

# Colorado Climate Center *WATF Climate Update*

Russ Schumacher, state climatologist

Water Availability Task Force

August 16, 2022



COLORADO  
CLIMATE  
CENTER



ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY

# Water year 2022 to date:

temperature, precipitation,  
evaporative demand

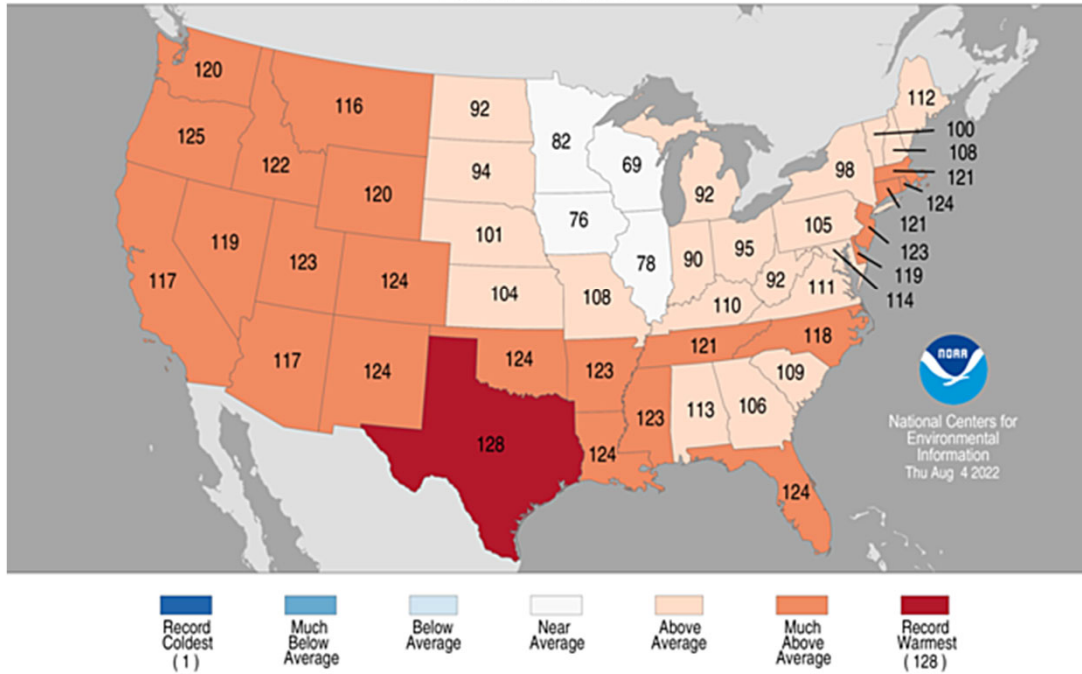


July 27, east of Fort Collins



## Statewide Average Temperature Ranks

July 2022  
Period: 1895–2022

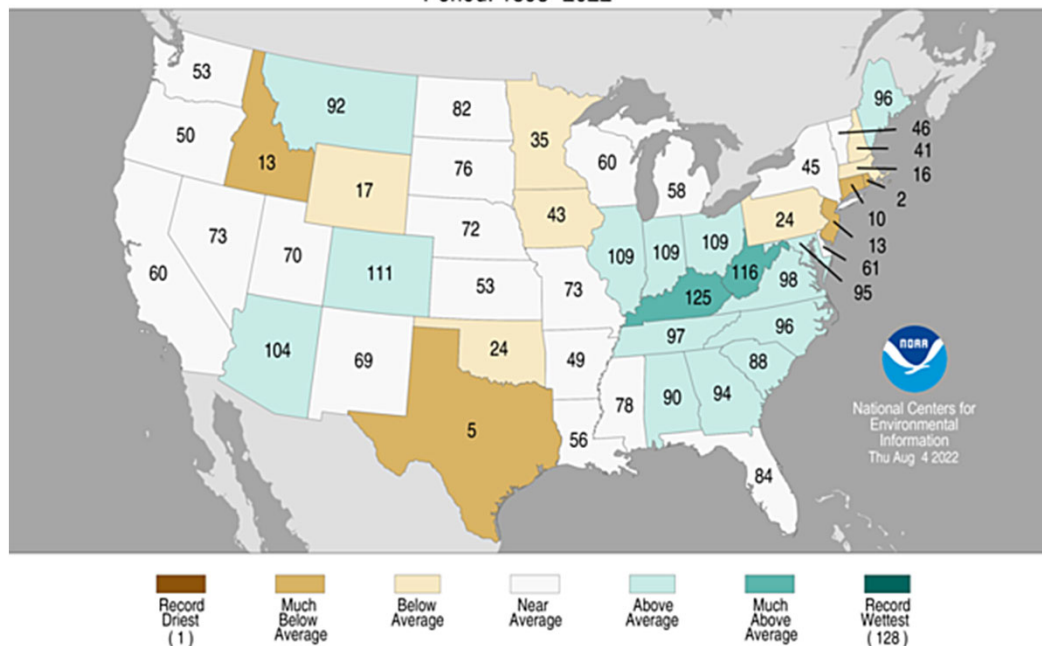


Statewide: tied for 8th warmest October-July  
2.6°F above 20<sup>th</sup> century average  
1.0°F above 1991-2020 average

Month	T Rank (of 127 years)	Above, below, or near avg?
Oct	41 <sup>st</sup> warmest	above
Nov	3 <sup>rd</sup> warmest	much above
Dec	2 <sup>nd</sup> warmest	much above
Jan	39 <sup>th</sup> warmest	above
Feb	30 <sup>th</sup> coolest	below
Mar	54 <sup>th</sup> warmest	near avg
Apr	49 <sup>th</sup> warmest	near avg
May	44 <sup>th</sup> warmest	above
Jun	23 <sup>rd</sup> warmest	above
Jul	5 <sup>th</sup> warmest	much above



# Statewide Precipitation Ranks July 2022 Period: 1895-2022



Statewide: 35<sup>th</sup> driest October-July  
1.73" below 20<sup>th</sup> century average

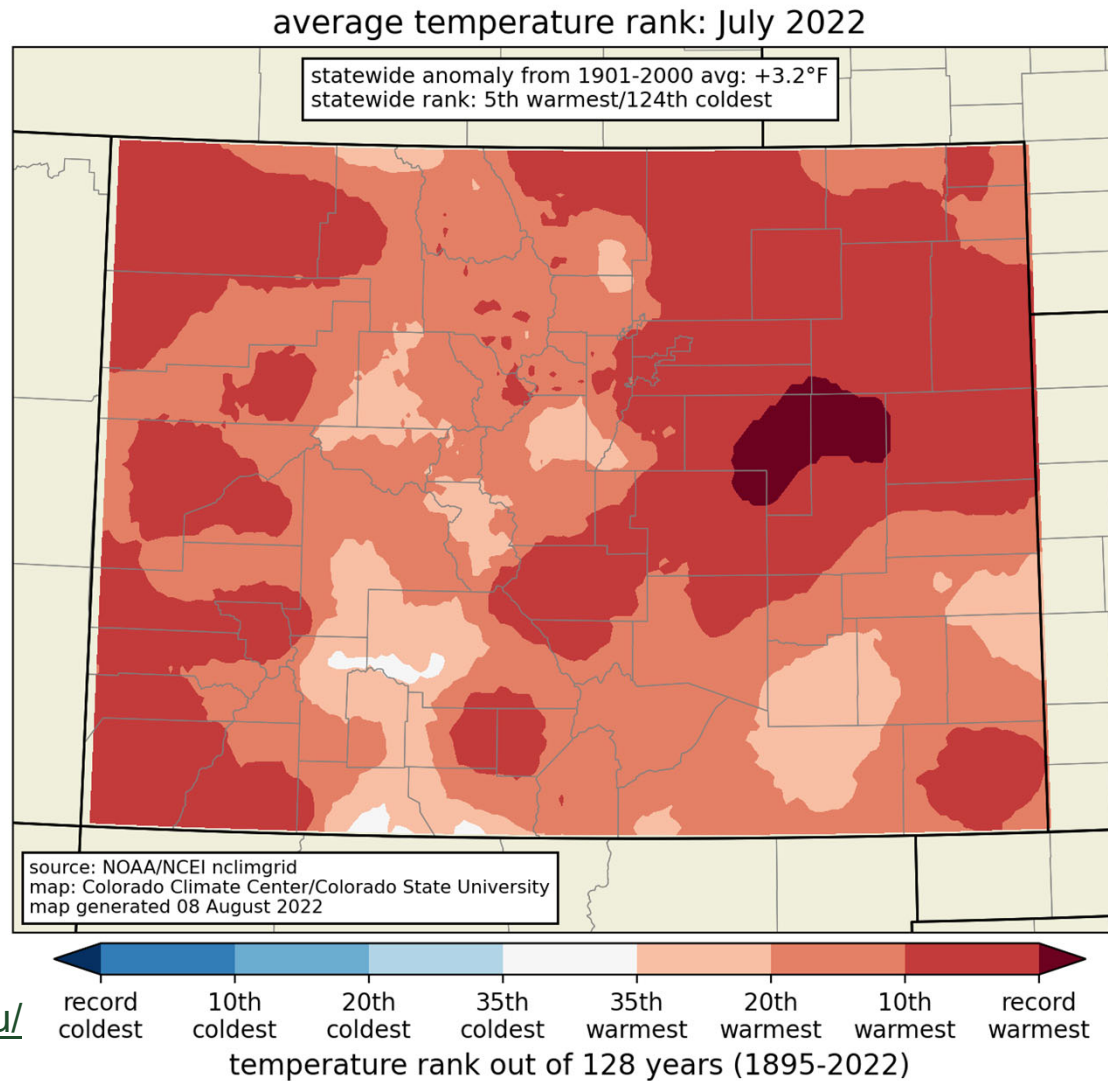
Month	P Rank (of 127 years)	Above, below, or near avg?
Oct	62 <sup>nd</sup> driest	near avg
Nov	10 <sup>th</sup> driest	much below
Dec	14 <sup>th</sup> wettest	above
Jan	39 <sup>th</sup> driest	below
Feb	52 <sup>nd</sup> driest	near avg
Mar	67 <sup>th</sup> driest	near avg
Apr	5 <sup>th</sup> driest	much below
May	45 <sup>th</sup> driest	near avg
Jun	67 <sup>th</sup> driest	near avg
Jul	18 <sup>th</sup> wettest	above





**Statewide: 5<sup>th</sup>  
warmest July**

**Warmest month on  
record in terms of  
the average low  
temperatures (i.e.,  
lots of warm nights)**



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

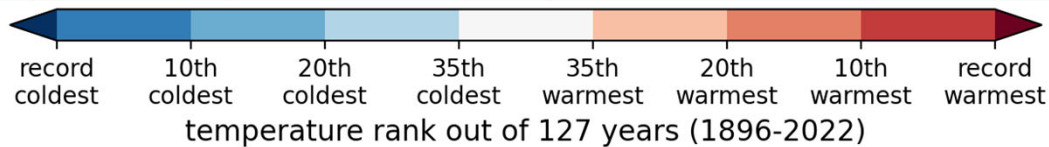
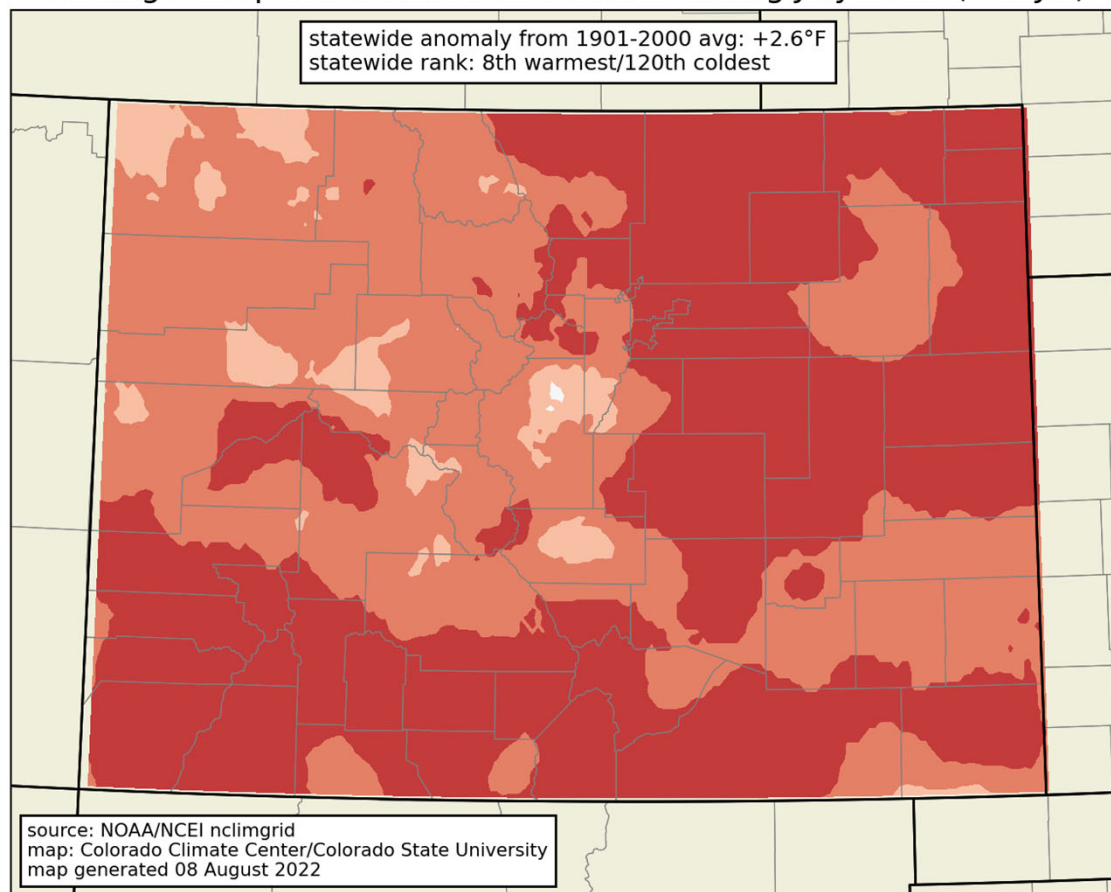


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average temperature rank: 10 months ending July 2022 (Oct-Jul)

**Statewide: tied for  
8th<sup>th</sup> warmest  
October-July**



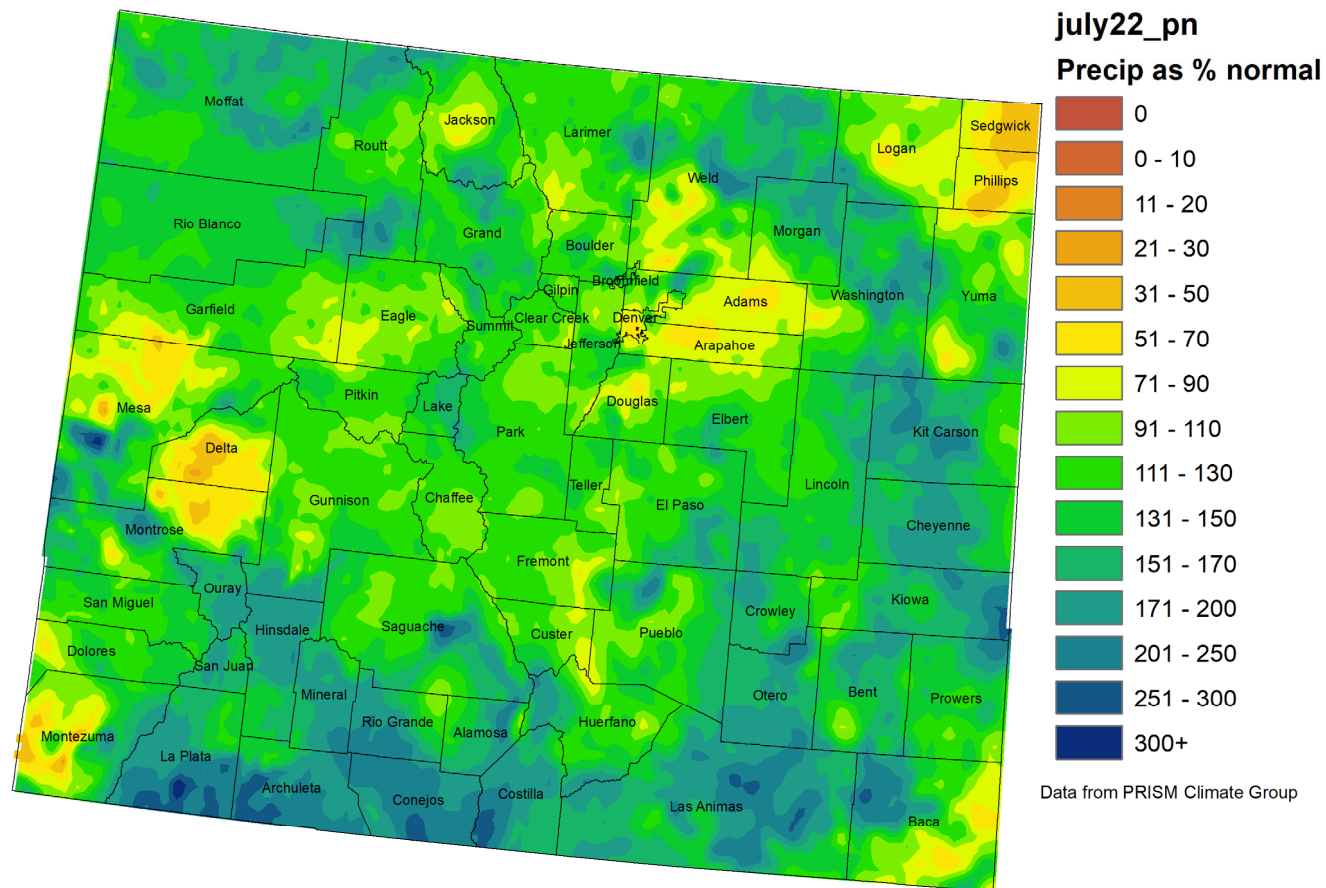
[http://climate.colostate.edu/  
co\\_cag/rank\\_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



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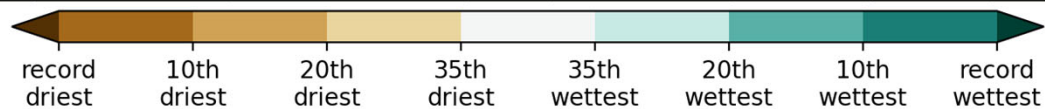
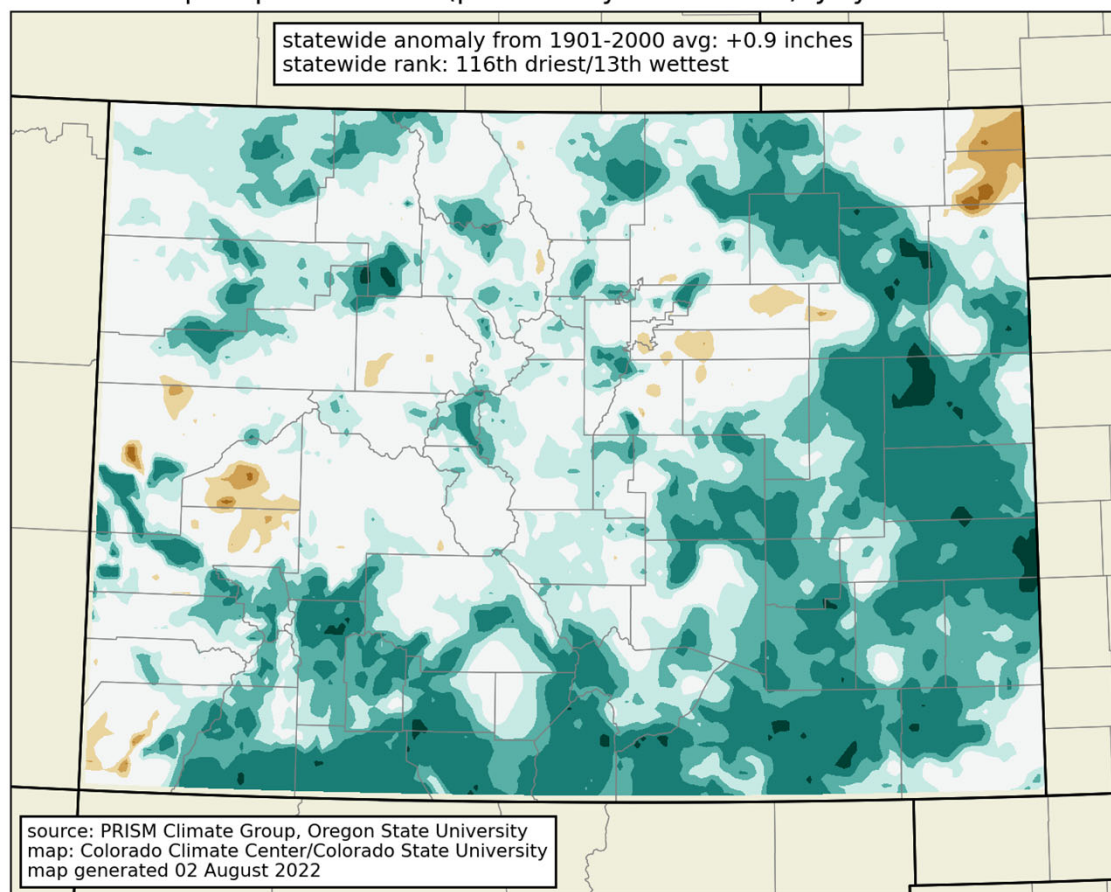


## Colorado July 2022 Precipitation as a Percentage of Normal



precipitation rank (preliminary PRISM data): July 2022

Statewide: 13<sup>th</sup>  
wettest July (PRISM  
dataset)



precipitation rank out of 128 years (1895-2022)

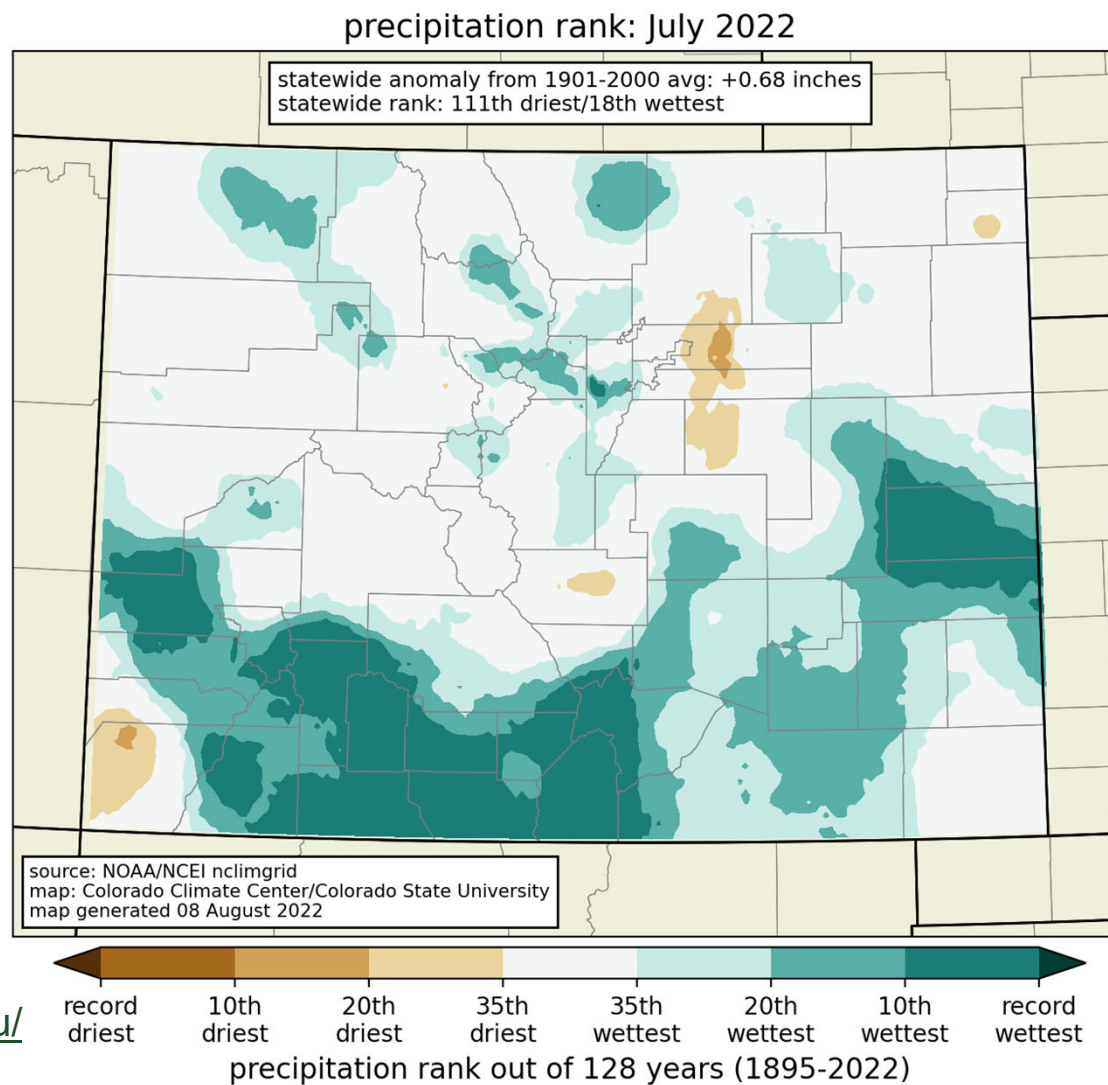
[http://climate.colostate.edu/  
co\\_cag/rank\\_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



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Statewide: 18<sup>th</sup>  
wettest July (official  
NOAA dataset)



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

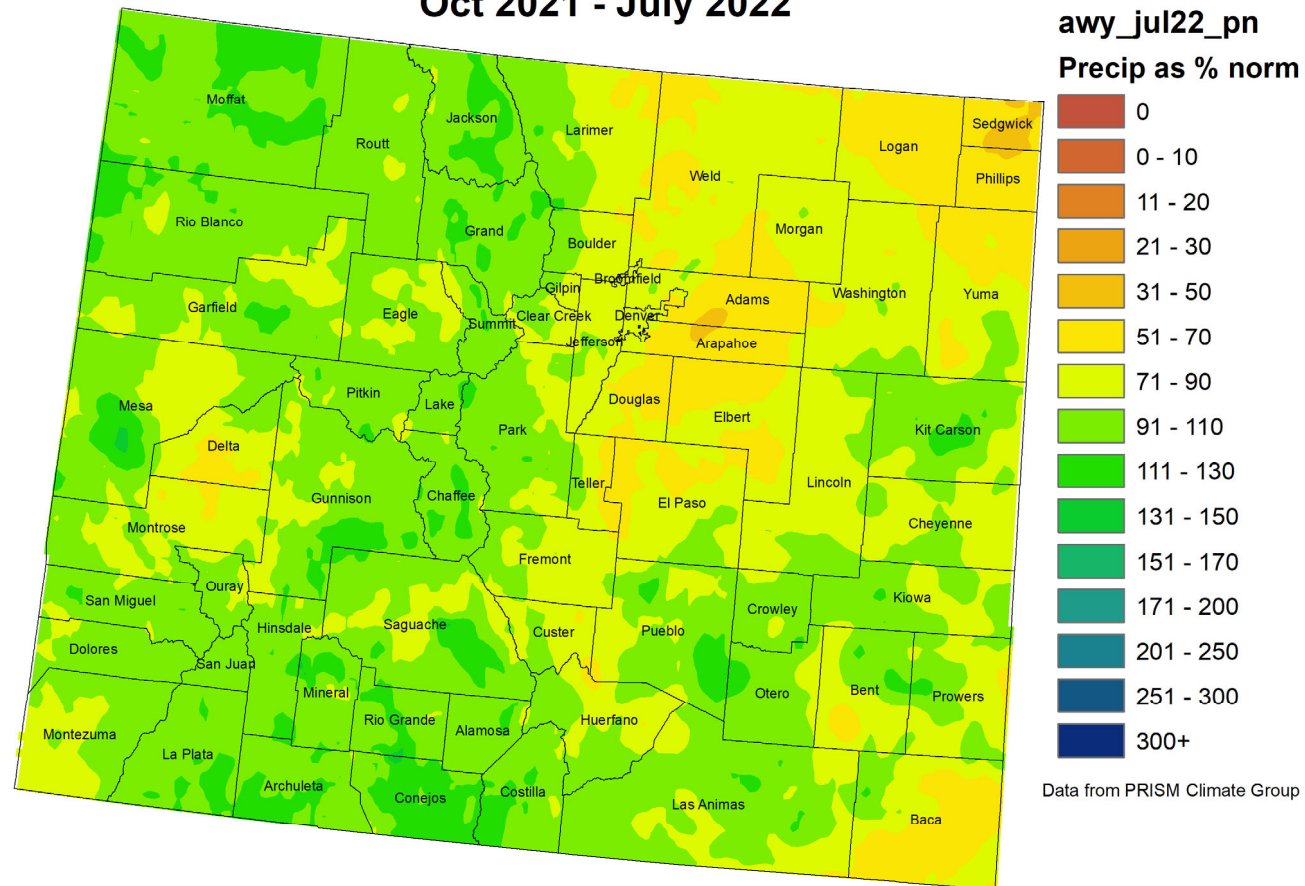


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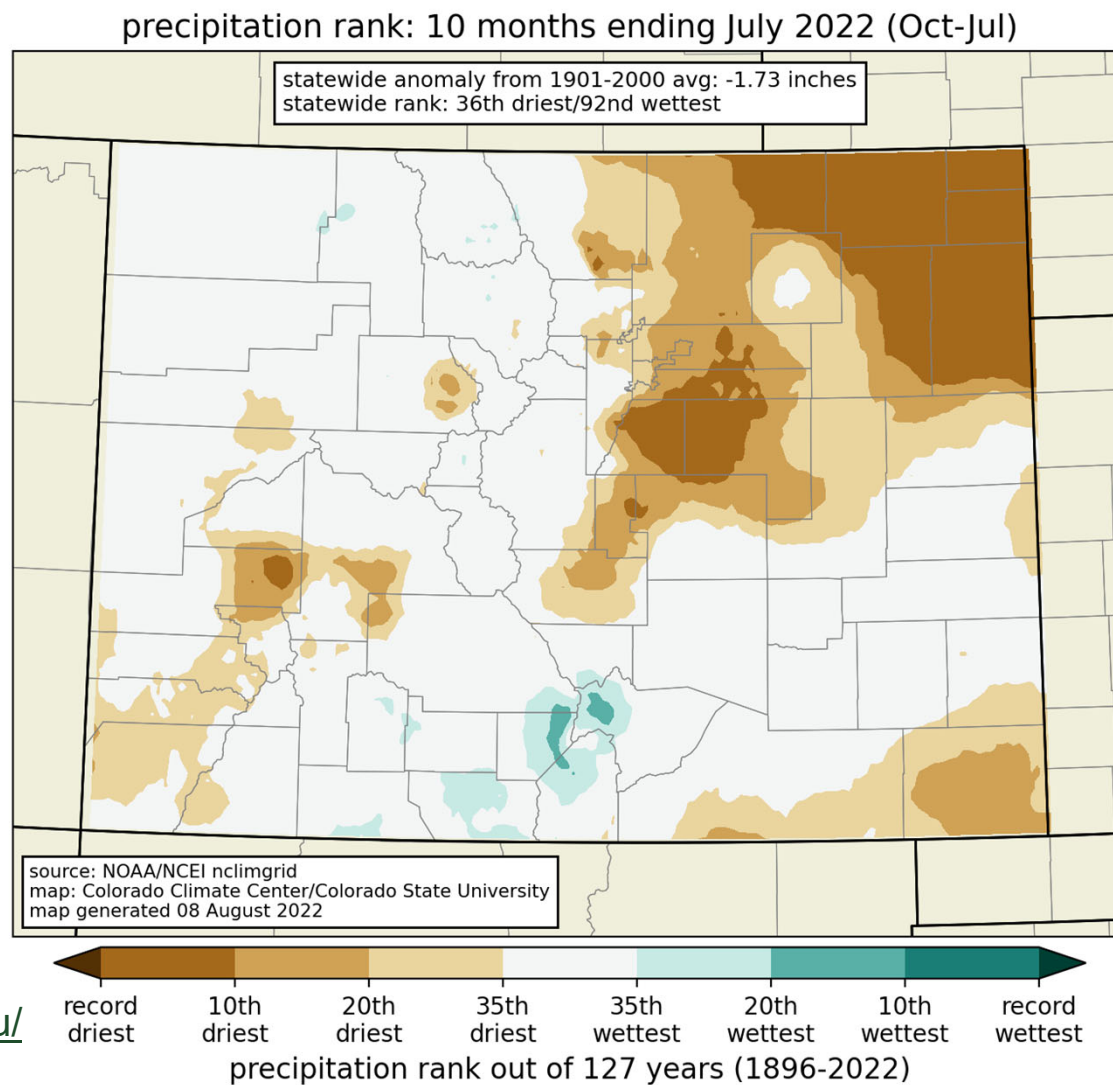




# Colorado Water Year 2022 Precipitation as a Percentage of Normal Oct 2021 - July 2022



Statewide: 36<sup>th</sup> driest  
October-July



[http://climate.colostate.edu/  
ranks\\_monthly\\_maps.html](http://climate.colostate.edu/ranks_monthly_maps.html)



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Colorado statewide average temperature and precipitation, July

Warm & dry

warm & wet

avg temp (F)

Warm & wet

July 2022

1991-2020 avg temp

1901-2000 avg temp

avg temp (F)

Cool & dry

cool & dry

accumulated precipitation (inches)

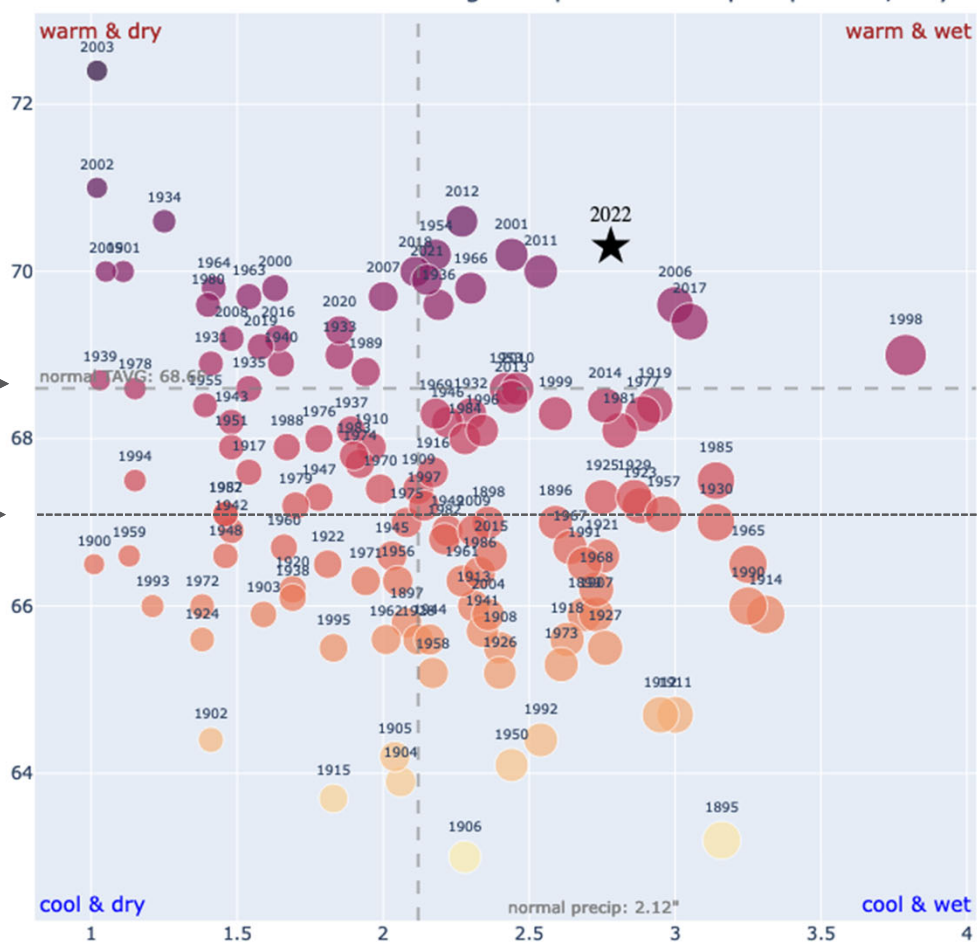
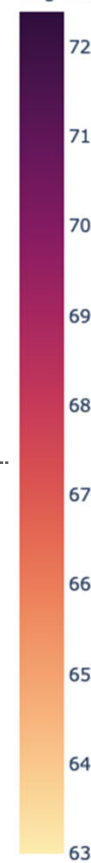
cool & wet

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](https://climate.colostate.edu/co_cag/quadrant.html)



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Colorado statewide average temperature and precipitation, October - July

Warm & dry

warm & wet

avg temp (F)

Warm & wet

Water year 2022  
through July

1991-2020 avg temp →

1901-2000 avg temp →

avg temp (F)

Cool & dry

cool & dry

normal precip: 14.49"

cool & wet

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

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



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Station	Rank among all-time hottest 10-day periods	Dates	10-day average temperature
Fort Collins	1 <sup>st</sup>	July 14-23	79.4°F
Greeley UNC	1 <sup>st</sup>	July 14-23	84.0°F
Montrose	1 <sup>st</sup>	July 14-23	80.5°F
Walsh 1 W	1 <sup>st</sup>	July 15-24	86.2°F
Denver International AP	6 <sup>th</sup>	July 14-23	82.0°F
Colorado Springs	8 <sup>th</sup>	July 14-23	78.4°F
Denver-Central Park	12 <sup>th</sup>	July 14-23	80.4°F
Pueblo	17 <sup>th</sup>	July 14-23	83.1°F
Grand Junction	22 <sup>nd</sup>	July 14-23	85.1°F

A combination of hot days and unusually warm nights during a July heat wave led to new records for the warmest 10-day period at some long-term stations

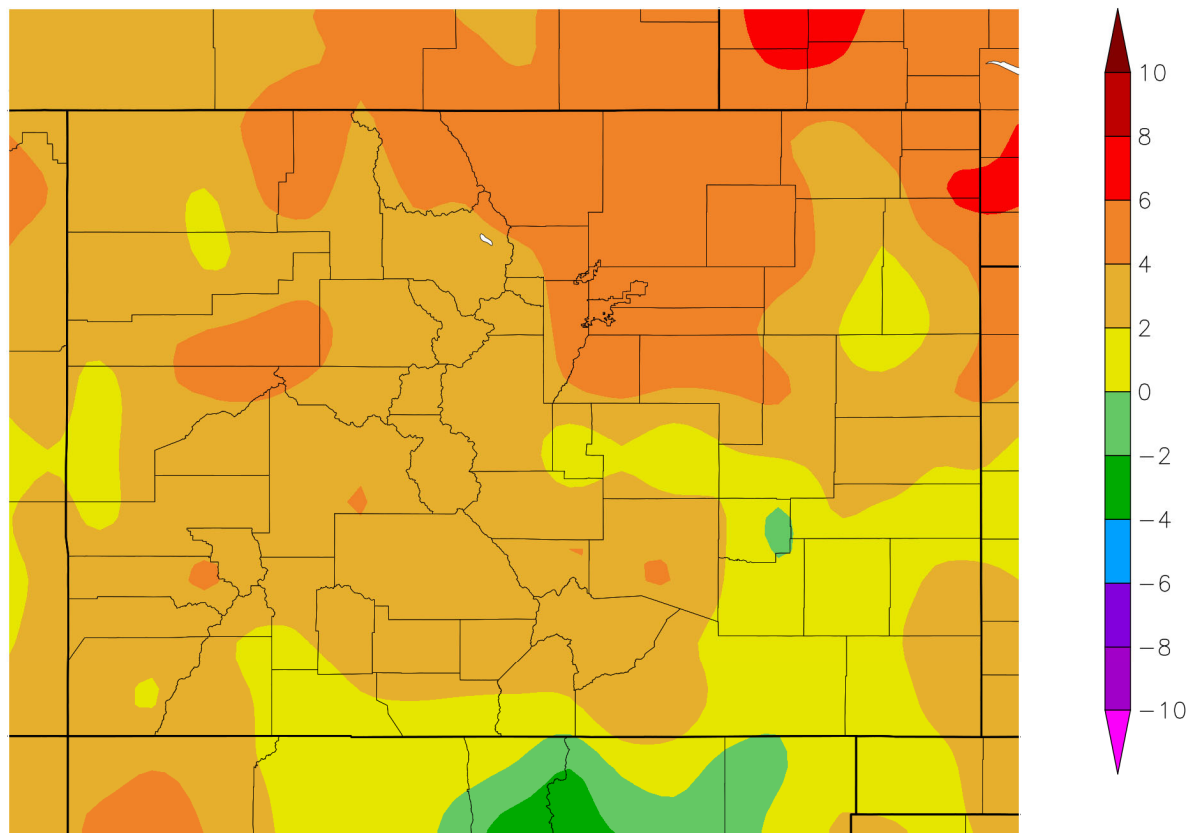
## July 2022 heat wave: where did it rank?

From our monthly climate summary:





# Departure from Normal Temperature (F) 8/1/2022 – 8/15/2022



Generated 8/16/2022 at HPRCC using provisional data.

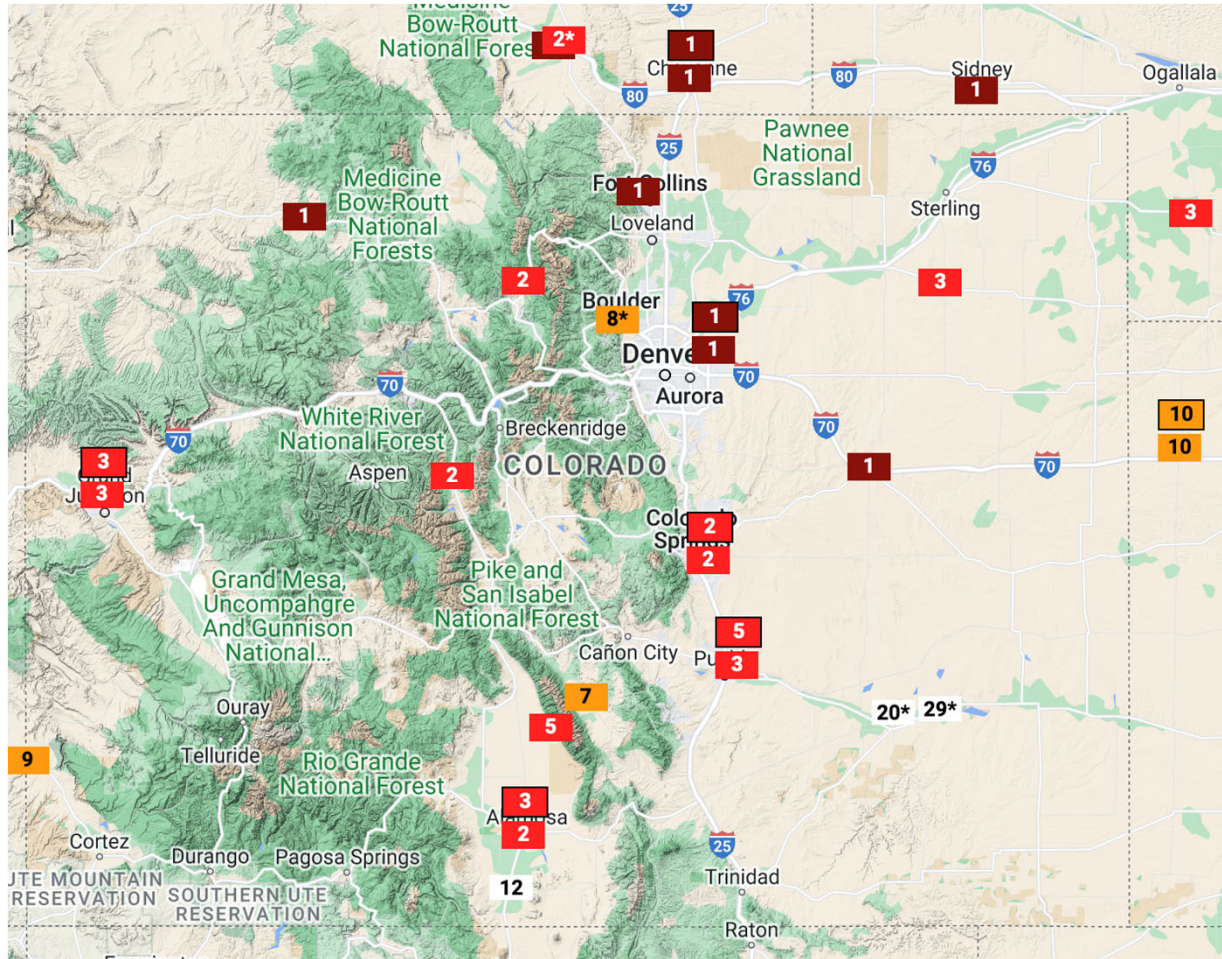
NOAA Regional Climate Centers



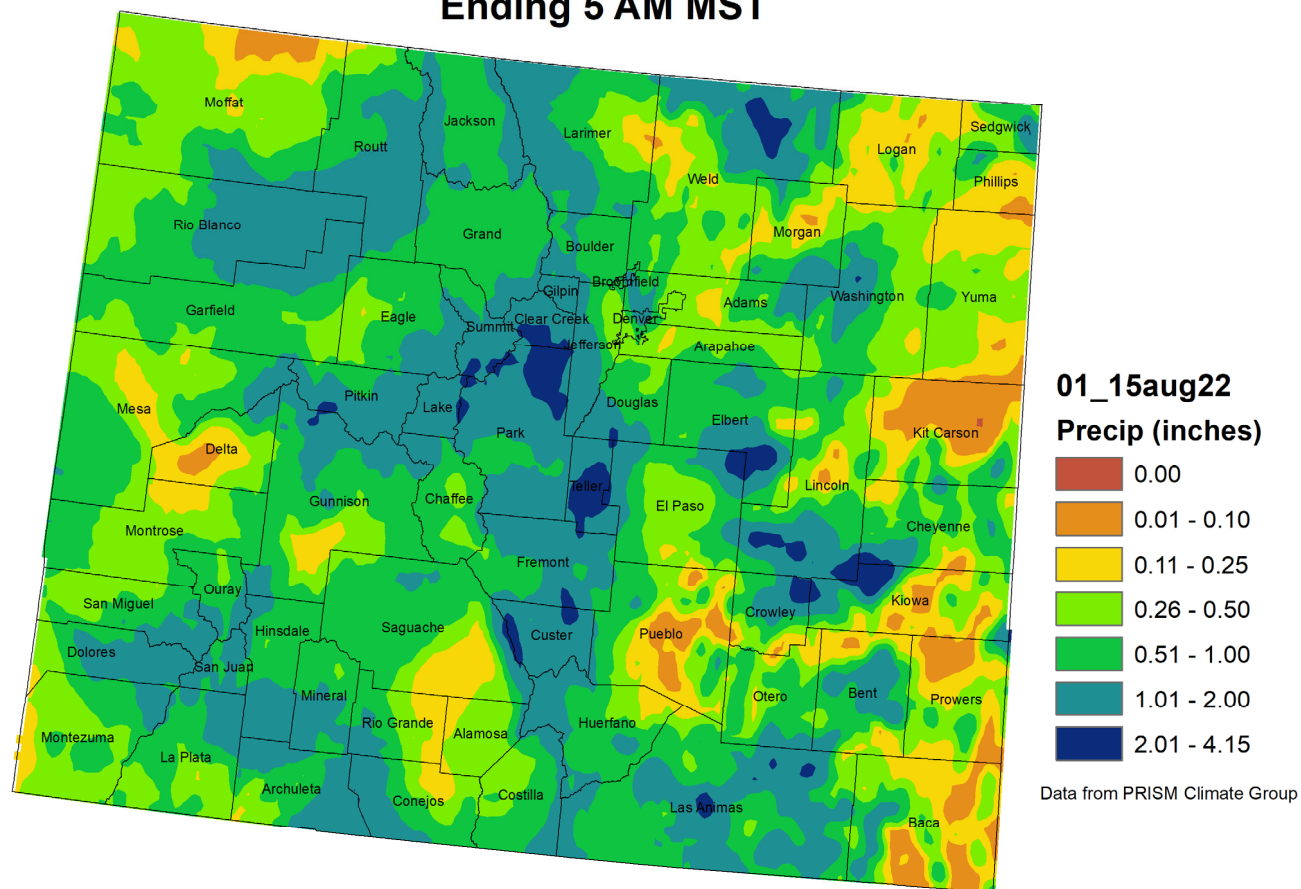
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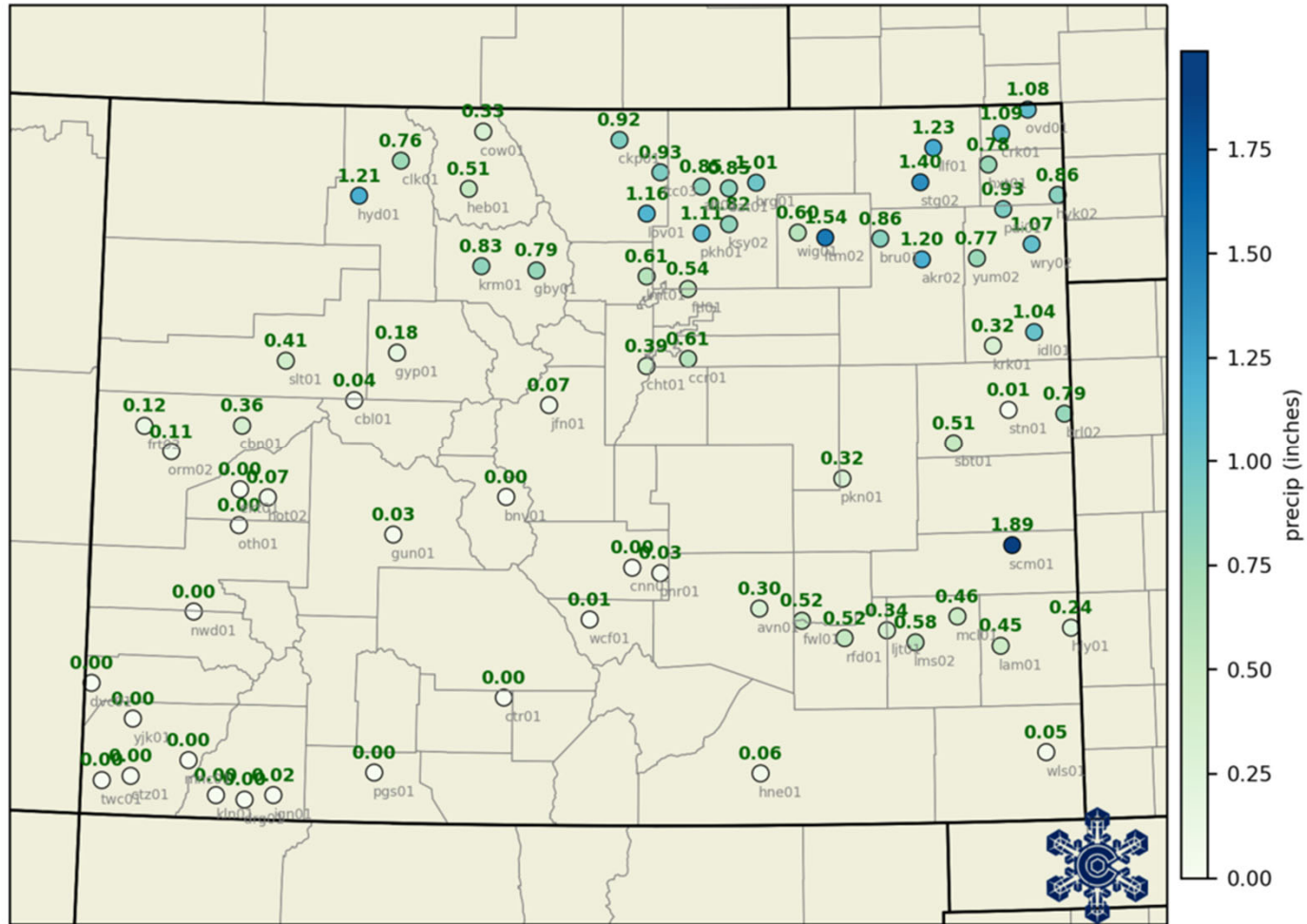
## Average temperature rank, August 1-14



# Colorado Month to Date Precipitation 1 - 15 August 2022 Ending 5 AM MST



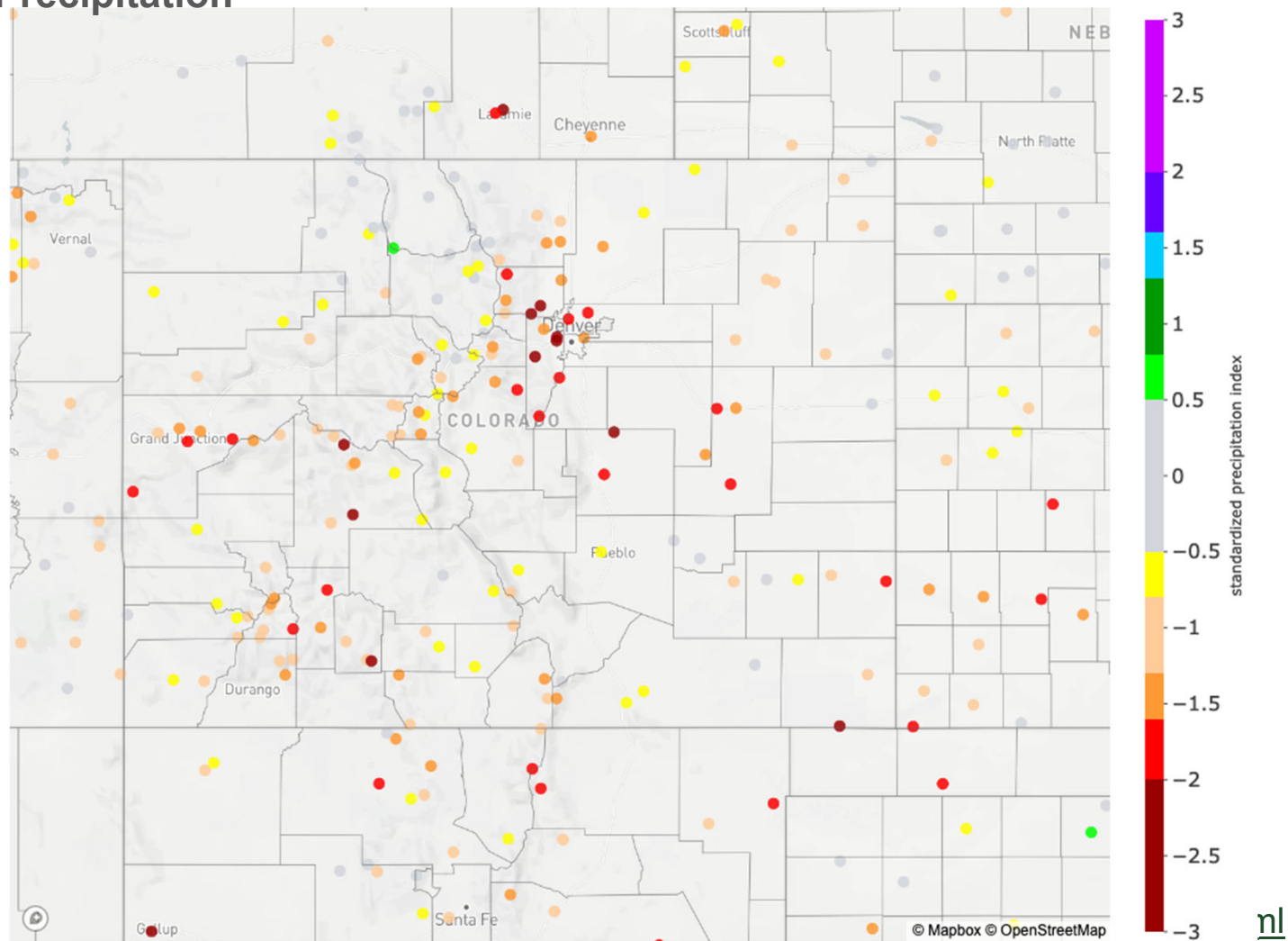
CoAgMET/Northern Water precipitation in previous 14 days: 01 May 2022-15 May 2022





# Standardized Precipitation Index

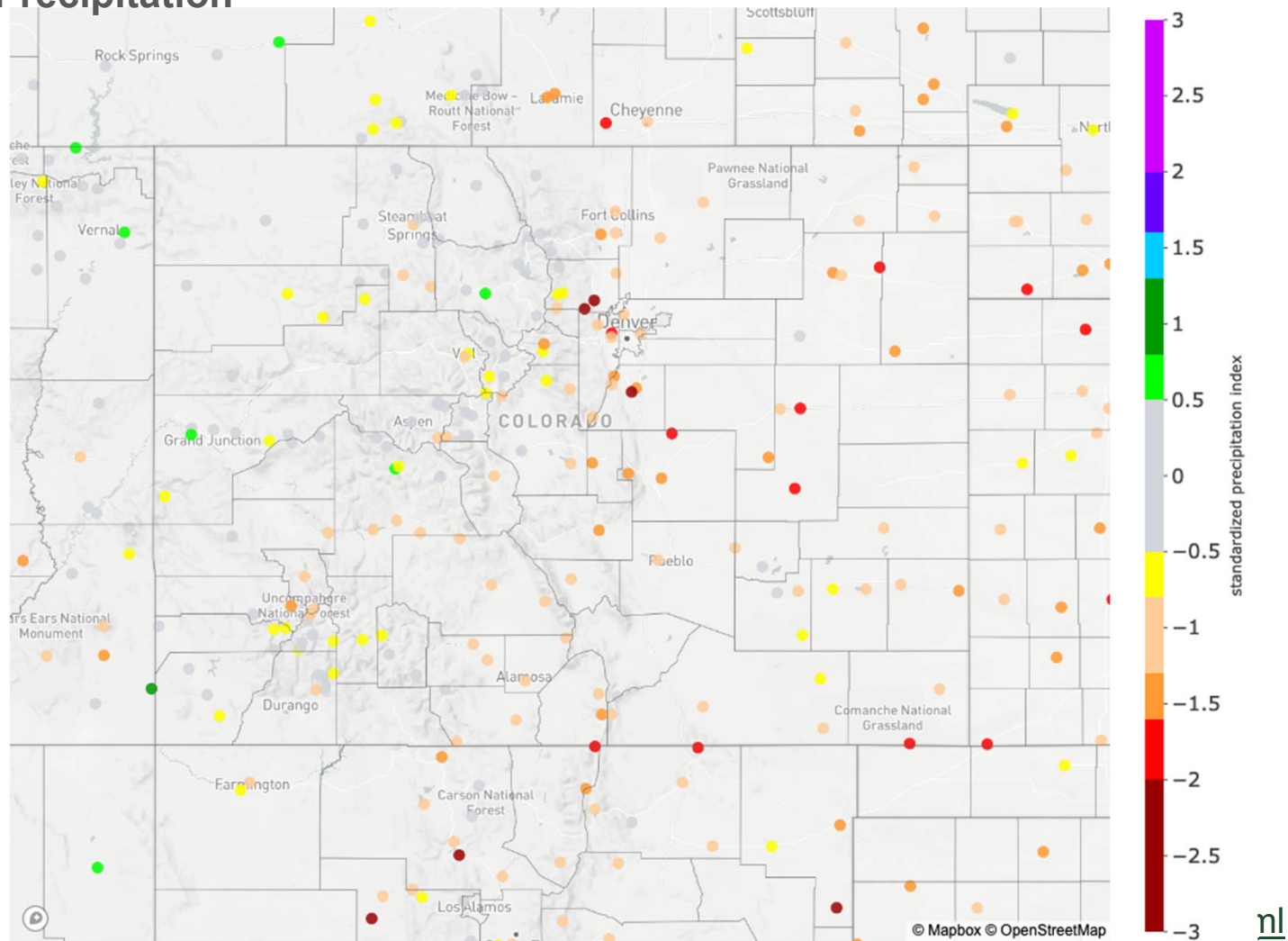
60-day Standardized Precipitation Index: 2022/03/19 - 2022/05/17



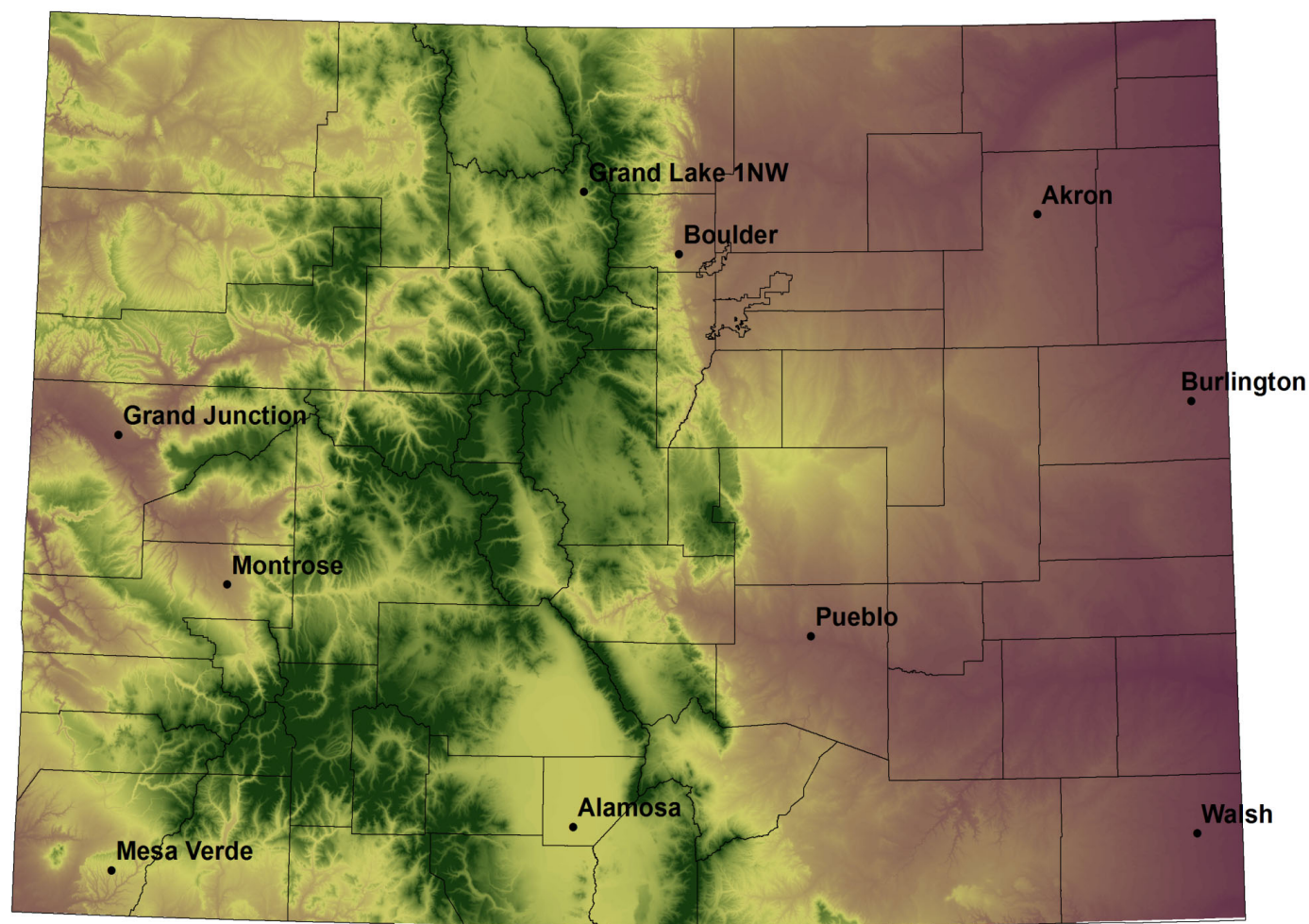


# Standardized Precipitation Index

Water-year-to-date Standardized Precipitation Index: 2021/10/01 - 2022/05/17



## NWS Cooperative Stations for WATF

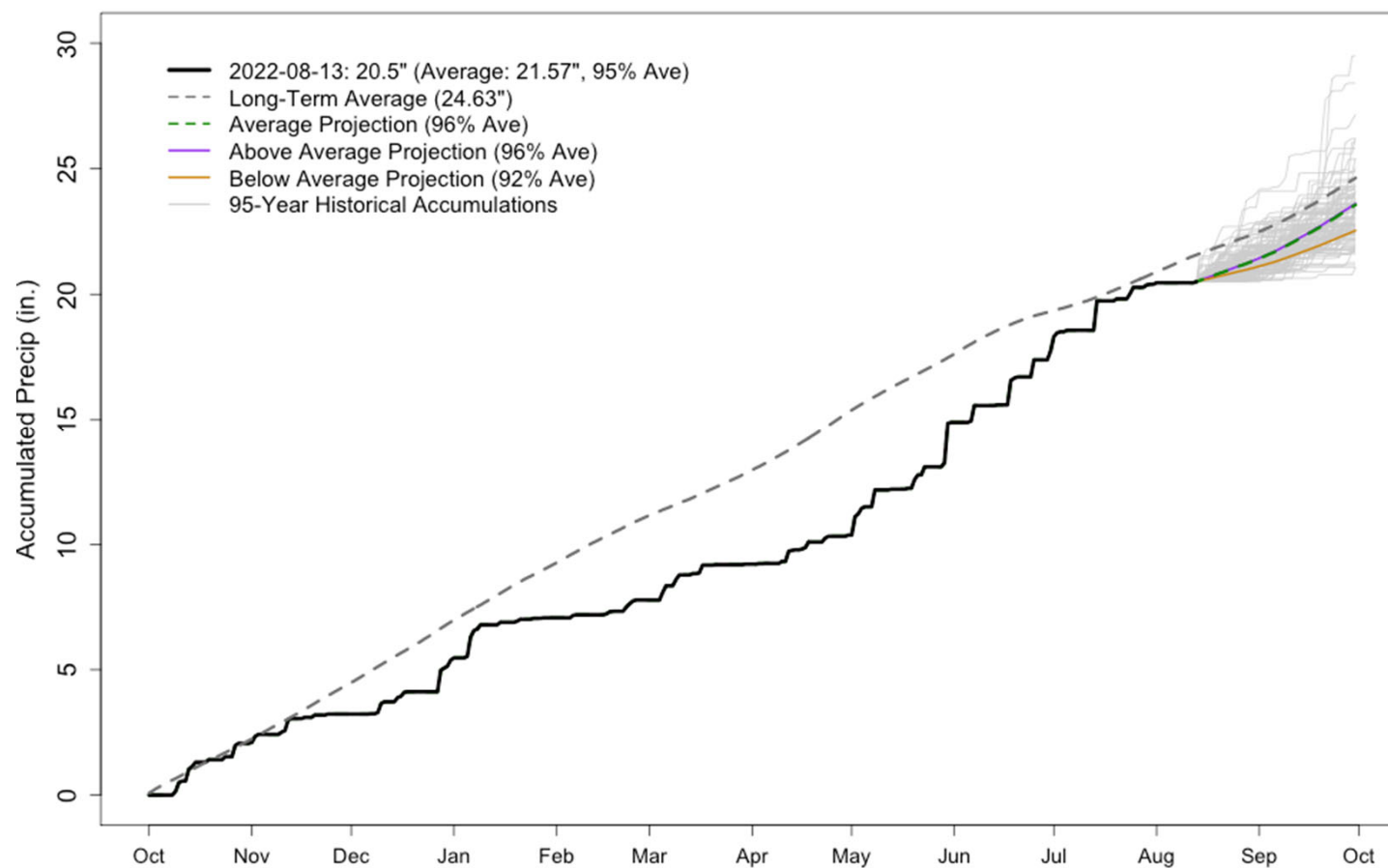


## Water Year 2022 – Station Updates



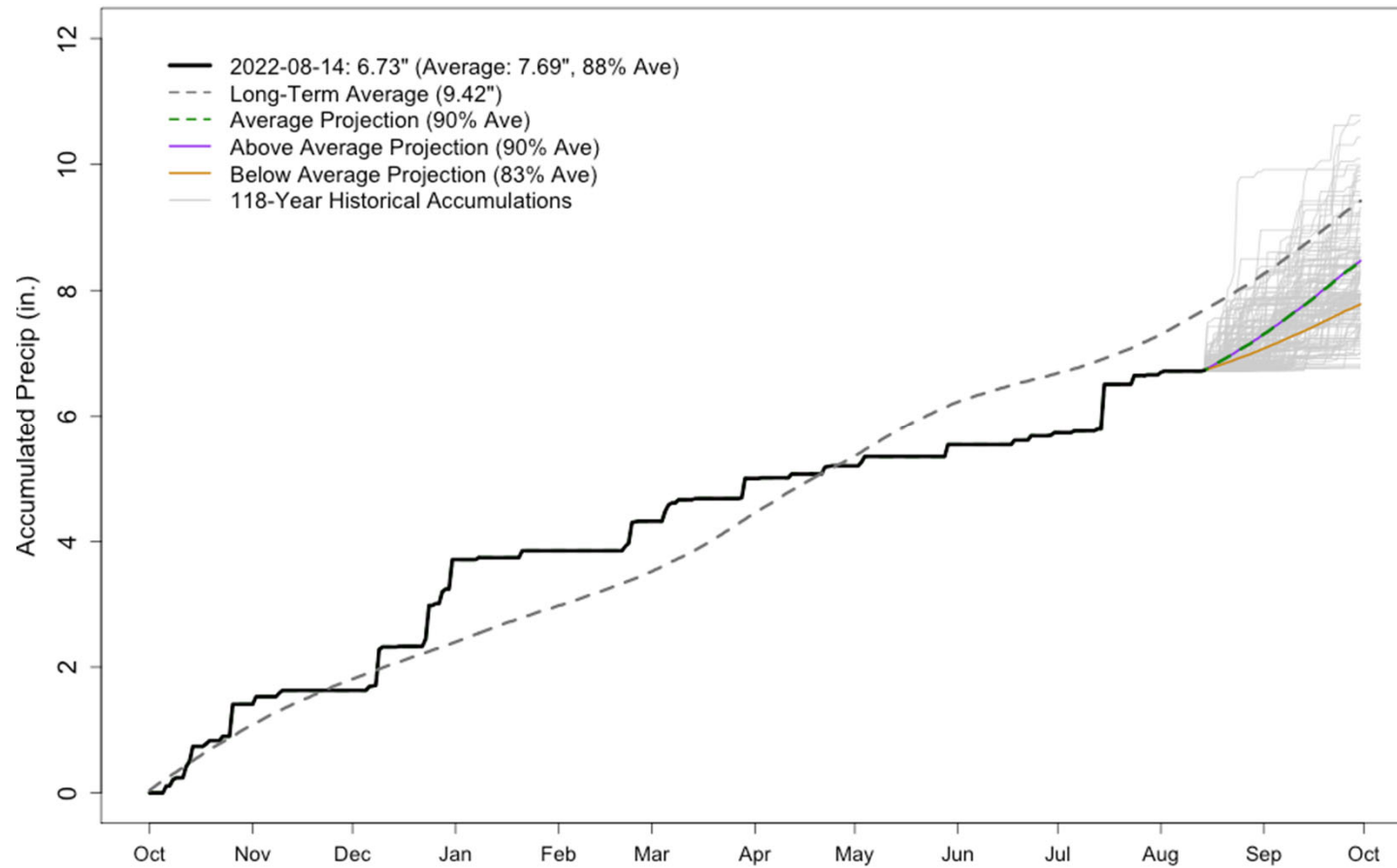
# Steamboat Springs

## STEAMBOAT SPRINGS WY2022 Precipitation Projections



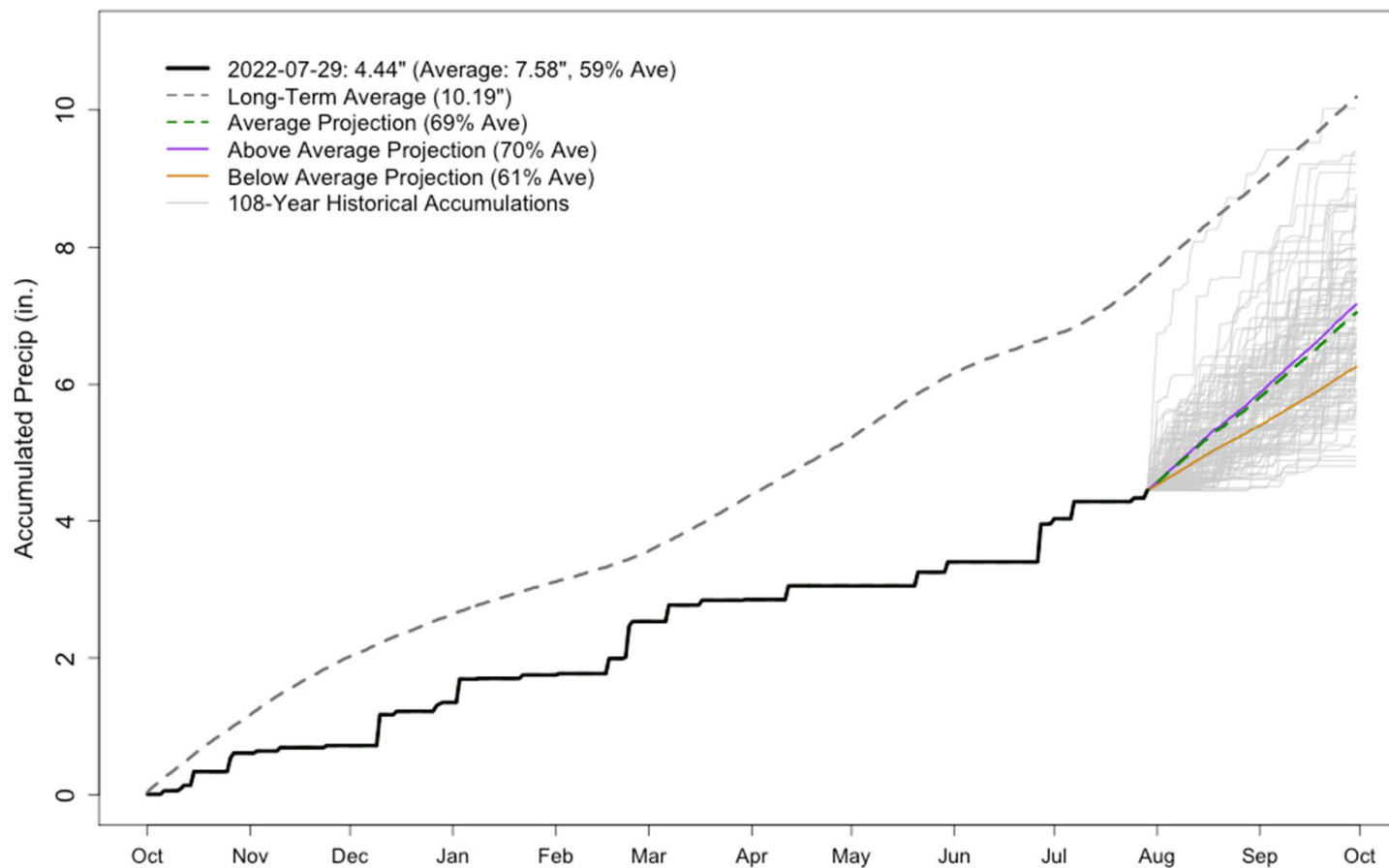
## Grand Junction

### GRAND JUNCTION WALKER FIELD WY2022 Precipitation Projections



# Montrose

## MONTROSE NO 2 WY2022 Precipitation Projections



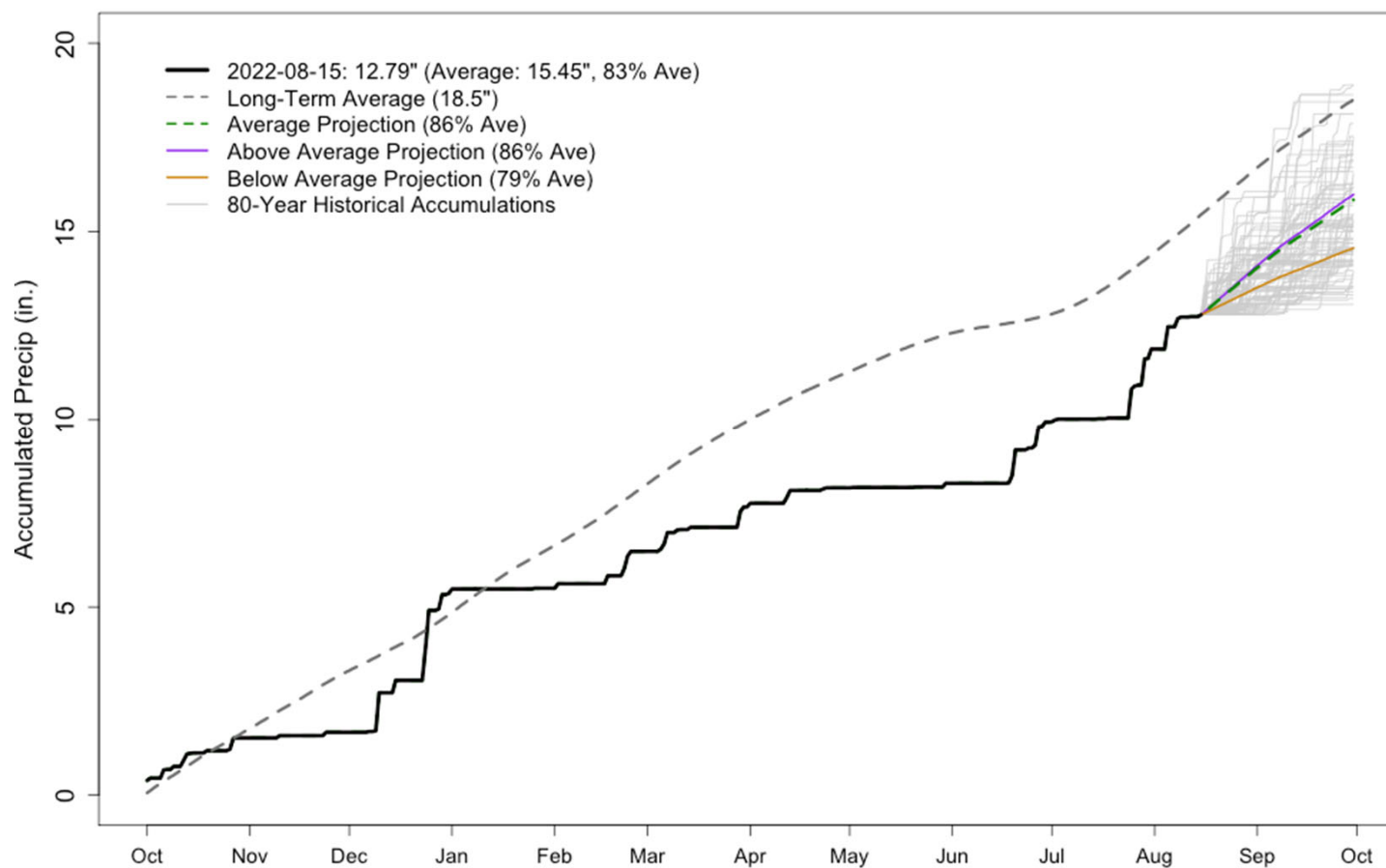
Note: data only through July 29. Nearby stations show around 0.5" since then





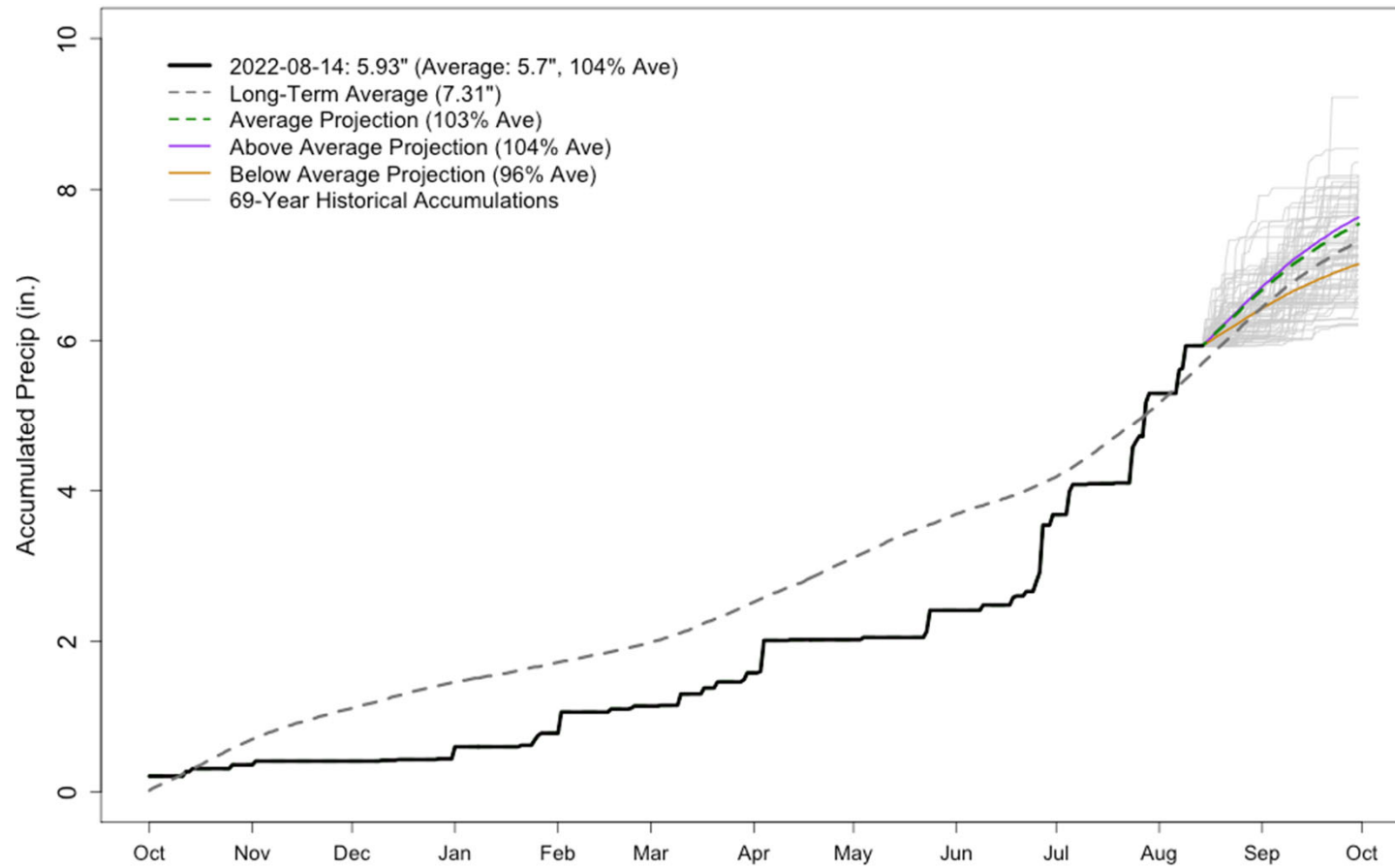
## Mesa Verde NP

### MESA VERDE NP WY2022 Precipitation Projections



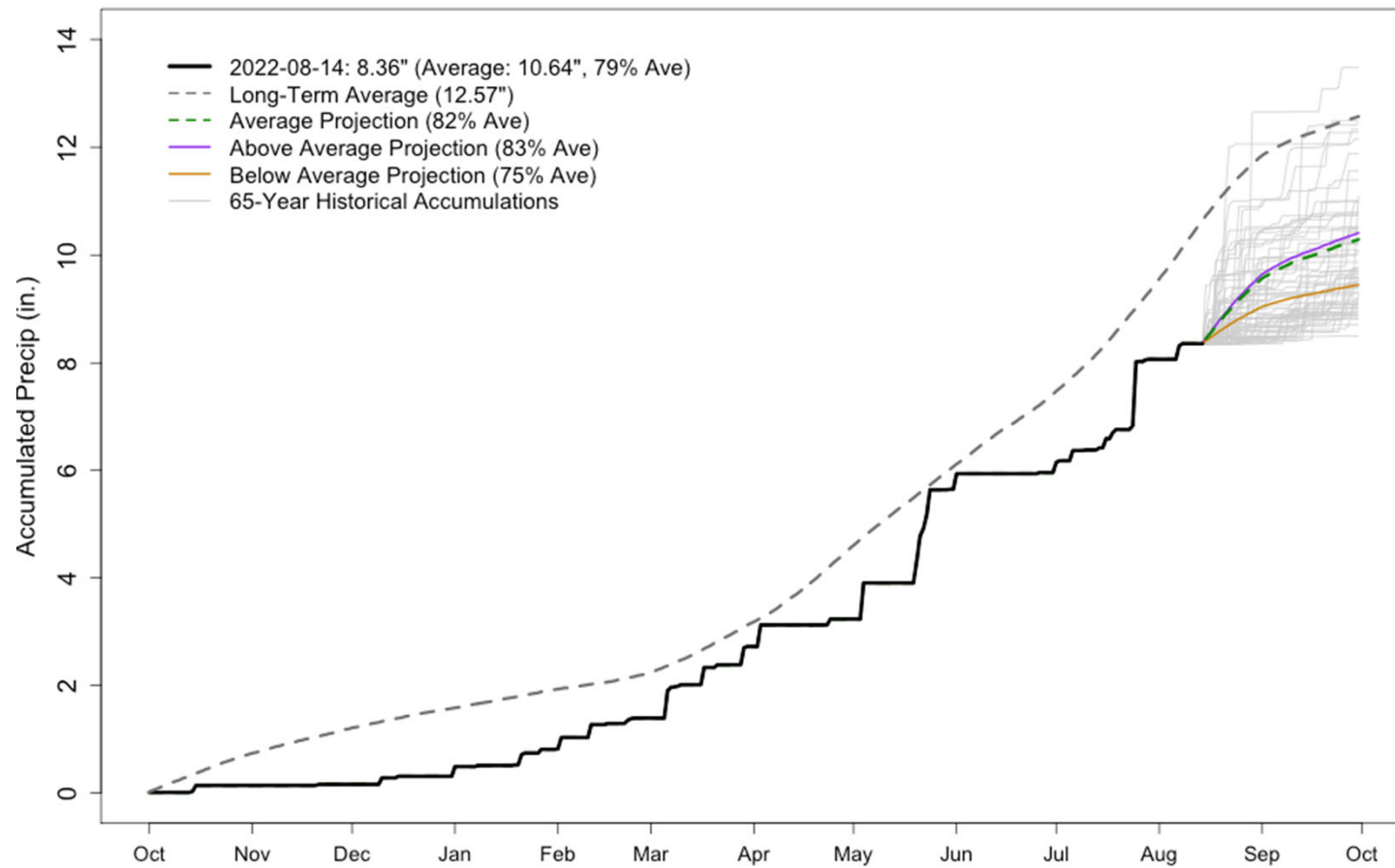
# Alamosa

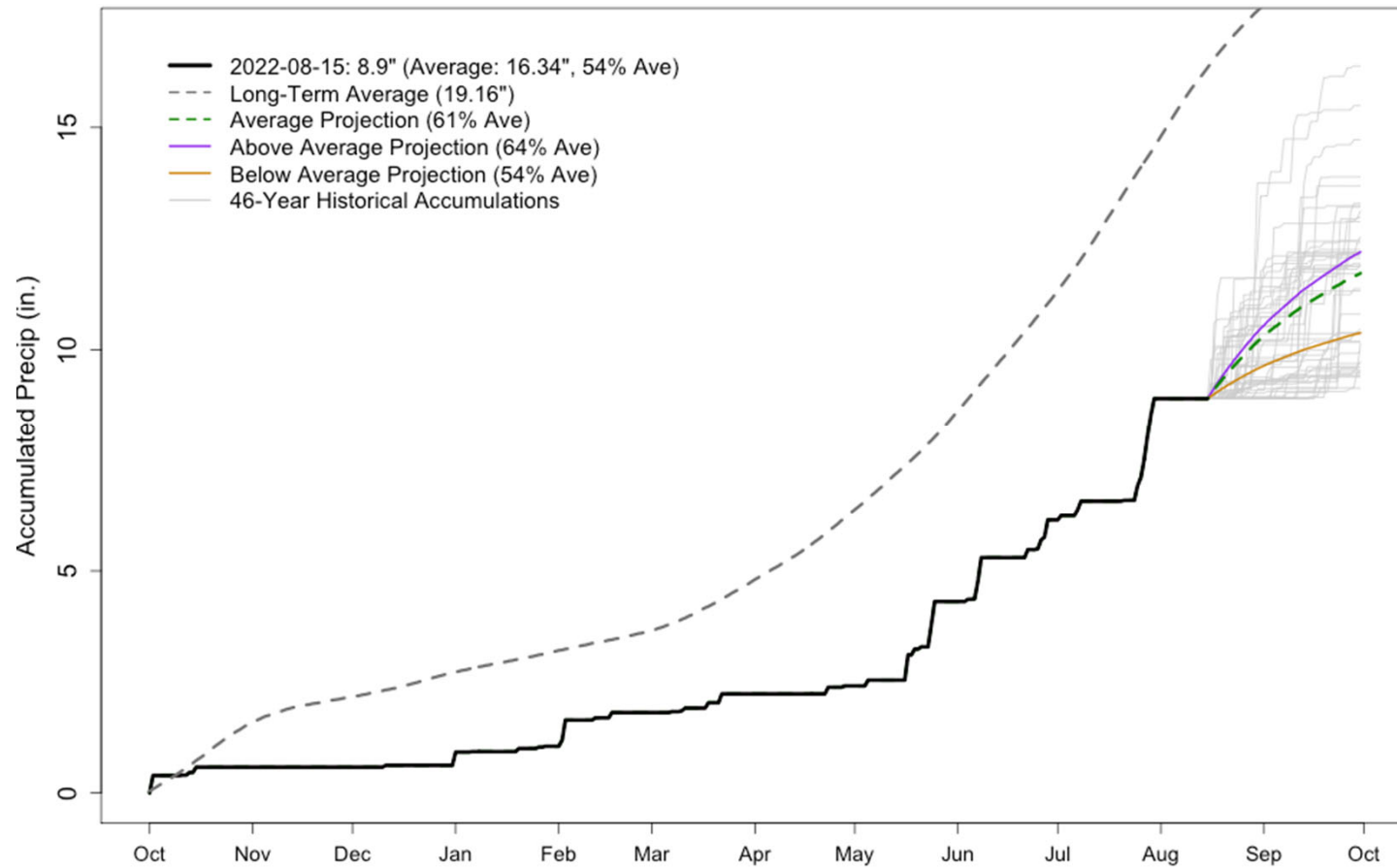
## ALAMOSA-BERGMAN FIELD WY2022 Precipitation Projections



# Pueblo

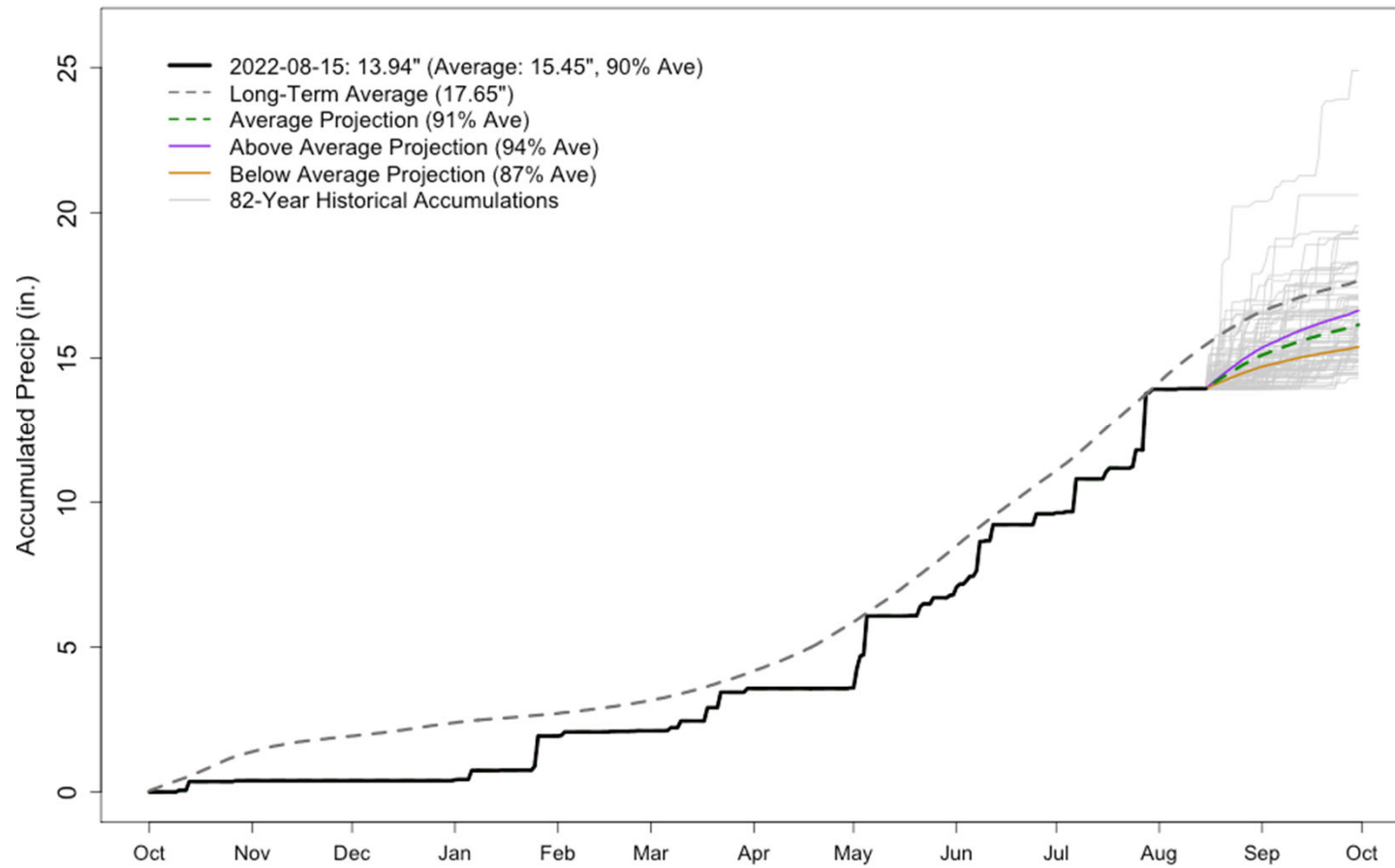
## PUEBLO MEMORIAL AIRPORT WY2022 Precipitation Projections



**WALSH 1 W WY2022 Precipitation Projections**

# Burlington

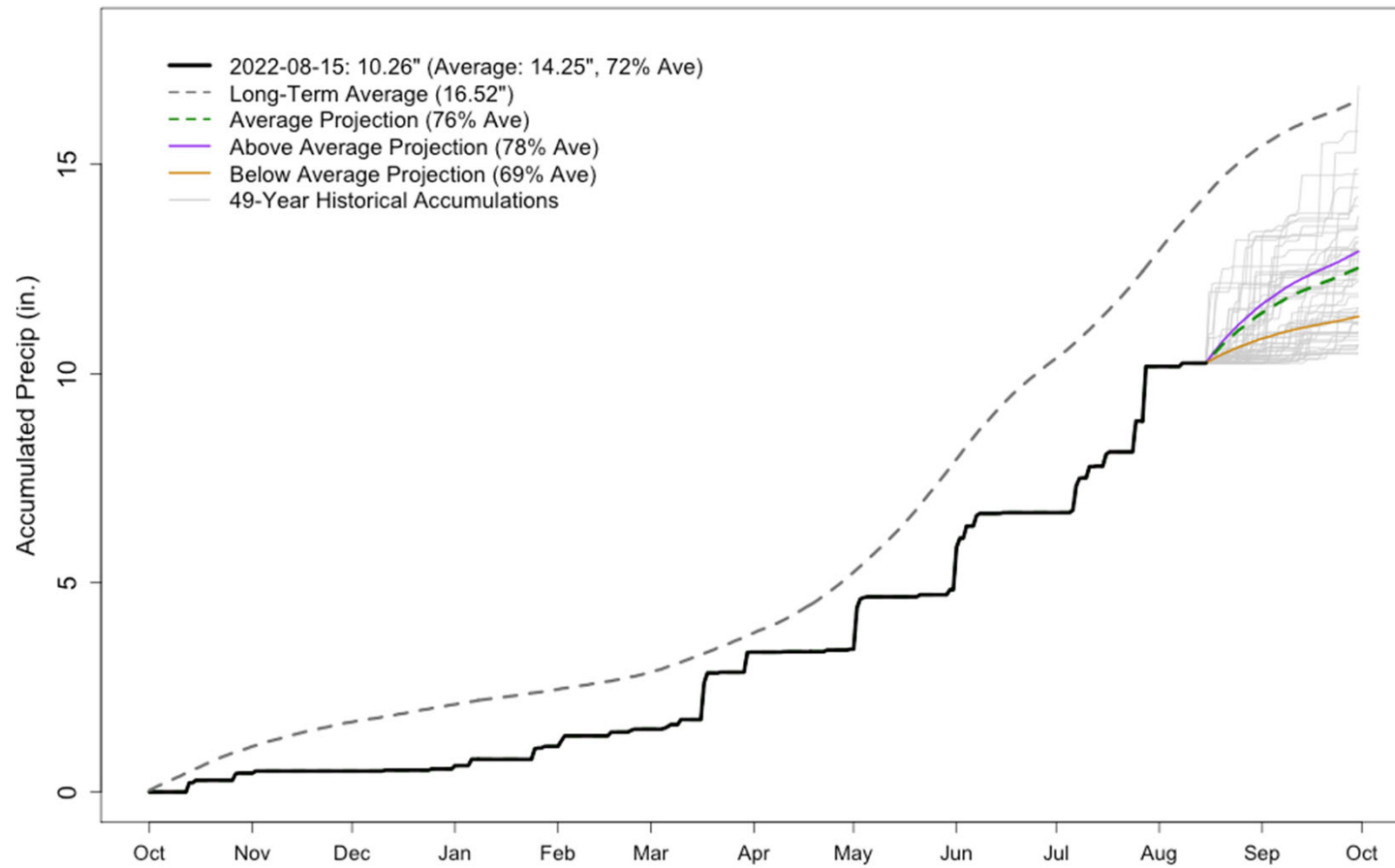
## BURLINGTON WY2022 Precipitation Projections





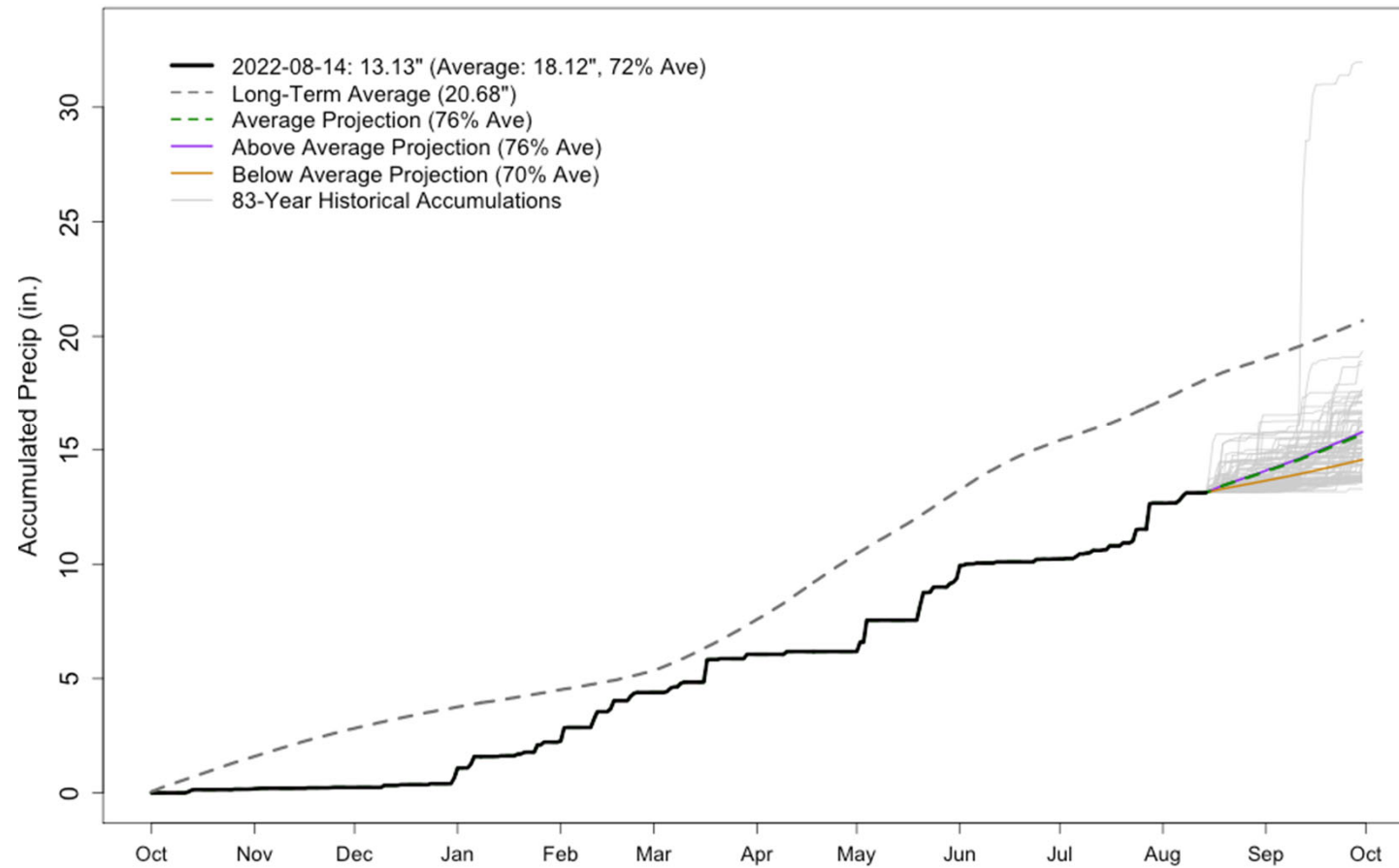
# Akron

## AKRON 4 E WY2022 Precipitation Projections



# Boulder

## BOULDER WY2022 Precipitation Projections



# Drought conditions

Evaporative demand, soil  
moisture, vegetation



August 10, Phillips County near Amherst

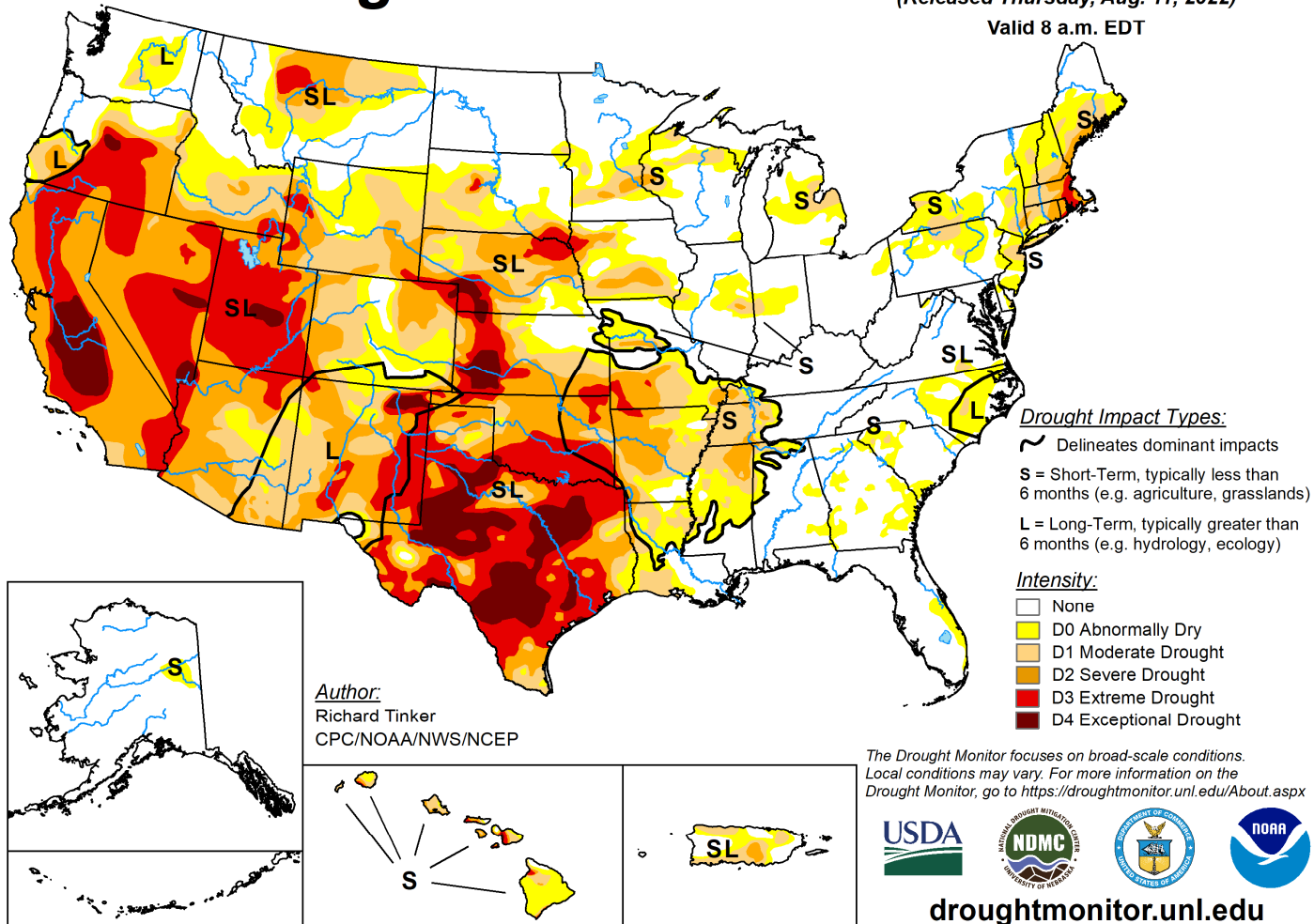


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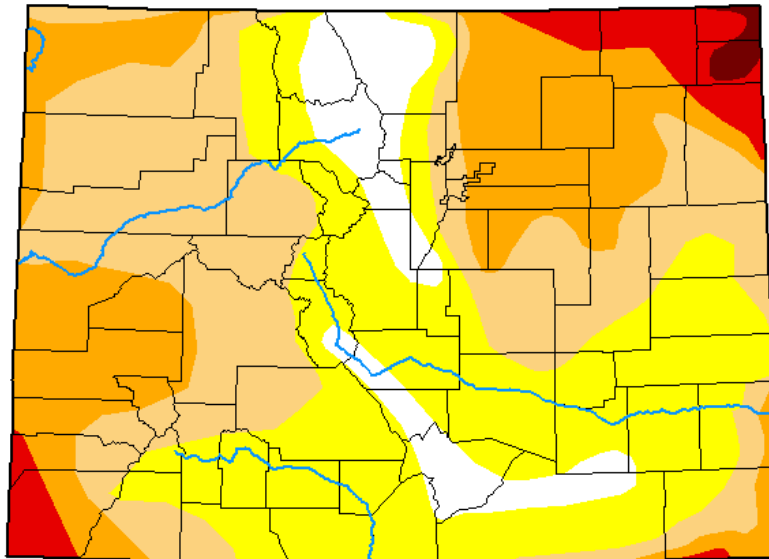


# U.S. Drought Monitor

**August 9, 2022**  
(Released Thursday, Aug. 11, 2022)  
Valid 8 a.m. EDT



# U.S. Drought Monitor Colorado



**August 9, 2022**

(Released Thursday, Aug. 11, 2022)

Valid 8 a.m. EDT

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	8.24	91.76	58.22	26.92	4.98	0.58
<b>Last Week</b> 08-02-2022	3.27	96.73	61.57	30.50	4.95	0.00
<b>3 Months Ago</b> 05-10-2022	0.00	100.00	91.50	57.44	5.81	1.20
<b>Start of Calendar Year</b> 01-04-2022	0.00	100.00	95.49	67.08	22.25	0.00
<b>Start of Water Year</b> 09-28-2021	12.72	87.28	46.42	26.30	15.05	3.91
<b>One Year Ago</b> 08-10-2021	53.18	46.82	34.43	28.04	20.37	6.38

## 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

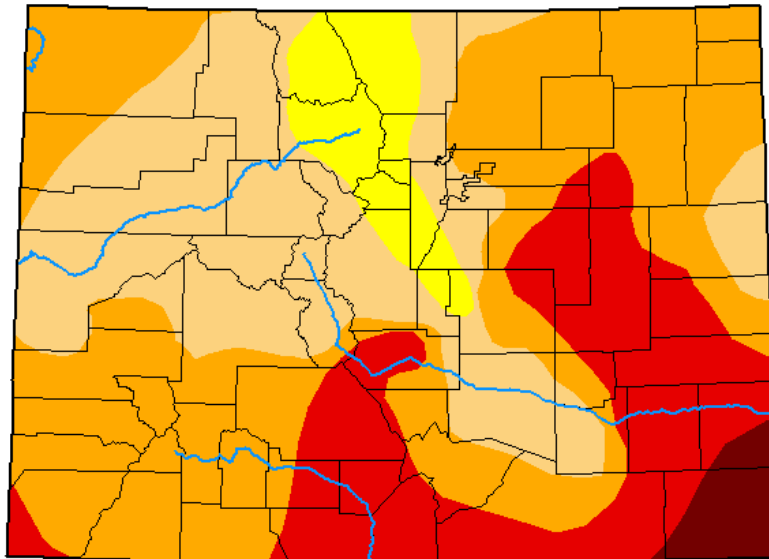


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)





# U.S. Drought Monitor Colorado



**May 17, 2022**

(Released Thursday, May. 19, 2022)

Valid 8 a.m. EDT

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	0.00	100.00	93.46	63.89	22.98	2.61
<b>Last Week</b> 05-10-2022	0.00	100.00	91.50	57.44	5.81	1.20
<b>3 Months Ago</b> 02-15-2022	0.00	100.00	90.41	59.81	8.55	0.00
<b>Start of Calendar Year</b> 01-04-2022	0.00	100.00	95.49	67.08	22.25	0.00
<b>Start of Water Year</b> 09-28-2021	12.72	87.28	46.42	26.30	15.05	3.91
<b>One Year Ago</b> 05-18-2021	23.30	76.70	51.80	39.29	28.96	16.39

## 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 Heim  
NCEI/NOAA



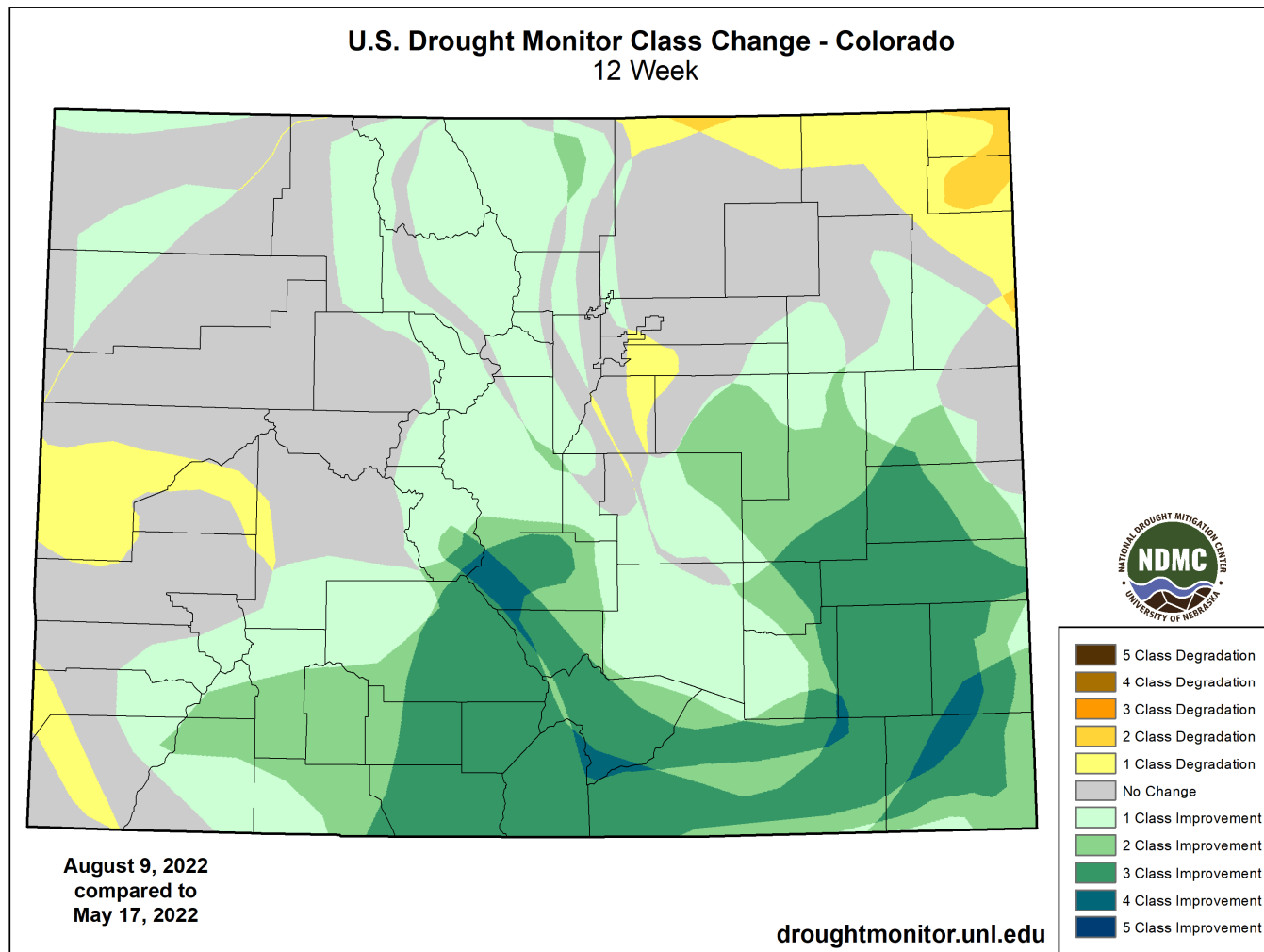
[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

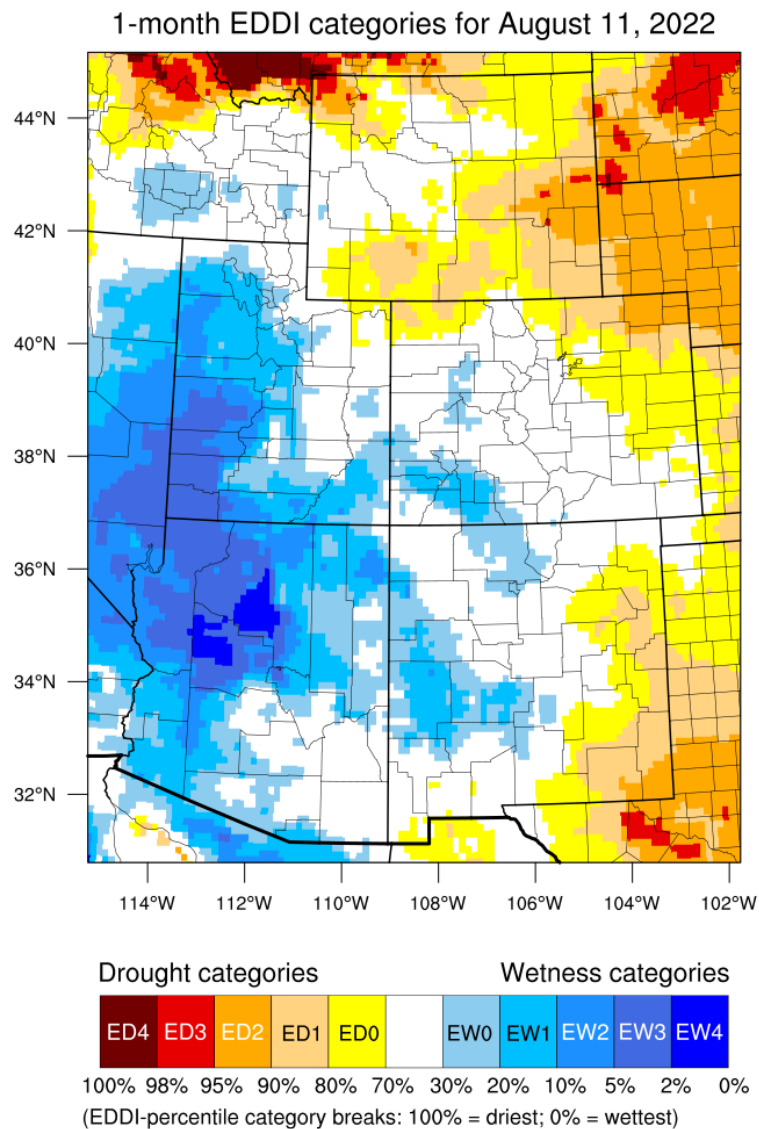


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## Change over 12 weeks





Generated by NOAA/ESRL/Physical Sciences Laboratory

## Evaporative Demand Drought Index

An active North American Monsoon with cloudy, humid conditions reduced evaporative demand across much of Colorado in the last month – the exception being the northeast corner

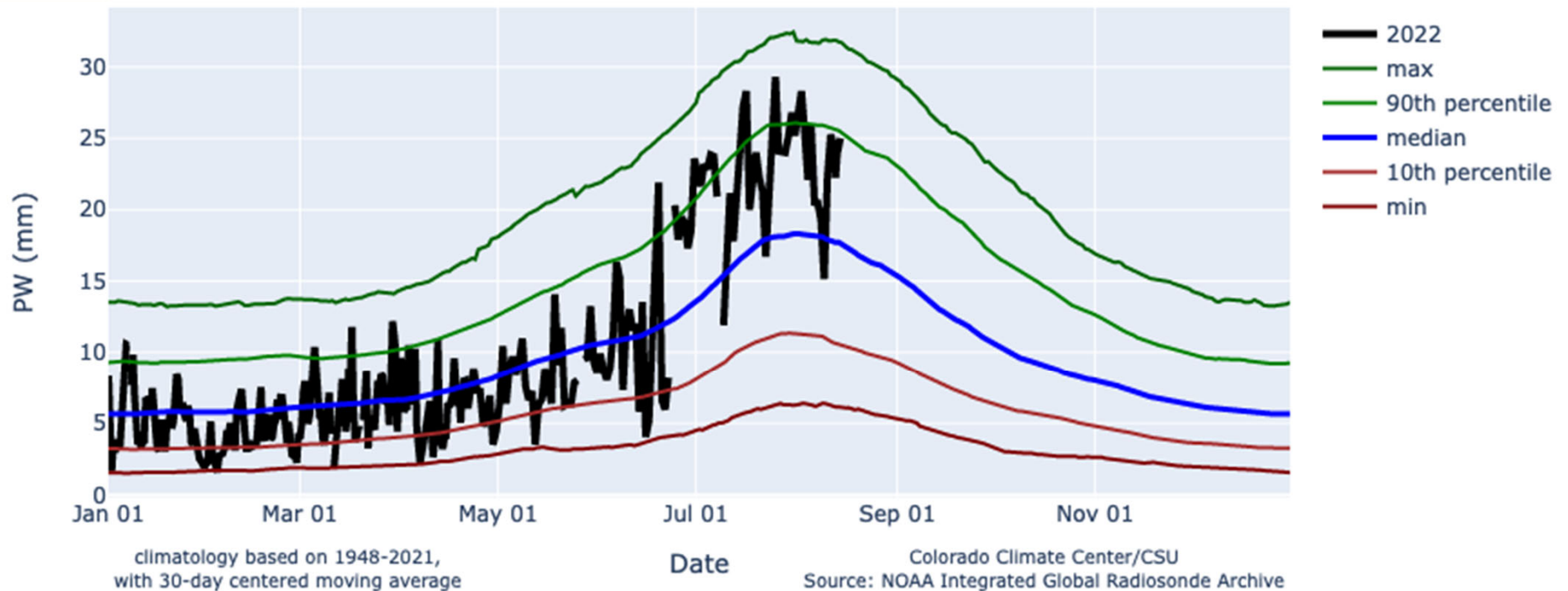


Precipitable water: water vapor added up through the depth of the atmosphere

select year:

2022 ▼

### Grand Junction precipitable water climatology and selected year data



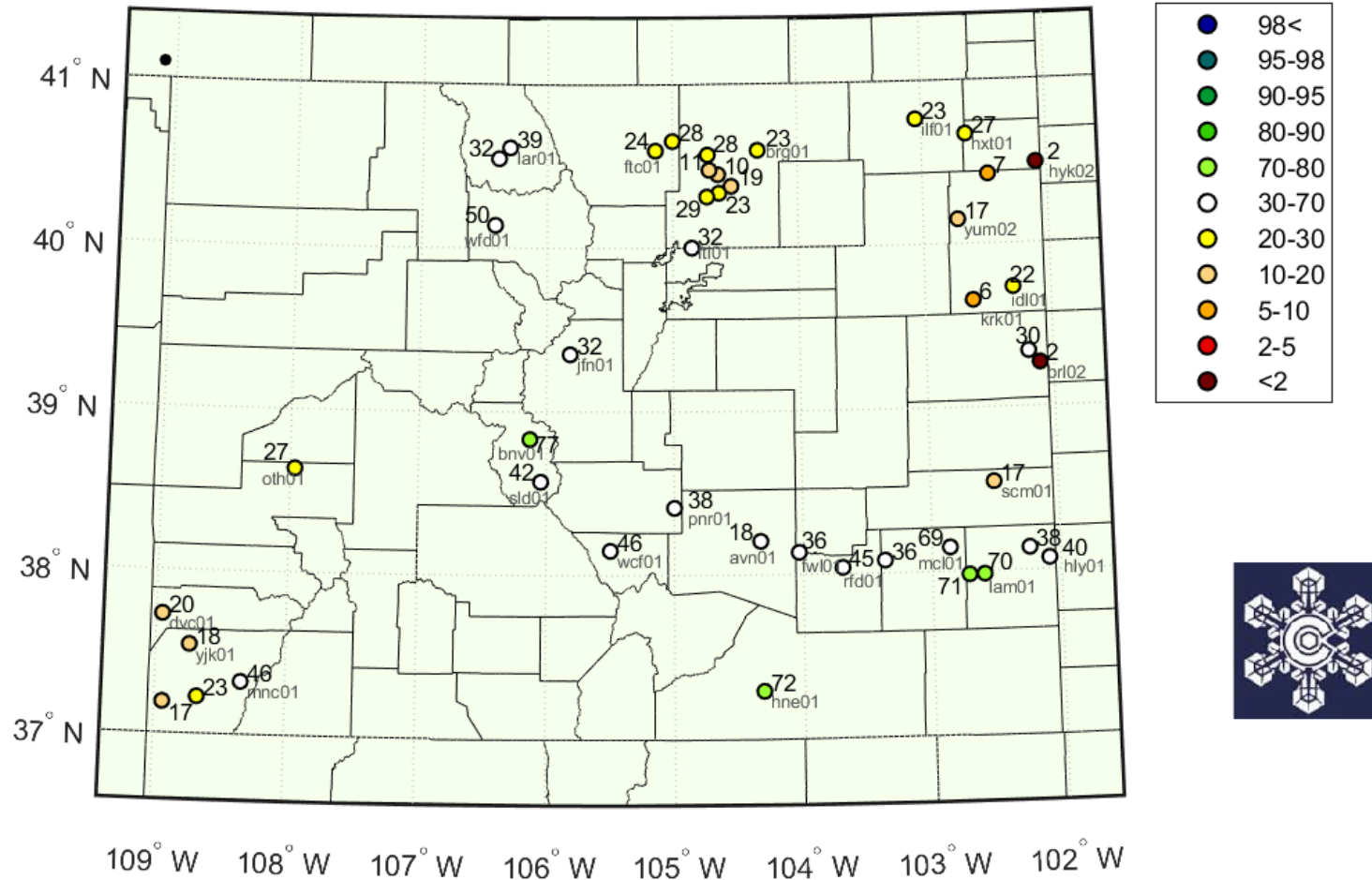
<https://climate.colostate.edu/pw.html>



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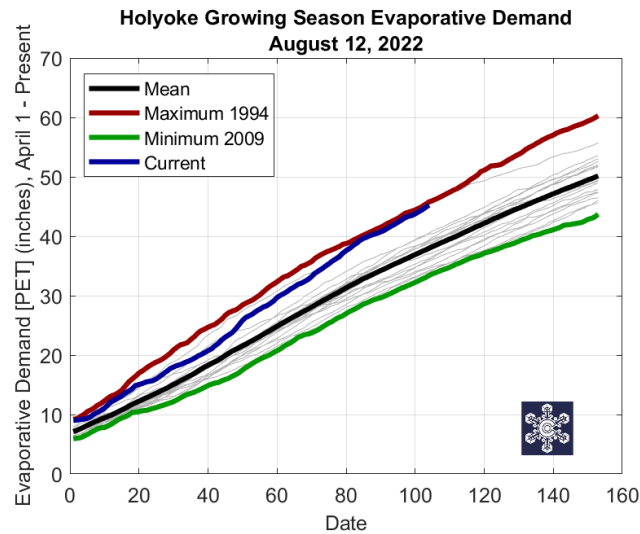


## Growing Season Water Balance (P/PET) Percentiles August 12, 2022

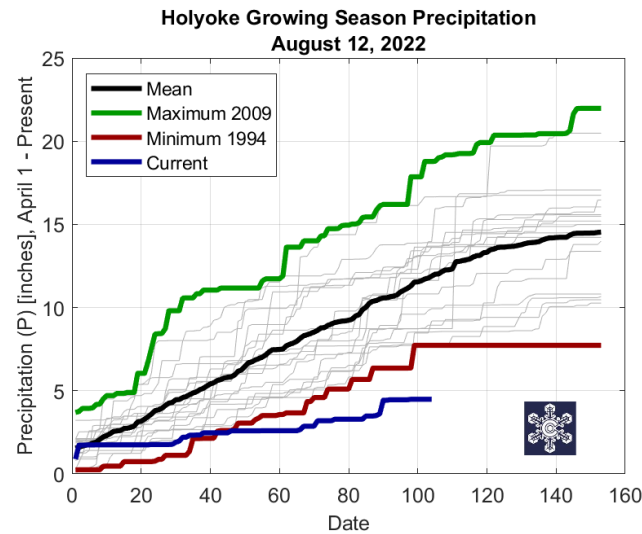




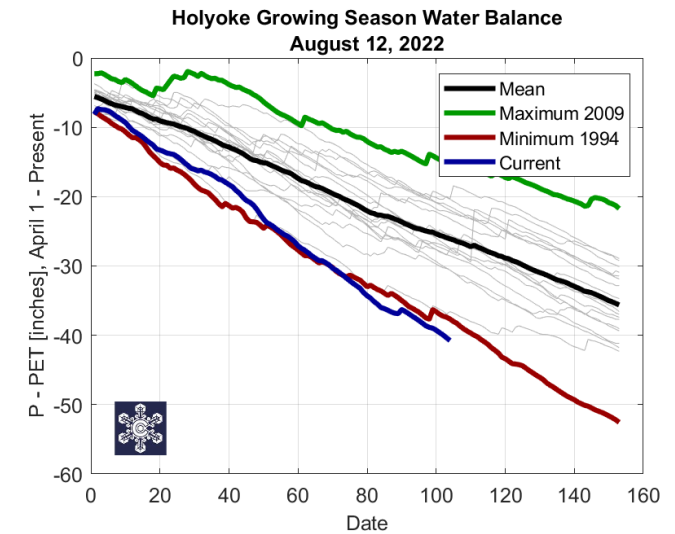
# Holyoke CoAgMET station, since April 1



Near-record evaporative demand



Record-low precipitation

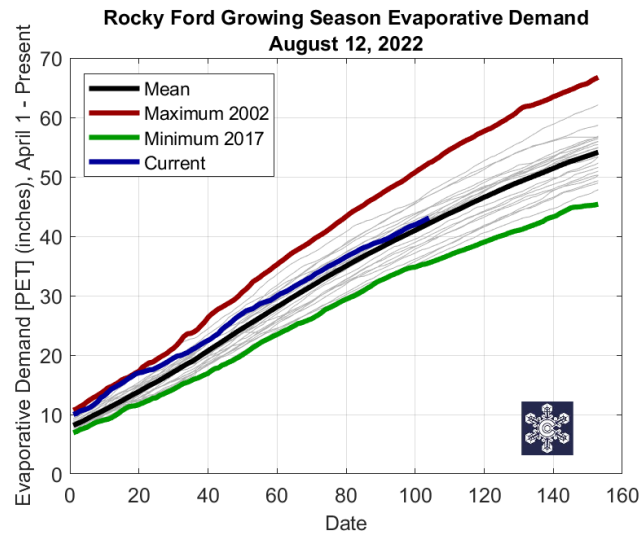


Record-low water balance

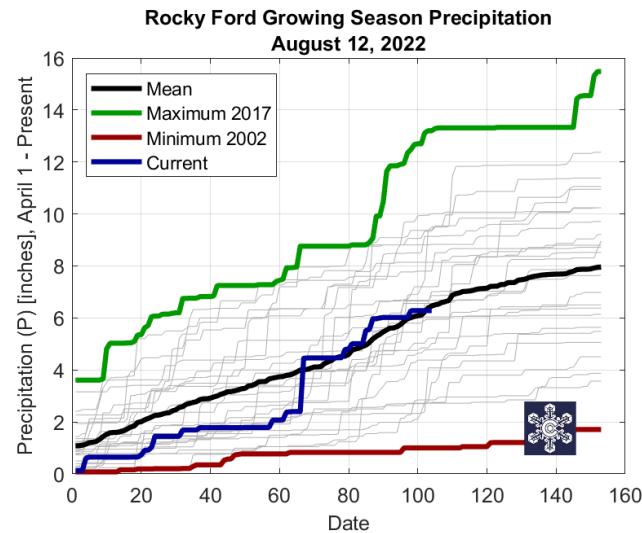
Data since 1992 at this station



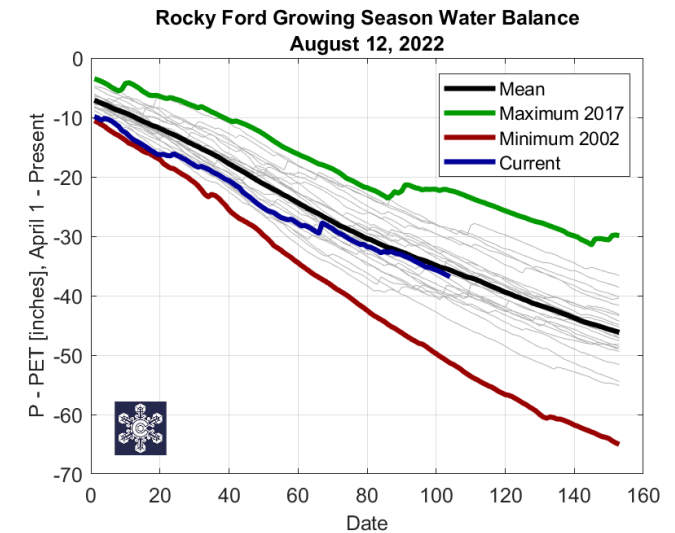
# Rocky Ford CoAgMET station, since April 1



Near-record evaporative demand



Record-low precipitation

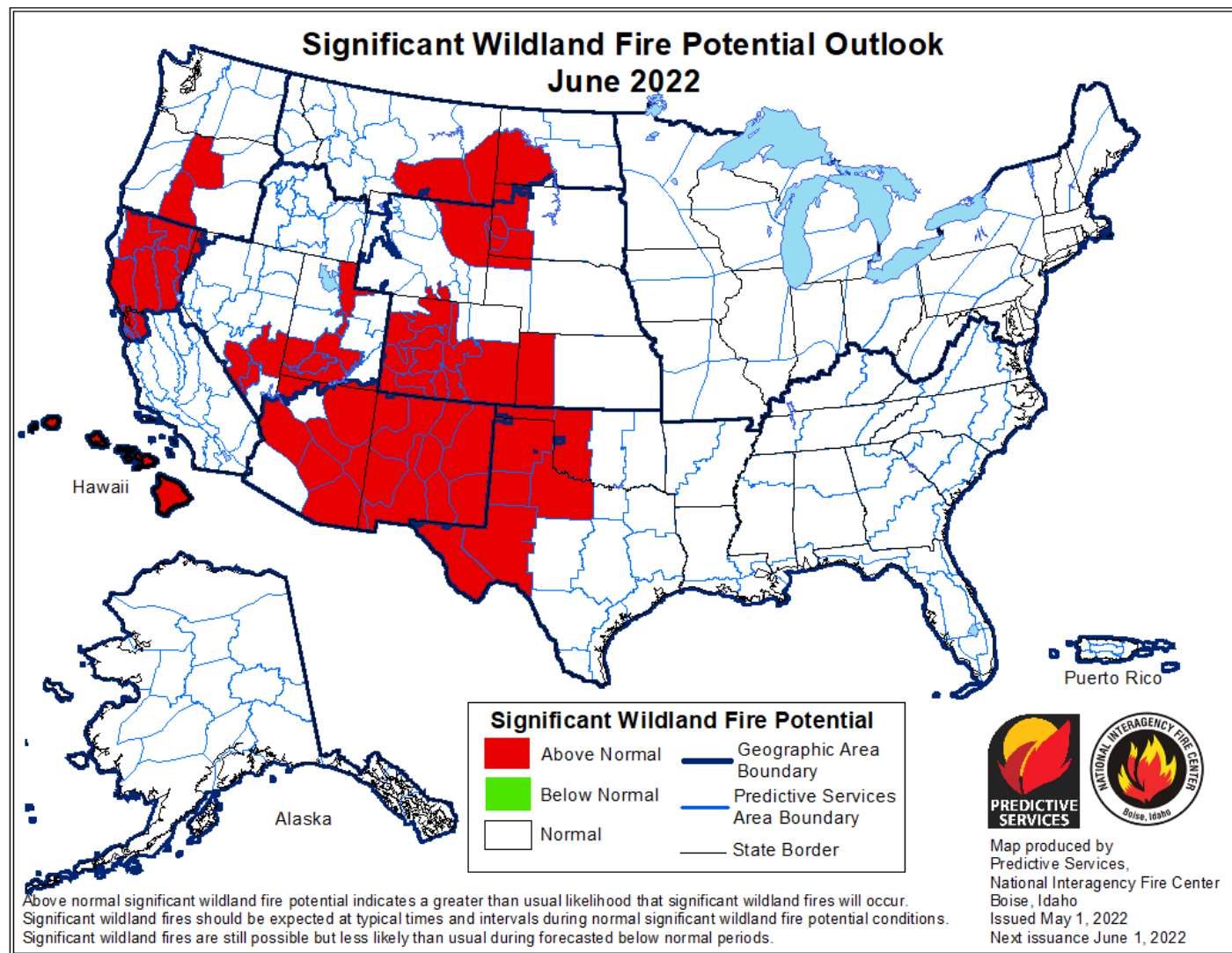


Record-low water balance

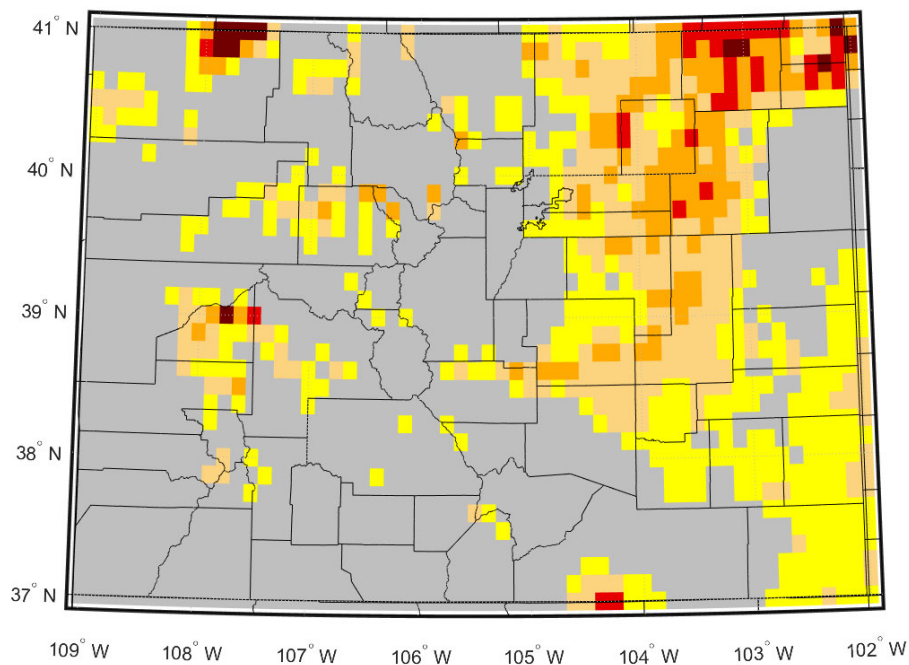
Data since 1992 at this station



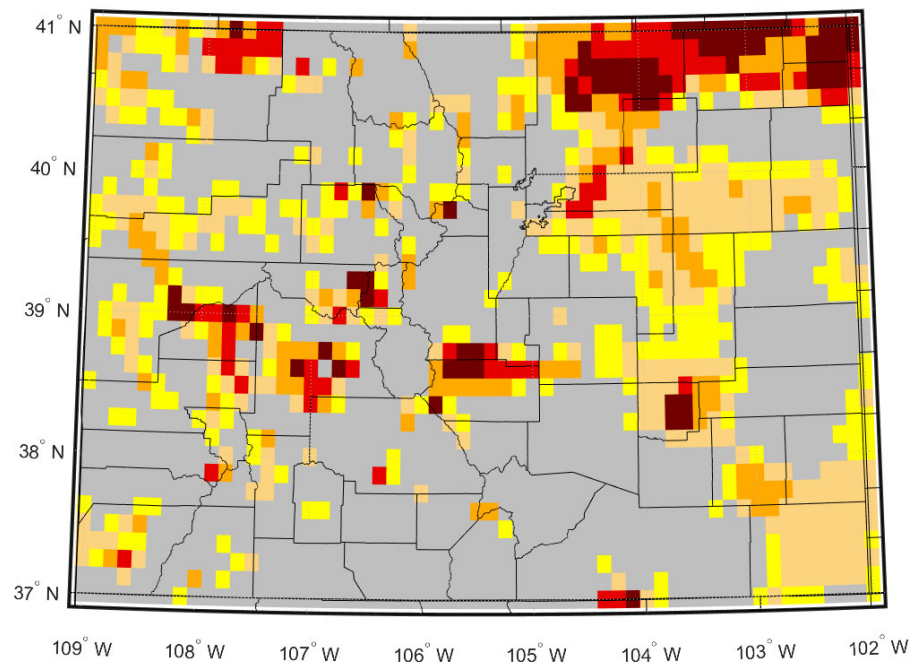
USDA outlooks for wildfire potential show increased risk across much of the state through the summer



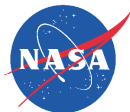
Top 10cm Soil Moisture Percentile  
08/06/2022



Top Meter Soil Moisture Percentile  
08/06/2022

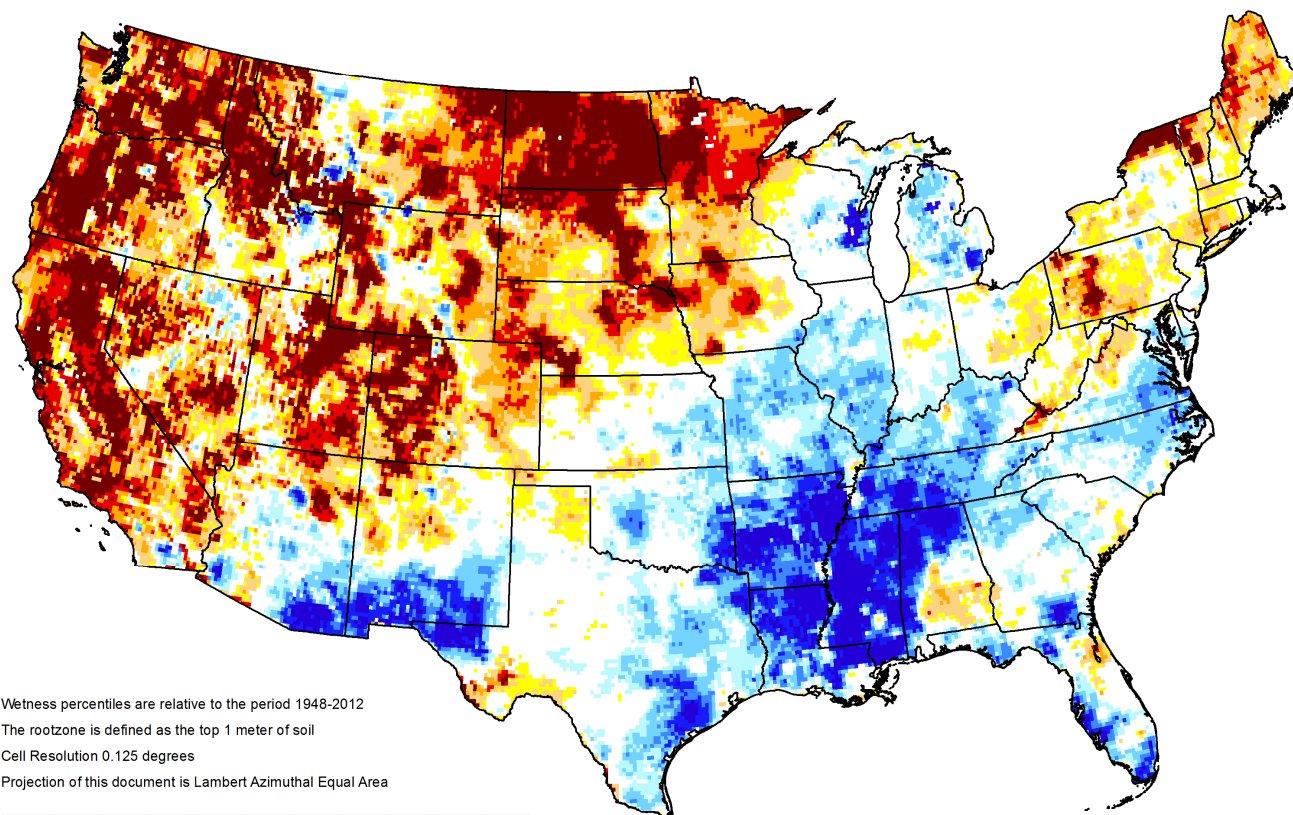


Both shallow and deep soil moisture remains poor in much of northeast Colorado; conditions have improved across much of southern Colorado; some dry pockets on the western slope.



## GRACE-Based Root Zone Soil Moisture Drought Indicator

August 16, 2021

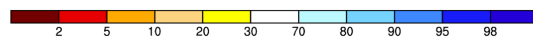


Wetness percentiles are relative to the period 1948-2012

The rootzone is defined as the top 1 meter of soil

Cell Resolution 0.125 degrees

Projection of this document is Lambert Azimuthal Equal Area



Wetness Percentile

<https://nasagrace.unl.edu>



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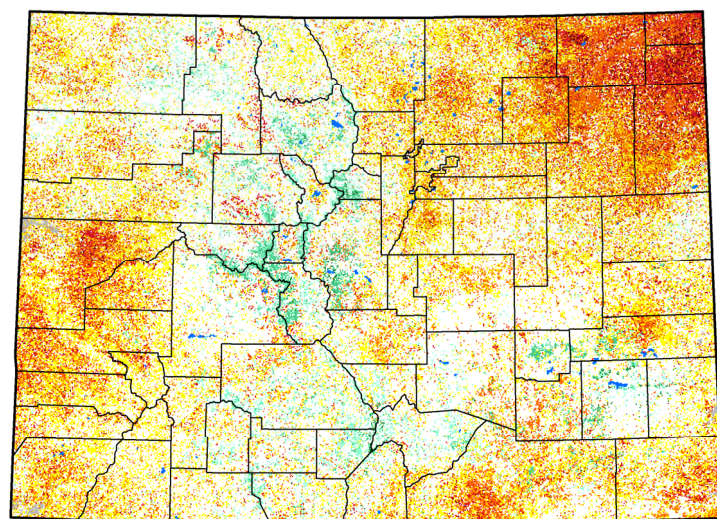




VegDRI: longer-term vegetation condition

### Vegetation Drought Response Index Complete: Colorado

July 31, 2022



#### Vegetation Condition

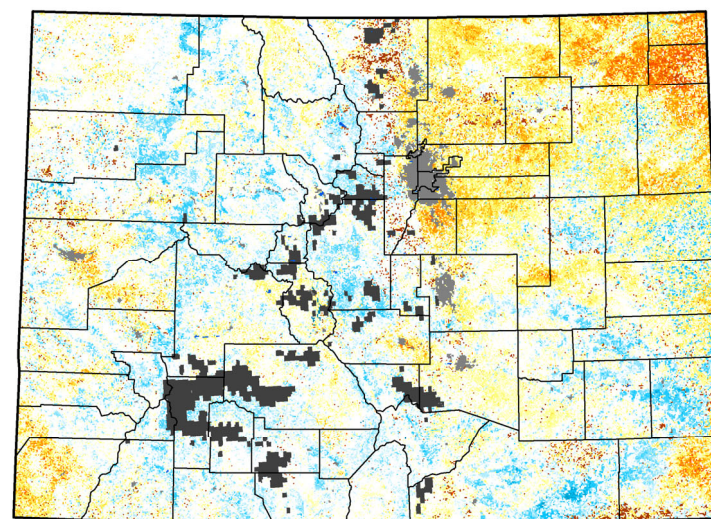
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-drought stress
- Near Normal
- Unusually Moist
- Very Moist
- Extreme Moist
- Out of Season
- Water



QuickDRI: shorter-term vegetation response

### Quick Drought Response Index Colorado

July 31, 2022  
(Week 31)



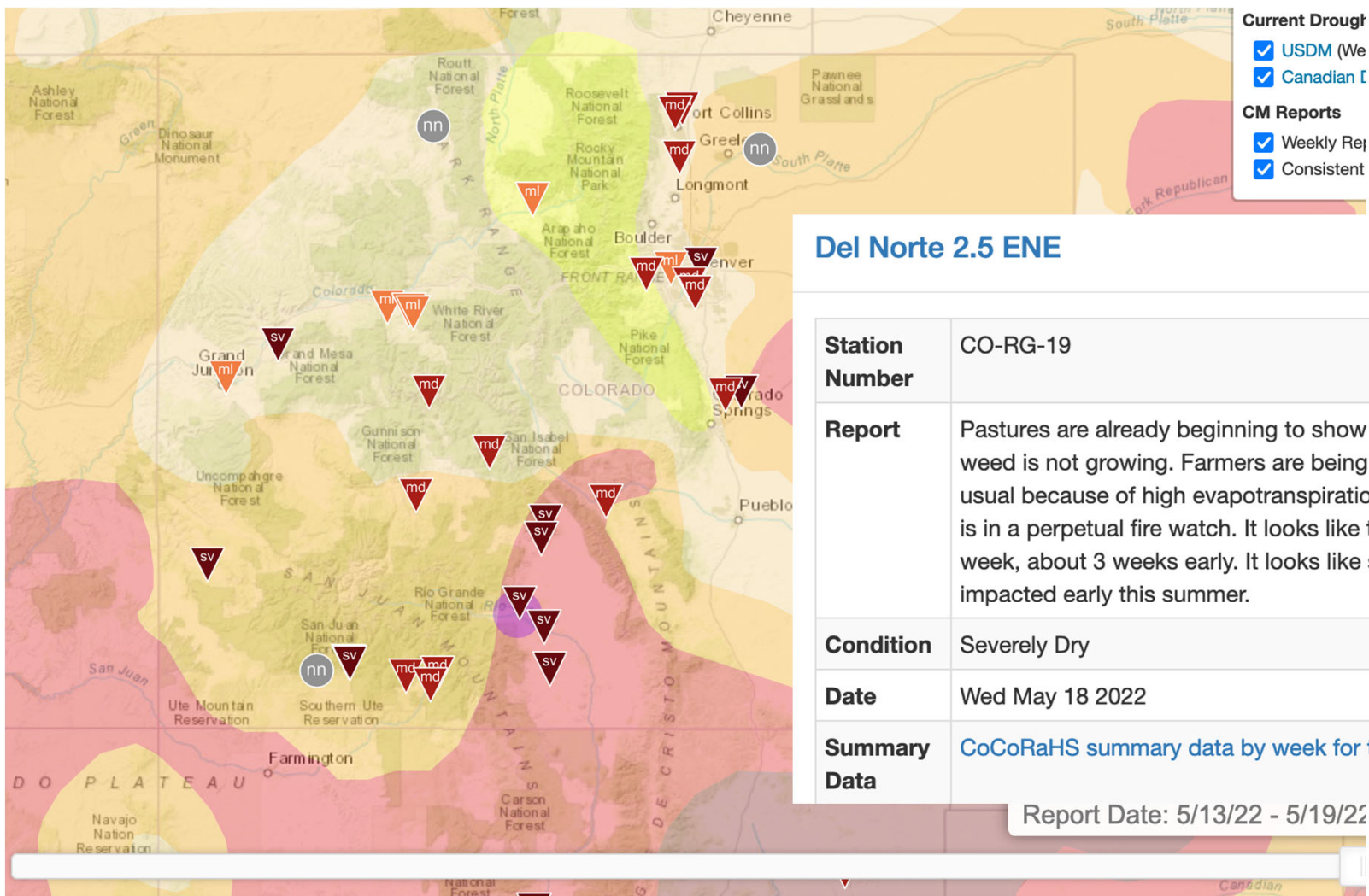
#### Conditions Relative to 4-Week Historical Average

- Wetter
- Near Average
- Drier
- Out of Season
- Urban
- No Data
- Water



COLORADO CLIMATE CENTER





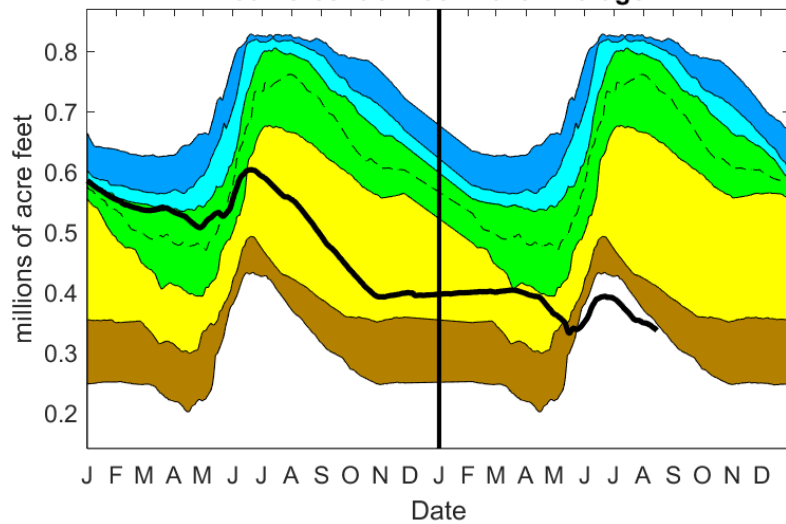
## Del Norte 2.5 ENE

<b>Station Number</b>	CO-RG-19
<b>Report</b>	Pastures are already beginning to show signs of stress. Even the kochia weed is not growing. Farmers are being forced to apply more water than usual because of high evapotranspiration rates. The whole San Luis Valley is in a perpetual fire watch. It looks like the Rio Grande River peaked last week, about 3 weeks early. It looks like surface irrigation will be severely impacted early this summer.
<b>Condition</b>	Severely Dry
<b>Date</b>	Wed May 18 2022
<b>Summary Data</b>	<a href="#">CoCoRaHS summary data by week for this station.</a>

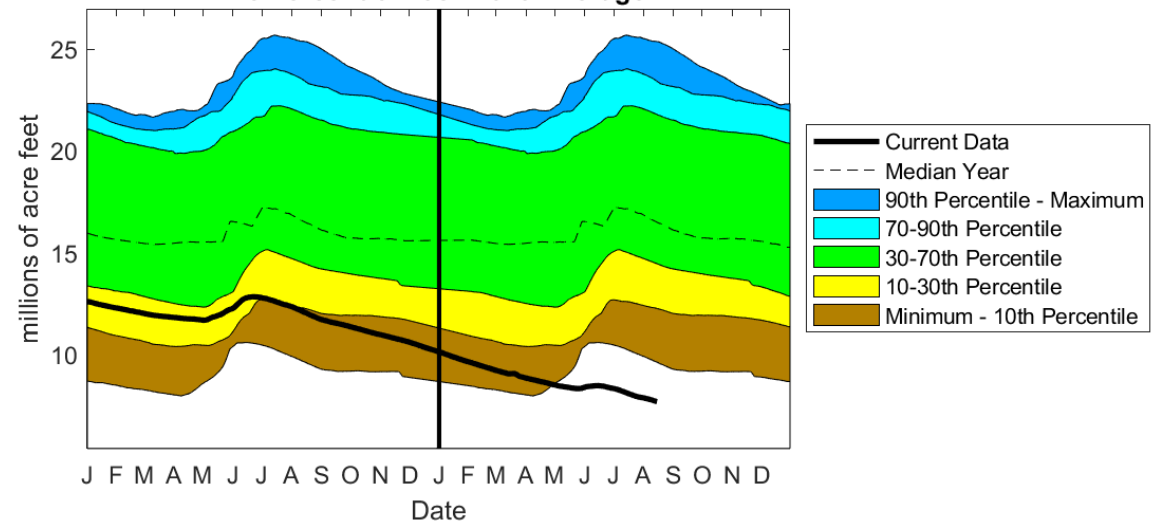
Report Date: 5/13/22 - 5/19/22



**Blue Mesa Reservoir Level 08/15/2021**  
**50 Percent of 1981-2019 Average**



**Lake Powell Level 08/15/2021**  
**43 Percent of 1981-2019 Average**



See others on our drought page:  
<https://climate.colostate.edu/drought/>







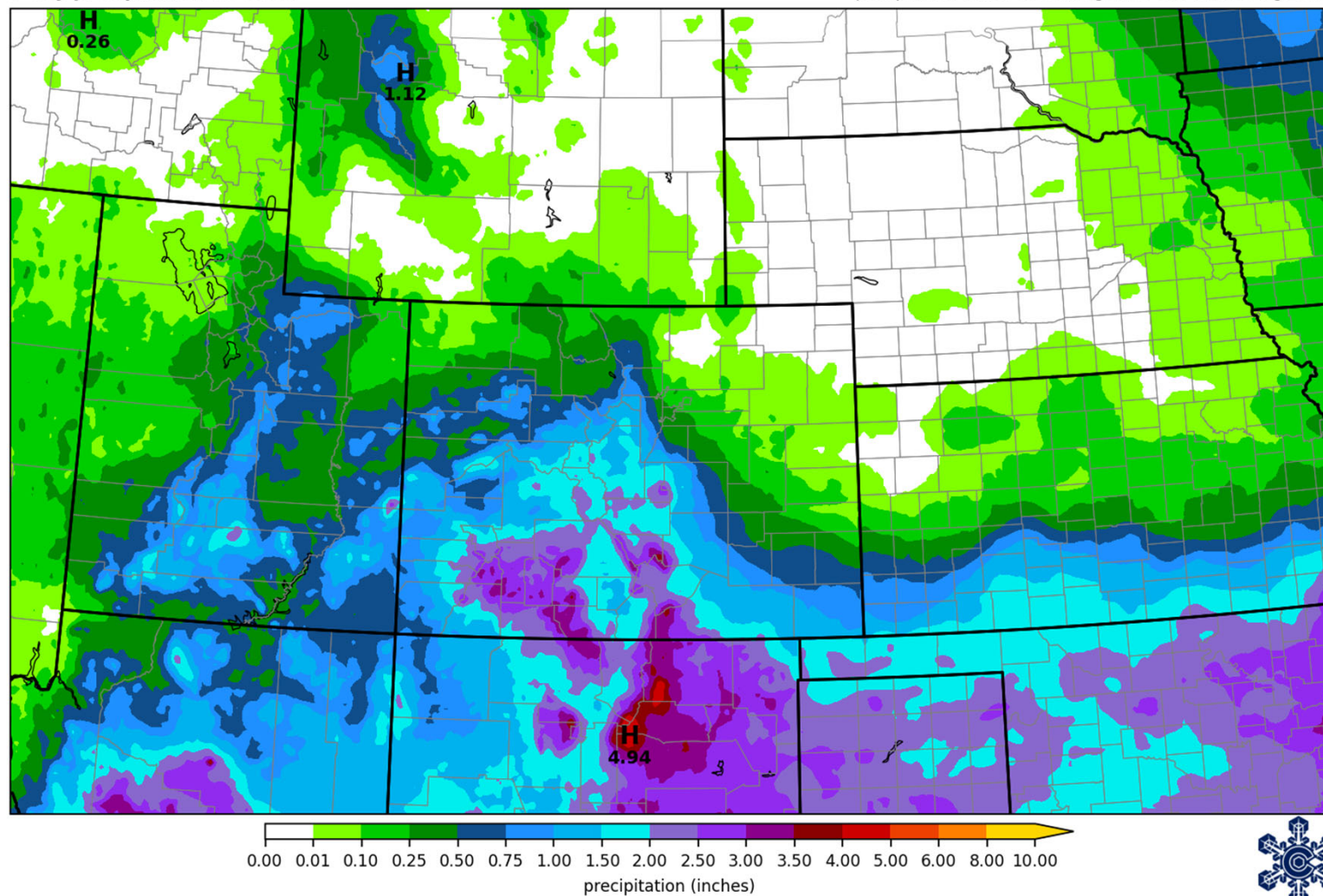
## Outlook



# NOAA 7-day precipitation forecast

NOAA Weather Prediction Center  
7-day precipitation forecast

forecast issued 1200 UTC Tue 16 Aug 2022  
precipitation in 168 hrs ending 1200 UTC Tue 23 Aug 2022



COLORADO CLIMATE CENTER

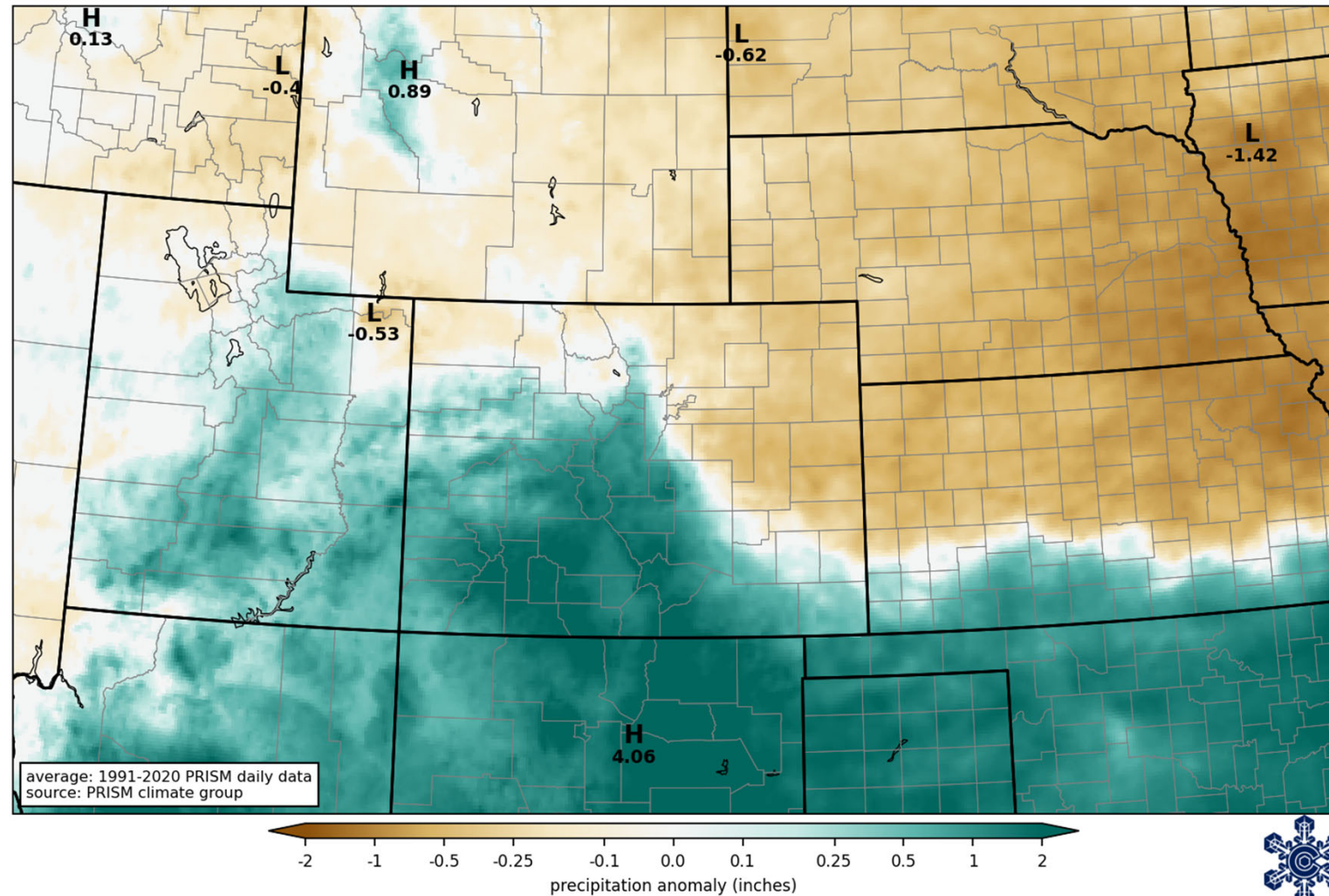




# NOAA 7-day precipitation forecast (difference from average)

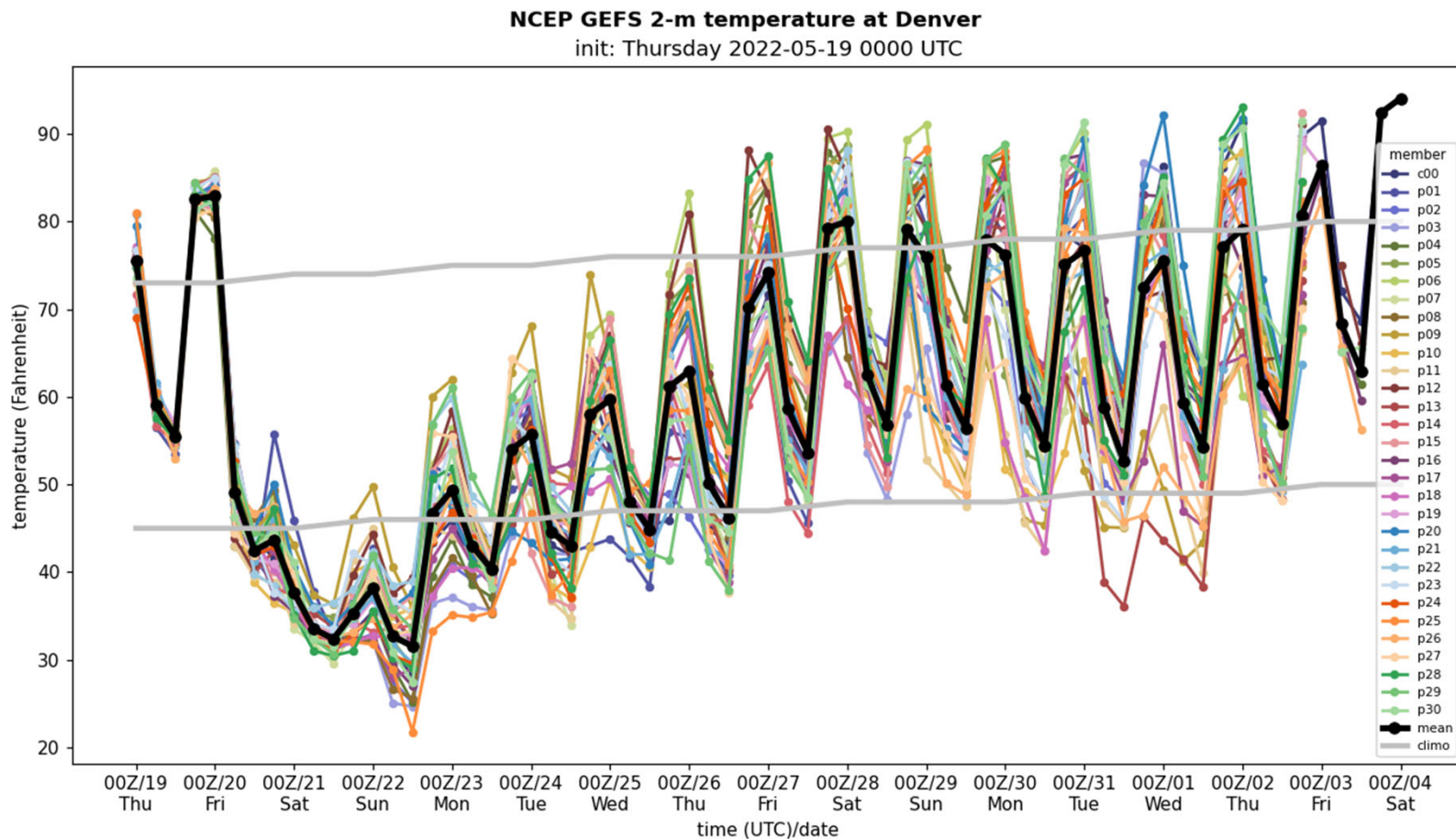
NOAA Weather Prediction Center  
7-day precip forecast departure from average

forecast issued 1200 UTC Tue 16 Aug 2022  
precipitation in 168 hrs ending 1200 UTC Tue 23 Aug 2022

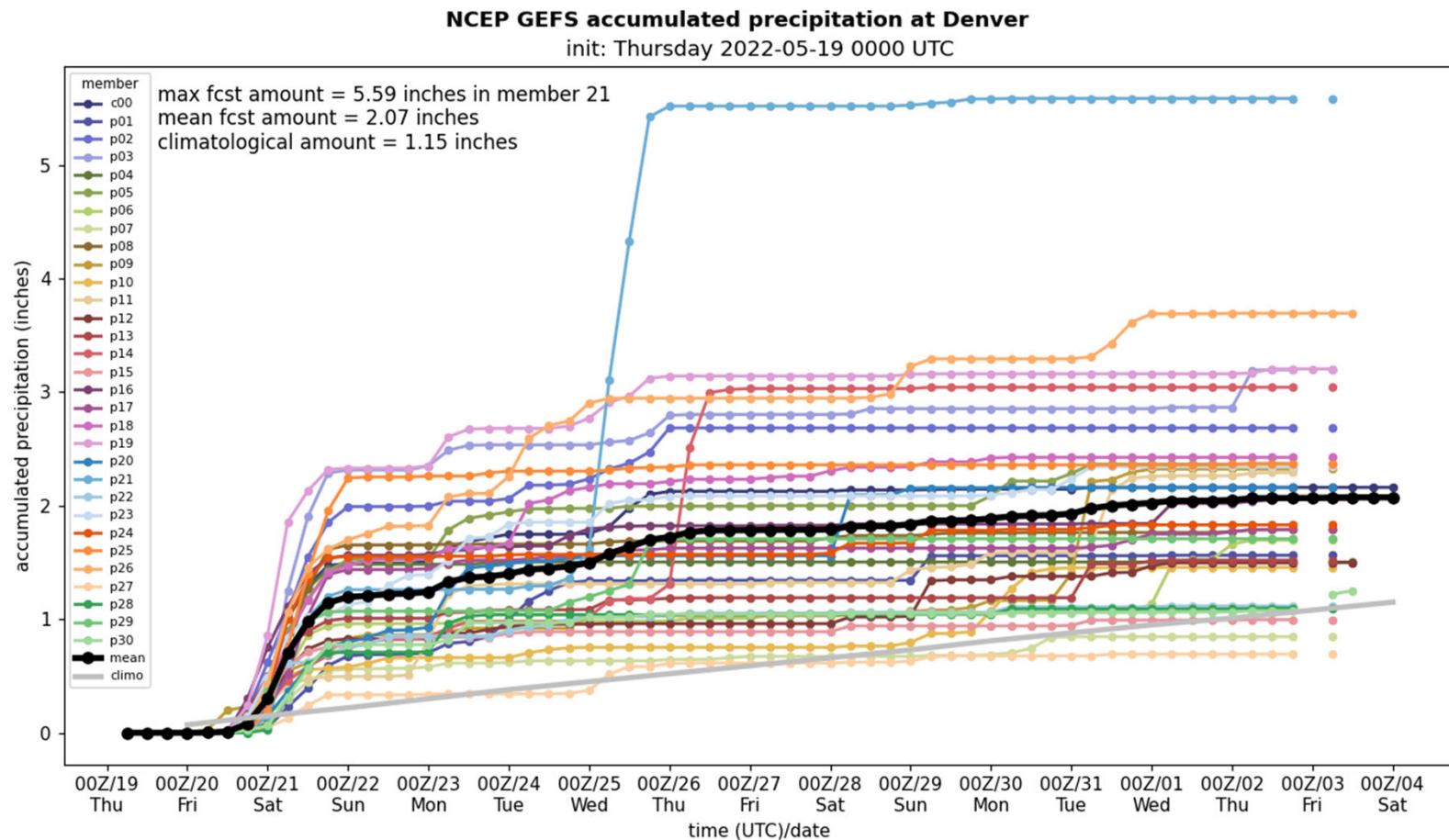




Very warm today, very strong cold front tonight, possible record cold Sunday morning, then slowly back to a warm and dry pattern



Very warm today, very strong cold front tonight, possible record cold Sunday morning, then slowly back to a warm and dry pattern

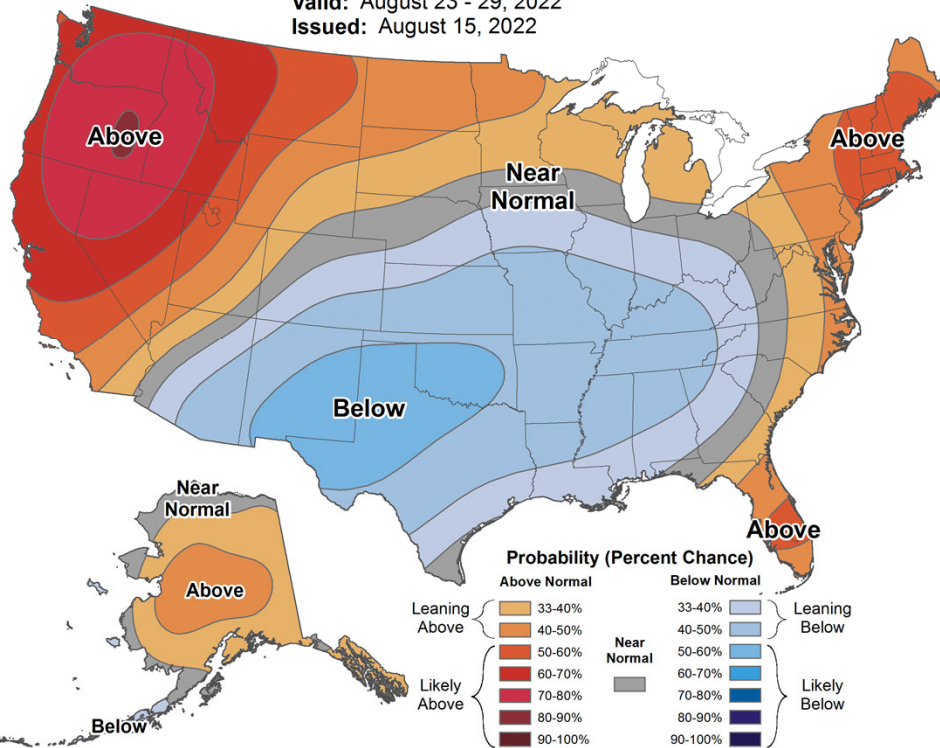


# Cooler, wetter than average conditions projected to continue through end of August



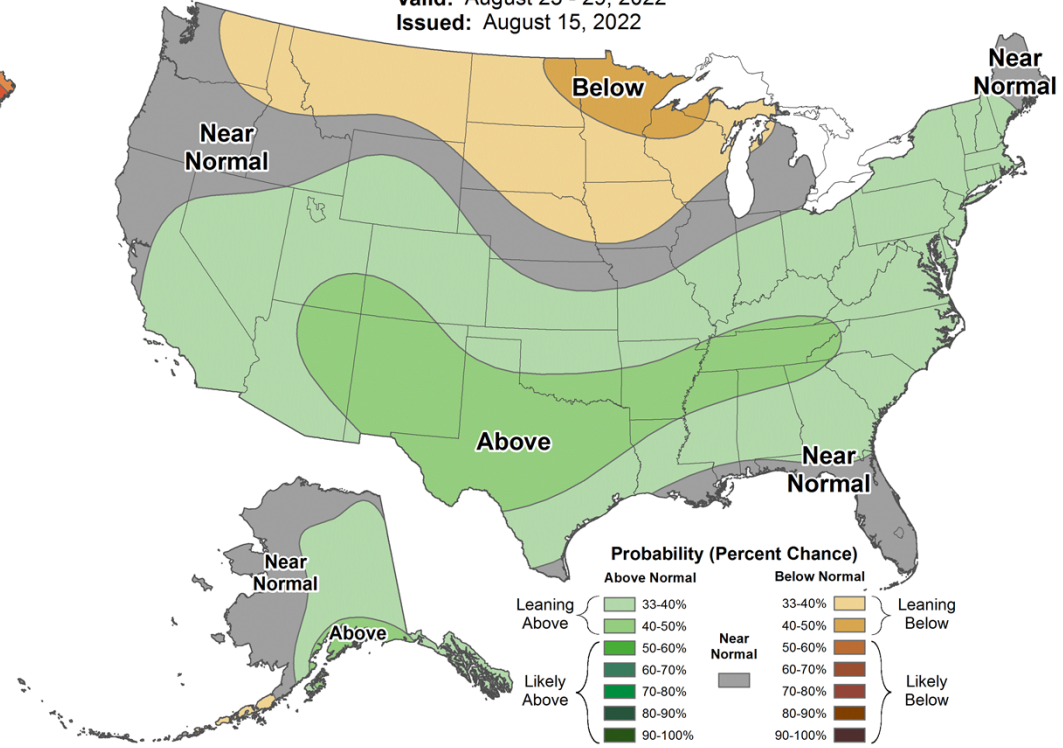
## 8-14 Day Temperature Outlook

Valid: August 23 - 29, 2022  
Issued: August 15, 2022



## 8-14 Day Precipitation Outlook

Valid: August 23 - 29, 2022  
Issued: August 15, 2022



# Strong La Niña to continue at least through fall

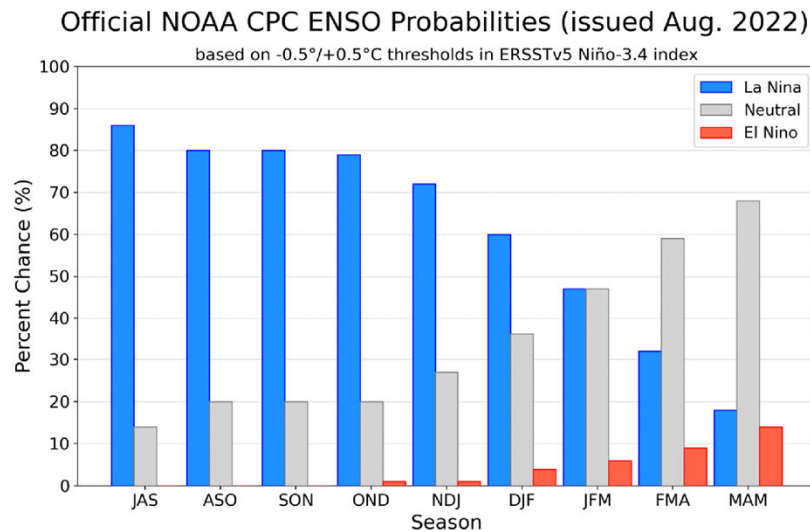


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $120^{\circ}\text{W}$ - $170^{\circ}\text{W}$ ). Figure updated 11 August 2022.

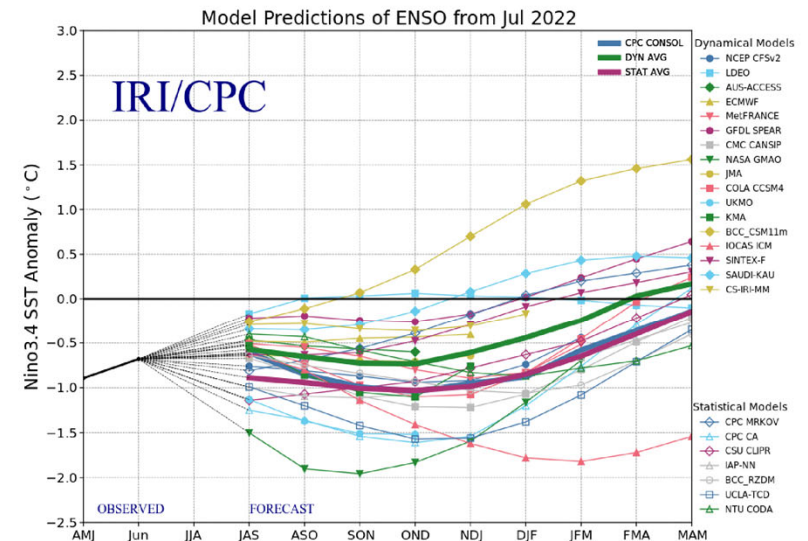


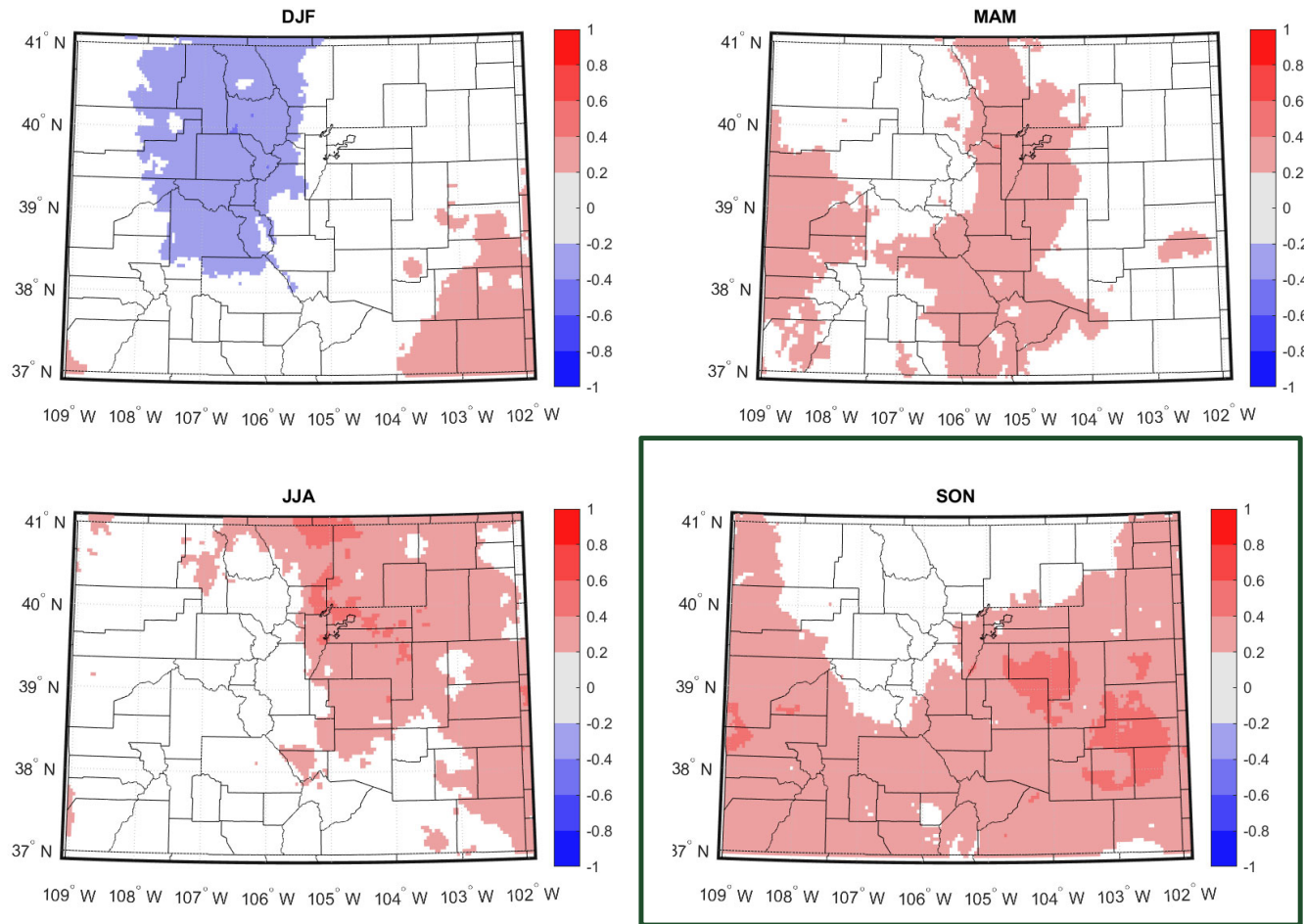
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region ( $5^{\circ}\text{N}$ - $5^{\circ}\text{S}$ ,  $120^{\circ}\text{W}$ - $170^{\circ}\text{W}$ ). Figure updated 19 July 2022.

High confidence in persistence of La Niña through fall, weakening through winter





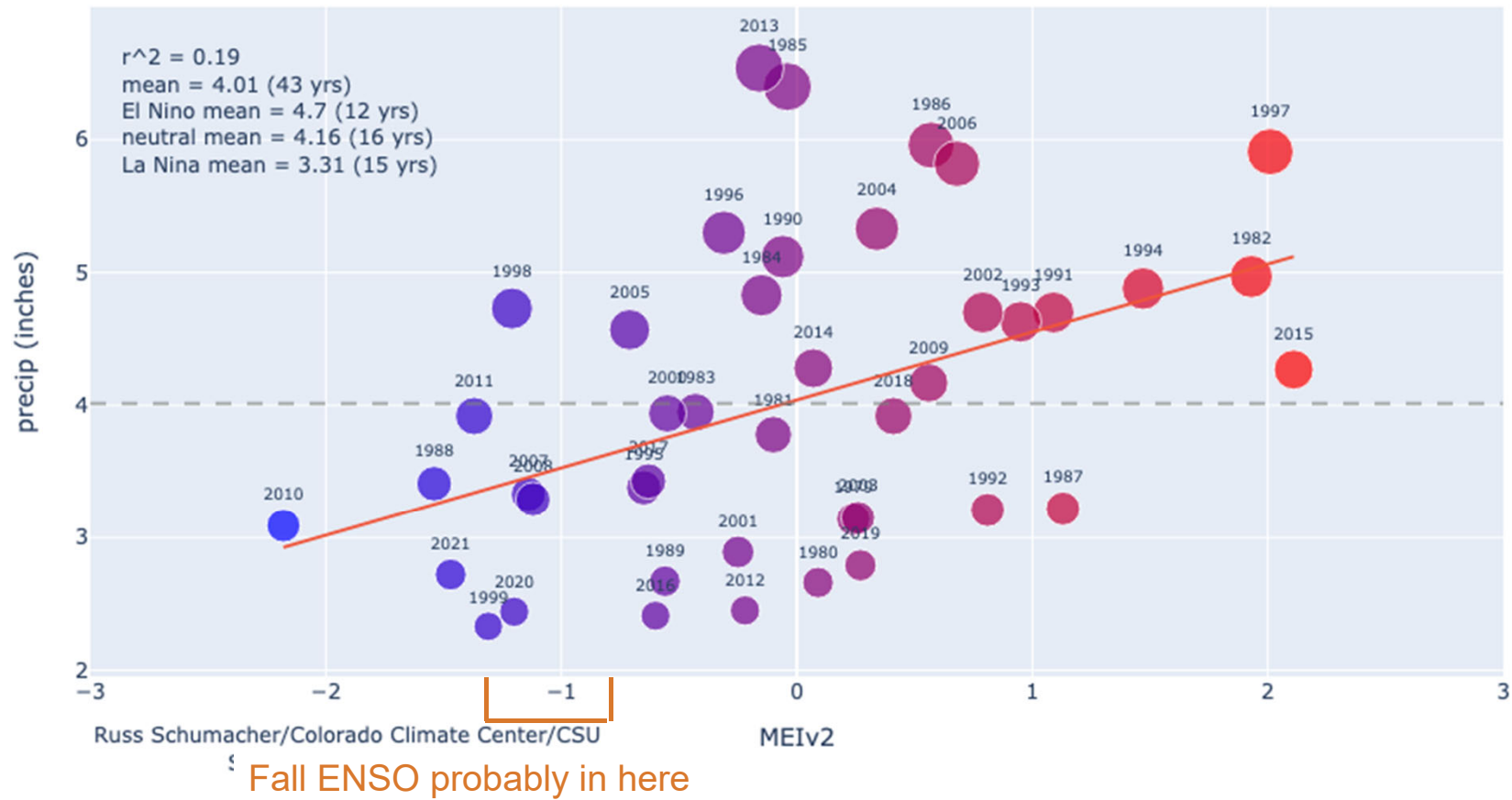
## Correlation between ENSO ONI and Colorado Seasonal Precipitation (masked for significance at 95% confidence)



Red = El Niño wetter    Blue = La Niña wetter

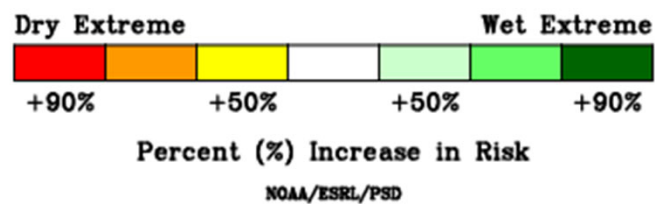
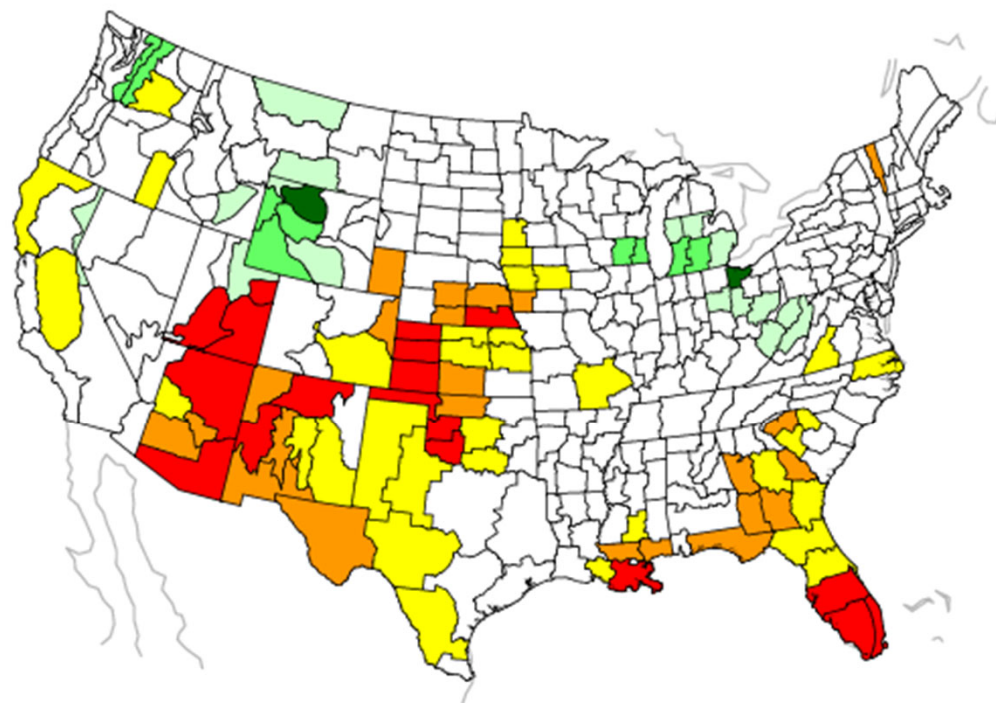


## Colorado statewide average precipitation vs multivariate ENSO index, September - November

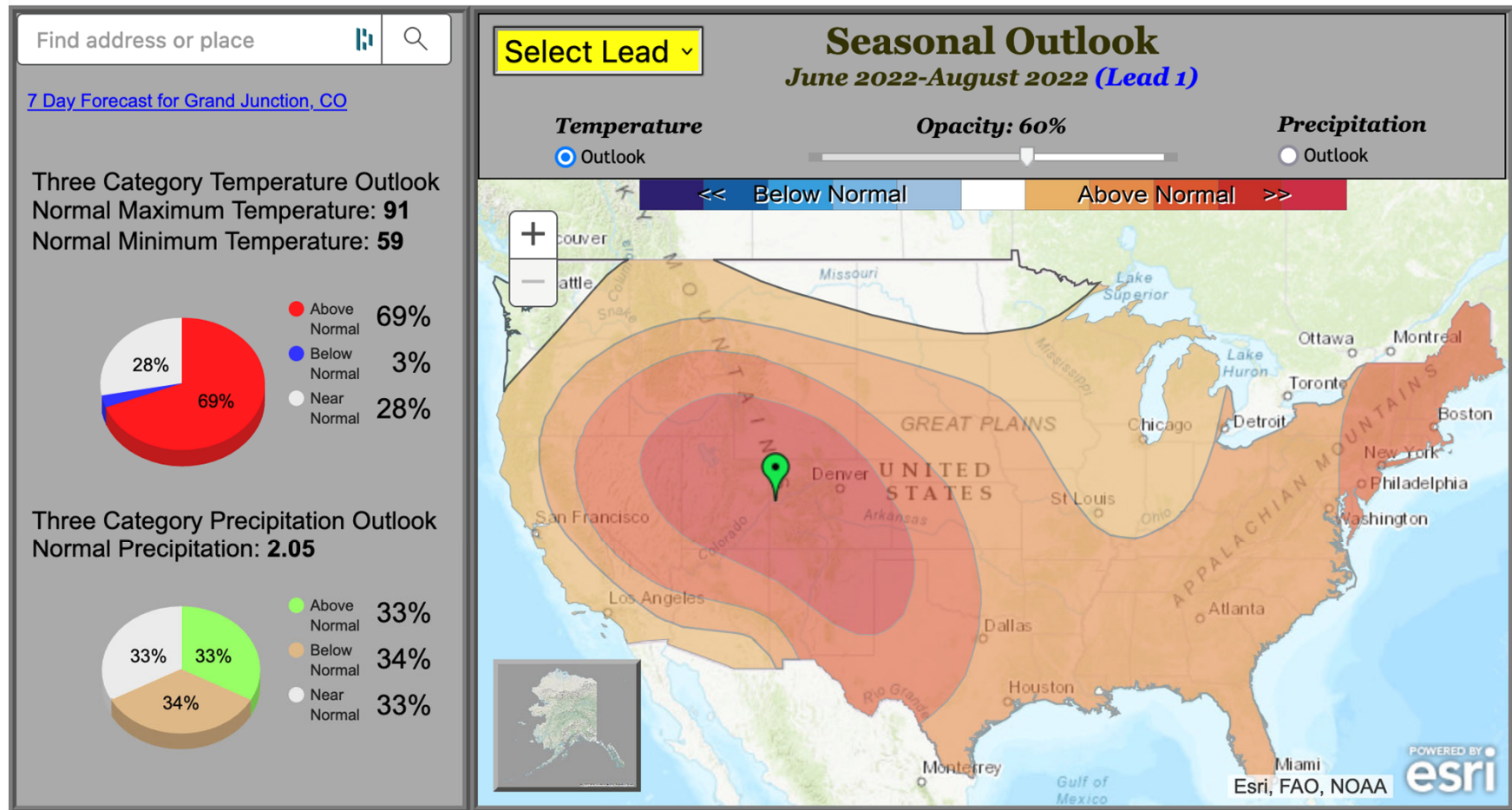




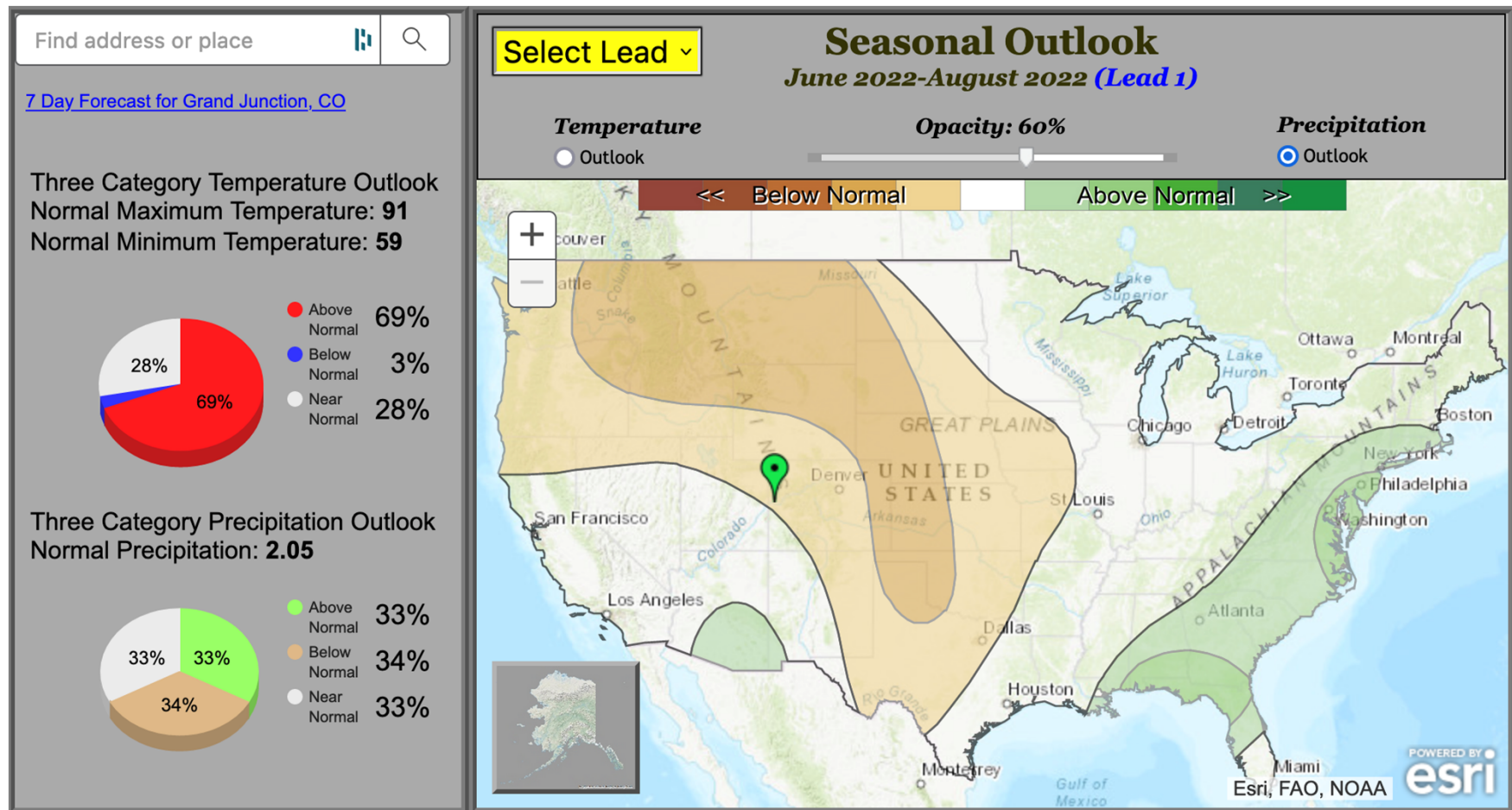
**MAM Precipitation During La Nina  
Increased Risk of Wet or Dry Extremes**



# June-July-August outlook



# June-July-August outlook



# Takeaways

- July was a very warm month: 5<sup>th</sup> warmest overall, and warmest in terms of minimum temperatures
- An active monsoon has brought substantial drought improvement across southern Colorado and many mountain areas in the last two months
- Drought is persisting on the western slope, and in the northeast and southeast corners of the state
- The first half of August was hot; conditions have cooled and should remain fairly wet through the end of the month
- The “triple-dip” La Niña looks likely at least into fall – La Niña falls tend to be dry. A little too early to say on winter (new NOAA outlooks come out Thurs)



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