Colorado Climate U[illegible]ate

Russ Schumacher, state climatologist

Water Availability Task Force

March 28, 2023

COLORADO CLIMATE CENTER

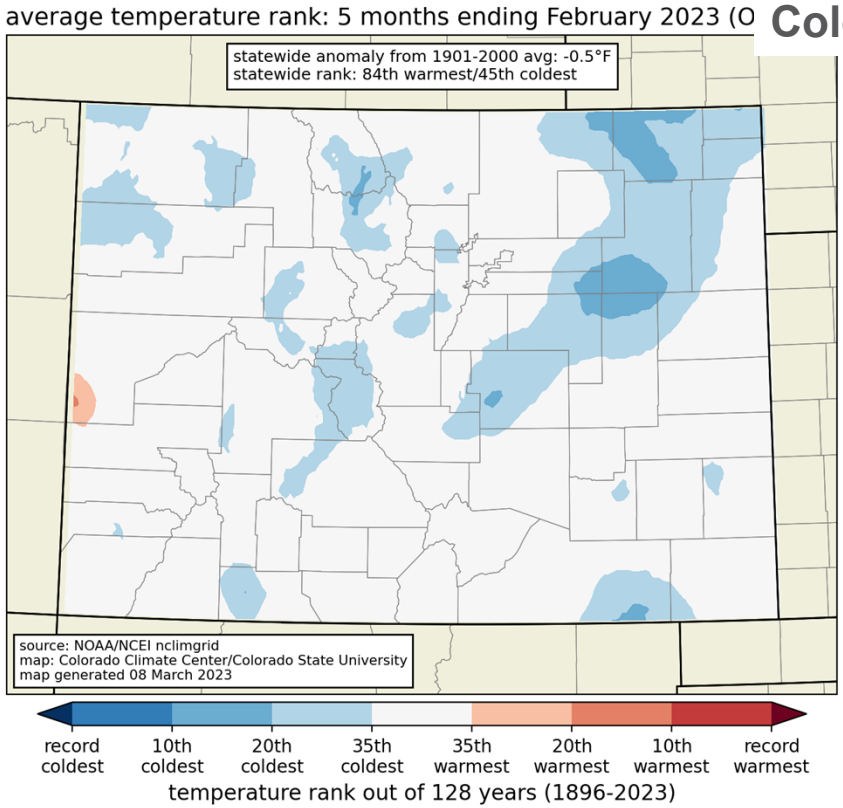
[illegible]OSPHERIC SCIENCE

[illegible]DO STATE UNIVERSITY

Water year 2023 to date:

temperature, precipitation, evaporative demand

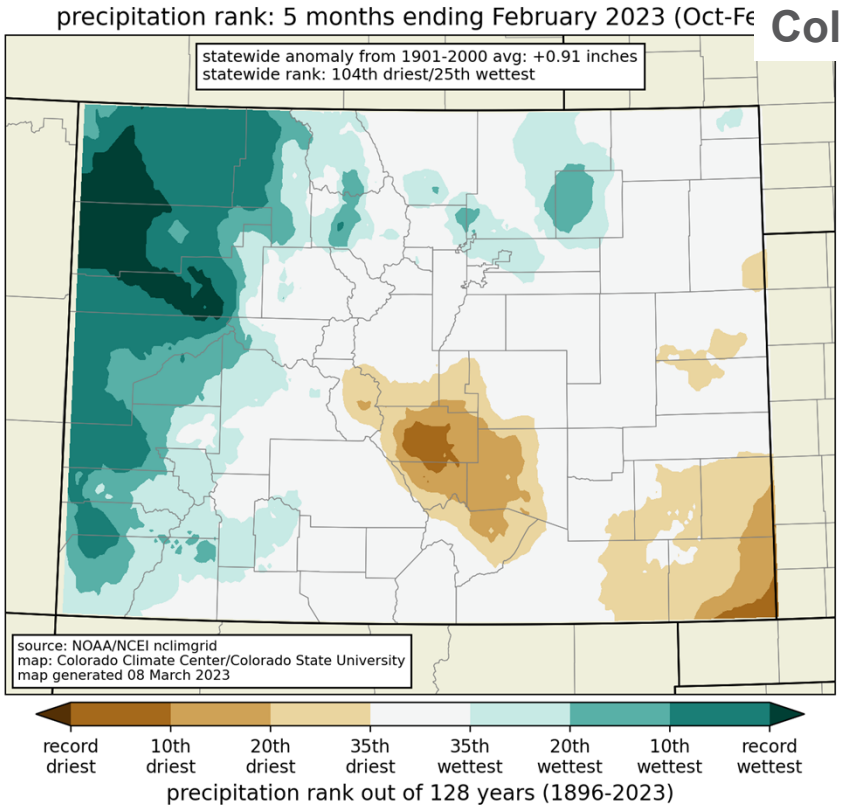
Yesterday (March 27),
My backyard, Fort Collins



Colorado rankings:

Month	T Rank (of 128 years)	Above, below, or near 20th century avg?
Oct	45th warmest	near avg
Nov	29th coolest	below
Dec	52nd coolest	near avg
Jan	55th coolest	near avg
Feb	41st coolest	below

Statewide: 45th coldest October-February (out of 128), coolest start to a water year since 2010



Colorado rankings:

Month	P Rank (of 128 years)	Above, below, or near 20th century avg?
Oct	63rd driest	near avg
Nov	52nd driest	near avg
Dec	20th wettest	above
Jan	10th wettest	much above
Feb	61st driest	near avg

Statewide: 25th wettest October-February (out of 128), wettest start to a water year since 2019

Colorado February 2023 Precipitation as a Percentage of Normal

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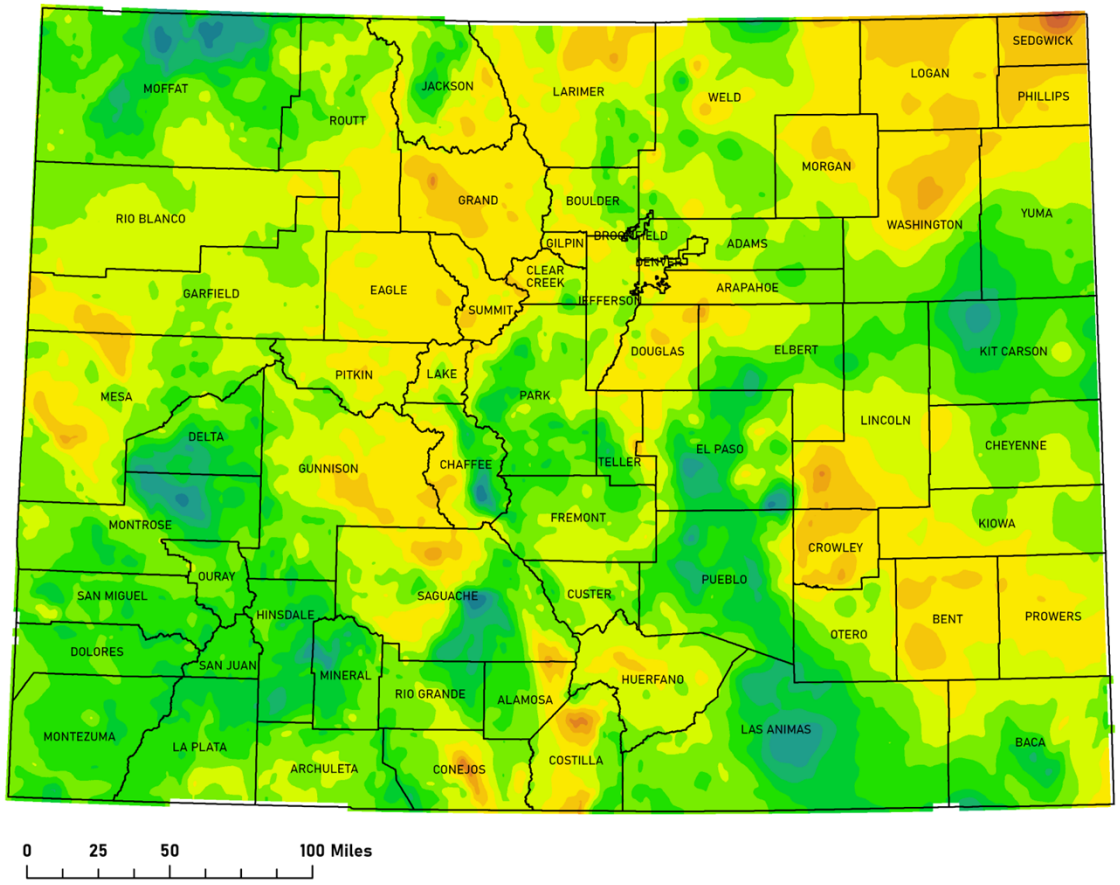


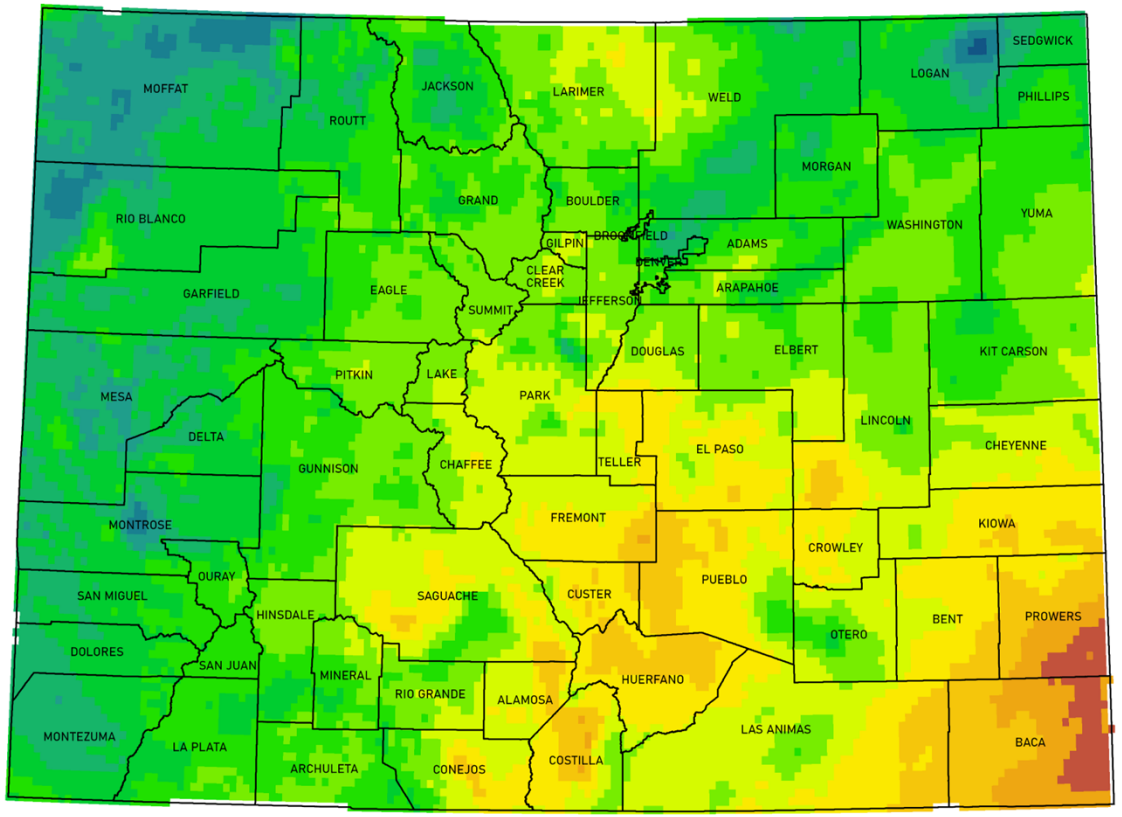
% of Normal
Value

- 0 - 2
- 2 - 10
- 10 - 20
- 20 - 30
- 30 - 50
- 50 - 70
- 70 - 90
- 90 - 110
- 110 - 130
- 130 - 150
- 150 - 170
- 170 - 200
- 200 - 250
- 250 - 300
- 300+

Data from PRISM Climate Group

October 2022 – February 2023 Precipitation as a Percentage of Normal

COLORADO CLIMATE CENTER



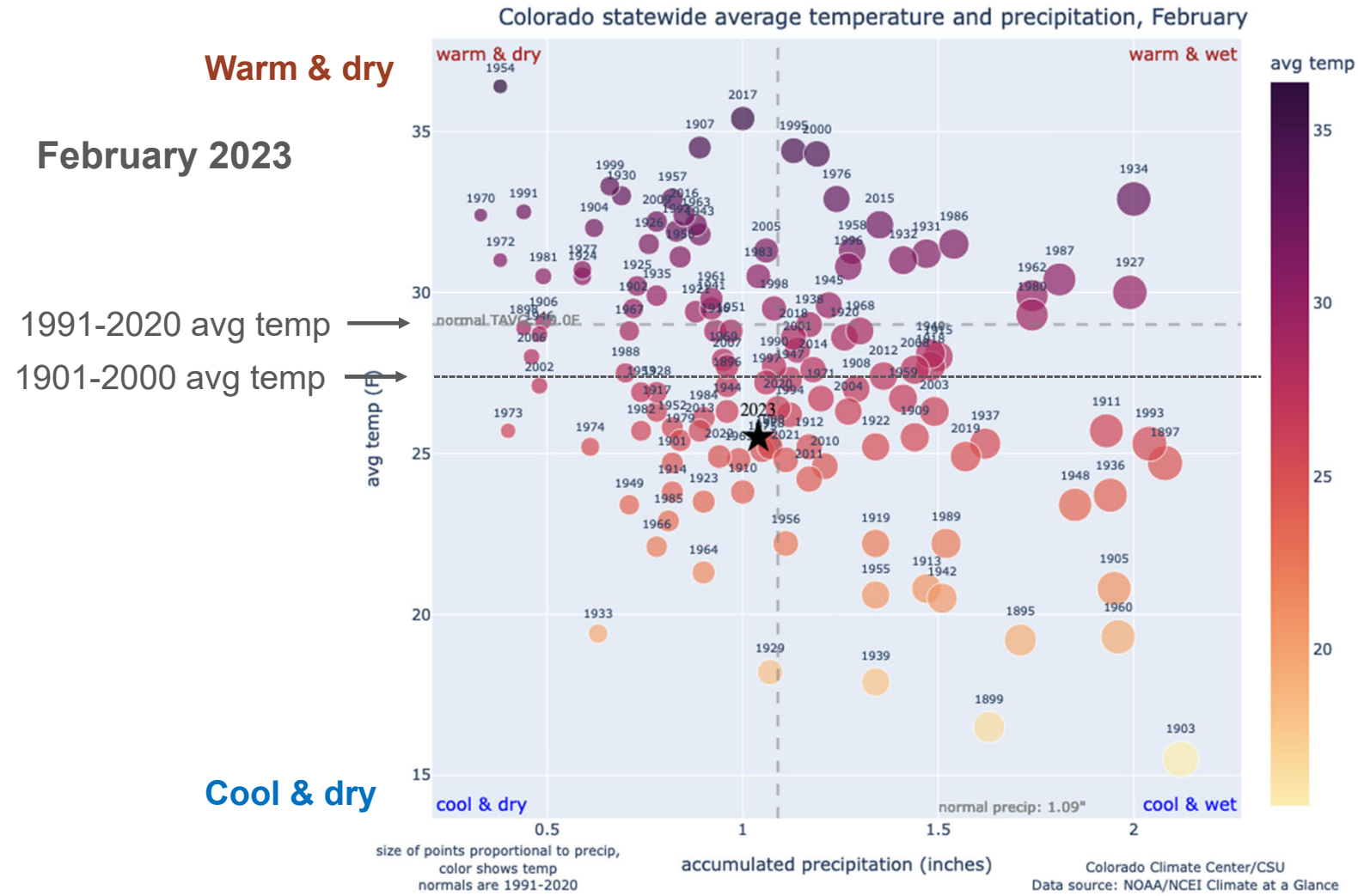
% of Normal
Value

- 0 – 2
- 2 – 10
- 10 – 20
- 20 – 30
- 30 – 50
- 50 – 70
- 70 – 90
- 90 – 110
- 110 – 130
- 130 – 150
- 150 – 170
- 170 – 200
- 200 – 250
- 250 – 300
- 300+

Data from PRISM Climate Group

Warm & dry

February 2023



1991-2020 avg temp

1901-2000 avg temp

Warm & wet

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

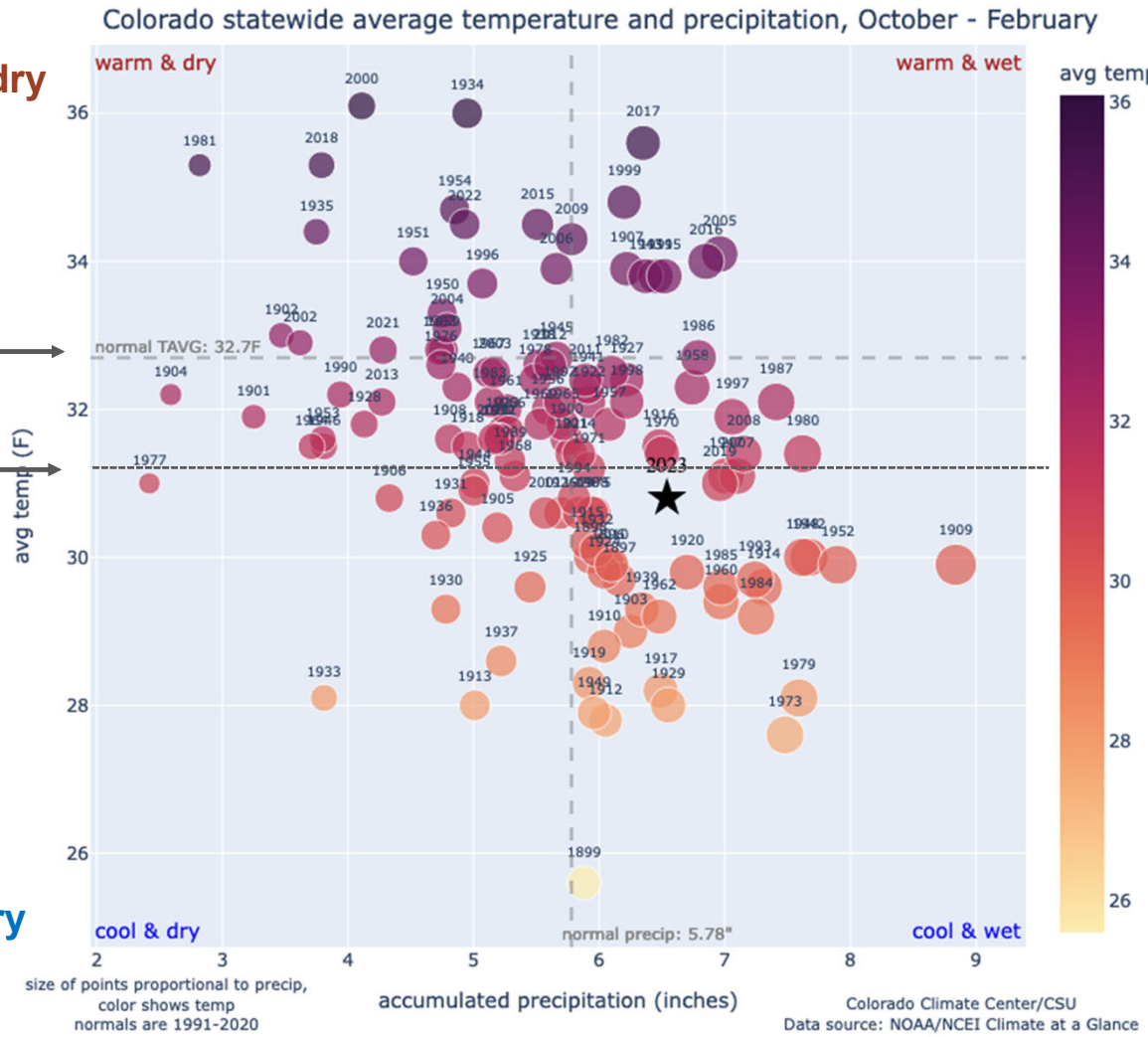
Cool & dry

Cool & wet

Warm & dry

Warm & wet

Water year 2023 through February



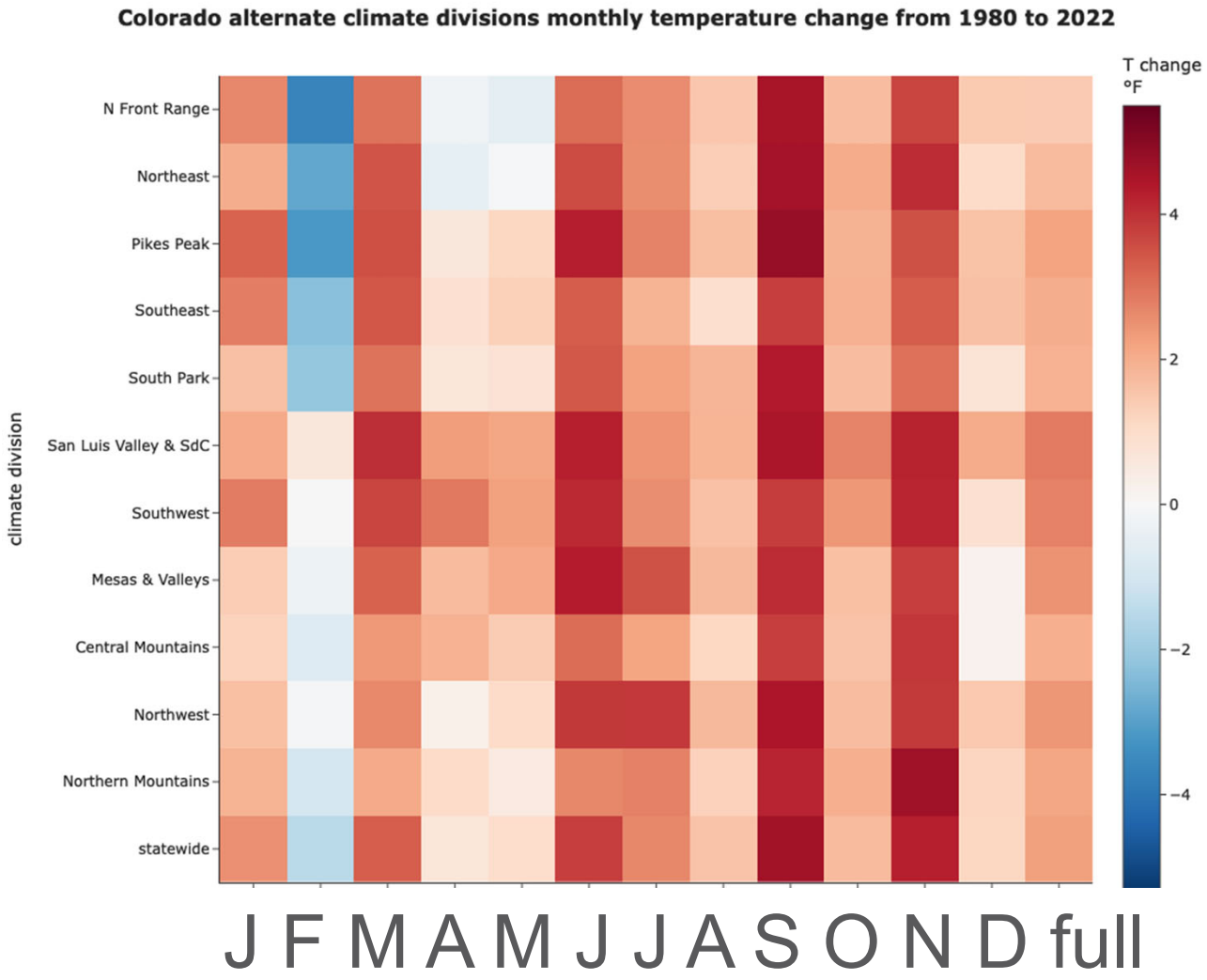
1991-2020 avg temp →

1901-2000 avg temp →

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

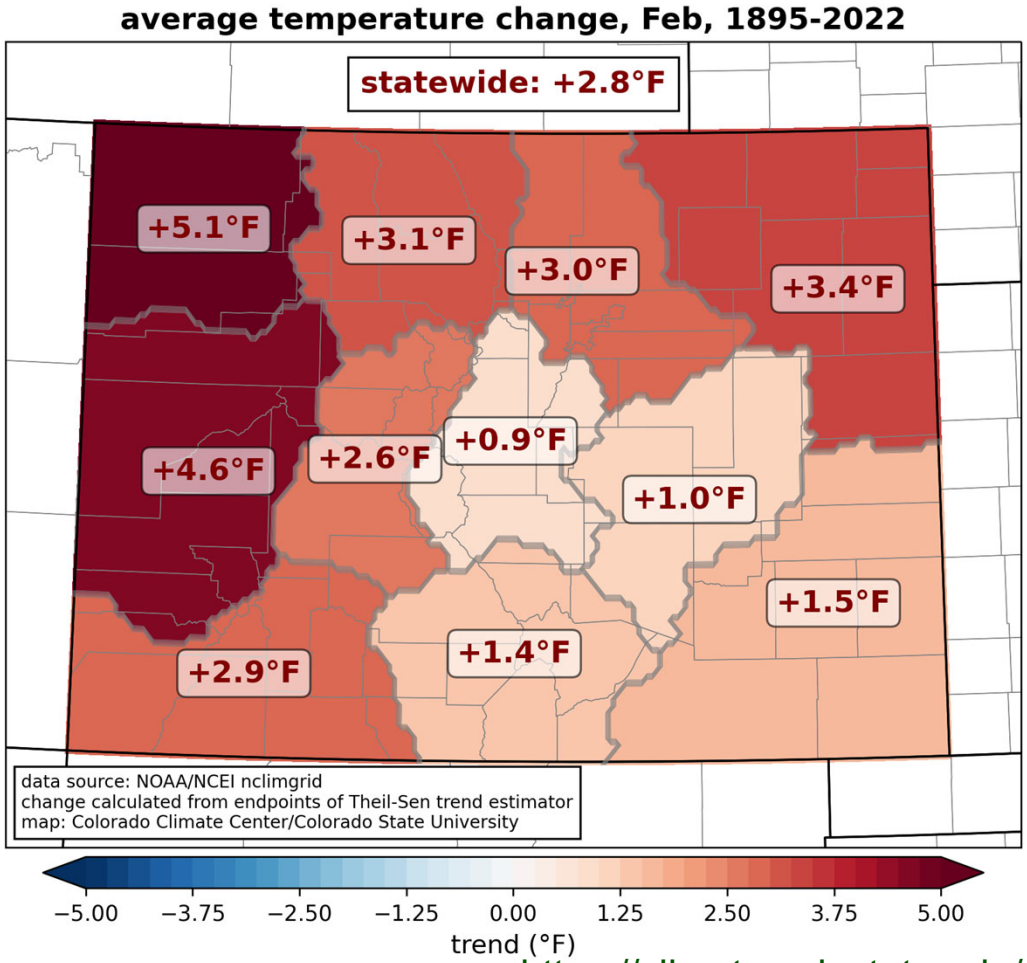
Cool & dry

Cool & wet

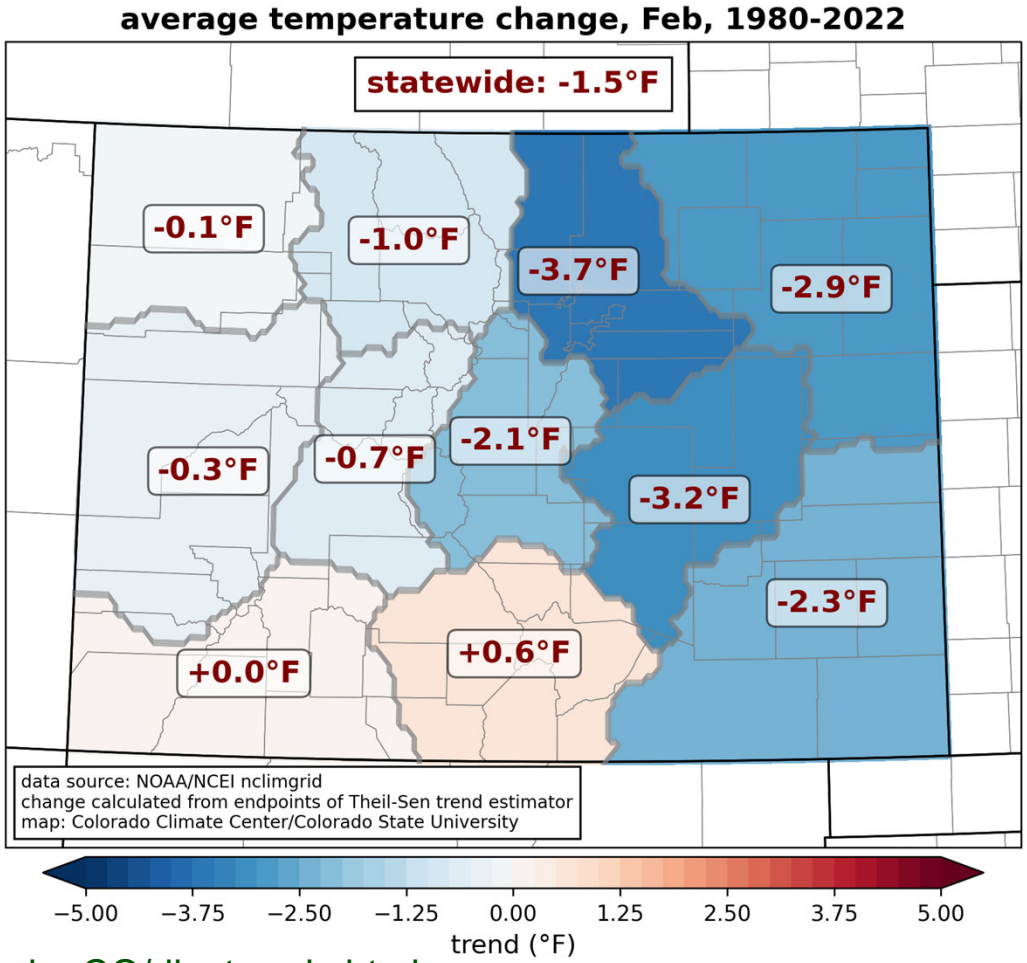


Temperature trend since 1980

February temperature trend since 1895

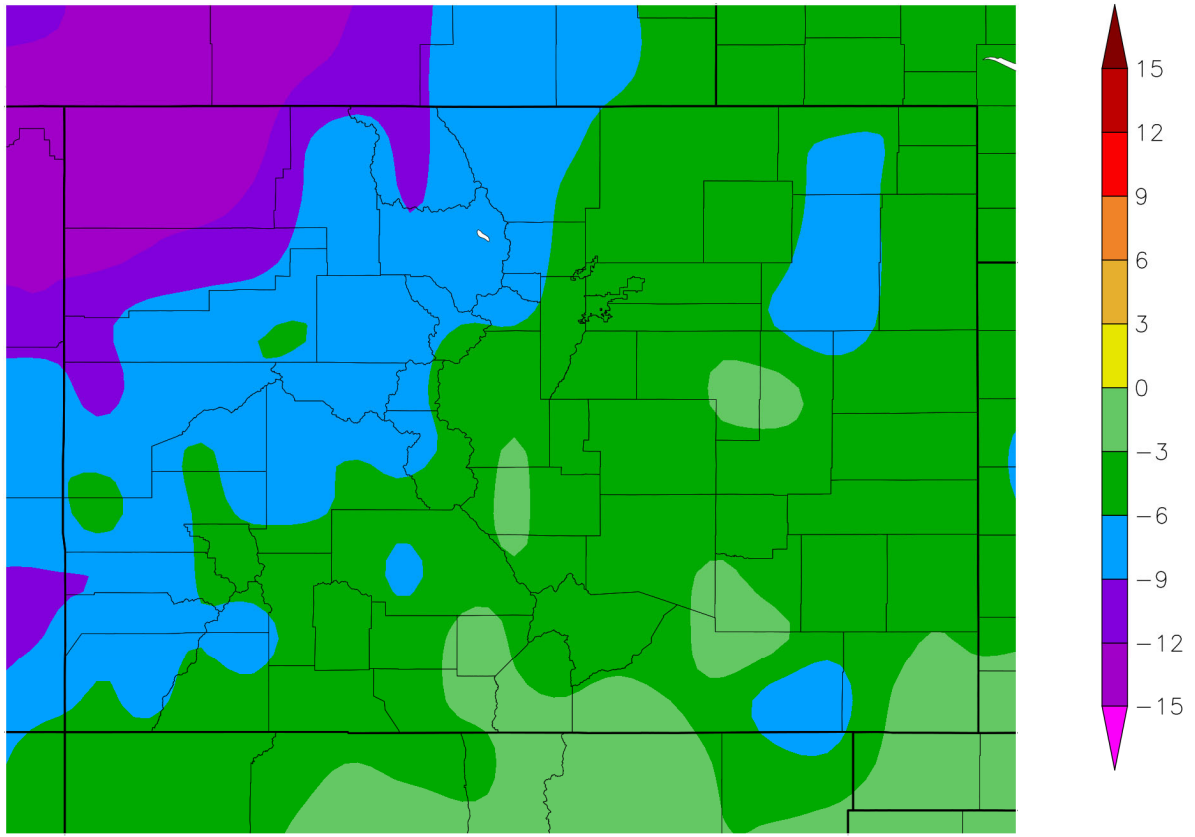


February temperature trend since 1980



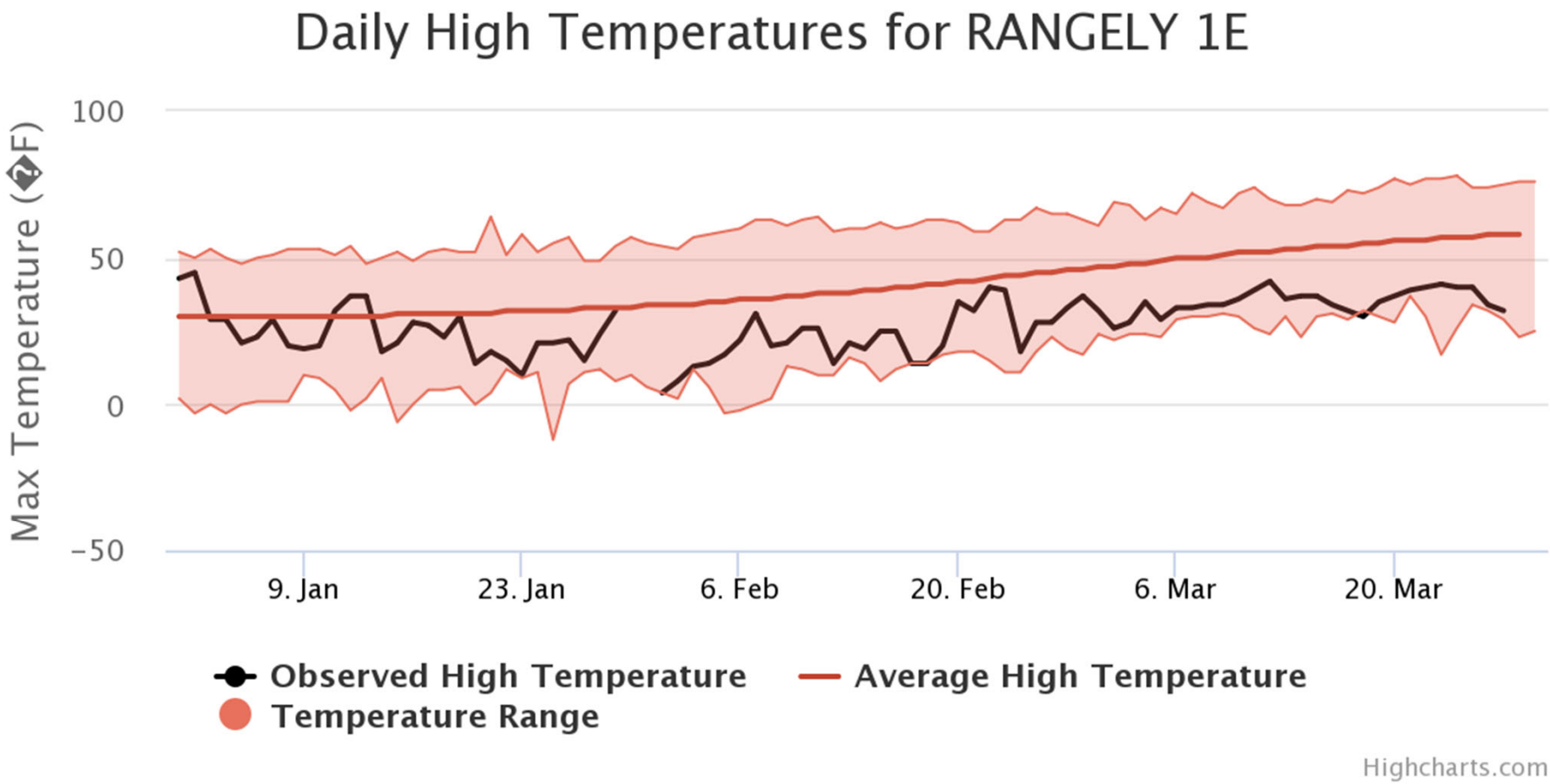
https://climate.colostate.edu/cc_in_CO/div_trends.html

Departure from Normal Temperature (F)
3/1/2023 – 3/27/2023



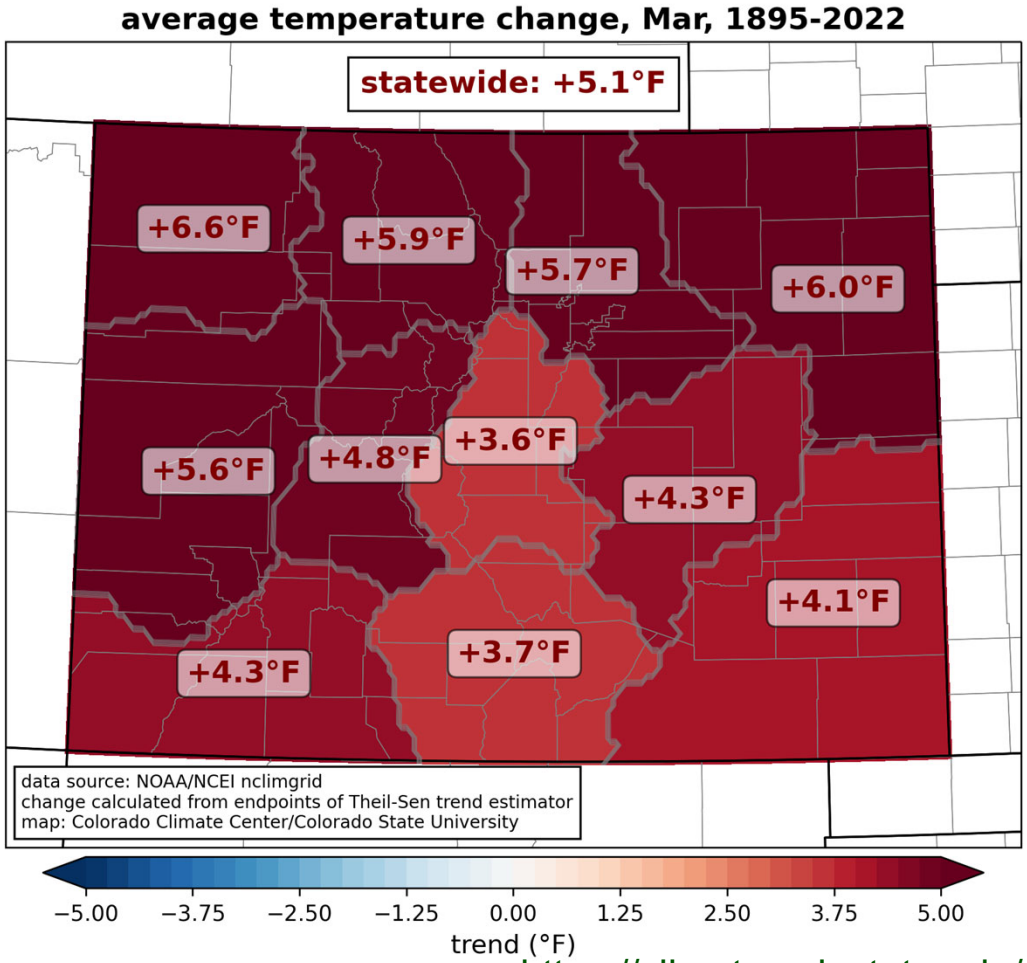
Generated 3/28/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

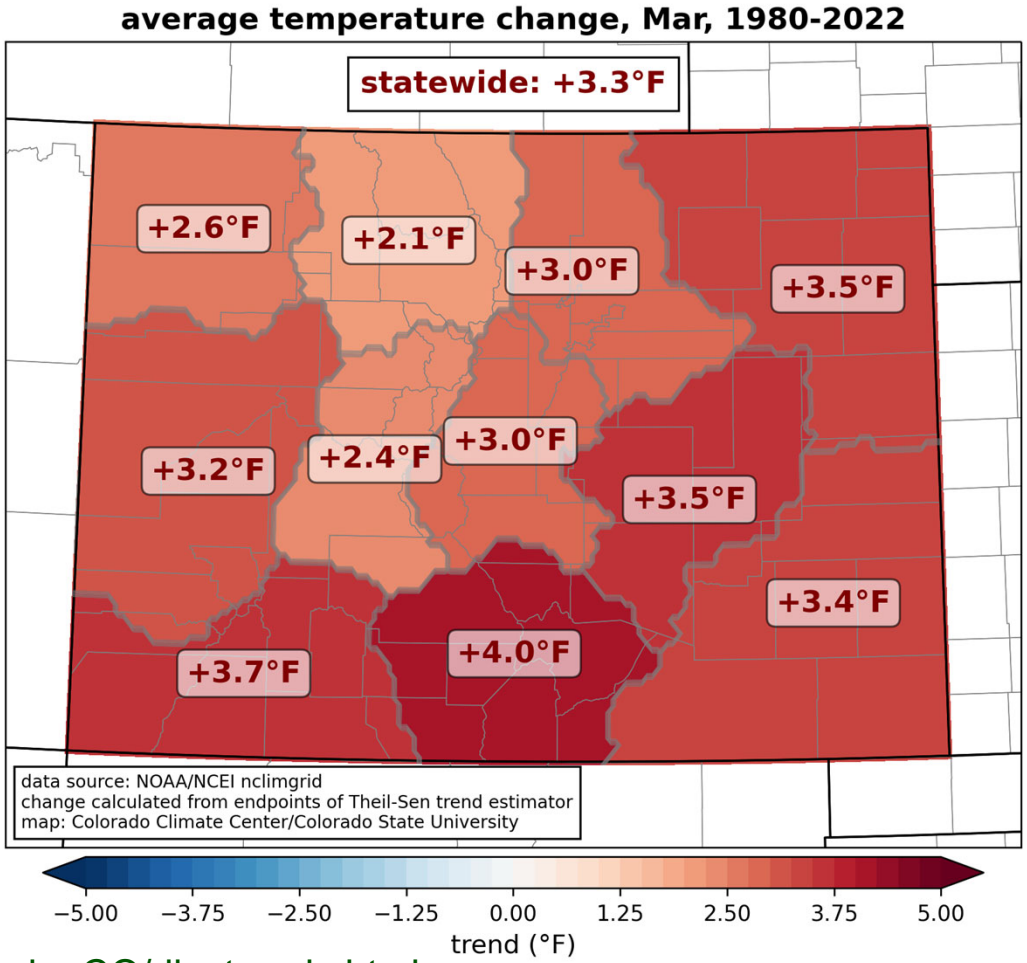


Every day since at least February 1 has had a below-normal high temperature
(the streak may extend back to January 13; there are a couple missing days at the end of Jan)

March temperature trend since 1895

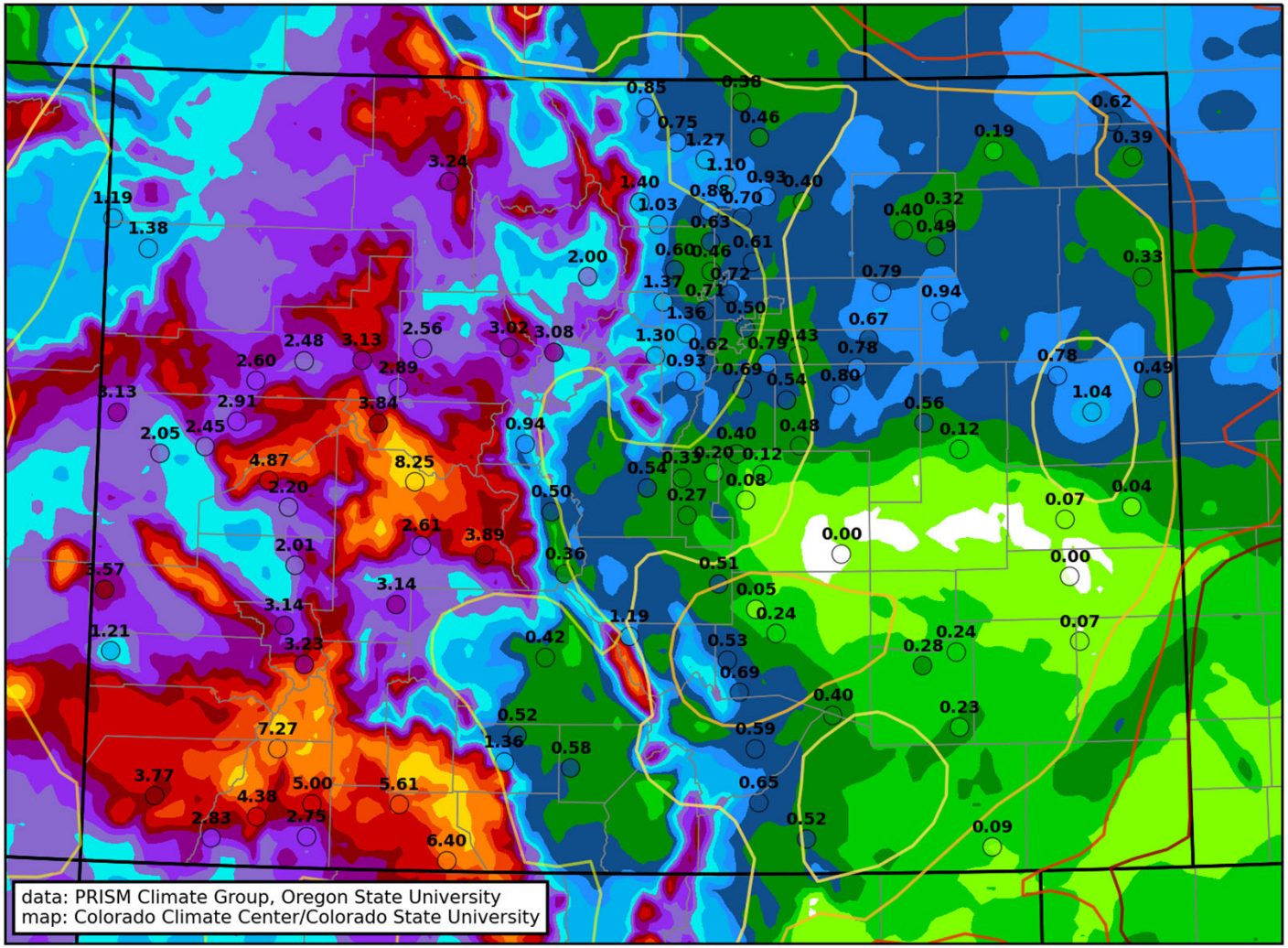


March temperature trend since 1980



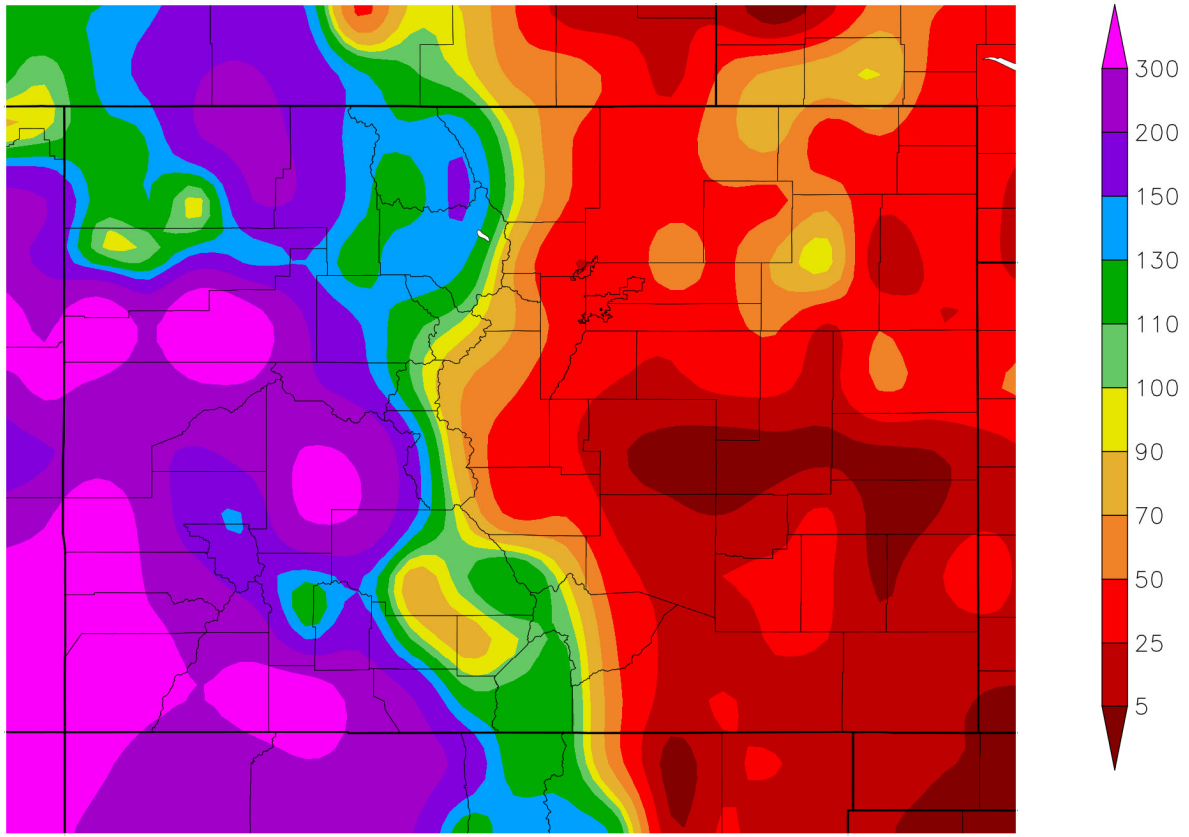
https://climate.colostate.edu/cc_in_CO/div_trends.html

PRISM and CoCoRaHS month-to-date precipitation, US Drought Monitor through 5:00am MST 27 March 2023



March precipitation through Monday morning

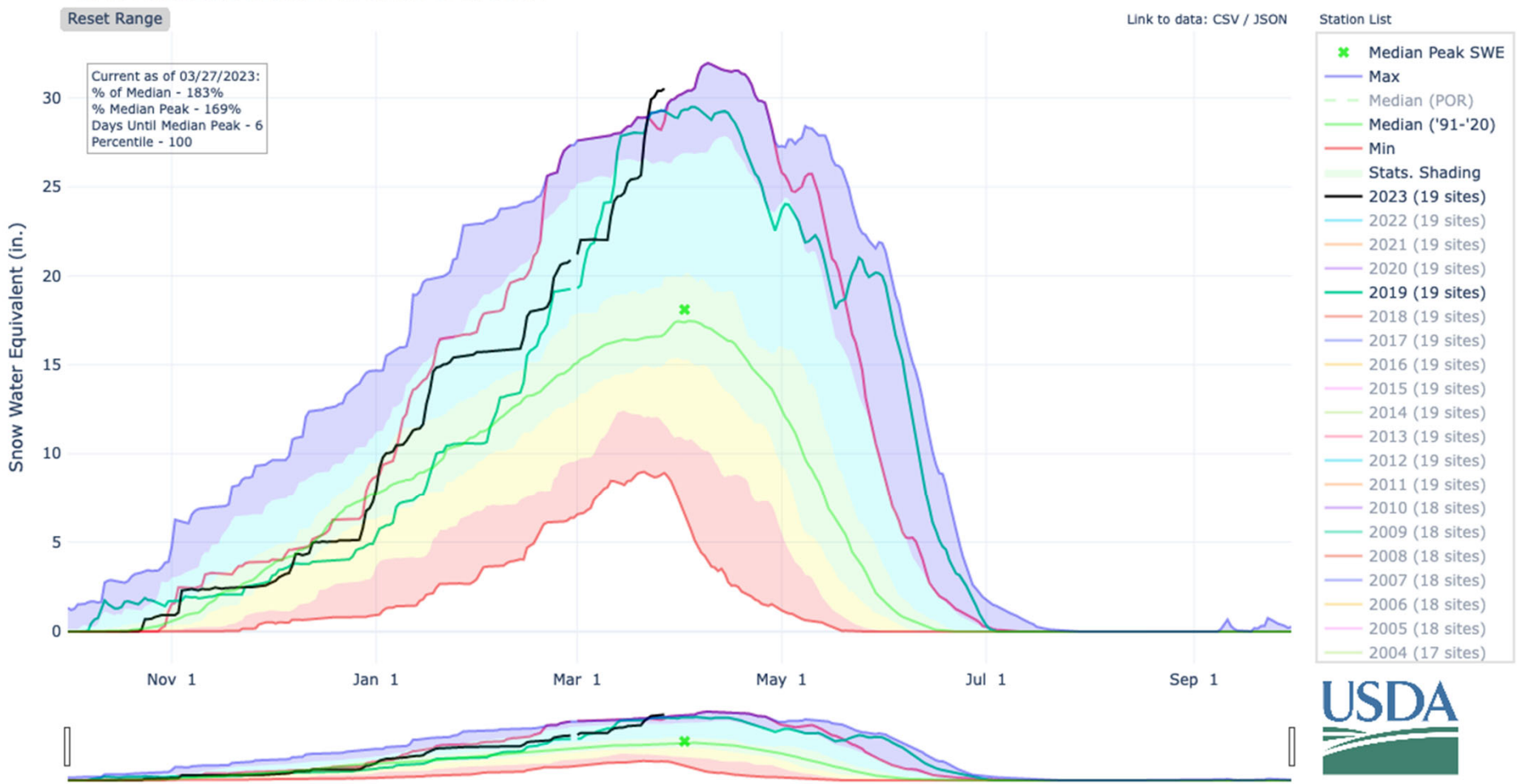
Percent of Normal Precipitation (%)
3/1/2023 – 3/27/2023

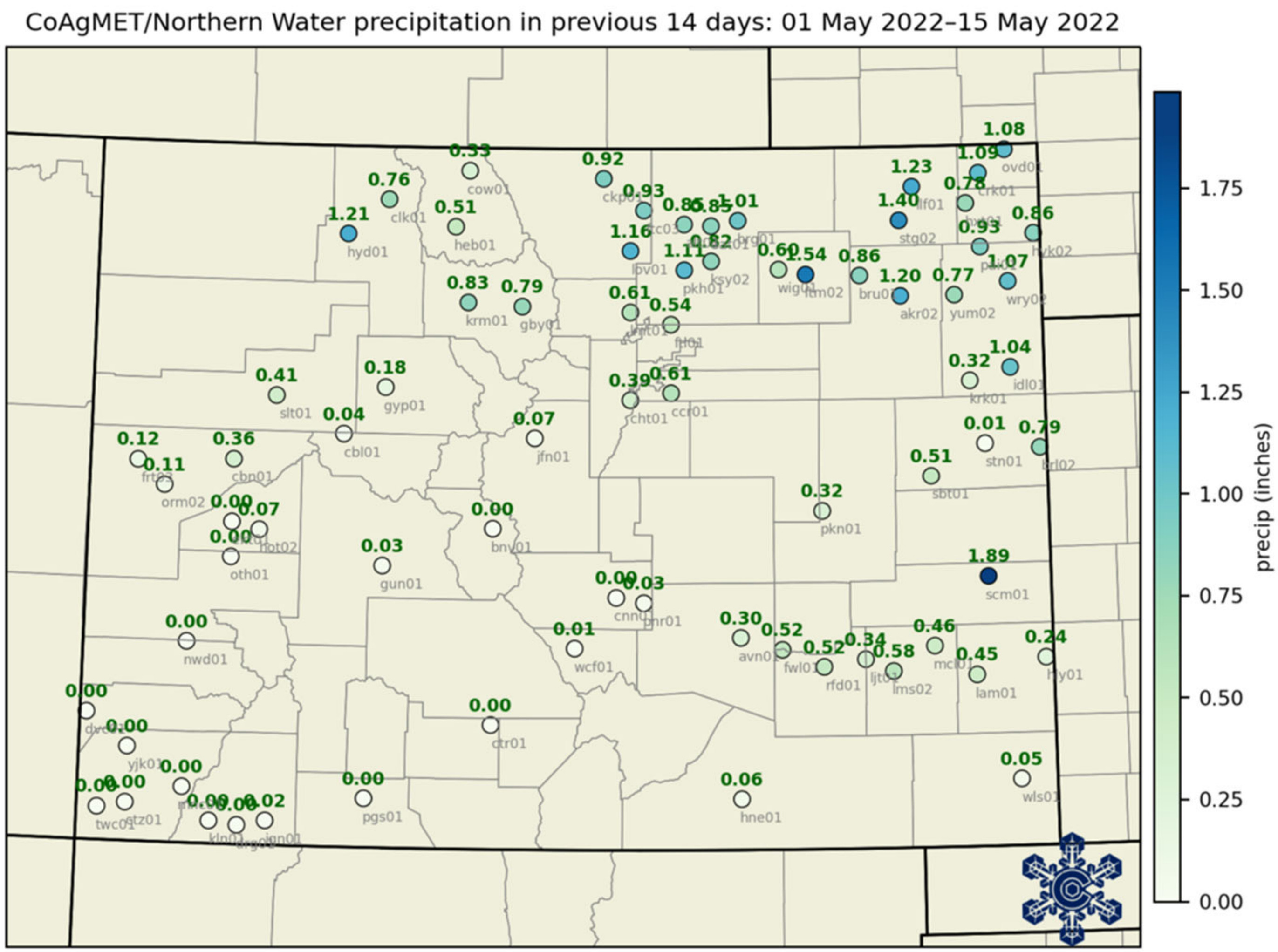


Generated 3/28/2023 at HPRCC using provisional data.

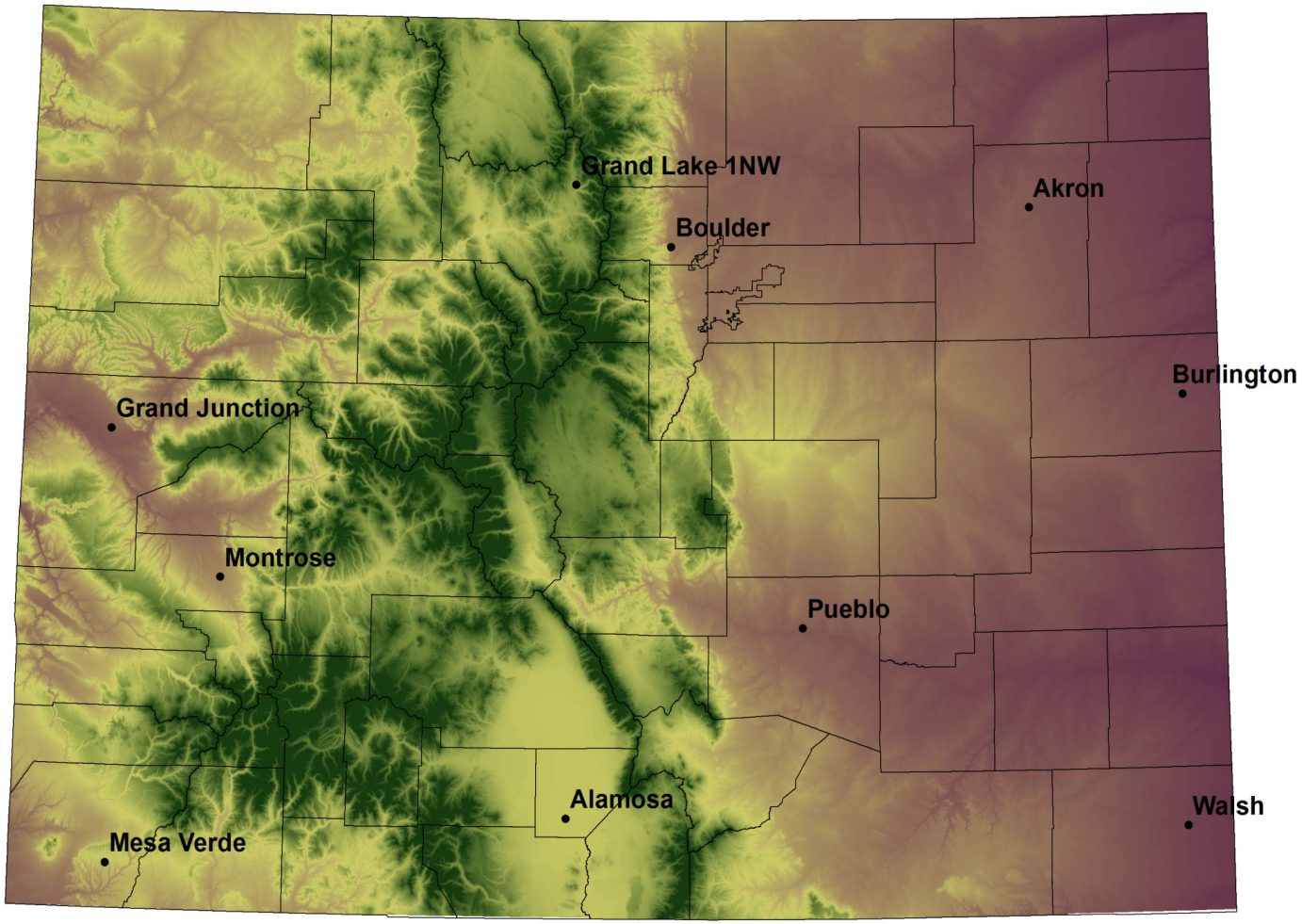
NOAA Regional Climate Centers

Black: this year, blue: 2019, red: 1993




CoAgMET/Northern Water precipitation in previous 14 days: 01 May 2022–15 May 2022
precip (inches)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00

NWS Cooperative Stations for WATF



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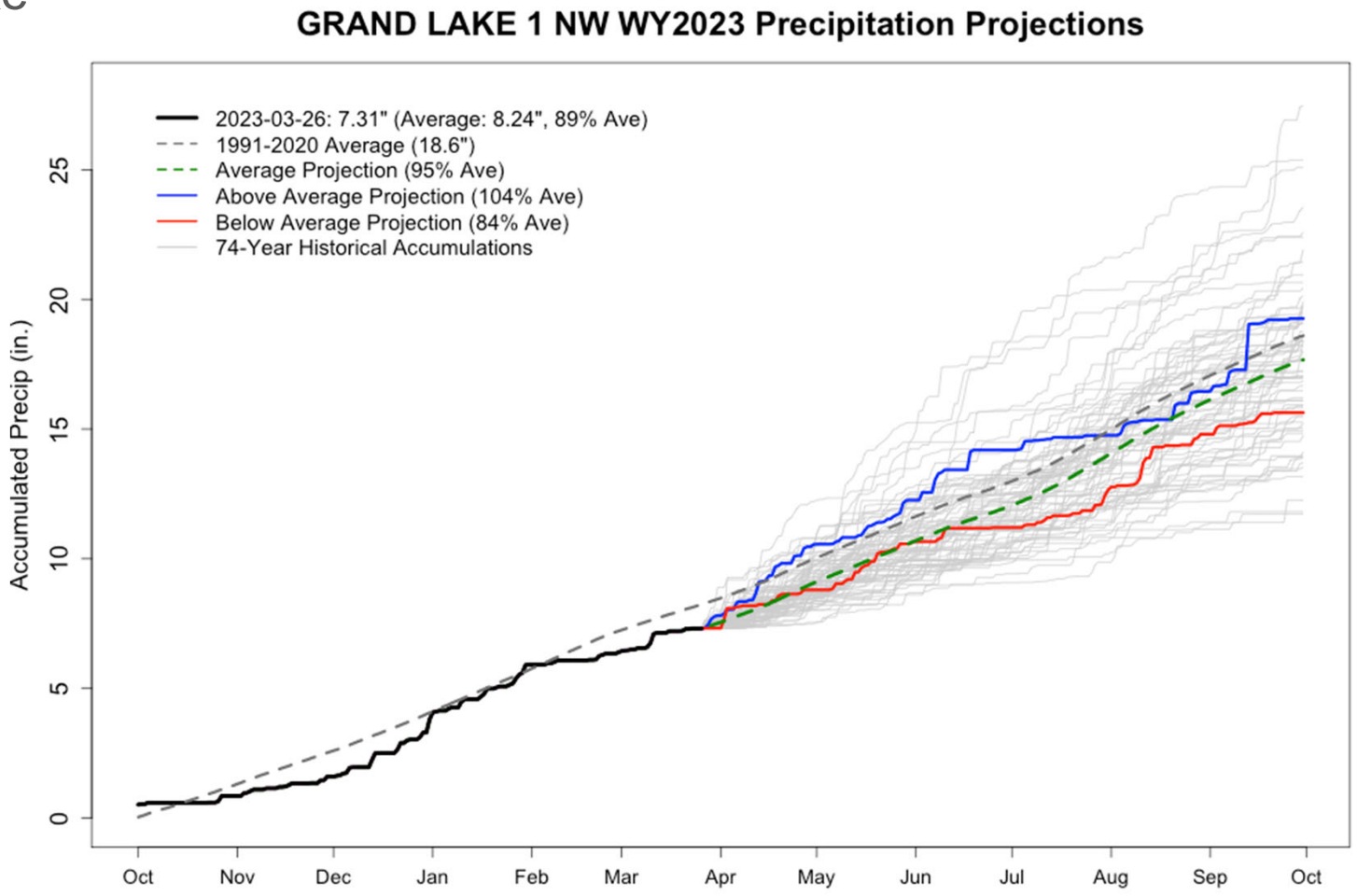
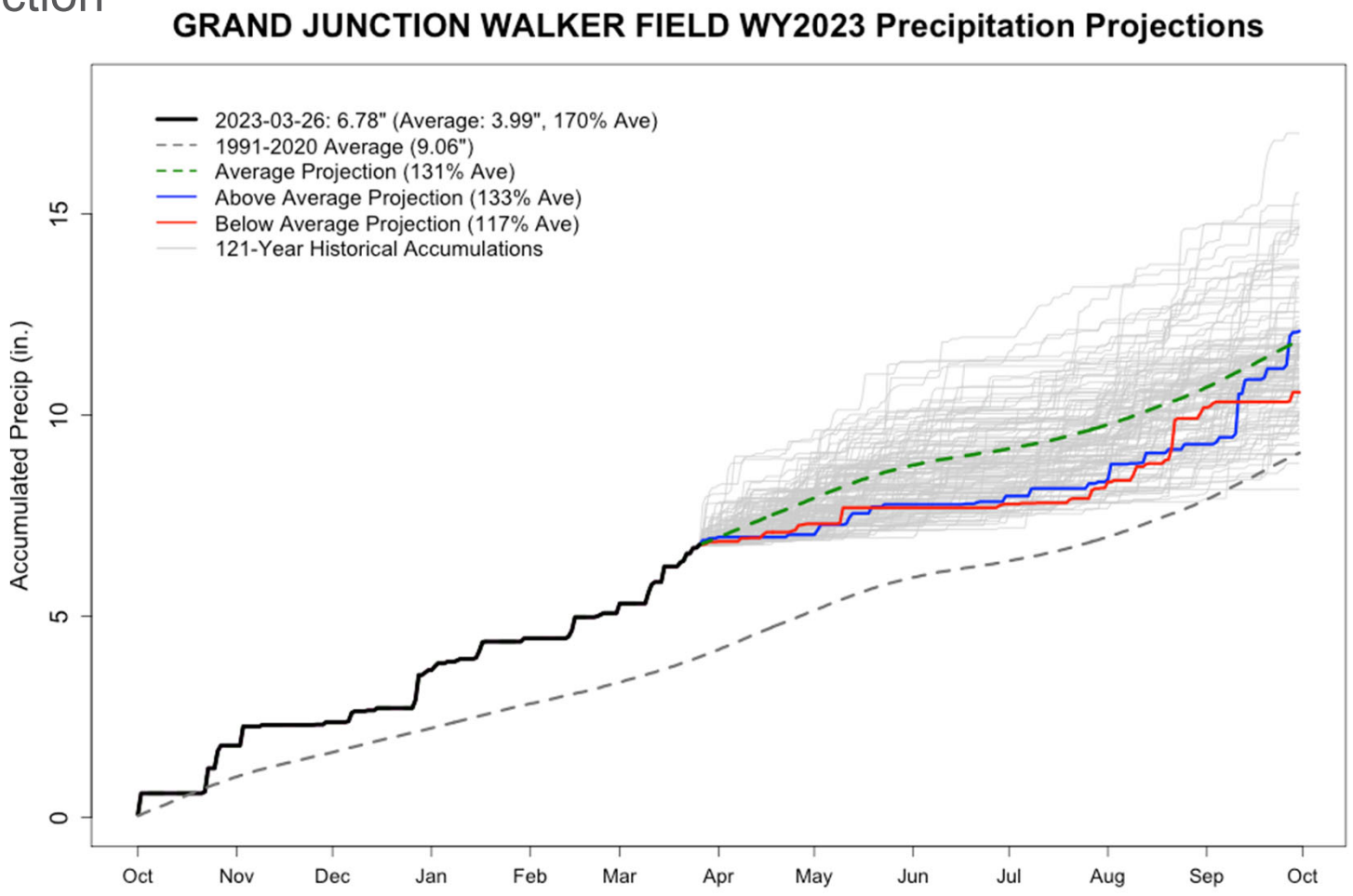
Water Year 2022 – Station Updates

Grand Lake

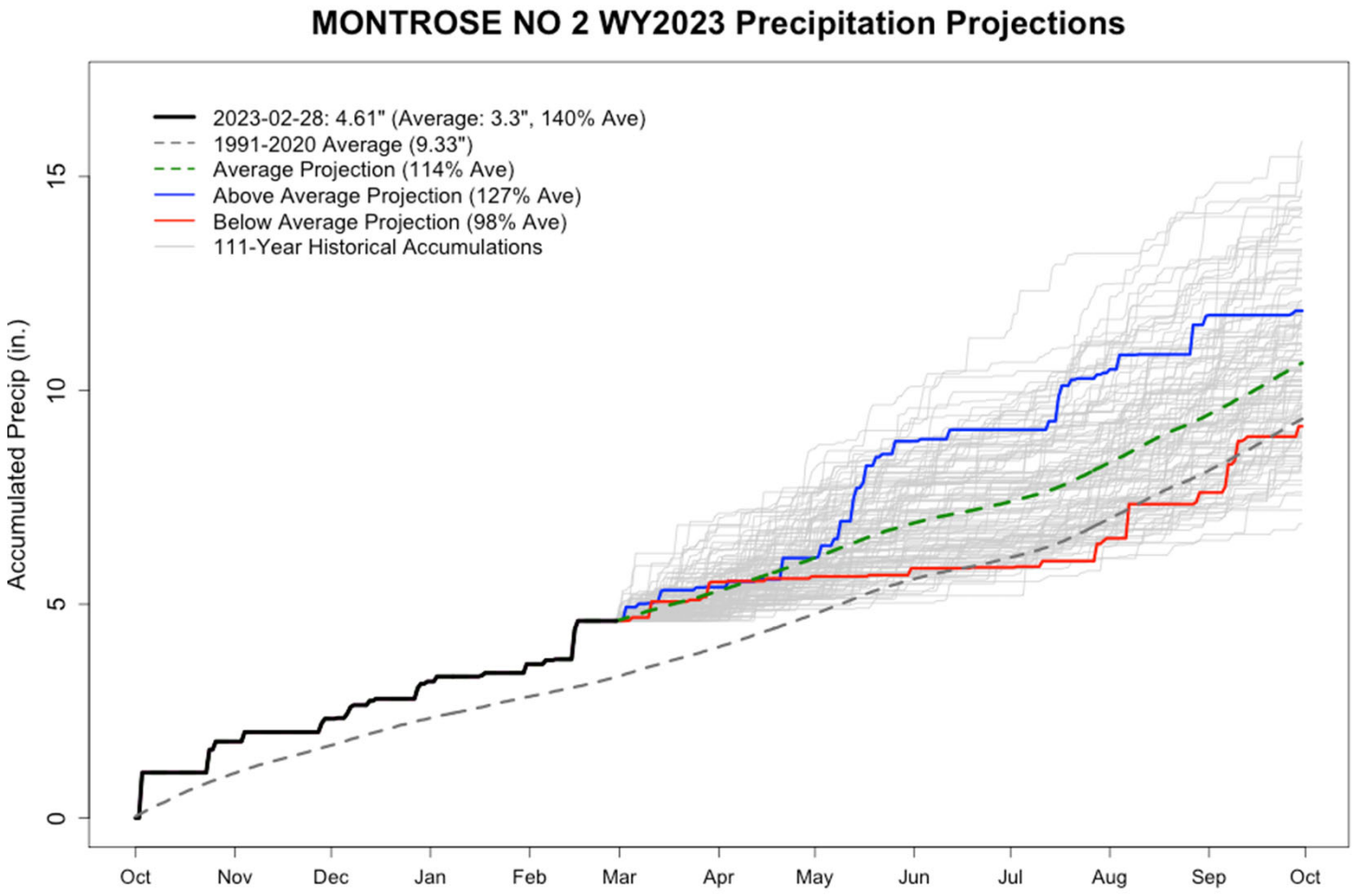

GRAND LAKE 1 NW WY2023 Precipitation Projections
2023-03-26: 7.31" (Average: 8.24", 89% Ave)
1991-2020 Average (18.6")
Average Projection (95% Ave)
Above Average Projection (104% Ave)
Below Average Projection (84% Ave)
74-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
25
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Grand Junction



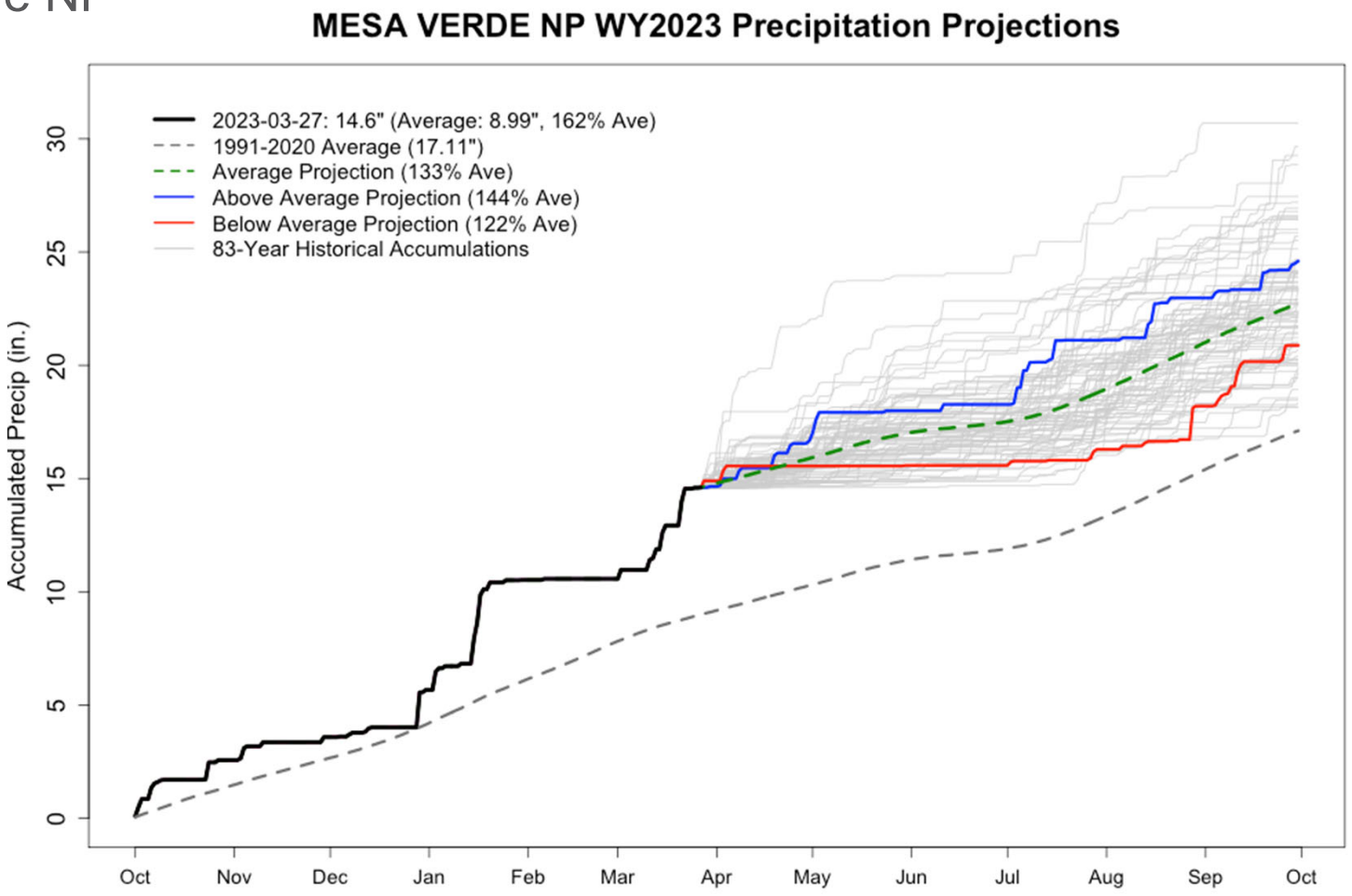
3rd wettest water year to date, behind 2019 (7.61”) and 1929 (8.14”)

Montrose



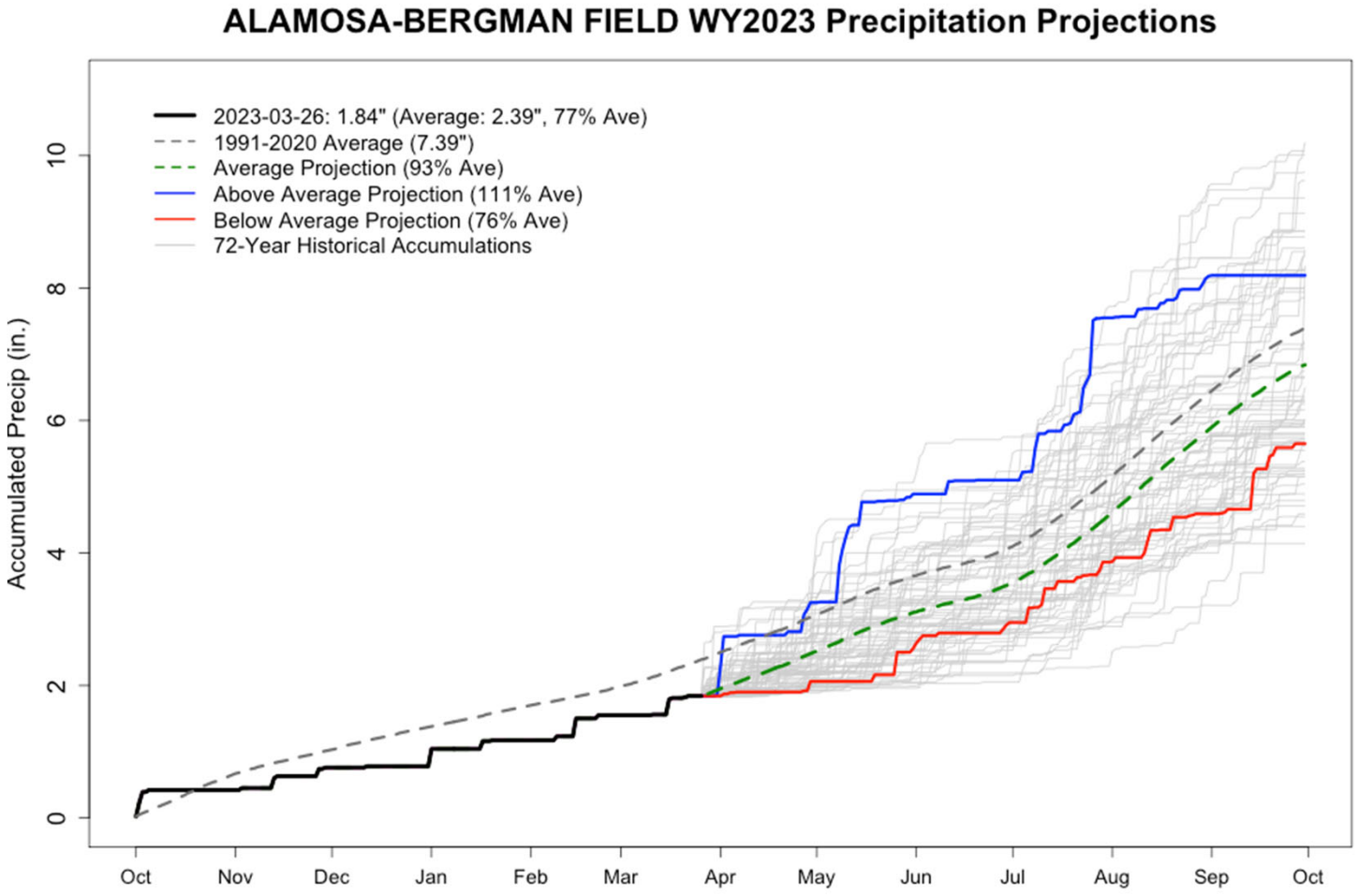
Note: data only through February

Mesa Verde NP

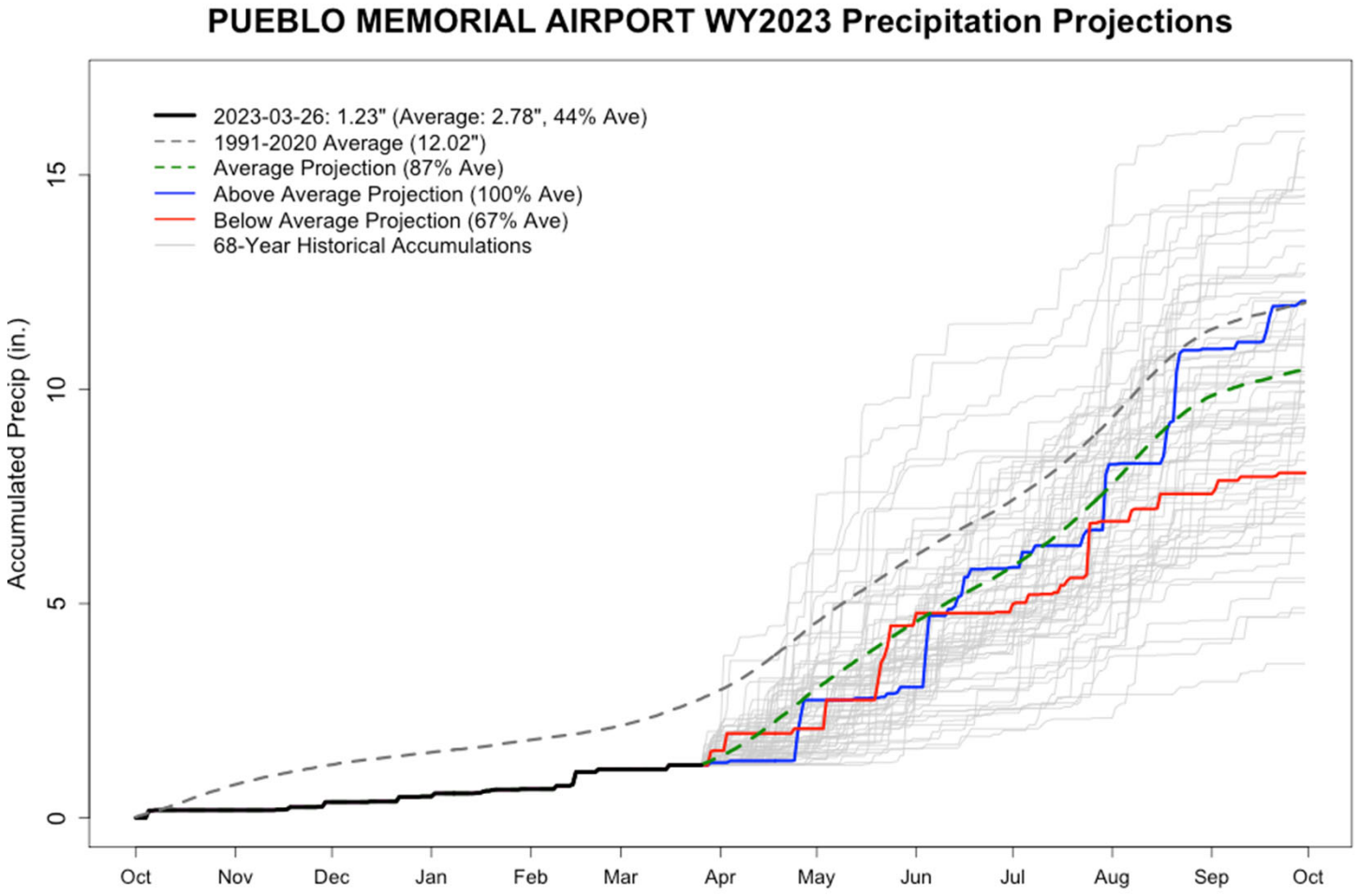


Only about 2.5” shy of the average for the entire water year, with the summer monsoon yet to come

Alamosa

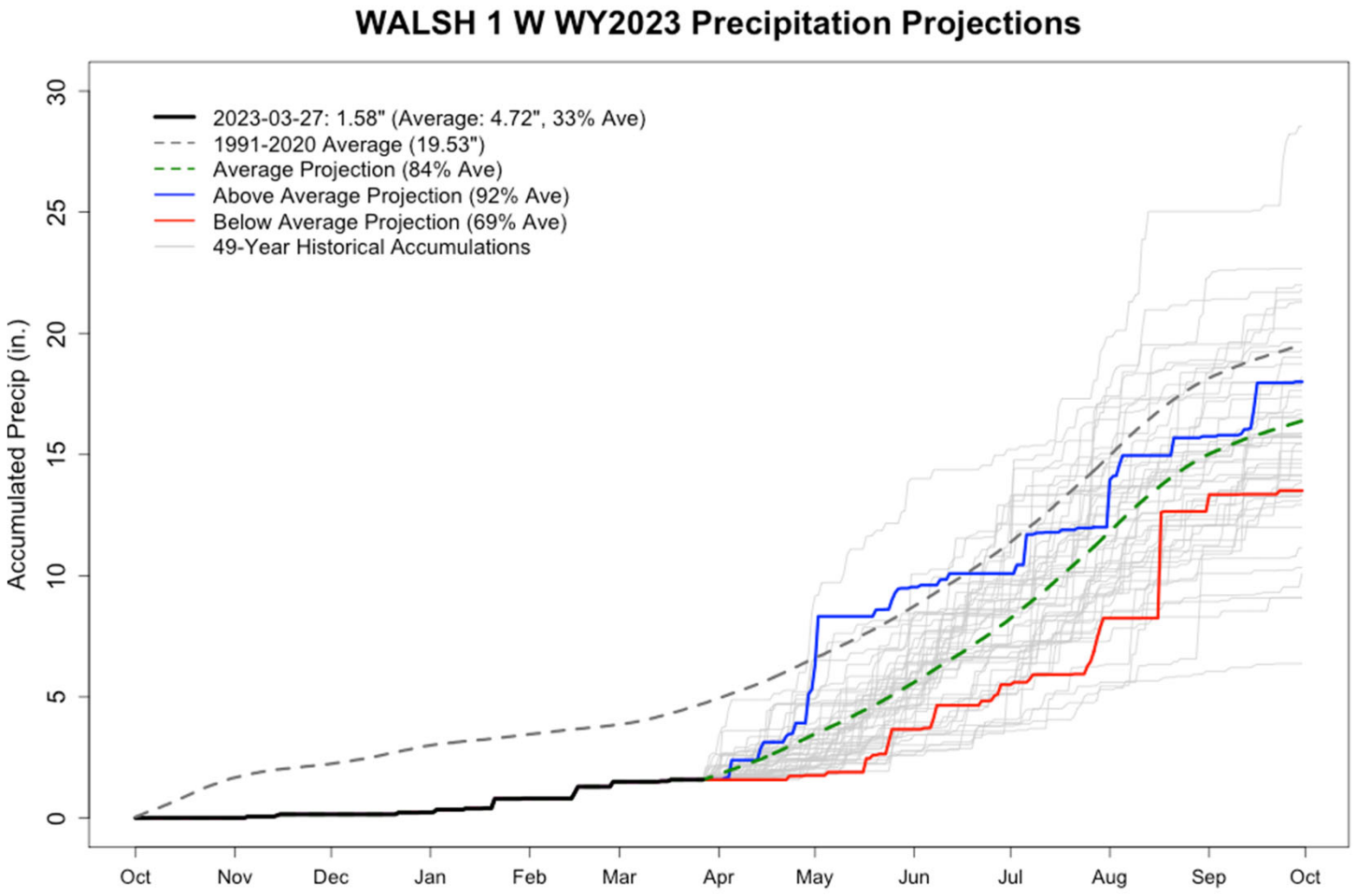

ALAMOSA-BERGMAN FIELD WY2023 Precipitation Projections
2023-03-26: 1.84" (Average: 2.39", 77% Ave)
1991-2020 Average (7.39")
Average Projection (93% Ave)
Above Average Projection (111% Ave)
Below Average Projection (76% Ave)
72-Year Historical Accumulations
Accumulated Precip (in.)
0
2
4
6
8
10
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Pueblo



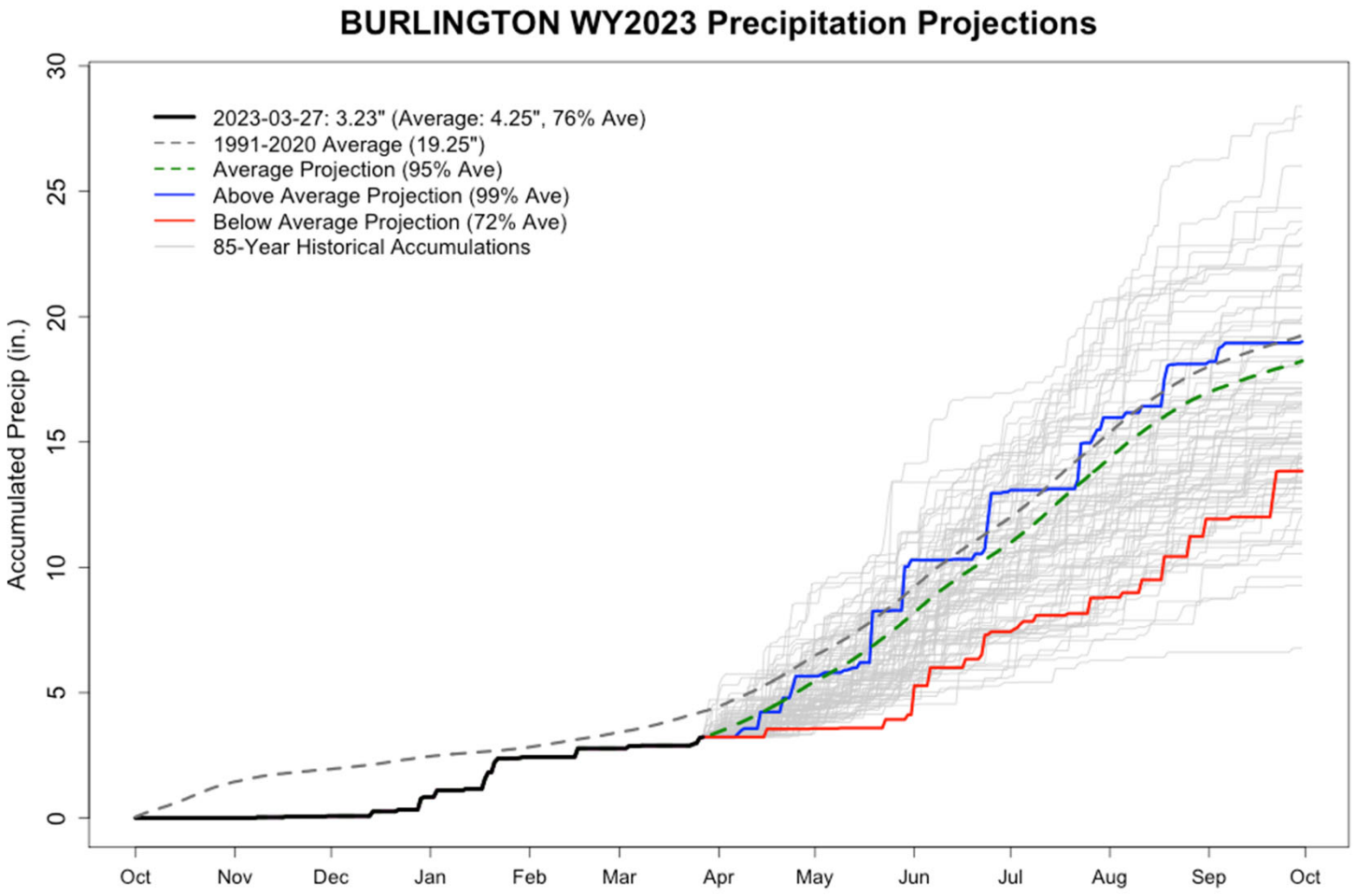
8th driest water year to date

Walsh

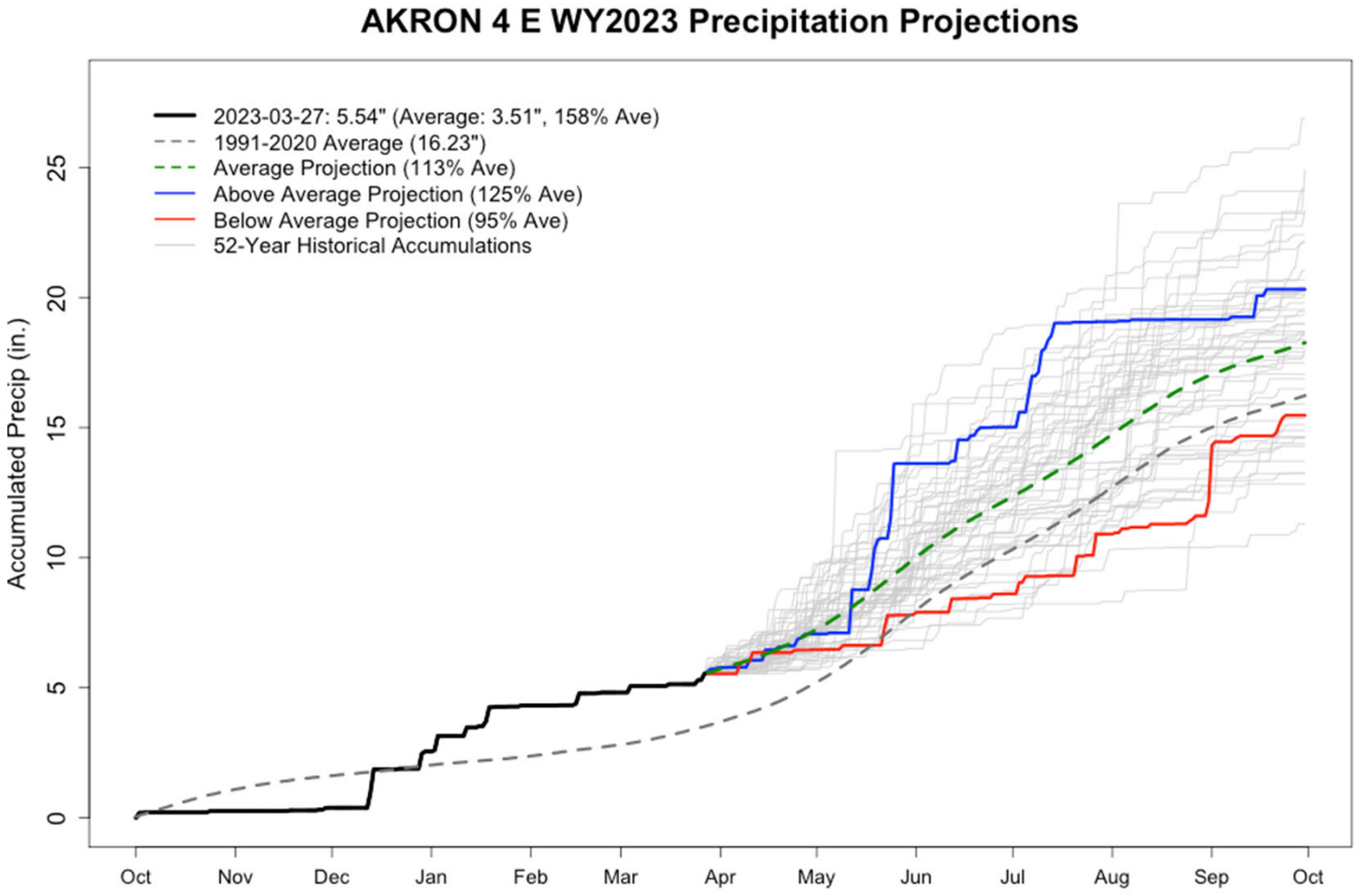


8th driest water year to date – even drier than last year

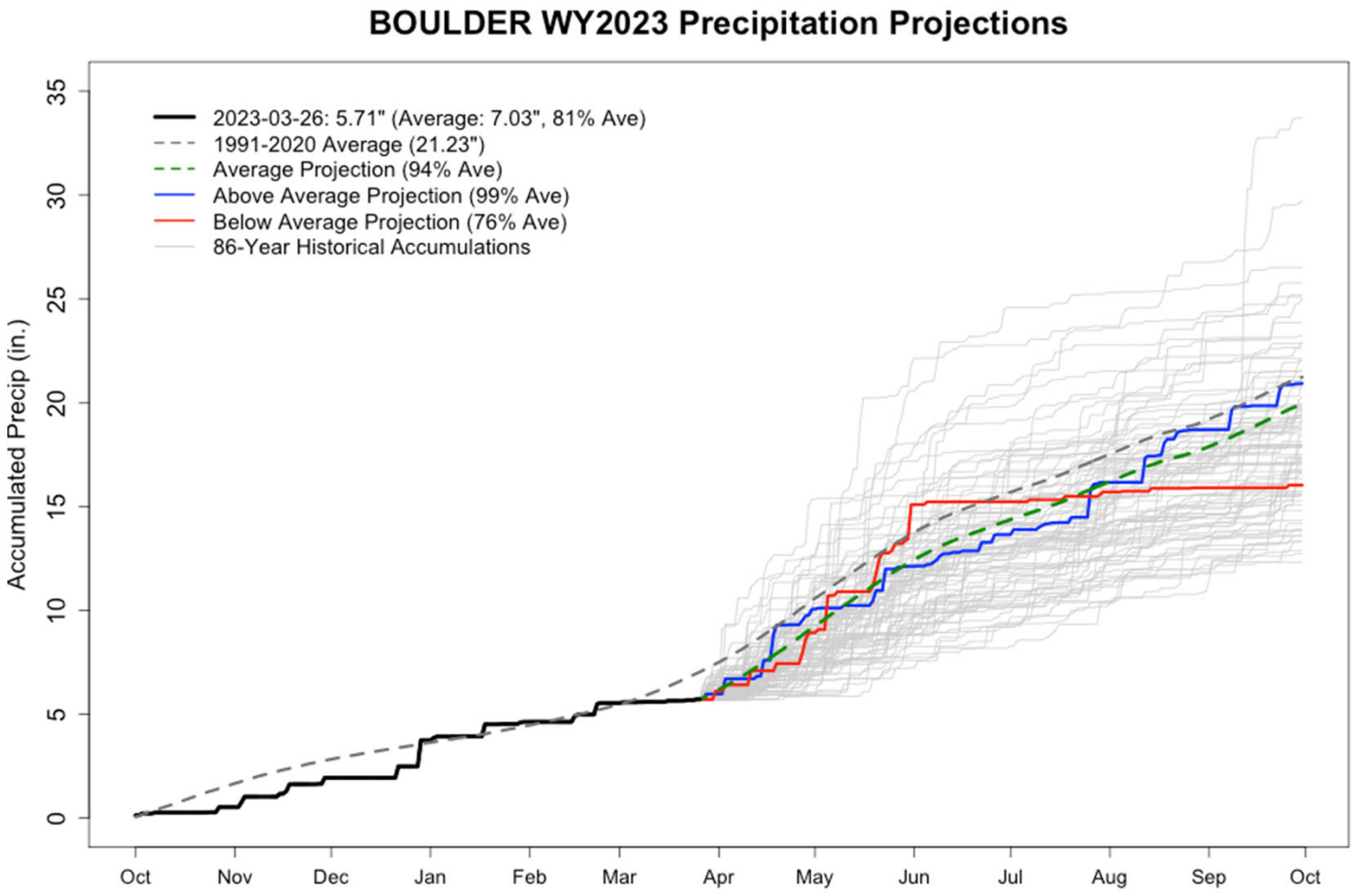
Burlington


BURLINGTON WY2023 Precipitation Projections
2023-03-27: 3.23" (Average: 4.25", 76% Ave)
1991-2020 Average (19.25")
Average Projection (95% Ave)
Above Average Projection (99% Ave)
Below Average Projection (72% Ave)
85-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
25
30
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

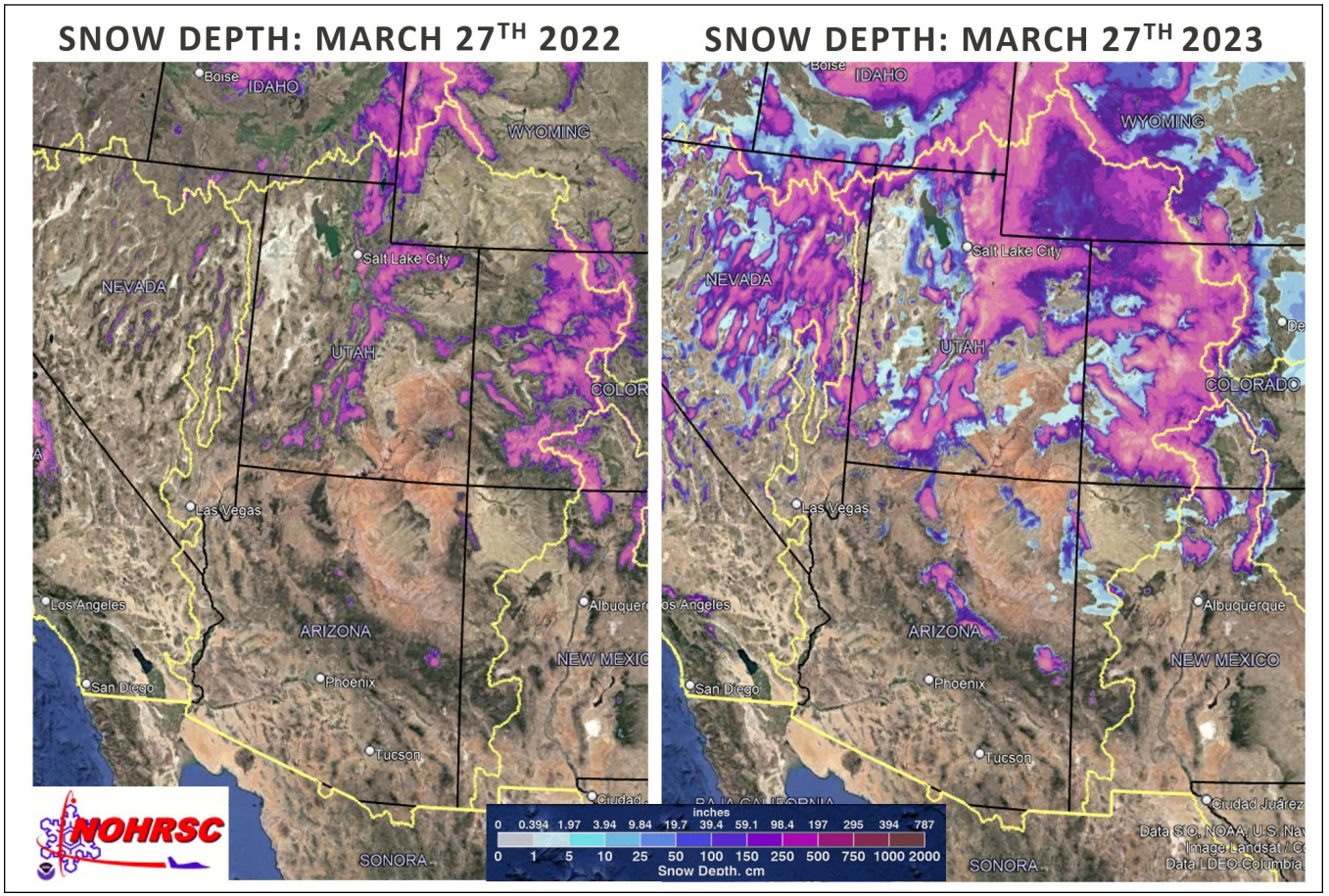
Akron


AKRON 4 E WY2023 Precipitation Projections
2023-03-27: 5.54" (Average: 3.51", 158% Ave)
1991-2020 Average (16.23")
Average Projection (113% Ave)
Above Average Projection (125% Ave)
Below Average Projection (95% Ave)
52-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
25
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Boulder


BOULDER WY2023 Precipitation Projections
2023-03-26: 5.71" (Average: 7.03", 81% Ave)
1991-2020 Average (21.23")
Average Projection (94% Ave)
Above Average Projection (99% Ave)
Below Average Projection (76% Ave)
86-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
25
30
35
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Drought conditions



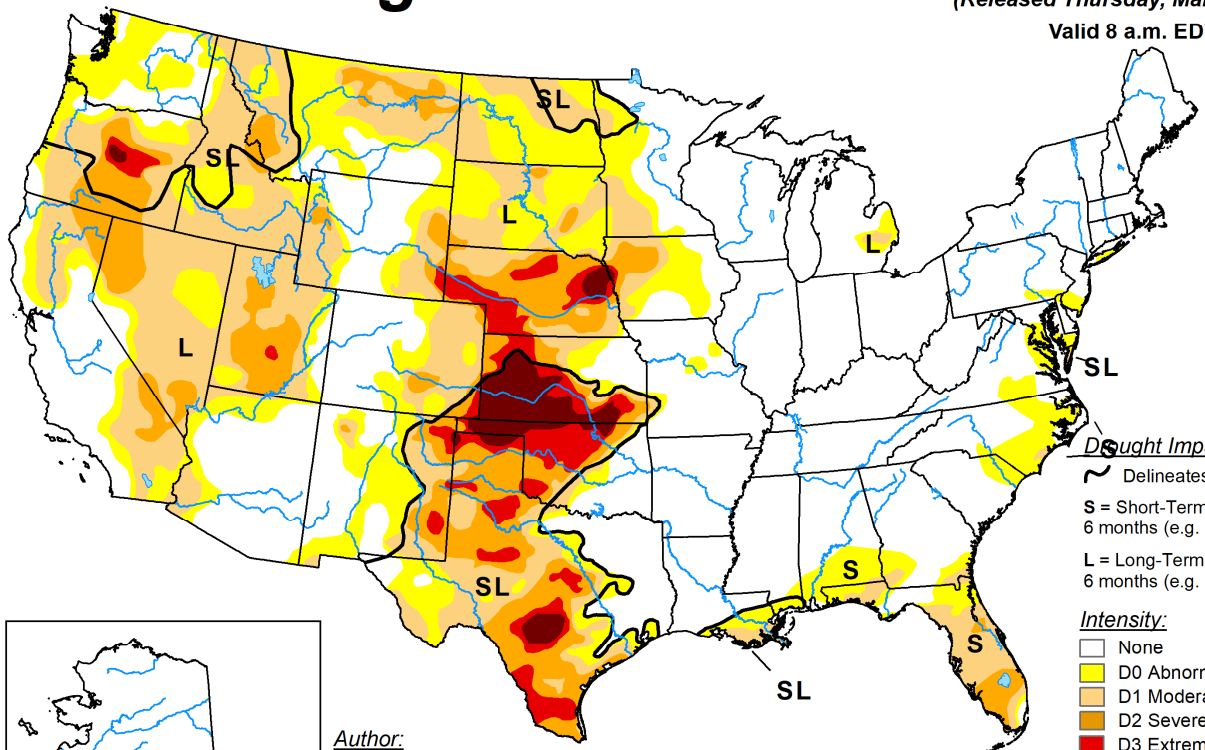
https://twitter.com/nwscbrfc/status/1640398515158523905/photo/1

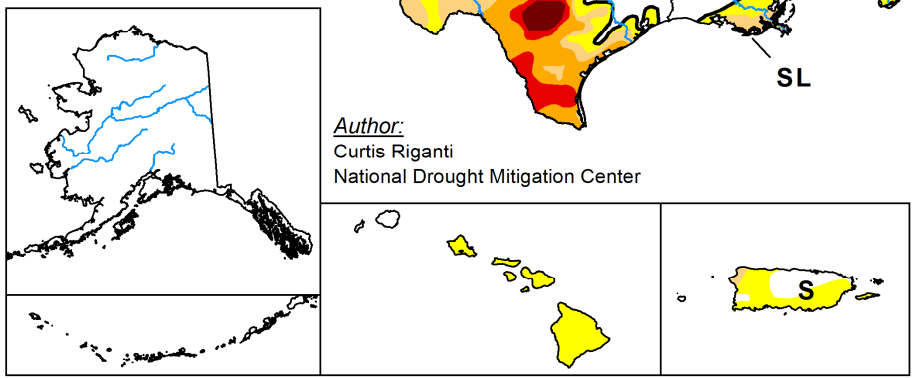
U.S. Drought Monitor

March 21, 2023

(Released Thursday, Mar. 23, 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:
Curtis Riganti
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

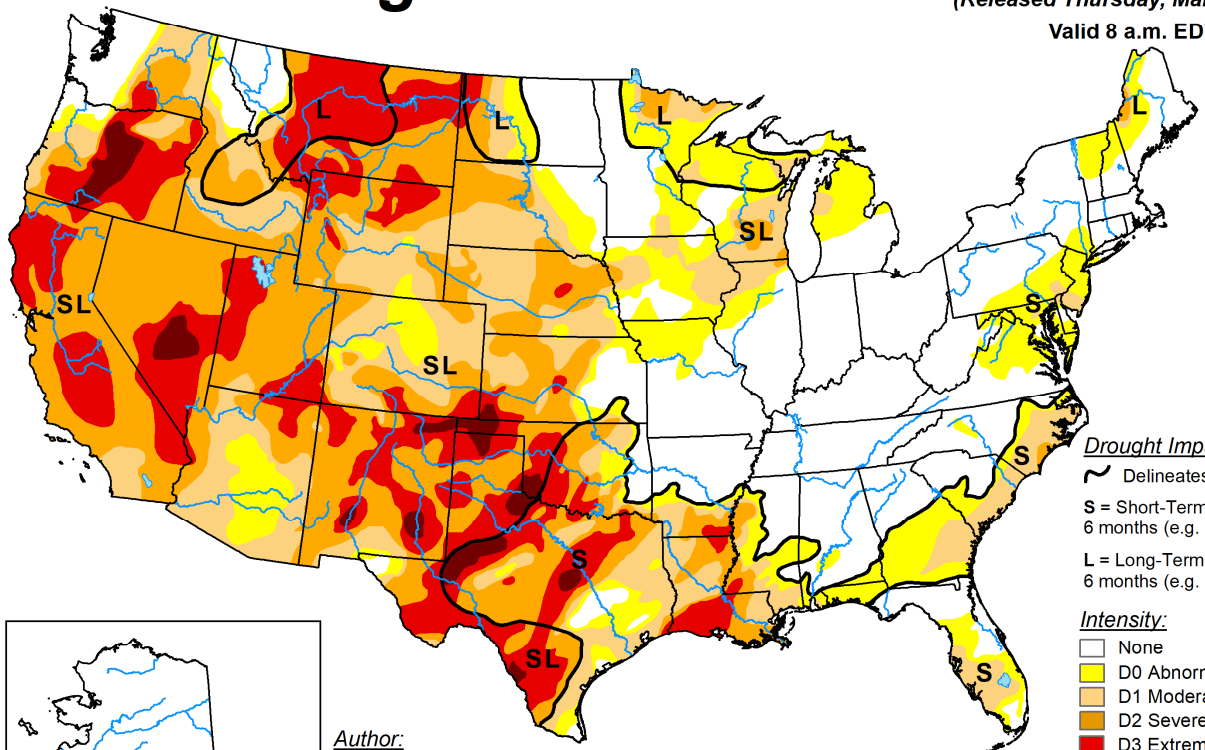
U.S. Drought Monitor

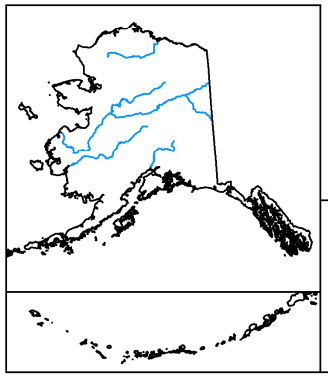
March 22, 2022

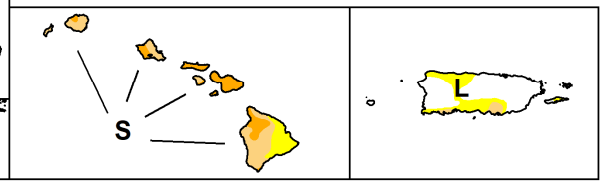
(Released Thursday, Mar. 24, 2022)

Valid 8 a.m. EDT

One year ago







Author:
Adam Hartman
NOAA/NWS/NCEP/CPC

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Delineates dominant impacts

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- D4 Exceptional Drought

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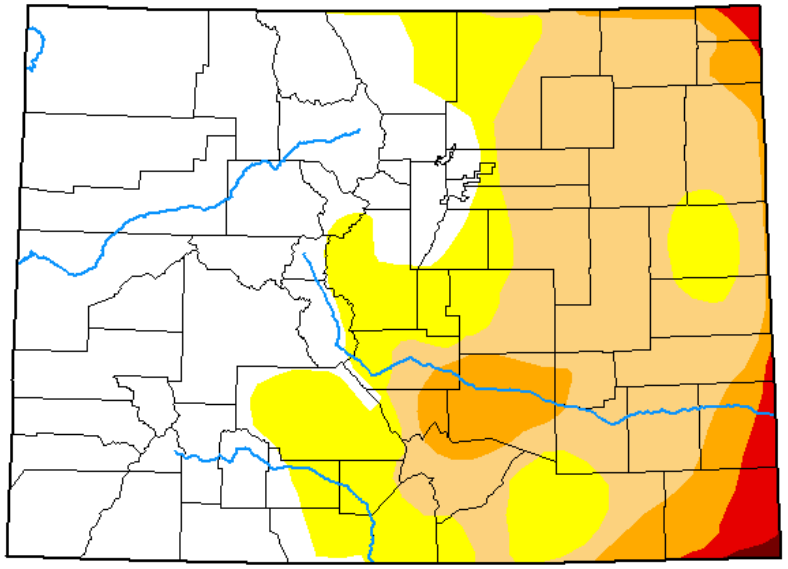
droughtmonitor.unl.edu

U.S. Drought Monitor

Colorado



March 21, 2023

(Released Thursday, Mar. 23, 2023)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	46.56	53.44	36.22	9.05	2.00	0.16
Last Week *03-14-2023*	46.03	53.97	36.48	9.05	2.00	0.16
3 Months Ago *12-20-2022*	16.26	83.74	43.34	30.79	3.23	0.53
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 *03-22-2022*	0.00	100.00	82.83	33.50	7.11	0.13

Intensity:

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

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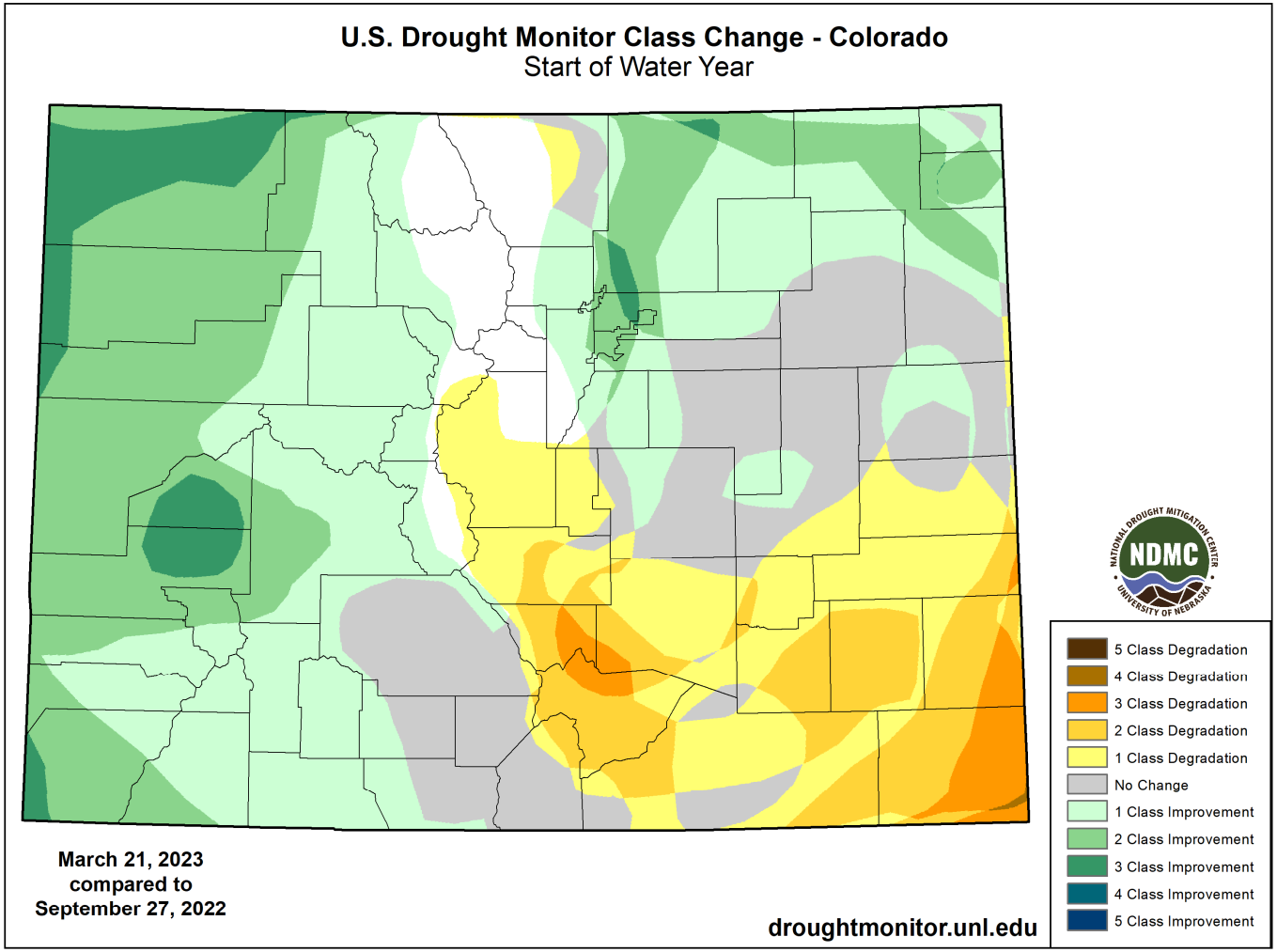
Author:

Curtis Riganti

National Drought Mitigation Center

droughtmonitor.unl.edu

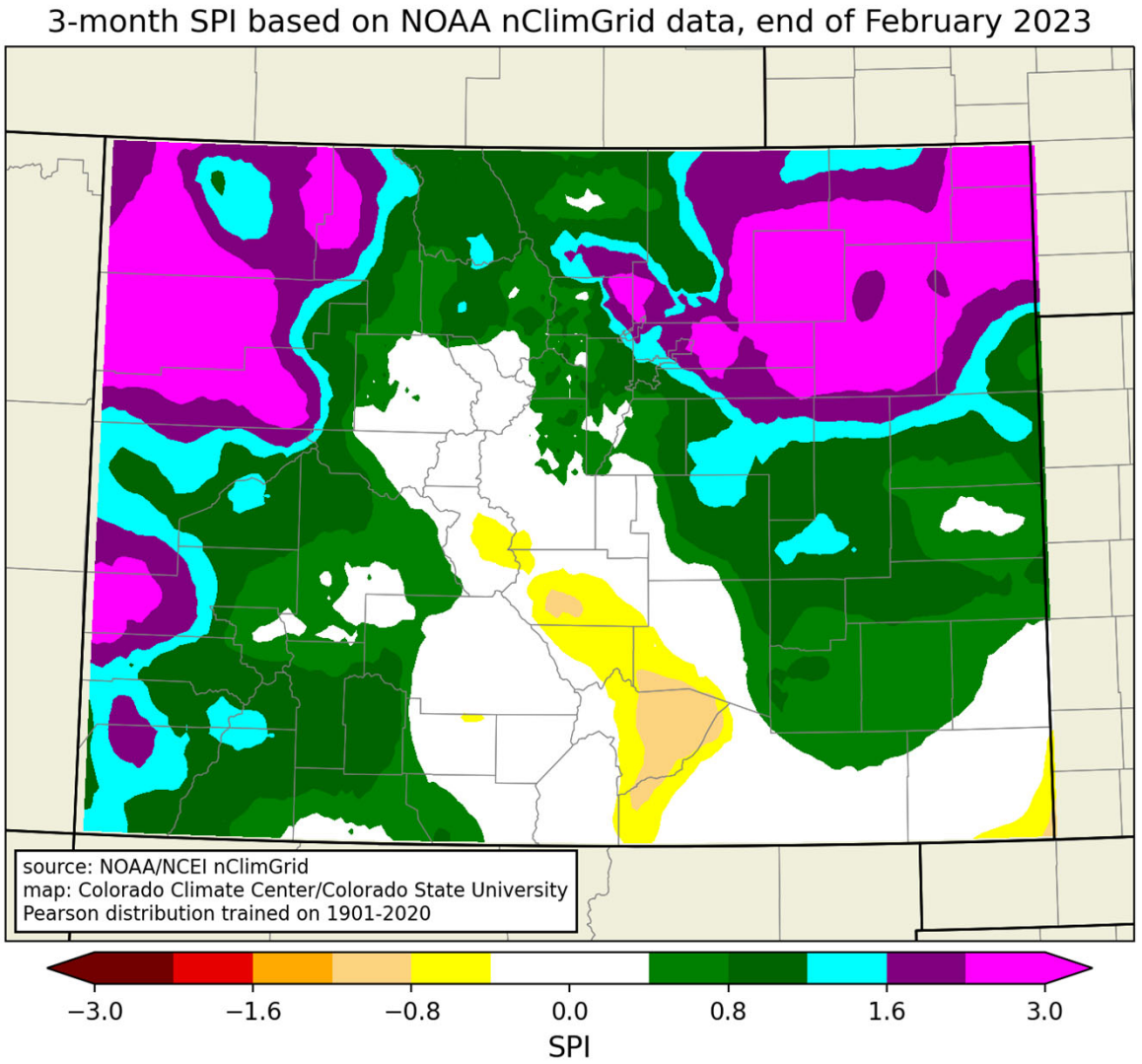
Change since start of water year



Short vs. long-term conditions

Some locations that have been very wet recently are still quite dry over the last 1-4 years

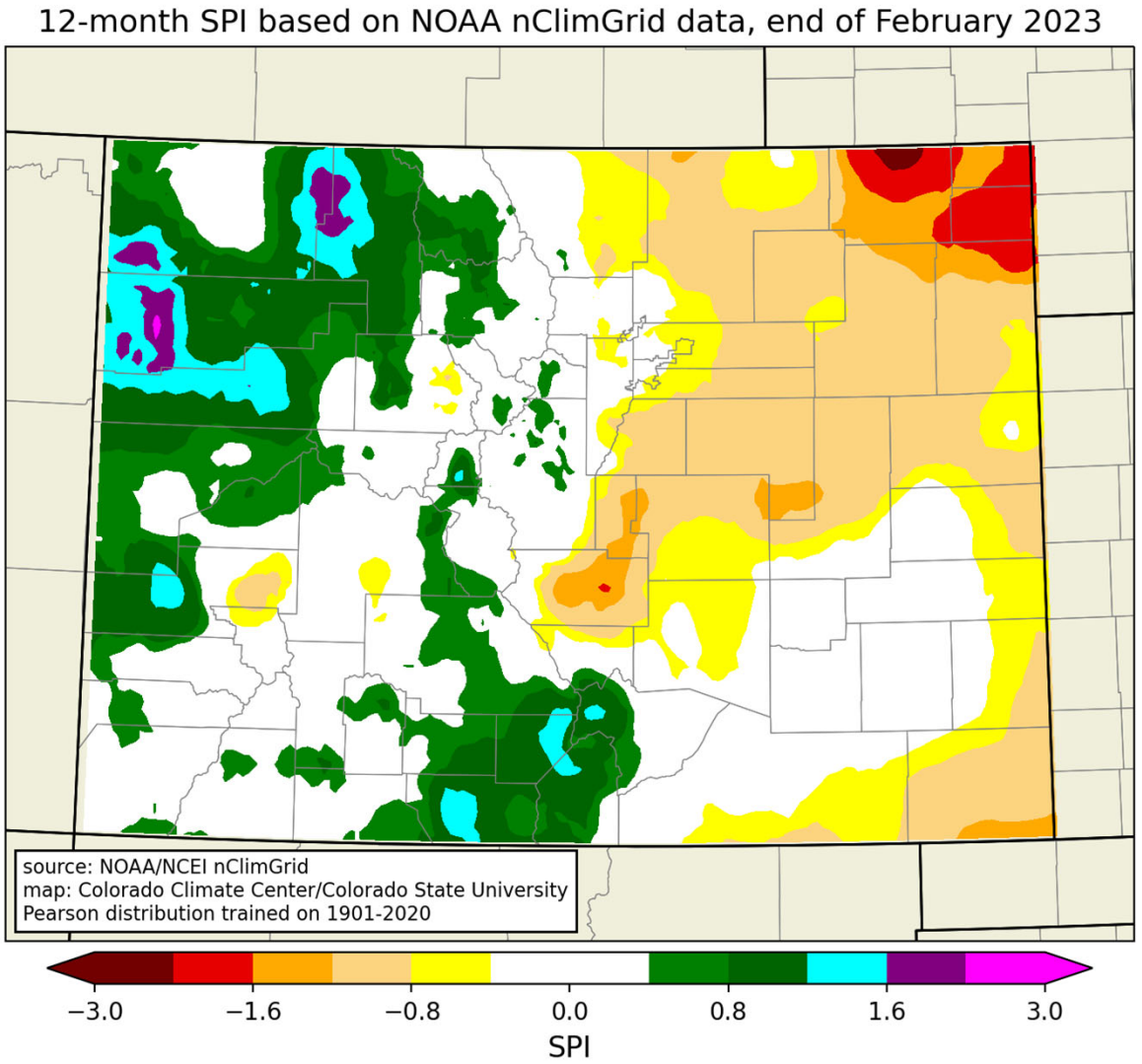
3-month Standardized Precipitation Index through February 2023



Short vs. long-term conditions

Some locations that have been very wet recently are still quite dry over the last 1-4 years

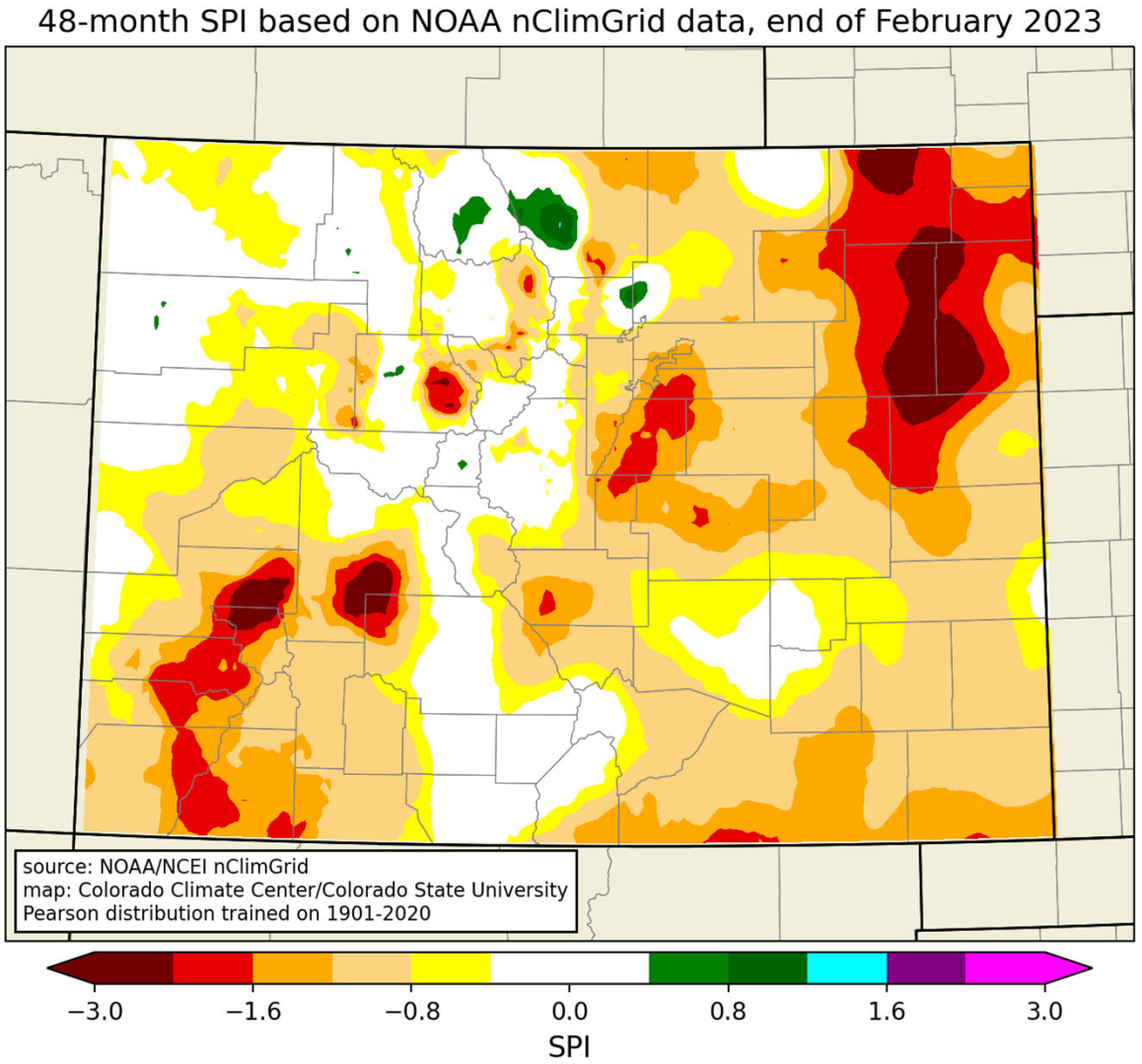
12-month Standardized Precipitation Index through February 2023

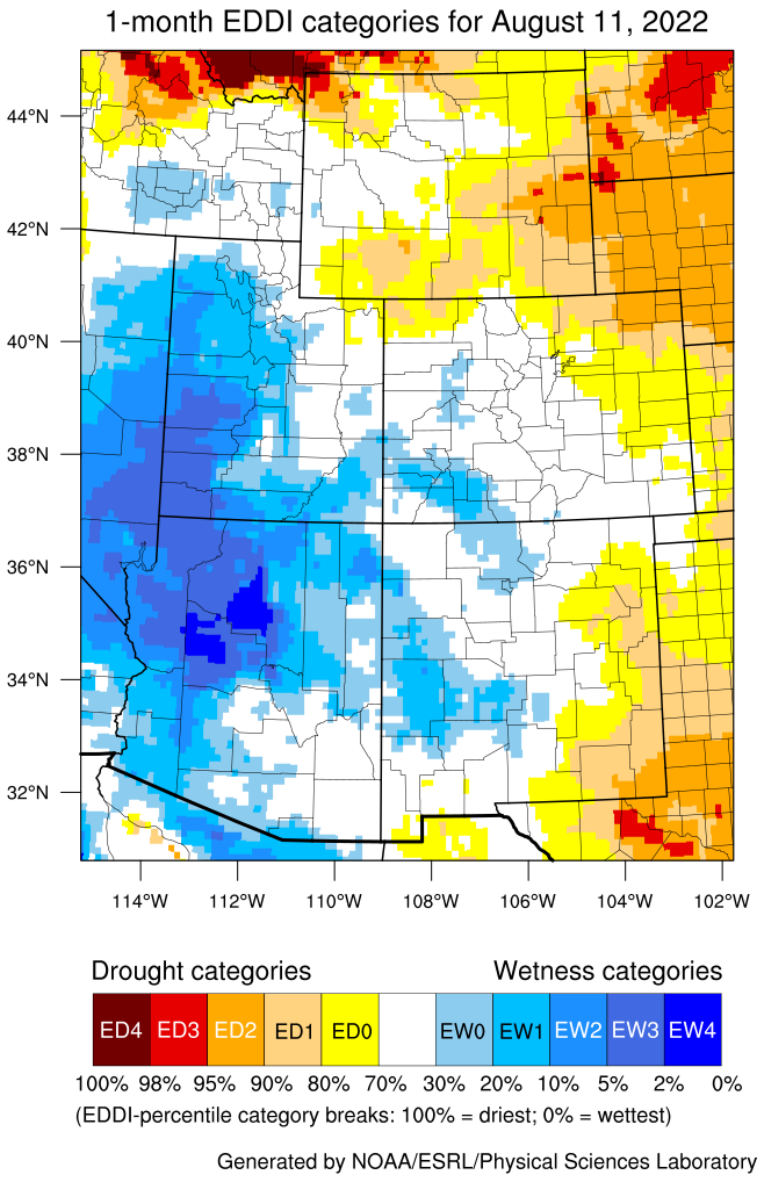


Short vs. long-term conditions

Some locations that have been very wet recently are still quite dry over the last 1-4 years

48-month Standardized Precipitation Index through February 2023





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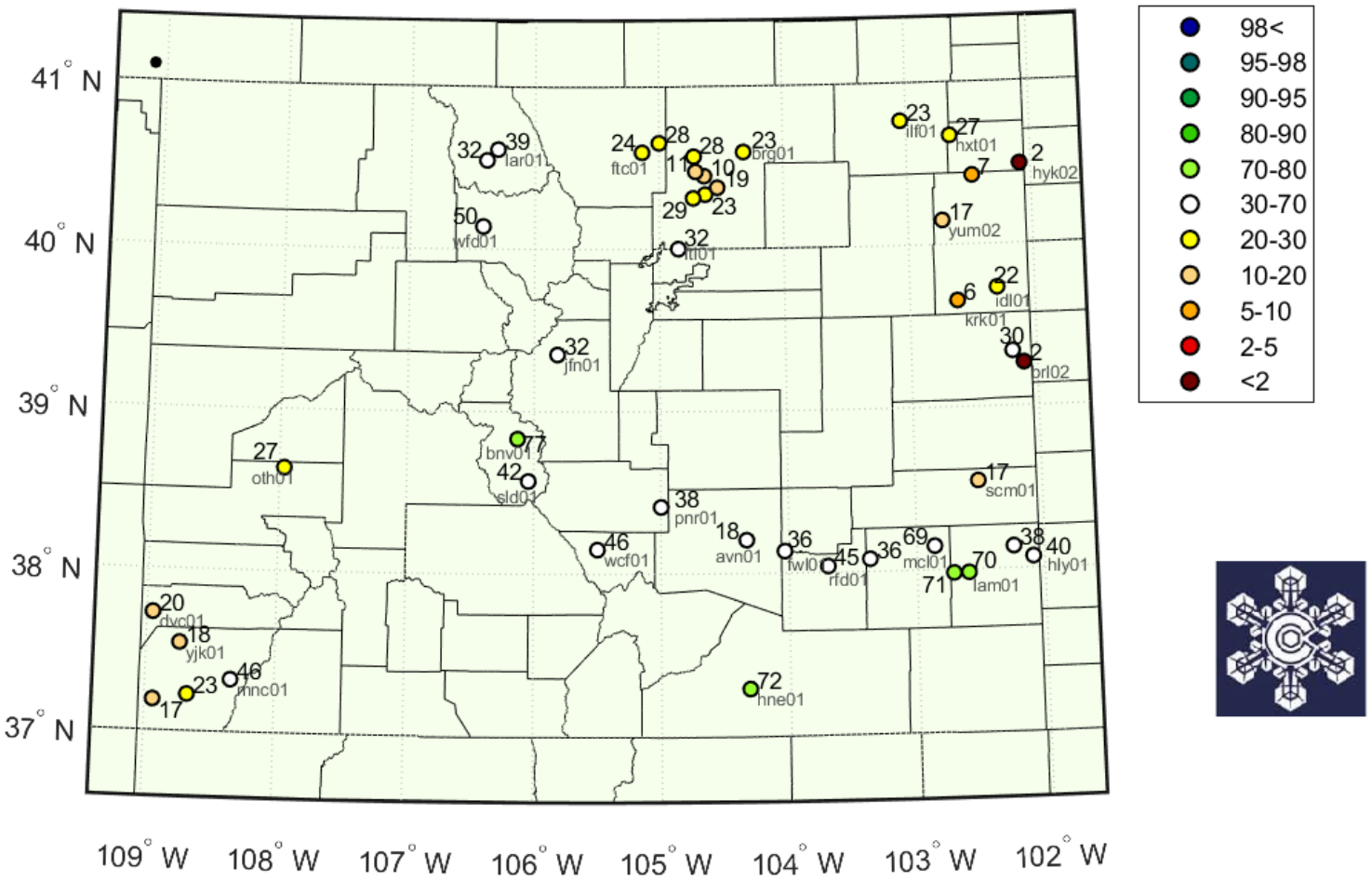
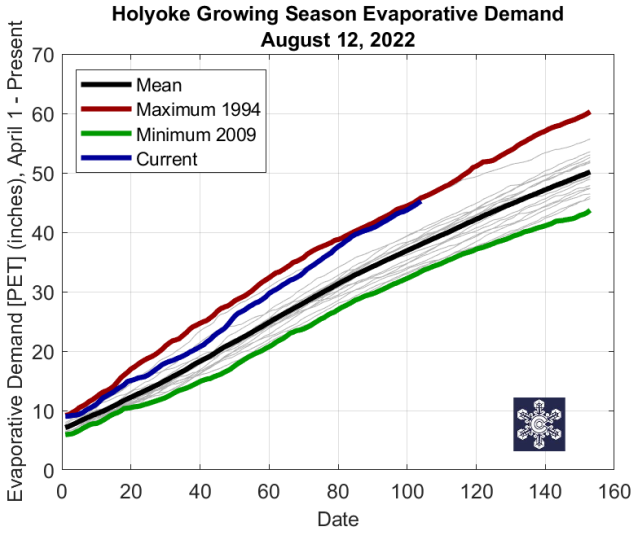
Evaporative Demand Drought Index

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

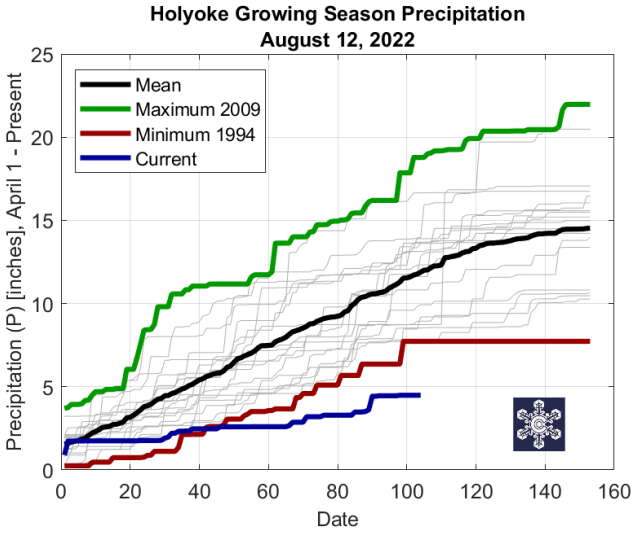
Growing Season Water Balance (P/PET) Percentiles
August 12, 2022



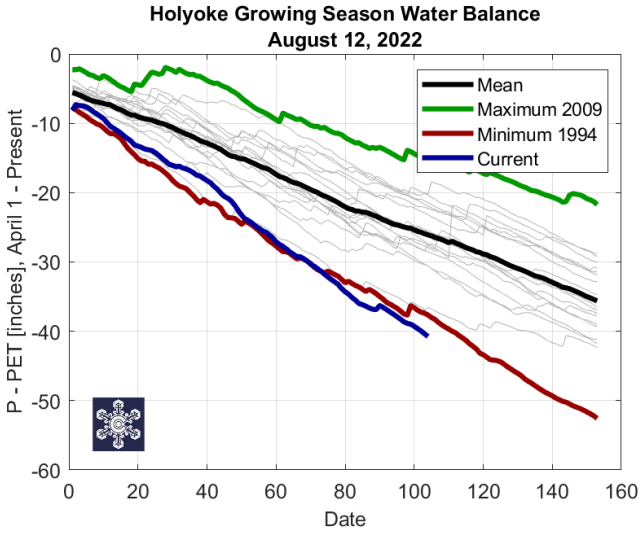
Holyoke CoAgMET station, since April 1



Near-record evaporative demand



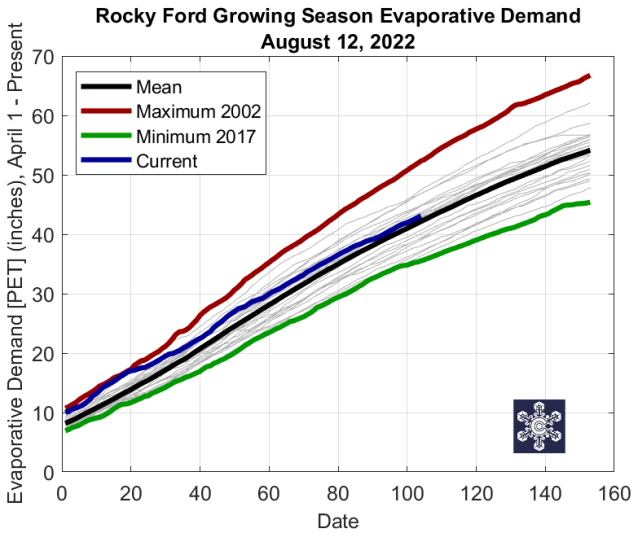
Record-low precipitation



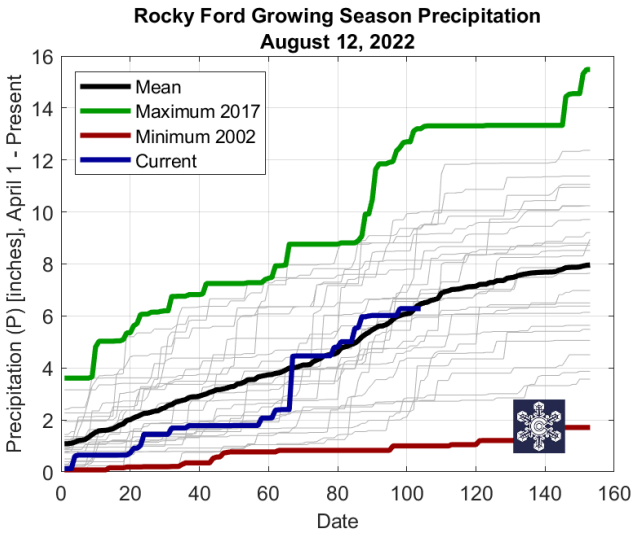
Record-low water balance

Data since 1992 at this station

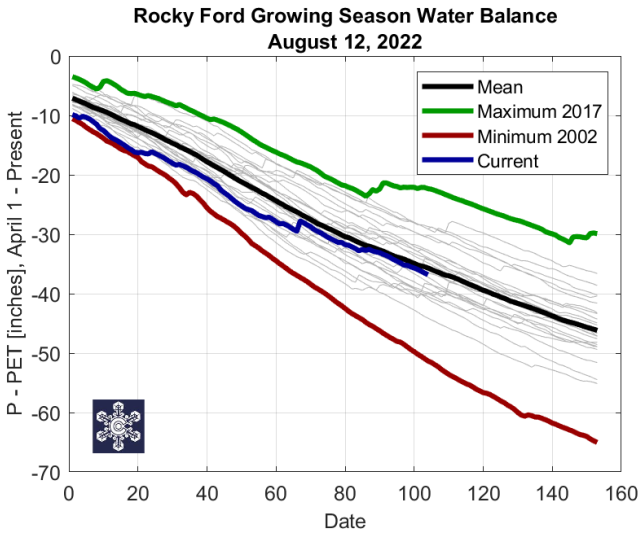
Rocky Ford CoAgMET station, since April 1



Near-record evaporative demand



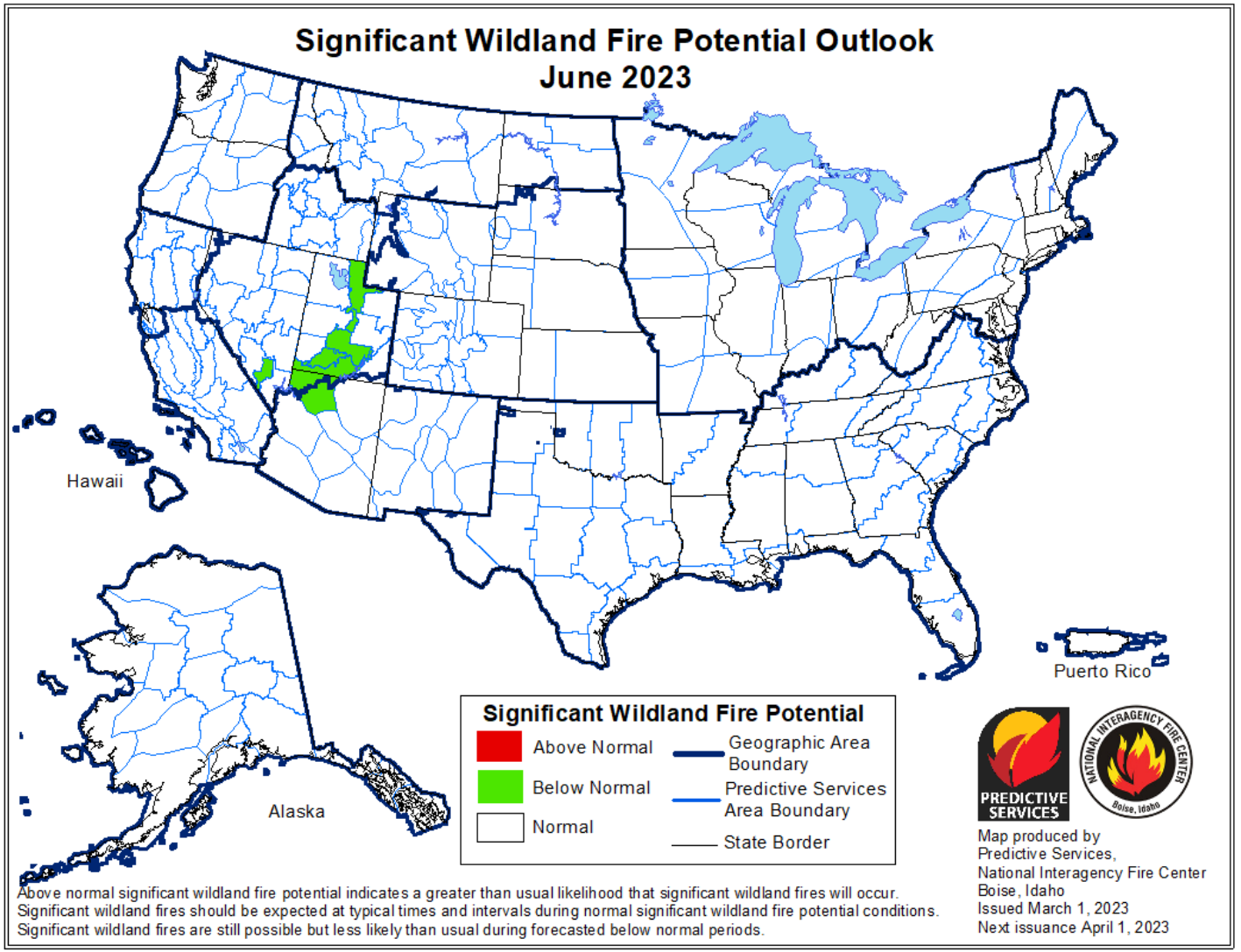
Record-low precipitation

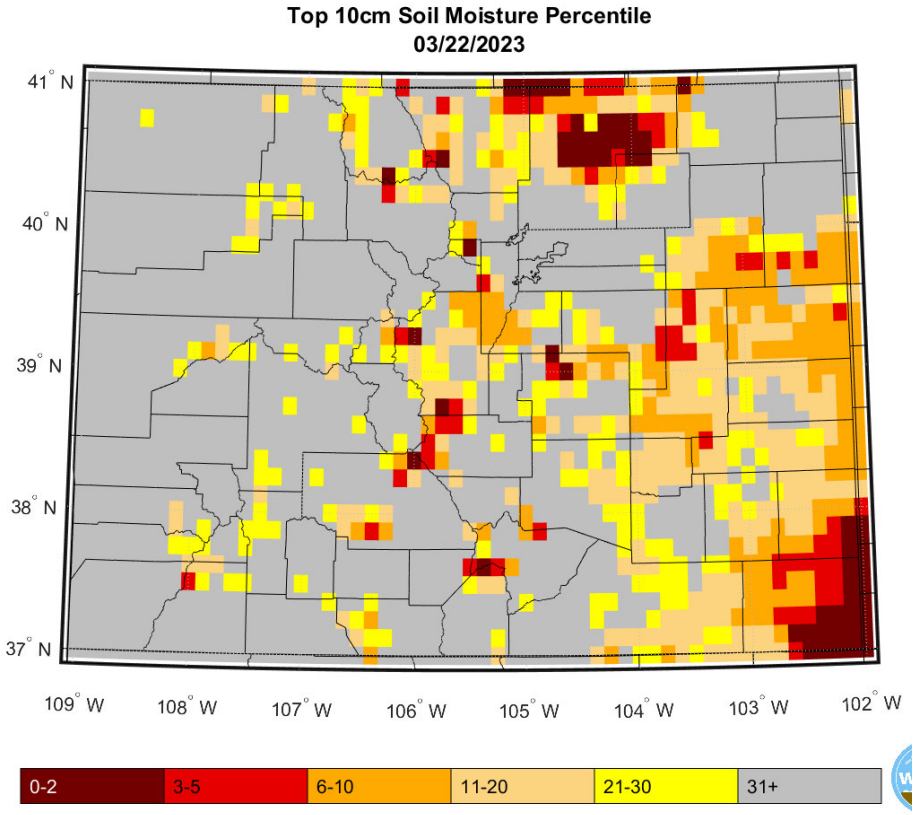


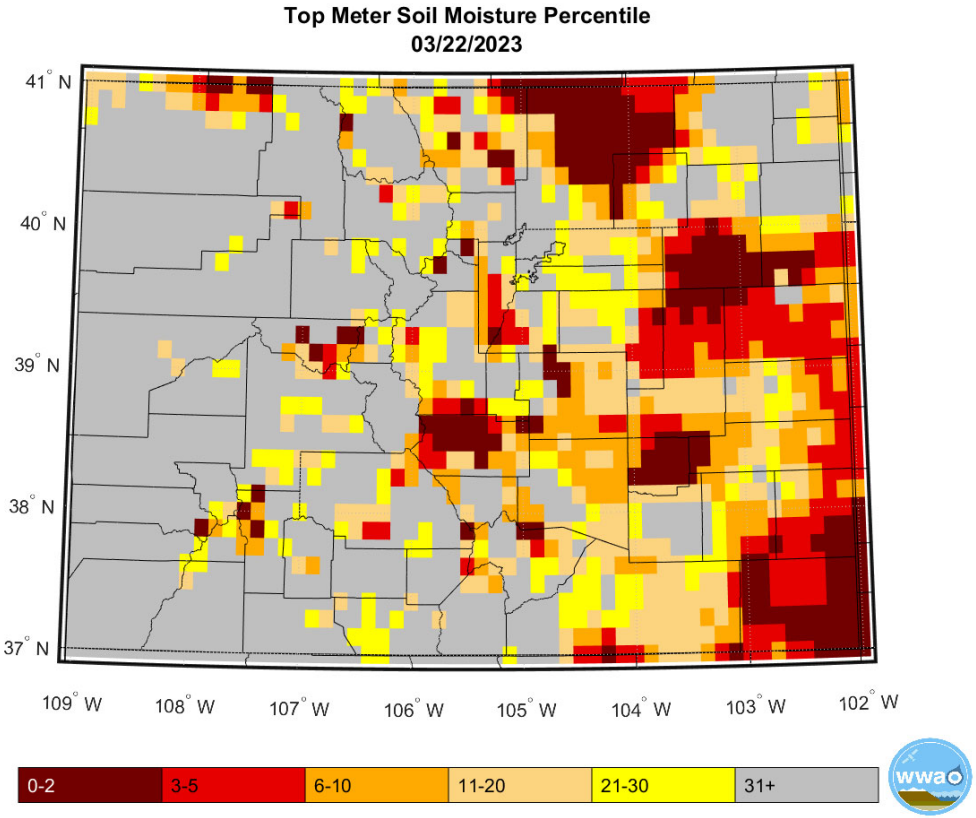
Record-low water balance

Data since 1992 at this station

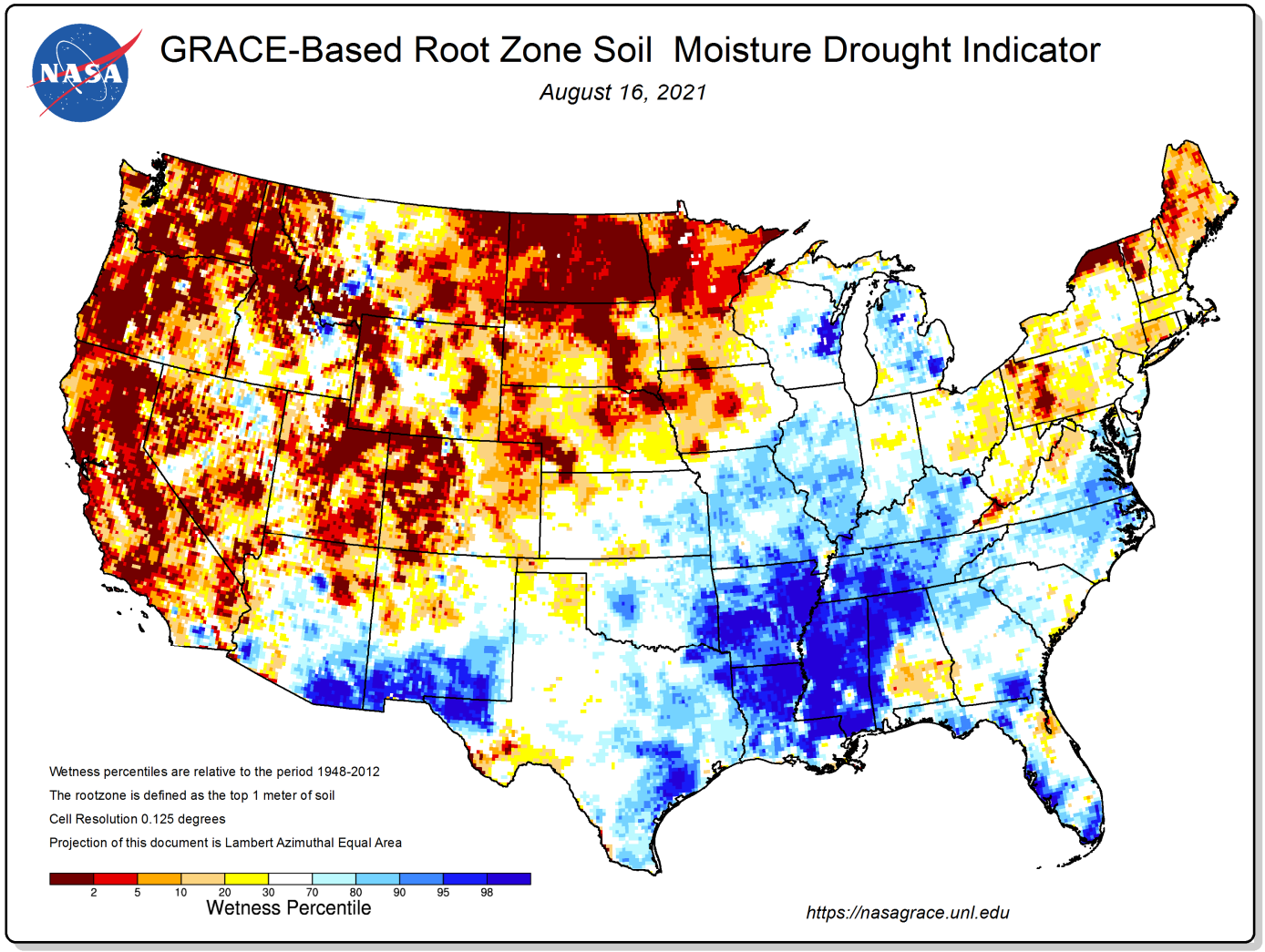
USDA outlooks for wildfire potential show near-normal risk across Colorado



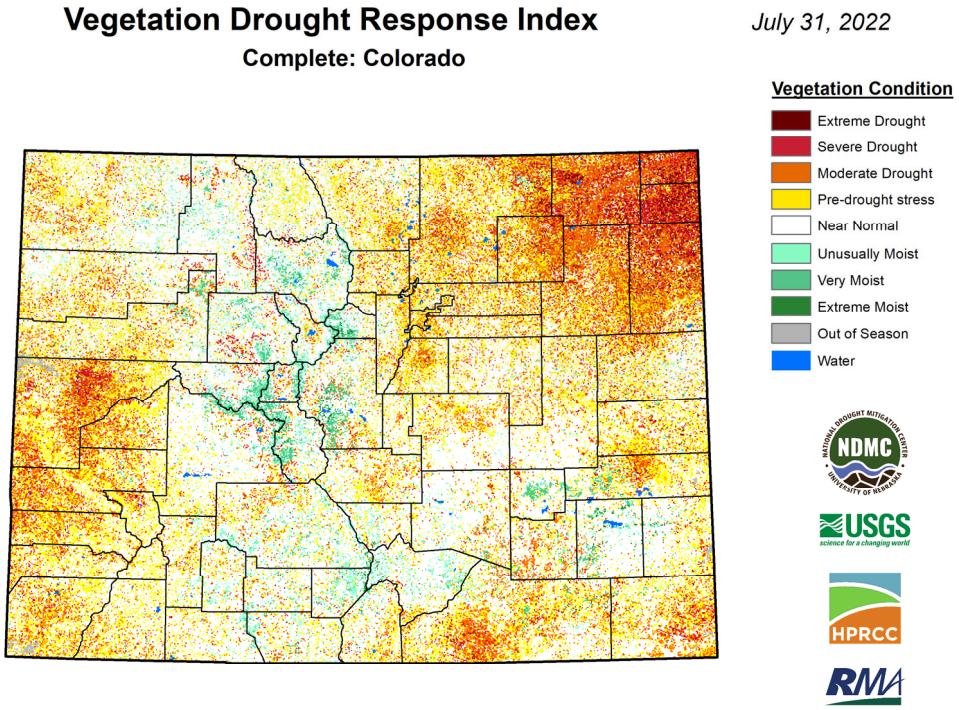




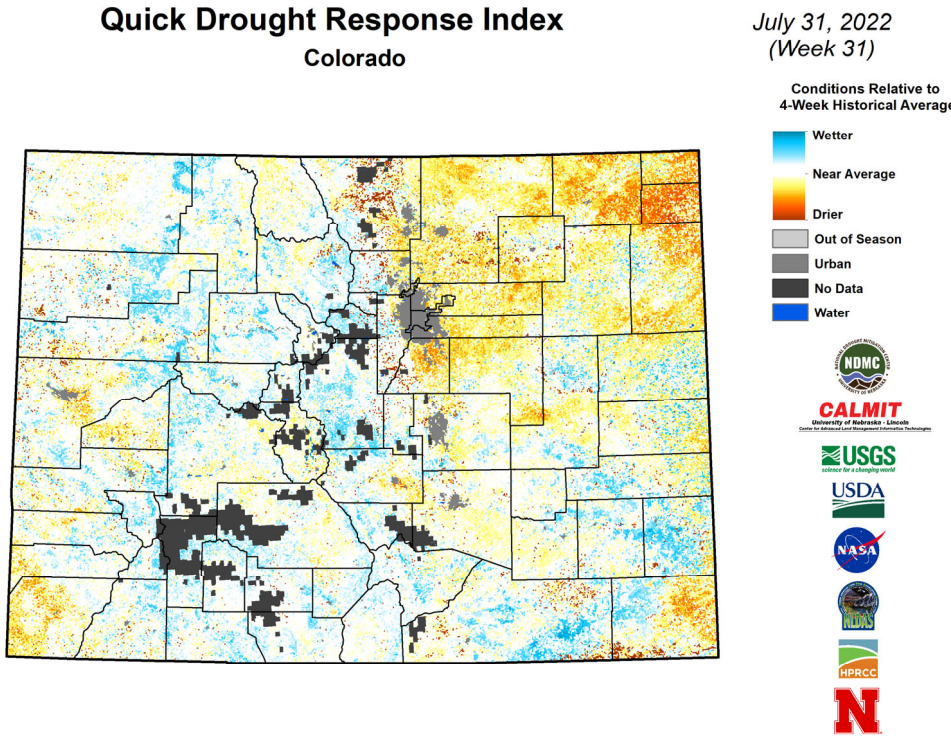
Soil moisture continues to be poor in southeastern Colorado, with some pockets of poor conditions persisting in northeast CO. Most of the high country and western slope have favorable soil moisture conditions (with soils still frozen)

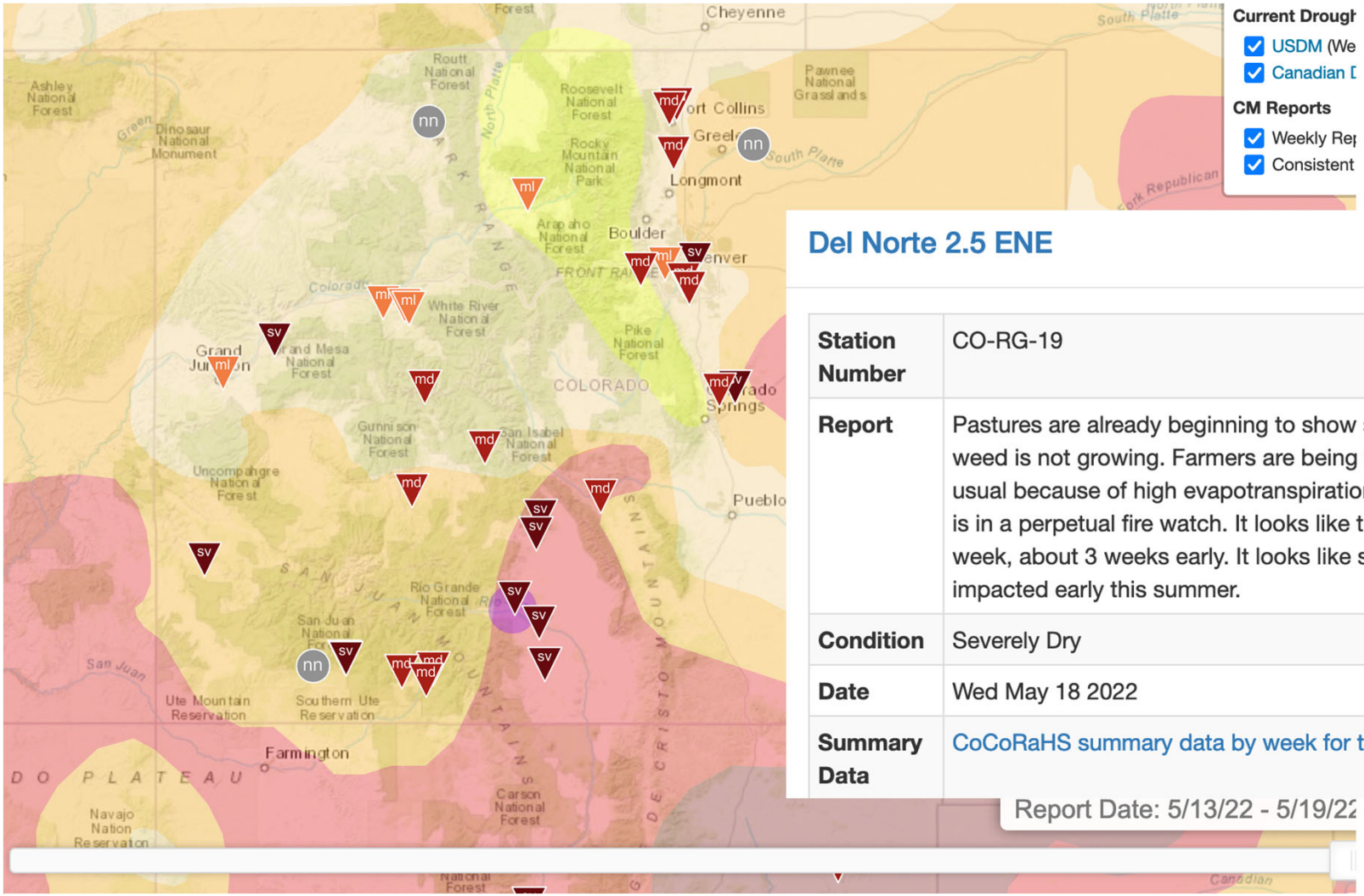

GRACE-Based Root Zone Soil Moisture Drought Indicator
August 16, 2021
Wetness percentiles are relative to the period 1948-2012
The rootzone is defined as the top 1 meter of soil
Cell Resolution 0.125 degrees
Projection of this document is Lambert Azimuthal Equal Area
2 5 10 20 30 70 80 90 95 98
Wetness Percentile
https://nasagrace.unl.edu

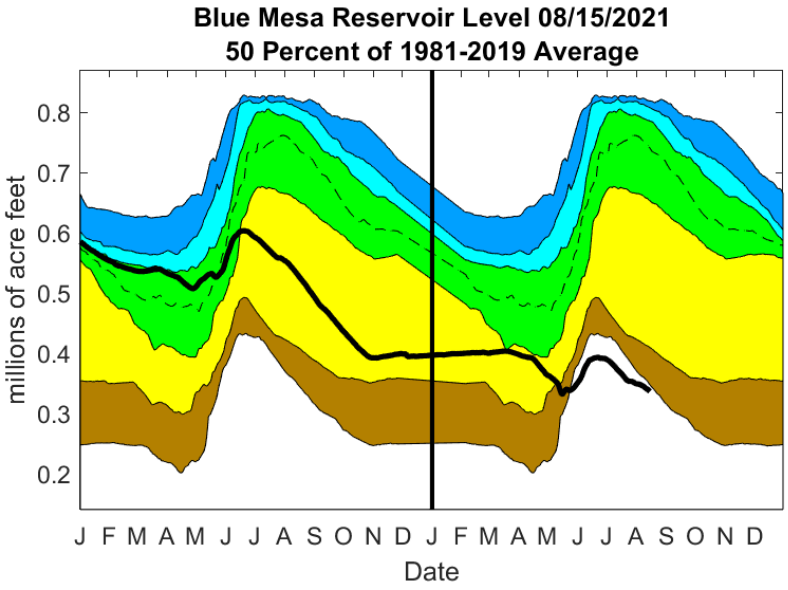
VegDRI: longer-term vegetation condition

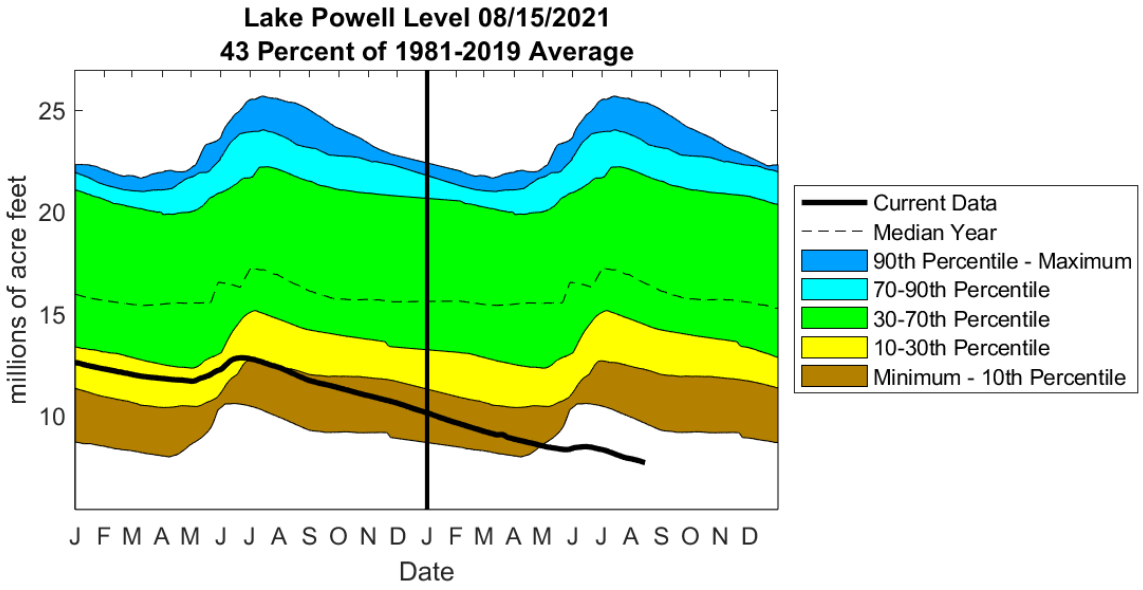


QuickDRI: shorter-term vegetation response




Current Drough
USDM (We
Canadian D
CM Reports
Weekly Rep
Consistent
Del Norte 2.5 ENE
Station Number
CO-RG-19
Report
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.
Condition
Severely Dry
Date
Wed May 18 2022
Summary Data
CoCoRaHS summary data by week for this station.
Report Date: 5/13/22 - 5/19/22
Cheyenne
Fort Collins
Longmont
Boulder
Denver
Colorado Springs
Pueblo
Grand Junction
Farmington
COLORADO
Routt National Forest
Roosevelt National Forest
Rocky Mountain National Park
Arapaho National Forest
White River National Forest
Grand Mesa National Forest
Pike National Forest
Gunnison National Forest
San Isabel National Forest
Uncompahgre National Forest
Rio Grande National Forest
San Juan National Forest
Carson National Forest
Pawnee National Grasslands
Ashley National Forest
Dinosaur National Monument
Ute Mountain Reservation
Southern Ute Reservation
Navajo Nation Reservation
FRONT RANGE
SAN JUAN MOUNTAINS
SANGRE DE CRISTO MOUNTAINS
North Platte
South Platte
Republican
Canadian





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

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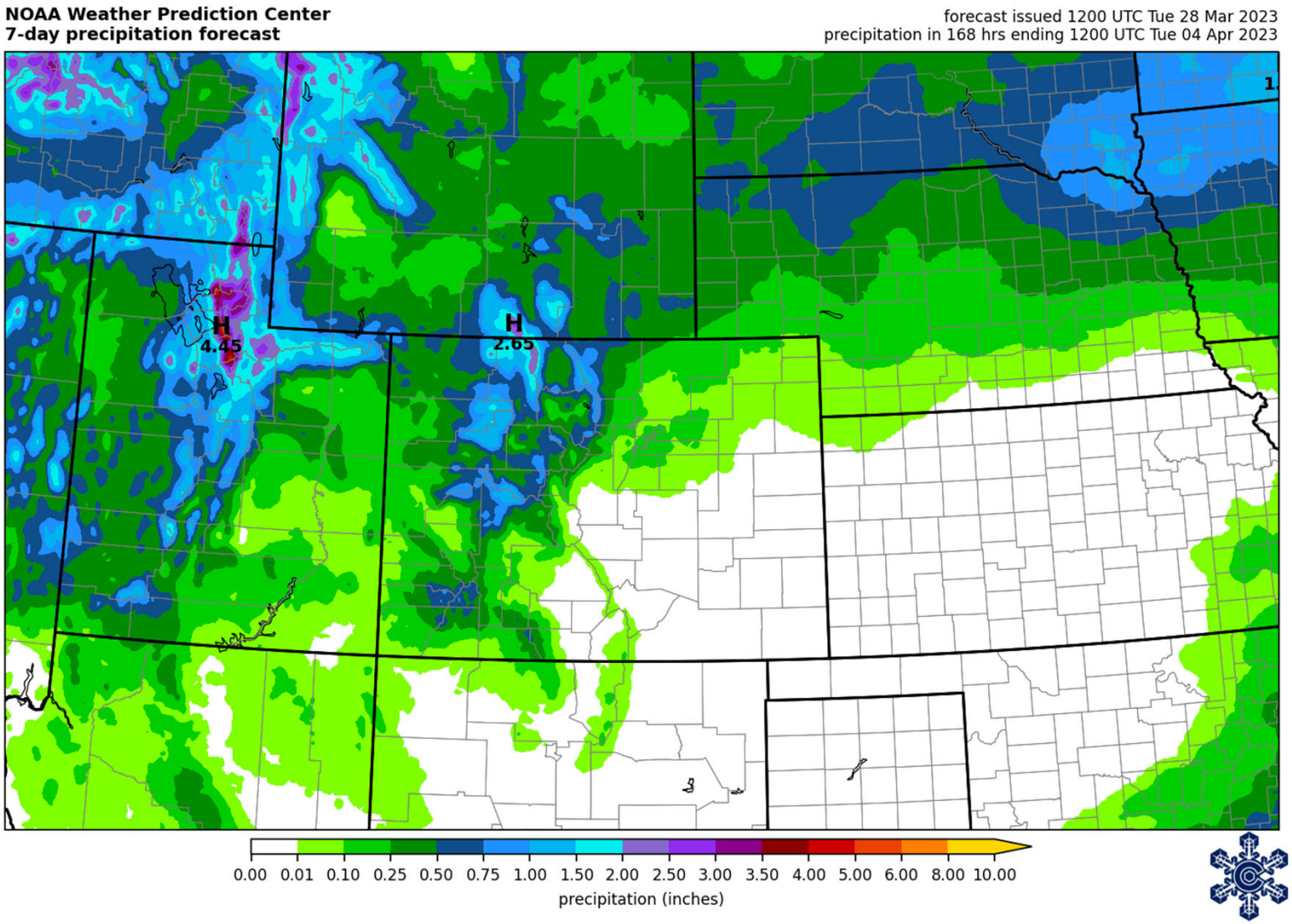
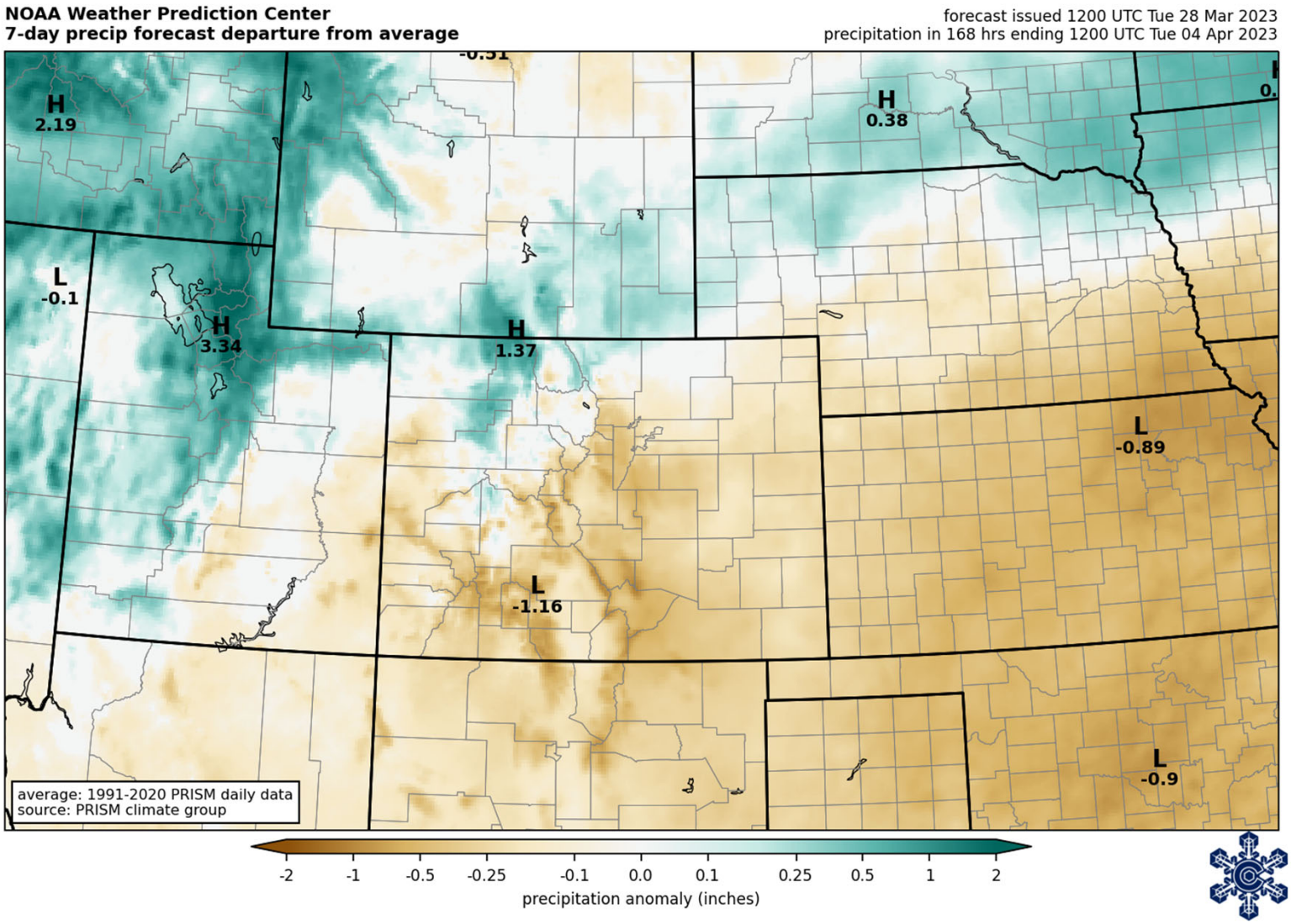
Outlook

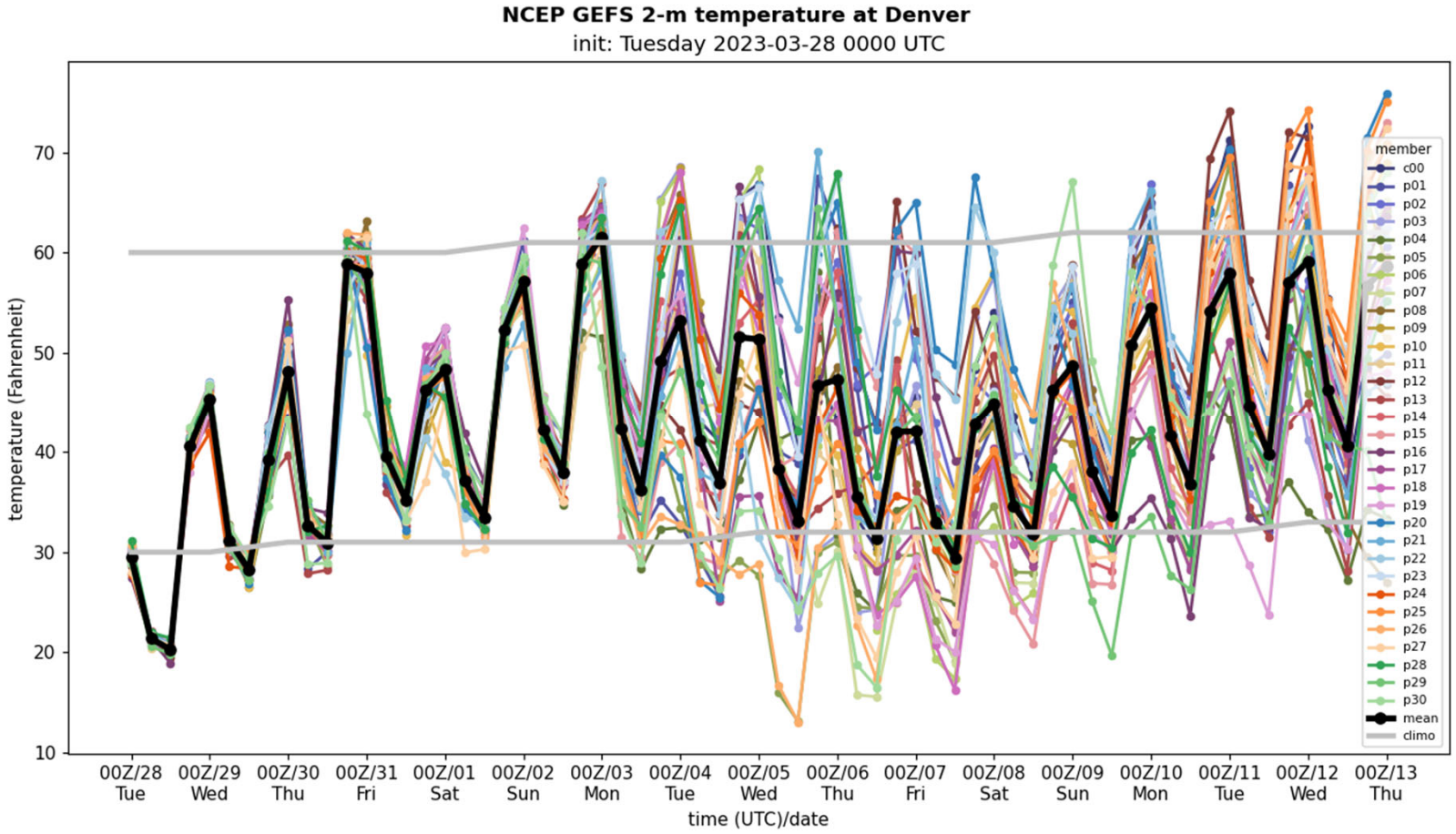
NOAA 7-day precipitation forecast



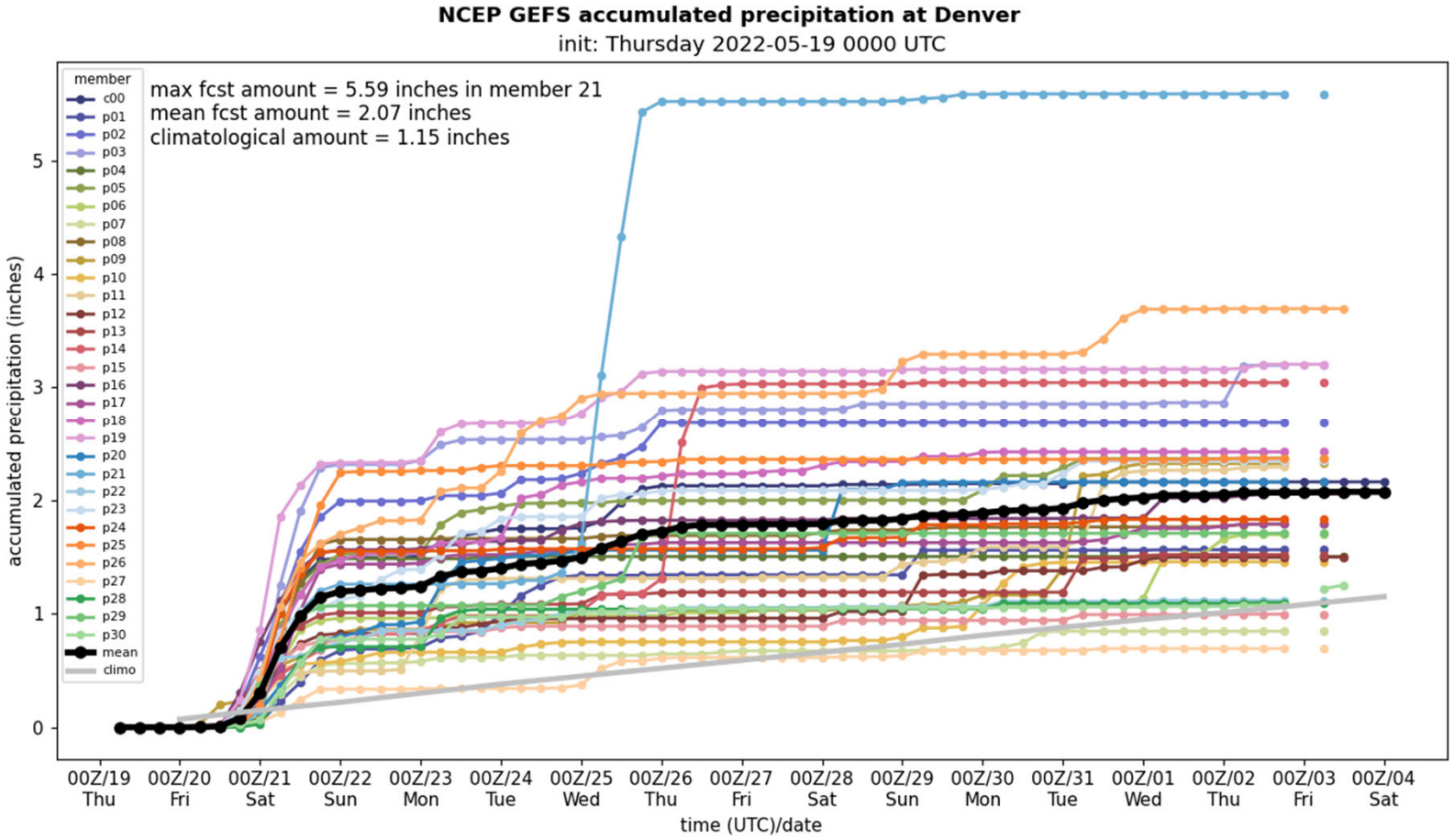
NOAA 7-day precipitation forecast (difference from average)



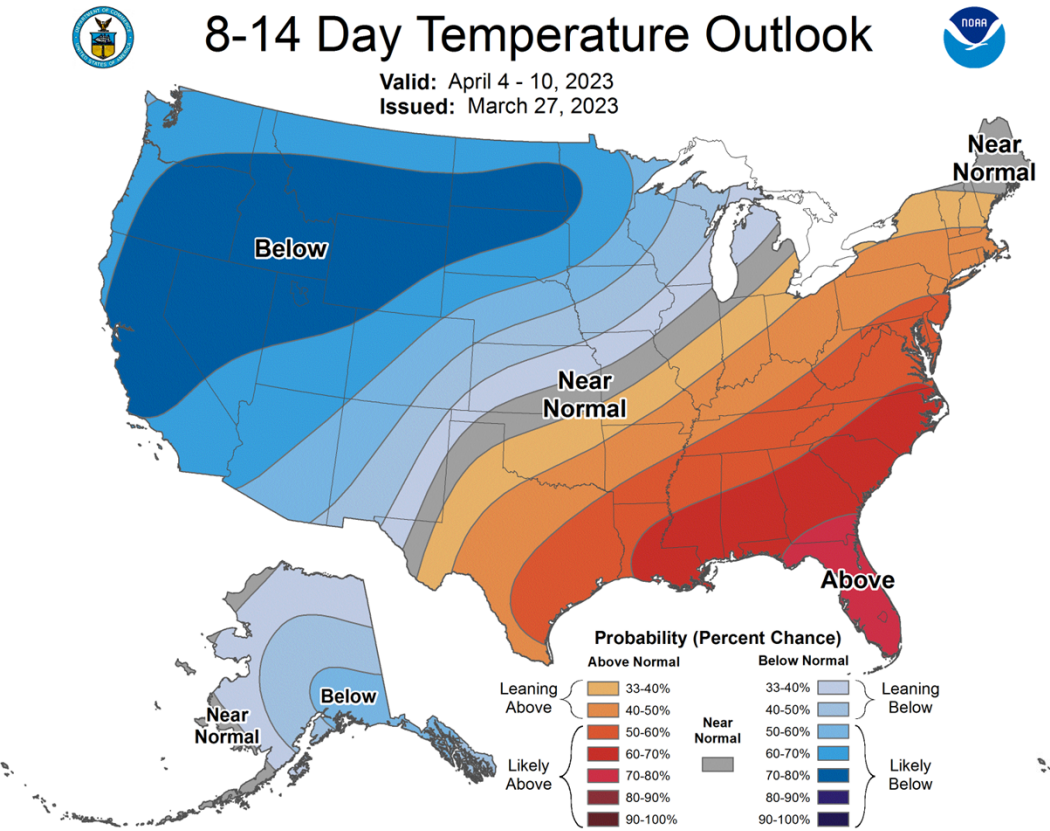
Warming back up through the week, the weekend looks like it should be near/above normal, before another potential cool-down

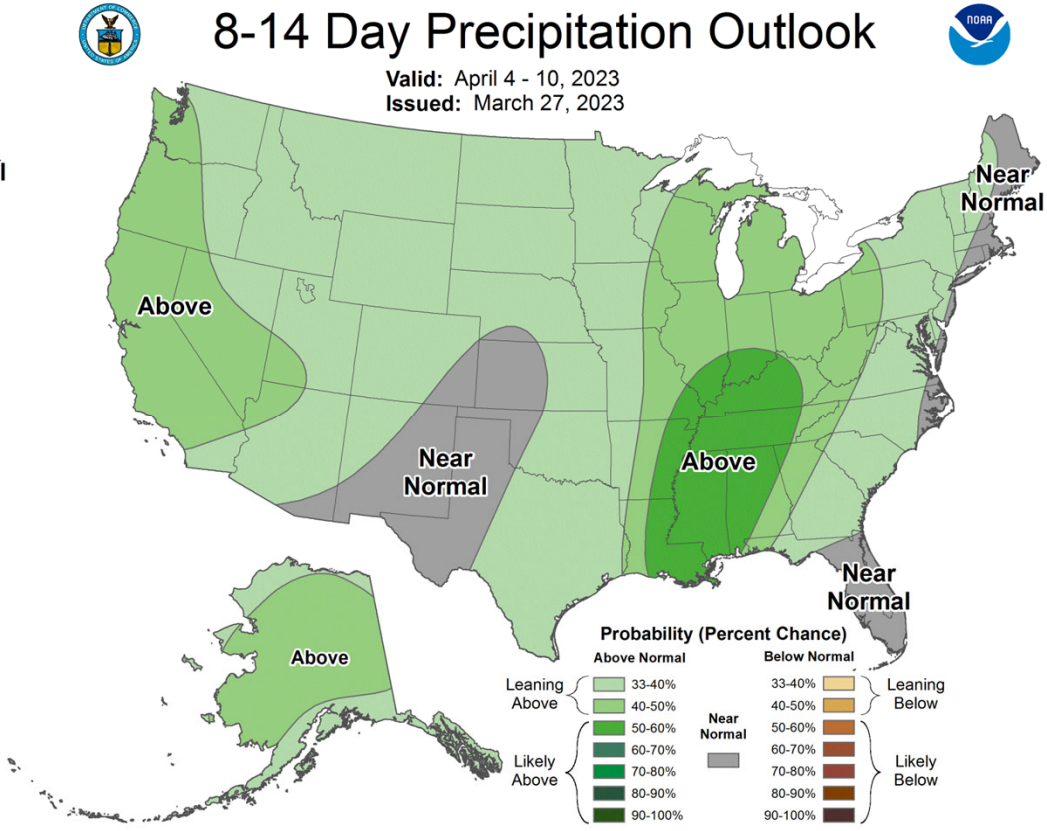


Very warm today, very strong cold front tonight, possible record cold Sunday morning, then slowly back to a warm and dry pattern

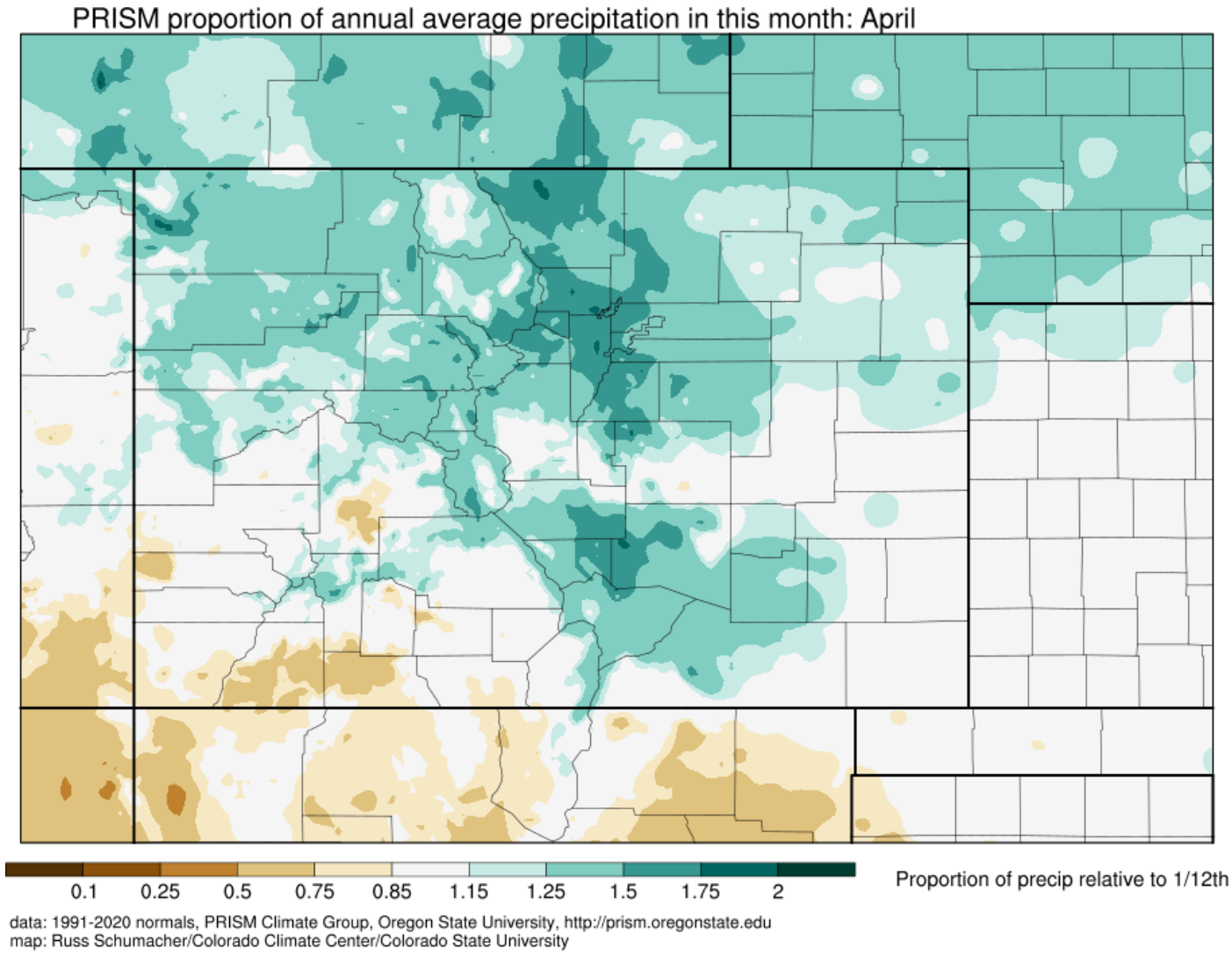


The April 4-10 period looks to be cooler than normal again, with a slight tilt toward wetter than average





Is April typically a wet or dry month?



La Niña is finally over!

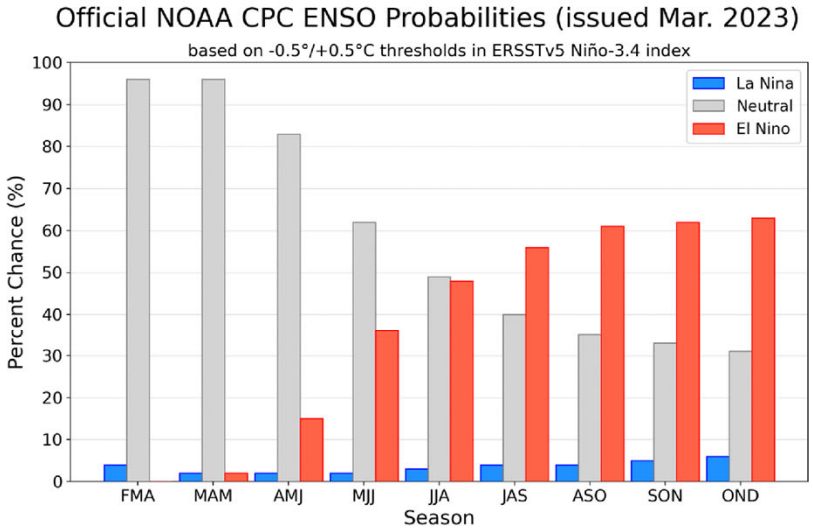


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N-5°S, 120°W-170°W). Figure updated 9 March 2023.

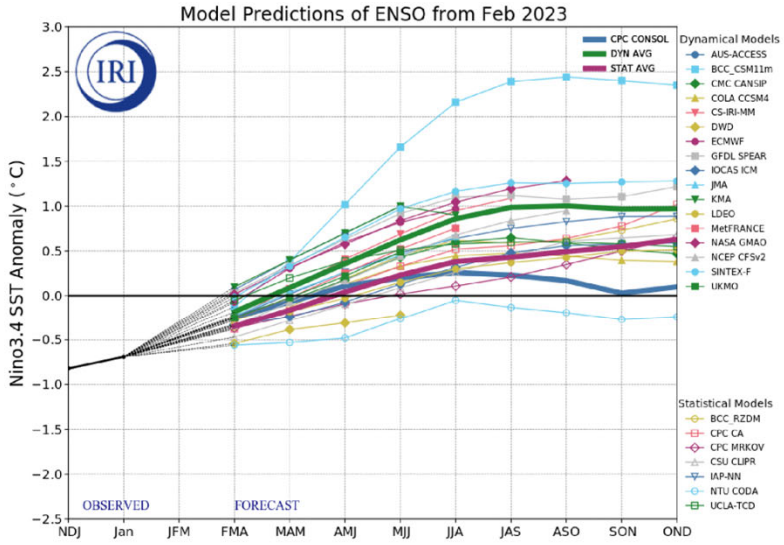
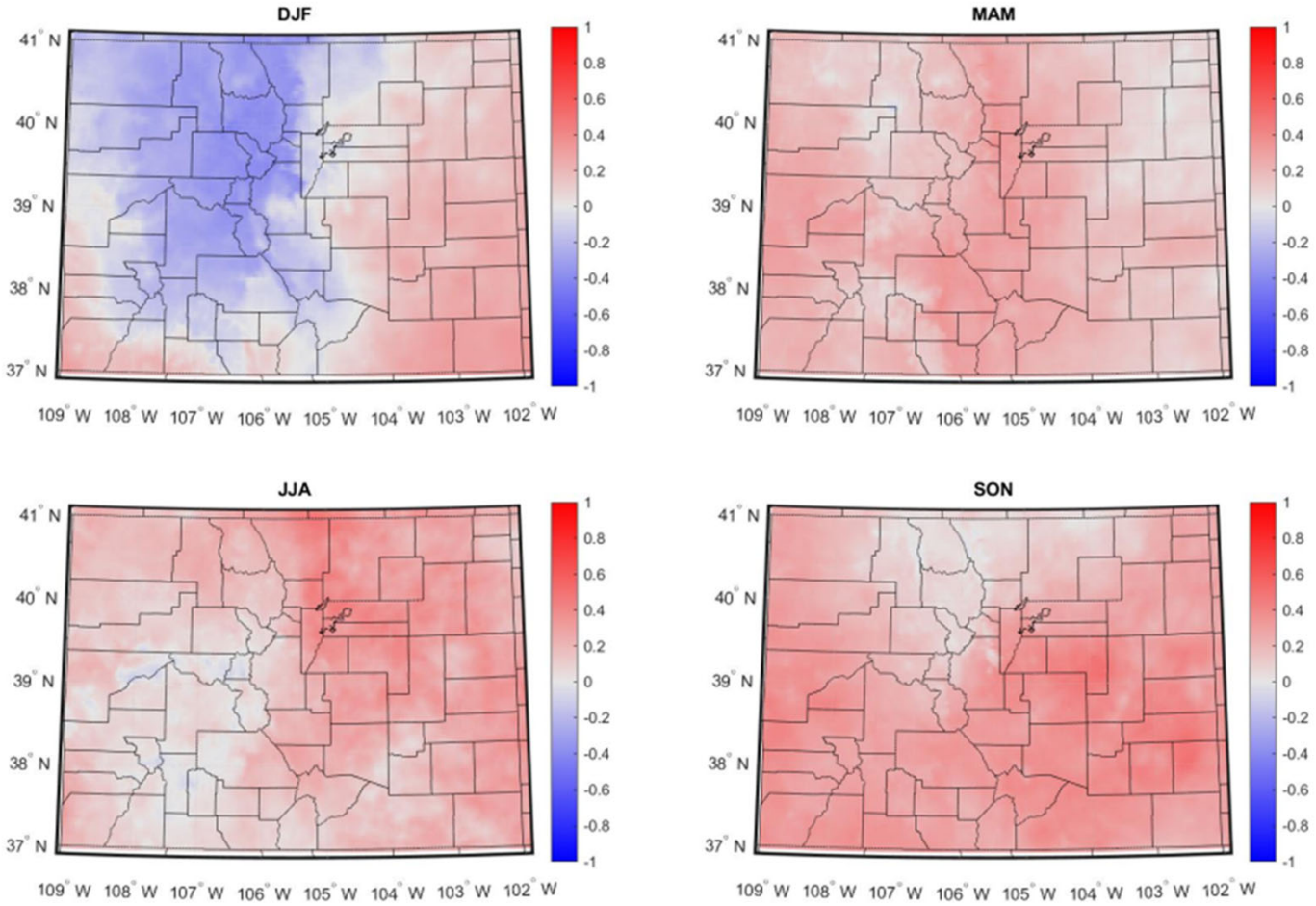


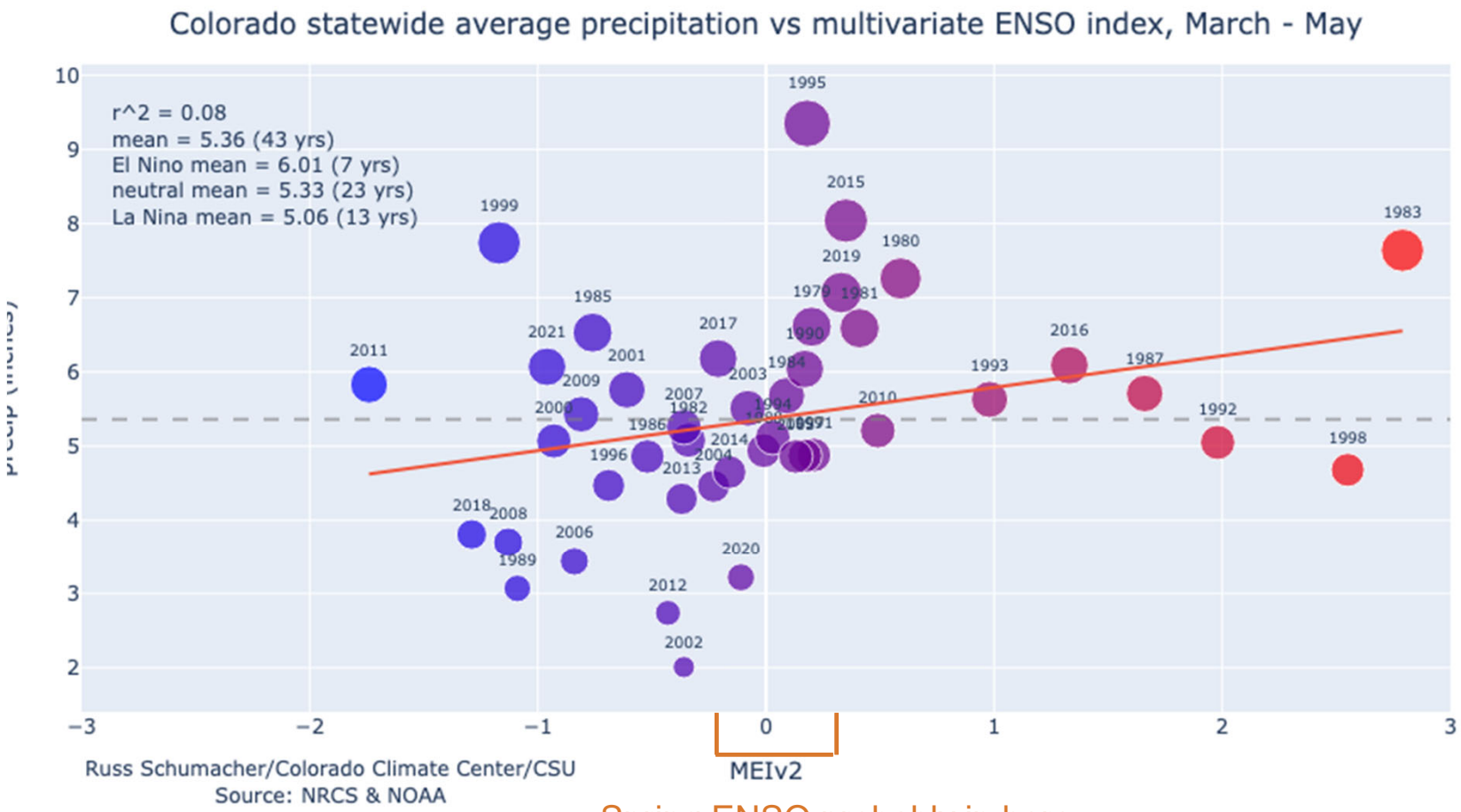
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 20 February 2023 by the International Research Institute (IRI) for Climate and Society.

Neutral conditions likely to go through the spring, with the possibility of El Niño emerging by summer/fall (though could also remain neutral)

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

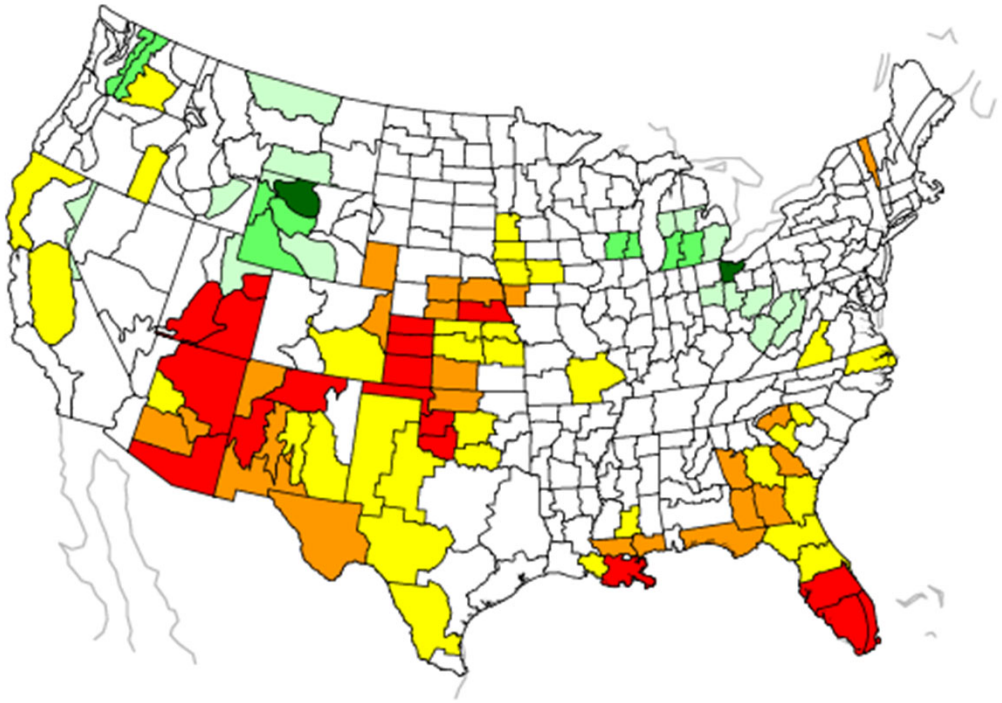


Blue = La Niña wetter Red = El Niño wetter

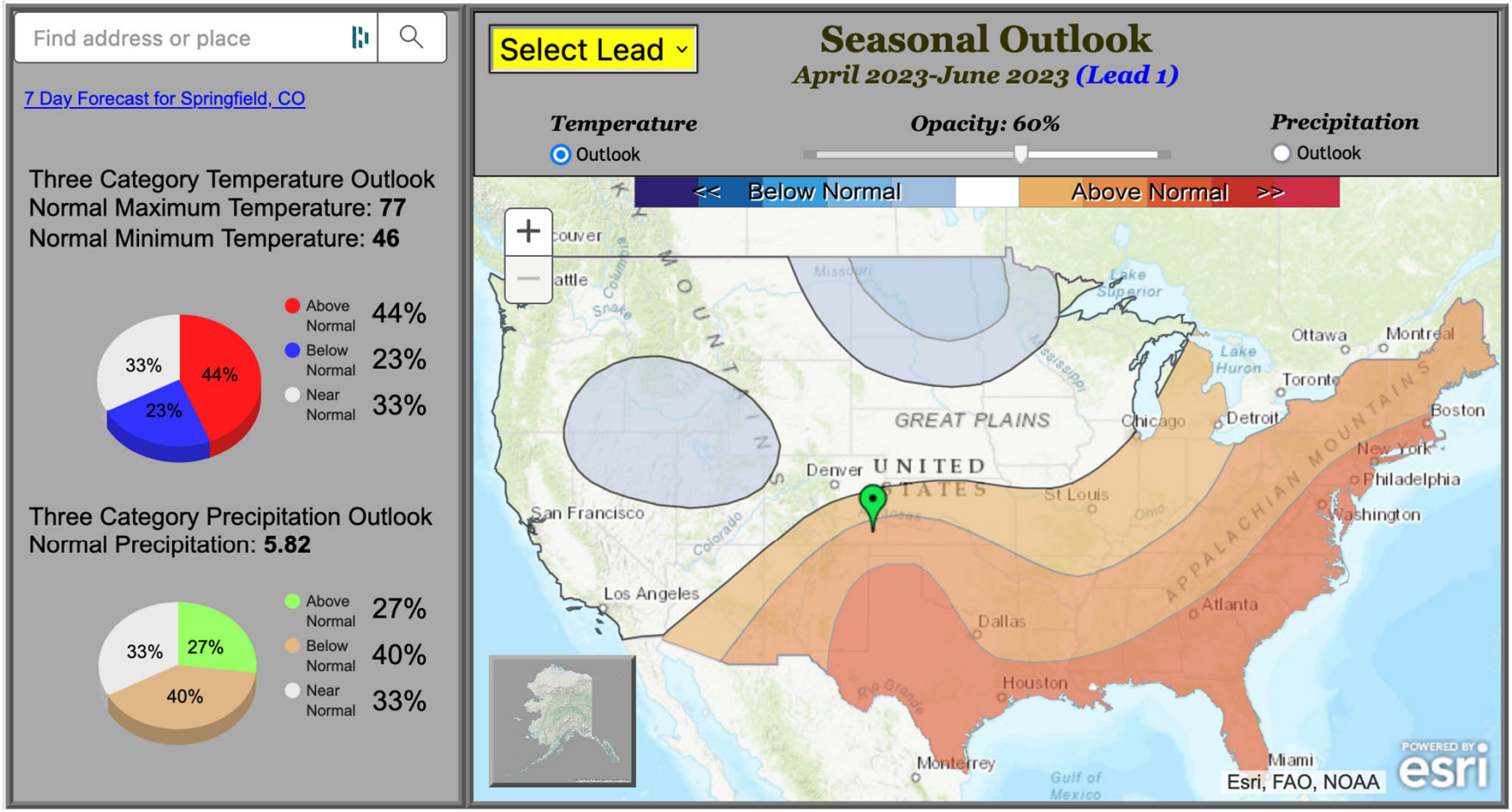


Spring ENSO probably in here

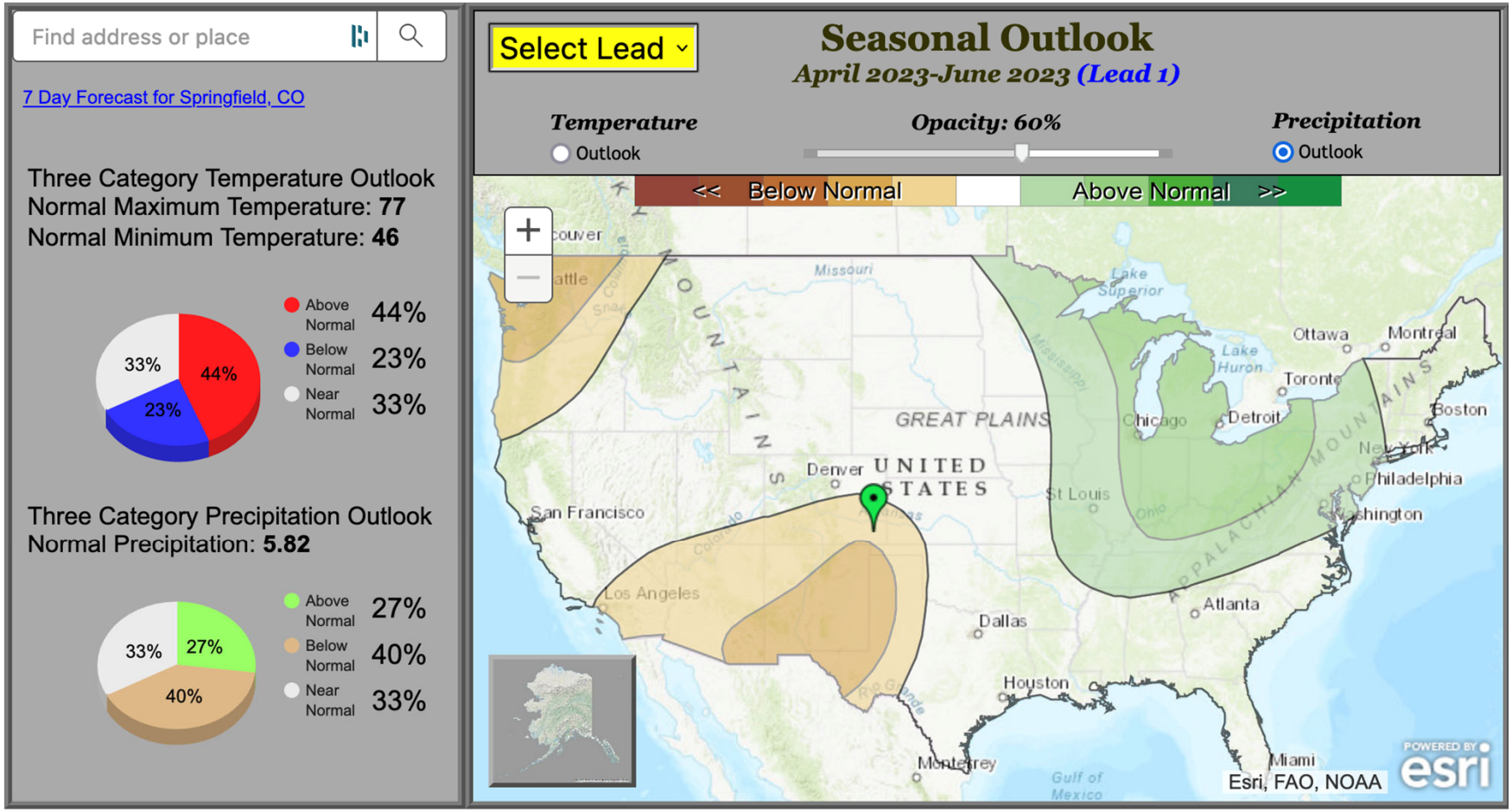
MAM Precipitation During La Nina
Increased Risk of Wet or Dry Extremes



April-May-June outlook



April-May-June outlook



Takeaways

- March will be the 5th cooler-than-average month in a row, and it has delivered in a big way for the mountains, especially the San Juans
- **Within western Colorado**, drought concerns have largely faded for now, with streams and reservoirs likely to return to a near-normal range, though of course big problems still persist downstream
- **Southeastern Colorado** remains dry, and March has generally been dry **east of the divide** so far (with some exceptions)
- La Niña has ended, with neutral conditions expected through spring and the possibility of El Niño by summer/fall (though that remains uncertain)
- Not much confidence in the outlook for the rest of spring and summer. Summer outlook leans toward warmer than normal, in line with recent trends

Thank you!

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