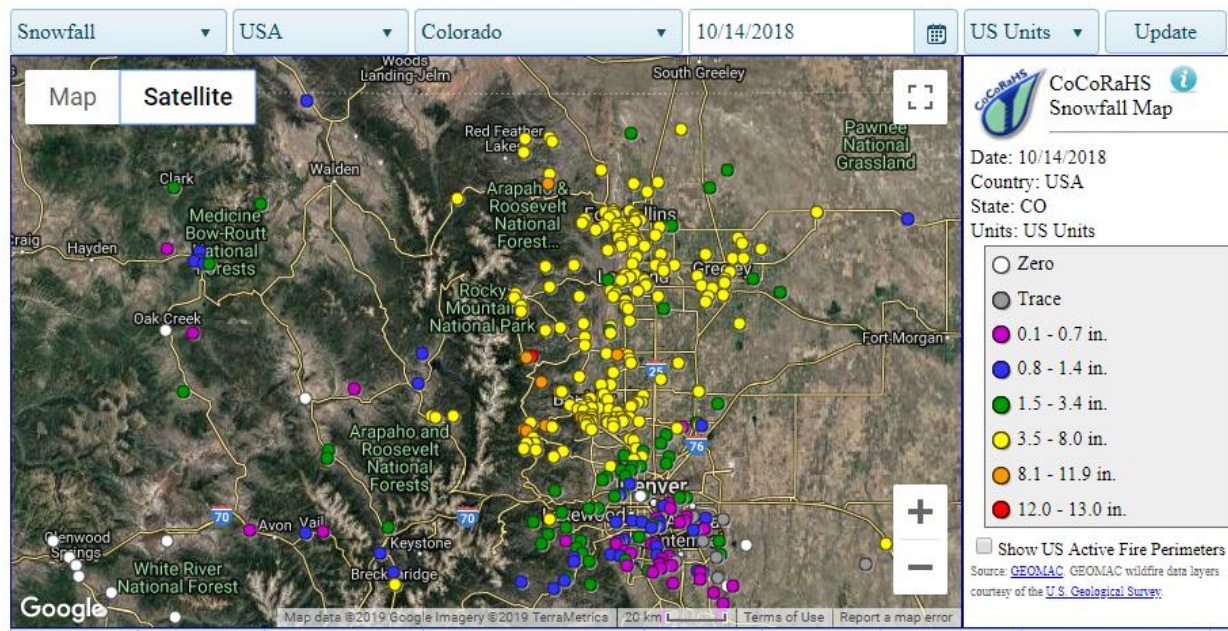
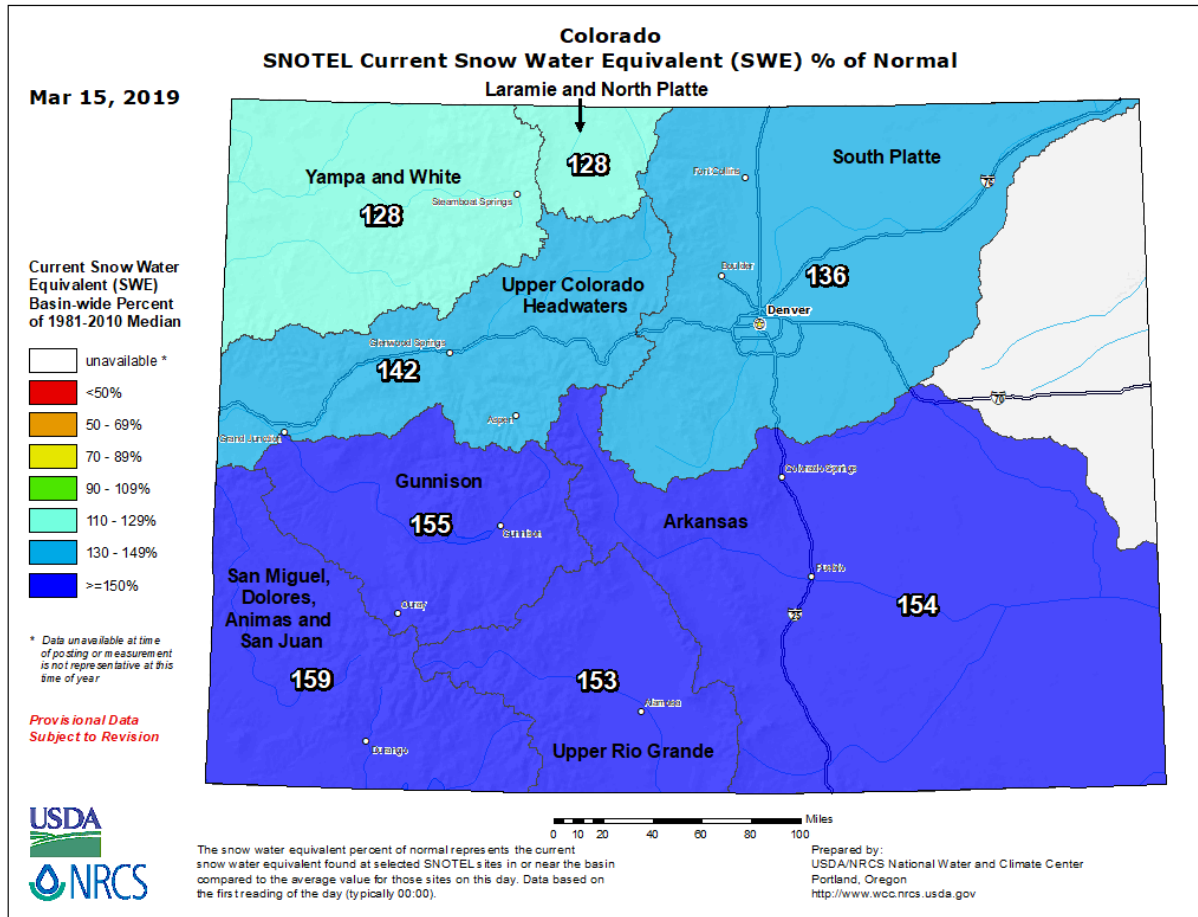


## Colorado CoCoRaHS Seasonal Newsletter: *When Will Winter End?* March 18<sup>th</sup>, 2019

Snow Abounds: Last time I wrote a newsletter, the state had just experienced one of the warmest Septembers on record. This capped off one of the warmest, driest, most drought-stricken summers on record for the west slopes. Even so, snow was just around the corner! The Urban Corridor got its first real dose of winter on October 13<sup>th</sup>, 2018. CoCoRaHS reports the following morning totaled 7-10" in Boulder, and over a foot in the hills of the Front Range. This brought our snow season off to a nice start, and is still the biggest snowstorm of the year for some.



For many of us, the snows did not disappoint this winter. February and March have been wet, especially for our high country. Snowpack in the southern portion of the state is now above 150 percent of normal. That's a big deal in mid-March! Snowpack in the northern half of the state is still on the generous side too. The drought of 2018 was historic; these are exactly the conditions we needed to break out of drought. There's no cure for drought in Colorado quite like a cold, snowy winter.



Here are some of the more fun CoCoRaHS snow stats for this winter:

Highest daily snowfall total: 23.2" – CO-LP-79 (February 22<sup>nd</sup> 2019)

Highest daily precipitation total: 2.93" – CO-AR-217 (March 14<sup>th</sup> 2019)

Highest depth of snow on ground: 96" – CO-MN-1 (February 23<sup>rd</sup> 2019)

Highest seasonal snowfall total: 449.4" – CO-DL-45

Thank you all so much for your efforts measuring and reporting snowfall this winter. Snowfall measurements are not always easy to come by. We put a man on the moon 50 years ago, but still have trouble measuring snow without a human being present. This is all the more reason why your measurements are important. I've been reaching out personally to folks who have measured more than four feet of snow on the ground. If I've missed you, give me a hollar! Here are some testimonials and pictures:



*"I've got a big snow thrower (nicknamed 'Brutus') so I'm keeping up with the driveway, but the road conditions are dicey. Saw the storm coming so we don't have to go out for supplies. Finally, we have a 'big strong German Shepherd' who loves to play in the snow" (CO-LP-61).*



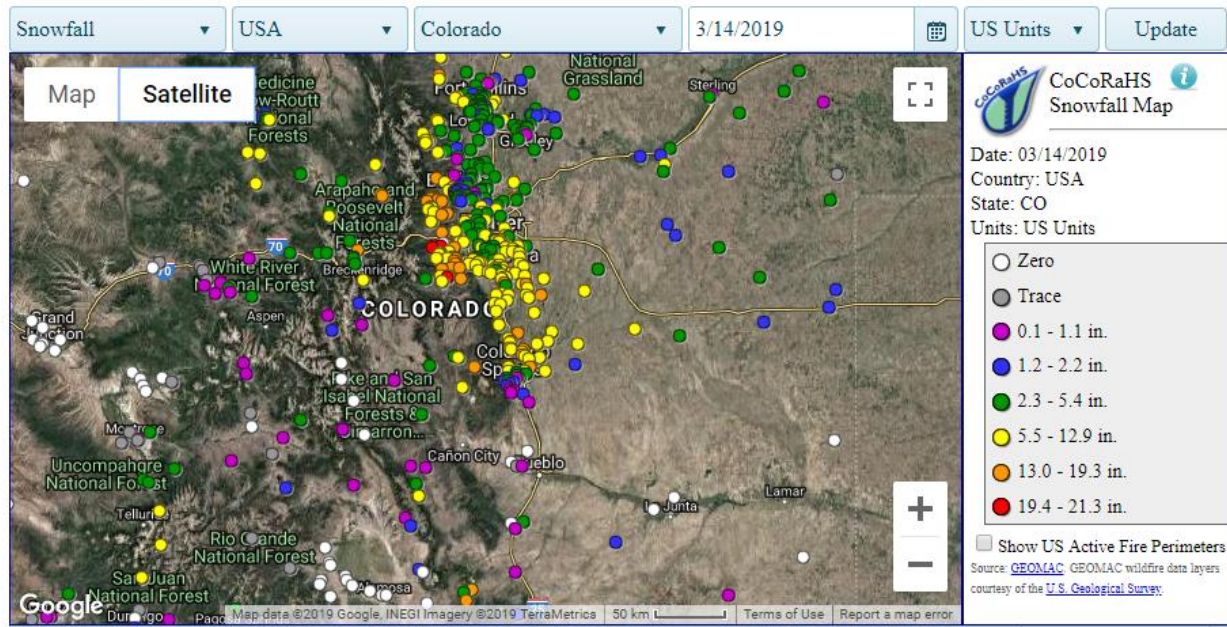
*"I still have no WiFi but will enter daily measurements when I'm back online. Total for last week's storm 52.0" total snow on ground was as high (deep) as 96" (CO-MN-1).*

Experiences with big snow are not always positive:

*"Over the years I have lots of stories but this winter's are mostly dismal – my water line froze the day after Thanksgiving and I have been hauling drinking water just over ½ mile twice a day, every day on bad legs and a sore foot" (CO-GN-18).*

Our most recent storm, the fabled "bomb cyclone" was a nice moisture-maker (albeit disappointing for many of us from a snow total perspective). What made this storm special was how low the central pressure got, and how windy this caused conditions to be. Colorado Springs recorded a wind gust of 96 mph. The lowest measured altitude-adjusted pressure was 971 millibars (mb), which is an unofficial state record. For perspective, sea level pressure is 1013 mb. Extremely strong hurricanes can have central pressures below 900 mb. I hesitate to get too into what causes a "bomb cyclone" as it's hard to avoid nerd-speak. The storm's positioning, upper level winds, and moisture content are all contributing factors. Our topography plays a roll too. Email me for more details.

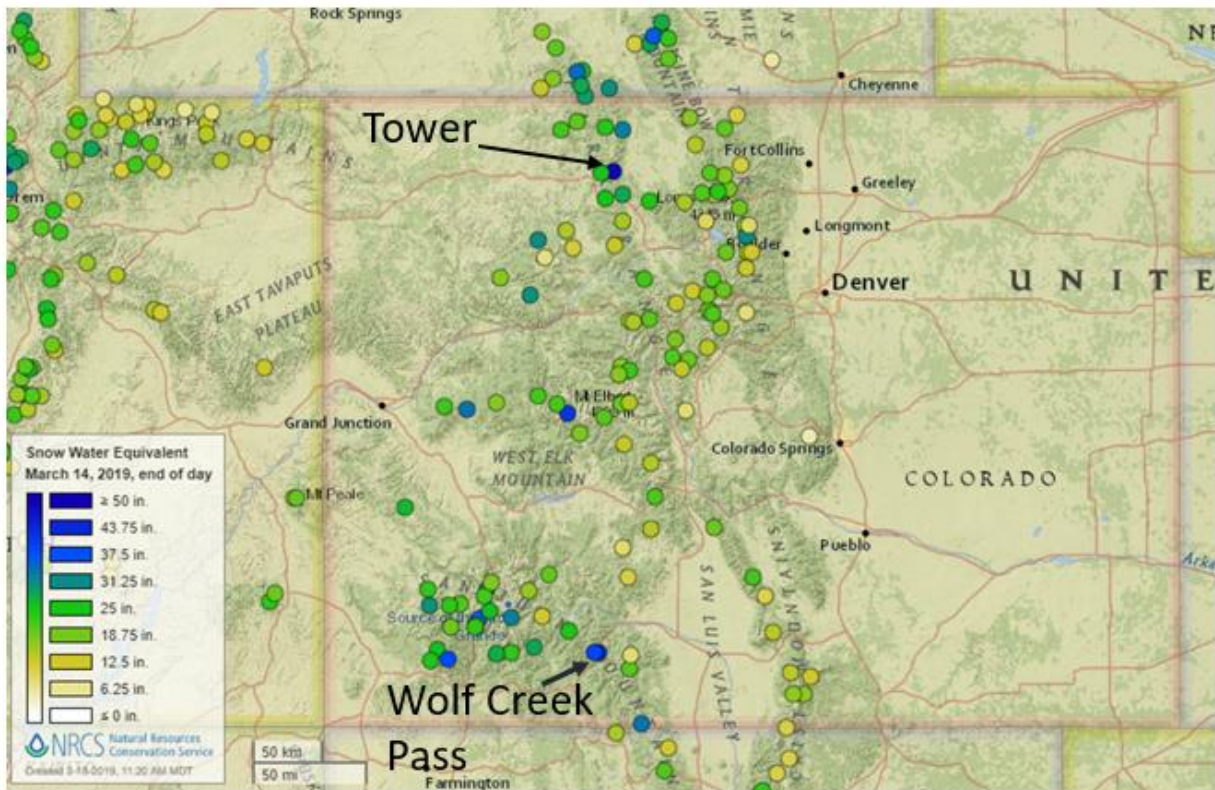




Where are the snowiest places in the state? You're probably used to seeing maps like the one above, that show how snowpack compares to average. But what is average for the mountains nearest you? Are they more or less snowy than other mountains in the state? What about the nation? Wolf Creek Pass has the official Colorado record for most snowfall in one season (837.5") (see map below). The national record for most snow in a season is held by Mt. Baker, Washington (1,140"). As you can imagine, there is plenty of uncertainty in these types of records as places that are prone to extreme snow are, basically by definition, difficult places to take a measurement. And as previously mentioned, we don't have very reliable automated measurements of snow.

One of our more robust ways to track snow these days is through the Snowpack Telemetry (SNOTEL) network. These stations are carefully installed and maintained across the western United States in areas where it's critical for our water supply forecasts to have snow information. These stations don't measure the snowfall directly, but instead measure the total amount of water that has accumulated on the station snow pillow. It's the same thing you measure if you take a core sample of your total snow depth. Year after year, we see the highest snowpack measurements in the state come from a station called "Tower." It is located just northeast of the Steamboat Springs ski area (see map below). There's currently almost 50" of snowpack sitting on the Tower snow pillow. That's as much water as some of the wettest areas received during Hurricane Harvey! As such, we'll be rooting for it to melt slowly.

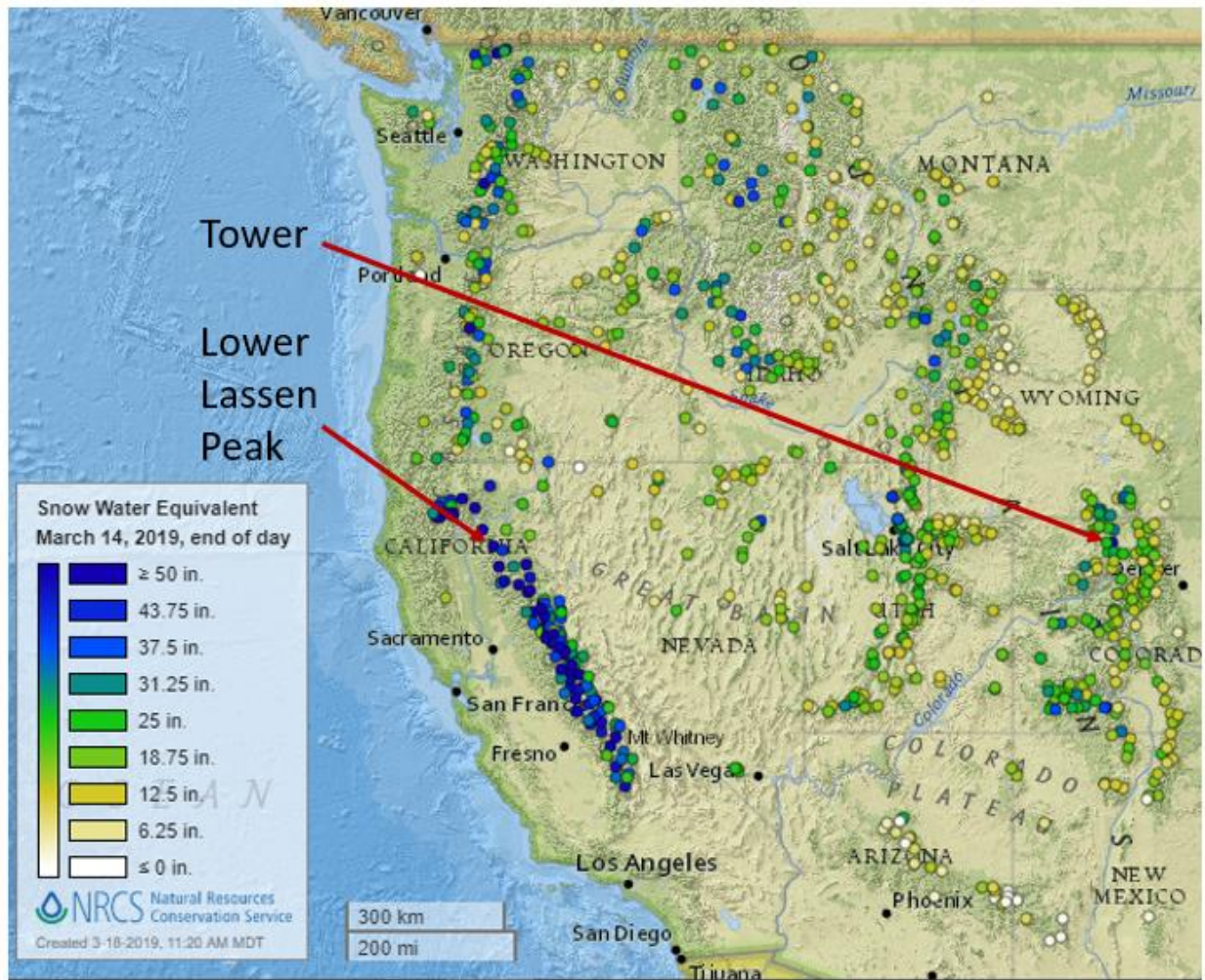
Is Tower truly the wettest spot in the state? Well, we can't measure everywhere, so it's difficult to say for certain; probably not. Areas in the San Juans and western Elk Mountains are capable of rivaling, or even surpassing, Tower in snowpack collection in a given year.



*This map shows the current value of snowpack (inches) measured at various SNOTEL sites across the state. You can see lots of variation, all the way from fewer than six inches to nearly 50 inches, and yet snowpack is above normal all across the state. Normal means different things different places.*

Perhaps you've seen or heard that the Sierra Nevadas in California have had a big year. If Tower were in the Sierra Nevadas, a snowpack measurement of 50" would not stand out as being high among other SNOTEL stations. The highest snowpack measurement in the nation is currently at Lower Lassen Peak (96.7") (see map below). These kinds of numbers are exciting, but has the potential to cause devastating flooding.





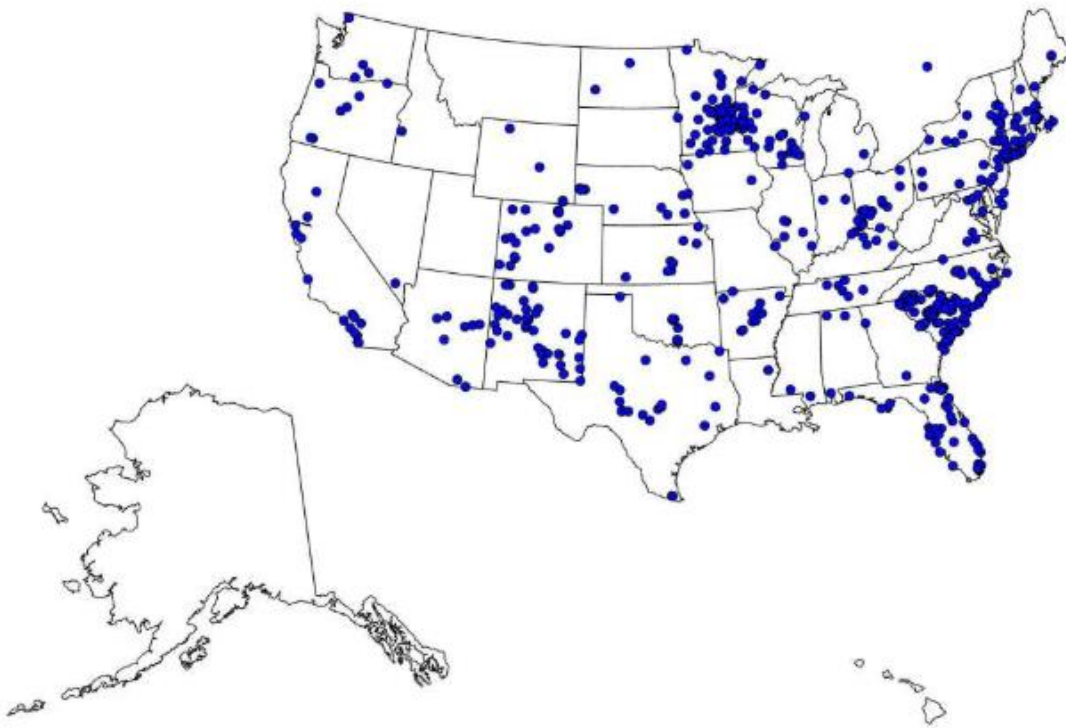
*This map shows the current value of snowpack (inches) measured at various SNOTEL sites across the US. The wettest station for 2019 in Colorado and the US as a whole are highlighted.*

Preparing for Spring: February and early March made it feel like winter would never turn the corner into spring. Just in the last few days, you can finally start to feel it in the air. The days are certainly getting longer. There is some truth to the old saying “when the days get longer, the storms get stronger.” For those of you who take a break during winter, your time of year is coming. Please don’t throw out that gauge during spring cleaning. You are still needed. Dust it off, and put it proudly on its perch outside. You may have few snows left to go, but soon enough it’ll be time for thunderstorms. Spring and summertime thunderstorms vary a great deal on small spatial scales. There is no such thing as too many measurements. Don’t forget your reports are sent immediately to your local National Weather Service Office. The “significant weather report” or “hail report” you file when you get hammered this spring or summer could help save lives.

Tell Your Friends: It’s March. That means March Madness! Most folks associate “March Madness” with a riveting 64-team collegiate basketball tournament (I filled out my bracket this morning). Us weather nerds at the Colorado Climate Center and CoCoRaHS Headquarters

associate it with an annual CoCoRaHS recruiting competition <https://cocorahs.org/Content.aspx?page=Marchmadness19>. The CoCoRaHS Cup (we appropriate all sorts of mainstream sports terminology here) is awarded to both the state with the most volunteers that sign up, and the state with the most volunteers that sign up per capita. Despite being the home of CoCoRaHS, we have never hoisted this cup in Colorado. Given the rip-roaring starts that Minnesota, South Carolina, Florida, and New Mexico have achieved, I suspect the same will be true this year. We can still do well! We encourage you to share your experience with friends who are also curious about the weather. It's worth noting that CoCoRaHS is a fantastic way to be a part of a part of a wide variety of scientific efforts that ultimately support your community. You, and whoever you might encourage to sign up, is benefitting your local weather forecasting office, scientists who work with satellites and radars, and river forecasters, and researchers around the globe. Plus, you have the coolest newsletters to look forward to!

#### **New CoCoRaHS Observers March, 2019**



Not the sharing type? That's okay, but we implore you to keep it up. We are so grateful to each and every one of you for all of the love and support over the past two decades. The longer we collect precipitation data across the country, the richer our dataset becomes. We can't wait to see where CoCoRaHS is 10, 20, and even 50 years from now.

Many, many thanks!



Peter Goble  
Colorado CoCoRaHS Coordinator