

# Colorado Climate Update

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**Russ Schumacher, state climatologist**

**Water Availability Task Force**

**August 17, 2023**



**COLORADO  
CLIMATE  
CENTER**



**ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY**

# Water year 2023 to date: temperature, precipitation, evaporative demand

Photo courtesy Dan Fitts



5.25" diameter, will likely be confirmed as new state record

Photo courtesy NWS Goodland



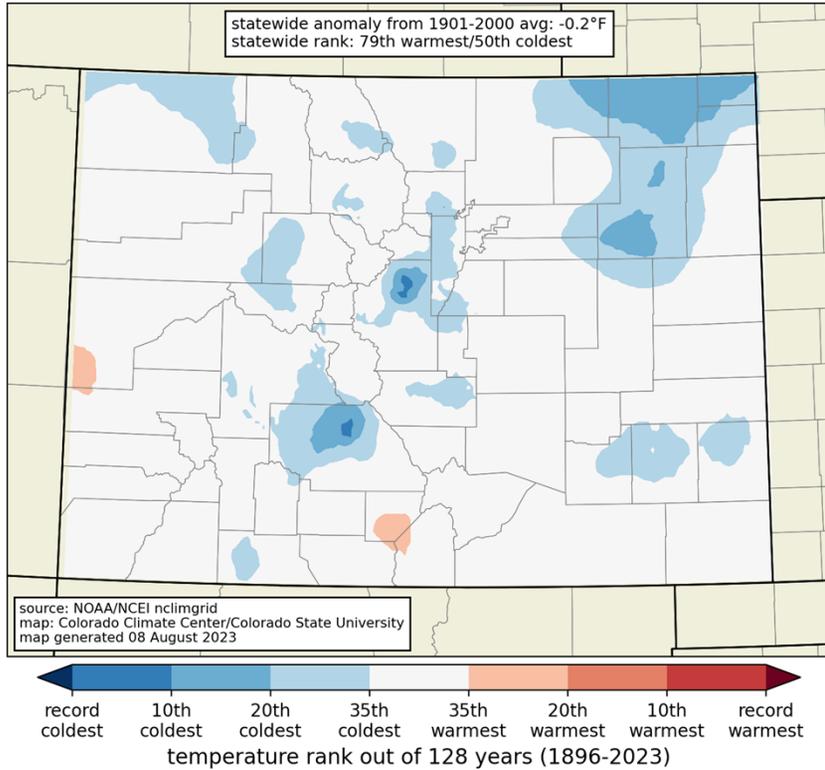
Cory Gardner  
@CoryGardner

We are in the basement. This is no joke get in your basement and take cover. Taken by Jim Pagel north of Yuma. Southwest of his home.



5:28 PM · Aug 8, 2023 · 80.7K Views

average temperature rank: 10 months ending July 2023 (Oct-Jul)



**Statewide: tied for 47<sup>th</sup> coolest first 10 months of the water year; coolest since 2010**

## Colorado rankings:

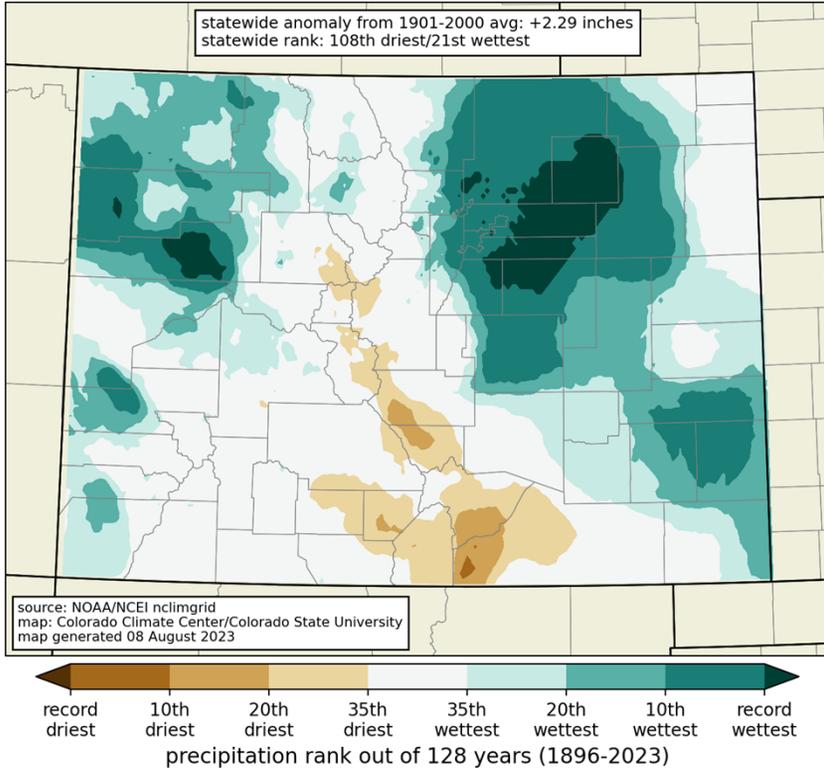
Month	T Rank (of 128 years)	Above, below, or near 20 <sup>th</sup> century avg?
Oct	45 <sup>th</sup> warmest	near avg
Nov	29 <sup>th</sup> coolest	below
Dec	52 <sup>nd</sup> coolest	near avg
Jan	55 <sup>th</sup> coolest	near avg
Feb	41 <sup>st</sup> coolest	below
Mar	22 <sup>nd</sup> coolest	below
May	18 <sup>th</sup> warmest	above
June	30 <sup>th</sup> coolest	below
July	21 <sup>st</sup> warmest	above

Maps from: [https://climate.colostate.edu/co\\_cag/rank\\_maps.html](https://climate.colostate.edu/co_cag/rank_maps.html)

Data from: <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/time-series>



precipitation rank: 10 months ending July 2023 (Oct-Jul)



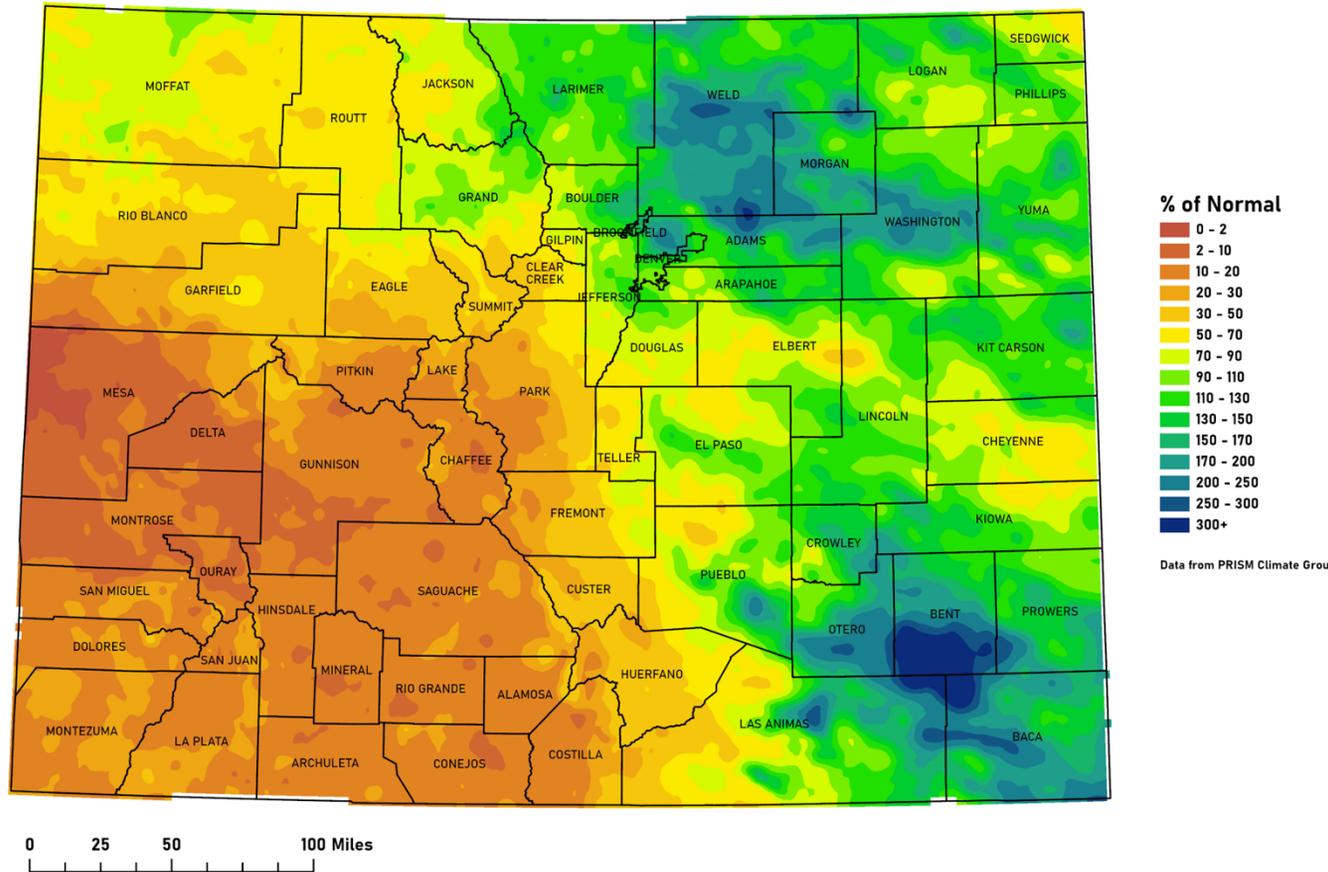
**Statewide: Tied for 21<sup>st</sup> wettest first 10 months of the water year; wettest since 2019**

### Colorado rankings:

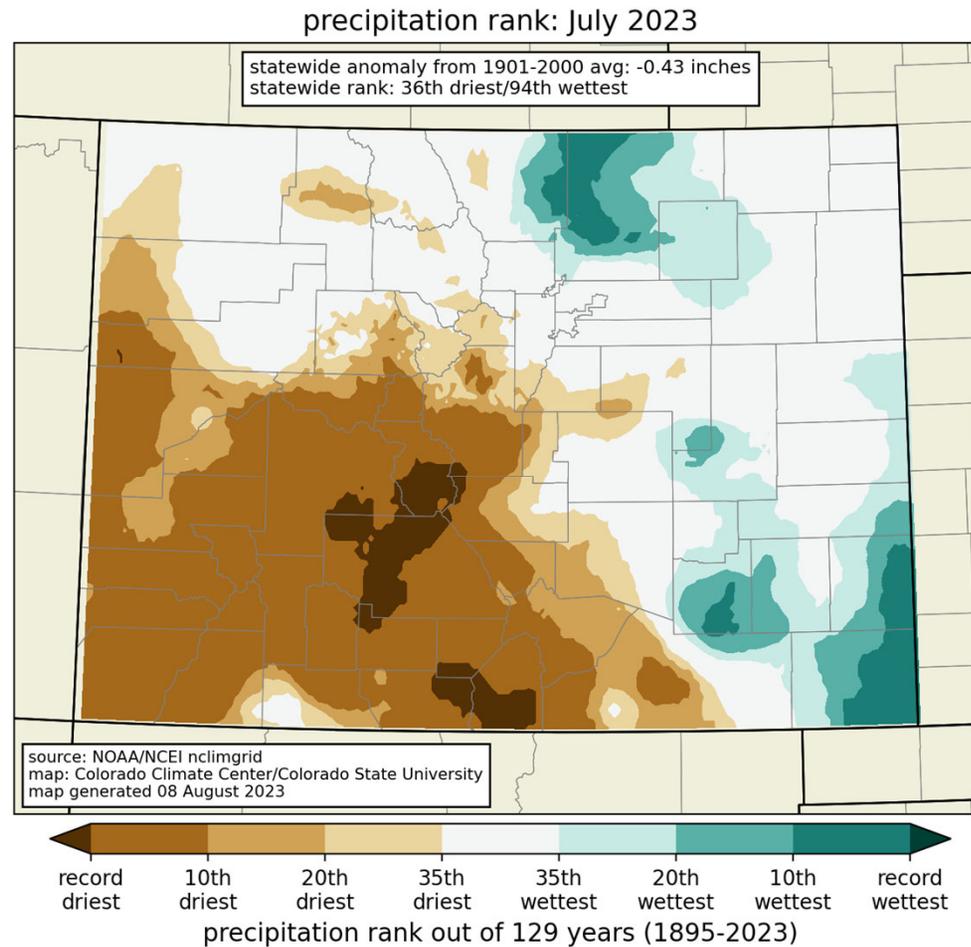
Month	P Rank (of 128 years)	Above, below, or near 20 <sup>th</sup> century avg?
Oct	63 <sup>rd</sup> driest	near avg
Nov	52 <sup>nd</sup> driest	near avg
Dec	20 <sup>th</sup> wettest	above
Jan	10 <sup>th</sup> wettest	<b>much above</b>
Feb	61 <sup>st</sup> driest	near avg
Mar	32 <sup>nd</sup> wettest	above
Apr	37 <sup>th</sup> driest	below
May	22 <sup>nd</sup> wettest	above
June	6 <sup>th</sup> wettest	<b>much above</b>
July	35 <sup>th</sup> driest	below



# Colorado July 2023 Precipitation as a Percentage of Normal

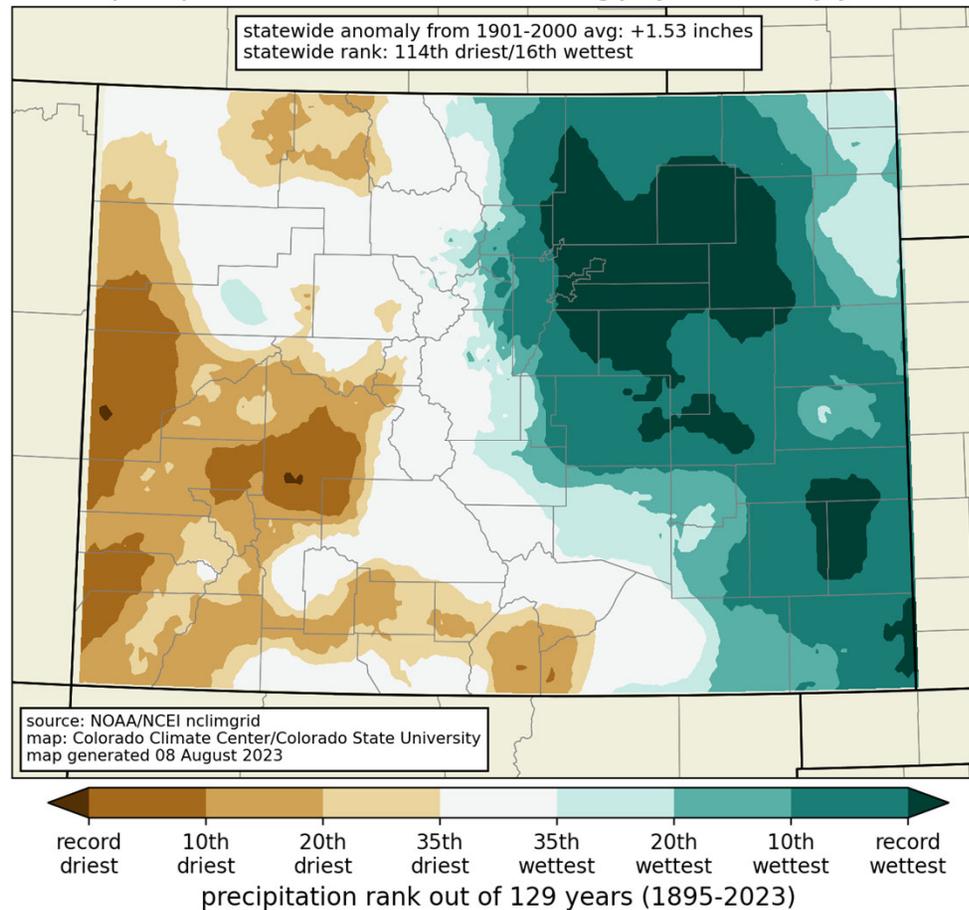


# July 2023



# May-June-July 2023

precipitation rank: 3 months ending July 2023 (May-Jul)

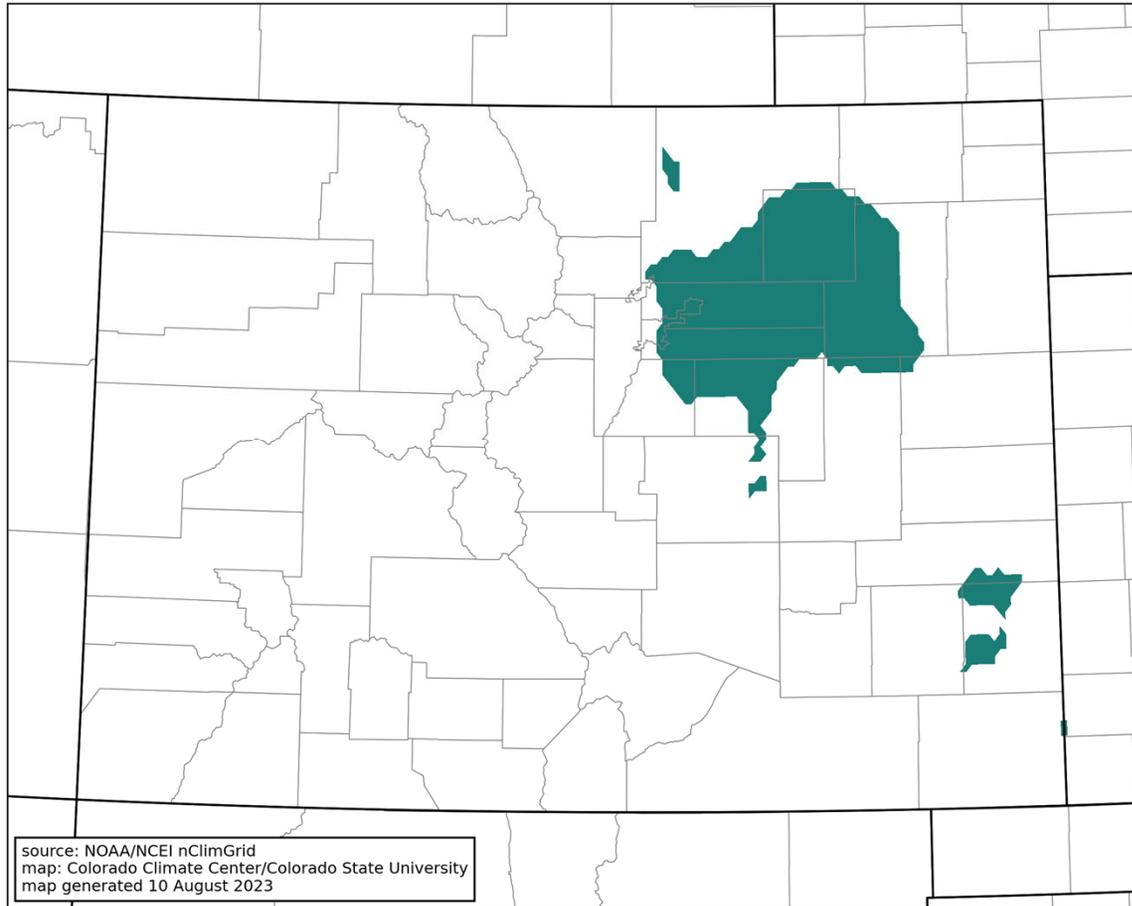


**Record wet May-June-July for a large part of northeast Colorado**



# May-June-July 2023

locations where May-June-July 2023 was the wettest 3-month period on record



**Wettest 3-month period on record for the areas shown here**



Colorado statewide average temperature and precipitation, July

Warm & dry

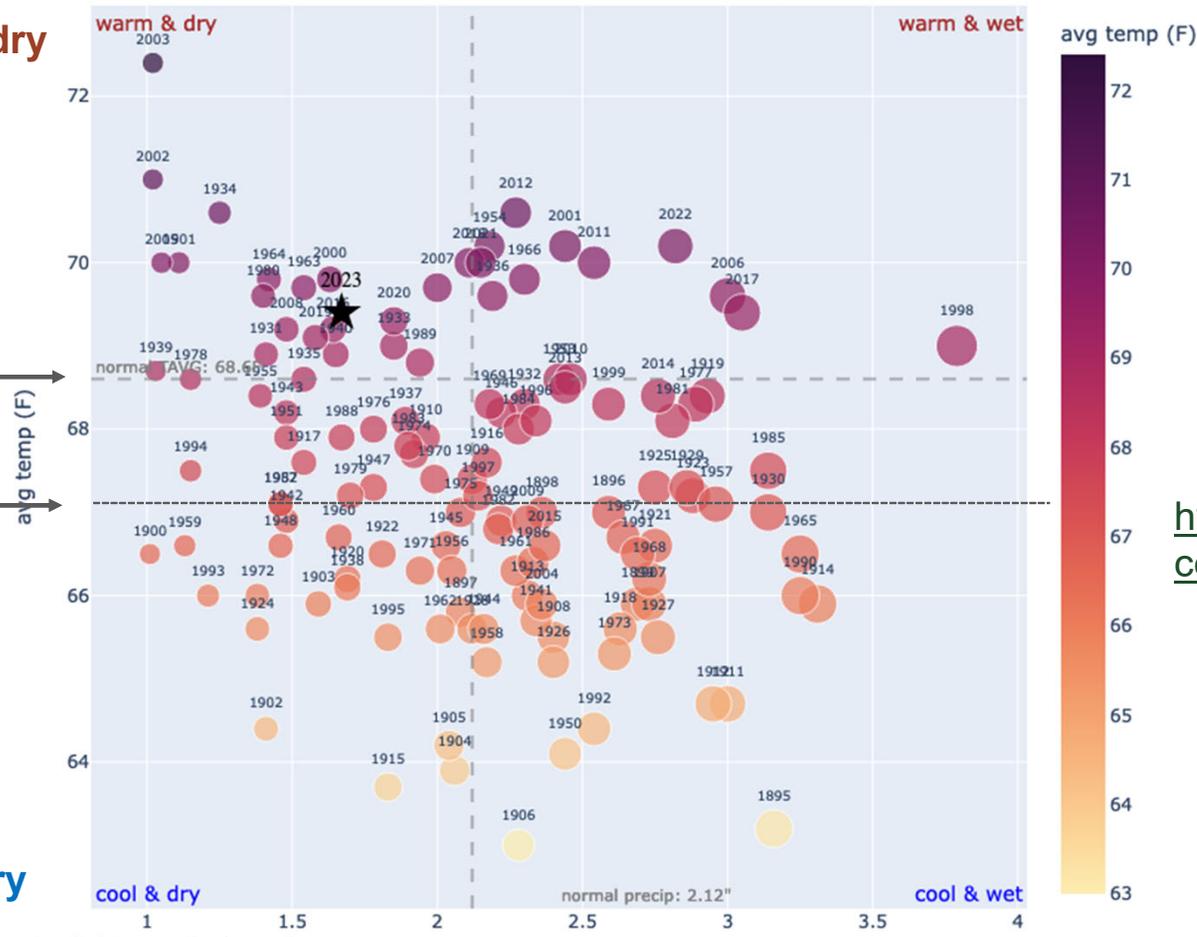
warm & wet

Warm & wet

July 2023

1991-2020 avg temp →

1901-2000 avg temp →



Cool & dry

cool & dry

cool & wet

Cool & wet

size of points proportional to precip,  
color shows temp  
normals are 1991-2020

Colorado Climate Center/CSU  
Data source: NOAA/NCEI Climate at a Glance

[https://climate.colostate.edu/co\\_cag/quadrant.html](https://climate.colostate.edu/co_cag/quadrant.html)



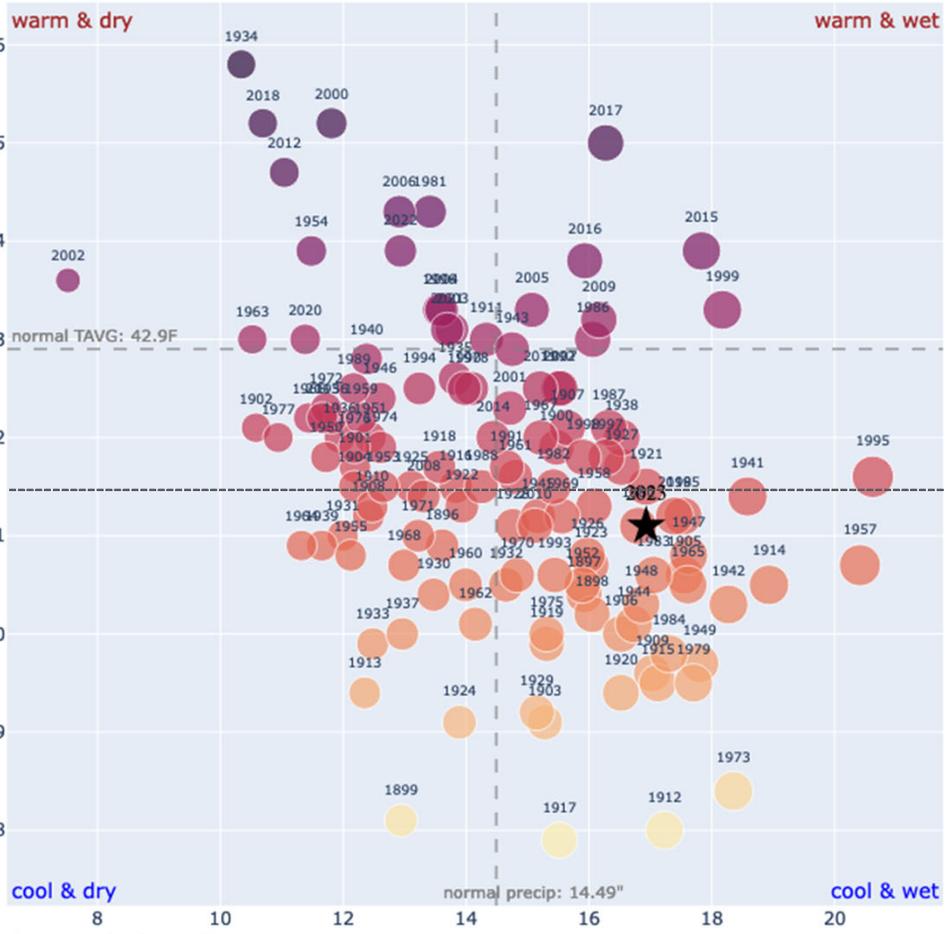
Colorado statewide average temperature and precipitation, October - July

**Warm & dry**  
Water year 2023  
through July

1991-2020 avg temp →

1901-2000 avg temp →

**Cool & dry**



avg temp (F) **Warm & wet**

[https://climate.colostate.edu/co\\_cag/quadrant.html](https://climate.colostate.edu/co_cag/quadrant.html)

**Cool & wet**

size of points proportional to precip,  
color shows temp  
normals are 1991-2020

accumulated precipitation (inches)

Colorado Climate Center/CSU  
Data source: NOAA/NCEI Climate at a Glance



Colorado CD4 (Platte drainage) average temperature and precipitation, May - July

Warm & dry

warm & wet

Warm & wet

May-June-July  
2023: Platte River  
Drainage

1991-2020 avg temp →

1901-2000 avg temp →



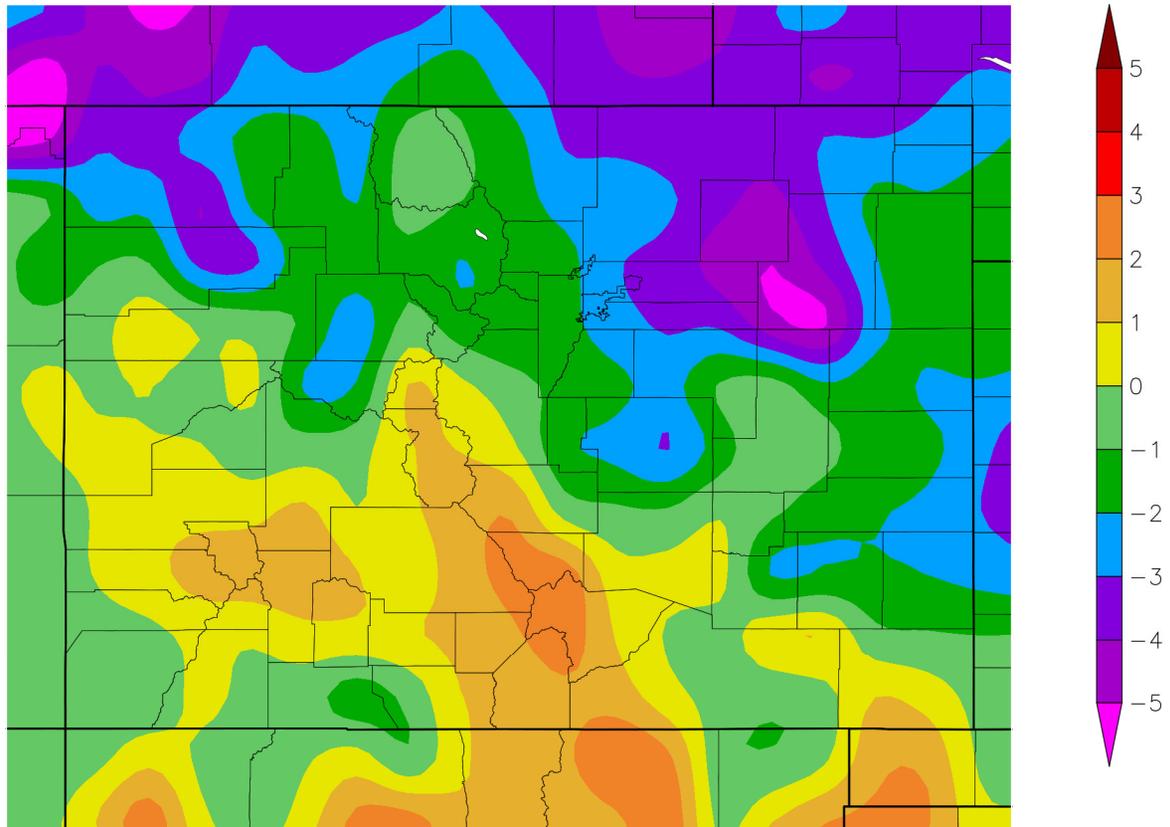
[https://climate.colostate.edu/co\\_cag/quadrant.html](https://climate.colostate.edu/co_cag/quadrant.html)

Cool & dry

Cool & wet



# Departure from Normal Temperature (F) 8/1/2023 – 8/15/2023



Generated 8/16/2023 at HPRCC using provisional data.

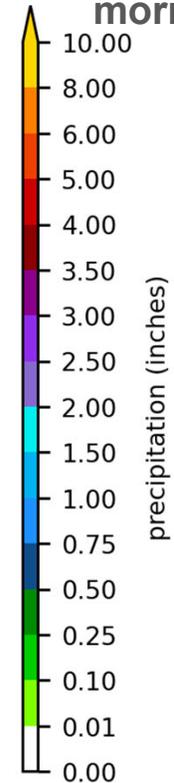
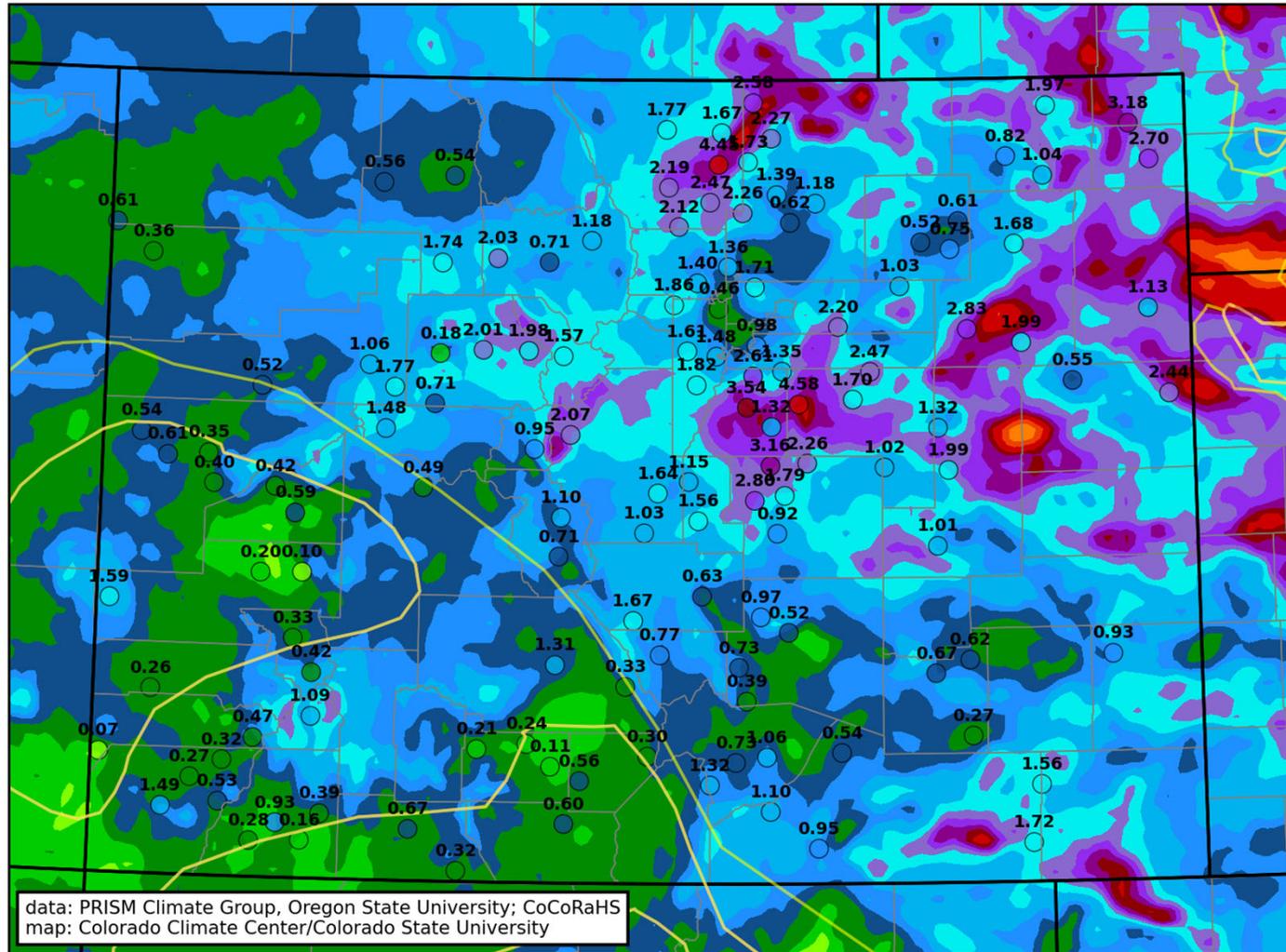
NOAA Regional Climate Centers



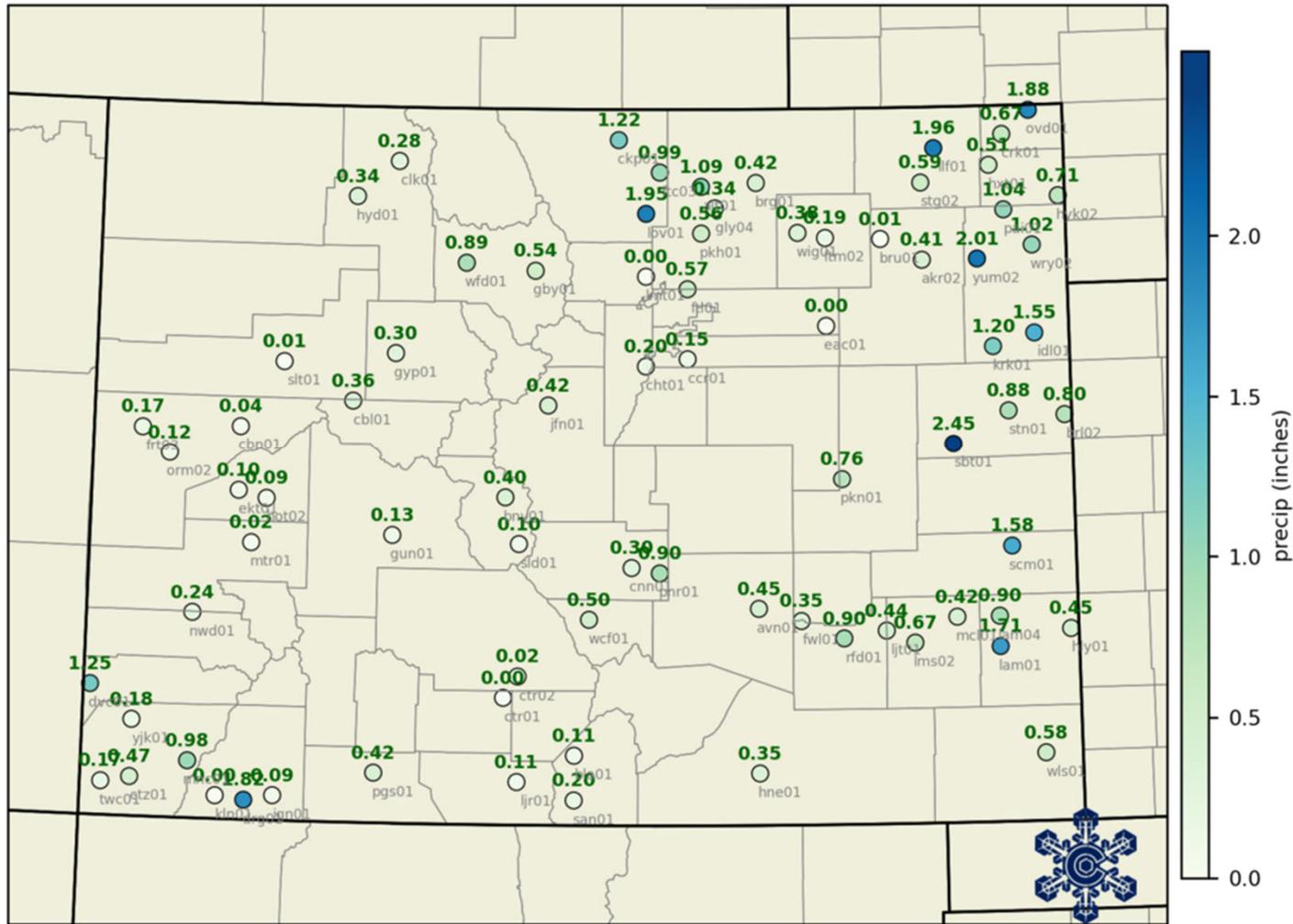
PRISM and CoCoRaHS month-to-date precipitation, US Drought Monitor

through 5:00am MST Tue 15 August 2023

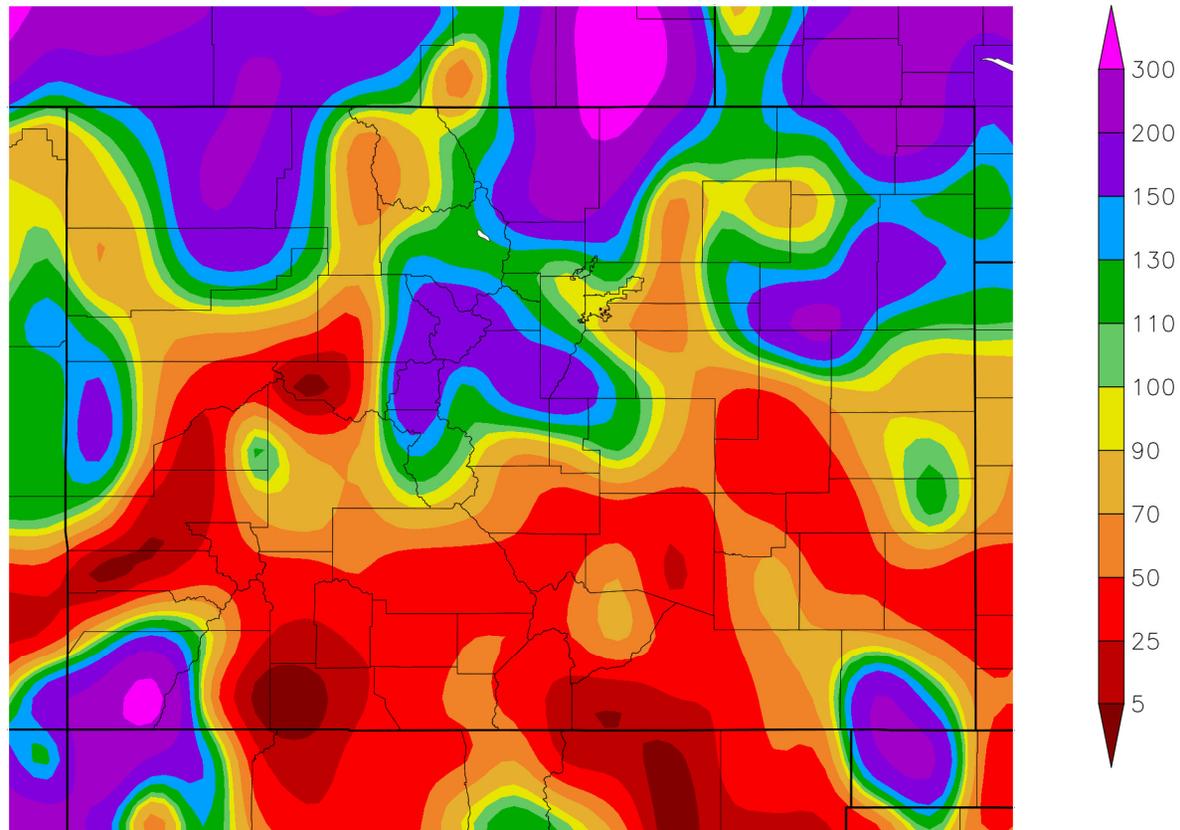
### August precipitation through Tuesday morning



CoAgMET/Northern Water precipitation in previous 14 days: 01 Aug 2023-15 Aug 2023



# Percent of Normal Precipitation (%) 8/1/2023 – 8/15/2023



Generated 8/16/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers



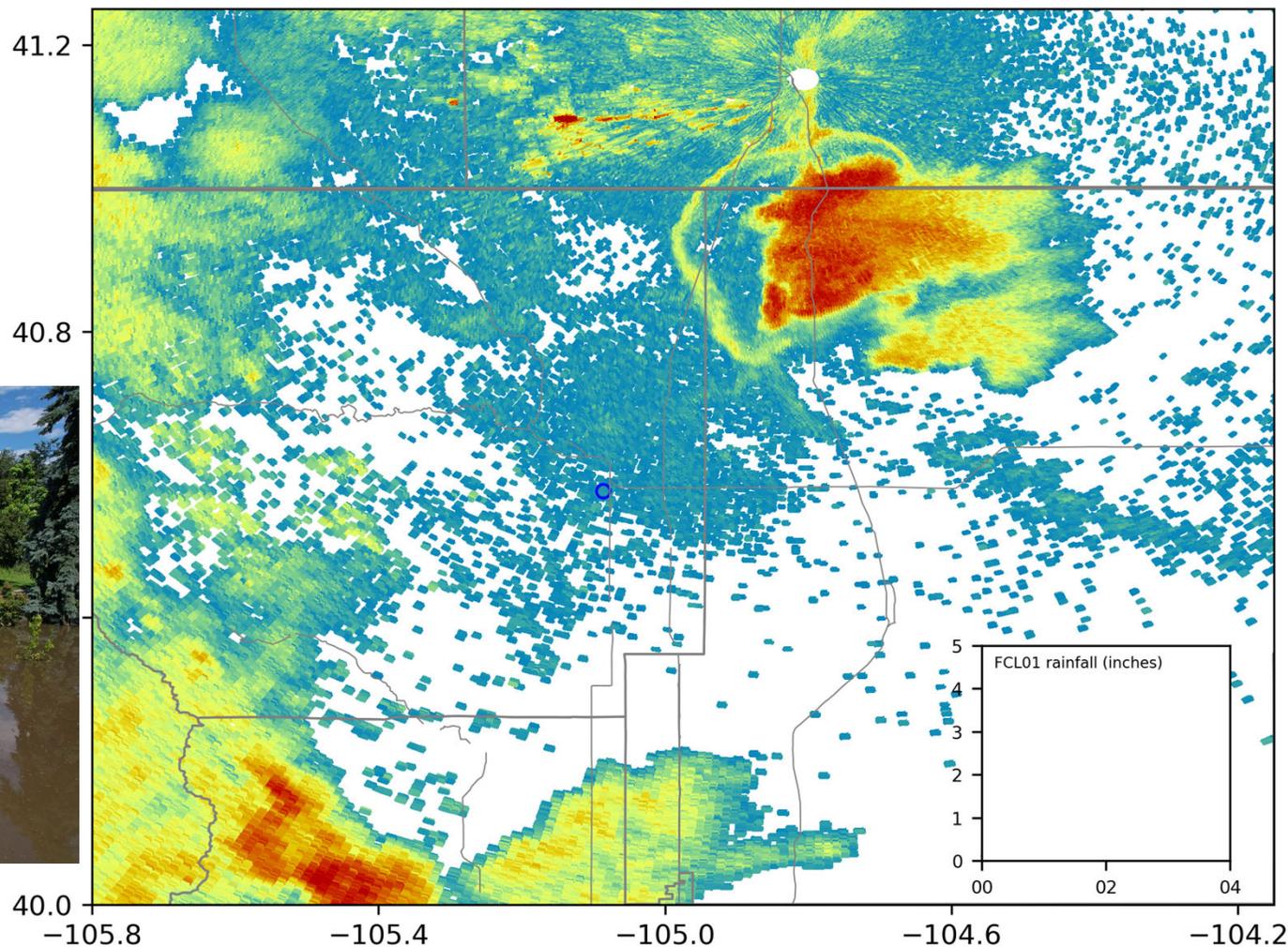
# Fort Collins deluge, evening of July 31

Over 3.3" of rain in an hour!

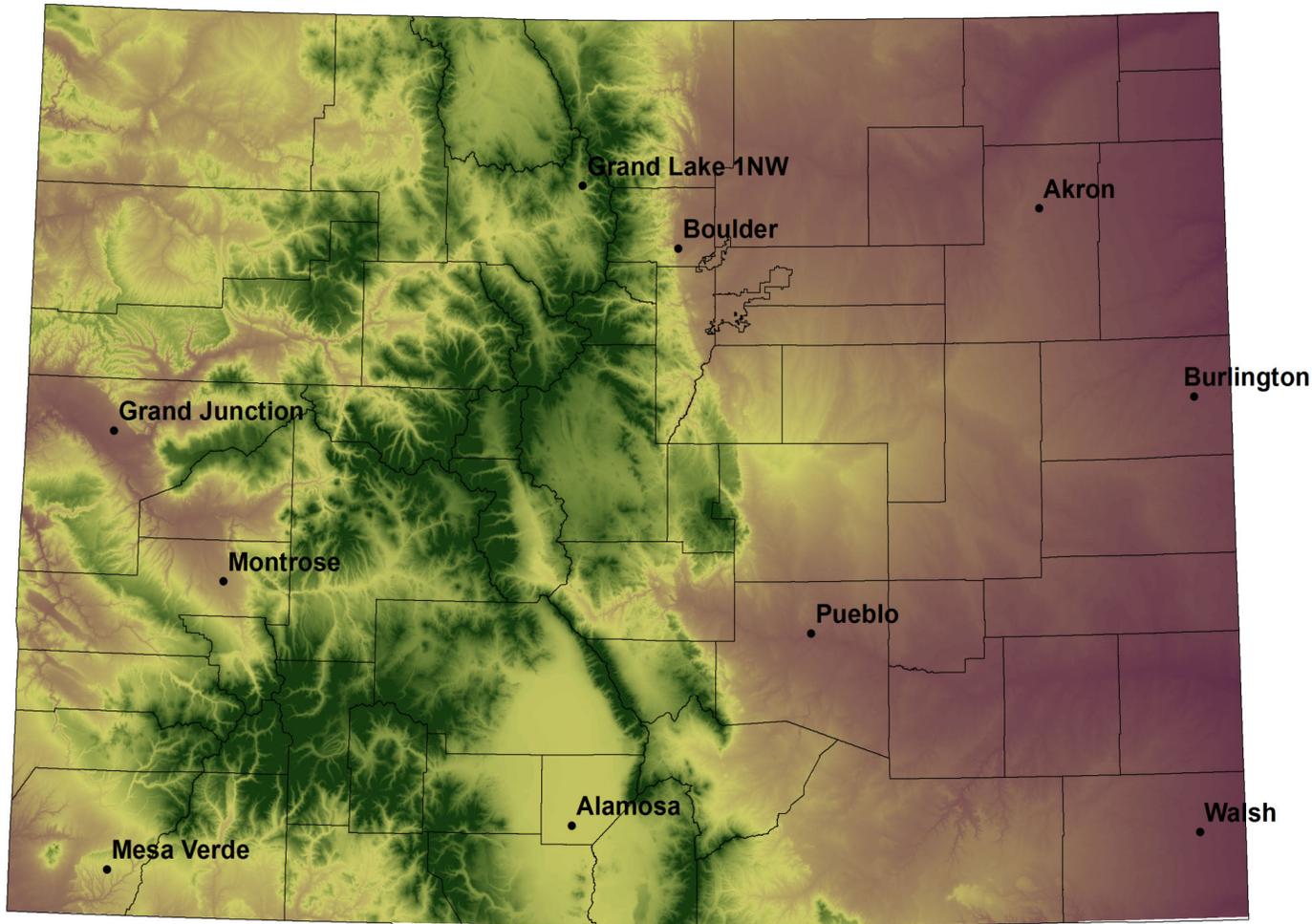


<https://source.colostate.edu/csus-past-flood-mitigation-efforts-minimized-damage-from-july-31-rains/>

KCYS 0.5-degree reflectivity 0002 UTC 01 Aug 2023



## NWS Cooperative Stations for WATF

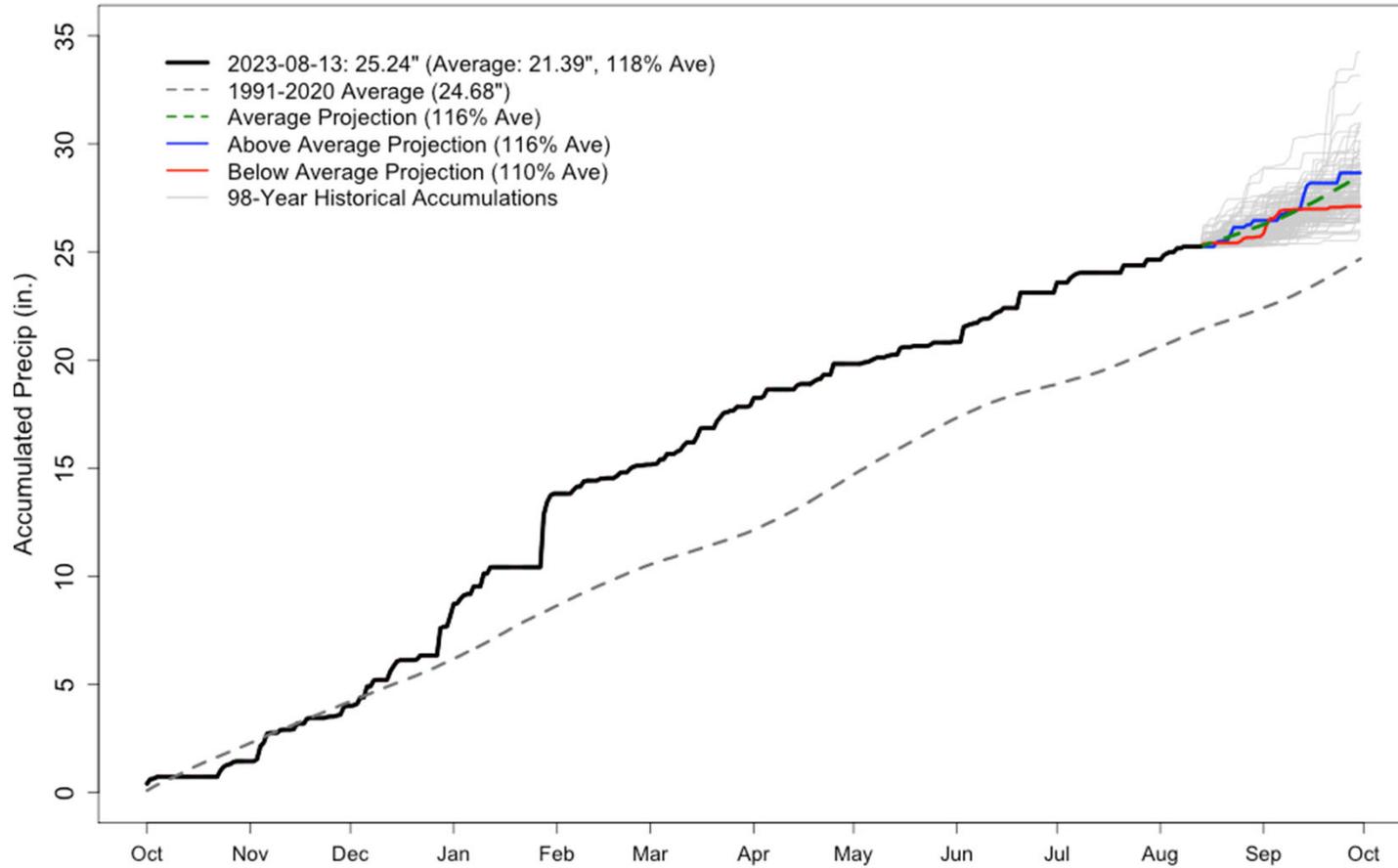


## Water Year 2023 – Station Updates



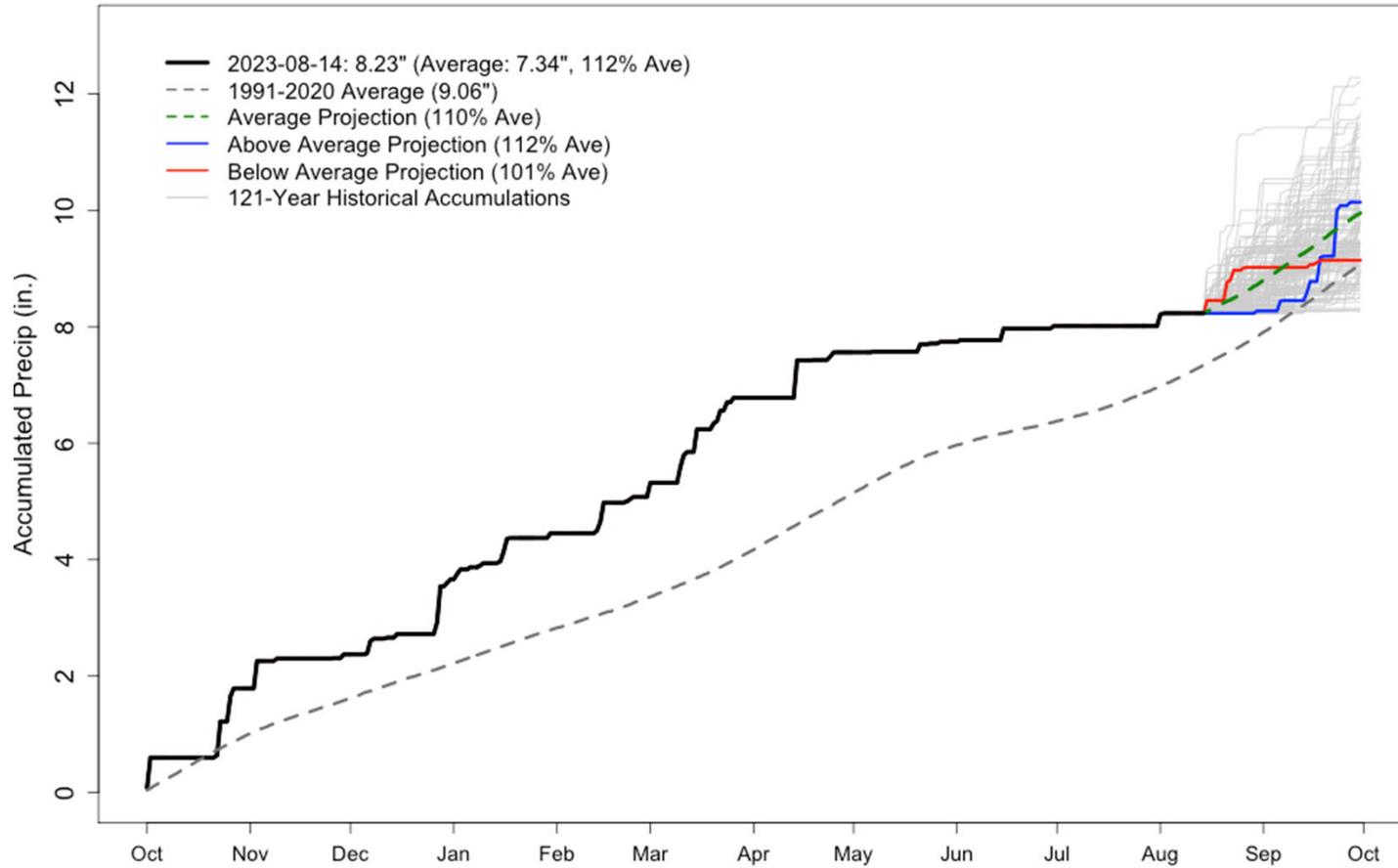
# Steamboat Springs

## STEAMBOAT SPRINGS WY2023 Precipitation Projections



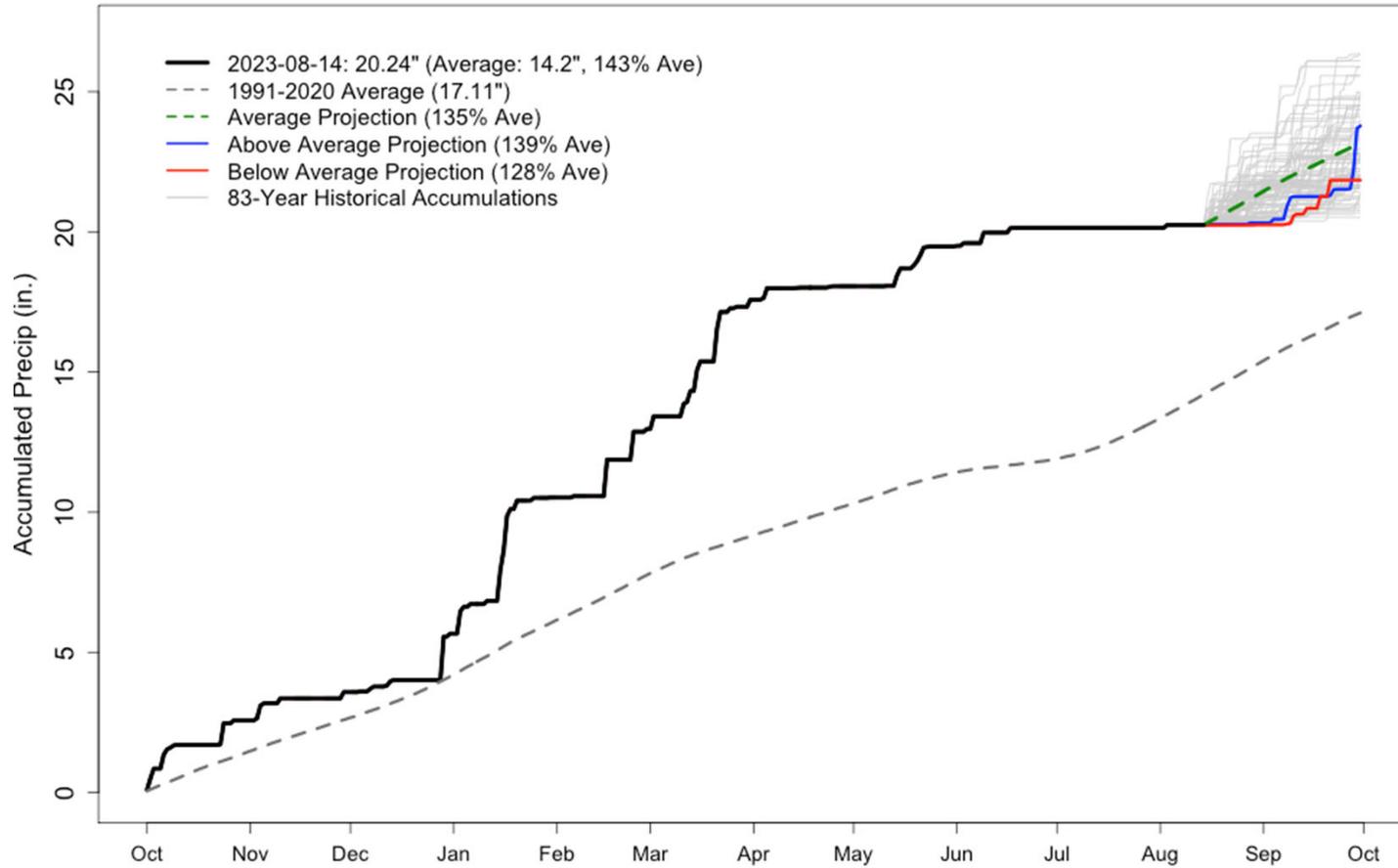
# Grand Junction

## GRAND JUNCTION WALKER FIELD WY2023 Precipitation Projections



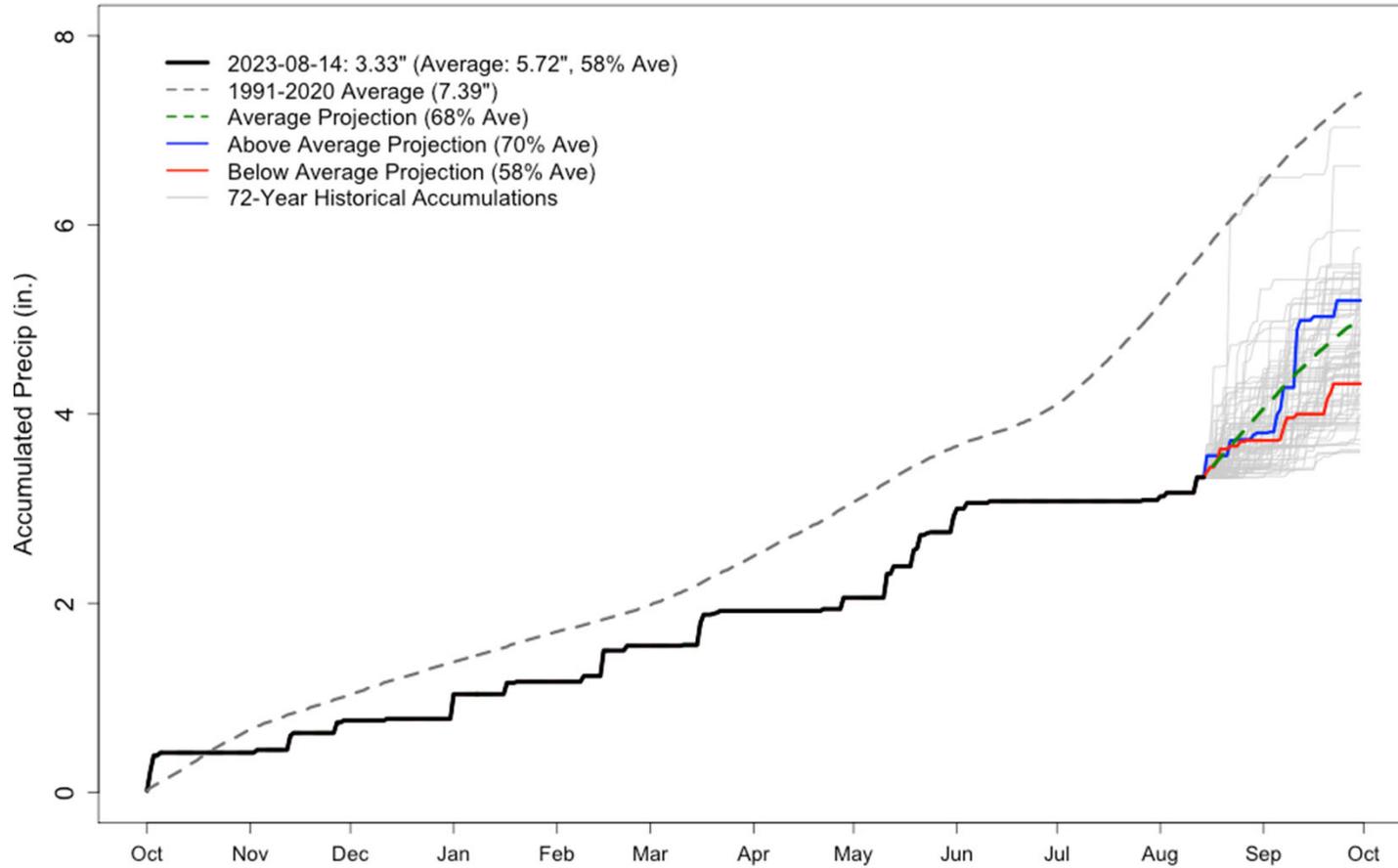
# Mesa Verde NP

## MESA VERDE NP WY2023 Precipitation Projections



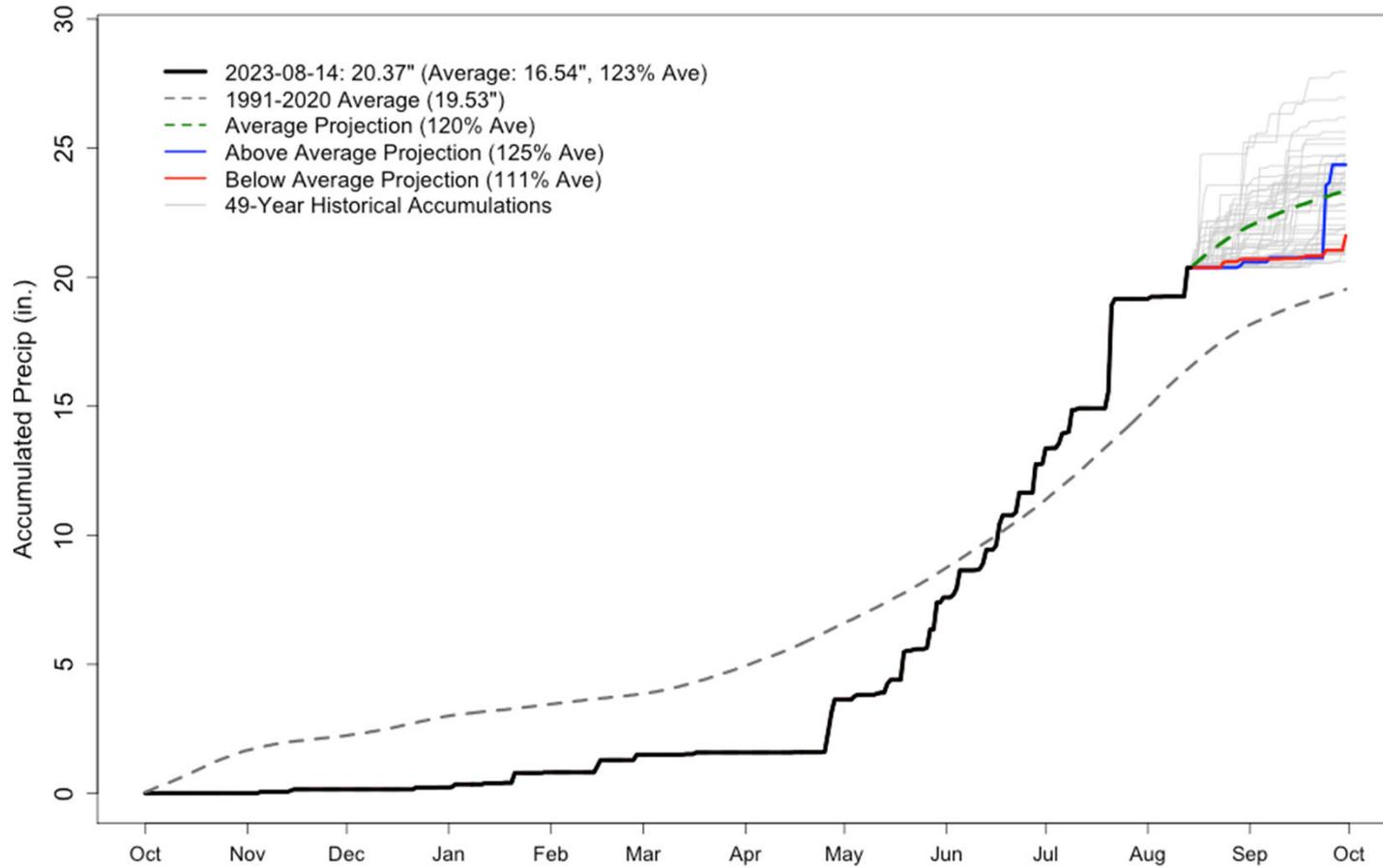
# Alamosa

## ALAMOSA-BERGMAN FIELD WY2023 Precipitation Projections



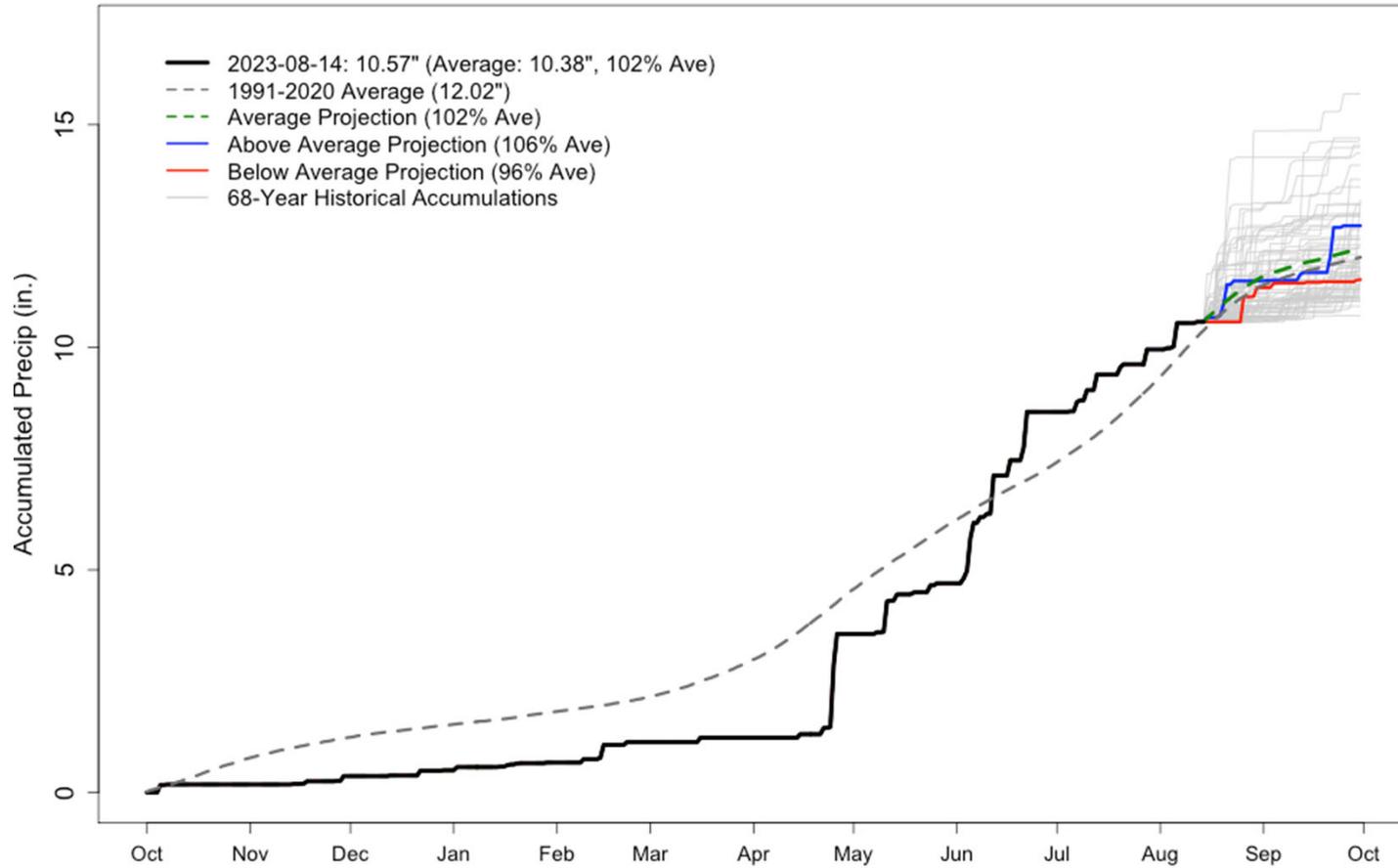
# Walsh

## WALSH 1 W WY2023 Precipitation Projections



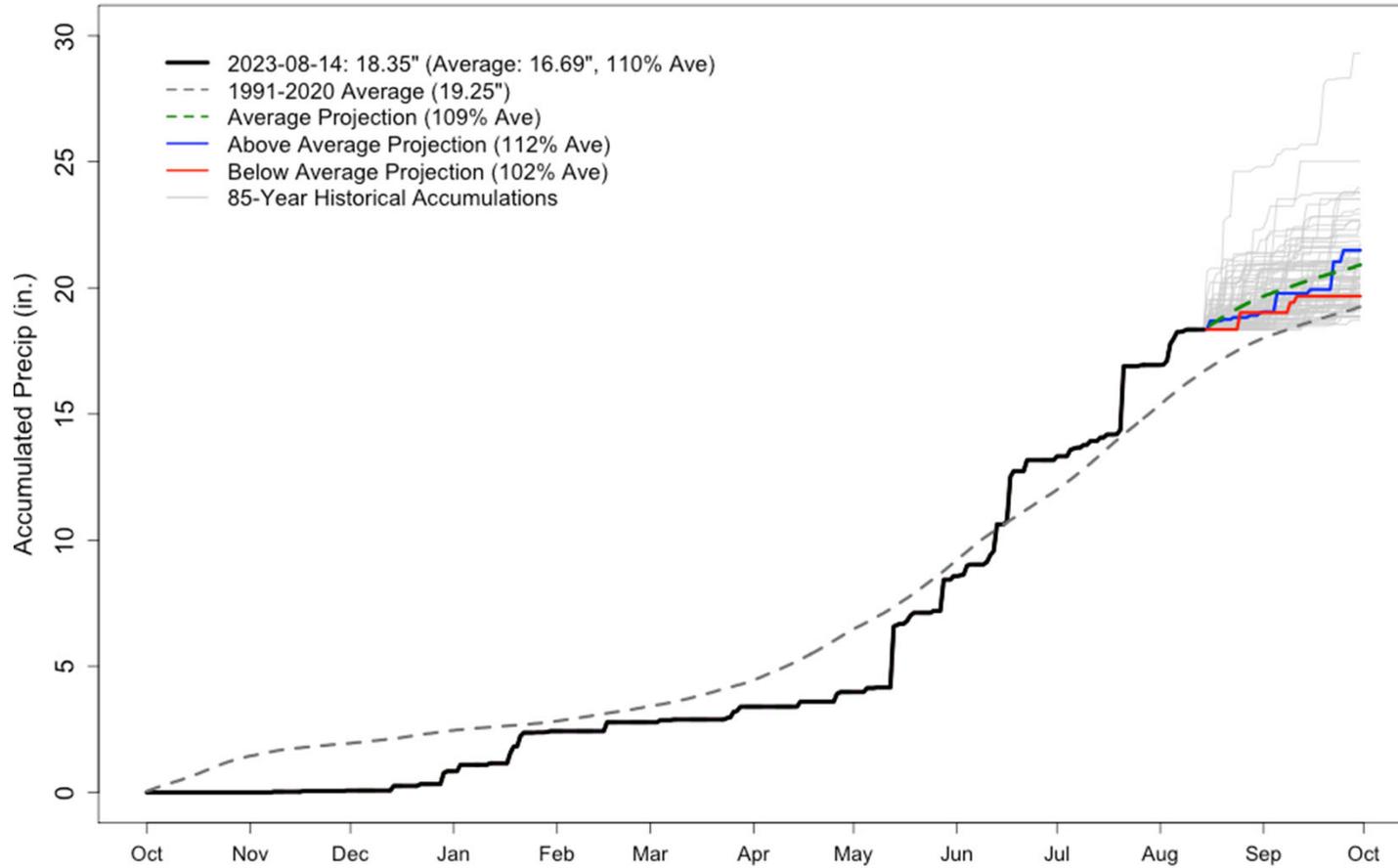
# Pueblo

## PUEBLO MEMORIAL AIRPORT WY2023 Precipitation Projections



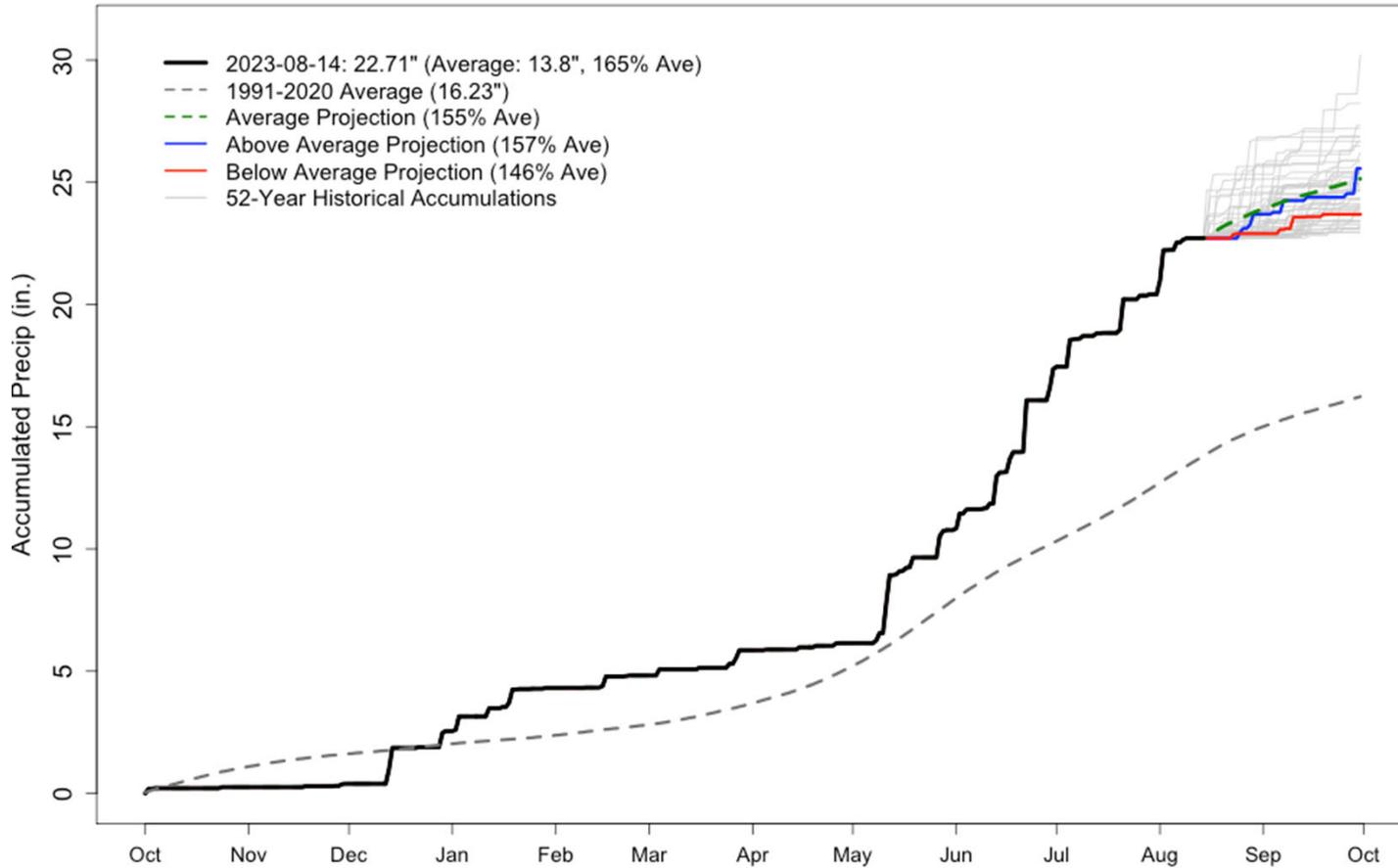
# Burlington

## BURLINGTON WY2023 Precipitation Projections



# Akron

## AKRON 4 E WY2023 Precipitation Projections

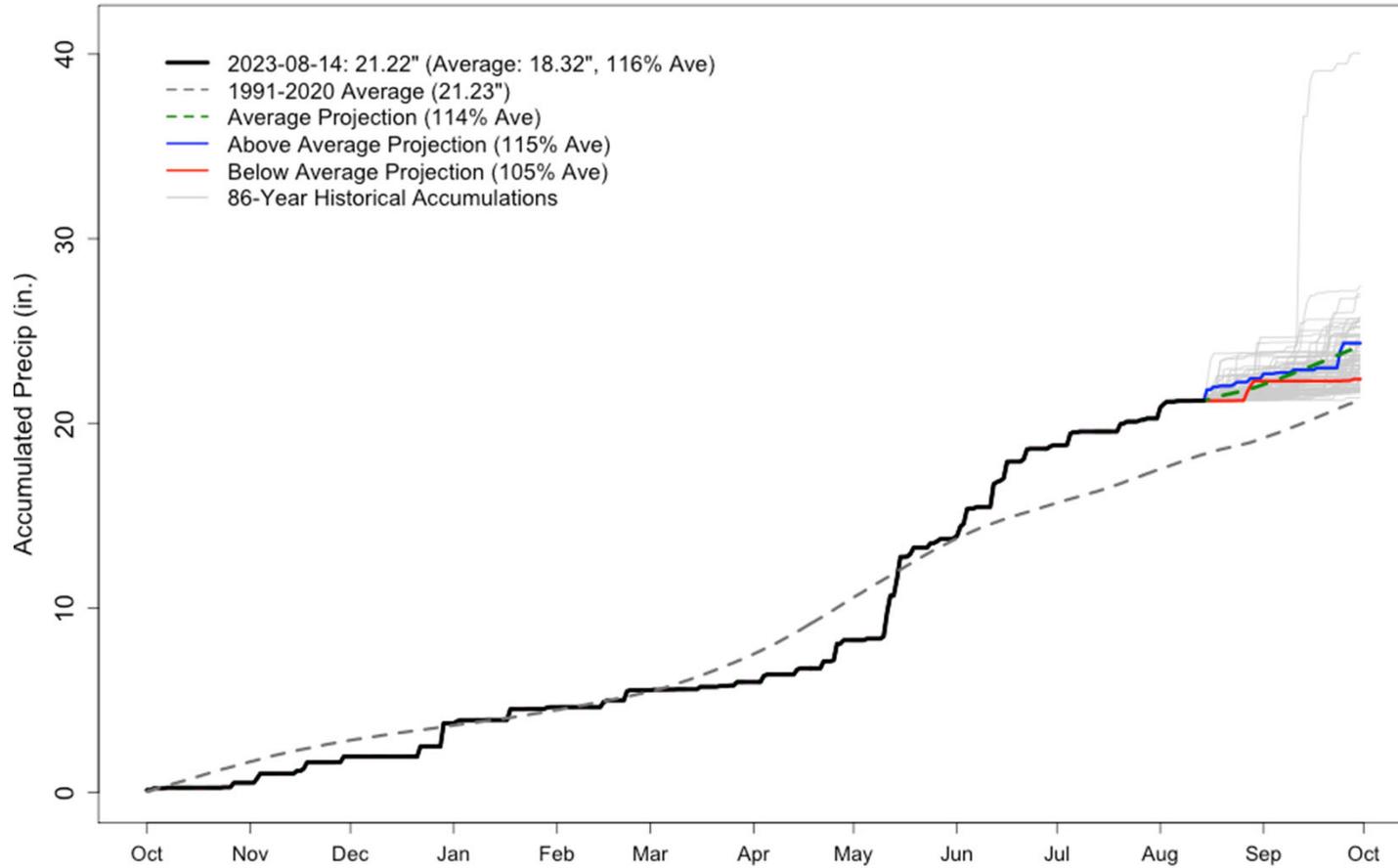


Already the 9<sup>th</sup> wettest water year, with 1.5 months to go



# Boulder

## BOULDER WY2023 Precipitation Projections



# Drought conditions

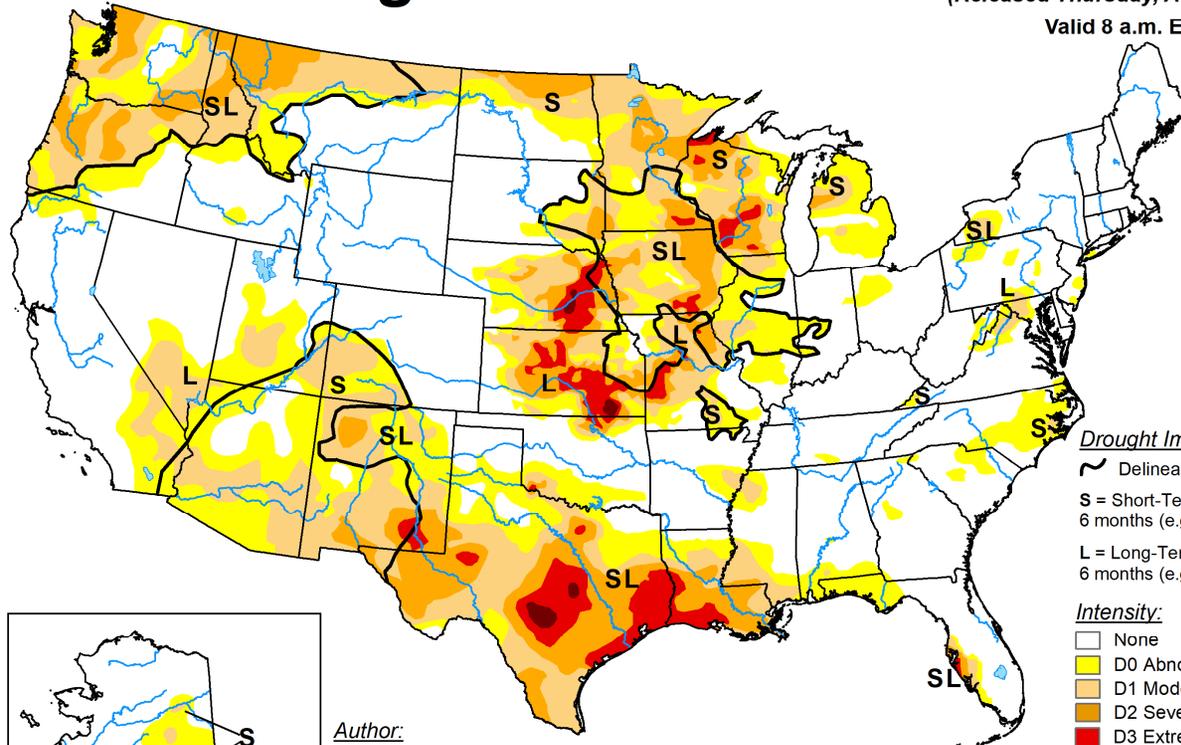


Lowline Fire, Gunnison County, July 29  
<https://inciweb.nwcg.gov/incident-information/cogmf-lowline-fire>



# U.S. Drought Monitor

**August 15, 2023**  
 (Released Thursday, Aug. 17, 2023)  
 Valid 8 a.m. EDT

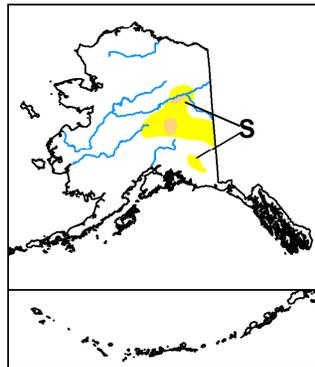


**Drought Impact Types:**

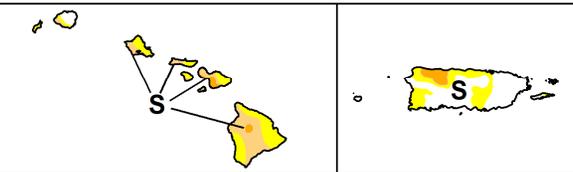
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

**Intensity:**

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



**Author:**  
 Lindsay Johnson  
 National Drought Mitigation Center



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>

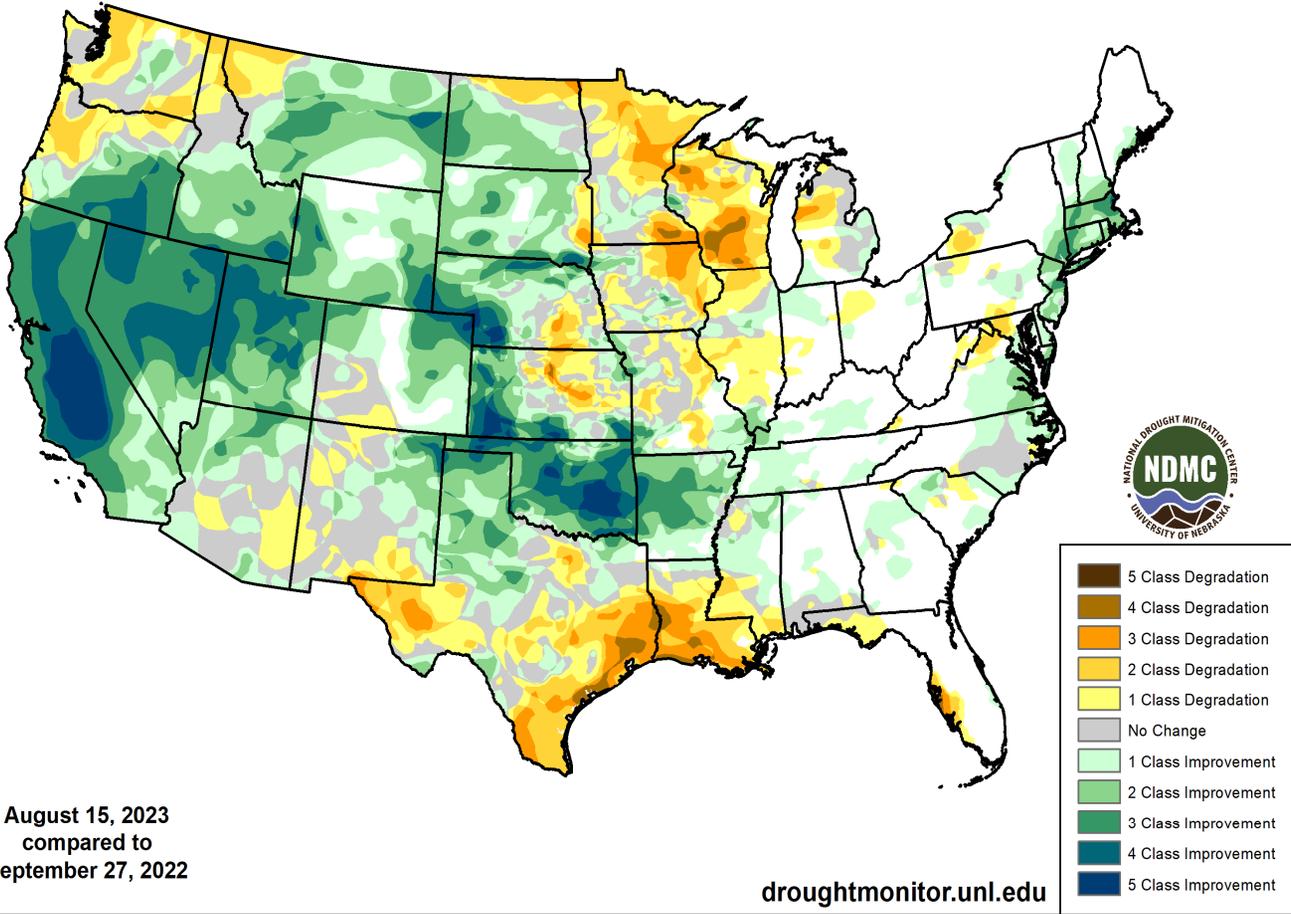


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)



**U.S. Drought Monitor Class Change - CONUS**  
Start of Water Year

**Change since  
start of water  
year**



# U.S. Drought Monitor Colorado

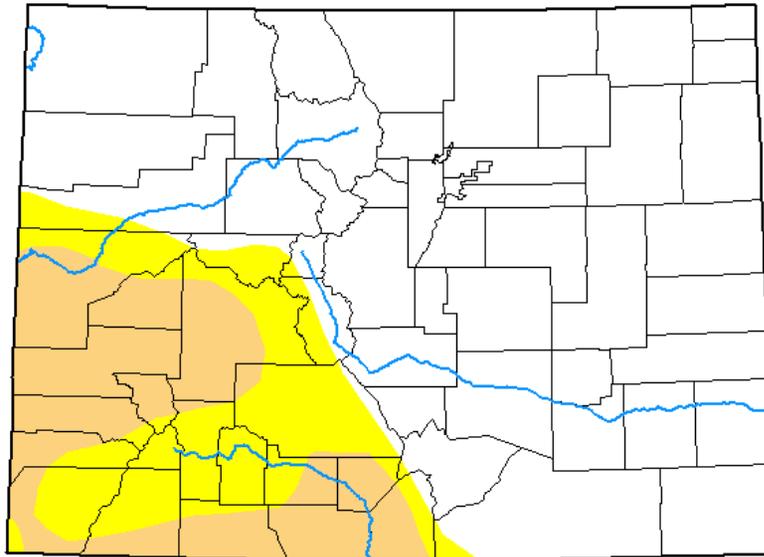
**August 15, 2023**

(Released Thursday, Aug. 17, 2023)

Valid 8 a.m. EDT

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	71.82	28.18	15.04	0.00	0.00	0.00
<b>Last Week</b> 08-08-2023	73.20	26.80	12.42	0.00	0.00	0.00
<b>3 Months Ago</b> 05-16-2023	54.68	45.32	10.76	2.91	1.15	0.31
<b>Start of Calendar Year</b> 01-03-2023	39.97	60.03	33.83	12.28	1.91	0.01
<b>Start of Water Year</b> 09-27-2022	15.46	84.54	45.65	15.47	3.73	0.57
<b>One Year Ago</b> 08-16-2022	8.24	91.76	57.92	23.67	5.04	0.58



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:

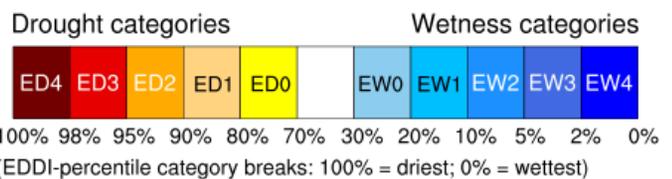
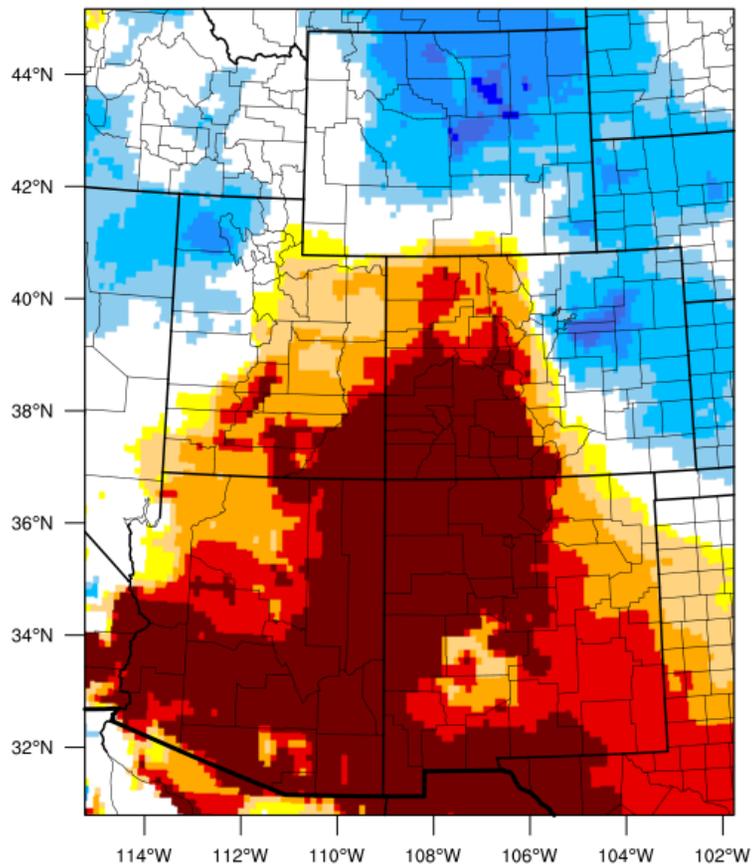
Lindsay Johnson  
National Drought Mitigation Center



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)



2-month EDDI categories for August 12, 2023



Generated by NOAA/ESRL/Physical Sciences Laboratory

## Evaporative Demand Drought Index

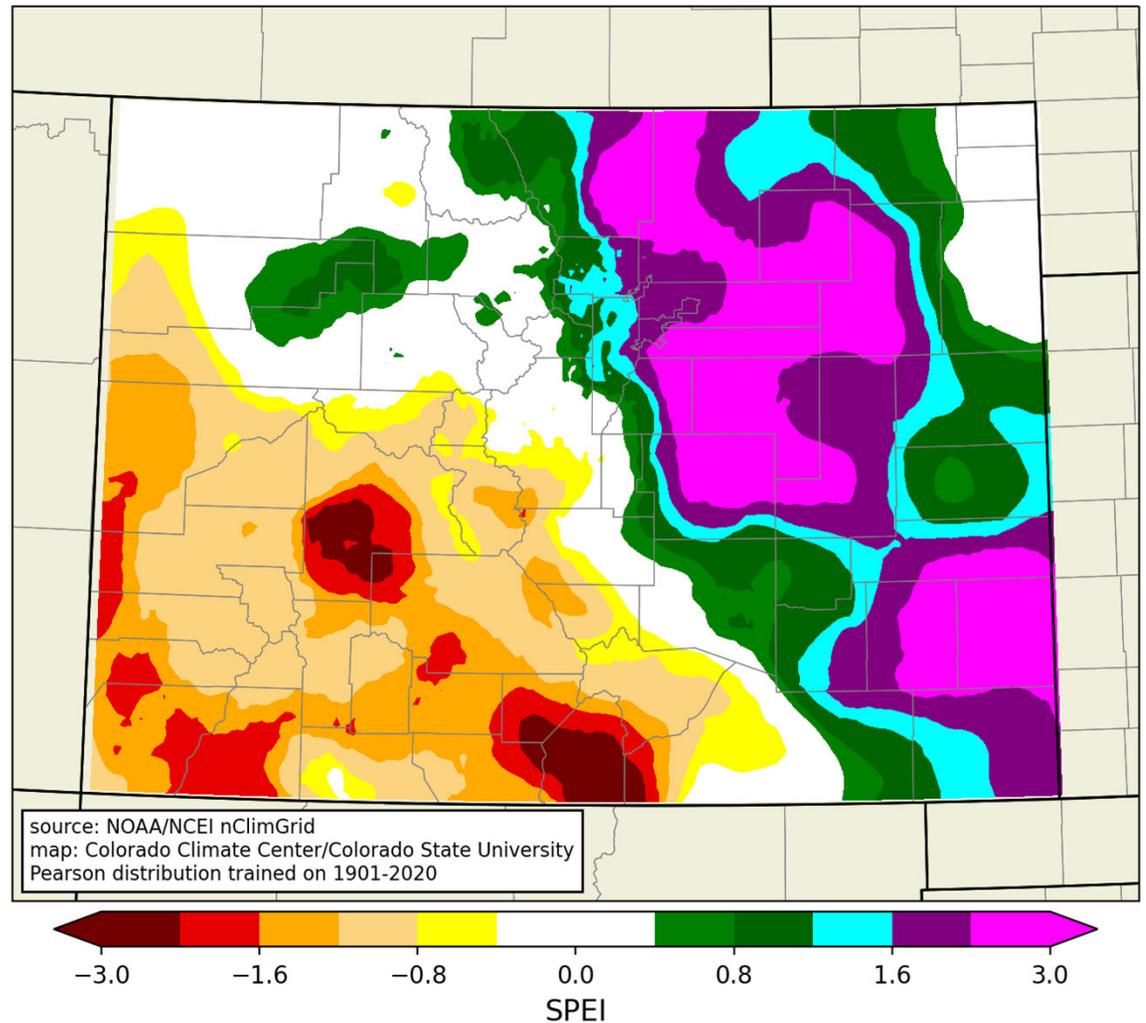
Over the last 2 months, evaporative demand has been extremely high (hot & dry) over western Colorado and the southwestern US; very low (cool & wet) over eastern Colorado





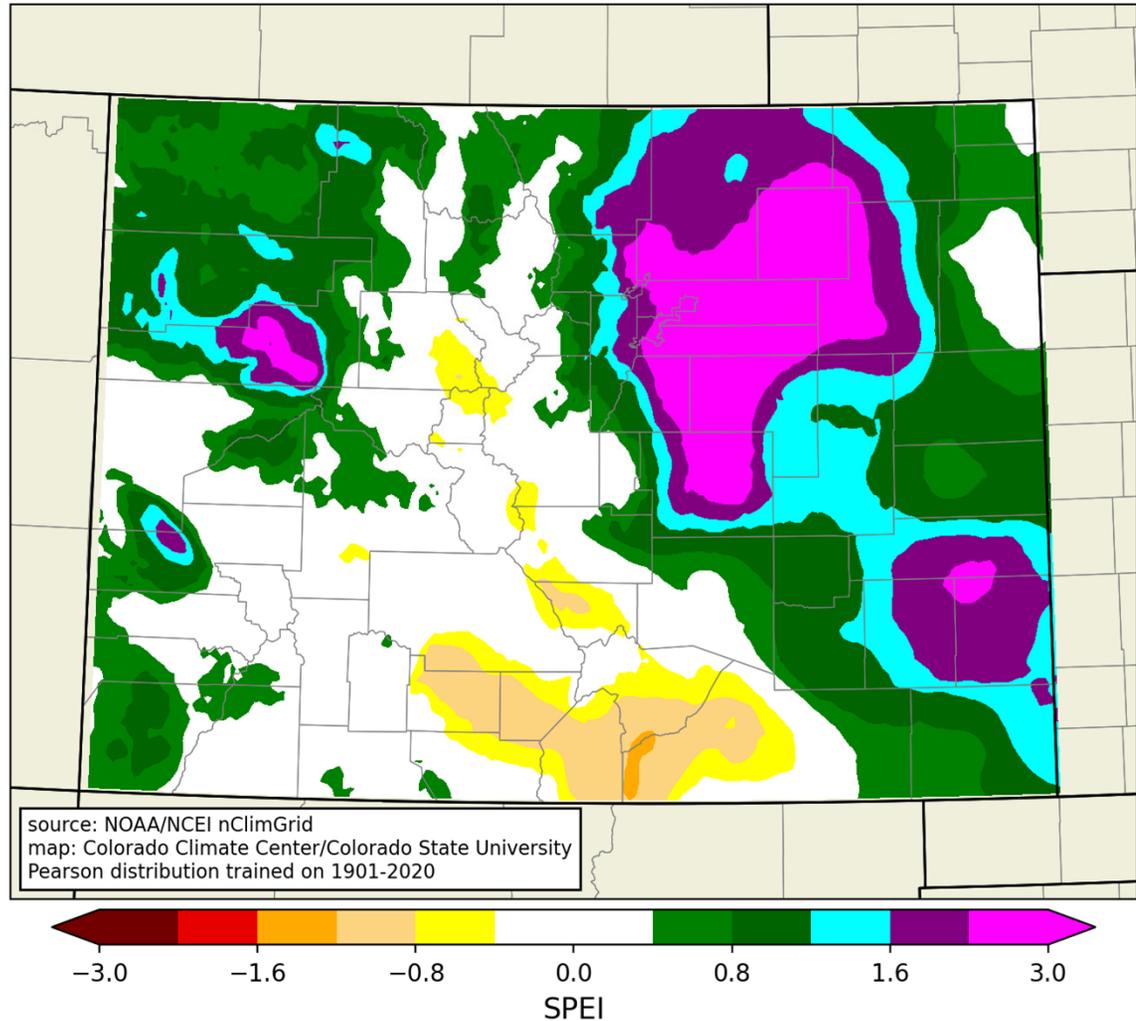
# Standardized Precipitation- Evapotranspiration Index, last 2 months

2-month SPEI based on NOAA nClimGrid data, end of July 2023



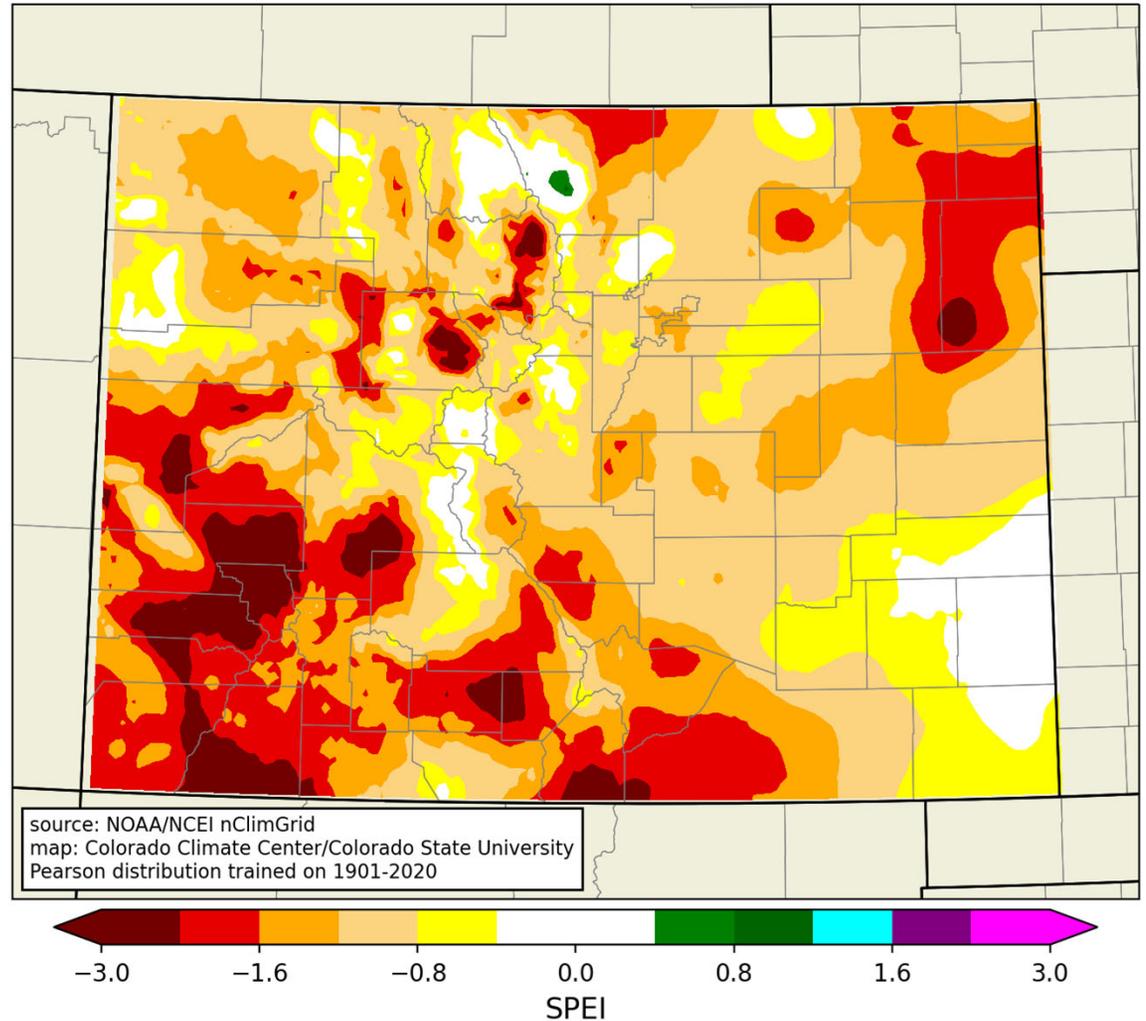
# Standardized Precipitation- Evapotranspiration Index, last 9 months

9-month SPEI based on NOAA nClimGrid data, end of July 2023

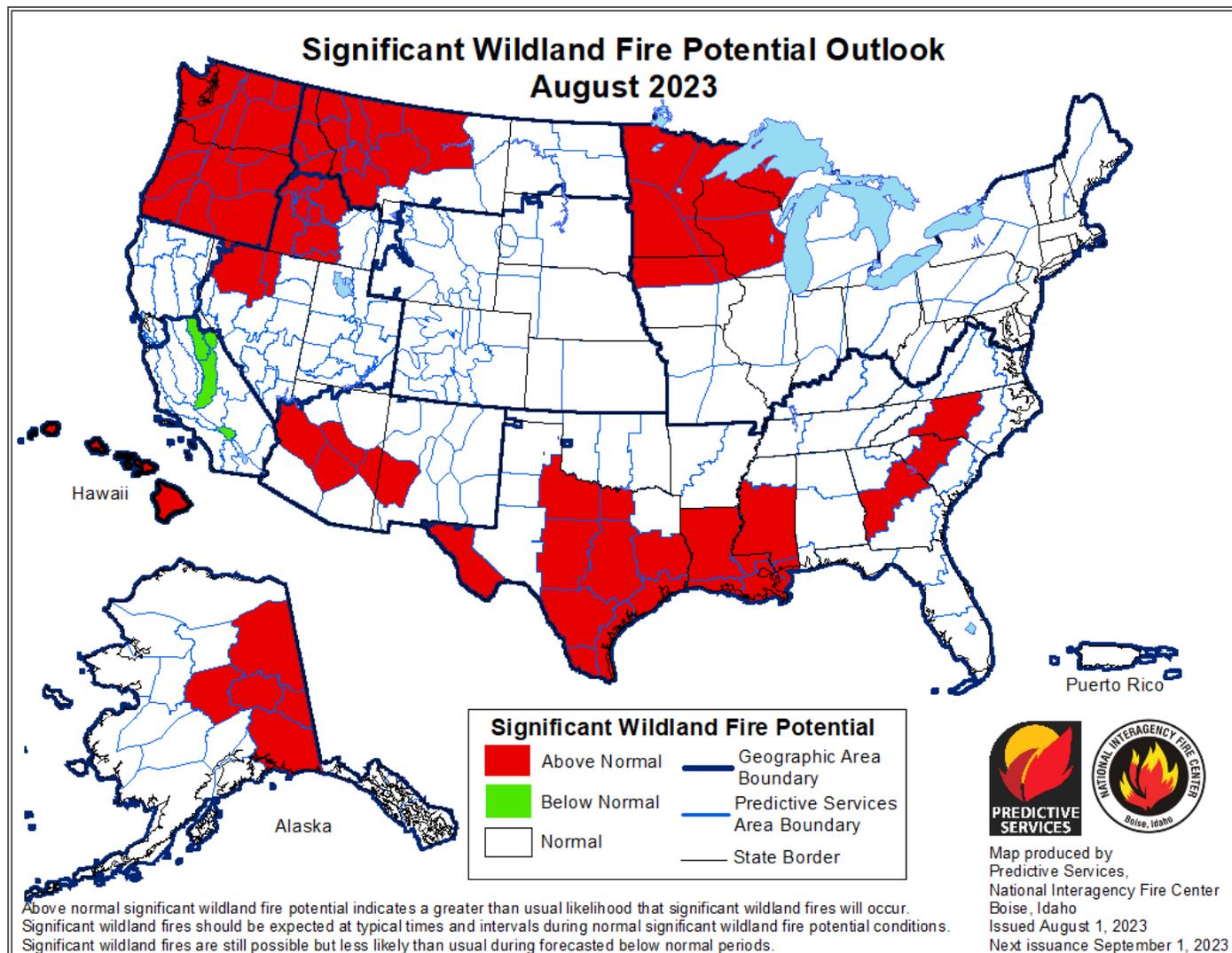


# Standardized Precipitation- Evapotranspiration Index, last 5 years

60-month SPEI based on NOAA nClimGrid data, end of July 2023



# USDA outlooks for wildfire potential show near-normal risk across Colorado

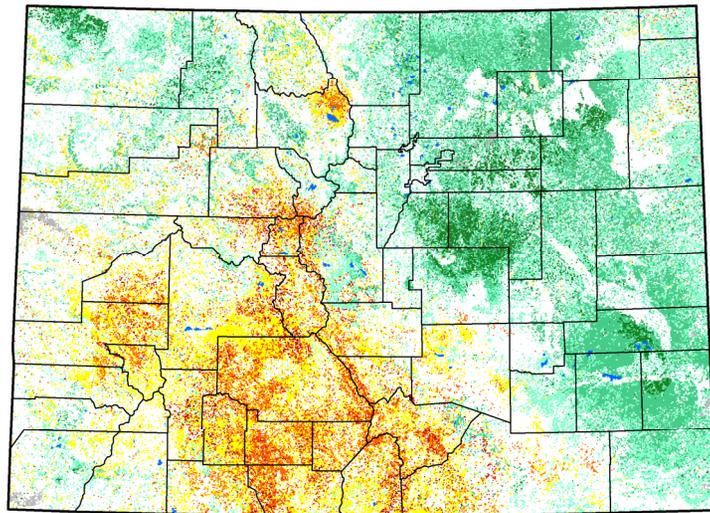


VegDRI: longer-term vegetation condition

QuickDRI: shorter-term vegetation response

**Vegetation Drought Response Index**  
Complete: Colorado

August 13, 2023



**Vegetation Condition**

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





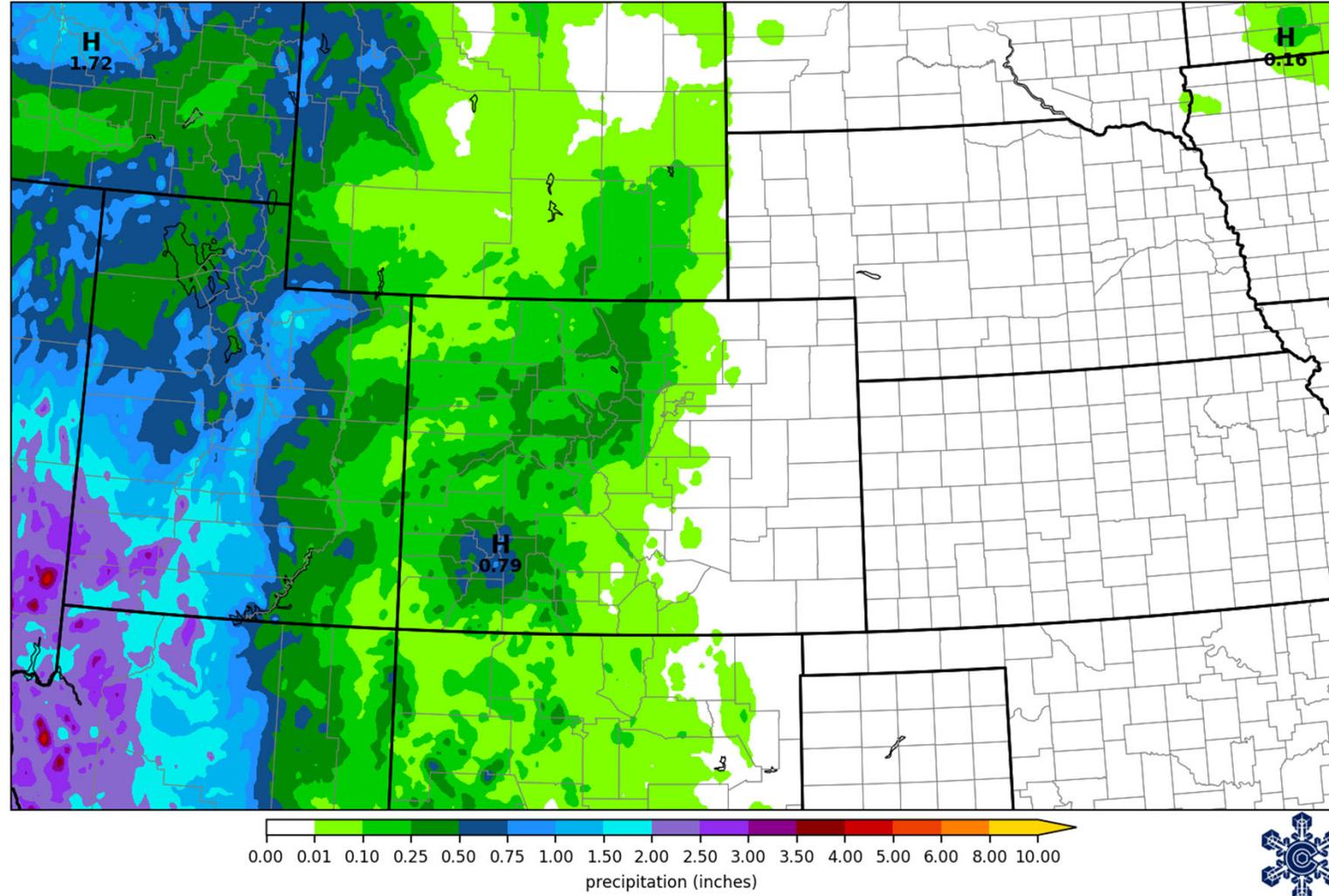
## Outlook



# NOAA 7-day precipitation forecast

NOAA Weather Prediction Center  
7-day precipitation forecast

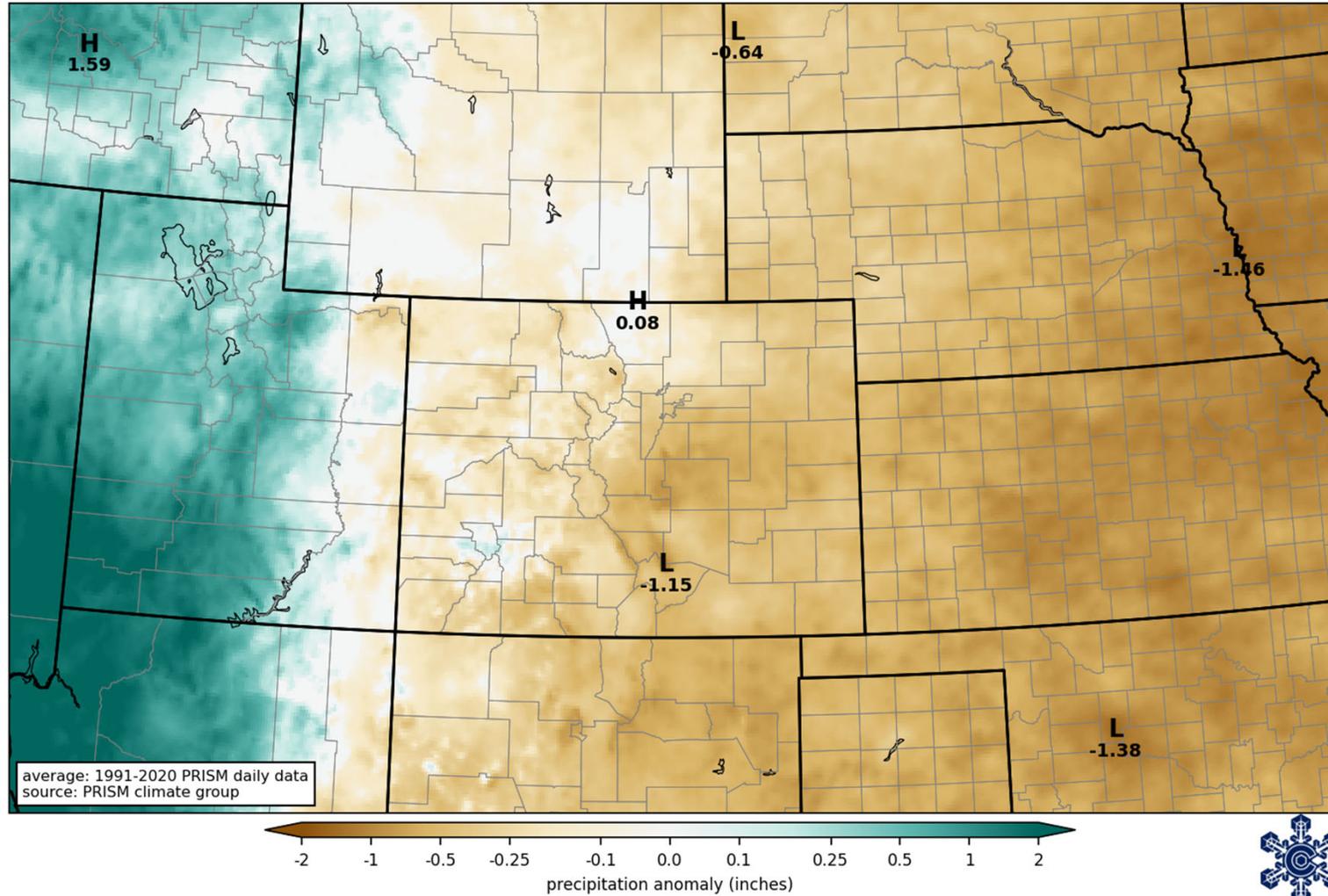
forecast issued 0000 UTC Thu 17 Aug 2023  
precipitation in 168 hrs ending 0000 UTC Thu 24 Aug 2023



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

forecast issued 0000 UTC Thu 17 Aug 2023  
precipitation in 168 hrs ending 0000 UTC Thu 24 Aug 2023

# NOAA 7-day precipitation forecast (difference from average)



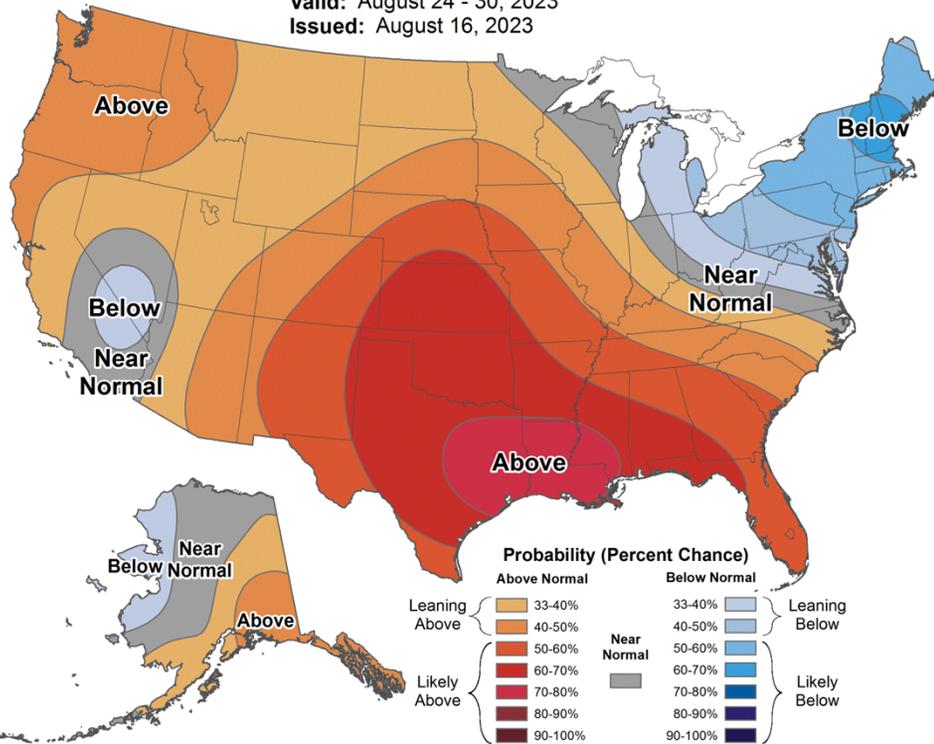
# Hot and dry over the next 7 days; following week leans toward warm and wet



## 8-14 Day Temperature Outlook



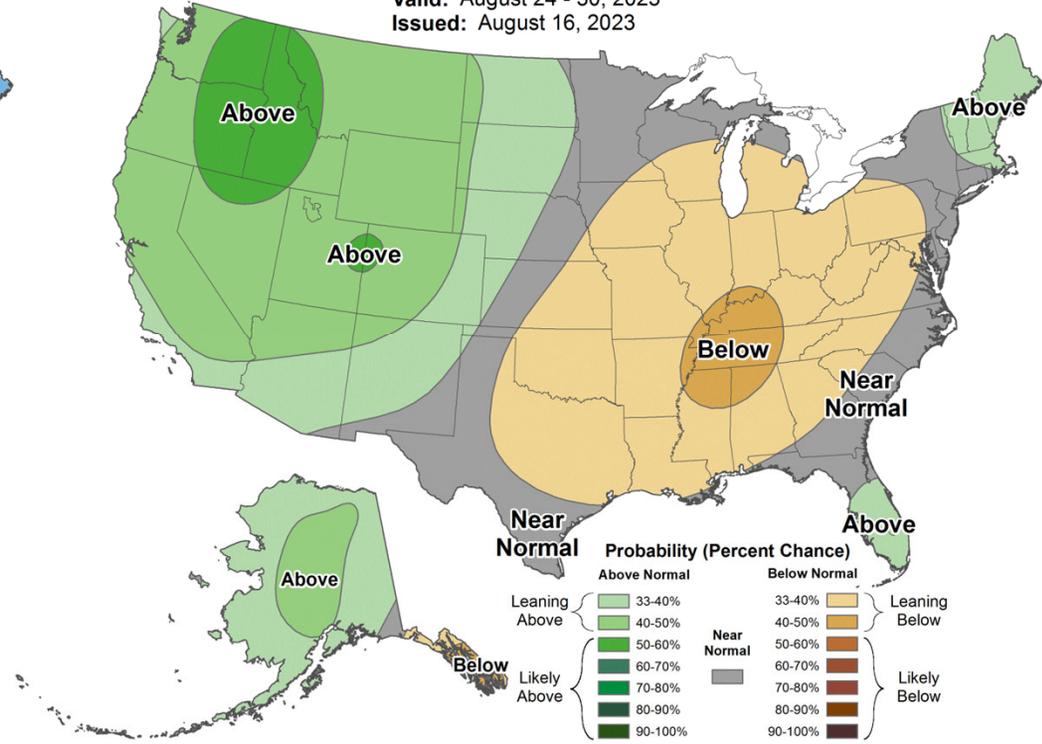
Valid: August 24 - 30, 2023  
 Issued: August 16, 2023



## 8-14 Day Precipitation Outlook



Valid: August 24 - 30, 2023  
 Issued: August 16, 2023



# El Niño is here, and will persist through the winter

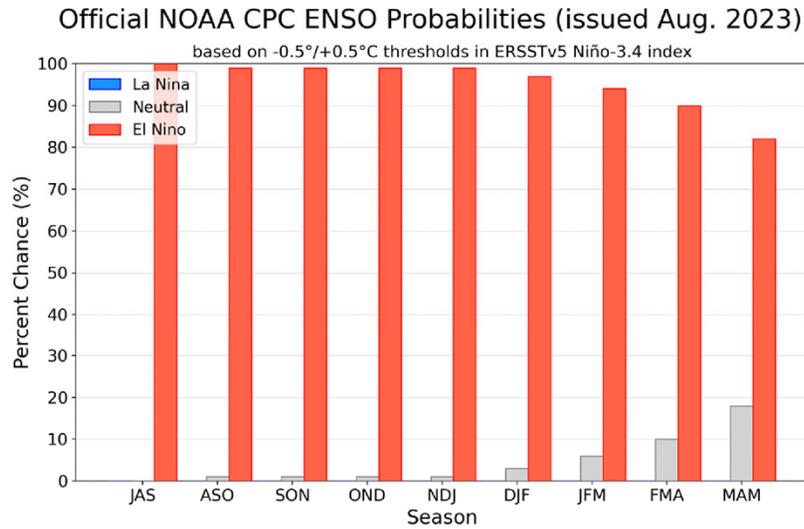


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $120^{\circ}\text{W}$ - $170^{\circ}\text{W}$ ). Figure updated 10 August 2023.

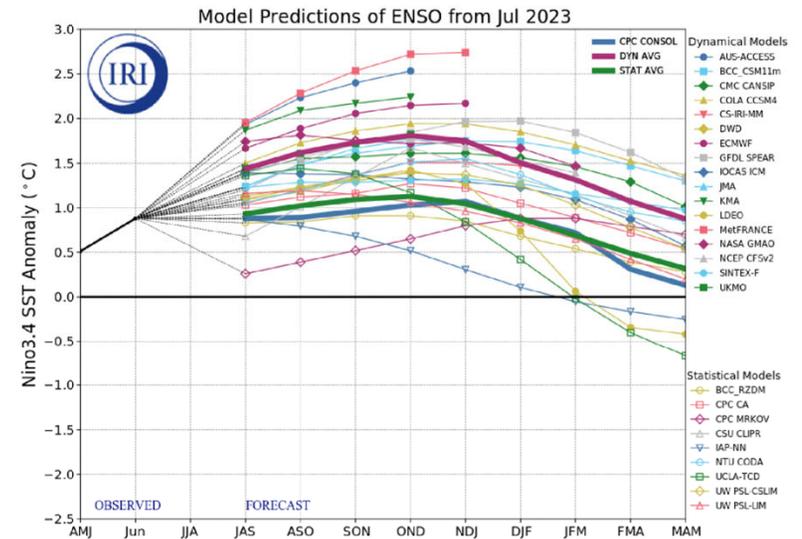
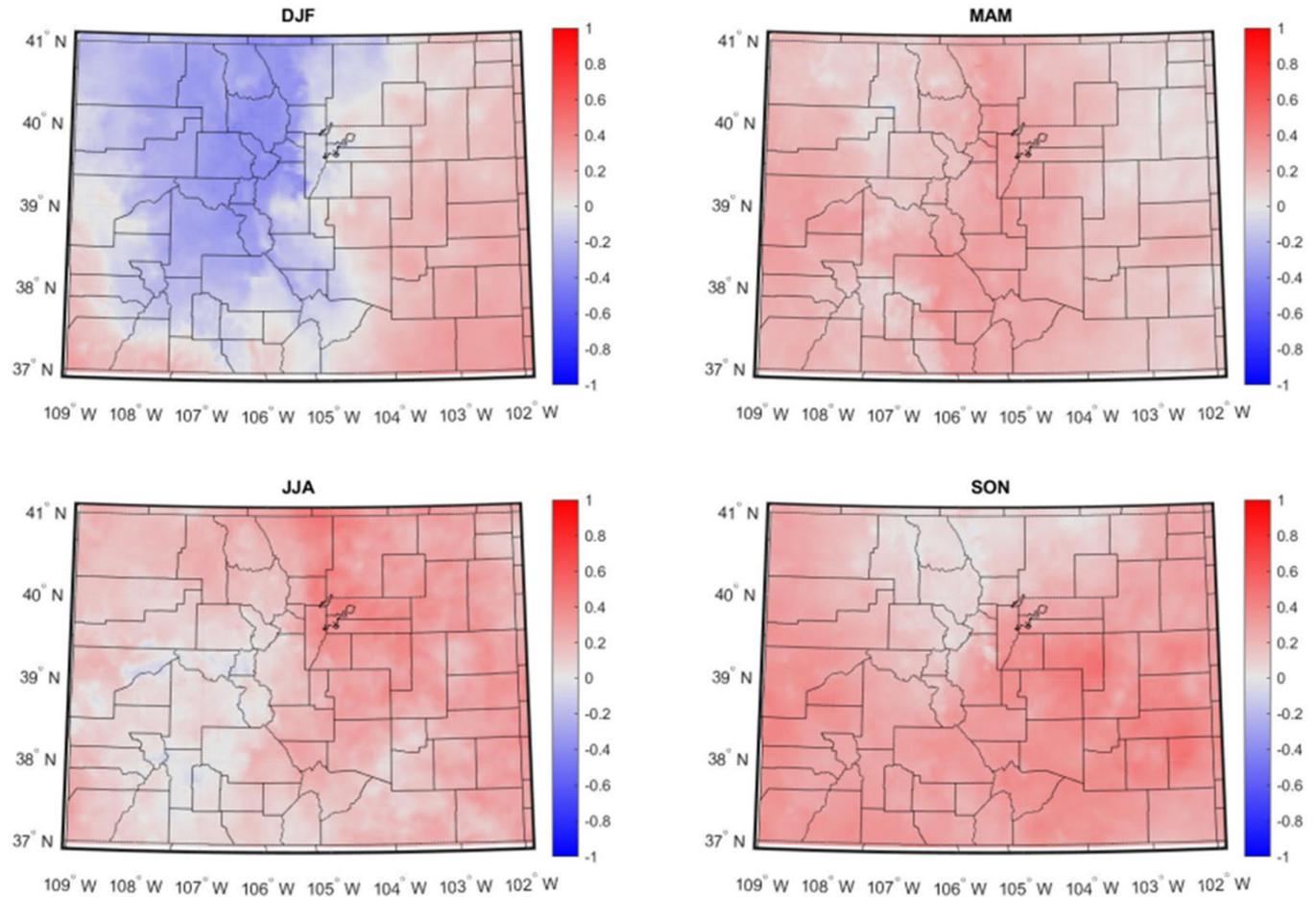


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $120^{\circ}\text{W}$ - $170^{\circ}\text{W}$ ). Figure updated 19 July 2023 by the International Research Institute (IRI) for Climate and Society.



El Niño has arrived:  
what does it mean  
for Colorado  
precipitation?

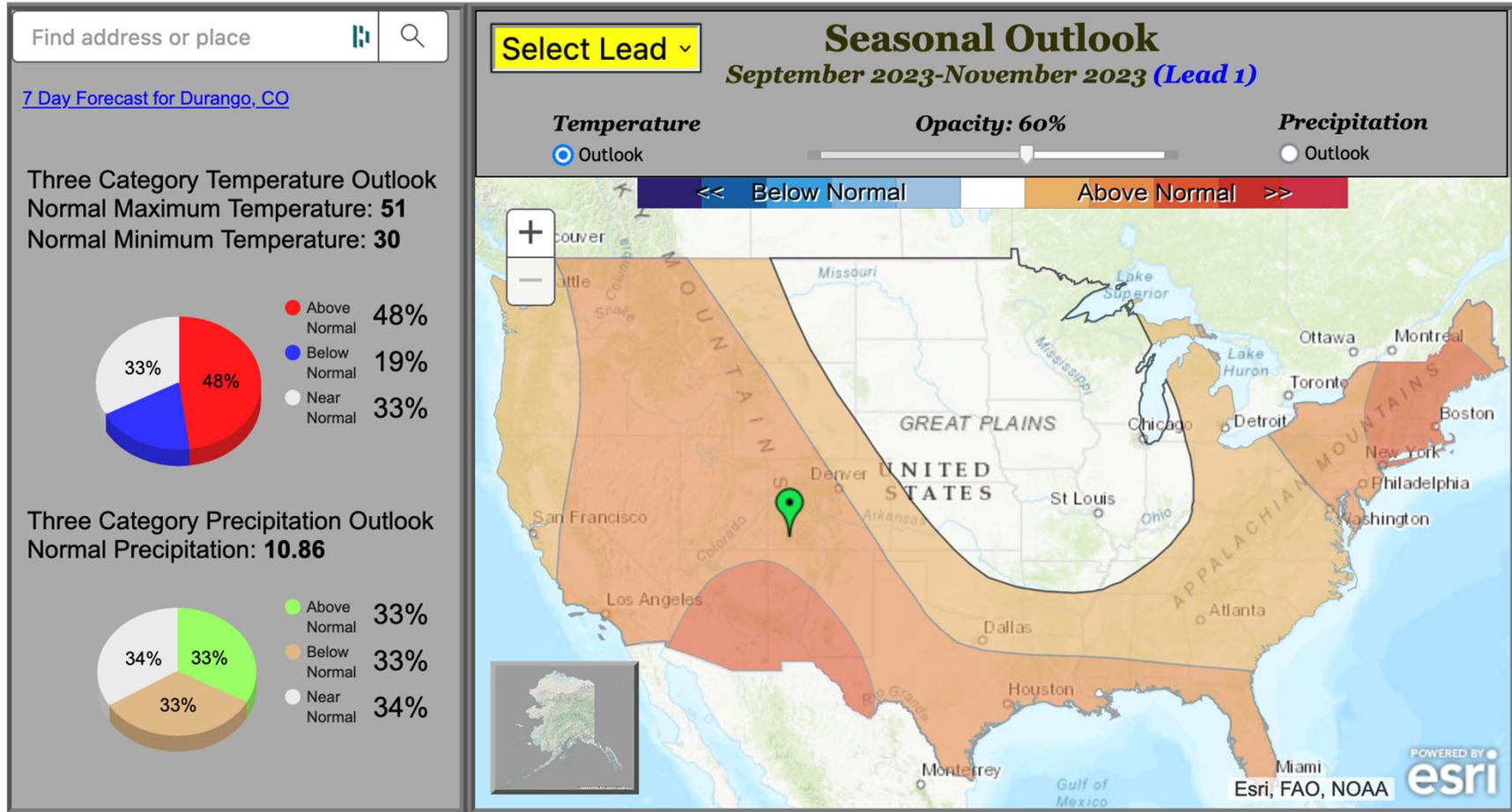
Correlation Between ENSO ONI and Seasonal Precipitation in Colorado (1951-2020)



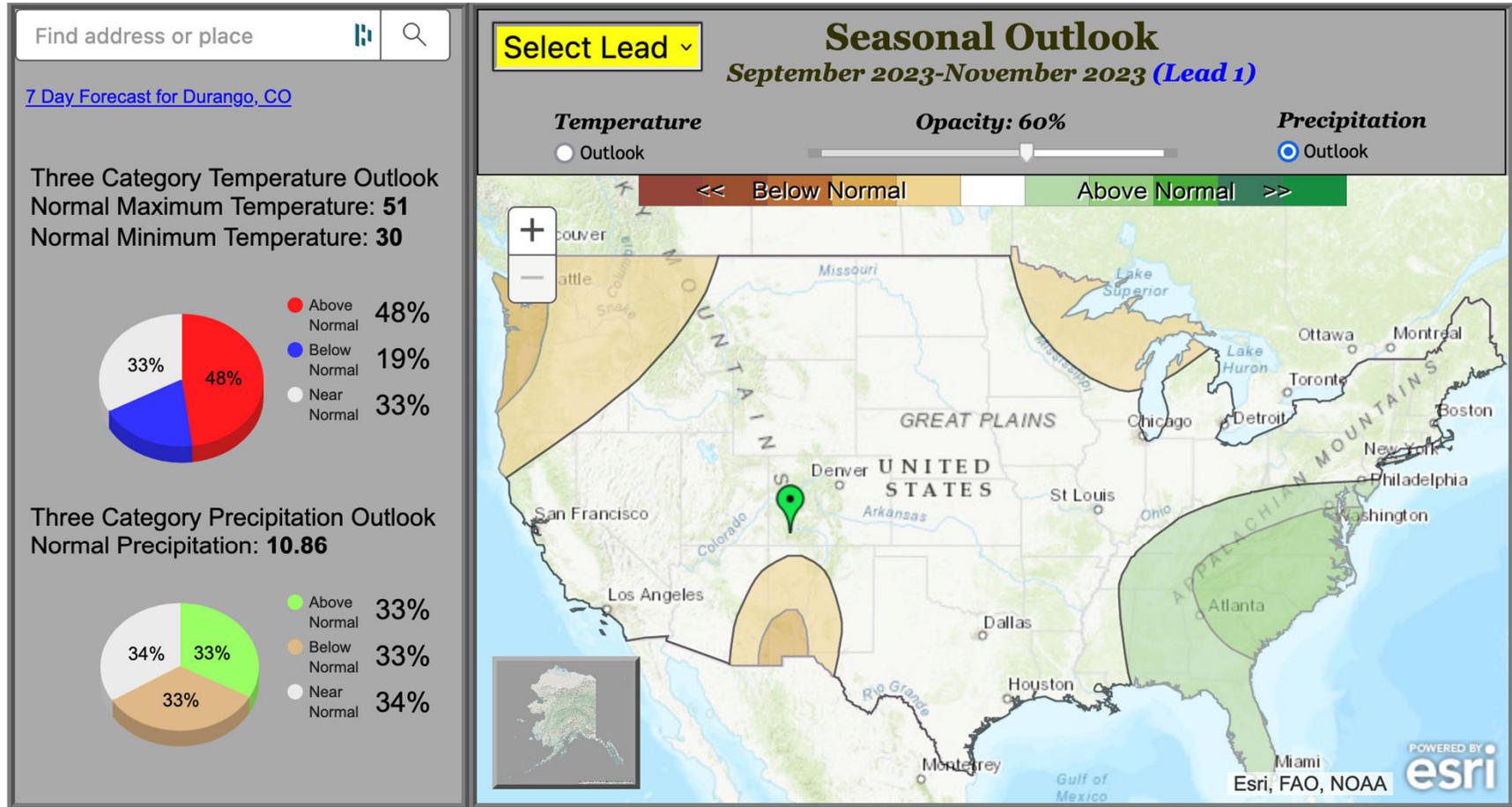
Blue = La Niña wetter Red = El Niño wetter



# Sept-Oct-Nov outlook



# August-Sept-Oct outlook



# Takeaways

- July and early August remained wet over eastern Colorado, but western Colorado had an extremely hot and dry July
- Overall, the water year through 10 months remains on the cool and wet side
- Short-term drought is returning to western Colorado, with a slow start to the monsoon. Eastern Colorado remains drought-free.
- El Niño now in place and will persist through the winter
- Hot and dry conditions in the coming weeks, fall outlook leans toward warmer than average conditions, but not much certainty on precipitation





Thank you!

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

[ruess.sci.colostate.edu](https://ruess.sci.colostate.edu/)

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DEPARTMENT OF ATMOSPHERIC SCIENCE

COLORADO STATE UNIVERSITY

