

Colorado CoCoRaHS Summer Newsletter

July 2023

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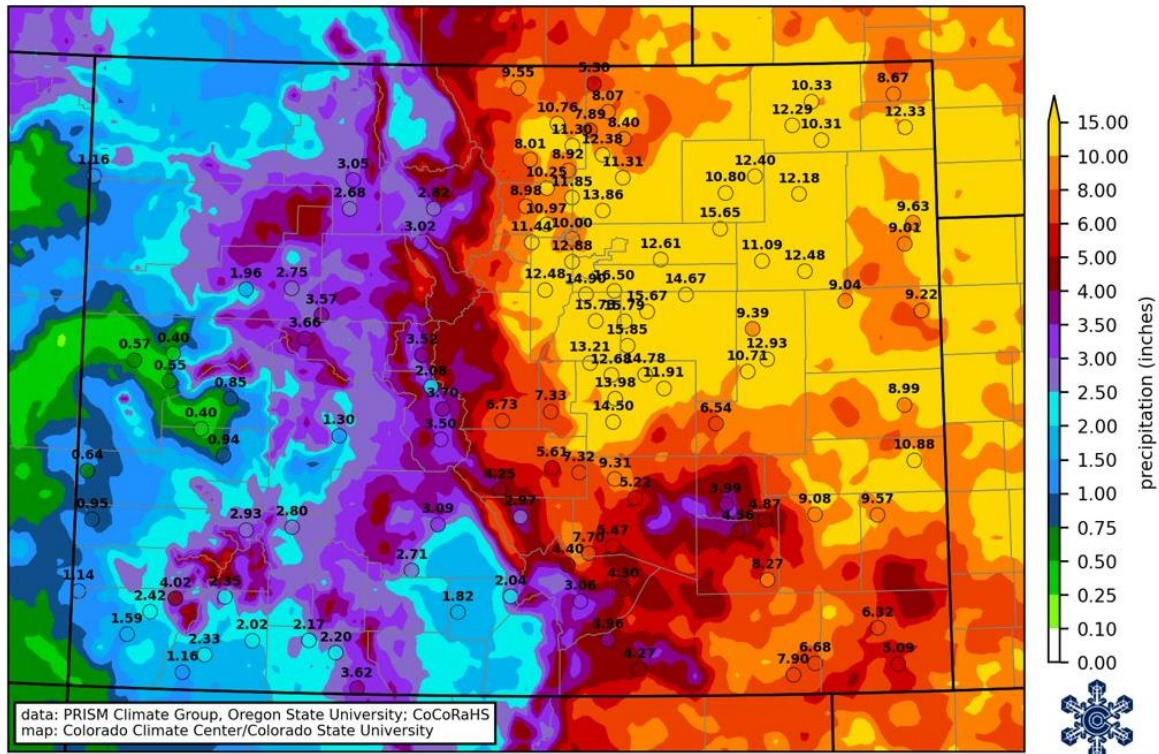


Photo Credit: Russ Schumacher

Recent Rainfall

Hello Colorado CoCoRaHS community! Wow, what a blast these last couple of months have been for measuring rainfall! Maybe you're sick of it by now, or maybe you're like me and can't get enough of the daily storm activity. Many of us east of the Continental Divide recorded over 10" of rainfall between May 1st and June 30th. 32 of us have recorded over 15" of rainfall between May 1st and June 30th. Another 1-3" has fallen across much of this area to start the month of July. The first graphic below shows rainfall totals from May and June. The second graphic shows our top ten wettest stations. What two months it was for Elbert County! The third graphic shows places where the last two months are the wettest two consecutive months ever recorded!

PRISM & CoCoRaHS total precipitation since May 1 through 5:00am MST 30 June 2023



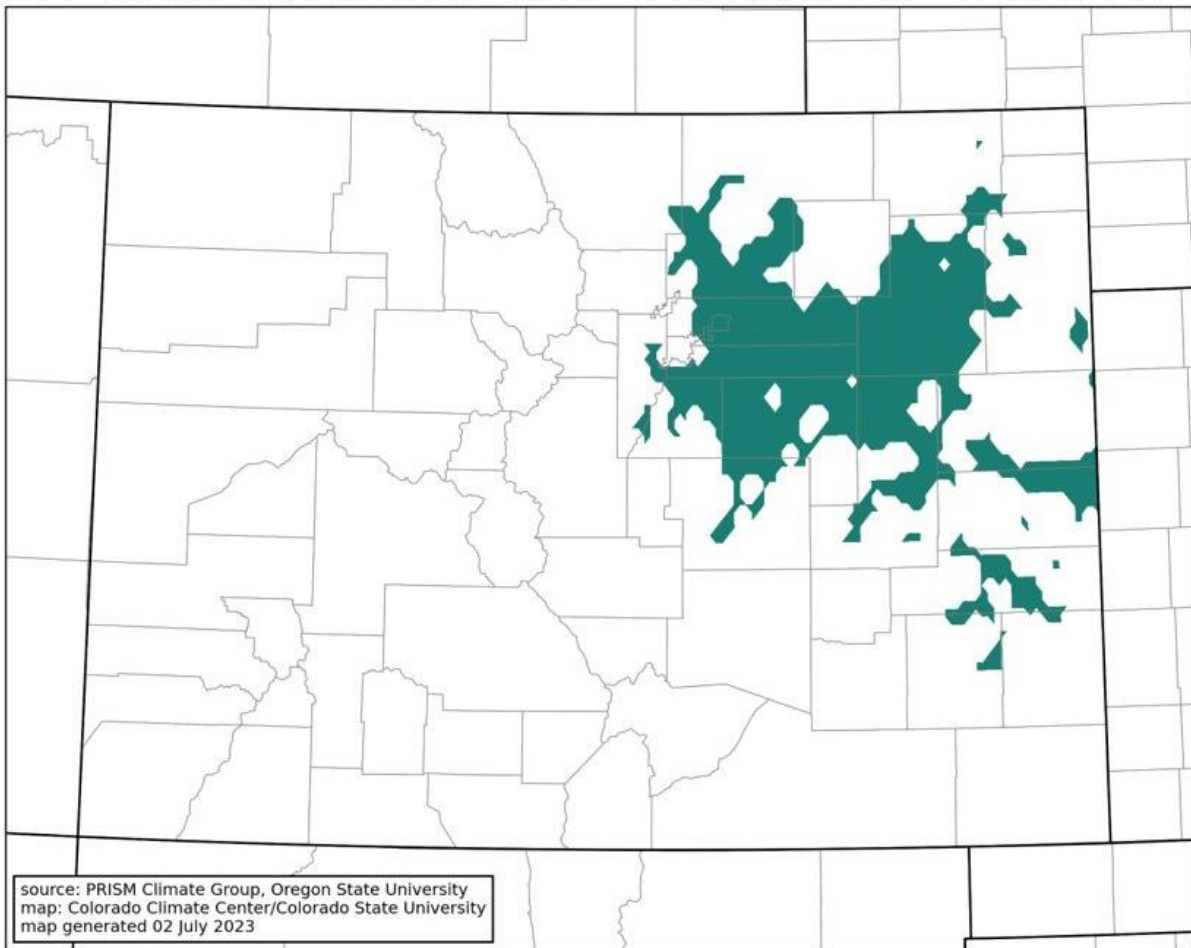
May-June Rainfall totals from CoCoRaHS stations with complete data records. Gridded data from the Parameter-elevation Regressions on Independent Slopes (PRISM) Model.

Wettest Colorado CoCoRaHS Stations in May and June

Station Number	May-June 2023 Precipitation	Percentage of Annual Average
CO-AR-416	18.93	100
CO-AR-321	17.83	101
CO-EL-101	16.74	89
CO-AR-225	16.5	86
CO-EL-75	16.37	84
CO-DG-282	16.02	93
CO-EL-76	16	82
CO-EL-17	15.85	79
CO-EL-96	15.8	82
CO-EL-5	15.79	82

Top 10 wettest Colorado CoCoRaHS stations in May and June. Totals given in inches, and % of the station's PRISM estimated annual average.

locations where May-June 2023 was the wettest 2-month period on record (PRISM data)



Locations where May-June 2023 was the wettest 2-month period on record (shown in teal) since 1900 based on PRISM data.

The result of such large and consistent rainfall events has been a recharge in soil moisture across the plains, high reservoirs, and some of the highest streamflows ever recorded on the South Platte River. What's more, with the relatively cool recent daytime temperatures and bountiful moisture, the Denver area's June water usage was the lowest recorded since the 1960s. Recent years of drought and higher water prices have made folks especially conscious of their water use, letting the extra rain nourish their lawns and gardens.

Pictures

I love storm pictures. Tornadoes, lightning, hail, heavy rain, stunning cloud formations, all of it. If you can respond to this email with storm pictures, I'll be so thankful. My favorite one will be featured on the cover of the next newsletter. No cheating though! Please submit your own photos from storms you experienced.

Reporting Beyond the Rainfall

If you examine the “Enter My New Reports” section of the CoCoRaHS website, you’ll find that there are a number of ways to contribute to CoCoRaHS beyond the daily rainfall report. If you only want to measure daily rainfall that is perfectly fine, but I am going to give a quick plug to a few of our other reporting protocols:

Significant Weather Reports – These reports are a big hit with the National Weather Service because they are received in real time. It is valuable to indicate in your daily report that flash flooding occurred. However, it is even more valuable to indicate this in a “Significant Weather Report.” This way the National Weather Service can react to what you are seeing as soon as the report is submitted, potentially even issuing a flash flood warning.

Hail Reports – Many of us have seen hail in the last two months. For some of us, it was large and destructive. We have seen reports of 3+” hailstones out on the eastern plains. CoCoRaHS allows you to submit a hail report too. Recently, our hail reporting protocols have been expanded to include pictures. For those who have not submitted a hail report in some time, try this out! There will be a “submit photo” option when you fill out a hail report that takes you to a JotForm page where you can share your files. Hail reports are also sent to the National Weather Service in real-time. These reports can be used to issue, or validate, a severe thunderstorm warning.

The map below shows tornado (red), severe hail (green), severe wind (blue), and flash flooding (brown) reports issued by the National Weather Service in June 2023. One of the National Weather Service’s favorite data sources for such information is you. Those of you who submitted significant weather reports and hail reports greater than one inch in diameter contributed to this map. It’s a great map, but your reports do more than make pretty maps. These reports also helped the Weather Service issue and validate warnings that are used to notify other people further downstream in a severe storm’s path so they can stay safe and protect their property. Kudos!

Colorado PRELIMINARY severe thunderstorm and flood/flash flood reports, June 2023

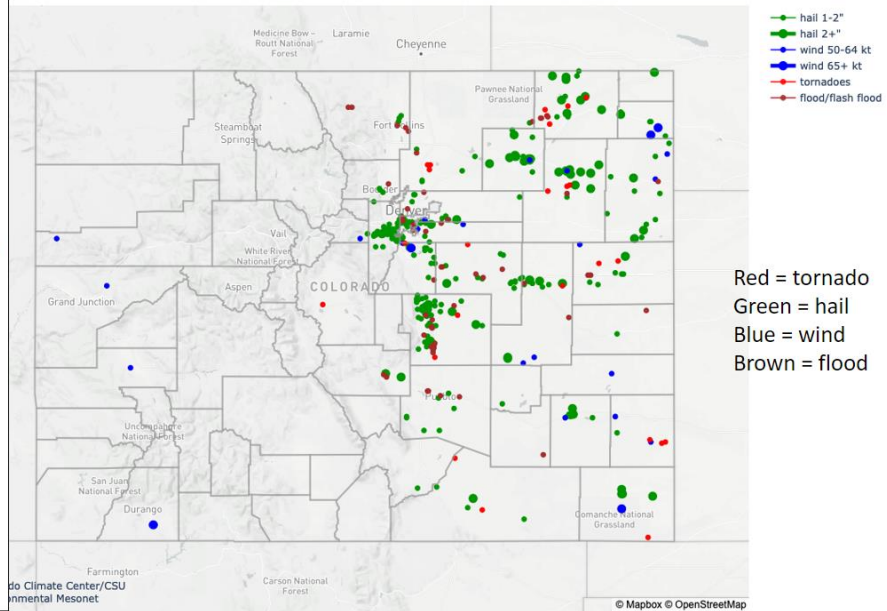
Preliminary severe weather and flood/flash flood reports for June 2023

36 tornadoes on 6/21, most recorded on one day in state records

https://www.weather.gov/bou/Tornadoes_June_21_2023

Grenada tornado on 6/23 was the first EF-3 in Colorado since 2015

- 310 severe (1"+) hail reports
- 77 2"+ hail reports
- 14 3"+ hail reports



Red = tornado
Green = hail
Blue = wind
Brown = flood

Interactive map updating in near-real-time at: https://climate.colostate.edu/ytd_severe_storms.html

Locations of severe weather reports in June 2023. Red = tornado, green = hail, blue = wind, brown = flood.

Conditions Monitoring Reports – I love reading your Condition Monitoring reports. I think I bring them up in about every single newsletter. For those of you who many do not know, Condition Monitoring reports are a quick and convenient way for you to anecdotally appraise how what you're experiencing deviates from normal, give us a few sentences describing what you're seeing, and tell us who is impacted. The comments are the most important part. It's not just us who read them, folks who make the US Drought Monitor map pay attention too.

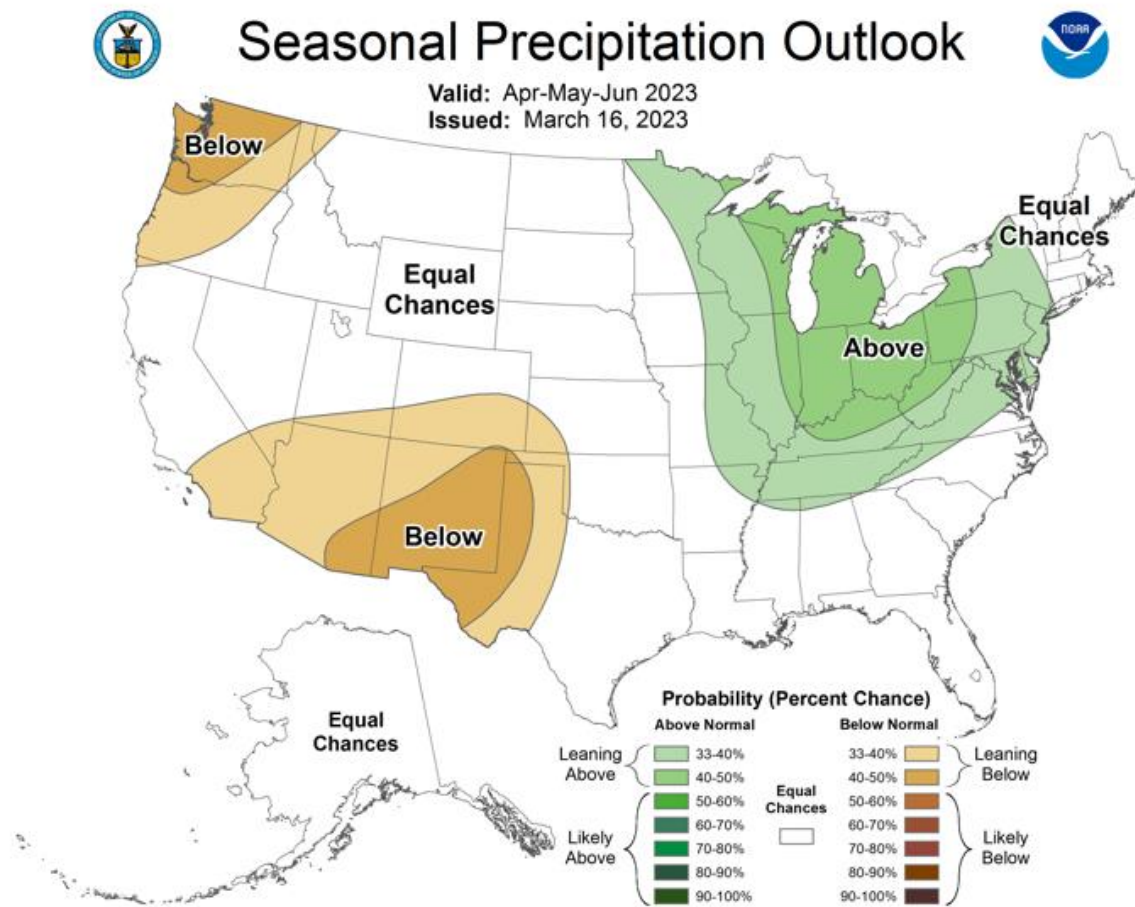
Your reports don't need to be long or technical. Just tell your story. What that looks like will depend on your location, but here are some examples: Are you in a forest? Tell us about how the trees are holding up to stress, and any changes in timing of leaves coming and going that you notice. Out on the prairie? Feel free to discuss how the grasses are growing, and if you have adequate soil moisture. In a city? You can talk about vegetation conditions at the local park, water restrictions, or changes in the water demand for your lawn or garden. These are just a few examples of many. Condition Monitoring Reports can be filed by logging onto the website, selecting "Condition Monitoring Report" in "Enter My New Reports" section, and following the prompts on the form. For additional context, see the "Condition Monitoring" hyperlink above.

You can file Condition Monitoring reports as frequently as daily, but we're only recommending once/week. Even biweekly or monthly reporting is helpful. Please know that all your current efforts as volunteers are appreciated. Condition Monitoring reports are not a requirement or expectation.

Seasonal Forecasting (could we have seen this coming?)

Whenever we have an outlying climate event like the wet weather of May and June 2023, I like to play a little Monday Morning Quarterback. Could we have seen this event coming and spread the word? The

plot below is a seasonal forecast for April-June of this year issued by the Climate Prediction Center in March: It shows a slight increase in the probability of a dry spring for southern Colorado, and equal chances of a wet, dry, or near normal spring for northern Colorado. We often refer to these forecasts as “equally clueless.” Seasonal forecasting is tough because individual weather events can make or break a prediction, and we are only good at predicting individual weather events up to 10 days in the future. We can use known relationship between sea surface temperature patterns, which help dictate the atmosphere’s circulation, to produce seasonal forecasts that are better than random chance. The most commonly used pattern is the El Niño Southern Oscillation, or ENSO.



Climate Prediction Center April-June precipitation outlook for the Coterminous United States. Green areas represent an increased chance of above average (upper tercile, > 67th percentile) precipitation. Brown areas represent increased chance of below average (lower tercile, < 33rd percentile) precipitation.

There are two reasons I think it would have been difficult to see this wet spring coming ahead of time: 1. Uncertainty in sea surface temperature pattern, and 2. The imperfect relationship between sea surface temperature patterns and atmospheric circulation.

Firstly, the plot shown above shows a pretty typical La Niña precipitation forecast for April-June. La Niña pushes the polar jet stream north, leading to drier than normal conditions across the southwest, and wetter than normal conditions for the Great Lakes Region. At the time the forecast above was issued we did not know the reigning La Niña would rapidly give way to El Niño.

In Colorado on average, El Niño conditions are significantly wetter than La Niña from late spring through about mid-fall. Once we knew El Niño was coming (late April) seasonal forecasts did shift wetter, but it is bold to predict a wet anomaly as extreme as May-June 2023 based on El Niño alone. Predicting precipitation given El Niño is like predicting a poker hand with a few extra aces in the deck. There is a greater chance of hitting big, but still, plenty of opportunity for a bad hand. For what it is worth, the last time La Niña gave way to El Niño so rapidly during spring was 1965, and that was also a very wet spring, but predicting another very wet spring with a sample size of one is risky.

Thanks again so much to all of you for the dedication to this program! CoCoRaHS continues to help us understand the weather and climate of Colorado a little better with every new weather extreme.

Kindest Regards,

Peter