

# WELCOME!

## EnviroDIY and monitoring in the DRB monthly meeting

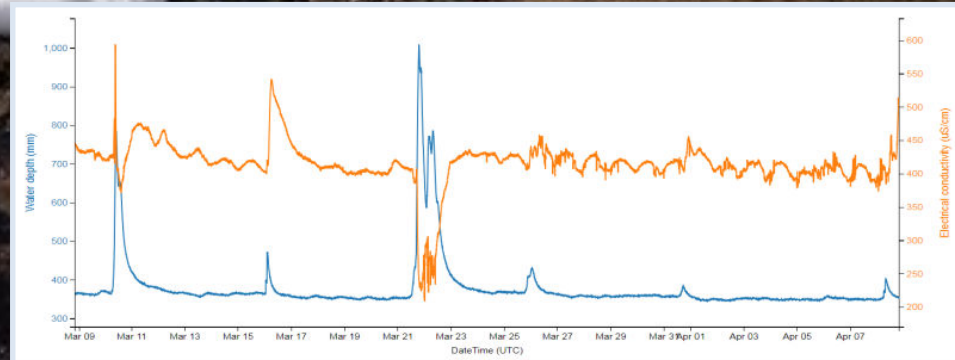
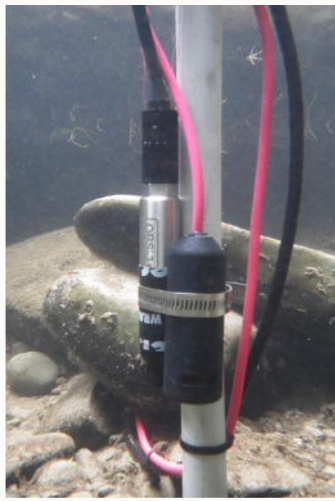
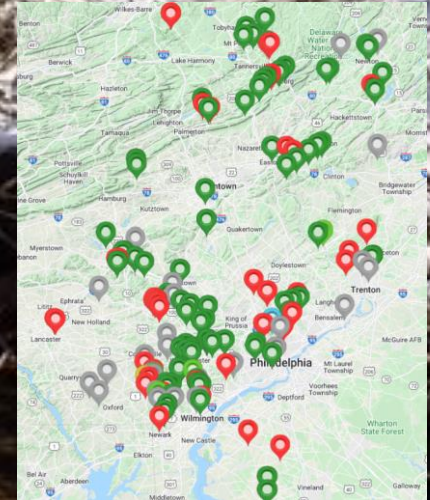
*Online, Thursday January 18, 2024, 2:30-3:30p*



EnviroDIY



Monitor My Watershed®



STROUD  
WATER RESEARCH CENTER

# Today's Agenda

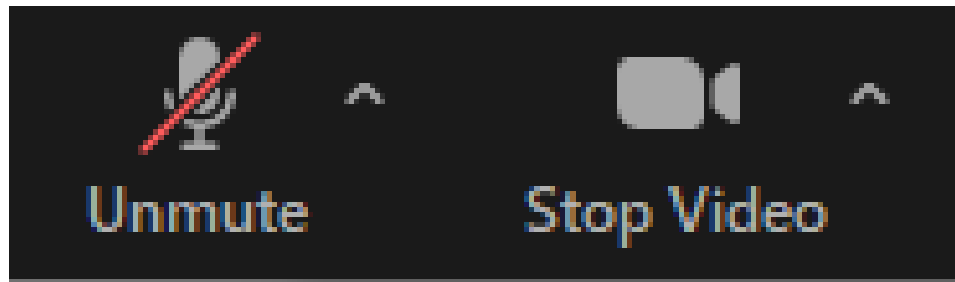
1. Introduction
2. Stroud Updates
3. Local Policy/Practice Workgroup Updates
4. Presentation – **Management of an EnviroDIY CTD monitoring station**
5. Discussion
6. Conclusion



# Zoom Orientation



**\*Meeting is being recorded**



**\*Please mute when not speaking to the group**



# These Monthly Meetings

Recordings available at: <https://wikiwatershed.org/drwi/>

YouTube

Search

**WELCOME!**  
**Monthly EnviroDIY-DRWI User Group Meeting**  
*Online, Thursday February 17, 2021, 2:30-3:30p*

EnviroDIY

Monitor My Watershed®

STROUD

February 2022 EnviroDIY-DRWI Monthly Meeting

24 views • Feb 17, 2022

1 DISLIKE SHARE SAVE ...

Stroud Water Research Center Videos  
571 subscribers

SUBSCRIBE



# These Monthly Meetings

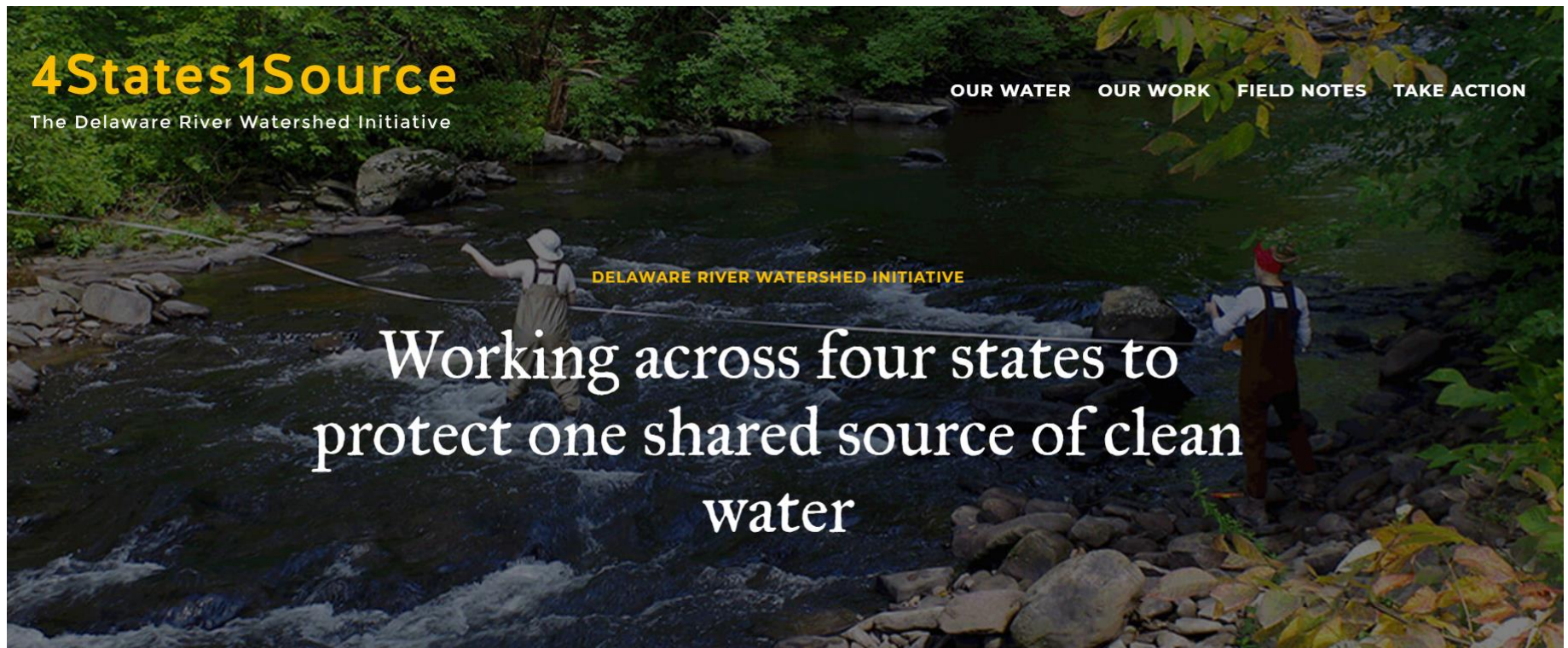
- Every third Thursday of the month
- 2:30-3:30p
- Zoom link will remain the same:  
<https://us02web.zoom.us/j/81881801310?pwd=eUFmbXZLbmRibVcxa1dtNVhzRmNvZz09>
- Reminder email one week prior to each month's meeting
  - All are welcome, please share
  - **And let us know if others should be added**

# REMINDER

- Attendees include:
  - Groups working in Delaware River Watershed Initiative (DRWI)
  - Groups working in Delaware River Basin (DRB) but not DRWI
  - Folks from outside the DRB
- Stroud Center support via DRWI and C-SAW

# Delaware River Watershed Initiative (DRWI)

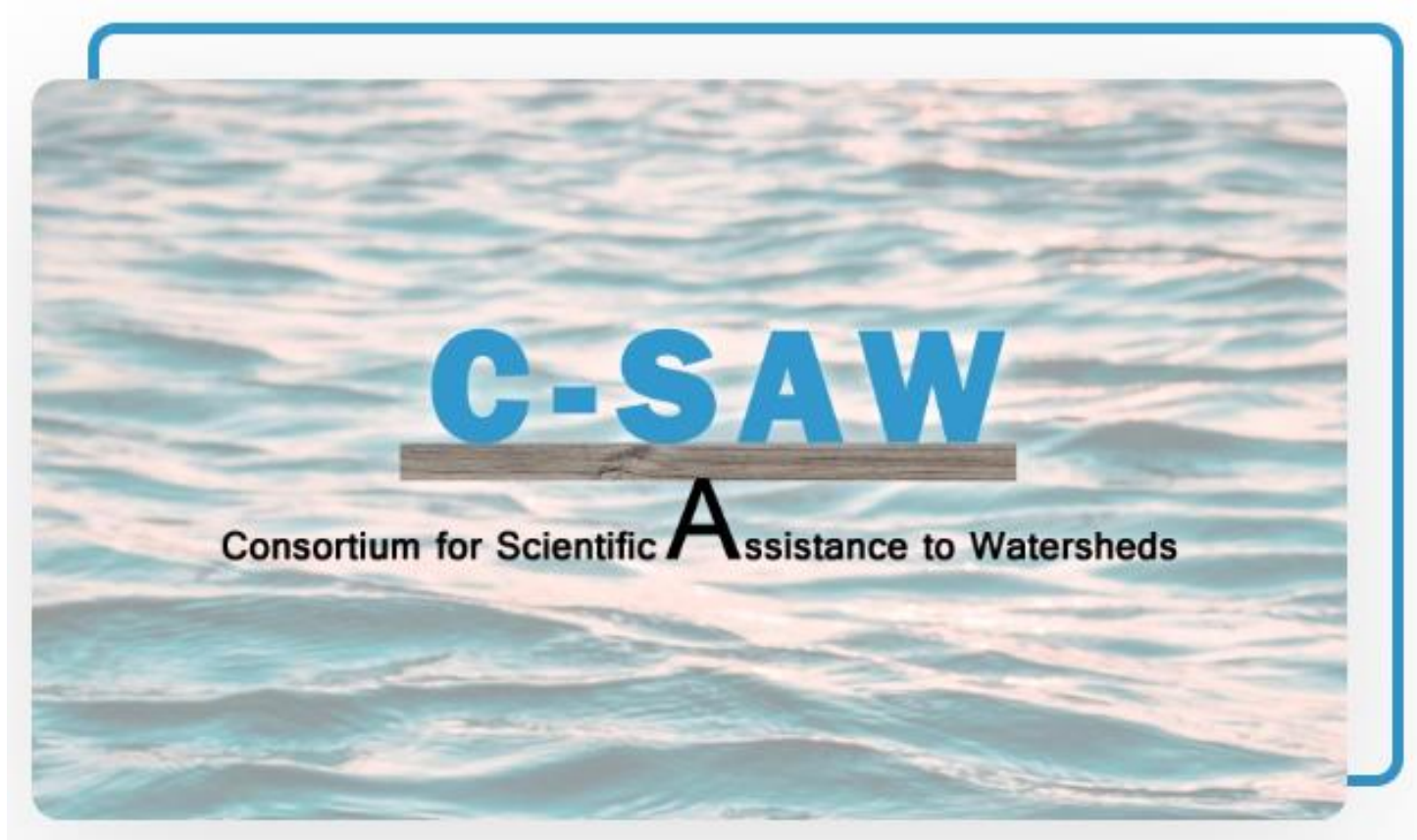
<https://4states1source.org/>





# C-SAW

<https://www.c-saw.info/>



# Goals for these monthly meetings

- Time to check-in, ask questions, report issues, network, etc.
- Updates from the Stroud Center
- Presentations
  - Science
  - Monitoring
  - Watershed management

*\*All of this to support gathering good data and using it purposefully*

# Stroud Center project personnel

## Stroud Center team:

David Bressler



Community science  
facilitator

Christa Reeves



Northern DRB technician  
and collaborator

Shannon Hicks



Research Engineer,  
Mayfly and EnviroDIY  
Inventor/Designer



# Stroud Center project personnel

## Master Watershed Steward Facilitators:

Carol Armstrong



Joe Debes, George Seeds



Master Watershed  
Steward Program



PennState Extension

# Stroud Center project personnel

## Stroud Center DRWI Leads:

Dr. John Jackson



Senior Research Scientist

Matt Ehrhart



Director of Watershed Restoration

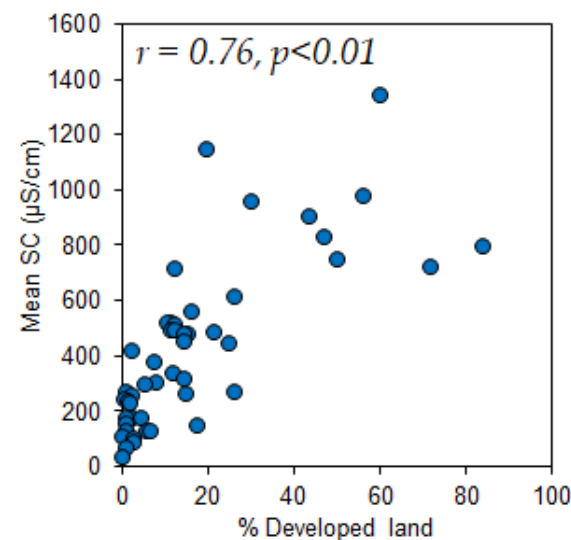
Dr. David Arscott



Executive Director, President  
Research Scientist

# Stroud Center Perspective – EnviroDIY in the DRB

- Primary Goal
  - Support Station owners, managers, and volunteers
  - Use stations for local purposes
- Secondary Goal
  - Analyze basin-wide data set
  - Develop tools to characterize and contextualize watersheds





# Updates

- Updates from the Stroud Center on EnviroDIY, science and monitoring, communications, etc.

# Support on Snapshots

- Stroud Center support on synoptic sampling events (aka snapshots and blitzes)
  - Salt (chloride and conductivity)
  - ~~Water temperature~~
- *\*Please be in touch if you would like support in doing this type of monitoring*

# If you want, send your photos and stories



## Email or Text to:

- Diane Huskinson ([dhuskinson@stroudcenter.org](mailto:dhuskinson@stroudcenter.org); 717-383-1179)
- Dave Bressler ([dbressler@stroudcenter.org](mailto:dbressler@stroudcenter.org); 410-456-1071)

# Local Policy/Practice Workgroup

- **Current leadership:**

- Ian Brastow, Lopatcong Creek Initiative/New Jersey Highlands Coalition (NJ)
- Dave Manning, PA Master Watershed Steward and Schuylkill Water Steward with Green Valleys Watershed Association (PA)
- Steve Tricarico, Tulpehocken Creek Watershed Association, member Bern Township planning committee (PA)
- Christa Reeves, Musconetcong Watershed Association (NJ)
- Alex Jackson, Township Supervisor (PA)
- Joe Debes, PA Master Watershed Steward and Stroud Center volunteer (PA)
- Carol Armstrong, PA Master Watershed Steward (PA)
- Tali MacArthur, PA Environmental Council (PEC)/PA Organization for Watersheds and Rivers (POWR)(PA)

- **Support:**

- David Bressler, Stroud Water Research Center (PA)

- ***Meetings: 1<sup>st</sup> Thursdays, 11:00a – 12:30p (Zoom, <https://zoom.us/j/5889670619>)***



# Local Policy/Practice Work Group

## **Short Term Charge:**

To develop the most effective way of employing stream monitor data – conductivity, temperature, depth, and sometimes turbidity – and related measures to advise and otherwise influence municipal entities. The charge includes an emphasis on stream quality in relation to land use and development.

# Updates from Local Policy/Practice Workgroup

## **Deliverable Updates**

- Municipal Interactions
  - How to engage with municipal leaders (Ready for use)
- Temperature
  - Guidance Document – Putting Stream Temperature Data To Work (last stages of internal review)
  - One-pagers (some available, some in development)
- Conductivity
  - Guidance Document (outline ready)

# Updates from Local Policy/Practice Workgroup

- Document: **Putting Stream Temperature Data to Work**
  - Final resource document under review
    - Internal review is coming to a conclusion
    - External reviewers have been identified
  - Discussion of supporting materials
    - 1-page summaries tailored per request to watershed groups (e.g., request from fishing association re temperature impacts on trout)
    - 1-page summaries, each dealing with a *single* concept as it pertains to stream temperature (e.g., groundwater, ambient temperature, solar radiation, stream mixing, impervious surface, deforestation, impoundments, etc.).
    - Powerpoint presentations that conform to middle- or high school curricular efforts aimed at watershed ecology.

# Updates from Local Policy/Practice Workgroup

## Document: **How to Engage with Municipal Leaders**

- To be distributed via the Stroud Center  
(<https://wikiwatershed.org/drwi/> or possibly Manage My Watershed)
- Possibly a feedback survey which will document requested changes or suggestions
- The document will “live” in one place but be distributed via partners



# Updates from Local Policy/Practice

<https://weconservepa.org/eac/eac-network-conference-registration/>

## EAC Network Virtual Conference: Registration Open

The **EAC Network Virtual Conference** will be held **Saturday, February 24, starting at 9AM**. Join fellow Environmental Advisory Council (EAC) members, municipal staff, elected officials, and others interested in the work of EACs for a full day of training and networking, without the hassle of travel! Available sessions cover a wide range of topics, including healthy yards/healthy streams, urban agriculture & forestry, sustainable waste management options, light pollution, and deer management.



**AGENDA**

**REGISTRATION**

**NEW THIS YEAR:**

*EACs can submit group registrations for up to five members at one price!*



Any questions before we move on?





# Today's Presentation

## Management of an EnviroDIY™ CTD Monitoring Station

- Overview of the station and technology
- Overview of management roles
  - Oversee the management process
  - Monitor the data/station performance
  - Maintain the station (cleaning, etc.)
  - Check station performance (Quality Control and Troubleshooting)
- Specifics on each of these roles

# Overall

- GOOD DATA is the point of all this – improve understanding of the stream
- Engage with your station(s) – TEAMWORK
- Be in touch with the Stroud Center for guidance and/or use the EnviroDIY Forum



Dave Bressler, facilitator

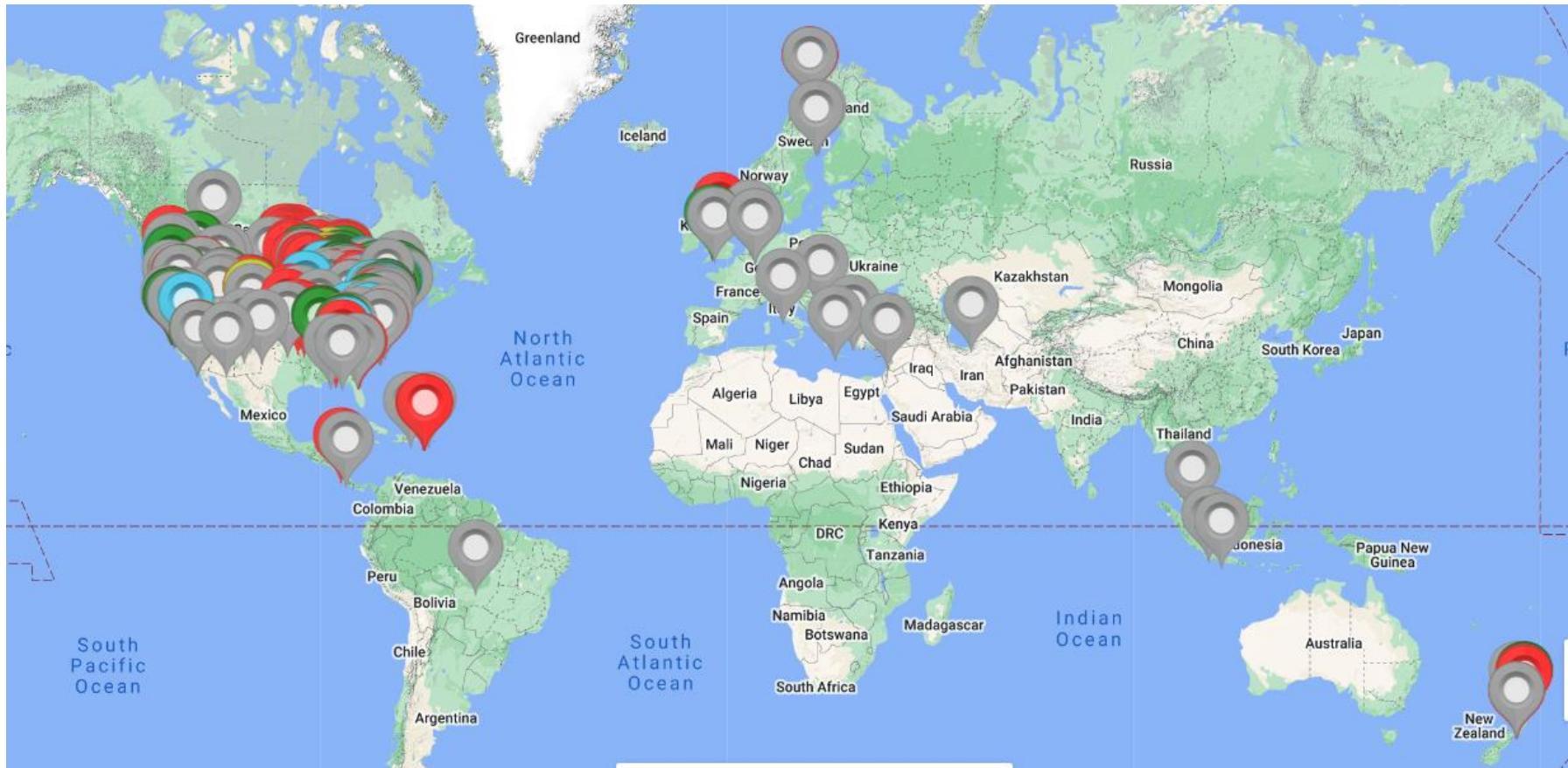


Shannon Hicks, engineer





EnviroDIY is a toolkit of open source hardware and resources for the environmental community. Established in 2014.



The main goal: to teach users how to build and maintain instrumentation for do-it-yourself environmental monitoring.



Welcome to EnviroDIY, a community for do-it-yourself environmental science and monitoring. EnviroDIY is part of [WikiWatershed](#), a web toolkit designed to help citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students advance knowledge and stewardship of fresh water. **New to EnviroDIY?** [Start here](#)

Mo

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# Environmental Sensors

[Home](#) > [Forums](#) > Environmental Sensors

Discussions about all types of environmental sensors.

Viewing 10 topics - 1 through 10 (of 88 total)

1 2 3 ... 7 8 9 →

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Topic

Voices

Posts

Last Post

 [Hydros 21/Decagon CTD: reading error](#)Started by: [Letsid](#)

5

9

[2024-01-15 at 7:55 AM](#)[Bibhuti Bikramaditya](#)[Sensor reading errors using Meter Teros modular library](#)Started by: [Braedon](#)


2

4

[2024-01-02 at 3:57 PM](#)[Sara Damiano](#)[Please Help! Meter CTD Gen2 being blocked by Yosemitech 511-a](#)Started by: [James\\_NZ](#)

4

10

[2023-12-15 at 1:48 PM](#)[mbullard](#) [Rain gauge gets stuck](#)Started by: [Pavel](#)

2

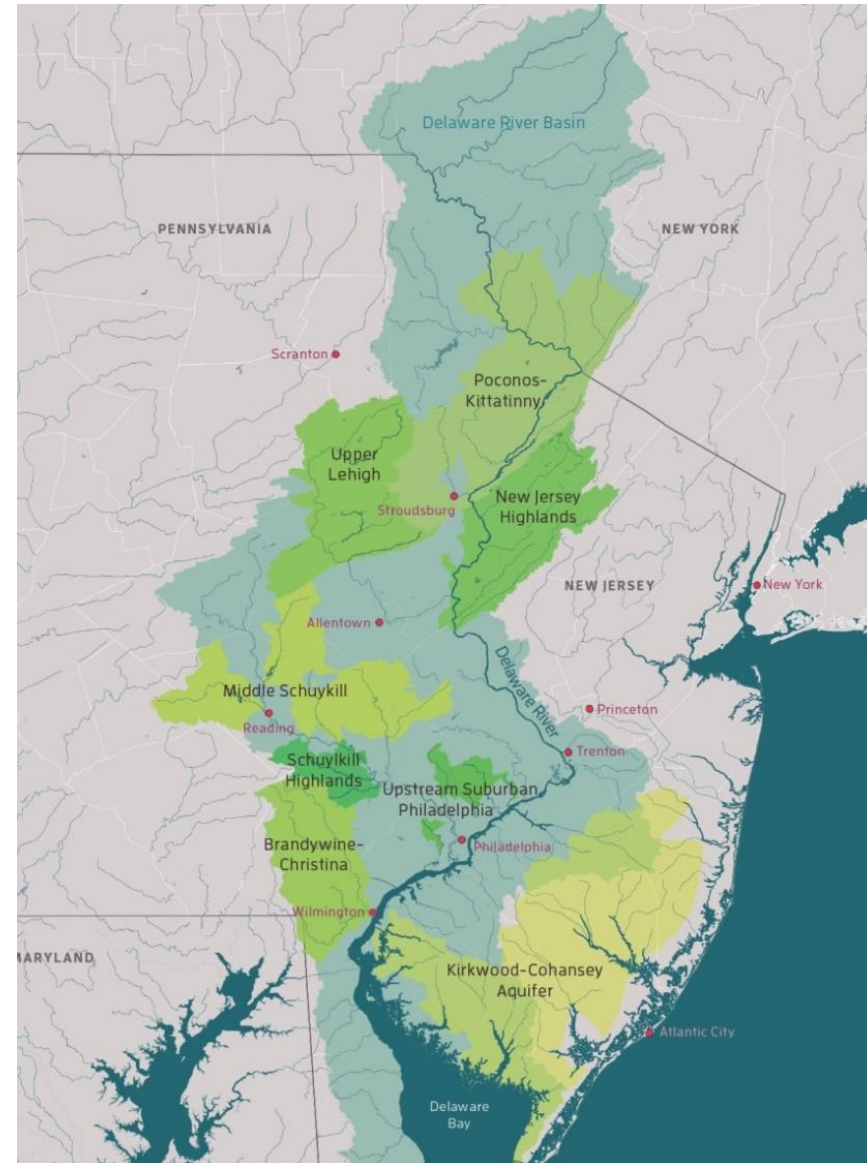
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[2023-12-14 at 1:38 PM](#)[Pavel](#)

# EnviroDIY™ in the Delaware River Basin

## EnviroDIY and the Delaware River Watershed Initiative:

- Stroud Center facilitation and support
- 50+ watershed groups, schools, and universities
- CTD<sub>(conductivity, temperature, depth)</sub> and sometimes turbidity
- Continuous data: data points recorded every five minutes
- Real-time data transmission to Monitor My Watershed portal
- 200+ stations deployed since 2017







**EnviroDIY™**

# Monitoring Stations

## Waterproof logger box and solar panel



**Meter Hydros 21 CTD sensor**

## Mayfly Data Logger





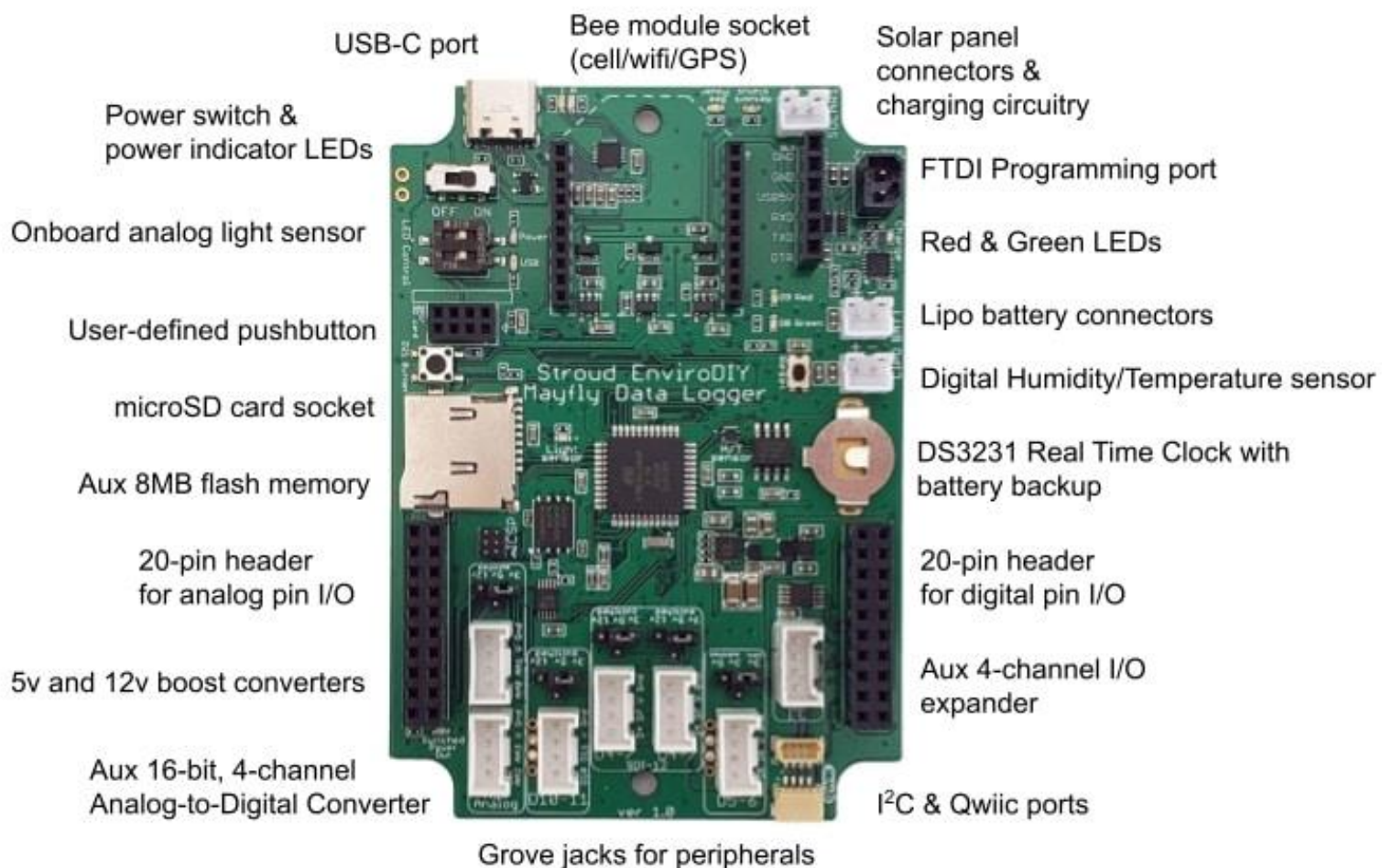




# EnviroDIY™ Mayfly Data Logger

<https://www.envirodiy.org/mayfly/>

## Features of the EnviroDIY Mayfly Data Logger v1.0 and v1.1



# Workshop 1: Introduction to EnviroDIY

- Intro to Mayfly Data Logger
- Intro to Arduino
- Programming logger using Arduino sketches
- Testing on low cost sensors





# Workshop 2: Building an EnviroDIY Monitoring Station (programming and assembling a CTD station)





# EnviroDIY™ Monitoring Stations

## Workshop 2: Building an EnviroDIY Monitoring Station (programming and assembling a CTD station)



**Waterproof  
logger box  
and solar panel**



**Mayfly Data  
Logger**



**Meter Hydros 21  
CTD sensor**



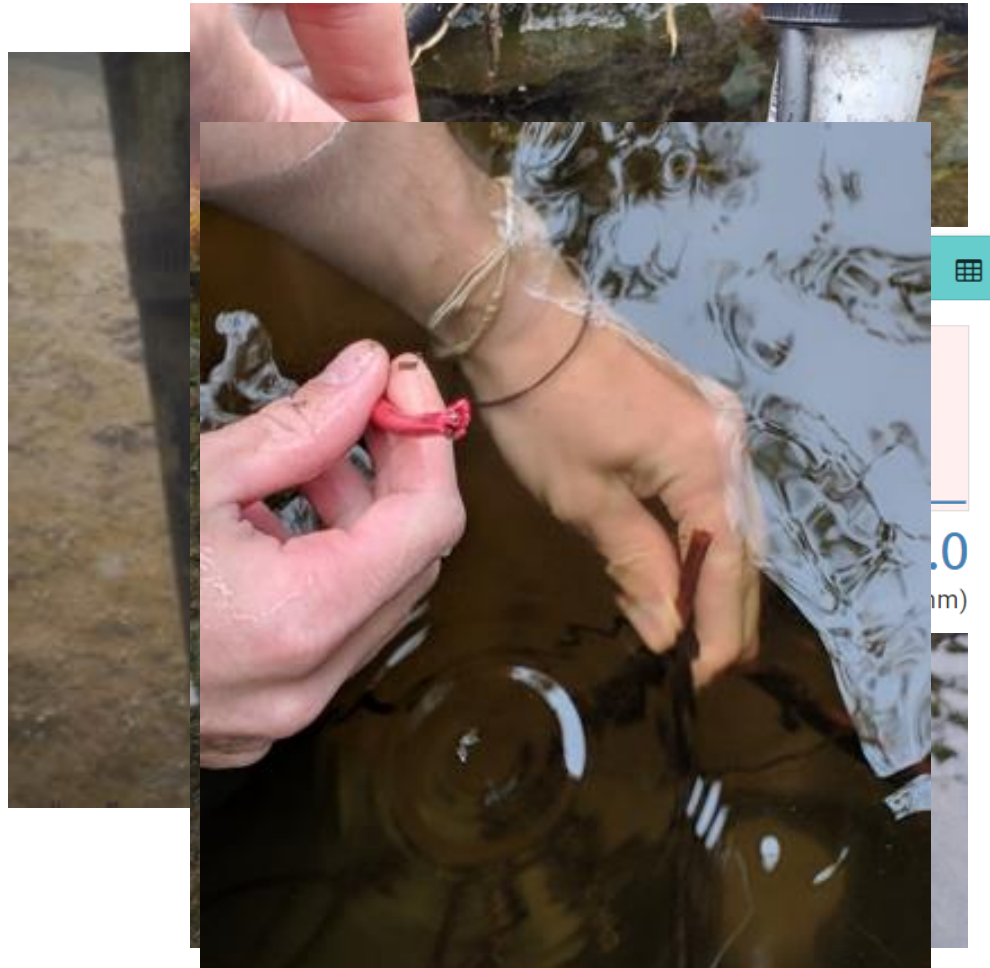
## Workshop 3: Managing an EnviroDIY Monitoring Station (managing a CTD station)





## Workshop 3: Managing an EnviroDIY Monitoring Station (managing a CTD station)

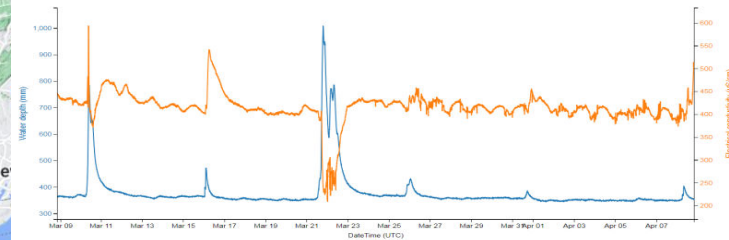
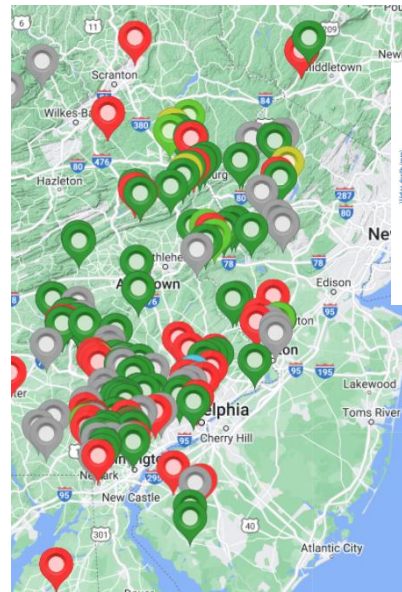
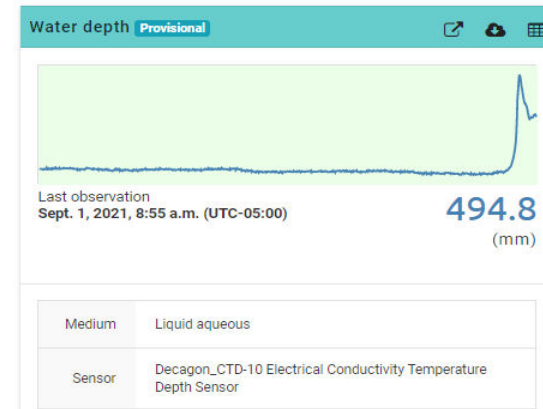
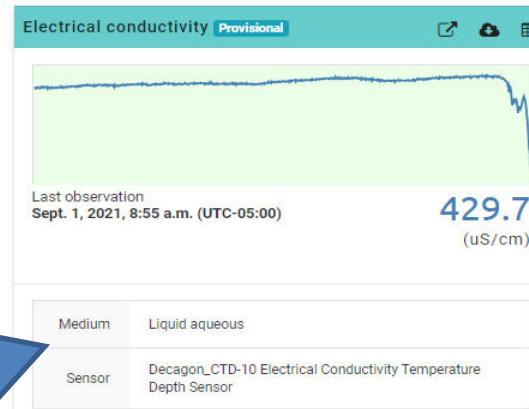
- Monitoring the data
- Sensor cleaning
- Quality Control
- Troubleshooting



# Management of an EnviroDIY™ CTD Monitoring Station

- Overview of the station and technology
- Overview of management roles
  - Oversee the management process
  - Monitor the data/station performance
  - Maintain the station (cleaning, etc.)
  - Check/upkeep station performance  
(Quality Control and troubleshooting)
- Specifics on each of these roles

# Basic station function





# EnviroDIY™ CTD Monitoring Station

**Waterproof logger box  
and solar panel**



**Meter Hydros 21 CTD sensor**

**Mayfly Data Logger**



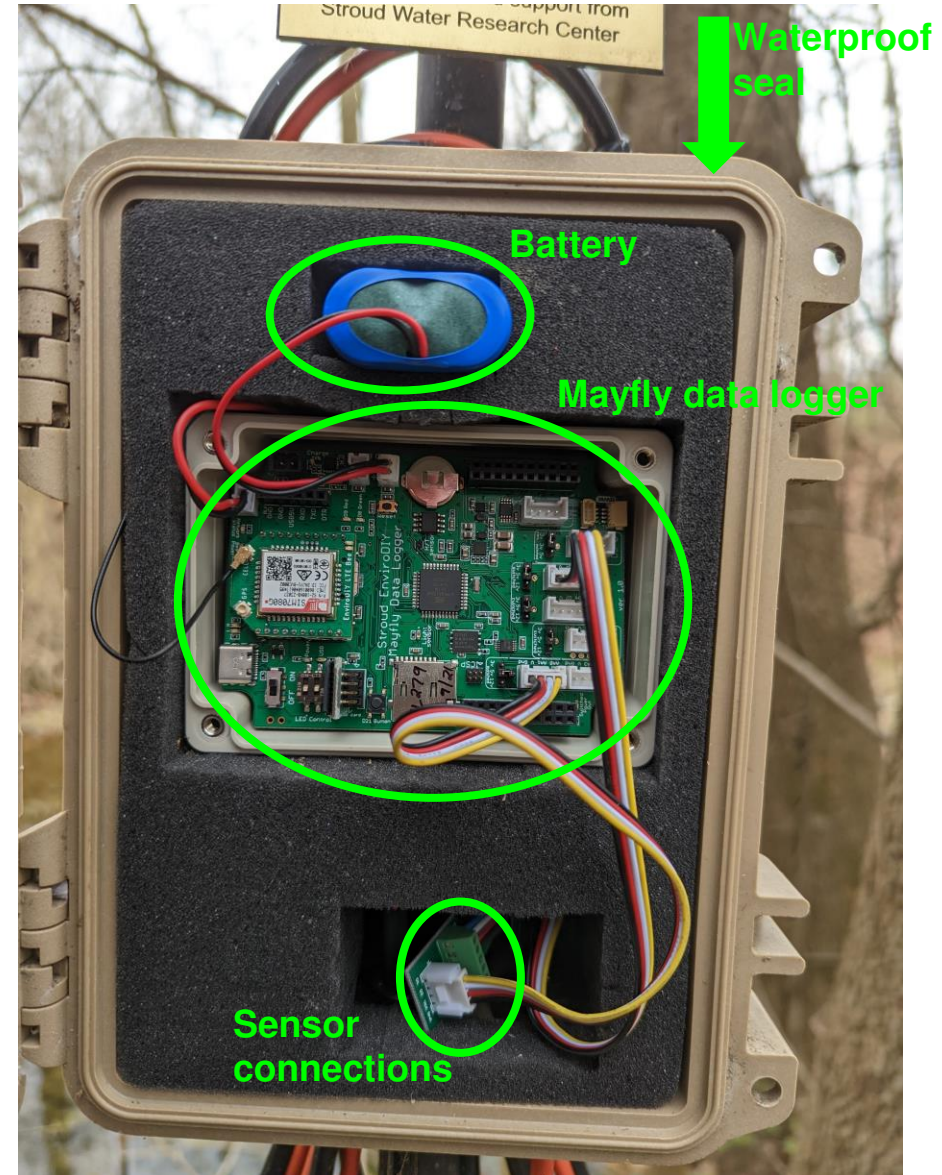
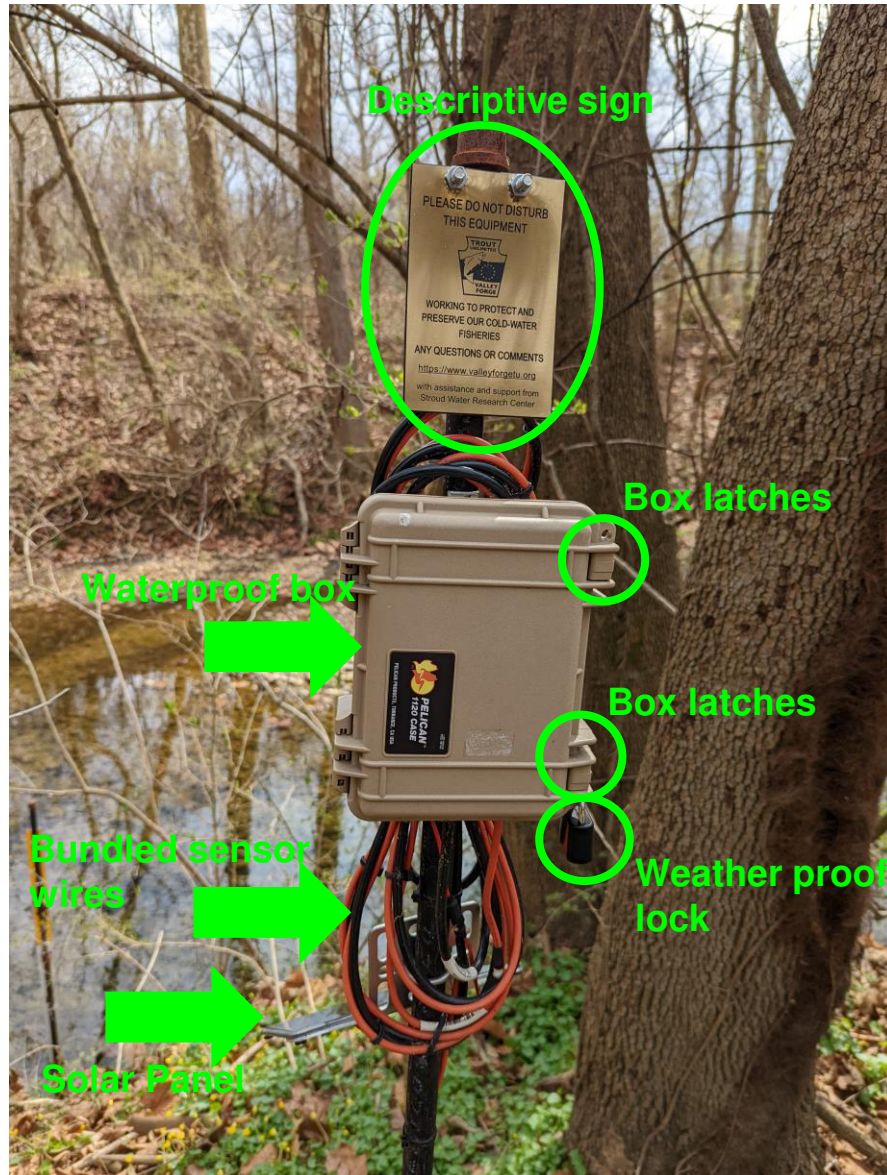


# EnviroDIY™ CTD Monitoring Station



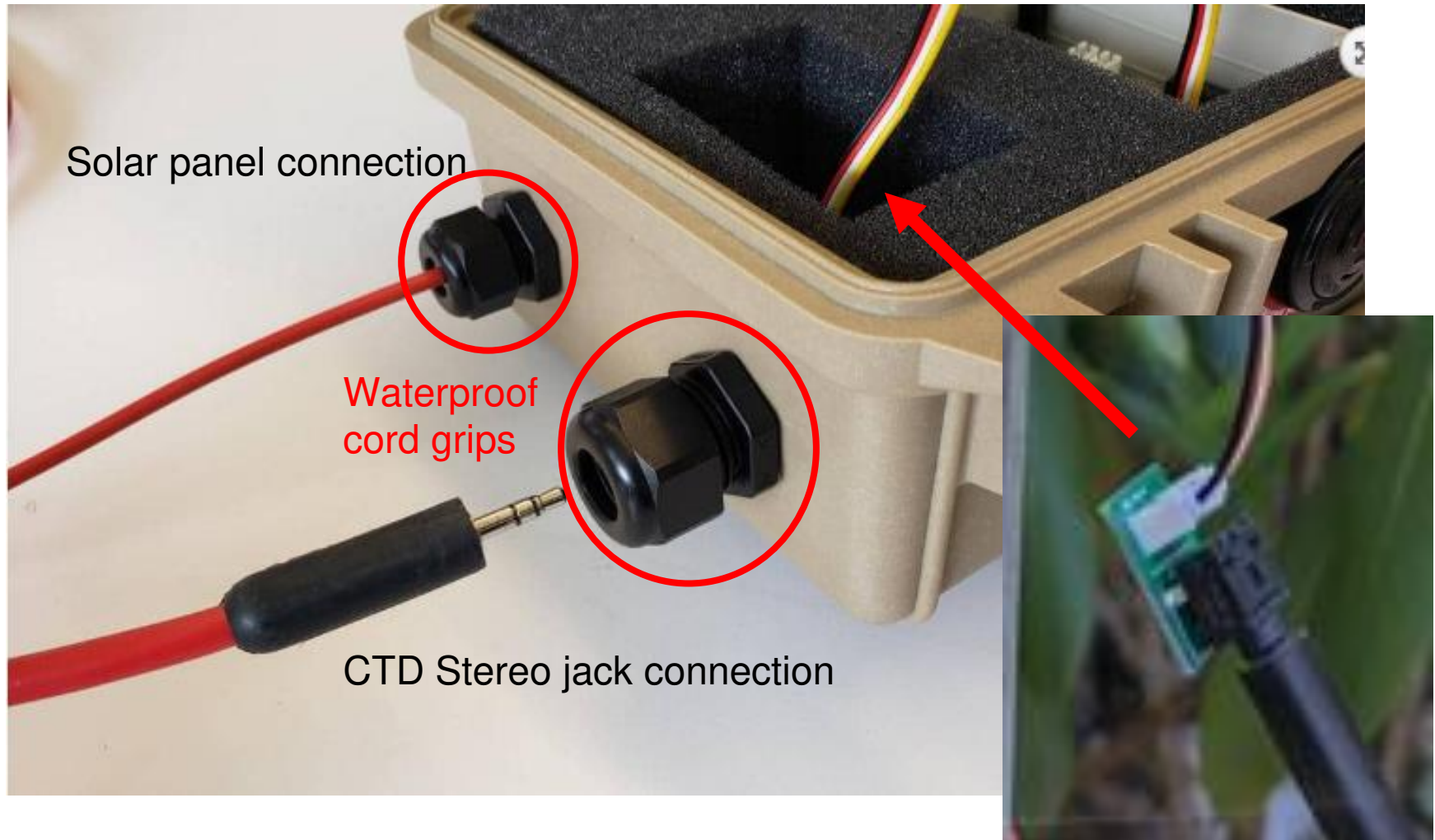


# Parts of overall station to know about

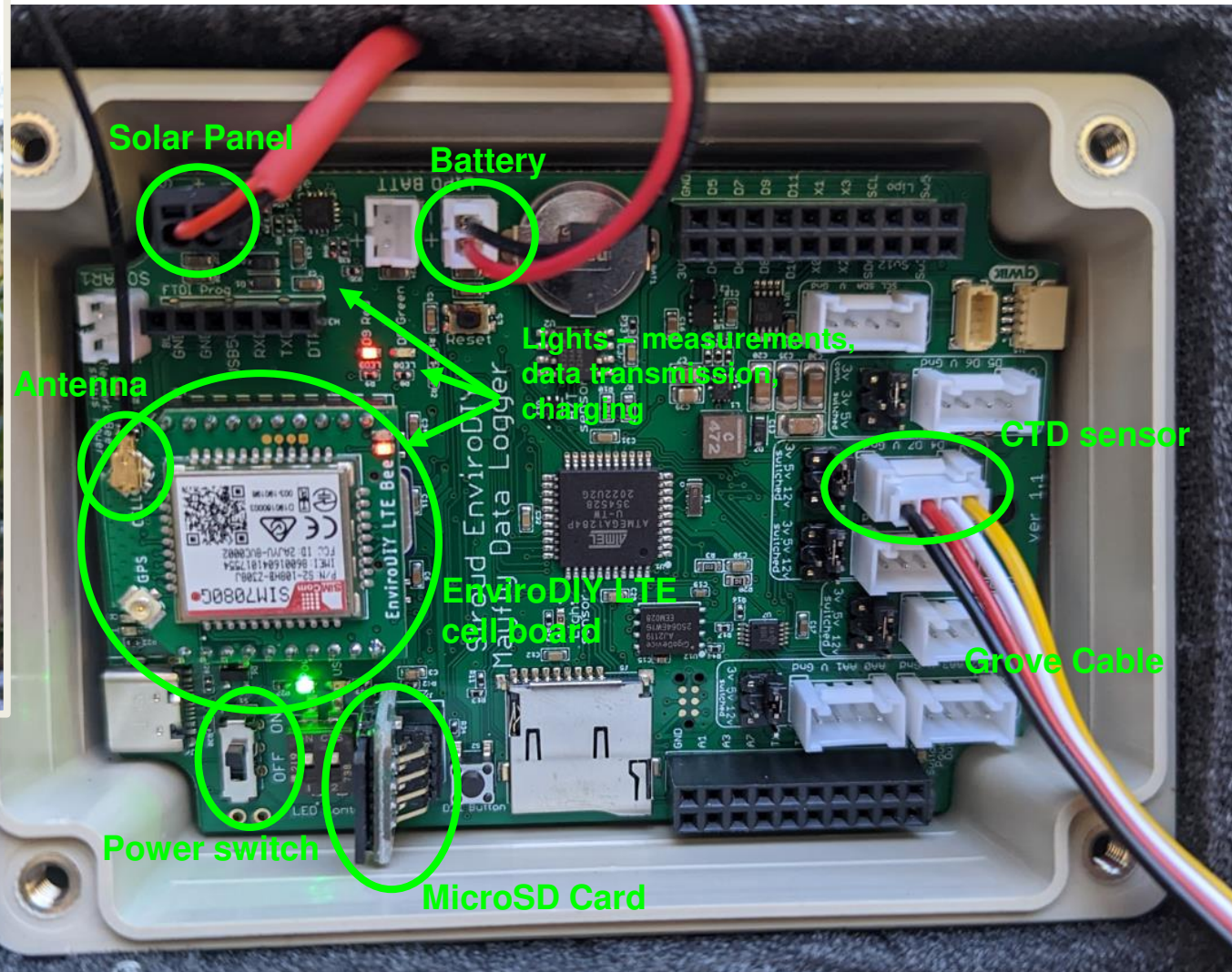




# Parts of overall station to know about

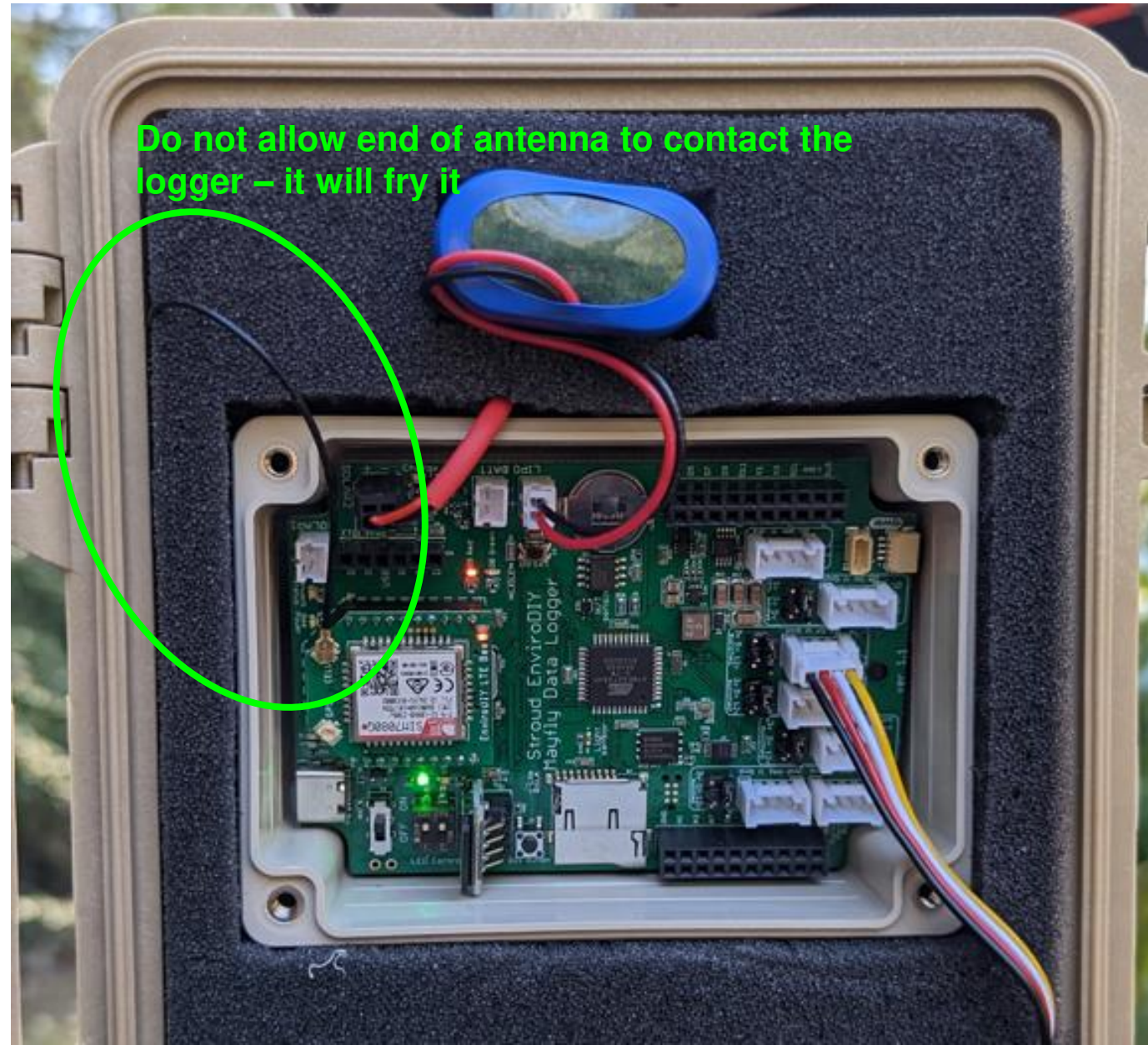


# Parts of the Mayfly to know about

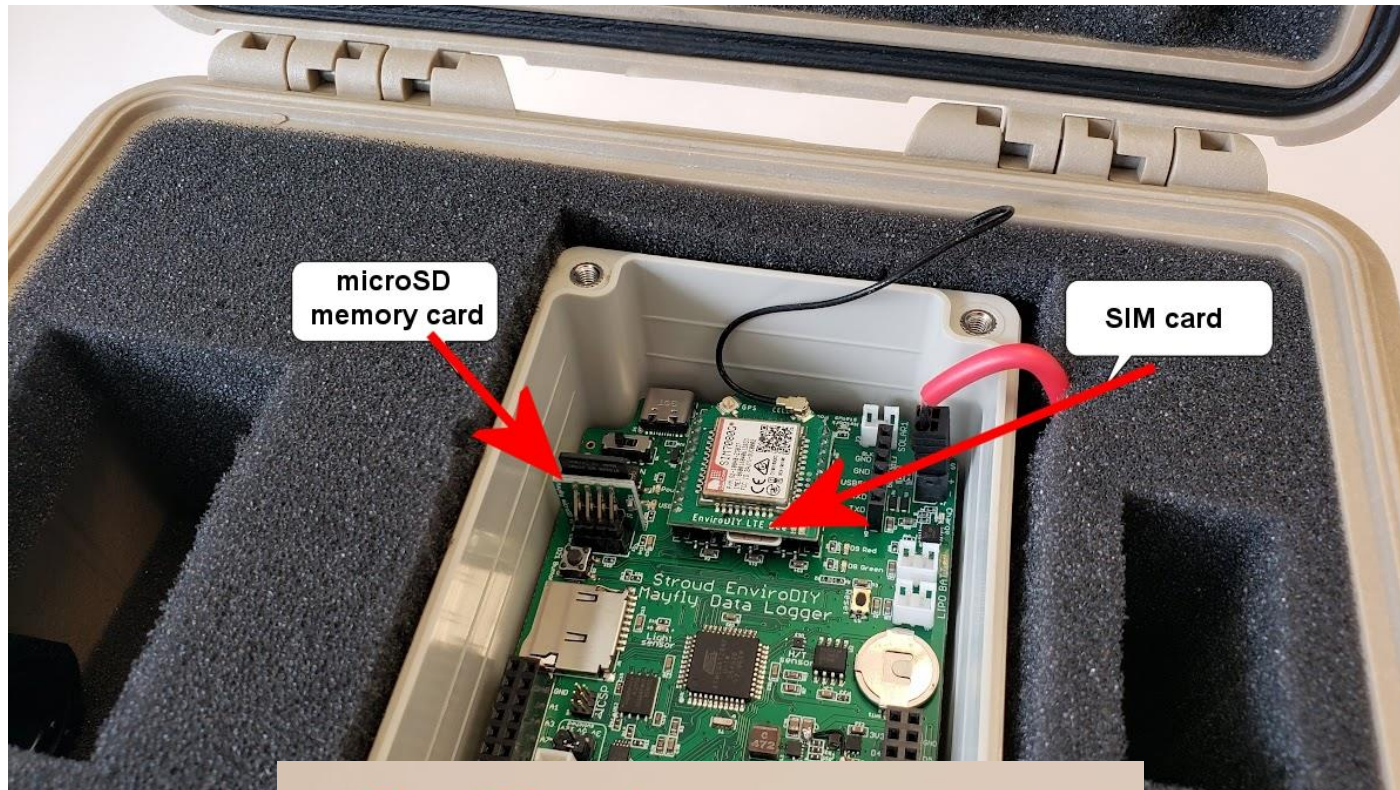




# Parts of the Mayfly to know about



# Parts of the Mayfly to know about



**MicroSD card  
(memory card for  
storing logger data)**

**SIM card  
(for cellular  
module)**





# Parts of the CTD sensor to know about

## Meter Hydros 21 CTD sensor (older version)

Temperature  
sensor well  
protected  
internally

White disc is the  
ceramic pressure  
transducer (water  
depth)—vulnerable to  
breakage/freezing

Screw heads are  
where conductivity is  
measured – if  
covered by silt/algae  
will affect readings



# Parts of the CTD sensor to know about

## Meter Hydros 21 CTD sensor (newer version)



Pressure transducer  
(water depth) – same  
general location, but  
more protected

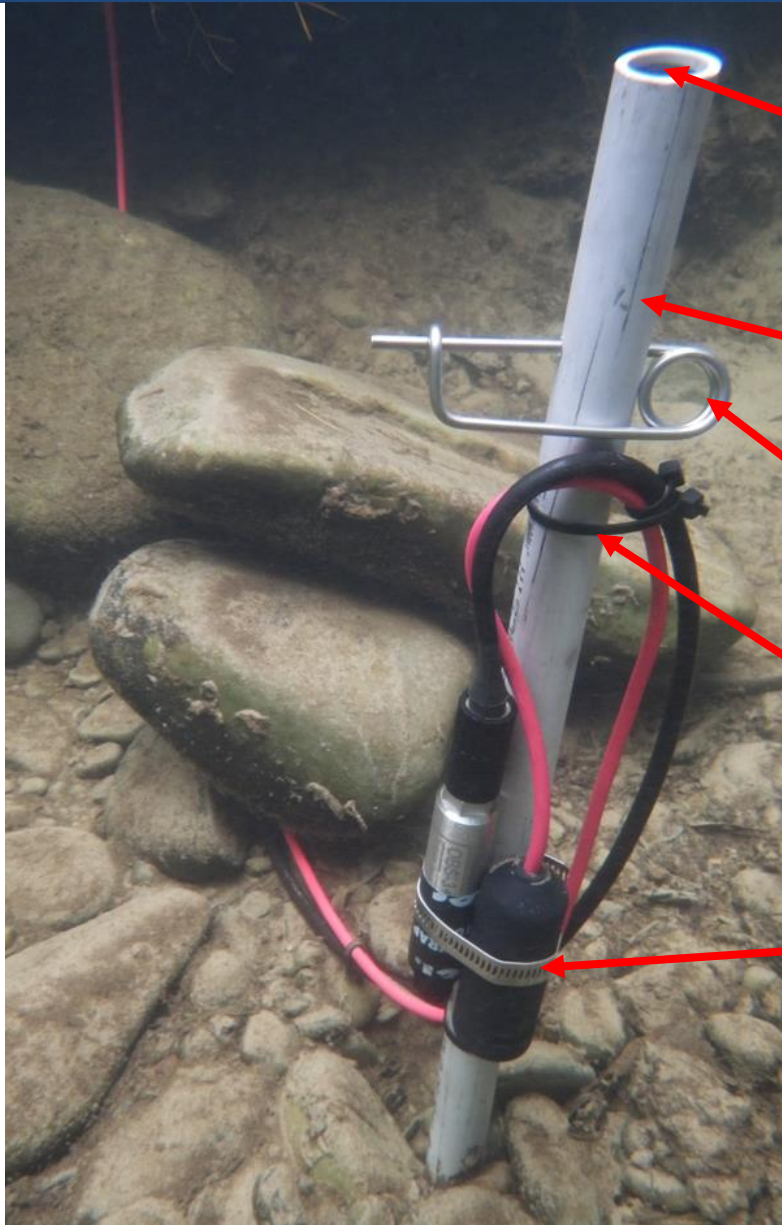


Screw heads are  
where conductivity is  
measured – if  
covered by silt/algae  
will affect readings





# Parts of the sensor bundle to know about



$\frac{3}{4}$  in Pointed "rebar" with holes  
– anchored in stream bed



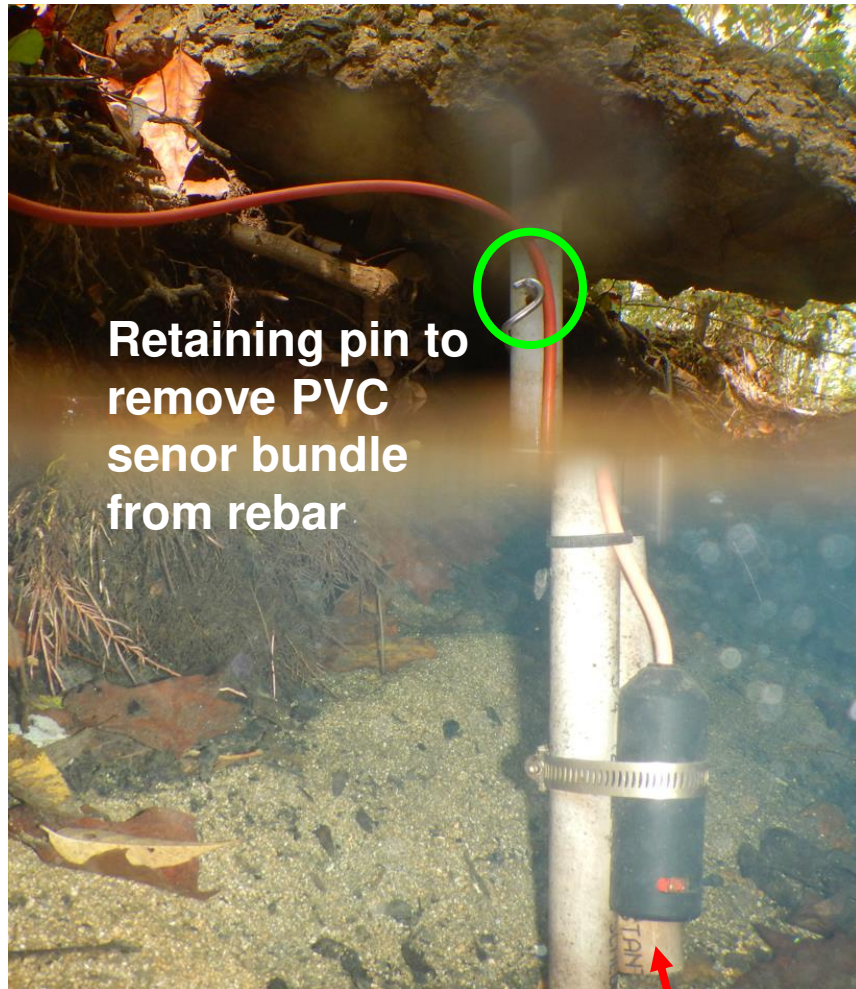
$\frac{3}{4}$  in PVC

Stainless steel retaining pin

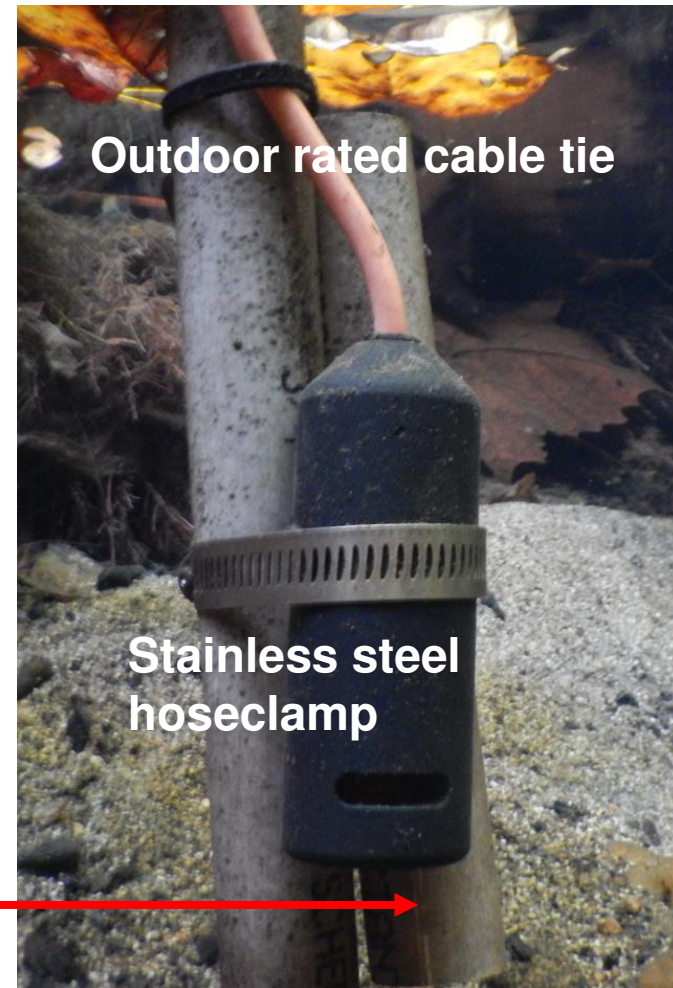
Outdoor rated cable ties

Stainless steel hose clamp

# Parts of the sensor bundle to know about



PVC spacer





# Parts of overall station to know about





# Parts of overall station to know about



**Metal conduit  
to protect  
sensor wires  
from rodent  
chewing and  
other damage**

# The basic station management process

- Personnel roles
  - Station Owner/Manager – ensuring station is managed properly
  - Desktop monitoring of station functionality via Monitor My Watershed (Daily)
  - Sensor cleaning and station maintenance (Weekly or per situational needs)
  - Quality Control and troubleshooting (Quarterly and per situational needs)



# The basic station management process



## Quick Guide: Recommended Roles/Responsibilities for Managing an EnviroDIY Monitoring Station

Contact Stroud Center support team with issues/questions ([dbressler@stroudcenter.org](mailto:dbressler@stroudcenter.org);

[shicks@stroudcenter.org](mailto:shicks@stroudcenter.org); [rjohnson@stroudcenter.org](mailto:rjohnson@stroudcenter.org))

Access resources referenced below via <https://wikiwatershed.org/drwi/>

### Station Owner/Manager – ensuring station is managed properly

- Assign individuals to the following roles: 1) desktop monitoring of station functionality via Monitor My Watershed, 2) sensor cleaning and station maintenance, and 3) quality control (QC)
- Track above tasks and make sure that they are being accomplished
- Ensure Hologram cell plan is paid to ensure data transmission to Monitor My Watershed

### Desktop monitoring of station functionality via Monitor My Watershed (Daily)

- Check site(s) of interest on a daily basis via Monitor My Watershed:
  - On "Browse Sites" map: Is the station live (i.e., dark green)?
  - Are the quick view data panels showing expected data ranges?
  - Are there any abnormal numbers/patterns in quick view data panels or in Time Series Analyst graphs?
- Contact station owner/manager, maintenance, and/or QC people with any issues identified (e.g., sensor fouling, low battery)

### Sensor cleaning and station maintenance (Weekly)

- Review station data on Monitor My Watershed before and after station maintenance
- Visit station at least once a month (weekly is recommended)
- Clean sensor(s)
- Clear sediment and debris from under and near sensor(s)
- Clear vegetation and debris from around the logger and solar panel
- Complete Field Visit Data sheet and enter into online form
- Reference EnviroDIY Maintenance Quick Guide as needed

### Conduct Quality Control (Quarterly and per situational needs)

- Review station data on Monitor My Watershed before and after conducting QC
- Use calibrated hand-held meter to cross check station conductivity and temperature data
  - Make sure QC measurement and sensor station reading match up – if they don't (difference greater than 10%), proceed with troubleshooting or contact Stroud Center
- If turbidity is a high priority, conduct cross check using a turbidity tube or turbidity meter when conditions are suitable (i.e., when water is cloudy/muddy enough to assess turbidity data)
- Use metric ruler and on-site QC rebar pin (or staff gauge) to cross check station depth data
- Swap microSD card with blank SD card and save data file to secure location
- Complete Field Visit Data sheet and enter into online form
- Reference EnviroDIY Quality Control Quick Guide as needed

<https://wikiwatershed.org/drwi/>



# Common station Owner/Manager duties

- Assign individuals to the following roles:
  - 1) desktop monitoring of station functionality via Monitor My Watershed,
  - 2) sensor cleaning and station maintenance, and
  - 3) quality control (QC) and troubleshooting
- Track above tasks and make sure that they are being accomplished
- Ensure Hologram cell plan is paid to ensure data transmission to Monitor My Watershed

# Common station Owner/Manager duties

## Station owner/manager set Monitor My Watershed for data transmission alerts

- Station owner log in to Monitor My Watershed
- Go to site page and click EDIT button
- Scroll down and click “Notify...” and choose # of hours

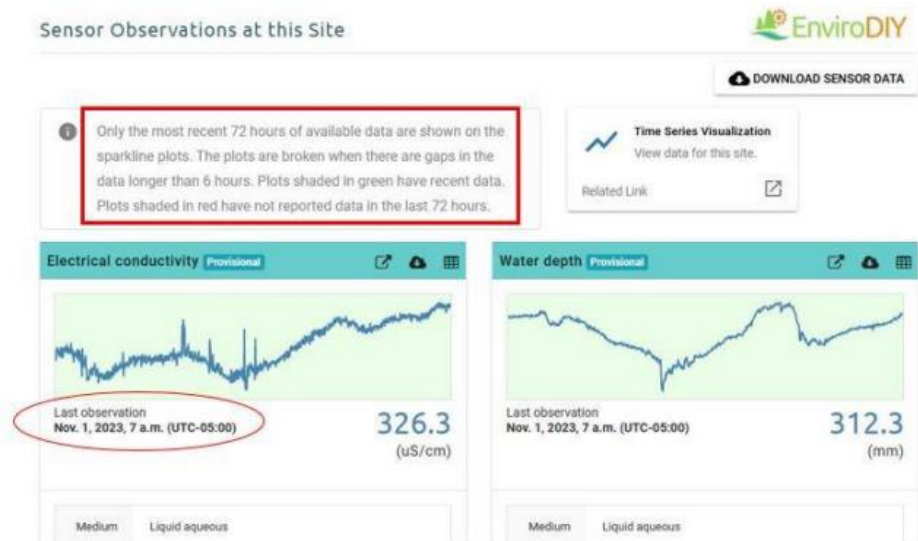
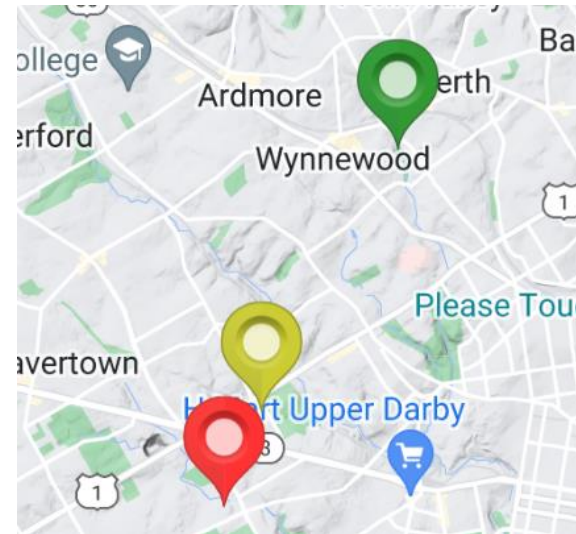
The screenshot shows the 'Schuylkill River at The Schuylkill Center for Environmental Education (PUSR4S)' site page. At the top right, there are three buttons: 'VIEW TOKEN UUID LIST', 'EDIT' (circled in red), and 'DELETE'. Below these, there is a map showing the site location. On the left, there is a table with site details:

Deployment By	David Bressler
Organization	Stroud Water Research Center
Registration Date	July 27, 2020, 5:26 a.m.

A large blue arrow points from the 'EDIT' button to the notification settings below. The notification settings include a checked checkbox (circled in red) labeled 'Notify me if site stops receiving sensor data.' and a text input field (circled in red) with the value '2' labeled 'Notify after' and 'hours of site inactivity.' At the bottom, there are two buttons: 'CANCEL' and 'SAVE EDITS'.

# Desktop monitoring of station functionality

- Check site(s) of interest on a daily basis via Monitor My Watershed:
  - **Station live?**
    - On “Browse Sites” map: Is the station live (i.e., dark green)?
  - **Data look good?**
    - Are the quick view data panels showing expected data ranges?
    - Are there any abnormal numbers/patterns in quick view data panels or in Time Series Analyst graphs?
- **Communicate**
  - Contact station maintenance team with any issues identified (e.g., sensor fouling, low battery)





# Desktop monitoring of station functionality



## Quick Guide: Monitoring EnviroDIY online data using Monitor My Watershed

The following is a brief tutorial by ~~Master Watershed Steward, Charlie Coalter~~, who currently (2023) monitors data feeds for ~30 EnviroDIY monitoring stations across the Delaware River Basin. Most EnviroDIY stations are online and transmit data in near real-time to the Monitor My Watershed data portal. As such, station function can be easily monitored from a computer (or even smartphone). Daily (or semi-daily) monitoring of the data is highly recommended so that if/when station issues arise they can be identified and addressed in a timely manner.

### Charlie's process:

- Open the main MonitorMW page for a station.

#### 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 Visualization  
View data for this site.

Related Link



- The first thing I look for is to see if the station is online.
  - Check observation time (circled in red above). The observation time should be within 5 minutes of local time. This is the one parameter most overlooked. Time is always in Eastern Standard Time (EST), it does not adjust for Eastern Daylight Time (EDT). Data is uploaded every 5 minutes and should agree with local time. If current time is greater than five minutes different from the time shown online then data transmission may be an issue. Note, some stations may transmit less frequently (e.g., 15 minute intervals) – in



<https://wikiwatershed.org/drwi/>

# Desktop monitoring of station functionality

## Regular email updates to station maintenance teams

Brodhead WA Station Status External Inbox x



**Charlie Coulter**

Jan 16, 2024, 8:20 AM (1 day ago)

to Edie, Todd, Michael, Paul, Doug, James, candace, Richard, Krista, Genni, doug, Deborah, Stuart, me, Shannon ▼

Hi All,

I am not sure if you got the email from Dave Bressler about the possibility of CTD sensors freezing. With this stretch of frigid temperatures there is that possibility however all of your sensors are in fair weather so there isn't much of a chance any of them will freeze around the tip of the sensor.

Presently Butz Run is dropping offline overnight due to a low battery. Pocono at Tannersville has an inop CTD sensor for an unknown reason. Conductivity on the CTD sensor at Swiftwater is very erratic. Failing sensor.

The rest of your stations look to be in pretty good shape.

Here are their current status:

**BWA1** Forest Hill Run ----- **Normal**  
**BWA3** Lower Mill Creek ----- **Normal**  
**BWA4** Butz Run ----- **Offline/Battery low**  
**BWA5** Yankee Run ----- **Normal**  
**BWA6** Pocono Creek on Rail Gap ----- **Normal**  
**BWA7** McMichaels Creek on Pomeroy ----- **Normal**  
**Swift314** Swiftwater Creek at 314 ----- **CTD Sensor readings erratic**  
    - All other parameters ----- **Normal**  
**BWA8** Pocono Creek at Tannersville ----- **CTD Sensor -9999**  
    - All other parameters ----- **Normal**  
**BWA9** Upper McMichaels Creek ----- **Normal**  
**BWA10** Marshalls Creek Falls ----- **Normal**  
**PKPK3S** Paradise Creek at Pour Pt ----- **Normal / Battery getting Low**  
**PKBH7S** Brodhead Creek at Pour Pt ----- **Normal**

# Sensor cleaning and station maintenance (Weekly or per situational needs)

- Review station data on Monitor My Watershed before and after station maintenance
- Visit station at least once a month (weekly is recommended until station dynamics are understood)
- Clean sensor(s)
- Clear sediment and debris from under and near sensor(s)
- Clear vegetation and debris from around the logger and solar panel
- Complete Field Visit Data sheet and enter into online form (located at <https://wikiwatershed.org/drwi/>)
- Reference EnviroDIY Maintenance Quick Guide as needed (located at <https://wikiwatershed.org/drwi/>)



# Cleaning the CTD sensor



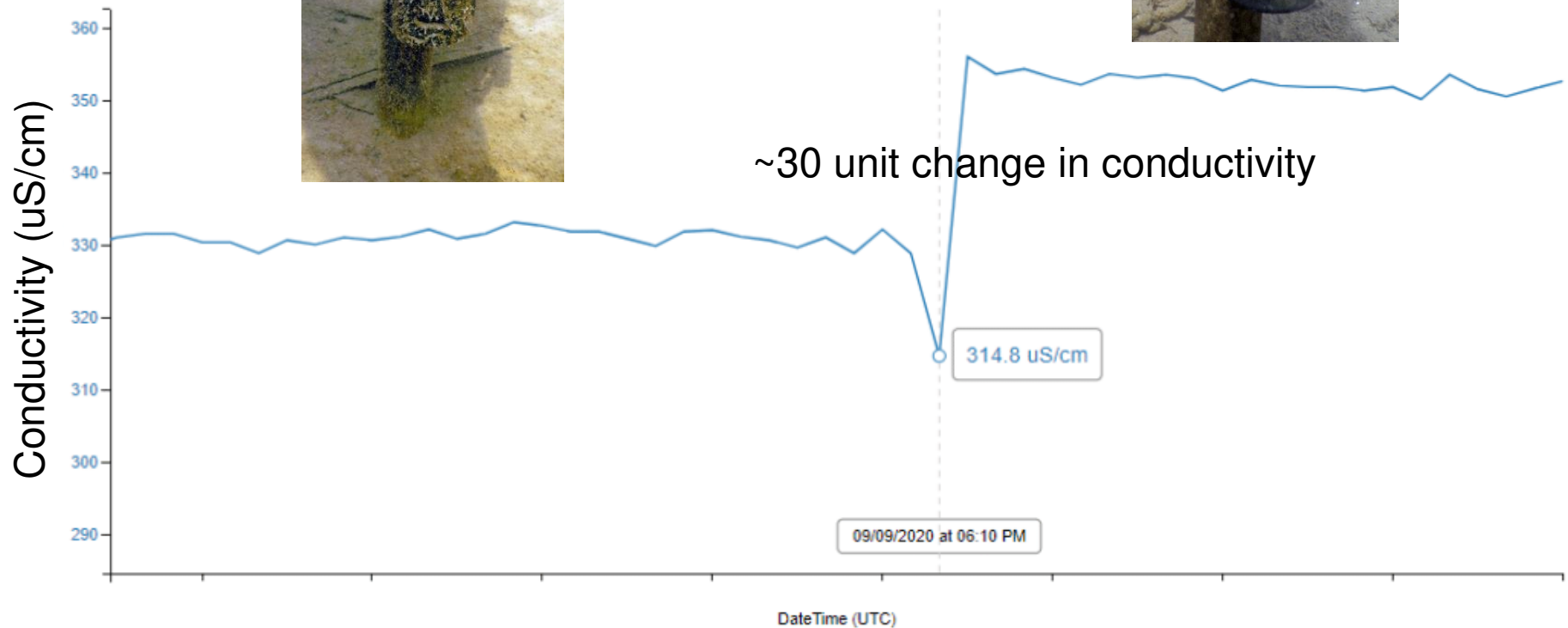
# Cleaning the CTD sensor



Use the soft white bristles or Q-tip to *gently* clean the four screw heads



# Cleaning the CTD sensor

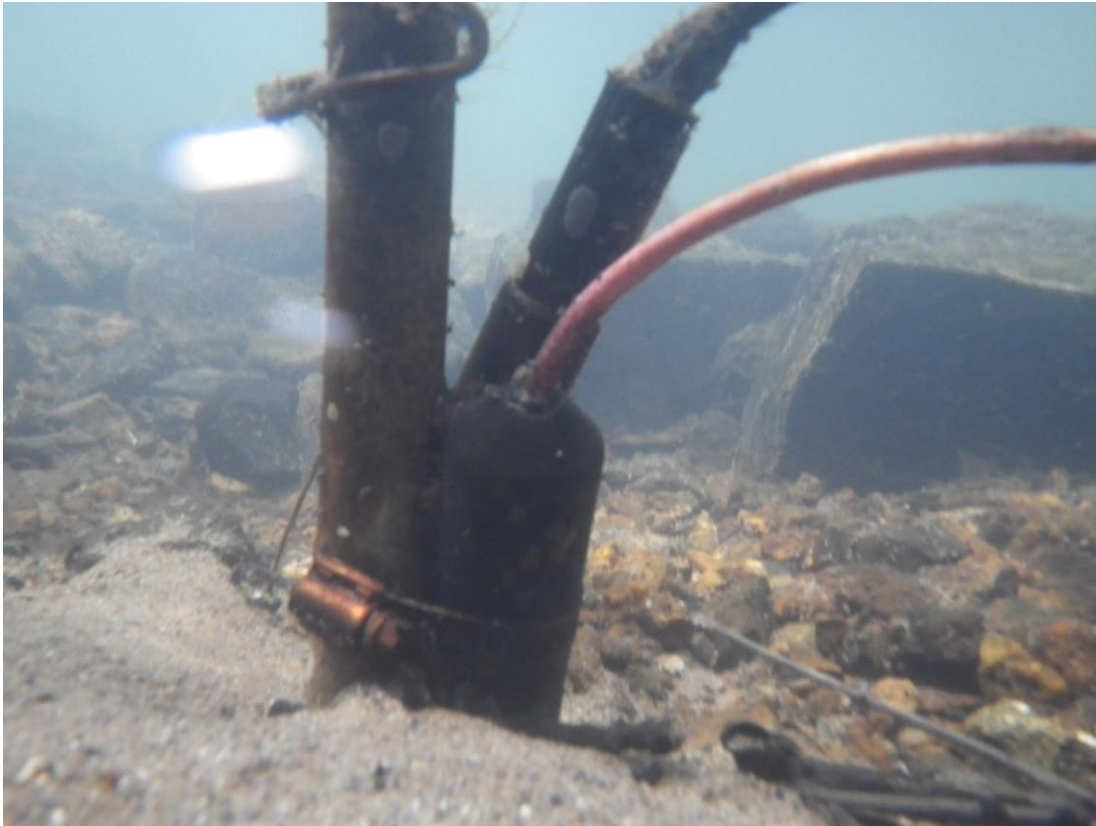




# Digging out buried sensor

Sediment deposits can be removed – not usually necessary to move sensor

- Dig out with hands or shovel (be careful to not damage sensor)



# Cleaning the CTD sensor



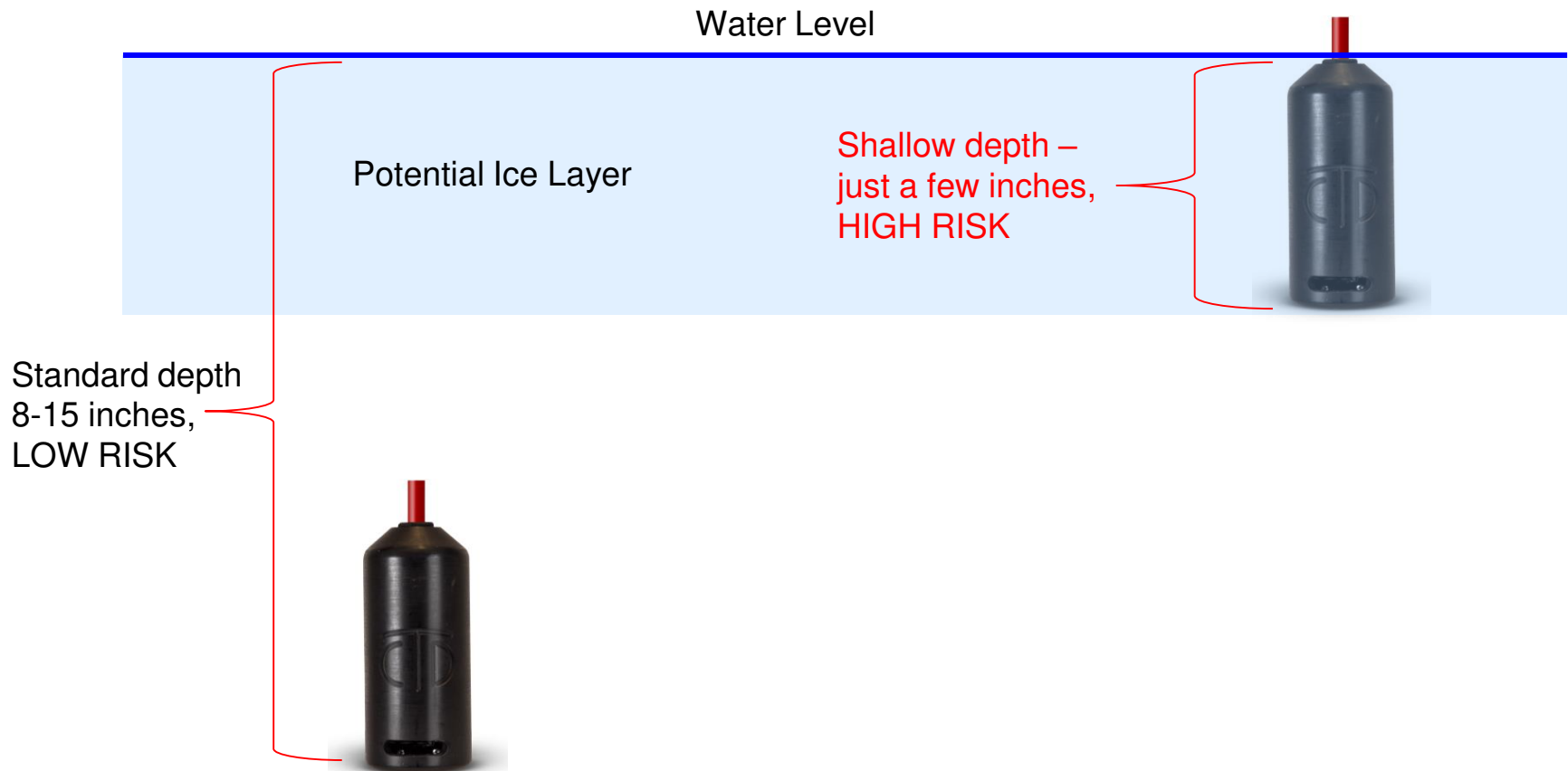
Check sensor readings BEFORE and AFTER cleaning

- If **cleaning doesn't change the readings** much (e.g., <10%) then consider cleaning **less frequently**
- If **cleaning changes readings substantially** consider **cleaning more frequently**

# Adjusting for freeze risk

No need to break ice if sensor is below where ice will form

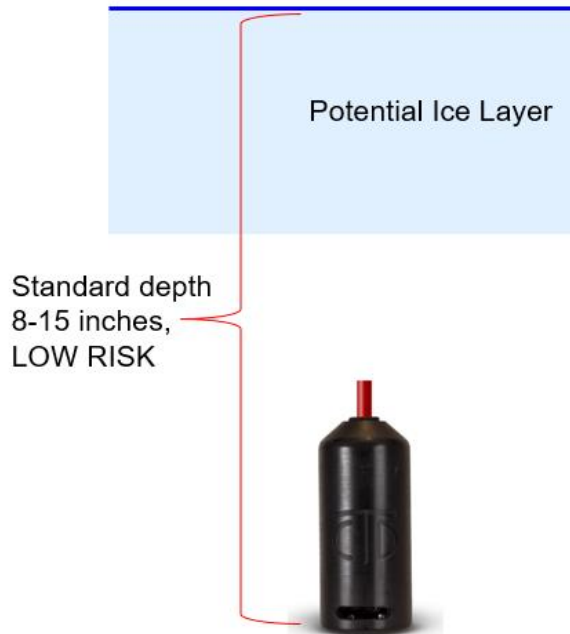
- Risk of damage only if ice forms ON the CTD sensor body





# Adjusting for freeze risk

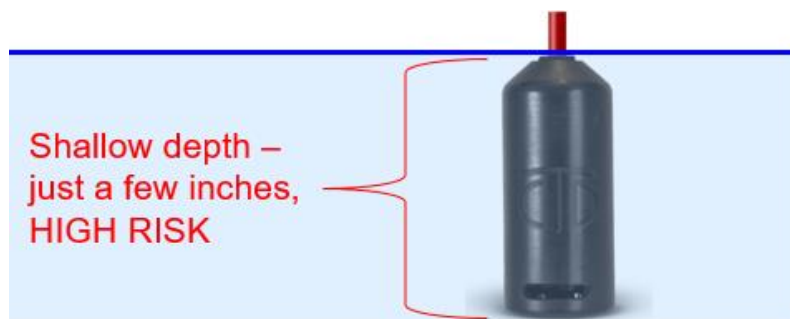
- No need to break ice or remove sensor if it's below where ice will form
  - Only risk of damage if ice forms on the CTD sensor itself



# Adjusting for freeze risk

Break ice around sensor

- Only if ice is easy to break
- Breaking thicker ice can damage sensor
- If CTD is already encased in thick ice all you can do is wait



# Adjusting for freeze risk

Remove CTD sensor from stream

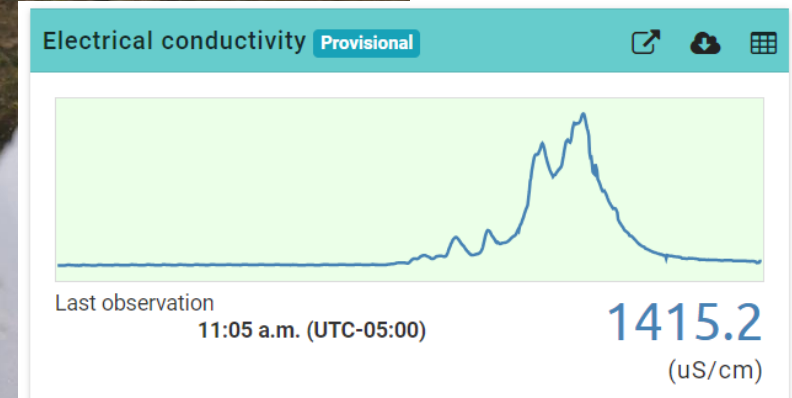
- Turn station off
- Remove entire sensor bundle (remove retaining clip, etc.)
- Dry sensor thoroughly
- Wrap in towel and plastic and secure it
- Hang it on station or nearby tree





# Quality Control (quarterly or per situational needs)

Cross check Conductivity and Water Temperature using calibrated hand held meter



\*Recommended  
<10% difference  
between readings

# Quality Control

Cross check Water Depth using a metric ruler



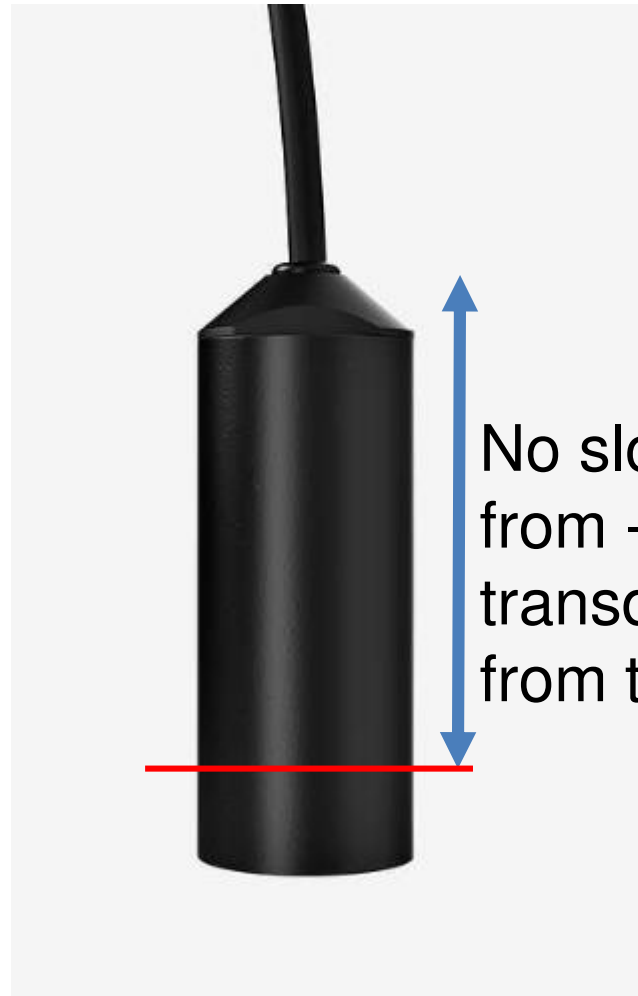
Older Version CTD

Measure from  
pressure  
transducer to  
water surface

# Quality Control

Cross check water depth using a metric ruler

Newer Version CTD



No slot to measure  
from - pressure  
transducer **8cm**  
from top of sensor



# Quality Control

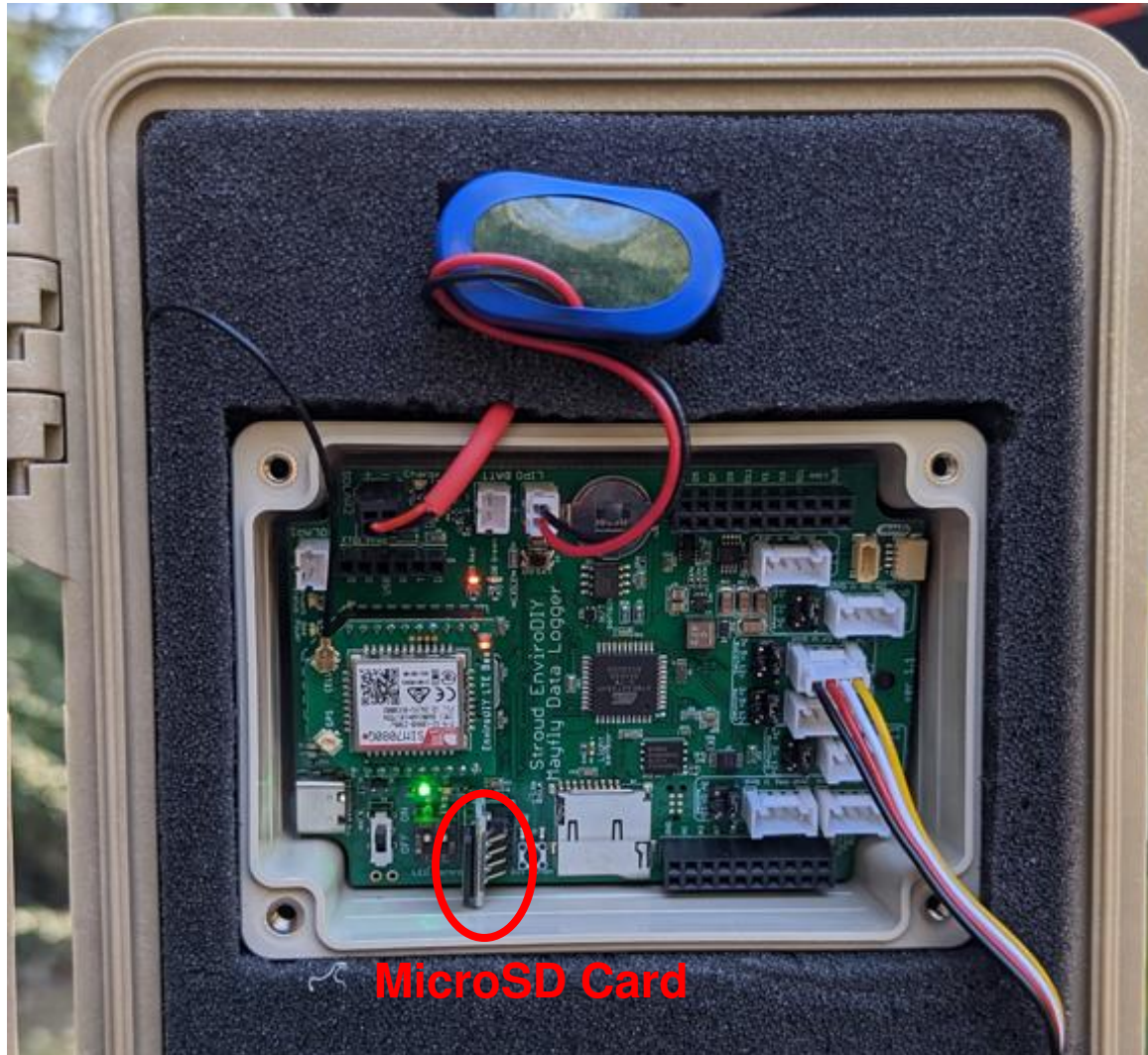
## Special cases

- Install a second temporary continuous station to cross check suspicious patterns
- Stroud Center assistance



# Quality Control

Download data files from microSD card



MicroSD card  
(memory card for  
storing logger data)



Download files then  
delete from card –  
swap in blank card  
every time you  
download

# Quality Control

Download data files from microSD card

Store files on a secure server  
or hard drive



	A	B	C	D	E	F	G	H	I
1	Data Logger: SL082	RamseyRun							
2	Data Logger File: SL082_RamseyRun_2023-10-30.csv								
3	Sampling Feature UUID: 85d2450f-a802-4c4f-8664-be32277d3c08								
4	Sensor Name:	MeterHyd	MeterHyd	MeterHyd	SensirionS	EnviroDIY	CalculateC	SensirionSHT4x	
5	Variable Name:	specificCo	temperatu	waterDep	temperatu	batteryVo	signalPer	relativeHumidity	
6	Result Unit:	microsie	degreeCe	millimete	degreeCe	volt	percent	percent	
7	Result UUID:	de4a6bf7-	ff3ec931-	e48623f5-	a9fb6aa5-	9ad8e5fe-	7bd50ed4-	a77568d8-e0da-48ea-	
8	Date and Time in U	Hydros21c	Hydros21t	Hydros21c	SHT4xTem	Battery	signalPer	SHT4xHumidity	
9	10/30/2023 11:45	251.3	16	210.7	22.27	4.124	52	75.31	
10	10/30/2023 11:50	251.1	16	210.2	22.35	4.245	52	81.58	
11	10/30/2023 11:55	250.8	16.03	210.2	22.51	4.245	58	84.26	
12	10/30/2023 12:00	250.6	16.1	211.2	22.66	4.245	58	85.1	
13	10/30/2023 12:05	250.6	16.1	210.7	22.8	4.245	52	85.46	
14	10/30/2023 12:10	250.5	16.1	212	22.99	4.245	55	85.97	
15	10/30/2023 12:15	250.5	16.1	211.3	23.17	4.245	58	87.18	
16	10/30/2023 12:20	250.2	16.2	210.8	23.52	4.245	55	90.22	
17	10/30/2023 12:25	250.2	16.2	211.2	24.21	4.245	58	89.33	
18	10/30/2023 12:30	250	16.2	211.2	24.25	4.245	55	89.43	
19	10/30/2023 12:35	250.7	16.3	211	24.24	4.245	55	88.39	
20	10/30/2023 12:40	250.1	16.3	210.2	24.86	4.245	58	85.89	
21	10/30/2023 12:45	249.7	16.3	210.8	24.49	4.23	58	86.39	
22	10/30/2023 12:50	250.4	16.4	210.7	24.27	4.245	55	86.03	

*\*Note SD card files can be  
uploaded to Monitor My  
Watershed to fill data gaps*



# Troubleshooting

→   [wikiwatershed.org/drwi/](https://wikiwatershed.org/drwi/) <https://wikiwatershed.org/drwi/>

## EnviroDIY Monitoring Station Help Resources

### Manual and Appendices

The Stroud Center created a manual to help you build, program, and install an EnviroDIY manage your station. Please leave feedback on the individual articles so that we can cc

- [EnviroDIY Monitoring Station Manual and Appendices](#)

### Quick Guides

- [EnviroDIY Monitoring Station Management Roles and Responsibilities Quick Guide](#)
- [EnviroDIY Monitoring Station Maintenance Quick Guide](#)
- [EnviroDIY Monitoring Station Quality Control Quick Guide](#)
- [EnviroDIY Monitoring Station Data Patterns Quick Guide](#)
- [EnviroDIY Monitoring Station Troubleshooting Quick Guide](#)
- [EnviroDIY Monitoring Station Time Zone Guide](#)
- [Monitoring EnviroDIY Online Data Using Monitor My Watershed](#)
- [Understanding Your EnviroDIY Monitoring Station Data](#)

# Troubleshooting



## Appendix 4 from the manual

### EnviroDIY Sensor Station Troubleshooting Quick Guide



## 4. Troubleshooting

Last updated on 2023-06-27

[Print this page](#)

To access a printable PDF version of the EnviroDIY Troubleshooting Quick Guide please click the following link: [EnviroDIY Monitoring Station Troubleshooting Quick Guide](#). The troubleshooting quick guide is designed to be printed to provide troubleshooting tips while in the field. Further explanations can be found in the text below.

### 4.1 Battery Dies

When logger battery level goes below ~3.4 V the data logger will cease to operate, so the logger is programmed to stop transmitting data to the website at 3.55v, however data will still be saved to the microSD card until it gets below 3.4v.

1. Check solar panel and red wire outside the logger box.
2. Ensure no corrosion or excess moisture is seen on the Mayfly logger board.
3. Check that no insect or rodents have chewed wires or occupied the inside of the enclosure.
4. Check solar panel orientation, look at the live data, has it been charging or slowly dying-canopy cover can change and adjustments may need to be made.
5. If several lights are constantly lit on the Mayfly, or you see no lights during the sampling period (usually set to every 5 minutes), then the logger program may have "frozen" and caused an excess drain on the battery.
6. For given light conditions you may need to upgrade to a larger battery or solar panel or both.
7. Occasionally a battery pack will fail after about 2 or 3 years, usually because it was exposed to excess moisture that

#### JUMP TO A SECTION

##### 4.1 Battery Dies

##### 4.2 Data From the Real-Time Feed Stops

##### 4.3 Invalid Sensor Readings

##### 4.4 Brown Varnish on Turbidity Sensor

##### 4.5 Erratic Depth Measurements

##### 4.6 Highly Variable Measurements

##### 4.7 Spiky Conductivity Measurements

##### 4.8 Rapid Change in Depth

#### CAN'T FIND THE ANSWER?

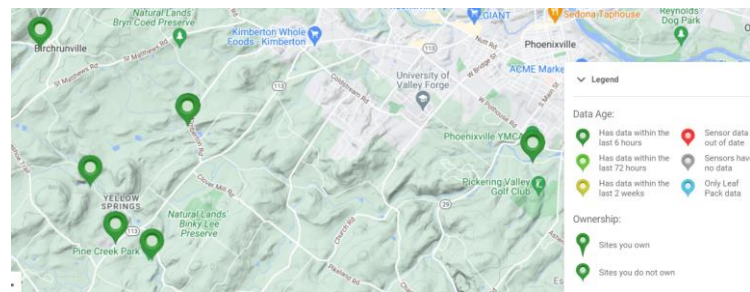
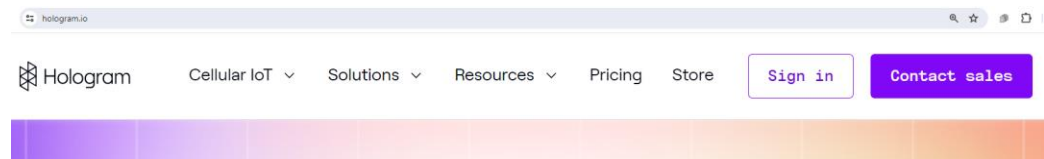
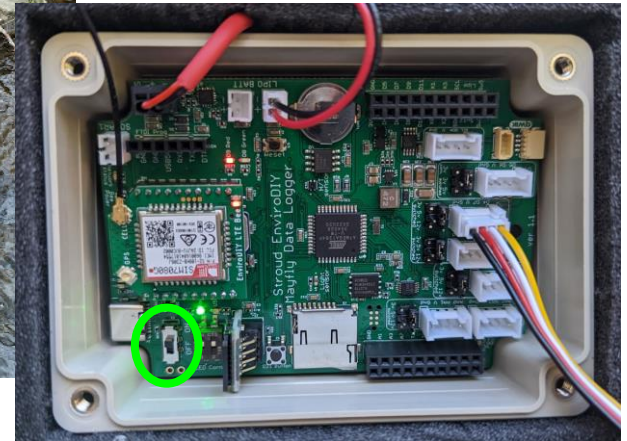
If you've searched the knowledge base and still need help, please post on the forum

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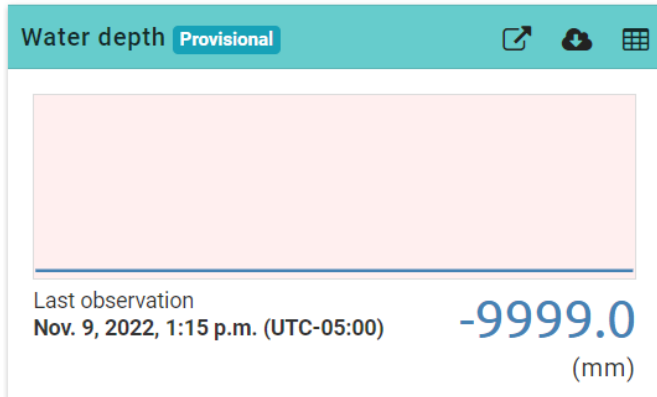
# Troubleshooting – station isn't transmitting

- Make sure station is intact
- Cycle the power – turn the Mayfly off, pause 30sec, turn it on
- Make sure cell plan is paid
- Check if other stations are not transmitting – i.e., is it a Monitor MW issue?

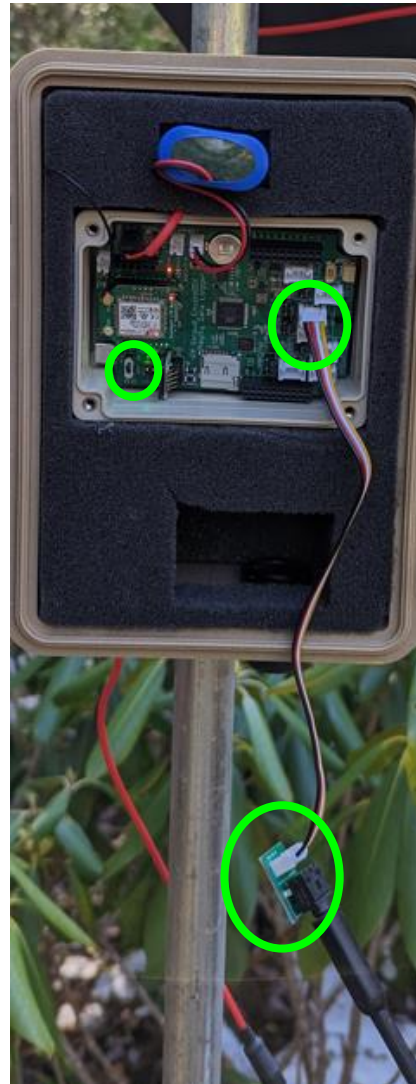




# Troubleshooting – -9999 on MonitorMW



- Cycle the power
- Make sure stereo-jack isn't loose
- Make sure Grove cable is connected
- Make sure sensor/wire isn't damaged (knicks, severed, rodent chewing)



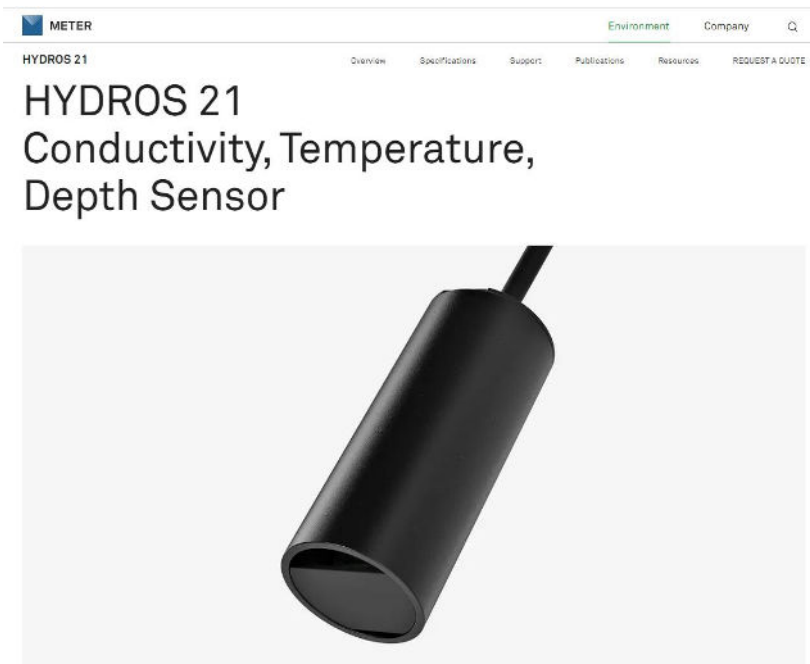
# Troubleshooting – sensor measurements are wrong

- Make sure CTD sensor isn't buried
- Make sure screw heads are clean
- Make sure nothing wedged in CTD slot
  - Possibly remove from stream to check
- Make sure your hand held meter is calibrated and working correctly



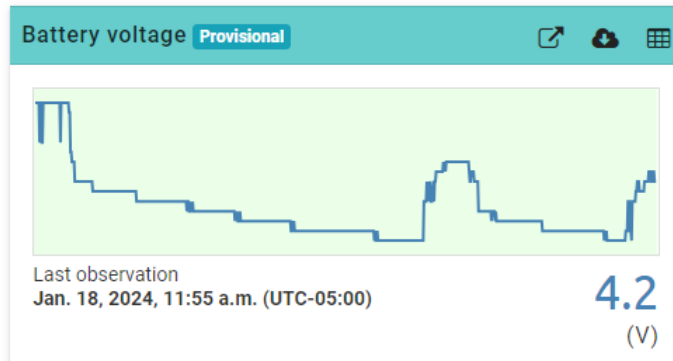
# Troubleshooting

- If CTD is broken/malfunctioning reach out to the Stroud Center
- CTDs under warranty for at least a year – send back to Meter Group for replacement





# Troubleshooting – power issues

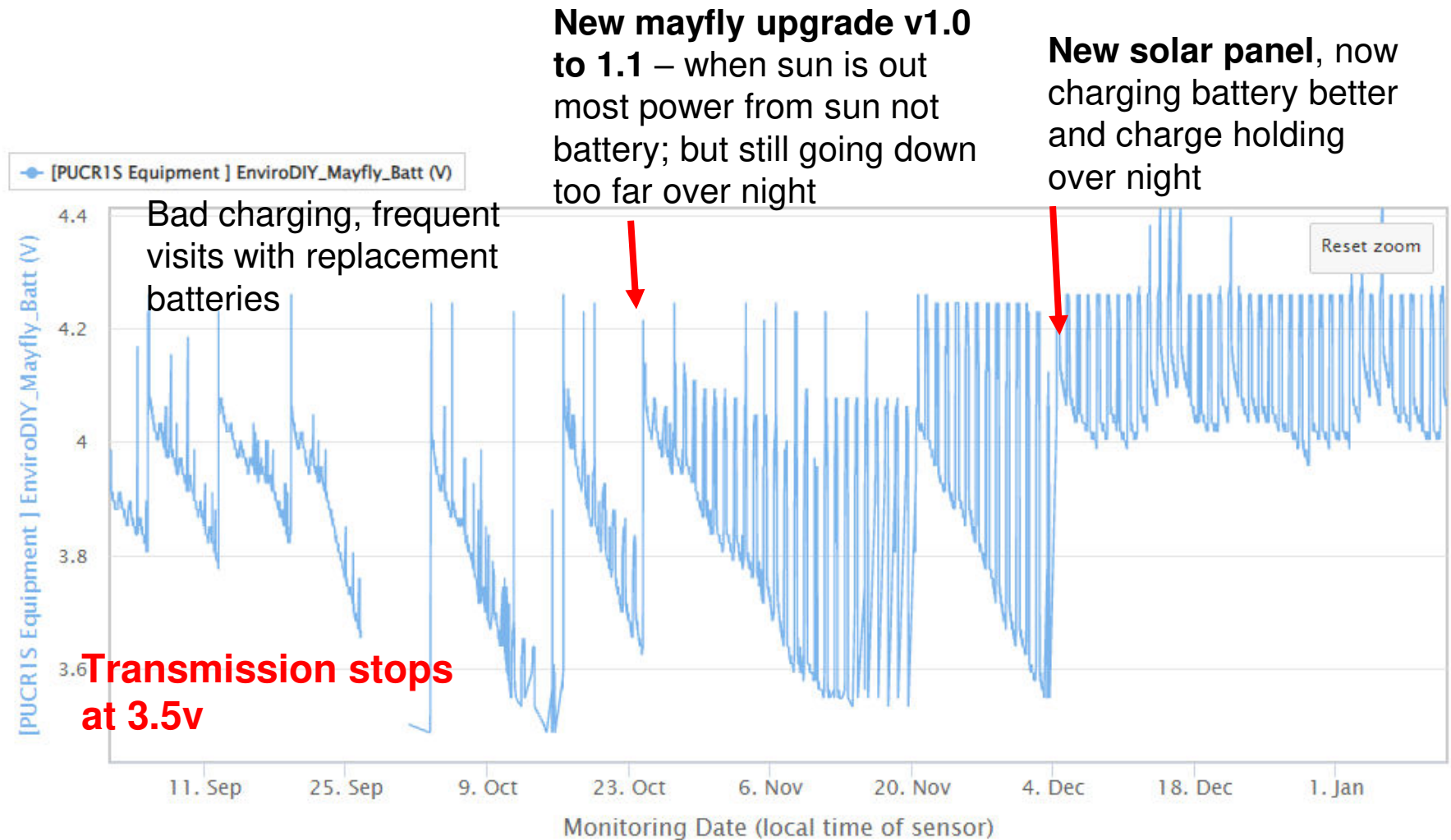


***Transmission stops at 3.5v,  
prepare to swap at ~3.6-3.7v***

- Swapping batteries may be necessary at times:
  - Fall – when leaves are still on trees but lower light
  - Thick/evergreen canopy
  - Solar panel too small or malfunctioning
  - Bad battery – corrosion, etc.



# Troubleshooting – power issues



# Troubleshooting – power issues

Backup battery



Charger



A to C cable



Wall adaptor



<https://wikiwatershed.org/drwi/>



# Troubleshooting – power issues

<https://wikiwatershed.org/drwi/>

- [Understanding Your EnviroDIY Monitoring Station Data](#)

## Support Supplies

- [EnviroDIY Monitoring Station purchase options for maintenance and quality control](#)

## Troubleshooting



### Equipment/supply list for maintenance, quality control, and troubleshooting of standard Stroud Center EnviroDIY Monitoring Station (*pricing and availability subject to change*)

#### SD cards and adaptors:

- Single micro SD card and SDHC adaptor, \$6.00: <https://www.amazon.com/SanDisk-Mobile-MicroSDHC-SDSDQM-B35A-Adapter/dp/B004ZIEMWU>; value pack (5 count), \$19.65: <https://www.amazon.com/PACK-SanDisk-MicroSD-SDSDQAB-008G-Packaging/dp/B00MHZ6ZJQ>
- USB adaptor (for computer that cannot accommodate SDHC adaptor), \$10.99: <https://www.amazon.com/Reader-Adapter-Micro-UHS-I-Cards/dn/B07L63Z54G>

#### Power:

- Lipo Charger, PRT-15217, \$9.95:
  - <https://www.sparkfun.com/products/15217>
  - <https://www.digikey.com/en/products/detail/sparkfun-electronics/PRT-15217/10244131>
  - <https://www.adafruit.com/product/1904>
- USB wall adapter 5V, TOL-11456, \$3.95:
  - <https://www.sparkfun.com/products/11456>
  - <https://www.digikey.com/en/products/detail/philhong-usa/PSAA05A-050QL6-R/6560437>
- Lithium Ion Battery Pack - 3.7V 4400mAh, \$19.95:
  - <https://www.amazon.com/Battery-Packs-Lithium-Pack-3-7V/dp/B0137IRGHG>
  - <https://www.digikey.com/en/products/detail/adafruit-industries-llc/354/5054541>
  - <https://www.adafruit.com/product/354>
- USB Type A to Type C Cable, \$4.95:
  - <https://www.adafruit.com/product/4474>
  - <https://www.digikey.com/en/products/detail/adam-tech/CA-USB-AM-CM-1FT/9830207>
  - <https://www.sparkfun.com/products/15425>


#### Cleaning/Maintenance:

- Brush (for Meter Hydros 21 CTD sensor and Campbell OBS3+ Turbidity sensor), \$4.18: <https://www.lowes.com/pd/Scotch-Brite-Poly-Fiber-Dish-Brush/50273199>
- Hose clamp driver, example \$3.98: <https://www.lowes.com/pd/Sheffield-5-Piece-7-5-in-Multi-Bit-Screwdriver/50146890>


# Troubleshooting – detailed supply list

EnviroDIY Manual (Knowledge Base), <https://www.envirodiy.org/knowledge-base/>

<https://www.envirodiy.org/envirodiy-monitoring-station-parts-list/>

About ▾Participate ▾Mayfly ▾BlogForums ▾VideosShop ▾HelpRegisterLog InQ

An Initiative of Stroud Water Research CenterSubscribeEnviroDIY on GitHub

Welcome to EnviroDIY, a community for do-it-yourself environmental science and monitoring. EnviroDIY is part of [WikiWatershed](#), a web toolkit designed to help citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students advance knowledge and stewardship of fresh water. **New to EnviroDIY?** [Start here](#)

## EnviroDIY Monitoring Station Parts List

This is the comprehensive parts list for building an EnviroDIY Monitoring station. Detailed instructions can be found in the EnviroDIY Monitoring Station Manual and Appendices available in the [knowledge base](#).

Items with (\*) in the Product Name are included in the [EnviroDIY Monitoring Kit](#).

This embedded list is dynamic and reflects periodic updates made by the EnviroDIY team. You may [download a copy](#) from Google Drive but be sure to check back here for updates.

Please email [webmaster@stroudcenter.org](mailto:webmaster@stroudcenter.org) with questions.

EnviroDIY Parts List (PUBLIC) : Dynamic List

Grove 4Pin Cables 20cm (5PACK) *	Section 6.3	Seeed Technology Co., Ltd	Digi-Key	<a href="#">Link</a>	\$3.20	1	\$3.20	Grove series Cable Assembly
Term Block Plug 2POS STR 2.5mm( connector for solar panel cable) *	Section 6.2	Phoenix Contact	Digi-Key	<a href="#">Link</a>	\$0.96	1	\$0.96	2 Position Terminal Block Plug, Female Sockets 0.098" (2.50mm) - 180° Free Hanging (In-Line)
Grove to sensor adapter boards for CTD (Grove to 3.5mm stereo jack) 5 pack *	Section 6.2	EnviroDIY	EnviroDIY	<a href="#">Link</a>	\$35.00	1	\$35.00	to connect CTD sensor to board via grove socket to headphone jack connector
Power cable for solar panel *	Section 6.2	Voltaic Systems	Voltaic Systems	<a href="#">Link</a>	\$4.00	1	\$4.00	Extension with Exposed Leads ; Only needed for Mayfly logger 0.5b
Universal Solar Panel Bracket, for 2-9W panels *	Section 6.4	Voltaic Systems	Voltaic Systems	<a href="#">Link</a>	\$9.00	1	\$9.00	Connect a Voltaic solar panel to a breadboard or other custom connector. Female 3.5x1.1mm connection on one end, tinned positive and negative cables on the other. Cable is 21 inches (53 cm).

# Troubleshooting

<https://wikiwatershed.org/drwi/>

- For Stroud Center assistance complete a **Service Request Form**



## EnviroDIY Monitoring Station Service Request Form

Please complete this form with as much information as possible to assist Stroud Water Research Center technicians in troubleshooting your problem.

\*Please note, station assistance is only available to groups working within the Delaware River Basin.

dbressler@stroudcenter.org [Switch account](#)



Not shared

\* Indicates required question

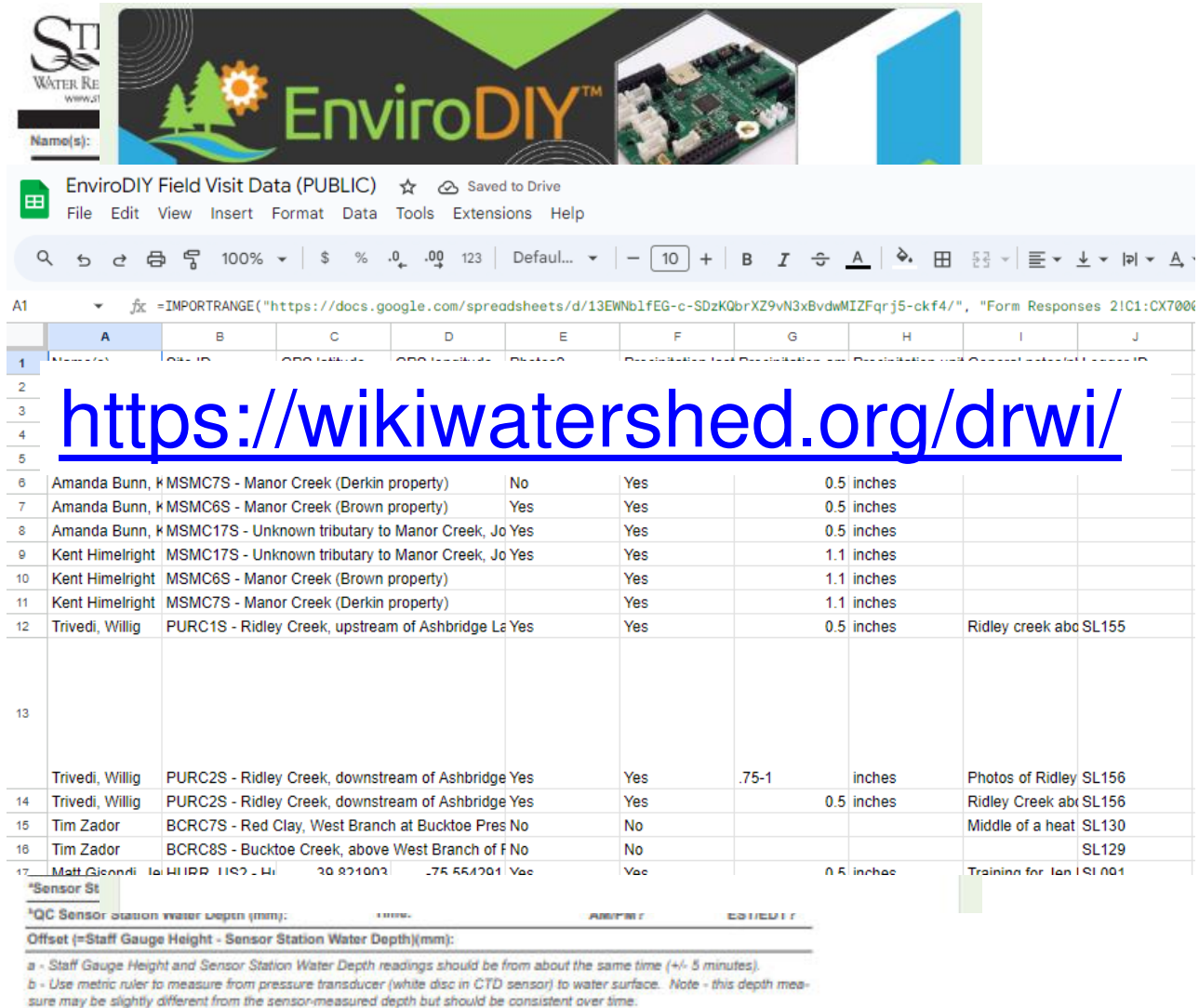
Name (first and last) \*

Your answer



# Complete a Field Visit Data form whenever you visit a site, and enter online

- Ensures your visits and activities are documented
- Important for quality control data – documentation of data accuracy/precision



**EnviroDIY Field Visit Data (PUBLIC)** ☆ Saved to Drive

File Edit View Insert Format Data Tools Extensions Help

100% | \$ % .00 .00 123 | Default... | - 10 + | B I U A |

A1 `=IMPORTRANGE("https://docs.google.com/spreadsheets/d/13EWNb1fEG-c-SDzKQbrXZ9vN3xBvdwMIZFqrj5-ckf4/", "Form Responses 21C1:CX7006")`

	A	B	C	D	E	F	G	H	I	J
1	Name(s)	Station ID	Station Name	Station Location	Station Type	Station Status	Station Depth	Station Date	Station Notes	
2										
3										
4										
5										
6	Amanda Bunn, K	MSMC7S - Manor Creek (Derkin property)		No	Yes		0.5 inches			
7	Amanda Bunn, K	MSMC6S - Manor Creek (Brown property)		Yes	Yes		0.5 inches			
8	Amanda Bunn, K	MSMC17S - Unknown tributary to Manor Creek, Jo	Yes		Yes		0.5 inches			
9	Kent Himelright	MSMC17S - Unknown tributary to Manor Creek, Jo	Yes		Yes		1.1 inches			
10	Kent Himelright	MSMC6S - Manor Creek (Brown property)			Yes		1.1 inches			
11	Kent Himelright	MSMC7S - Manor Creek (Derkin property)			Yes		1.1 inches			
12	Trivedi, Willig	PURC1S - Ridley Creek, upstream of Ashbridge La	Yes		Yes		0.5 inches		Ridley creek abo	SL155
13										
14	Trivedi, Willig	PURC2S - Ridley Creek, downstream of Ashbridge	Yes		Yes		.75-1 inches		Photos of Ridley	SL156
15	Trivedi, Willig	PURC2S - Ridley Creek, downstream of Ashbridge	Yes		Yes		0.5 inches		Ridley Creek abo	SL156
16	Tim Zador	BCRC7S - Red Clay, West Branch at Bucktoe Pres	No		No				Middle of a heat	SL130
17	Tim Zador	BCRC8S - Bucktoe Creek, above West Branch of F	No		No					SL129
18	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
19	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
20	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
21	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
22	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
23	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
24	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
25	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
26	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
27	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
28	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
29	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
30	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
31	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
32	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
33	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
34	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
35	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
36	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
37	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
38	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
39	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
40	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
41	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
42	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
43	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
44	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
45	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
46	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
47	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
48	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
49	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
50	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
51	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
52	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
53	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
54	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
55	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
56	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
57	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
58	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
59	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
60	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
61	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
62	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
63	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
64	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
65	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
66	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
67	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
68	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
69	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
70	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
71	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
72	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
73	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
74	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
75	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
76	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
77	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
78	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
79	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
80	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
81	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
82	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
83	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
84	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
85	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
86	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
87	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
88	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
89	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
90	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
91	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
92	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
93	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
94	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
95	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
96	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
97	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
98	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
99	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129
100	Matt Glendon	BCRC1S - Bucktoe Creek, above West Branch of F	No		No					SL129

**\*Sensor St**

**\*QC Sensor Station water Depth (mm):**

**Offset (=Staff Gauge Height - Sensor Station Water Depth)(mm):**

*a - Staff Gauge Height and Sensor Station Water Depth readings should be from about the same time (+/- 5 minutes).*

*b - Use metric ruler to measure from pressure transducer (white disc in CTD sensor) to water surface. Note - this depth measure may be slightly different from the sensor-measured depth but should be consistent over time.*

# Final Thoughts

- Keep sensors clean – know data patterns of when fouling/malfunction happens
- Monitor online status – know asap when offline so you can make adjustments
- Open the logger box from time to time (ants and moisture are a common problem) – take the time to check inside the box
- Cycle power as a low level solution always worth doing
- Be aware of solar hit problems and battery levels – pay attention and adjust if swapping batteries is happening regularly
- Be in touch with the Stroud Center, keep us in the loop on your questions/issues

# Final Thoughts

- GOOD DATA that supports better understanding of the stream
- Find people with interest and time to support the work – TEAMWORK



# Mentors currently available

- Carol Armstrong (MWS), [mnem.np@gmail.com](mailto:mnem.np@gmail.com), 610-659-7477
- Joe Debes (MWS), [j\\_debes@msn.com](mailto:j_debes@msn.com),
- Christa Reeves (Musconetcong Watershed Association/Stroud Center), [christa@musconetcong.org](mailto:christa@musconetcong.org), 727-520-5849



# Conclusion

Next month's meeting will be on:

**Thursday February 15, 2023**  
**2:30-3:30p**



# Onward!

## Stroud Water Research Center contacts:

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