

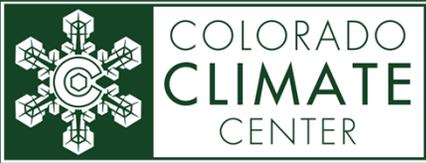
# Colorado Climate Center

## *WATF Climate Update*

Peter Goble, Service Climatologist

Water Availability Task Force

July 27<sup>th</sup>, 2021



# Today's Update

- Temperature and Precipitation Statistics
- Hydrological Conditions
- Outlook (2<sup>nd</sup> year La Niña?)
- Summary

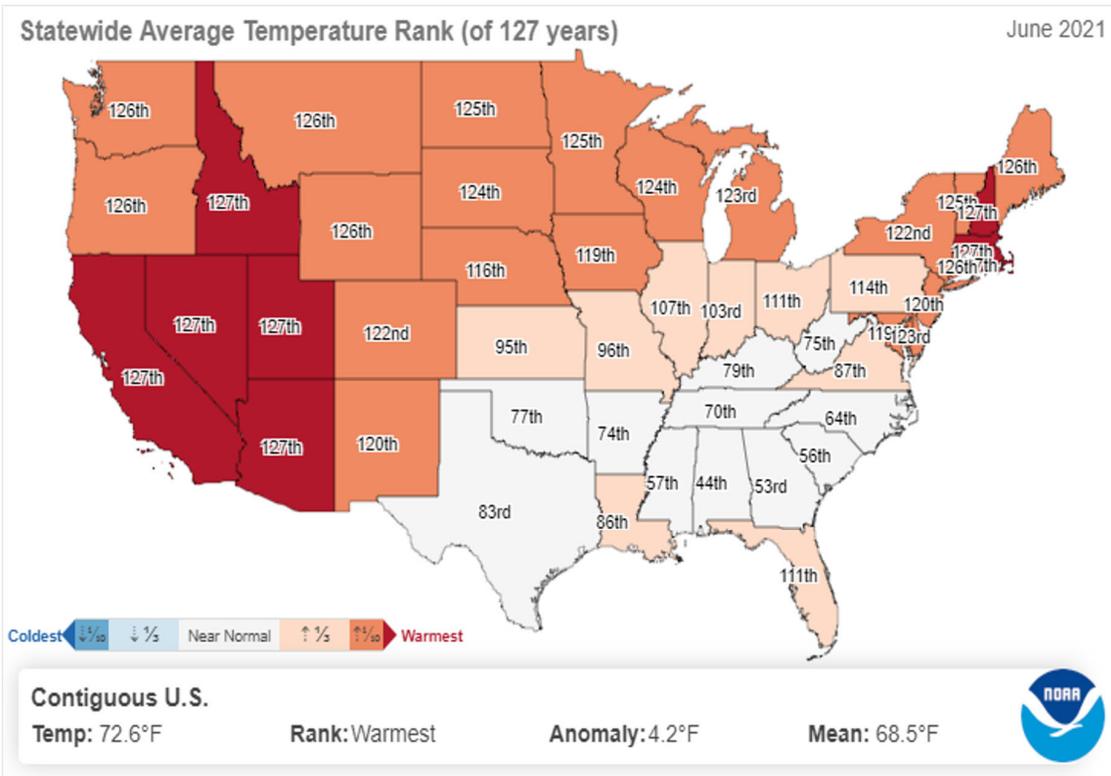




## 2021 Water Year To Date

temperature, precipitation,  
standardized precipitation index





Month	T Rank (of 126 years)	Above, below, or near avg?
Oct	52 <sup>nd</sup> warmest	Near normal
Nov	4 <sup>th</sup> warmest	Much above normal
Dec	22 <sup>nd</sup> warmest	Above normal
Jan	33 <sup>rd</sup> warmest	Above normal
Feb	28 <sup>th</sup> coolest	Below normal
Mar	46 <sup>th</sup> warmest	Near normal
Apr	62 <sup>nd</sup> coolest	Near normal
May	50 <sup>th</sup> warmest	Near normal
Jun	6 <sup>th</sup> warmest	Much above normal
Jul		
Aug		
Sep		

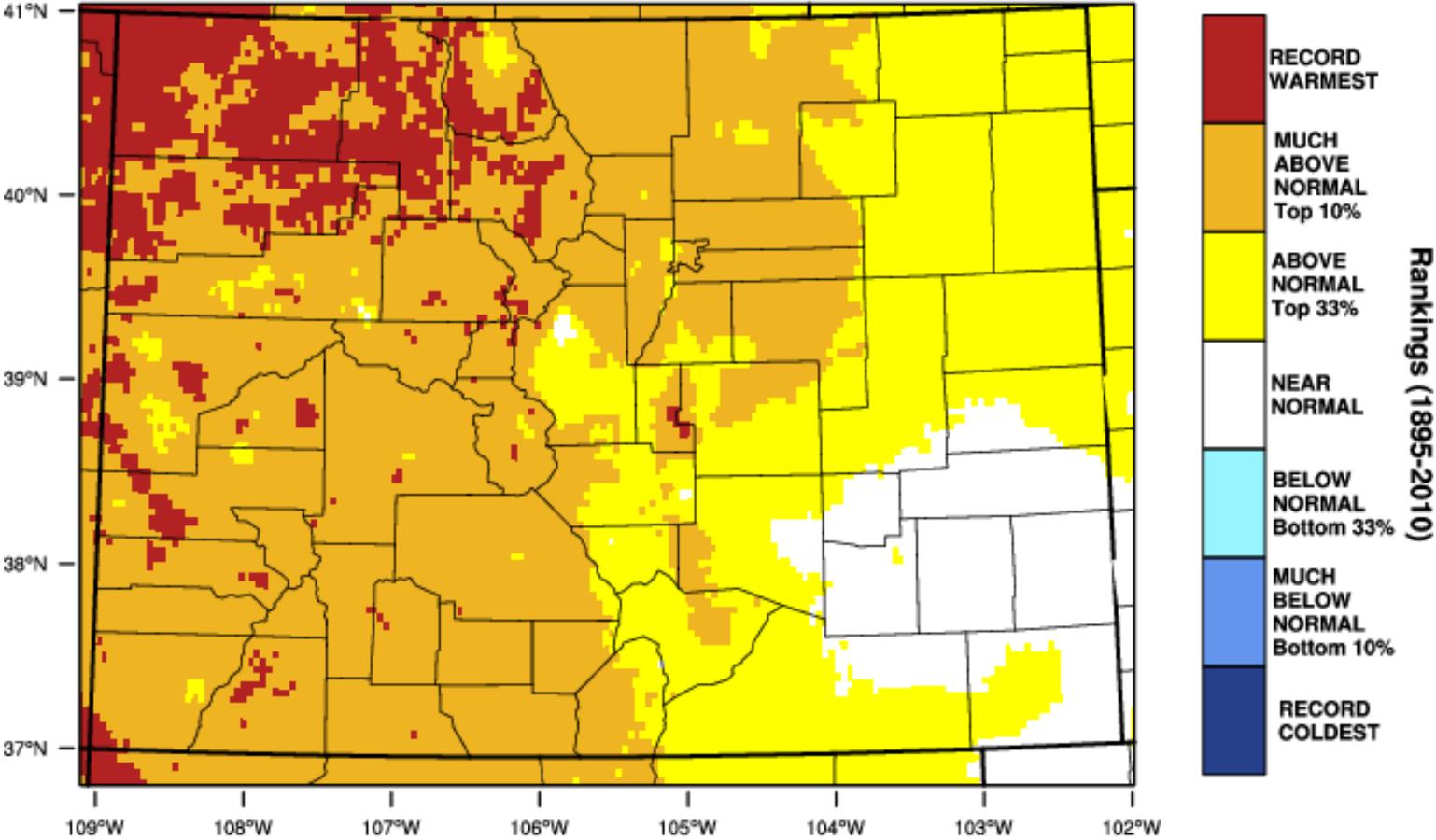
June was warm, and particularly, warm early

Numerous maximum temperature records in the middle of the month with a cooler spell at the end

2012, 2016, 2018 were warmer



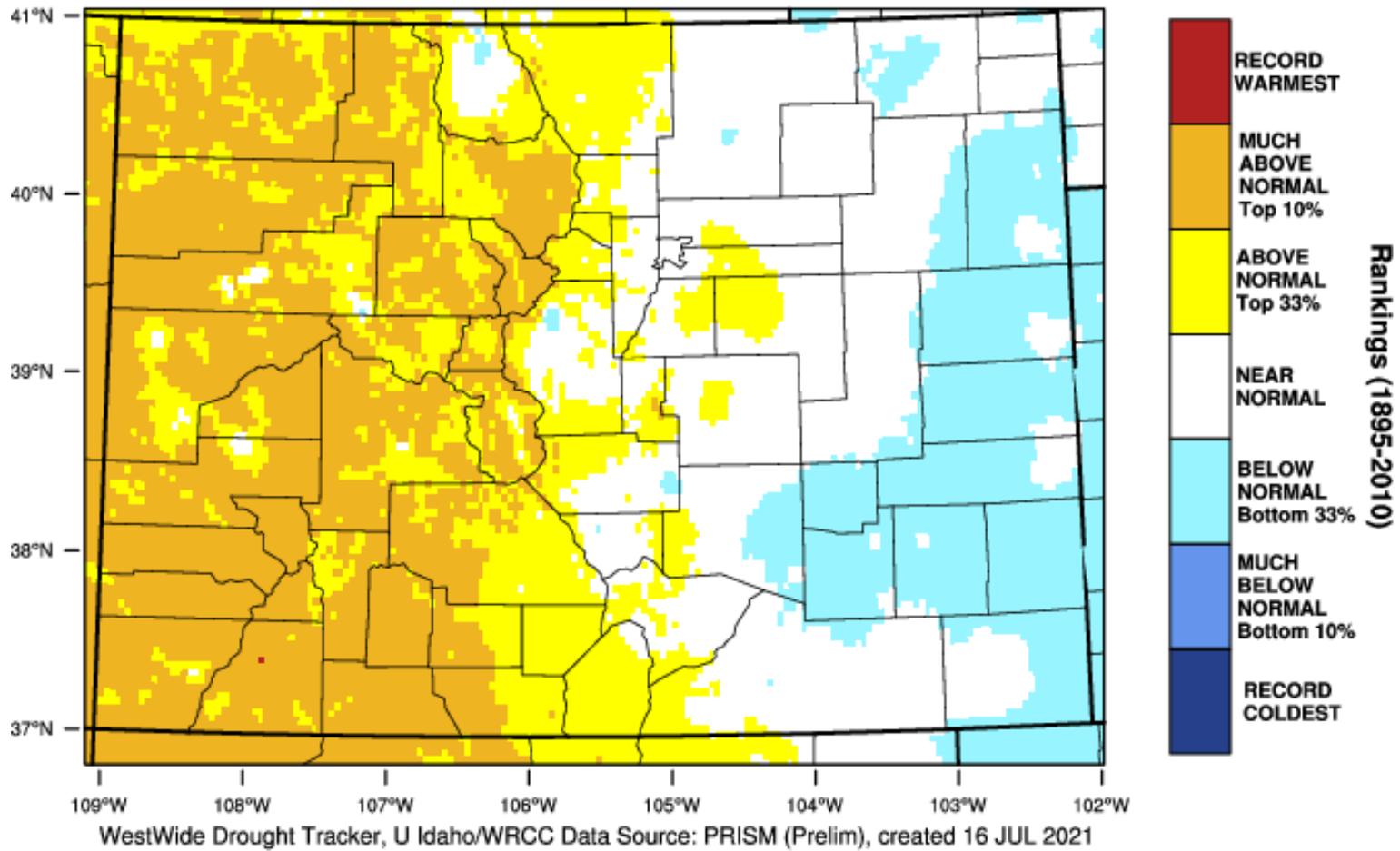
# Colorado - Mean Temperature June 2021 Percentile



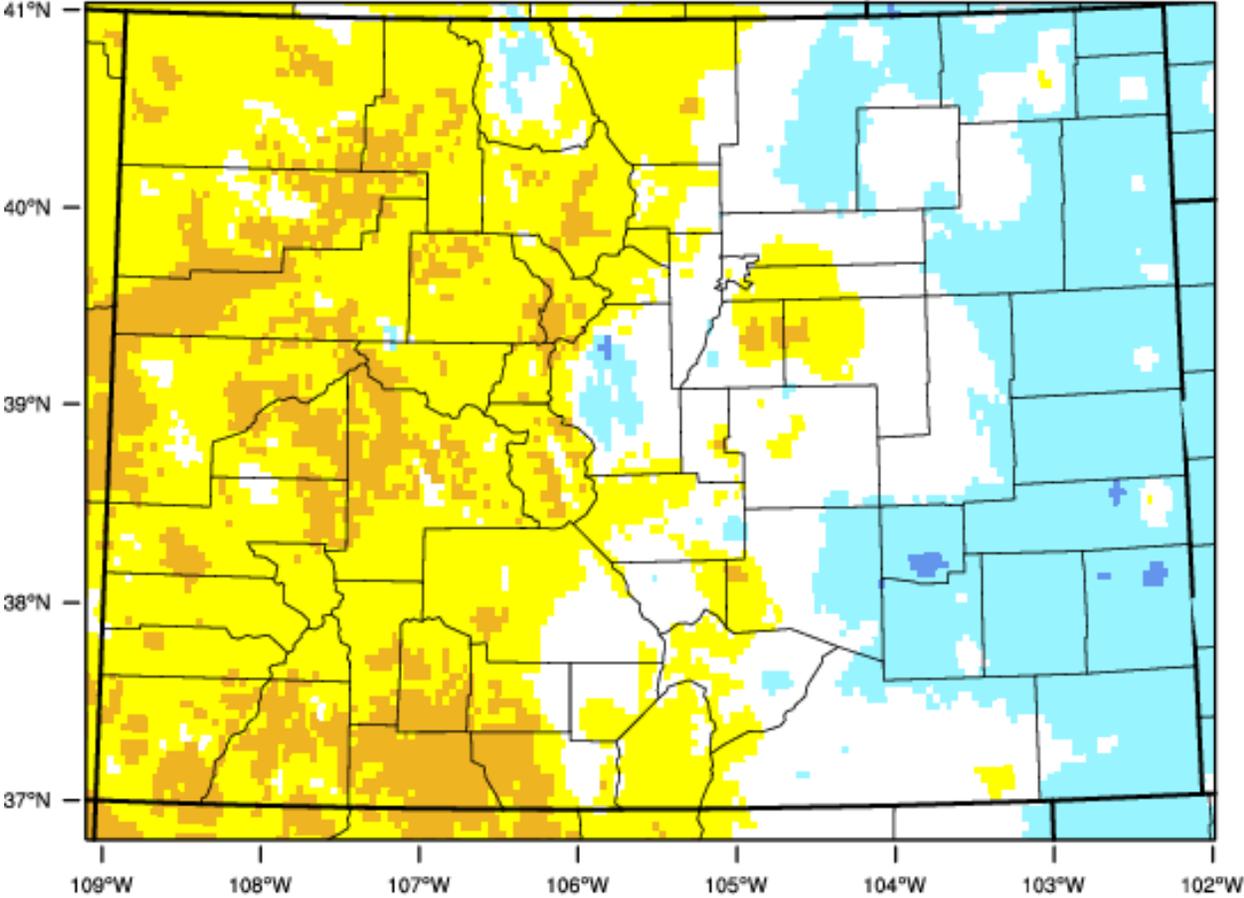
WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 JUL 2021



### Colorado - Mean Temperature April-June 2021 Percentile



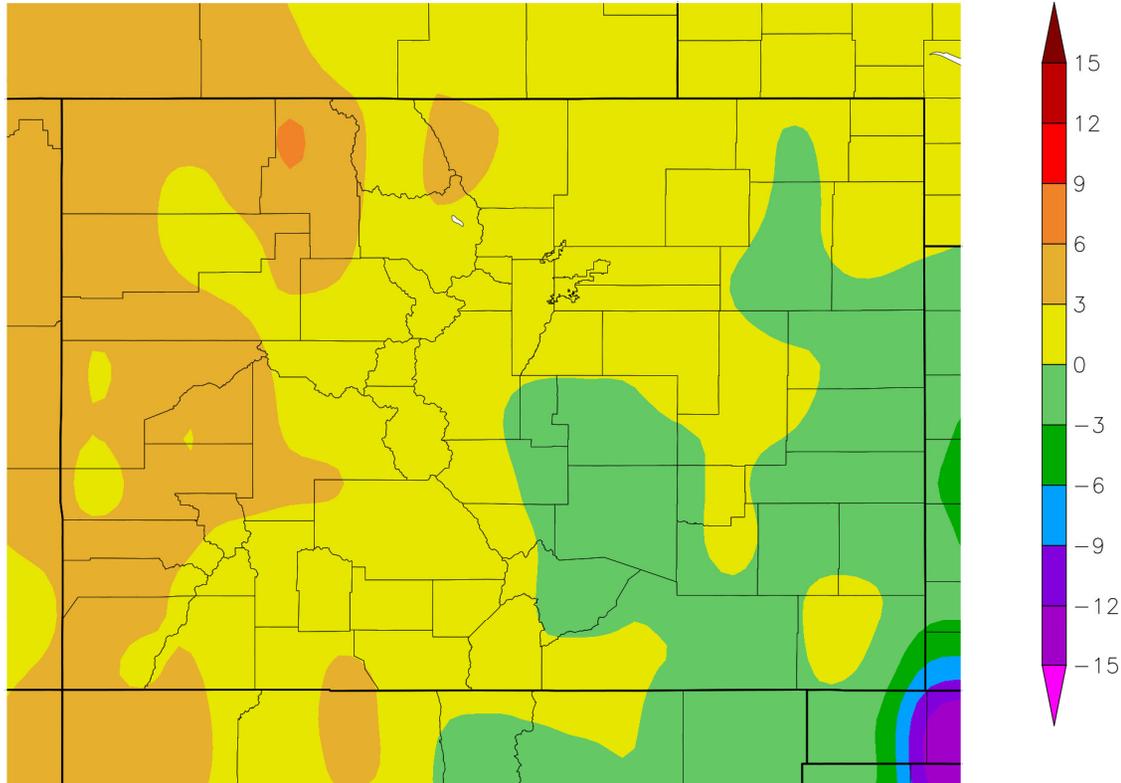
# Colorado - Mean Temperature October-June 2021 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 JUL 2021



## Departure from Normal Temperature (F) 7/1/2021 – 7/25/2021



We've seen much warmer than normal conditions across the west so far this summer, but cooler than normal on the southern plains

Colorado has been in the gradient zone of this pattern

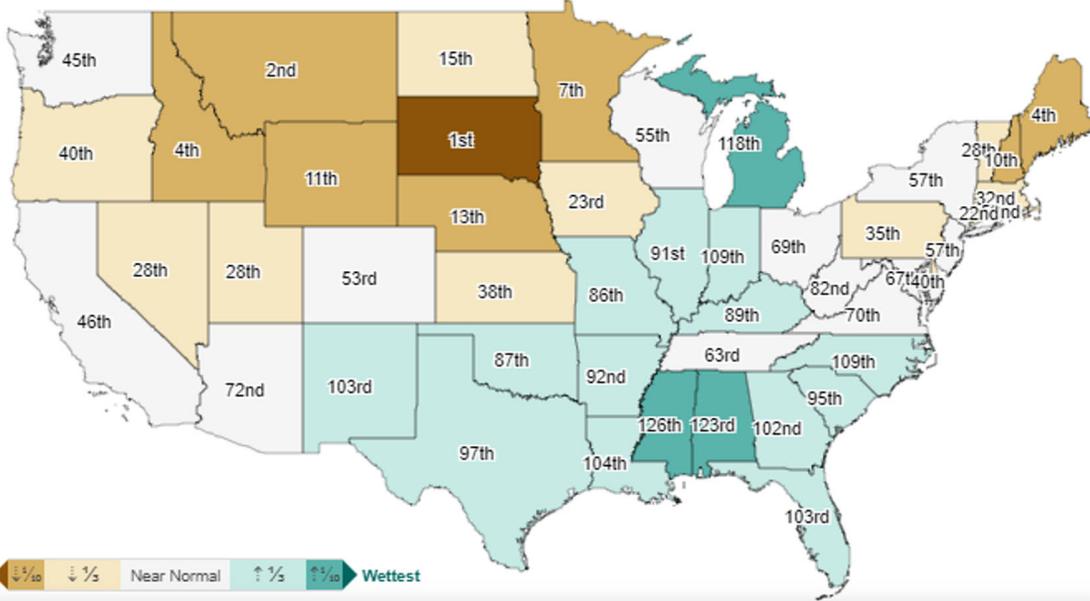
Warmer than normal on the west slopes. Cooler than normal in the Arkansas River Valley

New record high temp for GJT: 107!



Statewide Precipitation Rank (of 127 years)

June 2021



Driest  $\downarrow \frac{1}{10}$   $\downarrow \frac{1}{2}$  Near Normal  $\uparrow \frac{1}{2}$   $\uparrow \frac{1}{10}$  Wettest

Contiguous U.S.

Precip: 2.93"

Rank: 59th Driest

Anomaly: 0.00"

Mean: 2.93"



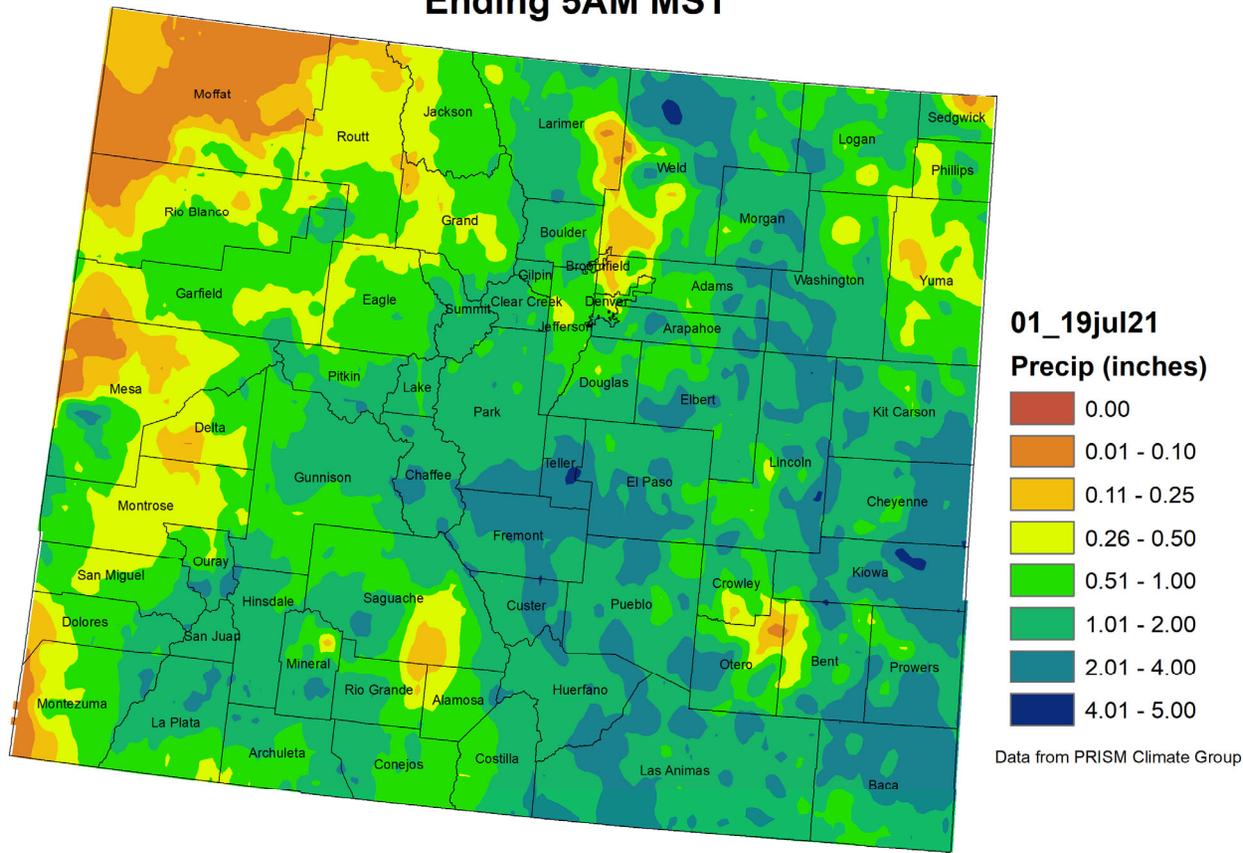
Month	P Rank (of 126 years)	Above, below, or near avg?
Oct	40 <sup>th</sup> driest	below
Nov	44 <sup>th</sup> driest	Near normal
Dec	59 <sup>th</sup> driest	Near normal
Jan	38 <sup>th</sup> driest	Below normal
Feb	58 <sup>th</sup> wettest	Near normal
Mar	20 <sup>th</sup> wettest	Above normal
Apr	18 <sup>th</sup> driest	Below normal
May	10 <sup>th</sup> wettest	Much above normal
Jun	53 <sup>rd</sup> driest	Near normal
Jul		
Aug		
Sep		

Spring was a drought buster for eastern CO

The west slopes have stayed dry



## Colorado Month to Date Precipitation 1 - 19 July 2021 Ending 5AM MST



Fairly average moisture for July so far with more to come.

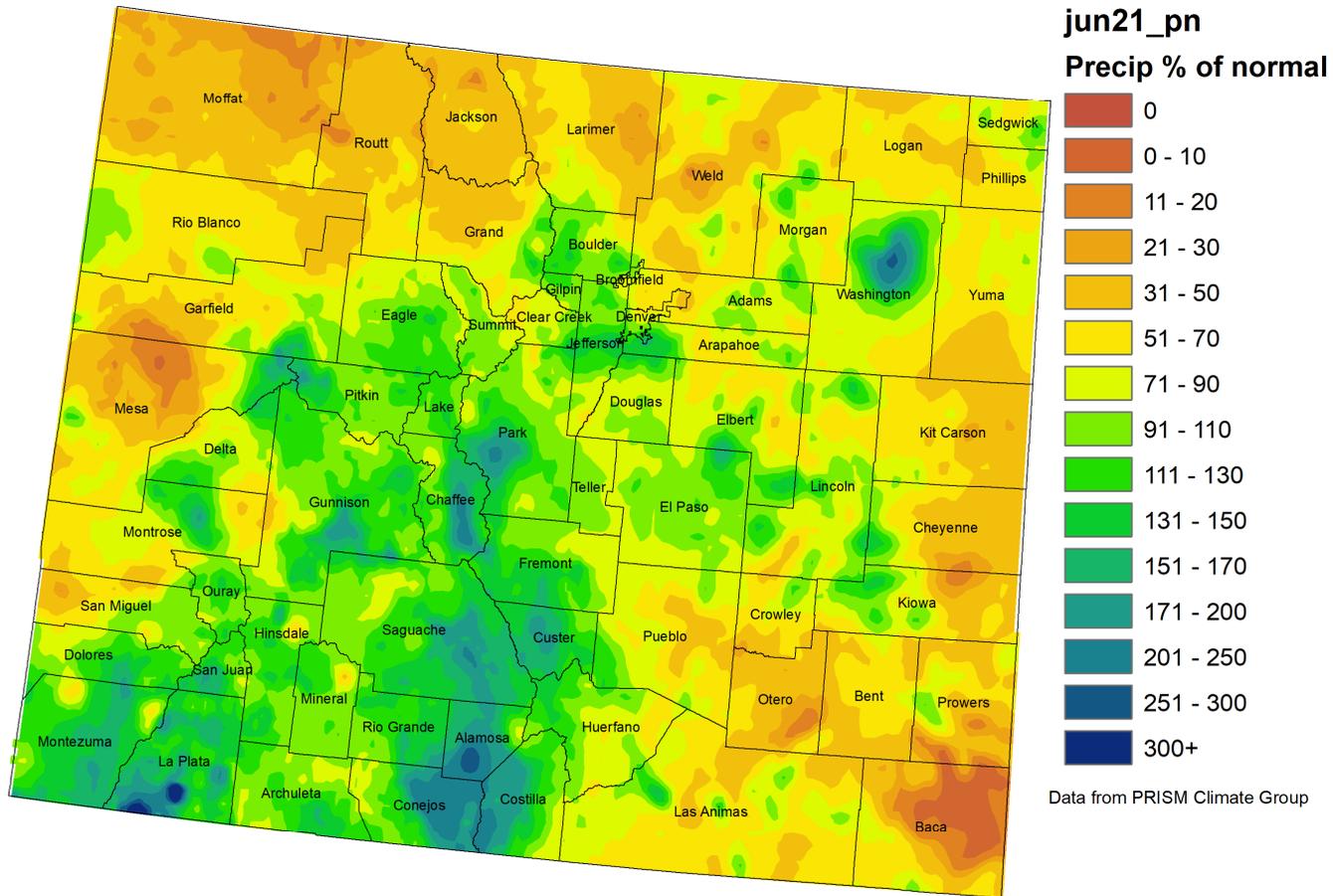
A few holes in the precipitation (e.g. Fort Collins/Loveland)

NE corner below normal

Flash flooding has occurred on burn scars. This will likely continue to be an issue



## Colorado June 2021 Precipitation as a Percentage of Normal

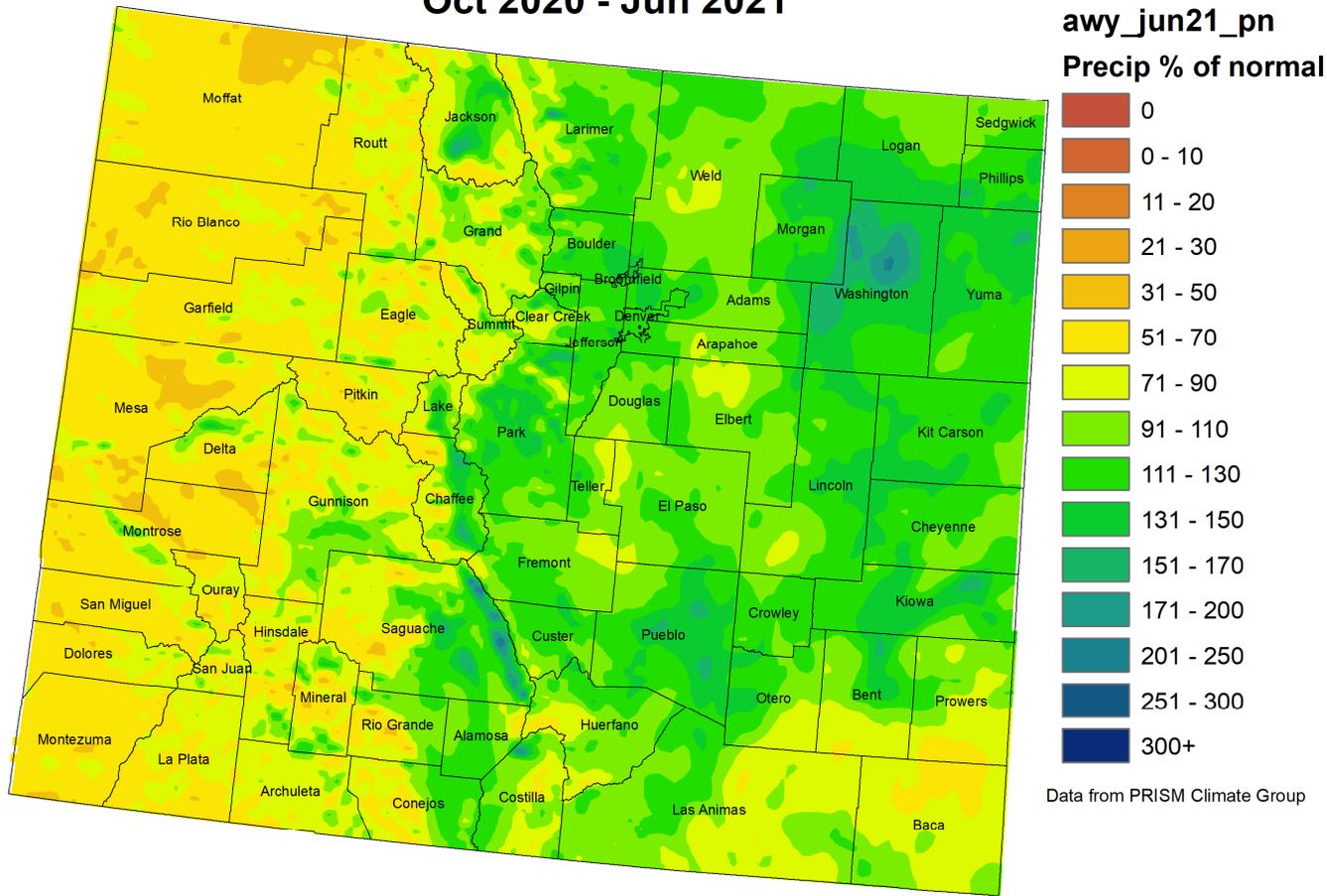


Some drought relief in SW CO in June, though June is the dry season for SW CO

Drought deepens in NW CO



# Colorado Water Year 2021 Precipitation as a Percentage of Normal Oct 2020 - Jun 2021

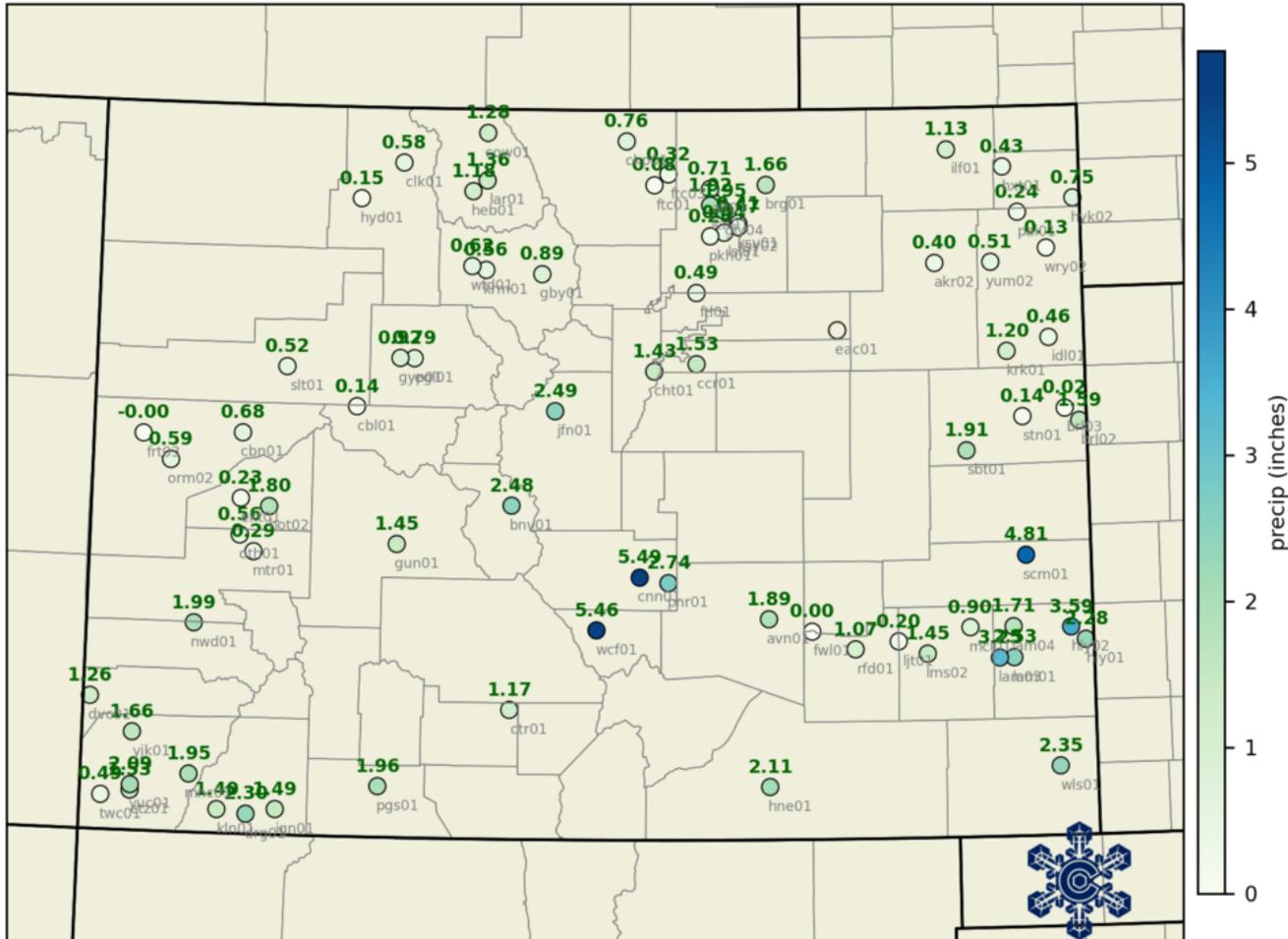


Above normal moisture for the water year east of the Continental Divide thanks to some big upslope storms

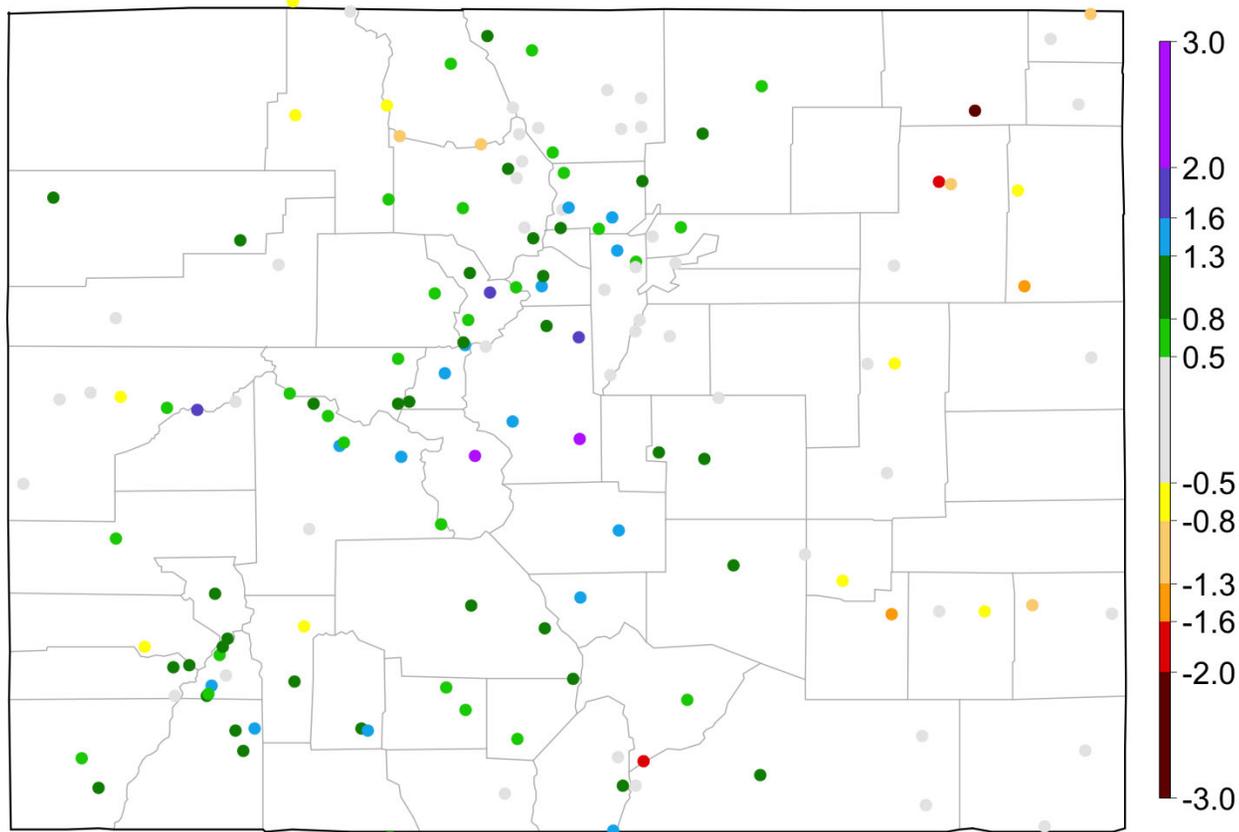
As expected, the west slopes have not recovered from a poor snow year



CoAgMET precipitation in previous 30 days: 25 Jun 2021-25 Jul 2021



30-day SPI: 2021/06/23 - 2021/07/22

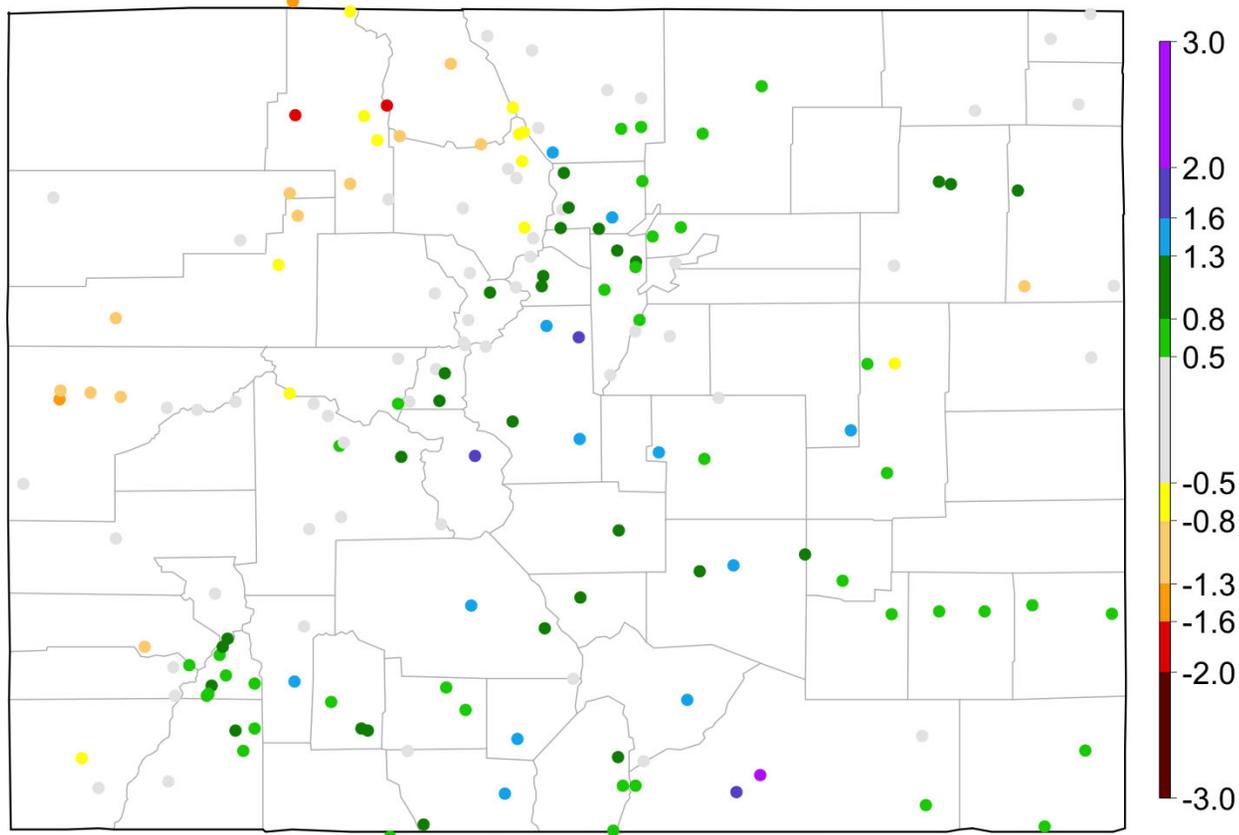


Data from High Plains Regional Climate Center and ACIS

<http://climate.colostate.edu/~drought/spi.html>



90-day SPI: 2021/04/24 - 2021/07/22

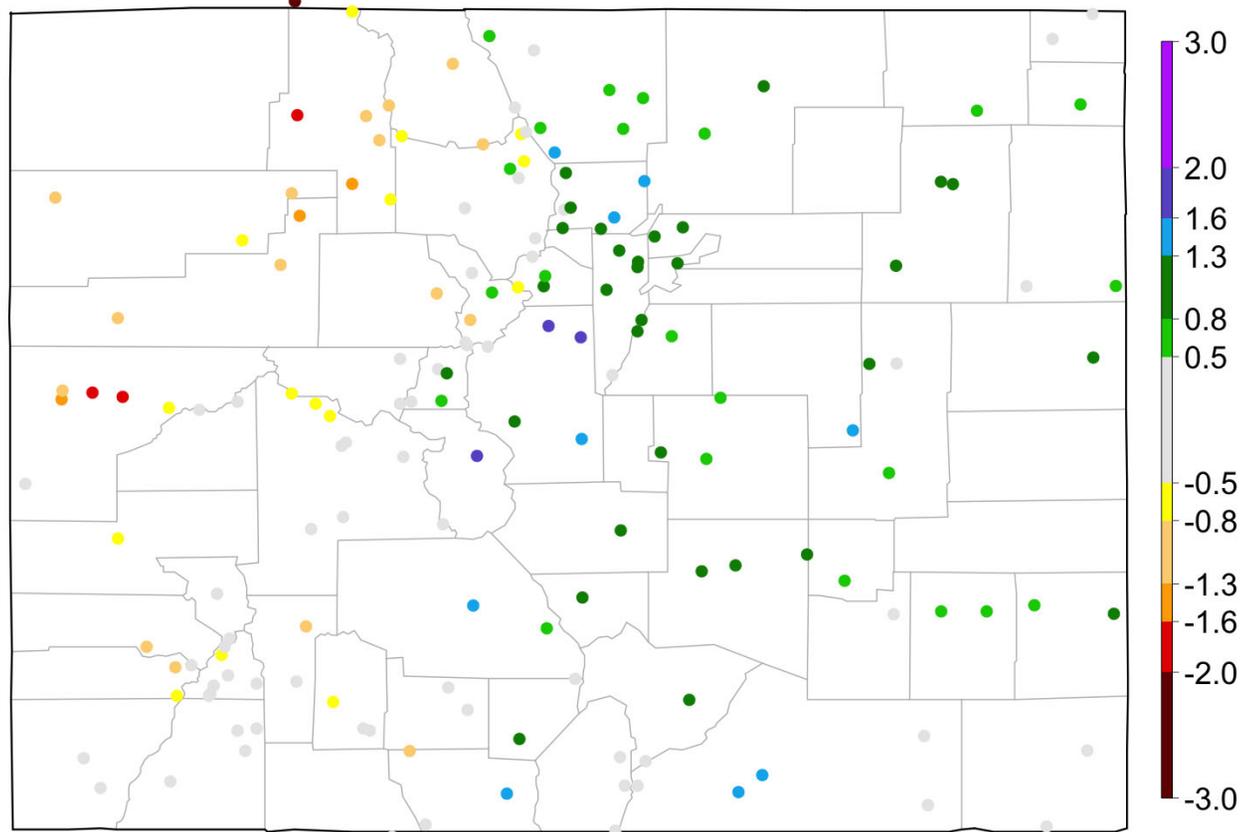


Data from High Plains Regional Climate Center and ACIS

<http://climate.colostate.edu/~drought/spi.html>



6-month SPI: 2021/01/22 - 2021/07/22

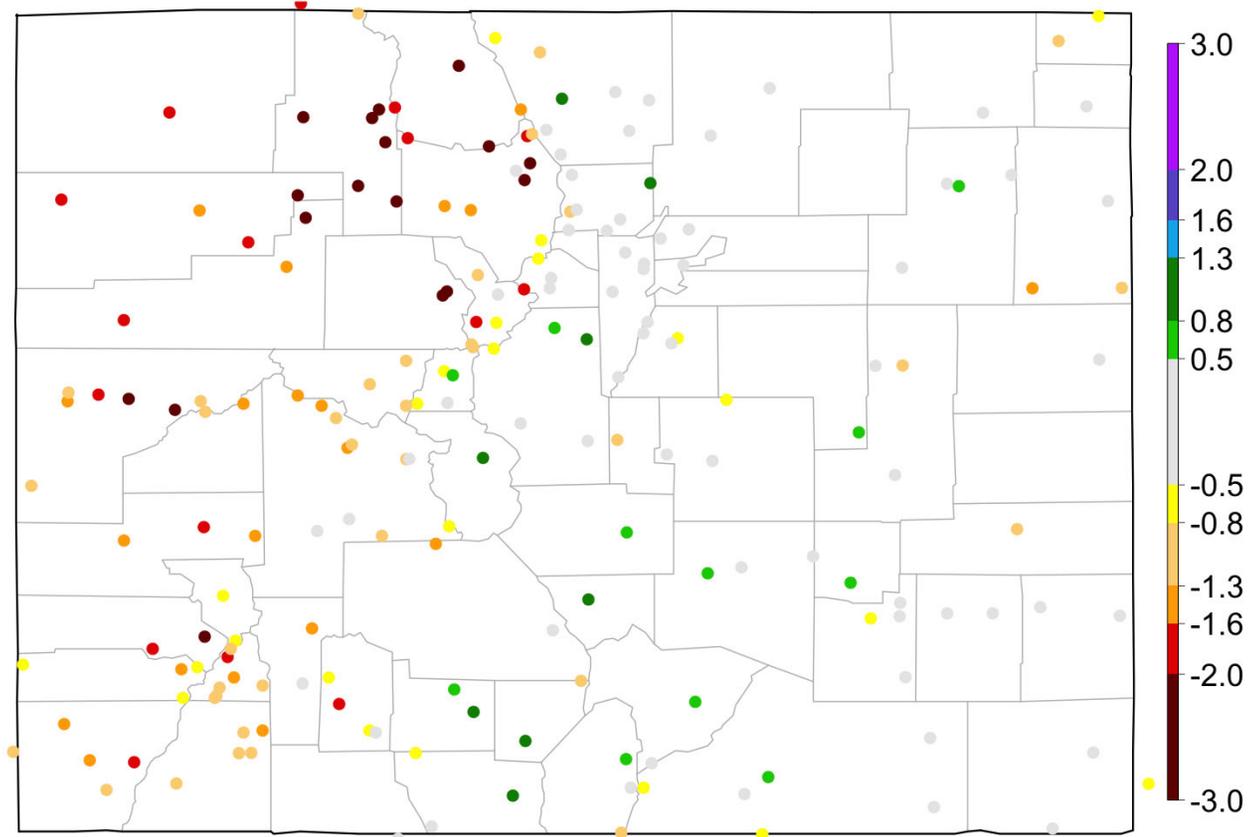


Data from High Plains Regional Climate Center and ACIS

<http://climate.colostate.edu/~drought/spi.html>



12-month SPI: 2020/07/23 - 2021/07/22

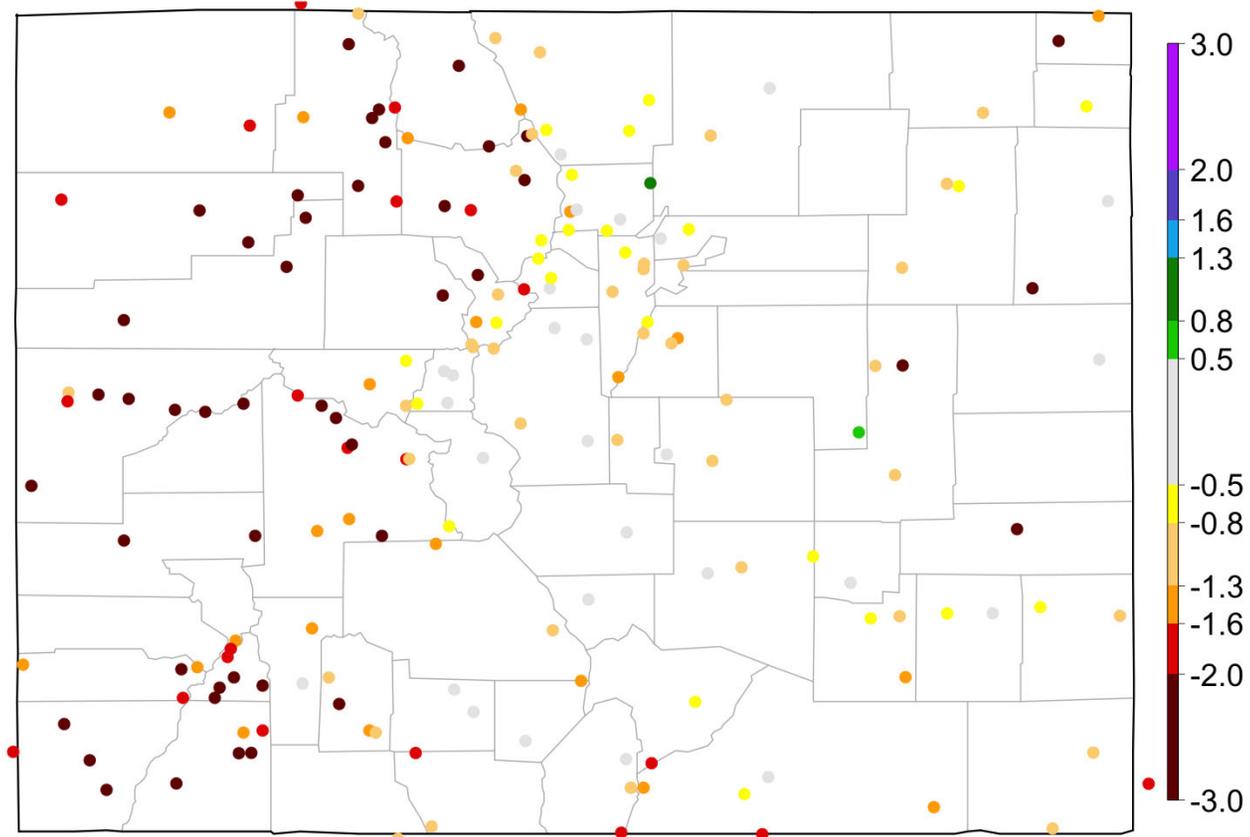


Data from High Plains Regional Climate Center and ACIS

<http://climate.colostate.edu/~drought/spi.html>



24-month SPI: 2019/07/23 - 2021/07/22



Long-term SPIs better correlated to water supply situation out west

Data from High Plains Regional Climate Center and ACIS

<http://climate.colostate.edu/~drought/spi.html>





# Drought

National Drought

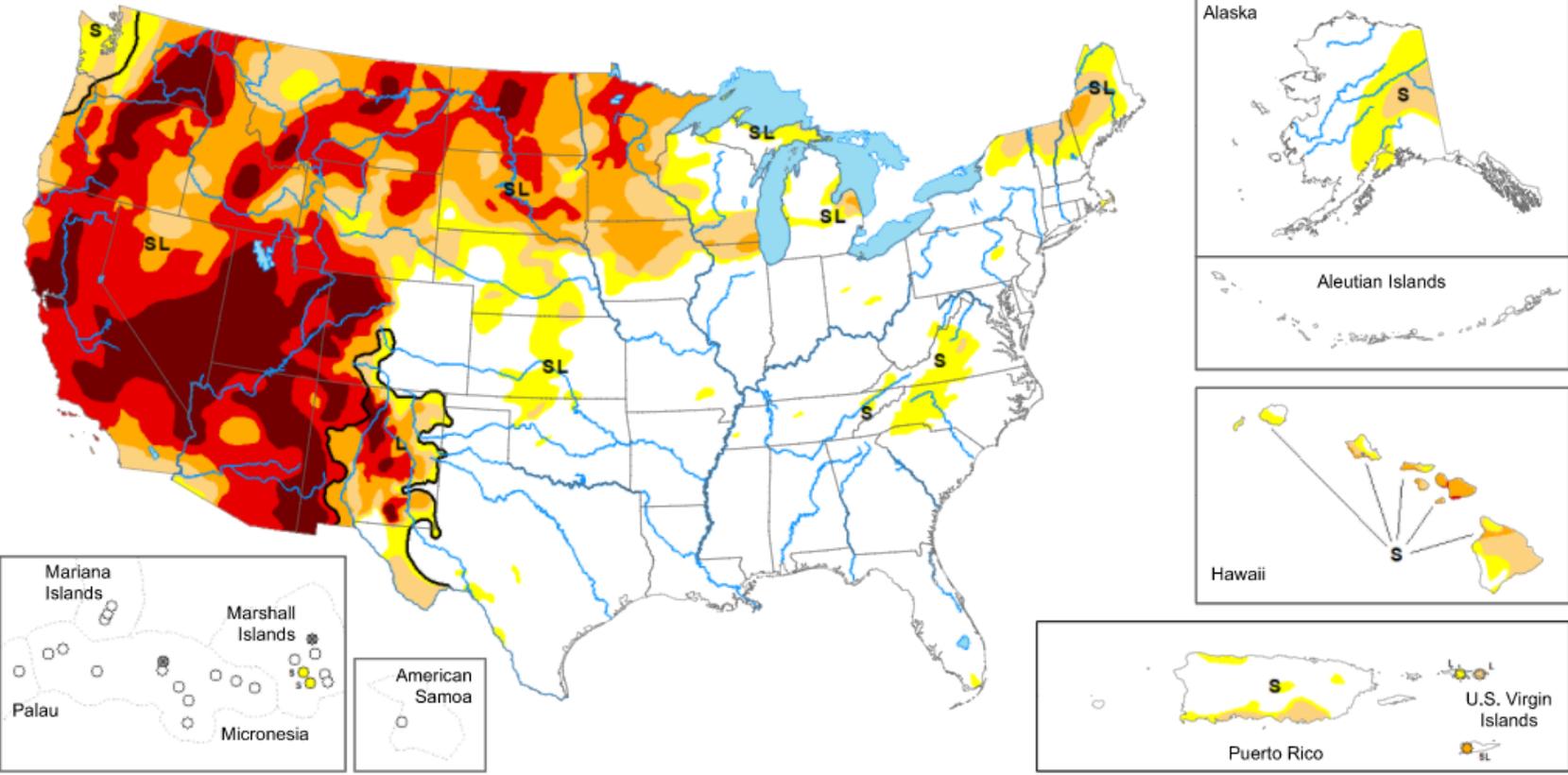
Colorado Drought

Long-Term Drought



Map released: July 22, 2021

Data valid: July 20, 2021

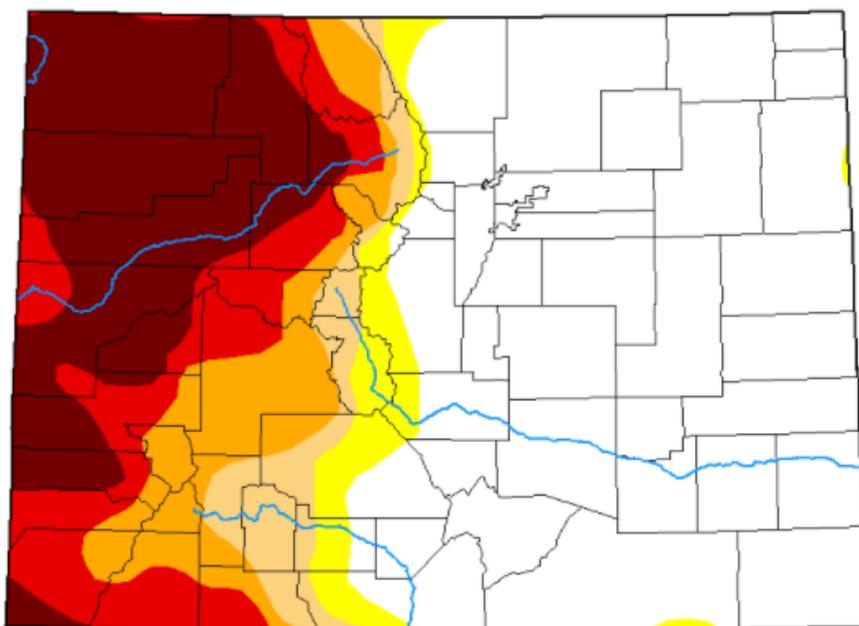


# Colorado

[Home](#) > Colorado

**Map released: Thurs. July 22, 2021**

**Data valid: July 20, 2021 at 8 a.m. EDT**



## Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

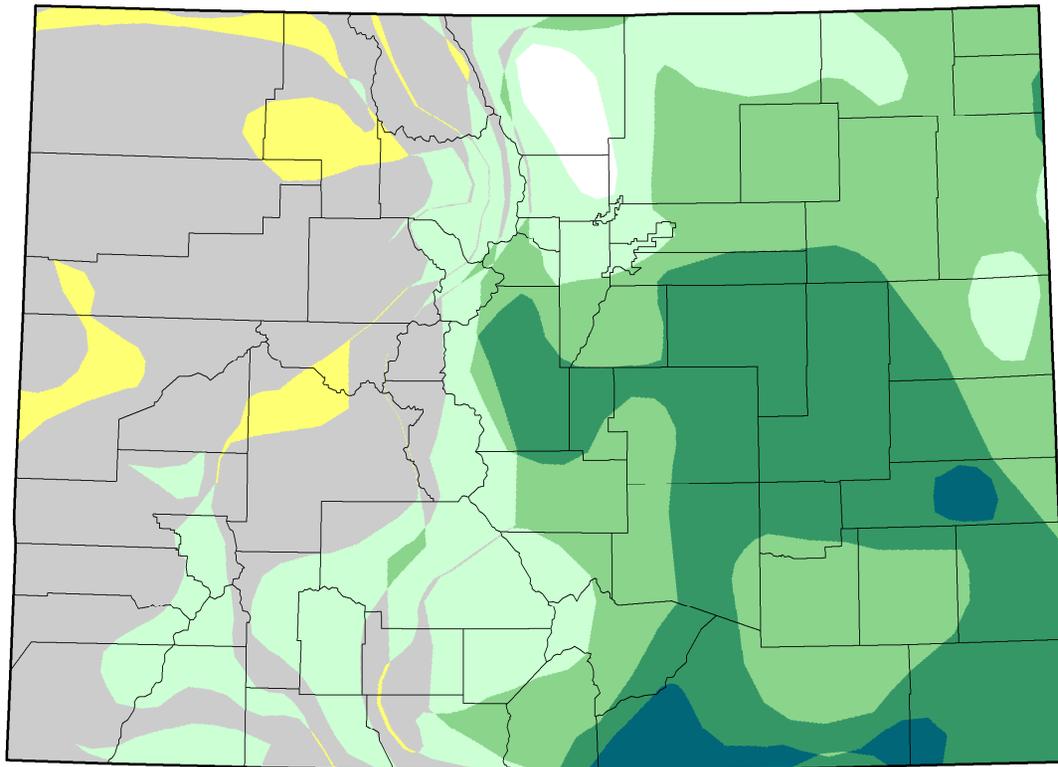
## Authors

United States and Puerto Rico Author(s):  
**Brad Rippey**, U.S. Department of Agriculture

Pacific Islands and Virgin Islands Author(s):  
**Richard Heim**, NOAA/NCEI



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



July 20, 2021  
compared to  
April 27, 2021

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



- 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

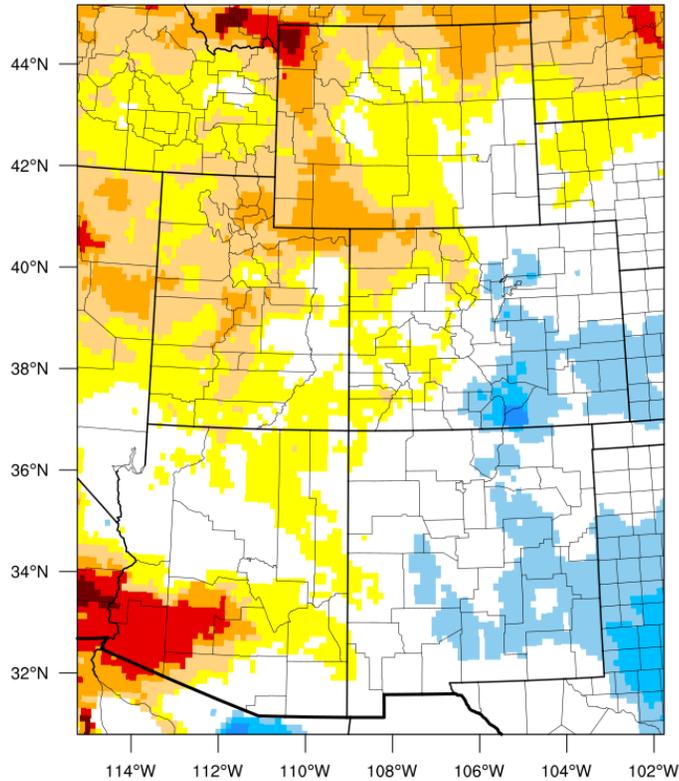
Major improvements to drought monitor this spring in E CO

Status quo in W CO (nowhere to go but up)

28.2% of state in extreme or exceptional drought



3-month EDDI categories for July 21, 2021



Low three month evaporative demand in E CO thanks to May

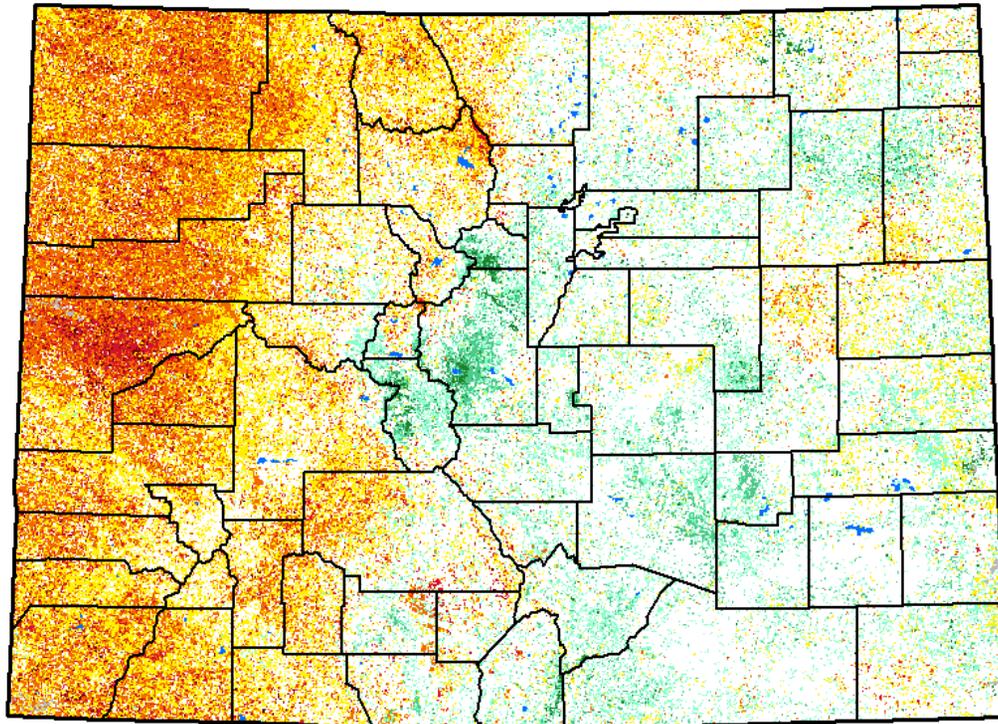
EDDI shows lower than normal evaporative demand in July too. Humidity?



Generated by NOAA/ESRL/Physical Sciences Laboratory



Map for July 18, 2021

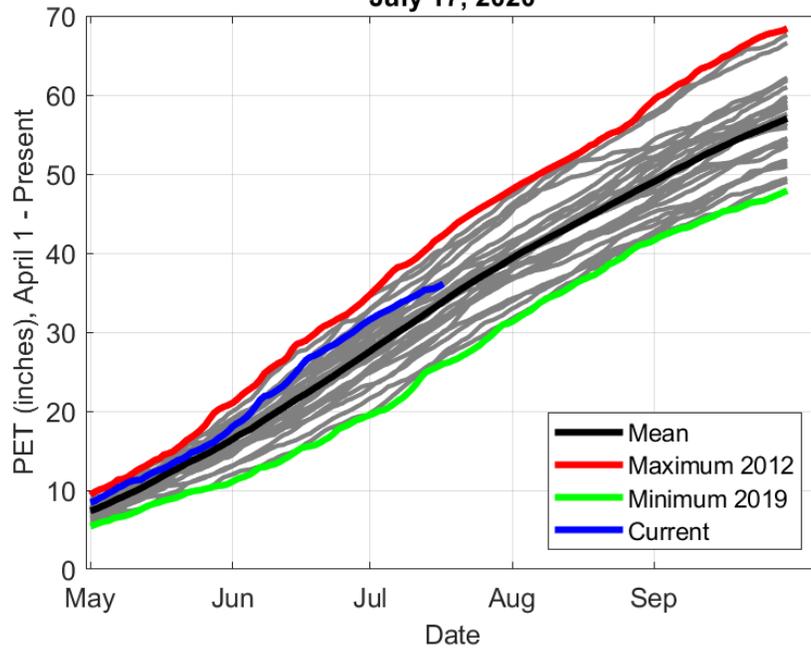


## Vegetation Condition

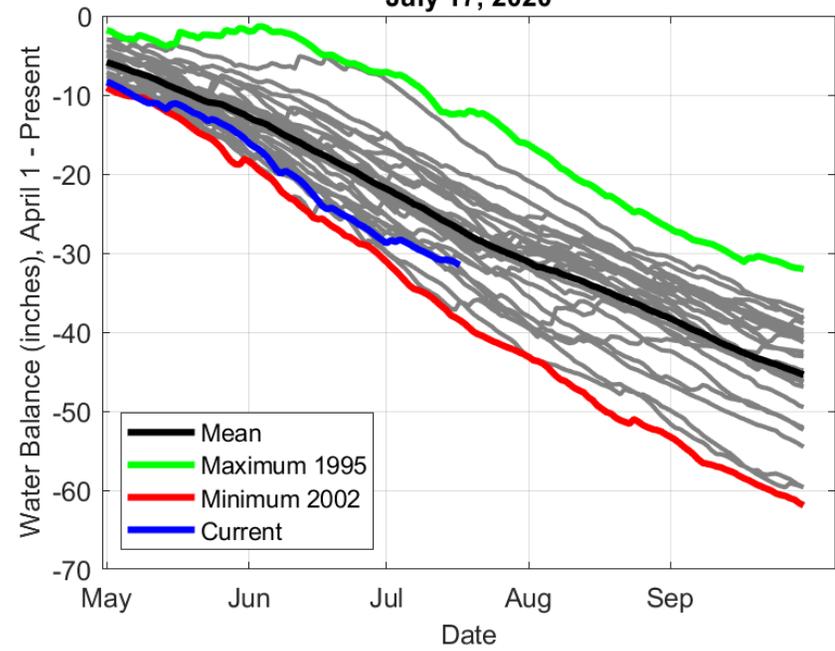
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-drought stress
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water
- Other Landcover



**Burlington Growing Season Evaporative Demand**  
July 17, 2020



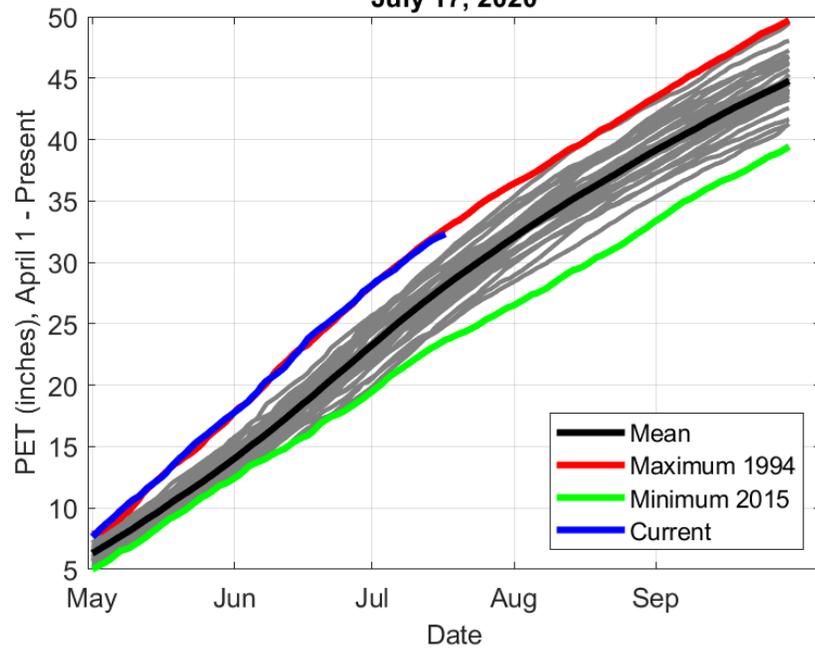
**Burlington Growing Season Water Balance**  
July 17, 2020



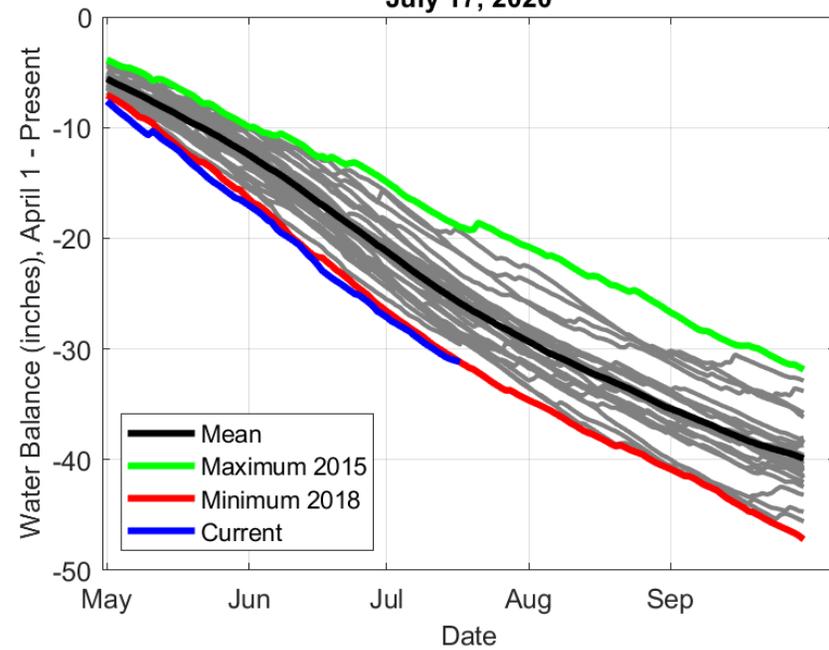
<http://climate.colostate.edu/~drought/et.php>



Olathe Growing Season Evaporative Demand  
July 17, 2020



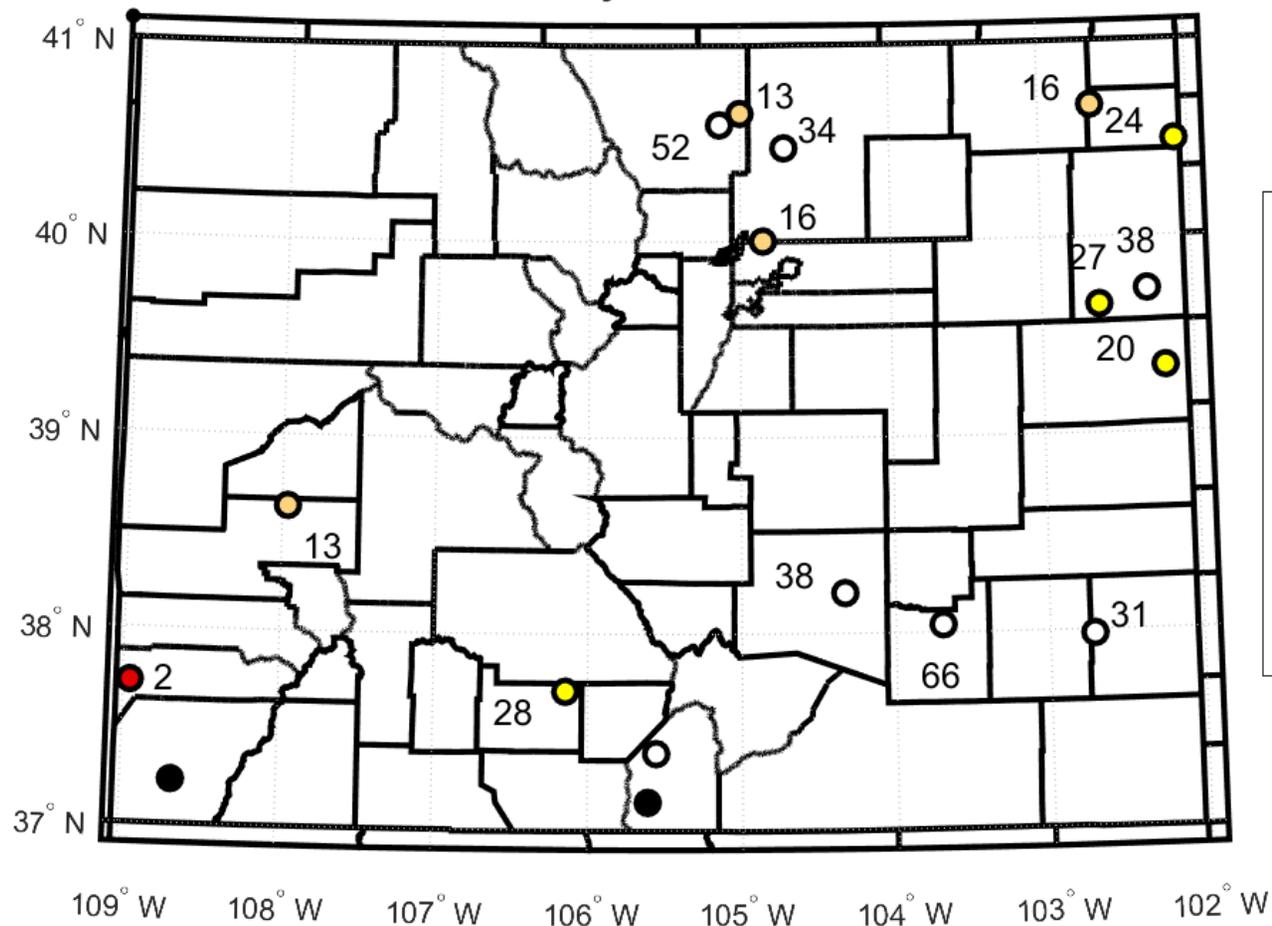
Olathe Growing Season Water Balance  
July 17, 2020



<http://climate.colostate.edu/~drought/et.php>



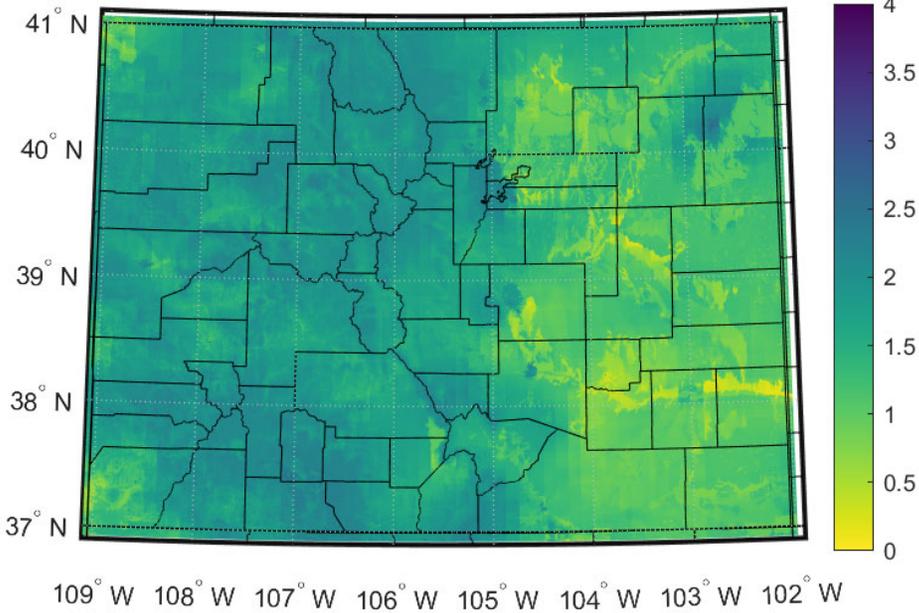
## Growing Season Water Balance (P/PET) Percentiles July 17, 2020



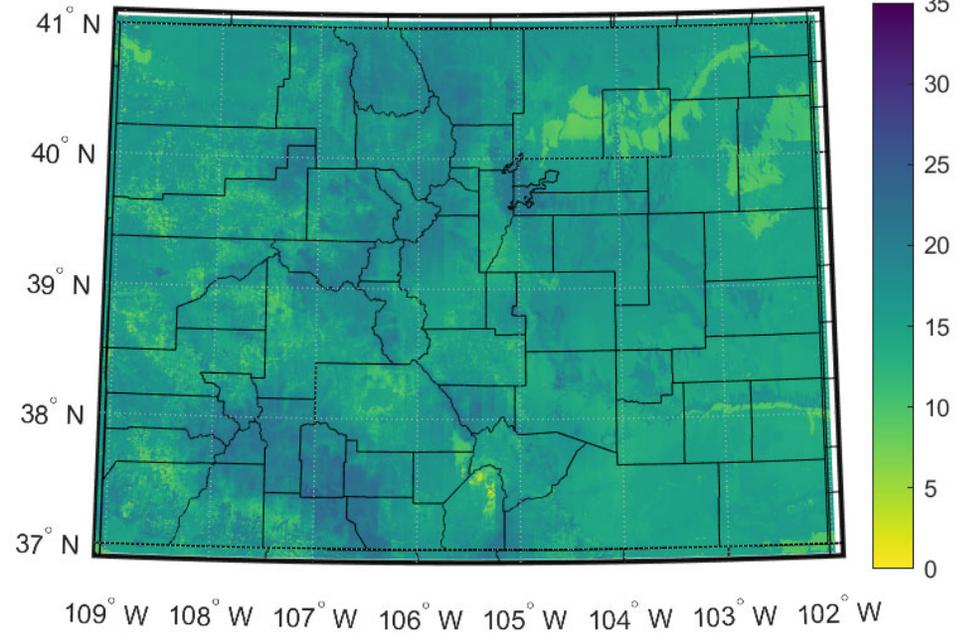
Water balance (P/PET) from CoAgMET stations shows substantial recovery in the Arkansas River Valley, particularly at Rocky Ford



**Top 10cm Plant Available Water (cm)**  
11/13/2020



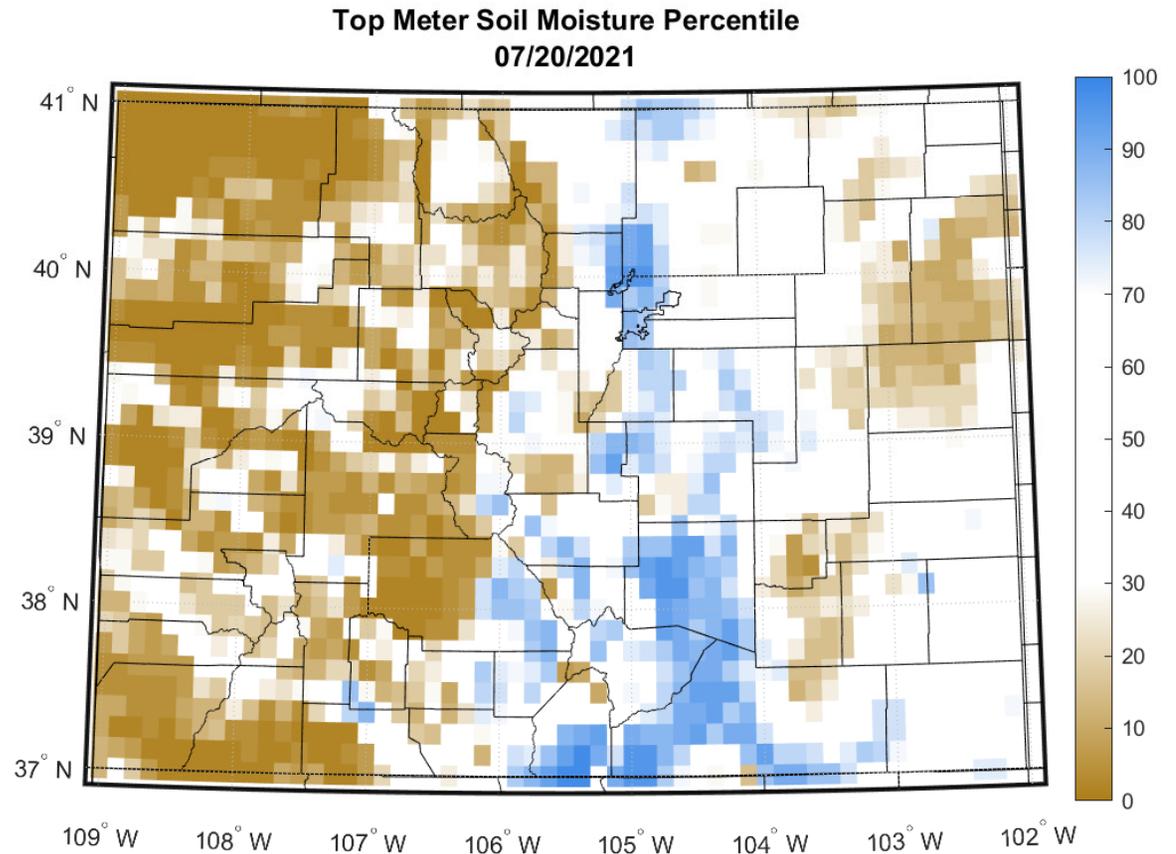
**Top Meter Plant Available Water (cm)**  
11/13/2020



Soil moisture has actually improved recently save for the Arkansas basin



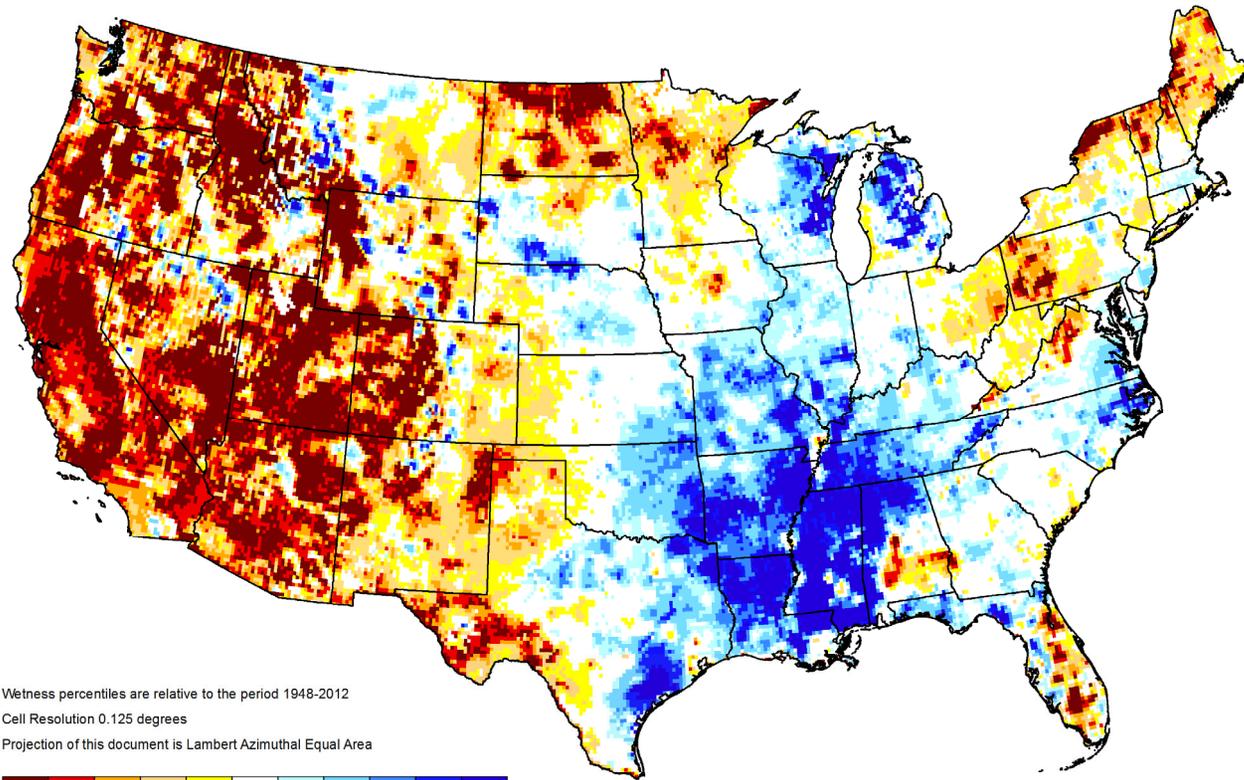
- Record low soil moisture for low elevations on the West Slopes
- Soil moisture has improved in the San Juans in recent weeks
- Topsoils drying out in eastern CO



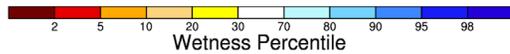


# GRACE-Based Shallow Groundwater Drought Indicator

July 19, 2021



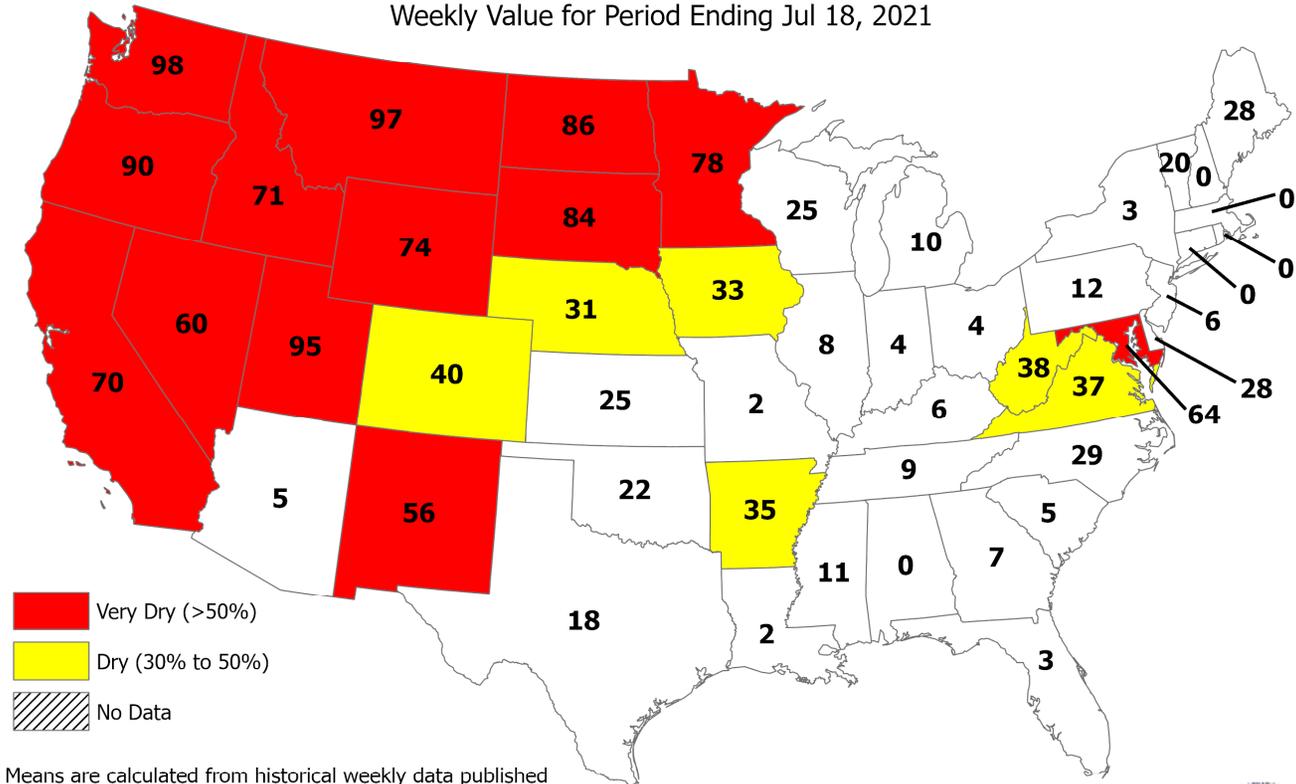
Wetness percentiles are relative to the period 1948-2012  
Cell Resolution 0.125 degrees  
Projection of this document is Lambert Azimuthal Equal Area



<https://nasagrace.unl.edu>



**USDA Topsoil Moisture by Short-Very Short**  
 Percent of State Area  
 Weekly Value for Period Ending Jul 18, 2021



Very Dry (>50%)  
 Dry (30% to 50%)  
 No Data

Means are calculated from historical weekly data published by USDA/NASS using the closest date to the equivalent date for this year.

Results are based on the short and very short percentages of topsoil moisture (upper 6 inches) reported by the USDA. Reports are based on subjective observations.





# Outlook

Next 7 days

CPC Outlooks

Monsoon Progression

Precipitation Projections

ENSO setup for fall



# NOAA 7-day precip forecast

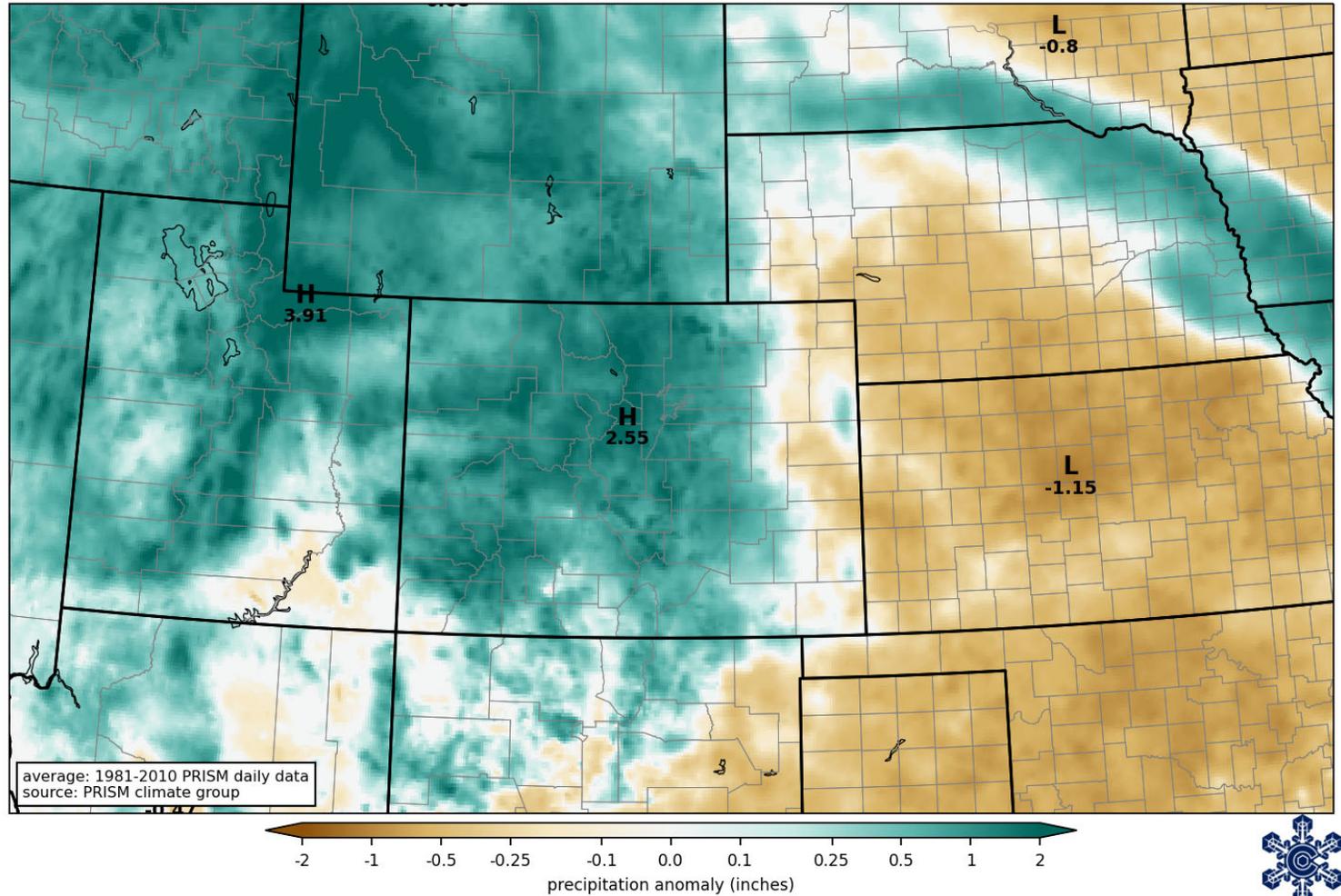
Look for cooler, wetter conditions this spring as monsoonal moisture collides with mid-latitude cold front

Widespread totals > 1.00", including NW CO

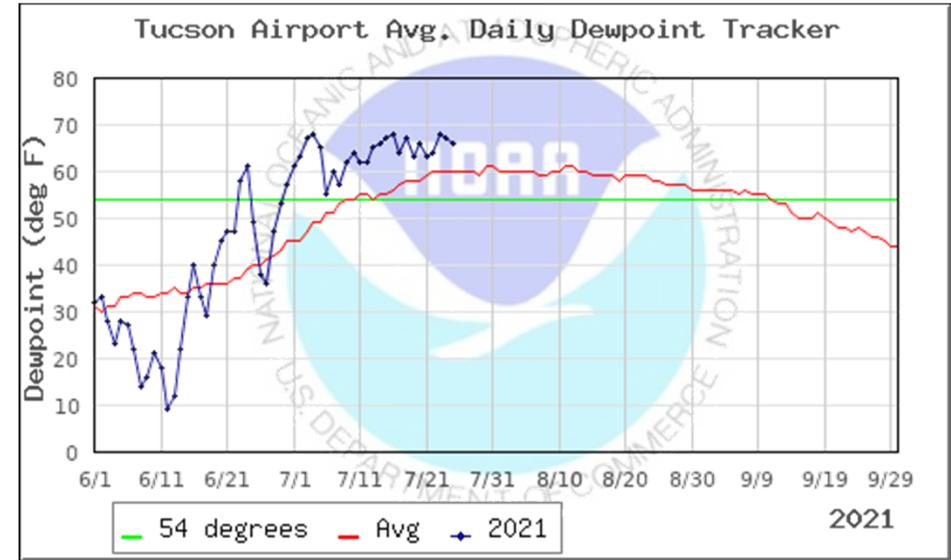
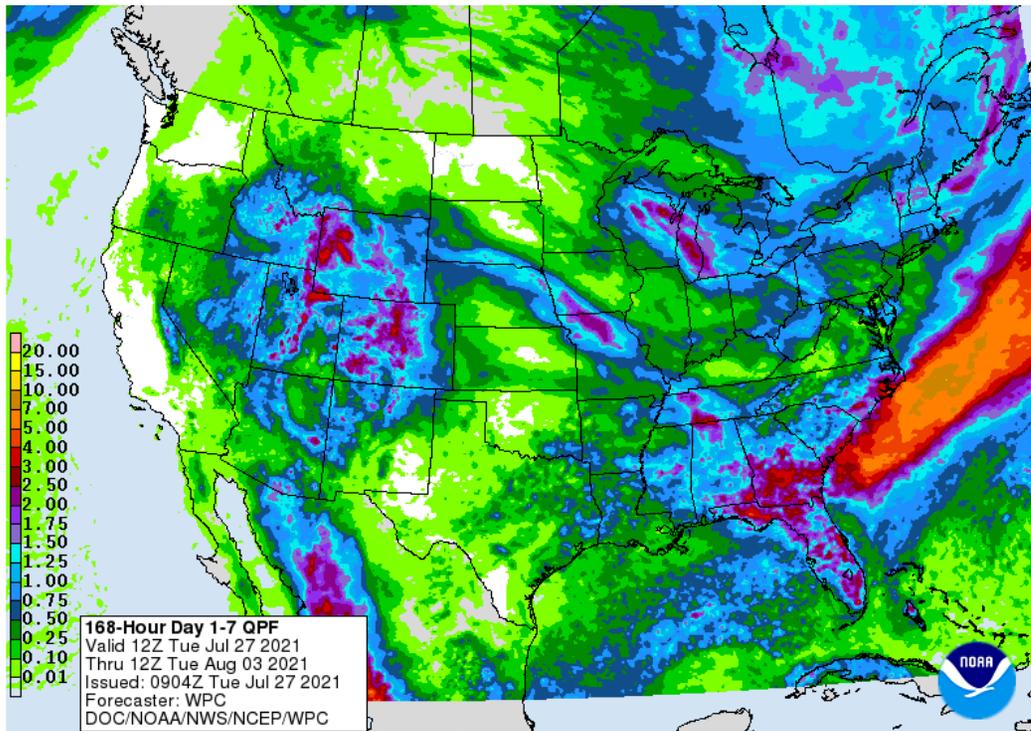
[http://schumacher.atmos.colostate.edu/weather/real\\_time/hpc\\_qpf\\_168h\\_imw/hpc\\_qpf\\_168h\\_imw.gif](http://schumacher.atmos.colostate.edu/weather/real_time/hpc_qpf_168h_imw/hpc_qpf_168h_imw.gif)

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

forecast issued 1200 UTC Tue 27 Jul 2021  
precipitation in 168 hrs ending 1200 UTC Tue 03 Aug 2021



# Monsoon

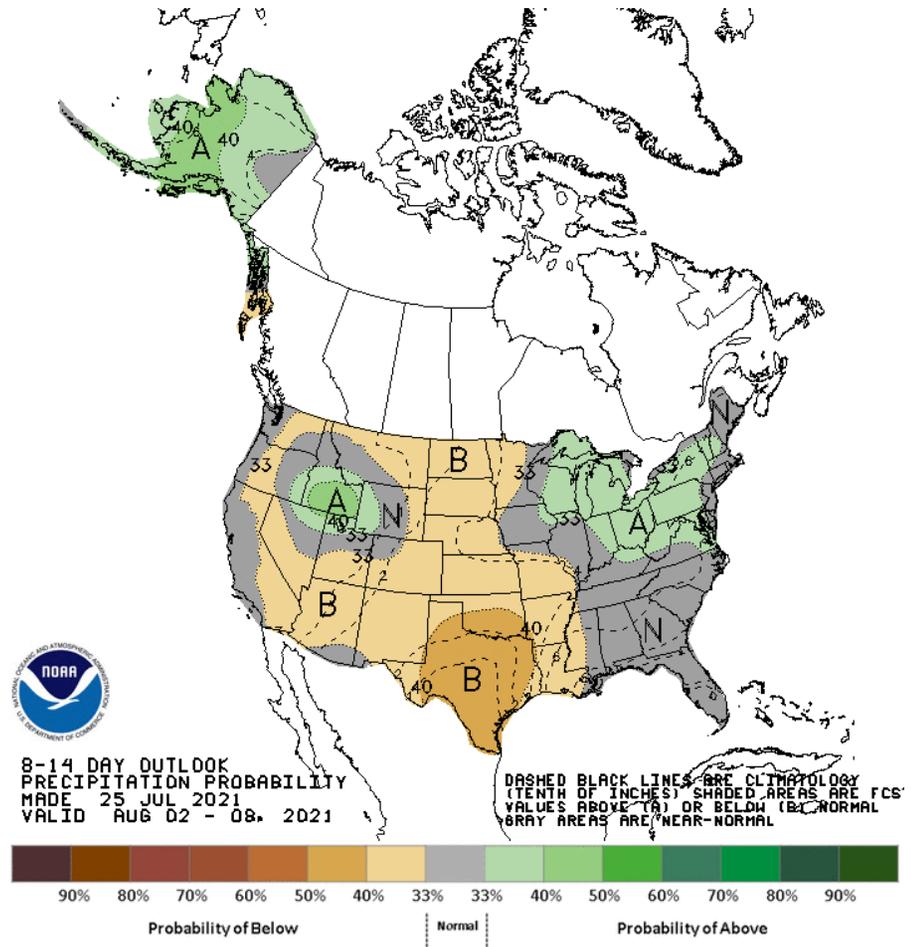
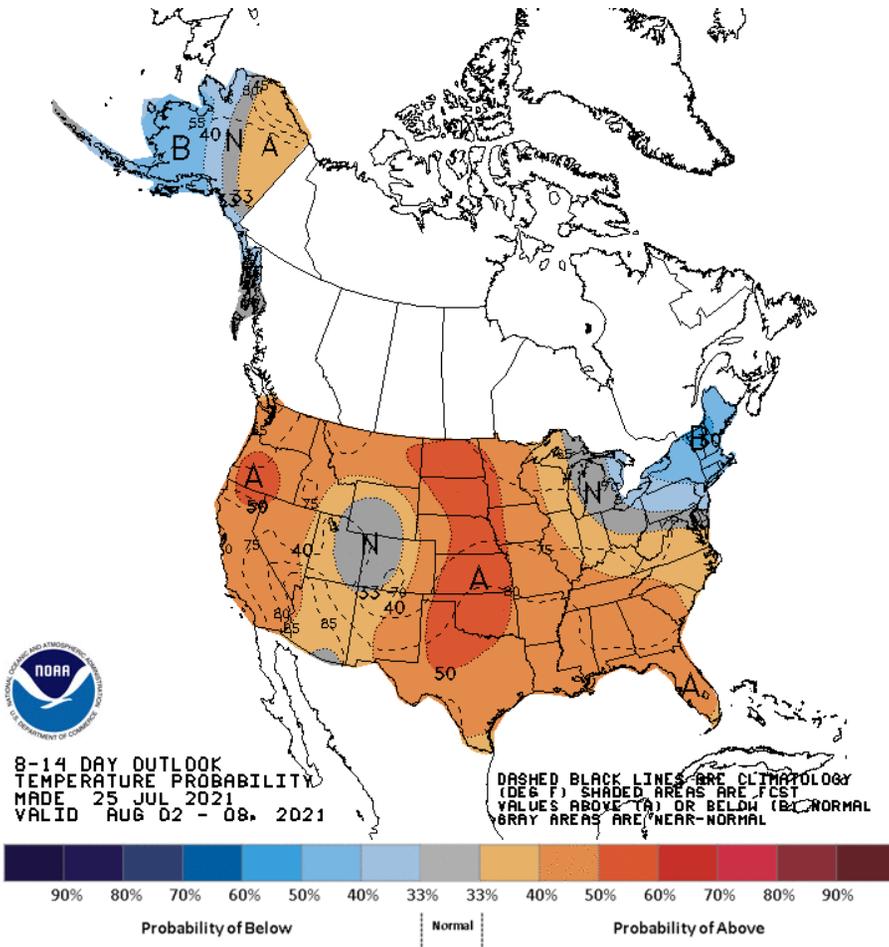


Clearly some monsoonal precipitation patterns beginning to take shape

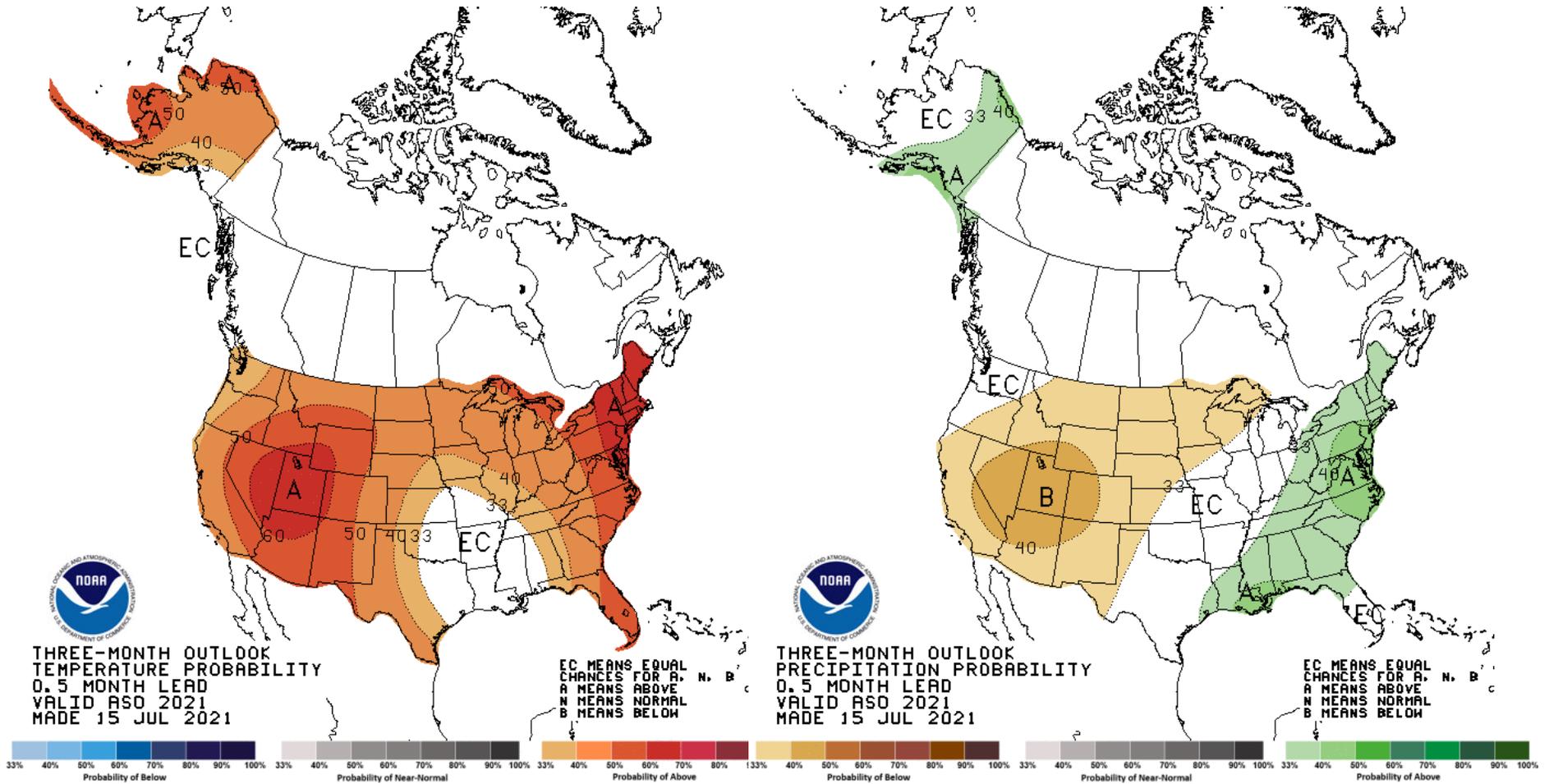
Clear monsoonal pattern this week



# 8-14 day outlook

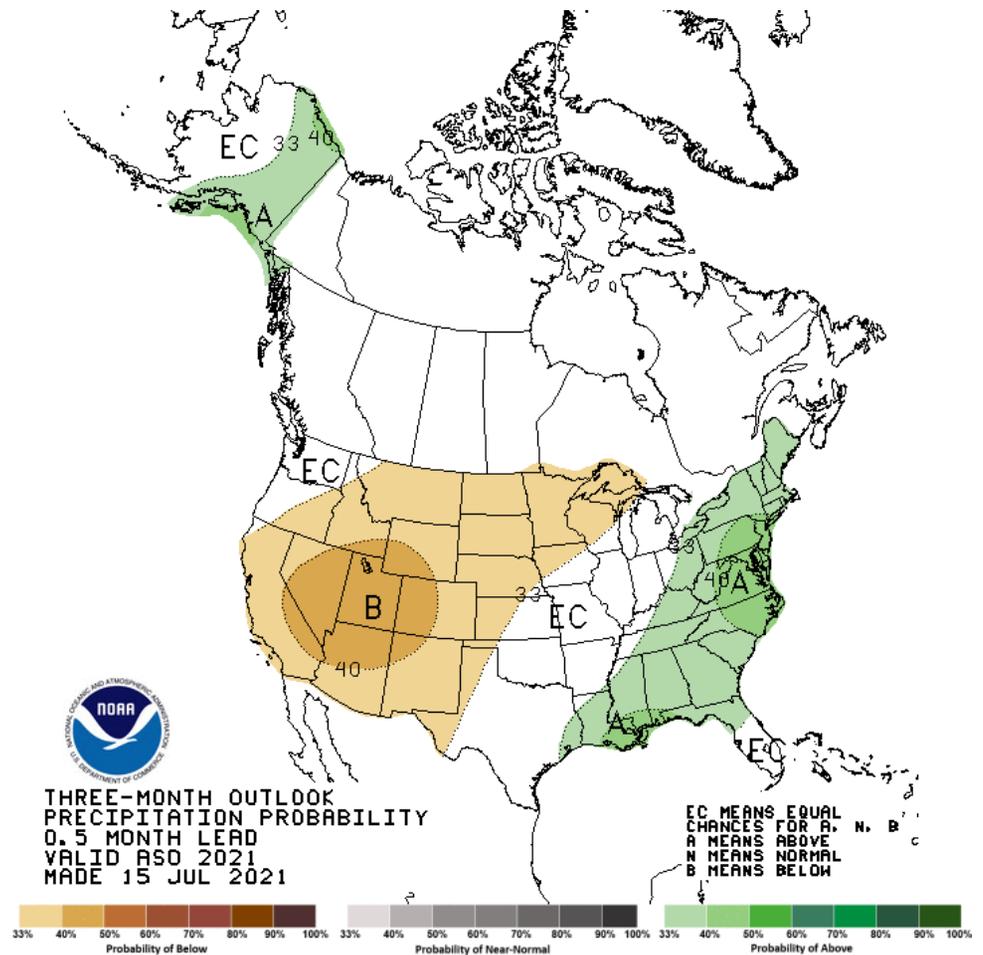


# Seasonal outlook

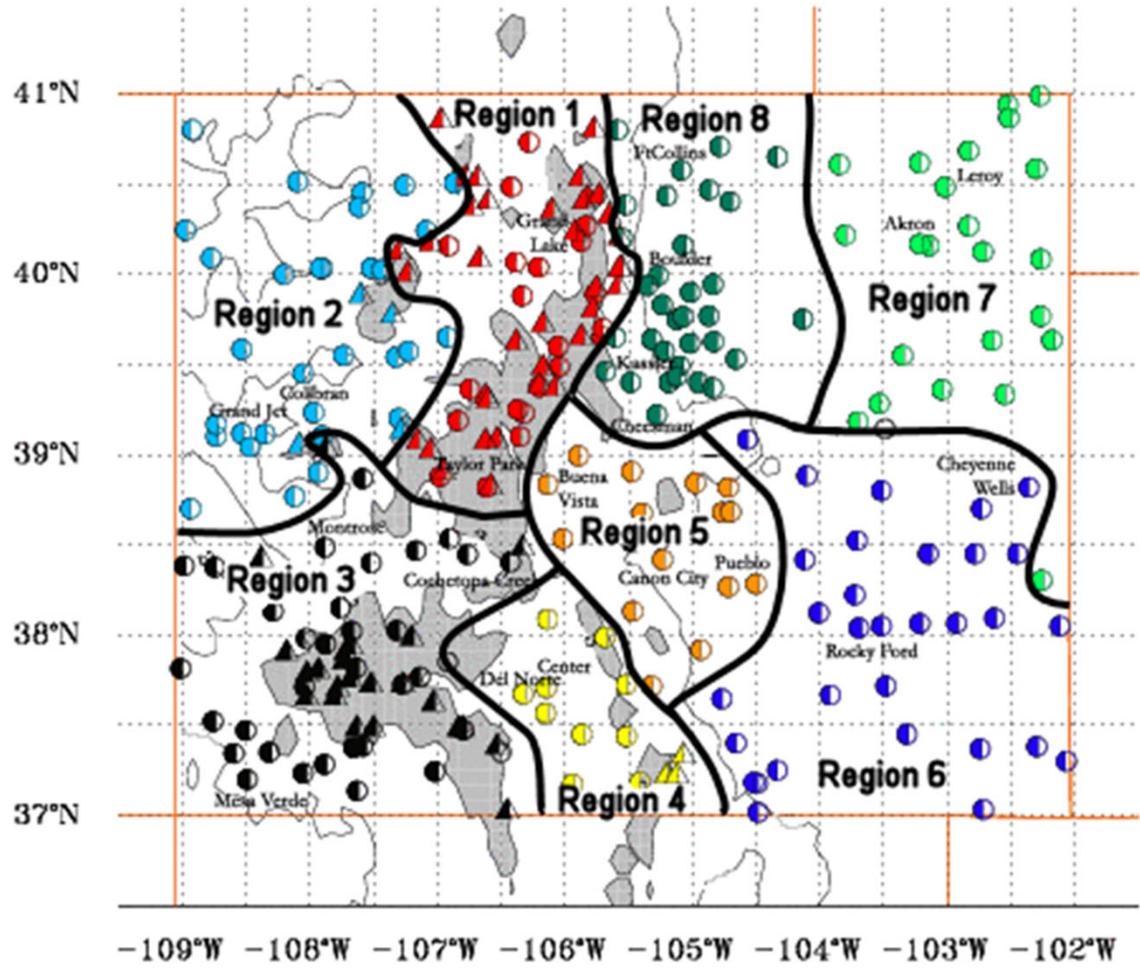


# Seasonal outlook

- Precip forecast heavily weighted on October
- 2<sup>nd</sup> year La Niña likely, which typically brings a dry winter



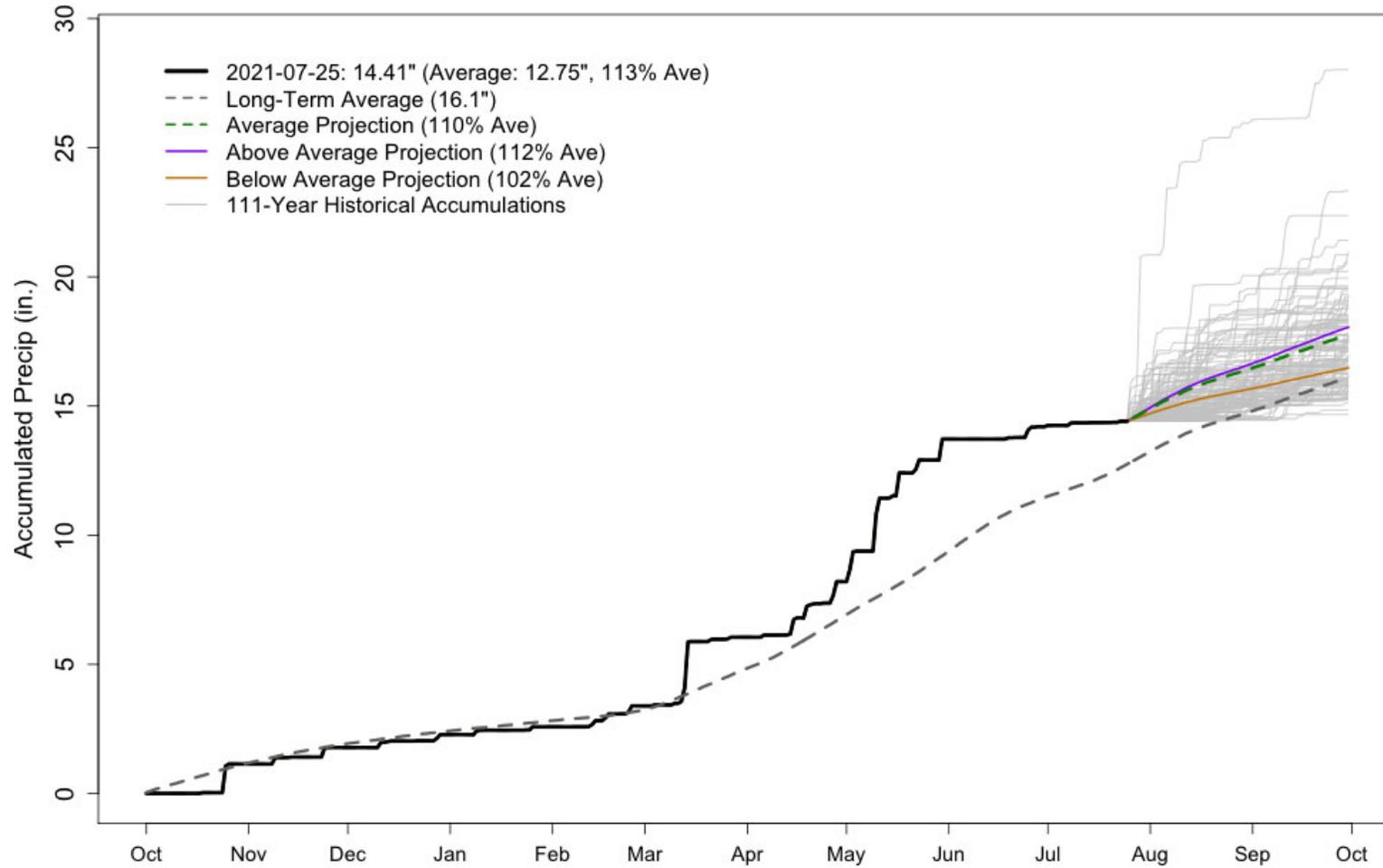
# COLORADO



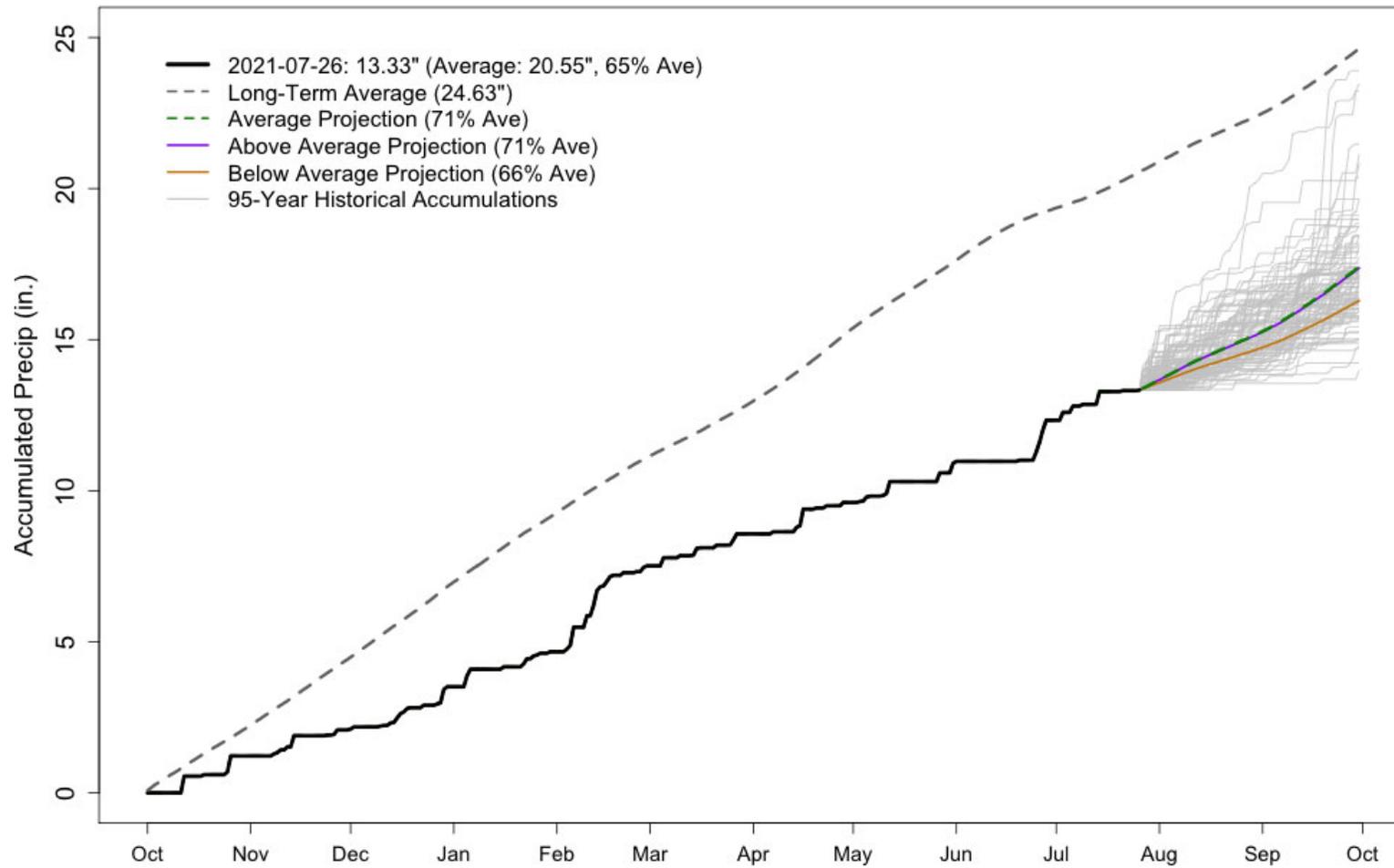
Precipitation Projections by Climate Region (credit: Klaus Wolter NOAA)



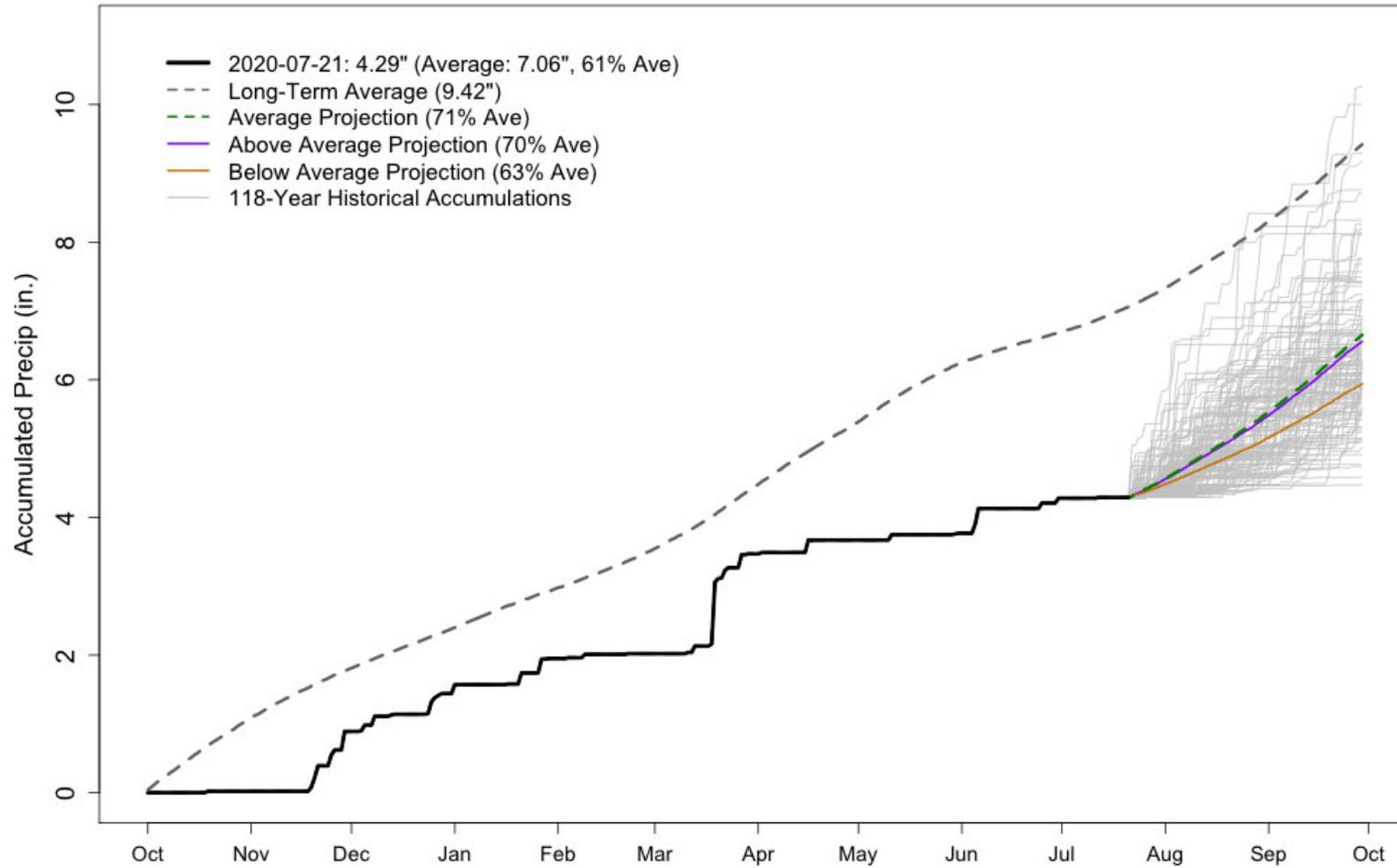
## FORT COLLINS WY2021 Precipitation Projections



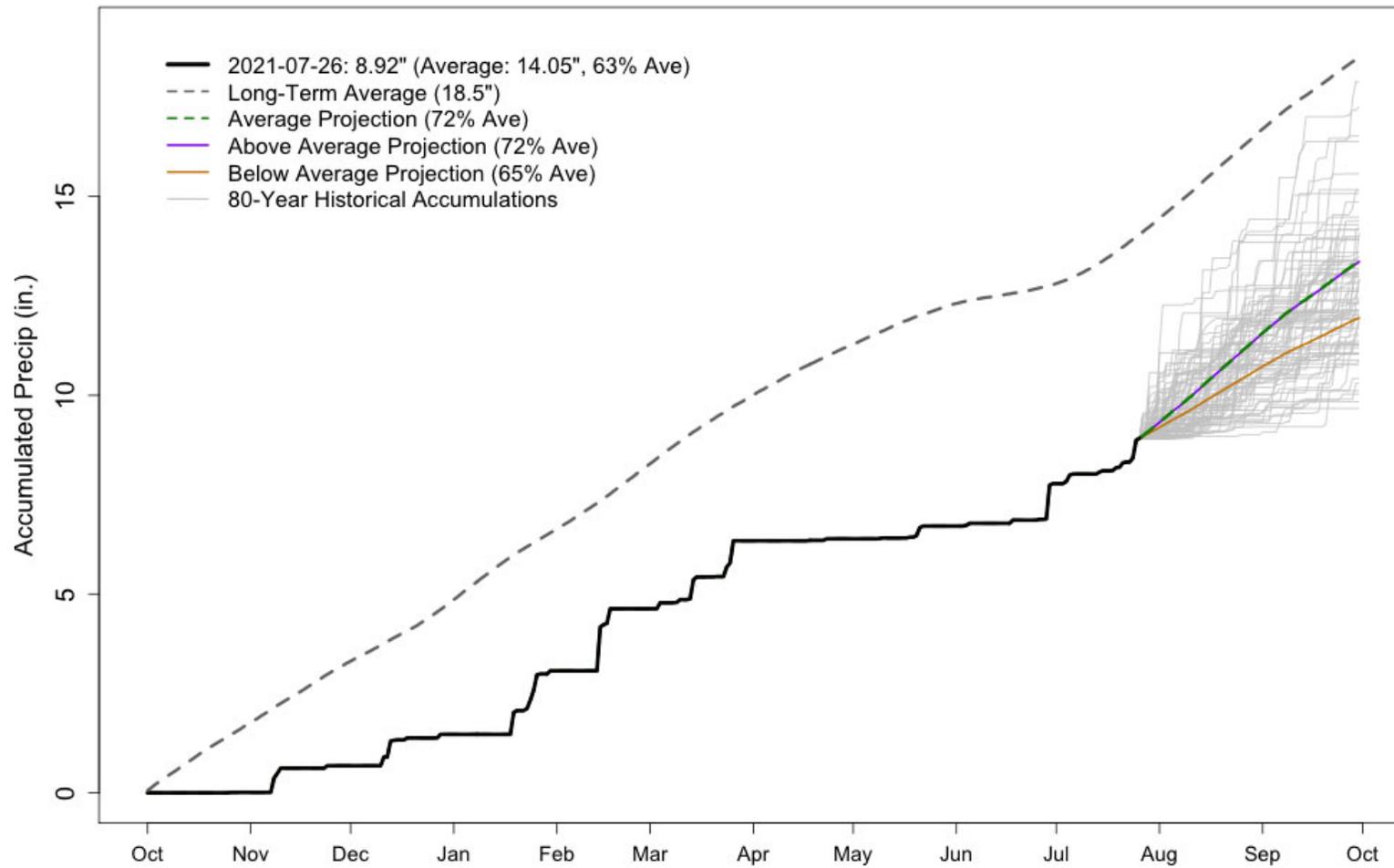
## STEAMBOAT SPRINGS WY2021 Precipitation Projections



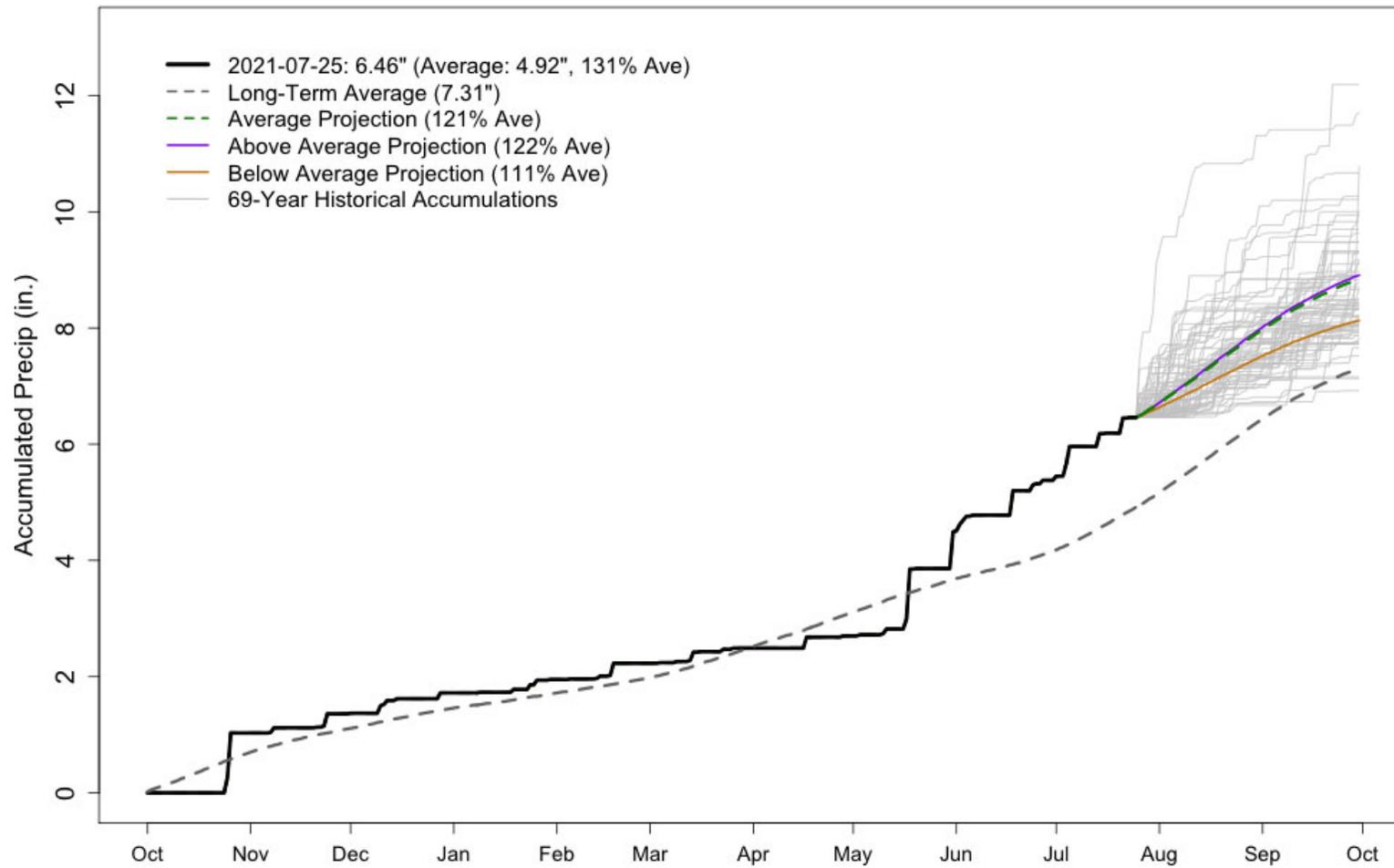
## GRAND JUNCTION WALKER FIELD WY2020 Precipitation Projections



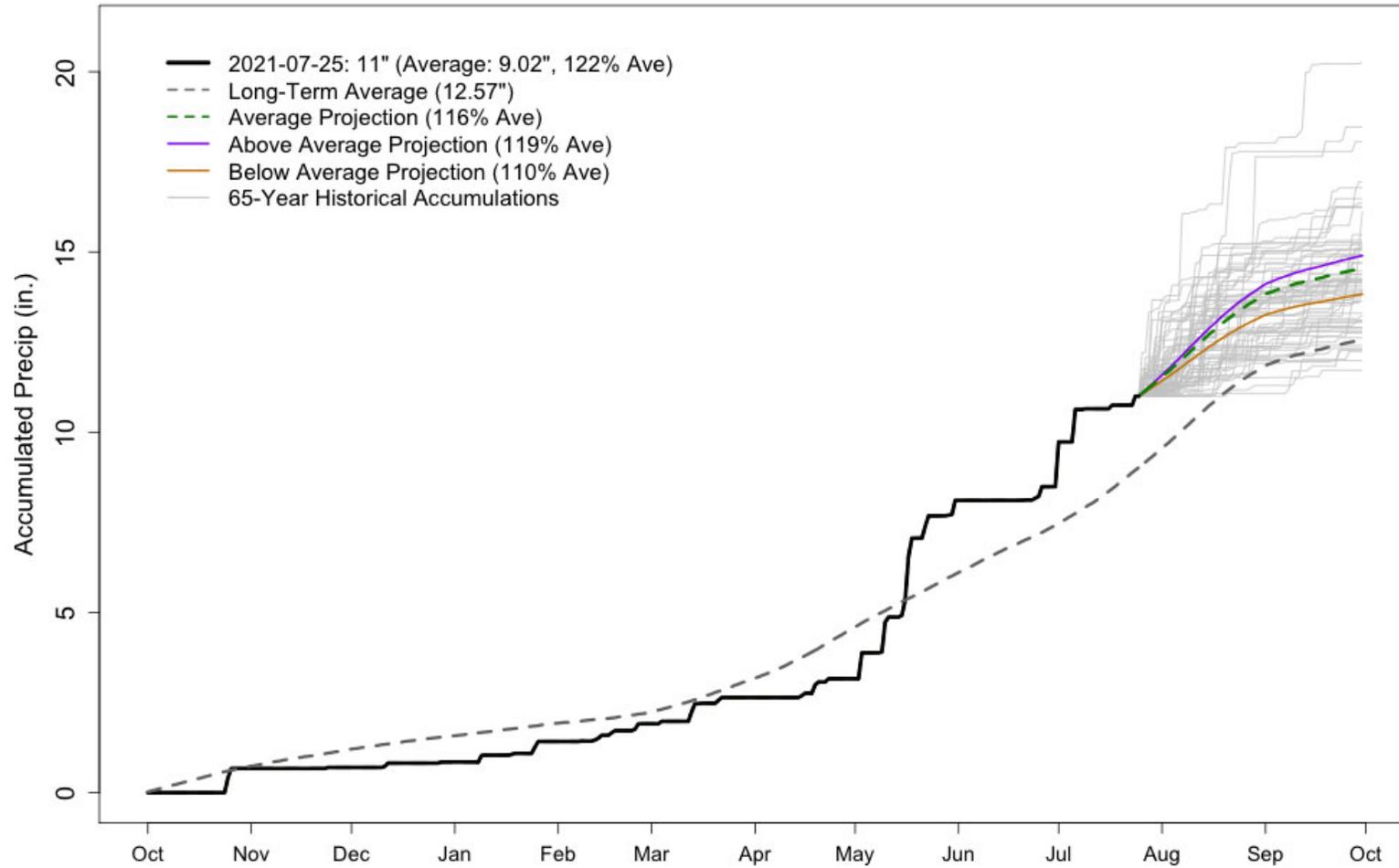
## MESA VERDE NP WY2021 Precipitation Projections



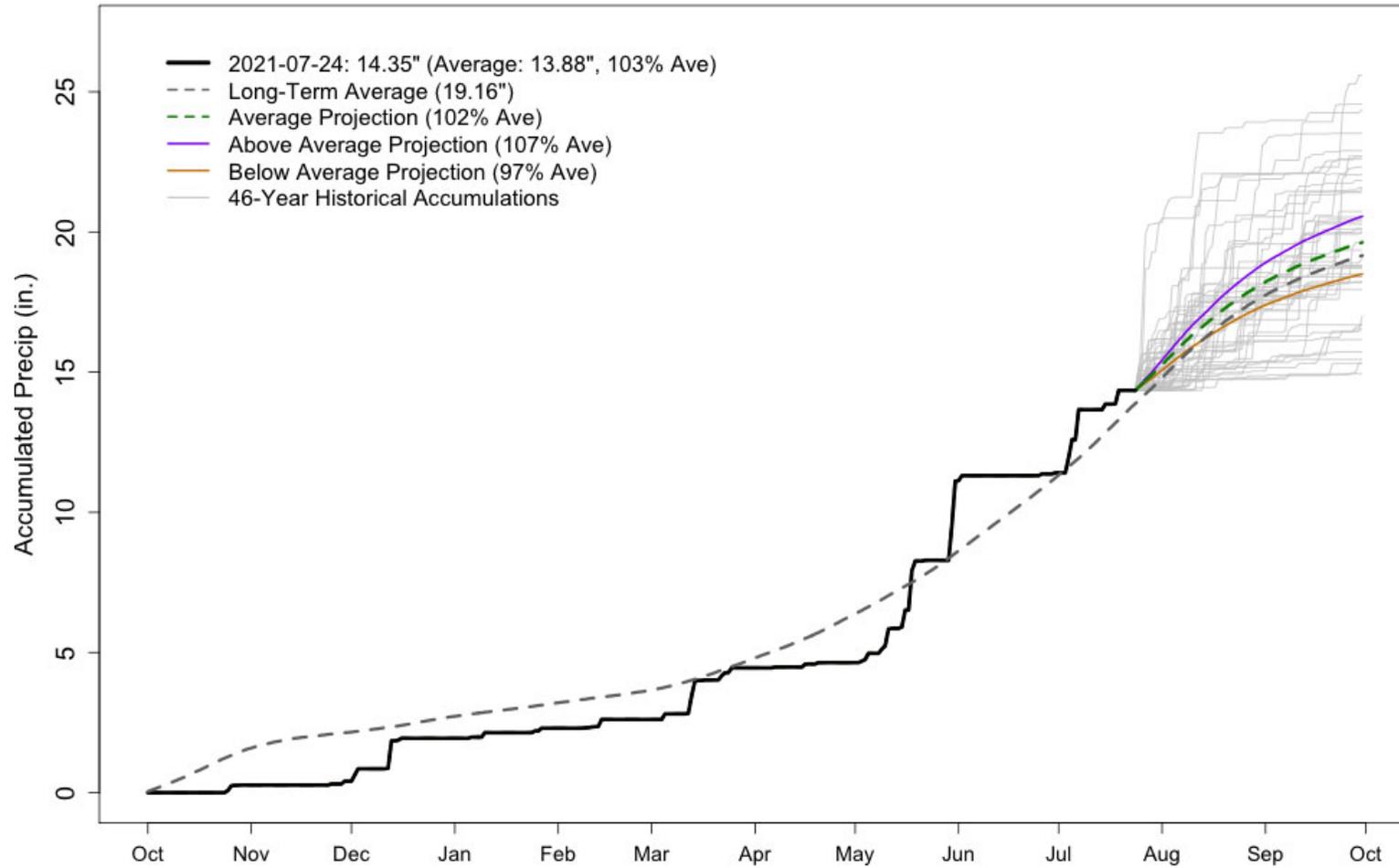
## ALAMOSA-BERGMAN FIELD WY2021 Precipitation Projections



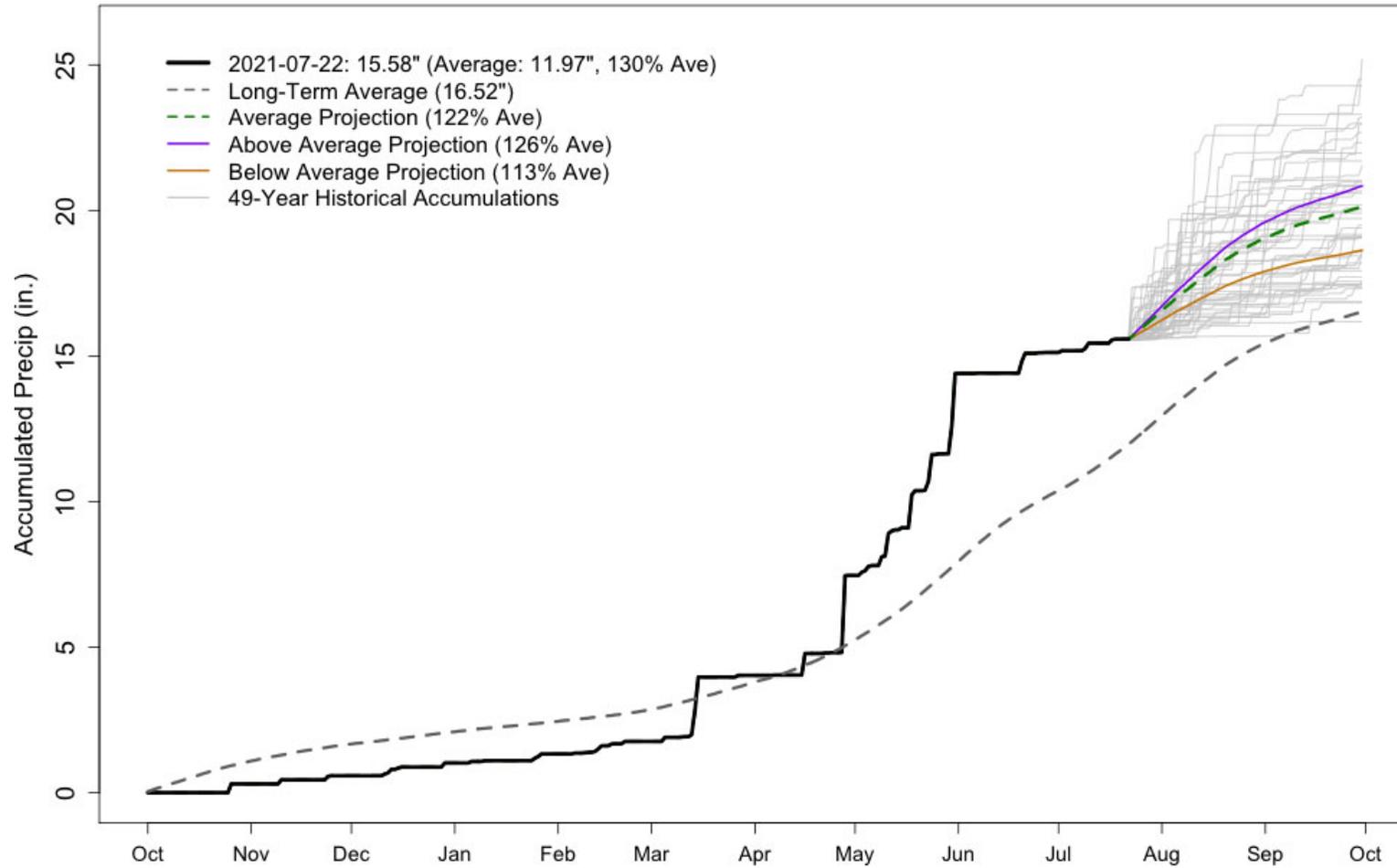
## PUEBLO MEMORIAL AIRPORT WY2021 Precipitation Projections



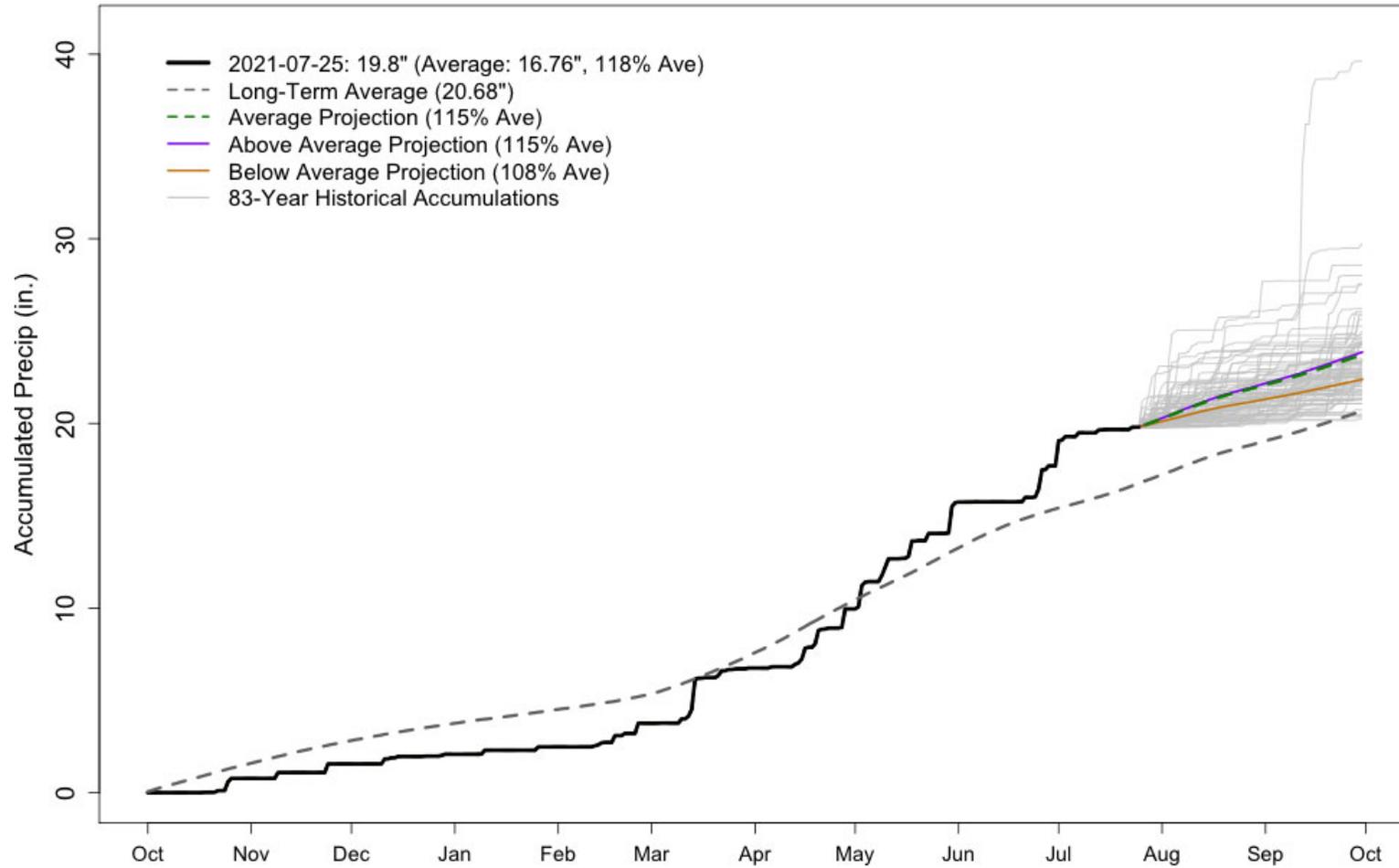
## WALSH 1 W WY2021 Precipitation Projections



## AKRON 4 E WY2021 Precipitation Projections



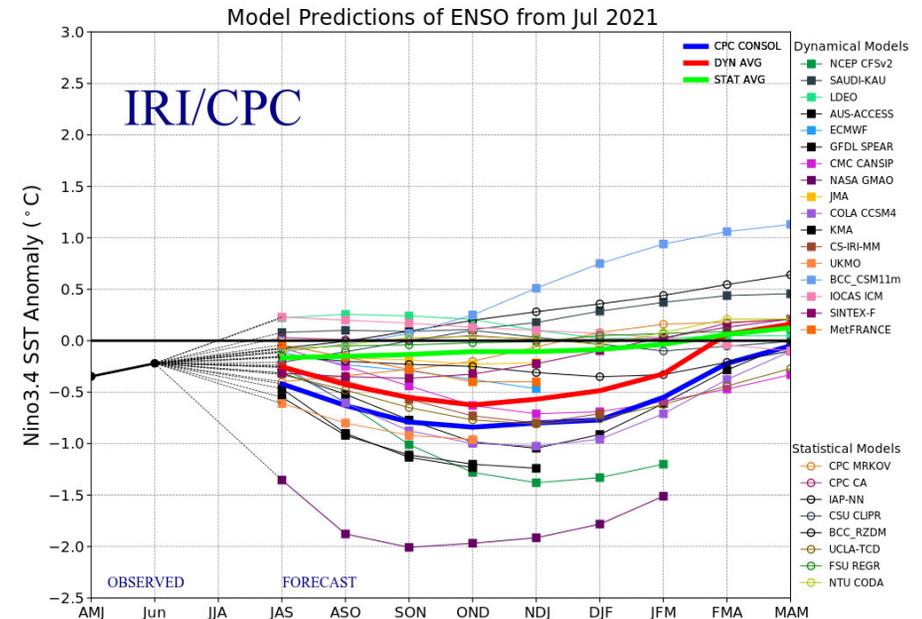
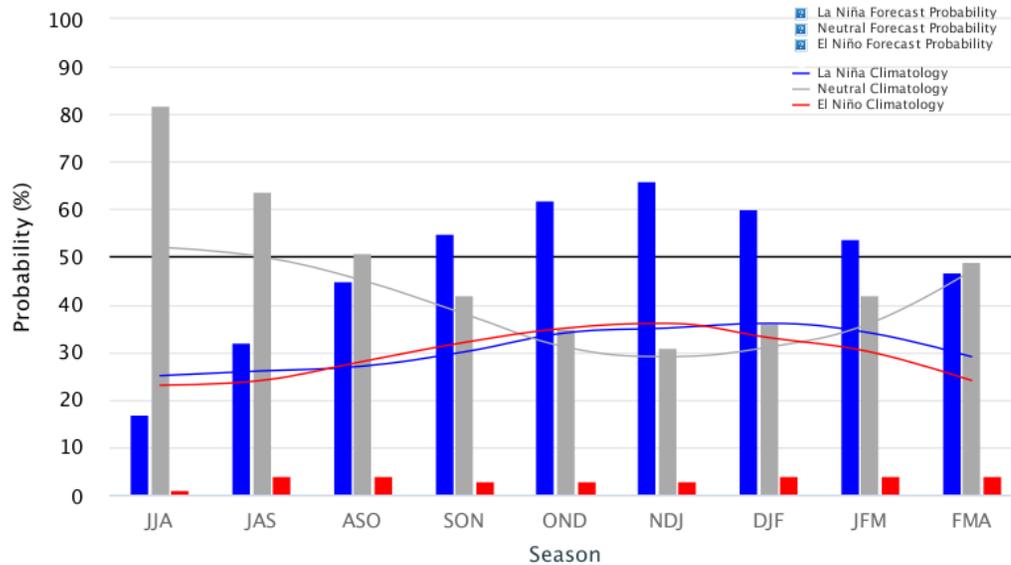
## BOULDER WY2021 Precipitation Projections



# What's the El Niño forecast?

Early-July 2021 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly  
Neutral ENSO:  $-0.5\text{ }^{\circ}\text{C}$  to  $0.5\text{ }^{\circ}\text{C}$



La Niña conditions are likely to last through the winter. It may well fall apart in the spring. That is actually a good combination for Colorado.



# Summary points

- Between spring and summer, most of Colorado has received decent moisture for spring/summer
- This drought has moved into long-term territory, and is, in many ways, more of a western region drought than a Colorado drought
- Three of the last four snowpacks, and four of the four last monsoons have been dry, and it's showing in the streamflows and reservoirs
- This monsoon is shaping up better than recent years, but next winter could plunge us further into long-term drought if 2<sup>nd</sup> year La Niña manifests



To view this and other presentations:  
[http://climate.colostate.edu/ccc\\_archive.html](http://climate.colostate.edu/ccc_archive.html)

[Peter.Goble@colostate.edu](mailto:Peter.Goble@colostate.edu)

Thank you!

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ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY