

# Troubleshooting

- Accurate data is the goal
  - Troubleshooting/QC are crucial to that
- Understanding your stations functions is essential
  - Read the manual
  - Know it's History
  - Keep a Maintenance Log
- Regular Preventive Maintenance
- Quarterly QC checks



# Troubleshooting

- **Troubleshooting Workflow**
  - Problem found on MMW
  - Collect symptoms
  - Rule out possible causes
  - Create a theory
  - Make up a work plan
  - Gather equipment
  - Head out to the station
  - Assess the area
  - Prove/disprove theory





# Overview of the most common problems

1. Monitoring Station is offline
2. Loss of cell transmission
3. Fouling or sensor malfunction
4. -9999 - communication problem between Mayfly and sensor
5. Battery voltage levels



# General Process to follow for all issues

- Check Monitor My Watershed Daily
- Visit the station to further investigate and issues
- Turn power off until all lights go out (except the charge light) and then back on
- If you can easily fix it, do so
- If replacement parts or help needed fill out Troubleshooting request form
- Fill out Field visit data sheet online



# Field Kit

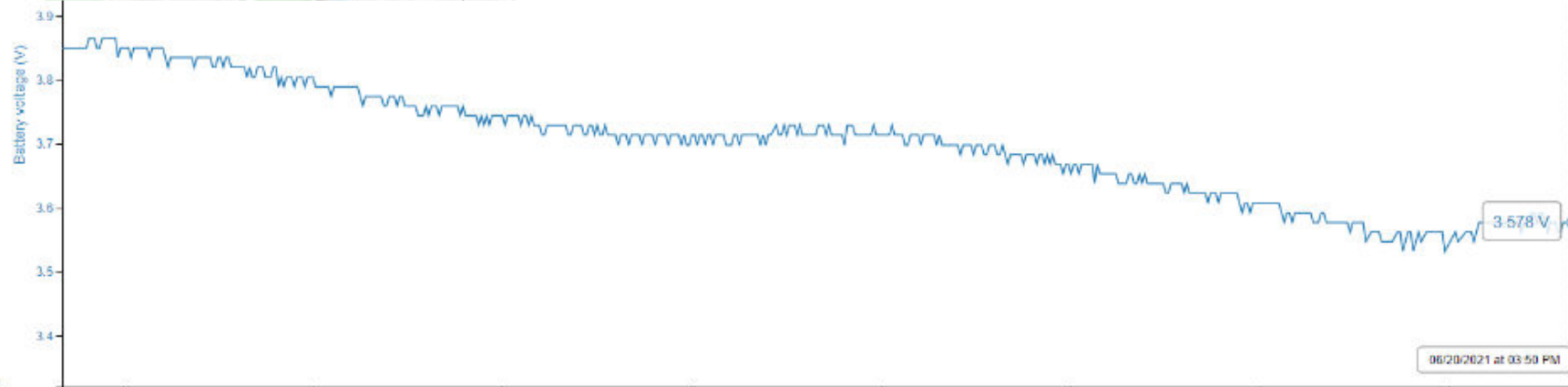
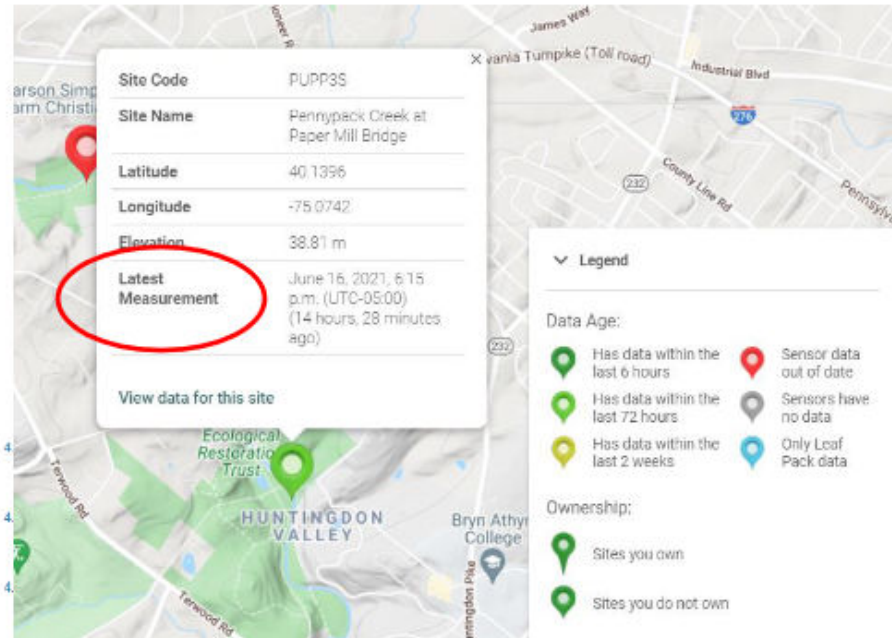


- Charged Battery
- Spare MicroSD card
- Cleaning Brush
- Metric Ruler
- Handheld Conductivity Meter
- Smart Phone
- Pencil and Note Pad
- Add to this as needed





# 1. Station is offline (Data are not live on MonitorMW)



## Possible issues:

- Power issues ( battery below 3.5 volts)
- Hologram data plan not paid or SIM card failure
- Bad cell board ( Digi LTEbee)
- MonitorMW issues
  - Website experiencing technical issues
- Dropped cell coverage

# Loss of Cellular Transmission

- Possible Issues:
  - Hologram account active
  - Battery >3.6v
  - Antennae wire not attached
  - Cell board not fully seated
  - Lights constantly on (cell board)
  - Check SD card for current data

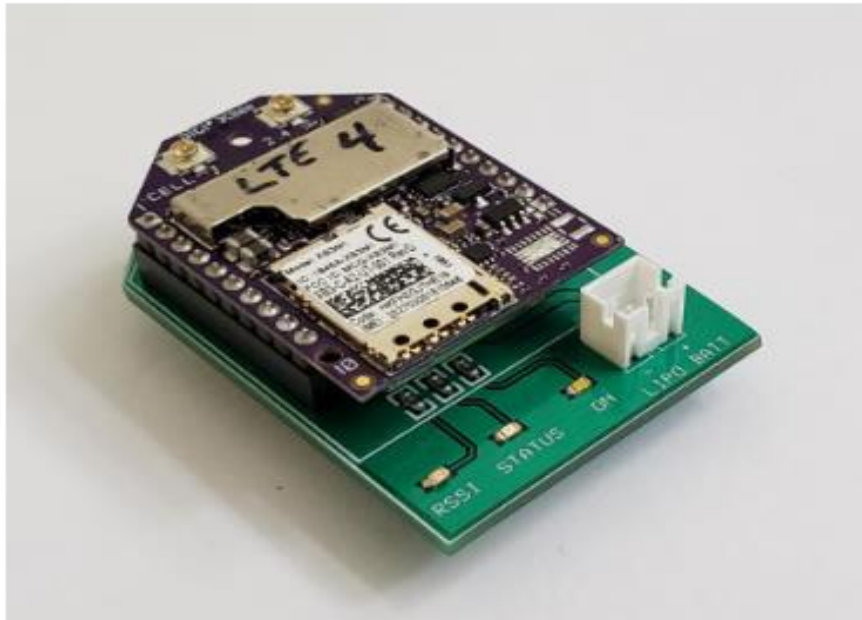




# Loss of cell transmission (not live on MonitorMW) cont.

Light patterns on cell board / LTE adapter as a diagnostic tool-

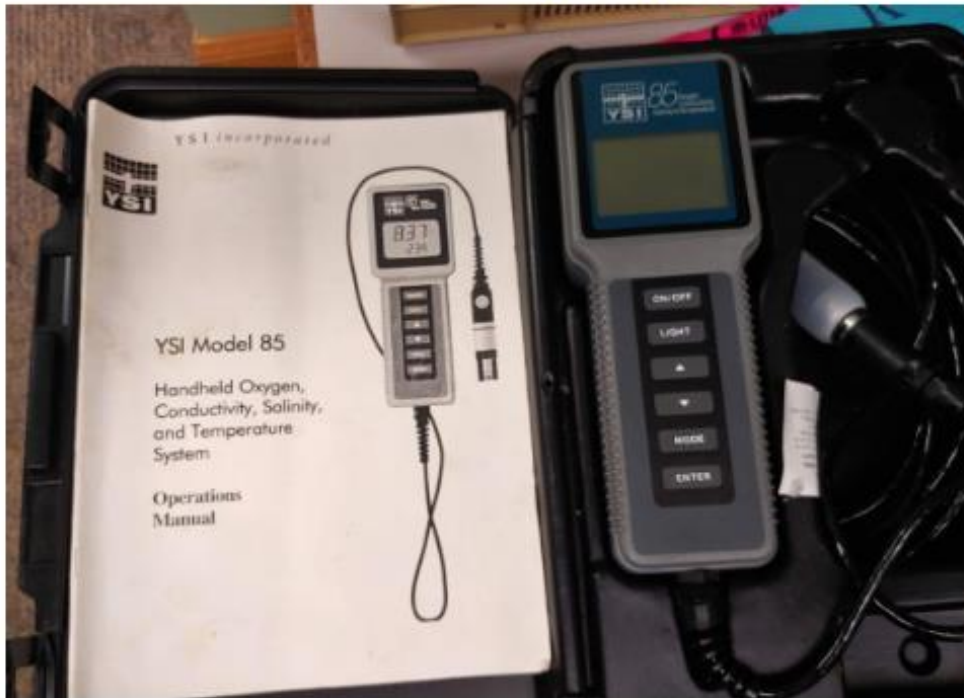
- Blue light is solid when it's looking for a connection and then blinks when it makes a connection and transmits
- If any light on the LTE adapter is on between 5 minute interval - this means that the cell board is hung up and needs to be reset or may be broken





# 3. Sensor fouling or malfunction

- Fouling or sensor malfunction
  - How to diagnose (patterns on MonitorMyWatershed)
  - Failing versus fouled sensor
  - How to check (i.e., quick cross checks)
  - Data outside normal range (e.g., high turb in baseflow conditions or flatline in storm conditions)



# Sensor Fouling

- Being buried
- Bio fouling (algae)
- Debris fouling (leaves/sticks)
- Chemical reaction fouling



Buried Sensor

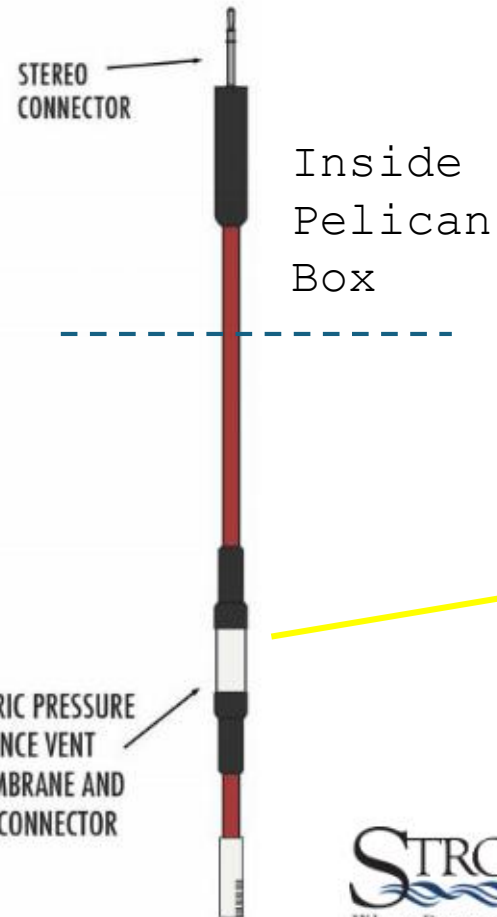
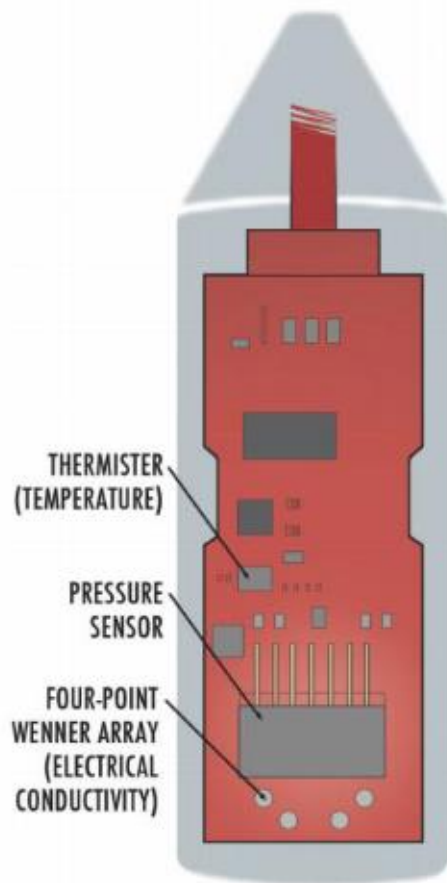


Bio Fouling





# Hydros 21 CTD Sensor



STROUD  
WATER RESEARCH CENTER





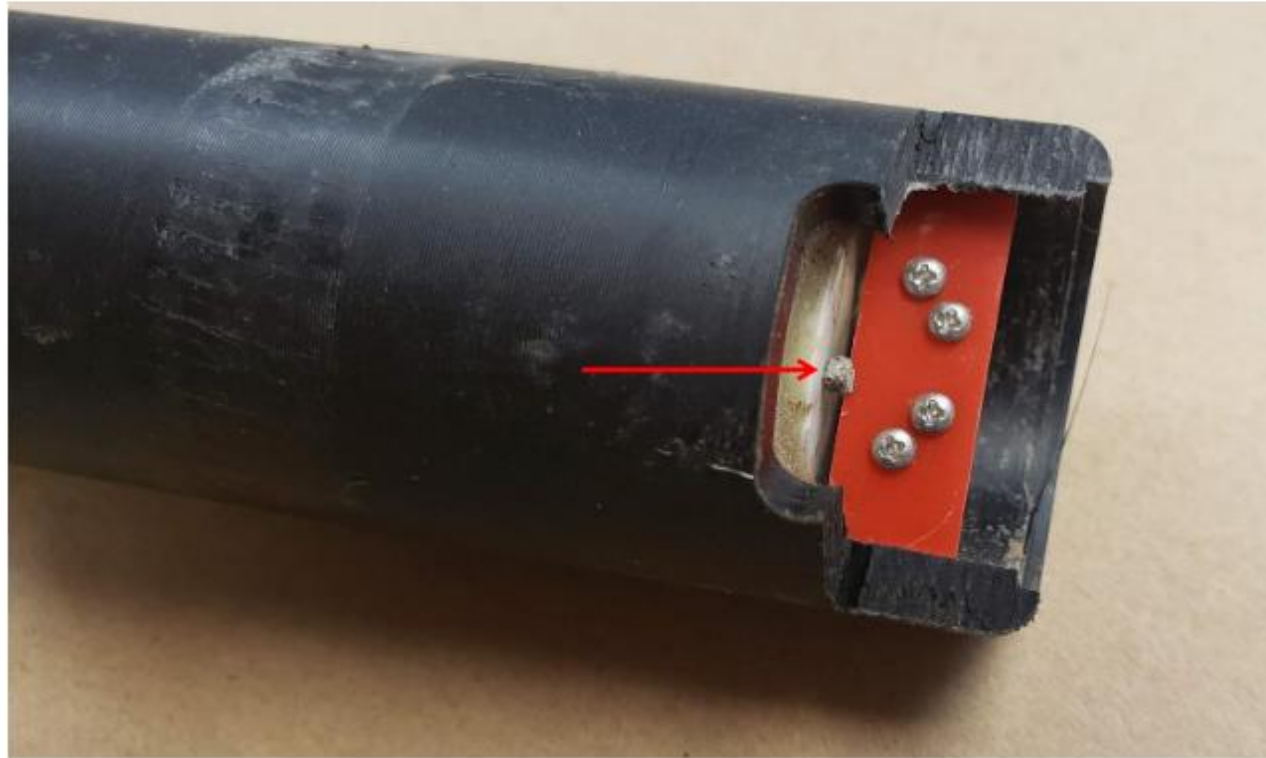
# Common Depth Issues

- Depth/Temperature Correlation
- Depth out of Range
- Dramatic changes followed by erratic behavior
- Fouled sensor



# Depth out of range

Dramatic increase in depth, usually after a storm, caused by sediment or other debris wedged against the pressure sensor



# Turbidity sensor malfunction



Cable cut



Cherry Creek on TNC Property (PKCV7S)

Low Sensor  
defaults to  
~50 NTU

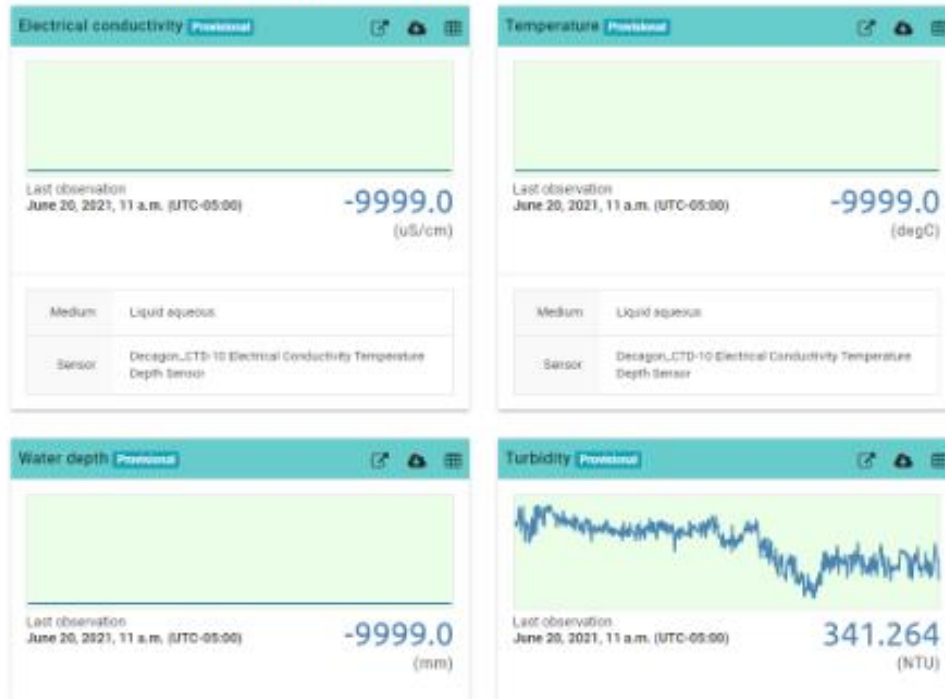
High sensor  
defaults to  
~250 NTU



## 4. -9999 communication problem between mayfly and sensor

### Possible issues:

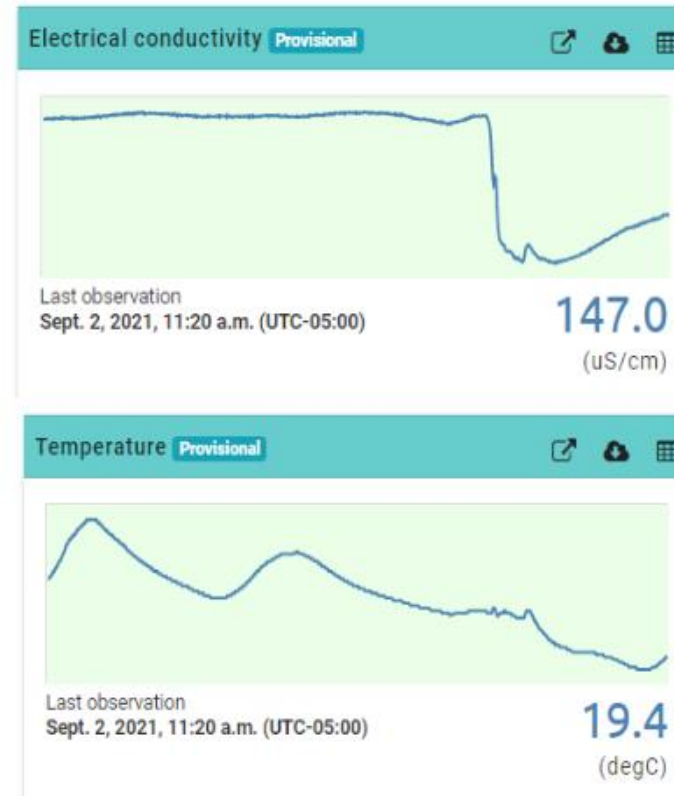
- Bad headphone jack
- Grove cable problem
- Sensor wire problem (damage/cut)
- Sensor reading out of expected sensor output range
- Internal sensor failure



# Calibrating to Data Ranges

## Quality Control (quarterly)

Cross check station data using calibrated handheld meter





# Calibrating to Data Ranges



As a quality check of your sensor depth, Take a measurement by hand, using a metric ruler.

Place the end of the ruler at the bottom of the opening in the CTD and measure to the water surface.

QUALITY CONTROL - WATER LEVEL DATA (*Rec frequency: quarterly and/or more frequently as needed*)

*Staff Gauge Height (m):	Time:	AM/PM?	EST/EDT?
*Sensor Station Water Depth (mm):	Time (military):	Not applicable	Always EST
<b>*QC Sensor Station Water Depth (mm):</b>	<b>Time:</b>	AM/PM?	EST/EDT?

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.*

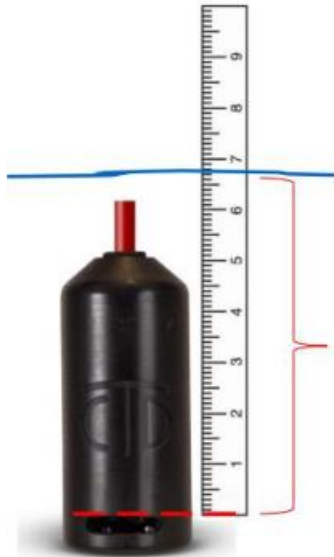


# Quality Control and Crosscheck

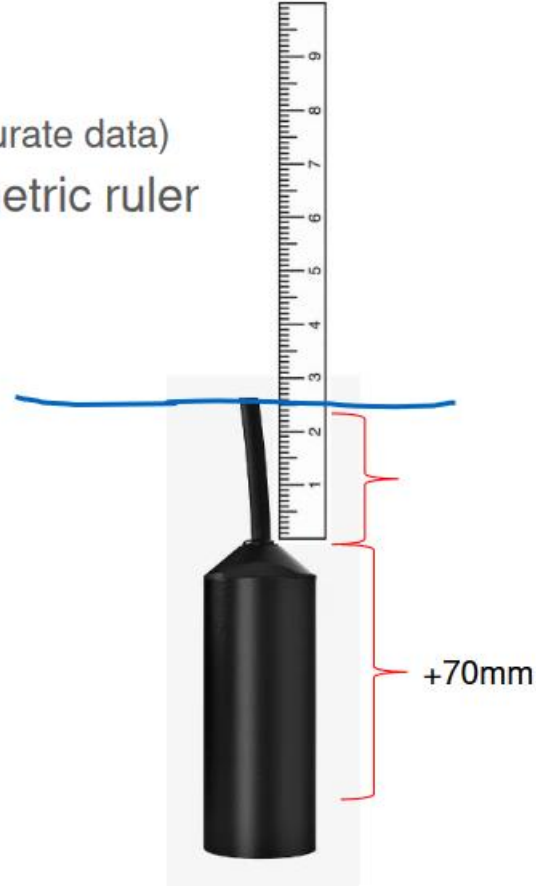
- **Quality Control**

(i.e., making sure the station is getting accurate data)

- \*Depth – crosscheck with metric ruler



Generation 1 Hydros 21 CTD



Generation 2 Hydros 21 CTD (no side slot)

Conductivity and Tempera



# Rodent problems













# Closing thoughts

- Preventive Maintenance and QC
- Know your Equipment
- The Manual is your friend – it has all the answers (almost)

## EnviroDIY Monitoring Station Manual (9 Articles)









The EnviroDIY team created this manual to help you build, program, and install an EnviroDIY Monitoring Station. Please leave feedback on the individual articles so that we can continue to improve the documentation.

-  1. Key Terms and Links
-  2. EnviroDIY Overview
-  3. EnviroDIY Monitoring Station
-  4. Preparing the Mayfly Data Logger
-  5. Programming and Activating an EnviroDIY Monitoring Station
-  6. Building an EnviroDIY Monitoring Station
-  7. Installing an EnviroDIY Monitoring Station
-  8. Managing a Monitoring Station
-  9. References and Acknowledgments

 [View all](#)

## EnviroDIY Monitoring Station Manual Appendices (8 Articles)

The EnviroDIY Monitoring Station appendices contain supplemental information to help you manage your EnviroDIY Monitoring Station. Please leave feedback on the individual articles so that we can continue to improve the documentation.

-  1. Battery and Solar Options
-  2. Example Data
-  3. Data Patterns
-  4. Troubleshooting
-  5. Commercial Meters
-  6. Field Supplies Checklist
-  7. Maintenance Checklist
-  8. Supplemental Sampling, Rating Curves, Loads

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<https://www.envirodiy.org/knowledge-base/>