

Water-Level Monitoring for Everyone

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11 March, 2019
MOXXI 2019
New York

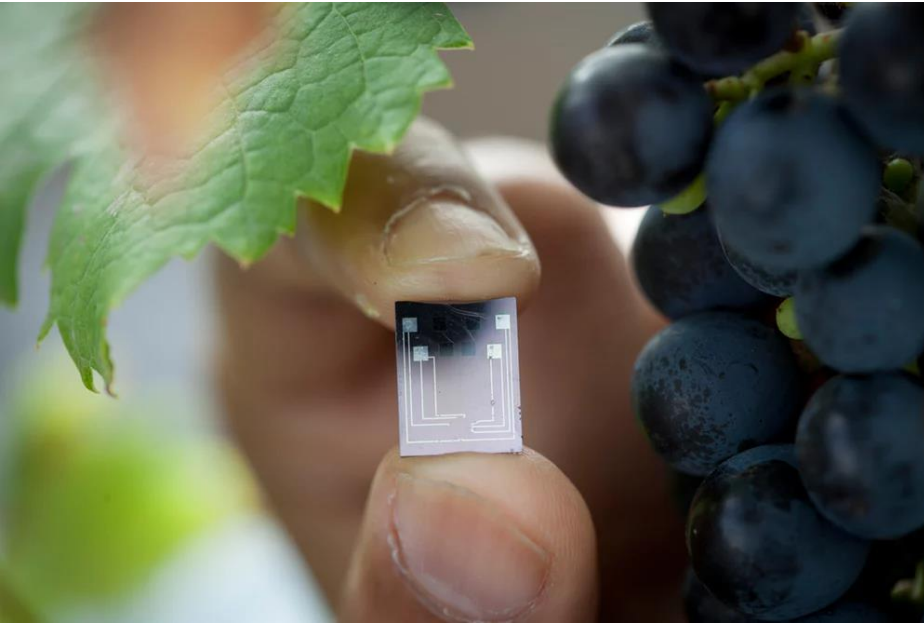


Gallatin Streams Team; <https://glwqd.org/stream-teams/>

What is CUAHSI (kuh – WAH – see)?

- CUAHSI is a non-profit consortium of about 140 U.S. academic institutions, non-profits, and international universities; also open to others.
- We do things no one institution could do alone for the water science community.
- We enable transparency in science and data, ensuring data are **F**indable, **A**ccessible, **I**nteroperable, and **R**eusable (FAIR).
- We support education at all levels.
- We work with academic institutions, agencies, industry, and citizen scientists.

Volunteer Monitoring, Citizen Science, and Crowd-Sourcing are Growing in Importance



**\$5 Soil Moisture Sensors with
~ three-year life expectancy**

<http://wetlandswatch.org/media/>
<http://www.pigeonairpatrol.com/>
<https://newatlas.com/agriculture-water-sensor-chip/29459/#gallery>

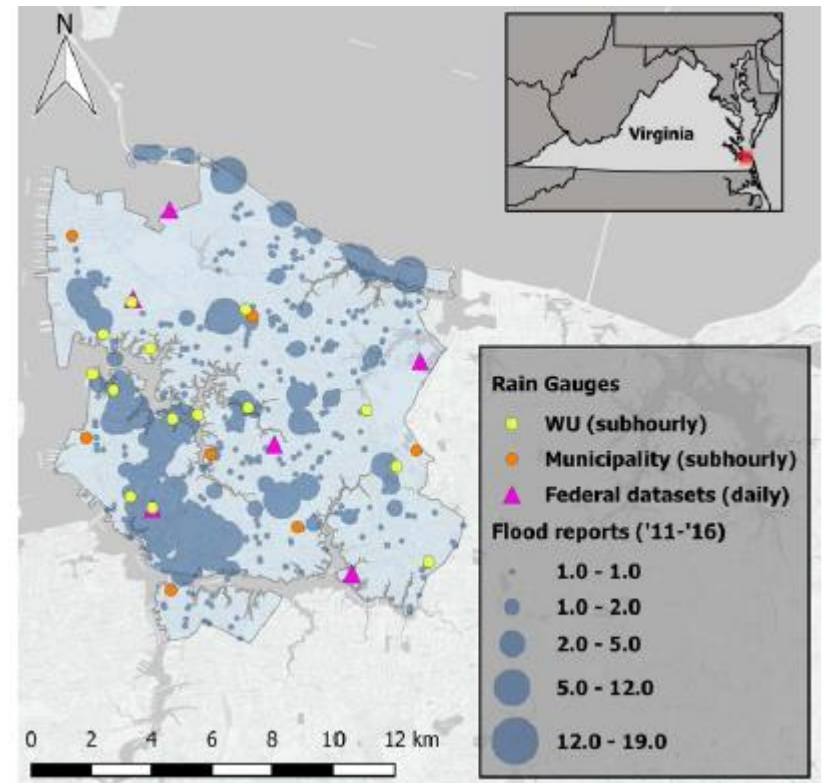


**Pigeons wearing backpacks
monitor No_x in London**

Smartphone App, Online Map Help Hampton Roads, Va. Pinpoint Flooding

The Sea Level Rise app and interactive storm-surge map enable the public to issue and receive information about waterlogged streets, while helping emergency managers better understand flood patterns.

BY TAMARA DIETRICH, TRIBUNE NEWS SERVICE / SEPTEMBER 24, 2014



**Crowd-Sourced Street
Flooding Information in Norfolk**

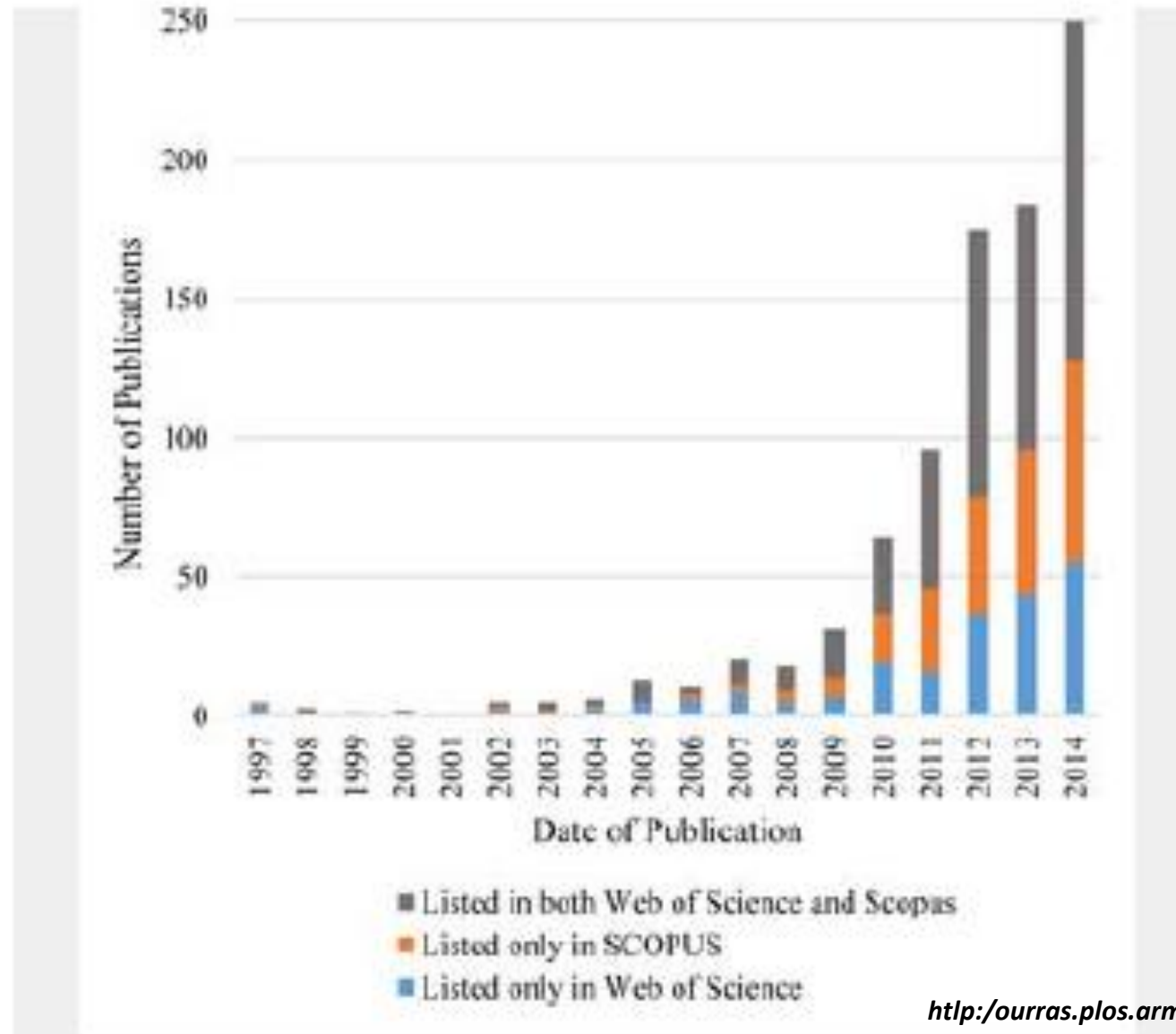
Volunteer Monitoring, Citizen Science, and Crowd-Sourcing are Growing in Importance

- Declining or flat agency budgets.
- New, robust, simple sensors.
- Apps for recording information and uploading data.
- Educated, engaged public.
- Incidental data.
- Machine learning for QA.



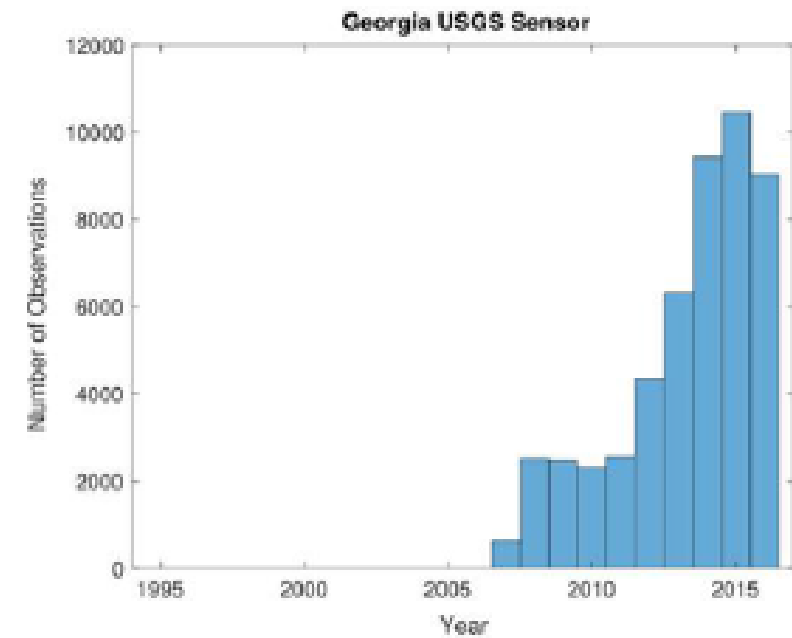
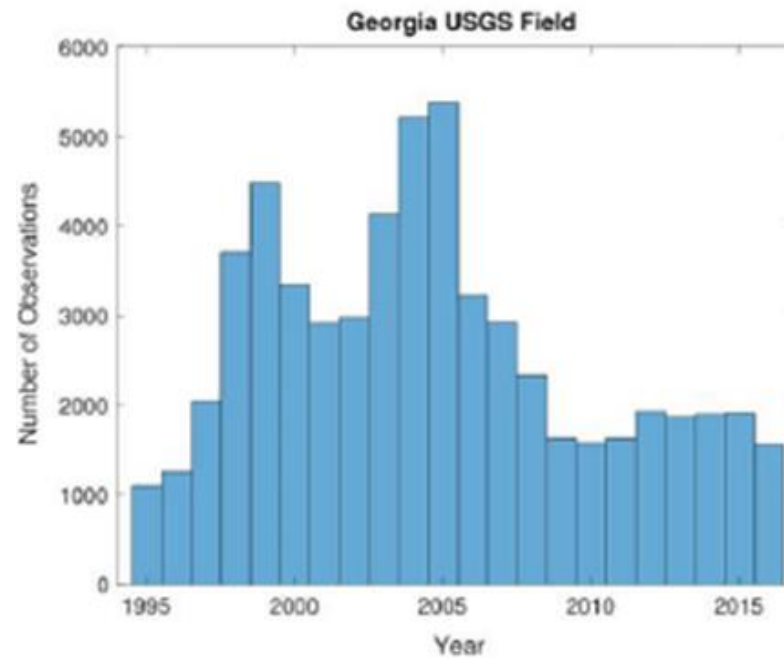
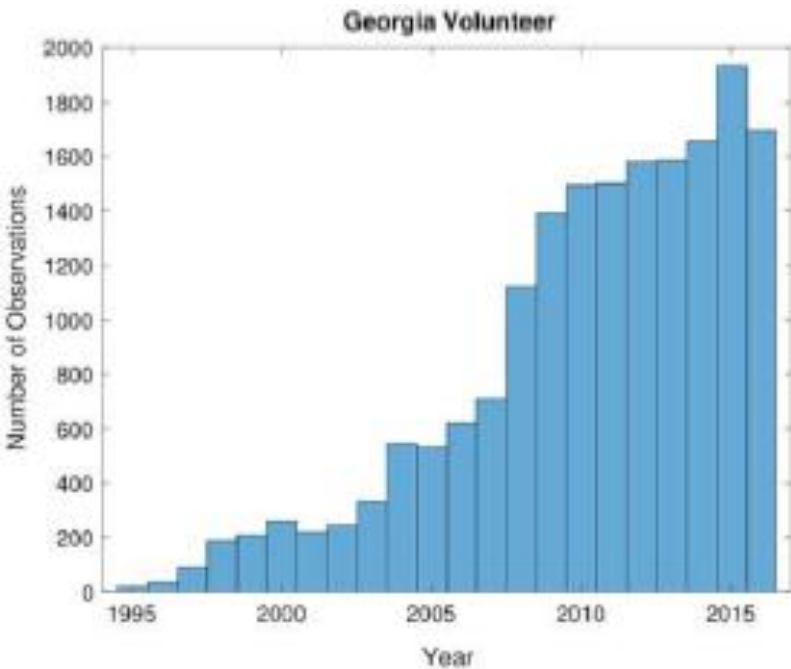
In Wisconsin 40 organizations monitor 800 sites

Volunteer Monitoring, Citizen Science, and Crowd-Sourcing are Growing in Importance



<http://ourras.plos.armiosanellride?id=10.1371ourra.pane.0143687>

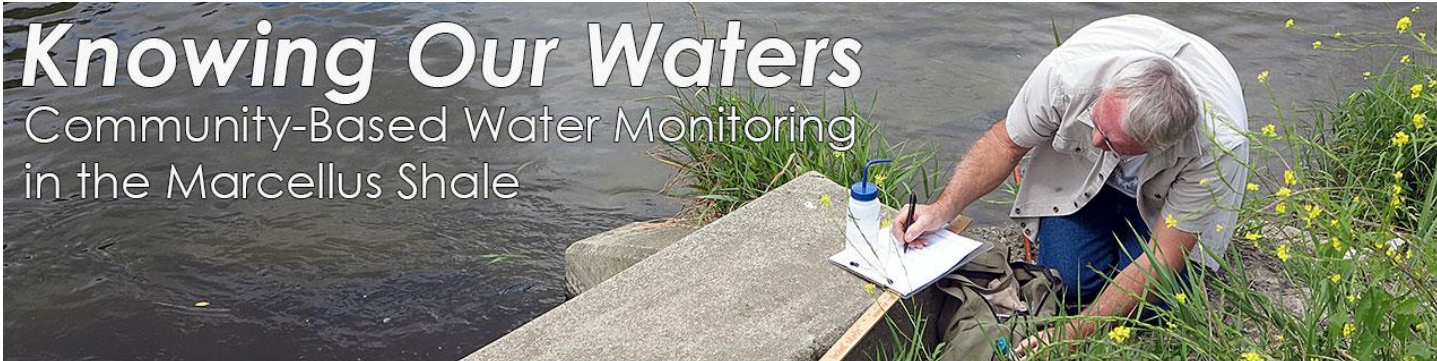
Volunteer Monitoring Equivalent to Agency Monitoring, but Automated Sensors Add New Capability



More Than 1,700 Volunteer Water-Quality Monitoring Organizations in the U.S.

Knowing Our Waters

Community-Based Water Monitoring
in the Marcellus Shale



Tip of the Mitt Watershed Council
Volunteer Water Quality Monitoring Programs

2015
REPORT



Local Volunteers
Monitor and Protect Our
Lakes and Streams



Starting a Volunteer Monitoring Program




Breann Hohman, Coordinator
Erie Soil and Water Conservation District

AT&T 3G 2:43 PM

Creek Watch Definitions

Photo



Take Photo

Data

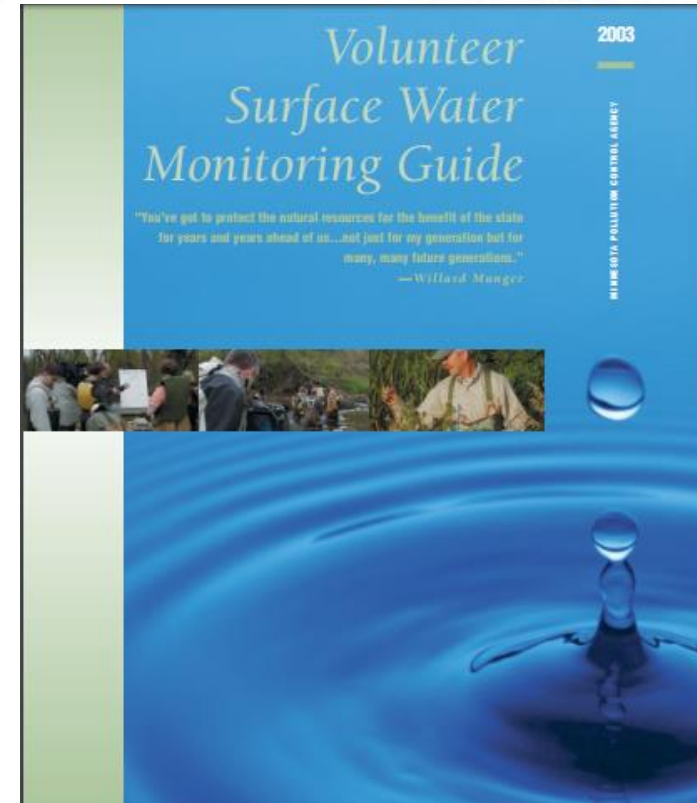
Water Level

Flow Rate

Trash

Save & Upload

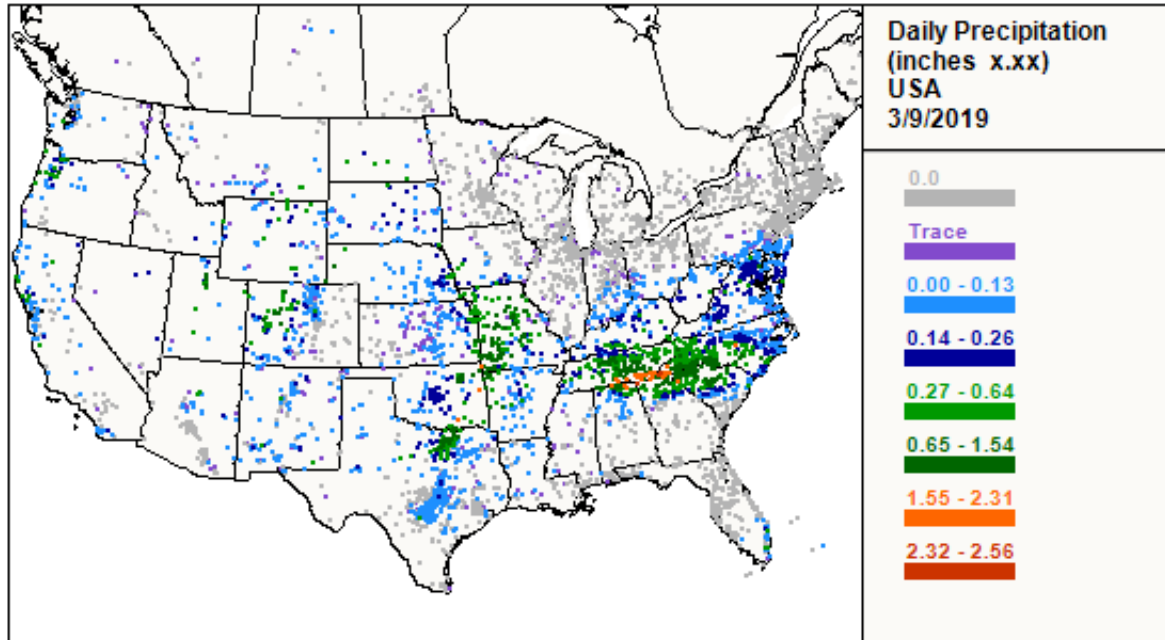
Report My Data Browse Instruction About





Reports received today 3/09/2019 as of 10:18 AM EST

Daily	Multi-day	SigWx	Hail	Condition	ET
5,931	47	1	9	36	7



iPhone Screenshots



- Established in 1998.
- More than 20,000 sites in all 50 US states, plus Canada and Bahamas
- Federal sponsorship.



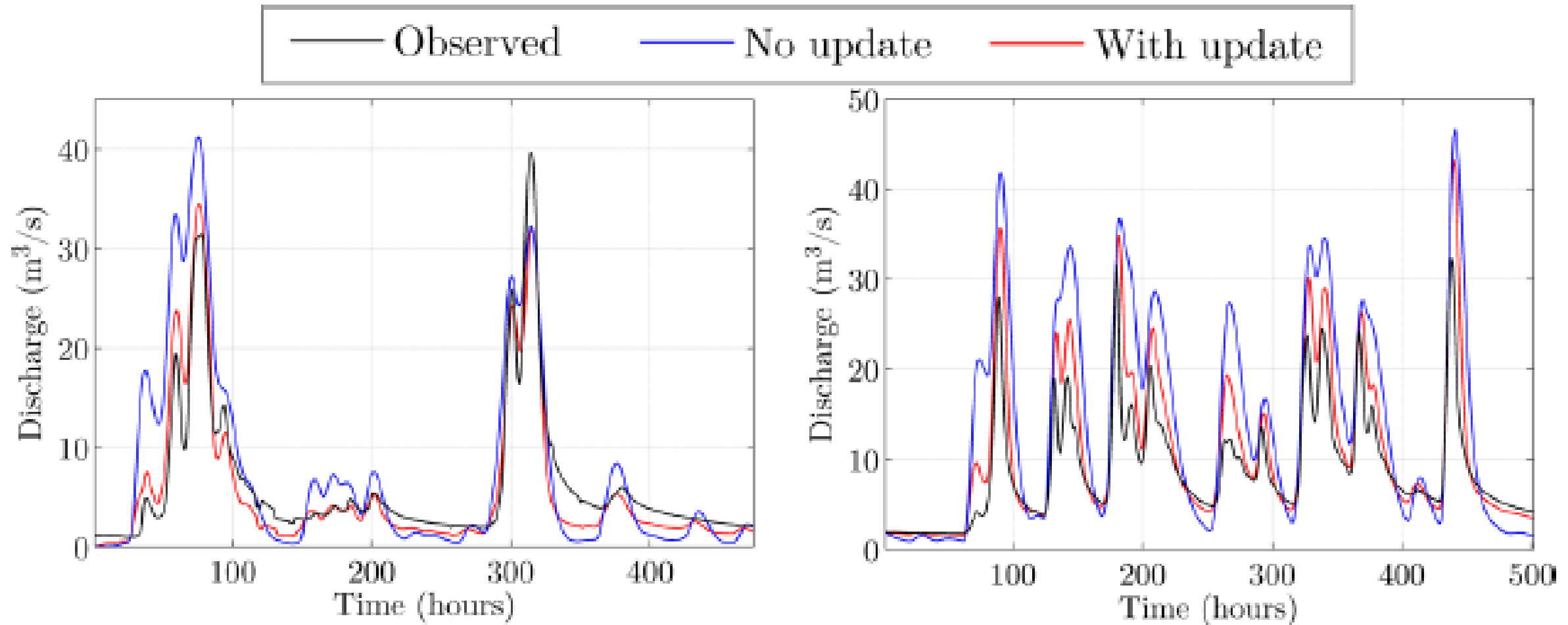
<http://www.crowdhydrology.com/>



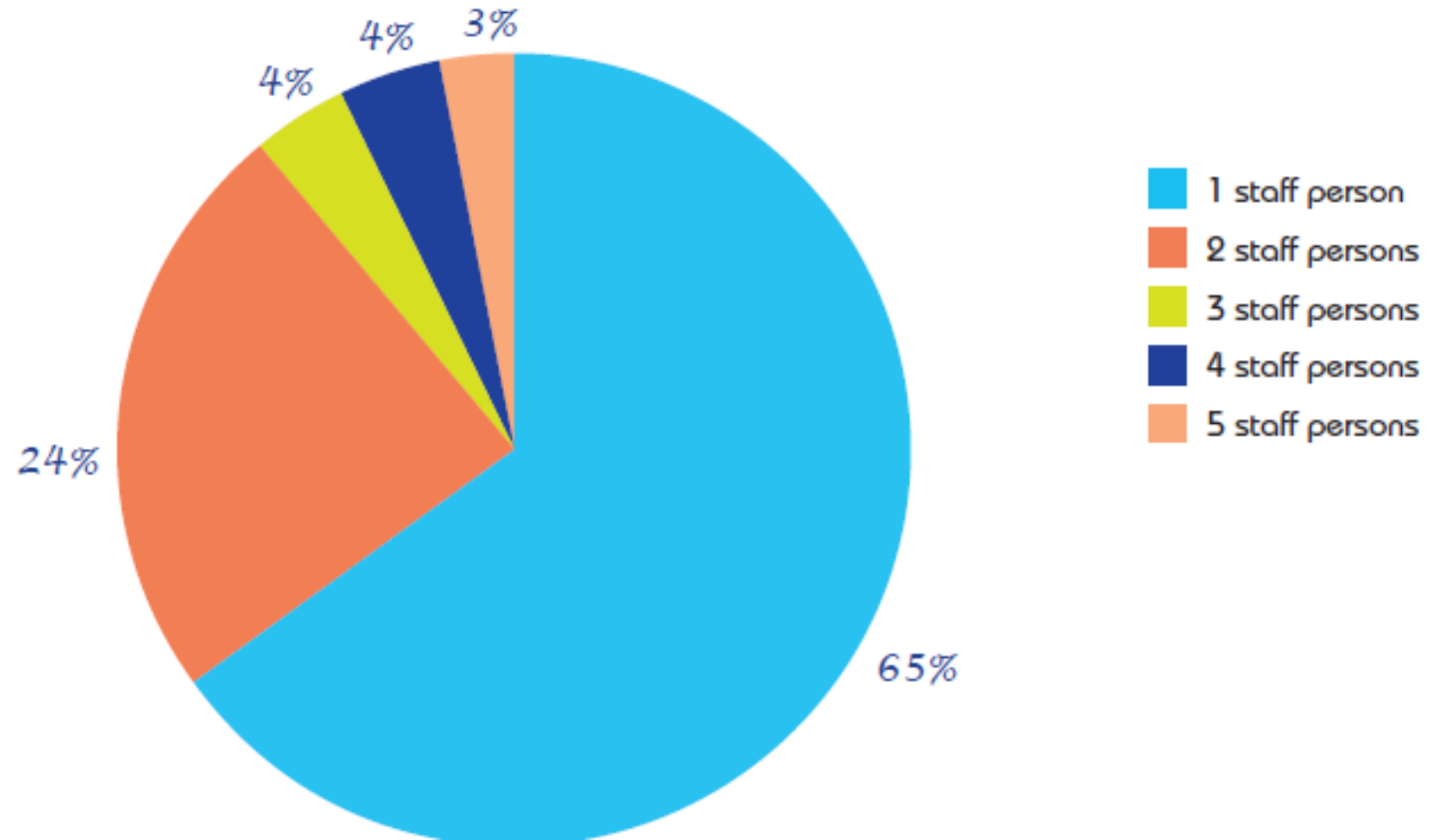
Welcome to the Mobile Hydrology citizen science application - where you can create your own history of water in your backyard, community, stream, spring, or lake, and join a global community of hydrology scientists and engineers who study and manage our water resources!



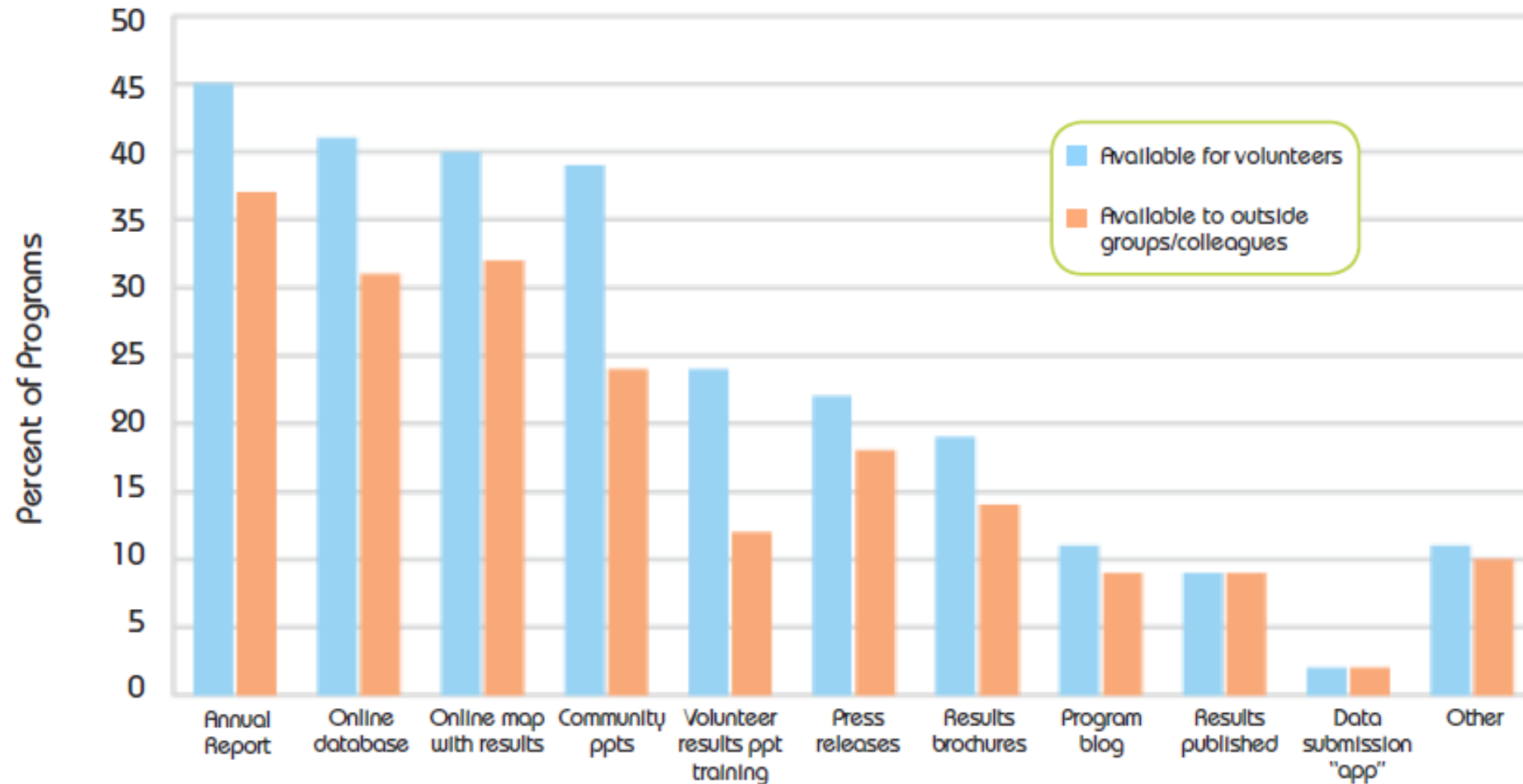
Volunteer Monitoring Data Can Improve Flood Forecasts



Volunteer Monitoring Organizations are Staff-Limited



Volunteer Monitoring Organizations are Staff-Limited, as are Data Sharing Capabilities



Publishing and Discovering Data with CUAHSI

- Format data to fit uploader template using controlled vocabulary database for required metadata.
- Upload data.
- Register service on CUAHSI Catalog.

Number of Data Sources	Properties Measured	Number of Time Series	Number of Locations	Number of Observations	Last Updated on
93	479	2,871,123	1,116,847	148,336,700,530	03/02/2019



First Time Publishers

Create New Publishing Account

Please notice that a Google account is required to create a publishing account. If you don't have a Google account, please request an account [here](#).

Existing Publishers

Login

Login with your Google account to access your existing database, where you can view, upload, and update data.

More Information

Help

<http://hiscentral.cuahsi.org/>
<https://www.cuahsi.org/data-models/publication/>

Data Publication and Discovery are Keys to Data Reuse and New Information

The screenshot displays the CUAHSI HydroClient interface. At the top, the CUAHSI logo and 'HYDROCLIENT' text are on the left, while navigation buttons for 'Workspace', 'About', 'QuickStart', and 'Sign in with Google' are on the right. A search bar at the top left contains 'boston, ma'. The main area is a map of the Boston region, overlaid with many blue circular markers, each containing a number. A 'Layer Control' dropdown is visible in the top right of the map area. On the right side, there is a sidebar with search filters: 'Data Service(s)...' with an 'All' option, 'Keyword(s)...' with a 'Chemical' option, and 'Advanced Search...' with an 'All' option. Below these is a 'Search Now' button. Further down, a 'Time Series Found' section shows '1,837' results. At the bottom of the sidebar is a 'Filter Results' button. A 'Help' button is located at the bottom right of the interface. The map includes a scale bar (5 km) and coordinates (Latitude: 42.205, Longitude: -71.749) at the bottom center.

CUAHSI
HYDROCLIENT

Workspace About QuickStart Sign in with Google

boston, ma

Layer Control

Data Service(s)...
◦ All

Keyword(s)...
◦ Chemical

Advanced Search...
◦ All

Search Now

Time Series Found

1,837

Filter Results

Help

Map Hybrid

Latitude: 42.205 Longitude: -71.749

Map data ©2017 Google 5 km

Data Publication and Discovery are Keys to Data Reuse and New Information

Search Results near: Dover, MA 02030, USA



Workspace

Exports










Selections ▾

Select Action ▾

Selection Help

Find in Table:

Publisher	Service Title	Keyword	Site Name	Data Type	Value Type
Charles River Water...	 - Charles River...	Ammonia	Rt. 109 Bridge, Ded...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	Nitrogen, nitrite (NO...	Rt. 109 Bridge, Ded...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	Nitrogen, total	Rt. 109 Bridge, Ded...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	Nitrogen, total kjeldahl	Rt. 109 Bridge, Ded...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	pH	Rt. 9 Gaging Statio...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	pH	Nahanton Park, Ne...	Regular Sampling	Sample
Charles River Water...	 - Charles River...	pH	Greendale Ave/Lyo...	Regular Sampling	Sam

Help

Data Publication and Discovery are Keys to Data Reuse and New Information



- Share data and models with colleagues.
- Manage access to the shared content.
- Share, access, visualize and manipulate hydrologic data and models.
- Use the web services API to program automated client access.
- Formally publish data and models.
- Discover and access data and models published by others.
- Use web apps to visualize, analyze and run models using data in HydroShare.



Thank you
Jerad Bales
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CUAHSI
UNIVERSITIES ALLIED FOR WATER RESEARCH

Brochdale, England, 2001
<http://www.euwfd.com/html/groundwater.html>