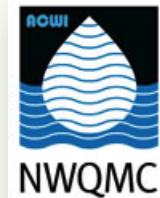


# Social.Water—a Tool for Harnessing the Power of Crowdsourcing to Involve Citizen Scientists in Hydrologic Data Acquisition



Michael N. Fienen  
mnfienen@usgs.gov  
Research Hydrologist  
*USGS Wisconsin  
Water Science Center*

Presentation to the  
National Water Quality Monitoring Council  
July 19, 2012

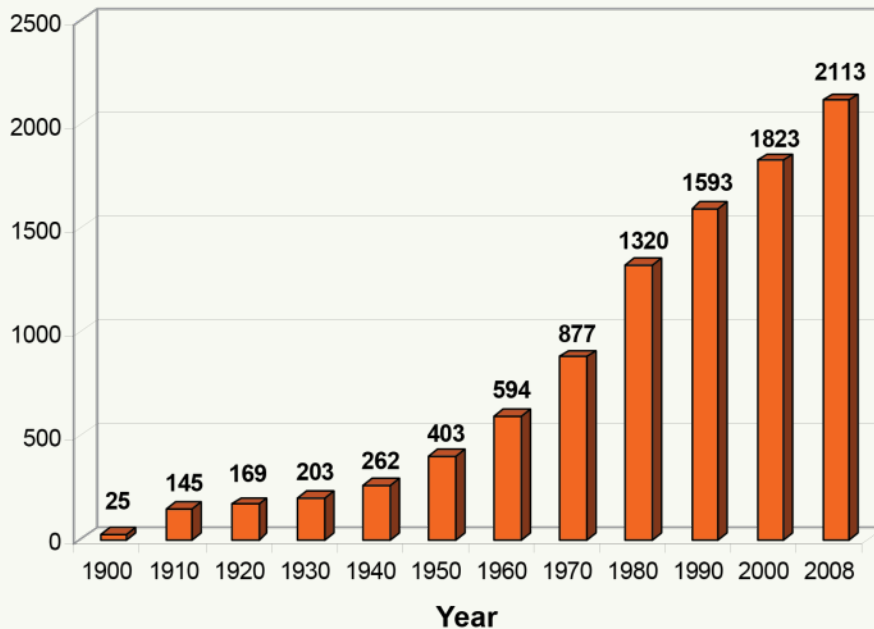


# Audubon Christmas Bird Counts

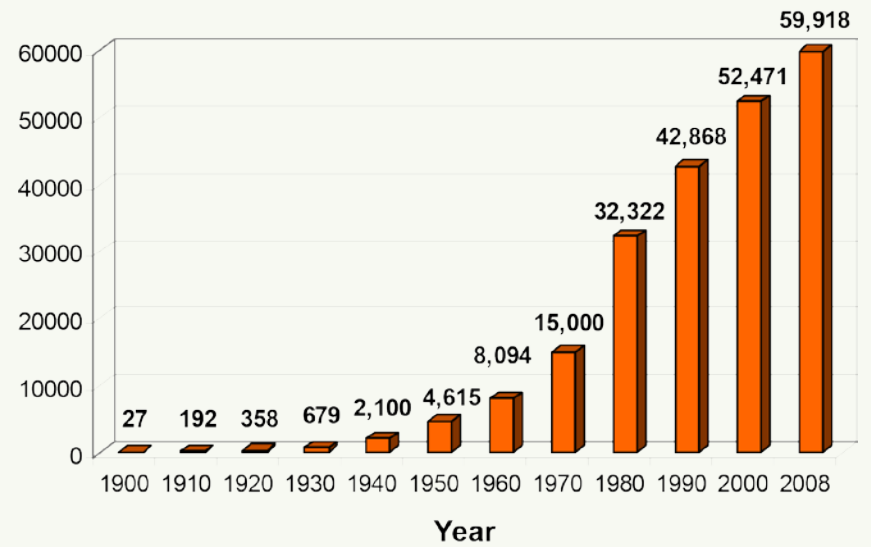


# Audubon Christmas Bird Counts: Growth of Participation

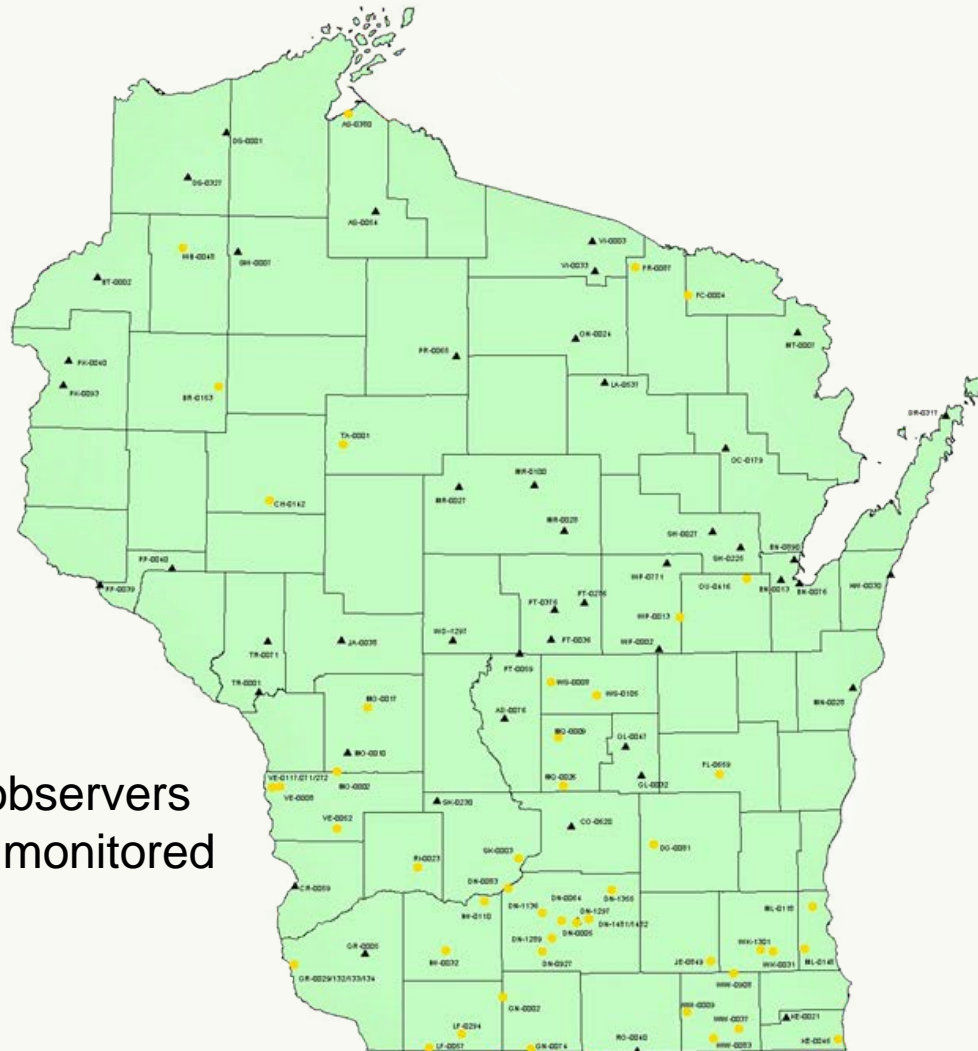
Number of Christmas Bird Counts



Number of CBC Participants



# Citizen Observers Contribute to the Wisconsin Groundwater Monitoring Network



black wells: citizen observers  
yellow wells: USGS monitored



# Harnessing the Crowd for Scientific Data and Analysis

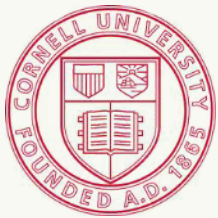
**ZOONIVERSE**  
REAL SCIENCE ONLINE

Galaxy Zoo and Moon Zoo  
[www.zooniverse.org/](http://www.zooniverse.org/)



CreekWatch

[creekwatch.researchlabs.ibm.com/](http://creekwatch.researchlabs.ibm.com/)



eBird

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



OpenDinosaur

[opendino.wordpress.com](http://opendino.wordpress.com)



wildlifecrossing.net

[www.wildlifecrossing.net/](http://www.wildlifecrossing.net/)



**SKYWARN**  
WEATHER.GOV®

Skywarn Weather Spotters

[www.nws.noaa.gov/skywarn/](http://www.nws.noaa.gov/skywarn/)



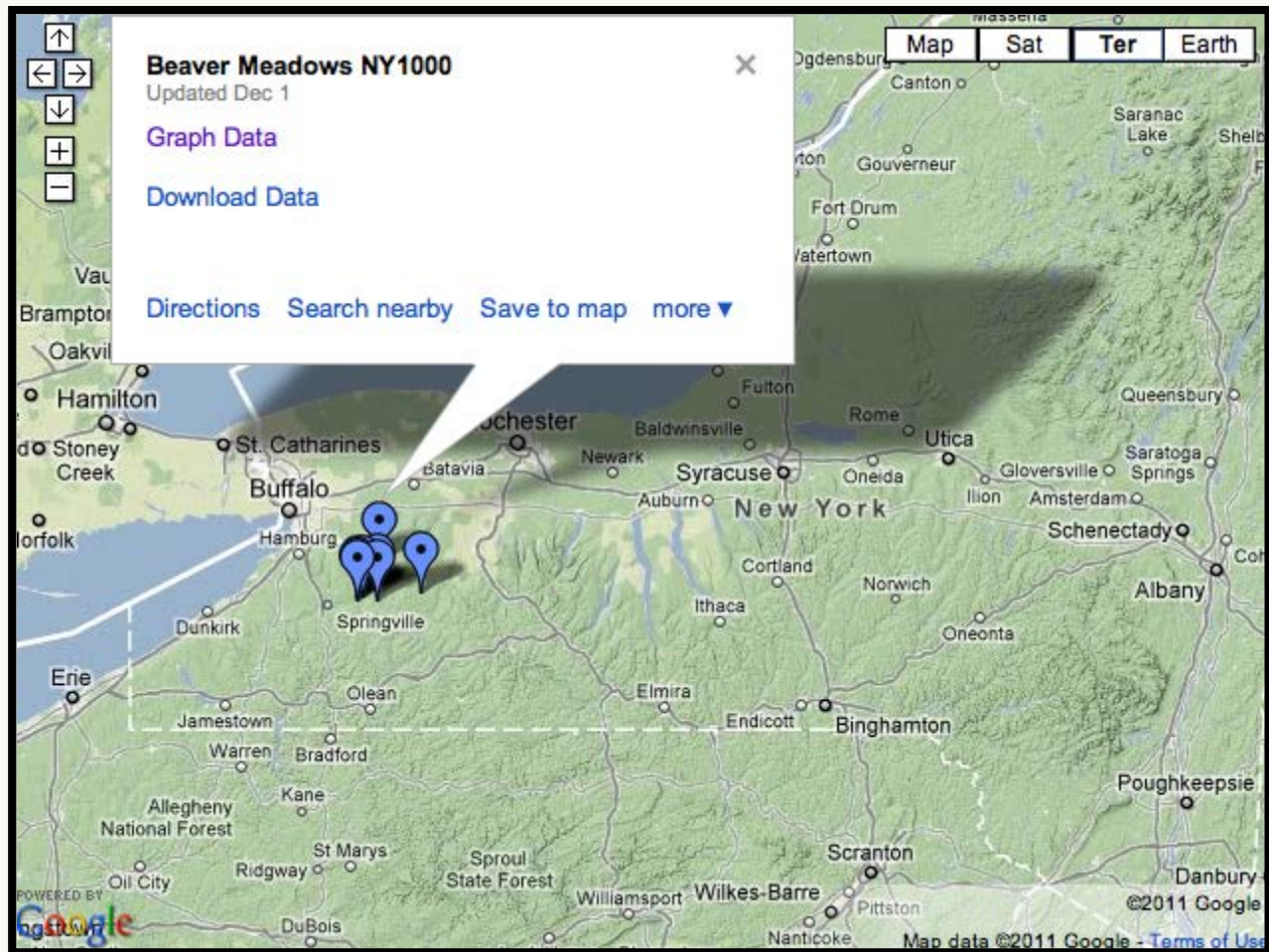
CoCoRaHS

Community Collaborative  
Rain, Hail, and Snow Network  
[www.cocorahs.org/](http://www.cocorahs.org/)





# crowdhydrology.org



# Social.Water Schematic Overview





# Signs and Gages

Text Water Level to:  
**(716)218-0282**

Station #:

**NY1009**

[www.CrowdHydrology.org](http://www.CrowdHydrology.org)

**3.30**

3.32

3.28

3.26

3.24

3.22

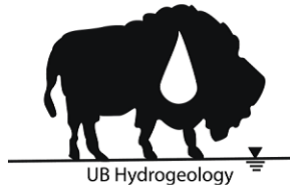
**3.20**

3.18

3.16



# Signs and Gages



## CrowdHydrology

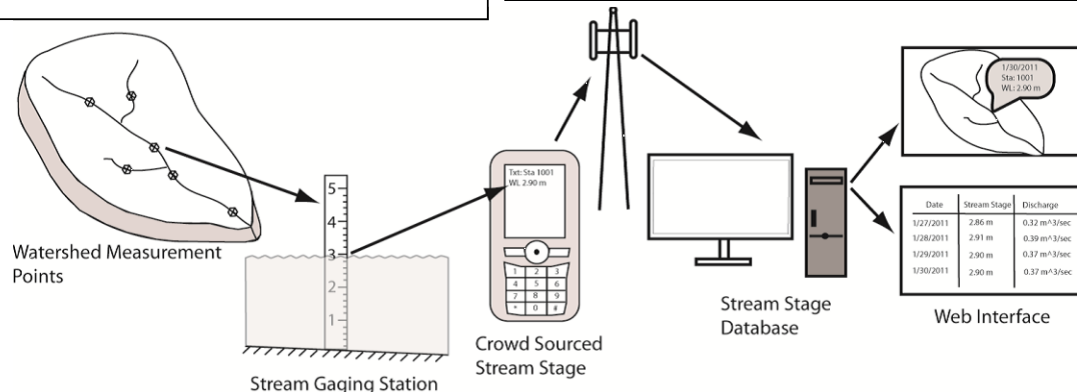


### Project Information

CrowdHydrology is an experiment currently conducted by the University at Buffalo Department of Geology. Our goal is to develop innovative methods to collect spatially distributed hydrologic data throughout Western New York. If you have any questions or would like to join our network please contact us at [www.CrowdHydrology.org](http://www.CrowdHydrology.org).

### How it works

1. Read the water level off the ruler (gaging staff)
2. Text the station number and the water level to **716-218-0282**
3. Stream stage is then added to our database at [www.CrowdHydrology.org](http://www.CrowdHydrology.org).
4. Researchers, Students, Outdoors people, Resource managers, etc. can then use these data.

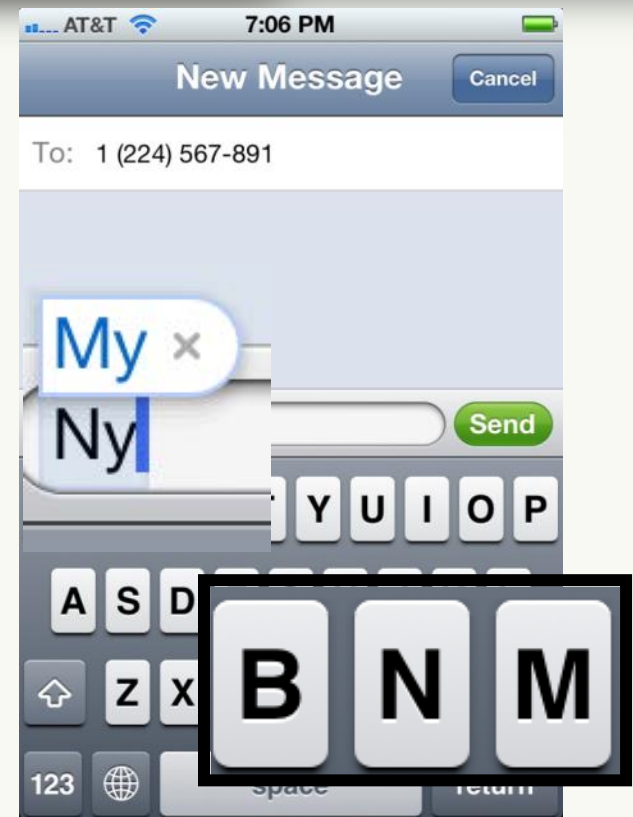
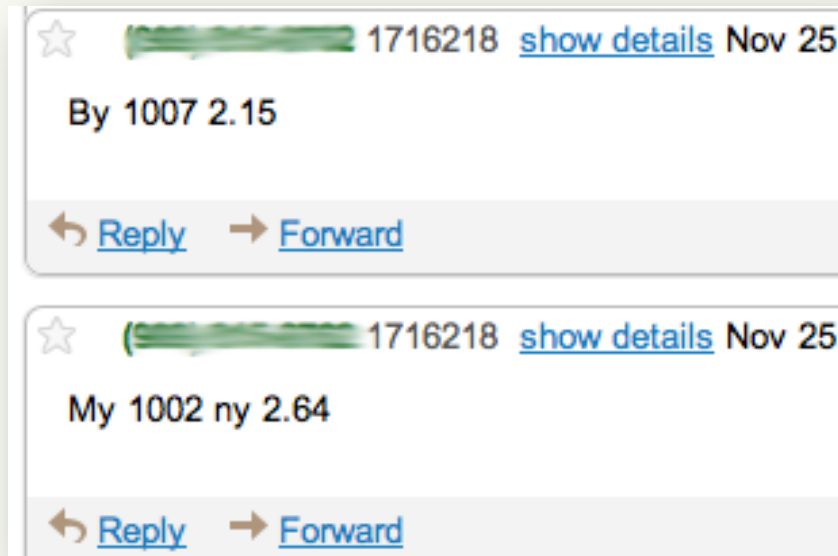
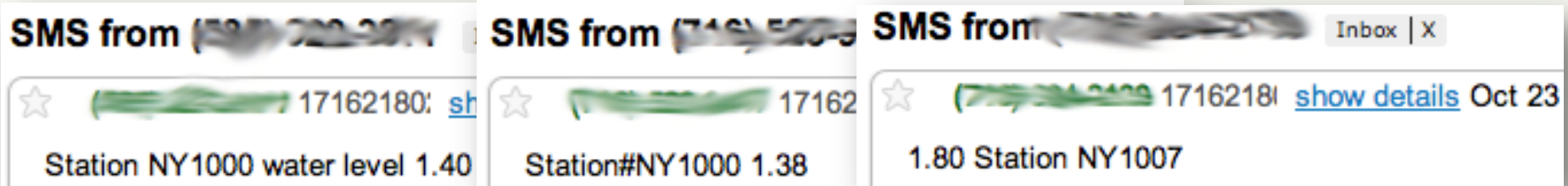


Station Number: \_\_\_\_\_

[www.CrowdHydrology.org](http://www.CrowdHydrology.org)

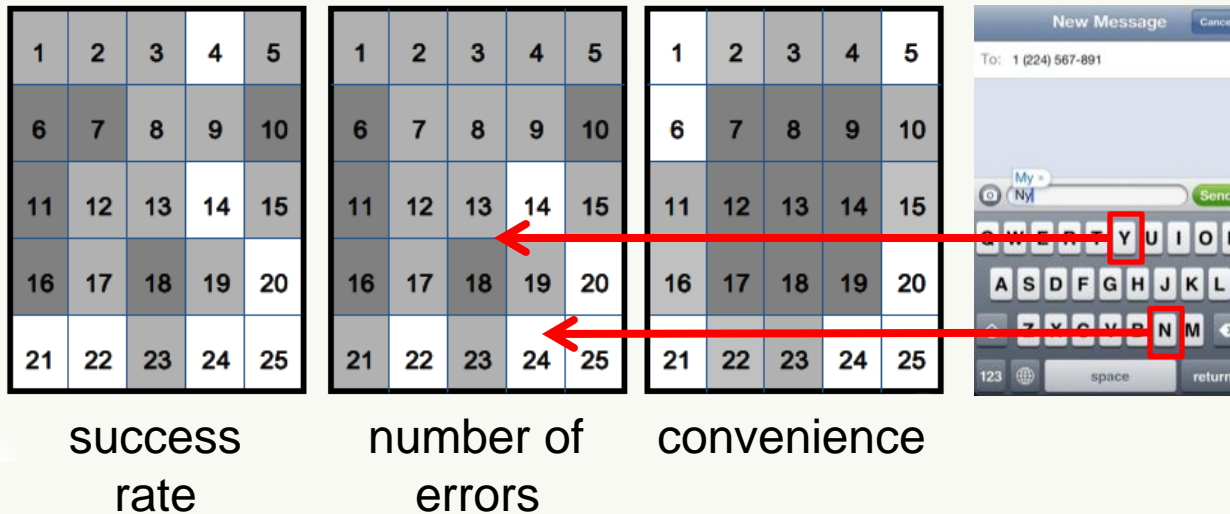
Site Partner: \_\_\_\_\_

# FuzzyWuzzy and the cost of generality...



# FuzzyWuzzy

what about typos on “y”?



Park et al. (2008)

Touch Key Design for Target Selection on a Mobile Phone

*Mobile HCI 2008 proceedings*

# FuzzyWuzzy

use regular expressions to trim out irrelevant information

~~Ny Station #1008 water level 2.45ft.~~

~~Sent using SMS to email. Reply to this email to text the sender back and save on SMS fees. <https://www.google.com/voice>~~

NY1000 NY1001 NY1002 NY1003 NY1004 ... NY1007 NY1008

# FuzzyWuzzy

use regular expressions to ~~pull out floating point information~~

~~Ny Station #1008 water level~~ 2.45ft.

~~Sent using SMS to email. Reply to this email to text the sender  
back and save on SMS fees. <https://www.google.com/voice>~~

# Simple Database (.csv file)

Date and Time,Gage Height (ft)

08/10/2011 13:40:45,1.46

08/16/2011 17:37:45,1.45

09/10/2011 16:20:55,1.36

09/12/2011 13:40:06,1.3

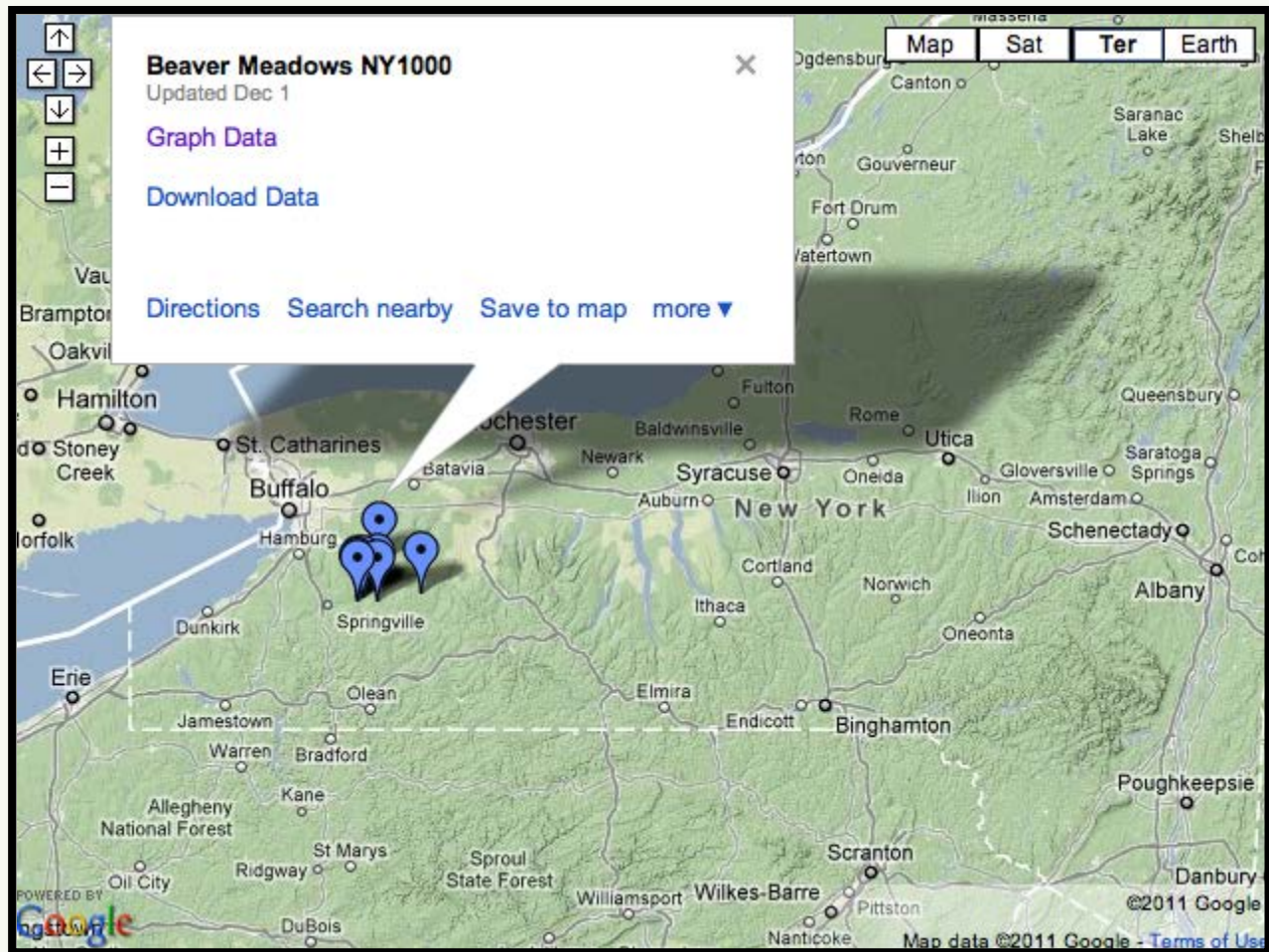
09/13/2012 06:20:09,2.45



Date and time read from email time stamp and converted to appropriate timezone

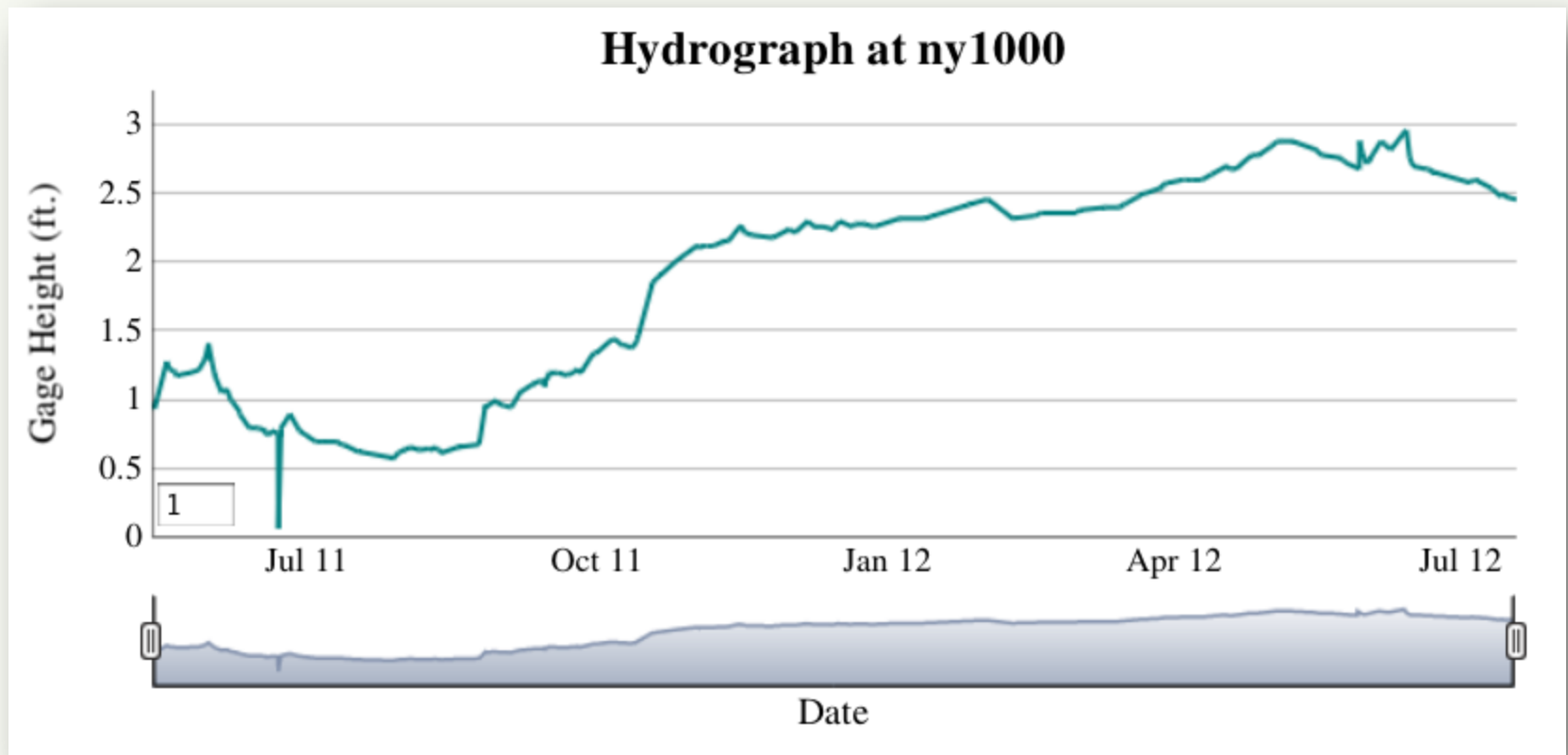
HTML page generated using Dygraphs JavaScript

# crowdhydrology.org

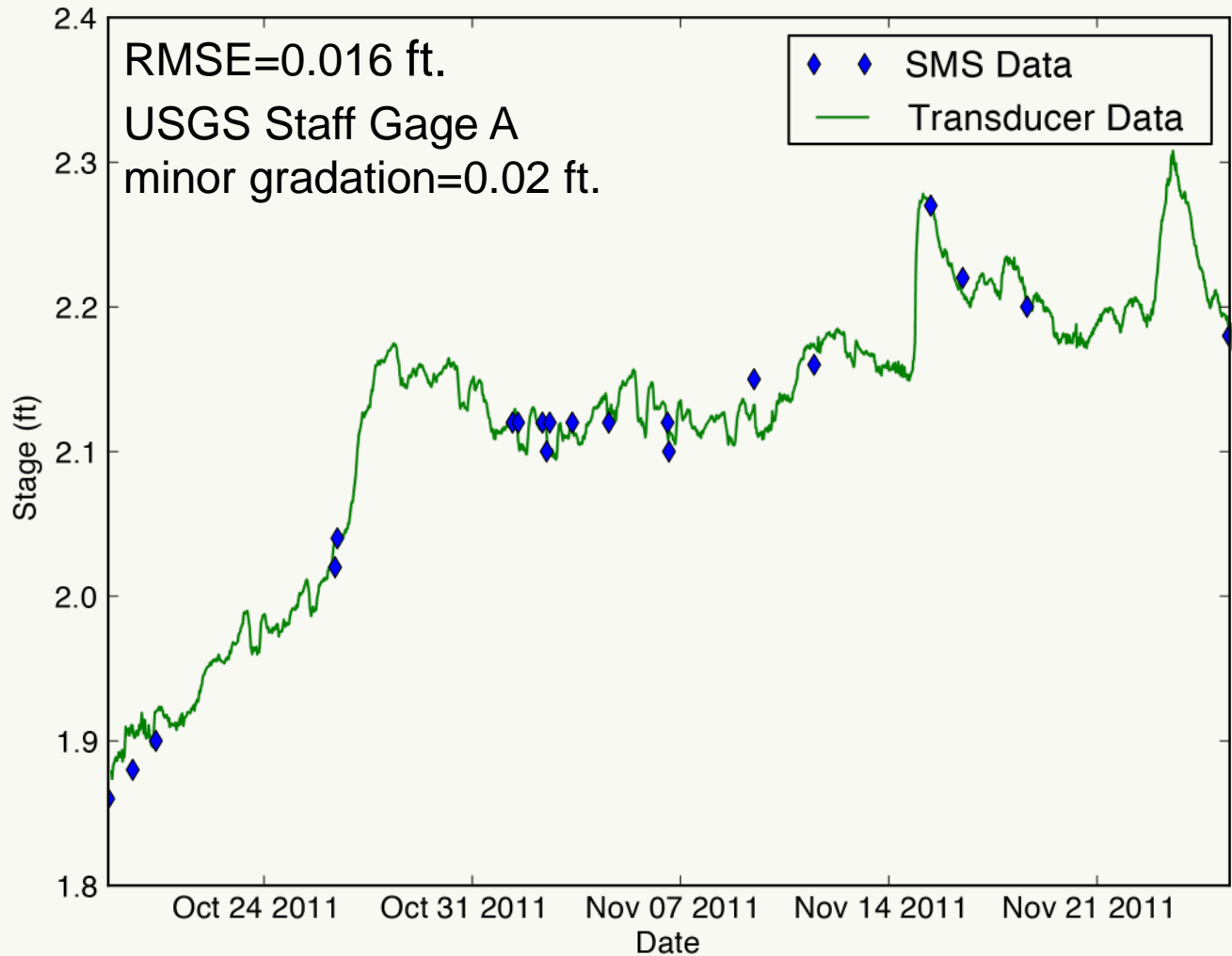




# 2011-2012 NY1000 History

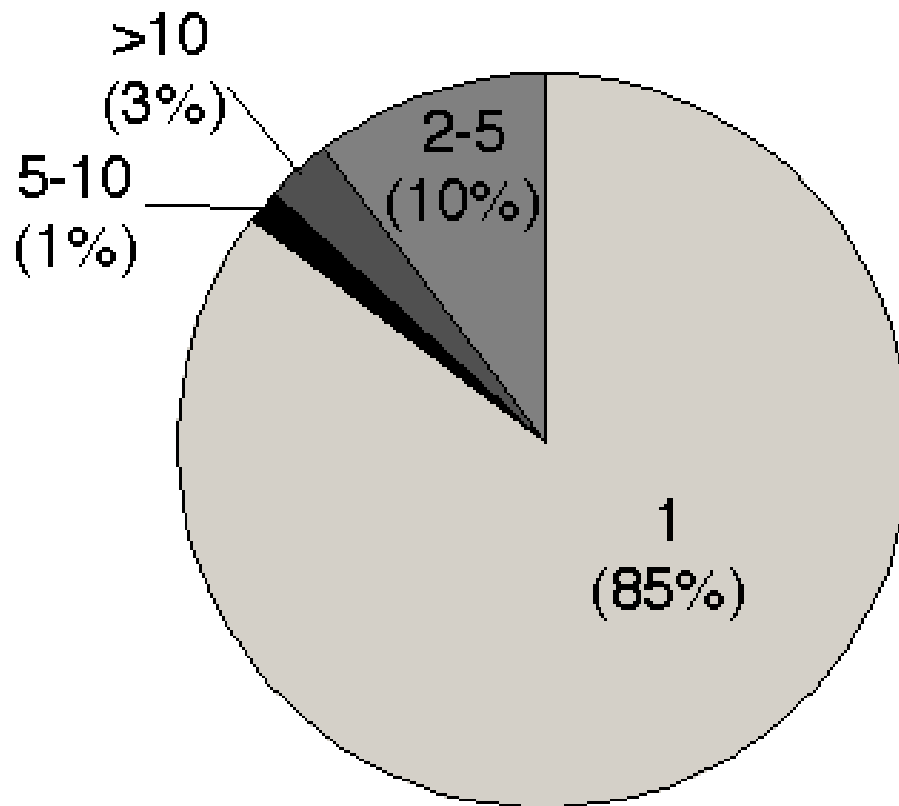


# 2011 NY1000 Validation

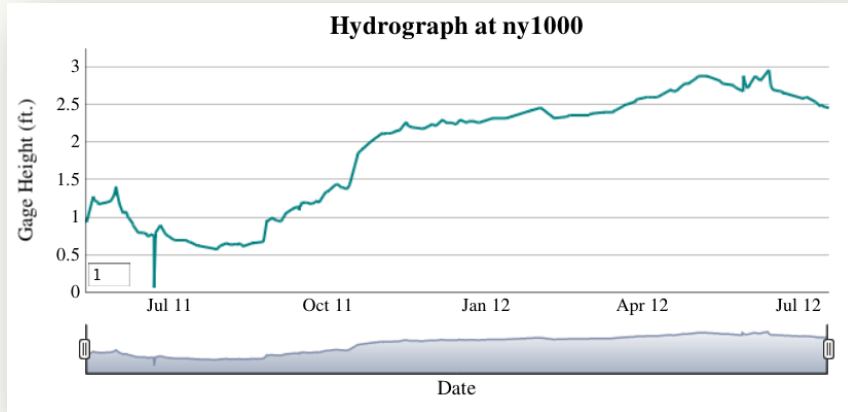


# Level of Participation and the Dr. Smith Effect

Number of Texts per Observer



# 2011 NY1000 History

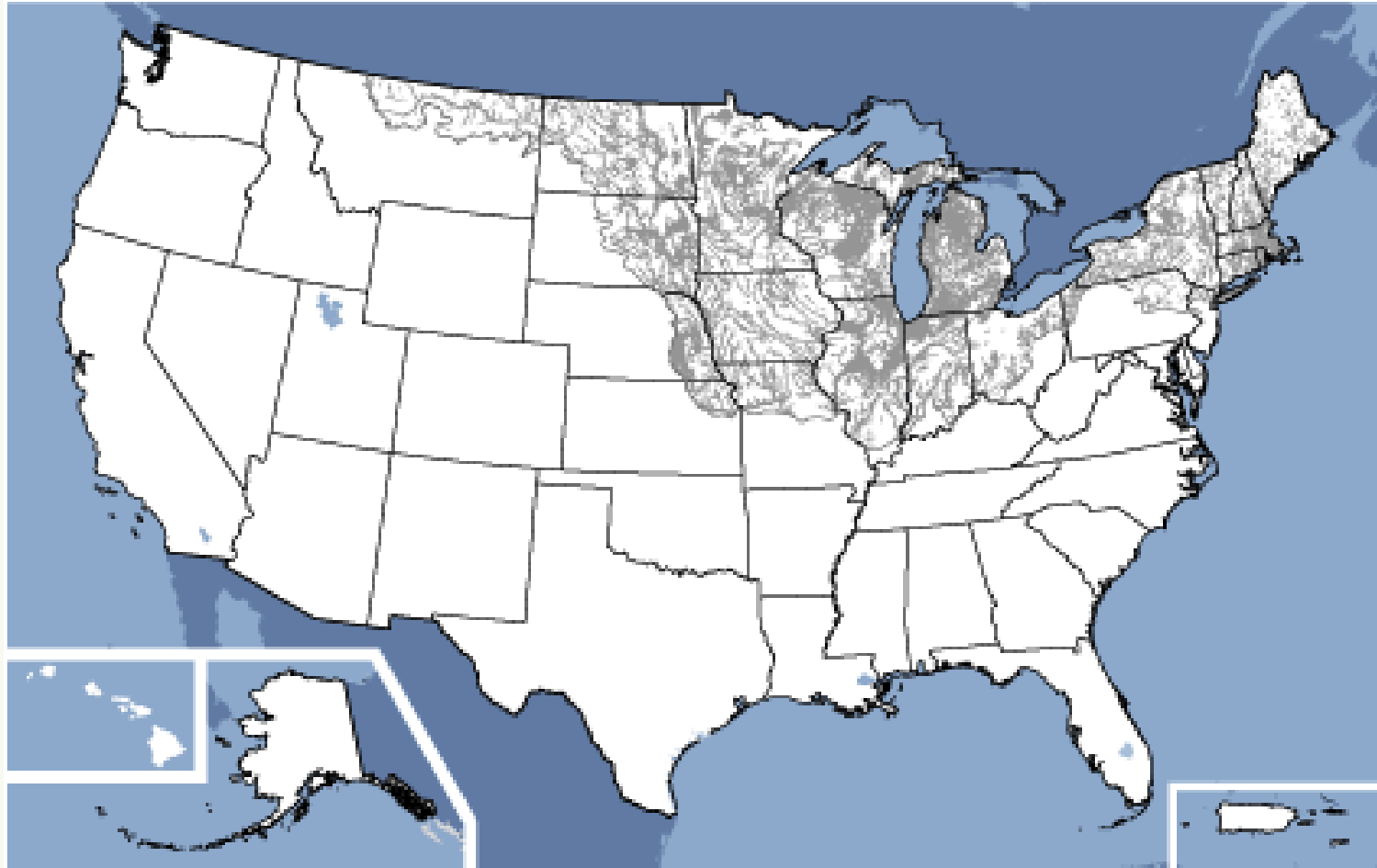


# Future Plans: Getting a hold on social aspects.

## Trout Lake Long Term Ecological Research Station USGS WEBB site



# Future Plans: Lakes and Streams in the Glacial Aquifer System



# Further Future Plans

Paper on CrowdHydrology published in *Ground Water*



Open-source Social.Water Code published on github



And documented in *Computers and Geosciences*



Madison Lake Clarity Project (Test and Text)

Smartphone App to also acquire photos?

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crowdsourcing hydrologic information may be a *secondary* source of data, but is a *primary* source of public engagement



# GSA 2012 Annual Meeting

## Charlotte, NC November 4-7, 2012

### T78 Citizen Science, Mobile Applications, and Geoscience (Posters)

The focus of this session will be to demonstrate the use and applications of both citizen science projects and mobile applications within the geosciences.

**ABSTRACTS DUE TUESDAY AUGUST 14, 2012**



# Questions?

Thanks to:

Chris Lowry, University at Buffalo

Laura De Cicco, USGS-CIDA Middleton,

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Dave Yearke, Loren Smith and Charlotte Hsu, SUNY Buffalo

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