Colorado Climate Center – *WATF Climate Update*

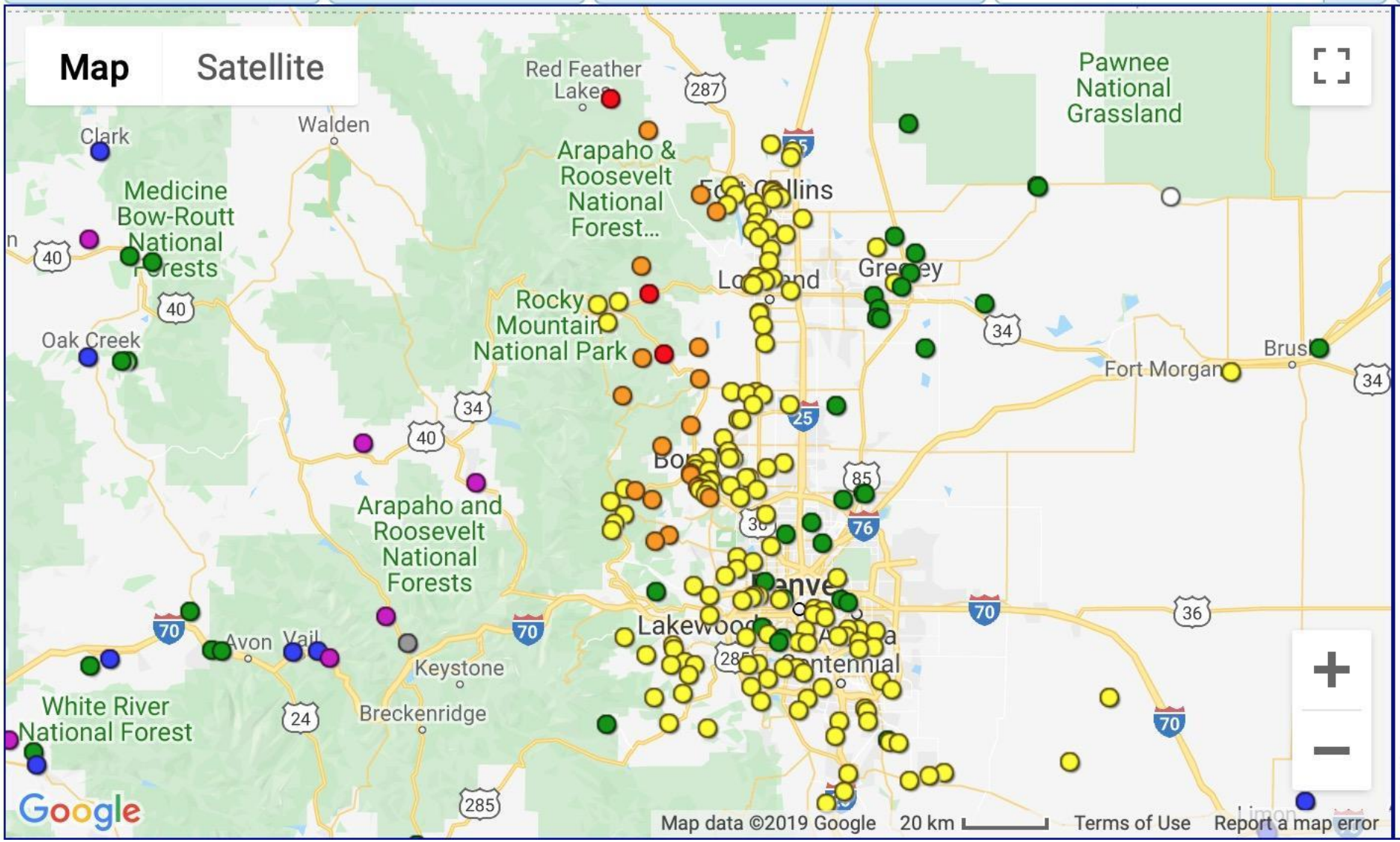
Becky Bolinger

Water Availability Task Force

November 26, 2019

ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Snowfall | USA | Colorado | 11/26/2019 | US Units | Update



CoCoRaHS Snowfall Map

Date: 11/26/2019
Country: USA
State: CO
Units: US Units

- Zero
- Trace
- 0.1 - 1.6 in.
- 1.7 - 3.2 in.
- 3.3 - 8.0 in.
- 8.1 - 19.2 in.
- 19.3 - 28.8 in.
- 28.9 - 32.0 in.

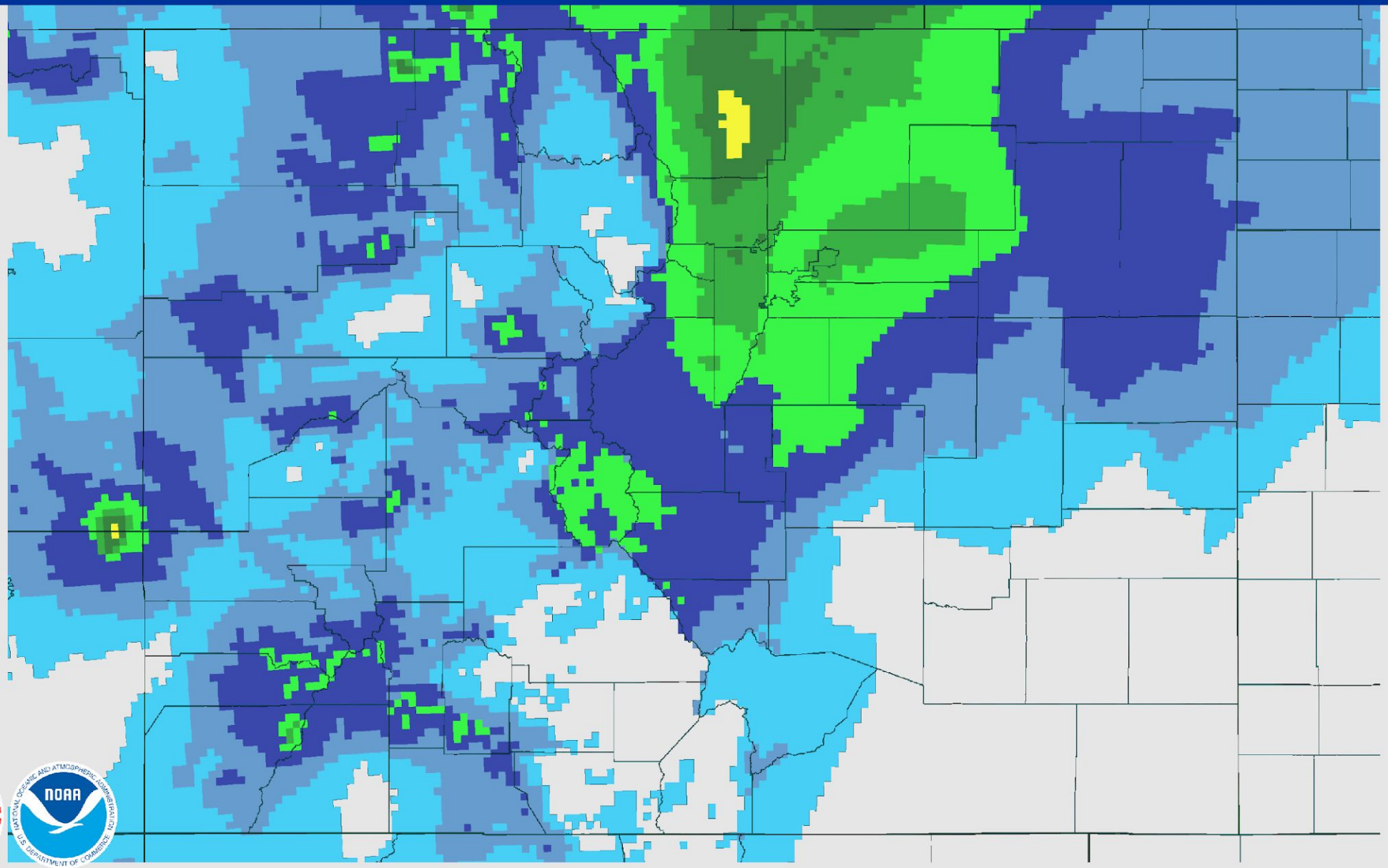
☐ Show US Active Fire Perimeters

Source: GEOMAC. GEOMAC wildfire data layers courtesy of the U.S. Geological Survey.

November 26, 2019 1-Day Observed Precipitation

Created on: November 26, 2019 - 16:14 UTC

Valid on: November 26, 2019 12:00 UTC



COLORADO CLIMATE CENTER

In Water Year 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.

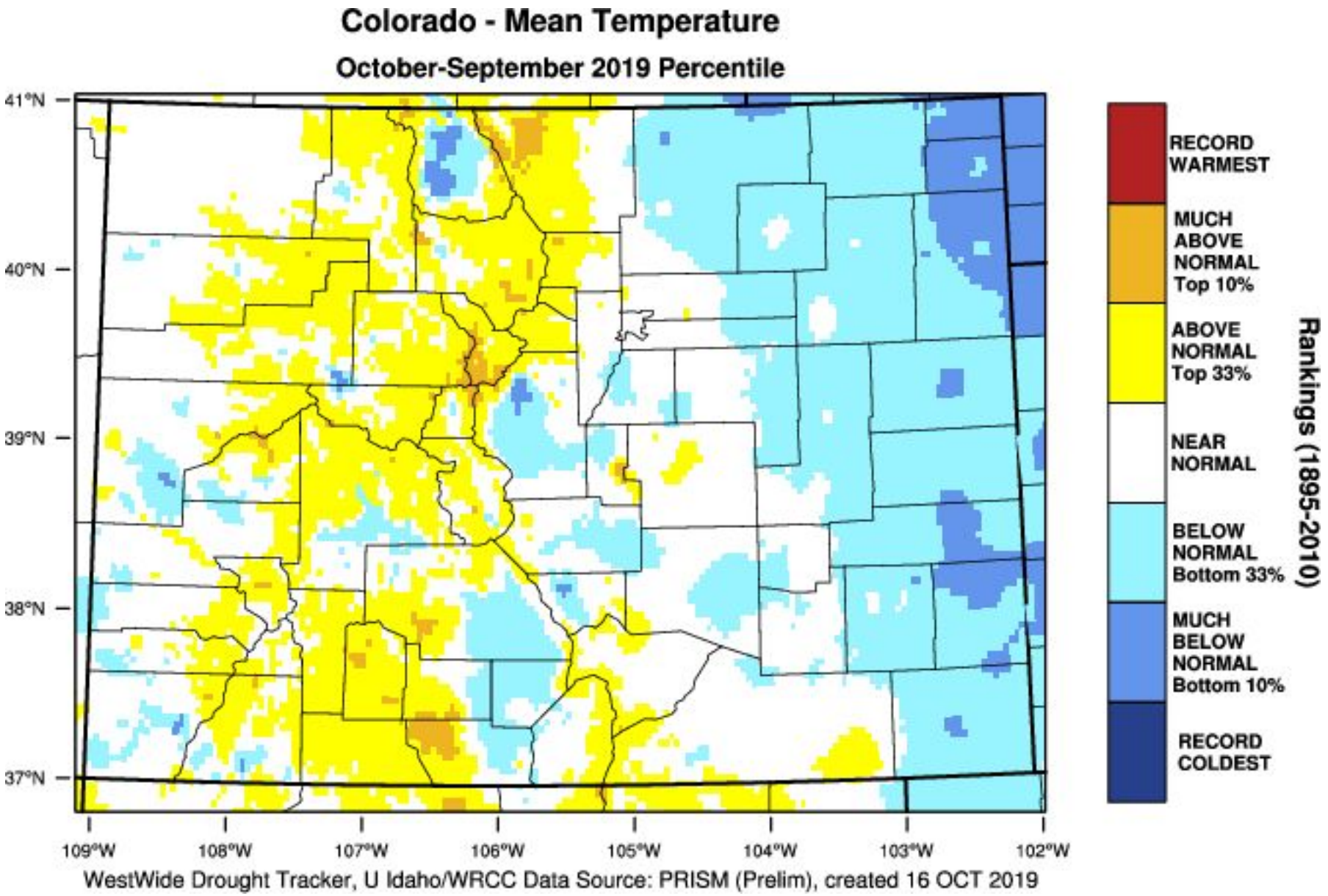
Read the full report of this state record here: https://tinyurl.com/COTempRecord

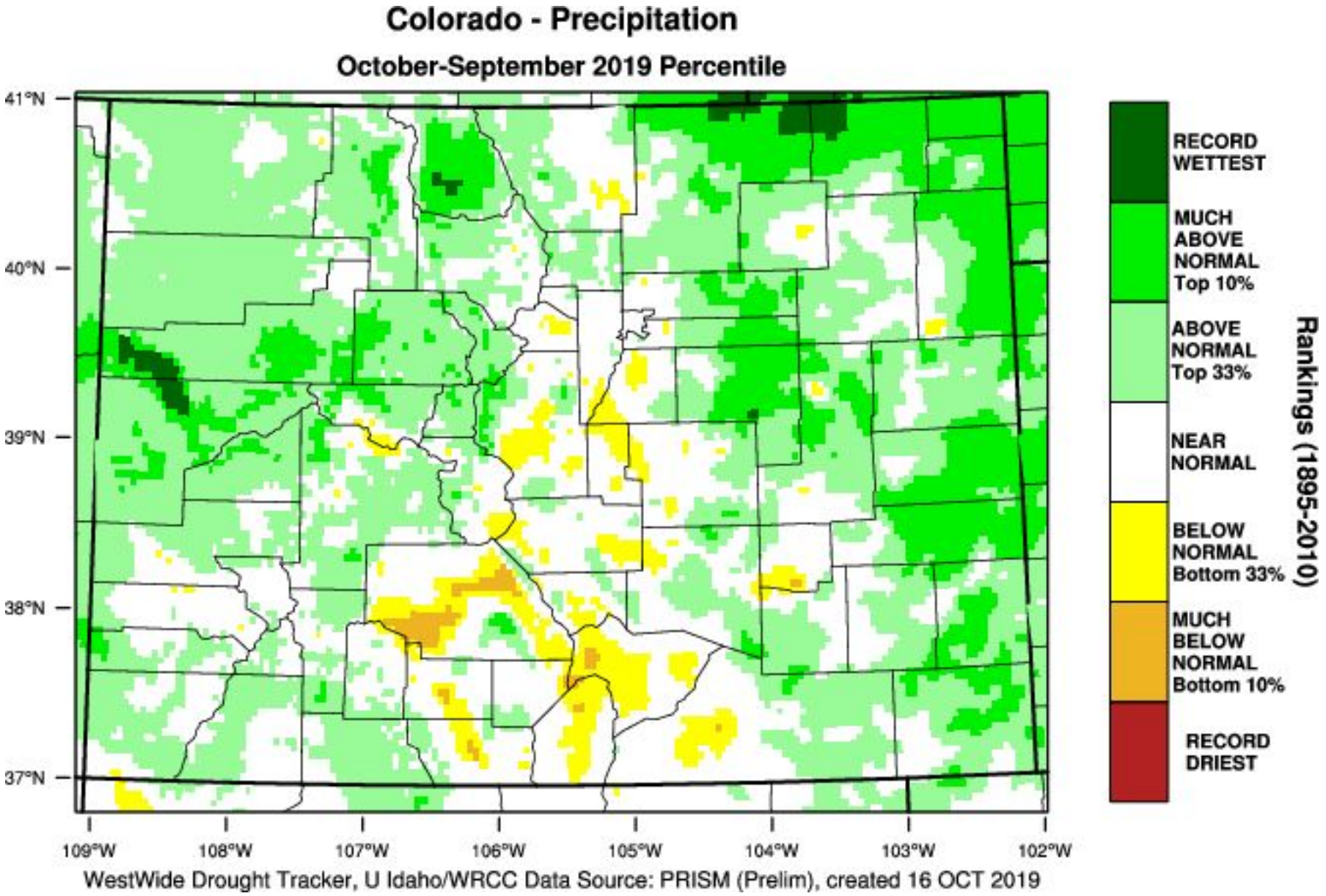
On the afternoon of August 13, 2019 the National Weather Service in Goodland warned of severe thunderstorms over eastern CO, capable of producing very large hail. Near the town of Bethune, one family watched as several chunks of large hail bounced in their front yard. While the initial size of the largest 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

Water Year 2019

Colorado's Climate in Review…


Colorado - Mean Temperature
October-September 2019 Percentile
41°N
40°N
39°N
38°N
37°N
109°W
108°W
107°W
106°W
105°W
104°W
103°W
102°W
RECORD WARMEST
MUCH ABOVE NORMAL Top 10%
ABOVE NORMAL Top 33%
NEAR NORMAL
BELOW NORMAL Bottom 33%
MUCH BELOW NORMAL Bottom 10%
RECORD COLDEST
Rankings (1895-2010)
WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2019


Colorado - Precipitation
October-September 2019 Percentile
41°N
40°N
39°N
38°N
37°N
109°W
108°W
107°W
106°W
105°W
104°W
103°W
102°W
RECORD WETTEST
MUCH ABOVE NORMAL Top 10%
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NEAR NORMAL
BELOW NORMAL Bottom 33%
MUCH BELOW NORMAL Bottom 10%
RECORD DRIEST
Rankings (1895-2010)
WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2019

CO STATEWIDE RANKING in 125-YEAR RECORD

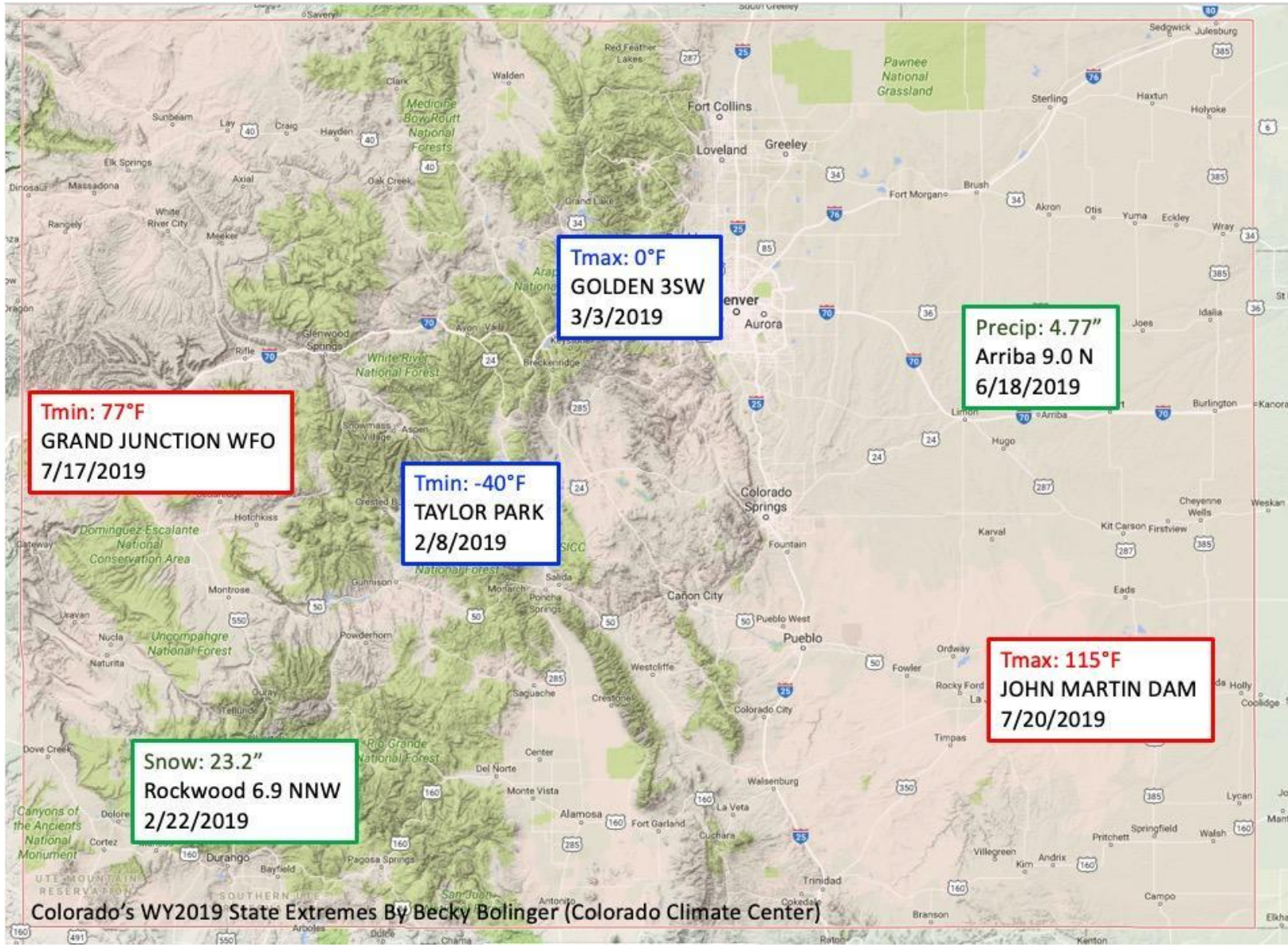
MONTH	T RANK	P RANK
Oct 2018	31st coolest	14th westtest
Nov 2018	41st coolest	near average
Dec 2018	near average	31st driest
Jan 2019	40th warmest	29th wettest
Feb 2019	29th coolest	17th wettest
Mar 2019	near average	**5th wettest**
Apr 2019	18th warmest	near average
May 2019	**5th coolest**	15th wettest
Jun 2019	near average	42nd wettest
Jul 2019	22nd warmest	29th driest
Aug 2019	8th warmest	23rd driest
Sep 2019	**record warmest**	21st driest
Water Year	near average	34th wettest

From NOAA NCEI's National Temperature and Precipitation Rank Maps:
www.ncdc.noaa.gov/sotc/national

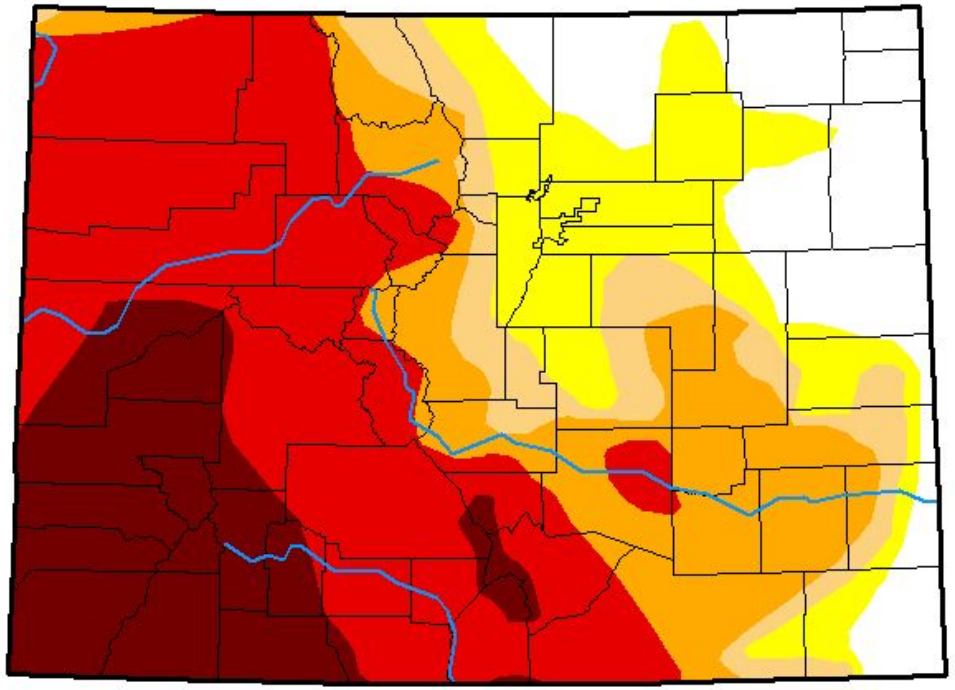
NUMBER OF DAILY AND MONTHLY STATION RECORDS BROKEN in CO

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

From NOAA NCEI's Select U.S. Records: www.ncdc.noaa.gov/extremes/records



U.S. Drought Monitor
Colorado



October 2, 2018
(Released Thursday, Oct. 4, 2018)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	14.19	85.81	72.30	64.41	48.47	16.21
Last Week *09-25-2018*	14.19	85.81	72.30	64.41	48.47	16.21
3 Months Ago *07-03-2018*	20.46	79.54	67.30	52.31	36.46	8.81
Start of Calendar Year *01-02-2018*	6.57	93.43	33.53	7.27	0.00	0.00
Start of Water Year *09-25-2018*	14.19	85.81	72.30	64.41	48.47	16.21
One Year Ago *10-03-2017*	70.54	29.46	3.70	0.00	0.00	0.00

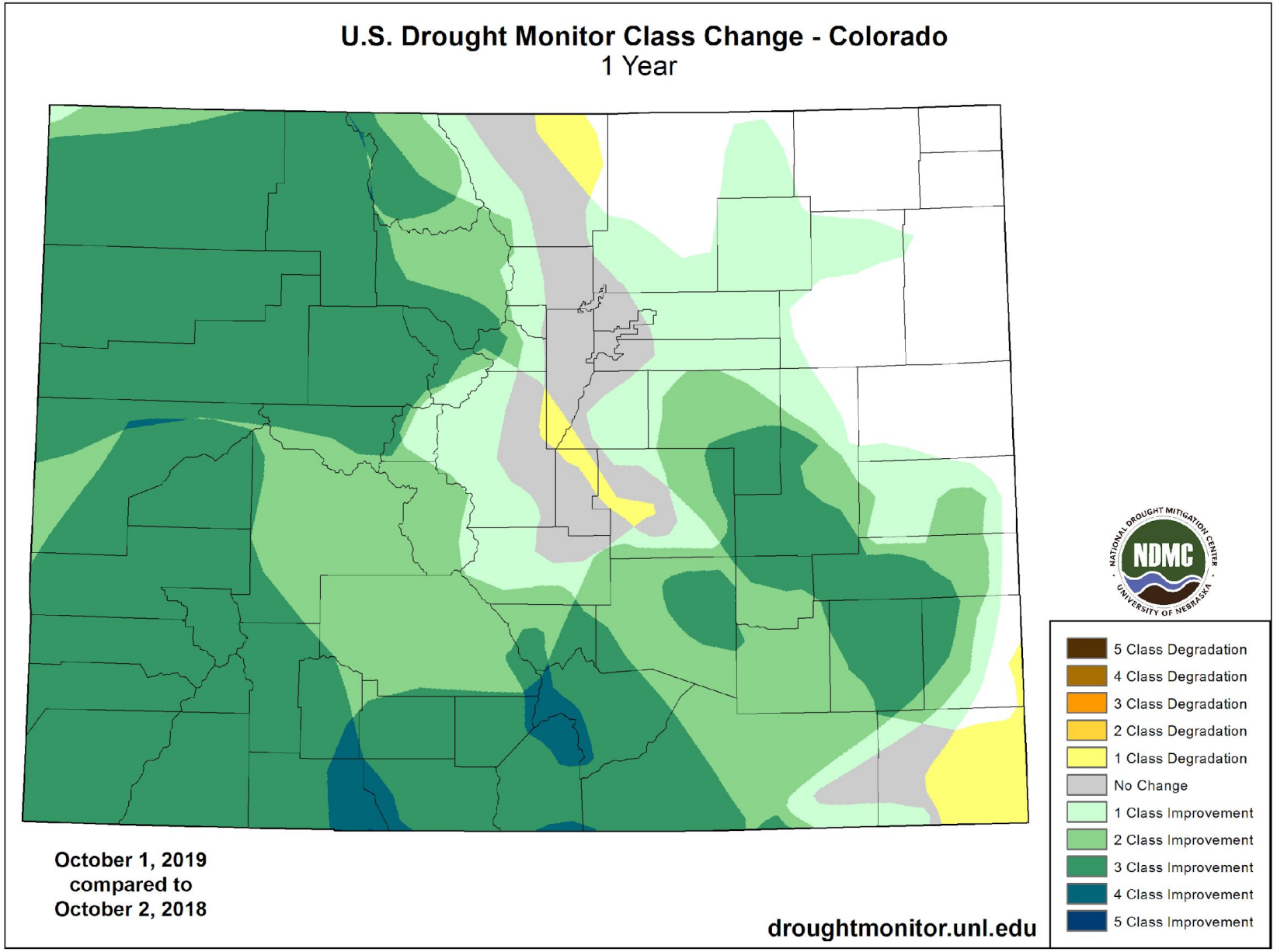
Intensity:

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

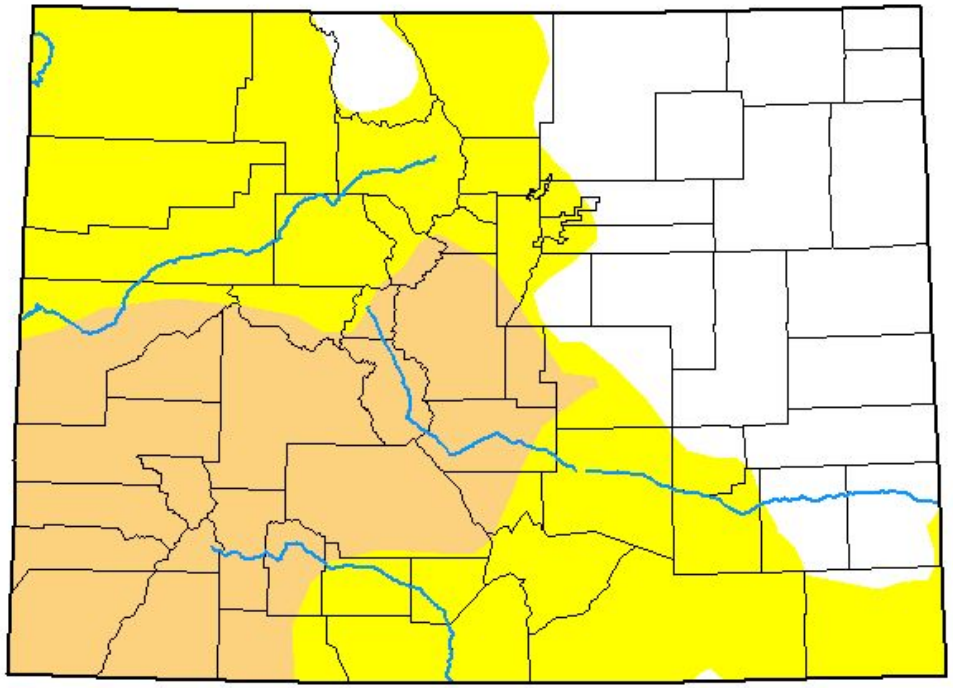
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
David Miskus
NOAA/NWS/NCEP/CPC

http://droughtmonitor.unl.edu/


U.S. Drought Monitor Class Change - Colorado
1 Year
October 1, 2019
compared to
October 2, 2018
droughtmonitor.unl.edu
NDMC
NATIONAL DROUGHT MITIGATION CENTER
UNIVERSITY OF NEBRASKA
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

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 *09-24-2019*	34.06	65.94	10.81	0.00	0.00	0.00
3 Months Ago *07-02-2019*	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year *01-01-2019*	17.94	82.06	66.26	54.91	27.11	11.22
Start of Water Year *10-01-2019*	30.14	69.86	27.53	0.00	0.00	0.00
One Year Ago *10-02-2018*	14.19	85.81	72.30	64.41	48.47	16.21

Intensity:

- None
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Author:
Brian Fuchs
National Drought Mitigation Center

droughtmonitor.unl.edu

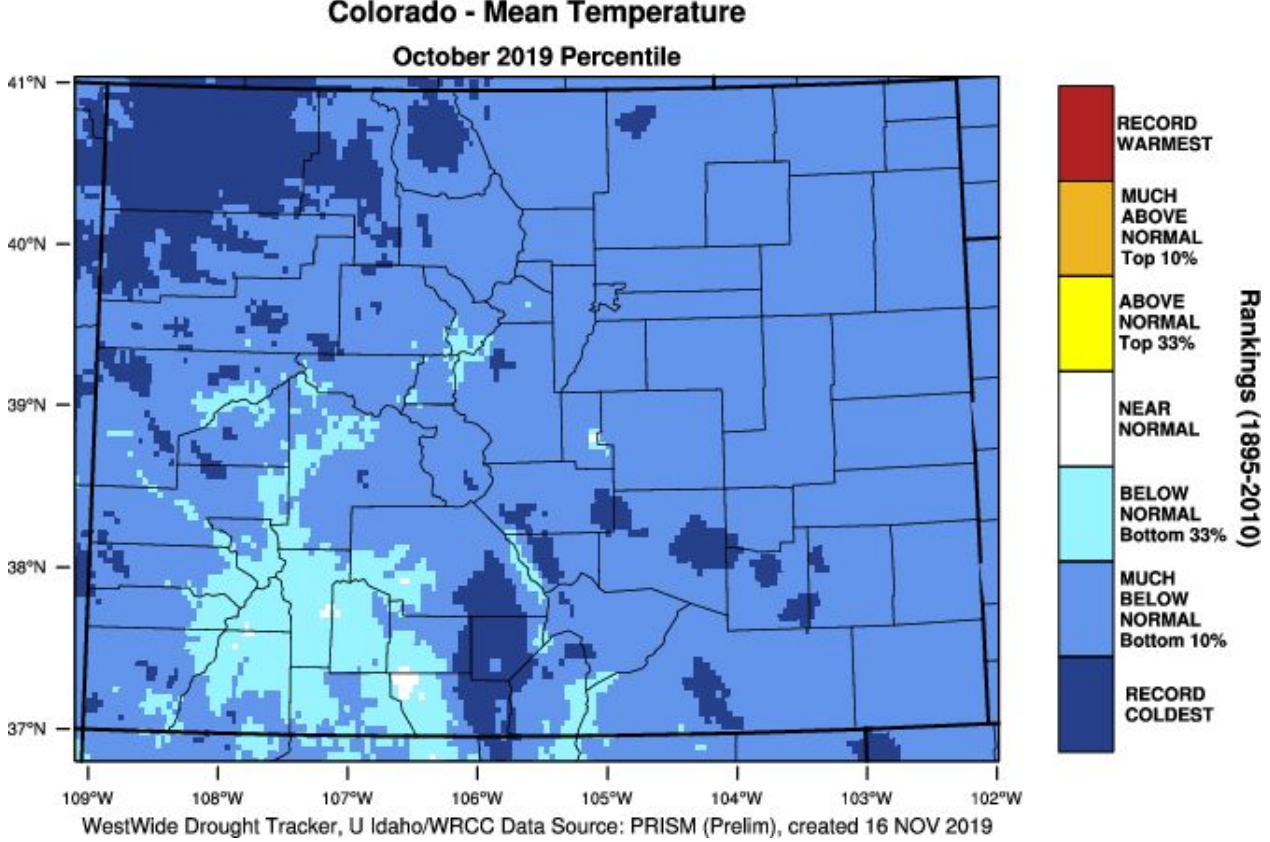
COLORADO
CLIMATE
CENTER

2020 Water Year To Date

temperature, precipitation,
anomalies, drought conditions

Temperature and precipitation rank maps currently unavailable

** from warmest September on record to 4th coldest October on record is one of the largest rank jumps ever, and also one of the biggest changes in monthly average temperature **


Colorado - Mean Temperature
October 2019 Percentile
41°N
40°N
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37°N
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108°W
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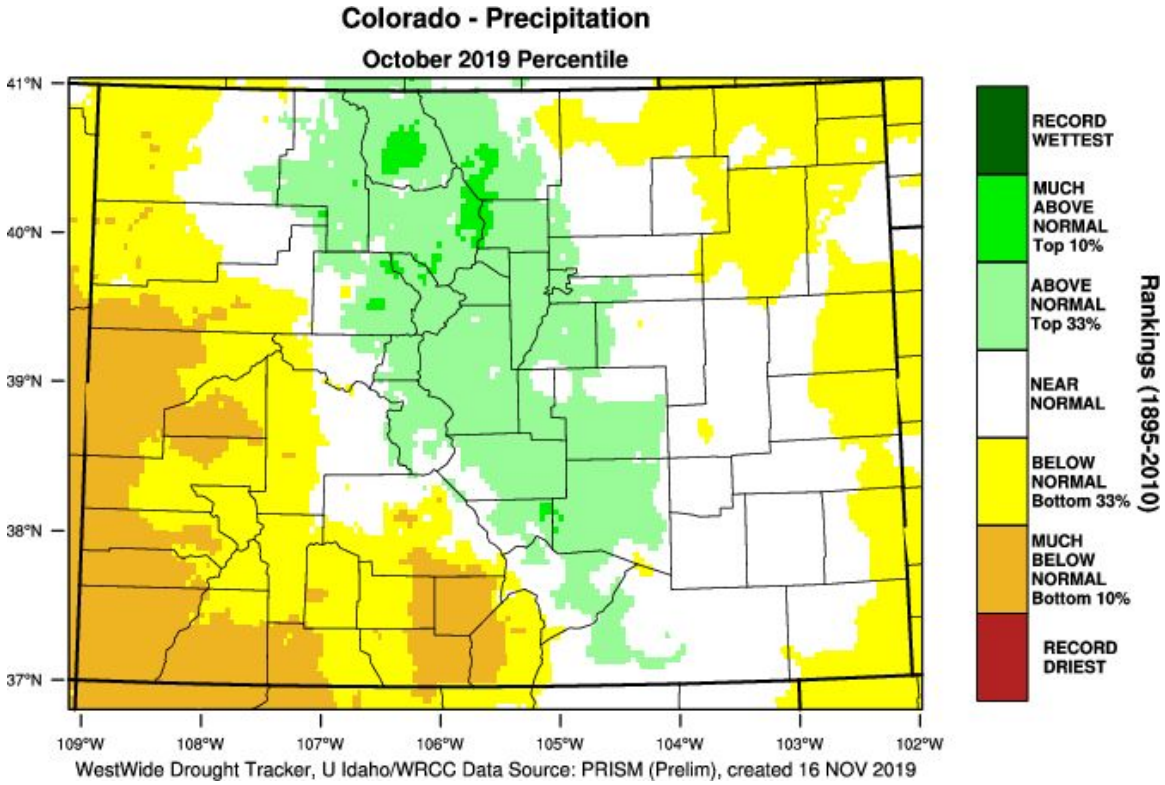
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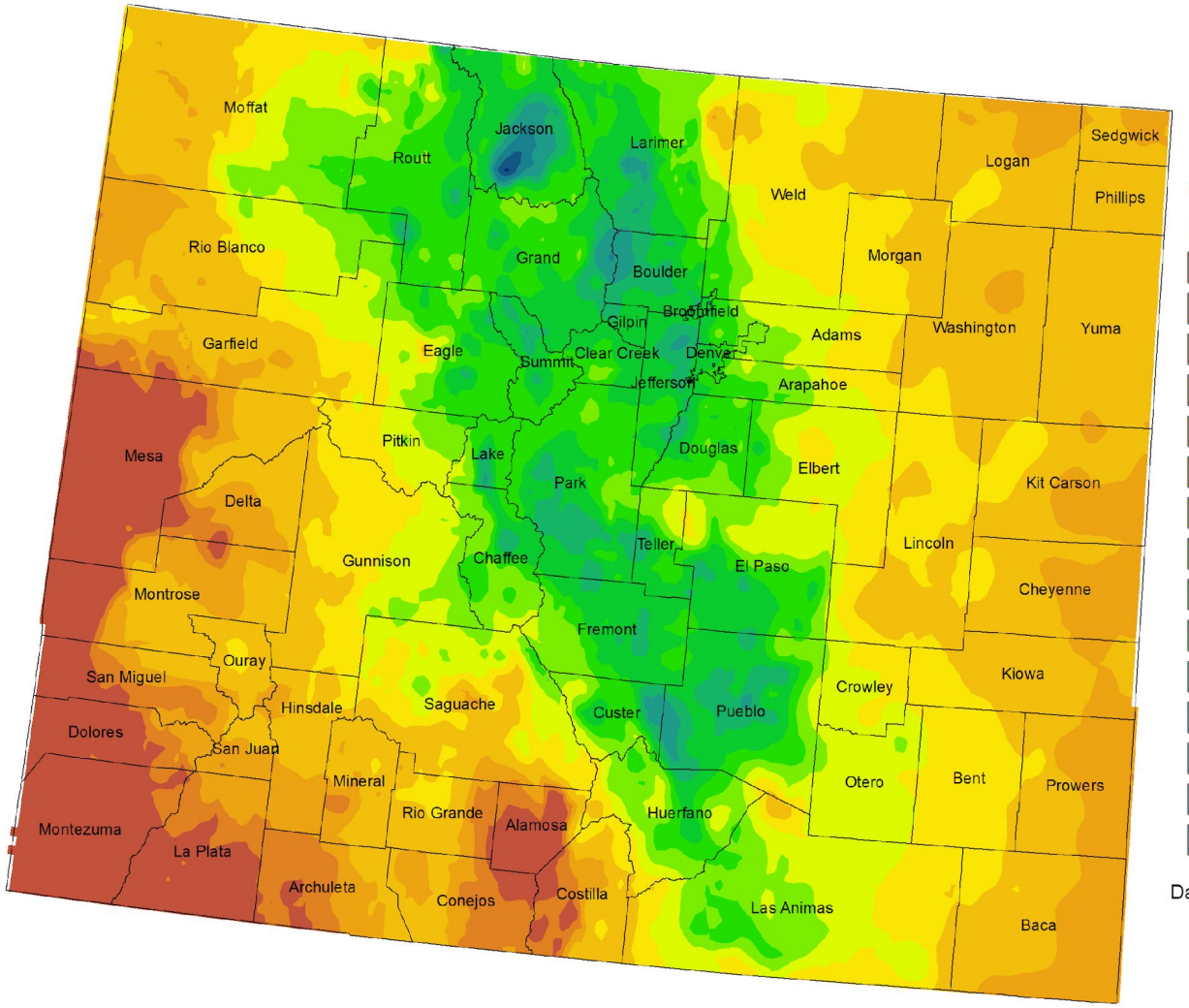
Colorado October 2019 Precipitation as a Percentage of Normal

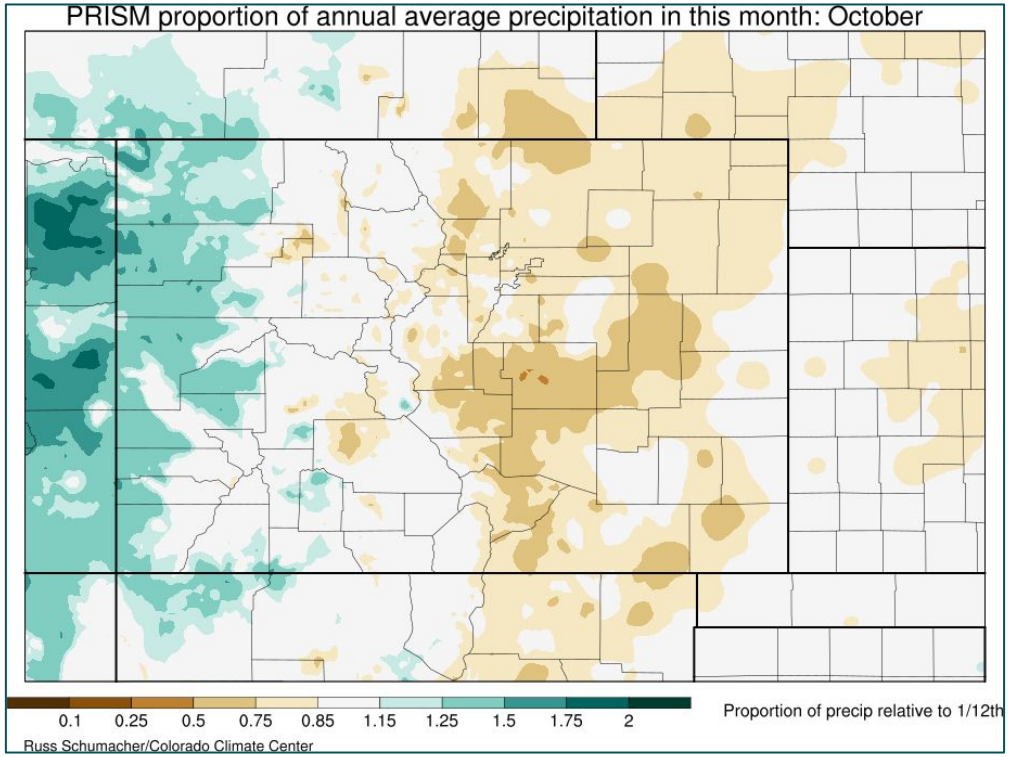


oct19_pn_co

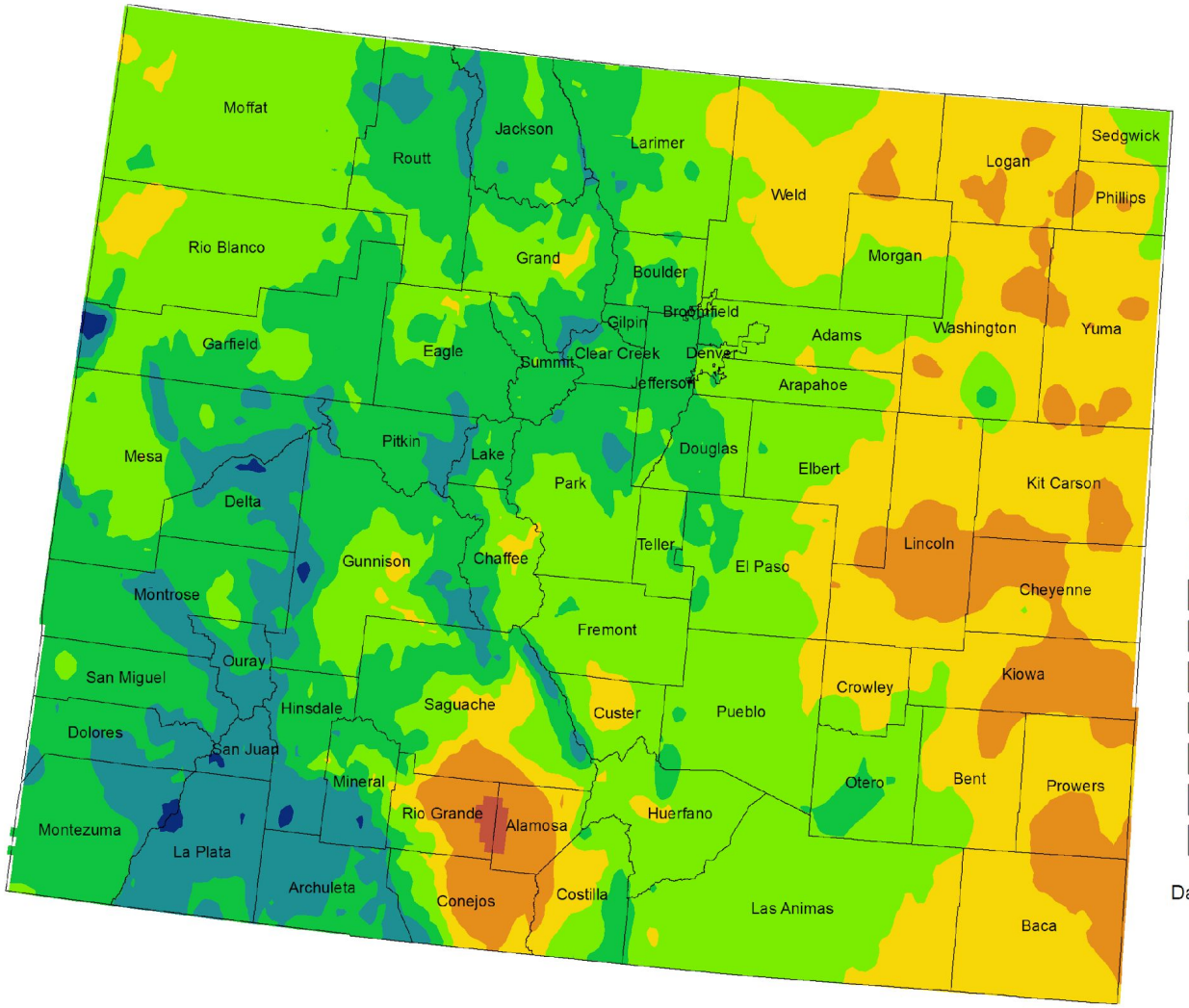
Precip as % of normal

- 0
- 1 - 10
- 11 - 20
- 21 - 30
- 31 - 50
- 51 - 70
- 71 - 90
- 91 - 110
- 111 - 130
- 131 - 150
- 151 - 170
- 171 - 200
- 201 - 250
- 251 - 300
- 300+

Data from PRISM Climate Group



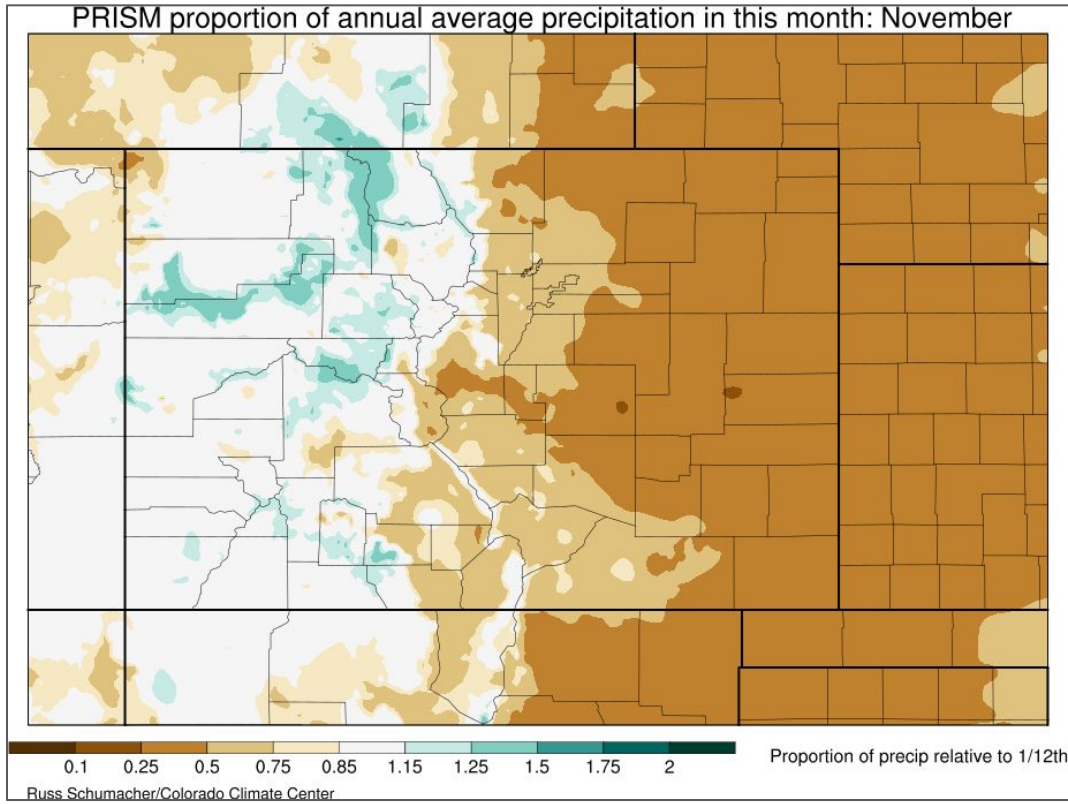
Colorado Month to Date Precipitation
1 - 24 November 2019



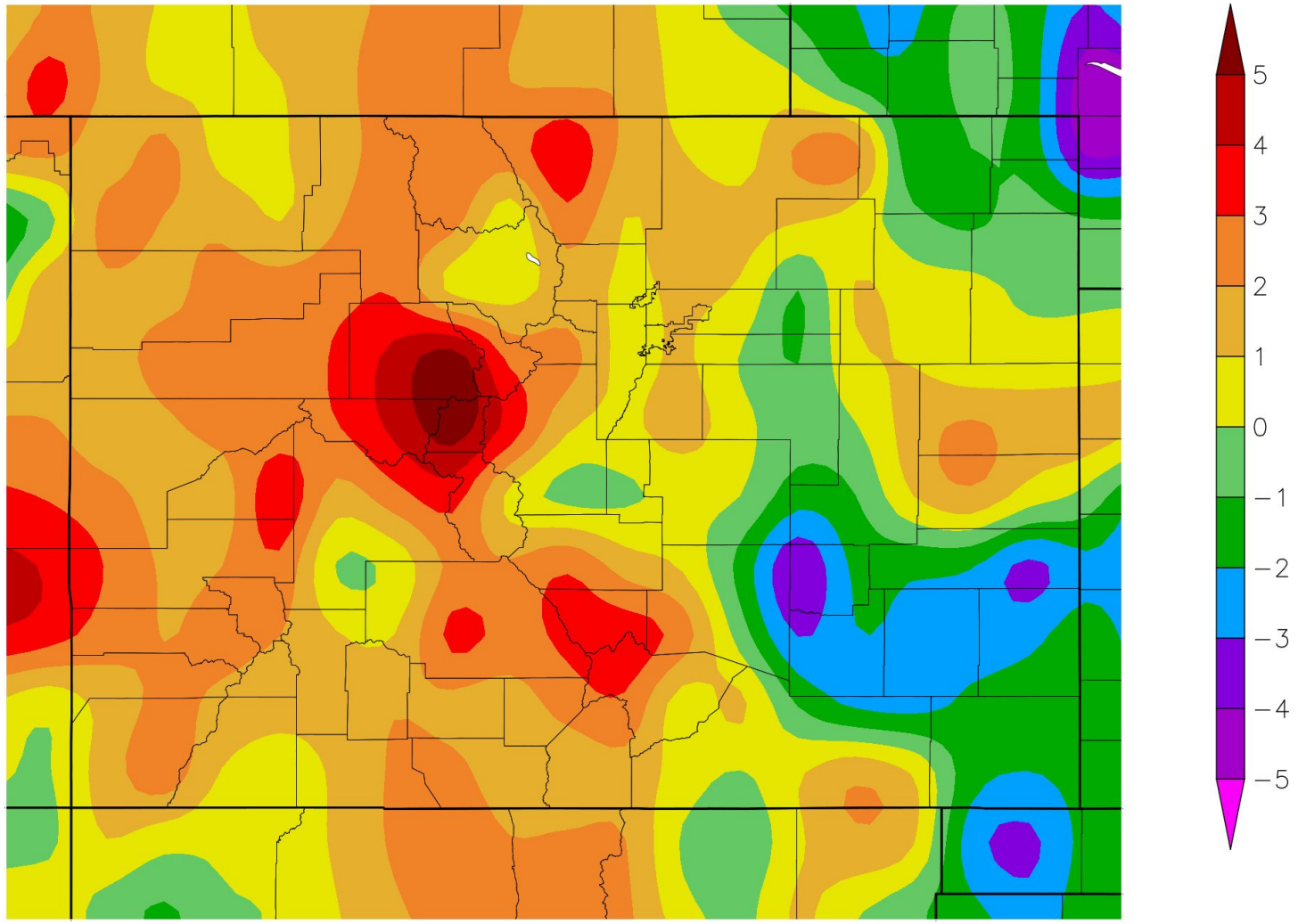
01_24nov19_CO
Precp (inches)

- 0.00
- 0.01 - 0.10
- 0.11 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.35

Data from PRISM Climate Group



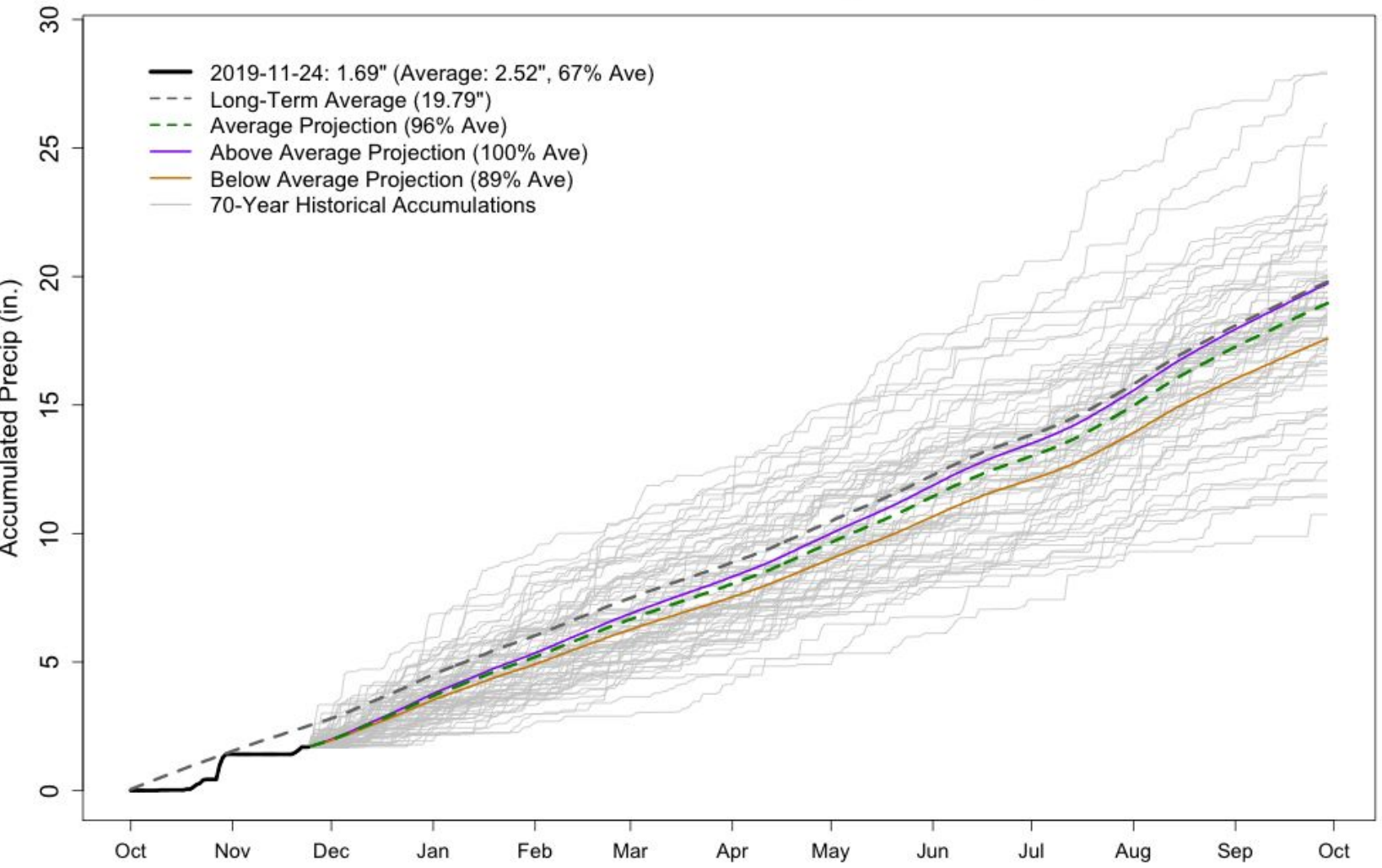
Departure from Normal Temperature (F)
11/1/2019 – 11/25/2019

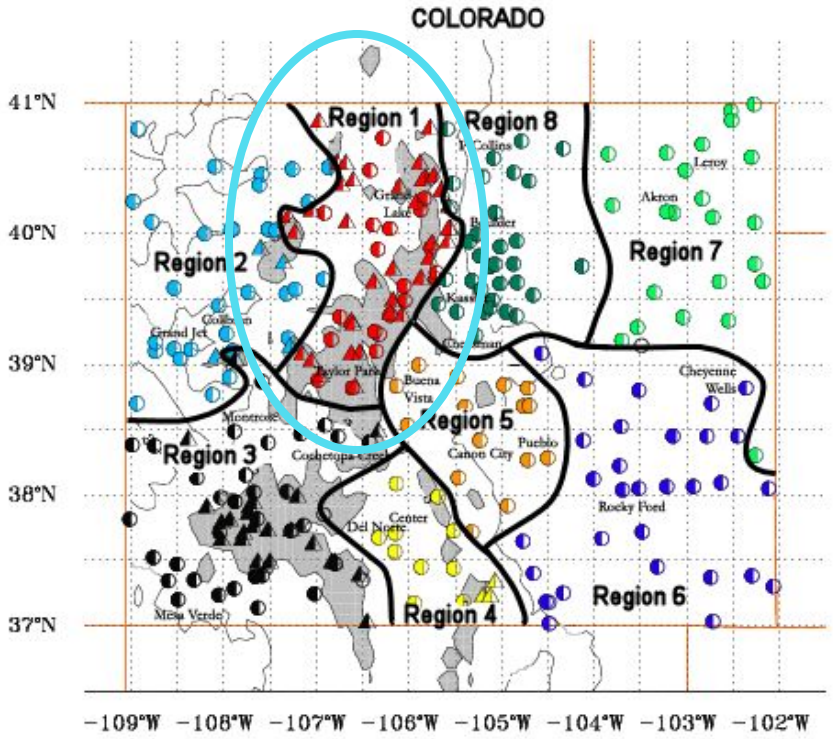


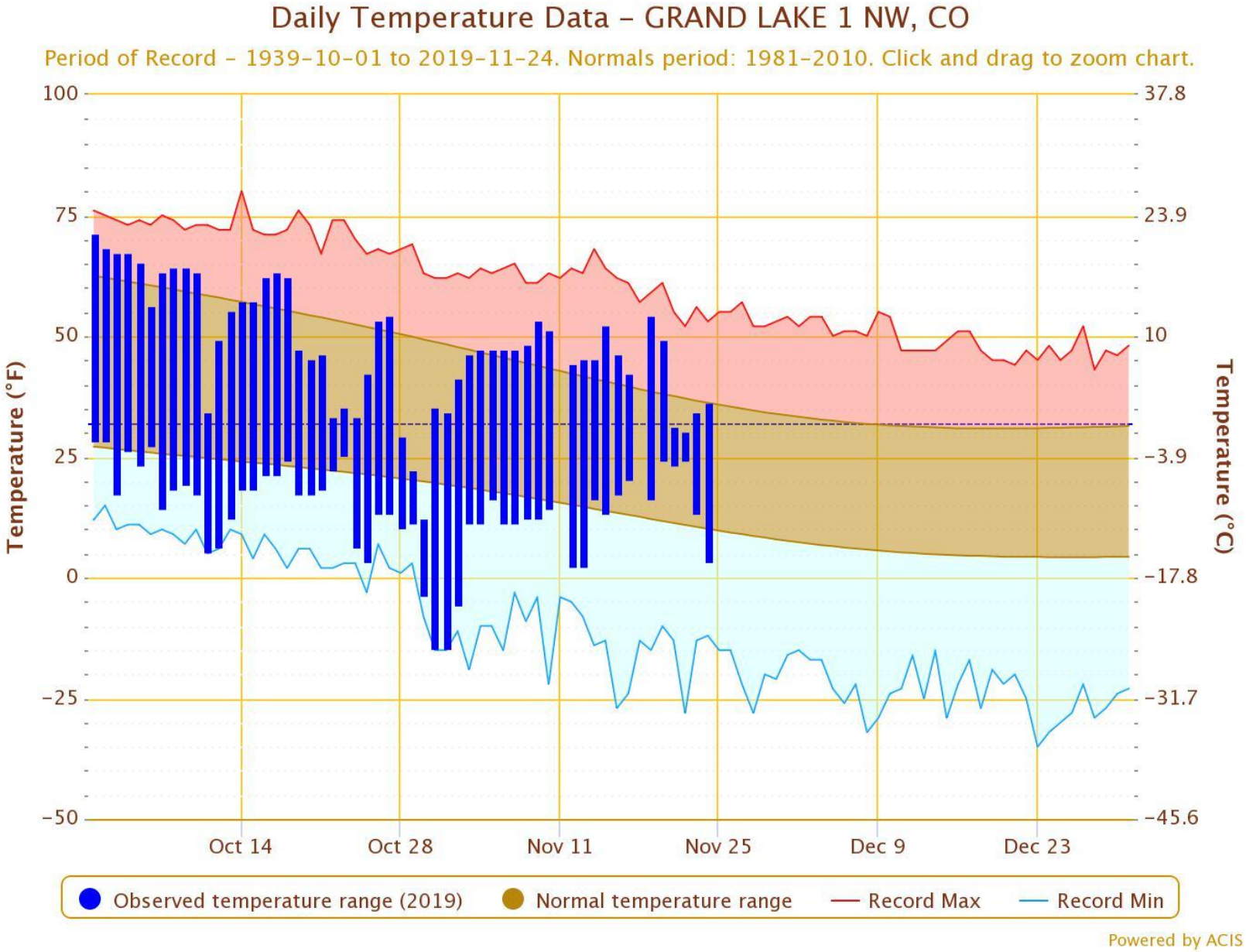
Generated 11/26/2019 at HPRCC using provisional data.

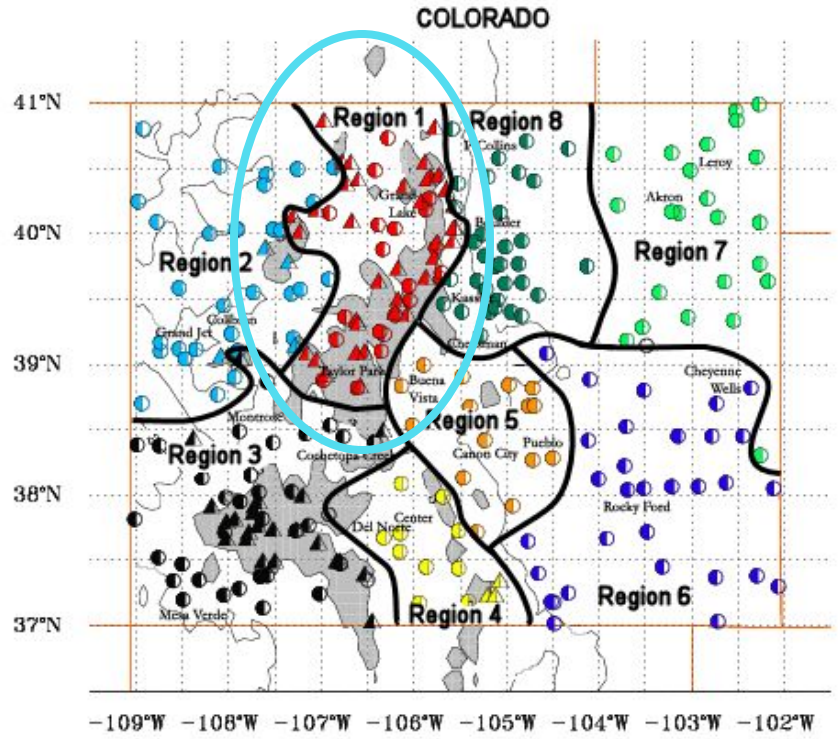
NOAA Regional Climate Centers

GRAND LAKE 1 NW WY2020 Precipitation Projections

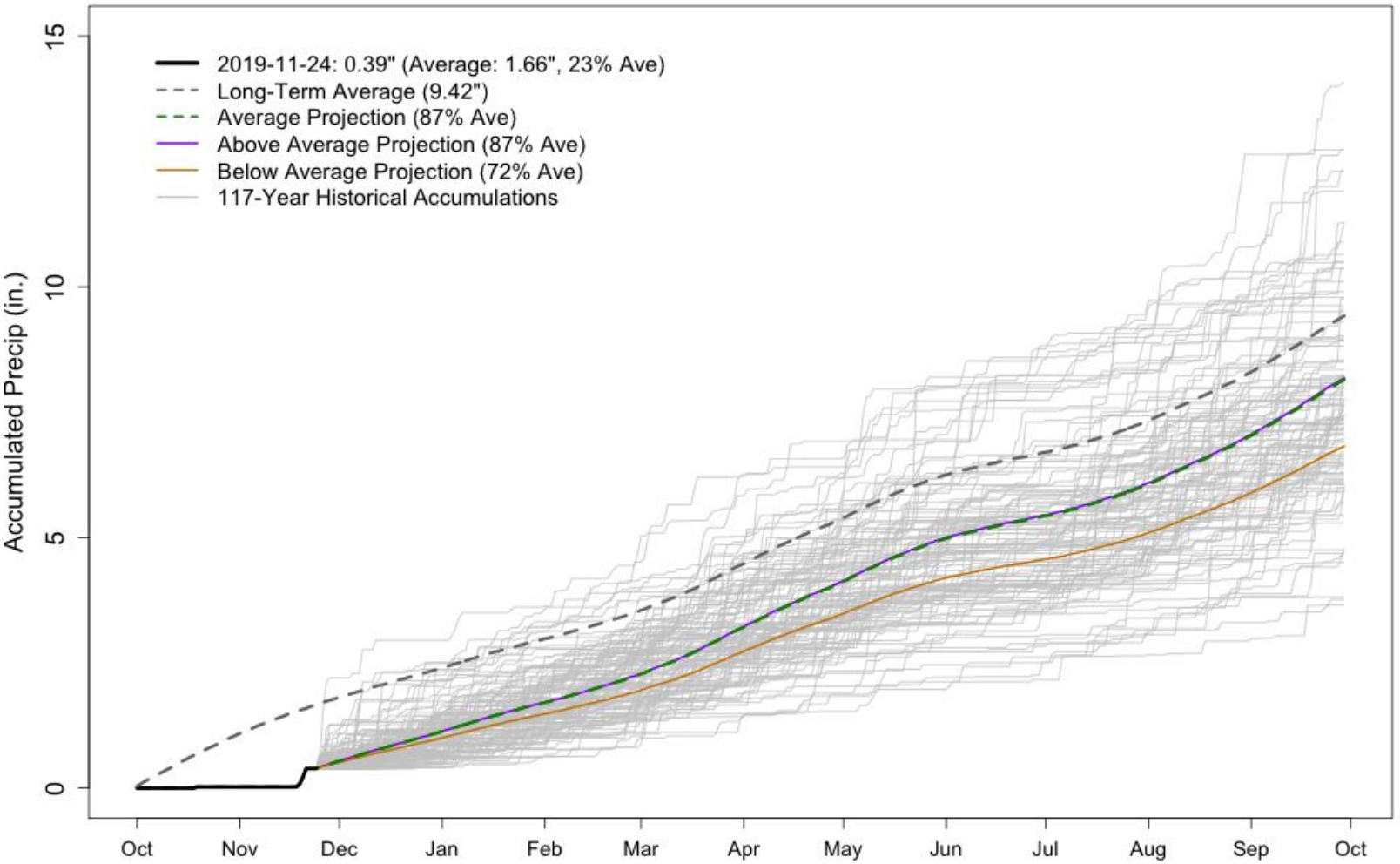


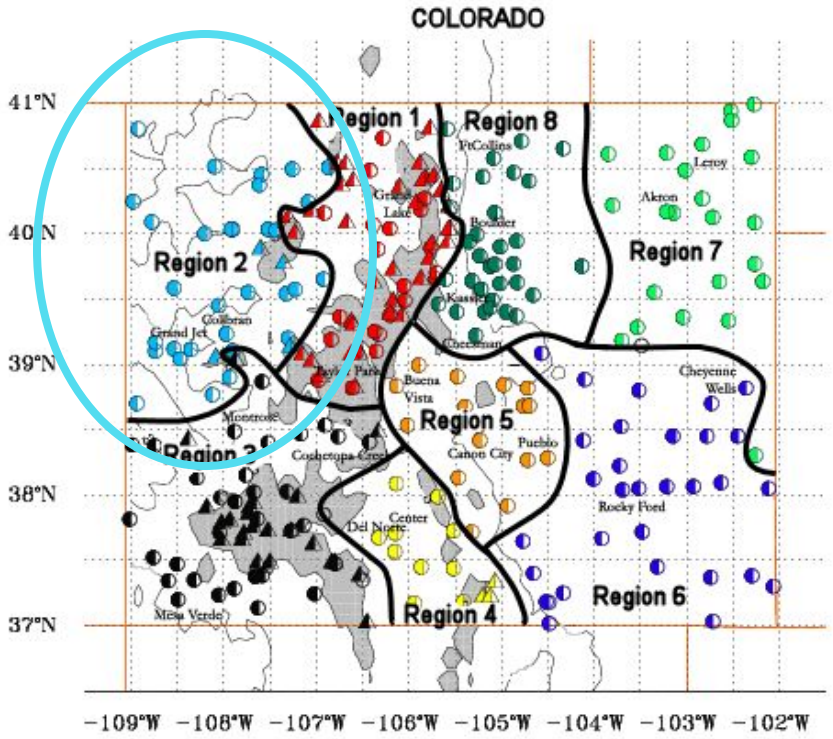



Daily Temperature Data - GRAND LAKE 1 NW, CO
Period of Record - 1939-10-01 to 2019-11-24. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
75
50
25
0
-25
-50
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS


COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

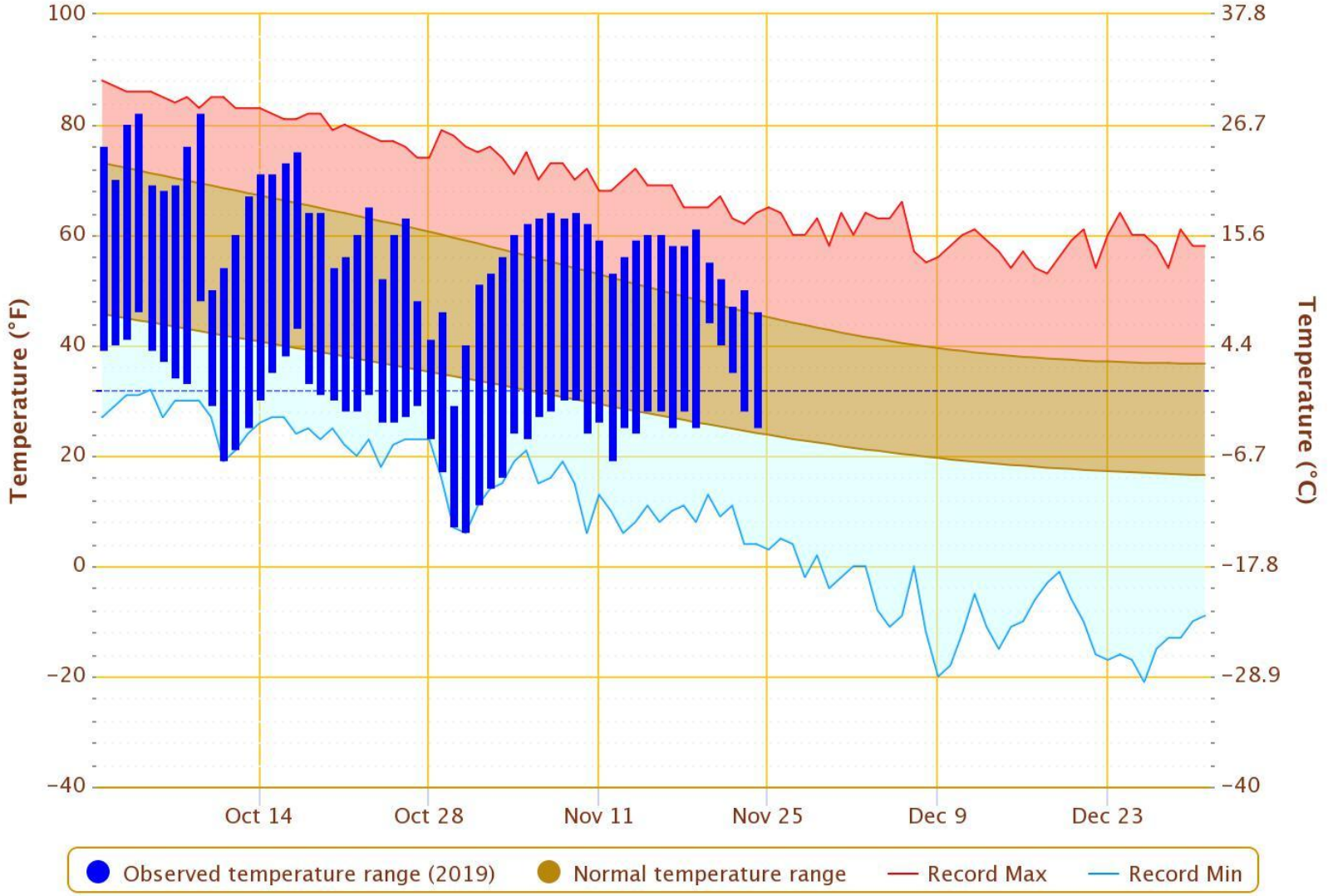
GRAND JUNCTION WALKER FIELD WY2020 Precipitation Projections



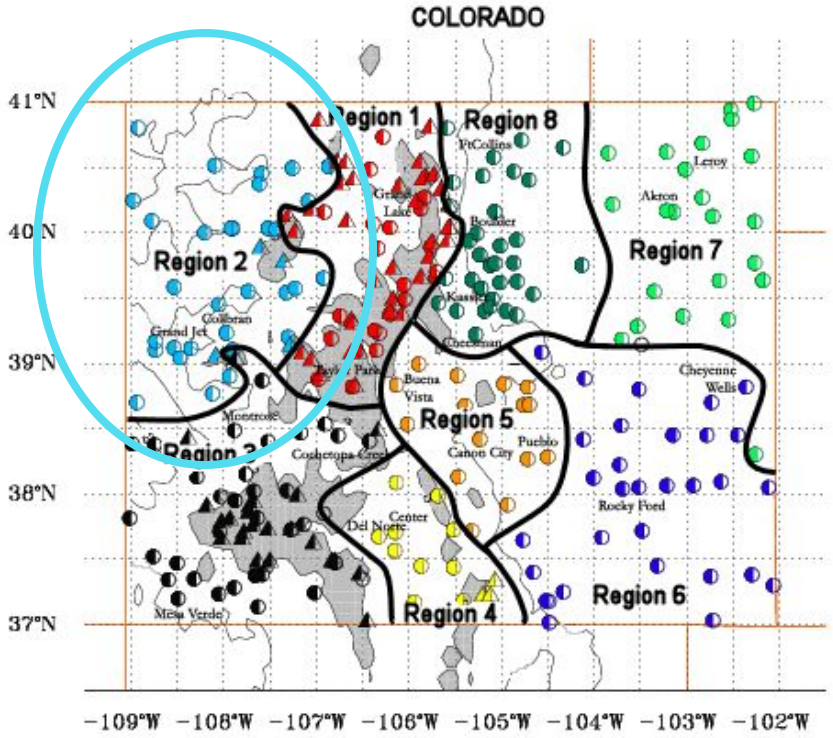


Daily Temperature Data – GRAND JUNCTION WALKER FIELD, CO

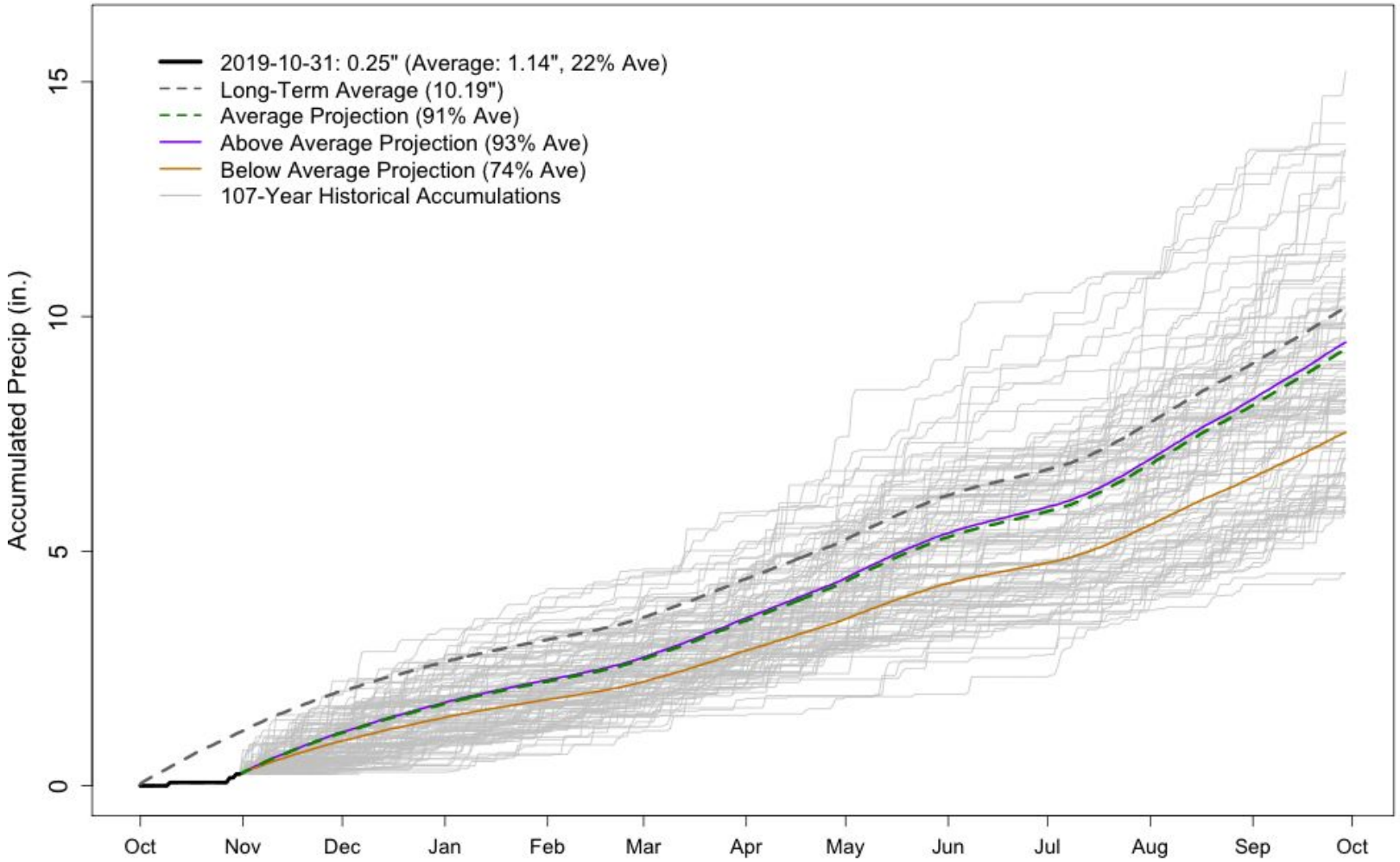
Period of Record – 1900-01-01 to 2019-11-24. Normals period: 1981-2010. Click and drag to zoom chart.

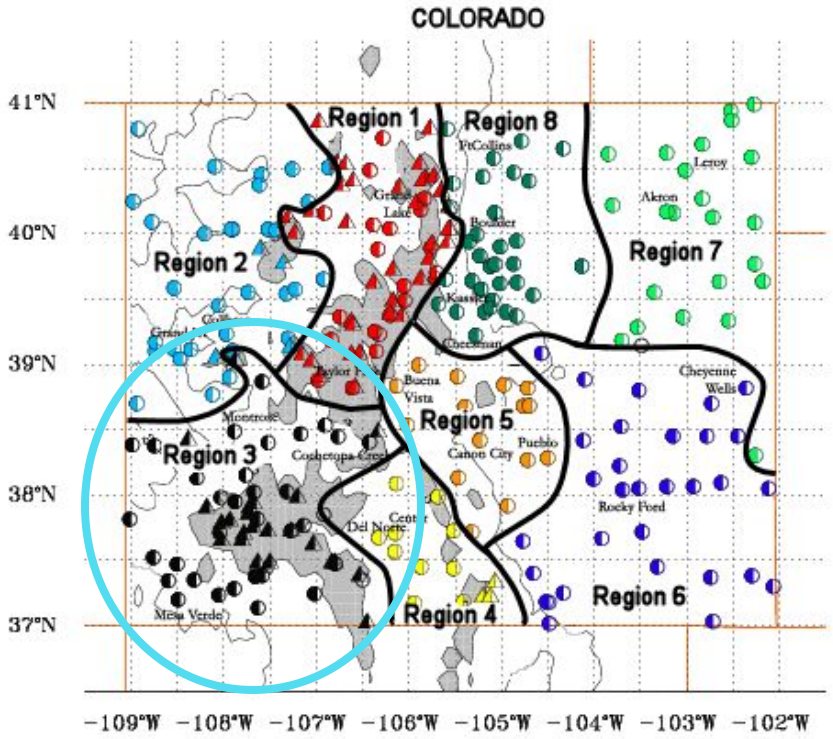


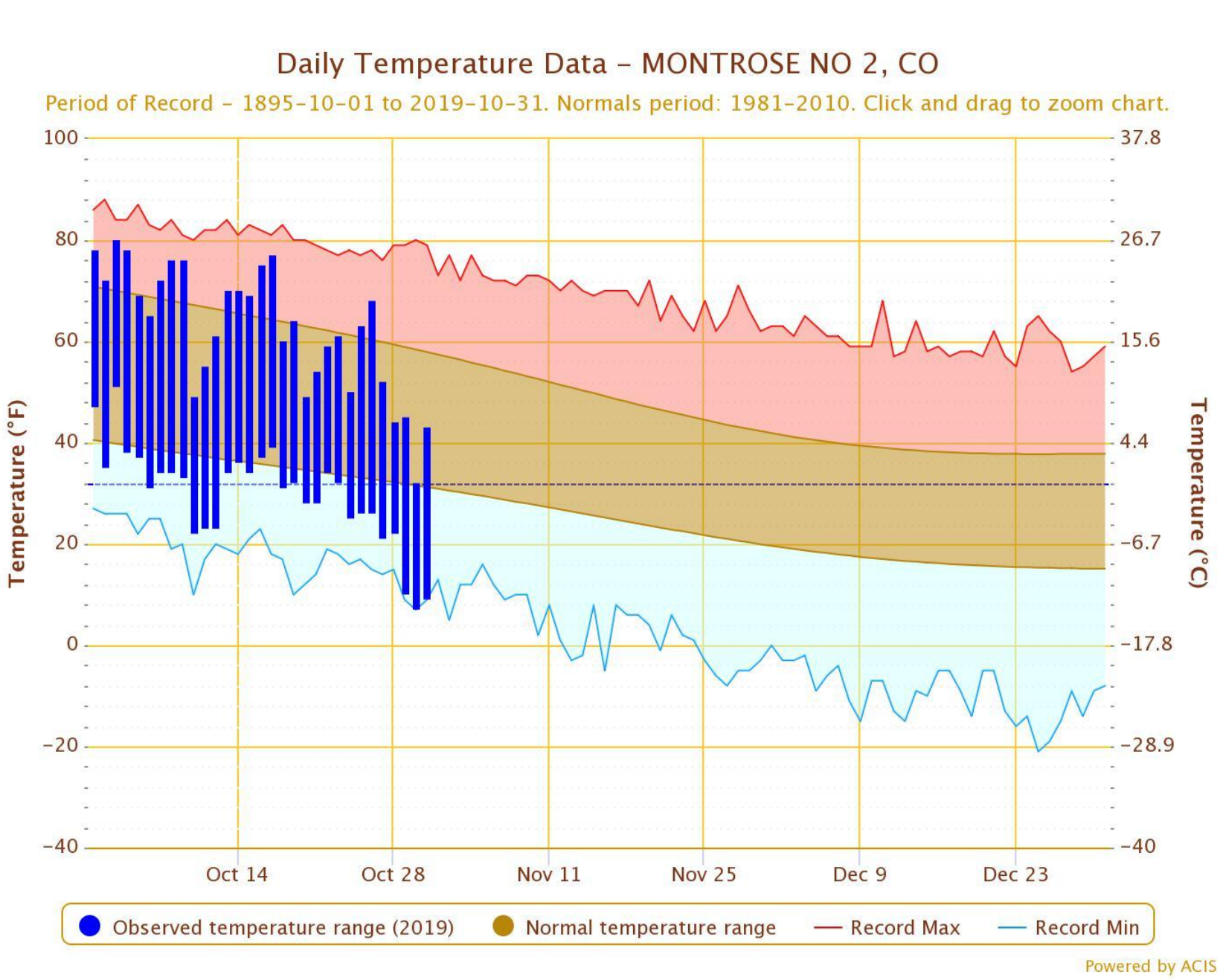
Powered by ACIS

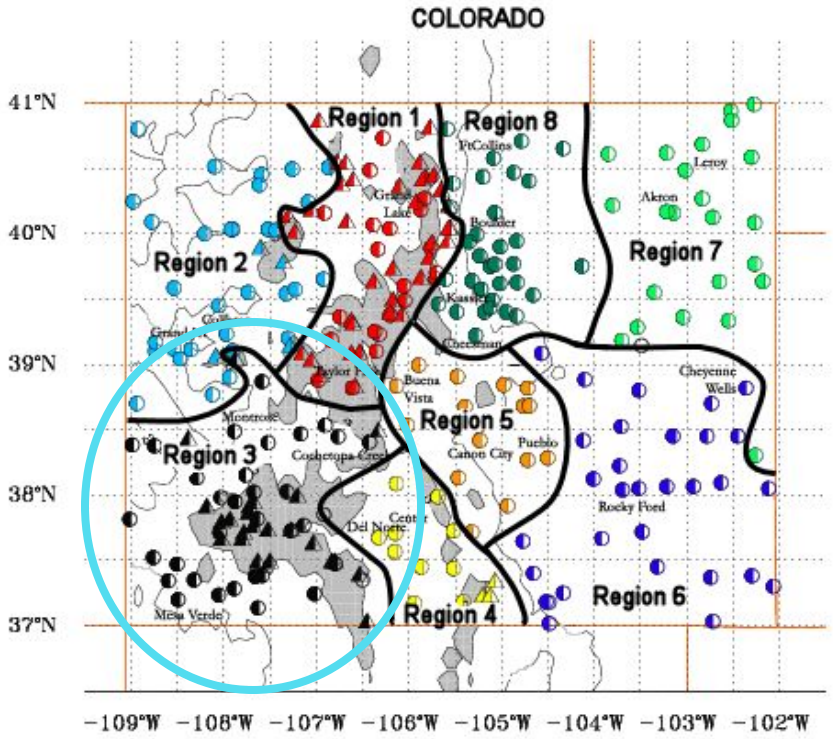


MONTROSE NO 2 WY2020 Precipitation Projections

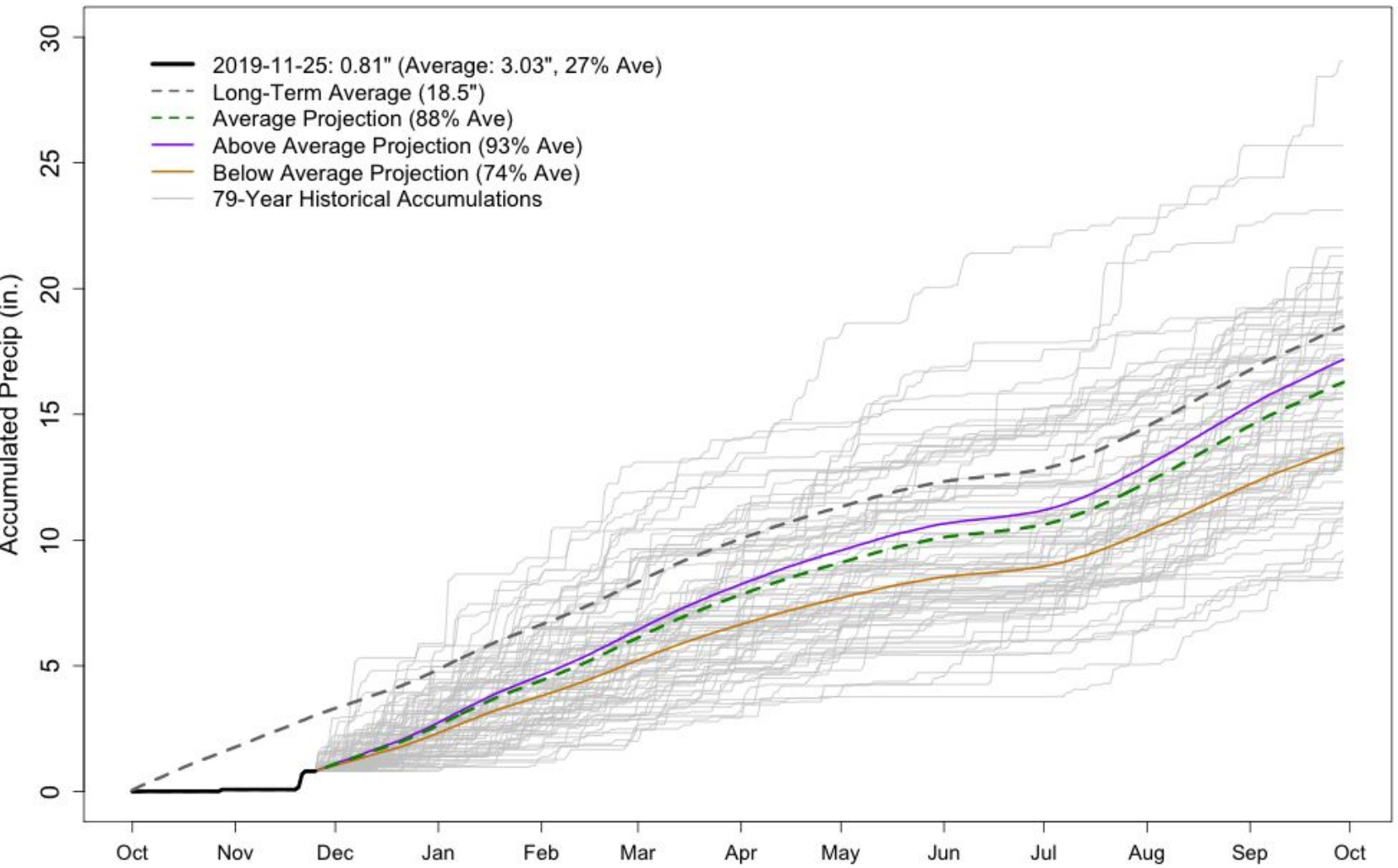


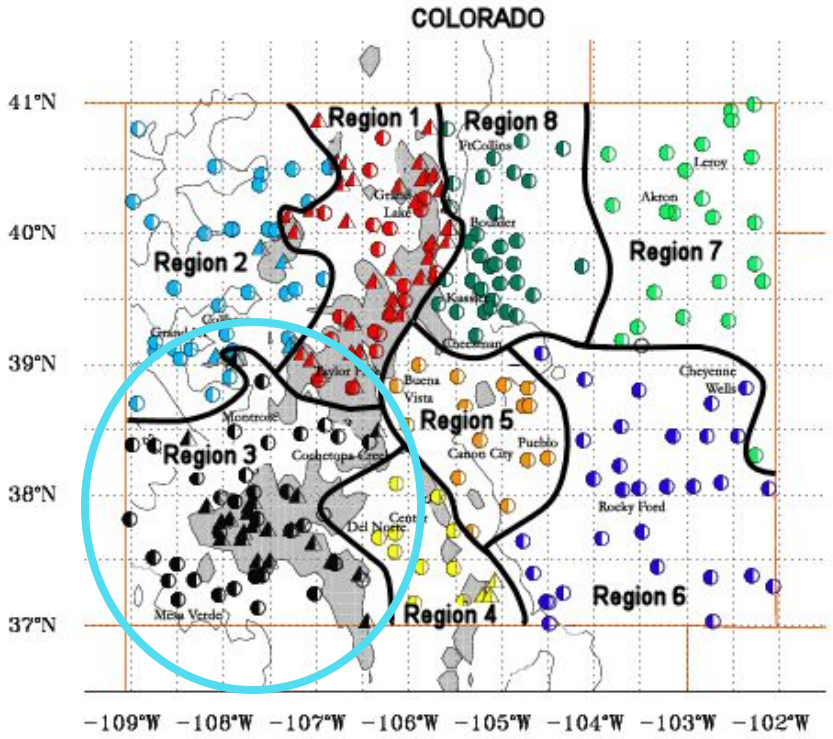


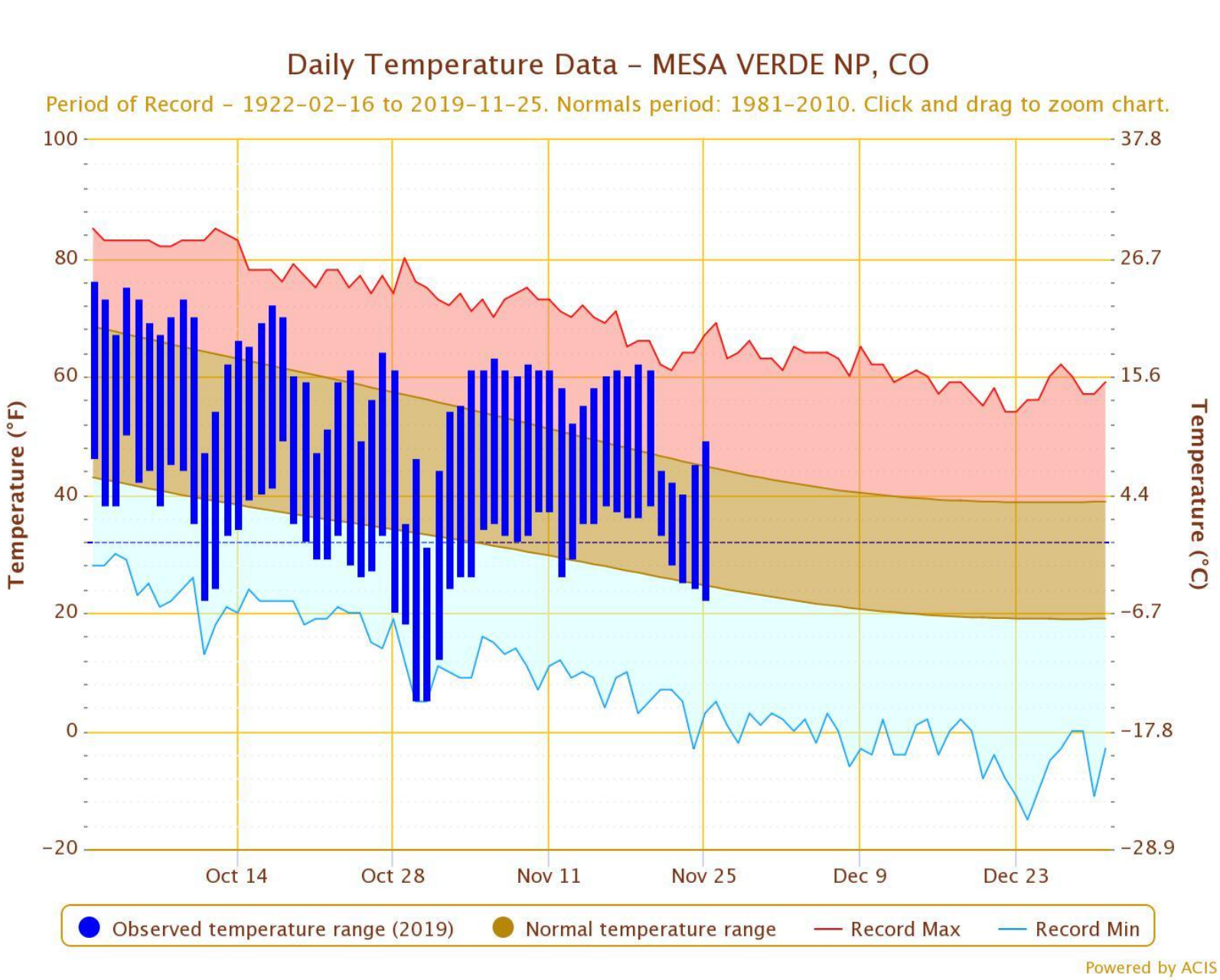

Daily Temperature Data - MONTROSE NO 2, CO
Period of Record - 1895-10-01 to 2019-10-31. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
80
60
40
20
0
-20
-40
37.8
26.7
15.6
4.4
-6.7
-17.8
-28.9
-40
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS


COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

MESA VERDE NP WY2020 Precipitation Projections






Daily Temperature Data - MESA VERDE NP, CO
Period of Record - 1922-02-16 to 2019-11-25. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
80
60
40
20
0
-20
37.8
26.7
15.6
4.4
-6.7
-17.8
-28.9
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
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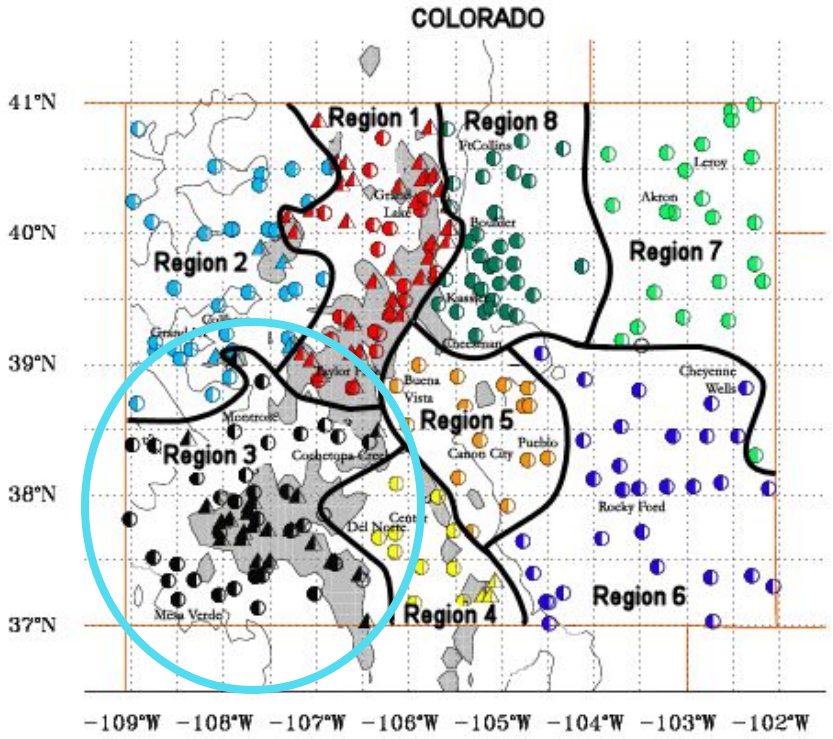
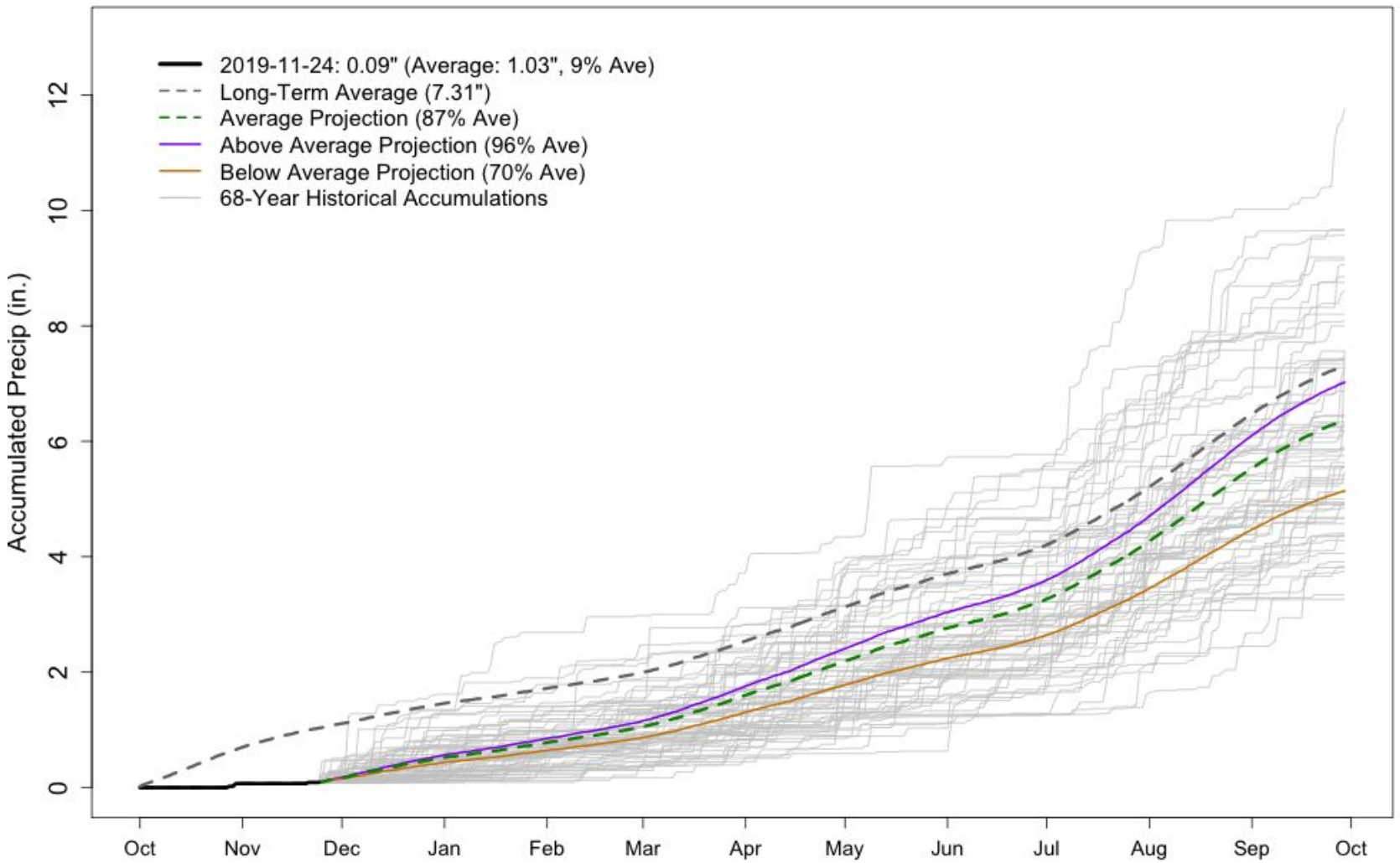
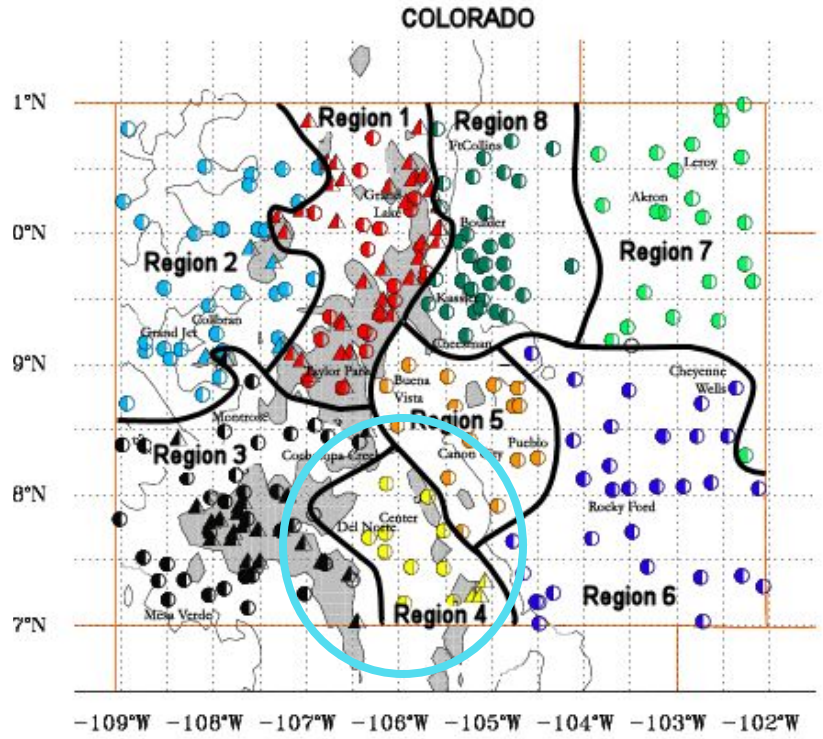
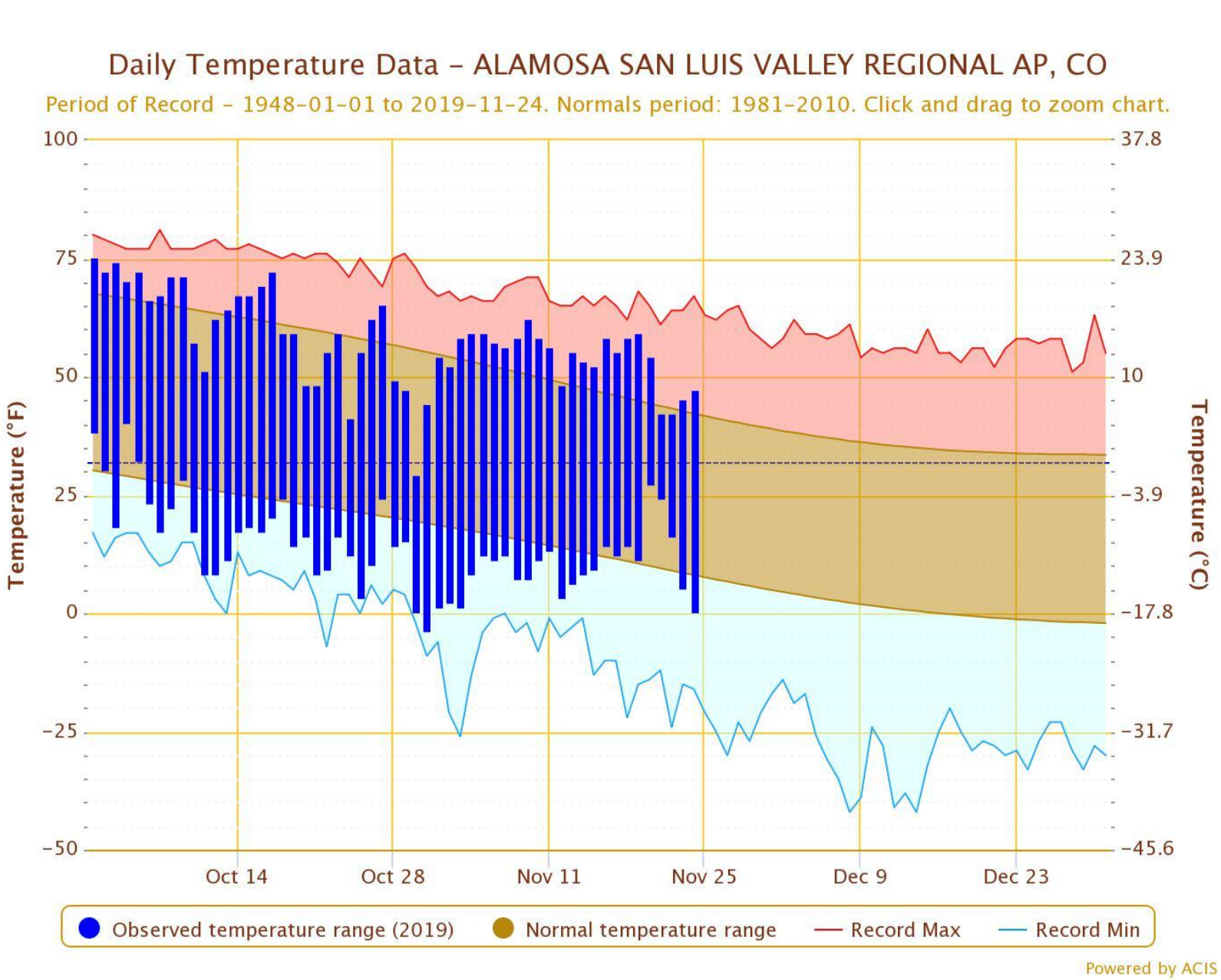
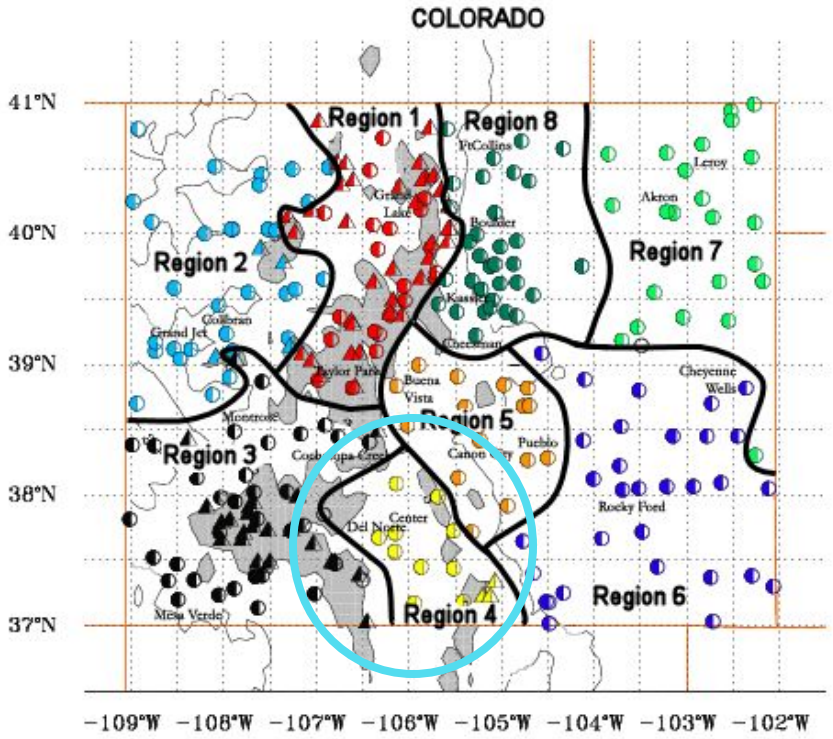

COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

ALAMOSA SAN LUIS VALLEY REGIONAL AP WY2020 Precipitation Projections

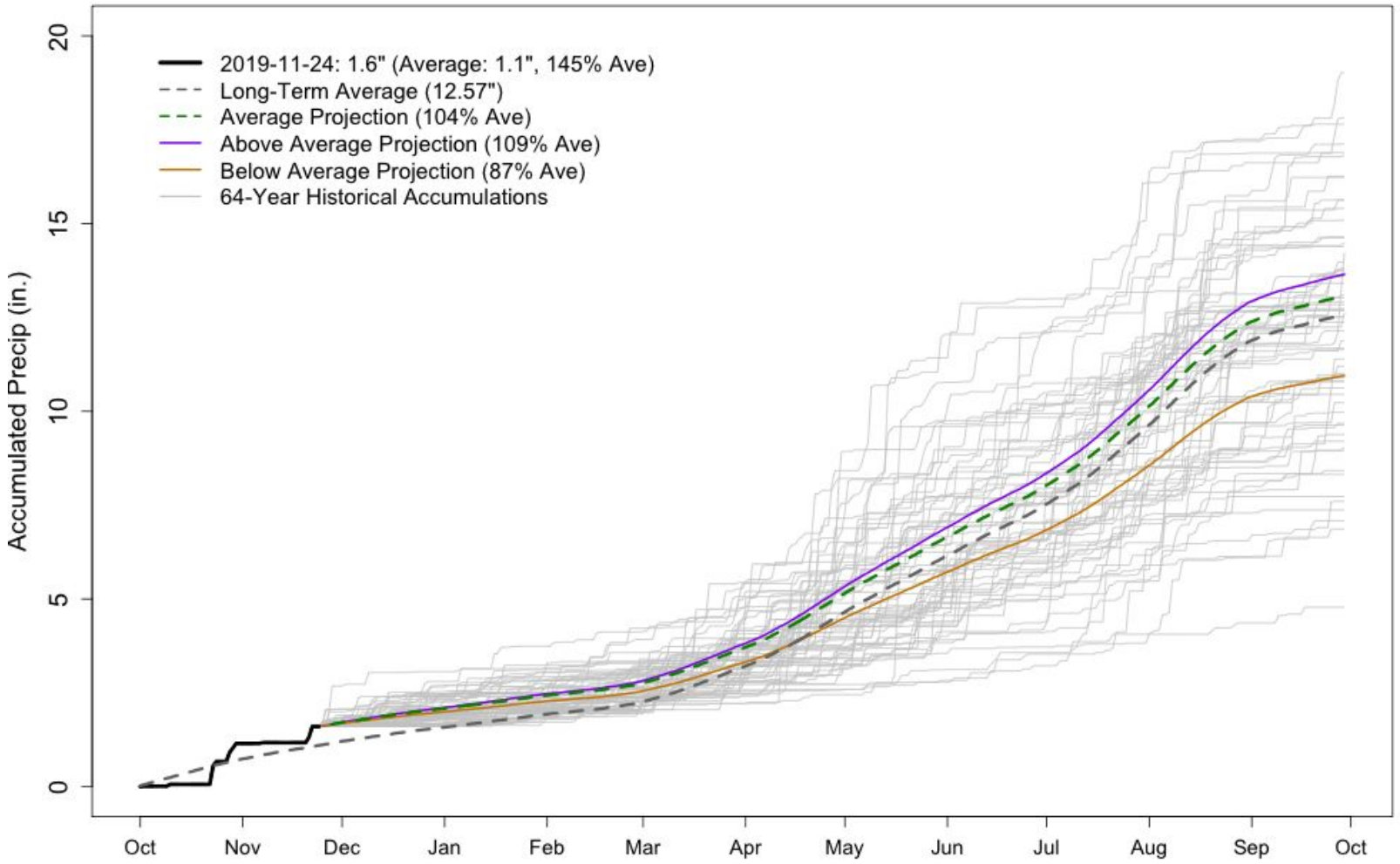


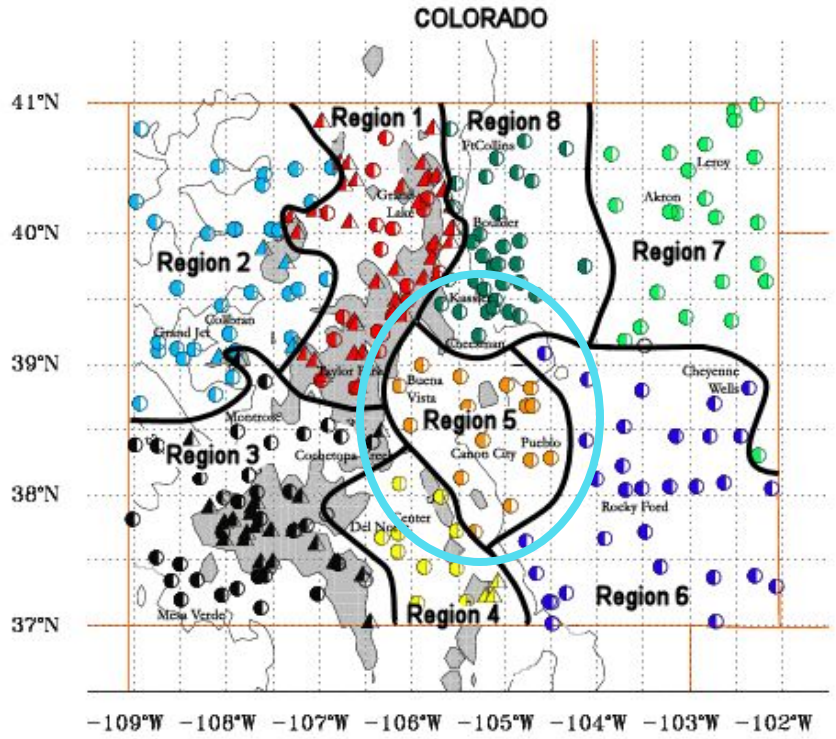


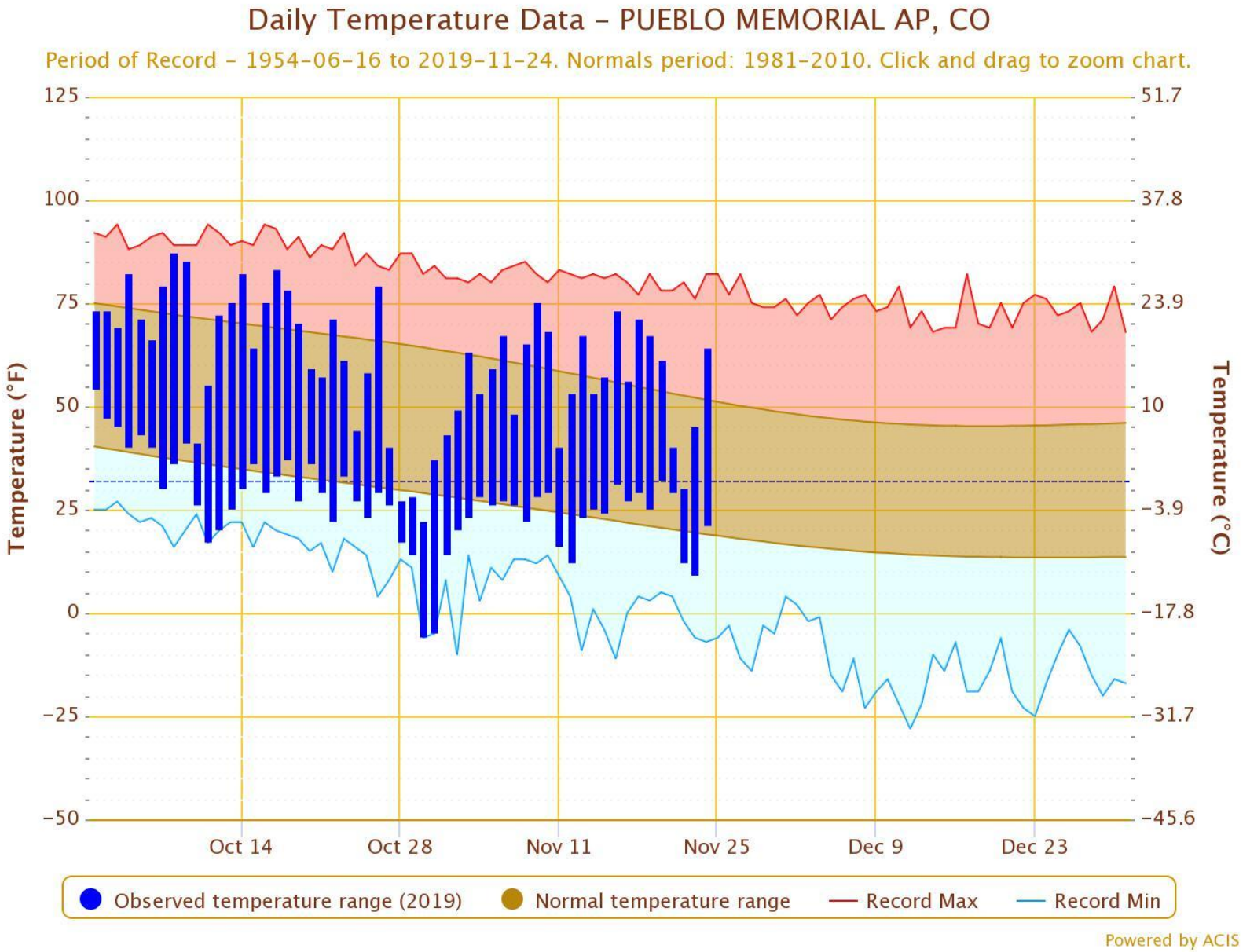

Daily Temperature Data - ALAMOSA SAN LUIS VALLEY REGIONAL AP, CO
Period of Record - 1948-01-01 to 2019-11-24. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
75
50
25
0
-25
-50
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS

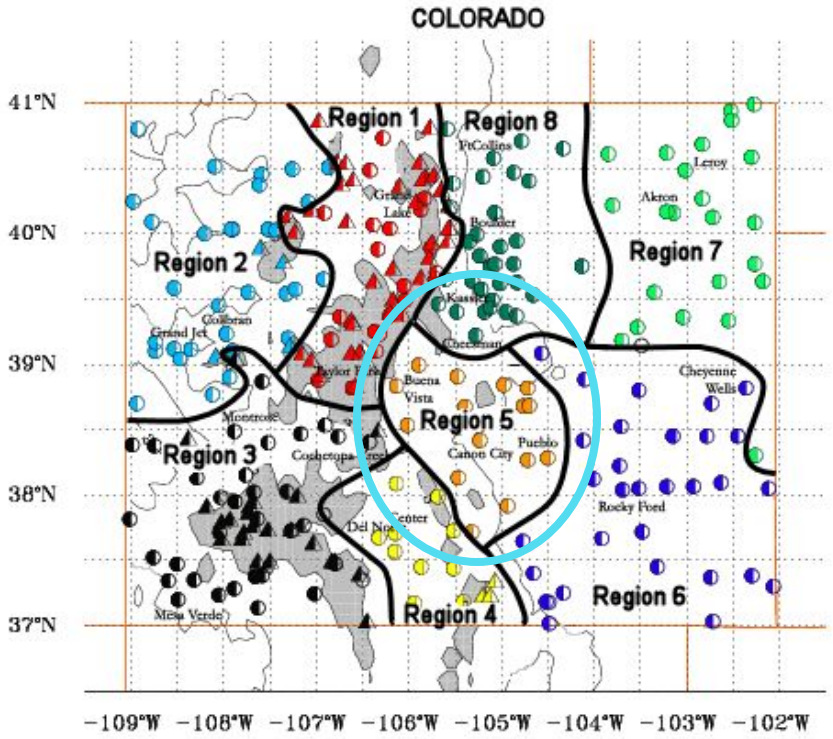

COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

PUEBLO MEMORIAL AP WY2020 Precipitation Projections

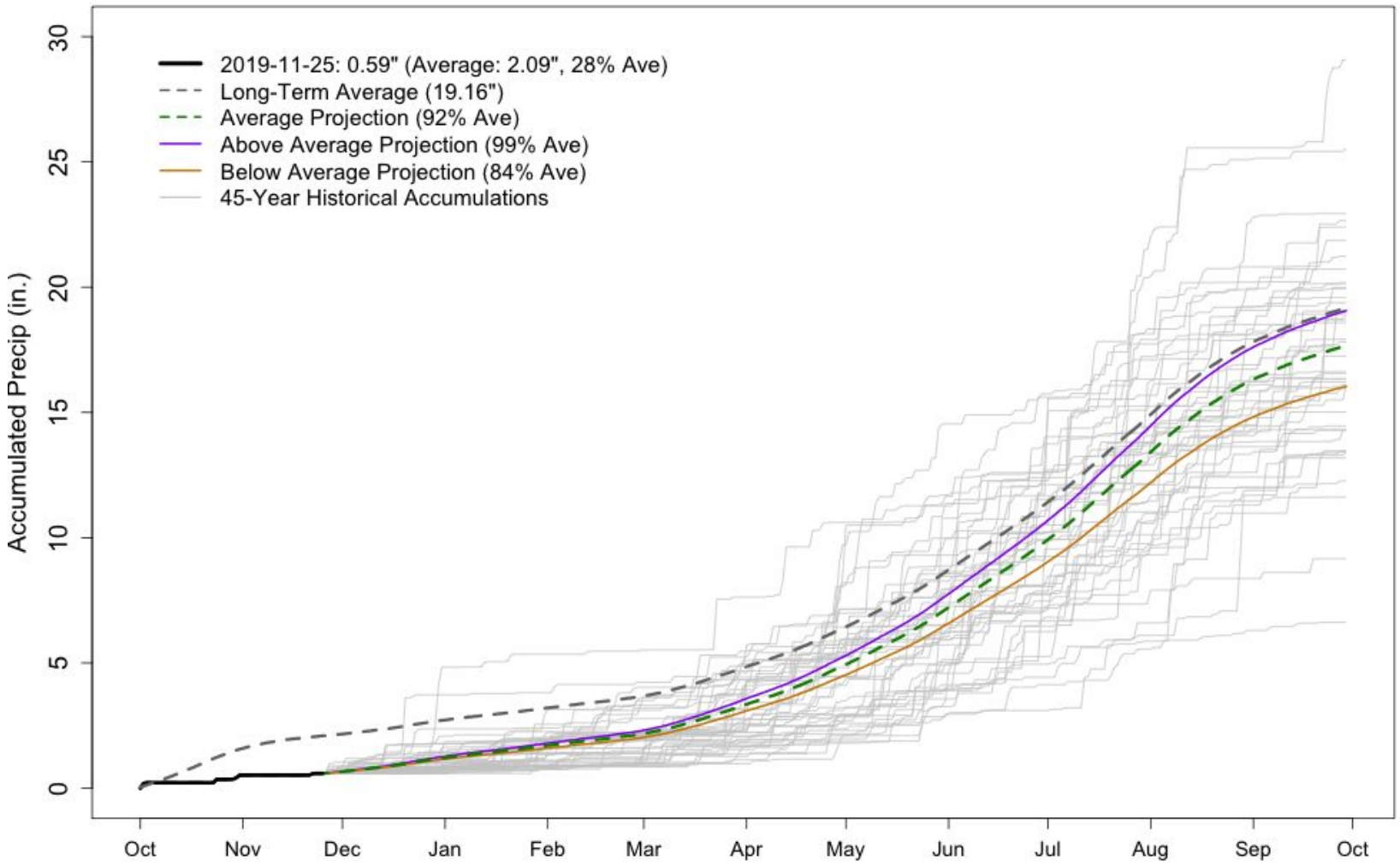


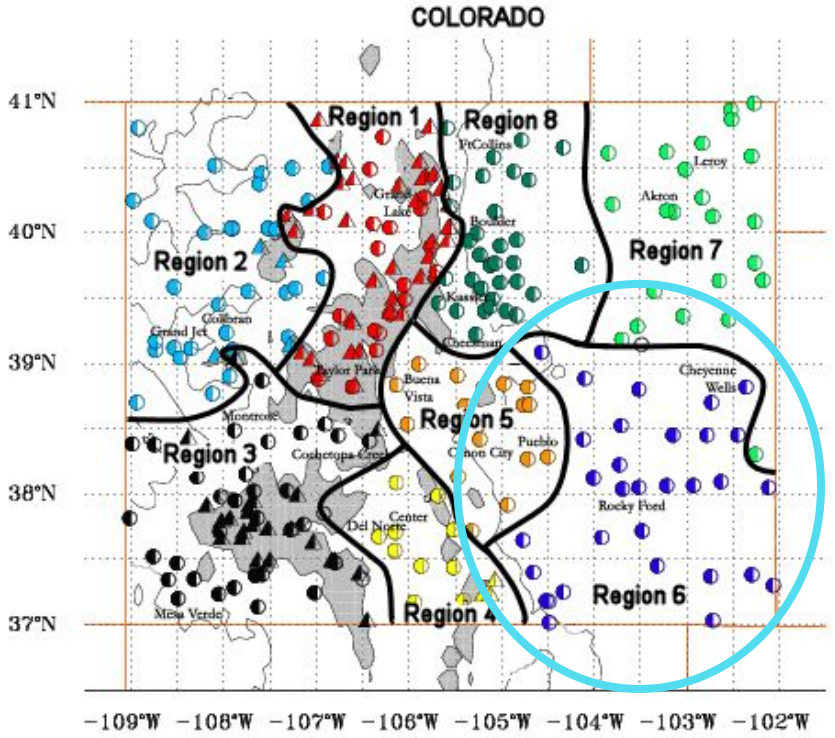


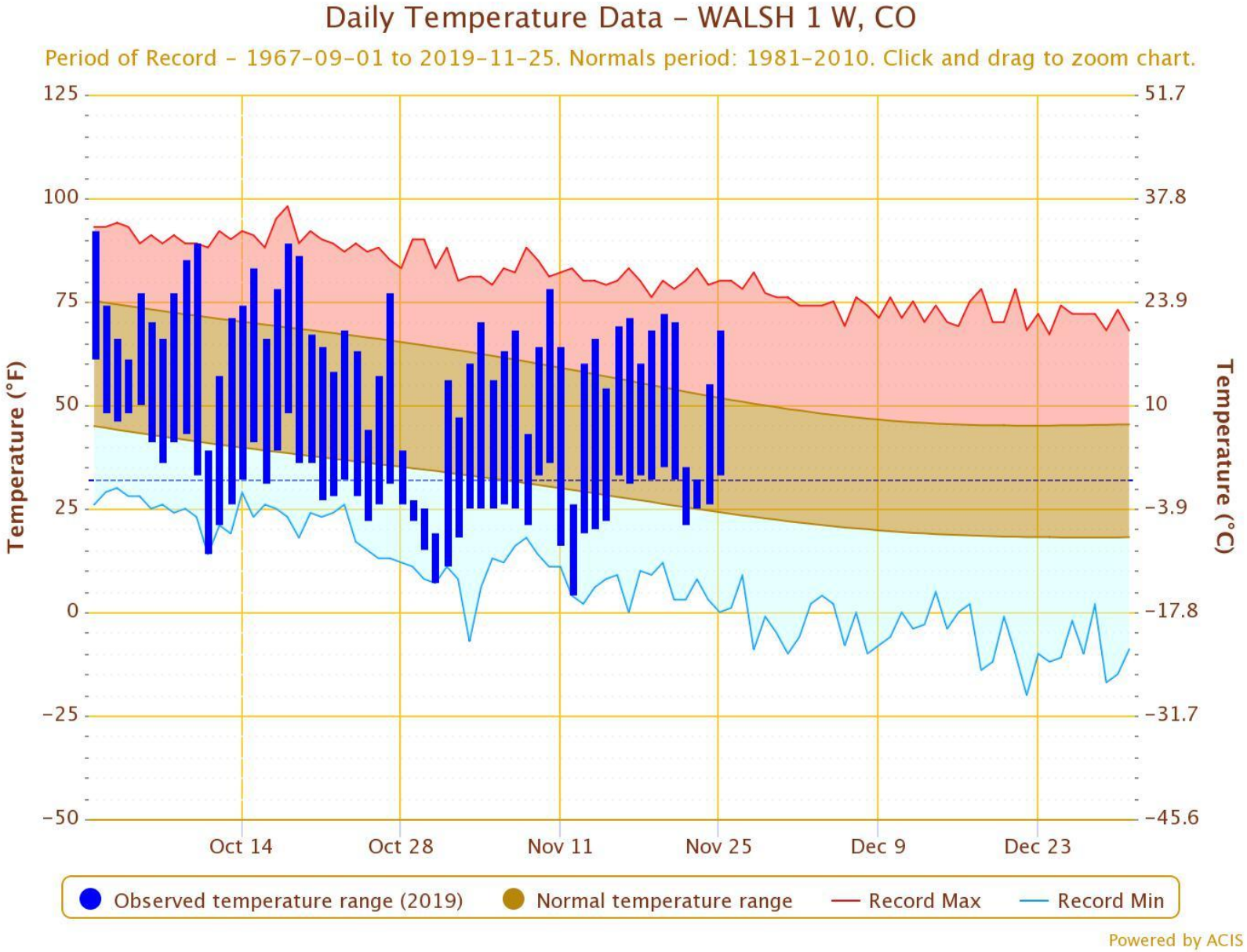

Daily Temperature Data - PUEBLO MEMORIAL AP, CO
Period of Record - 1954-06-16 to 2019-11-24. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
125
100
75
50
25
0
-25
-50
51.7
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS

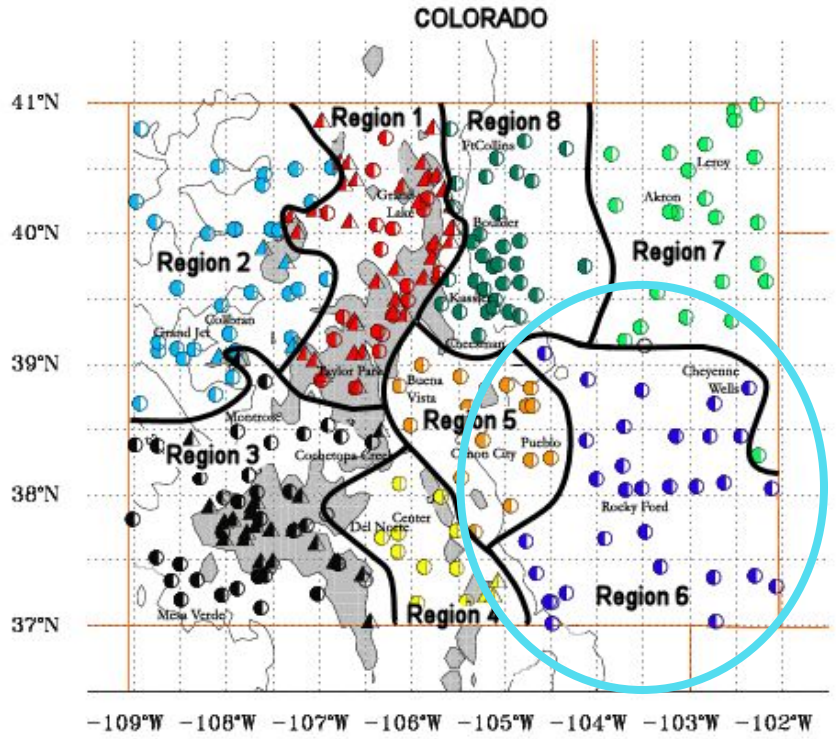

COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

WALSH 1 W WY2020 Precipitation Projections

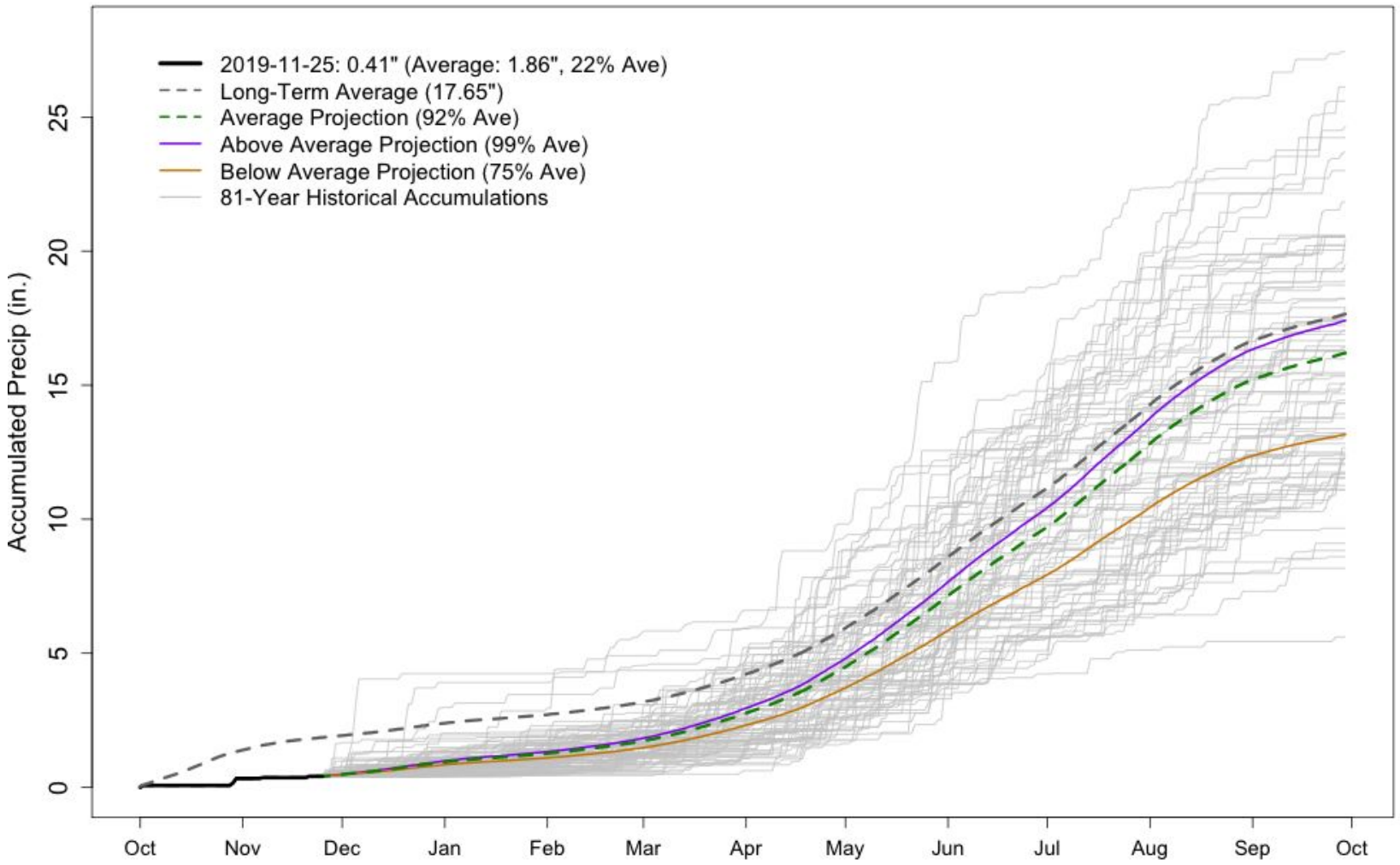


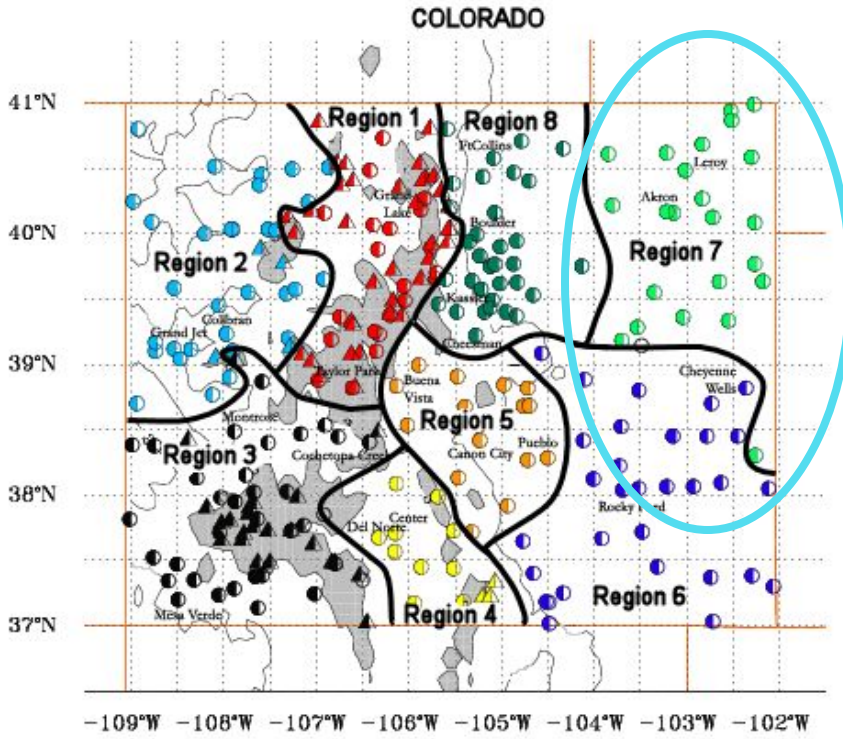


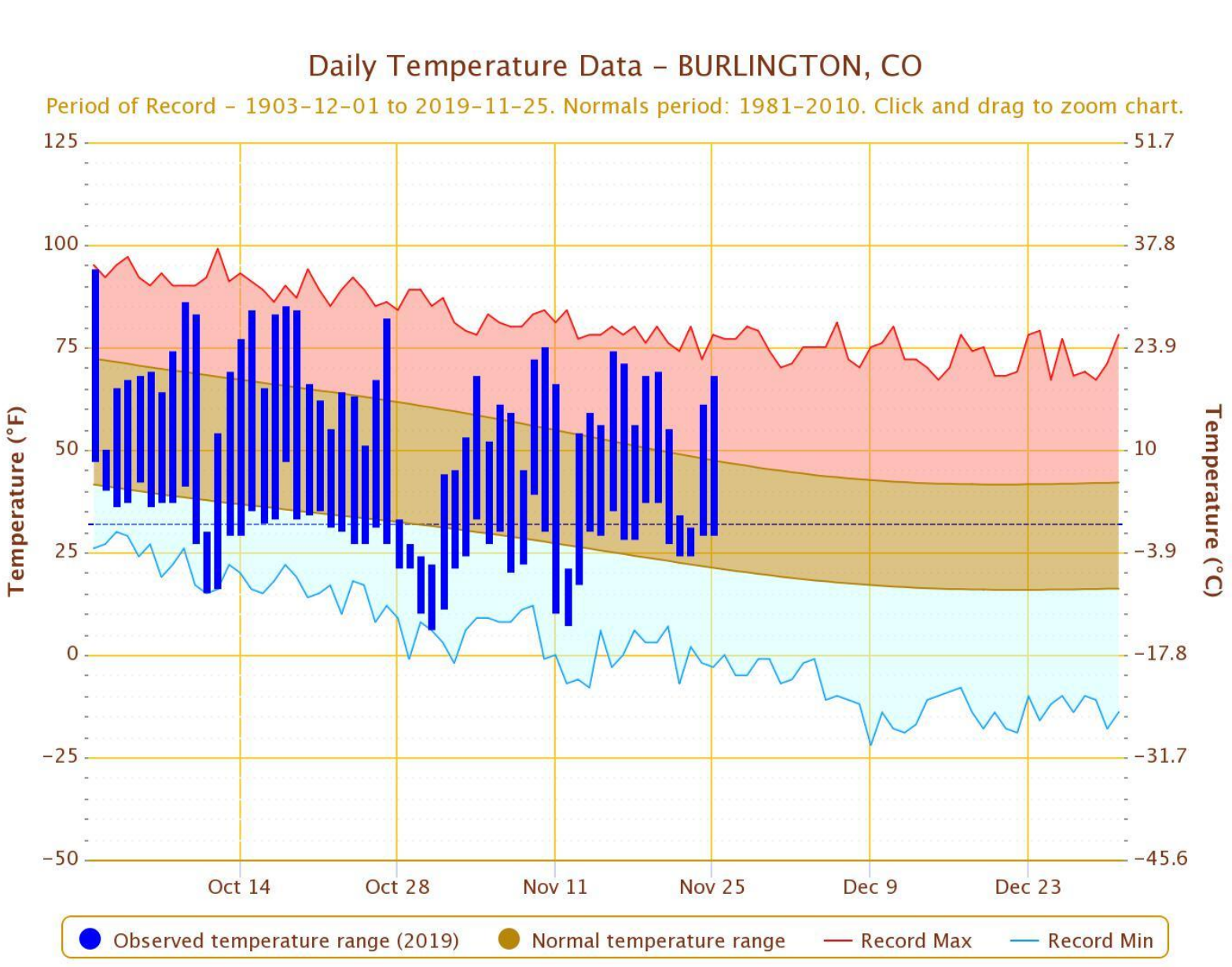

Daily Temperature Data - WALSH 1 W, CO
Period of Record - 1967-09-01 to 2019-11-25. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
125
100
75
50
25
0
-25
-50
51.7
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS

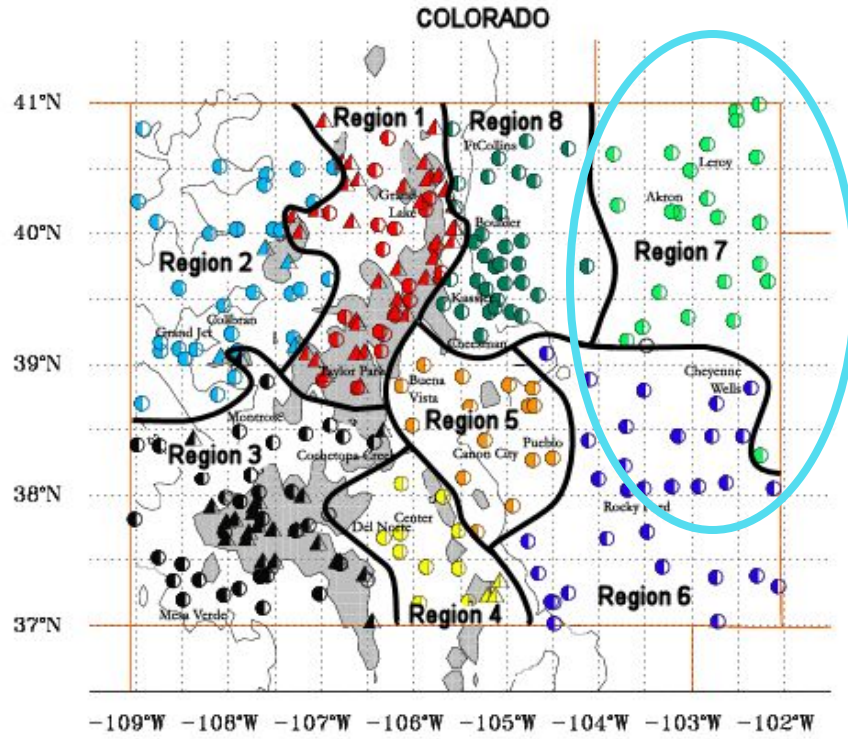

COLORADO
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
Fort Collins
Leroy
Akron
Grand Lake
Boulder
Glenwood Springs
Grand Junction
Taylor Park
Buena Vista
Cheyenne Wells
Monticello
Canon City
Pueblo
Rocky Ford
Del Norte
Center
Mesa Verde

BURLINGTON WY2020 Precipitation Projections

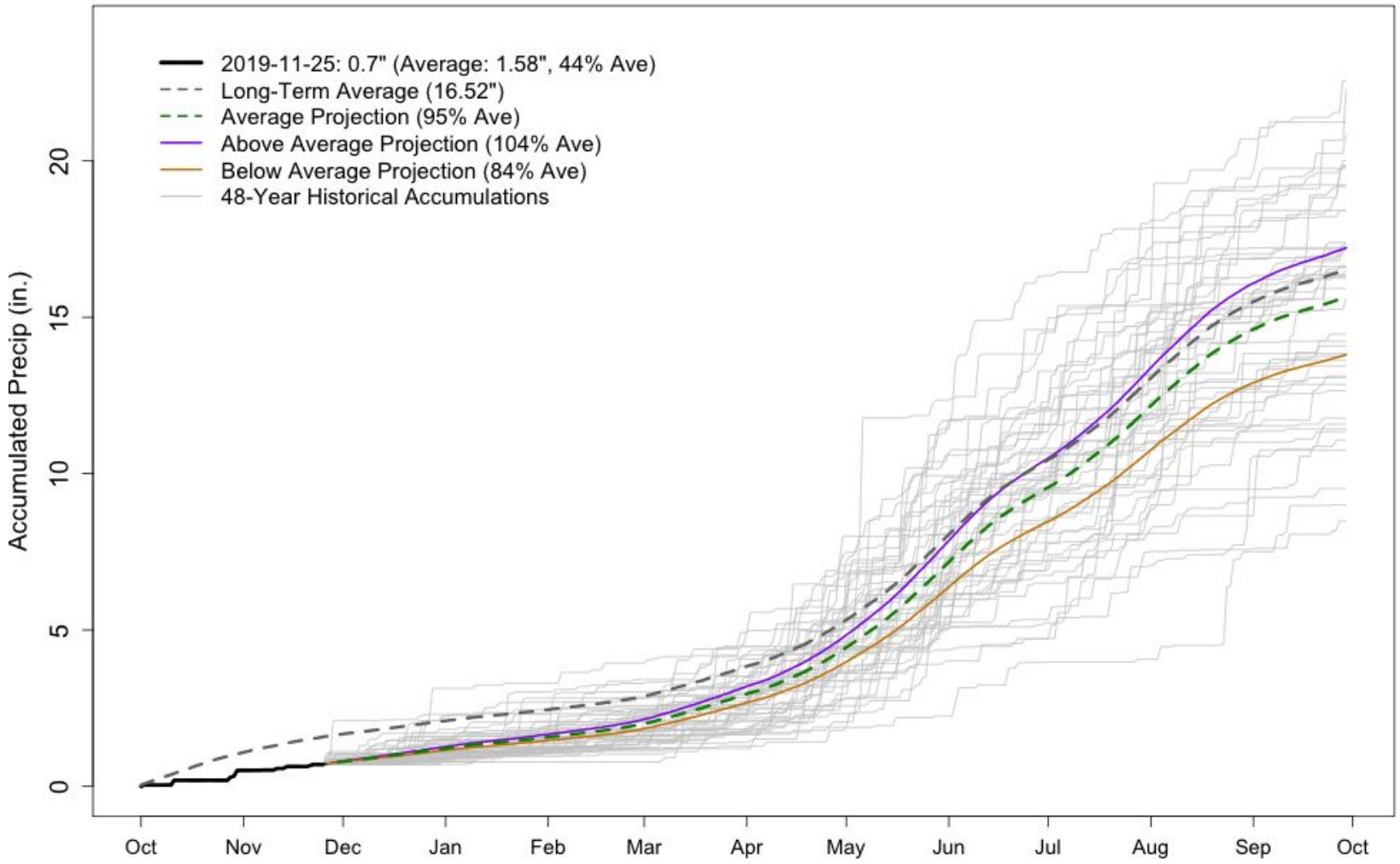


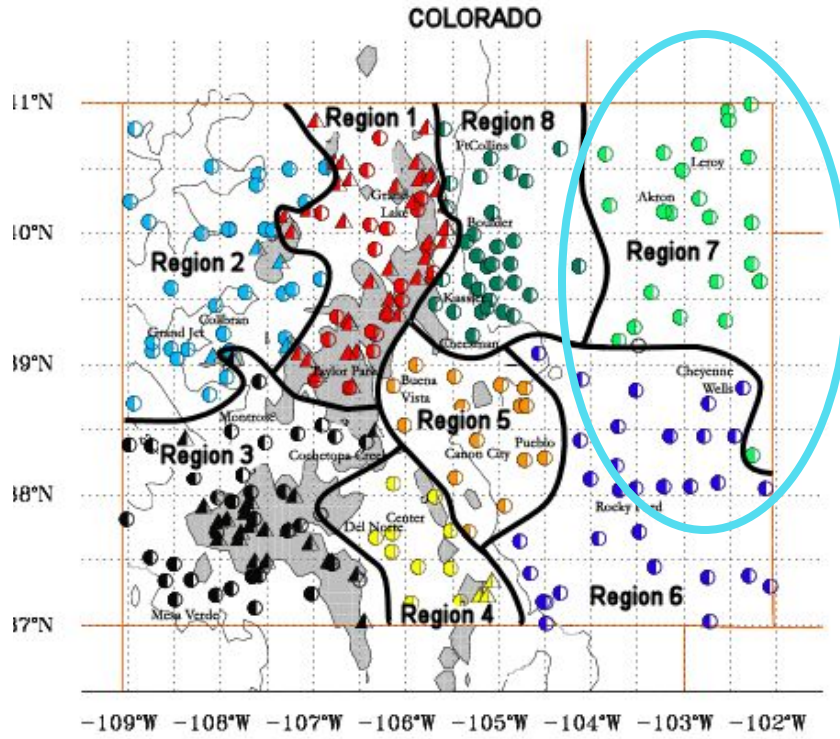


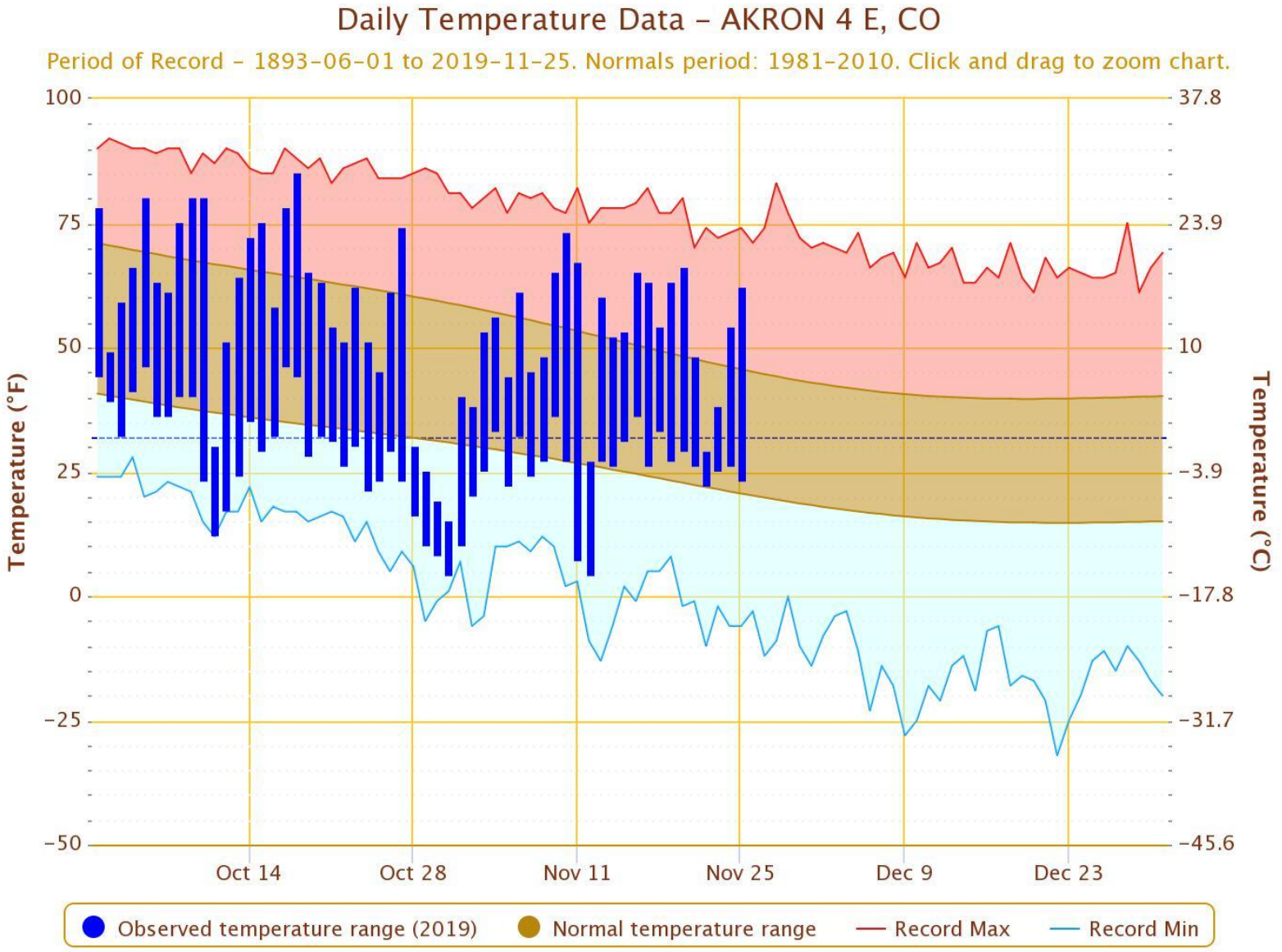

Daily Temperature Data - BURLINGTON, CO
Period of Record - 1903-12-01 to 2019-11-25. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
125
100
75
50
25
0
-25
-50
51.7
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS

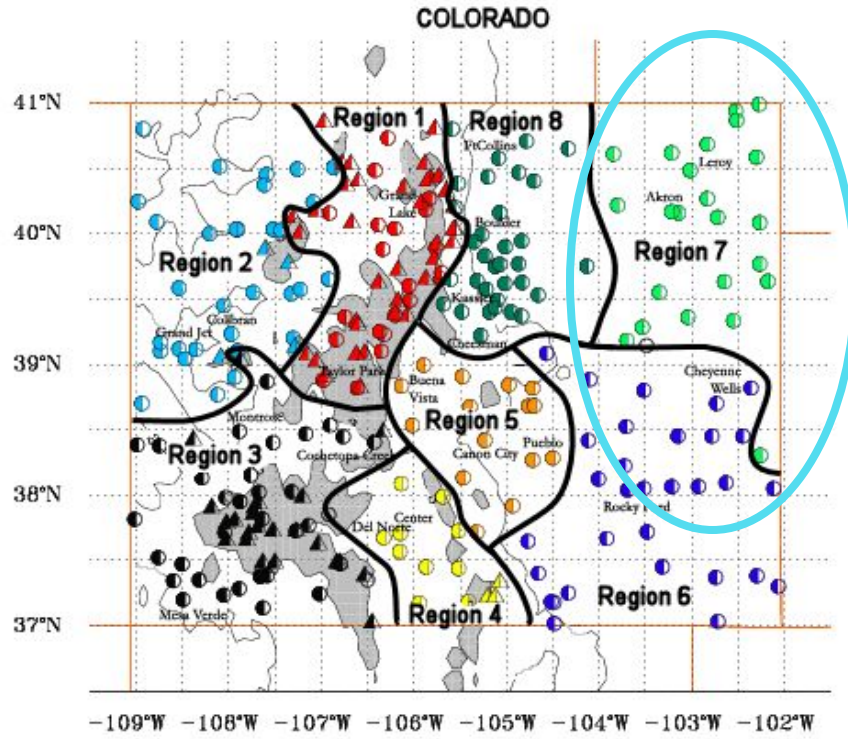

COLORADO
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
Grand Junction
Gunnison
Montrose
Telluride
Mesa Verde
Durango
Pagosa Springs
Del Norte
Center
Alamosa
Saguache
Taylor Park
Buena Vista
Salida
Canon City
Pueblo
Colorado Springs
Kassler
Boulder
Ft Collins
Greeley
Akron
Leroy
Cheyenne Wells

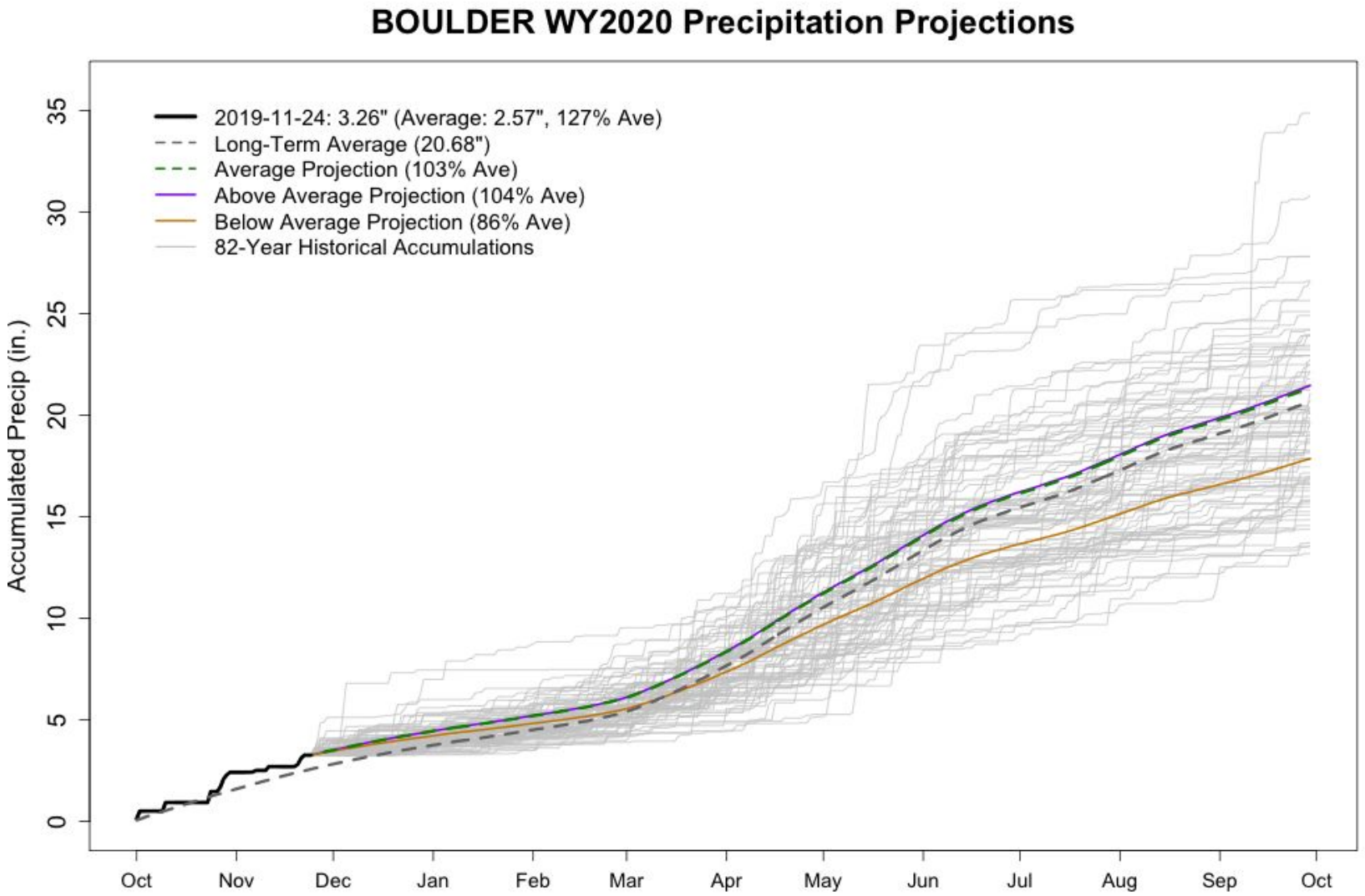
AKRON 4 E WY2020 Precipitation Projections

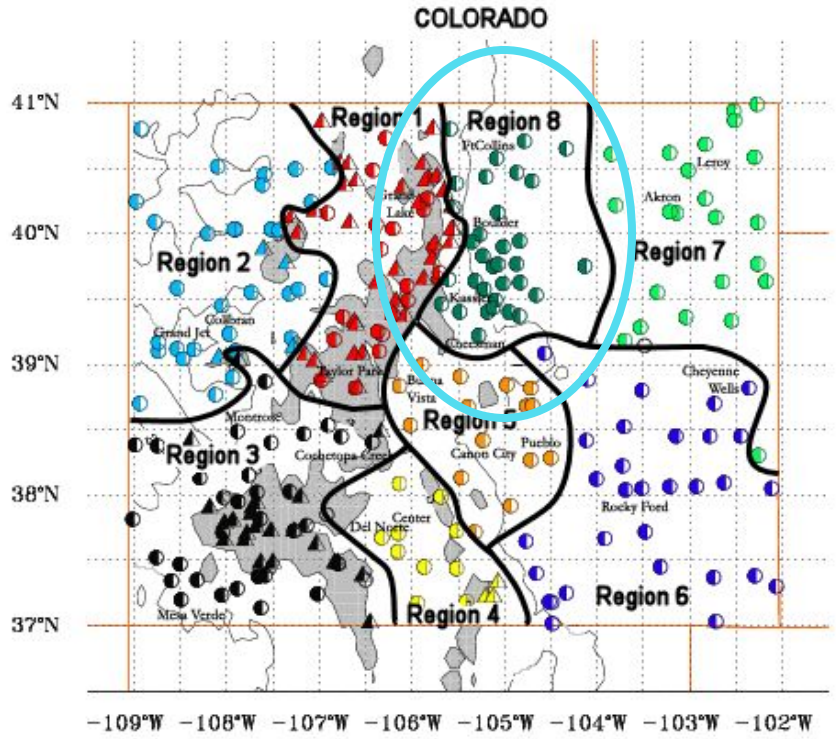


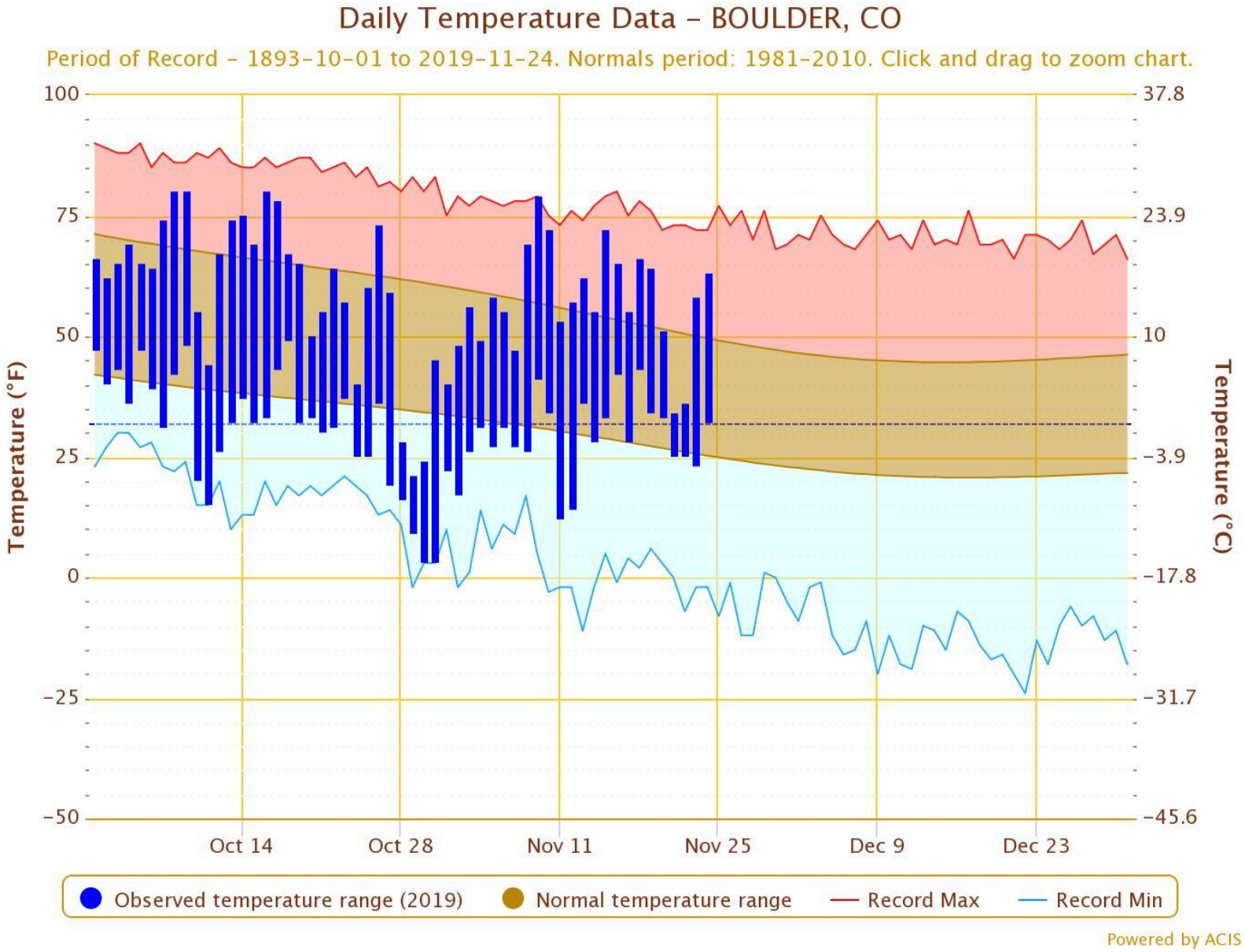


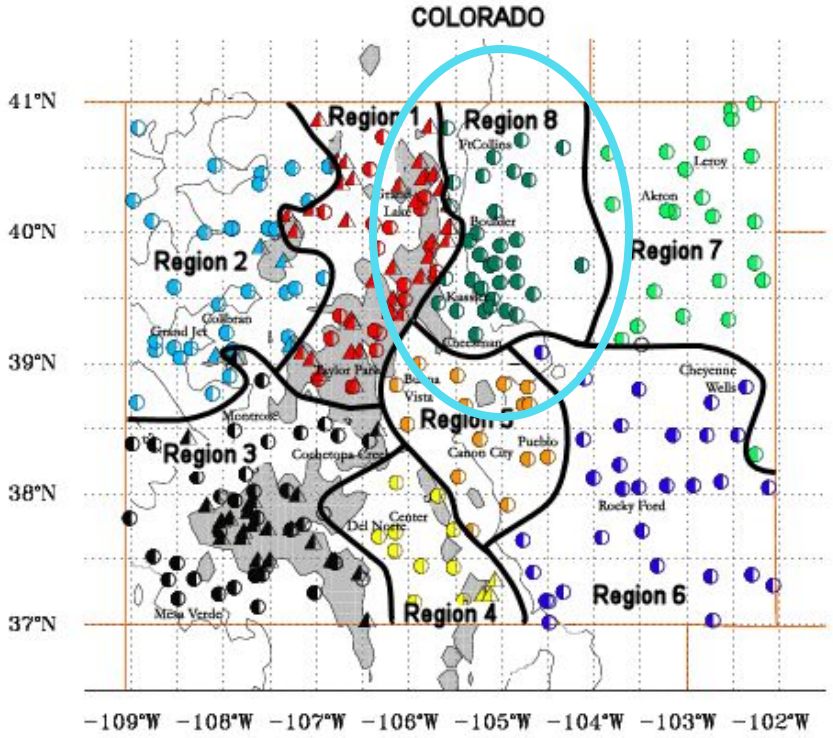

Daily Temperature Data – AKRON 4 E, CO
Period of Record – 1893-06-01 to 2019-11-25. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
75
50
25
0
-25
-50
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS


COLORADO
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8

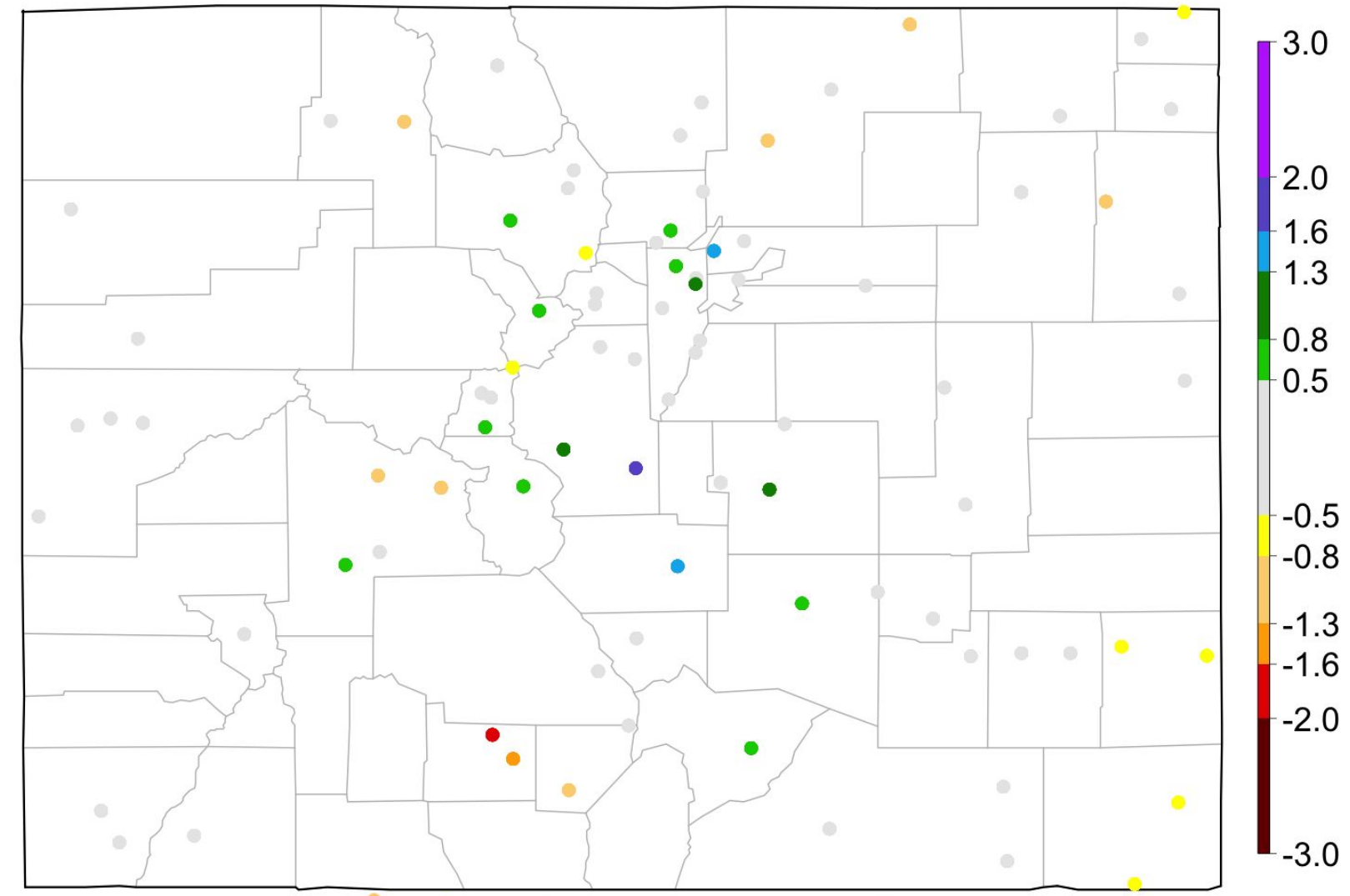

BOULDER WY2020 Precipitation Projections
2019-11-24: 3.26" (Average: 2.57", 127% Ave)
Long-Term Average (20.68")
Average Projection (103% Ave)
Above Average Projection (104% Ave)
Below Average Projection (86% Ave)
82-Year Historical Accumulations
Accumulated Precip (in.)
0
5
10
15
20
25
30
35
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct


COLORADO
Region 1
Region 8
Region 2
Region 7
Region 3
Region 5
Region 4
Region 6
41°N
40°N
39°N
38°N
37°N
−109°W
−108°W
−107°W
−106°W
−105°W
−104°W
−103°W
−102°W


Daily Temperature Data - BOULDER, CO
Period of Record - 1893-10-01 to 2019-11-24. Normals period: 1981-2010. Click and drag to zoom chart.
Temperature (°F)
Temperature (°C)
100
75
50
25
0
-25
-50
37.8
23.9
10
-3.9
-17.8
-31.7
-45.6
Oct 14
Oct 28
Nov 11
Nov 25
Dec 9
Dec 23
Observed temperature range (2019)
Normal temperature range
Record Max
Record Min
Powered by ACIS

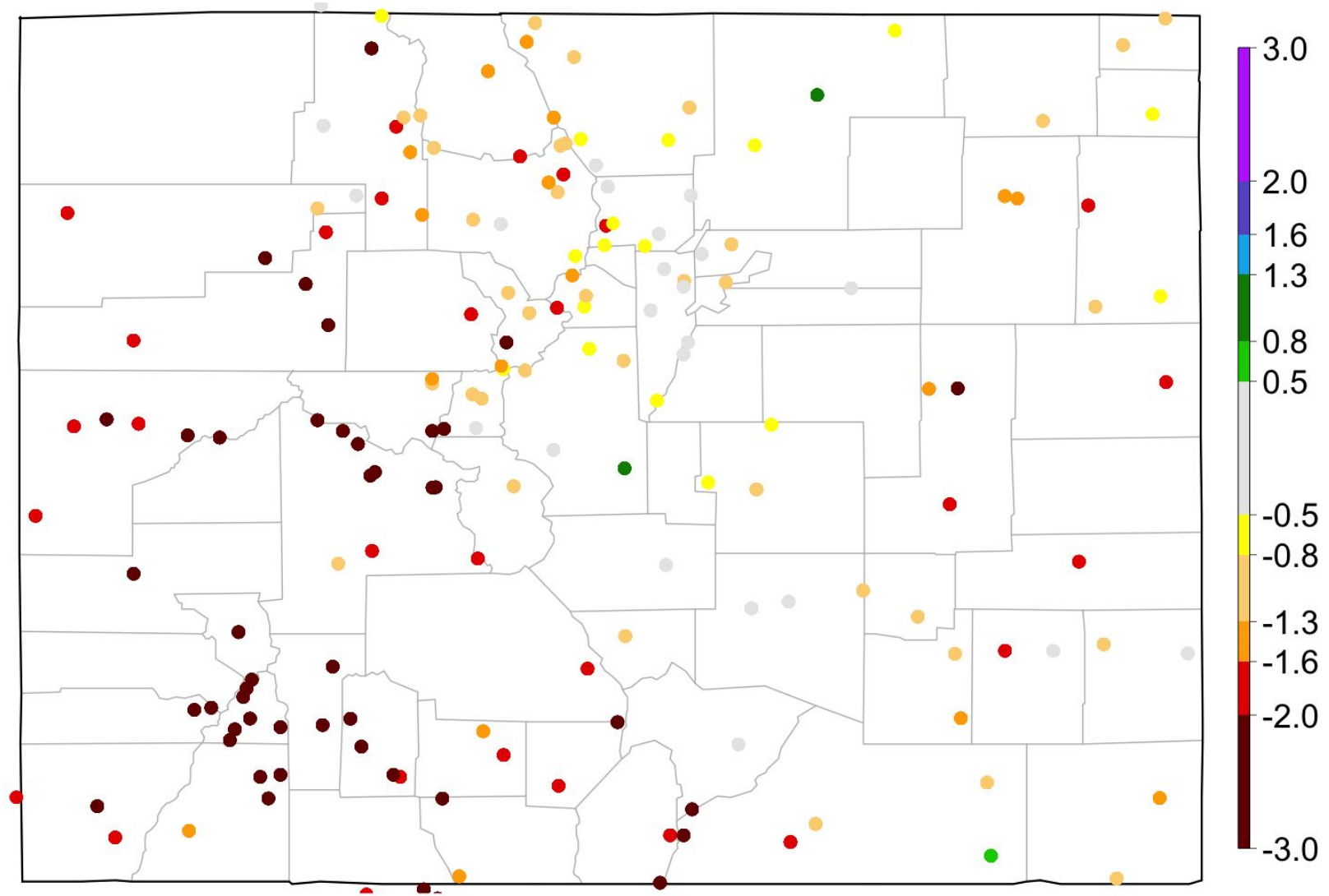

COLORADO
Region 1
Region 2
Region 3
Region 4
Region 5
Region 6
Region 7
Region 8
41°N
40°N
39°N
38°N
37°N
-109°W
-108°W
-107°W
-106°W
-105°W
-104°W
-103°W
-102°W

30-day SPI: 10/25/2019 - 11/23/2019



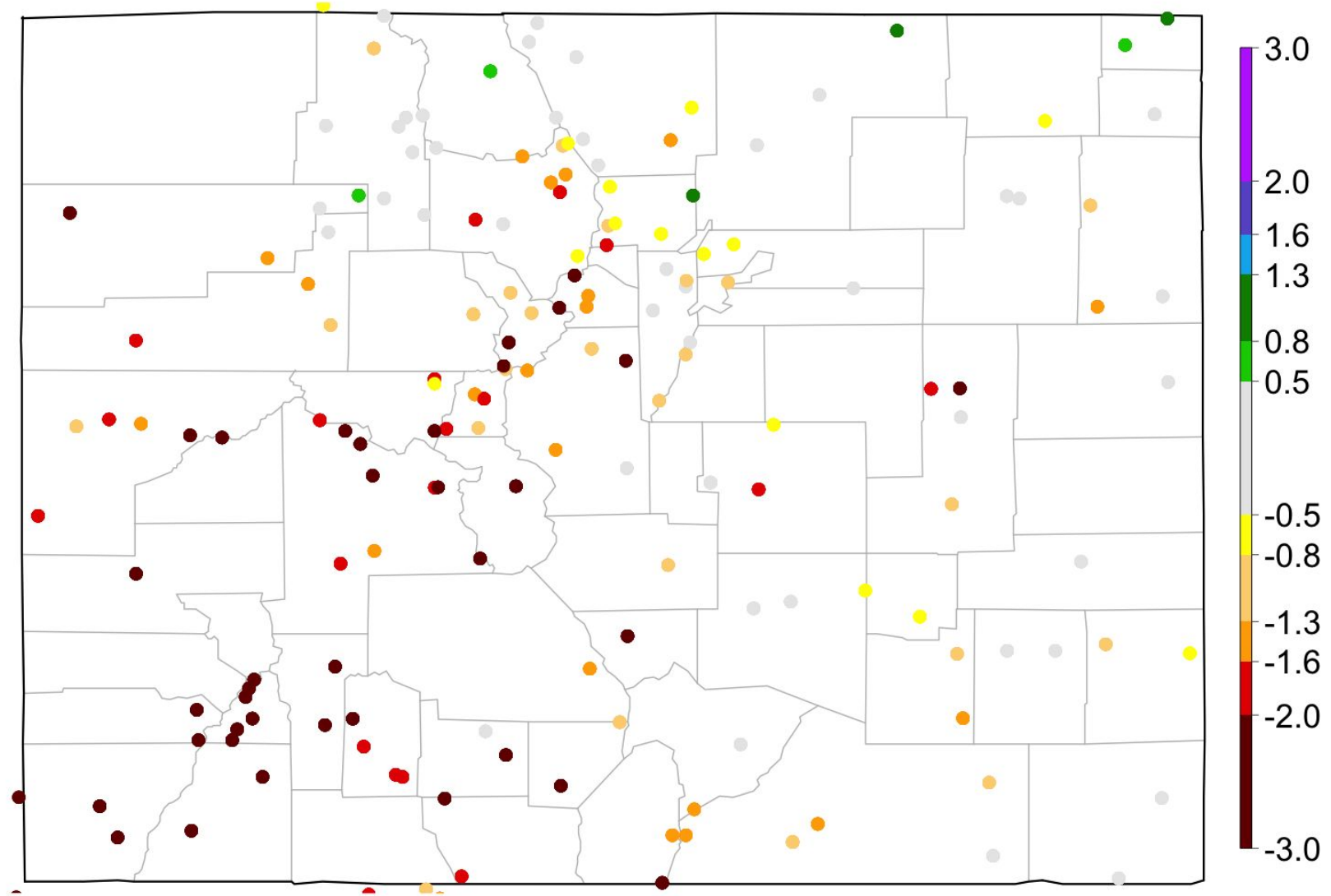
Data from High Plains Regional Climate Center and ACIS

90-day SPI: 8/26/2019 - 11/23/2019



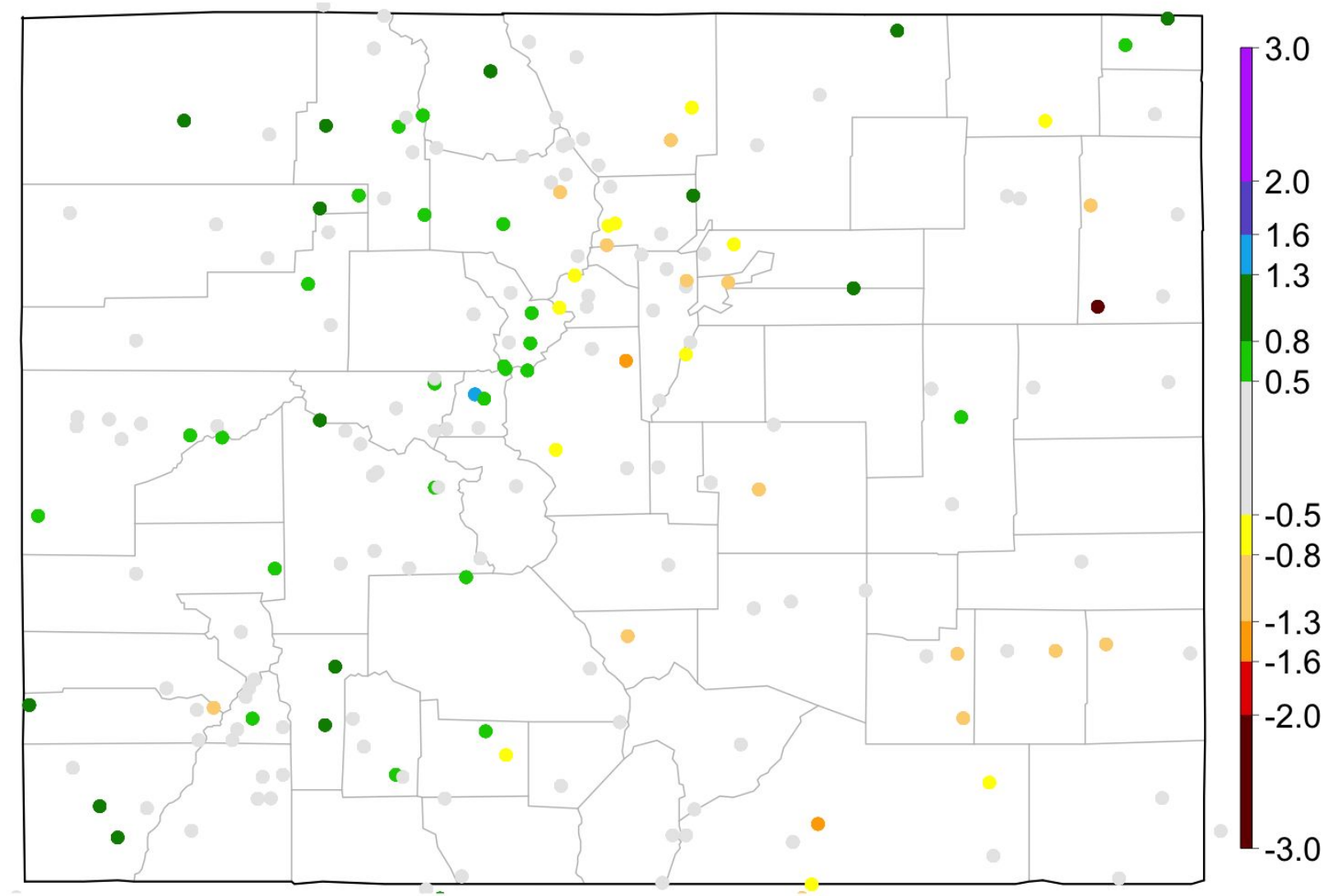
Data from High Plains Regional Climate Center and ACIS

6-month SPI: 5/24/2019 - 11/23/2019



Data from High Plains Regional Climate Center and ACIS

12-month SPI: 11/24/2018 - 11/23/2019



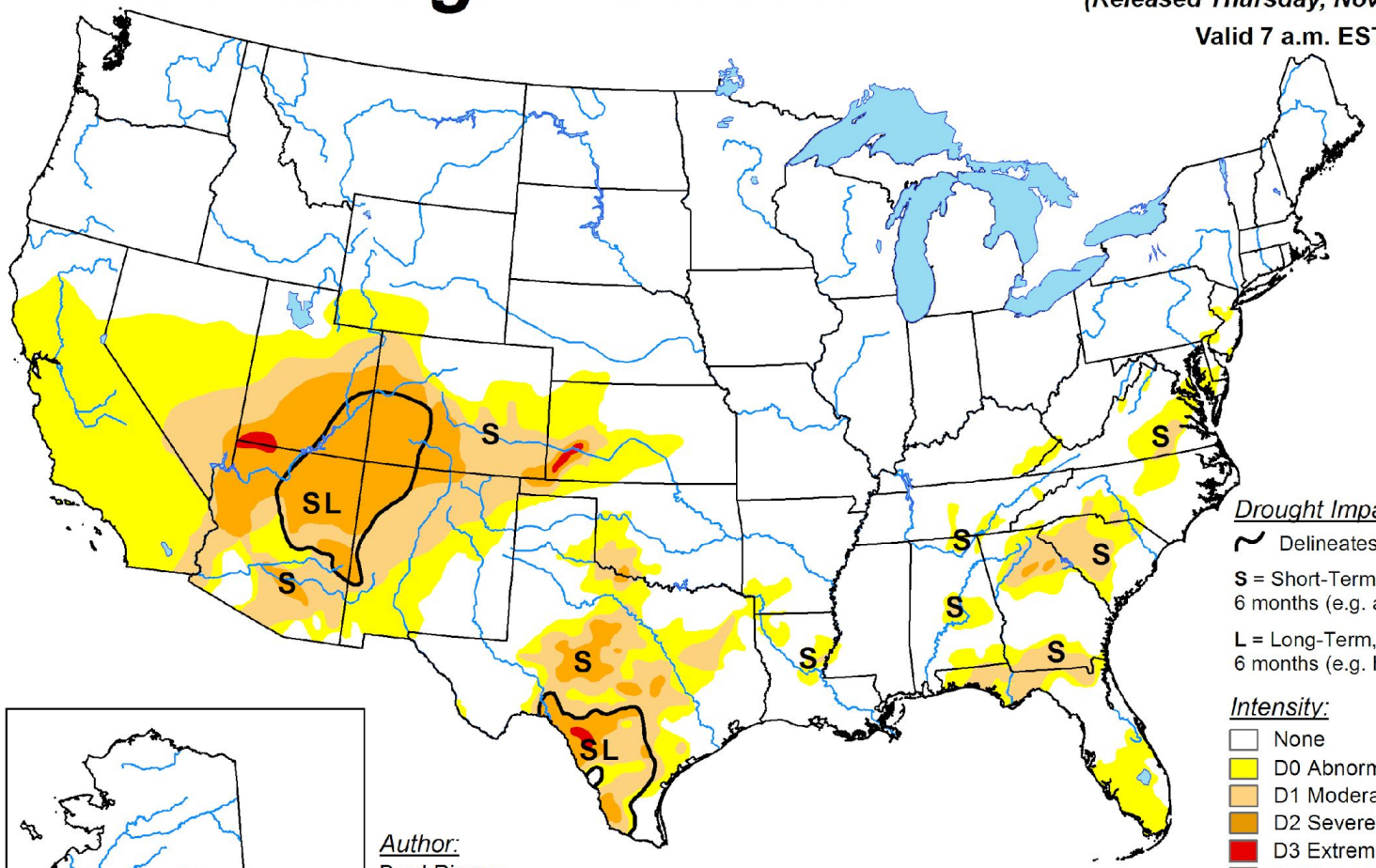
Data from High Plains Regional Climate Center and ACIS

U.S. Drought Monitor

November 19, 2019

(Released Thursday, Nov. 21, 2019)

Valid 7 a.m. EST



Drought Impact Types:

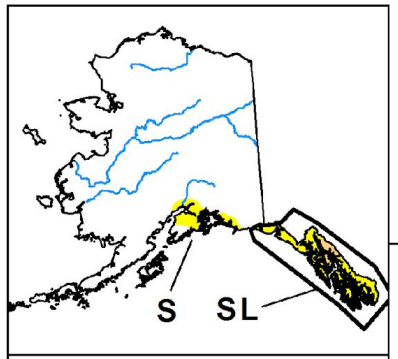
Delineates dominant impacts

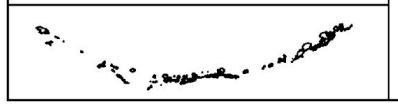
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

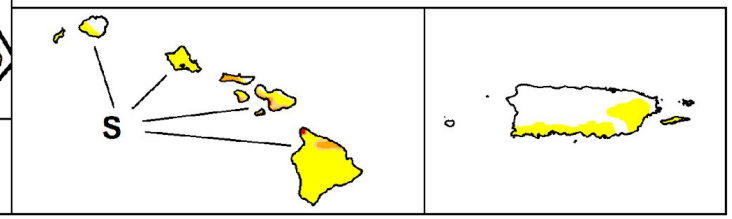
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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







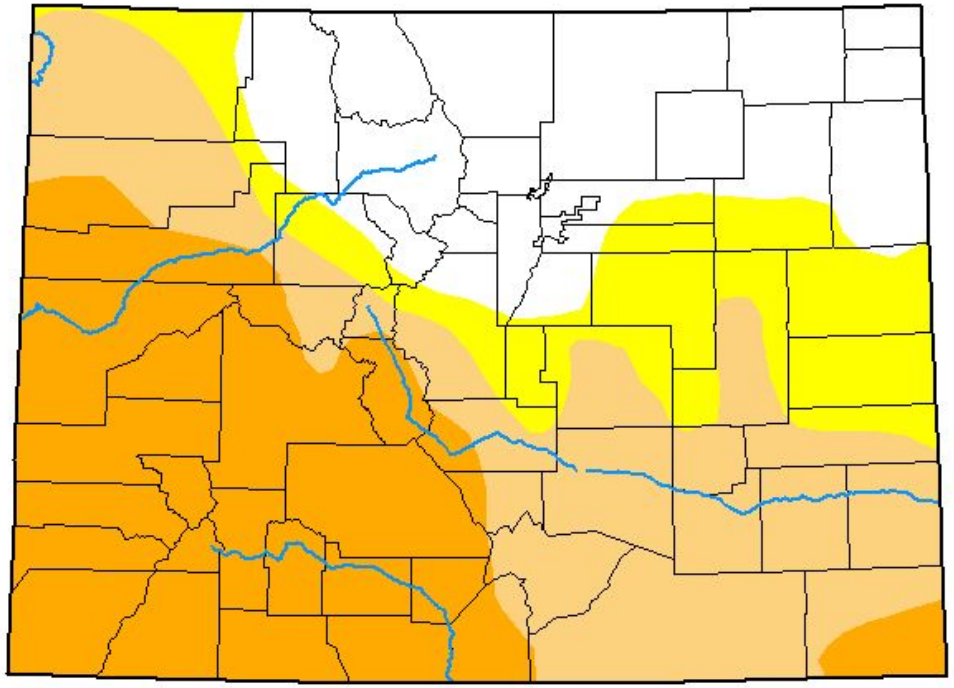
Author:
Brad Rippey
U.S. Department of Agriculture

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

USDA · NDMC · NOAA

droughtmonitor.unl.edu

U.S. Drought Monitor
Colorado



November 19, 2019
(Released Thursday, Nov. 21, 2019)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	25.19	74.81	59.95	32.23	0.00	0.00
Last Week *11-12-2019*	25.74	74.26	55.27	31.02	0.00	0.00
3 Months Ago *08-20-2019*	93.35	6.65	0.00	0.00	0.00	0.00
Start of Calendar Year *01-01-2019*	17.94	82.06	66.26	54.91	27.11	11.22
Start of Water Year *10-01-2019*	30.14	69.86	27.53	0.00	0.00	0.00
One Year Ago *11-20-2018*	17.10	82.90	66.26	54.82	34.13	13.35

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

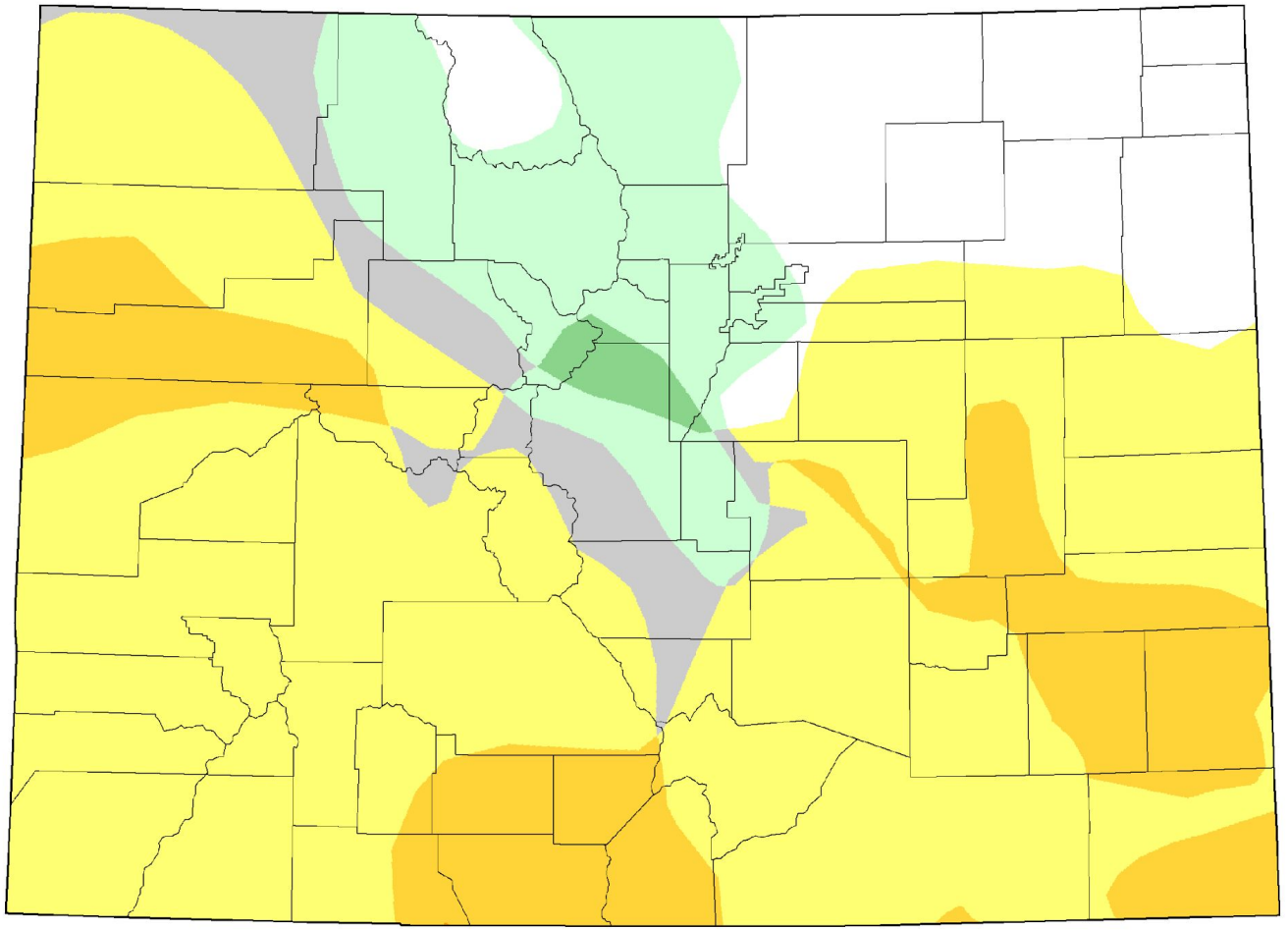
Author:

Brad Rippey
U.S. Department of Agriculture

droughtmonitor.unl.edu

U.S. Drought Monitor Class Change - Colorado

Start of Water Year



November 19, 2019
compared to
October 1, 2019

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

COLORADO CLIMATE CENTER

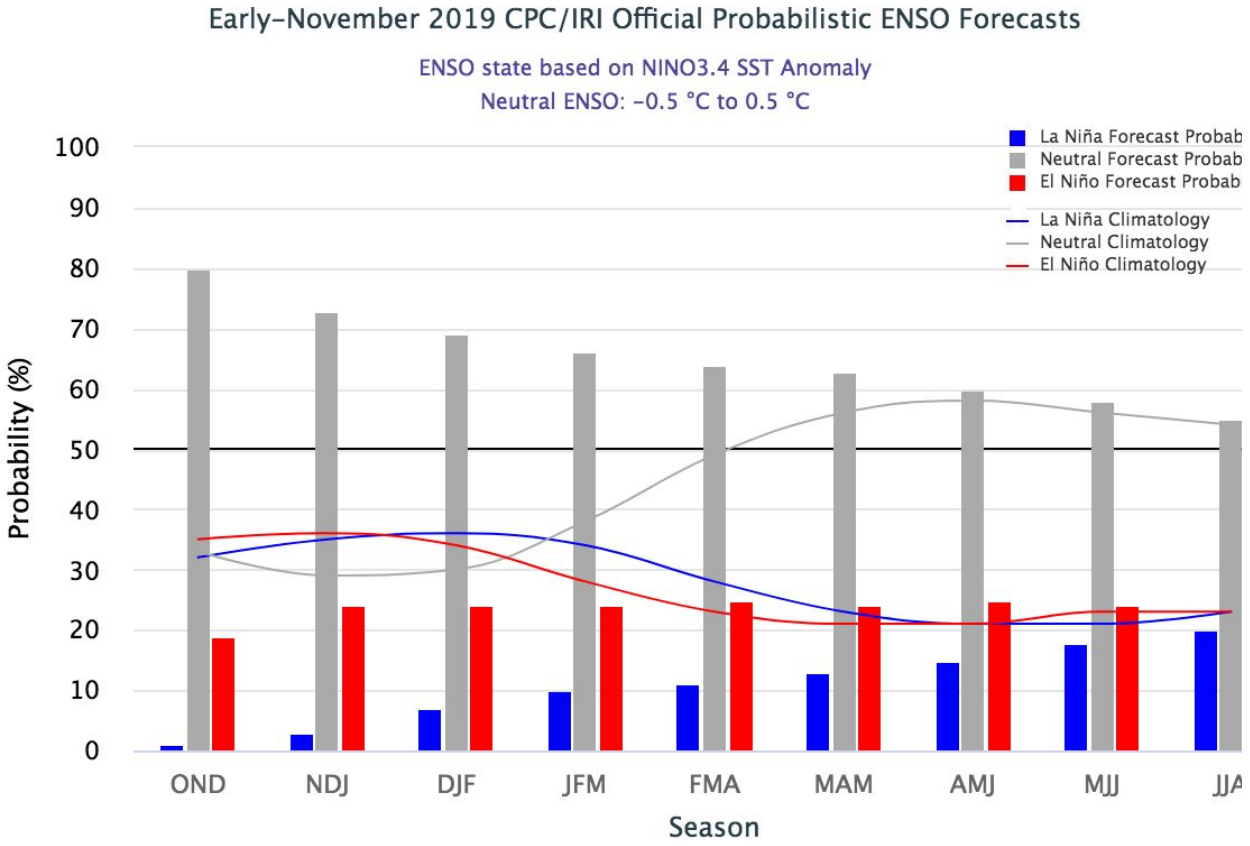
Winter Outlook

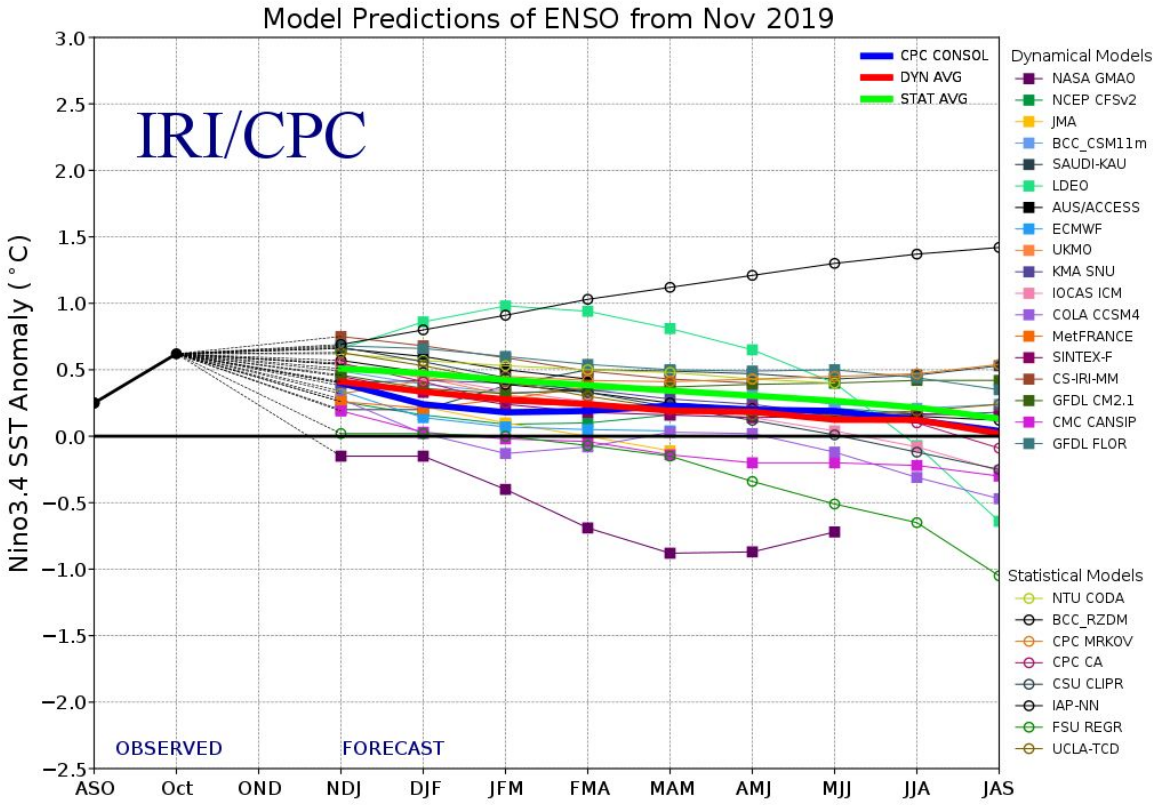
El Niño or La Niña?

CPC Outlooks

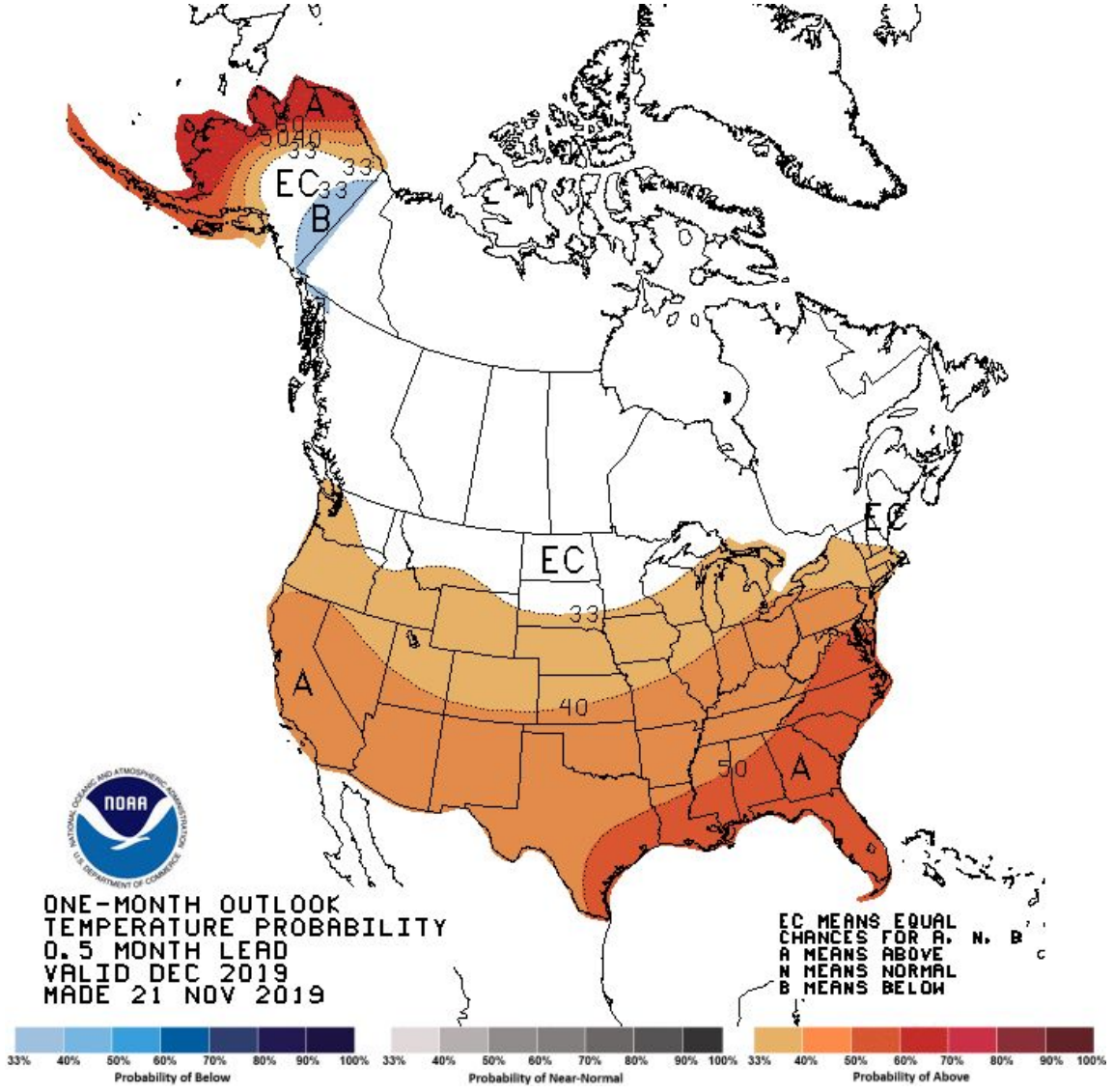
How important is start of season?

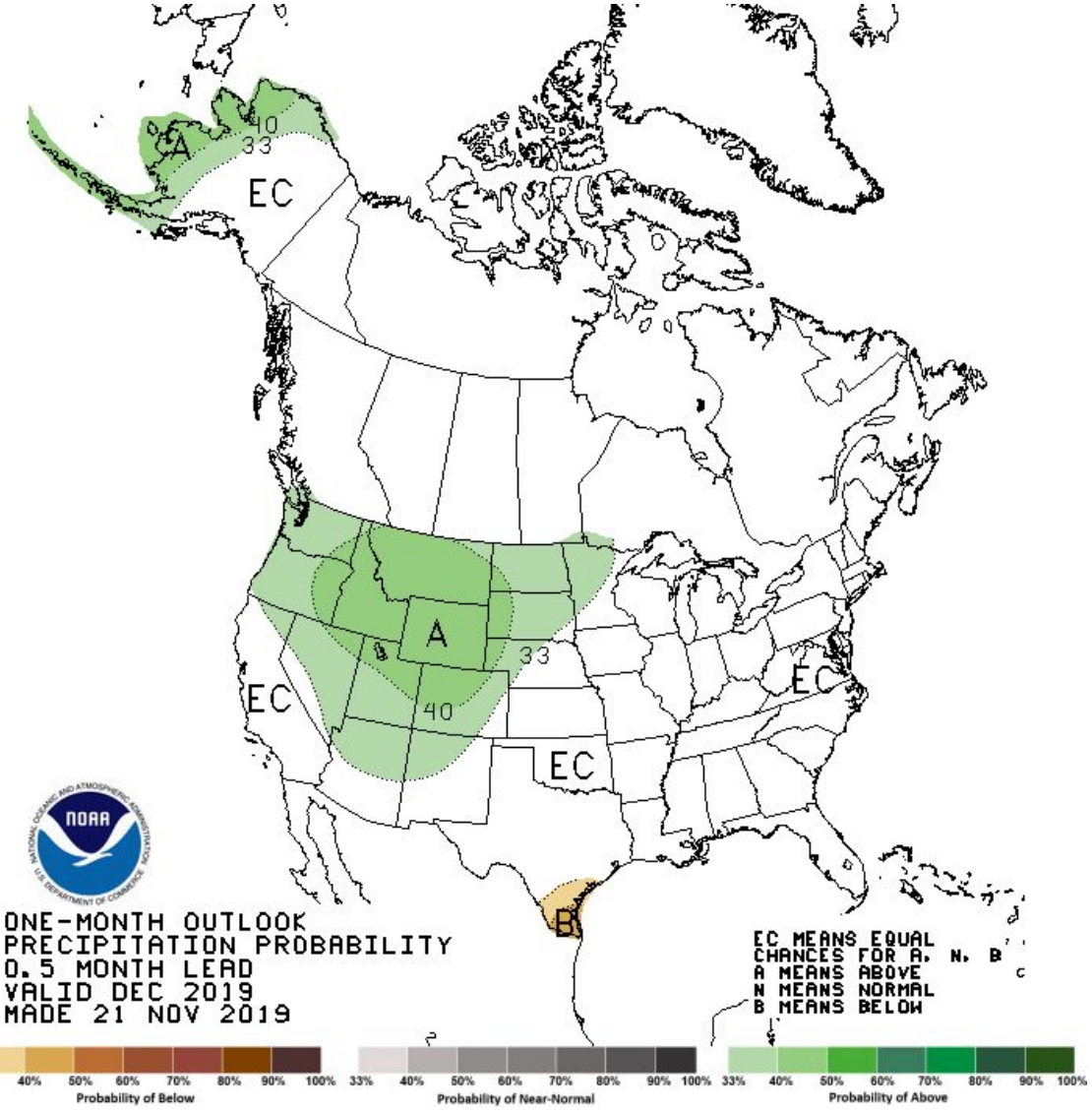
No El Niño or La Niña forecast



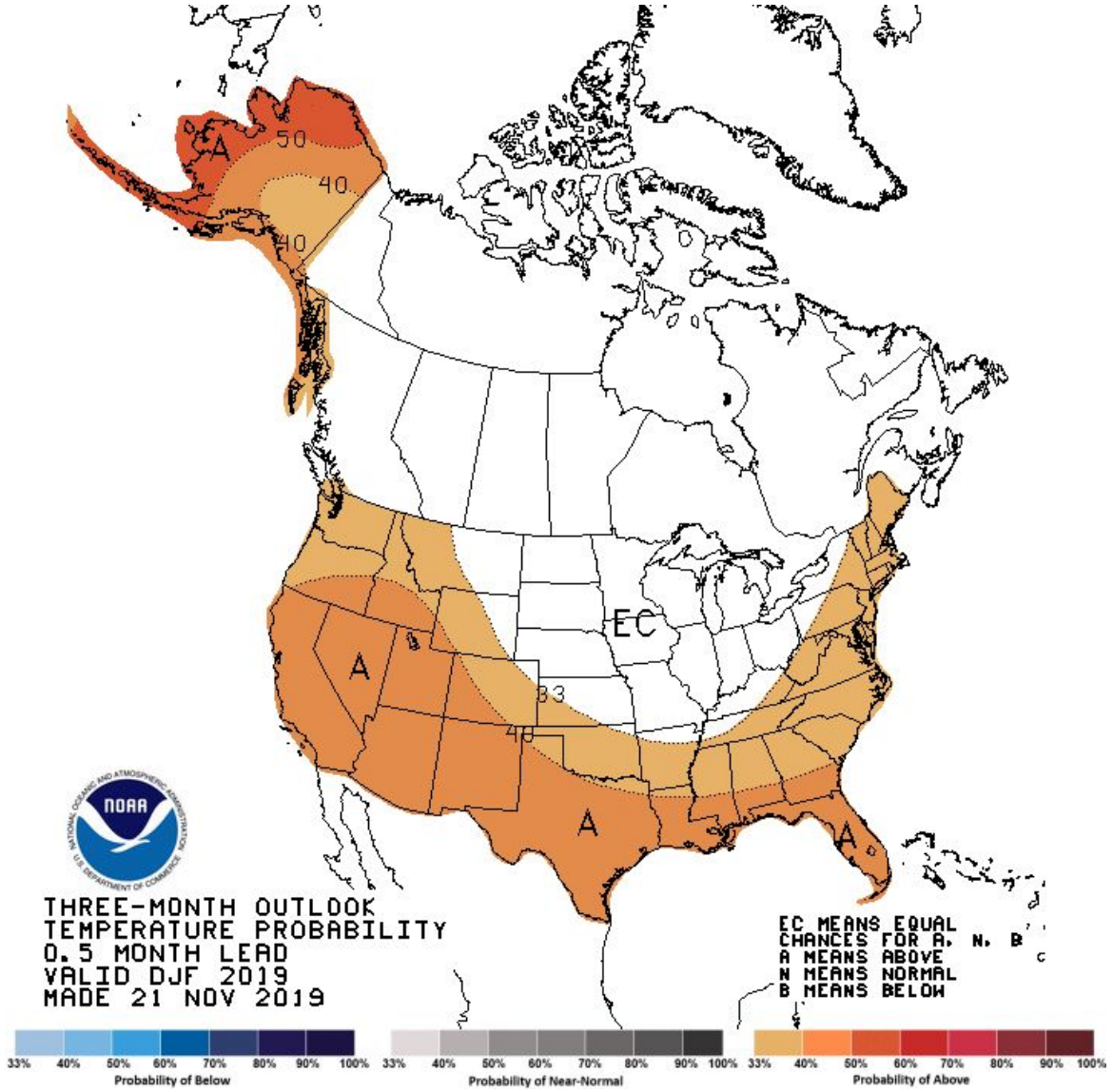


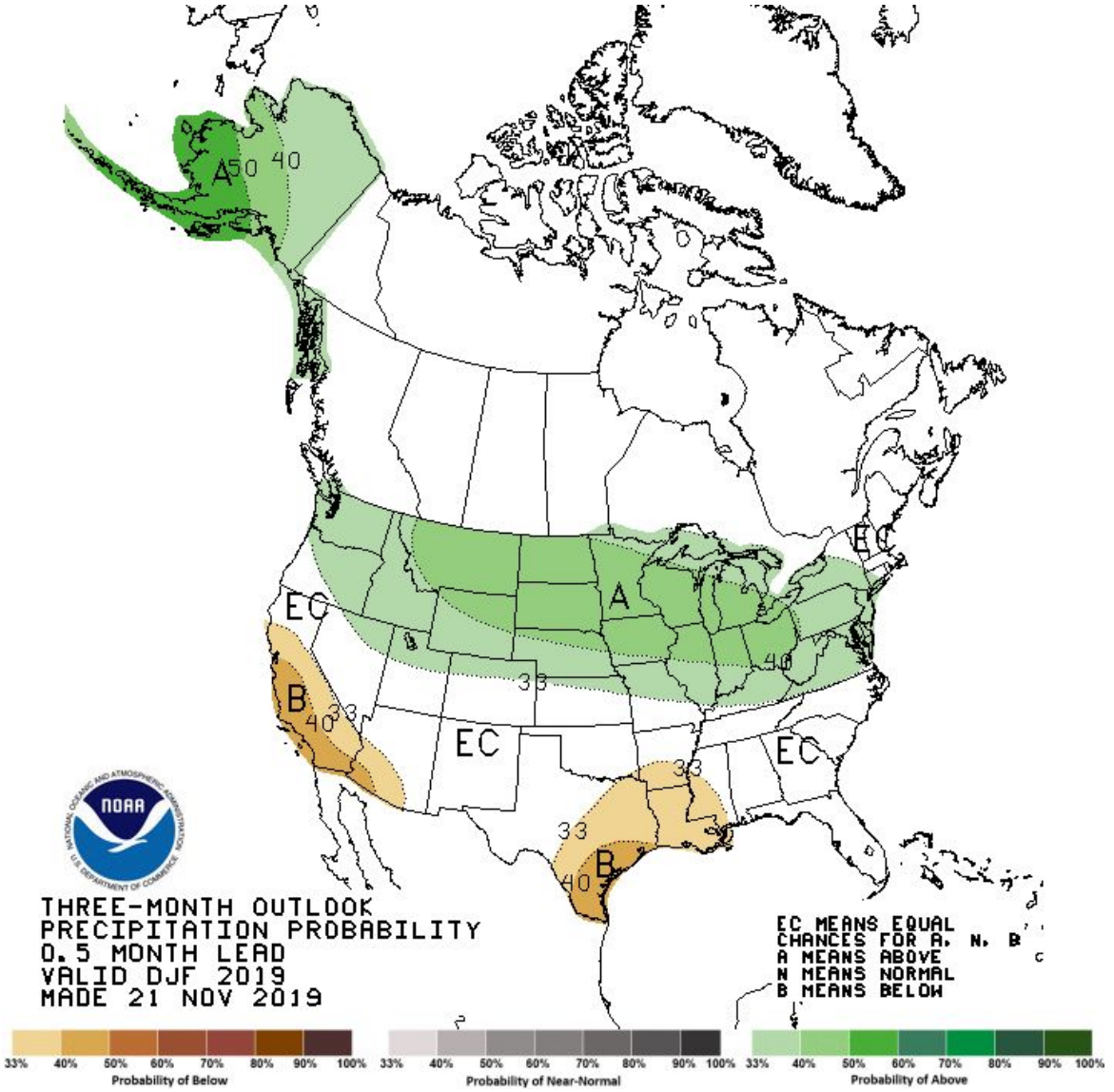
One Month Outlook

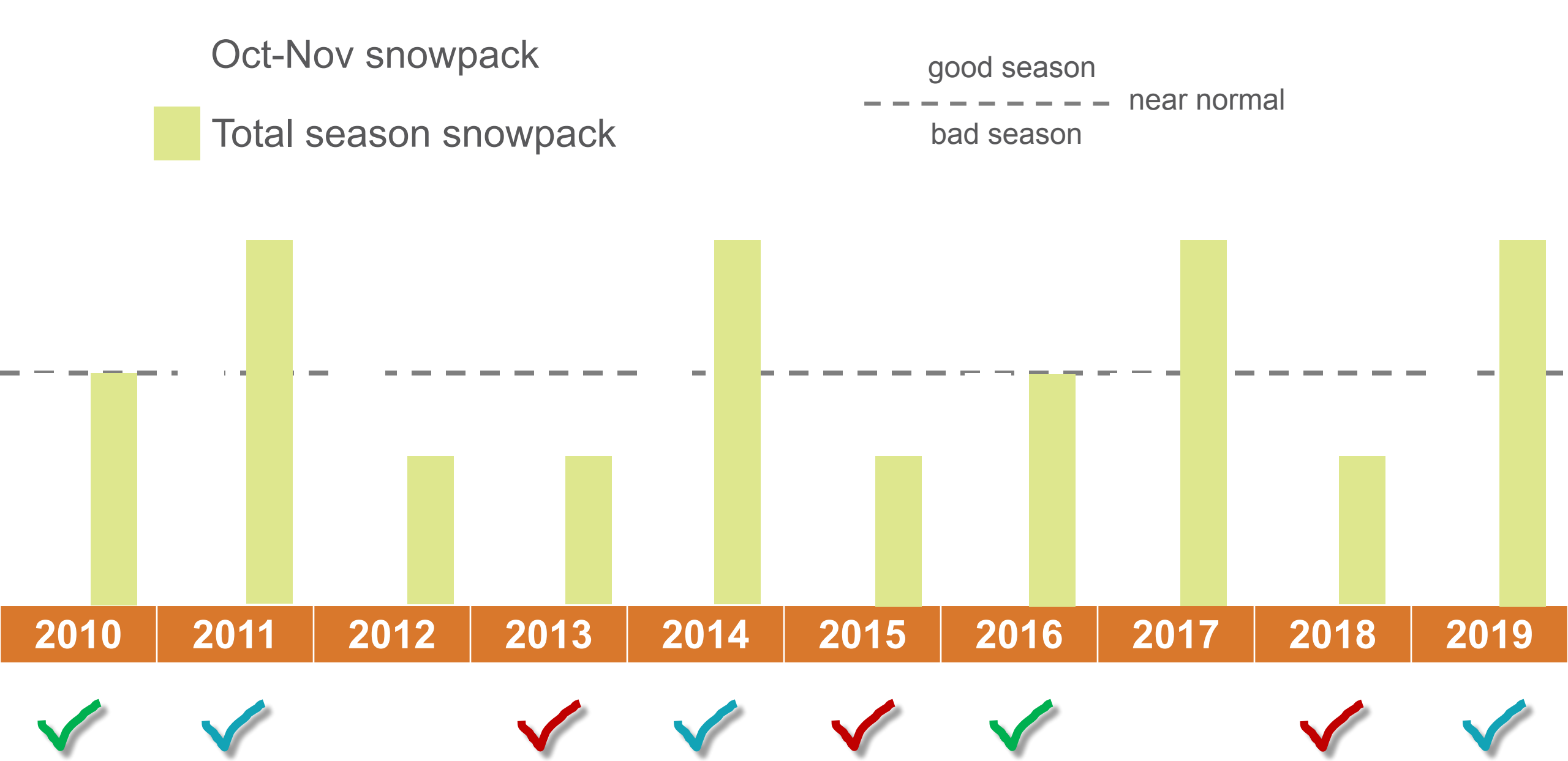


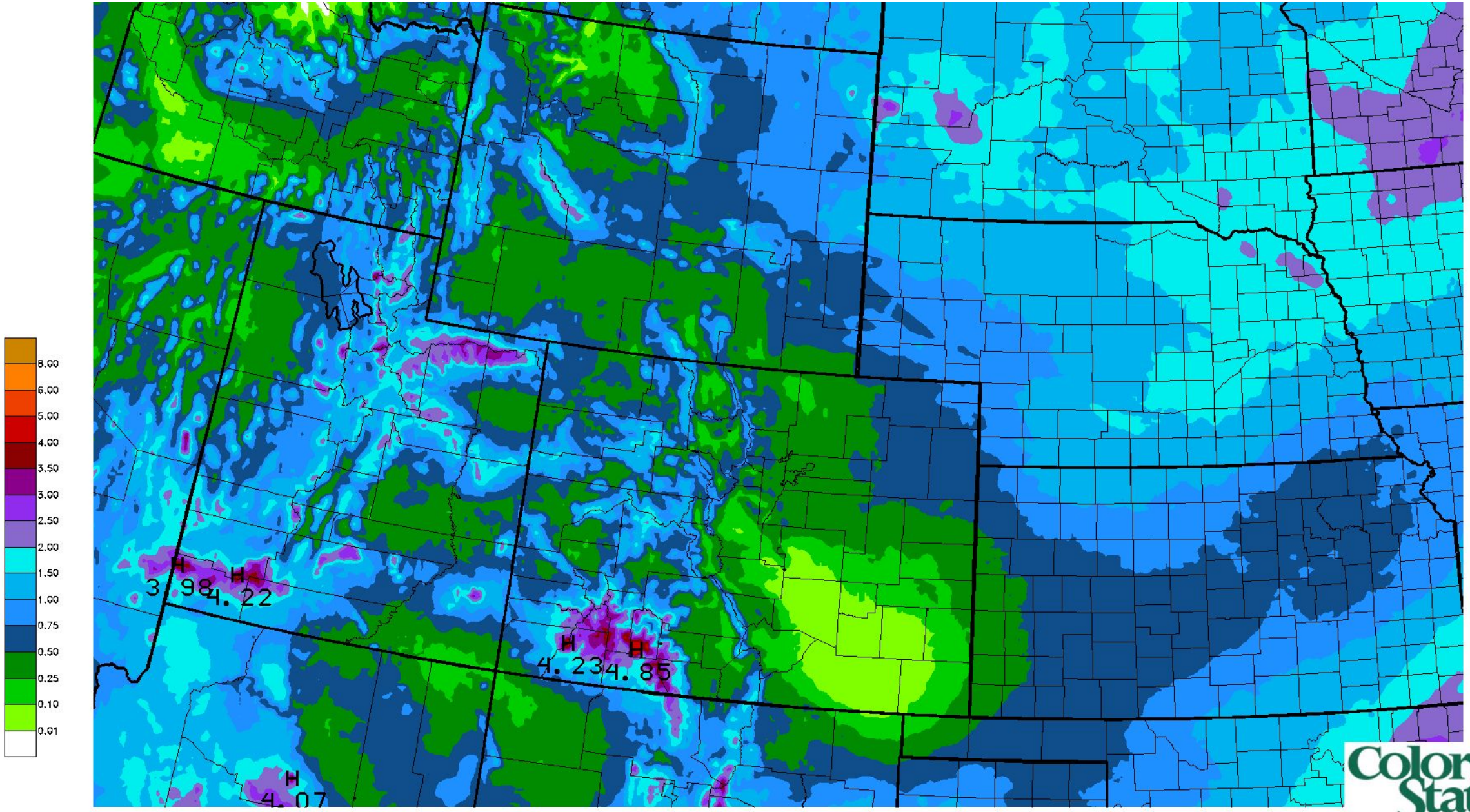


Dec-Jan-Feb Outlook






Oct-Nov snowpack
Total season snowpack
good season
near normal
bad season
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019



WPC FORECAST PRECIPITATION (INCHES) IN 7 DAYS ENDING TUE 191203/1200V168
FORECAST ISSUED 191126/1200F168

Colorado State University

CPC and Model Outlooks…

- ✔ With no El Niño or La Niña forecast to dominate large-scale patterns, the outlook is a bit more uncertain for the winter.
- ✔ Temperature probabilities leaning toward warmer than average, likely driven by climate change signal.
- ✔ Precipitation probabilities are a lot more uncertain.
- ✔ Promising outlook for those areas that had a strong start to the water year with good snowpack in October and November.
- ✔ Don’t worry yet, there’s still a lot of snow accumulating season yet to go!

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To view this and other presentations:
http://climate.colostate.edu/ccc_archive.html

Thank you

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