Data, Variability, and Trends in Colorado’s Climate

Russ S. Schumacher
Colorado State Climatologist
Director, Colorado Climate Center
Department of Atmospheric Science, Colorado State University

Along with: Zach Schwalbe, Becky Bolinger, Peter Goble, Nolan Doesken
Statewide annual average temperature

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

Data source: NOAA/NCEI
Graphic by Colorado Climate Center
Of the 12 warmest years on record, 9 have occurred since 2000.
Statewide water year precipitation anomalies

Colorado statewide annual (water year) precipitation anomaly

precipitation anomaly (inches) from 1901-2000 average

Global temperature anomalies, January-July

https://www.ncdc.noaa.gov/sotc/global/201907
Global temperature anomalies, January-July

https://www.ncdc.noaa.gov/sotc/global/201907
Recent Washington Post analysis

Precipitation: no two years are ever the same!
June 22!
Fraction of Colorado in Drought Based on 48 month SPI (SPI < -1)

Data source: NCEI nclimgrid
US Drought Monitor: Colorado

U.S. Drought Monitor
Colorado

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

Intensity:
- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Medium Orange: D2 Severe Drought
- Dark Orange: D3 Extreme Drought
- Red: 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/
US Drought 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/
Two very different water years: Grand Junction

Average for water year: 9.42"

Last water year: 4.65"

Only took to Feb. 14 to surpass that!

10.75” so far...
US Drought Monitor: Colorado

**Intensity:**
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought
US Drought Monitor: Colorado

Colorado Percent Area

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought
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.
12-month period from June 2018-May 2019 was wettest on record for the continental US
U.S. Drought Monitor

Continental U.S. (CONUS)

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

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

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

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...

2\textsuperscript{nd} driest water year on record for Colorado

3\textsuperscript{rd} warmest water year on record for Colorado
Anemometer and wind vane: Wind speed, direction and gusts

Pyranometer: Solar radiation

Tipping bucket rain gage

Data logger

Temperature/Humidity sensor in radiation shield

Solar panel powers the station when the sun shines

Soil temperatures

Above all else facing South

2 and 6 inches below ground

2 m

1-3 m
Evaporative demand: the atmosphere’s “thirst”

Reference Evapotranspiration at Olathe CoAgMET Station

- 2018
- 2019
- Other Years

http://climate.colostate.edu/~drought/et.php
Keep up with current drought conditions…

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

Tune in for monthly webinars…including one this morning

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

Follow us on Facebook and Twitter! @ColoradoClimate