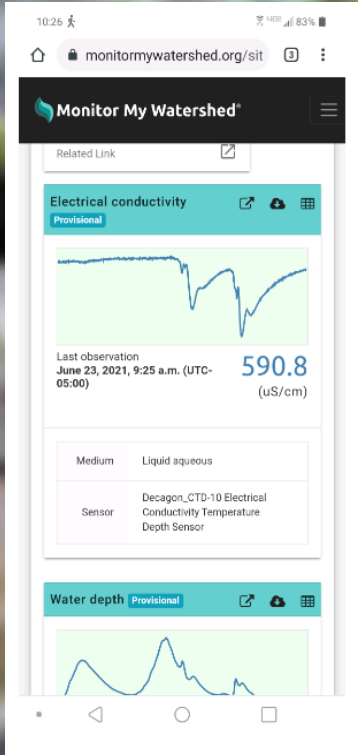
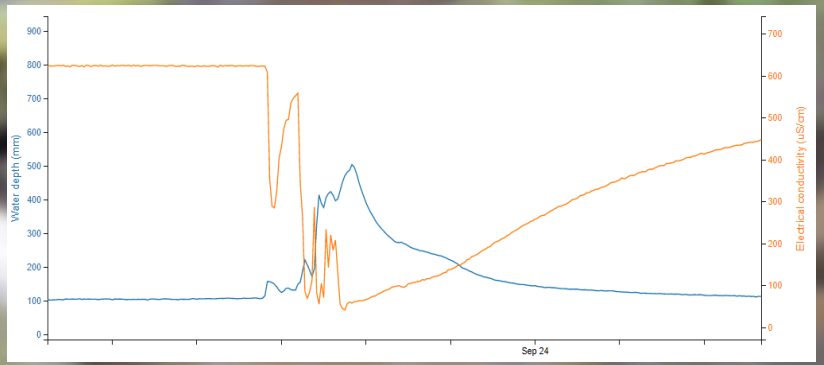
Managing an EnviroDIY Monitoring Station and using Monitor My Watershed

Per lessons from the Delaware River Basin

Day 2, Tuesday October 6, 2021, PA Watershed Specialist Meeting (virtual)

David Bressler, Stroud Water Research Center





Today

Goal: Understand ways you can use the stations and how to keep them functioning and collecting accurate data

- Examples of usage
- Management – maintenance, quality control, and troubleshooting
- George Seeds' case study

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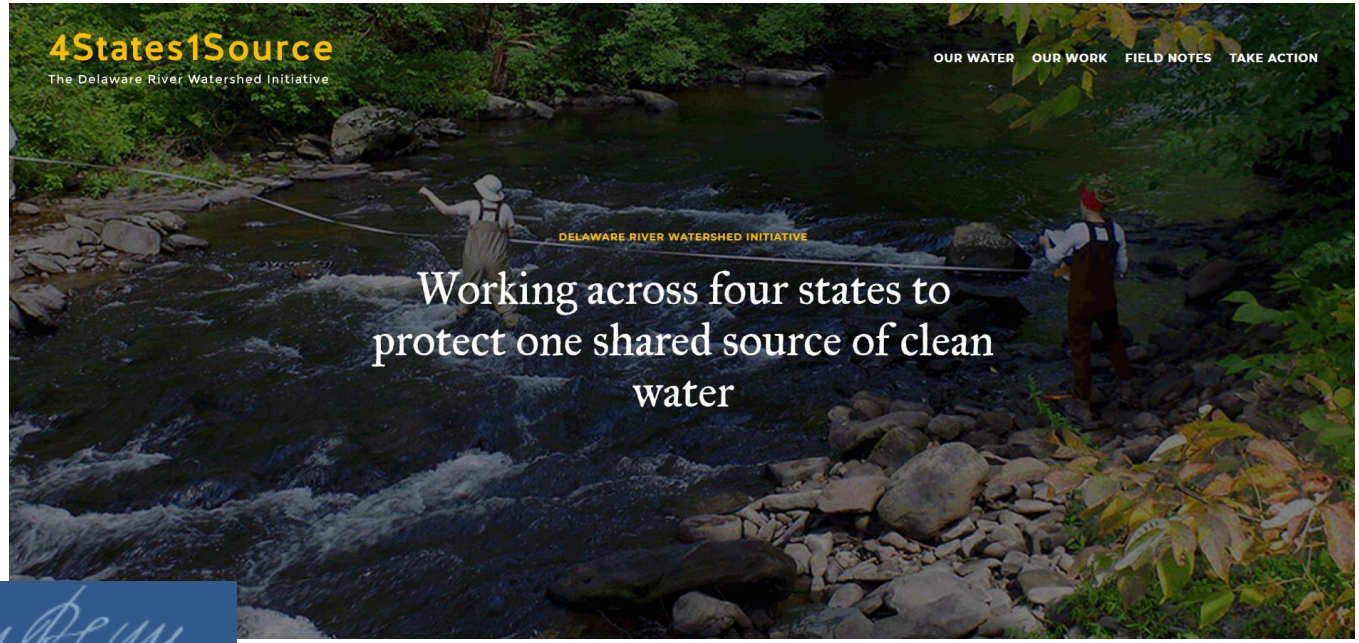
Experience in the Delaware River Basin

- Support for developing EnviroDIY in the DRB from the Delaware River Watershed Initiative



WILLIAM PENN FOUNDATION

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Short list of examples of station usage

- **Examples of work being done** (see https://wikiwatershed.org/drwi/#project-updates):
  - Municipal work
  - Flooding
  - Salt issues
  - Pollution assessment
  - Trout habitat
  - Agricultural restoration
  - Sediment
  - Education/classroom work

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PA County Conservation Districts currently using EnviroDIY Monitoring Stations

- Berks County Conservation District, Kent Himelright, Watershed Coordinator
- Lackawanna CCD, Cheryl Nolan, Watershed Specialist
- Fulton CCD, Scott Alexander, Watershed Specialist
- Potter CCD, Emily Shosh, Communications and Outreach Advisor

COMMON DATA PATTERNS

- Seasonal and daily temperature fluctuations
- Inverse relationship between depth and conductivity during storms
- Conductivity spikes in the winter (road salt)
- Conductivity increases due to unknown sources
- Turbidity increases in storms

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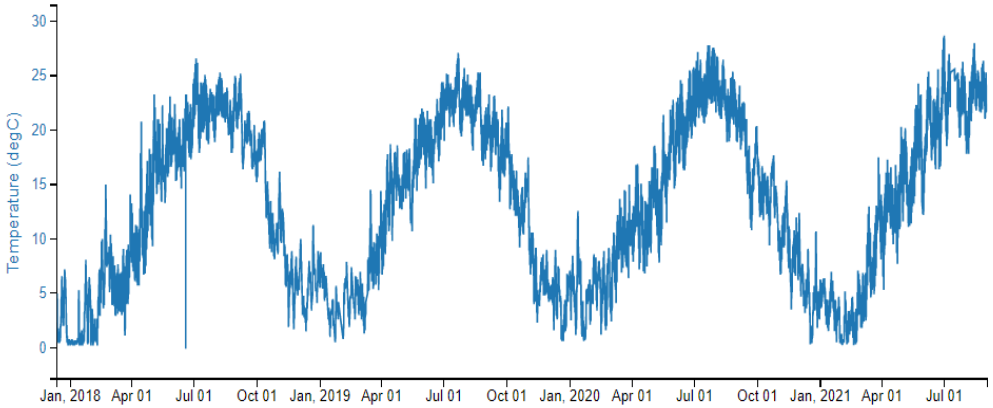
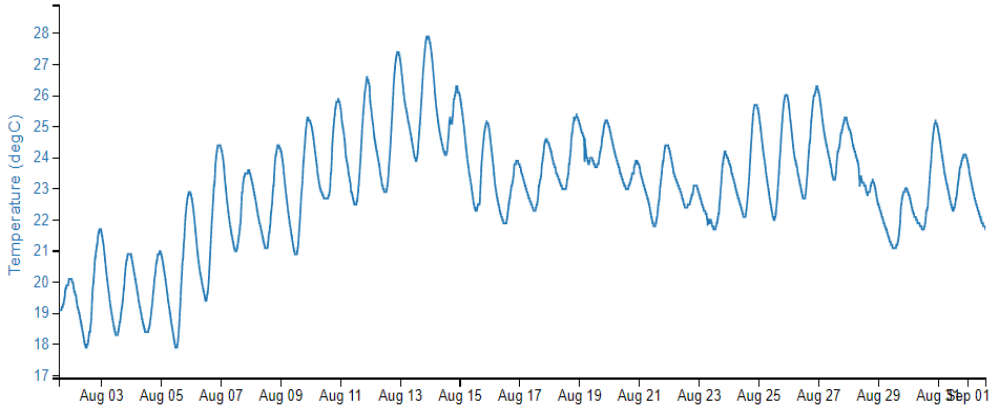
Seasonal and day/night (diel) patterns in temperature





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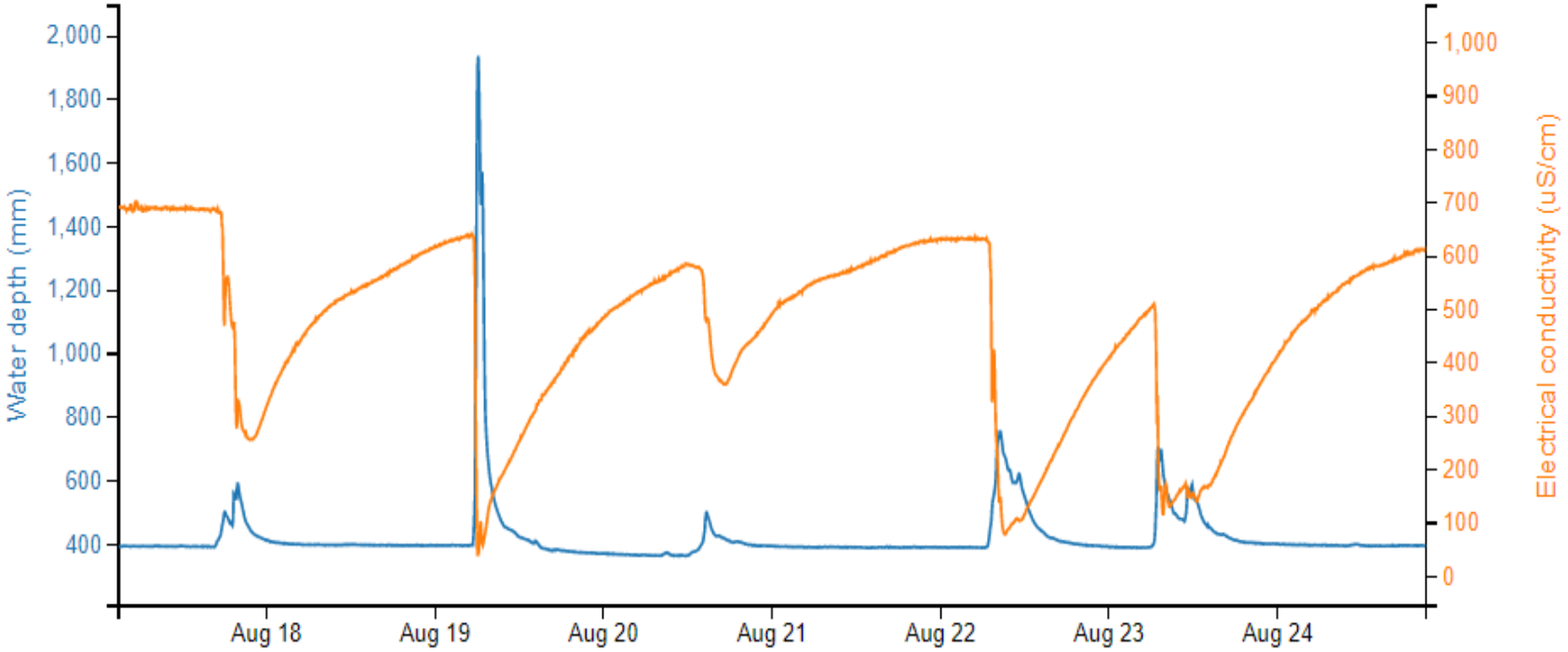
Dilution of stream water during storms

Conductivity decreases as depth increases



Naylors Run – urban watershed, high conductivity and lots of dilution during storms

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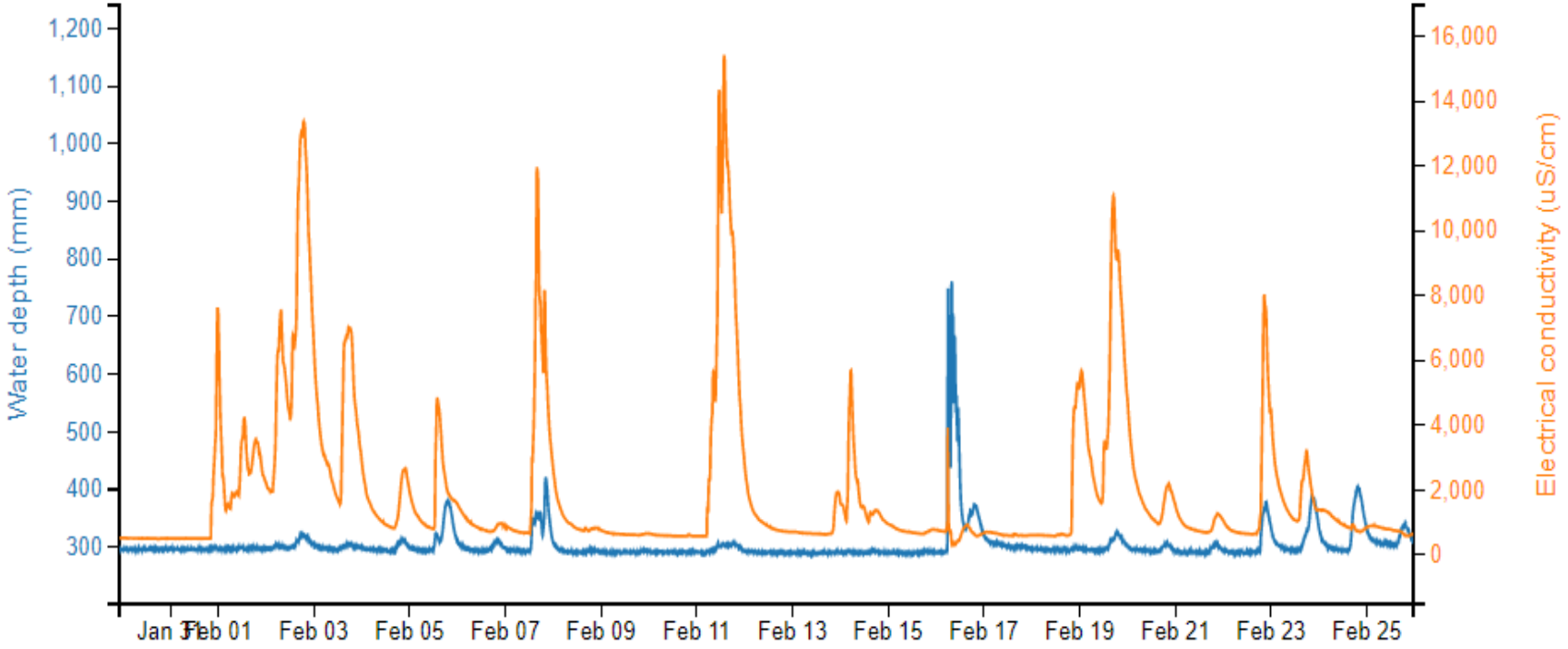
Conductivity spikes in winter

Flushes of road salt/de-icer as ice and snow melt



Tributary to Cobbs Creek in Philadelphia area

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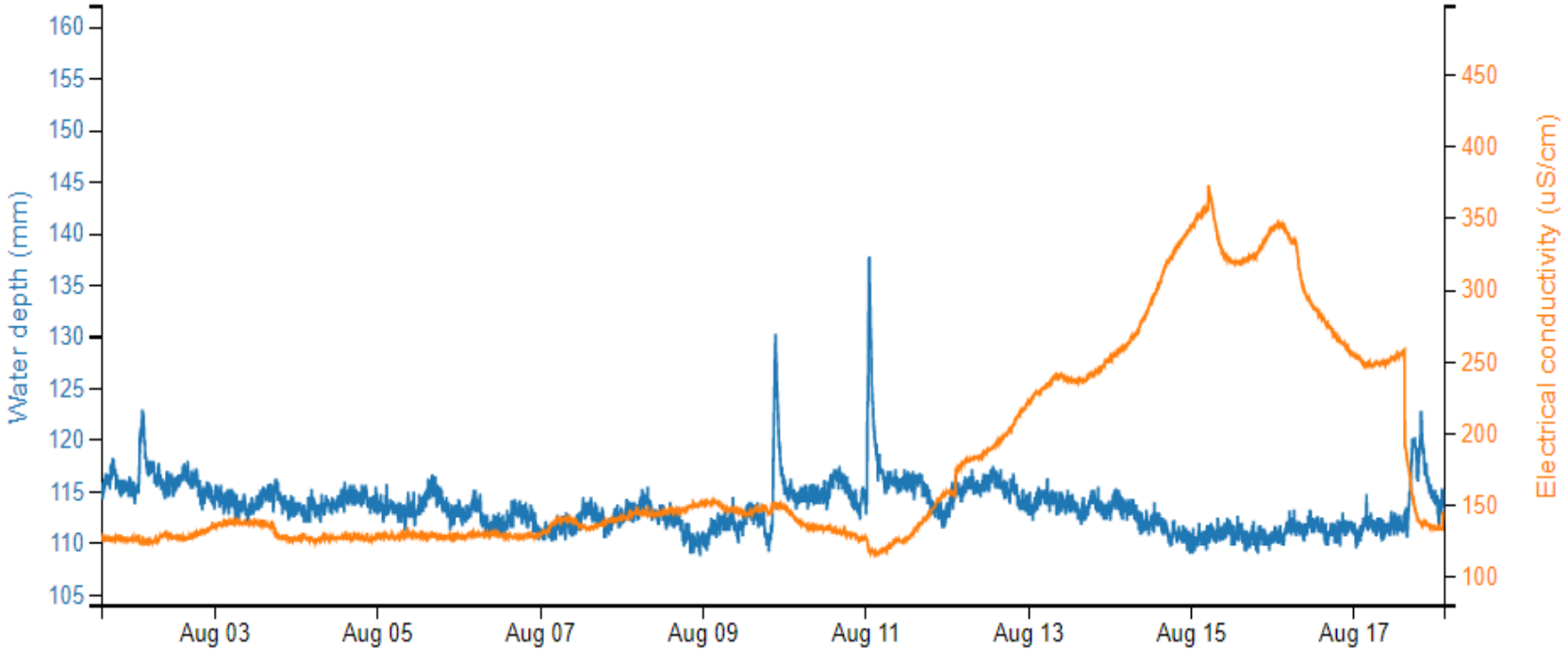
Conductivity increases due to unknown sources

Pollutant, sensor fouling, malfunction?



Palmer Run, a heavily forested stream in First State National Historical Park, DE

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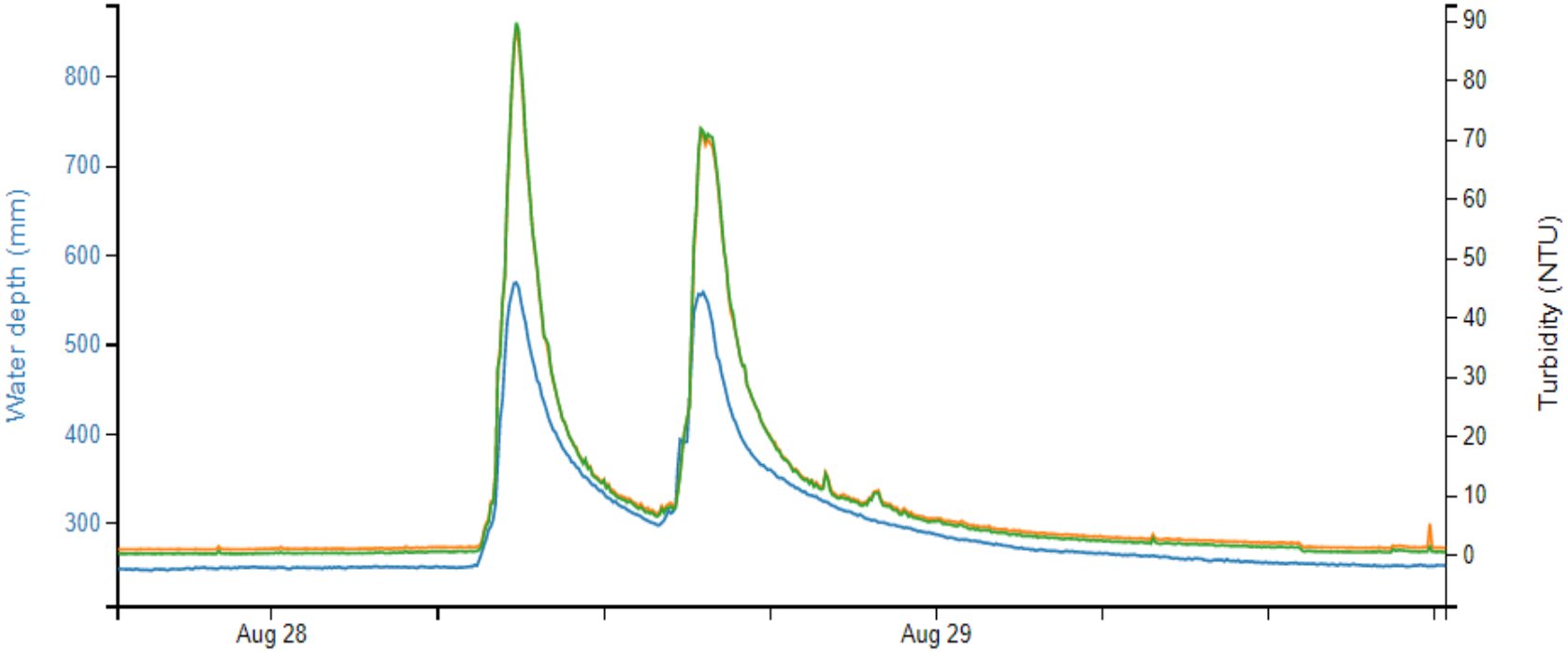
Increased turbidity during storms



Valley Creek upstream of Valley Forge National Historical Park at Ecology Park

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EXAMPLES OF USAGE

- Water quality of streams entering First State National Historical Park – The Nature Conservancy, DE
- Unknown inputs to Pickering Creek – Master Watershed Stewards
- Stormwater and urbanization – Darby Creek Valley Association
- Agricultural restoration and sediment – Berks County Conservation District
- University and K-12 classrooms – East Stroudsburg University and Conestoga Valley High School
- Urban influence and salt contamination – West Chester Univ and MWStewards
- Local watershed management – Wallkill Watershed Management Group

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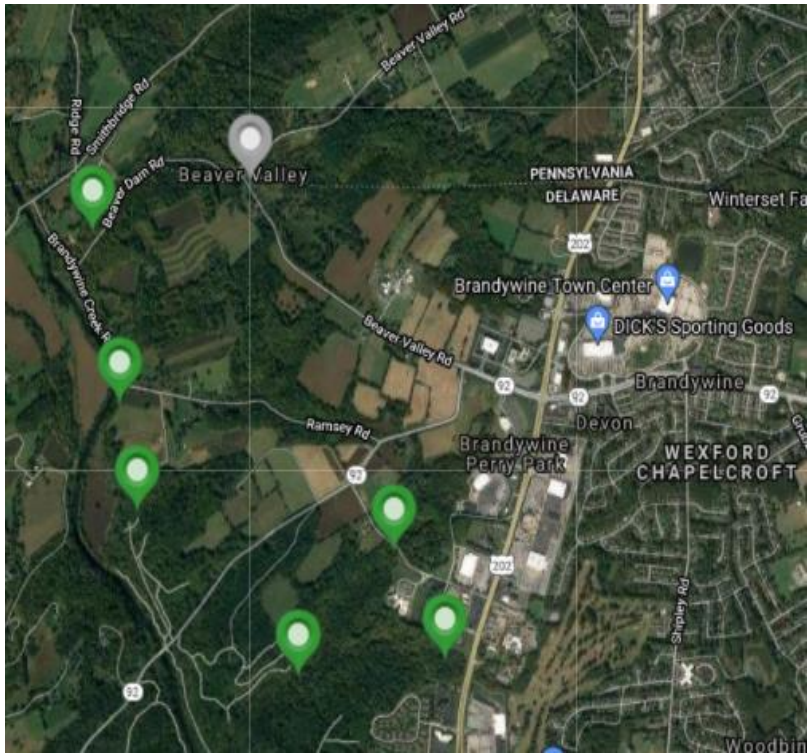
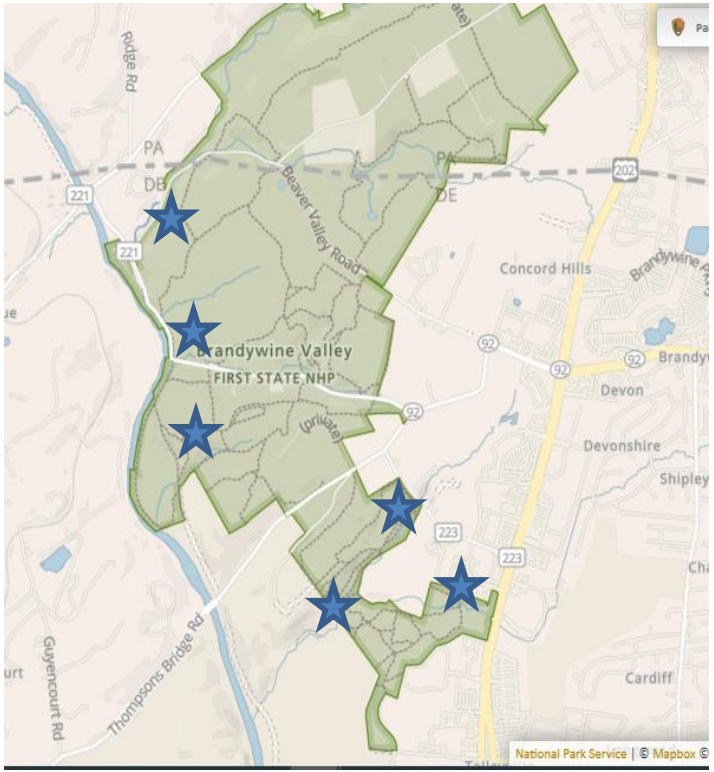
Water quality entering First St National Park





Work by The Nature Conservancy, Delaware (TNC Stream Stewards)

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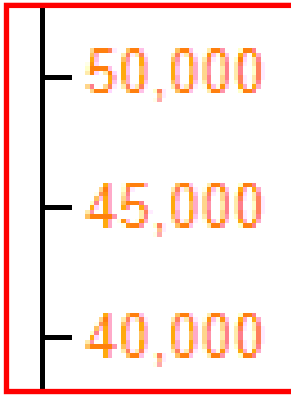
Water quality entering First St National Park

Identification of severe road salt/de-icer pollution events

***Ocean water is ~50,000 uS/cm**



Work by The Nature Conservancy, Delaware (TNC Stream Stewards)

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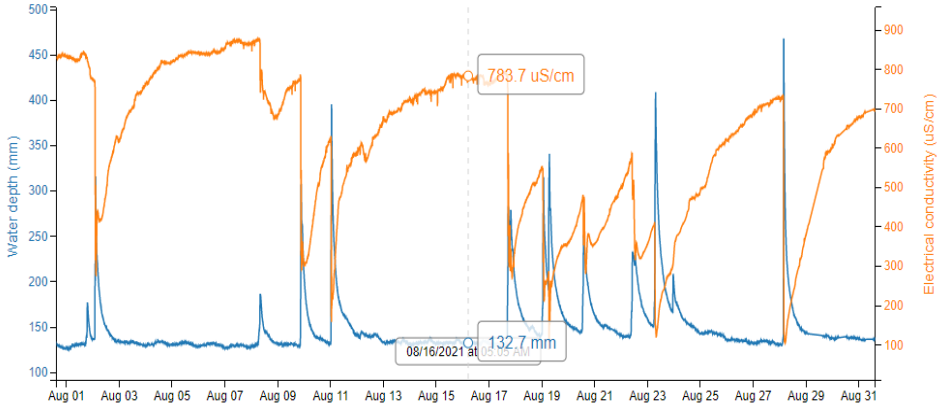
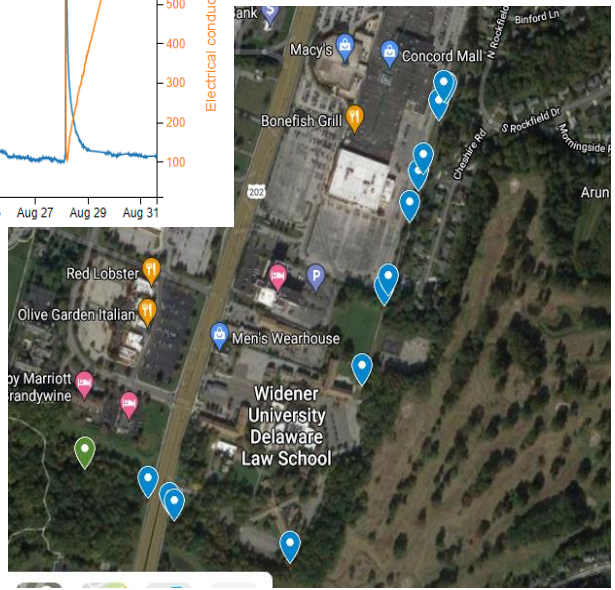
Water quality entering First St National Park

Sleuthing out and trying to fix sources of the elevated conductivity – working with New Castle Co and the mall





Work by The Nature Conservancy, Delaware (TNC Stream Stewards)

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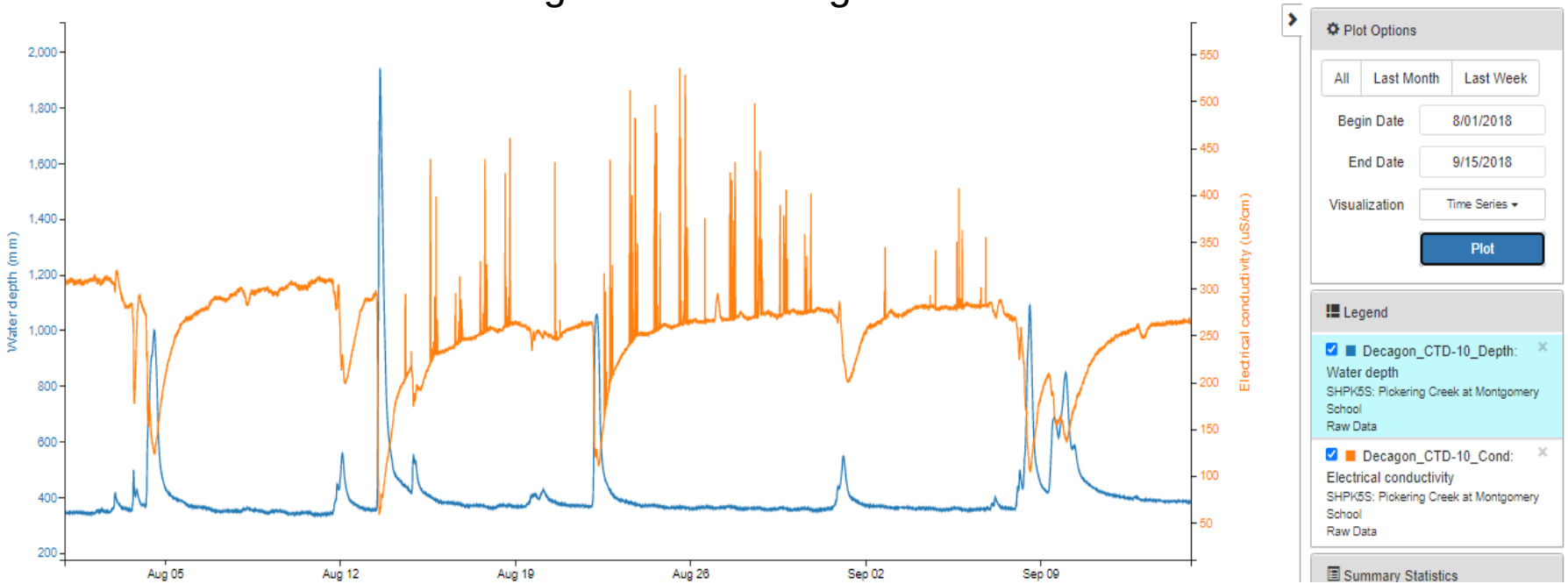
Unknown inputs to Pickering Creek

Unregulated discharge???



Aug – Sept 2018

Work by Master Watershed Stewards (Carol Armstrong and others)

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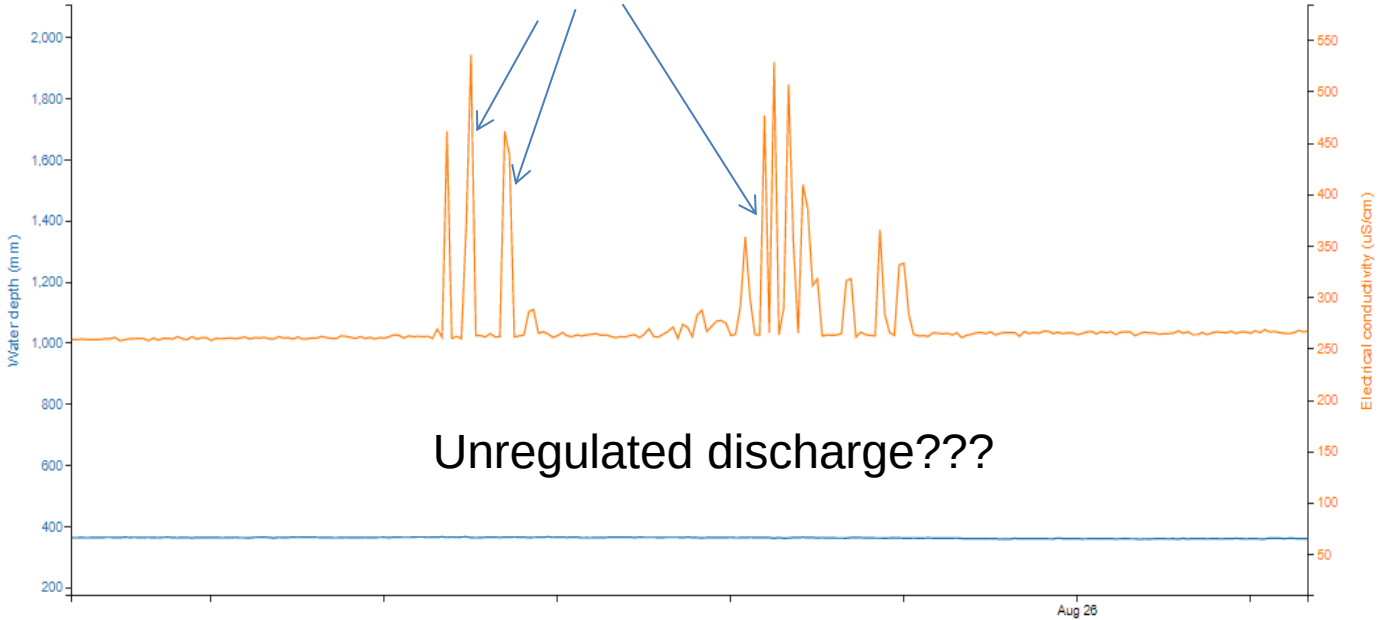
Unknown inputs to Pickering Creek

5-15 minute spike duration – challenging to coordinate upstream measurements



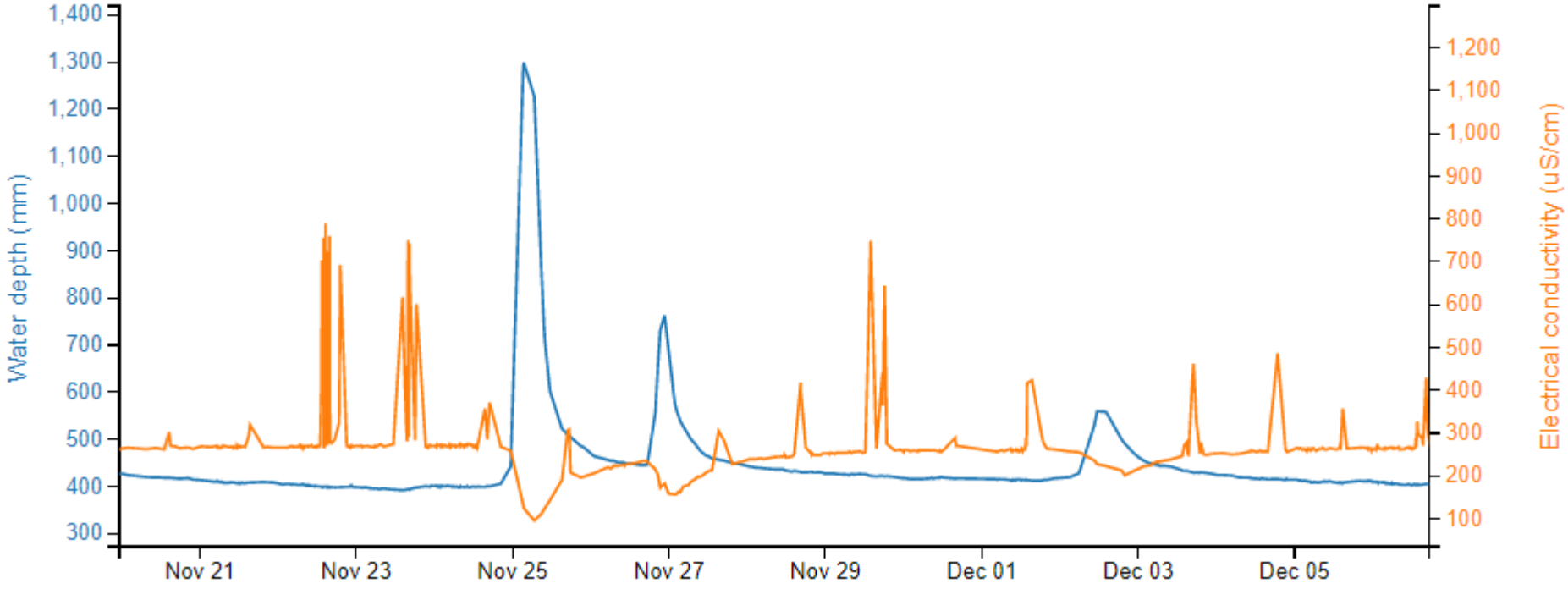
Unregulated discharge???

Aug – Sept 2018

STROUD WATER RESEARCH CENTER

Unknown inputs to Pickering Creek

Pattern disappeared then reappeared briefly in Nov 2018, then left for good(?)



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Stroud Water Research Center

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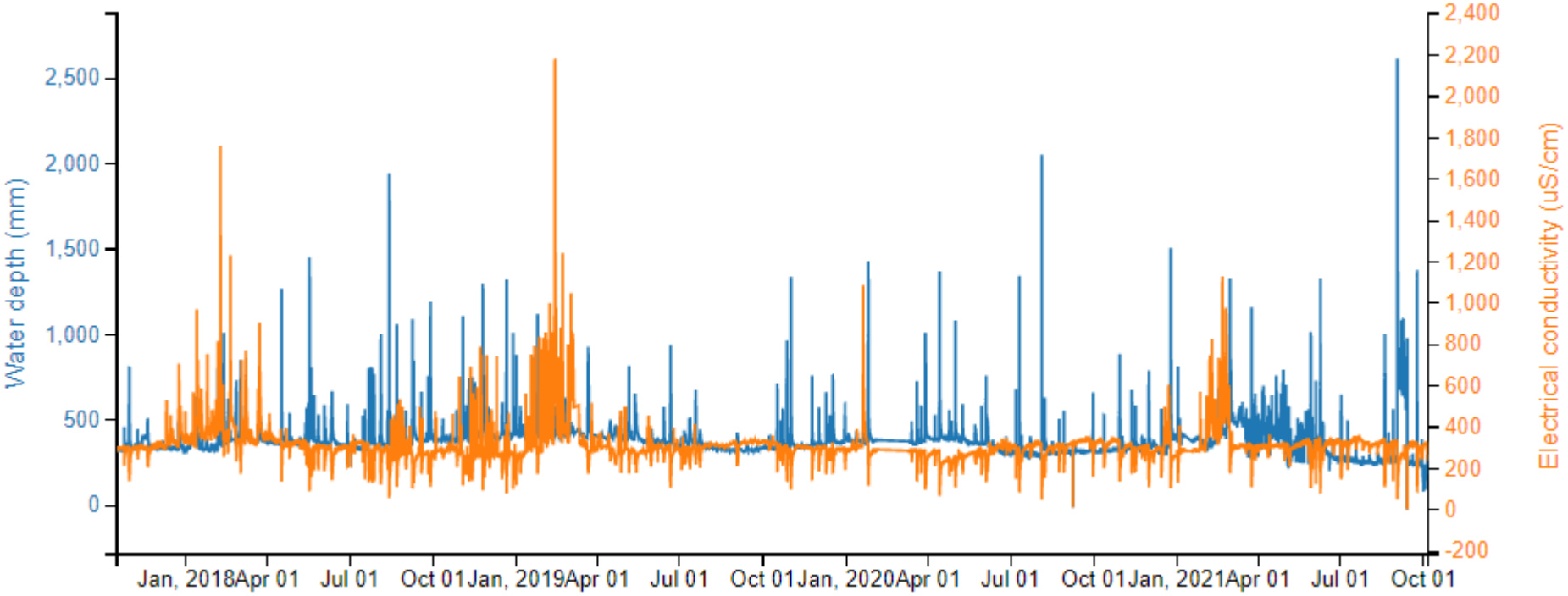

Work by Master Watershed Stewards (Carol Armstrong and others)

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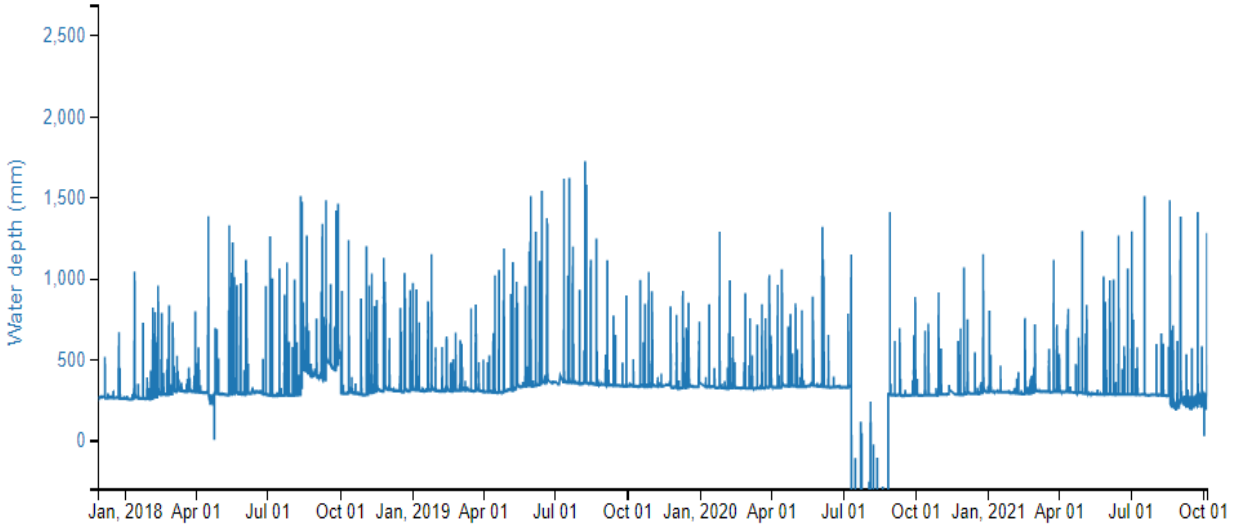
Stormwater and urbanization

Watershed entirely piped (blue streams on map are historic, not current) – goal for GSI and daylighting of stream, reduction of flooding



Work by Darby Creek Valley Association (Derron LaBrake)

Stormwater and urbanization

Derron is currently communicating with the neighborhood about the impacts of impervious surfaces on stormwater and flooding (supporting this convo with videos such as below)

Baseflow

Recent >1m depth flow

Work by Darby Creek Valley Association (Derron LaBrake)

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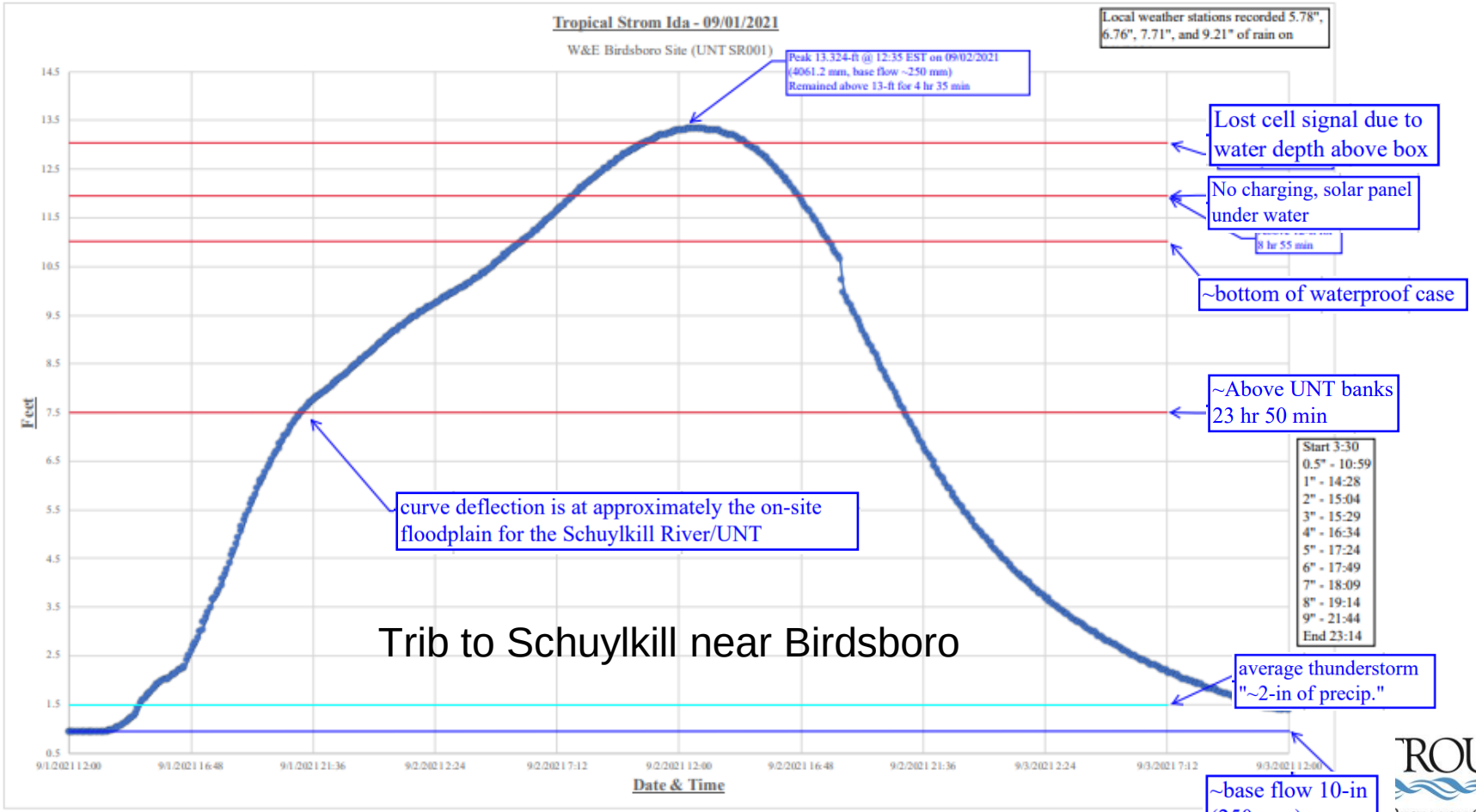
Stormwater example from Derron



Work by Wetlands and Ecology, Inc (Derron LaBrake)

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Agricultural restoration, sediment

Excluding cattle and planting buffer reduces sediment into stream (tributary to Manor Ck)

Berks County Conservation District

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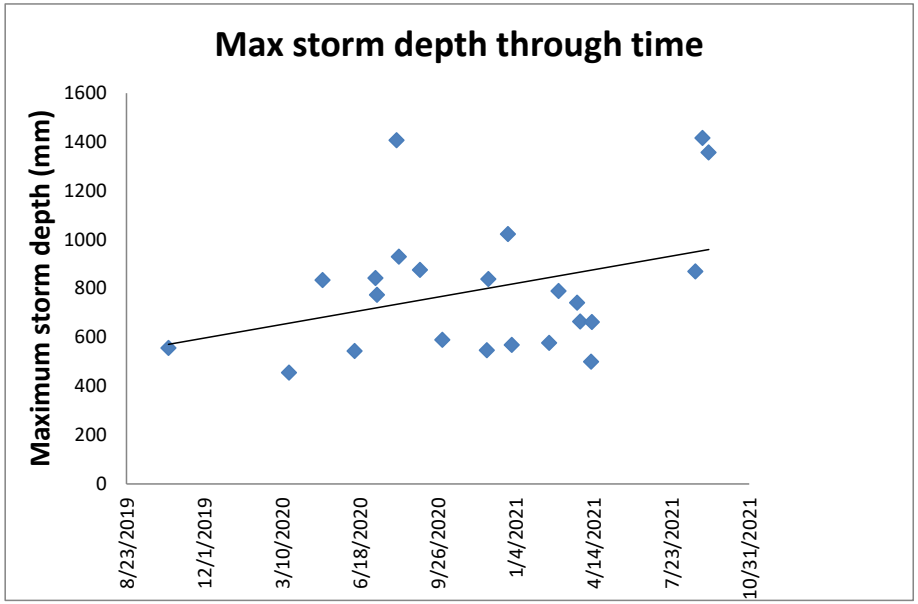
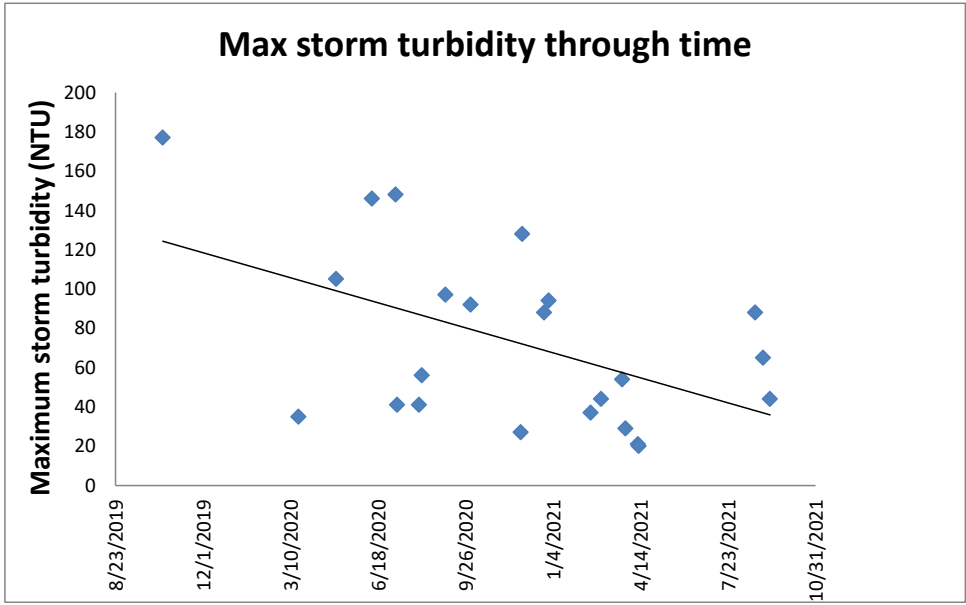
Agricultural restoration, sediment

Even though turbidity sensor had fouling issues it does *appear* as if storm turbidity has decreased





Tributary to Manor Creek

Berks County Conservation District

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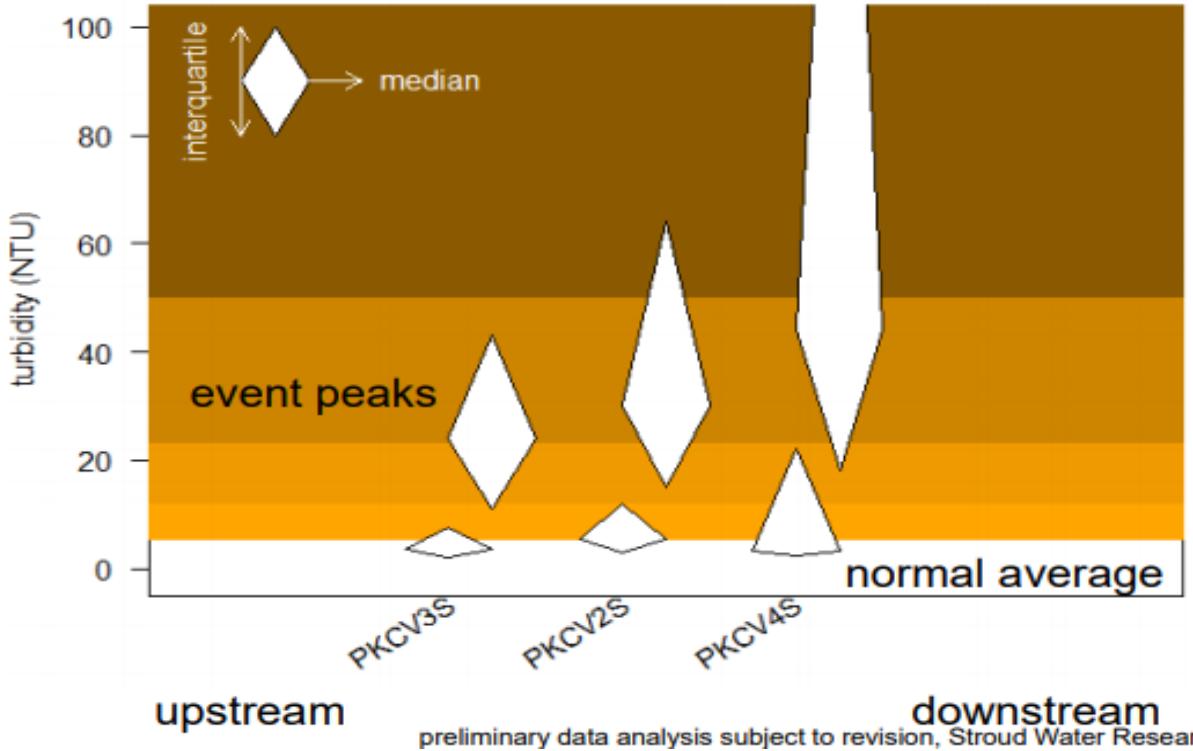
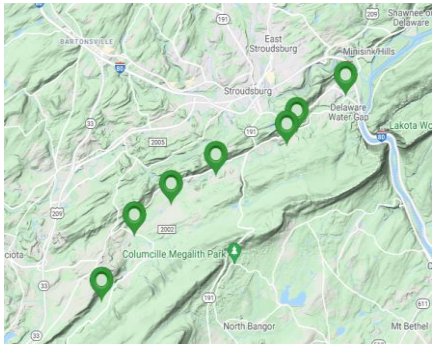
ESU monitoring stations along Cherry Ck

East Stroudsburg University support to Delaware River Watershed Initiative, **turbidity** in relation to the landscape





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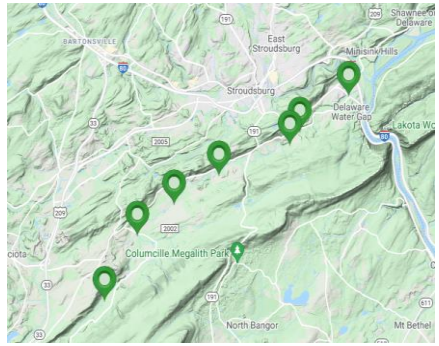
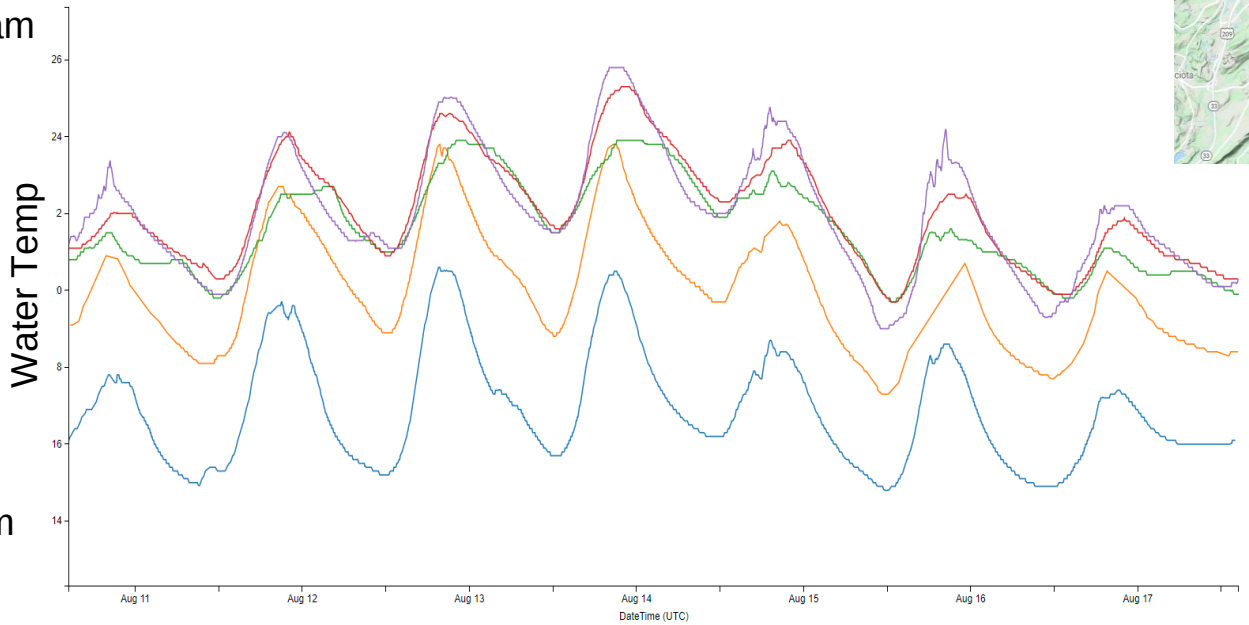
ESU monitoring stations along Cherry Ck

East Stroudsburg University support to Delaware River Watershed Initiative, **temperature** in relation to the landscape



Downstream

Upstream



Decagon_CTD-10_Temp: Temperature
ESUCC25: Cherry Creek at Domotor
Raw Data

Decagon_CTD-10_Temp: Temperature
ESUCC24: Cherry Creek at Dent
Raw Data

Decagon_CTD-10_Temp: Temperature
PKCV6S: Cherry Creek on USFW Property
Raw Data

Decagon_CTD-10_Temp: Temperature
PKCV4S: Cherry Creek at Pour Point
Raw Data

Decagon_CTD-10_Temp: Temperature
PKCV3S: Cherry Creek Upstream
Raw Data

Stream gets warmer going downstream, with some exceptions…why?

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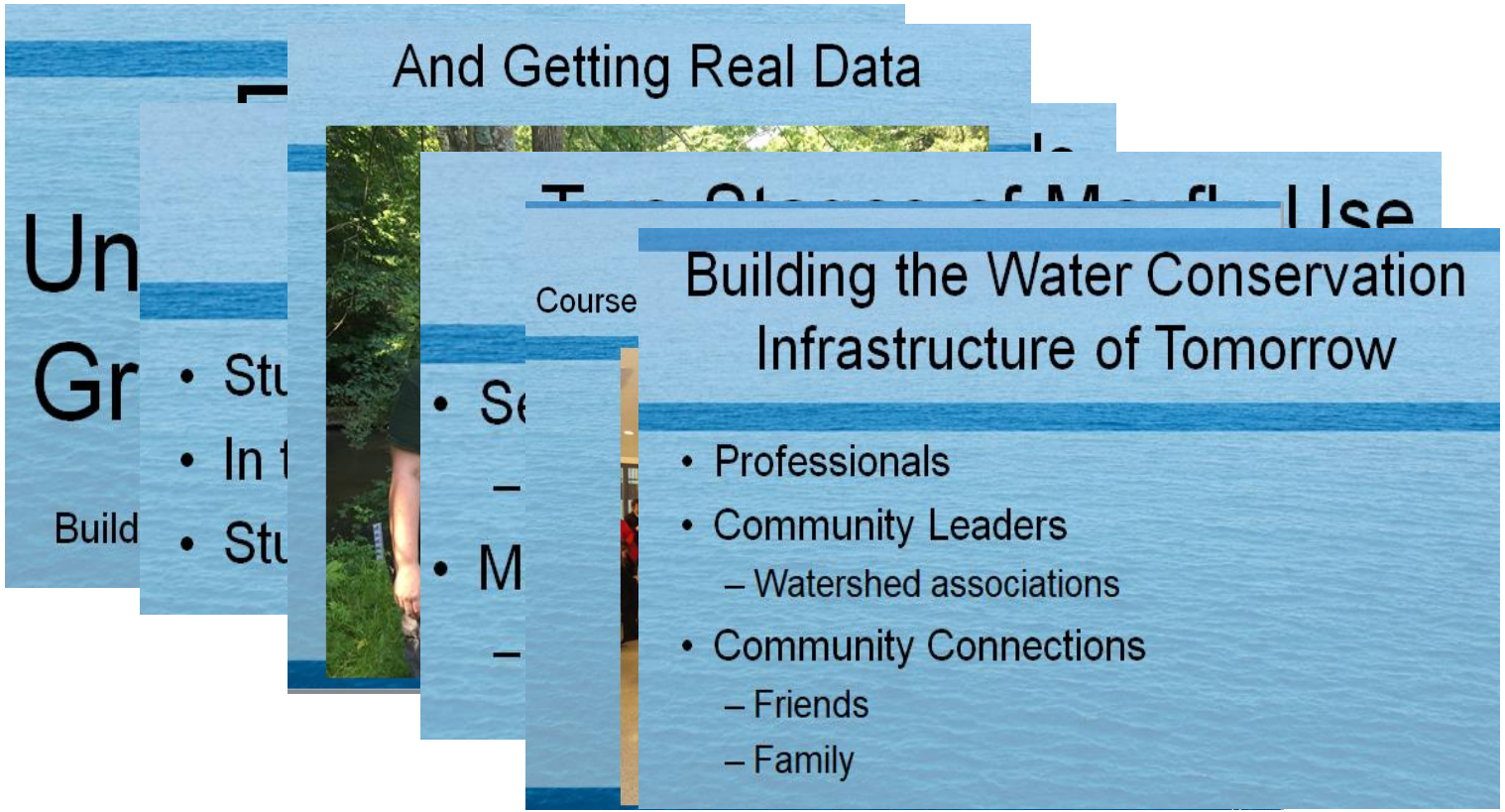
ESU classroom and lab work



Dr. Paul Wilson

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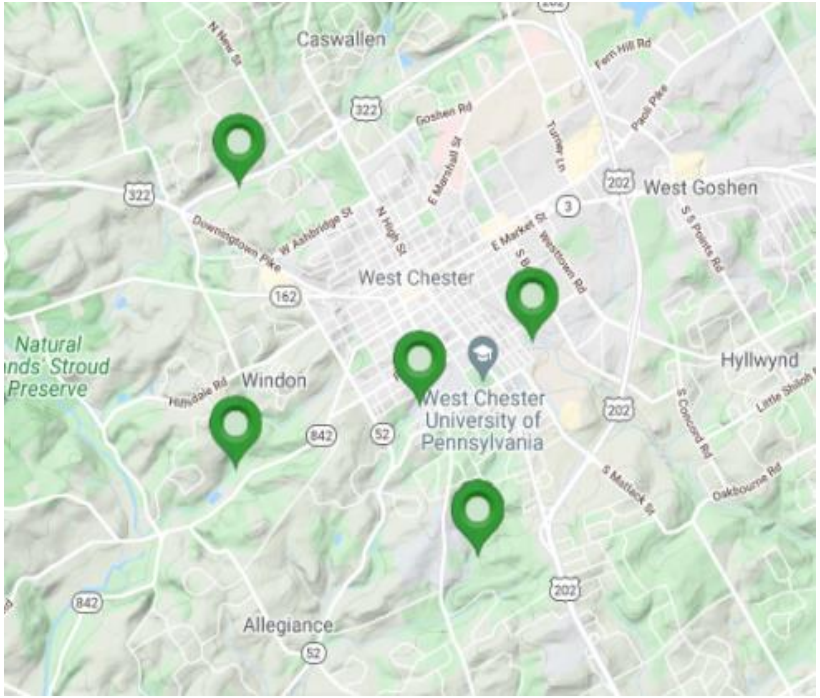
Conestoga Valley High School classrooms

Science teachers Kerrie Snavely and Jim Hovan

Urban impacts and salt in West Chester, PA



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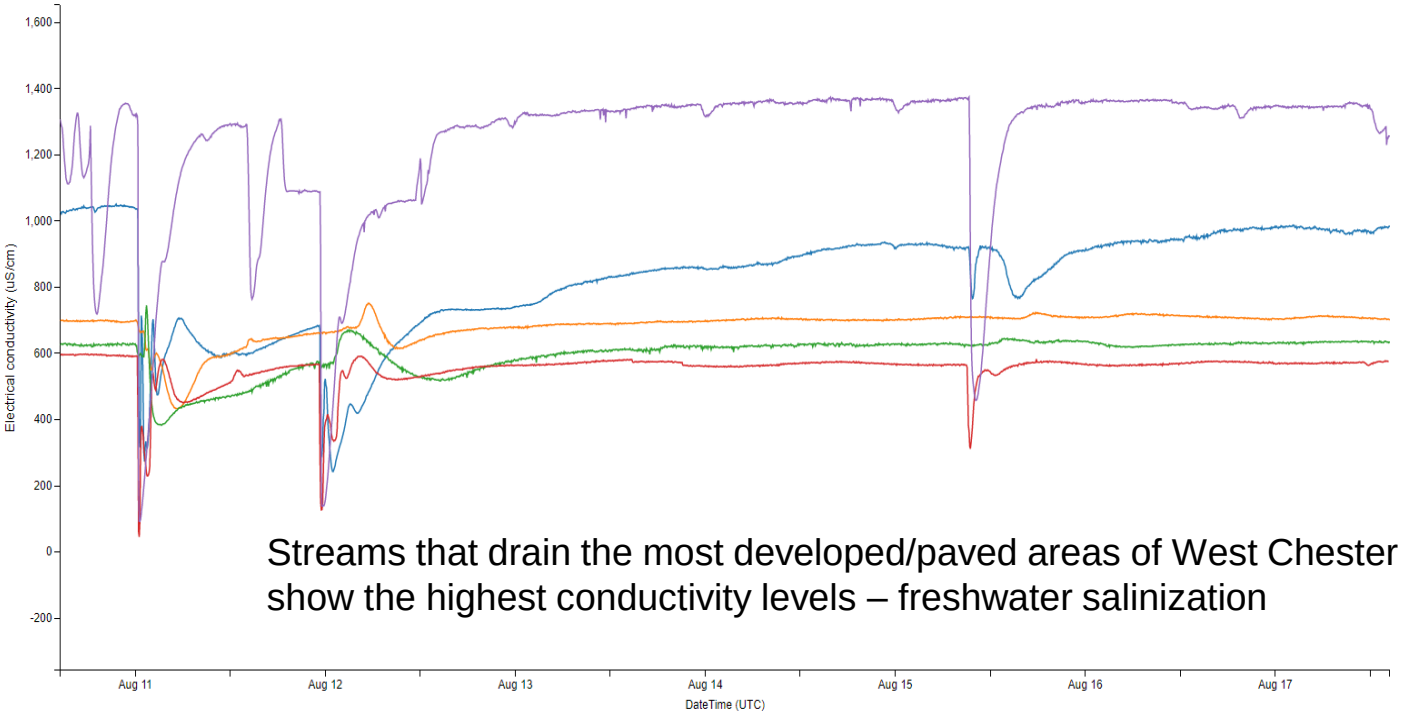
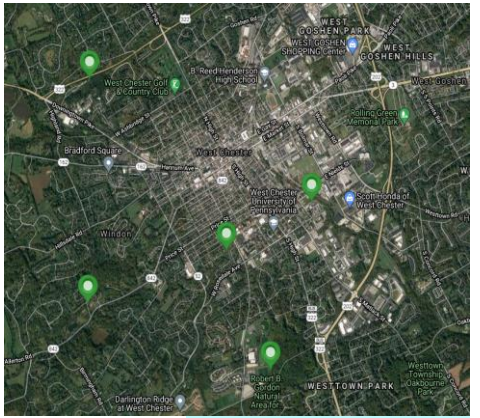
Urban impacts and salt in West Chester, PA

Variability in pollution status of local streams, new knowledge of these streams



Streams that drain the most developed/paved areas of West Chester show the highest conductivity levels – freshwater salinization



Decagon_CTD-10_Cond:
Electrical conductivity
BCGC1S: Goose Creek at Greenfield Park
Raw Data

Decagon_CTD-10_Cond:
Electrical conductivity
BCTR1S: Taylor Run Upstream of WC Taylor WWTP
Raw Data

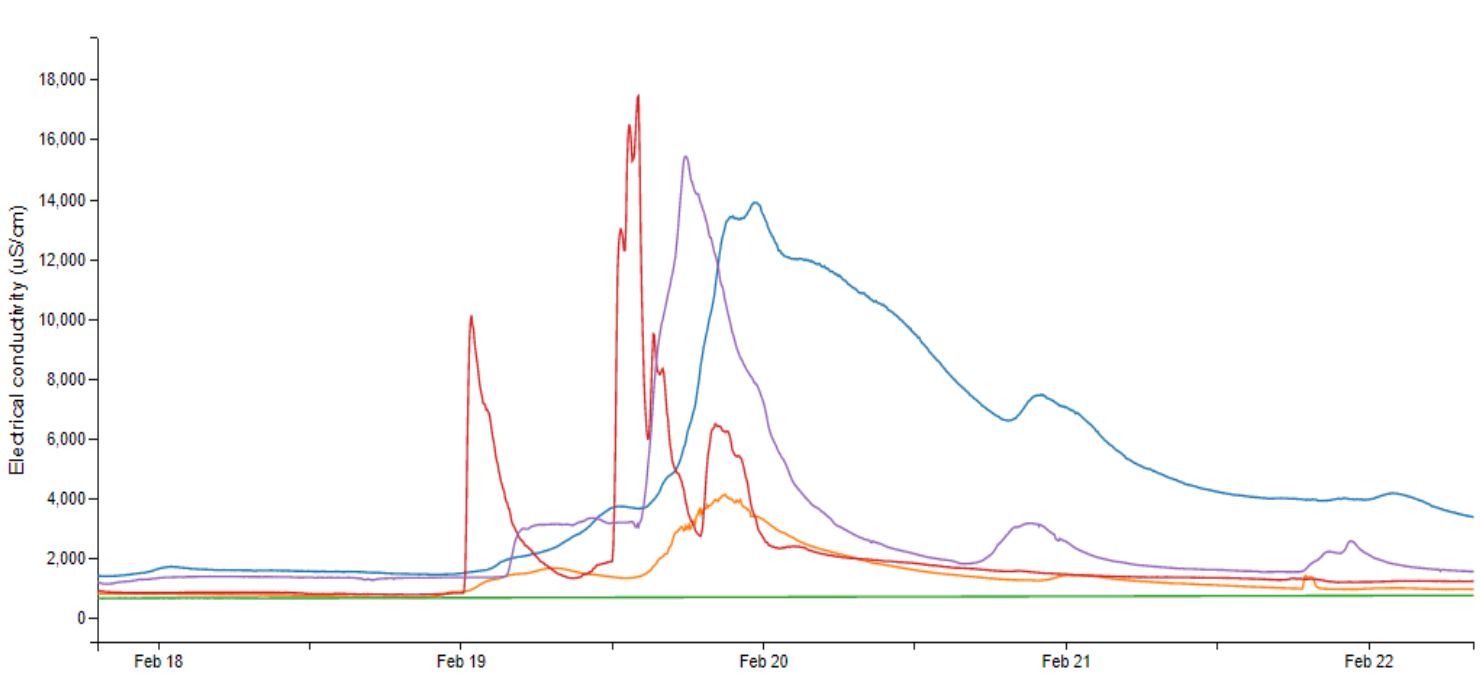
Decagon_CTD-10_Cond:
Electrical conductivity
BCBE7S: Blackhorse Run at Buchner Property
Raw Data

Decagon_CTD-10_Cond:
Electrical conductivity
BCPR8S: Unnamed Tributary to Plum Run at Gordon Natural Area
Raw Data

Decagon_CTD-10_Cond:
Electrical conductivity
BCPR9S: Plum Run at New Street Garage
Raw Data

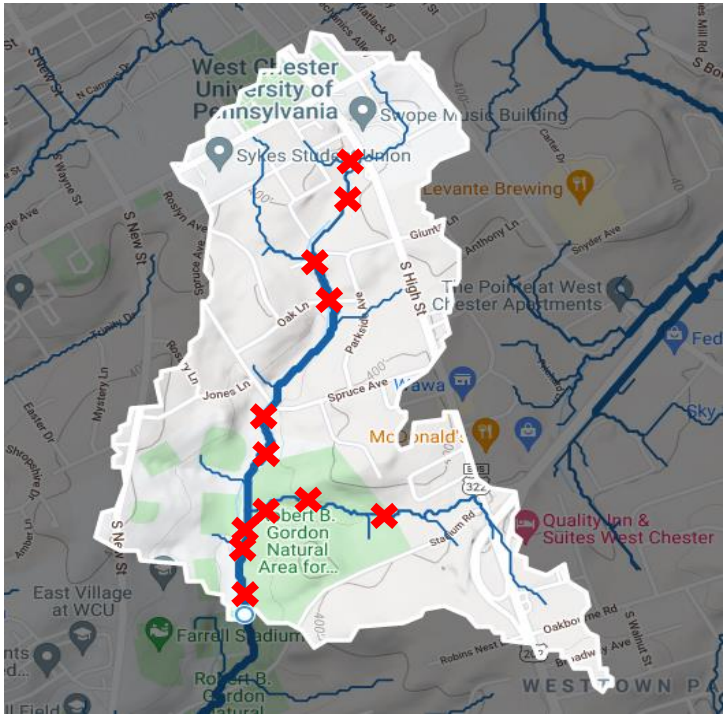
Urban impacts and salt in West Chester, PA

Winter storm conductivity data show different timing and duration of events



Urban impacts and salt in West Chester, PA

Longitudinal sampling to determine sources and extent of contamination – Elisabeth R, Conestoga High School



East Branch Plum Run

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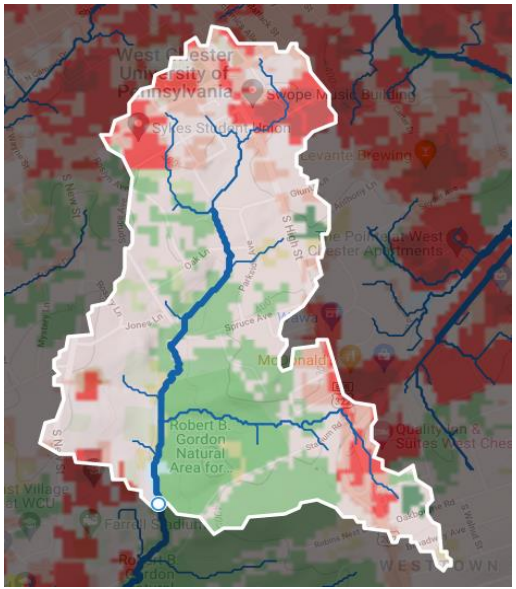

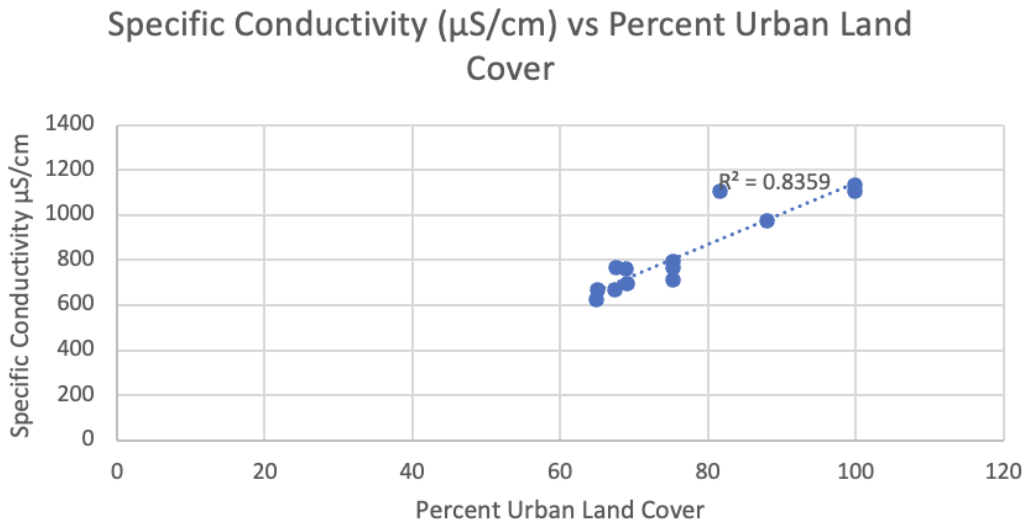

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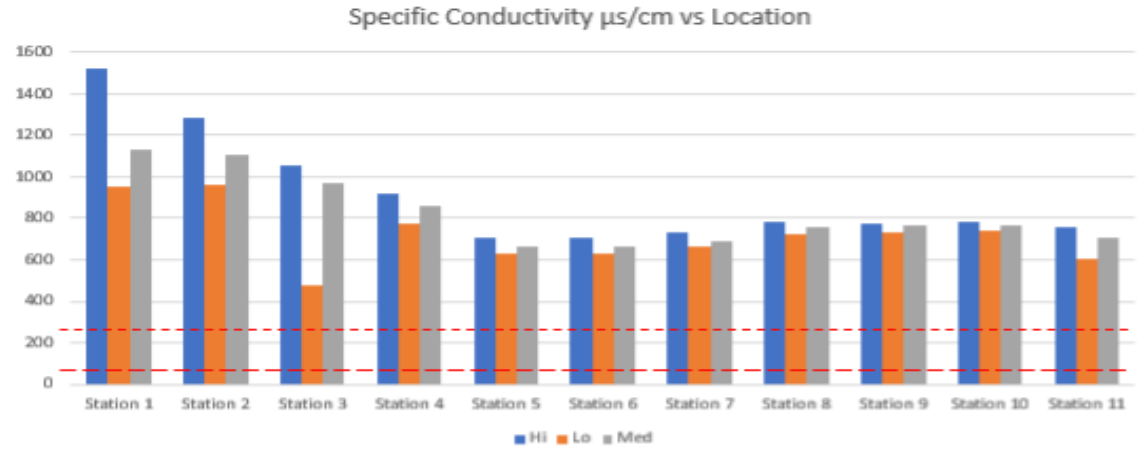

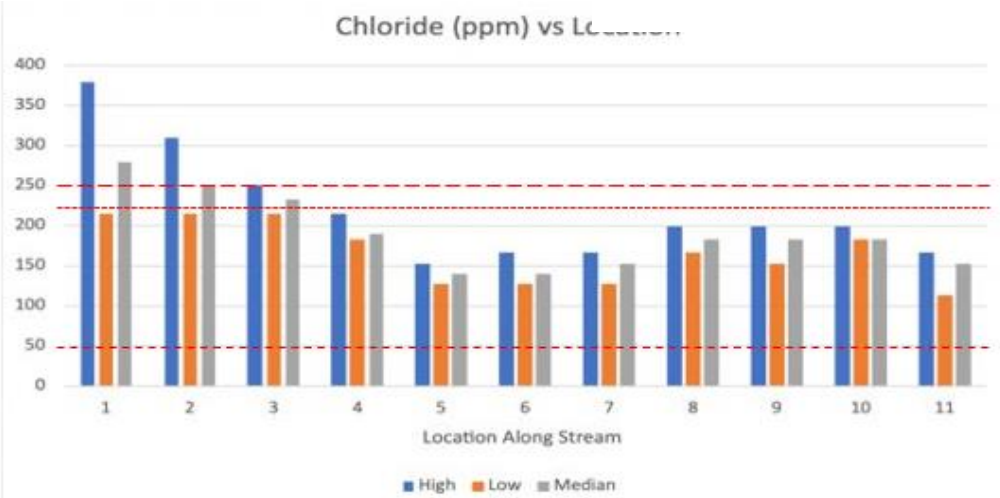

Olson and Cormier 2019; Griffith 2014

EPA/NJ/MI/MD

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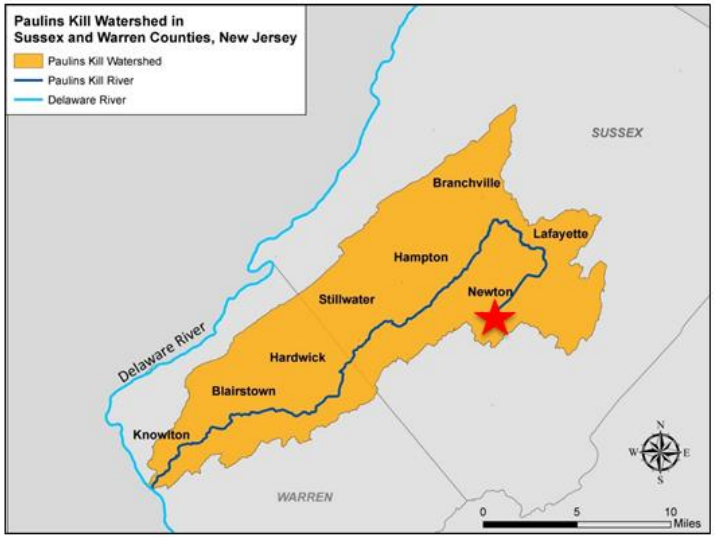
Watershed Characterization for upper Paulins Kill

Upper Paulins Kill Water Quality Report 2020



This water quality report was produced by the Wallkill River Watershed Management Group and Stroud Water Research Center as part of a Delaware River Watershed Initiative citizen science effort funded by the William Penn Foundation. The report begins with an Executive Summary that reviews New Jersey water quality standards and highlights the water quality monitoring parameters that have surpassed these thresholds. The second half of the report is a Scientific Assessment that provides a detailed synopsis of the water quality data that have been collected since the sensor station was installed in 2017.

The purpose of this report is to inform regional stakeholders of any existing water quality trends that represent a threat to the Paulins Kill River and the surrounding community. The recommendations provided should be used to inform decisions and prevent further degradation of water quality.

Work by Wallkill Watershed Management Group

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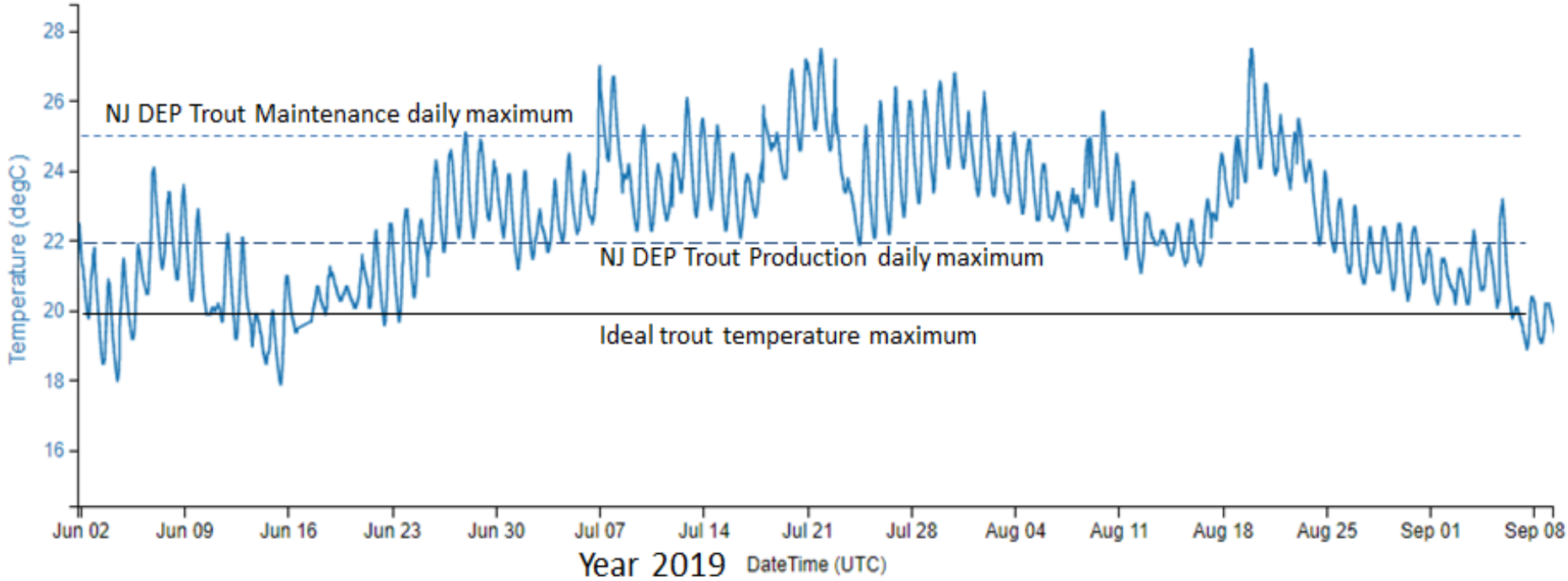
Watershed Characterization for upper Paulins Kill

Water temperature in relation to state trout criteria



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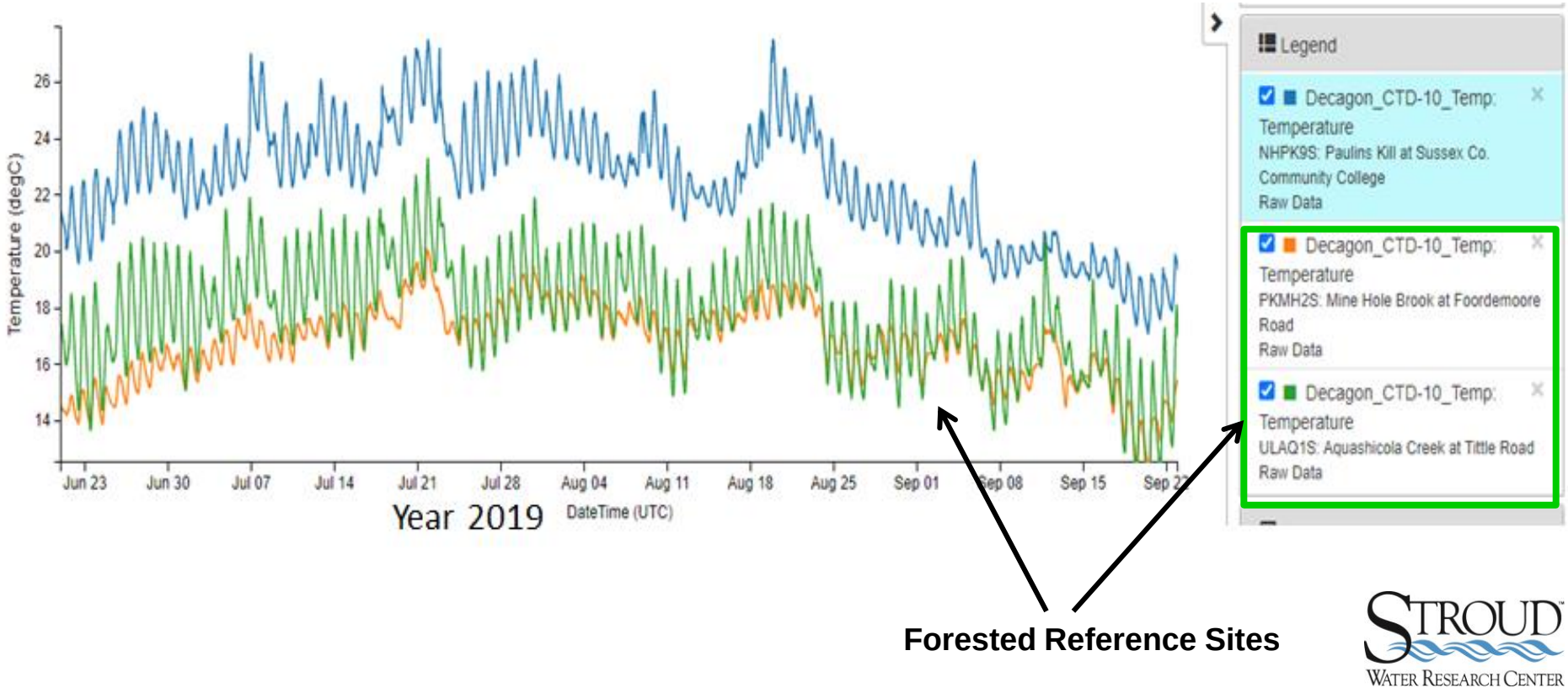
Watershed Characterization for upper Paulins Kill

Water temperature in relation to local forested “reference” sites



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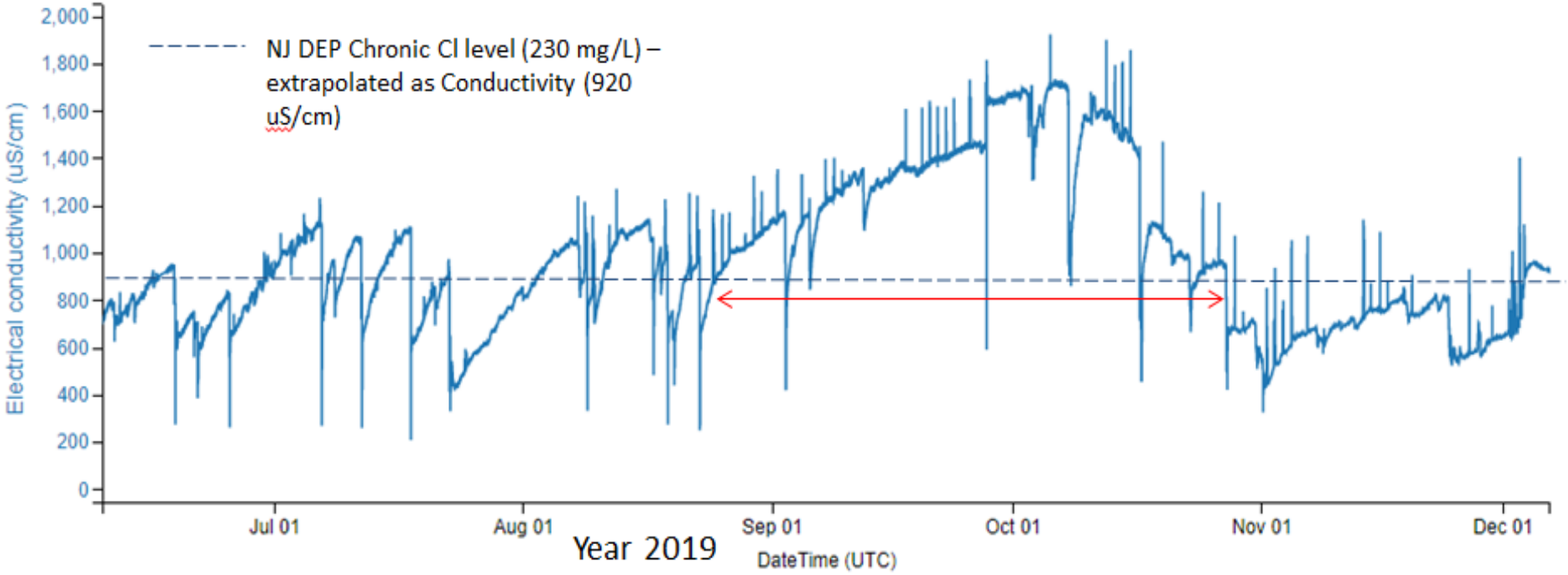
Watershed Characterization for upper Paulins Kill

Conductivity (and chloride) in relation to state criteria



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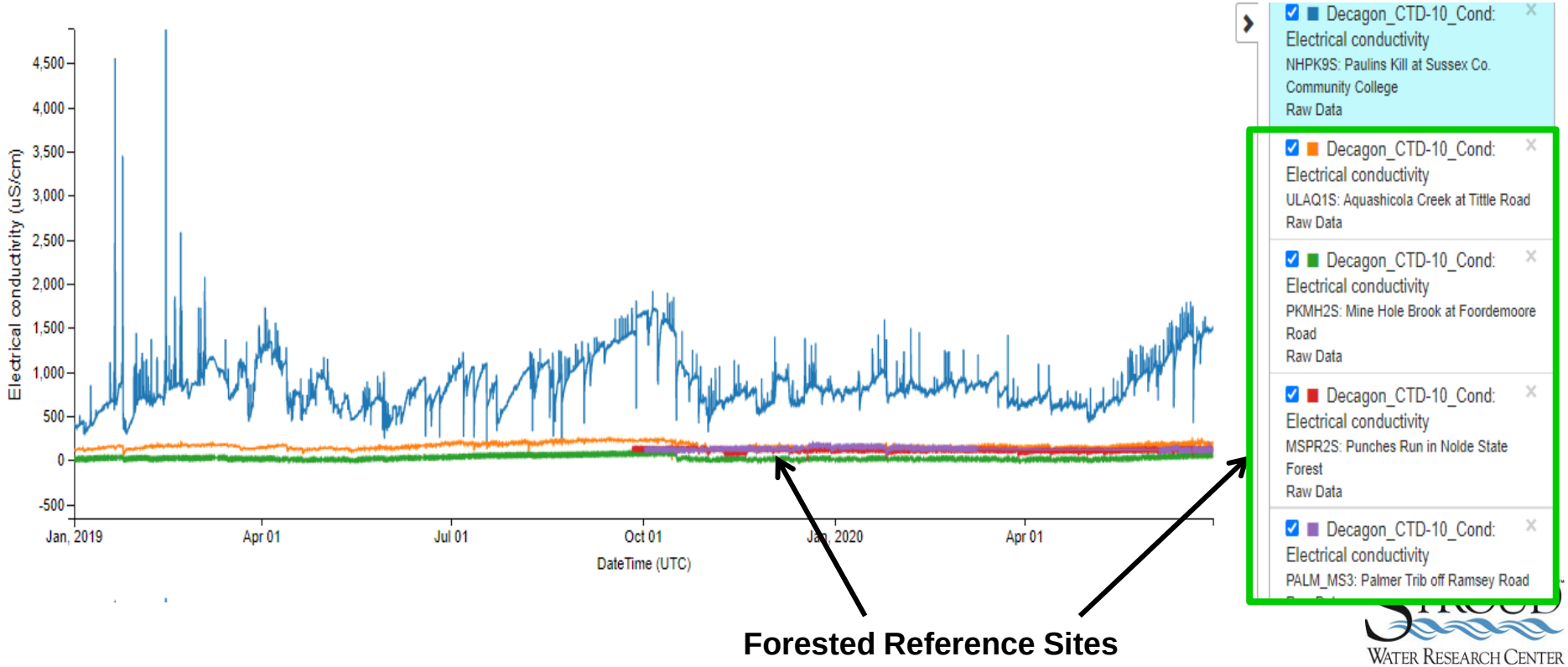
Watershed Characterization for upper Paulins Kill

Conductivity (and chloride) in relation to local forested “reference” sites



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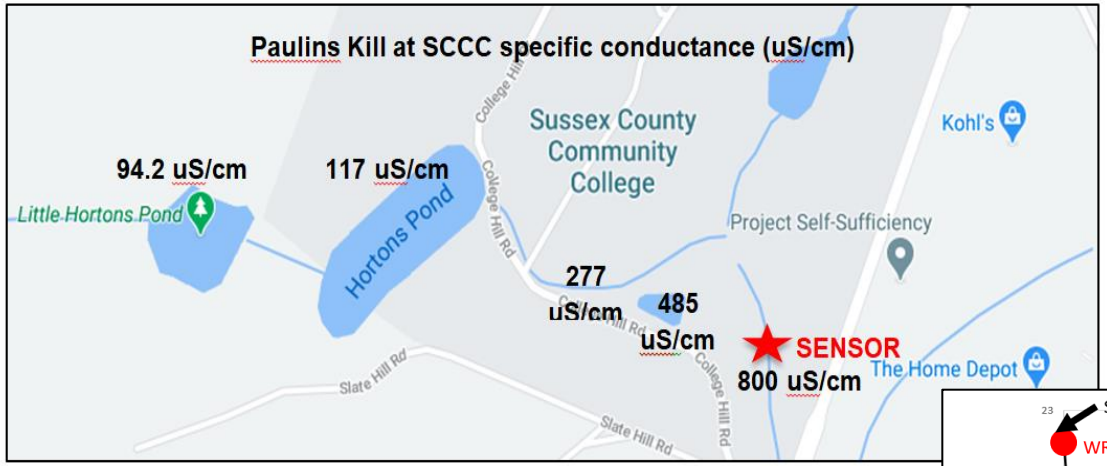
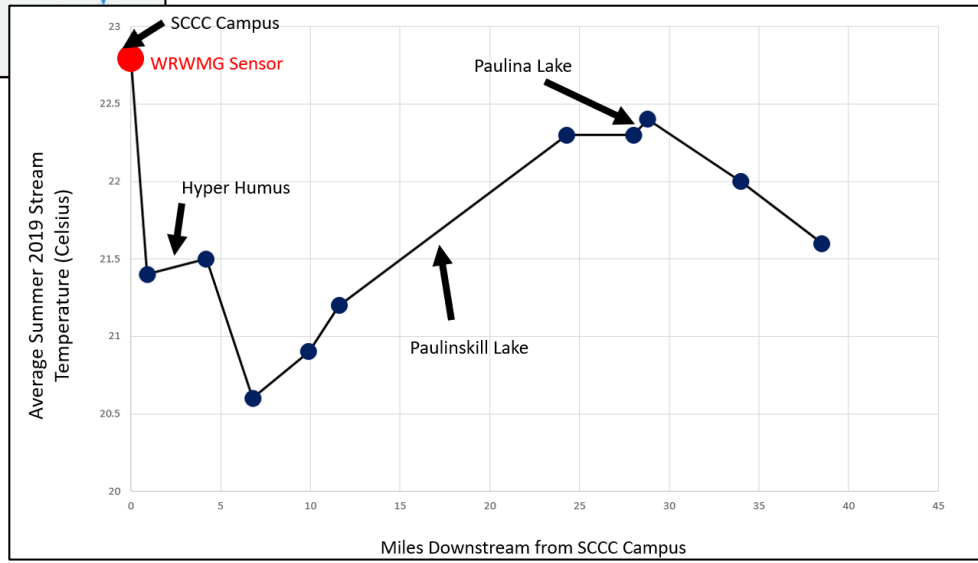
Watershed Characterization for upper Paulins Kill



Specific Conductance (uS/cm) on 11/25/20



Watershed Characterization for upper Paulins Kill

Sussex County Community College Administration: Enhanced Long-Term Planning

- Assess alternative methods for road/parking lot de-icing in the winter.
- Determine opportunities to reduce quantities of salt applied in the winter.
- Evaluate whether ponded areas are necessary or if they could be removed to reduce stream warming.

Upstream Landowners: Adjust land use to increase infiltration and reduce runoff

Local Environmental Organizations:

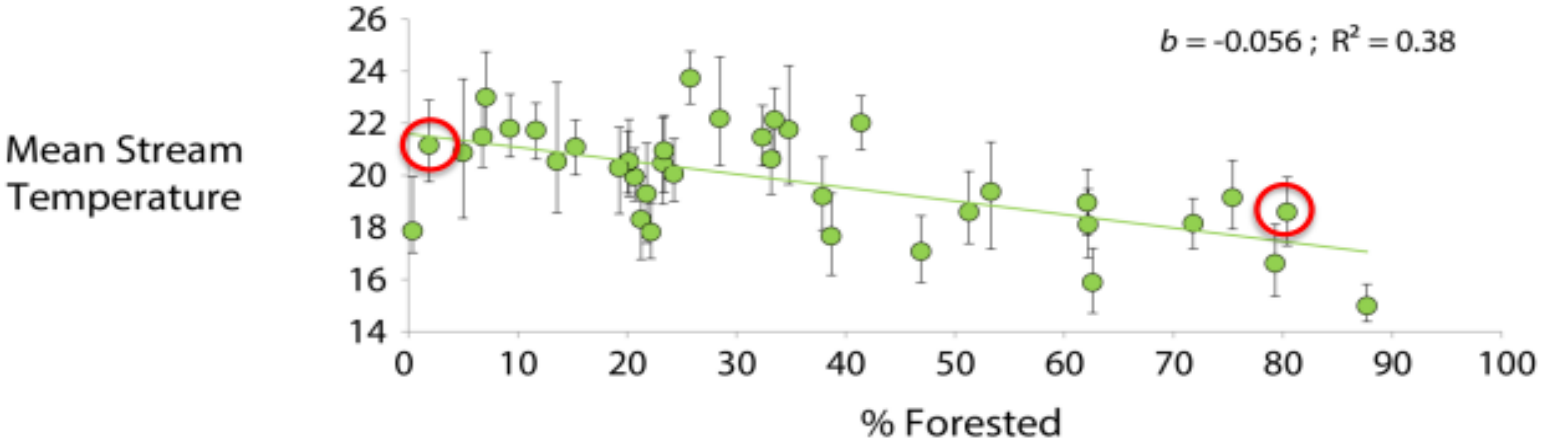
- Conduct additional water quality monitoring in the headwaters of the watershed to confirm observed trends in the data.

Newton Municipal Officials:

- Evaluate whether stronger ordinances should be enacted for stormwater management.
- Consider establishing stormwater utilities that could fund a municipal stormwater management program with the collected user fees.
- Plant trees on township-owned open space.
- Provide public information sessions to inform residents of the issue and advise how they can reduce pollution from their own properties.
- Conduct workshops that introduce solutions to area residents, e.g. rain barrel workshops

Trends in the Delaware River Basin

Forest area and stream temperature



10% forested area yields a 0.5°C decrease

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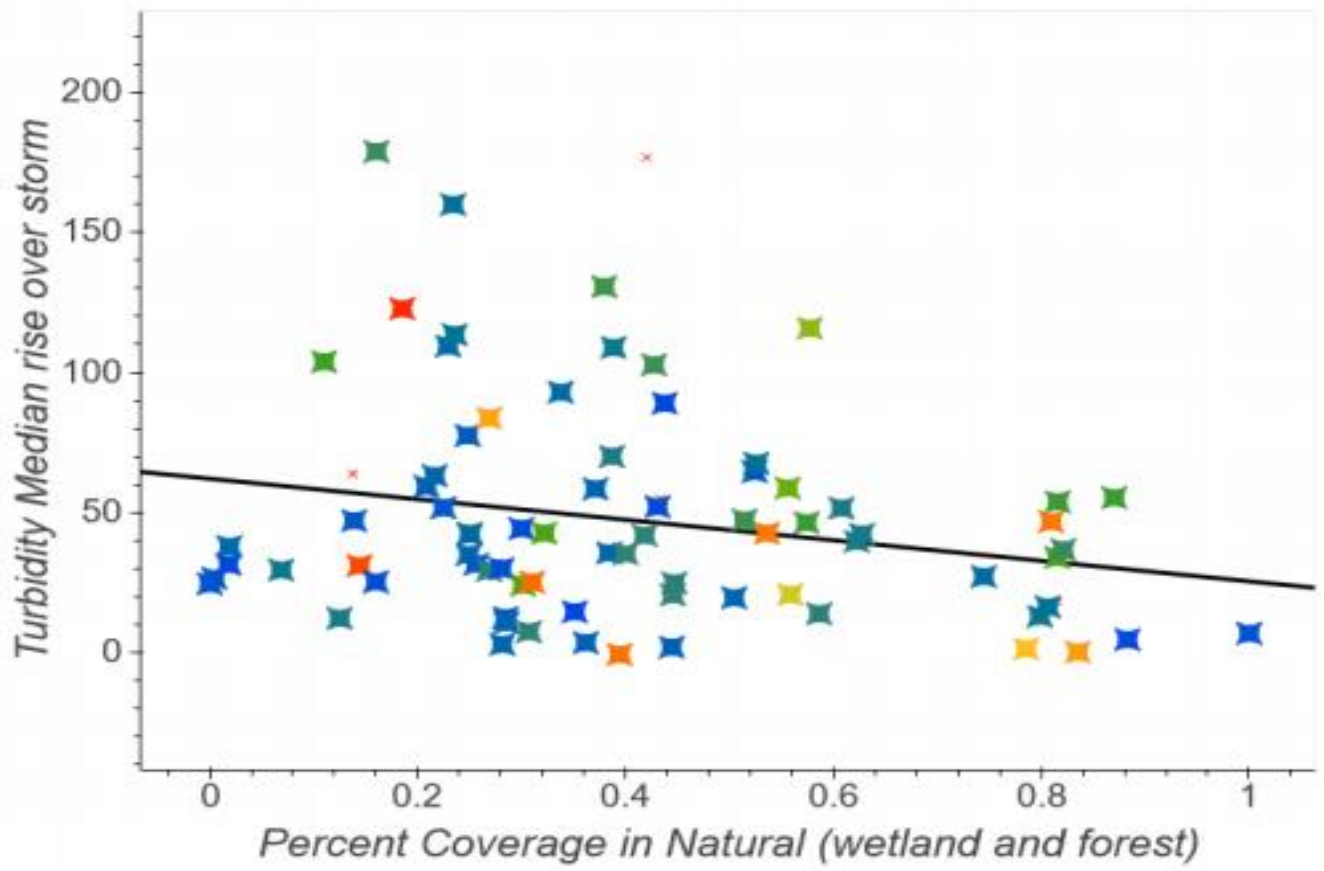
Trends in the Delaware River Basin



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Summary of example usage

- What to remember
  - Each parameter has different implications for ecology and management – understand if/how each one can be used for your purpose
  - Wide variety of uses – be clear on purpose
  - Wide variety of audiences – know who you can work with and why
  - **Main consideration: Where's the action? How will data be used? Do your best to have specific goals and your plan articulated before monitoring**

STROUD WATER RESEARCH CENTER

STATION MANAGEMENT

- Maintenance
- Quality Control
- Troubleshooting

STROUD WATER RESEARCH CENTER

Station Management

- Resources: https://wikiwatershed.org/drwi/

STROUD WATER RESEARCH CENTER

Station Management

- **Roles and Responsibilities Quick Guide** (located at https://wikiwatershed.org/drwi/)

General Resources

- EnviroDIY Field Visit Data
- EnviroDIY Monitoring Station Help Resources

Manual

- Monitoring station manual on EnviroDIY

Quick Guides

- EnviroDIY Monitoring Stations Management Roles and Responsibilities Quick Guide
- EnviroDIY Maintenance Quick Guide
- EnviroDIY Quality Control Quick Guide
- EnviroDIY Data Patterns Quick Guide
- EnviroDIY Time Zone Guide
- Understanding your EnviroDIY Monitoring Station Data

EnviroDIY™ Monitor My Watershed®

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

Contact Stroud Center support team with issues/questions (dbressler@stroudcenter.org; shicks@stroudcenter.org; 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

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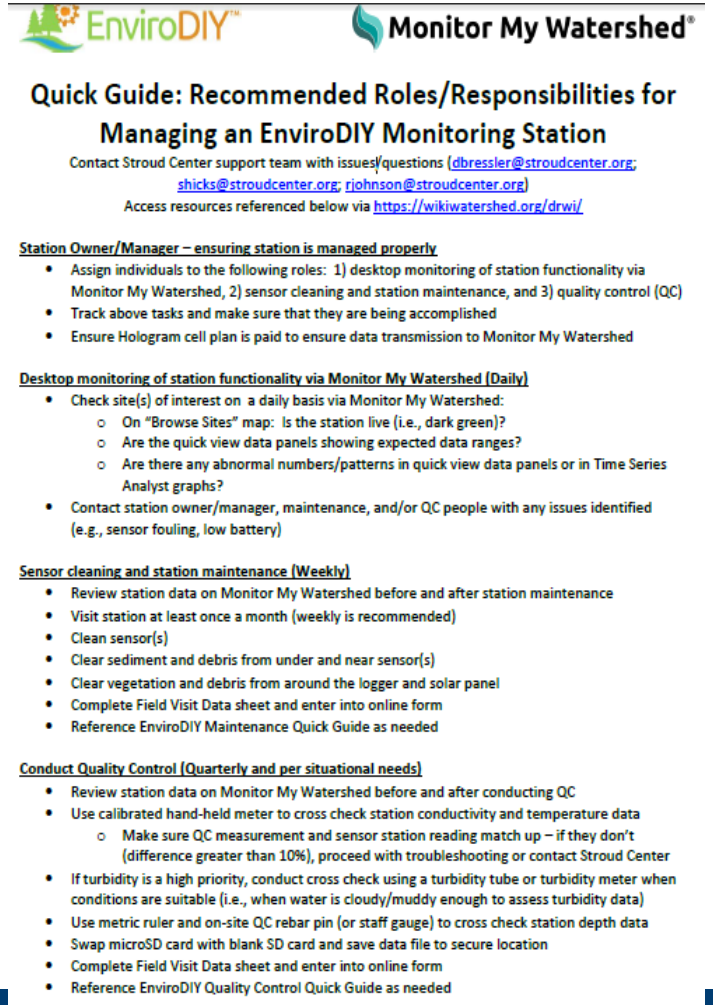
Station Management

*__A technical lead__ or at least one person with time and expertise on electronics/engineering/ etc. is ideal for ensuring sustained station functionality



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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

STROUD WATER RESEARCH CENTER

Station Management

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STROUD WATER RESEARCH CENTER

Station Management

- Roles and Responsibilities Quick Guide
  1. Management oversight – ensure functionality (below tasks completed), data usage, pay cell plane, etc.
  2. Desktop monitoring of station function – On check station function and data readings on MonitorMW **daily**
  3. Maintenance – clean sensors **once a week**
  4. Quality Control – do data cross checks **quarterly**

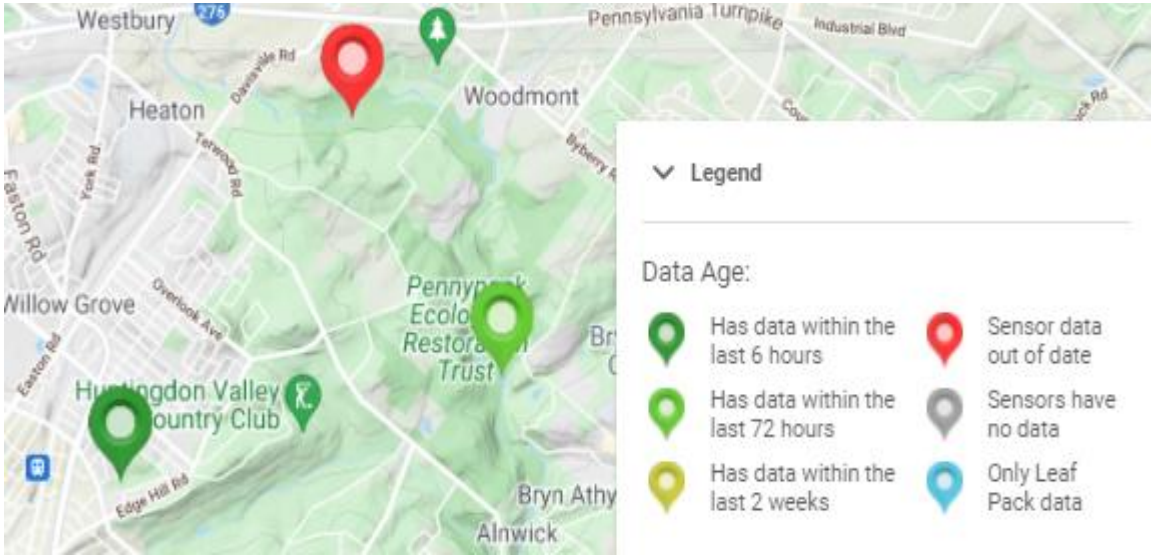
***Each role takes time – multiple people with some time or fewer people with more time**

STROUD WATER RESEARCH CENTER

Station Management

Desktop monitoring of station function (daily)

On “Browse Sites” map: Is the station live (i.e., dark green)?



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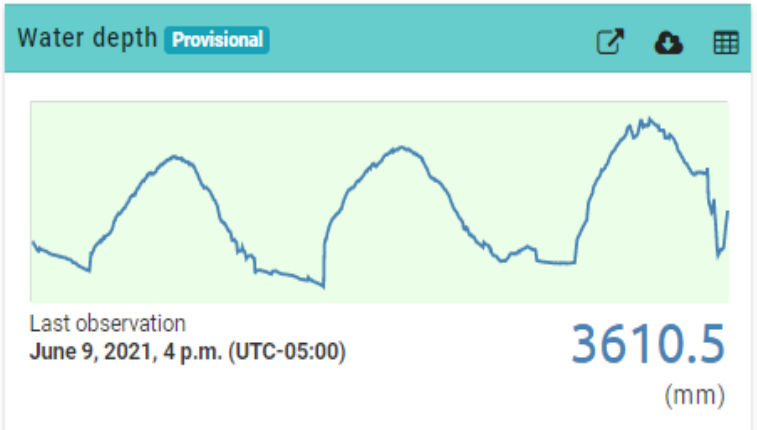
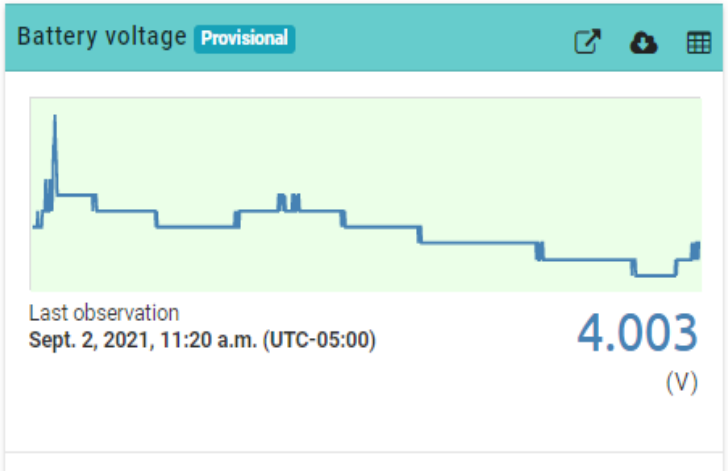
Station Management

Desktop monitoring of station function (daily)

Are the quick view data panels showing expected data ranges?





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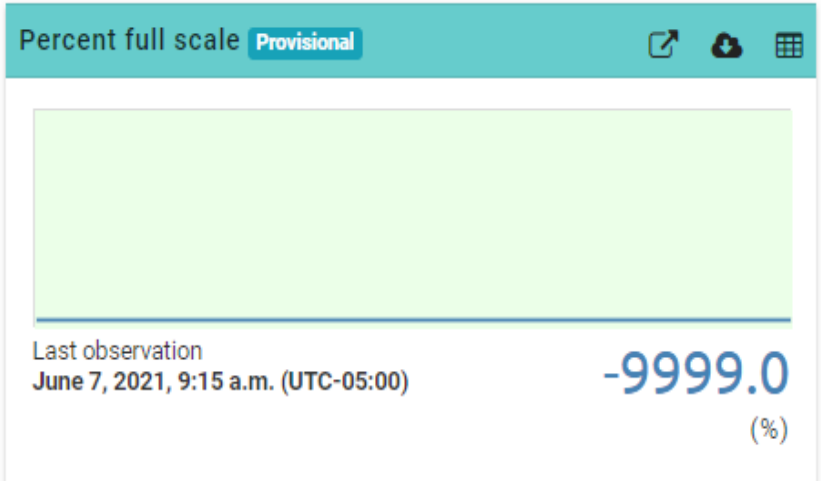
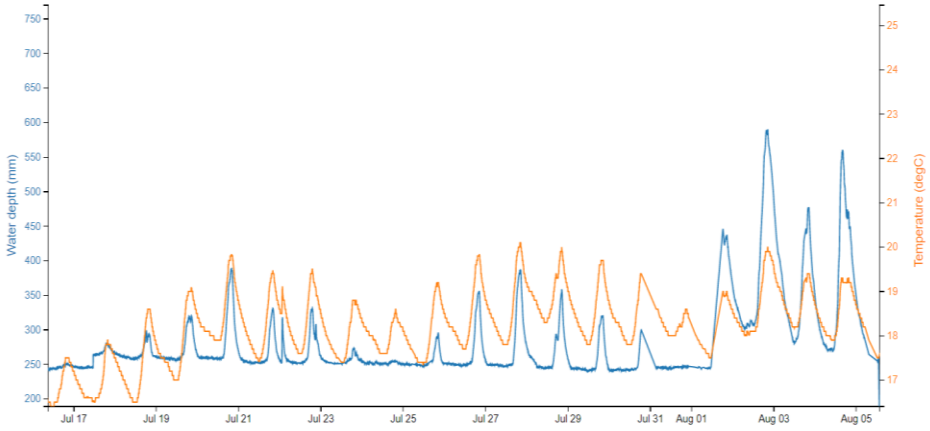
Station Management

Desktop monitoring of station function (daily)

Are there any abnormal numbers/patterns in quick view data panels or in Time Series Analyst graphs?





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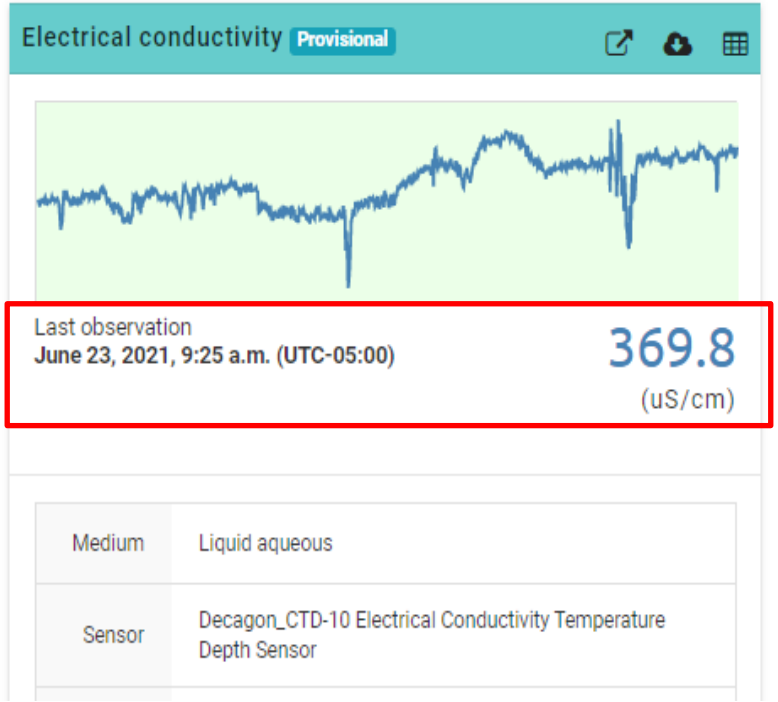
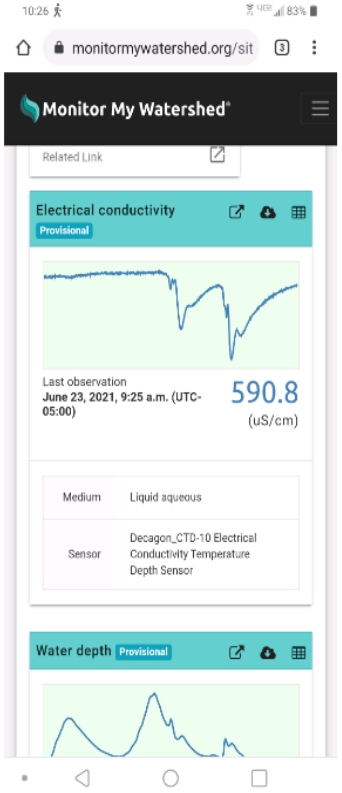
Station Management

Data panels - current readings, easy access a smart phone (important for Maintenance and Quality Control)



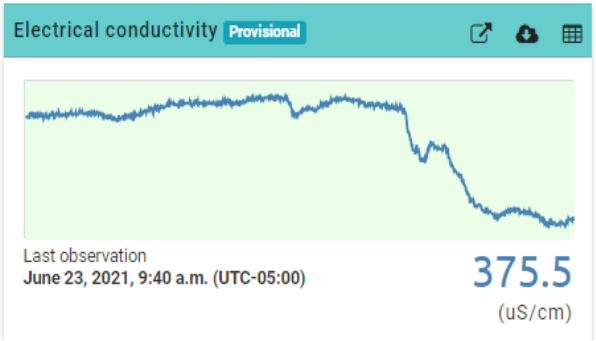


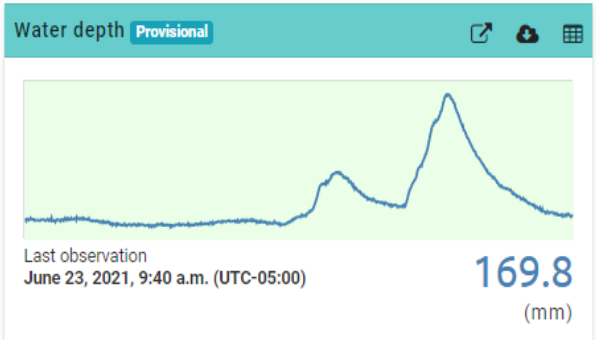
STROUD WATER RESEARCH CENTER

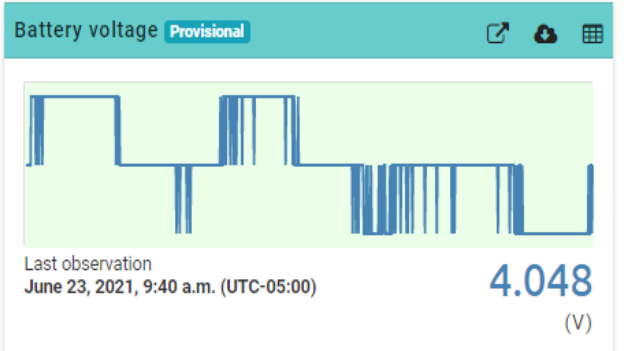
Station Management

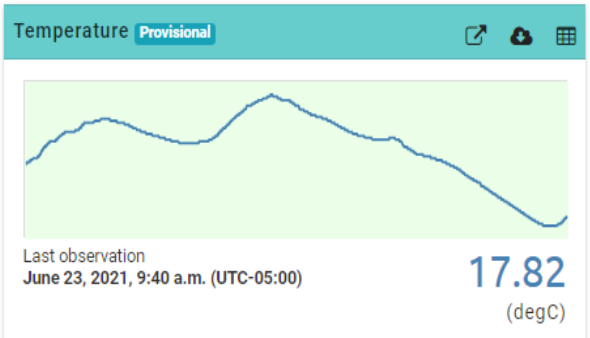
Maintenance, sensor cleaning (weekly)

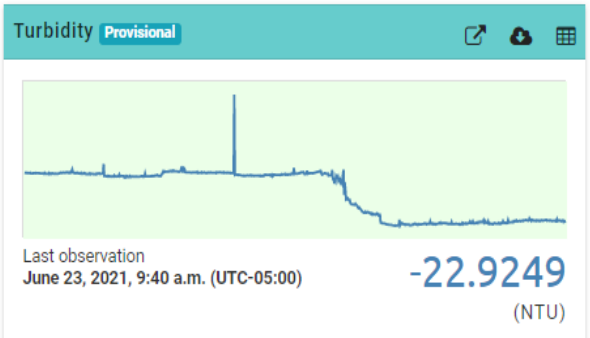
Review station data on Monitor My Watershed before and after station maintenance











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Station Management

Maintenance, sensor cleaning (weekly)

Clean sensor(s)

Photo 4. Outer body of CTD sensor before cleaning.

Photo 5. Outer body of CTD sensor after cleaning.

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Station Management

Maintenance, sensor cleaning (weekly)

Clean sensor(s)

Photo 6. Cleaning the screw heads inside the CTD sensor.

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Station Management

Maintenance, sensor cleaning (weekly)

Clear vegetation and debris from around logger box and solar panel

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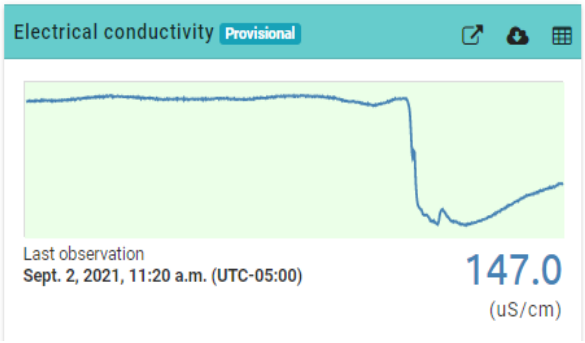
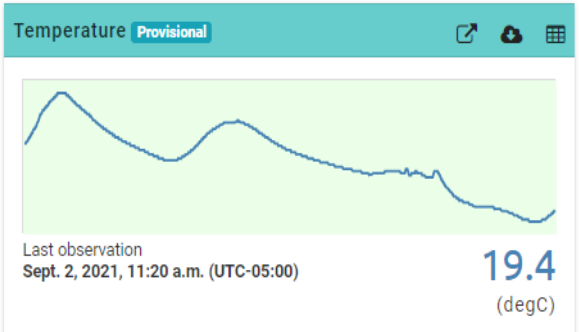
Station Management

Quality Control (quarterly)

Cross check station data using calibrated handheld meter





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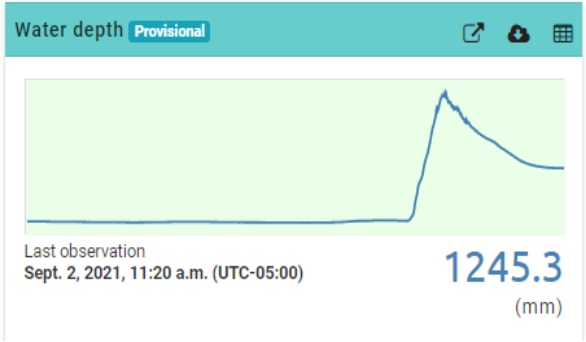
Station Management

Quality Control, data cross checks (quarterly)

Cross check station data using calibrated handheld meter



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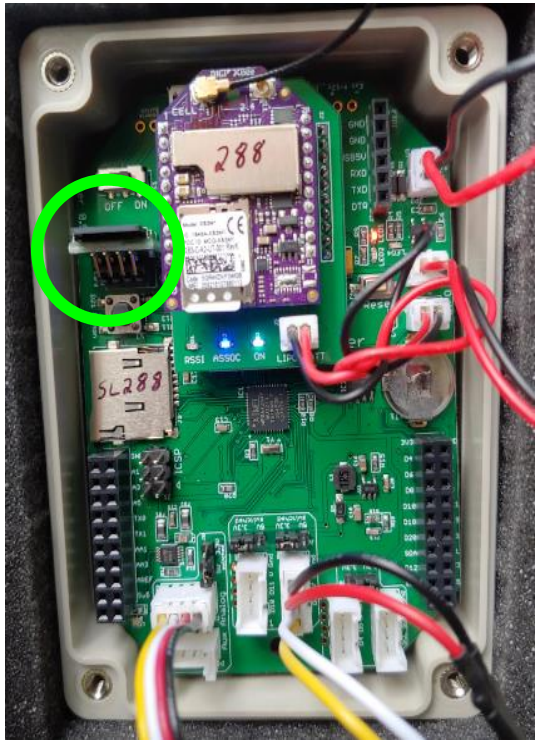
Station Management

Quality Control, back up data (quarterly)

Swap micro SD cards (generally the most secure data)



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Troubleshooting, the toughest part

Most common problems

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

STROUD WATER RESEARCH CENTER

Troubleshooting, the toughest part

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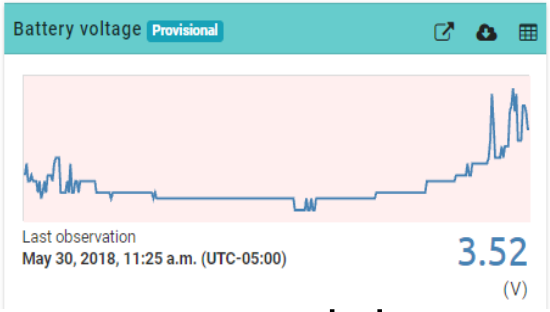
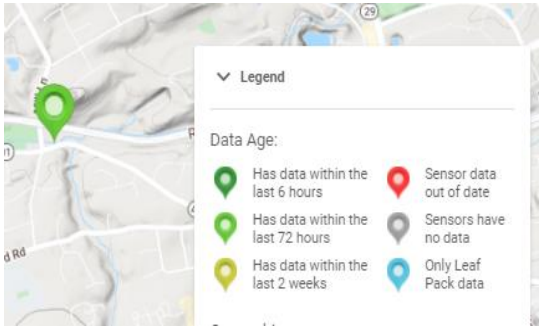
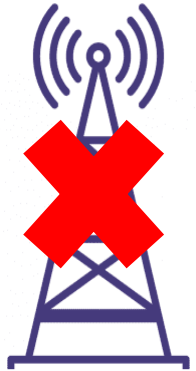




No $$

Hologram



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

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Troubleshooting – Fouling/Malfunction

<u>Most common problems</u>

2. Fouling or sensor malfunction

Fouling, possible issues

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

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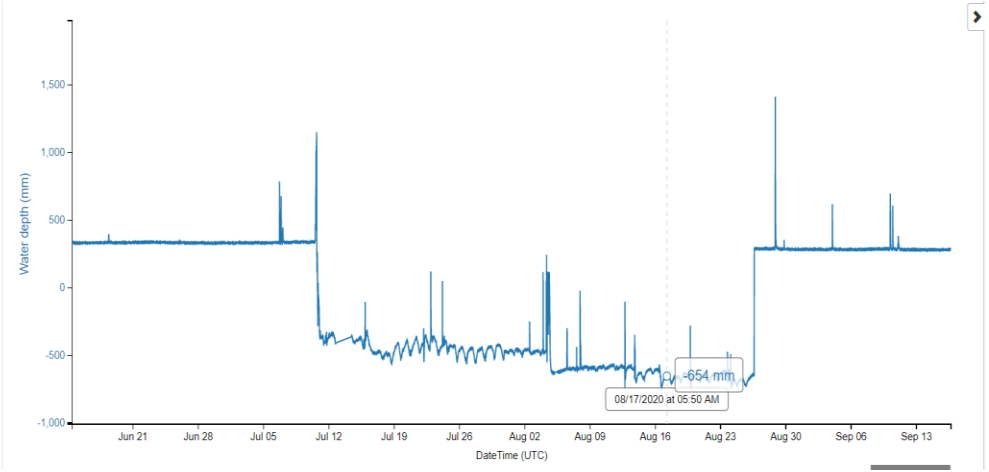
Troubleshooting, the toughest part

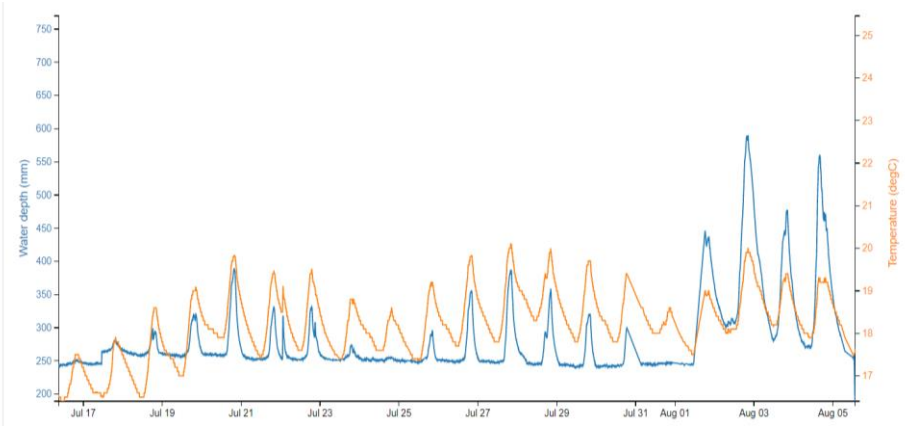
<u>Most common problems</u>

2. Fouling or sensor malfunction



Sensor malfunction, possible issues

- Negative numbers
- Abnormal correlations
- *Lots of others



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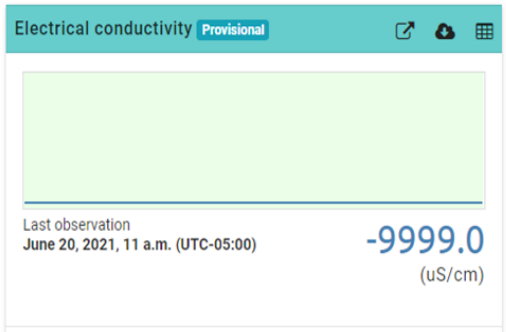
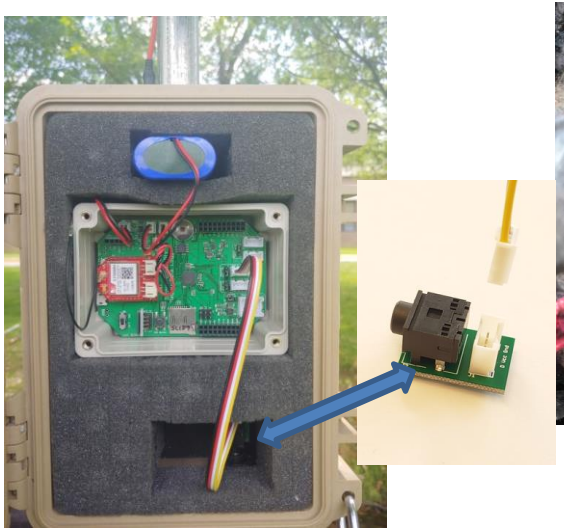
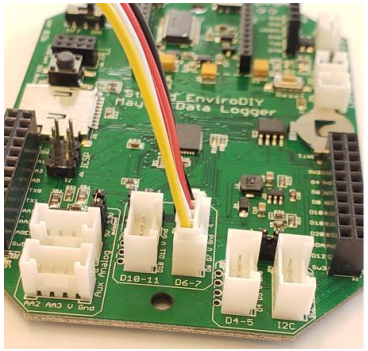
Troubleshooting, the toughest part

<u>Most common problems</u>

3. -9999 - communication problem between Mayfly and sensor







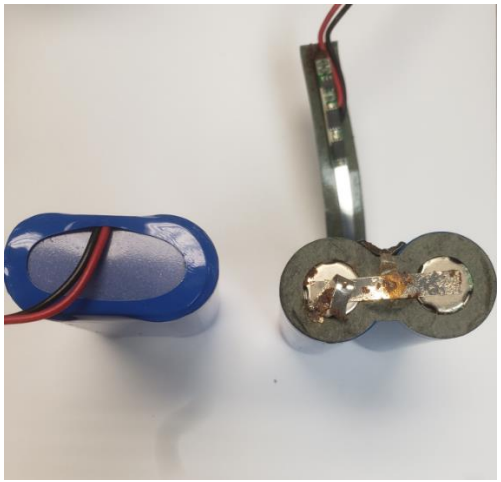
-9999, possible issues

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

Troubleshooting, the toughest part

<u>Most common problems</u>

4. Battery voltage levels



Possible issues

- Poor solar charging
- Damaged/disconnected battery
- Damage to wires
- Sensors, Cell board, or solar panel interference can drain batteries

Troubleshooting, the toughest part

Most common problems

4. Battery voltage levels

Battery charging equipment – links available at https://wikiwatershed.org/drwi/

Lithium Ion Battery Pack – 3.7V 4400mAh.

SparkFun LiPo Charger Plus.

USB 2.0 Cable A to C – 3 Foot.

USB Wall Charger – 5V, 1A (Black)

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Materials/Support/Guidance

Available at https://wikiwatershed.org/drwi/

STROUD WATER RESEARCH CENTER
www.stroudcenter.org

EnviroDIY Field Visit Data

Enter all data online: wikiwatershed.org/drwi; password: drwi

Name(s):

Site ID:	**LoggerID:**
Stream Name:	**Location:**
GPS (Lat/Long):	**Date:** **Arrival Time:** **AM/PM?** ***EST/EDT?**
Photos? Yes/No	**EST=Eastern Standard Time; EDT=Eastern Daylight Time (Daylight Savings)*
Precipitation last 24 Hours? Yes/No Amount:	**Water Clarity (Clear, Cloudy, Muddy):**
General Notes/ Photo Descriptions:	

SENSOR CLEANING (*Recommended frequency: weekly or biweekly; monthly if only CTD sensor*)

***Cleaned Sensors? Yes/No If Yes, exact time:** **AM/PM?** **EST/EDT?** **Clean >5 min. before grab sampling*

GRAB SAMPLES (*Rec frequency: Situational; for rating curves, collect when water is high/turbid or higher than normal conductivity*)

Grab Sample Taken? Yes/No	**Time collected (to minute):** **AM/PM?** **EST/EDT?**
Sample Number:	**Volume:**
Bottle Type:	**Date Shipped:**
Lab Sent To:	**Notes:**

*SENSOR STATION DATA TO MATCH WITH GRAB SAMPLE LAB RESULTS (*Complete in field or office*)

Sensor station Conductivity (uS/cm):	**Time (military):**	**Not applicable**	**Always EST**
Sensor station Turbidity (NTU):	**Time (military):**	**Not applicable**	**Always EST**

**For use in Turbidity/TSS and Conductivity/Chloride rating curve development. Record sensor station Cond and Turb data at time nearest to grab sample collection time. Can be completed in field (by accessing online data) or in office (online or download from microSD card). Acquire final grab sample lab results from Stroud Center (or lab that processed sample).*

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**
***QC Sensor Station Water Depth (mm):**	**Time:**	**AM/PM?**	**EST/EDT?**

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

EnviroDIY Monitoring Station Manual

The EnviroDIY team created the EnviroDIY Monitoring Station Manual and appendices to help you build, program, install, and manage an EnviroDIY Monitoring Station.

- To download or print a copy of this document, click on the PDF icon above the first section.
- To share a hyperlink to a particular section of this document, click on "#" at the end of the section title to get a URL to copy and paste.
- If you have a suggestion on how to improve this documentation, please follow the instructions in the "Send Us Feedback" section at the end of the manual.

Search

1. Key Terms and Links
2. Overview
3. EnviroDIY Monitoring Station
4. Preparation
5. Building

1. Key Terms and Links #

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. WikiWatershed: WikiWatershed, an initiative of Stroud℠ Water Research Center, is a web toolkit designed to help citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students advance knowledge and stewardship of fresh water. Mayfly Data Logger: User-programmable microprocessor board that is fully compatible with the Arduino IDE software; data logger used in EnviroDIY Monitoring Station SL###. EnviroDIY

Maintenance Quick Guide

Quality Control Quick Guide

EnviroDIY

STROUD WATER RESEARCH CENTER

Equipment and supply list for maintenance and quality control 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
- USB adaptor (for use when computer cannot accommodate SDHC adaptor), $10.99: https://www.amazon.com/Reader-Adapter-Micro-UHS-I-Cards/dp/B07L63Z54G
- Micro SD card and adaptor value pack (5 count), $19.65: https://www.amazon.com/PACK-SanDisk-MicroSD-SDSDQAB-008G-Packaging/dp/B00MHZ6ZJQ

Power:

- Lipo Charger, PRT-15217, $9.95:
  - https://www.sparkfun.com/products/15217

Videos

- Programming and Building an EnviroDIY Mayfly Monitoring Station
- Installing an EnviroDIY Mayfly Monitoring Station
- Maintaining and Enhancing an EnviroDIY Mayfly Monitoring Station
- Troubleshooting an EnviroDIY Mayfly Monitoring Station
- Measuring and Predicting Discharge and Chloride and/or Sediment Loads
- Webinars

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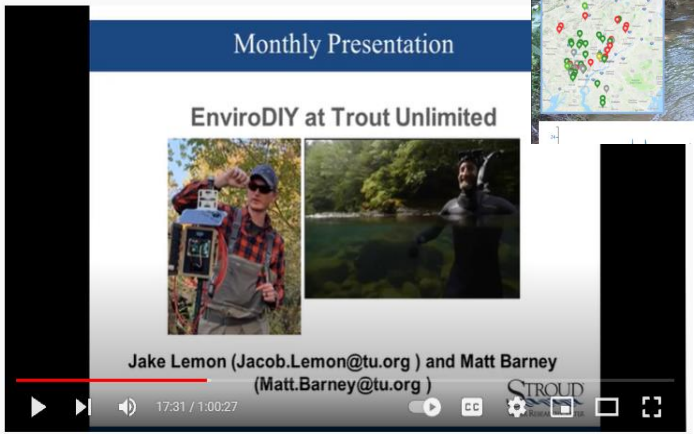
Materials/Support/Guidance

Available at https://wikiwatershed.org/drwi/

Meetings, Workshops, and Conferences

- Monthly EnviroDIY-DRWI User Group Meetings
- User Support Workshops and Trainings
- Conference Presentations
- Watershed Ecology Workshops



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IN SUMMARY FOR TODAY

- Be clear on your purpose, goals, plans for the data
- Good data require good maintenance
- Volunteers are great support
- Plenty of guidance materials

- **Job has just started once you have data – what to do with it?**
  - **Analysis/interpretation/communication**

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Thank You!

Stroud Water Research Center, EnviroDIY-DRWI contacts:

- David Bressler, dbressler@stroudcenter.org, 410-456-1071
- Shannon Hicks, shicks@stroudcenter.org, 610-268-2153 x1267
- Rachel Johnson, rjohnson@stroudcenter.org, 973-557-8995
- Christa Reeves, christa@musconetcong.org, 908-537-7060

Master Watershed Stewards, EnviroDIY-DRWI contacts:

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

On to George!!!

Stroud Water Research Center

Notes

Schedule
Day 1 (Oct 5), 8:40-10:10
EnviroDIY program, website, costs, programming, building, install etc.- 8:40-9:30,
Ensign/Bressler/Nolan (important - why do this? How will it help? describe types of problems it can help solve, examples - kent ag bmps, first state protect natural resource, wc trying to contribute to urban pollution convo; importance of time and personnel to keep function)
Ensign (EnviroDIY, website, costs) - 8:40-8:55
Bressler (programming, building, installing) - 8:55-9:30
Cheryl Nolan case study (building) - 9:30-9:50
Questions 9:50-10:10
Day 2 (Oct 6), 8:35-10:05
EnviroDIY management and MonMW - 8:35-9:45,
Bressler - 8:35-9:25 (important - why do this? How will it help? describe types of problems it can help solve, examples - kent ag bmps, first state protect natural resource, wc trying to contribute to urban pollution convo; importance of time and personnel to keep function)
George Seeds case study (managing) - 9:25-9:45
Questions 9:45-10:05

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Short list of examples of station usage – turn thesinto additional slide

- **Examples of work being done** (see https://wikiwatershed.org/drwi/#project-updates):
  - Musconetcong and NJ TU – flow/WWTP effluent; temperature and brook trout
  - DE TNC/First State NHP – pollution into national park
  - East Stroudsburg Univ – DRWI PKC cluster; class work
  - Watershed Hydrological Analysis Team – stormwater and sediment
  - White Clay Wild Scenic – working with municipalities
  - Wallkill and Lopatcong – Watershed Characterization collaboration, local decision makers
  - TNC NJ – Paulins Kill temperature and sediment from dams
  - Deerpark Rural Alliance – Dragon Springs development pollution, Basha Kill monitoring
  - Brodhead Watershed Assoc – salt sleuthing and municipal infractions on Forest Hill Run
  - West Chester Univ – salt from WCU and WC borough
  - Primrose Creek Watershed Assoc – quarry monitoring

Include map

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