

# California Cumulonimbus

Spring 2017

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## Welcome Message

by Jimmy Taeger



Map of California divided up into different CoCoRaHS regions. Each region has one or more coordinators. (Source: CoCoRaHS)

Flowers are in bloom and the days are getting longer which means...it's time for another edition of the *California Cumulonimbus*! The *California Cumulonimbus* is a biannual newsletter for California CoCoRaHS observers that is issued twice a year; once in the spring and once in the fall.

This edition contains articles on the change from drought monitoring to condition monitoring, February flooding, the importance of reporting each day, an observer spotlight, who actually uses your observations, and CA winter precipitation and drought conditions.

If you're not a CoCoRaHS volunteer yet, it's not too late to join! CoCoRaHS, which stands for Community Collaborative Rain Hail and Snow network, is a group of volunteer observers who report precipitation daily. Not only is it fun, but your report gives vital information to organizations and individuals such as the National Weather Service, River Forecast Centers, farmers, and others.

Visit [cocorahs.org](http://cocorahs.org) to sign up, or e-mail [Jimmy.Taeger@noaa.gov](mailto:Jimmy.Taeger@noaa.gov) for additional information.

Enjoy the newsletter!



## Condition Monitoring Resource Page

from cocorahs.org

To understand the impacts of drought on plants, animals and people, it is very helpful to monitor conditions regularly, whether the weather is wet or dry. This allows us to see how a drought year differs from a normal year, and learn how different plants, animals and people respond to the onset, intensification, and recovery of drought.

Regular condition monitoring can also help identify expected seasonal changes versus changes caused by unseasonable wet or dry conditions.

This type of monitoring can also help to identify long-term or cumulative effects of drought.

Check out the link below for more [information on Condition Monitoring.](#)

### A FEW USERS OF CONDITION REPORTS

- ◆ National Drought Mitigation Center
- ◆ National Integrated Drought Information System
- ◆ NOAA's Regional Integrated Sciences and Assessments
- ◆ The Carolina's Integrated Sciences & Assessments
- ◆ The American Association of State Climatologists





## February Ends with Big Rain and Flooding in SW CA

by Joe Dandrea

Just after midnight on February 28th, 2017, after almost 24-hours of non-stop rain, the Fashion Valley gage on the San Diego River peaked at 14.15 feet. This is the third highest crest of the river at this point in history, according to the United States Geological Survey (USGS). Based on estimated flow, this was comparable to floods that occurred on February 21, 1914, March 6, 1995, and December 22, 2010. Significant impact occurred in Mission Valley where the river inundated low-water crossings, portions of Hotel Circle, the Transit Station and parking garage at Fashion Valley, and low areas adjacent to the river channel. According to the California Nevada River Forecast Center (CNRFC), a basin-wide estimate of 3.68 inches fell on 27 February. This is a lot of water to fall over a 24-hour period in any watershed. There have been bigger floods, much bigger floods, some without reliable measurements at the current Fashion Valley gage site, although many of these occurred when San Diego was largely undeveloped. For more info: [www.wrh.noaa.gov/sgx/briefing/SanDiegoRiverFlood2017.pdf](http://www.wrh.noaa.gov/sgx/briefing/SanDiegoRiverFlood2017.pdf)

According to USGS records, the river gage was established in 1912 and functioned until January of 1916 when a flood wiped out the gaging station, which was not re-established until 1982. The gage has been in operation through the present, but Mission Valley has changed dramati-

cally, and the Watershed itself was divided up in 1934, and again in 1943 with the completion of El Capitan and San Vicente Dams. These changes make it nearly impossible to compare floods prior to 1943 to subsequent events. The San Diego River Watershed itself is now divided into three, with only the lower third contributing to the flow at the gage site at Fashion Valley. The remaining drainages including San Vicente Creek and those in the upper watershed draining the Cuyamaca Mountains feed El Capitan and San Vicente Reservoirs.



FIGURE 1) Flooding in Mission Valley, CA from the end of February storm. (Source: Alex Tardy)

The January 27, 1916 flood remains the Flood of Record in Mission Valley following a two week deluge, when the gage measured 19.30 feet, with an estimated flow of 70,000 cubic feet per second. The USGS estimated that between 20 and 27 inches of rain soaked the San Diego River Watershed during the last two weeks of

the month. The resulting flood was catastrophic. This flood will likely remain the largest flow ever to be measured on the San Diego River due to the upstream dam regulation now in place.

The second biggest flood likely occurred back on February 21, 1980, after the watershed was divided. There was no official USGS gage at that time, but reports and photos of the event suggest it was bigger than anything we have seen since. The rain measurement at Ramona eclipsed that of January 1916. 15 to 20 inches of rain fell over a six-week period and culminated with four inches in twelve hours on February 21st. Much of Mission Valley was under water with both San Vicente and El Capitan Dams spilling. The 1980 flood may well be about as much flow as we can expect to see going forward in any flood on the lower San Diego River, since San Vicente Dam was spilling at the time and has since been raised considerably.

The NWS in San Diego monitors the USGS river gage as does the RFC in Sacramento. River models there input forecast precipitation to derive flood levels at the Fashion Valley Gage. If the RFC is forecasting a stage of 11.3 ft. or higher, the NWS-San Diego will issue a River Flood Warning. River Statements are also issued based on gage levels forecast by the RFC.

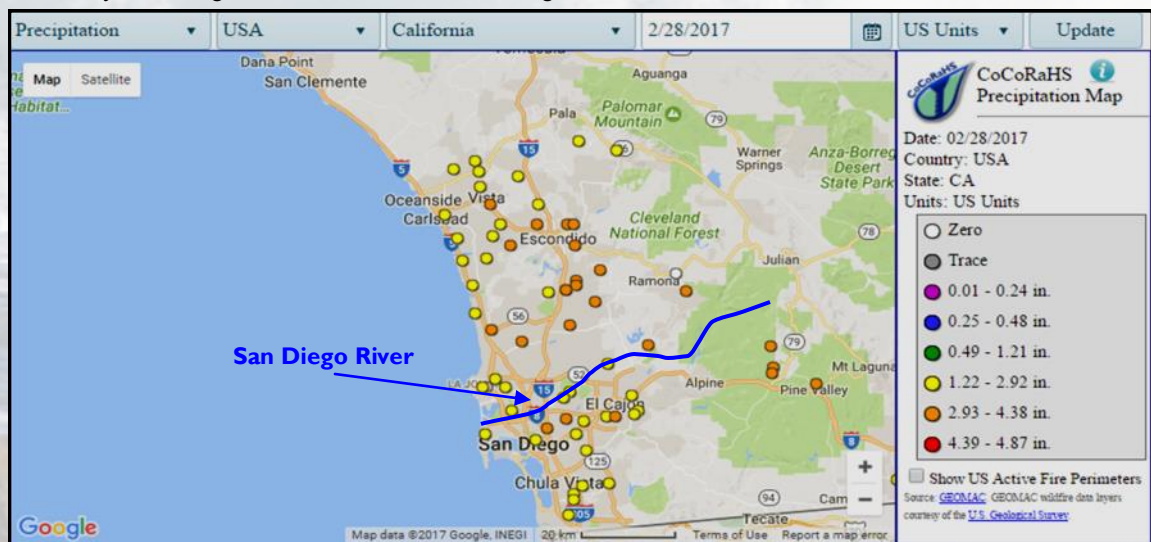


FIGURE 2) 24-hour precipitation observations ending around 7am on February 28th, 2017, showing a portion of the water that fell over the San Diego River Basin that generated flooding. (Source: cocorahs.org)



## California Cumulonimbus

## The Importance of Reporting Daily

by Rand Allan

When we all became CoCoRaHS observers because of our interest in the weather. However, when you keep rainfall records with CoCoRaHS, many others are depending on you to maintain accurate and timely reports. Engineers use your information to help design channels, retention basins, and bridges over rivers. Climatologists use your records to document the ever-changing climate. Hydrologists use your records in river flow models. Data analysts use it as a check on the accuracy of nearby observers' measurements. Finally, the [PRISM portal](#) utilizes your data to continuously update a national climate model. This model uses the last 100 years of rain data as input to produce annual climate data (you can use this portal to compare your observations against the climate for your site).

Since many others depend on the data, it is important to enter observations not only when it rains but also when there is no rain. Excluding data during clear weather is treated the same as missing

data, and prevents the data from being effectively used by others. Consistent observations are important, too. Setting up a daily routine of a certain time to read and submit an observation can make reporting easier to remember, especially when rain does not occur for weeks at a time. *Remember, zero rain is data, too.* At the very least on regular intervals, click the Monthly Zeros tab, and click the check box on each day you know there was no rain to complete the records (*see Fig 1*). If you forget or were unable to take a reading during a storm, take it the next day at your regular time and record the amount as a multiday reading. If something happens to the rain gage and you lose the rain total that fell during a storm, record it as missing data (NA).

For those of you who make your observations in the mountains of Southern California, you are subject to periodic snow events. Keep a watch on weather conditions, and when snow is forecast during the next few days, remove the funnel and inner measuring tube of your rain gage to catch the snowfall. At your next observation, take your rain gage and pour your snow into a pan to melt the snow. Next, C-A-R-E-F-U-L-L-Y pour the water into the small inner measuring tube to measure the melted snow and record that for your observation (be sure to replace the rain gage at its post). It would also be useful to have a snow board placed on the ground next to the rain gage. When it snows, measure the depth of snow on the board, clear the board of snow, and record the snow depth on your records.

Remembering to enter an observation every day of the year helps to maintain complete records that can then be used by others. If all else fails, make a commitment to treat your observations like a diary of the weather for the day, like farmers used to do, and enter it every day. Note the sky conditions, observations on the changing of the seasons, or temperature changes,...whatever peaks your interest. Even this information can be used by the researchers to tell a little bit about the climate in your area.

Finally, remember also to keep us up to date with your contact information. If you move, sometimes you can keep your same ID number if you are close enough to your old location. If you move out of the area or no longer wish to collect rain data, let us know so we can update the records.

Happy observing! Let's all strive for 100% complete records.

**Data Entry : Monthly Zeros Form**

Monthly Zeros

Station Number : Station Name :

< April 2017 >

| Sun                                 | Mon                                 | Tue                                 | Wed                                 | Thu                                 | Fri                                 | Sat                                 |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 26                                  | 27                                  | 28                                  | 29                                  | 30                                  | 31                                  | 1                                   |
| <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip |
| 2                                   | 3                                   | 4                                   | 5                                   | 6                                   | 7                                   | 8                                   |
| <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip | <input type="checkbox"/> 0.0 Precip |
| 9                                   | 10                                  | 11                                  | 12                                  | 13                                  | 14                                  | 15                                  |
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| 16                                  | 17                                  | 18                                  | 19                                  | 20                                  | 21                                  | 22                                  |
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| 23                                  | 24                                  | 25                                  | 26                                  | 27                                  | 28                                  | 29                                  |
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| 30                                  | 1                                   | 2                                   | 3                                   | 4                                   | 5                                   | 6                                   |
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FIGURE 1) Days which have no data and the observer is certain no precipitation fell can be easily marked as "zero" by clicking the box on the day and clicking "submit" when finished. (Source: cocorahs.org)

## Observer Spotlight: Doug Beadle

by Jimmy Taeger

Doug Beadle grew up in the Sierra foothills in the 1960s and 1970s. He enjoyed watching the weather forecast in the winter, and always hoped for a chance of snow. That spurred a life-long captivation with meteorology and climatology, including waking at 4:00 AM every third day in college to launch weather balloons.

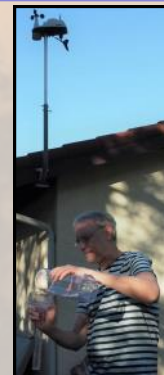
Doug worked for 20+ years as an environmental consultant in North-

ern CA before being forced to retire with disabling spinal arthritis. He joined CoCoRaHS when the program began in CA in 2008 to aid local forecast professionals and to provide hands-on science lessons for his two daughters that his wife home-schooled. Taking observations has since become a family affair. Most days, his daughters would take the rain gauge measurements, while he or his wife would confirm using data from their roof-mounted weather station. Doug is also a trained

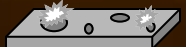
[NWS Skywarn weather spotter](#).

In just the last nine years, the Beadles have recorded a rather large range of annual precipitation totals at their Bay Area home; from 12.59" in 2013-2014 to 36.36" (and counting) in 2016-2017, representing 61% and 174% of their (30-year) annual average of 20.5".

Big thanks to the Beadles for their daily dedication to observing for CoCoRaHS!!



Doug measuring precip by his weather station (Source: Doug Beadle)





## Who Uses CoCoRaHS Observations?

from cocorahs.org

**Y**ES, IT REALLY IS TRUE! Your data are used every day!

No matter how many times we repeat this, the question just keeps coming up "who cares about and who uses the observations from CoCoRaHS volunteers?" It must be hard to fathom that precipitation data is so useful and that backyard rain gauges have a place of importance in national and global climate monitoring in the 21st Century. But the fact is, it's true. Your rainfall reports -- including your reports of zero precipitation -- are very valuable and are being used EVERY DAY. Every morning many organizations pull data from the CoCoRaHS database at least every hour to get all the latest reports as they come in. They wish all CoCoRaHS observers submitted their reports right away.

When you see forecasts of river stages and flood levels on the Missouri, the Mississippi, the Ohio, the Colorado River or most anywhere else in the country -- guess what data are helping the forecasters make these forecasts? Yes, timely CoCoRaHS data!

Your reports of hail or heavy rain may trigger the NWS to issue severe thunderstorm or flash flood warnings. In cases of extreme localized storms, your local report could help save lives.

Don't let all this "importance" frighten you. The weight is not all on observers' shoulders. The real value comes from having thousands of volunteers reporting from all over. So keep up the good work, and go out and find more weather enthusiasts to help measure, map and track the amazingly variable patterns of precipitation.

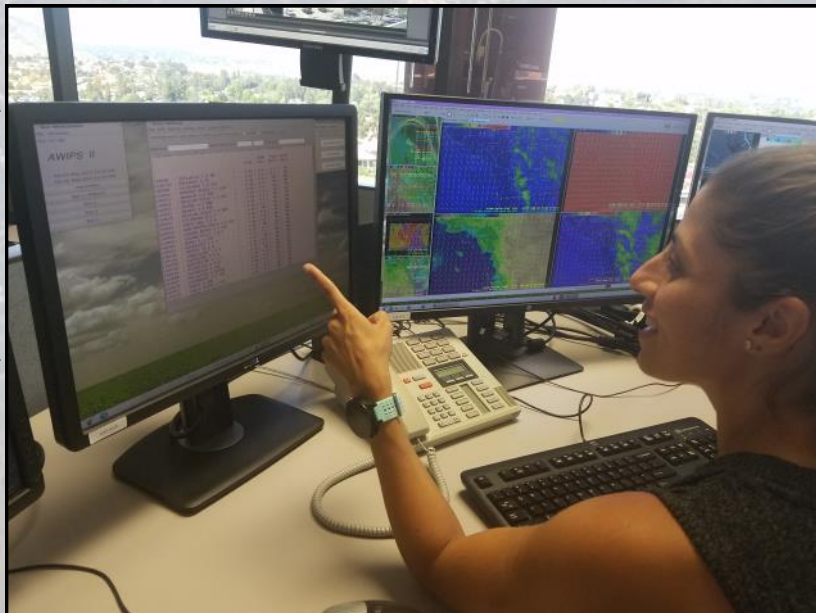
A key reason that CoCoRaHS data are so useful is because the rain gauge used by CoCoRaHS volunteers -- the 4-inch diameter, 11.30" capacity clear plastic rain gauge is very good. Under

most circumstances, this type of gauge performs as well as the official National Weather Service Standard Rain Gauge that has been used for over 120 years documenting our nation's climate. Most CoCoRaHS volunteers have found representative locations to mount their gauge to get very high quality readings. The CoCoRaHS gauge, if installed and used properly, provides very accurate readings. CoCoRaHS volunteers tend to be very interested and very committed to careful and high-quality observations. As a result, the data are usually excellent for a wide range of uses.

Below are just a few of our many users, there are probably many others. The most obvious ones that come to mind are:

1. Weather Forecasters
2. Hydrologists
3. Water management
4. Researchers
5. Agriculture
6. Climatologists
7. Insurance Industry
8. Engineering
9. Recreation

Thanks for being a CoCoRaHS observer and rest assured that your observation efforts are producing much fruit.



**FIGURE 1) National Weather Service Forecaster, Stefanie Sullivan, looking at the summary of observations from SW CA observers in the office computer database.**



***“Your reports of hail or heavy rain may trigger the NWS to issue severe thunderstorm or flash flood warnings.”***





California Cumulonimbus

# Record Precipitation Removes Most of California from Drought

by James Brotherton

The historic California drought, which began in 2011, has officially been declared over by the State of California. Well, most of the state, anyway, as portions of the Central Valley, including Tuolumne, Fresno, Tulare, and Kings Counties, remain under a drought emergency. The percentage of the state under drought, according to the [U.S. Drought Monitor](#), is now less than at the start of the drought in 2011.

Heavy rains during the past winter targeted Northern California in the first several months of the winter, transitioning to much of the rest of the state later in the season. Since then, a very large percentage of the drought had been eliminated in California due to a persistent weather pattern, with Atmospheric River-enhanced Pacific storm systems, which allowed rounds of significant rain events to consistently hammer the state. Beginning at the end of February, the water hose essentially shut off in Southern California, but the northern half of the state remained very wet, and the North Sierra Precipitation 8-Station Index broke the all-time wettest record in early April (See Fig 1).

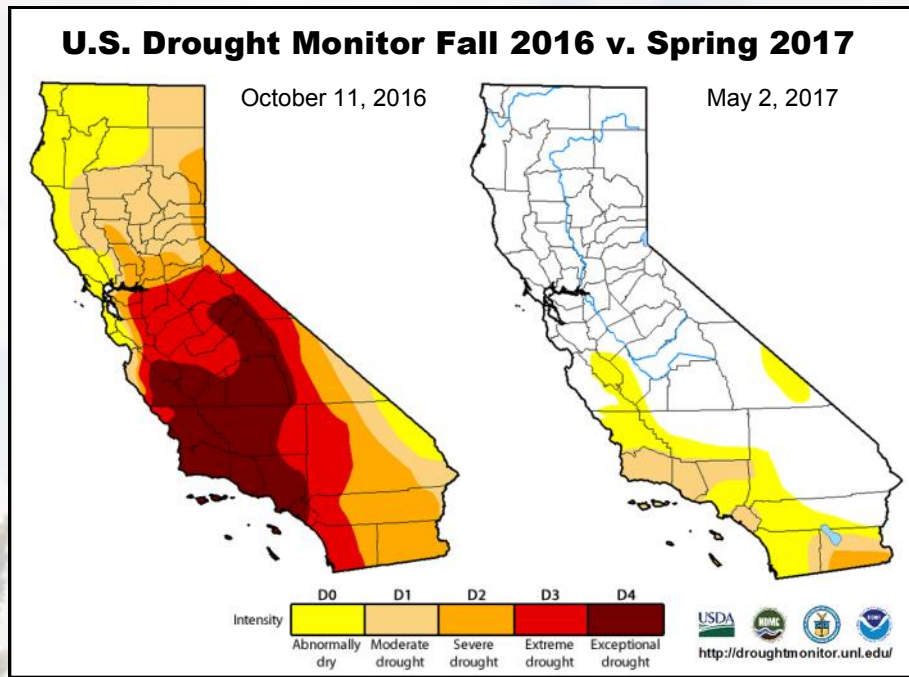


FIGURE 2) A comparison of the drought monitor from mid-October 2016 to early May 2017. By February 21, 2017 all of California was removed from Extreme and Exceptional drought. (Source: The U.S. Drought Monitor)

In addition to the periodic heavy rainfall events, which caused widespread flooding,

power outages, and erosional damage, snowfall in the Mountains of Central and Northern California was historic, to put it mildly! The snowpack across the Northern and Central California mountains, including the Sierra Nevada, where much of the state's water supplies are stored, rose to well-above normal levels. As an interesting point of reference, on April 1, 2015, there was no snow to measure at Phillips Station in the Sierra Nevada. On March 30, 2017, 92 inches of snow and 46.1 inches of snow-water equivalent were measured.

While the snowpack and reservoirs are looking great, residents of the Central Valley continue to feel the drought. Groundwater, the source of at least a third of the supplies Californians use, will take much more than a historically wet water year to be replenished in many areas.

Although the drought declaration has been lifted for most of the state, conservation efforts across the state are not slowing down. "This drought emergency is over, but the next drought could be around the corner," Governor Jerry Brown said. "Conservation must remain a way of life."

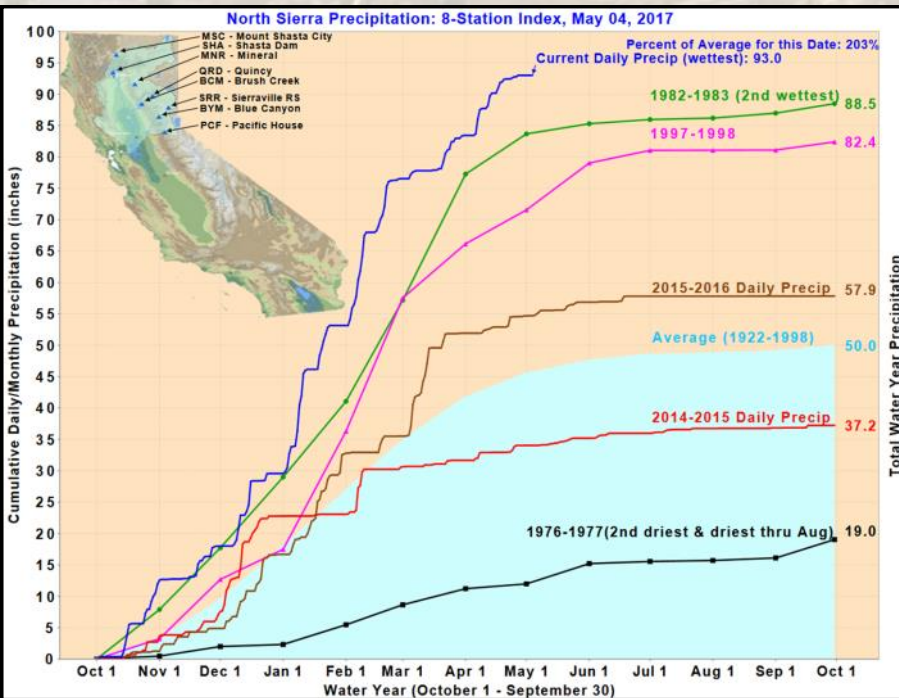
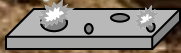


FIGURE 1) The 8-Station Index of precipitation from the 2016-2017 water year as of May 4, 2017 compared with recent years, the driest year and the 1922-1998 average. (Source: California of Department Resources)





# California CoCoRaHS



Marina Chetner



California Travel Guide



Walerian Walawski



Michael Melford

## California Cumulonimbus

### SPRING 2017 CALIFORNIA CUMULONIMBUS CONTRIBUTORS

- **Rand Allan:** California South Coast Coordinator - San Diego Region: Author  
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- **James Brotherton:** Author  
Lead Forecaster - NWS San Diego
- **Joe Dandrea:** Author  
Lead Forecaster - NWS San Diego
- **Jimmy Taeger, California State Co-Coordinator:** Editor, Template Designer and Author  
General Forecaster - NWS San Diego

### What is CoCoRaHS?

CoCoRaHS, which stands for Community Collaborative Rain Hail and Snow Network, is a non-profit group of volunteer precipitation observers. Anyone can join, and it's easy to report the information. All you need is a 4 inch rain gauge, the internet, and a few minutes each day. The website is easy to navigate and has different instructional materials for anyone to learn how to record an observation.

The site also has daily maps of observer's reports showing where precipitation fell the day before. It's fun to compare the different amounts of precipitation that can fall in an area from just one storm. Not only is the information interesting to look at, it is very valuable for organizations such as the National Weather Service, hydrologists, farmers and many others.

Visit [cocorahs.org](http://cocorahs.org) to sign up, or e-mail [Jimmy.Taeger@noaa.gov](mailto:Jimmy.Taeger@noaa.gov) for questions. Join CoCoRaHS, today!



Rain gauge required for the program.



[cocorahs.org](http://cocorahs.org)



[California CoCoRaHS State Webpage](http://California CoCoRaHS State Webpage)



[California CoCoRaHS](http://California CoCoRaHS)



[weather.gov](http://weather.gov)