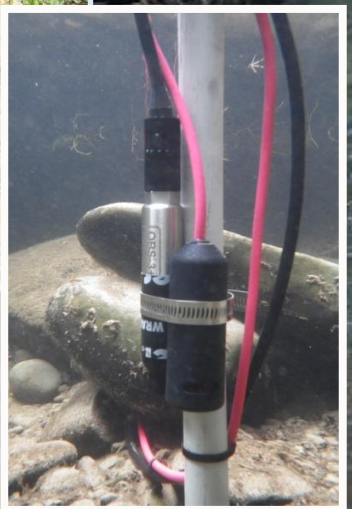
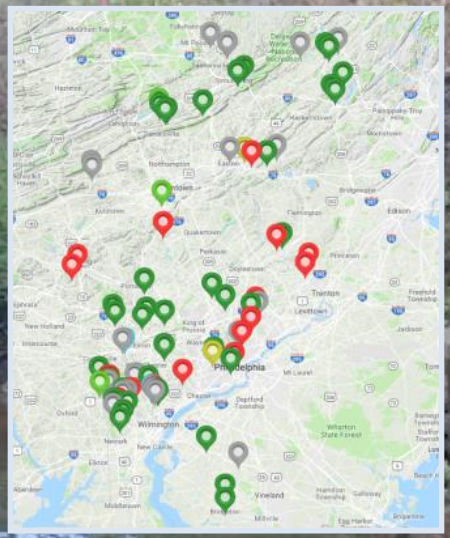
WELCOME!

Master Watershed Stewards
EnviroDIY Sensor Station Support Workshop

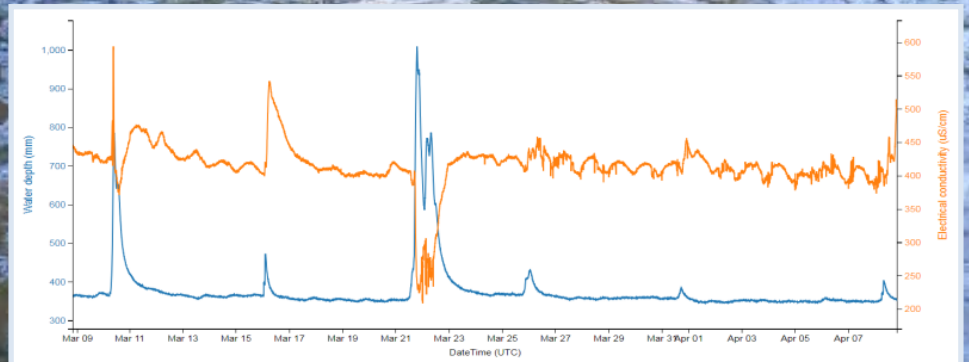
Online, May 17, 2020, 1:00-3:00p



EnviroDIY



Monitor My Watershed®



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Zoom Orientation

- ★ **Audio-Visual Check**
- ★ **Using the Features: Chat, Mute, Video, Share screen, Breakout rooms**
- ★ **Privacy Permissions**

Stroud Water Research Center will be recording this live workshop or webinar, including all questions, comments, etc. by the audience. By participating, you agree to allow the recording to be posted on the Stroud Center's YouTube channel, website, Facebook page, Instagram feed, and other media.

***Audio and Video should be disabled for everyone except current speaker**

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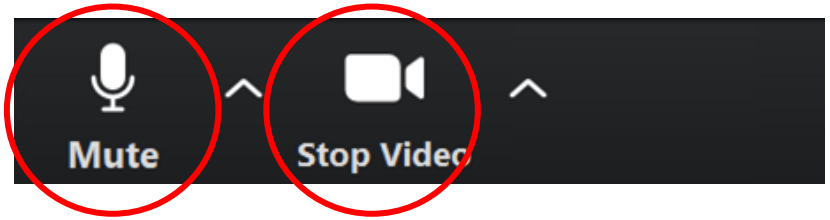
Zoom Orientation

★ Audio – Other than the current presenter, **everyone MUTE audio**

★ Video – Other than the current presenter, **please keep video disabled**



*Tip – Press space-bar on keyboard to temporarily unmute (you are unmuted while space bar is held down)

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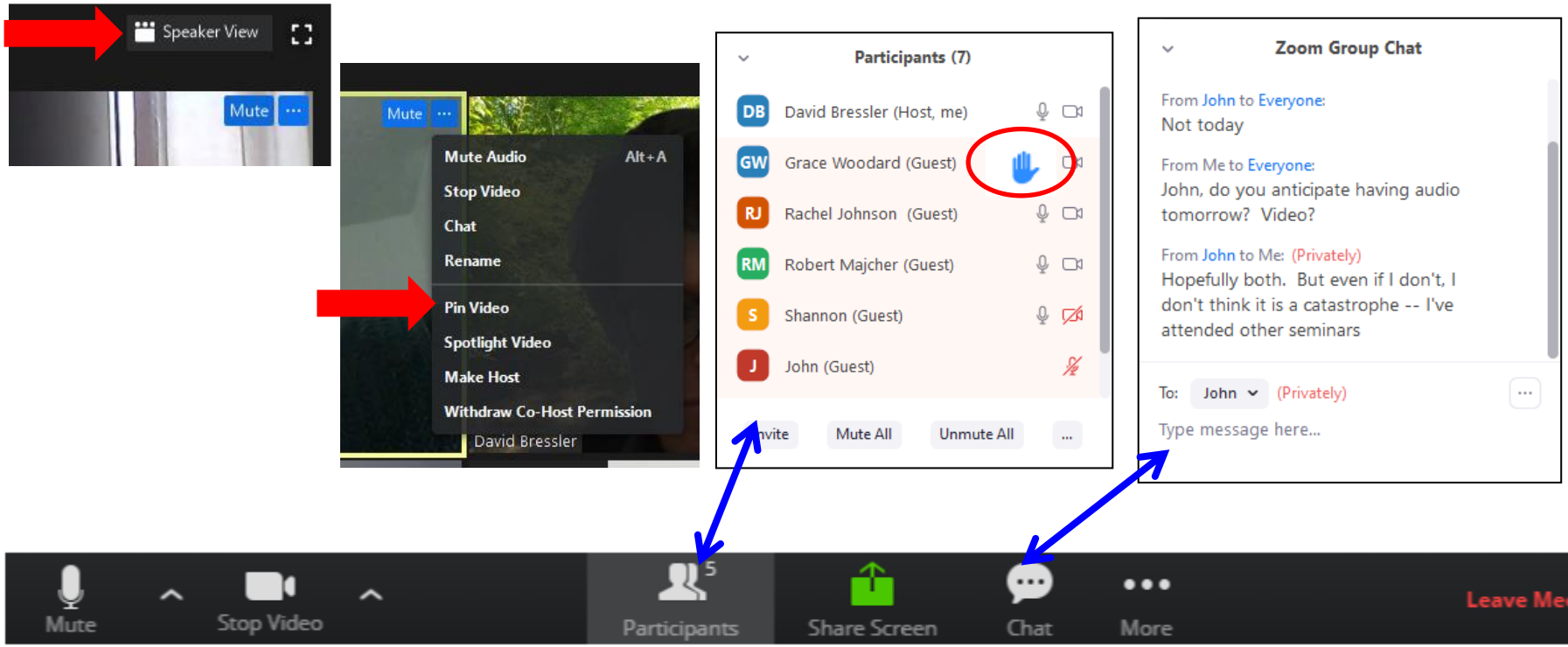
Zoom Orientation

- ★ If you have a question type it into the CHAT BOX
- ★ Anything urgent technical use the RAISE HAND feature, then unmute
- ★ Unmute and speak freely during designated question period at 2:30



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Zoom Orientation

- ★ All Stroud Center folks are co-hosts – ability to control audio/video
- ★ Waiting room has been disabled

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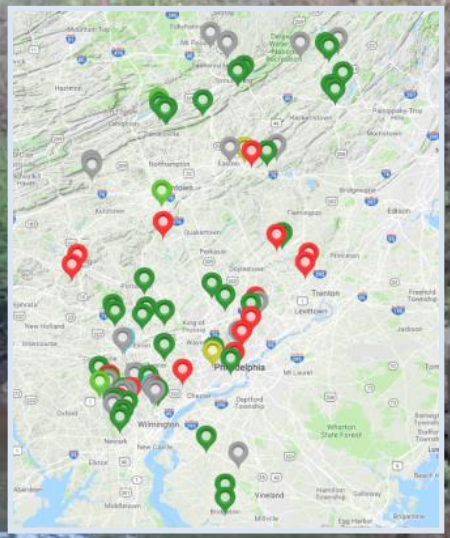
Master Watershed Stewards
EnviroDIY Sensor Station Support Workshop

Online, May 17, 2020, 1:00-3:00p

EnviroDIY



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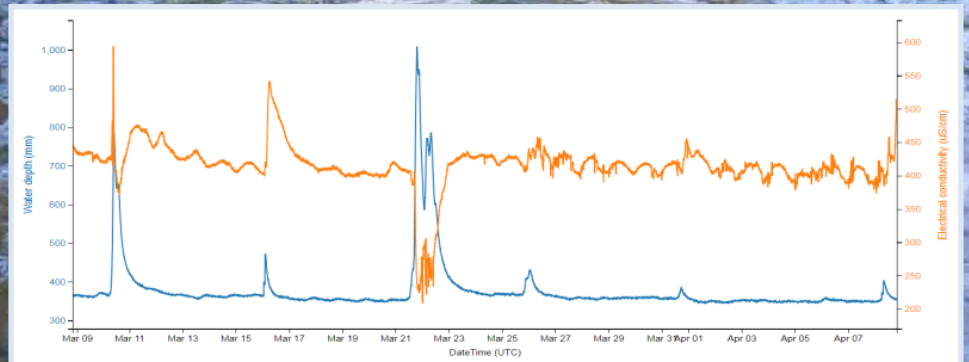

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Introductions

Workshop

Stroud Center: David Bressler, Shannon Hicks, Rachel Johnson

Master Watershed Stewards: Carol Armstrong, George Seeds (Chester & Delaware Co.)

Special Talks

Stroud Center: Diana Oviedo-Vargas and Marc Peipoch

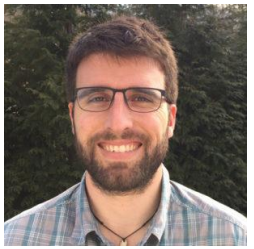
Roles

- Roles
  - George Seeds – organizer, big picture presenter
  - Carol Armstrong – organizer, context and case study presenter
  - Rachel Johnson – technical presenter, questions
  - Shannon Hicks – questions, feedback
  - Diana Oviedo, PhD and Marc Peipoch, PhD – special talks, questions
  - Dave Bressler – moderator, presenter









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Agenda

A. THE BIG PICTURE OF CITIZEN SCIENCE IN THE DRWI – 20 MIN.
   i. Welcome, introduction, housekeeping
   ii. Big picture of citizen science and its application to EnviroDIY/DRWI and MWS efforts
   iii. Overview of DRWI and Stroud role in supporting citizen science and sensor stations –
   iv. Application of data to protect watersheds: education, watershed management, reporting problems

B. THE DATA AND RESOURCES YOU NEED TO SUPPORT THE WORK – 30 MIN.
   i. Intro to Wikiwatershed
   ii. Review of Monitor My Watershed tool (MonMW) and practical usage issues
   iii. Review of basic maintenance and QC, using MonMW: understanding sensor and station functions, and critical tasks needed to achieve usable data, using quick guides
   iv. Support: Contacts for emergencies, technical problems, communication options, use of mentors

C. HOW DATA BECOMES USEFUL – 25 MIN.
   i. Stroud's role and capacities versus station owners
   ii. Broad scale interpretation of the data to understand the watershed; Temperature and Conductivity

D. PRACTICAL ISSUES IN WORKING WITH STATIONS – 20 MIN.
   i. Guidelines for the roles, responsibilities, communication, and learning opportunities for volunteers
   ii. Overview of building your own station

E. QUESTIONS AND DISCUSSION – 25 MIN.

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Goal for today

Build capacity to work with EnviroDIY stations and data

- This is an overview – lots of subtlety beyond what we can discuss today
- Use the resources that are available and be patient with your knowledge building
- Communicate and ask questions of station owner, the team, mentors, and Stroud Center

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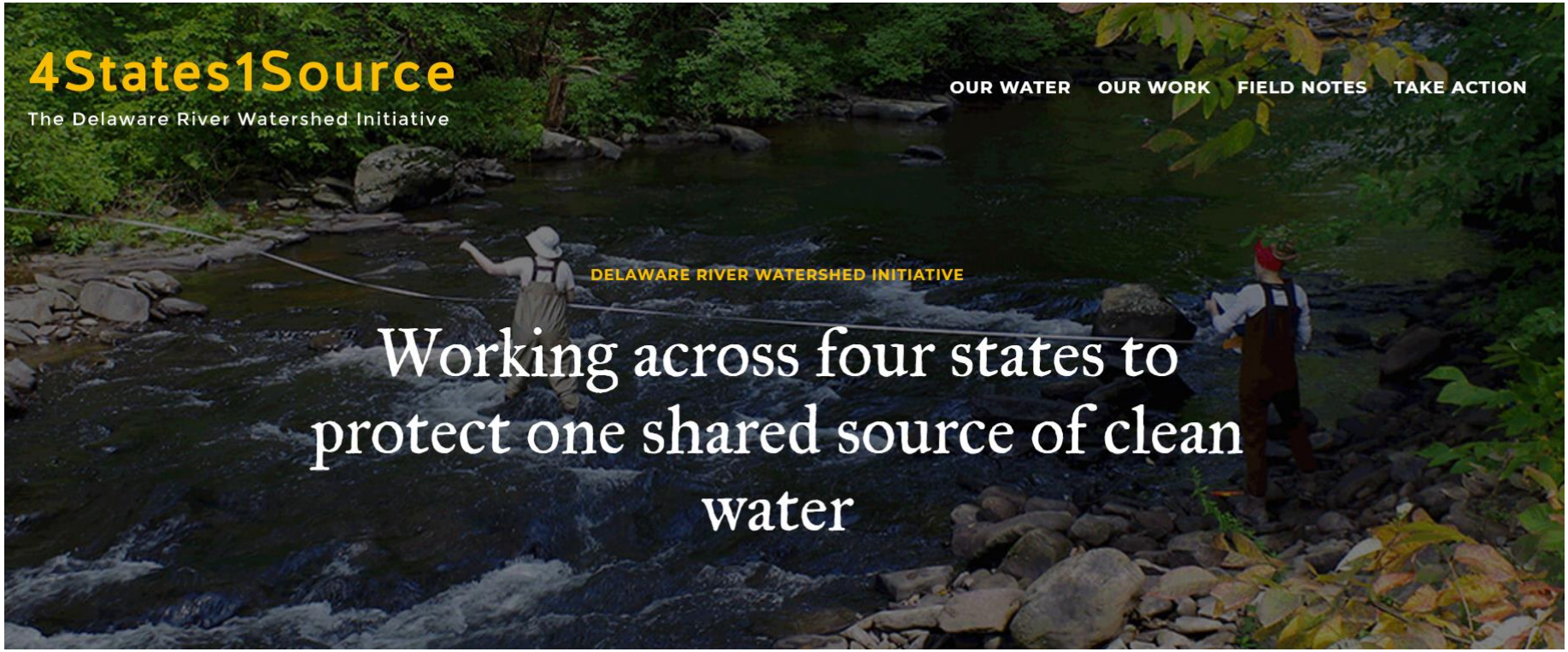
Delaware River Watershed Initiative



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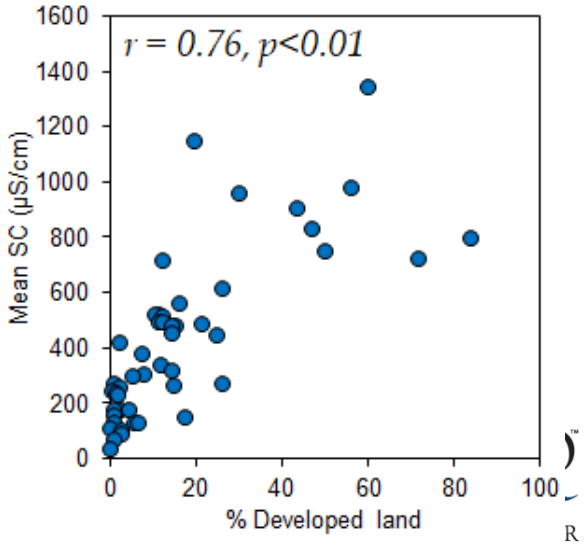
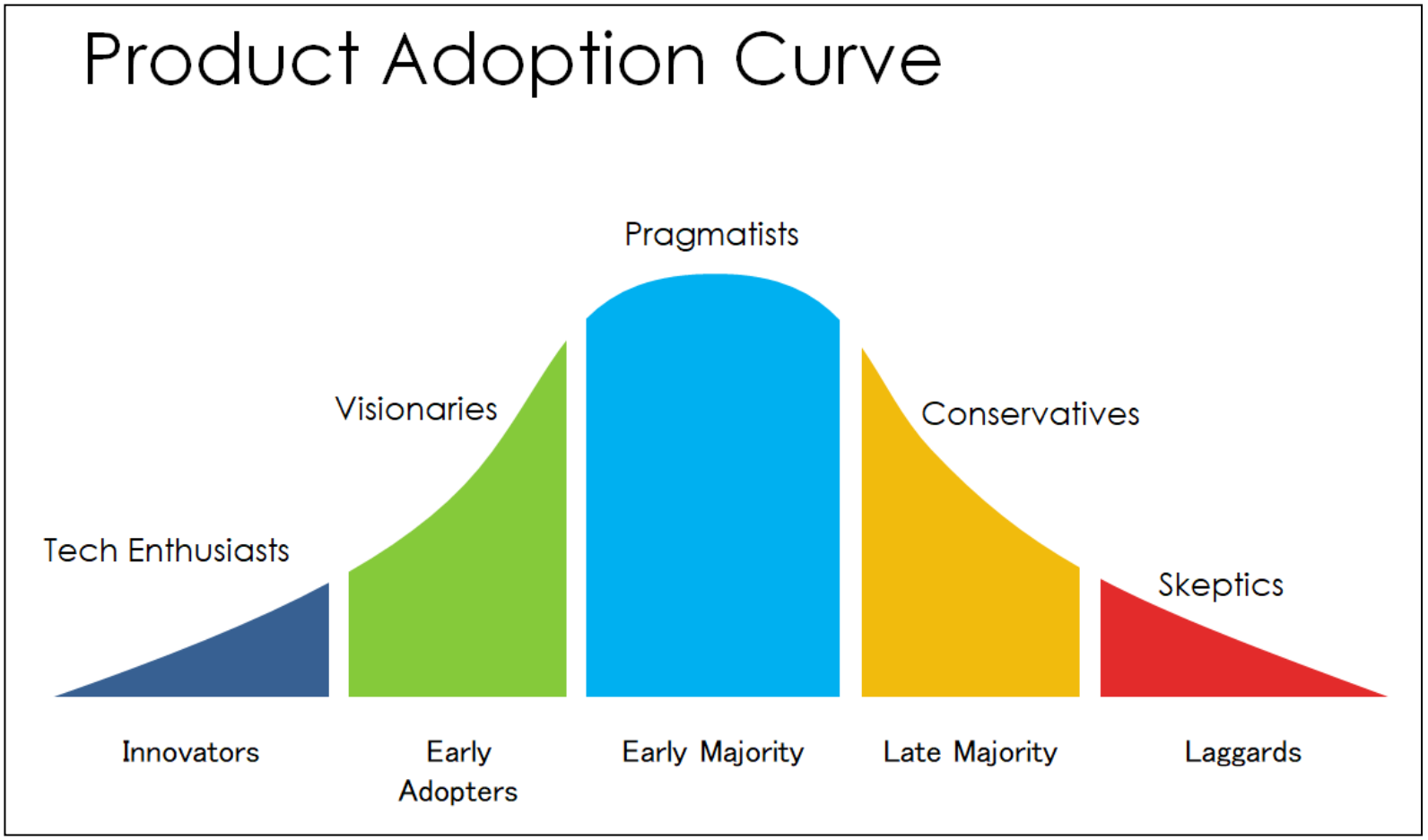
Stroud Center – EnviroDIY in DRWI

- Primary Goal
  - Support station owners in using stations for their own purposes
    - Workshops
    - Guidance materials
    - 1:1 support, trainings, small group events

- Secondary Goal
  - Analyze basin-wide data set
  - Develop tools to characterize and contextualize watersheds



It's a new project with a new product



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The Big Picture

Stroud Water Research Center

Big Picture: Citizen Science in the DRWI, Enviro DIY & MWS Efforts

Viewing our role as volunteer MWS's in the context of the overall Delaware River Watershed Initiative (DRWI) and the broader citizen science movement gives our work larger meaning and value.

Citizen Science

- Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions. -- *Oxford Dictionary*

- The involvement of the public in scientific research – whether community-driven research or global investigations. – *Citizen Science Association*

- Citizen Science volunteer networks allow scientists to accomplish tasks that would be too expensive or time-consuming to accomplish through other means.

- Citizen Science is a growing global movement that is increasing in its importance as government funding becomes scarcer and the need for science-based information increases, particularly in the environmental sciences and ecology.

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Big Picture: Citizen Science in the DRWI, Enviro DIY & MWS Efforts

Delaware River Watershed Initiative Citizen Science

https://williampennfoundation.org/delaware-river-watershed-initiative

- "The goal of the DRWI citizen science is to not only engage the public with conservation, but to train volunteers to generate meaningful, professional-quality water data that can be shared more broadly across the watershed."- *Andrew Johnson, Director of Watershed Protection, William Penn Foundation*

- "We wanted to build a framework that would harness the enormous capacity of conservation organizations to work together on a shared approach, and to see whether that critical mass could affect greater change. The result is a model that will not only have an effect in the Delaware River watershed, but also will provide a model that can be replicated in other watersheds tackling similarly complex issues." - *Janet Haas, Board Chair, William Penn Foundation*

- MWS's support local watershed groups across the Delaware River Basin and the Stroud Water Research Center in building science capacity to better address questions about how local watersheds function and how to restore and protect these resources.

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Application, Case Studies

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East Stroudsburg University at Cherry Valley National Wildlife Refuge

Action without Vision just passes time
Vision without Action is just a dream

U.S. Fish & Wildlife National Wildlife Refuge System

The purpose of the National Wildlife Refuge system was to support survival of migrating species by giving protected space for breeding, wintering, and foraging. The U.S. Fish & Wildlife Service are planning for climate change on National Wildlife Refuges.

They plan to conserve the future with scientific excellence at a landscape scale, to benefit a diverse public, and to nurture the next generation of leaders.

The Cherry Valley National Wildlife Refuge was added in 2008 with up to 20,000 migrating raptors and more than 140 species due to large blocks of unfragmented forest along the Kittatinny Ridge for interior-forest birds breeding grounds.

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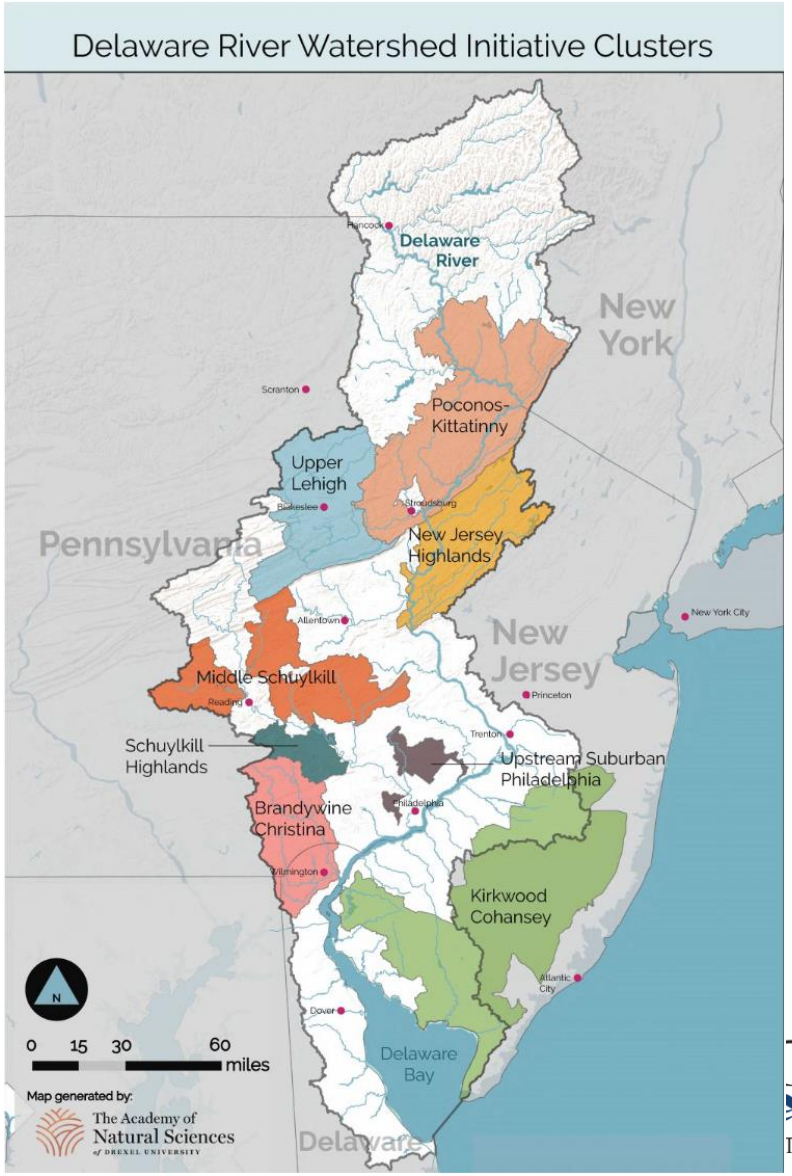
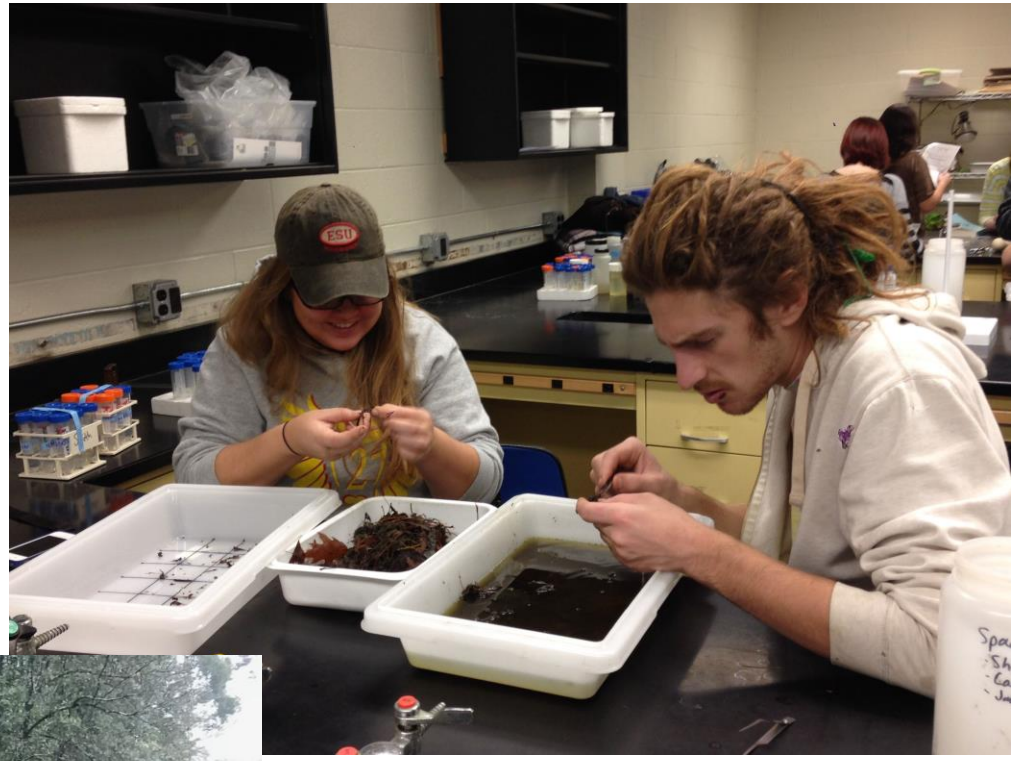
Educational and Research Purposes

Paul Wilson, Assoc. Professor of Biology, focuses on monitoring of aquatic ecosystems at CVNWR as part of the Delaware River Watershed Initiative. He involves ESU students through his Stream Ecology Class, ESU student research projects, and the ESU Environmental Club.



Stream Ecology is a field research class using 2 sites at CVNWR - students learn field and laboratory methods typically used by professionals. Each student presents their work in a science poster session.



U.S. DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

ESU EAST STROUDSBURG UNIVERSITY

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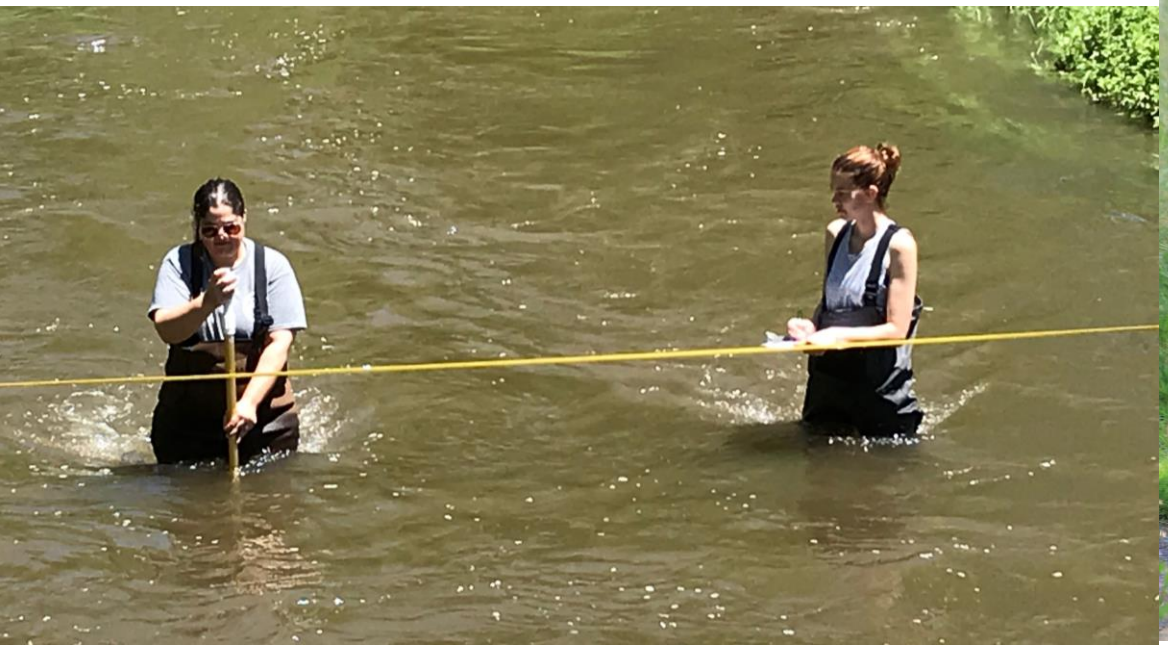
Research students use data from four Mayfly Data Loggers in Cherry Creek, learn to maintain the sensor stations, and conduct macroinvertebrate and chemical sampling.



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The Environmental Club includes students from all majors who are interested in stream ecology and aquatic life.

STREAM STEWARDS

The Nature Conservancy

NATIONAL PARK SERVICE

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Kim Hachadoorian, Project Manager, TNC

WILLIAM PENN FOUNDATION

www.nature.org/destreamstewards

- **First State National Historical Park** was designated in 2013, after being created by President Obama as First State National Monument.
- Its purpose is to celebrate the European cultural diversity of this settlement in the 1600s, and to celebrate the role Delaware played in the establishment of the U.S.
- The Stream Stewards are a Citizen Monitoring Program. Its work focuses on Rocky Run, Hurricane Run, Ramsey Run, Beaver Creek, and Palmer Run, all tributaries running into the Brandywine Creek, which joins the Christina River where the Delaware River meets the Estuary.
- Estuaries host more wildlife births than any other ecosystem in the world and have a wide range of habitats. Stream Stewards' work focuses on decreasing pollutants into the Estuary.

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The Stream Stewards' focus is on the impact of stormwater runoff on these tributaries for current and future research and management recommendations

- Stream Stewards is a Watershed Stewardship partnership between The Nature Conservancy, First State National Historical Park (FRST) and Stroud Water Research Center. Starting in 2016, a team of Citizen Science volunteers has been collecting water quality data on the streams that flow through FRST into Brandywine Creek.
- They use six Mayfly Data Loggers for conductivity, depth, temp, and turbidity. From additional sites they also take grab samples for E. coli counts and for macroinvertebrate indices, and measure pH and chloride.
- Those streams that are surrounded mostly by natural areas have low conductivity and are used for comparison with the monitored streams with headwaters in areas of dense residential and commercial development. These latter streams have high baseline conductivity and conductivity spikes into the tens of thousands µS/cm.

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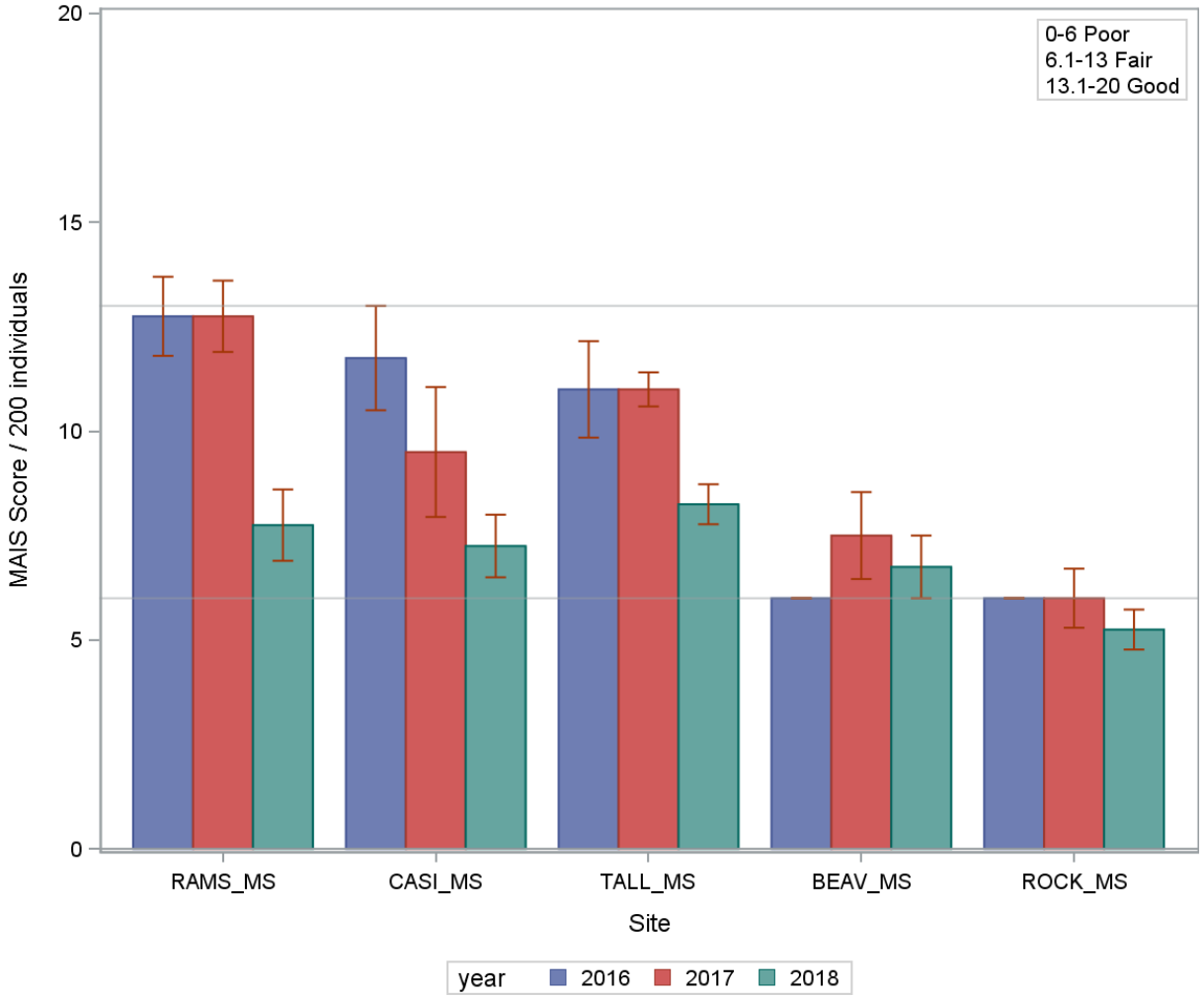

Macroinvertebrate Aggregated Index for Streams (MAIS) scores have declined, and the highest scores were with in the "Fair" category

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Analyses
Rocky Run TMDL

- High conductivity throughout the year at Rocky Run from road salt in mall and other parking lots, maybe summer flushing of salt.
- High pH in one pipe being studied.
- Stream Stewards providing info to DNREC to assist with Pollution Control Strategies for TMDLs, and ^ awareness & stewardship.
- Goals are to partner with landowners, water utilities, municipalities, state to influence policy and practice.
- Analyses shared with New Castle County who investigated and found and capped an oil/water separator at Auto store in Concord Mall that was inadvertently tied into the storm sewer system; Mall, store, County and SS worked very cooperatively to mitigate stream pollution.


Catch basin from Shopping Ctr - overflow enters Rocky Run

Chester County – Who to Call
For Water and Environmental Concerns and Complaints

Emergencies, including Spill and Fish Kills

Issue	Contact	Availability	Phone Number	Additional Information
Spills and other emergencies should be reported immediately	PA DEP	24 hours 7/365	484-250-5900 or 1-800-541-2050 (866-255-5158 (statewide))	Chester County is in the Southeast Region. Water quality problems are in the DEP Clean Water Program
Environmental complaints including water quality should be reported immediately	PA DEP	Weekdays 8:00a – 4:00p	484-250-5991	Off hours, leave a message
Fish kills (1st call)	PA DEP	24 hours	484-250-5900	Off hours, leave a message
Fish kills (2nd call)	PA Fish and Boat Commission	Weekdays 8:00a – 4:00p	717-626-0228	
Environmental health concerns (harmful env'l exposures, child care locations, natural gas and oil production health concerns, PFAS, lead)	PA Dept. of Health	24 hours 7 days	1-877-PA-HEALTH (1-877-7243)	601 Westtown Rd, West Chester.
Enforcement of violations related to on-lot sewage disposal systems, solid waste disposal	Chester County Dept. of Health	Weekdays 8:30a – 4:30p	610-344-6225 (sewage and water) 610-344-6688, 610-344-6526	https://www.chesco.org/365/Sewage-Water

Non-emergency environmental complaints can be submitted online ("Report An Incident") at: http://www.depweb.state.pa.us/portal/server.pt/community/southeast_regional_office/13778/environmental_complaints/617089

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Construction Site and Industrial Issues

Issue	Contact	Availability	Phone Number	Additional Information
Construction site pollution issues including erosion; off-site discharges of mud/sediment, improper or no silt fencing; sediment and stormwater discharges not controlled by BMPs	Chester County Conservation District	Weekdays 8:00a – 4:00p	610-925-4920	
Salt piles secured poorly or unsecured, salt runoff should be reported	Public Works Dept. of relevant township	Weekdays		Can provide short film to township, "Salty Streams" by Stroud Water Res Ctr: https://www.youtube.com/watch?v=DvJ_-Zzz0kQ
Pipeline construction problems, discharge of industrial waste to waters of PA	PA DEP Bureau of Clean Water	Weekdays 8:00a – 4:00p Emergency: 24 hours 7/365	484-250-5990	Off hours, leave a message

Broken Water Mains and other Water Supply Issues

Issue	Contact	Availability	Phone Number	Additional Information
Broken water mains	Public Works Dept. of relevant township/borough/city	Weekdays		Information from Chester County Water Resources Authority – 610-344-5400
Broken water mains	Aqua Pennsylvania	24/7/365	610-525-1402	
Clogged or leaking sanitary sewer lines	Sewer Dept. or Public Works Dept. of relevant township	Weekdays		
Illegal water main or water pipe discharges into streams, storm drains, ponds	Public Works Dept. of relevant township Public Water Supplier: Aqua Pennsylvania	 Weekdays 8:00a – 5:00p	 610-692-3859	 713 Tower Lane, West Chester

Contact PA DEP emergency line – 484-250-5900 or 1-800-541-2050 if unable to reach township and problem is urgent.

Salt piles on unnamed business uphill from Little Valley Creek, E. Whiteland

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200 m from Pickering Creek

Site code: SHPK6S
Site name: Pickering downstream

Reporting sewage and broken sewer equipment

Site code: PUSR1S
Site name: Sandy Run, Abington

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Data and Resources to Support the Work

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Data and Resources to Support the Work

- https://wikiwatershed.org/drwi/

Delaware River Watershed Initiative Resources

EnviroDIY Field Visit Data Sheet

- Enter field visit data
- View field visit data (Looking for older data?)

Data Sheets

- EnviroDIY Field Visit Data sheet (blank)
- EnviroDIY Field Visit Data sheet tutorial
- Stream Discharge Data sheet

Data and Data Visualization Resources

- Monitor My Watershed
- Monitor My Watershed help resources
- http://drwisensors.dreamhosters.com/

Sensor Station Help Resources

Manuals

- DRWI sensor station manual (more complete, access limited to DRWI users)
- Sensor station manual (formal, publicly available version)

Quick Guides

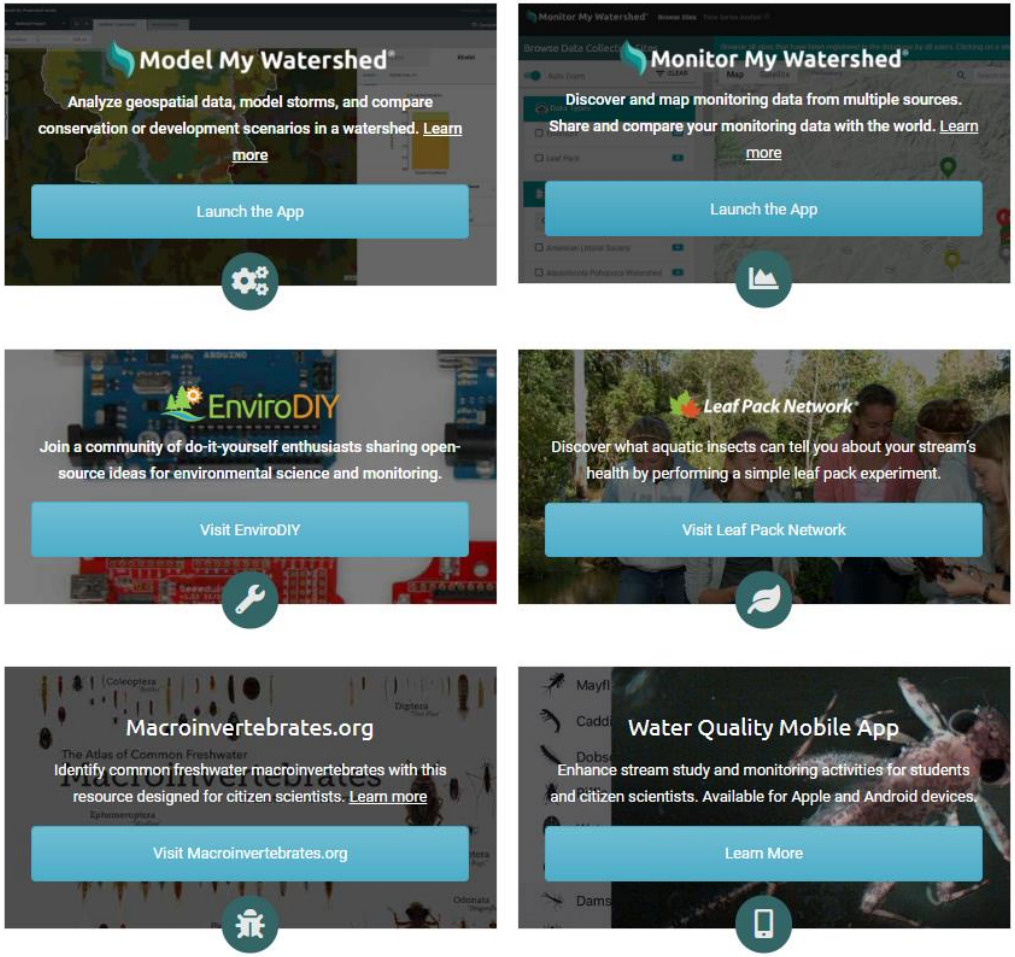
- Data patterns quick guide
- Time zone guide
- Maintenance quick guide
- Quality control quick guide
- Understanding your EnviroDIY Mayfly sensor station data

Video Tutorials

- Sensor station installation
- Discharge rating curve calculator: Using Flowmeter Data | Using Neutrally Buoyant Object Data
- Load calculator: Part 1, Entering Rating Curves | Part 2, Preparing Sensor Data | Part 3, Calculating Storm Loads
- Stage to Area Predictor: Entering Cross Section Data
- Sensor Bundle Maintenance: Sensor Cleaning and Bundle Removal
- Collecting a Grab Sample and Building Site Rating Curves
- Performing Quality Control on the Site and Sensor Station
- Downloading Sensor Station Data
- Installing a Staff Gauge at Your Sensor Station Site

WikiWatershed®

- A web toolkit designed to help people advance knowledge and stewardship of fresh water.



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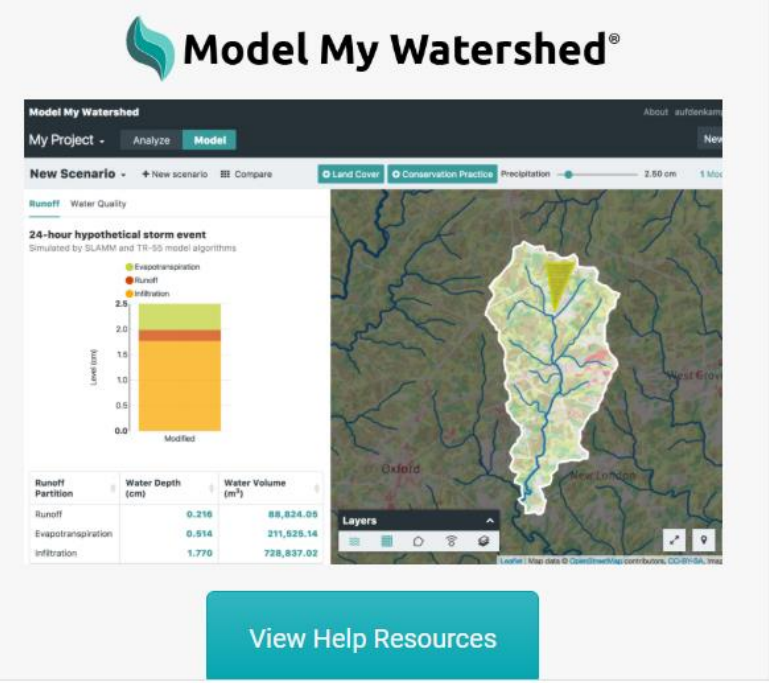
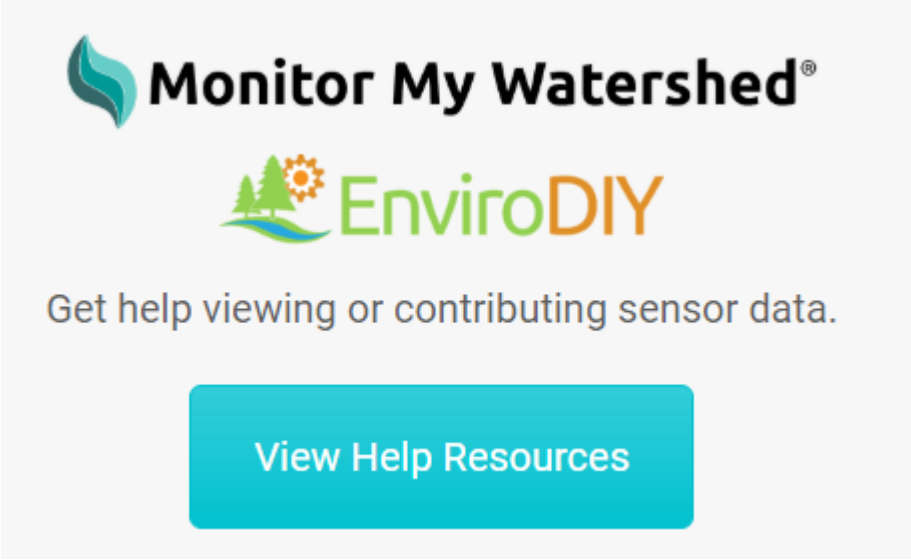
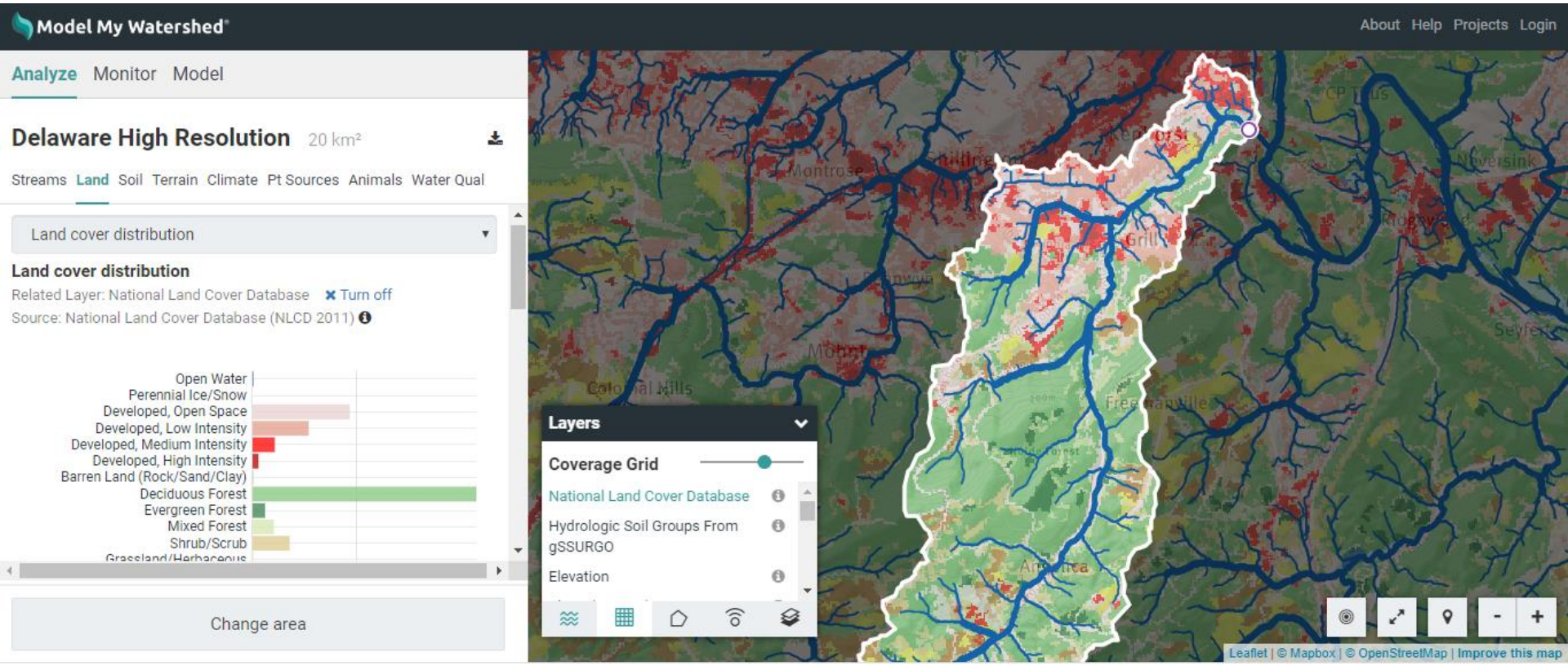
Wikiwatershed help

- https://wikiwatershed.org/help/
  - Videos
  - Manuals
  - Curricula





Model My Watershed®



Angelica Creek Downstream of The Nature Place (MSAC2S)

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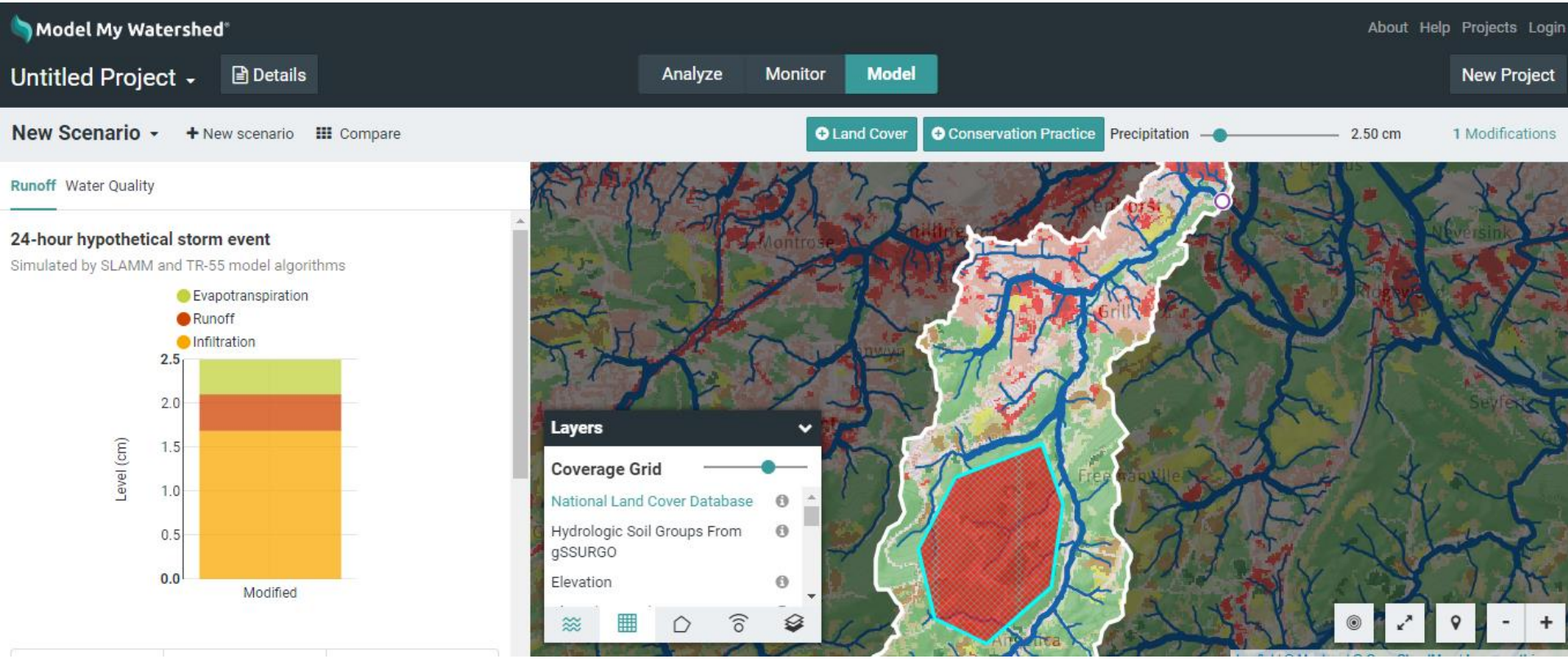
Model My Watershed®



Angelica Creek Downstream of The Nature Place (MSAC2S)

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Model My Watershed®

Compare

Runoff | Water Quality

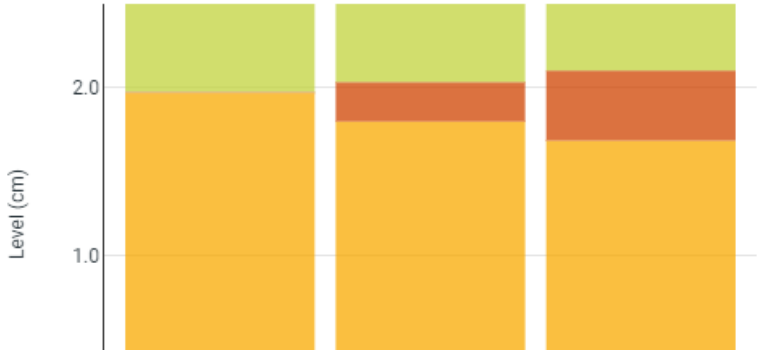
Precipitation 2.50 cm

Scenarios

Predominantly Forested | Current Conditions | New Scenario

Combined Hydrology

- Evapotranspiration
- Runoff
- Infiltration



Angelica Creek Downstream of The Nature Place (MSAC2S)

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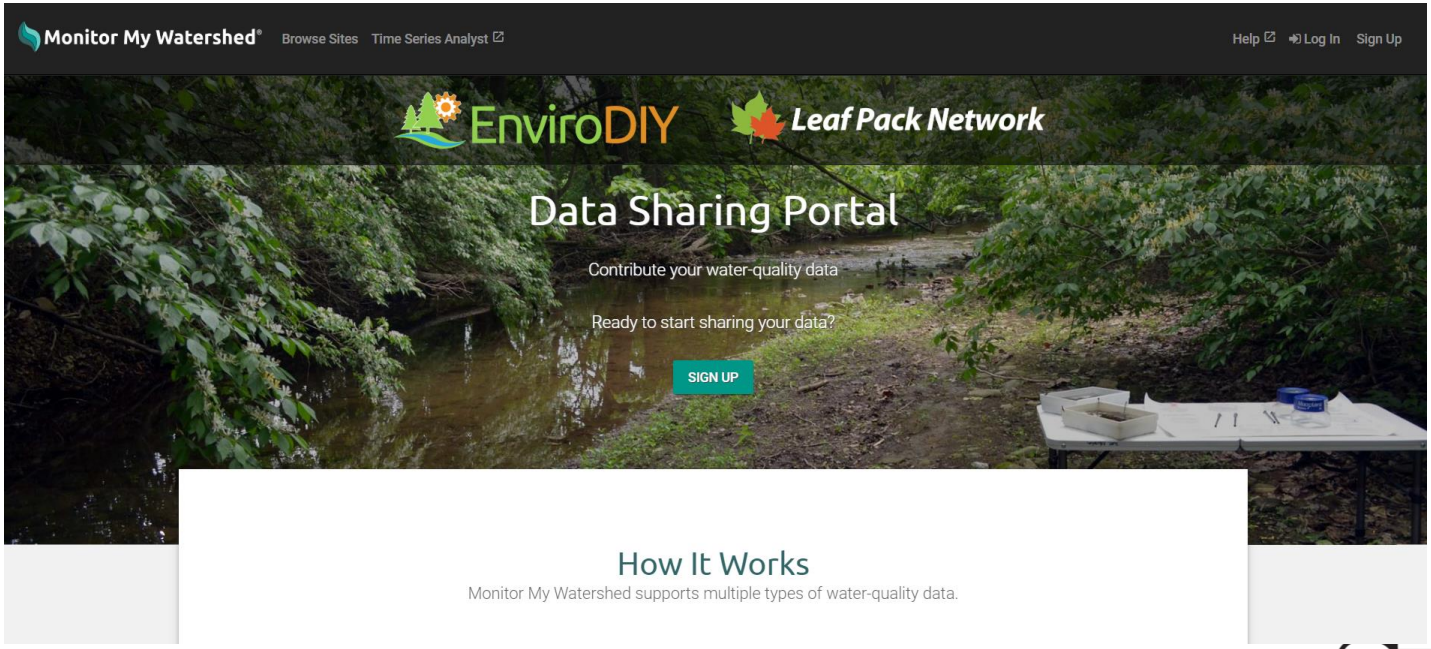
Monitor My Watershed®

- Monitor My Watershed® is a data portal that allows you to share and explore do-it-yourself environmental monitoring data.
- It currently hosts EnviroDIY™ sensor data and Leaf Pack Network® macroinvertebrate data.
- https://monitormywatershed.org/



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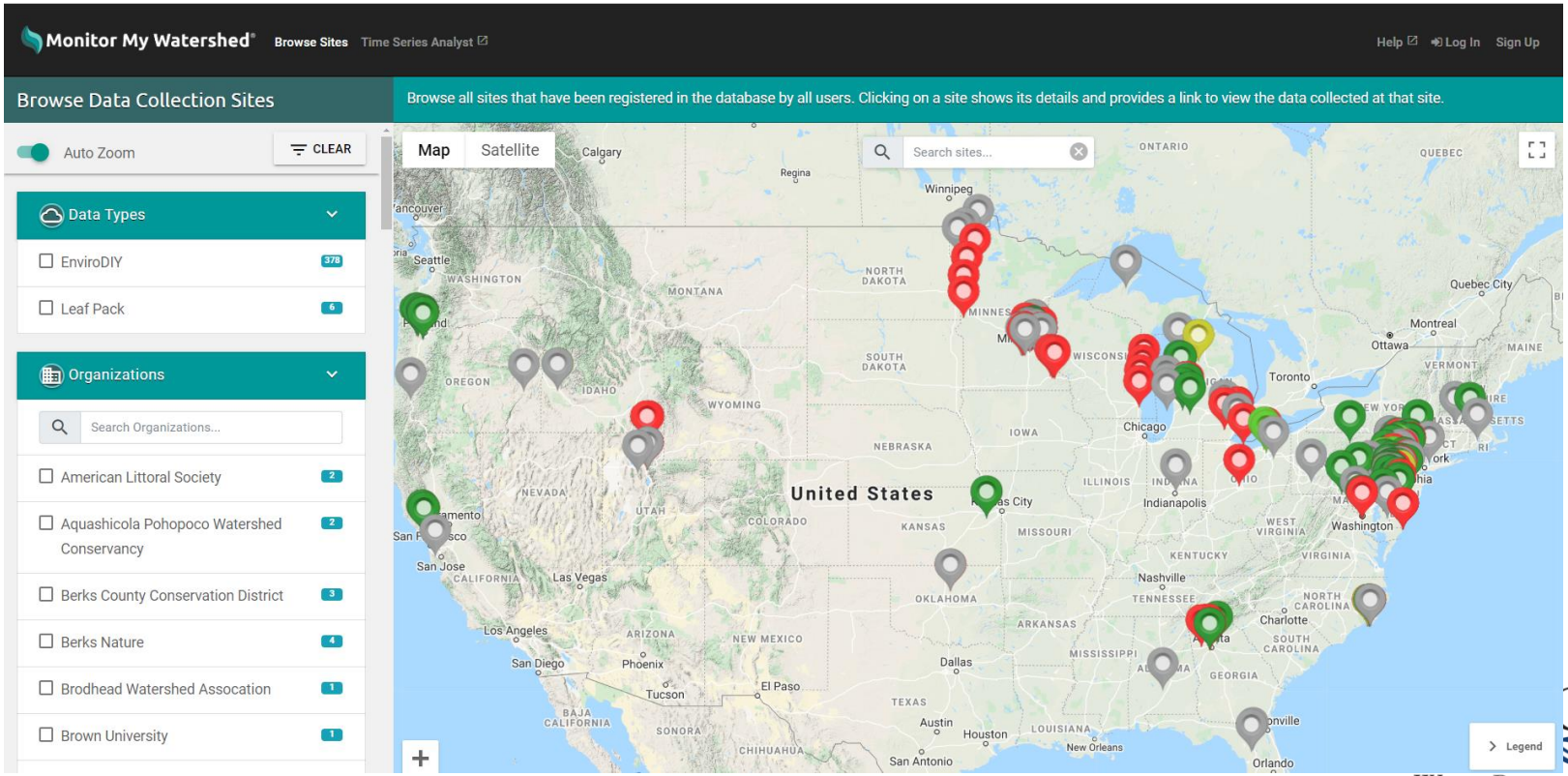
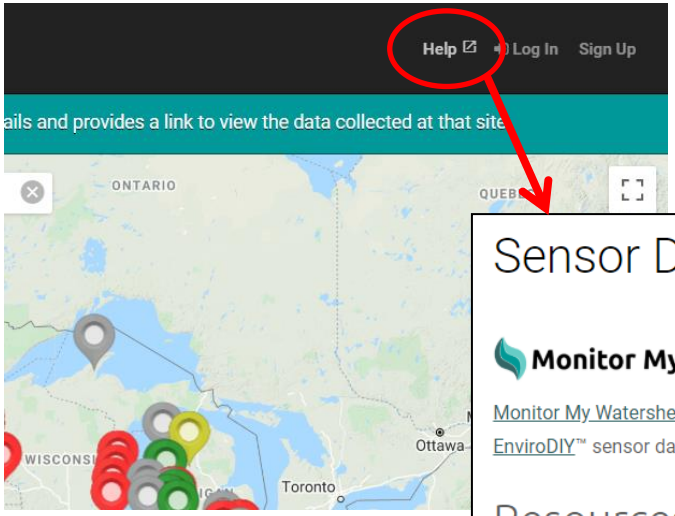
Monitor My Watershed®

- Key points about MonitorMW
  - It is entirely public – no login or pass needed to access, visualize, and download data



Monitor My Watershed®

- Key points about MonitorMW
  - There are ***now*** help resources, guidance materials, and lesson plans (drafts)



Sensor Data Help

Monitor My Watershed® EnviroDIY

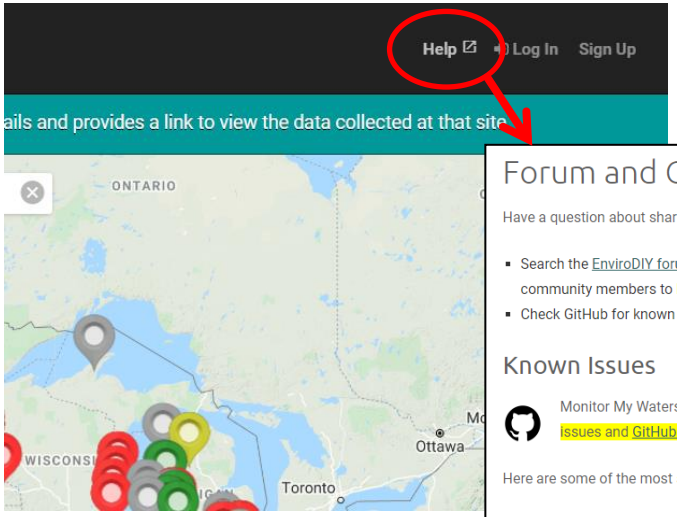
Monitor My Watershed® is a data portal that allows you to share and explore do-it-yourself environmental monitoring data. It currently hosts EnviroDIY™ sensor data and Leaf Pack Network® macroinvertebrate data. Monitor My Watershed is part of the WikiWatershed® toolkit.

Resources

- Monitor My Watershed Quick Reference Guide
- Manual: Sharing and Viewing Sensor Data on Monitor My Watershed
- Getting Started with the Mayfly Data Logger (hardware details, software instructions, sensor station manual)
- How to Use Monitor My Watershed
  - 15-minute video
  - 55-minute video
- Curricula

Monitor My Watershed®

- Key points about MonitorMW
  - There is a way to provide feedback on bugs and feature requests



Forum and GitHub

Have a question about sharing sensor data on Monitor My Watershed? Before submitting a question by email, please do the following:

- Search the EnviroDIY forums for similar issues. If you don't find the answer, try posting your question on the forum to allow EnviroDIY community members to help.
- Check GitHub for known issues (see below).

Known Issues

Monitor My Watershed is under development and there are a number of known issues. Check our GitHub issue tracker to see known issues and GitHub milestones to see scheduled bug fixes and feature additions.

Here are some of the most significant known issues:

- ~~Users being warned that site is unsafe due to expired SSL certificate~~ FIXED
- ~~Error when attempting a password reset~~ FIXED
- Website timing out when uploading CSV files
- ~~Registration form says organization name is optional but it is currently set as required~~ FIXED
- ~~Uploaded sensor data not appearing in Times Series Analyst~~ FIXED
- Uploaded data not appearing/not filling gaps

Still Need Help?

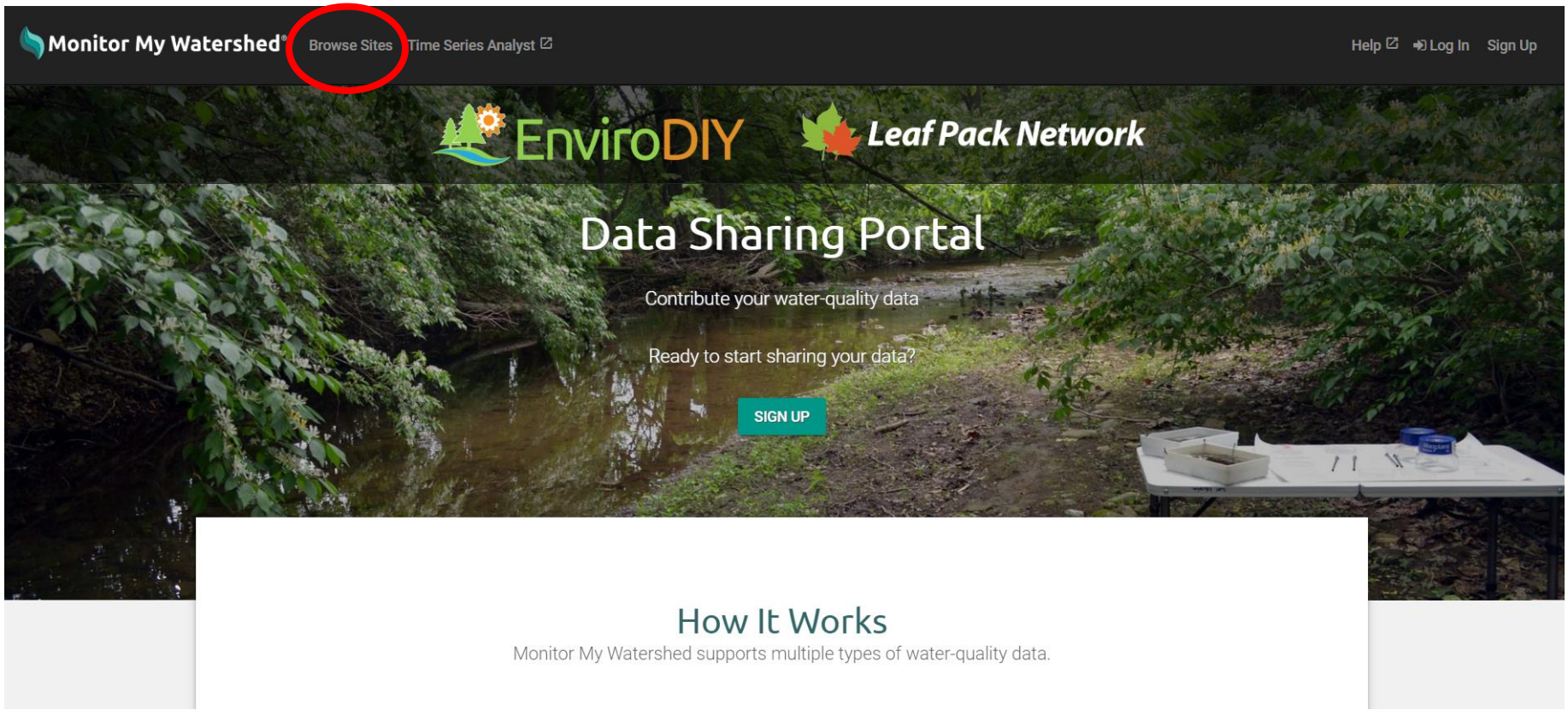
If you've reviewed the resources and still need help, or would like to report a bug or request a feature, please use our contact form. GitHub users are welcome to report problems in the issue tracker.

View the Monitor My Watershed Terms of Use and Privacy Policy.

STROUD WATER RESEARCH CENTER

Monitor My Watershed®

- https://monitormywatershed.org/



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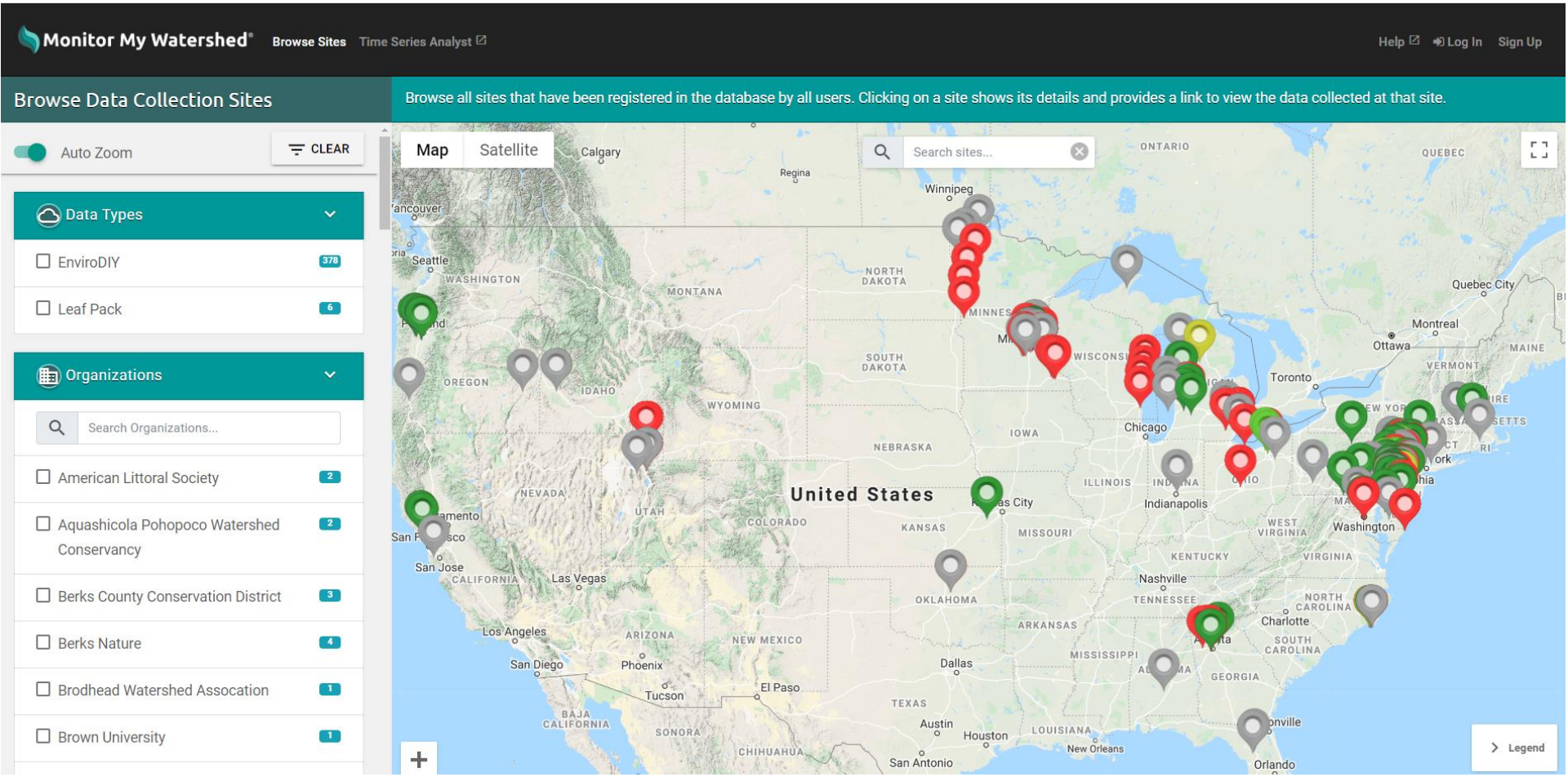

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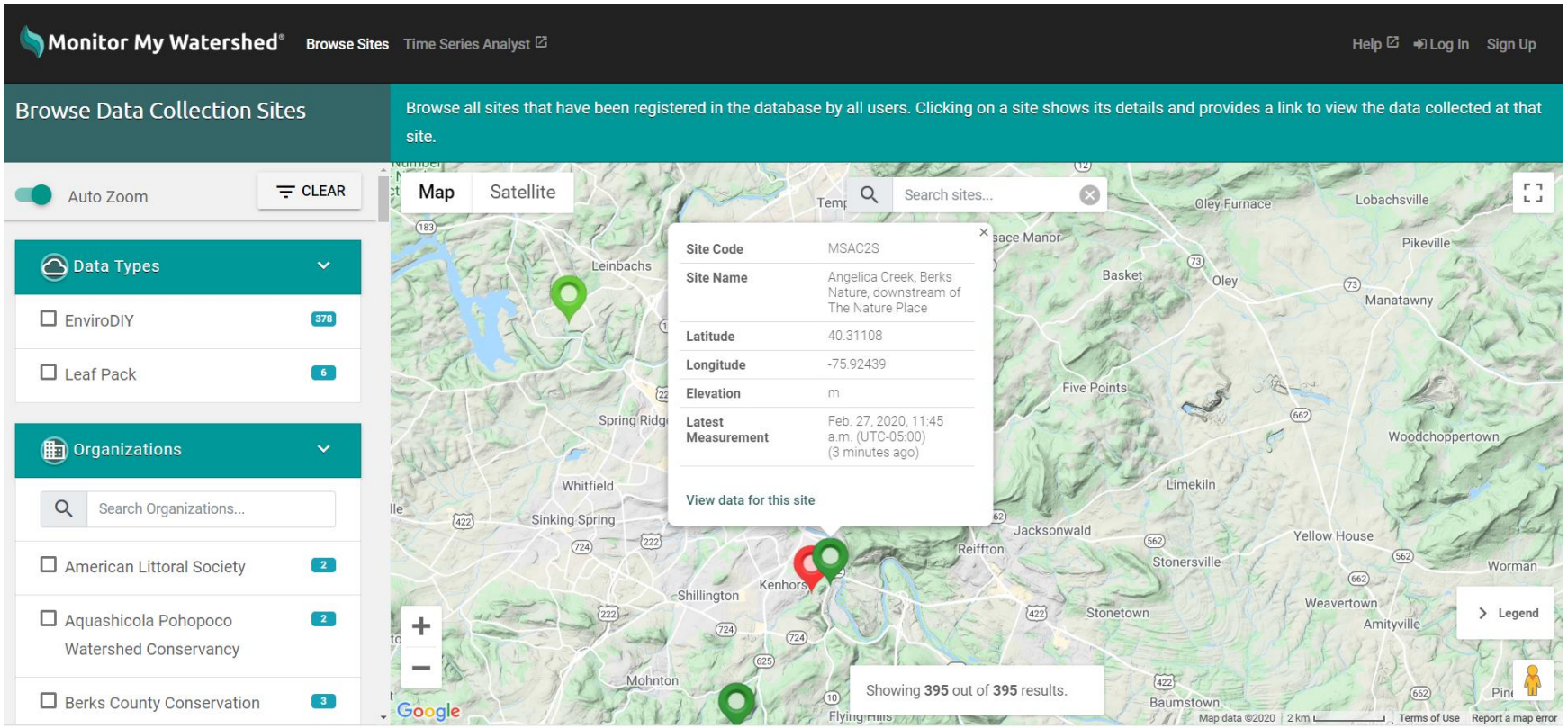
Monitor My Watershed®



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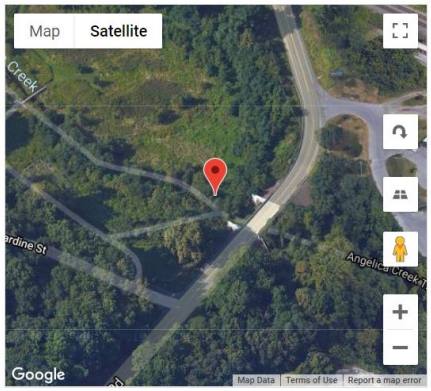
Monitor My Watershed®

Monitor My Watershed®

Angelica Creek, Berks Nature, downstream of The Nature Place (MSAC2S)

Deployment By	Michael Griffith
Organization	Berks Nature
Registration Date	Sept. 16, 2019, 8:06 p.m.
Deployment Date	Sept. 18, 2019, 4:15 p.m.
Latitude	40.31108
Longitude	-75.92439
Elevation (m)	-
Elevation Datum	MSL
Site Type	Stream
Stream Name	Angelica Creek
Major Watershed	-



Sensor Observations at this Site

EnviroDIY

DOWNLOAD SENSOR DATA

Only the most recent 72 hours of available data are shown on the sparkline plots. The plots are broken when there are gaps in the data longer than 6 hours. Plots shaded in green have recent data. Plots shaded in red have not reported data in the last 72 hours.

Time Series Analyst
View data for this site.
Related Link

Water depth Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
372.5
(mm)

Medium	Liquid aqueous
Sensor	Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Temperature Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
6.4
(degC)

Medium	Liquid aqueous
Sensor	Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Electrical conductivity Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
272.2
(uS/cm)

Medium	Liquid aqueous

Turbidity Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
5.6225
(NTU)

Medium	Liquid aqueous

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Time Series Analyst for comparison of time, site, chemistry, and downloading of data

- Find your station, select the data you want to review

Map | Datasets | Visualization

Search

Show All | Show Selected | Clear Selected | Export selected (.zip) | Show / hide columns

Plot	Series	Network	Site Code	Variable Code	Variable Name	Quality Control Level	Nu
☑	366	EnviroDIY	SHPK6S	Decagon_CTD-10_Depth	Water depth	Raw Data	
☐	367	EnviroDIY	SHPK6S	Decagon_CTD-10_Temp	Temperature	Raw Data	
☑	368	EnviroDIY	SHPK6S	Decagon_CTD-10_Cond	Electrical conductivity	Raw Data	
☐	369	EnviroDIY	SHPK6S	Campbell_OBS3_Turb	Turbidity	Raw Data	
☑	370	EnviroDIY	SHPK6S	Campbell_OBS3_Turb	Turbidity	Raw Data	
☐	371	EnviroDIY	SHPK6S	EnviroDIY_Mayfly_Temp	Temperature	Raw Data	
☑	372	EnviroDIY	SHPK6S	EnviroDIY_Mayfly_Batt	Battery voltage	Raw Data	
☐	1929	EnviroDIY	SHPK6S	Sodaq_2GBee_SignalPercent	Percent full scale	Raw Data	

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Time Series Analyst Graphs and data

- Select data from multiple sites to make comparisons
- Select your desired time period for analysis
- Can also display as histogram, or box and whisker graphs.
- Cursor will give specific data points, and graph can be expanded by dragging, too.

Side code: SHPK6S
Site name: Pickering Creek downstream

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Monitor My Watershed®

- Key points about MonitorMW
  - It's new and in development, this is important for users to understand
  - It is entirely public – *no login or pass needed to access, visualize, and download data
  - There are now help resources, guidance materials, and lesson plans (drafts)
  - There is a way to provide feedback on bugs and feature requests, GitHub
  - A lot more than what was provided here – ability to build station, establish a site on MonitorMW, and upload/transmit data

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Station Maintenance and QC

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Sensor Station Maintenance and QC

Introduction

- **Brief overview of what we will be covering in this section:**
  - Review of how the sensor station functions
  - Review maintenance and QC critical tasks
  - Relating tasks to MonitorMyWatershed data

What do we mean when we mention maintenance and QC?

Why does it matter?

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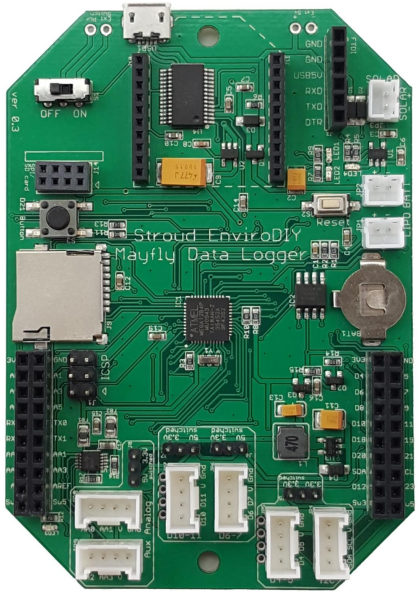
Sensor Station functions



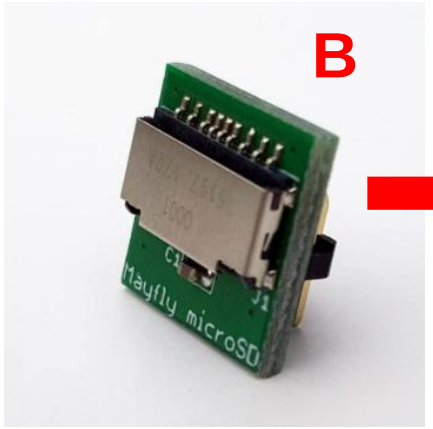
The mayfly data logger – sending continuous data every 5 minutes to MonitorMyWatershed.org

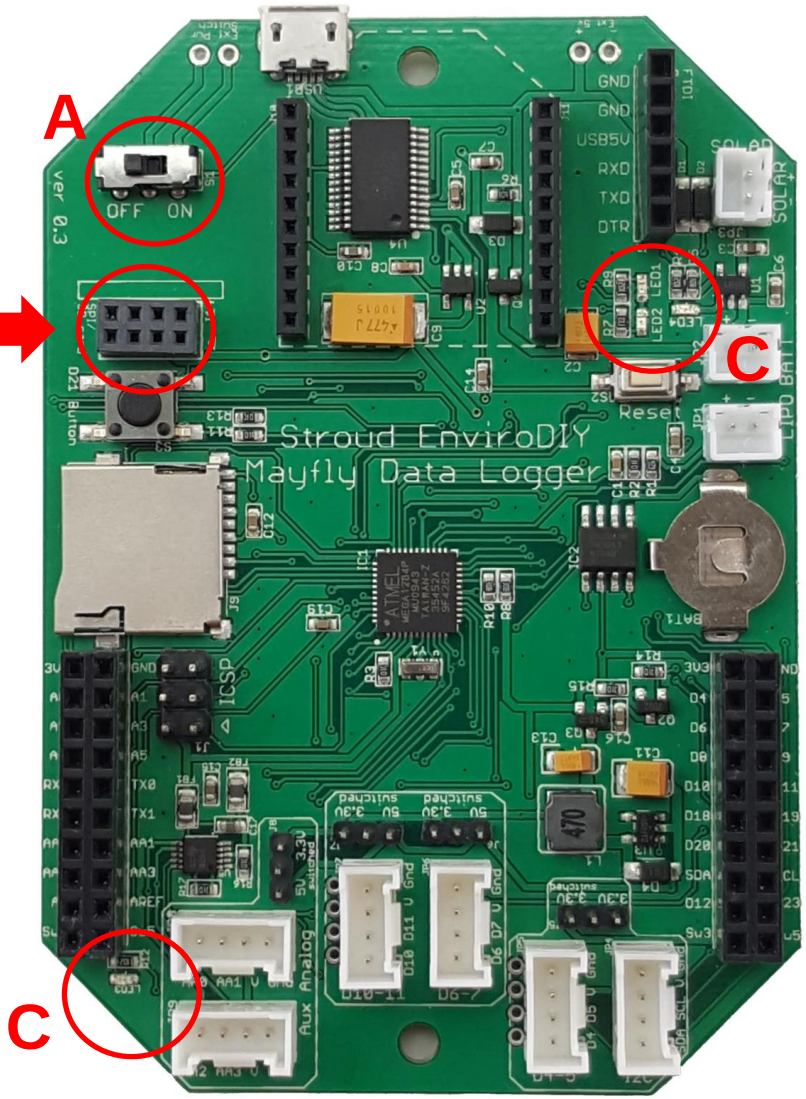
DateTime	TimeOffset	DateTimeUTC	Decagon_CTD-10_Depth	Decagon_CTD-10_Temp	Decagon_CTD-10_Cond	Campbell_OBS3_Turb-1	Campbell_OBS3_Turb-2	EnviroDIY_Mayfly_Temp	EnviroDIY_Mayfly_Batt	Digi_Cellular_RSSI	Digi_Cellular_SignalPercent
9/18/2019 11:15	-5:00	9/18/2019 16:15	303.3	17.3	403.8	4.61499	4.07552	23.5	4.078	-57	90
9/18/2019 11:20	-5:00	9/18/2019 16:20	304.5	17.1	409.3	3.8014	3.22395	24	4.078	-45	109
9/18/2019 11:25	-5:00	9/18/2019 16:25	303.3	17.1	410.7	5.06607	4.5499	24.5	4.078	-45	109
9/18/2019 11:30	-5:00	9/18/2019 16:30	304.7	17.1	410.5	5.55909	5.05835	24.5	4.078	-57	90
9/18/2019 11:35	-5:00	9/18/2019 16:35	302.7	17.2	414.8	6.5625	6.07589	24.75	4.078	-57	90
9/18/2019 11:40	-5:00	9/18/2019 16:40	301.2	17.2	413.8	6.3067	5.8192	25	4.078	-57	90
9/18/2019 11:45	-5:00	9/18/2019 16:45	299.7	17.2	413.5	9.61286	9.25615	25.25	4.154	-45	109
9/18/2019 11:50	-5:00	9/18/2019 16:50	301.2	17.3	413.8	11.156	10.90822	26.25	4.154	-57	90
9/18/2019 11:55	-5:00	9/18/2019 16:55	300.8	17.3	414.5	9.28674	8.92836	29	4.139	-45	109
9/18/2019 12:00	-5:00	9/18/2019 17:00	302.5	17.3	414.2	2.80841	2.1842	28.75	4.109	-57	90
9/18/2019 12:05	-5:00	9/18/2019 17:05	302.8	17.32	412.8	1.59383	0.91303	28	4.094	-57	90
9/18/2019 12:10	-5:00	9/18/2019 17:10	301.7	17.4	413.7	1.39442	0.71011	27.75	4.094	-45	109
9/18/2019 12:15	-5:00	9/18/2019 17:15	300.7	17.4	408.8	12.71542	12.49092	27.25	4.094	-57	90
9/18/2019 12:20	-5:00	9/18/2019 17:20	301.3	17.4	409.7	1.82901	1.16912	27.25	4.094	-57	90
9/18/2019 12:25	-5:00	9/18/2019 17:25	302.5	17.42	408.8	1.31029	0.61832	27.75	4.094	-57	90
9/18/2019 12:30	-5:00	9/18/2019 17:30	303.3	17.5	414	1.27918	0.58451	27.75	4.094	-57	90
9/18/2019 12:35	-5:00	9/18/2019 17:35	301.2	17.5	413.7	1.22848	0.5362	29	4.124	-57	90

MSAC2S_TimeSeriesResults.csv

Site Code: MSAC2S
Site Name: Angelica Creek, Berks Nature, downstream of The Nature Place

Sensor Station functions cont.





A- ON/OFF Switch
B- MicroSD card adapter
C- LED lights

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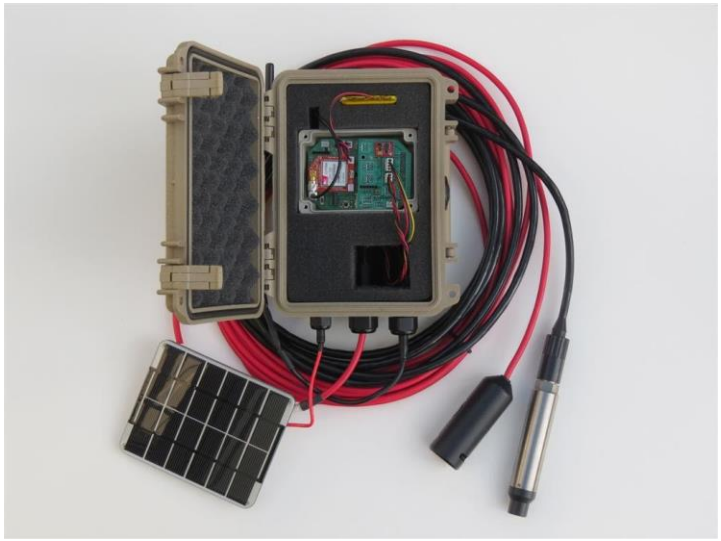
Sensor Station Functions

Sensors most commonly used for our purposes:

1. HYDROS21 CTD sensor by METER Group
2. OBS-3+ Turbidity sensor by Campbell Scientific



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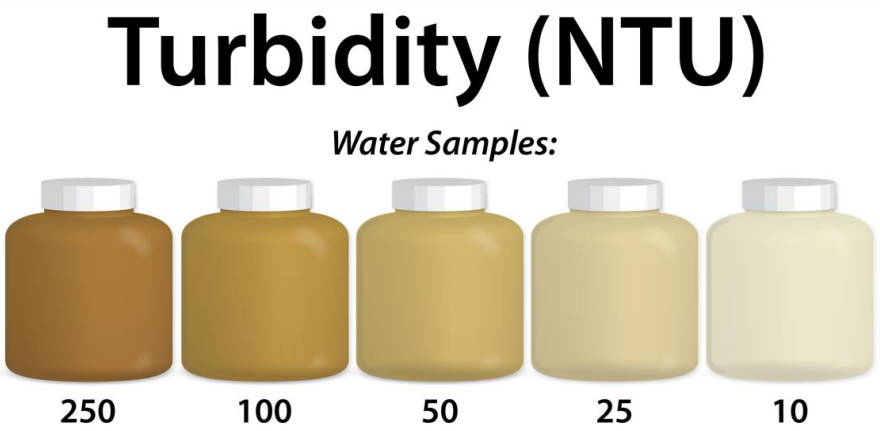
The OBS-3+ Turbidity Sensor

Turbidity sensor

- Measures the clarity of the water in Nephelometric Turbidity Units (NTU)
- A measure of material *suspended* in the water (*not dissolved*)



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The OBS-3+ Turbidity Sensor

Stroud Water Research Center

HYDROS21 CTD Sensor

CTD sensor – **C**onductivity, **T**emperature, **D**epth

Conductivity (Electrical Conductivity)(uS/cm, microsiemens per centimeter)

- A measure of how well water conducts electricity
- Directly related to the concentration of dissolved ions in the water
- Commonly used to screen for pollution – generally higher in areas with human activity
- Is an *indicator* of water quality

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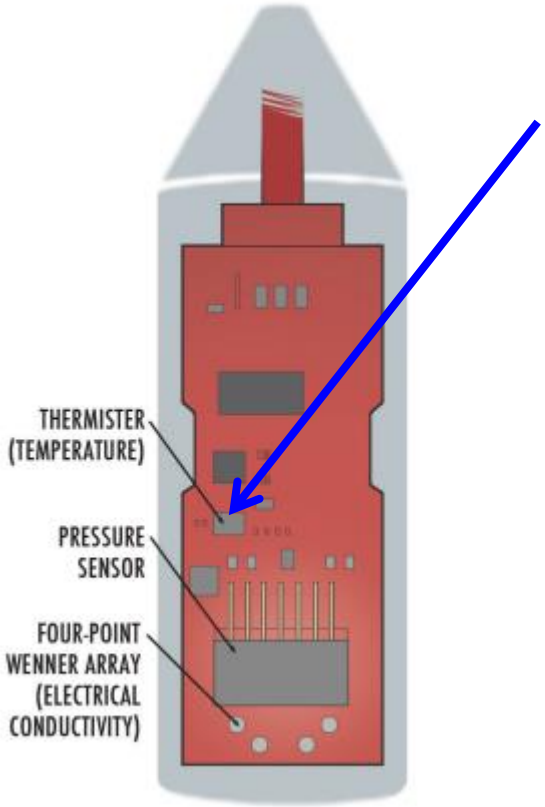
HYDROS21 CTD Sensor cont.



Temperature

- Water temperature (degrees C)
- Important to fish (especially Trout) and other organisms

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HYDROS21 CTD Sensor cont.

Depth (water depth)

- Measures distance from pressure transducer (white disk) to surface of water
- Compensates for air pressure
- Coarse measure of discharge (i.e., flow, amount of water per unit time)

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Maintenance Visit

- **Frequency of visits:** site specific, but recommend once a week.

STROUD WATER RESEARCH CENTER

EnviroDIY Sensor Stations

Maintenance Quick Guide

Stroud Center contacts:

- General:
  - David Bressler: dbressler@stroudcenter.org
    410-456-1071 (cell), 610-268-2153, ext. 312 (office)
- Technical:
  - Shannon Hicks: shicks@stroudcenter.org
    302-304-0957 (cell), 610-268-2153, ext. 267 (office);
  - Rachel Johnson: rjohnson@stroudcenter.org
    973-557-8995 (cell)

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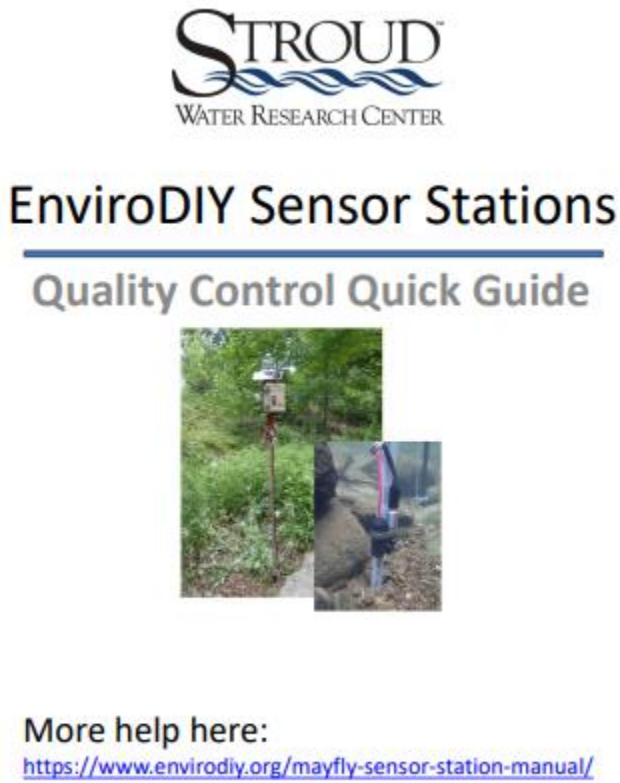
Quality Control Visit

- **Frequency of visits:** Quarterly, or as needed
- Review QC quick guide



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Online Data vs. Reality

Familiarizing yourself with the normal functioning of your station

In baseflow conditions…

and in storm events…

How can you tell if an event you are seeing online is real?

Or if it is a malfunction / fouling of a sensor ?

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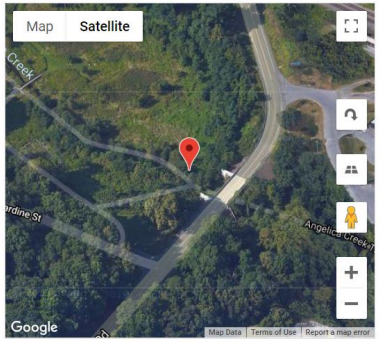
Viewing data on MonitorMyWatershed

Monitor My Watershed®

Angelica Creek, Berks Nature, downstream of The Nature Place (MSAC2S)

Deployment By	Michael Griffith
Organization	Berks Nature
Registration Date	Sept. 16, 2019, 8:06 p.m.
Deployment Date	Sept. 18, 2019, 4:15 p.m.
Latitude	40.31108
Longitude	-75.92439
Elevation (m)	-
Elevation Datum	MSL
Site Type	Stream
Stream Name	Angelica Creek
Major Watershed	-



Sensor Observations at this Site

EnviroDIY

DOWNLOAD SENSOR DATA

Only the most recent 72 hours of available data are shown on the sparkline plots. The plots are broken when there are gaps in the data longer than 6 hours. Plots shaded in green have recent data. Plots shaded in red have not reported data in the last 72 hours.

Time Series Analyst
View data for this site.
Related Link

Water depth Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
372.5 (mm)

Medium	Liquid aqueous
Sensor	Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Temperature Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
6.4 (degC)

Medium	Liquid aqueous
Sensor	Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Electrical conductivity Provisional

Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
272.2 (uS/cm)

Medium	Liquid aqueous

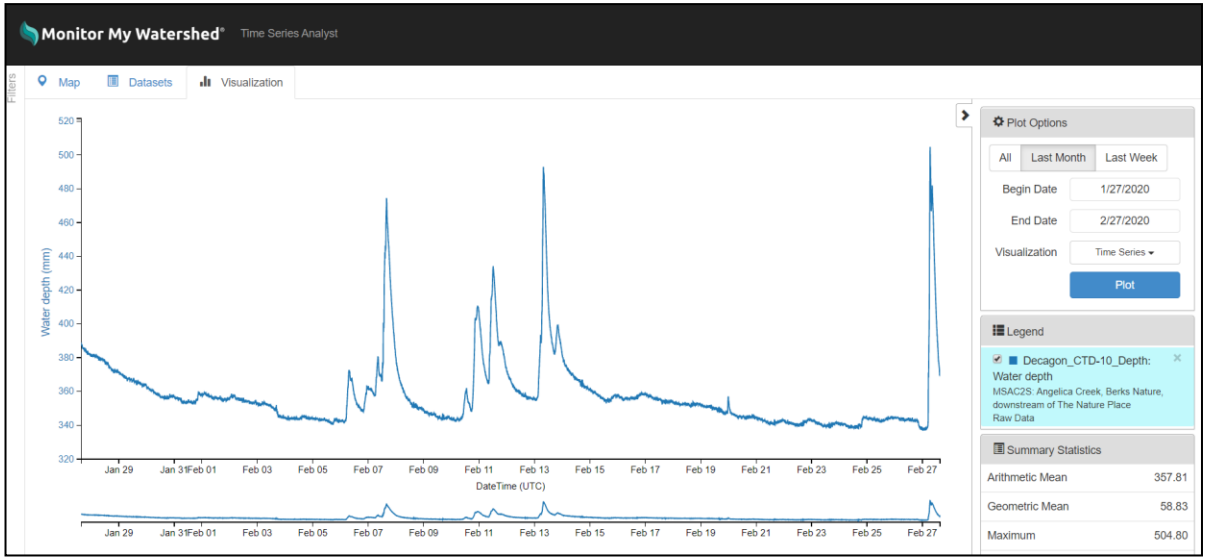
Turbidity Provisional

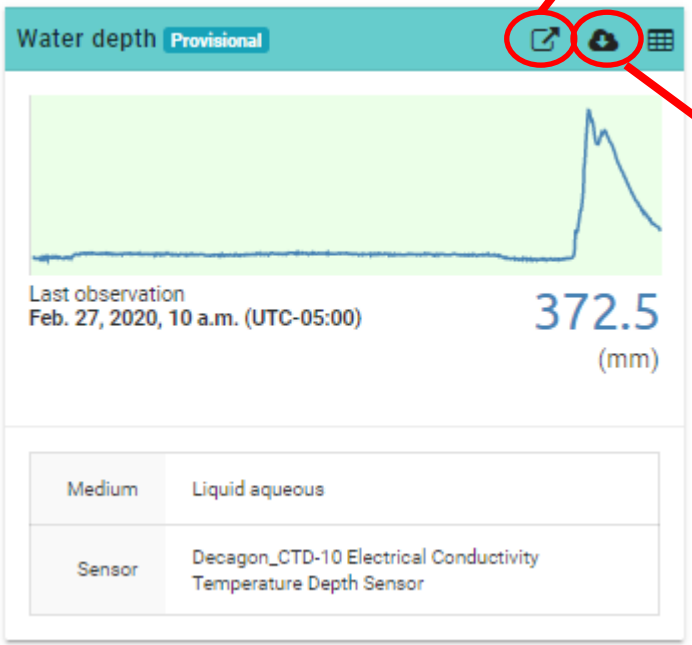
Last observation
Feb. 27, 2020, 10 a.m. (UTC-05:00)
5.6225 (NTU)

Medium	Liquid aqueous

STROUD WATER RESEARCH CENTER

Viewing data on MonitorMyWatershed





# Organization: BerksNature			
# SourceLink: https://monitormywatershed.org/sites/MSAC2S/			
# ContactName: Michael Griffith			
# Phone:			
# Email: michael.griffith@berksnature.org			
# Citation:			
#			
DateTime	TimeOffset	DateTimeUTC	Decagon_CTD-10_Depth
9/18/2019 11:15	-5:00	9/18/2019 16:15	303.3
9/18/2019 11:20	-5:00	9/18/2019 16:20	304.5
9/18/2019 11:25	-5:00	9/18/2019 16:25	303.3
9/18/2019 11:30	-5:00	9/18/2019 16:30	304.7
9/18/2019 11:35	-5:00	9/18/2019 16:35	302.7
9/18/2019 11:40	-5:00	9/18/2019 16:40	301.2
9/18/2019 11:45	-5:00	9/18/2019 16:45	299.7
9/18/2019 11:50	-5:00	9/18/2019 16:50	301.2
9/18/2019 11:55	-5:00	9/18/2019 16:55	300.8
9/18/2019 12:00	-5:00	9/18/2019 17:00	302.5
9/18/2019 12:05	-5:00	9/18/2019 17:05	302.8
9/18/2019 12:10	-5:00	9/18/2019 17:10	301.7
9/18/2019 12:15	-5:00	9/18/2019 17:15	300.7
9/18/2019 12:20	-5:00	9/18/2019 17:20	301.3
9/18/2019 12:25	-5:00	9/18/2019 17:25	302.5
9/18/2019 12:30	-5:00	9/18/2019 17:30	303.3
9/18/2019 12:35	-5:00	9/18/2019 17:35	301.2
9/18/2019 12:40	-5:00	9/18/2019 17:40	302.3

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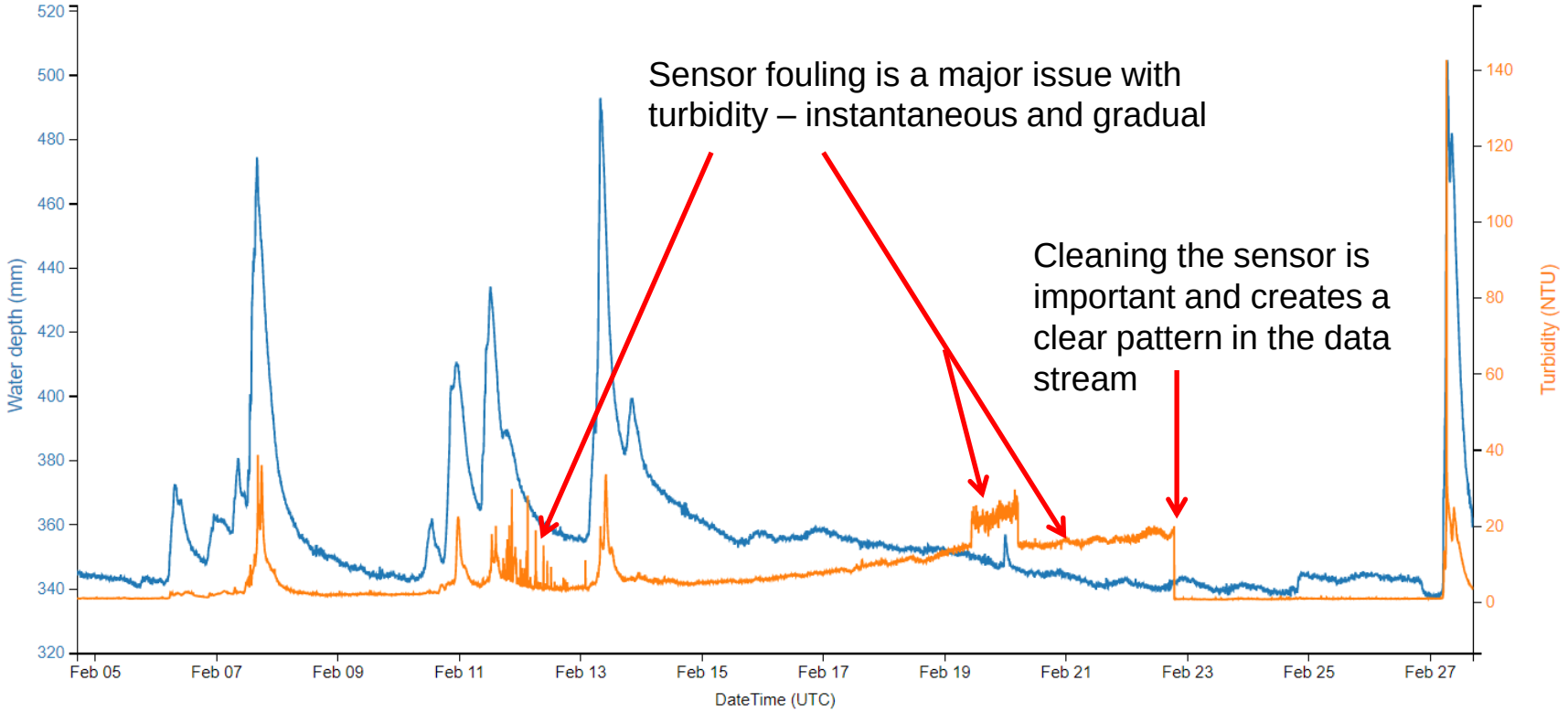
Turbidity Fouling & cleaning

Turbidity increases during storms as sediment is washed into stream and mobilized from stream bed and banks, i.e., turbidity and depth are usually positively correlated



Site Code: MSAC2S
Site Name: Angelica Creek, Berks Nature, downstream of The Nature Place

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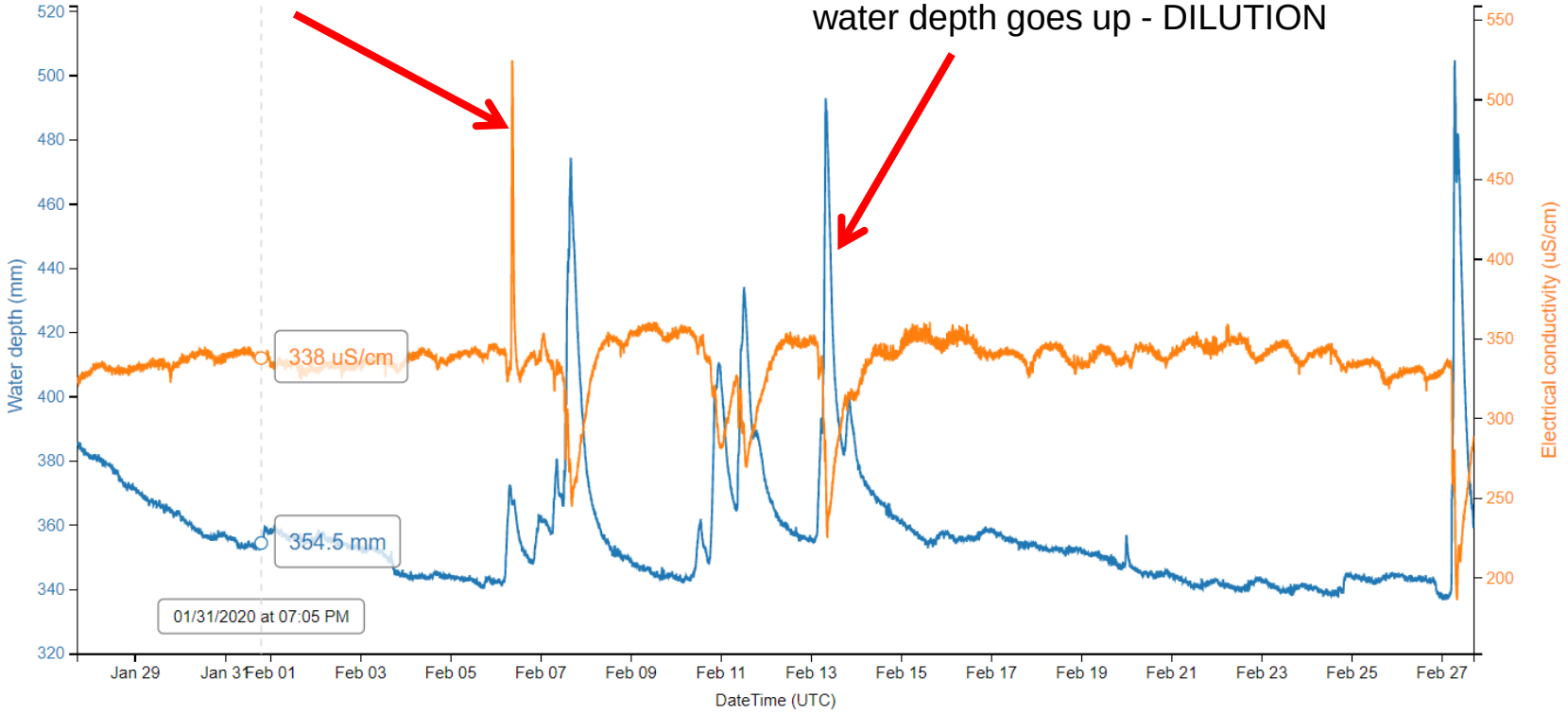
Conductivity patterns

Conductivity can spike in winter due to flushes of road salt/de-icers

Usually conductivity goes down as water depth goes up - DILUTION



Site Code: MSAC2S
Site Name: Angelica Creek, Berks Nature, downstream of The Nature Place

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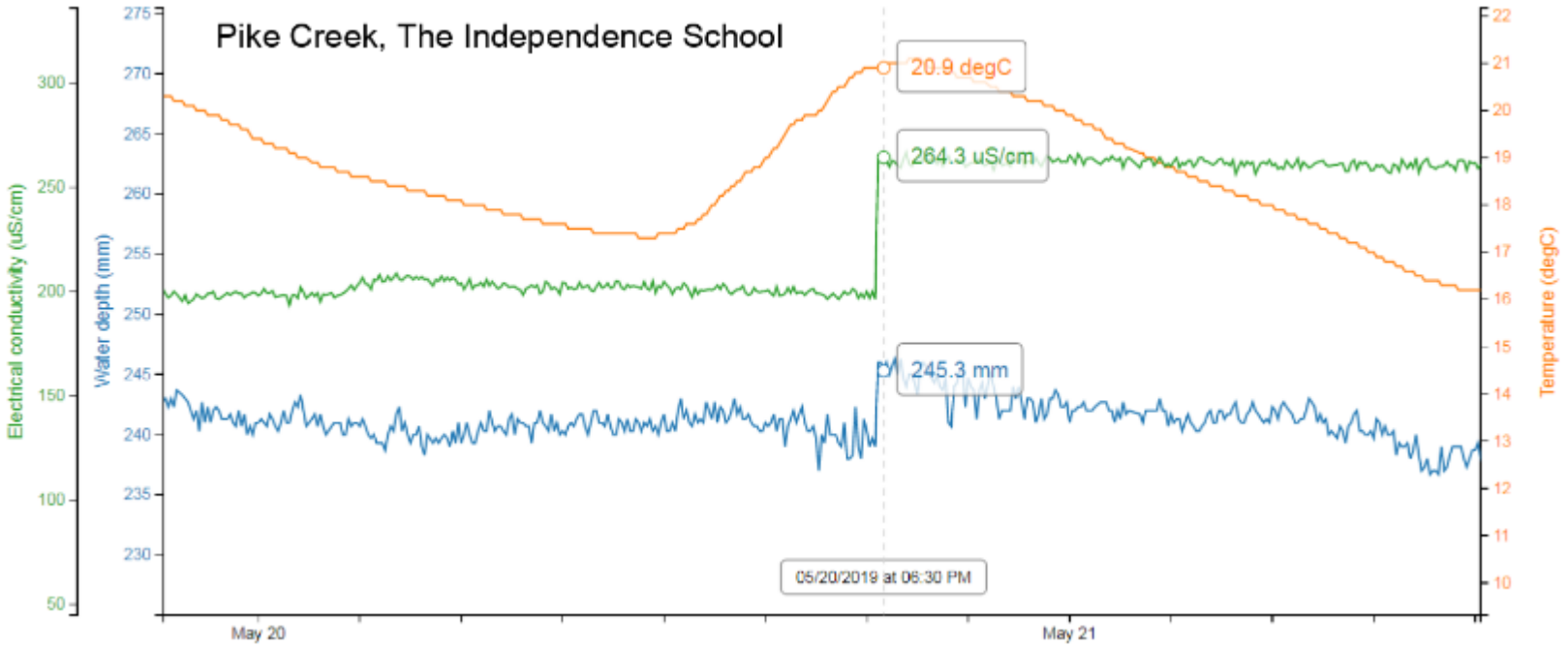
How cleaning effects conductivity & depth



Conductivity, temperature and depth readings *after* cleaning
Conductivity change of ~60 uS/cm
Depth change of ~5mm;

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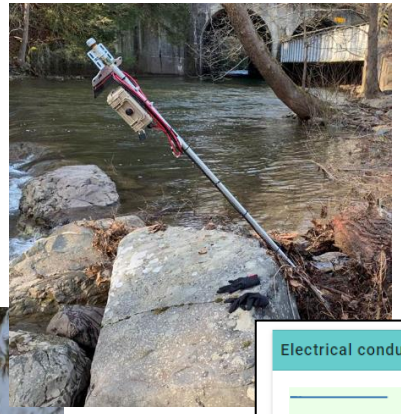
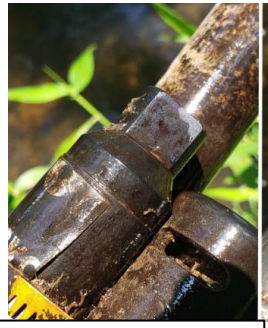
Responding to Problems

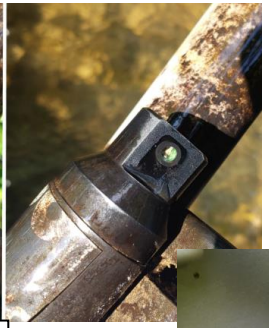
Stroud Water Research Center

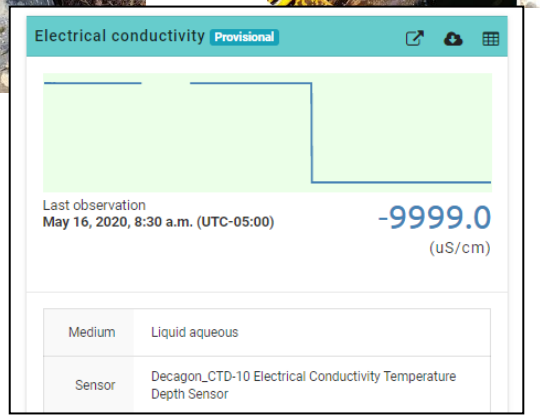
Issues, Emergencies, Help

- **Urgent issues – <u>anything causing bad data or no data</u>**
  - **Contact the station owner – *always keep them in the loop**
  - As needed include:
    - Stroud Center – Dave Bressler, Shannon Hicks, Rachel Johnson
    - Carol Armstrong and George Seeds, MWS mentors



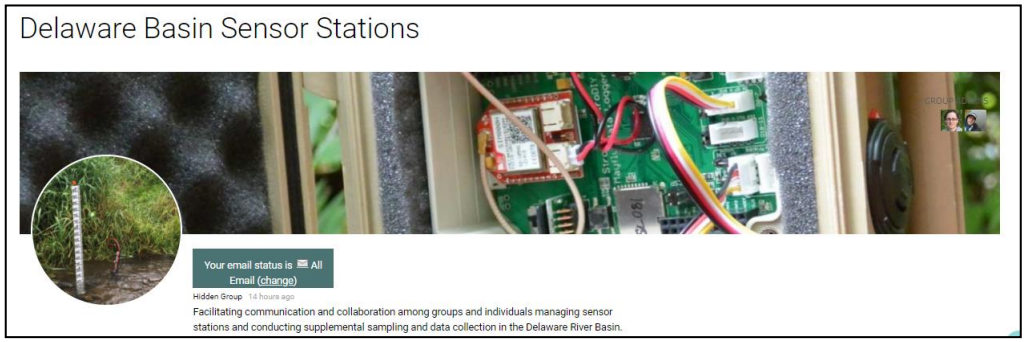






Issues, Emergencies, Help

- Non-urgent questions, issues
  - Station owner and the station team (if there is one)
  - Post to Delaware Basin Sensor Stations online group, https://wikiwatershed.org/groups/delaware-basin-sensor-stations/



  - Consult mentors – Carol Armstrong and George Seeds

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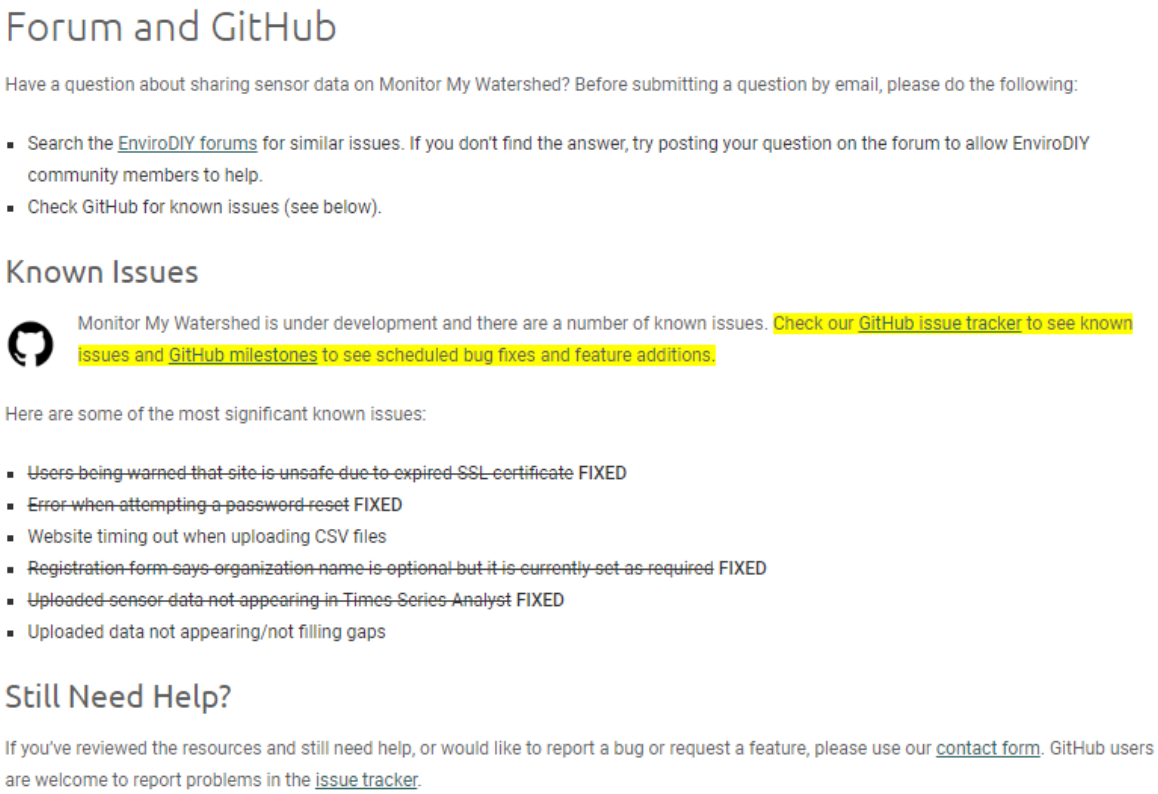
Issues, Emergencies, Help

- Monitor My Watershed malfunction issues
  - https://wikiwatershed.org/help/sensor-help/ - confirm if issue has been reported



Forum and GitHub

Have a question about sharing sensor data on Monitor My Watershed? Before submitting a question by email, please do the following:

- Search the EnviroDIY forums for similar issues. If you don't find the answer, try posting your question on the forum to allow EnviroDIY community members to help.
- Check GitHub for known issues (see below).

Known Issues

Monitor My Watershed is under development and there are a number of known issues. Check our GitHub issue tracker to see known issues and GitHub milestones to see scheduled bug fixes and feature additions.

Here are some of the most significant known issues:

- ~~Users being warned that site is unsafe due to expired SSL certificate~~ FIXED
- ~~Error when attempting a password reset~~ FIXED
- Website timing out when uploading CSV files
- ~~Registration form says organization name is optional but it is currently set as required~~ FIXED
- ~~Uploaded sensor data not appearing in Times Series Analyst~~ FIXED
- Uploaded data not appearing/not filling gaps

Still Need Help?

If you've reviewed the resources and still need help, or would like to report a bug or request a feature, please use our contact form. GitHub users are welcome to report problems in the issue tracker.

  - If issue has not been reported, report it on: https://github.com/ODM2/ODM2DataSharingPortal/issues

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How Data Becomes Useful

Stroud Water Research Center

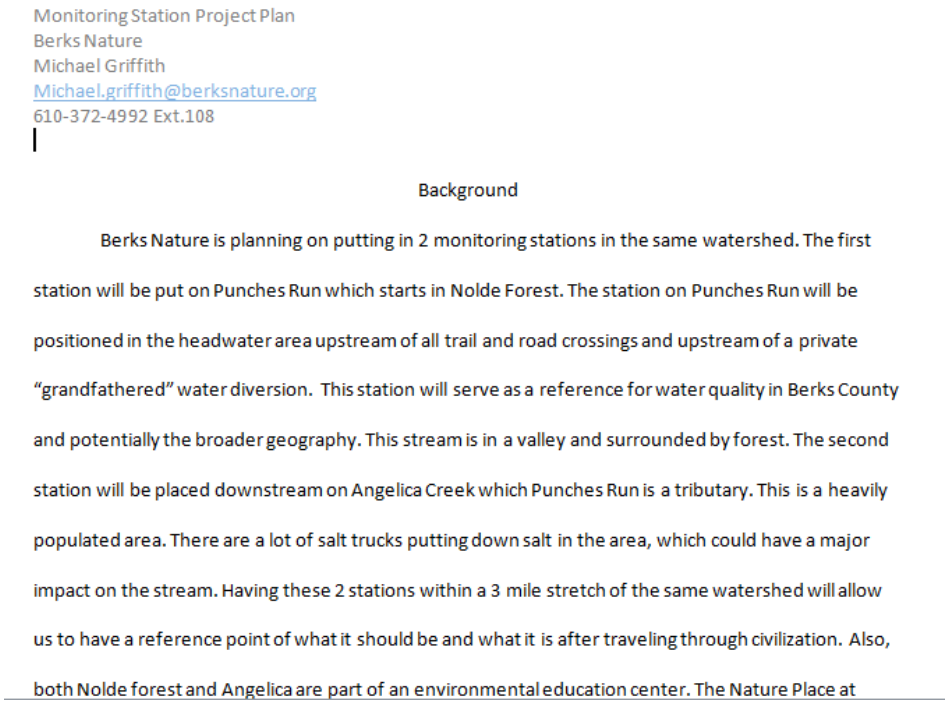
Station and Data Usage

- EnviroDIY in DRWI, Stroud support and intentions:
  - Primary goal - station owners and their support use data for own purposes
    - Lines of communication, roles and responsibilities, goals for the specific sensor
    - Reference initial project plans, continue to refine
    - Ongoing brief oral reports to station owners, checking in
    - Develop rapport with station owner
  - Secondary goal – basin-wide analysis - Diana and Marc's special talks
    - Currently in development
    - Extent uncertain next several years

Station and Data Usage

- Primary purpose in DRWI context
  - **Station owners use station for own purposes**

***Dialogue with station owner on project plan, station owner intentions for the station(s) e.g.,**



Monitoring Station Project Plan
Berks Nature
Michael Griffith
Michael.griffith@berksnature.org
610-372-4992 Ext.108

Background

Berks Nature is planning on putting in 2 monitoring stations in the same watershed. The first station will be put on Punches Run which starts in Nolde Forest. The station on Punches Run will be positioned in the headwater area upstream of all trail and road crossings and upstream of a private "grandfathered" water diversion. This station will serve as a reference for water quality in Berks County and potentially the broader geography. This stream is in a valley and surrounded by forest. The second station will be placed downstream on Angelica Creek which Punches Run is a tributary. This is a heavily populated area. There are a lot of salt trucks putting down salt in the area, which could have a major impact on the stream. Having these 2 stations within a 3 mile stretch of the same watershed will allow us to have a reference point of what it should be and what it is after traveling through civilization. Also, both Nolde forest and Angelica are part of an environmental education center. The Nature Place at

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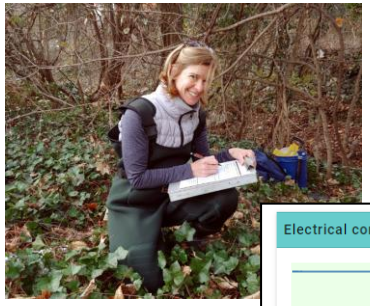
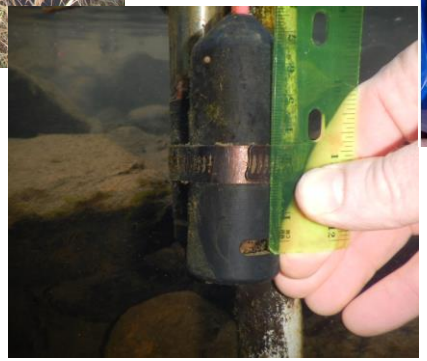
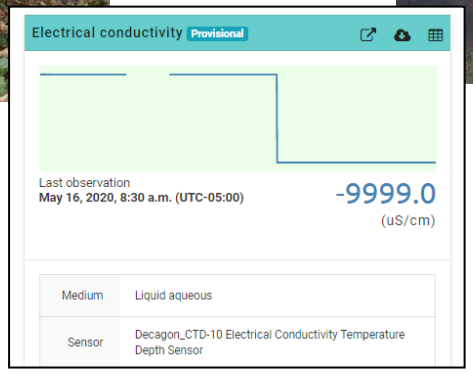
Station and Data Usage

- Primary purpose in DRWI context
  - **Station owners use station for own purposes**

***Work with station owner (and with Stroud Center and MWS assistance) to build out expertise, goals, roles, and responsibilities**







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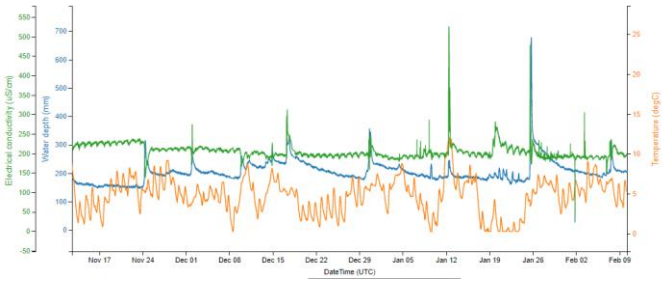
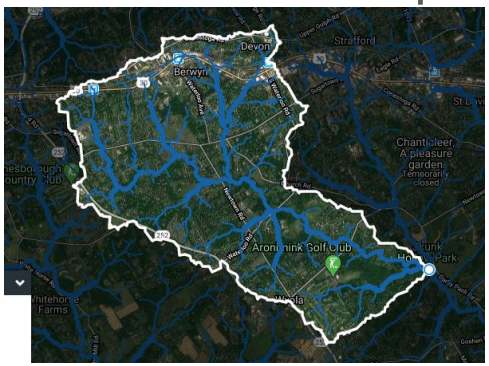
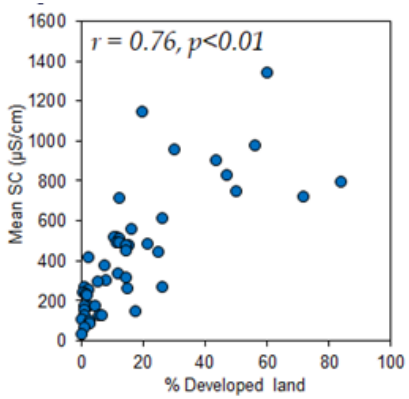
Station and Data Usage

- DRWI efforts and focus
  - Primary goal - station owners use data for own purposes





  - **Secondary goal – basin-wide analysis by the Stroud Center**



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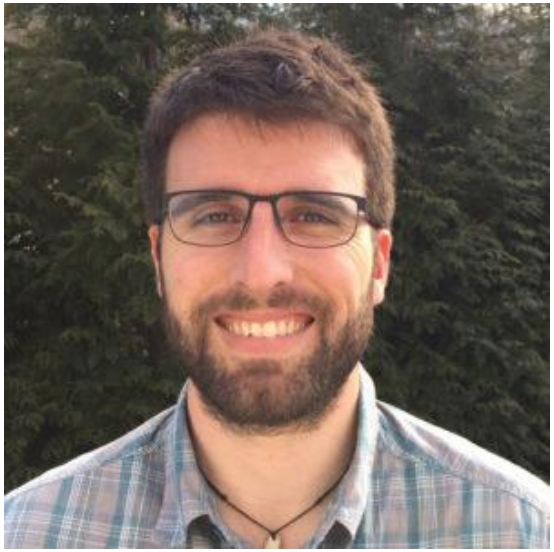
Basin-wide Data Analyses

Diana Oviedo-Vargas, PhD

Topic: Conductivity



Marc Peipoch, PhD

Topic: Water Temperature

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Practical Issues

Stroud Water Research Center

Proposed Guidelines to Establish Structure, Roles & Responsibilities for MWS Stream Monitoring Support

- MWS and station owner/manager meet in person
- Understand the owner organization's purpose and goals for stream monitoring and data collection
- MWS obtain a copy of the sensor station project plan if possible
- Understand the station owner/manager's needs and what specific tasks they need support with
- Be clear about MWS interests, skill set and availability to ensure there is good fit with the owner's needs and expectations
- Establish if additional training or the support of a mentor is needed
- Agree on specific MWS tasks and schedule
- Discuss and agree on best way to communicate for questions, troubleshooting, routine updates
- Determine if other volunteers are involved, clarify responsibilities and how communication and activities will be coordinated
- Monthly on-line meetings for MWS's, other volunteers, station owners and SRW.

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MWS Stream Sensor Initial Assignment Questionnaire (Draft)

- MWS Name:
- MWS Email: Phone:
- MWS Mentor (if applicable)
- Sensor Owner Organization:
- Sensor Station Manager:
- Station Manager Email: Phone:
- Sensor Station Site ID: Logger ID:
- Stream Name:
- Purpose/Goals of Stream Sensor (see Sensor Project Plan):
- What specific tasks does the station owner need assistance with in managing this site and how frequently?
- Regular maintenance/cleaning
- QC
- Discharge measurement
- Data Analysis
- Other
- Does the MWS interest, skill set and availability match the needs of station owner?
- Does MWS know how to use Monitor My Watershed to access and manipulate sensor station real-time data?
- Is additional training or the support of a mentor needed to optimally support this site?
- What is the preferred method of communication with station owner (email, text, phone call, WikiWatershed DRWI Forum)?
- Who does MWS contact first for questions and troubleshooting?
- Does the owner want periodic routine updates? How frequently?
- Are other MWS's or volunteers involved? If so, list names and contact information and responsibilities.
- Who is responsible for coordinating the activities of MWS's and volunteers involved and what is the best way to communicate with the group?

Mentoring is an essential part of success of working relationship within the context of ecology fieldwork

Responsibilities of the mentee

- Personal responsibility for one's volunteerism and sense of effectiveness.
- The role of an Individual Development Plan in thinking about progress in the work. Be patient with the mentor's time by being prepared when having a discussion. But never be reticent in approaching your mentor, and if needed, change mentors.
- Communication of expectations and needs?
- Other mentors and resources? Consider having more than one mentor from within the organization, or from another source.
- We are trying to develop leadership skills in ourselves and in others, and remember that you might become a mentor yourself.

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Mentors currently available

- Carol Armstrong (MWS), mnem.np@gmail.com, 610-659-7477
- George Seeds (MWS), geoseeds@verizon.net, 484-886-9586
- Rachel Johnson (Stroud Center), rjohnson@stroudcenter.org, 973-557-8995
- Christa Reeves (Stroud Center)(in the north, situational), christa@musconetcong.org, 727-520-5849

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Building a Station

Stroud Water Research Center

Building a Station

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Building a Station

- Initial questions
  - Why do you want a station?
  - What questions will the data help to answer?
  - What are your intentions for the station and data?
- Resources needed
  - Money to purchase supplies and equipment
  - Personnel to build and maintain station
  - Time to monitor data and deal with issues – they will happen!

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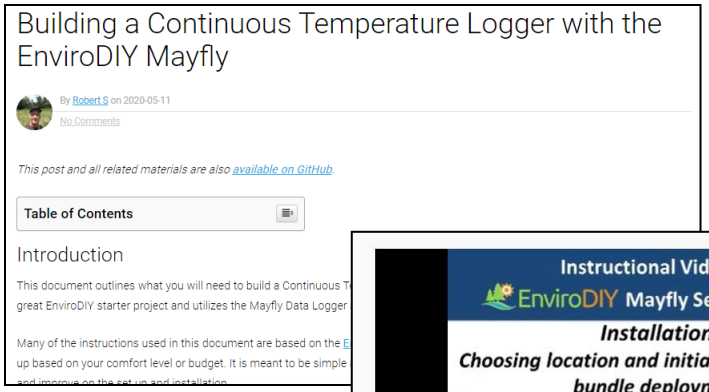
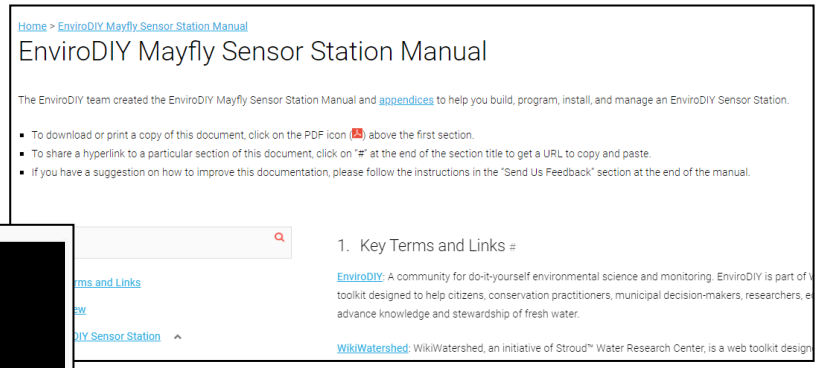
Building a Station

- References and videos available
  - Blogs – recent ones by Moore and Sarnoski
  - Videos: https://www.envirodiy.org/videos/
  - Manual: https://www.envirodiy.org/mayfly-sensor-station-manual/





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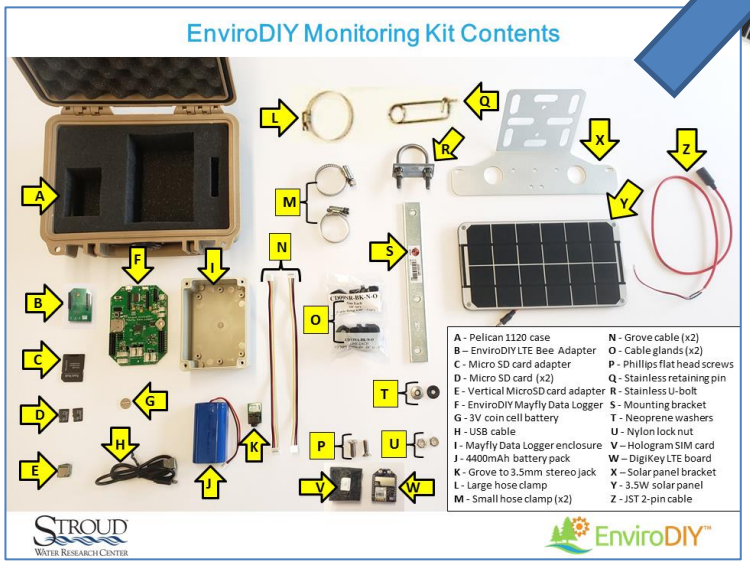
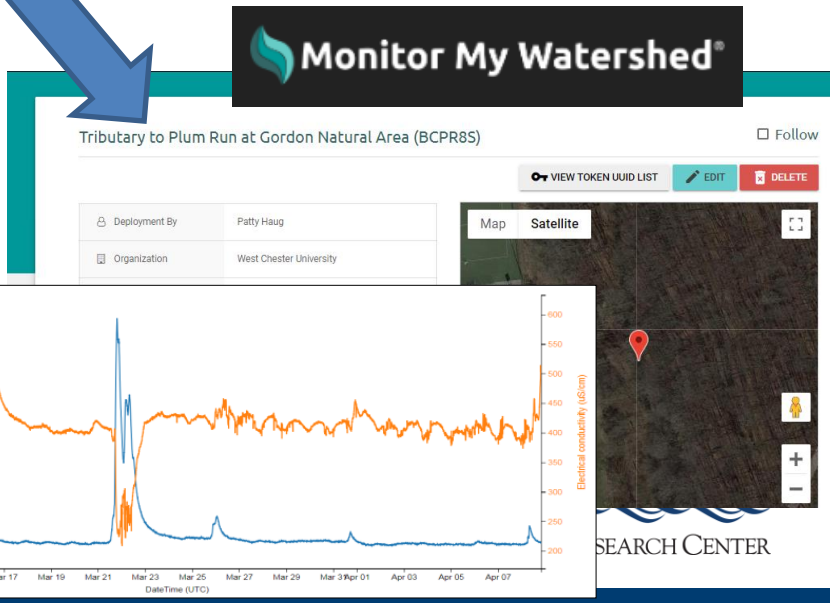
Building a Station

- Programming a Mayfly data logger and assembling an EnviroDIY sensor station that collects continuous data and sends it Monitor My Watershed





Building a Station

- Options other than standard Stroud Center CTD/Turbidity station, e.g.,

Building a Continuous Temperature Logger with the EnviroDIY Mayfly

By Robert S on 2020-05-11

No Comments

https://www.envirodiy.org/building-continuous-temperature-logger-envirodiy-mayfly/

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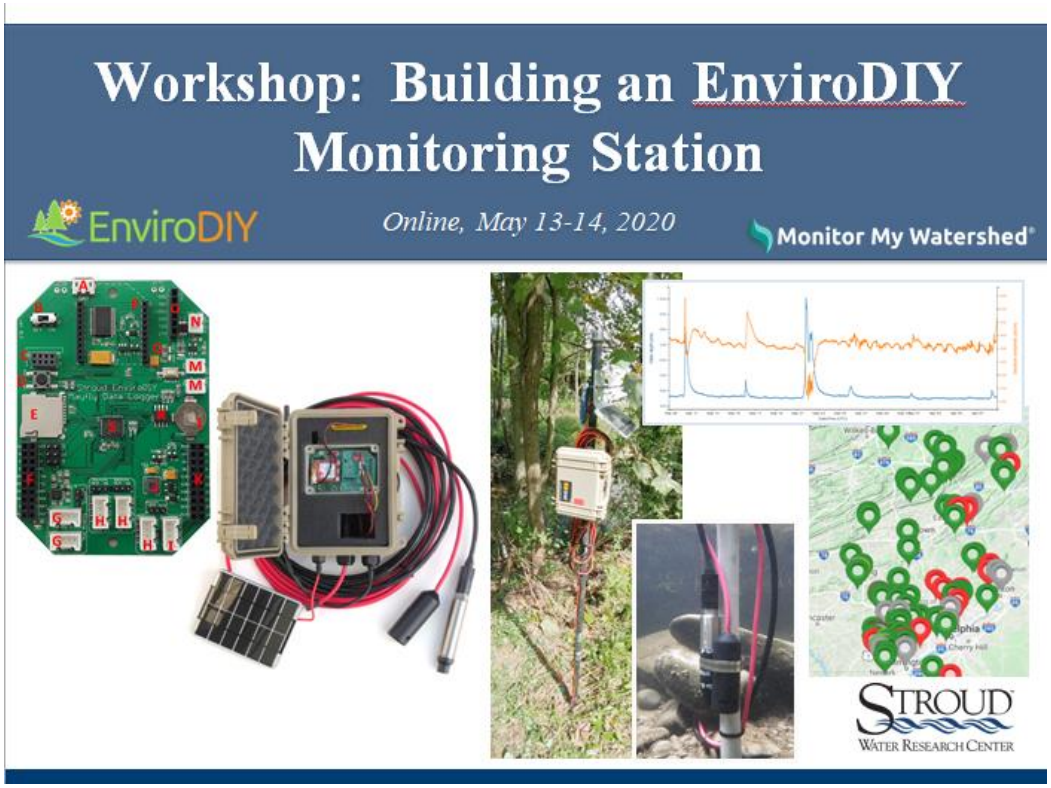
Building a Station

- May 13-14, 2020 – first EnviroDIY Build workshop
  - Recording will be available soon via https://wikiwatershed.org/drwi/



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Final Points

- Use https://wikiwatershed.org/drwi/
  - Access Field Visit Data sheet entry and past entries
  - Access manual, guidance, video, workshops
- Keep Quick Guides handy and reference them
- Dialogue with station owner and team regularly
- Use Monitor My Watershed to track the station function and data
- Visit the station and MonitorMW regularly
  - Know the site
  - Know the watershed
  - Know the data
  - Clean the sensors and do Quality Control
  - Complete and enter online Field Visit Data sheet

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Onward!

Master Watershed Stewards, EnviroDIY DRWI contacts:

- Carol Armstrong, mnem.np@gmail.com, 610-659-7477
- George Seeds, geoseeds@verizon.net, 484-886-9586

Stroud Water Research Center, EnviroDIY DRWI contacts:

- David Bressler, dbressler@stroudcenter.org, 410-456-1071
- Shannon Hicks, shicks@stroudcenter.org
- Rachel Johnson, rjohnson@stroudcenter.org