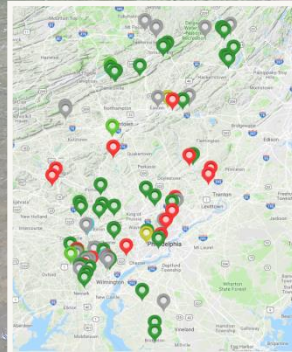
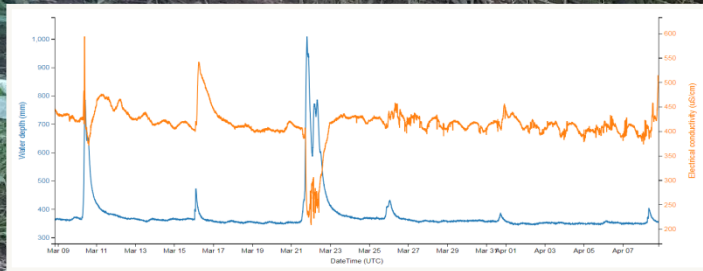


Part 1. Citizen science and continuous sensors - spatial and temporal patterns of specific conductivity and water temperature in streams and rivers of the Delaware River Basin

*David Bressler, Diana Oviedo-Vargas, and Marc Peipoch
Stroud Water Research Center*

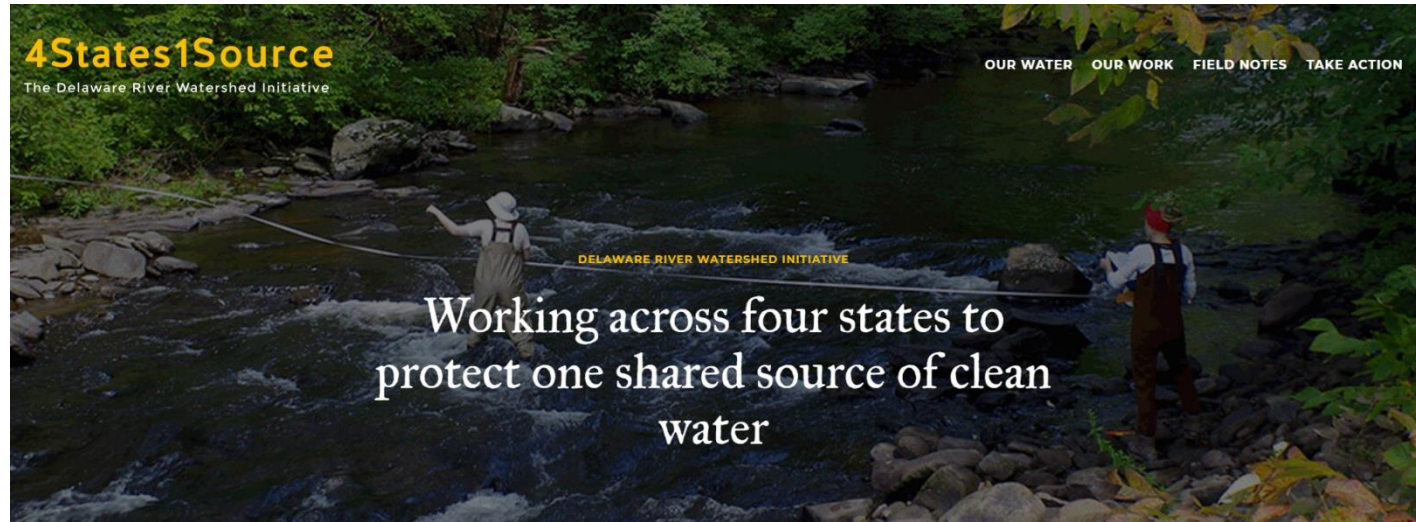
November 19, 2019 at The Academy of Natural Sciences of Drexel University



STROUD
WATER RESEARCH CENTER

Background

Delaware River Watershed Initiative - William Penn Foundation
Stroud Center helping to build science capacity through the basin

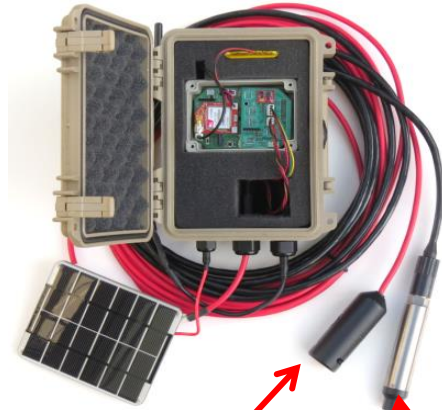


Background

- Science capacity building across DRB via facilitation of continuous monitoring using EnviroDIY Mayfly Sensor Stations
- Stations granted to watershed groups and schools
- Private purchase

Basic sensor station setup

***Stations designed,
programmed, and built
by Stroud Center
(Shannon Hicks,
engineer)**



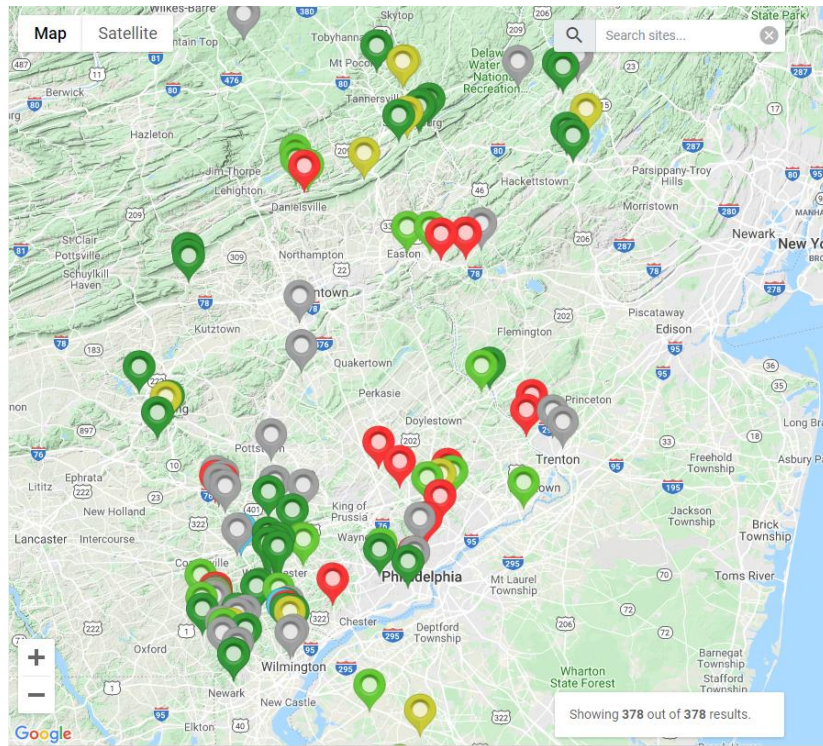
**Campbell OBS-3+
Turbidity sensor**

**Meter Group CTD-10 sensor
– Conductivity, Temperature,
Depth**



Stations deployed across the Delaware Basin

~70 Stations in DRB,
so far



More than 35 organizations that own stations

Organization

American Littoral Society
 Aquashicola-Pohopoco Watershed Conservancy
 Bartrams Garden
 Berks County Conservation District
 Berks Nature
 Brodhead Watershed Association
 Darby Creek Valley Association
 Delaware Riverkeeper
 East Stroudsburg University
 Eastern Delaware County Stormwater Collaborative
 Great Marsh Institute
 Green Valleys Watershed Association
 Lake Committee, Somerset Lake Community
 Lopatcong Creek Initiative; NJ Highlands Coalition
 Montgomery School
 Musconetcong Watershed Association
 Penn State Master Watershed Stewards, Berks County
 Pennypack Ecological Restoration Trust
 Primrose Creek Watershed Association
 Schuylkill River Greenways
 Silver Lake Nature Center
 South Jersey Land & Water Trust
 The Independence School
 The Land Conservancy for Southern Chester County
 The Nature Conservancy, Delaware
 The Nature Conservancy, New Jersey
 The Watershed Institute
 Tookany/Tacony-Frankford Watershed Partnership
 Trout Unlimited
 Trout Unlimited, New Jersey
 Upper Perkiomen High School
 Valley Forge Trout Unlimited
 Walkkill River Watershed Management Group
 White Clay Wild and Scenic
 Wildlands Conservancy
 Willistown Conservation Trust
 Wissahickon Valley Watershed Association
 Woodstown High School



PennState Extension



BERKS COUNTY
CONSERVATION DISTRICT



BARTRAM'S GARDEN



EAST
STROUDSBURG
UNIVERSITY



GREEN VALLEYS
WATERSHED
ASSOCIATION



WHITE CLAY CREEK
National Wild & Scenic River
Ours to Enjoy. Ours to Protect.

Aquashicola Pohopoco
Watershed Conservancy



Primrose Creek WATERSHED ASSOCIATION

UPPER PERKIOMEN HIGH SCHOOL



Tookany/Tacony-Frankford
Watershed Partnership, Inc.



The Great Marsh
Institute



AMERICAN LITTORAL SOCIETY
Caring for the Coast



LAFAYETTE



montgomeryschool
PreK to Grade 8



Woodstown High School
Learning is our mission
Once a Wolverine, Always a Wolverine



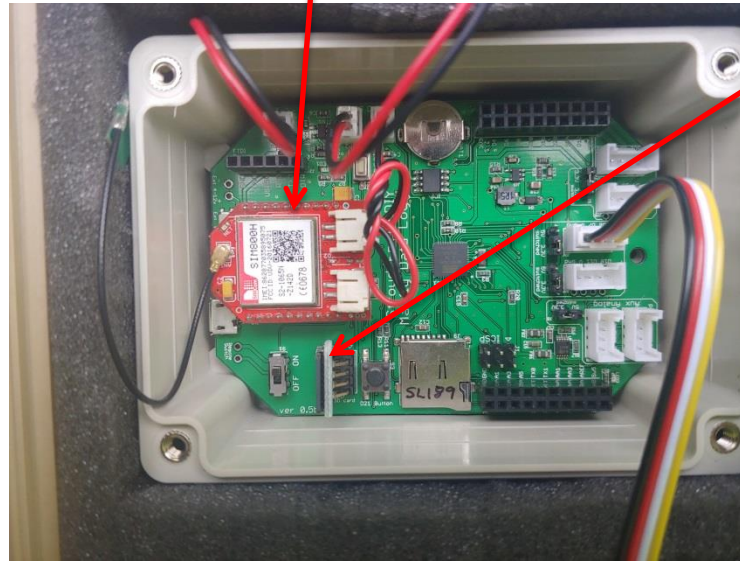
STROUD™
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Basic sensor station setup



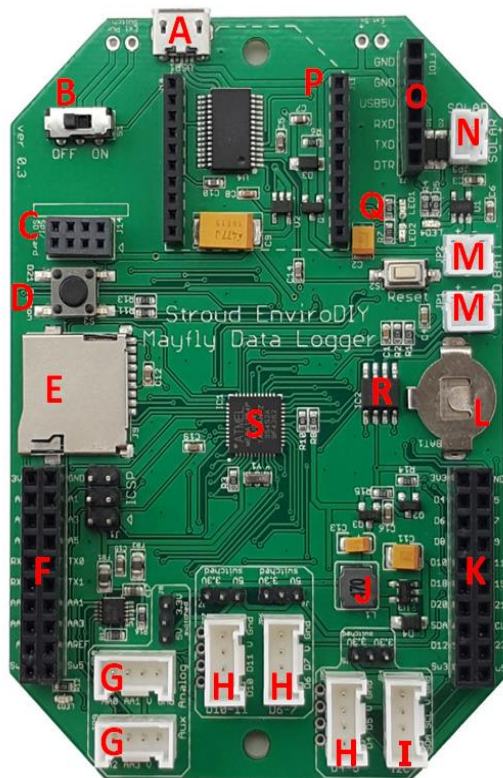
Solar powered

Online – 2G or 4G cell signal



Data logged to microSD card every 5 minutes, then transmitted via cell signal to Monitor My Watershed data portal

Basic sensor station setup



Features of the EnviroDIY Mayfly Data Logger

A	MicroUSB port – connect a standard MicroUSB cable to a computer for programming the Mayfly using the Arduino software
B	Power switch – turns the Mayfly board on and off
C	microSD/SPI connector – socket for vertical microSD memory card adapter board or other SPI devices
D	Pushbutton – connected to pin D21 for user-defined input
E	microSD card socket – socket for storing data on a standard microSD memory card
F	Analog pin header – access to the Mayfly's power, ground, & analog pins, and also the four Auxiliary 16-bit Analog-to-Digital converter pins
G	Auxiliary ADC Grove connectors – pairs of Auxiliary Analog pins along with ground and power (3.3v or 5V)
H	Digital pin Grove connectors – pairs of digital pins along with ground and power (3.3v or 5v), for connecting sensors and Grove accessories
I	I2C port Grove connector – connection for any devices that use the I2C protocol
J	5-volt boost converter – generates 5v for powering external sensors
K	Digital pin header – access to the Mayfly's power, ground, & digital pins
L	Clock battery – socket for CR1220 lithium battery to keep clock chip (R) running when no other power is connected to Mayfly
M	LiPo battery connectors – JST socket for connecting Lithium Polymer (LiPo) rechargeable battery. Additional socket is for providing power to high-current peripheral devices
N	Solar panel connector – JST socket for connecting 6v solar panel for charging the LiPo battery
O	FTDI programming header – alternative port for programming board using an external FTDI adapter instead of using the Mayfly microUSB port
P	Bee module socket – connection port for various telemetry modules that use the Bee footprint (mesh radio , WiFi , cellular)
Q	Red & Green LEDs – LEDs for providing visual feedback, connected to pins D8 (green) and D9 (red)
R	Real-time clock – DS3231 clock module with on-board temperature sensor, retains the date and time after initial programming, requires battery (L)
S	Processor – ATmega1284p microprocessor

Basic sensor station setup



Basic sensor station setup



Monitor My Watershed

The screenshot shows a web browser at the URL `monitormywatershed.org`. The page features a dark header with the site name and navigation links. Below the header is a large banner image of a stream with the **EnviroDIY** and **Leaf Pack Network** logos. The main heading is **Data Sharing Portal**, followed by the text "Contribute your water-quality data" and "Ready to start sharing your data?" with a **SIGN UP** button. A modal window titled **How It Works** is open, explaining that the site supports multiple types of water-quality data. It includes the **EnviroDIY** logo and a description of the community. At the bottom of the modal, there are three numbered steps (1, 2, 3) on a dark teal bar.

Monitor My Watershed* Browse Sites Time Series Analyst IG Help Log In Sign Up

EnviroDIY **Leaf Pack Network**

Data Sharing Portal

Contribute your water-quality data

Ready to start sharing your data?

SIGN UP

How It Works

Monitor My Watershed supports multiple types of water-quality data.

EnviroDIY

Share and Explore Sensor Datasets

EnviroDIY is a community of enthusiasts sharing do-it-yourself ideas for environmental science and monitoring.

- 1
- 2
- 3

Monitor My Watershed

← → ↺ ⌂ ⓘ Not secure | monitormywatershed.org/browse/ 🔍 ☆ ⚙️ Ⓓ Ⓜ

Monitor My Watershed Browse Sites Time Series Analyst

Help Log In Sign Up

Browse Data Collection Sites

Auto Zoom CLEAR

Data Types

☐ EnviroDIY 268

☐ Leaf Pack 8

Organizations

☐ American Littoral Society 2

☐ Aquashicola Pohopoco Watershed Conservancy 2

☐ Berks County Conservation District 2

☐ Berks Nature 2

☐ Brodhead Watershed Association 1

☐ Brown University 1

☐ Chattahoochee Riverkeeper 1

☐ Cleveland Metroparks 1

☐ Darby Creek Valley Association 1

Browse all sites that have been registered in the database by all users. Clicking on a site shows its details and provides a link to view the data collected at that site.

Map Satellite

Showing 300 out of 300 results.

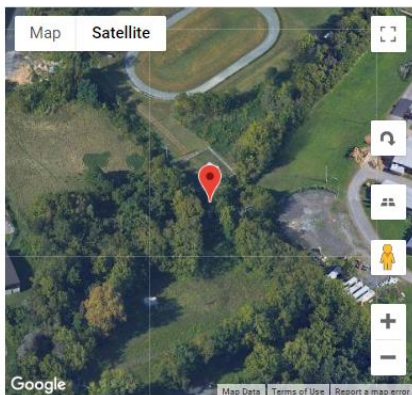
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Monitor My Watershed

monitormywatershed.org/sites/MSPL2S/

Un-named Tributary to Plum Run (MSPL2S)

Deployment By	Karin Wulkowicz
Organization	Pennsylvania State University Extension - Master Watershed Steward Program
Registration Date	June 25, 2019, 8:52 p.m.
Deployment Date	June 26, 2019, 4 p.m.
Latitude	40.378635
Longitude	-76.012667
Elevation (m)	76.0
Elevation Datum	MSL
Site Type	Stream
Stream Name	-
Major Watershed	Delaware
Sub Basin	Plum Run
Closest Town	-
Notes	SL249 - Berks County Conservation District office



Sensor Observations at this Site

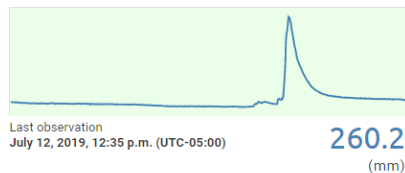


DOWNLOAD SENSOR DATA

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

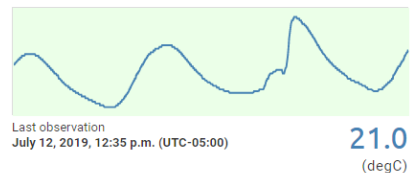
Water depth **Provisional**



Medium Liquid aqueous

Sensor Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Temperature **Provisional**



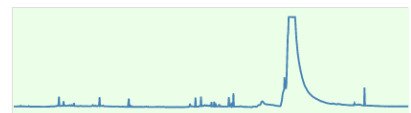
Medium Liquid aqueous

Sensor Decagon_CTD-10 Electrical Conductivity Temperature Depth Sensor

Electrical conductivity **Provisional**



Turbidity **Provisional**



Monitor My Watershed

Map Datasets Visualization



Plot Options

All Last Month Last Week

Begin Date 6/26/2019

End Date 11/17/2019

Visualization Time Series

Plot

Legend

- ☒ Decagon_CTD-10_Depth: Water depth
MSPL2S: Un-named Tributary to Plum Run Raw Data
- ☒ Campbell_OBS3_Turb: Turbidity
MSPL2S: Un-named Tributary to Plum Run Raw Data
- ☒ Decagon_CTD-10_Temp: Temperature
MSPL2S: Un-named Tributary to Plum Run Raw Data
- ☒ Decagon_CTD-10_Conc: Electrical conductivity
MSPL2S: Un-named Tributary to Plum Run Raw Data

Summary Statistics

Arithmetic Mean	177.27
Geometric Mean	34.35
Maximum	641.70

Monitor My Watershed

monitormywatershed.org/sites/MSPL2S/

	A	B	C	D	E	F	G	H	I	J	K	L
46	DateTime	TimeOffset	DateTimeUTC	Decagon_CTD-10_Depth	Decagon_CTD-10_Temp	Decagon_CTD-10_Cond	Campbell_OBS3_Turb-1	Campbell_OBS3_Tu	EnviroDIY_Mayfly_	EnviroDIY_Mayfly_Batt	Digi_Cellular_RSSI	Digi_Cellular_Si
47	6/26/2019 11:00	-5:00	6/26/2019 16:00	-9999	-9999	-9999		234.39456	29.75	4.821	-69	
48	6/26/2019 11:05	-5:00	6/26/2019 16:05	-9999	-9999	-9999		234.39995	29.75	4.169	-81	
49	6/26/2019 18:10	-5:00	6/26/2019 23:10	-9999	-9999	-9999	53.7909	236.17874	27.5	4.897	-69	
50	6/26/2019 18:20	-5:00	6/26/2019 23:20	-9999	-9999	-9999	53.82562	235.66113	27.75	4.897	-69	
51	6/27/2019 9:35	-5:00	6/27/2019 14:35	239	18.52	261.3	6.48766	5.97695	27.5	4.124	-81	
52	6/27/2019 9:40	-5:00	6/27/2019 14:40	237.3	18.2	265.2	5.89173	5.37859	27.5	4.124	-69	
53	6/27/2019 9:45	-5:00	6/27/2019 14:45	239.5	18.2	265.3	6.82053	6.36557	27.75	4.124	-45	
54	6/27/2019 9:50	-5:00	6/27/2019 14:50	239.8	18.2	267.5	7.78113	7.37721	27.75	4.124	-45	
55	6/27/2019 9:55	-5:00	6/27/2019 14:55	241	18.2	267.5	5.9314	5.41228	27.75	4.124	-69	
56	6/27/2019 10:00	-5:00	6/27/2019 15:00	240	18.2	267.2	6.11507	5.60484	27.75	4.124	-45	
57	6/27/2019 10:05	-5:00	6/27/2019 15:05	240.8	18.3	266.2	12.5744	12.4203	27.75	4.124	-69	
58	6/27/2019 10:10	-5:00	6/27/2019 15:10	241.3	18.33	268.3	16.37171	16.41293	28	4.124	-69	
59	6/27/2019 10:15	-5:00	6/27/2019 15:15	240.2	18.4	268.3	6.23409	5.7348	28	4.124	-81	
60	6/27/2019 10:20	-5:00	6/27/2019 15:20	243.3	18.45	266.2	9.0793	8.7388	28	4.124	-45	
61	6/27/2019 10:25	-5:00	6/27/2019 15:25	243.2	18.5	267.2	5.63903	5.11389	28	4.124	-69	
62	6/27/2019 10:30	-5:00	6/27/2019 15:30	243.7	18.6	263.7	5.42718	4.87329	28.25	4.124	-81	
63	6/27/2019 10:35	-5:00	6/27/2019 15:35	242	18.6	264	6.63445	6.16813	28.25	4.124	-69	
64	6/27/2019 10:40	-5:00	6/27/2019 15:40	241.8	18.7	262.3	5.51101	4.96953	28.25	4.124	-81	
65	6/27/2019 10:45	-5:00	6/27/2019 15:45	242	18.7	264	5.64358	5.1139	28.25	4.124	-81	
66	6/27/2019 10:50	-5:00	6/27/2019 15:50	241.5	18.8	265	8.51304	8.15798	28.5	4.124	-81	
67	6/27/2019 10:55	-5:00	6/27/2019 15:55	240.5	18.87	266.5	5.67983	5.1524	28.5	4.124	-81	
68	6/27/2019 11:00	-5:00	6/27/2019 16:00	241.7	18.9	267.8	6.6811	6.20671	28.5	4.124	-69	
69	6/27/2019 11:05	-5:00	6/27/2019 16:05	241.7	19	267.3	5.8997	5.38823	28.75	4.124	-45	
70	6/27/2019 11:10	-5:00	6/27/2019 16:10	239.7	19	269	7.91858	7.53622	28.75	4.124	-45	
71	6/27/2019 11:15	-5:00	6/27/2019 16:15	240.5	19.1	266.8	6.31802	5.81184	28.75	4.124	-69	
72	6/27/2019 11:20	-5:00	6/27/2019 16:20	241.7	19.2	267.3	6.68776	6.23072	29	4.124	-69	
73	6/27/2019 11:25	-5:00	6/27/2019 16:25	241.8	19.2	268.3	6.22746	5.72526	29	4.124	-69	
74	6/27/2019 11:30	-5:00	6/27/2019 16:30	242.5	19.3	267.8	6.11845	5.60964	29.25	4.124	-81	
75	6/27/2019 11:35	-5:00	6/27/2019 16:35	241.5	19.3	265.8	5.65266	5.13316	29.25	4.109	-81	

Sensor stations for the Delaware River Watershed Initiative

- Primary goal with sensor stations: watershed groups investigate their own questions
 - Stroud supports these efforts
- Secondary goal: build basin-wide data set for broad scale analysis
 - Stroud and anyone else (publicly available via Monitor My Watershed)
 - **Diana Oviedo and Marc Peipoch today, parts 2 and 3**

Citizen Science

Volunteers, students, teachers, scientists, managers, others



Citizen Science

- Penn State Master Watershed Stewards
 - Supporting maintenance and QC, matching MWStewards with stations
 - Receive training, equipment, and supplies
 - Mentoring support system



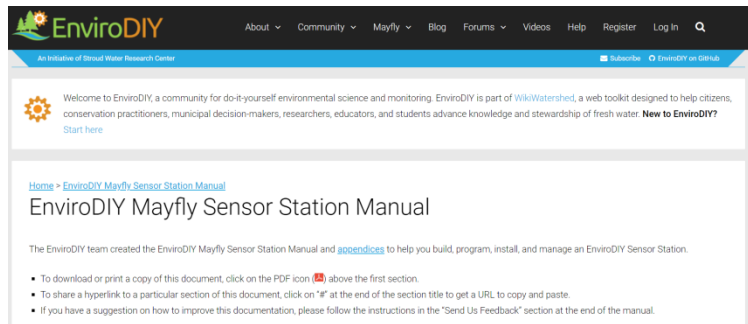
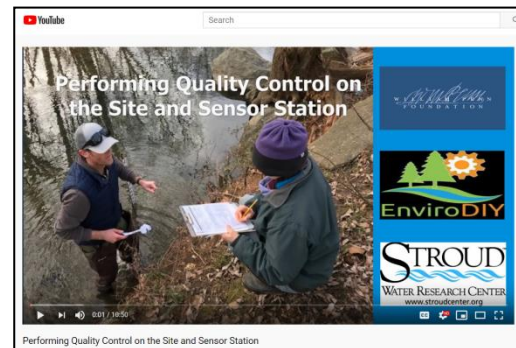
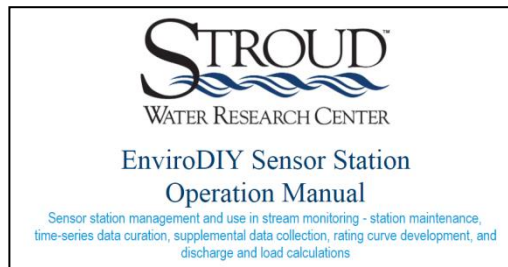
Citizen Science

Support via workshops, trainings, user group gatherings, 1:1 site visits



Citizen Science

Support via manuals, quick guides, presentations, videos, tutorials



Citizen Science

Support via equipment and supplies



DiST 3
HI98303
EC Tester



ISO 17025:2005 accredited
Calibration Certificate AGA
Cert. #2448.01



Support via data sheets, online data entry, and online meta-data access

EnviroDIY Field Visit Data

If you have trouble with this form, please contact webmaster@atroudcntr.org.

Please enter your email so we can send you a copy of your submitted data and a link for editing.

* Required


Email address *

Your email

Name(s)

Your answer

EnviroDiy Field Visit Data (Responses #2)									
File Edit View Insert Format Data Tools Help									
Timestamp									
Timestamp	Email Address	Name(s)	Site ID	GPS latitude	GPS longitude	Photo?			
6/17/2019 13:44:05	neway32@carroll.edu	Bresler, Hicks, Johnson, Evans, Mac	POC25 - Rocky Creek, O. Cantelini	39.974383	-76.495306				
6/17/2019 13:44:02	neway32@carroll.edu	Bresler, Hicks, Johnson, Evans, Mac	POC25 - Rocky Creek, O. Cantelini	39.981462	-75.437061				
6/17/2019 13:38:55	bskape@gmail.com	Bruce Kape	POC25 - Cherry Creek downstream						
3/17/2019 5:34:14	smuse@gaumont.net	Buckham	TESTWVC - WVC019, S21 land pond						
6/13/2019 17:41:27	chris@macmansion.com	C. Reeves	NHML115 - Unnamed tributary to Macmansion						
6/13/2019 16:01:08	chris@macmansion.com	C. Reeves	NHMAU10 - Macmansion Brook at Riverside Park						
11/14/2018 17:17:37	ctar338@gmail.com	C. Reeves	NHML115 - Unnamed tributary to Macmansion						
6/13/2019 11:58:18	chris@macmansion.com	C. Reeves	NHML145 - Macmansion Brook at Riverside Park	40.602481	-75.014958				
6/13/2019 11:01:19	chris@macmansion.com	C. Reeves	NHML130 - Macmansion Brook, Huguenote	40.602481	-75.139764				
5/30/2019 10:22:52	chris@macmansion.com	C. Reeves	NHMAUS - Macmansion Brook at Waterloo Road						
6/13/2019 15:58:25	chris@macmansion.com	C. Reeves	NHML115 - Unnamed tributary to Macmansion						
6/14/2019 13:40:37	ctar338@gmail.com	C. Reeves	POC145 - Cherry Creek four point						
3/13/2019 13:56:35	ctar338@gmail.com	C. Reeves	UGAD11 - Aquapark Creek, Title Road						
3/13/2019 14:17:48	ctar338@gmail.com	Carl Hutchinson, Tim Zastor	BORC13 - Red Clay, West Branch at Buckstone						
3/13/2019 14:17:10	ctar338@gmail.com	Carl Hutchinson, Tim Zastor	BORC13 - Buckstone Creek, above West Branch of Red Clay Creek						
1/10/2019 13:36:27	ctar338@gmail.com	Carl Hutchinson	BORC13 - Red Clay, West Branch at Buckstone						
12/18/2018 15:10:12	ctar338@gmail.com	Carl Hutchinson	BORC13 - Red Clay, West Branch at Buckstone						
1/10/2019 13:30:05	ctar338@gmail.com	Carl Hutchinson, Ian Reed	BORC13 - Buckstone Creek, above West Branch of Red Clay Creek						
5/20/2019 11:39:11	ctar338@gmail.com	Carl Hutchinson, Dana McCombs	BORC13 - Red Clay, West Branch at Buckstone Creek						
6/25/2019 13:06:13	ctar338@gmail.com	Carl Hutchinson, Roger Hutchinson, Dana McCombs	BORC13 - Buckstone Creek, above West Branch of Red Clay Creek						
7/20/2019 18:35:13	mrm.n@gmail.com	Carol Amanton	SHPR13 - Pottery Creek, Proseutivka YLCA						



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www.stroudwater.org

Stream Discharge Data

Name(s):			
Site ID:	GPS (Lat/Long):		Velocity Meter Type:
Logger ID:	Date:	Staff Gauge Height at start (in):	Serial Number:
Stream Name:	Start Time: AM / PM	Staff Gauge Height at end (in):	
Location:	Stop Time: AM / PM	Sensor Reported Water Depth at start (in):	Calibration Date:
	Time Zone: EST / EDT	Sensor Reported Water Depth at end (in):	

CROSS-SECTION AND VELOCITY

When safely available, take a wetted cross section measurement, recording the distance along the measuring tape (horizontal) and the water depth across the stream. The tape line should be string between the bank pins. If a velocity reader is available, record the water velocity at each interval. Make notes of the FPM/LCM (upstream bank pins) and RECD/LW (upstream left and right) and also the downstream where facing downstream, if available, whether using a flow meter or manually buoyed object, always record Points to Note, Distance Along Tapline and Water Depth. If not available, use Predicted Wetted Cross Sectional Area estimate from Stage/area relationship spreadsheet) and measured/crossed velocity data in Neutrally Buoyant Object section (right) or Unmeasured Flow Meter Velocity section (back).

Point	Points to Note L/CM/LW L/ED/LW	Distance Along Tap- line (in)	Water Depth (in)	Velocity (m/s) (Using Flow Meter)	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

NEUTRALLY BUOYANT OBJECT

Float object through main path of the stream. The measured transit should be halfway between the start and stop point. The total distance should be enough to ensure a travel time of 30 seconds.

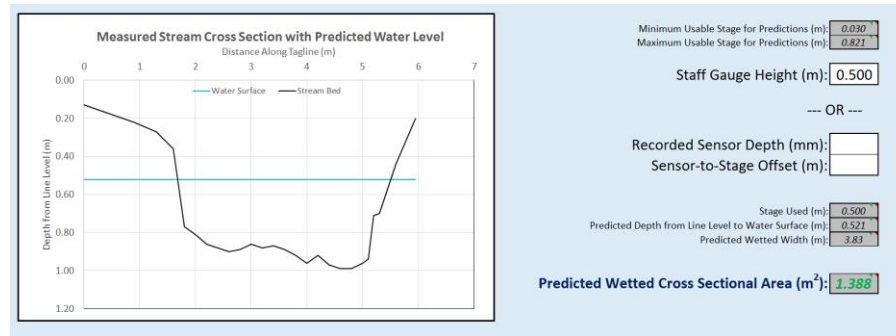
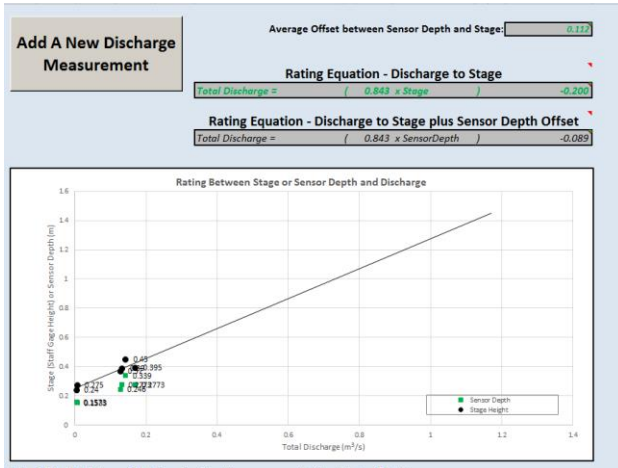
TOTAL

Travel Distance (m):	
Start-to-Transsect Distance (m):	
Transsect-to-End Distance (m):	

Float #	Travel Time (seconds)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Citizen Science

Support via Discharge Rating Curve Calculators, Stage-to-Area predictors, and Load Calculators



A		B		G		H		I		J	
Discharge Calculator Rating Curve Equation				Sensor Depth (mm)		Staff Gauge Height (m)		Discharge (m³/s)		Turb (NTU)	
1	$y = mx + b$	2	$y = 0.843x - 0.2$	3	CTDDeth Data from Webpage	4	Sensor Depth + Sensor Offset	5	Input Sensor Depth (x) into Discharge Rating Curve	6	Turbidity Data from Webpage
3	m (slope)	4	0.843	5	368	0.48	6	0.20464	7	5.05	
4	b (y-axis intercept)	5	-0.2	6	372.5	0.4845	7	0.208435	8	5.82	
TSS/Turbidity Rating Curve Equation				9	379.7	0.4917	10	0.2145031	11	5.83	
6	$y = mx + b$	7	$y = 2.1682x - 10.606$	8	386.3	0.4983	9	0.2206693	10	5.97	
7	m (slope)	8	2.1682	9	393.4	0.5054	10	0.2260522	11	6.97	
8	b (y-axis intercept)	9	-10.606	10	394.9	0.5069	11	0.2273167	12	6.18	
Chloride/Conductivity Rating Curve Equation				12	394.3	0.5063	13	0.2268109	14	6.29	
10	$y = mx + b$	11	0	12	391.4	0.5034	13	0.2243662	14	6.31	
11	m (slope)	12	0	13	390.6	0.5026	14	0.2236918	15	6.32	
12	b (y-axis intercept)	13	0	14	389.1	0.5011	15	0.2224273	16	6.2	
Average Offset Between Sensor Depth and Stage				16	387.5	0.4995	17	0.2210785	18	6.55	
14	Offset (m)	15	0.112	16	388.3	0.5003	17	0.221529	18	6.48	
Load Totals				18	388.4	0.5004	19	0.2218372	20	7.02	
Sediment Load (mg)				19	390.6	0.5026	20	0.2236918	21	6.43	
17	Chloride Load (mg)	18	-	20	392	0.504	21	0.224872	22	7.27	
18	Sediment Load (kg)	19	254.45	21	393.5	0.5055	22	0.2261365	23	6.9	
19	Chloride Load (kg)	20	-	22	395.5	0.5075	23	0.2278025	24	6.63	
20	Sediment Load (lb)	21	559.78	23	400.1	0.5121	24	0.2317003	25	7.54	
21	Chloride Load (lb)	22	-	24	407.2	0.5192	25	0.2376856	26	6.8	
Notes				25	415.4	0.5274	26	0.2445982	27	7.2	
1) All values on this page will be filled once every				26	424.8	0.5368	27	0.2525224	28	7.9	
value and equation found on the "Data Import"				27	432.1	0.5441	28	0.2586763	29	8.35	
worksheet is appropriately filled out.				28	440.4	0.5524	29	0.2656732	30	7.74	
2) Data under the "Load Calculations" section will				29	448.4	0.5604	30	0.274712	31	8.02	
Data Import											

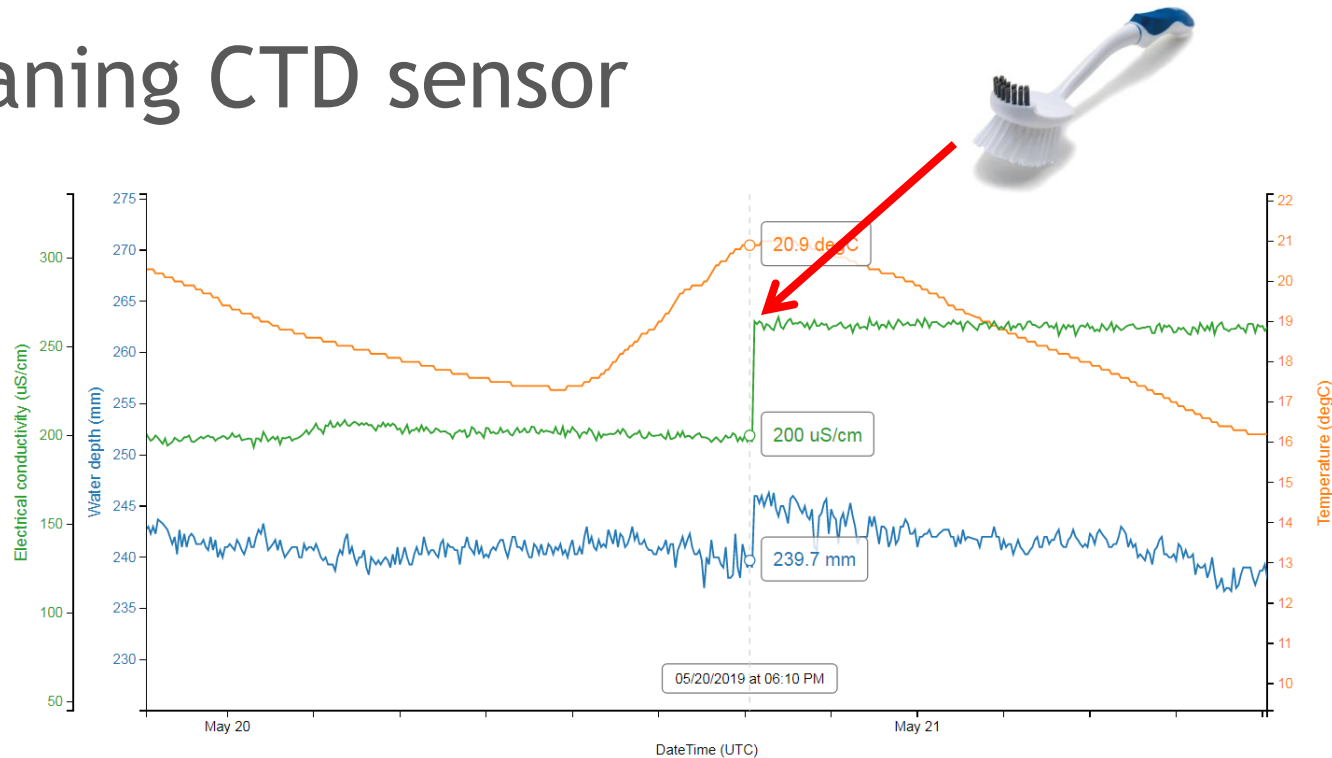
Citizen Science

Support via grab samples for turbidity/TSS and conductivity/chloride rating curves and lab analysis



Citizen Science Support - Maintenance

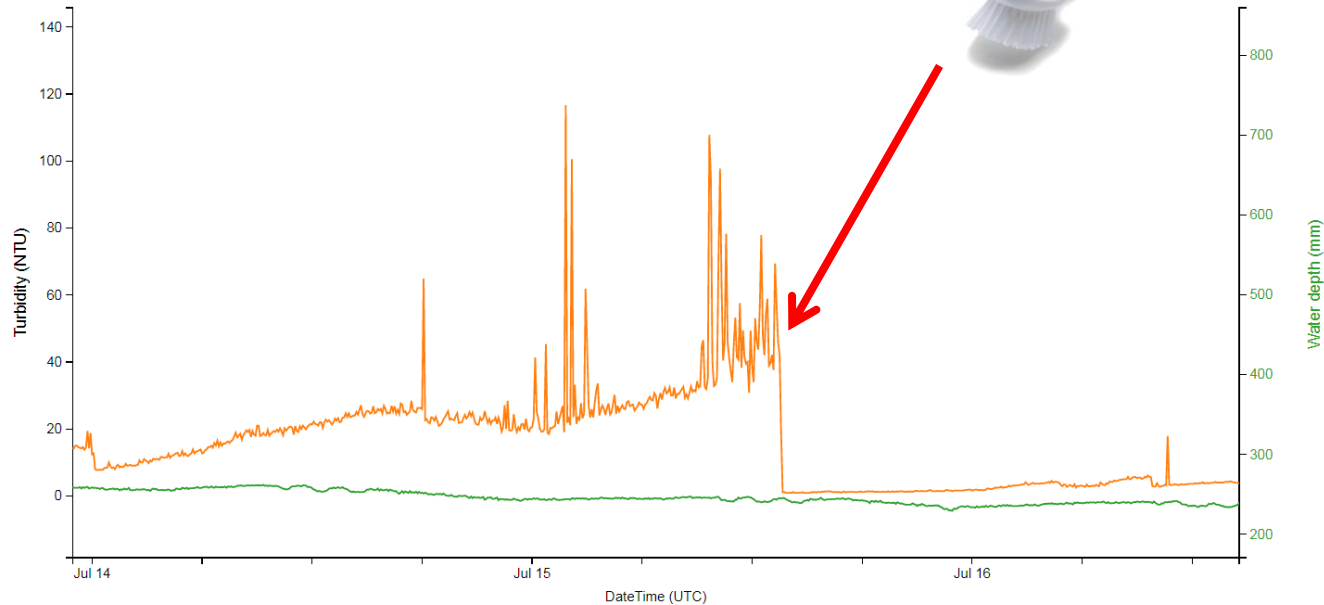
Cleaning CTD sensor



Pike Creek, The Independence School

Citizen Science Support - Maintenance

Cleaning Turbidity sensor



Ridley Creek, Ashbridge Preserve, Upstream

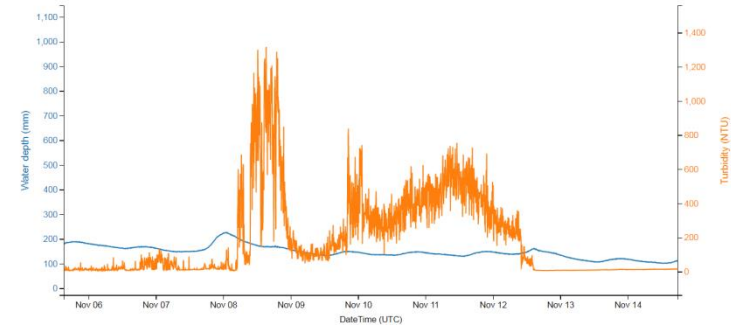
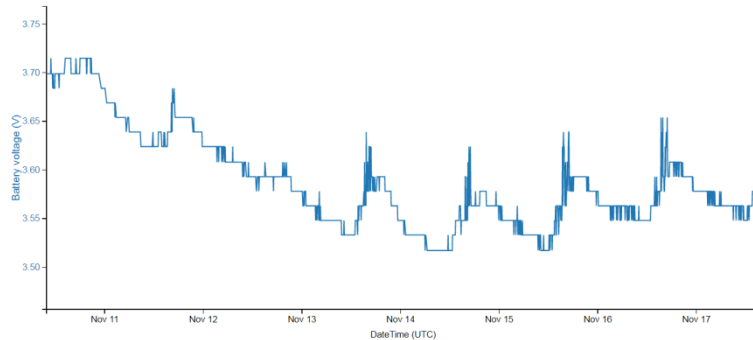
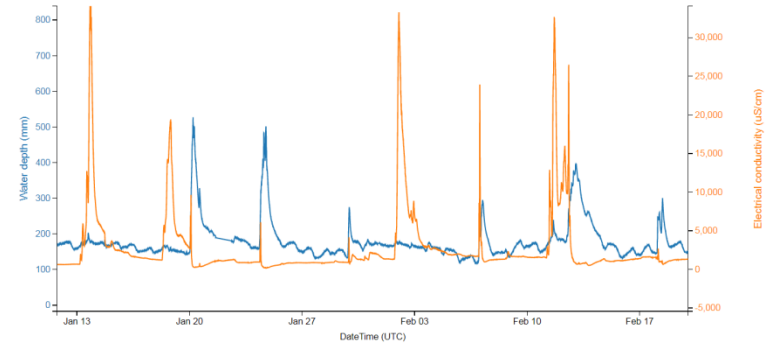
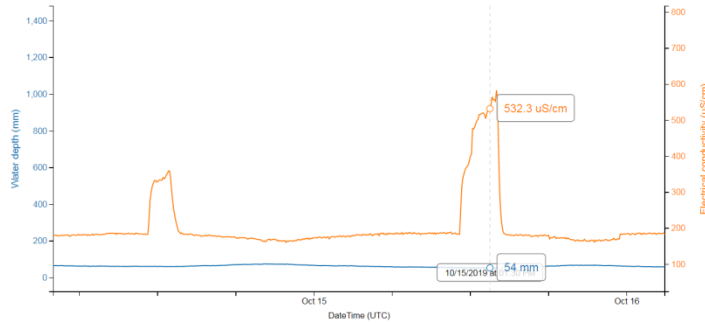
Citizen Science Support - Maintenance

Problem Identification, eyes on-site



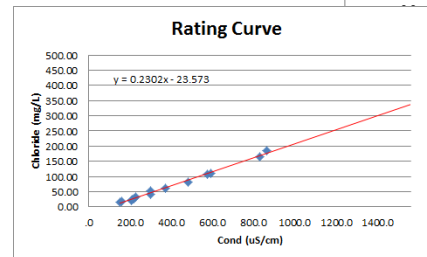
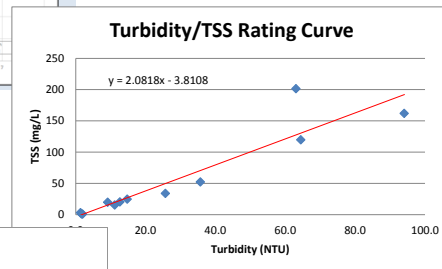
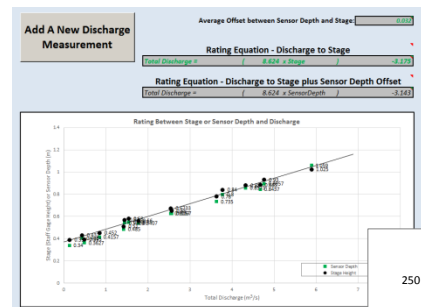
Citizen Science Support - Maintenance

Tracking data and station function



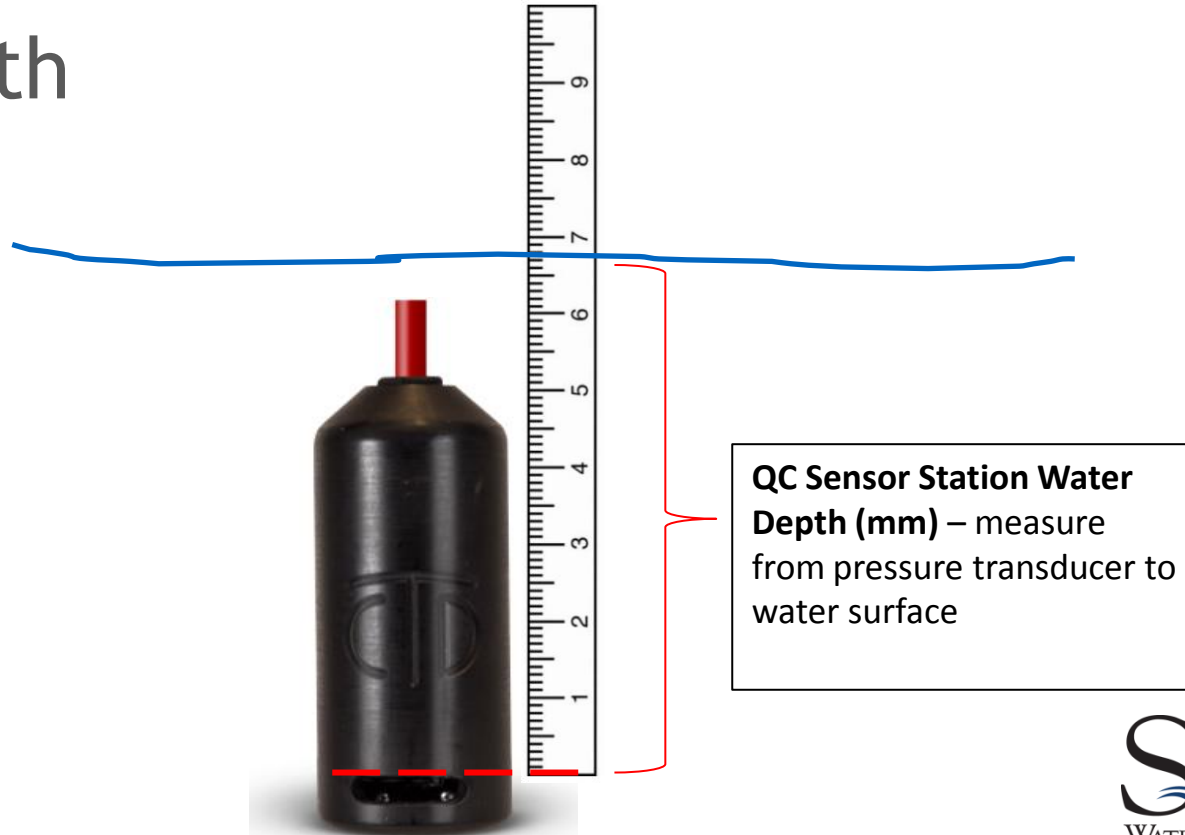
Citizen Science Support – Rating curve development

Collecting and shipping grab samples, measuring discharge



CitSci Support - Quality Control

QC of depth



CitSci Support - Quality Control

QC of water depth



Staff Gauge Height – Sensor Station Water Depth =
Offset (*Should remain the same over time)

12.5cm = 0.125m

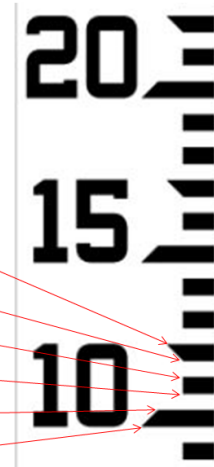
12.0cm = 0.120m

11.5cm = 0.115m

11.0cm = 0.110m

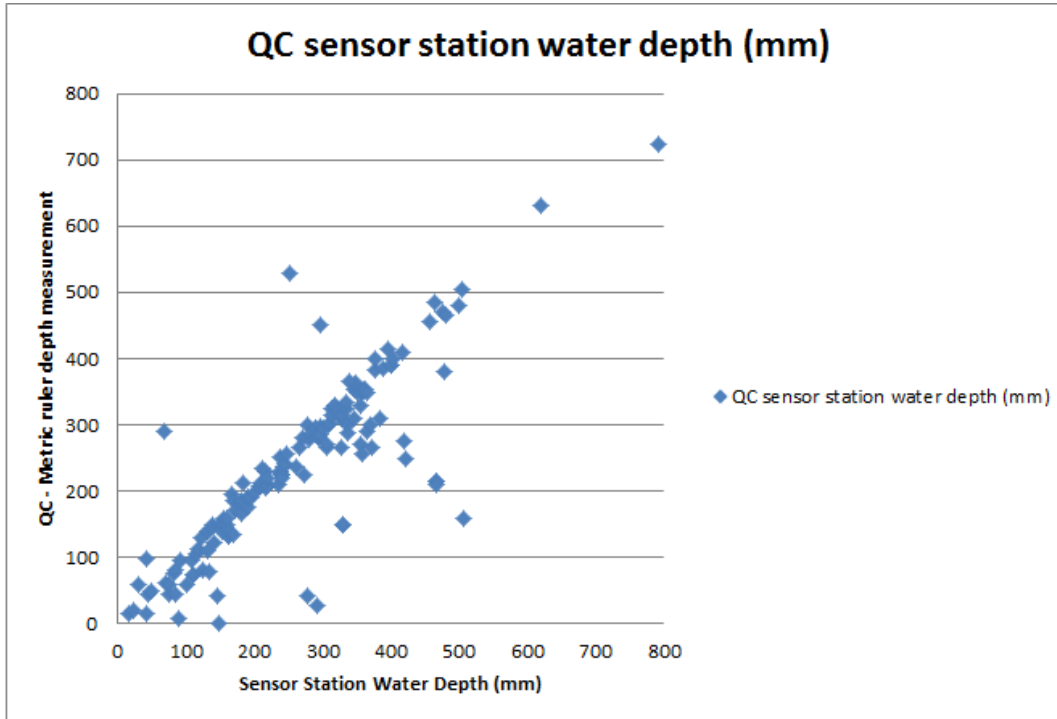
10.5cm = 0.105m

10.0cm = 0.100m



CitSci Support - Quality Control

QC of water depth



CitSci Support - Quality Control

QC of Conductivity

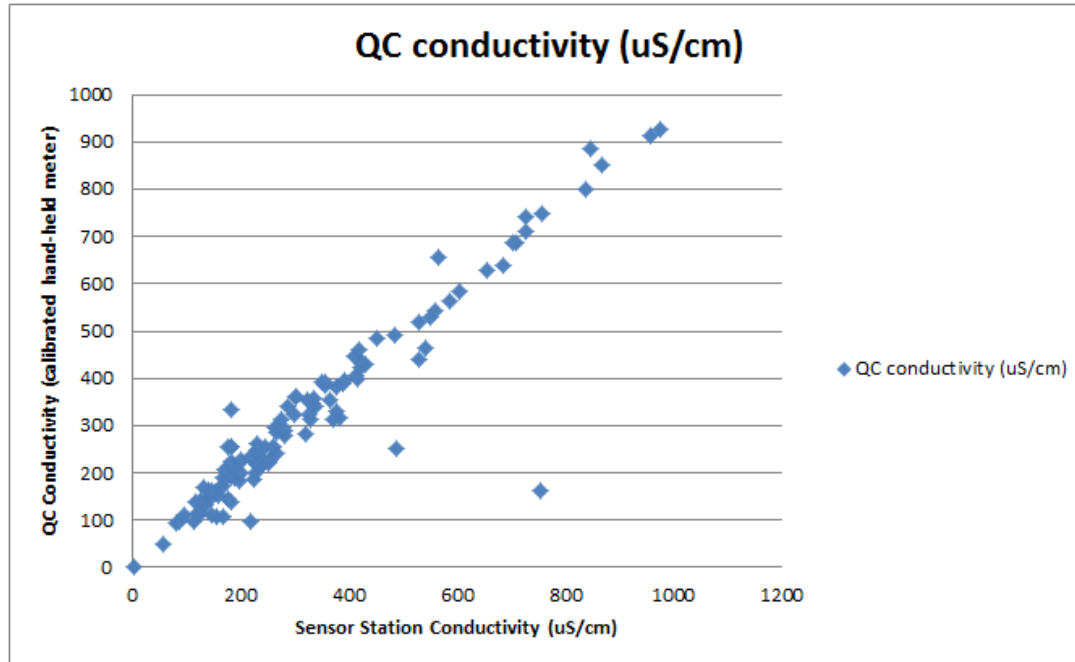
DiST 3
HI98303
EC Tester



1413 $\mu\text{S}/\text{cm}$ Conductivity Standard

CitSci Support - Quality Control

QC of Conductivity



CitSci Support - Quality Control

QC of Temperature



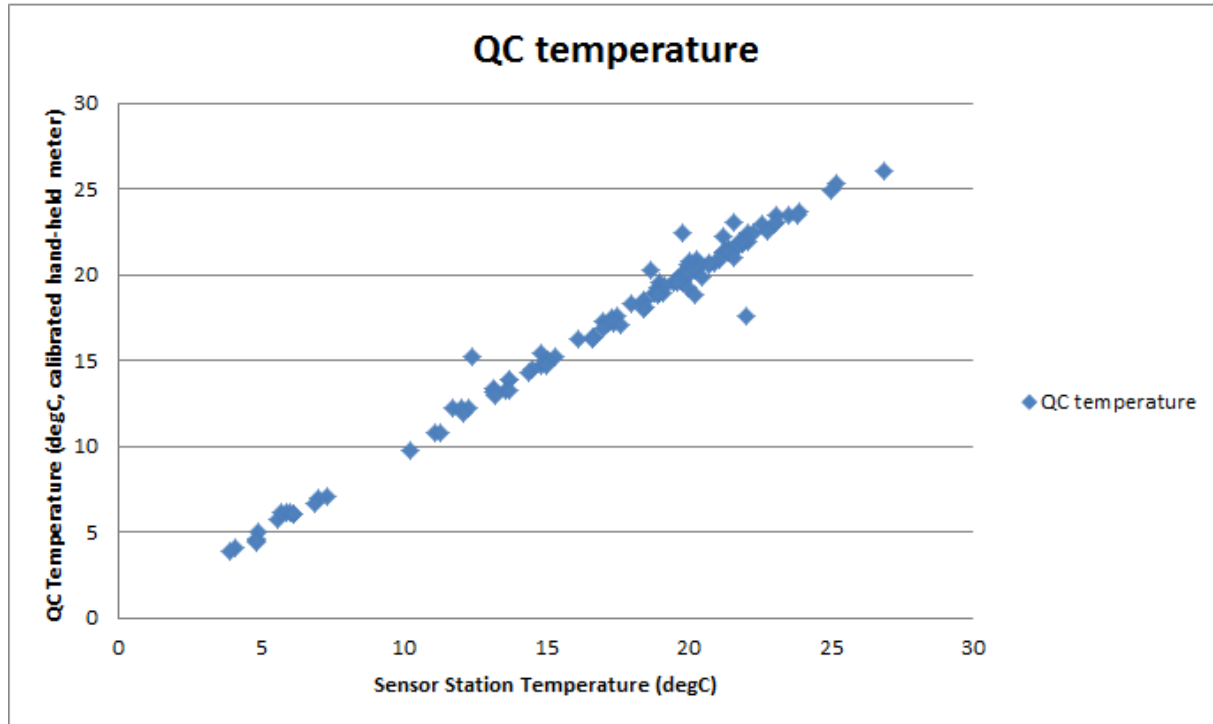
1229T59

Description **DURAC** Calibrated Electronic
Stainless Steel Stem Thermometer, -40/232°C (-
40/450°F), 127mm (5") Probe

ISO 17025:2005 accredited
Calibration Certificate, A2LA
Cert. #2448.01

CitSci Support - Quality Control

QC of Temperature



Future

New project, trying things, moving forward, learning, lots of balls in the air

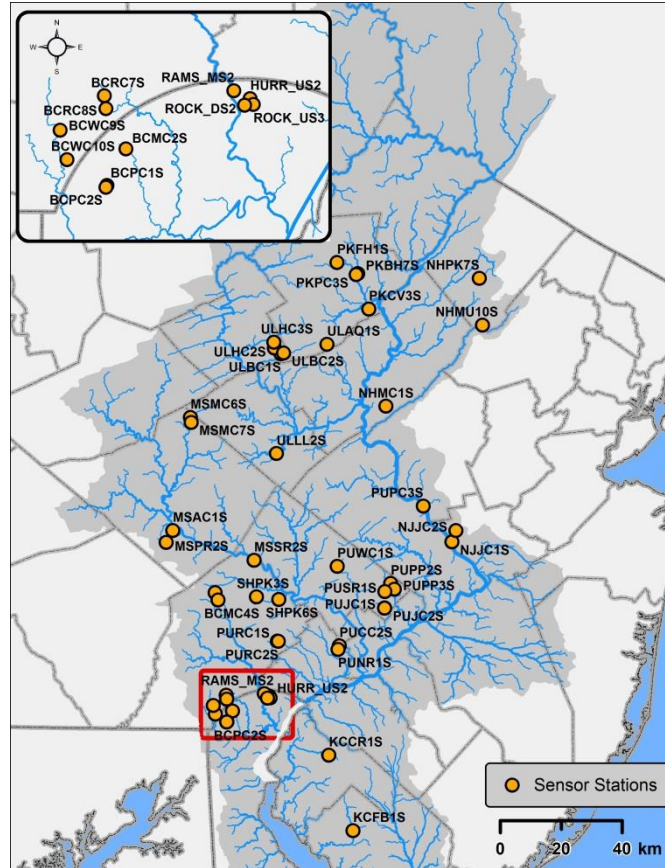


Future

- Lots to do
 - Build CitSci support infrastructure, collaborations
 - Build out Monitor My Watershed
 - Keep up with technology - cell communication, sensors, etc.
 - Understand and apply the data - site-specific and [broadly across the DRB](#)

Parts 1-3

- Part 1 - Overview of EnviroDIY sensor stations and citizen science in the Delaware River Basin
- Part 2 - Preliminary results on analysis of continuous conductivity data from stations across the DRB
- Part 3 - Preliminary results on analysis of water temperature data from stations across the DRB



Thank you!

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