



CoCoRaHS

Community Collaborative Rain, Hail, & Snow Network

Ashley Wolf

Meteorologist-NWS Green Bay

Northeast Wisconsin CoCoRaHS Coordinator



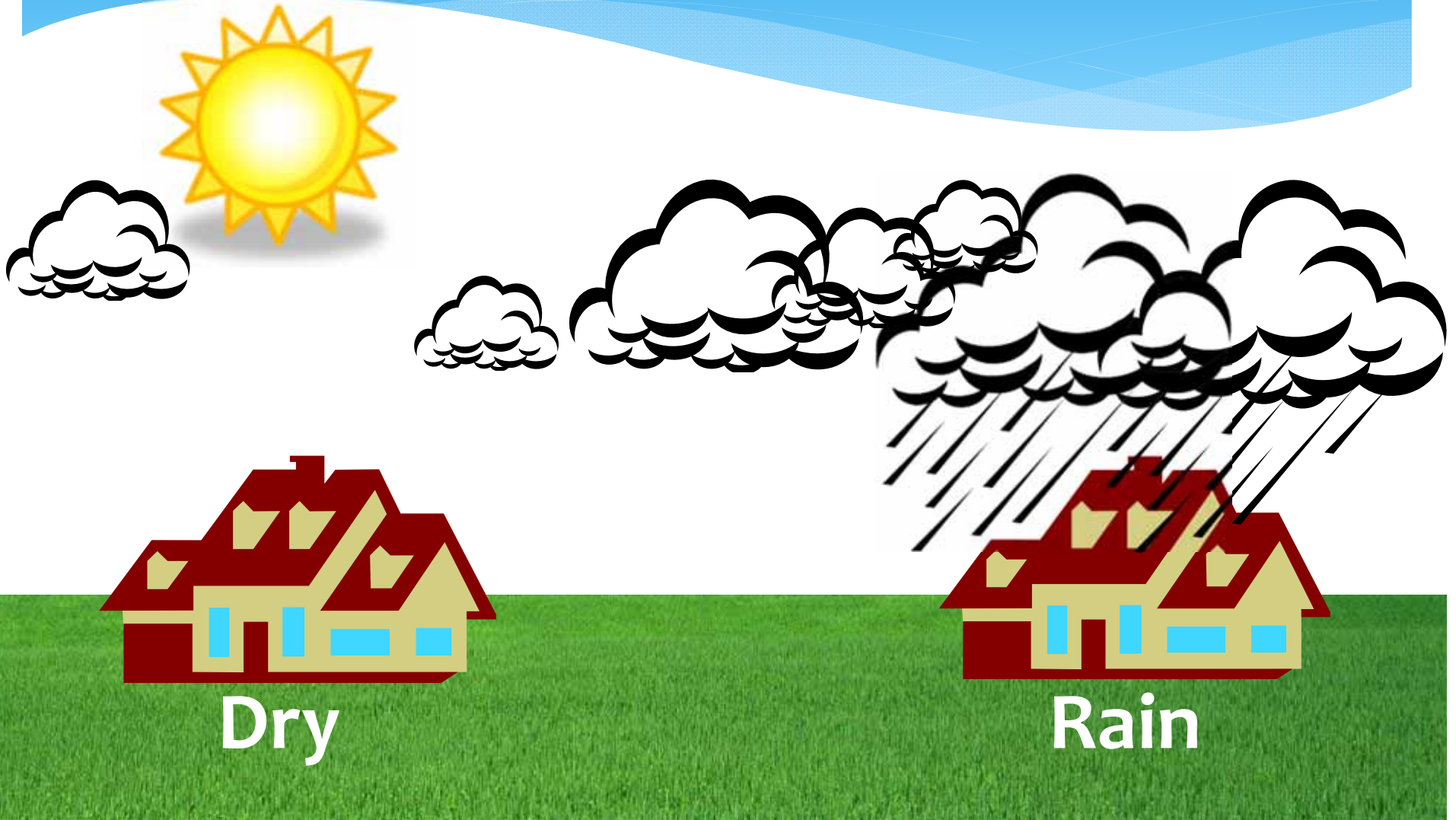
Who, What, Where and Whys of CoCoRaHS

What?

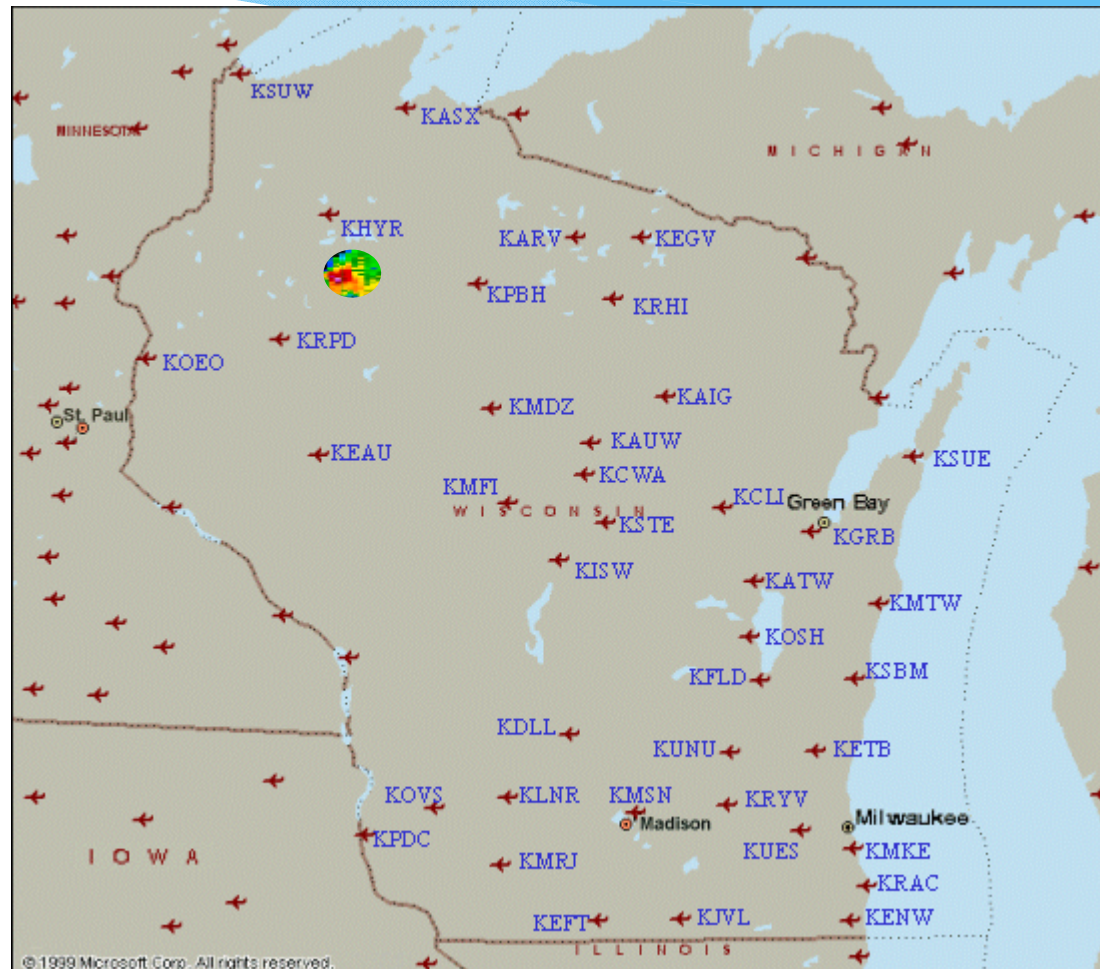
CoCoRaHS stands for the Community Collaborative Rain, Hail and Snow Network. It is a non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation. Our goal is to provide the highest quality data for natural resource, education and research applications by using low-cost tools, providing accessible training and education, and utilizing an interactive website.

We are now in all fifty states and expanding into Canada!

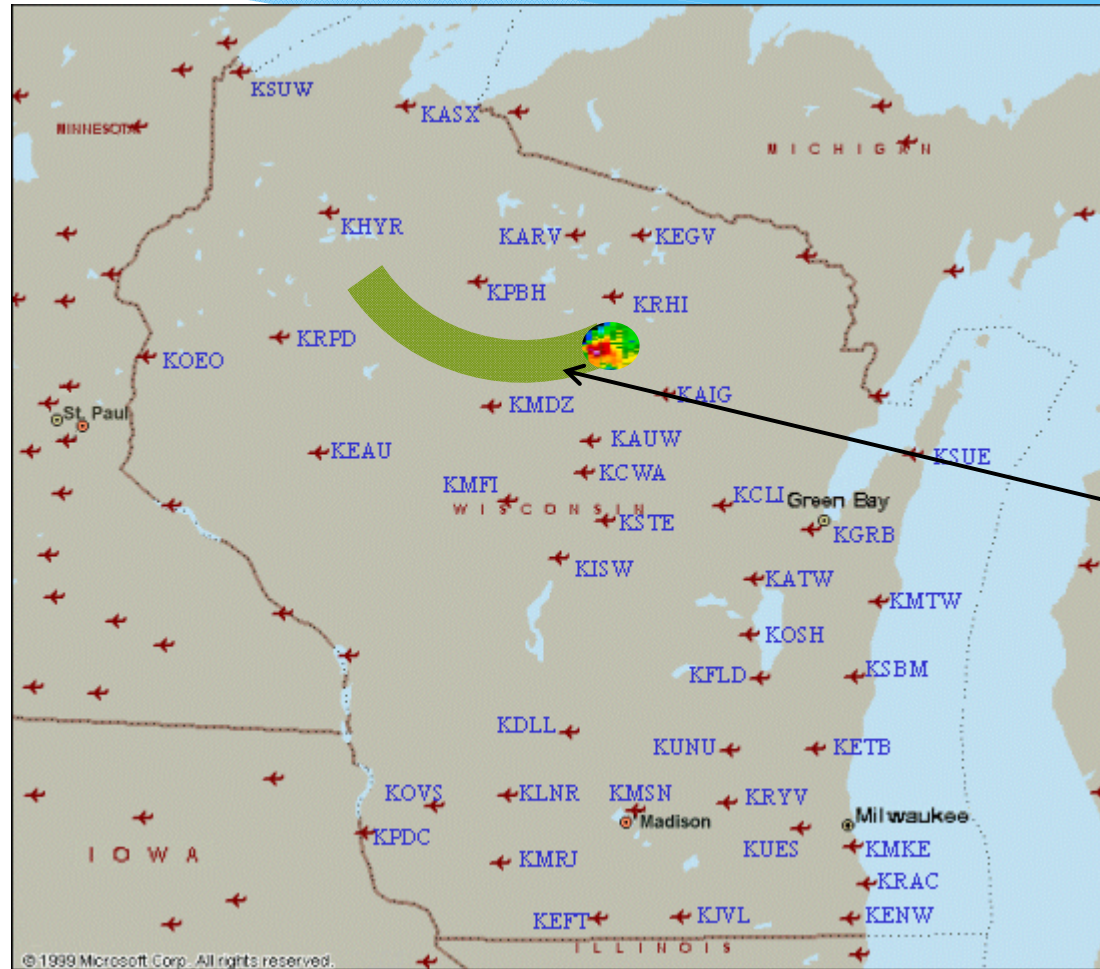
Why: Rain and Snow is HIGHLY Localized



Filling in the Gaps!



Filling in the Gaps!



Precipitation did not fall at rainfall reporting sites... no rainfall amounts observed!

Where?

History of CoCoRaHS

Where?

A flash flood, resulting from a highly localized intense rain storm, hit areas of Fort Collins, Colorado in 1997...

... Later analysis showed that 14 inches of rain fell in southwest portions of Fort Collins (where the flooding originated). Only 2 inches fell 4 miles east of the flooded area where the Fort Collins observation site was located...

... The flash flooding on Spring Creek caused \$2 Million in damage and killed 5 people. Major structures, including Colorado State University, suffered widespread damage.

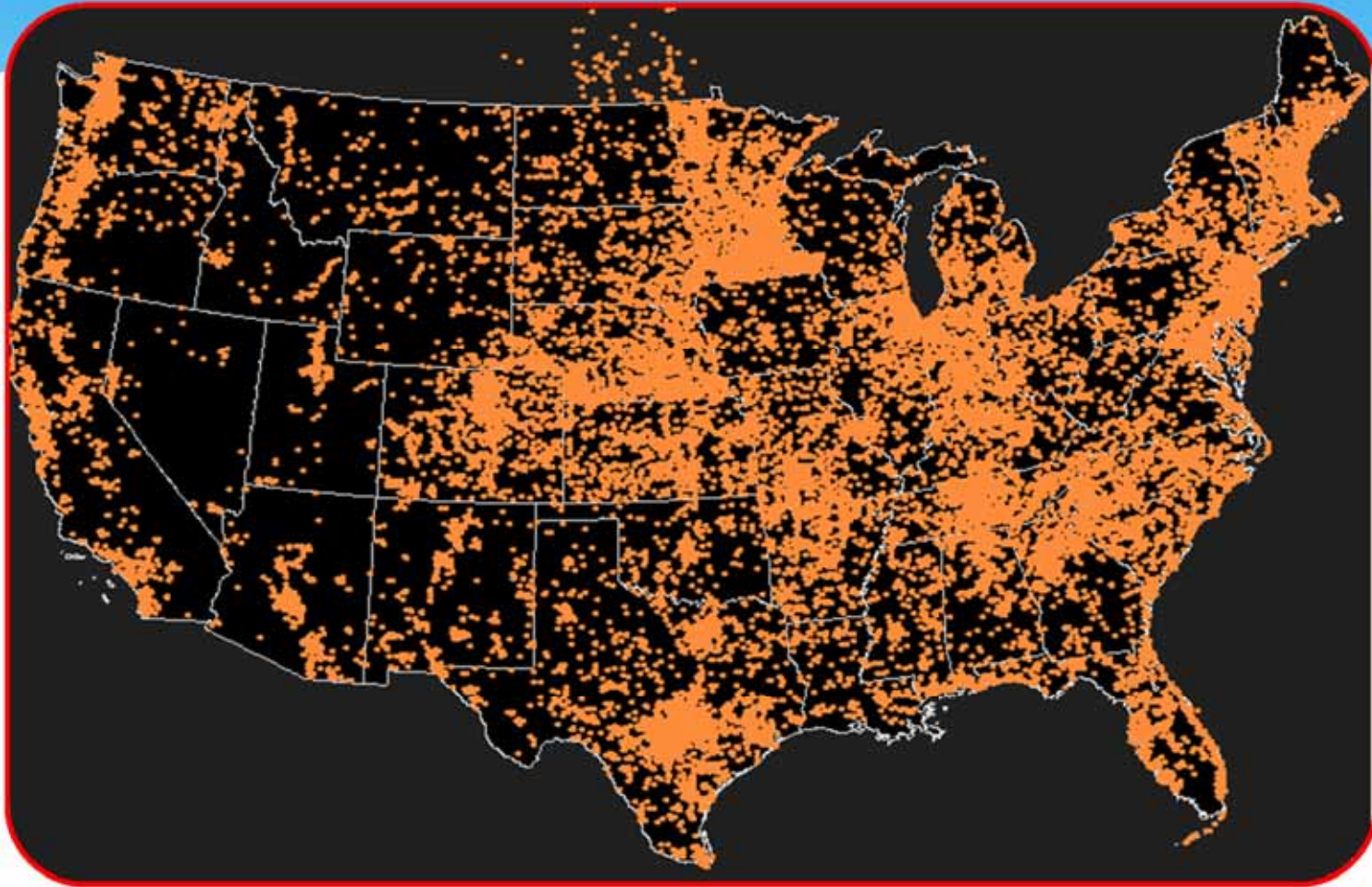
Where: The Fort Collins Flood



Lack of data points in the area resulted in missed lifesaving warnings as forecasters were unaware of the localized intense rainfall and thus, were surprised by the flash flooding. This event helped point out the need for volunteers to report weather events, track rainfall patterns, help scientists, and monitor water resources.

CoCoRaHS was established in 1998 by Colorado State University in response to the Fort Collins Flooding event. In the years since, CoCoRaHS now includes thousands of volunteers nationwide.

Where: CoCoRaHS Locations



Who uses CoCoRaHS data?

- * Meteorologists and Hydrologists
- * Emergency Managers
- * City utilities (such as water supply companies)
- * Insurance Companies
- * Researchers
- * Farmers
- * Teachers
 - * Etc...

... People in your own Community!

Who:

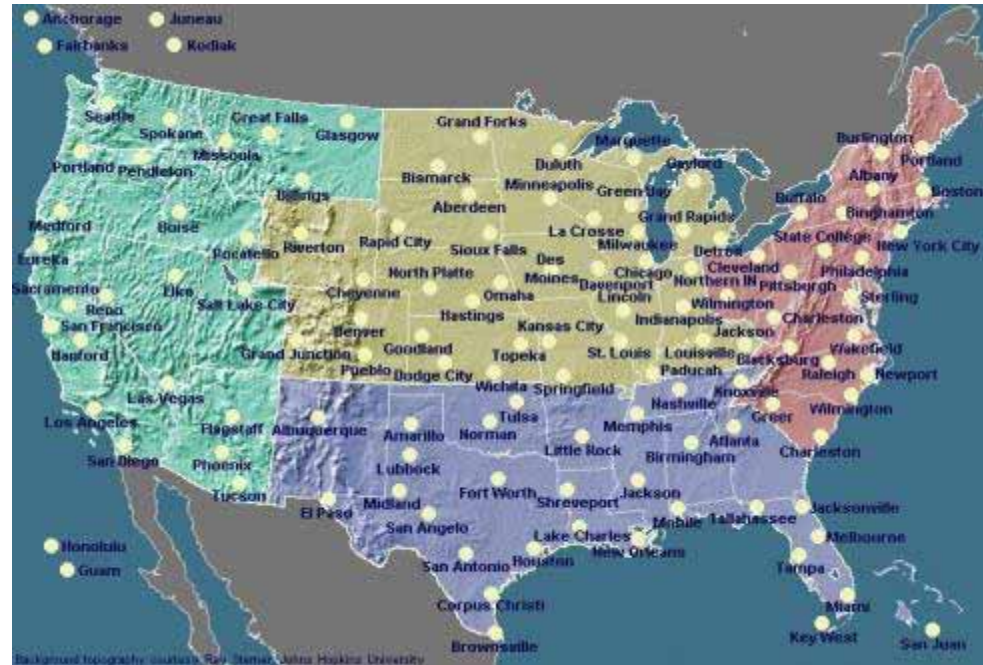
The National Weather Service





The National Weather Service is responsible for issuing forecasts and warnings for the protection of life and property and the enhancement of the national economy.

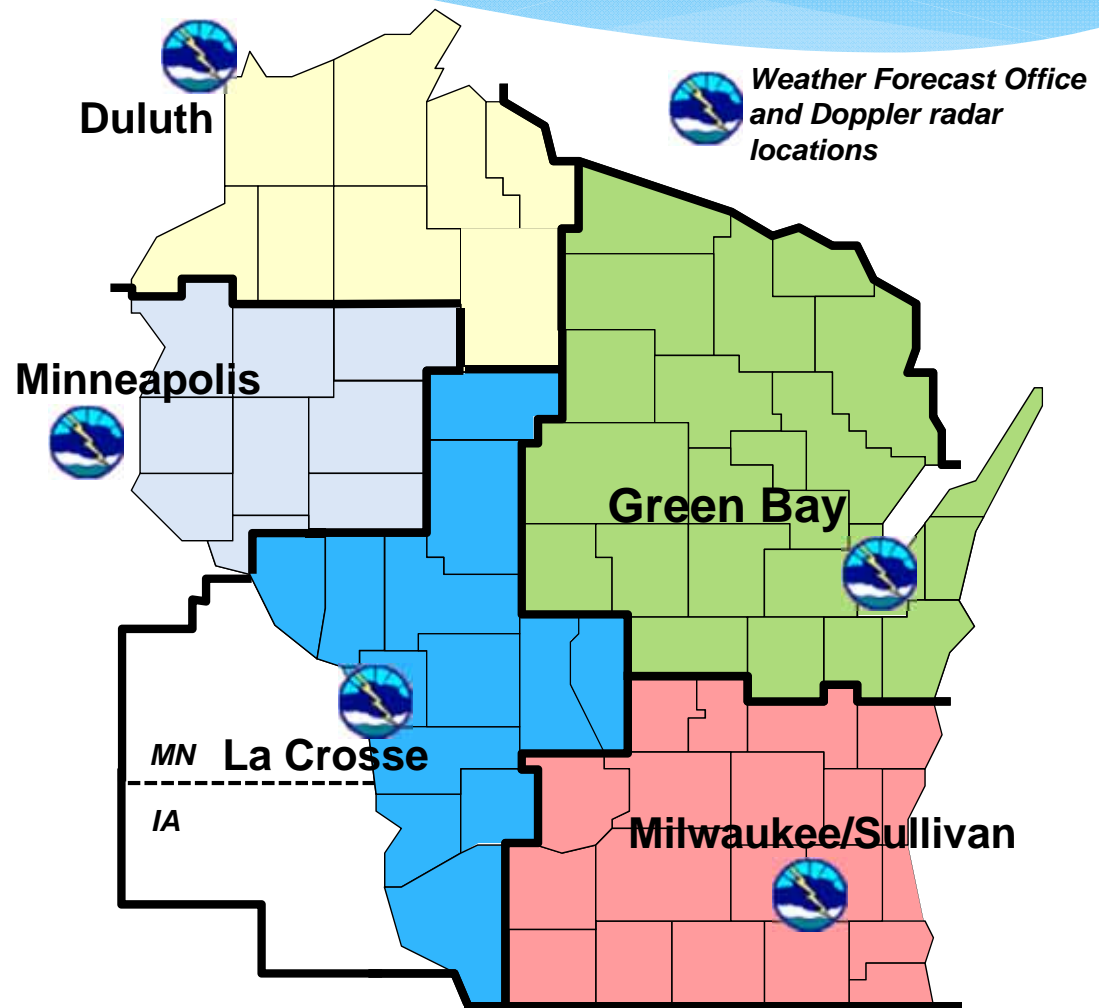
There are 122 NWS Weather Forecast Offices across the country, including offices in Puerto Rico and Guam.



NWS in Wisconsin

Five offices serve 72 counties, rivers, and marine areas of Wisconsin.

Each office has a Doppler radar, which gives meteorologists a unique view of storms.



The Office in Green Bay

Meteorologists are on duty 24 hours a day, monitoring the weather for 22 counties in northeast Wisconsin including the bay and nearshore waters of Lake Michigan.



Inside the NWS - The Staff



Our NWS Office:

Meteorologist in Charge
Warning Coordination Met.
Electronic Systems Analyst
9 Forecasters
2 Electronics Techs

Admin Assistant
Science and Training Met.
Observations Program Leader
4 Forecaster Assistants
Information Technology Officer



Inside the NWS - What We Do

Weather Observations:

- Surface
- Upper Air



Types of Forecasts:

- Public
- Aviation
- Marine
- Severe Weather
- Hydrologic
- Fire Weather



Other Activities:

- Public Outreach
- Research



CoCoRaHS reports are used often by NWS meteorologists to provide additional information in data-sparse areas or during highly variable events (such as snow).

CoCoRaHS reports are also used for research purposes, storm reports and warnings, and are even included in short term weather models.

In general: we NEVER can have too many observations! If you have one, we will take it!



3 inches of snow in the past hour? That's significant, thank you so much for the report!

Who can be a CoCoRaHS observer?



ANYONE!

As long as you have an interest in weather and about 5 minutes in the morning, YOU could be the next CoCoRaHS reporter.

- General Public
- Schools
- 4H
- Botanical Gardens
- Farmers and Ranchers





**Necessary Equipment:
Everything needed to be a
Precipitation Reporter**

Necessary Equipment

- 4 inch Rain Gauge
 - A place to mount the gauge



Necessary Equipment

- 4 inch Rain Gauge
 - A place to mount the gauge
 - Snowboard (Weighted white piece of plywood)
 - A marker so you don't lose your snowboard in the snow

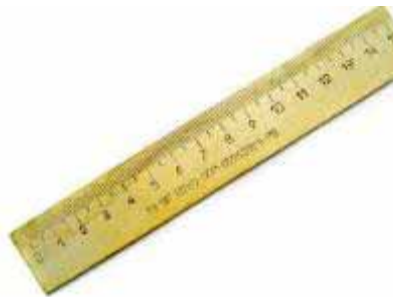


Necessary Equipment

- 4 inch Rain Gauge
 - A place to mount the gauge
 - Snowboard
 - A marker so you don't lose your snowboard in the snow



- Yard stick or ruler for snow and hail measuring



Now you have all the tools you need to be a volunteer precipitation reporter!

Necessary Equipment

Q: I already have an automatic rain gauge, can I use this to report precipitation?





A: The 4inch, non-automatic gauge is required. The Colorado Climate Center has been involved in rain gauge studies for many years to determine the best practices for accurate weather observations, and research has shown that the automatic rain gauge can be up to 25% inaccurate. Furthermore, the automatic gauge had problems measuring snowfall.

If we're all using different kinds of gauges with different abilities to catch precipitation, it's too hard to determine if differences in rain or snowfall are "real" or due to the kind of instrument that was used to report the measurement.

For climate data and research applications, as well as supporting the "NowCasting" goals of NOAA, we encourage you to use the 4" diameter high capacity manual rain gauge for CoCoRaHS.



Reporting for CoCoRaHS

Rain <i>24-hour Total</i>	Snow <i>24-hour Total, Depth</i>	Hail <i>Size</i>	“Significant Weather”
			

Report these elements every morning around 7AM

Report these elements **AS SOON** as possible after they occur!

Ways to report:

My Data Entry : Daily Precipitation Report Form

Precipitation Report Form

Station Number : CO-LR-610
Station Name : Fort Collins 3.5 SW

* Denotes Required Field

4/24/2009 *Observation Date
7:00 AM *Observation Time
0.59 *Rain and Melted Snow to the nearest hundredth inch that has fallen in the gauge during the past 24 hours
 Yes No Report was taken at registered location?

Observation Notes: (This will be available to the public)
Heavy rain last evening. Several tree branches snapped off due to high winds. We sure needed that rain!

New Snowfall

Accumulation of new snow in inches to the nearest tenth
 Melted value from core to the nearest hundredth

Total Snow and Ice on Ground at Observation Time

Depth of total snow and ice (new and old) in inches to the nearest half inch
 Melted value from core to the nearest hundredth

Remarks are not required but are welcome. Allows you to input any weather information you would like to include!

Winds?
Snow and Rain Mix?
Thunderstorm Yesterday?
Fog occurring?

Online forms

Ways to report:

My Data Entry : Daily Precipitation Report Form

Precipitation Report Form

Station Number : CO-LR-610

Station Name : Fort Collins 3.5 SW

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4/24/2009 *Observation Date

7:00 AM *Observation Time

0.59 *Rain and Melted Snow to the nearest hundredth inch th gauge during the past 24 hours

Yes No Report was taken at registered location?

Observation Notes: (This will be available to the public)

Heavy rain last evening. Several tree branches snapp off due to high winds. We sure needed that rain!

New Snowfall

NA Accumulation of new snow in inches to the nearest tenth

NA Melted value from core to the nearest hundredth

Total Snow and Ice on Ground at Observation Time

NA Depth of total snow and ice (new and old) in inches to th

NA Melted value from core to the nearest hundredth

Online forms

CoCoRaHS SIGNIFICANT WEATHER REPORT

(09/2012)

Station No.: _____ Station Name: _____

Observation Date: _____ Observation Time: _____ AM PM

Time duration that the report covers _____ Minutes. Just type an "X" for AM or PM, to fill it in.

RAIN:

_____ New Rain and Melted Snow that has fallen during the report duration, in inches to the nearest hundredth.

_____ Total Precipitation, rain and melted snow, since storm began, in inches to the nearest hundredth.

SNOW:

_____ Depth of New Snow that has fallen during the report duration, in inches to the nearest tenth.

_____ Total depth of snow and ice on ground at the time of this observation to nearest half inch.

Additional Information:

Report was taken at registered location? ___ Yes ___ No

Was There Flooding? ___ Yes ___ No

If Yes, how severe?

___ Minor (typical). Street or field flooding.

___ Unusual street or field flooding (only see this every few years)

___ Severe Flooding

___ Extreme (never seen it this bad before)

Just type an "X" for Yes or No, to fill it in.

Just type an "X" for how severe the flooding was.

Observation Notes (This will be available to the public)

Ways to report:

My Data Entry : Daily Precipita

Precipitation Report Form

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* Denotes Required

4/24/2009 *Observation Date
 7:00 AM *Observation Time
 0.59 *Rain and Melted gauge during the
 Yes No Report was taken

Observation Notes: (This will be available to
 Heavy rain last off due to high

New Snowfall

NA Accumulation of
 NA Melted value from
 Total Snow and Ice on Ground at Obser
 NA Depth of total sn
 NA Melted value from

Online forms

My Data Entry : Hail Report Form

Hail Report Form (09/2012) Submit Data Reset

Station Number : CO-LR-610
 Station Name : Fort Collins 3.5 SW

* Denotes Required Field

12/17/2009 *Date of Hail Storm ?
 4:55 PM Time Hail Storm Began ?

Yes No Report was taken at registered location?

Size of hailstones

Smallest: Rice
 Average: 1" Quarter Size
 Largest: 1 3/4" Golf Ball Size

Hail Lasted
 10 Minutes This time is accurate within 1 min.

Hailfall was: Continuous Intermittent

Hailstones were:
 (Check all that apply)
 Hard Soft Mixed (Hard & Soft) Clear Ice White Ice

Was there more rain than hail? Yes No

Hail Started:
 Before rain After rain Same time as rain

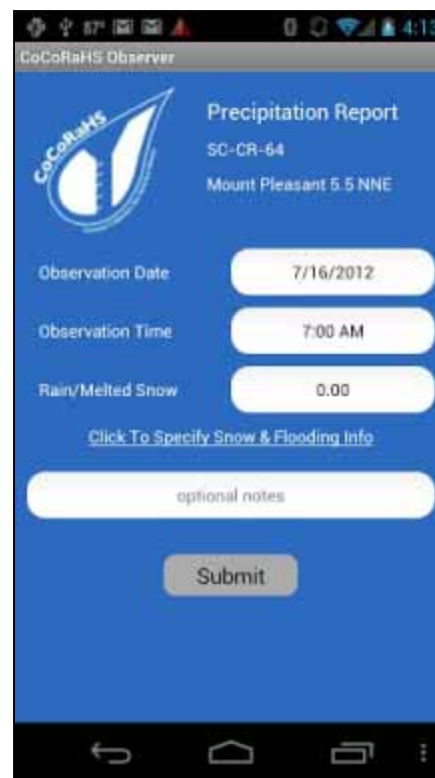
Largest Hail Started
 Before smaller hail After smaller hail Same time as smaller hail

REPORT

AM PM
 it type an "X" for
 l or PM, to fill it in.

ie report
 m began, in
 t duration, in
 f this
 t type an "X" for
 s or No, to fill it in.
 t type an "X" for
 v severe the
 xing was.

Ways to report... on the Go!



The screenshot displays the CoCoRaHS Observer mobile application interface. At the top, the status bar shows the time as 4:13. The app title is "CoCoRaHS Observer". The main header features the CoCoRaHS logo on the left and the text "Precipitation Report" on the right. Below the header, the station information is displayed: "SC-CR-64" and "Mount Pleasant 5.5 NNE". The form contains three input fields: "Observation Date" with the value "7/16/2012", "Observation Time" with the value "7:00 AM", and "Rain/Melted Snow" with the value "0.00". A link labeled "Click To Specify Snow & Flooding Info" is positioned below these fields. A text input field for "optional notes" is located at the bottom of the form, followed by a "Submit" button. The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps icons.

Mobile app!

Reporting for CoCoRaHS: Common Mistakes



Mistake #1: Gauge Sighting



Mistake #1: Gauge Sighting



Placing your gauge under a tree will block falling precipitation, resulting in lower precipitation than what really fell



Putting your gauge next to your house will also block falling precipitation, especially wind driven snow



Sighting your gauge on a solid fence will cause lower or higher amounts

Examples of Good Gauge Sighting



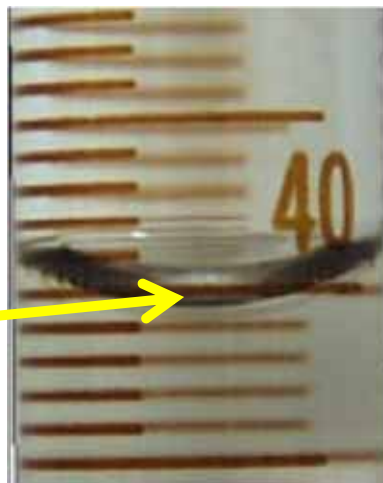
Mistake #2: Measuring

- Measure rainfall to the nearest hundredth and don't round! If you have 0.57" of new rain, report the exact measurement and not 0.6"
- 0.0" counts as a report. We want to know where it DIDN'T rain in addition to where it did. So don't forget to report your zeros!
- The dreaded meniscus:

Mistake #2: Measuring

- Measure rainfall to the nearest hundredth and don't round! If you have 0.57" of new rain, report the exact measurement and not 0.6"
- 0.0" counts as a report. We want to know where it DIDN'T rain in addition to where it did. So don't forget to report your zeros!
- The dreaded meniscus:

Read the measurement at the **BOTTOM** of the meniscus curve



As water fills up the measuring tube, a curved surface is formed called a meniscus. It is formed by the surface tension of a liquid in contact with the sides of the tube.

Mistake #3: Snow depth \neq New snow

Snow Depth: The measurement of snow that is on the ground, new and old



Snow DEPTH

New Snow: The amount of that fell in the past 24 hours on your snowboard



NEW snow

Mistake #4: Measuring snow in windy conditions

Windy conditions may create a situation where the amount of snow in the gauge or on the board is not representative of what fell on the ground (blowing and drifting)

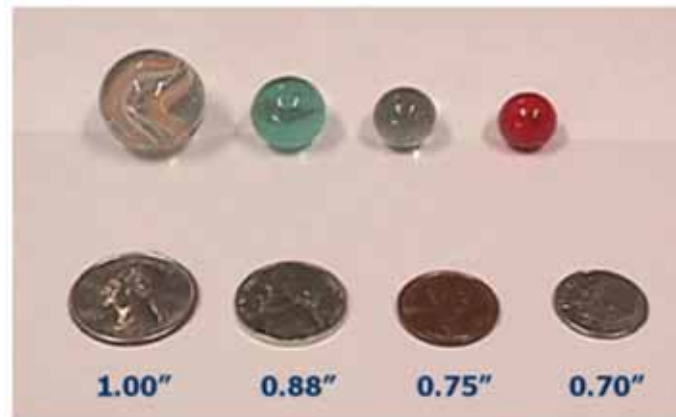


What you measure here...

...is going to be different than what measure here!

Best way to deal with this is to take numerous snow measurements in the area and report the average.

Mistake #5: Marble Size Hail



Marbles come in various sizes and is non-specific when reporting hail. Try instead to compare the size to a coin or ball (IE: golf ball, softball)

Concepts in Severe Storm Spotting

2013

NOAA National Weather Service
Green Bay
www.weather.gov/grb



Building a Weather-Ready Wisconsin

Mistake #6: “I Need to report EVERY morning to be an observer”

FALSE!

If you cant report every day, you can still sign up to be part of the CoCoRaHS network. As we said before, we can never have enough observations, so its okay if you don't have time every morning... WE'LL TAKE IT!

Reporting for CoCoRaHS: Common Mistakes



Through proper training, avoiding common mistakes, and using your best judgment, it is easy to report accurate observations!



Okay, Sign me up!
(How to Join)

www.cocorahs.org

Slideshows and videos are available online for free to train you how to take accurate rain, snow, and hail measurement

CoCoRaHS COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK
"Because every drop counts"

Home | States | View Data | Maps | My Data | My Account | Admin | Logout

Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nation."

6,523 daily precipitation reports received today as of 11/8/2011 2:35 PM EST

Daily Precipitation (inches x.xx) USA 11/8/2011

Trace
0.00 - 0.31
0.32 - 0.62
0.63 - 1.55
1.56 - 3.72
3.73 - 5.59
5.59 - 8.20

Main Menu

- Home
- About Us
- Join CoCoRaHS
- Contact Us
- Donate

Resources

- [FAQ / Help](#)
- [Education](#)
- [Training Slide-Shows](#)
- [Videos](#)
- [Drought Impacts](#)
- [Volunteer Coordinators](#)
- [Hail Pad Distribution/Drop-off](#)
- [Help Needed](#)
- [Printable Forms](#)
- [The Catch](#)
- [Message of the Day](#)
- [Data Analysis](#)
- [CoCoRaHS Blog](#)
- [Web Groups](#)
- [State Newsletters](#)
- [Master Gardener Guide](#)
- [State Climate Series](#)
- [Sponsors](#)
- [Links](#)
- [CoCoRaHS Store](#)

Things to know about...

- **Rain**
- **Hail**
- **Snow**

Purchase an official CoCoRaHS 4" Rain Gauge
"The official CoCoRaHS Rain Gauge supplier"

WEATHERYOURWAY.COM

Fast, Friendly service from a meteorologist and fellow CoCoRaHS Observer

www.cocorahs.org

The screenshot displays the CoCoRaHS website interface. At the top, the logo features a stylized water drop with a rain gauge inside, labeled 'CoCoRaHS'. To its right, the text reads 'COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK' with the tagline 'Because every drop counts'. Below this is a navigation bar with links for 'Home | States | View Data | Maps' and 'My Data Entry | Login', along with social media icons for YouTube, Facebook, and Twitter.

The main content area is titled 'Training Slide Shows' and includes the instruction: 'Click on one of the CoCoRaHS Training Slide-Shows below to view as HTML or download as PDF.' There are four thumbnail images for training materials:

- GETTING STARTED**: A thumbnail showing a rain gauge in a field under a cloudy sky. Below it are links for [HTML](#) and [PDF](#).
- "IN DEPTH" SNOW MEASURING**: A thumbnail showing a snowy landscape with trees. Below it are links for [HTML](#) and [PDF](#).
- ICE ACCRETION**: A thumbnail showing a rain gauge with ice buildup. Below it are links for [HTML](#) and [PDF](#).
- MEASURING THE WATER CONTENT OF SNOW BY WEIGHT**: A thumbnail showing a person measuring snow in a container on a scale. Below it are links for [HTML](#) and [PDF](#).

On the left side of the page, there is a 'Main Menu' and 'Resources' sidebar. The 'Main Menu' includes links for Home, About Us, Join CoCoRaHS, Contact Us, and Donate. The 'Resources' section is divided into several categories:

- FAQ / Help**: Education, Training Slide-Shows, Videos, Drought Impacts, Evapotranspiration.
- Volunteer Coordinators**: Hail Pad, Distribution/Drop-off, Help Needed, Printable Forms.
- Other Resources**: The Catch, Message of the Day, Data Analysis, CoCoRaHS Blog, Web Groups, State Newsletters, Master Gardener Guide, March Madness Contest, State Climate Report.

www.cocorahs.org

Purchase your 4inch rain gauge if you do not already have one

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JOIN CoCoRaHS

TRAINING SLIDE-SHOWS

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After you have completed the training and have your equipment, you are ready to join the CoCoRaHS network!

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After filling out the online application, your state or local coordinator will contact you with further information and your station ID... and you are ready to report!

www.cocorahs.org

Just sign in and submit your daily information

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In Summary...

- CoCoRaHS volunteers are essential to not only meteorologists and researchers, but members of your own community
 - Observations enhance the warning process, which could save lives
 - Helps farmers and ranchers, which could save valuable crops and cattle
 - Future research involving your observations may aid in projects in your town (such as wind farms, water supply, etc..)
- After purchasing a 4inch rain gauge and completing some online training, you are ready to report precipitation observations
 - 24 rain and snowfall
 - Snow Depth
 - Hail
 - “Significant Weather”
- With training, experience, and using your best judgment... your morning observations will make a big impact!

Thank You!

We want to thank you in advance for any and all support you provide to the National Weather Service and our products. It is technology AND people makes the forecast and warning process successful!