

# VOLUNTEERS OBSERVING PRECIPITATION ACROSS NORTH AMERICA





## A short history of CoCoRaHS



# CoCoRaHS was born in response to the 1997 Fort Collins, Colorado Flood



**STORM TOLL**  
Deaths - 5 confirmed  
Injuries - 40  
Missing - 16  
Rescued - 160  
Damages - Tens of millions of dollars at Colorado State University, \$1.5 million to \$2 million to city roads and bridges; \$1 million to city parks and trails; no estimate for private property.

**Wednesday**  
**FORT COLLINS COLORADOAN**  
**City death toll at 5; damage in millions**  
I thought I was dead a few times  
CSU's book losses speak volumes  
Rainfall breaks 20-year record

**July 30th 1997**



# The flood pointed out:

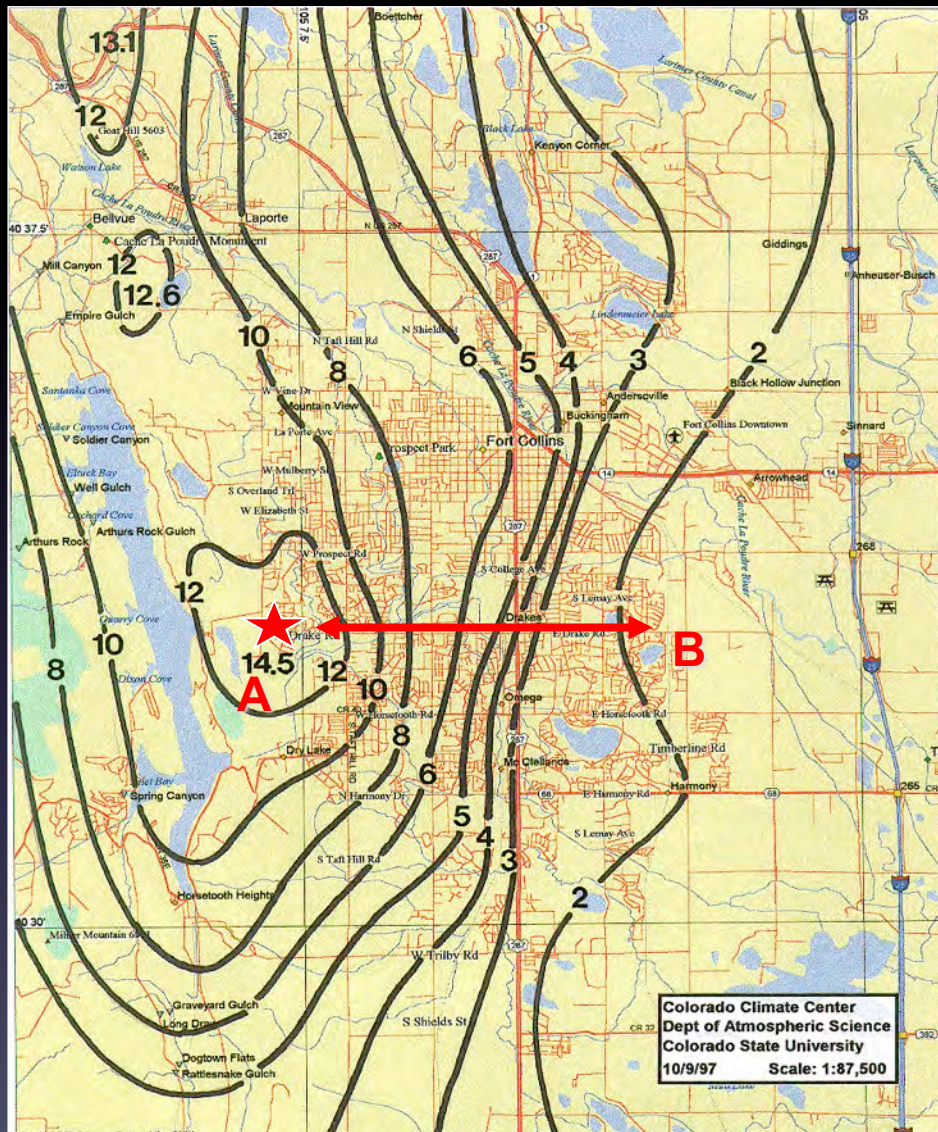


Figure 14. Rainfall (inches) for Fort Collins, Colorado, for 4:00 p.m. MDT  
July 27, 1997 through 11:00 p.m. MDT for July 28, 1997

1. The extreme local variations in rainfall possible from convective storms.

2. The important role individuals can play in measuring, mapping and reporting precipitation.

Distance between A and B = 5 miles  
(8 km)

A = 14.5 inches (368 mm)

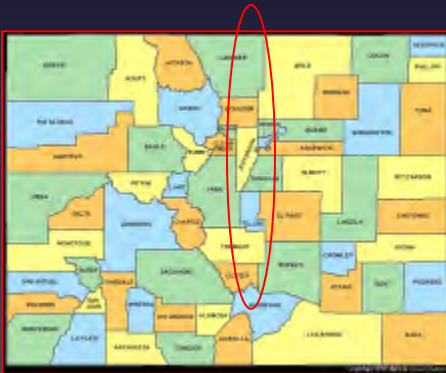
B = 2.0 inches (50.8 mm)



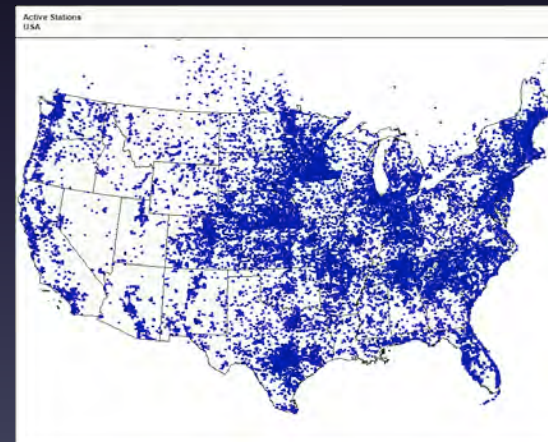
# 1998



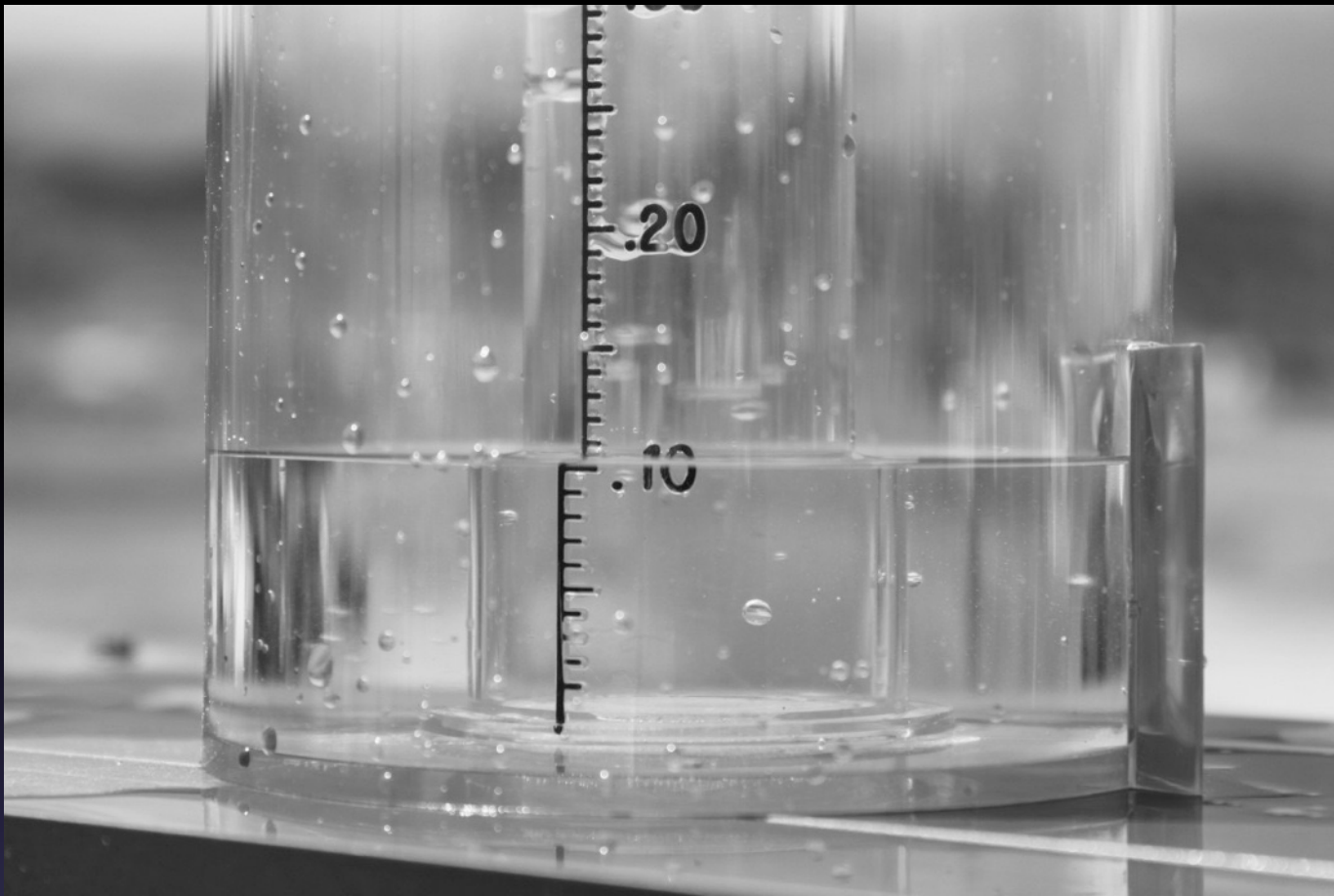
# Today



A few dozen volunteers  
in Northern Colorado



20,000+ volunteers in all  
50 states, Canada, Puerto Rico,  
the U.S. Virgin Islands and the Bahamas



CoCoRaHS' s goal is to provide:

*High Quality Precipitation Data  
and  
Educational Resources and Outreach*



# Rainfall data

CoCoRaHS has quickly become the largest source of daily precipitation measurements in the United States



# Snowfall data

CoCoRaHS Volunteers measure both snowfall depth (new and accumulated) as well as the water content of the snow (SWE)



# Hail data

CoCoRaHS has become one of the largest repositories of hail data in the United States

# The CoCoRaHS Website

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

Select Language ▼

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

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

**Main Menu**

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**What is your landscape's current CONDITION?**  
Tell us by submitting a "CoCoRaHS Condition Report"

**WET?  
NORMAL?  
DRY?**

Reports received today 7/18/2018 as of 12:36 PM EDT

| Daily | Multi-day | SigWx | Hail | Condition | ET  |
|-------|-----------|-------|------|-----------|-----|
| 8,710 | 81        | 0     | 0    | 16        | 117 |

Daily Precipitation (inches x.xx)  
USA  
7/18/2018

Canada

**JOIN COCORAHHS**

**TRAINING SLIDE-SHOWS**

**Things to know about...**

- Rain
- Hail
- Snow

Download on the App Store

ANDROID APP ON Google Play

**CoCoRaHS WxTalk Webinar Series**

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

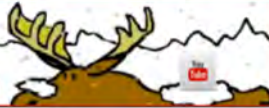
**AMBASSADOR™ WRN**  
WEATHER-READY NATION

**NOAA**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
U.S. DEPARTMENT OF COMMERCE

www.cocorahs.org



**Watch the**  **CoCoRaHS Canada Intro Video**



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## About CoCoRaHS Canada

## Program Coordinators

## Testimonials

## Supporters

Français



facebook

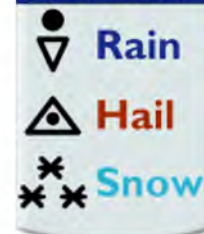
JOIN  
CoCoRAHS

[Shop CoCoRaHS](#)



**DONATE**  
To Help Support  
**CoCoRaHS** 

### Things to know about...



What is your landscape's current  
**CONDITION?**  
Tell us by submitting a "CoCoRaHS Condition Report!"

WET?  
NORMAL?  
DRY?



**Send us your Pictures & Comments Via Facebook or Twitter**



[www.facebook.com/CoCoRaHS-Canada](http://www.facebook.com/CoCoRaHS-Canada)



<https://twitter.com/CoCoRaHSCanada>

[CoCoRaHS Canada Brochure](#) 

**Are you enthusiastic about watching and reporting weather?**

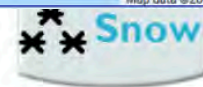
**Do you want to learn more about how weather impacts our lives and the environment?**

**Then CoCoRaHS Canada is for YOU!**



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[View the CoCoRaHS Bahamas P](#)



## Welcome to CoCoRaHS Bahamas!

The *Bahamas Family Islands* are delighted to be participating in the growing CoCoRaHS network. In collaboration with the Bahamas Department of Meteorology, Bahamas CoCoRaHS observers provide important information about rainfall that is used by meteorologists, hydrologists, farmers, water resource managers, environmental health, NEMA, as well as your friends and neighbors. This effort in the Bahamas is especially important given the great variation in rainfall across the islands (sometimes only blocks apart) from Grand Bahama to Great Inagua.



# Simple, easy-to-handle low cost equipment



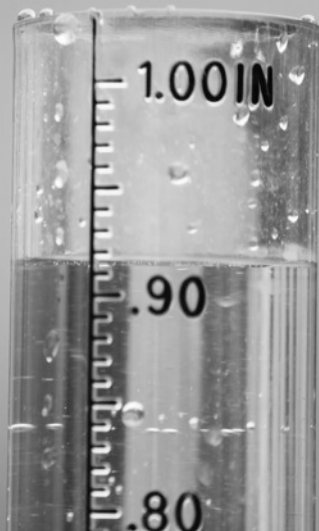
(the maintenance is not in the equipment, but in the volunteers!)



All observers use the same gauge

The 10.2 cm (4") diameter high-capacity plastic rain gauge

Cost approximately  
\$35.00 (U.S.)



Gauge measures to 0.2 mm (0.01").  
Holds 260 mm (11.30") of precipitation.

Volunteer observers report daily  
at ~7:00 AM local time



Observations can be recorded in millimeters or inches

# Observer entry forms for reporting daily observations



The CoCoRaHS App

**My Data Entry : Daily Precipitation Report Form**

**Precipitation Report Form** [Submit Data](#) [Reset](#)

Station Number : CO-LR-610

Station Name : Fort Collins 3.5 SW

\* Denotes Required Field

8/16/2011 \* **Observation Date** ?

7:00 AM \* **Observation Time** ?

1.09 \* **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 thunderstorms overnight. Intense lightning and gusty winds. Many tree branches fallen in my backyard.

**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 the nearest half inch** ?

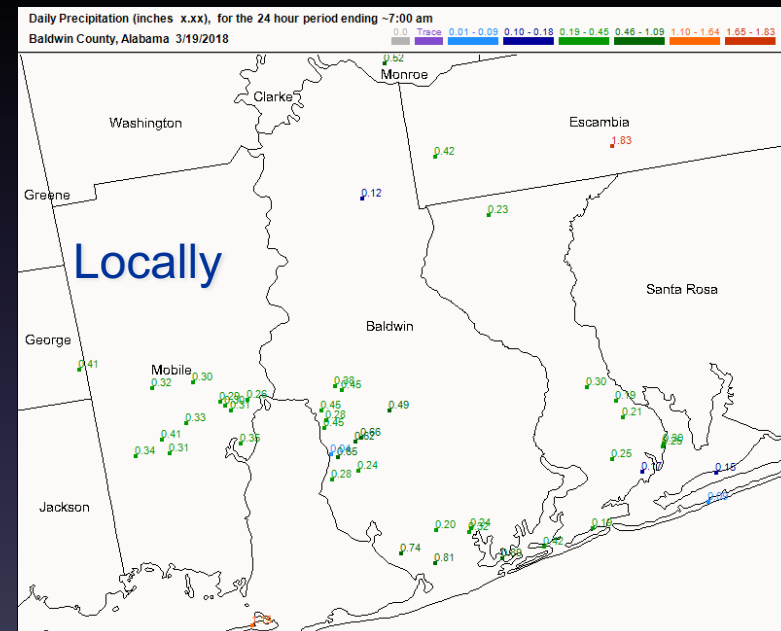
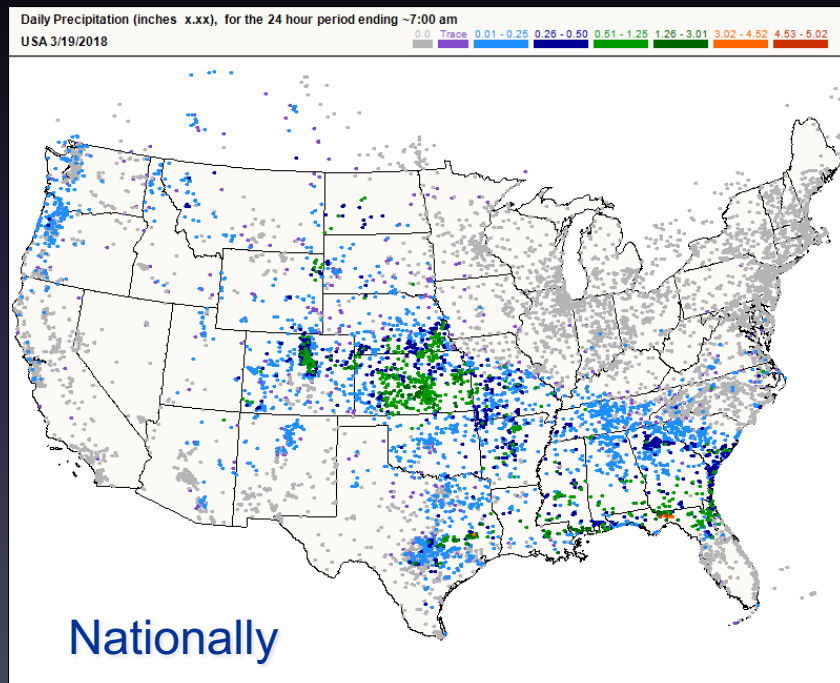
NA **Melted value from core to the nearest hundredth** ?

**Duration Information**

On-line form



| Date      | Time    | Station Number | Station Name     | Total Precip In. ▲ | New Snow In. ❄️💧 | Total Snow In. ❄️💧 | State | County  | View | 🗺️ Maps                                       |
|-----------|---------|----------------|------------------|--------------------|------------------|--------------------|-------|---------|------|---|
| 3/17/2018 | 7:00 AM | AL-BW-3        | Daphne 1.2 NNW   | 0.65               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 7:00 AM | AL-BW-36       | Daphne 4.2 NE    | 0.62               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 6:26 AM | AL-BW-4        | Daphne 0.4 SW    | 0.56               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 6:50 AM | AL-BW-26       | Loxley 0.4 SSW   | 0.48               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 7:30 AM | AL-BW-60       | Daphne 1.5 SSW   | 0.48               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 7:00 AM | AL-BW-1        | Fairhope 2.3 N   | 0.46               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 7:00 AM | AL-BW-13       | Fairhope 3.7 NNW | 0.45               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |
| 3/17/2018 | 7:00 AM | AL-BW-40       | Fairhope 1.5 WSW | 0.45               | NA   NA          | NA   NA            | AL    | Baldwin |      | <a href="#">Classic</a>   <a href="#">New</a> |

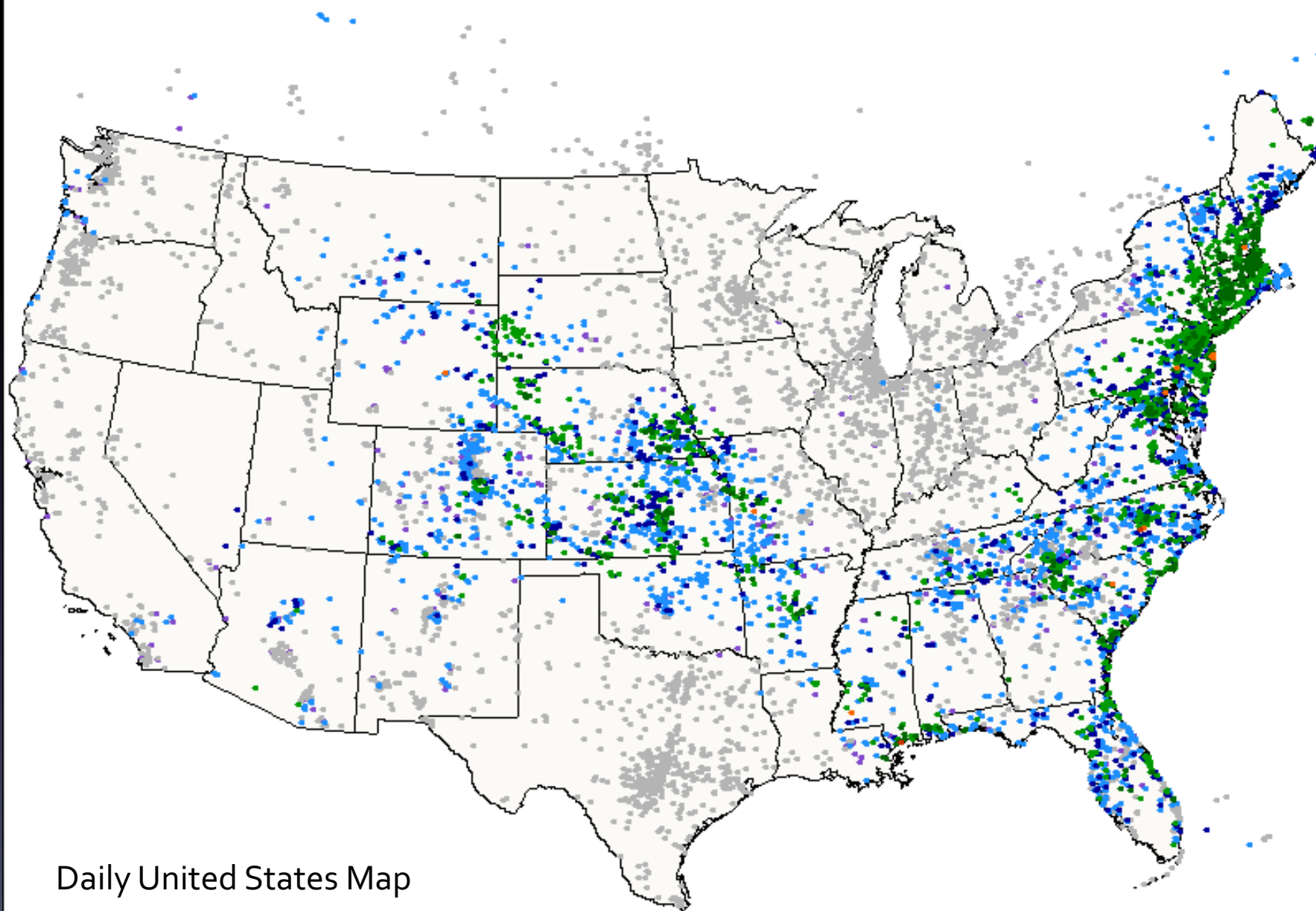


Volunteer's observations are immediately available in **map** and **table** form for the public to view.

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 7/18/2018

0.0 Trace 0.01 - 0.29 0.30 - 0.58 0.59 - 1.45 1.46 - 3.48 3.49 - 5.22 5.23 - 5.79



Daily United States Map

A dense network of observers across the country

# Volunteers data are permanently archived and available in a variety of summary reports

CoCoRaHS data archived daily in NOAA/NCEI's **GHCN-D** (Global Historical Climate Network)



## Wyoming 2017 CoCoRaHS Water Year Summary



[Download the Wyoming 2017 water year summary report as an Excel file with station totals](#)

| Station Number | Station Name       | Days Covered By All Reports | Total Pcpn | Daily Reports | Multiday Reports | Display Options      |                        |                       |
|----------------|--------------------|-----------------------------|------------|---------------|------------------|----------------------|------------------------|-----------------------|
| Albany         |                    |                             |            |               |                  |                      |                        |                       |
| WY-AB-1        | Laramie .73 ENE    | 320                         | 9.11"      | 308           | 6                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-2        | Centennial 1.2 NNE | 130                         | 7.74"      | 100           | 6                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-5        | Laramie 1.3 SE     | 362                         | 11.08"     | 289           | 6                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-30       | Laramie 2.7 ESE    | 314                         | 10.02"     | 314           | 0                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-40       | Laramie 17.1 WNW   | 5                           | 0.00"      | 5             | 0                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-42       | Laramie 8.7 S      | 203                         | 4.71"      | 203           | 0                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-45       | Laramie 1.7 N      | 363                         | 8.51"      | 296           | 9                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-47       | Laramie 2.4 W      | 318                         | 9.12"      | 313           | 1                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-48       | Laramie 0.8 N      | 364                         | 11.55"     | 326           | 10               | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-49       | Laramie 1.4 N      | 340                         | 9.73"      | 340           | 0                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-51       | Laramie 18.8 WSW   | 1                           | 1.50"      | 1             | 0                | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |
| WY-AB-52       | Laramie 1.4 NNE    | 360                         | 9.50"      | 285           | 20               | <a href="#">HTML</a> | <a href="#">Charts</a> | <a href="#">Excel</a> |

Water Year Summary –  
October 1st thru  
September 30th





## 2017 CoCoRaHS Water Year Summary for Station WY-SW-30

|                |                      |           |           |
|----------------|----------------------|-----------|-----------|
| Station Number | WY-SW-30             | Latitude  | 41.6535   |
| Station Name   | Rock Springs 4.4 NNW | Longitude | -109.2645 |
| County         | Sweetwater           | Elevation | 6498 feet |

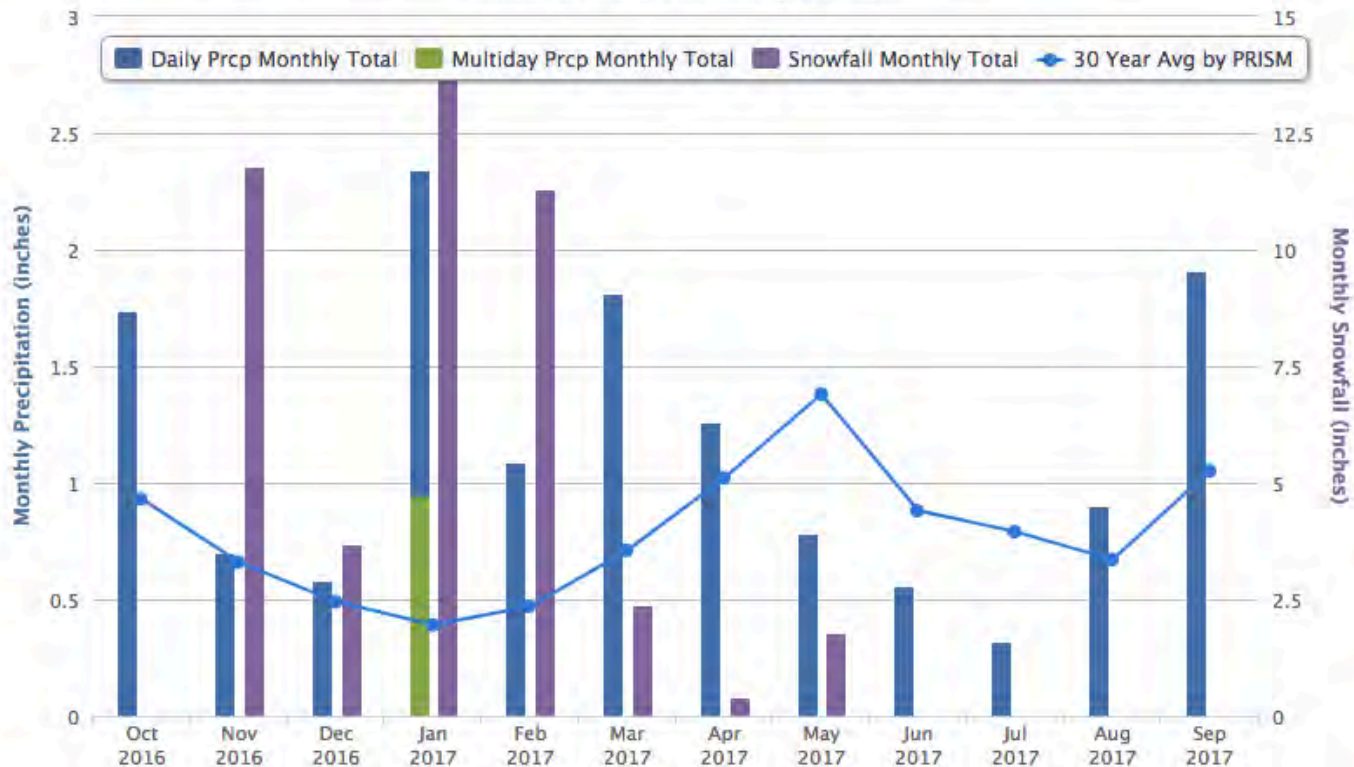
### Monthly Prcp Totals Chart

### Accumulated Prcp Chart

### Daily Prcp Chart

### Monthly Precipitation for the 2017 Water Year (Oct 2016 – Sept 2017)

Station: WY-SW-30 Rock Springs 4.4 NNW



Monthly Precipitation Totals



## 2017 CoCoRaHS Water Year Summary for Station WY-SW-30

|                |                      |           |           |
|----------------|----------------------|-----------|-----------|
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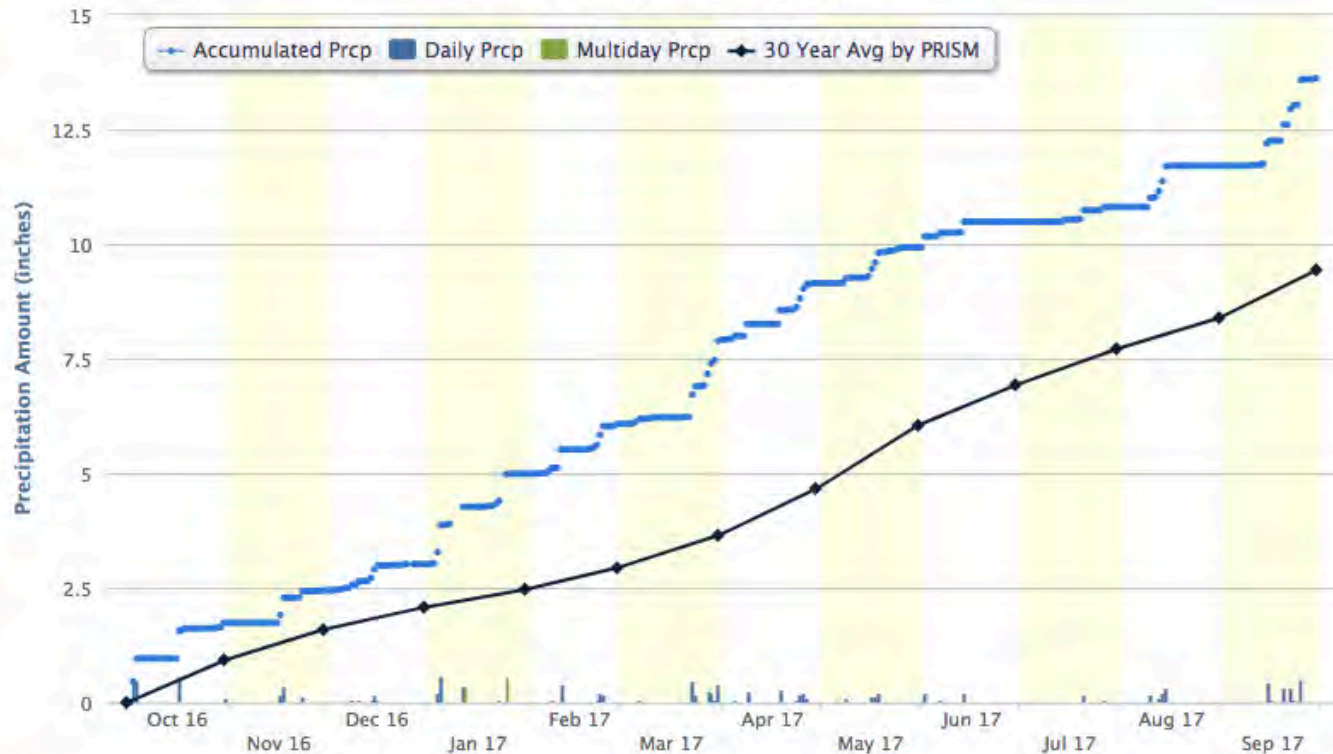
Monthly Prcp Totals Chart

Accumulated Prcp Chart

Daily Prcp Chart

### 2017 Water Year (Oct 2016 – Sept 2017) Accumulated Precipitation

Station: WY-SW-30 Rock Springs 4.4 NNW



Accumulated Precipitation



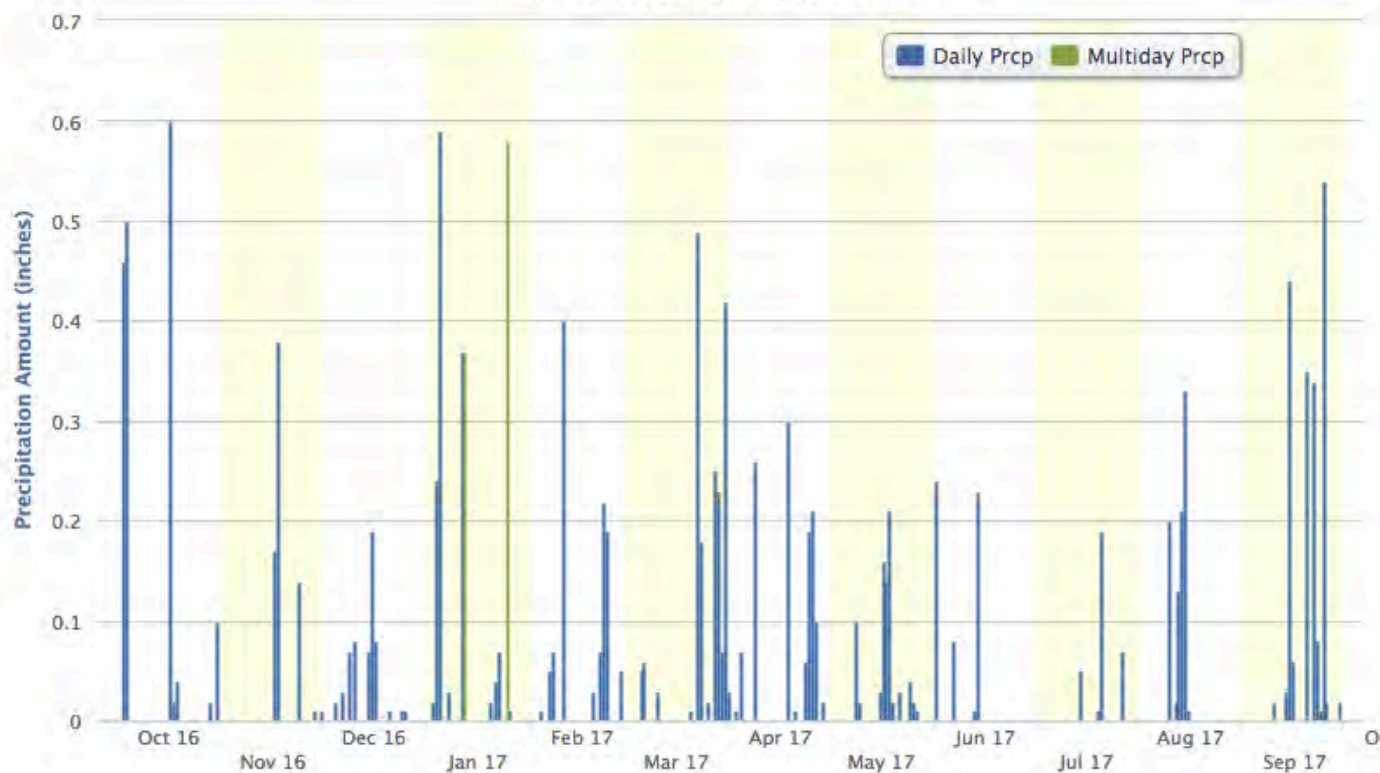
## 2017 CoCoRaHS Water Year Summary for Station WY-SW-30

|                |                      |           |           |
|----------------|----------------------|-----------|-----------|
| Station Number | WY-SW-30             | Latitude  | 41.6535   |
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| County         | Sweetwater           | Elevation | 6498 feet |

[Monthly Prcp Totals Chart](#)[Accumulated Prcp Chart](#)[Daily Prcp Chart](#)

### 2017 Water Year (Oct 2016 – Sept 2017) Daily Precipitation

Station: WY-SW-30 Rock Springs 4.4 NNW

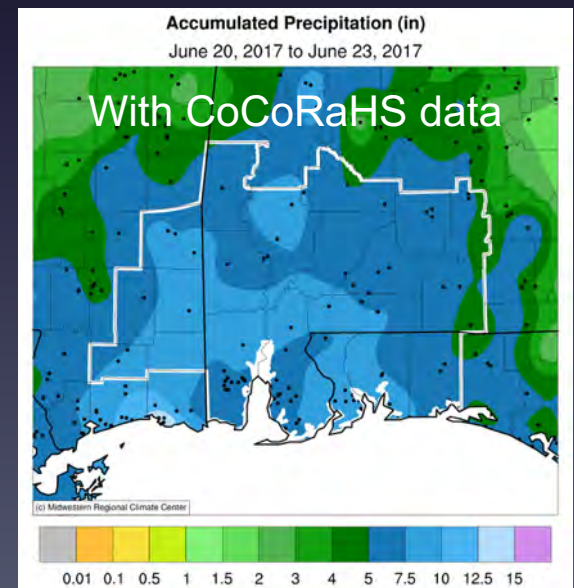
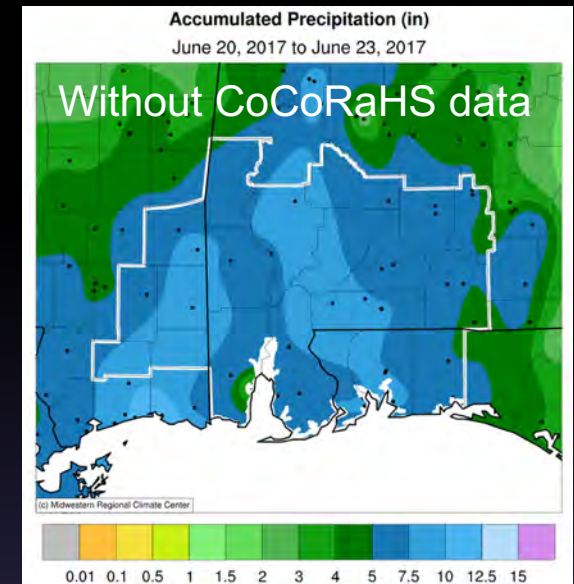
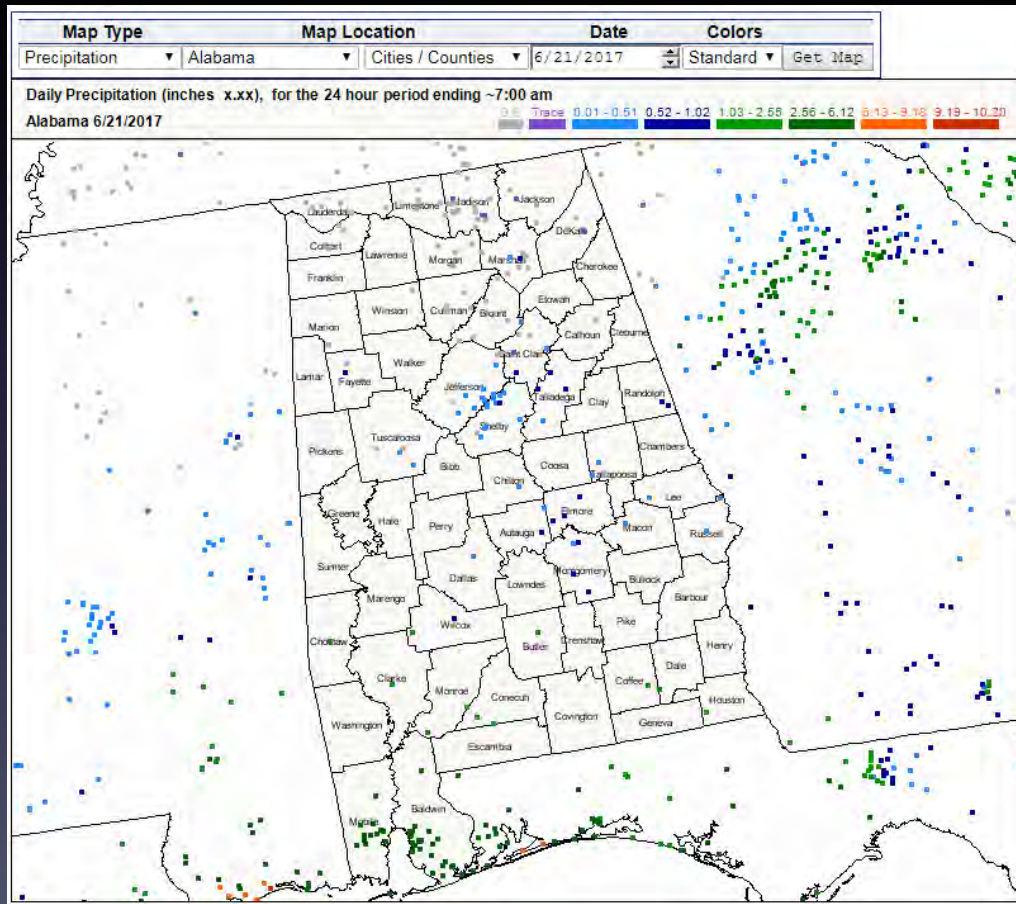


Daily Precipitation



# CoCoRaHS helps provide a finer mesh of data by supplementing other networks (like NWS COOP).

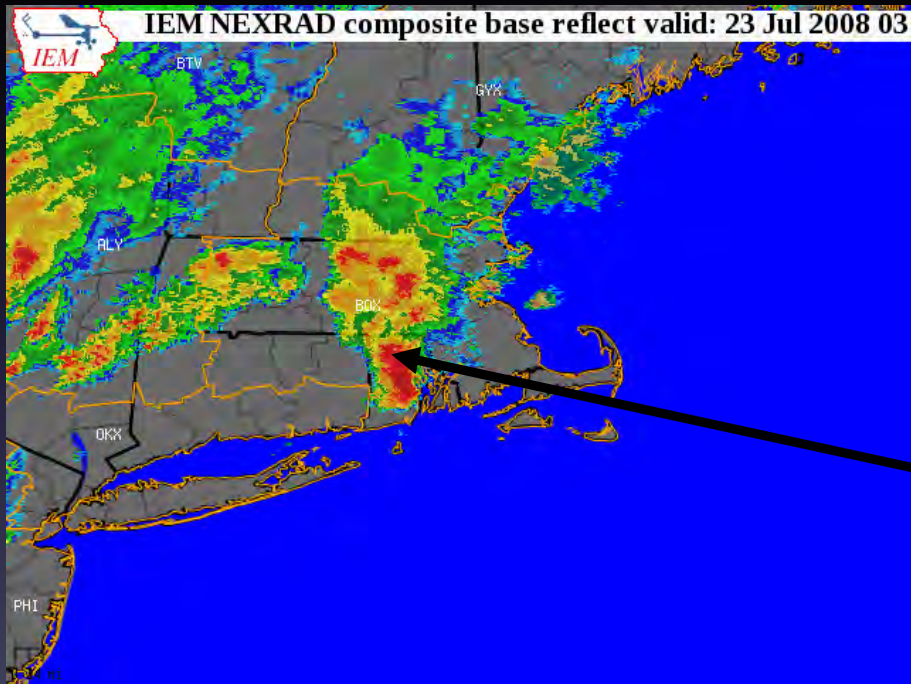
*“It’s like increasing the number of pixels on your digital camera. You get a much clearer picture!”*



# Significant Weather Reports

Sends an alarm to the National Weather Service

Advanced warning to the National Weather Service regarding potential flash flooding



## View Data : View Significant Weather Report

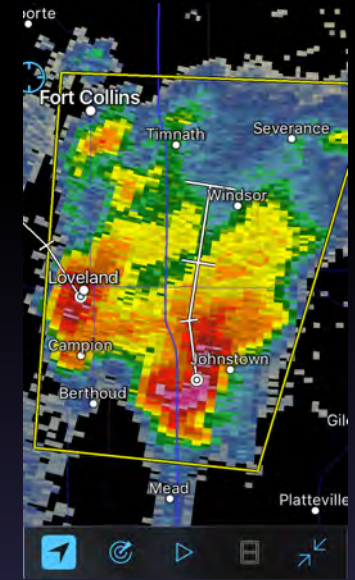
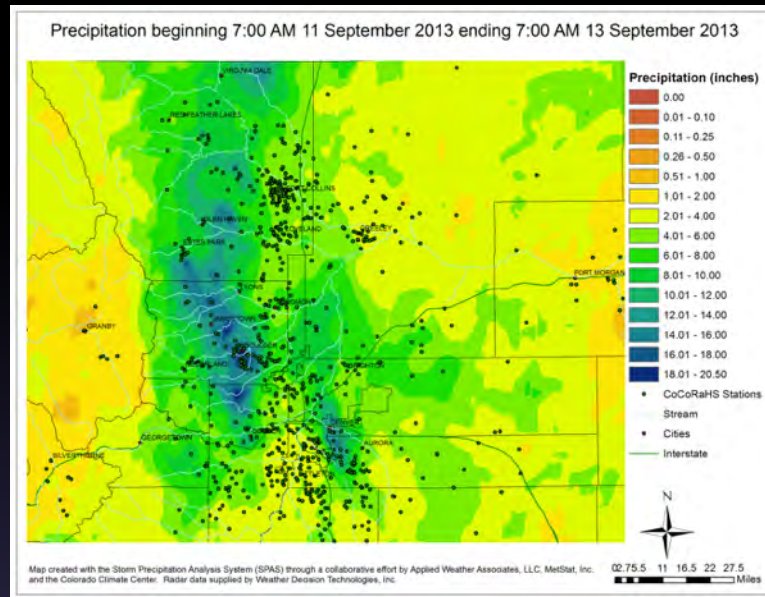
### Significant Weather Report

|                               |                   |
|-------------------------------|-------------------|
| Station Number:               | RI-WS-1           |
| Station Name:                 | Hope Valley 3.7 S |
| Date:                         | 7/23/2008 3:15 PM |
| Submitted                     | 7/23/2008 3:23 PM |
| Notes:                        |                   |
| Taken at Registered Location: | True              |
| Precip Duration Minutes:      | 15                |
| New Precip Amount:            | 1.00              |
| Total Precip Amount:          | NA                |
| New Snow Depth:               | NA                |
| Total Snow Depth:             | NA                |
| Flooding:                     | No                |

July 23, 2008 – A CoCoRaHS observer in Hope Valley, RI provided an intense rainfall report which *led to the issuance of a timely Flash Flood Warning*. Life threatening urban flooding was reported in Warwick and Providence at the start of the evening rush hour, where several cars were stranded in more than 2 feet of water, requiring people to be rescued. Lead time would have been much less without the CoCoRaHS report. - Joe Dellicarpini, NWS Taunton, MA



With the high variability of rainfall, **one observation** can make a critical difference, especially in areas where there are few observers.





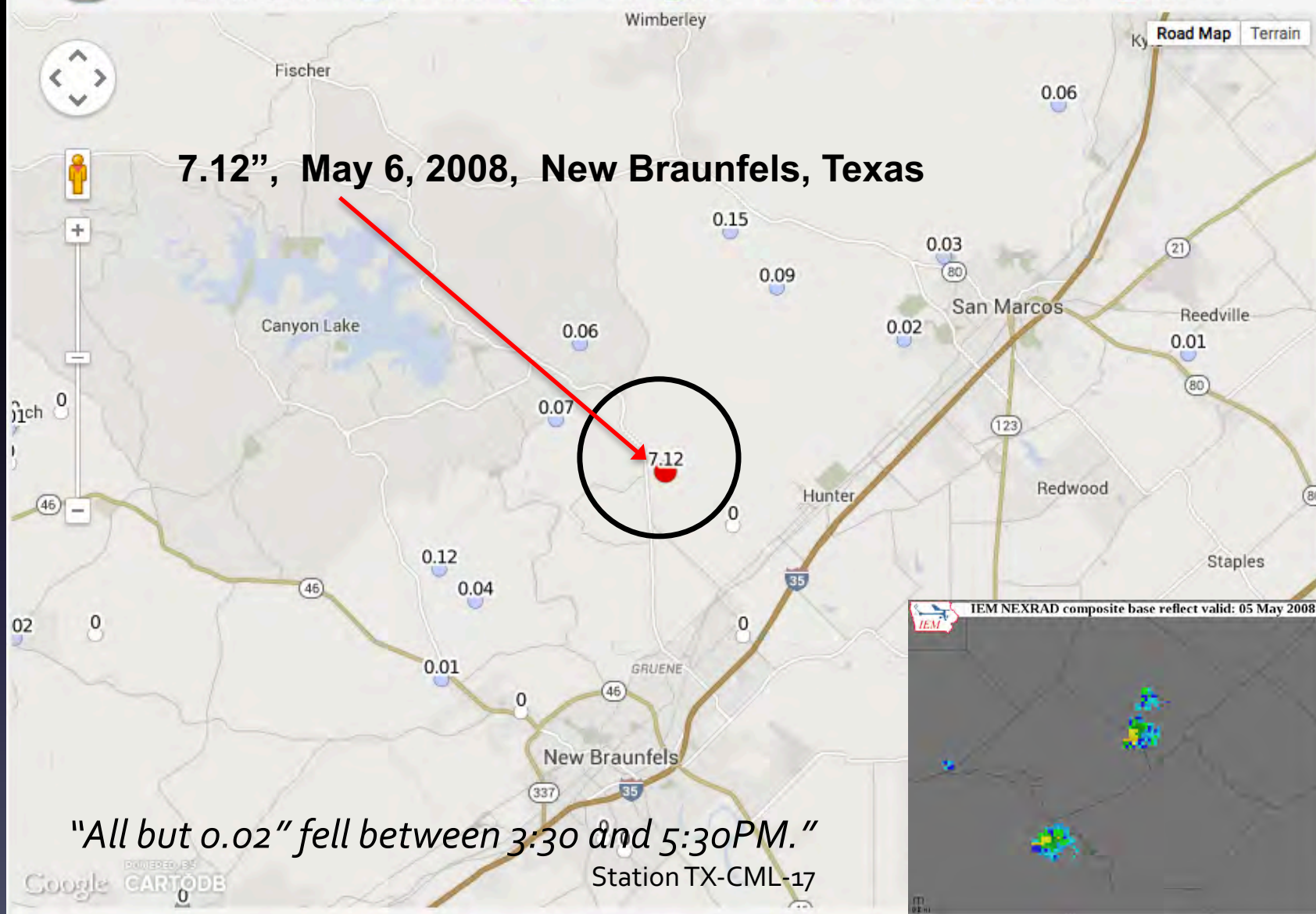
SOME HEAVY RAINFALL EXAMPLES FROM ACROSS THE COUNTRY  
AND THE VARIABLITIY ASSOCIATED WITH EACH EVENT





## Precipitation for 2008-05-06 values in inches

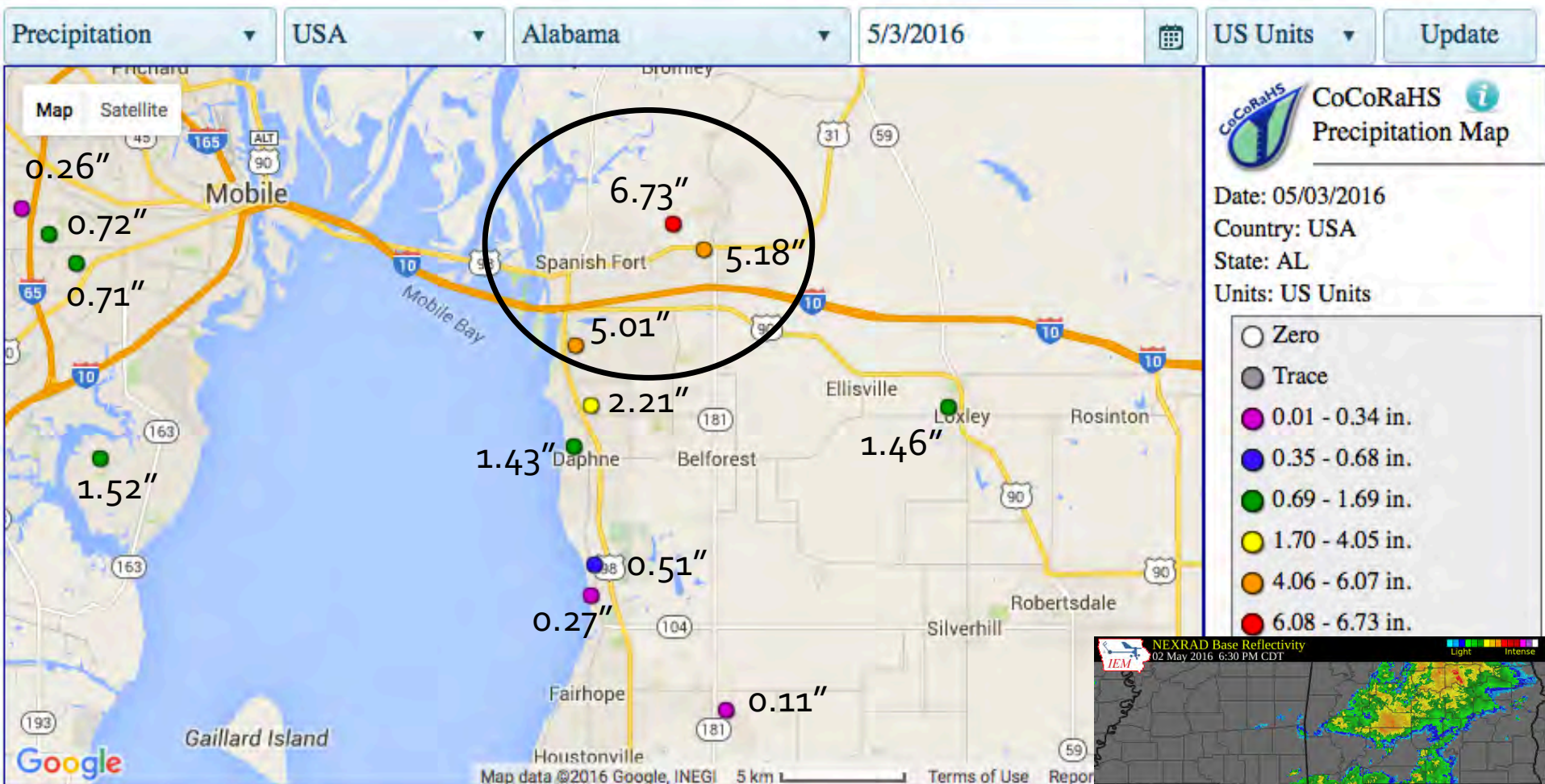
Zero Trace 0.01 - 0.36" 0.37 - 0.72" 0.73 - 1.79" 1.80 - 4.28" 4.29 - 6.42" 6.43 - 7.12"



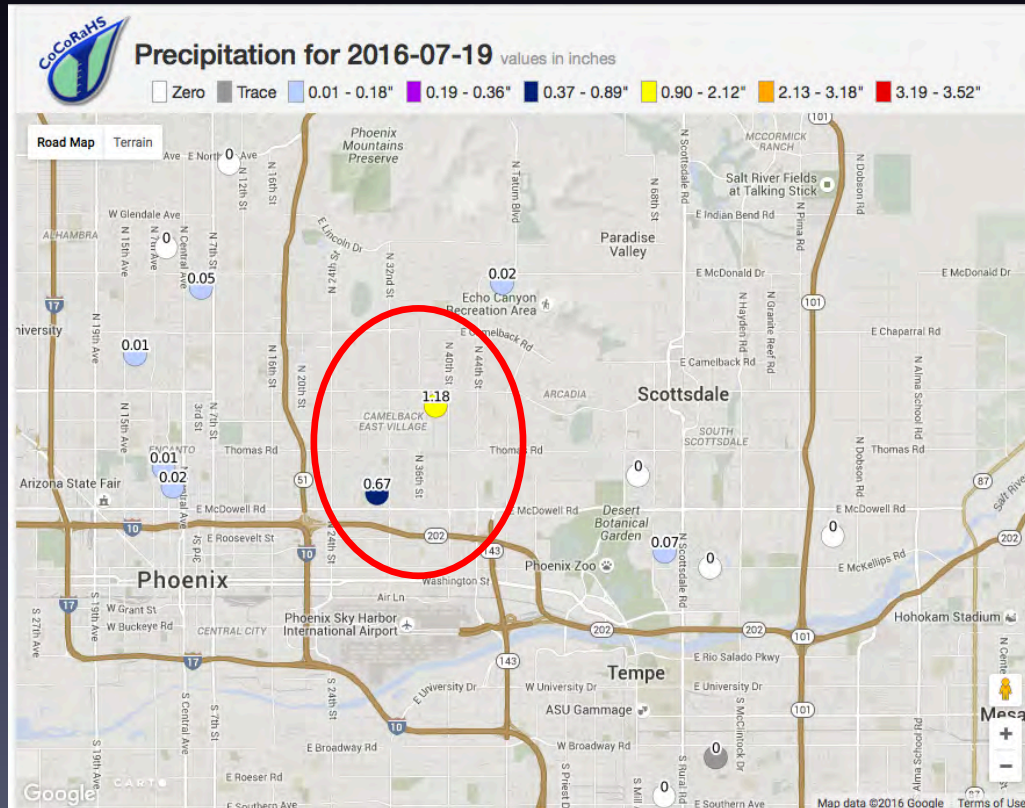
A great example of **one observation** making a difference



# Mobile, AL- May 2, 2015 ~Between 5:00 – 7:00 PM





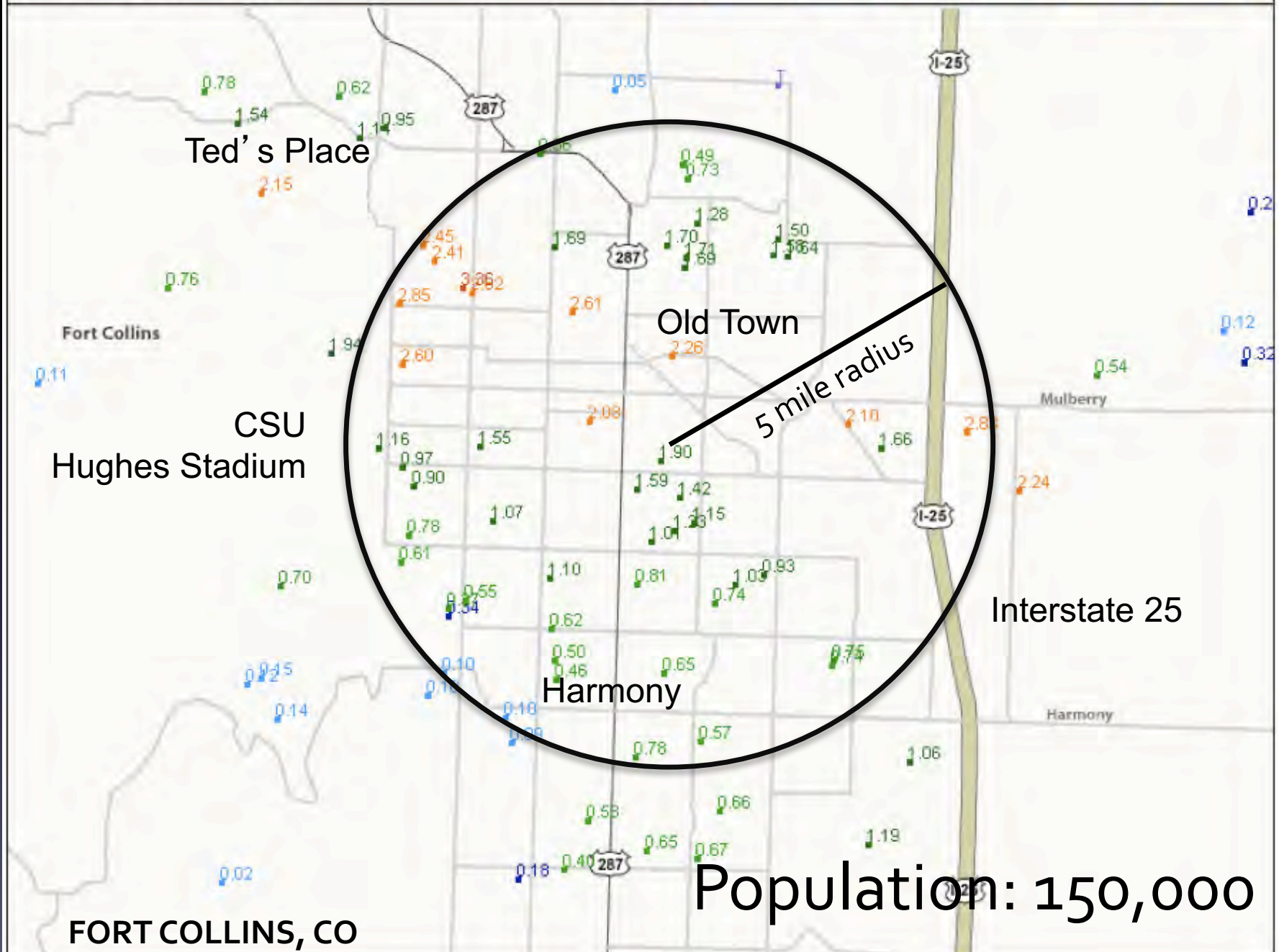


# Phoenix Microburst July 18, 2016

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

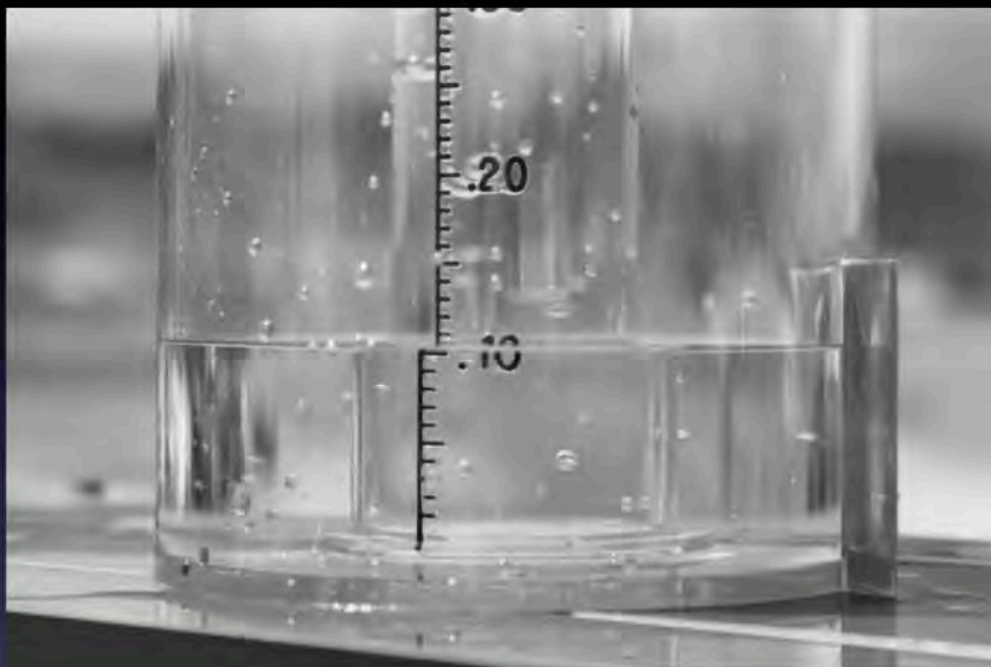
Fort Collins, Colorado 7/21/2009

0.0 Trace 0.01 - 0.17 0.18 - 0.34 0.35 - 0.84 0.85 - 2.02 2.03 - 3.03 3.04 - 3.36





# Who uses CoCoRaHS Observations?



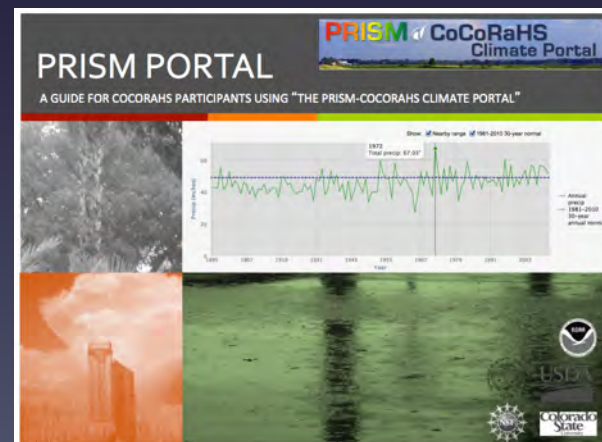
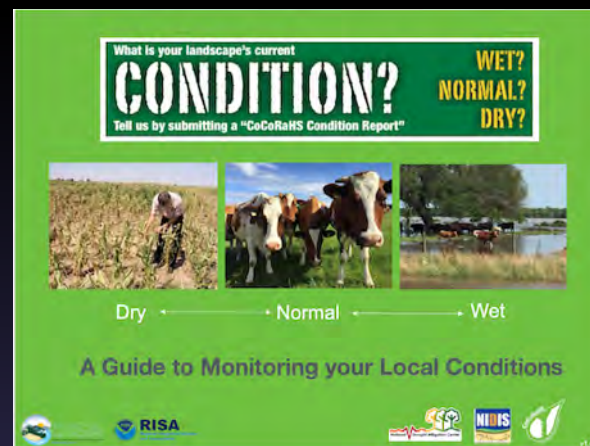
1. Weather Forecasters
2. Hydrologists
3. Water management
4. Researchers
5. Agriculture
6. Climatologists
7. Insurance Industry
8. Engineering
9. Recreation
10. Many others

*"CoCoRaHS is **CRITICAL** (my emphasis) to hazardous weather operations at the NWS Austin-San Antonio Weather Forecast Office. We utilize the daily precipitation reports to produce maps such as the one attached, which are used extensively by the media (directly shown on TV broadcasts), our emergency management partners (for briefing officials and planning search and recovery operations), and the general public."*


*Jon Zeitler – NWS Austin-San Antonio Weather Forecast Office*



# Additional resources/opportunities for our observers



# Evapotranspiration


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

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## Reference Evapotranspiration


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**Measuring Reference Evapotranspiration  $ET_o$**   
*"The 'up' side of the water cycle"*



**View the  $ET_o$  guide via:**

[pdf](#)

**HTML (coming soon)**



**ET (evapotranspiration)** is the water evaporated from the ground back to the atmosphere both as transpiration from the leaves of plants and also as direct evaporation from open water and soil.

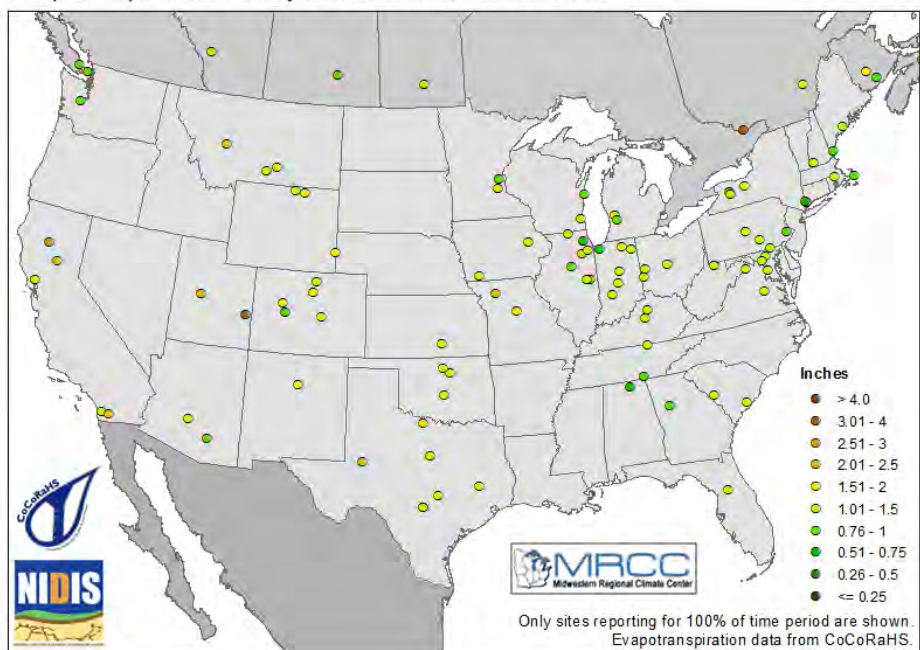
**Reference Evapotranspiration** is defined as "the ET from an extensive surface of clipped grass ( $ET_o$ ) or alfalfa ( $ET_r$ ) that is well-watered, and fully shades the ground." (Kimberly R&E Center, Univ. of Idaho)

**Help CoCoRaHS measure  $ET_o$ !** We know how much water comes from the sky (precipitation) since many of us measure it. Know how much water is leaving the soil and returning to the atmosphere is just as important. It matters for agriculture, lawn care, weather prediction, hydrology and much more, so we should try to measure it.

**Interested in becoming a  $ET_o$  observer?**



Evapotranspiration for 7-day Period: 7/10/2018 - 7/17/2018





# Soil Moisture Monitoring

## CoCoRaHS Soil Moisture Monitoring



### CoCoRaHS Soil Moisture Monitoring

We measure rainfall every day, but how much of that rain is soaking in? CoCoRaHS is now offering a soil moisture reporting option. It's more time and labor-intensive than measuring rain, so it won't be for everyone, and that is okay. It is a great opportunity to play outside, get your hands dirty, and learn something!

The materials cost approximately \$50. Anybody with a little bit of land, and access to an oven is welcome to join.

#### Take a look at the requirements:

[CoCoRaHS Soil Moisture Protocol](#)

#### To report your findings:

<https://cocoahs.org/Admin/MyDataEntry/SoilMoistureReport.aspx>

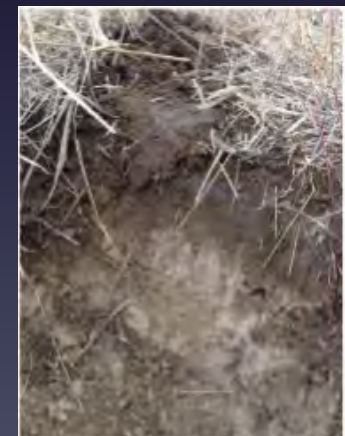
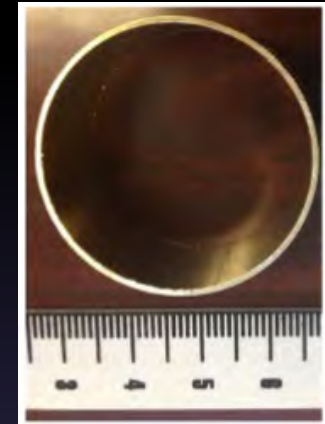
#### To view your submissions:

<https://www.cocoahs.org/ViewData/ListSoilMoistureReports.aspx>

#### Why participate?

By taking soil moisture measurements for CoCoRaHS, you will have the opportunity to be a part of the calibration/validation process for [NASA's Soil Moisture Active/Passive \(SMAP\) Satellite](#), aid in regional drought monitoring, and help close our understanding of the water cycle in your area.

If you have any questions about if this is right for you, please send an email to: [peter@cocoahs.org](mailto:peter@cocoahs.org).





# CoCoRaHS WXTalk Webinars



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

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WxTalk Webinar #61

CoCoRaHS WxTalk Webinar Series

Webinar #61 - Thursday, January 25, 2018

**Storm Surge, Run From the Water, Hide from the Wind**  
Jamie Rhome  
Storm Surge Specialist, Team Lead  
National Hurricane Center  
Miami, Florida



(Biography)

"Jamie Rhome is the Team-Lead of the National Hurricane Center Storm Surge Unit in Miami, Florida, a group that specializes in predicting storm surge inundation heights accompanying land-falling tropical cyclones using the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) computer model. The SLOSH model aids the unit in forecasting potential inundation values, posting watches and warnings of possible and expected life threatening surges, conducting post-storm model verification along, and creating the basis for Hurricane Evacuation Studies (HES) conducted by the Federal Emergency Management Agency (FEMA).

Jamie will discuss how hurricane storm surge threatens coastal communities in the United States and abroad, as well as how the NHC Storm Surge Unit forecasts surges from hurricanes using the SLOSH model. Along with real-time products and surge forecasting discussions, he will present the various risk analysis products available to emergency managers and the public before a storm even forms, and talk about what work has been done to assess and mitigate individual communities' flood risk from storm surges.

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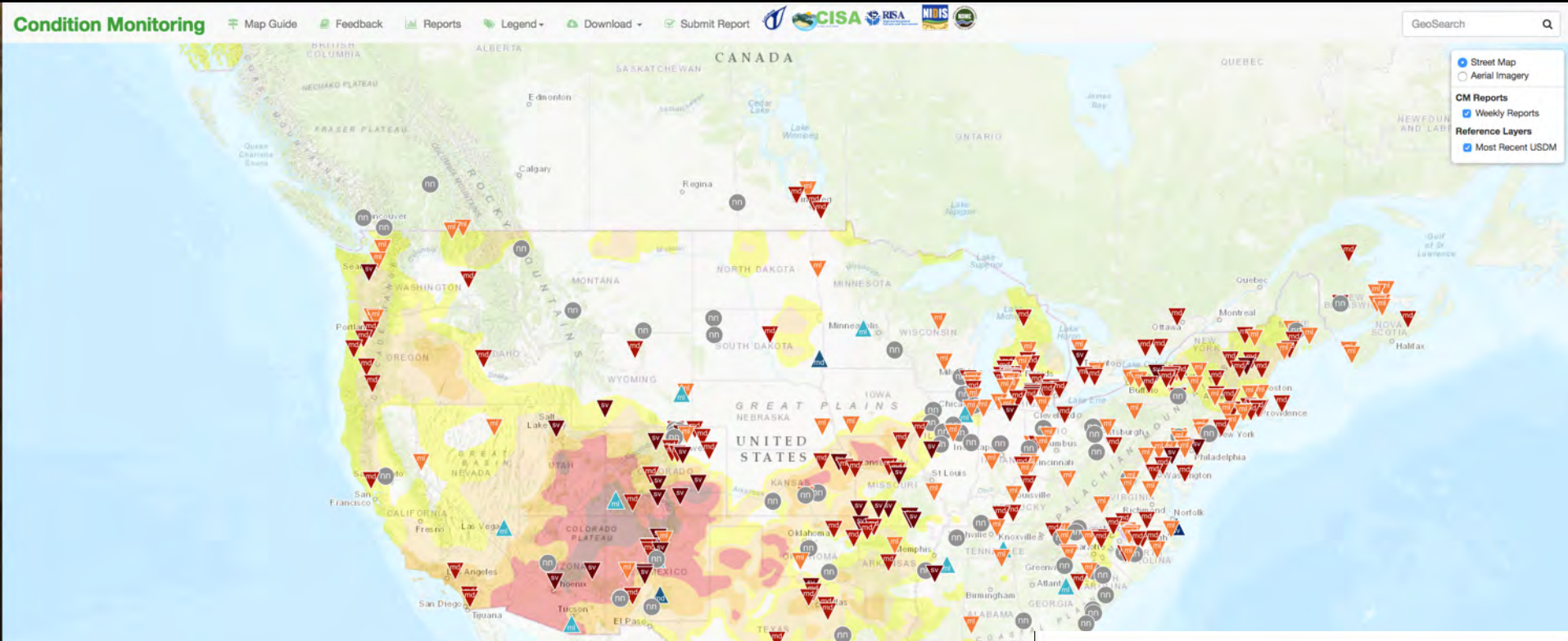
AMBASSADOR™  
**WPN**  
WEATHER-READY NATION



September 2018 - HAIL

November 2018 – NWS Products

# Condition Reports



## DRY CONDITIONS

### MODERATELY DRY

Plants may be brown due to dry conditions.

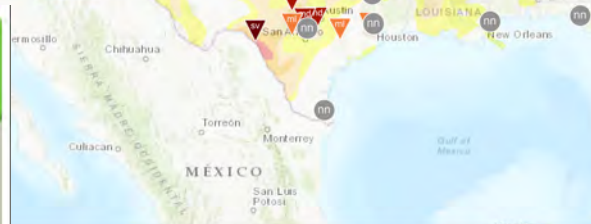
Streams, reservoirs, or well water levels may be low.

Voluntary water use restrictions may be in place.

Water shortages may be present.

Plants, crops, or pastures may be stressed.

Soil is dry.



Asking observers to report their conditions every Sunday.

## WET CONDITIONS

### MILDLY WET

Local plants, crops, or pastures are healthy, recovering from dry conditions or draining from wet conditions.

Soil moisture is above normal.







The CoCoRaHS Headquarters Team



# THANK YOU

For more information visit: [www.cocorahs.org](http://www.cocorahs.org)  
or contact: [hreges@atmos.colostate.edu](mailto:hreges@atmos.colostate.edu)