Colorado Climate Update

Russ Schumacher, state climatologist

Water Conditions Monitoring Committee

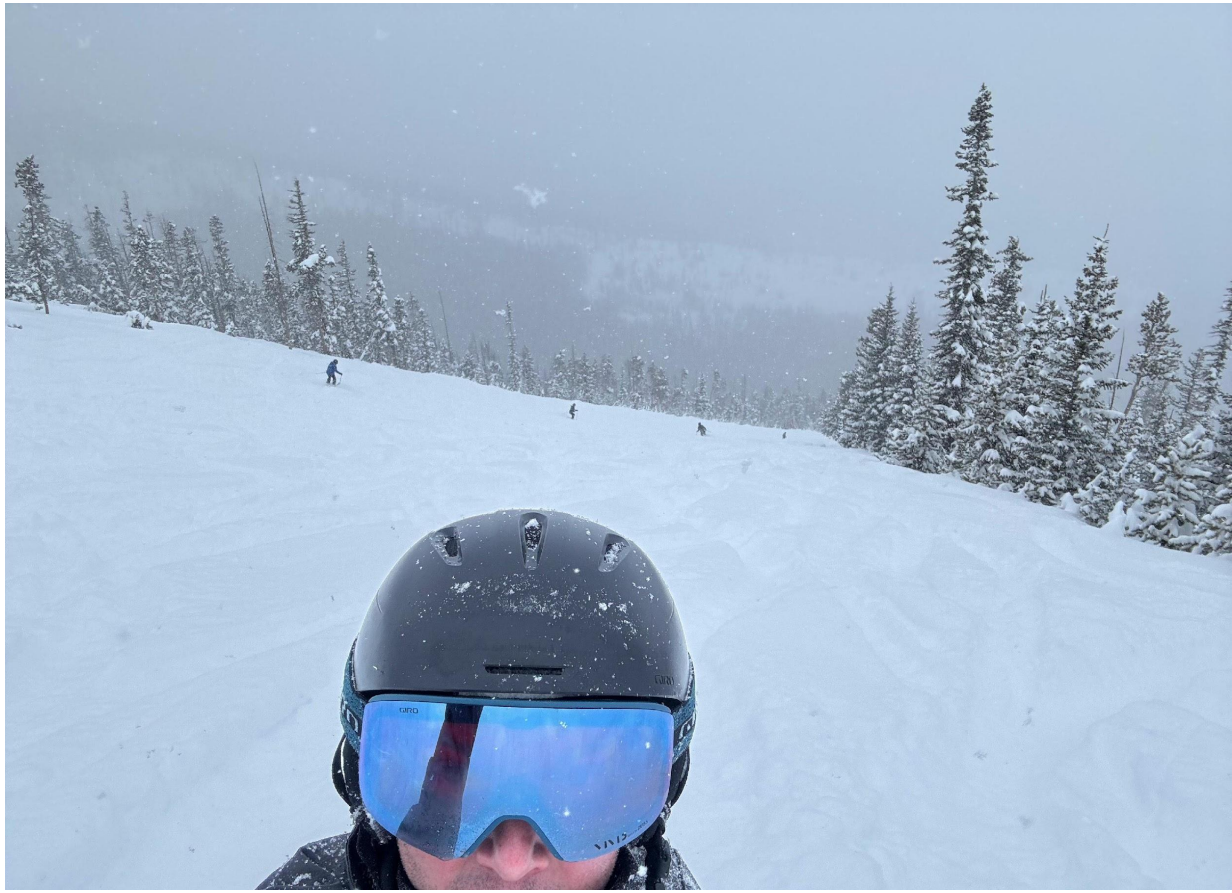
March 19, 2023

COLORADO CLIMATE CENTER

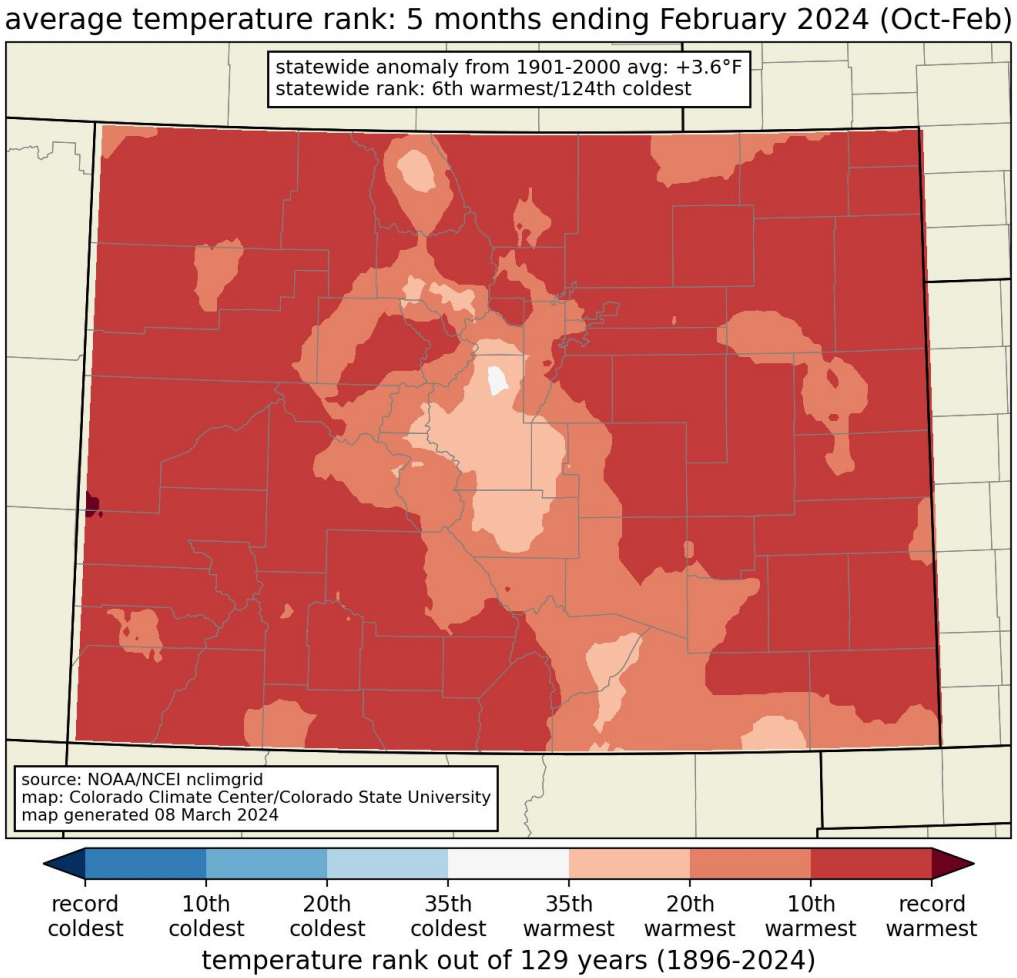
ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Water year 2024 to date:

temperature, precipitation, evaporative demand



In the deep powder at Winter Park last Thursday (March 14)

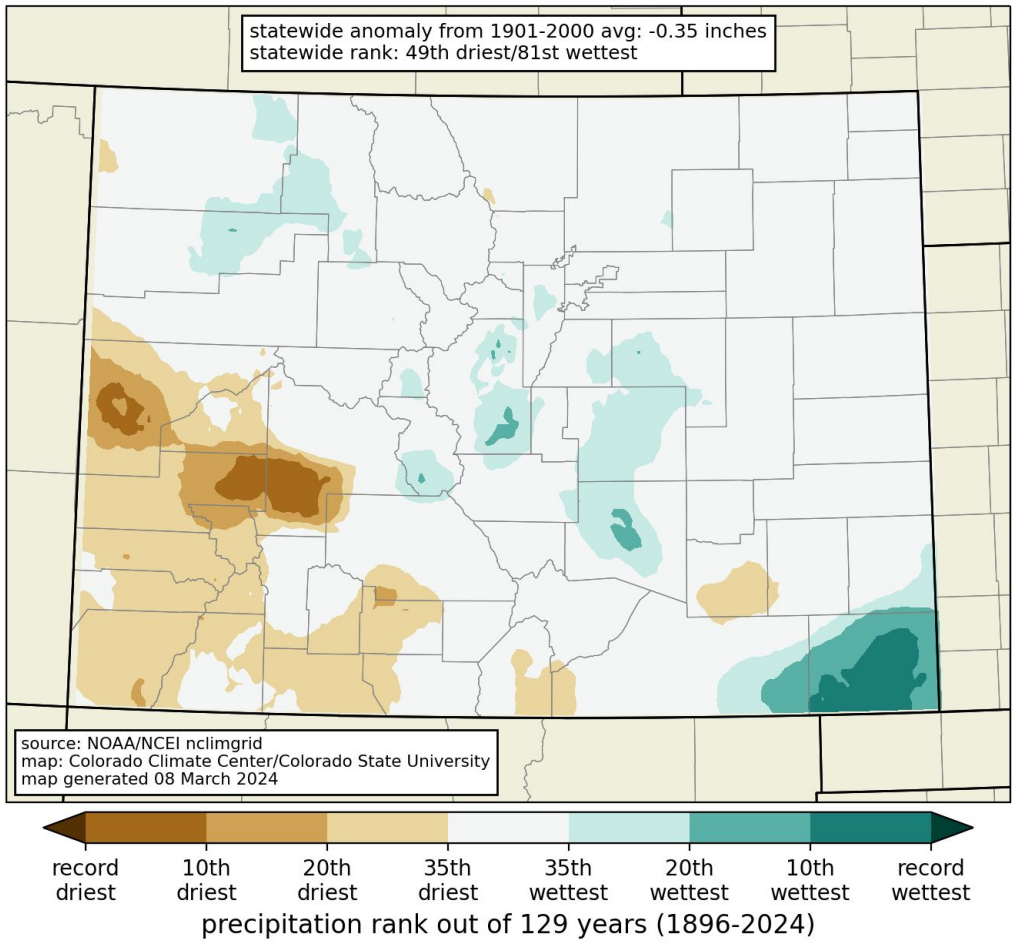


Colorado rankings:

Month	T Rank (of 129 years)	Above, below, or near 20th century avg?
Oct	26th warmest	above
Nov	20th warmest	above
Dec	7th warmest	much above
Jan	51th warmest	near avg
Feb	11th warmest	much above

Statewide: 6th warmest October-February (out of 129), warmest start to a water year since 2018

precipitation rank: 5 months ending February 2024 (Oct-Feb)



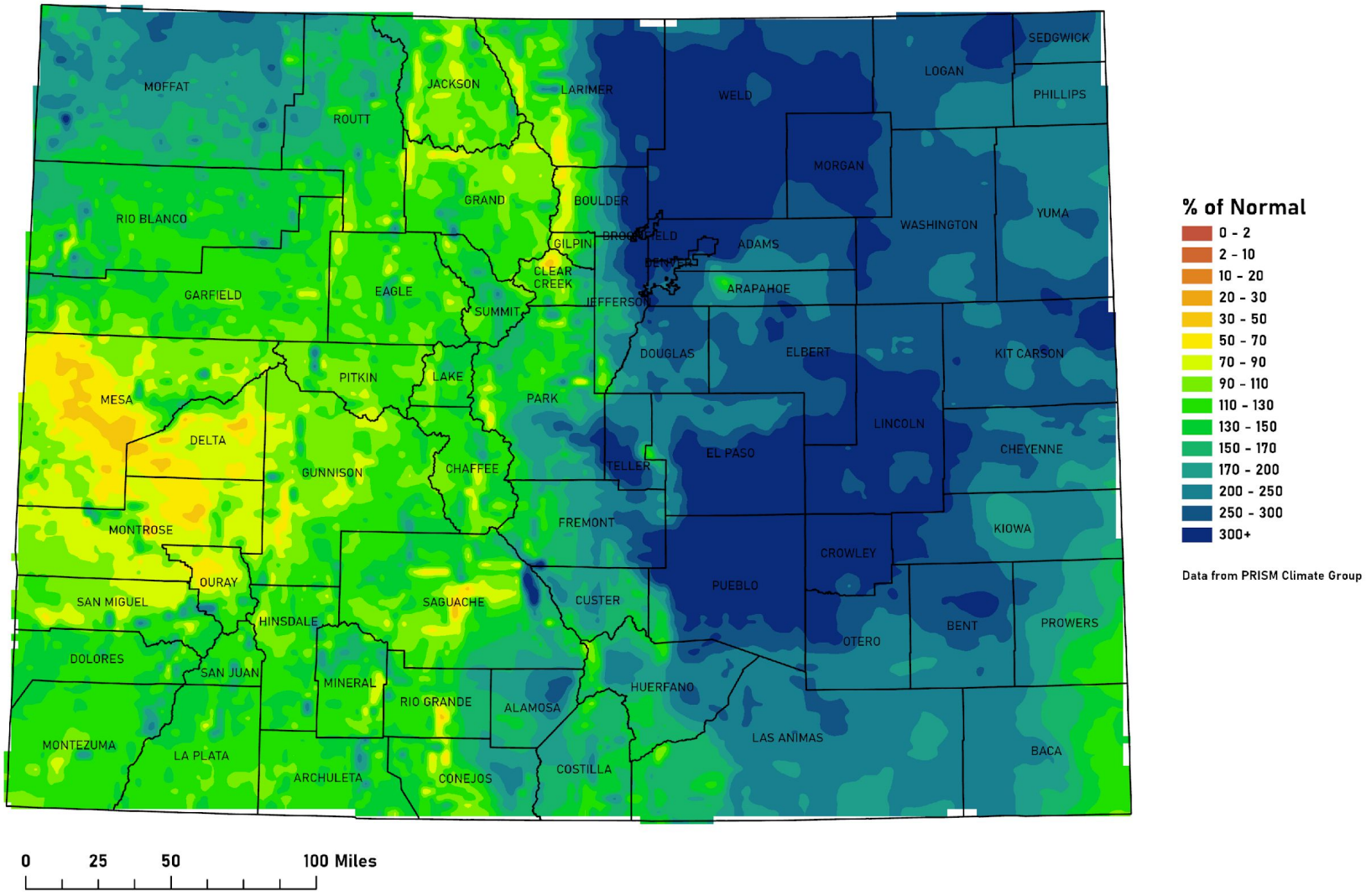
Statewide: tied for 48th driest/82nd wettest October-February (out of 129)

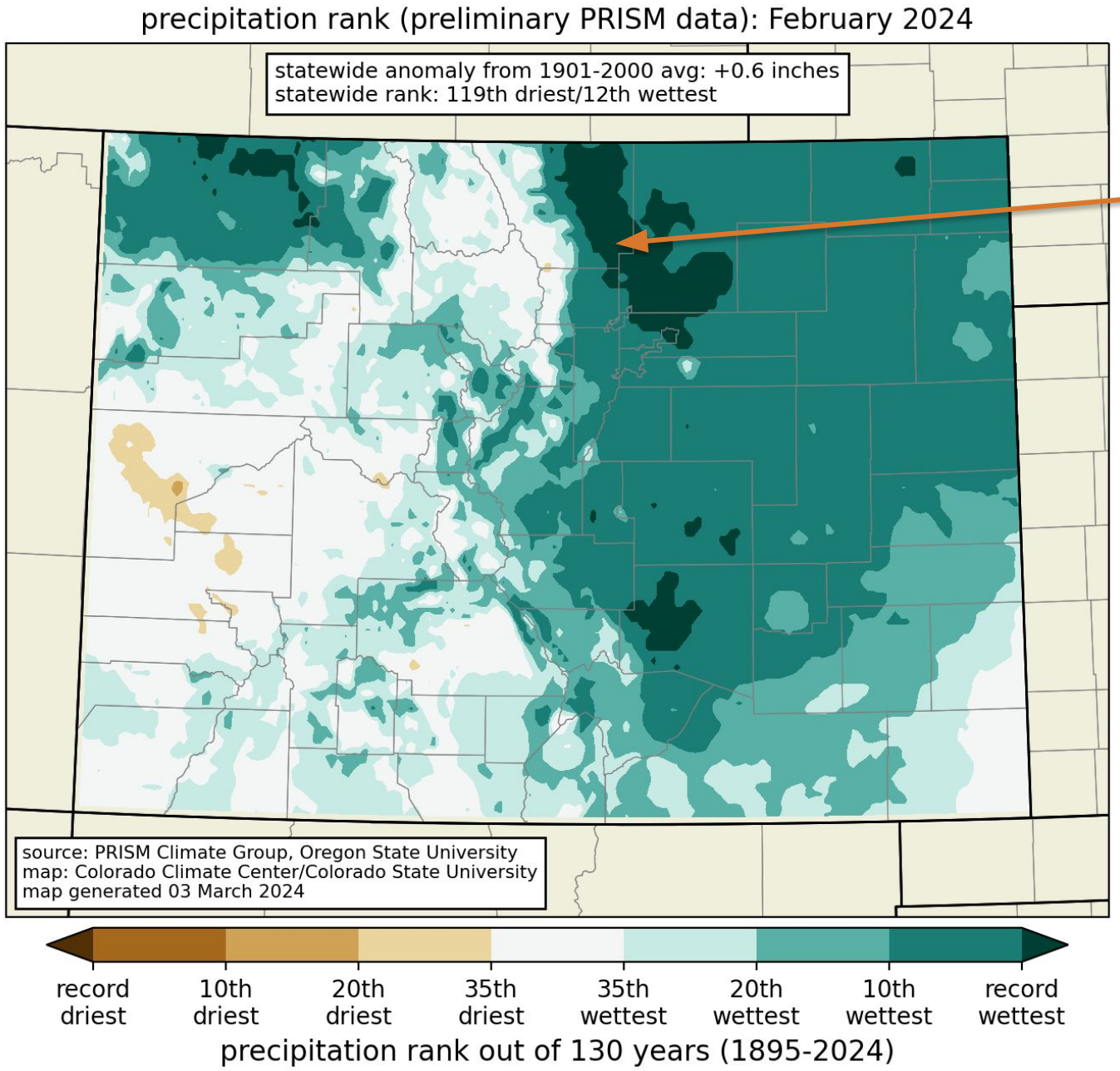
Colorado rankings:

Month	T Rank (of 129 years)	Above, below, or near 20th century avg?
Oct	52nd driest	near avg
Nov	22nd driest	below
Dec	66th driest	near avg
Jan	47th wettest	near avg
Feb	19th wettest	above

Colorado February 2024 Precipitation as a Percentage of Normal

COLORADO CLIMATE CENTER

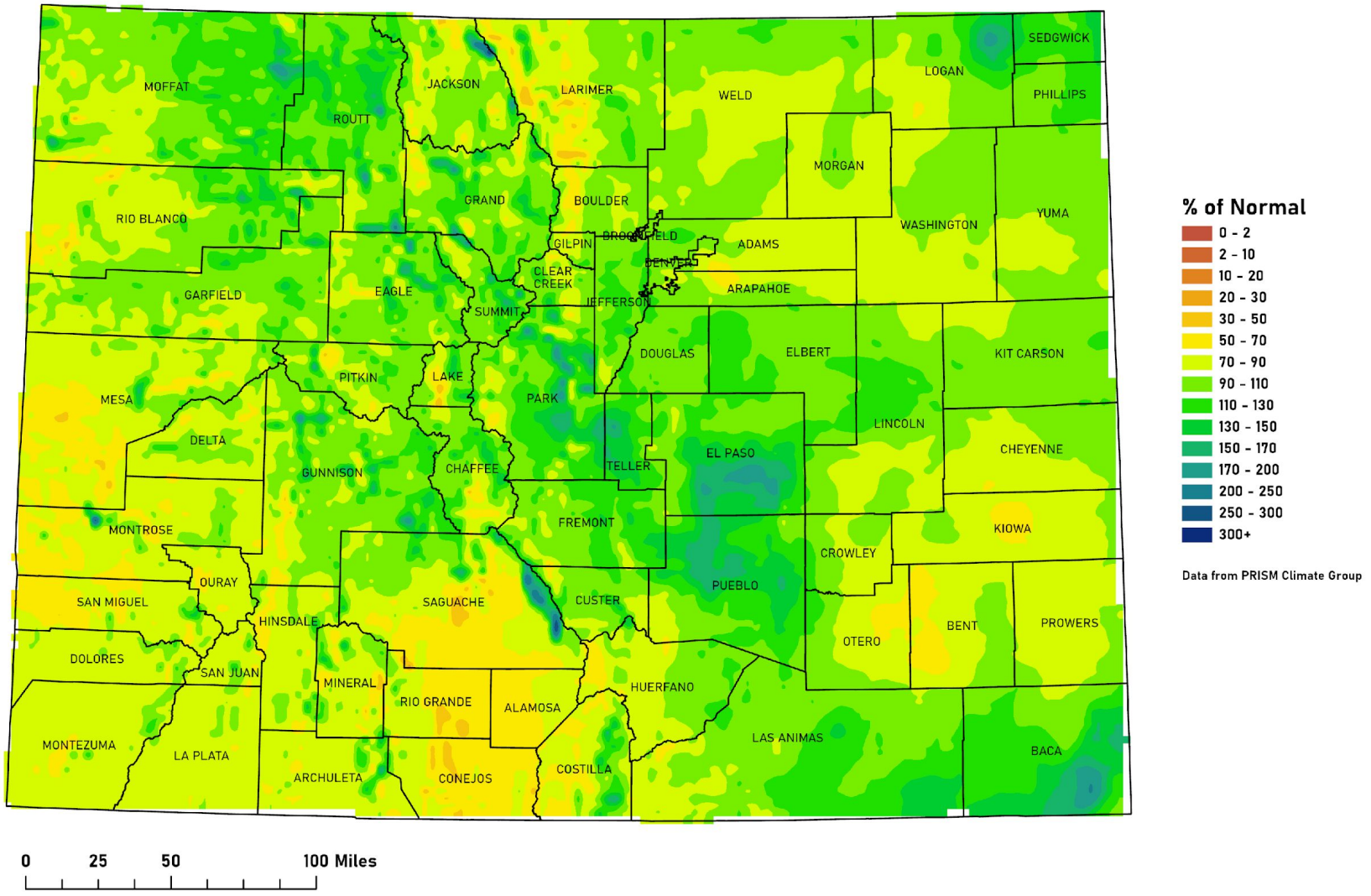




Record-wet February from storms on February 2-3 and 9-10

October 2023 - February 2024 Precipitation as a Percentage of Normal

COLORADO CLIMATE CENTER



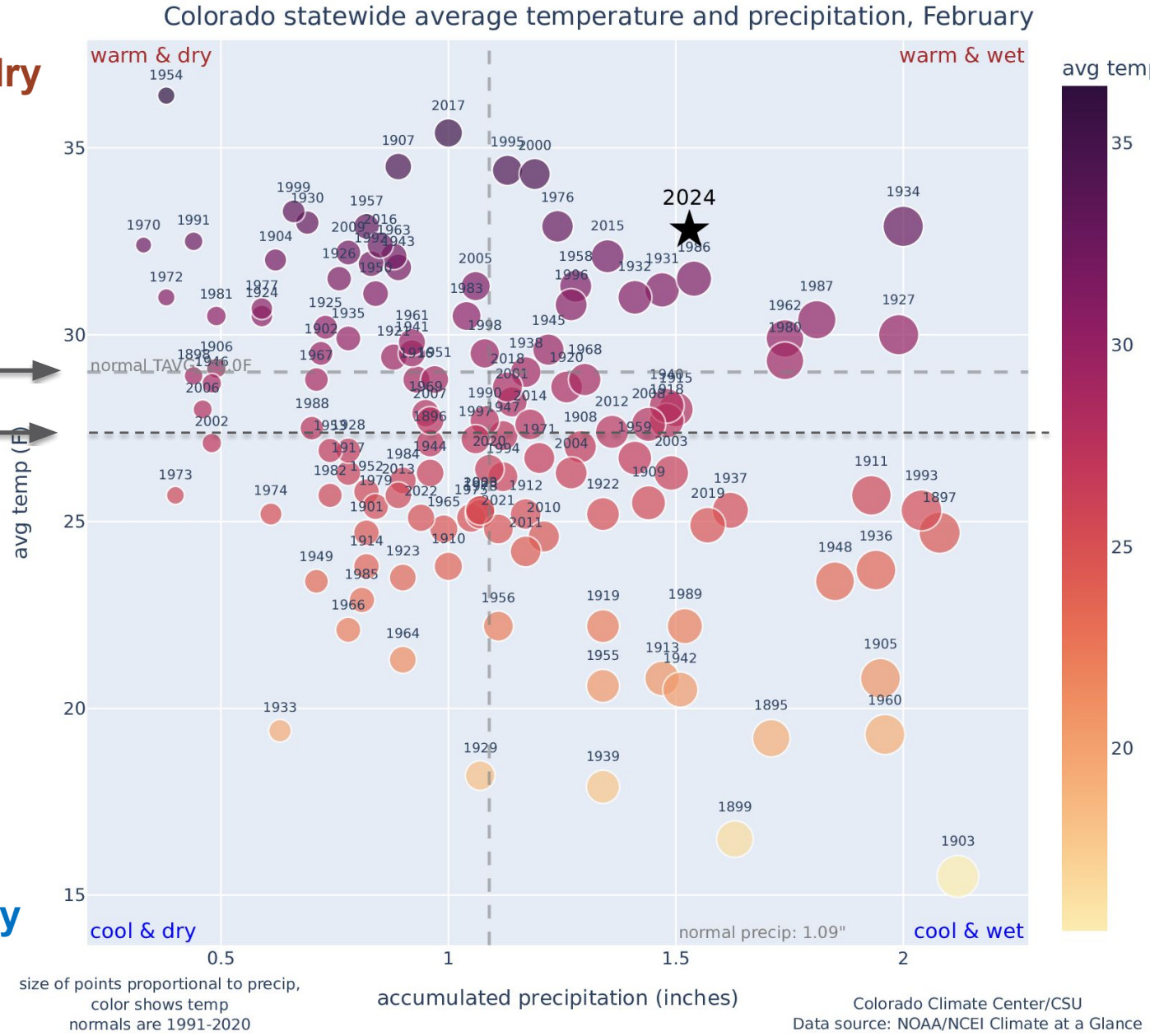
February 2024

Warm & dry

Warm & wet

1991-2020 avg temp

1901-2000 avg temp

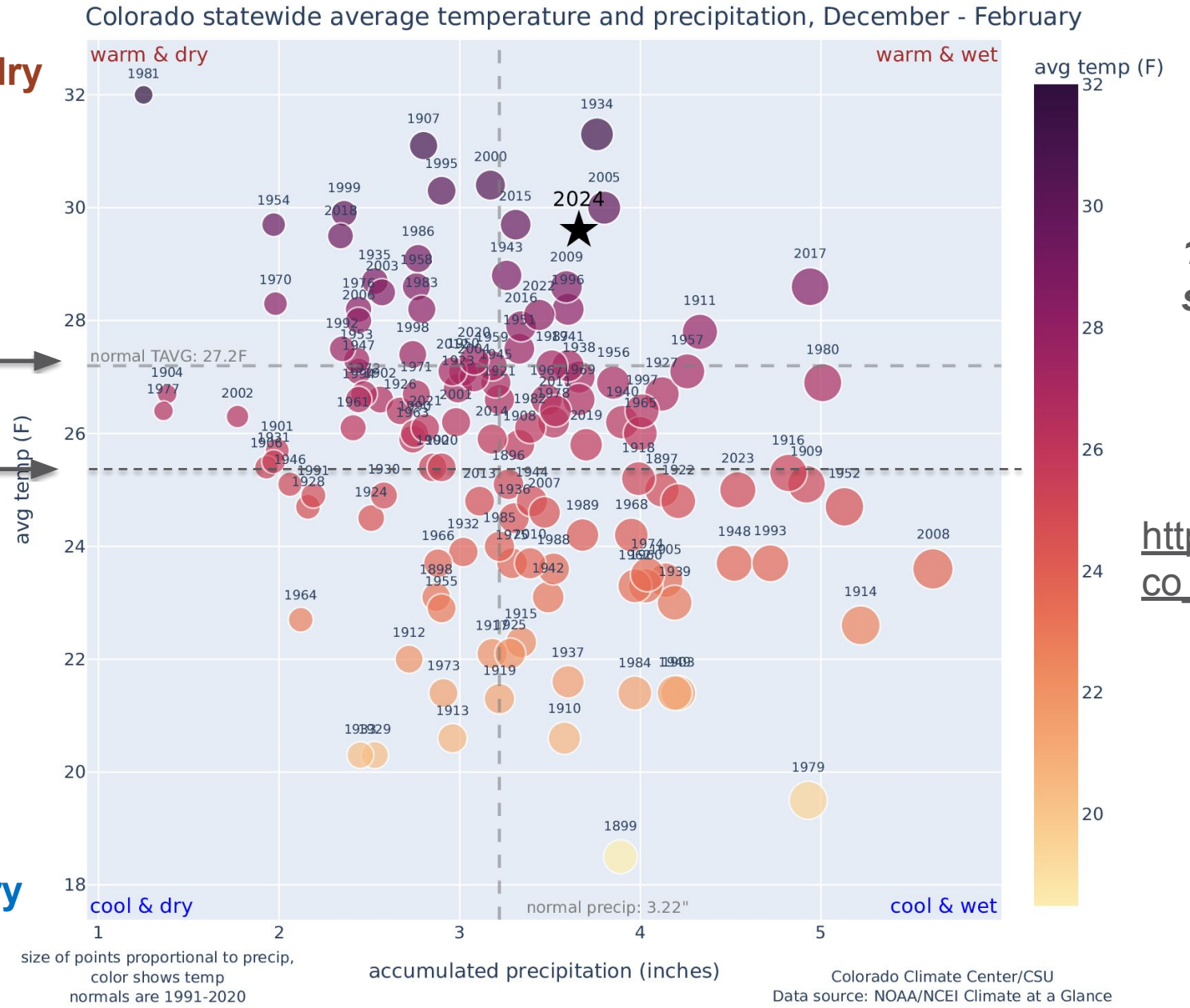


https://climate.colostate.edu/co_cag/quadrant.html

Cool & dry

Cool & wet

Winter (DJF) 2024



Warm & dry

1991-2020 avg temp

1901-2000 avg temp

Warm & wet

10th warmest winter statewide

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

Cool & dry

Cool & wet

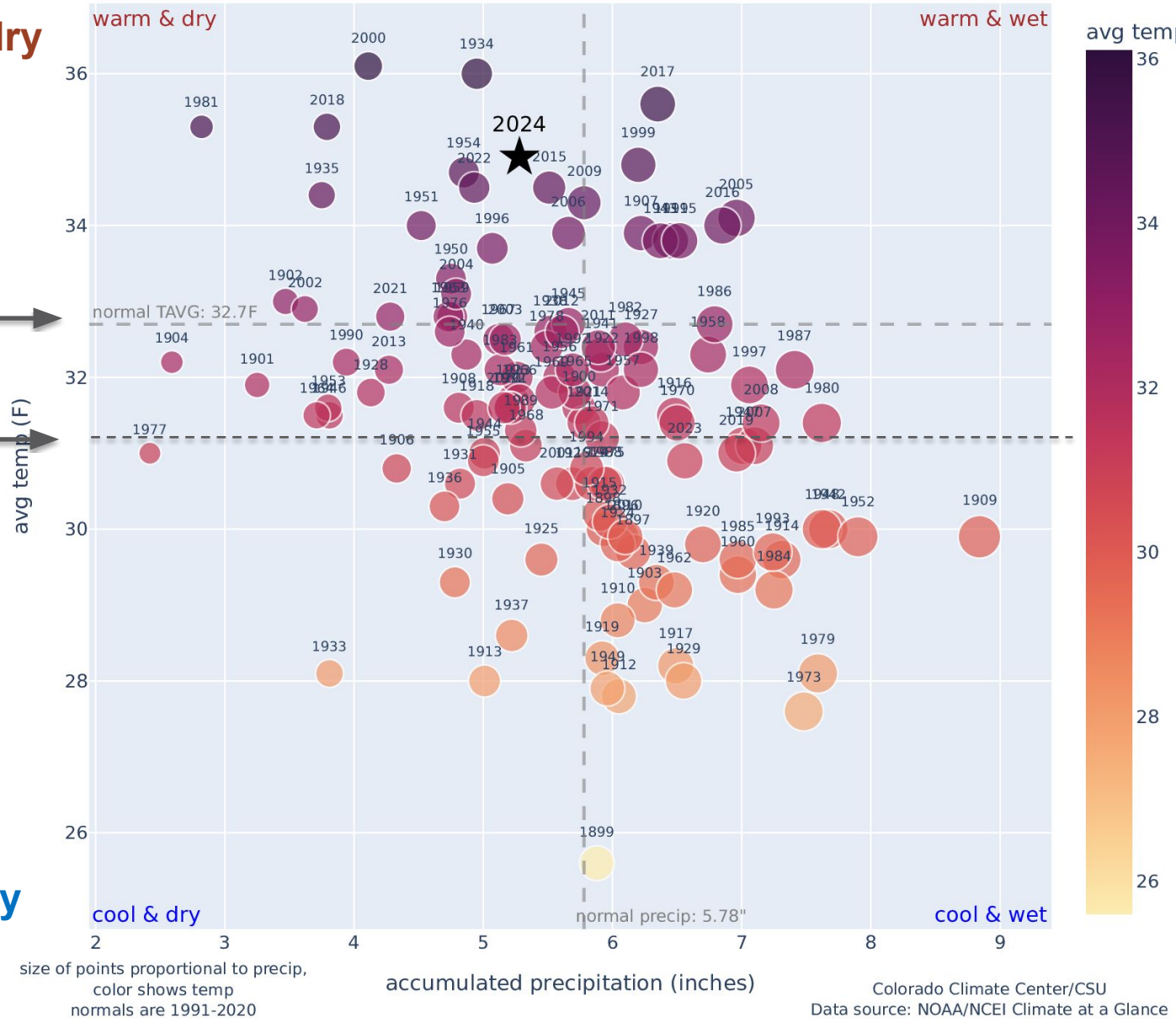
Warm & dry

Warm & wet

Water year 2023 through February

1991-2020 avg temp →

1901-2000 avg temp →

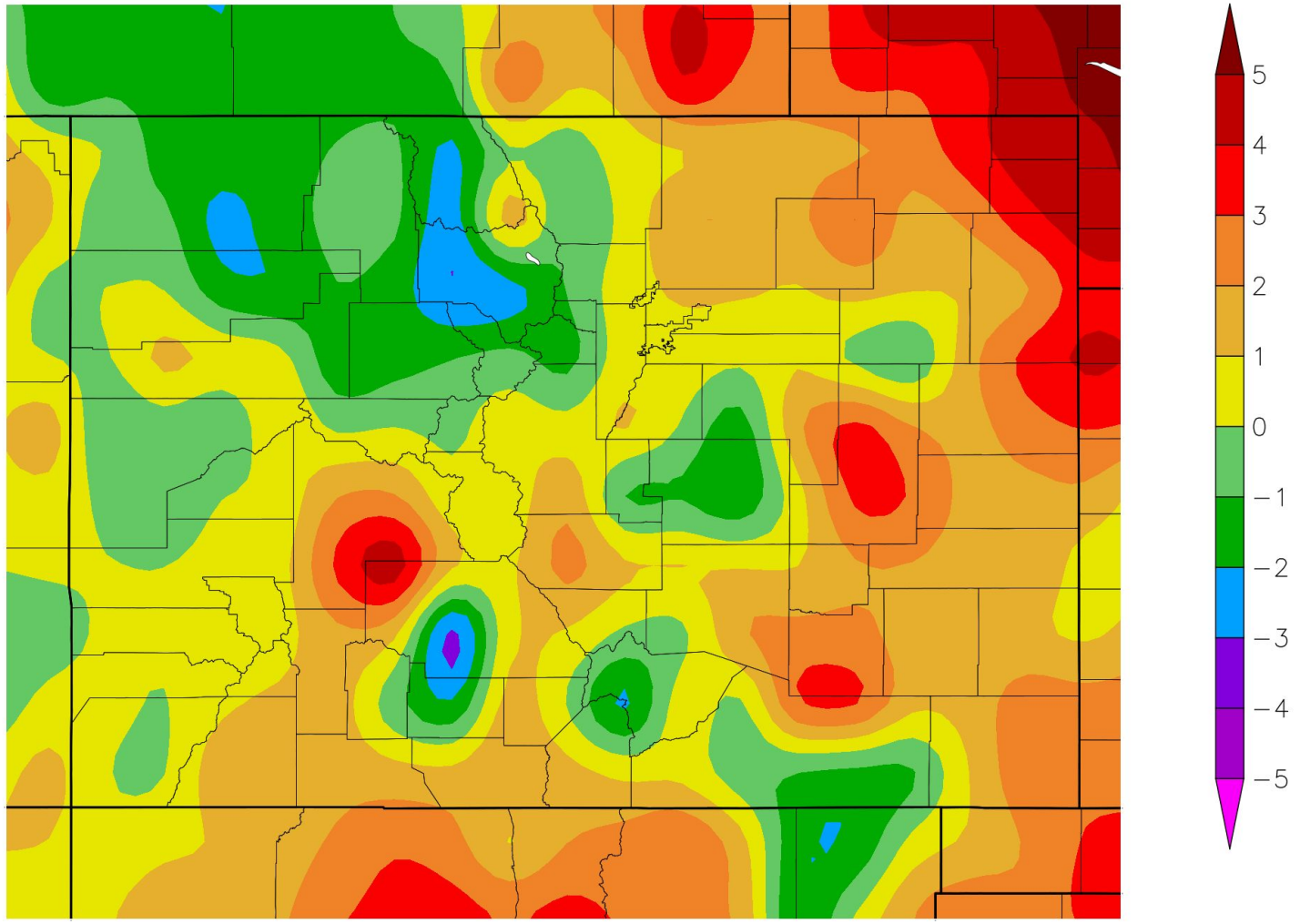


Cool & dry

Cool & wet

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

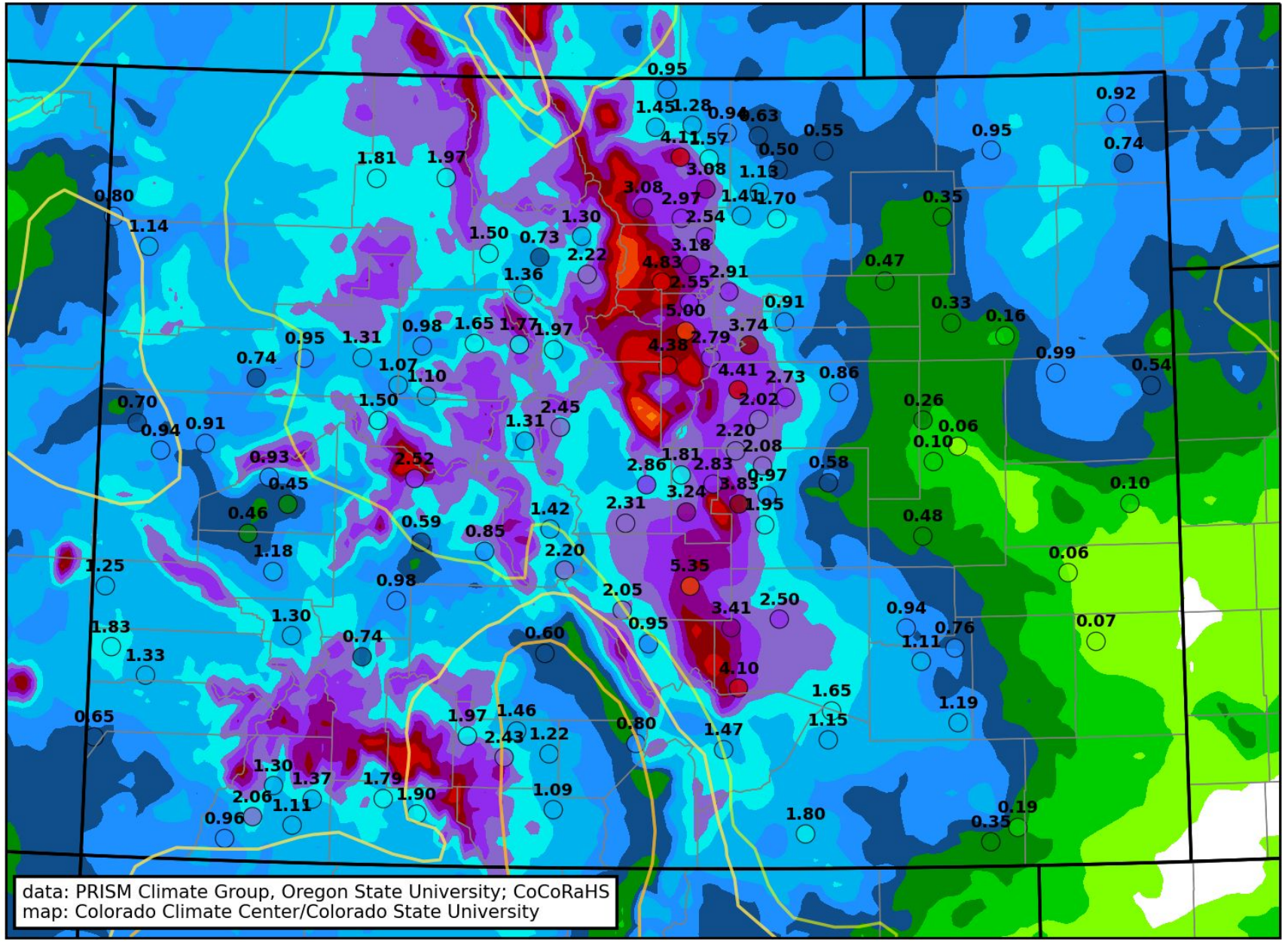
Departure from Normal Temperature (F)
3/1/2024 – 3/17/2024



Generated 3/18/2024 at HPRCC using provisional data.

NOAA Regional Climate Centers

PRISM and CoCoRaHS month-to-date precipitation, US Drought Monitor through 5:00am MST Sun 17 March 2024

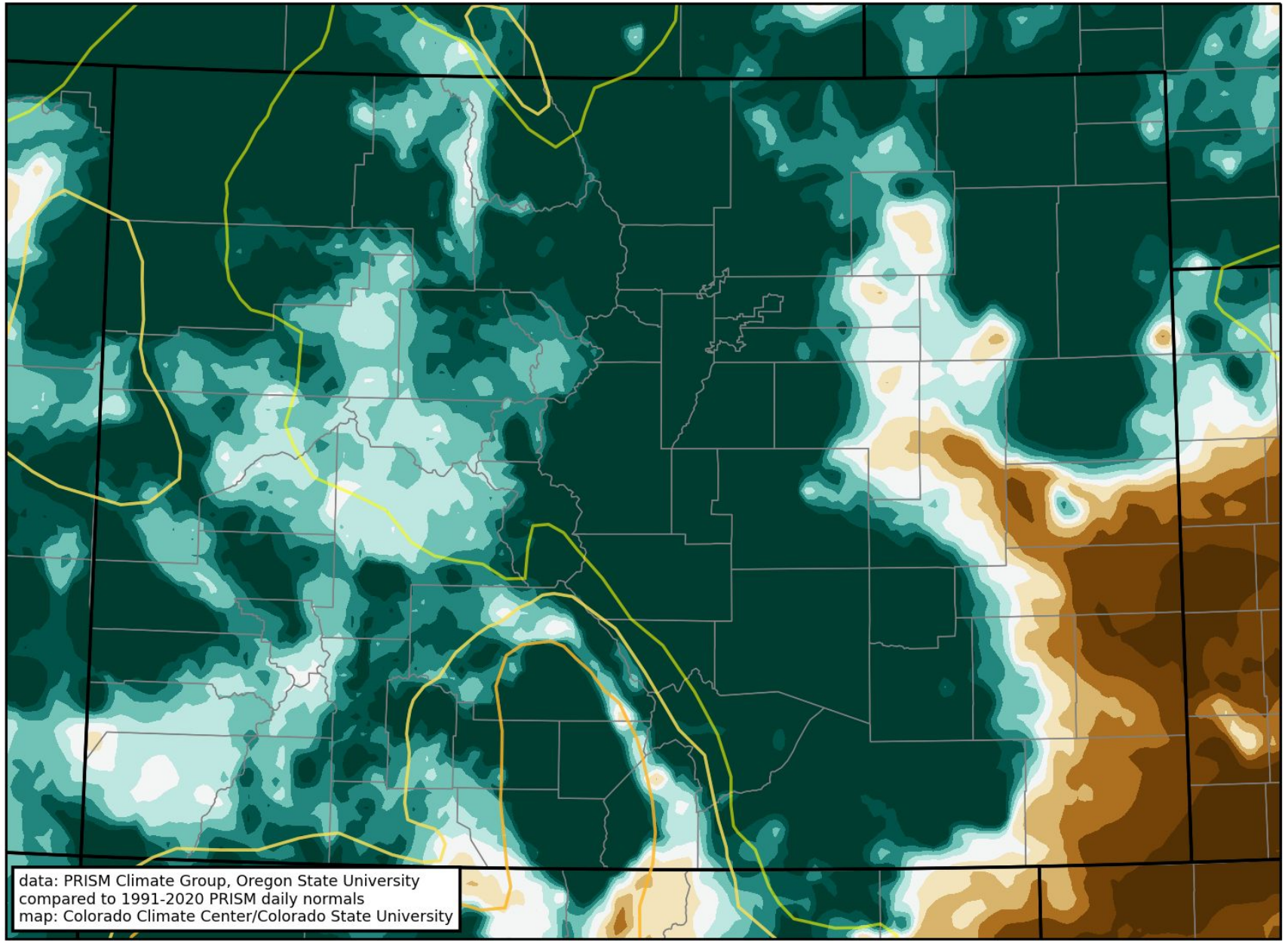


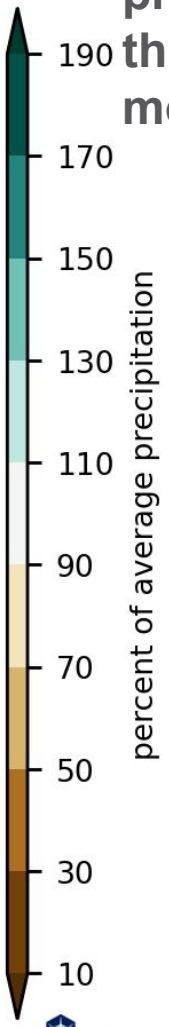
data: PRISM Climate Group, Oregon State University; CoCoRaHS
map: Colorado Climate Center/Colorado State University

March precipitation through Monday morning

PRISM month-to-date % of average precipitation, US Drought Monitor

through 5:00am MST Sun 17 March 2024

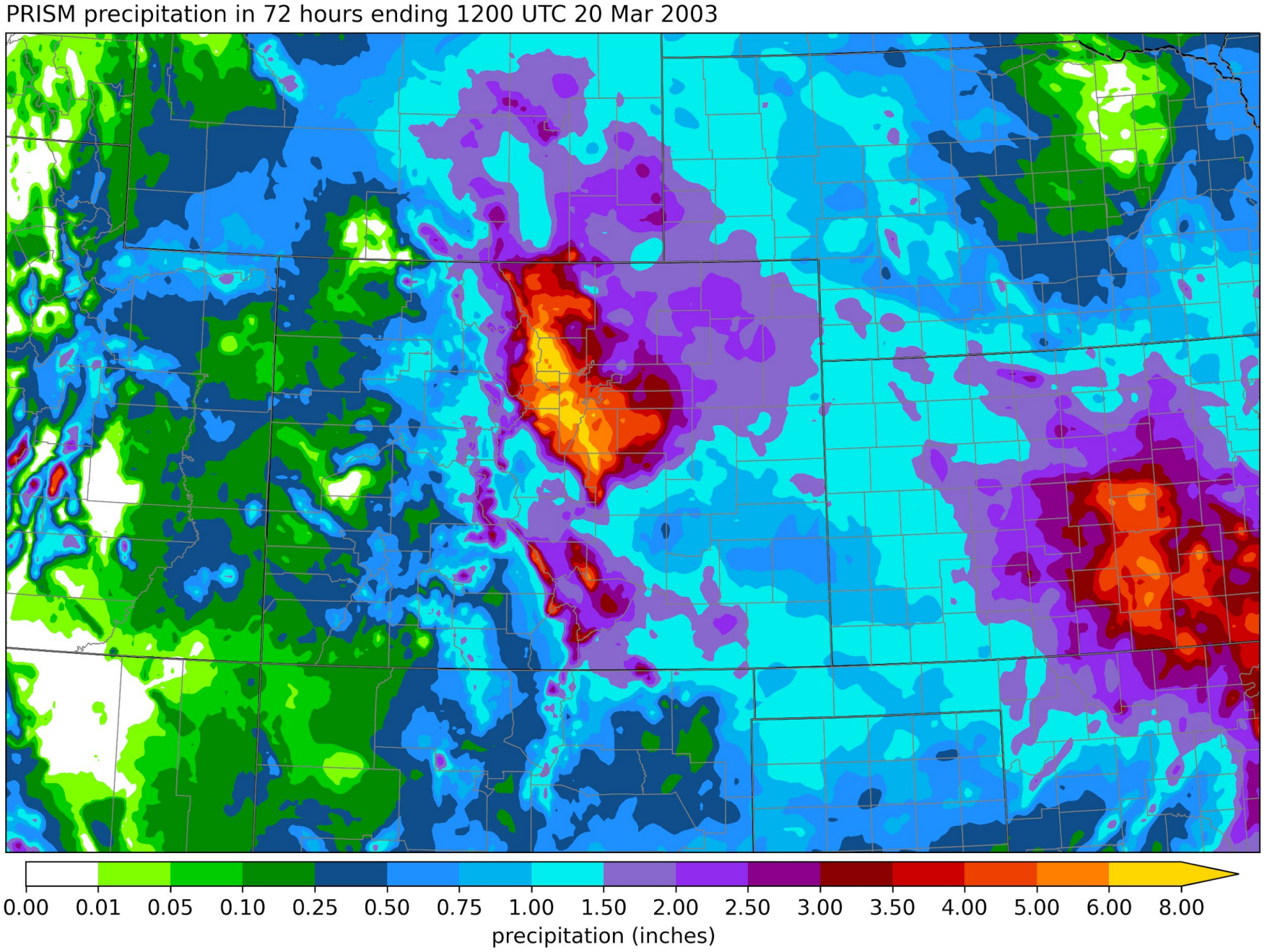




March percent of normal precipitation through Monday morning

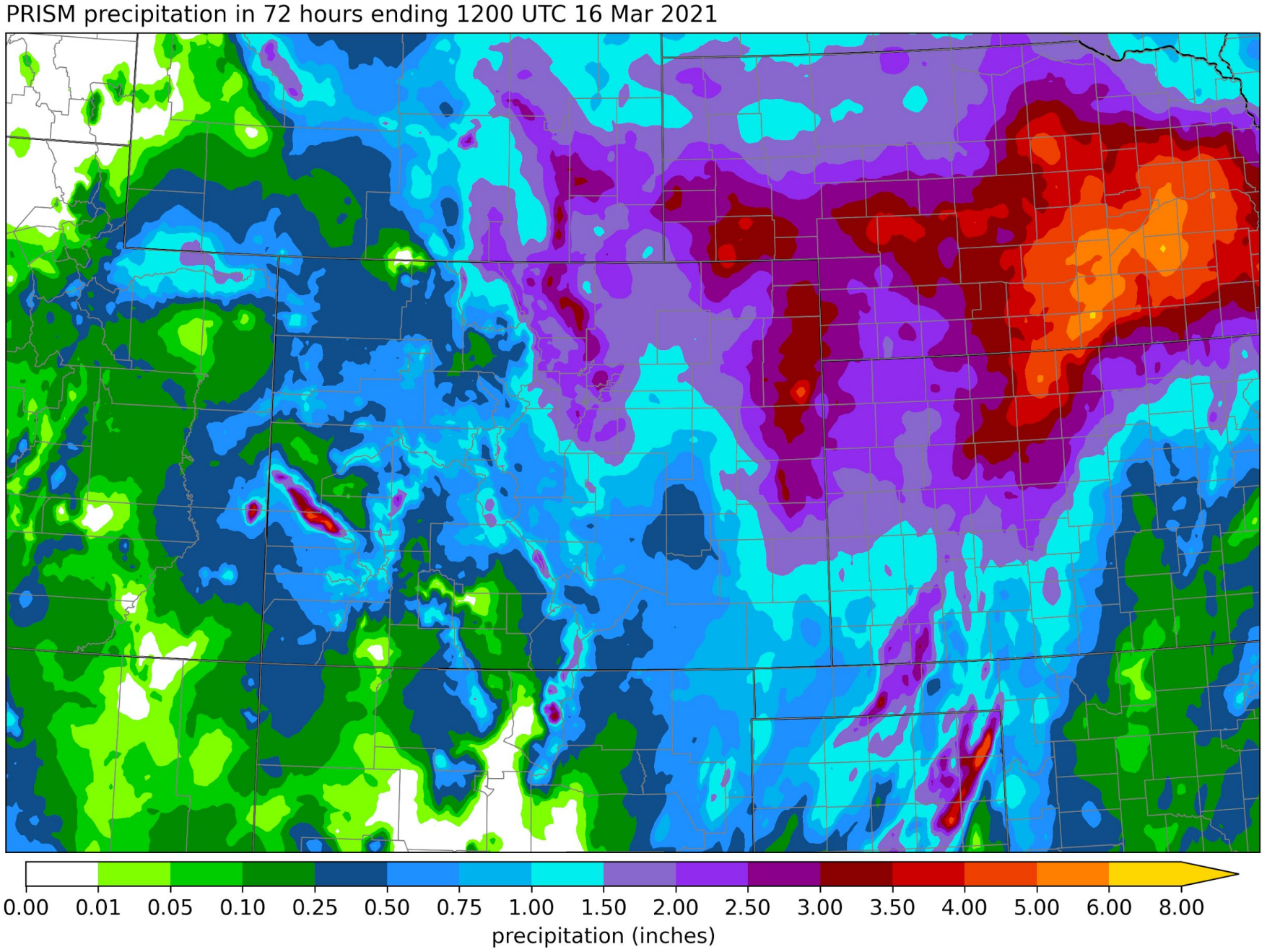
Comparison of big March upslope storms

March 2003



Comparison of big March upslope storms

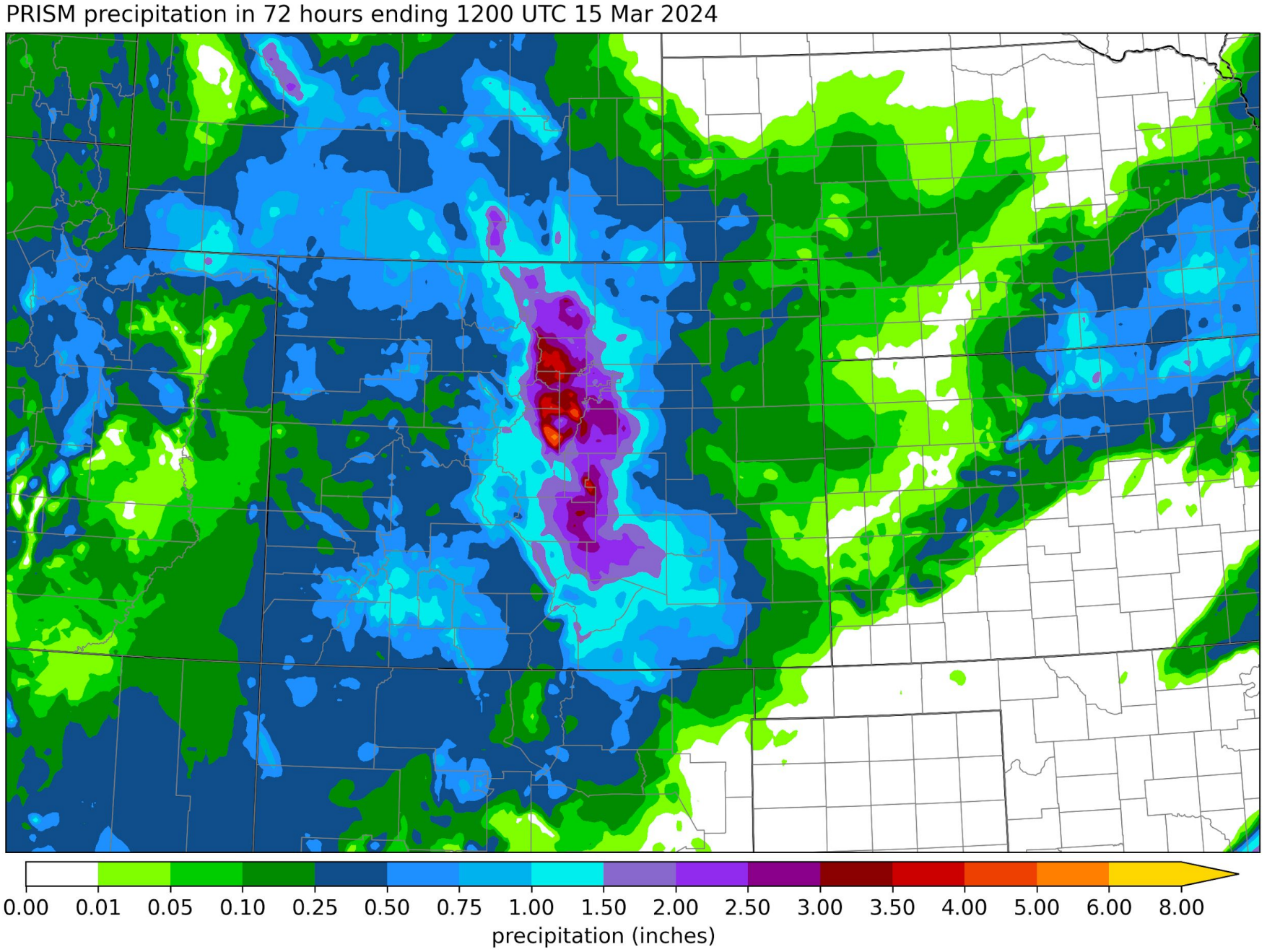
March 2021



Comparison of big March upslope storms

March 2024

Blog post from last week comparing forecasts of these storms: https://climate.colostate.edu/blog/index.php/2024/03/13/how-has-front-range-snowstorm-forecasting-advanced-since-march-2003/



Notable precipitation total

- The Canon City climate station had 3.27” of liquid in 2 days, which was the biggest 2-day precipitation event on record between November and March, and a top-10 precipitation event when considering all months.

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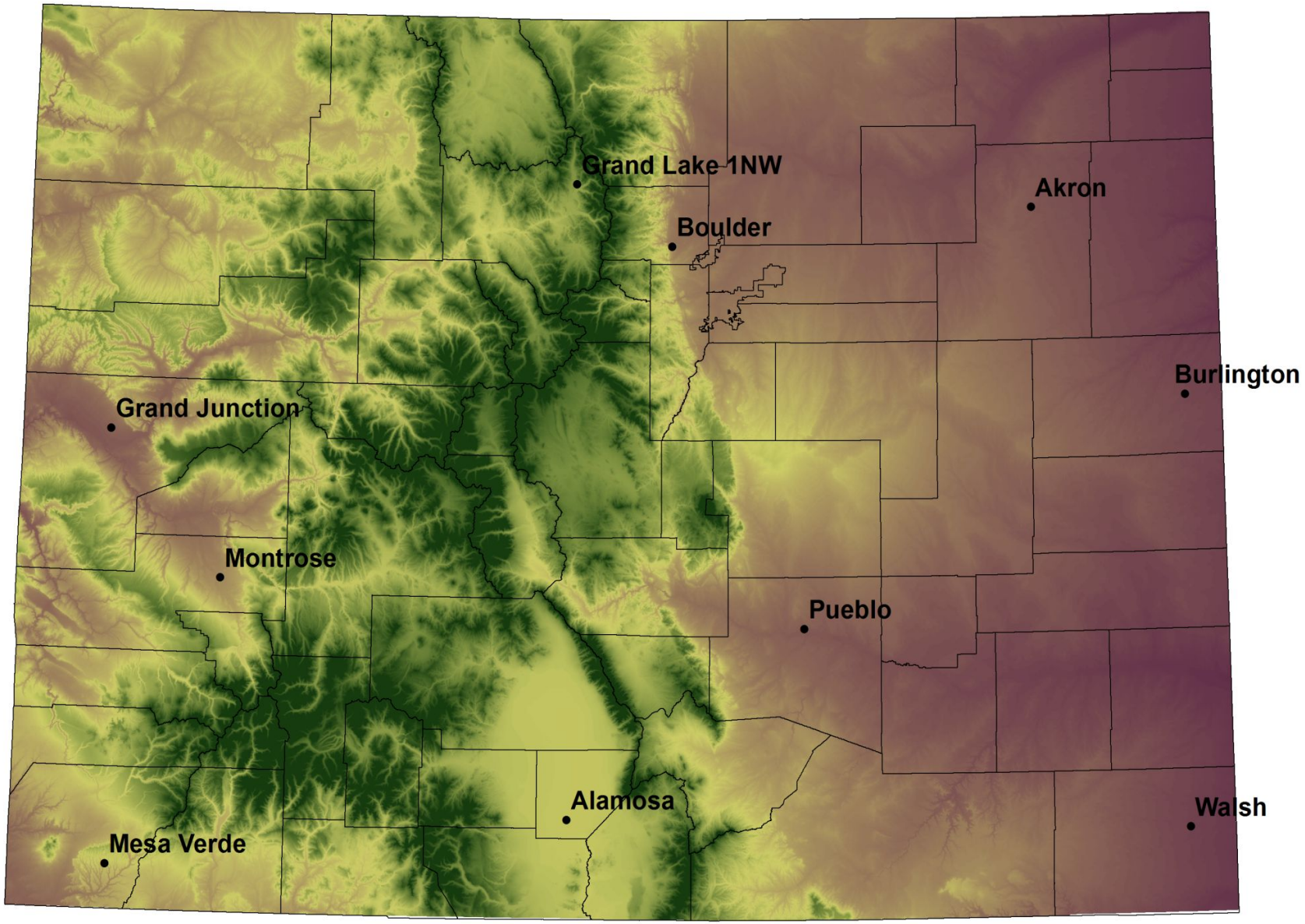
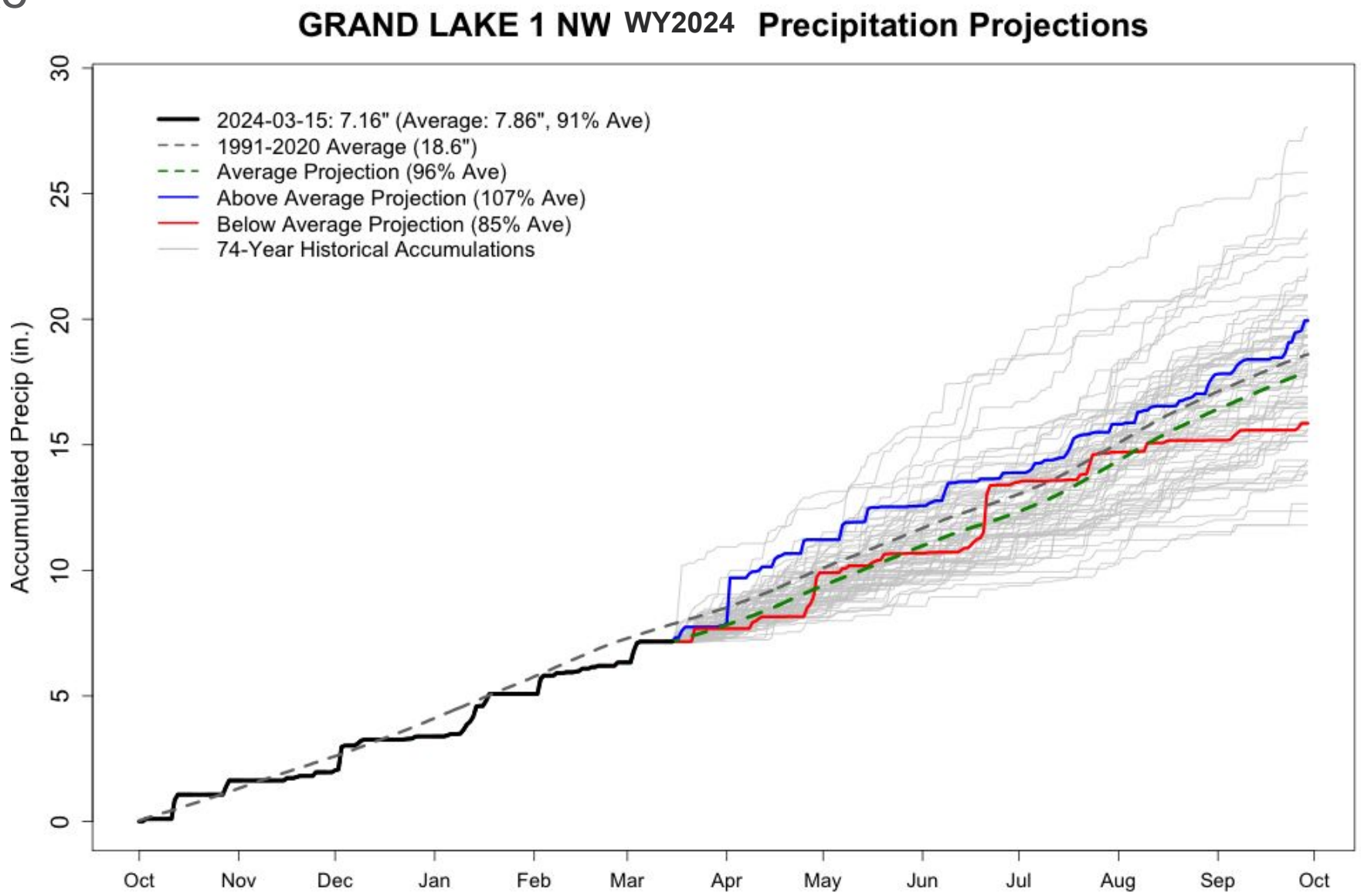
NWS Cooperative Stations for WATF

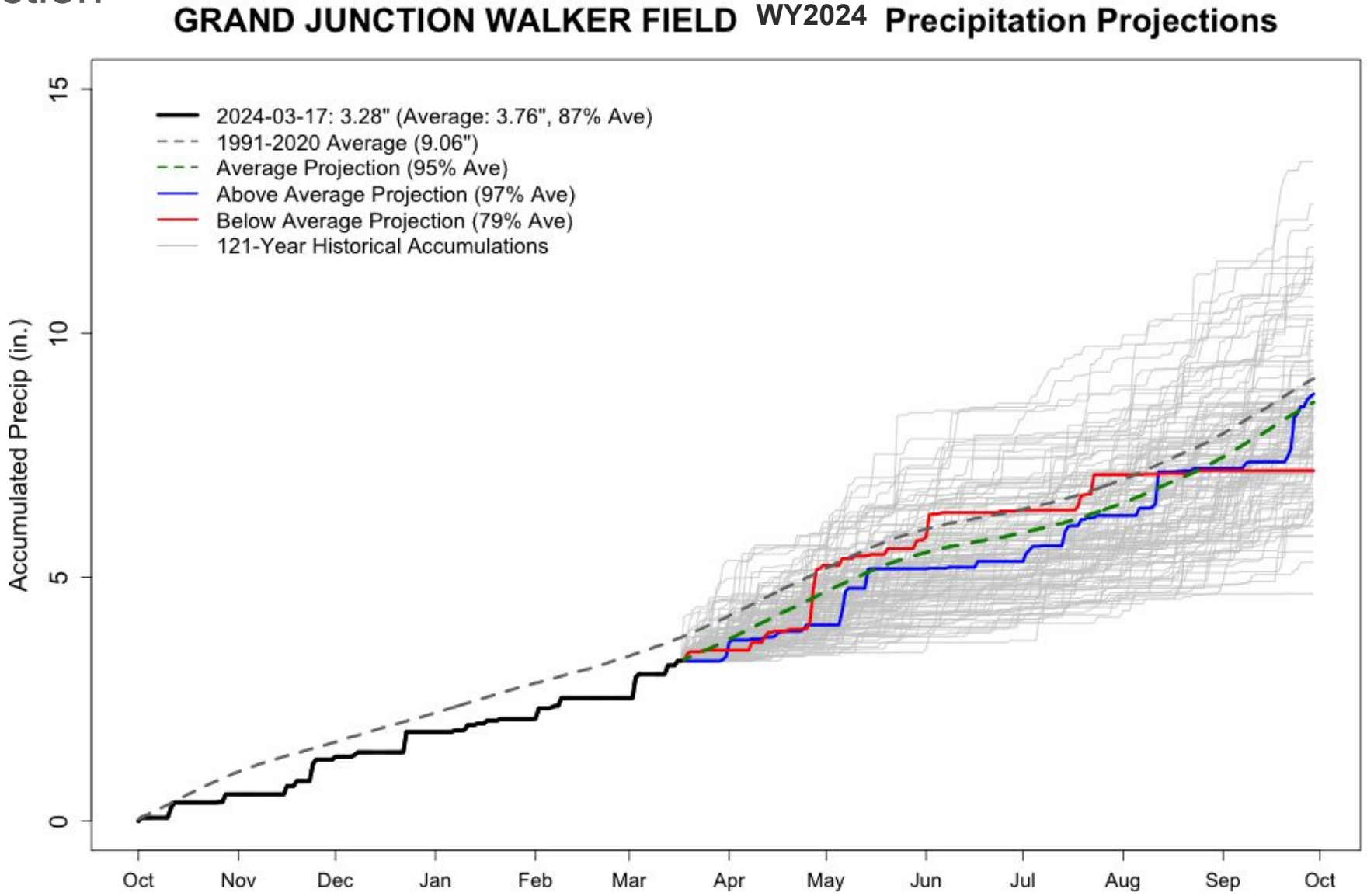


Water Year 2024 – Station Updates

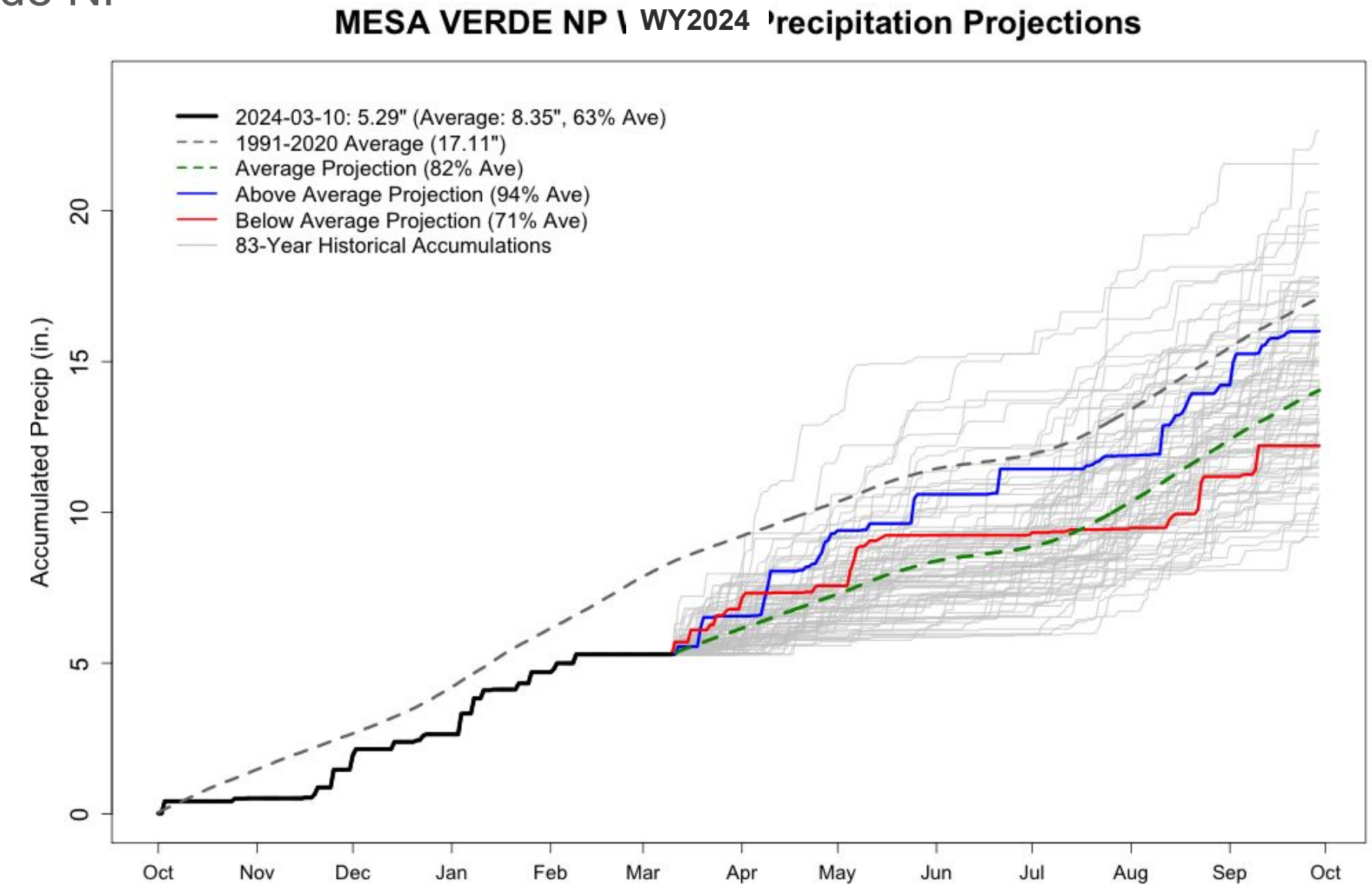
Grand Lake


GRAND LAKE 1 NW WY2024 Precipitation Projections
2024-03-15: 7.16" (Average: 7.86", 91% Ave)
1991-2020 Average (18.6")
Average Projection (96% Ave)
Above Average Projection (107% Ave)
Below Average Projection (85% Ave)
74-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

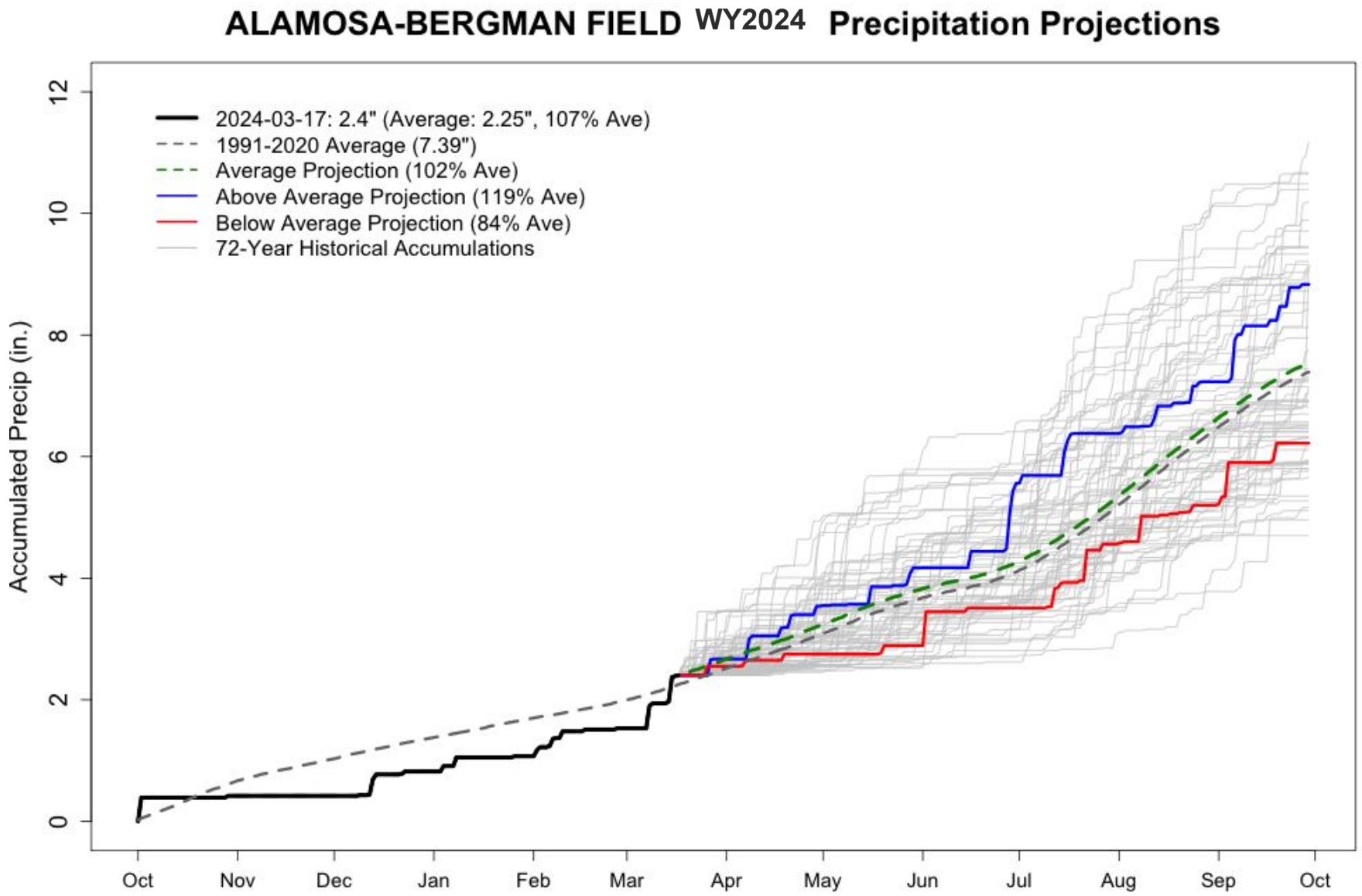
Grand Junction



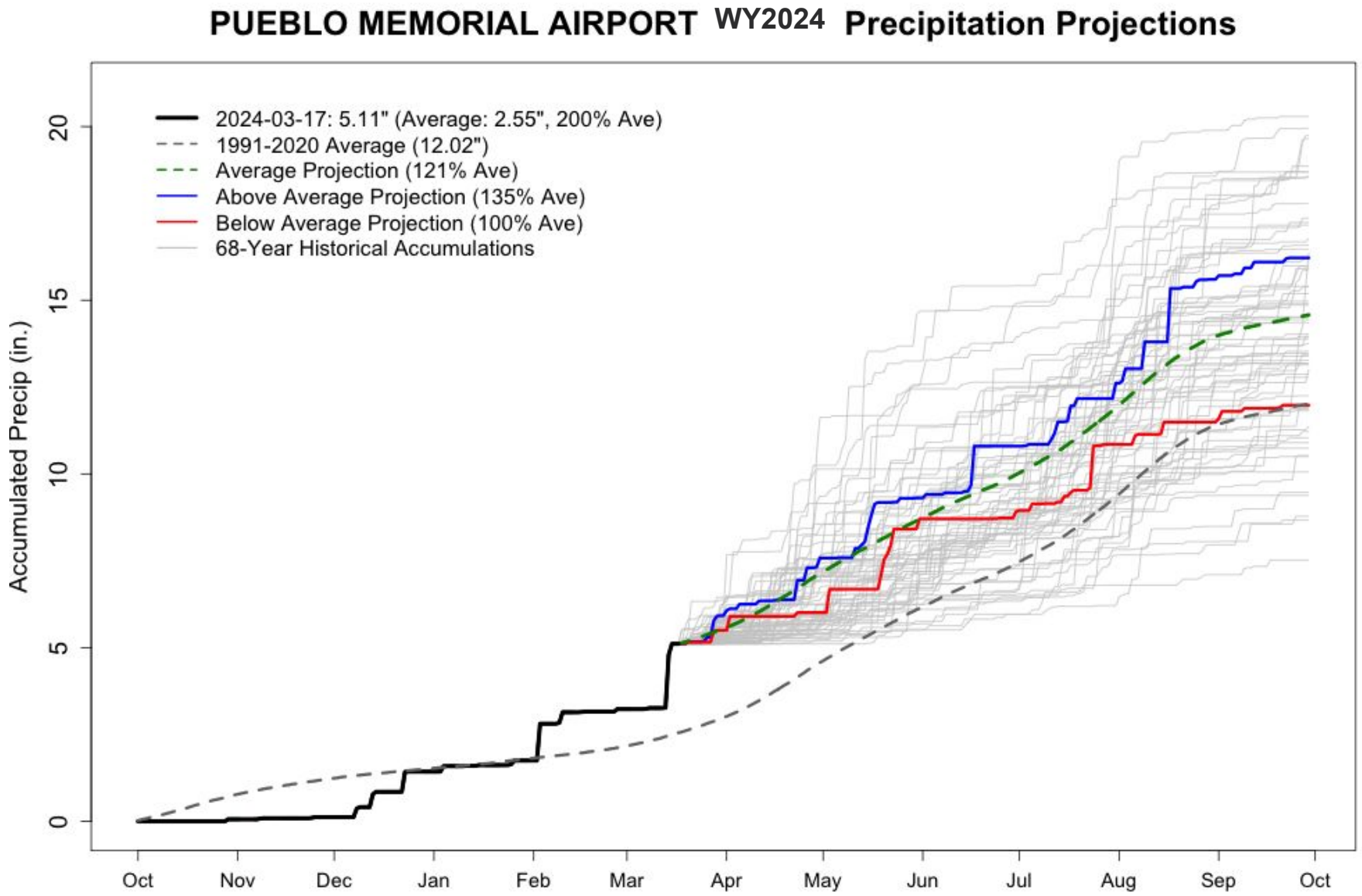
Mesa Verde NP



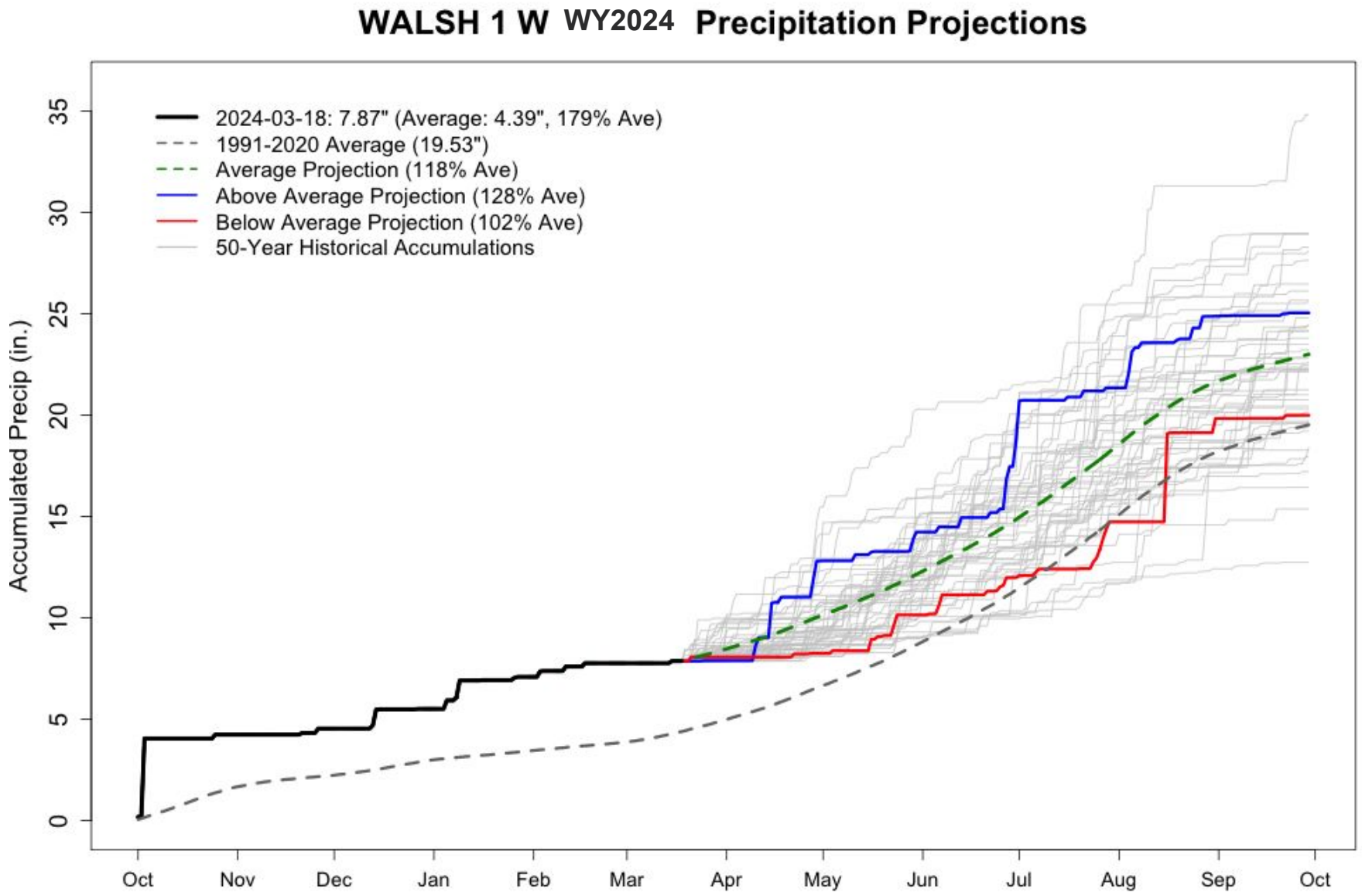
Alamosa


ALAMOSA-BERGMAN FIELD WY2024 Precipitation Projections
2024-03-17: 2.4" (Average: 2.25", 107% Ave)
1991-2020 Average (7.39")
Average Projection (102% Ave)
Above Average Projection (119% Ave)
Below Average Projection (84% Ave)
72-Year Historical Accumulations
Accumulated Precip (in.)
0
2
4
6
8
10
12
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

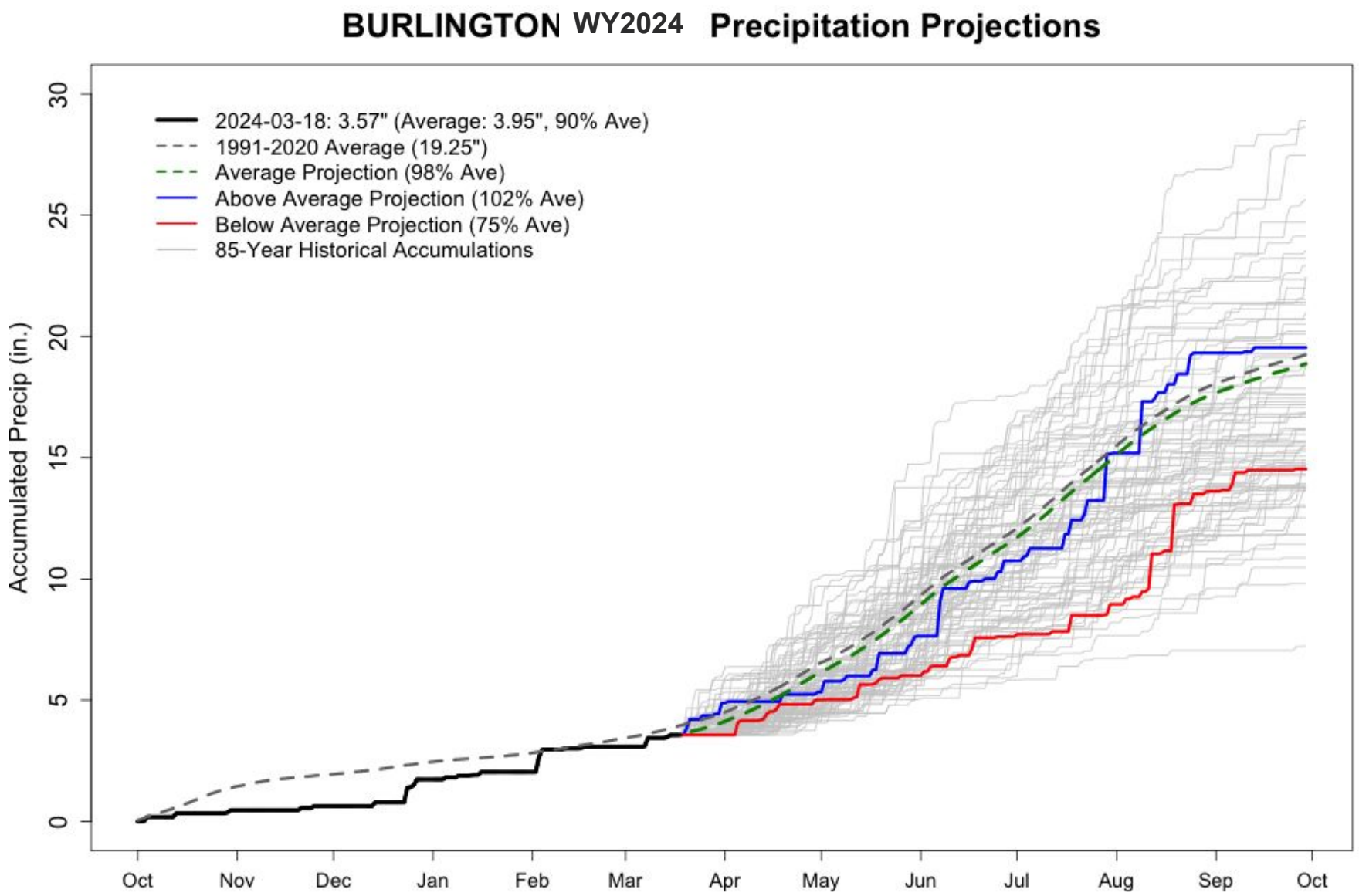
Pueblo


PUEBLO MEMORIAL AIRPORT WY2024 Precipitation Projections
2024-03-17: 5.11" (Average: 2.55", 200% Ave)
1991-2020 Average (12.02")
Average Projection (121% Ave)
Above Average Projection (135% Ave)
Below Average Projection (100% Ave)
68-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

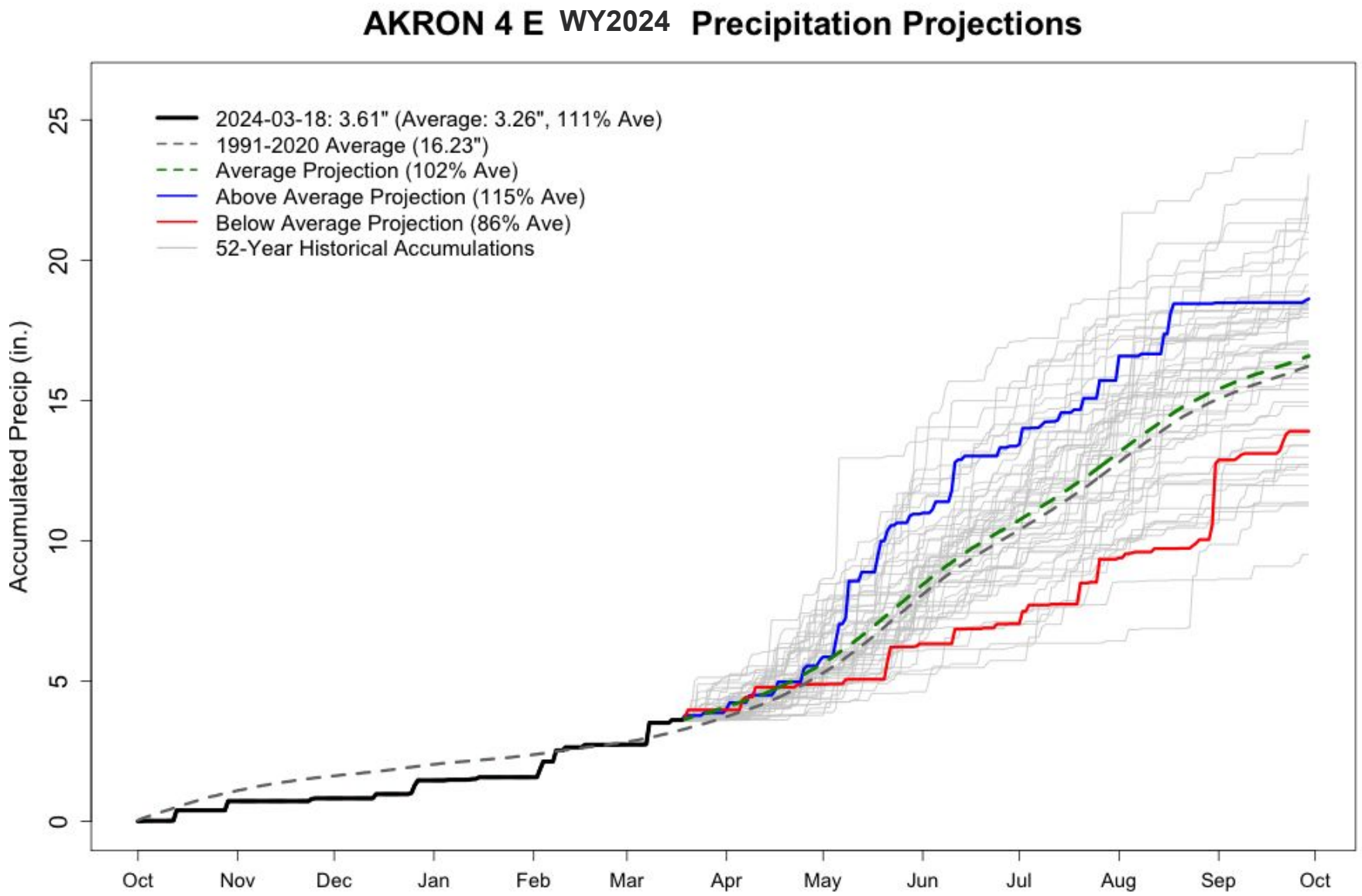
Walsh


WALSH 1 W WY2024 Precipitation Projections
2024-03-18: 7.87" (Average: 4.39", 179% Ave)
1991-2020 Average (19.53")
Average Projection (118% Ave)
Above Average Projection (128% Ave)
Below Average Projection (102% Ave)
50-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

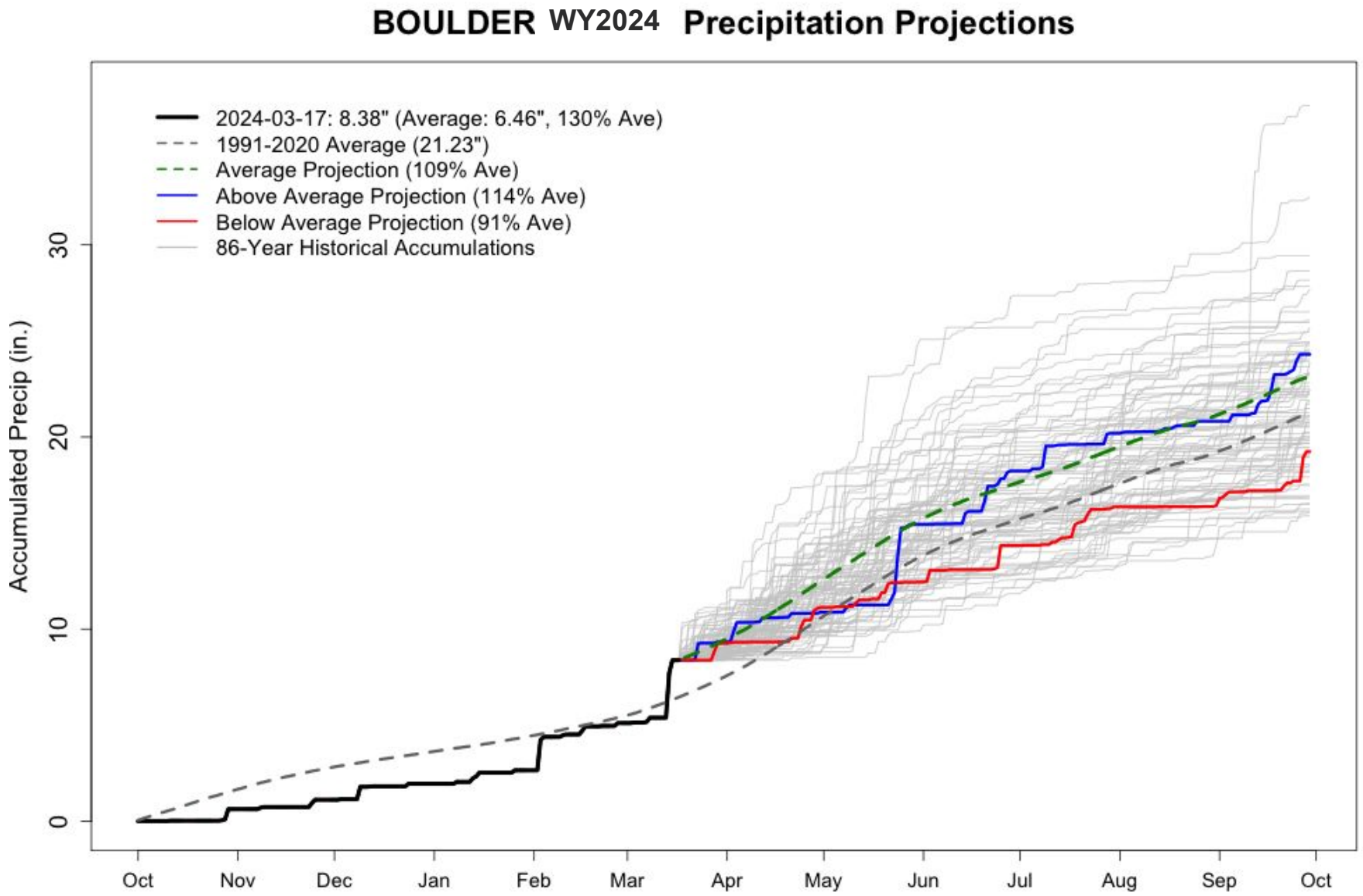
Burlington


BURLINGTON WY2024 Precipitation Projections
2024-03-18: 3.57" (Average: 3.95", 90% Ave)
1991-2020 Average (19.25")
Average Projection (98% Ave)
Above Average Projection (102% Ave)
Below Average Projection (75% 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 WY2024 Precipitation Projections
2024-03-18: 3.61" (Average: 3.26", 111% Ave)
1991-2020 Average (16.23")
Average Projection (102% Ave)
Above Average Projection (115% Ave)
Below Average Projection (86% 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 WY2024 Precipitation Projections
2024-03-17: 8.38" (Average: 6.46", 130% Ave)
1991-2020 Average (21.23")
Average Projection (109% Ave)
Above Average Projection (114% Ave)
Below Average Projection (91% Ave)
86-Year Historical Accumulations
Accumulated Precip (in.)
0
10
20
30
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Drought conditions

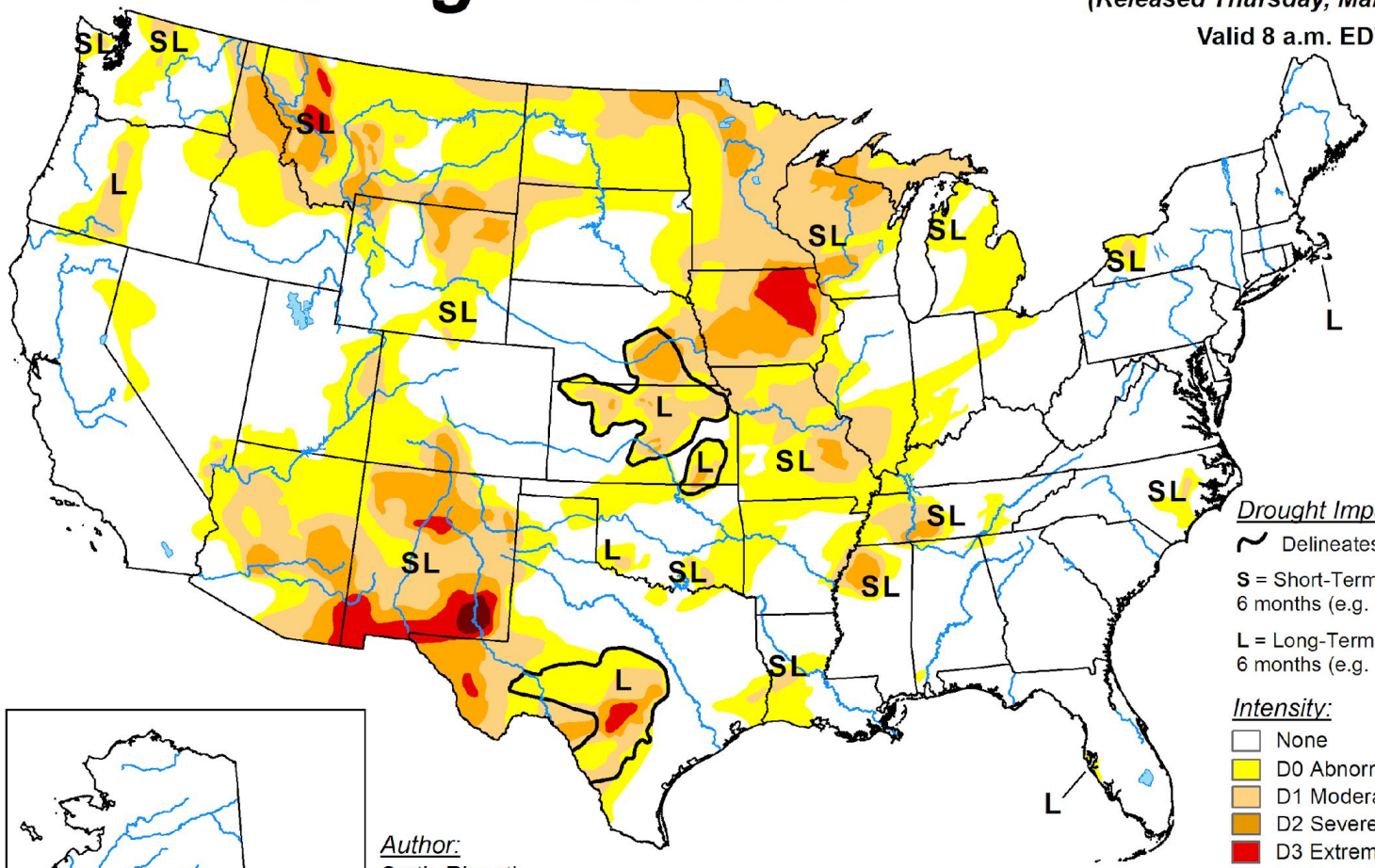
Not drought, just cool clouds
Saturday March 16, looking east from Fraser

U.S. Drought Monitor

March 12, 2024

(Released Thursday, Mar. 14, 2024)

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

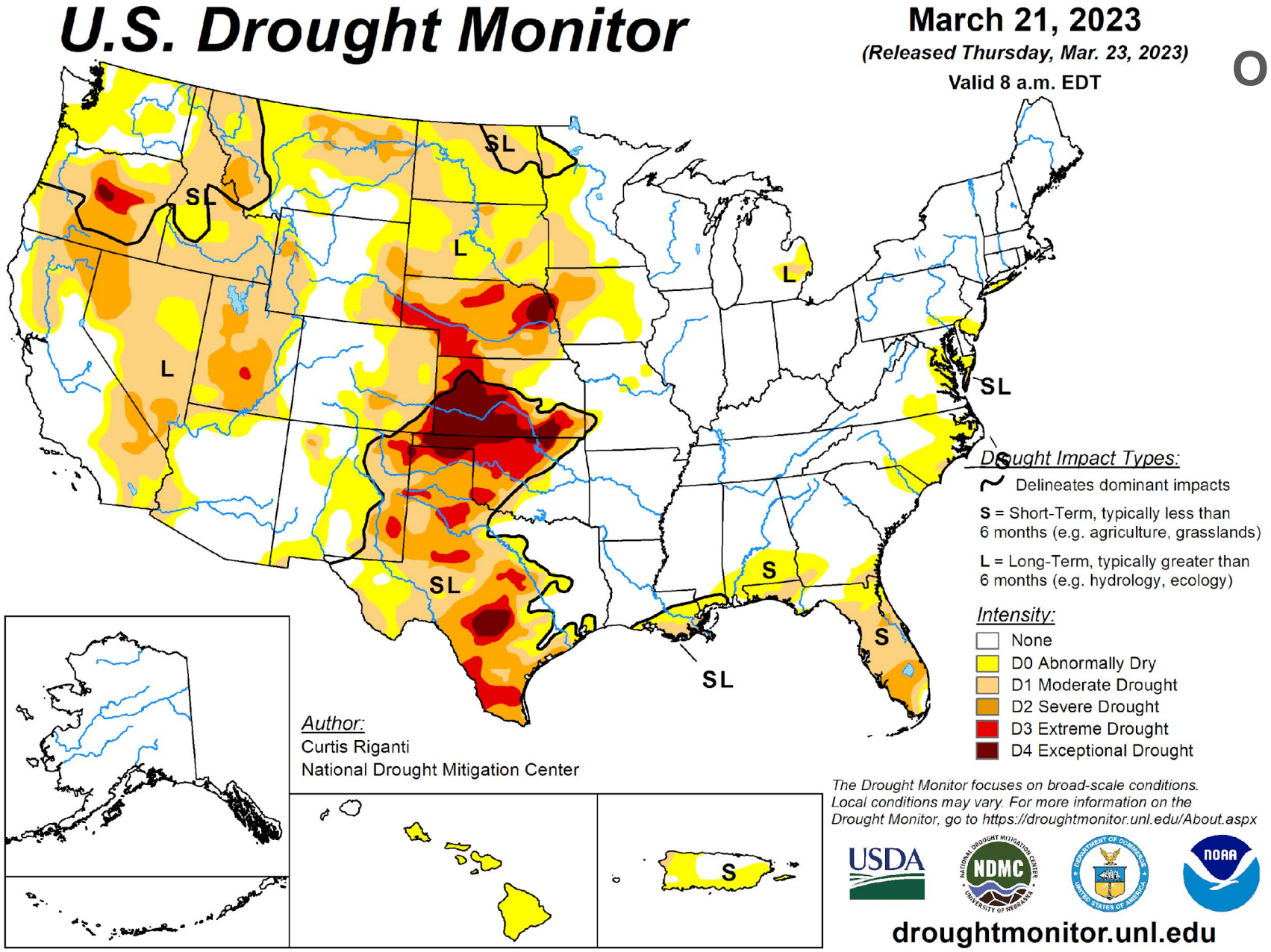
Author:
Curtis Riganti
National Drought Mitigation Center

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

USDA · NDMC · NOAA

droughtmonitor.unl.edu

One year ago


U.S. Drought Monitor
March 21, 2023
(Released Thursday, Mar. 23, 2023)
Valid 8 a.m. EDT
SL
L
S
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
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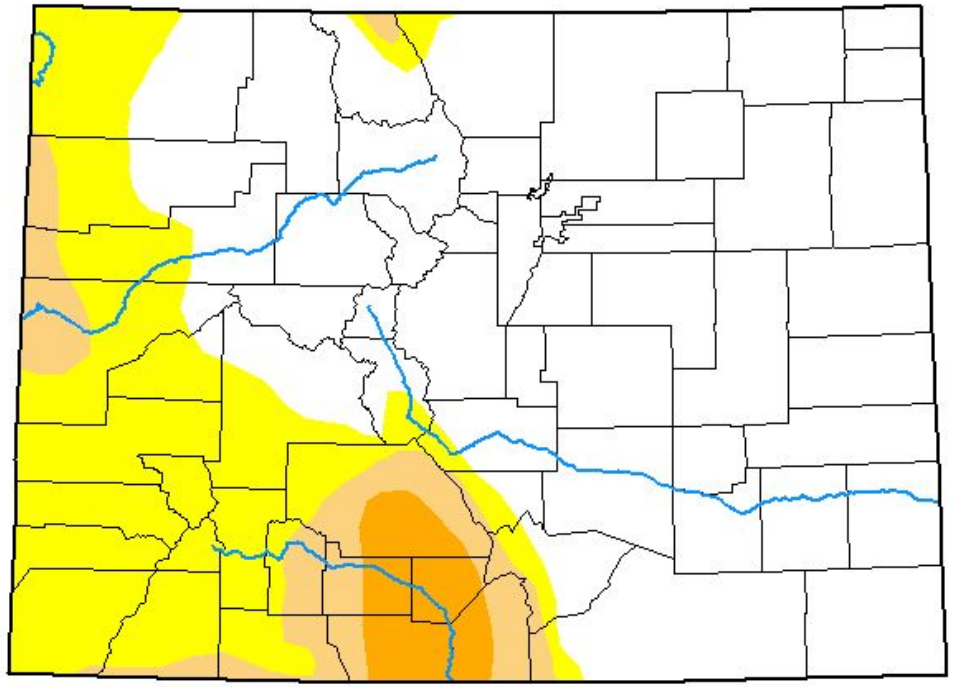
USDA
NDMC
NOAA
droughtmonitor.unl.edu

U.S. Drought Monitor
Colorado



March 12, 2024
(Released Thursday, Mar. 14, 2024)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	67.34	32.66	10.03	3.39	0.00	0.00
Last Week *03-05-2024*	67.05	32.95	10.03	3.39	0.00	0.00
3 Months Ago *12-12-2023*	36.08	63.92	25.86	8.85	2.05	0.00
Start of Calendar Year *01-02-2024*	34.65	65.35	29.59	8.85	2.05	0.00
Start of Water Year *09-26-2023*	65.71	34.29	17.43	2.77	0.00	0.00
One Year Ago *03-14-2023*	46.03	53.97	36.48	9.05	2.00	0.16

Intensity:

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

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

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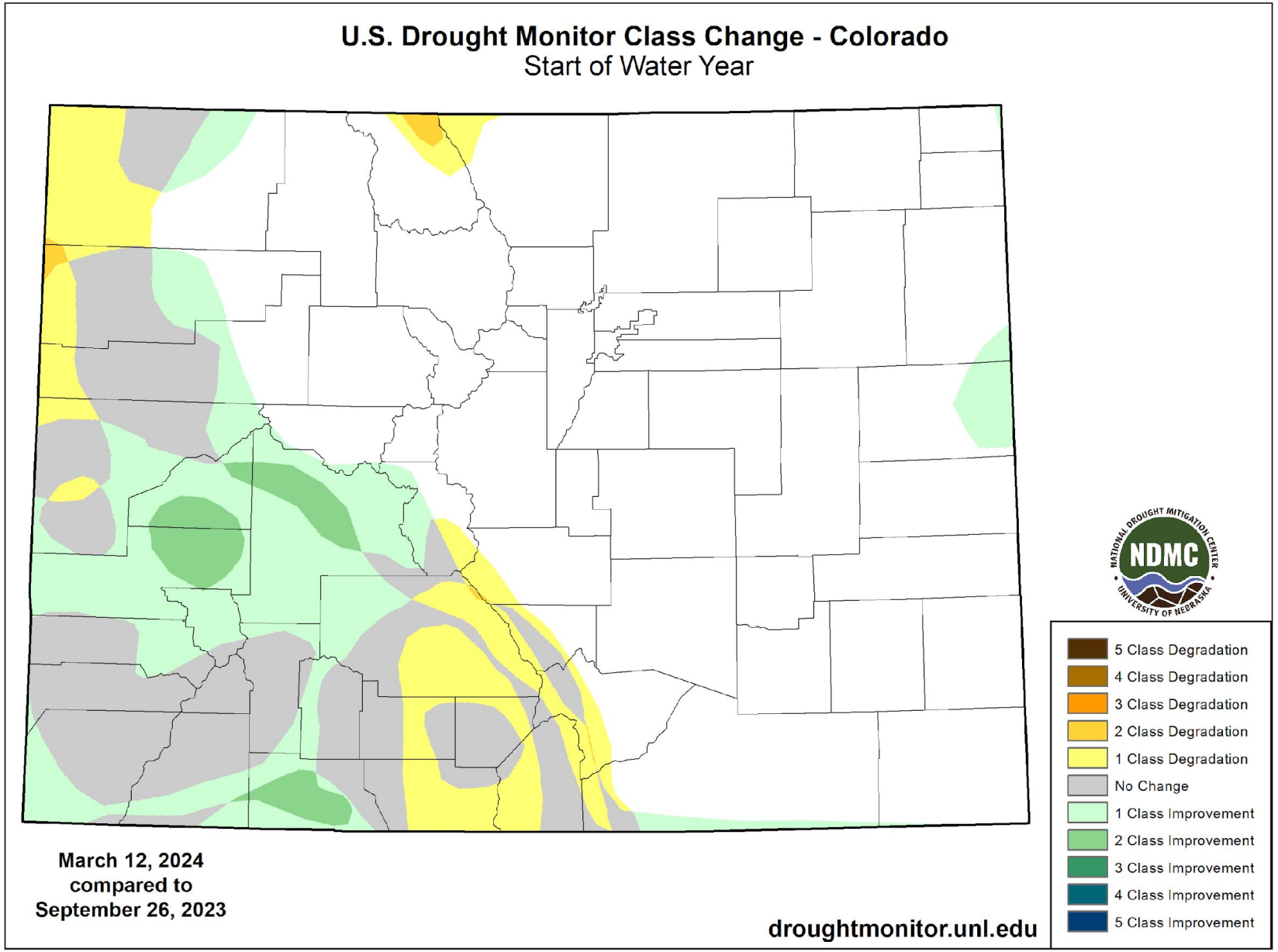
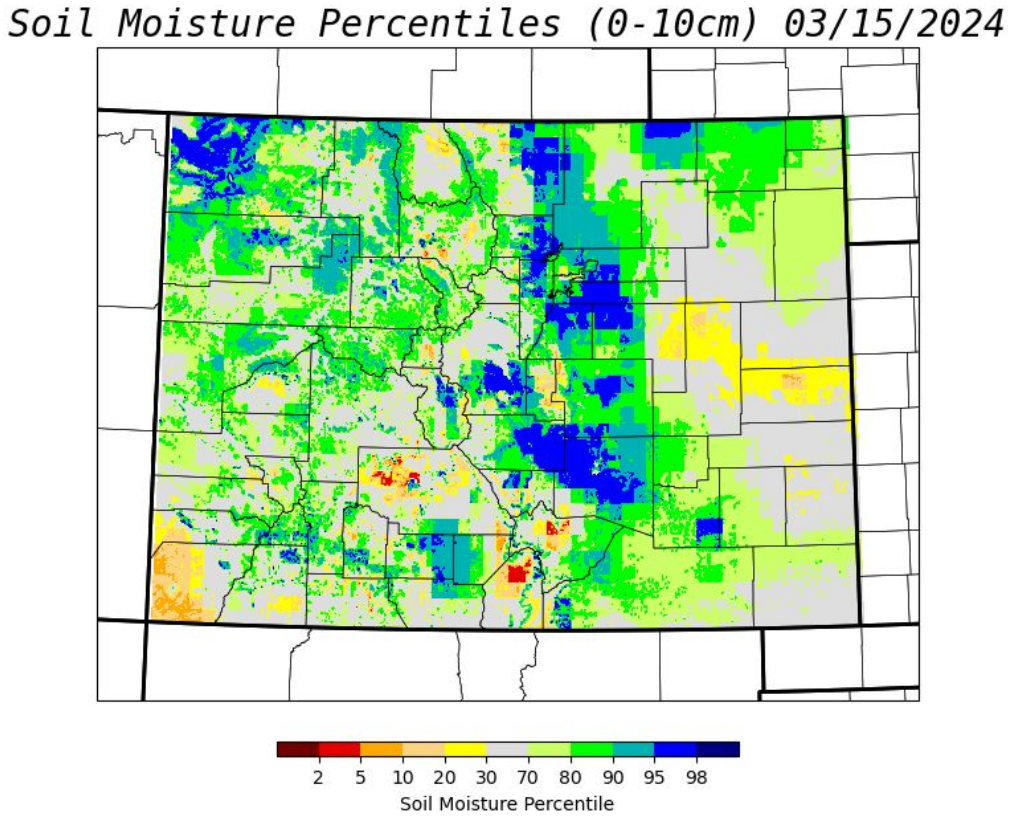
Curtis Riganti
National Drought Mitigation Center

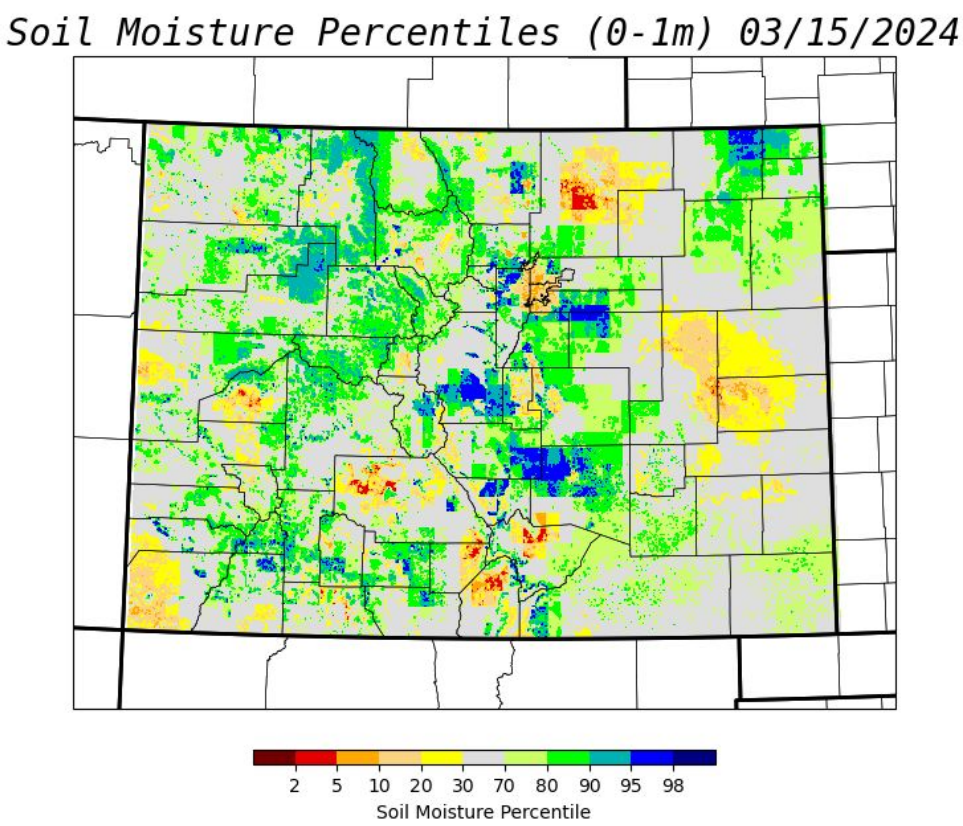
droughtmonitor.unl.edu

Note: does not yet include last week's storm

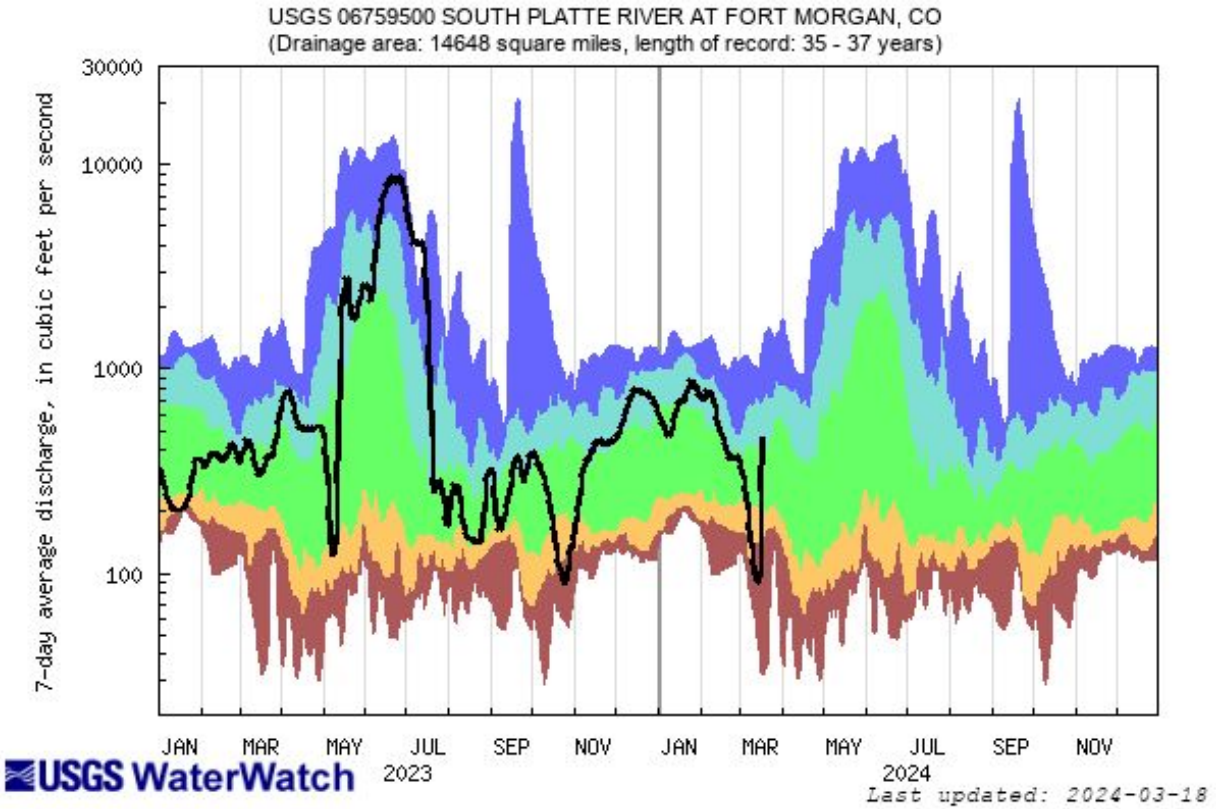
Change since start of water year

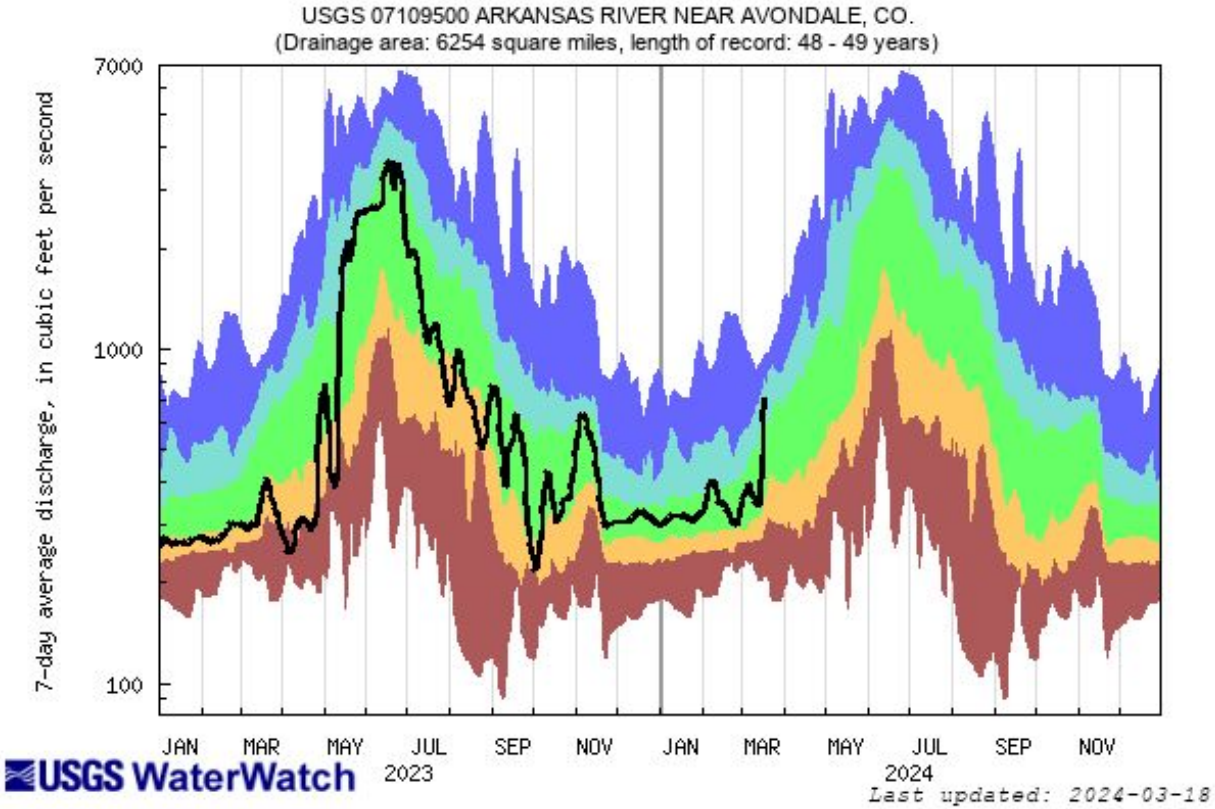


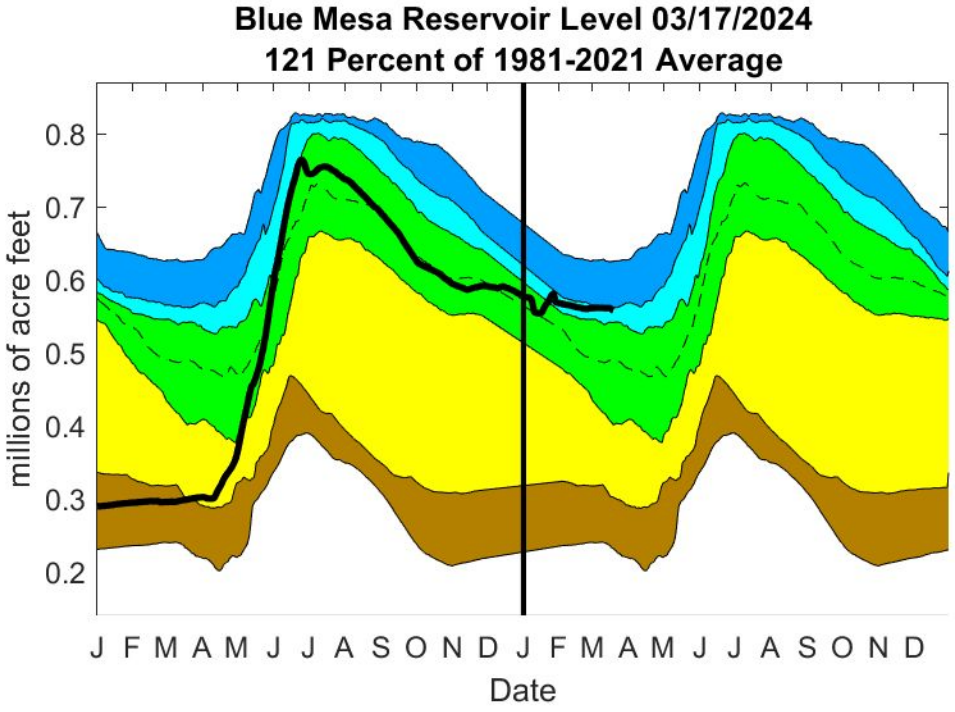


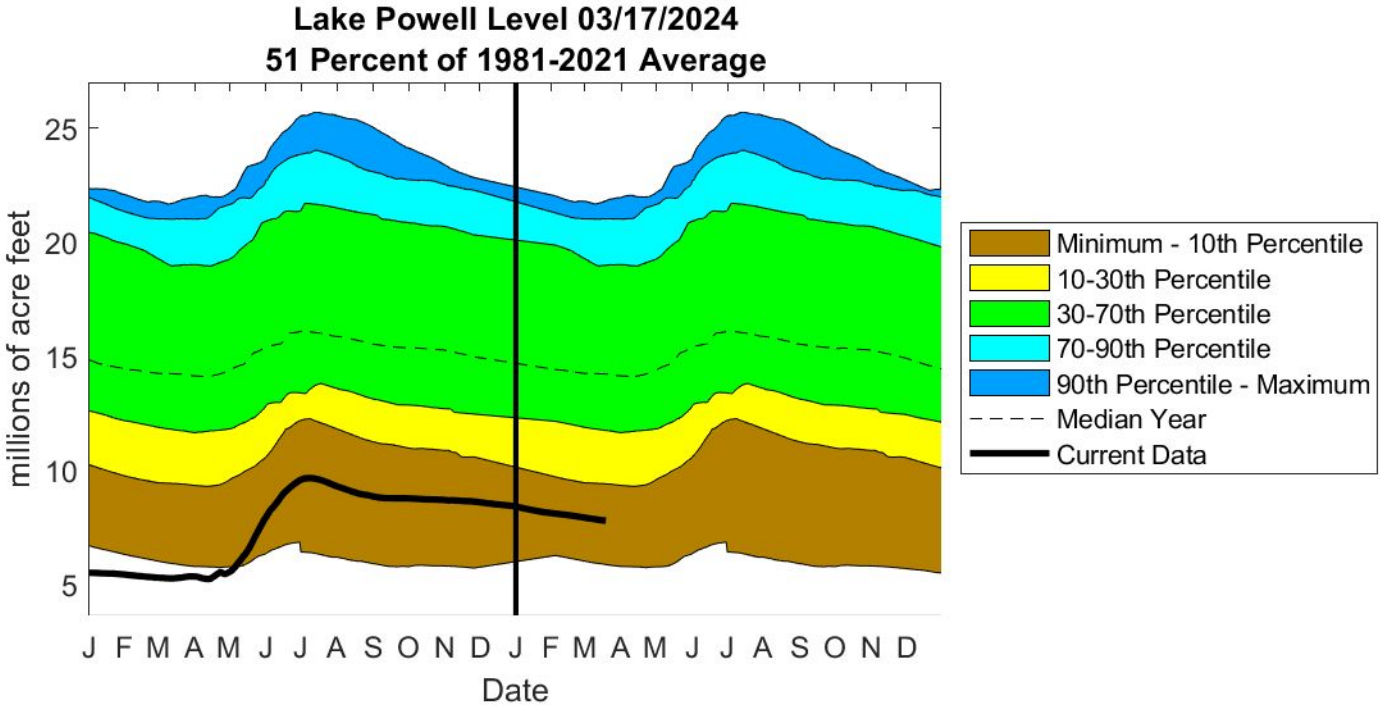


Shallow soil moisture is high in most areas reflecting the recent storm. There are a few areas where deep soil moisture is low, but nothing especially concerning (we are also still getting calibrated to using this new data source.)


USGS 06759500 SOUTH PLATTE RIVER AT FORT MORGAN, CO
(Drainage area: 14648 square miles, length of record: 35 - 37 years)
7-day average discharge, in cubic feet per second
30000
10000
1000
100
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
2023
2024
USGS WaterWatch
Last updated: 2024-03-18


USGS 07109500 ARKANSAS RIVER NEAR AVONDALE, CO.
(Drainage area: 6254 square miles, length of record: 48 - 49 years)
7-day average discharge, in cubic feet per second
7000
1000
100
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
2023
2024
USGS WaterWatch
Last updated: 2024-03-18





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

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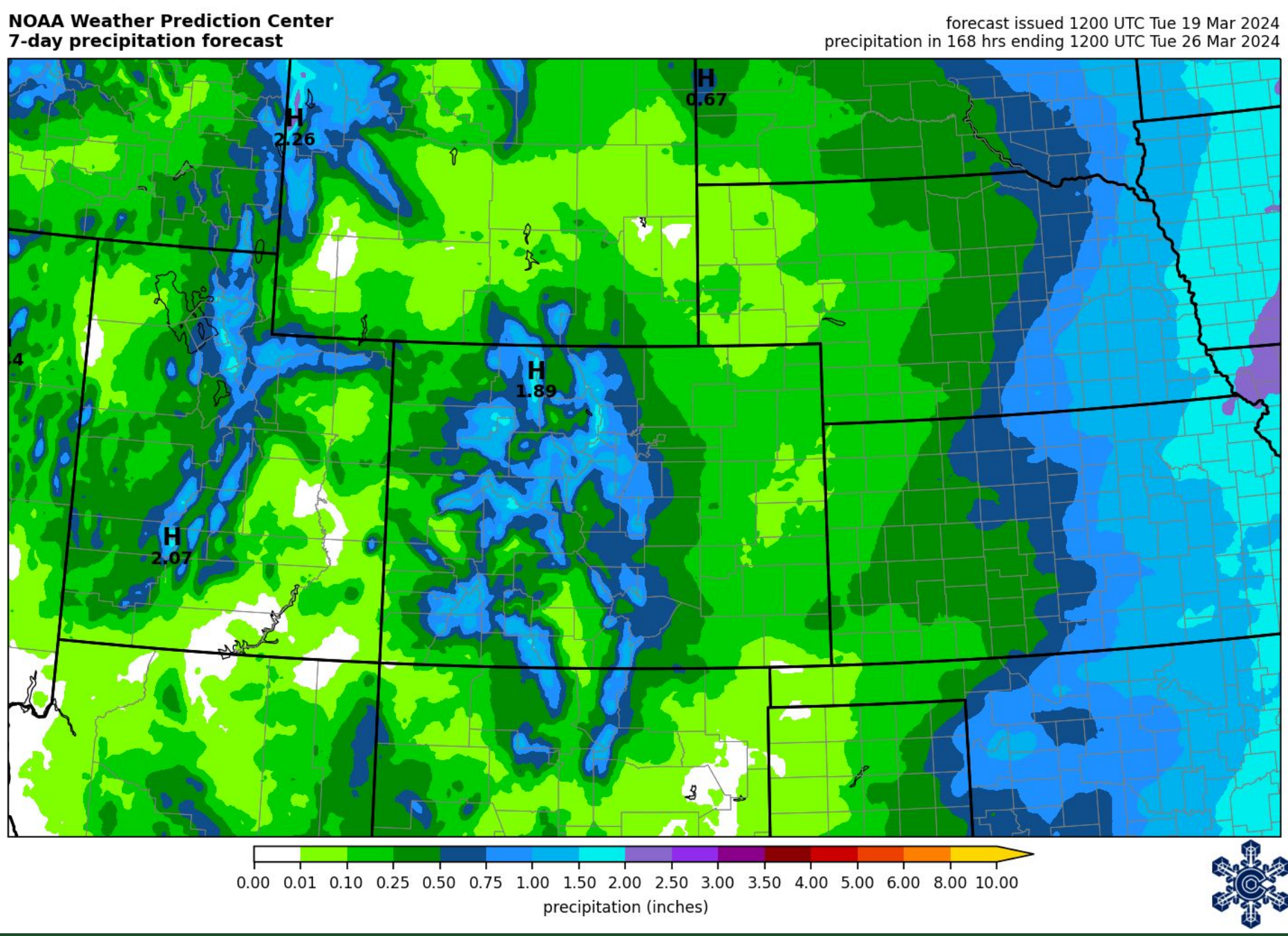
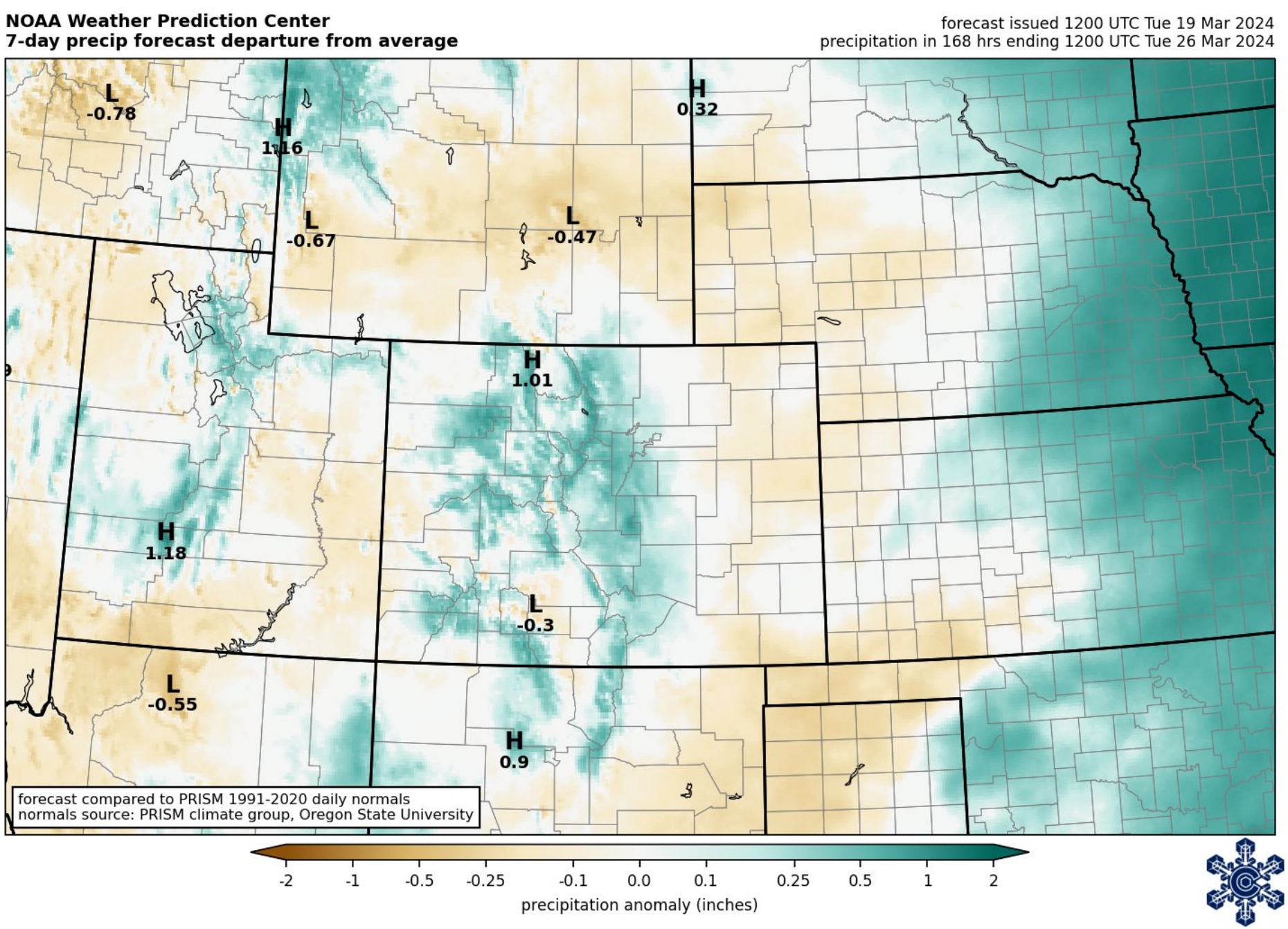
Outlook

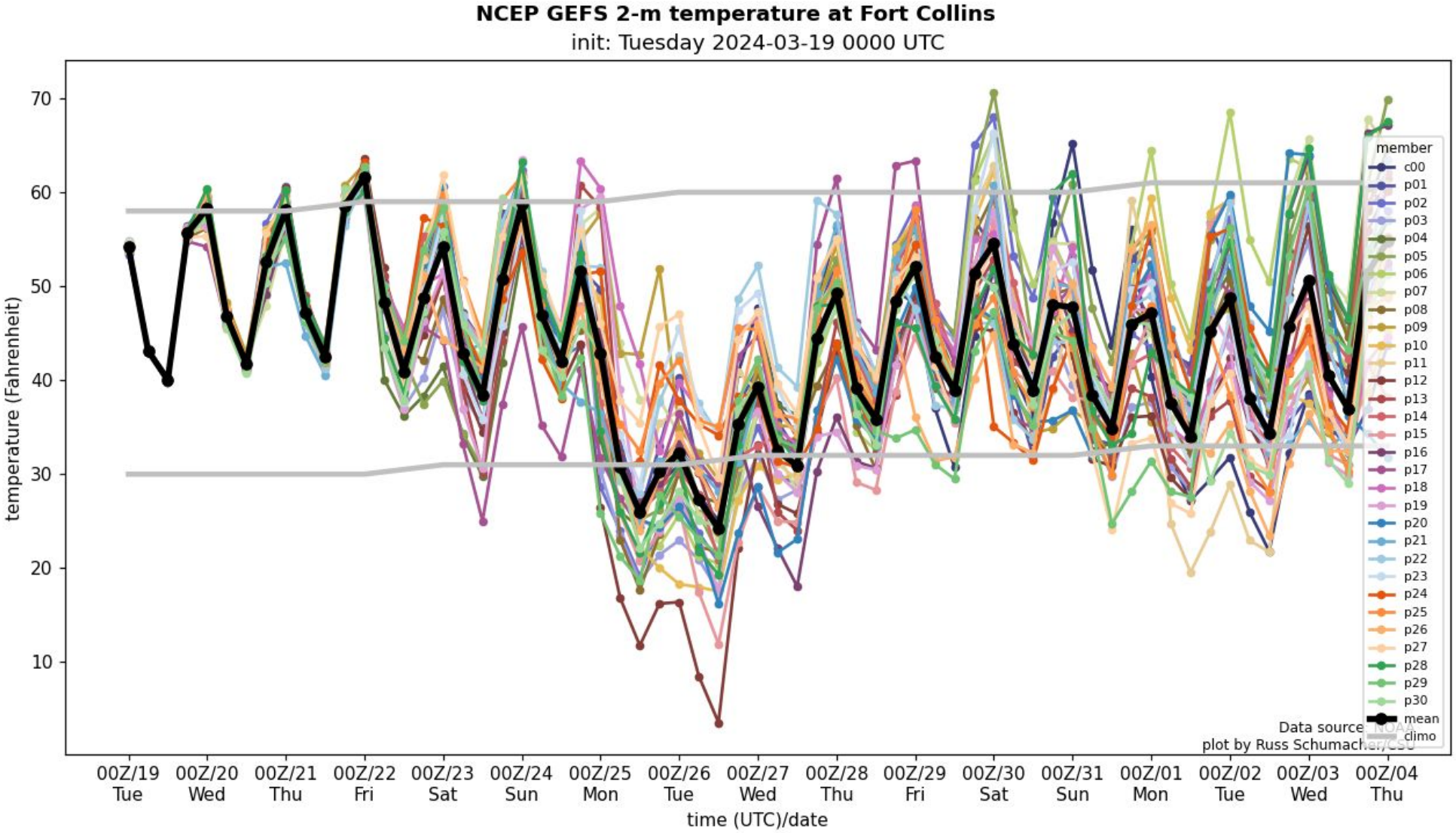
NOAA 7-day precipitation forecast



NOAA 7-day precipitation forecast (difference from average)



Warm for the rest of the week; next storm arrives Sunday/Monday. Doesn't look as big as the last one



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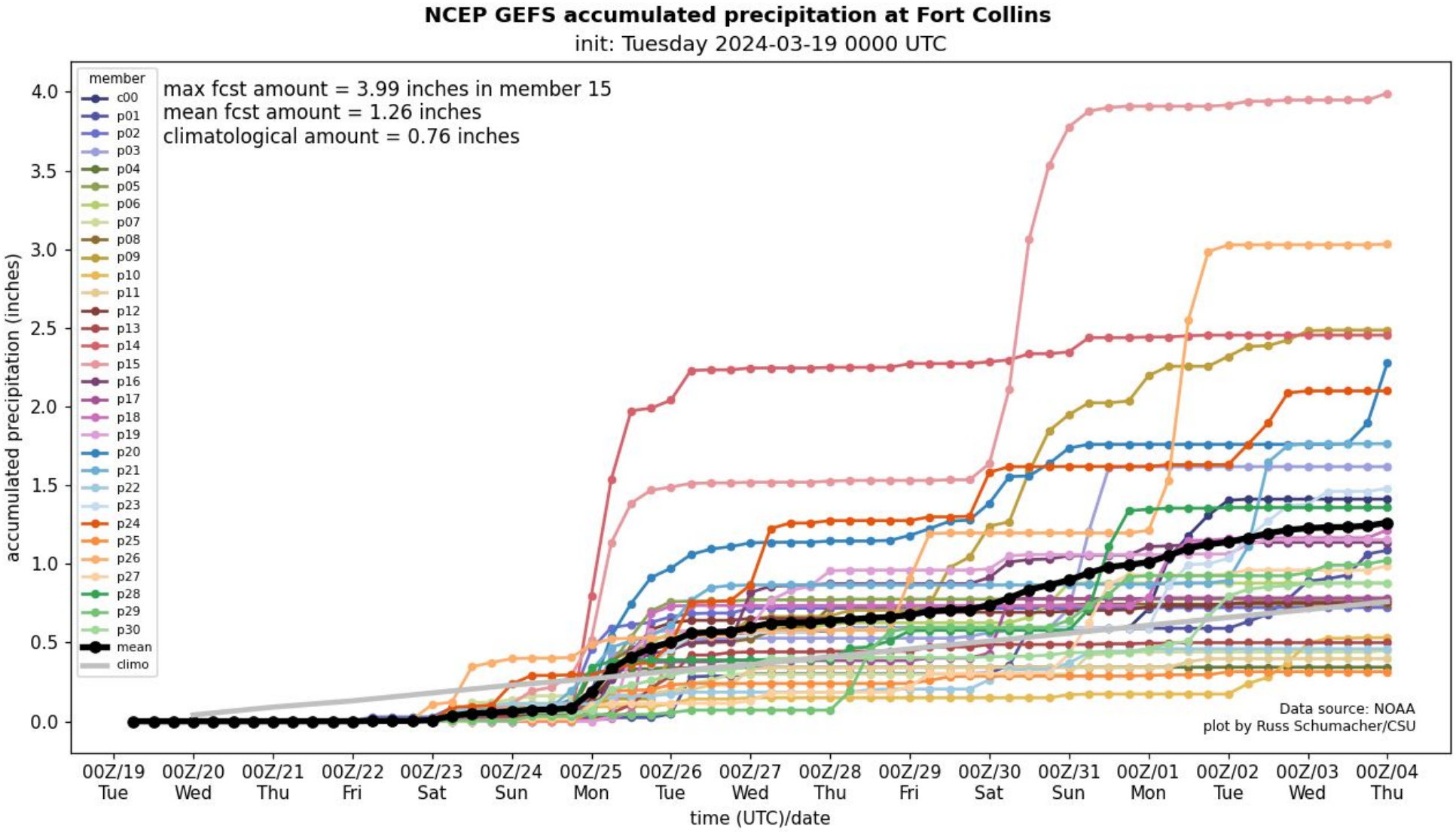
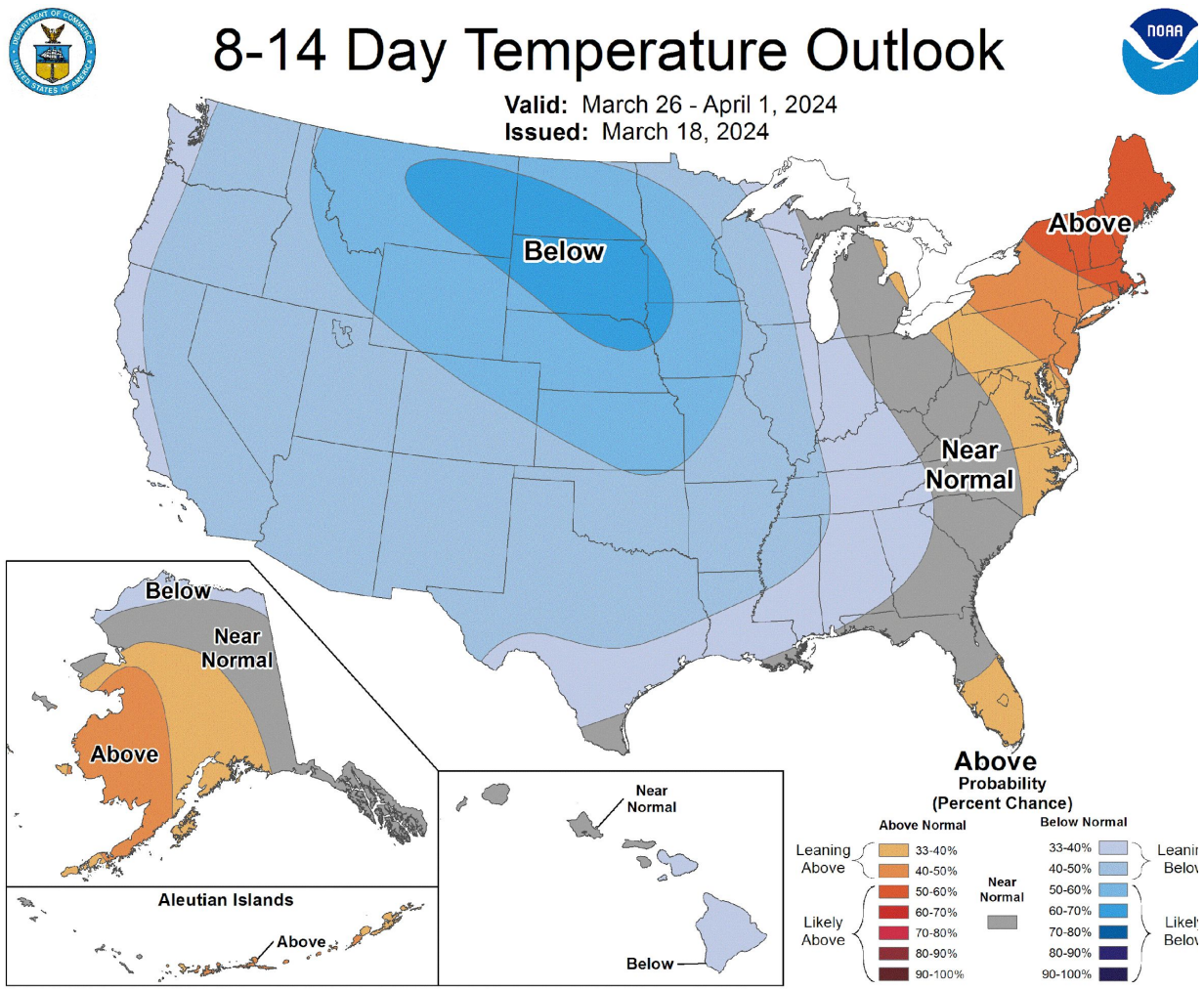
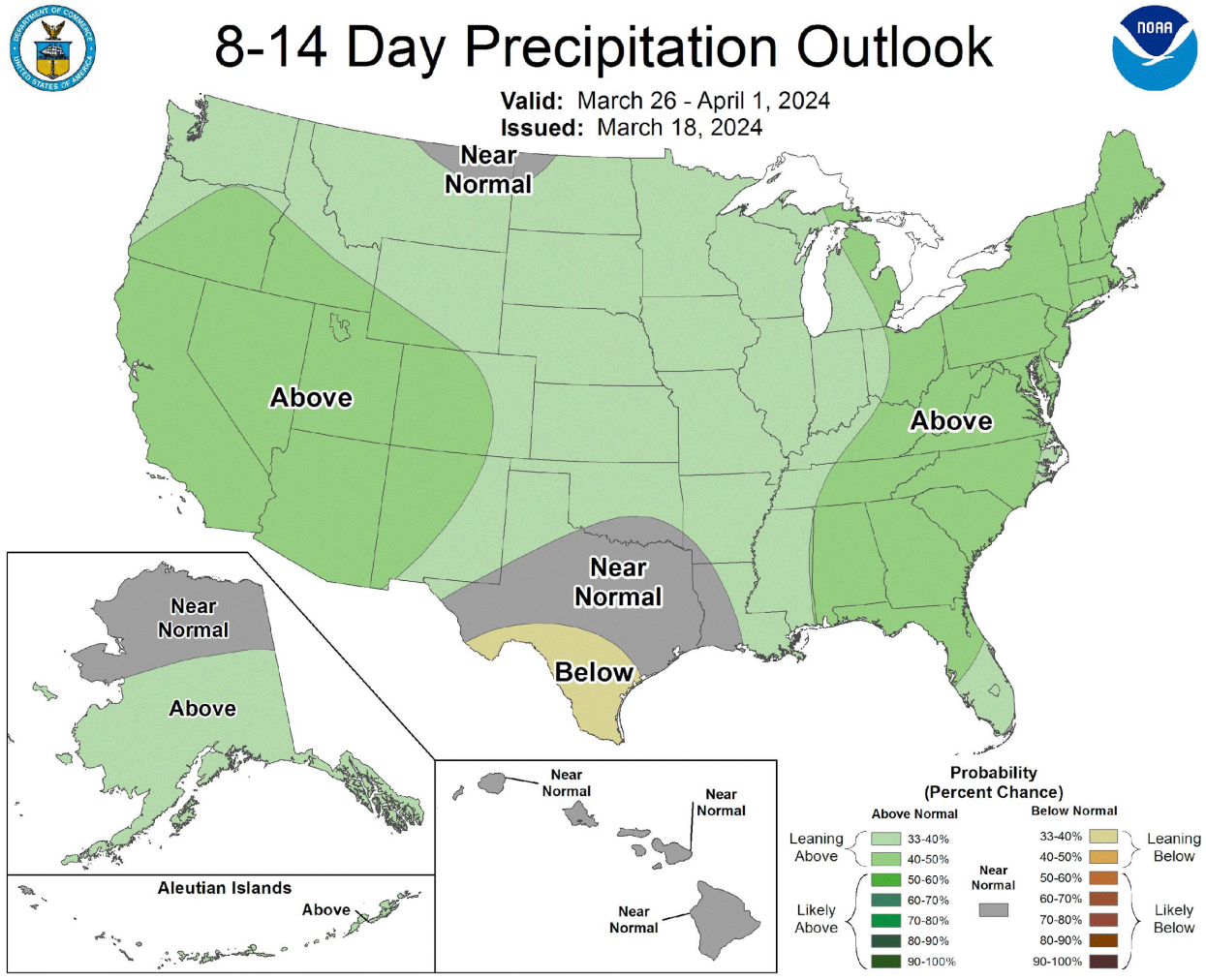


The March 26-April 1 period leans cooler and wetter than normal





El Niño still in place, but rapid transition expected to La Niña

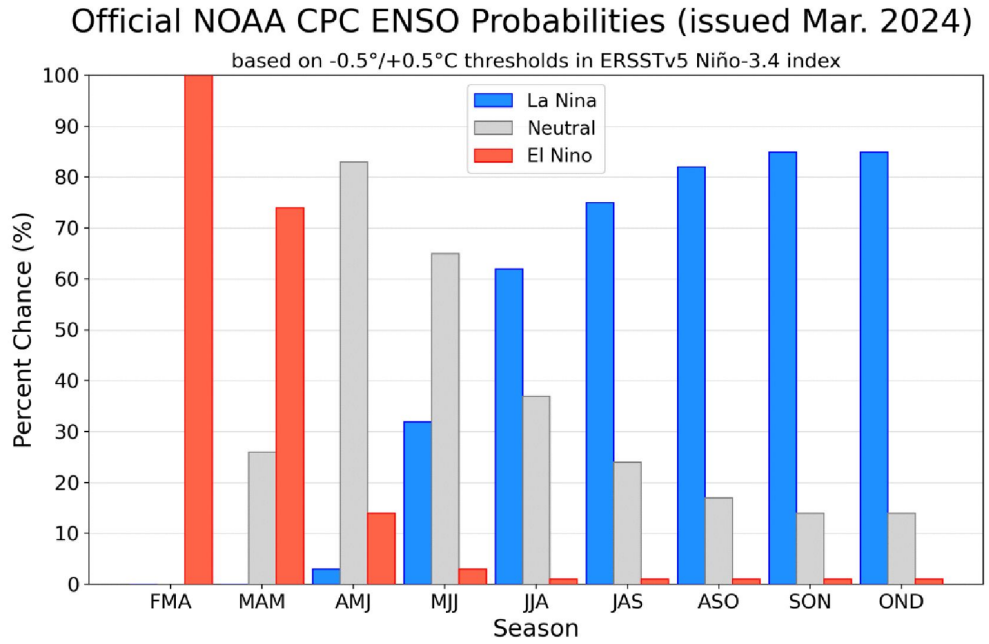


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N-5°S, 120°W-170°W). Figure updated 14 March 2024.

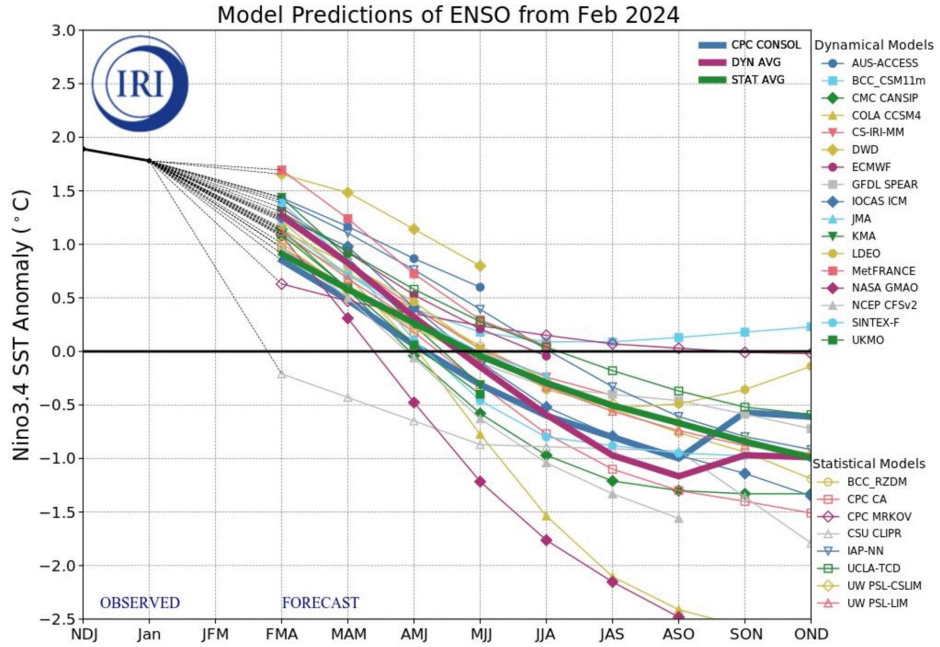
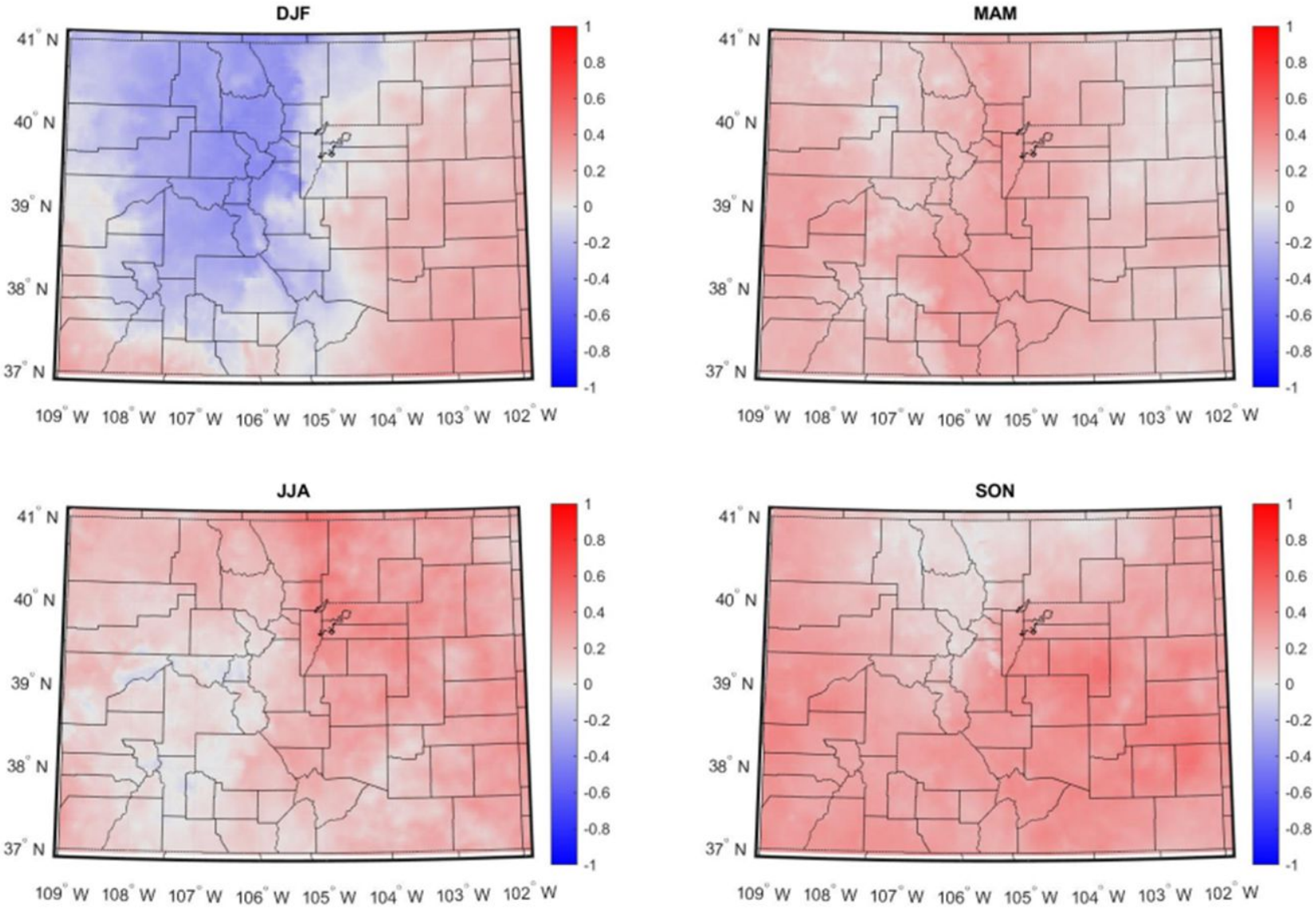


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 19 February 2024 by the International Research Institute (IRI) for Climate and Society.

"A transition from El Niño to ENSO-neutral is likely by April-June 2024 (83% chance), with the odds of La Niña developing by June-August 2024 (62% chance)." https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

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



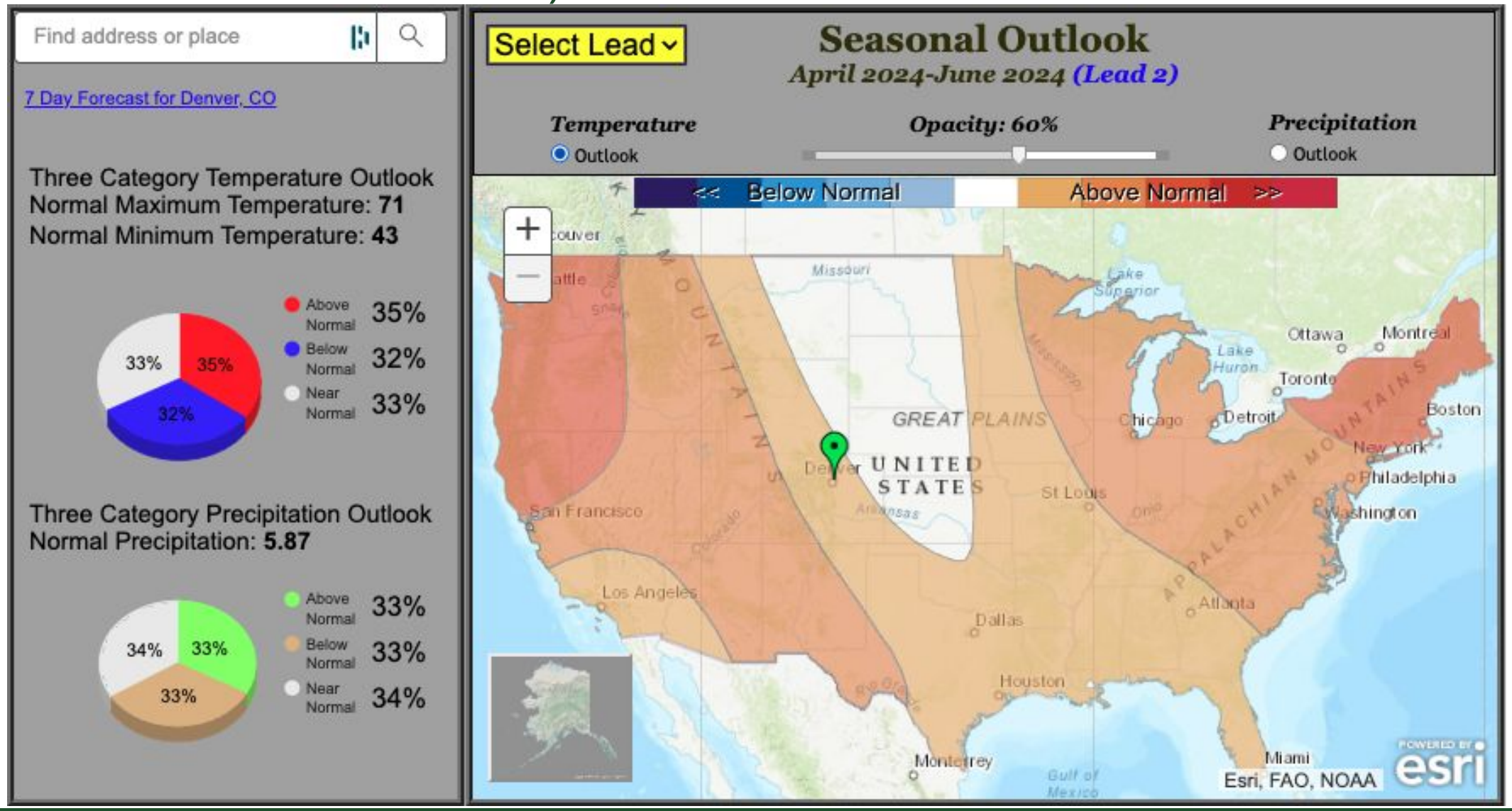
Blue = La Niña wetter Red = El Niño wetter

Other years with rapid shift from El Nino to La Nina

- 1998: slightly wet summer
- 1973: near-average summer
- 2016: dry summer
- 2010: near-average summer
- 1983: near-average summer

…not a ton of signal in these analogs

April-May-June outlook (note: these are nearly a month old; watch for new outlooks on Thurs.)



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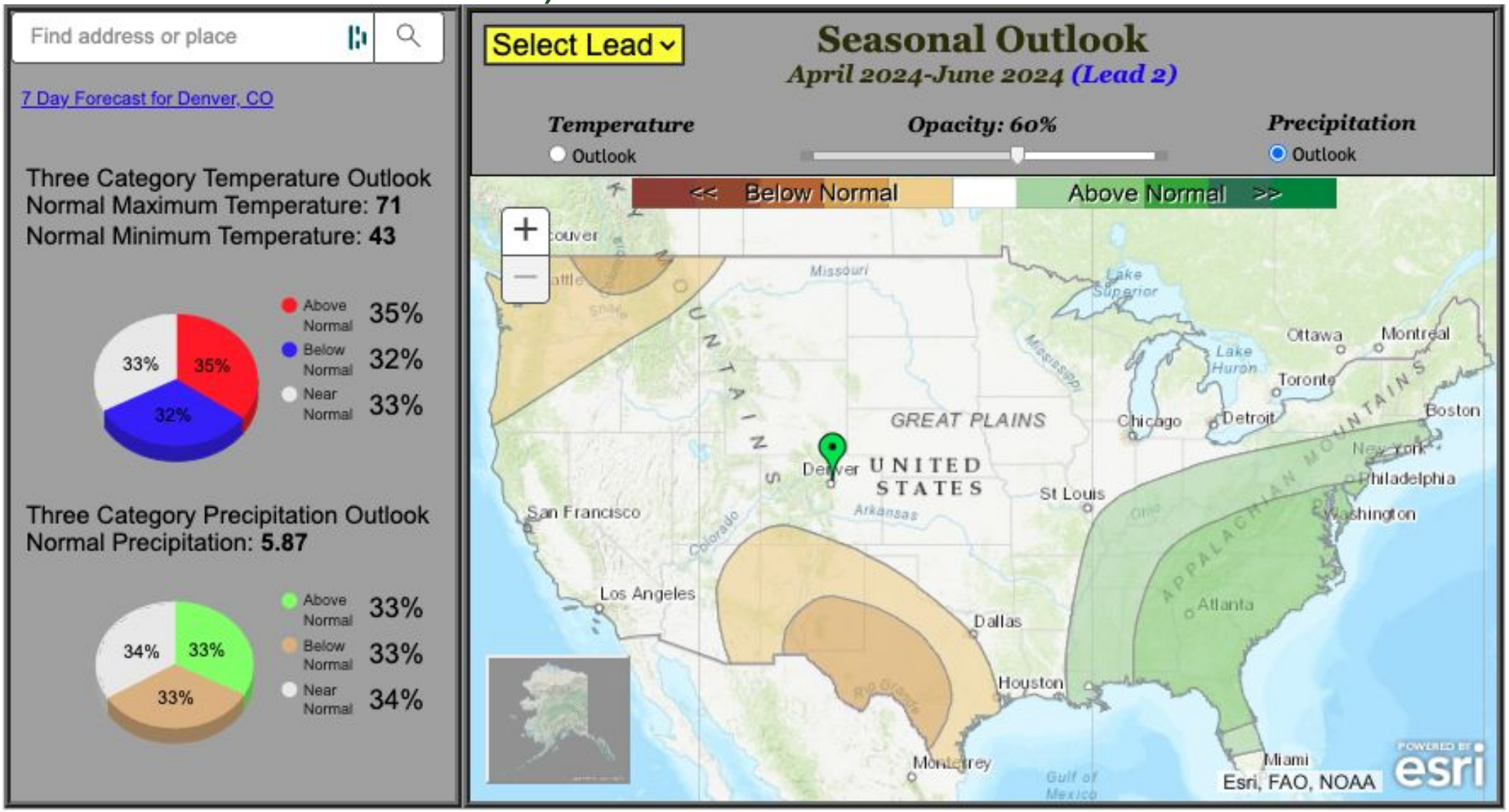

Takeaways

- Water Year 2024 so far has been very warm across Colorado (6th warmest start to the WY)
- In terms of precipitation, southwestern CO has been a bit dry for the water year to date but most of the rest of the state has been in the near-normal range
- The “Pi Day 2024” storm last week brought major precipitation to the Front Range, and also improved snowpack in the southwestern part of the state
- El Niño is still here but not for much longer – La Niña expected to return by summer or fall
- What does that mean for summer and beyond? Probably not good news, but pretty uncertain at this point

Thank you!

COLORADO CLIMATE CENTER

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