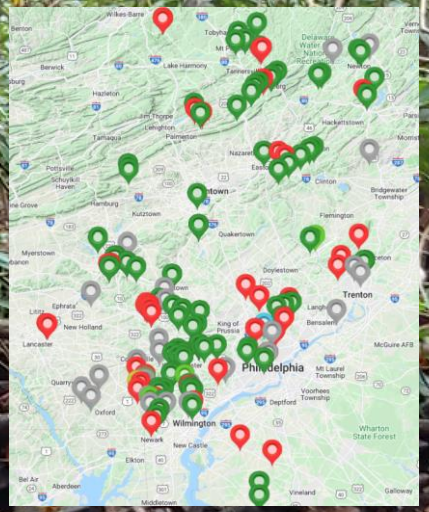
WELCOME!

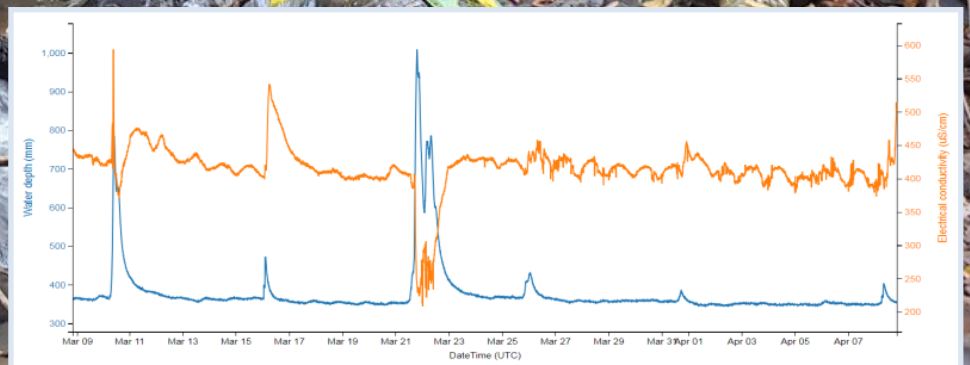
Monthly EnviroDIY in the DRB User Group Meeting

Online, Thursday March 17, 2022, 2:30-3:30p

EnviroDIY



Monitor My Watershed®



STROUD WATER RESEARCH CENTER

Zoom Orientation

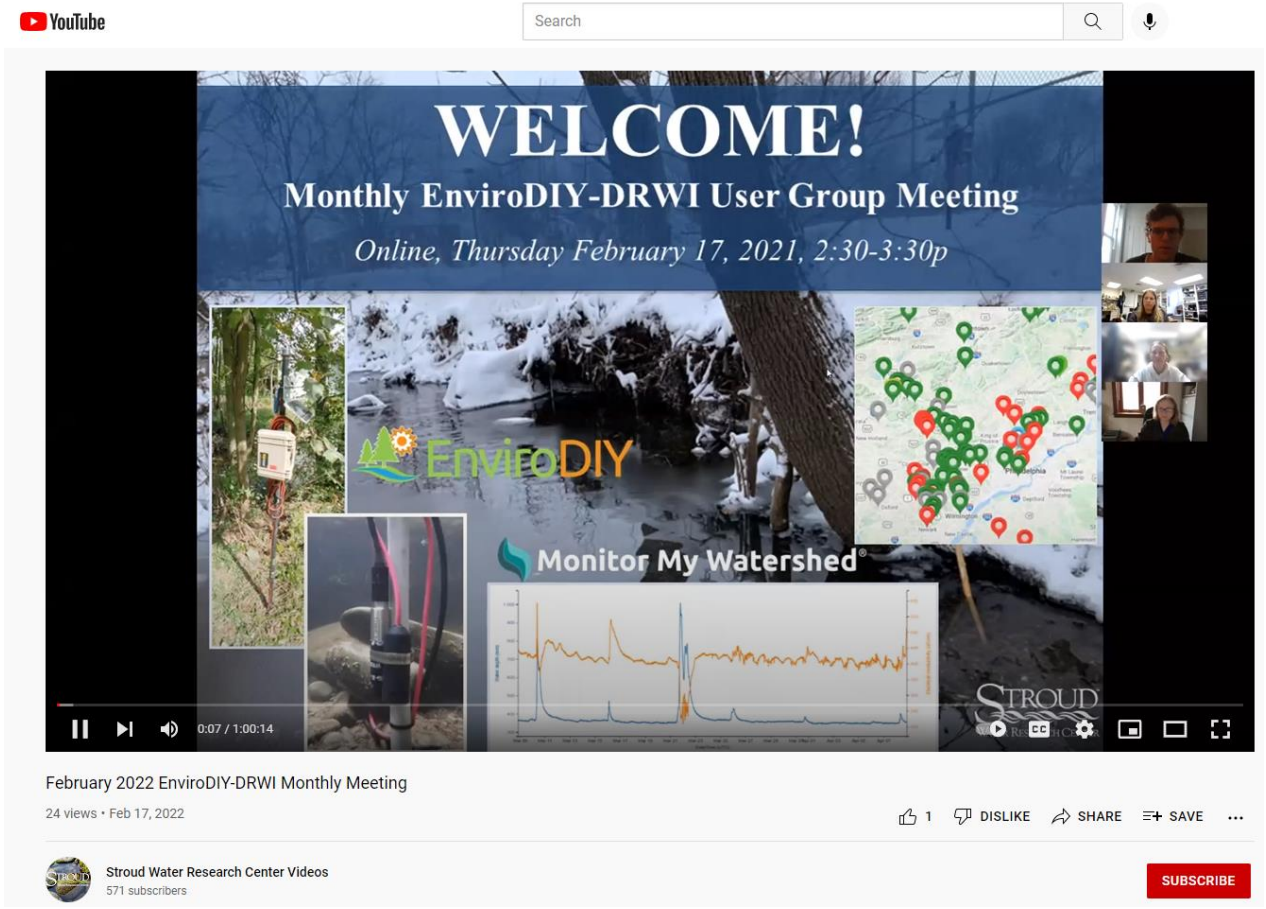
*Meeting is being recorded

***Mute unless asking question**

STROUD WATER RESEARCH CENTER

These Monthly Meetings

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



STROUD WATER RESEARCH CENTER

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**

STROUD WATER RESEARCH CENTER

REMINDER

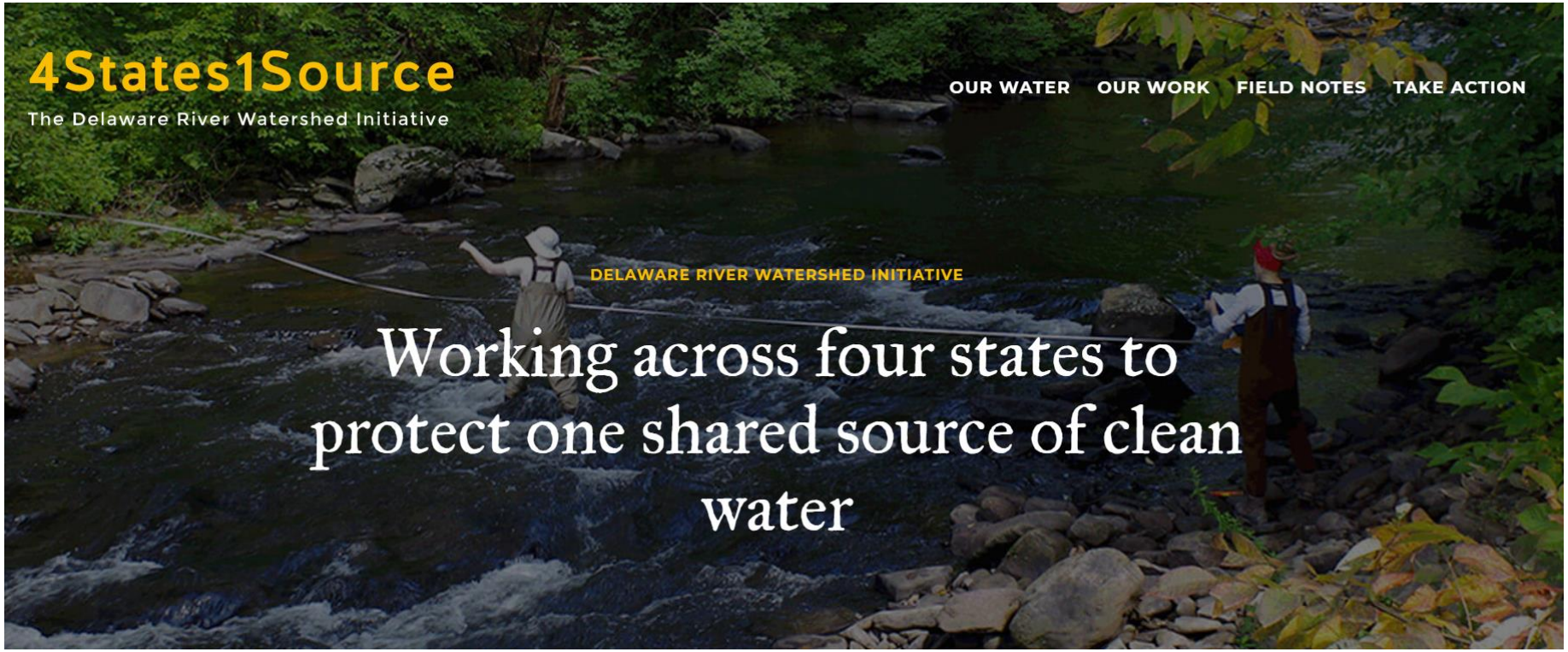
- Attendees include:
  - Groups working in Delaware River Watershed Initiative (DRWI)
  - Groups working in Delaware River Basin (DRB) but not DRWI
  - Folks from outside the DRB

- Stroud Center support via DRWI and C-SAW

STROUD WATER RESEARCH CENTER

Delaware River Watershed Initiative (DRWI)

https://4states1source.org/



STROUD WATER RESEARCH CENTER

C-SAW

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

What is C-SAW?

The Consortium for Scientific Assistance to Watersheds (C-SAW) is a team of specialists who provide *free* organizational and scientific technical assistance to Pennsylvania-based watershed and conservation organizations.

> *C-SAW does not conduct watershed monitoring or assessments. Instead, C-SAW helps watershed organizations do a better job with their own monitoring and assessments.*

STROUD WATER RESEARCH CENTER

Goals for these monthly meetings

- **Time to check-in, ask questions, report issues, network, etc.**
- **Updates** from the Stroud Center
- **Presentations**
  - **Station Owner/Manager Presentations** – communicate about individual situations, local watershed work
  - **Focus Topic Presentations** – guest presenters talk about technical/ecological/other focus topics

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

STROUD WATER RESEARCH CENTER

Stroud Center project personnel

Stroud Center Facilitators:

David Bressler

Project facilitator

Rachel Johnson

Research Engineer Technician

Christa Reeves

Northern DRB technician and organization collaborator

Shannon Hicks

Research Engineer, Mayfly and EnviroDIY Inventor/Designer

STROUD WATER RESEARCH CENTER

Stroud Center project personnel

Master Watershed Steward Facilitators:

Carol Armstrong

George Seeds

Master Watershed Steward Program

PennState Extension

Stroud Water Research Center

Stroud Center project personnel

Stroud Center DRWI Leads:

Dr. John Jackson

Senior Research Scientist

Matt Ehrhart

Director of Watershed Restoration

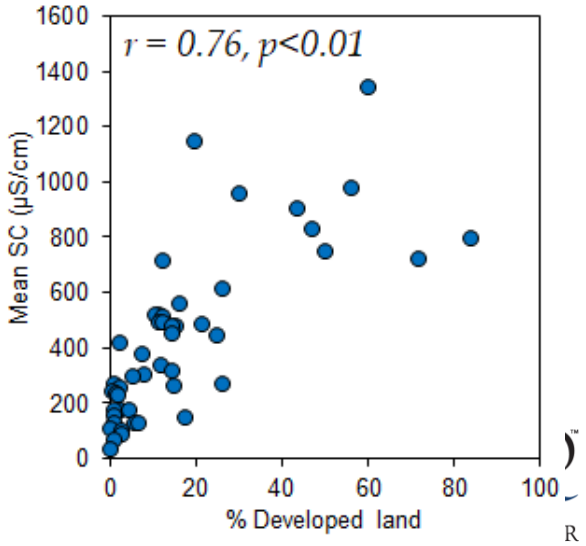
Dr. David Arscott

Executive Director, President
Research Scientist

STROUD WATER RESEARCH CENTER

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



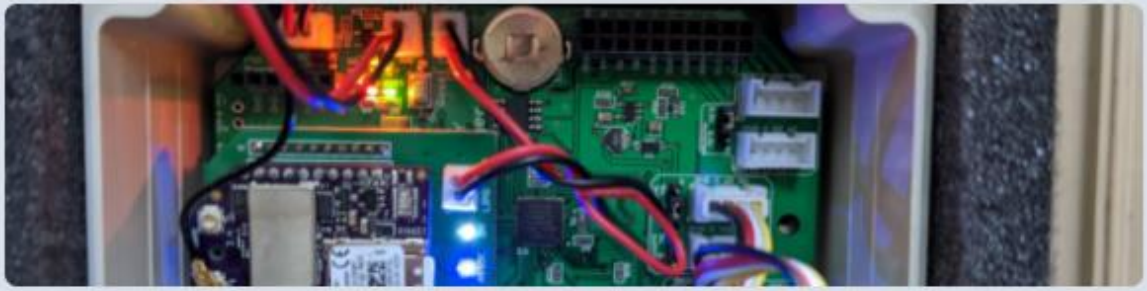
Today's Agenda

1. Introduction
2. Stroud Updates
3. Presentations:
   - Survey results
     - Csci and monitoring terminology
     - Salt in tap water results
     - Winter storm salt grab sample prelim results (winter storms)
   - EnviroDIY technology updates – Shannon Hicks
4. Discussion
5. Conclusion

STROUD WATER RESEARCH CENTER

Stroud Center Updates

- Reminder to request assistance via the EnviroDIY Service Request Form
  - https://wikiwatershed.org/drwi/



EnviroDIY Monitoring Station Service Request Form

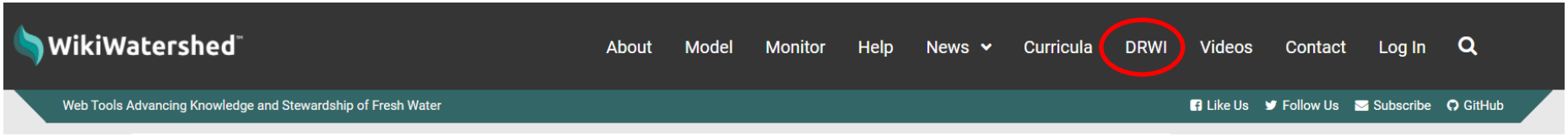
Please complete this form with as much information as possible to assist Stroud Water Research Center technicians in troubleshooting your problem. For extremely urgent issues please contact the Stroud Center team directly (rjohnson@stroudcenter.org; shicks@stroudcenter.org; dbressler@stroudcenter.org).

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

STROUD WATER RESEARCH CENTER

Stroud Center Updates

- Reminder on resources available at https://wikiwatershed.org/drwi/
- https://wikiwatershed.org



Use the links below to jump to a specific section of this page.

General Resources

- EnviroDIY Field Visit Data
- EnviroDIY Monitoring Station Help Resources
- Salt Monitoring Resources
- Data and Data Visualization Resources
- Volunteer Management Guidance Materials
- WikiWatershed Toolkit
- Project Updates

Meetings, Workshops, and Conferences

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

EnviroDIY Field Visit Data

EnviroDIY Field Visit Data Form (Online)

STROUD WATER RESEARCH CENTER

Any questions before we move on?

Monthly Presentations

- Survey results
  - Csci and monitoring terminology
  - Salt in tap water results
  - Salt grab sample results (winter storms)

- EnviroDIY technology updates – Shannon Hicks

CSci and Monitoring Terminology Survey

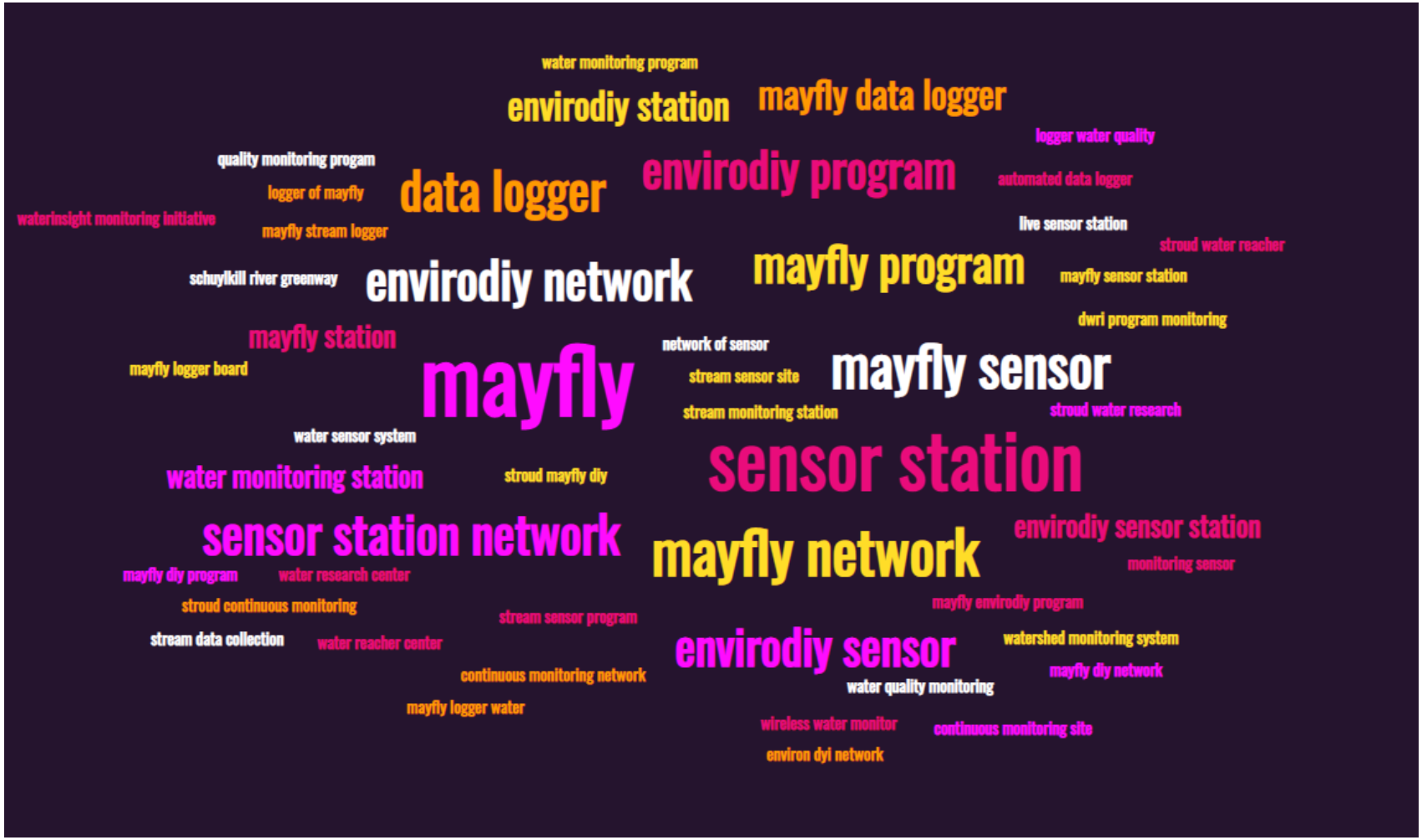
Stroud Water Research Center
Monitoring Terminology Survey

- What words and phrasing do you currently use when referring to the continuous monitoring stations that are distributed throughout the Delaware River basin?
- Do you have suggestions for what this group of stations and other monitoring activities could be called?
- What words and phrasing do you currently use in referring to watershed monitoring efforts done by watershed groups and volunteers?
- If you had your choice, what do you think is the best, most descriptive terminology to describe citizen/community/volunteer/public monitoring efforts?

STROUD WATER RESEARCH CENTER

CSci and Monitoring Terminology

- What words and phrasing do you currently use when referring to the **continuous monitoring stations** that are distributed throughout the Delaware River basin?



https://monkeylearn.com/word-cloud/result

CSci and Monitoring Terminology

- Do you have suggestions for what this **group of stations and other monitoring activities** could be called?

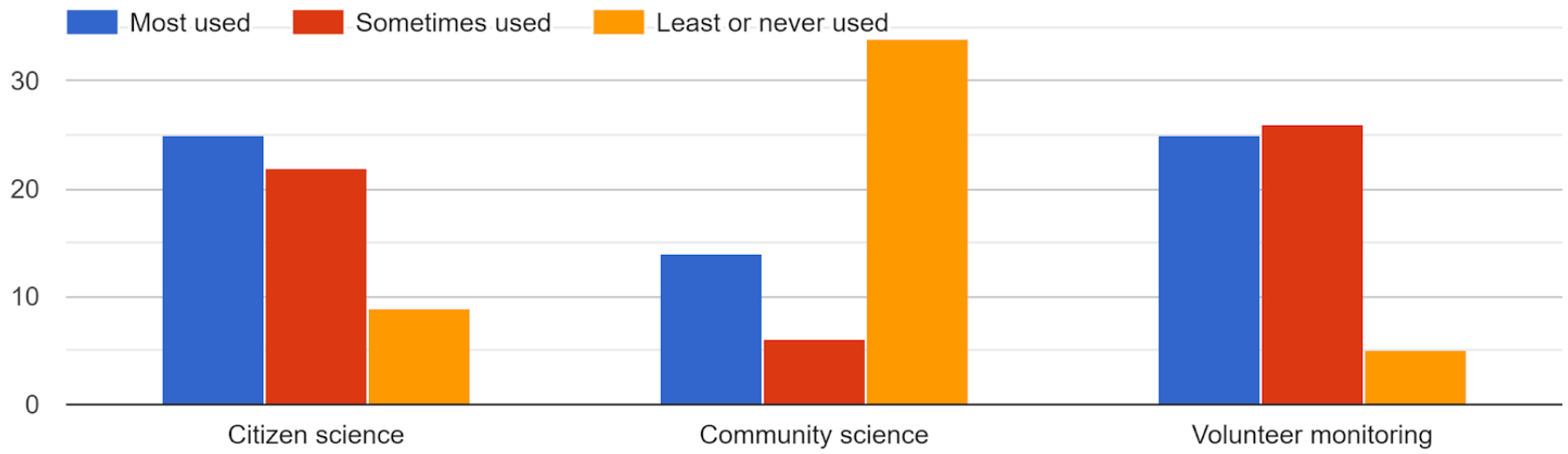
Continuous monitoring network	EnviroDYI DRW network
DelaRiver? DelaBasin?	Delaware Basin Mayfly Monitoring Network
Delaware River Basin Citizen Science Monitoring Network	Impact study
Delaware River Basin Stream Water Quality Monitoring Network (DWBSWQMN)	Mayfly is a perfect appellation for the whole system, or any part of it.
Delaware River Basin Water Quality Coalition	Mayfly Stream Stations
Delaware River Basin water quality monitoring partnership	Monitoring network comprised of mayfly stations
Delaware River EnviroDYI Network	Delaware Water Quality Network
Delaware River water quality monitoring	Something with Stroud in the name!
Delaware River Watershed Community Stream Monitoring Program	Stream Pulse Monitors
Delaware River Watershed Water Quality Assurance	Stroud Center water monitoring program for the Delaware River Basin
Delaware watershed	Stroud Continuous Water Monitoring
DRB Enviro DIY program, or DRB Mayfly program sound good to me	Stroud EnviroDIY Mayfly Logger Water Quality Monitoring Progam
DRB EnviroDIY sensor network	Stroud Mayfly Water Quality Sensors (for the Delaware River Watershed)
DRB Mayfly Water Quality Network	Stroud Supported Delaware River Basin Monitoring Program
DRB Monitoring Network	Stroud's DRB Watershed Monitoring Program
DRB monitoring stations	StroudSense in the DRB
DRB stream monitoring network	Water Data
DRB/Stroud Data Stations	Water Quality Agents of the Delaware River Basin
EnviroDIY Network	

"Environmental work needs to rethink language...not that it should be advertising sloganeering...but sharper, less encumbered." -survey participant

STROUD WATER RESEARCH CENTER

CSci and Monitoring Terminology

- What words and phrasing do you currently use in referring to **watershed monitoring efforts done by watershed groups and volunteers**? (multiple choice)



STROUD WATER RESEARCH CENTER

CSci and Monitoring Terminology

- If you had your choice, what do you think is the best, most descriptive terminology to describe **citizen/community/volunteer/public monitoring efforts**?

Survey participant: *I think "volunteer monitoring" fell out of favor because "citizen science" was a sexier alternative, but the use of the word "citizen" is problematic in itself. It is generally accepted that the terms above mean different things, where citizen science is top down and volunteer monitoring is bottom up. We typically say "Community Water Monitoring" to encompass both ideas. Check out this article in Science that expounds on just how confused we all are: https://www.science.org/doi/epdf/10.1126/science.abi6487*

https://monkeylearn.com/word-cloud/result

STROUD WATER RESEARCH CENTER

CSci and Monitoring Terminology

Cooper et al., 2021. Inclusion in citizen science: The conundrum of rebranding. Science 372, 1386 https://www.science.org/doi/epdf/10.1126/science.abi6487

DIVERSITY

Inclusion in citizen science: The conundrum of rebranding

Does replacing the term "citizen science" do more harm than good?

By Caren B. Cooper, Chris L. Hawn, Lincoln R. Larson, Julia K. Parrish, Gillian Bowser, Darlene Cavalier, Robert R. Dunn, Mordechai (Muki) Haklay, Kaberi Kar Gupta, Na'Taki Osborne Jelks, Valerie A. Johnson, Madhusudan Katti, Zakiya Leggett, Omega R. Wilson, Sacoby Wilson

As the scientific community, like society more broadly, reckons with long-standing challenges around accessibility, justice, equity, diversity, and inclusion, we would be wise to pay attention to issues and lessons emerging in debates around citizen science. When practitioners first placed the modifier "citizen" on science, they intended to signify an inclusive variant within the scientific enterprise that enables those without formal scientific credentials to engage in authoritative knowledge production (*1*). Given that participants are overwhelmingly white adults, above median income, with a college degree (*2*, *3*), it is clear that citizen science is typically not truly an egalitarian variant of science, open and available to all members of society, particularly those underrepresented in the scientific enterprise. Some question whether the term "citizen" itself is a barrier to inclusion, with many organizations rebranding their programs as "community science." But this co-opts a term that has long referred to distinct, grassroots practices of those underserved by science and is thus not synonymous with citizen science. Swapping the terms is not a benign action. Our goal is not to defend the term citizen science, nor provide a singular name for the field. Rather, we aim to explore what the field, and the multiple publics it serves, might gain or lose by replacing the term citizen science and the potential repercussions of adopting alternative terminology (including whether a simple name change alone would do much to improve inclusion).

A more fruitful way forward, rather than focusing on name changes, is to focus on approaches that increase inclusion—that is, to enable all people to feel that the identity they hold belongs and authentically influences the culture, values, and future of the field. To lend weight to those approaches, we recommend increases in funding for community science and the subset of citizen science and science more generally that address the interests, concerns, and needs of members of society historically and currently underserved by science.

CO-OPTING LANGUAGE

The term citizen science has come to have two intertwined meanings. The original, narrower definition, coined in the mid-1990s, refers to projects led by institutions guiding decentralized data collection by volunteers often unknown to each other yet sharing the common goal of advancing scientific research (*1*). These projects number in the thousands, and even a single project can engage millions of people (*4*). The second definition arose later as a kind of "big tent" concept to refer to highly varied projects across many disciplines

CSci and Monitoring Terminology

- Stroud Water Research Center current terminology decisions, per survey and internal discussions:
  - The general work: **"Community Science"**
    - Explanation:
      - In the U.S. "citizen" can imply exclusivity according to legal status
      - "Volunteer" does not include professionals, which are also a part of CScience
  - The current network: **"EnviroDIY in the Delaware River Basin"**
    - No consensus, so remains "EnviroDIY in the DRB" until consensus can be reached (possibly as network expands beyond EnviroDIY)

STROUD WATER RESEARCH CENTER

Salt in tap water survey

Instructions – Delaware River Basin Survey of Salt in Tap Water

Overview
The following is a protocol for documenting salt levels in tap water as represented by the concentration of chloride ions (Cl^-). Measuring electrical conductivity is also recommended as it can provide additional explanatory information and is directly related to chloride concentration. Questions? Contact David Bressler (dbressler@stroudcenter.org)

Equipment/Supplies
- Chloride QuanTab® Test Strips, 30-600 mg/L or other chloride measurement method
- Conductivity meter (e.g., Hanna DiST®3 Waterproof EC Tester)
- Conductivity meter calibration solution (e.g., 1413 µS/cm Conductivity Standard)
- Data entry form: Delaware River Basin Survey of Salt in Tap Water

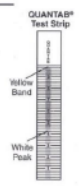
Method
The basic method:
1. Acquire some tap water from a house or building/office. *Note: if a water softener is being used, please take the sample from an outdoor tap that is not treated with the softener.
2. Measure chloride using test strip (or other method; note method below is for Hach QuanTab strips).
3. Measure conductivity (make sure to calibrate the meter beforehand).
4. Enter this information along with the address of the tap water location and water source information into the data entry form (to find the source of your water check your local water utility's website).
5. After you submit the data form you will receive a confirmation email with a record of your data and with a link for viewing all data that have been submitted, viewable as a spreadsheet. Summary graphs and maps may be available at a later date.

Chloride strip usage: Follow directions provided by the manufacturer (on back of bottle). The basic process is to stand a test strip vertically in about an inch of tap water (in any plastic or glass container), wait several minutes for the horizontal yellow line at the top of the strip to turn black, then read the test strip and use the chart to translate results into a chloride concentration (mg/l). Note that the chart conversions may vary slightly between bottles.

Black line at top indicates strip is ready to be read

Chloride level, at peak of white gradient

Quantab Units	%NaCl	ppm(mg/L) Cl^-	Quantab Units	%NaCl	ppm(mg/L) Cl^-
1.2	0.005	29	4.6	0.034	205
1.4	0.006	35	4.8	0.036	221
1.6	0.007	42	5.0	0.039	239
1.8	0.008	49	5.2	0.042	257
2.0	0.009	56	5.4	0.045	276
2.2	0.011	64	5.6	0.049	296
2.4	0.012	73	5.8	0.052	318
2.6	0.013	82	6.0	0.056	341
2.8	0.015	91	6.2	0.060	365
3.0	0.017	101	6.4	0.065	391
3.2	0.018	112	6.6	0.069	419
3.4	0.020	123	6.8	0.074	449
3.6	0.022	135	7.0	0.079	482
3.8	0.024	148	7.2	0.085	517
4.0	0.027	161	7.4	0.092	556
4.2	0.029	175	7.6	0.099	599
4.4	0.031	189	7.8	0.107	646



Conductivity meter usage: Calibrate the meter using conductivity calibration solution and measure conductivity.

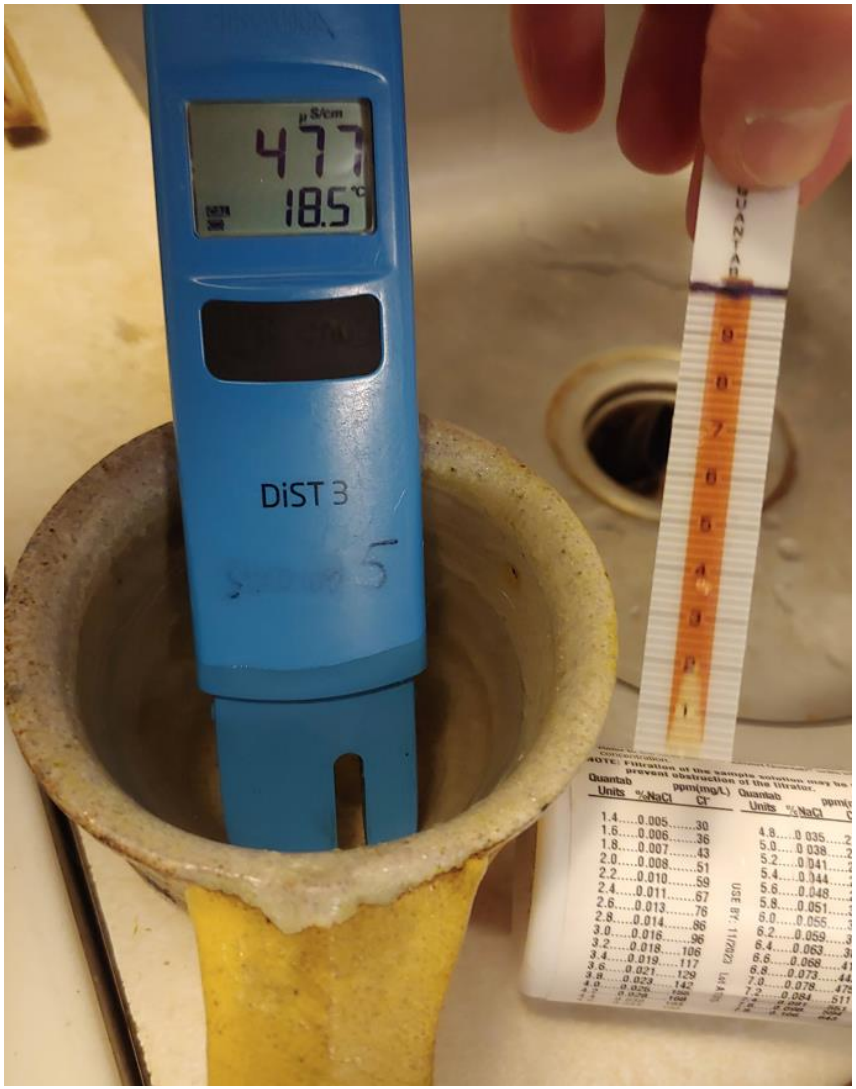
National Recommendations

Standard	Chloride (Cl^-)(mg/l)	Notes
EPA Secondary Drinking Water Regulation	250	
EPA Drinking Water Advisory on Sodium	46-93*	30-60 mg/l Sodium (Na^+) recommendation
EPA Drinking Water Advisory on Sodium "low/no salt diets"	31*	20 mg/l Sodium (Na^+) recommendation

*Estimate based on atomic mass units of Sodium and Chloride (NaCl): Na=23, Cl=35; note other salts such as $MgCl_2$, $CaCl_2$, and KCl not considered.
https://www.epa.gov/sdwa/drinking-water-regulations-and-contaminants
https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_sodium_dwreport.pdf

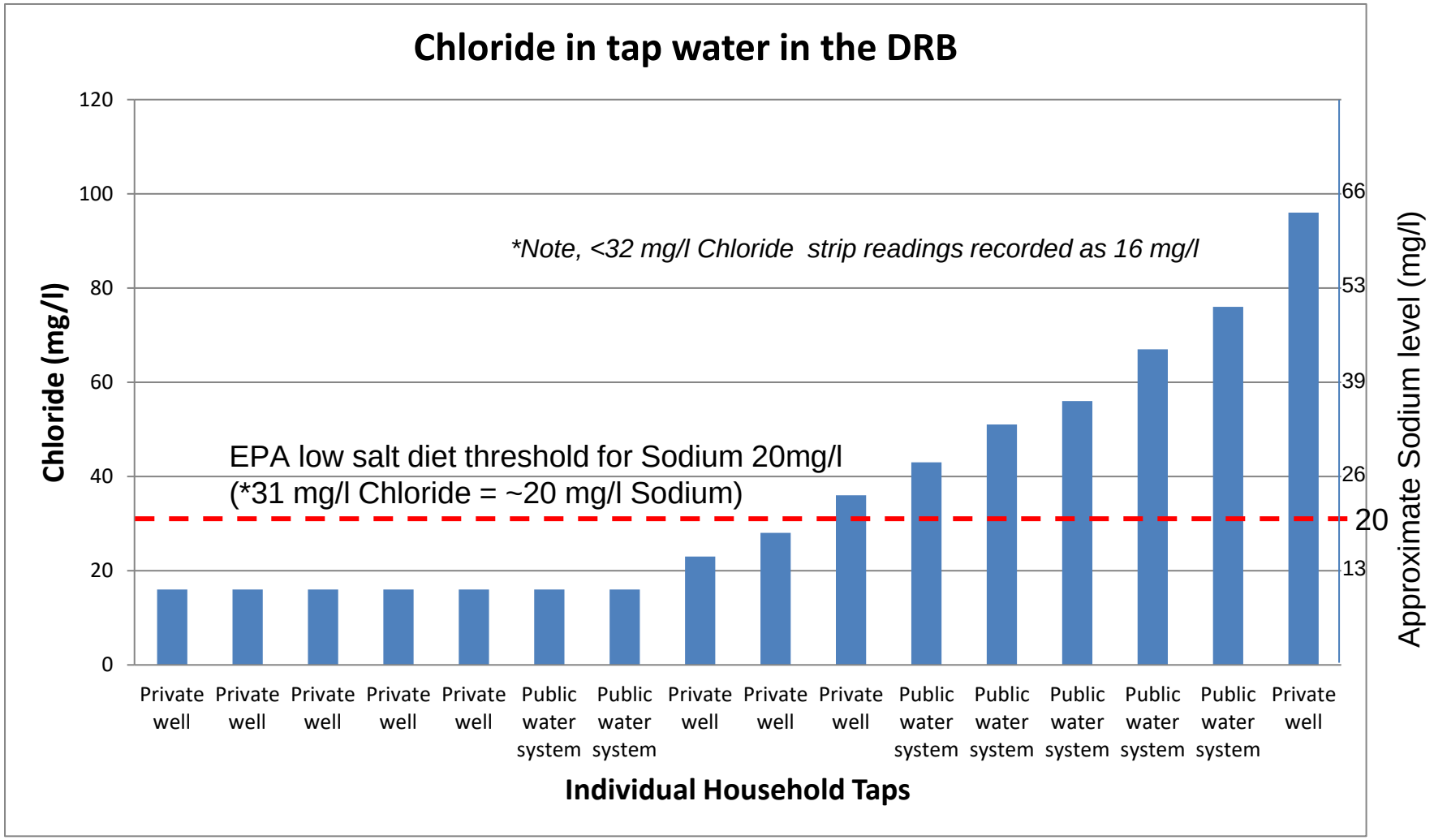
STROUD WATER RESEARCH CENTER

Salt in tap water survey



STROUD WATER RESEARCH CENTER

Salt in tap water survey



*Estimate based on atomic mass units of Sodium and Chloride (NaCl): Na=23, Cl=35; note other salts such as $MgCl_2$, $CaCl_2$, and KCl not considered.
https://www.epa.gov/sdwa/drinking-water-regulations-and-contaminants
https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_sodium_dwreport.pdf

STROUD WATER RESEARCH CENTER

Salt in tap water

- Cruz et al. 2022. Impacts of Road Deicing Application on Sodium and Chloride Concentrations in Philadelphia Region Drinking Water

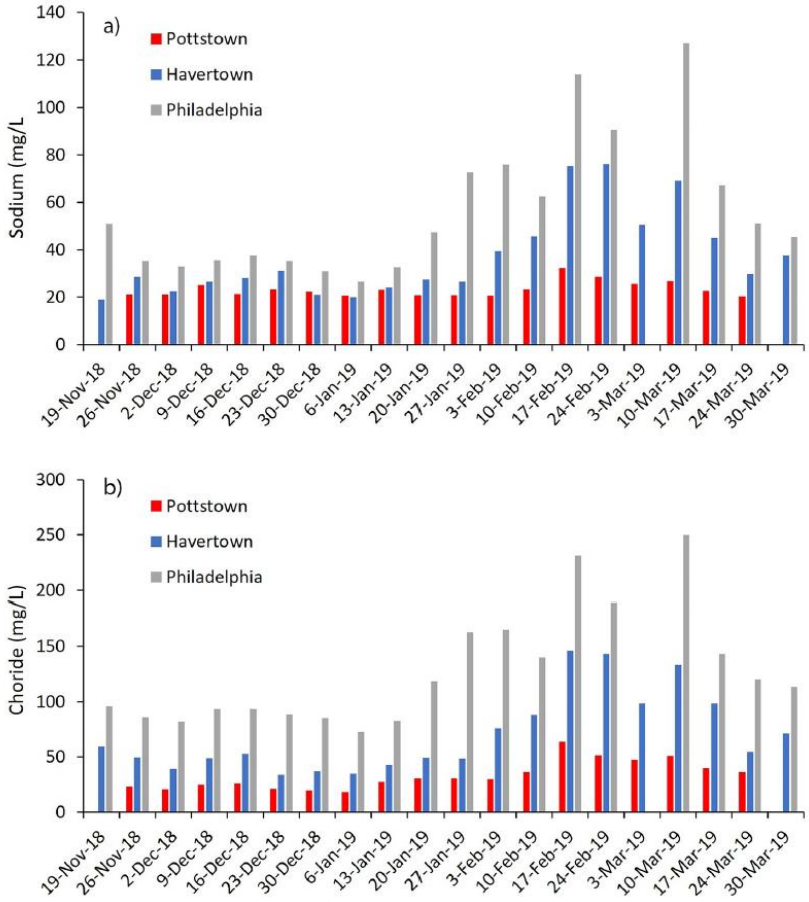


Figure 3. Graphs depicting: (a) weekly sodium concentrations (mg/L) in tap water for each of the three study residences, and (b) weekly chloride concentrations (mg/L) in tap water for each of the three study residences. *Note*. No samples were collected from Pottstown on 19 November 2018 and 30 March 2018, and Philadelphia on 10 March 2019.

STROUD WATER RESEARCH CENTER

Salt in tap water survey

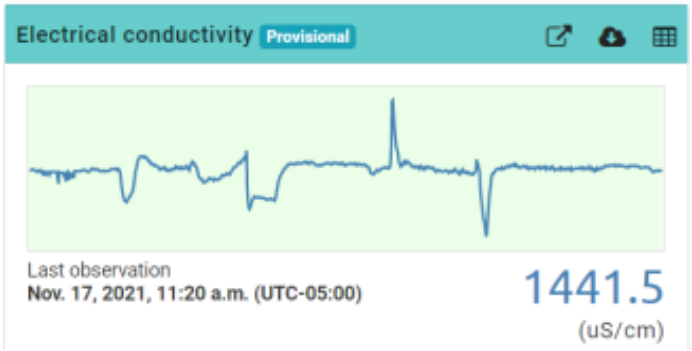
- **The survey continues…**
  - *If you don't have Chloride test strips but would like to participate give Dave Bressler (dbressler@stroudcenter) an address and he'll send you a test strip or two.

- *Keep in mind: Salt has contaminated groundwater and surface water – it is a **year-round issue***

Winter storm salt in urban DRB streams

- Selected urban streams targeted for winter storm salt data collection

Grab sample, chloride measurement, and conductivity measurement

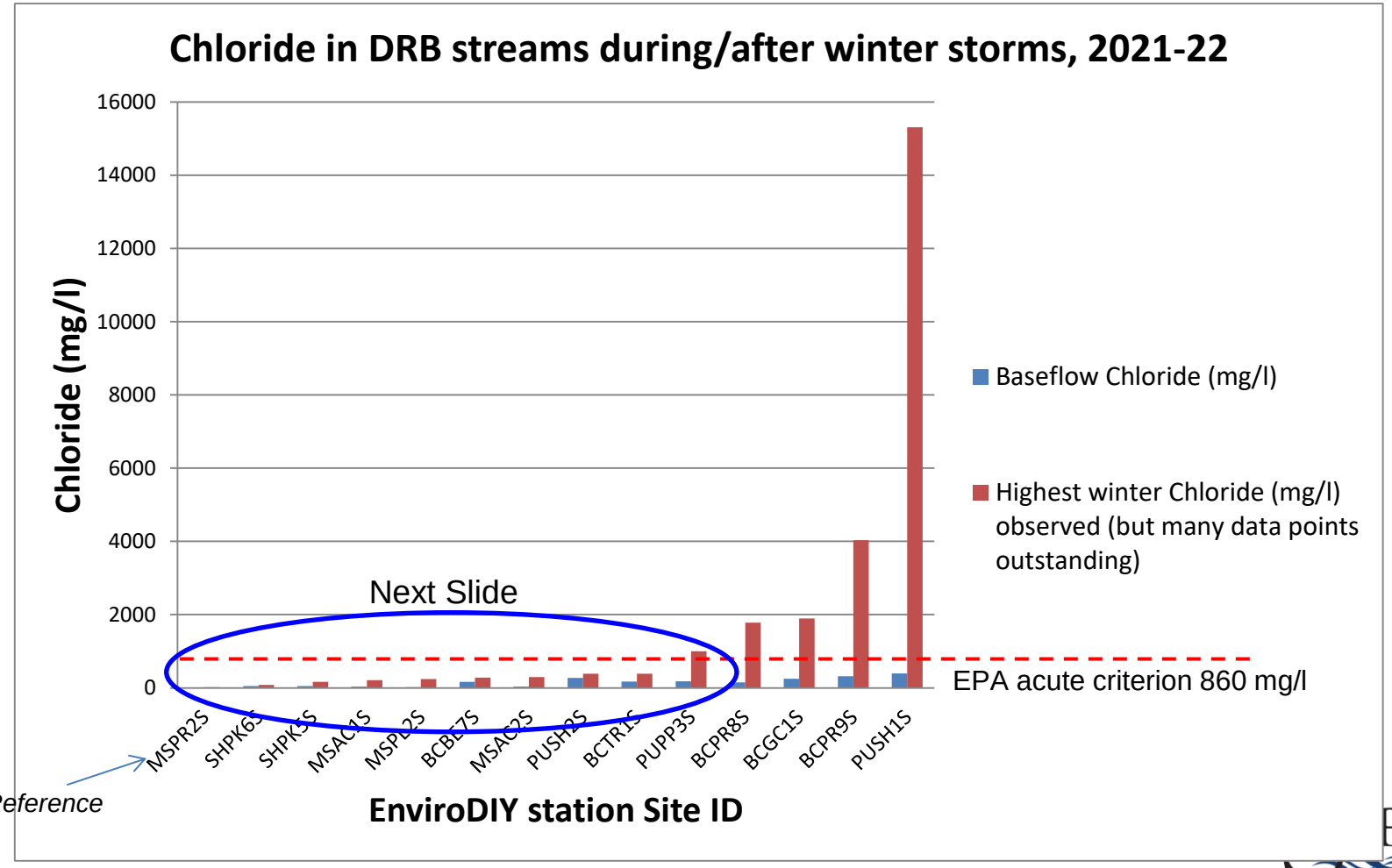


Samples being processed but some chloride data currently available: NEXT TWO SLIDES

STROUD WATER RESEARCH CENTER

Winter storm salt in urban DRB streams

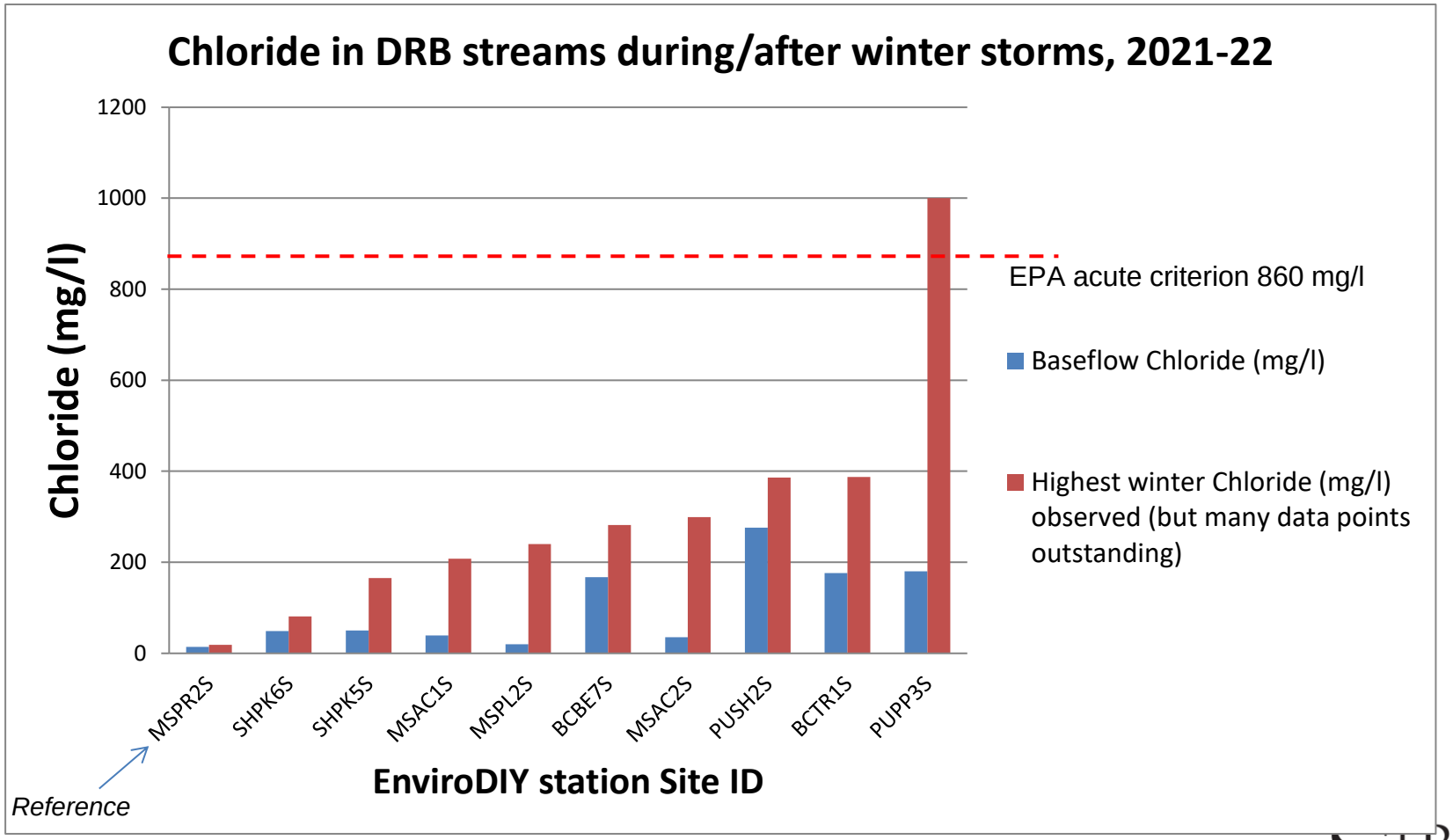
- Incomplete results



WATER RESEARCH CENTER

Winter storm salt in urban DRB streams

- Incomplete results (sites <1000 mg/l)



STROUD WATER RESEARCH CENTER

Winter storm salt in urban DRB streams

- Full results to be presented at a later date

Stroud Water Research Center

Technology updates

- Shannon Hicks technology updates

STROUD WATER RESEARCH CENTER

Future meetings

- April , 2022 – Broad scale analysis, summarization, and interpretation of EnviroDIY in the DRB monitoring network data, Diana Oviedo

STROUD WATER RESEARCH CENTER

Mentors currently available

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

Anyone else interested? If so get in touch with Stroud Center or Carol or George

STROUD WATER RESEARCH CENTER

Conclusion

Next month's meeting will be on:

Thursday April 21, 2021
2:30-3:30p

Onward!

Stroud Water Research Center, EnviroDIY-DRWI contacts:

- David Bressler, dbressler@stroudcenter.org, 410-456-1071
- Shannon Hicks, shicks@stroudcenter.org, 610-268-2153 x267
- 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