

Colorado Climate Center – *WATF Climate Update*

Russ Schumacher, state climatologist

Water Availability Task Force

February 16, 2021



COLORADO
CLIMATE
CENTER



ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Water year 2021 to date:

temperature, precipitation, snow,
evaporative demand

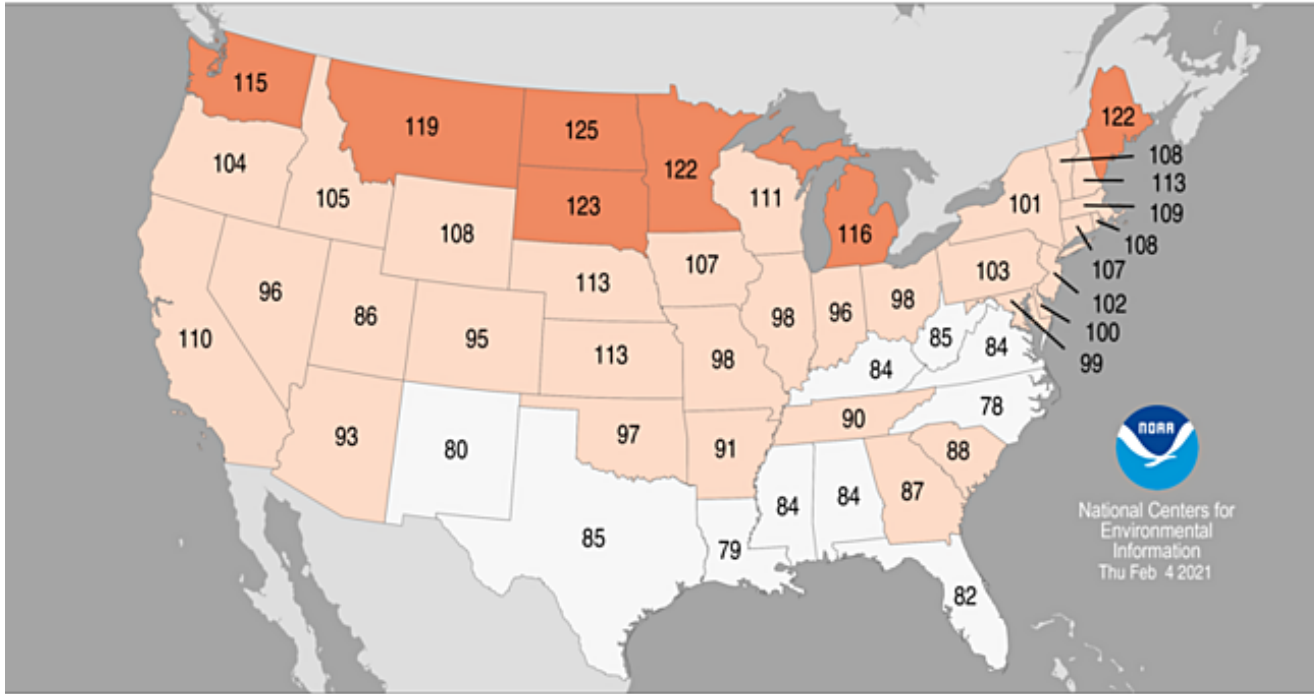


Photos by Henry Reges
& Russ Schumacher



Statewide Average Temperature Ranks

January 2021
Period: 1895–2021



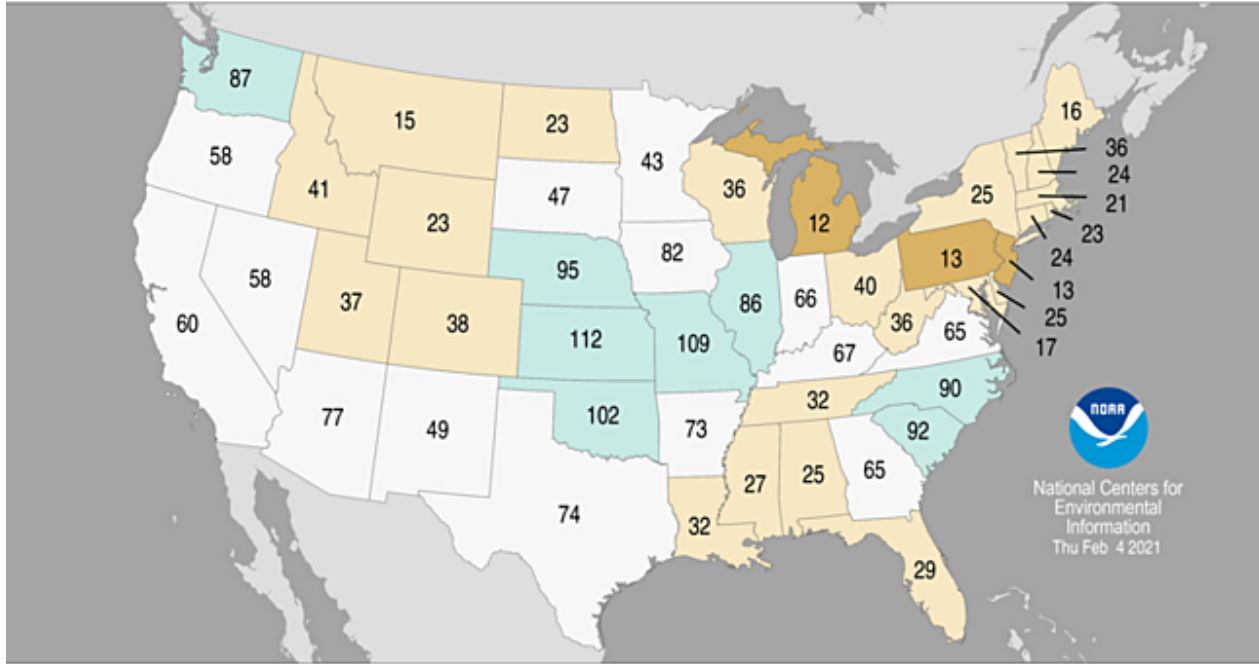
Statewide: 15th warmest October – January
2.5°F above 20th century average

Month	T Rank (of 127 years)	Above, below, or near avg?
Oct	54 th warmest	near avg
Nov	7 th warmest	much above
Dec	46 th warmest	near avg
Jan	33 rd warmest	above

9 straight months of above-average temperature (April 2020 was last below-average month)



Statewide Precipitation Ranks January 2021 Period: 1895–2021



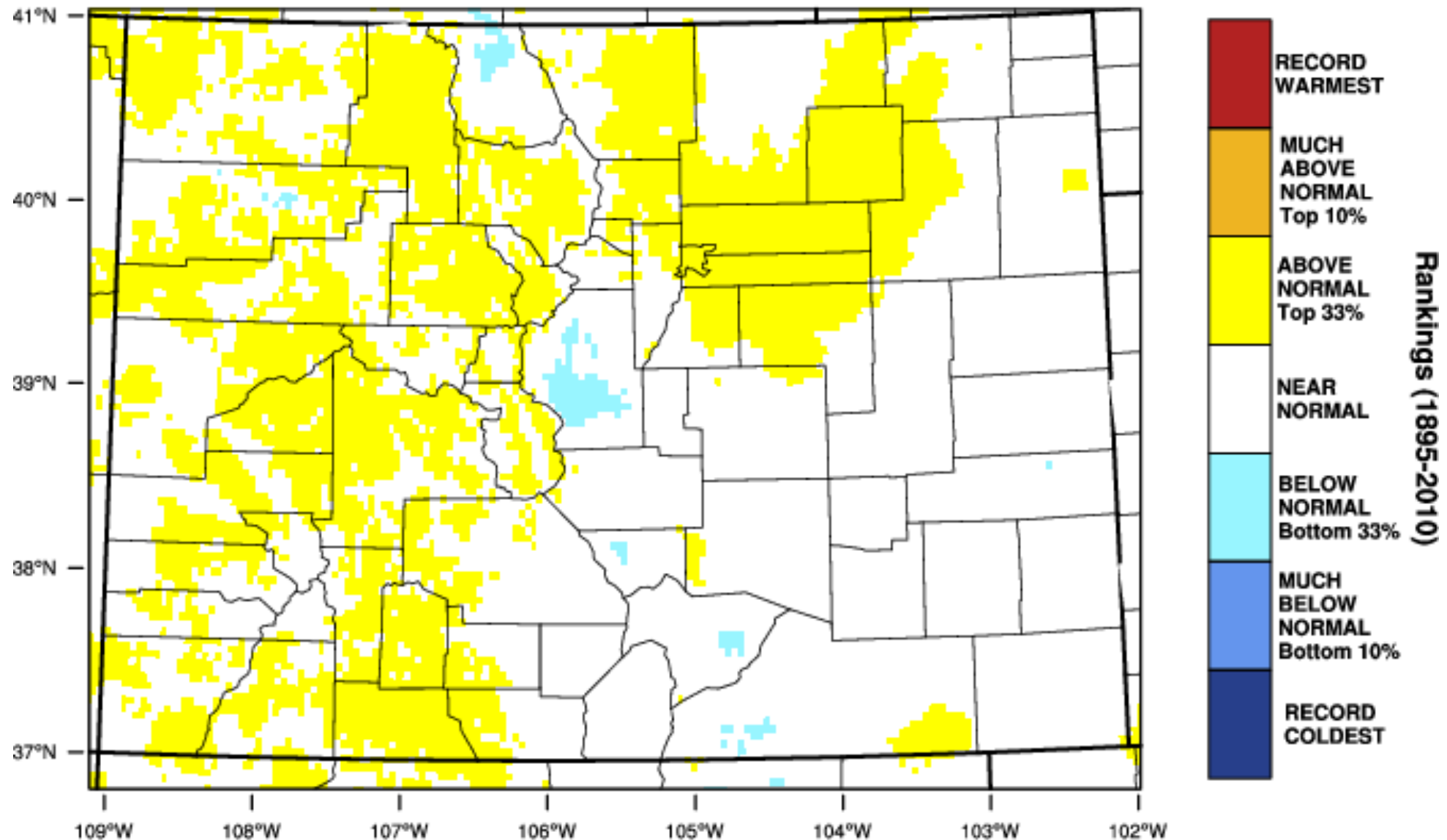
Statewide: 15th driest October-January
1.38" below 20th century average

Month	P Rank (of 127 years)	Above, below, or near avg?
Oct	16 th driest	below
Nov	44 th driest	near avg
Dec	56 th driest	near avg
Jan	38 th driest	below

11 straight months of below-average precip (February 2020 was last above-average month)

Colorado - Mean Temperature

January 2021 Percentile

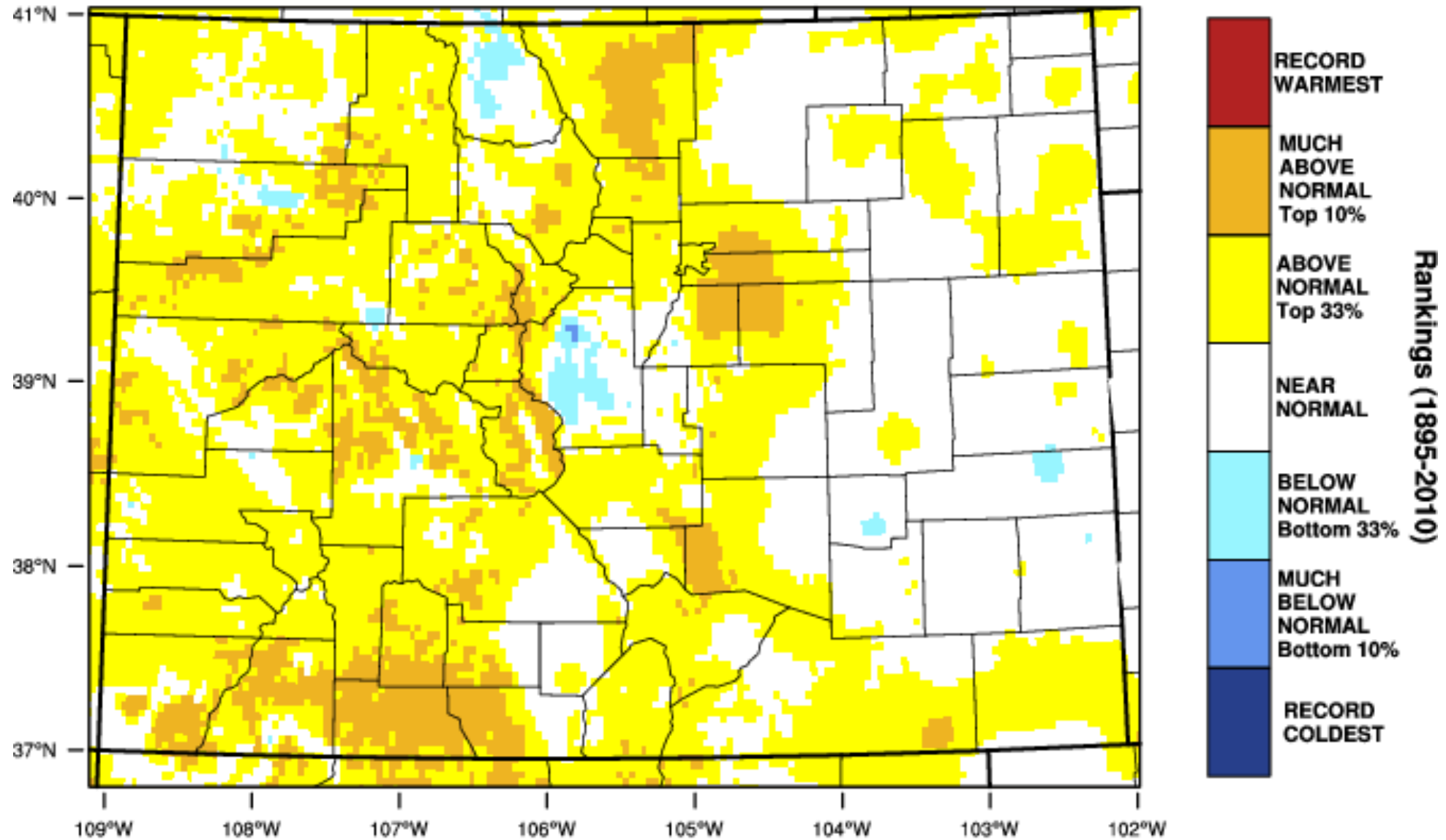


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 2 FEB 2021



Colorado - Mean Temperature

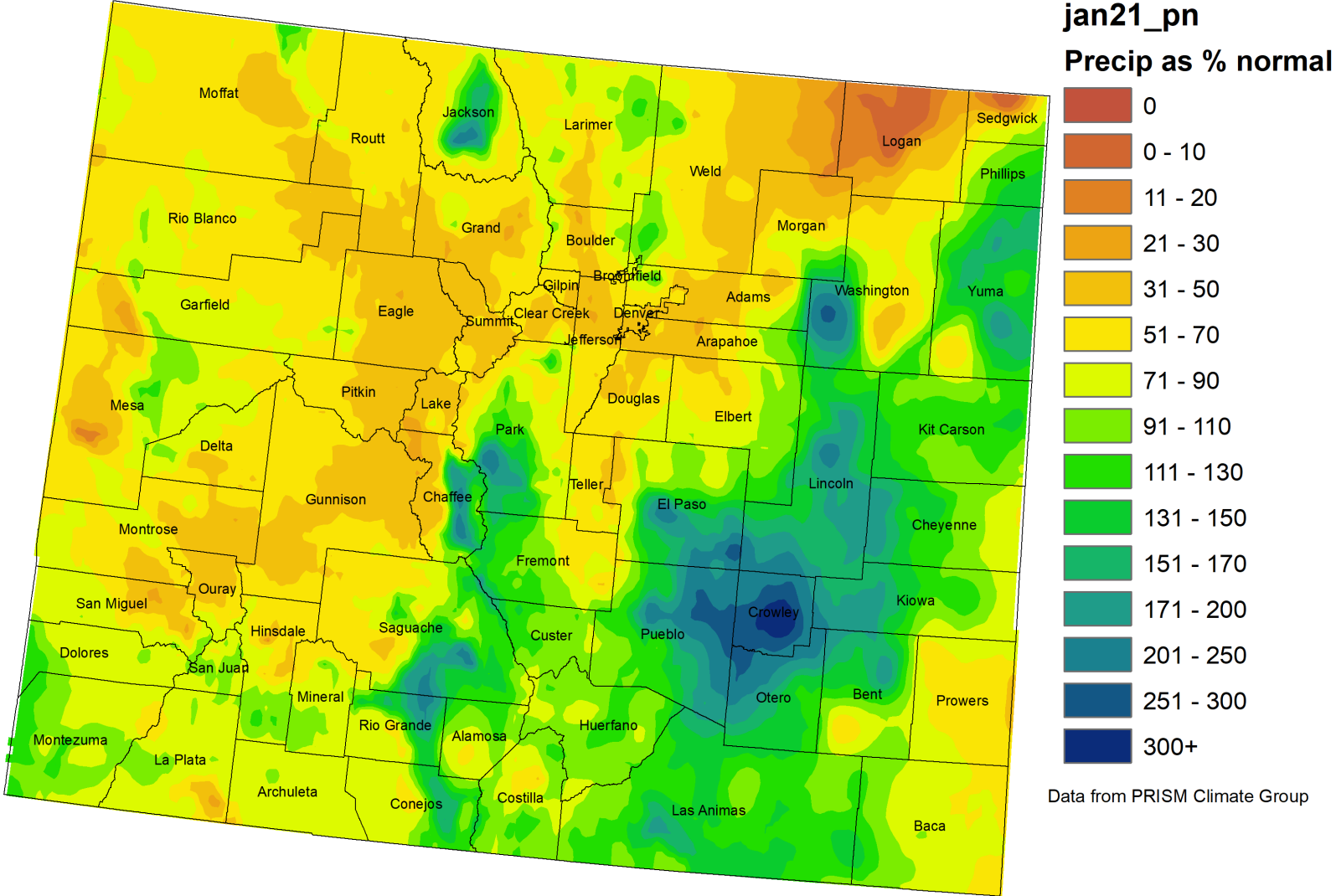
October-January 2021 Percentile



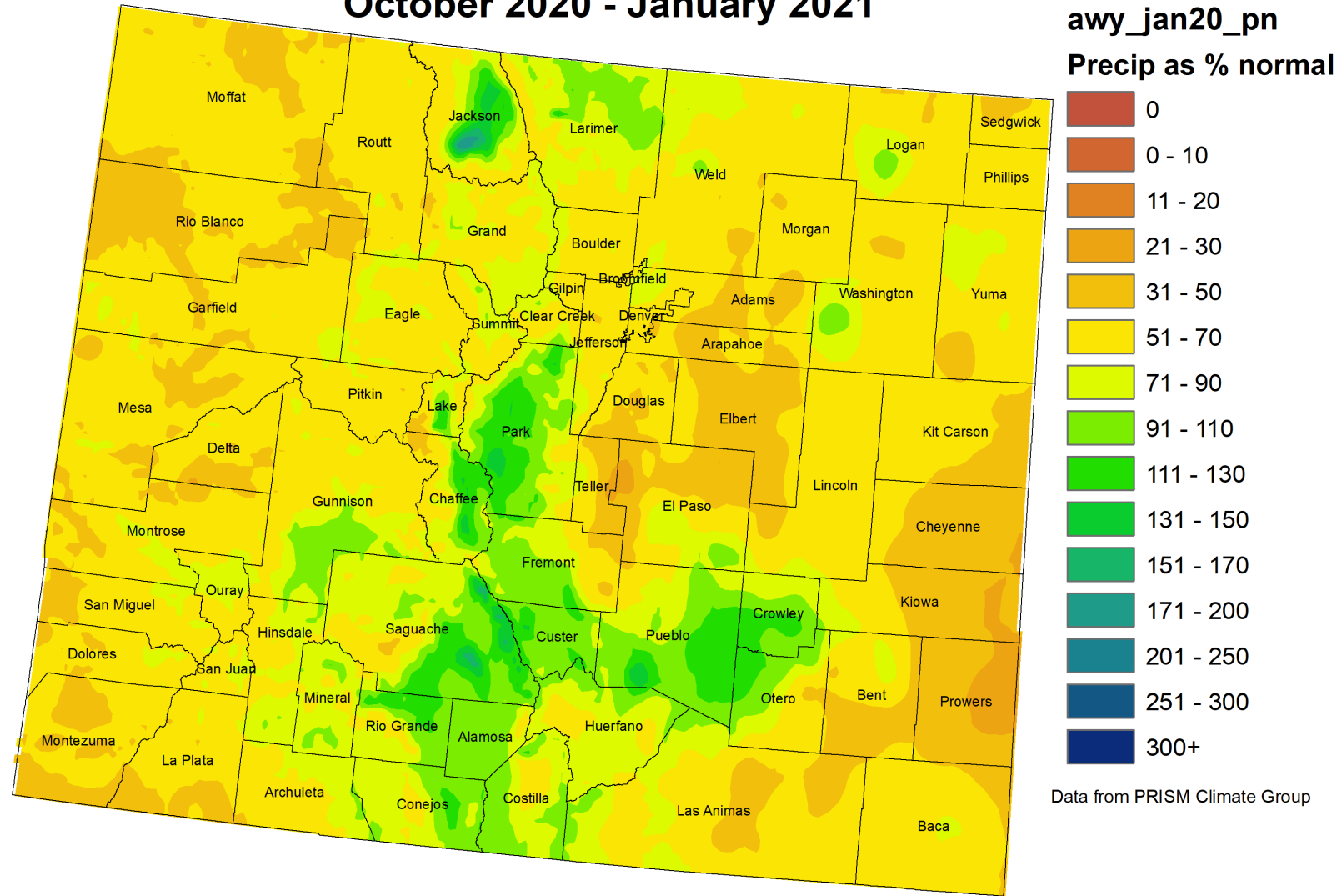
WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 2 FEB 2021



Colorado January 2021 Precipitation as a Percentage of Normal

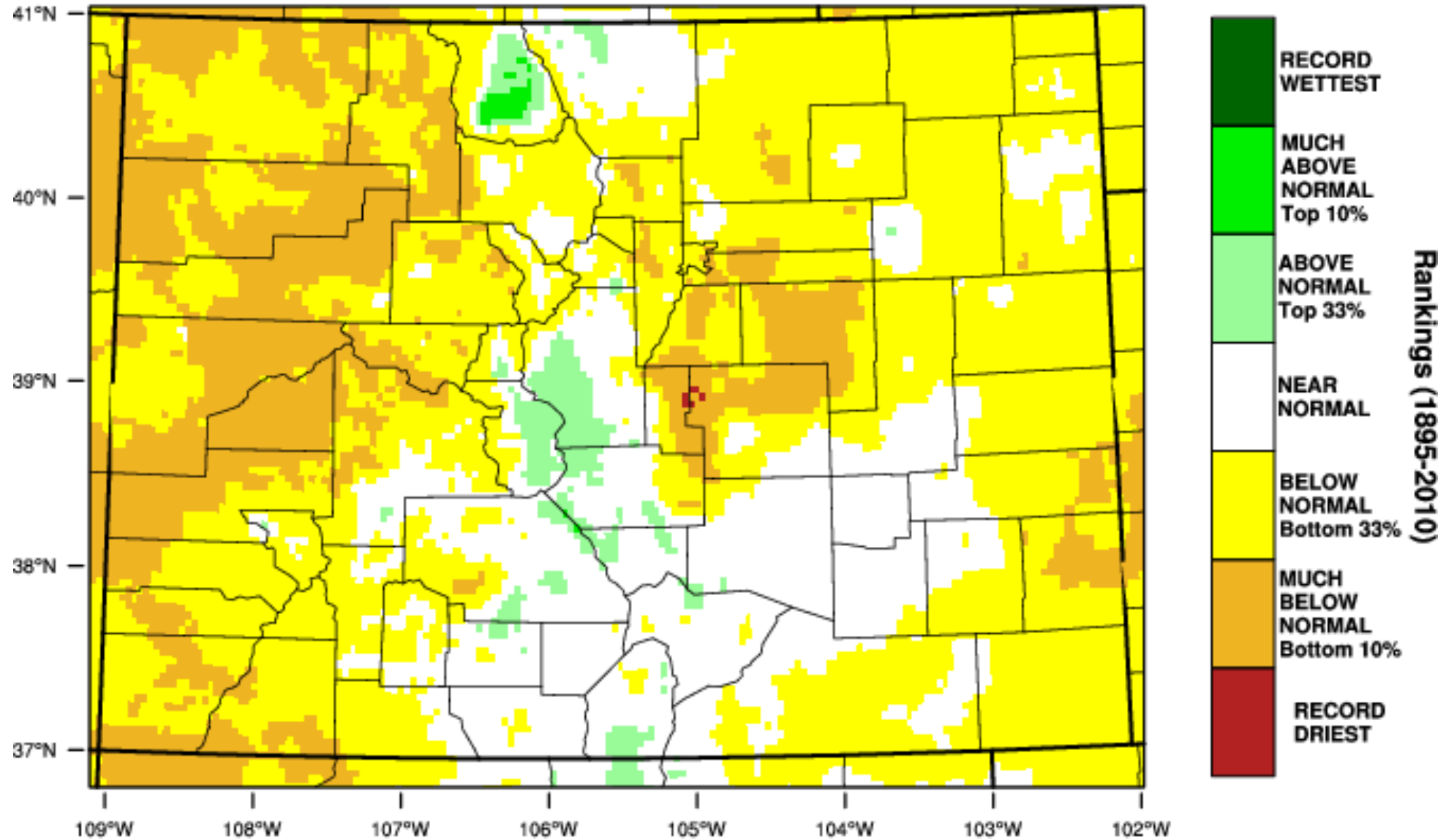


Colorado Water Year 2021 Precipitation as a Percentage of Normal October 2020 - January 2021



Colorado - Precipitation

October-January 2021 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 11 FEB 2021



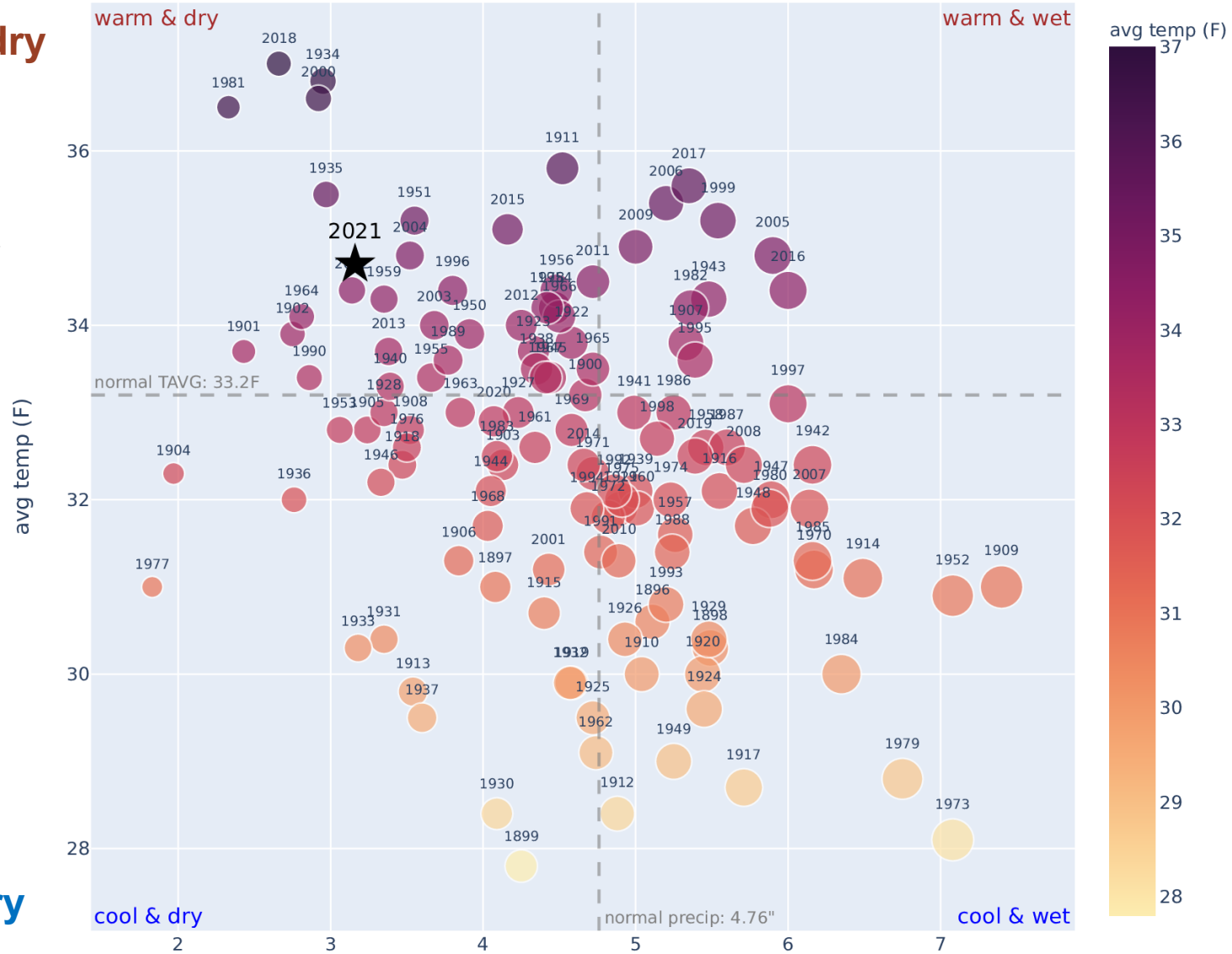
Water year 2021 through January

Colorado average temperature and precipitation, October - January

Warm & dry

warm & wet

Warm & wet



Cool & dry

cool & dry

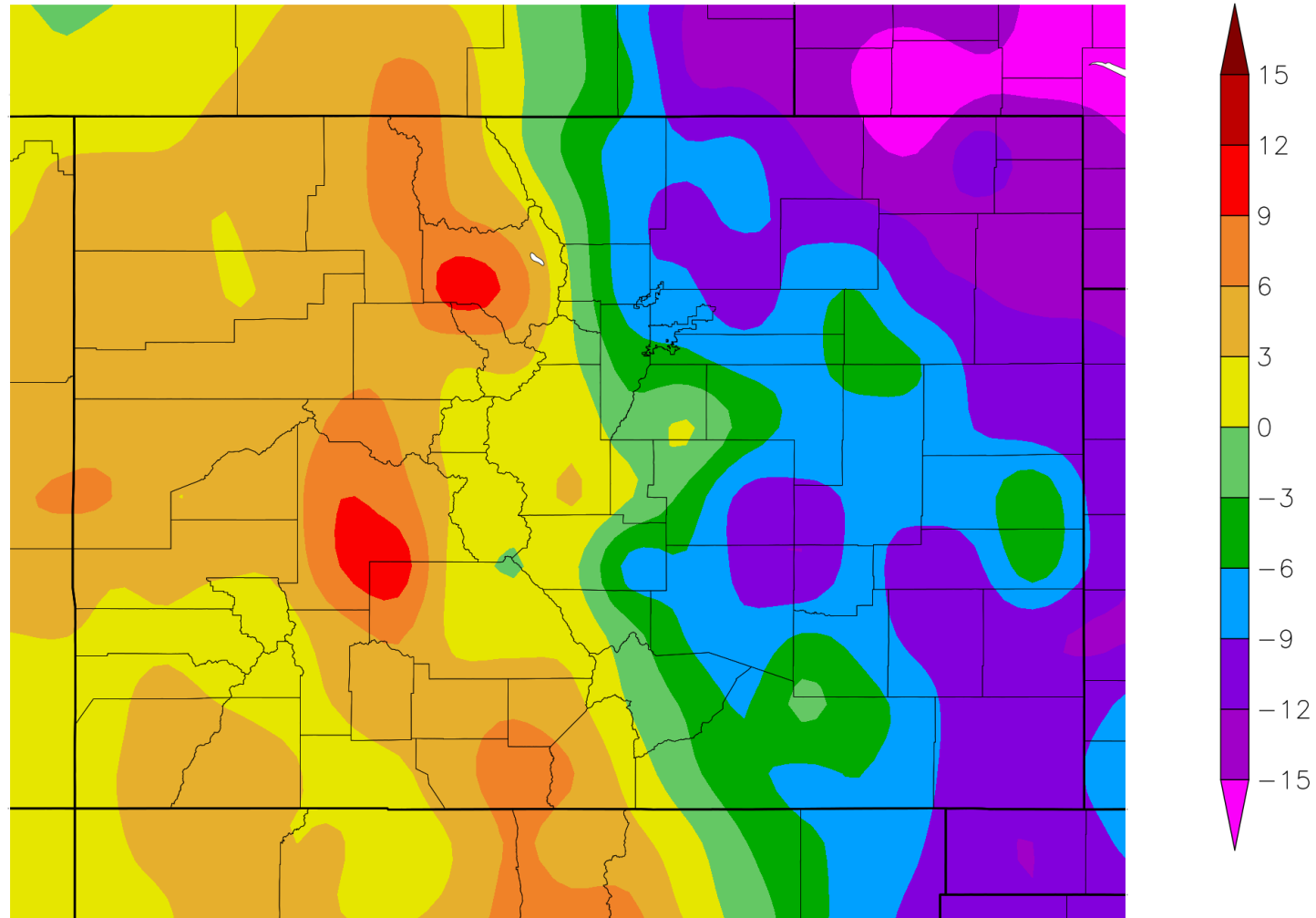
cool & wet

Cool & wet

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



Departure from Normal Temperature (F) 2/1/2021 - 2/15/2021

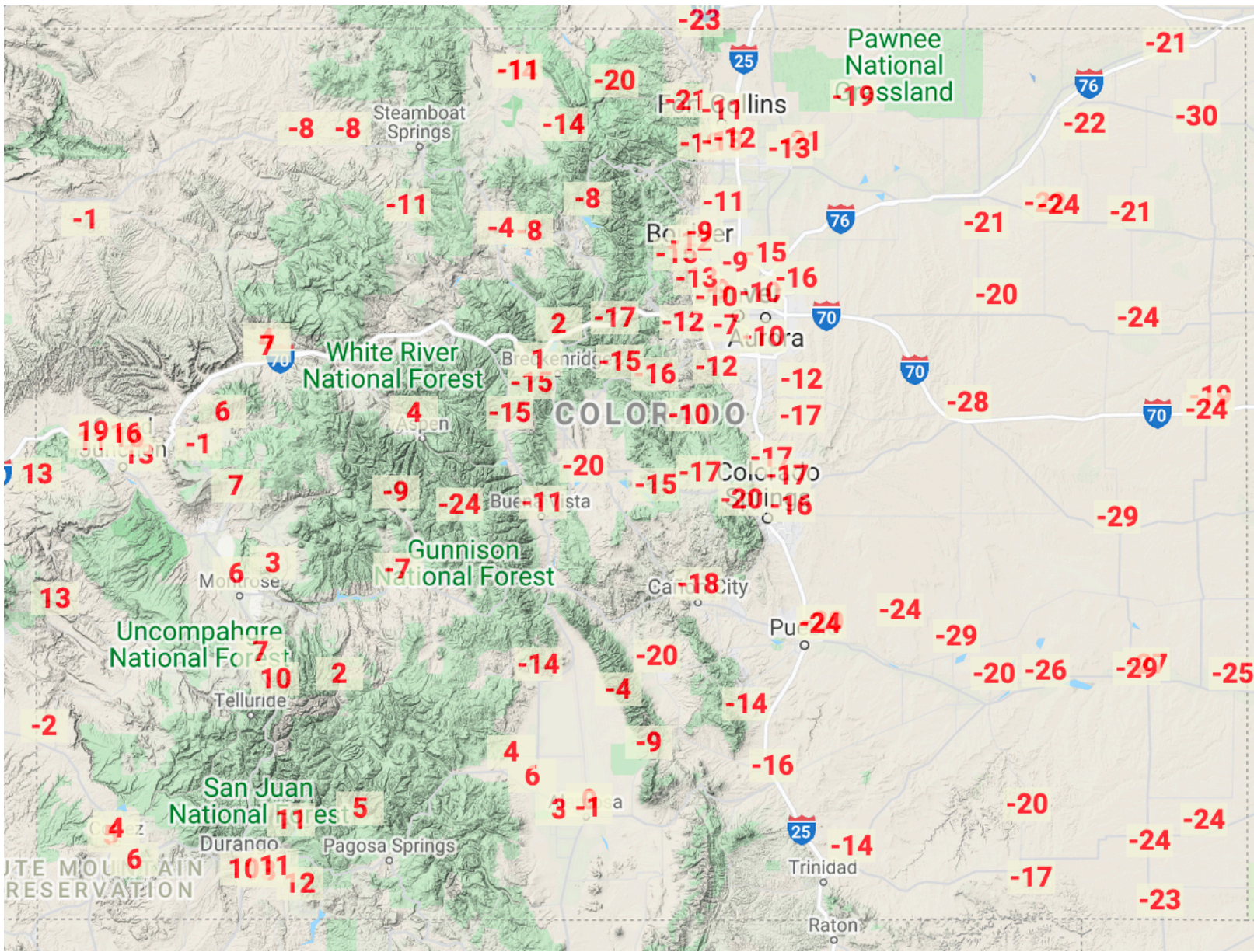


Generated 2/16/2021 at HPRCC using provisional data.

NOAA Regional Climate Centers



Minimum temps on 14-15 February



Minimum 1-Day Mean Min Temperature for HOLYOKE, CO

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	-36.0	1899-02-12
2	-35.0	1919-12-09
3	-33.0	1989-12-23
-	-33.0	1989-12-22
5	-30.0	2021-02-15
-	-30.0	1901-12-15
-	-30.0	1901-12-14
8	-28.0	1919-12-10
-	-28.0	1899-02-11
10	-27.0	1933-02-08

Last value also occurred in one or more previous years.
Period of record: 1897-02-15 to 2021-02-15



Minimum 1-Day Mean Min Temperature for LAMAR, CO

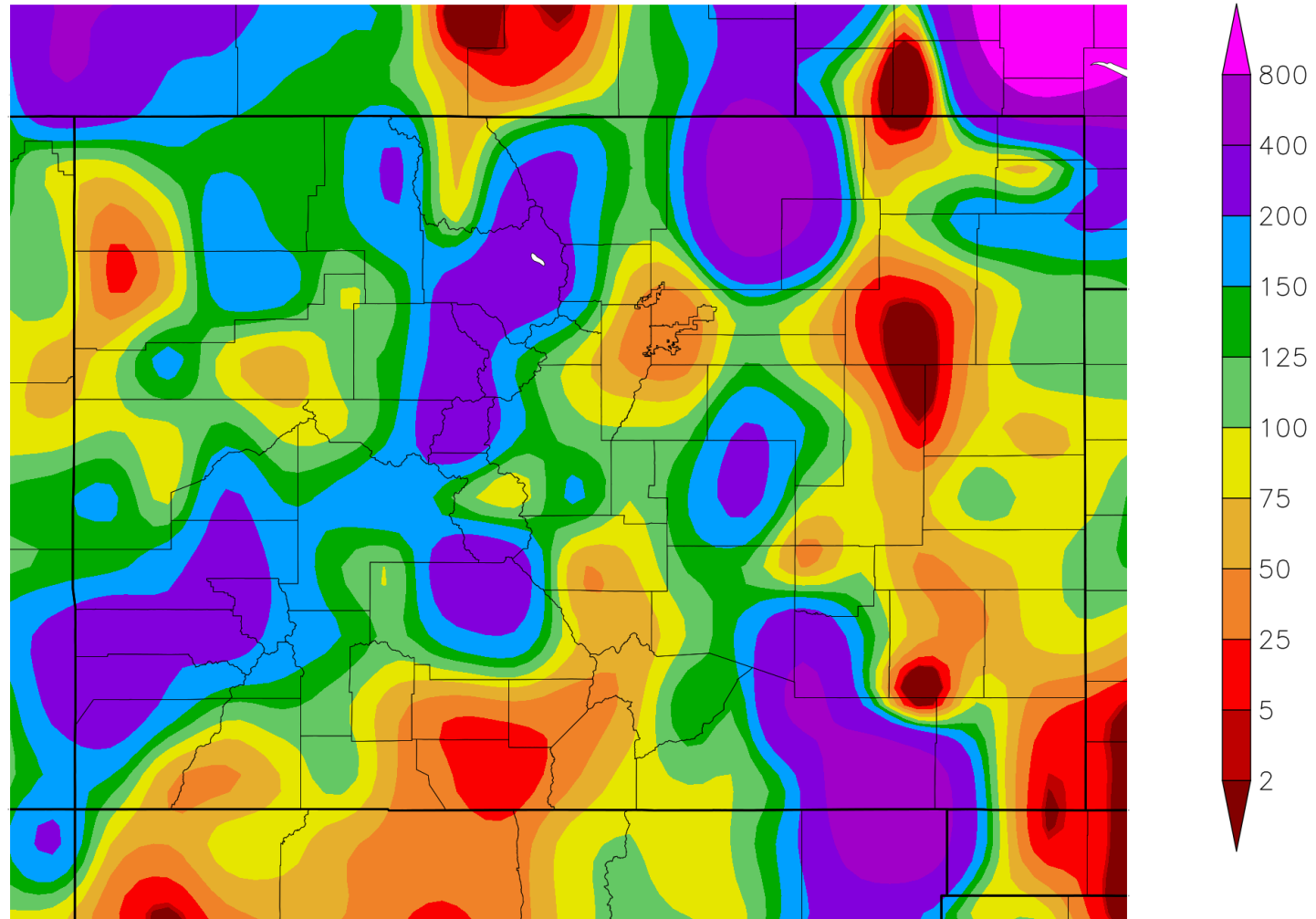
Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	-30.0	1899-02-12
2	-29.0	1949-01-30
3	-27.0	2021-02-15
-	-27.0	1948-01-28
5	-24.0	1942-01-05
6	-23.0	1989-12-22
-	-23.0	1961-12-12
-	-23.0	1948-03-10
-	-23.0	1932-12-12
10	-22.0	1984-01-19

Last value also occurred in one or more previous years.
Period of record: 1893-01-01 to 2021-02-15



Percent of Normal Precipitation (%) 2/1/2021 - 2/14/2021

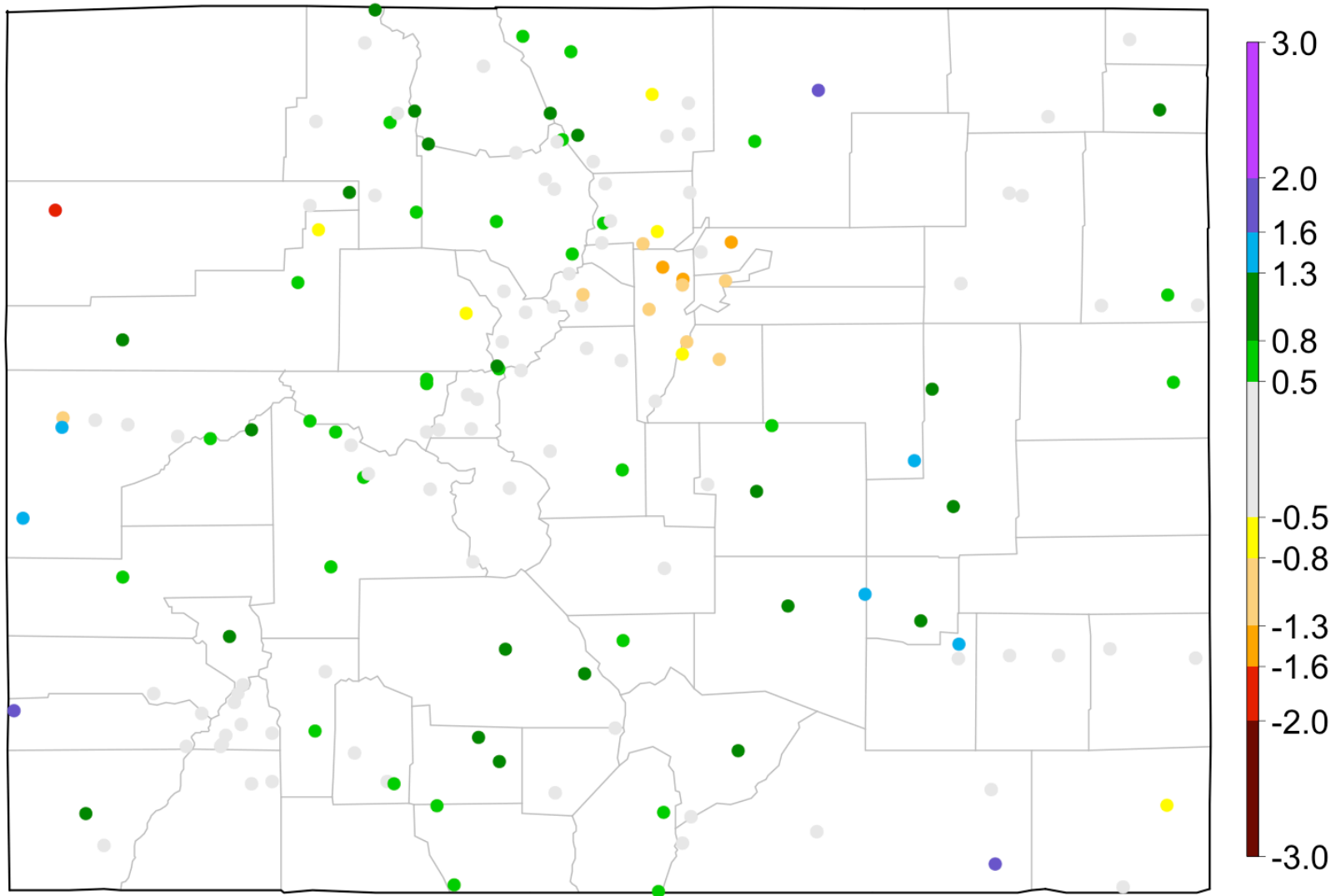


Generated 2/15/2021 at HPRCC using provisional data.

NOAA Regional Climate Centers



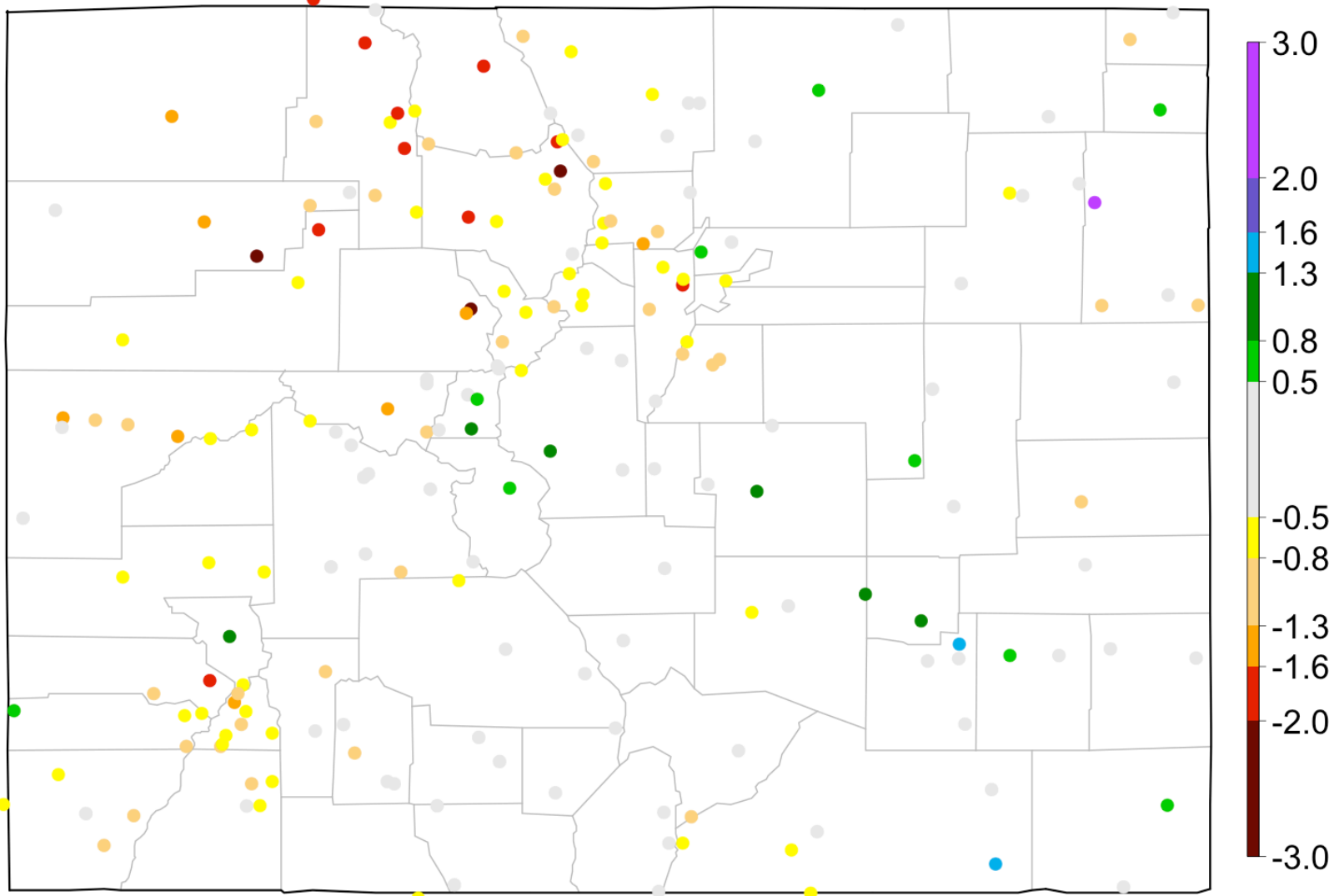
30-day SPI: 2021/01/15 - 2021/02/13



Data from High Plains Regional Climate Center and ACIS



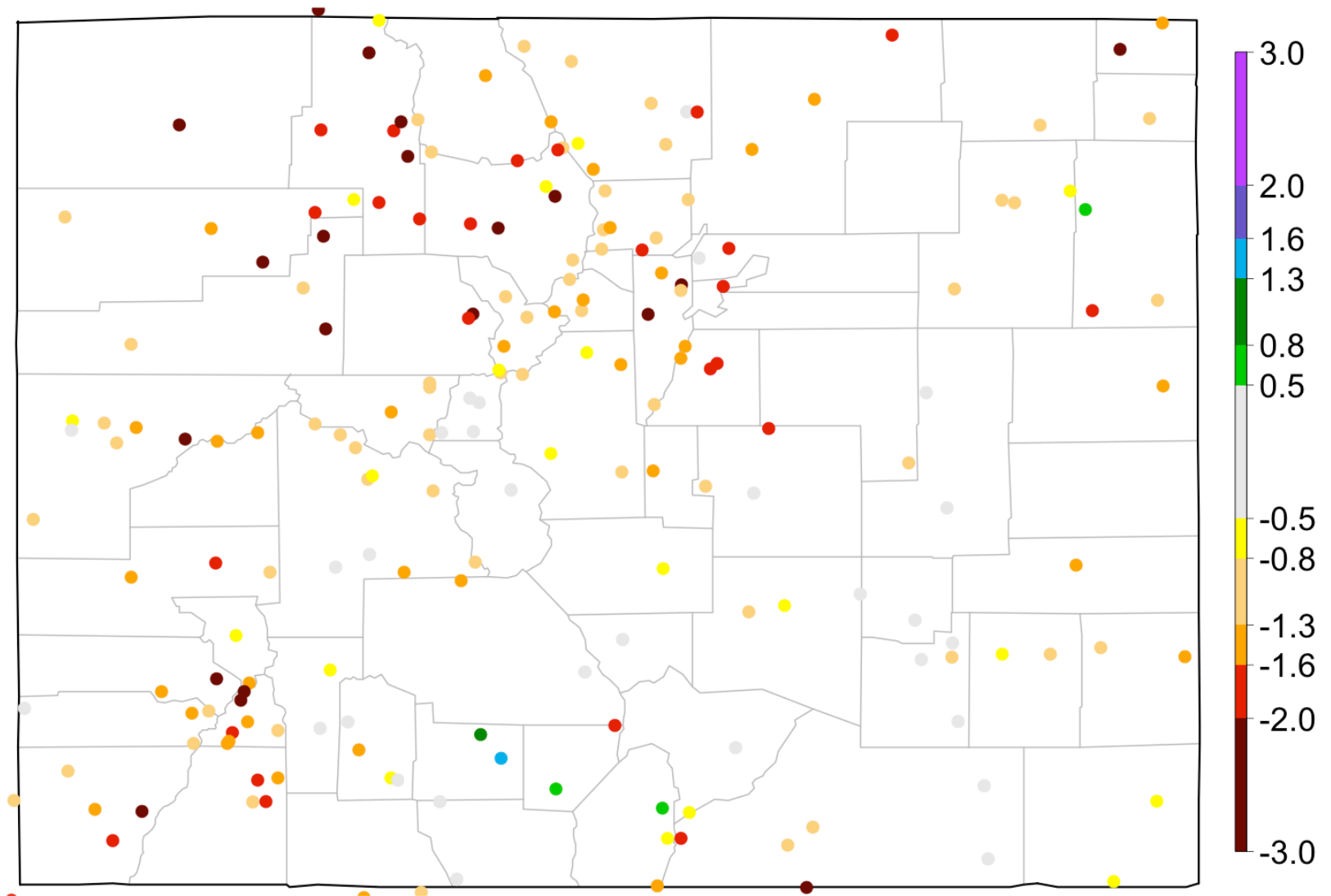
90-day SPI: 2020/11/16 - 2021/02/13



Data from High Plains Regional Climate Center and ACIS

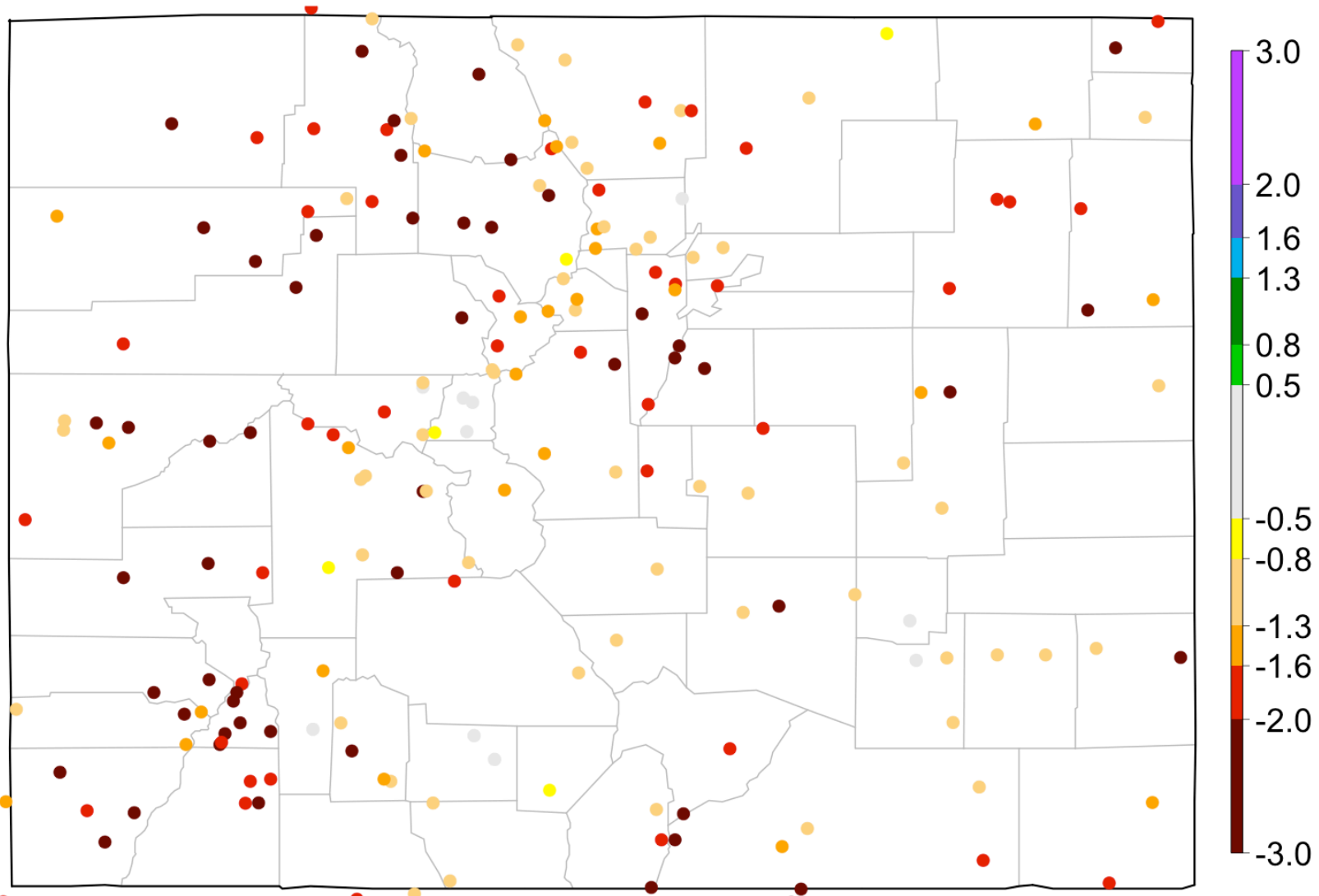


6-month SPI: 2020/08/14 - 2021/02/13



Data from High Plains Regional Climate Center and ACIS

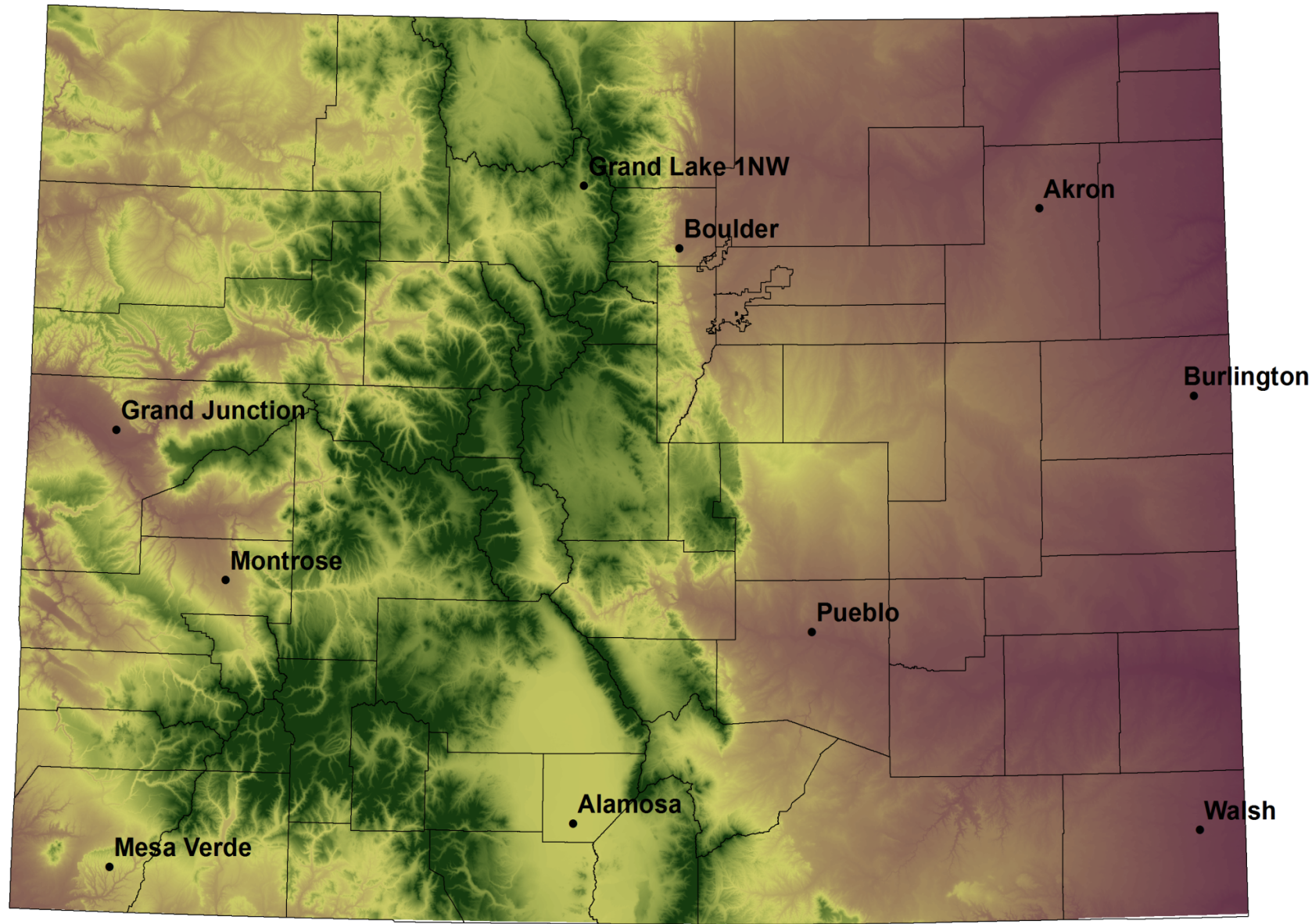
12-month SPI: 2020/02/14 - 2021/02/13



Data from High Plains Regional Climate Center and ACIS



NWS Cooperative Stations for WATF



Water Year 2020 – Station Updates



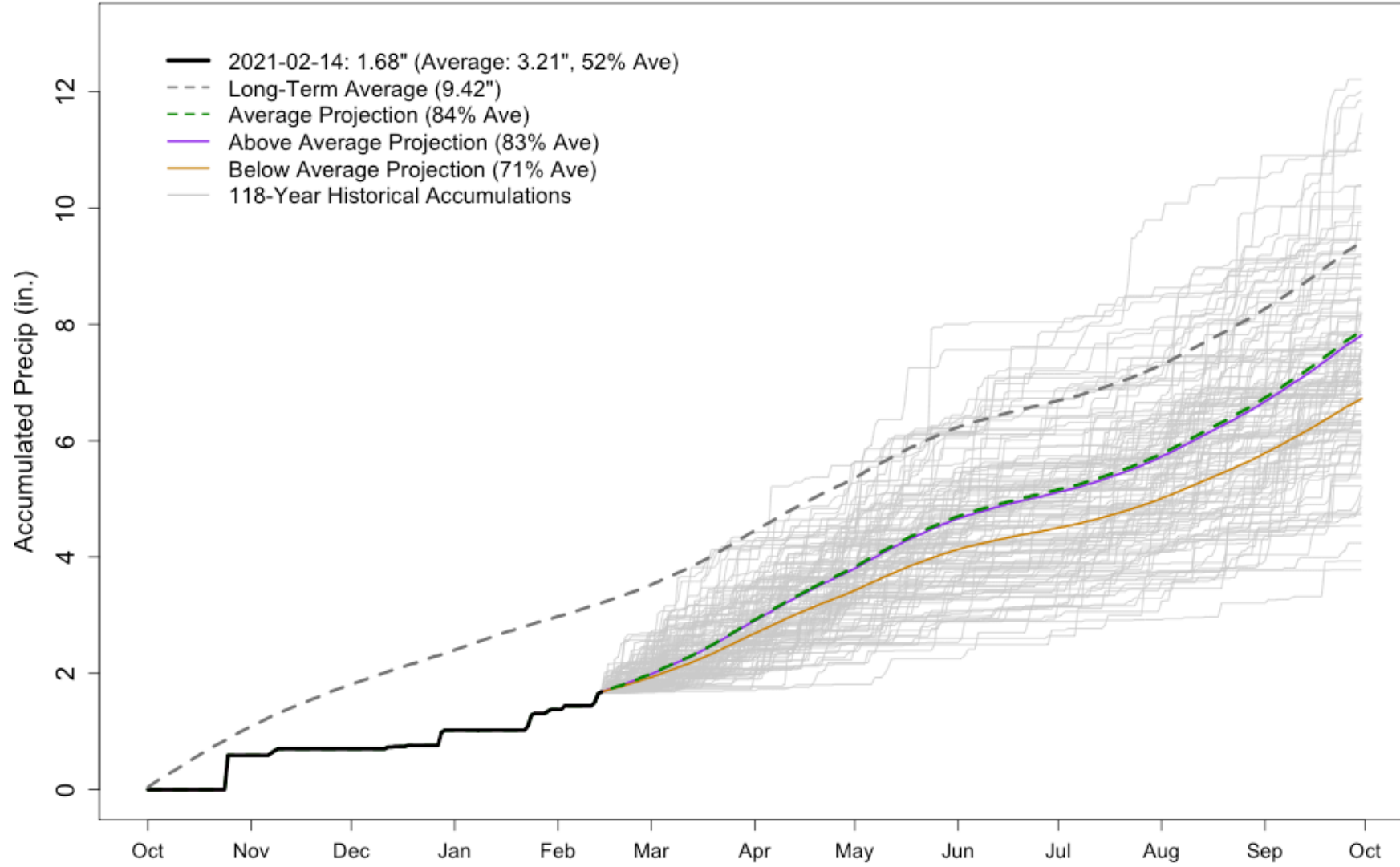
Grand Lake

(A lot of missing data from the fall – won't show this month)

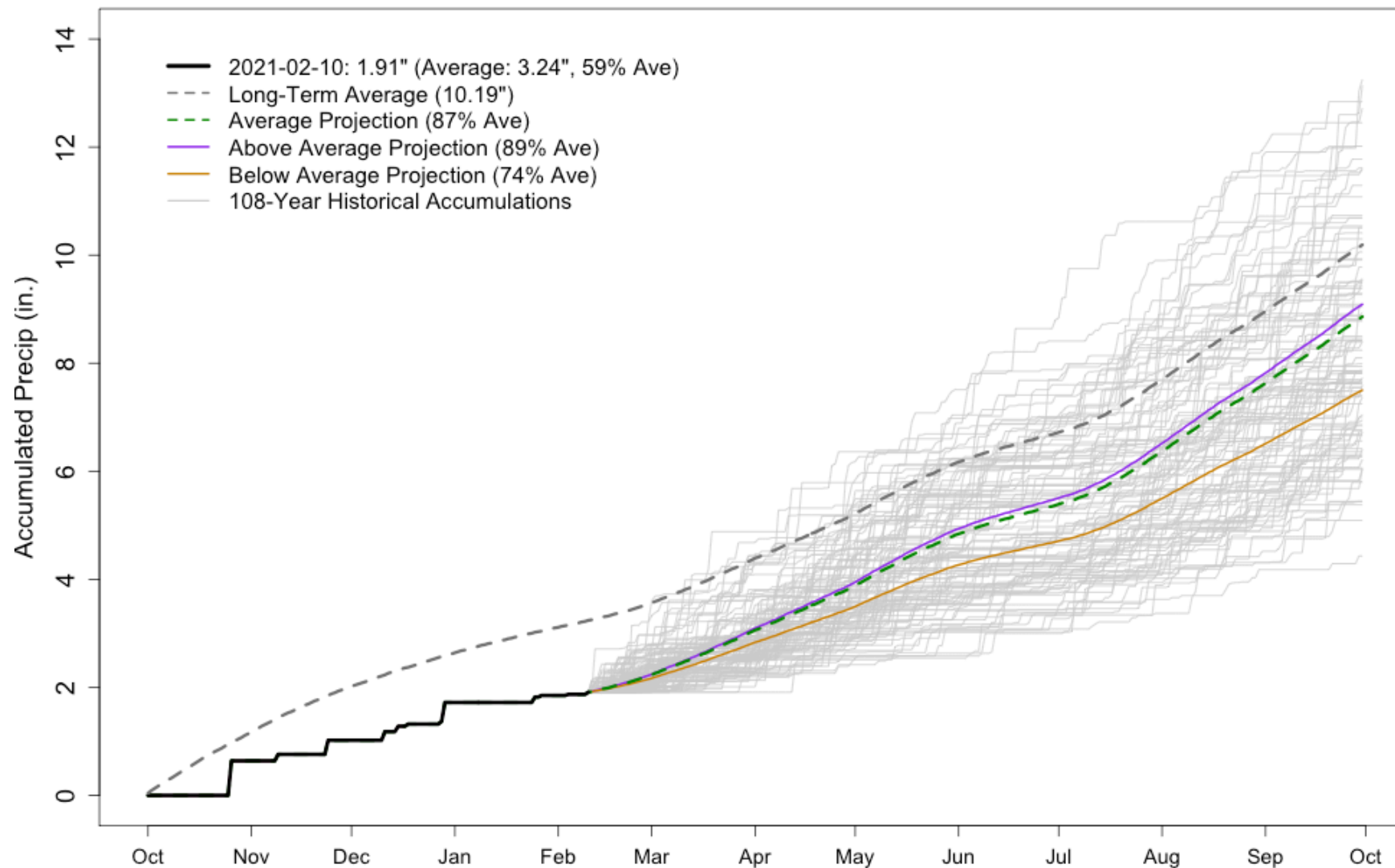


Grand Junction

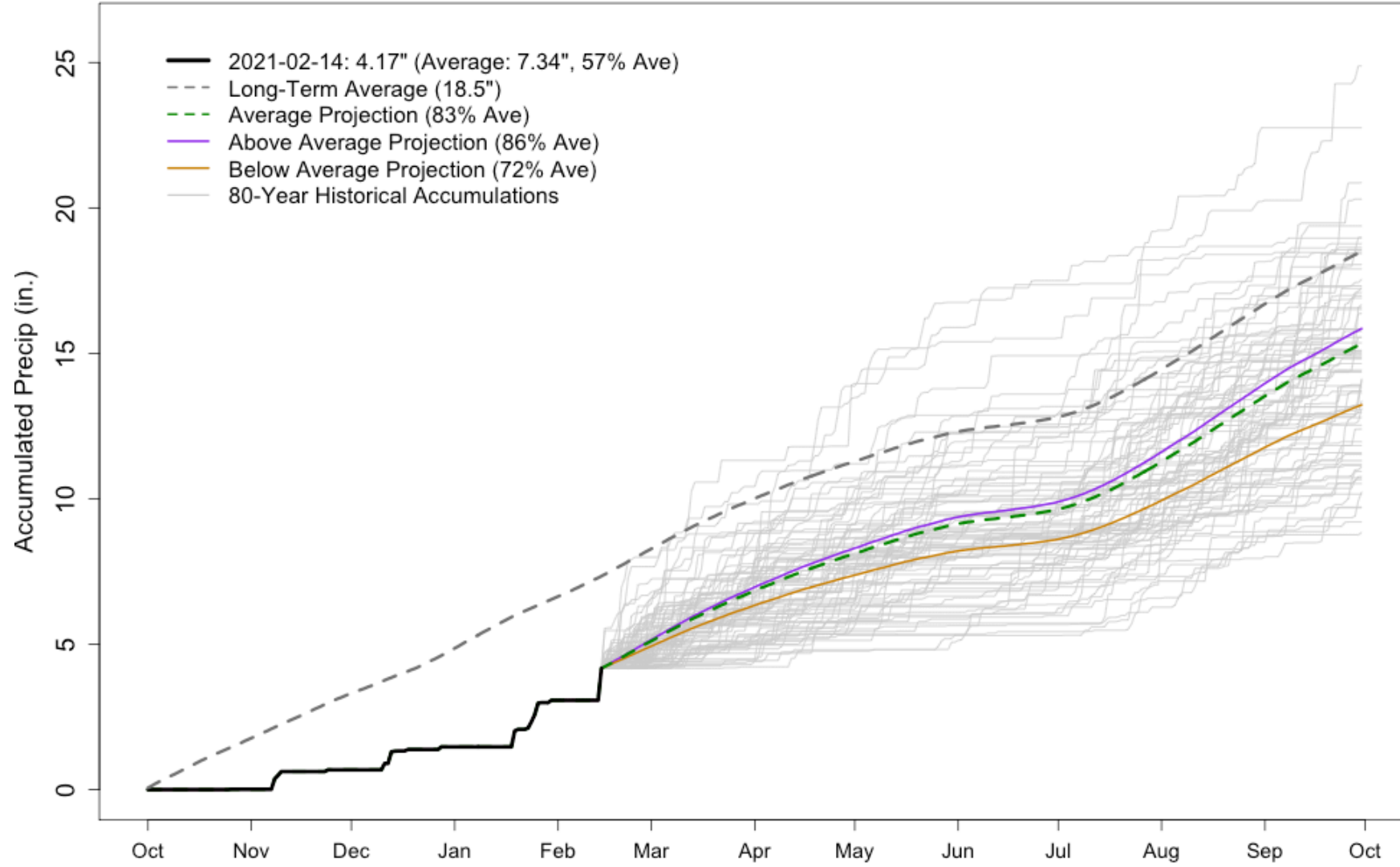
GRAND JUNCTION WALKER FIELD WY2021 Precipitation Projections



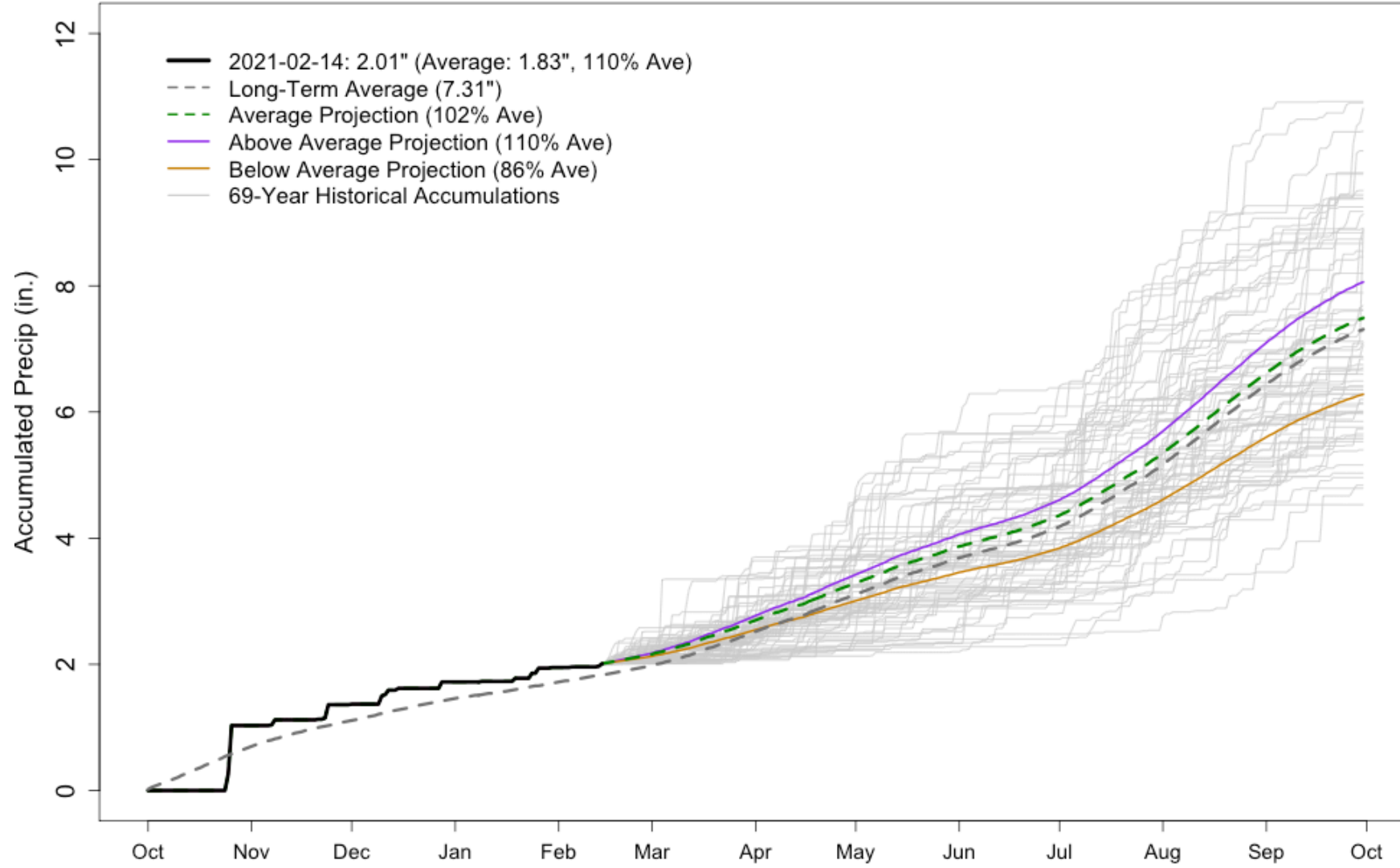
MONTROSE NO 2 WY2021 Precipitation Projections



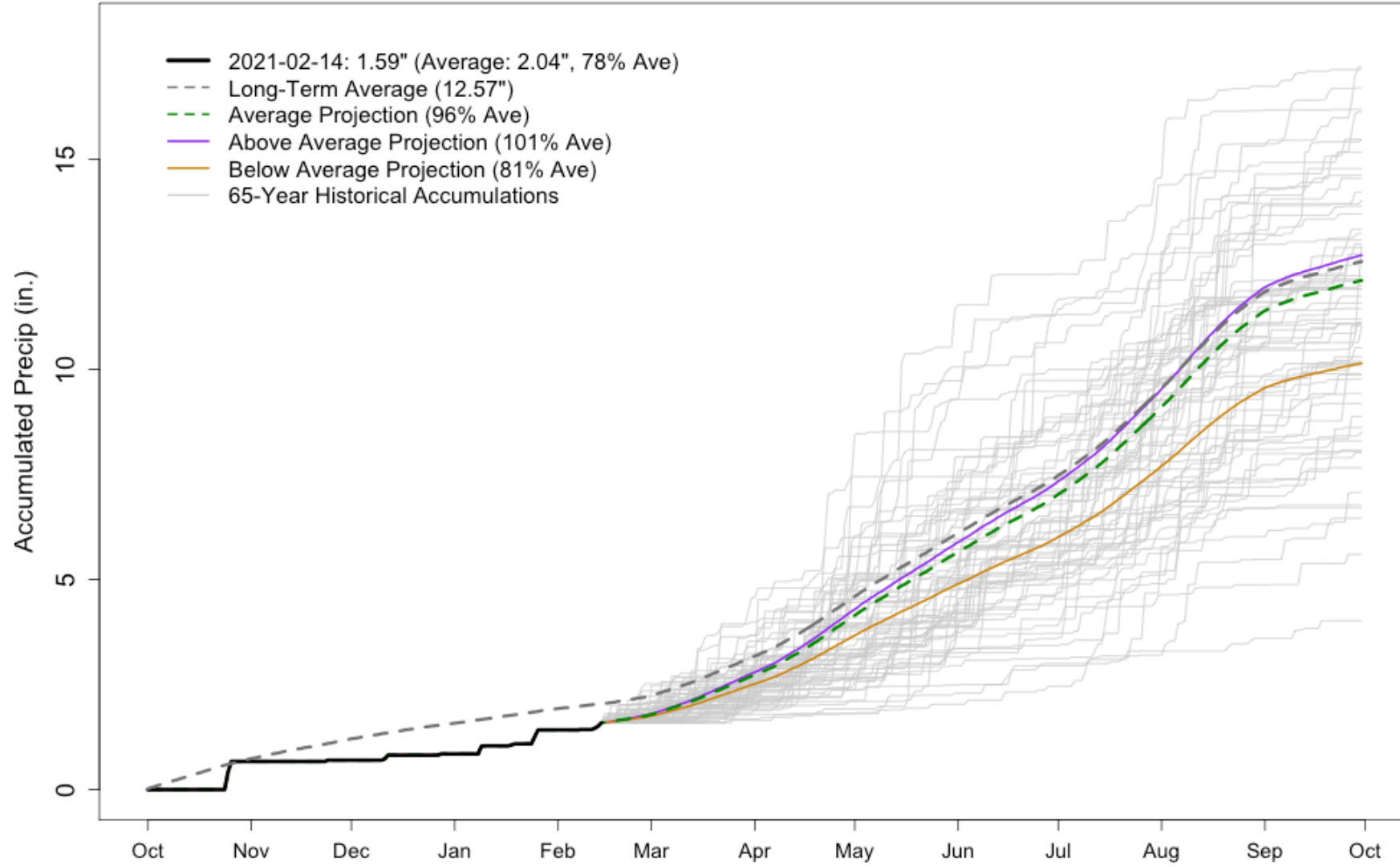
MESA VERDE NP WY2021 Precipitation Projections



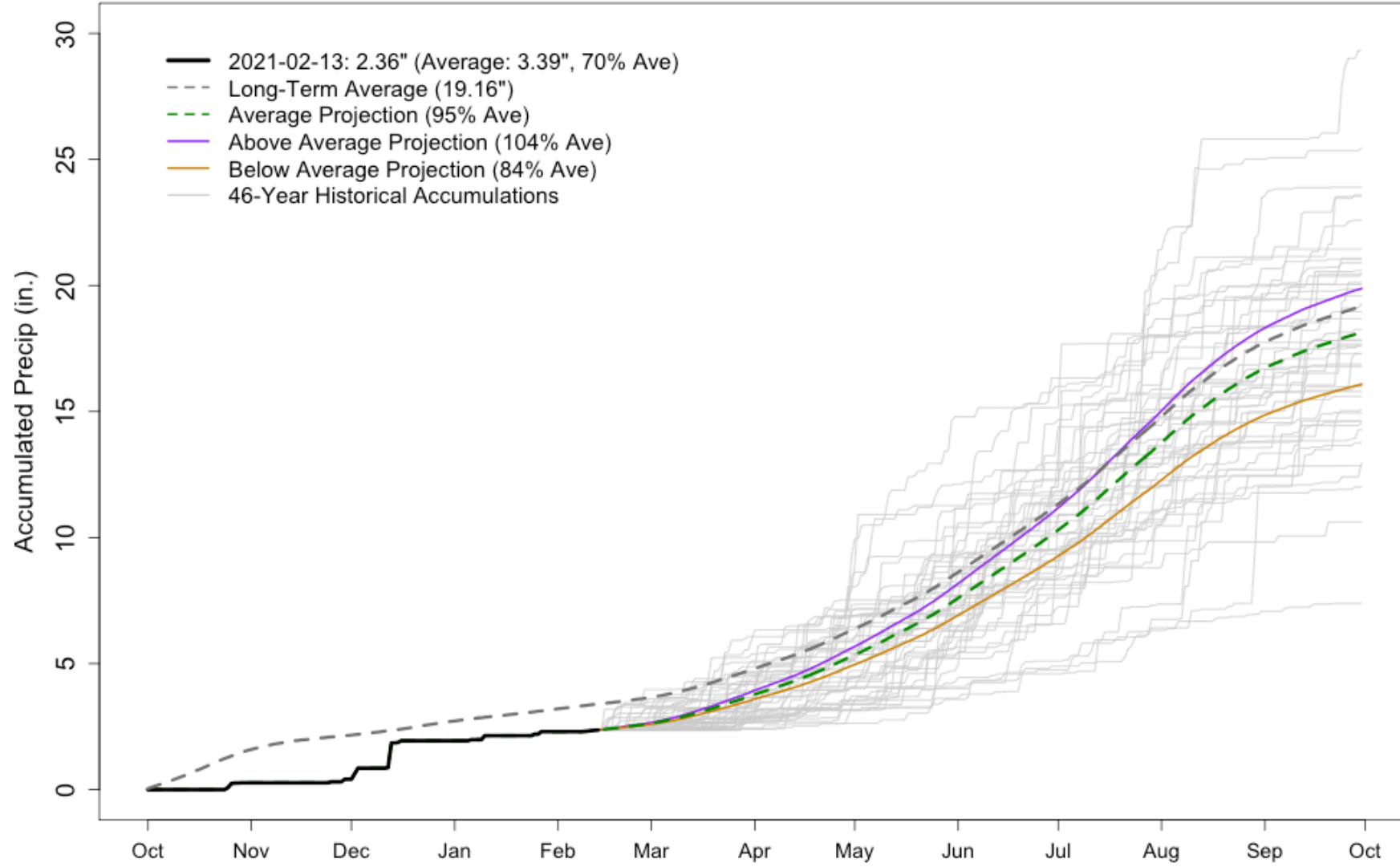
ALAMOSA-BERGMAN FIELD WY2021 Precipitation Projections



PUEBLO MEMORIAL AIRPORT WY2021 Precipitation Projections

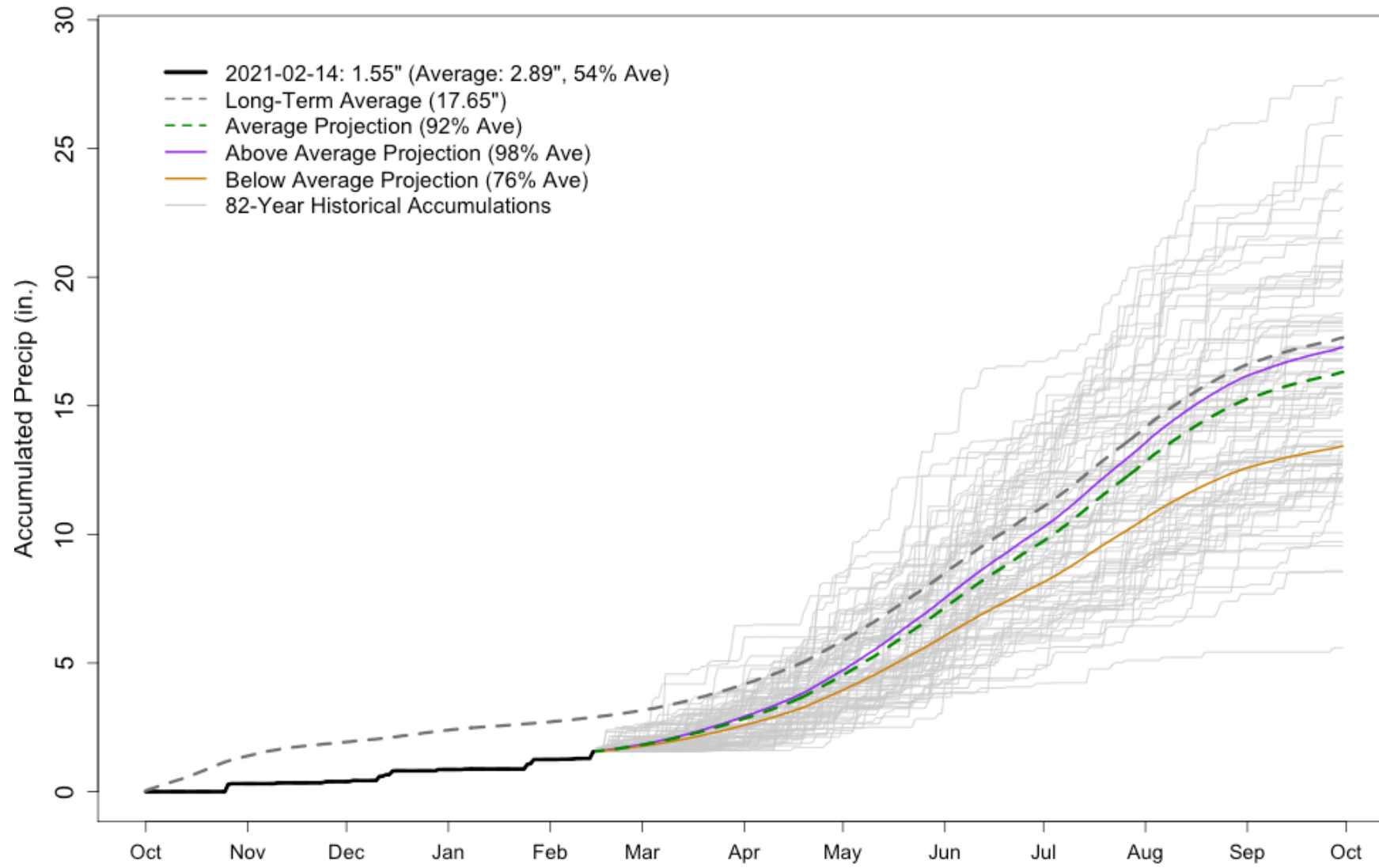


WALSH 1 W WY2021 Precipitation Projections

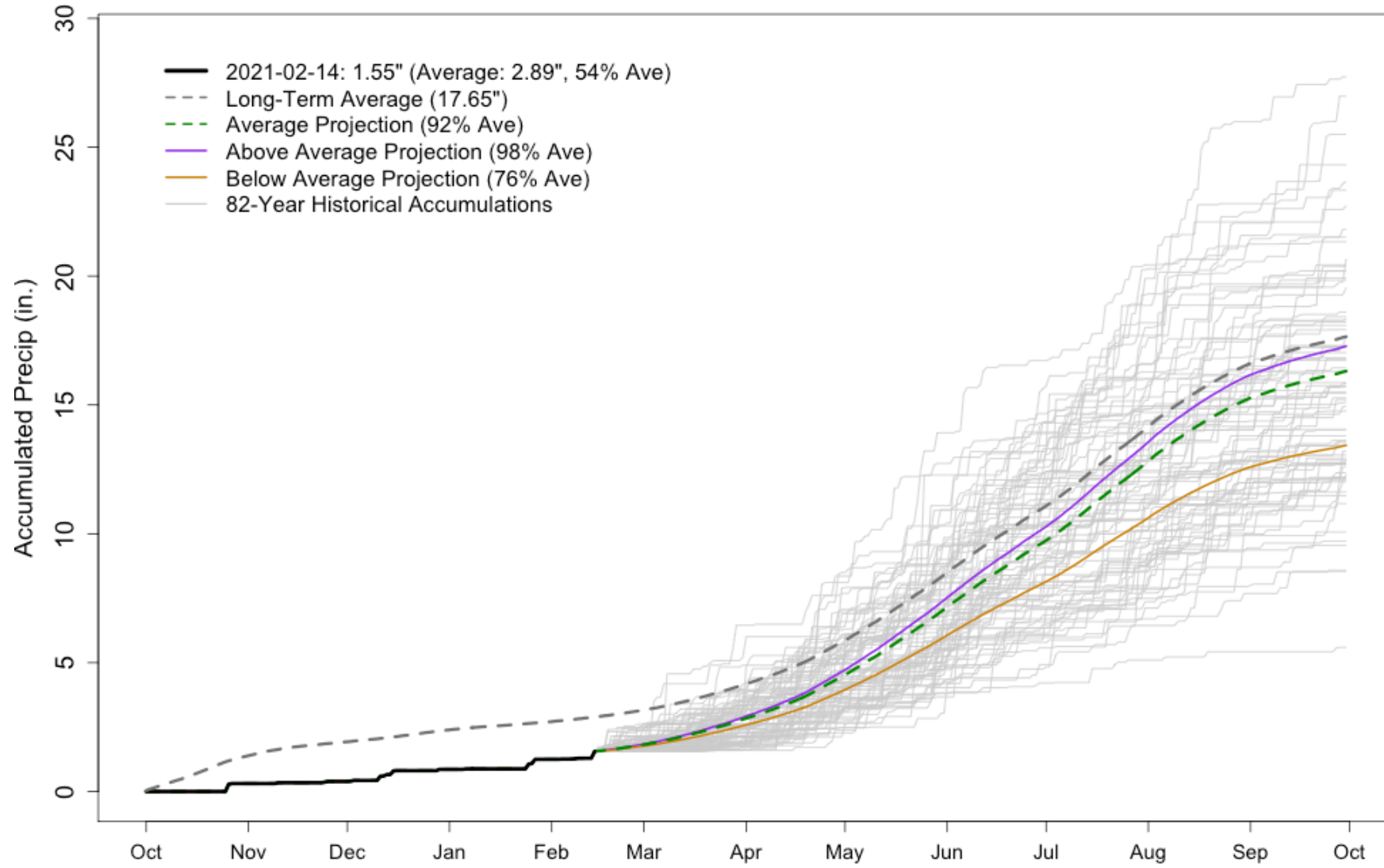


Burlington

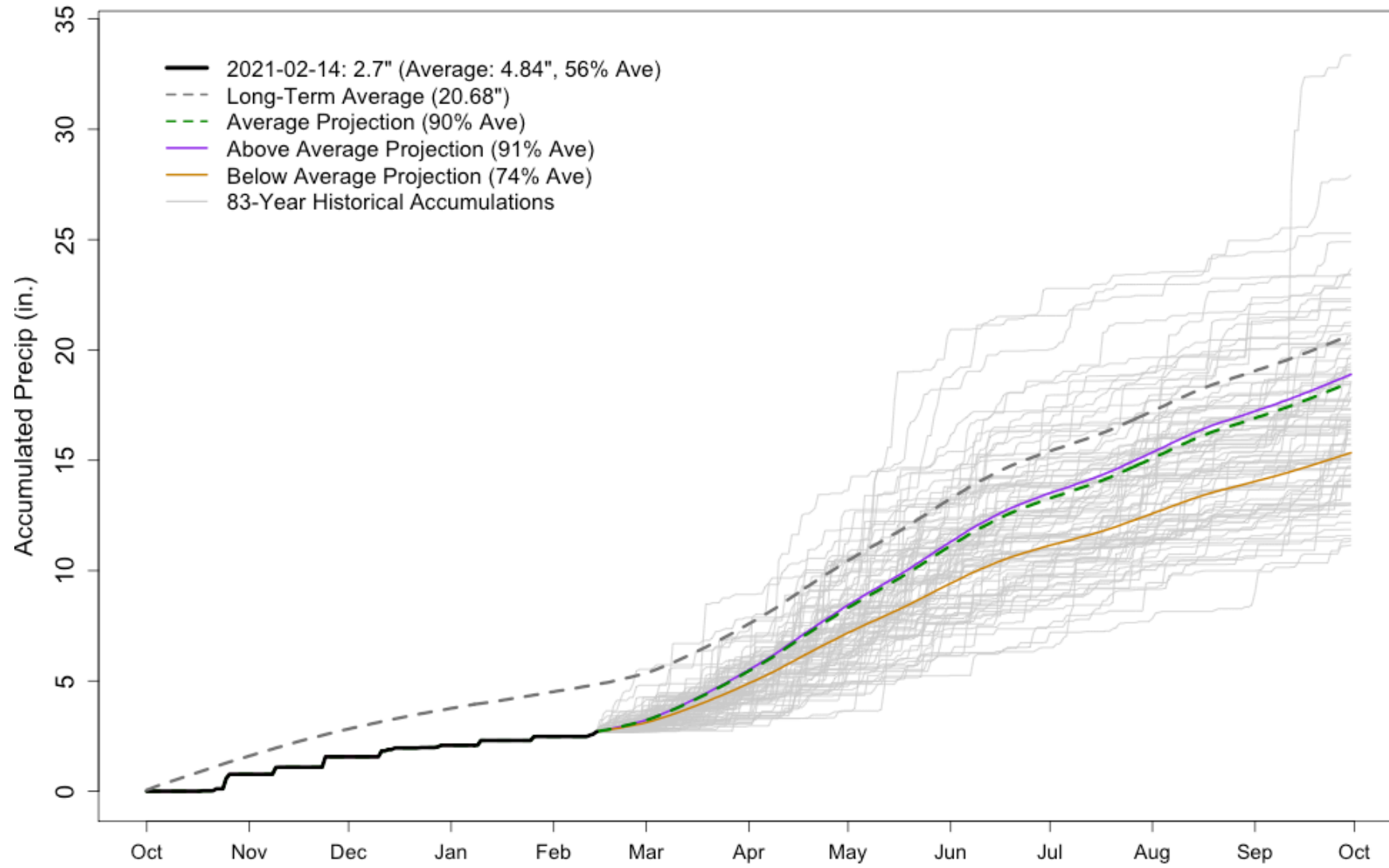
BURLINGTON WY2021 Precipitation Projections

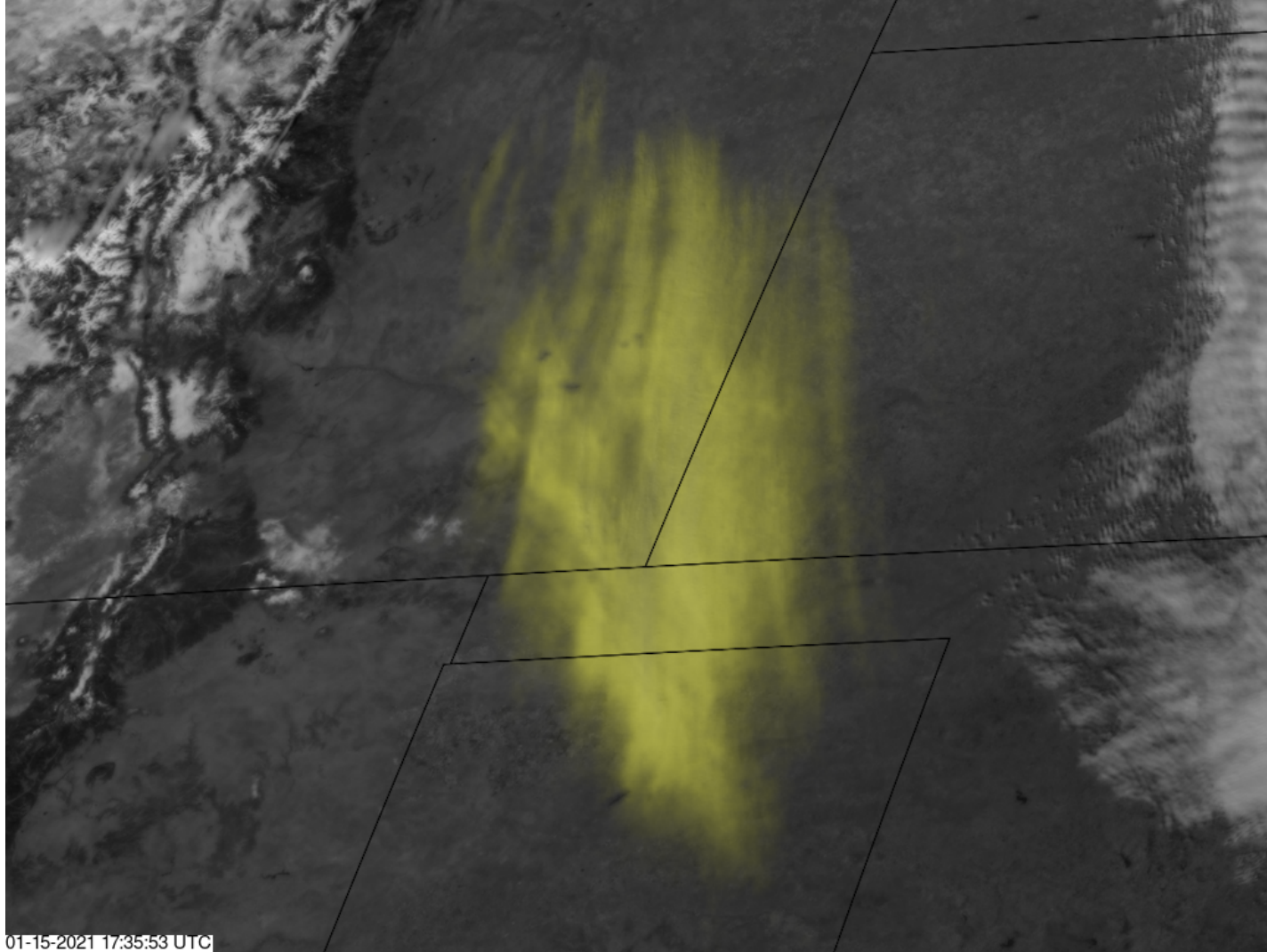


BURLINGTON WY2021 Precipitation Projections



BOULDER WY2021 Precipitation Projections





01-15-2021 17:35:53 UTC

Dust storm on the eastern Plains, January 15, 2021

http://rammb.cira.colostate.edu/ramsdisk/online/loop.asp?data_folder=loop_of_the_day/goes-16/20210115000000&number_of_images_to_display=200&loop_speed_ms=50

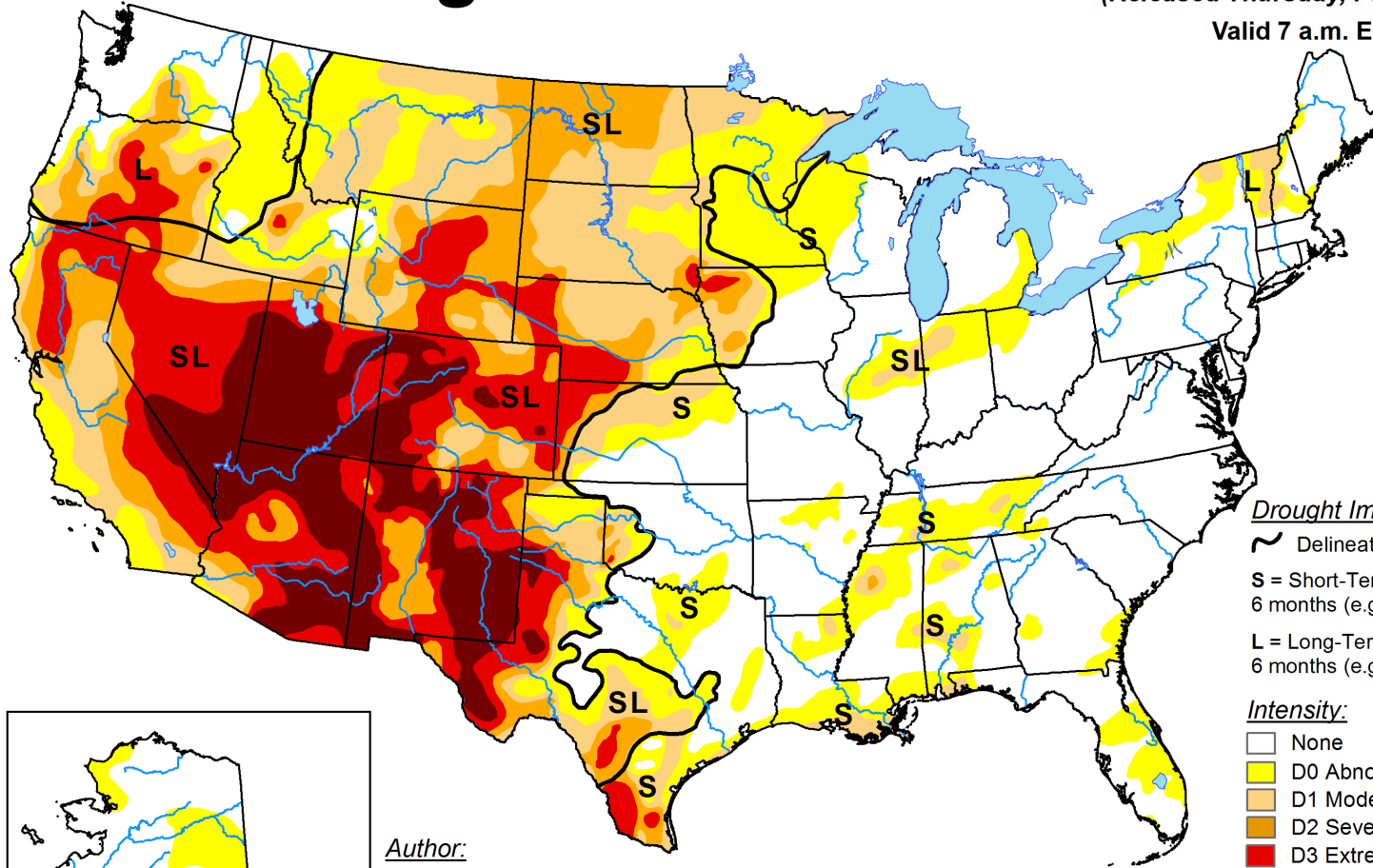
Drought Conditions



U.S. Drought Monitor

February 9, 2021
(Released Thursday, Feb. 11, 2021)

Valid 7 a.m. EST

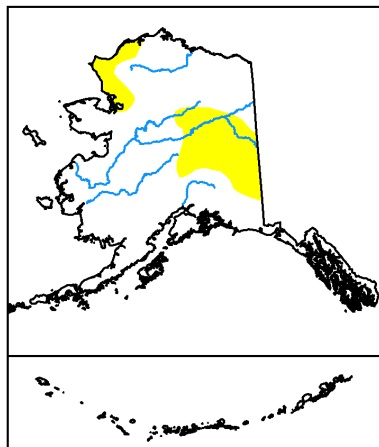


Drought Impact Types:

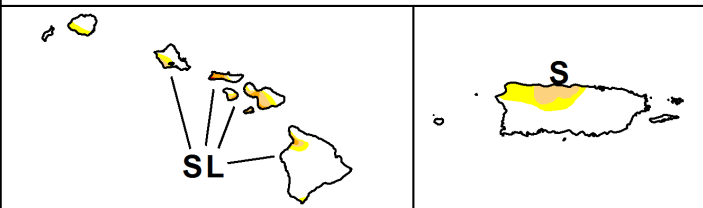
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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



Author:
Brad Rippey
U.S. Department of Agriculture



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>

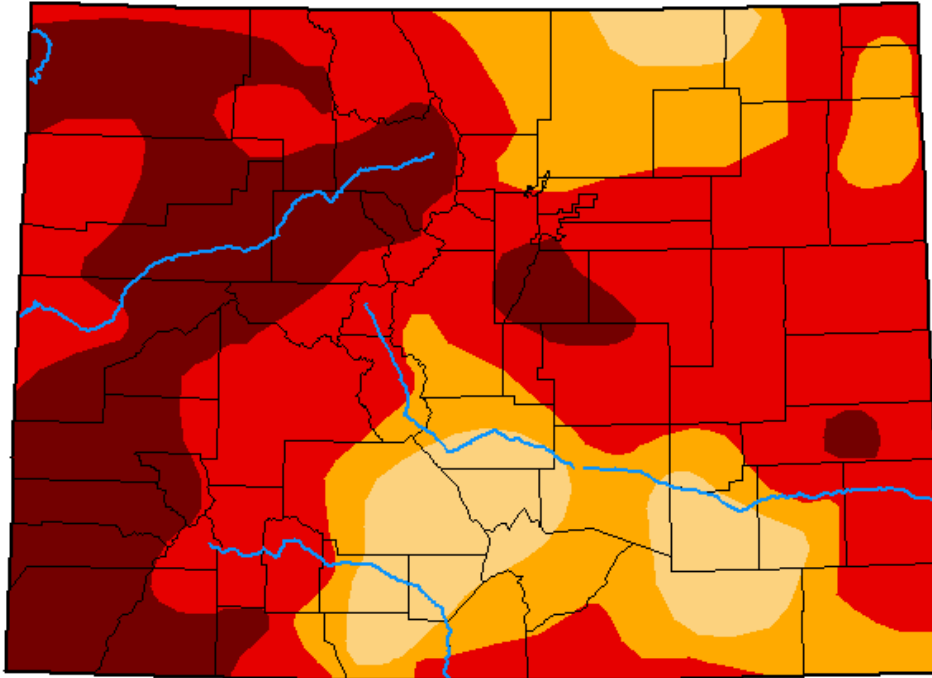


droughtmonitor.unl.edu



U.S. Drought Monitor Colorado

February 9, 2021
(Released Thursday, Feb. 11, 2021)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	90.24	70.11	24.79
Last Week 02-02-2021	0.00	100.00	100.00	90.24	70.73	24.79
3 Months Ago 11-10-2020	0.00	100.00	100.00	93.71	74.08	24.64
Start of Calendar Year 12-29-2020	0.00	100.00	100.00	93.73	76.17	27.60
Start of Water Year 09-29-2020	0.00	100.00	99.29	89.35	52.88	2.64
One Year Ago 02-11-2020	27.72	72.28	43.82	3.30	0.00	0.00

Intensity:

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

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U.S. Department of Agriculture



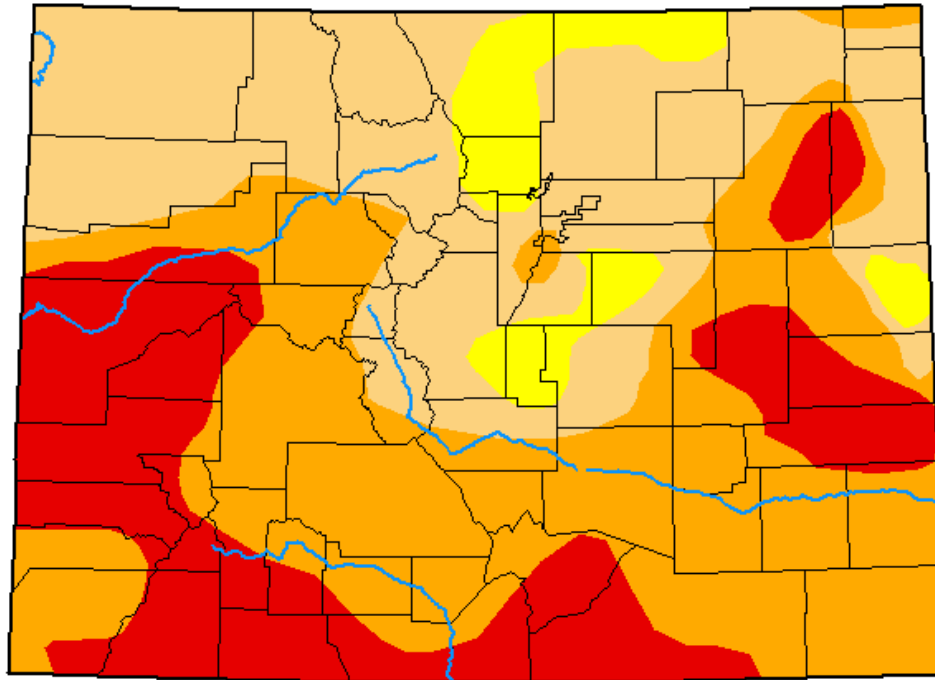
droughtmonitor.unl.edu



U.S. Drought Monitor Colorado

August 11, 2020
(Released Thursday, Aug. 13, 2020)
Valid 8 a.m. EDT

Six months ago



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	93.87	61.43	23.66	0.00
Last Week 08-04-2020	0.00	100.00	85.88	58.79	26.64	0.00
3 Months Ago 05-12-2020	20.76	79.24	62.66	46.09	14.65	0.00
Start of Calendar Year 12-31-2019	31.72	68.28	51.19	20.11	0.00	0.00
Start of Water Year 10-01-2019	30.14	69.86	27.53	0.00	0.00	0.00
One Year Ago 08-13-2019	93.35	6.65	0.00	0.00	0.00	0.00

Intensity:

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

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Author:

Brian Fuchs
National Drought Mitigation Center

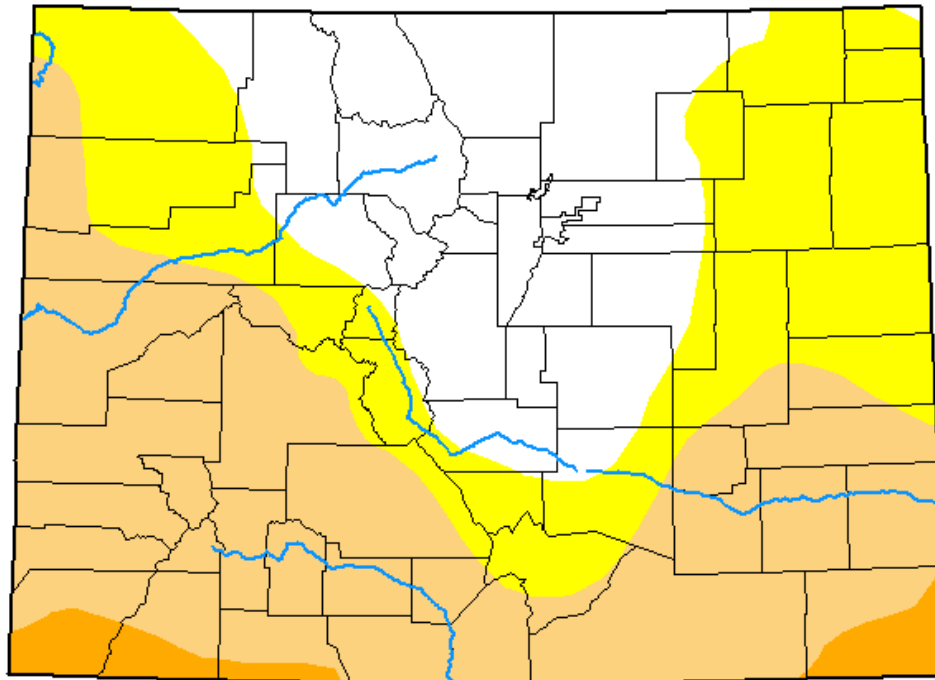


droughtmonitor.unl.edu



U.S. Drought Monitor Colorado

February 11, 2020 **One year ago**
 (Released Thursday, Feb. 13, 2020)
 Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	27.72	72.28	43.82	3.30	0.00	0.00
Last Week <i>02-04-2020</i>	22.39	77.61	51.12	3.30	0.00	0.00
3 Months Ago <i>11-12-2019</i>	25.74	74.26	55.27	31.02	0.00	0.00
Start of Calendar Year <i>12-31-2019</i>	31.72	68.28	51.19	20.11	0.00	0.00
Start of Water Year <i>10-01-2019</i>	30.14	69.86	27.53	0.00	0.00	0.00
One Year Ago <i>02-12-2019</i>	8.15	91.85	67.16	39.69	21.84	0.11

Intensity:

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

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Author:

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 CPC/NOAA/NWS/NCEP

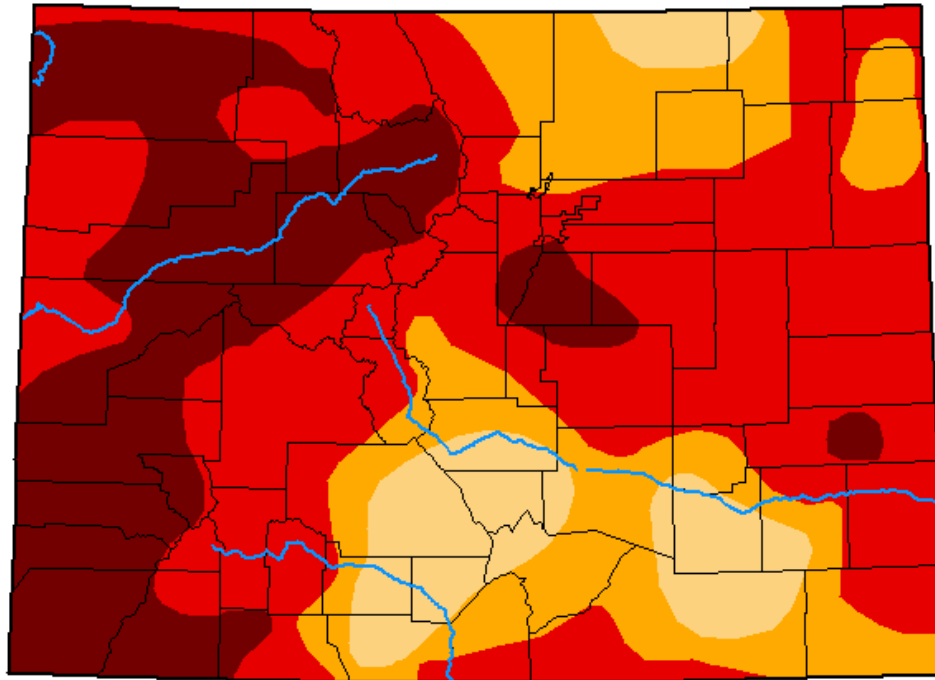


droughtmonitor.unl.edu



U.S. Drought Monitor Colorado

February 9, 2021
(Released Thursday, Feb. 11, 2021)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	90.24	70.11	24.79
Last Week 02-02-2021	0.00	100.00	100.00	90.24	70.73	24.79
3 Months Ago 11-10-2020	0.00	100.00	100.00	93.71	74.08	24.64
Start of Calendar Year 12-29-2020	0.00	100.00	100.00	93.73	76.17	27.60
Start of Water Year 09-29-2020	0.00	100.00	99.29	89.35	52.88	2.64
One Year Ago 02-11-2020	27.72	72.28	43.82	3.30	0.00	0.00

Intensity:

- None
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U.S. Department of Agriculture

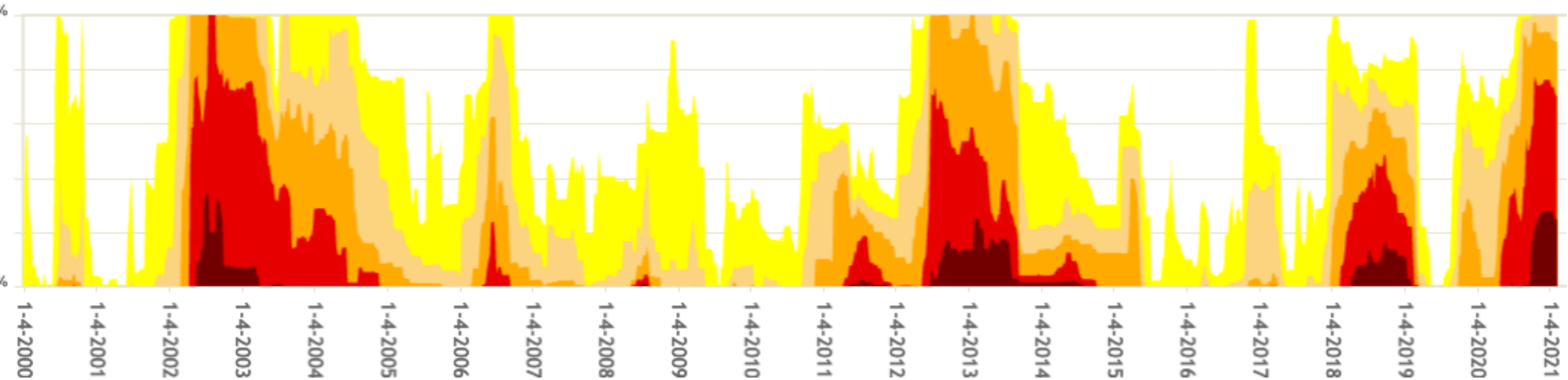


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Percent of Colorado in drought (since 2000)

Colorado Percent Area

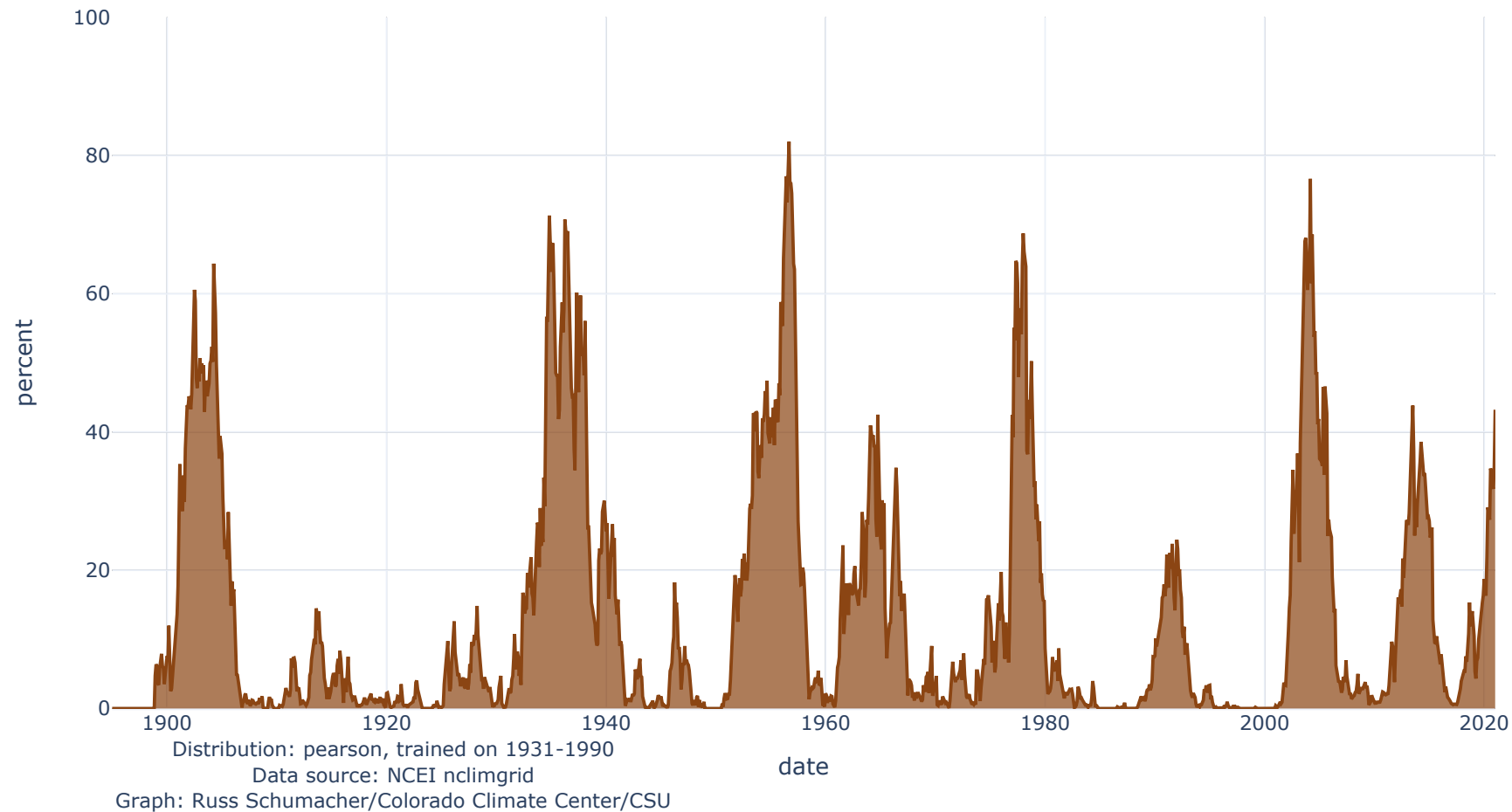


Intensity:

-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought



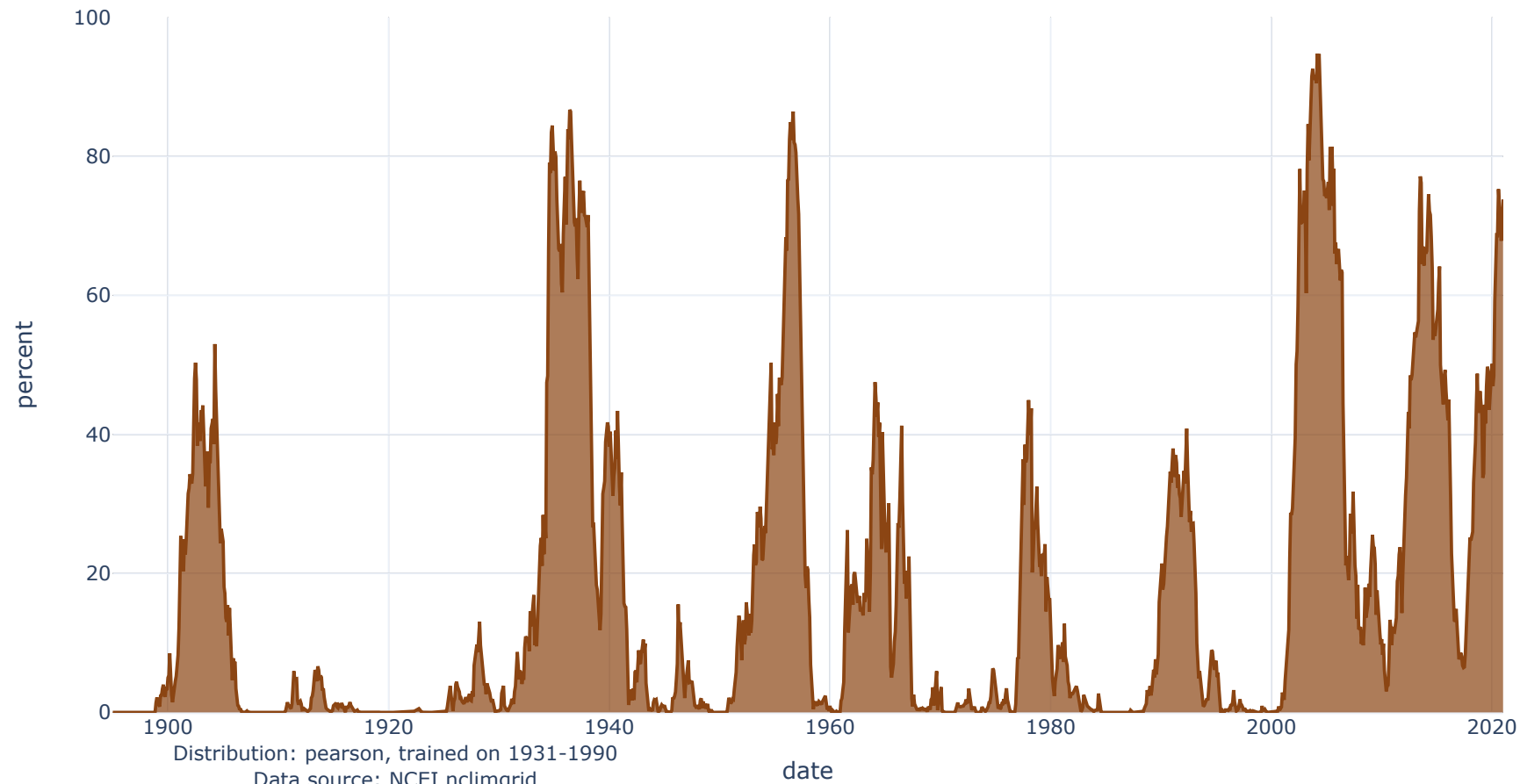
Percent of Colorado in long-term drought (since 1895) based on 48-month SPI < 1



Considers
precip only



Percent of Colorado in long-term drought (since 1895) based on 48-month SPEI < 1

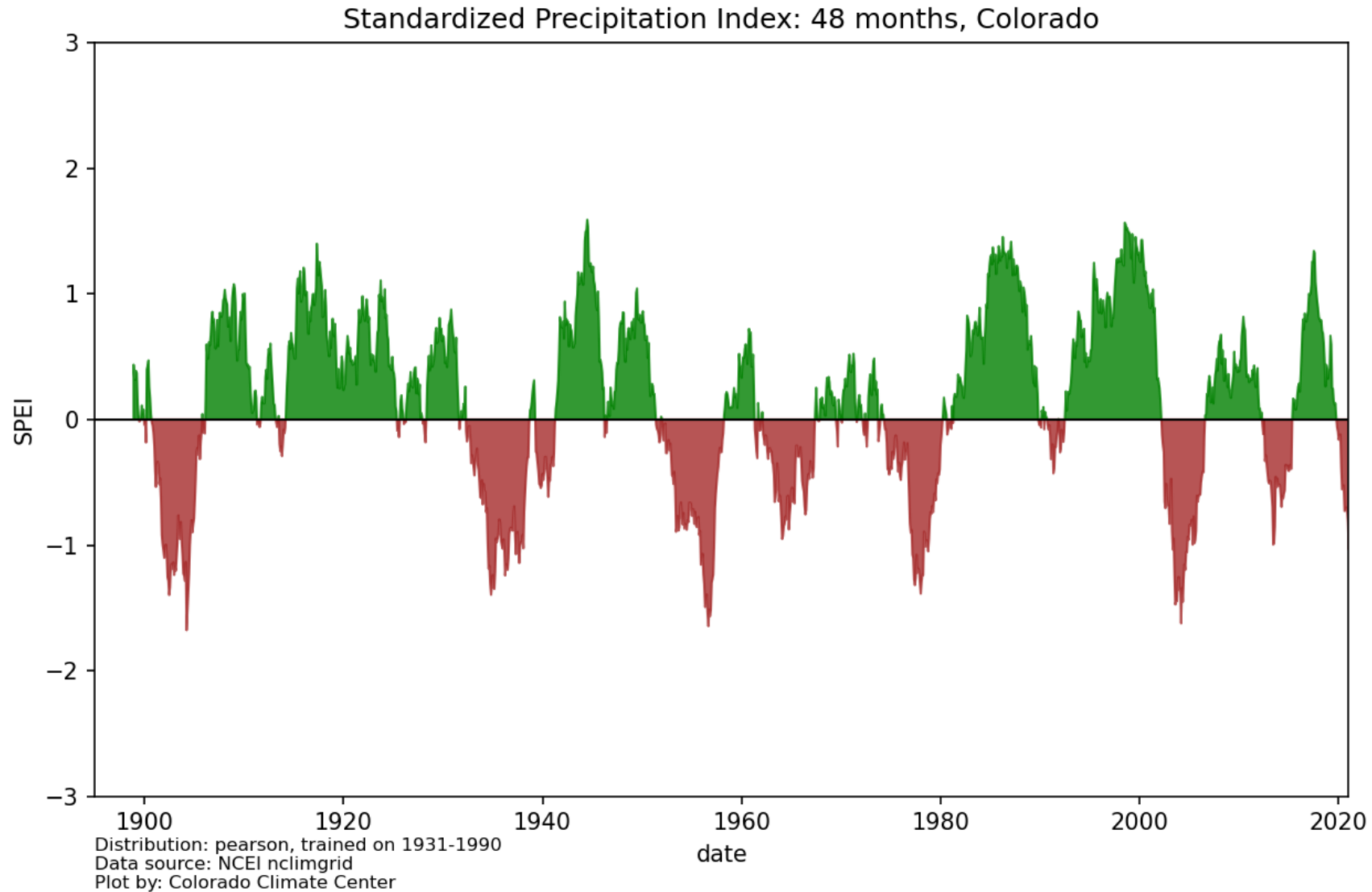


Considers
precip +
temperature

Distribution: pearson, trained on 1931-1990
Data source: NCEI nclimgrid
Graph: Russ Schumacher/Colorado Climate Center/CSU



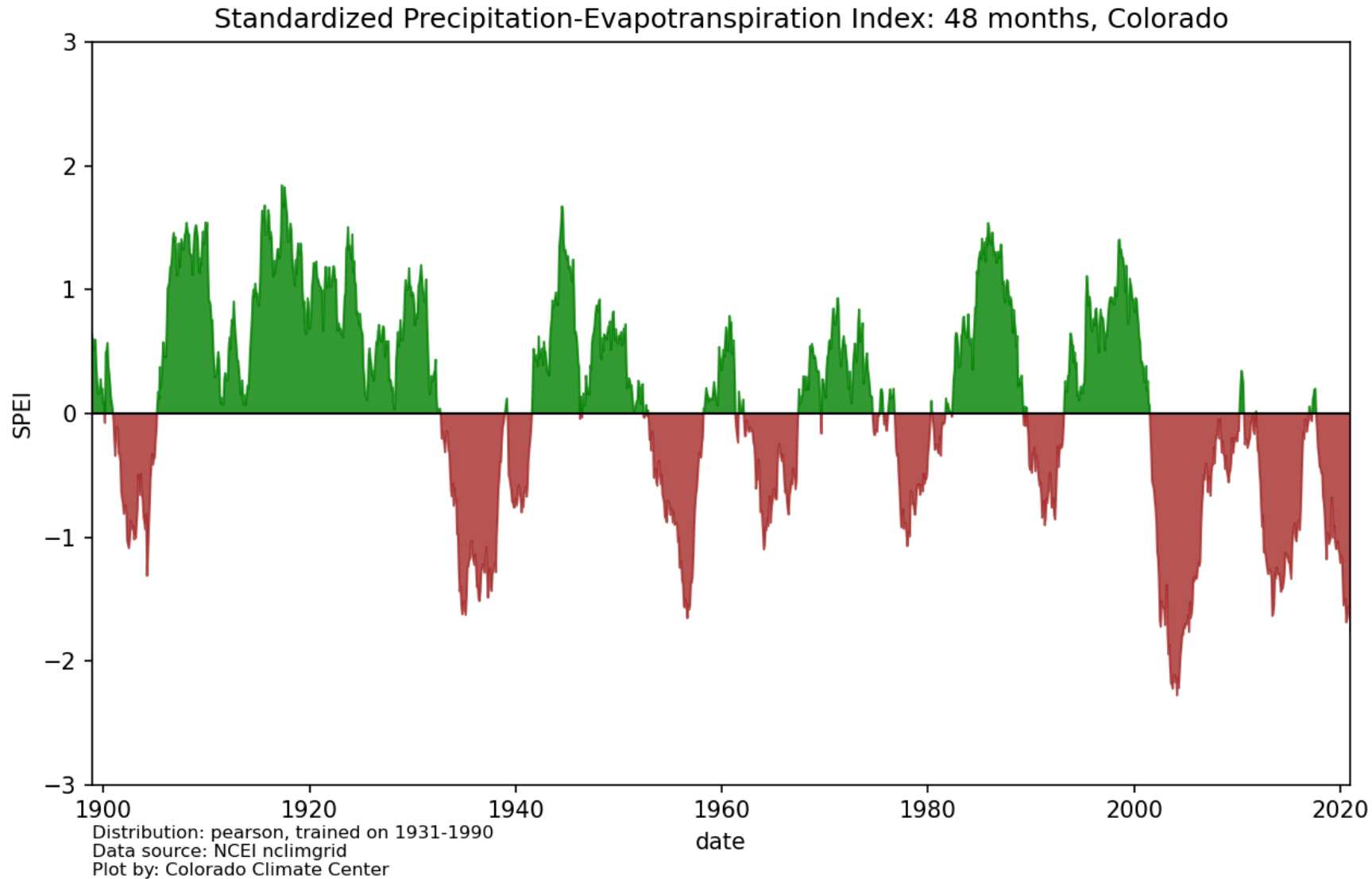
Standardized precipitation index (48 months)



Considers
precip only



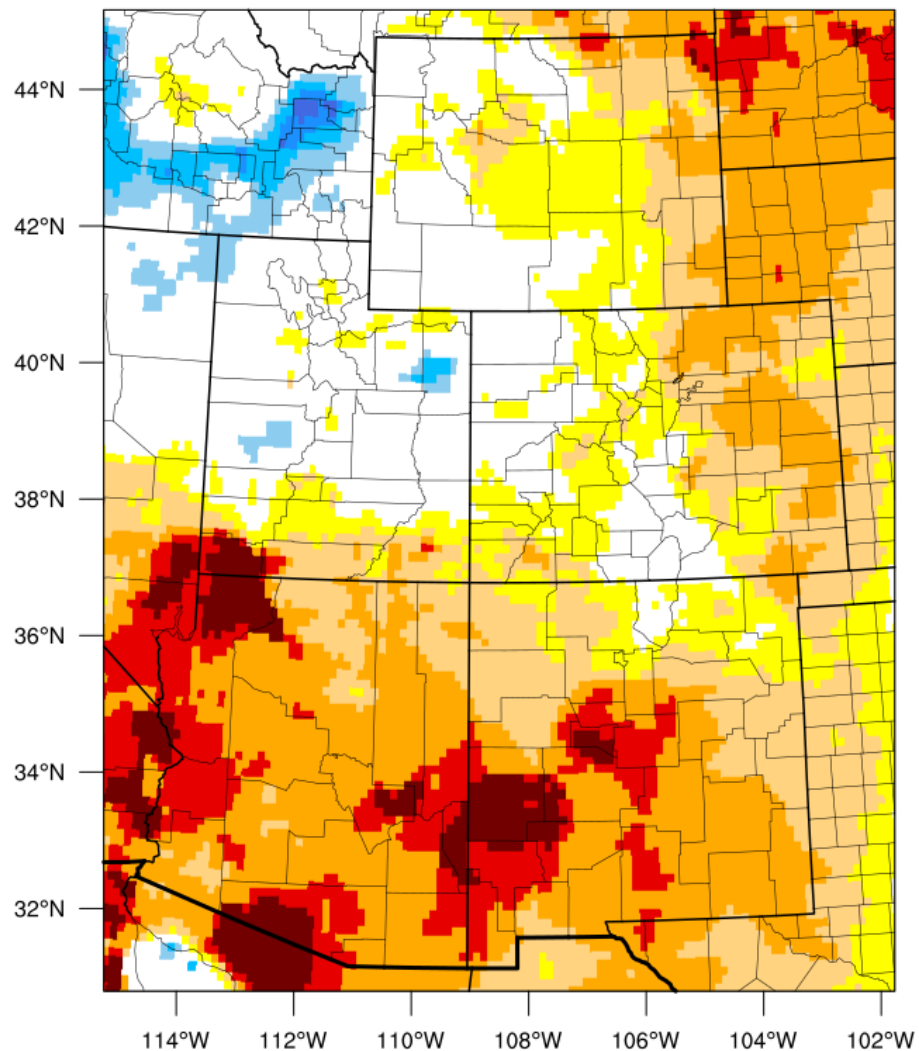
Standardized precipitation-evapotranspiration index (48 months)



Considers
precip +
temperature



3-month EDDI categories for February 11, 2021



Drought categories

Wetness categories



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

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

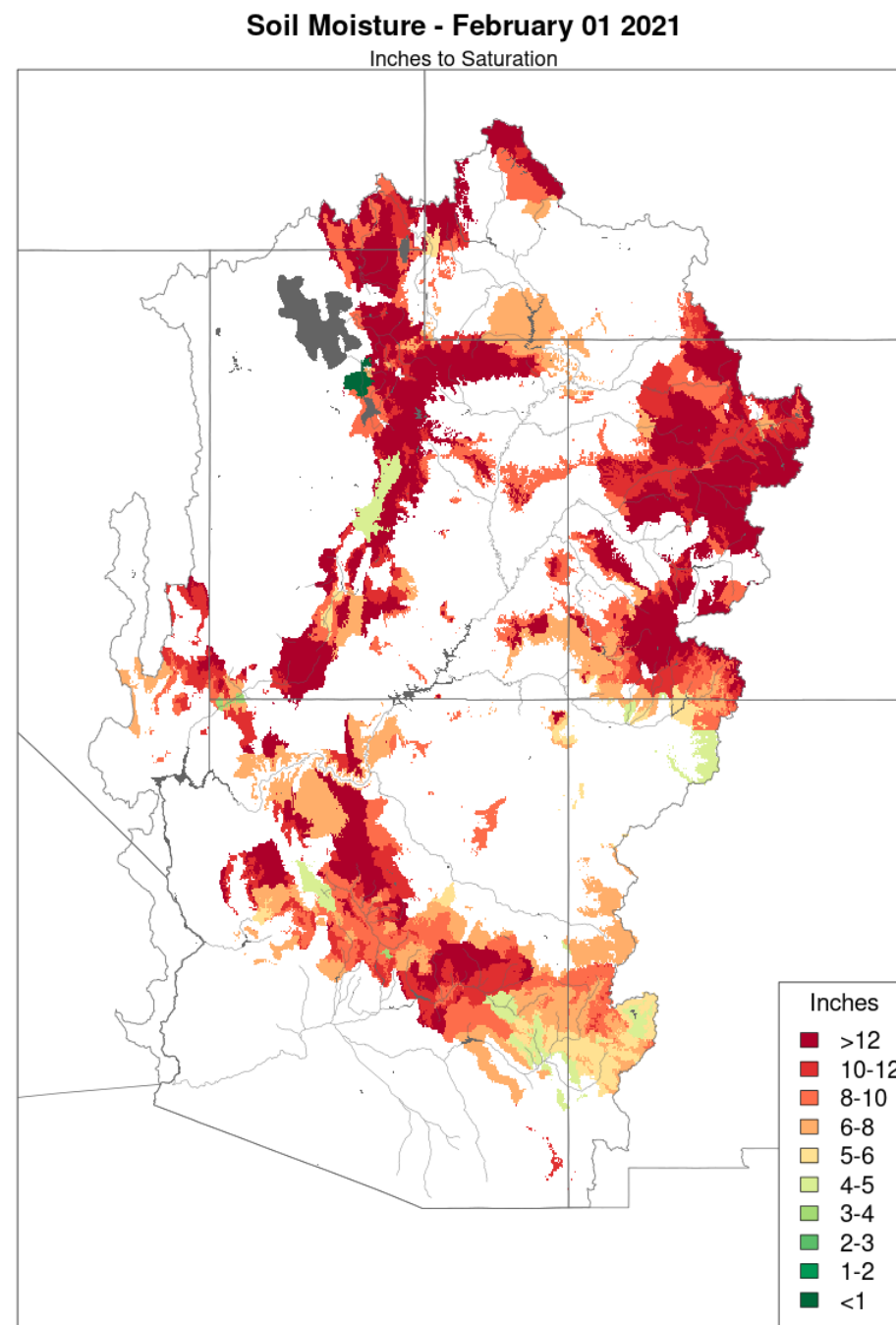
Evaporative Demand Drought Index

Over last 3 months, near-normal in western Colorado, above-normal evaporative demand on eastern Plains (but “normal” is pretty low in winter)



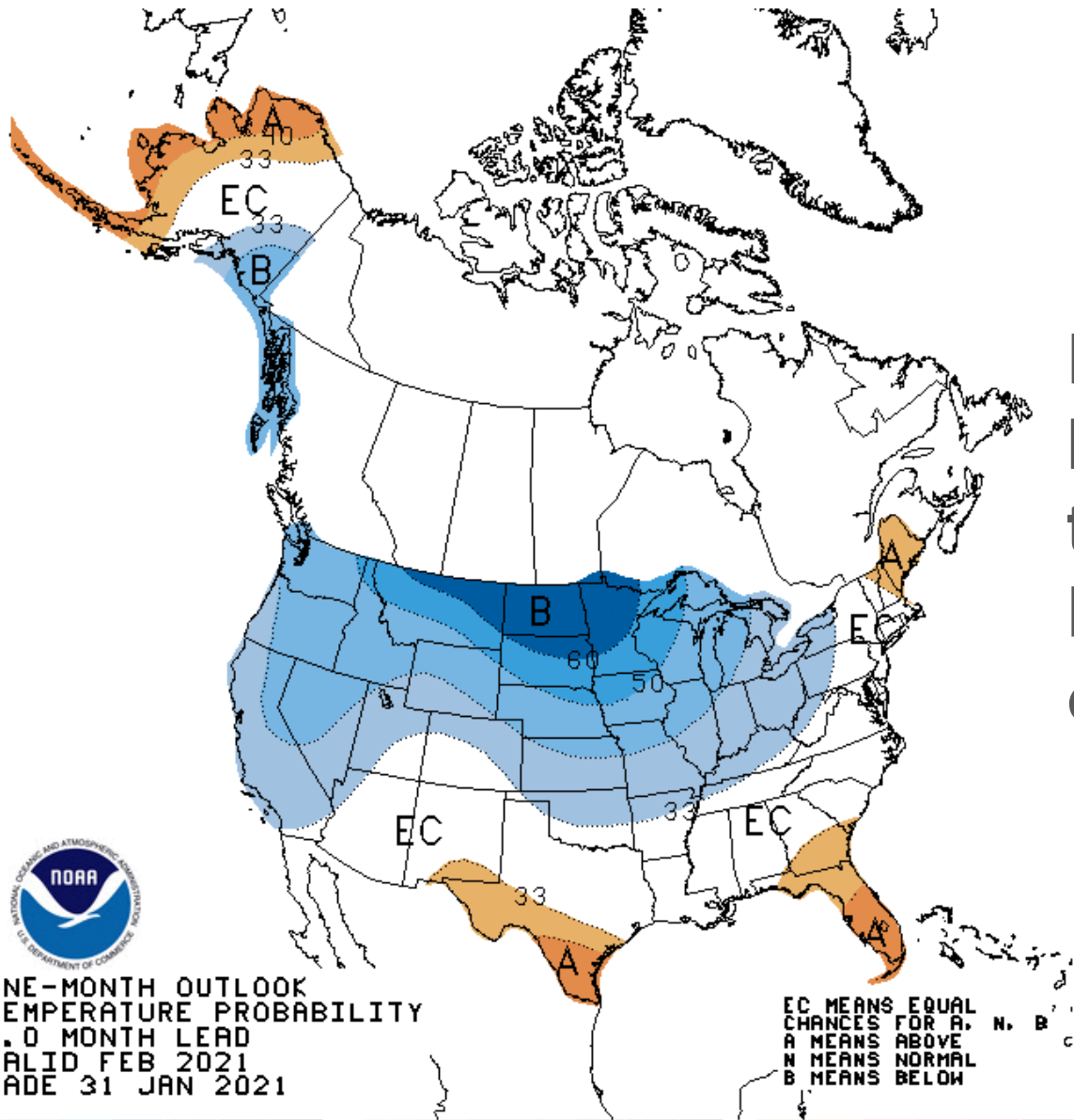
CBRFC soil moisture: inches to saturation

10+ inches across much of the Colorado River Basin (as of February 1)

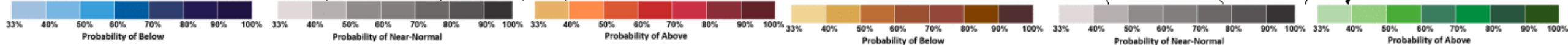
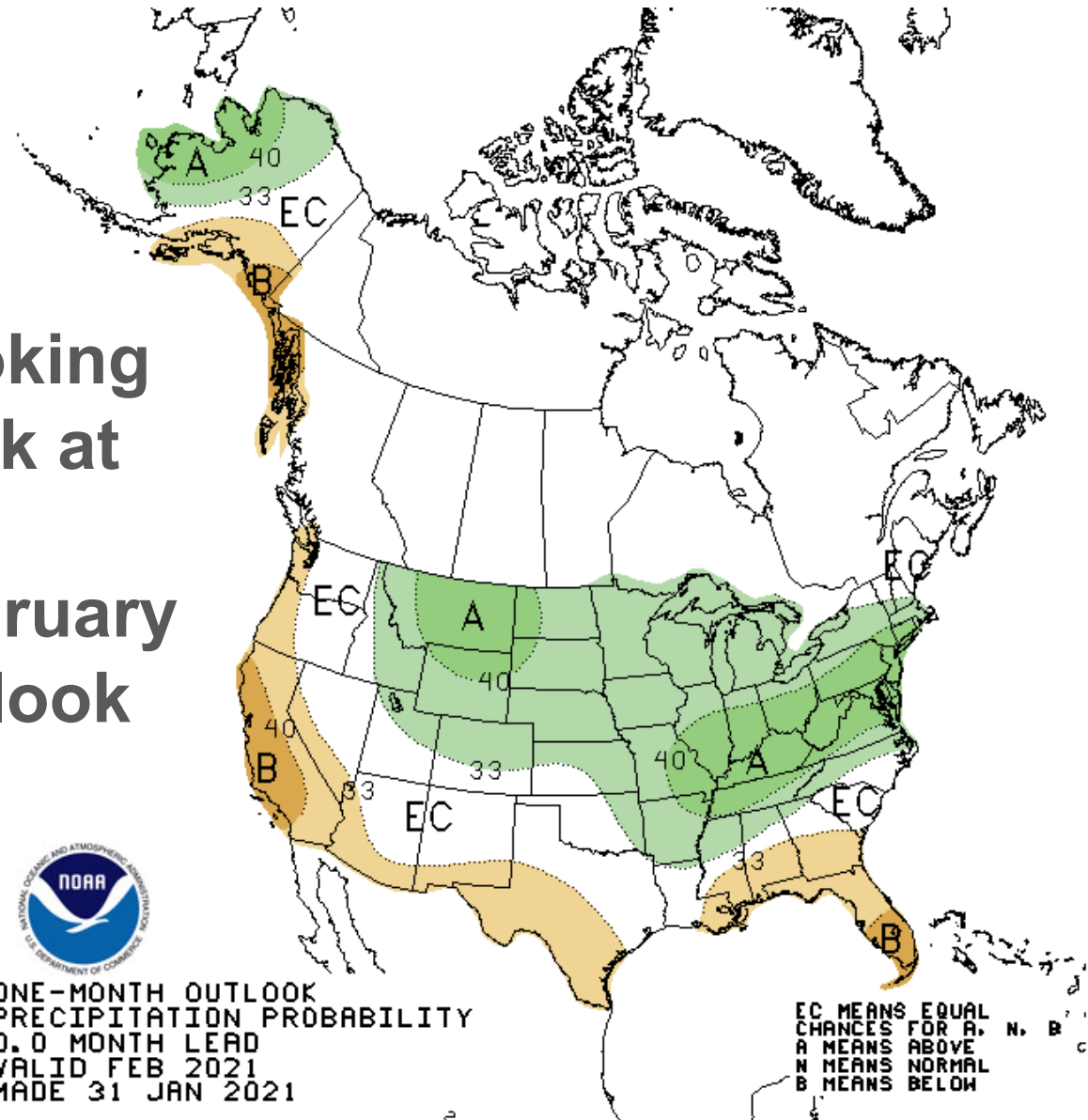


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

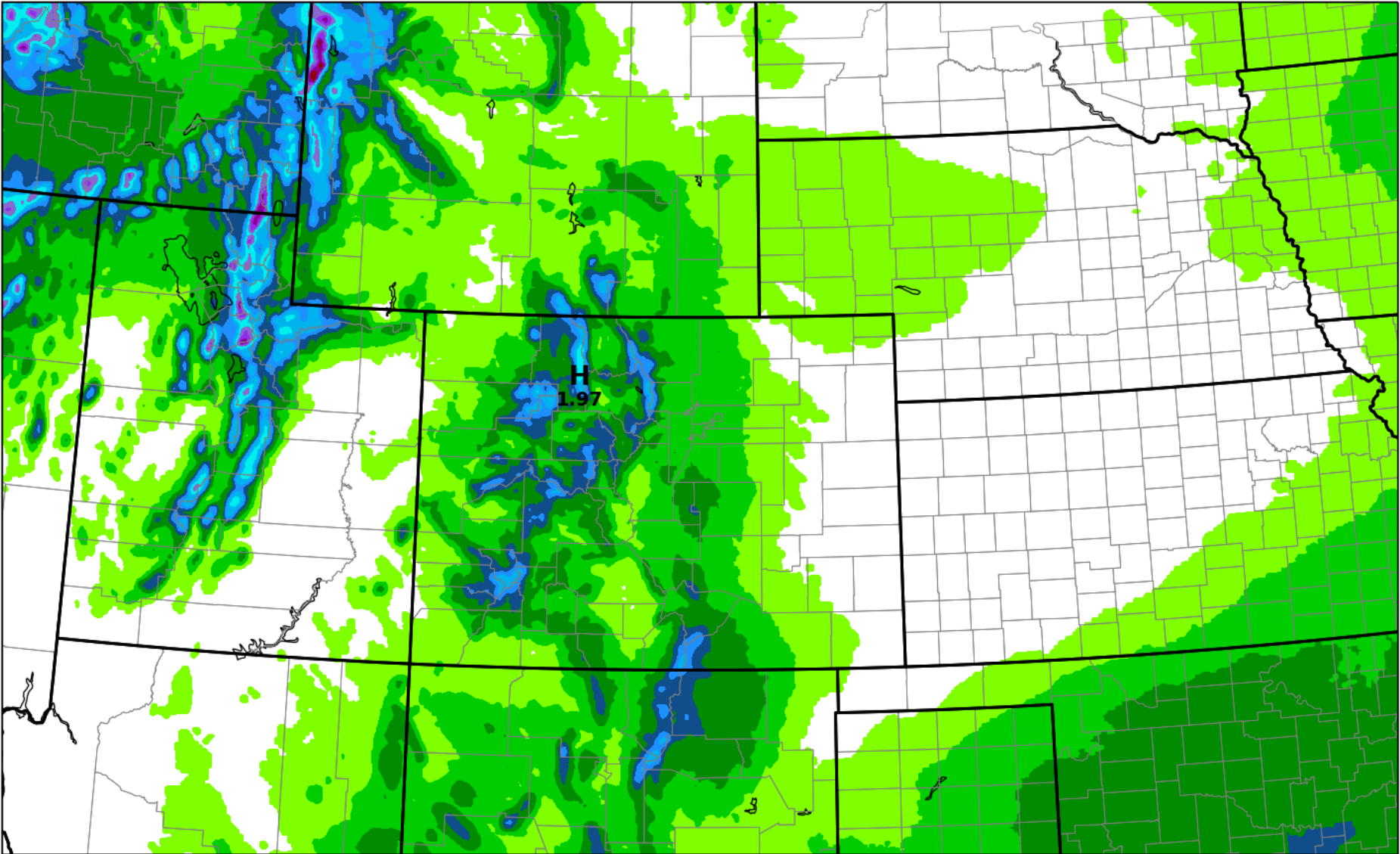




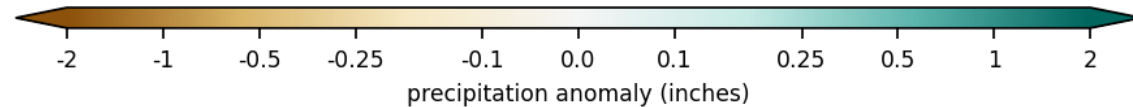
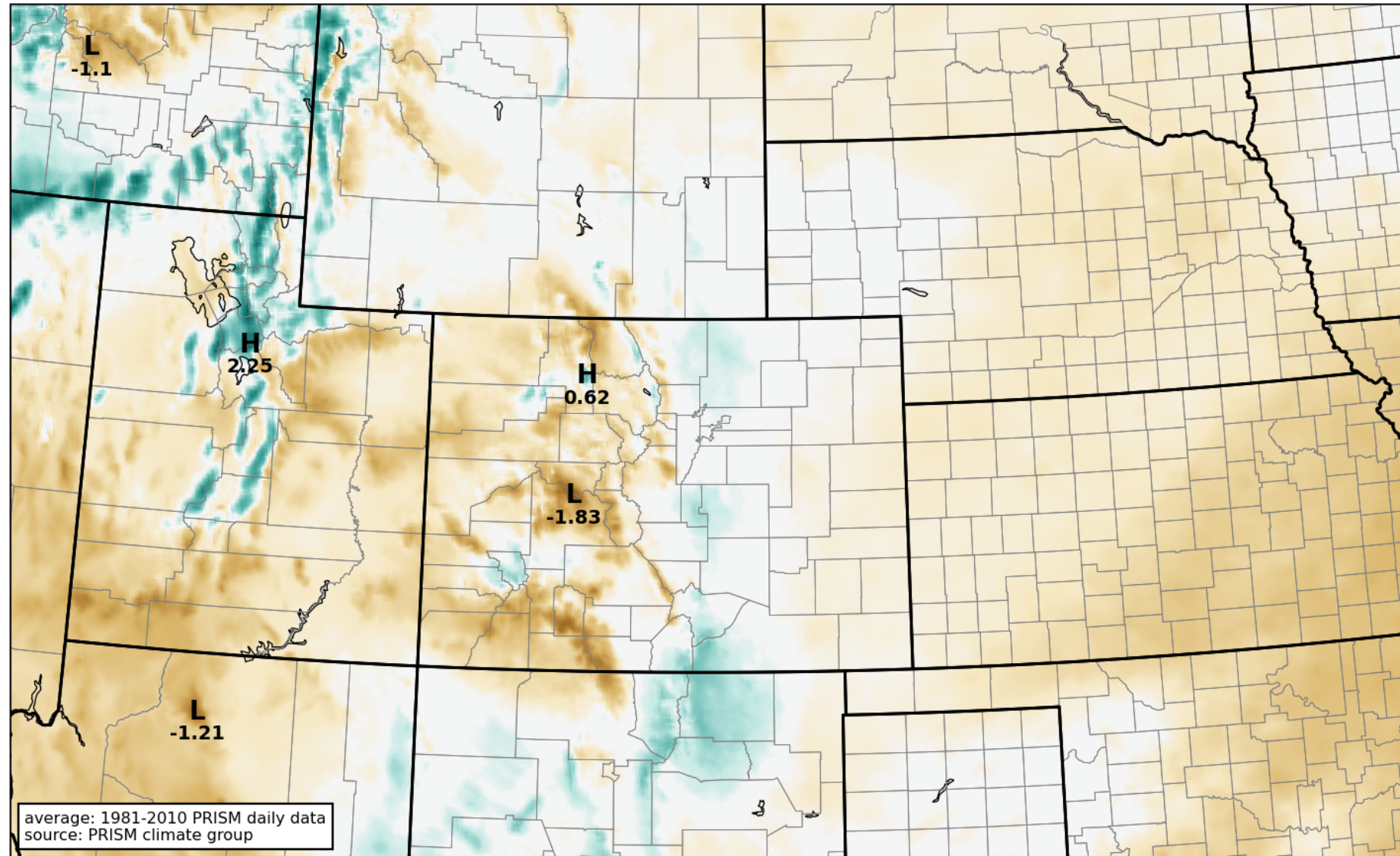
Looking back at the February outlook



NOAA 7-day precipitation forecast



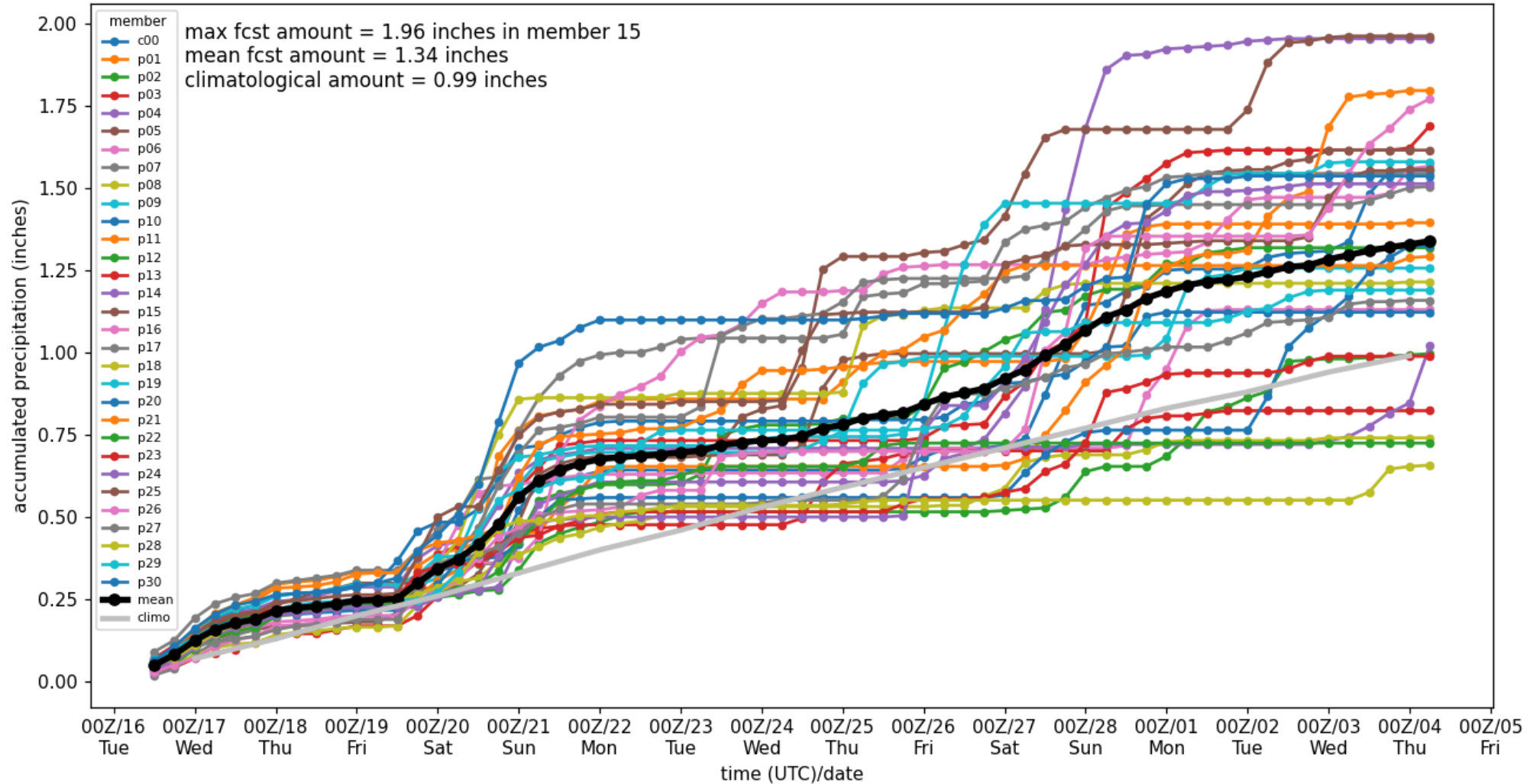
NOAA 7-day precipitation forecast (difference from average)



Northern mountains look to stay pretty active, not as much to the south

NCEP GEFS accumulated precipitation at Steamboat Springs

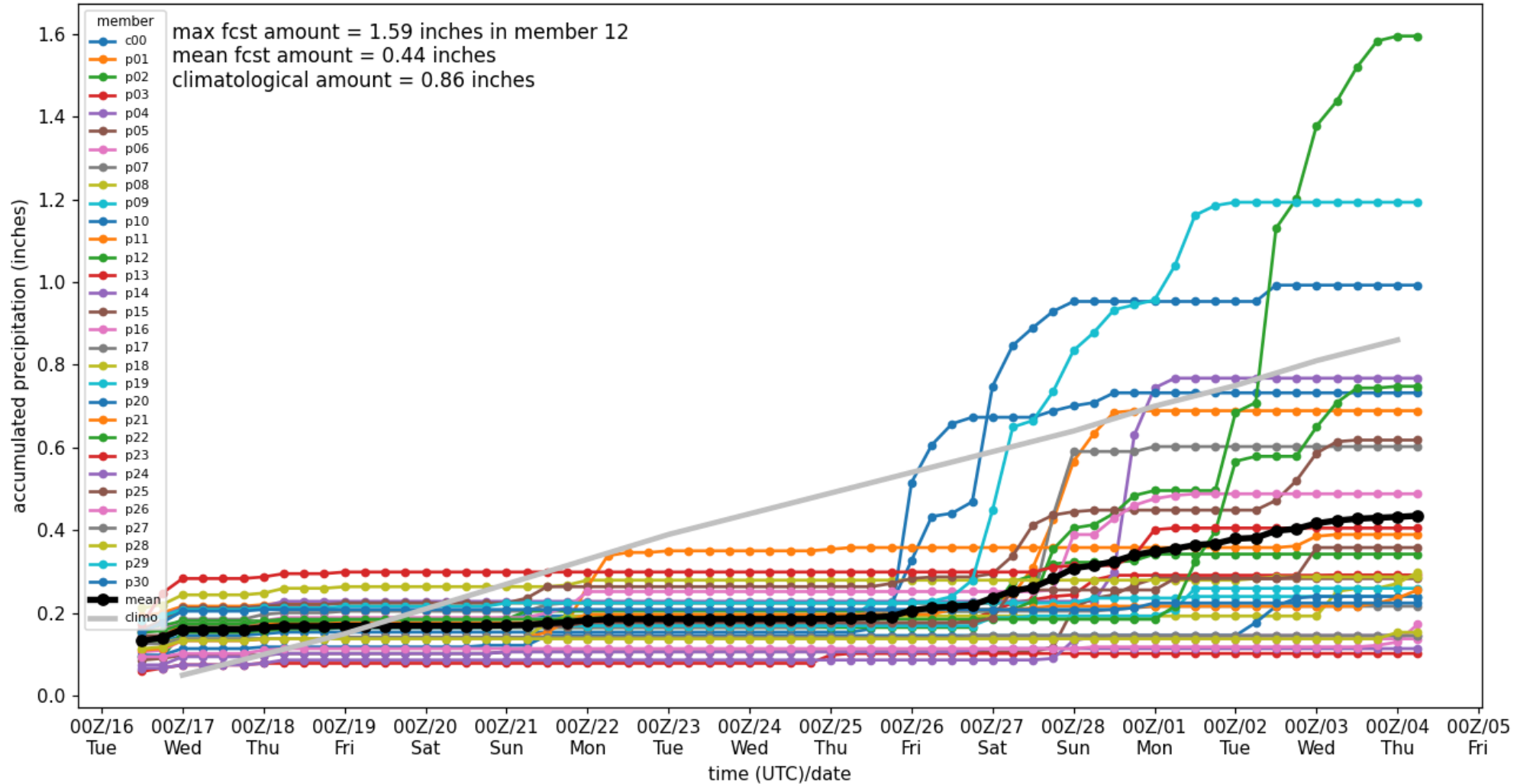
init: Tuesday 2021-02-16 0600 UTC



Northern mountains look to stay pretty active, not as much to the south

NCEP GEFS accumulated precipitation at Durango

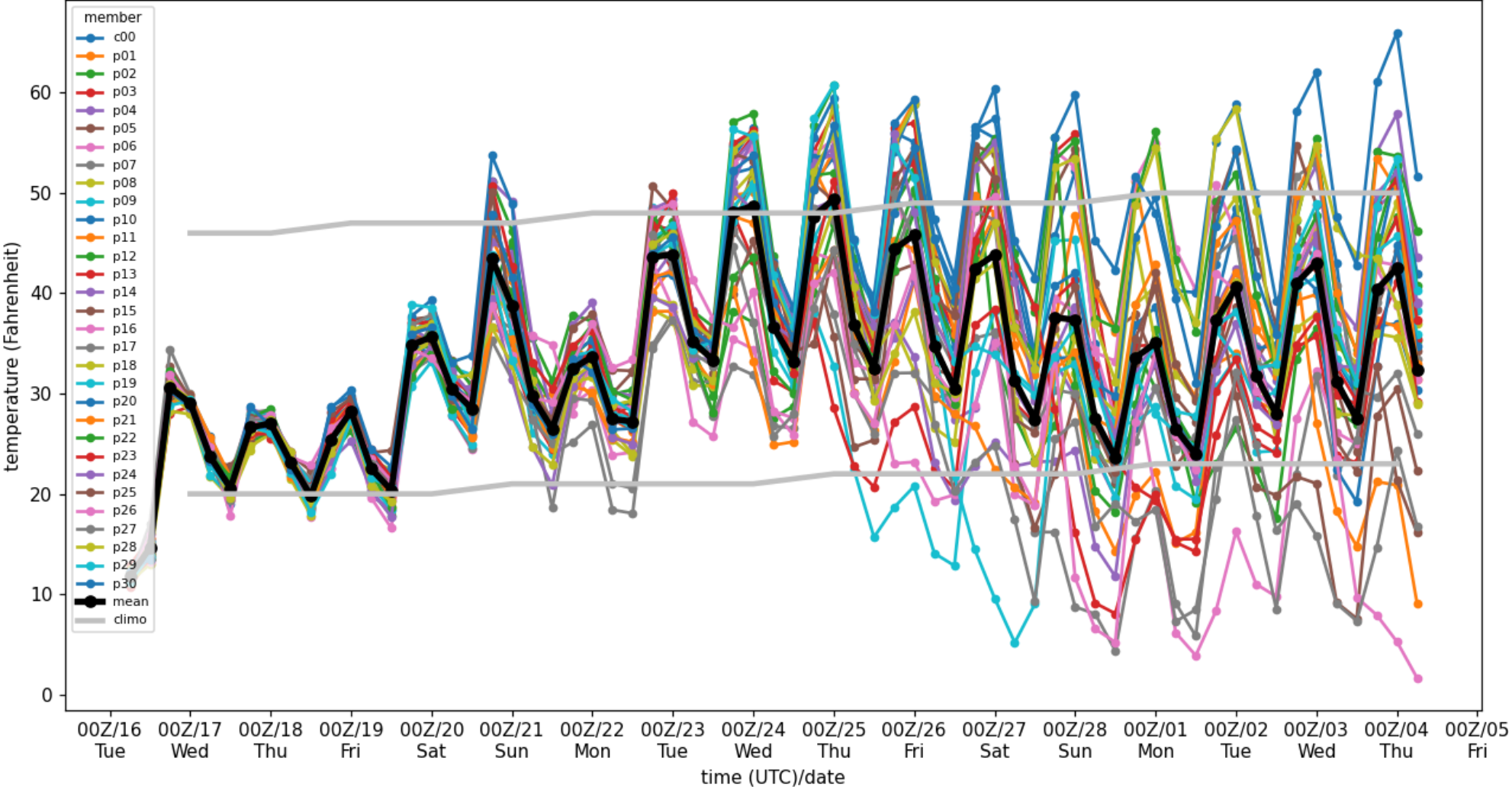
init: Tuesday 2021-02-16 0600 UTC

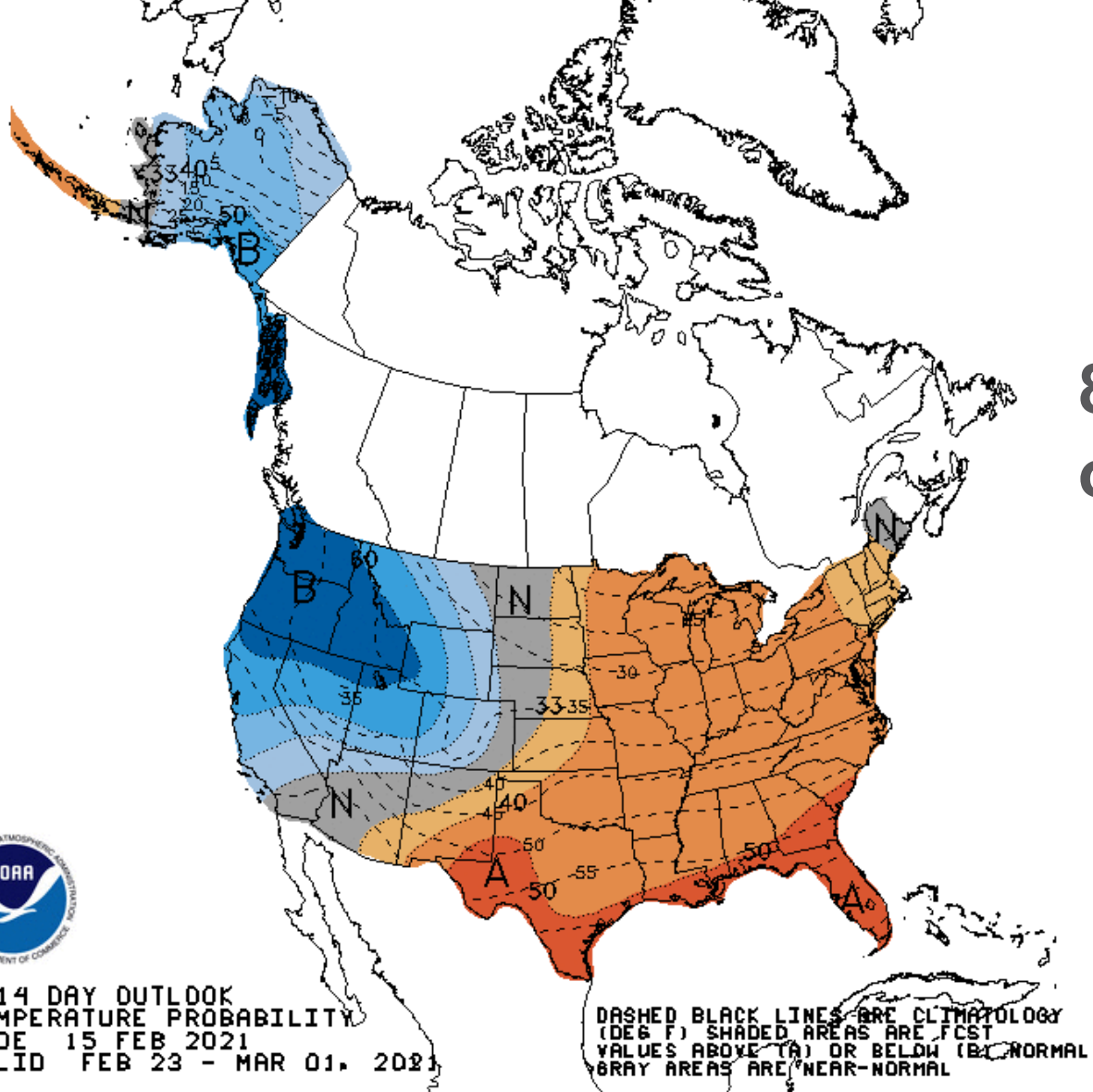


We'll be slowly climbing out of the deep freeze, still cold the rest of this week, near-normal temps returning by the weekend/next week

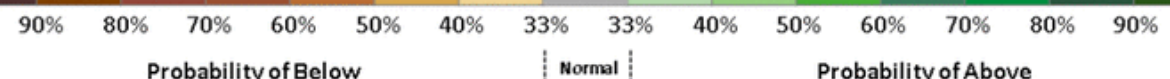
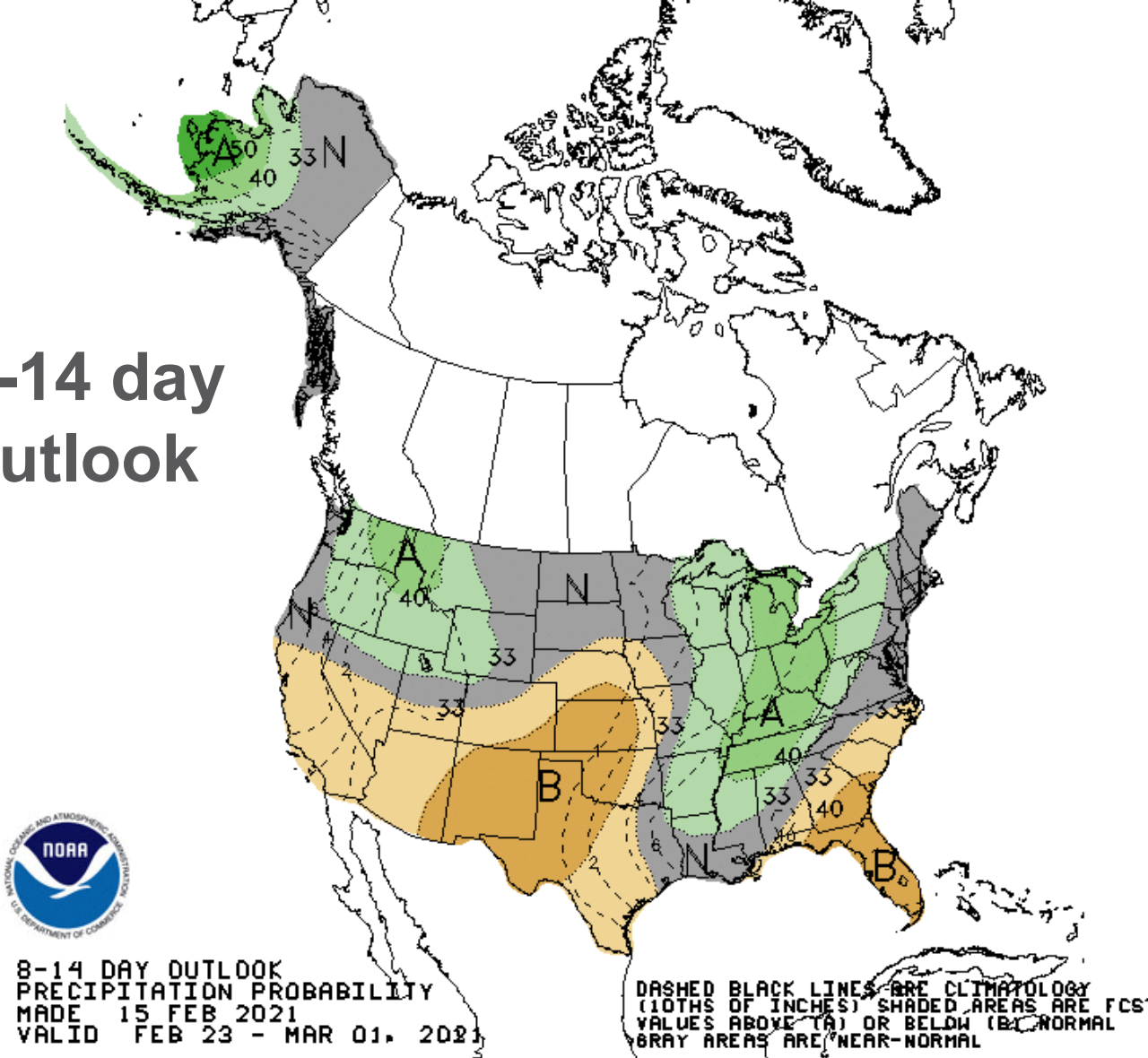
NCEP GEFS 2-m temperature at Denver

init: Tuesday 2021-02-16 0600 UTC

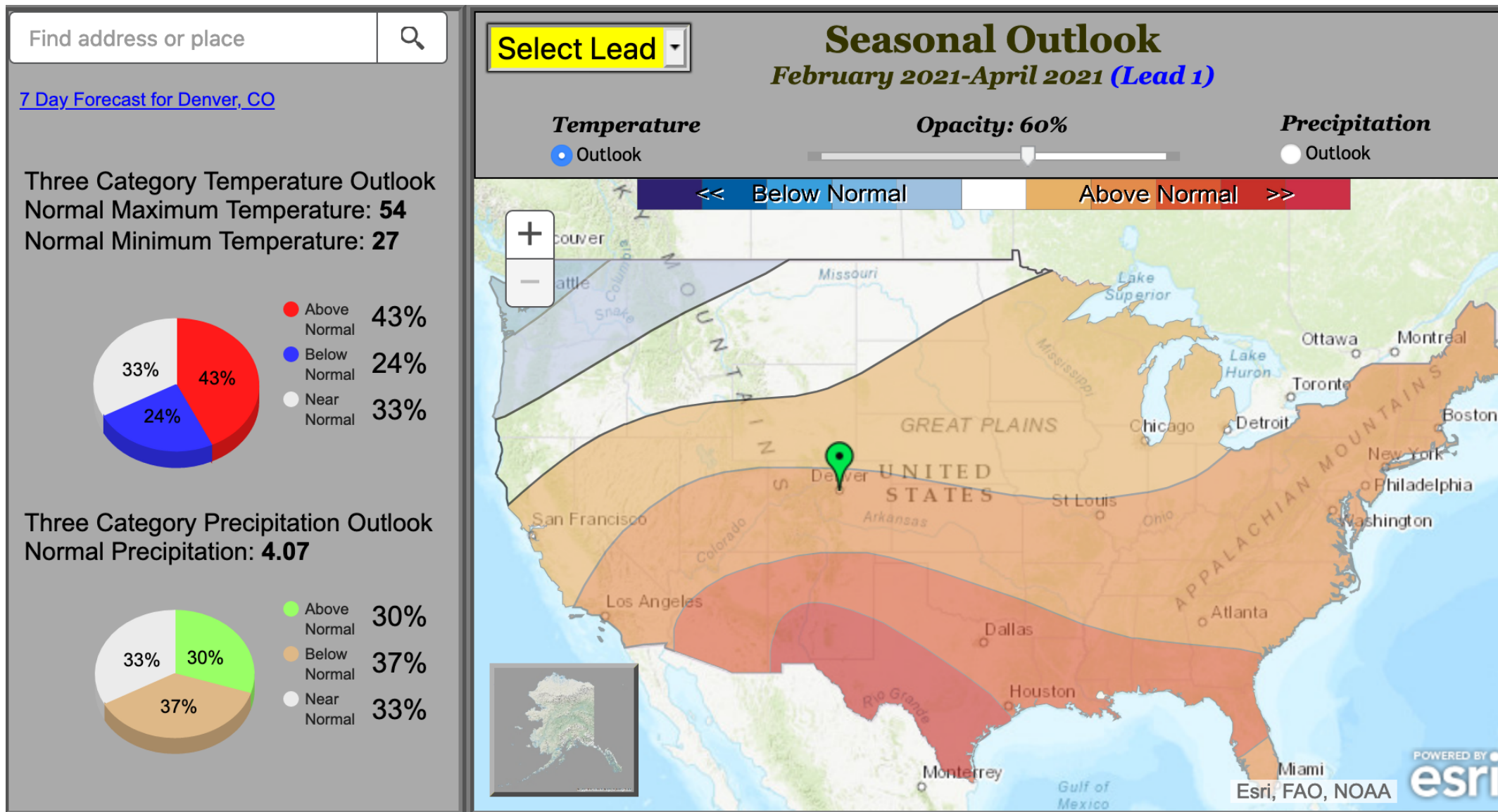




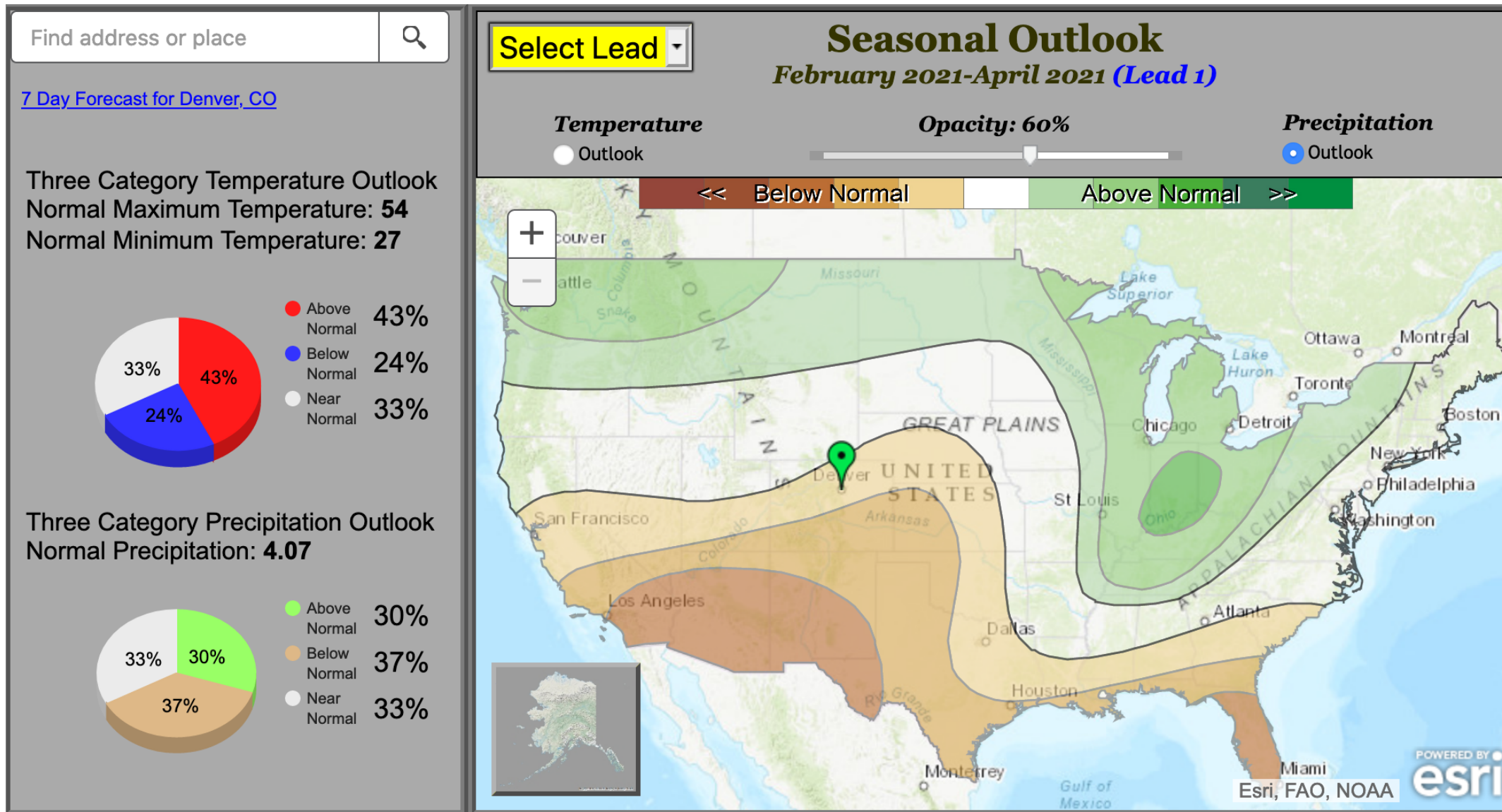
8-14 day outlook



February-March-April outlook



February-March-April outlook



La Niña ongoing; may weaken by spring

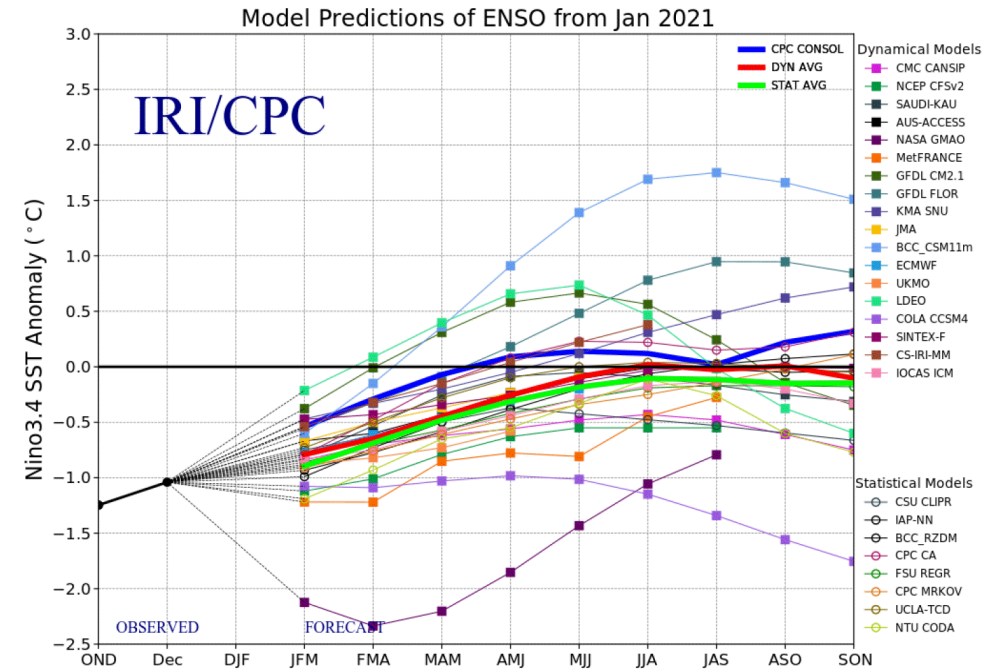
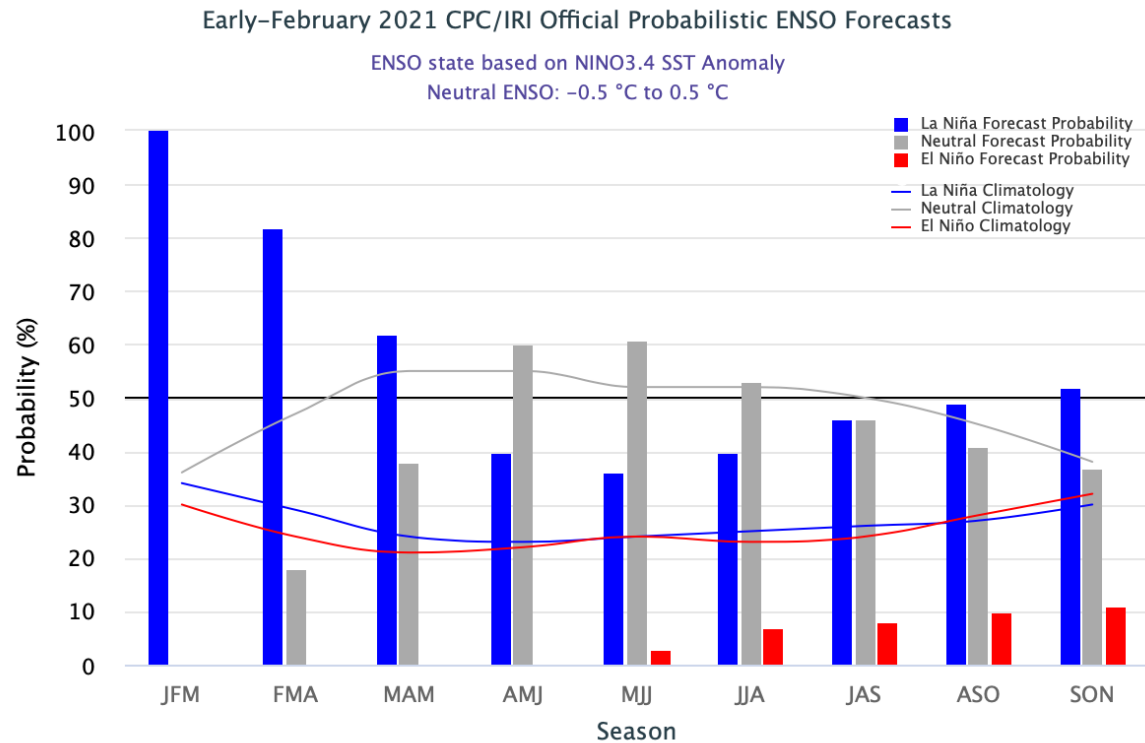


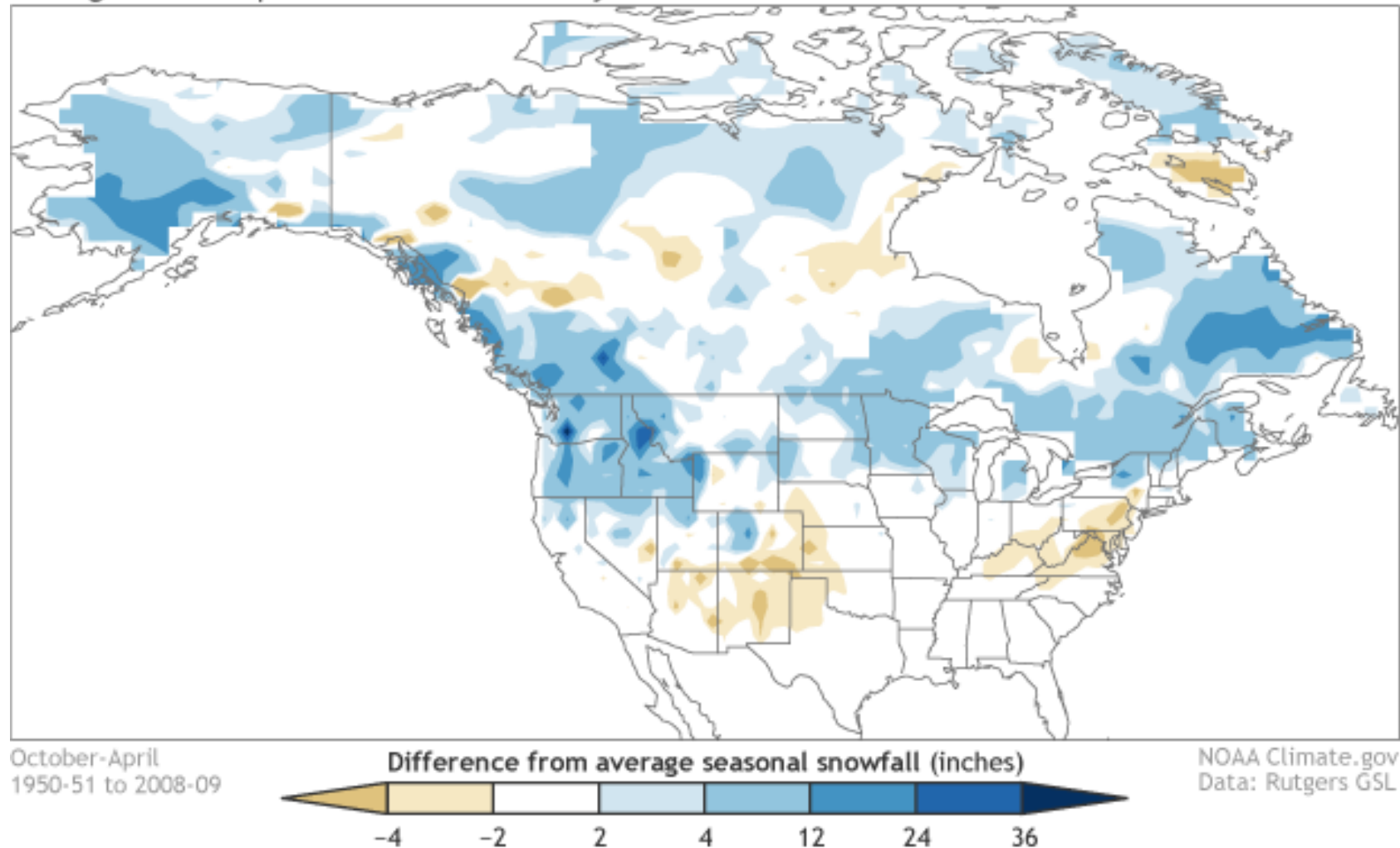
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 19 January 2021.

We've been in La Niña for several months; 60% chance conditions transition back to neutral in the spring



La Niña winters are usually good for snow in northern mountains (but not so far) – will we see a comeback?

Average snowfall patterns for all La Niña years



<https://www.climate.gov/news-features/blogs/enso/what-about-snow-during-la-niña-winters>



Statewide snowpack in “first dip” La Niña years

SNOW WATER EQUIVALENT IN STATE OF COLORADO

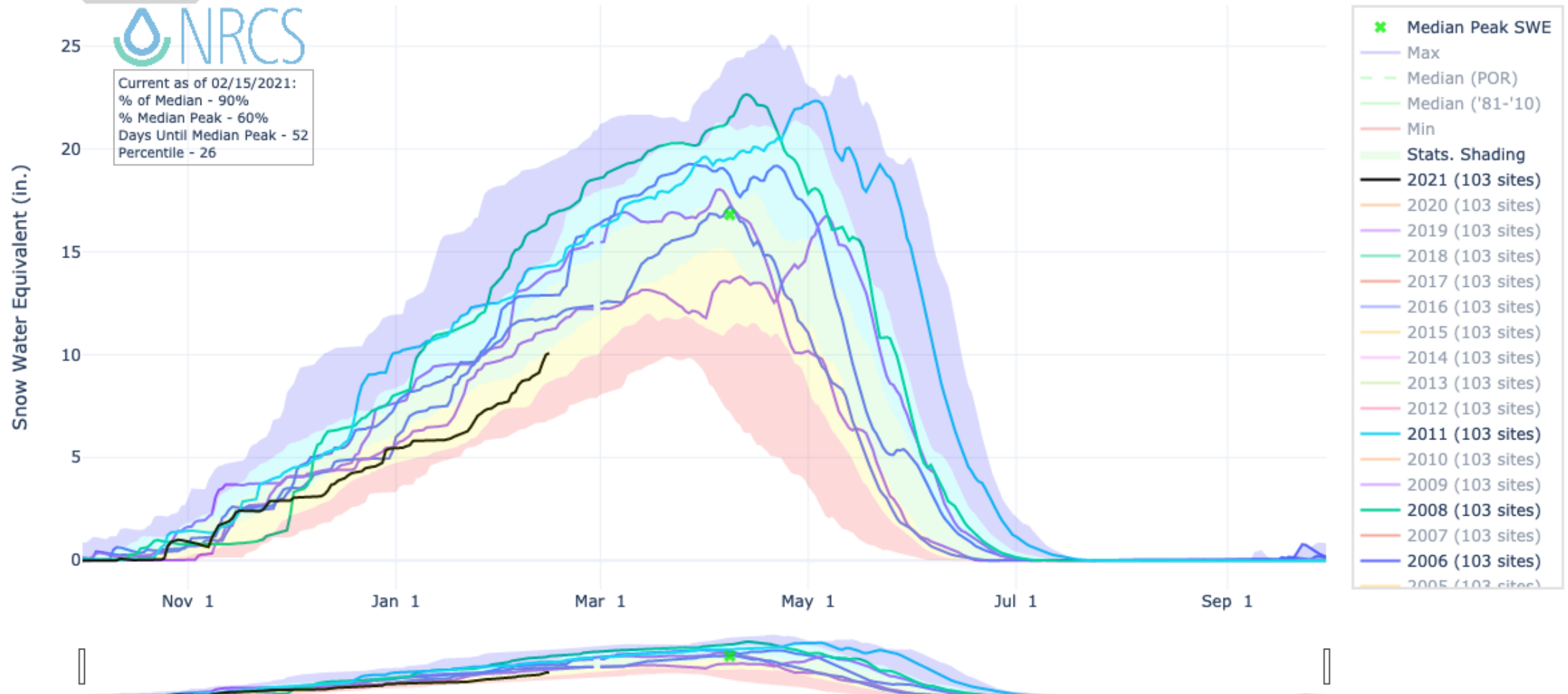
Reset Range

[Link to data: CSV / JSON](#)

[Station List](#)



Current as of 02/15/2021:
 % of Median - 90%
 % Median Peak - 60%
 Days Until Median Peak - 52
 Percentile - 26

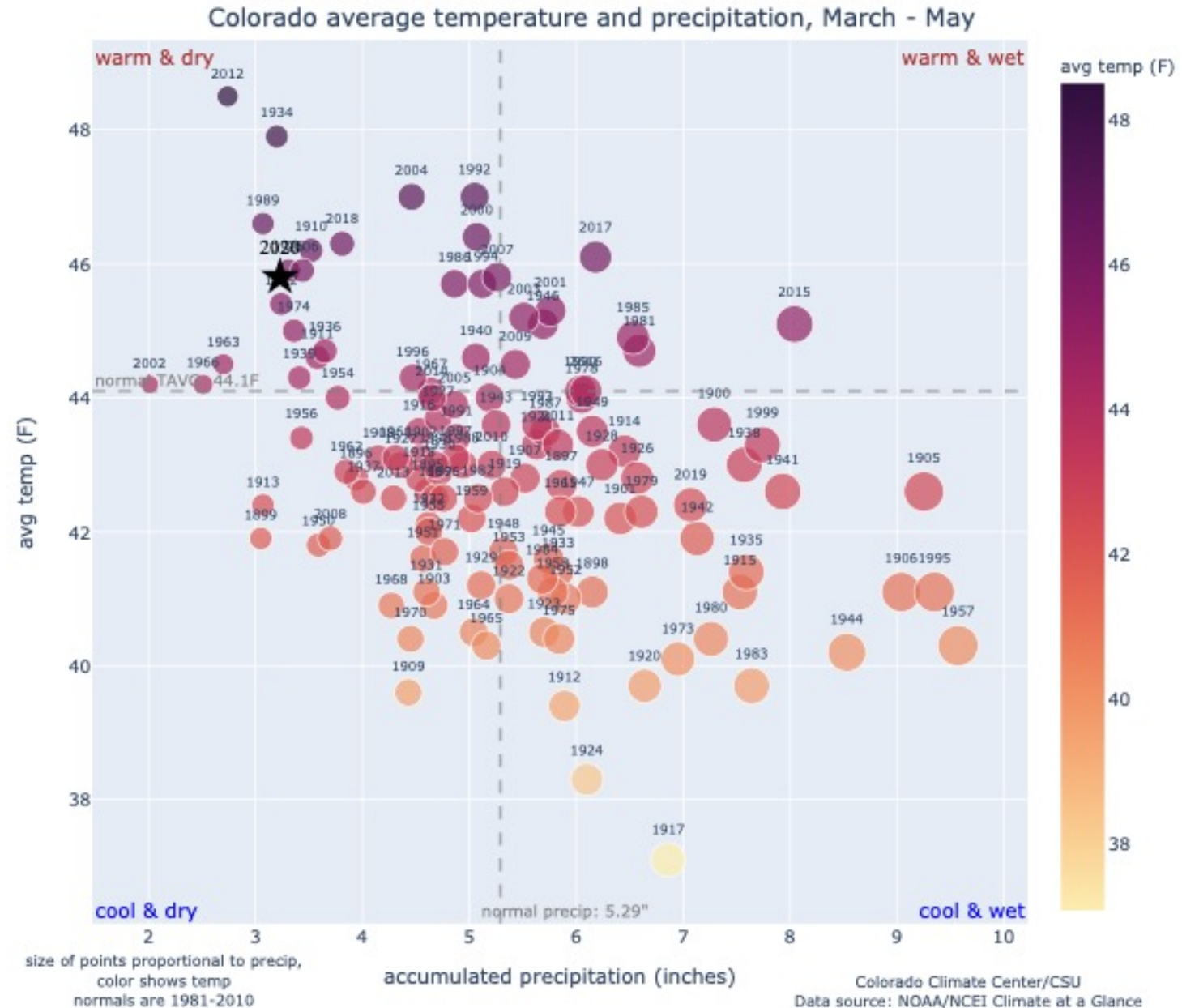


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
 For more information visit: [30 year normals calculation description](#).

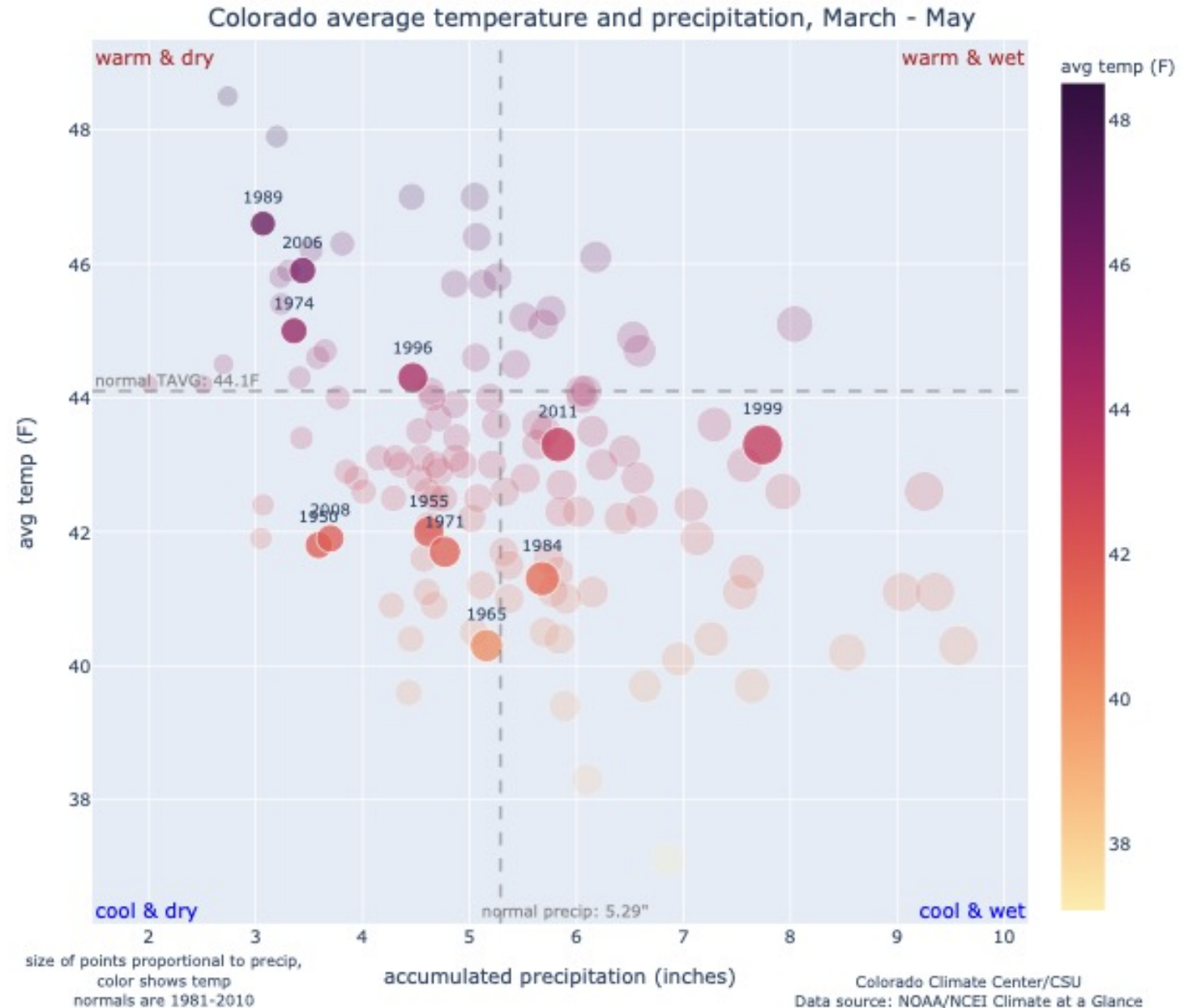
Other years: 1989, 1996, 1999, 2006, 2008, 2011



Statewide temp/precip, March-April-May



Statewide temp/precip, March-April-May in “first dip” La Niña years



years: 1950, 1955, 1965, 1971, 1974, 1984,
1989, 1996, 1999, 2006, 2008, 2011



Takeaways

- Drought persists. January was again warm and dry, though we've had a great start to February so far.
- Drought impacts to this point have been largely agricultural and ecological, but the hydrologic impacts may be imminent
- We remain in a La Niña pattern, but this La Niña has not been typical. Expectation is that we transition back to neutral conditions in the spring.
- La Niña in winter is supposed to be a good thing for NW CO snowpack, but hasn't been so far. La Niña springs tend to lean dry, and rarely see a wet extreme
- We should be prepared for a low runoff year



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