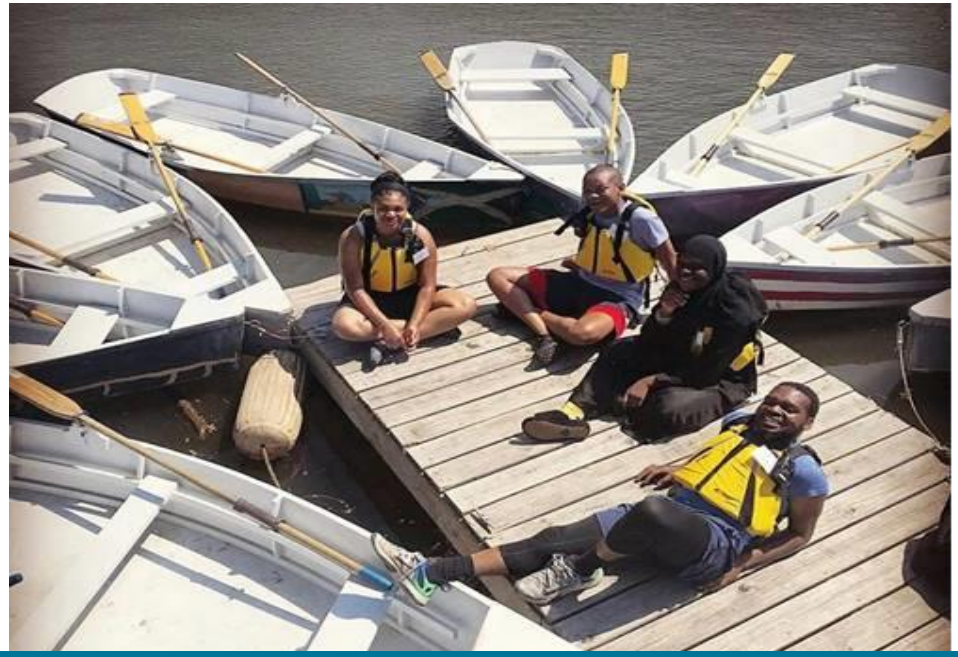


Putting data to action:

Community science, partnership, and advocacy for a healthy Schuylkill River

river NETWORK
connecting people · saving rivers

BARTRAM'S GARDEN

ABOUT RIVER NETWORK

River Network connects water-focused nonprofits, agencies, businesses, and communities for greater local impact and healthier rivers across the U.S.

We envision a future of clean and ample water for people and nature, where local caretakers are well-equipped, effective, and courageous champions for our rivers.

For details about free and paid membership levels, please visit:
www.rivernetwork.org/get-involved/join-our-network/
Together, we can do more.

WHAT IS DATA-TO-ACTION?

River Network:

Using data to take action at the intersection of science and policy to advocate for change at the federal, state, and local levels to better protect rivers, streams, and communities.

What does Data-to-Action mean to you?

LOCAL DATA ARE VALUABLE

HOW ARE YOU USING YOUR DATA?

CLEAN WATER ACT

Objective:

To restore and maintain the chemical, physical and biological integrity of the Nation's waters

National goal:

Eliminate discharge of pollutants to surface water
All waters will be "fishable and swimmable" wherever attainable

> "water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water"

Clean Water Act, Section 101(a)

WATER QUALITY STANDARDS

Designated Uses

Human Uses or Ecological Conditions that are officially recognized and protected.

Water Quality Criteria

Descriptions of the conditions considered necessary to protect each designated use.

Antidegradation Policy

Required process for protecting all existing uses, keeping healthy waters healthy and giving strict protection to outstanding waters.

"A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses."
40 CFR 131.2

https://www.rivernetwork.org/wp-content/uploads/2015/10/cwa04-final-draft.pdf

DESIGNATED USES

Title 25 ▸ Chapter 93

§ 93.4. Statewide water uses.

(a) *Statewide water uses.* Except when otherwise specified in law or regulation, the uses set forth in Table 2 apply to all surface waters. These uses shall be protected in accordance with this chapter, Chapter 96 (relating to water quality standards implementation) and other applicable State and Federal laws and regulations.

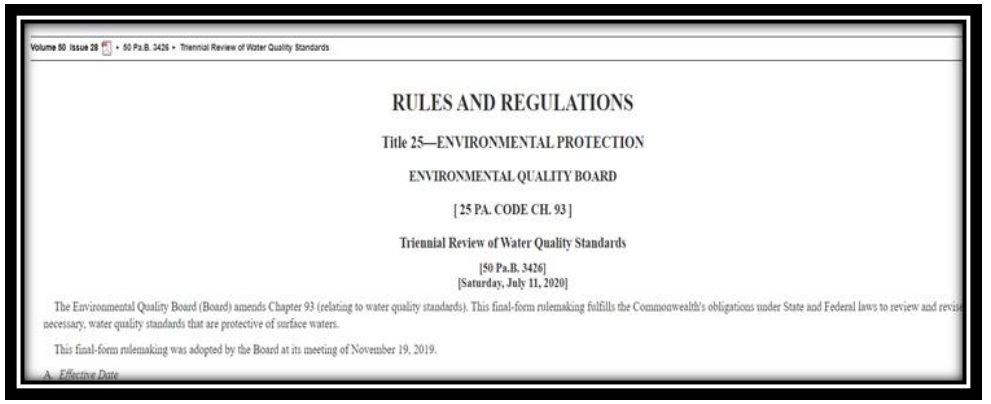
TABLE 2

Symbol	*Use*
	Aquatic Life
WWF	Warm Water Fishes
	Water Supply
PWS	Potable Water Supply
IWS	Industrial Water Supply
LWS	Livestock Water Supply
AWS	Wildlife Water Supply
IRS	Irrigation
	Recreation
B	Boating
F	Fishing
WC	Water Contact Sports
E	Esthetics

Exception: The Delaware Estuary and tidal portion of the tributaries around Philadelphia are not designated for water contact.

ENGAGEMENT OPPORTUNITIES

- State's are supposed to review their water quality standards every three years through a Triennial Review
- State's assess their streams and report on their impaired waters every two years through the Integrated Report
- Discharge permits will have public comment opportunities on a rolling basis (5 year cycles)



http://www.pacodeandbulletin.gov/Display/pabull?file=/secure/pabulletin/data/vol50/50-28/900.html

Cecily Anderson

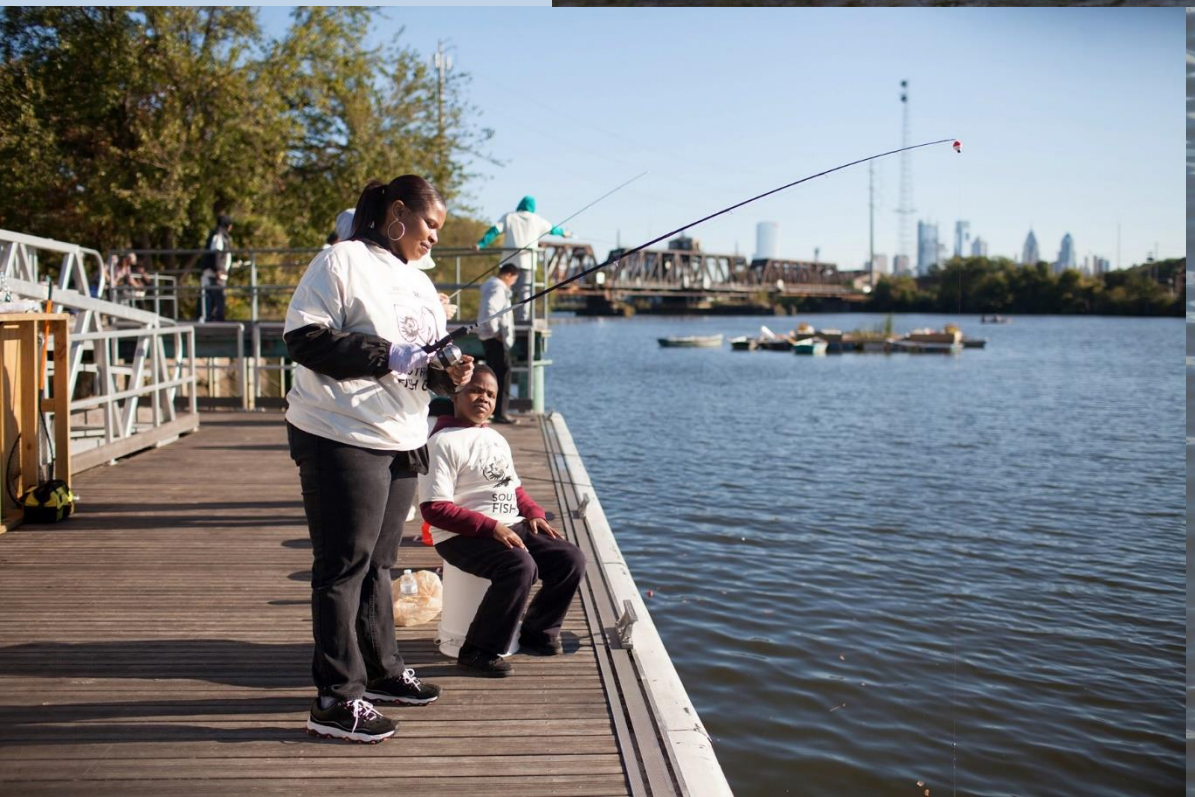
Community Science on the Tidal Schuylkill

Chloe Wang, River Programs Coordinator, Bartram's Garden
Ammarava Mika-El, Denkyem River Guardian Team Leader
Yasir Hall, Denkyem River Guardian Team Leader, Horticulture Apprentice

Bartram's Garden

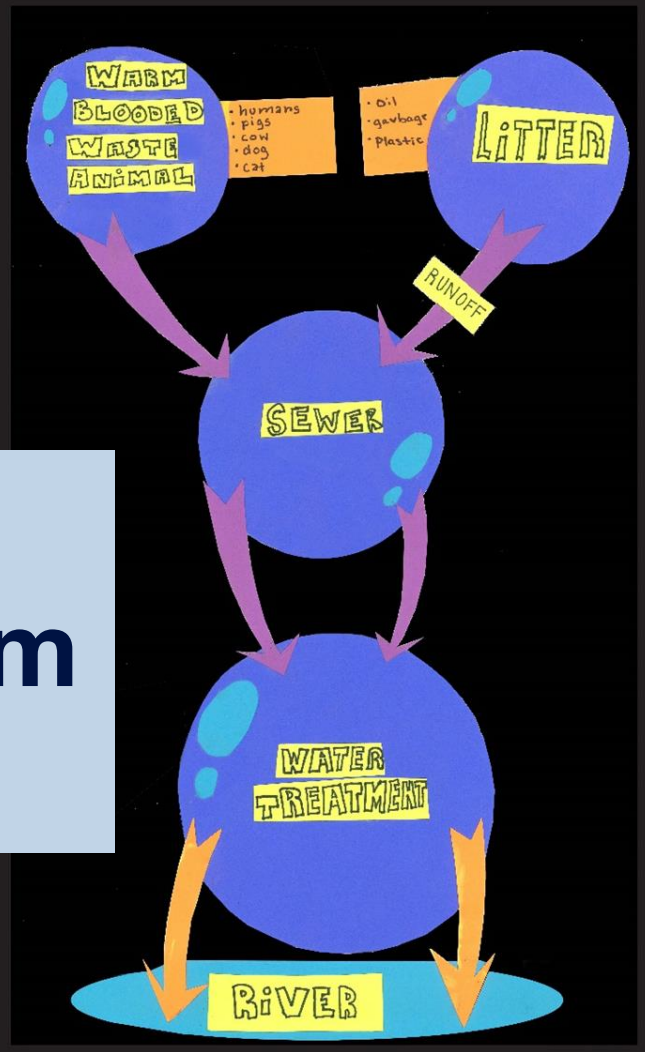
BARTRAM'S GARDEN
COMMUNITY
BOATHOUSE

Mission: "to create a welcoming, accessible, affirming, fun and safe experience for guests of all abilities and from all backgrounds."



Combined Sewer System

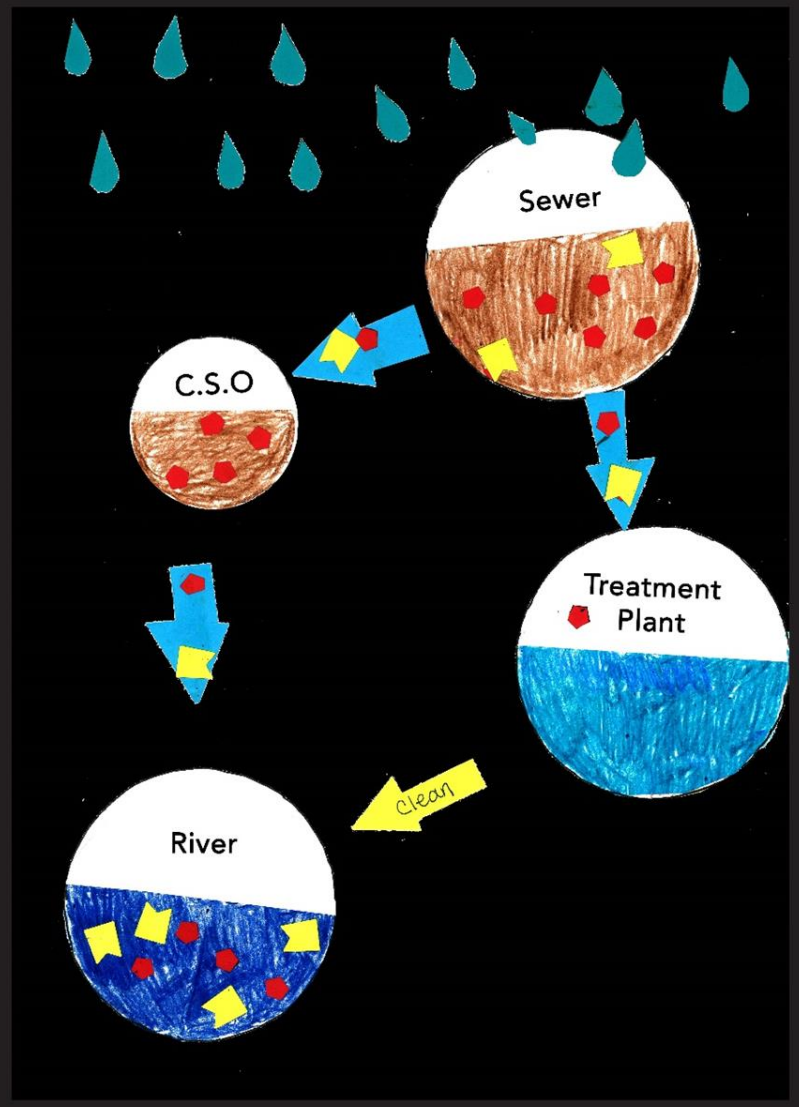
Info graphics created by Denkyem River Guardians



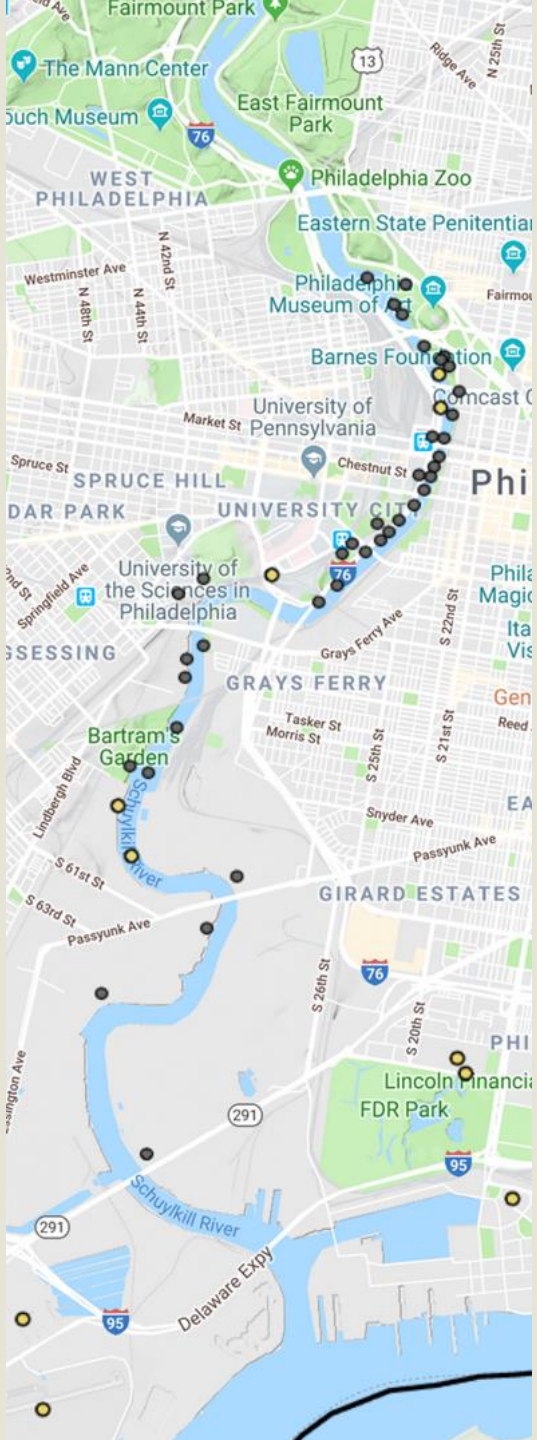
Wastewater and litter travels from homes and businesses through pipes and storm drains into a combined sewer system. It ends at one of three sewer treatment plants in the Philadelphia area where the water is sifted, treated, cleaned and released back into the river.

The infographs above and to the right were created by The River Crew to demonstrate the flow of wastewater before and after rainfall.

When it rains as little as one tenth of an inch, the sewers flood causing sewer treatment plants to be at capacity. Wastewater then overflows into one of 43 combined sewer outfalls along the Lower Schuylkill River. These outfalls (CSO's) empty directly into the river, carrying our wastewater and everything that comes with it, including E.Coli – temporarily affecting the water quality.



40 CSOs on the tidal Schuylkill…



Combined Sewer Outfalls

Stormwater Outfalls

Many questions…

- Is our cancellation policy sufficient to keep people safe? Is it too conservative?
- How high are pathogen levels in dry weather, and after rainfall? Is there a clear correlation between rainfall and bacteria?
- What about between bacteria and other variables that could be predictive, and can be measured more immediately?

...and many people invested in river health

Volunteers

Interns & Staff

Program Participants

Water Quality Monitoring Program Design

Key partners in methods consultation

- **Stroud Water Research Center**
- **Marion Waggoner**
- **Dave Yake**

Water Quality Monitoring Program Design

What standards to go by?

Table 4. Recommended 2012 RWQC.

Criteria Elements	Estimated Illness Rate (NGI): 36 per 1,000 primary contact recreators — Magnitude		OR	Estimated Illness Rate (NGI): 32 per 1,000 primary contact recreators — Magnitude	
Indicator	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]		GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]
Enterococci – marine and fresh	35	130		30	110
OR					
E. coli – fresh	126	410		100	320

Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

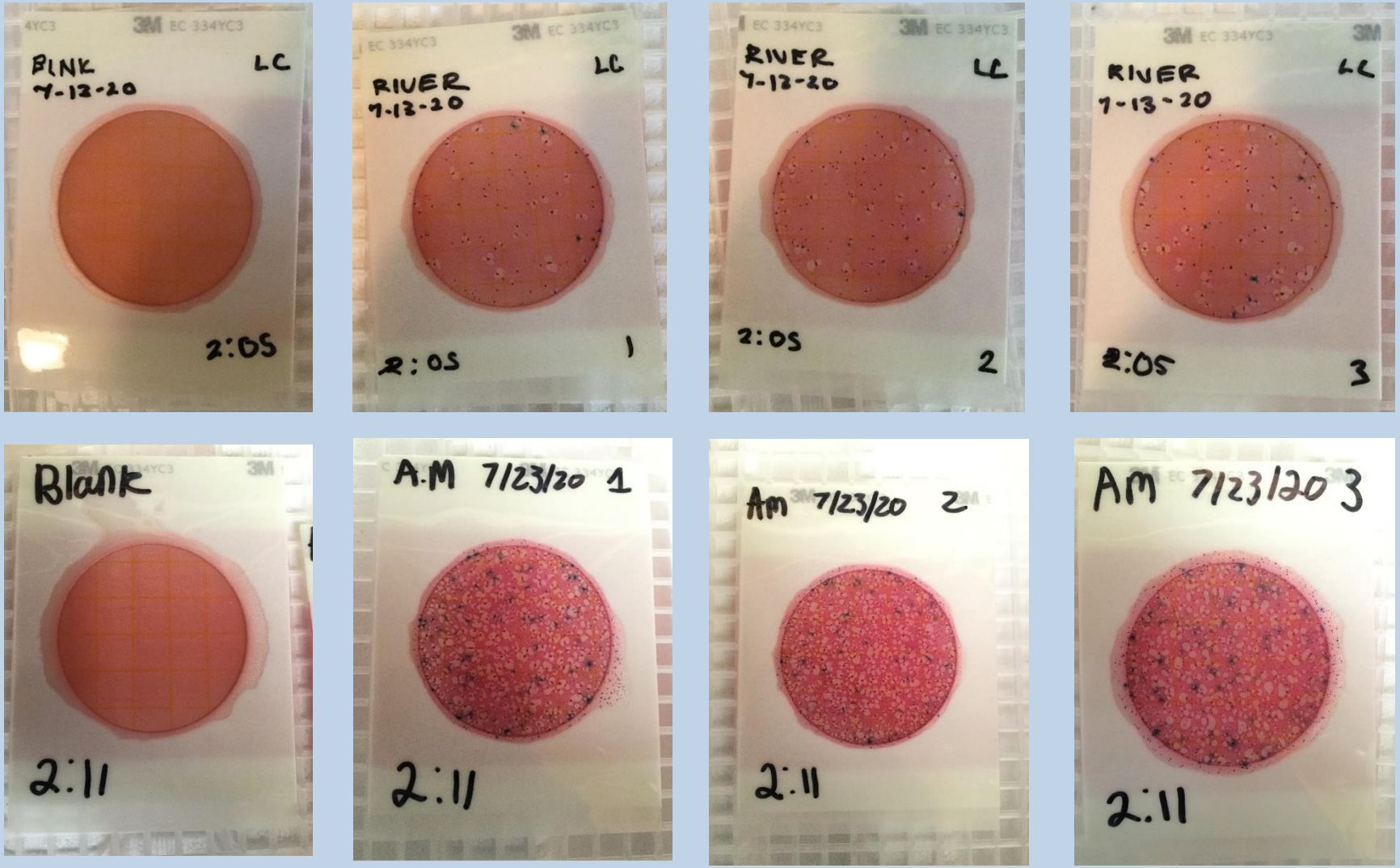
[a] EPA recommends using EPA Method 1600 (U.S. EPA, 2002a) to measure culturable enterococci, or another equivalent method that measures culturable enterococci and using EPA Method 1603 (U.S. EPA, 2002b) to measure culturable *E. coli*, or any other equivalent method that measures culturable *E. coli*.

◀ **EPA Recommended *E. coli* Levels for recreational waters, now adopted by PA DEP for May-September**

GM = geometric mean; STV = statistical threshold value

EPA RWQC 2012: https://www.epa.gov/sites/production/files/2015-10/documents/rwqc2012.pdf

E. coli testing



3M Petrifilm method, adapted from Georgia Adopt-a-Stream
https://adoptastream.georgia.gov/sites/adoptastream.georgia.gov/files/related_files/document/Bacterial.pdf

EnviroDIY Mayfly Sensor Station from Stroud

Transmits to the internet every 5 min:

- **Conductivity**
- **Depth**
- **Water and air temperatures**
- **Turbidity**
- **Dissolved Oxygen**

View data online: http://monitormywatershed.org/sites/PUSR2S/

Additional parameters

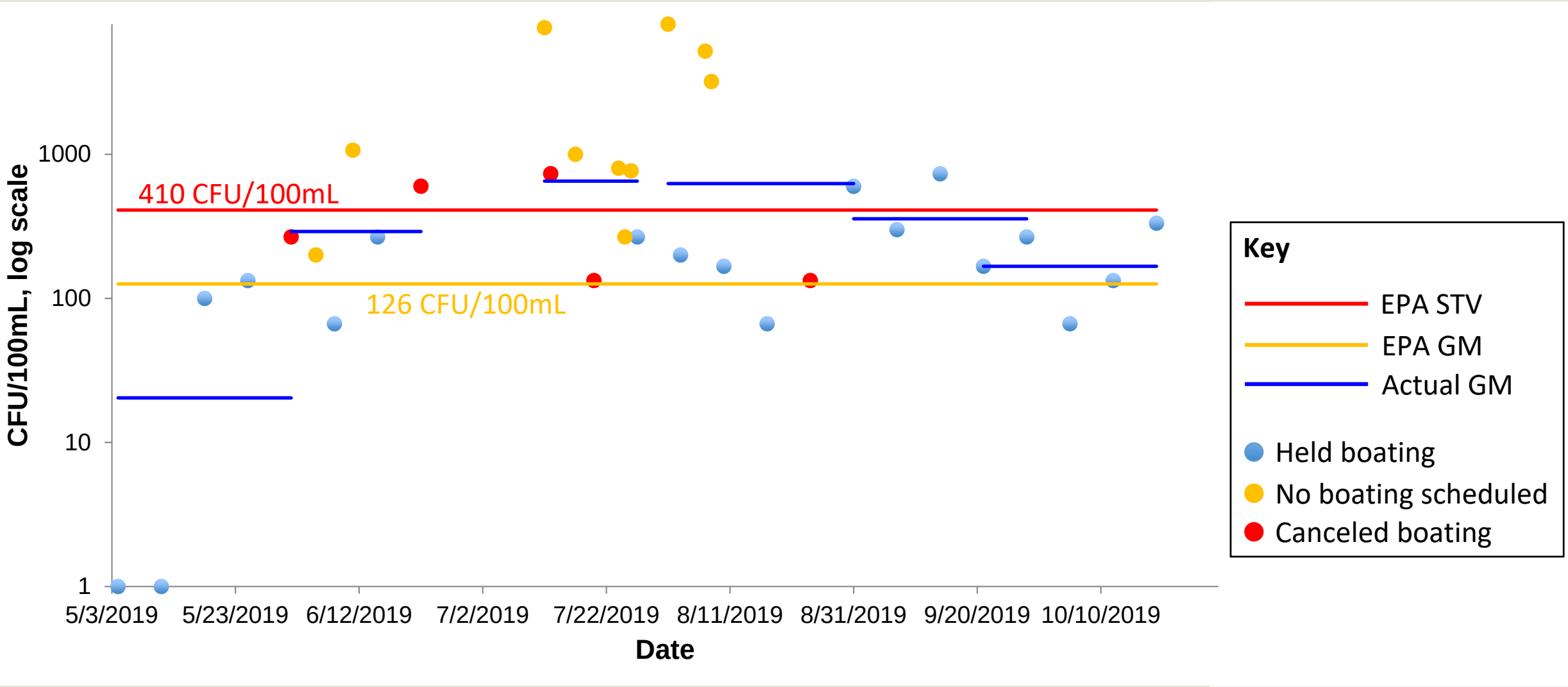
pH, conductivity, temperature – Hanna Instruments handheld probe

Localized rainfall – AcuRite digital rain gauge

Nitrate, phosphate – IORodeo colorimeter

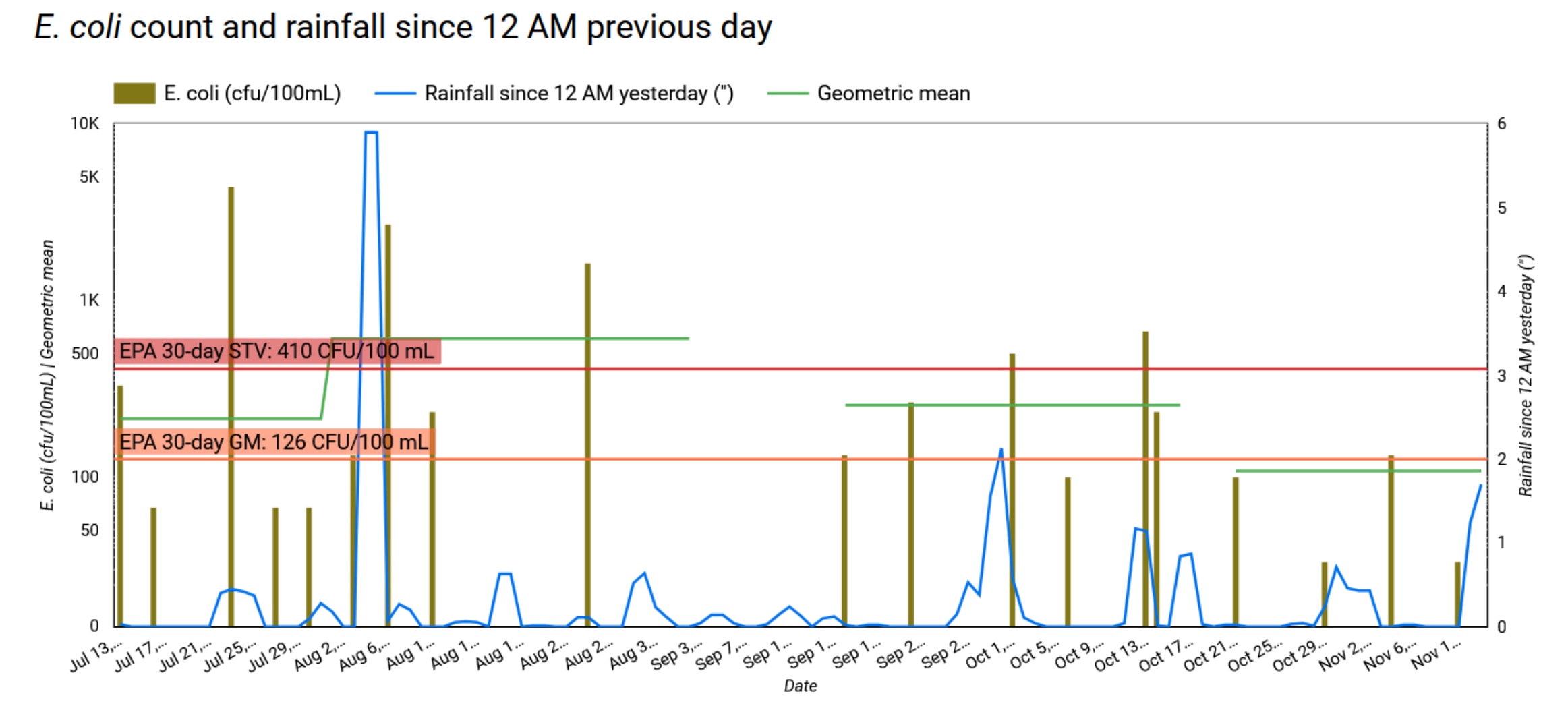
Preliminary Findings

2019 Bartram's *E. coli* data



Preliminary Findings

2020 *E. coli* + rain data:
https://datastudio.google.com/u/0/reporting/d7c8b1af-9681-43d5-8437-26ce004a11e0/page/2vtYB



Applying data: internal policy review

- E. coli and rain data affirm that our acting cancellation policy is about the best we can do on the tidal Schuylkill.
  - Policy: cancel public kayaking programs within 24h of at least 0.25” of rain and/or within a week of a large flood event.
- We can aim to not exceed the EPA STV of 410 CFU/100mL – even though the waterway does not meet swimmable criteria overall.
  - Within 24h of rainfall below 0.25,” E. coli counts generally range between 0-400 CFU/100mL
- By this standard, if we had programs scheduled on each of the 54 dates we sampled in 2019-2020, cancellation policy would have been 93% effective.

Applying data: external advocacy

Partnership with River Network and PennFuture

- Training for Bartram's River Programs staff in local water policy context
- Similar training for volunteers
- Identified possible avenues for advocacy; chose to pursue data submission to PA DEP and DRBC – agencies responsible for state/local water quality standards

Applying data: external advocacy

Submitting data to DEP biannual Integrated Water Quality Report

For DEP to use data in the 305(b)/303(d) process, it must be of a documented quality. DEP will screen all outside sources of data for the following minimal requirements:

1. Written documentation of the protocols used in sampling and analysis describing quality assurance and quality control measures in the form of a Monitoring Study Design or Quality Assurance Project Plan.
2. Location and extent of the waterbody

The data will then be placed into tiers as described below:

Tier 1: educational or environmental screening data that has known quality and a study plan but does not follow DEP or EPA quality assurance plans. These data will not be used for regulatory assessment purposes but can be used by DEP to highlight areas of interest for future monitoring efforts.

Tier 2: data have clearly defined quality assurance plans and procedures but may not have followed approved DEP data collection protocols. These data may not be used for assessment purposes but can be used for other purposes such as trend or performance analysis.

Tier 3: assessment level data that have approved quality assurance plans, follow appropriate study designs, and followed DEP data collection protocols. Individuals seeking to provide DEP with tier 3 data must also be audited by DEP staff before submitting data.

Letter and data submission to agencies

"We appreciate the work that DEP and DRBC put in to keep our waterways healthy. However, we need more support from your end. Currently, we understand your focus of assessment has been entirely on aquatic life, but we are submitting these data and information on our program to demonstrate that there is more to the river than just aquatic life, and we need you to look deeper into the river's health. There are other important factors to consider."

BARTRAM'S GARDEN

Bartram's Garden Community Boathouse
5400 Lindbergh Blvd
Philadelphia, PA 19143

February 12, 2020

Pennsylvania Department of Environmental Protection
Bureau of Clean Water
Water Quality Division
Attn: Heidi Biggs
P.O. Box 8774
Harrisburg, PA 17105-8774

Delaware River Basin Commission
25 Cosey Road
P.O. Box 7360
West Trenton, NJ 08628-0360

To Whom It May Concern:

We are a group of volunteers, high school interns, and staff who support public boating and fishing programs at Bartram's Garden Community Boathouse. We have been collecting water quality data over the past two years, and we write to you to provide our data for consideration in the assessment of Pennsylvania's water quality.

Bartram's Garden Community Boathouse has offered free and low-cost public boating and fishing programs on the tidal Schuylkill River since 2015. These programs are supported by a crew of over 100 dedicated volunteers and a youth crew of high school interns who facilitate a safe boating experience for all guests. On Saturdays between late April and late October,[1] our free kayaking and rowing program typically attracts between 100–300 participants, many of whom are first-time boaters. In 2019, over 5,600 people participated in our boating and fishing programs.

As a result of controls on many industrial point sources of pollution along the Schuylkill River, the vast improvement in water quality over the last few decades has made it feasible for people to safely access and enjoy this public waterway. However, the tidal portion of the Schuylkill is still subjected to frequent and persistent inputs of pollution, with direct impact on our program safety, from the approximately 40 combined sewer overflow discharge points that empty raw sewage into the river during many rain events. Our policy is to cancel public boating within 24 hours of rainfall of a quarter-inch or more, though we have sometimes been more conservative because the Philadelphia Water Department's CSOCast web site has indicated in the past that overflows can be triggered by as little as a tenth of an inch of rain. This cancellation policy is determined to be protective of our guests based on our understanding of the interactions of

[1] Note that our program season begins earlier and ends later than the Water Contact season defined by DEP as May–September.

Figures

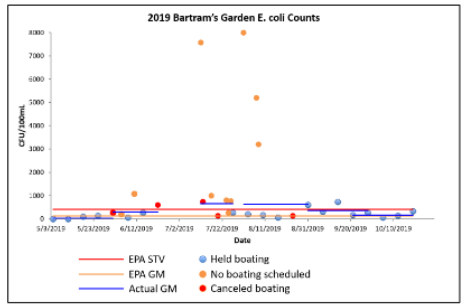


Figure 1. *E. coli* readings taken this season. Orange and red lines are EPA recommended geometric mean and statistical threshold value, blue lines are actual calculated monthly geometric means. Note that the result for the highest point on this plot was actually "too numerous to count," but it is represented here as 8000 CFU/100mL. Cancellations were made for various reasons, not limited to rainfall.

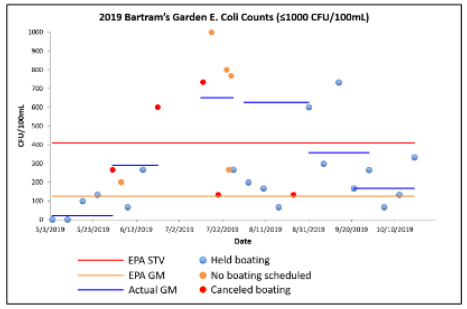


Figure 2. *E. coli* readings taken this season, only including readings ≤1000 CFU/100mL to better visualize the low range.

Full letter: http://www.rivernetwork.org/wp-content/uploads/2020/04/cover-

Asks to agencies

As mentioned above, DEP and DRBC have not assessed bacterial counts on the tidal Schuylkill. We submit our consistently high river program attendance, as well as the popularity of our site for personal boating and fishing, as evidence that water recreation is an existing use of the waterway and therefore warrants protection under the Clean Water Act. We thus see the need for an update to DEP's designated uses for the tidal Schuylkill River, if not the entire segment that currently encompasses the tidal Schuylkill. We offer the following suggestions to make DEP and DRBC standards better reflect and protect existing uses and improve consistency between the two agencies:

1. DEP should designate the tidal Schuylkill for water contact in accordance with its existing use.
2. Likewise, DRBC should update its designation of this segment from secondary to primary contact to more accurately reflect the risk of immersion and ingestion inherent in Bartram's Garden program activities (i.e., kayaking) and other forms of water contact we observe (e.g., paddleboarding, canoeing, jet skiing) as discussed above; see footnote 2.
3. DEP and DRBC should update bacterial criteria for water contact from fecal coliform to *E. coli* **year-round**.
4. DEP should assess the tidal Schuylkill for water contact and its existing warm water fish designation. The blanket "aquatic life" use that is currently assessed in this segment is inadequate and does not include assessment of the parameters that define WWF criteria. Our data point to exceedances of these criteria that call into question whether the segment can be considered "attaining" for all aquatic life. Based on assessment, the status of the tidal Schuylkill with respect to water contact and warm water fish should be listed in DEP's next Integrated Report. A TMDL should be developed to address any impairments and protect recreators.
5. DRBC should also monitor the tidal Schuylkill for the Stream Quality Objectives listed for Zone 4 and submit this data to DEP.

Widening ripples…

- Ongoing communication with agencies and new efforts to make DEP more receptive to data from outside groups
- Schuylkill Water Quality Partner Project - coordinated data collection to inform public messaging about the river from headwaters to mouth
  - Upcoming Tier 2 data submission to DEP
- Water Center sampling for Delaware River Roadmap to Restoration for Recreational Use in Philadelphia and Camden
  - Will expand knowledge around outstanding questions, including how bacterial levels evolve before, during, and after rainfall, and relative contribution of human and non-human sources to fecal pollution
- Data communication
  - Web page development, data visualization and interpretation, speaking engagements

“Data-to-action” is not one-size-fits-all… prioritize directing your energy strategically to send a clear message that supports your end goals.

Partnership and collaboration can help identify and build collective momentum for greater impact.

Enacting community science principles

- Meaningful, relevant questions that meet a real need for information, and existing care and interest
- Data is applied toward addressing the problem at a systemic level
- Participatory process from program design to data application
  - Youth interns and adult volunteers contribute with equal weight, not separately – we can all be civic participants

Thank you!

Contact Chloe Wang with further questions:

cwang@bartramsgarden.org