

Colorado Climate Center *WATF Climate Update*

Russ Schumacher, state climatologist

Water Availability Task Force

May 19, 2022



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CLIMATE
CENTER



ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Water year 2022 to date:
temperature, precipitation,
evaporative demand

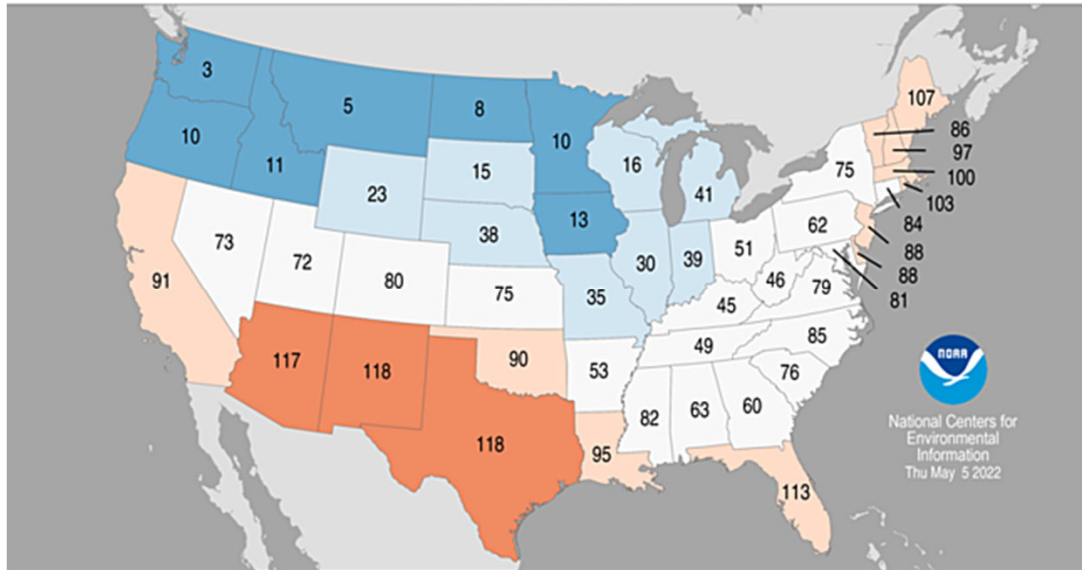


From CODOS update, May 8 near Ophir Pass
<http://www.codos.org/codosupdates/may102022>
Photo credit: Omar Behery



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

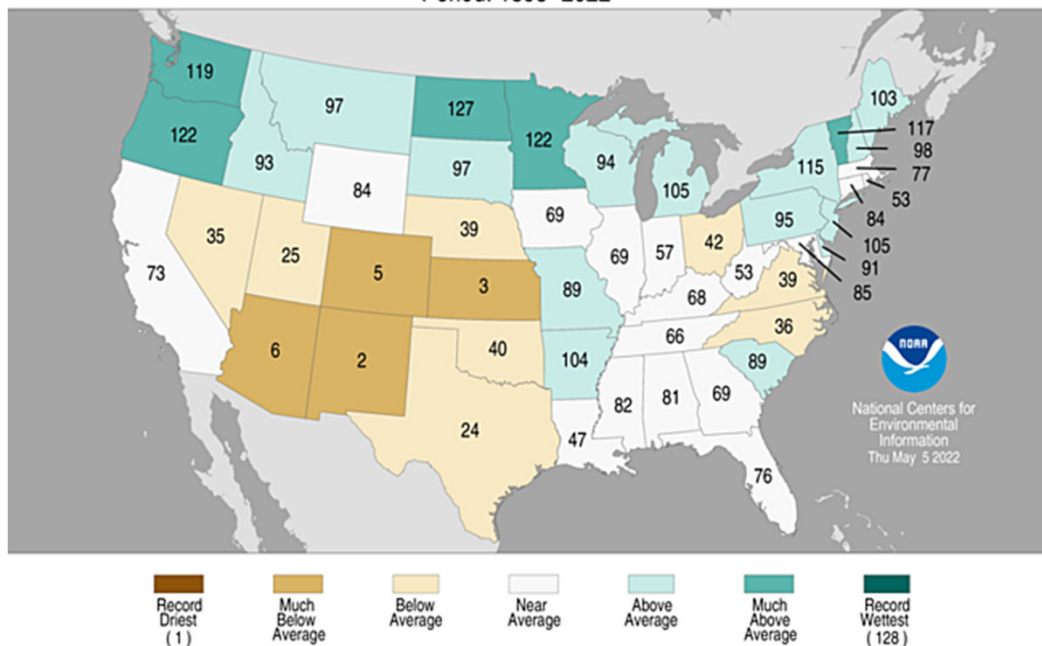


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Statewide Precipitation Ranks

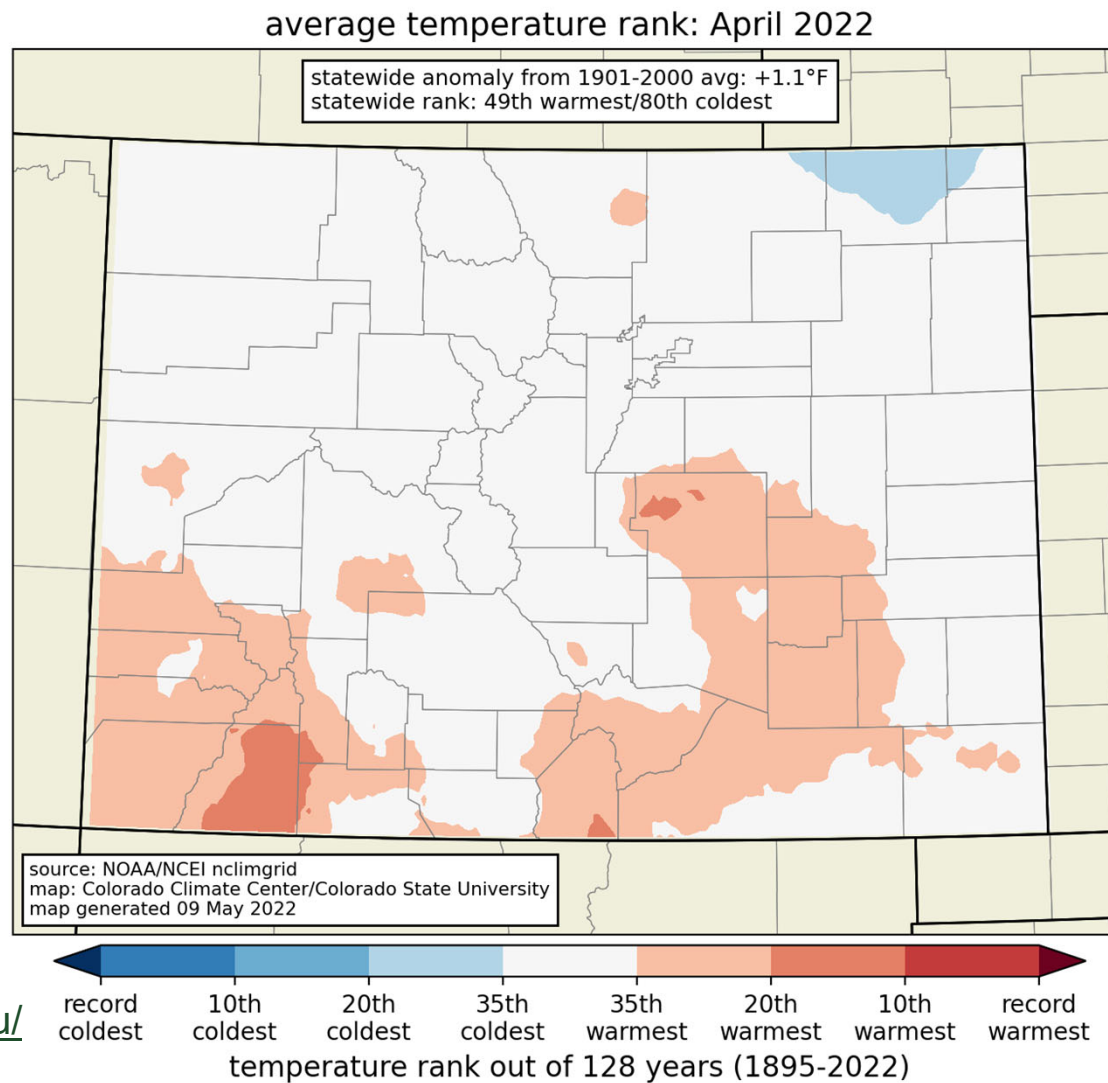
April 2022
Period: 1895–2022



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

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: 49th
warmest April**



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

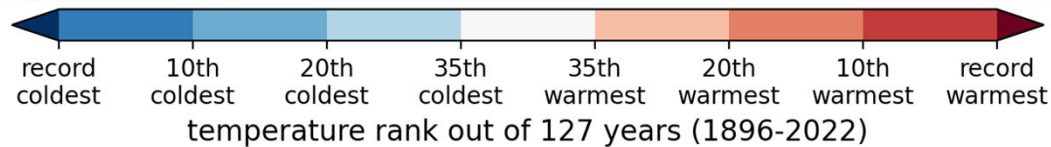
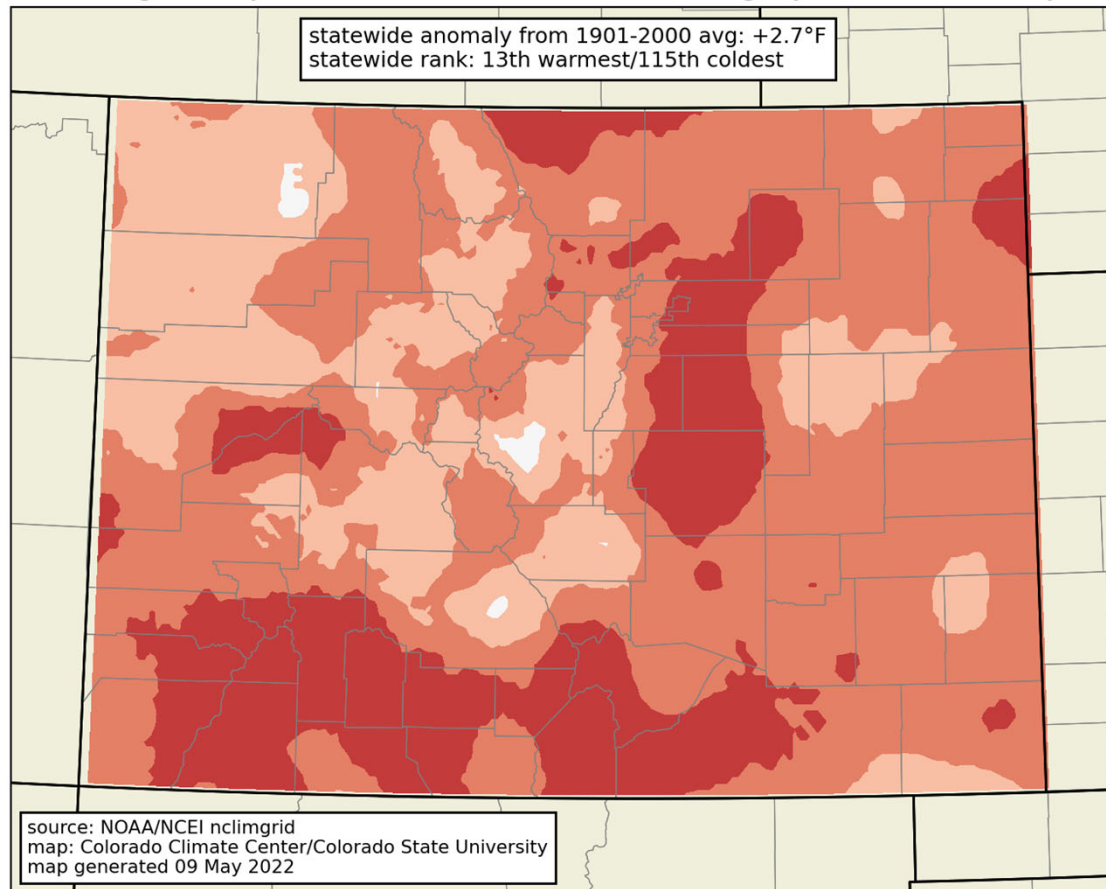


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Statewide: 13th
warmest October-
April

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



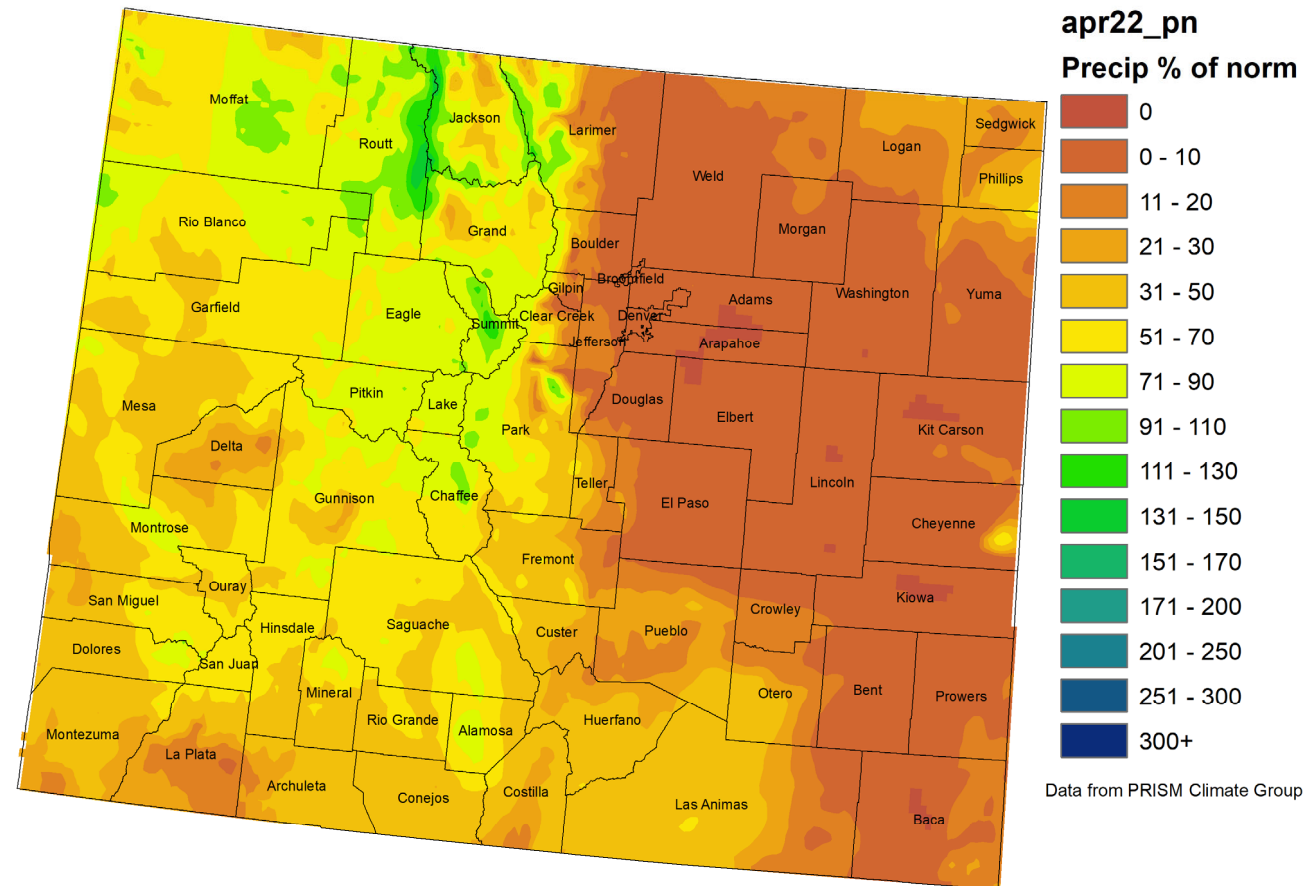
[http://climate.colostate.edu/
co_cag/rank_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



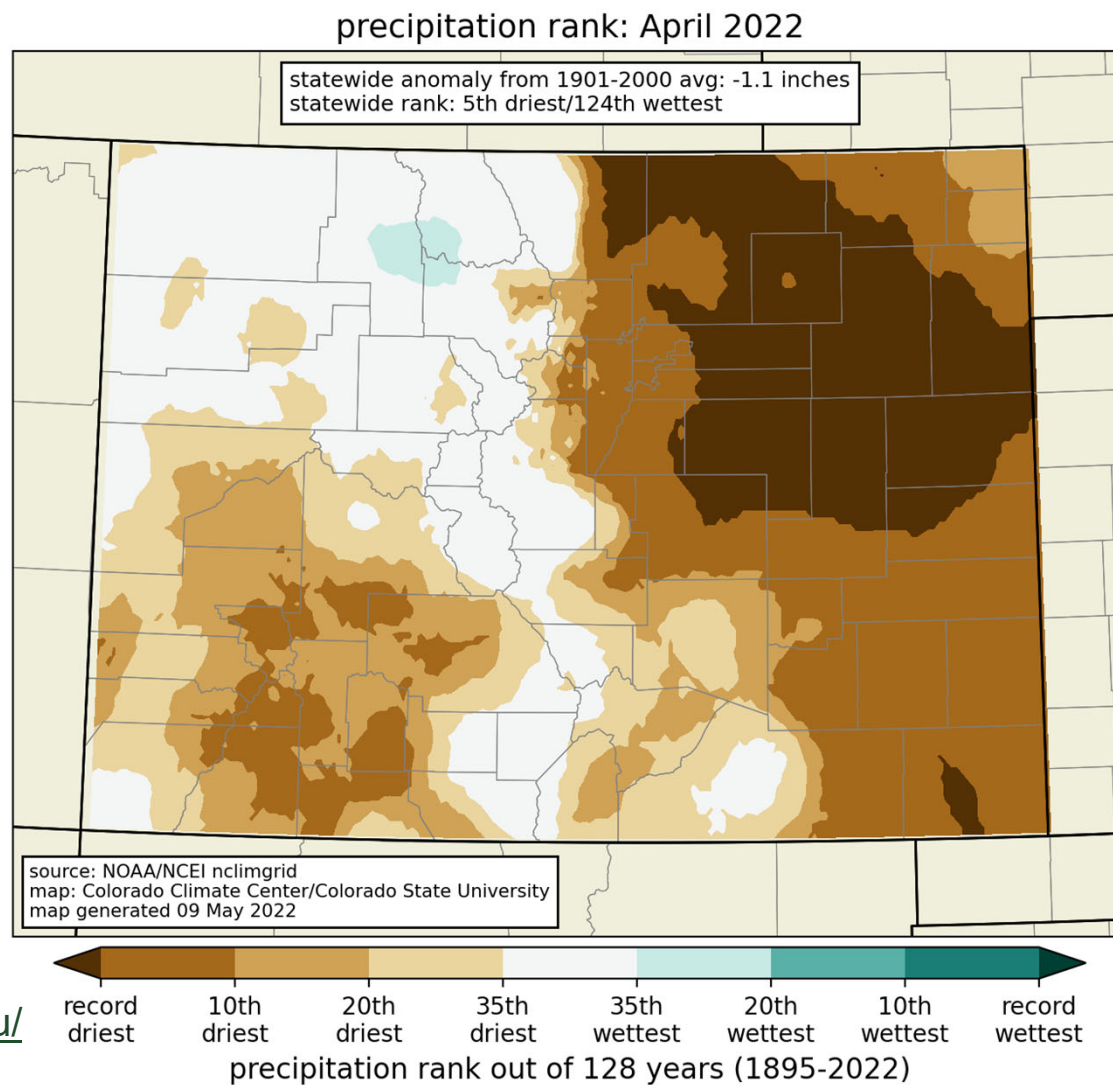
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Colorado April 2022 Precipitation as a Percentage of Normal



Statewide: 5th driest
April



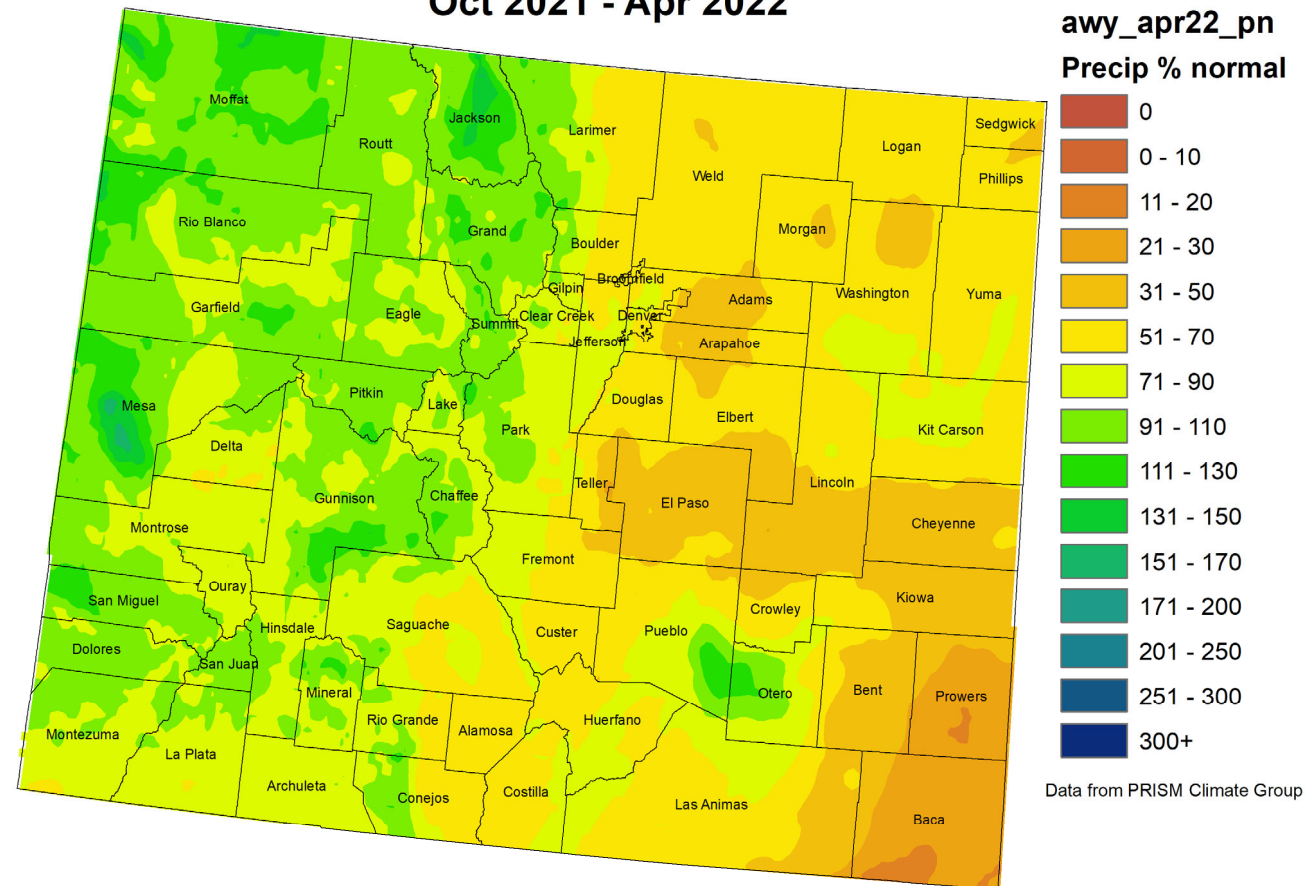
[http://climate.colostate.edu/
co_cag/rank_maps.html](http://climate.colostate.edu/co_cag/rank_maps.html)



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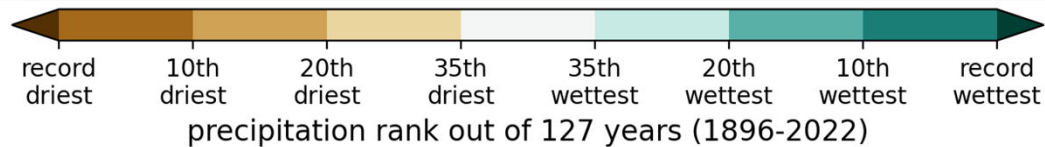
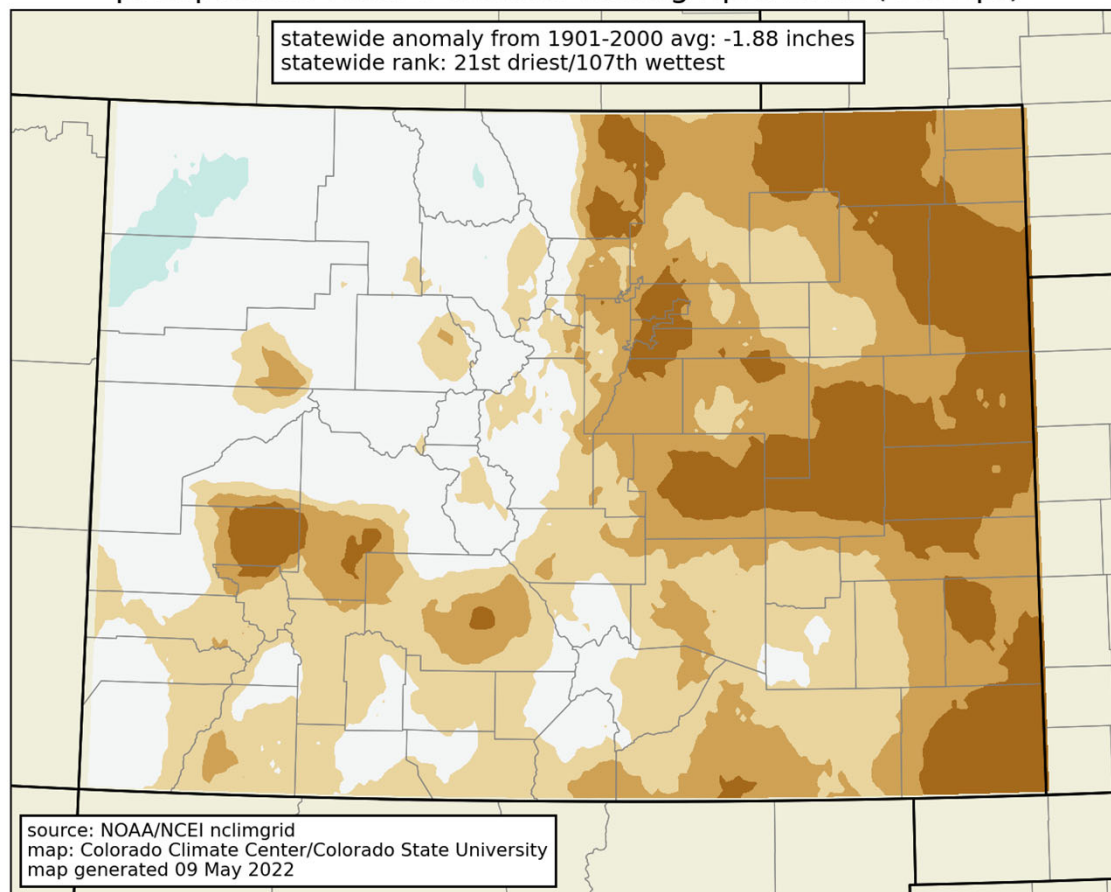


Colorado Water Year 2022 Precipitation as a Percentage of Normal Oct 2021 - Apr 2022



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

**Statewide: 21st driest
October-January**

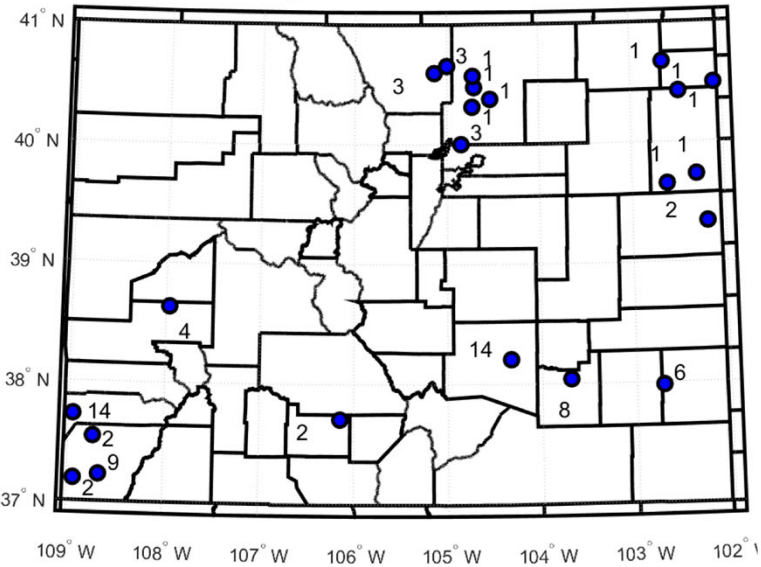


[http://climate.colostate.edu/
ranks_monthly_maps.html](http://climate.colostate.edu/ranks_monthly_maps.html)



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(below) April rankings of wind and potential evapotranspiration at long-term CoAgMET stations

COLORADO STATE UNIVERSITY

CoAgMET Colorado's Mesonet

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



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Colorado statewide average temperature and precipitation, October - April

Warm & dry

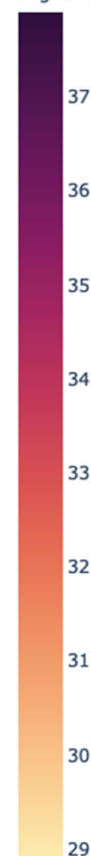
Water year 2022
through April

warm & wet

Warm & wet

avg temp (F)

avg temp (F)



1991-2020 avg temp →

1901-2000 avg temp →

Cool & dry

cool & dry

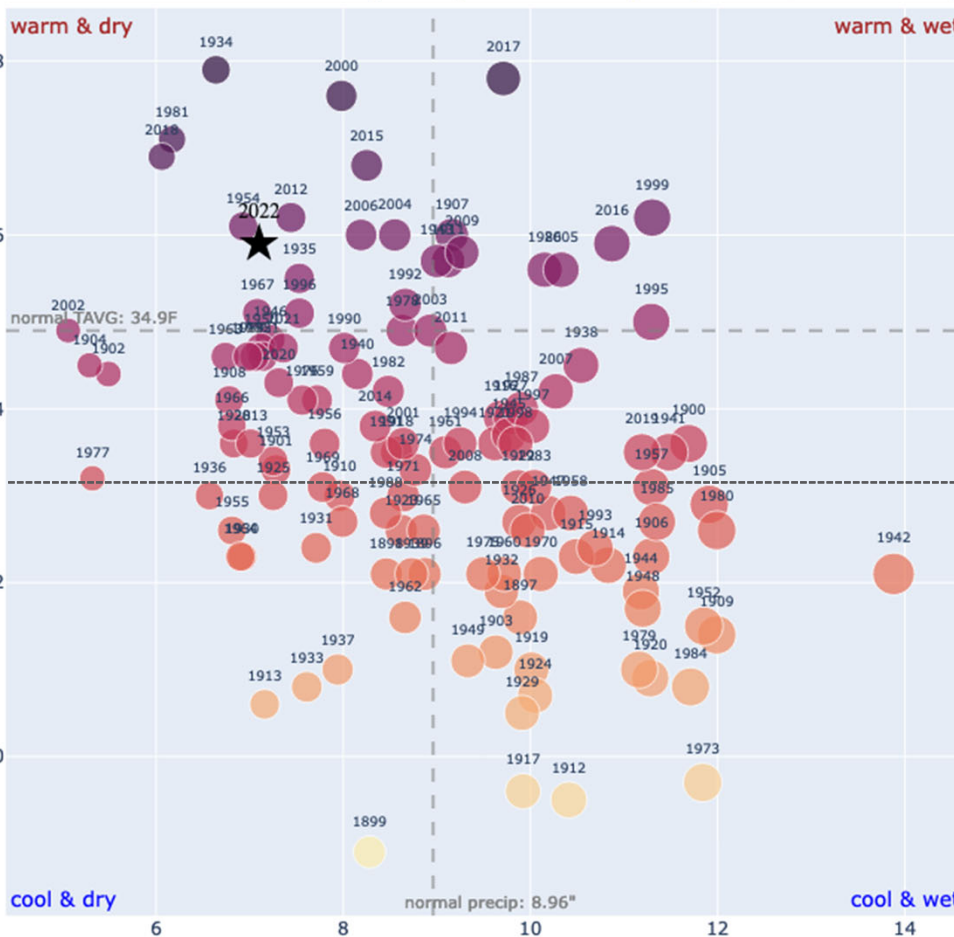
Cool & wet

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



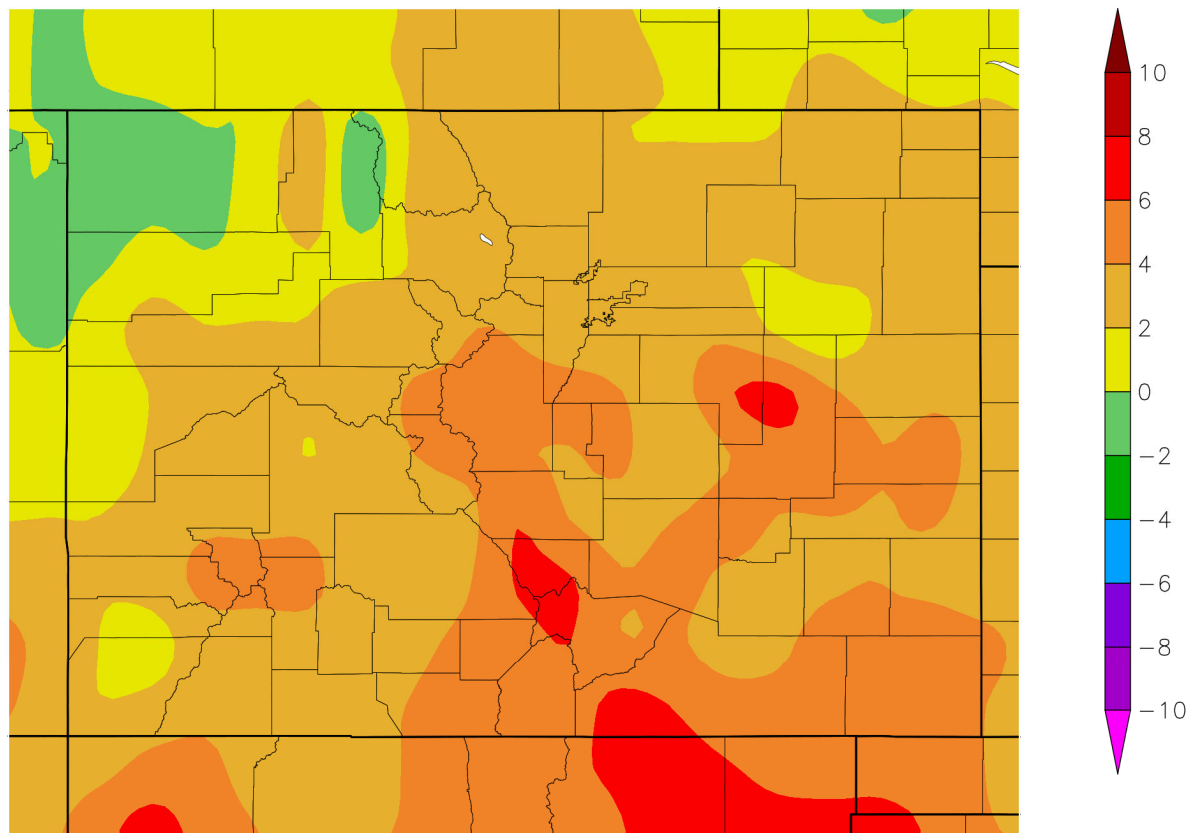
https://climate.colostate.edu/co_cag/quadrant.html



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



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

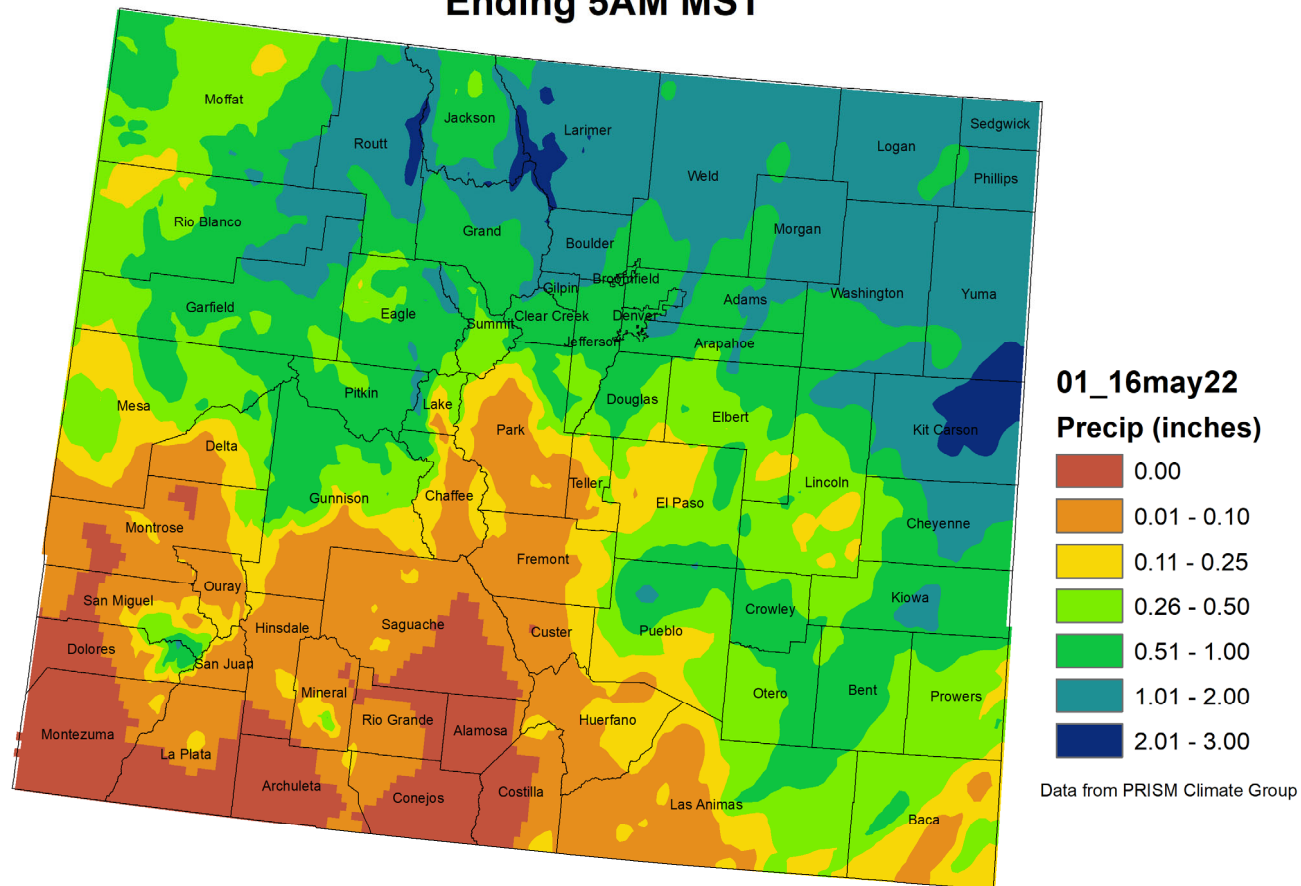
NOAA Regional Climate Centers



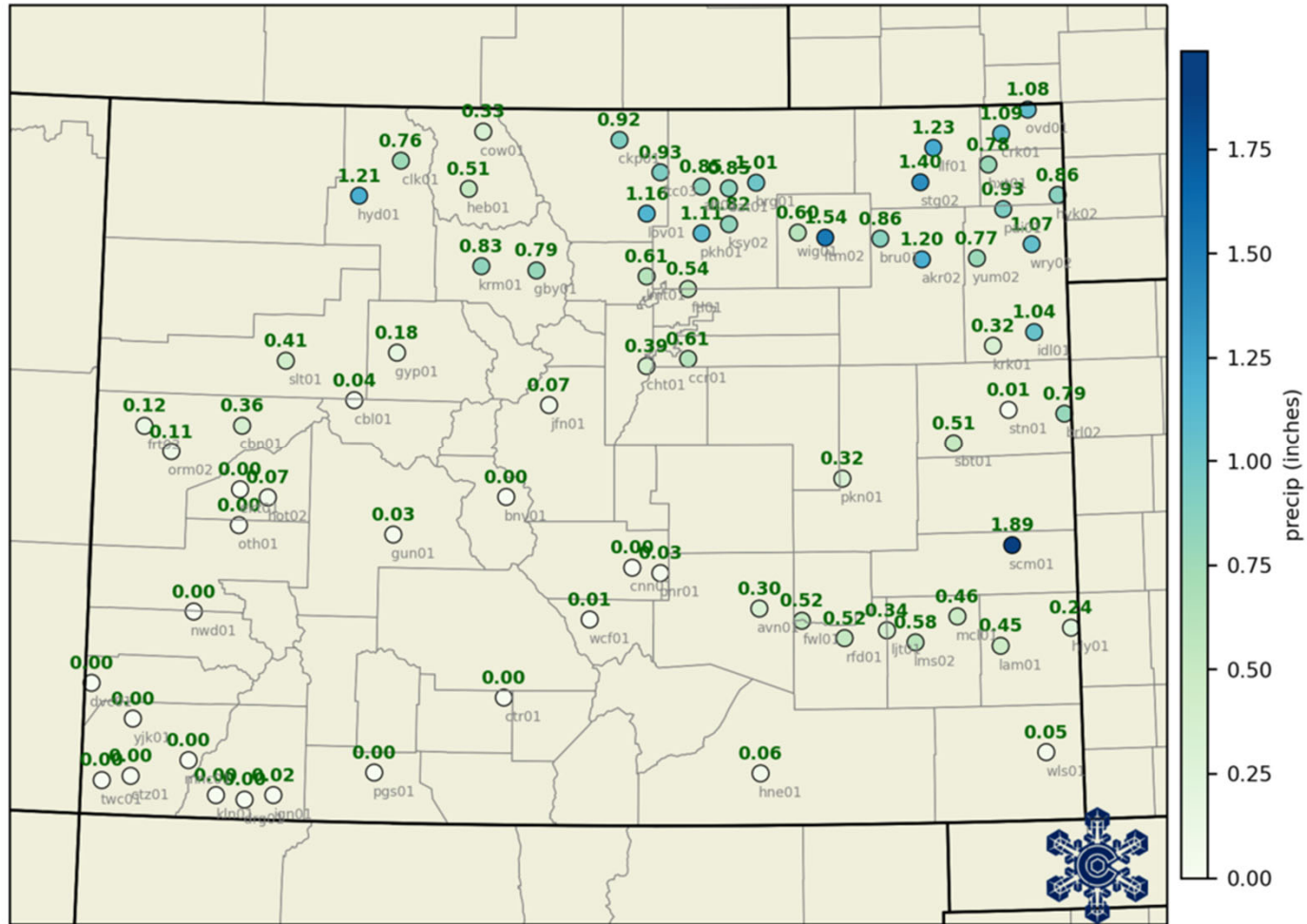
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Colorado Month to Date Precipitation 1 - 16 May 2022 Ending 5AM MST

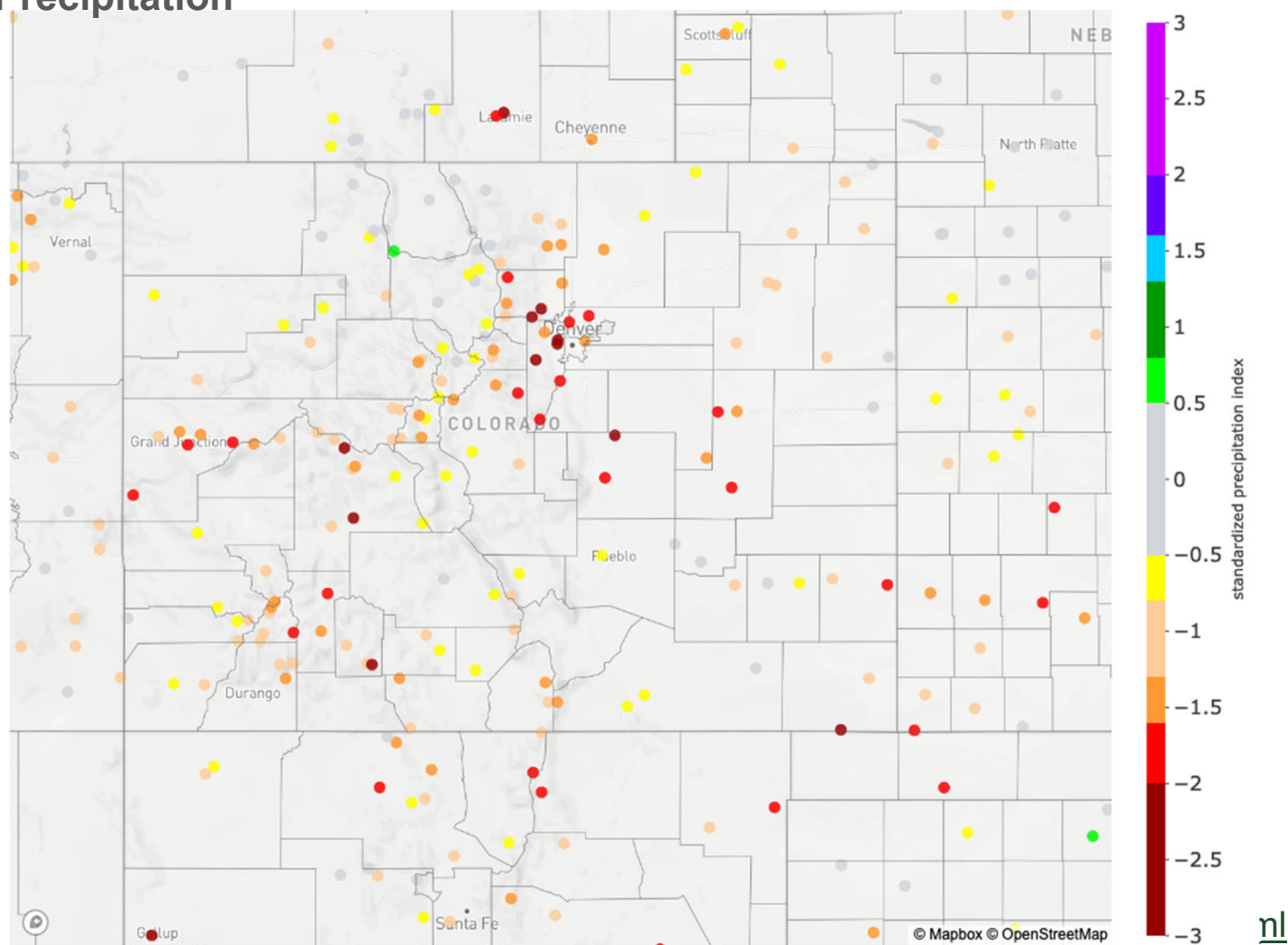


CoAgMET/Northern Water precipitation in previous 14 days: 01 May 2022-15 May 2022



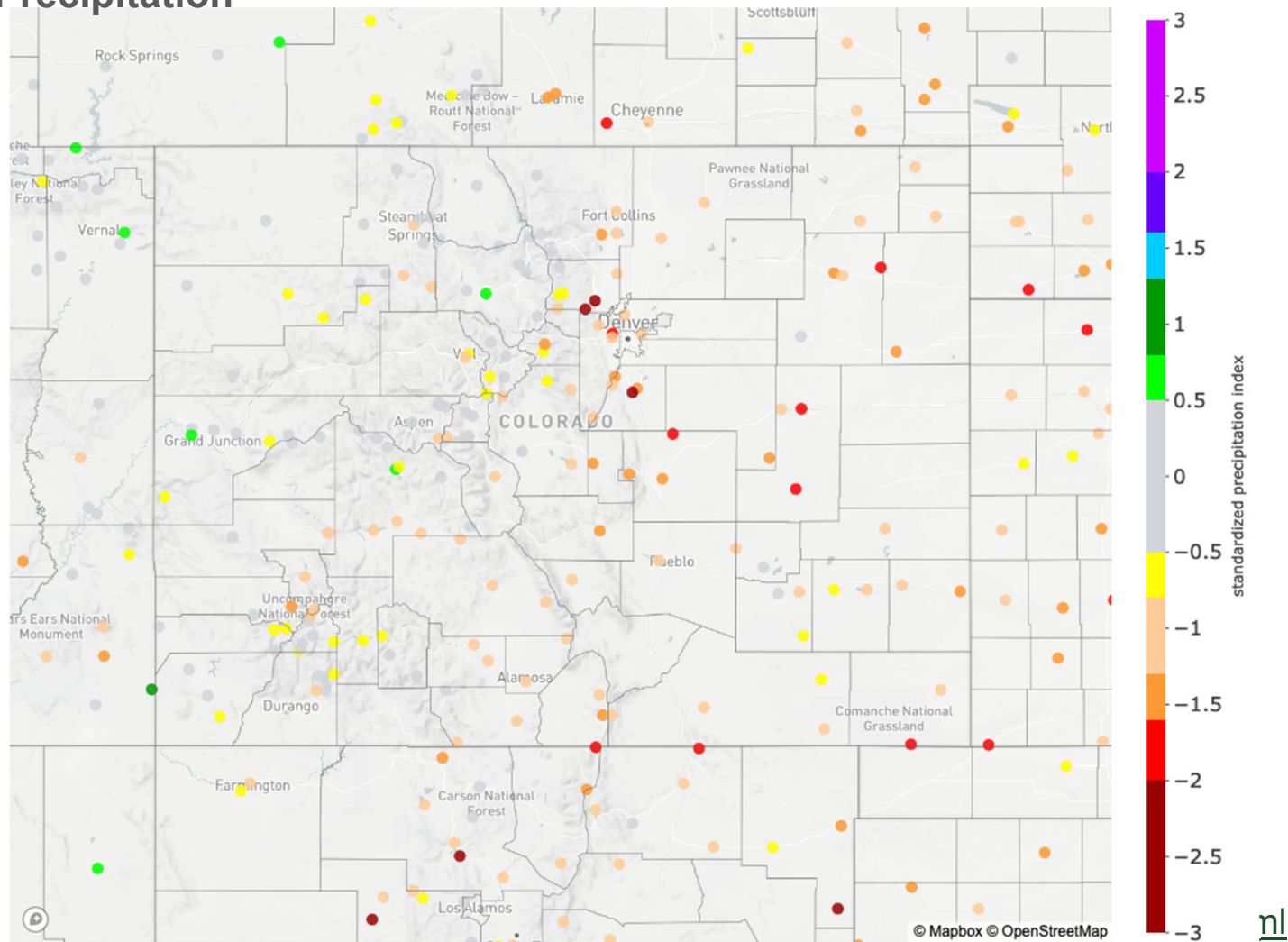
Standardized Precipitation Index

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

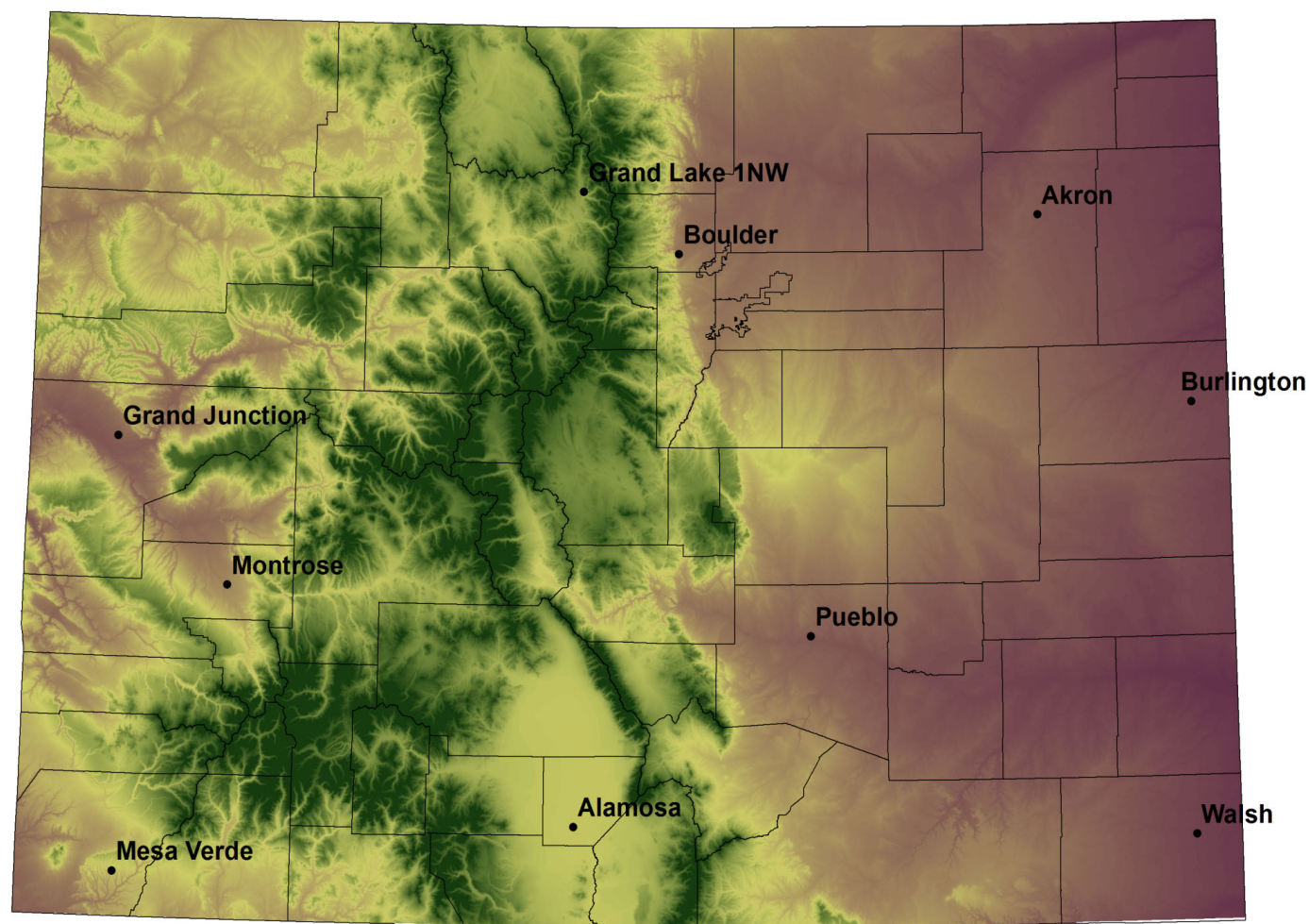


Standardized Precipitation Index

Water-year-to-date Standardized Precipitation Index: 2021/10/01 - 2022/05/17



NWS Cooperative Stations for WATF

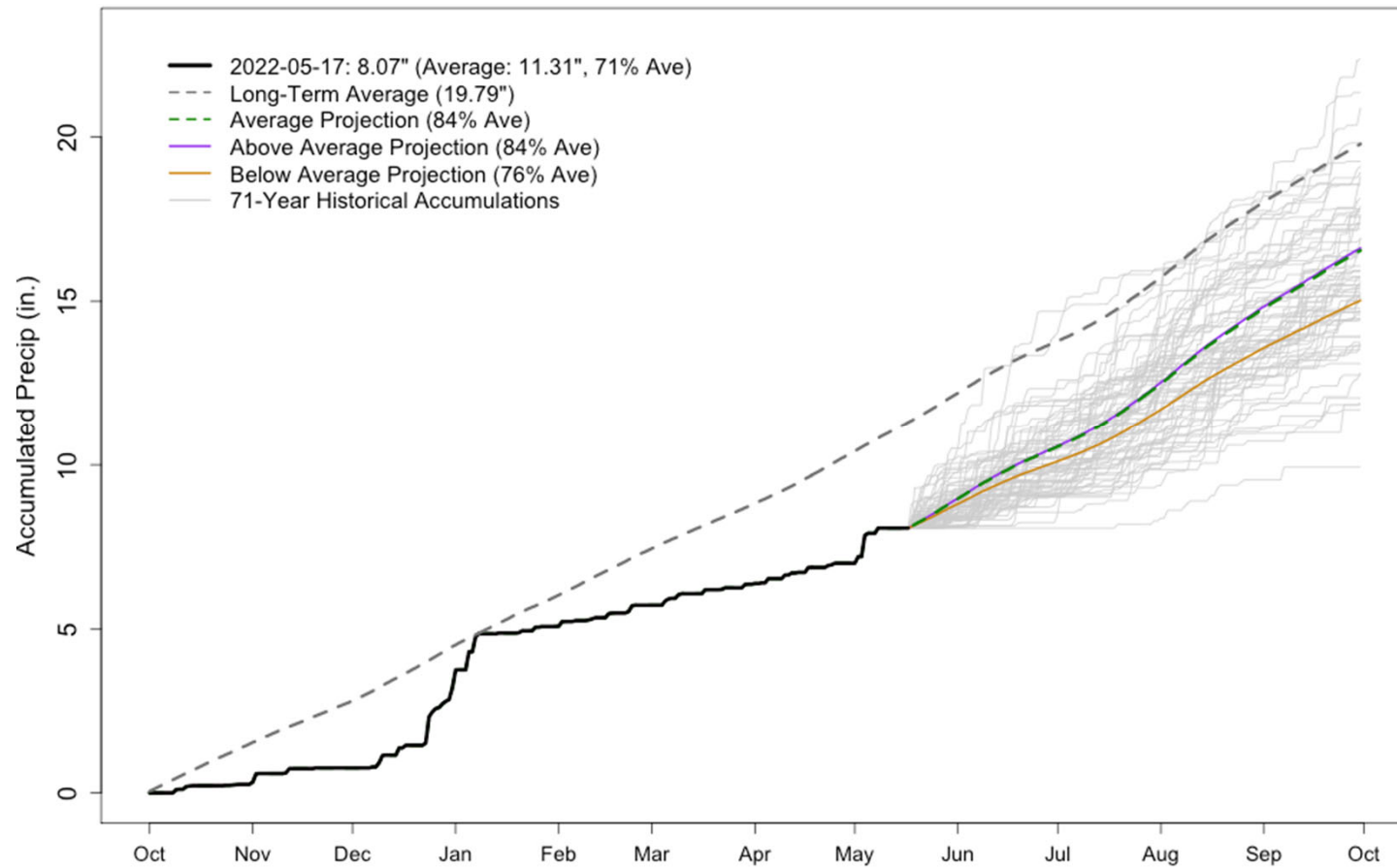


Water Year 2022 – Station Updates



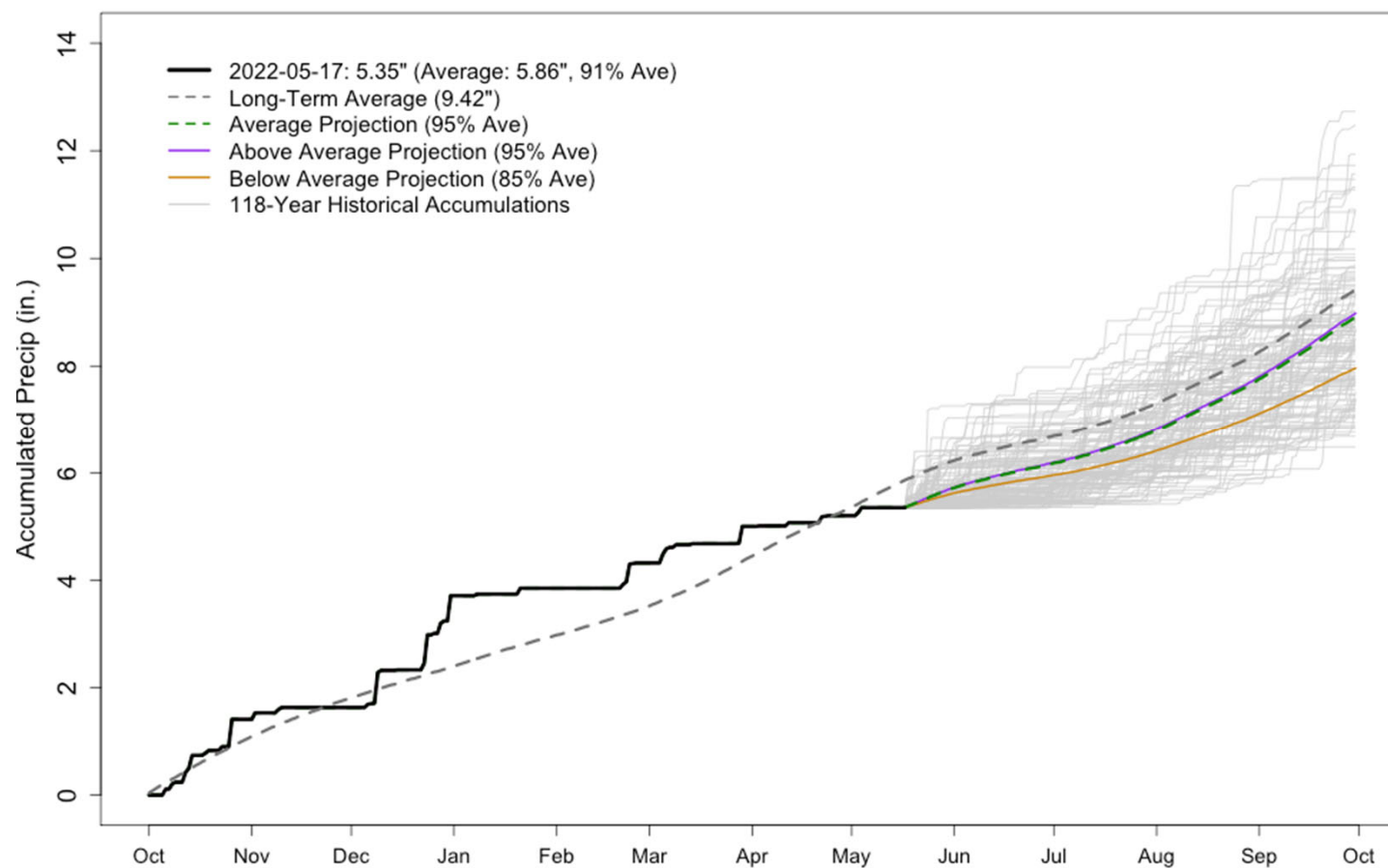
Grand Lake

GRAND LAKE 1 NW WY2022 Precipitation Projections



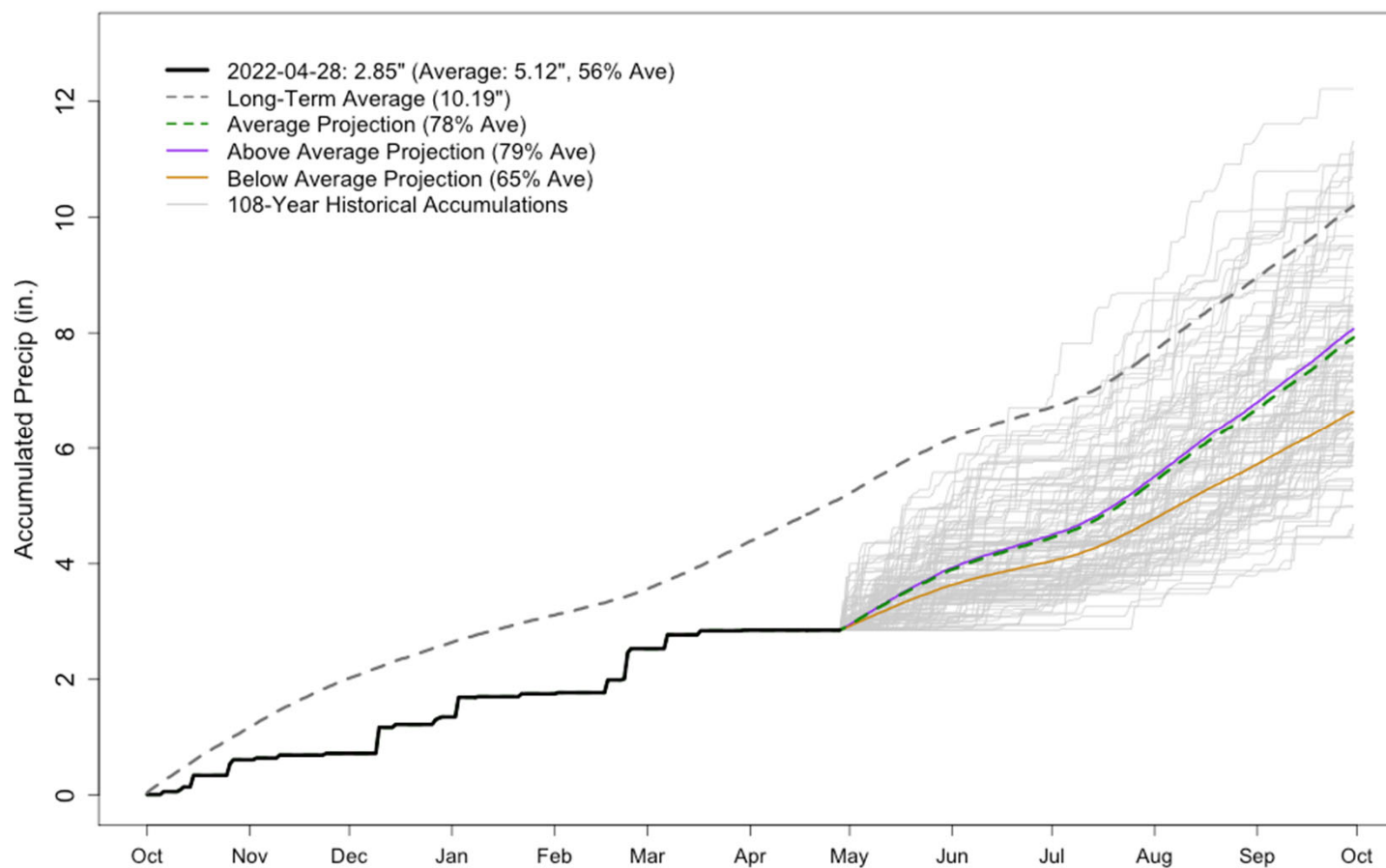
Grand Junction

GRAND JUNCTION WALKER FIELD WY2022 Precipitation Projections



Montrose

MONTROSE NO 2 WY2022 Precipitation Projections

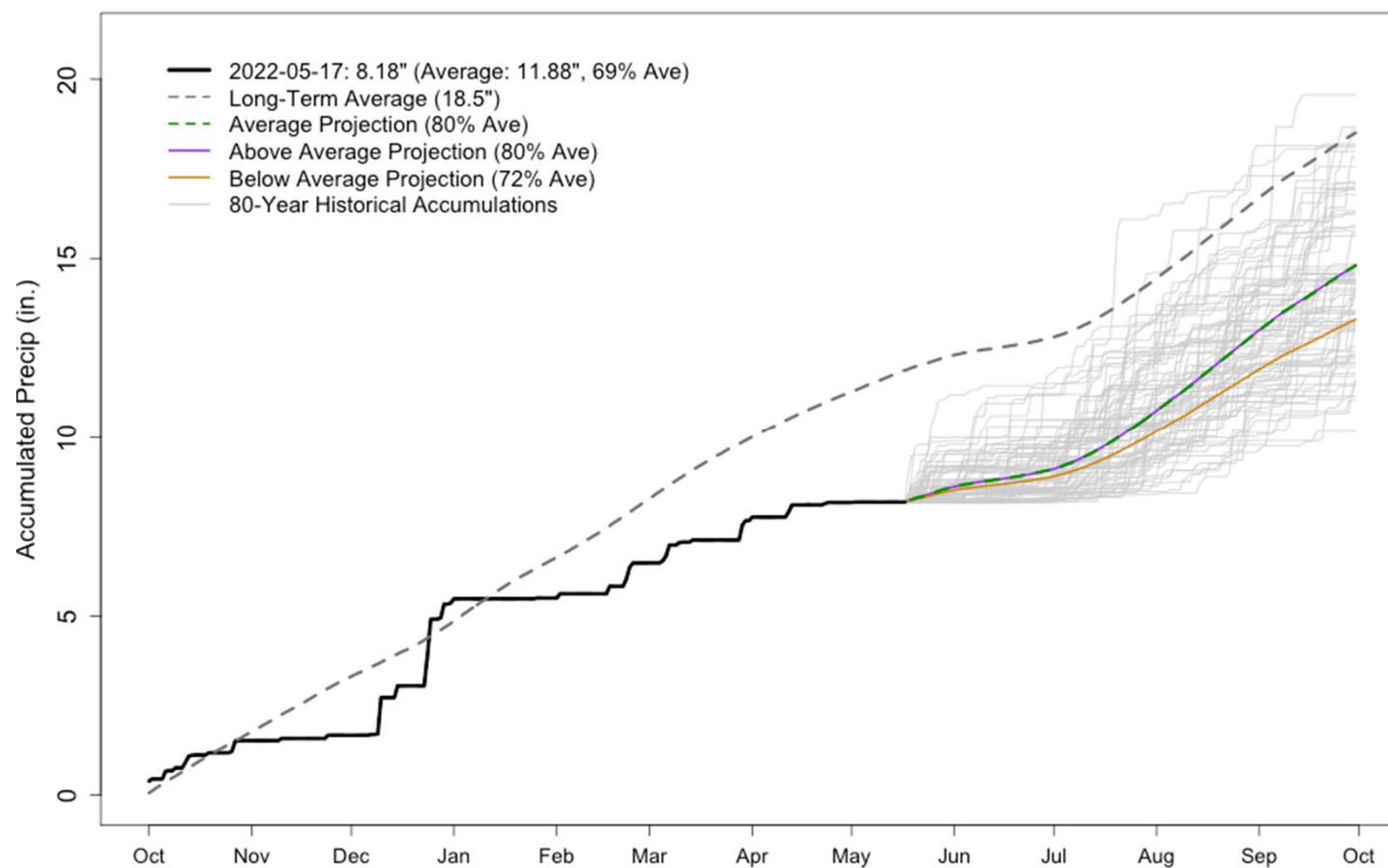


Note: data only through April 28, but nearby stations have had only a few hundredths of rain since



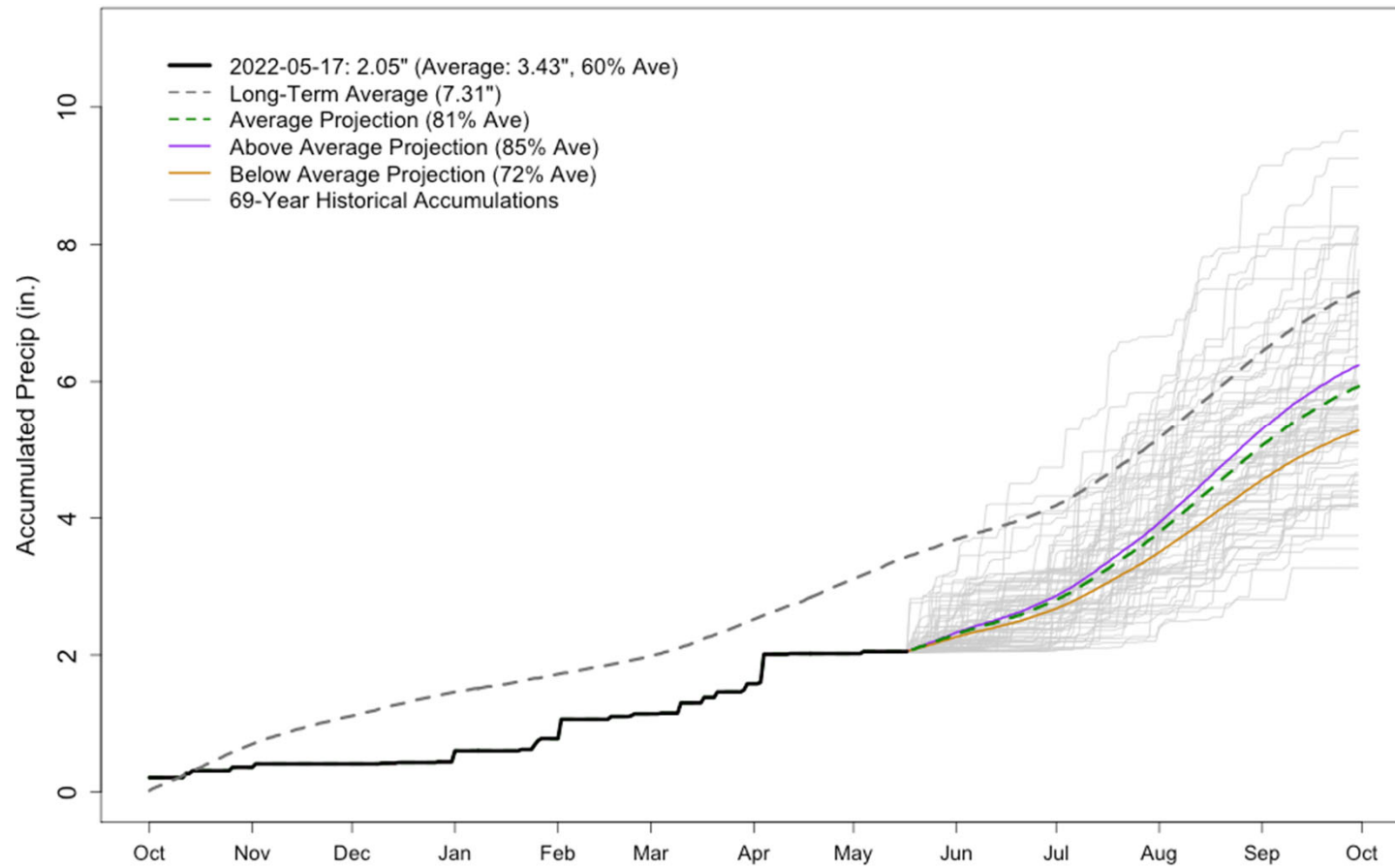
Mesa Verde NP

MESA VERDE NP WY2022 Precipitation Projections



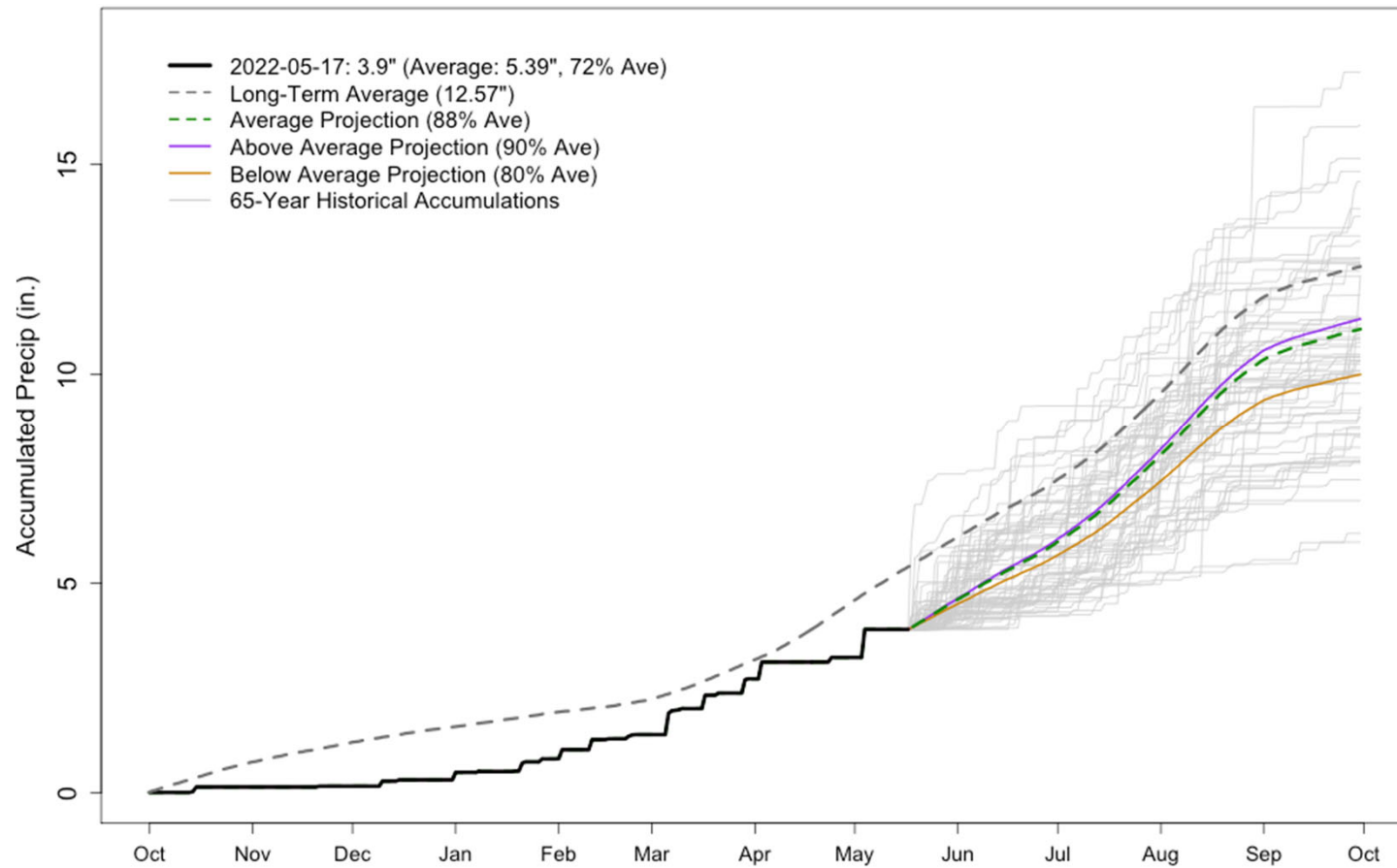
Alamosa

ALAMOSA-BERGMAN FIELD WY2022 Precipitation Projections



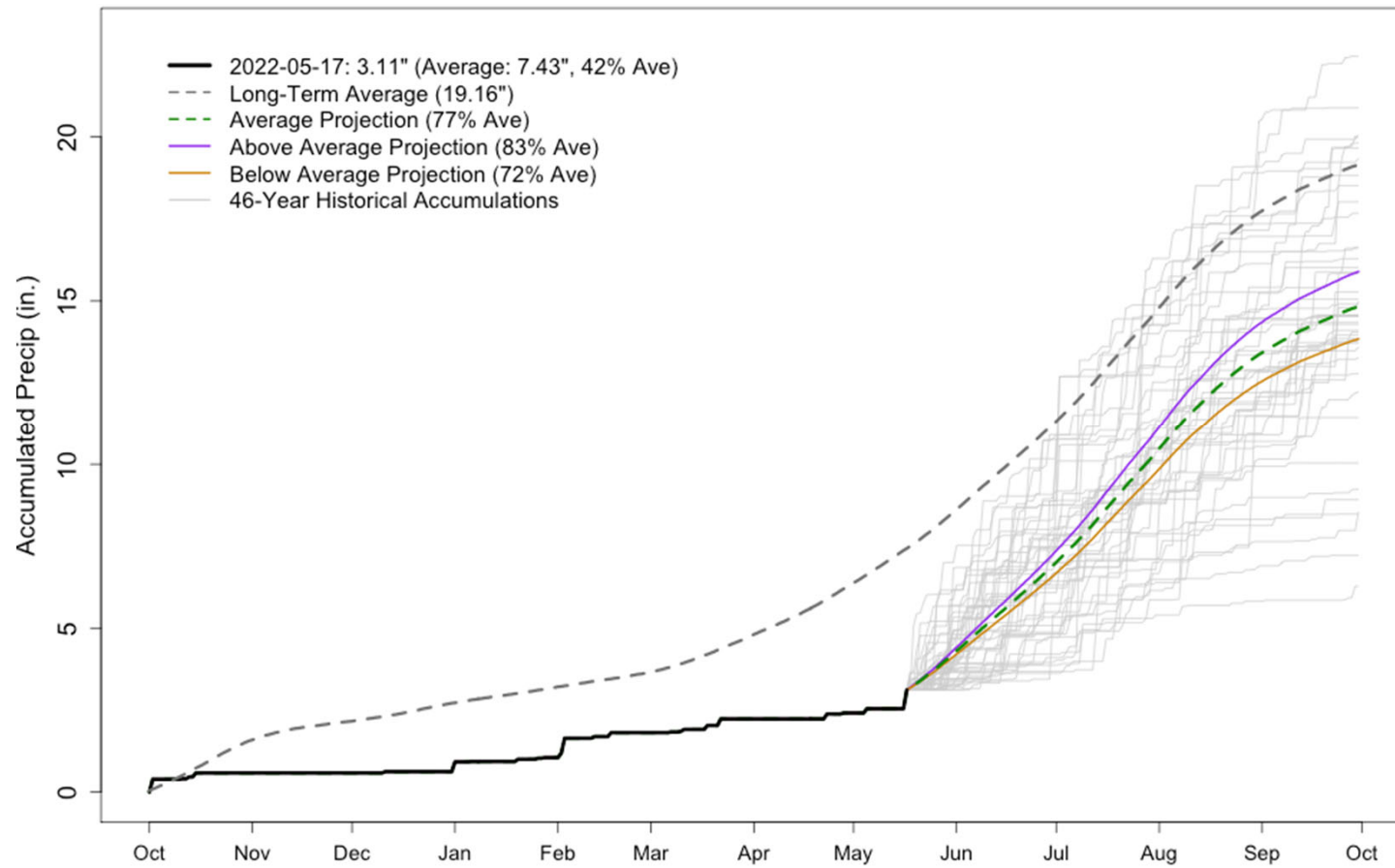
Pueblo

PUEBLO MEMORIAL AIRPORT WY2022 Precipitation Projections



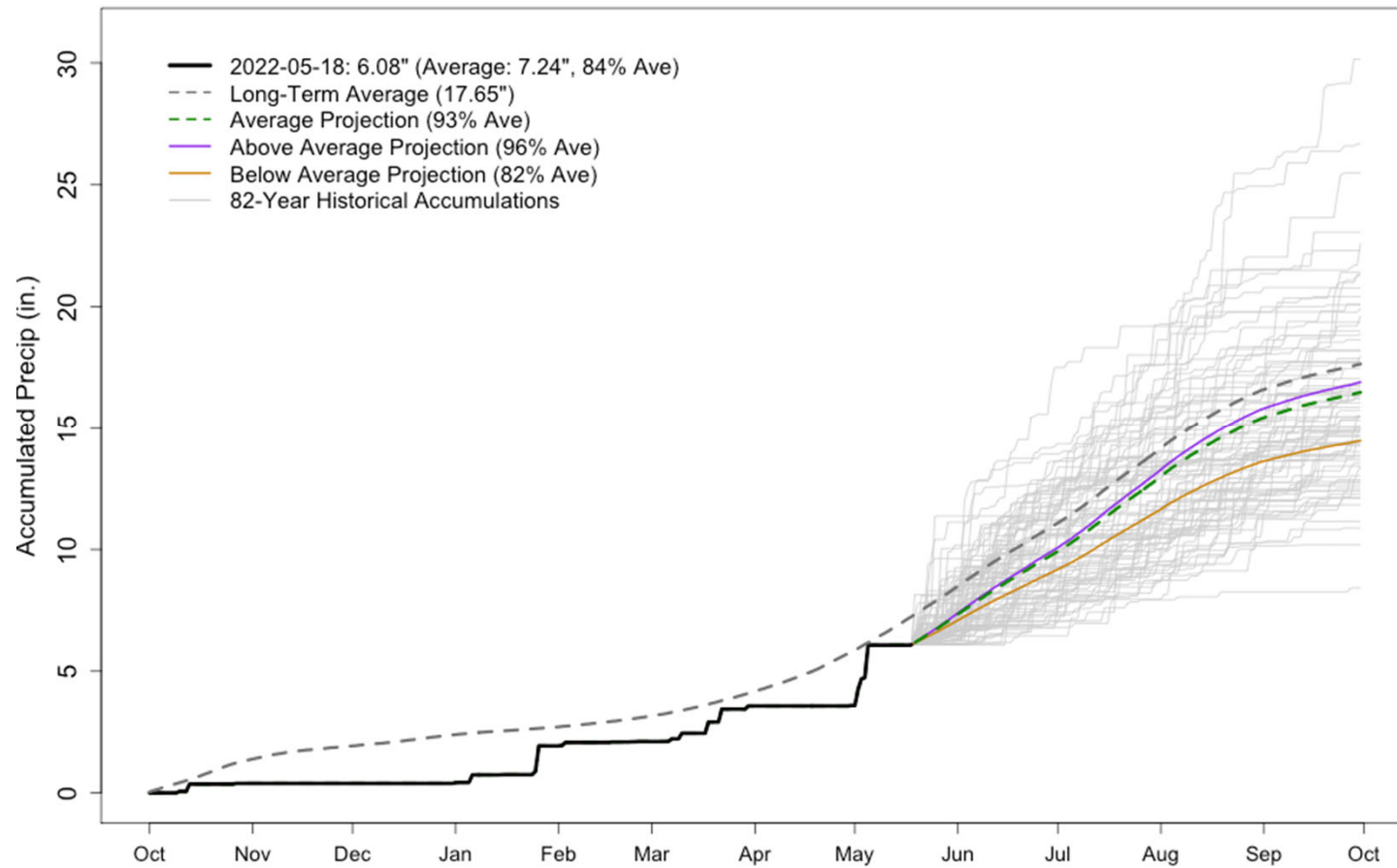
Walsh

WALSH 1 W WY2022 Precipitation Projections



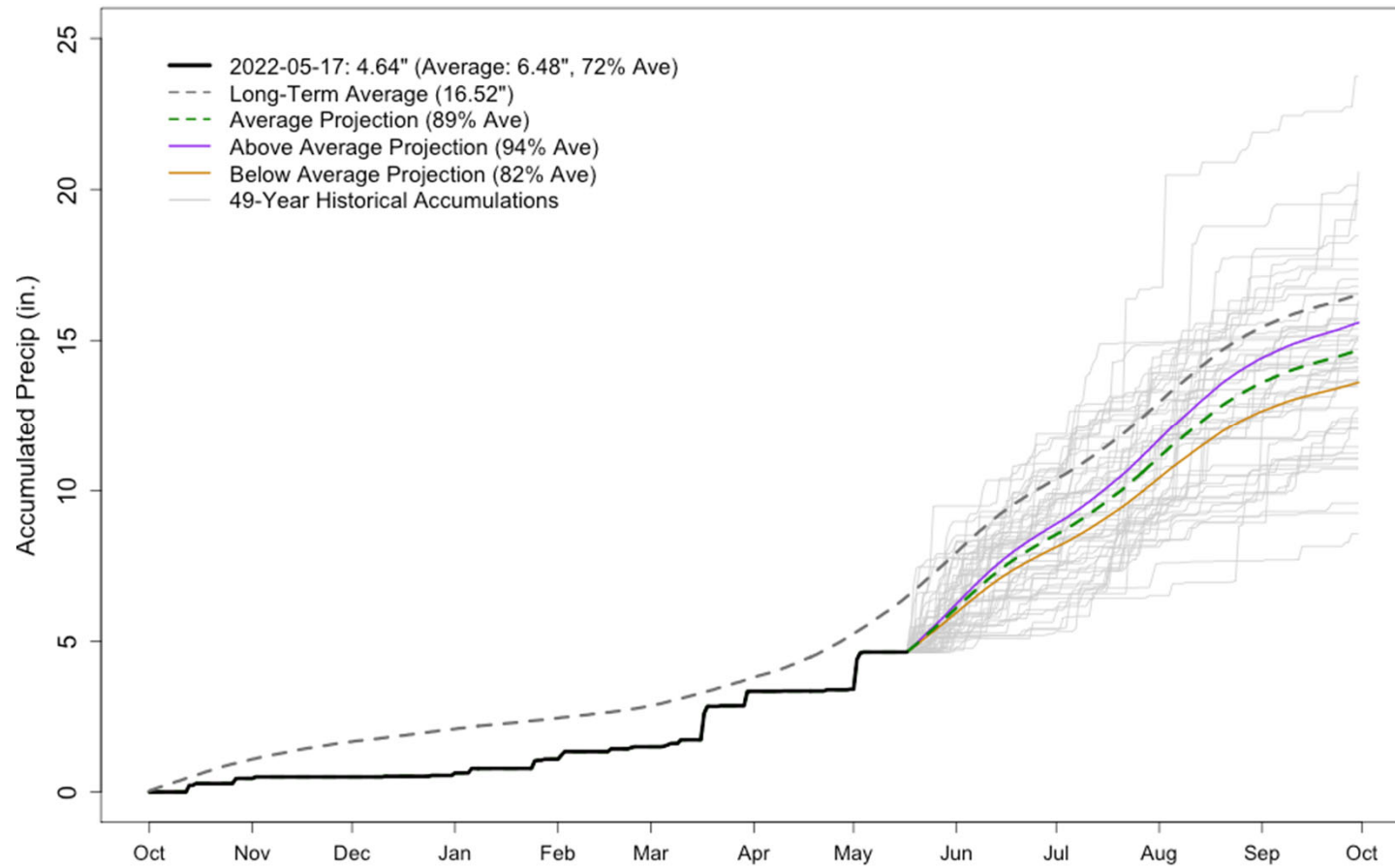
Burlington

BURLINGTON WY2022 Precipitation Projections



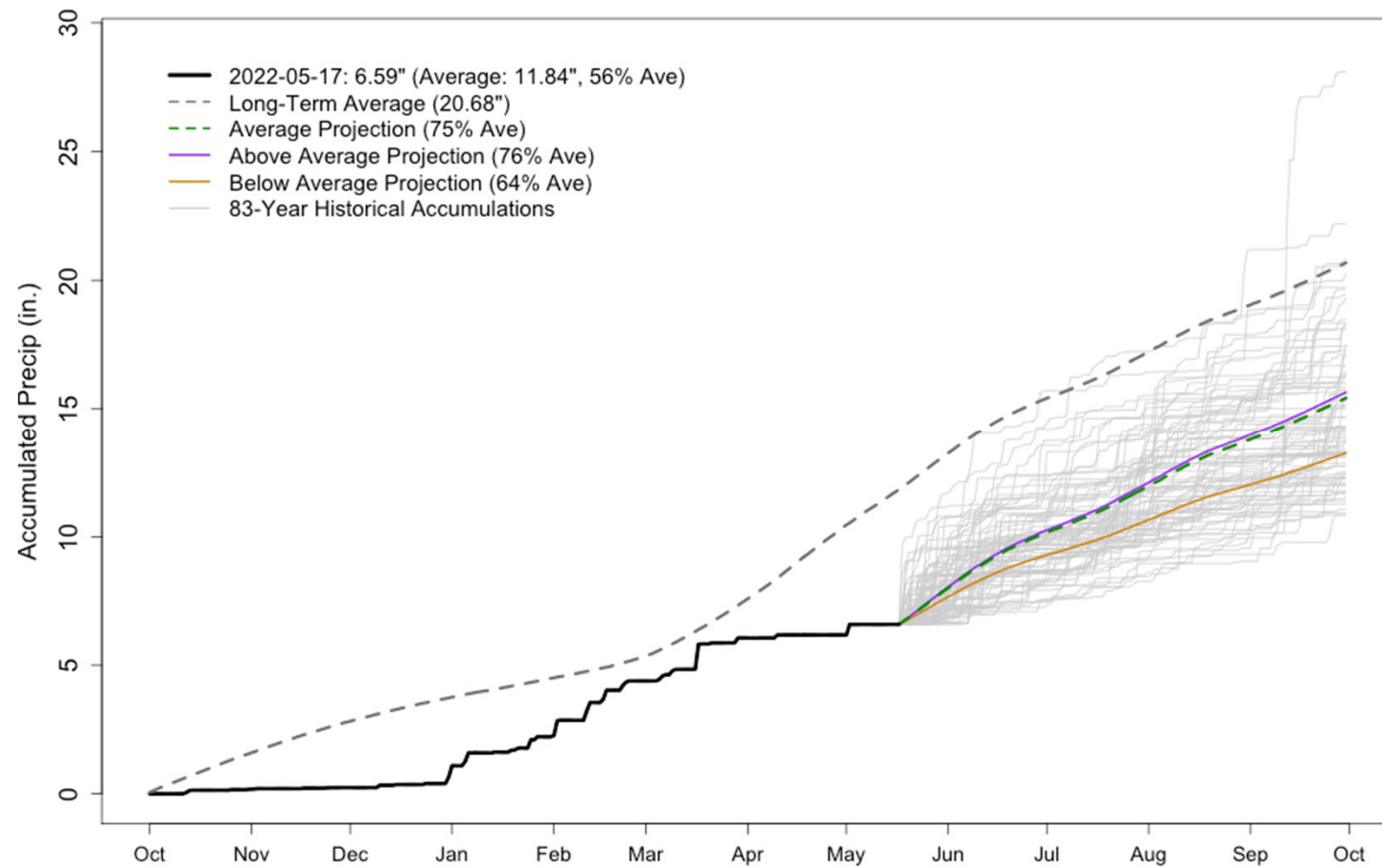
Akron

AKRON 4 E WY2022 Precipitation Projections



Boulder

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

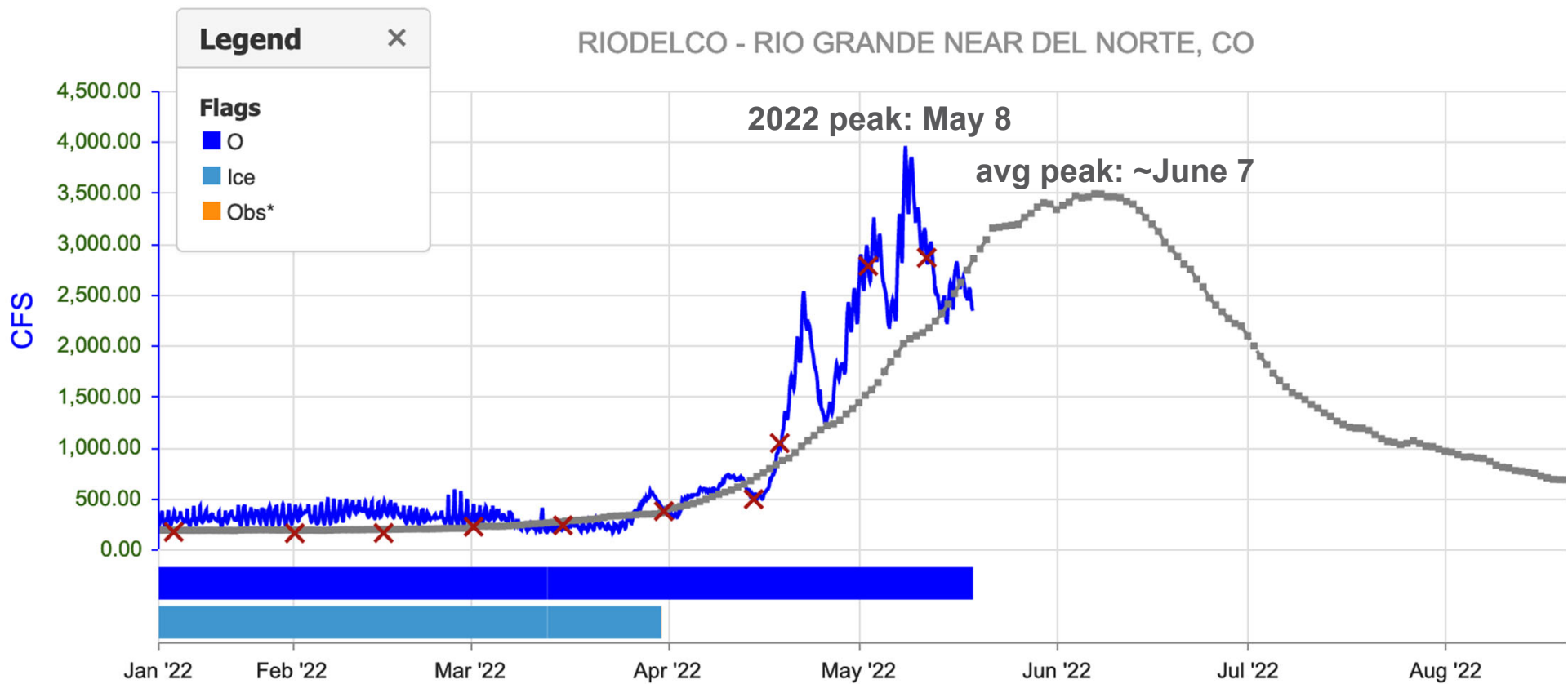
Year	SWE delta (inches)
2022	-27.5
2020	-23.6
1989	-22.2
2009	-19.9
1996	-19.6

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







Bear Lake SNOTEL,
Tuesday May 17

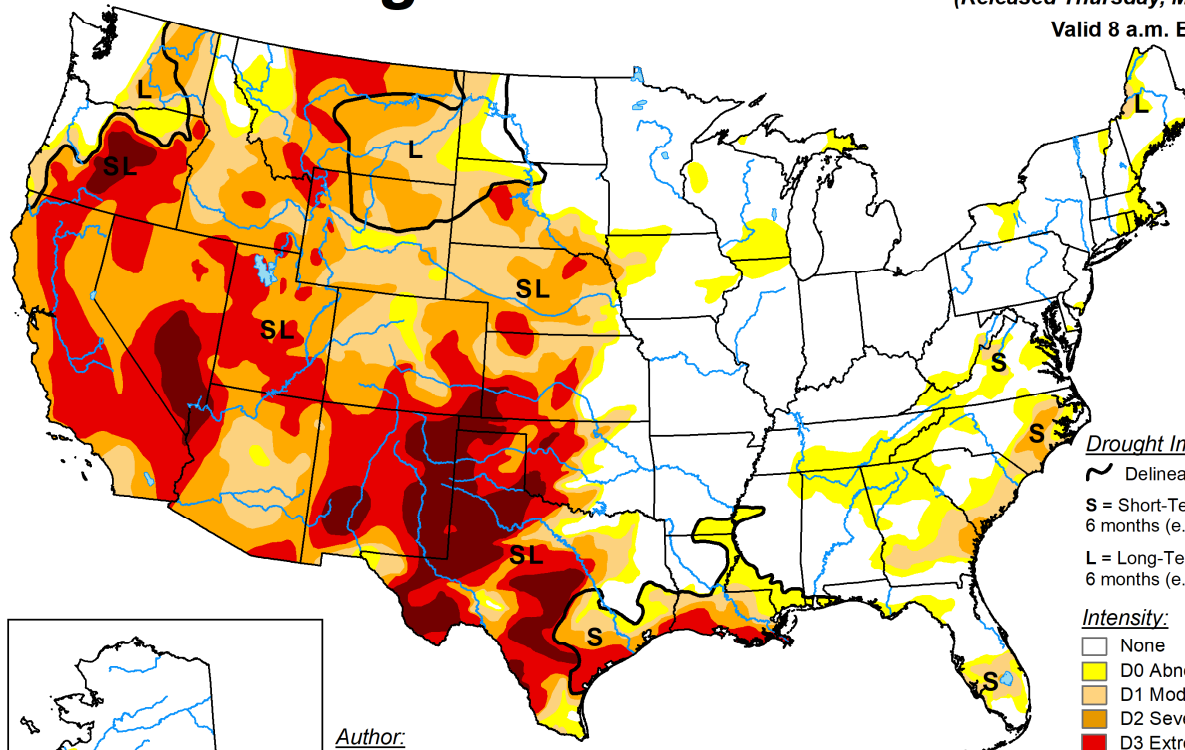
(8.0" of SWE; 63% of normal)

Drought Conditions



U.S. Drought Monitor

May 17, 2022
(Released Thursday, May. 19, 2022)
Valid 8 a.m. EDT



Drought Impact Types:

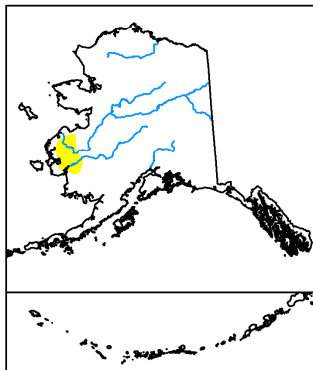
~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

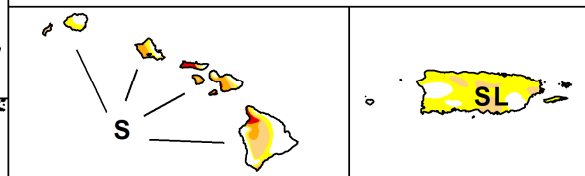
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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



Author:
Richard Heim
NCEI/NOAA



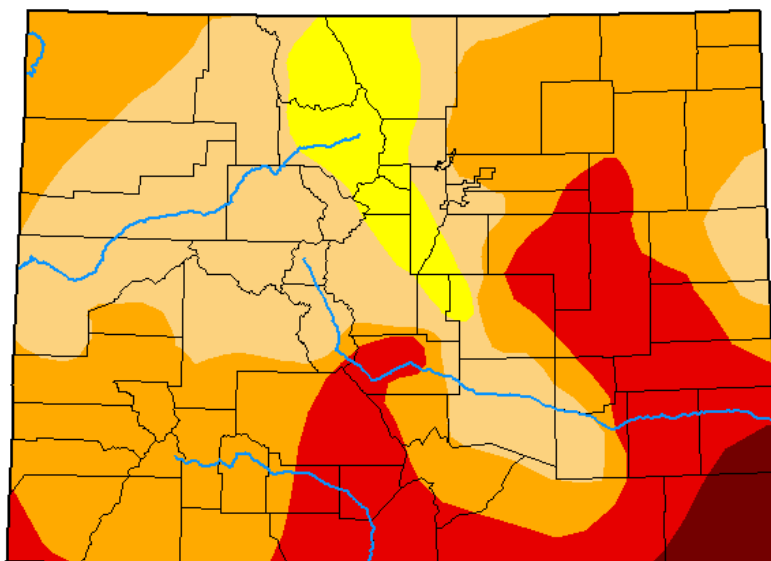
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



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	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate 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



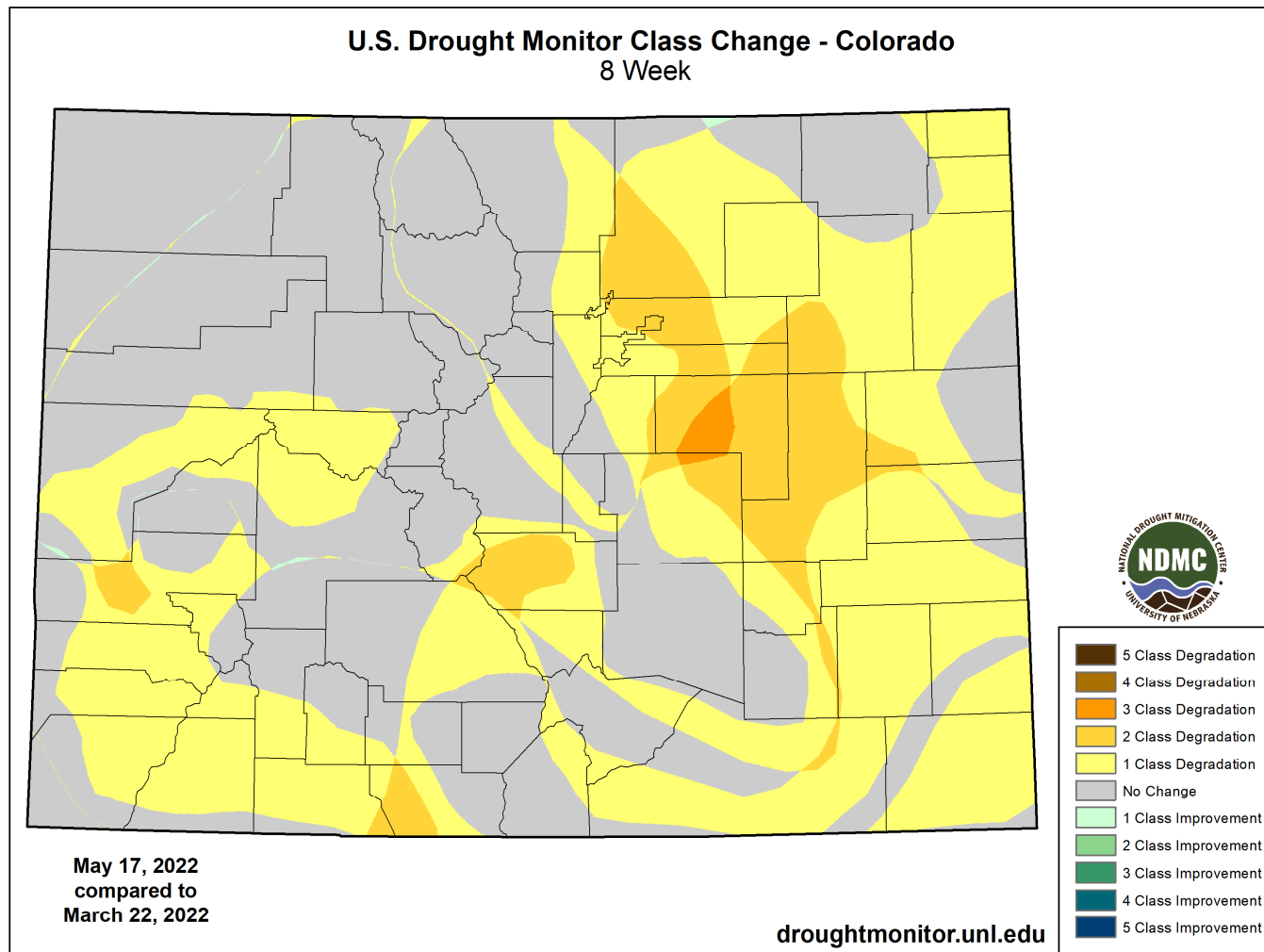
droughtmonitor.unl.edu

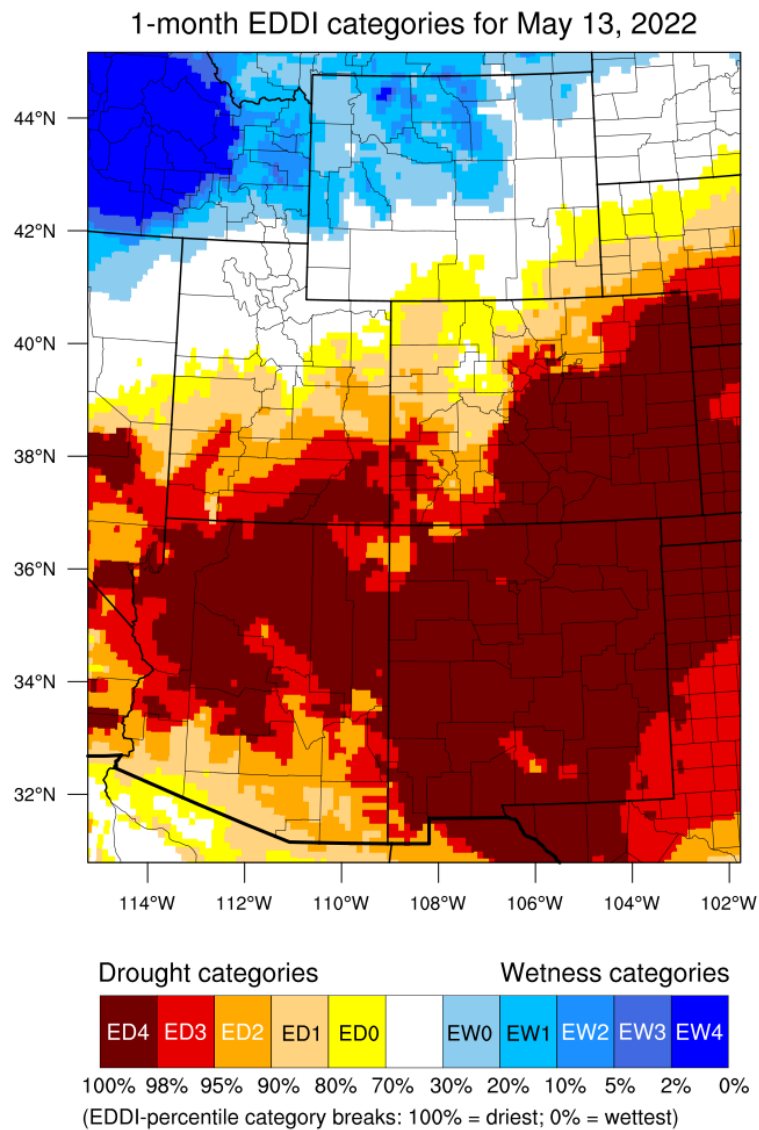


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Change over
two months



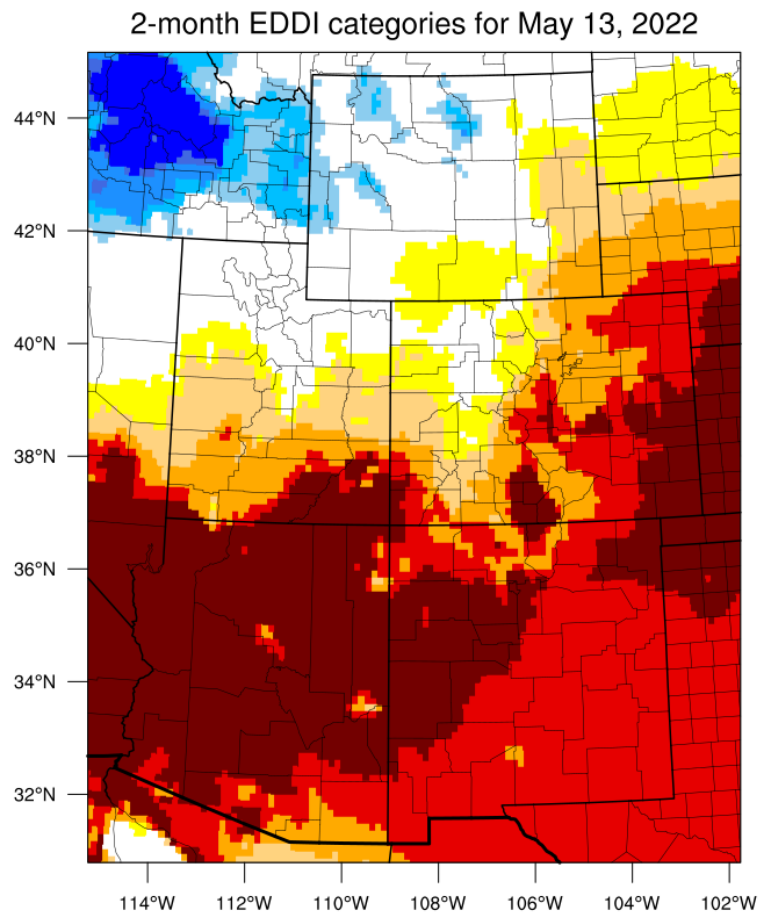


Generated by NOAA/ESRL/Physical Sciences Laboratory

Evaporative Demand Drought Index

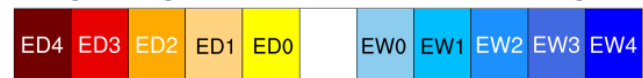
Warm, dry, sunny, and windy
conditions through April led to
record-level evaporative
demand over the last month
across much of Colorado





Drought categories

Wetness categories



100% 98% 95% 90% 80% 70% 30% 20% 10% 5% 2% 0%

(EDDI-percentile category breaks: 100% = driest; 0% = wettest)

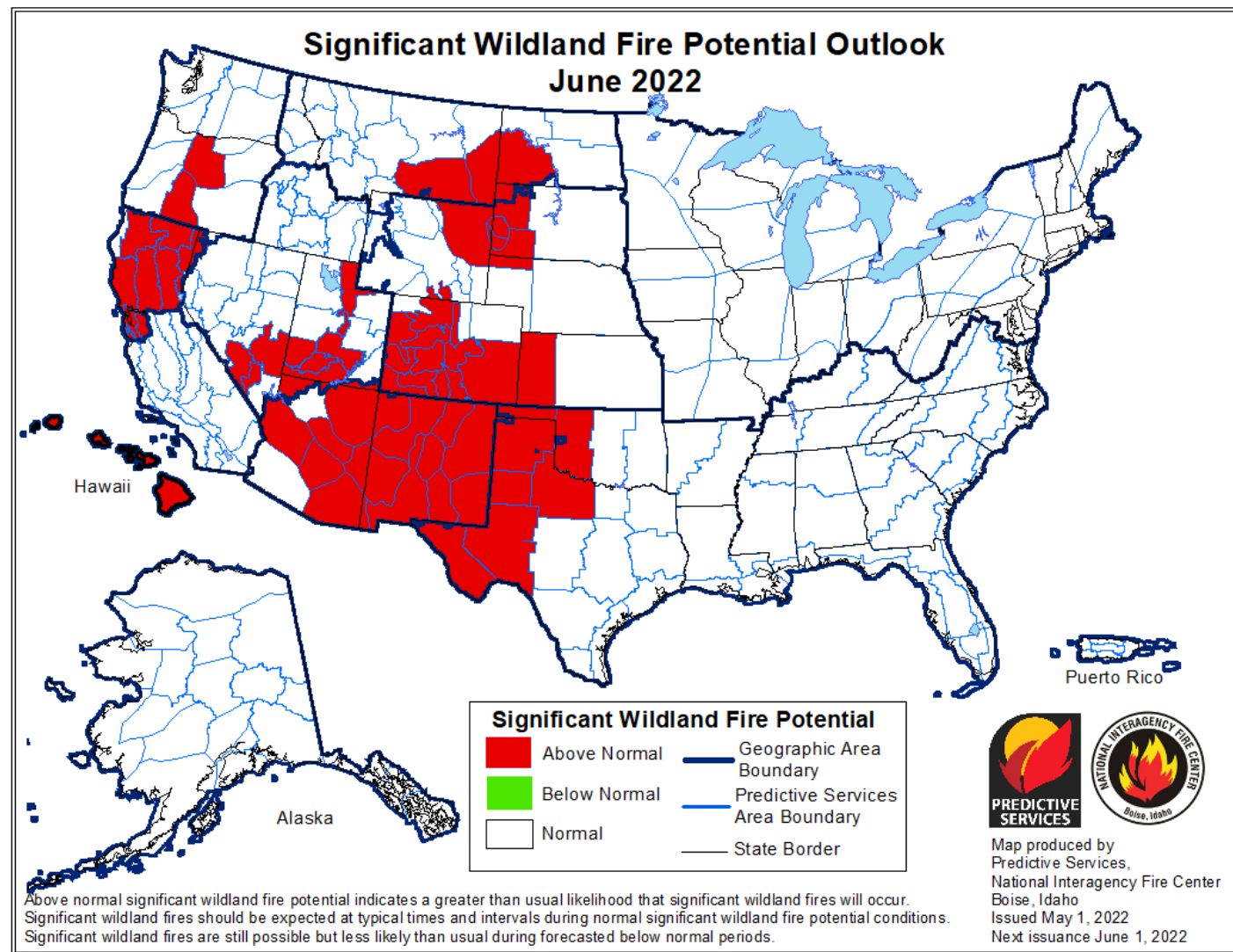
Generated by NOAA/ESRL/Physical Sciences Laboratory

Evaporative Demand Drought Index

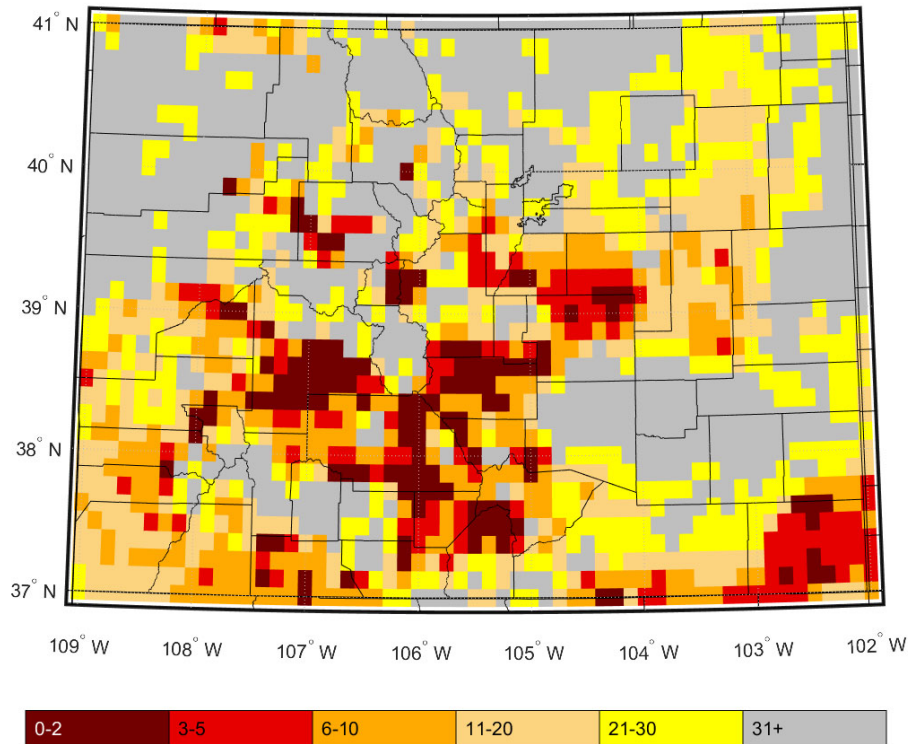
Similar story over the last 2
months, especially in
southeast Colorado



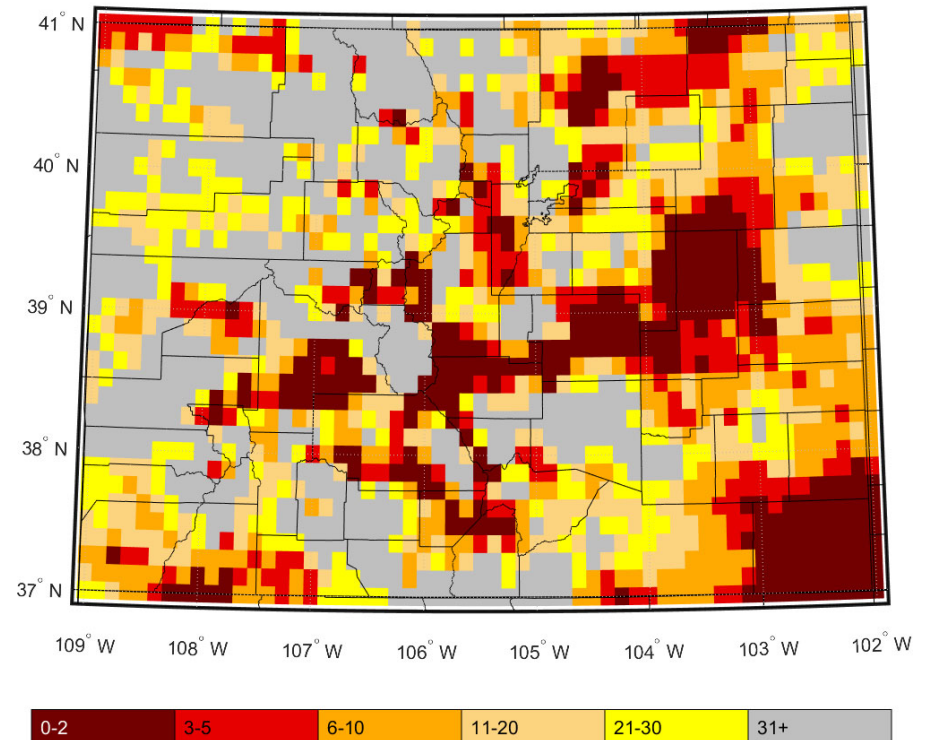
USDA outlooks for wildfire potential show increased risk across much of the state through the summer



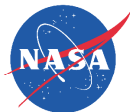
Top 10cm Soil Moisture Percentile
05/10/2022



Top Meter Soil Moisture Percentile
05/10/2022

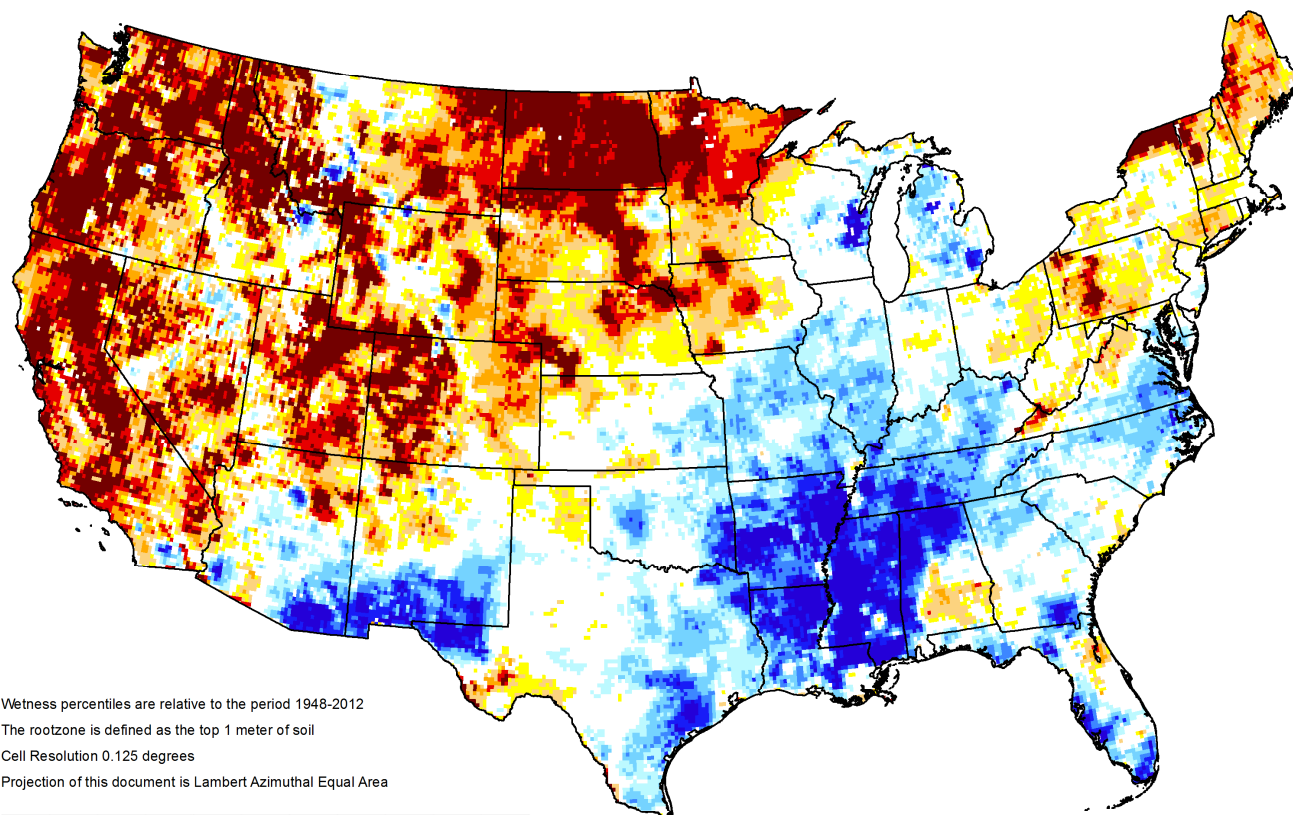


Soil moisture conditions bad and getting worse across much of the eastern plains, San Luis Valley, and portions of the western slope



GRACE-Based Root Zone Soil Moisture Drought Indicator

August 16, 2021

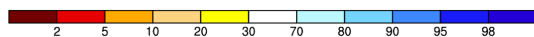


Wetness percentiles are relative to the period 1948-2012

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



Wetness Percentile

<https://nasagrace.unl.edu>



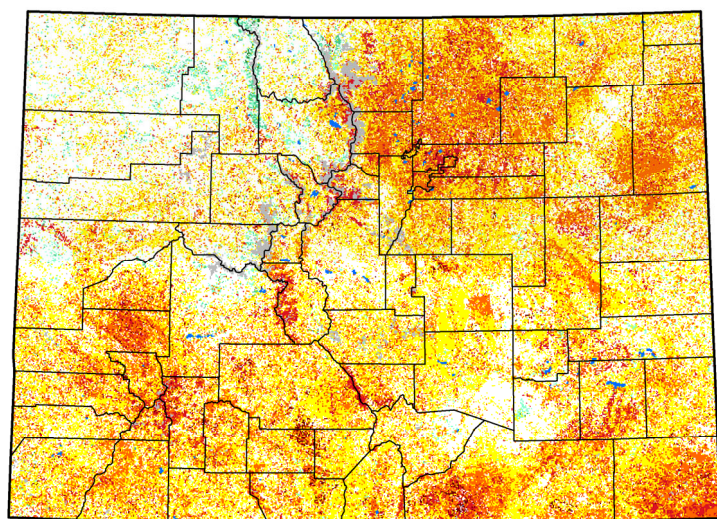
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VegDRI: longer-term vegetation condition

Vegetation Drought Response Index Complete: Colorado

May 15, 2022



Vegetation Condition

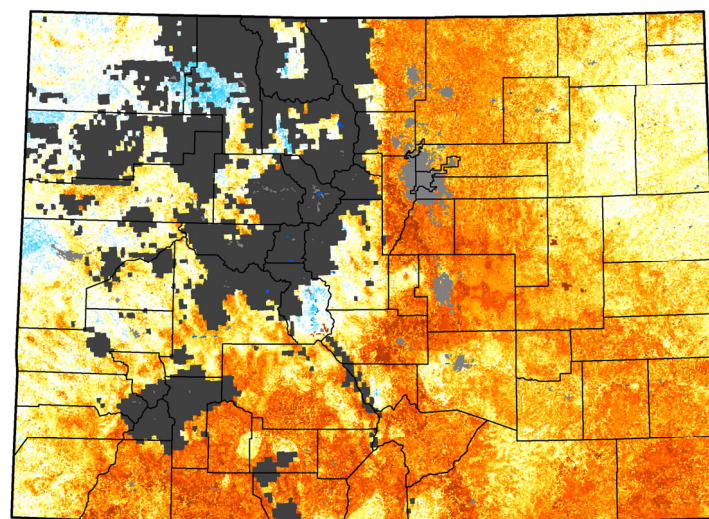
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-drought stress
- Near Normal
- Unusually Moist
- Very Moist
- Extreme Moist
- Out of Season
- Water



QuickDRI: shorter-term vegetation response

Quick Drought Response Index Colorado

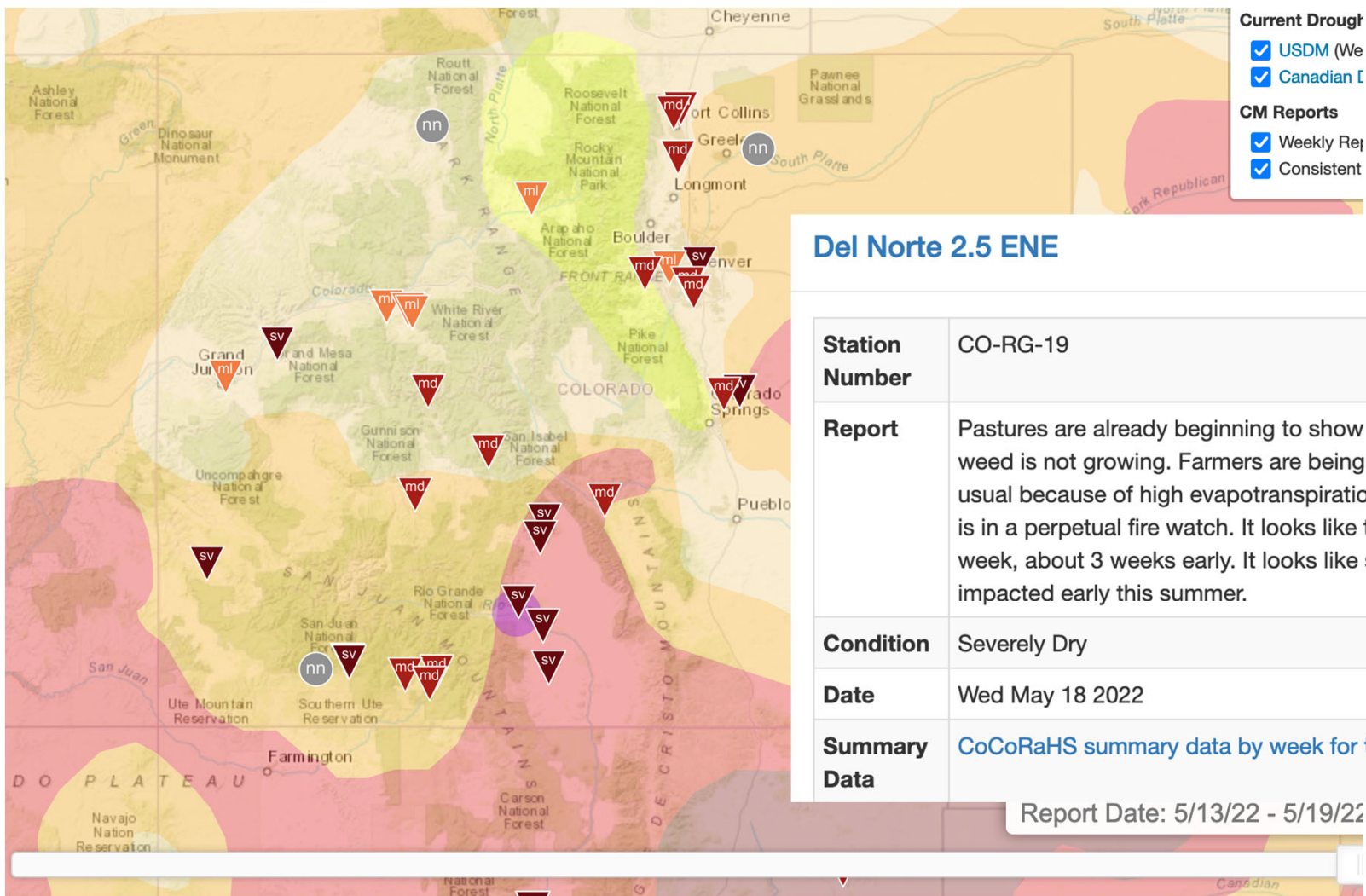
May 15, 2022
(Week 20)



Conditions Relative to 4-Week Historical Average

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



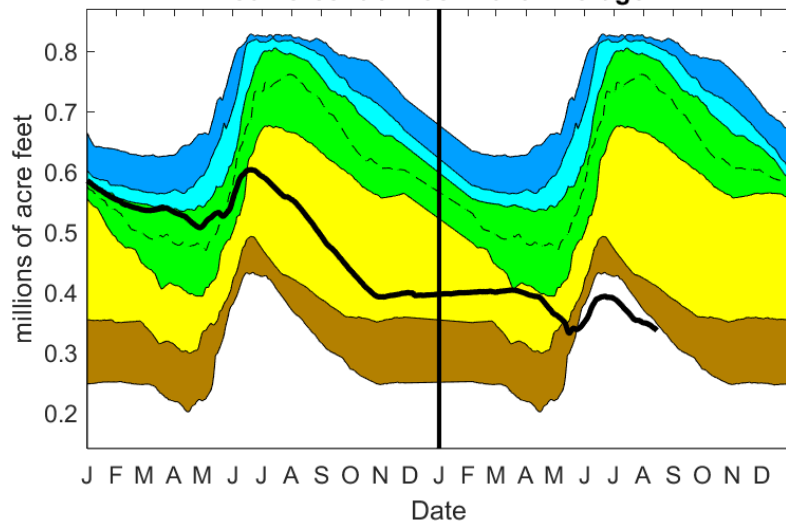


Del Norte 2.5 ENE

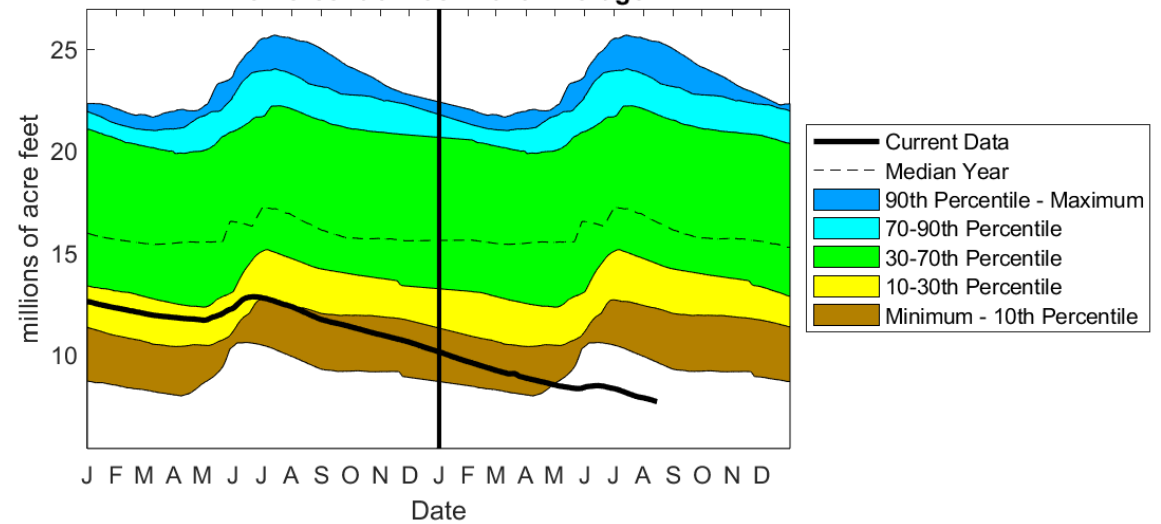
Station Number	CO-RG-19
Report	Pastures are already beginning to show signs of stress. Even the kochia weed is not growing. Farmers are being forced to apply more water than usual because of high evapotranspiration rates. The whole San Luis Valley is in a perpetual fire watch. It looks like the Rio Grande 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

Blue Mesa Reservoir Level 08/15/2021
50 Percent of 1981-2019 Average



Lake Powell Level 08/15/2021
43 Percent of 1981-2019 Average



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





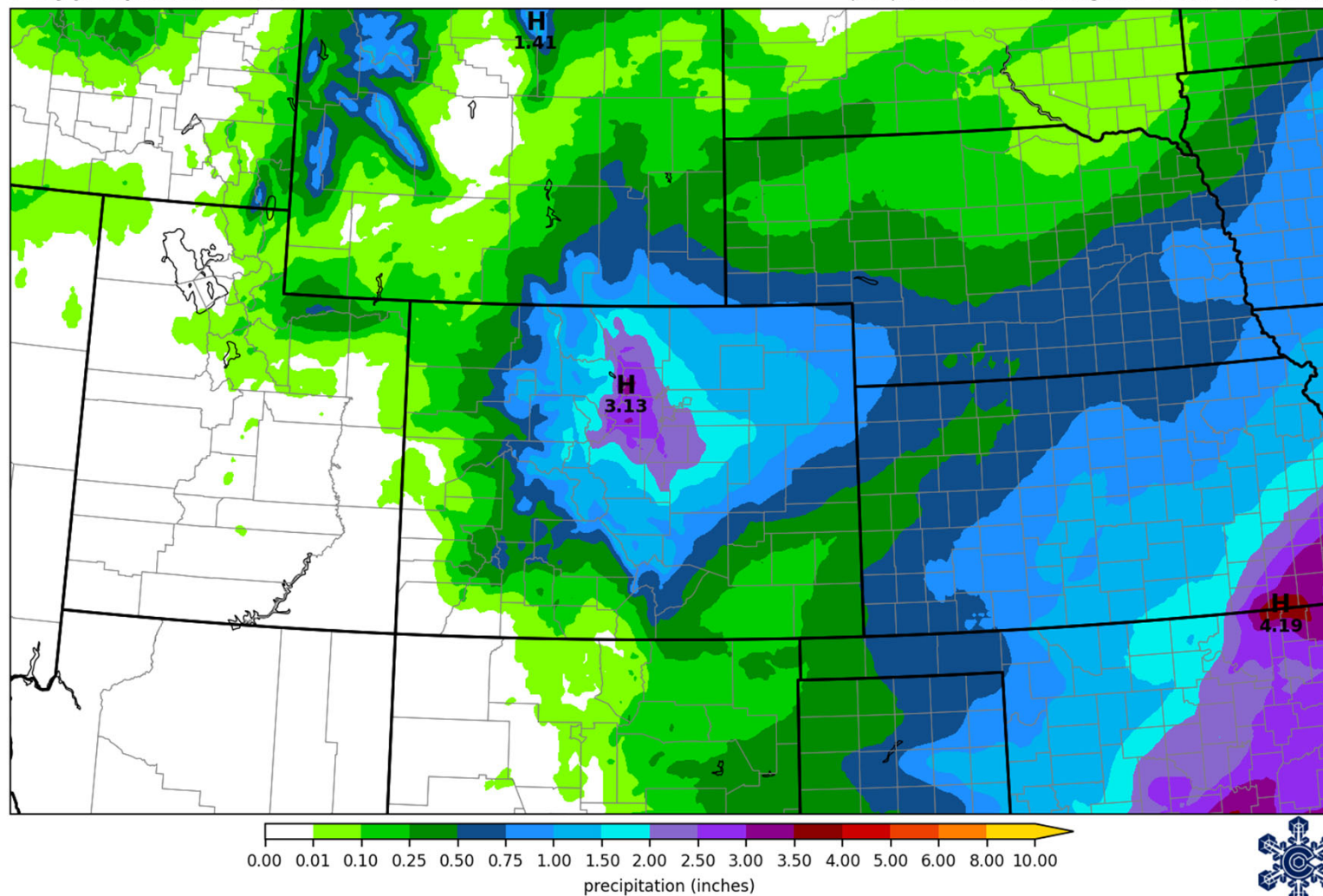
Outlook



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



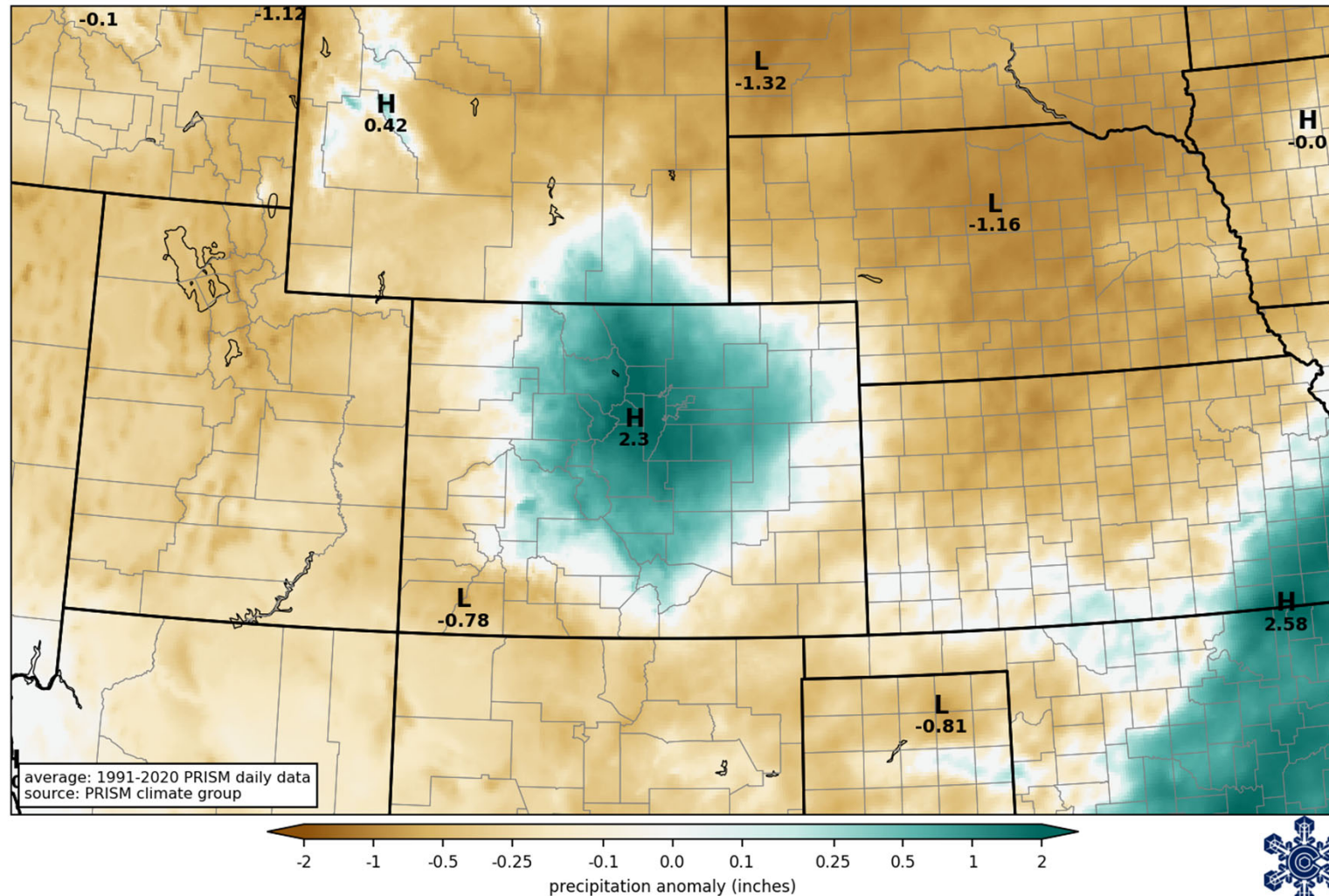
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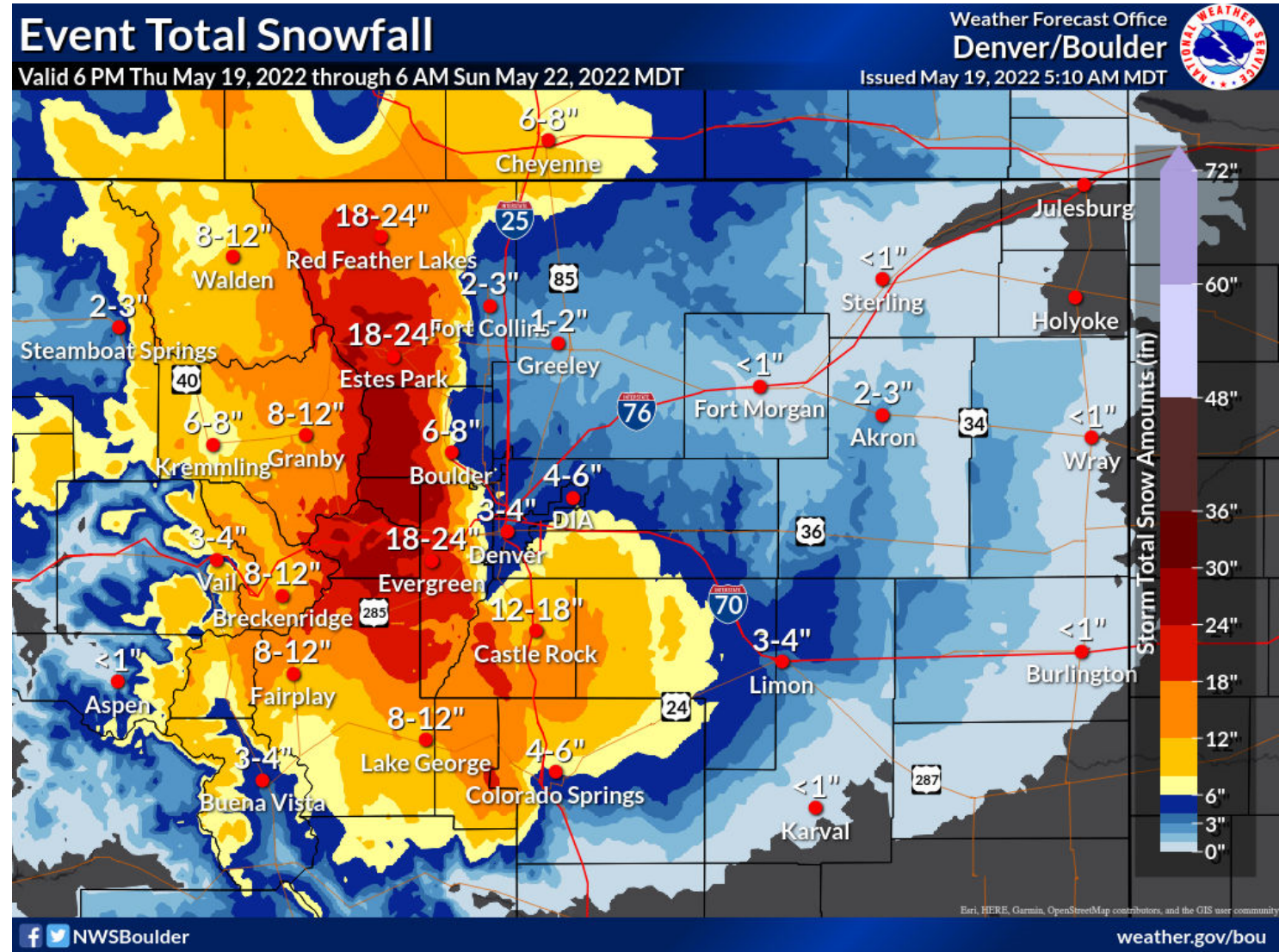
NOAA 7-day precipitation forecast (difference from average)

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

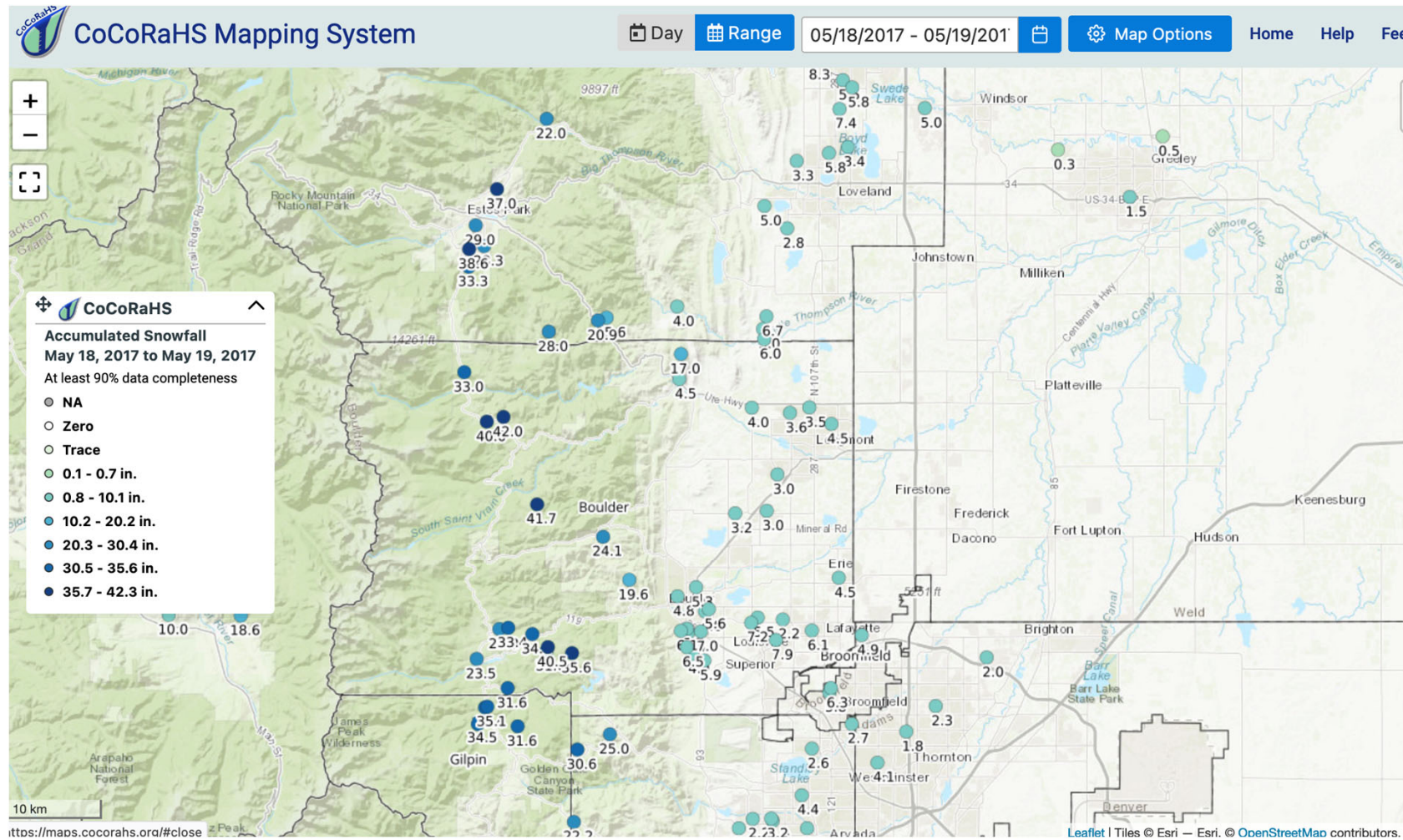
forecast issued 1200 UTC Thu 19 May 2022
precipitation in 168 hrs ending 1200 UTC Thu 26 May 2022



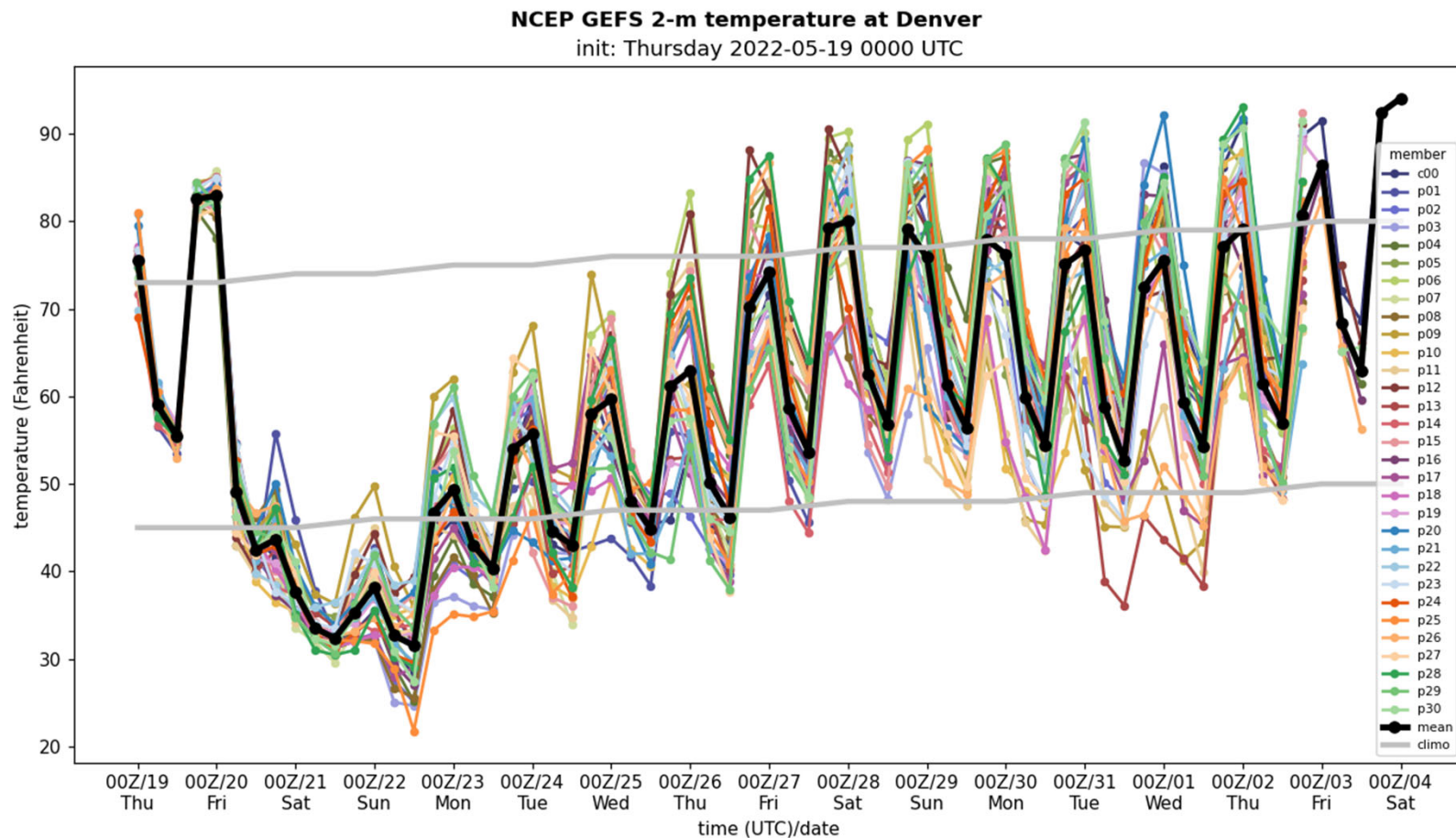
NWS snowfall forecast



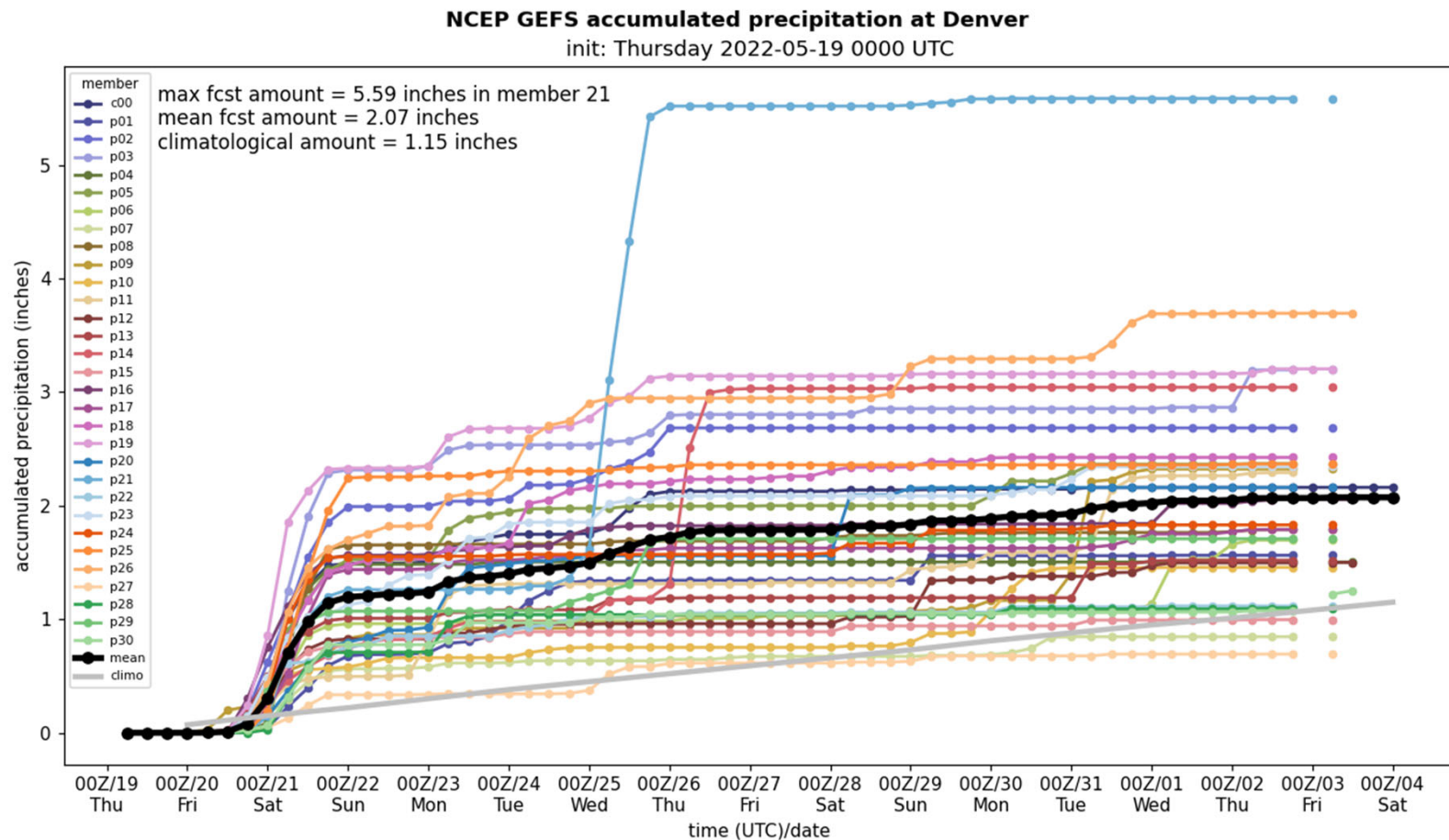
Remember
this storm
from 5
years
ago?



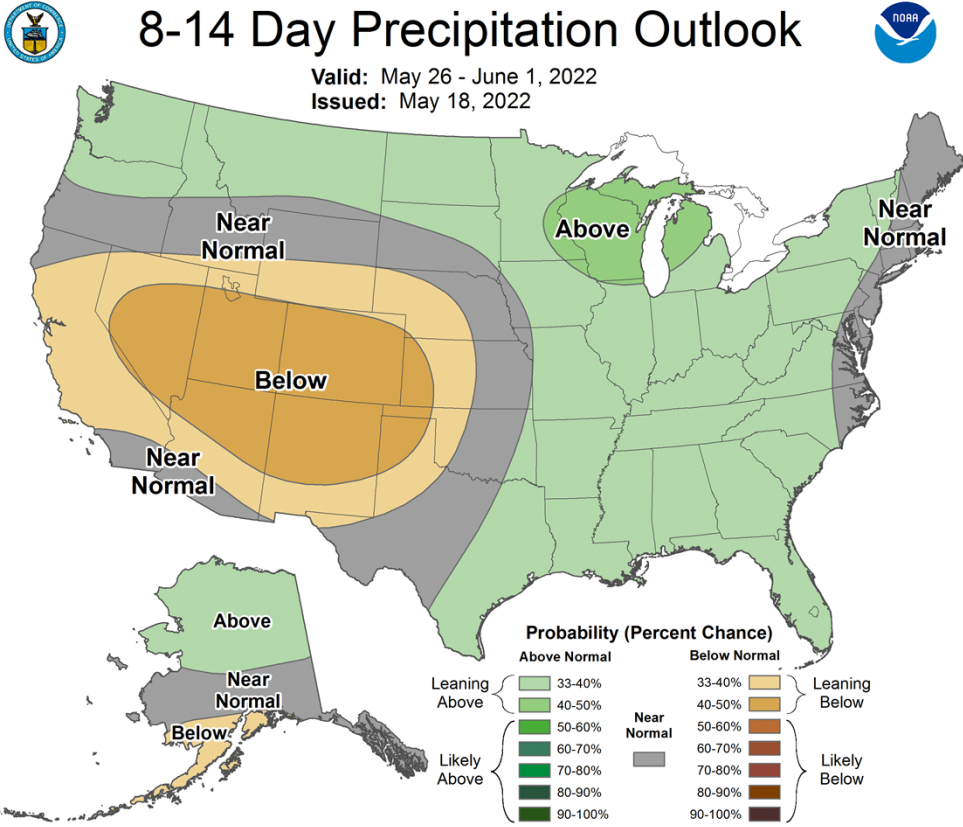
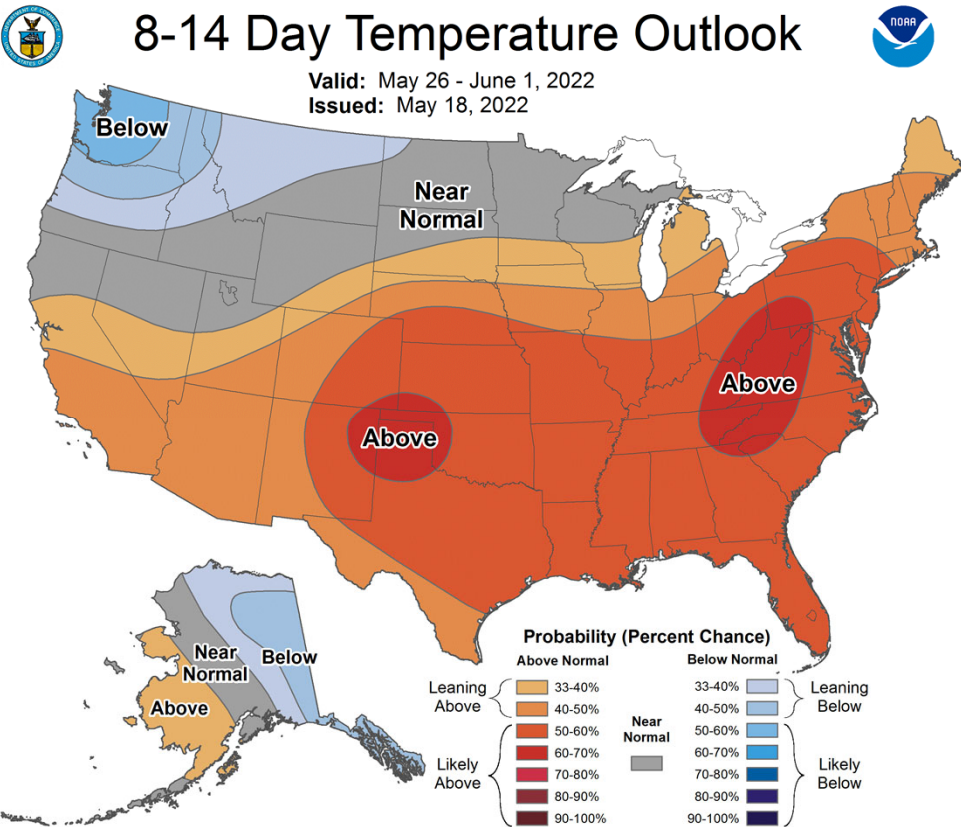
Very warm today, very strong cold front tonight, possible record cold Sunday morning, then slowly back to a warm and dry pattern



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May 26-June 1: back to warm and dry



Strong La Niña continues

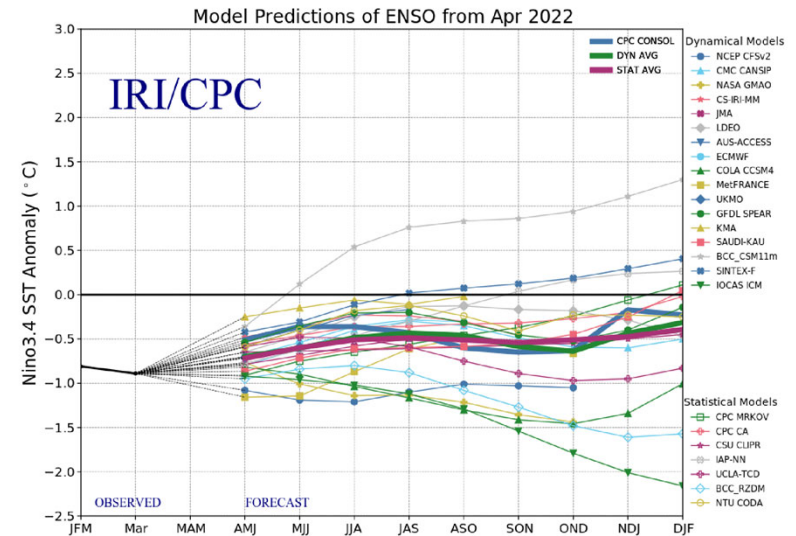
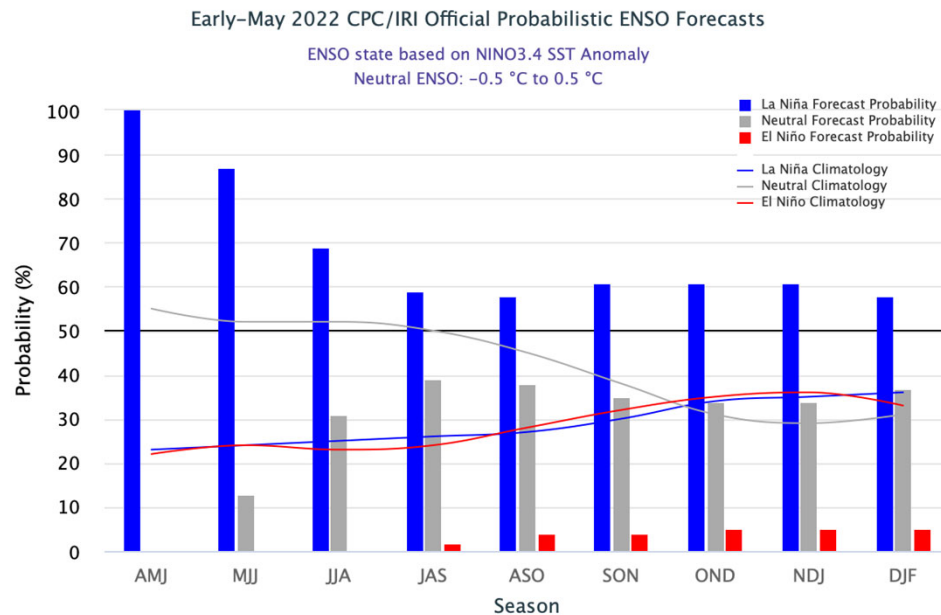
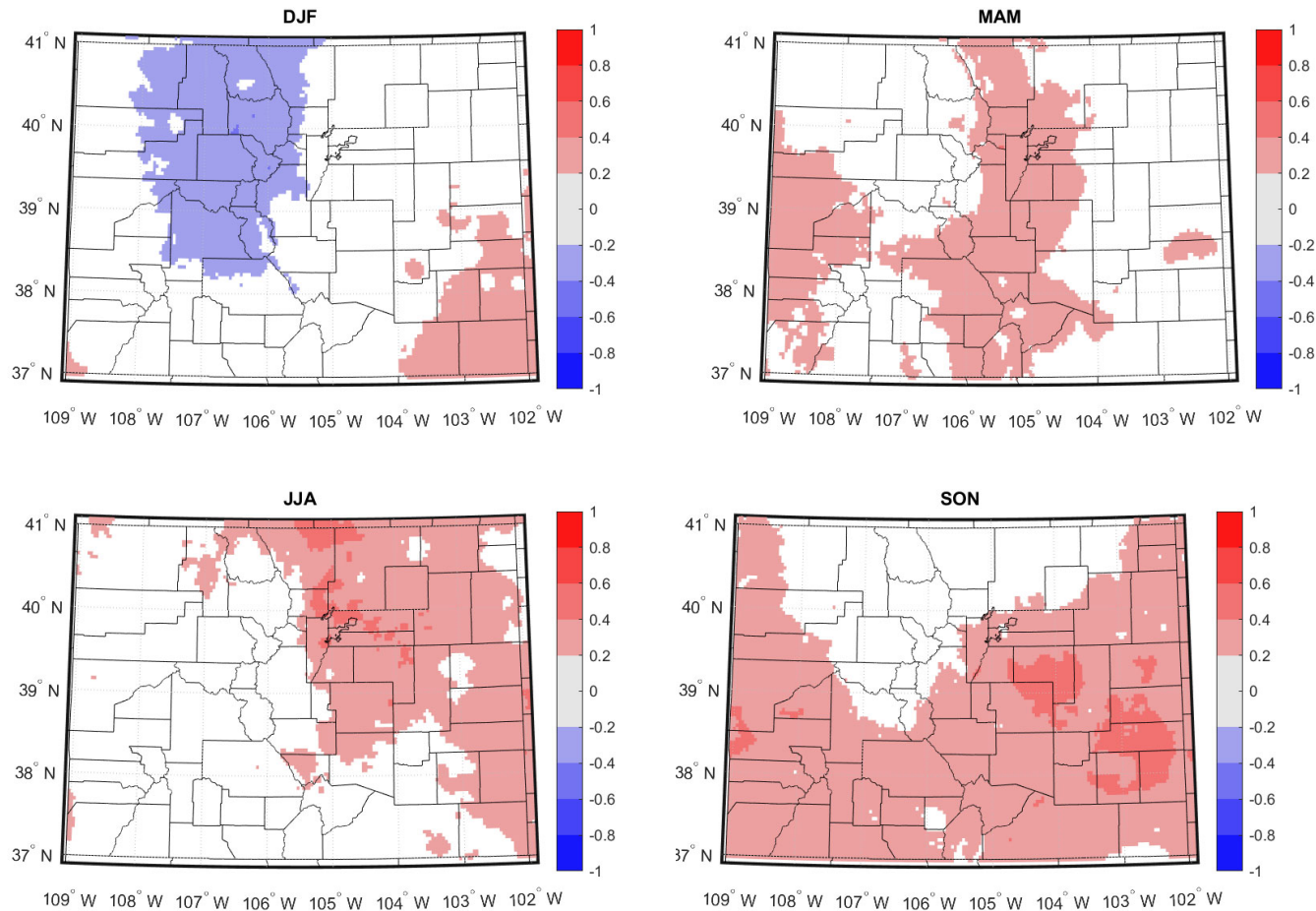


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N - 5°S , 120°W - 170°W). Figure updated 19 April 2022

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



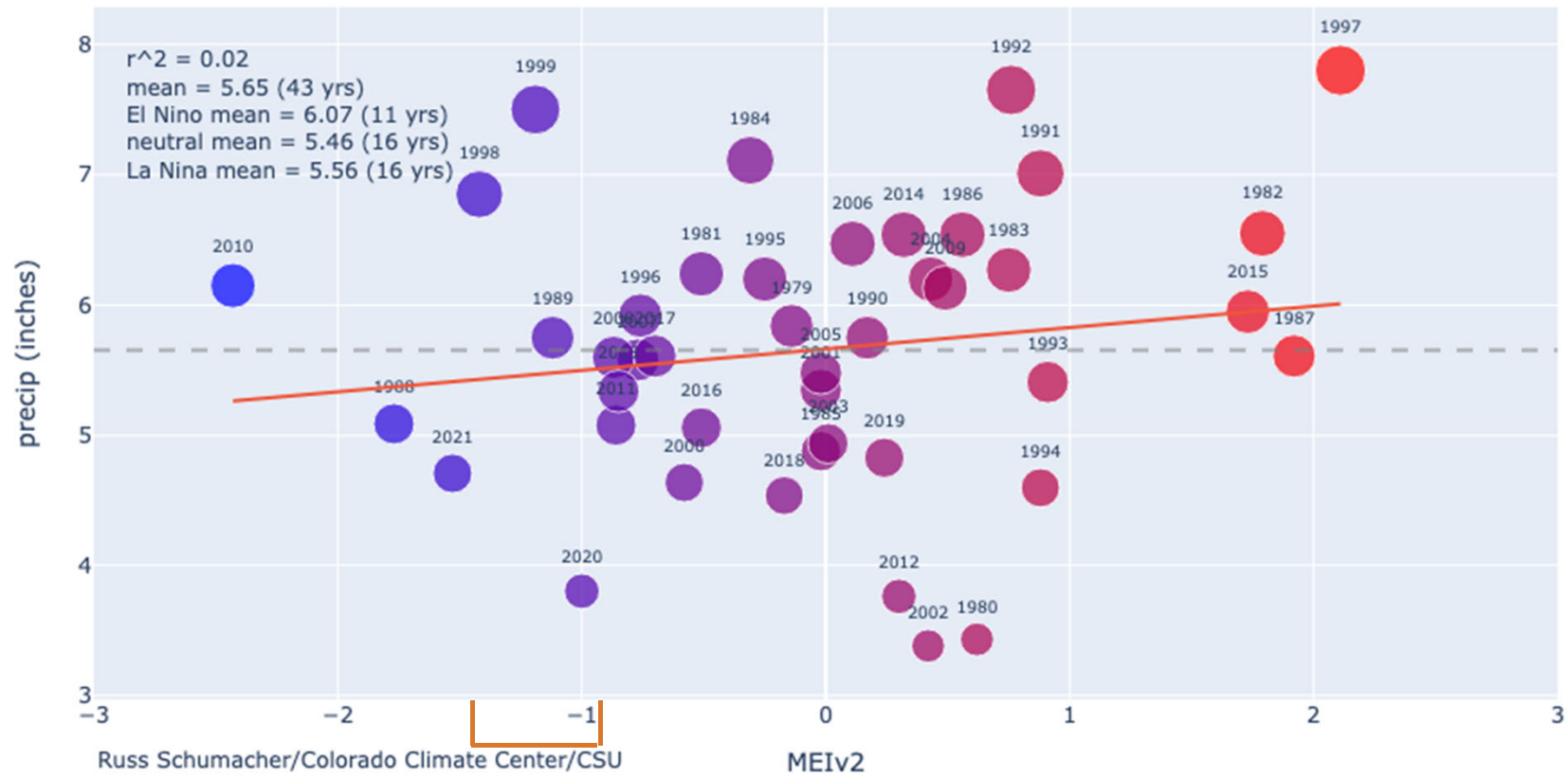
Correlation between ENSO ONI and Colorado Seasonal Precipitation (masked for significance at 95% confidence)



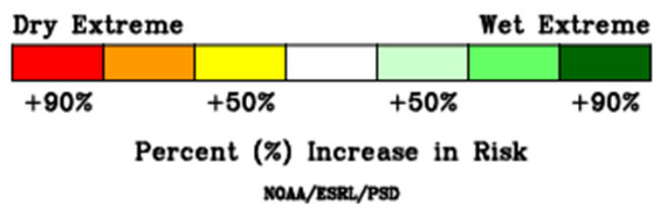
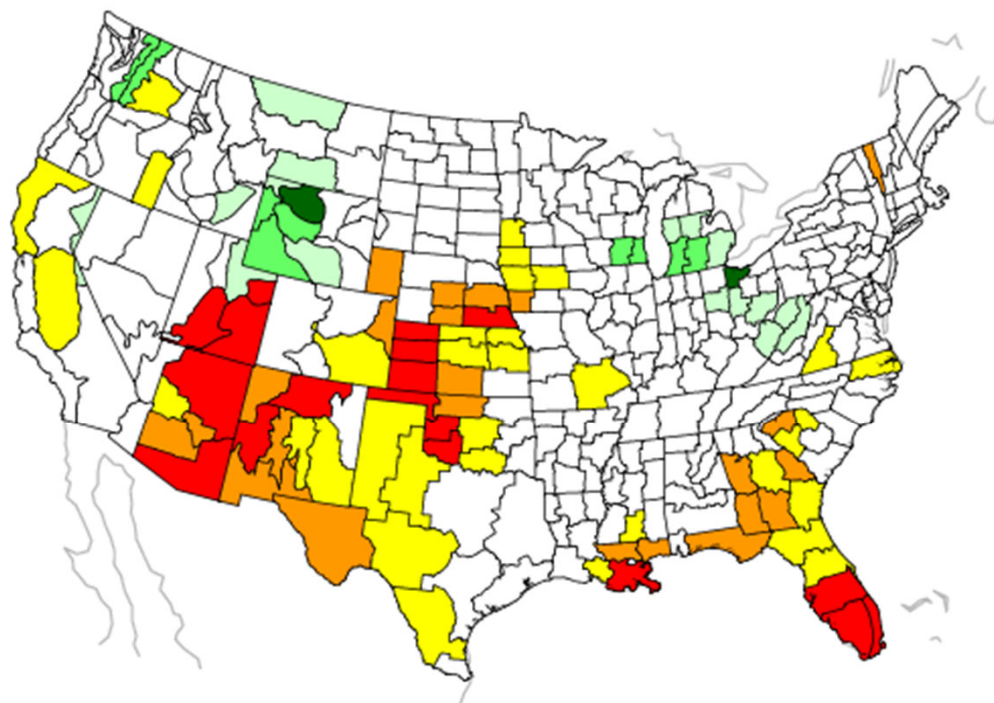
Red = El Niño wetter Blue = La Niña wetter



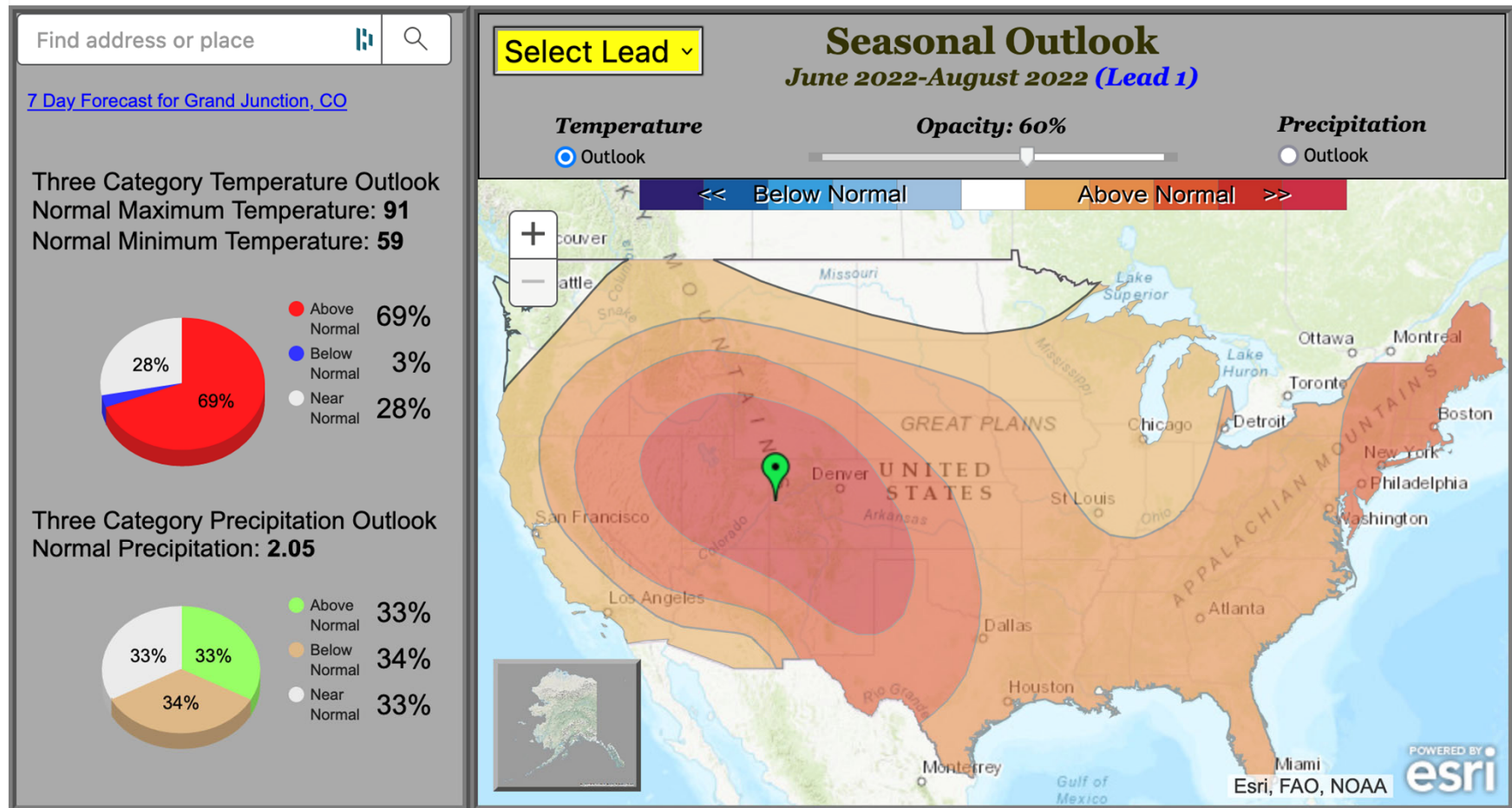
Colorado statewide average precipitation vs multivariate ENSO index, June - August



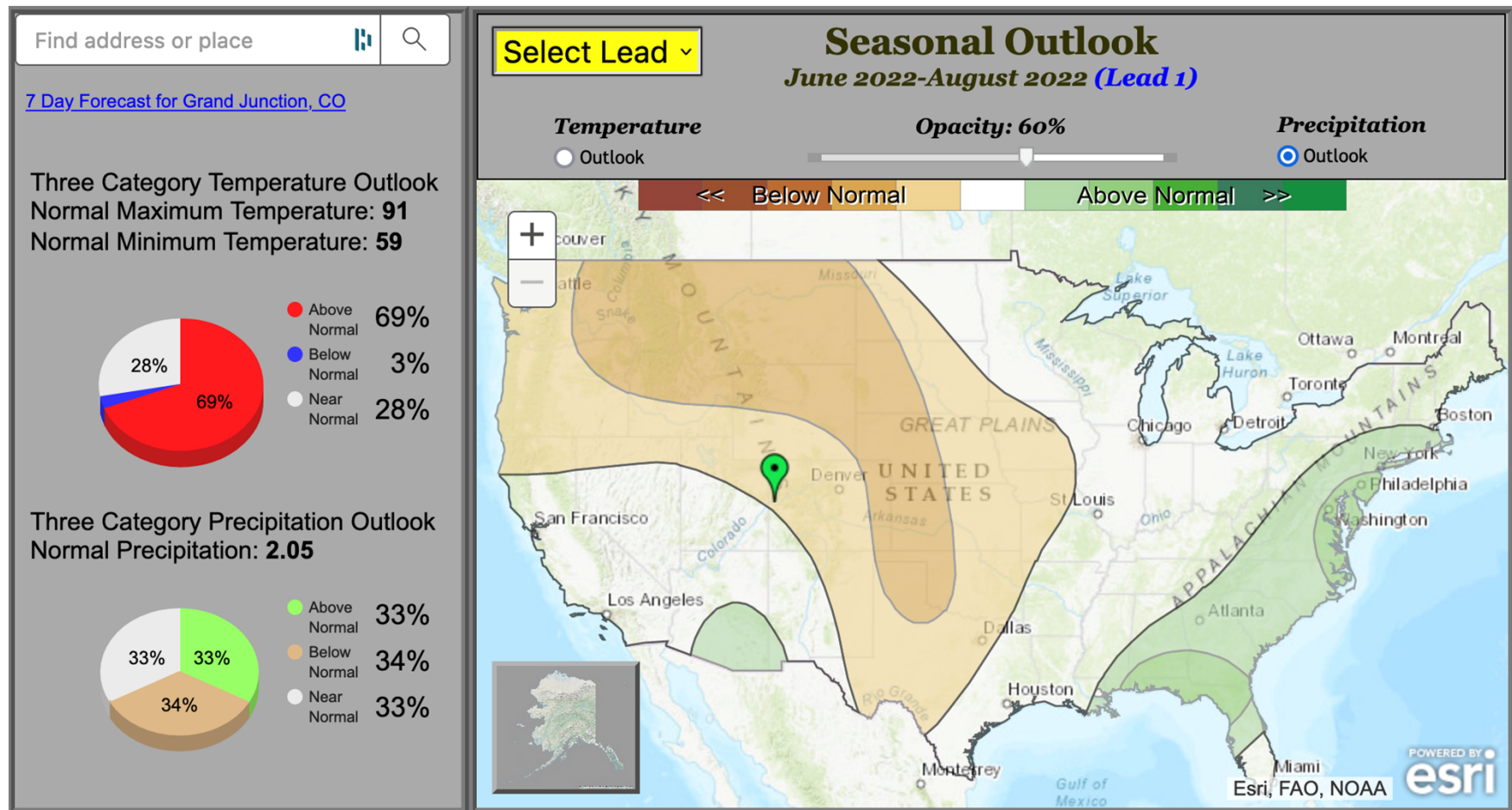
**MAM Precipitation During La Nina
Increased Risk of Wet or Dry Extremes**



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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