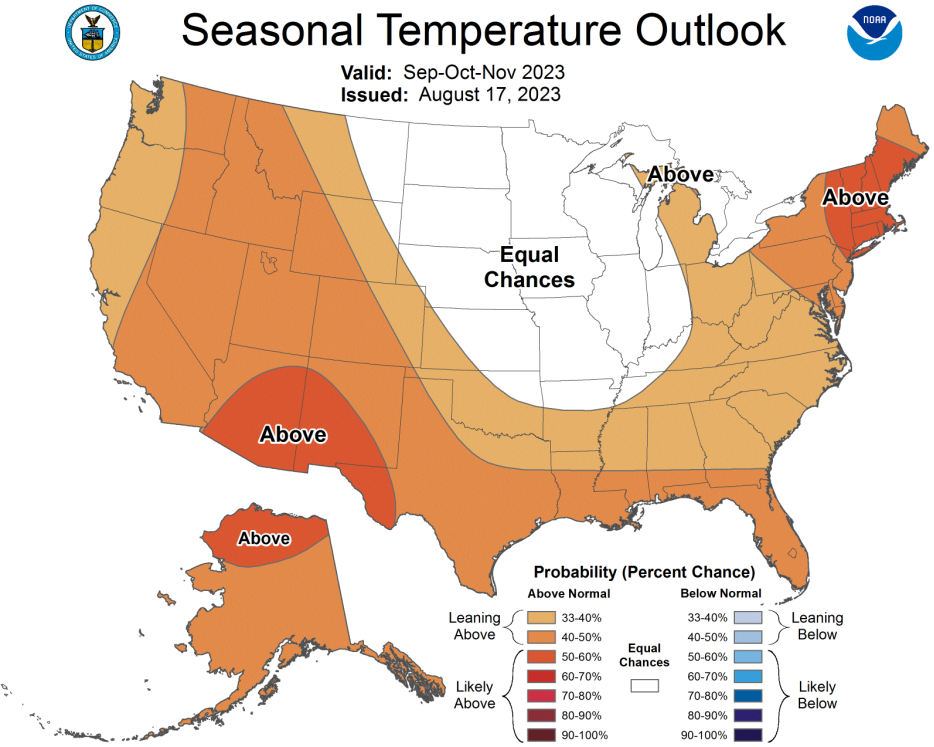


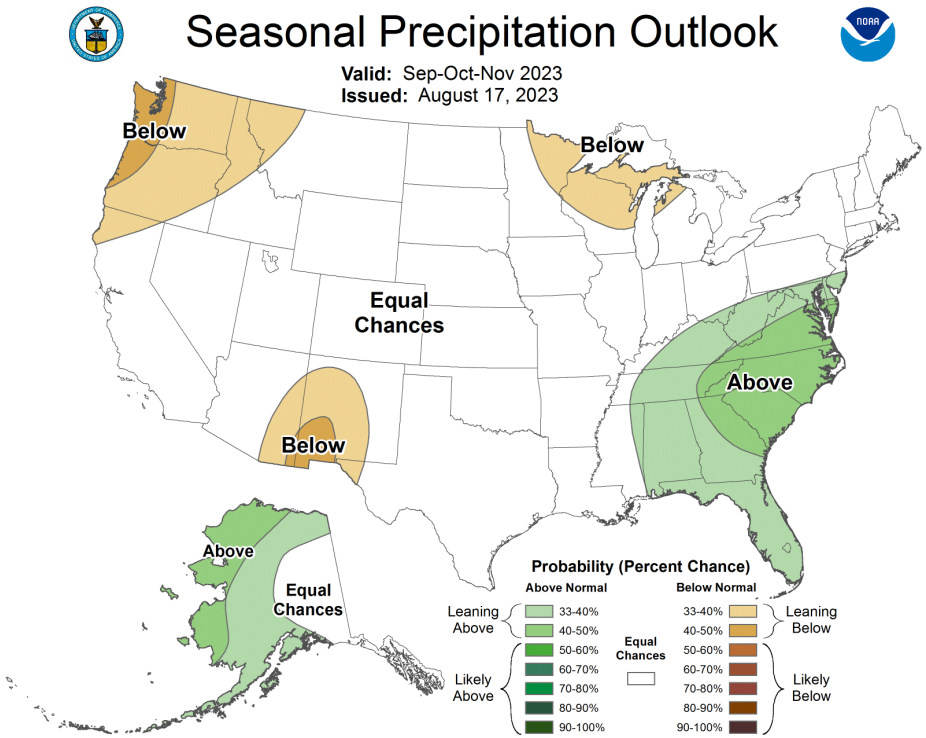


Temperatures likely to be above average at the end of the month, with a slight leaning toward above average precipitation.

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

Seasonal outlook



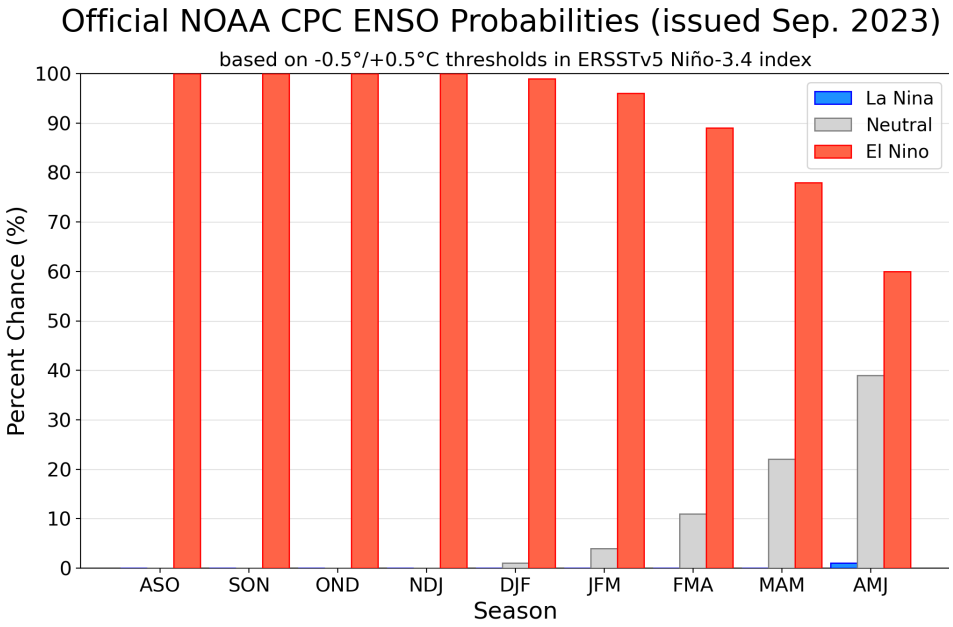


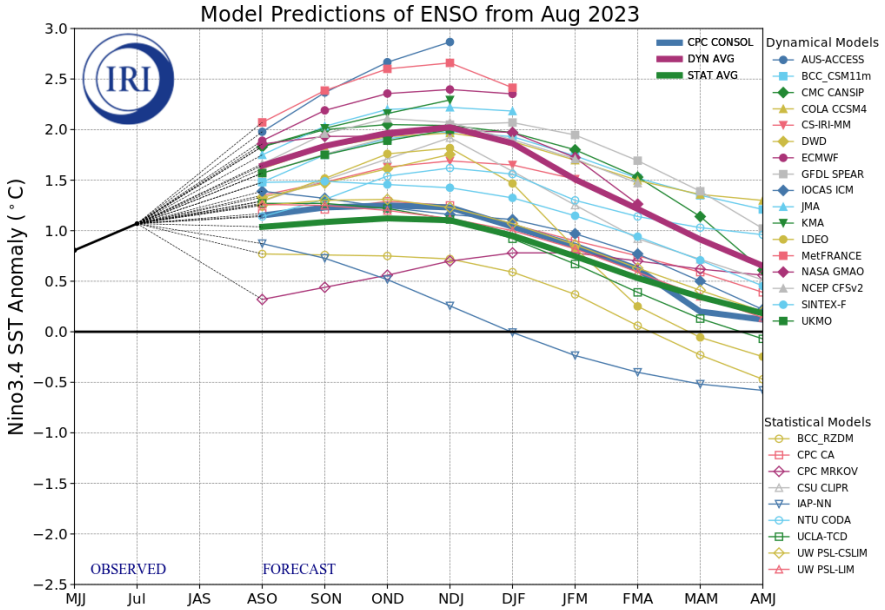
Stay tuned for new seasonal outlook maps released on Thursday this week!

As of now, lots of uncertainty with our precipitation outlook, but some confidence in above average temperatures in the fall.

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

What's the ENSO forecast?



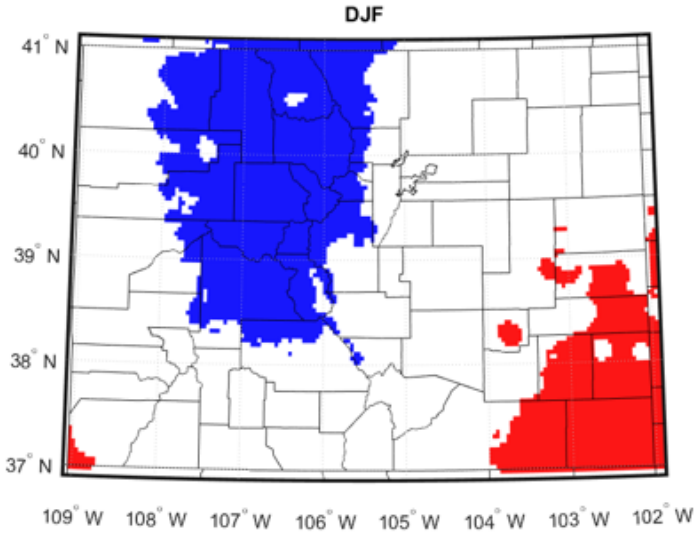


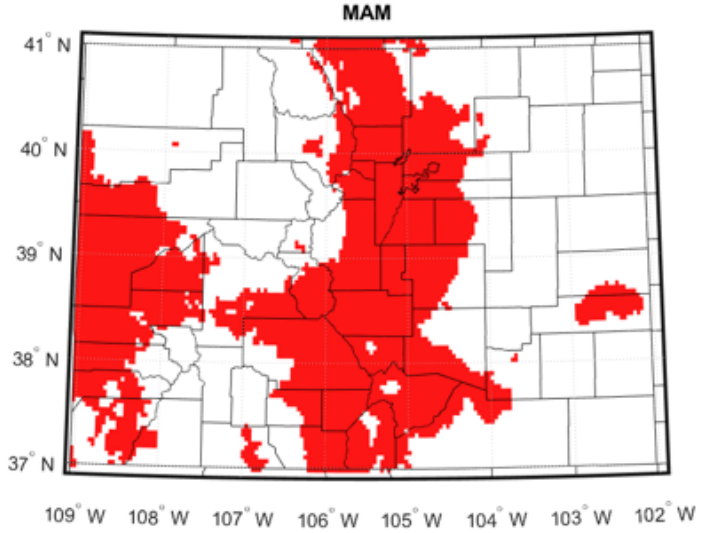
CPC/IRI September 15, 2023: As of mid-Aug 2023, the previously moderate El Niño conditions in the central-eastern equatorial Pacific have strengthened further. Key oceanic and atmospheric variables are consistent with the El Niño, though the atmosphere is not yet fully coupled to the warm sea surface temperature anomalies in the central-eastern equatorial Pacific Ocean. A CPC El Niño advisory remains in place for August 2023. Almost all of the models in the IRI ENSO prediction plume forecast an El Niño event during boreal autumn continuing into winter and early spring of 2024, while weakening during the end of the forecast and ENSO-neutral become the most likely category (Apr-Jun 2024 with 59% chance).

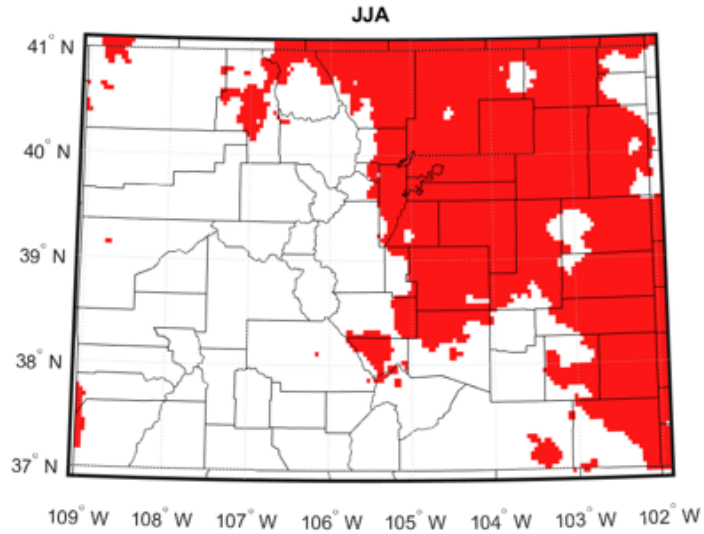
https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

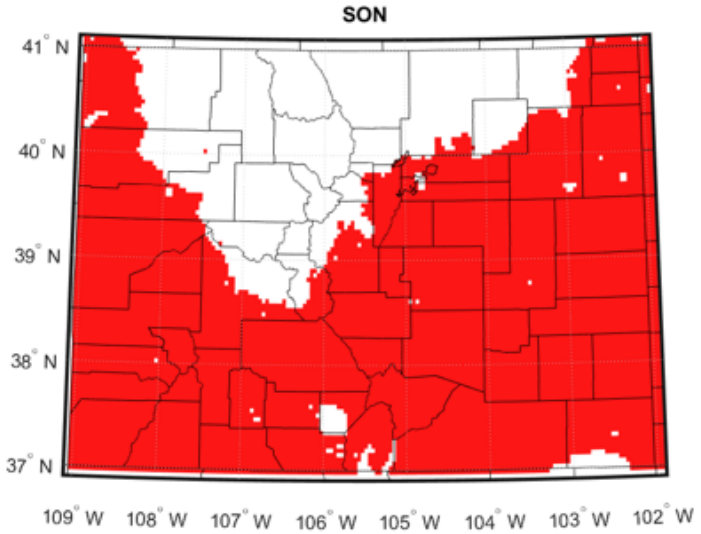
What does El Niño mean for the upcoming cold season?

General Relationship Between Colorado Precipitation and El Niño Southern Oscillation (1951-2020)







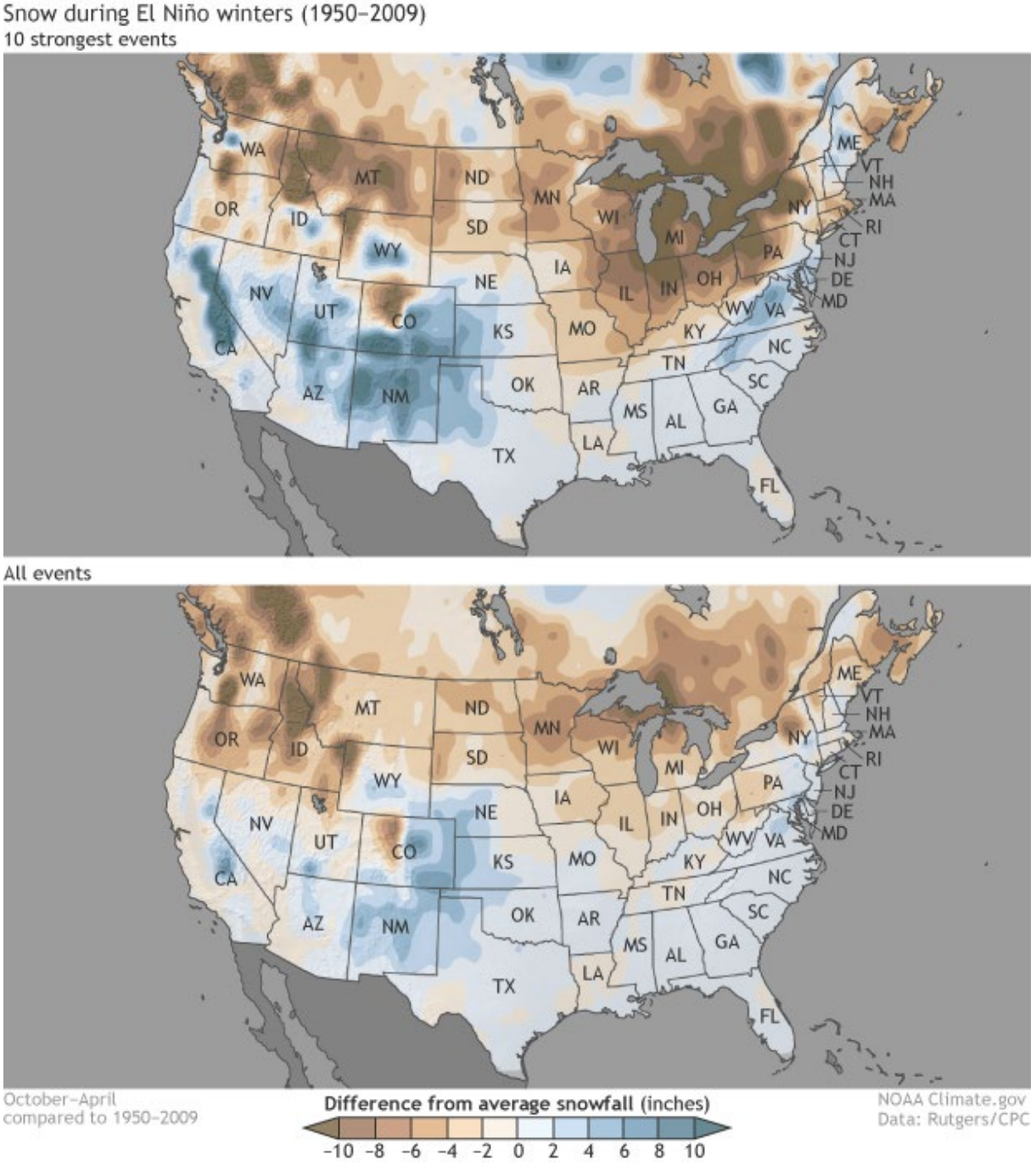


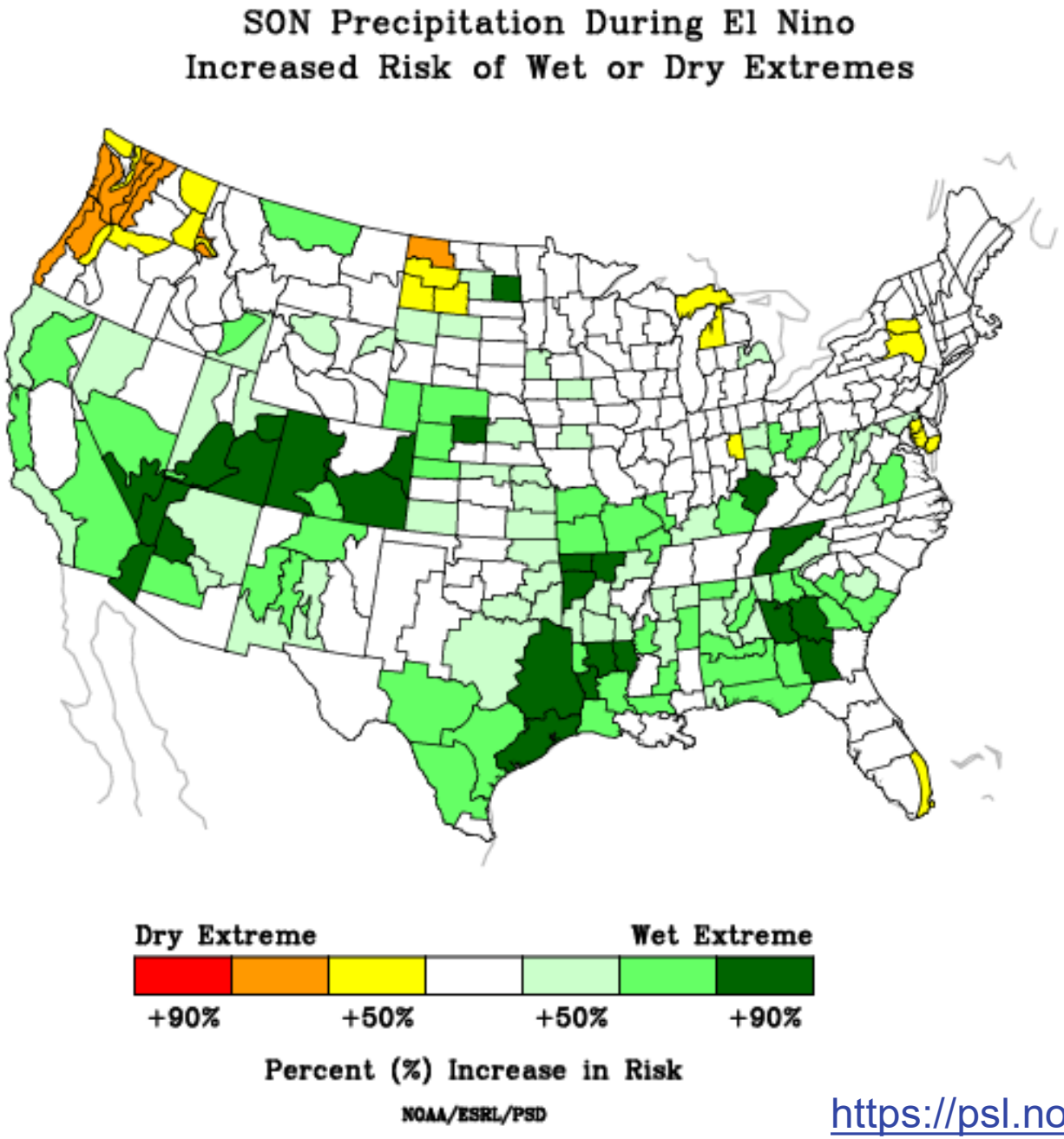
Red: El Niño tends wetter

Blue: La Niña tends wetter

Snow and El Nino

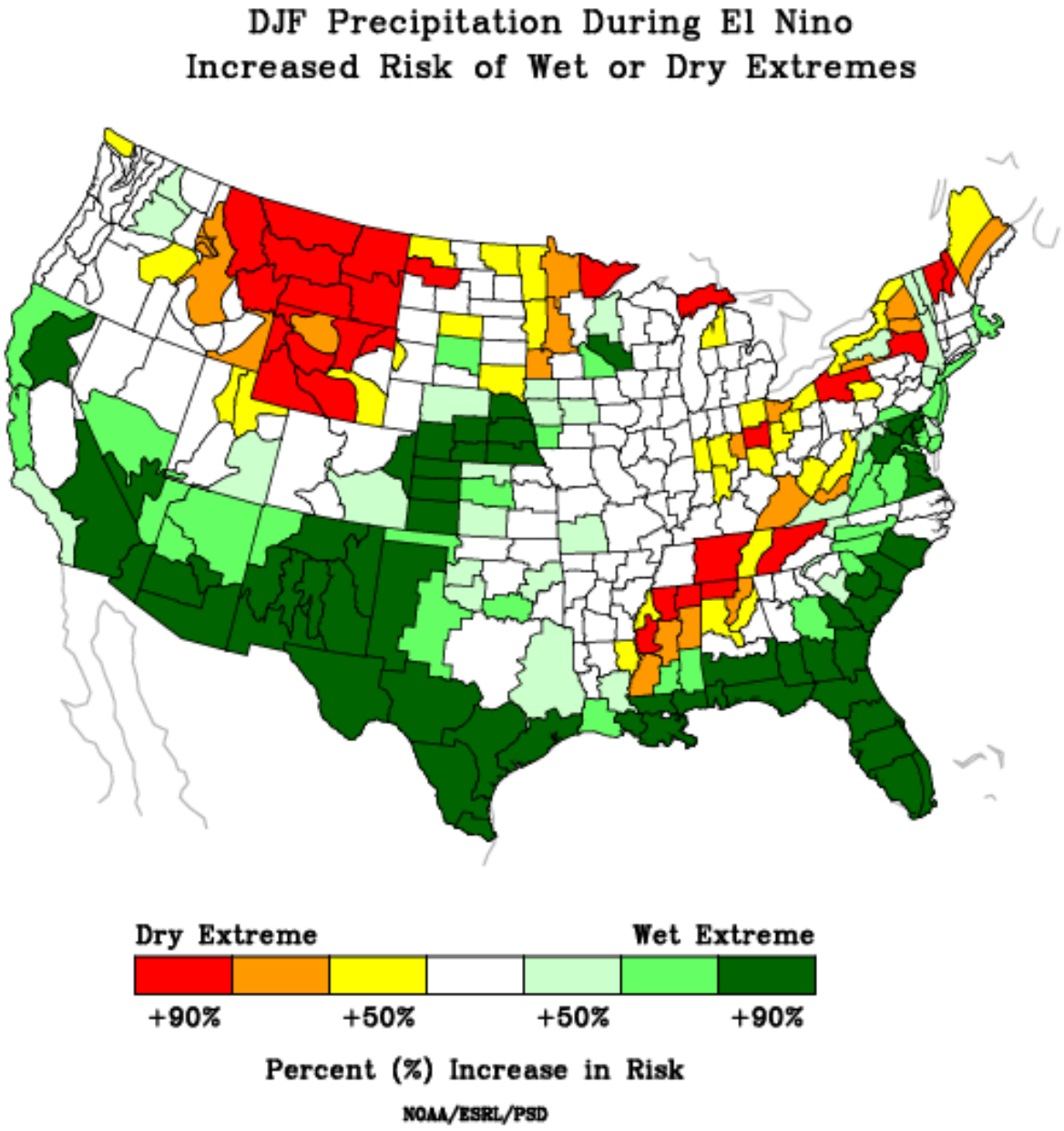
https://climate.gov





Historically, there is an increased risk of wet extremes and decreased risk of dry extremes during a fall El Niño.

https://psl.noaa.gov/enso/climaterisks/



In the winter El Niño definitely favors the southern mountains and southwest for precipitation.

Northern mountains and northerwest are much more likely to experience dry extremes.

https://psl.noaa.gov/enso/climaterisks/

Key Takeaways

- Current conditions as we progress through fall:
  - Overall decent, still active precipitation pattern, temperatures not too hot
  - Soils have dried in some spots
  - Developing and worsening drought in the southwest and SLV
- Start to the snowpack season?
  - Seasonal temperature outlooks indicate would could have a later start
  - Hopefully our current conditions keep the soils from drying out too much
  - Until then, enjoy the fall colors!
- What can we expect with El Nino?
  - With the favoring to the southern mountains, drought recovery is possible
  - Drought development could be in the cards for the northern mountains
  - Of course that relationship is never perfect!
  - As always, expect some cold snaps and snowy conditions.

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

Thank you

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COLORADO STATE UNIVERSITY