



Climate Update



Peter Goble
Colorado Climate Center

Presented to
Water Availability Task Force
January 23, 2020
Denver, CO

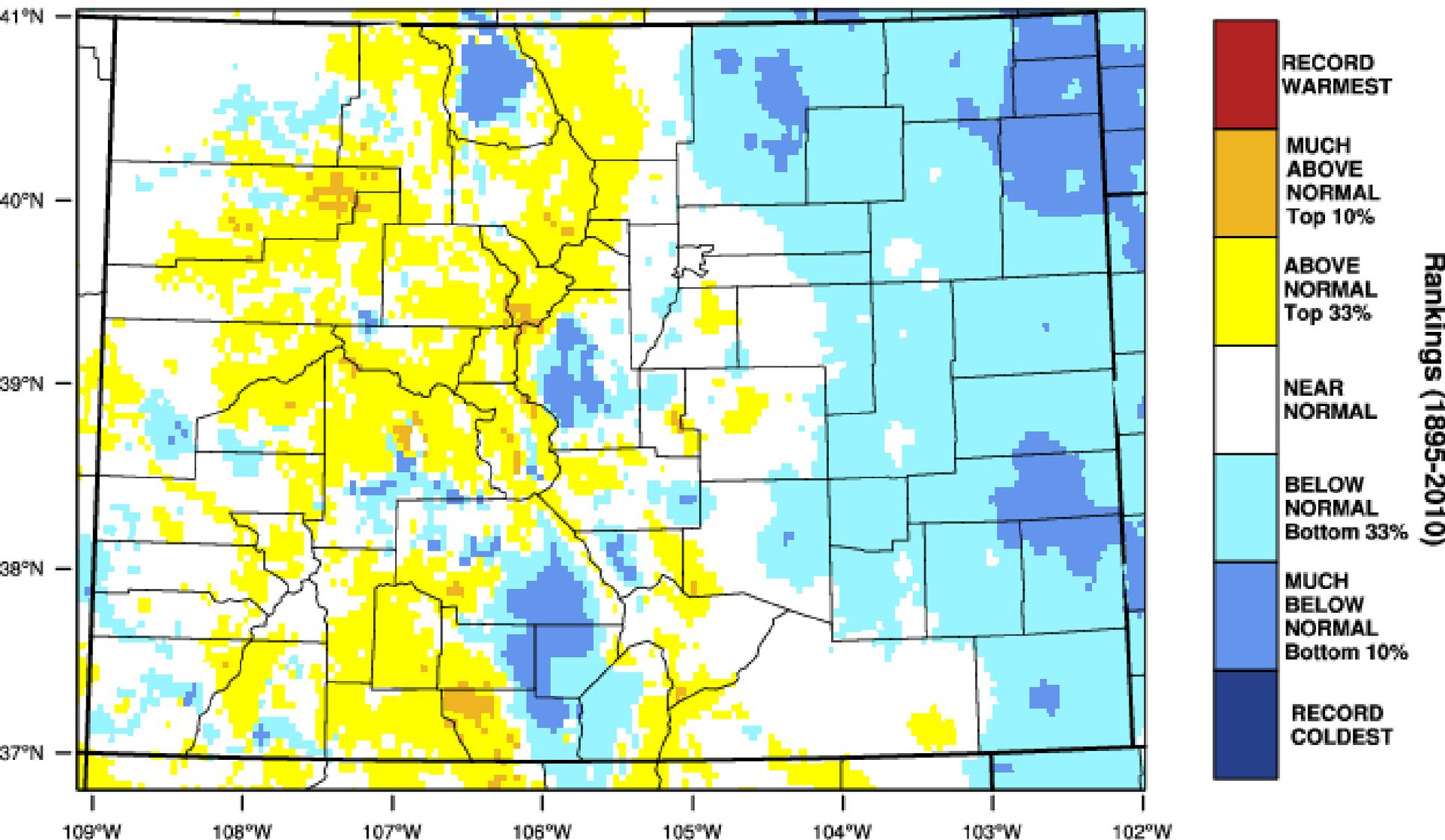
Today's Agenda

- Brief Calendar Year Recap
- Recent Conditions
- Drought Status
- Spring Outlook

Part I: 2019

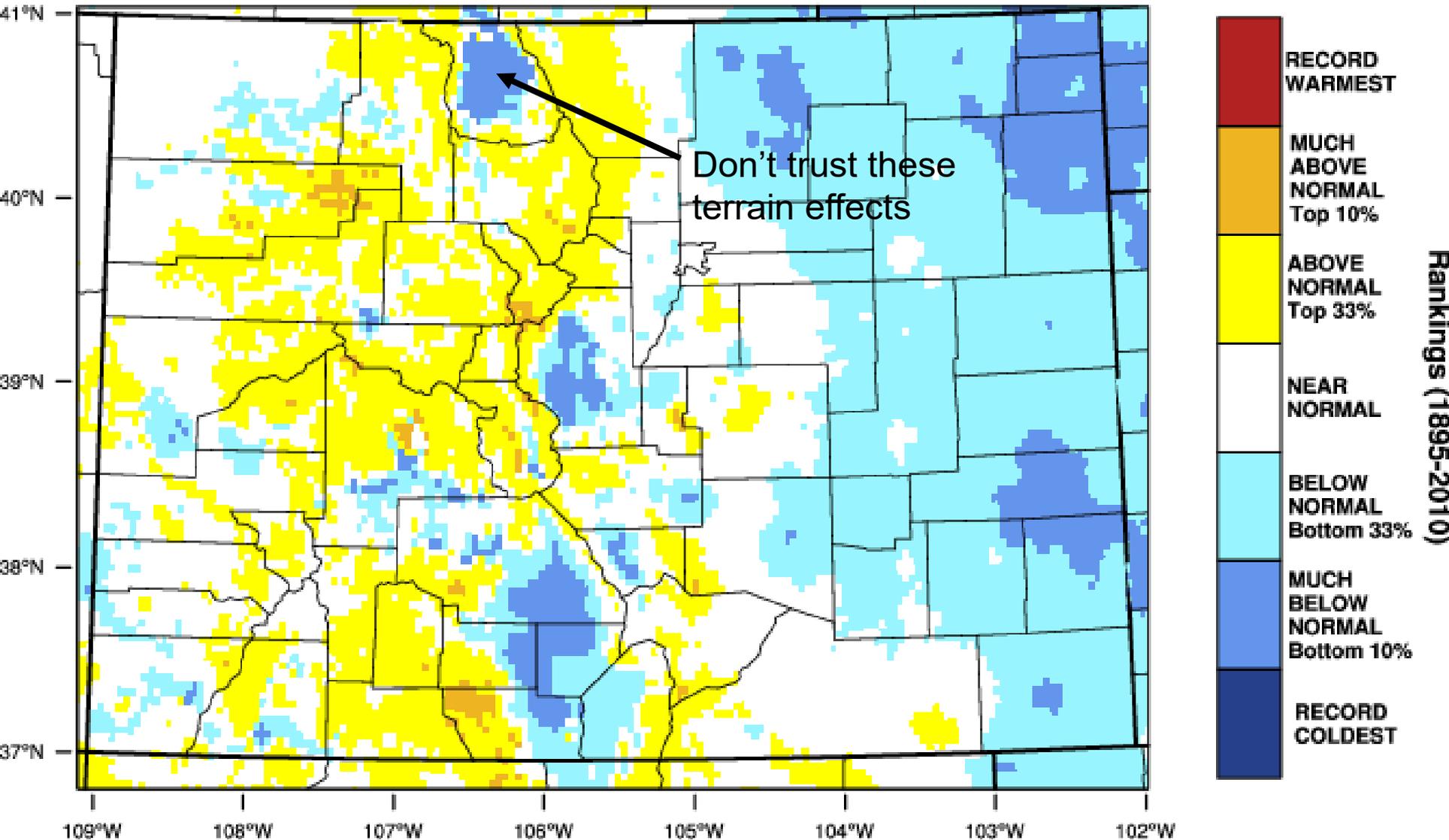


Colorado - Mean Temperature January-December 2019 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

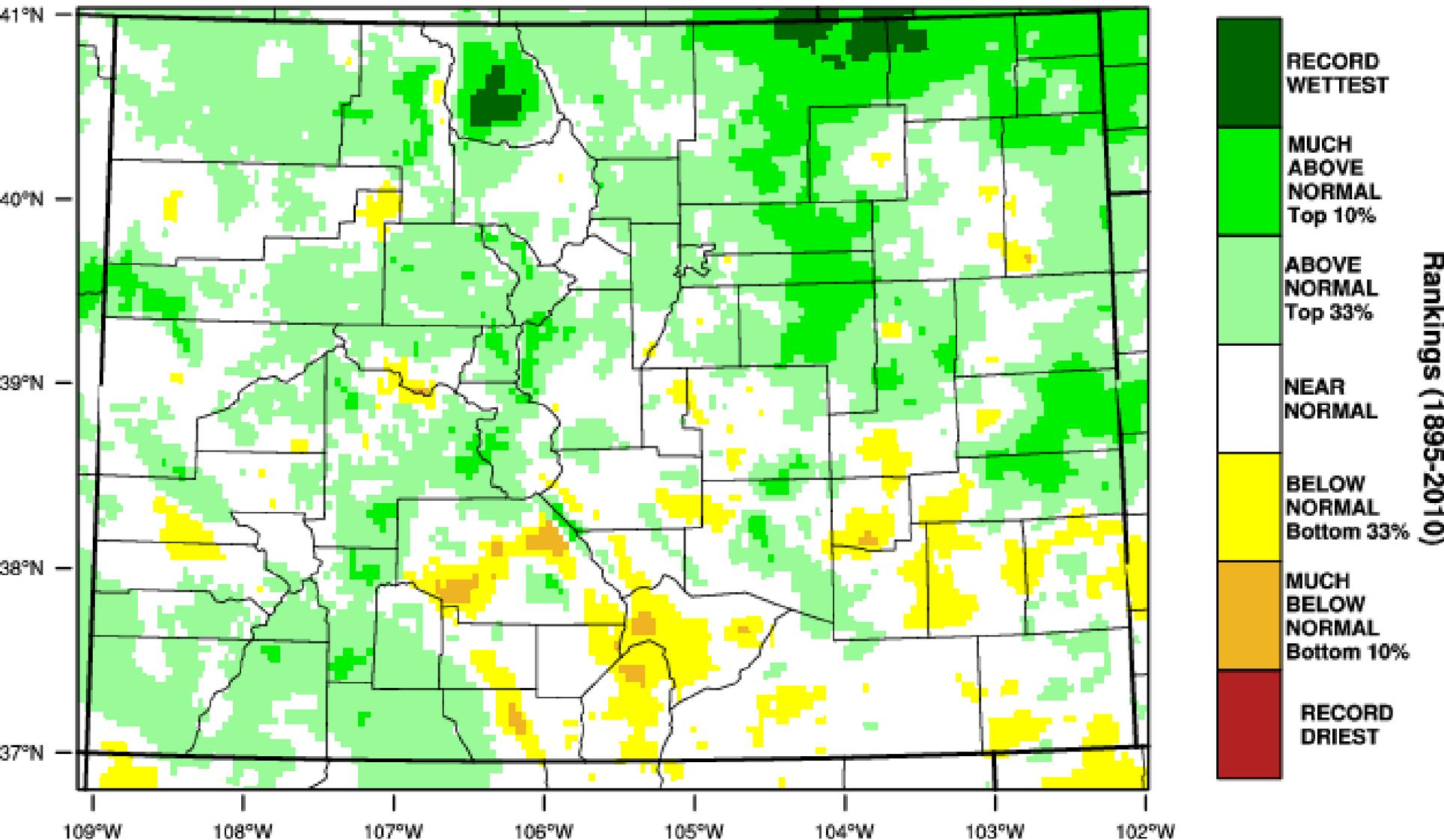
Colorado - Mean Temperature January-December 2019 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

Colorado - Precipitation

January-December 2019 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

2019 Brought Us Ups and Downs

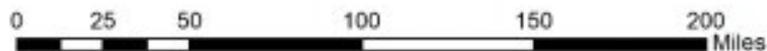
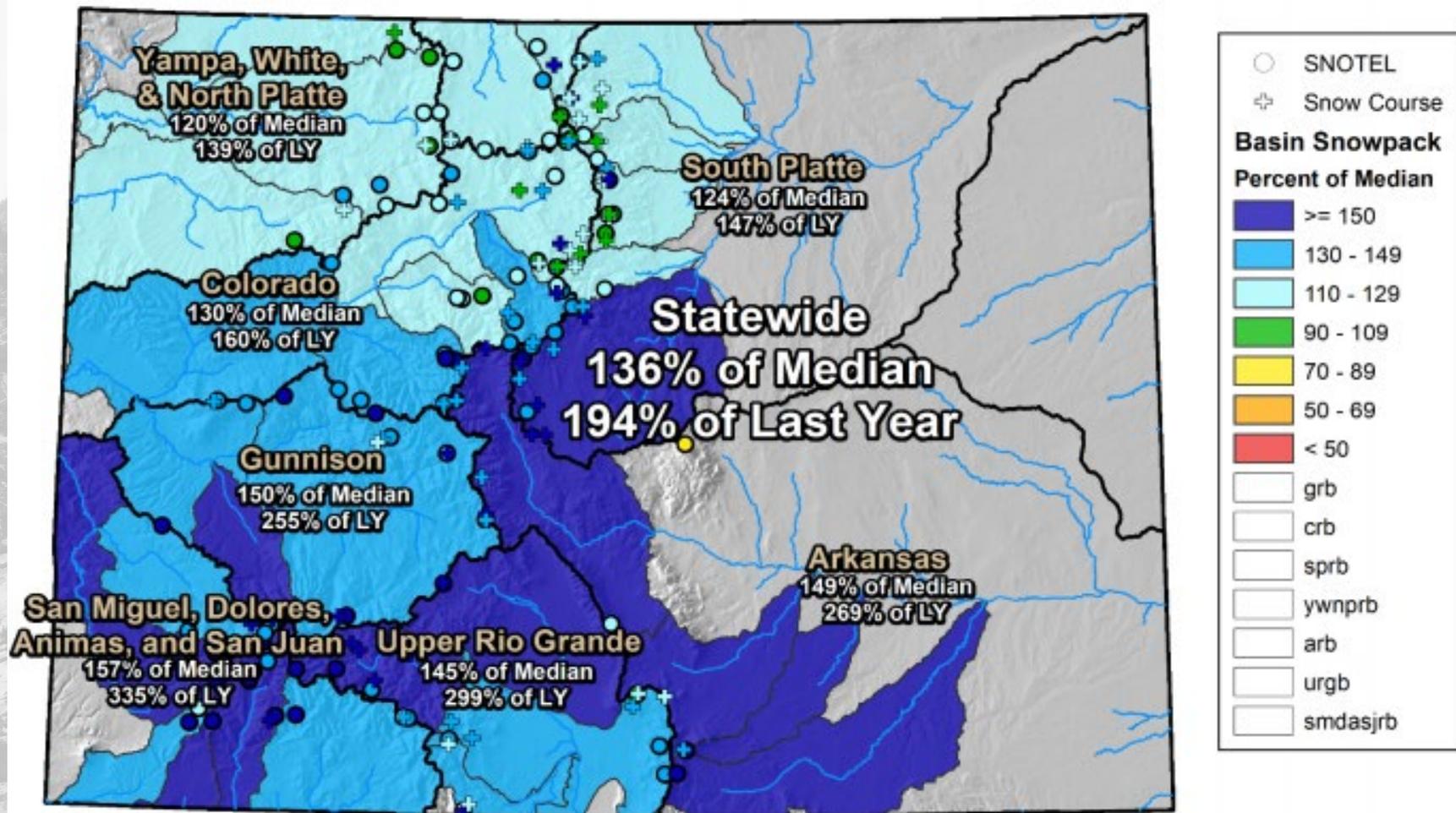
- We started the water year with severe drought in SW CO following one of our warmest, driest years on record
- This was followed by a cold, wet spring and 150+ % of normal snowpack
- We improbably did away with drought entirely by June of 2019
- The monsoon was an abject failure. September 2019 was the hottest September on record. Boy did we need that snowpack

CO STATEWIDE RANKING in 125-YEAR RECORD

MONTH	T RANK	P RANK
Oct 2018	31 st coolest	14 th westtest
Nov 2018	41 st coolest	near average
Dec 2018	near average	31 st driest
Jan 2019	40 th warmest	29 th wettest
Feb 2019	29 th coolest	17 th wettest
Mar 2019	near average	5 th wettest
Apr 2019	18 th warmest	near average
May 2019	5 th coolest	15 th wettest
Jun 2019	near average	42 nd wettest
Jul 2019	22 nd warmest	29 th driest
Aug 2019	8 th warmest	23 rd driest
Sep 2019	record warmest	21 st driest
Water Year	near average	34 th wettest
From NOAA NCEI's National Temperature and Precipitation Rank Maps: www.ncdc.noaa.gov/sotc/national		

Colorado Monthly Snowpack Summary

April 1, 2019

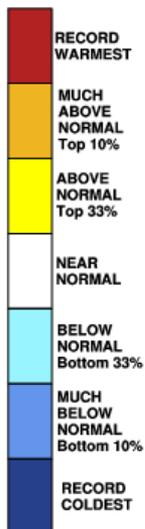
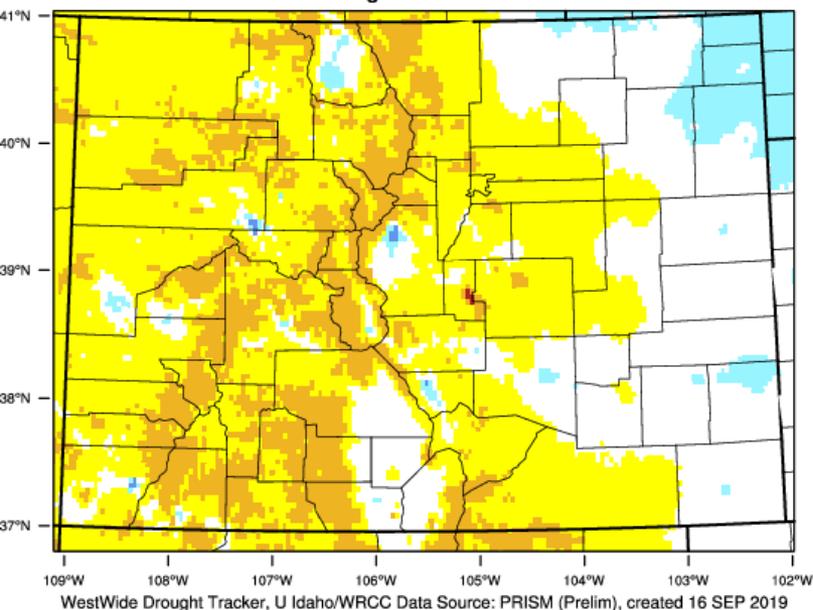


United States Department of Agriculture

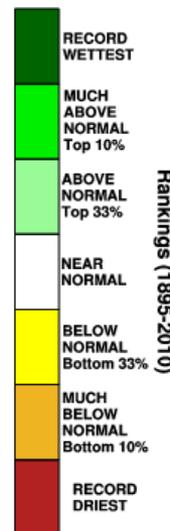
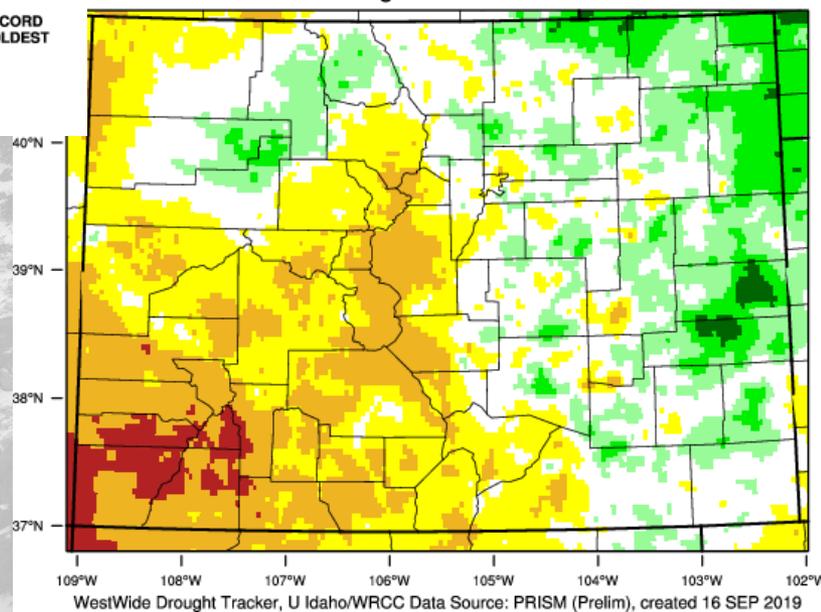
Natural Resources Conservation Service

Summer 2019

Colorado - Mean Temperature
June-August 2019 Percentile



Colorado - Precipitation
June-August 2019 Percentile



NUMBER OF DAILY AND MONTHLY STATION RECORDS BROKEN in CO

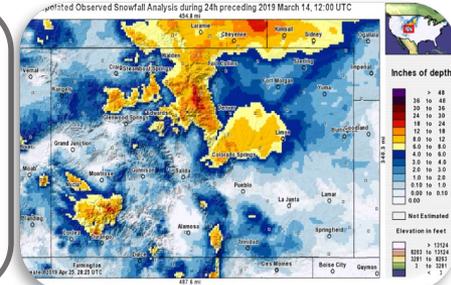
Weather Record Broken	Record broken for a day	Record broken for a month
Highest Max Temperature	555	33
Highest Min Temperature	1372	78
Lowest Max Temperature	1375	20
Lowest Min Temperature	718	5
Highest Precipitation	1275	46
Highest Snowfall	365	9

In 2019, Three New State Records Were Established!



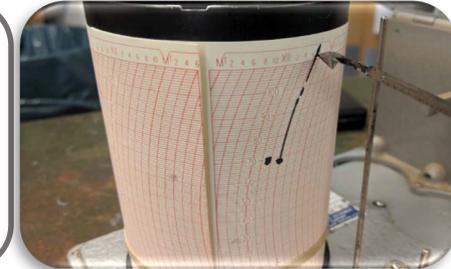
On March 13, 2019 a bomb cyclone passed over Colorado, bringing hurricane-force winds, snowfall, and over 2 inches of precipitation to the Front Range and Eastern Plains. In Colorado Springs, a wind gust of 96 mph was reported, a new all-time record for that location. But most notable about this event was the center of the low pressure system. As it passed over southeast CO, Lamar reported a sea-level pressure of 970.4 mb, a new all-time state record low pressure, beating the old record by almost 5 millibars!

Read the statistics from the bomb cyclone here:
https://climate.colostate.edu/pdfs/storm_records.pdf



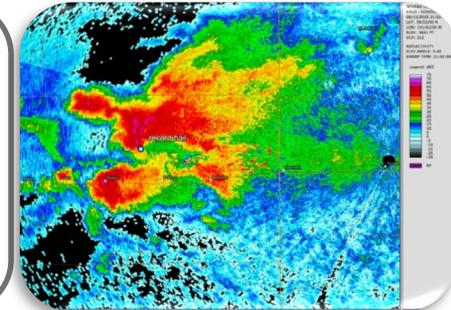
Late Friday afternoon on July 19, 2019, the high temperature at John Martin Dam topped out at 115°F. Observers came in to work on Monday morning to find the temperature observation literally off the charts on their thermograph and estimated it at 115°F on the July 20 observation report – one degree higher than our state’s previous all-time record high temperature.

Read the full report of this state record here: <https://tinyurl.com/COTempRecord>



On the afternoon of August 13, 2019 the National Weather Service in Goodland warned of severe thunderstorms over eastern CO, capable of producing very large hail. Near the town of Bethune, one family watched as several chunks of large hail bounced in their front yard. While the initial size of the largest was around 5.5”, some melting occurred before it was placed in the freezer. The next day, an official measurement was taken, verifying that the diameter of 4.83” was a new record for largest hail stone ever measured in the state.

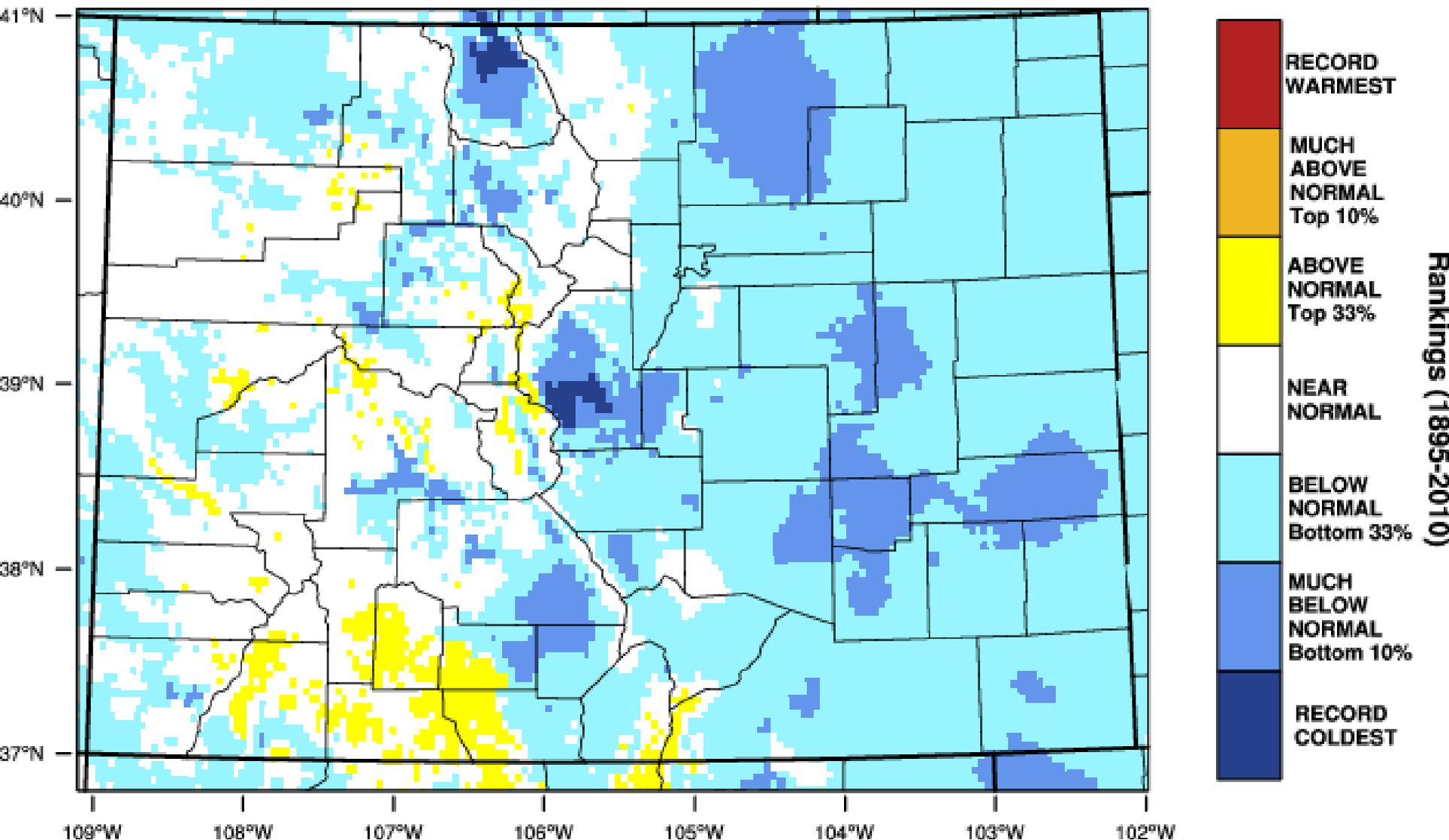
Read the full report of this state record here: <https://tinyurl.com/COHailRecord>



Part II: Recent Months and Weeks

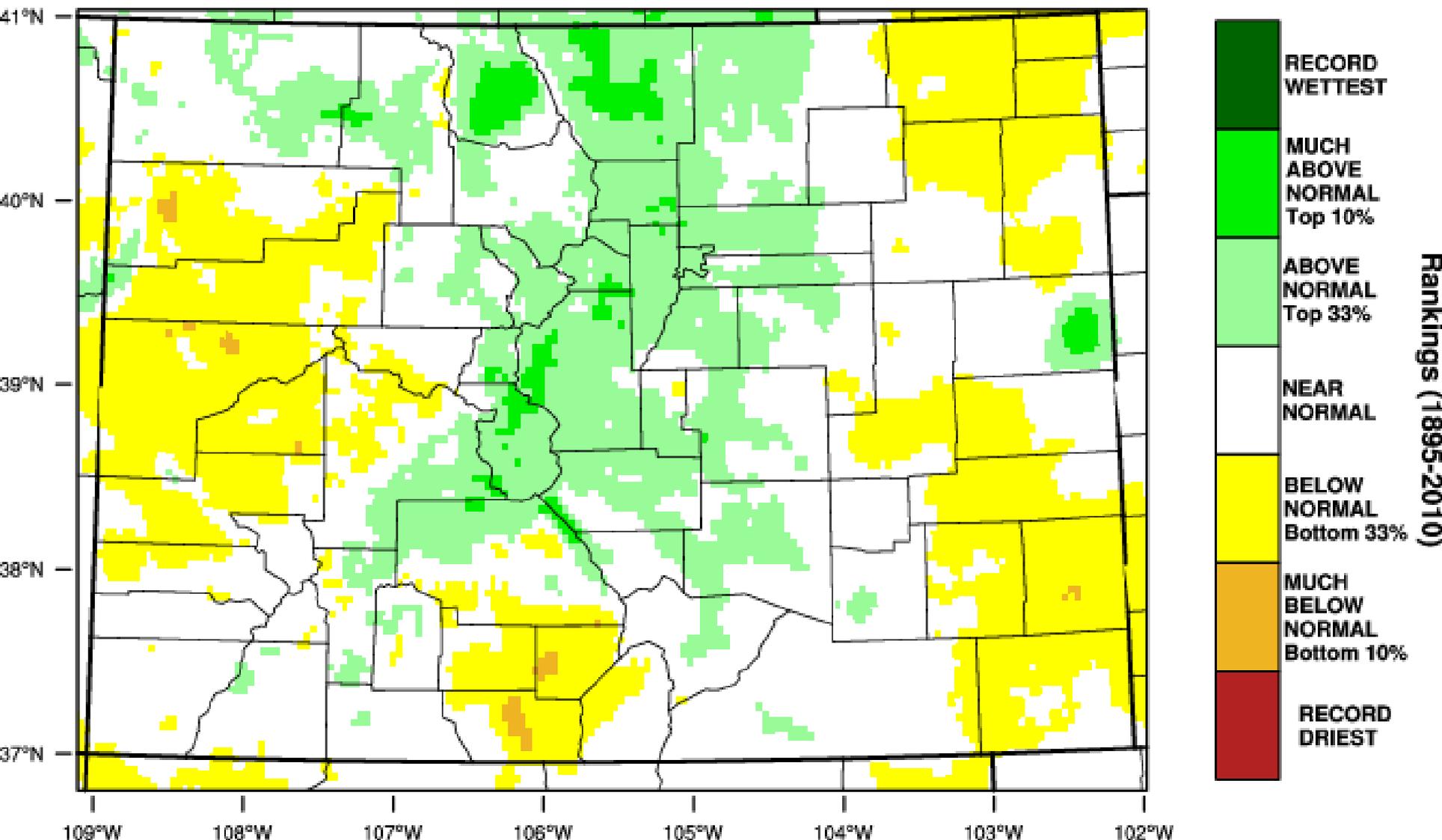


Colorado - Mean Temperature October-December 2019 Percentile



Colorado - Precipitation

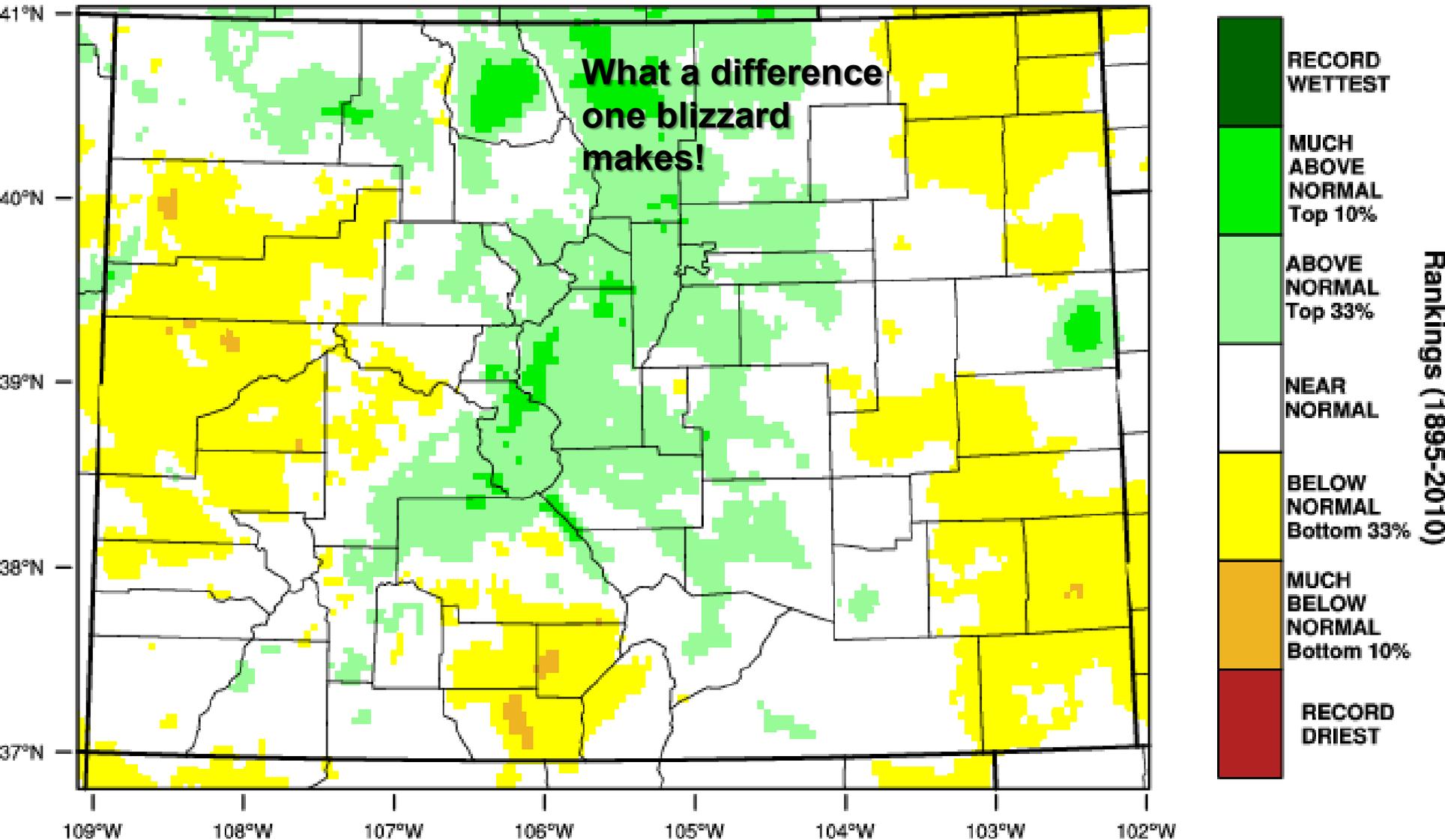
October-December 2019 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

Colorado - Precipitation

October-December 2019 Percentile

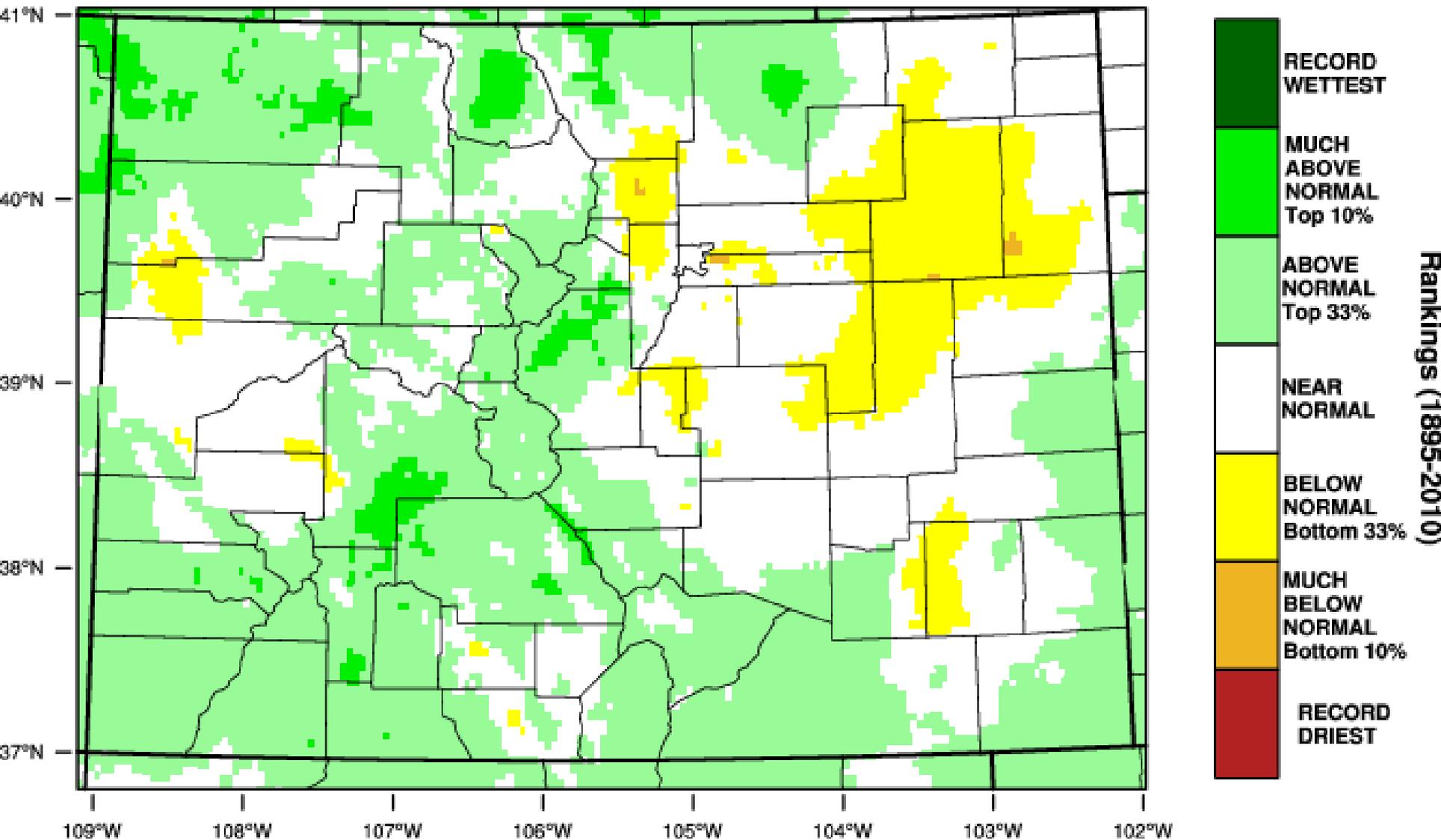




- 16.5" of snowfall at Fort Collins weather station on 11/22 and 11/23
- I estimate I shoveled over 3000 lbs of snow!
- The snow season has been too kind to my back since...

Colorado - Precipitation

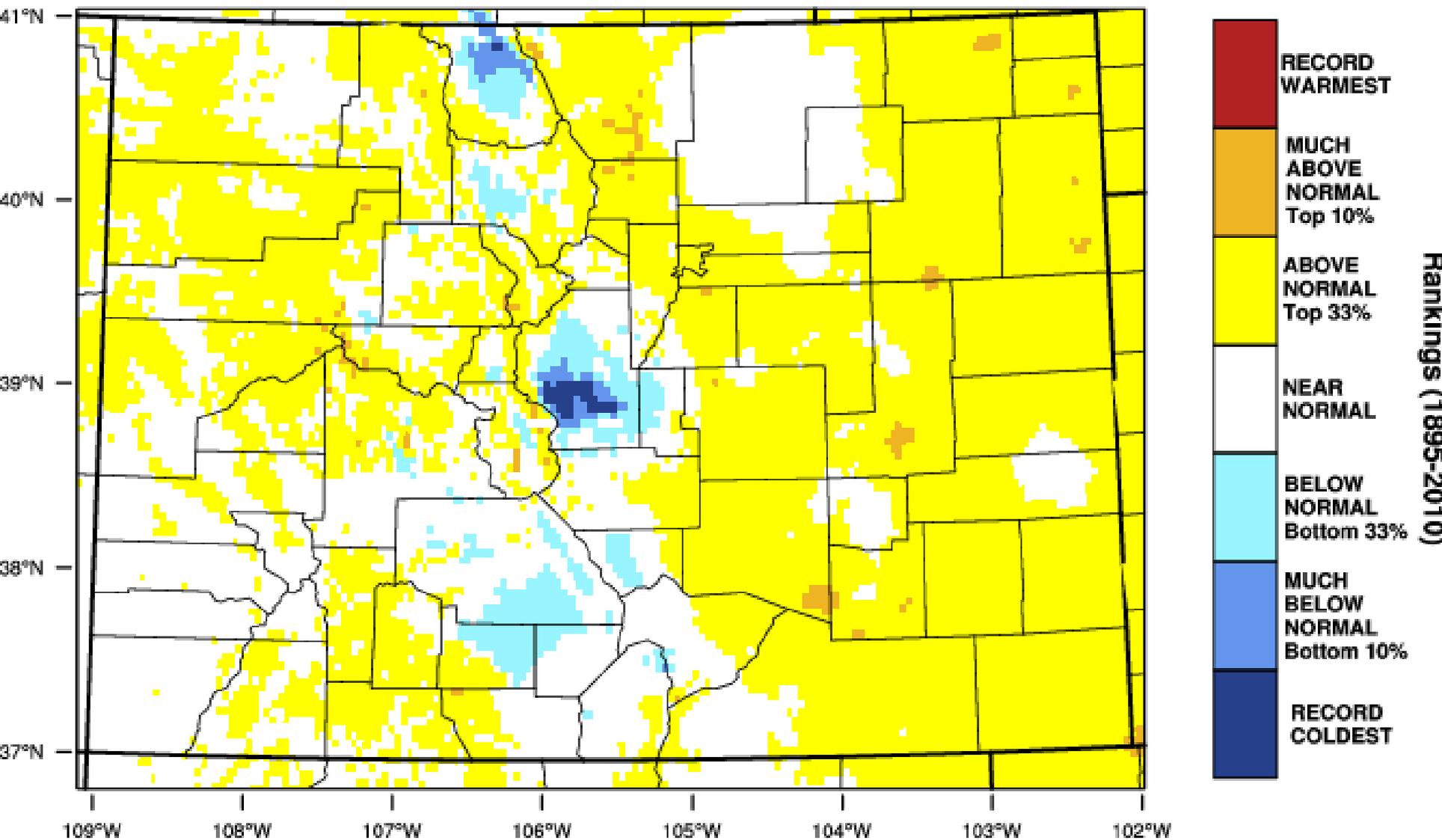
December 2019 Percentile



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

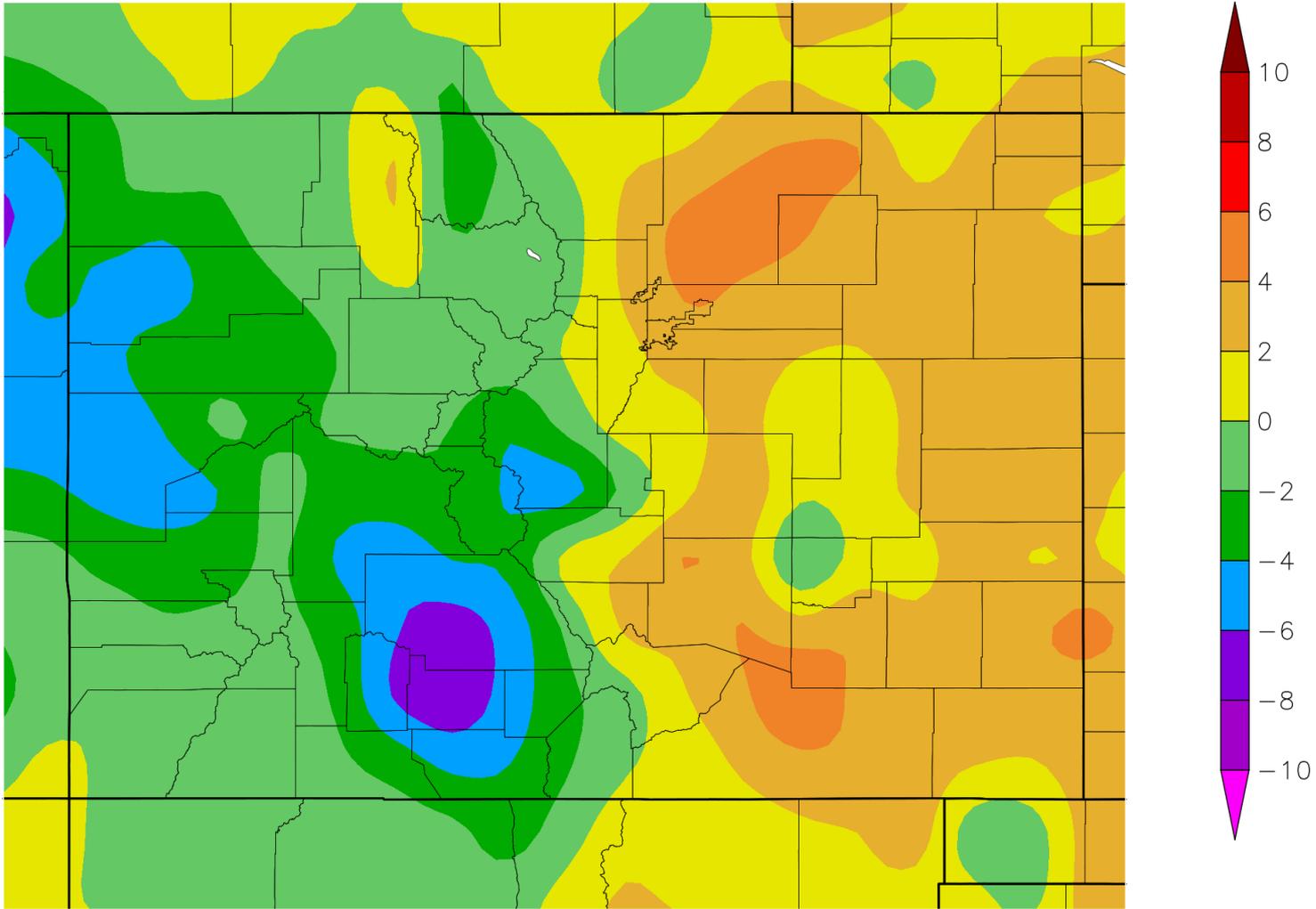
Colorado - Mean Temperature

December 2019 Percentile

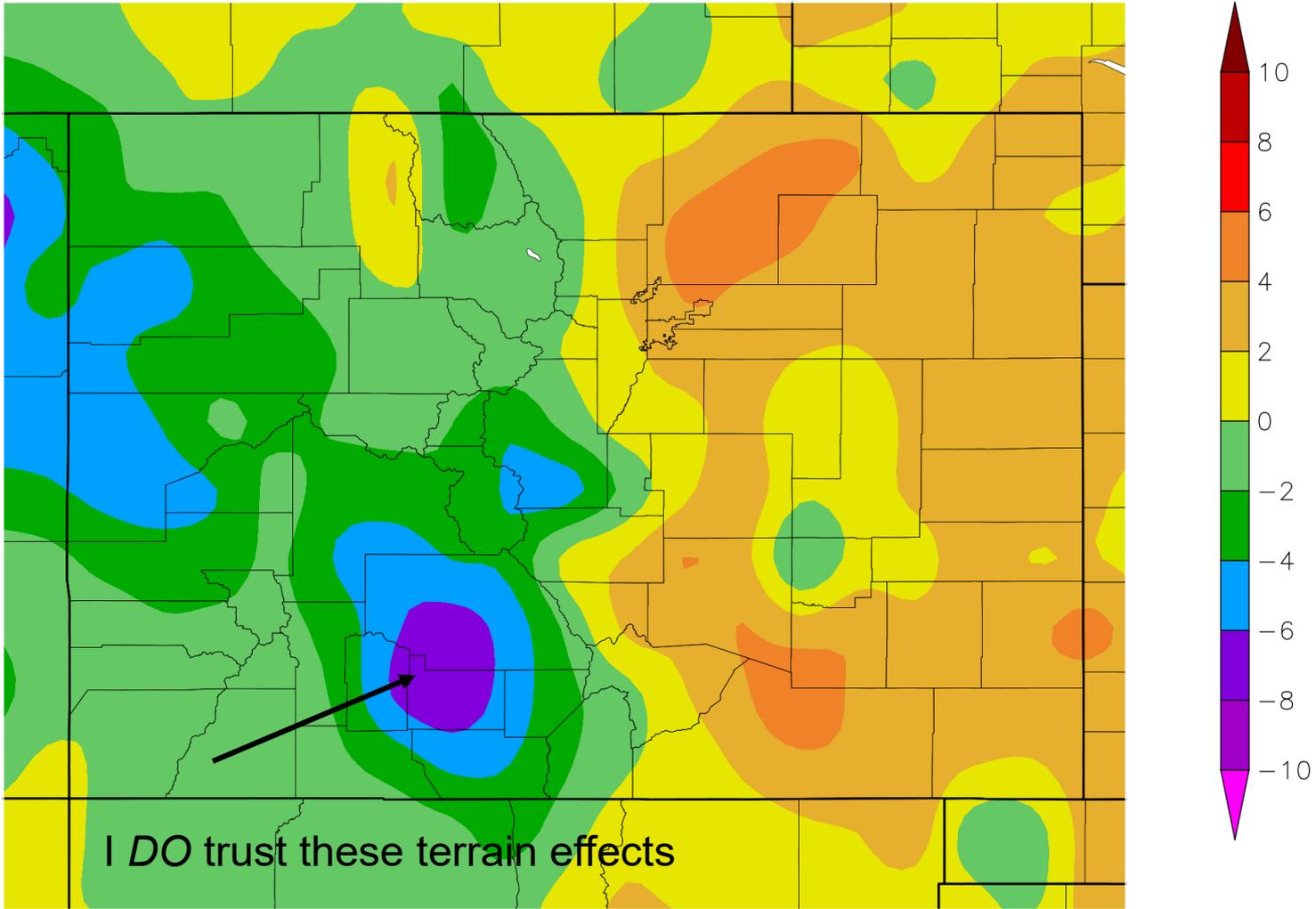


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 5 JAN 2020

Departure from Normal Temperature (F) 1/1/2020 - 1/20/2020

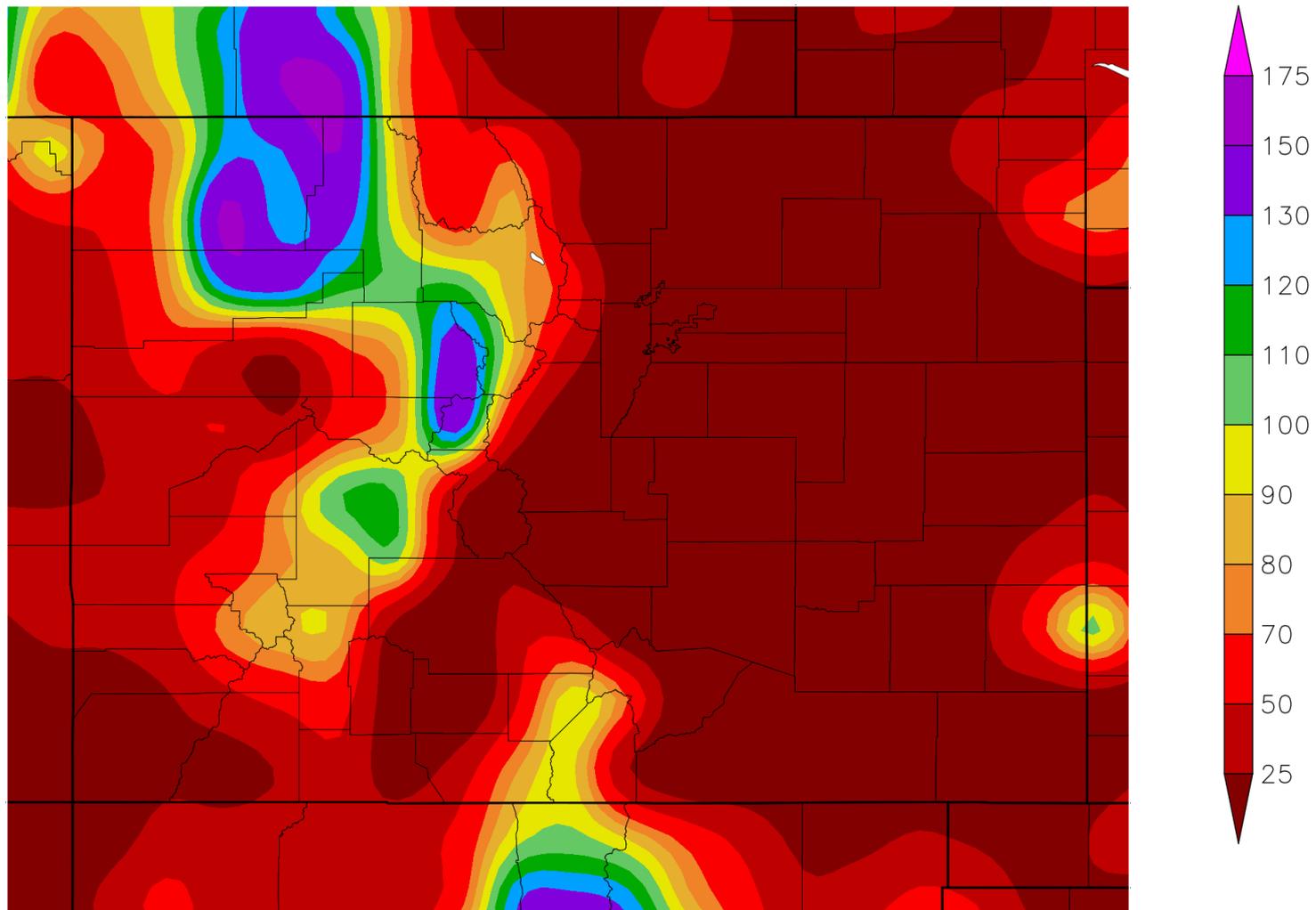


Departure from Normal Temperature (F) 1/1/2020 - 1/20/2020



Percent of Normal Precipitation (%)

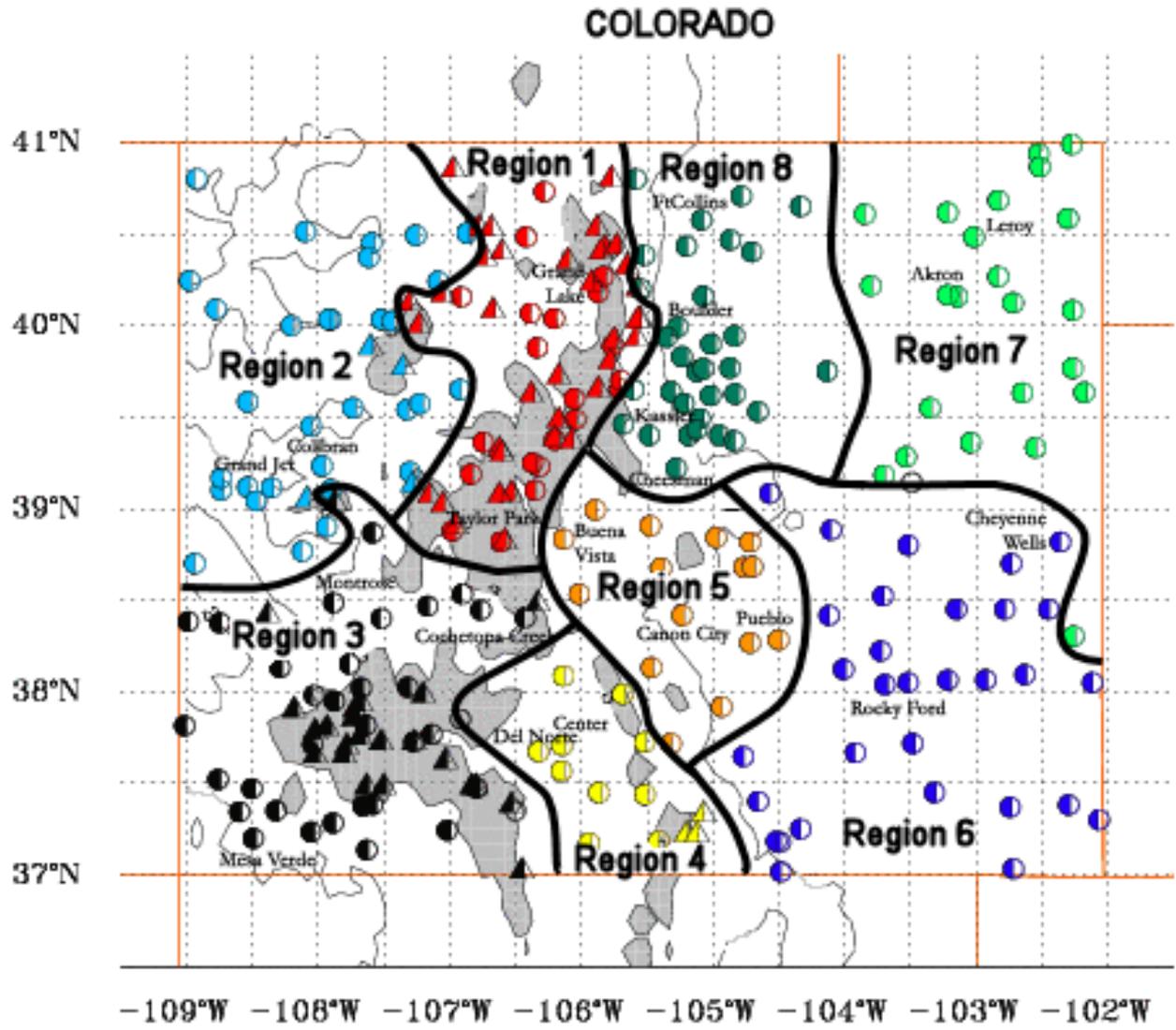
1/1/2020 - 1/20/2020



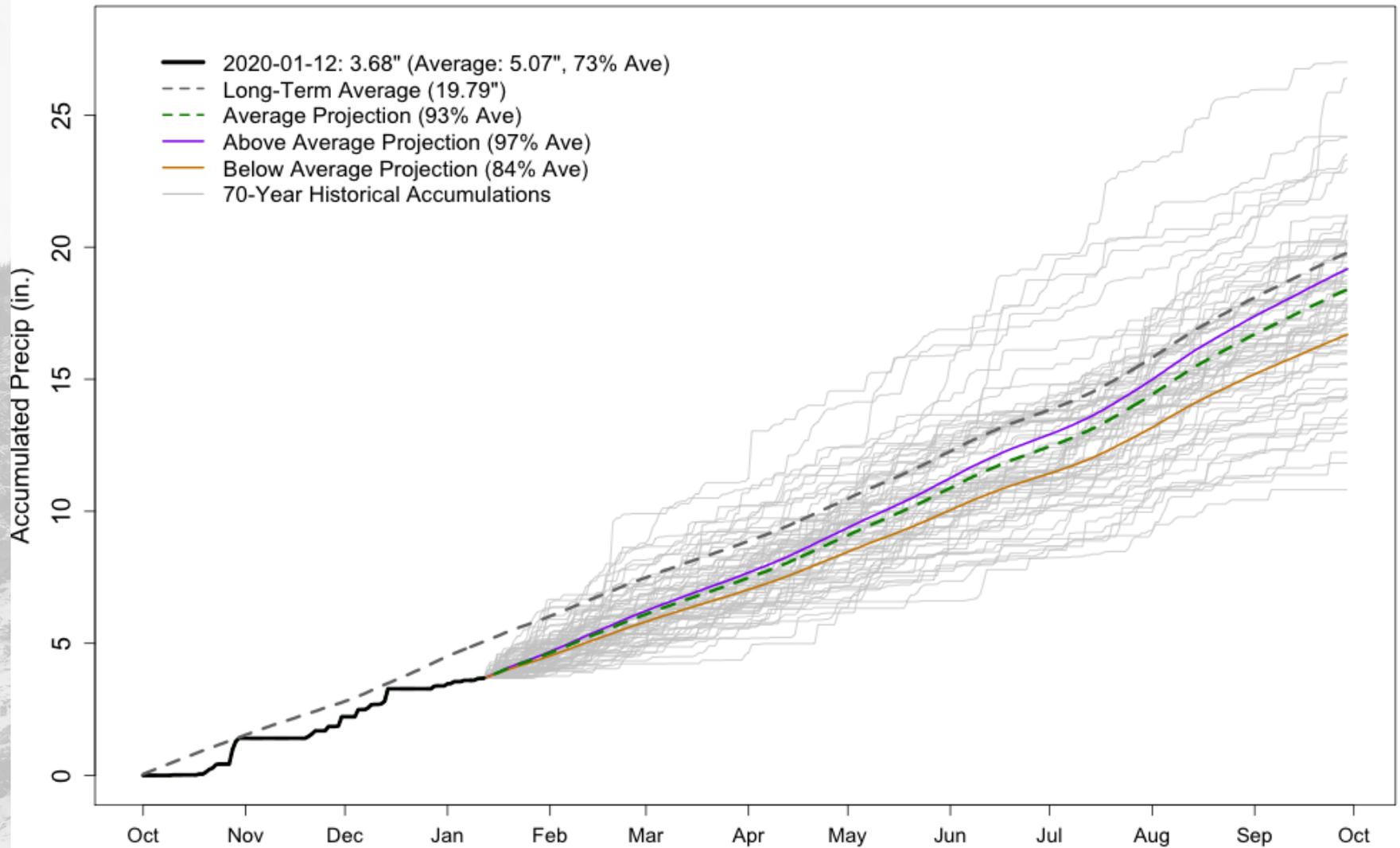
Places with No Measurable Precipitation This Decade

- Denver Stapleton
- Fort Collins
- Colorado Springs
- Boulder
- Pueblo
- Akron

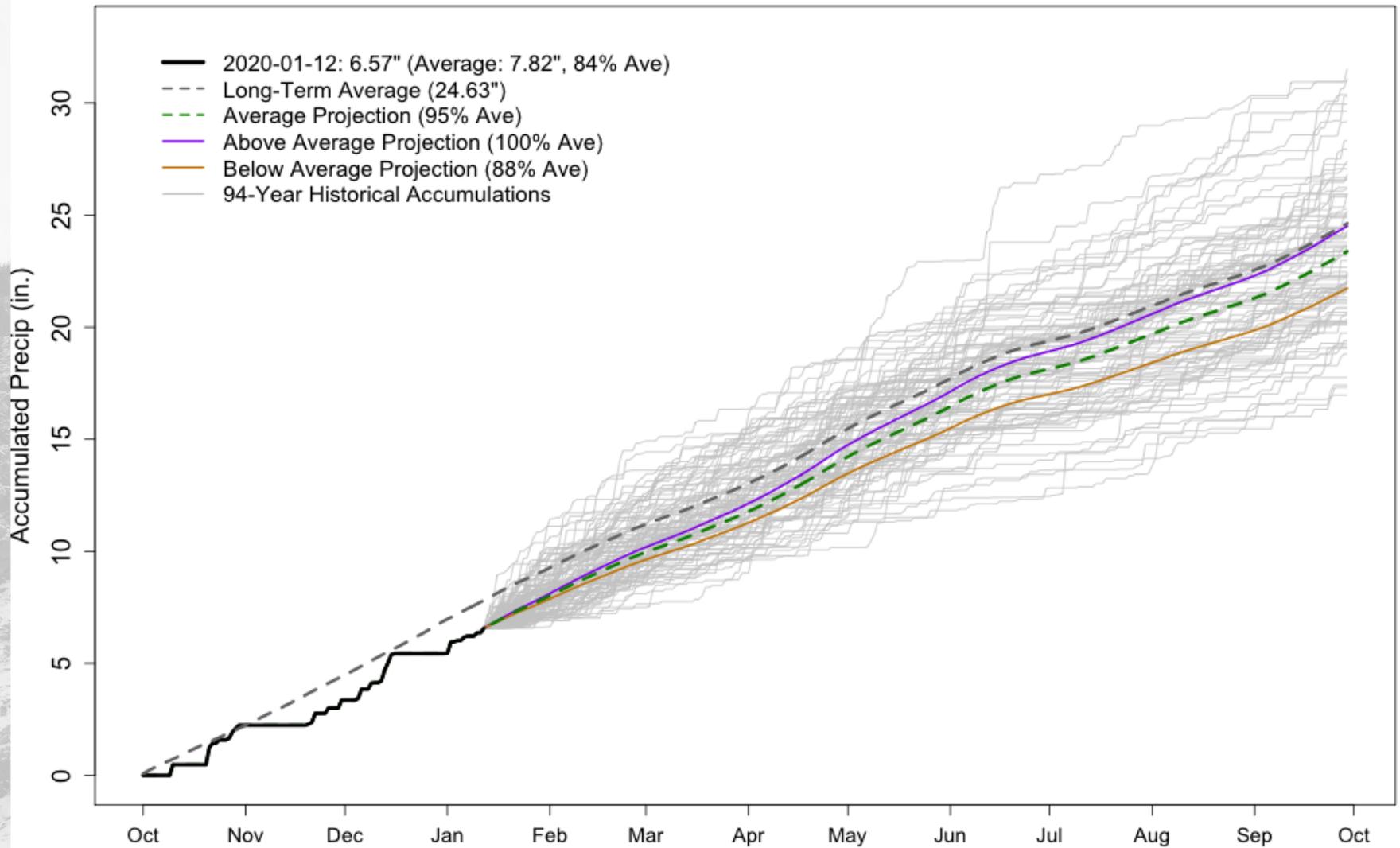
Precipitation by Climate Division



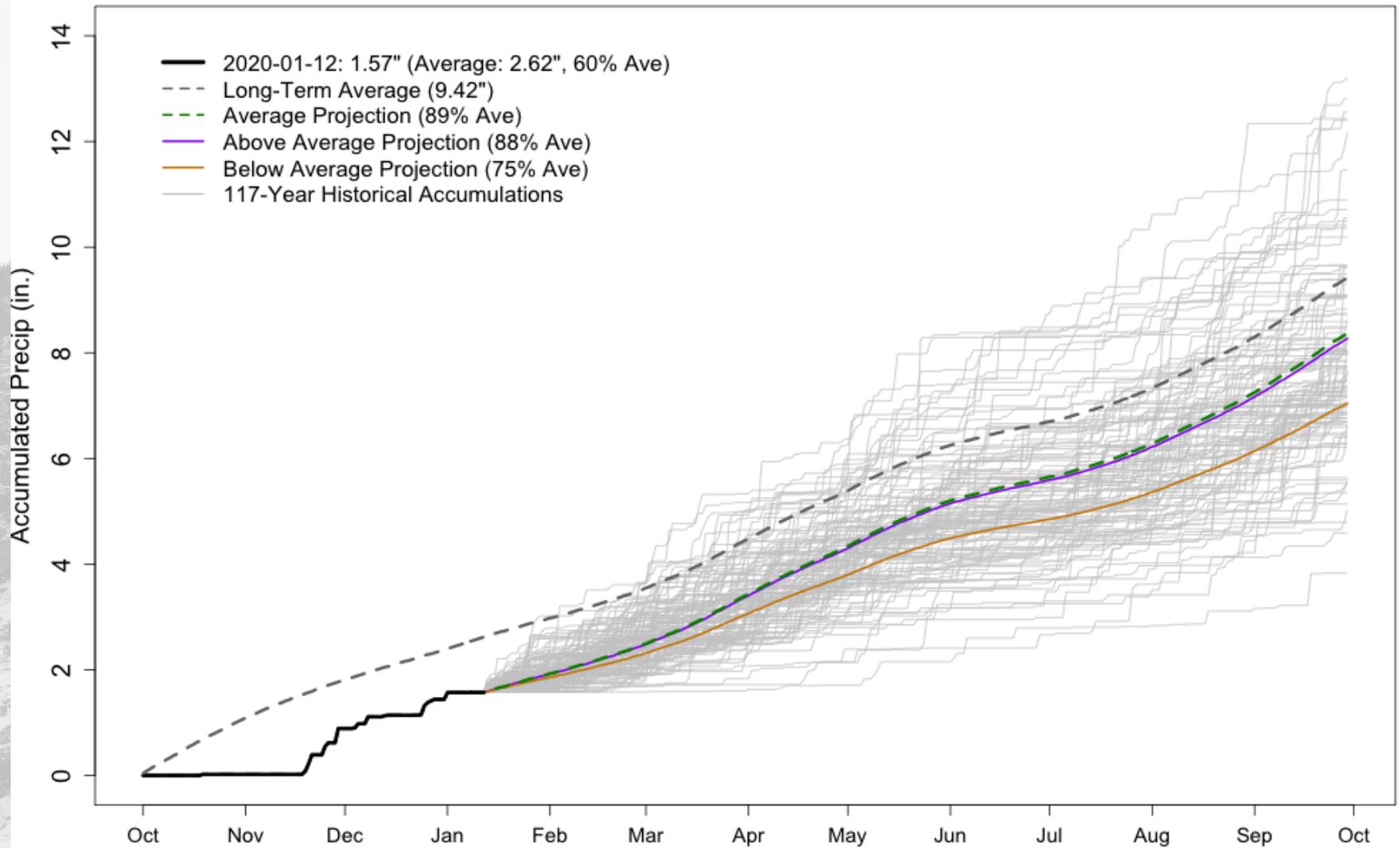
GRAND LAKE 1 NW WY2020 Precipitation Projections



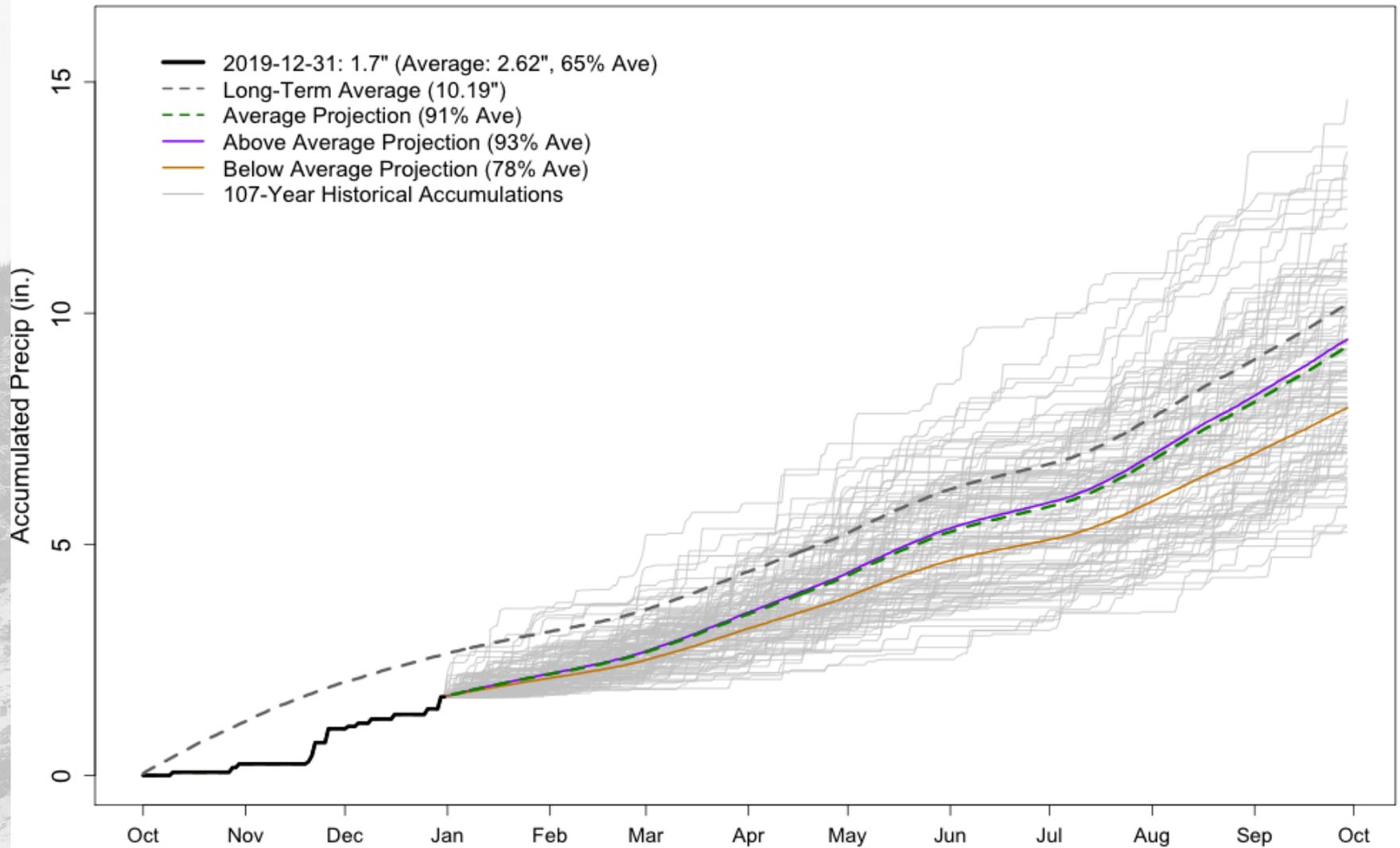
STEAMBOAT SPRINGS WY2020 Precipitation Projections



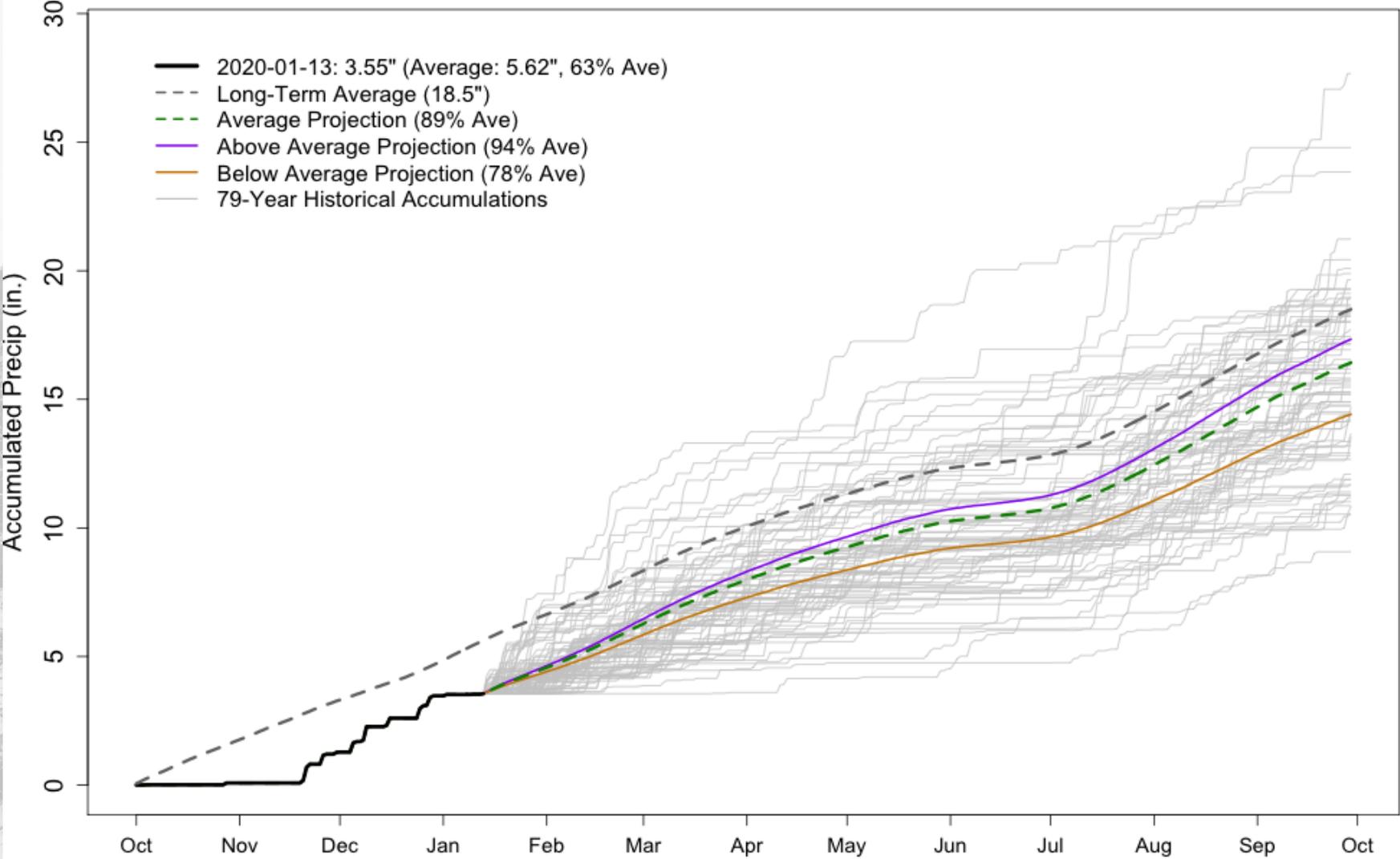
GRAND JUNCTION WALKER FIELD WY2020 Precipitation Projections



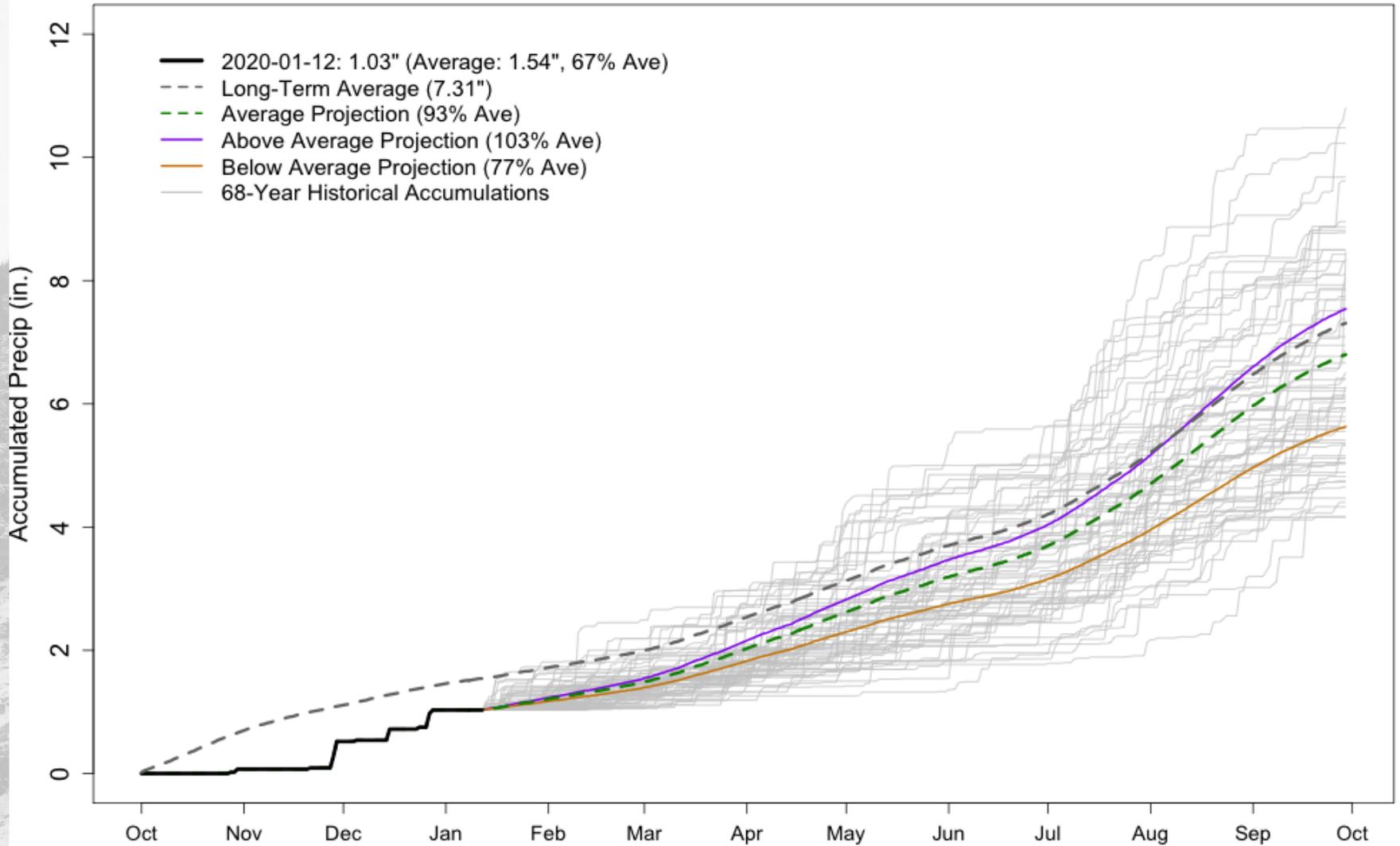
MONTROSE NO 2 WY2020 Precipitation Projections



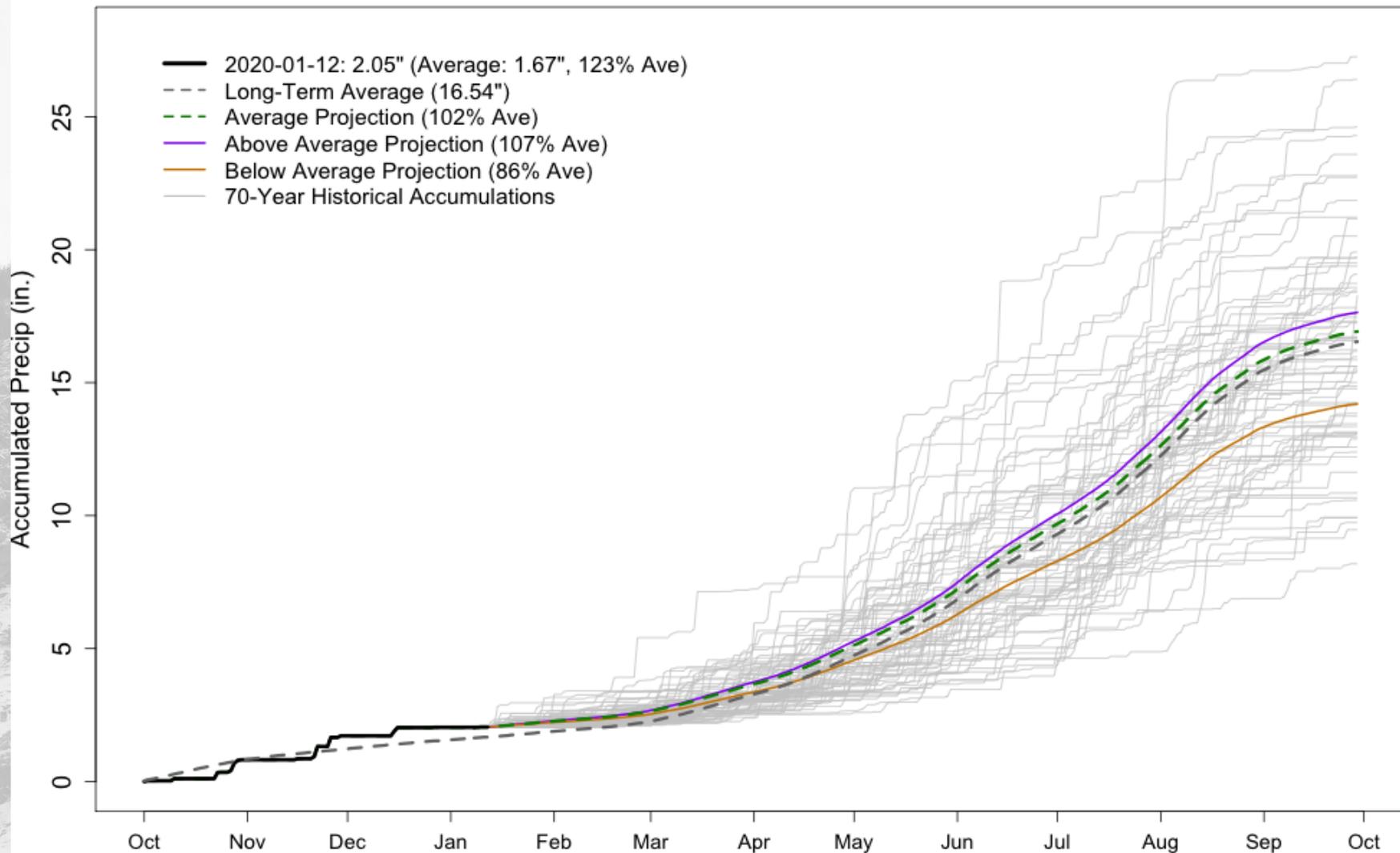
MESA VERDE NP WY2020 Precipitation Projections



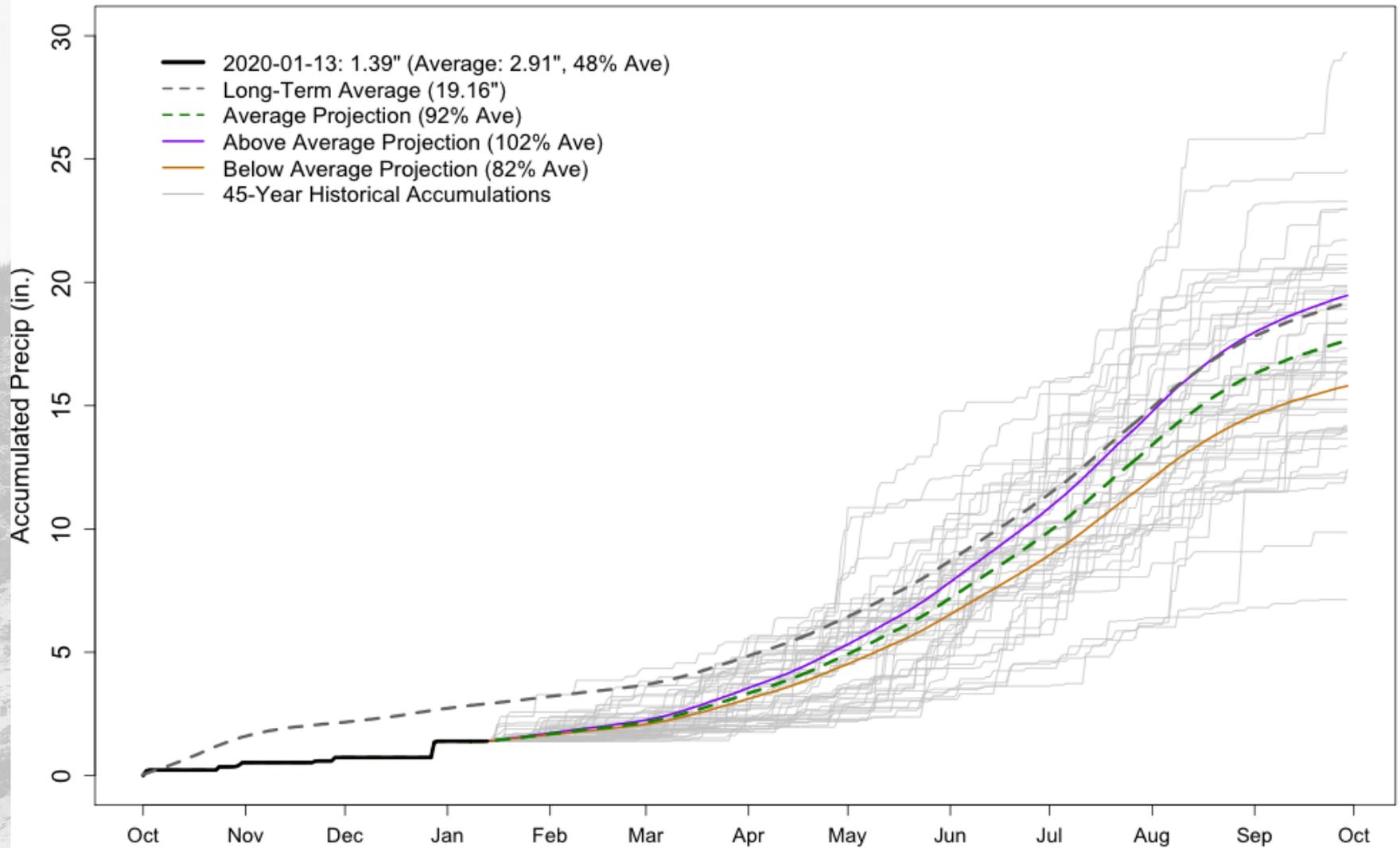
ALAMOSA SAN LUIS VALLEY REGIONAL AP WY2020 Precipitation Projections



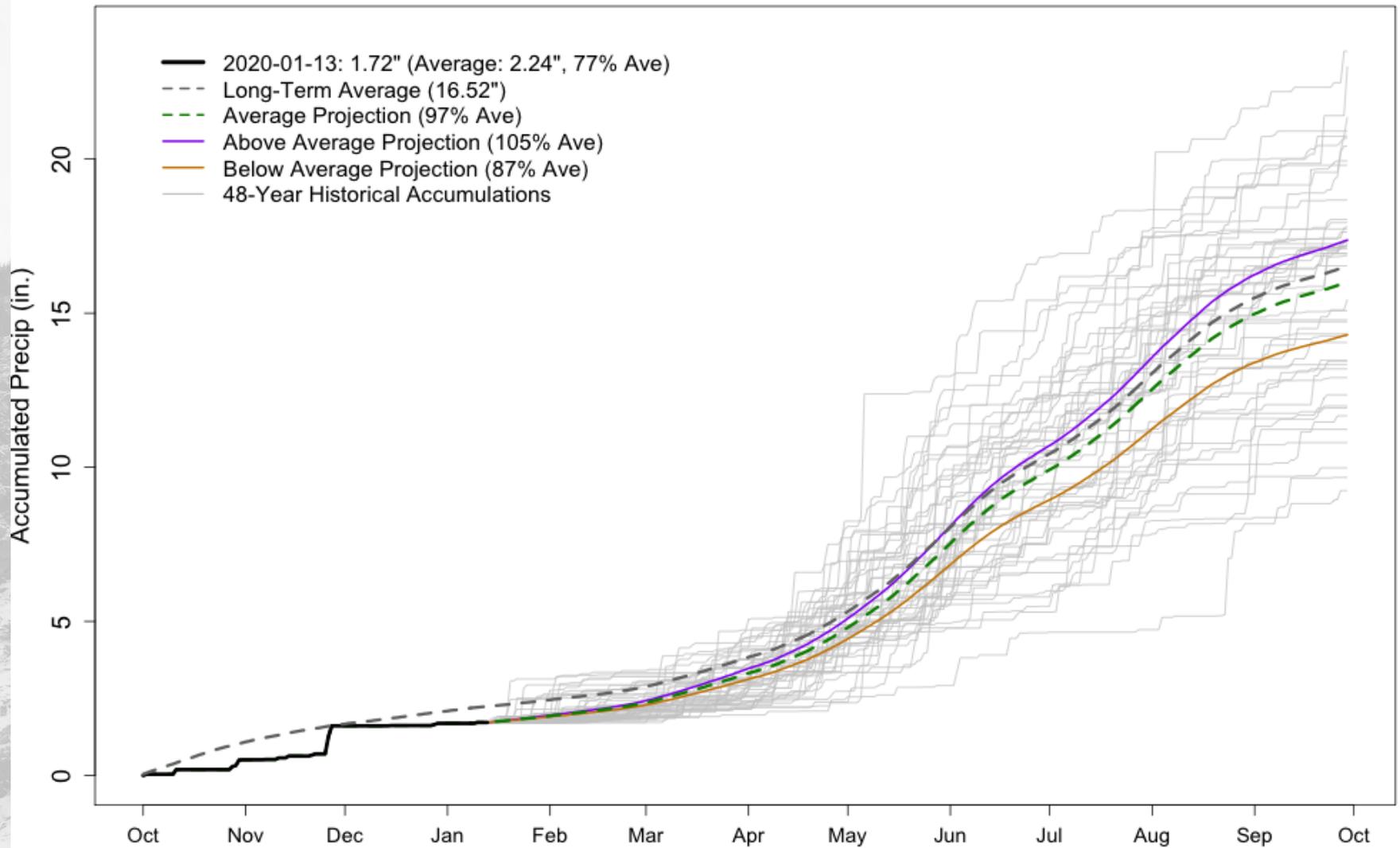
COLORADO SPRINGS MUNICIPAL AP WY2020 Precipitation Projections



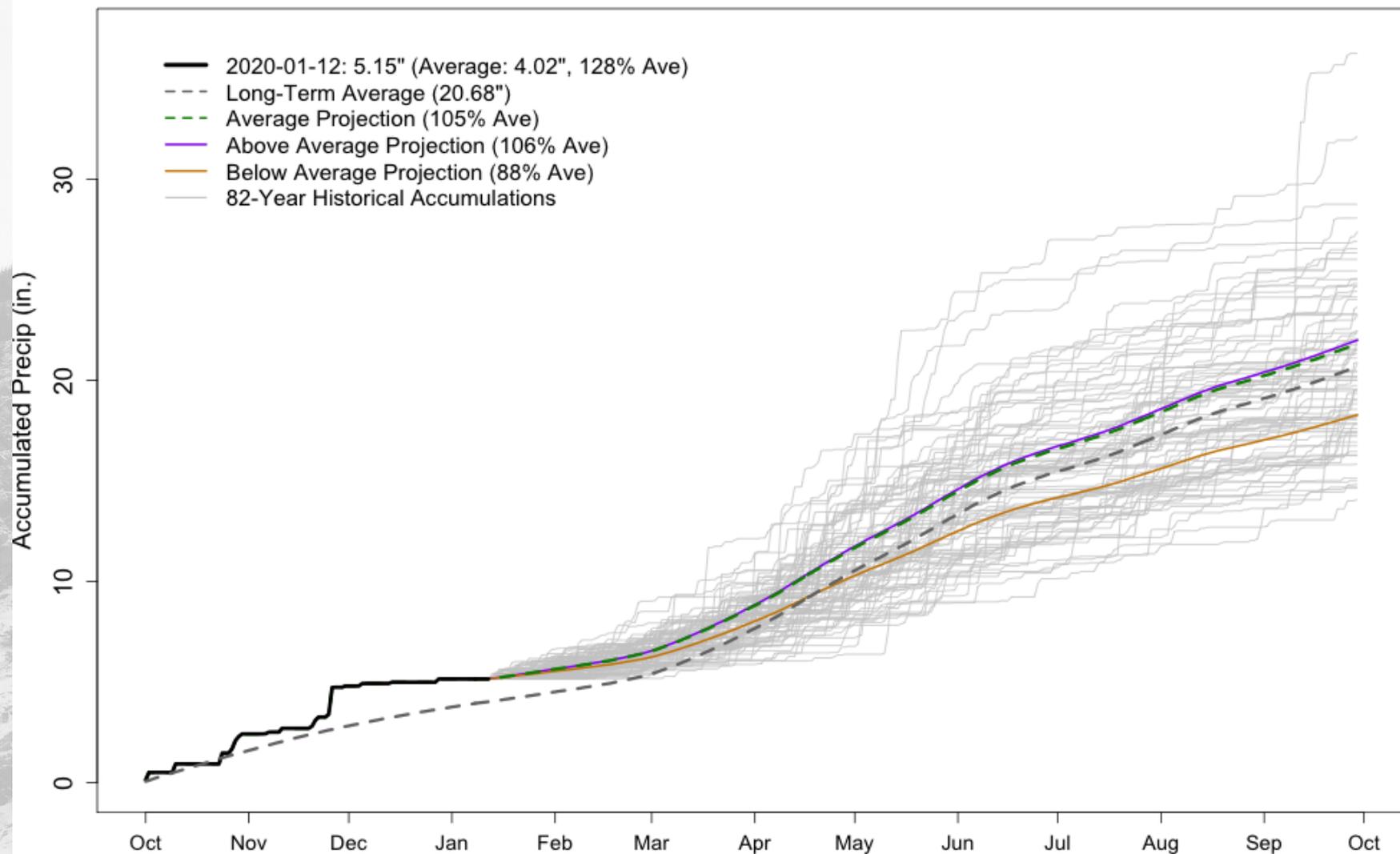
WALSH 1 W WY2020 Precipitation Projections



AKRON 4 E WY2020 Precipitation Projections



BOULDER WY2020 Precipitation Projections



Recent Conditions Summary

- Much of the state is running below normal for the water year. Most of the damage was done in October
- It's early these deficits can be made up
- The Thanksgiving Week Blizzard gave a considerable boost to the Front Range
- Snowpack is running a little above normal

Part III: Drought. Where do we Stand?

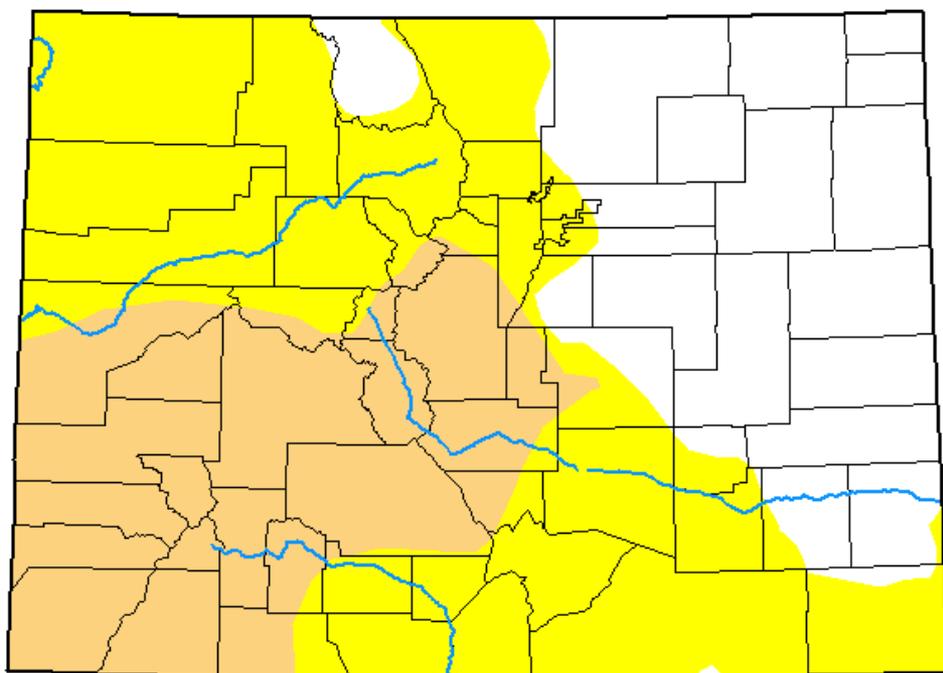


U.S. Drought Monitor Colorado

October 1, 2019
(Released Thursday, Oct. 3, 2019)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	30.14	69.86	27.53	0.00	0.00	0.00
Last Week <i>09-24-2019</i>	34.06	65.94	10.81	0.00	0.00	0.00
3 Months Ago <i>07-02-2019</i>	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year <i>01-01-2019</i>	17.94	82.06	66.26	54.91	27.11	11.22
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>10-02-2018</i>	14.19	85.81	72.30	64.41	48.47	16.21



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. See accompanying text summary for forecast statements.

Author:

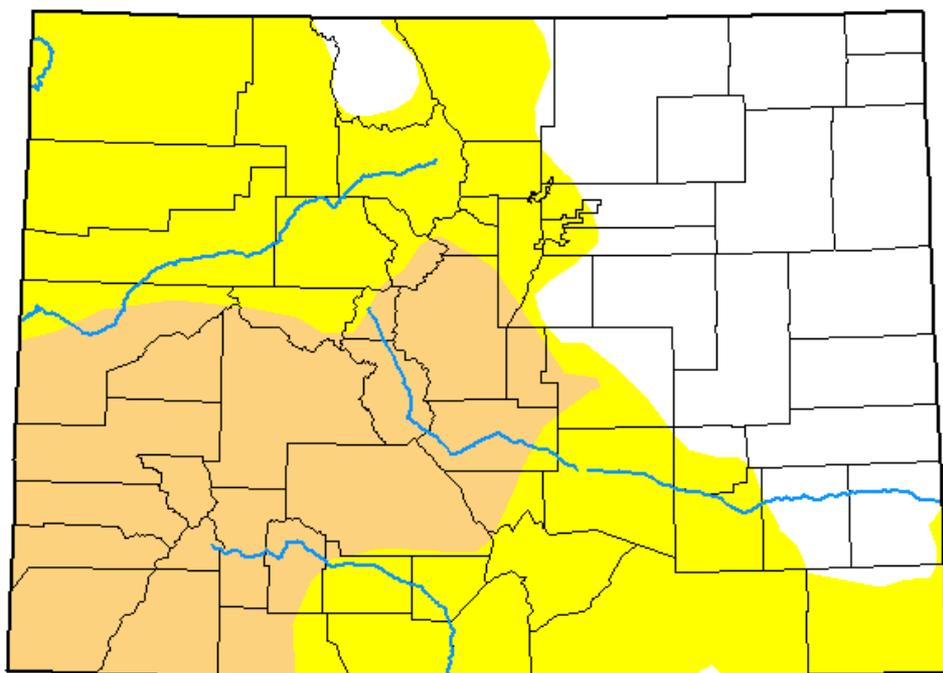
Brian Fuchs
National Drought Mitigation Center



droughtmonitor.unl.edu

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Author:

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National Drought Mitigation Center

Darn. We were drought free in June



droughtmonitor.unl.edu

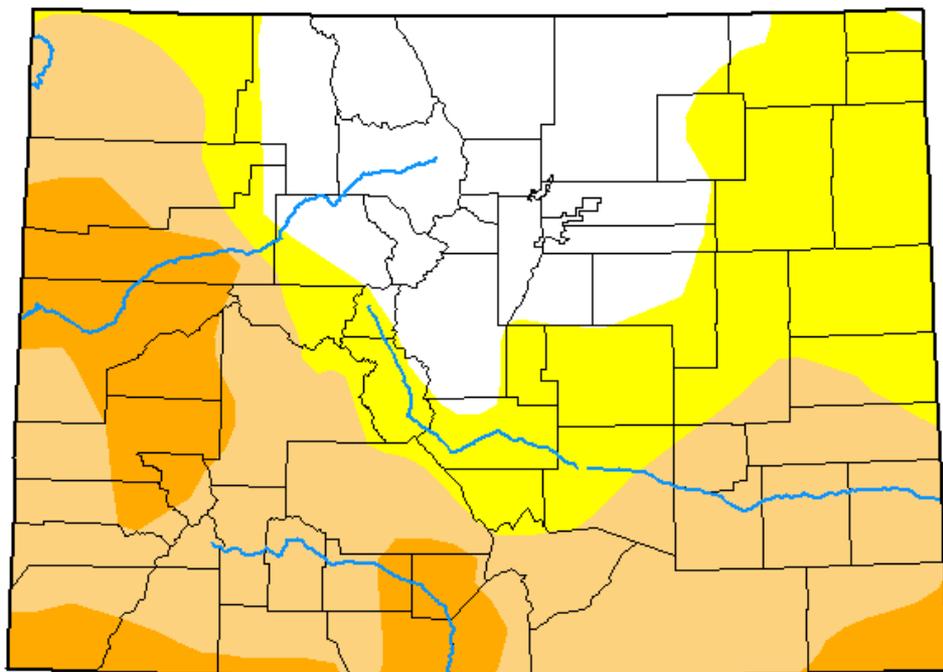
U.S. Drought Monitor

Colorado

January 21, 2020
 (Released Thursday, Jan. 23, 2020)
 Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	22.39	77.61	51.19	13.84	0.00	0.00
Last Week <i>01-14-2020</i>	31.72	68.28	51.19	13.84	0.00	0.00
3 Months Ago <i>10-22-2019</i>	11.64	88.36	60.76	27.41	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>01-22-2019</i>	15.91	84.09	68.49	42.41	22.04	2.79



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:

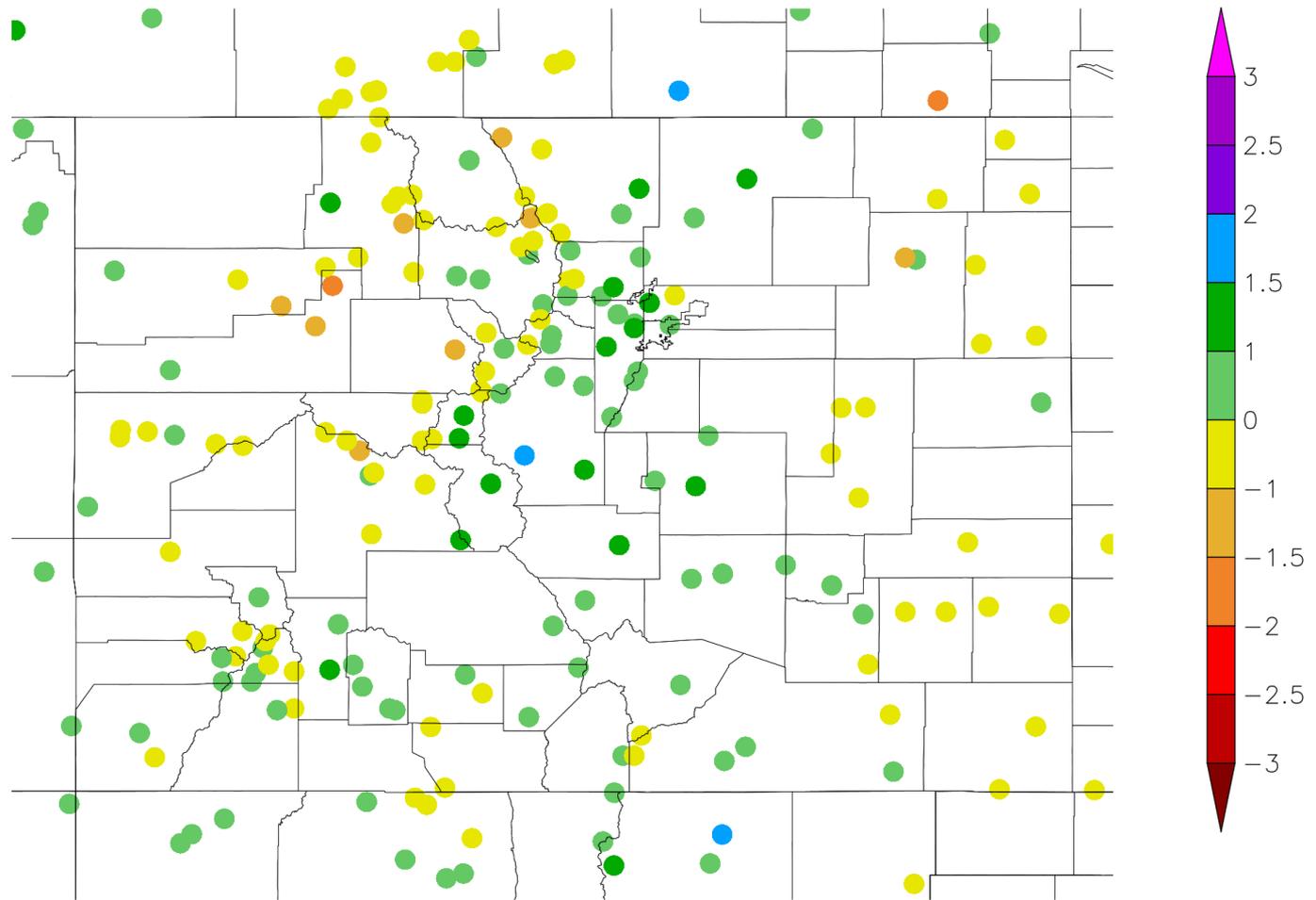
Richard Heim
 NCEI/NOAA



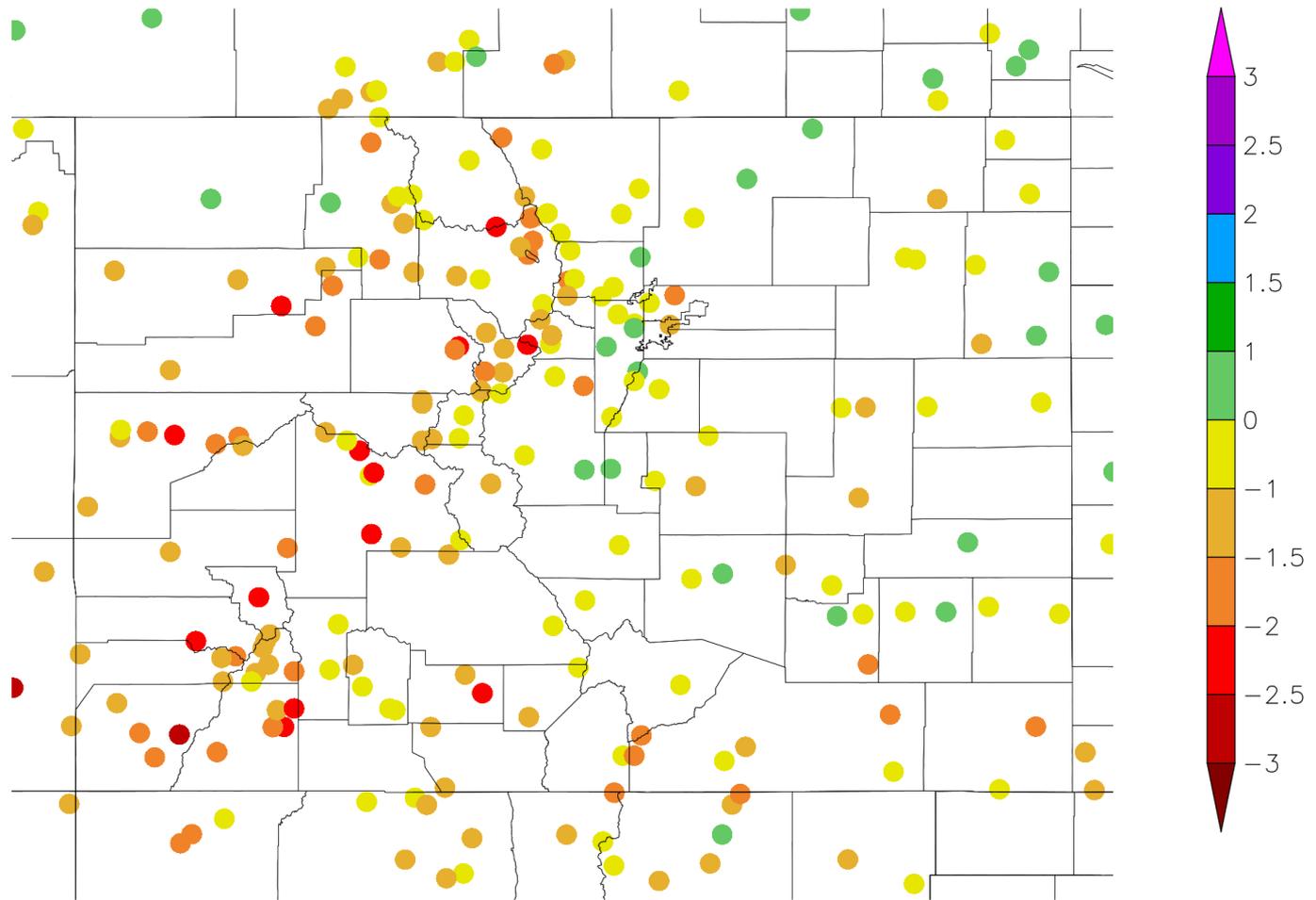
droughtmonitor.unl.edu

90 Day SPI

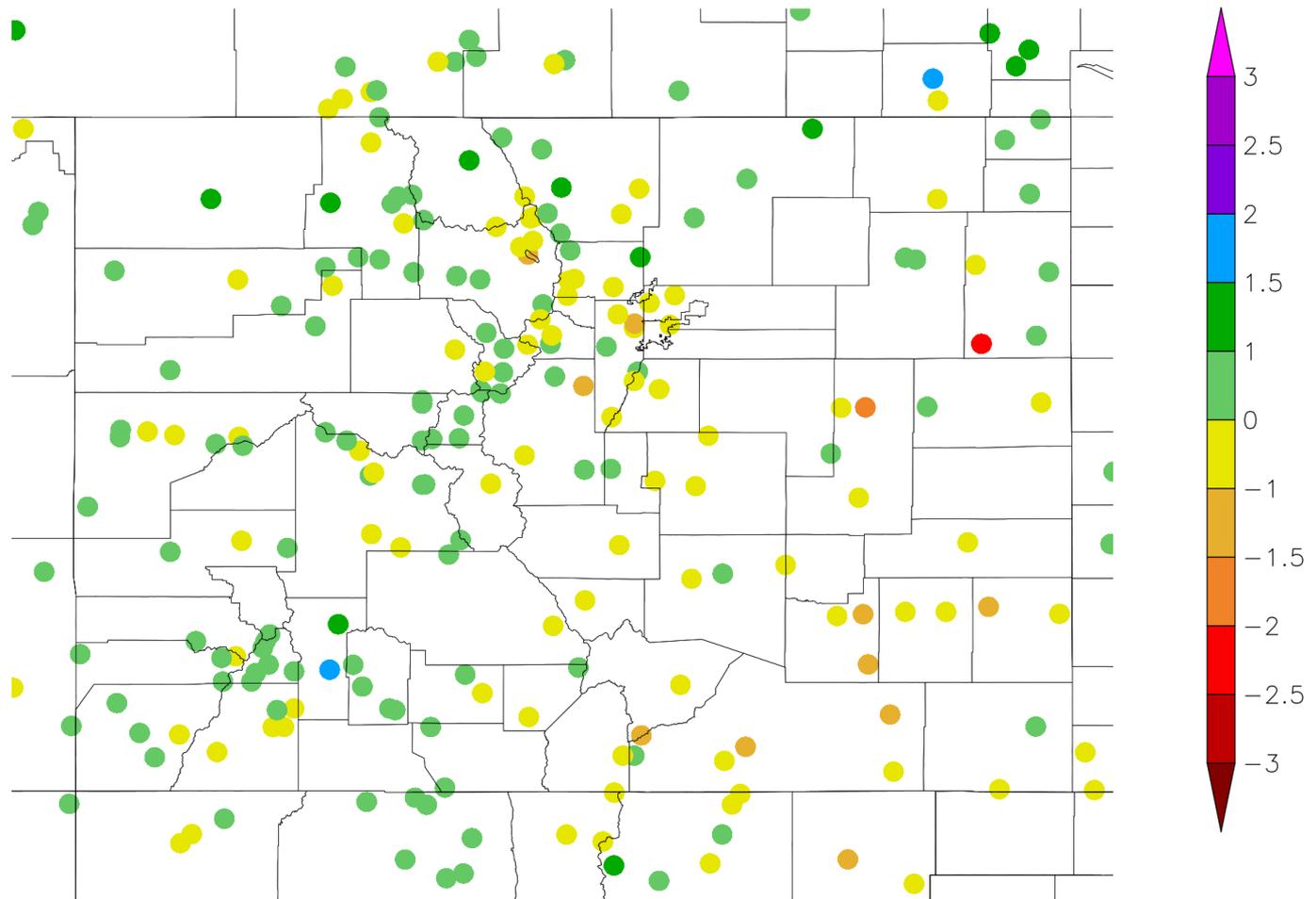
10/22/2019 – 1/19/2020



6 Month SPI 7/20/2019 - 1/19/2020



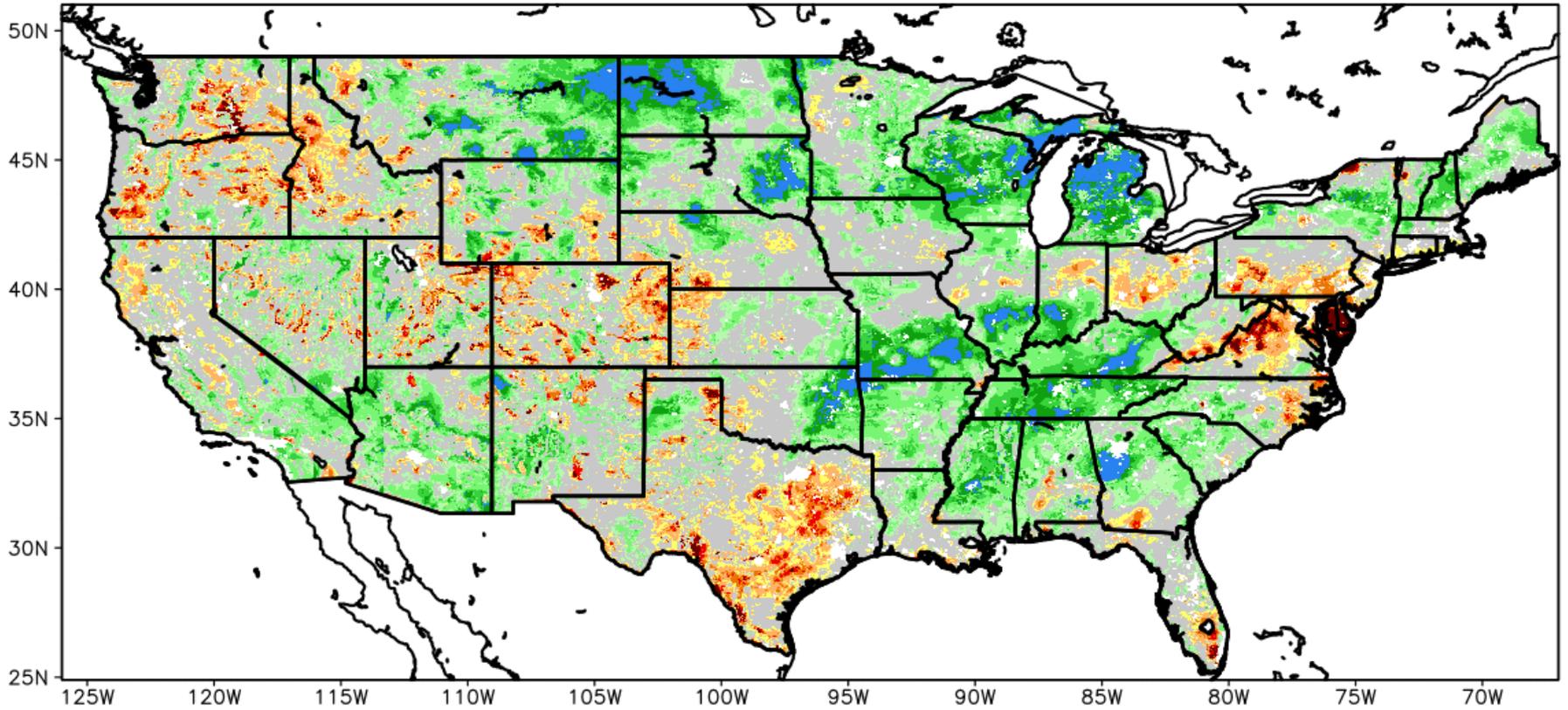
12 Month SPI 1/20/2019 - 1/19/2020



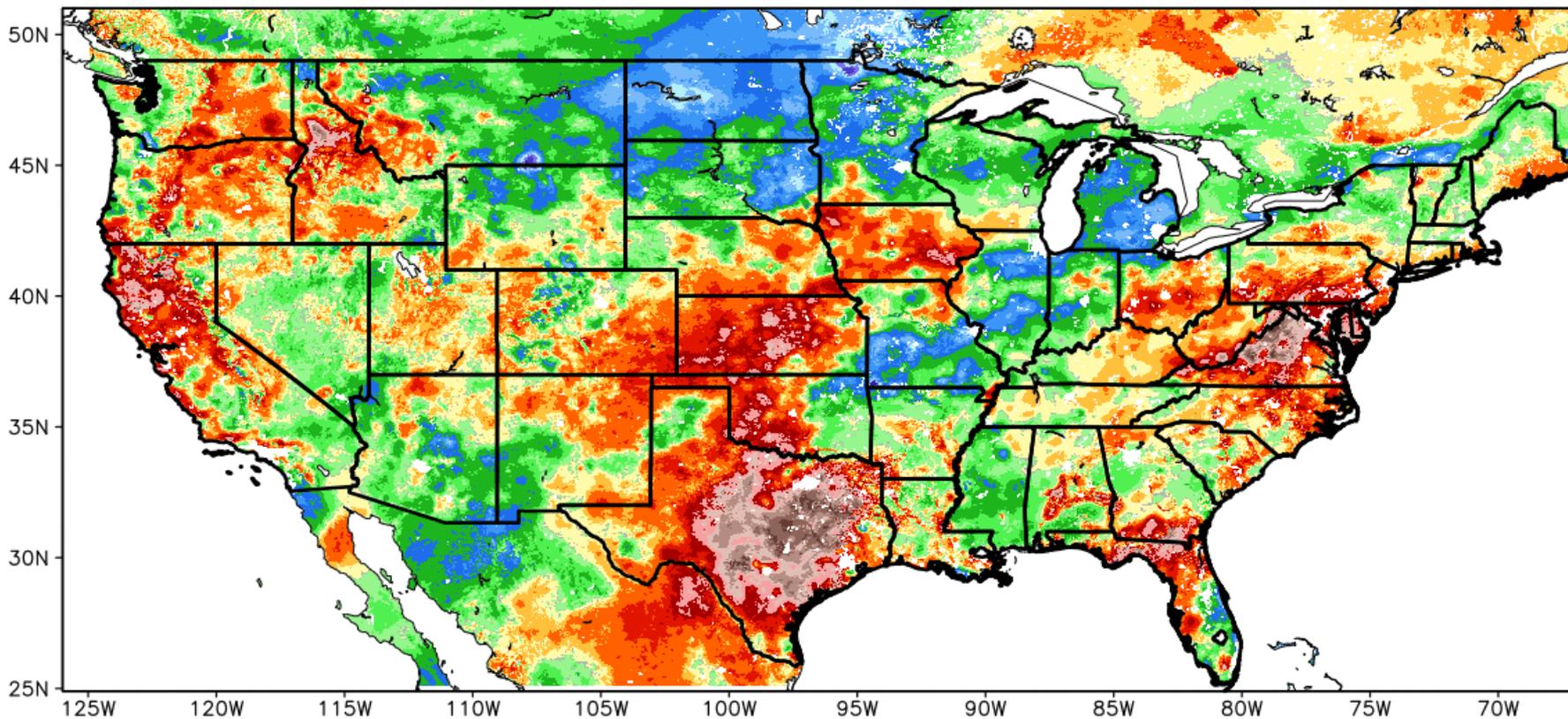
Impacts

- SE CO: Poor winter wheat planting conditions & concerning stand prior to dormancy. Moisture needed before green-up
- Central CO: Extended high elevation fire season. Decker fire burned well into October
- W CO: Soil moisture dry-down in fall means above average snowpack is needed for an average runoff
- High irrigation demand late summer/early fall
- Many drought impacts are suspended during winter, which makes recovery appraisal difficult

SPoRT-LIS 0-2 m RSM percentile valid 20 Jan 2020



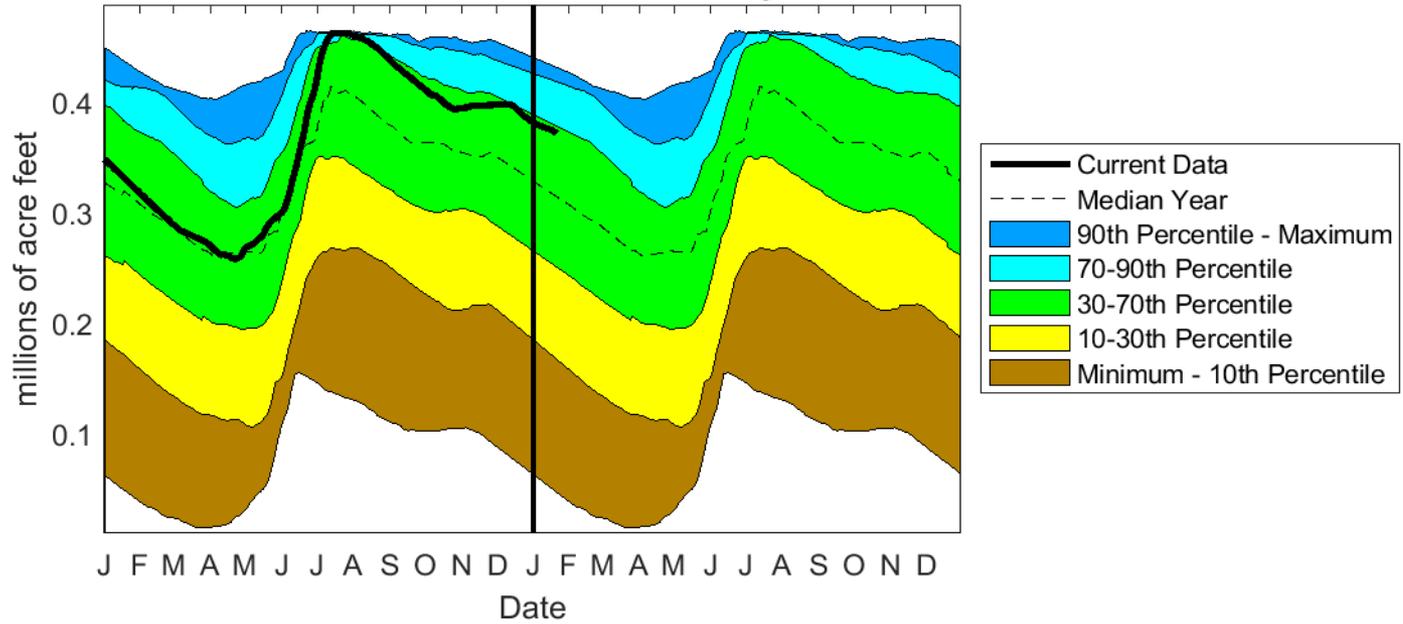
1-Year Difference in Column Relative Soil Moisture (%) valid 12z 20 Jan 2020



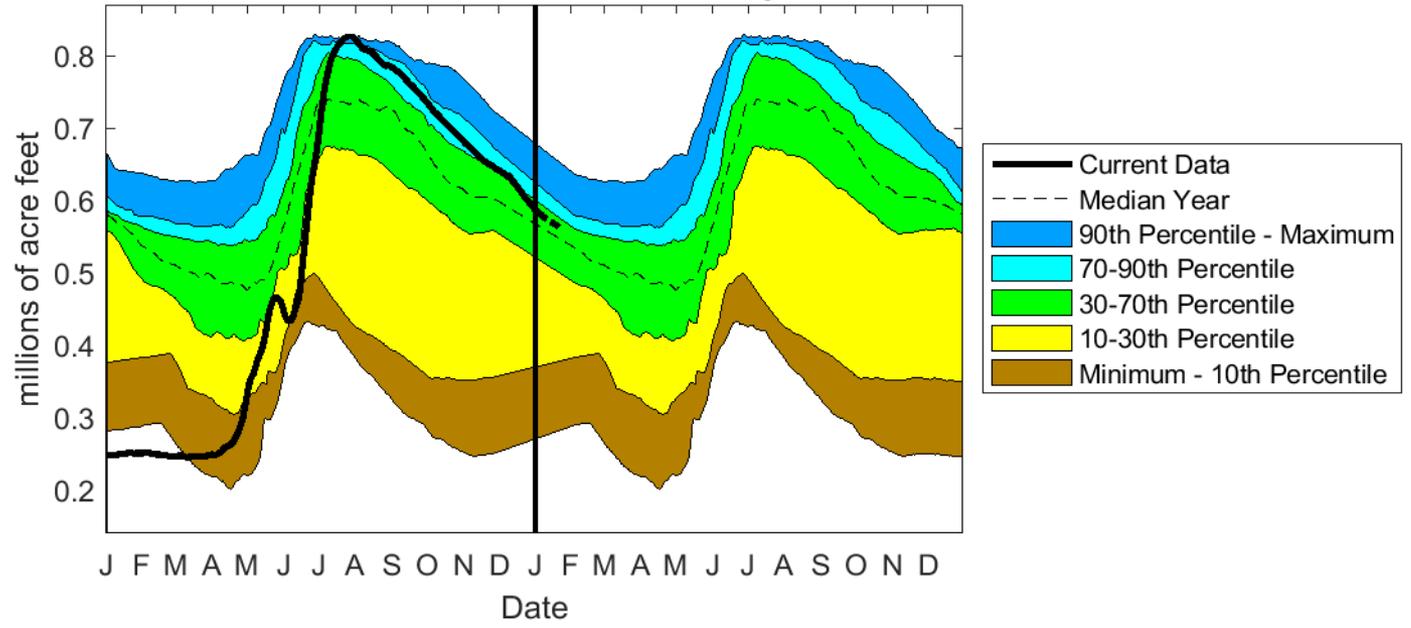
Reservoir and Soils Update



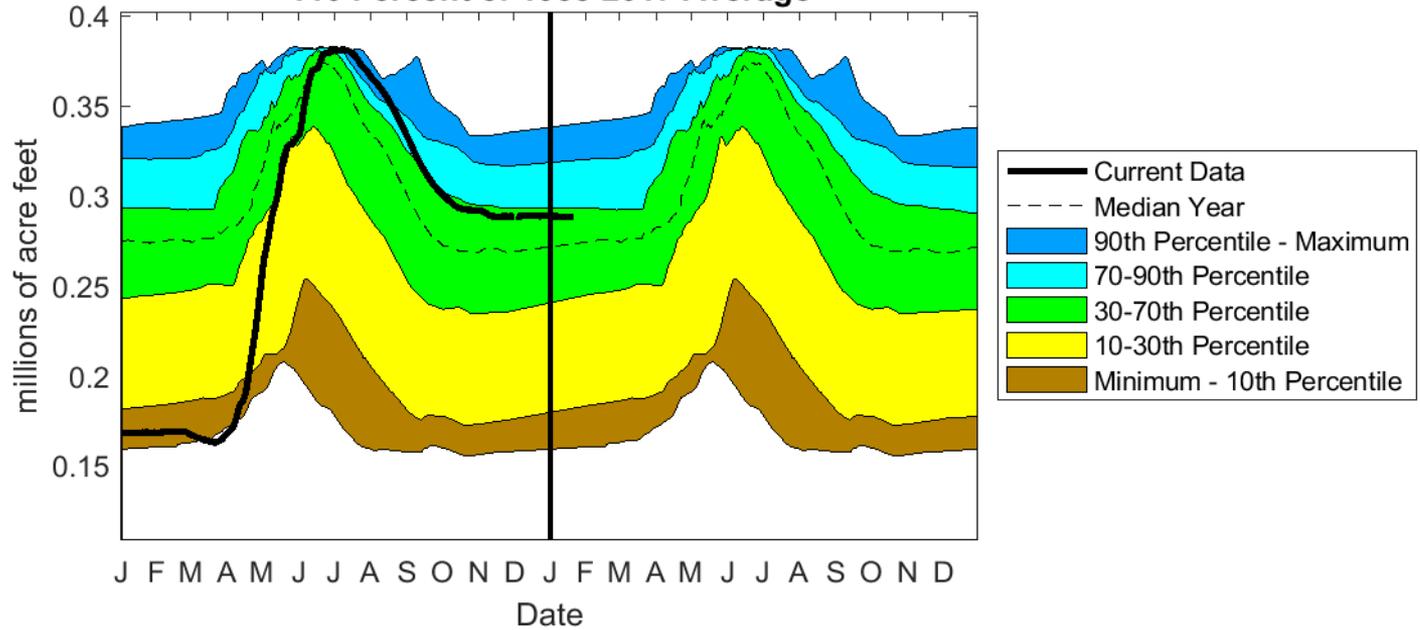
Lake Granby Level 2020-01-21
123 Percent of 1986-2017 Average



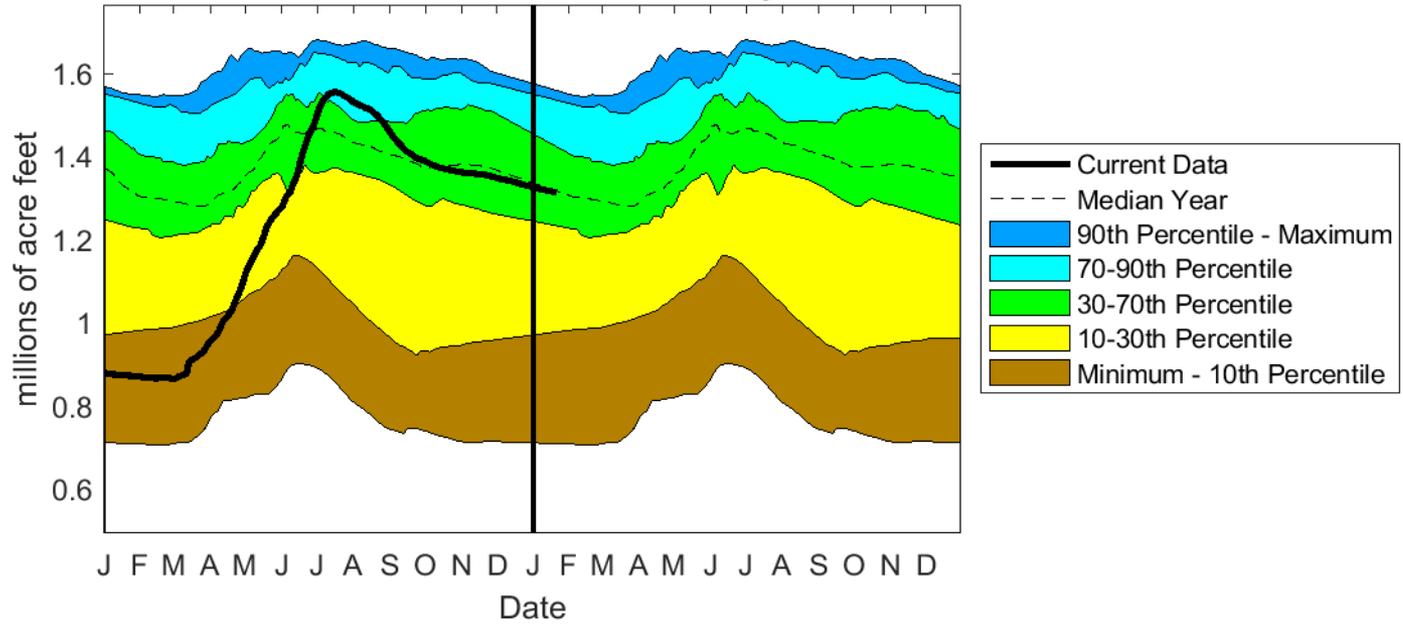
Blue Mesa Reservoir Level 2020-01-21
107 Percent of 1981-2017 Average

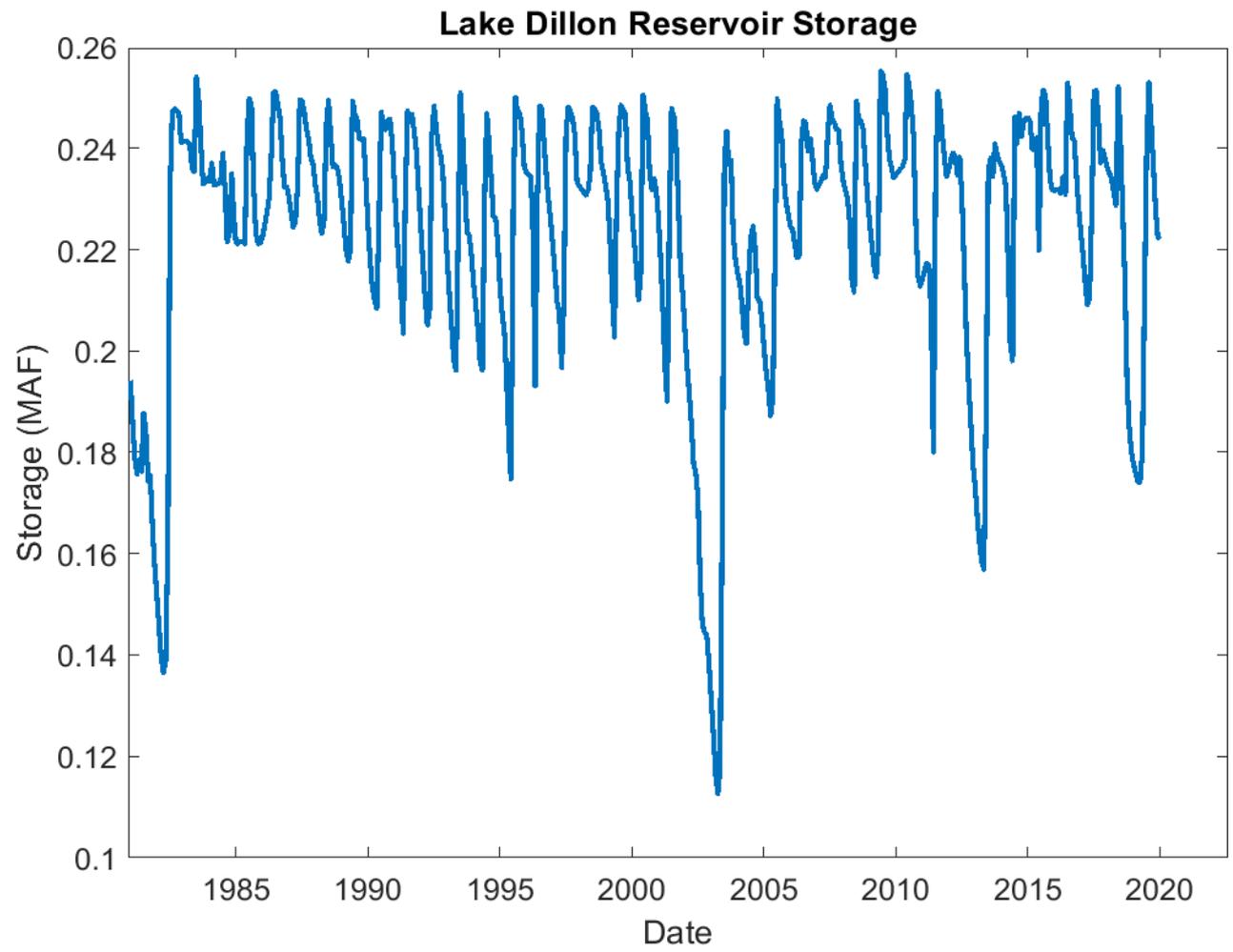


McPhee Reservoir Level 2020-01-21
110 Percent of 1988-2017 Average



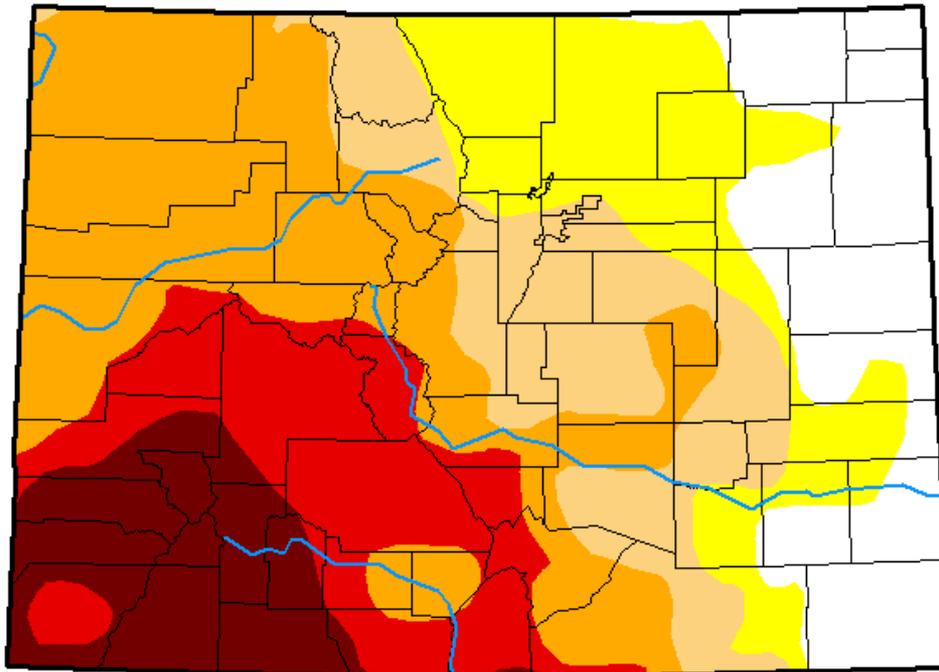
Navajo Reservoir Level 2020-01-21 101 Percent of 1981-2017 Average





U.S. Drought Monitor Colorado

...It could be worse!



January 15, 2019
(Released Thursday, Jan. 17, 2019)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.91	84.09	68.49	53.00	25.35	10.51
Last Week <i>01-08-2019</i>	14.89	85.11	69.48	54.91	25.69	10.51
3 Months Ago <i>10-16-2018</i>	16.64	83.36	67.83	59.23	39.09	13.64
Start of Calendar Year <i>01-01-2019</i>	17.94	82.06	66.26	54.91	27.11	11.22
Start of Water Year <i>09-25-2018</i>	14.19	85.81	72.30	64.41	48.47	16.21
One Year Ago <i>01-16-2018</i>	0.59	99.41	75.90	23.23	0.00	0.00

Intensity:

- 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. See accompanying text summary for forecast statements.

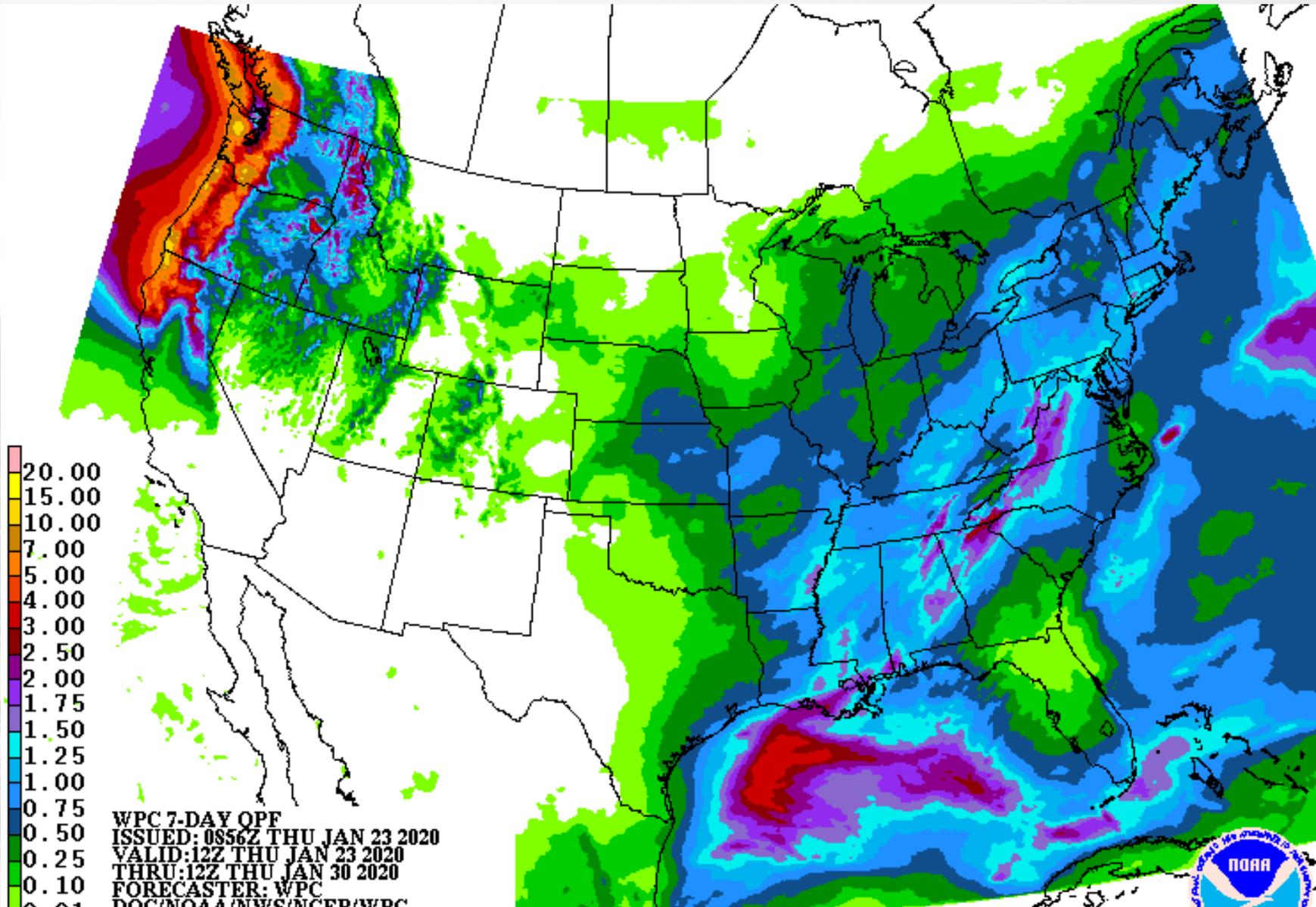
Author:
Brad Pugh
CPC/NOAA



<http://droughtmonitor.unl.edu/>

Part IV: Spring 2020



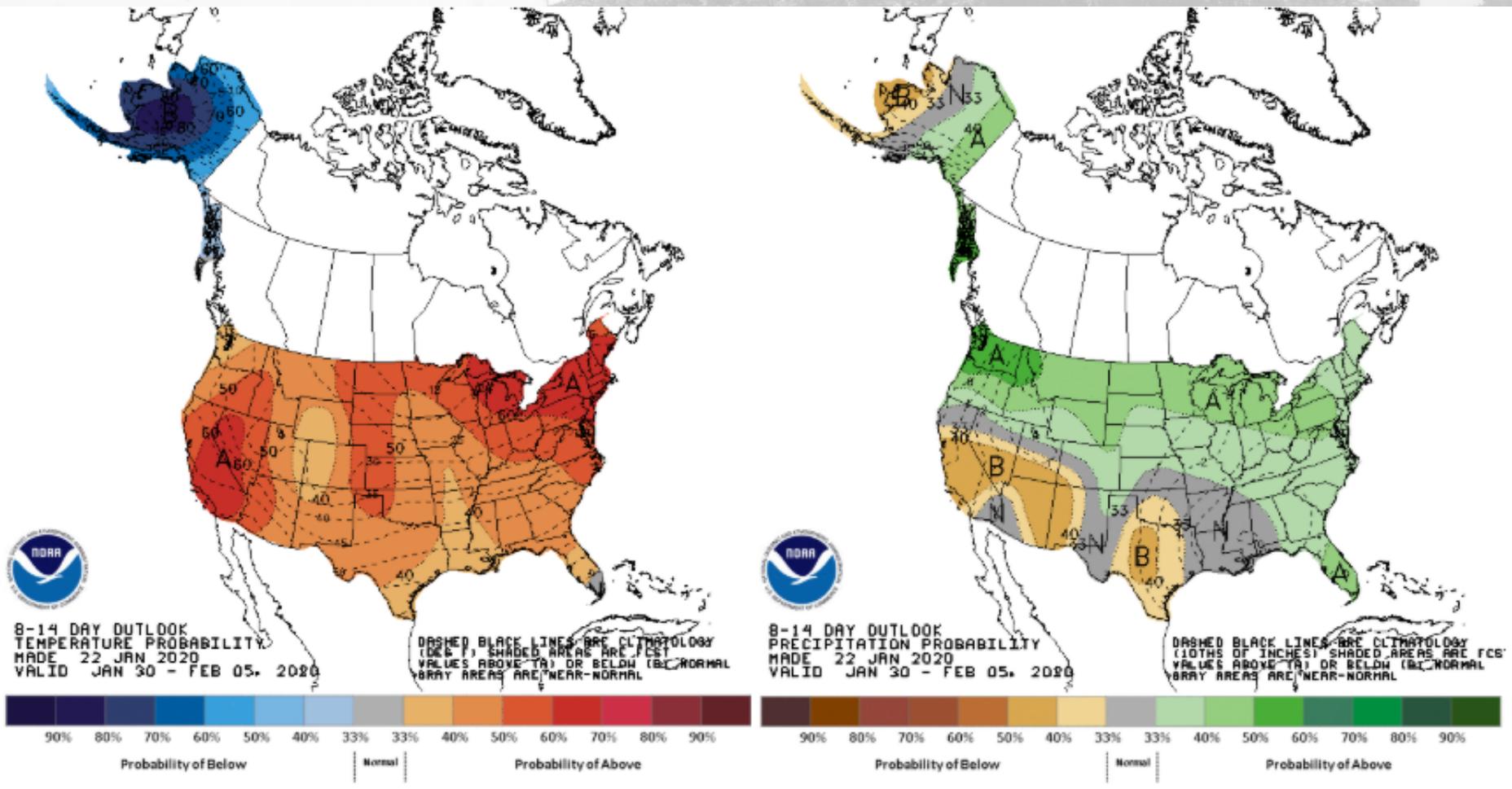


- 20.00
- 15.00
- 10.00
- 7.00
- 5.00
- 4.00
- 3.00
- 2.50
- 2.00
- 1.75
- 1.50
- 1.25
- 1.00
- 0.75
- 0.50
- 0.25
- 0.10
- 0.01

WPC 7-DAY OPF
ISSUED: 0856Z THU JAN 23 2020
VALID:12Z THU JAN 23 2020
THRU:12Z THU JAN 30 2020
FORECASTER: WPC
DOC/NOAA/NWS/NCEP/WPC

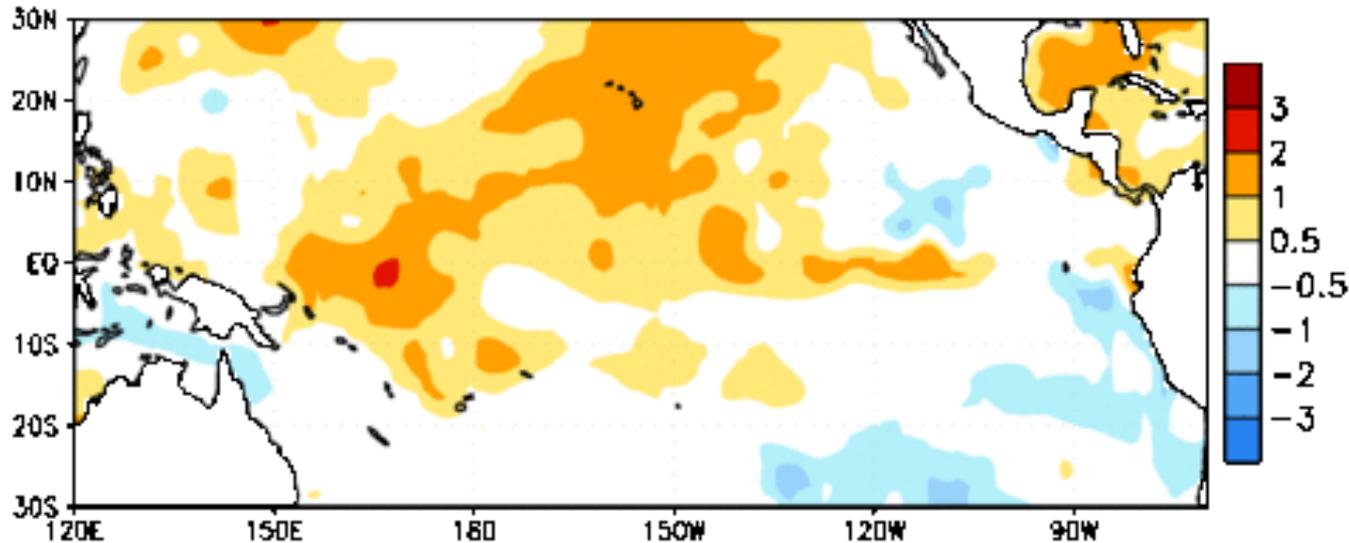


8-14 Day Outlook



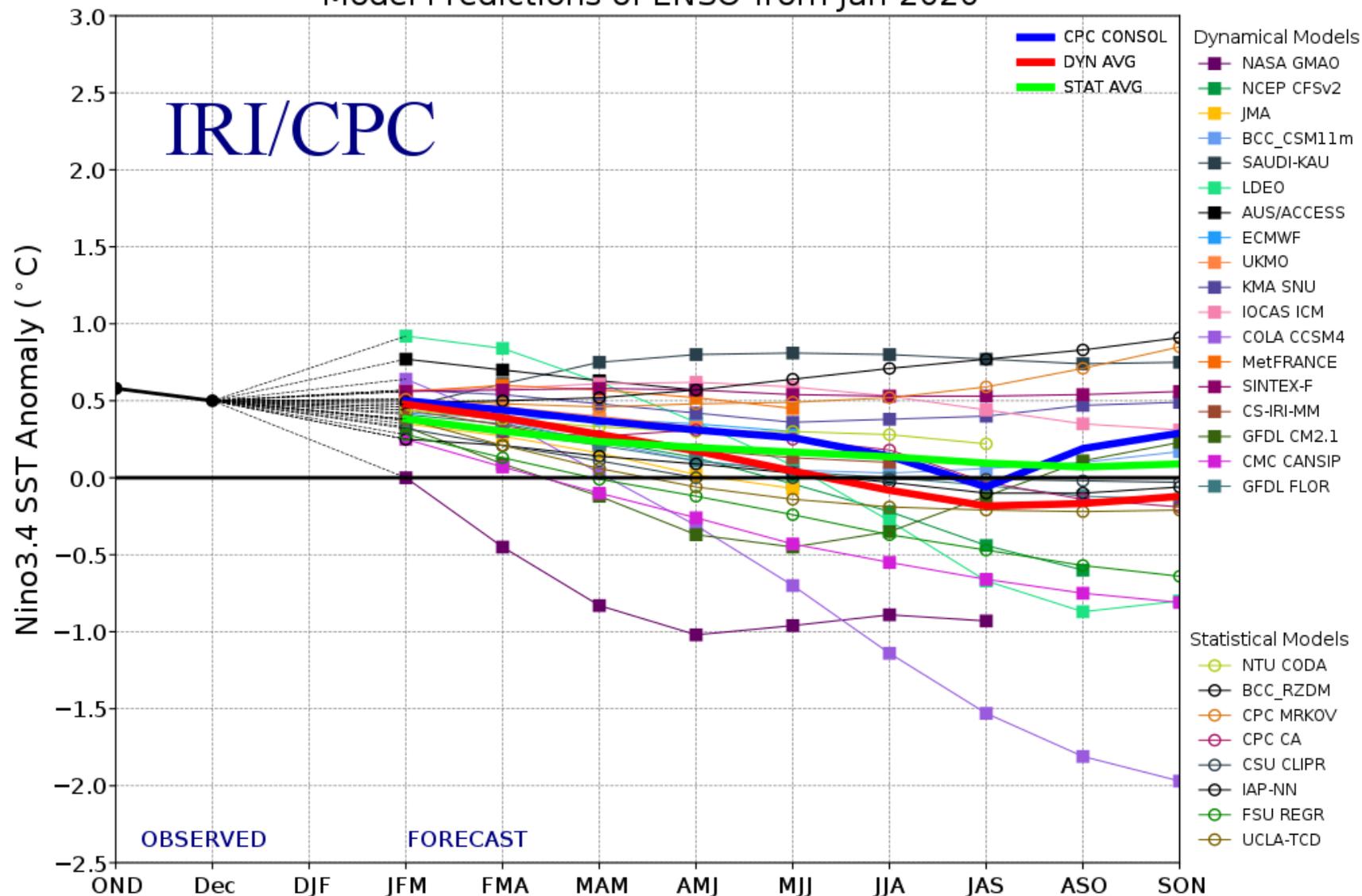
Current Sea Surface Temperature Pattern

Week centered on 30 OCT 2019
SST Anomalies (°C)

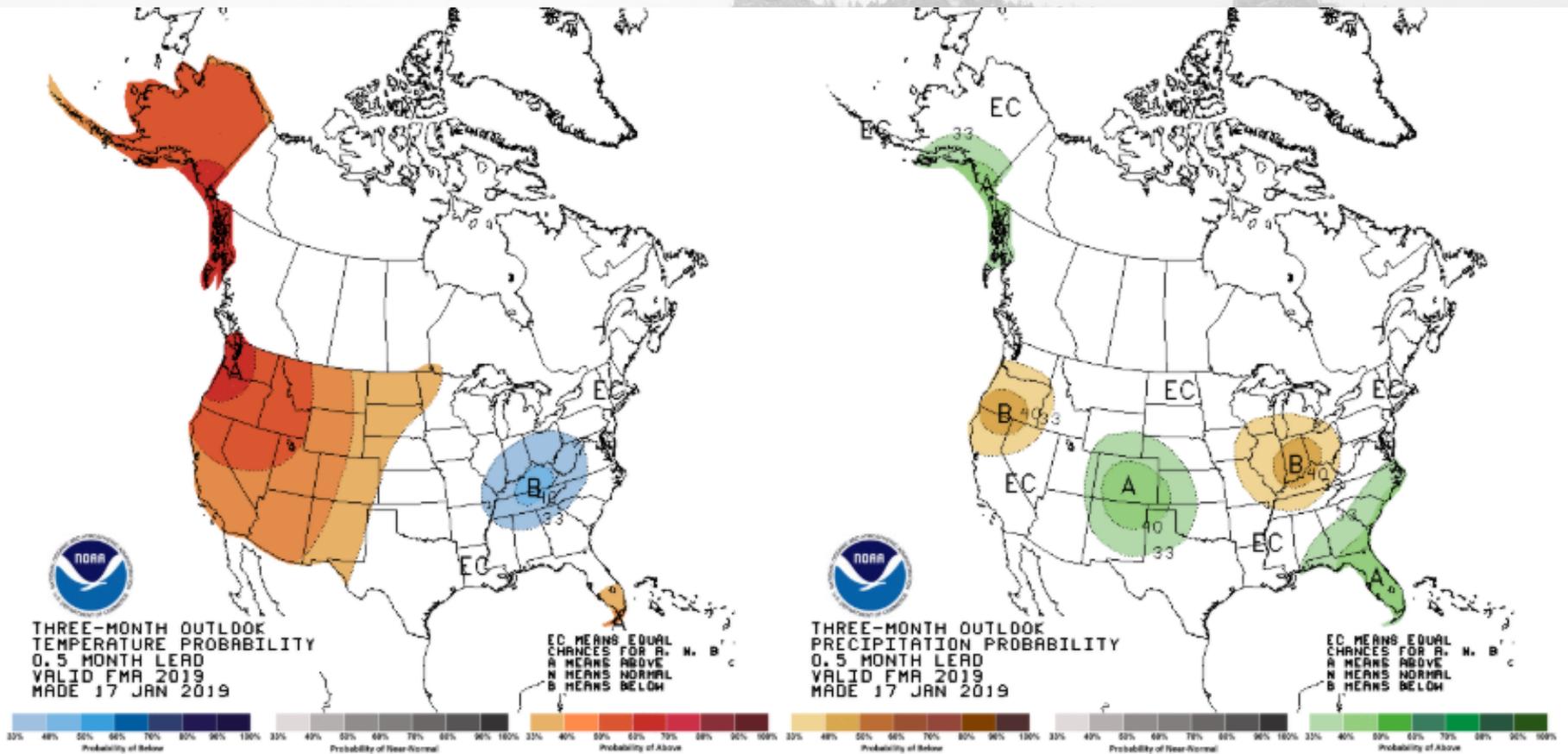


- Warmer signal eroding in central and eastern Pacific
- Models predicting neutral conditions for spring
- This reduces seasonal forecast skill

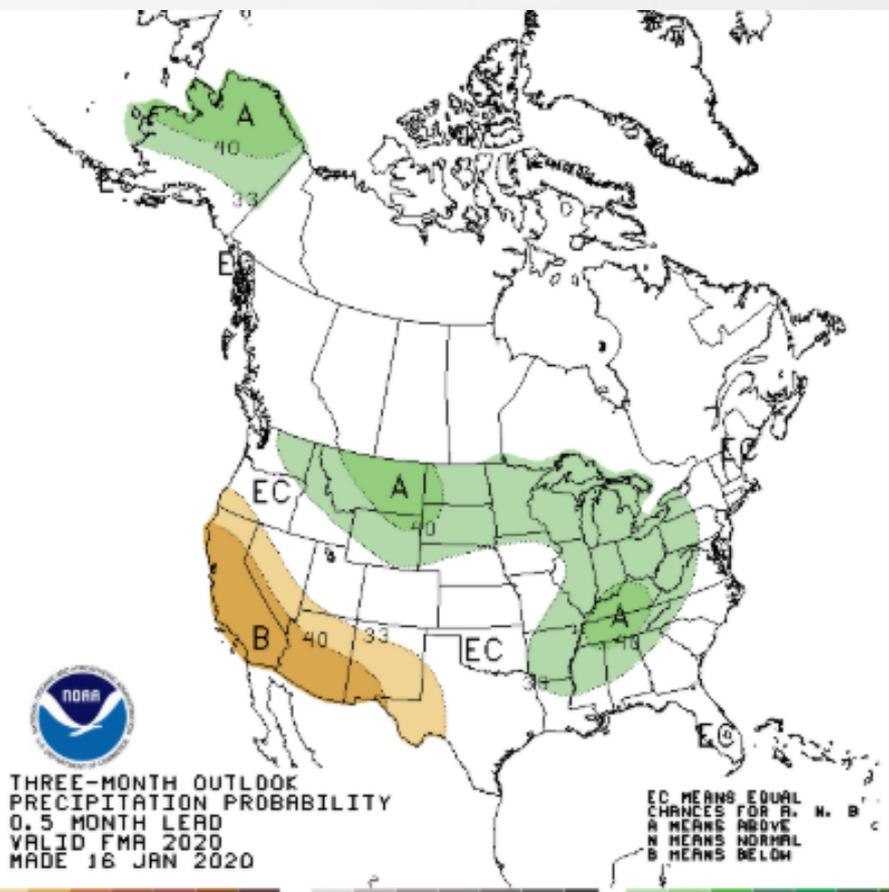
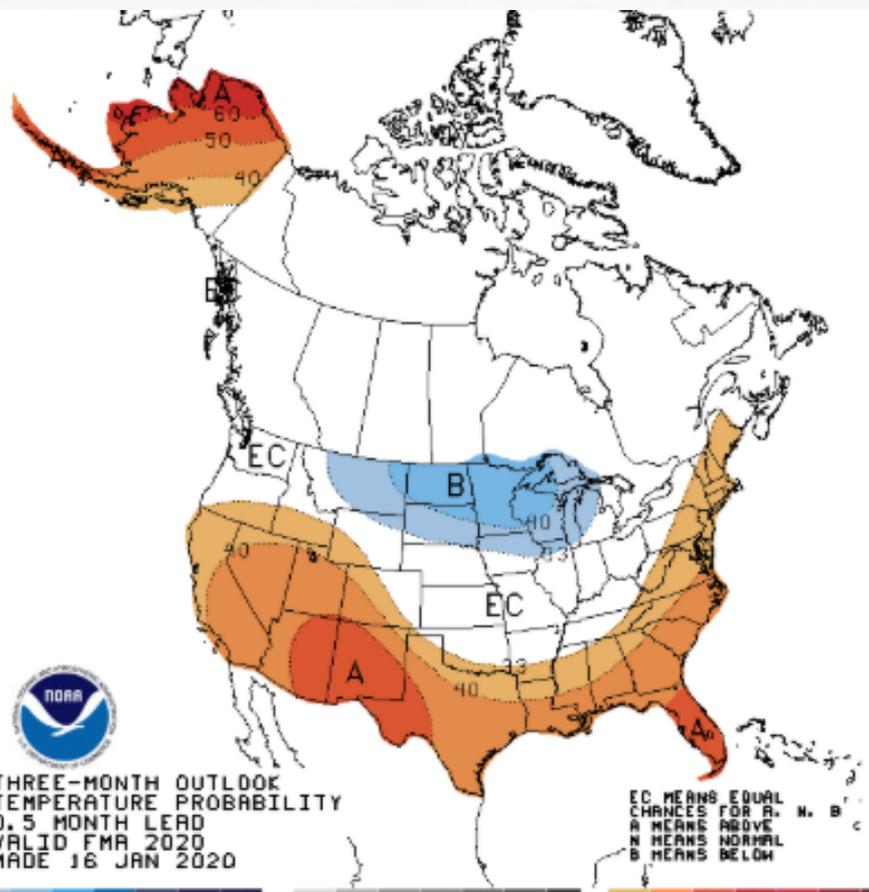
Model Predictions of ENSO from Jan 2020



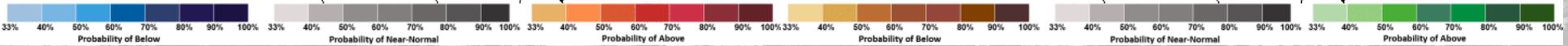
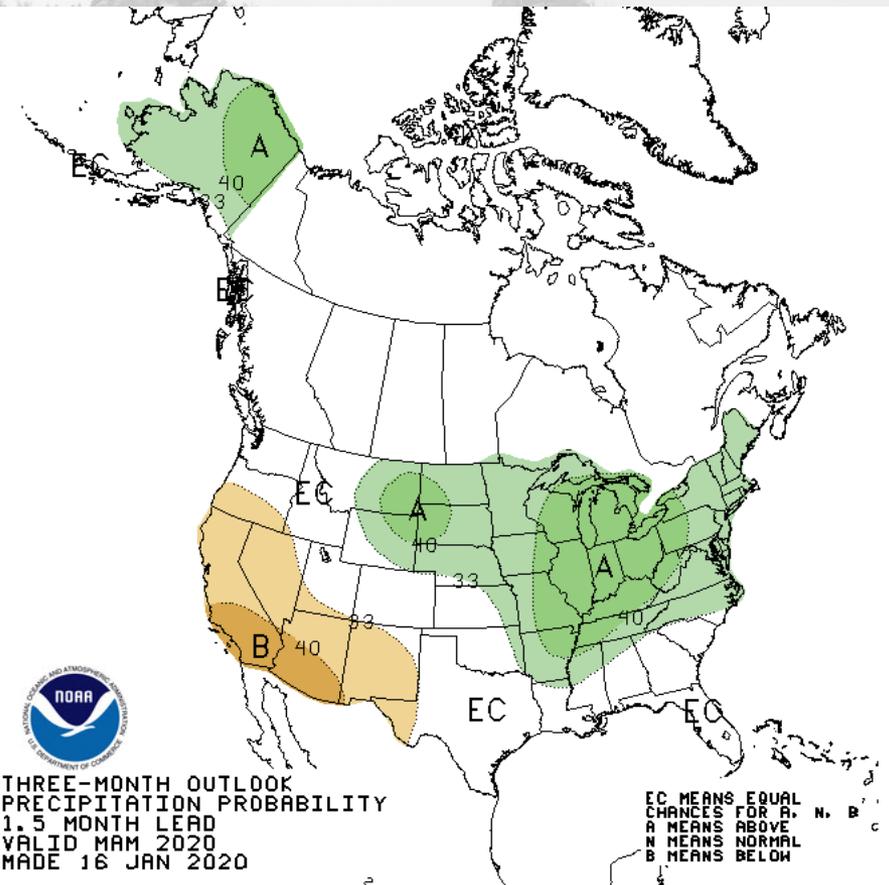
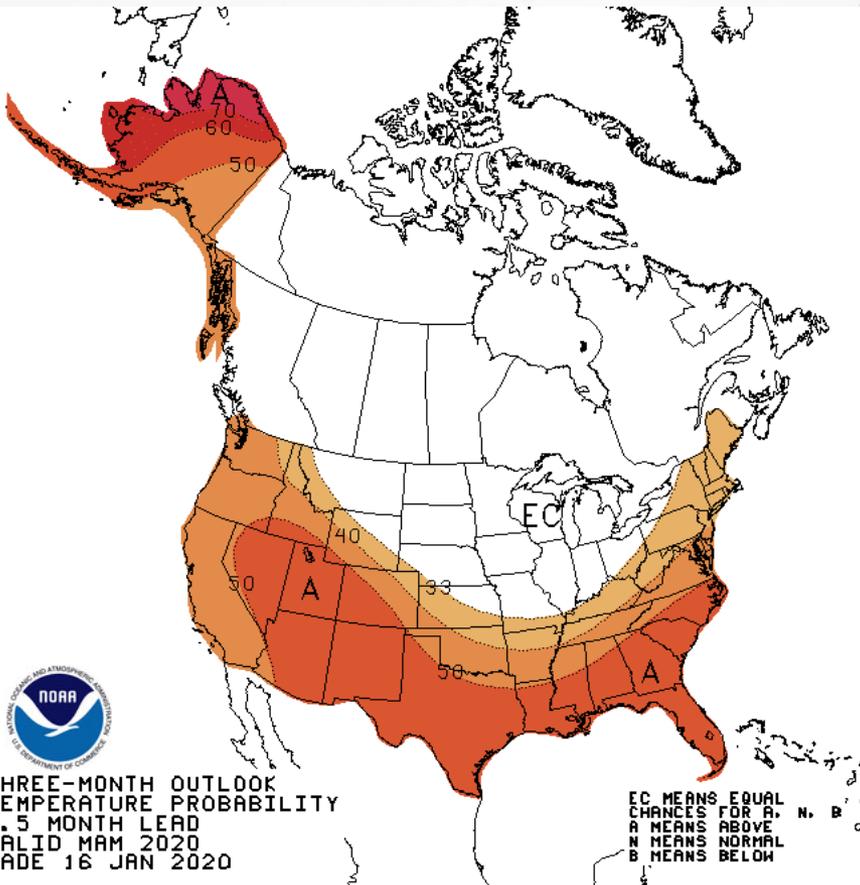
Last year's February-April Forecast



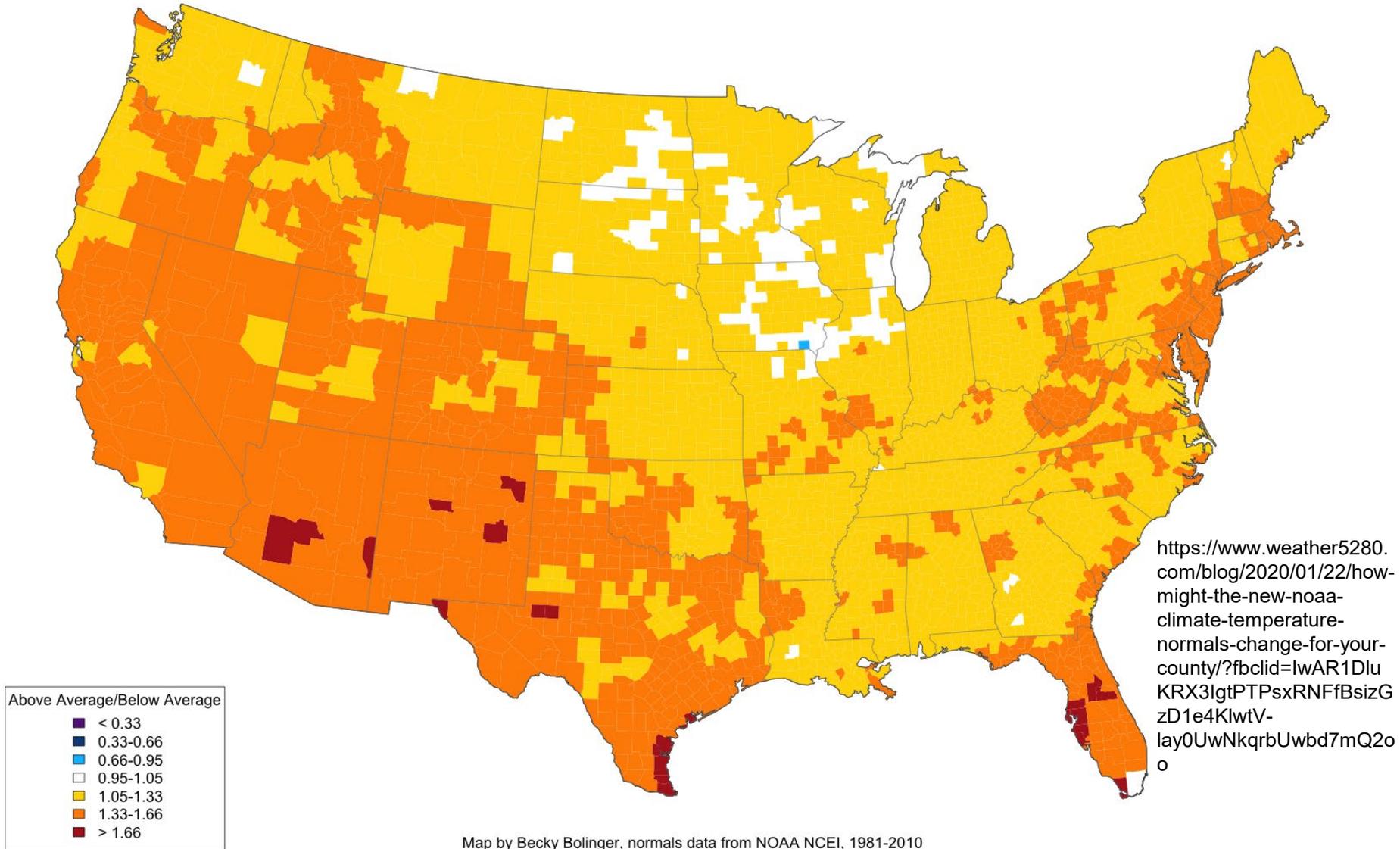
CPC February-April Outlook



March-May Outlooks: Influenced heavily by trends



Ratio of Above Average to Below Average Months, 1991-2019

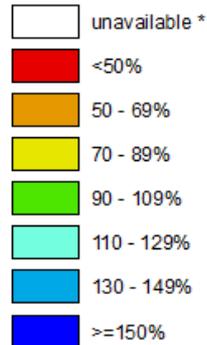


Colorado SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 21, 2020

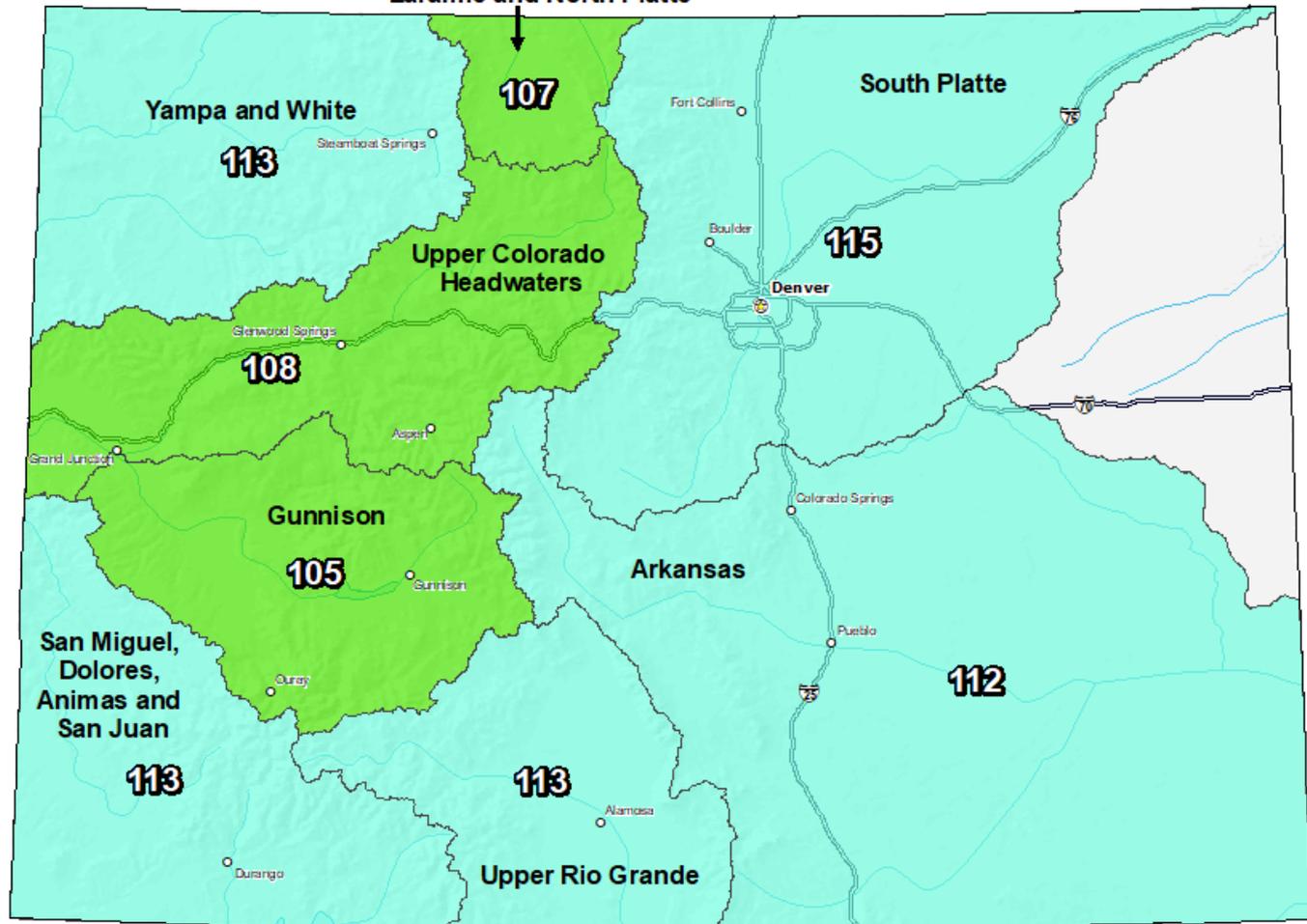
Laramie and North Platte

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year

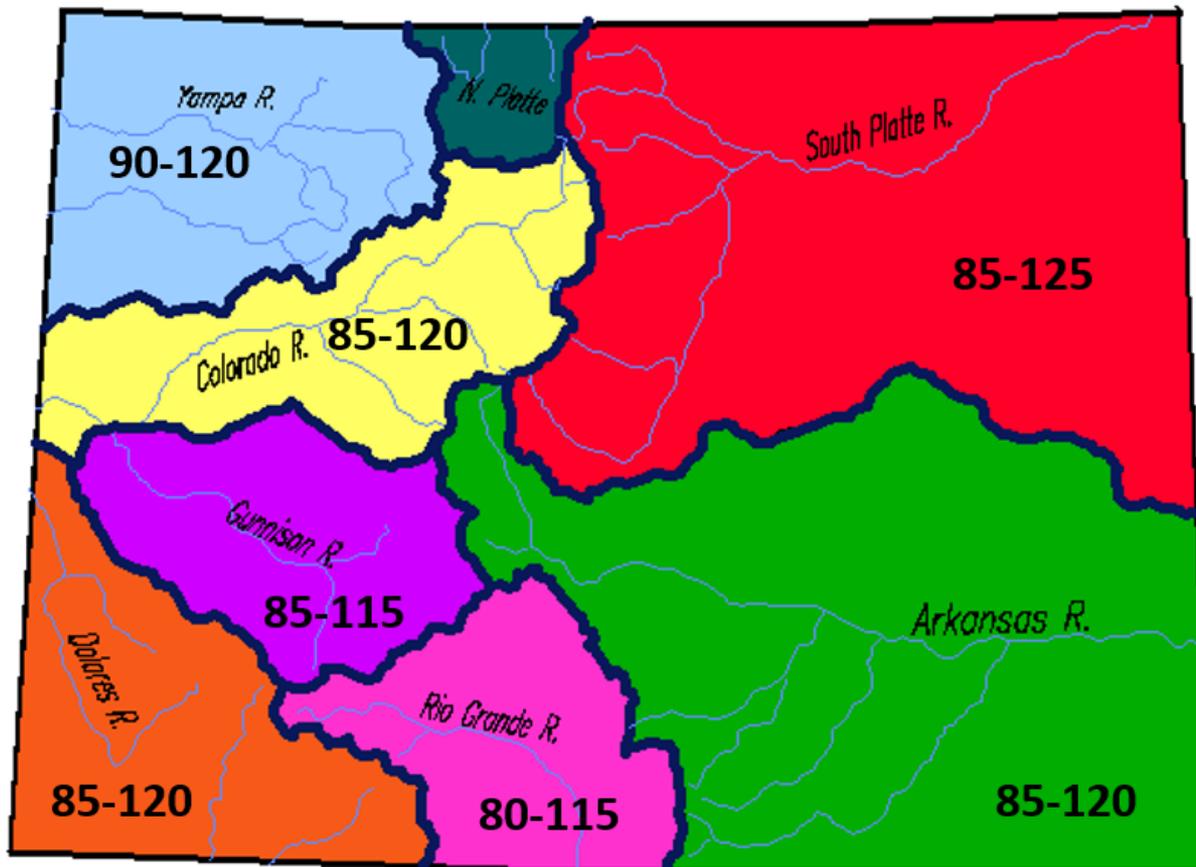
*Provisional Data
Subject to Revision*



The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

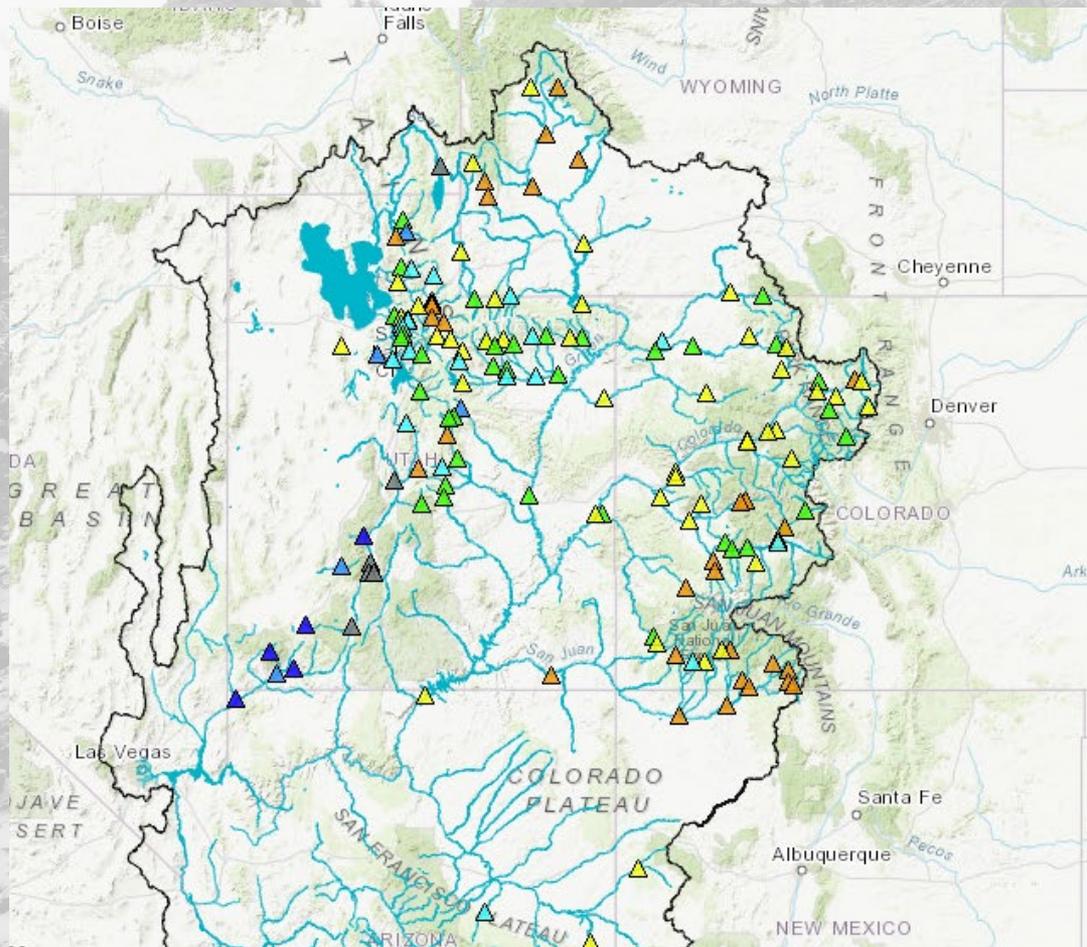
Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>

Peak Snowpack Projection 20-80th percentile range



- Snowpack likely to peak in normal range
- This does not cover the true range of variability
- More optimistic about northern basins based on outlook
- Favoring numbers a little on the lower end of average for southern basins

Colorado Basin River Forecast Center



▶ River Conditions

▶ Snow Conditions

▼ Water Supply Forecasts

First of Month Forecast Date: 2020-1-1

[Help](#)

Latest Model Run Date: 2020-01-21

Show [Hide Other Types](#)

- First of Month Forecast Percent Average
- First of Month Forecast Percent Median
- Latest Model Guidance Percent Average
- Latest Model Guidance Percent Median

- ▲ < 30%
- ▲ 30-50%
- ▲ 50-70%
- ▲ 70-90%
- ▲ 90-100%
- ▲ 100-110%
- ▲ 110-130%
- ▲ 130-150%
- ▲ 150-200%
- ▲ 200-300%
- ▲ 300-500%
- ▲ >500%
- ▲ Regulated
- ▲ No Forecast

CBRFC favors streamflow reductions based on dry fall soils

Takeaways

- Thus far, January has been dry for much of the state, but snowpack continues to make slow/steady progress
- Current snowpack is holding slightly above average. This does not guarantee an above average runoff given our dry soils
- While conditions are much improved from this time one year ago, moderate drought persists for southern Colorado. Most of the damage done last summer/fall
- Seasonal predictions are somewhat hamstrung by ENSO-neutral conditions. Both dynamical model output, and loss of El Niño reduce our odds of cool/wet extremes. Concern warranted for southern Colorado

Colorado Climate Center

Thanks, and let's keep in touch!

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Viewing this, and previous WATF Briefings:

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

