

The Water Data Collaborative: Citizen Science Monitoring Data and Data Sharing

Webcast sponsored by EPA's Watershed Academy



Thursday, May 9, 2019, 1:00pm – 3:00pm Eastern

Speakers:

- **Samantha Briggs**, Acting Clean Water Program Director, Izaak Walton League of America (IWLA)
- **John Dawes**, Executive Director, Chesapeake Commons
- **Emily Wiggans**, GIS Analyst, Chesapeake Conservancy

Webcast Logistics

- **To Ask a Question** – Type your question in the “Questions” tool box on the right side of your screen and click “Send.”
- **To Report any Technical Issues** (such as audio problems) – Type your issue in the “Question” tool box on the right side of your screen and click “Send” and we will respond by posting an answer in the “Questions” box.
- **Slides & Recording** – The slides are posted and a recording will be available within 2-3 weeks. <https://www.epa.gov/watershedacademy/lessons-learned-integrating-water-quality-and-nature-based-approaches-hazard>
- **Certificate of Attendance** – a certificate of attendance will be available at the end of the webcast. We will provide directions to retrieve this at the end of the webcast.

Speakers

- **Samantha Briggs**, Acting Clean Water Program Director, Izaak Walton League of America (IWLA)
- **John Dawes**, Executive Director, Chesapeake Commons
- **Emily Wiggans**, GIS Analyst, Chesapeake Conservancy



SUPPORTING COMMUNITY WATER SCIENCE

Samantha Briggs
Izaak Walton League of America
sbriggs@iwla.org



SUPPORTING COMMUNITY WATER SCIENCE



Why a Water Data Collaborative?

- **Integration** – Build a cooperative program between NGOs, water technology developers, and open data stewards to inform integrated technology innovations
- **Engagement** – Engage existing networks of community water scientists to design support that meets needs and reaches groups effectively
- **Inclusion** – Represent the valuable NGO data community to open water data efforts



Pisces Foundation Objectives

Access: Public has access to data collection tools to supplement government data with their own.

Share: Data collectors (governmental, academic and citizen science) can share and understand each other's data.

Use: Tools are available to turn data into *actionable* decision making to protect and restore freshwater resources.



Water Data Collaborative

Goal:

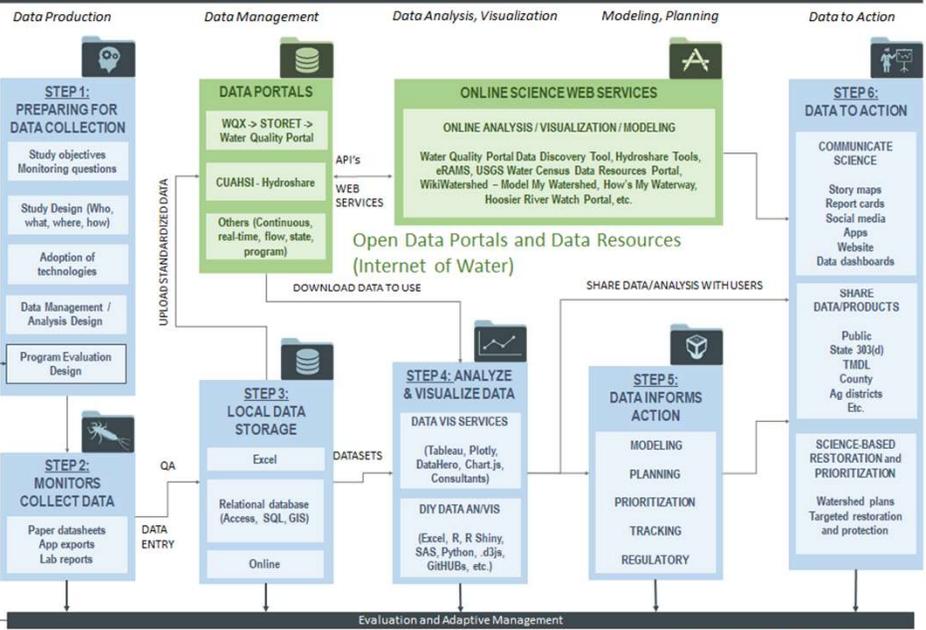
Increase the quality, accessibility, and use of NGO-collected water data

- Create a collaborative network of support for community water science
- Improve the data infrastructure that supports NGOs and community water science
- Increase adoption of best-practice resources, and technologies



A Citizen Water Science Framework: Powered with Open Data and Technologies

- 1) Document Existing Resources
- 2) Demonstrate the role of open data resources
- 3) Organize and guide access to resources

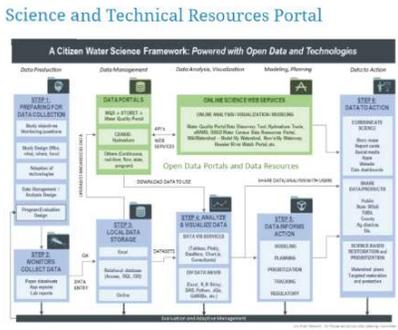


Adam Griggs - Water Data Collaborative, Life River Network



Catalogue Water Science Resources

- Our Work
- Ample Water
 - Strong Champions
 - Clean Water
 - How We Help
 - Catalyzing Policy Change
 - Providing Science Support
 - Science and Technical Resources Portal
 - Data Visualization
 - Monitoring and Data Production
 - Accessing and Sharing Data Online
 - River Science Connection
 - Networking & Learning
 - Best Practices
 - Impact Stories
- DONATE
- CONTACT US
- SEE THE MAP



- Monitoring and Data Production
- Find resources and information on monitoring study design, quality assurance, methods and equipment for monitoring, and discover new technologies changing how data is being collected.
- Data Management and Storage - Coming Soon!
- Find guidance for developing data management plans.
 - Learn about different database options and research options that fit your data management needs.
- Accessing and Sharing Data Online
- Discover and learn how to use data resource portals from federal, state, university, and NGO partners.

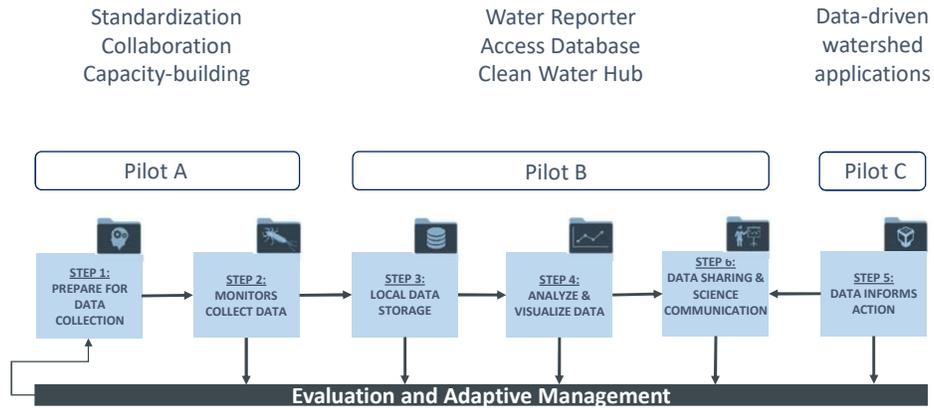
www.waterdatacollaborative.org



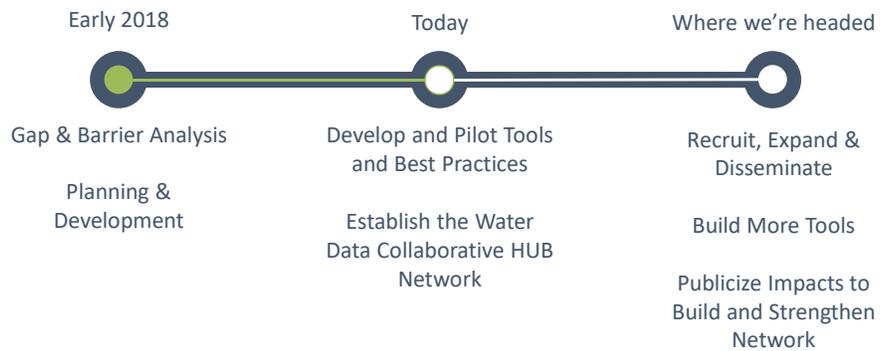


Building New Tools

1) Addressing gaps and barriers to adoption



Water Data Collaborative



Beginning with the End in Mind: Tools from the Water Data Collaborative for Effective Program Planning from the Water Data Collaborative



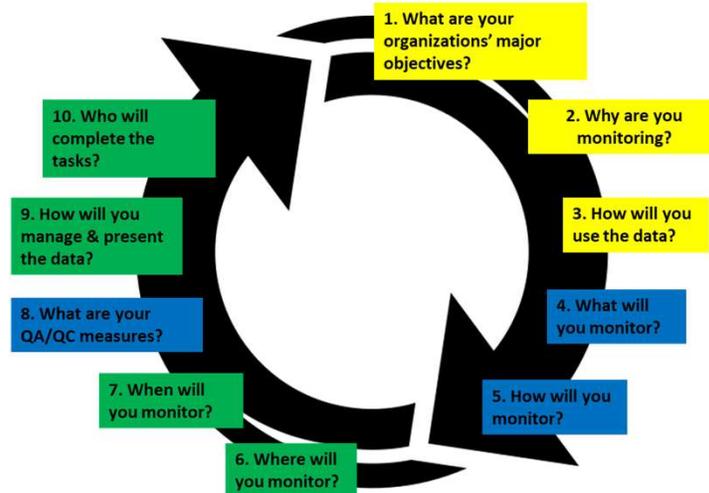
Samantha Briggs
Izaak Walton League of America
sbriggs@iwla.org

The Typical Problems for Volunteer Monitoring Groups:

- Effective/complete Study Design
- Choosing the correct protocol for your needs
- Navigating data solutions and data sharing



Study Design Process – the most important step!



River Network

Why is a study design needed?



- Focus
- Clearly articulated methods
- Scientific process
- QA/QC
- Continuity
- Data use pipeline



Study Design Resources – they exist!

- Tons of resources with National Water Quality Monitoring Council
- QAPP Resources – EPA, River Network
- ALLARM Study Design Manual
- ...and more!

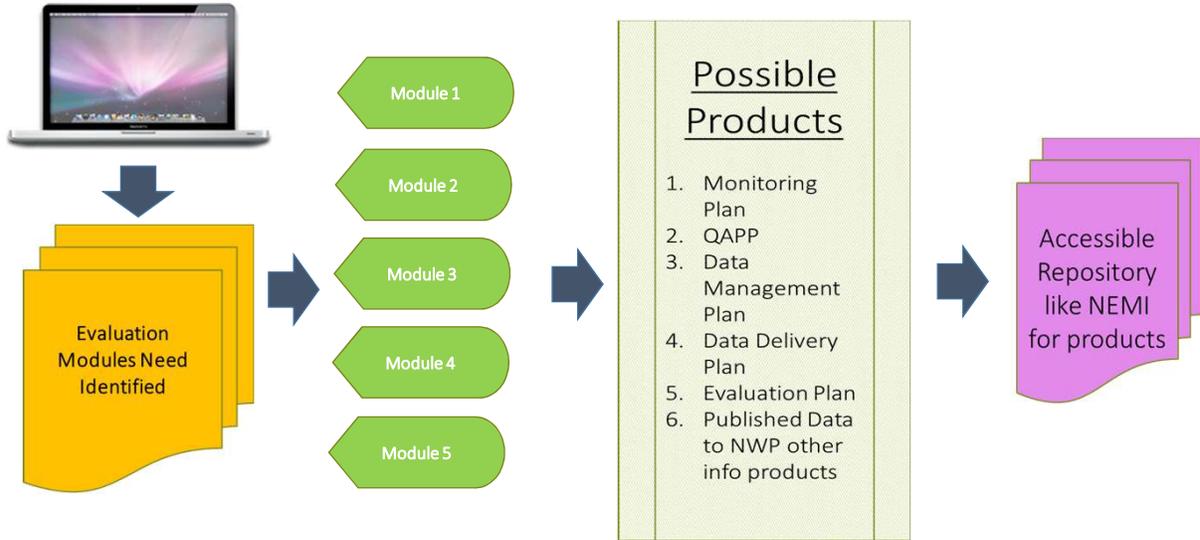


The Water Data Collaborative's Solution:

Meeting people where they are!



Study Design Guidance Modules



Module 1: Evaluating Where You Are



What have you documented?

What pieces are missing?



Module 2: Program Design: the who and the why



Module 2: Program Design: the who and the why



272 Stations
69 Samples
15 Organizations
67 Members

National Water Quality Monitoring Council
Working together for clean water

Water Quality Data

WQP Home Download Data How to use the WQP National Results Coverage About the WQP

Reset form

LOCATION

Place:

Point Location: ? Bounding Box: ?

Within miles of

North:

South:

Lat:

East:

Long:

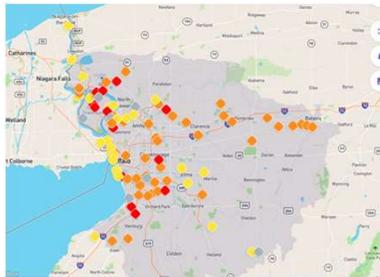
West:

Use my location

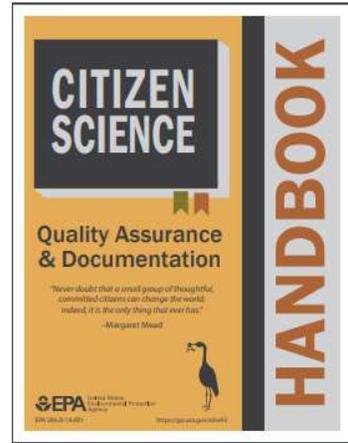


Module 3: Technical Design:

the what, when, where, data quality and management

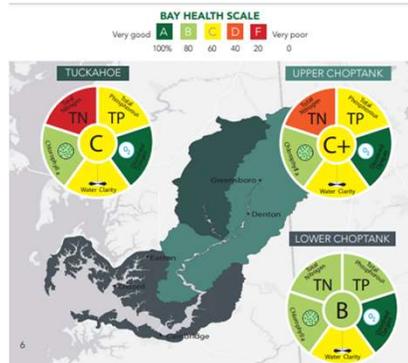


Dec_Lat	Dec_Long	County Name	DEQ_Of_Group	mon_date
38.91667	-78.18740	Warren	Group	7/15/2018
38.33279	-77.61132	Spotsylvania	Rappahannock Chapter TWL	11/13/2018
38.33287	-77.61265	Spotsylvania	Rappahannock Chapter TWL	12/12/2018
38.93583	-77.87060	Fauquier	Goose Creek	5/24/2018
38.93583	-77.87060	Fauquier	Goose Creek Association	10/30/2018
38.96228	-78.02970	Fauquier	Goose Creek Association	10/30/2018
38.93306	-77.89060	Fauquier	Goose Creek Association	5/26/2018
38.93306	-77.89060	Fauquier	Goose Creek Association	10/31/2018
38.93306	-77.80780	Fauquier	Goose Creek Association	5/28/2018
38.93306	-77.80780	Fauquier	Goose Creek Association	10/31/2018
39.03083	-77.87030	Leeson	Goose Creek Association	5/11/2018
39.03083	-77.87030	Leeson	Goose Creek Association	9/21/2018
38.96322	-77.33250	Fairfax	Reston Association Volunteer	2/23/2018
38.96322	-77.33250	Fairfax	Reston Association Volunteer	4/22/2018
38.96322	-77.33250	Fairfax	Reston Association Volunteer	8/5/2018
38.96322	-77.33250	Fairfax	Reston Association Volunteer	11/10/2018
39.19020	-77.61490	Leeson	group	10/14/2018
39.09555	-77.54240	Leeson	group	10/6/2018
39.09555	-77.54240	Leeson	group	5/14/2018
38.93920	-77.37140	Fairfax	Reston Association Staff ans	2/27/2018
38.93920	-77.37140	Fairfax	Reston Association Volunteer	4/29/2018
38.93920	-77.37140	Fairfax	Reston Association Staff ans	7/28/2018
38.93920	-77.37140	Fairfax	Reston Association Volunteer	10/6/2018
38.97880	-77.36440	Fairfax	Reston Association Volunteer	2/26/2018
38.97880	-77.36440	Fairfax	Reston Association Volunteer	4/23/2018
38.97880	-77.36440	Fairfax	Reston Association Volunteer	8/15/2018
38.97880	-77.36440	Fairfax	Reston Association Volunteer	10/24/2018
38.96194	-77.32360	Fairfax	Reston Association and Veh	1/13/2018
38.96194	-77.32360	Fairfax	Reston Association Staff ans	4/23/2018
38.96194	-77.32360	Fairfax	Reston Association and Veh	11/4/2018
38.95700	-77.33340	Fairfax	Reston Association Staff	2/28/2018
38.95700	-77.33340	Fairfax	Reston Association Staff ans	4/23/2018
38.93177	-77.26980	Fairfax	Northern Virginia Sol and W	7/28/2018
38.93823	-77.32240	Fairfax	Reston Association Staff	4/23/2018
38.93823	-77.32240	Fairfax	Reston Association staff ans	8/19/2018
38.93823	-77.32240	Fairfax	Reston Association and Veh	10/20/2018
38.92990	-77.34590	Fairfax	Reston Association Staff	2/21/2018



Module 4: Information Design:

Data to Information through Analyses, Interpretation, Reporting & Communicating



Module 5: Evaluation Design:

Will it work and how will I know?

- Communication
- Adoption
- Surveys
- QA/QC
- Evidence of data use



Study Design Tools from the WDC – stay tuned!

An online platform that connects monitoring groups nationwide with a streamlined study design process



Study Design Tools from the WDC – stay tuned!

- Training tools – videos, worksheets, evaluations, etc.



Fish and other aquatic life need oxygen like we do -- they just
6.2K views · October 3, 2018



Clean Water Minute with Sam Briggs, IWLA Save Our Streams
7.8K views · September 26, 2018



Clean Water Monitoring S
75 views · M:



Study Design Tools from the WDC – stay tuned!

Connection to service providers, such as NEMI, state contacts, other vol mon groups, and contacts from the WDC to help fill gaps in your program

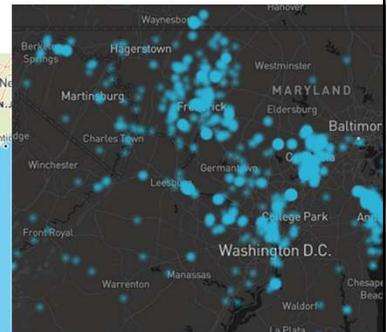


NEMI
National Environmental Methods Index



Study Design Tools from the WDC – stay tuned!

- Guidance for data management and use – Clean Water Hub, Distributed Database, Water Reporter, etc.



www.waterdatacollaborative.org



HOME ABOUT STEERING COMMITTEE RESOURCES NEWS CONTACT

Contact

Stay in touch with us and our efforts!

Name *

First

Last

Email *

Organization *

State *

Please select all that apply

- I or my organization may be interested in participating as a hub for citizen science information in the future
- I or my organization may be interested in becoming a part of the Water Data Collaborative Steering Committee in the future

Thank You!

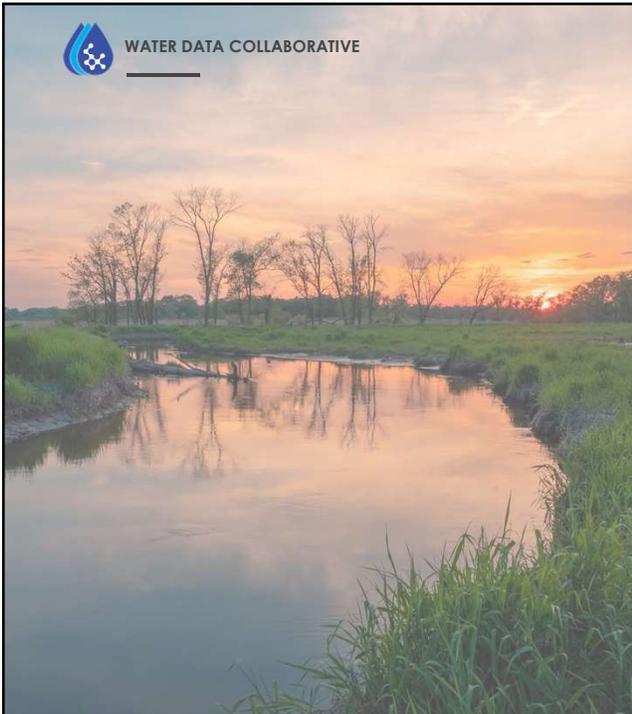


sbriggs@iwla.org

Water Data Collaborative:
<https://waterdatacollaborative.org>



WATER DATA COLLABORATIVE



WATER DATA COLLABORATIVE



**Unifying Volunteer Water
Quality Information with
Modern Software**

Watershed Academy Webcast - 5/9/19
John R. Dawes

Watershed Academy Webcast | 5.9.19



01 Defining the Why

Exploration of new ways to think about study design and building support for an outcome driven monitoring program.



Bloodlines
of our
nation





3.5

million miles
of streams
across the
U.S.



1 in 3

of us get
drinking water
from streams
affected by
the Clean
Water Rule





WATER DATA COLLABORATIVE

357

thousand
miles of
streams are
public water
systems

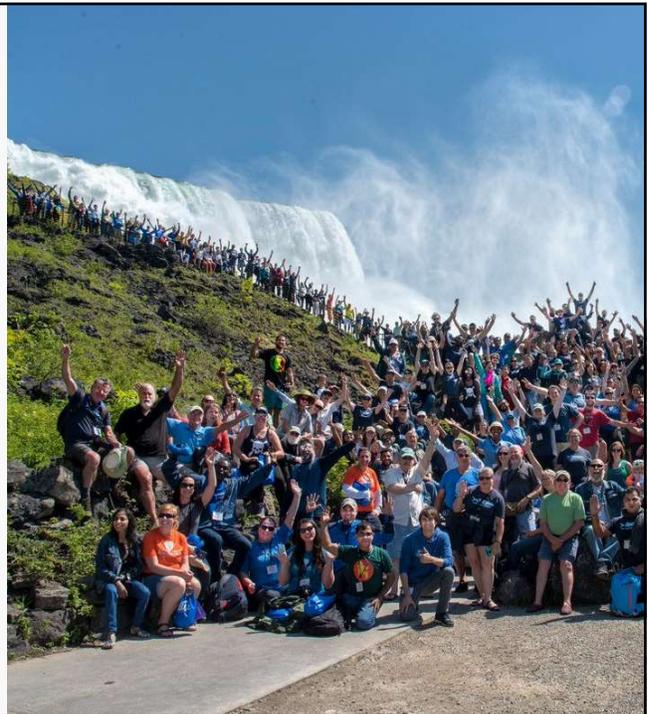


Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE

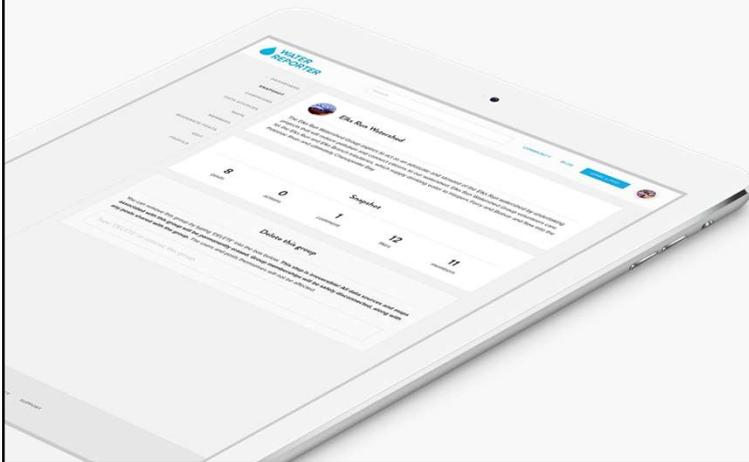
**“Our Technology is
a bridge to making
environmental
issues resonate with
thousands inside
and and outside the
choir”**





02 Monitoring 2.0

Meeting volunteers where they are. Integrating modern technologies into volunteer monitoring programs



Engagement strategies must modernize

In order to retain existing and convert new monitors, our tools must emulate the user experiences they interact with on a daily basis.



Simple and Interoperable

Modern software supporting these efforts should be built to enhance specific use cases and have a clear value proposition

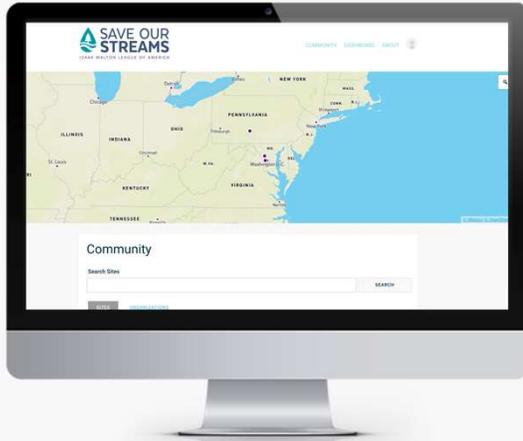


03 Case Studies and Tools

Data-driven approaches to tell the story of your watershed and program. The importance of machine readable data.



WATER DATA COLLABORATIVE



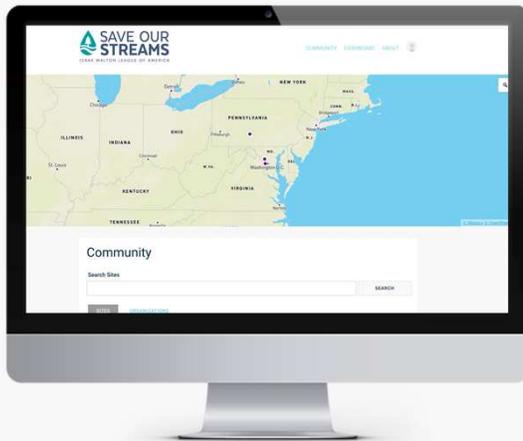
The Clean Water Hub

Easily bring online new or existing monitoring sites, manage your group, and collect data of a known quality.

Watershed Academy Webcast | 5.9.19



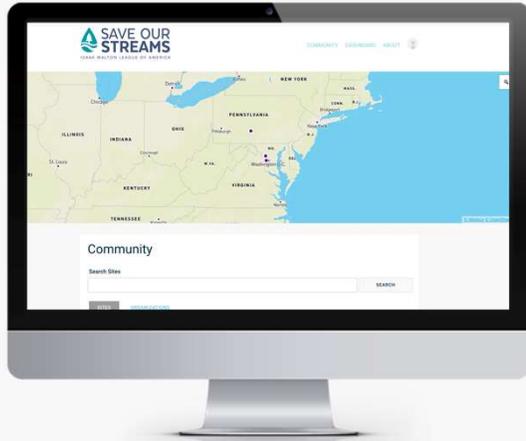
WATER DATA COLLABORATIVE



The Clean Water Hub

Manage macro invertebrate counts on your own map. Invite members of your monitoring team to your organization.

Watershed Academy Webcast | 5.9.19



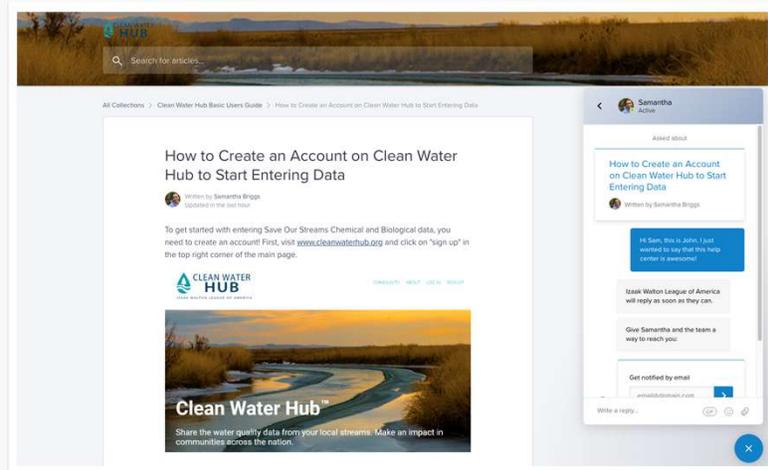
The Clean Water Hub

Coming Soon: Automatically integrate your monitoring data with federal data stores such as the Water Quality Exchange.



Help Center and Clean Water Minute

Empowering users with chat support, helpful videos, and searchable documentation



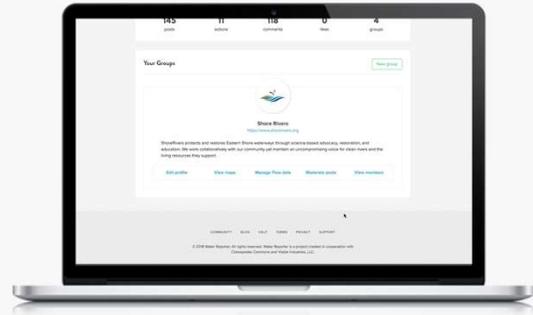


WATER DATA COLLABORATIVE

Water Reporter Data Sources

#01

Manage WQM data in one place



Watershed Academy Webcast | 5.9.19

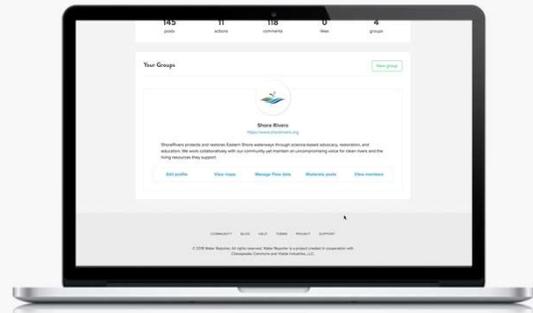


WATER DATA COLLABORATIVE

Water Reporter Data Sources

#02

Configurable station scoring



Watershed Academy Webcast | 5.9.19

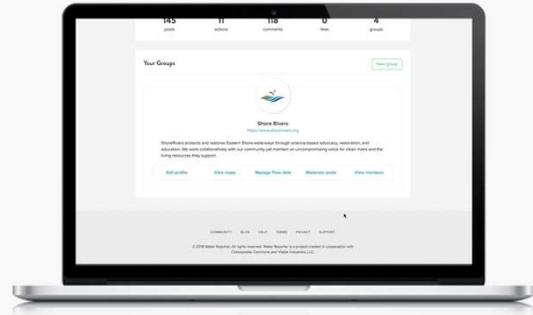


WATER DATA COLLABORATIVE

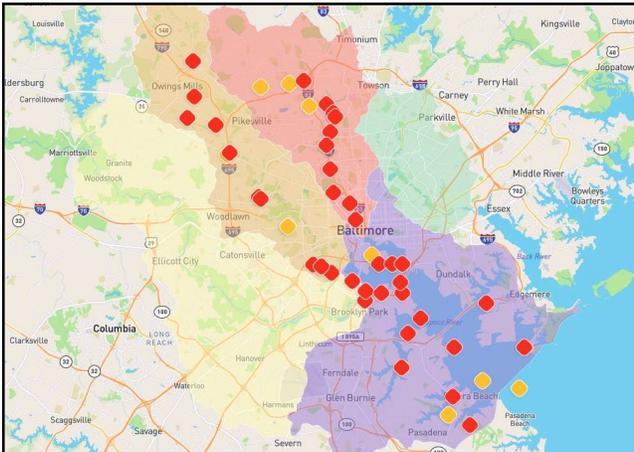
Water Reporter Data Sources

#03

Add live station maps in your website



Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE



33k readings, 49 sites, 7 years. Tracking State Water Quality Standards with Water Reporter Data Sources



Data Sources



Maps



Indicators

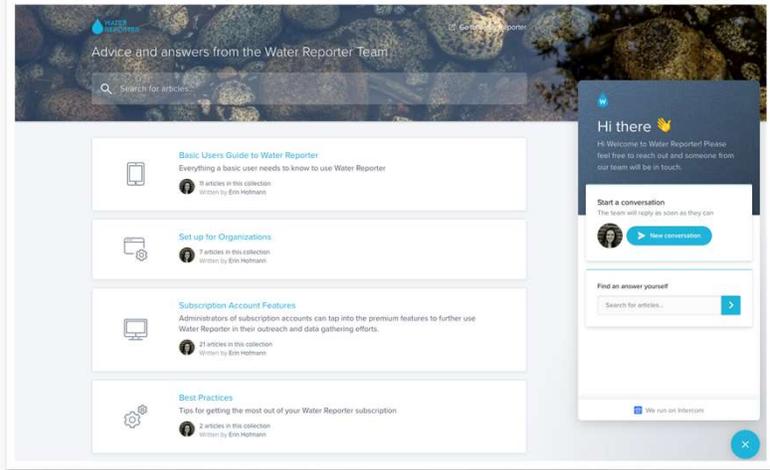
Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE

Help Center and Material Production

Empowering users with chat support, helpful, searchable documentation, and marketing materials.



Watershed Academy Webcast | 5.9.19



Get involved with #WinterSaltWatch

With your chloride test strips, you can help us to identify the extent of the issue and begin to take action to find smarter solutions that take into account our safety and the safety of our streams.

Main contact:
Samantha Briggs
Save our Streams Manager
sbriggs@iwl.org

Visit us at:
<https://www.iwla.org/conservation/water/winter-salt-watch>

What's the Dirt on Winter Road Salt?

Road salt is everywhere during winter months. It keeps us safe on roads and sidewalks, but it can also pose a threat to fish and wildlife as well as human health.

Fish and bugs that live in freshwater streams can't survive in extra salty water. And many of us (more than 118 million Americans) depend on local streams for drinking water. Water treatment plants are not equipped to filter out the extra salt, so it can end up in your tap water and even corrode your pipes.

PROTECT YOUR STREAMS AND YOUR ROADS THIS WINTER

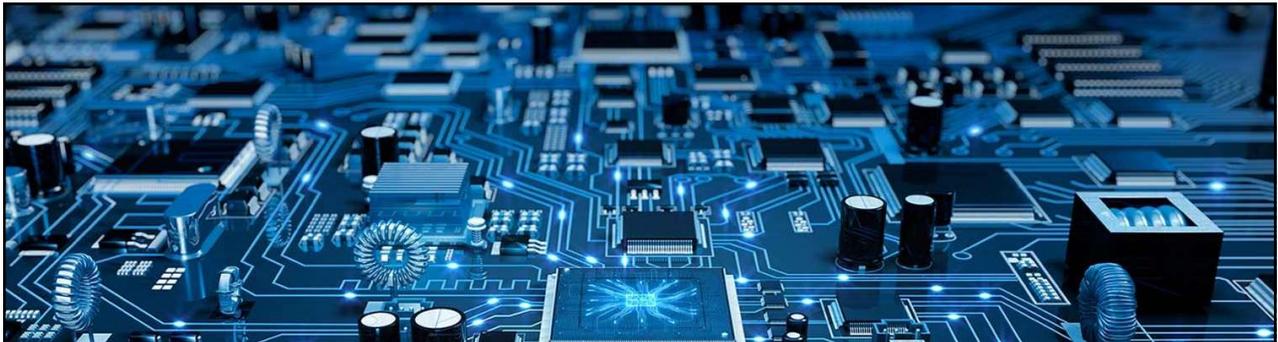


WATER DATA COLLABORATIVE

04 Looking Ahead

Growing our community,
technology and data sources
with a forward comparable
approach

Watershed Academy Webcast | 5.9.19



Internet
of Water



**Empower users to create data that
is searchable and discoverable**

Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE

Free / forever BASIC	\$ 20 /mo. PREMIUM	\$ 40 /mo. PRO
Share geo-located reports	Track report status	All premium features
Manage profile	Resolve reports	Water quality monitoring maps
Share reports with groups	Manage a campaign	Light-weight data management
Access comment threads	Campaign data download	Water quality protocol implementation
Share to social media outlets	Embedable report maps	Embedable water quality maps
Contribute to campaigns	Branding assistance	Access volunteer info
Create Account	Create Account	Create Account

Diversify Revenue

Ensure software produces clear value to users and the movement

Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE



Support deeper levels of configurability among products

Watershed Academy Webcast | 5.9.19



WATER DATA COLLABORATIVE

Sensor Integration

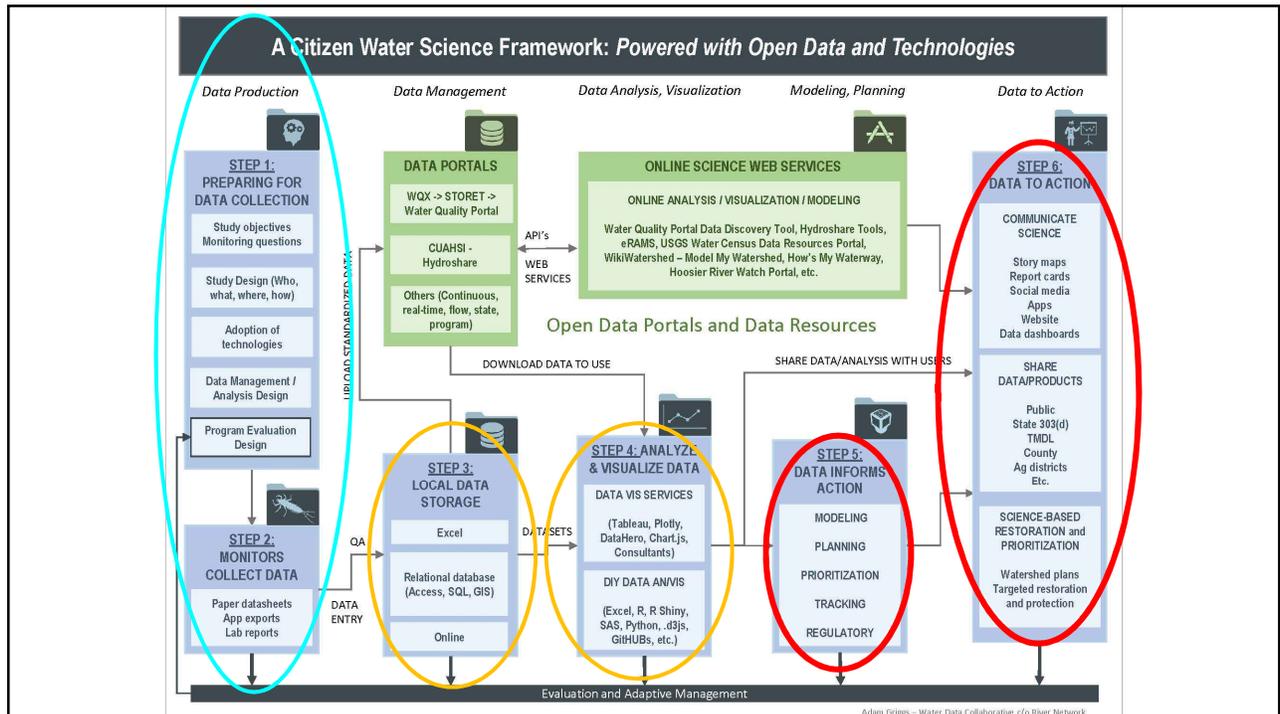
Increasing the
quantity and quality of
our monitoring
network.



WATER DATA COLLABORATIVE

Thank • You!

Emily Wiggans, GIS Analyst





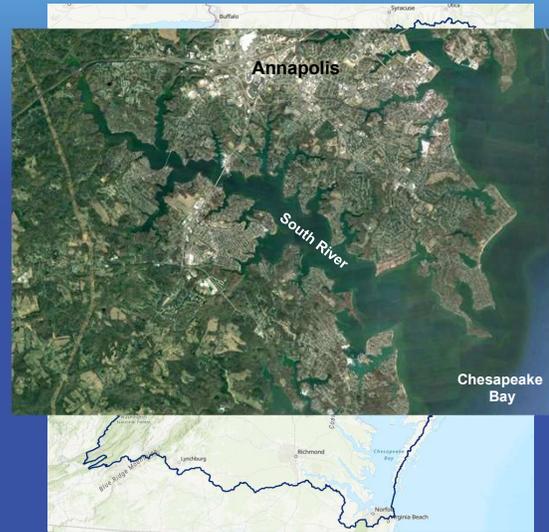
Precision Conservation



Case Study: South River, Anne Arundel County, Maryland

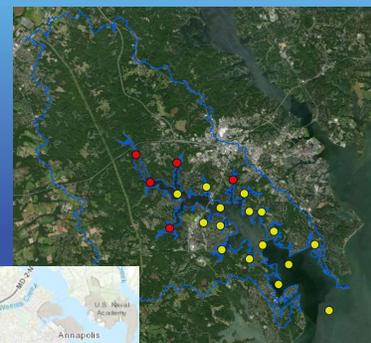
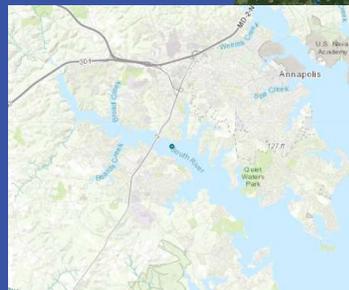


- Existing relationship; high-quality monitoring program with standardized data
- <https://southriverdata.net>
- Concerns: dissolved oxygen levels, bacteria, and water clarity especially for SAV!



Clarity in the South River

- Measured with Secchi disk at 21 stations by the now-*Arundel Rivers Federation*
- EPA's WQP has... 1!
- What story do the 21 sites tell that the EPA's does not?



Working Smarter with

- Why R? The benefits!
 - Open-source
 - Resources and tutorials available online
 - Built for statistical analysis
 - Handles spatial data well
- Use USGS' dataRetrieval function package to read in Secchi disk data for the site of interest through the EPA's WQP
- 3 Scenarios for use:
 - All WQX data – Use R!
 - Some WQX data, some of your own – Use R! Import your own as a .CSV (this example!)
 - All your own data – use R from a CSV or Excel file!

```

1 ##---Secchi Disk graphing---##
2 #install these packages from the package tab if they are not already present
3 #data retrieval to the library made by EPA for WQX data retrieval
4 library(dataRetrieval)
5 # dplyr is a very helpful
6 library(dplyr)
7 #and lubridate for date
8 library(lubridate)
9 #and gg plot for graphing
10 library(ggplot2)
11
12 EPA_wqsite <- readRDS("CRP_WQX-WR.1", "")
13
14 EPA_secchi <- readRDS("10-01-01", "2018-01-18")
15 #view data
16 #read(EPA_secchi)
17 #arrange the data by
18 EPA_secchi <- dplyr::arrange(EPA_secchi, desc(year(date)))
19
20 #grab the two columns we
21 EPA_secchi_cleaned <- select(EPA_secchi, clarity, date)
22 #need to create new date
23 EPA_secchi_cleaned <- mutate(EPA_secchi_cleaned, date = mdy(date))
24 colnames(EPA_secchi_cleaned) <- c("Station", "Clarity", "Date")
25 EPA_secchi_cleaned$Station <- "CRP_WQX-WR.1"
26
27 #read in SRP data, remove columns that are not relevant
28 SRP_data <- read.csv("C:\\ccsv01\\R\\GIS\\Piscos_River_network\\_data\\SRP_tidal_obs.csv", header=TRUE)
29 SRP_data_secchi <- SRP_data[,c(1, 3, 4, 7)]
30 SRP_data_secchi$date <- mdy(SRP_data_secchi$date)
31 #export as csv to go to
32 write.csv(SRP_data_secchi, "C:\\scripts\\SRP_data_secchi_cleaned.csv")
33 SRP_data_secchi_cleaned <- read.csv("C:\\scripts\\SRP_data_secchi_cleaned.csv")
34 #remove columns you don't want
35 SRP_data_secchi_cleaned <- select(SRP_data_secchi_cleaned, clarity, date)
36 #rename columns so they match
37 names(SRP_data_secchi_cleaned) <- c("Station", "Clarity", "Date")
38 SRP_data_secchi_cleaned$date <- mdy(SRP_data_secchi_cleaned$date)
39 SRP_data_secchi_cleaned <- na.omit(SRP_data_secchi_cleaned, invert = FALSE)
40
41
42 secchi_combined_df <- bind(EPA_secchi_cleaned, SRP_data_secchi_cleaned)
43 secchi_combined_df$Station <- "combined"
44 secchi_combined_df <- na.omit(secchi_combined_df, invert = TRUE)
45
46 station_count <- dplyr::count(secchi_combined_df, Station)
47 #glebe reef only has one record, remove it
48 secchi_combined_df <- filter(secchi_combined_df, Station != "glebe reef")
49
50
51 #plot graph
52 ggplot(secchi_combined_df) +
53   geom_jitter(aes(x = Station, y = clarity)) +
54   ylab("max(secchi)") +
55   xlab("year") +
56   scale_color_discrete(name = "water monitoring stations")
  
```

Set up tools needed for analysis: specific functions for analysis

Specify Secchi data from WQP – site name from prior data exploration

Over 54,000 records for this site – just want Clarity (Secchi depth) and Date fields!

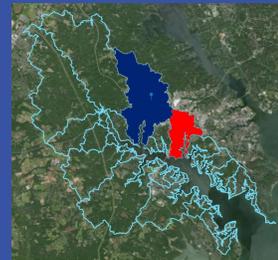
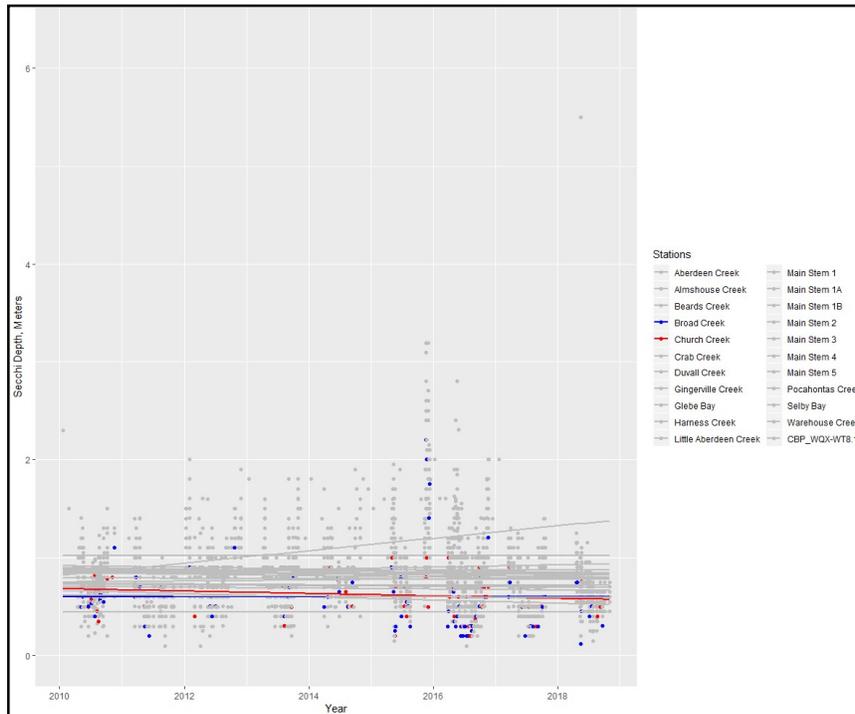
Bring in South River data from CSV file, light clean up for columns we don't want and formatting to match the WQP data

Combine WQP data and South River data for one analysis; more data standardization

Plot the combined datasets – can iterate with different filters as needed

Plotting in R

1. All stations
2. WQX station
3. Demo stations
4. Add trend lines
5. Dive deeper...



ArcGIS Pro Model Demo

2017 Tree Cover (1m)

2013/2014 Land cover (1 m)
*Update in progress!

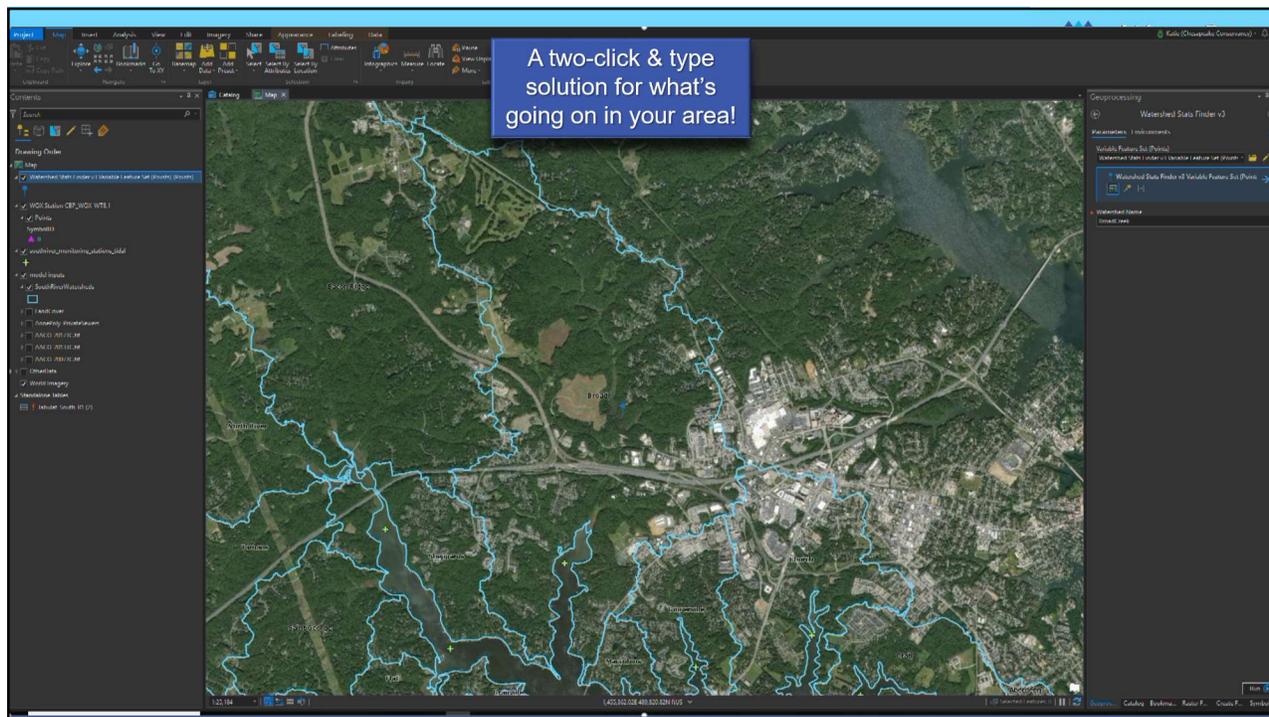
Water Data Collaborative

Input Datasets

(not showing parcel sewer data)

Get land cover data for the entire Chesapeake Bay Watershed:
<https://tinyurl.com/y3d8ozd2>

A two-click & type solution for what's going on in your area!



✓ Watershed Stats Finder v3 completed. ✕

View Details Open History

Geoproc... Catalog Bookma... Raster F... Create F... Symbol...

Basic Process

Select watershed of interest

➔

Calculate areas for input datasets within the selected watershed

➔

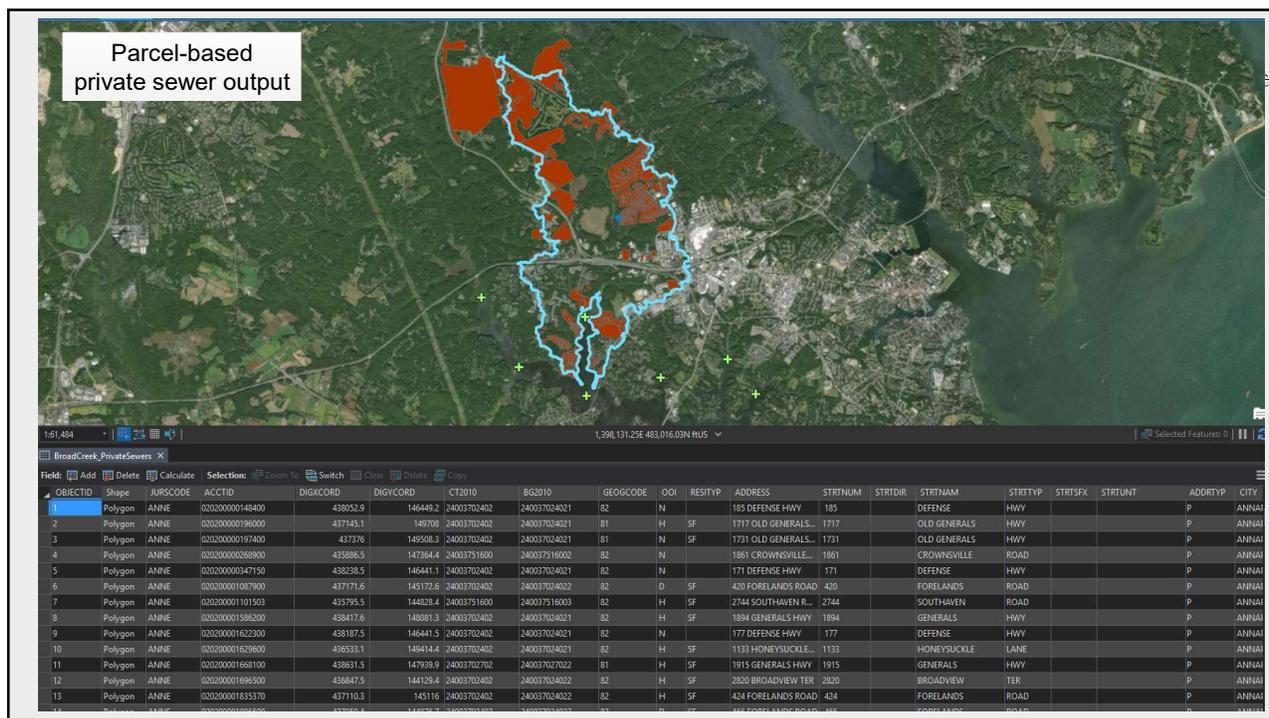
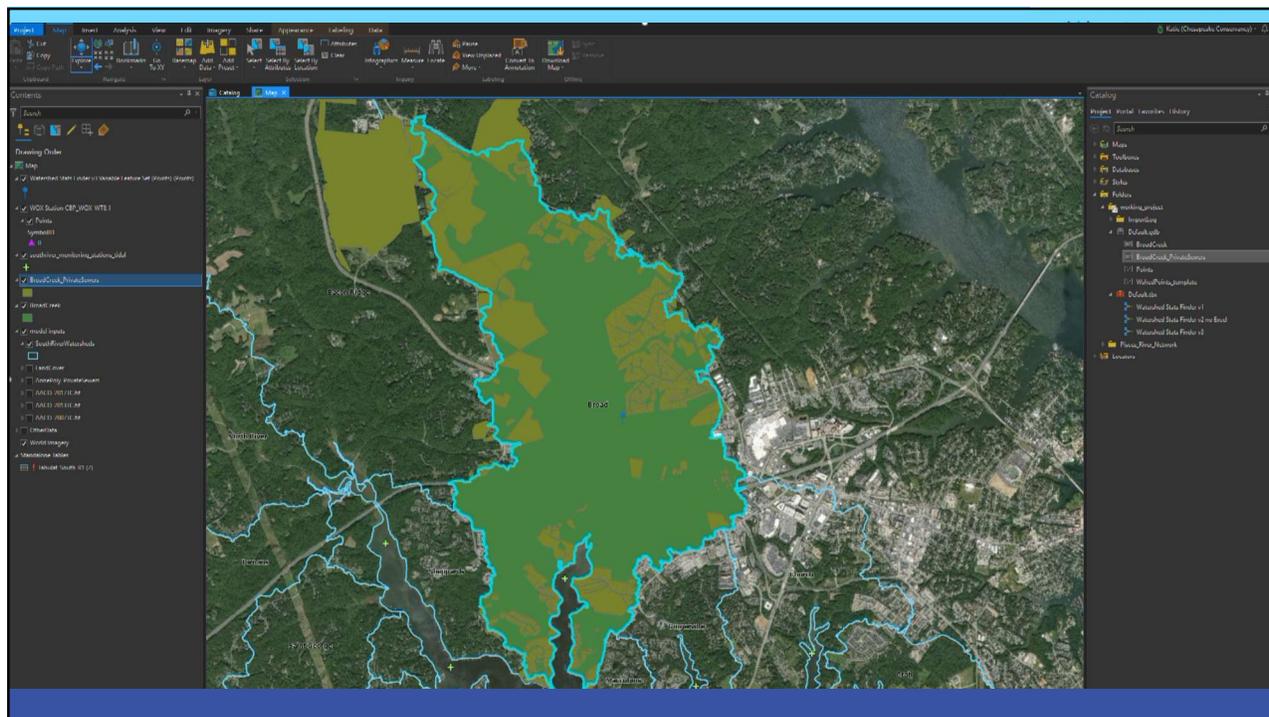
Join calculated values back to the original selection

➔

Intersect selected watershed with all 'touching' private sewer parcel data

➔

Copy area of land cover within watershed to Excel output

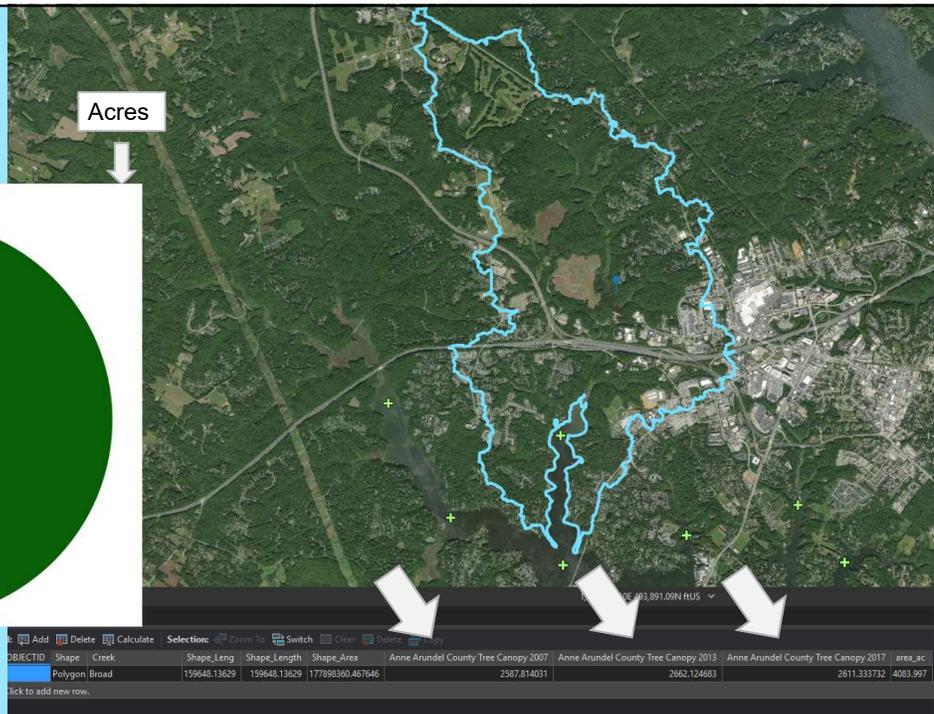
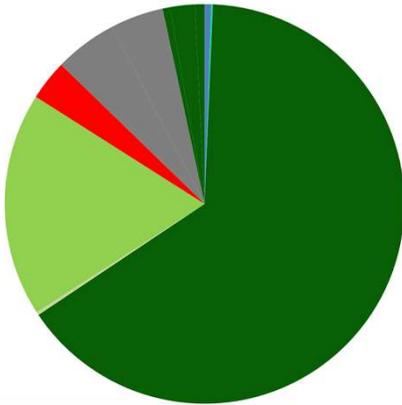


Watershed Stats:

- Tree Canopy - GIS
- Total Acreage - GIS
- Land Cover – direct Excel output

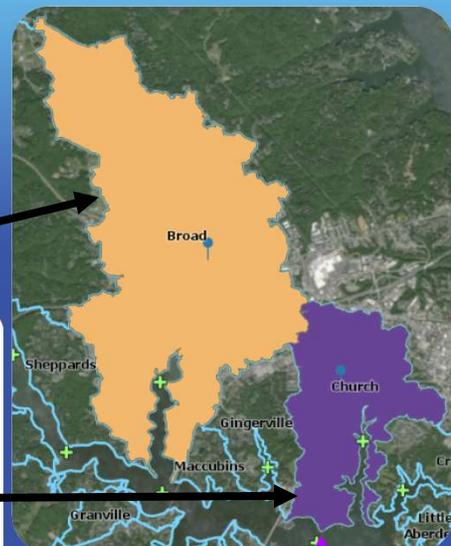
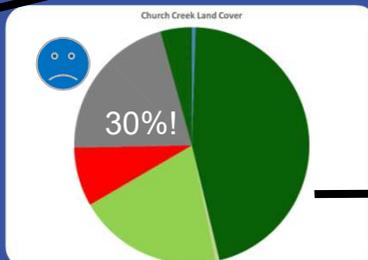
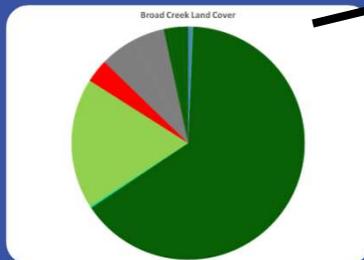
Acres

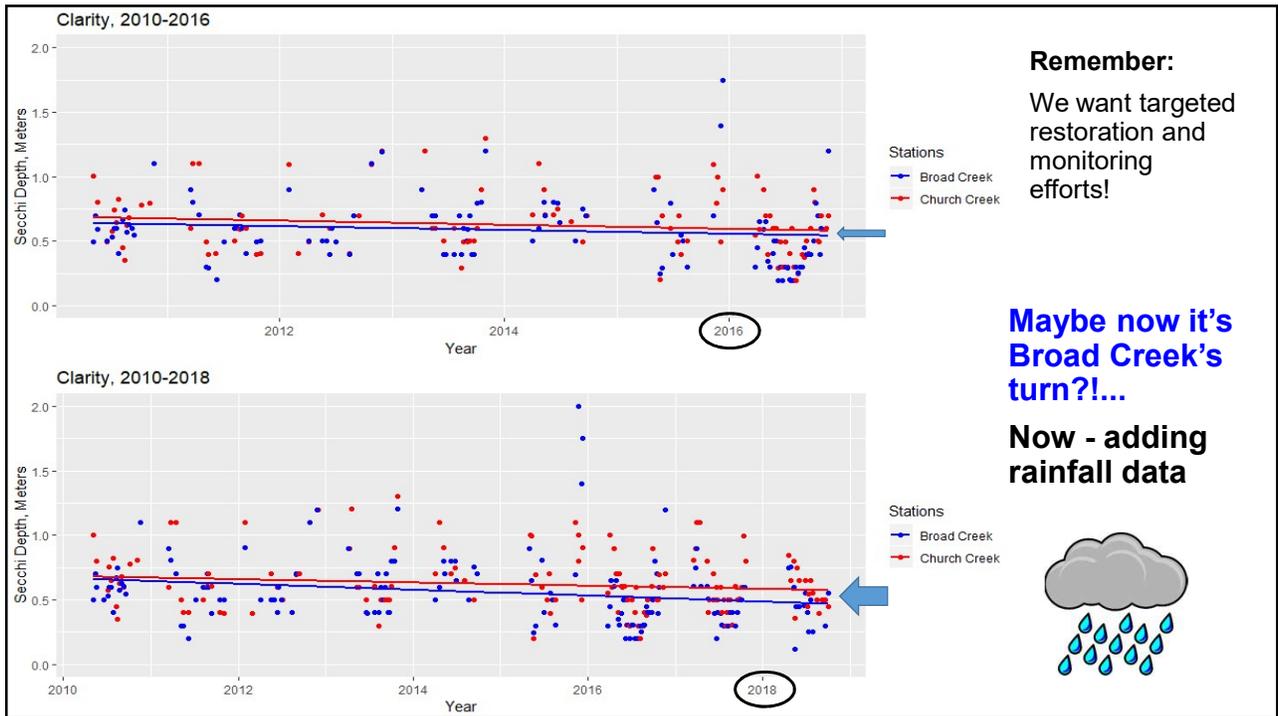
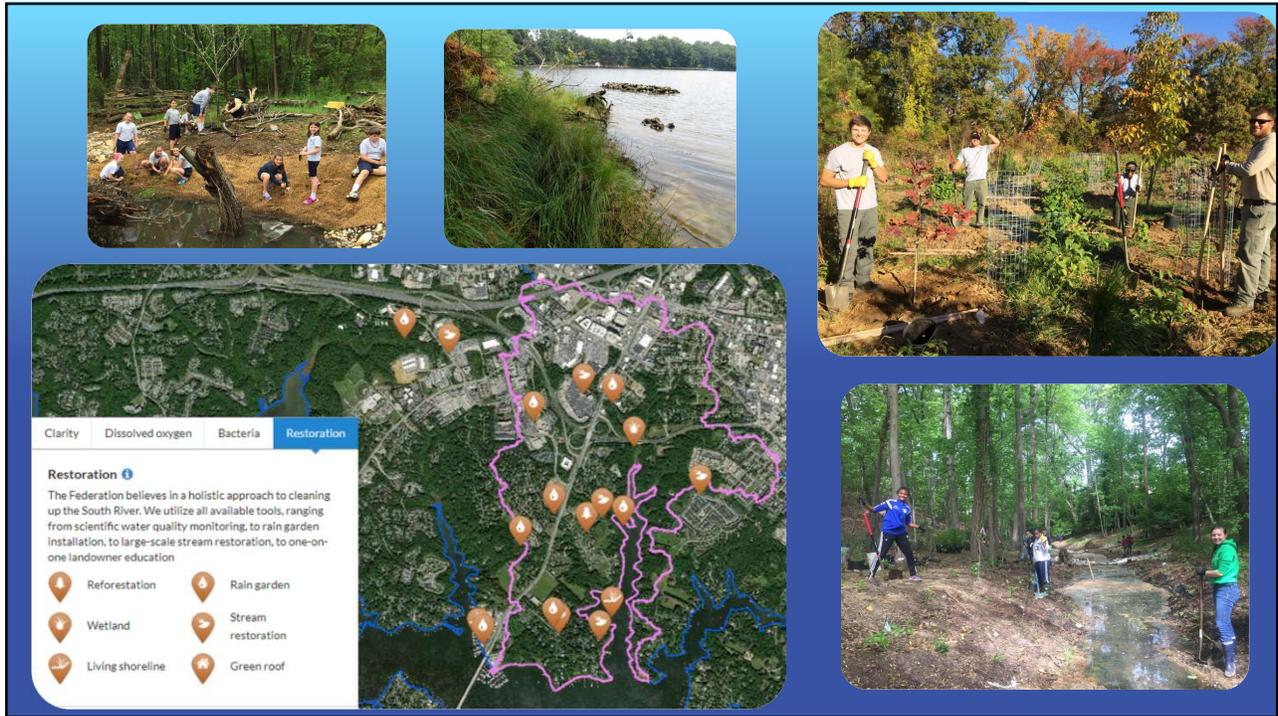
Broad Creek Land Cover



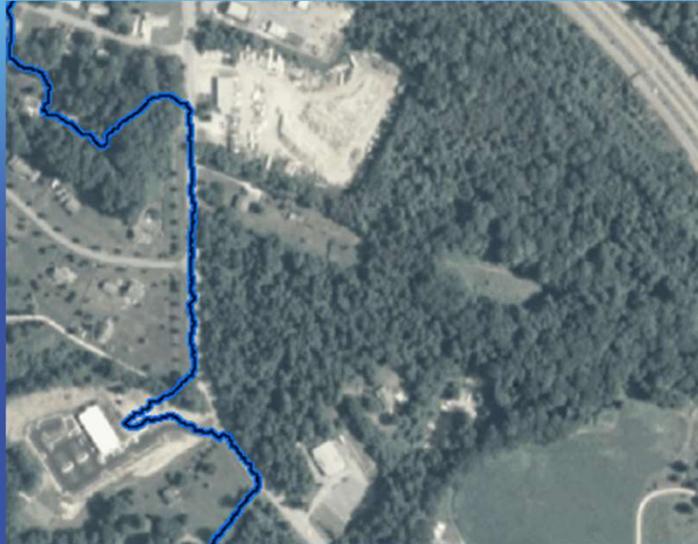
Why Does It Matter?

- Compare watersheds to determine most need
- Targeted restoration efforts
- Targeted monitoring efforts





A Candidate Area..?



Next Steps: Scaling Nationally

- Web App for Analysis
- Story Map for data sourcing
 - Land cover, watersheds, tree canopy, and more!
 - What do you need? *Let us know!*
- R analysis/data integration connected to GIS analysis process
- **Full process shared:** Web App, code on Github, ArcGIS Toolbox for download – stay as **transparent** as possible!



Thank You!

Find us and join our contact list at:

<https://waterdatacollaborative.org/>

Sam Briggs, sbriggs@iwla.org

John Dawes, dawes@chesapeakecommons.org

Emily Wiggans, ewiggans@chesapeakeconservancy.org

Speaker Contact Information

Dwane Young, Chief, Water Data Integration Branch, Environmental Protection Agency, young.dwane@epa.gov

Samantha Briggs, Acting Clean Water Program Director, Izaak Walton League of America (IWLA), sbriggs@iwla.org

John Dawes, Executive Director, Chesapeake Commons, dawes@chesapeakecommons.org

Emily Wiggans, GIS Analyst, Chesapeake Conservancy, ewiggans@chesapeakeconservancy.org

Participation Certificate

- If you would like to obtain a participation certificate you can access the PDF in the **Handouts** section of your control panel.
- You can type each of the attendees names into the PDF and print the certificates.

Watershed Academy Webcasts

More webcasts coming soon!

www.epa.gov/watershedacademy

The slides from today's presentations are posted.
A recording will be posted within the next 2-3 weeks.

Thank You!