

Colorado Climate Update

Russ Schumacher, state climatologist

Water Conditions Monitoring Committee

November 19, 2024



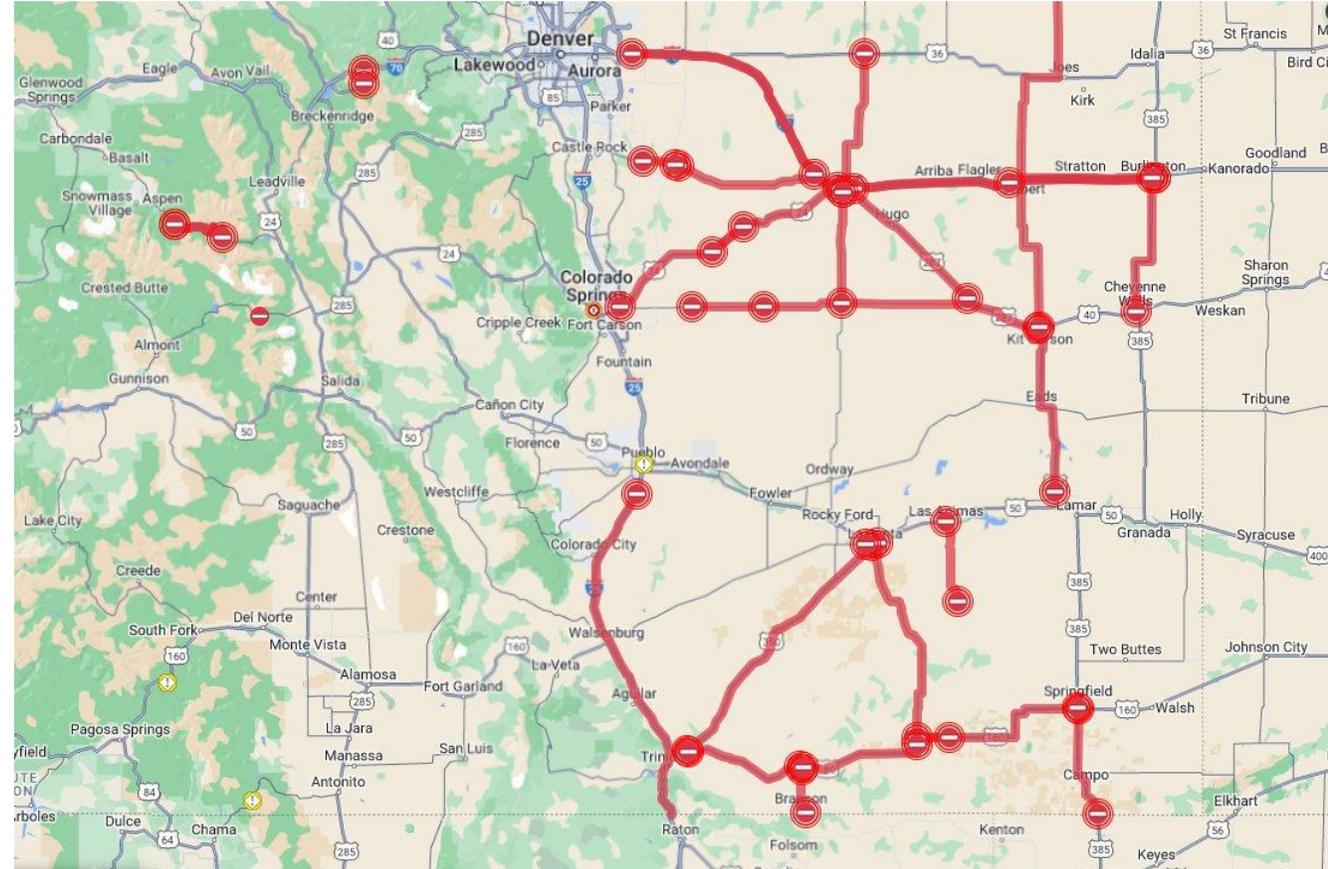
**COLORADO
CLIMATE
CENTER**



ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Recap of Water Year 2024, and WY2025 so far

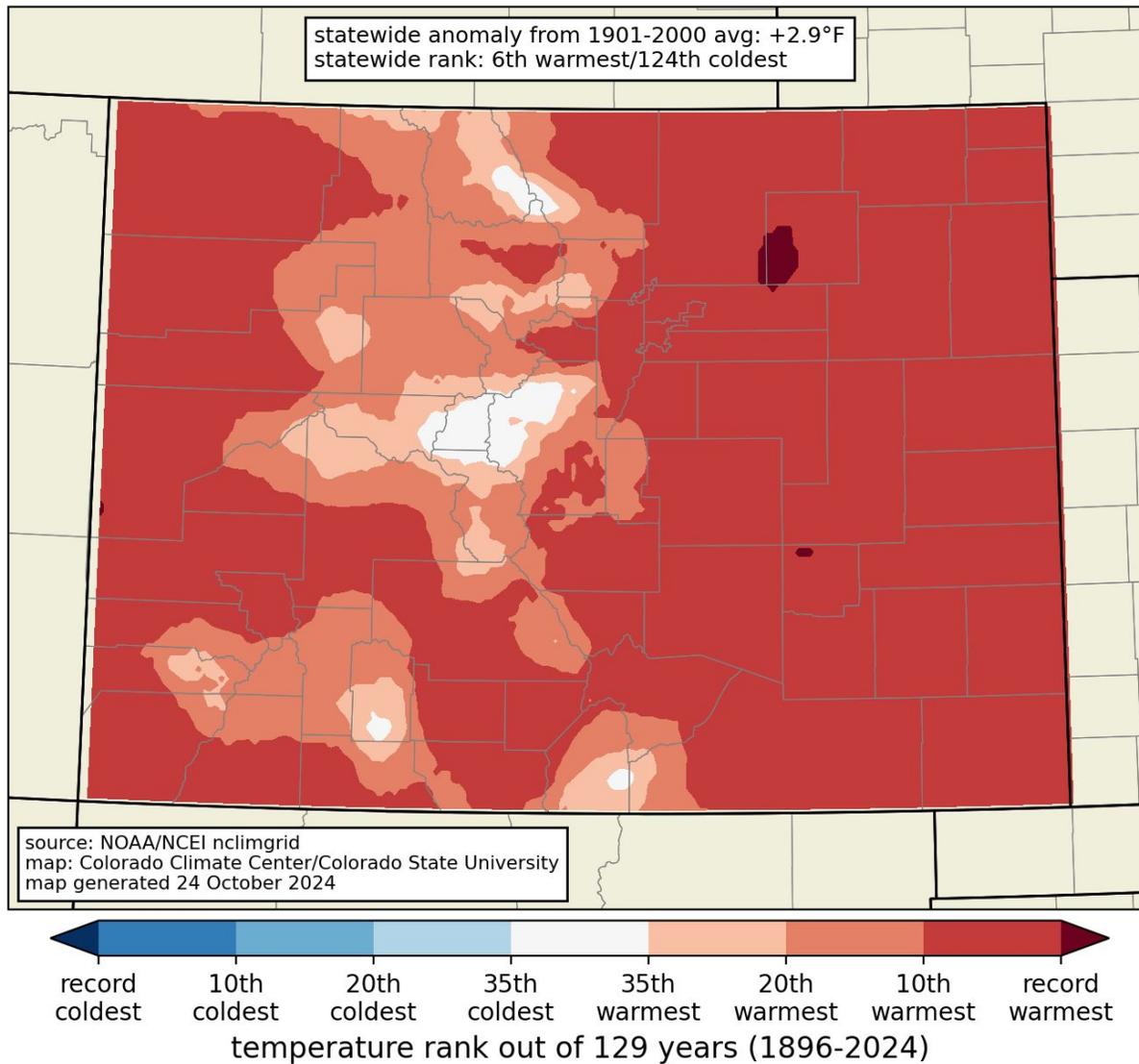
temperature, precipitation, etc.



CDOT road closures on November 8



average temperature rank: 12 months ending September 2024 (Oct-Sep)

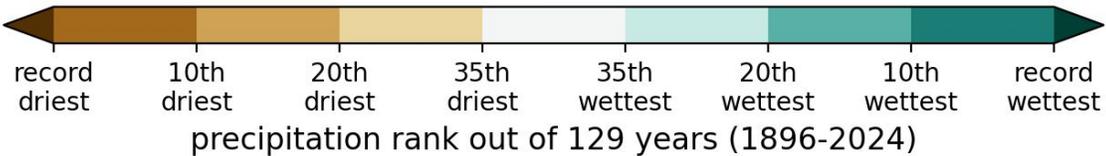
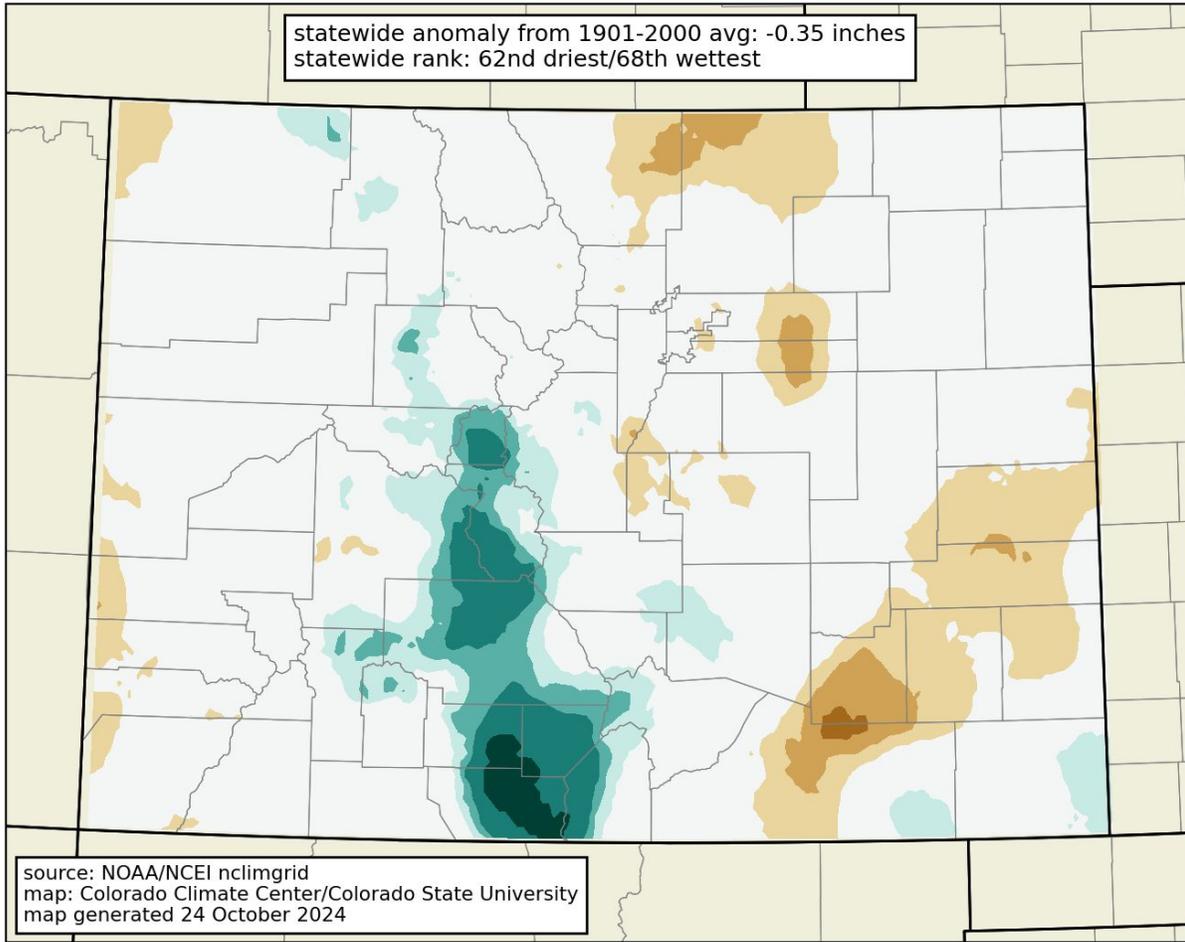


Statewide: tied for 6th warmest water year (out of 129),
tied with 2022

Month	T Rank (of 129 years)	Above, below, or near 20 th century avg?
Oct	27 th warmest	above
Nov	22 nd warmest	above
Dec	9 th warmest	much above
Jan	57 th warmest	near average
Feb	14 th warmest	above
Mar	39 th warmest	above
Apr	20 th warmest	above
May	47 th coolest	near average
Jun	3 rd warmest	much above
Jul	45 th warmest	near average
Aug	14 th warmest	above
Sep	7 th warmest	much above



precipitation rank: 12 months ending September 2024 (Oct-Sep)



Statewide: 62nd driest/68th wettest water year. Very close to the “normal” precipitation statewide

Month	P Rank (of 129 years)	Above, below, or near 20 th century avg?
Oct	53 rd driest	near average
Nov	23 nd driest	below
Dec	64 th driest	near average
Jan	47 th wettest	near average
Feb	15 th wettest	above
Mar	29 th wettest	above
Apr	43 rd driest	near average
May	58 th driest	near average
Jun	38 th wettest	above
Jul	29 th driest	below
Aug	13 th wettest	above
Sep	41 st driest	near average



Colorado statewide average temperature and precipitation, October - September

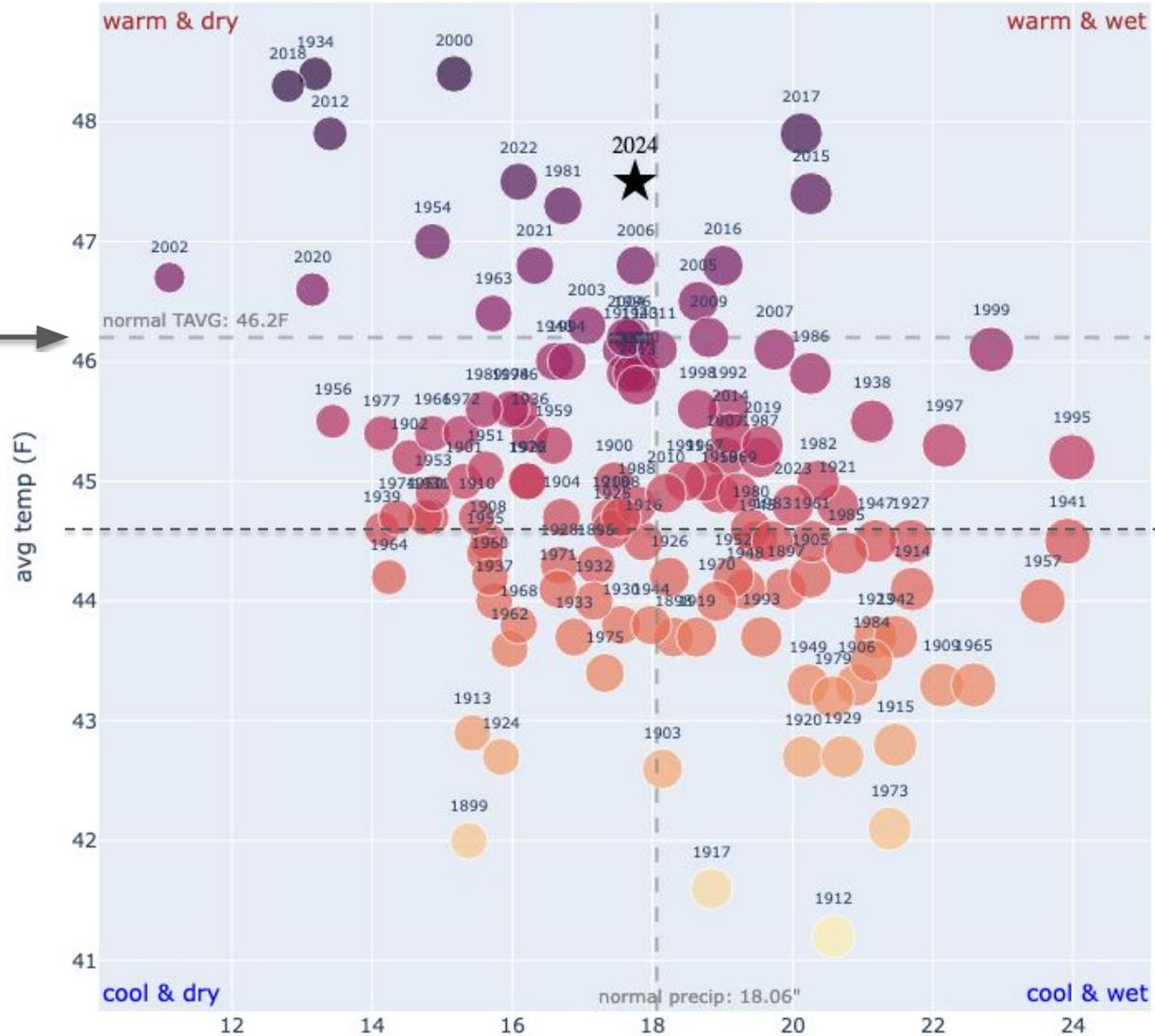
Warm & dry

Warm & wet

Water Year 2024

1991-2020 avg temp →

1901-2000 avg temp →



Statewide, WY2024 ended up in the warm and dry quadrant (though mostly warm, not especially dry)

Cool & dry

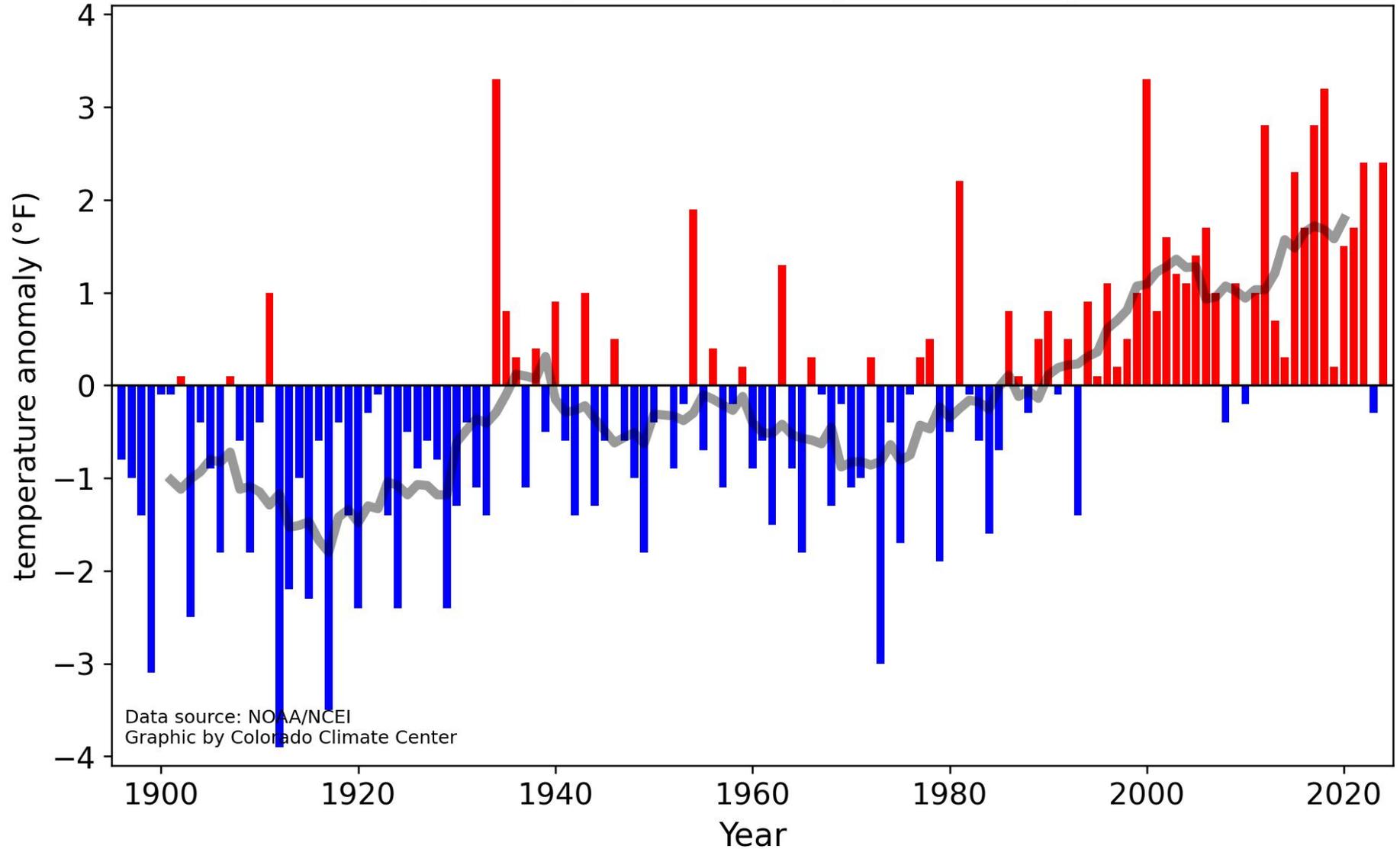
Cool & wet

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

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



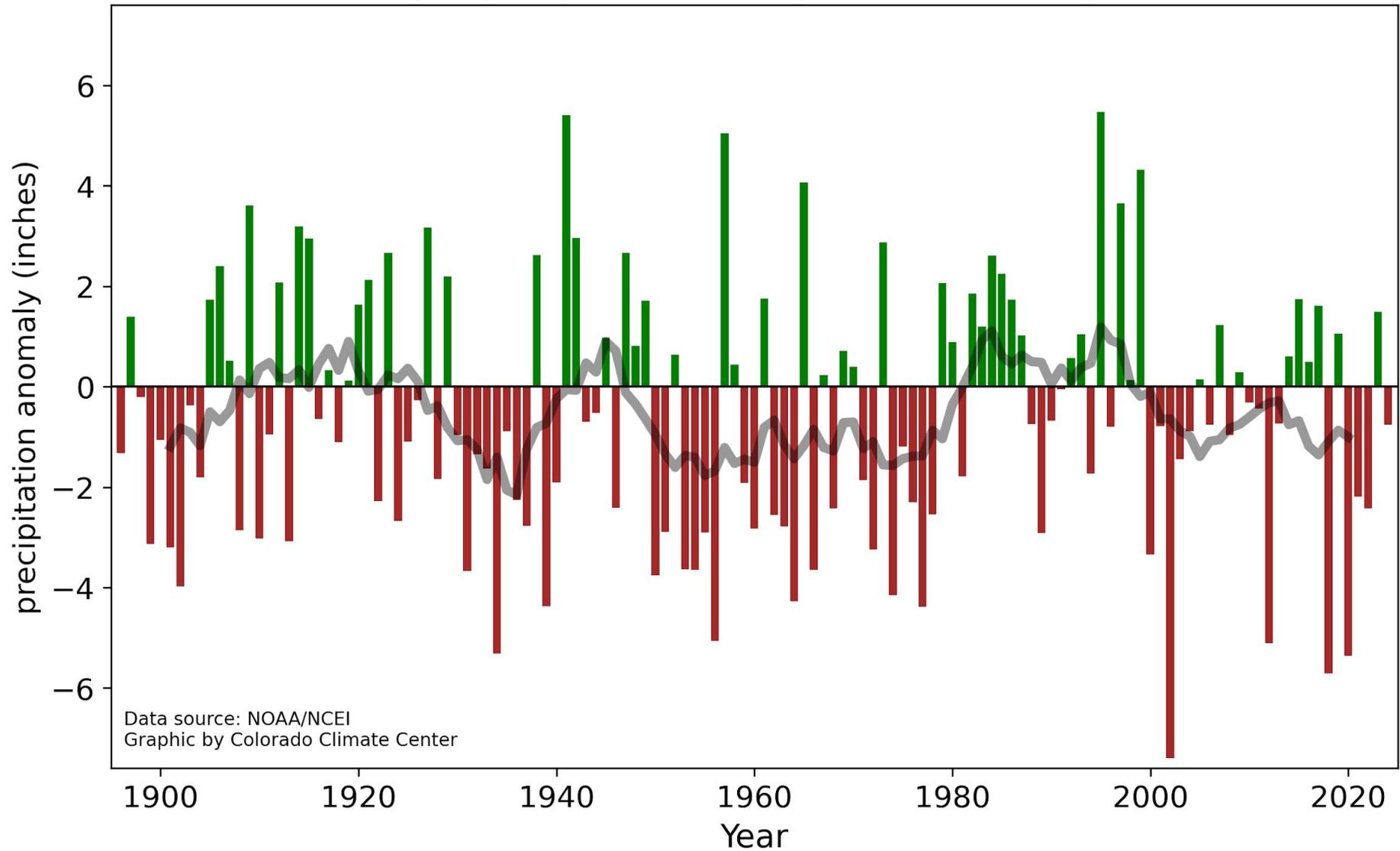
Colorado statewide water year temperature anomaly (°F), with respect to 1971-2000 average



7 of the 8 warmest water years have been since 2000; the other is 1934 which is tied with 2000 for the warmest water year



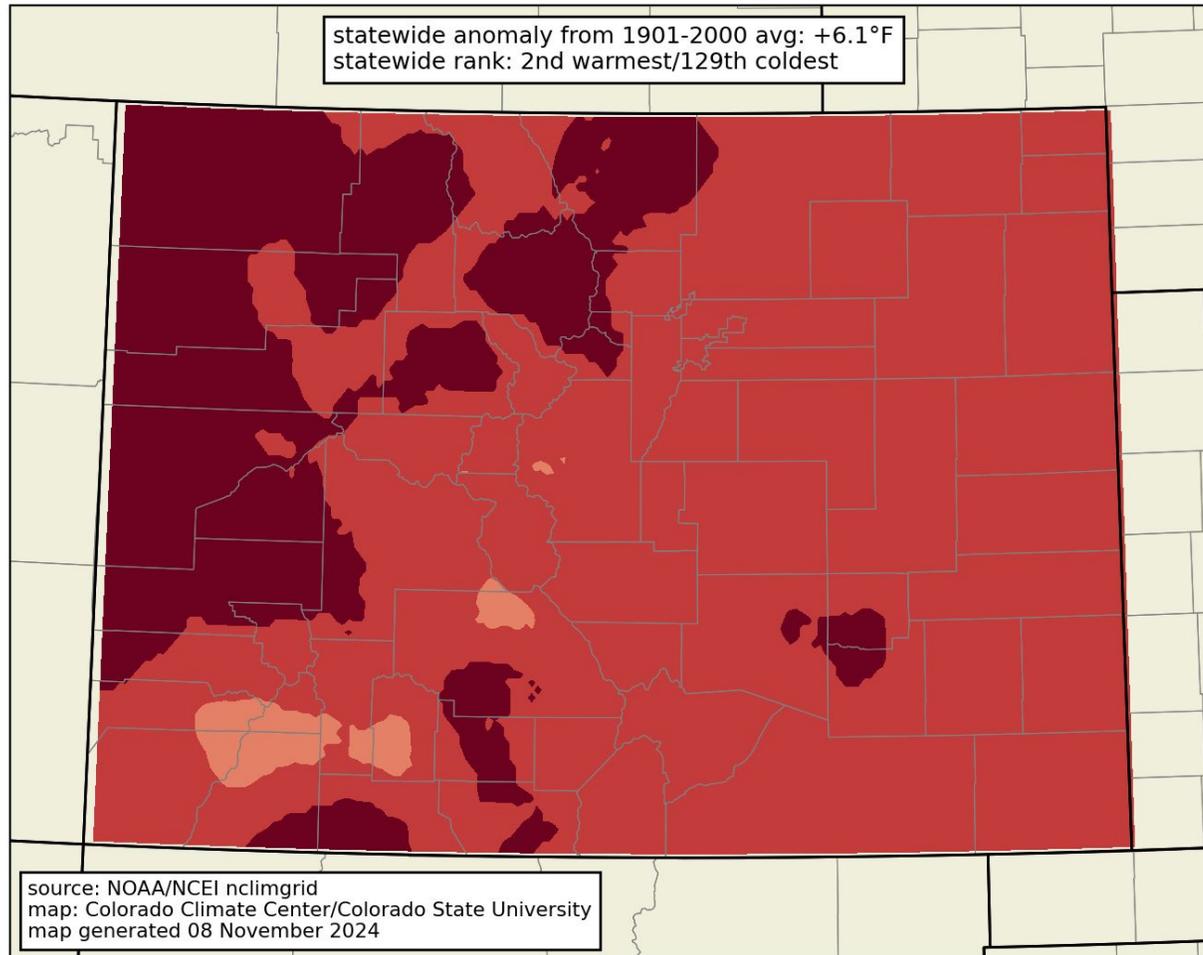
Colorado statewide water year precipitation anomaly (inches), with respect to 1971-2000 average



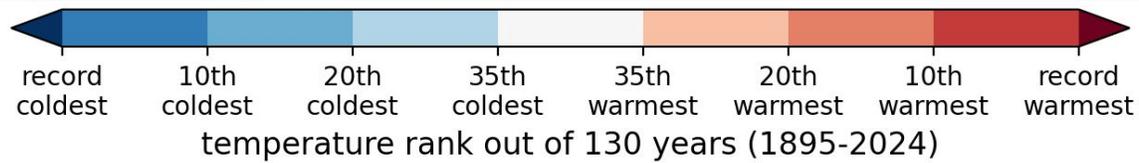
Data source: NOAA/NCEI
Graphic by Colorado Climate Center



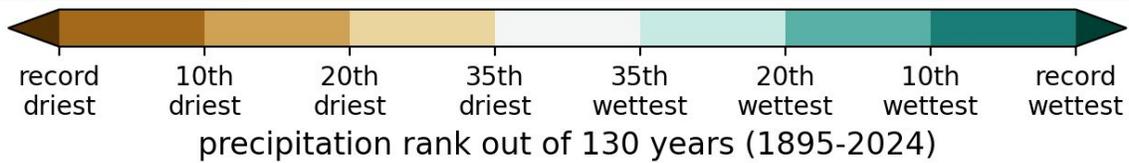
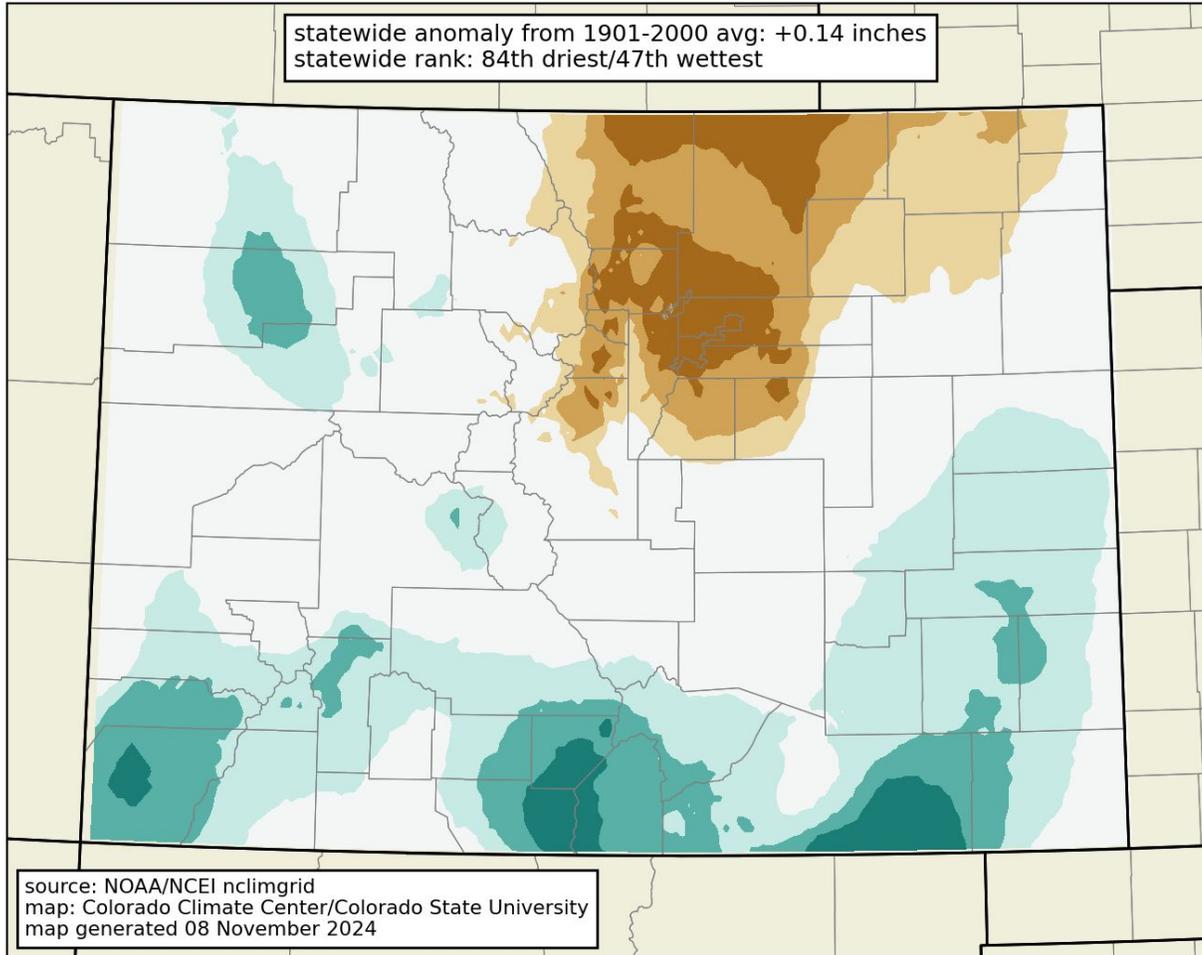
average temperature rank: October 2024



**2nd-warmest October on record,
behind only October 1963**



precipitation rank: October 2024



October was very dry in the north, wetter than average in the south



Colorado

October 2024 Average Temperature Rankings

View Period (Months): **All** 1 2 3 4 5 6 7 8 9 10 11 12 18 24 36 48 60

Download:

[↓ CSV](#)
[↓ JSON](#)
[↓ XML](#)

Record Coolest		Bottom 1/10		Bottom 1/3		Normal		Top 1/3		Top 1/10		Record Warmest	
Period	Value	1901-2000 Mean	Anomaly	Rank (1895-2024)	Coolest/Warmest Since		Record						
October 2024 1-Month	52.6°F (11.4°C)	46.5°F (8.1°C)	6.1°F	129th Coolest	Coolest since: 2023		1969						
				2nd Warmest	Warmest since: 1963		1963						
Sep-Oct 2024 2-Month	57.1°F (13.9°C)	51.9°F (11.1°C)	5.2°F	130th Coolest	Coolest since: 2023		1912						
				1st Warmest	Warmest to Date		2024						
Aug-Oct 2024 3-Month	60.7°F (15.9°C)	56.3°F (13.5°C)	4.4°F	130th Coolest	Coolest since: 2023		1912						
				1st Warmest	Warmest to Date		2024						
Jul-Oct 2024 4-Month	62.6°F (17.0°C)	59.0°F (15.0°C)	3.6°F	130th Coolest	Coolest since: 2023		1912						
				1st Warmest	Warmest to Date		2024						
Jun-Oct 2024 5-Month	63.4°F (17.4°C)	59.5°F (15.3°C)	3.9°F	130th Coolest	Coolest since: 2023		1912						
				1st Warmest	Warmest to Date		2024						
May-Oct 2024 6-Month	61.4°F (16.3°C)	58.2°F (14.6°C)	3.2°F	130th Coolest	Coolest since: 2023		1912						
				1st Warmest	Warmest to Date		2024						

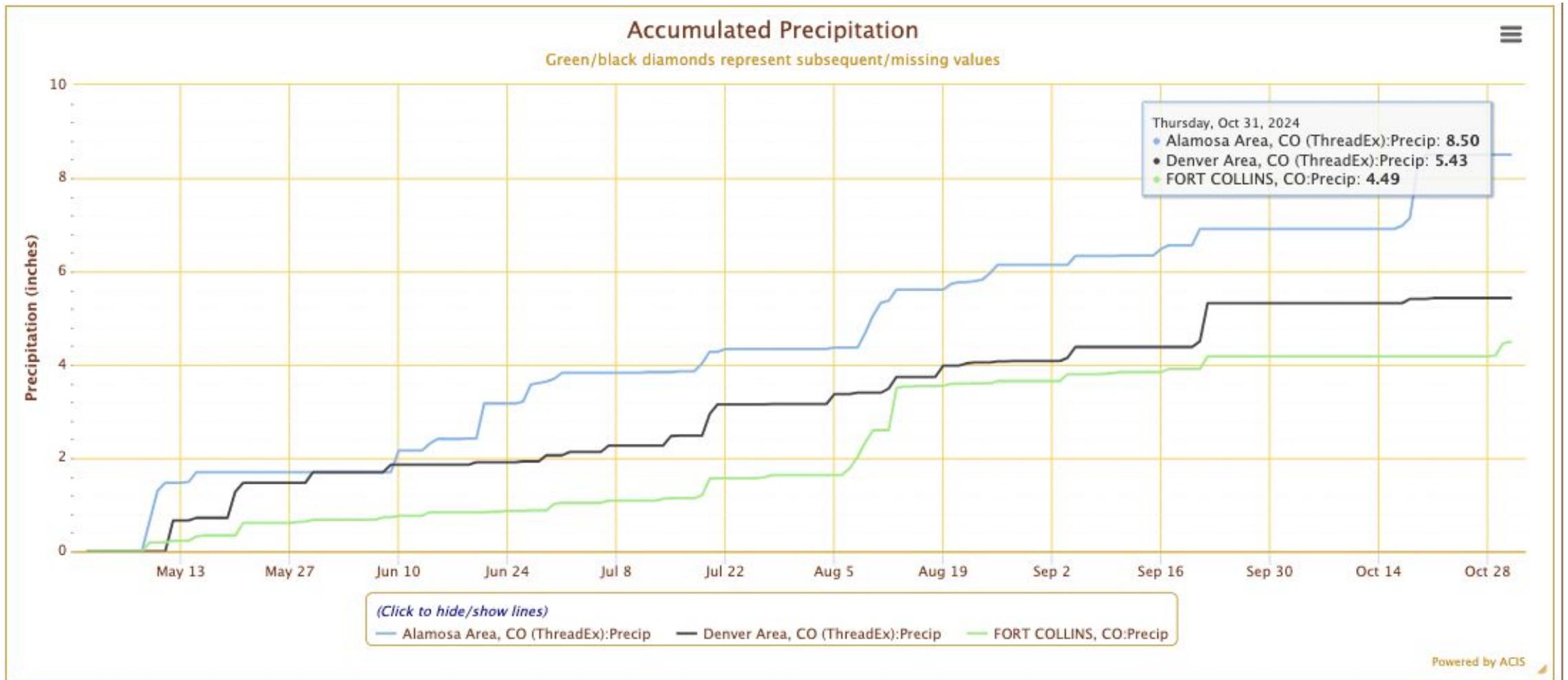
Although October itself wasn't record-warm statewide, it was the warmest over the 2, 3, 4, 5, and 6 months ending in October.

The calendar year through October has been the 6th-warmest on record.

Source:

<https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/rankings/>

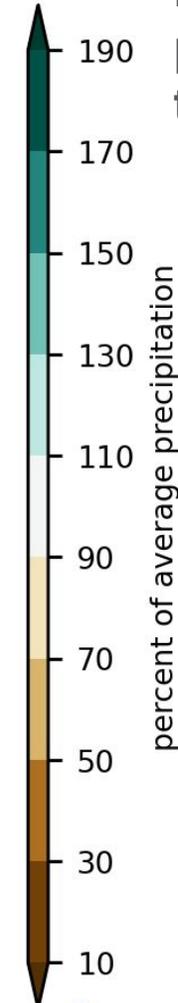
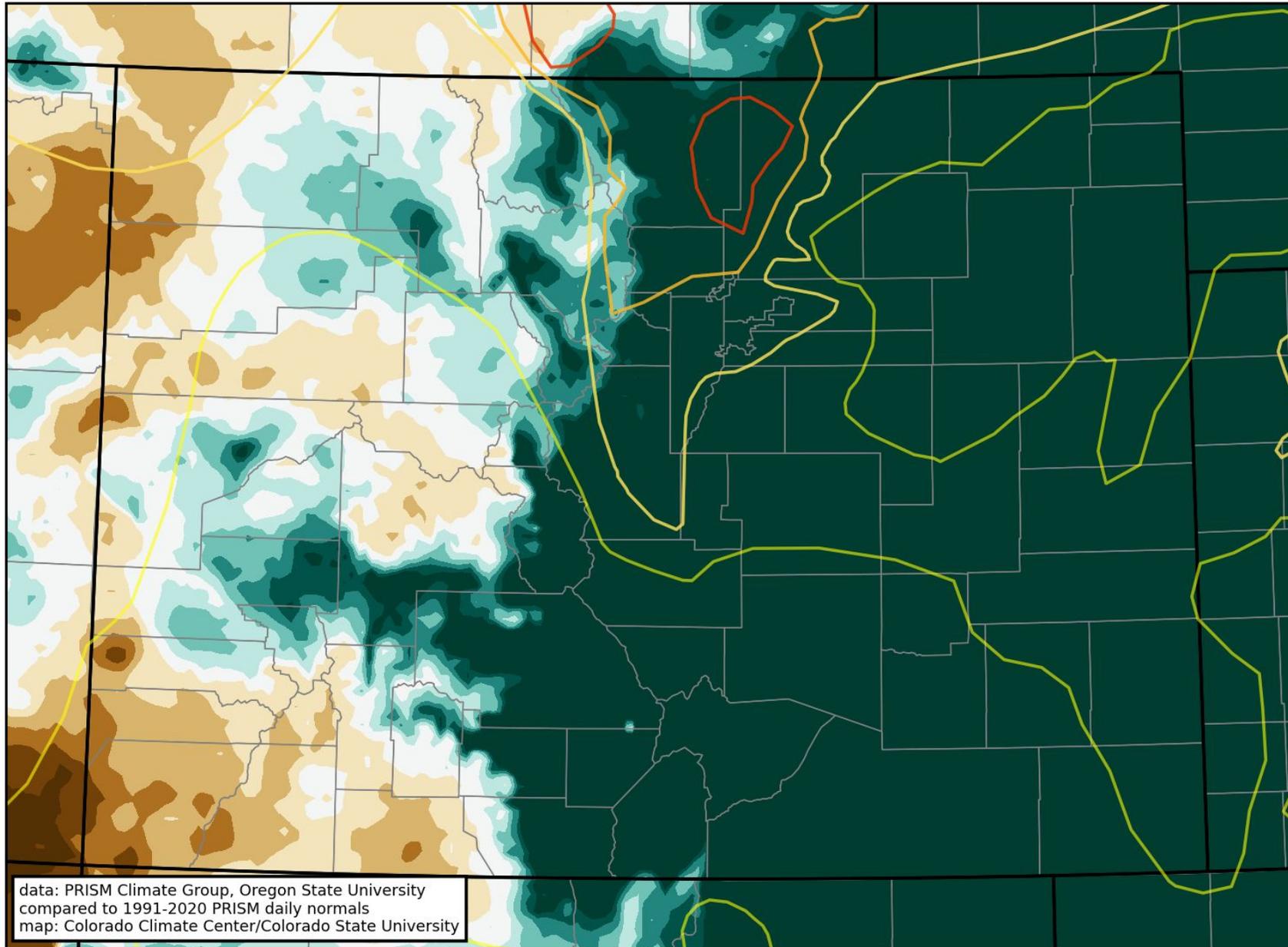




A remarkable precipitation stat: from May through October, Alamosa was a *lot* wetter than both Denver and Fort Collins. For this period, Alamosa typically gets about 5” and the Front Range locations average about 10”. But in 2024, Alamosa had 8.5” and Fort Collins only 4.49”. Only two other times has Alamosa been wetter than both Denver and Fort Collins from May-October, and never by such a large margin.

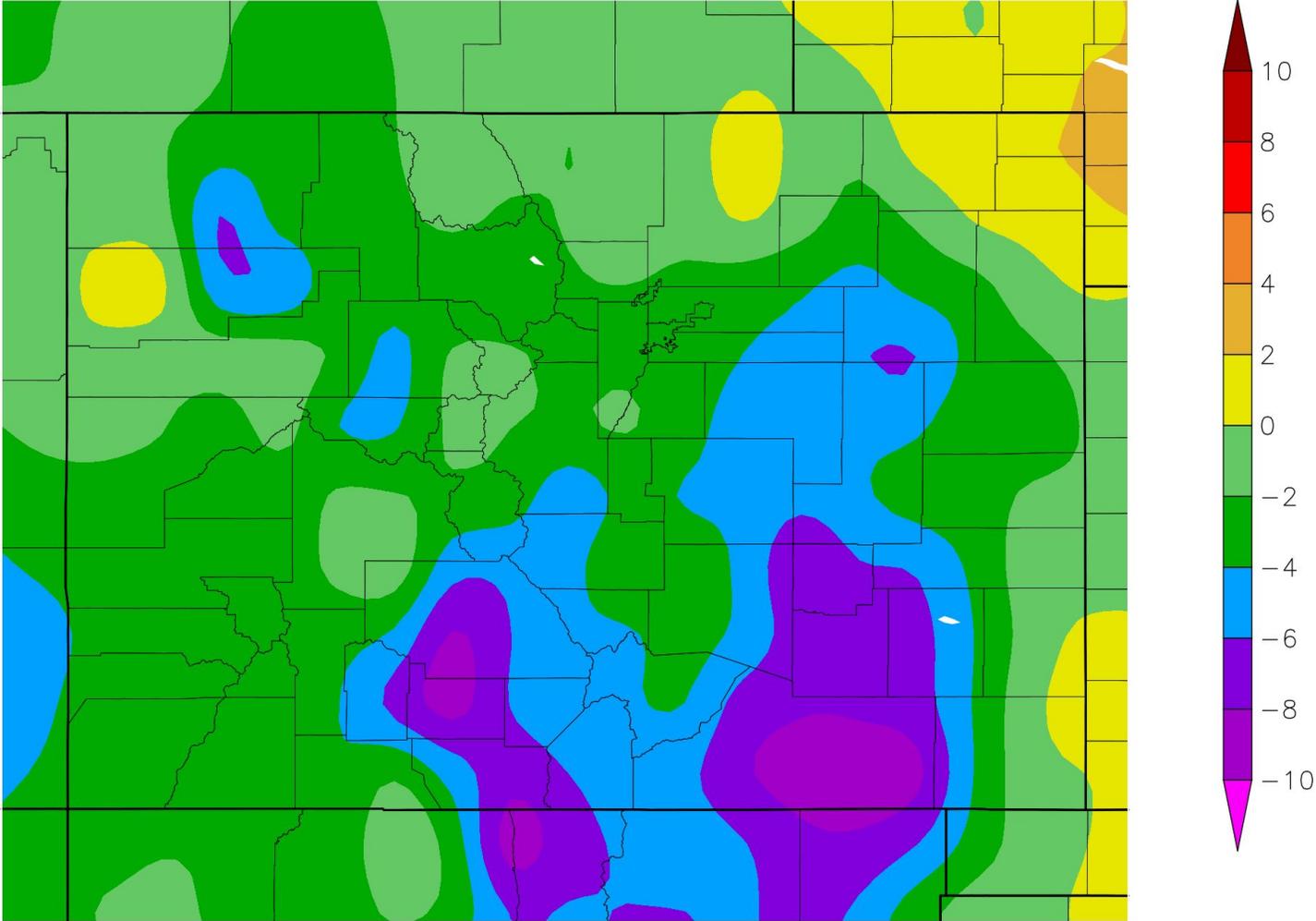


November percent of normal precipitation through the 17th



Departure from Normal Temperature (F) 11/1/2024 – 11/17/2024

**November
departure from
normal temperature
through the 17th**

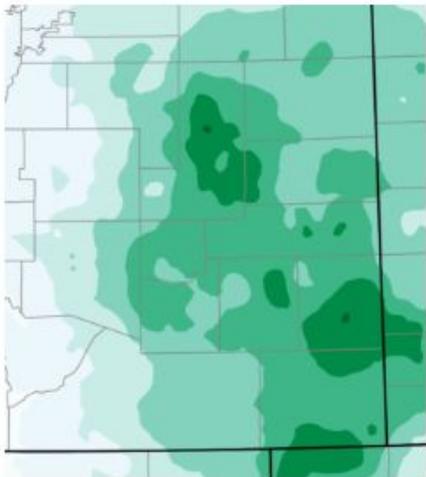


Generated 11/18/2024 at HPRCC using provisional data.

NOAA Regional Climate Centers



Colorado Climate Blog



climate context cocorahs drought snow water

A whopper of a snowstorm

Russ Schumacher November 18, 2024

Edit

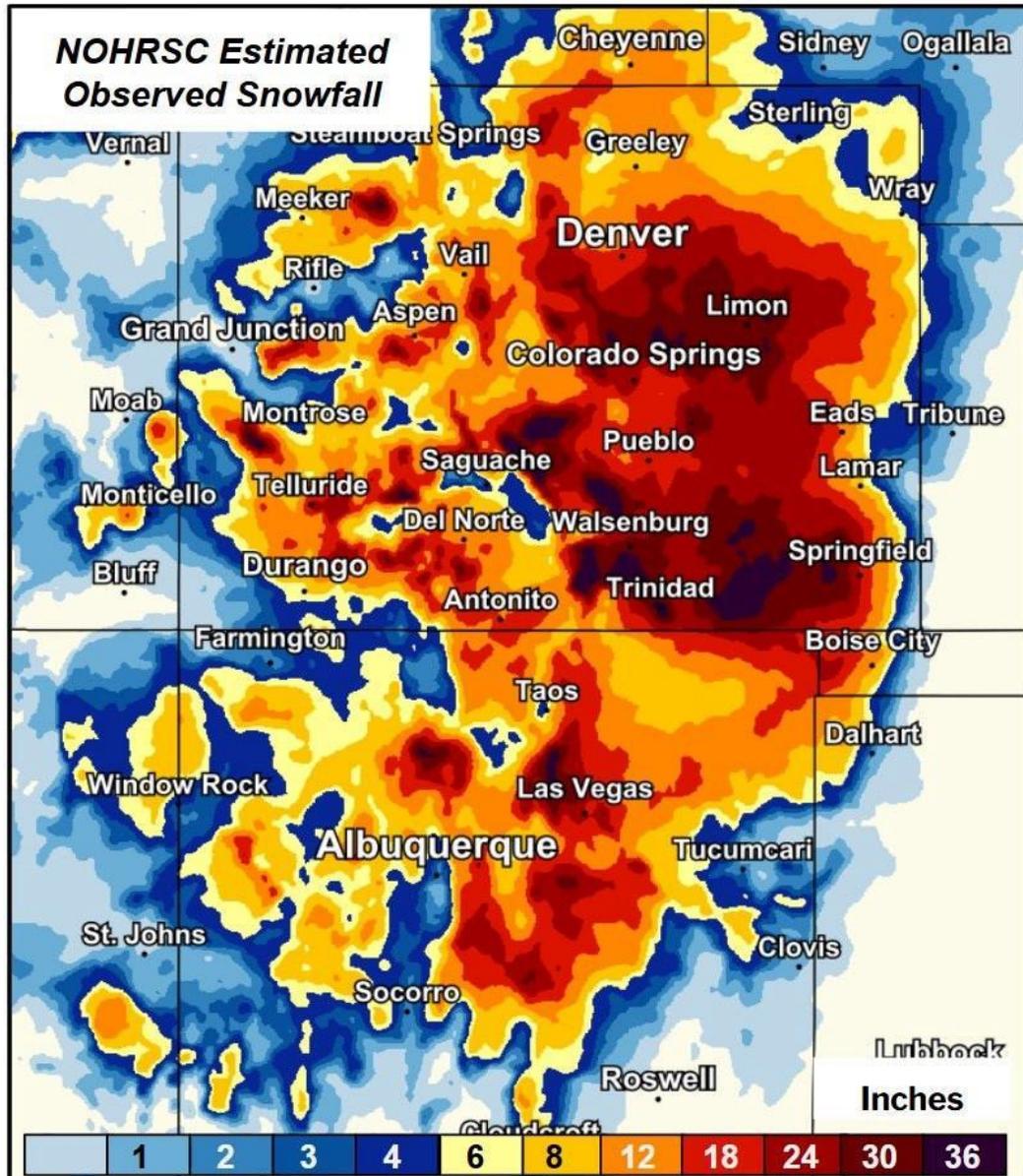
The six months from May through October were the warmest on record across Colorado, and parts of the state had been quite dry over that time period; you can read...

About this blog



<https://climate.colostate.edu/blog/>





Preliminary Selected Snowfall Reports



Valid 11/5- 11/9

Colorado

Fort Garland 12.9 miles ENE	53.3"
Trinidad 1.9 miles ENE	44.0"
Beulah	41.2"
Hugo	34.5"
Colorado Springs 1.1 miles NE	24.2"
Denver Intl Airport	19.2"

New Mexico

Angel Fire	40.0"
Las Vegas	38.2"
Rociada	36.0"
Los Alamos 6 miles W	29.0"
Clayton 2 miles ENE	22.0"
Santa Fe 2.4 miles N	16.0"

Oklahoma

Boise City	26.0"
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Texas

Texline	24.0"
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NATIONAL WEATHER SERVICE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
WEATHER PREDICTION CENTER

Issued 11/9/2024 11 AM EDT



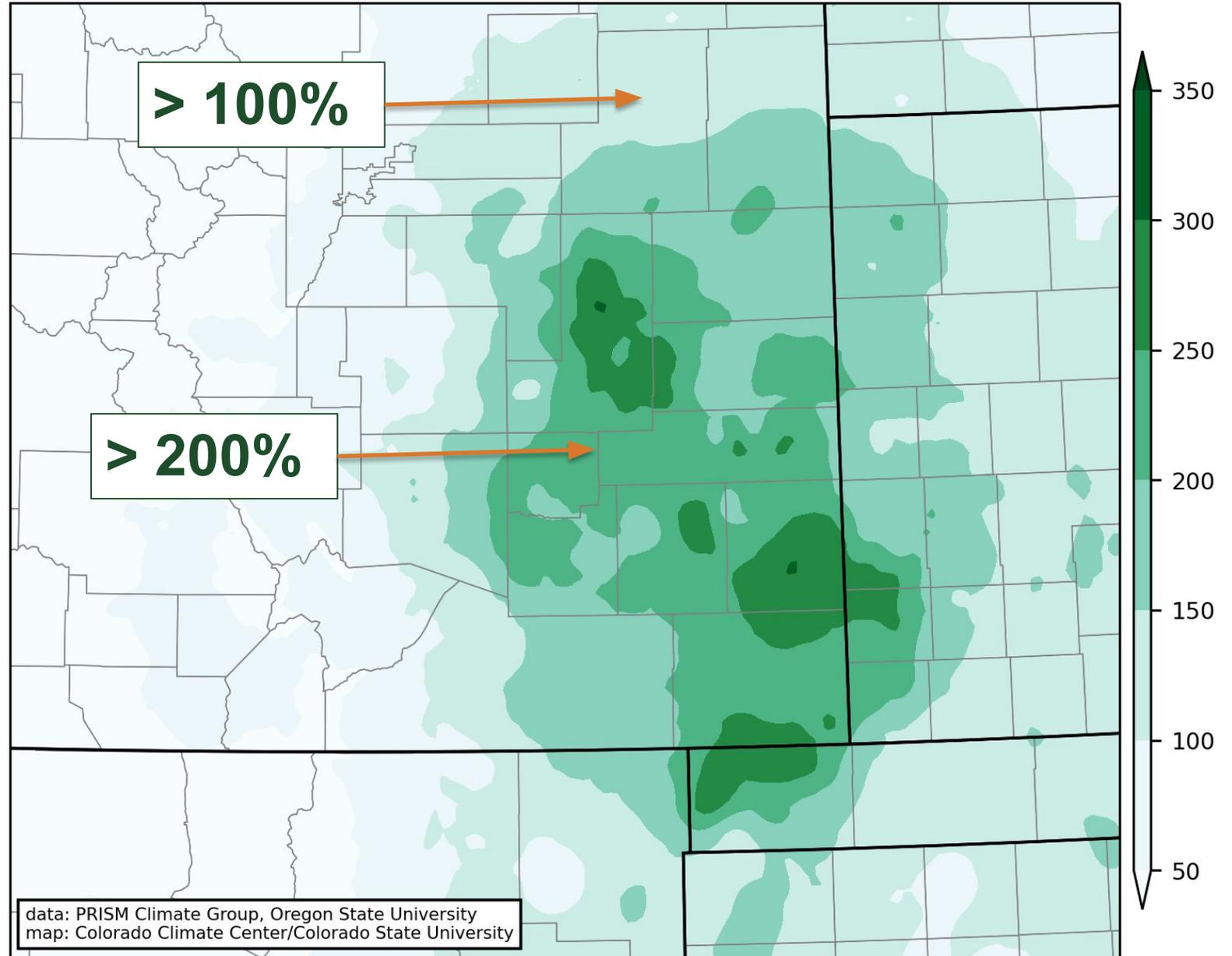
Top seven-day snowfall totals at stations in Colorado located east of -104.5° longitude. (Excludes stations in the mountains and foothills.)

	Name	Dates	7-day snowfall	Longitude	Latitude	Elevation
1	EADS	1946-11-03 through 1946-11-09+	50.0	-102.777	38.476	4212
2	TRINIDAD 1.9 ENE	2024-11-04 through 2024-11-10+	46.0	-104.473	37.175	6169
3	KARVAL	1946-11-02 through 1946-11-08+	46.0	-103.535	38.733	5111
4	TRINIDAD	1946-11-02 through 1946-11-08+	43.0	-104.487	37.179	6030
5	CAMPO 7 S	2006-12-28 through 2007-01-03+	42.0	-102.554	37.010	4105
6	HOLLY 0.1 ENE	2006-12-30 through 2007-01-05+	42.0	-102.122	38.056	3396
7	DEER TRAIL 6.1 SW	2024-11-06 through 2024-11-12+	41.0	-104.127	39.548	5505
8	KIOWA 3.9 S	2006-12-20 through 2006-12-26+	37.5	-104.452	39.288	6706
9	LAMAR	1946-11-02 through 1946-11-08+	37.1	-102.631	38.094	3627
10	ARAPAHOE 12S	2006-12-29 through 2007-01-04+	36.0	-102.161	38.684	4065
11	LIMON ATWATER RANCH	1946-11-03 through 1946-11-09	34.5	-103.769	38.950	5572
12	HUGO 0.3 SSW	2024-11-06 through 2024-11-12+	34.5	-103.470	39.130	5040
13	JOHN MARTIN DAM	1946-11-02 through 1946-11-08	34.2	-102.930	38.063	3811
14	SEDGWICK 5 S	1980-03-28 through 1980-04-03	34.0	-102.516	40.866	3996
15	SIMLA 5.3 SSE	2024-11-06 through 2024-11-12+	34.0	-104.039	39.072	6338



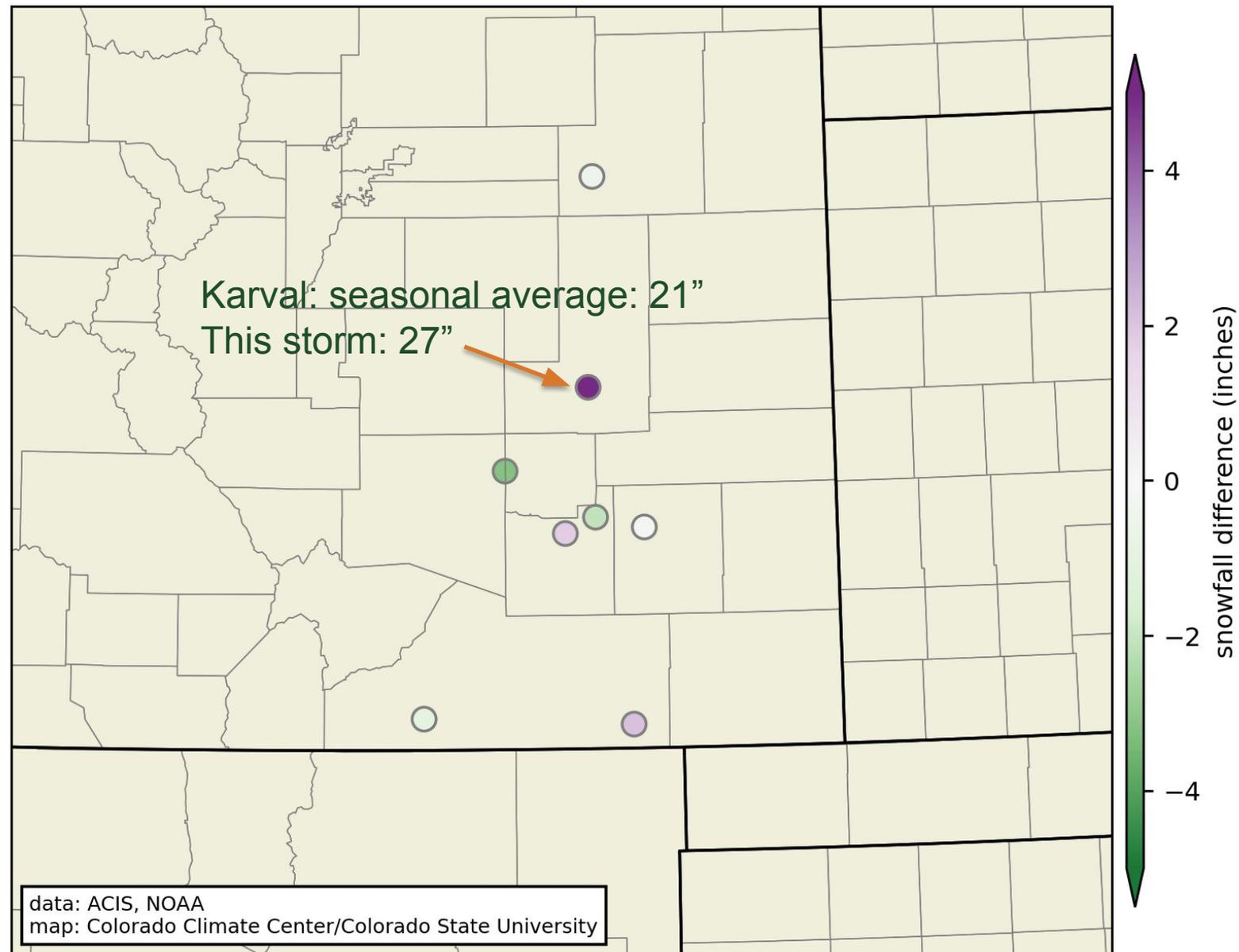
percent of Nov through Feb average precipitation that fell during 5-11 Nov 2024

Percent of the average November through February average precipitation that fell in this storm



7-day total from November 2024 storm minus average annual total snowfall

Comparison of
7-day snow total
from this storm to
the average
seasonal total



Drought conditions



Alexander Mountain Fire, July 29
Photo credit: Becky Bolinger

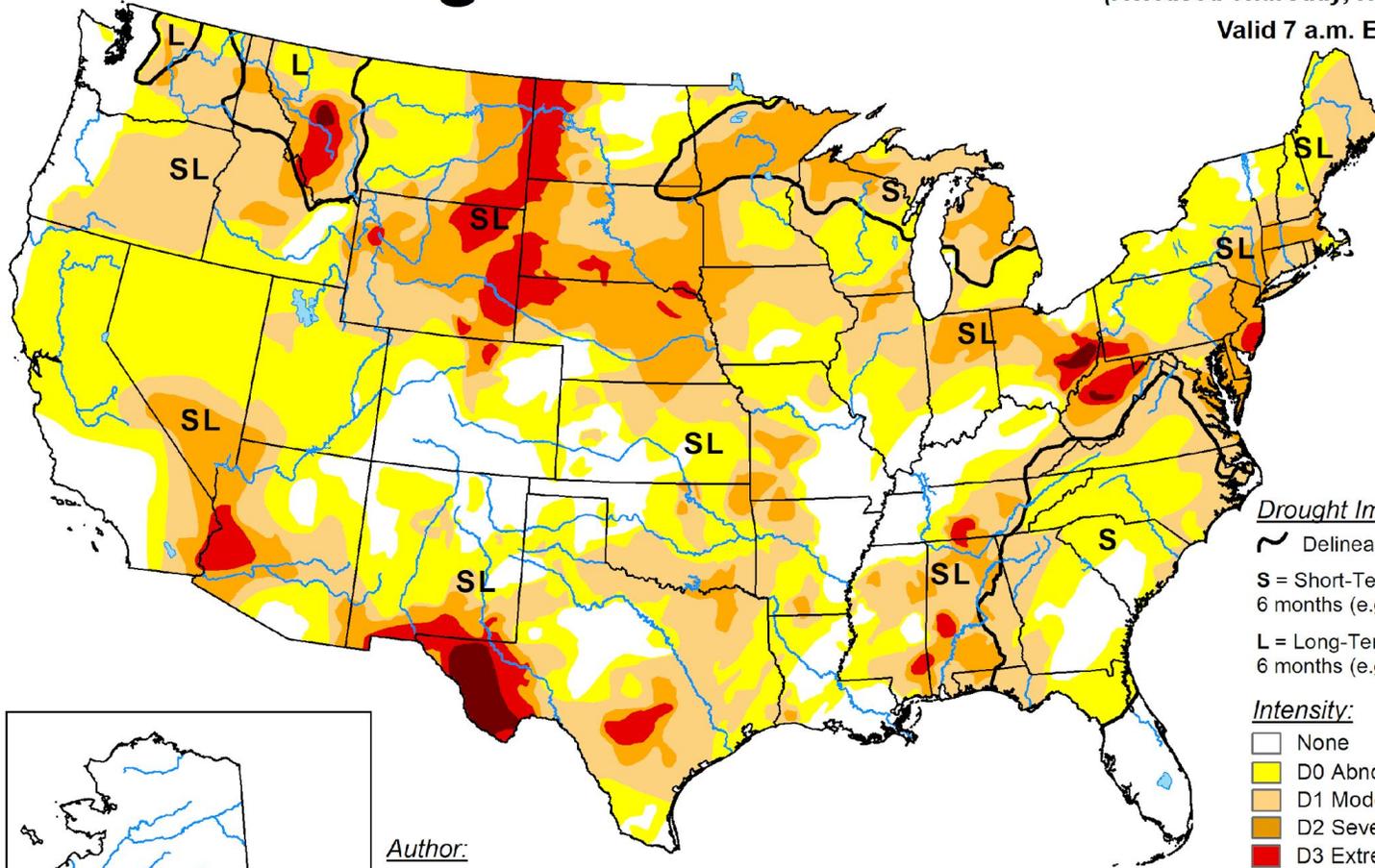


U.S. Drought Monitor

November 12, 2024
(Released Thursday, Nov. 14, 2024)

Valid 7 a.m. EST

83% of CONUS in D0 or worse, among the top few weeks in the USDM's history (since 2000)

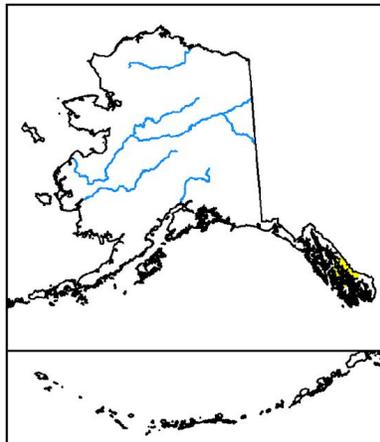


Drought Impact Types:

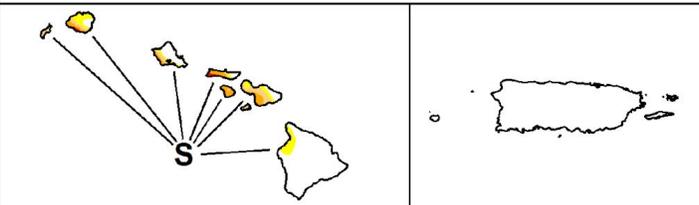
- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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



Author:
Richard Tinker
CPC/NOAA/NWS/NCEP



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>

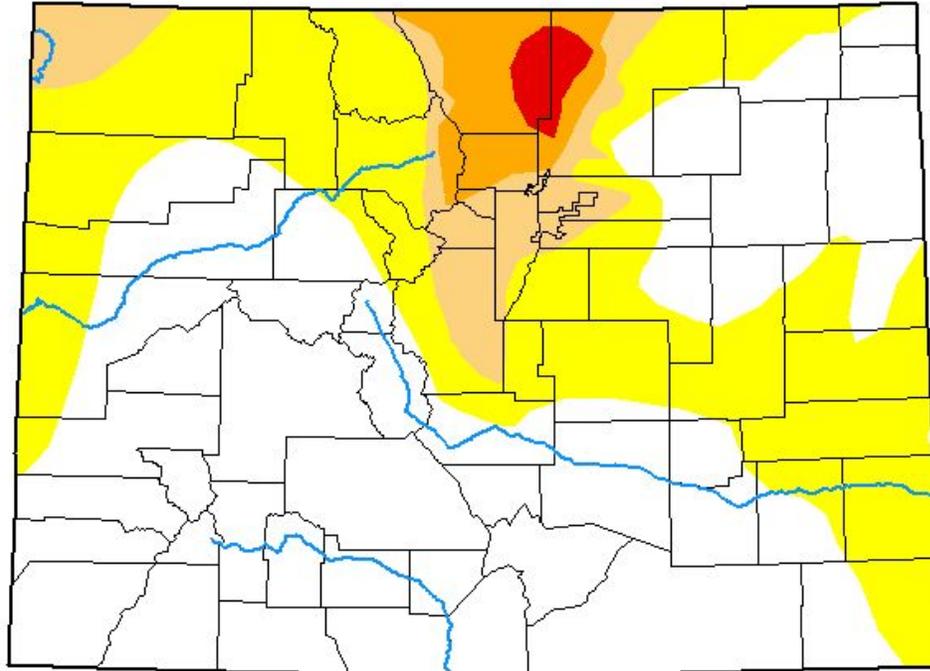


droughtmonitor.unl.edu



U.S. Drought Monitor Colorado

November 12, 2024
(Released Thursday, Nov. 14, 2024)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	57.86	42.14	10.39	4.26	0.94	0.00
Last Week 11-05-2024	42.17	57.83	33.67	8.74	3.26	0.00
3 Months Ago 08-13-2024	37.27	62.73	10.11	0.72	0.14	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 10-01-2024	48.27	51.73	24.40	4.62	0.00	0.00
One Year Ago 11-14-2023	47.66	52.34	26.90	6.87	1.31	0.00

Intensity:

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

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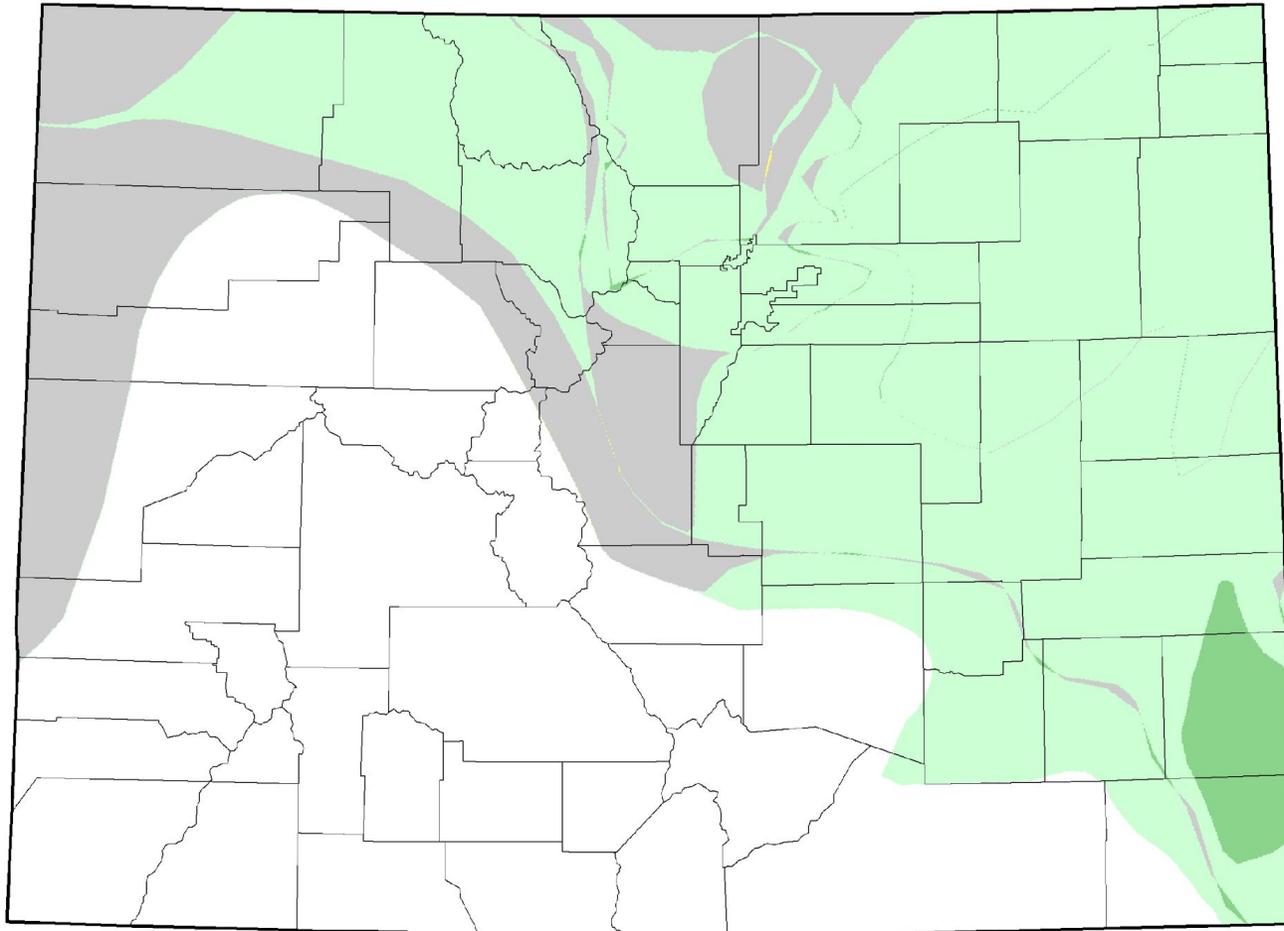


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U.S. Drought Monitor Class Change - Colorado 1 Week

Change last week (after the snowstorm)



- 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

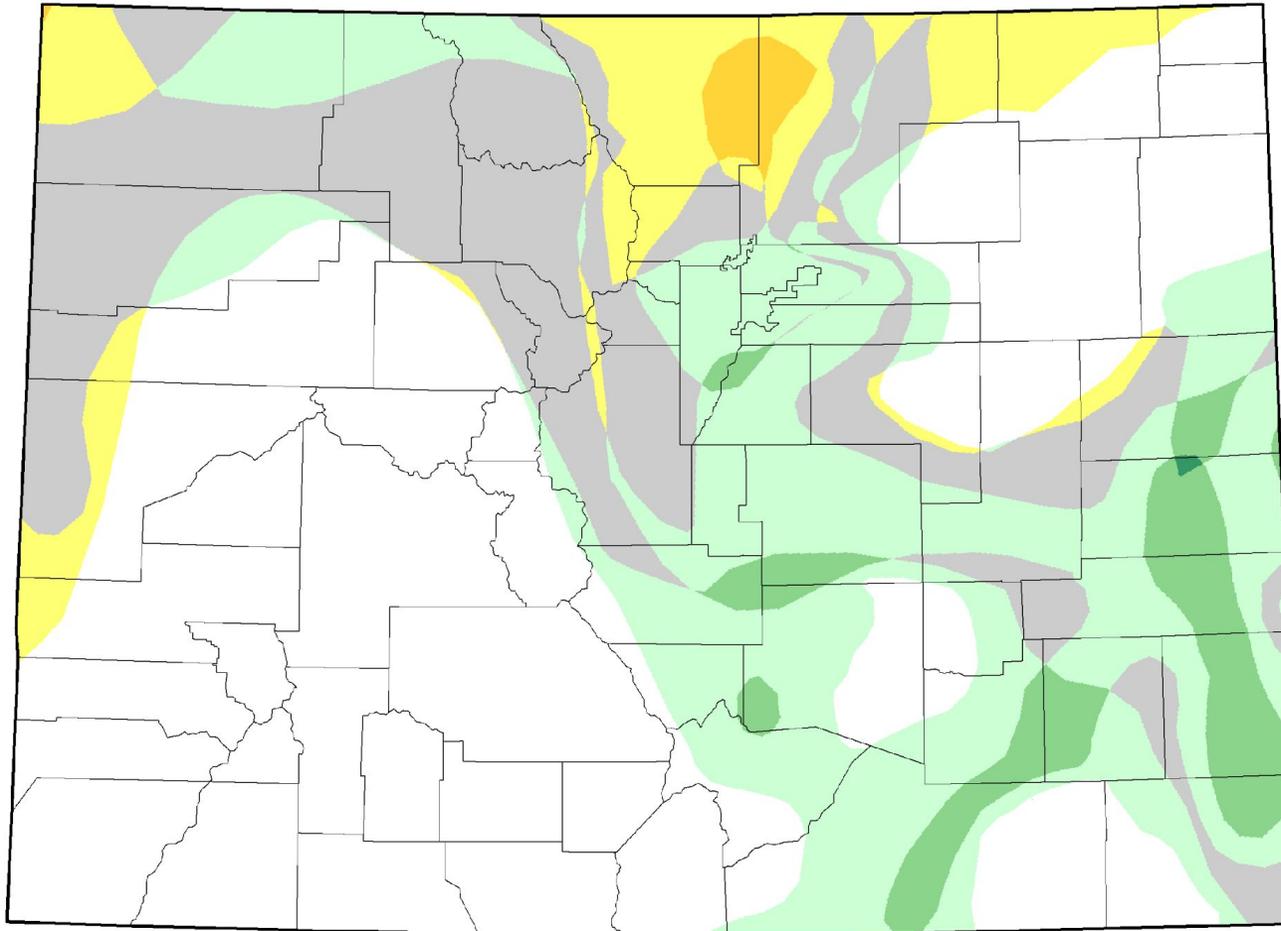
November 12, 2024
compared to
November 5, 2024

droughtmonitor.unl.edu



Change since October 1

U.S. Drought Monitor Class Change - Colorado 6 Week



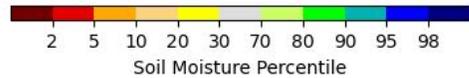
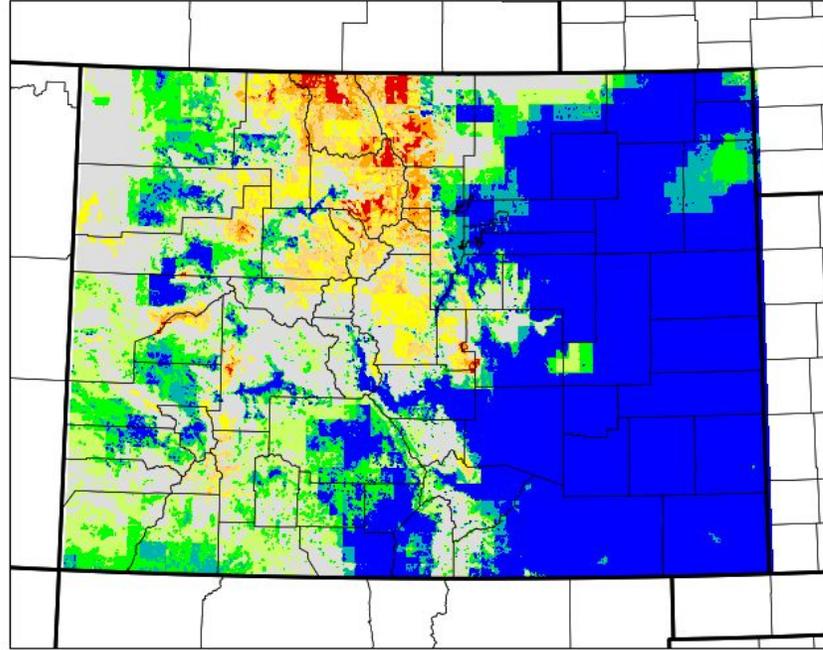
- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

November 12, 2024
compared to
October 1, 2024

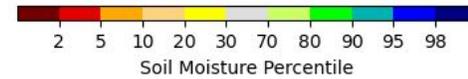
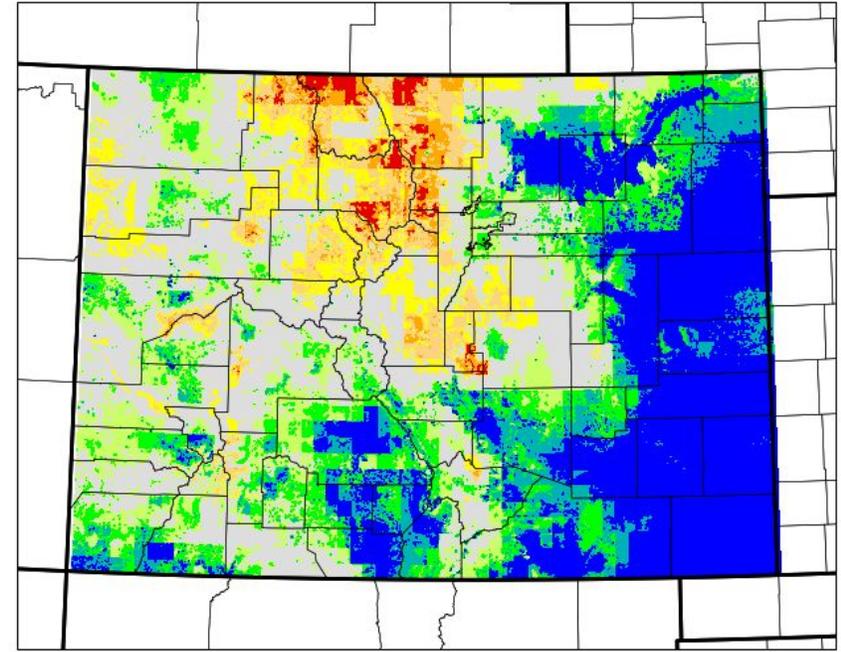
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Soil Moisture Percentiles (0-10cm) 11/14/2024



Soil Moisture Percentiles (0-1m) 11/14/2024

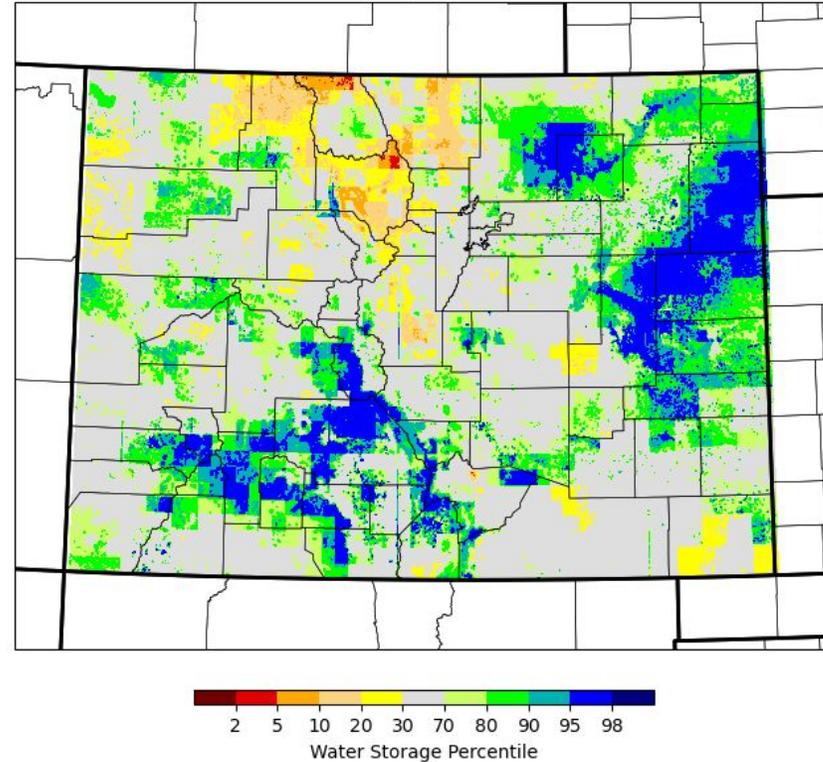


Soil moisture recovered in a major way in places that received a lot of precipitation from this month's storm. Above-average soil moisture across most of eastern Colorado now.

Soil moisture remains low in northern Colorado.



Terrestrial Water Storage Percentiles 11/14/2024



Terrestrial water storage: ground water + soil moisture + snowpack

Is this helpful? We are still evaluating it for a NASA project, any feedback welcome!



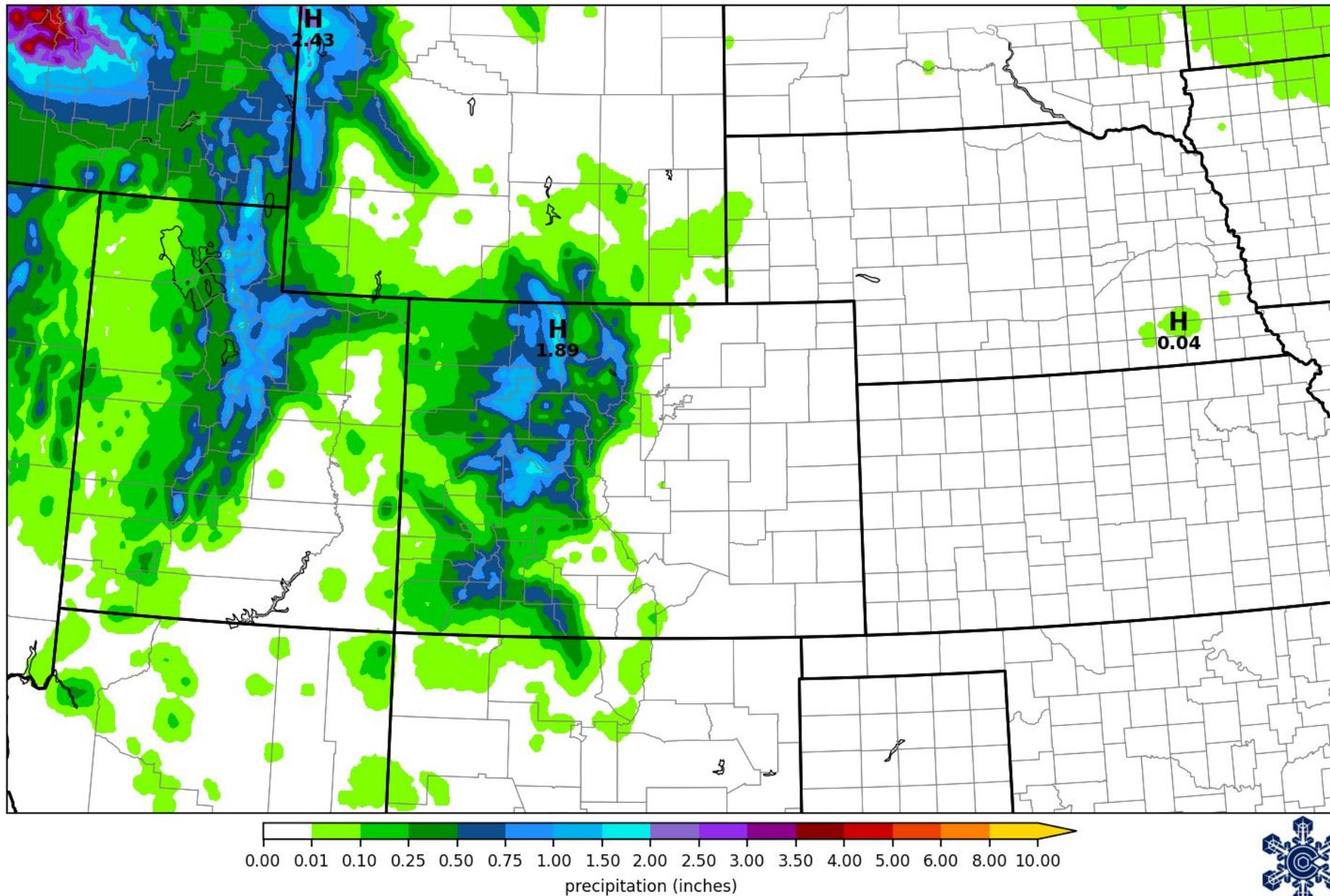


Outlook

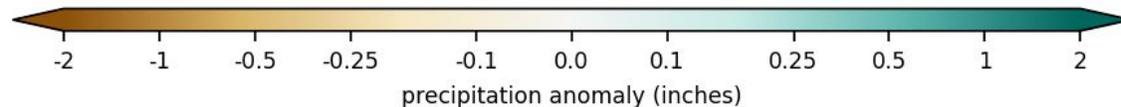
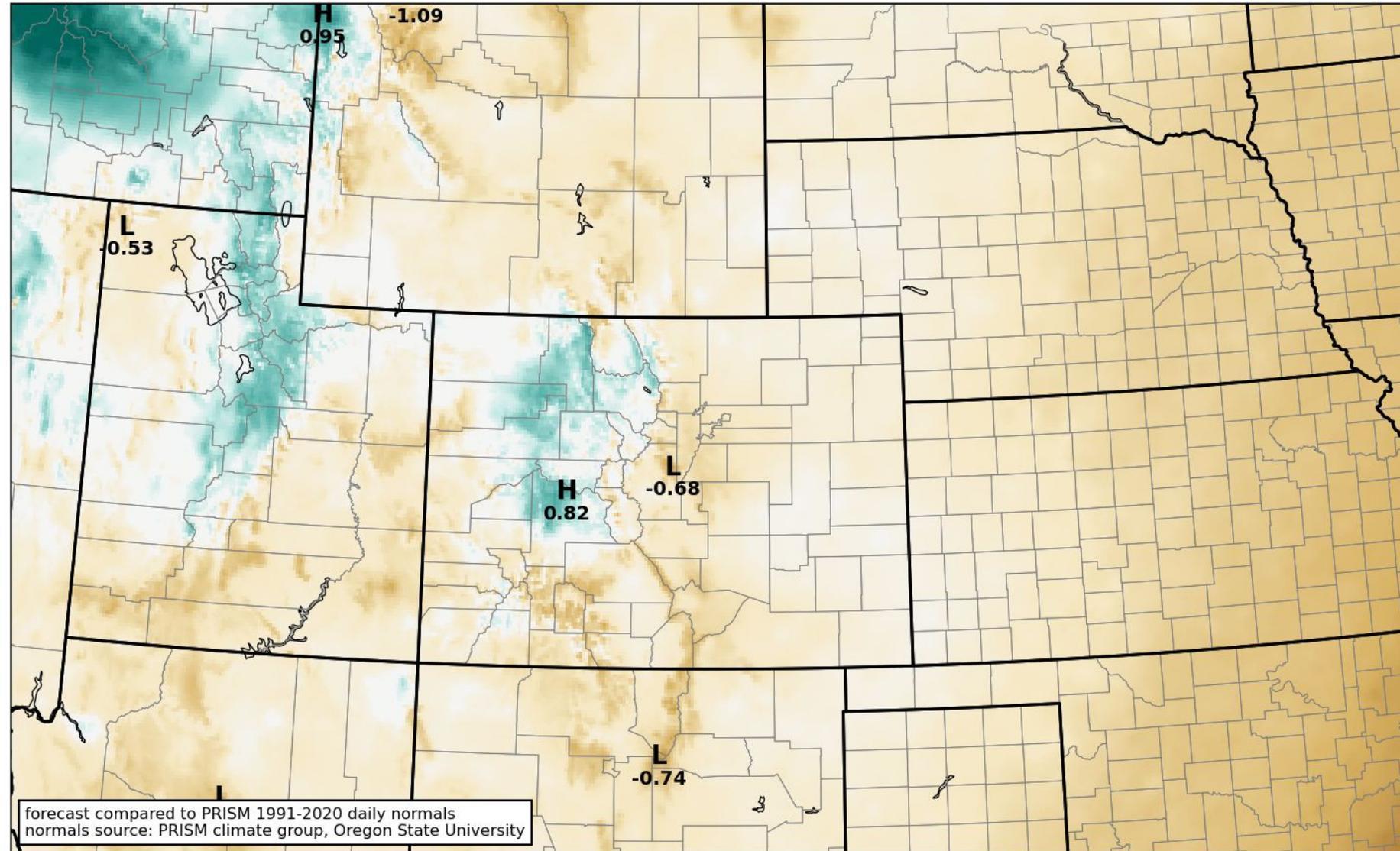


NOAA 7-day precipitation forecast

A bit of mountain
snow, dry elsewhere

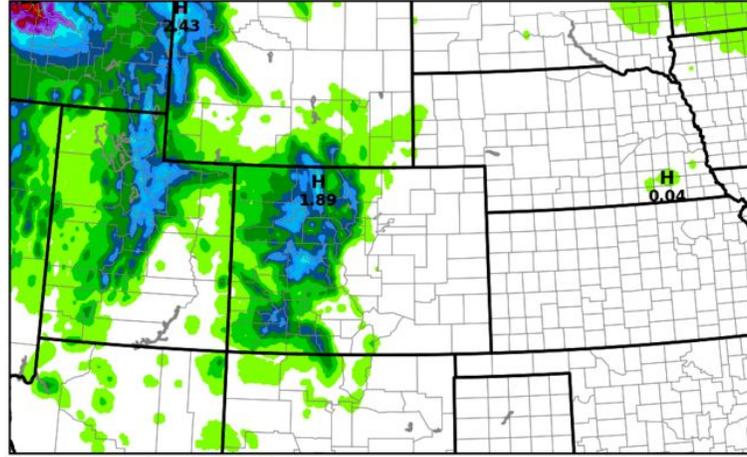


NOAA 7-day precipitation forecast (difference from average)

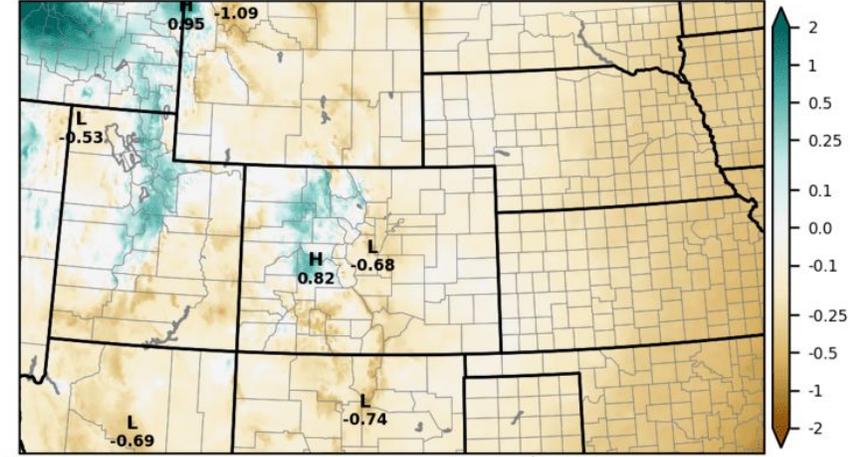


NOAA 7-day precipitation forecast

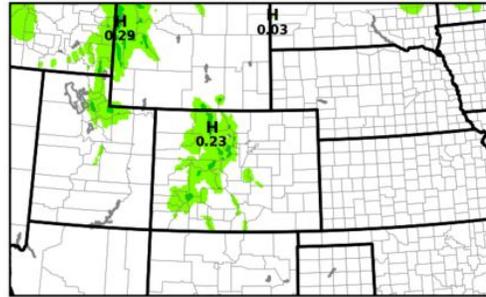
7-day total precipitation forecast



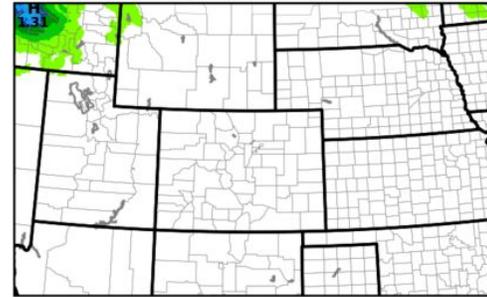
7-day precipitation forecast departure from average (inches)



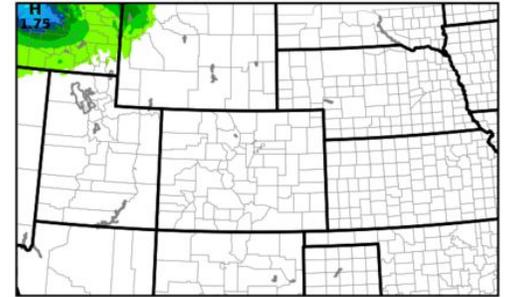
Day 1 Tue 19 Nov



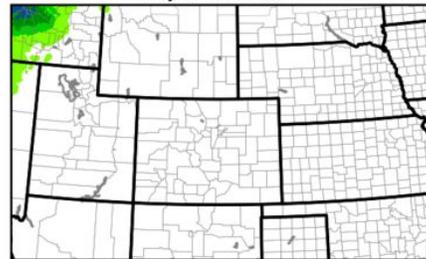
Day 2 Wed 20 Nov



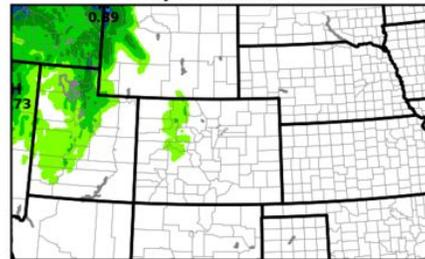
Day 3 Thu 21 Nov



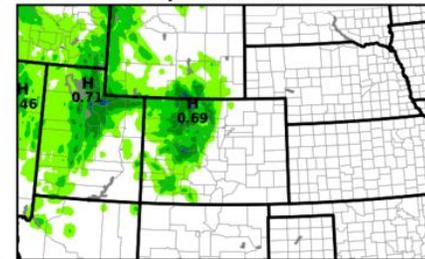
Day 4 Fri 22 Nov



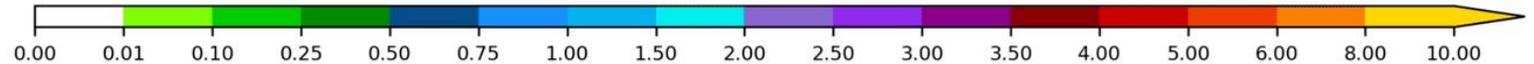
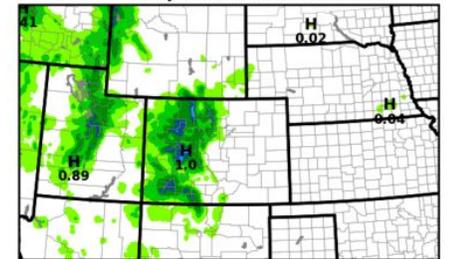
Day 5 Sat 23 Nov



Day 6 Sun 24 Nov



Day 7 Mon 25 Nov



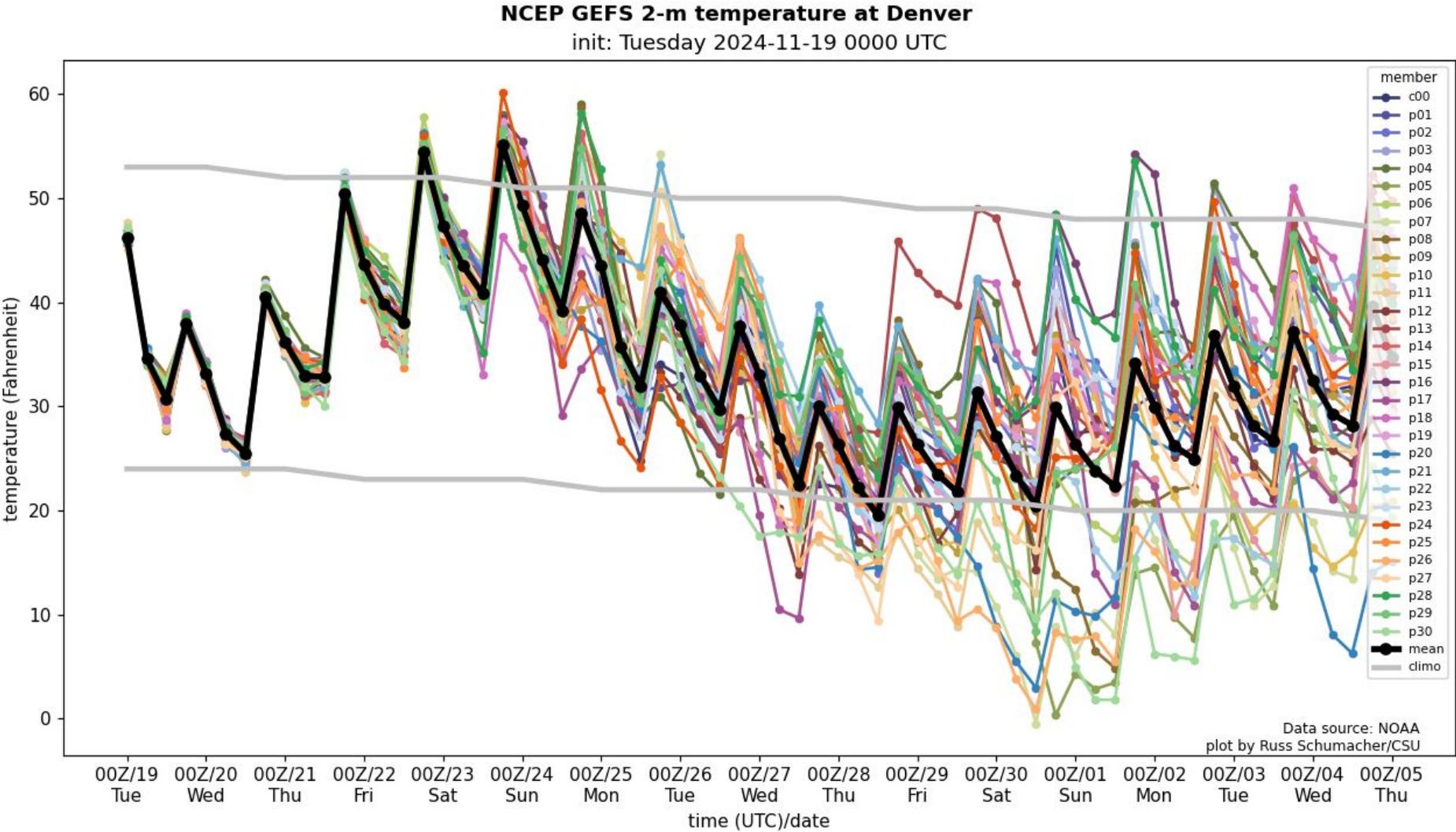
forecast compared to PRISM 1991-2020 daily normals
normals source: PRISM climate group, Oregon State University



Quick-look maps on our drought page:

<https://climate.colostate.edu/drought/#outlook>

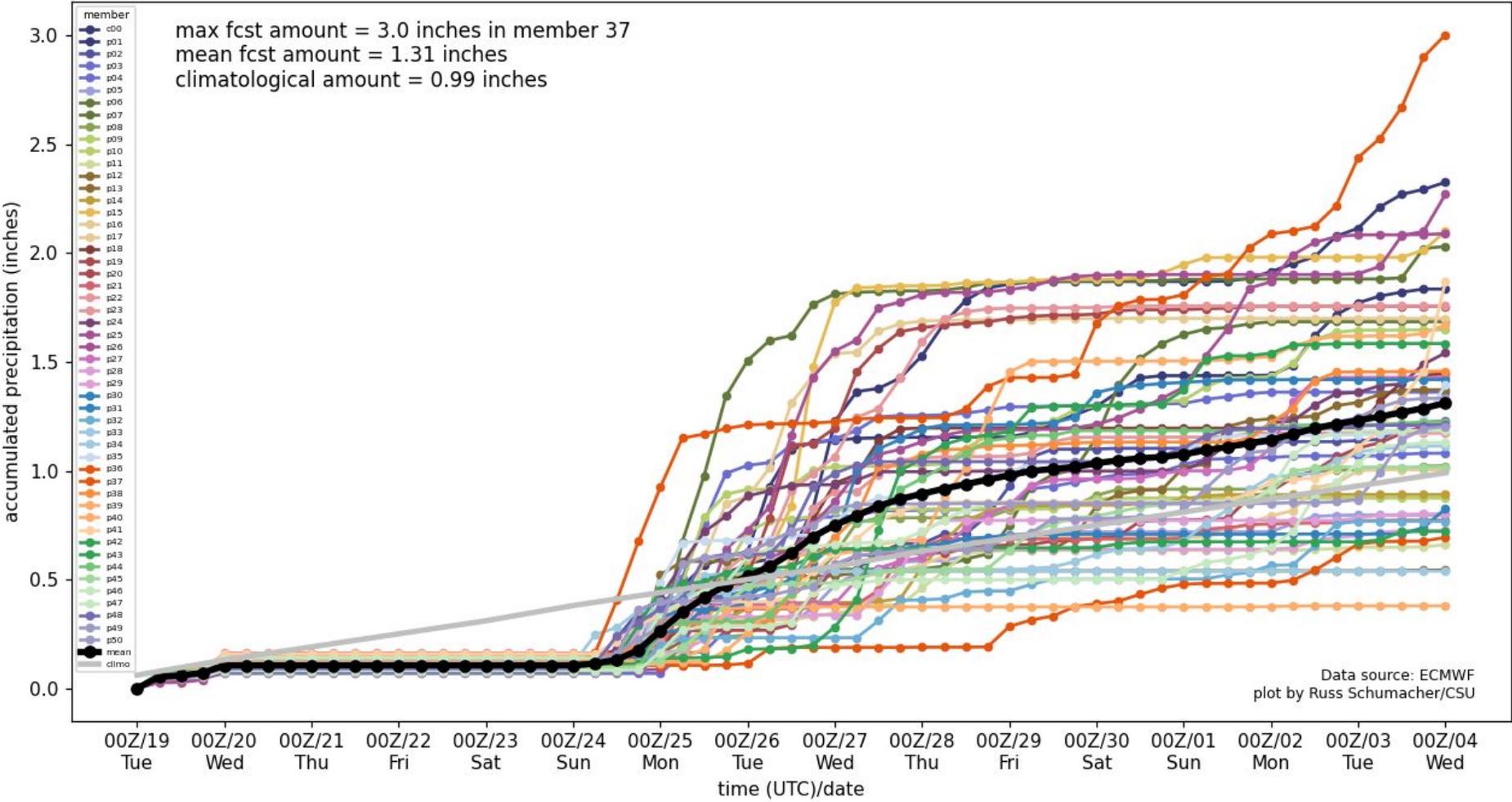
Cool midweek, warmer for the weekend, fairly cold next week



Mountain snow returns early next week, maybe also some lower-elevation snow?

ECMWF ensemble accumulated precipitation at Steamboat Springs

init: Tuesday 2024-11-19 0000 UTC



Thanksgiving week tilted toward cooler and wetter than average, especially in northern Colorado



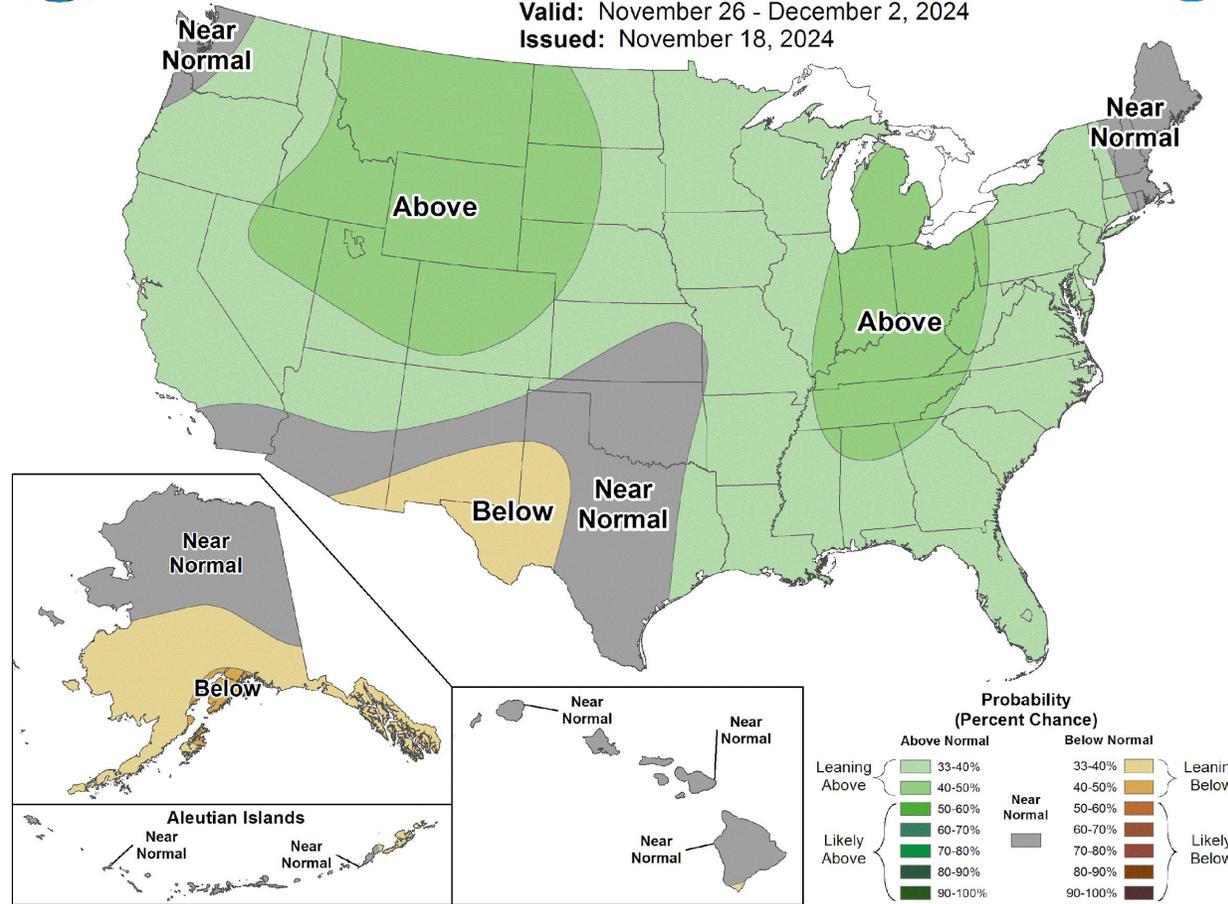
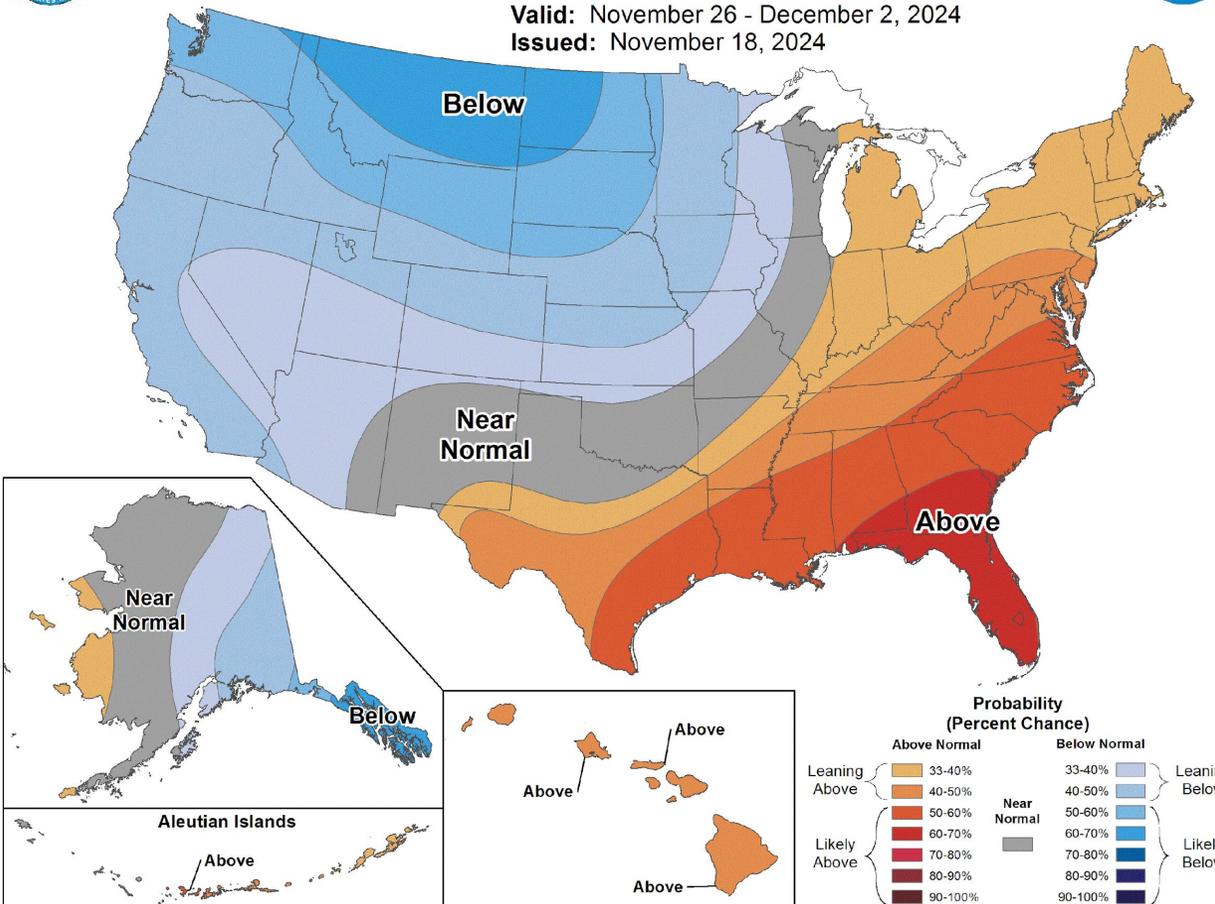
8-14 Day Temperature Outlook

Valid: November 26 - December 2, 2024
 Issued: November 18, 2024



8-14 Day Precipitation Outlook

Valid: November 26 - December 2, 2024
 Issued: November 18, 2024



La Niña emerging, but weaker than once expected

Official NOAA CPC ENSO Probabilities (issued November 2024)

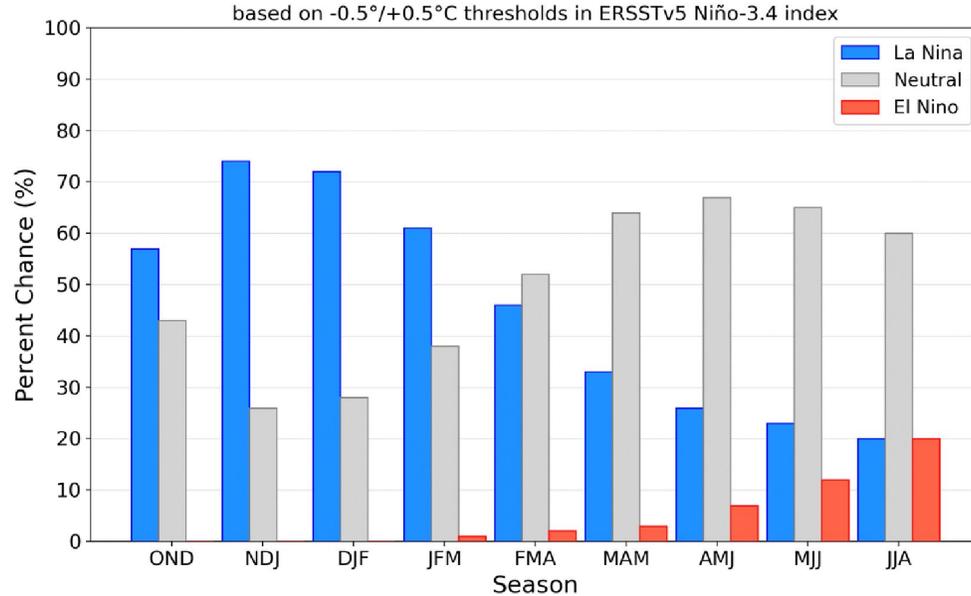


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 14 November 2024.

Model Predictions of ENSO from Oct 2024

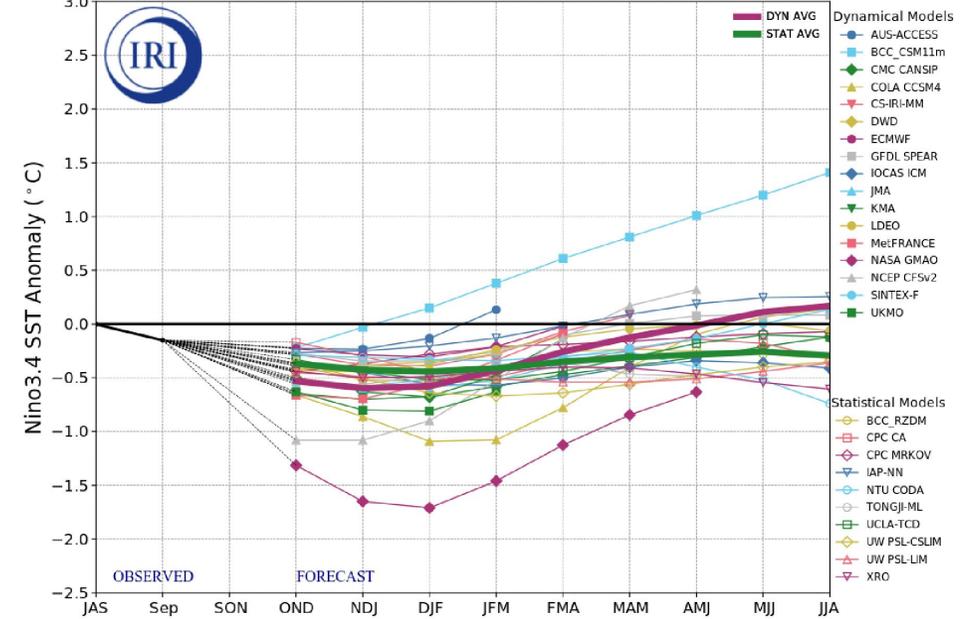
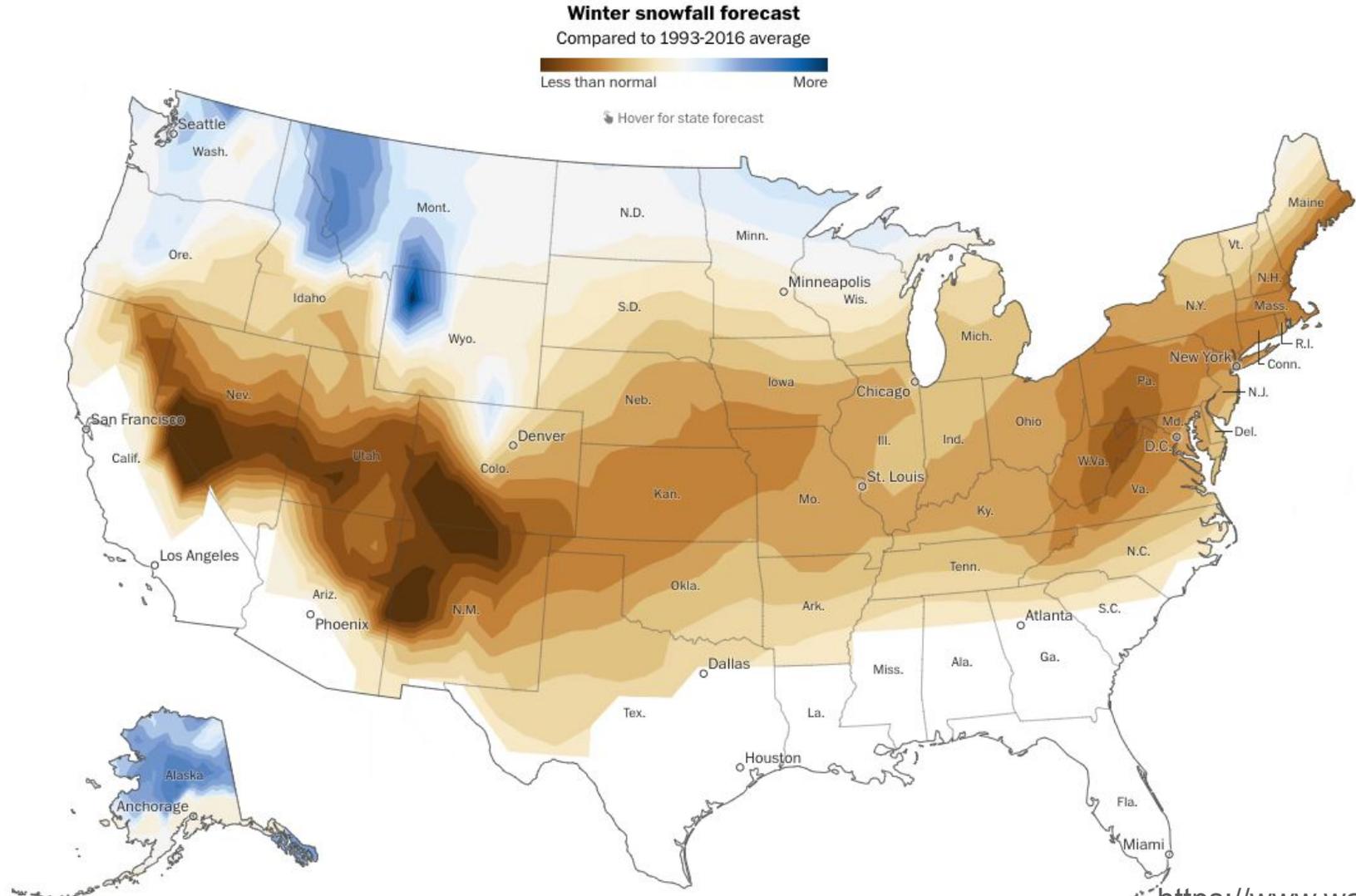


Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N - 5°S , 120°W - 170°W). Figure updated 18 October 2024 by the International Research Institute (IRI) for Climate and Society.

“La Niña is most likely to emerge in October-December 2024 (57% chance) and is expected to persist through January-March 2025...a weak and a short duration La Niña...less likely to result in conventional winter impacts, though predictable signals could still influence the forecast guidance.”

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml





Note: Winter includes December, January and February. Hawaii and unshaded areas omitted because they experience less than three inches of annual snowfall. State averages do not include areas with insufficient snowfall data.

<https://www.washingtonpost.com/climate-environment/interactive/2024/snow-forecast-trends-climate-change/>

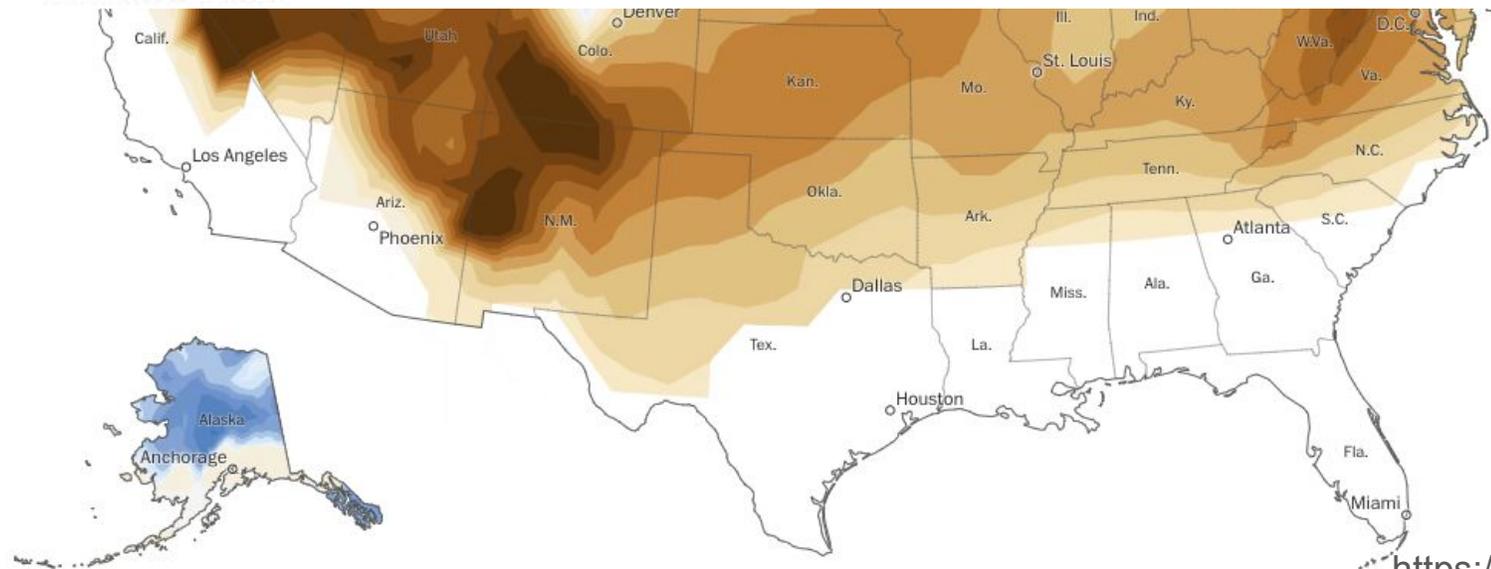
Winter snowfall forecast
Compared to 1993-2016 average

Less than normal More

Hover for state forecast



Note: Winter includes December, January and February. Hawaii and unshaded areas omitted because they experience less than three inches of annual snowfall. State averages do not include areas with insufficient snowfall data.

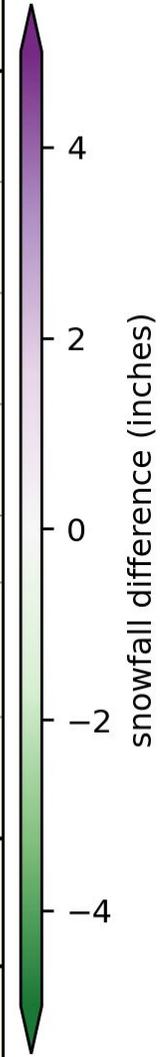
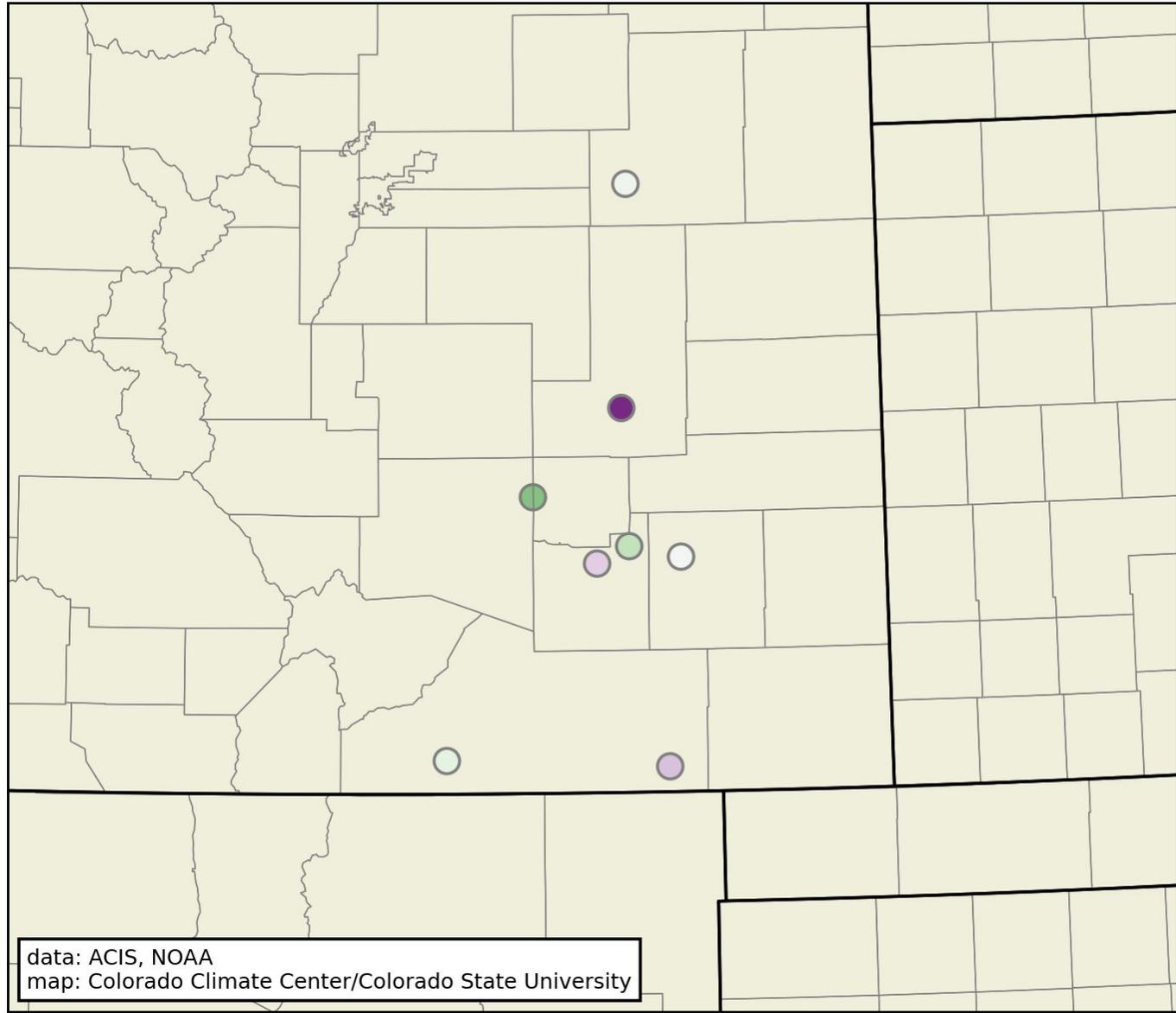


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<https://www.washingtonpost.com/climate-environment/interactive/2024/snow-forecast-trends-climate-change/>



7-day total from November 2024 storm minus average annual total snowfall



snowfall difference (inches)

cause they
insufficient

[washingtonpost.com/climate-environment/2024/snow-forecast-trends-climate-change/](https://www.washingtonpost.com/climate-environment/2024/snow-forecast-trends-climate-change/)

[ds-climate-change/](#)



Takeaways

- Water Year 2024 was warm: tied for 6th-warmest statewide. Precipitation was mixed in WY2024, with the statewide average being close to normal, but parts of southern Colorado very wet and parts of eastern Colorado dry.
- October was extremely warm, and the 6-month period from May to October was the warmest such period on record.
- A huge November snowstorm in southeastern Colorado will yield drought relief. Severe drought remains in Larimer and Weld Counties.
- La Niña is still expected, but won't be as strong as originally predicted
- La Niña tends to favor more snow in the northern mountains, less in the southern mountains overall, but the signals aren't that strong
- Overall low-confidence winter outlook for Colorado and surrounding areas





Thank you!



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