

# Data, Variability, and Trends in Colorado's Climate

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COLORADO  
**CLIMATE**  
CENTER

Colorado Water Congress  
August 2019



ATMOSPHERIC SCIENCE  
COLORADO STATE UNIVERSITY

# Statewide annual average temperature

Colorado statewide annual temperature anomaly (1895-2018), compared to 1901-2000 average

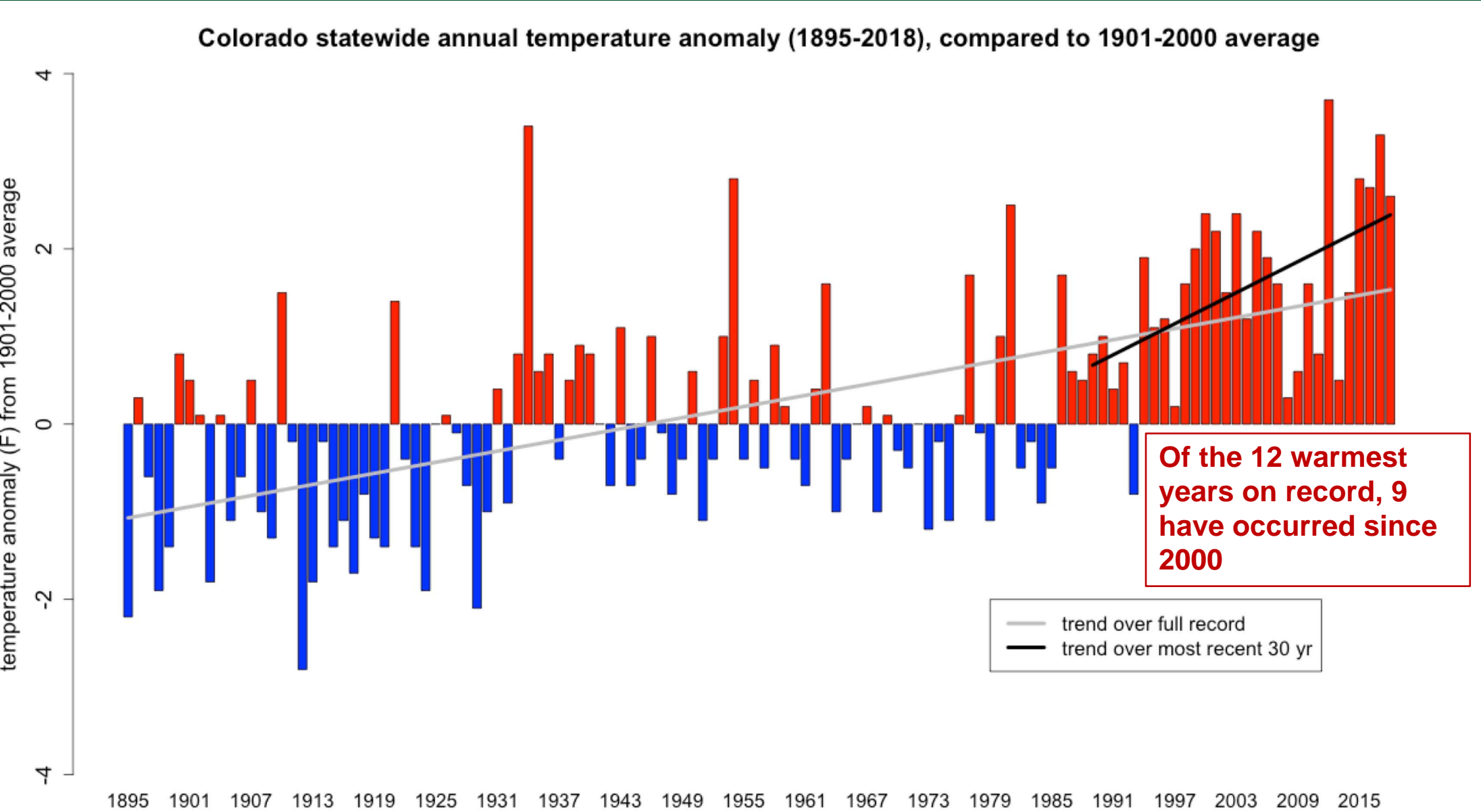


1895

Data source: NOAA/NCEI  
Graphic by Colorado Climate Center



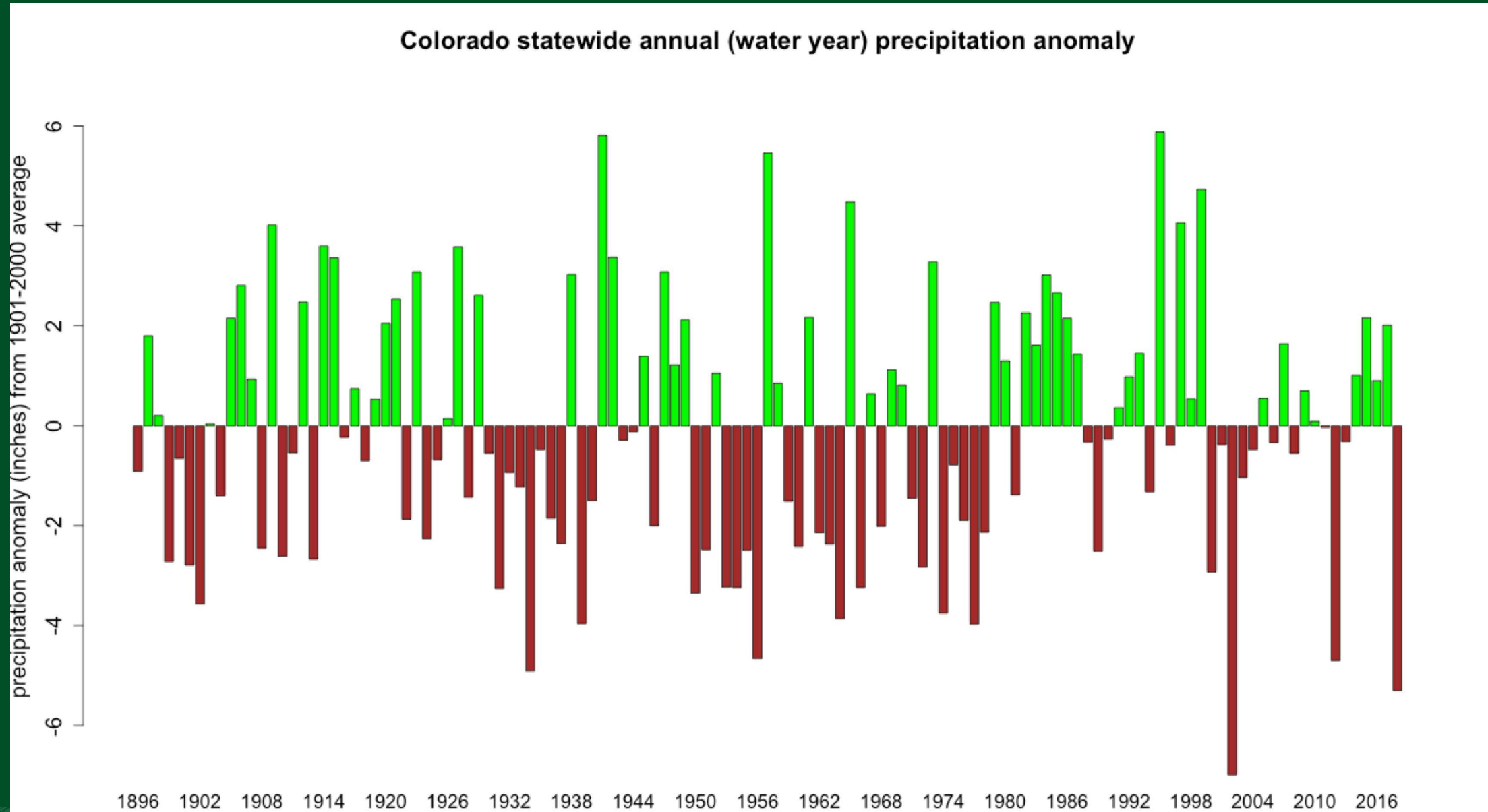
# Statewide annual average temperature



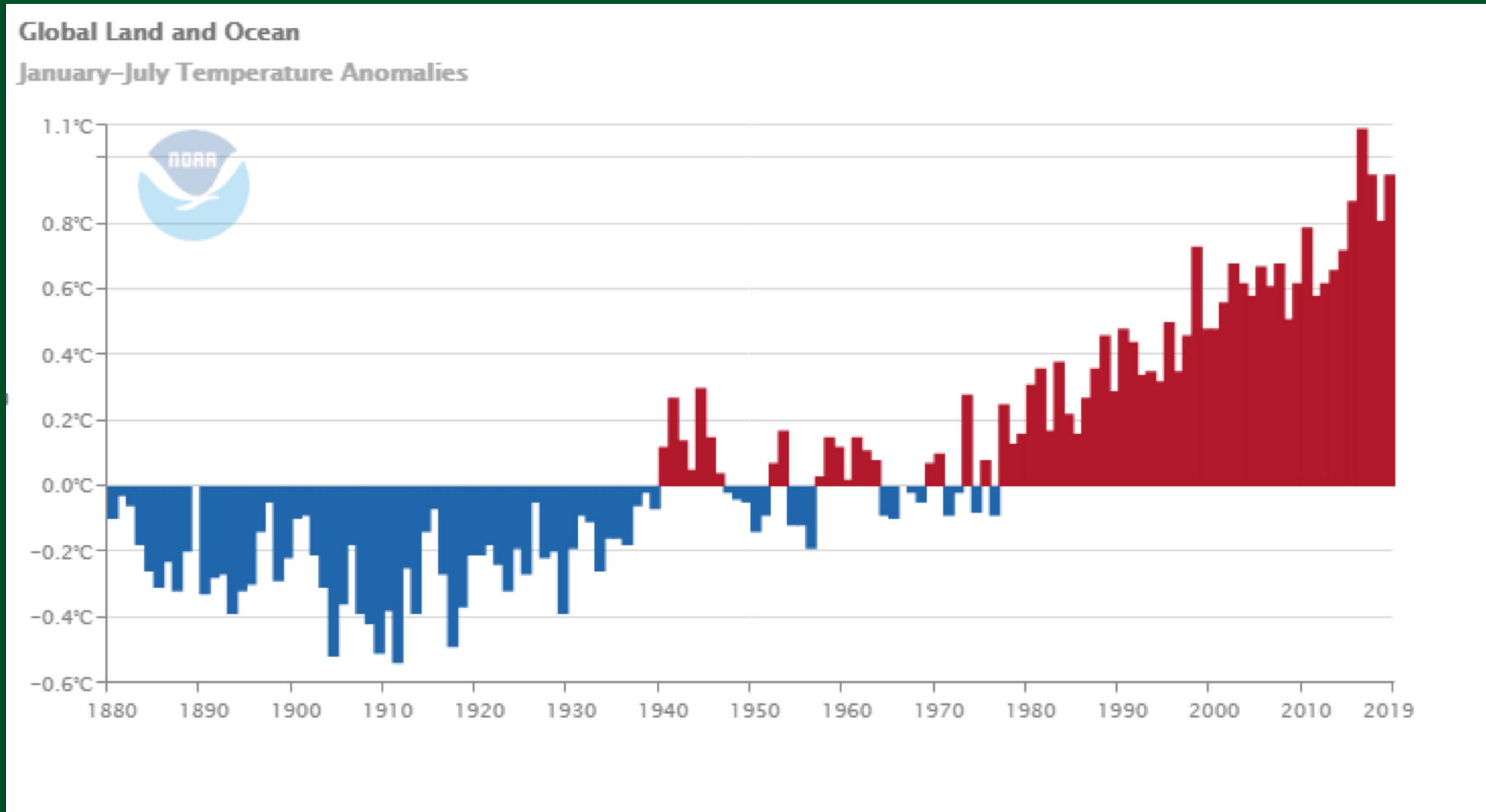
Data source: NOAA/NCEI  
Graphic by Colorado Climate Center



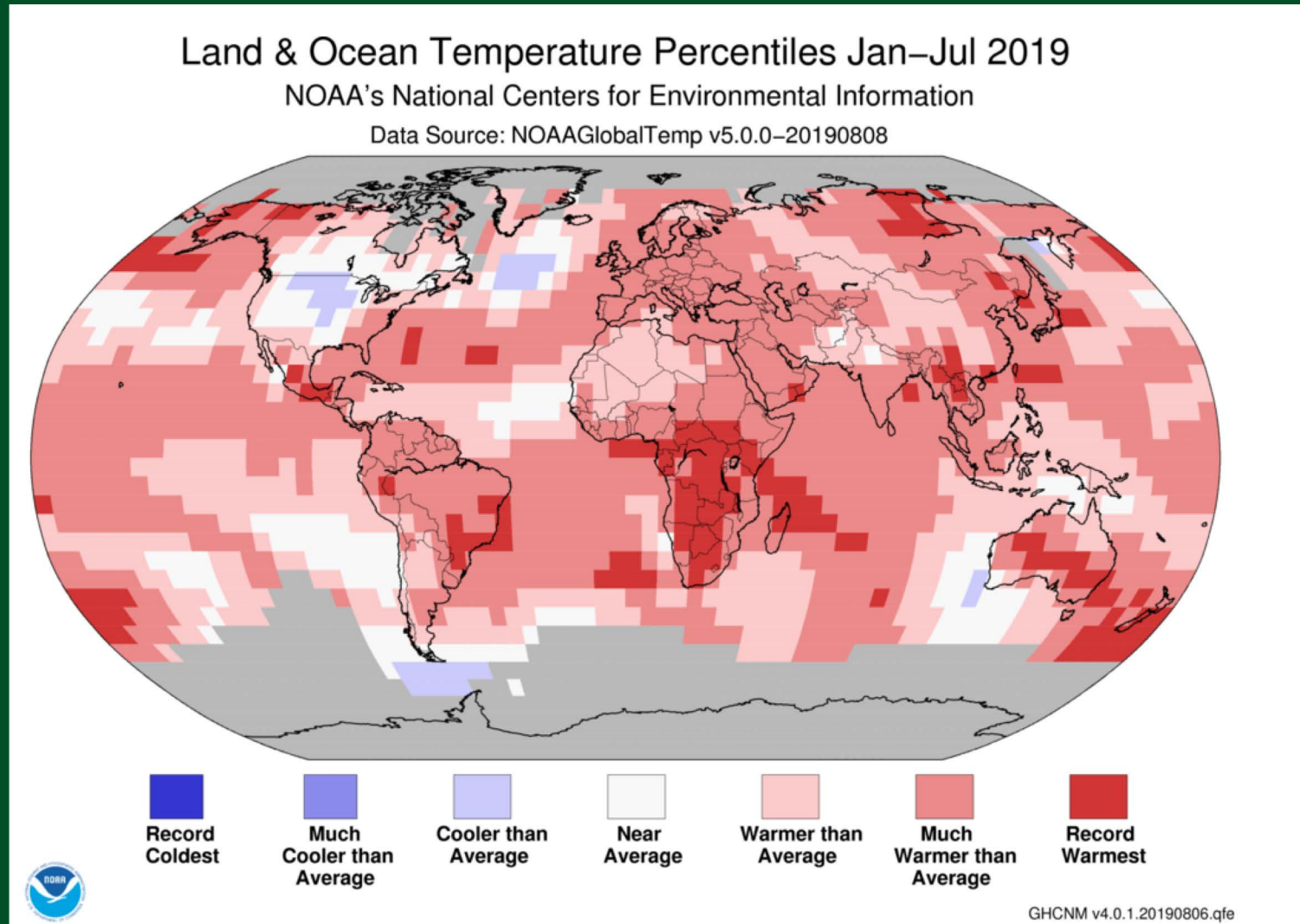
# Statewide water year precipitation anomalies



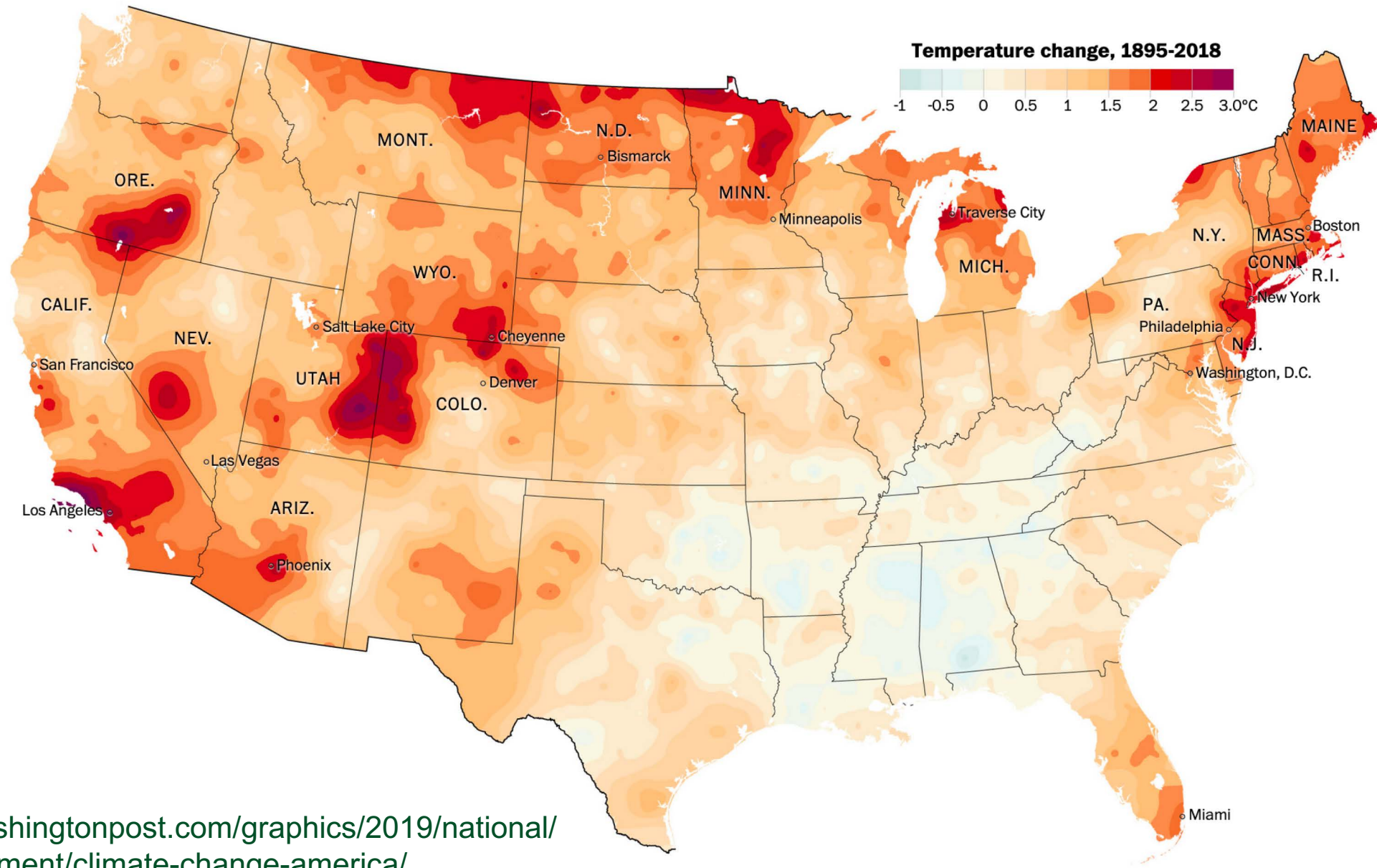
# Global temperature anomalies, January-July



# Global temperature anomalies, January-July



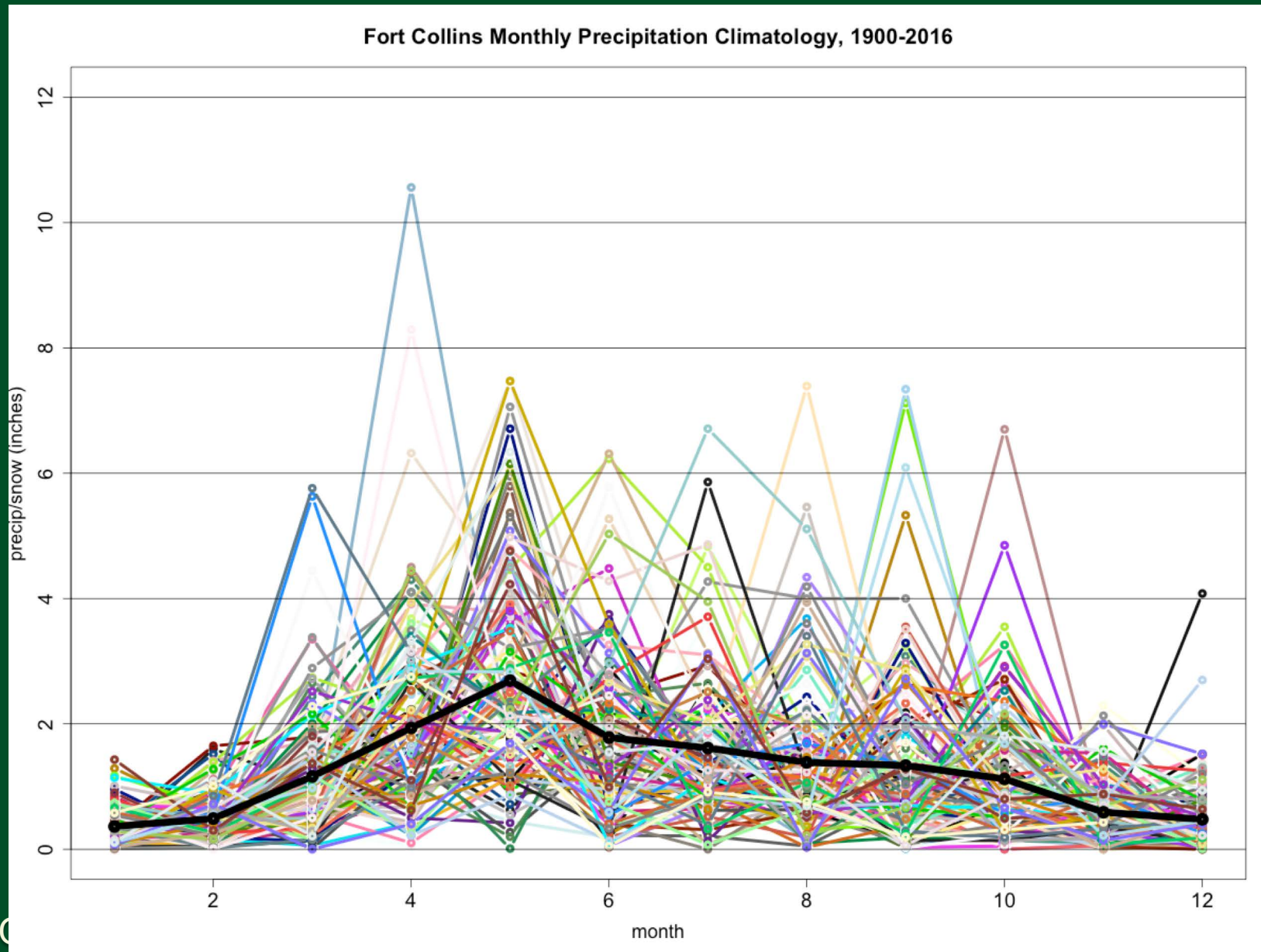
# Recent Washington Post analysis



<https://www.washingtonpost.com/graphics/2019/national/climate-environment/climate-change-america/>



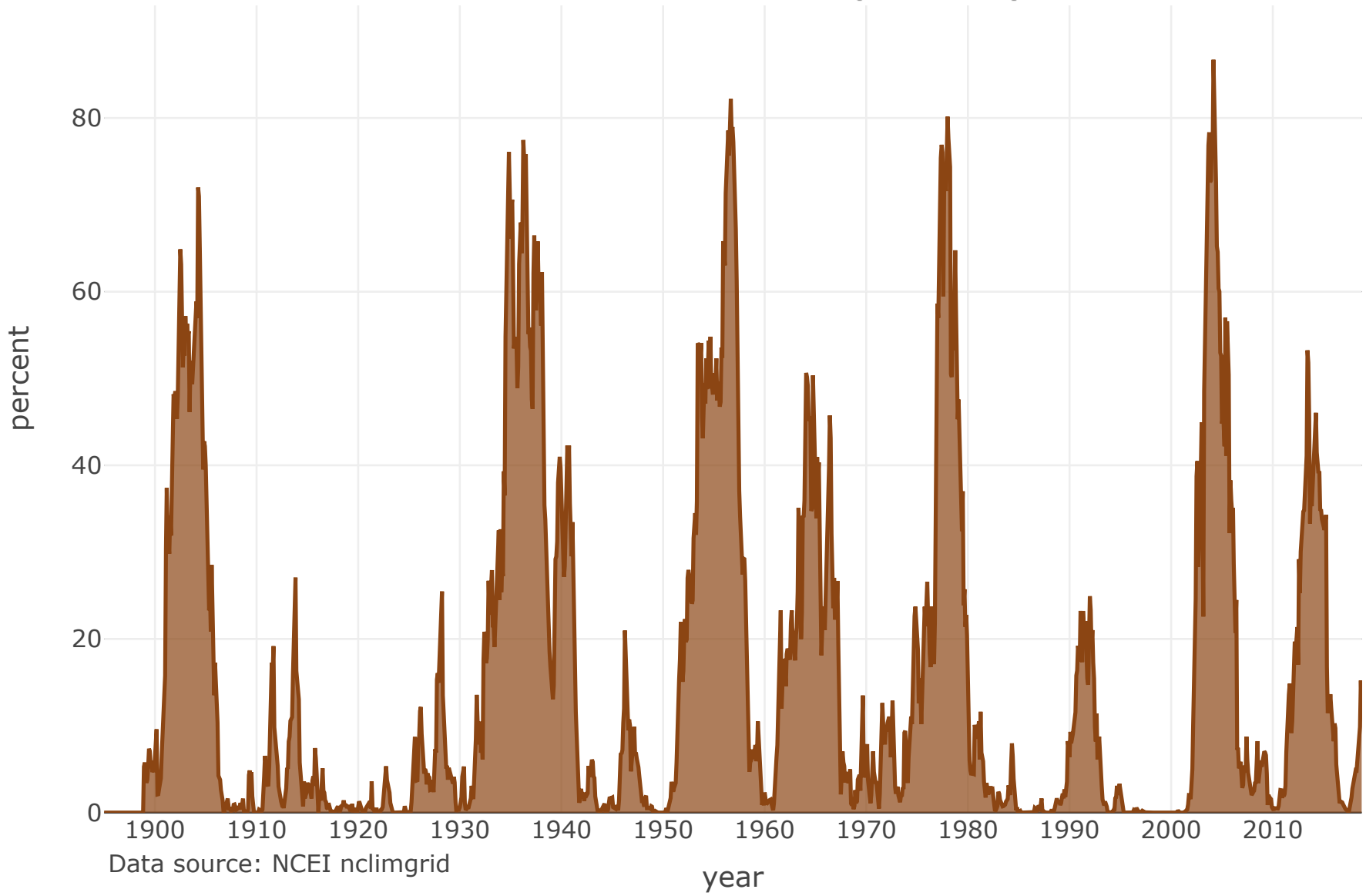
# Precipitation: no two years are ever the same!



# June 22!



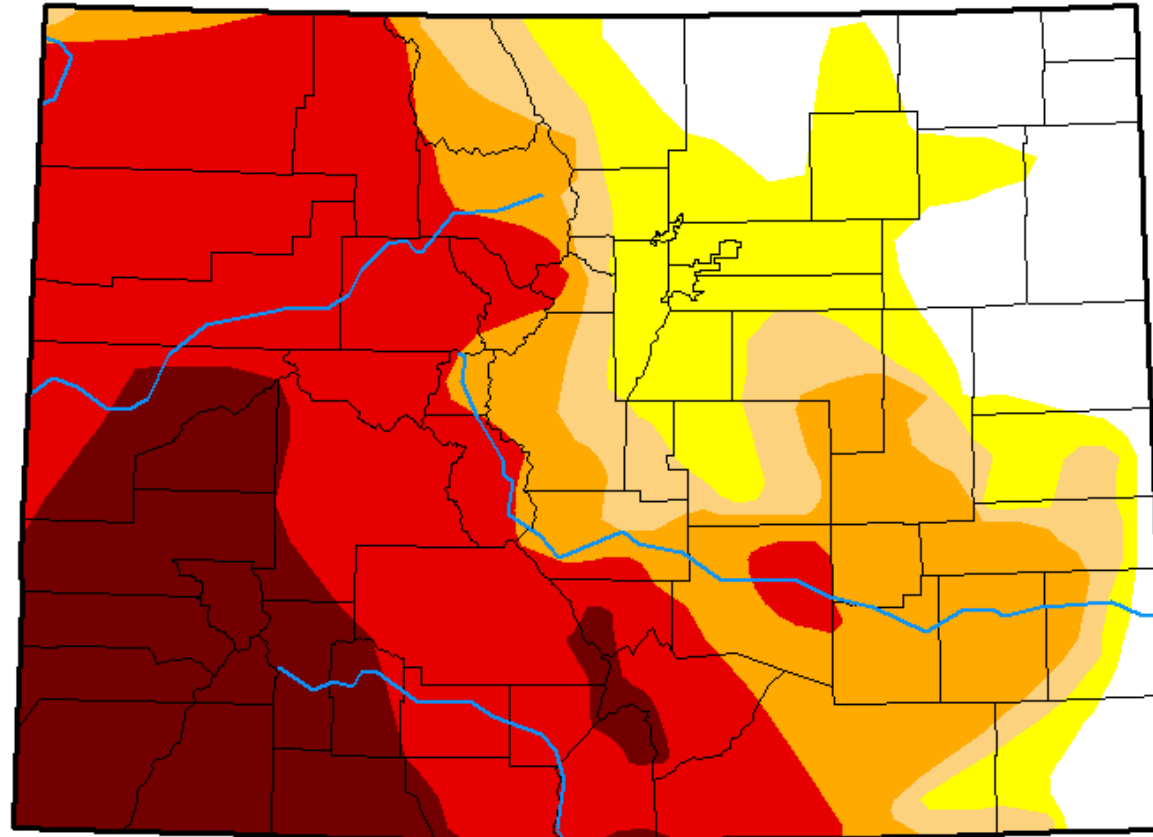
# Fraction of Colorado in Drought Based on 48 month SPI (SPI <-1)







# US Drought Monitor Monitor: Colorado

## U.S. Drought Monitor Colorado

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



**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:**

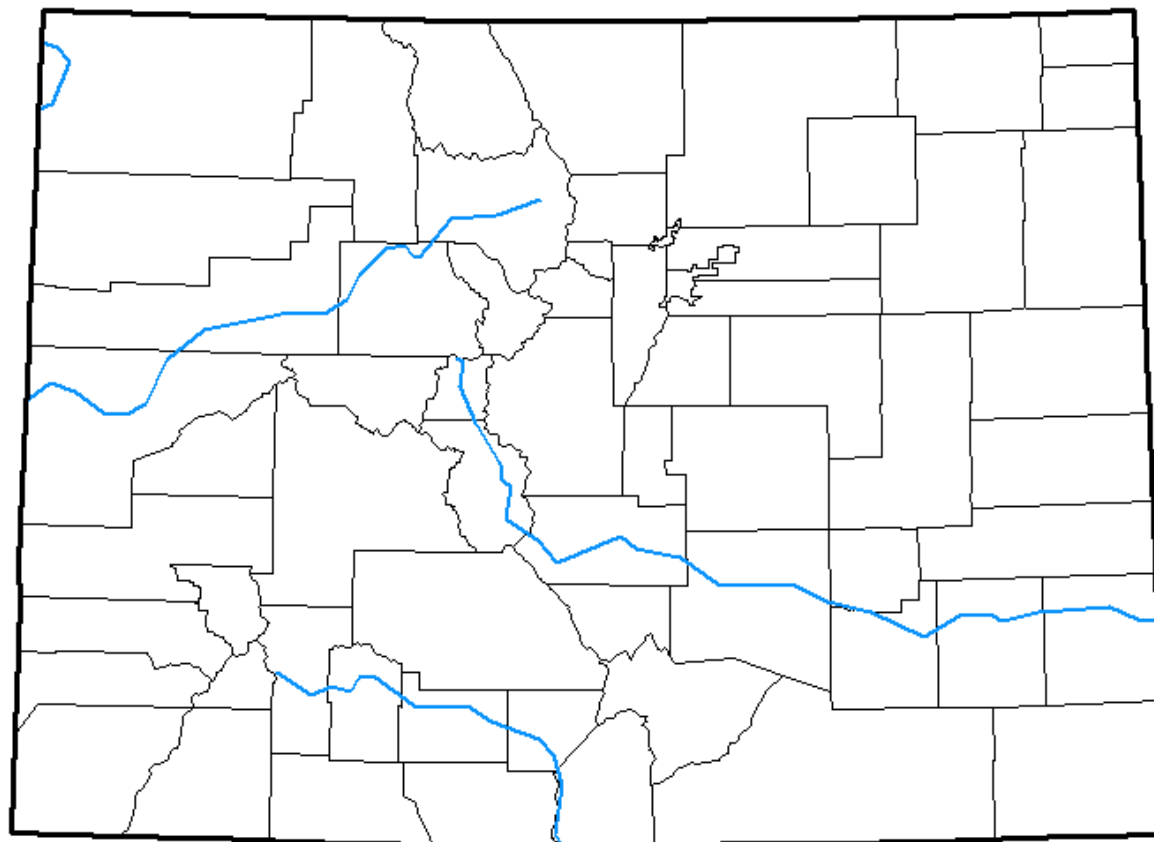
David Miskus  
NOAA/NWS/NCEP/CPC








# US Drought Monitor Monitor: Colorado

## U.S. Drought Monitor Colorado

May 28, 2019  
(Released Thursday, May. 30, 2019)  
Valid 8 a.m. EDT



### 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:

Richard Heim  
NCEI/NOAA

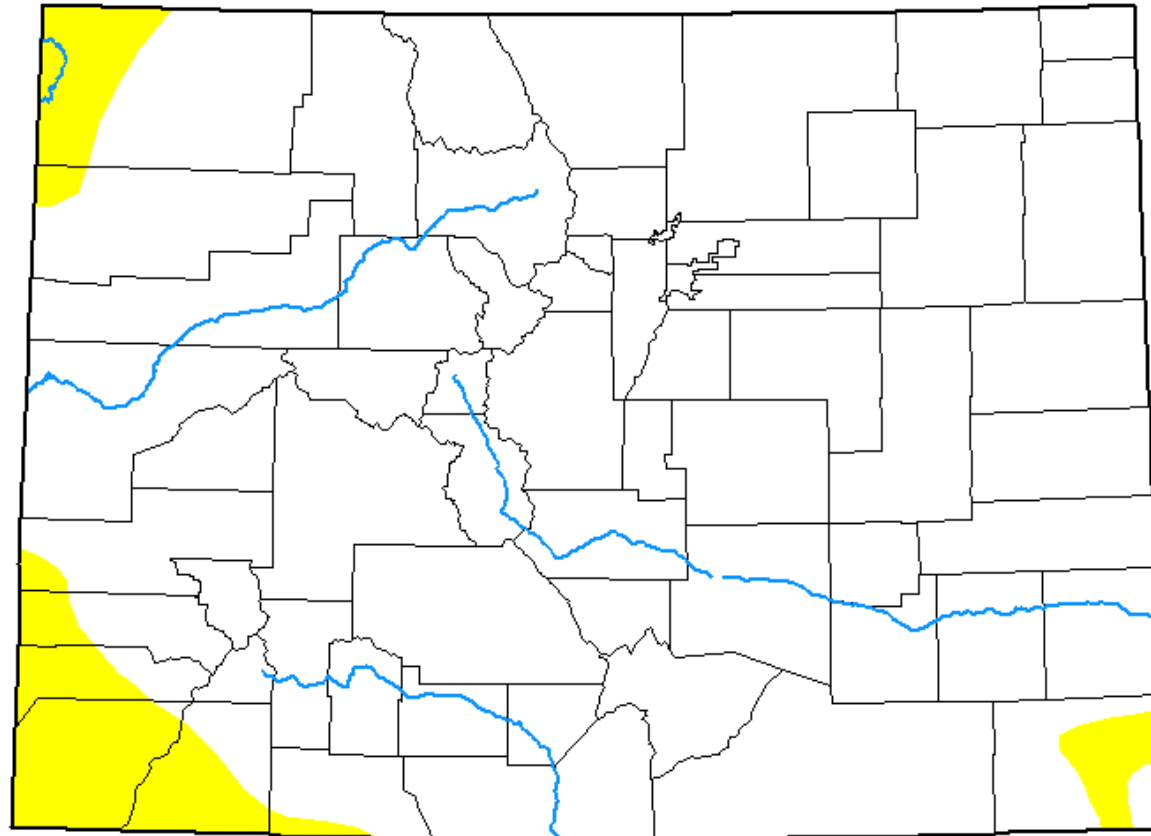


<http://droughtmonitor.unl.edu/>

# US Drought Monitor Monitor: Colorado

## U.S. Drought Monitor Colorado

**August 13, 2019**  
(Released Thursday, Aug. 15, 2019)  
Valid 8 a.m. EDT



### 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:

Richard Tinker  
CPC/NOAA/NWS/NCEP



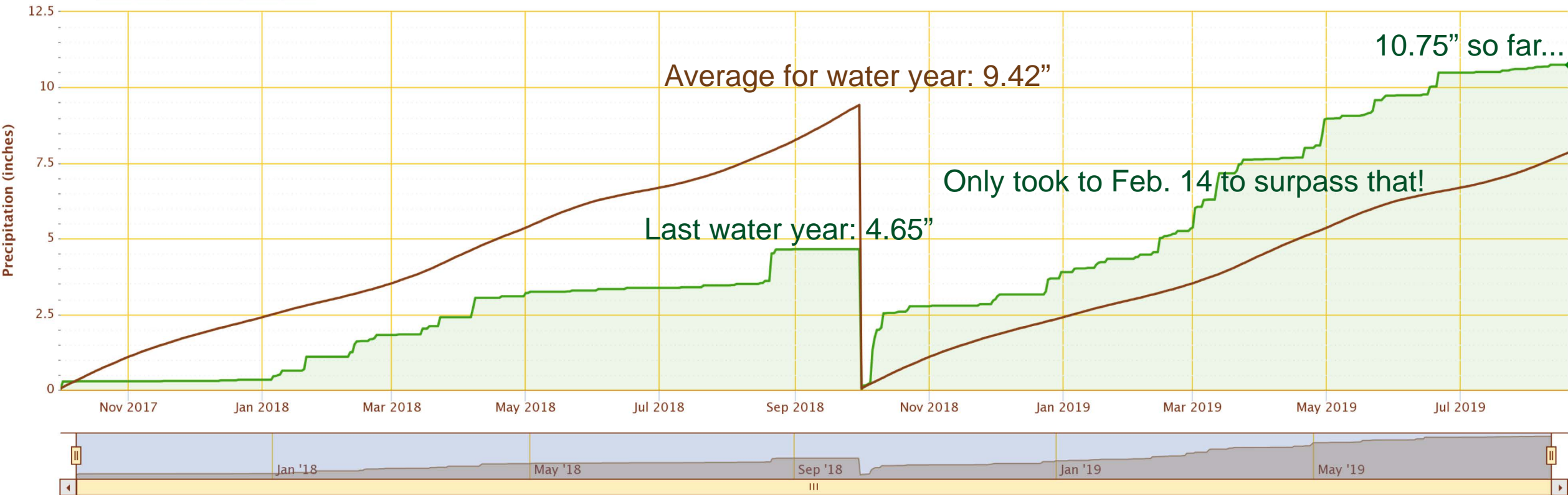
# Two very different water years: Grand Junction

Accumulated Precipitation – GRAND JUNCTION WALKER FIELD, CO

Use navigation tools above and below chart to change displayed range; green/black diamonds represent subsequent/missing values

Zoom 1m 3m 6m YTD 1y All

From 2017-10-01 To 2019-08-19

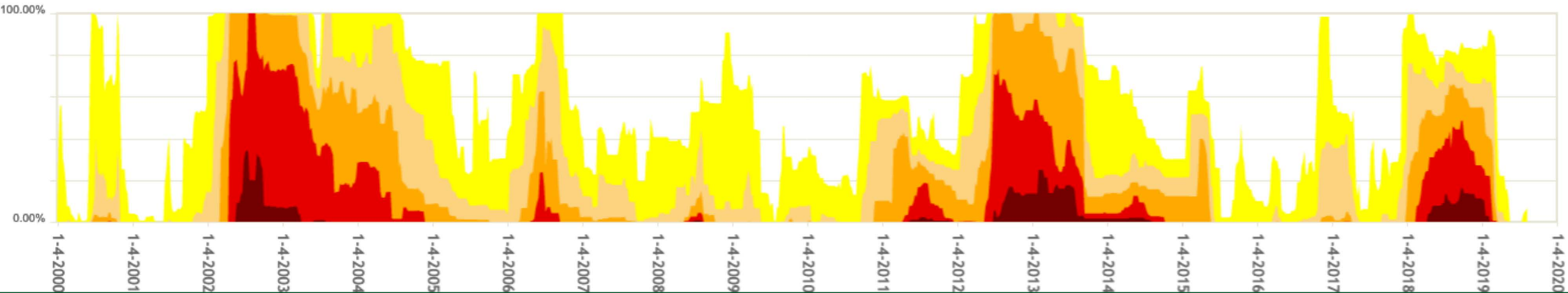


Powered by ACIS




# US Drought Monitor: Colorado

Colorado Percent Area



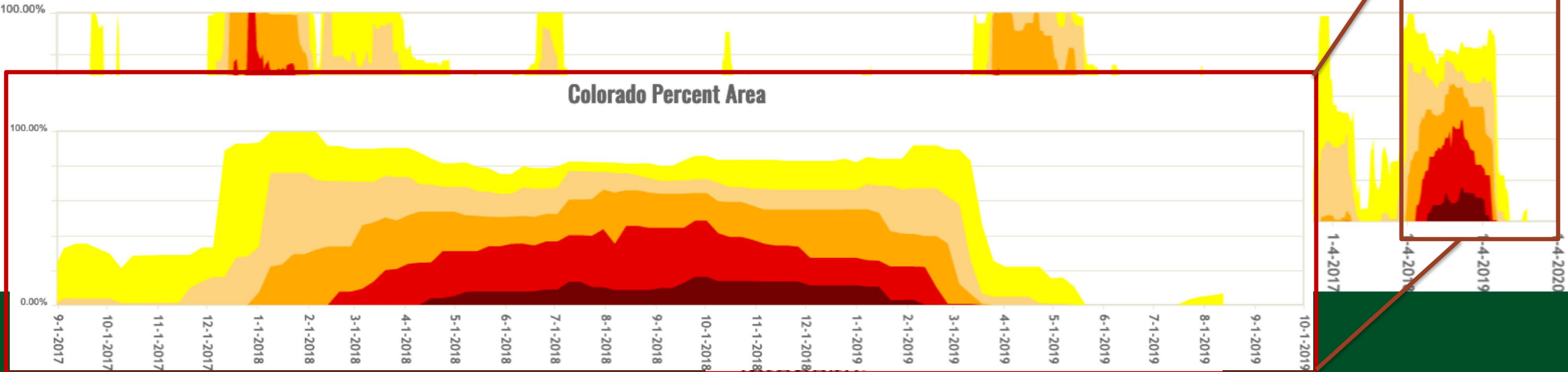
Intensity:

-  D0 Abnormally Dry
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# US Drought Monitor: Colorado

Colorado Percent Area



intensity.

-  D0 Abnormally Dry
-  D1 Moderate Drought
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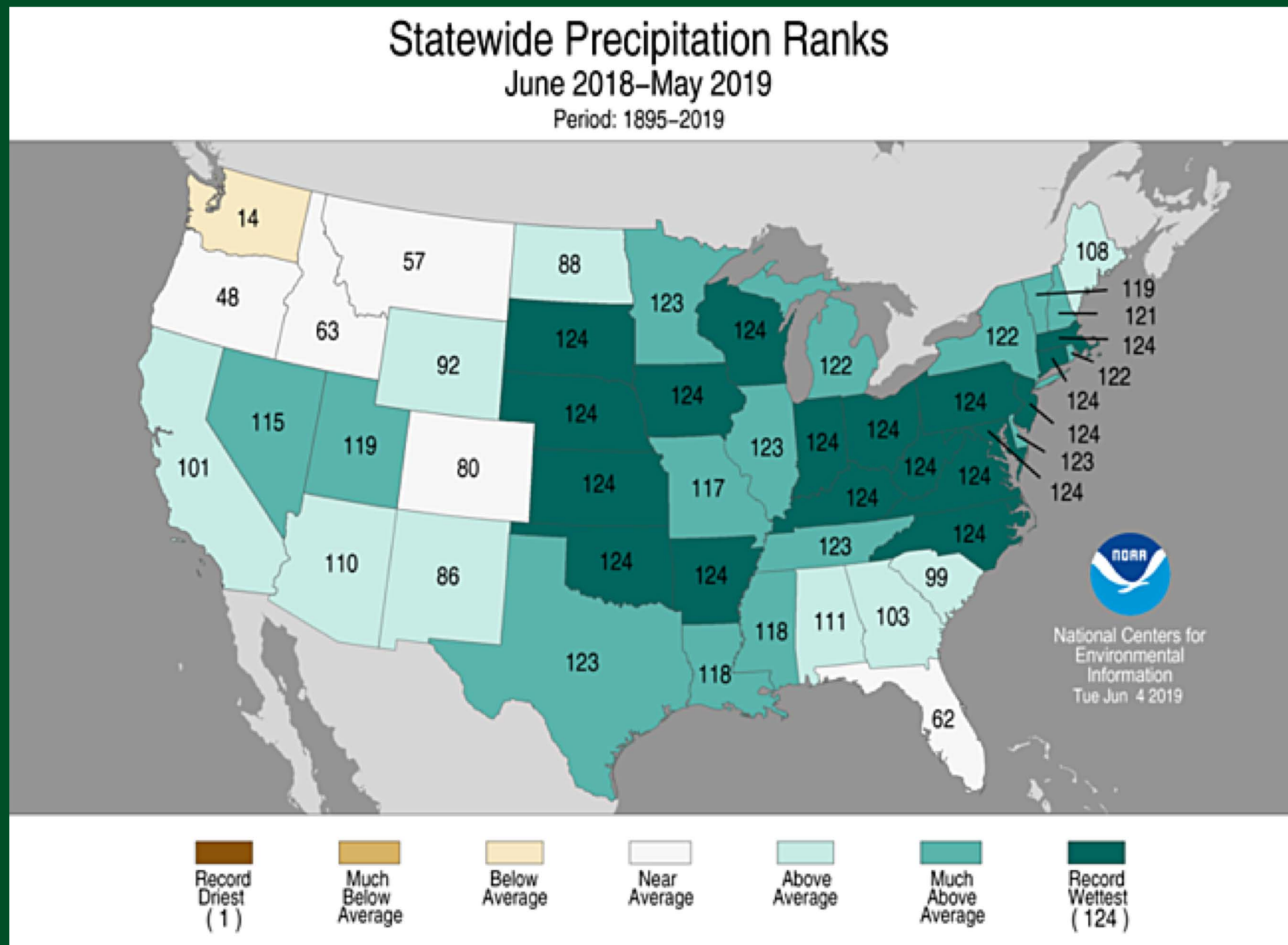
# Colorado Drought Monitor Facts

- Prior to May of this year:
  - Since the beginning of the US Drought Monitor, our state had never been completely free of D0 – D4.
  - Our previous record smallest amount of D0 occurred in May 2001, when only 0.13% of our state showed D0.
- As of May 28, 2019:
  - We became the last state to finally report a week of no D0-D4.
  - We had 8 straight weeks of an empty map, but that streak ended on July 23

Week	None	D0-D4
2019-05-21	99.99	0.01
2019-05-28	100.00	0.00
2019-06-04	100.00	0.00
2019-06-11	100.00	0.00
2019-06-18	100.00	0.00
2019-06-25	100.00	0.00
2019-07-02	100.00	0.00
2019-07-09	100.00	0.00
2019-07-16	100.00	0.00
2019-07-23	96.93	3.07

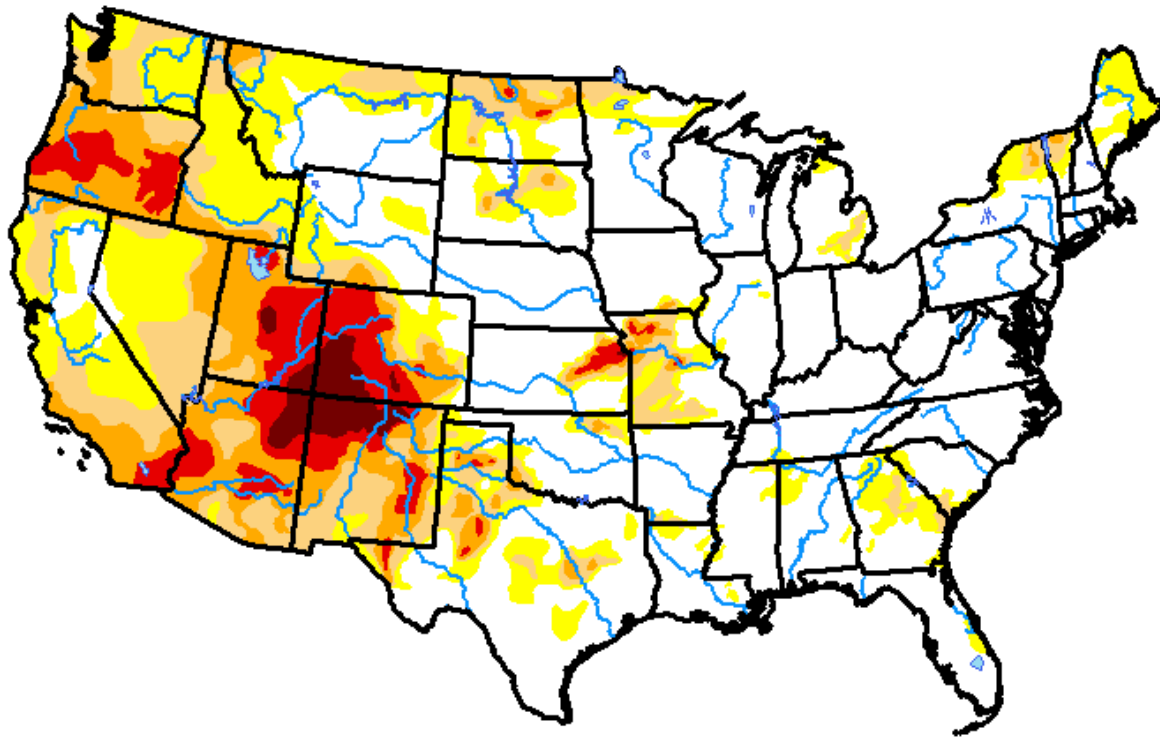


12-month  
period from  
June 2018-  
May 2019  
was wettest  
on record for  
the  
continental  
US








# U.S. Drought Monitor Continental U.S. (CONUS)

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



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

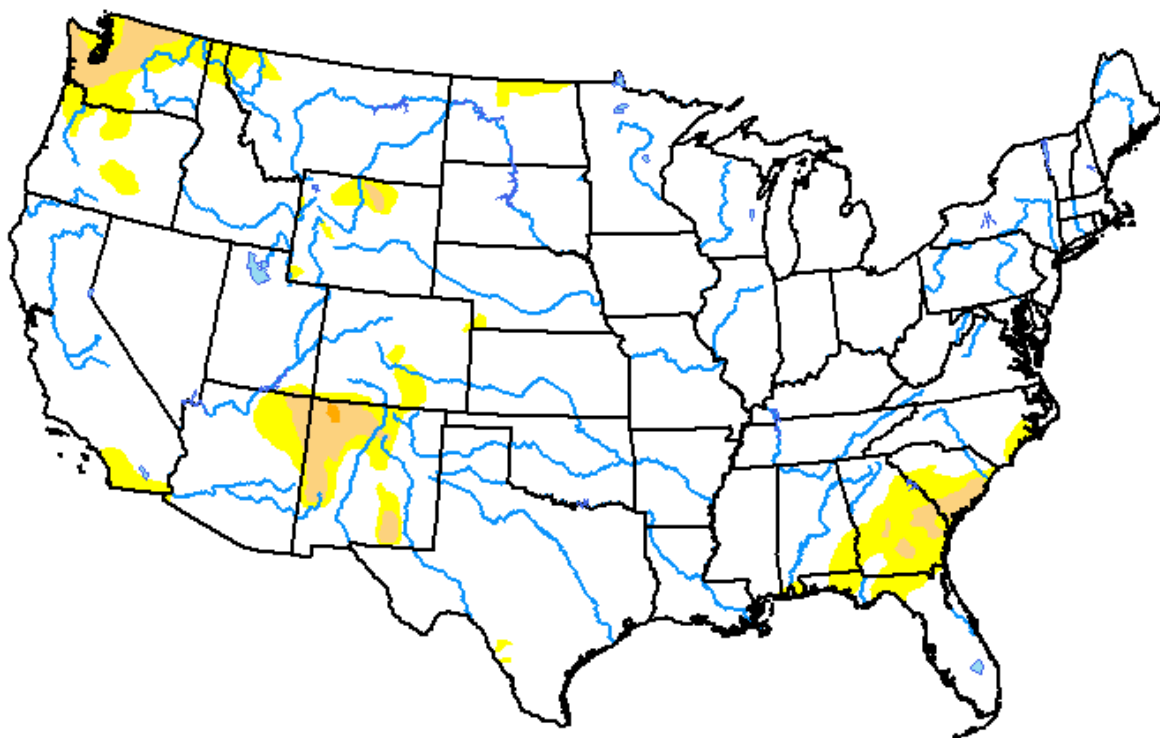


<http://droughtmonitor.unl.edu/>









# U.S. Drought Monitor Continental U.S. (CONUS)

May 14, 2019  
(Released Thursday, May. 16, 2019)  
Valid 8 a.m. EDT



### 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:

Curtis Riganti  
National Drought Mitigation Center

Lowest coverage of D0-D4 since start of the US  
Drought Monitor (8.84%)



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



# Historic flooding of 2019

- Longest flood on record for lower Mississippi River: 226 consecutive days in flood at Red River Landing, Louisiana

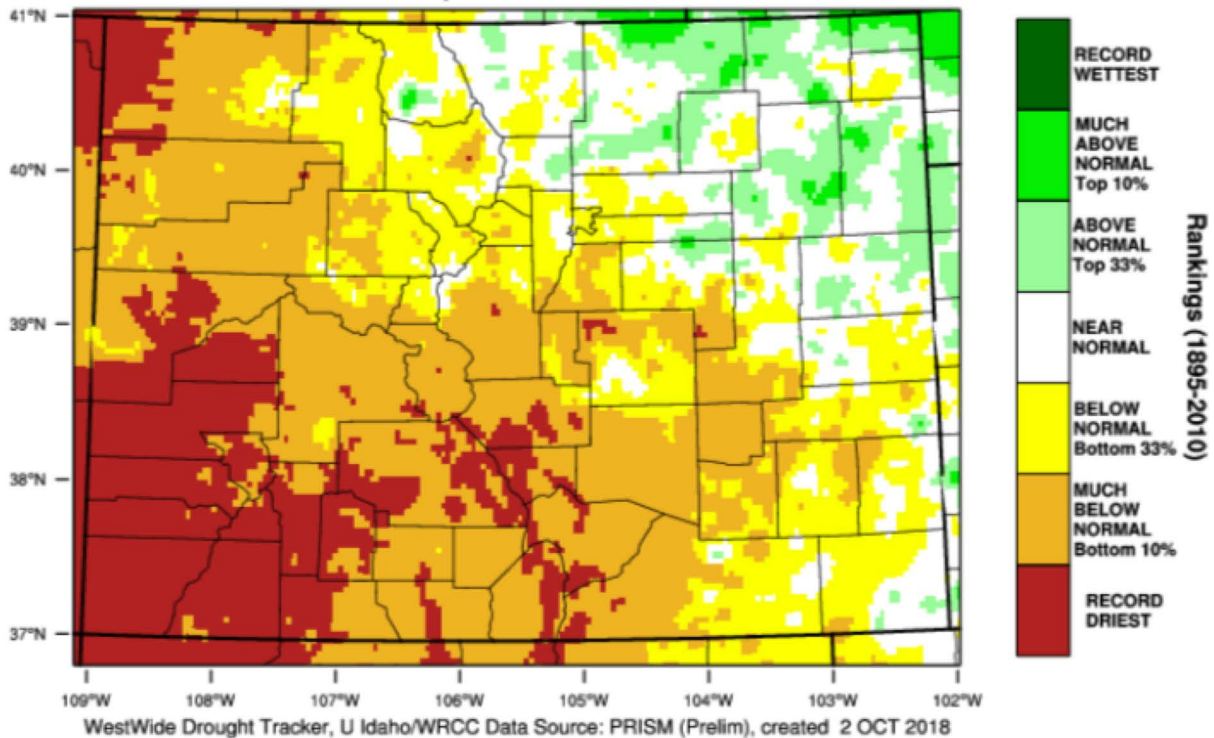


From St. Louis Post-Dispatch,  
<https://bloximages.newyork1.vip.townnews.com/stltoday.com/content/tncms/assets/v3/editorial/1/f5/1f508252-358d-5a3d-b959-fe46261291b3/5cf7f996a658e.image.jpg?resize=1700%2C1168>



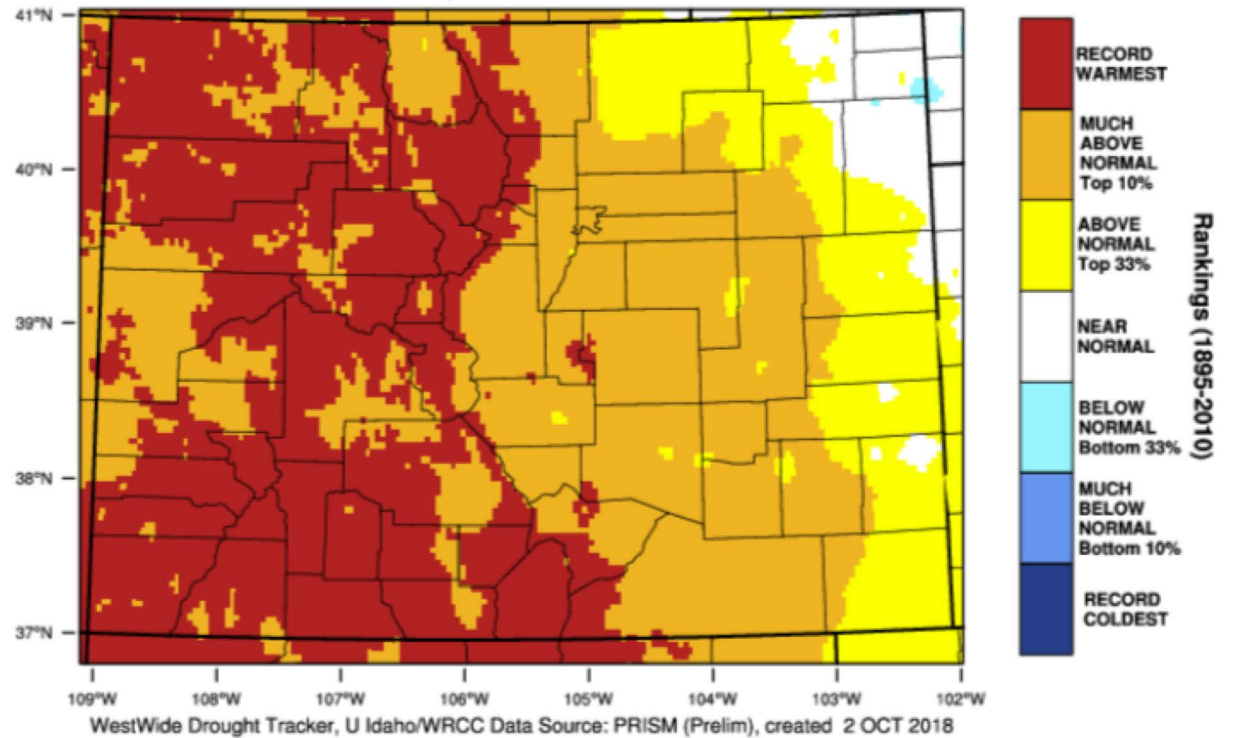
# Drought is not just precipitation...

Colorado - Precipitation  
October-September 2018 Percentile



2<sup>nd</sup> driest water year on record for Colorado

Colorado - Mean Temperature  
October-September 2018 Percentile

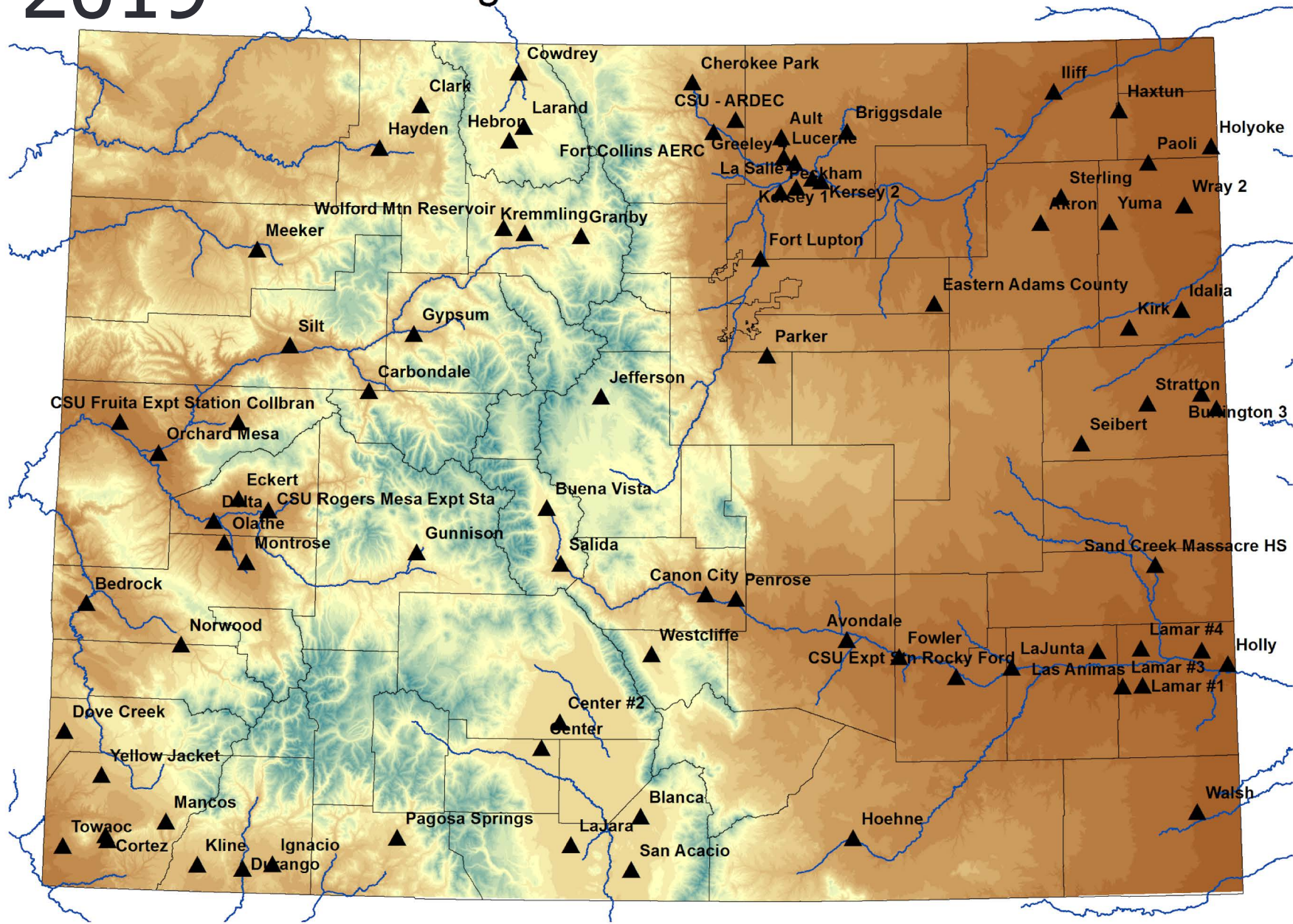


3<sup>rd</sup> warmest water year on record for Colorado



# 2019

## CoAgMET Station Locations



# About the stations

**Anemometer and wind vane: Wind speed, direction and gusts**

2 m

Above all else facing South

**Pyranometer: Solar radiation**

**Temperature/Humidity sensor in radiation shield**

2 m

**Tipping bucket rain gage**

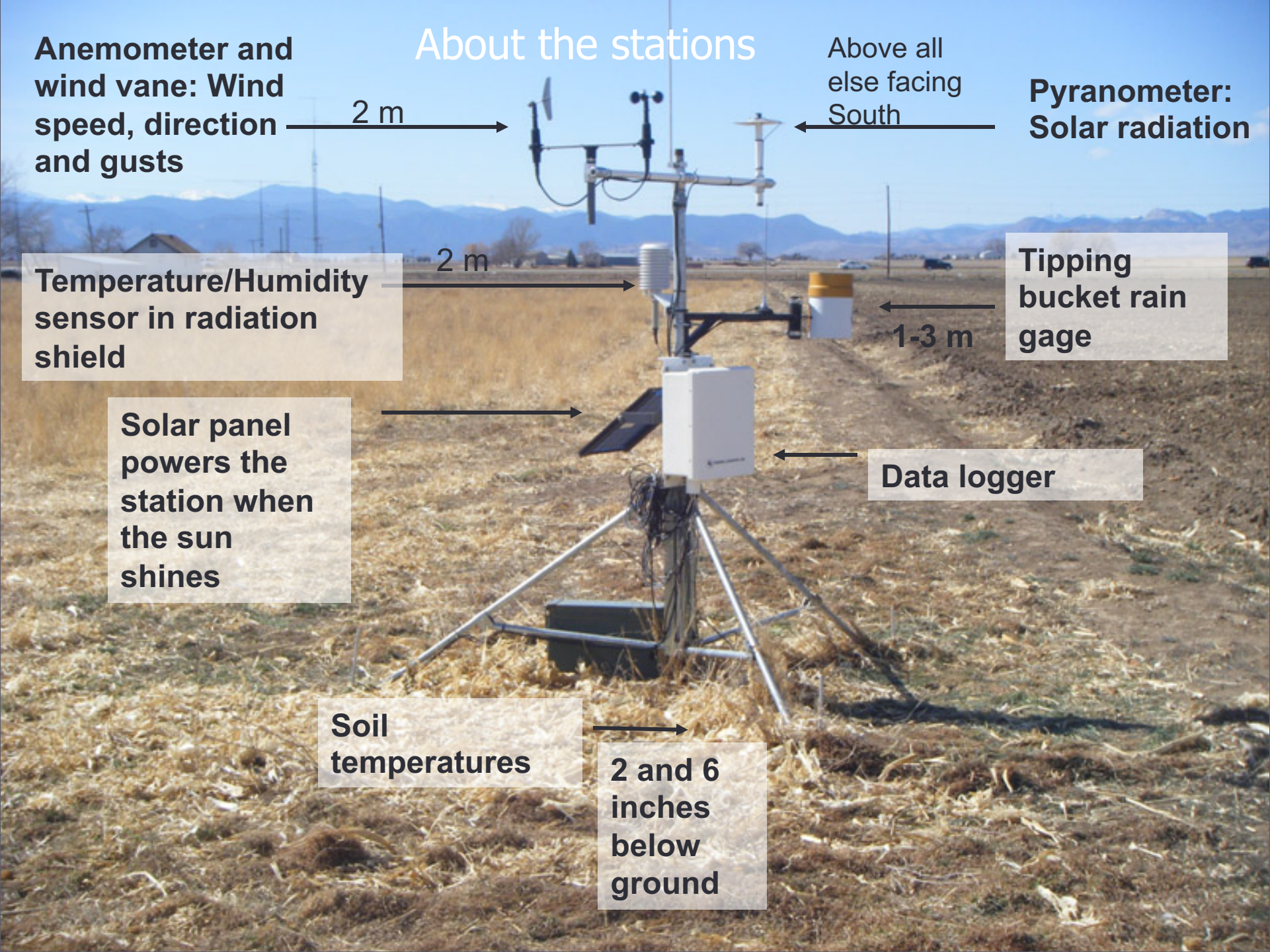
1-3 m

**Solar panel powers the station when the sun shines**

**Data logger**

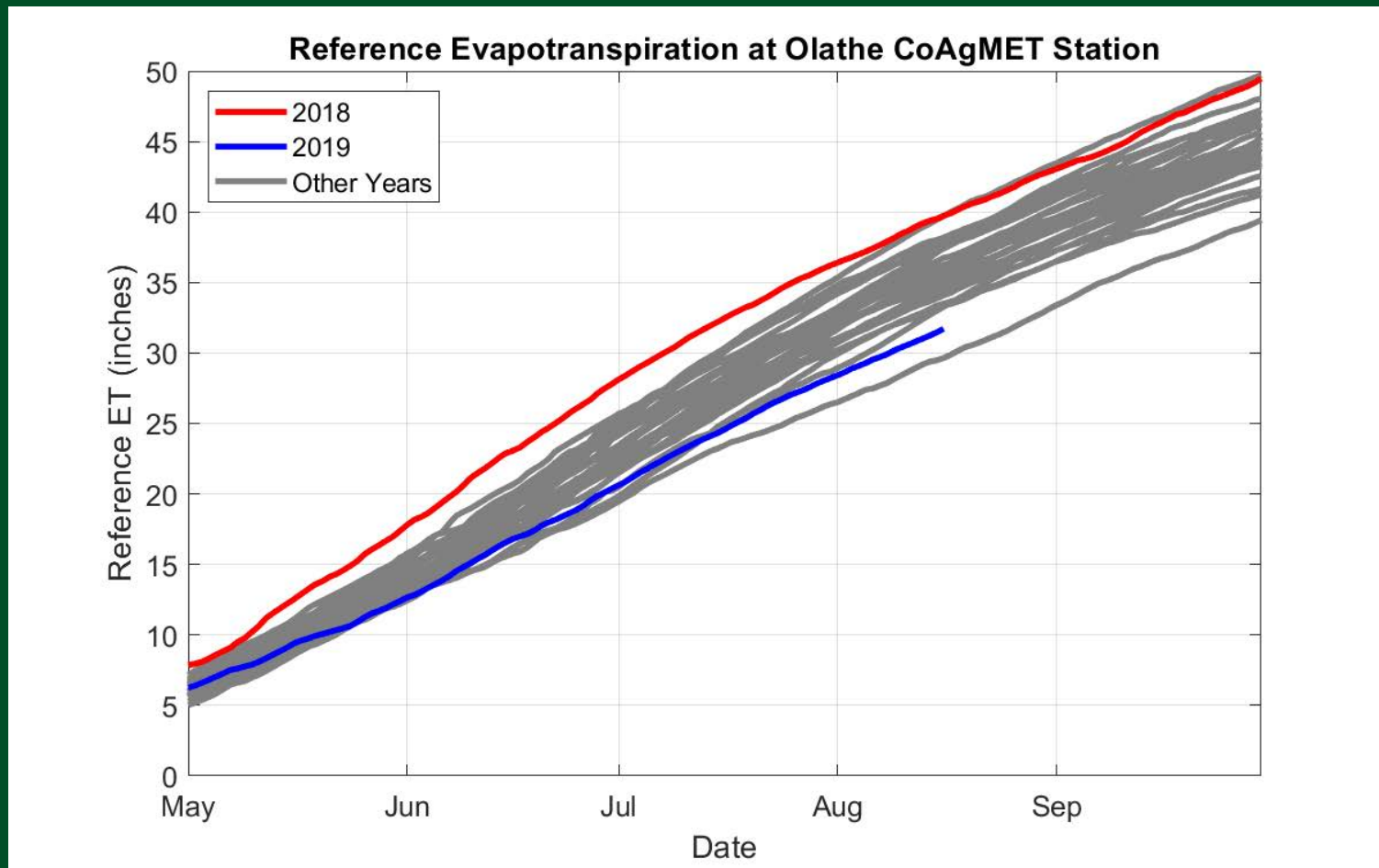
**Soil temperatures**

2 and 6 inches below ground

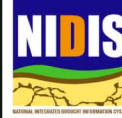


# Olathe CoAgMET station, comparison of 2018-2019 growing seasons (to all past seasons since 1992)

Evaporative demand: the atmosphere's "thirst"



# Keep up with current drought conditions...

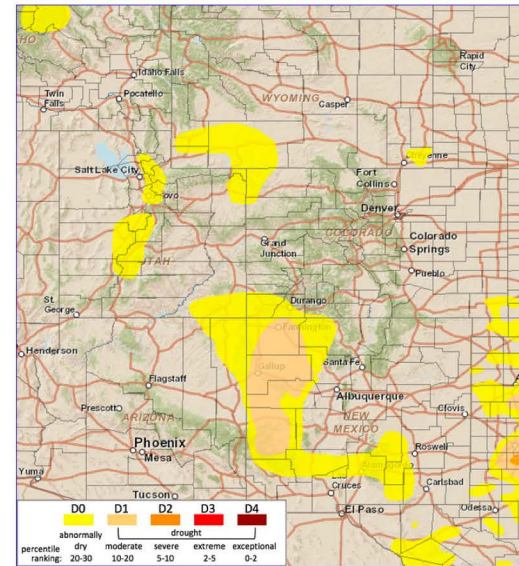


NIDIS Intermountain West  
Drought Early Warning System  
August 13, 2019

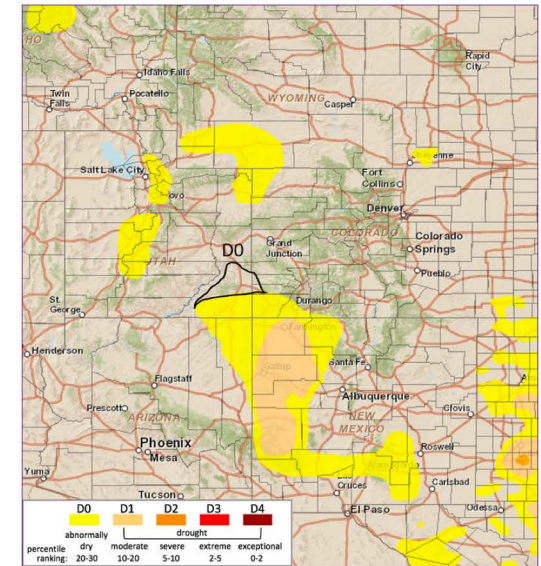


<http://climate.colostate.edu/~drought>

Tune in for monthly webinars...including one this morning



Current U.S. Drought Monitor Depiction ⓘ



Recommended Changes ⓘ

### Summary: August 13, 2019

The last week the Intermountain West region saw a west-east division for precipitation. The western portion of the region from the Continental Divide west was mostly dry with less than 0.10" over most of the region. East of the Divide saw a decent week with much of the area receiving at least 0.50" of precipitation, higher amounts near the eastern border.

The 30 and 60 day SPIs are showing the lack of moisture through most of the region, especially western Colorado and eastern Utah with the lack of monsoonal moisture. Once the wet spring comes into play in May and earlier, SPIs turn around quickly.

Despite the recent dryness, Evaporative Demand remains low or near normal in the UCRB. Since streamflows are still high and water supply is still in good shape, the recent dryness is not causing major alarm yet, however it's an area to keep a close eye on and slight expansions of D0 will be recommended as a warning for developing dryness.



# Thank you!

<http://climate.colostate.edu/>  
[russ.schumacher@colostate.edu](mailto:russ.schumacher@colostate.edu)

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**COLORADO CLIMATE CENTER**

*Providing information and expertise on Colorado's complex climate*