

Colorado Climate Update

Russ Schumacher, state climatologist

Water Availability Task Force

August 17, 2023



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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.



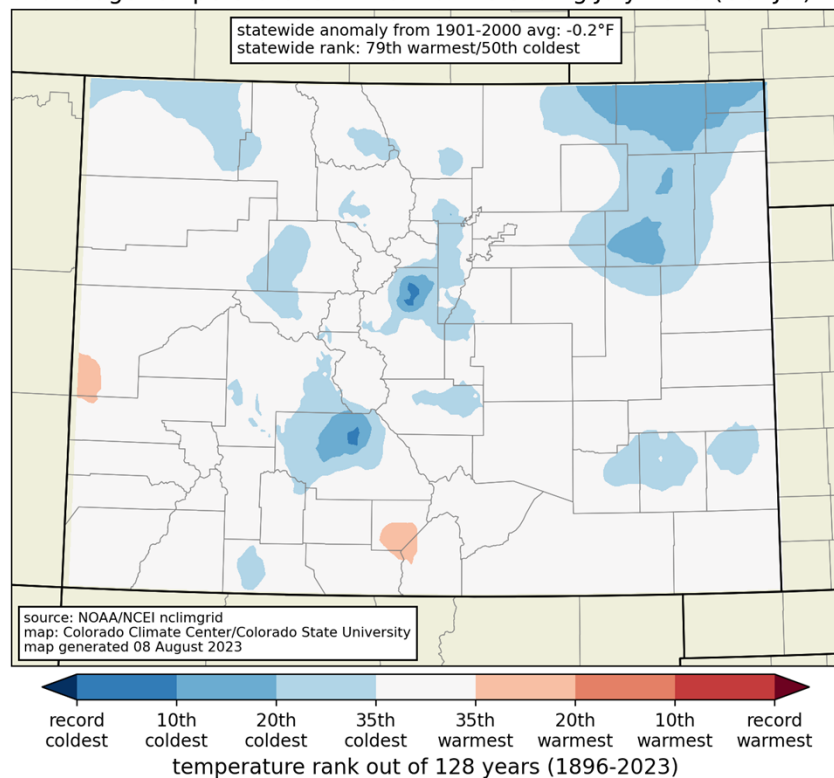
5:28 PM · Aug 8, 2023 · 80.7K Views



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



Statewide: tied for 47th coolest first 10 months of the water year; coolest since 2010

Colorado rankings:

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

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

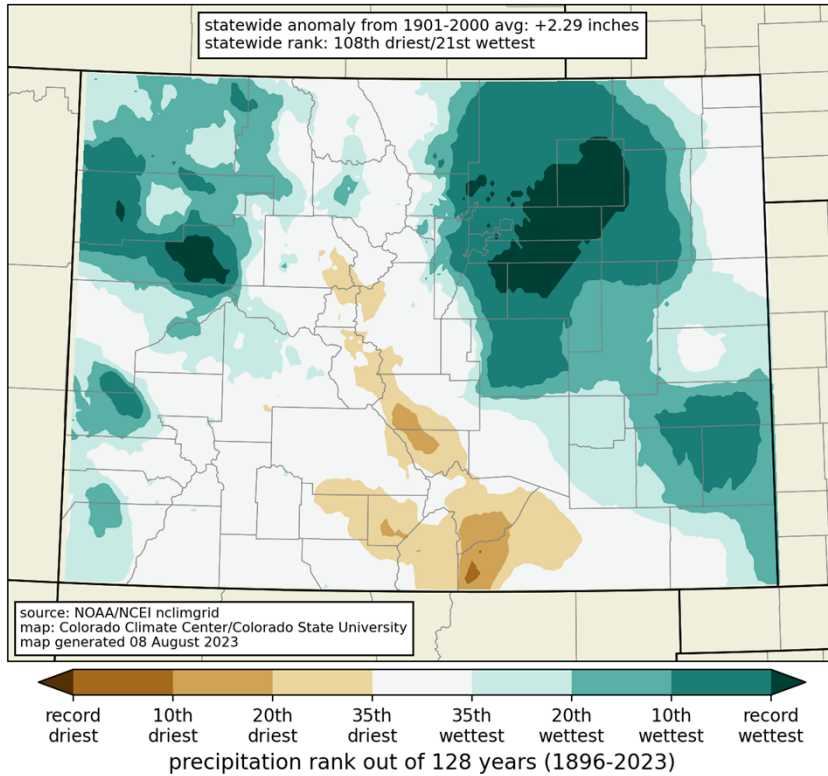
Data from: <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/time-series>



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

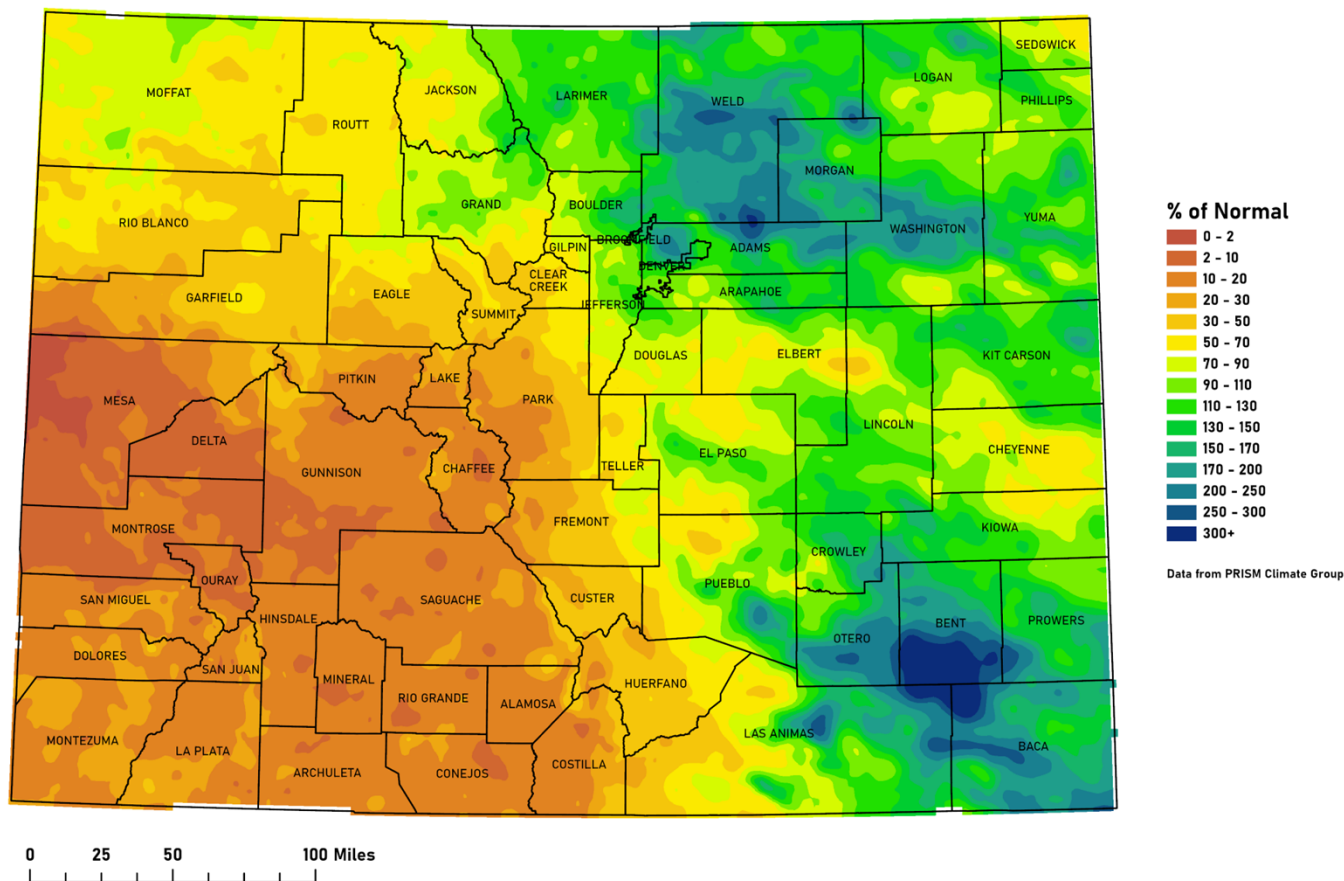


Statewide: Tied for 21st wettest first 10 months of the water year; wettest since 2019

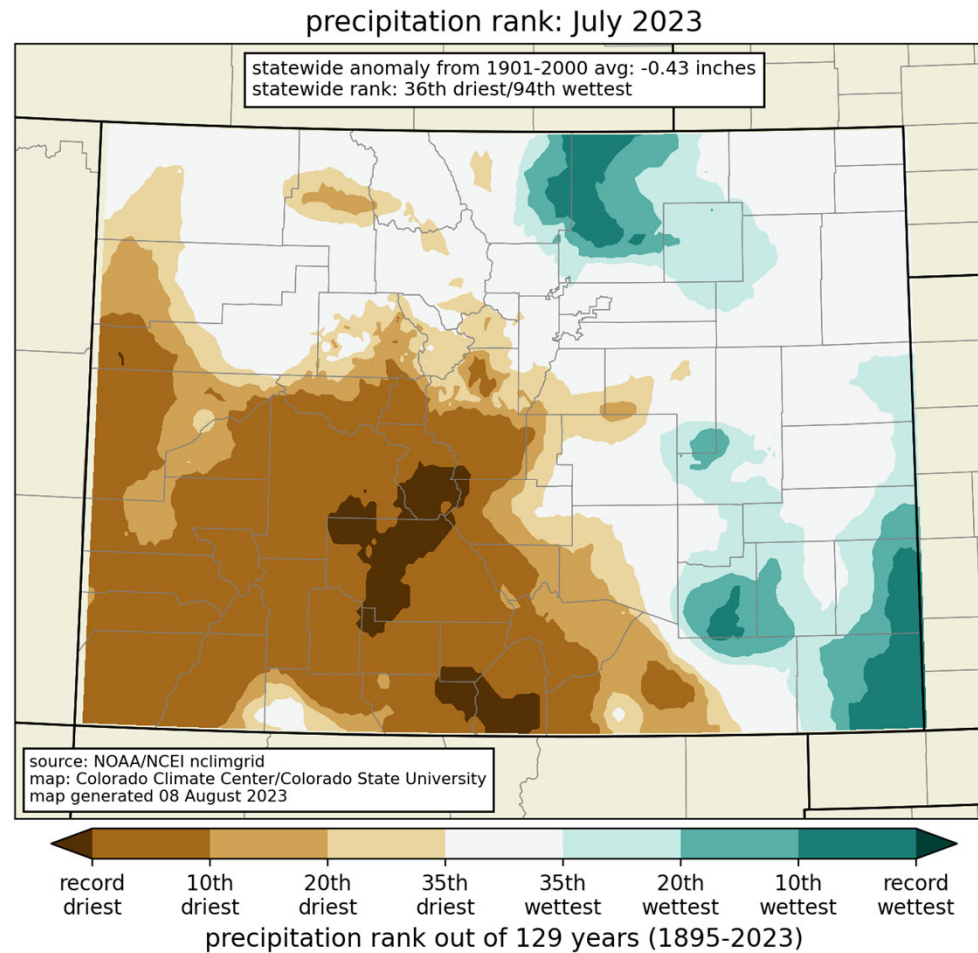
Colorado rankings:

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

Colorado July 2023 Precipitation as a Percentage of Normal

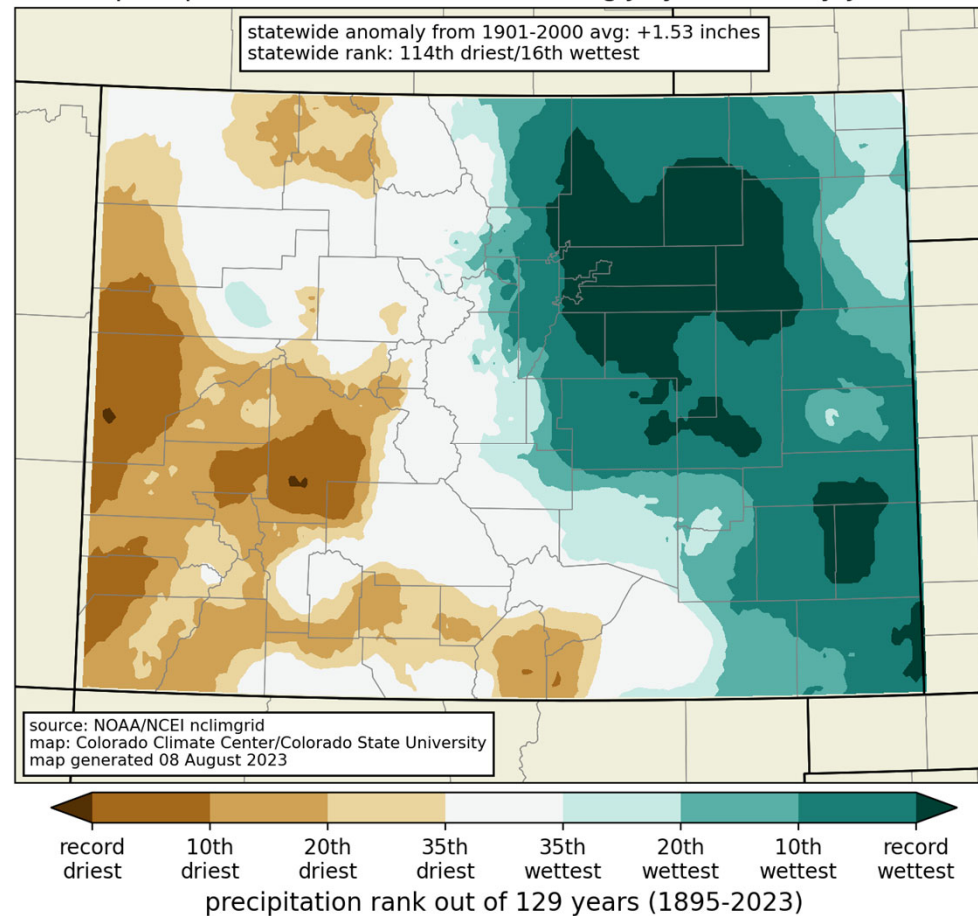


July 2023



May-June-July 2023

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

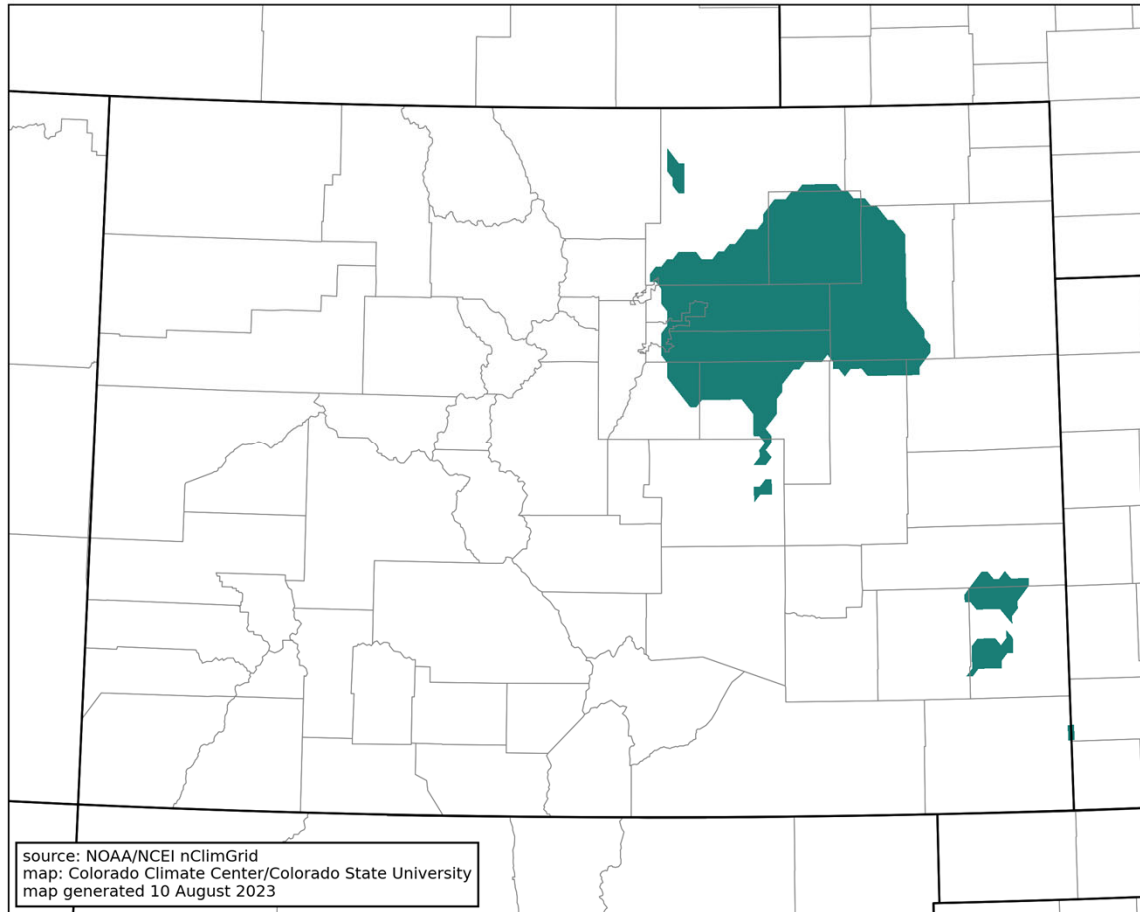


Record wet May-June-July for a large part of northeast Colorado



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

avg temp (F)

Warm & wet

July 2023

1991-2020 avg temp

1901-2000 avg temp

avg temp (F)

Cool & dry

cool & dry

accumulated precipitation (inches)

cool & wet

Cool & wet

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

normal precip: 2.12"

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

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



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Colorado statewide average temperature and precipitation, October - July

Warm & dry

Water year 2023 through July

warm & wet

avg temp (F)

Warm & wet

1991-2020 avg temp →

1901-2000 avg temp →



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

Cool & dry

cool & dry

cool & wet

Cool & wet



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May-June-July 2023: Platte River Drainage

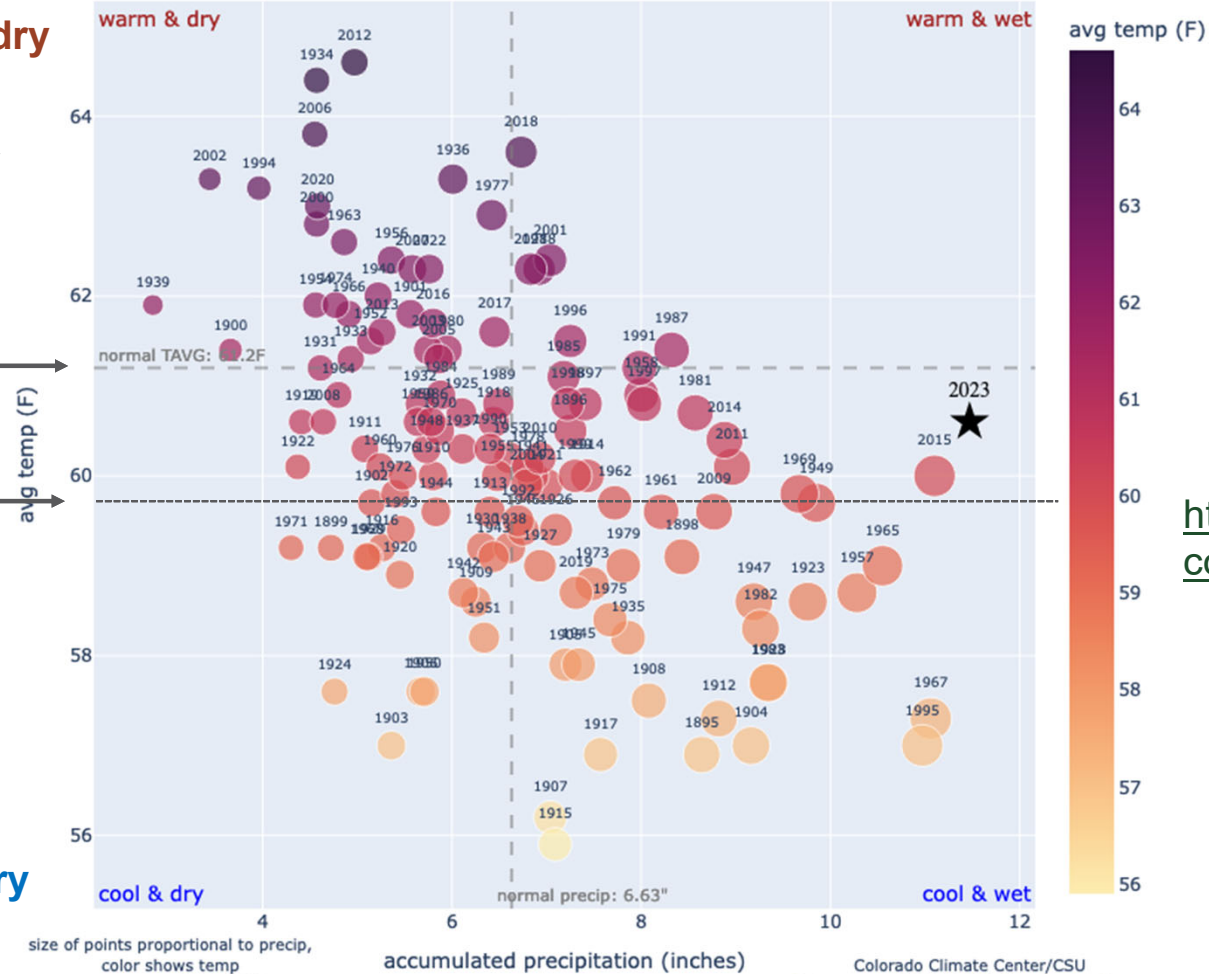
Warm & dry

Warm & wet

Cool & dry

Cool & wet

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



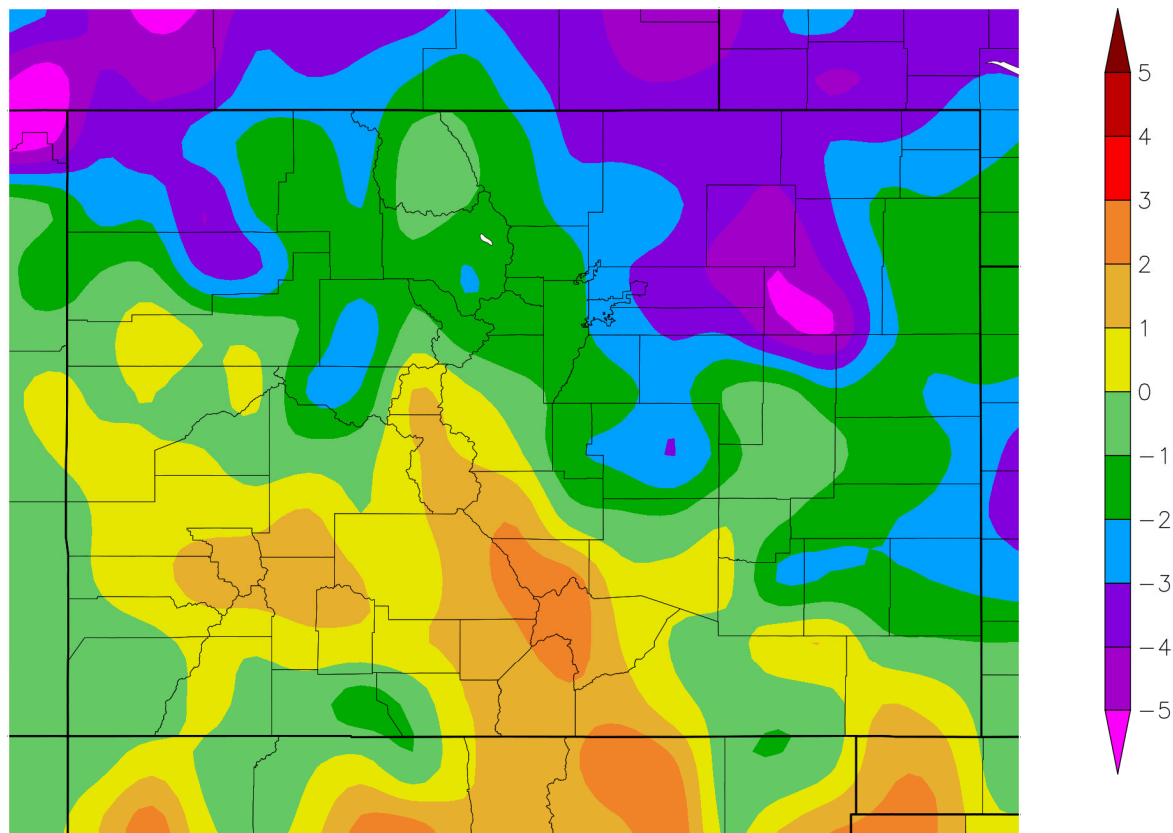
https://climate.colostate.edu/co_cag/quadrant.html



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



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

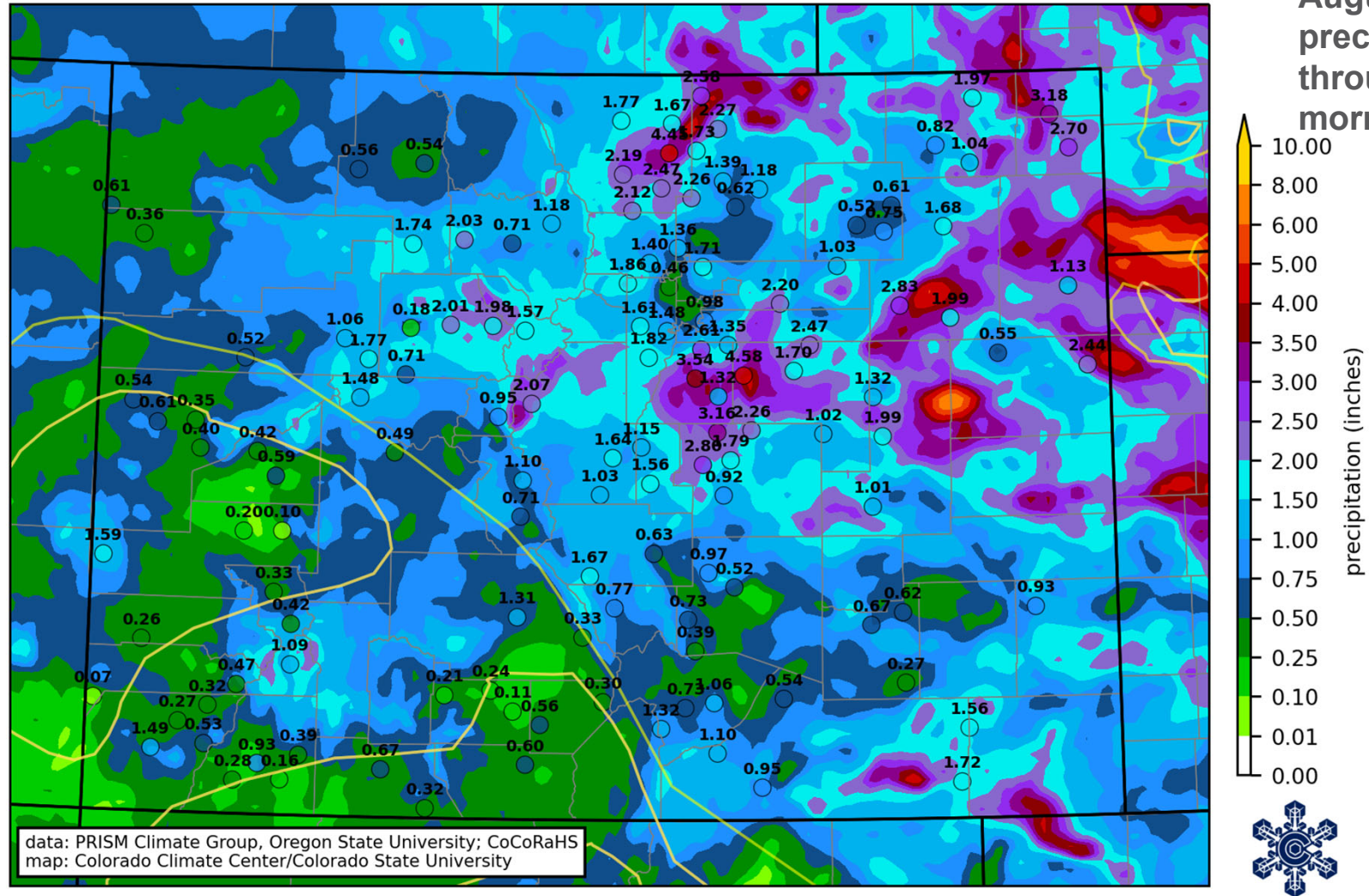
NOAA Regional Climate Centers



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August precipitation through Tuesday morning



precip (inches)

2.0

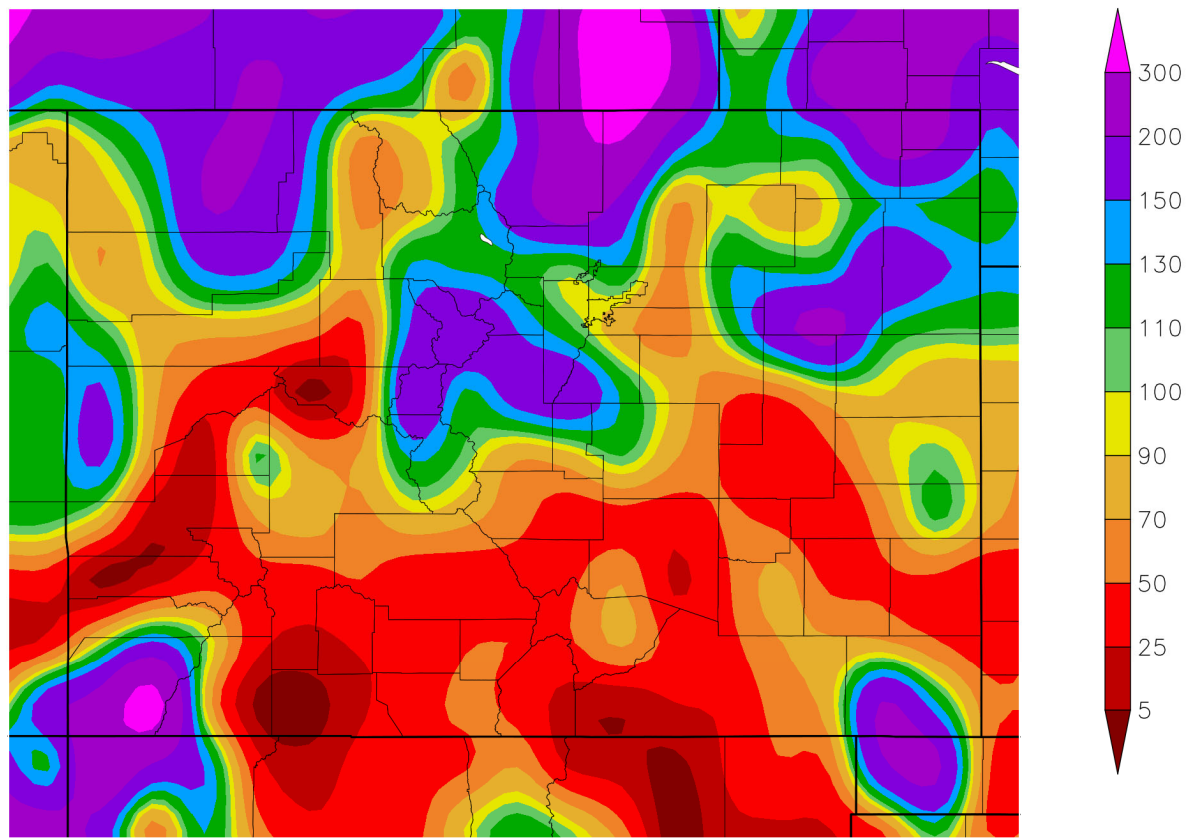
1.5

1.0

0.5

0.0

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



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

NOAA Regional Climate Centers



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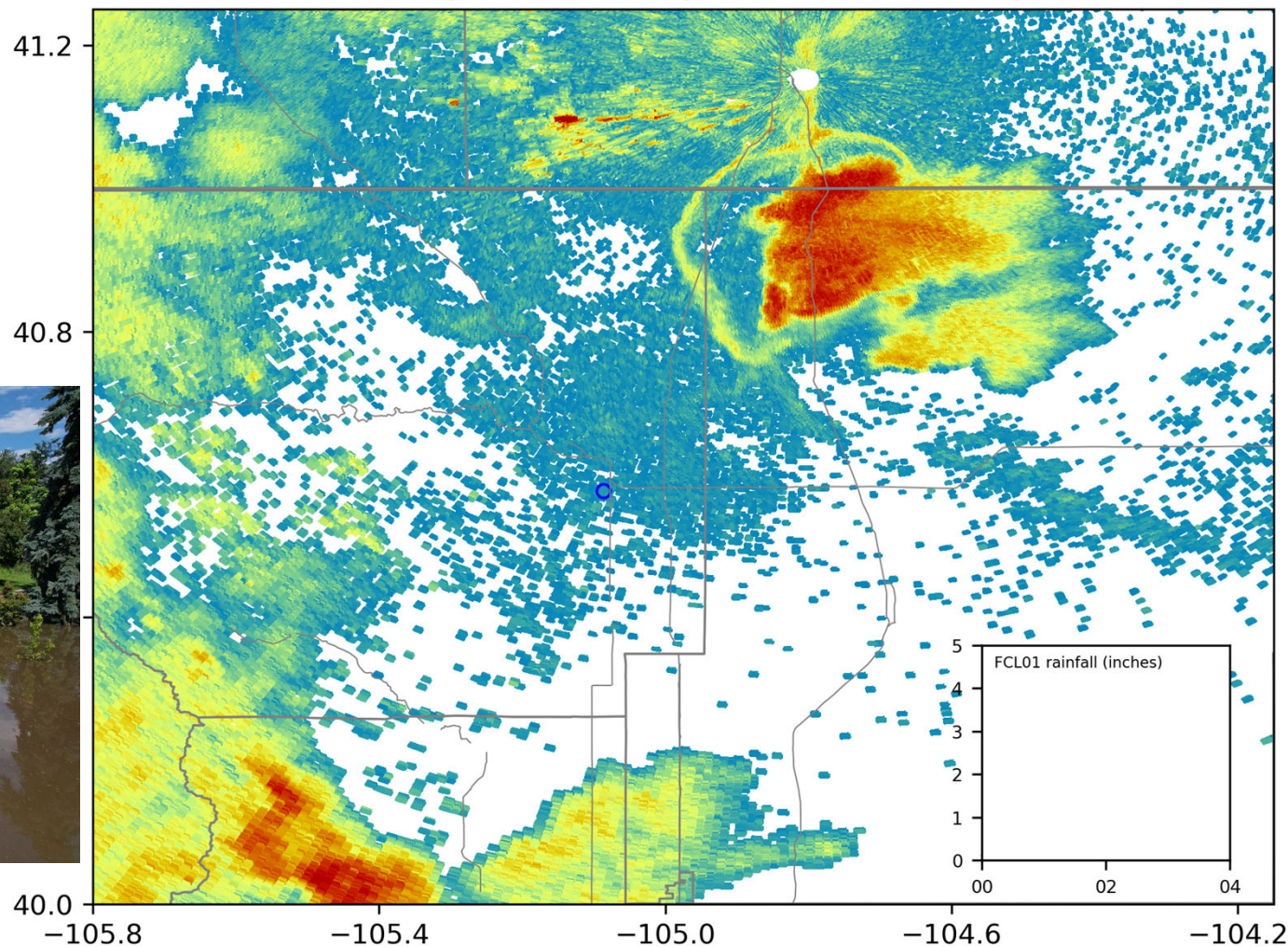
Fort Collins deluge, evening of July 31

Over 3.3" of rain in an hour!

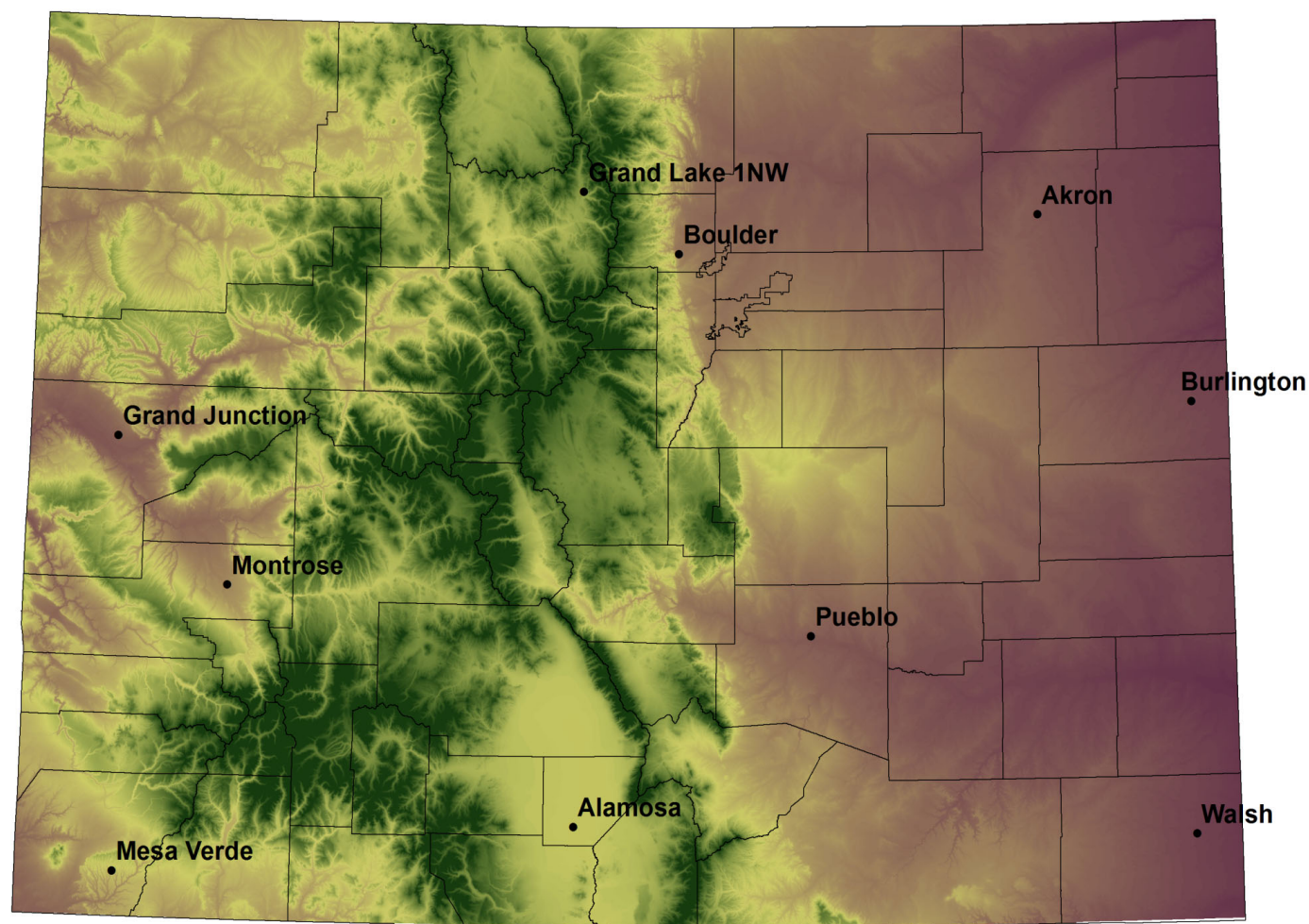


<https://source.colostate.edu/csus-past-flood-mitigation-efforts-minimized-damage-from-july-31-rains/>

KCYS 0.5-degree reflectivity 0002 UTC 01 Aug 2023



NWS Cooperative Stations for WATF

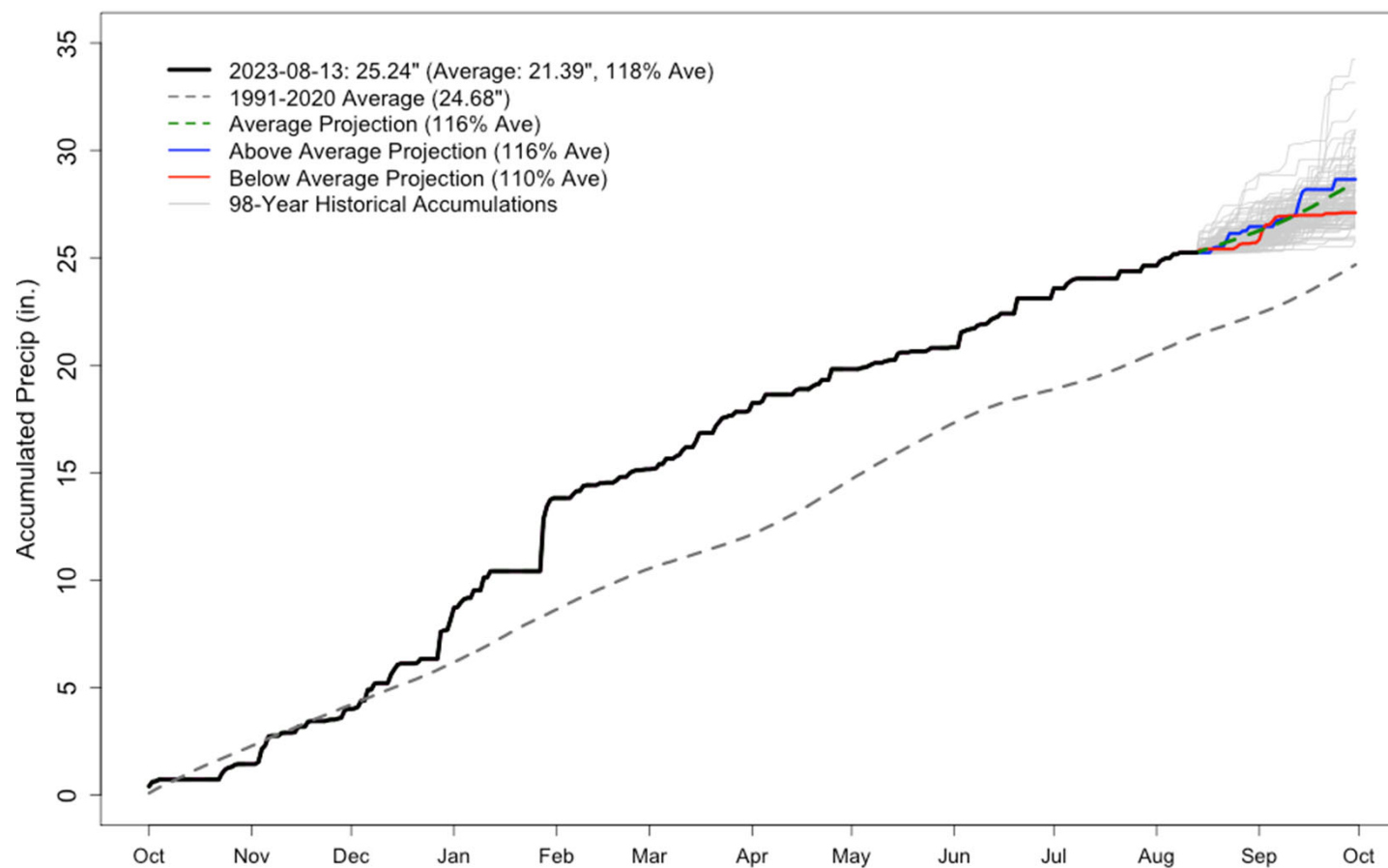


Water Year 2023 – Station Updates



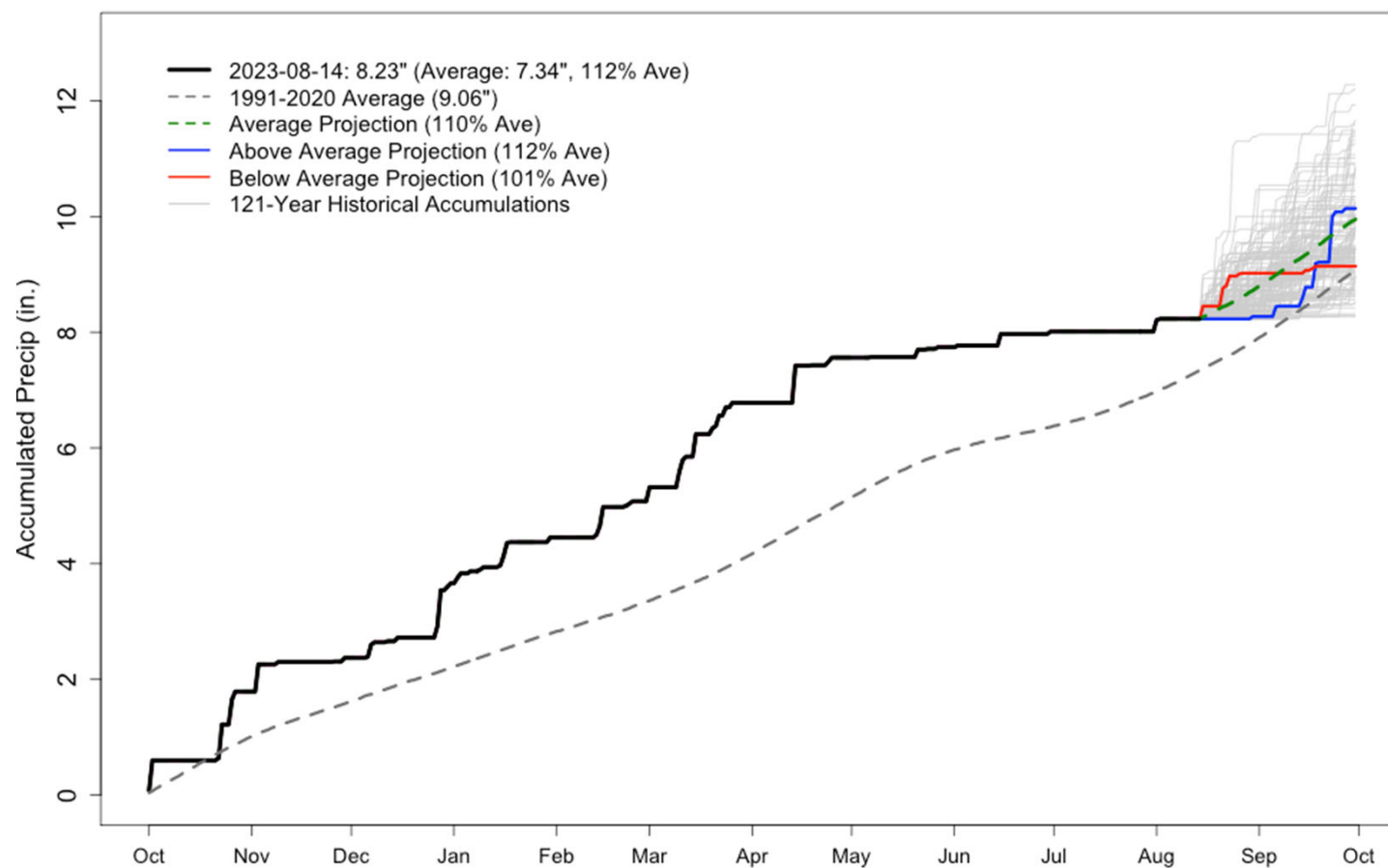
Steamboat Springs

STEAMBOAT SPRINGS WY2023 Precipitation Projections



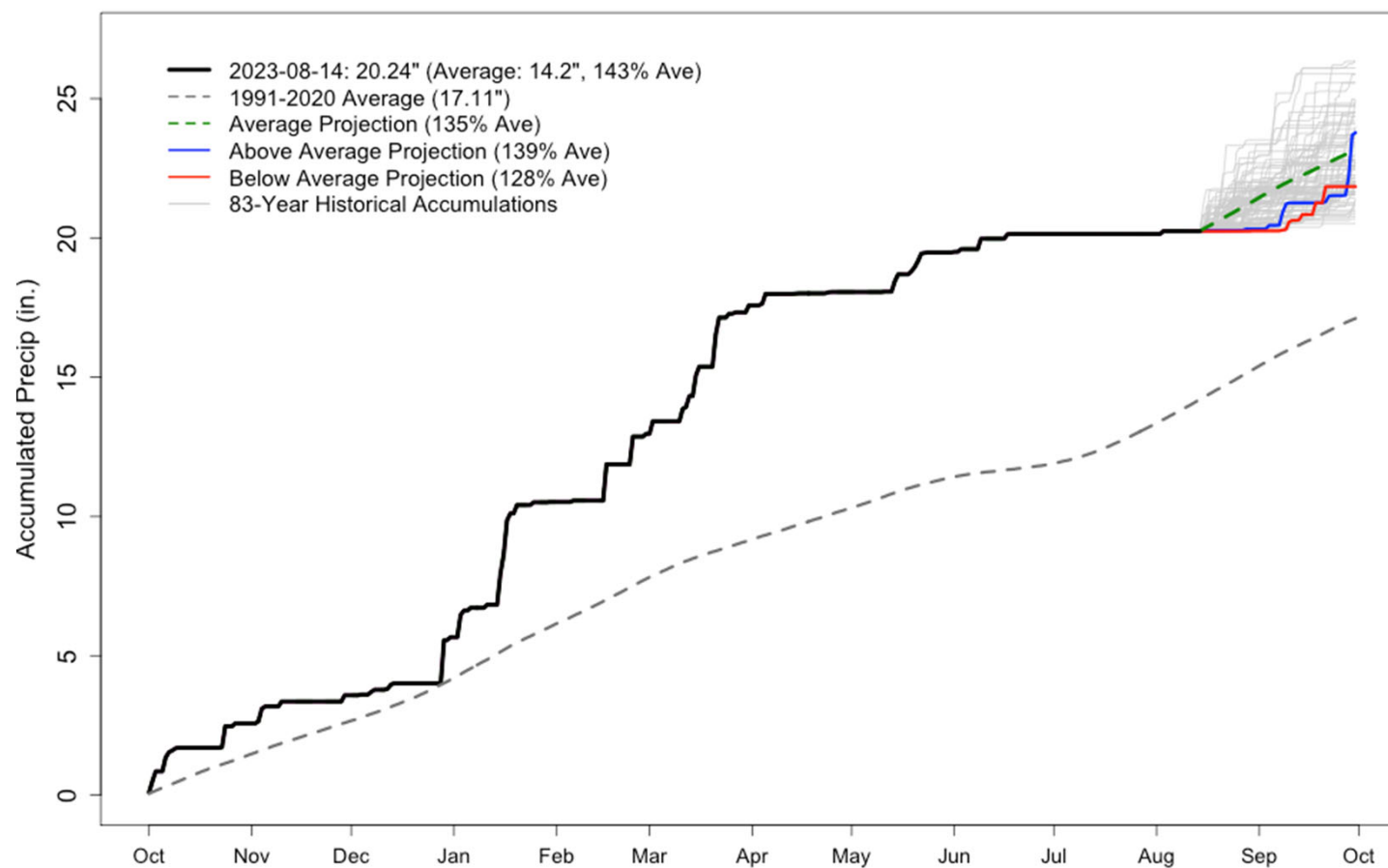
Grand Junction

GRAND JUNCTION WALKER FIELD WY2023 Precipitation Projections



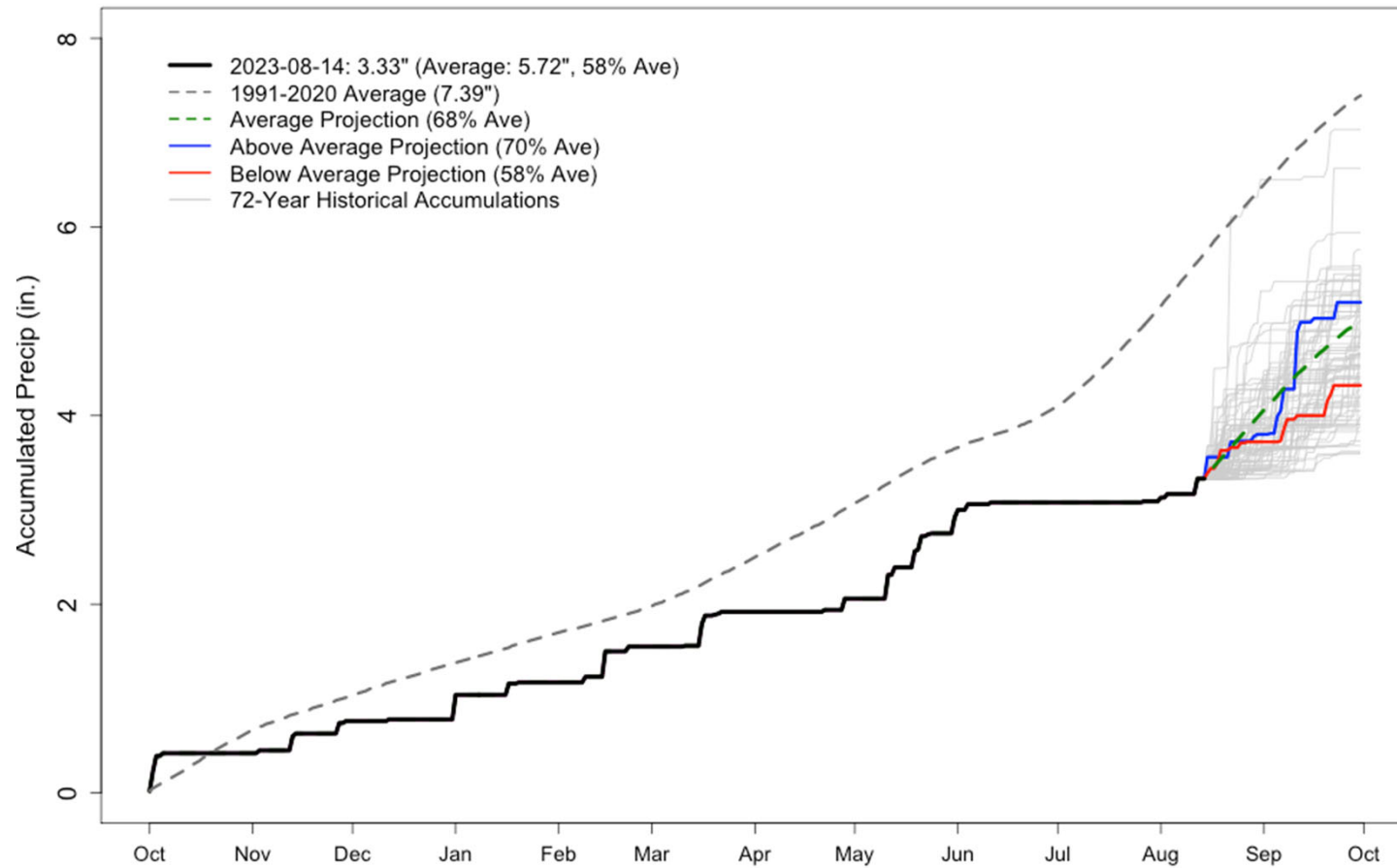
Mesa Verde NP

MESA VERDE NP WY2023 Precipitation Projections



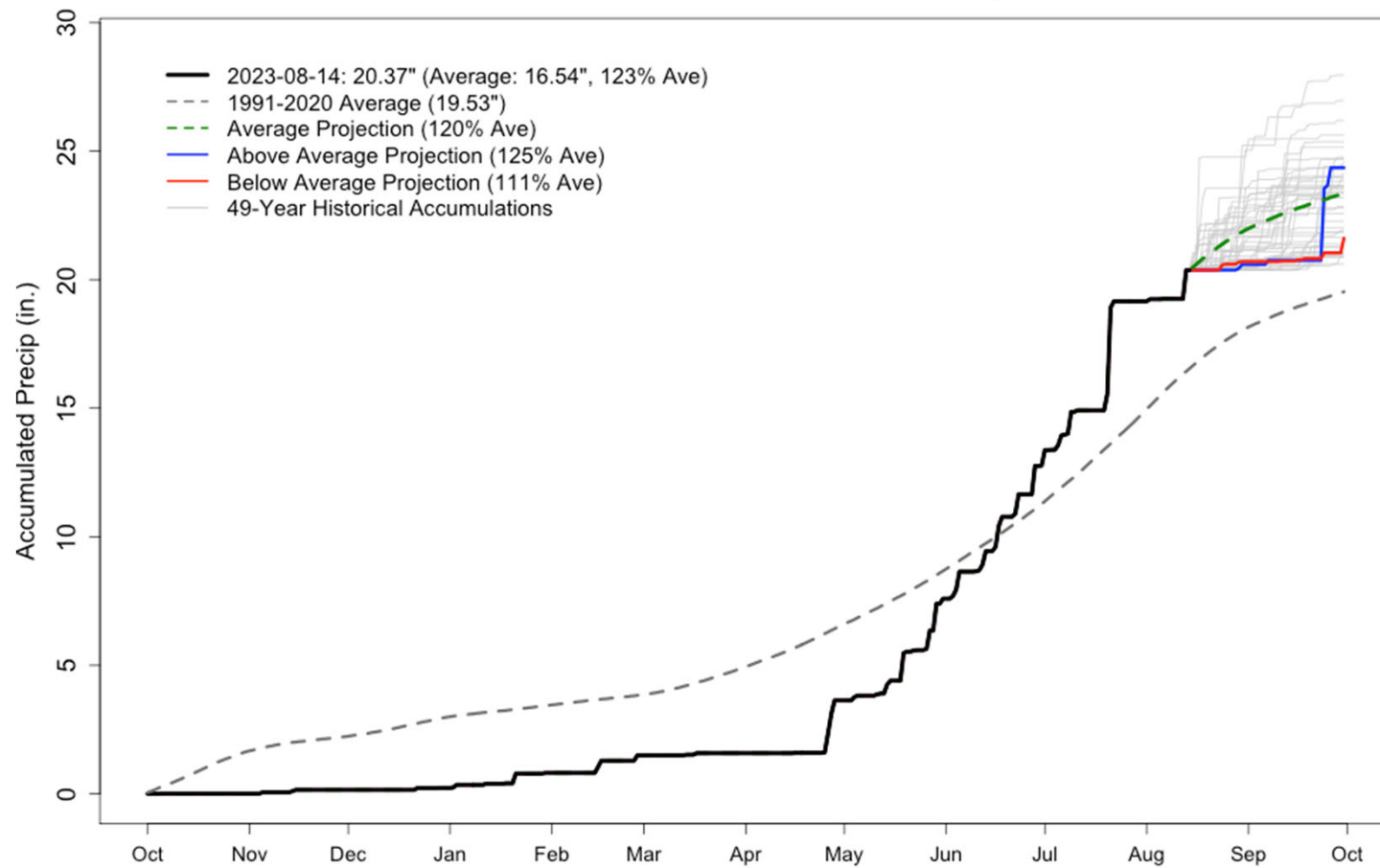
Alamosa

ALAMOSA-BERGMAN FIELD WY2023 Precipitation Projections



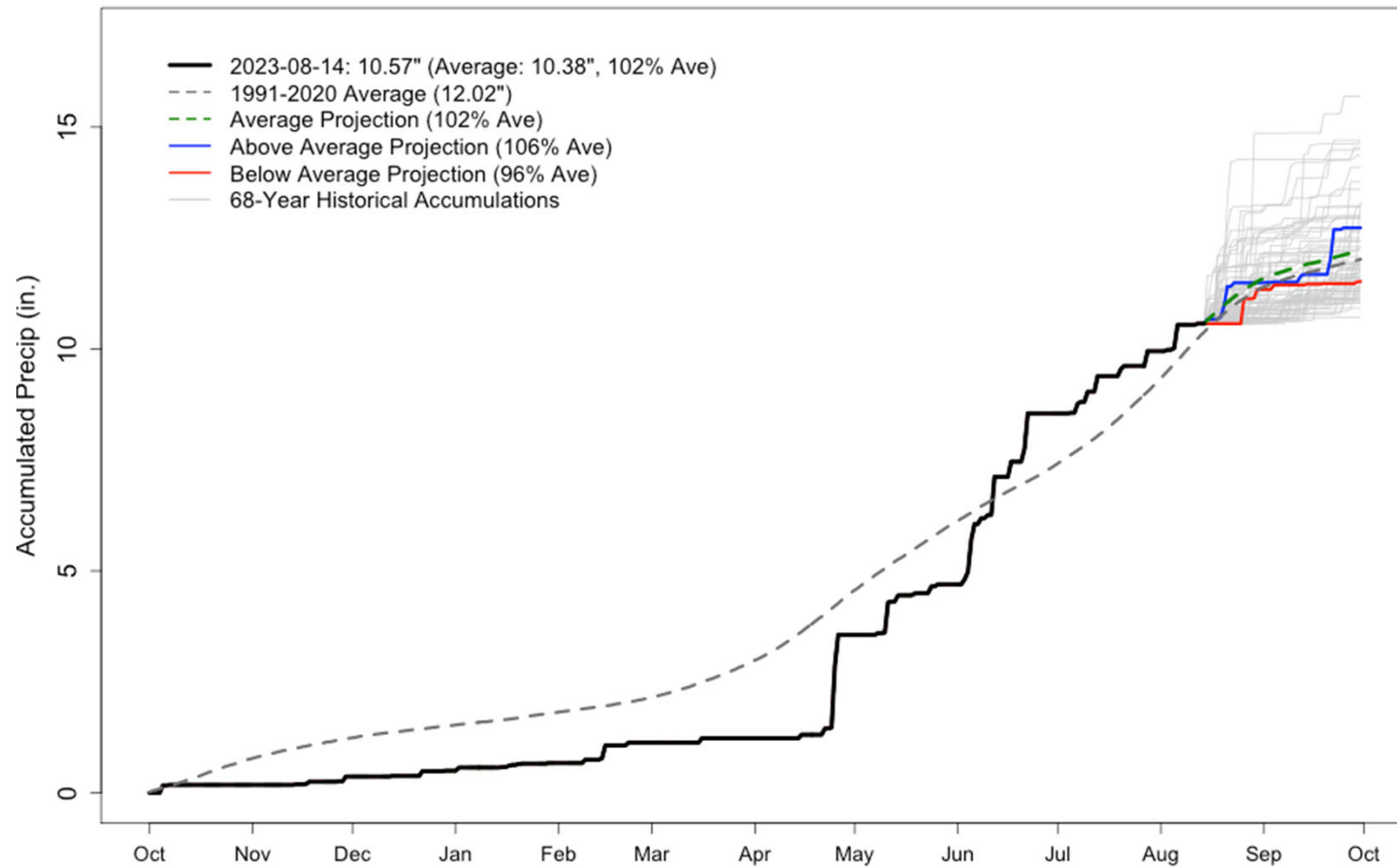
Walsh

WALSH 1 W WY2023 Precipitation Projections



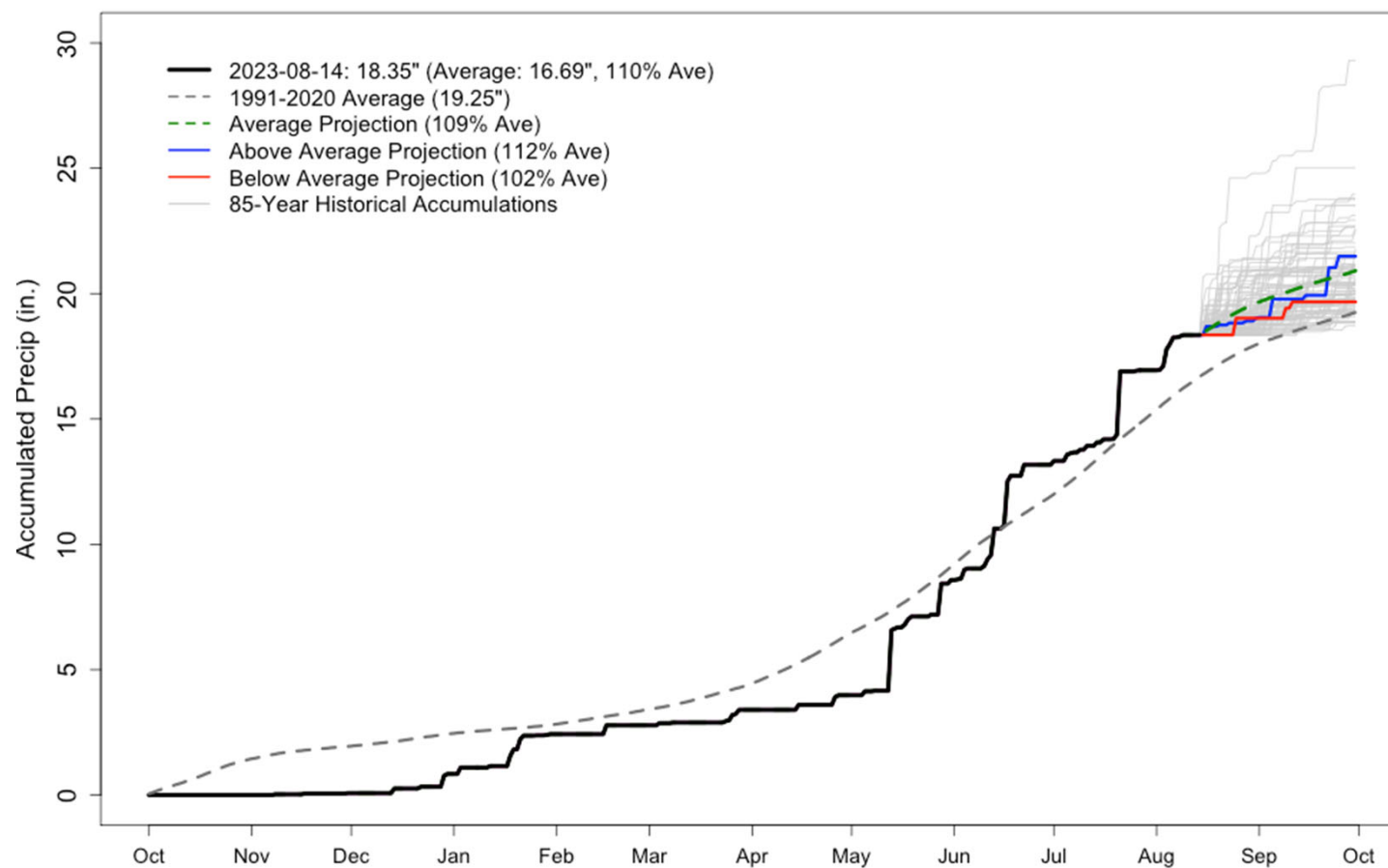
Pueblo

PUEBLO MEMORIAL AIRPORT WY2023 Precipitation Projections



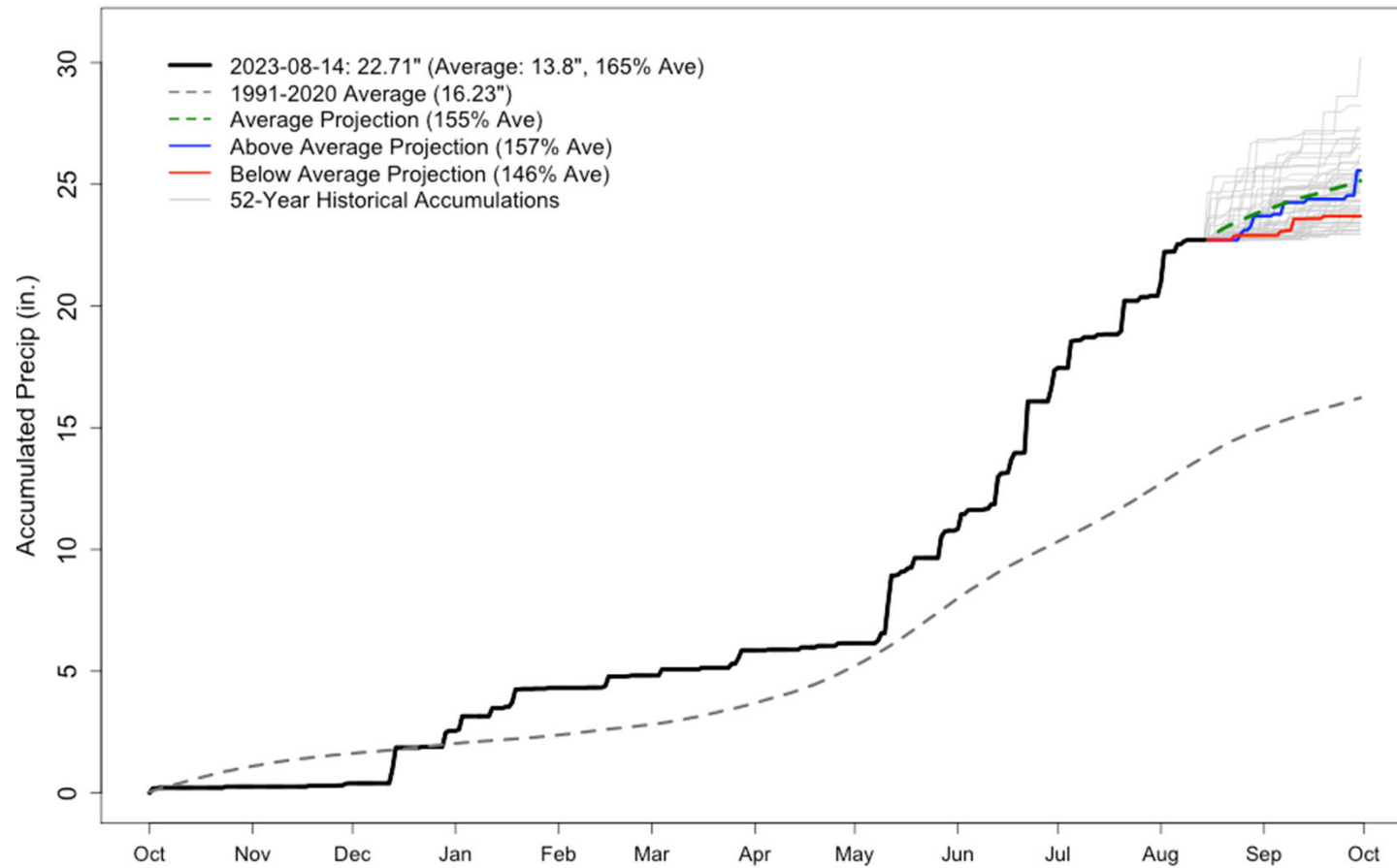
Burlington

BURLINGTON WY2023 Precipitation Projections



Akron

AKRON 4 E WY2023 Precipitation Projections

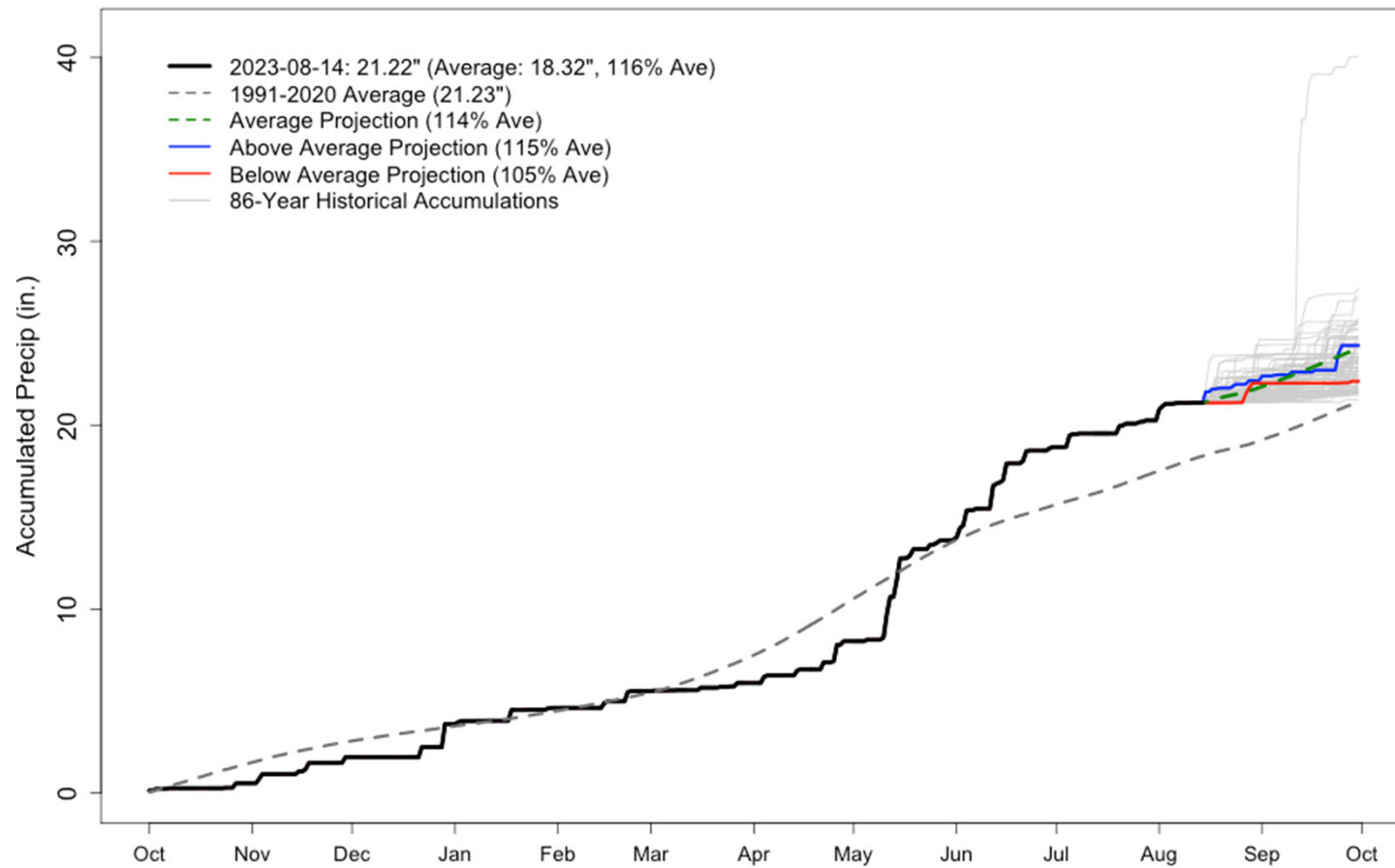


Already the 9th
wettest water
year, with 1.5
months to go



Boulder

BOULDER WY2023 Precipitation Projections



Drought conditions

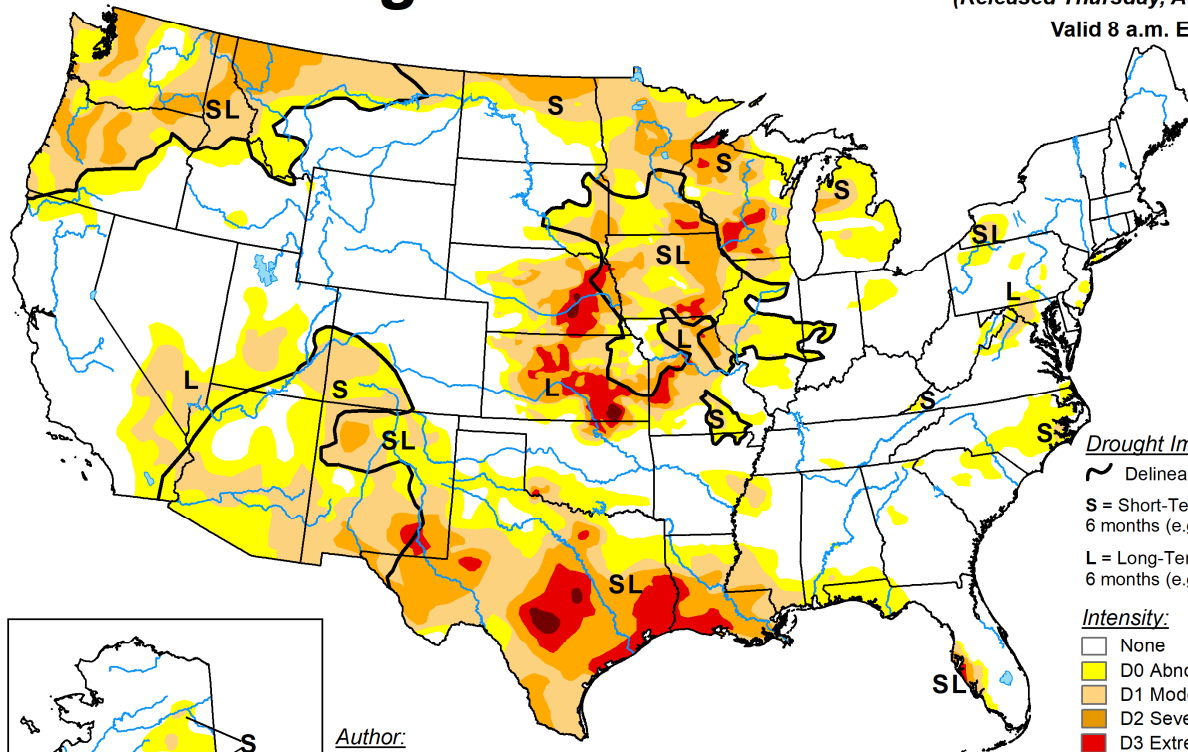


Lowline Fire, Gunnison County, July 29
<https://inciweb.nwcg.gov/incident-information/cogmf-lowline-fire>



U.S. Drought Monitor

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

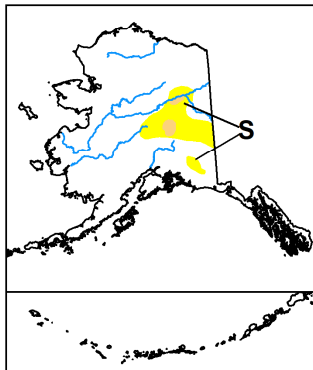


Drought Impact Types:

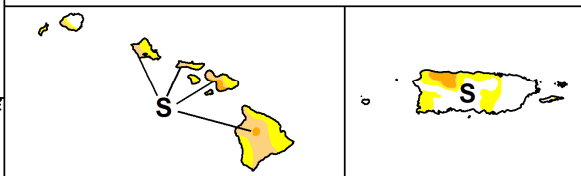
~ Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

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>

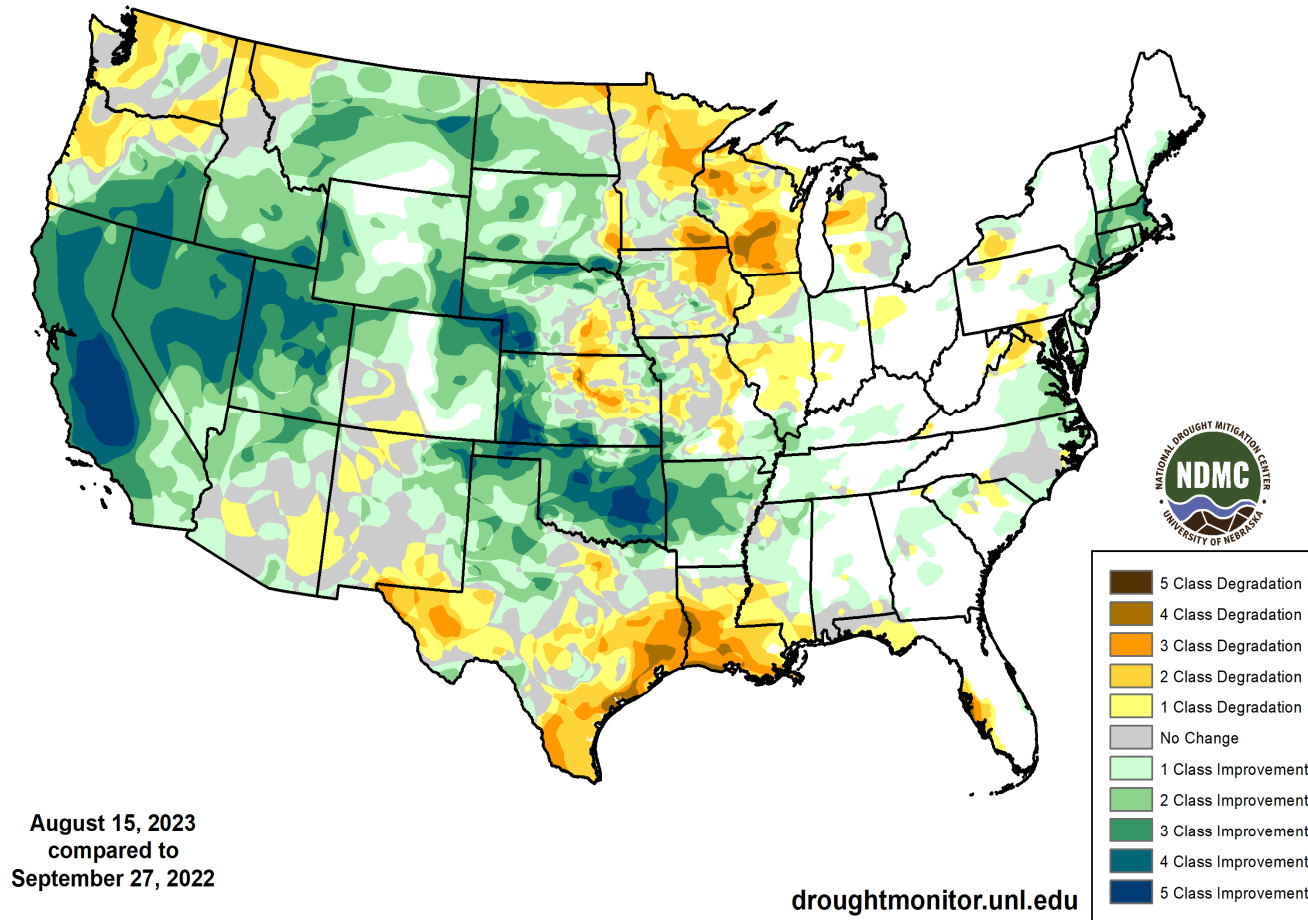


droughtmonitor.unl.edu

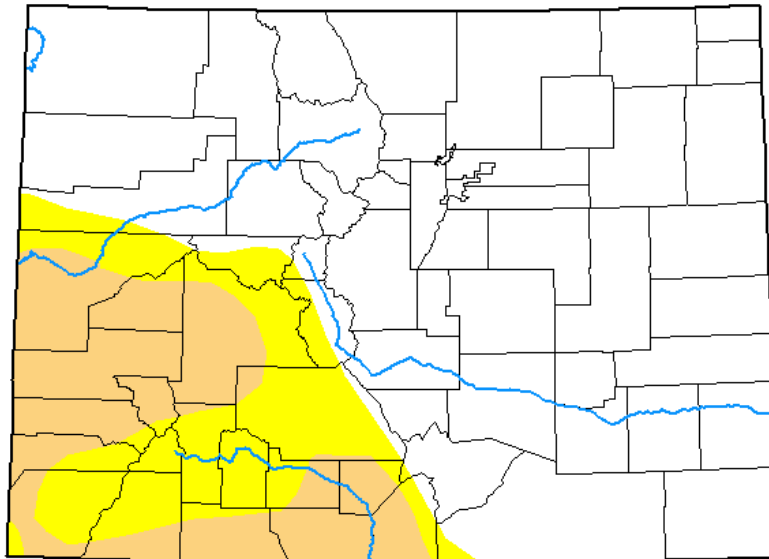


U.S. Drought Monitor Class Change - CONUS
Start of Water Year

**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
Current	71.82	28.18	15.04	0.00	0.00	0.00
Last Week 08-08-2023	73.20	26.80	12.42	0.00	0.00	0.00
3 Months Ago 05-16-2023	54.68	45.32	10.76	2.91	1.15	0.31
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 08-16-2022	8.24	91.76	57.92	23.67	5.04	0.58

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>

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National Drought Mitigation Center



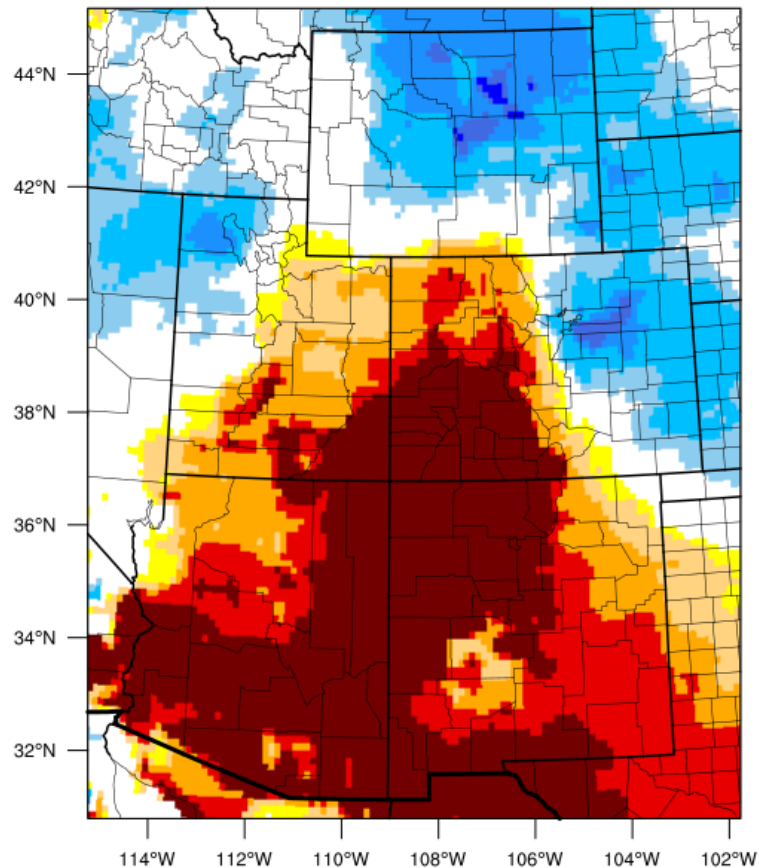
droughtmonitor.unl.edu



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2-month EDDI categories for August 12, 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

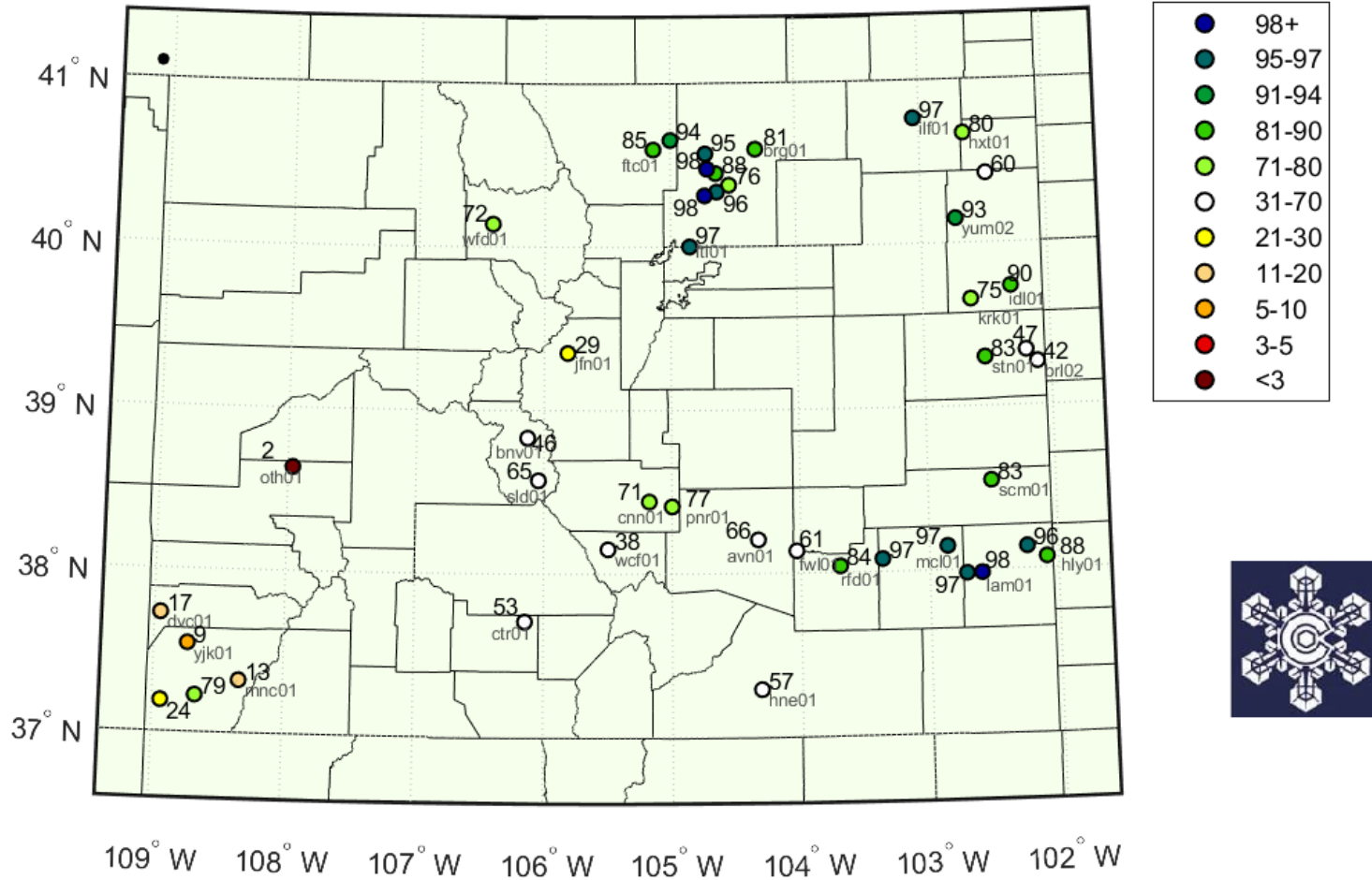
Evaporative Demand Drought Index

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



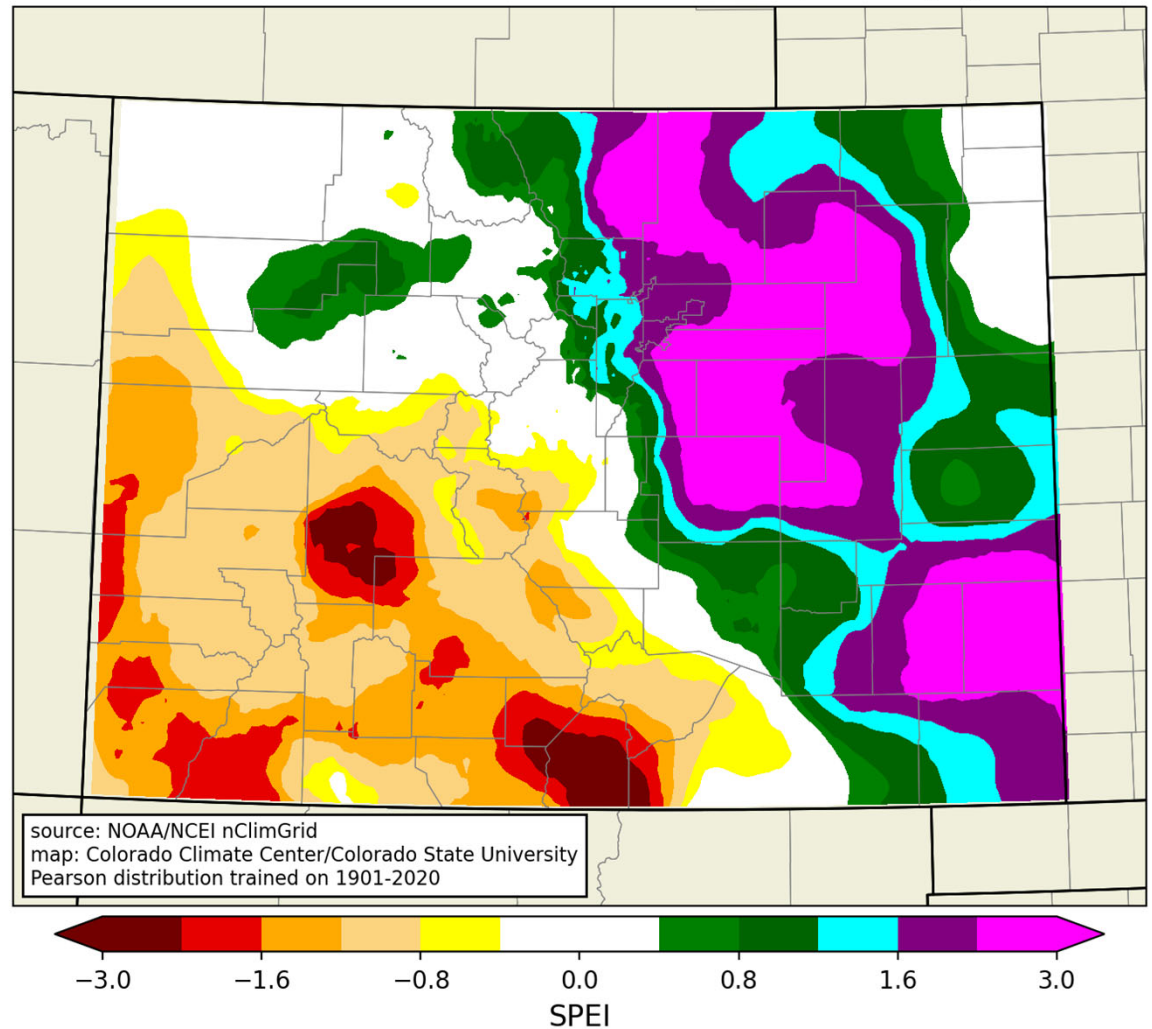
Growing Season Water Balance (P/PET) Percentiles

August 11, 2023



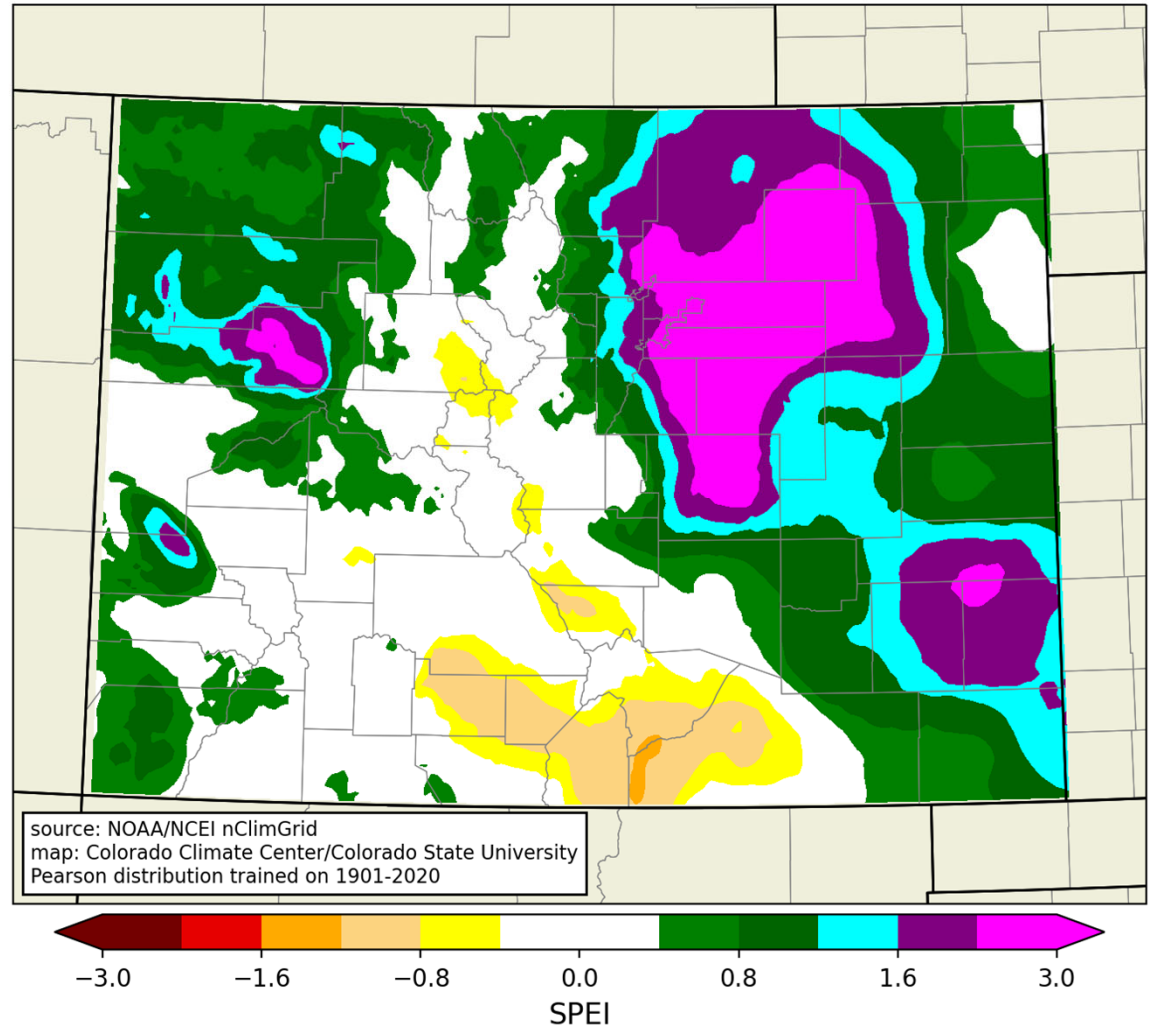
Standardized Precipitation- Evapotranspiration Index, last 2 months

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

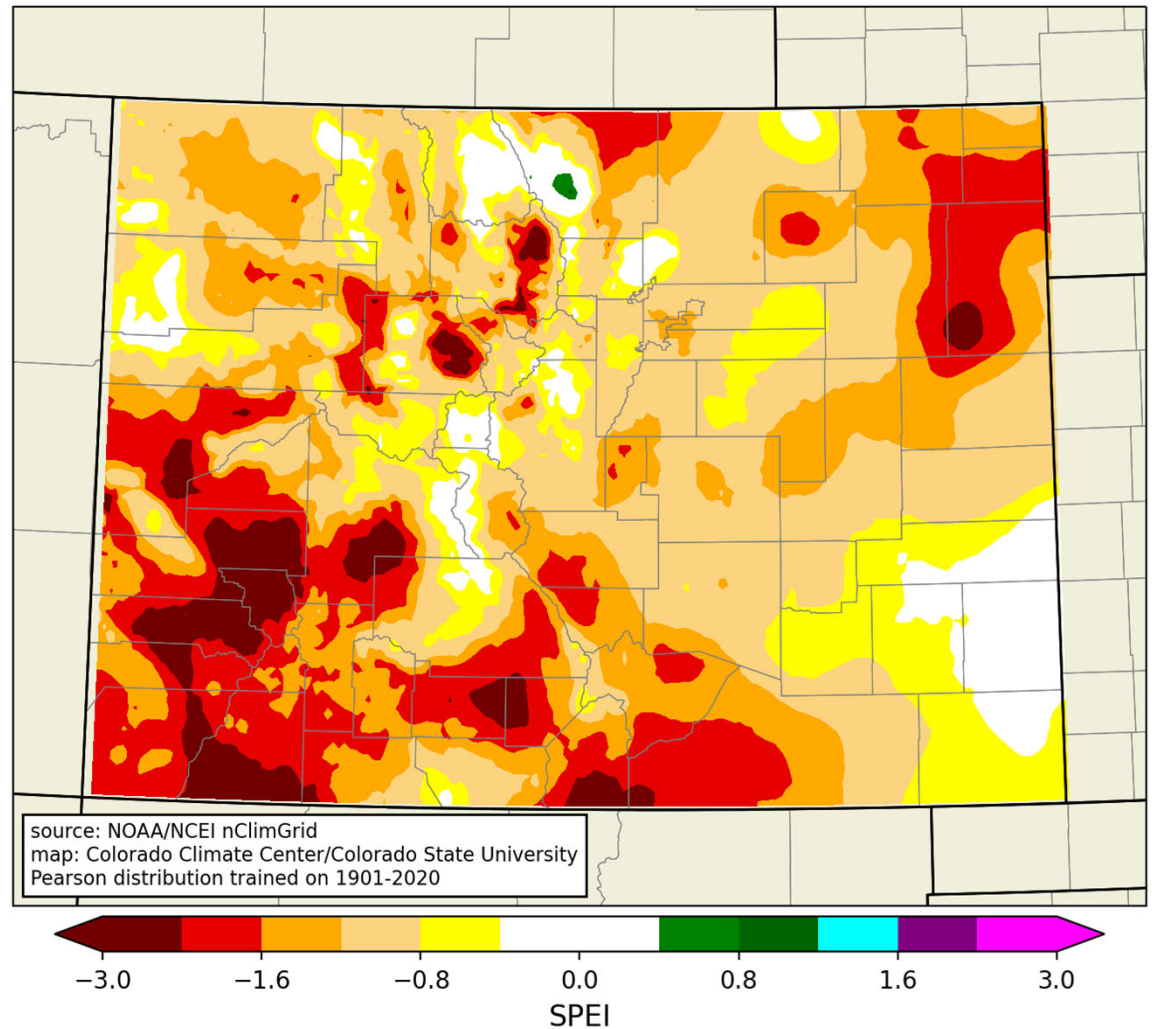


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Standardized Precipitation- Evapotranspiration Index, last 5 years

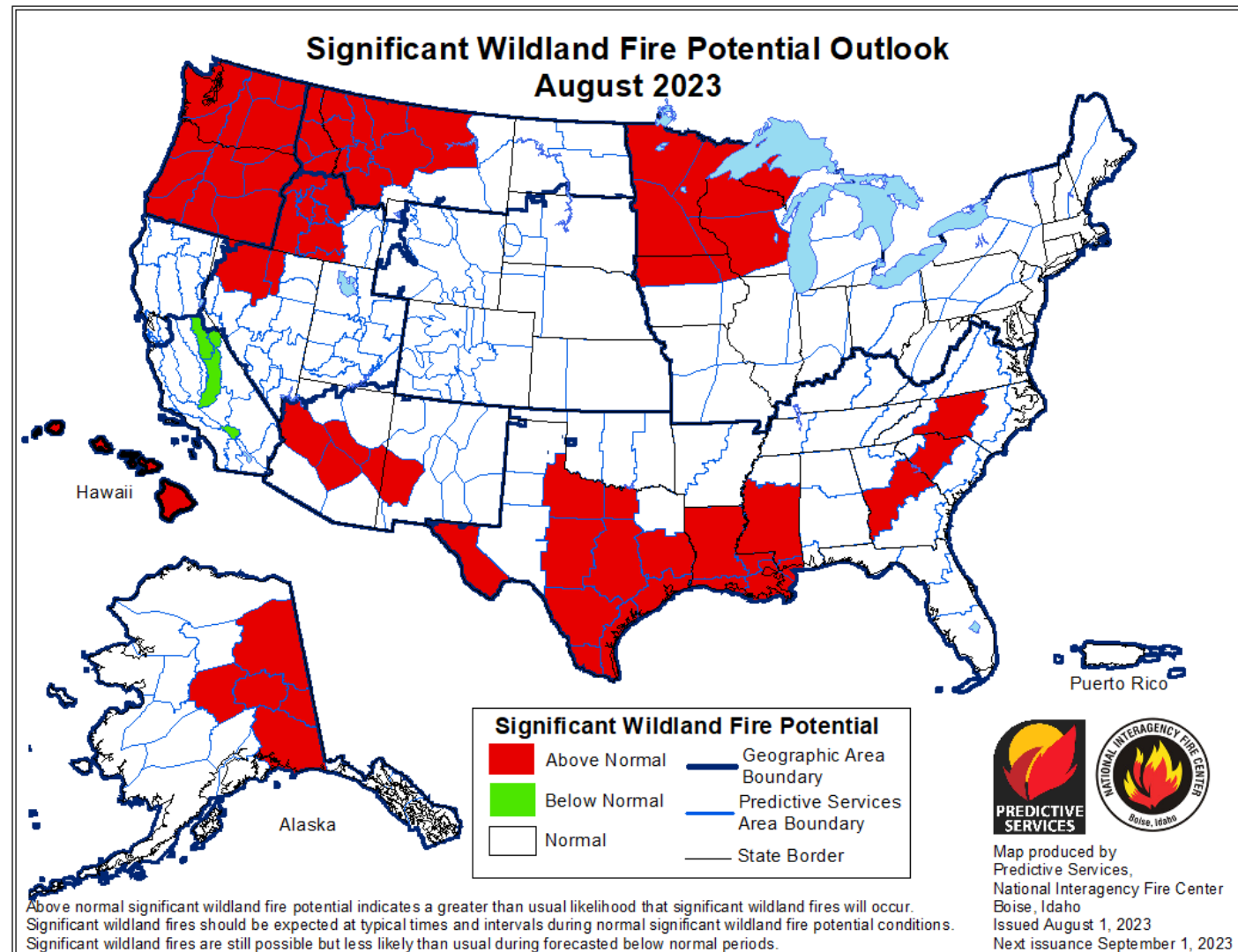
60-month SPEI based on NOAA nClimGrid data, end of July 2023



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

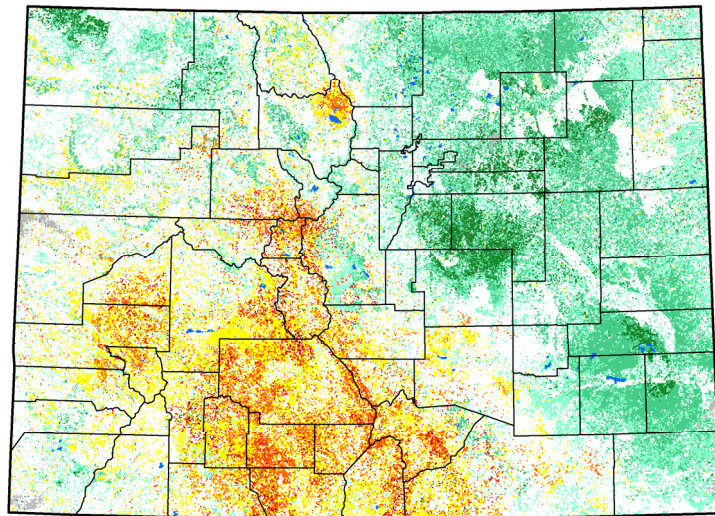


VegDRI: longer-term vegetation condition

QuickDRI: shorter-term vegetation response

Vegetation Drought Response Index
Complete: Colorado

August 13, 2023



Vegetation Condition





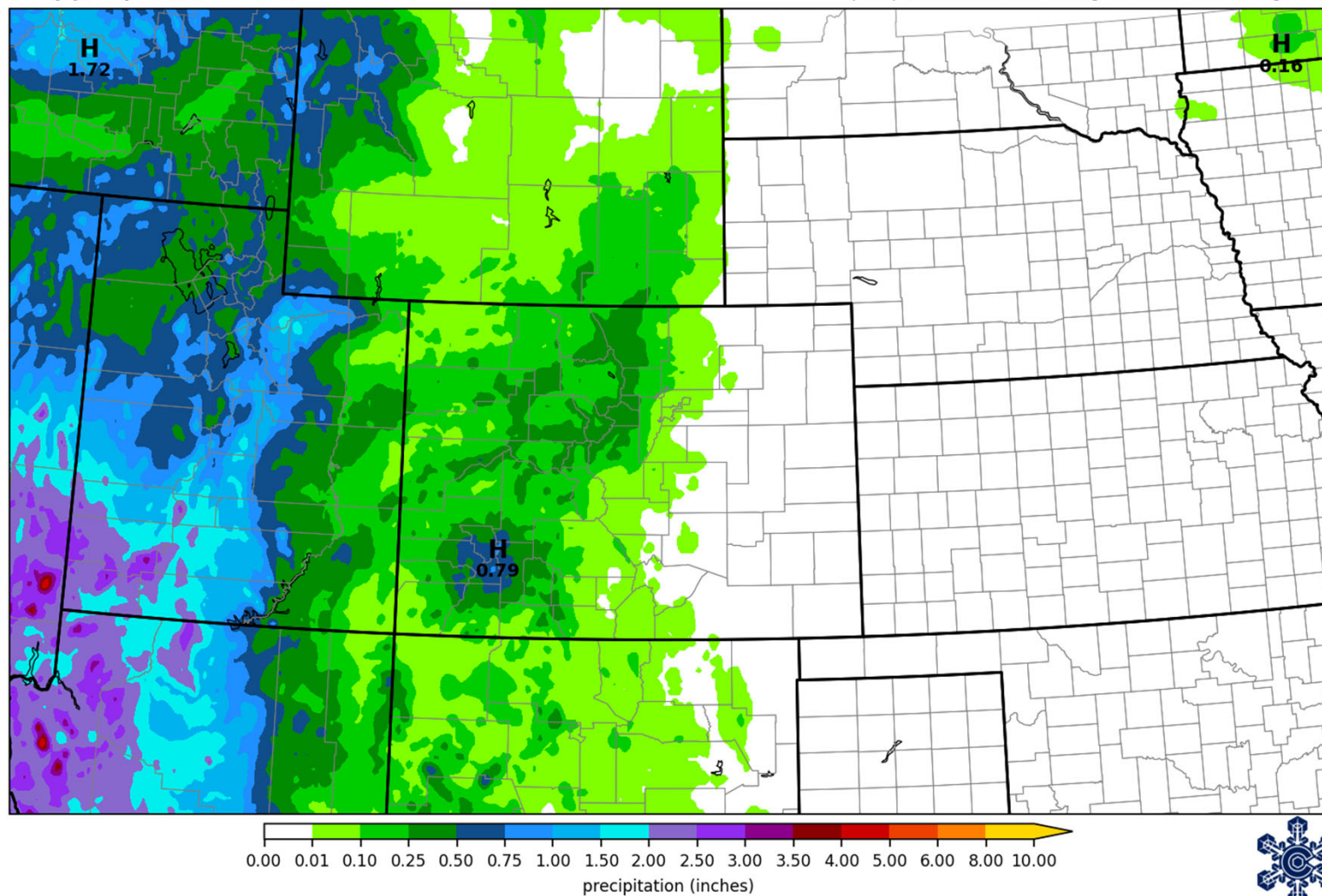
Outlook



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



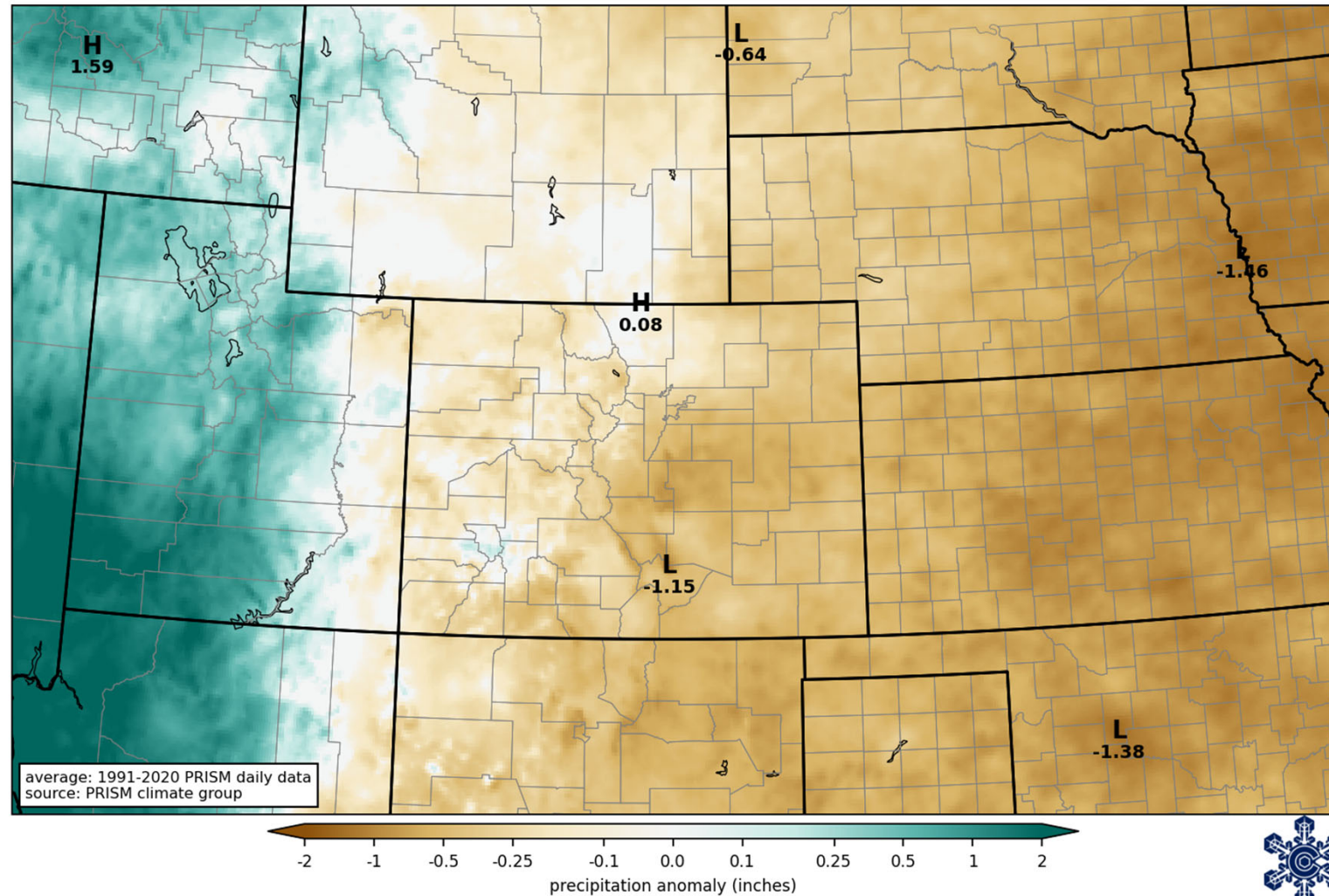
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NOAA 7-day precipitation forecast (difference from average)

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



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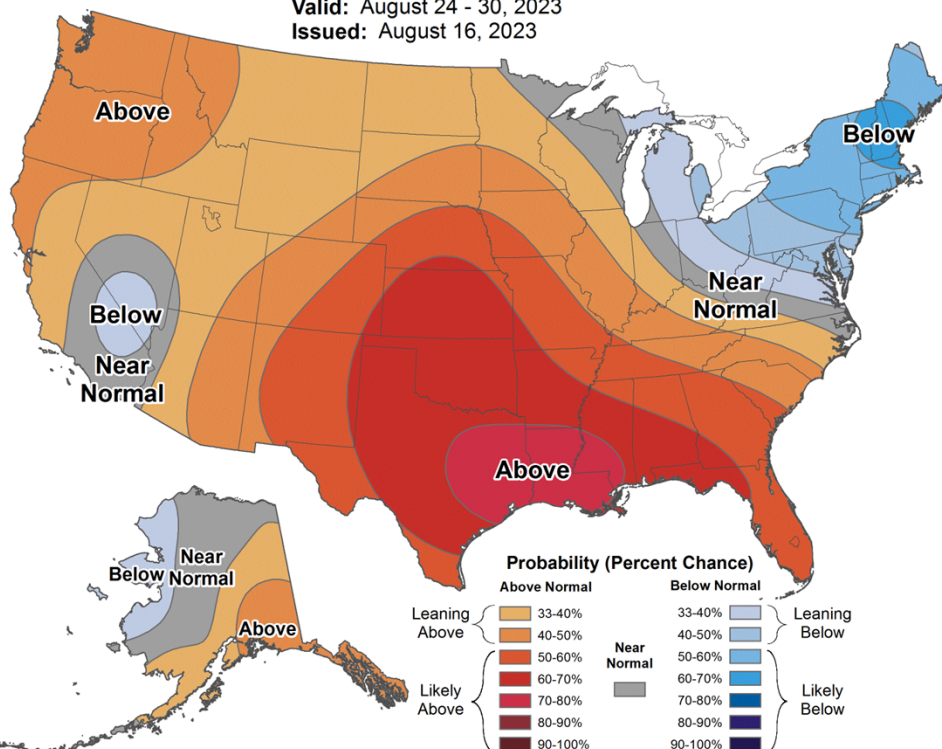


Hot and dry over the next 7 days; following week leans toward warm and wet



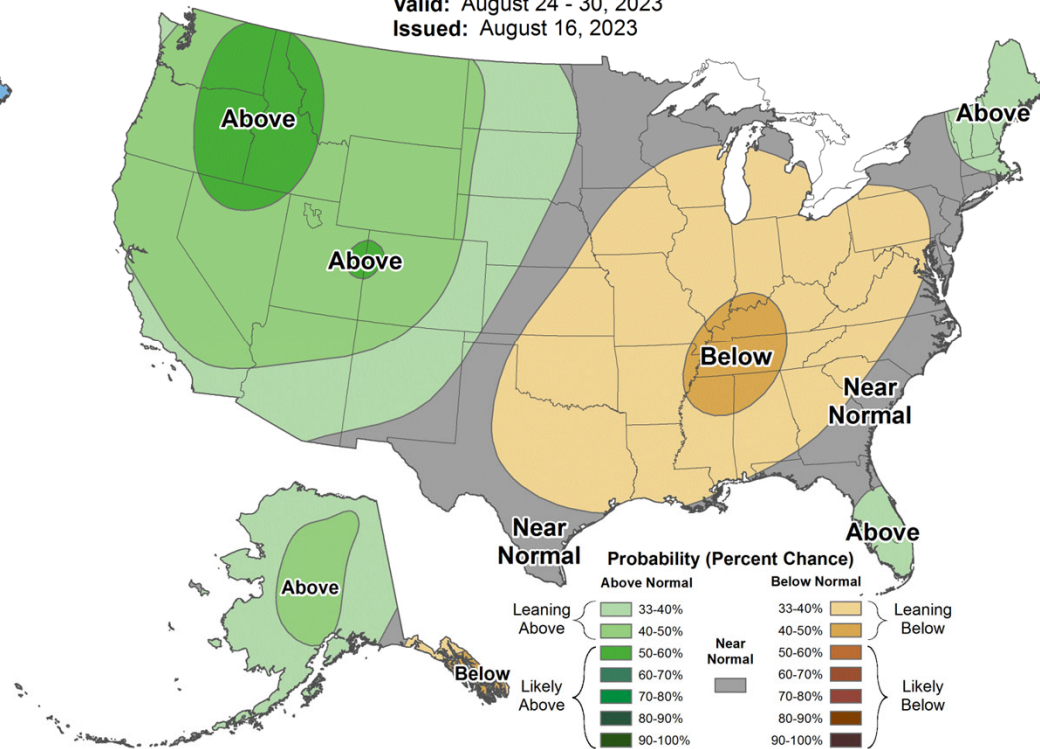
8-14 Day Temperature Outlook

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

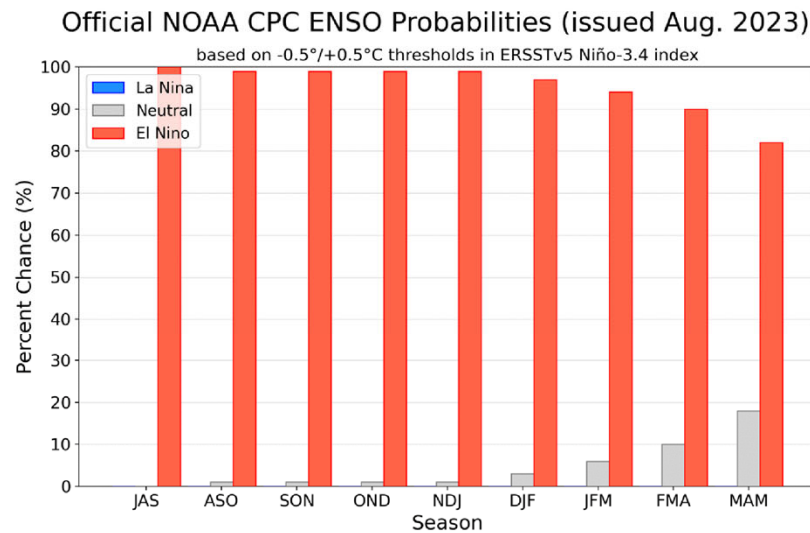


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 10 August 2023.

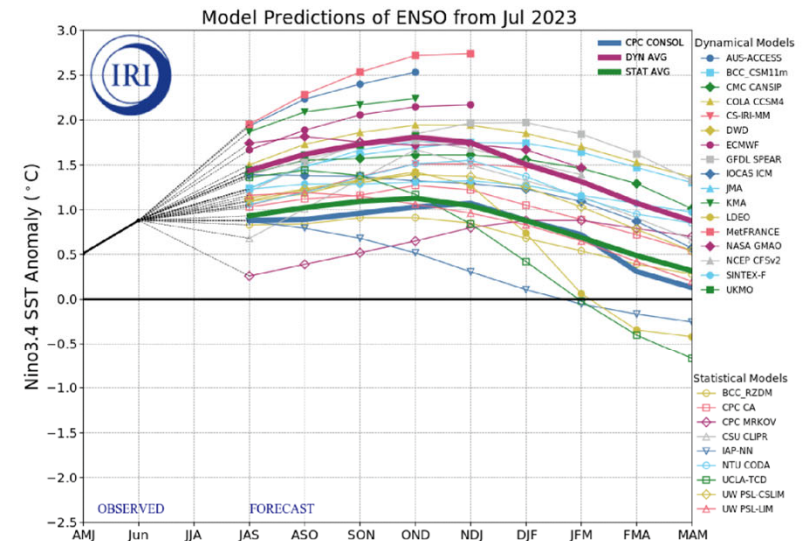
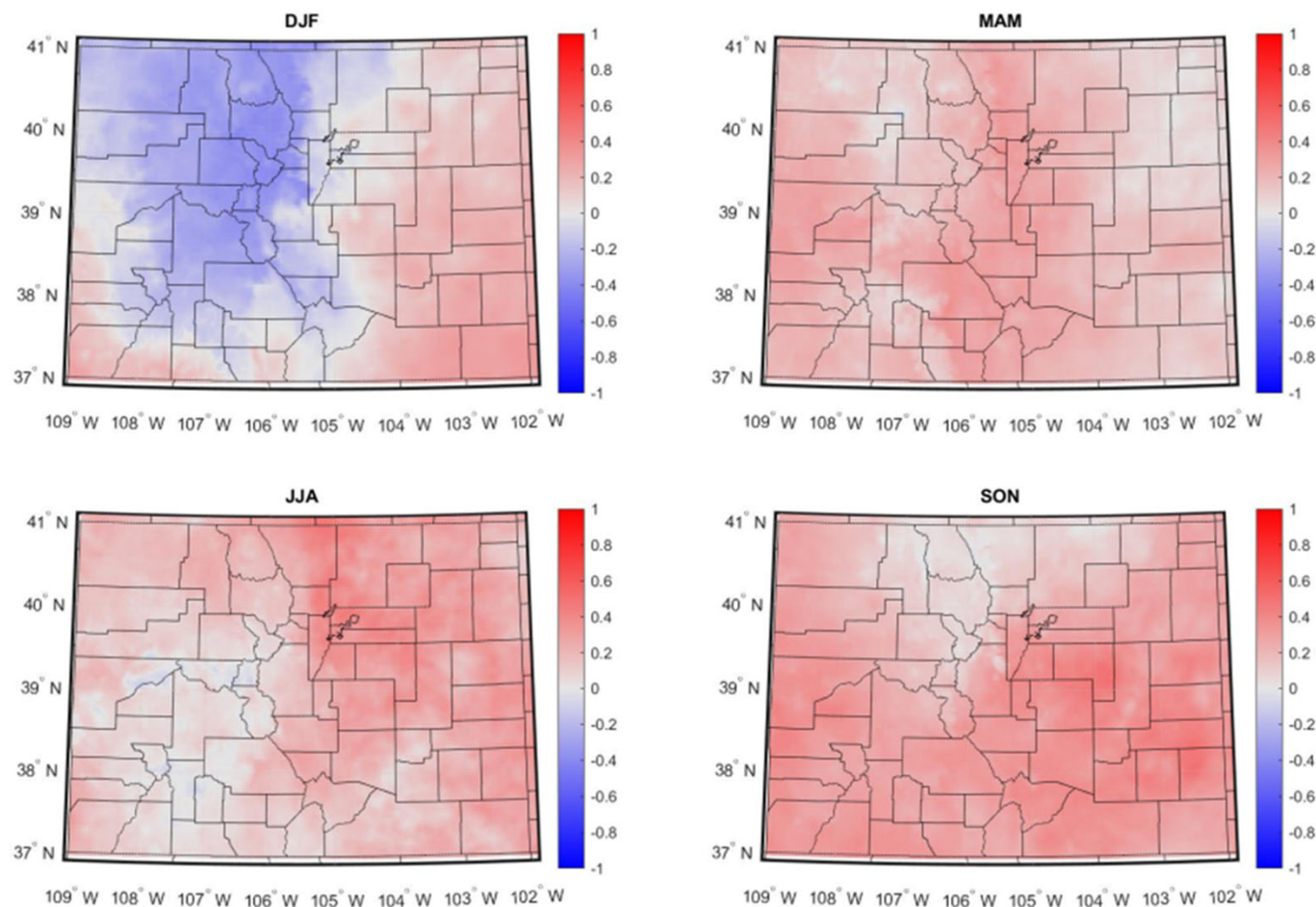


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N - 5°S , 120°W - 170°W). Figure updated 19 July 2023 by the International Research Institute (IRI) for Climate and Society.



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

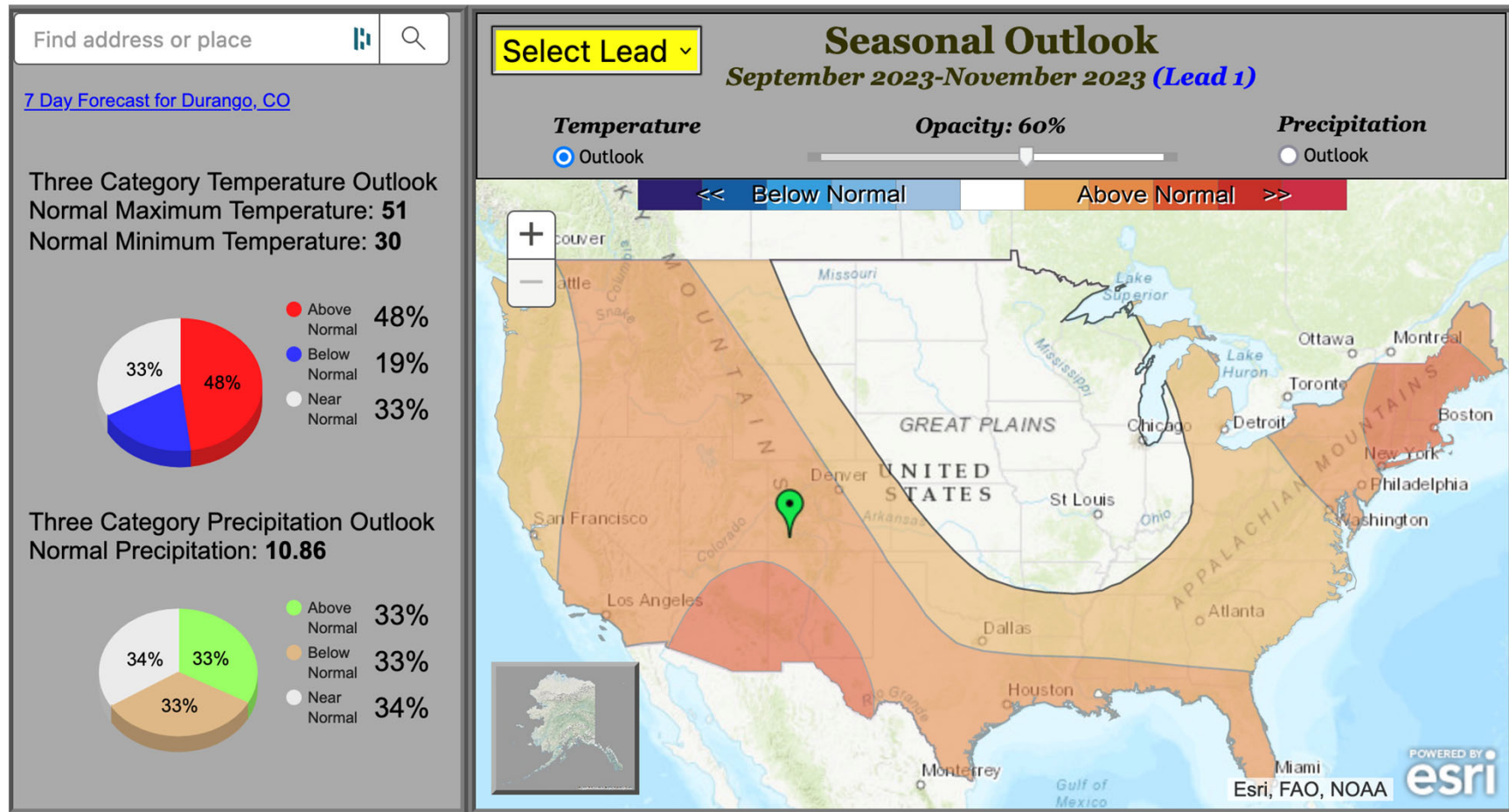
Correlation Between ENSO ONI and Seasonal Precipitation in Colorado (1951-2020)



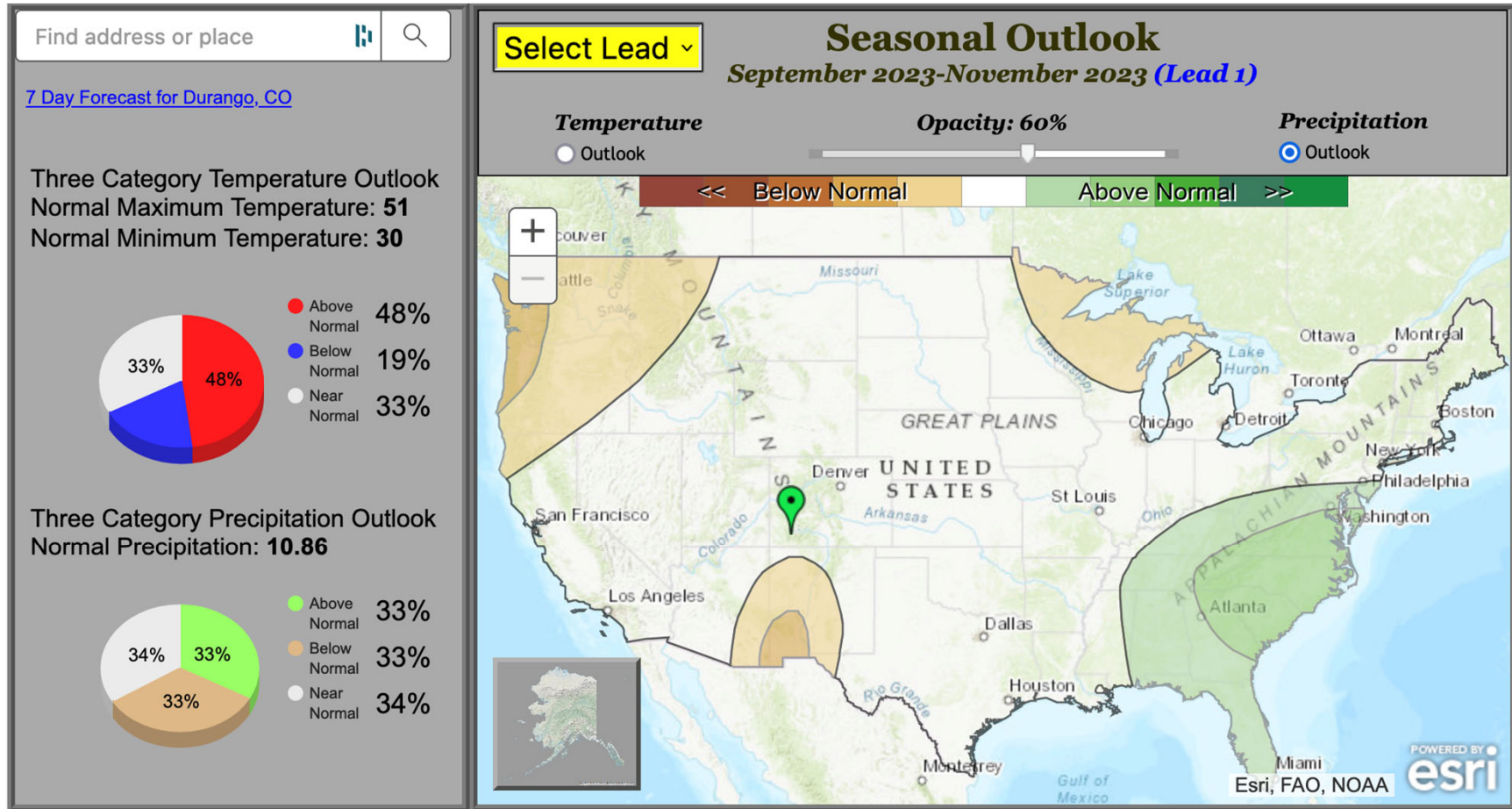
Blue = La Niña wetter Red = El Niño wetter



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.colorado.state.edu/>

[russ.schmittner](https://climate.colorado.state.edu/russ.schmittner)

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