

Colorado Climate Center – *WATF Climate Update*

Russ Schumacher, state climatologist

Water Availability Task Force

May 19, 2022



ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Water year 2022 to date:

temperature, precipitation,
evaporative demand



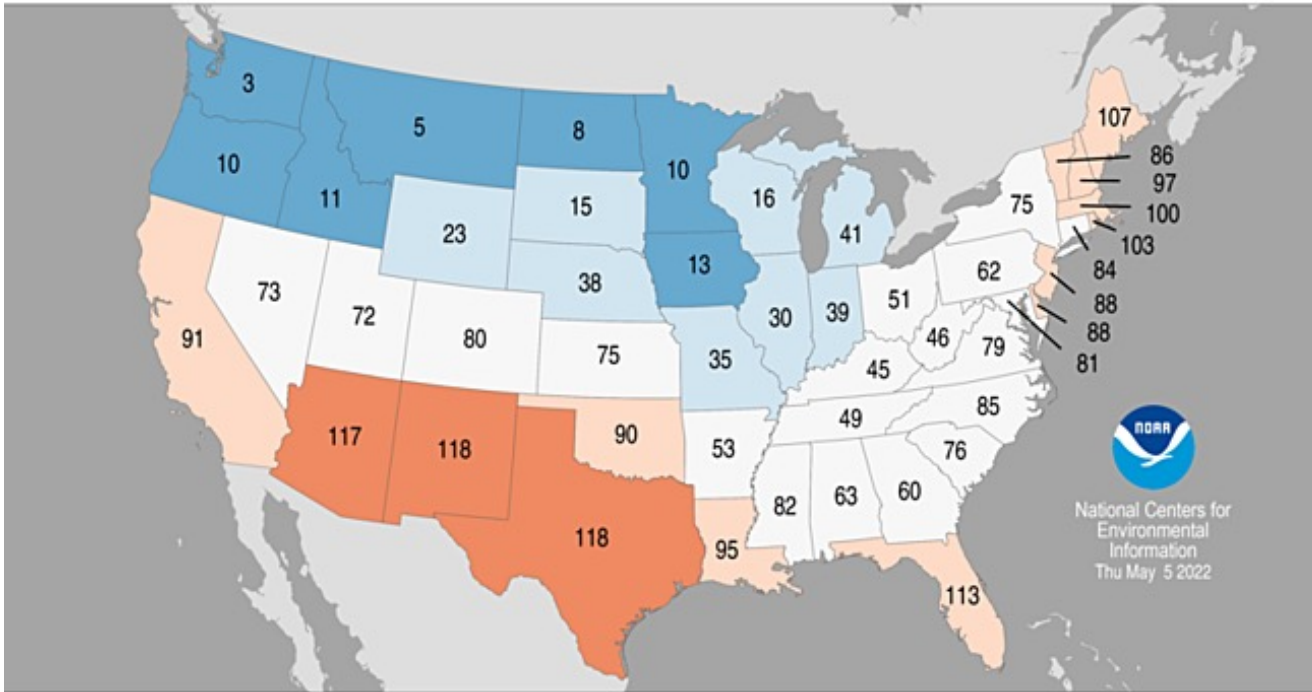
From CODOS update, May 8 near Ophir Pass
<http://www.codos.org/codosupdates/may102022>

Photo credit: Omar Behery



Statewide Average Temperature Ranks

April 2022
Period: 1895–2022



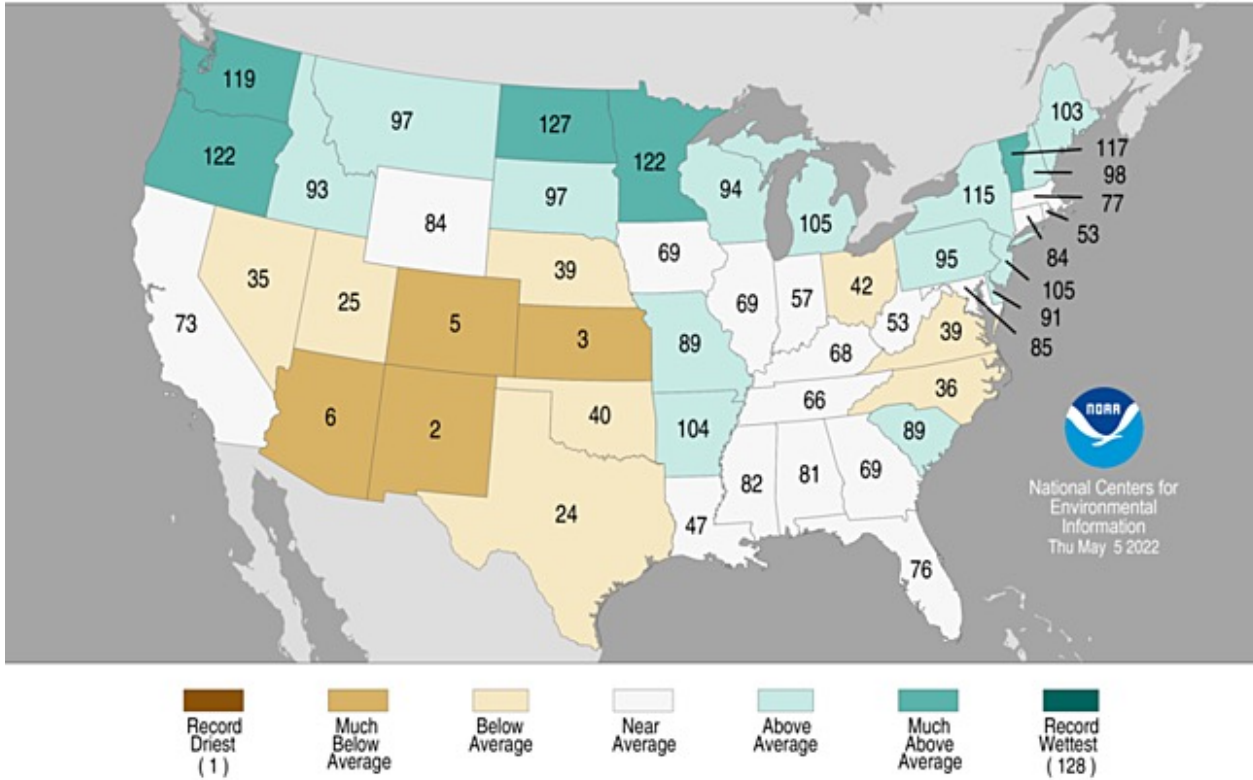
Statewide: tied for 13th warmest October-April
2.6°F above 20th century average
1.0°F above 1991-2020 average

Month	T Rank (of 127 years)	Above, below, or near avg?
Oct	41 st warmest	above
Nov	3 rd warmest	much above
Dec	2 nd warmest	much above
Jan	39 th warmest	above
Feb	30 th coolest	below
Mar	54 th warmest	near avg
Apr	49 th warmest	near avg



Statewide Precipitation Ranks

April 2022
Period: 1895–2022



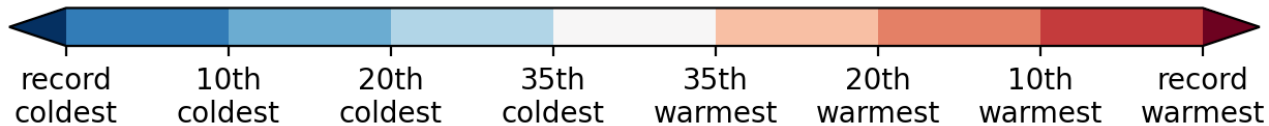
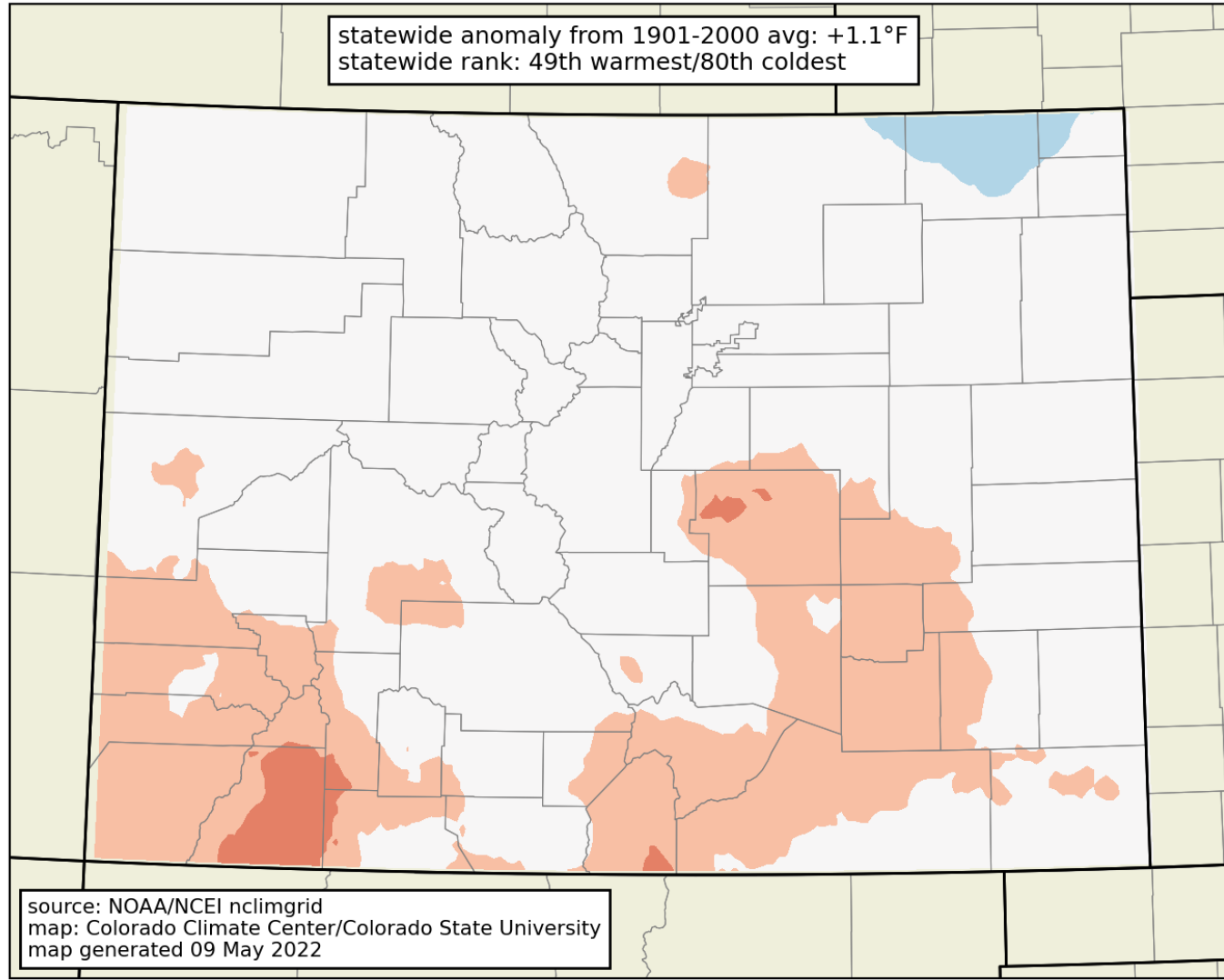
Month	P Rank (of 127 years)	Above, below, or near avg?
Oct	62 nd driest	near avg
Nov	10 th driest	much below
Dec	14 th wettest	above
Jan	39 th driest	below
Feb	52 nd driest	near avg
Mar	67 th driest	near avg
Apr	5 th driest	much below

Statewide: 39th driest October-April
0.98" below 20th century average



average temperature rank: April 2022

**Statewide: 49th
warmest April**



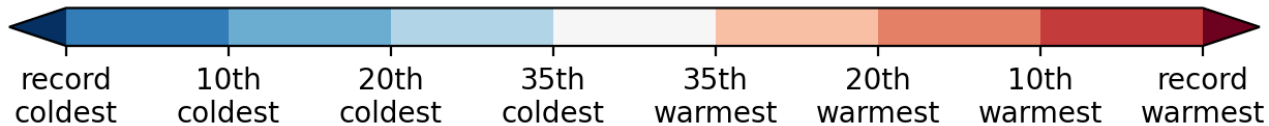
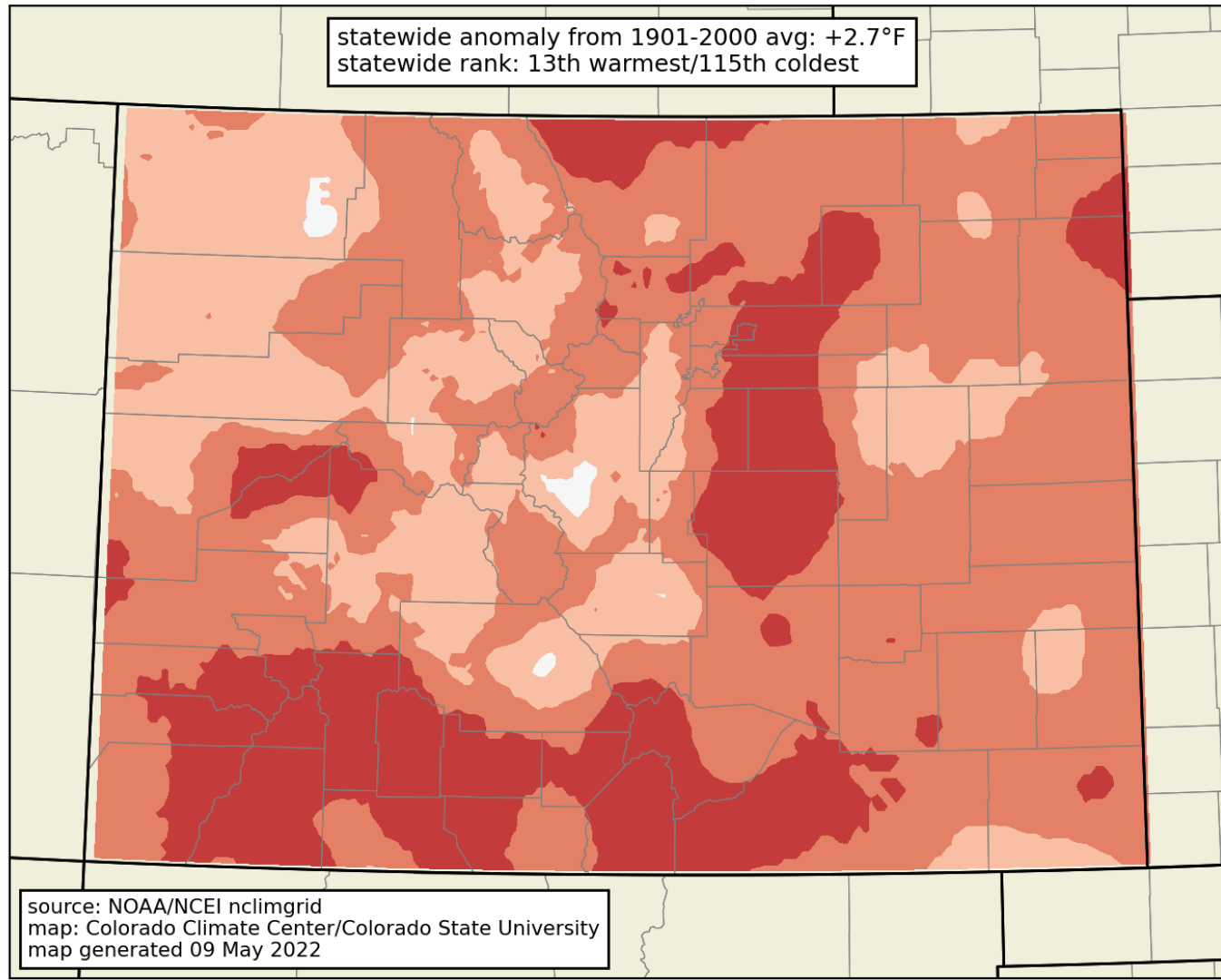
temperature rank out of 128 years (1895-2022)

[http://climate.colostate.edu/
co_cag/rank_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



average temperature rank: 7 months ending April 2022 (Oct-Apr)

Statewide: 13th
warmest October-
April

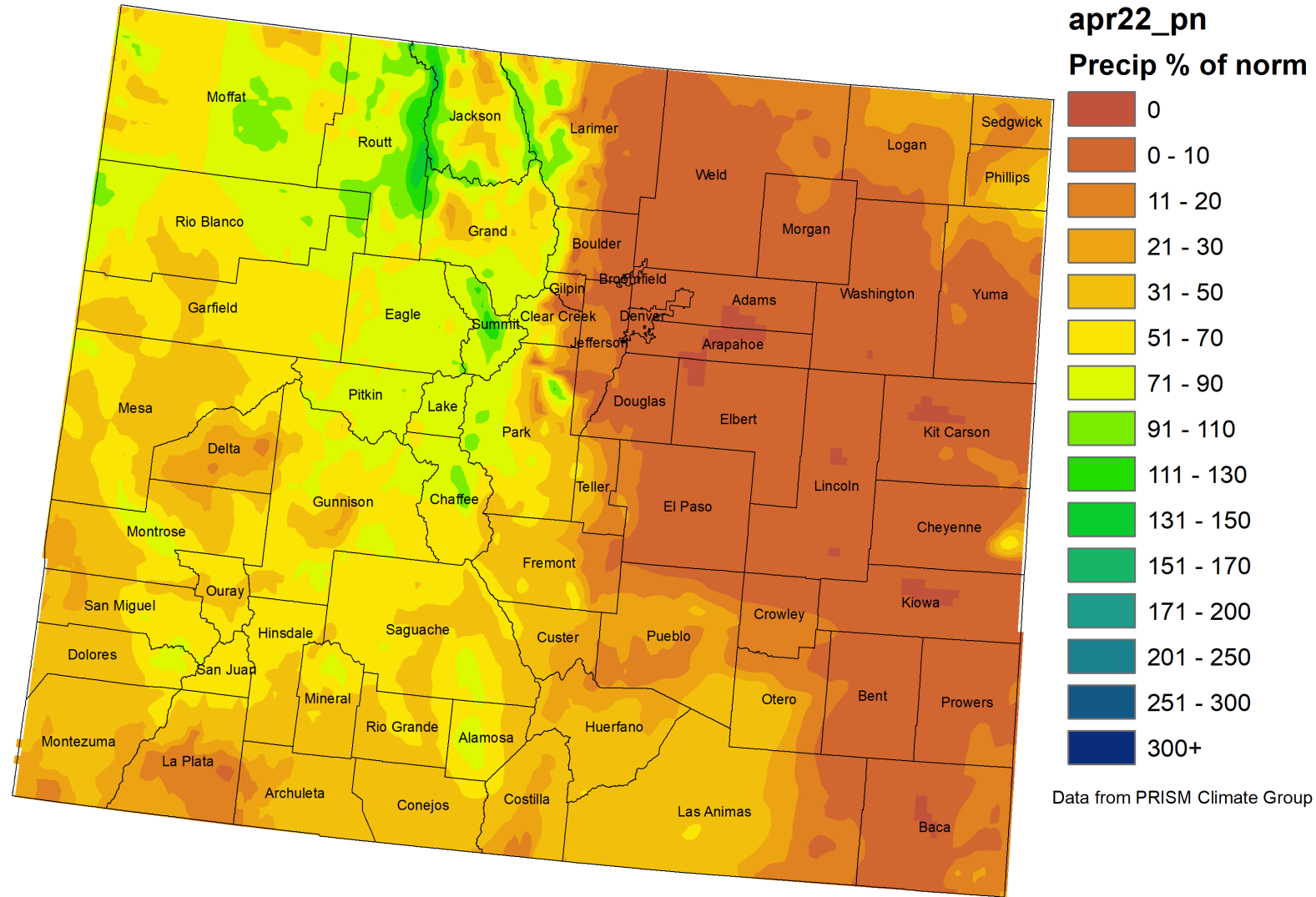


temperature rank out of 127 years (1896-2022)

[http://climate.colostate.edu/
co_cag/rank_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)

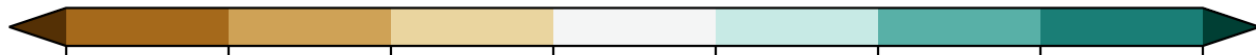
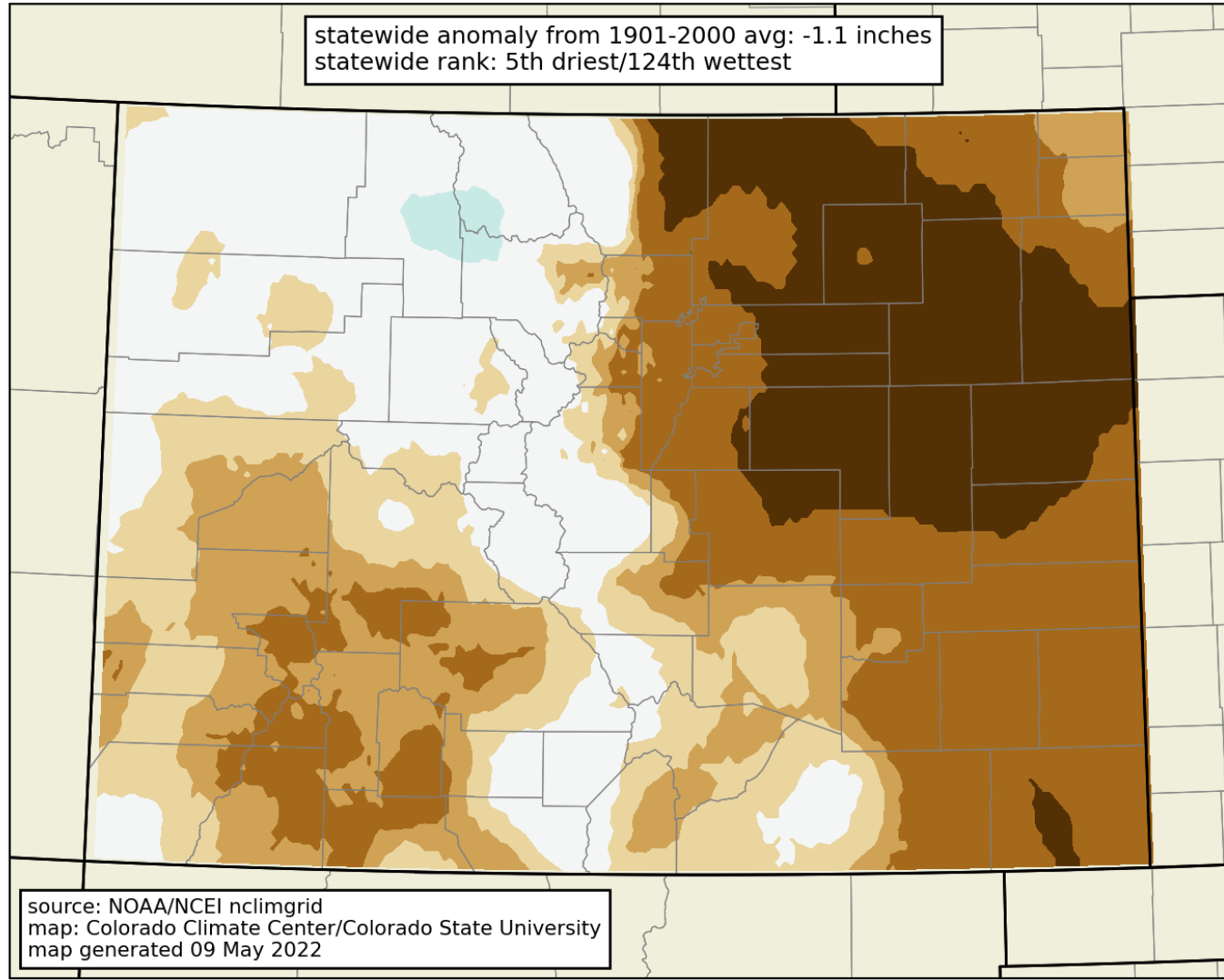


Colorado April 2022 Precipitation as a Percentage of Normal



precipitation rank: April 2022

Statewide: 5th driest April



record driest 10th driest 20th driest 35th driest 35th wettest 20th wettest 10th wettest record wettest

precipitation rank out of 128 years (1895-2022)

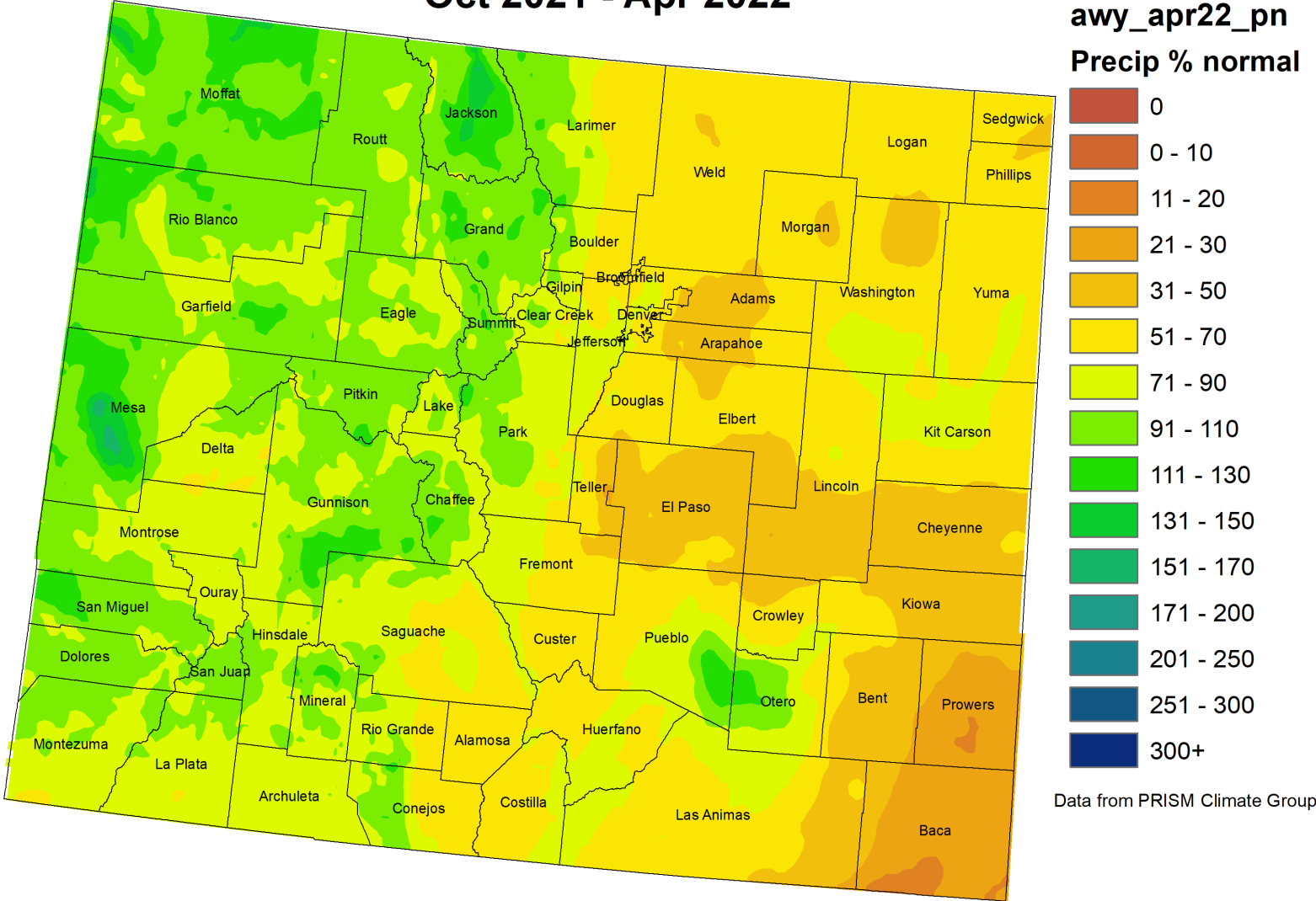
[http://climate.colostate.edu/
co_cag/rank_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



COLORADO CLIMATE CENTER

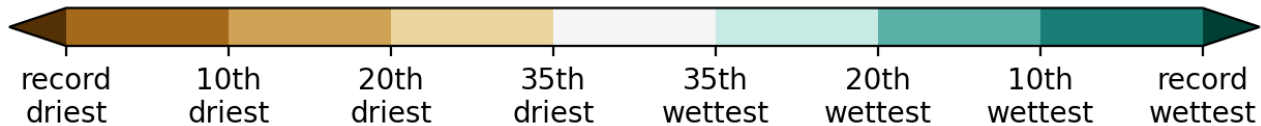
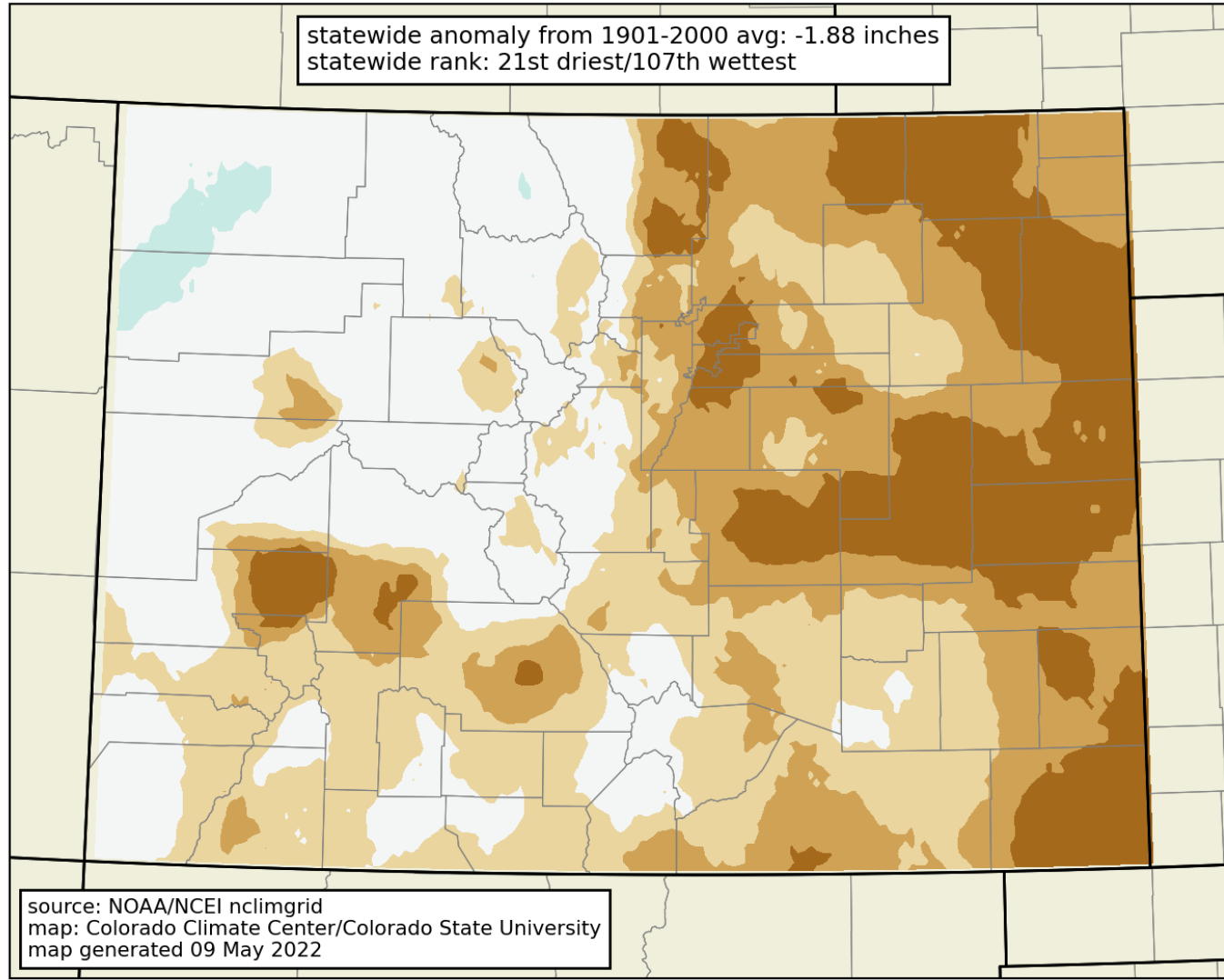


Colorado Water Year 2022 Precipitation as a Percentage of Normal Oct 2021 - Apr 2022



precipitation rank: 7 months ending April 2022 (Oct-Apr)

Statewide: 21st driest
October-January

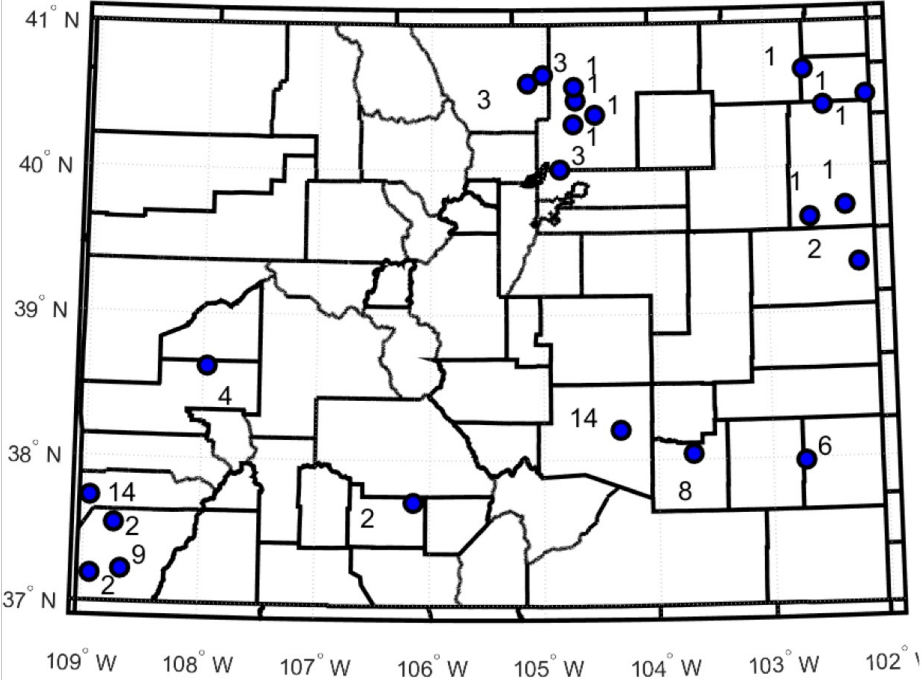


precipitation rank out of 127 years (1896-2022)

http://climate.colostate.edu/ranks_monthly_maps.html



April 2022 Wind Run Rank



(above) April ranking for wind run at long-term CoAgMET stations.
 (below) April rankings of wind and potential evapotranspiration at long-term CoAgMET stations

April Wind Summary



Station	Wind Run (miles/day)	Wind Run Anomaly (miles/day)	Rank	Days with Gusts > 40mph (gusts adjusted to 10m tower equivalent)	Potential ET (inches)	PET Anomaly (inches)	PET Rank
Ault	269	69	1	17	9.1	2.27	1
Avondale	173	-4	14	9	9.37	1.34	3
Burlington	304	34	2	19	10.39	2.43	1
Center	230	34	2	19	8.71	1.11	1
Cortez	122	4	9	0	7.6	0.9	4
Dove Creek	194	-2	14	8	8.33	0.75	6
Fort Collins	160	33	3	13	7.47	1.92	2
FTC ARDEC	224	29	3	14	8.56	1.91	3
Fort Lupton	212	25	3	17	8.52	1.32	2
Haxtun	304	83	1	20	9.27	2.35	1
Holyoke	277	62	1	17	9.02	1.88	2
Idalia	289	55	1	18	9.65	2.11	1
Kersey	233	68	1	15	8.85	2.15	1
Kirk	274	48	1	18	9.54	2.2	1
Lamar	241	14	6	13	11.56	2.6	1
Lucerne	237	54	1	16	9.07	2.28	1
Olathe	148	18	4	12	8.31	1.37	1
Paoli	226	27	1	18	8.56	1.59	2
Peckham	228	56	1	17	9.25	1.99	2
Rocky Ford	186	14	8	9	10.01	1.78	3
Towoac	211	55	2	11	9.82	2.18	1
Yellow Jacket	194	41	2	10	8.28	1.5	3

From our monthly climate summary: https://climate.colostate.edu/monthly_summary.html



Colorado statewide average temperature and precipitation, October - April

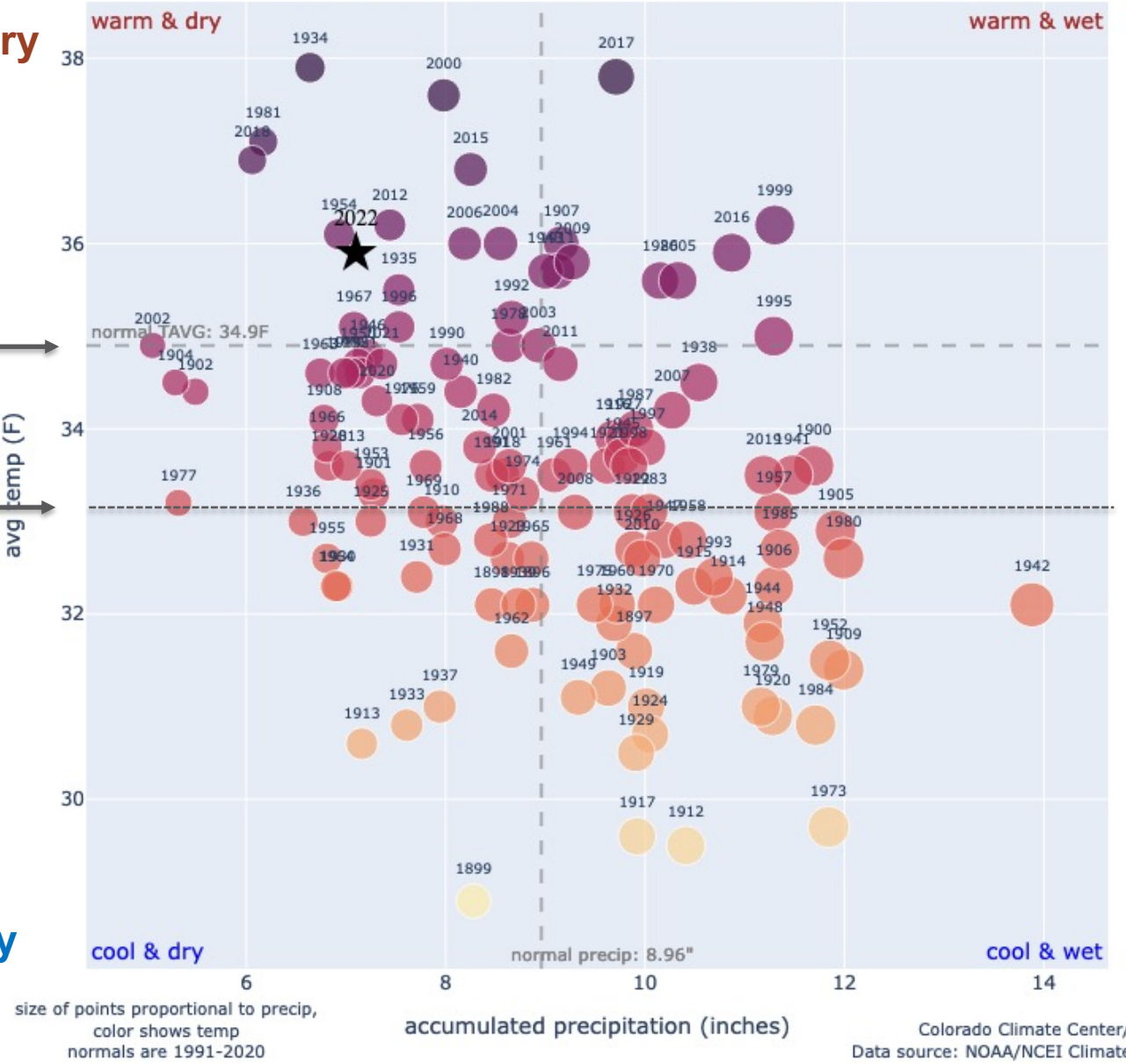
Warm & dry

Water year 2022 through April

1991-2020 avg temp →

1901-2000 avg temp →

Cool & dry



avg temp (F)

Warm & wet

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

Cool & wet

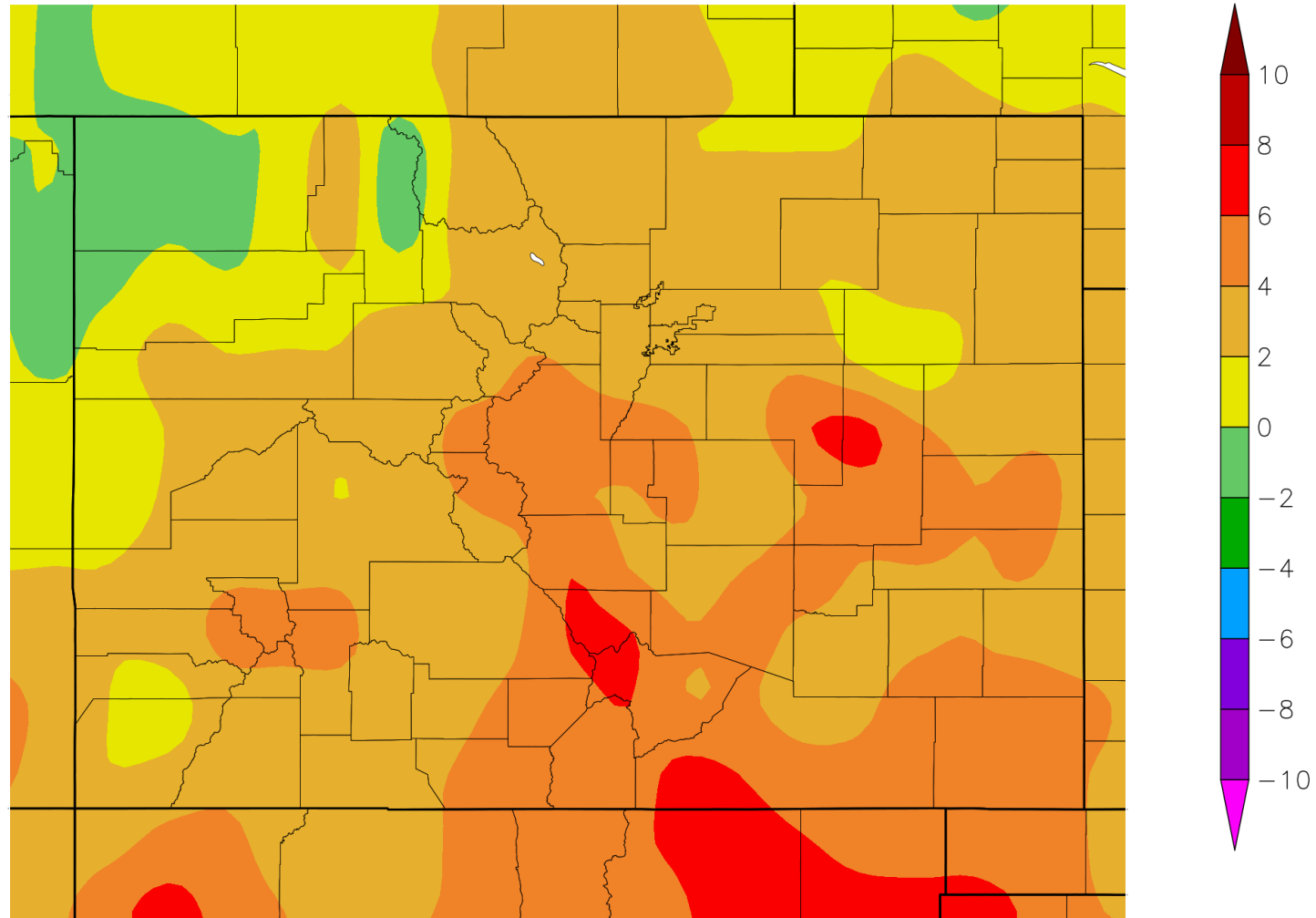
size of points proportional to precip,
color shows temp
normals are 1991-2020

accumulated precipitation (inches)

Colorado Climate Center/CSU
Data source: NOAA/NCEI Climate at a Glance



Departure from Normal Temperature (F) 5/1/2022 – 5/17/2022

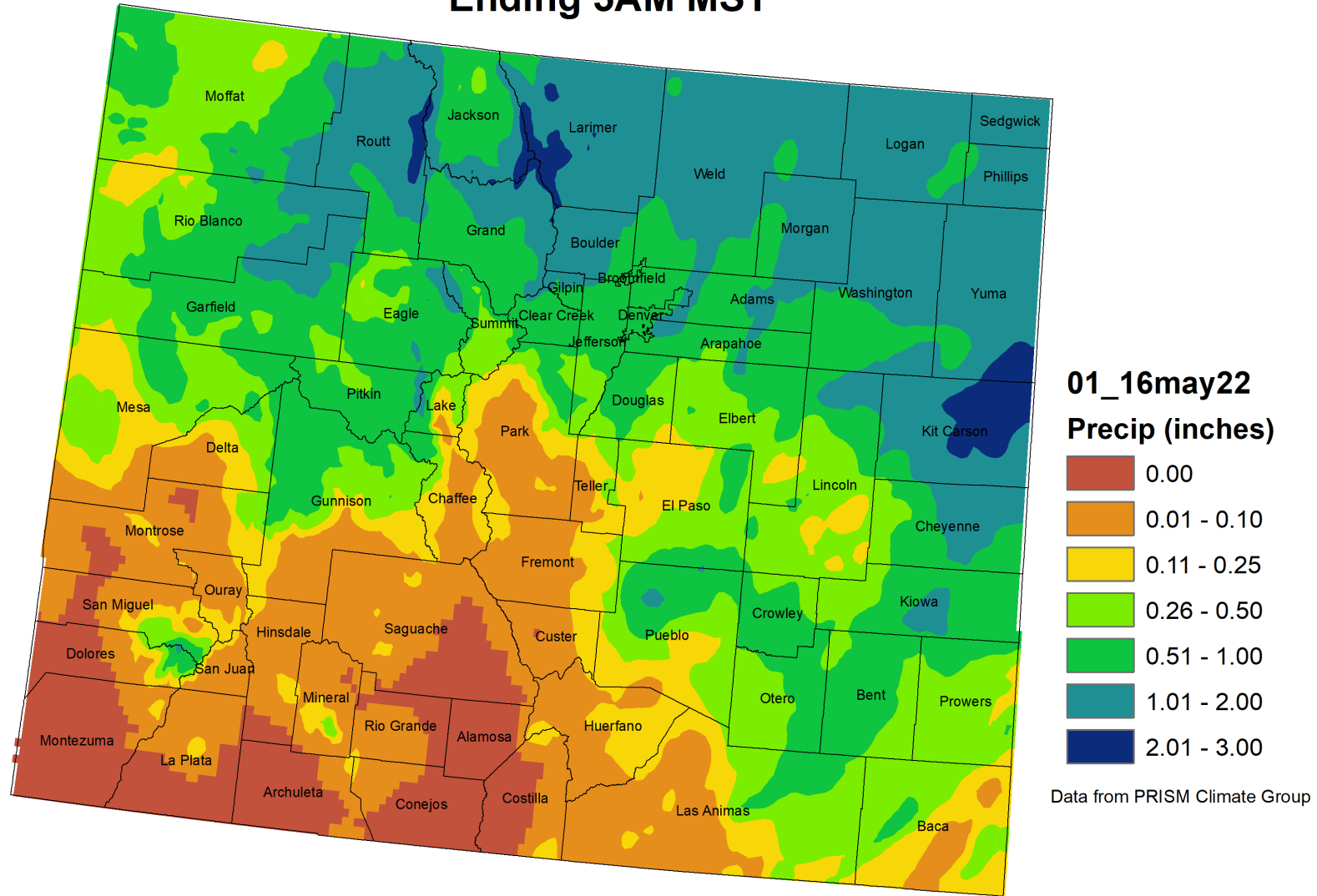


Generated 5/18/2022 at HPRCC using provisional data.

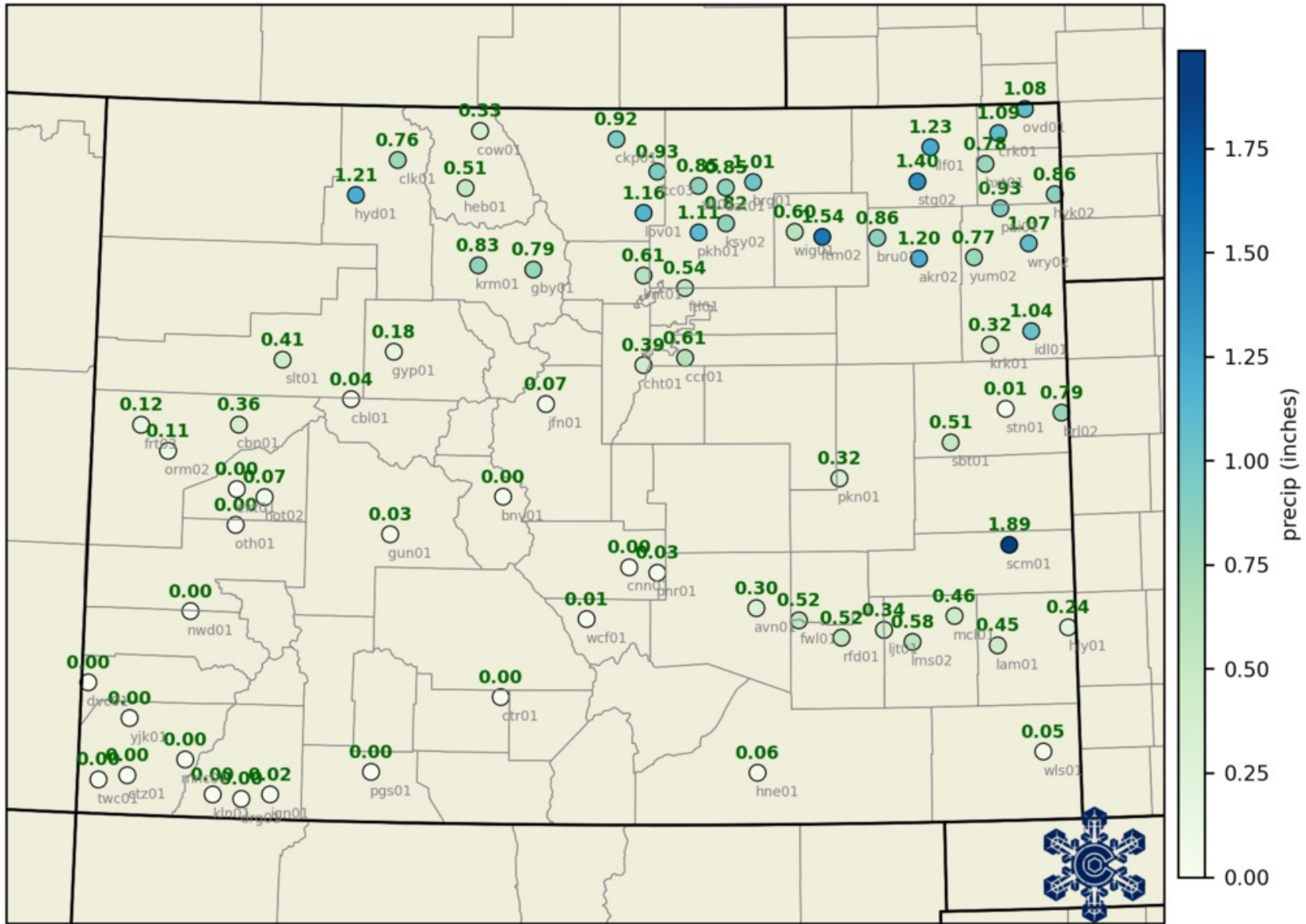
NOAA Regional Climate Centers



Colorado Month to Date Precipitation 1 - 16 May 2022 Ending 5AM MST

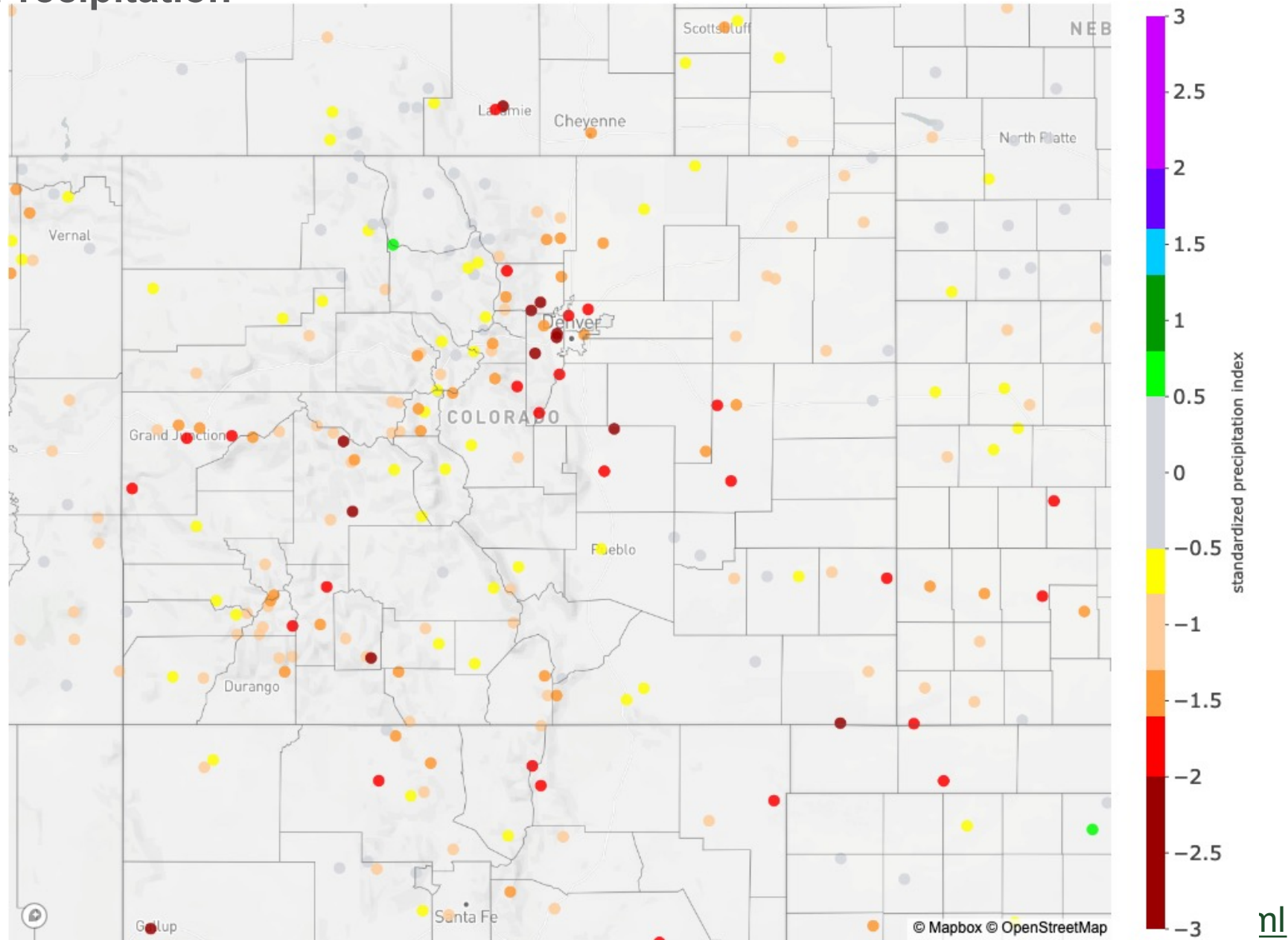


CoAgMET/Northern Water precipitation in previous 14 days: 01 May 2022-15 May 2022

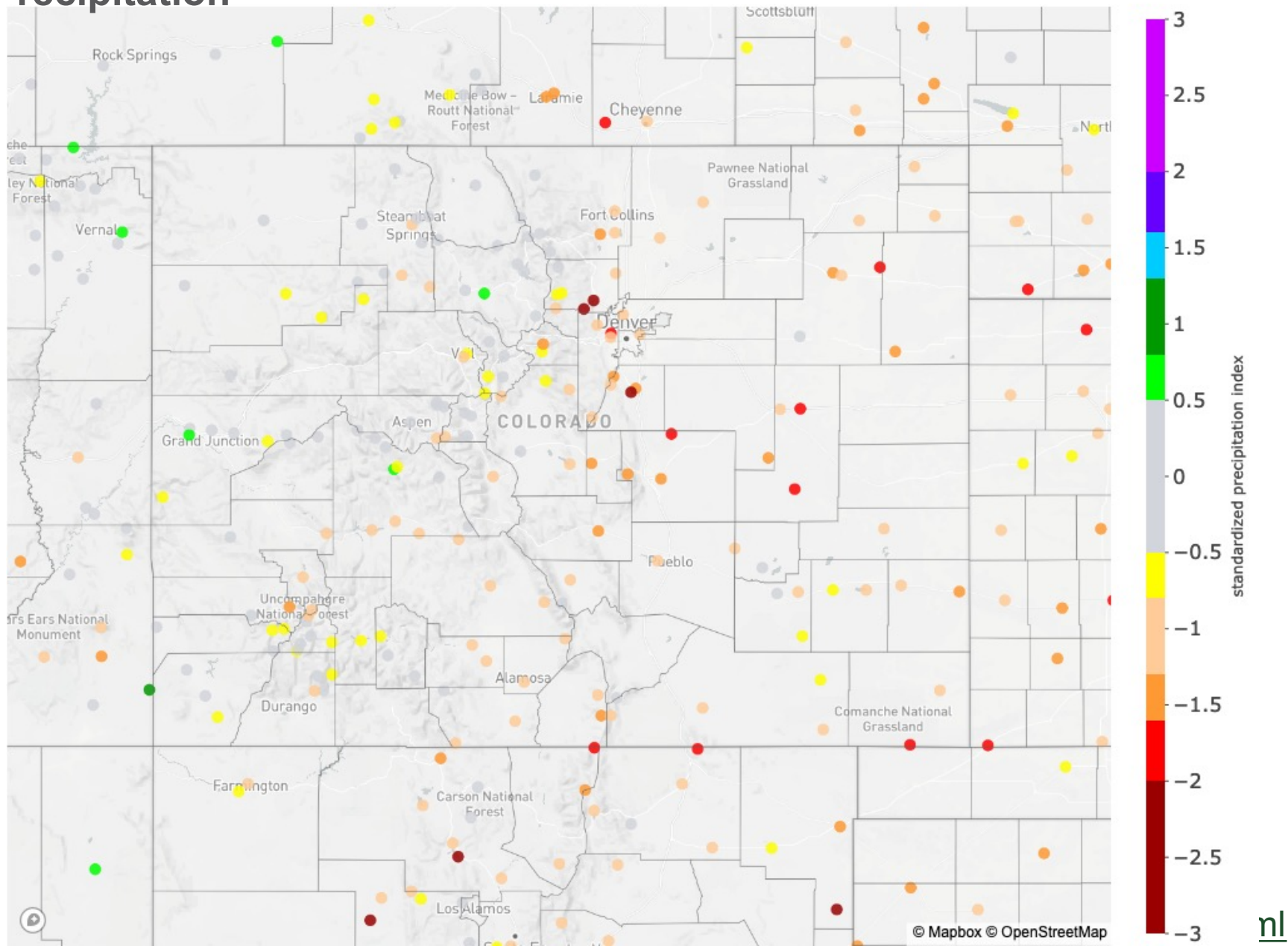


60-day Standardized Precipitation Index: 2022/03/19 - 2022/05/17

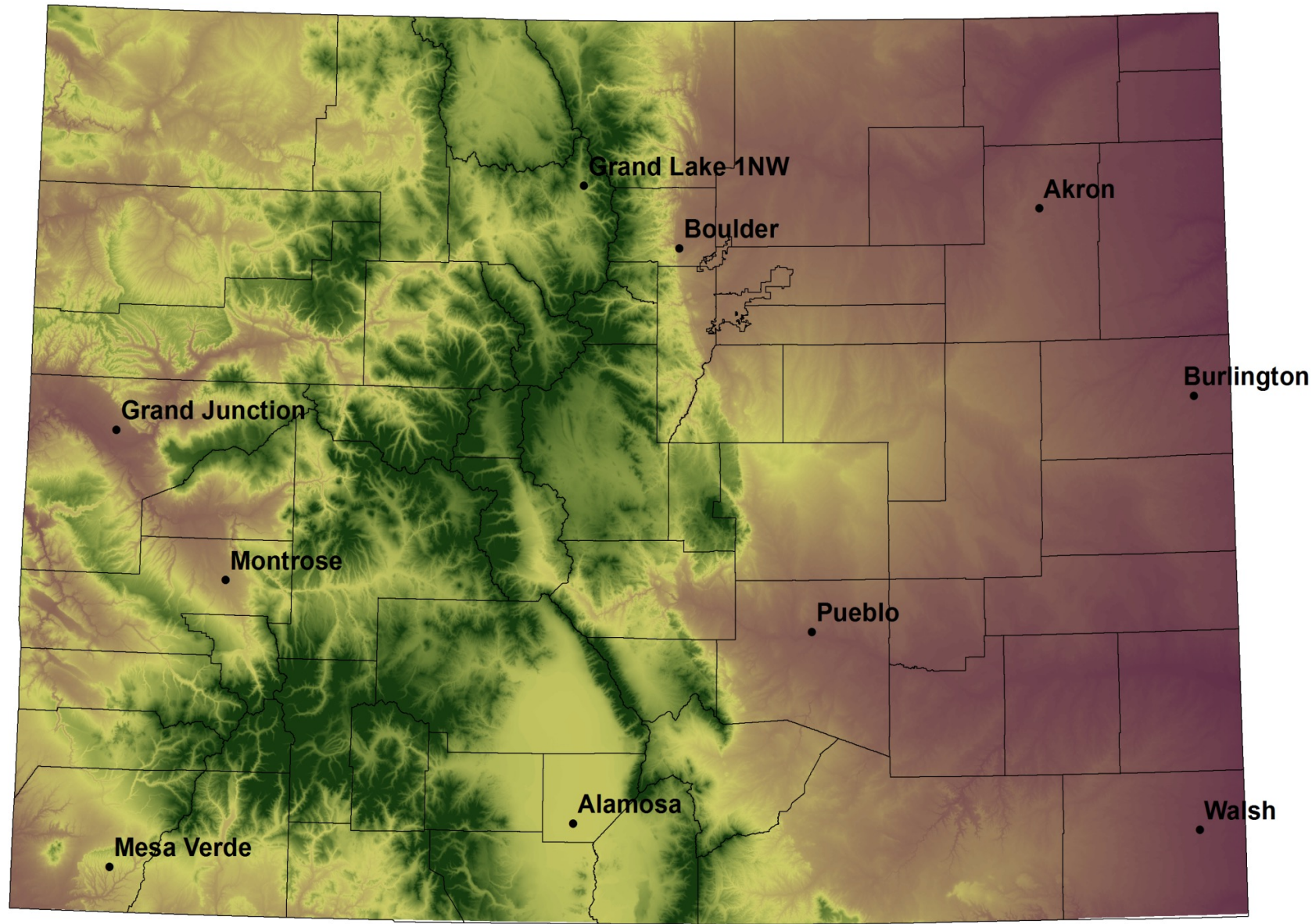
Standardized Precipitation Index



Standardized Precipitation Index



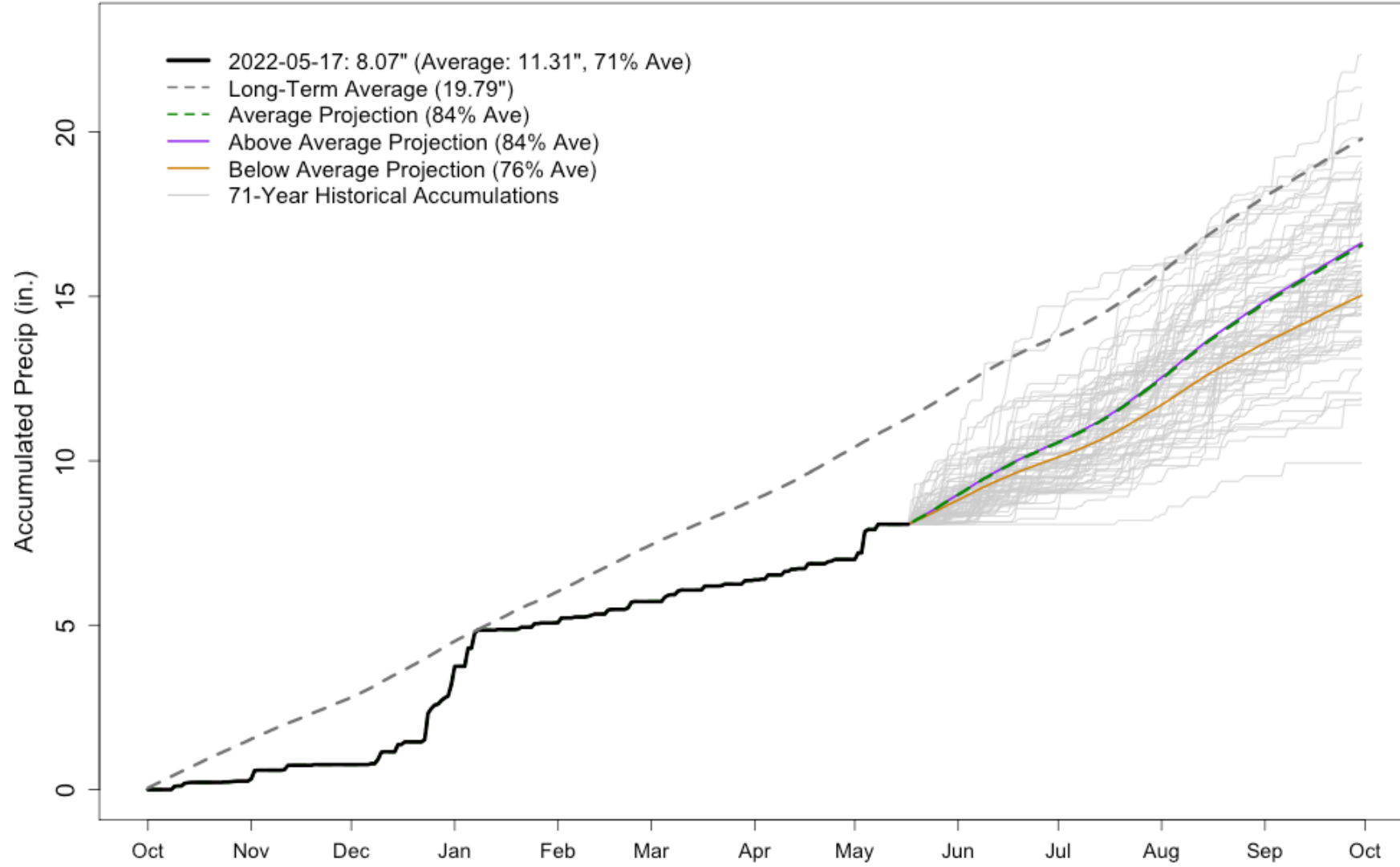
NWS Cooperative Stations for WATF



Water Year 2022 – Station Updates

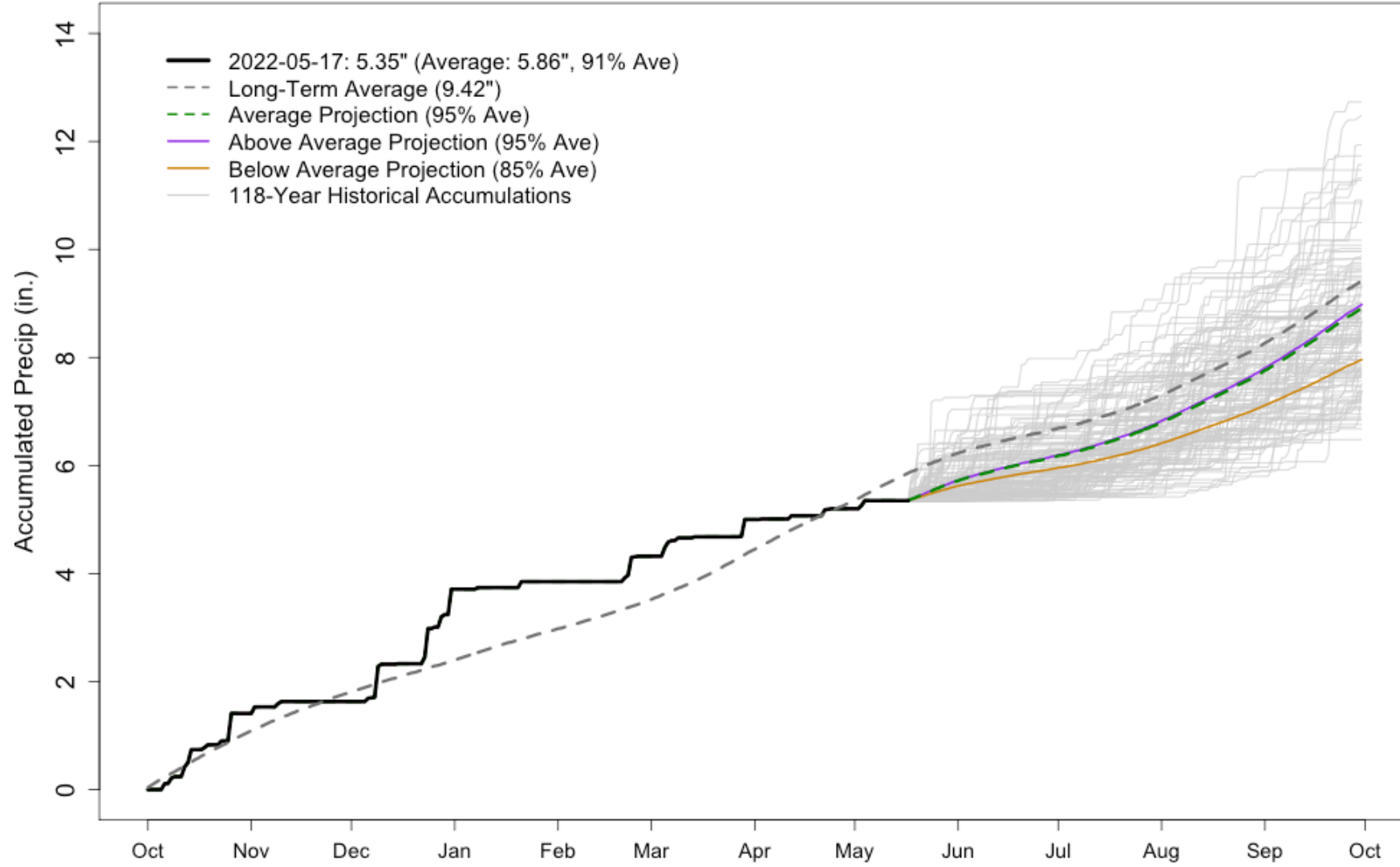


GRAND LAKE 1 NW WY2022 Precipitation Projections



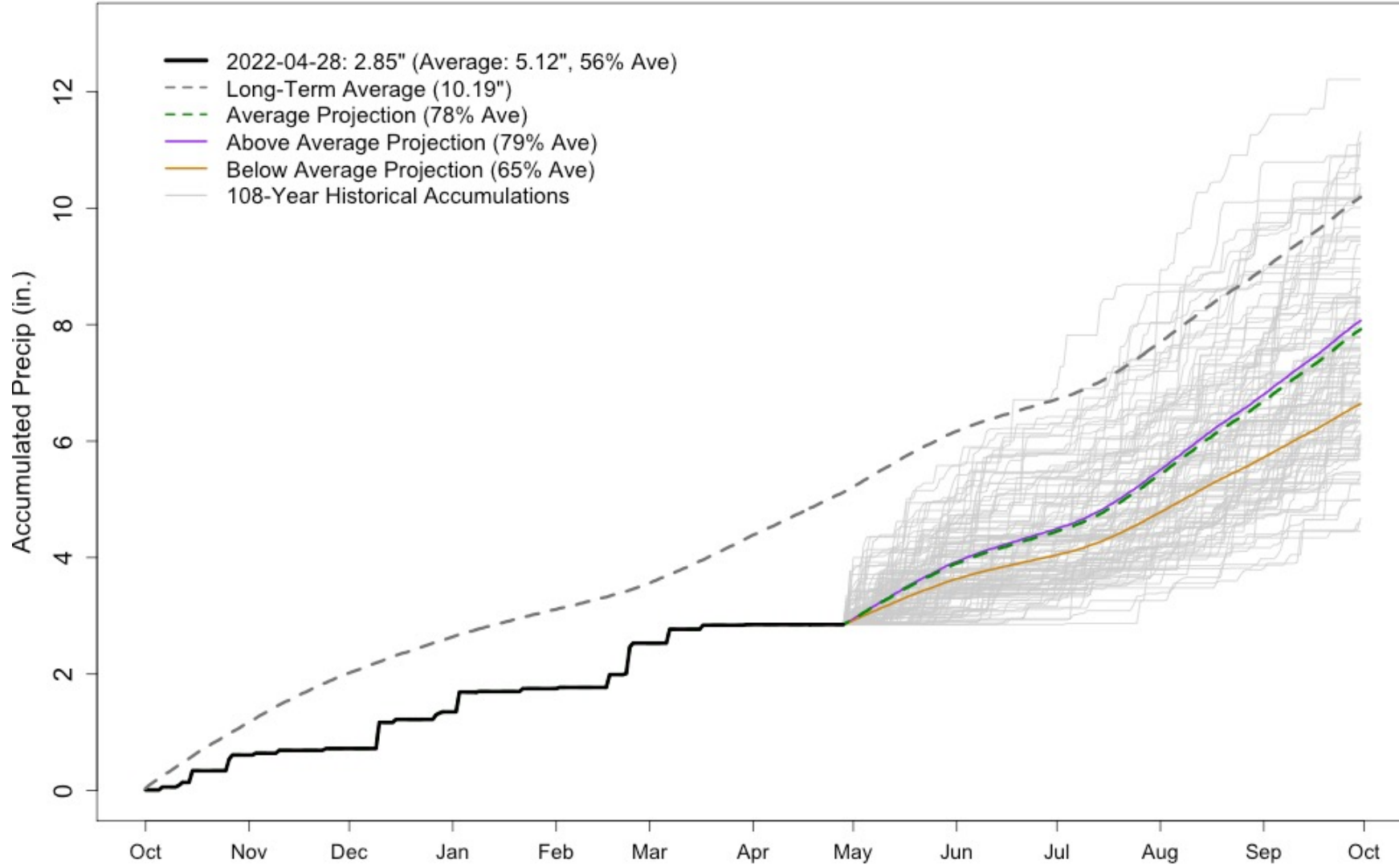
Grand Junction

GRAND JUNCTION WALKER FIELD WY2022 Precipitation Projections



Montrose

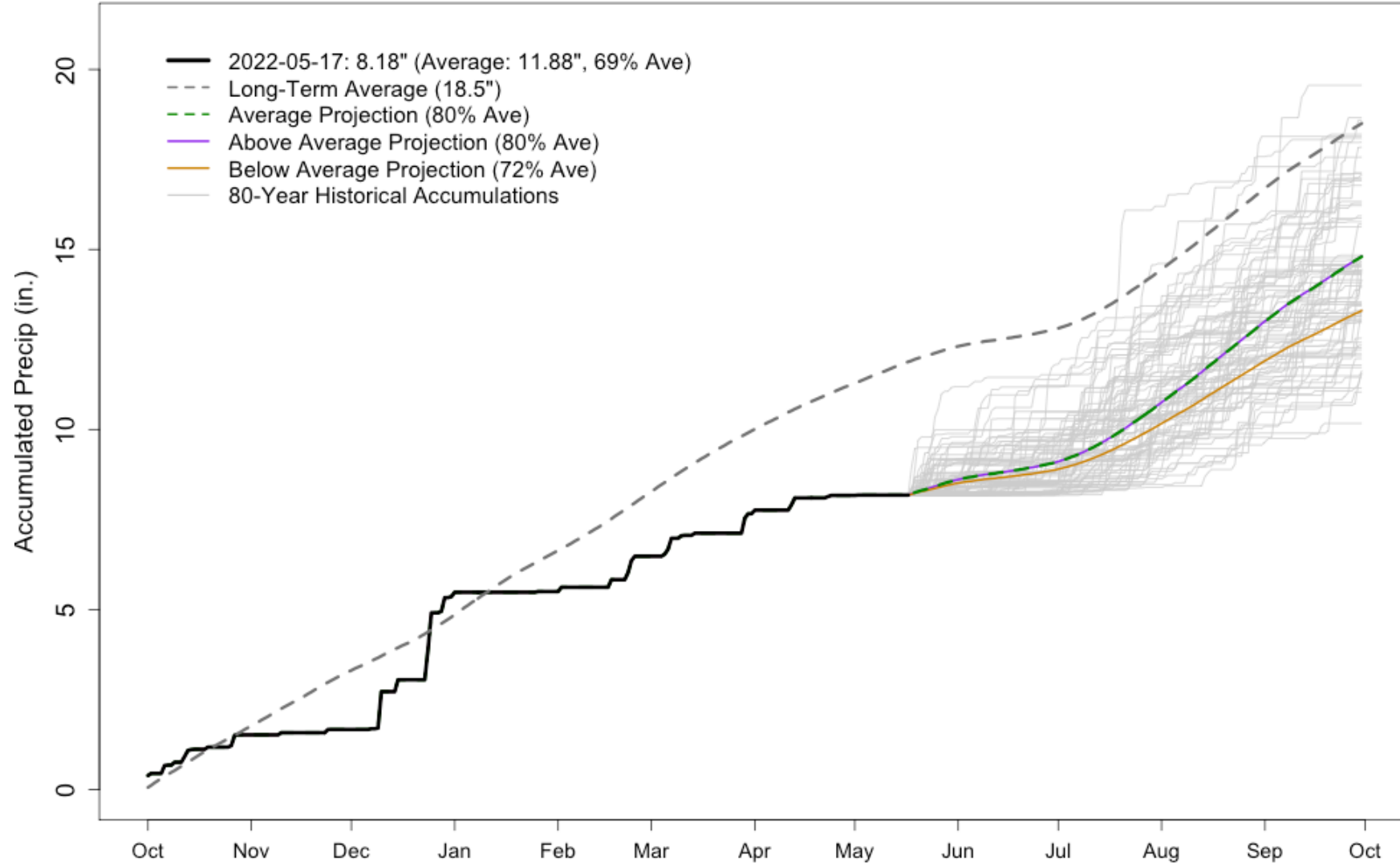
MONTROSE NO 2 WY2022 Precipitation Projections



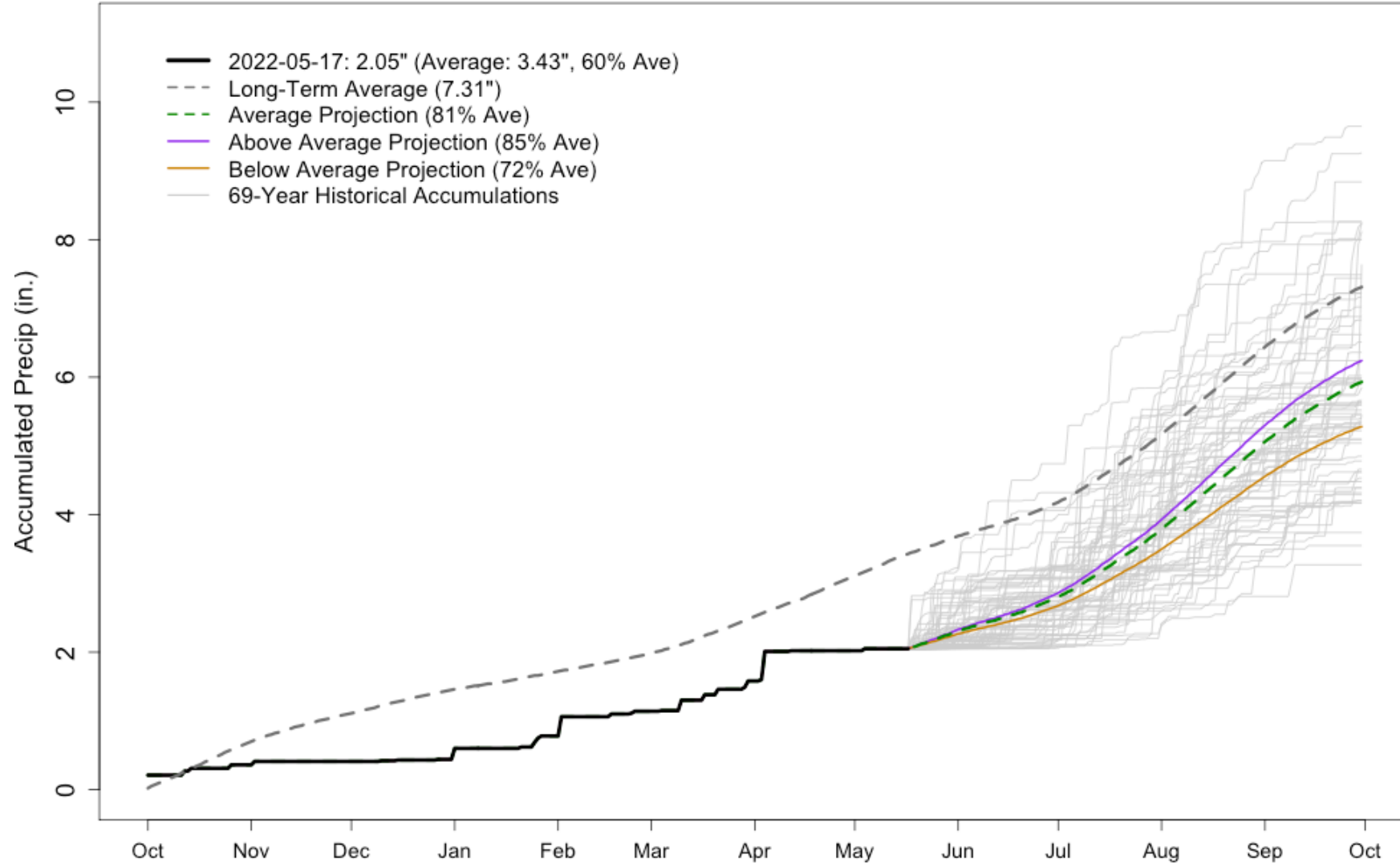
Note: data only through April 28, but nearby stations have had only a few hundredths of rain since



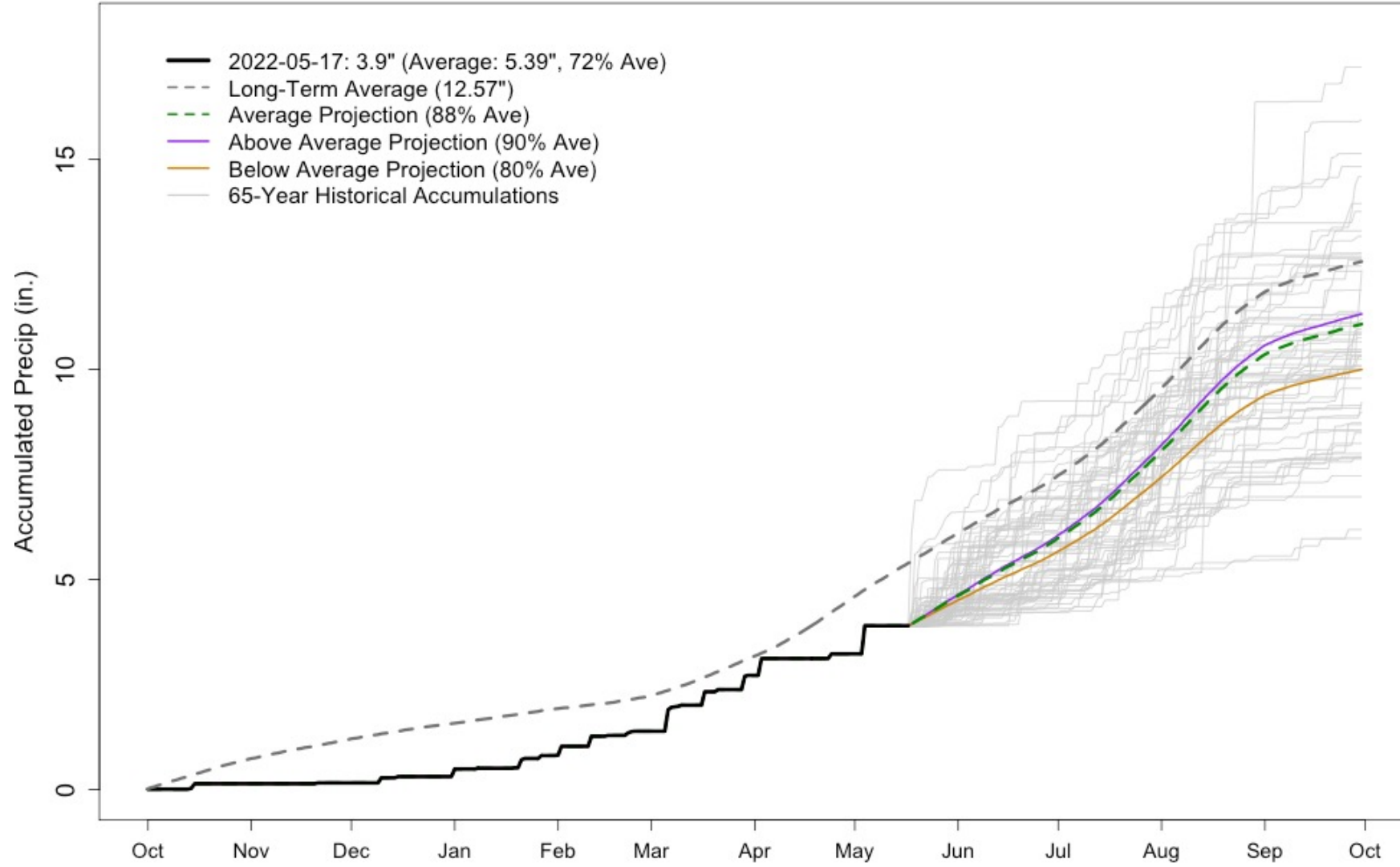
MESA VERDE NP WY2022 Precipitation Projections



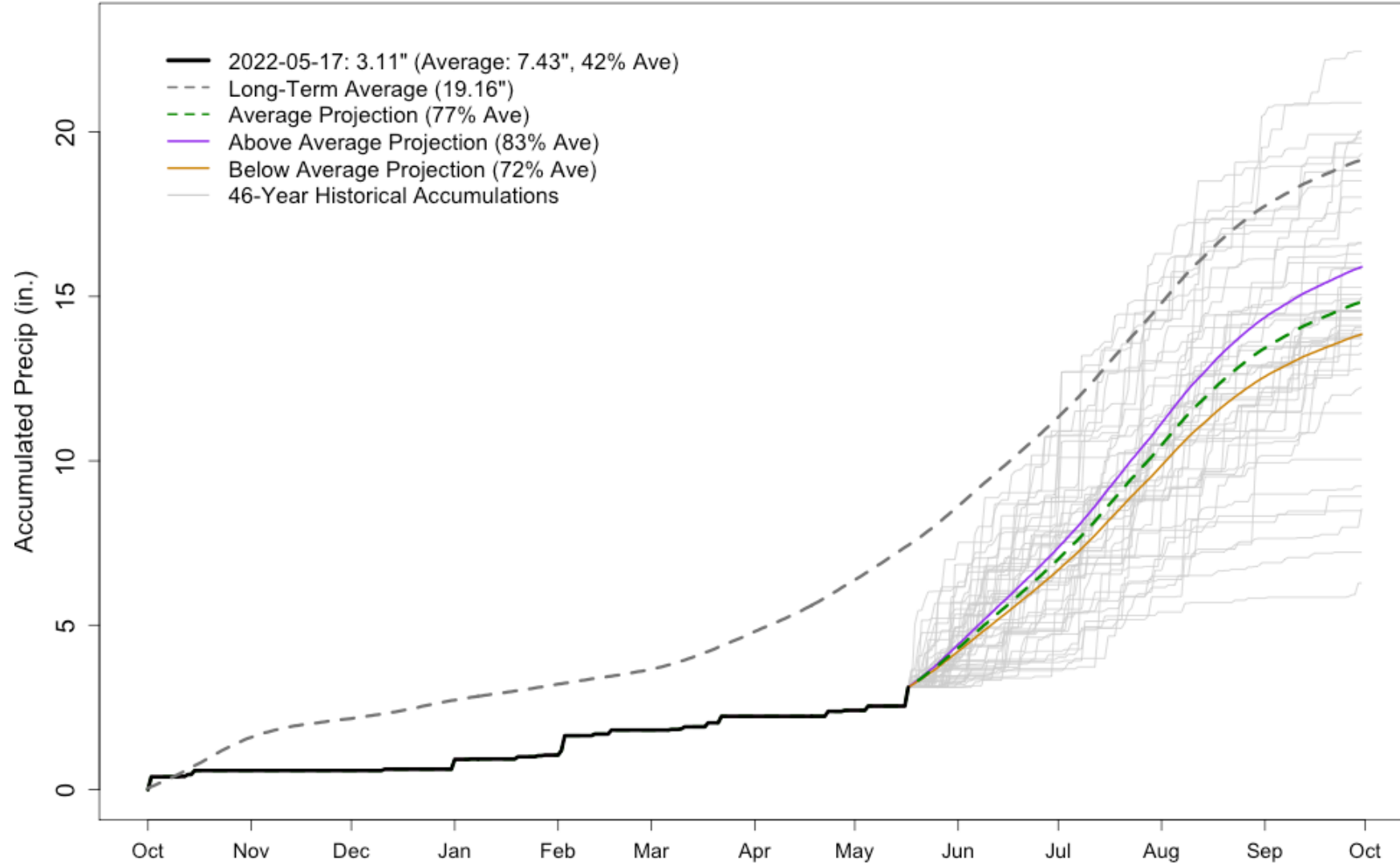
ALAMOSA-BERGMAN FIELD WY2022 Precipitation Projections



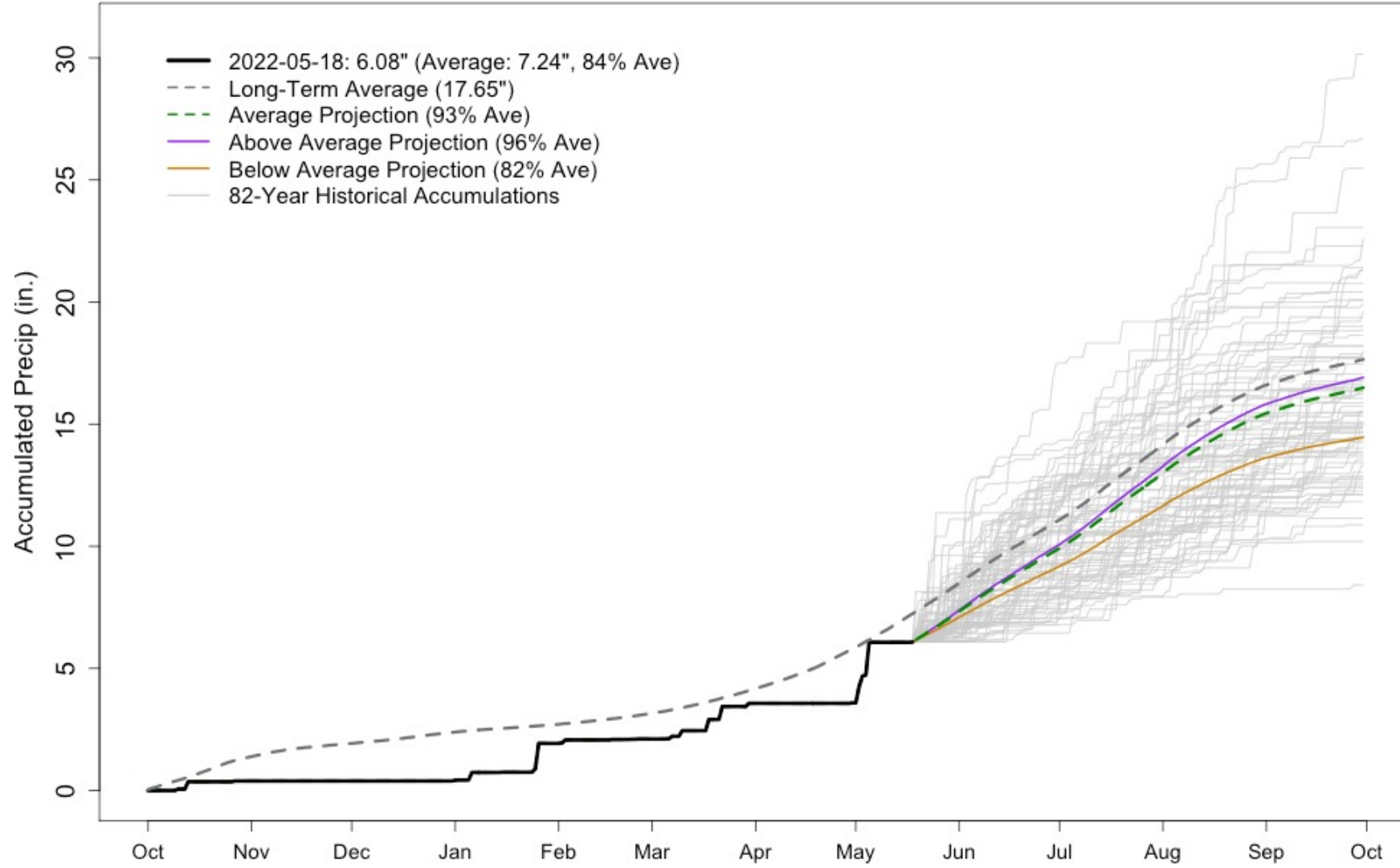
PUEBLO MEMORIAL AIRPORT WY2022 Precipitation Projections



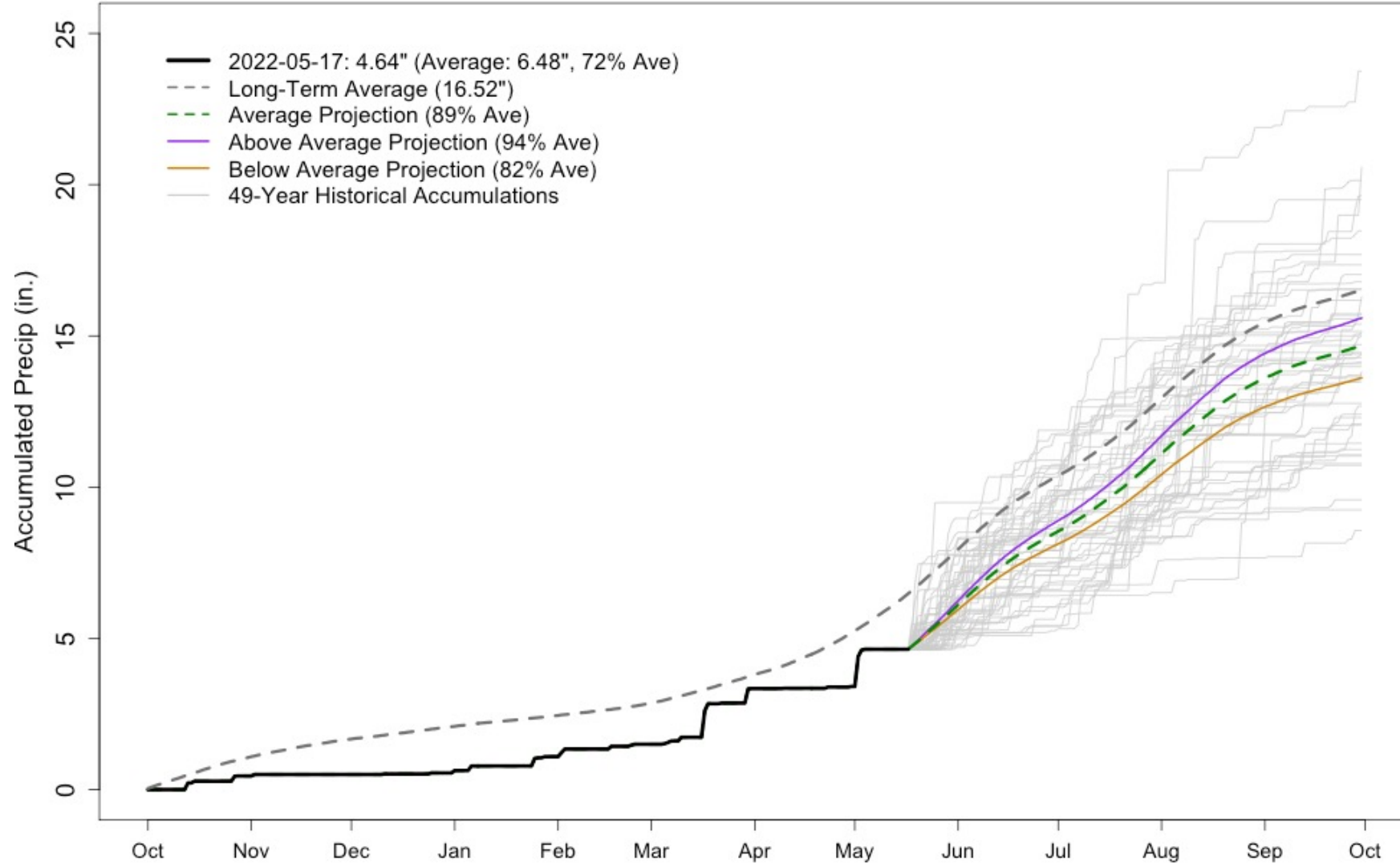
WALSH 1 W WY2022 Precipitation Projections



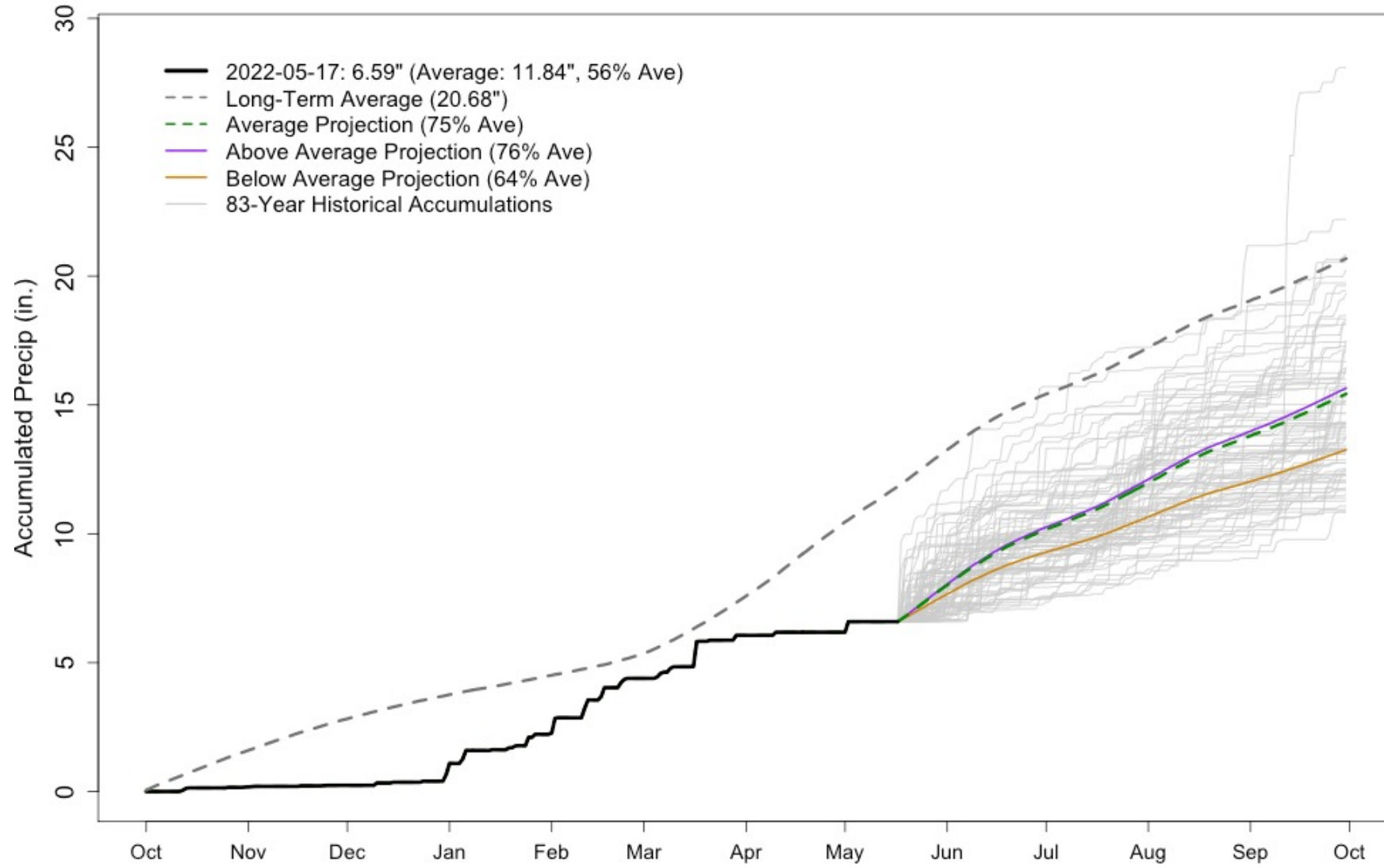
BURLINGTON WY2022 Precipitation Projections



AKRON 4 E WY2022 Precipitation Projections



BOULDER WY2022 Precipitation Projections



Largest 30-day loss of SWE prior to May 15

Middle Creek

Year	SWE delta (inches)
2022	-19.8
2009	-15.7
2012	-13.9
2020	-13.7
2008	-12.5

Upper San Juan

Year	SWE delta (inches)
2022	-27.5
2020	-23.6
1989	-22.2
2009	-19.9
1996	-19.6

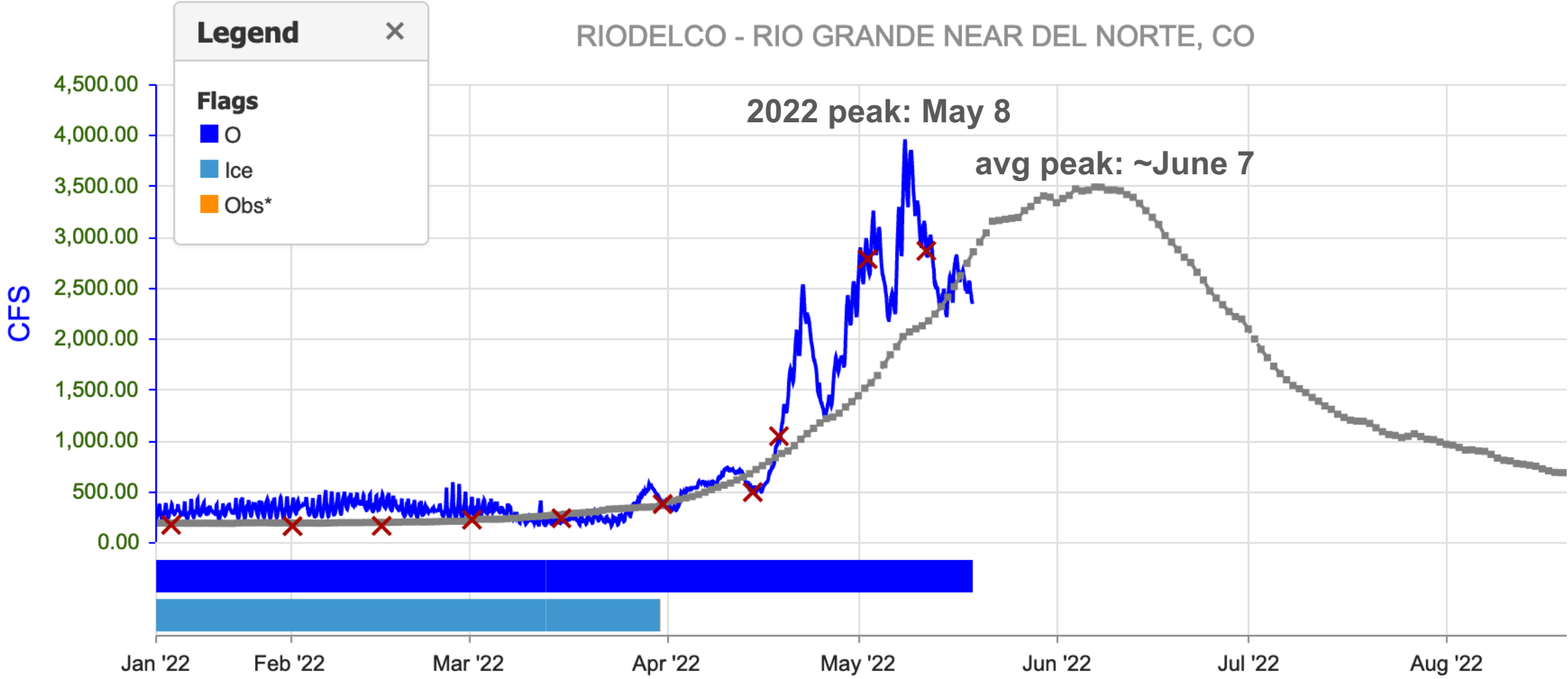
Wolf Creek Summit

Year	SWE delta (inches)
2022	-30.0
2018	-18.9
2020	-17.1
2014	-11.5
2017	-10.2

Also rapid declines farther north, though less extreme compared to these stations



RIODELCO - RIO GRANDE NEAR DEL NORTE, CO



Drought Conditions



Bear Lake SNOTEL,
Tuesday May 17

(8.0" of SWE; 63% of normal)

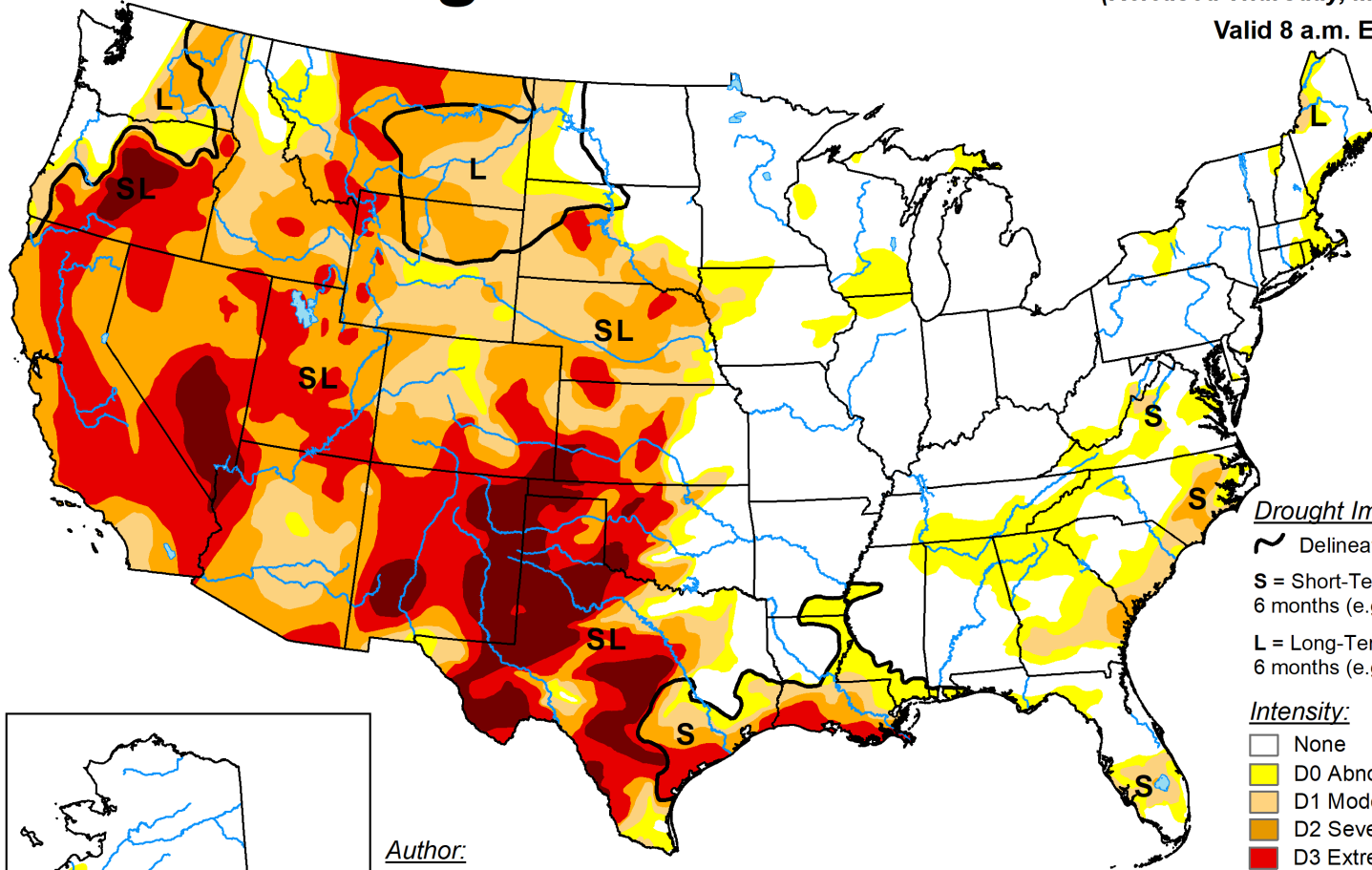


U.S. Drought Monitor

May 17, 2022

(Released Thursday, May. 19, 2022)

Valid 8 a.m. EDT

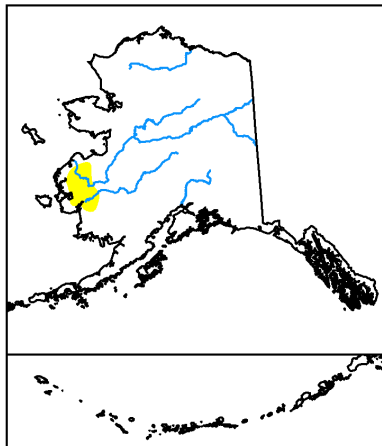


Drought Impact Types:

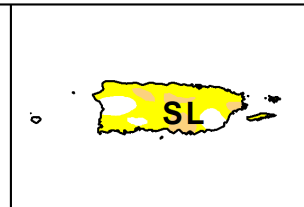
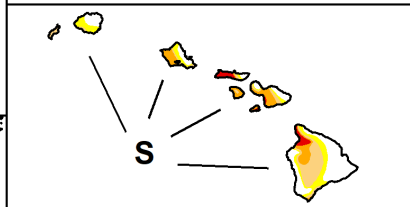
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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



Author:
Richard Heim
NCEI/NOAA



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 Colorado

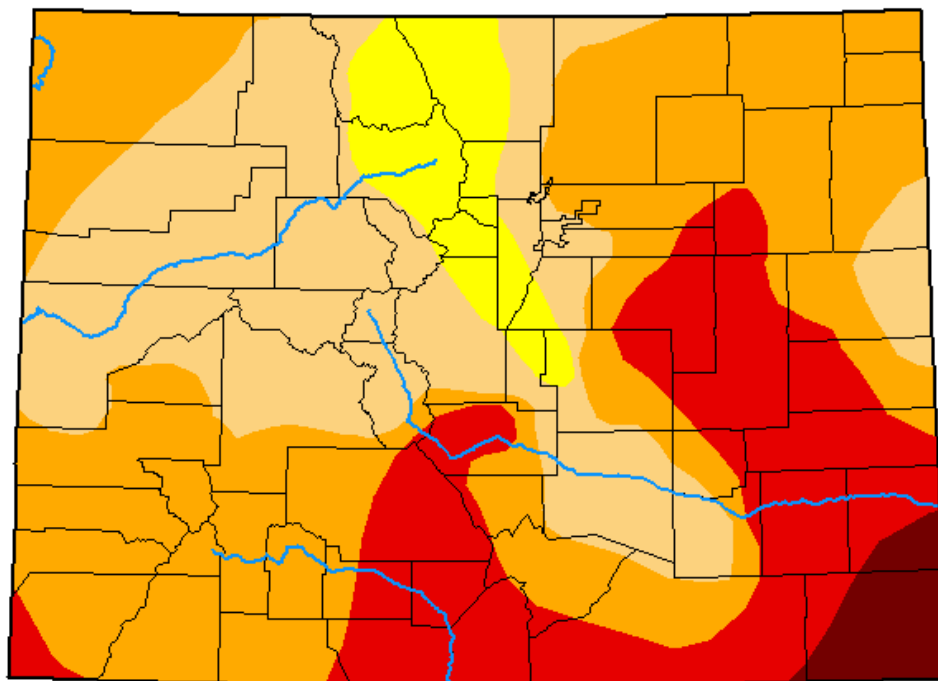
May 17, 2022

(Released Thursday, May. 19, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

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



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>

Author:

Richard Heim
NCEI/NOAA

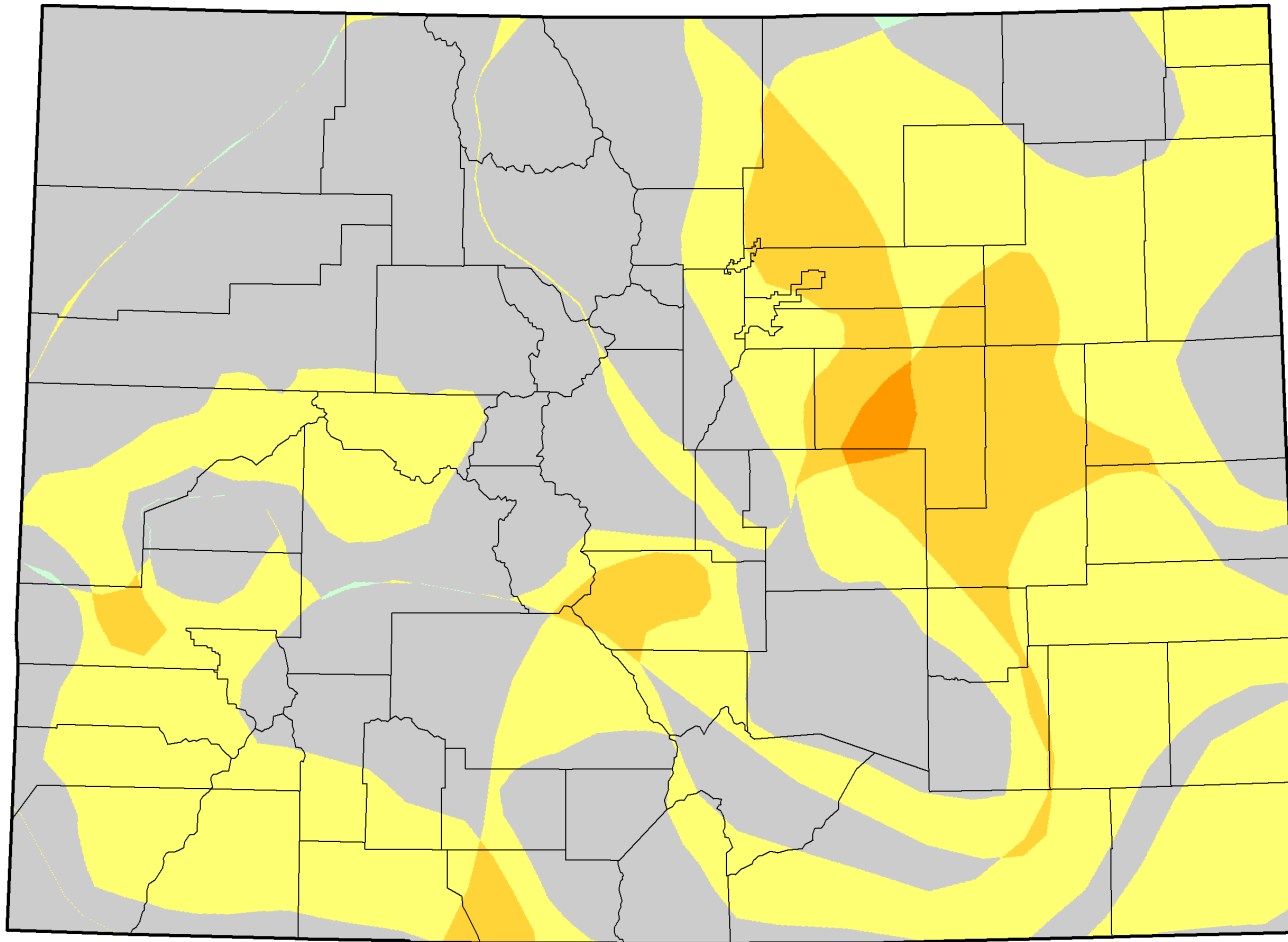


droughtmonitor.unl.edu



Change over two months

U.S. Drought Monitor Class Change - Colorado 8 Week



May 17, 2022
compared to
March 22, 2022

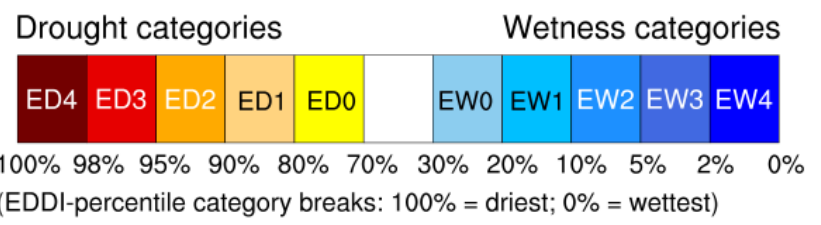
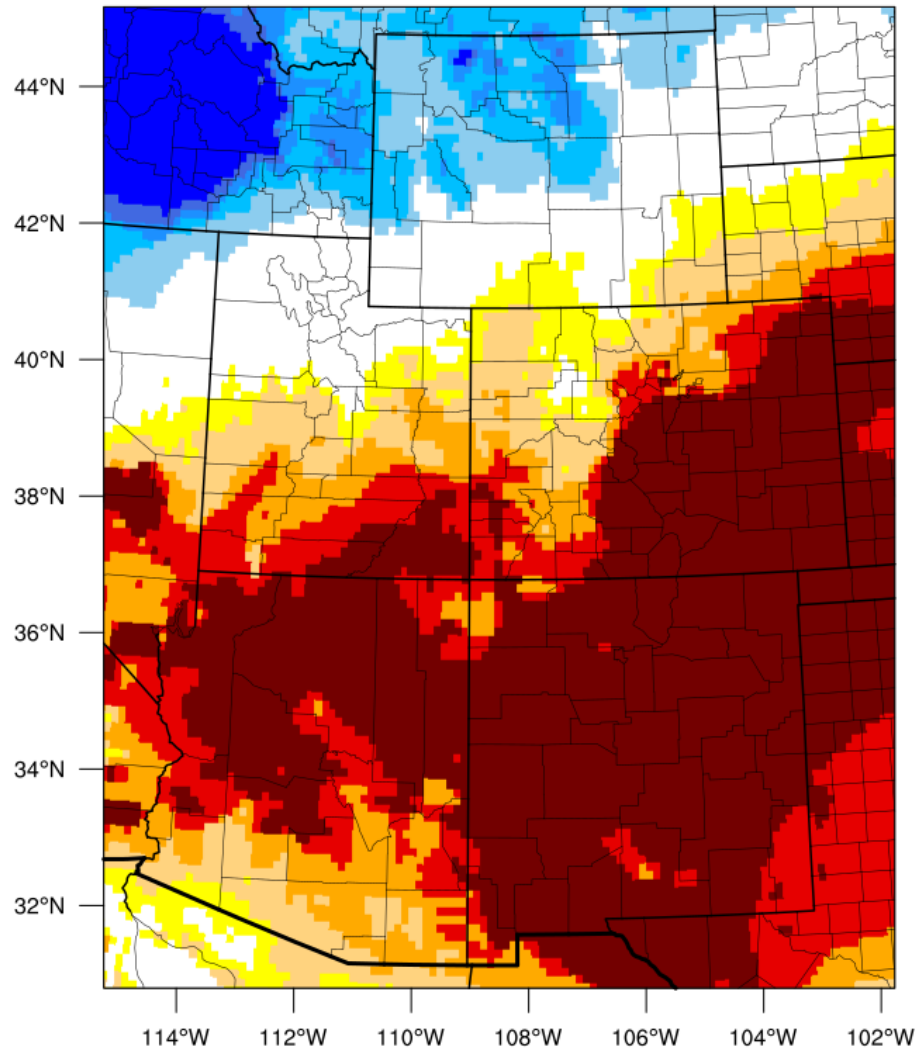
droughtmonitor.unl.edu



- 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



1-month EDDI categories for May 13, 2022

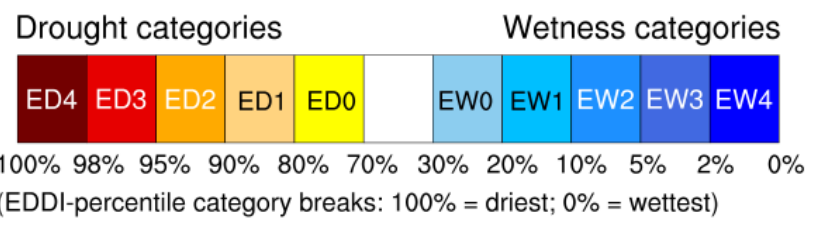
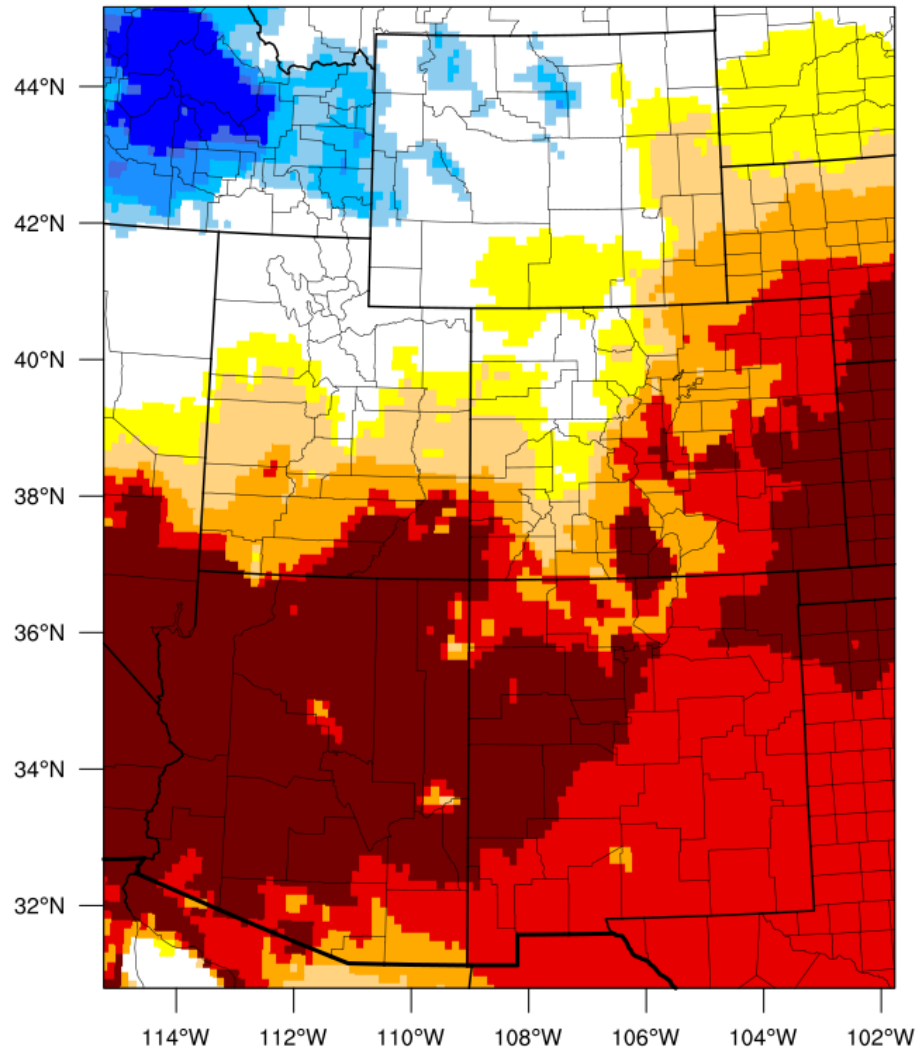


Evaporative Demand Drought Index

Warm, dry, sunny, and windy conditions through April led to record-level evaporative demand over the last month across much of Colorado



2-month EDDI categories for May 13, 2022

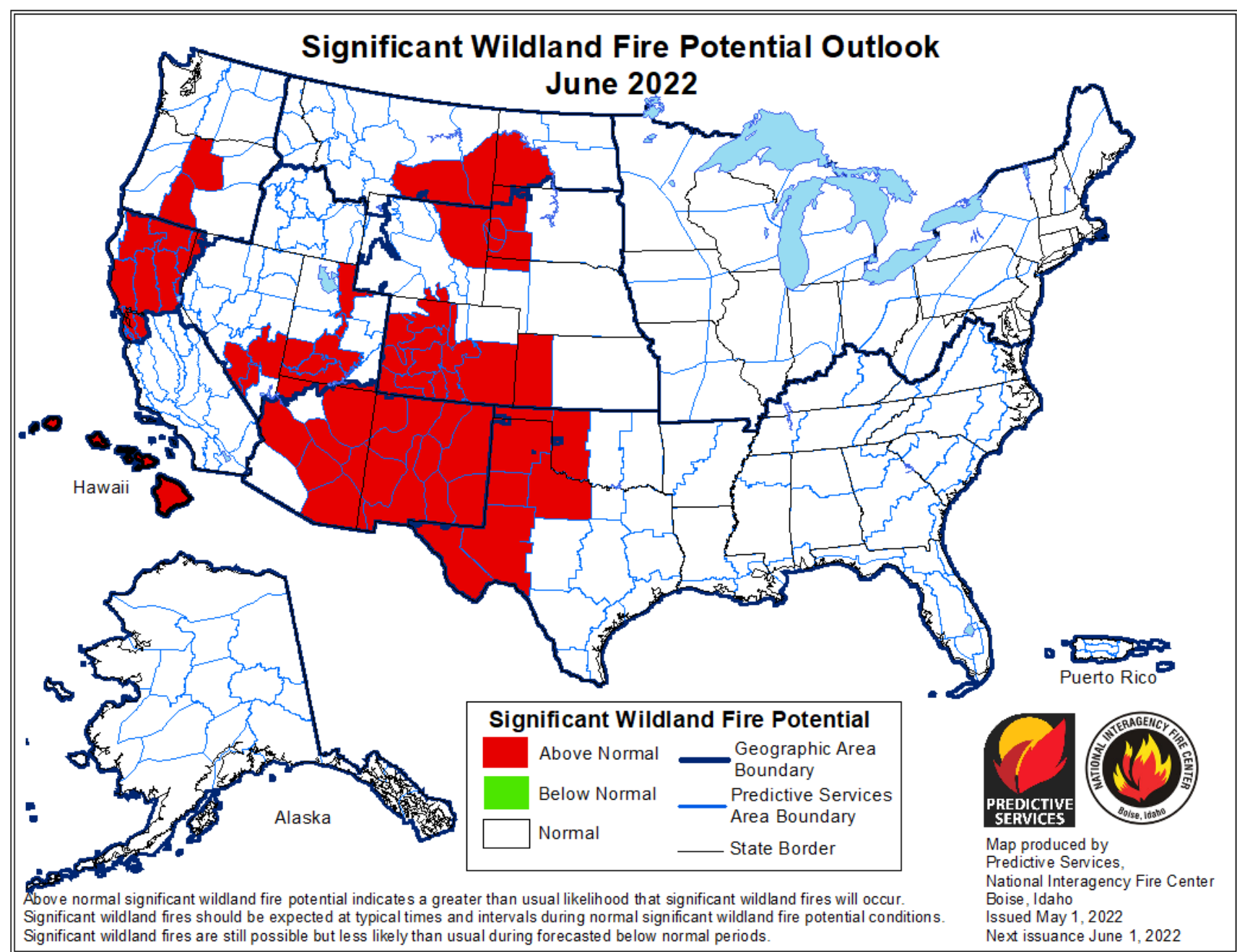


Evaporative Demand Drought Index

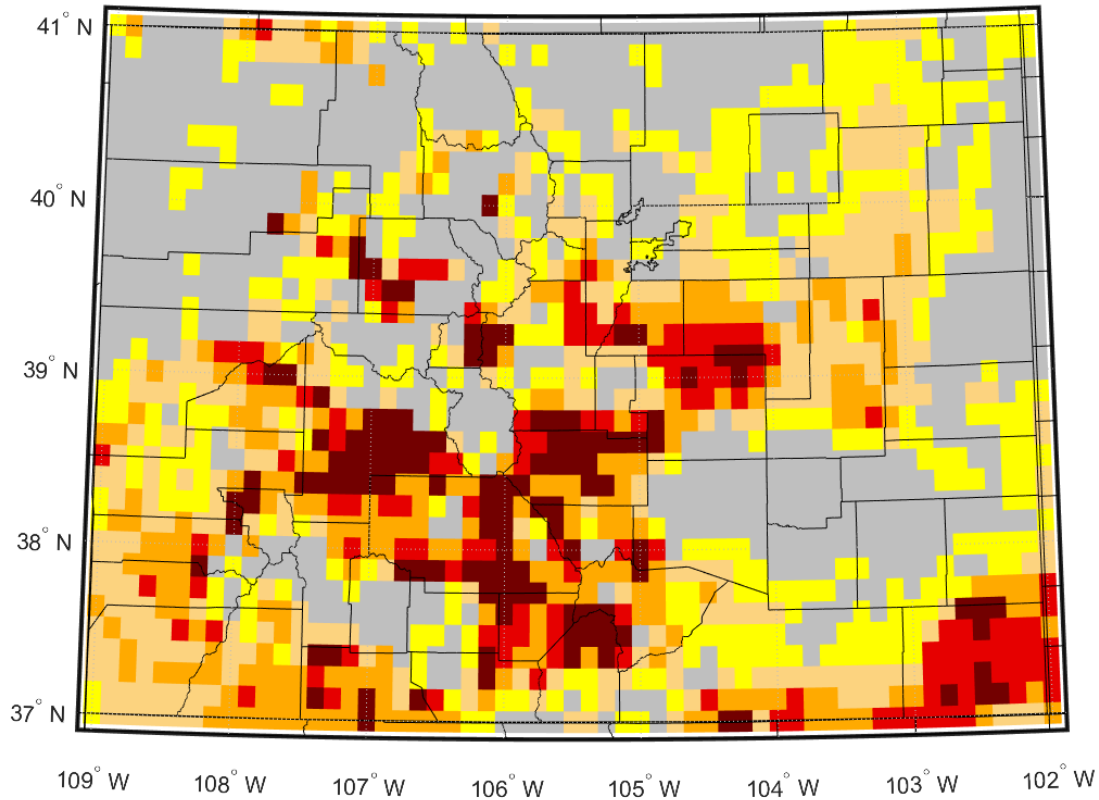
Similar story over the last 2
months, especially in
southeast Colorado



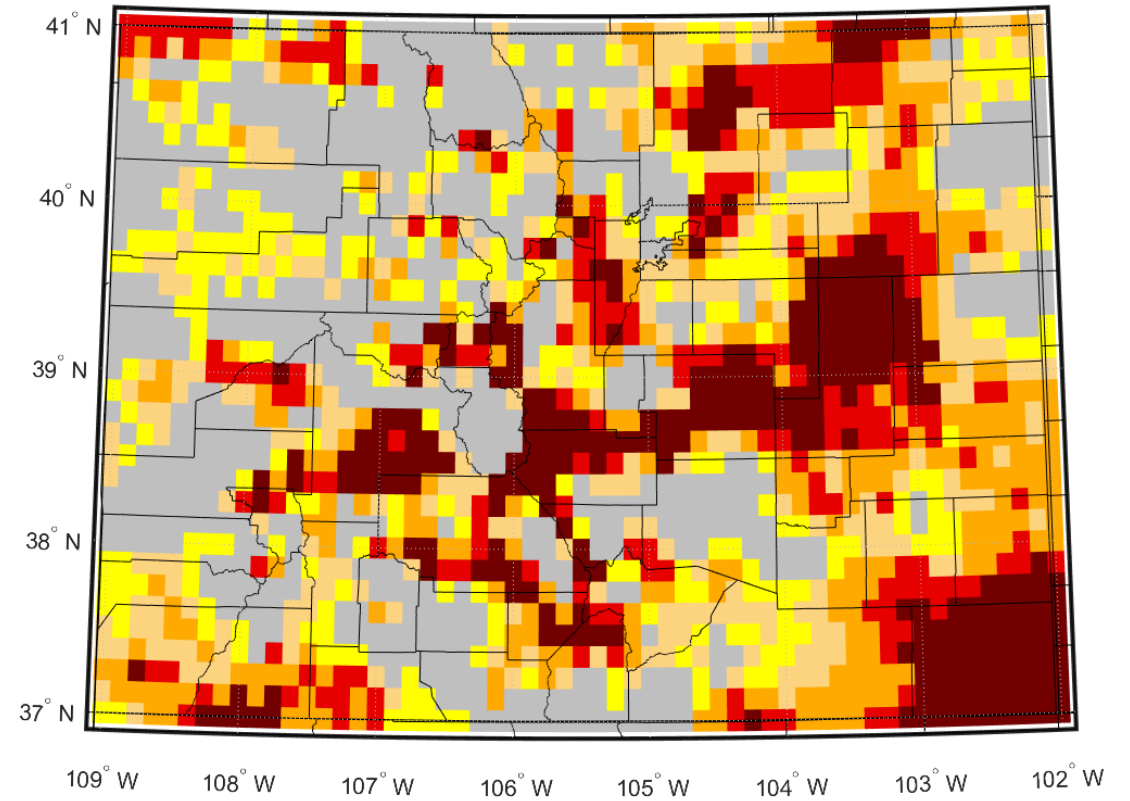
USDA outlooks for wildfire potential show increased risk across much of the state through the summer



Top 10cm Soil Moisture Percentile
05/10/2022



Top Meter Soil Moisture Percentile
05/10/2022



Soil moisture conditions bad and getting worse across much of the eastern plains, San Luis Valley, and portions of the western slope

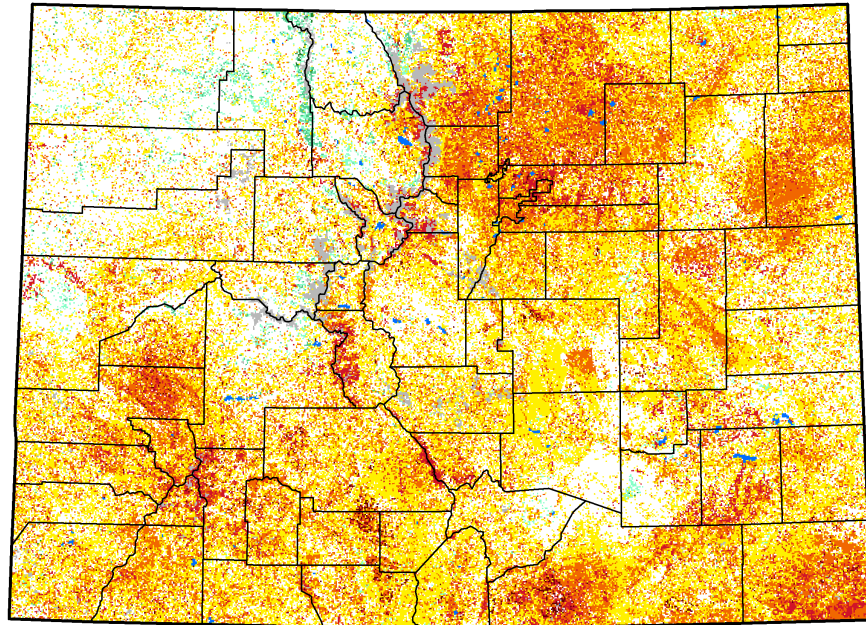


VegDRI: longer-term vegetation condition

Vegetation Drought Response Index

Complete: Colorado

May 15, 2022



Vegetation Condition

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

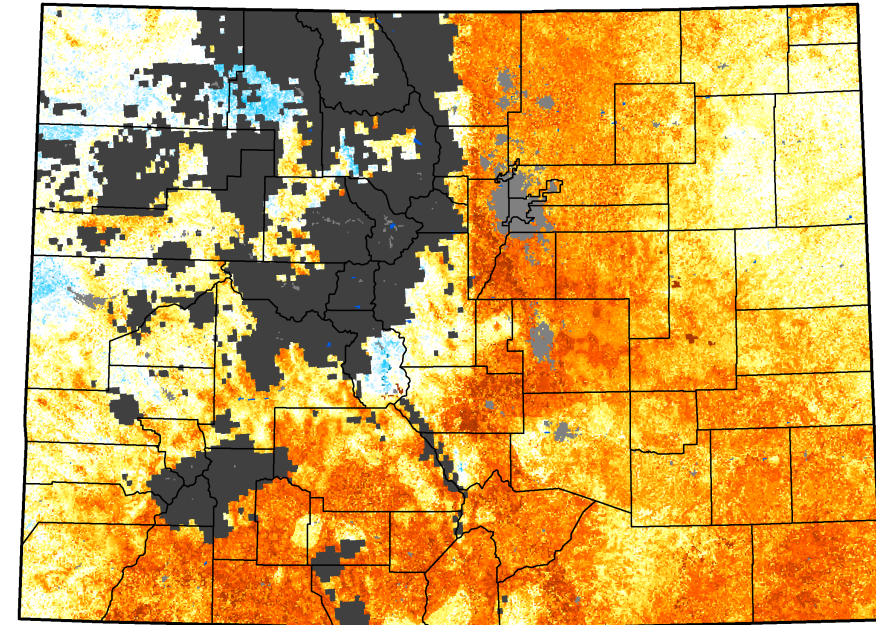


QuickDRI: shorter-term vegetation response

Quick Drought Response Index

Colorado

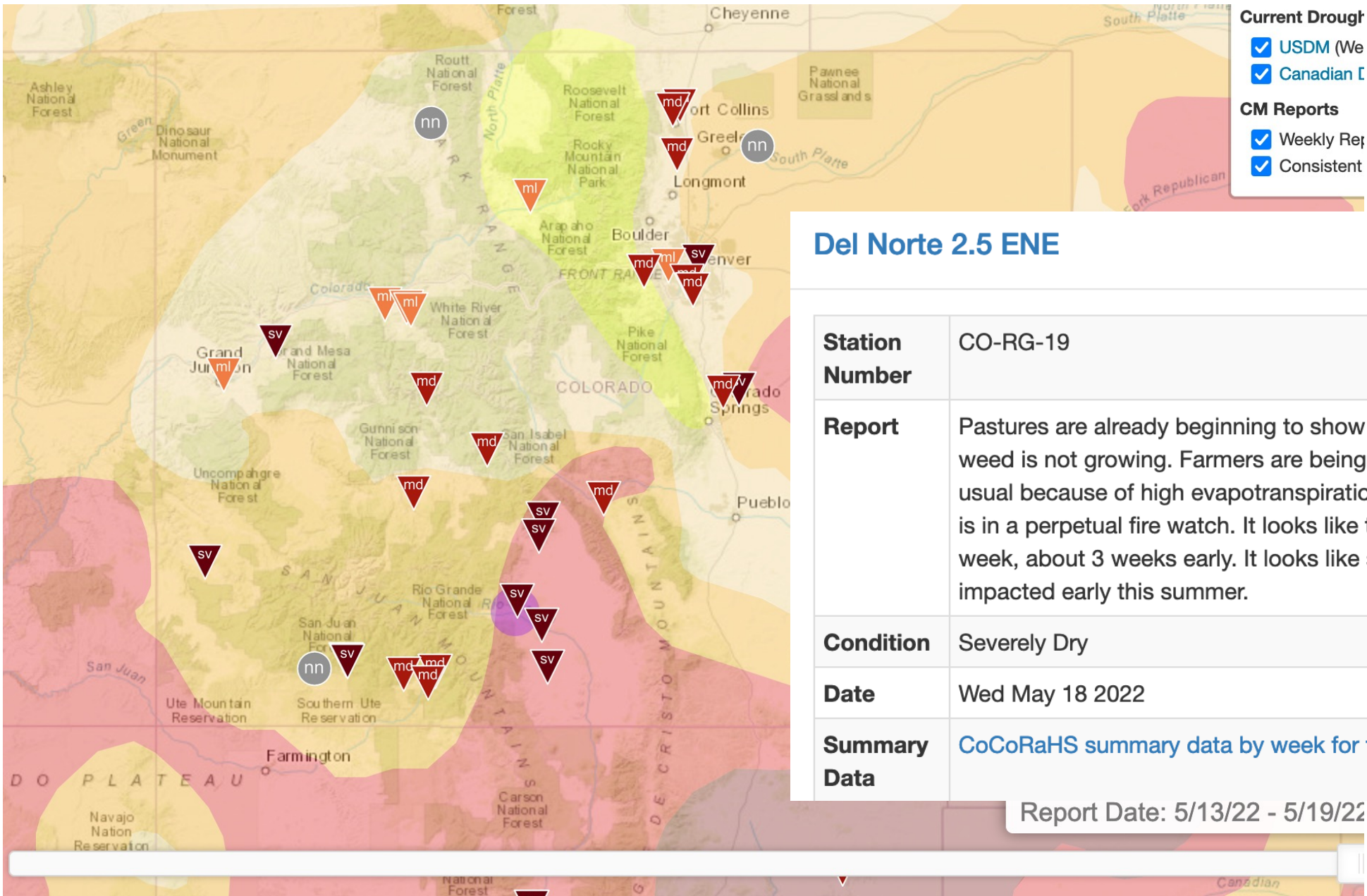
May 15, 2022
(Week 20)



Conditions Relative to 4-Week Historical Average

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





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





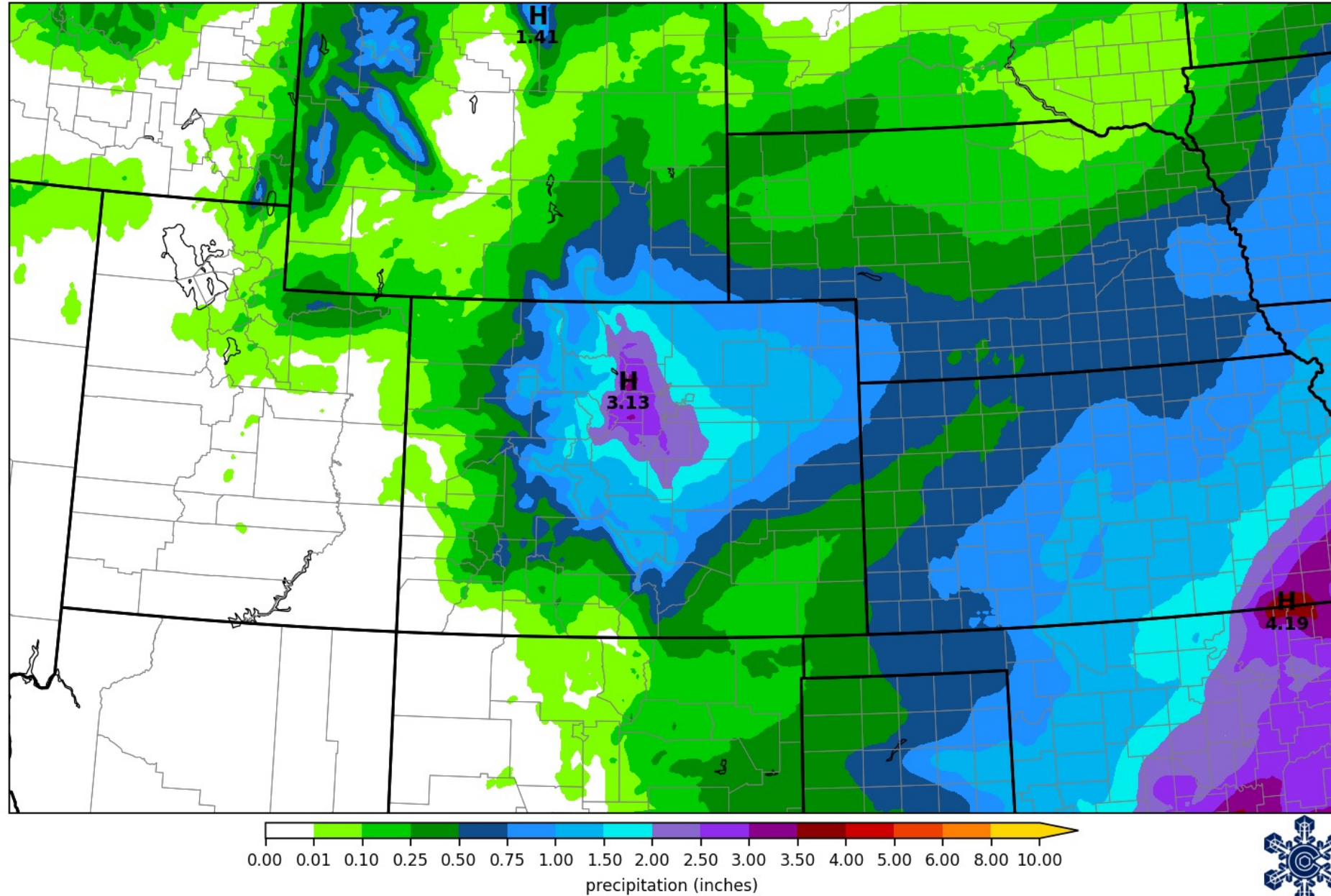
Outlook



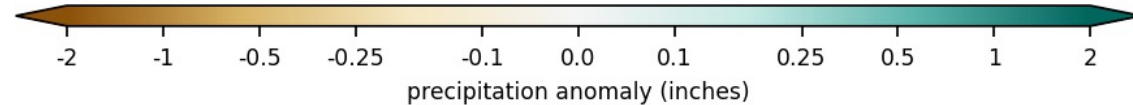
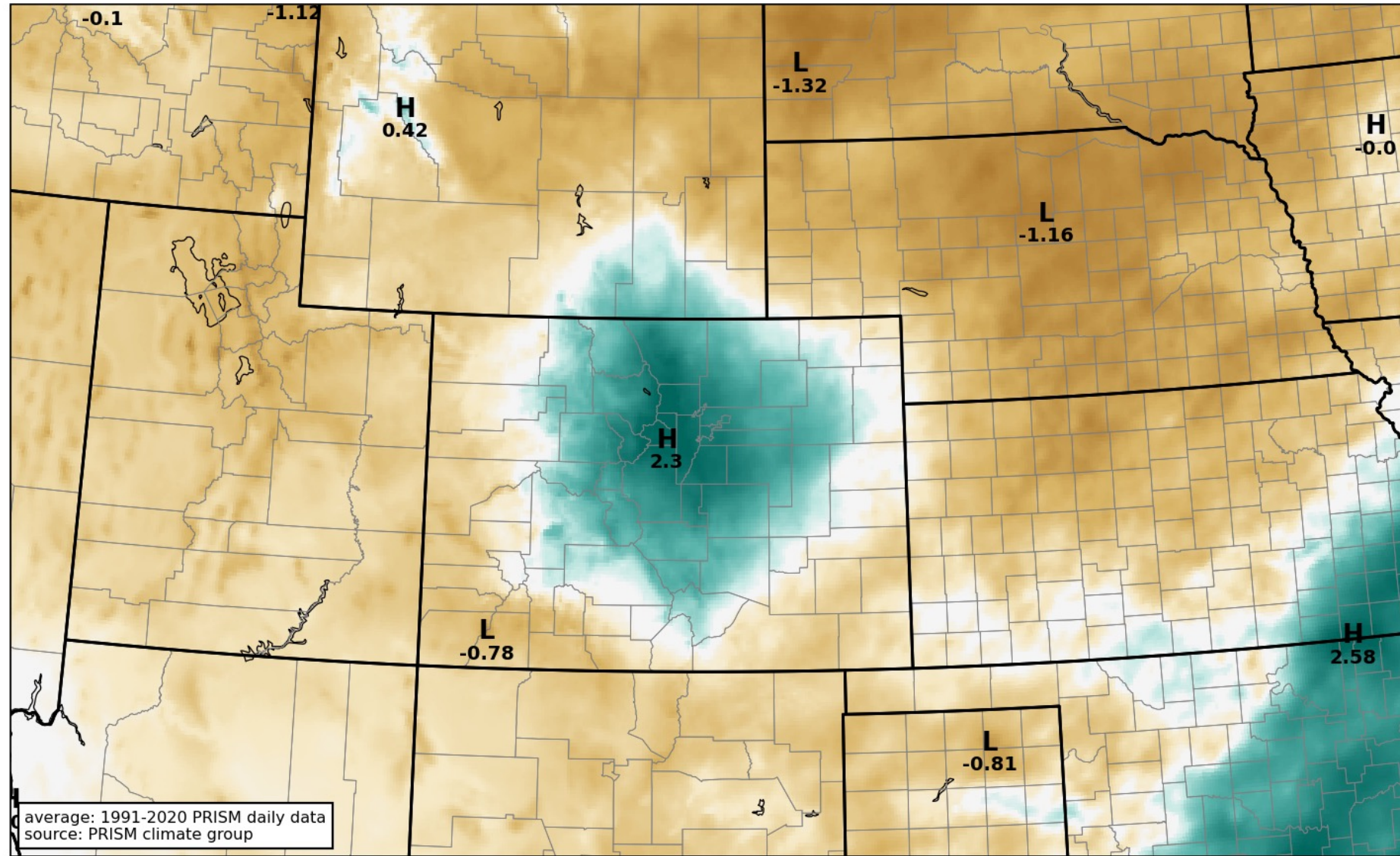
NOAA 7-day precipitation forecast

NOAA Weather Prediction Center
7-day precipitation forecast

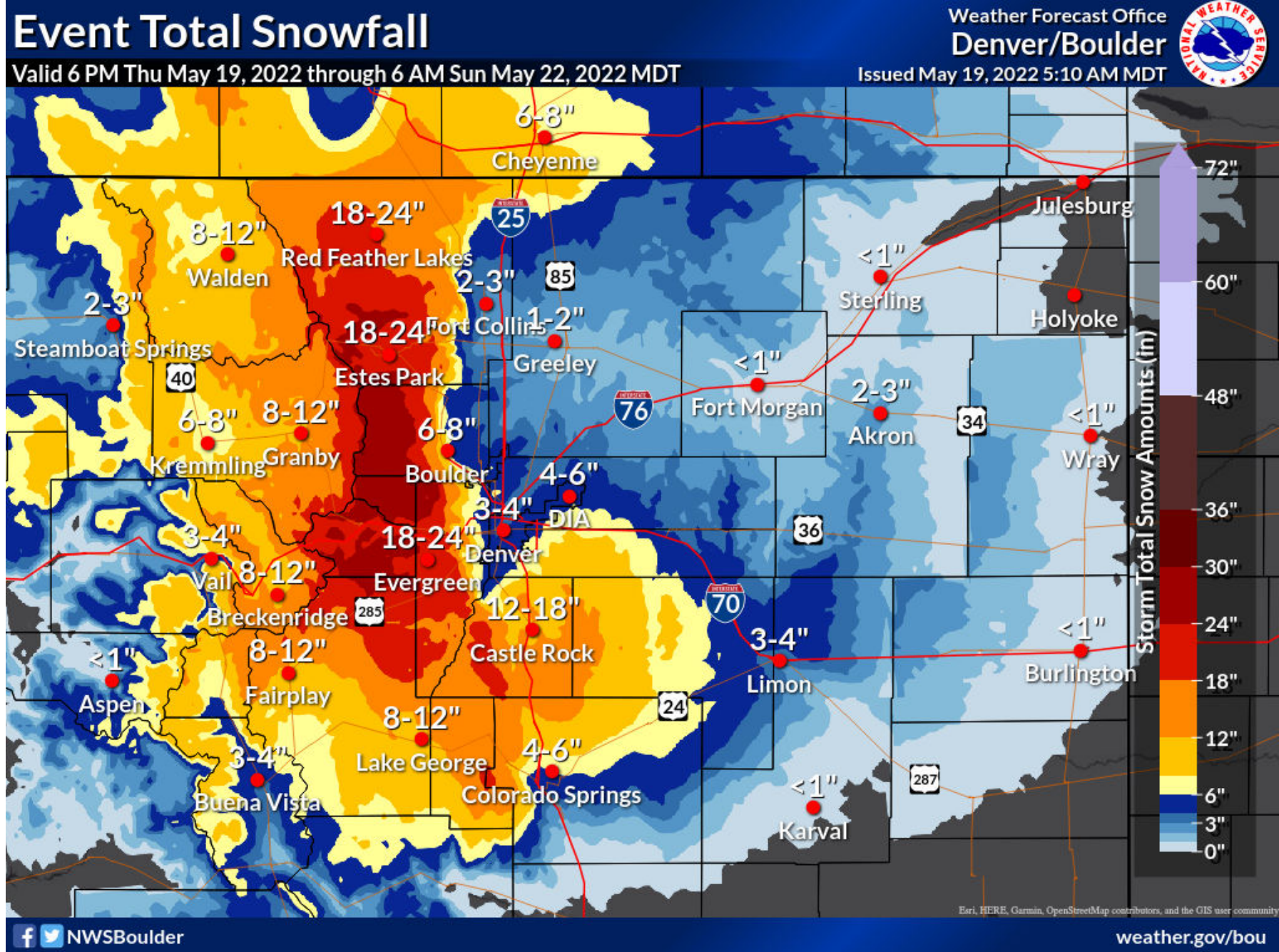
forecast issued 1200 UTC Thu 19 May 2022
precipitation in 168 hrs ending 1200 UTC Thu 26 May 2022



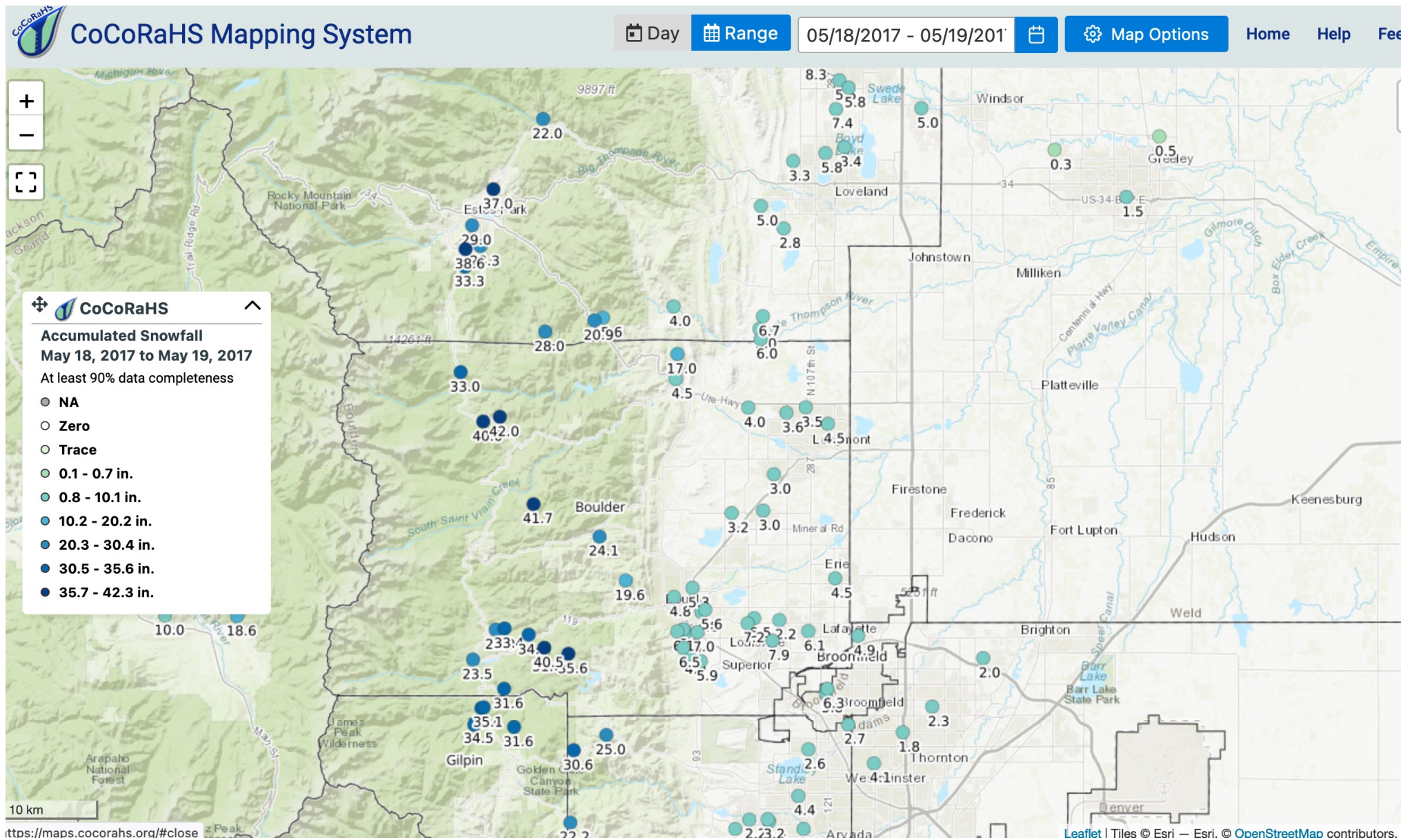
NOAA 7-day precipitation forecast (difference from average)



NWS snowfall forecast

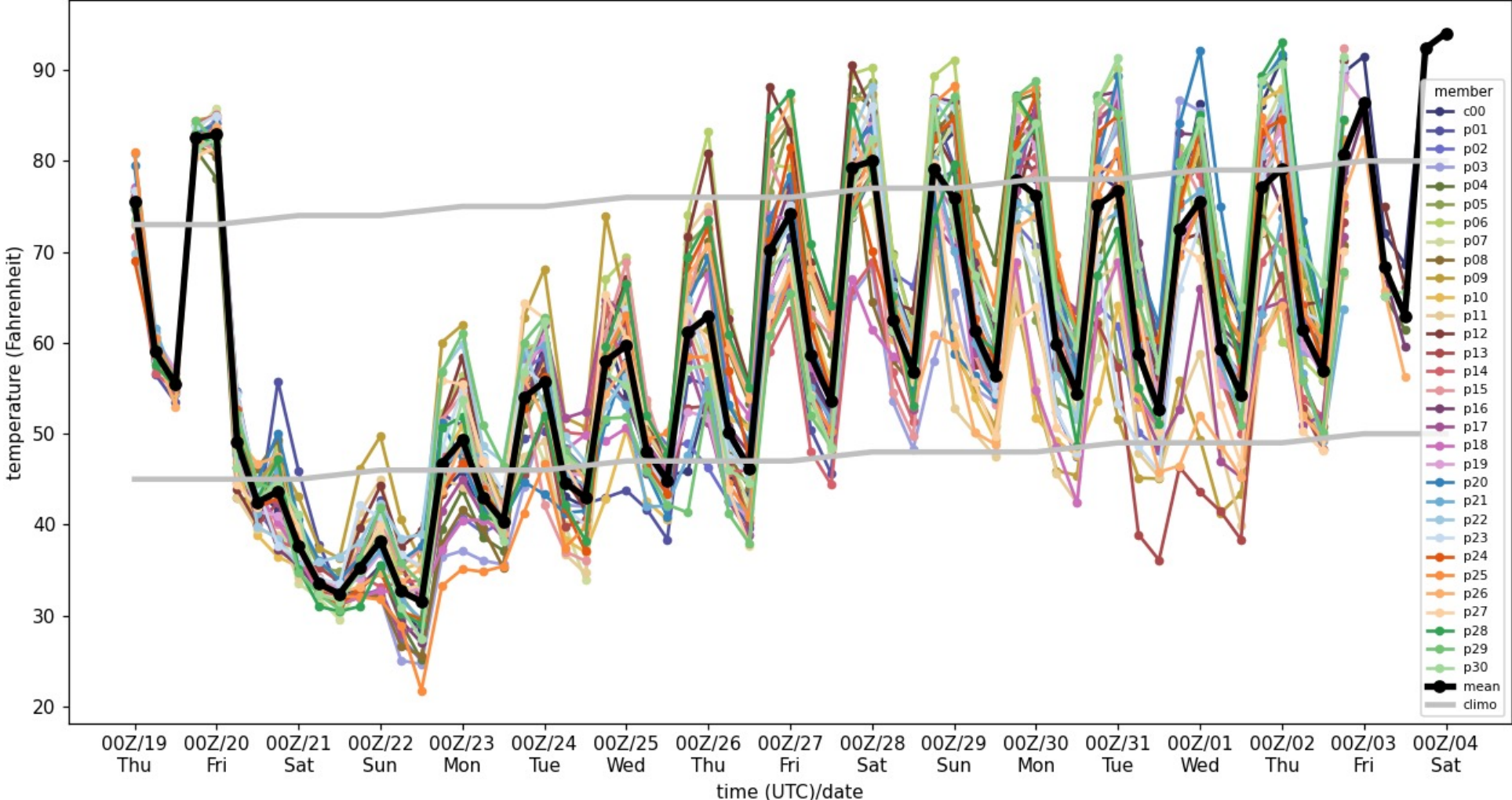


Remember this storm from 5 years ago?



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

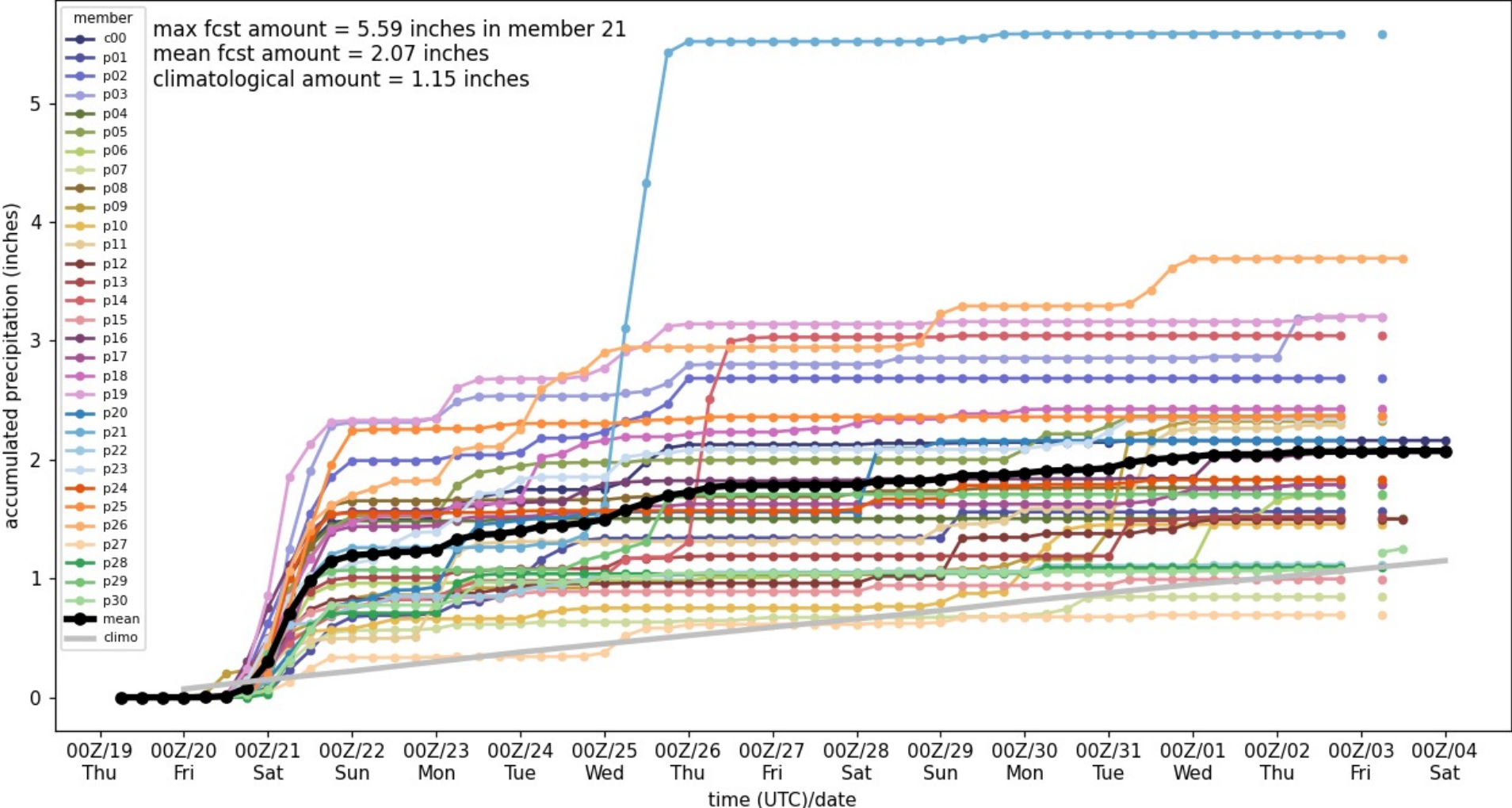
NCEP GEFS 2-m temperature at Denver
init: Thursday 2022-05-19 0000 UTC



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

NCEP GEFS accumulated precipitation at Denver

init: Thursday 2022-05-19 0000 UTC

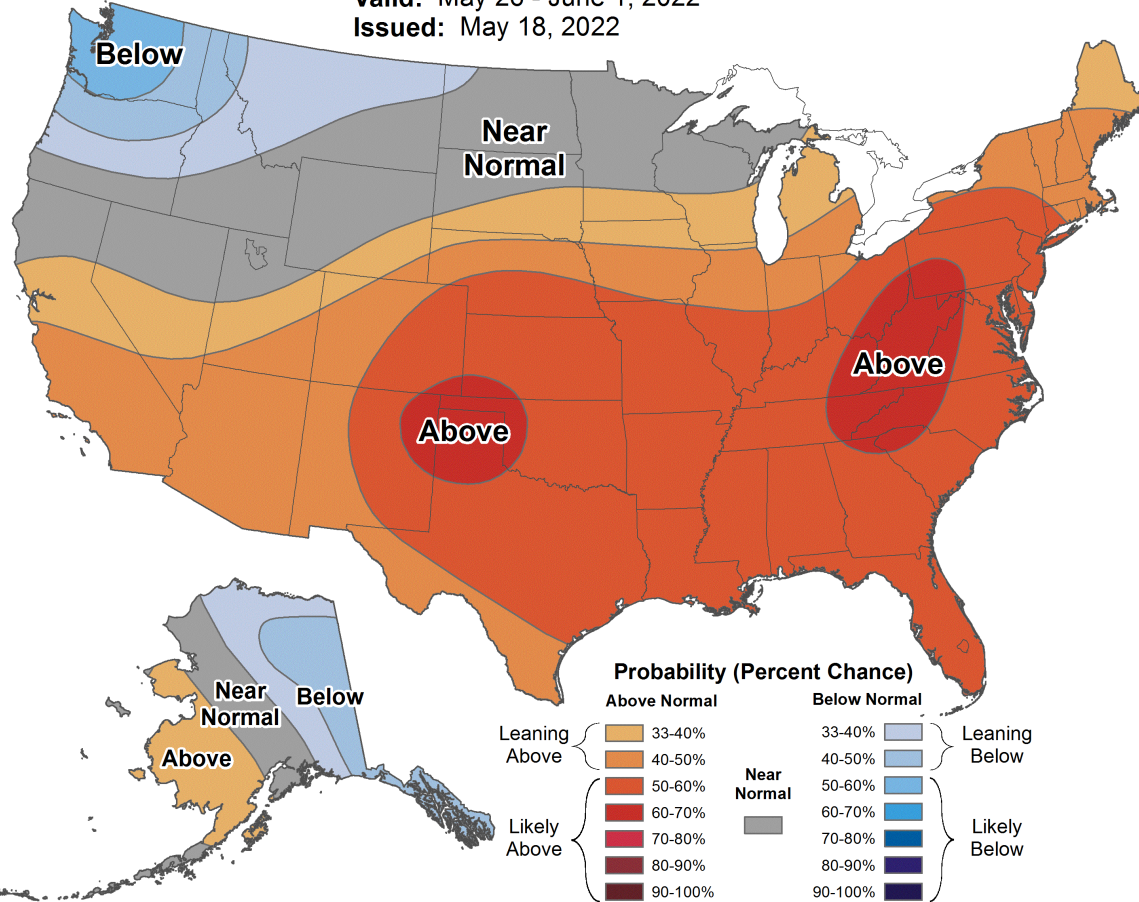


May 26-June 1: back to warm and dry



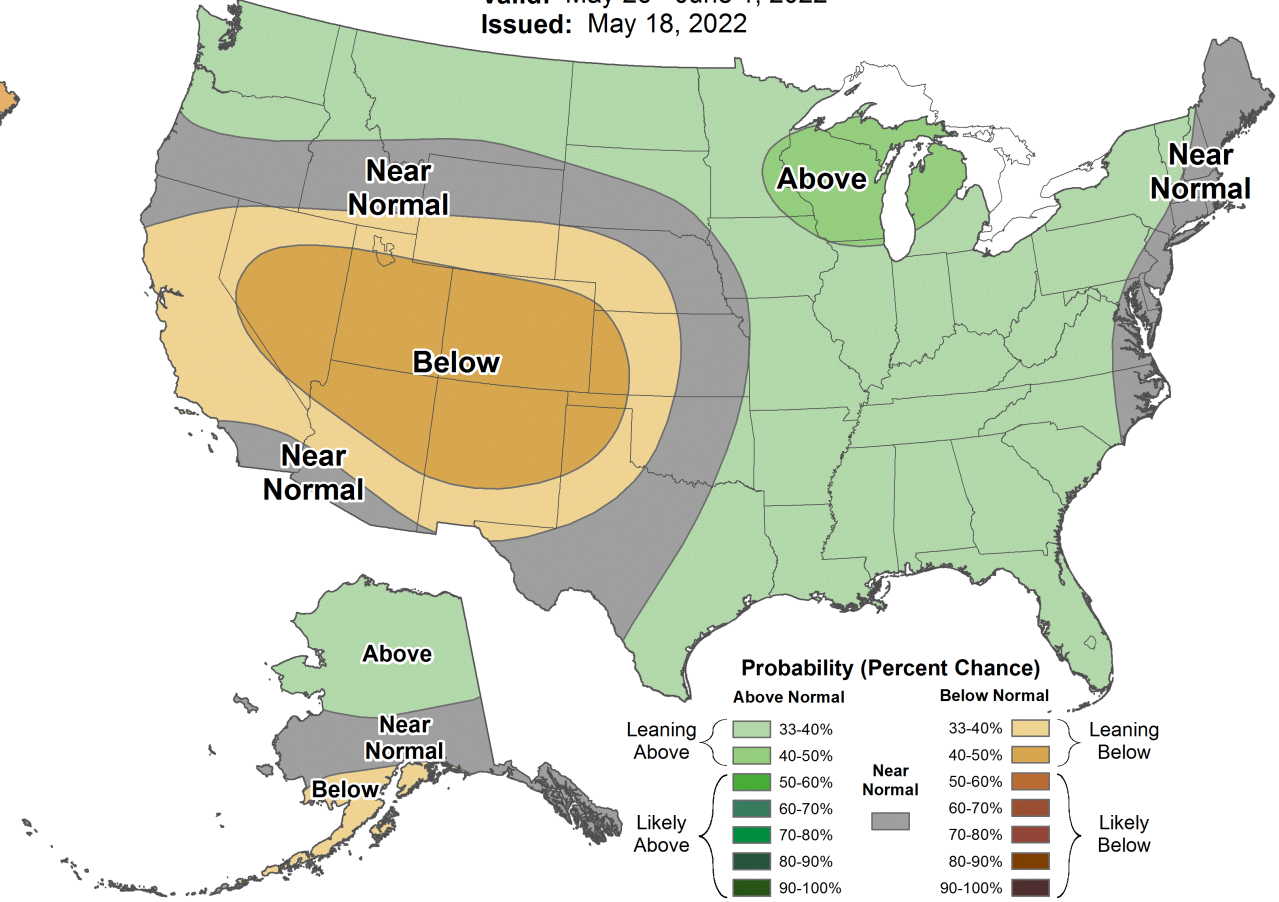
8-14 Day Temperature Outlook

Valid: May 26 - June 1, 2022
 Issued: May 18, 2022



8-14 Day Precipitation Outlook

Valid: May 26 - June 1, 2022
 Issued: May 18, 2022



Strong La Niña continues

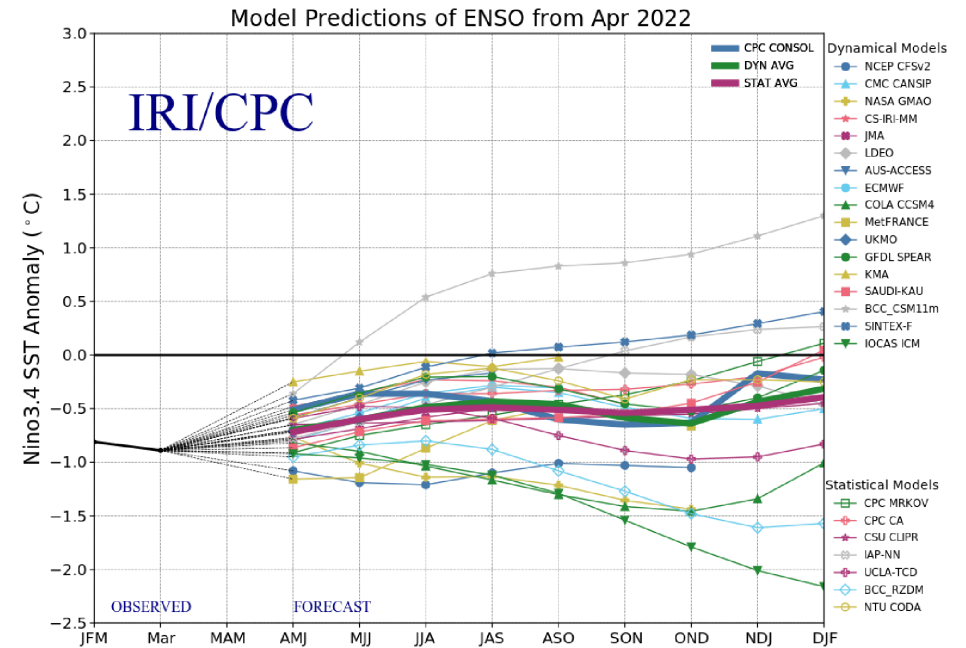
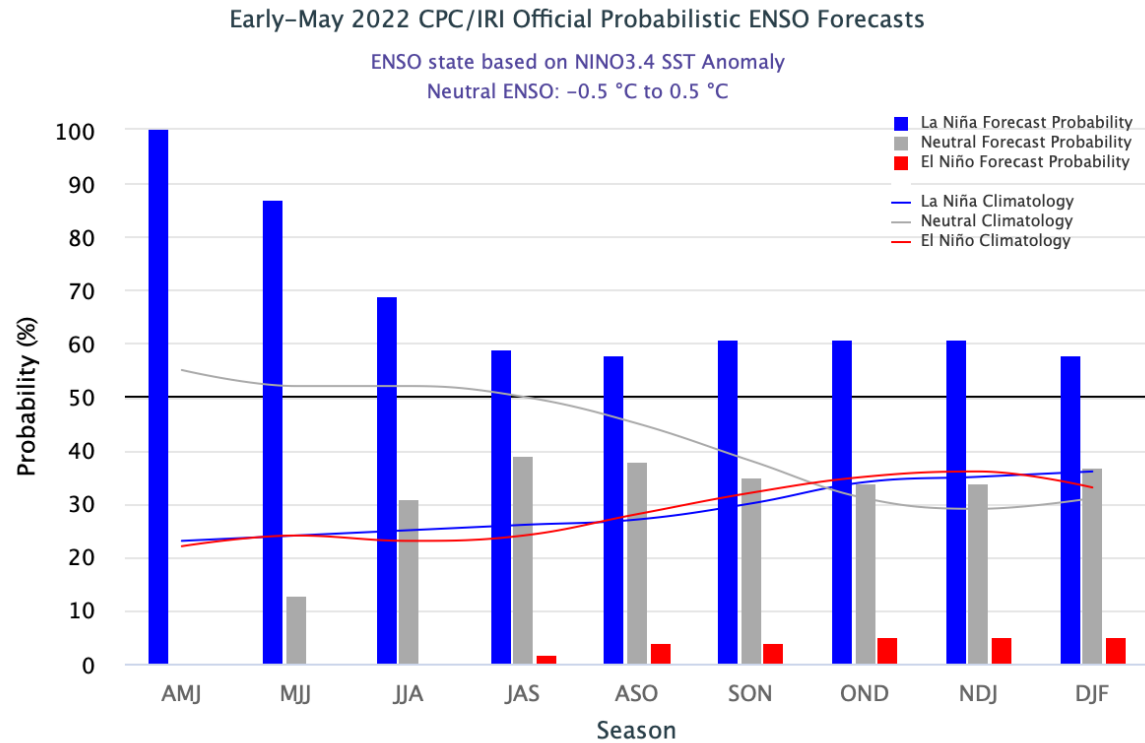
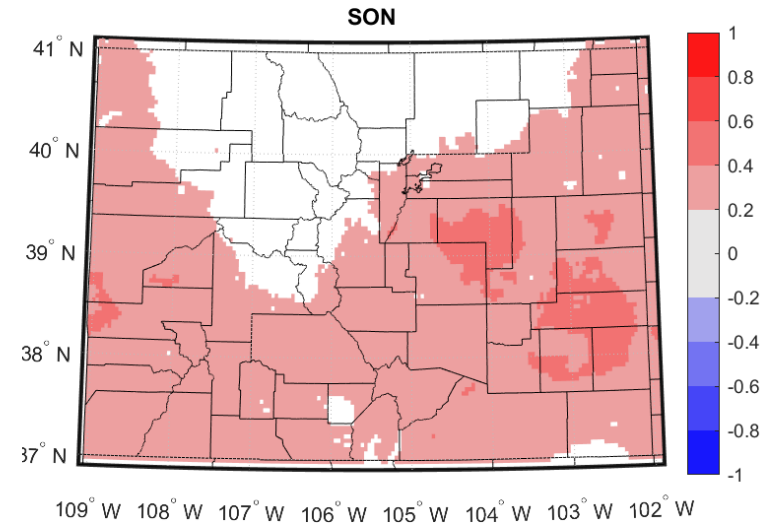
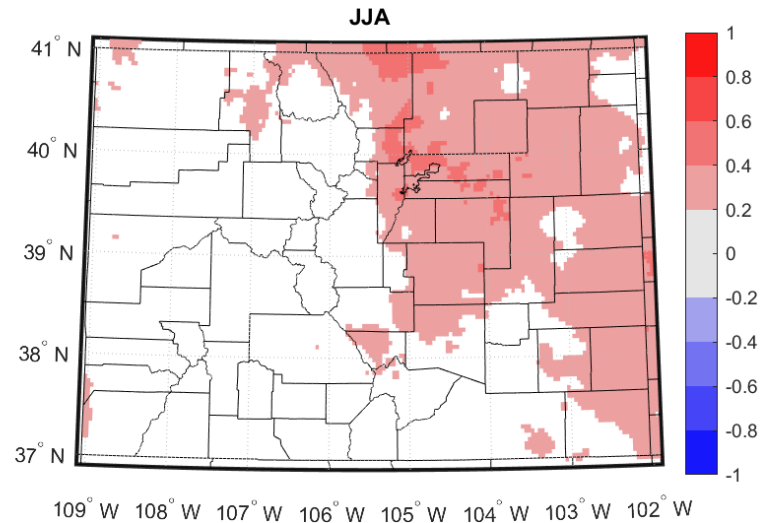
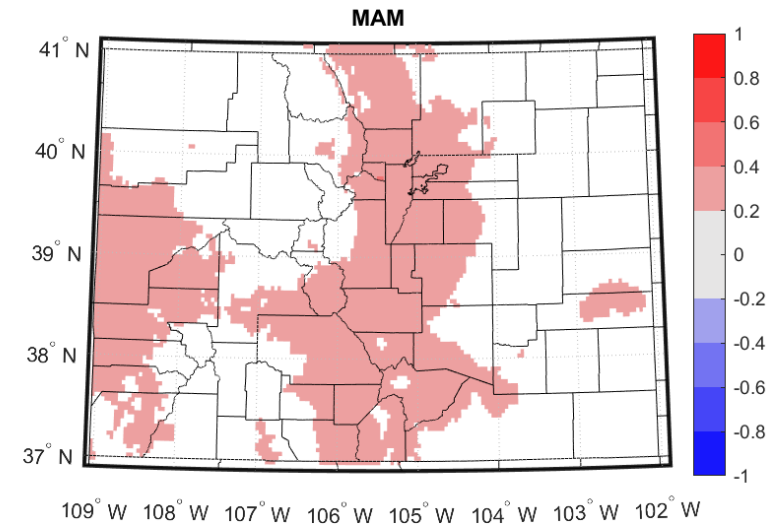
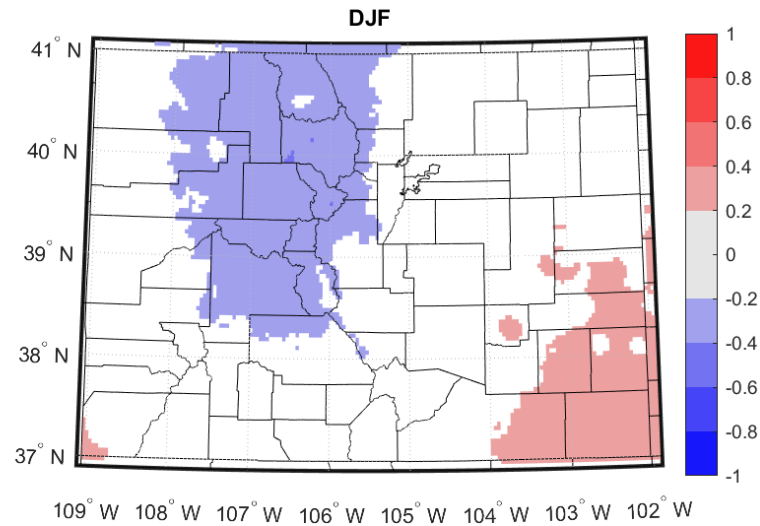


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N - 5°S , 120°W - 170°W) Figure updated 19 April 2022

Odds now favor La Niña to continue through the summer and potentially through the fall (61% chance of La Niña in the fall) – not great news

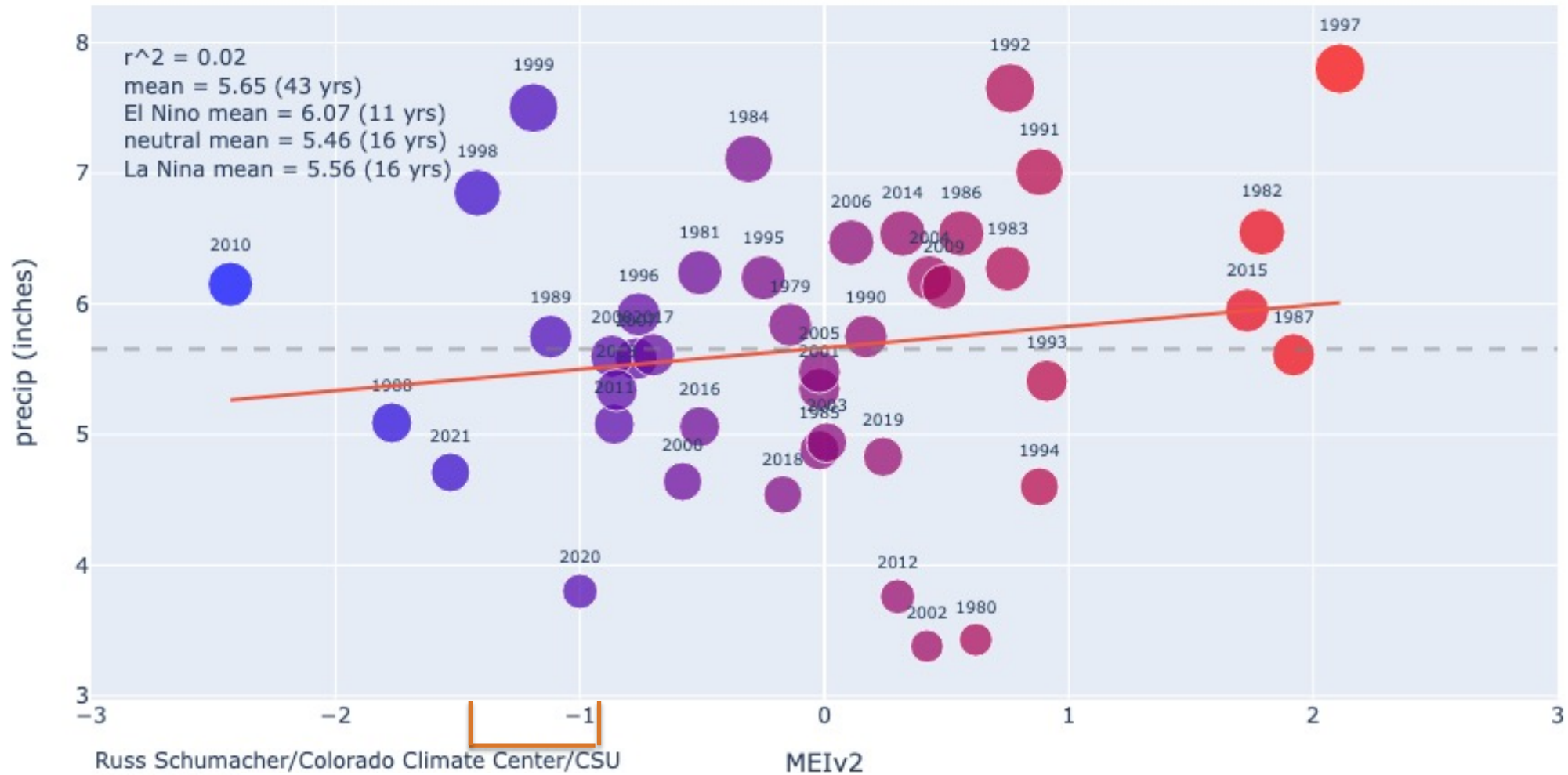


Correlation between ENSO ONI and Colorado Seasonal Precipitation (masked for significance at 95% confidence)

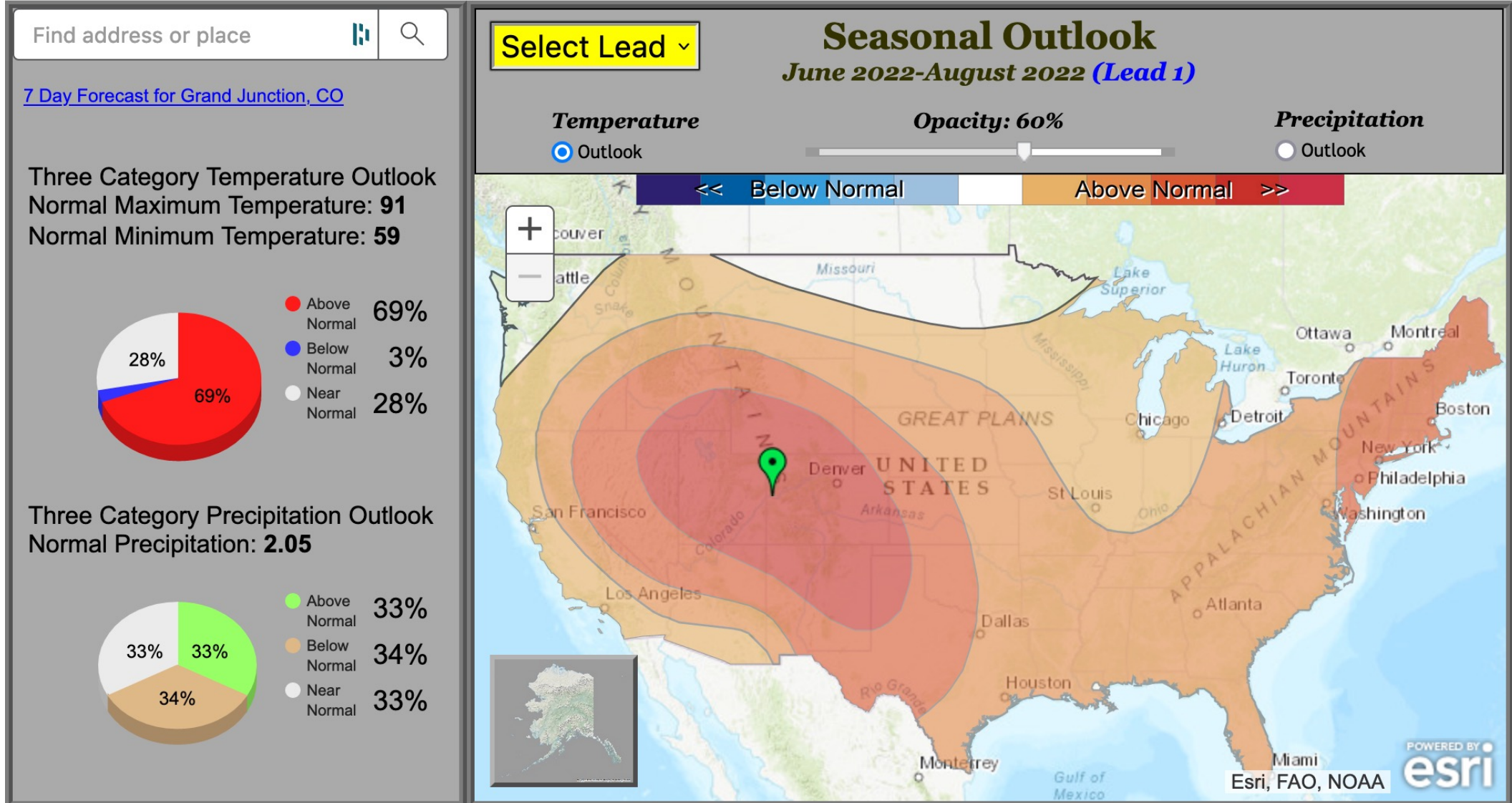


Red = El Niño wetter Blue = La Niña wetter

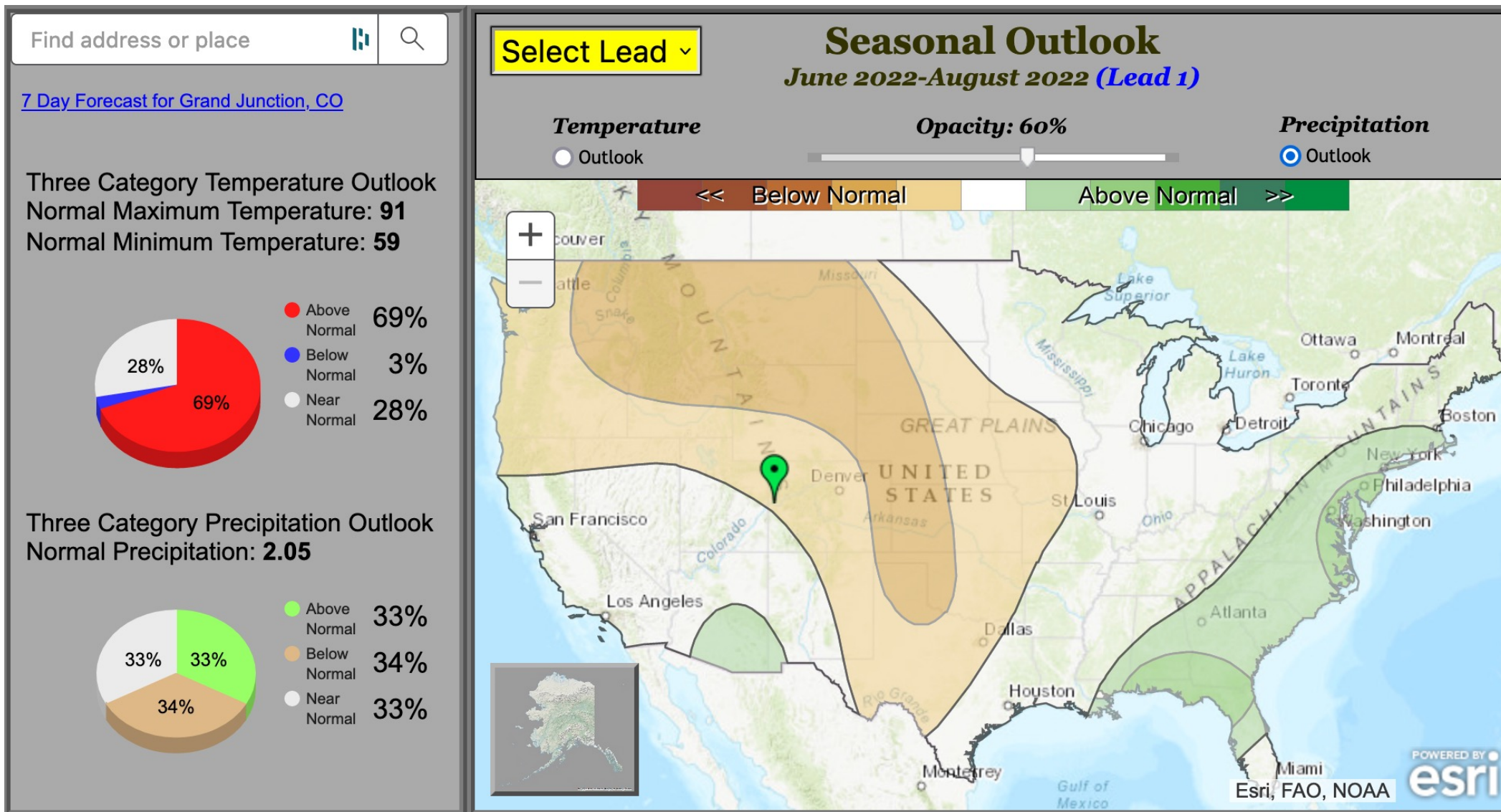
Colorado statewide average precipitation vs multivariate ENSO index, June - August



June-July-August outlook



June-July-August outlook



Takeaways

- Drought conditions have worsened significantly since mid-March, after many places experienced a record-dry and extremely windy April. Benefits of the storm in early May have mostly evaporated.
- A big change is on the way, with significant rain and snow for northern Colorado. Unfortunately the places that most need precipitation (southern Colorado) won't get as much
- Summer outlook shows high confidence in another warmer-than-average summer
- We may get a “triple-dip” La Niña, which would not be good news for Colorado – La Niña years tend to be dry



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