Colorado Climate Center –
WATF Climate Update

Russ Schumacher, state climatologist
Water Availability Task Force
August 24, 2021
Water year 2021 to date:
temperature, precipitation,
evaporative demand

I-70 flash flood and debris flow
Statewide: 17th warmest October – July
1.8°F above 20th century average
0.2°F above 1991-2020 average
Globally, July 2021 was the warmest month on record (data since 1880)
Statewide Precipitation Ranks
July 2021
Period: 1895–2021

<table>
<thead>
<tr>
<th>Month</th>
<th>P Rank (of 127 years)</th>
<th>Above, below, or near avg?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct</td>
<td>16&lt;sup&gt;th&lt;/sup&gt; driest</td>
<td>below</td>
</tr>
<tr>
<td>Nov</td>
<td>44&lt;sup&gt;th&lt;/sup&gt; dried</td>
<td>near avg</td>
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<tr>
<td>Dec</td>
<td>56&lt;sup&gt;th&lt;/sup&gt; dried</td>
<td>near avg</td>
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<tr>
<td>Jan</td>
<td>38&lt;sup&gt;th&lt;/sup&gt; dried</td>
<td>below</td>
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<tr>
<td>Feb</td>
<td>70&lt;sup&gt;th&lt;/sup&gt; dried</td>
<td>near avg</td>
</tr>
<tr>
<td>Mar</td>
<td>22&lt;sup&gt;nd&lt;/sup&gt; wettest</td>
<td>above</td>
</tr>
<tr>
<td>Apr</td>
<td>18&lt;sup&gt;th&lt;/sup&gt; dried</td>
<td>below</td>
</tr>
<tr>
<td>May</td>
<td>10&lt;sup&gt;th&lt;/sup&gt; wettest</td>
<td>much above</td>
</tr>
<tr>
<td>Jun</td>
<td>53&lt;sup&gt;rd&lt;/sup&gt; dried</td>
<td>near avg</td>
</tr>
<tr>
<td>Jul</td>
<td>61&lt;sup&gt;st&lt;/sup&gt; dried</td>
<td>near avg</td>
</tr>
</tbody>
</table>

Statewide: 49<sup>th</sup> driest October-July 0.94” below 20<sup>th</sup> century average
Colorado - Mean Temperature

October-July 2021 Percentile

WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 AUG 2021

COLORADO CLIMATE CENTER
Colorado July 2021 Precipitation as a Percentage of Normal

Data from PRISM Climate Group
Colorado Water Year 2021 Precipitation as a Percentage of Normal
Oct 2020 - July 2021

awy_jul21 pn
Precip % of normal

Data from PRISM Climate Group
Water year 2021 through July

Colorado average temperature and precipitation, October - July

1991-2020 avg temp

1901-2000 avg temp

Cool & dry

Warm & dry

Warm & wet

Cool & wet

Water year 2021 through July

Warm & dry

Warm & wet

Cool & dry

Cool & wet

Colorado Climate Center/CSU

Data source: NOAA/NCEI Climate at a Glance
Water year 2021 through July, Western Colorado
Water year 2021 through July, Arkansas River basin
Colorado Month to Date Precipitation
1 - 23 August 2021
Ending 5 AM MST

Data from PRISM Climate Group
Percent of Normal Precipitation (%)  
8/1/2021 – 8/22/2021
8.11" at the Holoyoke CoAgMET station in the last 30 days; all of it fell in 15 hours on Aug 19-20
24-month SPI: 2019/08/22 - 2021/08/21

Data from High Plains Regional Climate Center and ACIS

COLORADO CLIMATE CENTER
NWS Cooperative Stations for WATF

Water Year 2021 – Station Updates

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Grand Lake

(A lot of missing data from last fall – won’t show this month)
Steamboat Springs

STEAMBOAT SPRINGS WY2021 Precipitation Projections

- 2021-08-22: 14.9" (Average: 22", 68% Ave)
- Long-Term Average (24.63")
- Average Projection (71% Ave)
- Above Average Projection (71% Ave)
- Below Average Projection (67% Ave)
- 95-Year Historical Accumulations
Even with 1.4" of rain last week, still only 65% of average for the water year
Montrose

Note: data only through August 5, other stations around Montrose got ~1.5” of rain last week
Since October 2019, 20.81” compared to average of 31.84” (an 11” deficit)
ALAMOSA-BERGMAN FIELD WY2021 Precipitation Projections

- 2021-08-22: 6.62" (Average: 6.03", 110% Ave)
- Long-Term Average (7.31")
- Average Projection (108% Ave)
- Above Average Projection (109% Ave)
- Below Average Projection (109% Ave)
- 69-Year Historical Accumulations

Accumulated Precip (in.)

- Oct
- Nov
- Dec
- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
Walsh

WALSH 1 W WY2021 Precipitation Projections

- 2021-08-21: 17.81" (Average: 16.91", 105% Ave)
- Long-Term Average (19.16")
- Average Projection (105% Ave)
- Above Average Projection (108% Ave)
- Below Average Projection (99% Ave)
- 46-Year Historical Accumulations
BURLINGTON WY2021 Precipitation Projections

- 2021-08-23: 15.54" (Average: 16.05", 97% Ave)
- Long-Term Average (17.65")
- Average Projection (97% Ave)
- Above Average Projection (99% Ave)
- Below Average Projection (95% Ave)
- 82-Year Historical Accumulations
Akron

Since June 1, 1.75" compared to average of 6.59"

Driest June 1 – August 22 on record
BOULDER WY2021 Precipitation Projections

- 2021-08-22: 21.51" (Average: 18.57", 116% Ave)
- Long-Term Average (20.68")
- Average Projection (114% Ave)
- Above Average Projection (115% Ave)
- Below Average Projection (106% Ave)
- 83-Year Historical Accumulations

Accumulated Precip (in.)

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct
Black Hollow flash flood, Poudre Canyon
https://www.larimer.org/spotlights/2021/07/21/black-hollow-poudre-canyon-flooding-information

I-70 flash flood and debris flow
Precipitable water: total amount of water vapor in the atmosphere, measured by instruments on weather balloons
Precipitable water: total amount of water vapor in the atmosphere, measured by instruments on weather balloons

(As of last year: 2020)

Grand Junction precipitable water climatology and selected year data

- **2020**
- **max**
- **90th percentile**
- **median**
- **10th percentile**
- **min**

Climatology based on 1948-2020, with 30-day centered moving average

Date

Source: NOAA Integrated Global Radiosonde Archive

[https://climate.colostate.edu/pw.html](https://climate.colostate.edu/pw.html)
2-hour rainfall estimates from evening of July 20 (Black Hollow flash flood)

Rain gauge near Joe Wright reservoir (courtesy Stephanie Kampf, CSU):

0.77” in 10 minutes
0.99” in 20 minutes
Maximum average recurrence interval exceeded

For this high elevation, roughly a 100-200-year rain event

Closer to Black Hollow, however, more like a 25-year rainstorm
3-hour rainfall estimates from evening of July 22
3-hour rainfall estimates from evening of July 29
CDOT rain gauge 0.4 miles west of Bair Ranch (east of Glenwood Springs)

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<th>Type</th>
<th>Intens</th>
<th>Rate</th>
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<th>End Time</th>
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<th>1 hr. Accum</th>
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</table>
3-hour rainfall estimates from evening of July 31
12-day total precipitation (July 22 – August 3)

NOAA MRMS precipitation dataset + CoCoRaHS observations
Webcam view of the Dillon Pinnacles and Blue Mesa Reservoir, August 23

https://www.nps.gov/media/webcam/view.htm?id=81B46802-1DD8-B71B-0B3B619C8C1D1A09
Per drought.gov:

22.4% of the USA is in D3/D4 compared to 22.1% the previous week.

The high prior to the 2020/2021 drought was Aug 7, 2012, at 20.2%.
Three months ago
U.S. Drought Monitor Class Change - Colorado
13 Week

August 17, 2021
compared to
May 18, 2021

droughtmonitor.unl.edu

Change over three months
U.S. Drought Monitor

Colorado

August 17, 2021
(Released Thursday, Aug. 19, 2021)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

<table>
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<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
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<tr>
<td>Current</td>
<td>48.62</td>
<td>51.38</td>
<td>37.23</td>
<td>28.04</td>
<td>20.37</td>
<td>6.38</td>
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<td>Last Week</td>
<td>53.19</td>
<td>46.82</td>
<td>34.43</td>
<td>28.04</td>
<td>20.37</td>
<td>6.38</td>
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<td>3 Months Ago</td>
<td>23.30</td>
<td>76.70</td>
<td>51.80</td>
<td>39.29</td>
<td>28.96</td>
<td>16.39</td>
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<td>Start of Calendar Year 2021</td>
<td>0.00</td>
<td>100.00</td>
<td>100.00</td>
<td>93.73</td>
<td>76.17</td>
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<td>Start of Water Year 2020</td>
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<td>82.86</td>
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<td>One Year Ago 2020</td>
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<td>100.00</td>
<td>98.76</td>
<td>72.89</td>
<td>27.31</td>
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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:
Curtis Riganti
National Drought Mitigation Center

droughtmonitor.unl.edu
Percent of Colorado in drought (since 2000)

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought
Evaporative Demand Drought Index

Over last 3 months, high evaporative demand in northwest and northeast Colorado (warm, low humidity); near-normal across southwest Colorado and the Arkansas Valley; below normal in San Luis Valley
Growing Season Water Balance (P/PET) Percentiles
August 20, 2021

COLORADO CLIMATE CENTER
Shallow soil moisture has deteriorated in northeast Colorado in the warm, dry summer (Note: any effects of last week’s rainstorms are not yet included here)
Deep soil moisture is looking much better in parts of western Colorado, though significant deficits persist in some areas.

Soil moisture deficits have returned in eastern Colorado with the warm, dry summer.

(Note: any effects of last week's rainstorms are not yet included here)
VegDRI: longer-term vegetation condition

QuickDRI: shorter-term vegetation response
See others on our drought page: [https://climate.colostate.edu/drought/](https://climate.colostate.edu/drought/)
NOAA 7-day precipitation forecast
NOAA 7-day precipitation forecast (difference from average)
8-14 day outlook (1st week of Sept)

COLORADO CLIMATE CENTER
Currently ENSO-neutral conditions, La Niña may return by fall/winter

We’re in a La Niña watch. ~70% chance that La Niña is back in place in Nov-Dec-Jan.

September-October-November outlook

Temperature Outlook
- Above Normal: 53%
- Below Normal: 14%
- Near Normal: 33%

Precipitation Outlook
- Above Normal: 23%
- Below Normal: 44%
- Near Normal: 33%
September-October-November outlook

Three Category Temperature Outlook
Normal Maximum Temperature: 61
Normal Minimum Temperature: 31

Three Category Precipitation Outlook
Normal Precipitation: 10.56
Winter outlook

Three Category Temperature Outlook
Normal Maximum Temperature: 40
Normal Minimum Temperature: 15

Three Category Precipitation Outlook
Normal Precipitation: 10.70

Seasonal Outlook
December 2021-February 2022 (Lead 4)
Takeaways

• For the water year as a whole, western Colorado has been warm and dry, eastern Colorado wet. But this has been reversed for the summer.

• An active summer monsoon has improved the short-term drought situation in much of western Colorado, though it has also brought damaging flash floods.

• Longer-term hydrologic drought impacts are still significant, with reservoirs at or near record lows.

• With La Niña likely to return (plus the ongoing influences of climate warming), seasonal outlooks are not encouraging, though it’s still very early.
Thank you!

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