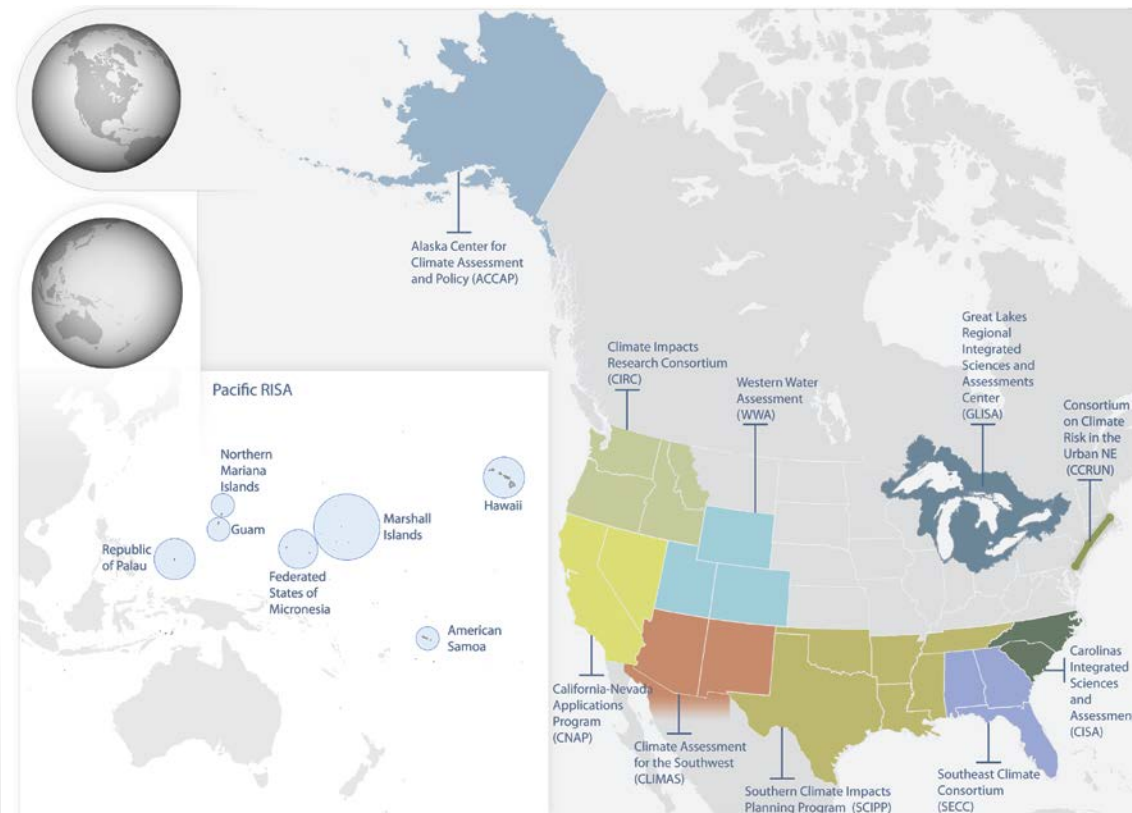


Improving Understanding of Drought Impacts in Coastal Ecosystems through Citizen Science

Amanda Brennan, Janae Davis, Kirstin Dow, Kirsten Lackstrom, Sumi Selvaraj
North Carolina Water Resources Research Institute Annual Meeting
March 18, 2015



CISA works with stakeholders in North and South Carolina to incorporate climate information into water, coastal and public health decision making.



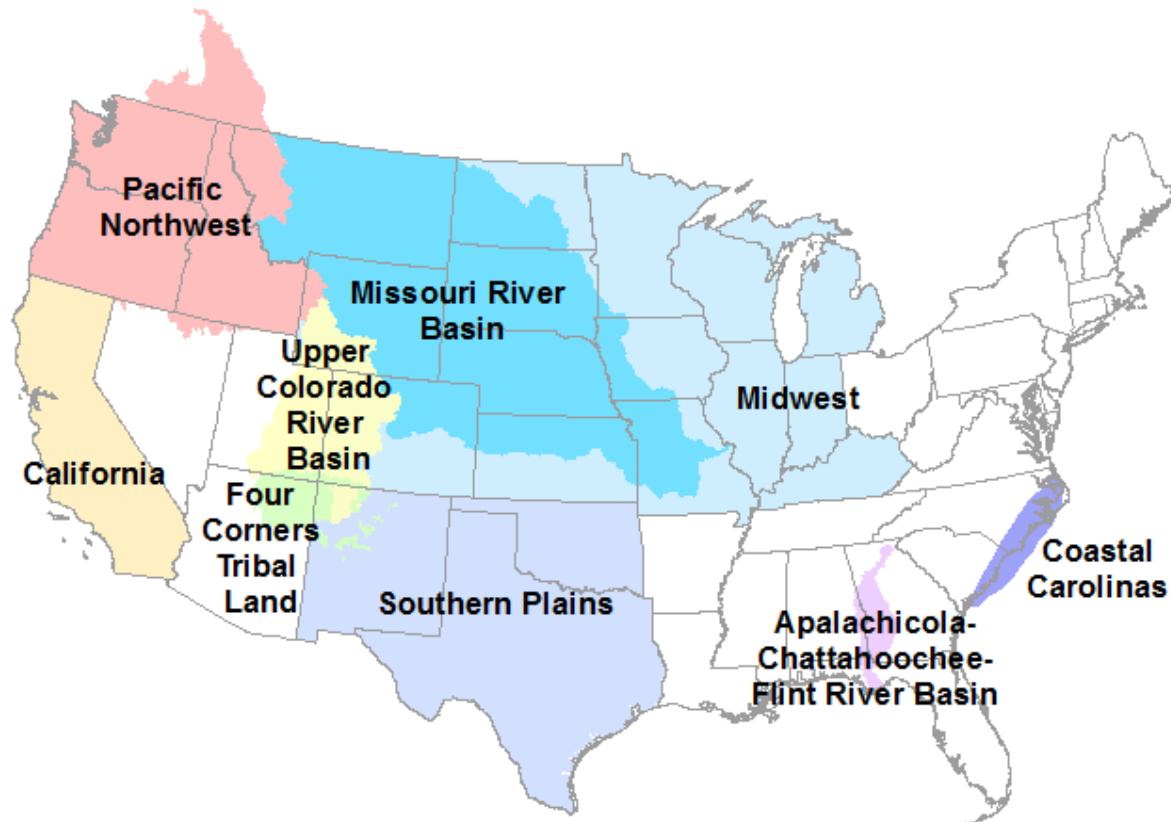
CISA Partners

- Southeast Regional Climate Center
- NC Sea Grant
- SC Sea Grant Consortium
- NC & SC State Climate Offices
- Federal, State, and Local Agencies
- Private Sector
- Non-Governmental Organizations



NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

NIDIS Drought Early Warning Information System (DEWS) Pilot Programs



2012 Carolina DEWS Scoping Workshop



Key information needs identified by workshop participants:

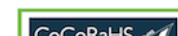
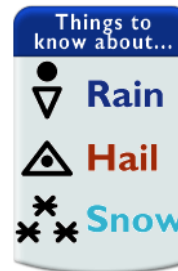
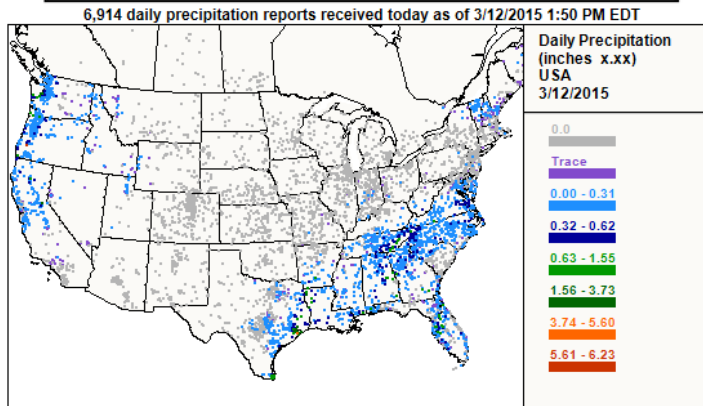
- Improved on-the-ground drought impacts monitoring and reporting
- Understanding impacts not captured by traditional drought indices (e.g., agriculture, water supply, fire)
- Capturing more information about drought onset and recovery



Community Collaborative Rain, Hail & Snow Network



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



- Daily precipitation measurements using the "official" 4" CoCoRaHS rain gauge
- Severe weather reports
- Drought impacts reports
 - Incorporated into the National Drought Impacts Reporter
- Online data entry (mobile apps also available)

Weekly Condition Monitoring

Connecting weather and climate to the environment

CISA recruited volunteers to submit weekly condition monitoring reports in addition to their daily precipitation measurements.

Regular observations help to identify:

- The early signs of drought
- When conditions begin to improve
- Any lingering impacts



Volunteer Training & Engagement



- In-person trainings
- Webinars
- Training and informational materials
- Project webpage
 - www.cisa.sc.edu/CoCoRaHS.html
- Ongoing communications with participants
 - “Cuckoo for CoCoRaHS in the Carolinas” blog
 - <https://carolinascocorahs.blogspot.com/>
 - Condition Monitoring “Star of the Week”
 - Monthly newsletter
 - Thank You postcards
 - Quarterly conference calls

Weekly Condition Monitoring

Everyone is a bit of an expert in one way or another. We ask observers to “tell us what they already know”...



Sample Condition Monitoring Reports



Photo Courtesy of observer Pat Momich

Madison County, NC – March 8, 2015

This has been a week of extremes – from a high of 73° to a low of 18° with a covering of snow and ice. The good news is that ***definite signs of spring*** are finally appearing. Song sparrows are starting to sing. Crocuses are blooming. And, best of all, ***wood frogs have returned to our pond and laid eggs***. This is late. According to my records over 10 years, the average date for wood frogs coming to the pond is February 18.

Wake County, NC – March 9, 2015

Moss is growing prolifically in my yard. The ground is still wet, great for digging up plants. More rain predicted for this week...sigh...

Orange County, NC – March 10, 2015

I worked outside this weekend, and I noticed that with all the snow and rain the ***ground is very saturated***. In addition, the water table must be high because my well water is almost clear. When the water is low, the well water is a rusty color. I also noticed that for the first time since I have lived in my house (2 years) the ***creek on my property has water in it***.

Evaluation Component

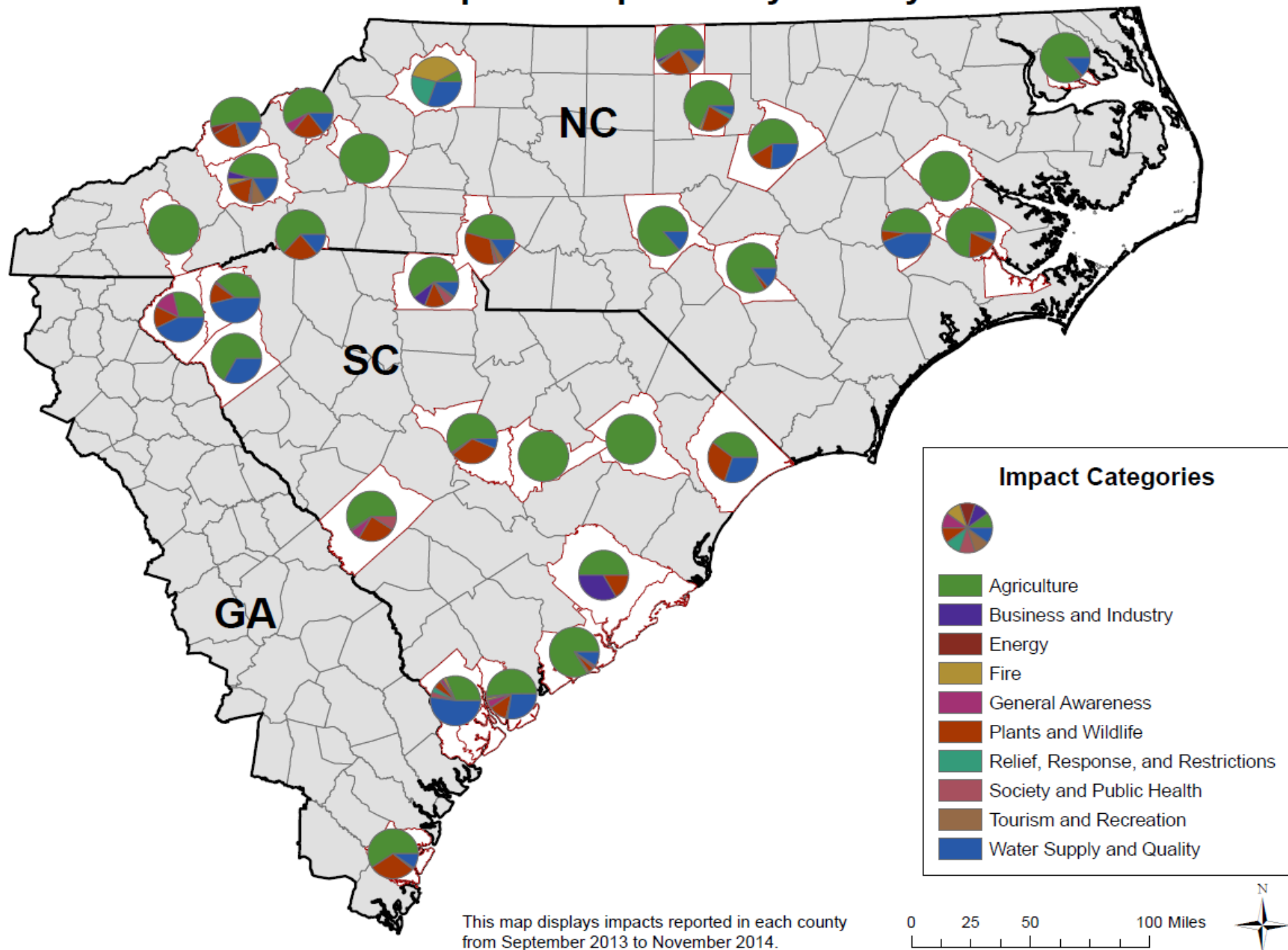
Connecting with drought decision makers

To further understanding of the usefulness of citizen science engagement as a means to increase drought impacts monitoring and reporting:

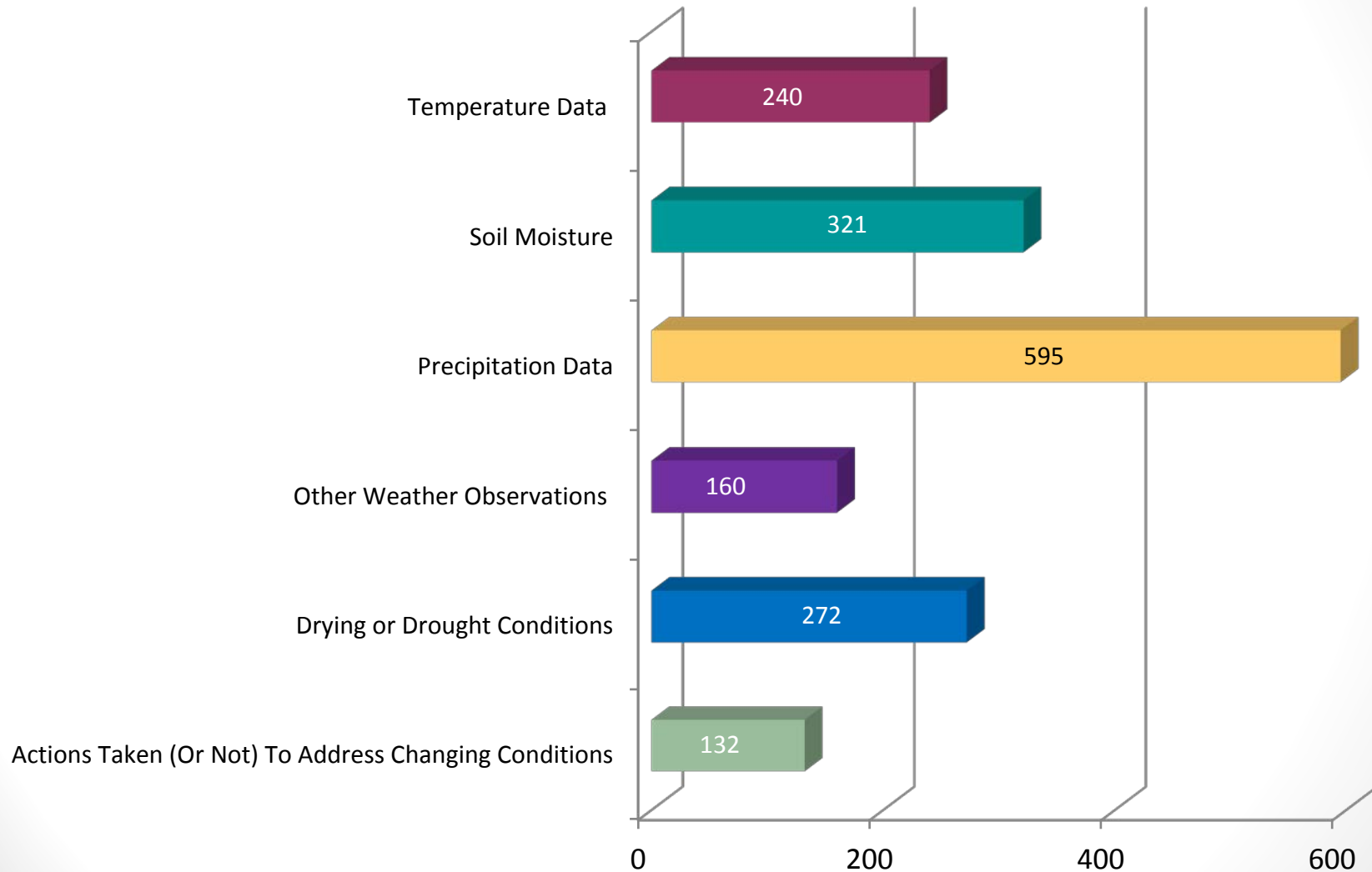


- All report content coded
- Charts, graphs and maps created to aggregate and visualize coded content
- Interviews conducted with drought decision makers

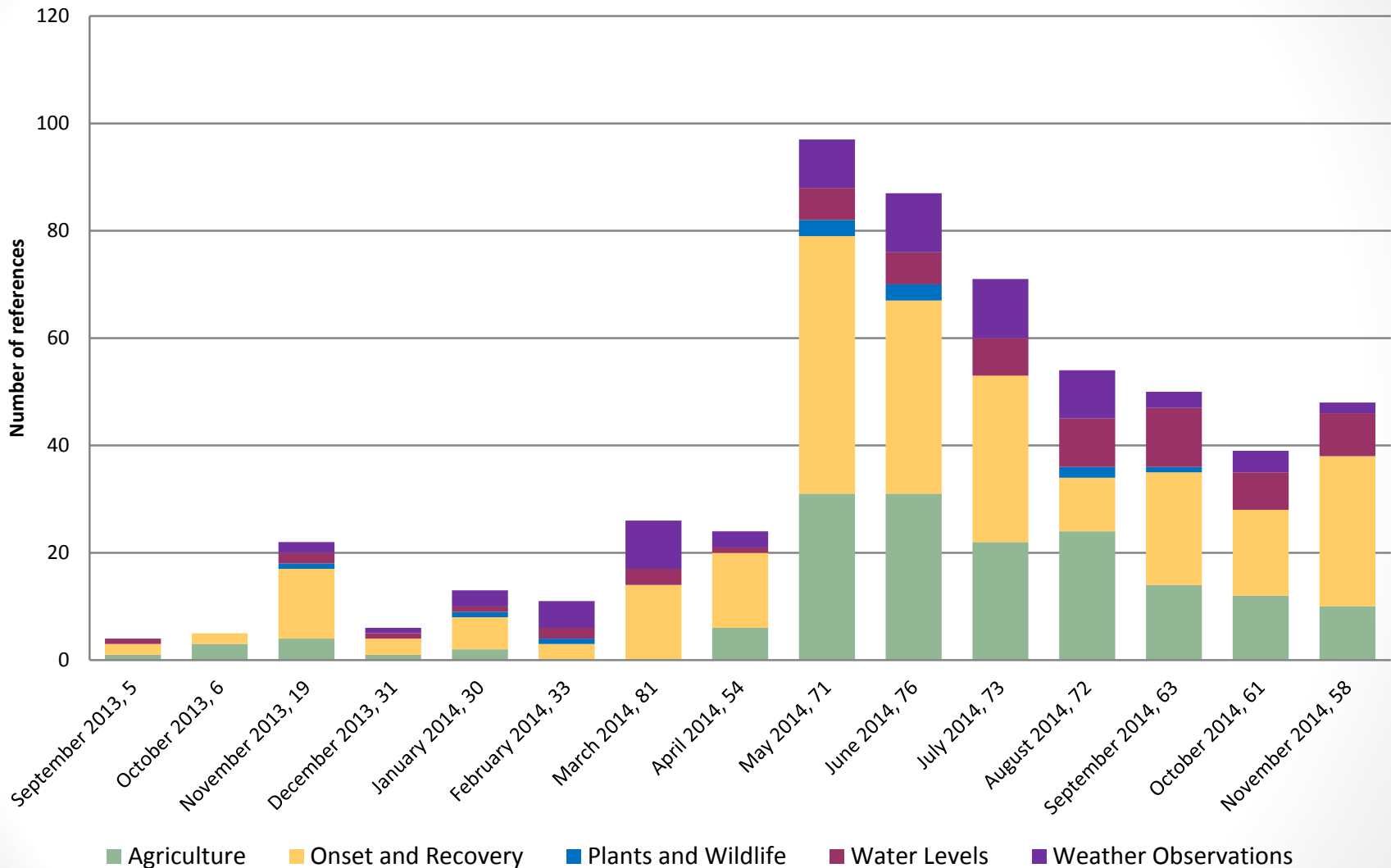
Impacts Reported by County



Other Report Content



References to Dry Conditions



* Numbers in x-axis labels indicate total number of reports submitted that month.

Summary of Interview Results

- CoCoRaHS is a major tool and asset because of the additional precipitation observations. Having condition monitoring reports to add to the context of those measurements is also useful.
- Reports can provide additional context to traditional qualitative indices that are already used.
- Decision context is very important with respect to the type of report information that is useful (e.g., plant stress shows early signs of dryness, water levels show continued dryness).
- Charts, graphs and maps provide a useful summary of the data and could help to identify trends (e.g., onset of dry conditions, recovery).
- Consistency in reporting precipitation measurements (and zero's) adds value to condition monitoring observations.

Evaluation Component

Citizen science engagement

To identify and assess best practices and approaches to support drought impacts reporting.

- 3 online surveys circulated to volunteers over the 1-year project commitment period to better understand:



- How useful education materials, trainings, the blog, and newsletter are for volunteers?
- How and why reporting frequency changes over time?
- What type of learning volunteers experience?
- What personal goals are achieved through volunteering?

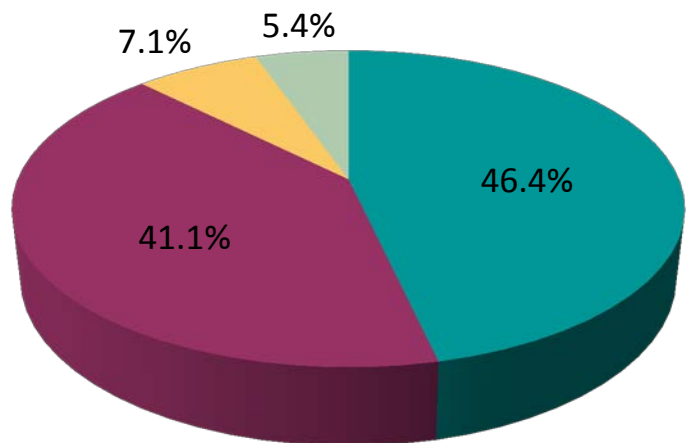
Participant Feedback Surveys

Recruitment Period	Survey #1	Survey #2	Survey #3
September – December 2013 (n=31)	January 2014 45%	June 2014 52%	November 2014 45%
January – mid- April 2014 (n=19)	June 2014 74%	November 2014 68%	To be distributed: April 2015
Late April – June 2014 (n=36)	September 2014 58%	January 2015 43%	To be distributed: June 2015

* Circulate surveys to everyone who agreed to participate (n), although not everyone who signed up submits regular condition monitoring reports.

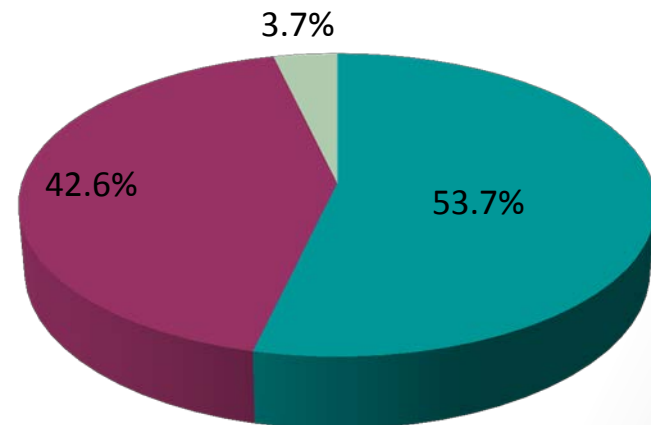
Survey 1: Volunteer Education

Before attending CISA's in-person training or webinar, how aware would you say you were about the diversity and extent of the impacts precipitation has on the local environment and economy (e.g. on wildlife, agriculture, local businesses)?



■ I was well aware ■ I was somewhat aware
■ I was slightly aware ■ I was not at all aware

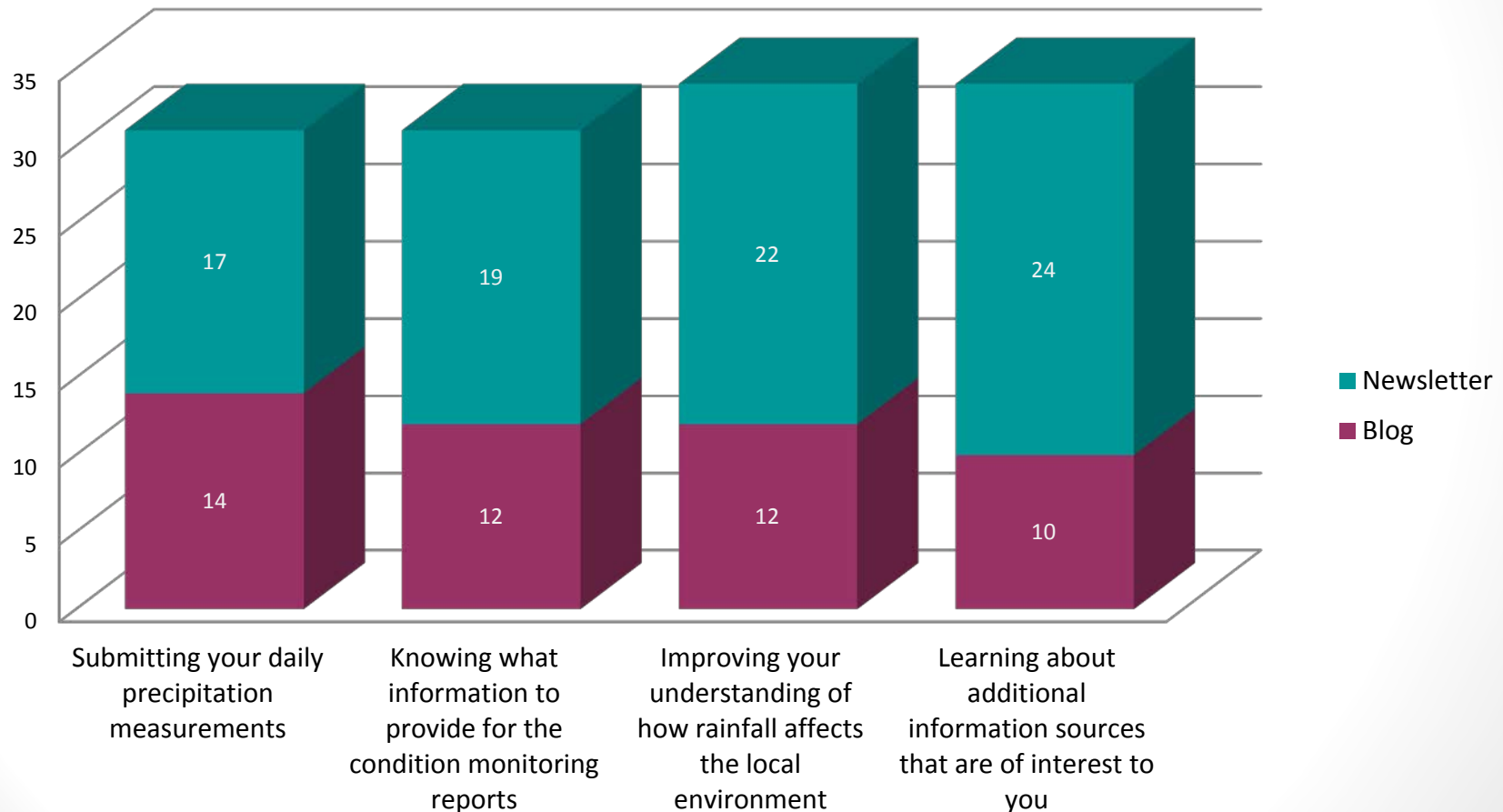
How helpful were the training and informational materials you received in improving your understanding of the impacts of too little or too much rainfall? (e.g., webinar, in-person training, volunteer notebook)



■ Very helpful ■ Somewhat helpful ■ Not helpful at all

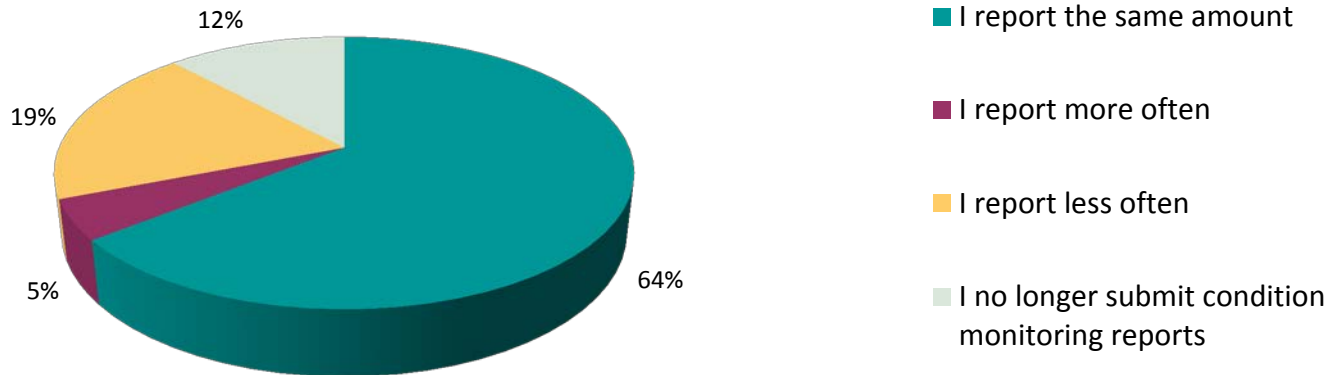
Survey 1: Volunteer Education

Is the information provided in the blog and/or newsletter helpful for the following?

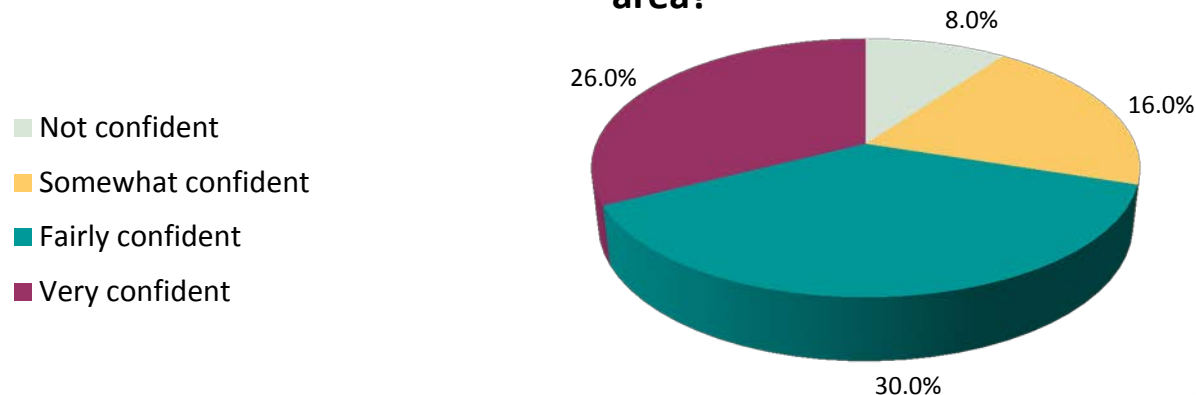


Survey 2: Reporting Consistency

How has the frequency of your reporting changed since you first started condition monitoring?

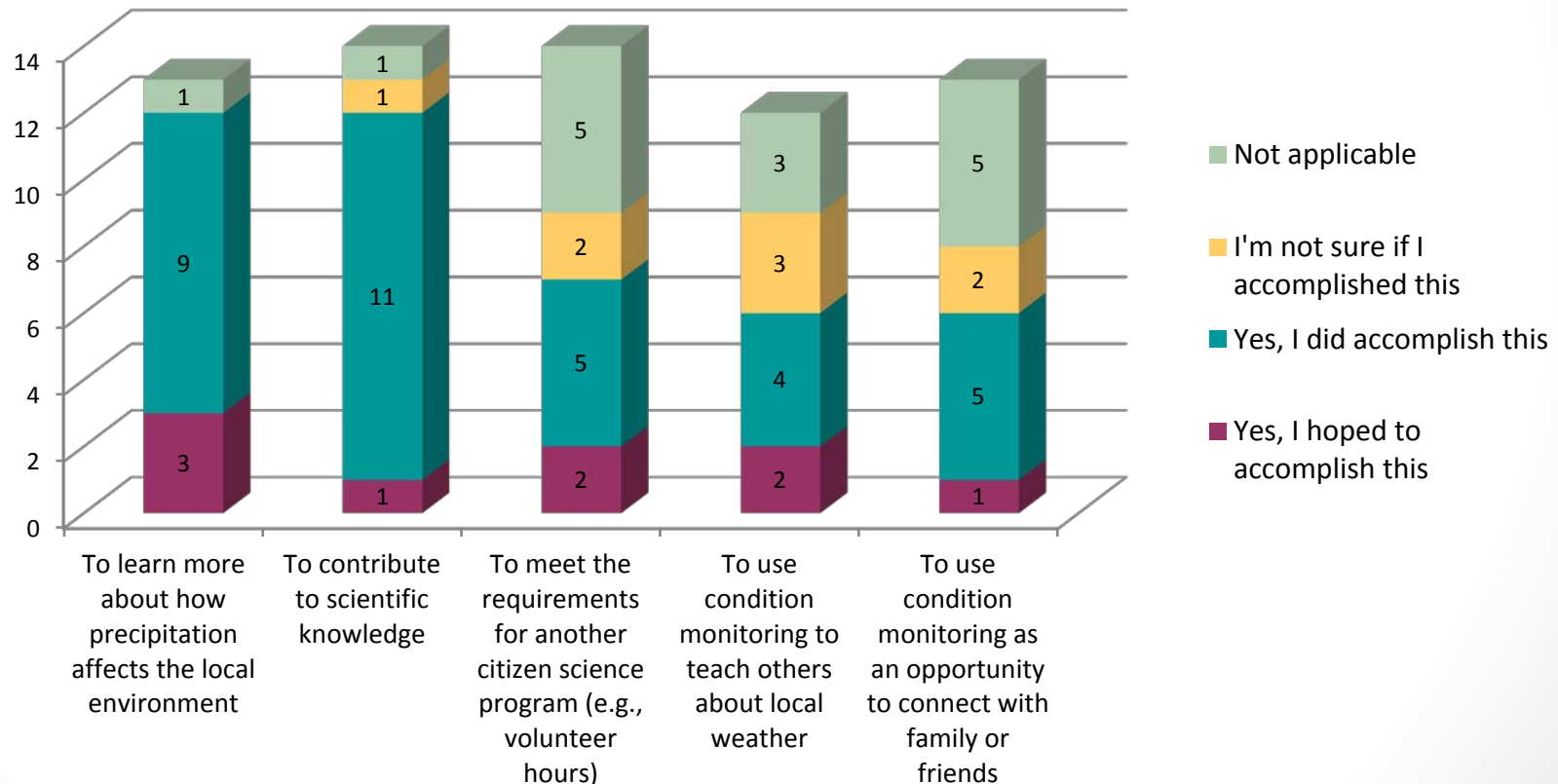


Now that you've been participating in condition monitoring for a while, how would you describe your level of confidence in reporting conditions in your area?



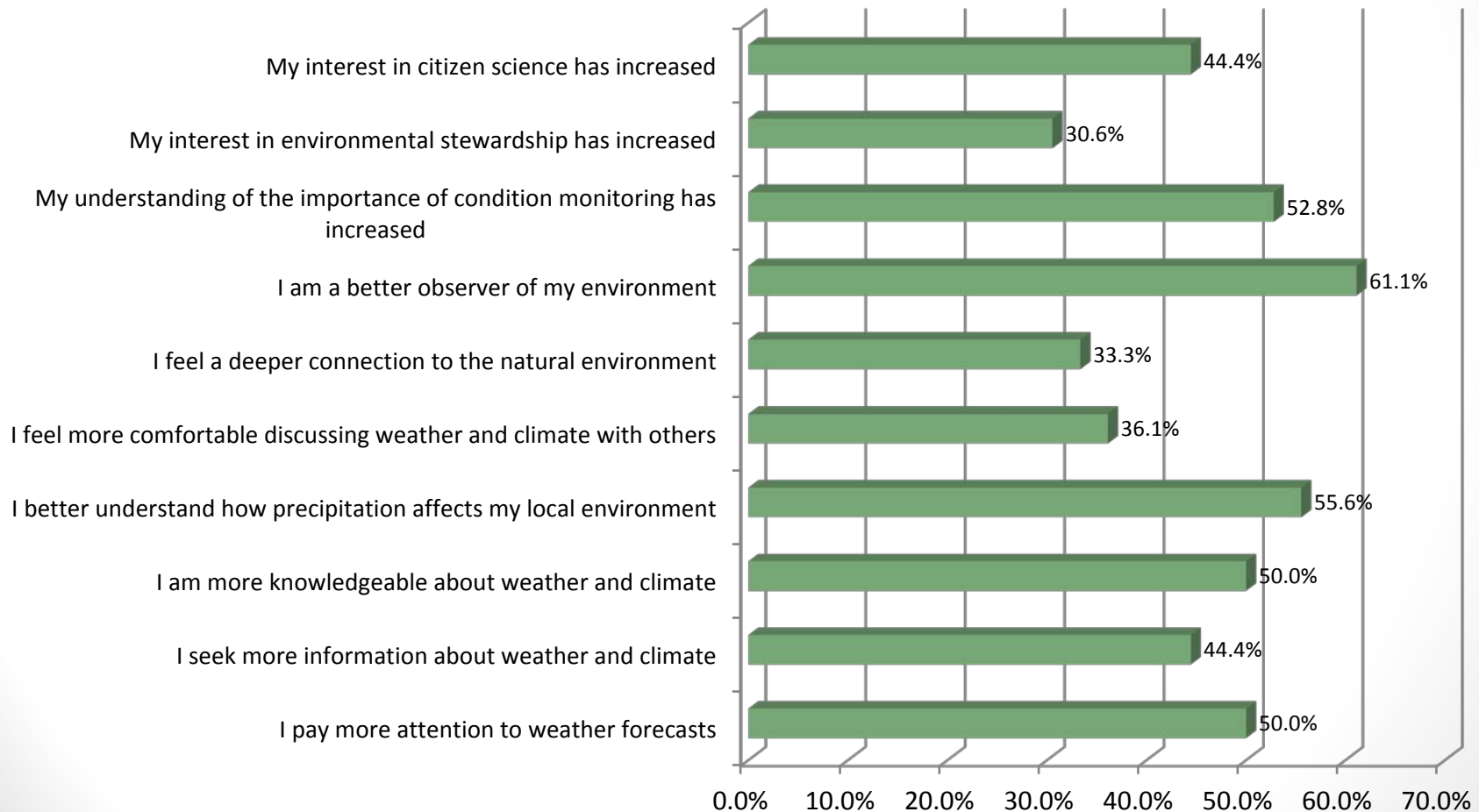
Survey 3: Volunteer Learning

Please tell us what you hoped to accomplish by participating in the CISA and CoCoRaHS citizen science condition monitoring project AND whether or not you feel you have achieved your goals.



Survey 3: Volunteer Learning

What changes have you experienced as a result of participating in the CISA and CoCoRaHS condition monitoring project? (Check all that apply)





Thank You!

Questions or Comments?

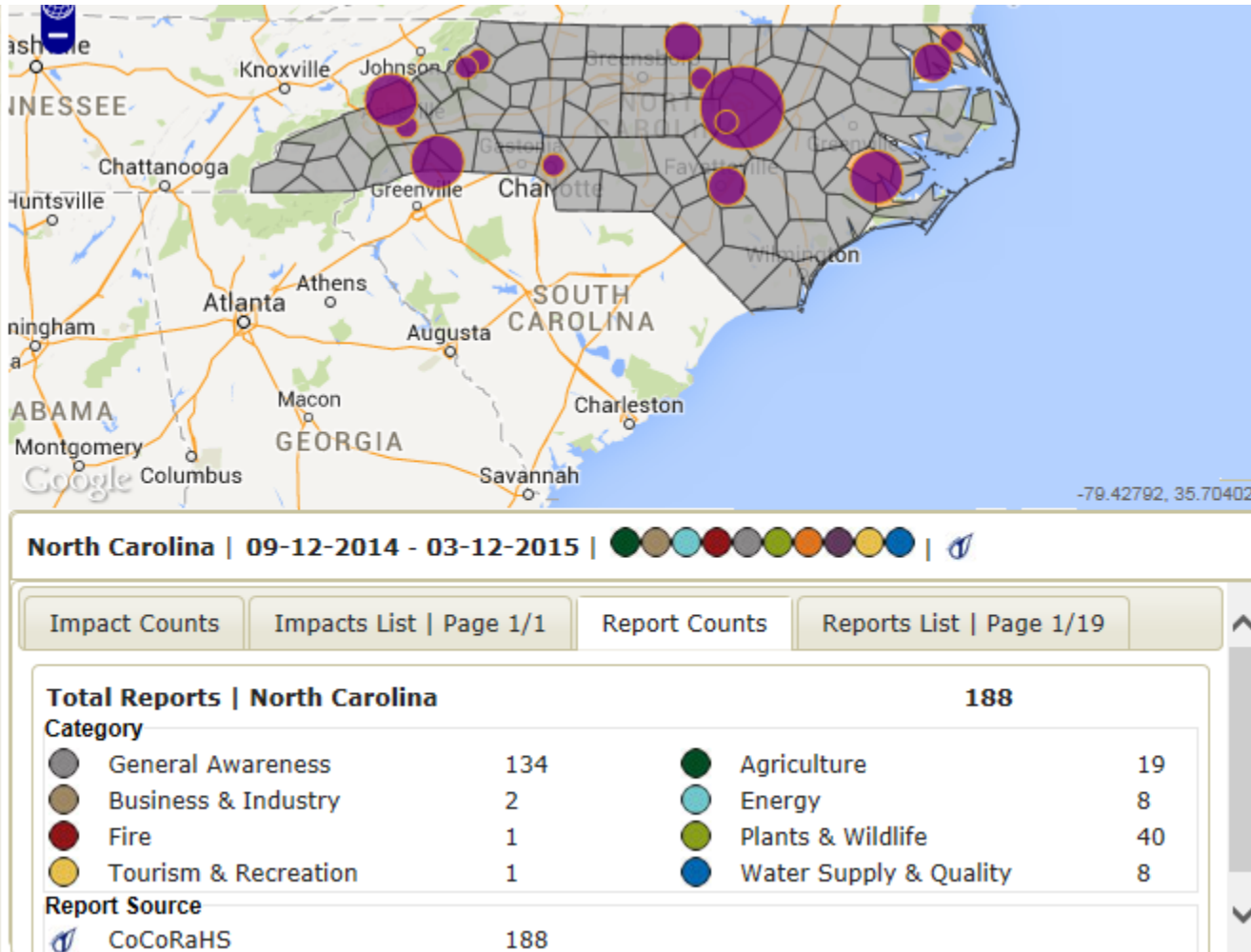
Amanda Brennan
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www.cisa.sc.edu

Drought-Related Impacts & Concerns in Coastal Ecosystems



Reporter

NC CoCoRaHS Reports included in the National Drought Impact Reporter for the last 6 months



CISA & CoCoRaHS Citizen Science Condition Monitoring Project



- To further understanding of the usefulness of citizen science engagement as a means to increase drought impacts monitoring and reporting
- Using existing tools developed by the Community Collaborative Rain, Hail and Snow (CoCoRaHS) network