

# Colorado climate update and outlook

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Dr. Becky Bolinger  
Assistant State Climatologist

Livestock and Forage Grower's Update

February 20, 2024



ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY



Where we are now

Temperature and precip

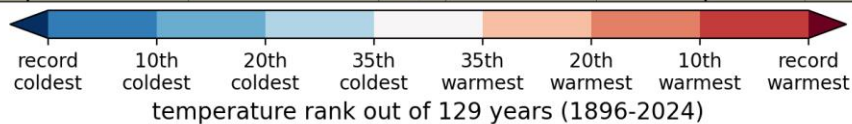
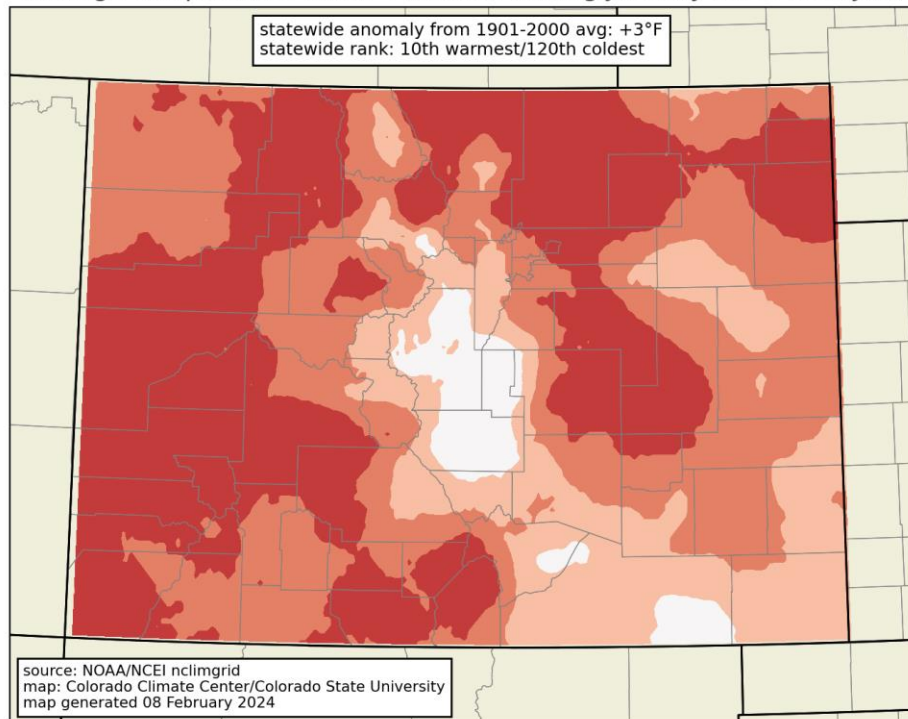
Snowpack

Drought

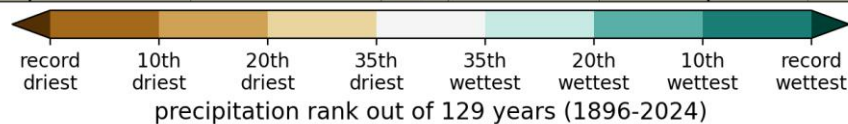
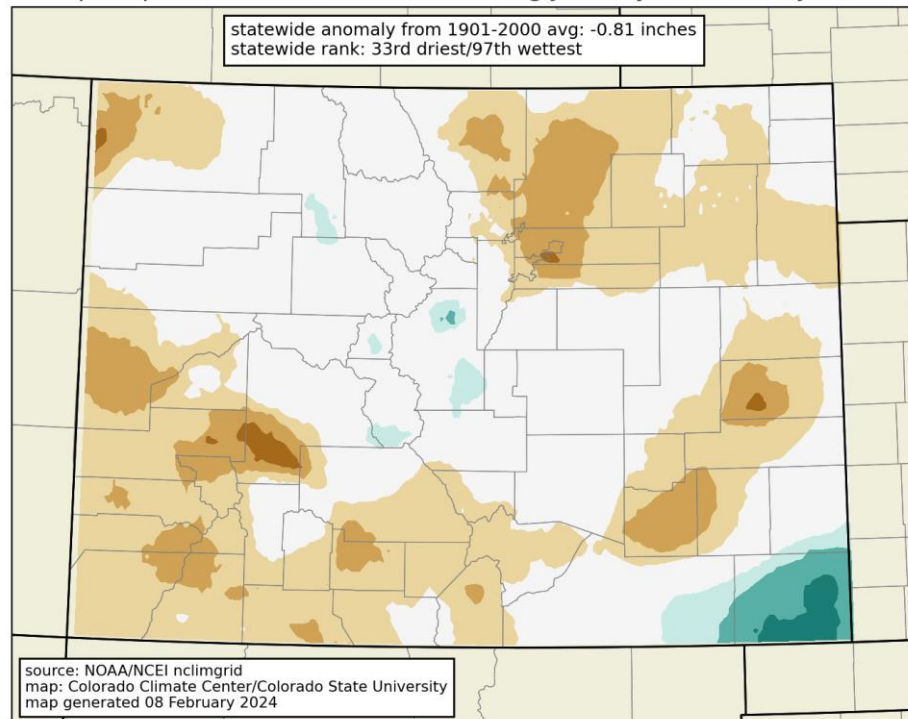


# October – January

average temperature rank: 4 months ending January 2024 (Oct-Jan)



precipitation rank: 4 months ending January 2024 (Oct-Jan)



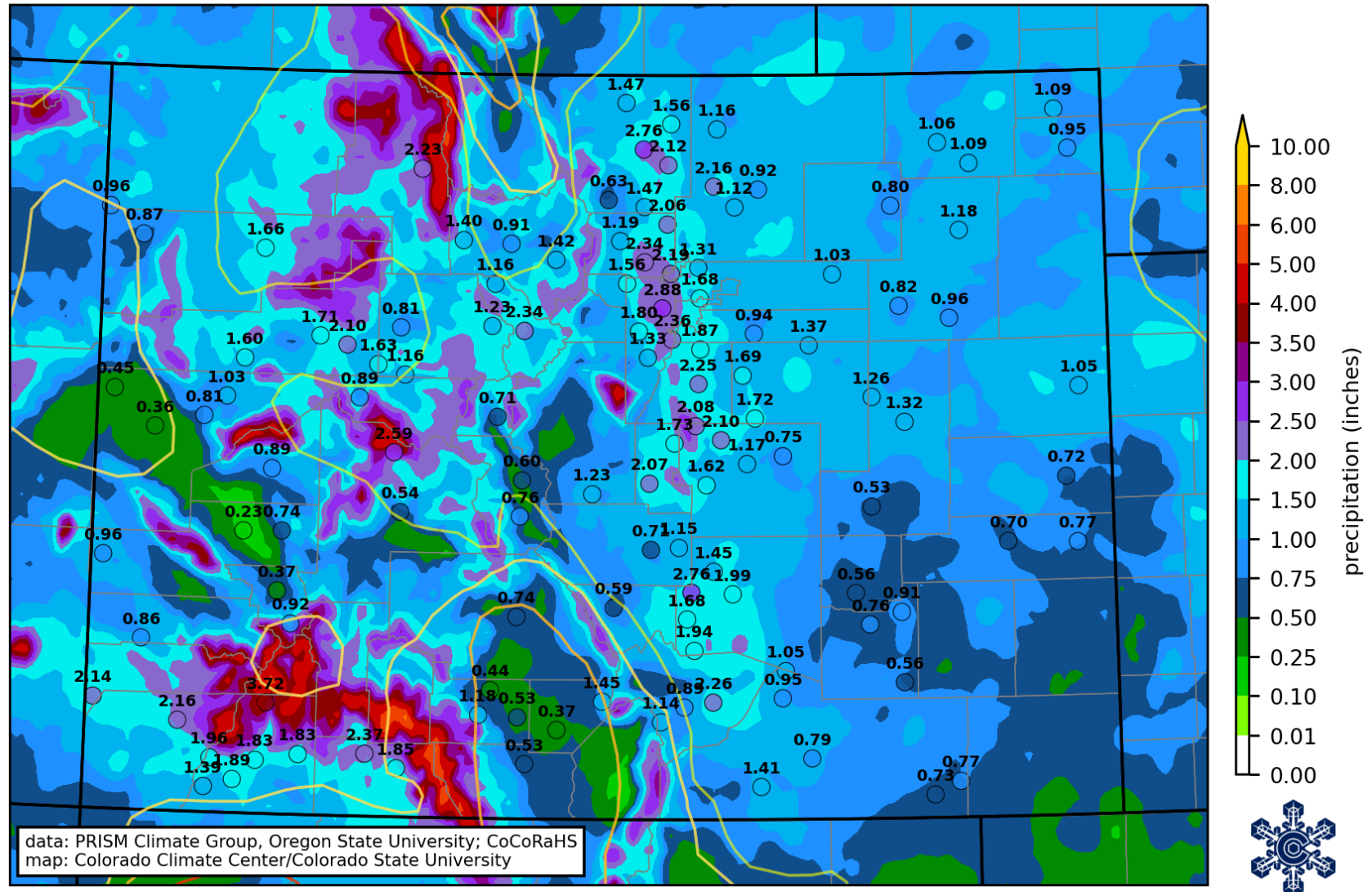
[https://climate.colostate.edu/co\\_cag/rank\\_maps.html](https://climate.colostate.edu/co_cag/rank_maps.html)



# February so far

PRISM and CoCoRaHS month-to-date precipitation, US Drought Monitor

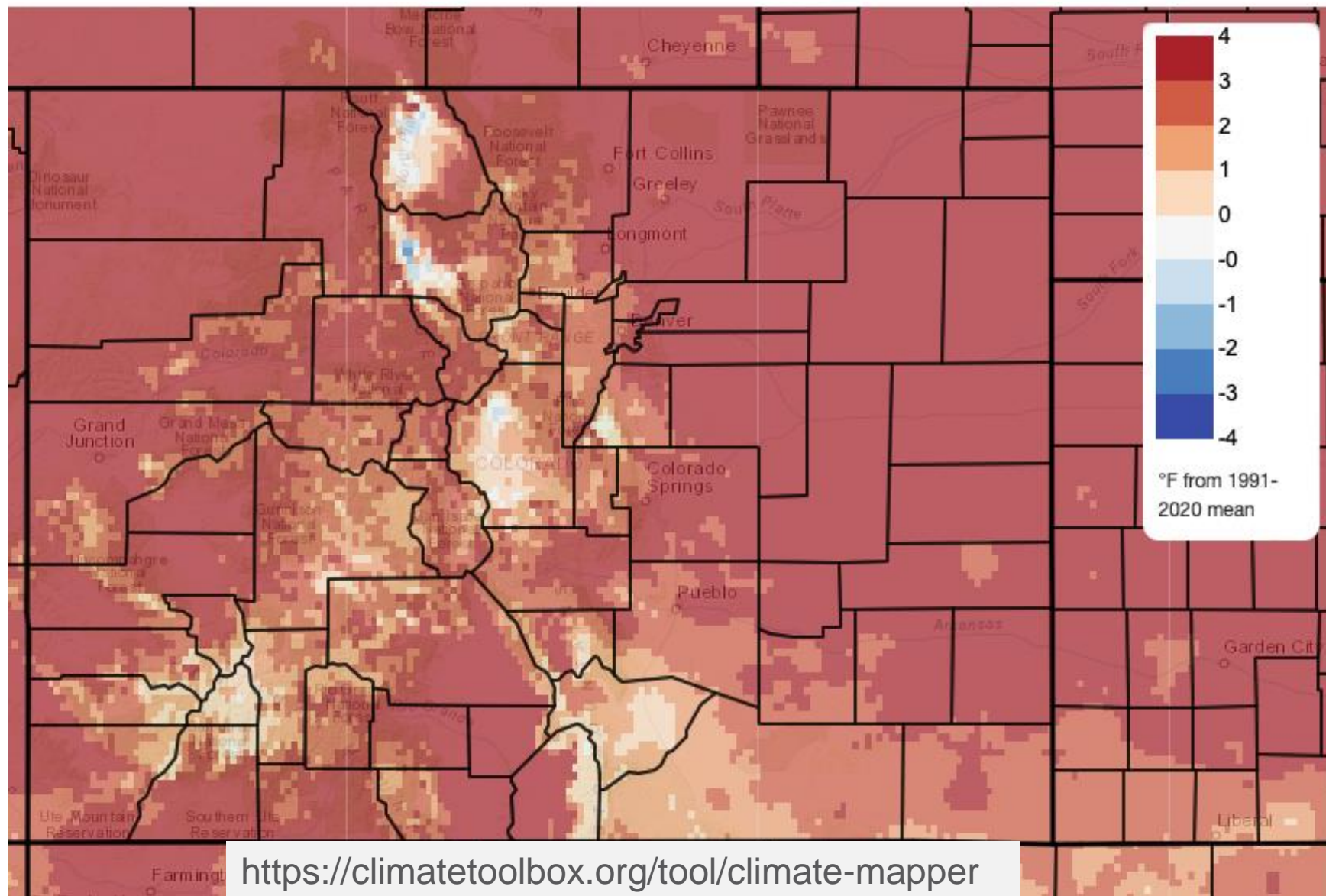
through 5:00am MST Sun 18 February 2024



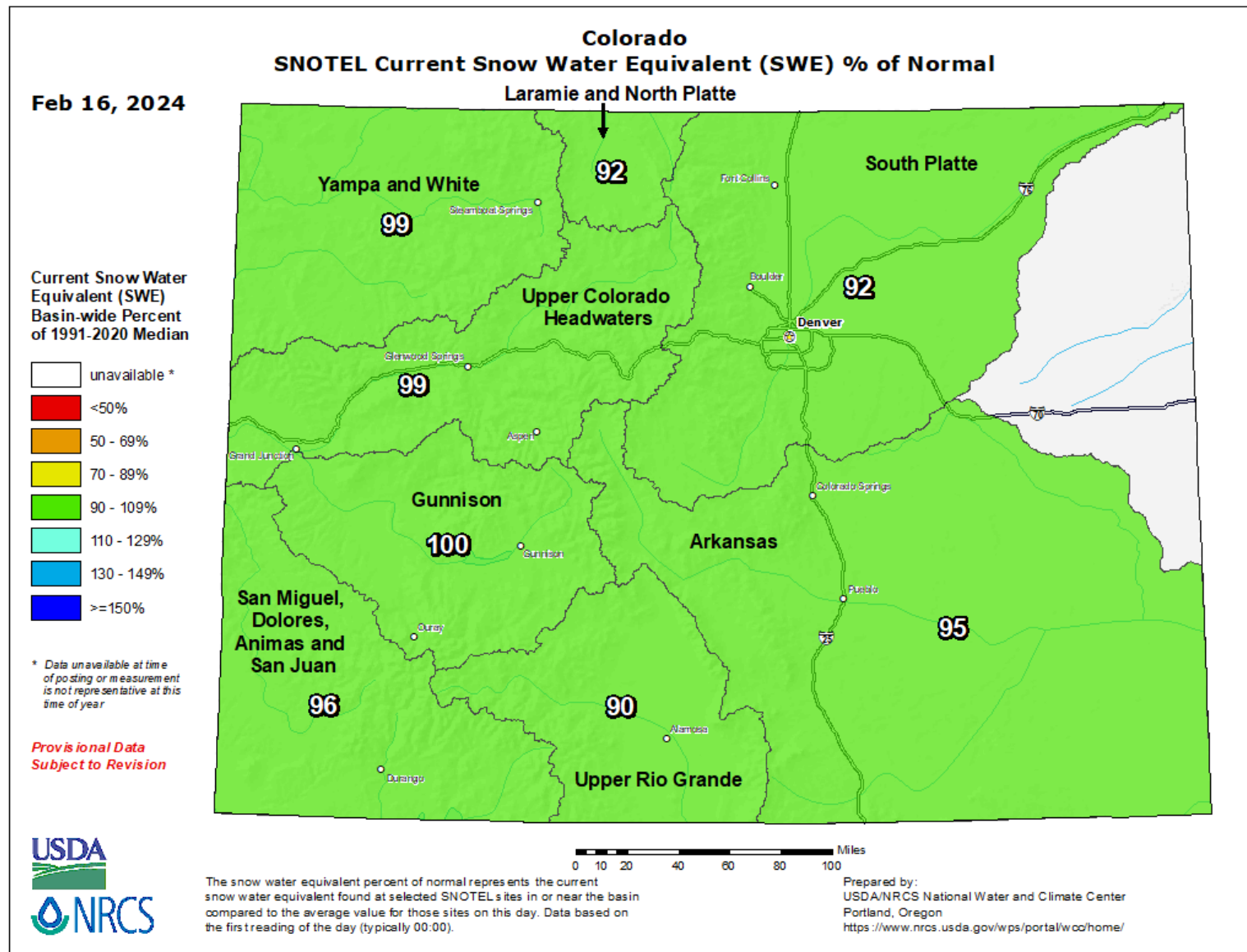
[https://climate.colostate.edu/maps/qpe/prism\\_mtd\\_current.png](https://climate.colostate.edu/maps/qpe/prism_mtd_current.png)

# Mean Daily Temperature Anomaly, Last 30 Days

2024/01/19 - 2024/02/17



# Current Snowpack



# U.S. Drought Monitor Colorado

**February 13, 2024**  
(Released Thursday, Feb. 15, 2024)  
Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	63.20	36.80	11.65	3.52	0.00	0.00
<b>Last Week</b> 02-06-2024	59.57	40.43	20.56	5.21	1.95	0.00
<b>3 Months Ago</b> 11-14-2023	47.66	52.34	26.90	6.87	1.31	0.00
<b>Start of Calendar Year</b> 01-02-2024	34.65	65.35	29.59	8.85	2.05	0.00
<b>Start of Water Year</b> 09-26-2023	65.71	34.29	17.43	2.77	0.00	0.00
<b>One Year Ago</b> 02-14-2023	41.35	58.65	37.42	12.29	2.00	0.16

## Intensity:

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

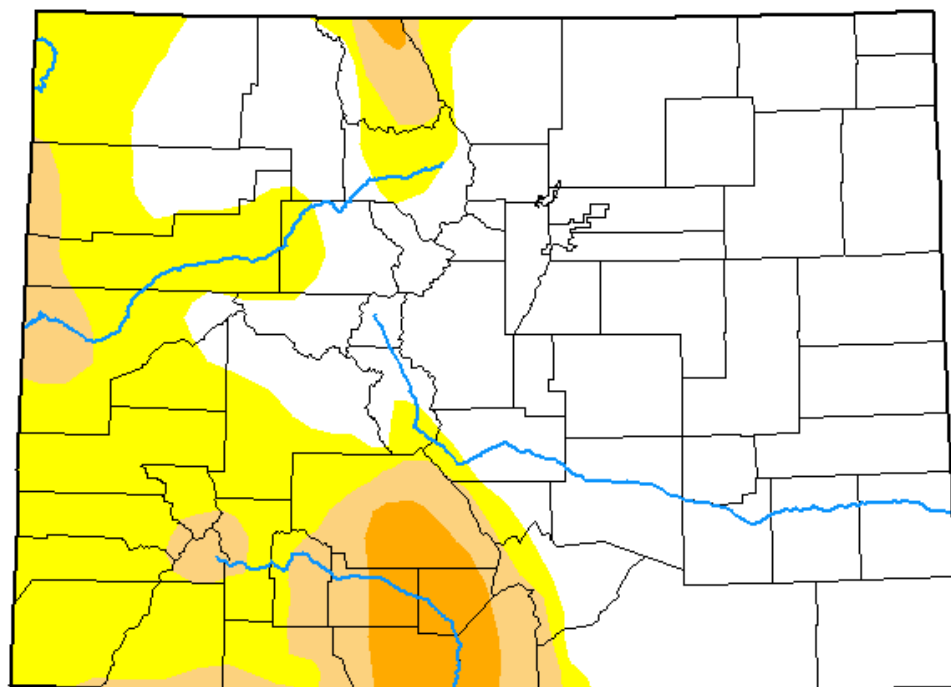
*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

## Author:

Deborah Bathke  
National Drought Mitigation Center

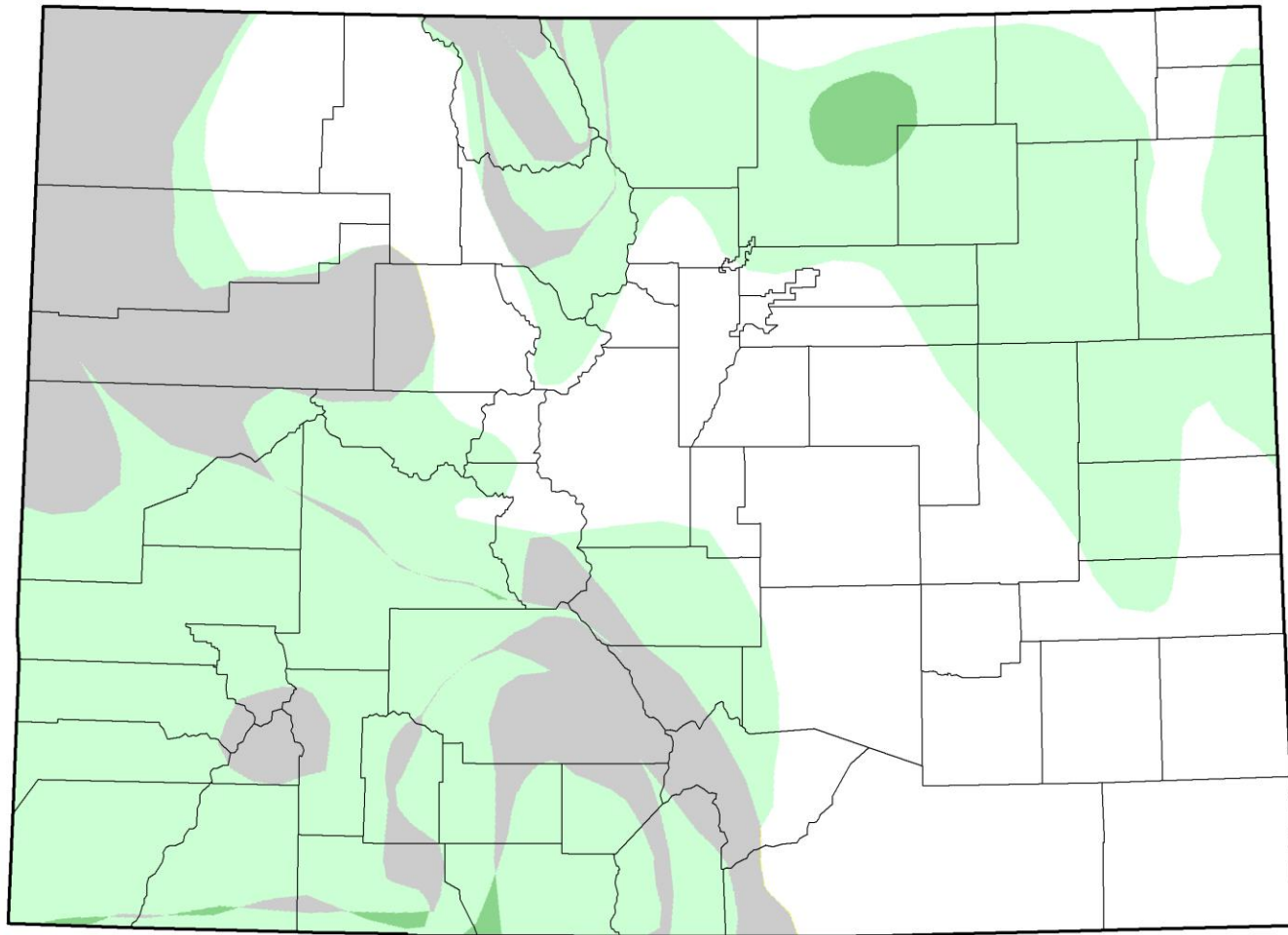


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)





## U.S. Drought Monitor Class Change - Colorado 4 Week



**February 13, 2024  
compared to  
January 16, 2024**

[droughtmonitor.unl.edu](http://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







## Spring outlook

Looking ahead to  
temperature and  
precipitation outlooks

Snowpack projections

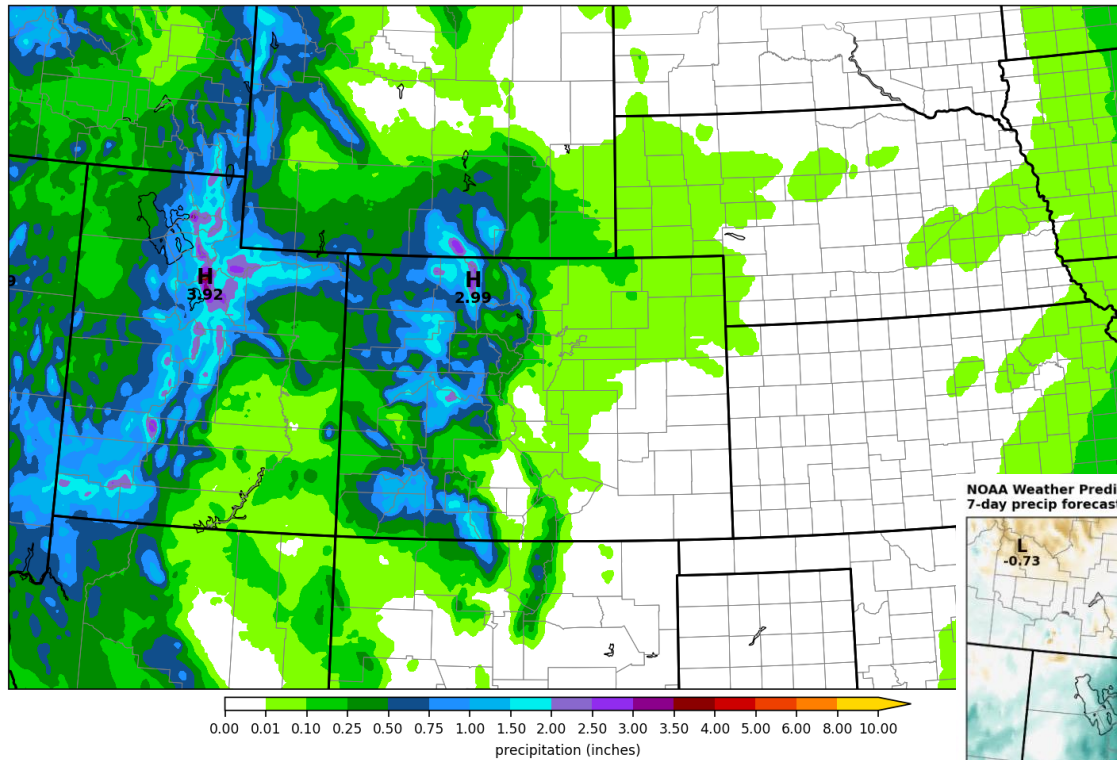
El Niño update



# NOAA 7-day precip forecast

NOAA Weather Prediction Center  
7-day precipitation forecast

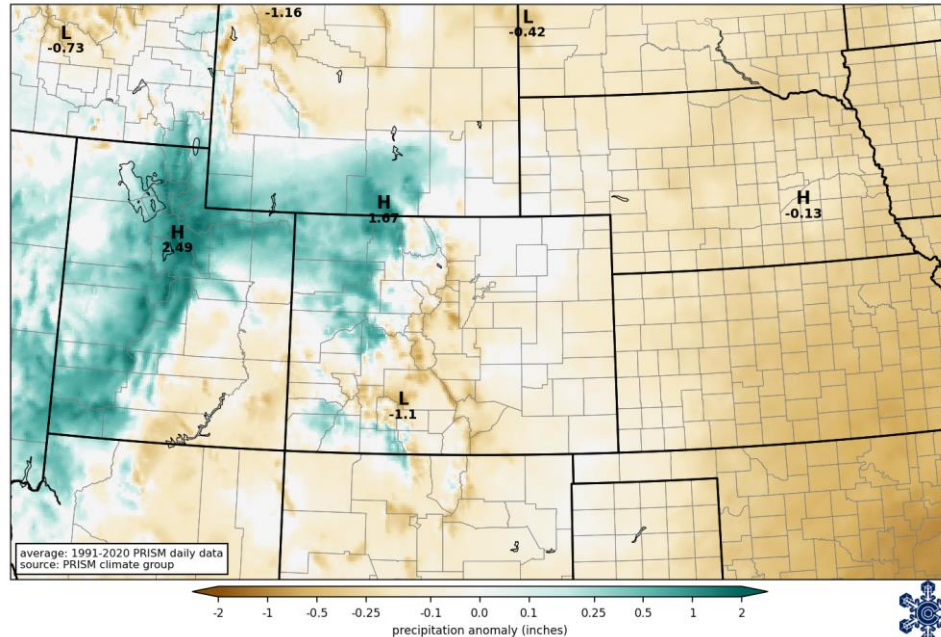
forecast issued 1200 UTC Tue 20 Feb 2024  
precipitation in 168 hrs ending 1200 UTC Tue 27 Feb 2024



Decent activity for parts of the northwest, but fairly dry around the rest of the state.

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

forecast issued 1200 UTC Tue 20 Feb 2024  
precipitation in 168 hrs ending 1200 UTC Tue 27 Feb 2024

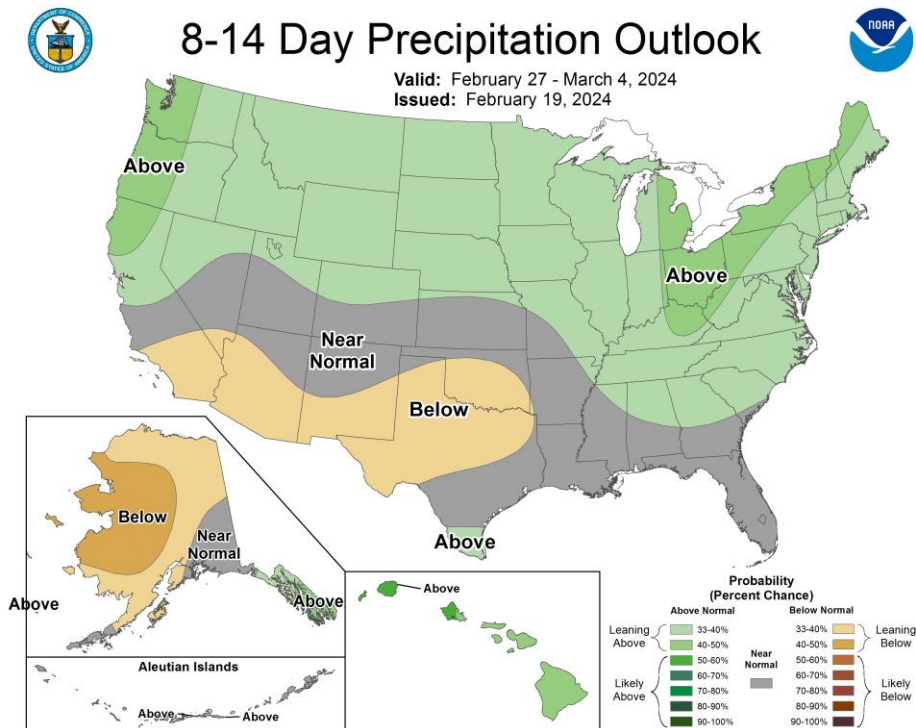
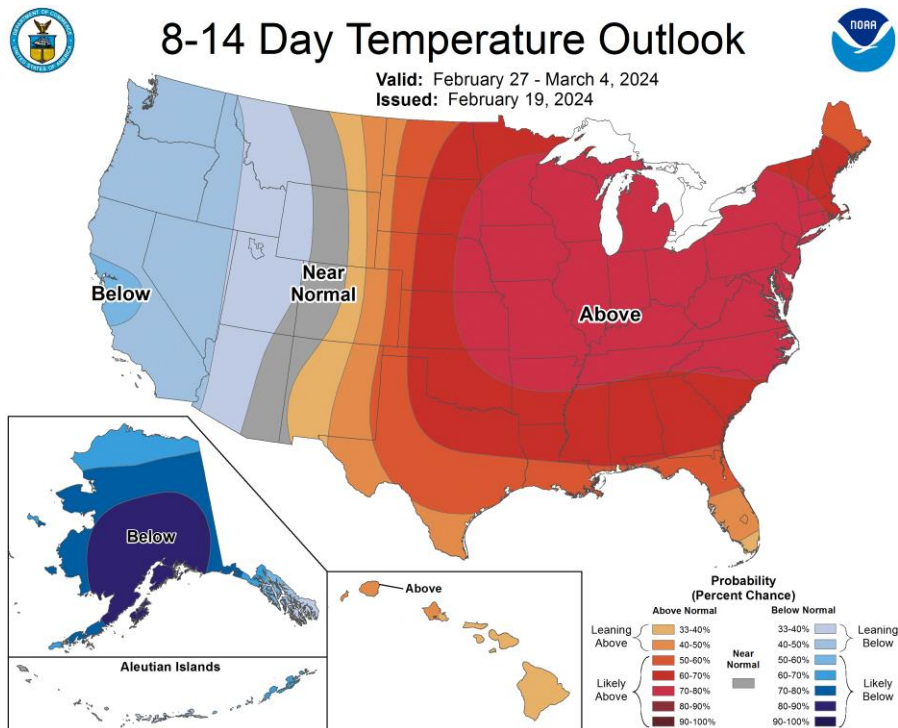


<http://schumacher.atmos.colostate.edu/weather/>





# 8-14 day outlook

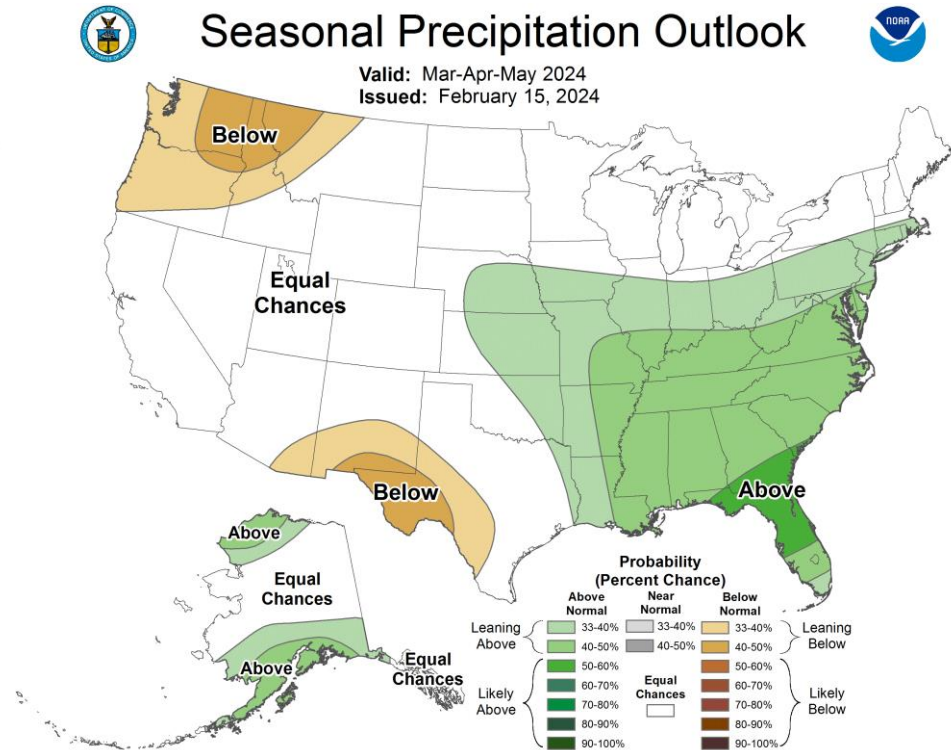
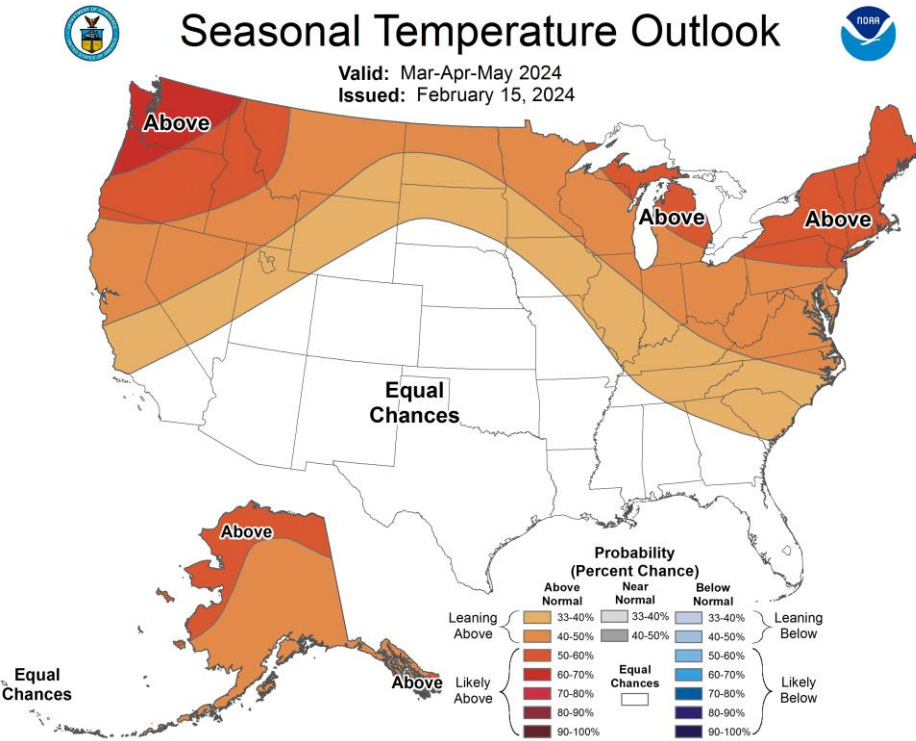


Temperatures likely to be above average east of the Divide. Most likely precipitation to be near normal, maybe slightly wetter to the north.

<https://www.cpc.ncep.noaa.gov>



# Seasonal outlook



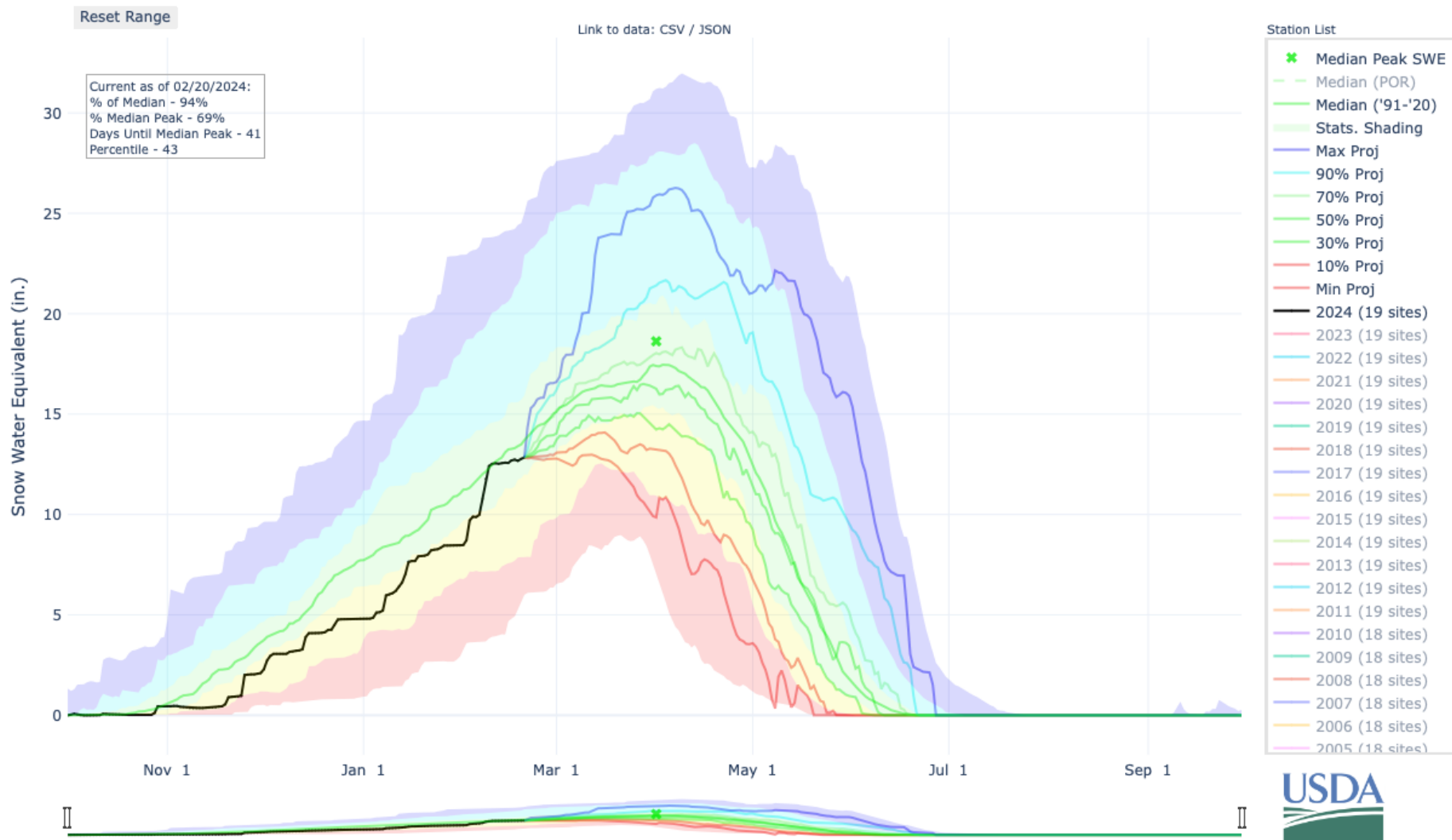
Not much guidance for spring outlook. Lots of uncertainty with temperature, especially given our variability in past springs. Climate models may be indicating possibility of a wetter March. Maybe a big snow on the way??

<https://www.cpc.ncep.noaa.gov>





# Snowpack projection – San Juan basin



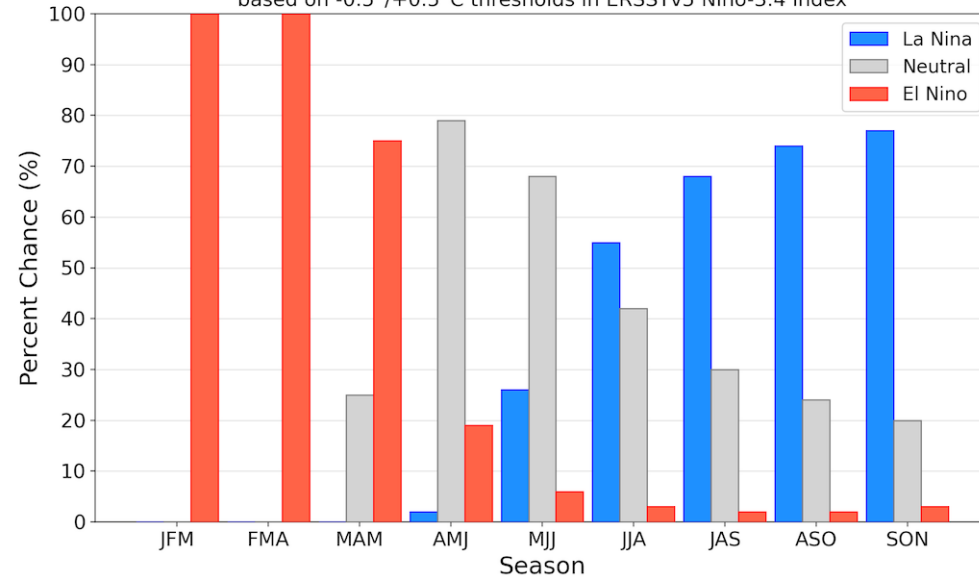
<https://nwcc-apps.sc.egov.usda.gov/basin-plots/#CO>



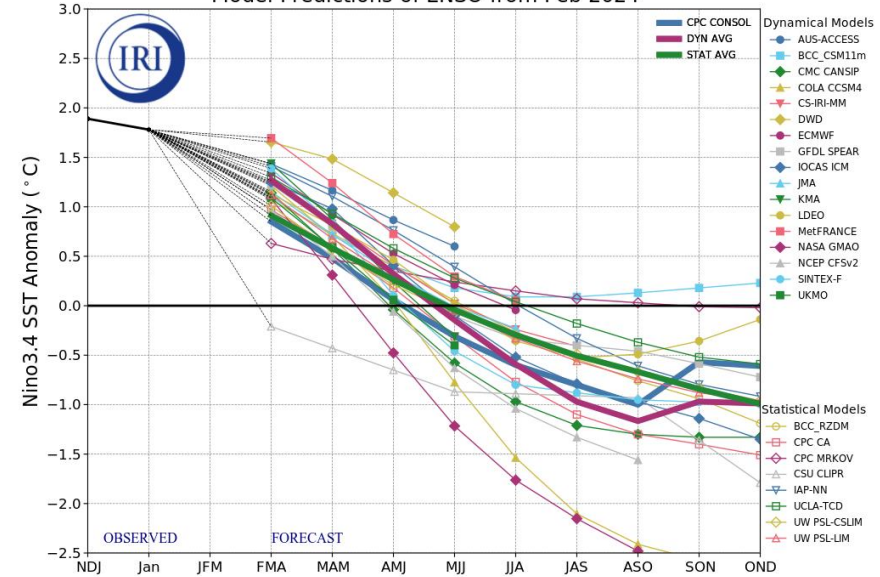
# What's the ENSO forecast?

## Official NOAA CPC ENSO Probabilities (issued Feb. 2024)

based on  $-0.5^{\circ}/+0.5^{\circ}\text{C}$  thresholds in ERSSTv5 Niño-3.4 index



## Model Predictions of ENSO from Feb 2024



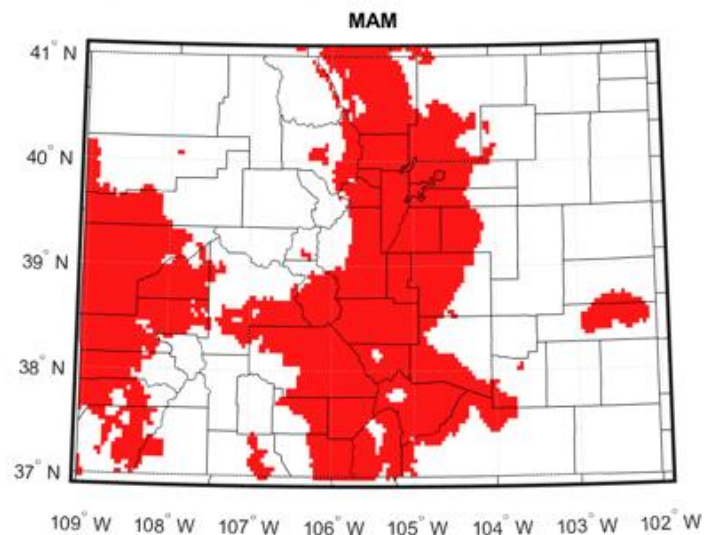
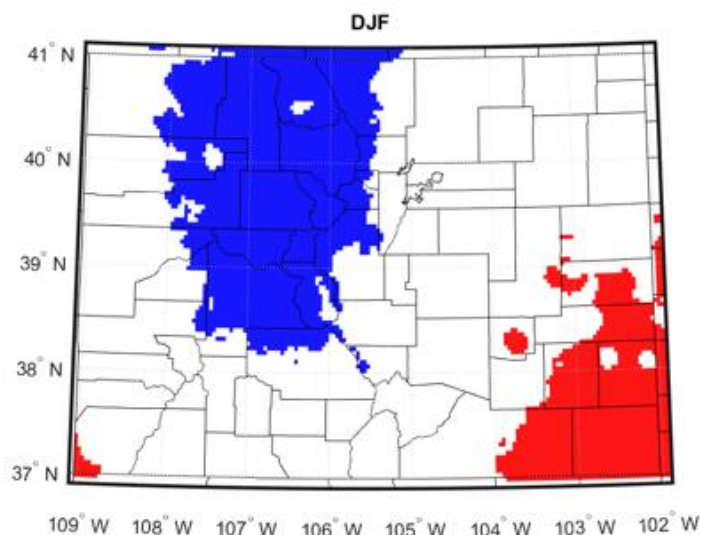
CPC/IRI February 19, 2024: As of mid-February 2024, moderate-strong El Niño conditions persist in the central-eastern equatorial Pacific, with important oceanic and atmospheric indicators aligning with an ongoing El Niño event that is gradually diminishing. An El Niño advisory from the CPC continues for February 2024, alongside a La Niña watch issued for June to August 2024. Almost all the models in the IRI ENSO prediction plume forecast a continuation of the El Niño event during the rest of the boreal winter and spring of 2024, which rapidly weakens thereafter.

<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

A decorative background consisting of a grid of small, light green dots arranged in a pattern that tapers to the right, creating a sense of depth and movement.

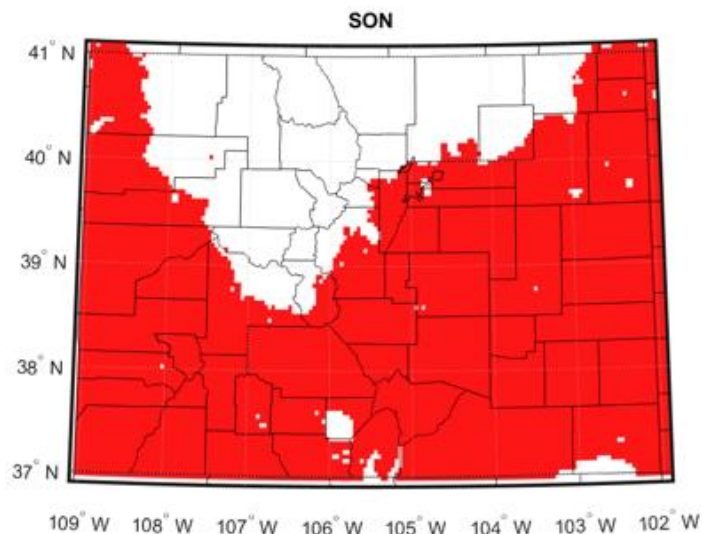
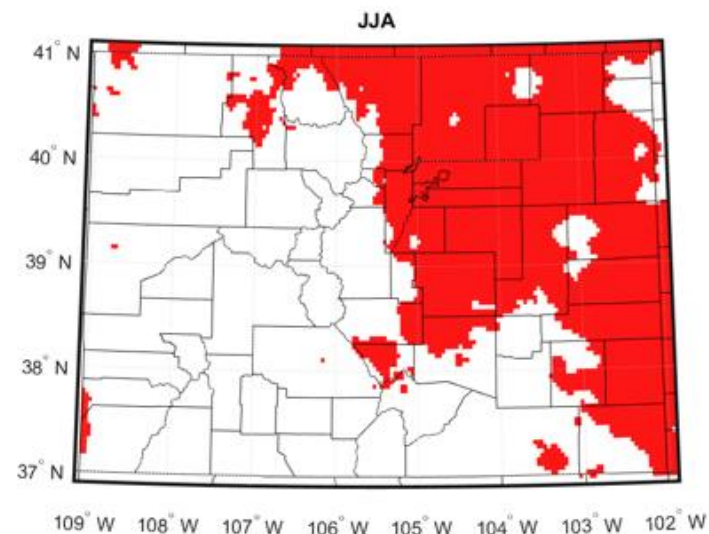
What does El Niño mean  
for the spring?

## General Relationship Between Colorado Precipitation and El Niño Southern Oscillation (1951-2020)



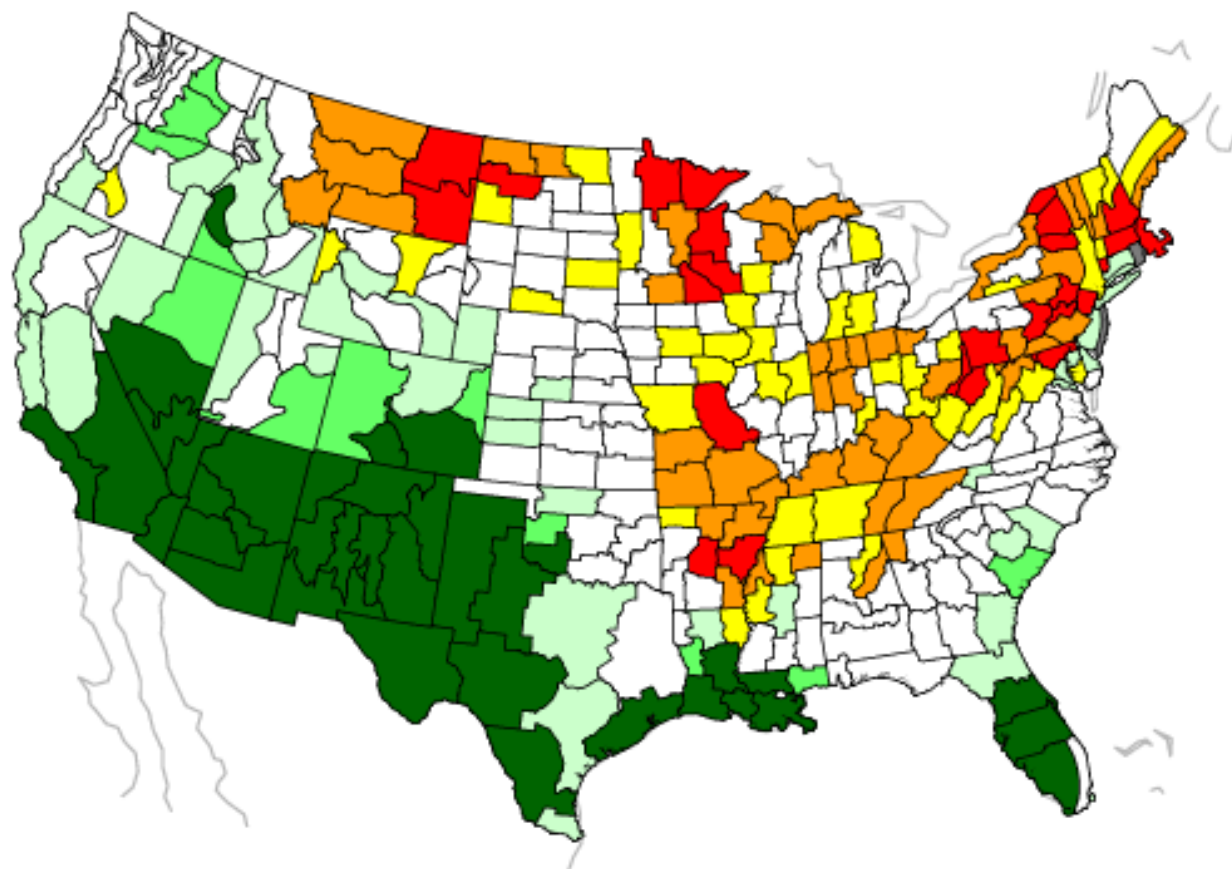
Red: El Niño tends wetter

Blue: La Niña tends wetter





## MAM Precipitation During El Nino Increased Risk of Wet or Dry Extremes



Information from previous El Niño events indicate we tend to have an increased risk for wet extremes, and a decreased risk for dry extremes in the spring.



Percent (%) Increase in Risk

NOAA/ESRL/PSD

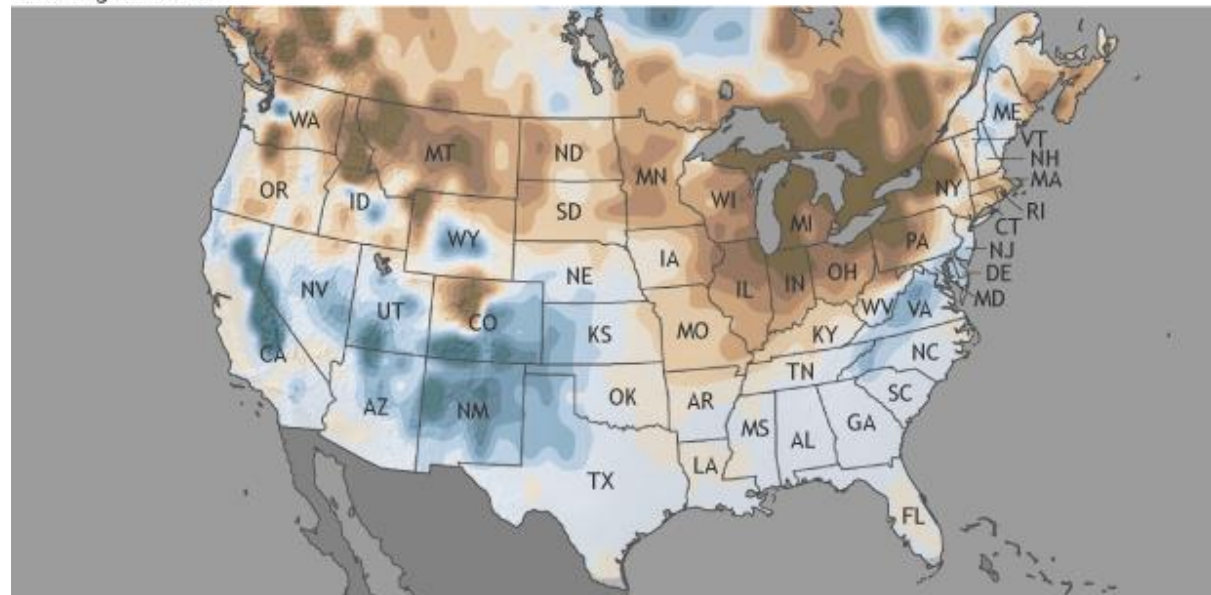
<https://psl.noaa.gov/enso/climaterisks/>

# Snow and El Niño

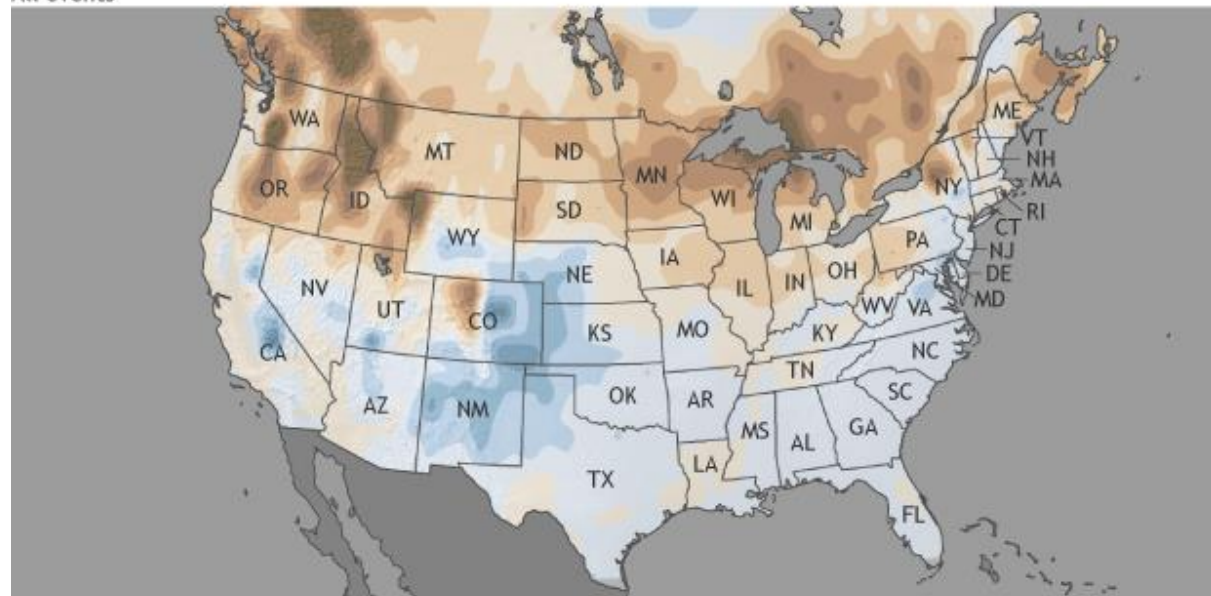
<https://climate.gov>

More favorable conditions for snow in southern CO and the eastern plains during an El Niño.

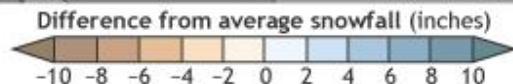
Northern mountains are more likely to miss out on snow during an El Niño.



All events



October–April  
compared to 1950–2009



NOAA Climate.gov  
Data: Rutgers/CPC

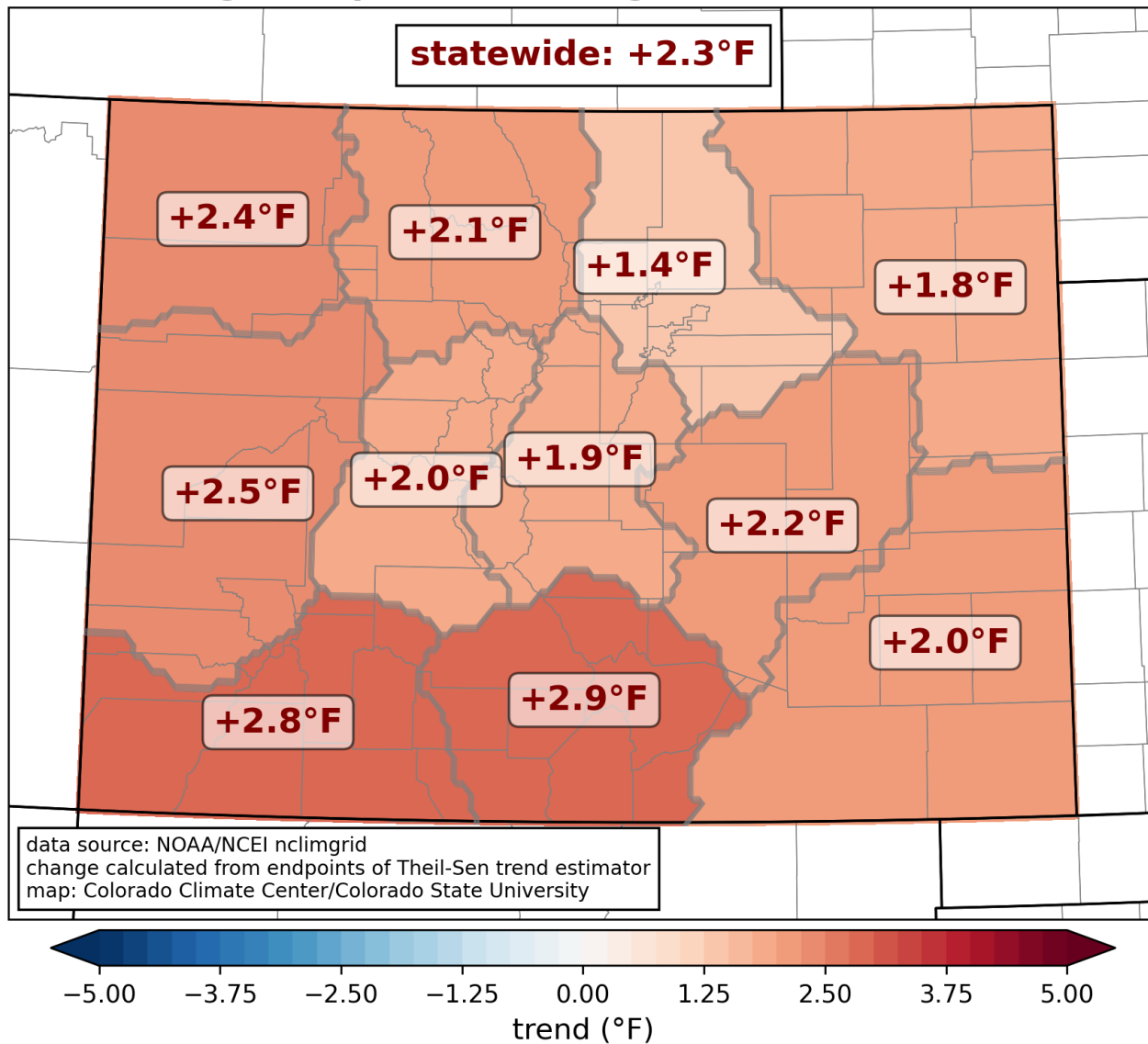




Further into the future...

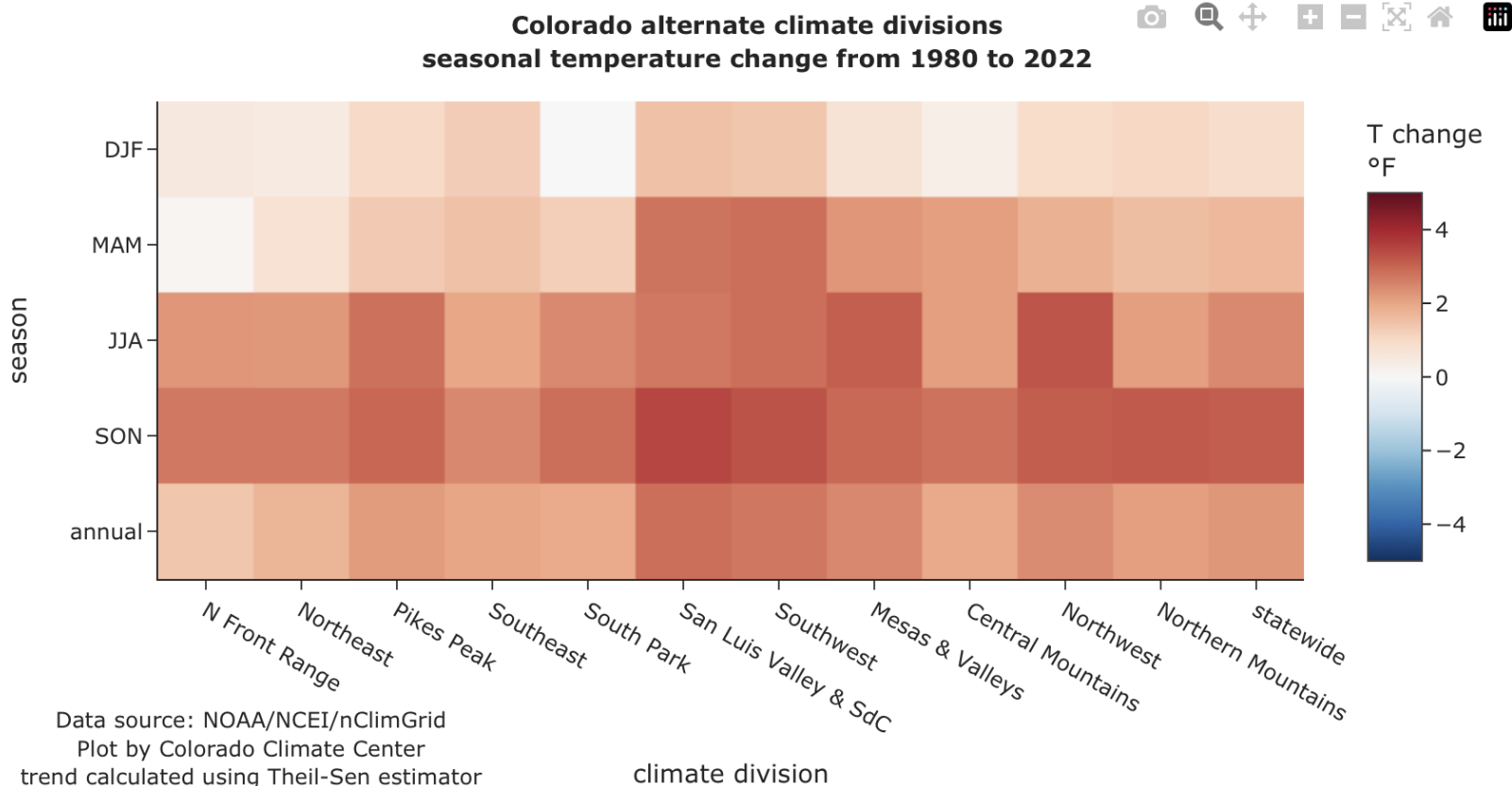
# Significant warming observed

average temperature change, annual, 1980-2022





# Warming by season and division



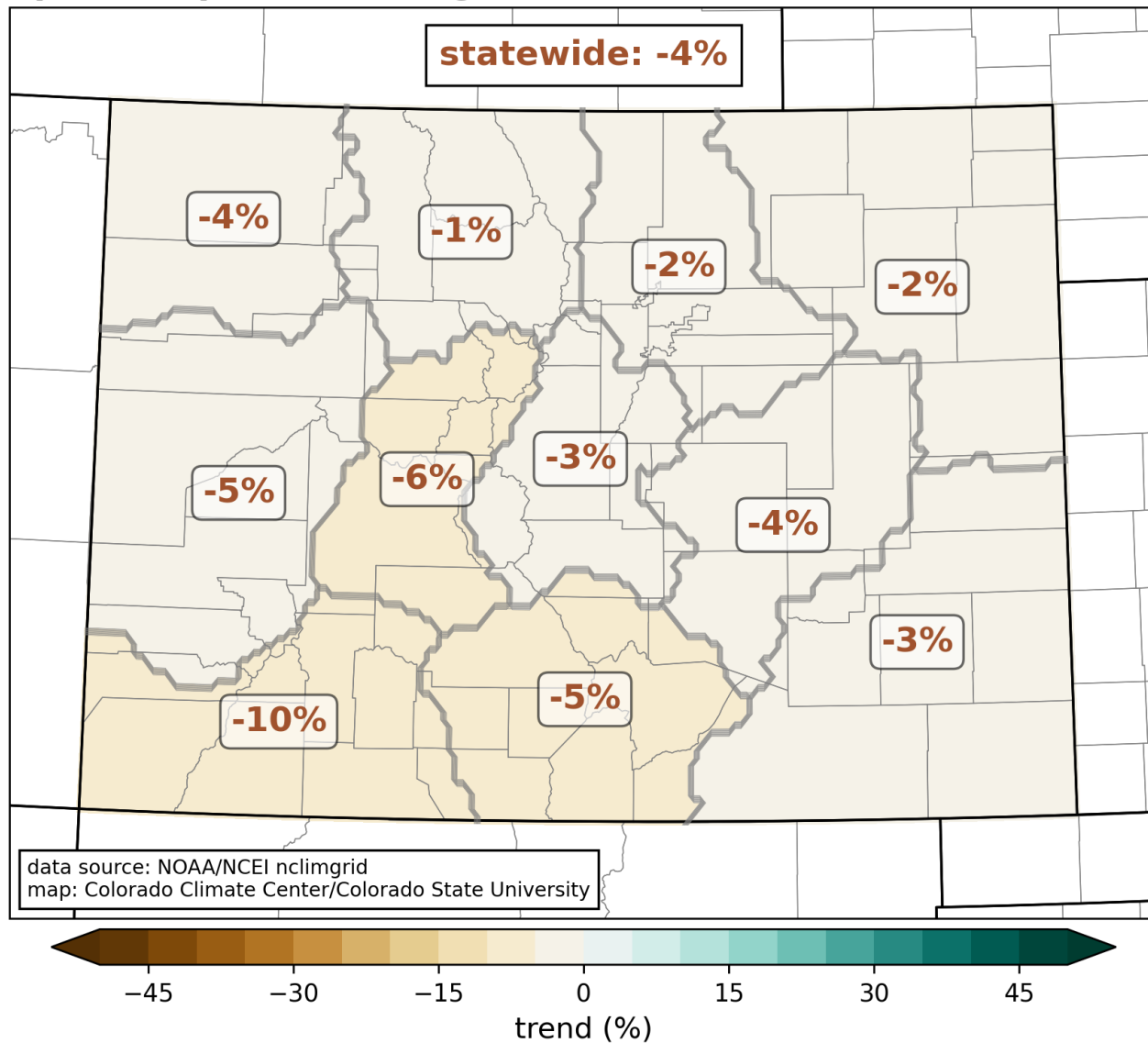
Southern CO warming more than other divisions

Fall warming more than other seasons

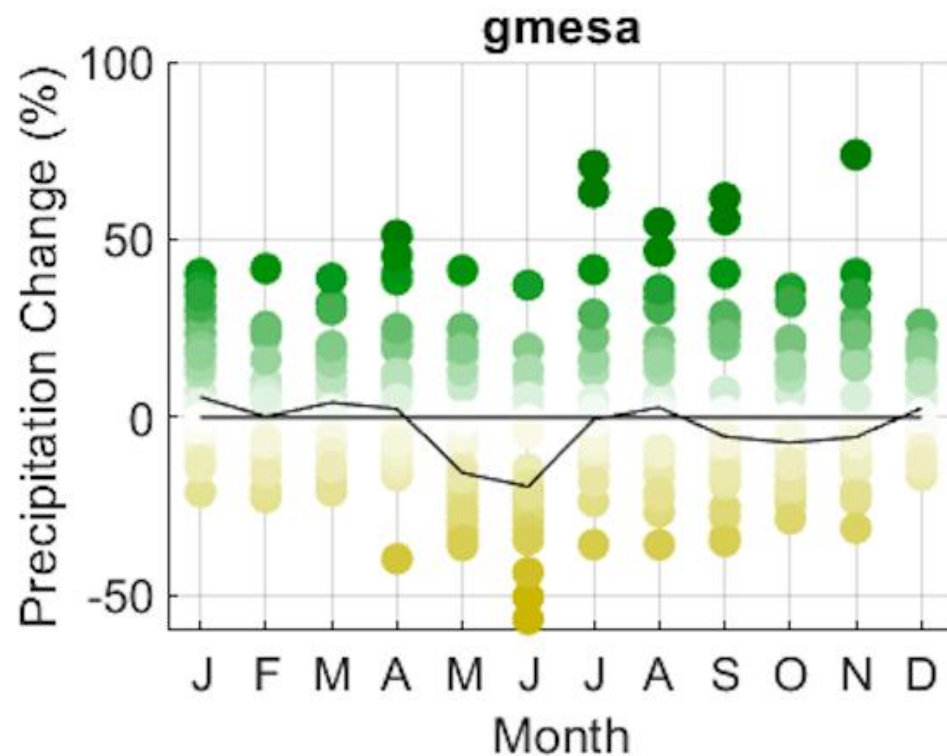
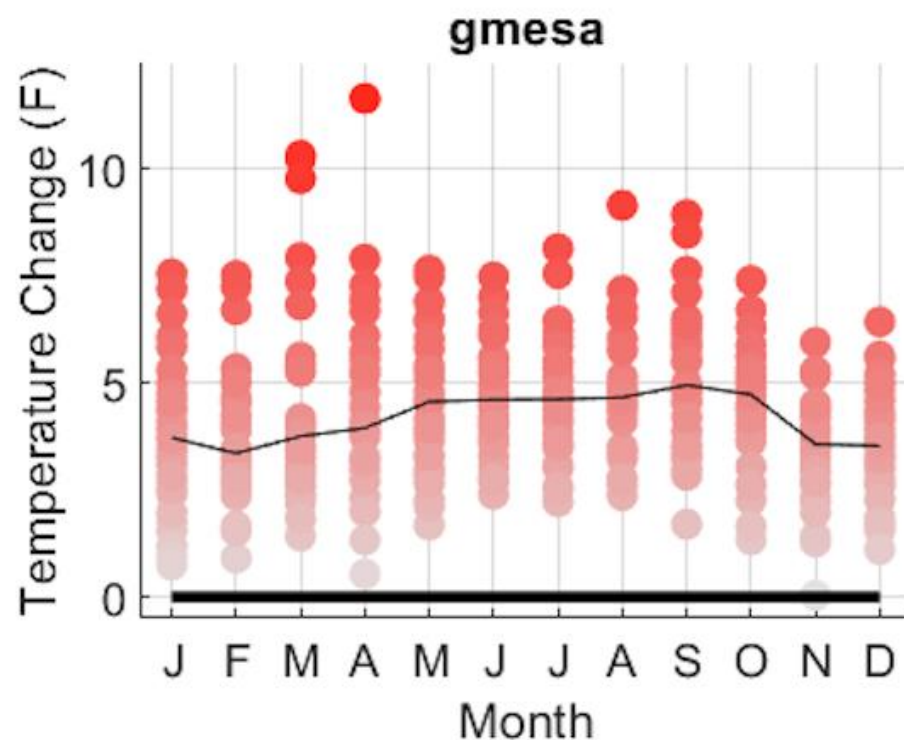
Most significant spring warming is occurring in the south and southwest

# Depending on time period, drying trends

precipitation percent change, annual, 2001-2022 minus 1951-2000



# Future projections on the West Slope



Temperatures will continue to increase in the future. Precipitation projections are uncertain, with a leaning to drier conditions in the late spring.



# What do warmer temperatures mean?

- ❑ Snowpack is more likely to peak early, and below median peak from the 1971-2000 time period.
- ❑ Overall annual streamflow volume is expected to be less.
- ❑ If precipitation is much above average, that could make up the deficit of the warmer temperature's impact.
- ❑ Wetter soils in the spring (with the earlier melt) and drier soils in the summer.
- ❑ Warmer falls could delay the start of the snowpack accumulation.
- ❑ [climatechange.colostate.edu](http://climatechange.colostate.edu)





Becky.Bolinger@colostate.edu

 @ClimateBecky

climate.colostate.edu

Thank you

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ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY