

Leveraging Participatory Science to Advance Water Quality Reporting and Partnership-Building Part 1



Thursday, May 23rd, 1:00pm – 3:00pm Eastern

Speakers:

- **Julie Vastine**, Director, Alliance for Aquatic Resource Monitoring (ALLARM) & Chair of National Water Quality Monitoring Council's Volunteer Monitoring Workgroup
- **Hilary Snook**, Environmental Scientist, USEPA New England Regional Laboratory
- **Petra Baldwin**, Water Quality Coordinator, Anacostia Riverkeeper
- **Mona Dominguez**, Director, Alabama Water Watch (AWW)
- **April Sevy**, Volunteer Education and Citizen Science Coordinator, Missouri Stream Team

Watershed Academy Webcast

- The slides for today's presentations are posted on the Watershed Academy webpage.
- A recording of the webcast will be posted within the next month.

www.epa.gov/watershedacademy

Webcast Logistics

- **To Ask a Question** – Type your question into 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 “Questions” tool box on the right side of your screen and click “Send” and we will respond by posting an answer in the “Questions” box.

Audience Polling



National Water Quality Monitoring Council

Working together for clean water

- The NWQMC was created in 1997 to foster collaboration, communication, and coordination across the nation's water quality monitoring community. The NWQMC serves as an informational resource seeking to advance monitoring through collaboration and information exchange.
- The Council works together to share best practices through a range of activities like hosting webinars, supporting data access through water quality portal, organizing the National Monitoring Conference, promoting diversity and inclusion, and generally sharing information across the monitoring community to support data-driven decision making.
- The Council has two work groups:
 - Volunteer Monitoring
 - Justice Equity Diversity Inclusion



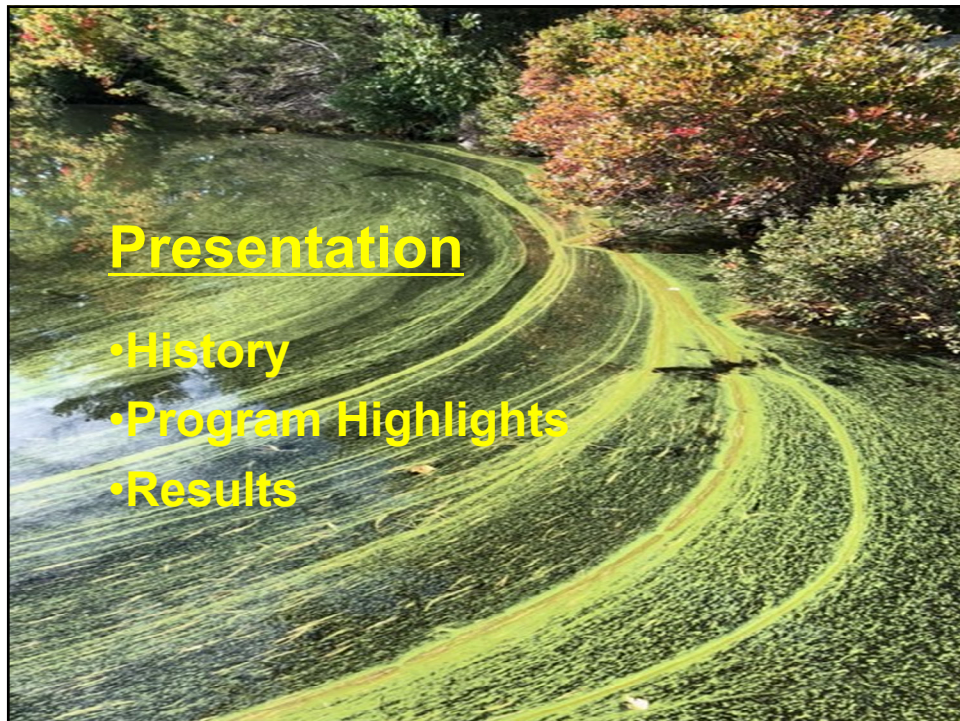
National Water Quality Monitoring Council

Working together for clean water

Volunteer Monitoring Workgroup

- The Volunteer Monitoring Workgroup was developed in 2016 to foster a national community and to encourage integration between volunteer monitoring activities and water quality monitoring conducted by Tribal Nations, and local, state and federal agencies.
- Deliverables include 3-4 annual webinars, support volunteer monitoring sessions and activities at the National Monitoring Conference.
- Includes 39 people (11 state agencies, 9 academic institutions, 9 federal staff, 6 non-profits, 2 research centers, 1 Tribal Nation, and 1 county).







A Brief History

- 2013 States raise concern
- Initiation of Ad Hoc working group
- Tiered program development
- CMC



Lake monitoring programs-a real need for citizen science!

- CT- 5,543 Sq. mi & 2,267 lakes/ponds
 - 10-20 lakes/year
- ME- 35,385 Sq. mi & over 6,000 lakes



UNITED STATES

P Patch + Follow 15.1K Followers

2 New Hampshire Water Bodies Have 'Cyanobacteria Warnings'

Story by Tony Schinella • 31m • 1 min read



A lake and a reservoir in New Hampshire have cyanobacteria warnings for the week ending May 16. © Shutterstock

CONCORD, NH — The New Hampshire Department of Environmental Services has restarted its water safety and healthy swimming mapping and tracking for the 2024 season.

On Thursday, the state released the latest information about cyanobacteria and fecal bacteria warnings, alerts, and advisories. Officials warn swimmers, waders, and pet owners to be cautious of water bodies with surface scum that change color or appear to have green streaks or blue-green flecks aggregating along the shore. Cyanobacteria is a harmful algal bloom that changes the color of the water and can cause illness if toxins stored in the cells are

reservoir

de Cod

vic

Is

Beware

By Bea Lewis Union Le

Here's cyanobacteria detect

Keep an eye on humans.

Ve al

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Regional and National Partners



A group of approximately 25 people, including staff and partners, are posed for a group photo in front of a white environmental monitoring van. The van features the EPA logo and the text 'Environmental Monitoring System'. The scene is outdoors on a paved area with trees in the background under a clear blue sky.



Tool Development

CyanoMon
Tracking progression
Forecasting/Trends
Temporal component

CyanoScope
System understanding
Education/awareness

bloomWatch
Notification/surveillance



CYANOBACTERIA MONITORING COLLABORATIVE

THREE COORDINATED MONITORING
PROJECTS TO LOCATE AND UNDERSTAND
HARMFUL CYANOBACTERIA

bloomWatch App

cyanoScope

cyanoMonitoring

Cyanos.org


SWALK?





July 23rd

JULY AUGUST





Public Dashboard – Real Time Notification

ENGLISH ESPAÑOL [About bloomWatch](#)  

BLOOMWATCH | REPORTS [REGION ALL REGIONS](#)

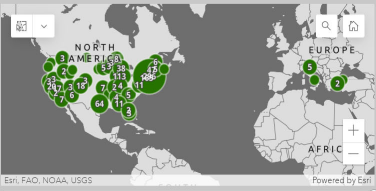
reports currently
809
visible on the map

BLOOM REPORTED | Between a football field and a tennis court
willow lake, Providence, RI on October 6, 2022
Lake condition: Calm Weather: Clear
Location: 41.78324, -71.41463

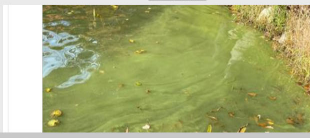
BLOOM REPORTED | Between a football field and a tennis court
Indian Lake, Whiting, ME on October 6, 2022
Lake condition: Calm Weather: Partly Cloudy
Location: 44.75666, -67.26344

BLOOM REPORTED | Between a football field and a tennis court
Roosevelt pond, providence, RI on October 6, 2022
Lake condition: Calm Weather: Clear
Location: 41.78324, -71.41463

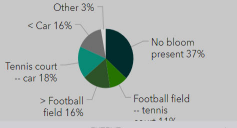
BLOOM REPORTED | Between a football field and a tennis court
pleasure, providence, RI on October 6, 2022
Lake condition: Calm Weather: Clear
Location: 41.78324, -71.41463



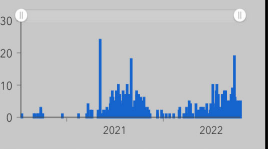
PHOTOS



Bloom extent



Report dates

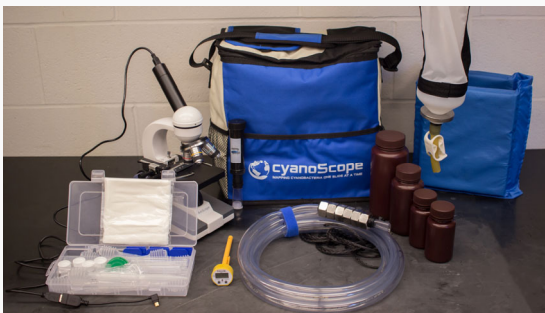


60°F Cloudy 12:05 PM 10/24/2022



Cyanoscope - An educational tool

- Kit development
 - Collect bloom samples
 - Determine composition
 - Identify toxin producers
- Track genera/species occurrence
- Open global participation



United States Environmental Protection Agency

iNaturalist Explore Community More

Projects Terms & Rules | Join this project

cyanoScope

MAPPING CYANOBACTERIA ONE SLIDE AT A TIME

ADD OBSERVATIONS

Stats

| Totals | Most Observations | Most Species | Most Observed Species |
|-------------------------------|---|----------------------------------|---|
| 3253 Observations » | 472 observations clark_county_public_health | 19 species kbeza31979 | 386 observations Microcystis aeruginosa |
| 188 Species » | 248 observations h2opurist | 14 species willbmisled | 183 observations Woronichinia naegelliana |
| | lanabluege | larryzsherman | |





CyanoScope Project

Observations

Species Location

The World 2,984 OBSERVATIONS 169 SPECIES 207 IDENTIFIERS 203 OBSERVERS

Map Grid List

Microcystis viridis
Genus Aphanizomenon
Microcystis wesenbergii
Genus Aphanocapsa
Delichospermum planc...
Microcystis aeruginosa
Genus Raphidopsis
Microcystis aeruginosa



NOAA Phytoplankton Monitoring Network

Open position
Managed and Program Analyst (EAS 072)

NCCOS 25 YEARS

ABOUT US FACILITIES FUNDING RESEARCH & TOOLS NEWS

Phytoplankton Monitoring Network

The National Phytoplankton Monitoring Network (PNM) is a community-based network of volunteers monitoring marine phytoplankton and harmful algal blooms (HABs). PNM recognizes the interrelationships between humans and coastal ecosystems while providing volunteer citizen scientists with meaningful opportunities for hands-on science engagement. The PNM enhances coastal sustainability research and response the growing threat posed by HABs by collecting important data for species composition and distribution in coastal waters and creating working relationships between volunteers and NOAA HAB researchers and state managers.

Data Collection

Citizen scientists collect data that feeds the Phytoplankton Monitoring Network. Explore the data submitted by the network or submit your own findings.

Submit Data Explore Data

The collection of Phytoplankton Monitoring Network information is authorized under the OMB Control Number included in the Citizen Science and Crowdsourcing Information Collections page.

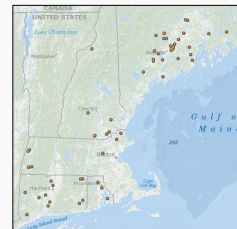
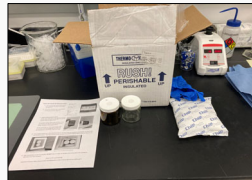


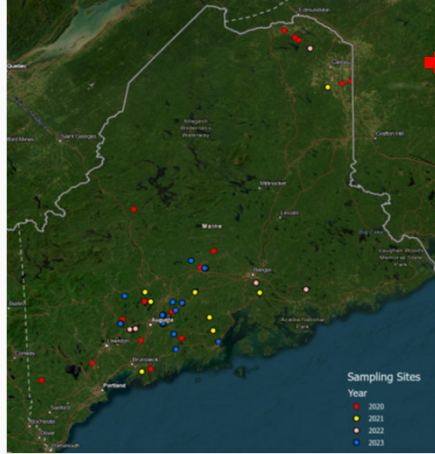
- Advanced monitoring and forecasting of blooms
- Tracking phytoplankton photopigments
- Fluorometric analysis
 - Rapid detection of cyanobacteria concentration in the water
 - Track seasonal patterns.



Region 1 Engagement

- Grab/IT samples collected by state and local partners using LSASD supplied kits
- Samples shipped to lab for toxin analysis
- Samples analyzed for multiple toxins





| Waterbody | state | Date | MC (ug/L) |
|---------------------------|-------|------------|-----------|
| Sabbattus-3796 | ME | 9/11/2023 | 426 |
| Sabbattus-3796 | ME | 8/26/2021 | 22.18 |
| Sabbattus-3796 | ME | 9/11/2023 | 16.5 |
| Lovejoy | ME | 8/28/2023 | 12.4 |
| Androscoggin Lake | ME | 9/9/2023 | 6.99 |
| Annabessacook Lake 9966-1 | ME | 10/6/2021 | 5.250 |
| Sabbattus-3796 | ME | 9/13/2022 | 5.25 |
| Webber Pond | ME | 9/7/2022 | 5.25 |
| Three Mile | ME | 11/3/2022 | 3.055 |
| Webber-5408-01 | ME | 9/14/2023 | 2.929 |
| Arnold Brook | ME | 8/31/2020 | 2.534 |
| Three Mile Pond-5416 | ME | 9/14/2023 | 2.492 |
| Sabbattus-3796 | ME | 8/27/2020 | 1.963 |
| Sabbattus-3796 | ME | 9/27/2022 | 1.898 |
| Sabbattus-3796 | ME | 9/13/2022 | 1.869 |
| Webber Pond 5408 | ME | 10/14/2020 | 1.741 |
| Webber Pond 5408 | ME | 9/24/2020 | 1.623 |
| Arnold Brook | ME | 8/31/2020 | 1.512 |
| Lovejoy | ME | 8/28/2023 | 1.436 |
| Sewall Pond 9943 | ME | 9/9/2020 | 1.35 |
| Fischer Lake - 1808 | ME | 8/31/2020 | 1.29 |
| Crystal Lake-3708 | ME | 9/17/2020 | 1.268 |
| Threemile pond 5416 | ME | 9/24/2020 | 1.254 |



BLOOMWATCH | REPORTS

reports currently visible on the map: **6**

BLOOM REPORTED | Suspected cyanobacteria sabattus, sabattus, ME on September 11, 2023
 Lake condition: Calm Weather: Overcast
 Location: 44.12515, -70.15656

BLOOM REPORTED | Suspected cyanobacteria Sabattus Pond, Sabattus, ME on September 27, 2022
 Lake condition: Rippled Weather: Partly Cloudy
 Location: 44.11926, -70.10586

BLOOM REPORTED | Suspected cyanobacteria sabattus, Sabattus, ME on September 13, 2022
 Lake condition: Calm Weather: Overcast
 Location: 44.12494, -70.15608

BLOOM REPORTED |

Tax Disposition (Natural Units)
 56% Aphanizomenon, 32% Woronichinia, 9% Dolichospermum, and less than 3% Microcystis

| Waterbody | Date | MC (ug/L) |
|--------------------|-----------|-----------|
| Sabattus Pond-3796 | 9/11/2023 | 426 |
| Sabattus Pond-3796 | 8/26/2021 | 22.18 |
| Sabattus Pond-3796 | 9/11/2023 | 16.5 |
| Sabattus Pond-3796 | 8/27/2020 | 1.963 |
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| Sabattus Pond-3796 | 9/13/2022 | 1.869 |



USGS-NPS Nationwide HABs Project Monitoring Locations



Trainings - Mobile Laboratory On-Site & Remote





Worcester Cyanobacteria Monitoring Collaborative: Overview, Accomplishments, and Challenges



May 23th 2019
EPA Region 1 Laboratory

Be a part of the Worcester Cyanobacteria Monitoring Collaborative!

Contribute to a nationwide study to understand local water quality challenges. Ever wonder what's going on in your lake or pond? Join a community of volunteer citizen scientists that collect lake water samples for analysis of algae and cyanobacteria.

Nuisance cyanobacteria and algal blooms are both ecological and public health concerns. They are becoming more frequent in New England, yet there are still gaps in our knowledge of how to predict and prevent them.

Volunteers will:

- Gain microscope and water quality sampling skills
- Contribute to a national study to understand cyanobacteria dynamics
- Report water quality issues and learn how to prevent them
- Meet other clean water advocates and water quality experts

Informational and Training Session: Tues, April 23rd, 6:00 pm
Bancroft School Field House, 100 Shore Drive
No science experience necessary, just a desire to learn more about your lake!

Contact burneisterj@worcesterna.gov for more information



APCC
Association to
Preserve Cape Cod

Home About Who We Are Our Work News & Events Resources Get Involved

Cyanobacteria




Association to
Preserve Cape Cod



Current
~500 lakes/ponds

2019
50+ lakes

2018
34 lakes

2017
6 lakes

2016
Cyano Demo




EPA United States Environmental Protection Agency

Environmental Topics Laws & Regulations Report a Violation About EPA

Glossary Data About Educators Contact Us

How's My Waterway?

Explore, Discover and Learn about your water.

Let's get started!

Search by address, zip code, or place... OR

Choose a place to learn about your waters:

Community State & Tribal National

Explore Topics:


Swimming Eating Fish Aquatic Life Drinking Water

DISCLAIMER

Discover.
Accessibility
Budget & Performance

Connect.
Data.gov
Inspector General

Ask.
Contact EPA
EPA Disclaimers



Contact info: **Questions?**

Hilary Snook – snook.hilary@epa.gov

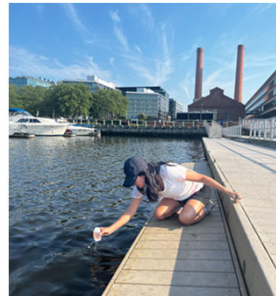
Corey Conville – conville.corey@epa.gov

Scan to download Bloomwatch App!

Apple
Android




DC Citizen Science Water Quality Monitoring



Project Partners & Funding



Project Background

- **Recreational Focus** – Rowing, boating, fishing, and other recreation around District waters are popular, though swimming has been illegal since the 1970s due to water quality concerns.
- **Infrastructural Improvements** - Monitoring helps track whether projects like the Clean Rivers Project tunnels, MS4 improvements, and green infrastructure have led to improved water quality.
- **Long term dataset** – We now have five summers of data to inform the public on water quality trends and advocate for clean waterways for all.



What gets into our waterways?



What data do we collect?



E. coli

Fecal
Indicator
Bacteria



Turbidity

Water clarity



pH

Acidity or
Alkalinity



Temperature

Water and Air



Recreational Water Quality Standards

Data from the analyzed samples are compared to DC's recreational water quality standards:

Bacteria (*E. coli*)

Single-sample value:
<410 MPN/100 mL
Geometric mean:
<126 MPN/100 mL

pH

6.5 - 8

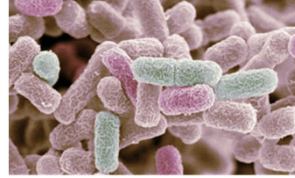
Turbidity

<20 NTU above
ambient



Why monitor *E. coli*?

- *E. coli* is a bacterium found in the intestines of humans and other warm-blooded animals
- *E. coli* is used as an **indicator for harmful bacteria** that may be in our waterways and make people sick if they ingest water from the river.



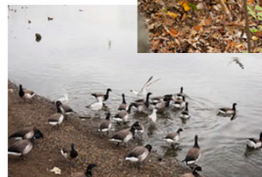
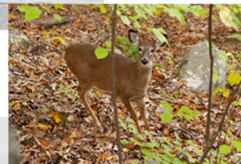
Why monitor *E. coli*?



Human waste from leaking sewage lines or overflows.

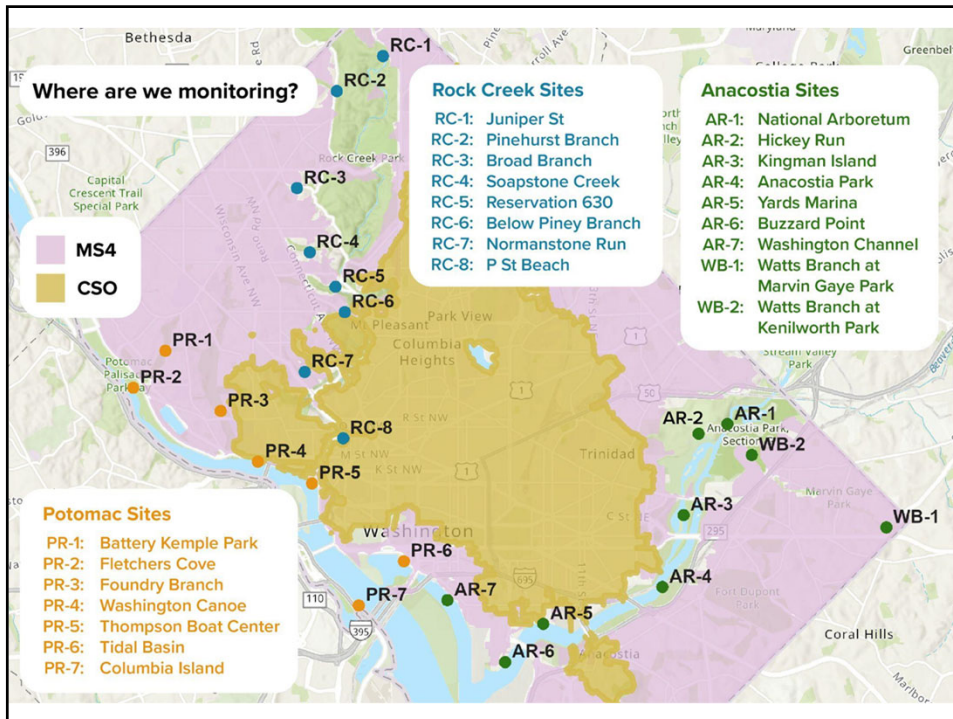
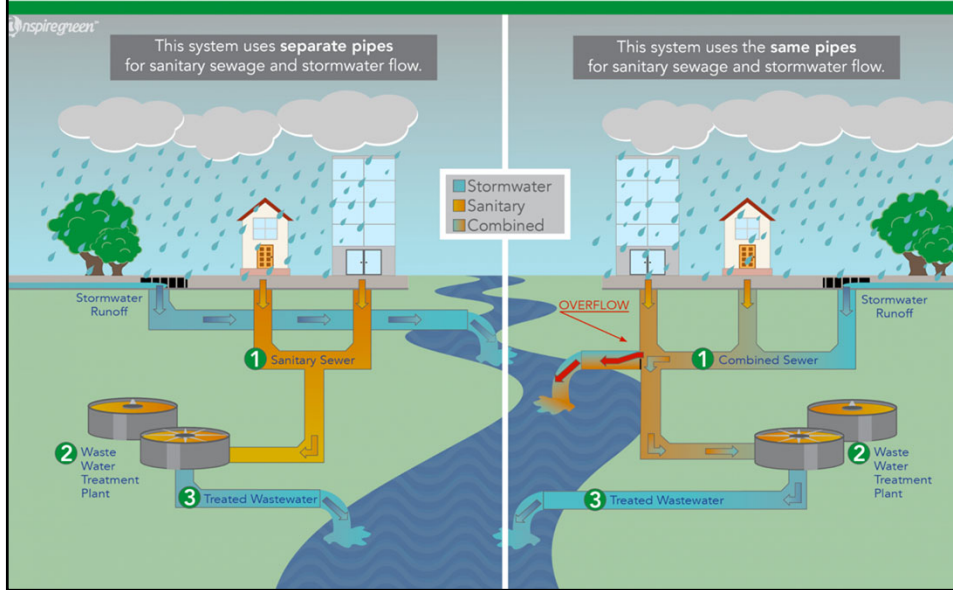


Wildlife and dog waste from stormwater runoff on impervious surfaces.



MS4 MUNICIPAL SEPARATE STORM SEWER SYSTEM

CSS COMBINED SEWER SYSTEM



Monitoring Process



Volunteers attend a training to learn how to properly collect samples.

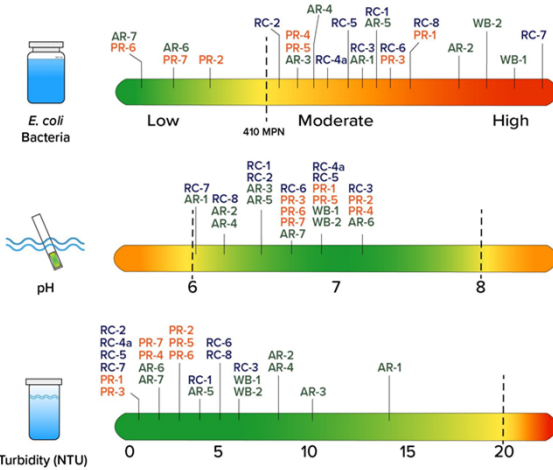
From May to September volunteers collect samples weekly on wednesday mornings.

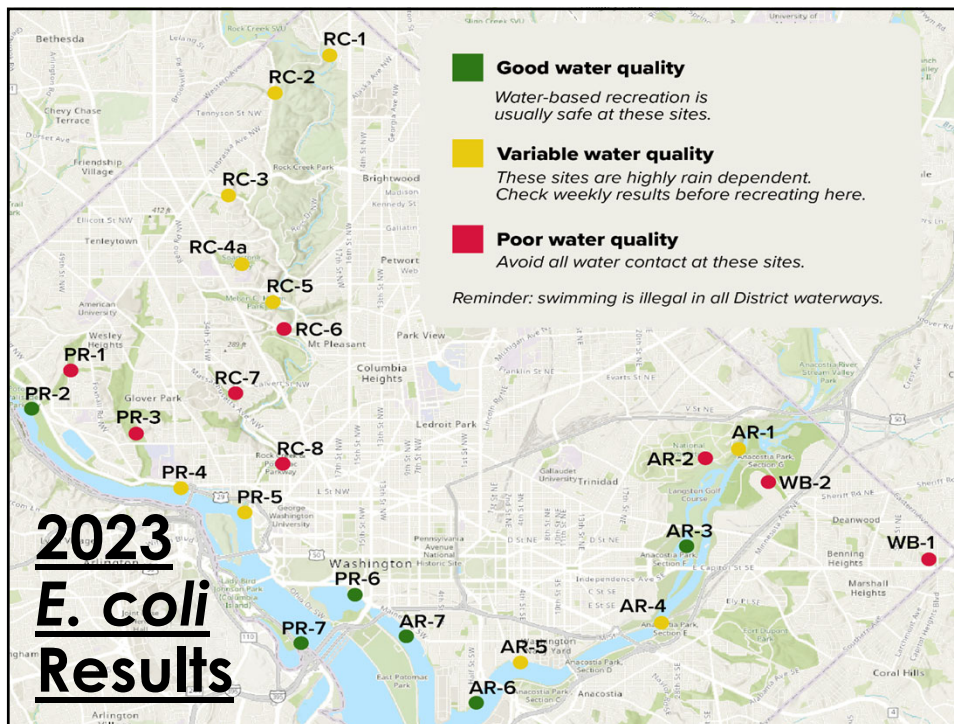
Samples are dropped off at ARK's lab for analysis using the IDEXX system.

Data is shared on social media, Swim Guide and website.



2023 Results





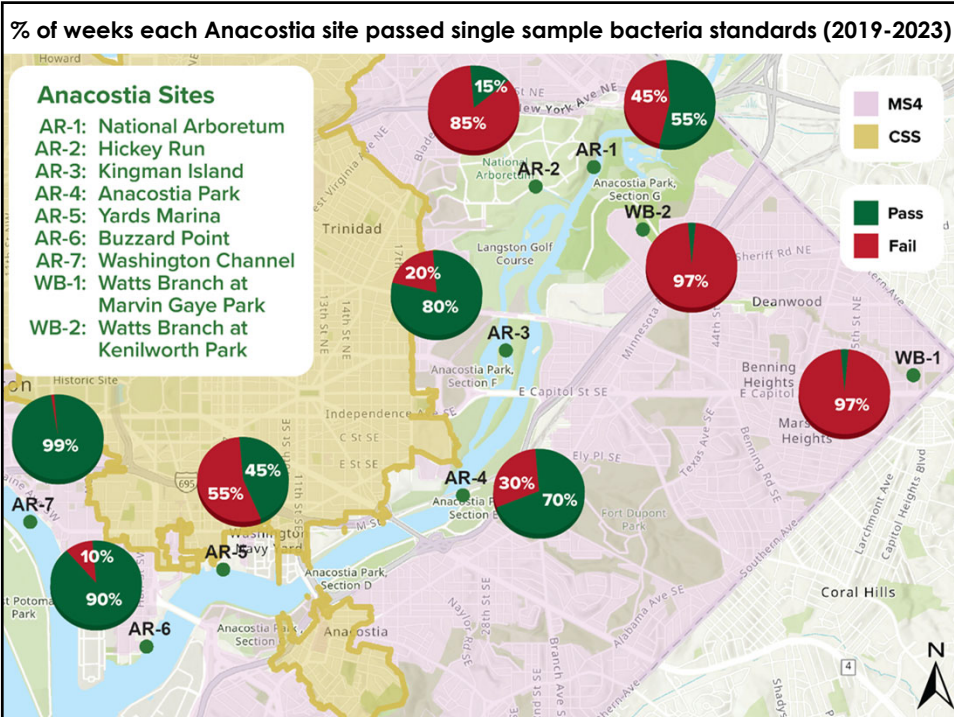
Three main factors influence bacteria levels

- 1. Precipitation** After rain, pollutants including bacteria enter surface waters via stormwater runoff.
- 2. Mainstem vs. Tributaries** Mainstem river sites have higher water volume, which helps dilute bacteria.
- 3. Wastewater Infrastructure** Sites affected by completed infrastructure projects have better water quality.

Anacostia River

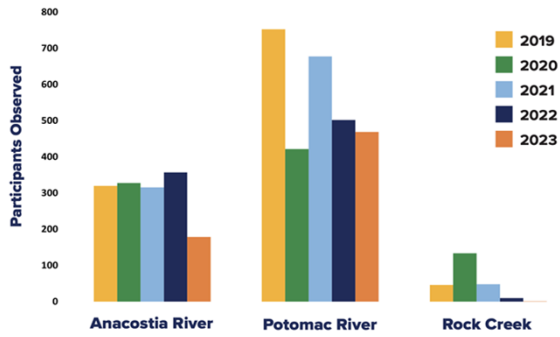
Multiple mainstem locations, especially those far from CSOs, consistently show passing water quality over the past five years — **Washington Channel (AR-7), Buzzard Point (AR-6), and Kingman Island (AR-3)**. However, sites on tributaries showed poor water quality.

Mainstem Sites pass **73%** of the time
 Tributaries pass **7%** of the time

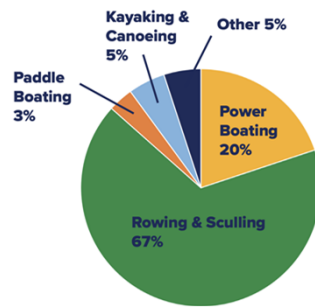


Recreational Use

Total Recreation Observed in District Waters from 2019-2023



Most Common Water Activities



Recreation often observed on main rivers even after heavy rain.

Decline suggests success of #RecreateResponsibly campaign.



Thank you to our volunteers!

Without their hard work, none of this would be possible!



Read the report!

2023 Fact Sheet



Full 5-Year Report



Tracking Volunteer Monitor Collected Water Data Across Time

ALABAMA WATER WATCH
ALABAMA EXTENSION

extension
ALABAMA A&M & AUBURN UNIVERSITIES

AUBURN UNIVERSITY
Water Resources Center

EPA Watershed Academy | May 23, 2024
Mona Dominguez | AWW Program Director



Overview

- Introduction to AL Water Watch
- Why & How to Track Water Quality Data Trends
- Challenges to Trend Tracking



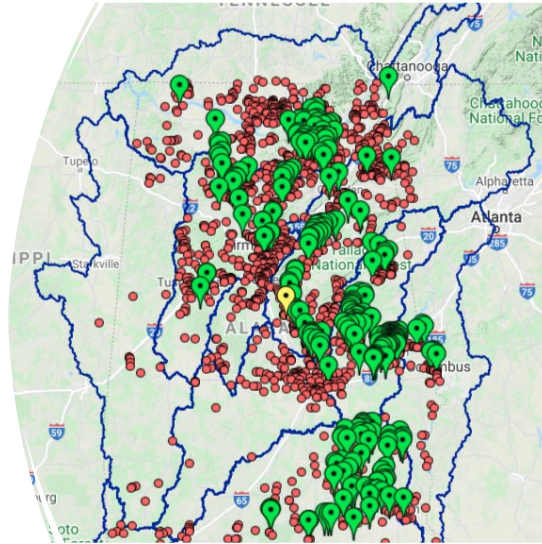
Program Vision & Mission

To have a citizen monitor on every stream, river, lake, and coast in Alabama. AWW facilitates our vision through:



AWW Impact

- **30+ years** of monitoring, over **110,000 data records**
- Data used for watershed management, research, education, protection of natural resources and more!



Monitoring Types



Water Chemistry



Bacteriological



Stream Biomonitoring



AWW Training Program

- Hybrid Model, self-paced online courses and in-person field sessions
- Training of Trainer Programs



4-H Alabama Water Watch



Since 2013, 4-H agents, teachers, and volunteers have reached 50,000 youth with 4-H AWW programming!

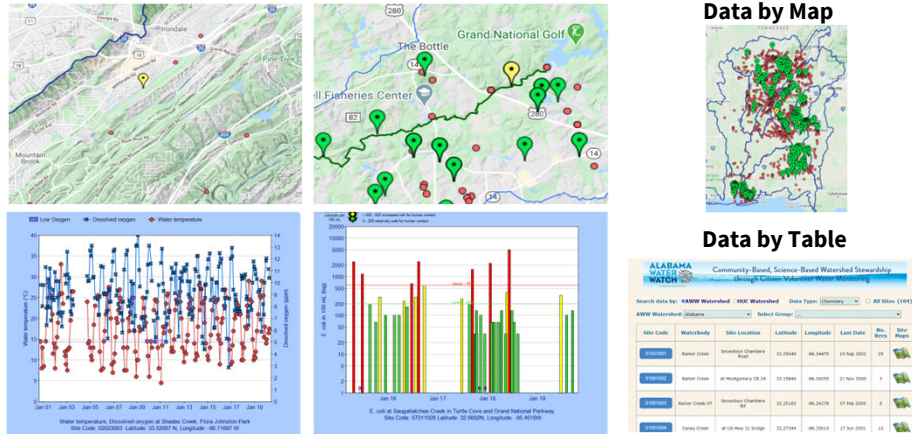


"4-H is important to me because it allows me to be a part of something that helps keep our ecosystems safe and healthy."

—Shelby Henry, Limestone County 4-H

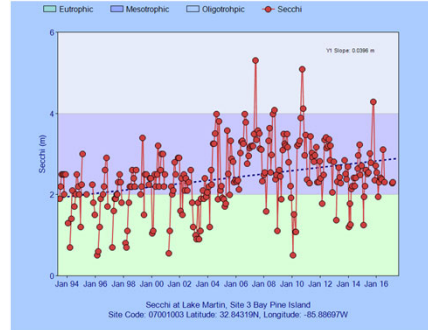
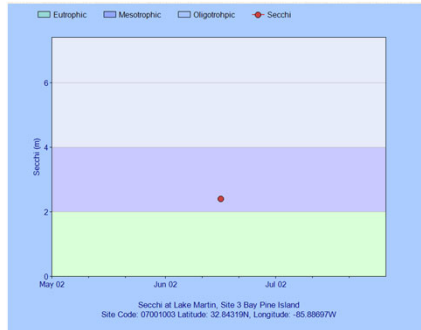


AWW Online Water Data Tools





Testing vs. Monitoring



Why Track Water Quality Trends?

"Is my waterbody getting better or worse, and why?"

Getting Better

Waterbodies are healthy or improving. Restoration actions and best management practices are effective. Continued protection is needed.




Getting Worse


Water quality is declining. It is important to collect monitoring information that can be used to identify and correct pollution problems.



How to Track Trends

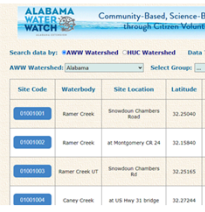


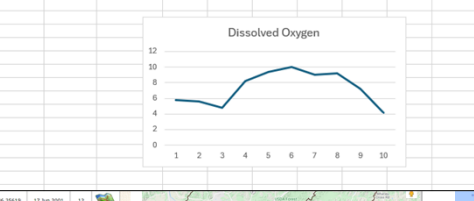
AWW Monitor anywhere



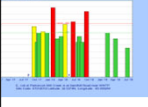
AWW Staff

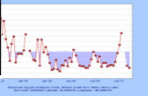
| Site | Sample Date | Sample Time | Air Temp | Water Temp | pH | Hard Degree | Alk. (mg/L) | DO1 | DO2 |
|---------|-------------|-------------|----------|------------|-----|-------------|-------------|-----|-----|
| 7016016 | 18-Aug-20 | 9:30 AM | 24 | 25 | 7.5 | 3 | 11 | 5.6 | 6 |
| 7016016 | 28-Jul-20 | 10:30 AM | 27 | 26 | 7 | 5 | 10 | 5.6 | 5.6 |
| 7016016 | 22-Jul-20 | 9:20 AM | 24.5 | 25 | 7 | 3 | 12 | 4.8 | 5 |
| 7016016 | 21-Mar-20 | 4:50 PM | 23 | 22.5 | 7 | 7 | 14 | 8.2 | 8.2 |
| 7016016 | 23-Feb-20 | 1:15 PM | 13 | 12.5 | 7 | 5 | 11 | 9.4 | 9.6 |
| 7016016 | 26-Jan-20 | 1:30 PM | 12.5 | 11 | 7 | 5 | 11 | 10 | 9.8 |
| 7016016 | 30-Dec-19 | 2:10 PM | 16 | 17 | 7 | 4 | 12 | 9 | 9.2 |
| 7016016 | 29-Nov-19 | 3:00 PM | 18 | 15 | 7 | 6 | 14 | 9.2 | 9.4 |
| 7016016 | 20-Oct-19 | 3:50 PM | 21 | 21 | 7 | 4 | 12 | 7.2 | 7.8 |
| 7016016 | 22-Sep-19 | 10:30 AM | 25 | 22.5 | 7 | 6 | 24 | 4.2 | 4.4 |






Dissolved Oxygen





How to Track Trends

How's My Waterway and WQX



Water Quality Data

Water Quality Download

Water quality data submitted from over 500 federal, state and tribal agencies, watershed organizations and other groups are available to support your water quality analysis.

[Water Quality Data Download](#)

Water Quality Data Upload with WQX

There are two options for you to share your data using WQX. You can choose a standard web-based application or WQX files that can be imported into Microsoft Excel spreadsheets or you can choose to enter a custom submission application using WQX files or forms through Exchange Network Nodes or Node Clients.

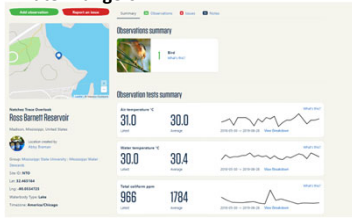
[Water Quality Data Upload with WQX](#)

Learn More about Water Quality Data

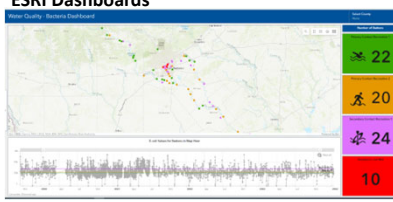
General information, Data Assistance, Tools, Training Videos, User Comments, and Funding. Learn how to get the most out of your data assistance with WQX.

[Learn More about Water Quality Data](#)

Water Rangers



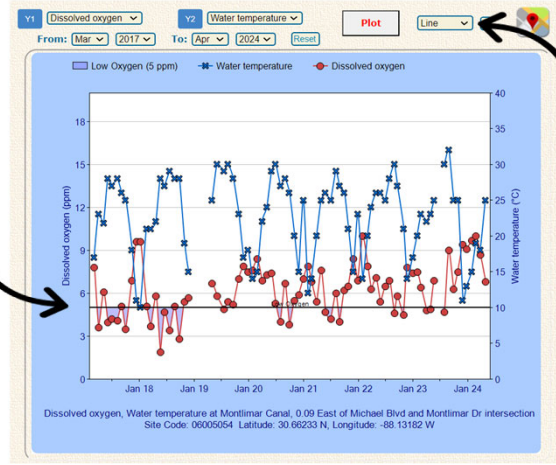
ESRI Dashboards





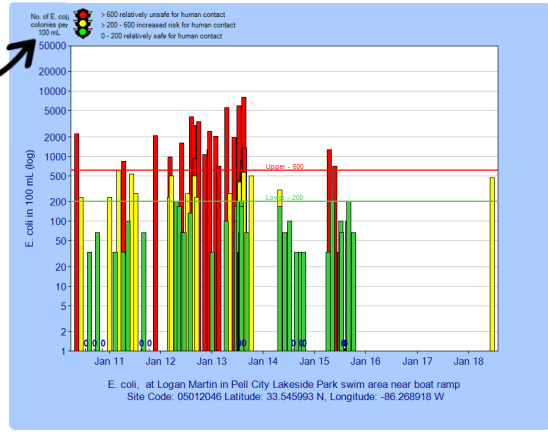
Keep Data Visualization Simple

AL Water Quality Standard for Dissolved Oxygen
5 ppm



Keep Data Visualization Simple

Traffic Light Colors to Indicate E.coli levels.





Increase Understanding of Water Data

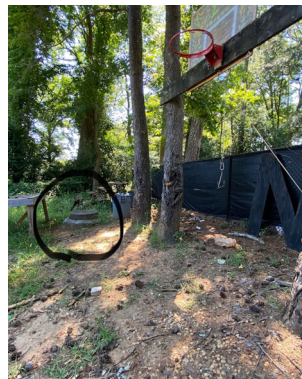
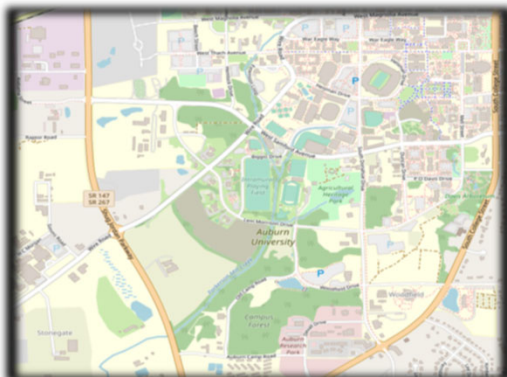
- Data Interpretation Sessions



- Learning Opportunities



Short-Term Outcomes



Possible Cause - Tree Roots into a sewer line, verified by camera.

Climate Change

Land-Use Changes

Upgrades to Use Classifications

Entering Wolf Bay Watershed

An Outstanding Alabama Water

Habitat Conditions

Long-Term Outcomes

Photo Credit: Bruce Dupree, ACES F&W

Photo Credit: Jeffrey Drummond

Challenges to Tracking Trends


- Keeping up with technology
- Encouraging participants to analyze data
- Time Requirements



Thanks!



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 Channel: Alabama Water Watch

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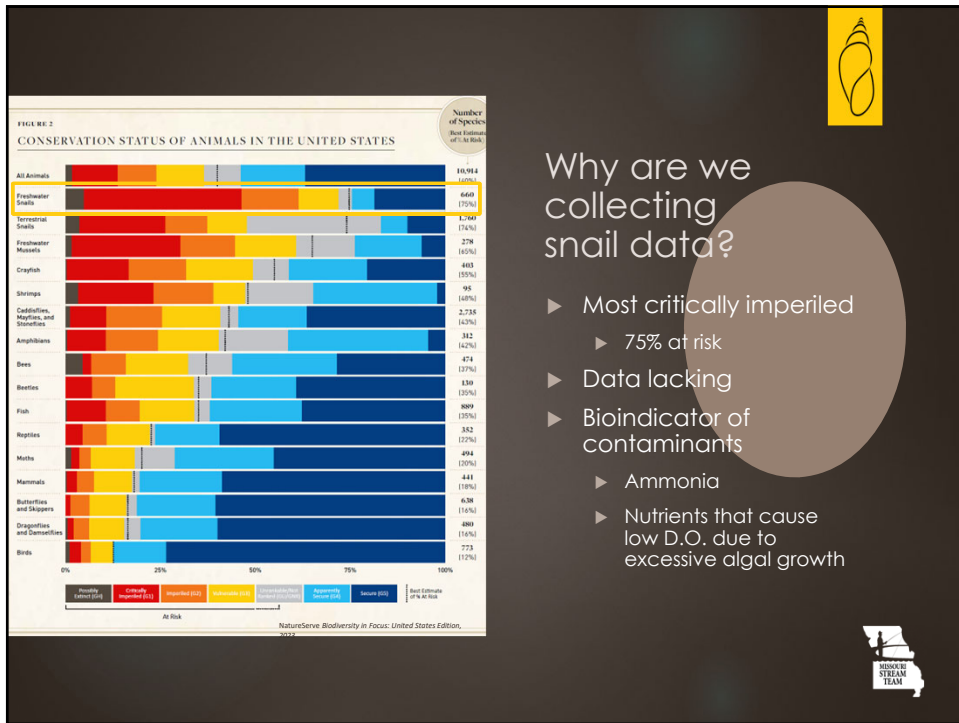
Show Me Snails

APRIL SEVY

VOLUNTEER EDUCATION AND CITIZEN SCIENCE COORDINATOR

MISSOURI DEPARTMENT OF CONSERVATION





Water Quality Standards (WQS)



- ▶ Recommendations for WQS set by EPA
- ▶ WQS set by DNR
 - ▶ Ex. Cold water habitat shall have a minimum of 6 mg/L dissolved oxygen
- ▶ EPA recommends WQS to protect mussels and snails from toxic effects of ammonia
 - ▶ Missouri DNR's current WQS only considers mussel data
 - ▶ Better snail distribution data may allow for better protections of waters from ammonia




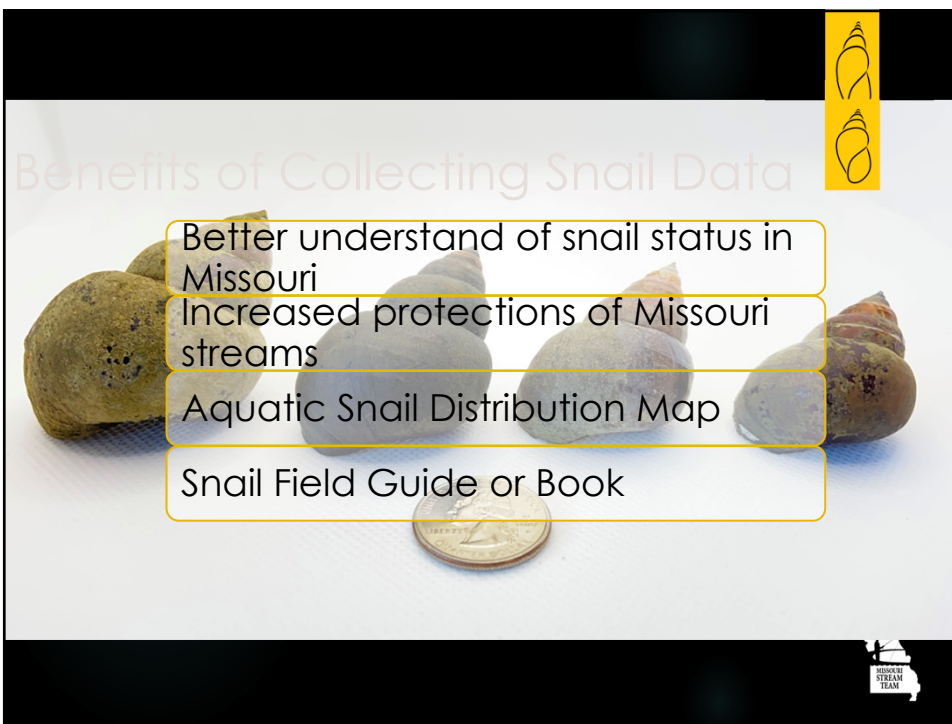
MISSOURI
STREAM
TEAM

MO Dept. of Conservation
*Relevancy, Science, and
Policy Branches*

**Missouri Stream
Team**


MO Dept. of Natural Resources





Benefits of Collecting Snail Data

- Better understand of snail status in Missouri
- Increased protections of Missouri streams
- Aquatic Snail Distribution Map
- Snail Field Guide or Book



Project Resources

- Snail Collection SOP
- Plain-language letter/email
- Vials
- Forceps
- Pencil
- Waterproof paper
- Pre-paid business mailing label
- Snail Sampling video
- Monthly check-ins with relevant education





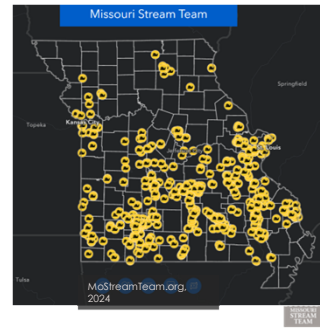
Preliminary Results

Samples

- Samples from 79 counties
- 2020 – 121 samples
- 2021 – 160 samples
- 2022 – 197 samples
- 2023 – 155 samples
- **Total – 661 samples**

Data

- 86 locations with no snails found
- Number of specimens identified – Over 2,000
- Number of species – 19
- Smallest species collected – midland siltsnail, max = 0.6 mm
- 1 record of Chinese Mysterysnail, prohibited species list



MISSOURI
STREAM
TEAM



Volunteer Engagement

- Routine communication
- Open communication
- Data feedback
- Educational programs
- Thank yous



SHOW-ME SNAILS

COLLECT THIS

- Stream snails
- Limpet snails
- Live snails
- Empty shells

NOT THAT

- Land snails
- Helicopsyche caddisflies
- Other cased caddisflies
- Mussels or clams

For Questions and More Information

Project information
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Snail Data
Steve.McMurray@mdc.mo.gov

Participation Certificate

- If you would like to obtain a participation certificate you can access the PDF in the **Handouts** section of your control panel.

Questions?

Watershed Academy Webcasts

Part 2 coming July 11th 1:00-3:00 pm!

The slides from today's presentations are posted on the Watershed Academy webpage.

A recording of the webcast will be posted within the next month.

www.epa.gov/watershedacademy

Contact Information

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Thank You!