

# Colorado Climate Center – *WATF Climate Update*

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**Peter Goble, Service Climatologist**

**Water Availability Task Force**

**November 20<sup>th</sup>, 2020**

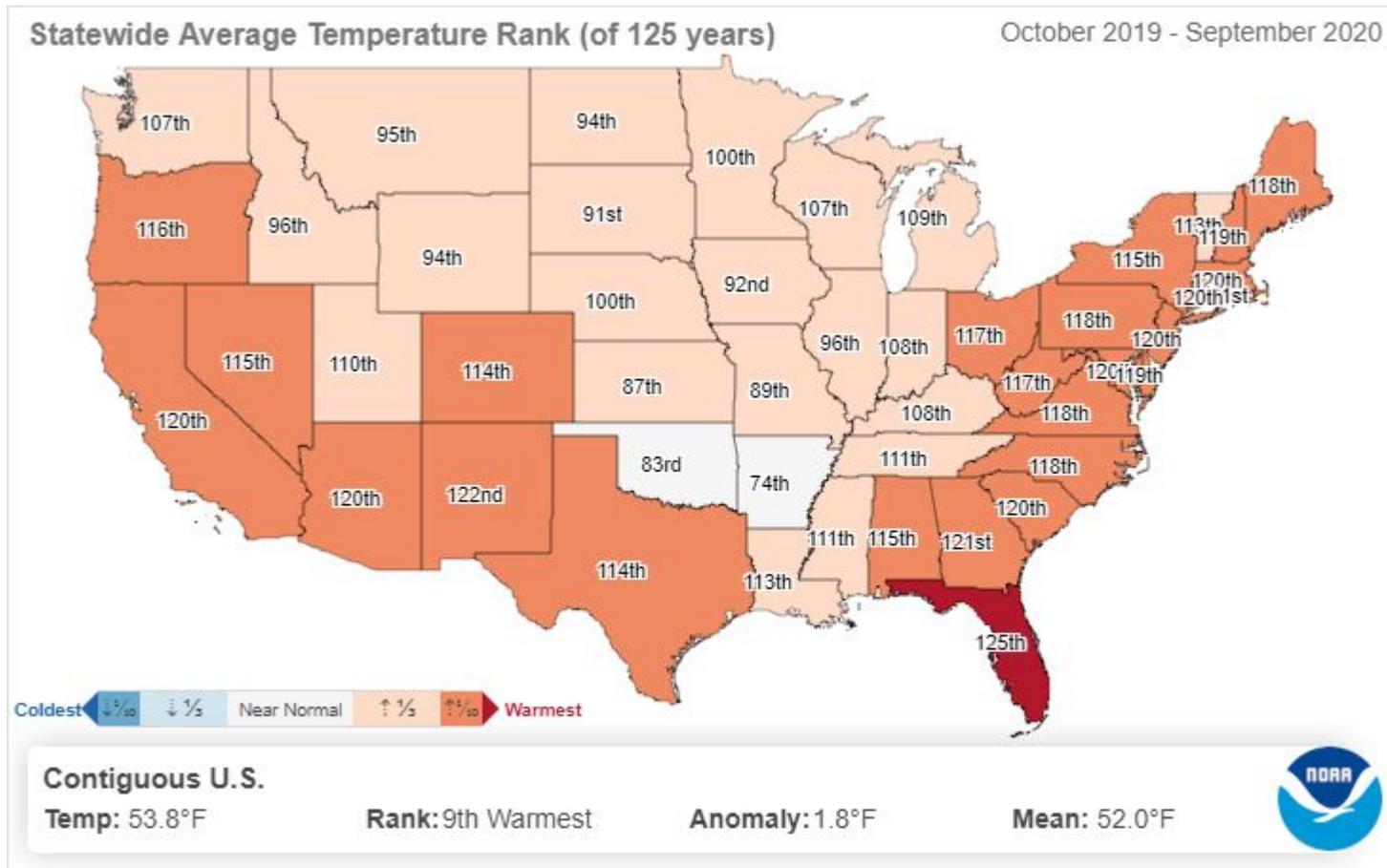


**ATMOSPHERIC SCIENCE**  
**COLORADO STATE UNIVERSITY**

# 2020 Water Year To Date

temperature, precipitation,  
standardized precipitation index





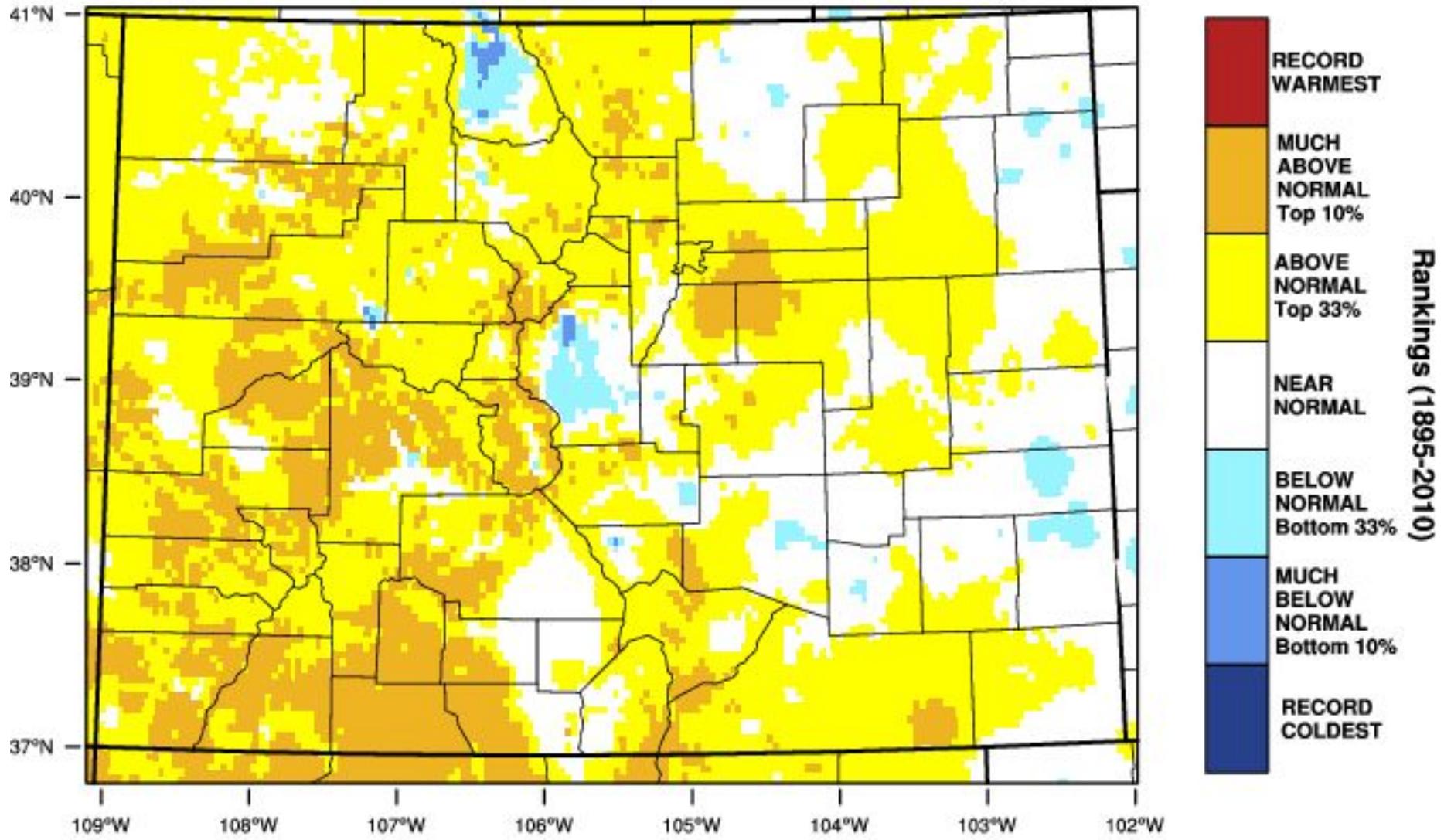
WY 2020 was the 12<sup>th</sup> warmest on record

Warm temperature anomalies took place during the summer more so than winter

The water year started cold, but ended with near record warmth

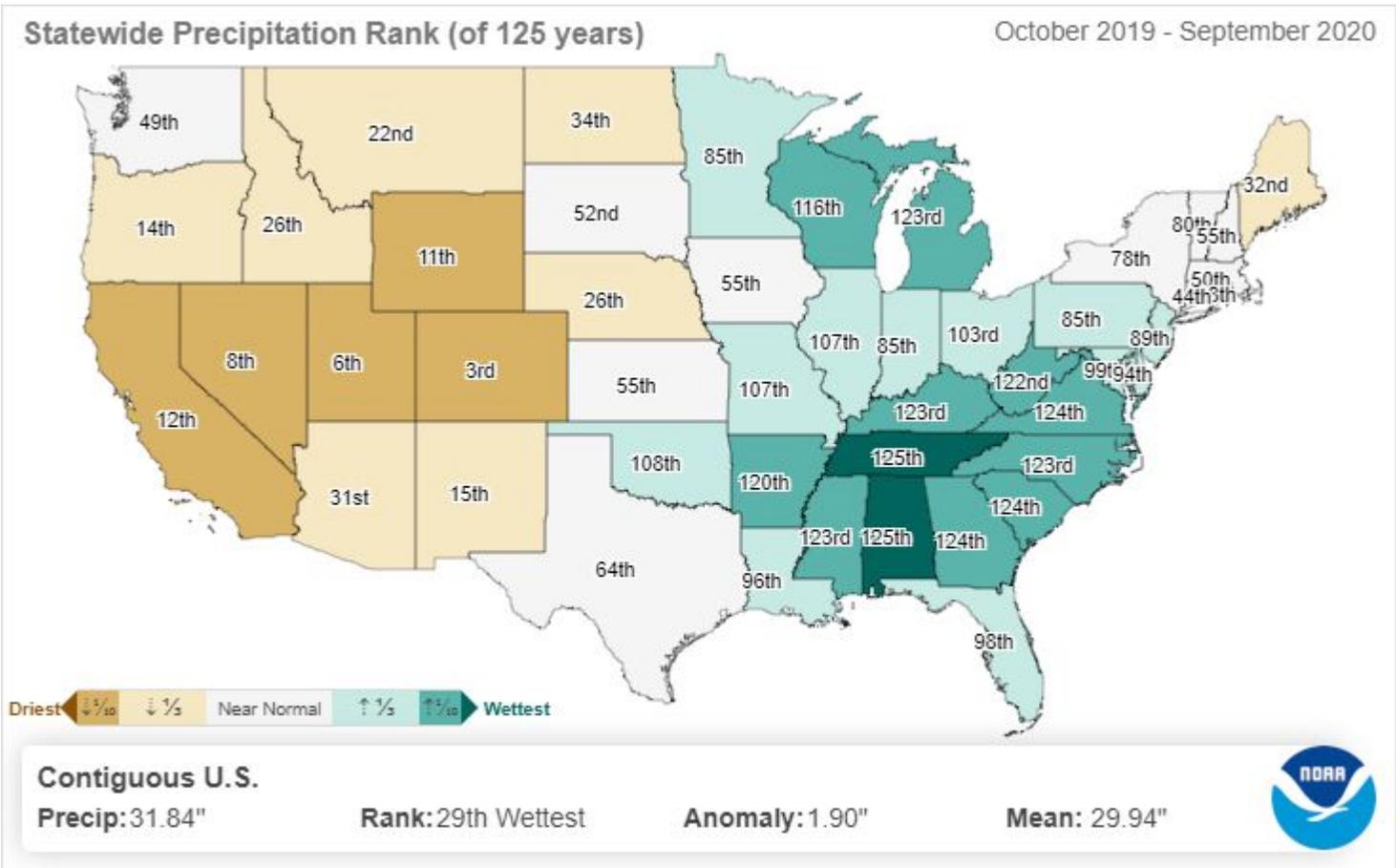
# Colorado - Mean Temperature

## October-September 2020 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2020





WY 2020 was the third driest on record

The last year this dry or drier was 2018

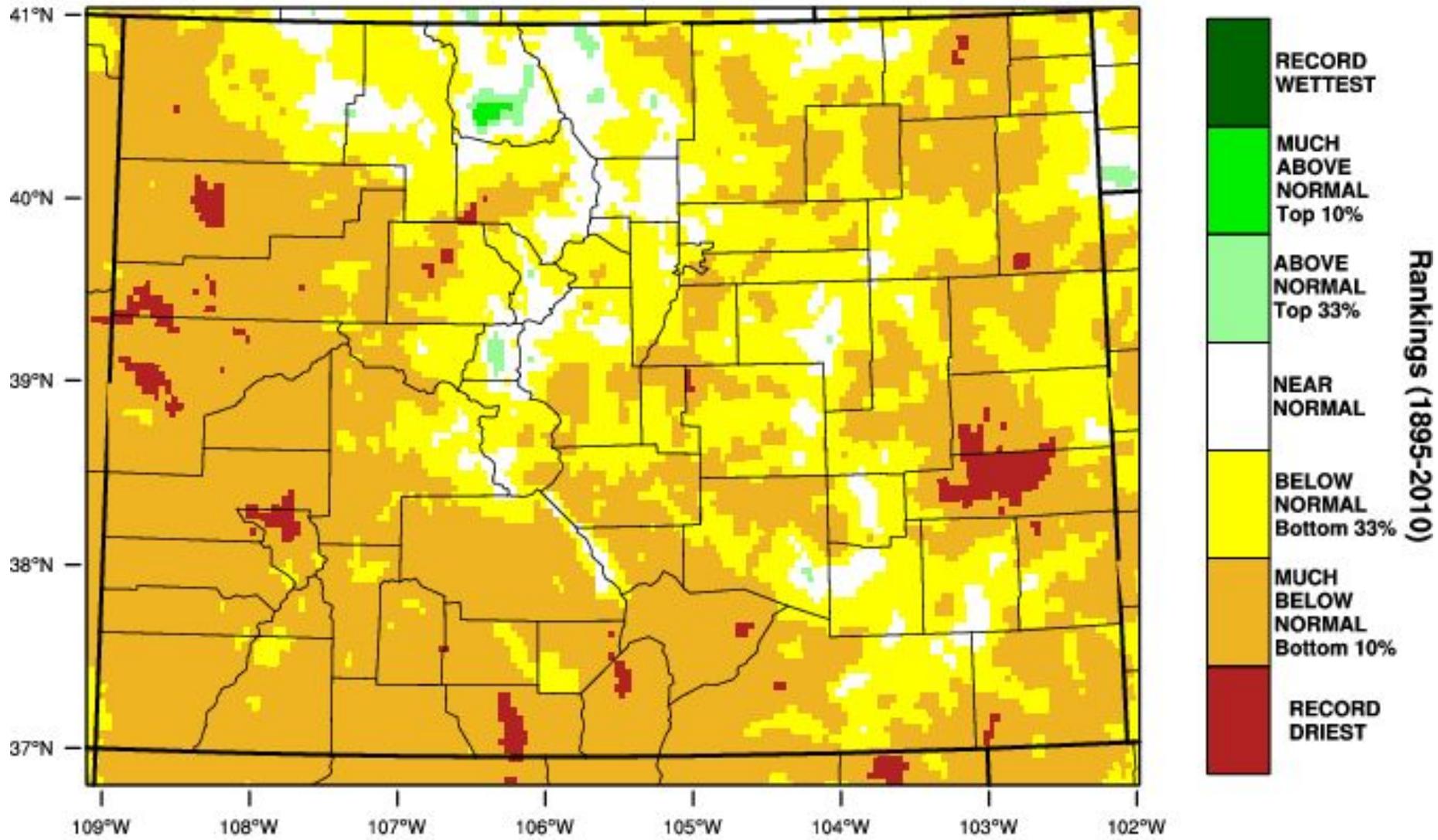
2002 was the driest year on record

Conditions late in the water year cemented widespread agricultural and ecological drought



# Colorado - Precipitation

## October-September 2020 Percentile

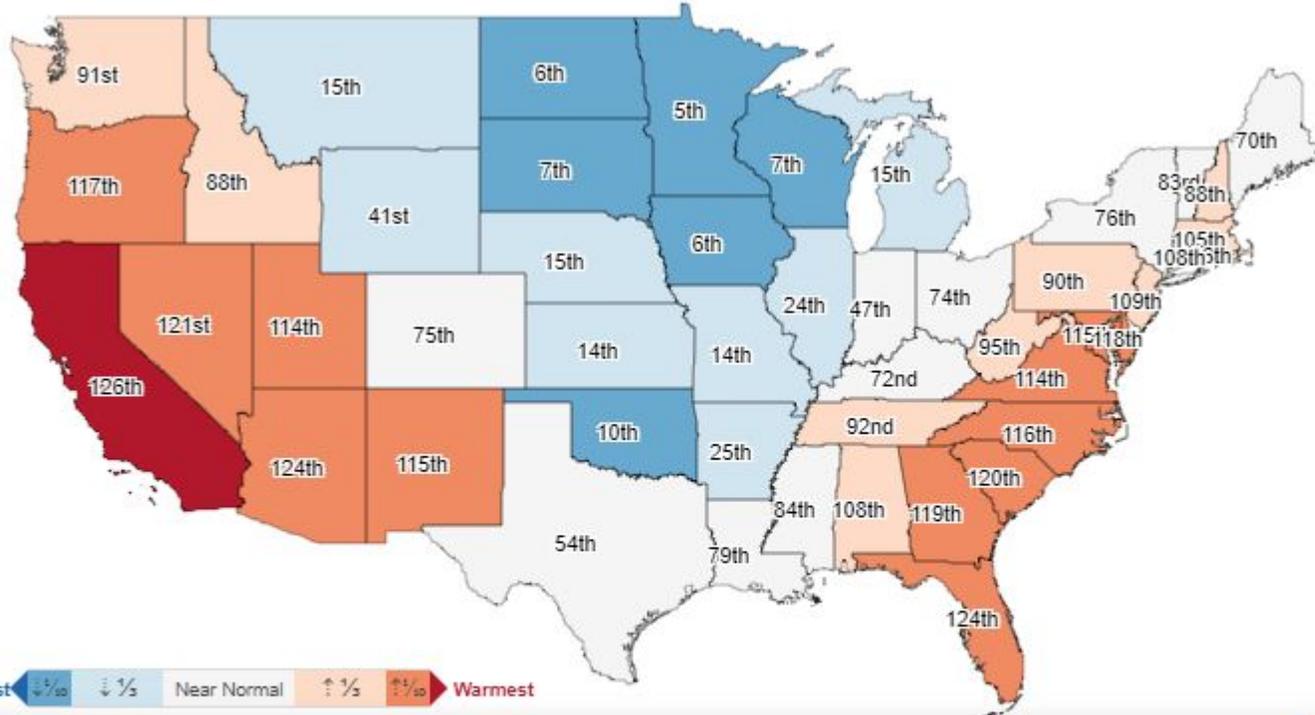


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2020



Statewide Average Temperature Rank (of 126 years)

October 2020



Contiguous U.S.

Temp: 54.4°F

Rank: 60th Warmest

Anomaly: 0.3°F

Mean: 54.1°F



Month	T Rank (of 126 years)	Above, below, or near avg?
Oct	52 <sup>nd</sup> warmest	Near normal
Nov		
Dec		
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		

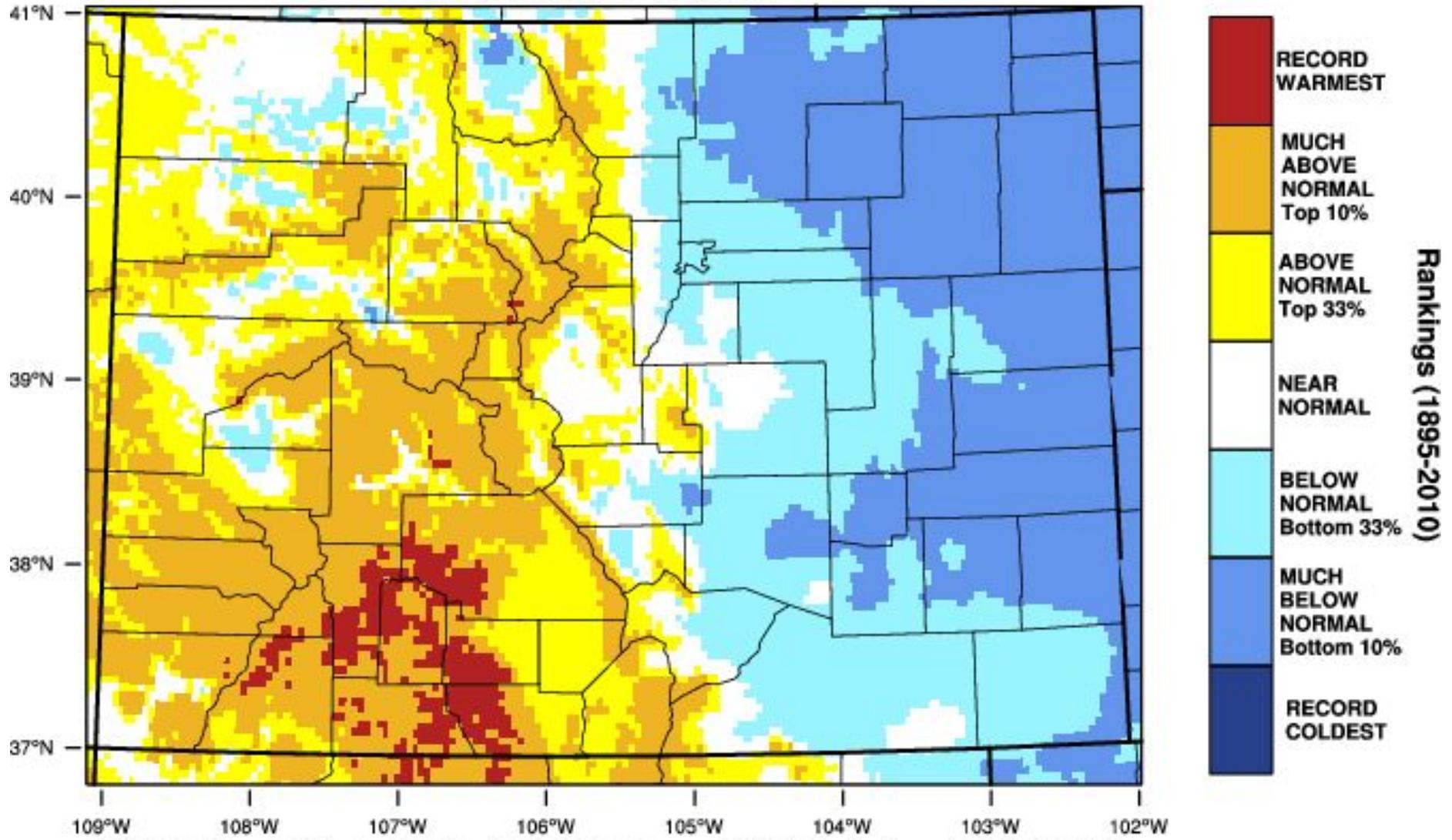
October temperatures were above normal for most of the month, but a strong cold snap hit just before Halloween

This is similar to what happened last year



# Colorado - Mean Temperature

## October 2020 Percentile

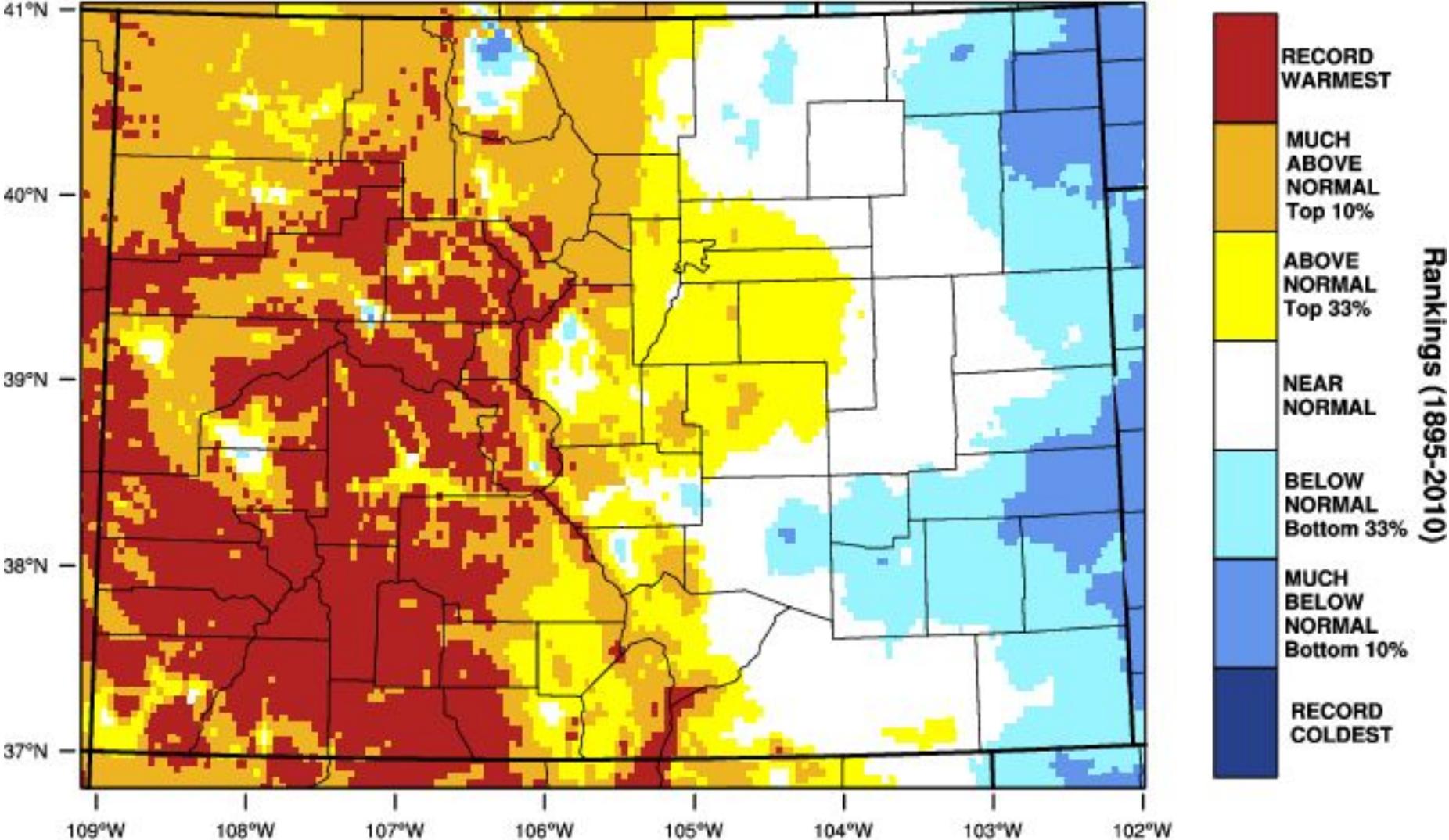


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 NOV 2020



# Colorado - Mean Temperature

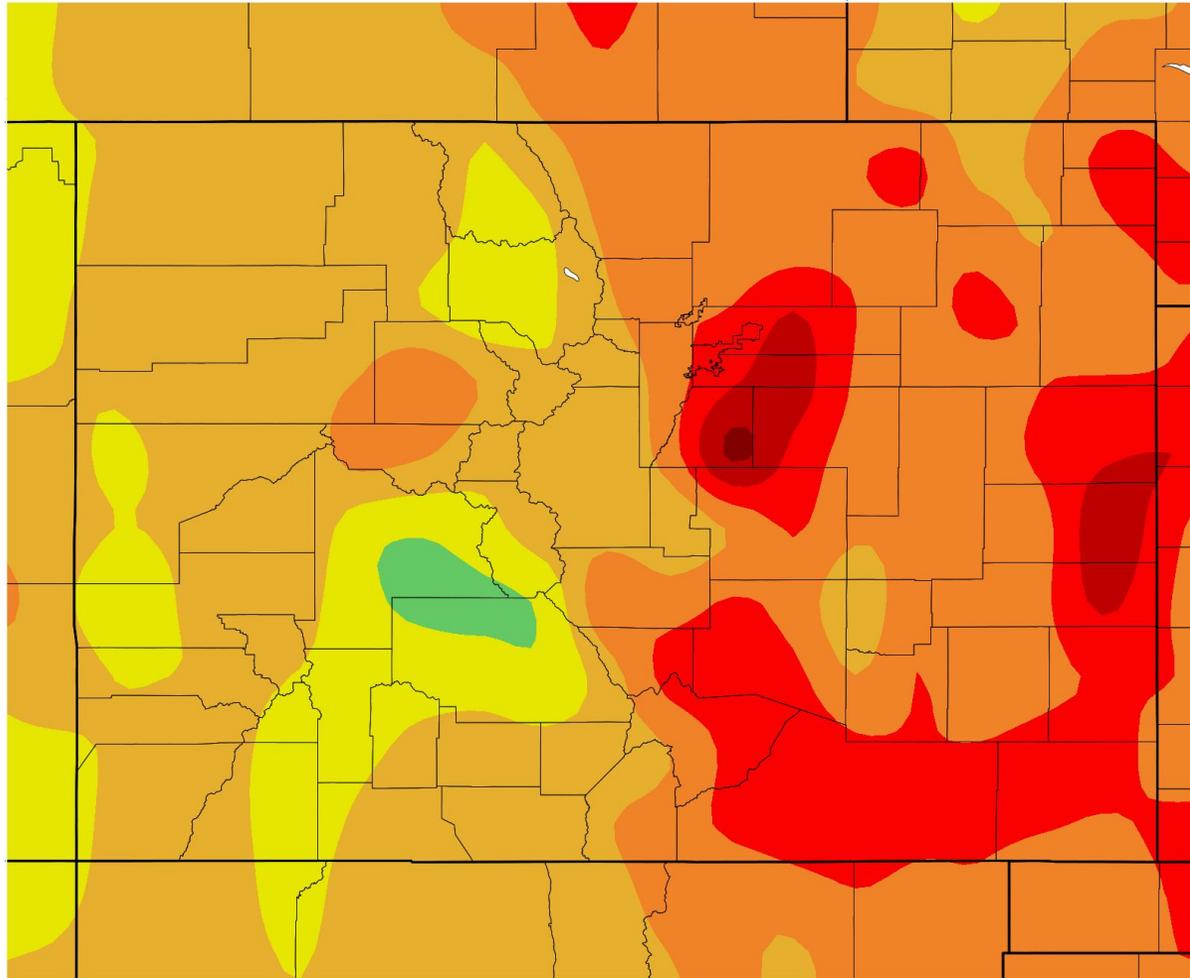
## August-October 2020 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 NOV 2020



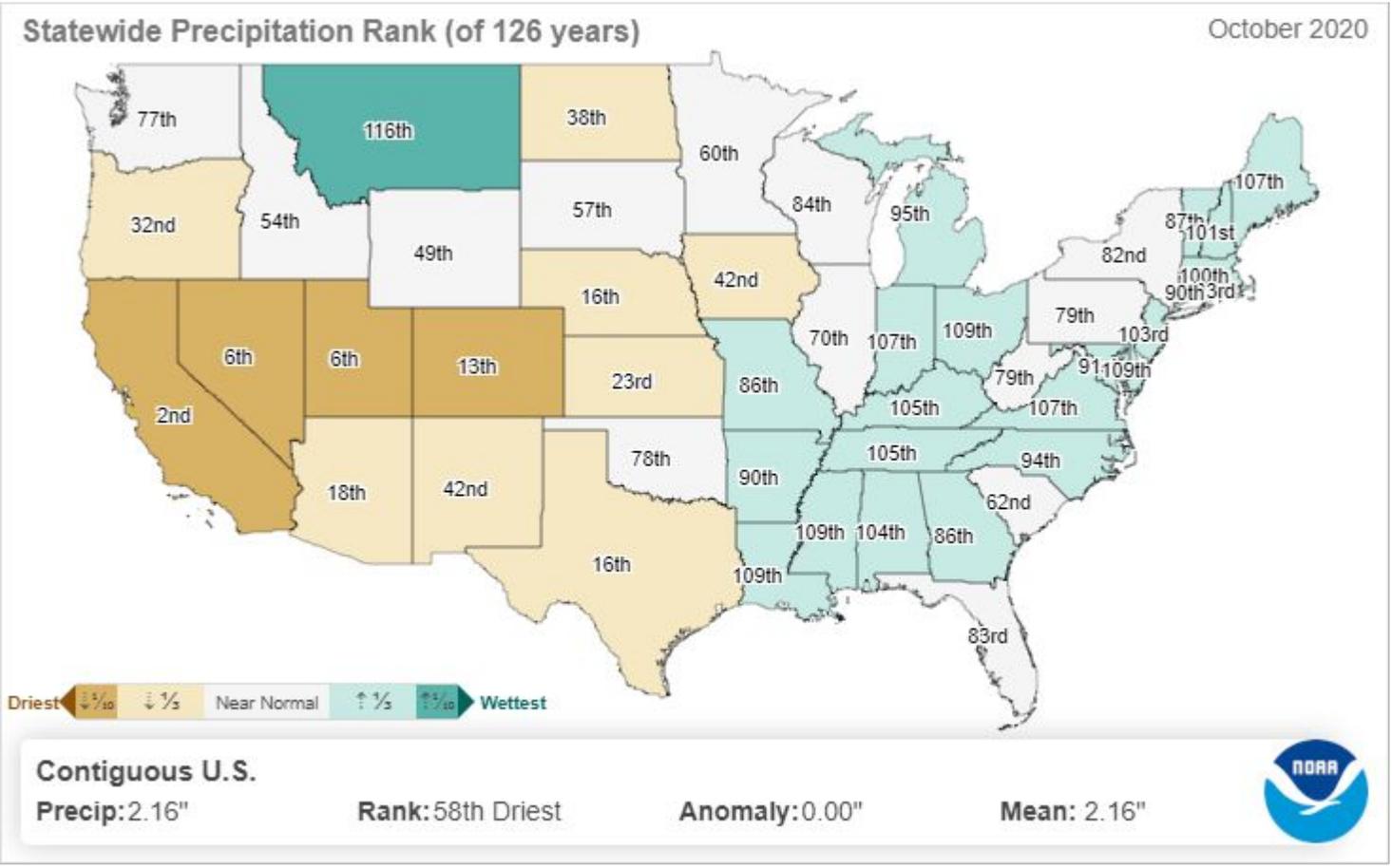
# Departure from Normal Temperature (F) 11/1/2020 – 11/18/2020



November is off to a warm start in eastern Colorado

This is likely to continue



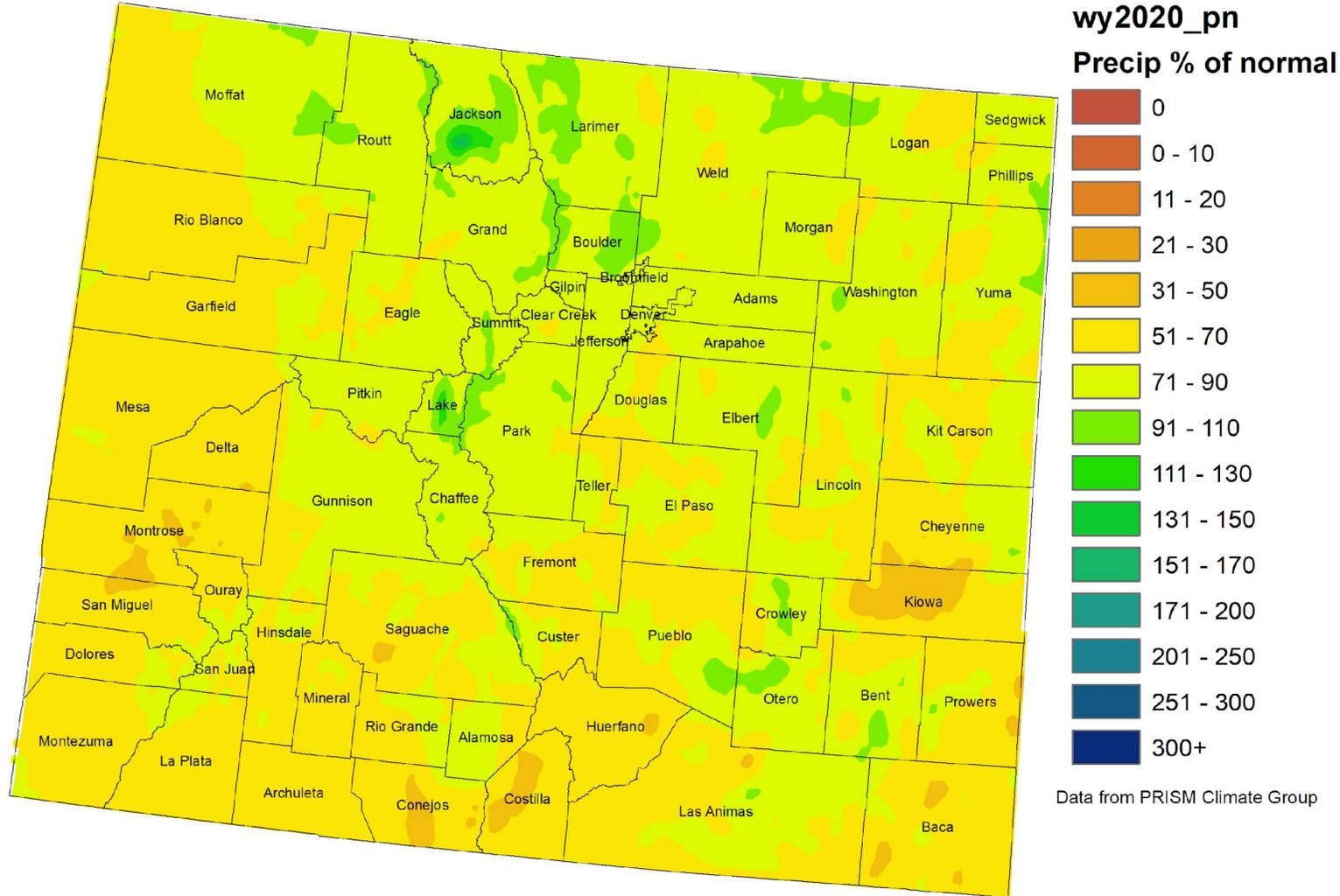


Month	P Rank (of 126 years)	Above, below, or near avg?
Oct	13 <sup>th</sup> driest	below
Nov		
Dec		
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		

Rough start to the water year from a moisture standpoint



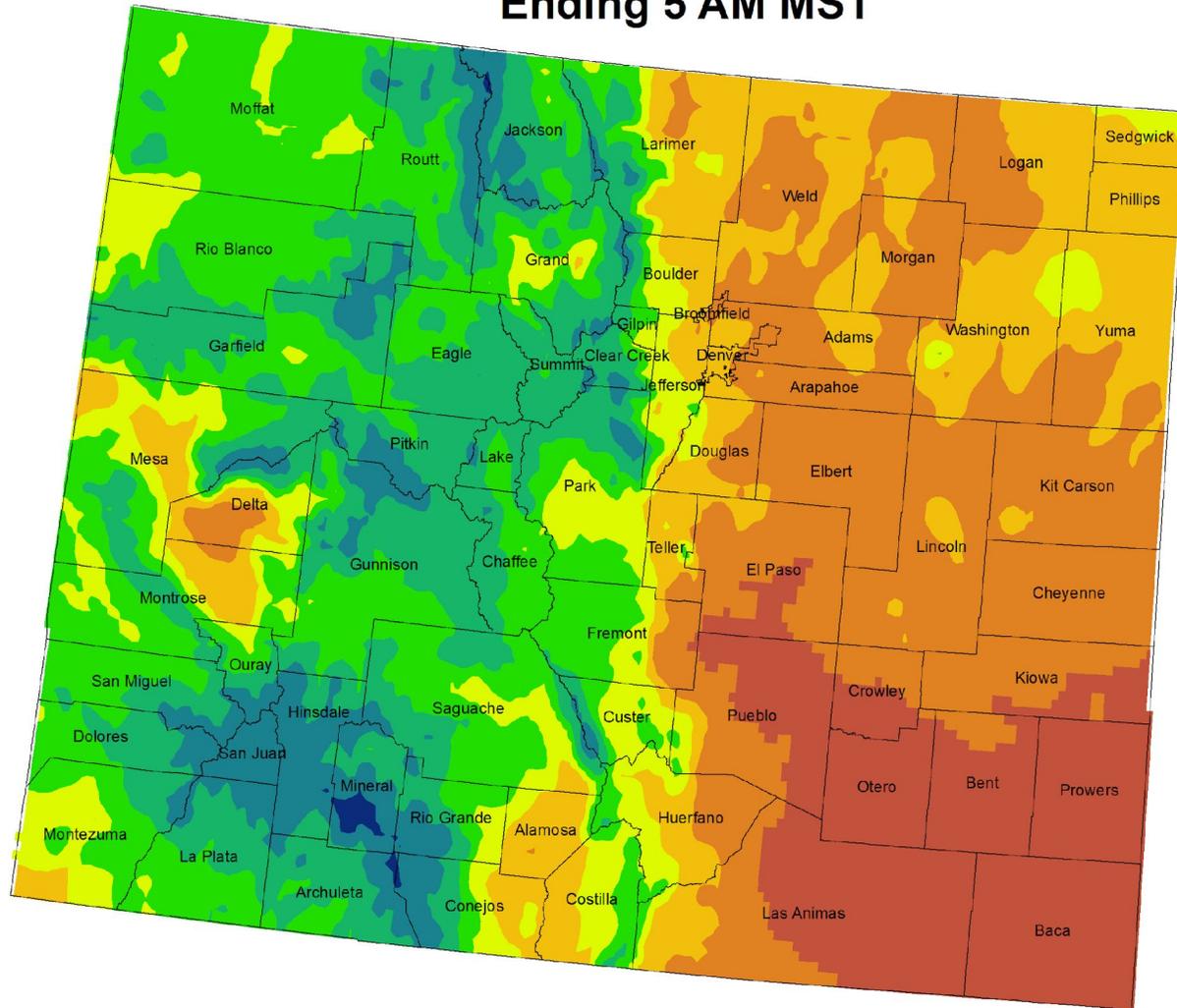
# Colorado Water Year 2020 Precipitation as a Percentage of Normal



Colorado has leaned dry to start the water year, though anomalies are not as extreme as August

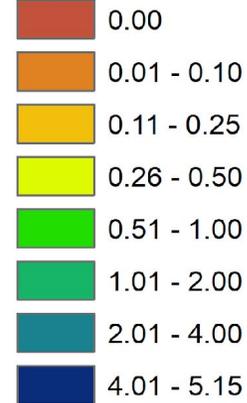
Very few areas starting above average

# Colorado Month to Date Precipitation 1 - 16 November 2020 Ending 5 AM MST



01\_16nov20

Precip (inches)

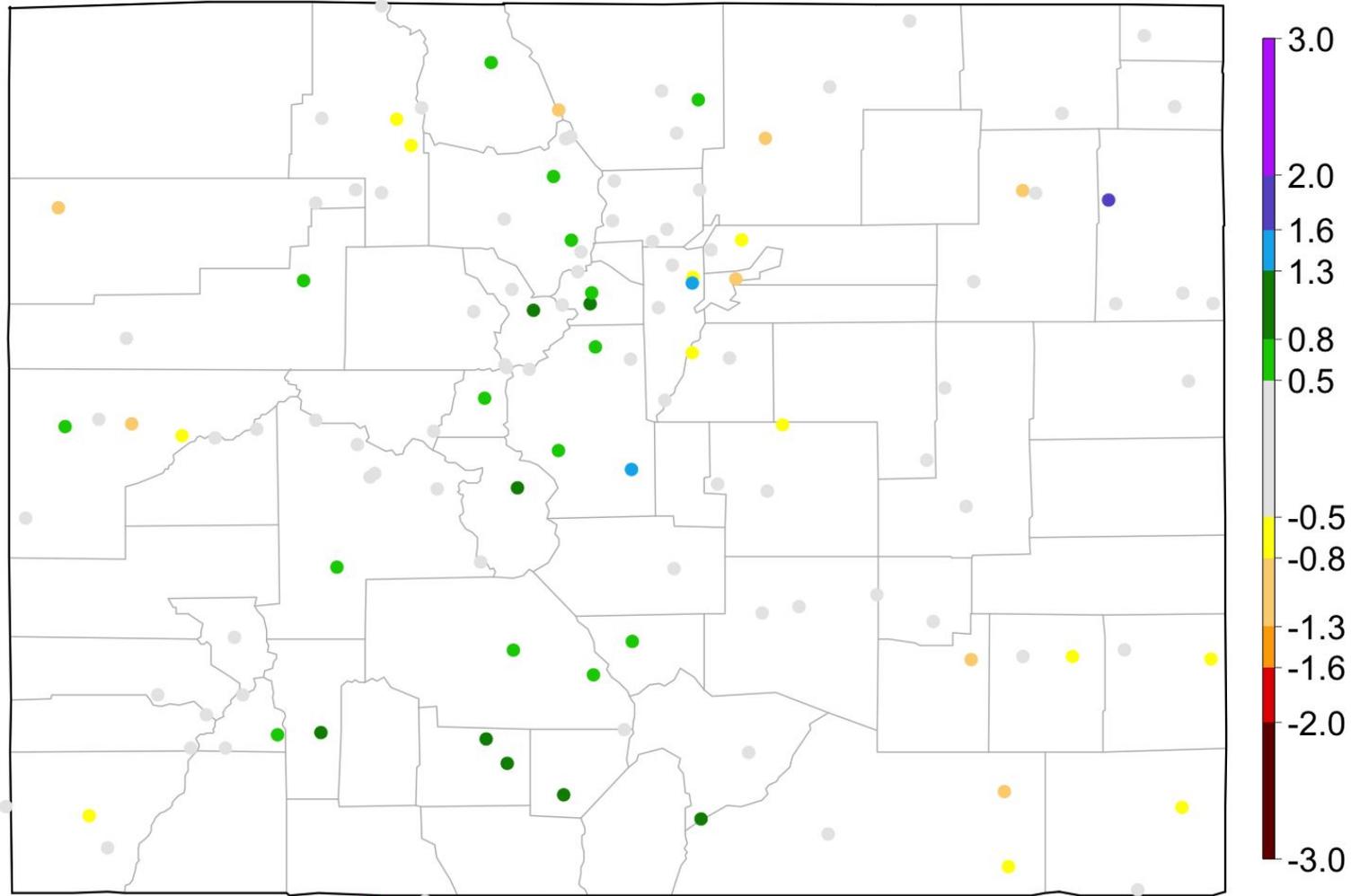


Data from PRISM Climate Group

November has given the mountains several decent storms, leading to an average start to the snow year



# 30-day SPI: 2020/10/18 - 2020/11/16

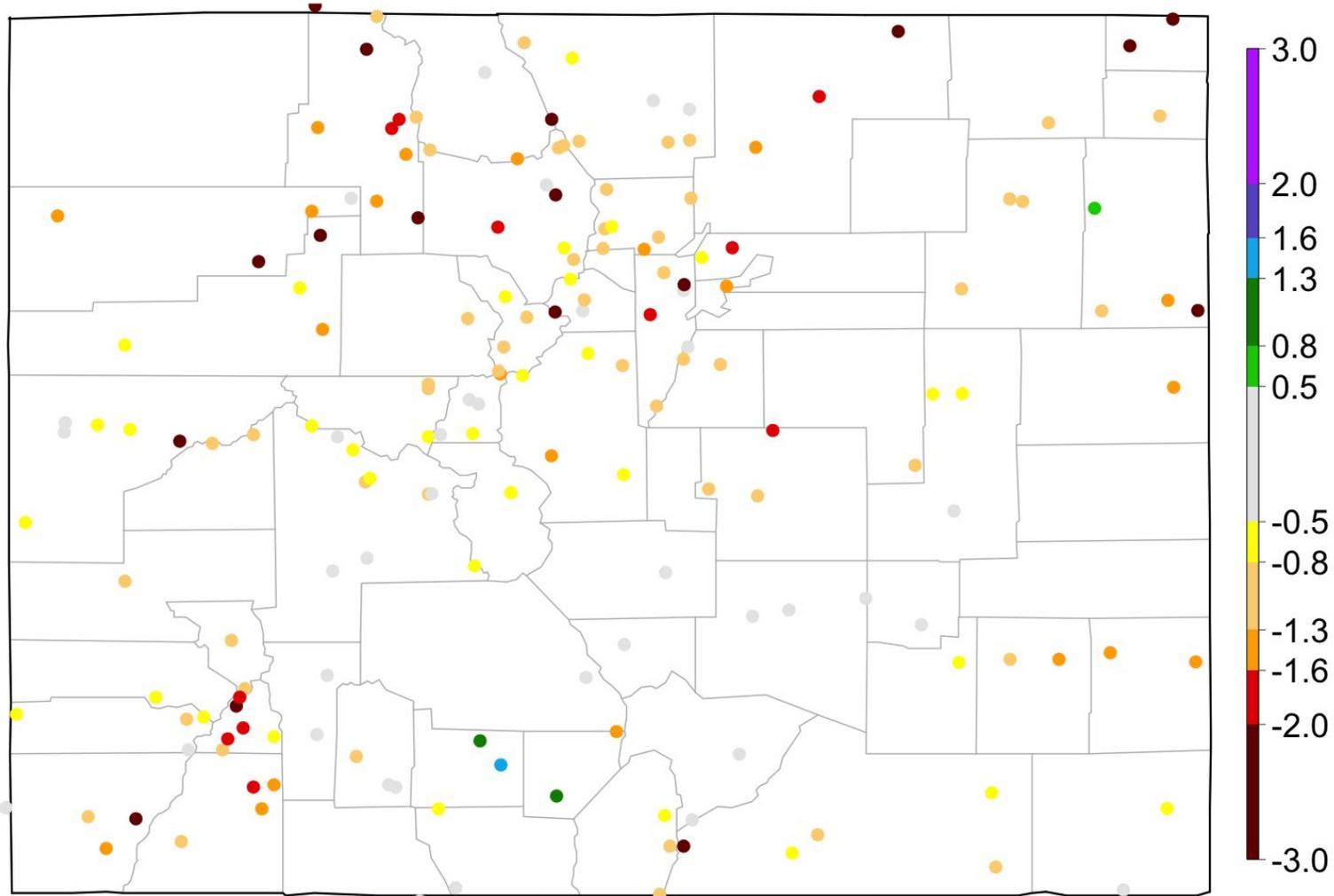


Data from High Plains Regional Climate Center and ACIS

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



90-day SPI: 2020/08/19 - 2020/11/16

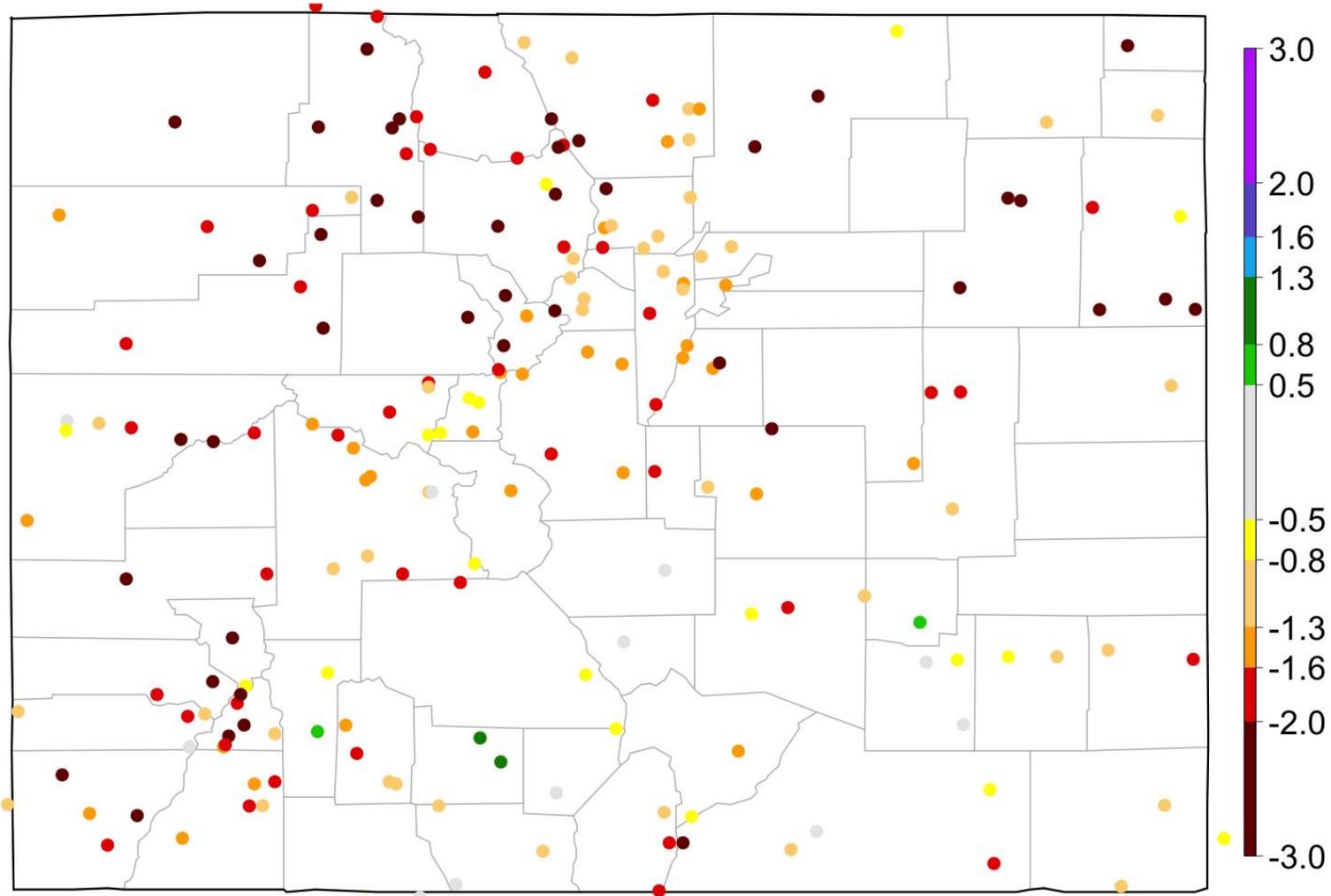


Data from High Plains Regional Climate Center and ACIS

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



# 6-month SPI: 2020/05/17 - 2020/11/16

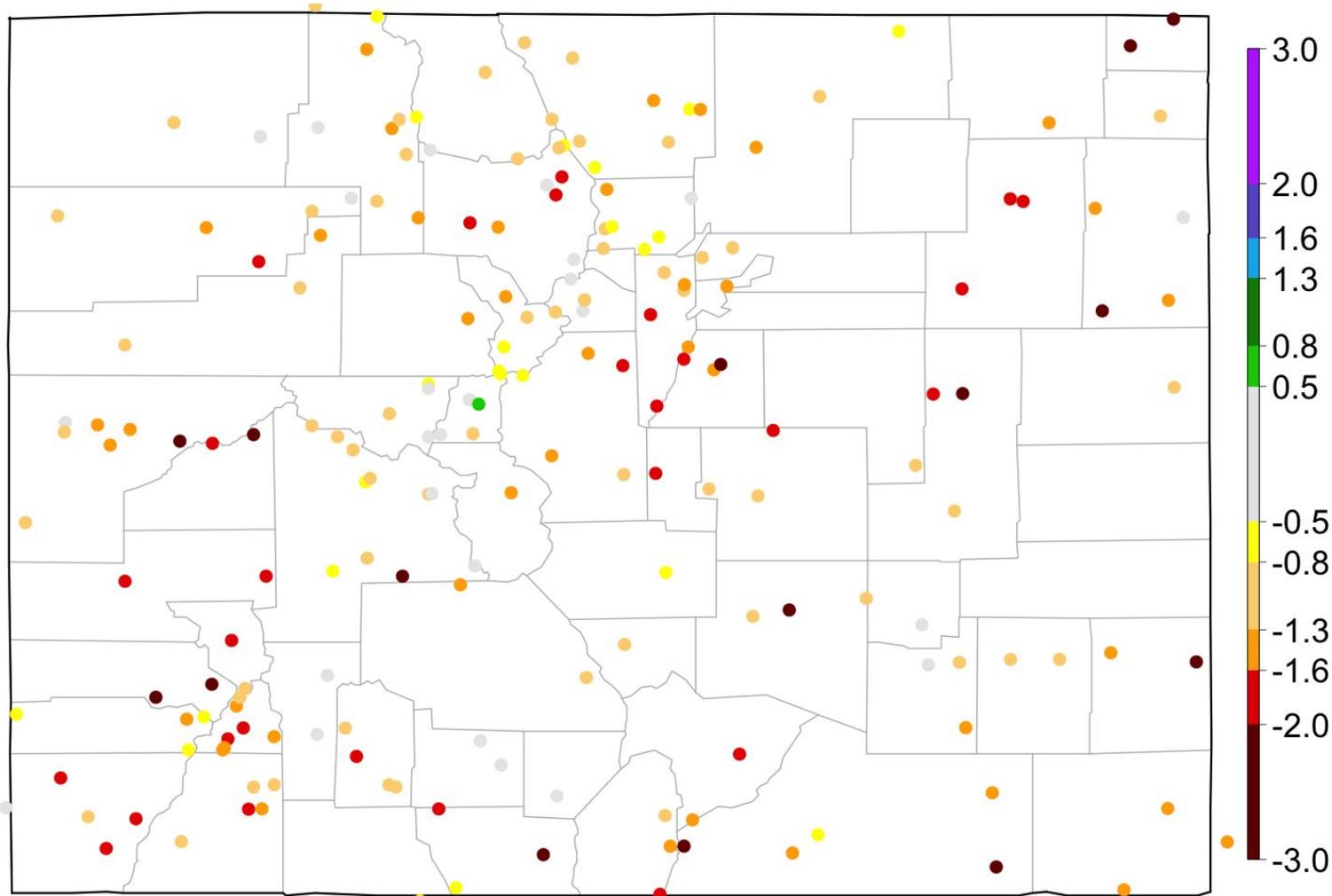


Data from High Plains Regional Climate Center and ACIS

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



# 12-month SPI: 2019/11/17 - 2020/11/16



Our state hasn't caught a big break since spring 2019.

Data from High Plains Regional Climate Center and ACIS

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





# Drought

National Drought

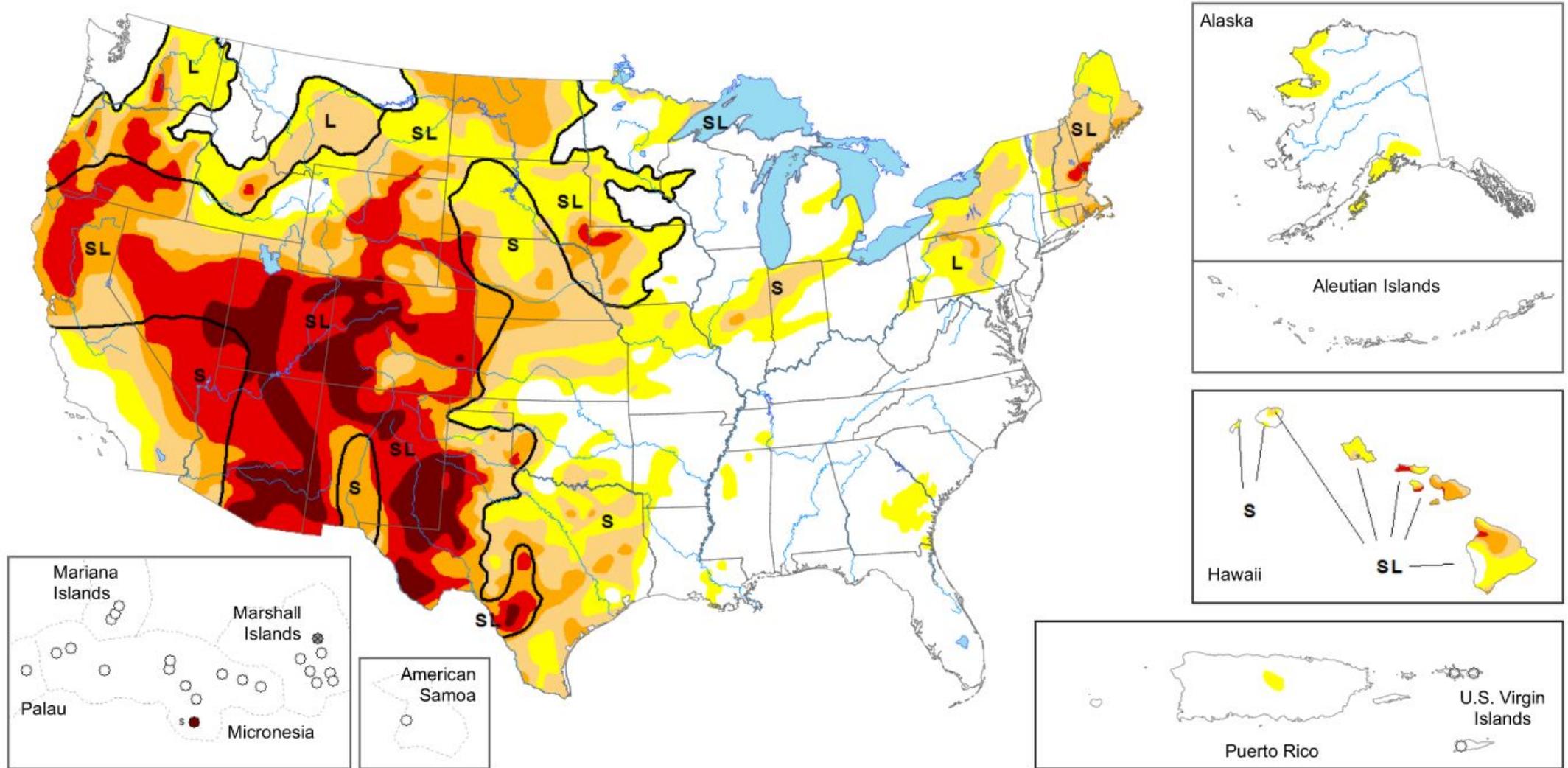
Colorado Drought

Flash Drought?



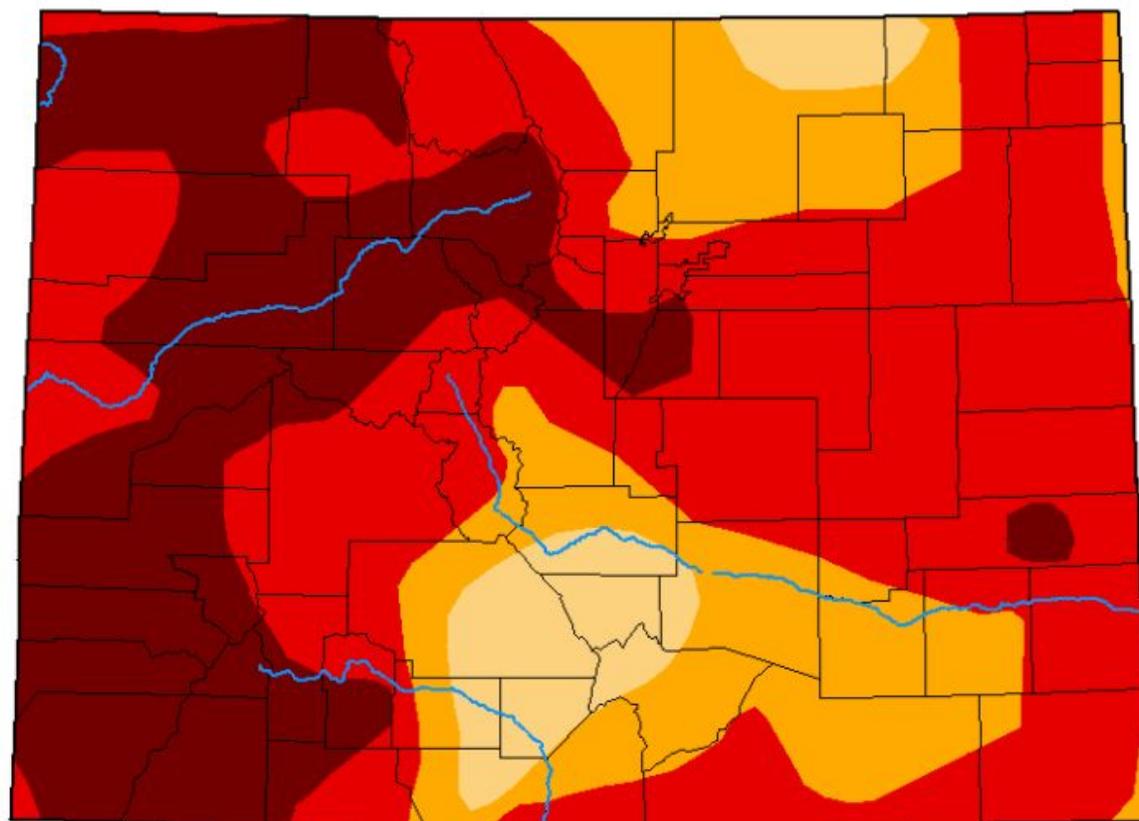
# Map released: November 19, 2020

Data valid: November 17, 2020



**Map released: Thurs. November 19, 2020**

**Data valid: November 17, 2020 at 7 a.m. EST**



### Intensity:

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

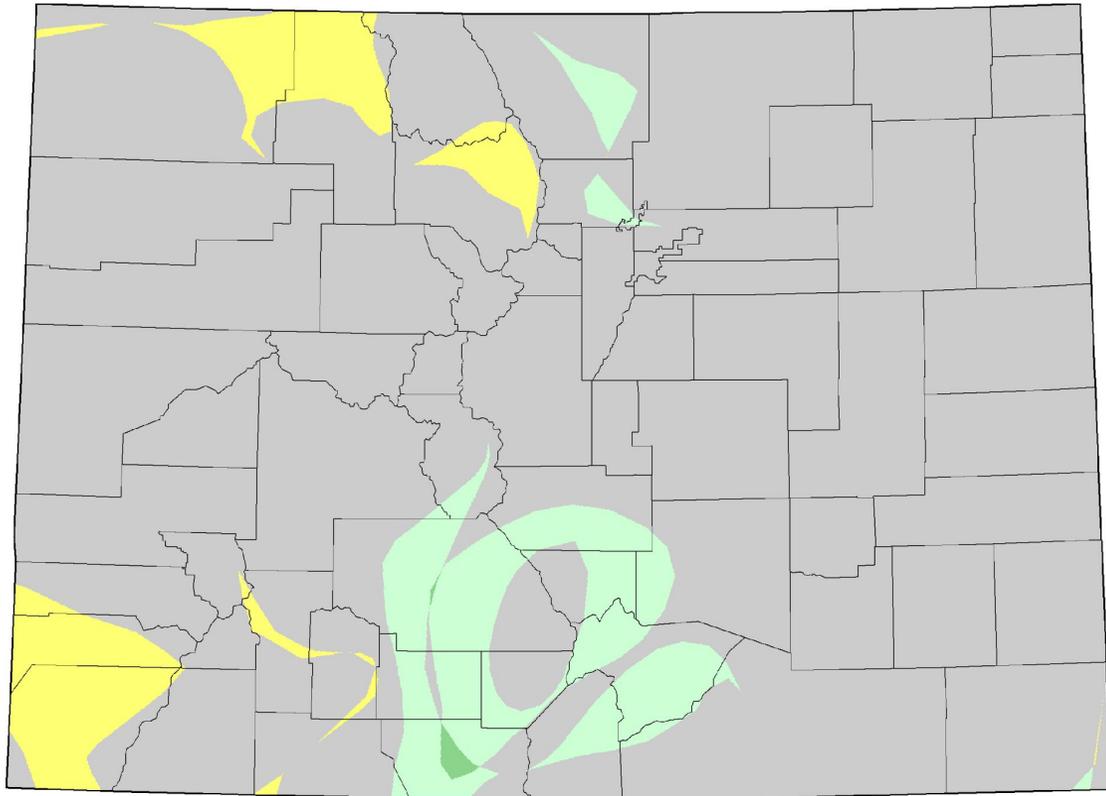
### Author(s):

**Richard Tinker**, NOAA/NWS/NCEP/CPC

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying [text summary](#) for forecast statements.*

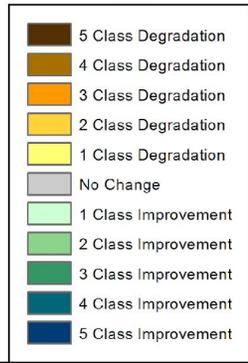


### U.S. Drought Monitor Class Change - Colorado 1 Month



November 17, 2020  
compared to  
October 20, 2020

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



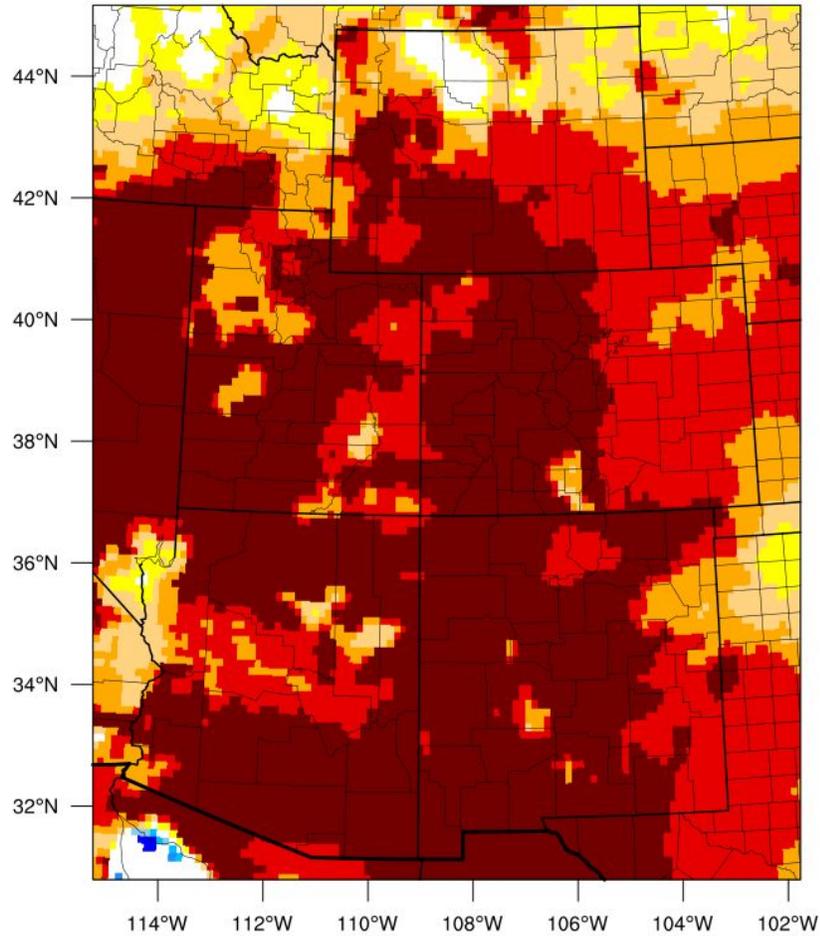
Improvements in San Luis Valley

Degradations in W CO

Steadily bad most places



3-month EDDI categories for November 15, 2020

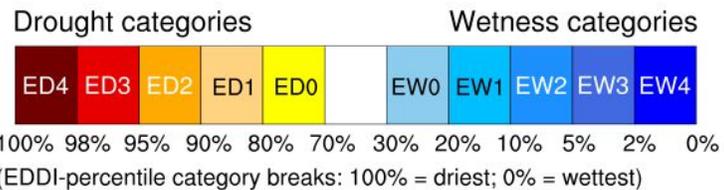


Highest fall evaporative demand across much of the west

These numbers are August-heavy

Wind has been a factor

This played a role in the fire situation

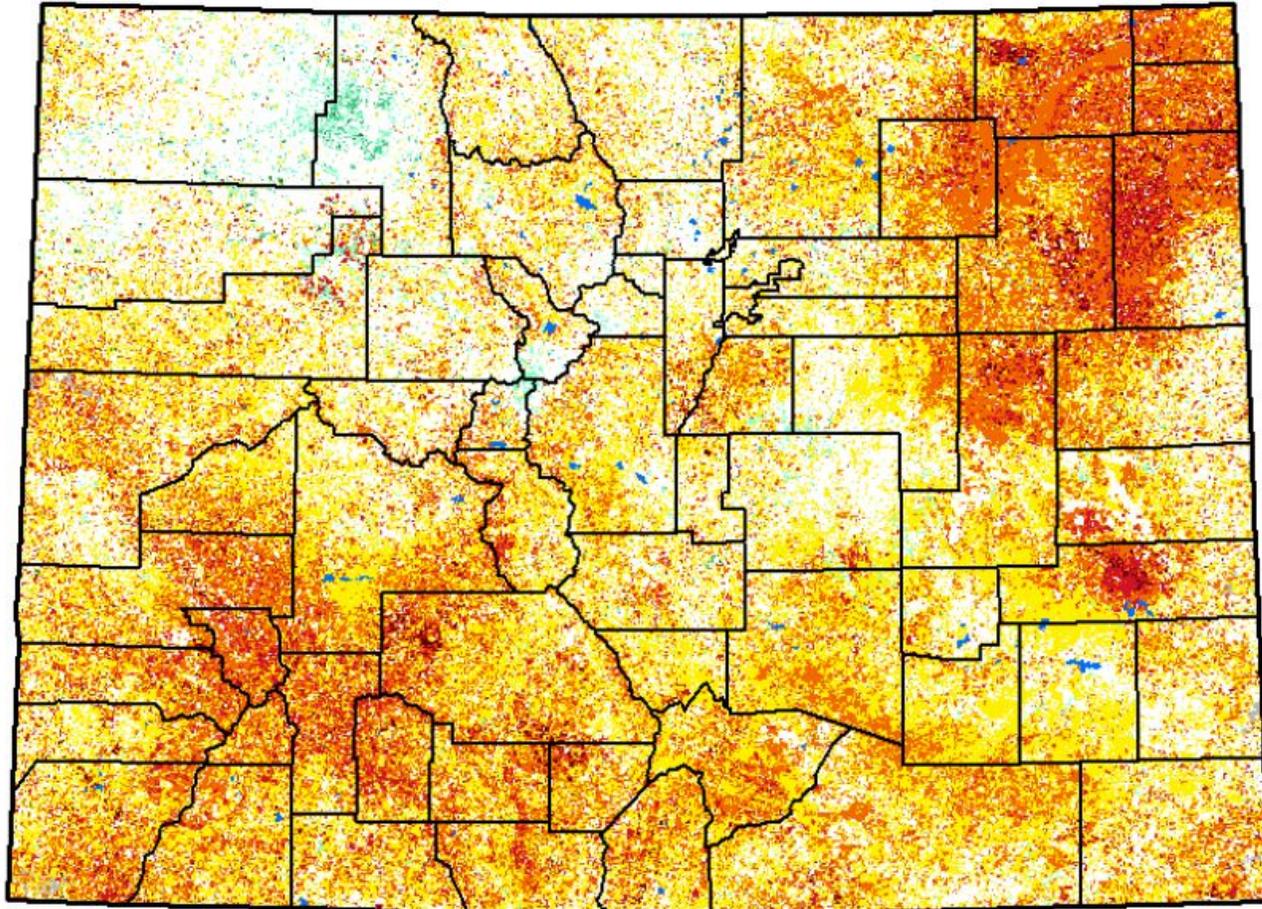


Generated by NOAA/ESRL/Physical Sciences Laboratory

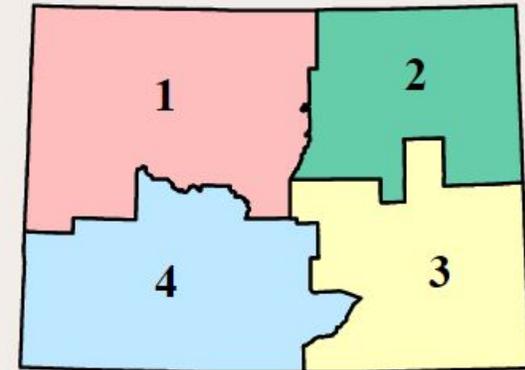


## Vegetation Condition

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



### Zoom to a region

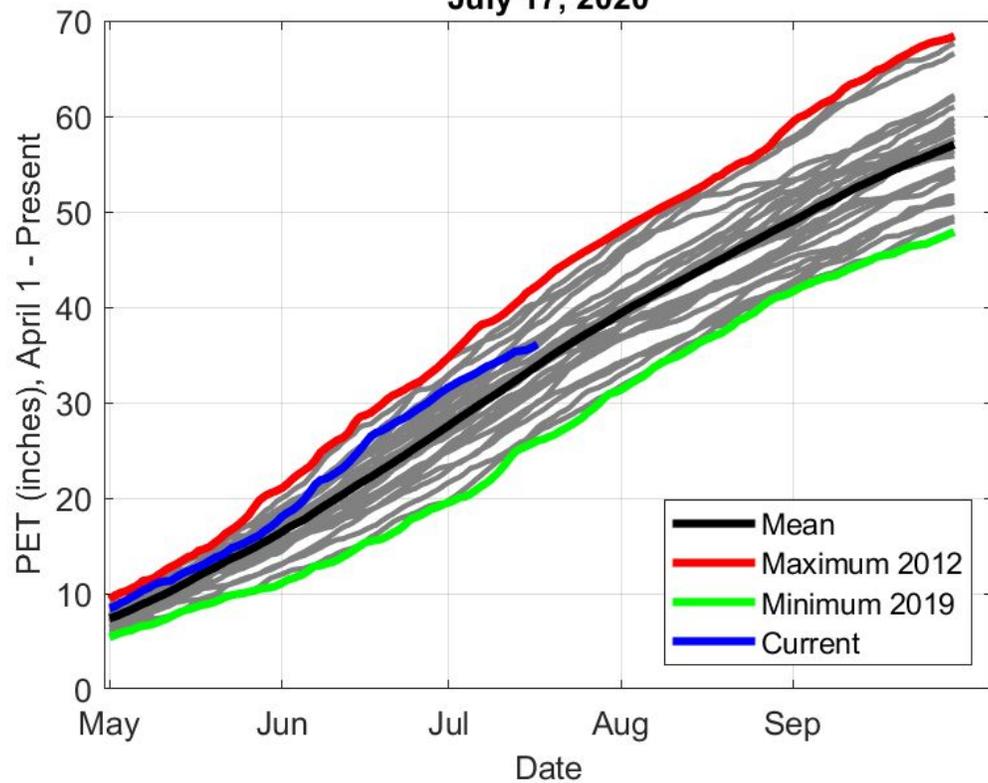


[Return to the U.S. map](#)

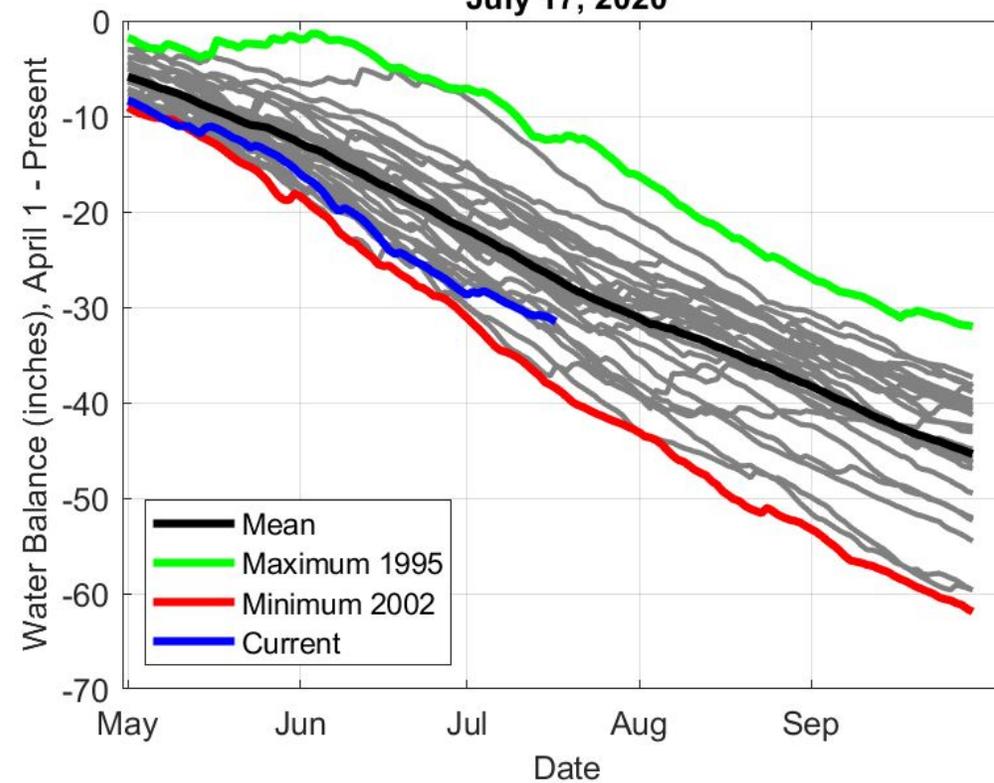
[State Statistics](#)



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



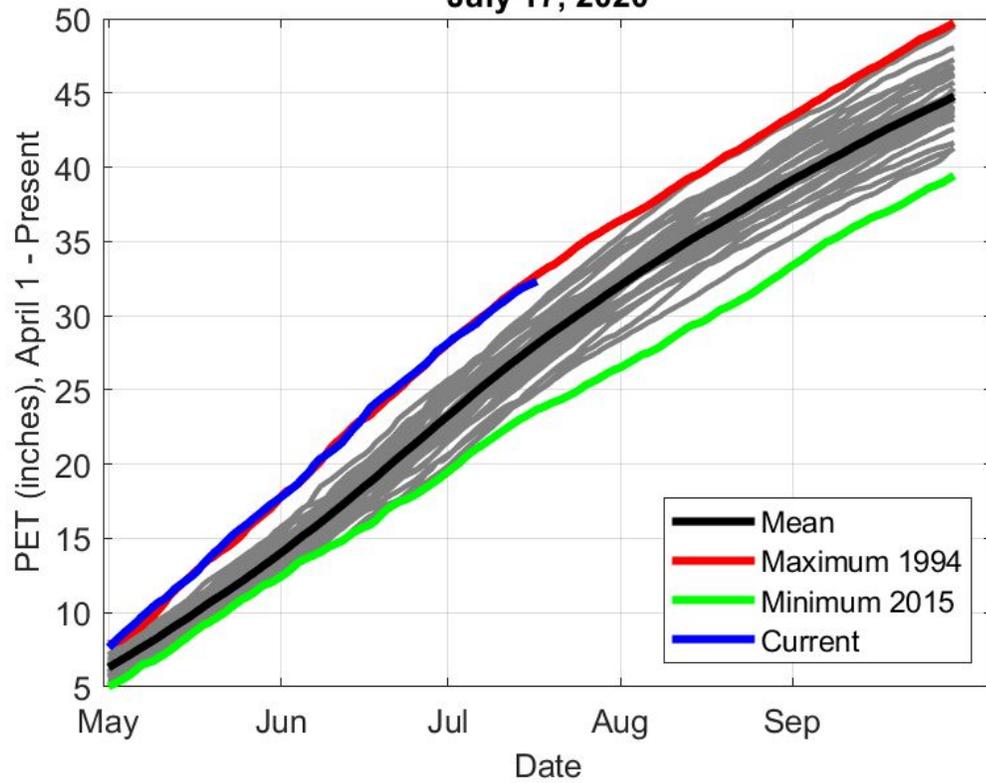
**Burlington Growing Season Water Balance  
July 17, 2020**



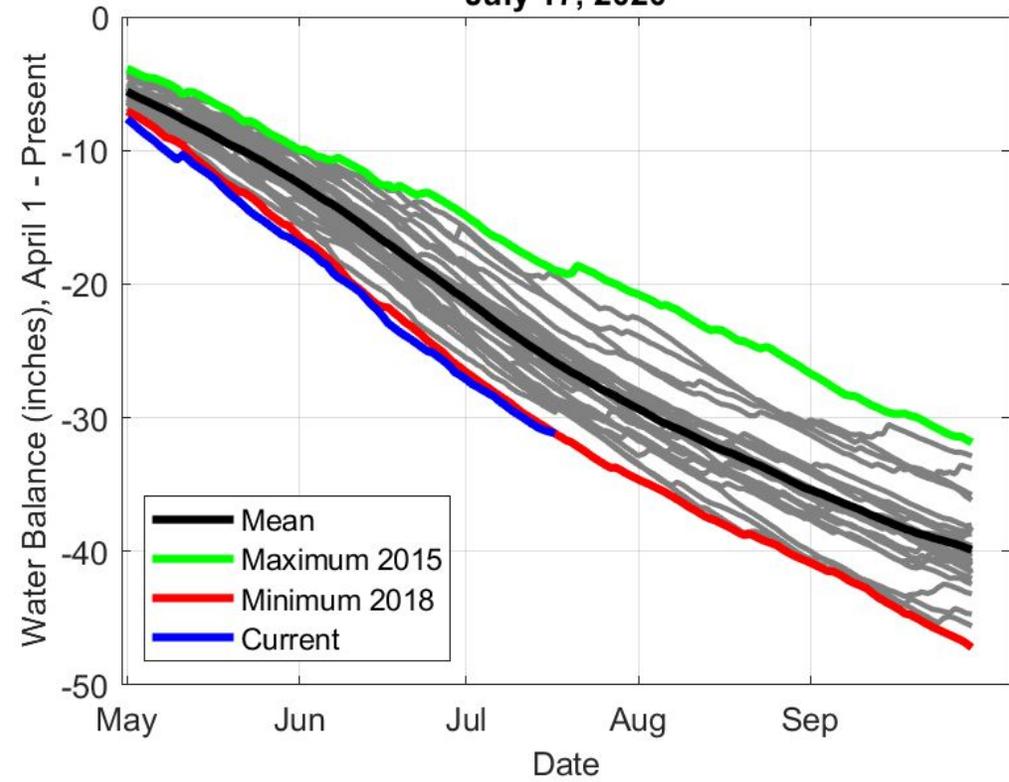
<http://climate.colostate.edu/~drought/et.php>



Olathe Growing Season Evaporative Demand  
July 17, 2020



Olathe Growing Season Water Balance  
July 17, 2020

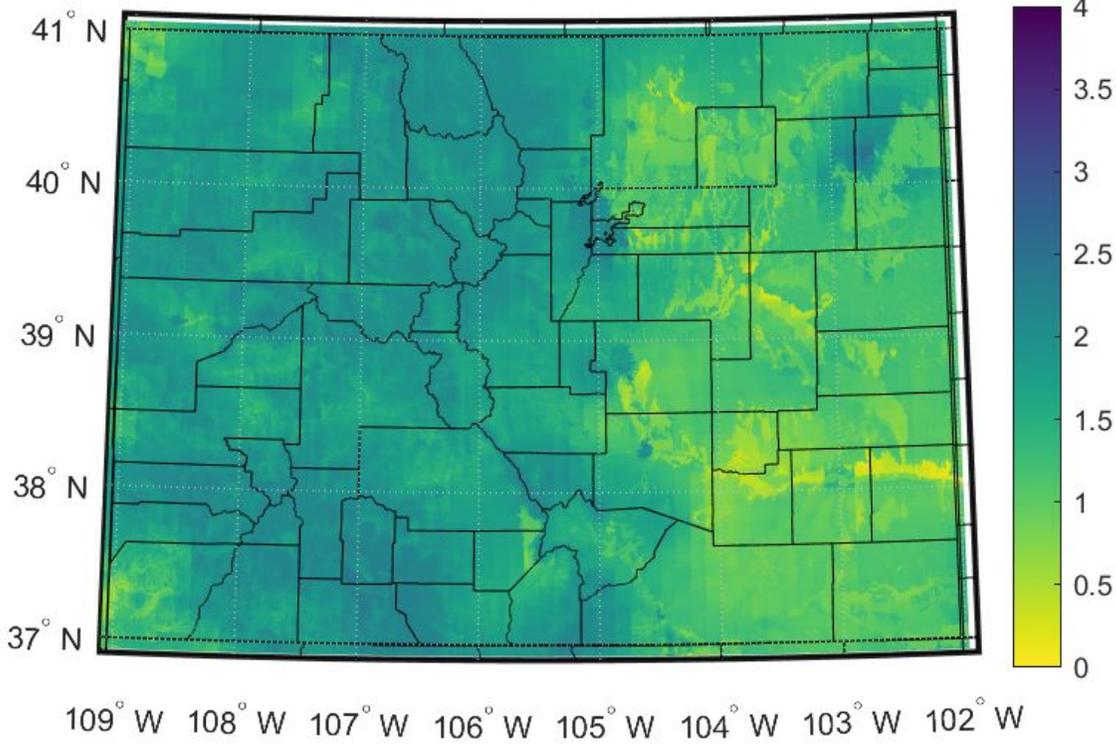


<http://climate.colostate.edu/~drought/et.php>

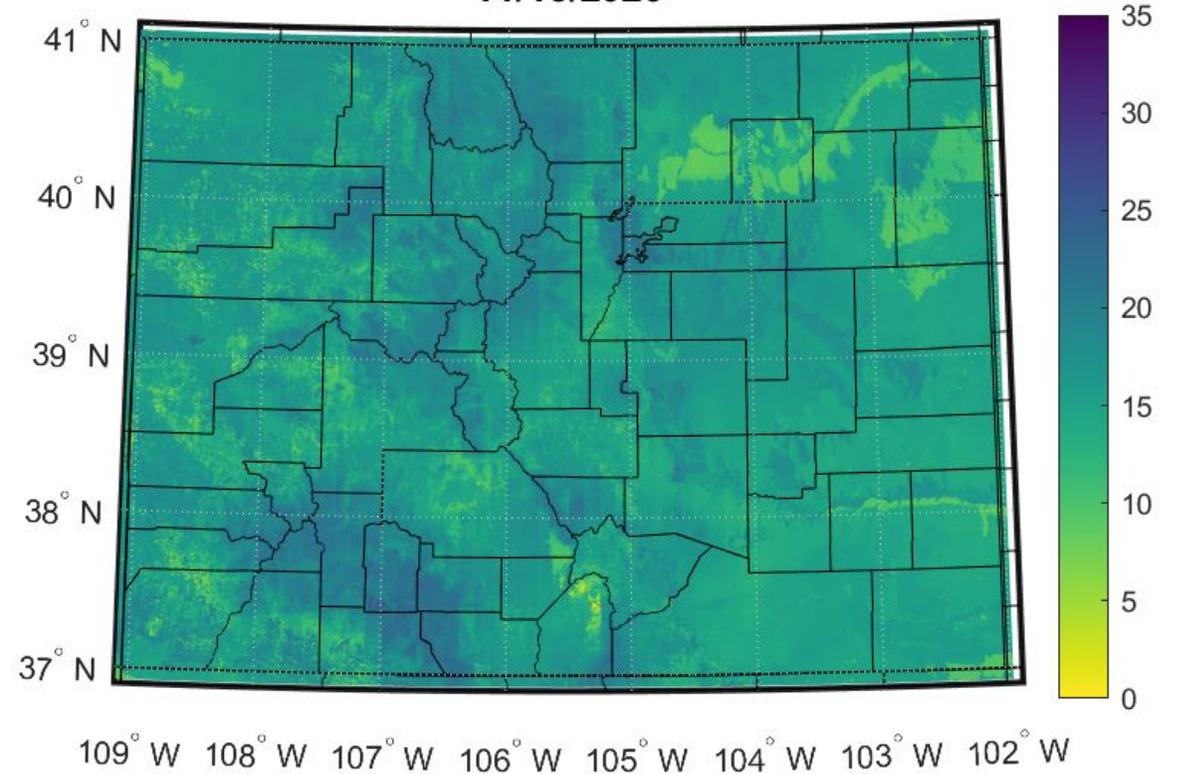




**Top 10cm Plant Available Water (cm)**  
11/13/2020



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



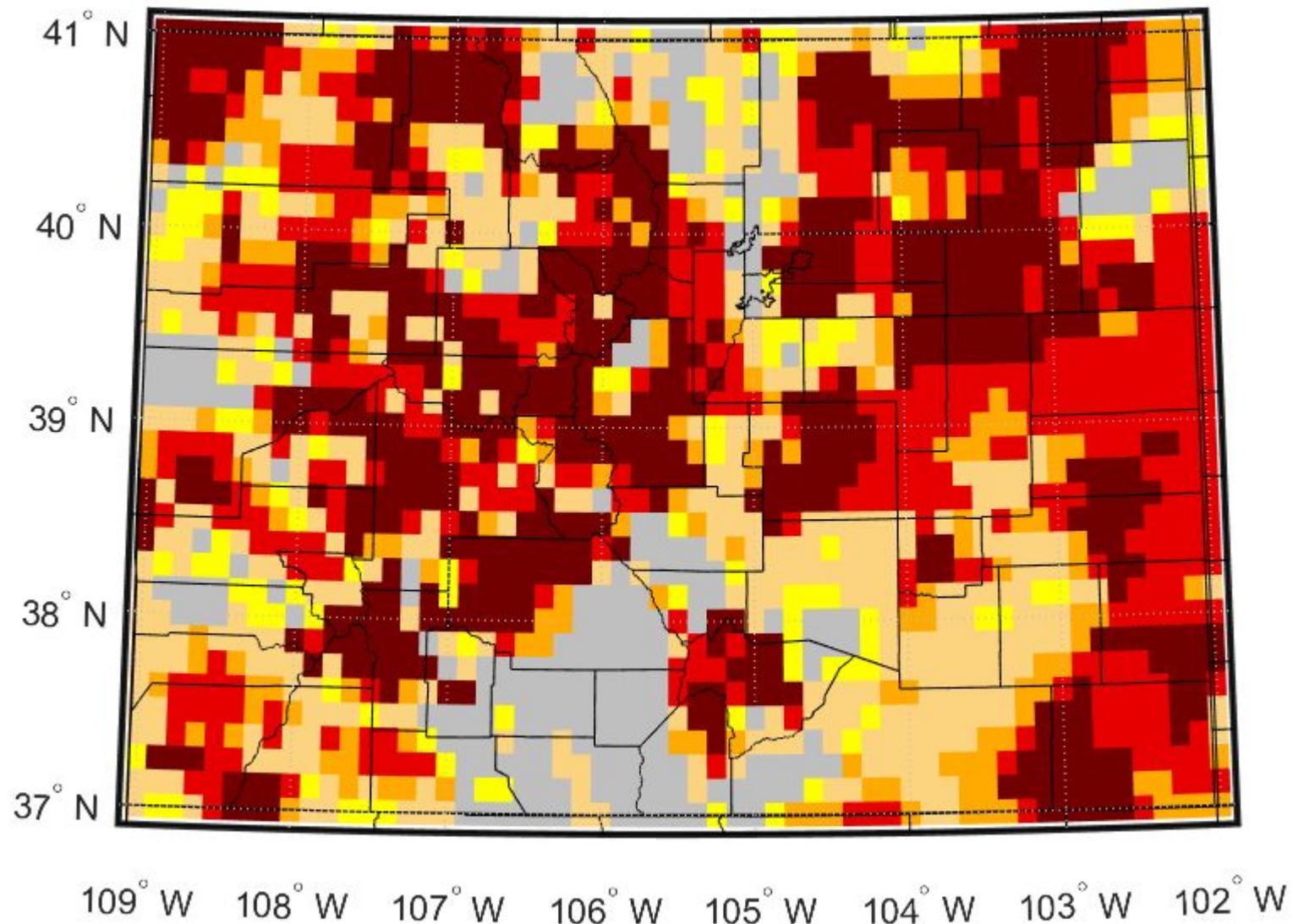
Soil moisture has actually improved recently save for the Arkansas basin



## Top Meter Soil Moisture Drought Category 11/13/2020

But it's still awfully low. This will have consequences on the runoff season come springtime

Dark red = drier than 2002, 2012, 2018



# Fires

- Cameron Peak (209ka), East Troublesome (194ka), and Pine Gulch (139ka) Fires are now the three largest wildfires in state history (in that order)
- 2020 is now Colorado's largest fire season on record
- Such rapid and intense expansion of fires in October is completely unprecedented. The East Troublesome fire's 193,812 acre footprint was burned completely in October
- Is this the new normal? Not every year will suck like 2020, but in a warmer climate dry years hurt more



Credit: Estes Park Inc



# 18% of Larimer County's Landmass Has Burned Since 2012

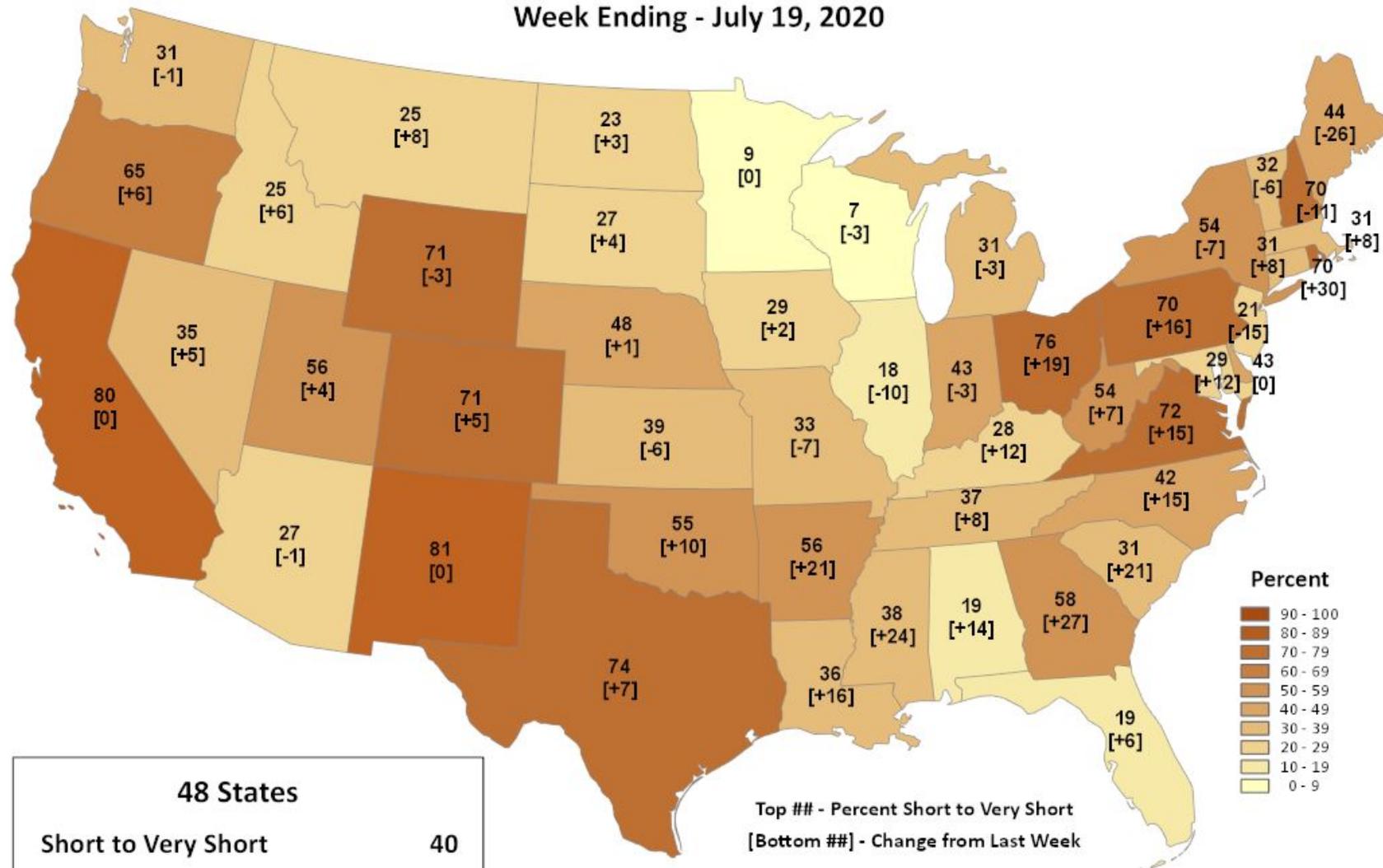


inciweb

# Topsoil Moisture

## Percent Short to Very Short

### Week Ending - July 19, 2020



**48 States**  
Short to Very Short **40**  
Change from Last Week **+4**

Top ## - Percent Short to Very Short  
[Bottom ##] - Change from Last Week

*Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.*



## Outlook

Next 7 days

CPC Outlooks

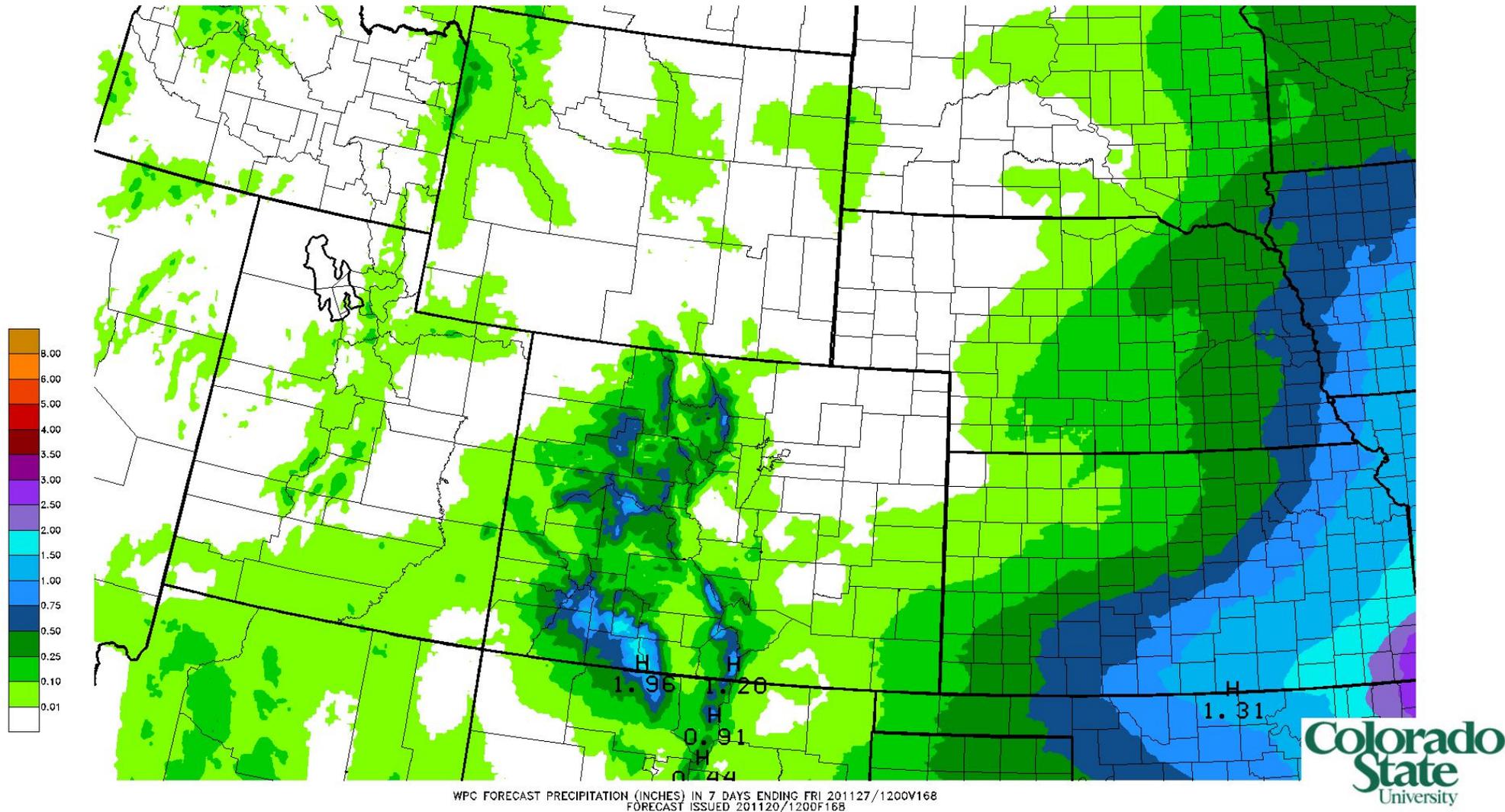
ENSO Information

Precipitation Projections



# NOAA 7-day precip forecast

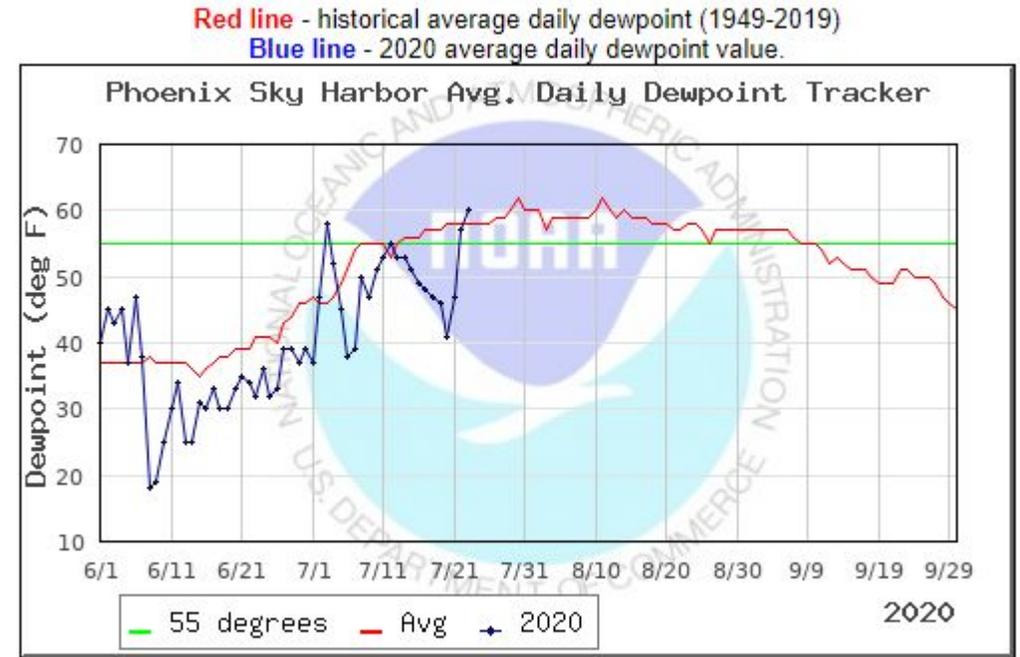
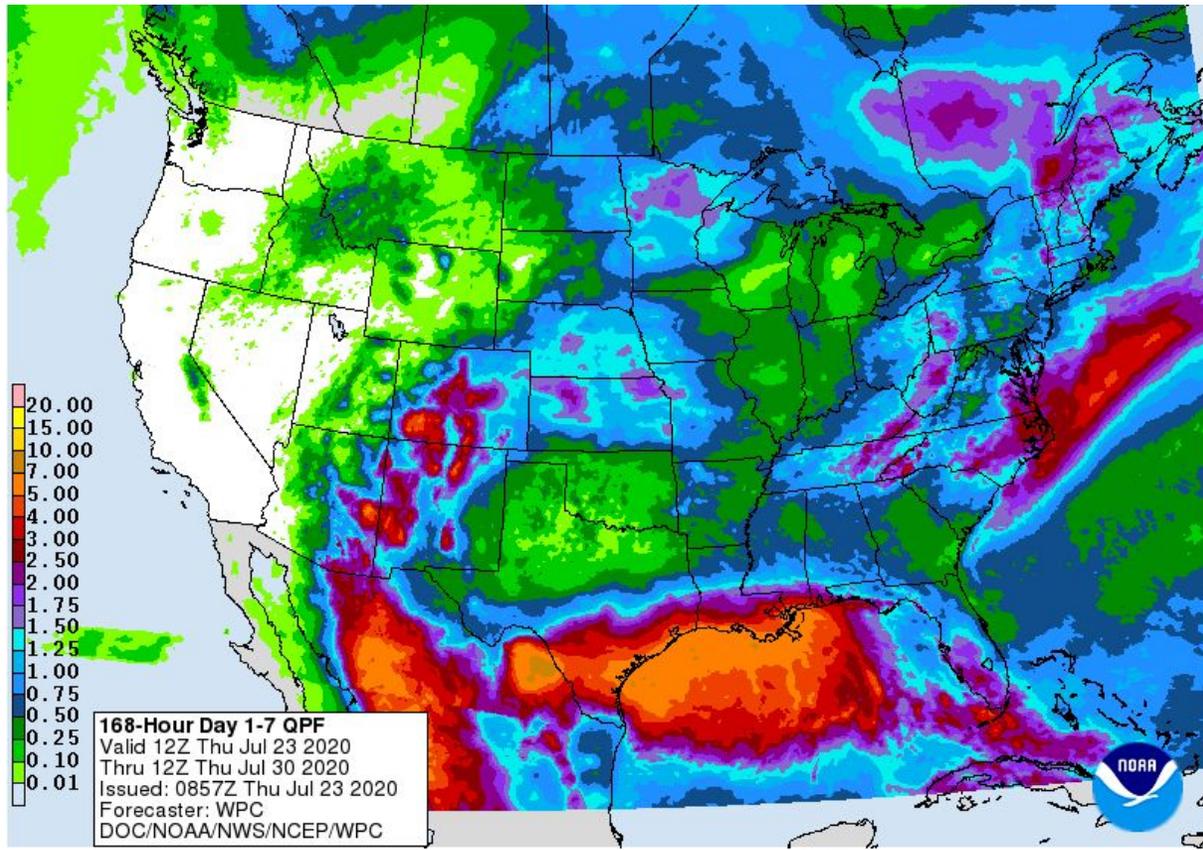
Another  
sparse QPF.  
We would  
like to see  
our high  
terrain  
averaging  
0.75-1.00"/w  
eek



[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)



# Monsoon

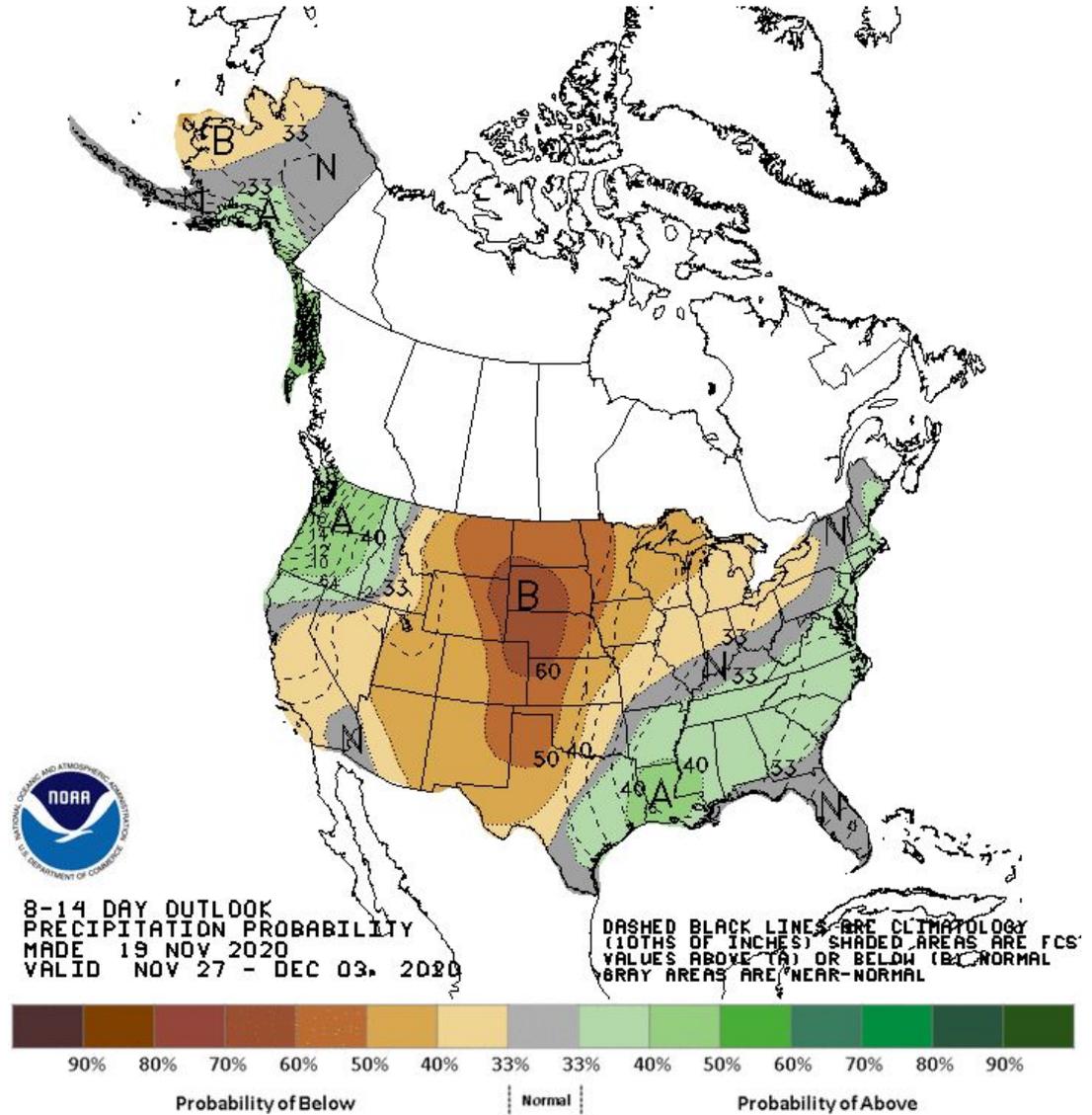
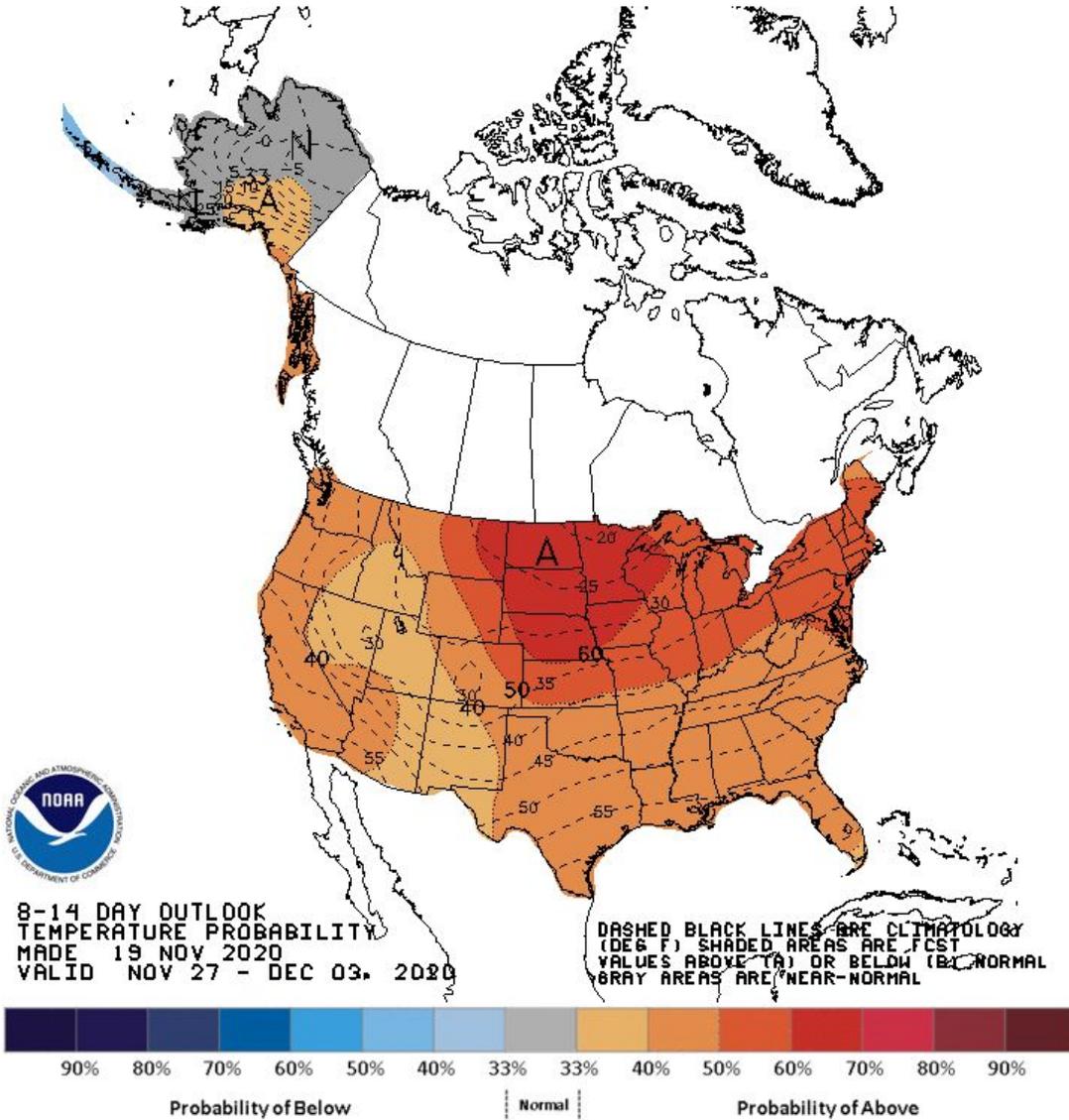


Clearly some monsoonal precipitation patterns beginning to take shape

Clear monsoonal pattern this week

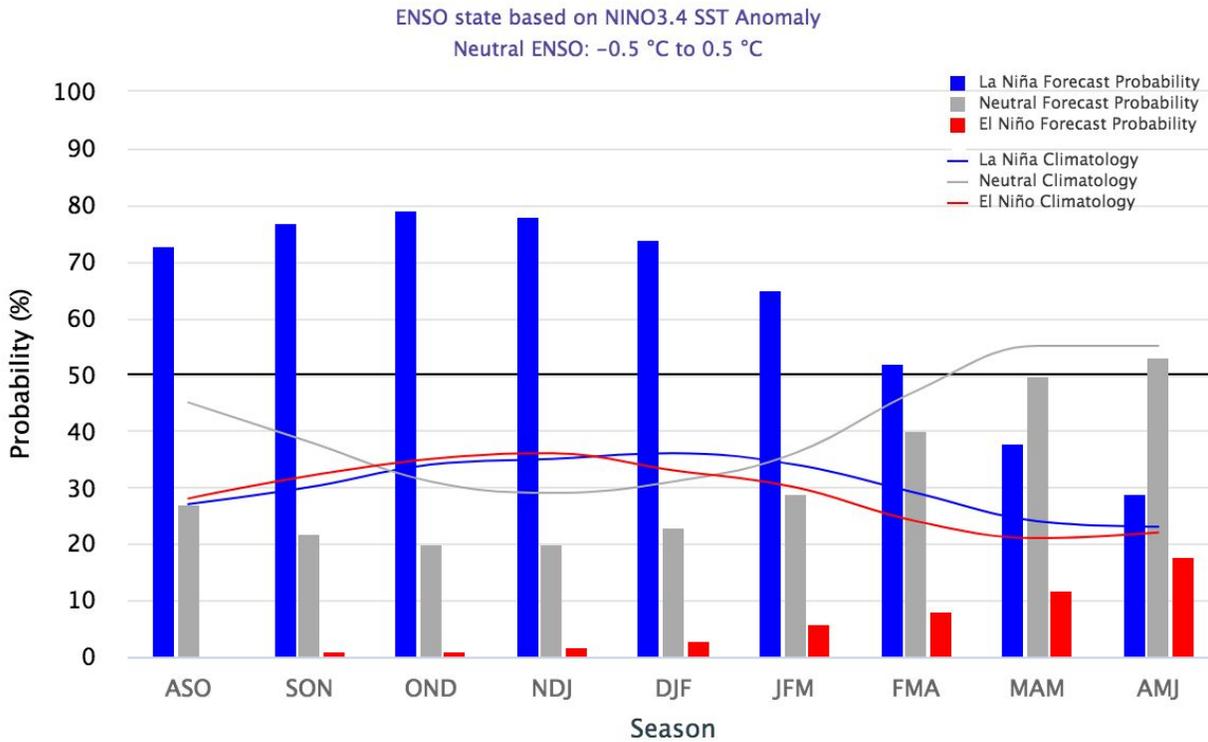


# 8-14 day outlook

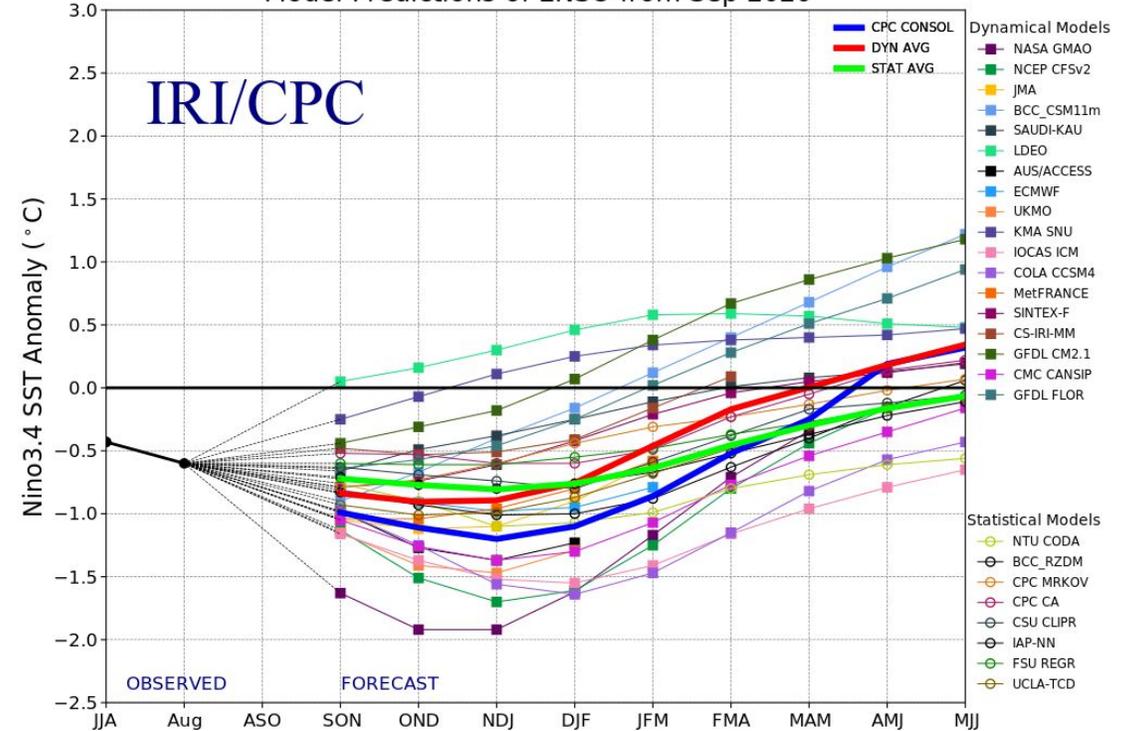


# What's the ENSO forecast?

Early-September 2020 CPC/IRI Official Probabilistic ENSO Forecasts



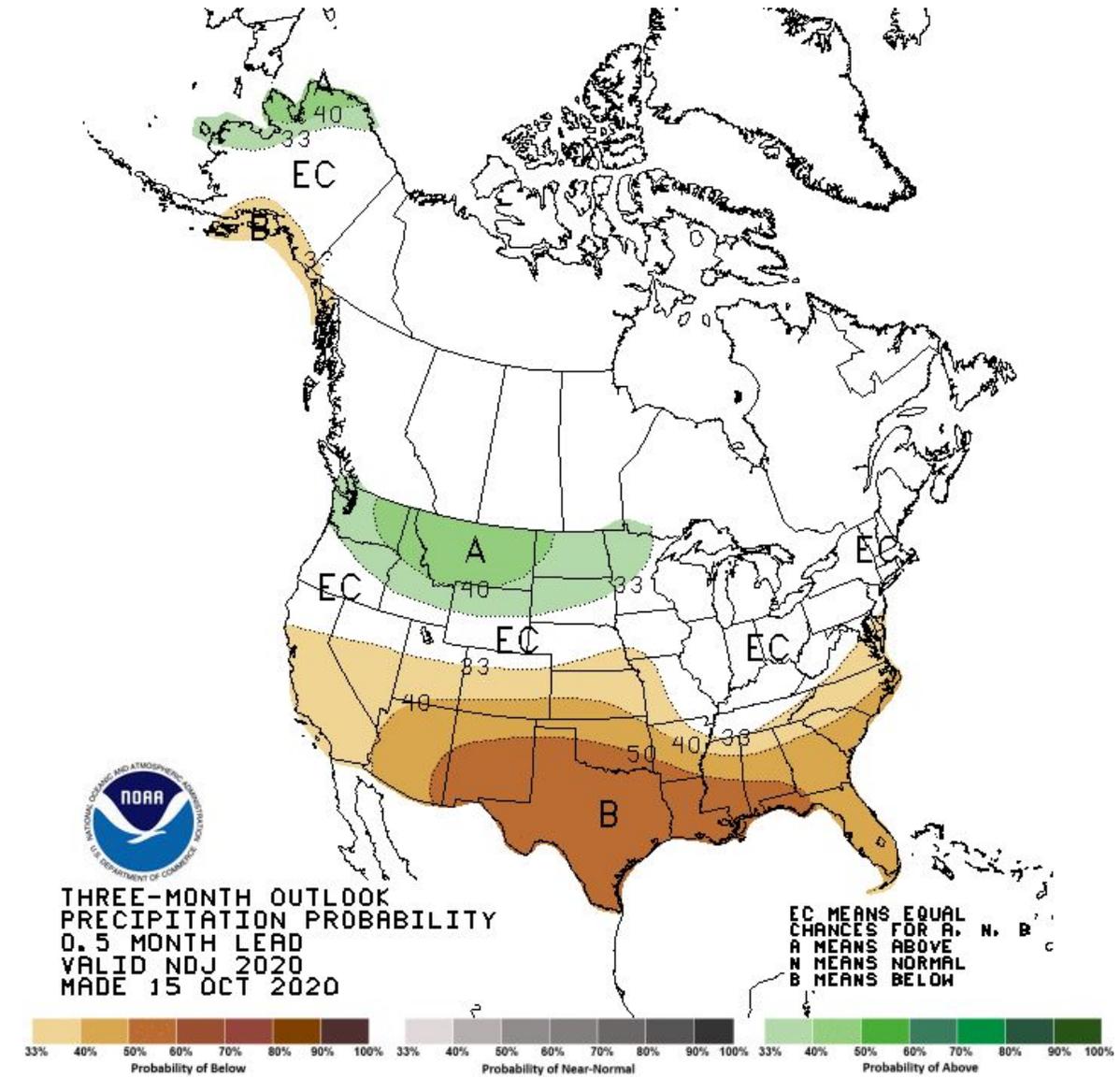
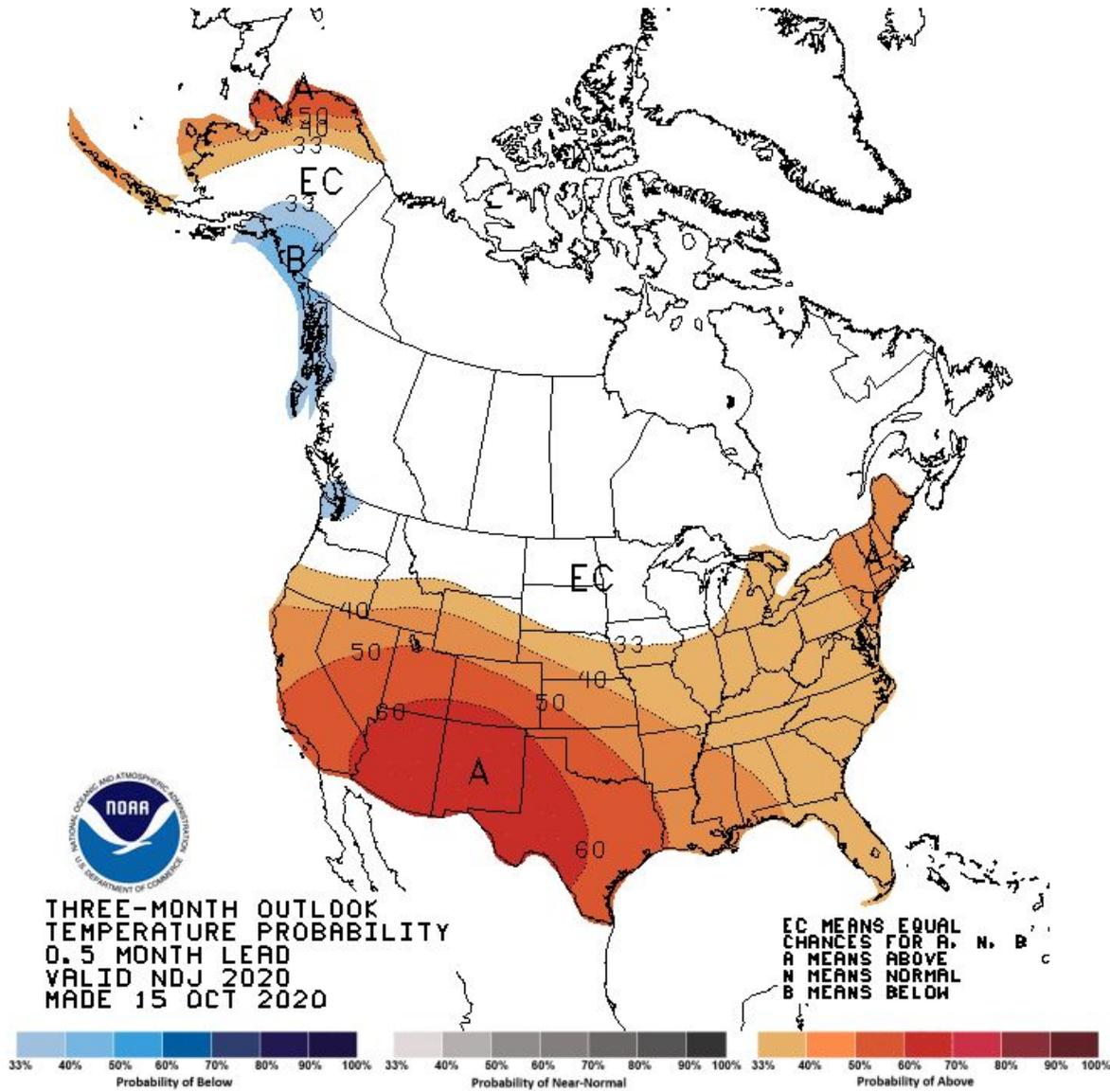
Model Predictions of ENSO from Sep 2020



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.



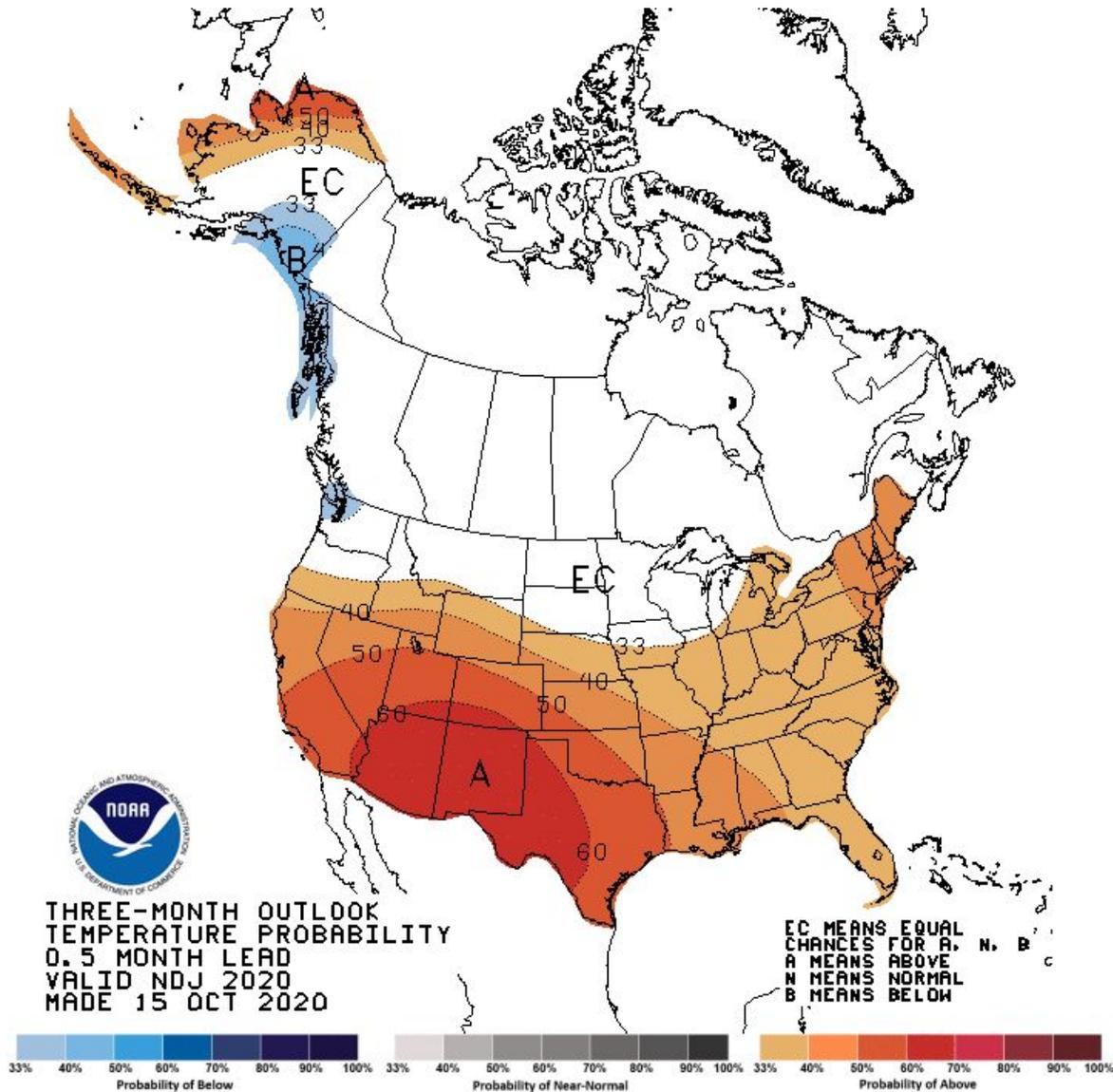
# Seasonal outlook



# Seasonal outlook

Moderate La Niña in play. May strengthen further

Temperature trends heavily factor into all seasonal guidance

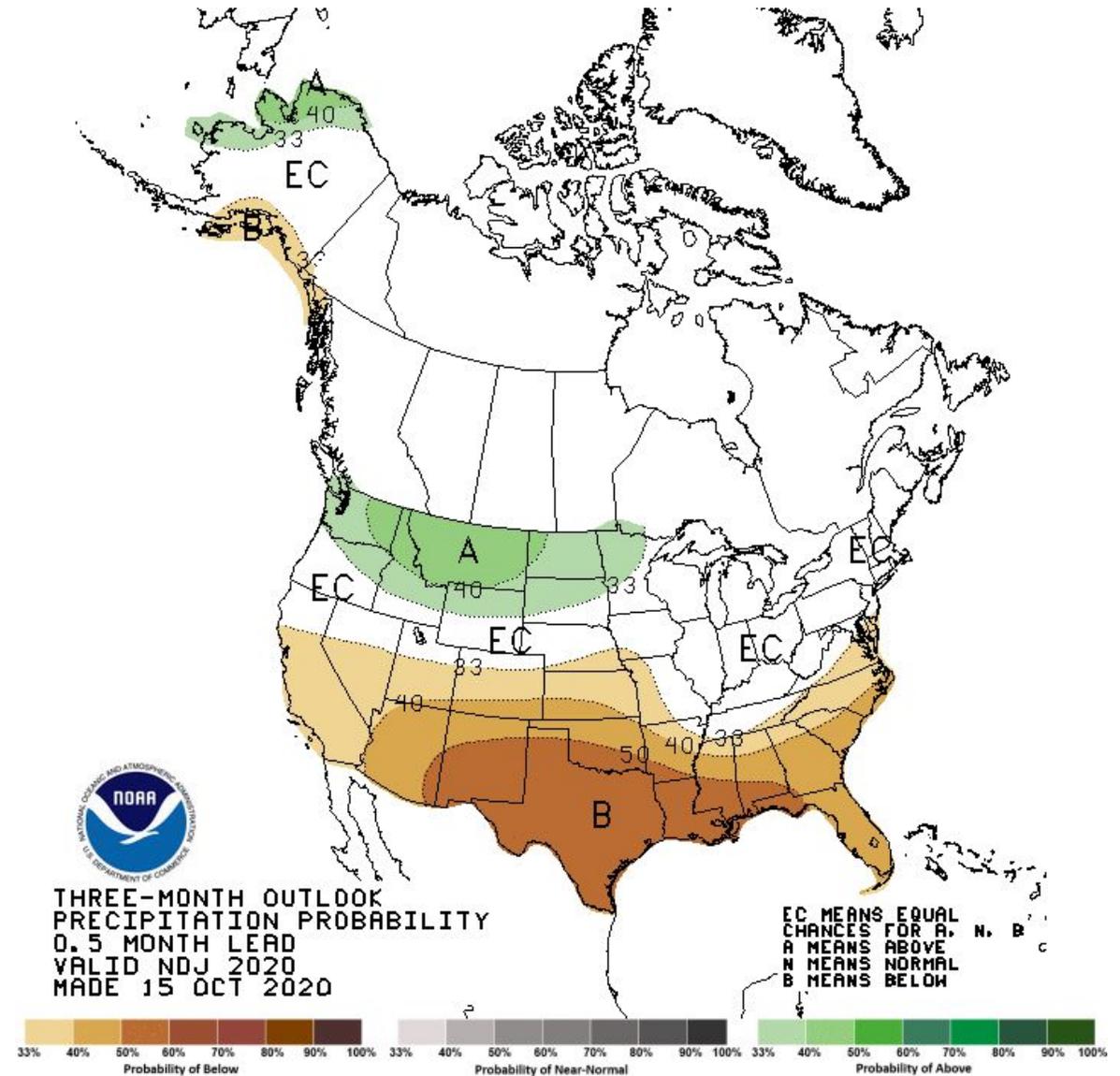


# Seasonal outlook

La Niña generally means more moisture to the north, less to the south

La Niña actually leads to snowier winters in the northern Rockies. Tilt towards below normal precip oversimplifies topographic impacts

Expect snow in the northern Rockies and wind in the Ark Valley



# Seasonal outlook

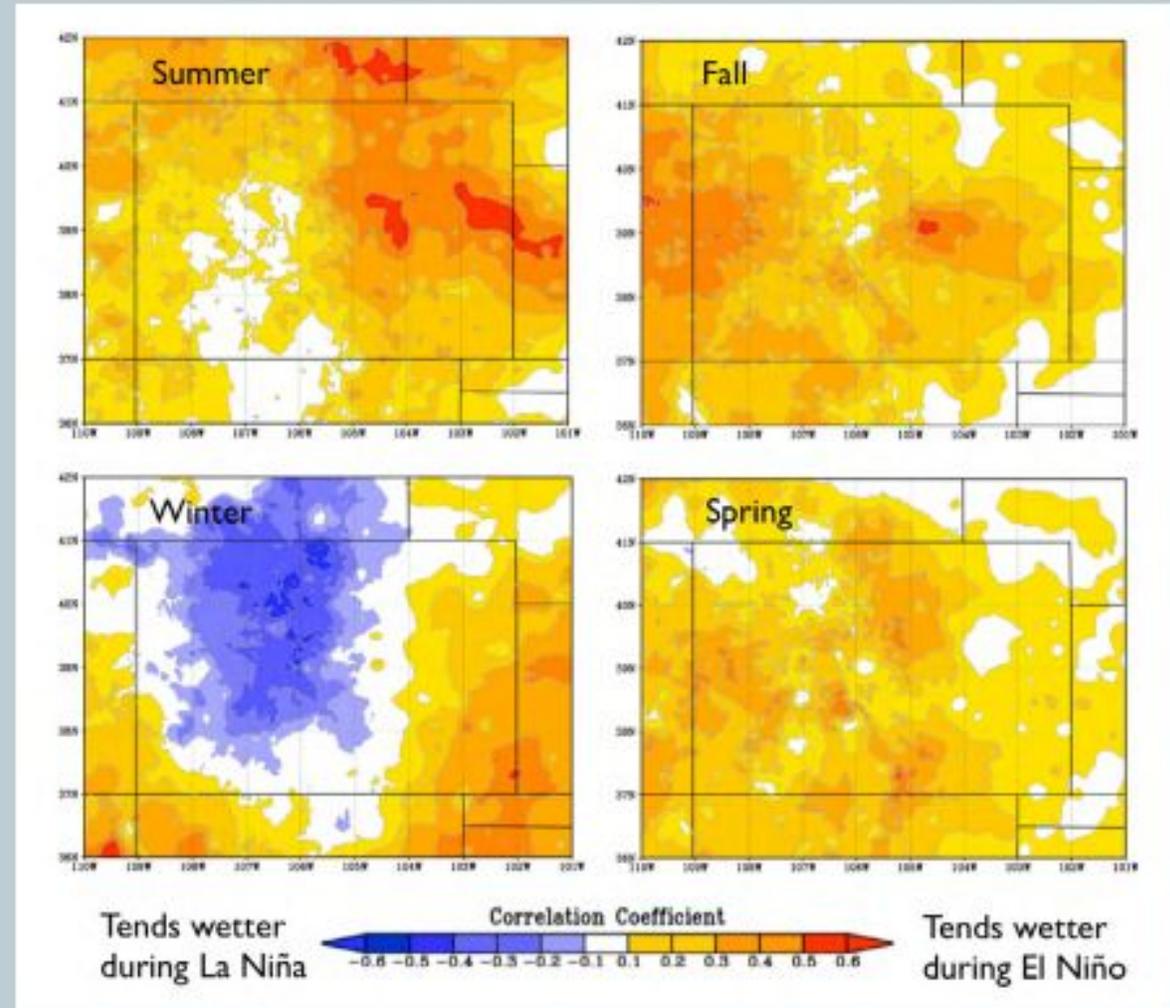
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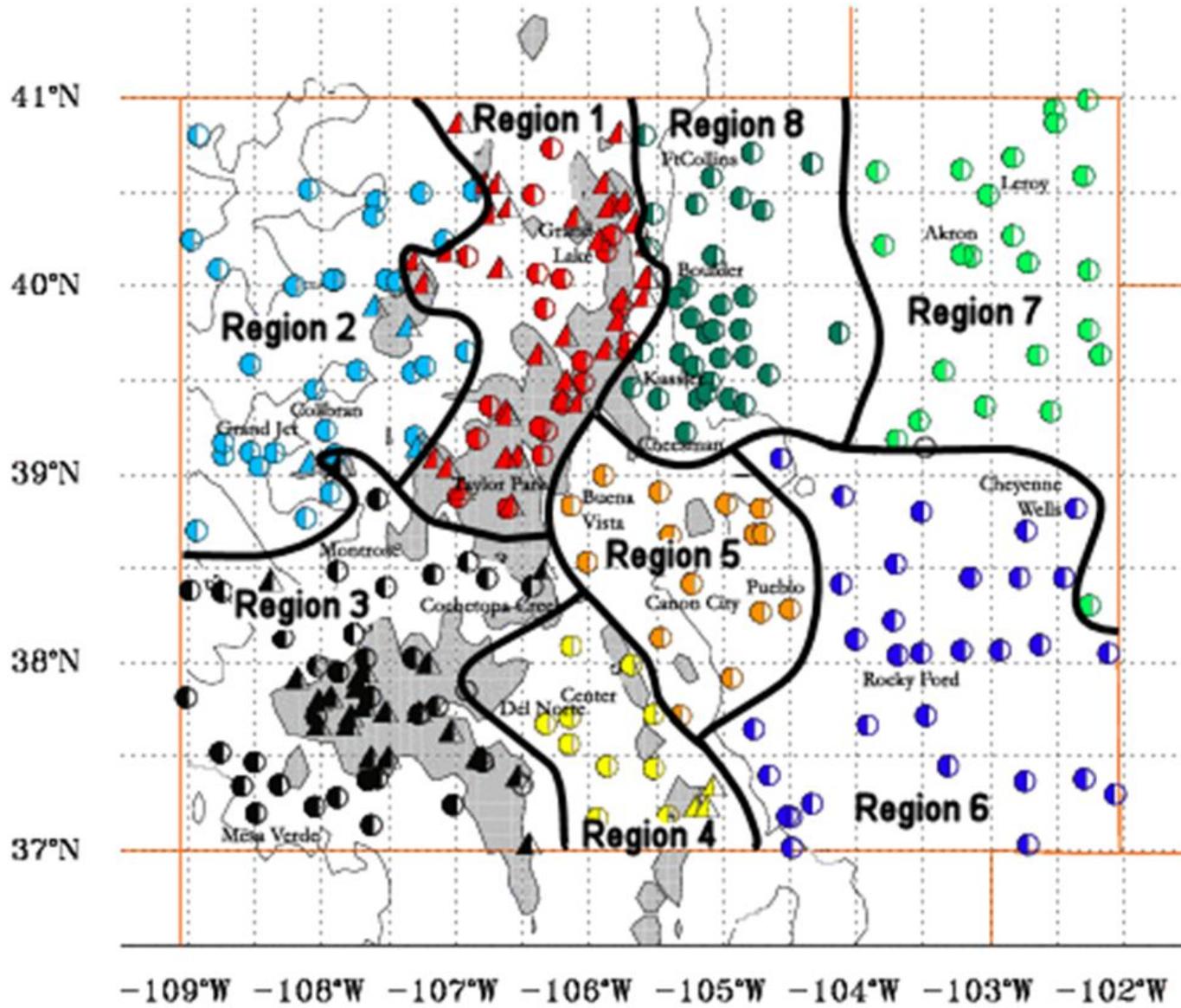
Expect snow in the northern Rockies and wind in the Ark Valley

Lukas et al.  
2014

FIGURE 2-4. Correlations between seasonal precipitation for Colorado and Multivariate ENSO Index (MEI), 1956–2005



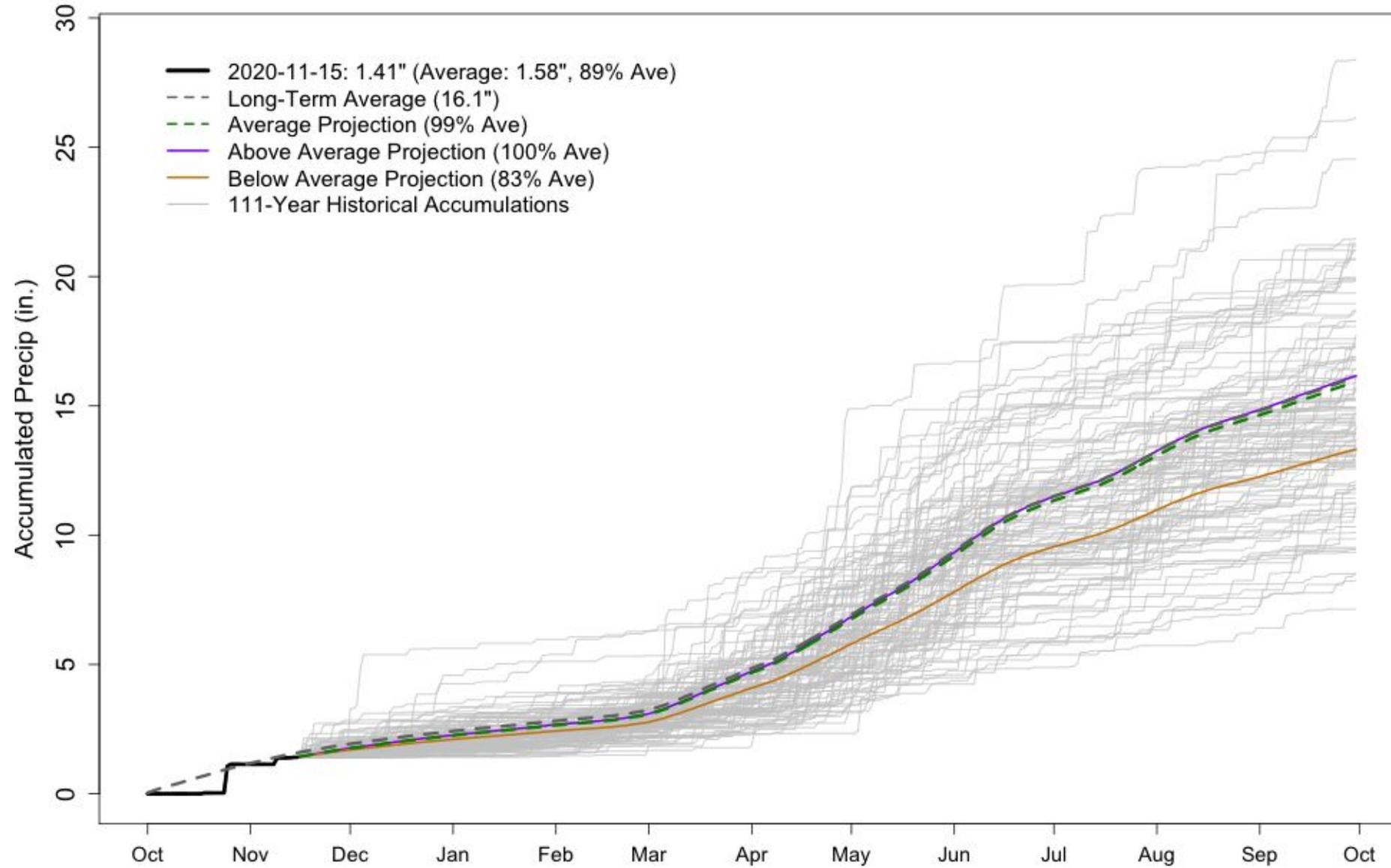
# COLORADO



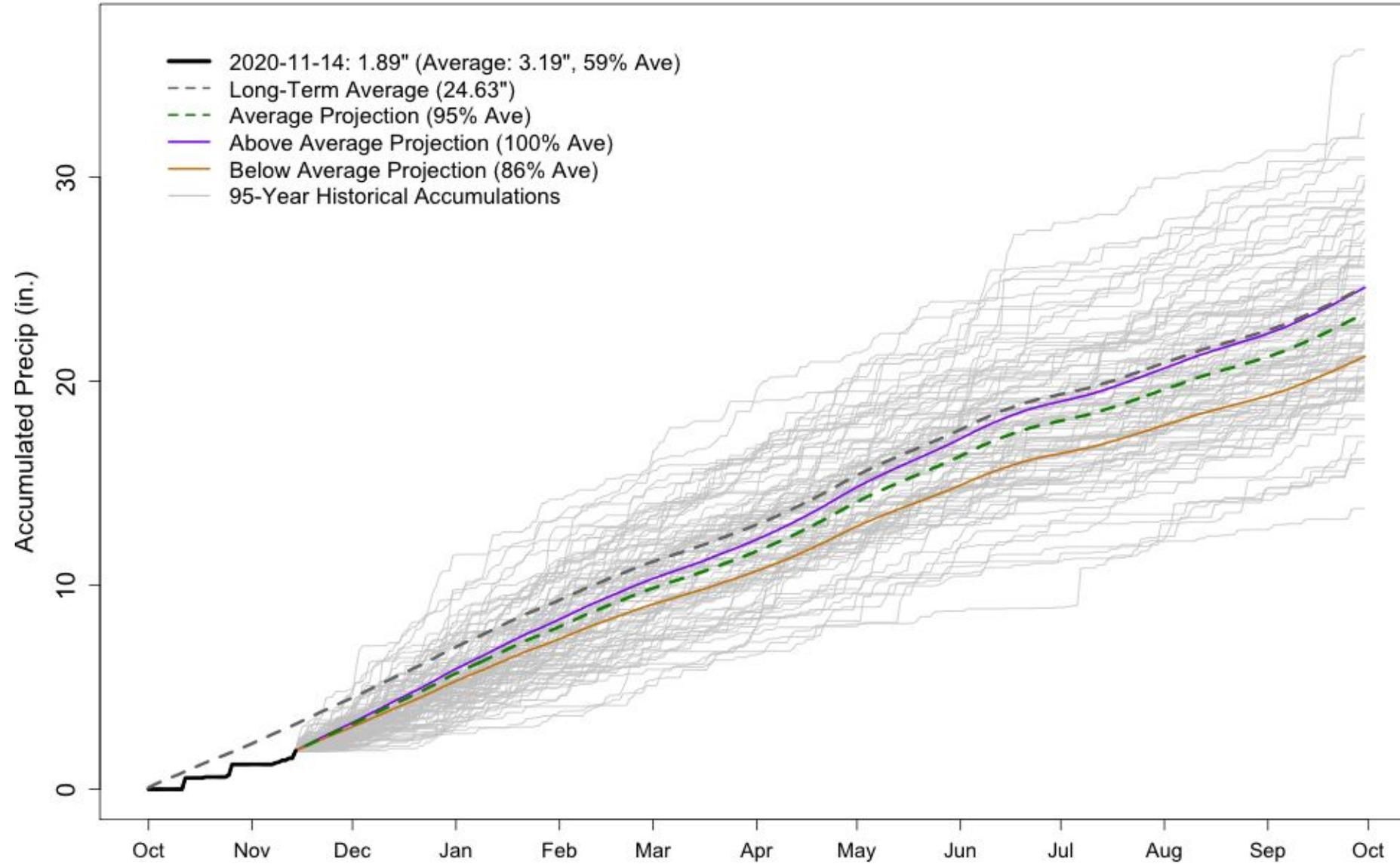
Precipitation Projections by Climate Region (credit: Klaus Wolter NOAA)



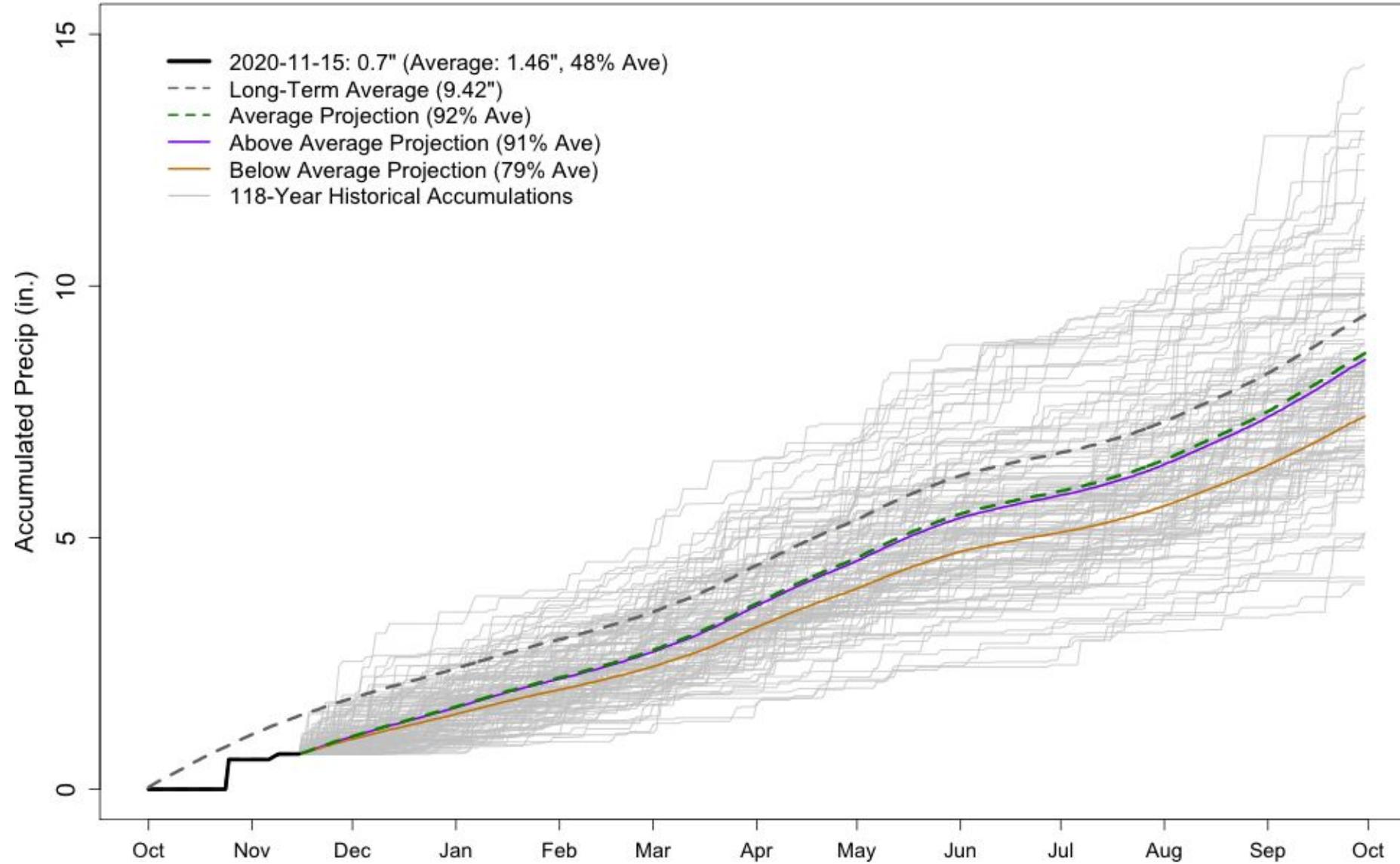
# FORT COLLINS WY2021 Precipitation Projections



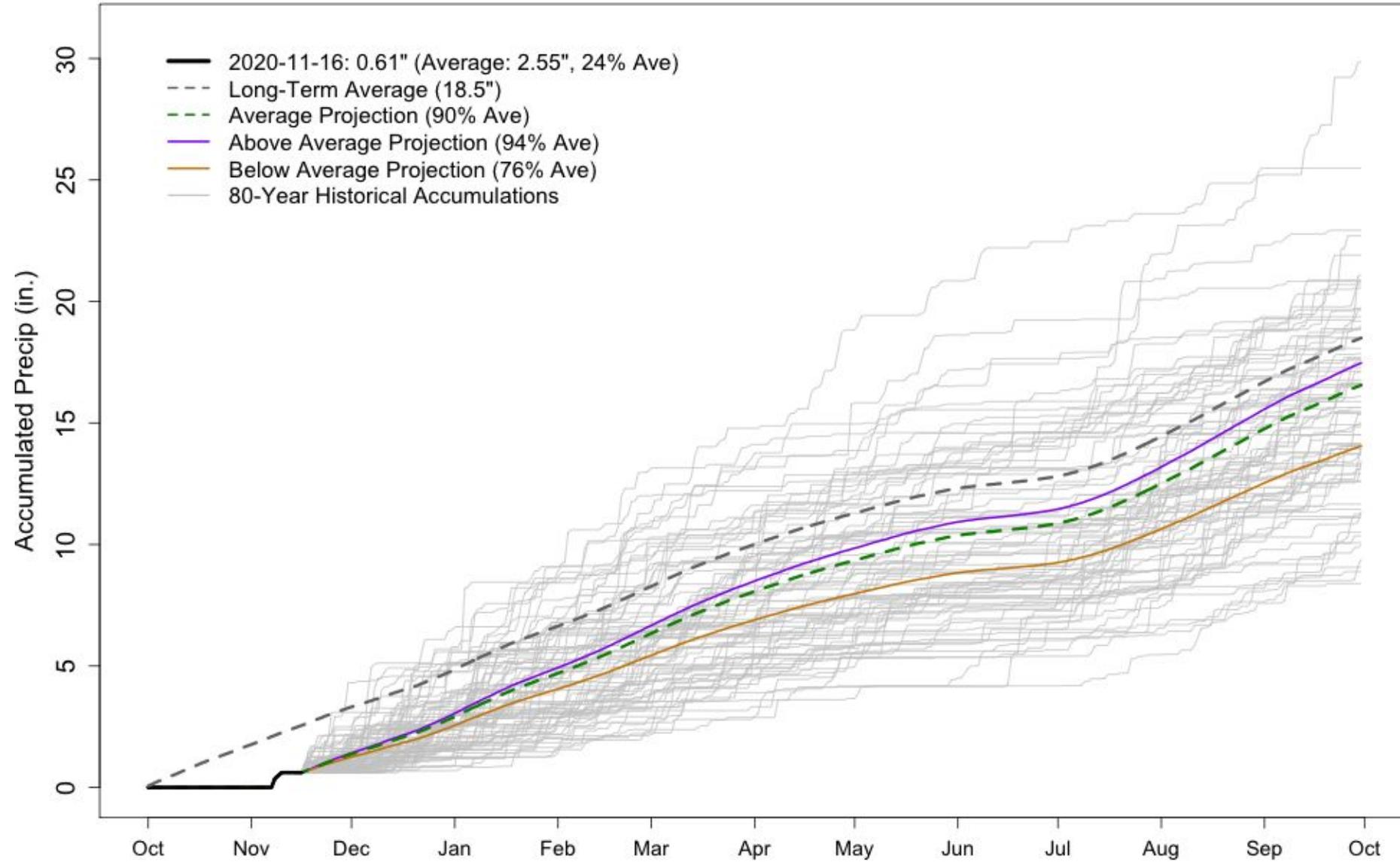
# STEAMBOAT SPRINGS WY2021 Precipitation Projections



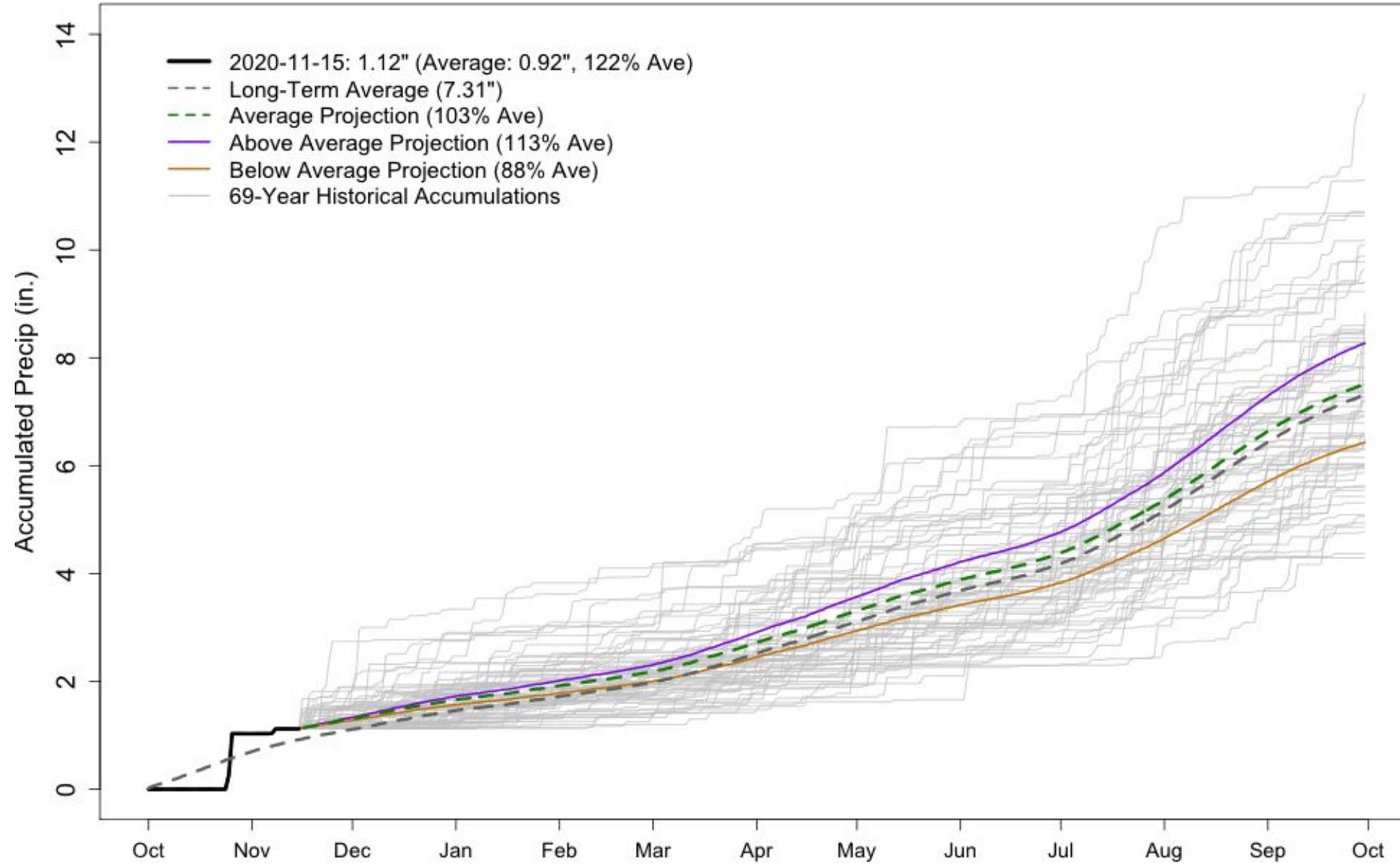
# GRAND JUNCTION WALKER FIELD WY2021 Precipitation Projections



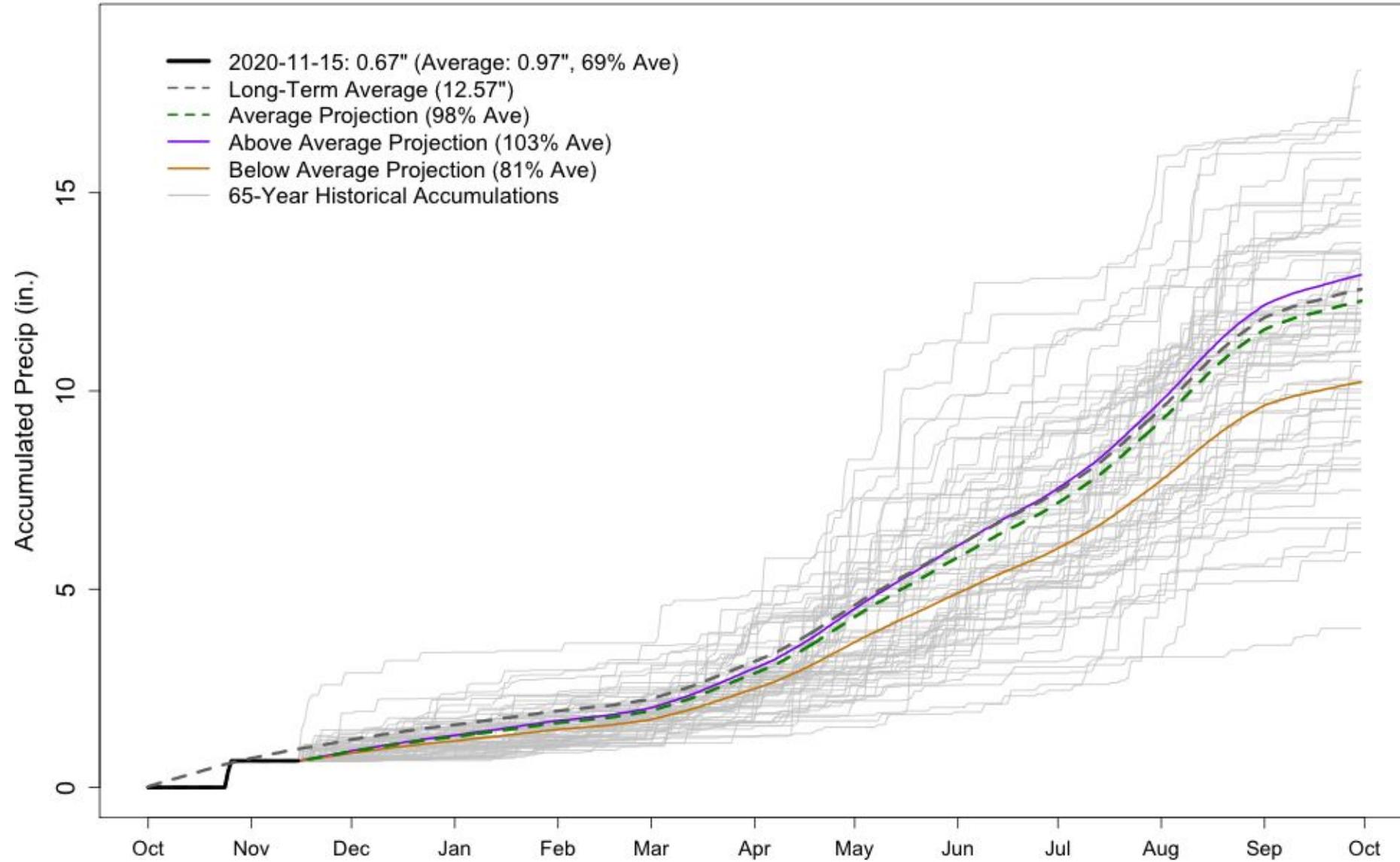
# MESA VERDE NP WY2021 Precipitation Projections



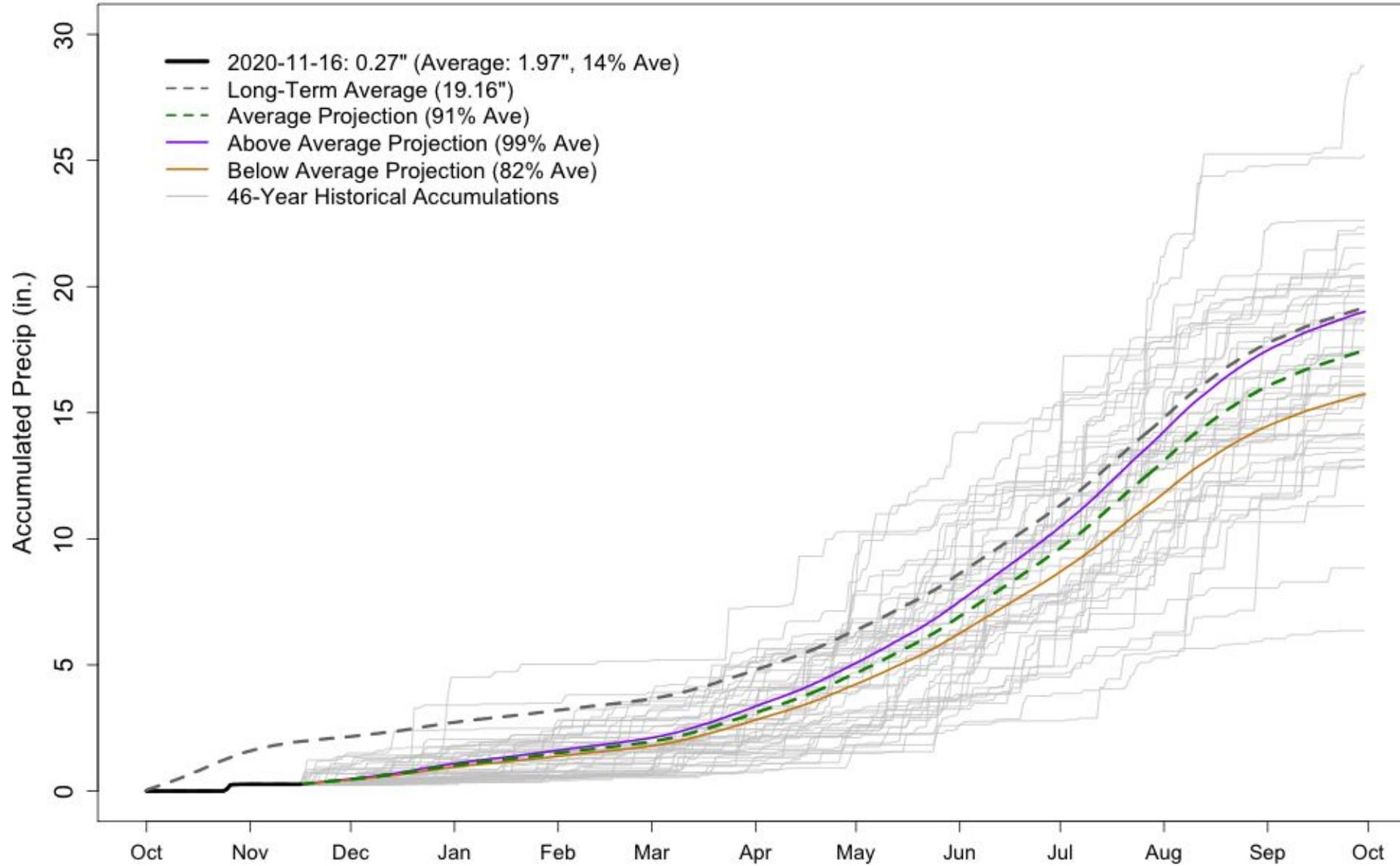
# ALAMOSA-BERGMAN FIELD WY2021 Precipitation Projections



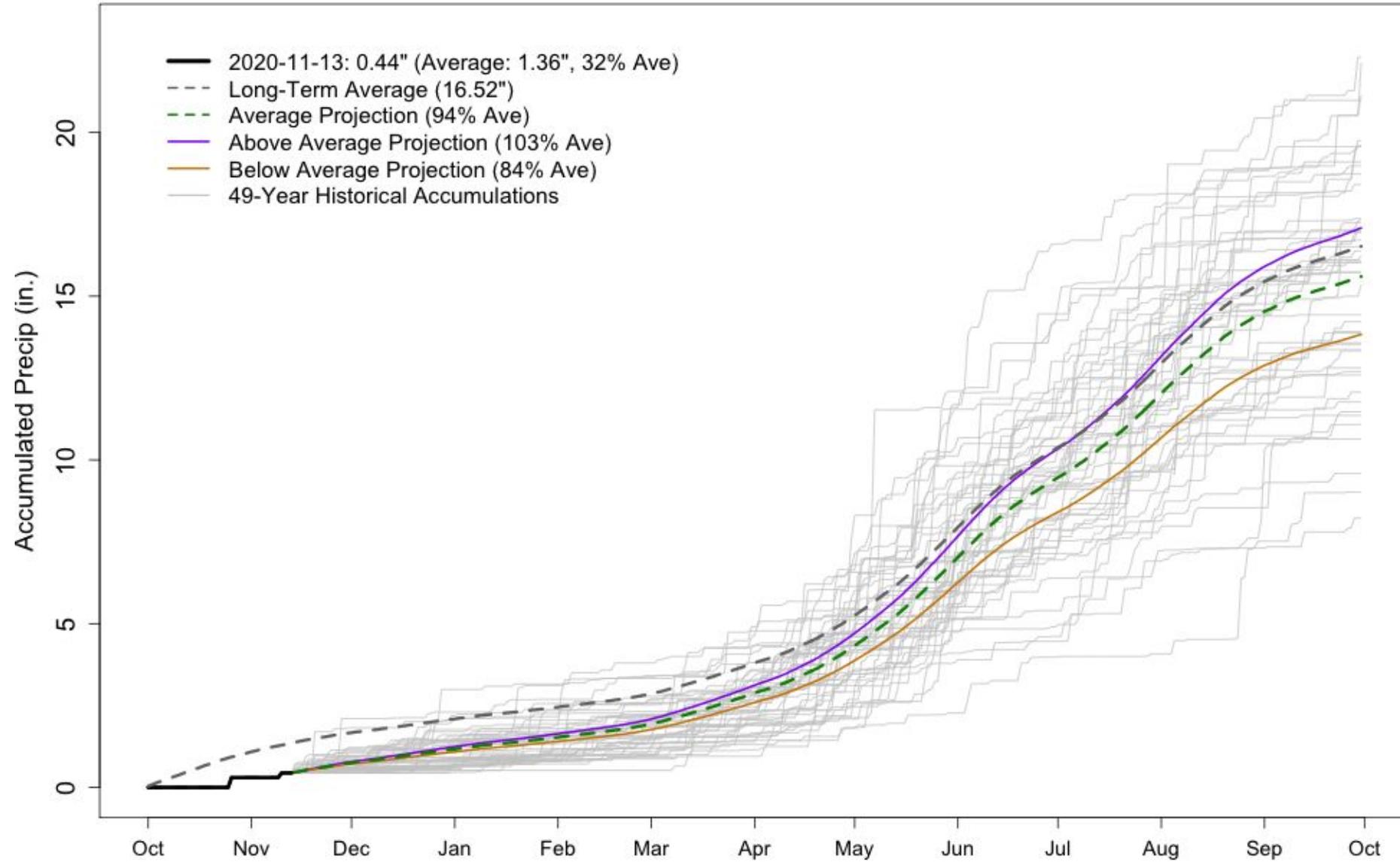
# PUEBLO MEMORIAL AIRPORT WY2021 Precipitation Projections



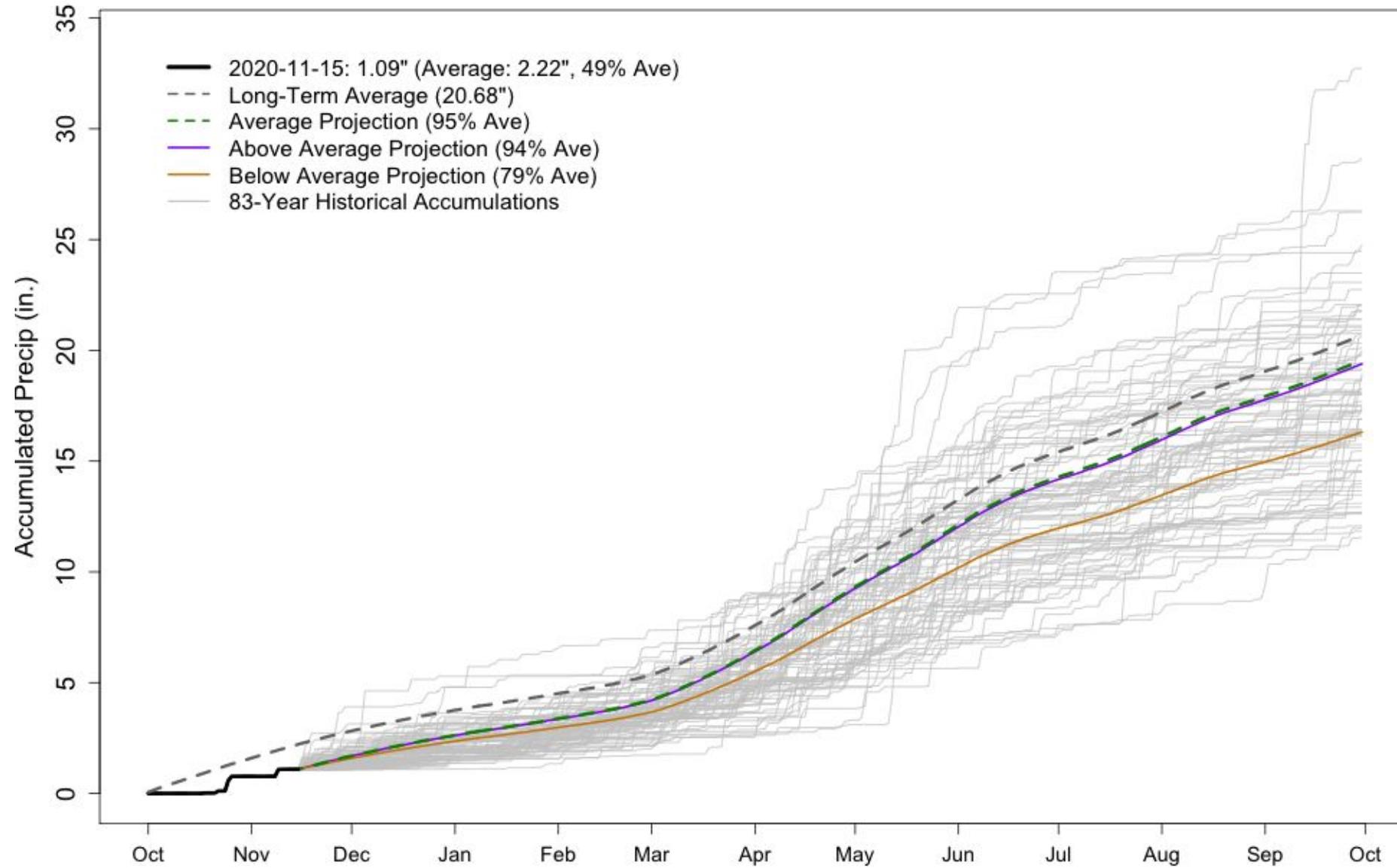
# WALSH 1 W WY2021 Precipitation Projections



# AKRON 4 E WY2021 Precipitation Projections



# BOULDER WY2021 Precipitation Projections



# Summary points

- WY 2020 is one we would like to forget (12<sup>th</sup> warmest and 3<sup>rd</sup> driest)
- The start of WY 2021 has been unsettling. We had a huge fire month in October, not typically part of high fire season for Colorado.
- The cool down at the end of October has brought back blue skies along the Front Range as fire growth have been brought back under control
- November to date hasn't been especially atypical. It has leaned a bit dry and warm with a few decent snows to start the mountain snowpack season
- The next several weeks are likely to lean warm and dry. No major breaks in the forecast. Expect snowpack numbers to fall a bit behind
- Weak La Niña is likely this winter. Expect warmer and dry conditions to be more likely to the south and more normal conditions to the north. Don't expect any widespread bailouts. Winners: NW CO. Losers: SE CO
- Above normal moisture is needed to put us on track next spring



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