

SYNOPTIC SAMPLING OF THE POTOMAC RIVER SINCE THE POTOMAC INTERCEPTOR COLLAPSE

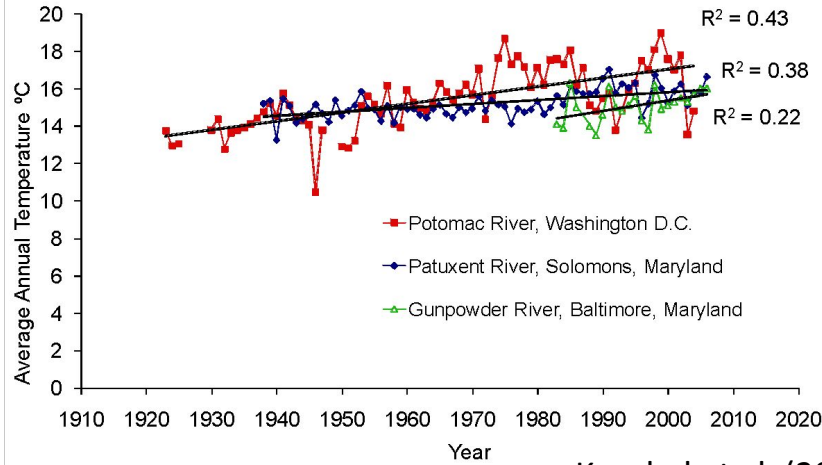
Dr. Sujay Kaushal and Weston Slaughter, University of Maryland

Outline

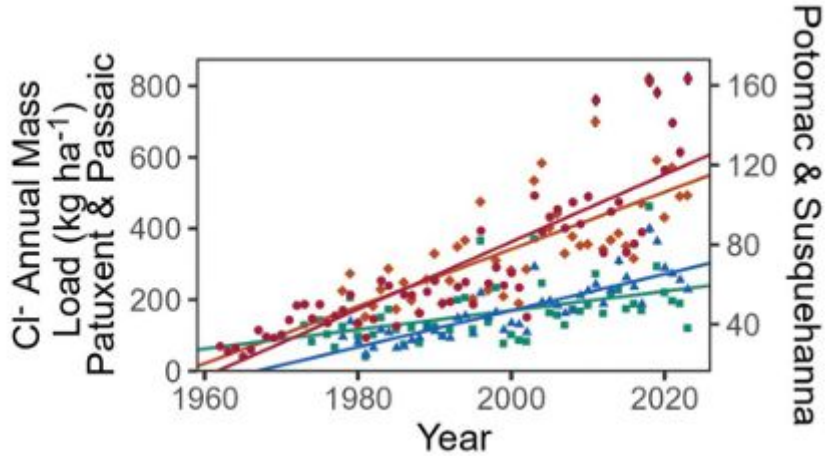
- Background: A Changing Potomac River
- From Partnerships to Rapid Responses
- Preliminary Results
- Future Plans

Potomac River Is Changing over Time

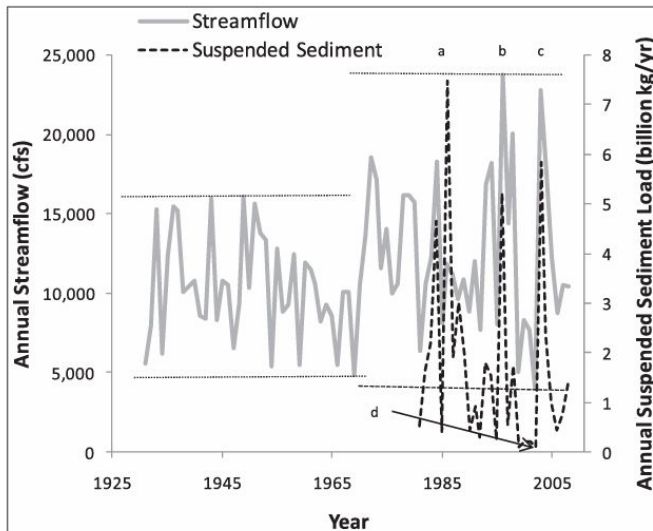
River Temperatures in Maryland-Washington D.C.



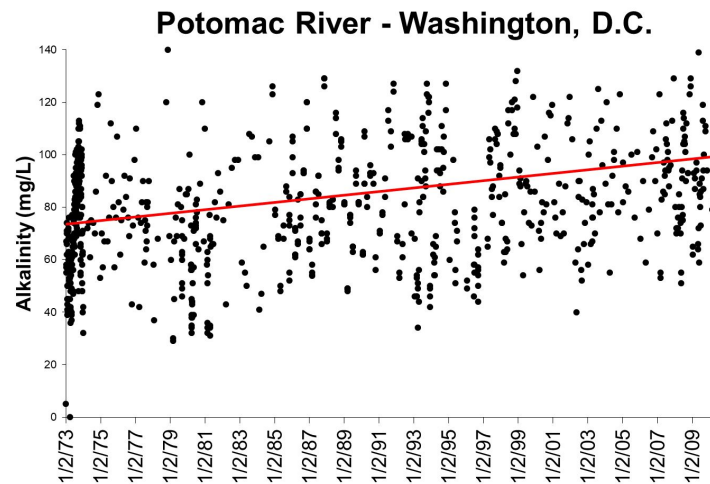
Kaushal et al. (2010a)



Kaushal et al. (2025)



Kaushal et al. (2010b)



Kaushal et al. (2013)

A warmer, saltier, and pulsed river is sensitive to pollution

Potomac Interceptor Collapse



Source: DC Water

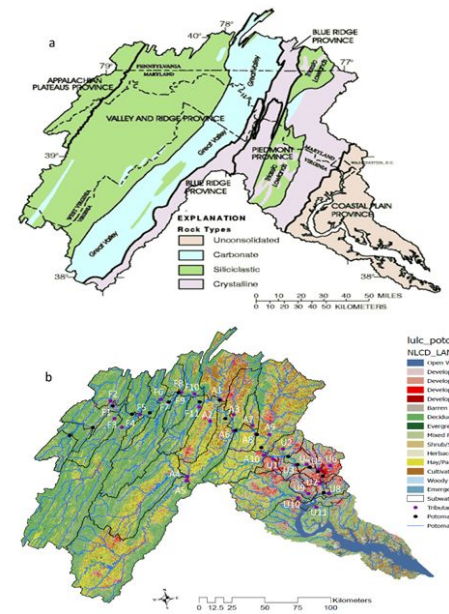
- January 19, 2026 (during winter road salt)
- 200 million gallons of raw wastewater
- What are the downriver water quality impacts?

Longitudinal Monitoring Can Track How Far Pollutants Persist

Examples of Potomac Longitudinal Monitoring

Tracking Nitrogen Sources

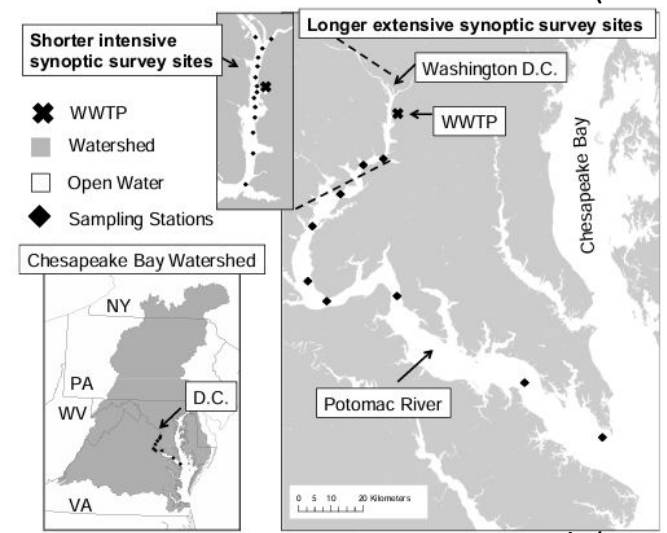
Pennino et al. (2016)
Duan et al. (2021a)



Duan et al. (2021)

Tracking Estrogens

Duan et al. (2021b)



Duan et al. (2010)

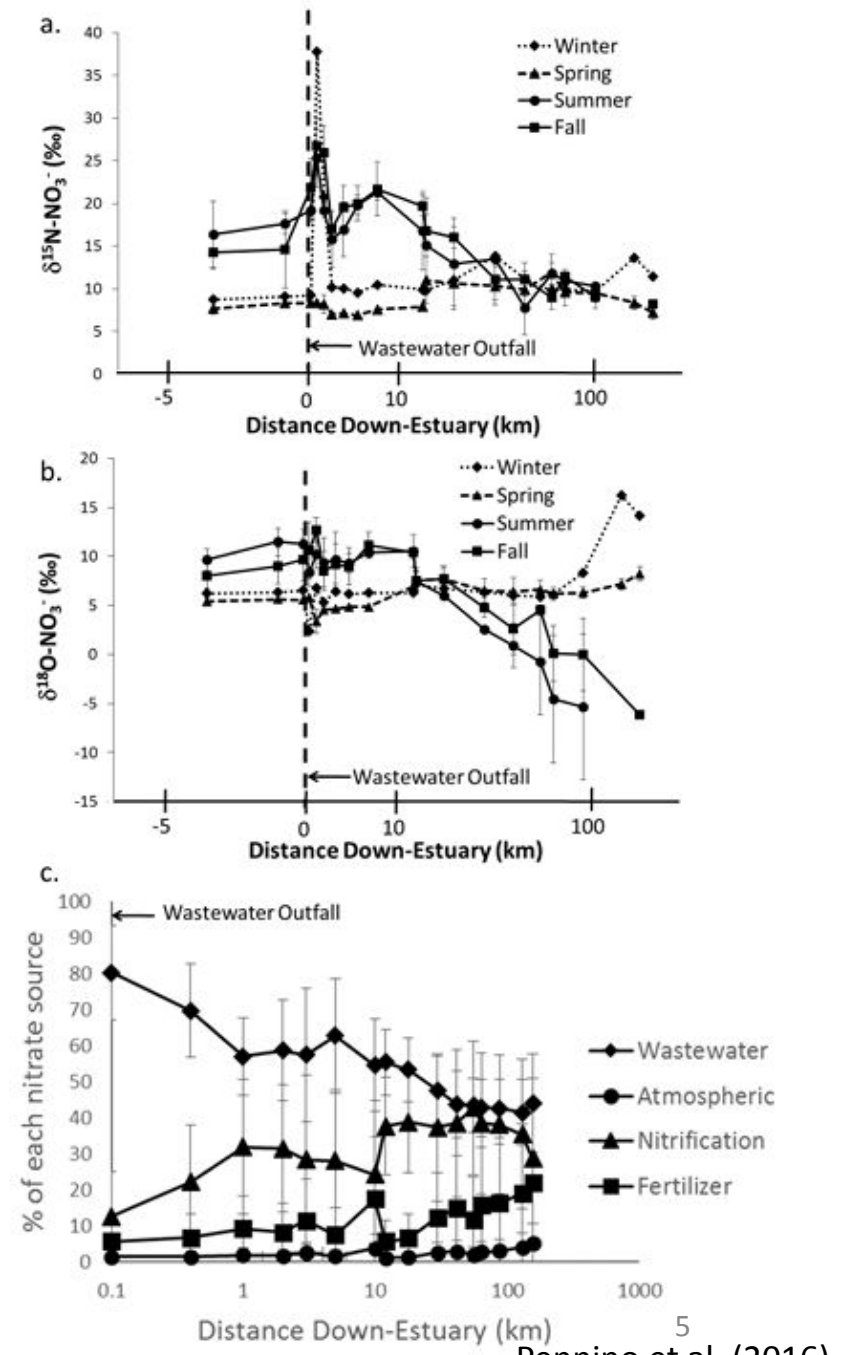
Tracking Alkalinity Sources

Duan et al. (2025)

Tracking Sodium Sources

Kaushal et al. (2021)

Figure 5.

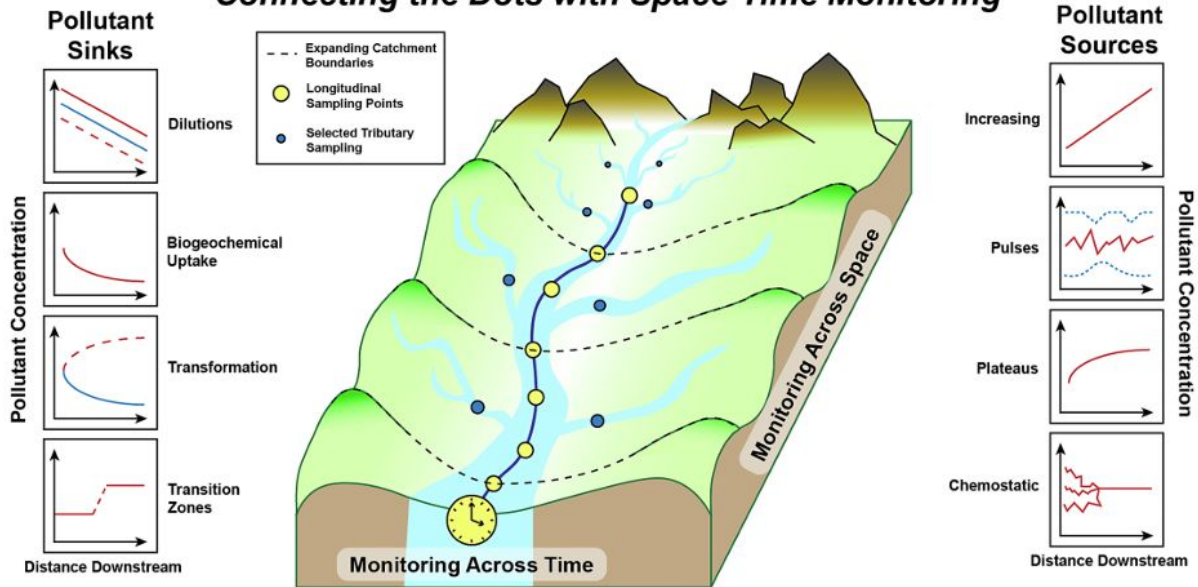


Pennino et al. (2016)

A Need to Track River Pollution and Recovery Holistically

The Watershed Continuum Approach

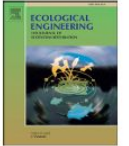
Connecting the Dots with Space-Time Monitoring



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Ecological Engineering

journal homepage: www.elsevier.com/locate/ecoleng



Watershed Continuum Monitoring Approach: combining multiple water quality patterns along stream and river flowpaths to track sources, pathways, and processing of pollutants[☆]

Sujay S. Kaushal^{a,*}, Ashley E. Mon^a, Stanley B. Grant^b, Paul M. Mayer^c, Aaron J. Porter^d, Andrew J. Sekellick^e, Jason H. Chase^e, Shantanu V. Bhide^b, John D. Jastram^d, Tamara A. Newcomer-Johnson^f, Sydney A. Shelton^a, Alexis M. Yaculak^a, Joseph T. Malin^g, Carly M. Maas^d, Nicholas Salanitri^a, Daniel J. Silberstein^a, Steven P. Hohman^h, Ashley B. Dann^a, Weston M. Slaughter^a, Megan A. Rippy^b, Ahmed Monofy^b, Ruth R. Shatkay^a, Jenna E. Reimer^a, Madeleine Seppi^a, Randi Noel^a, Julianna Mussa^a, Bennett Kellmayer^a, Gwendolyn Svirichchiⁱ, Melissa Greseⁱ, Walter L.M. Boger^a, Jeffrey Chanat^d, Shuiwang Duan^a, Kenneth T. Belt^j

Kaushal et al. (2026)

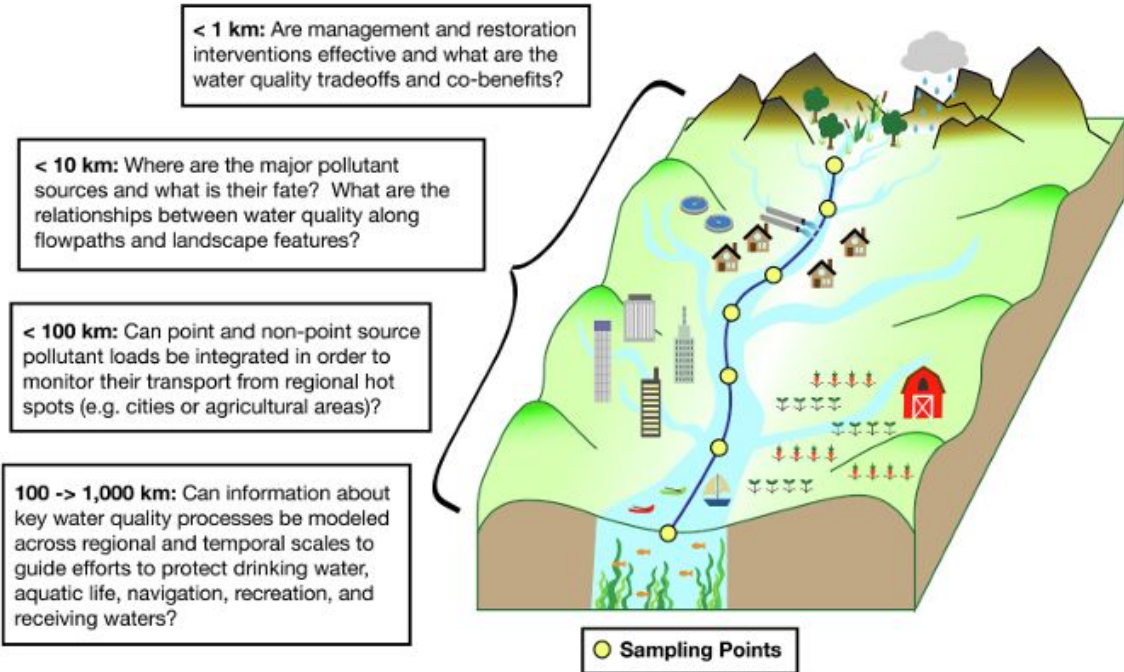
Establishing A Science Partnership to Understand Salinization



Vision: A collaborative scientific partnership is needed to address a complex, regional issue...

Thanks
MWCOG!

Tracking Sources, Fate, and Transport of Multiple Pollutants Together



What Questions Can Longitudinal Monitoring Answer Across Expanding Spatial Scales?



Weston Slaughter (left), a University of Maryland graduate student, collects sediment samples from the Potomac River in mid-April 2026 with volunteer David Solano.

Potomac Riverkeeper Network

Kaushal et al. (2026)

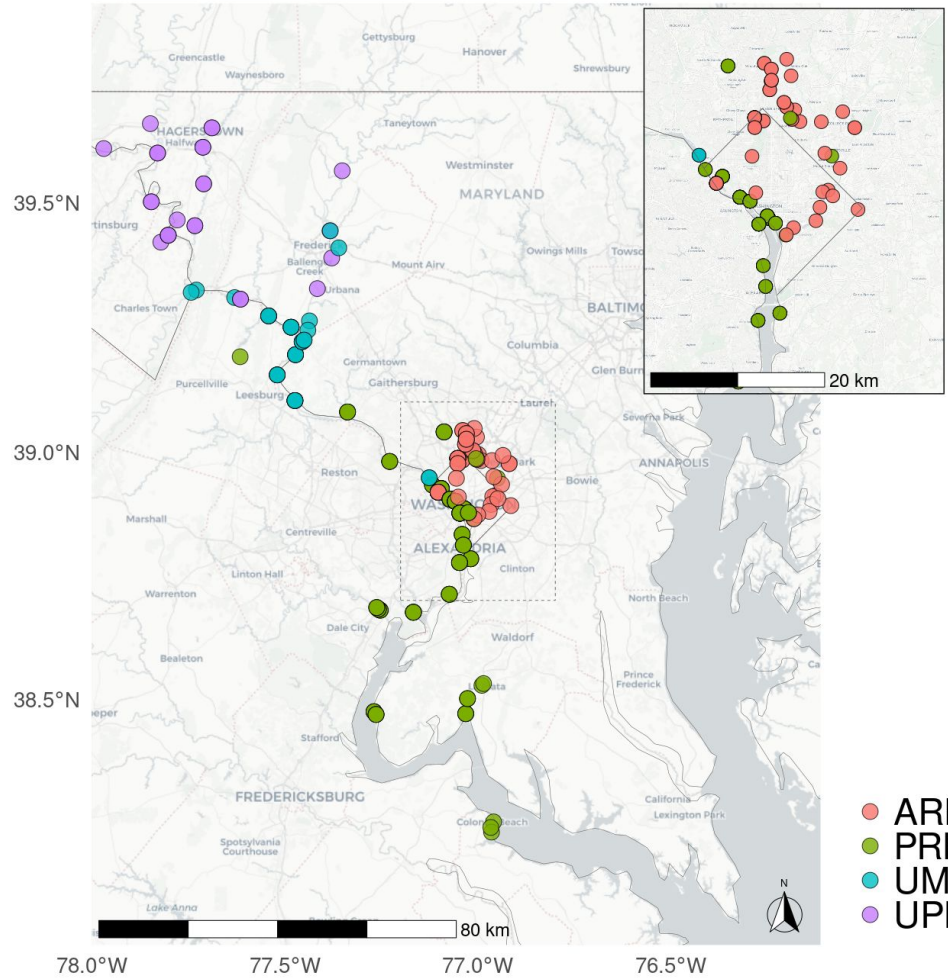
Chesapeake Bay Journal 2026

Potomac Partnerships



Thank You: **Catherine Gaudlip, Alexandria Werlang**, and All Volunteers

instagram: @upperpotomacriverkeeper



ANACOSTIA RIVERKEEPER®



Thank You: **Maureen Mitchell, Derek Shea**, and All Volunteers

instagram: @anacostiariverkeeper



POTOMAC RIVERKEEPER® NETWORK

Thank You: **Lisa Wu, Evan Quinter, Morgan Bench**, and All Volunteers

instagram: @potomac_riverkeeper_network

Potomac Partnerships



25 POTOMAC RIVERKEEPER NETWORK **Lower Potomac Weekly Water Quality Monitoring Results**
 Samples Taken: July 16, 2025

Meets water quality standards
 Cumplició con el estándar de calidad de agua

Failed to meet water quality standards
 No cumplició con el estándar de calidad de agua

Water quality data was not taken this week
 Los datos de la calidad de agua no se tomaron esta semana

Please note that regardless of current water quality status, swimming in district waters is illegal.
 Por favor tenga en cuenta que a pesar del estado de la calidad del agua, nadar en las aguas del distrito es ilegal.

Visit www.swimguide.org for more info!

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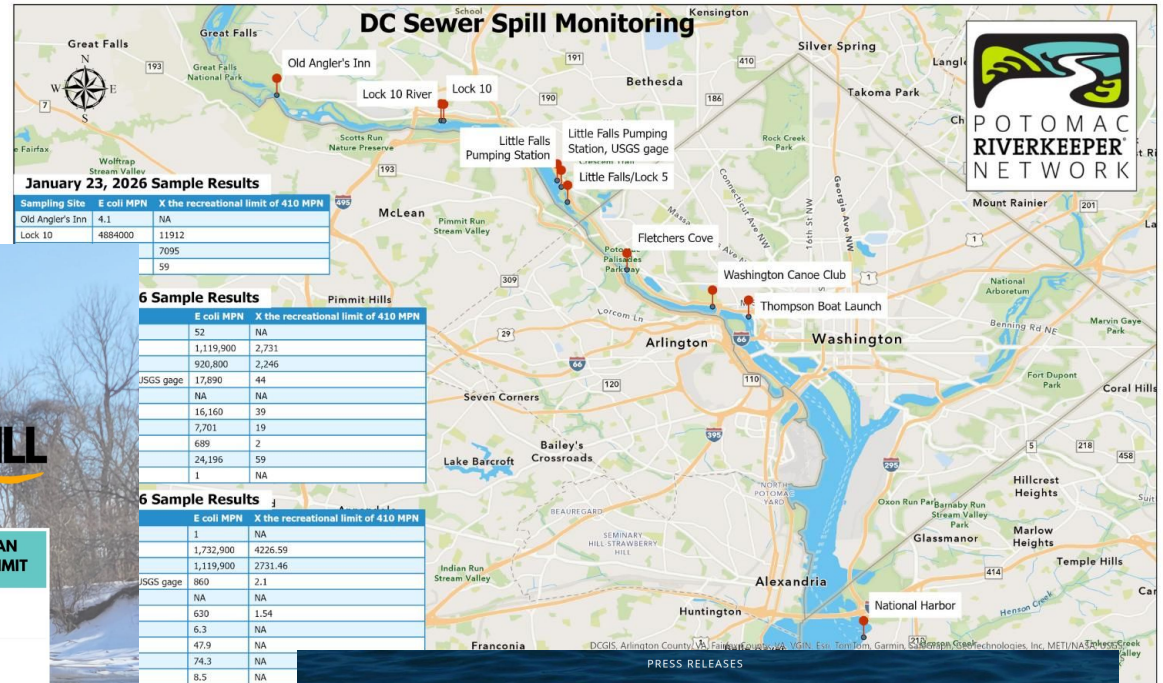
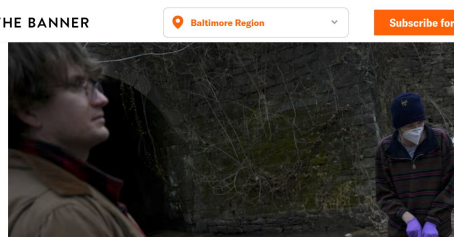
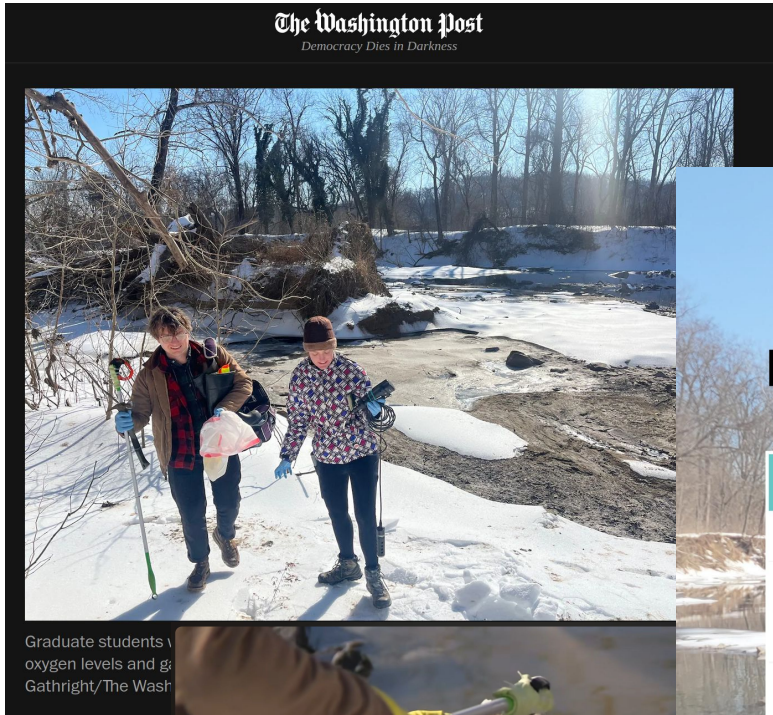
Water quality data was not taken this week
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Visit www.swimguide.org for more info!



Thank You: **Lisa Wu, Evan Quinter, Morgan Bench, and All Volunteers**

Potomac Spill – Rapid Response



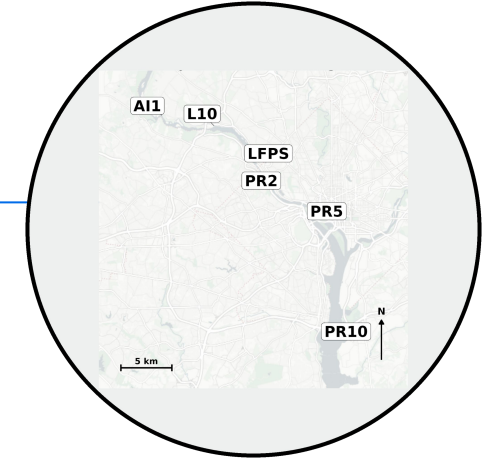
POTOMAC RIVERKEEPER NETWORK
 IN PARTNERSHIP WITH THE UNIVERSITY OF MARYLAND
SAMPLING DATA ON POTOMAC SEWAGE SPILL
 SAMPLES TAKEN 2/3/2026

LOCATION	E. COLI LEVELS	X HIGHER THAN RECREATION LIMIT
Old Angler's Inn (Upstream)	1 MPN	N/A
Potomac River near Cabin John at Lock 10	1,732,900 MPN	4,227
Lock House 10 Public River Access	1,119,900 MPN	2,731
Little Falls Pumping Station, USGS gauge	860 MPN	2
Little Falls/Lock 5	630 MPN	1.54
Fletcher's Cove	6.3 MPN	N/A
Washington Canoe Club	47.9 MPN	N/A
Thompson Boat Launch	74.3 MPN	N/A
National Harbor	8.5 MPN	N/A

*MPN (Most Probable Number) for E. coli refers to a statistical method used in water and food testing to estimate the quantity of E. coli (a fecal indicator bacterium) in a sample, utilizing UV light often used for E. coli confirmation, indicating fecal contamination. It's a key indicator of sanitation, with results expressed as MPN per volume (e.g., 100 mL) to assess drinking water safety or shellfish quality.

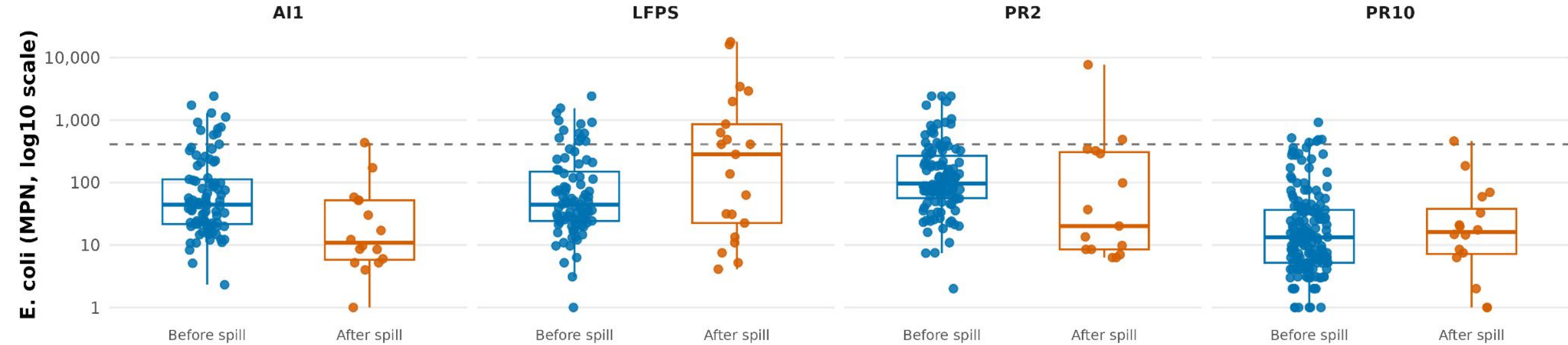


Potomac Spill – Before and After

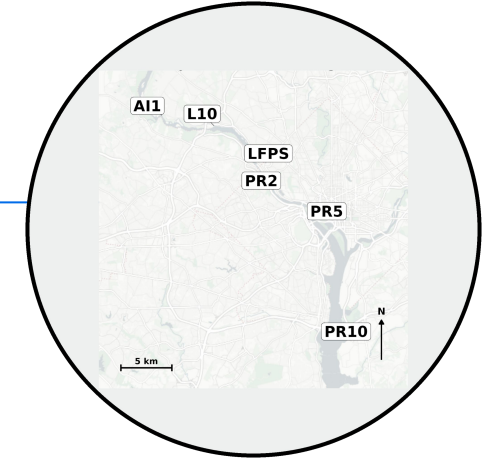


Before vs After Spill E. Coli at PRKN Routine Sites

horizontal dashed line = EPA recreational threshold (410 MPN)

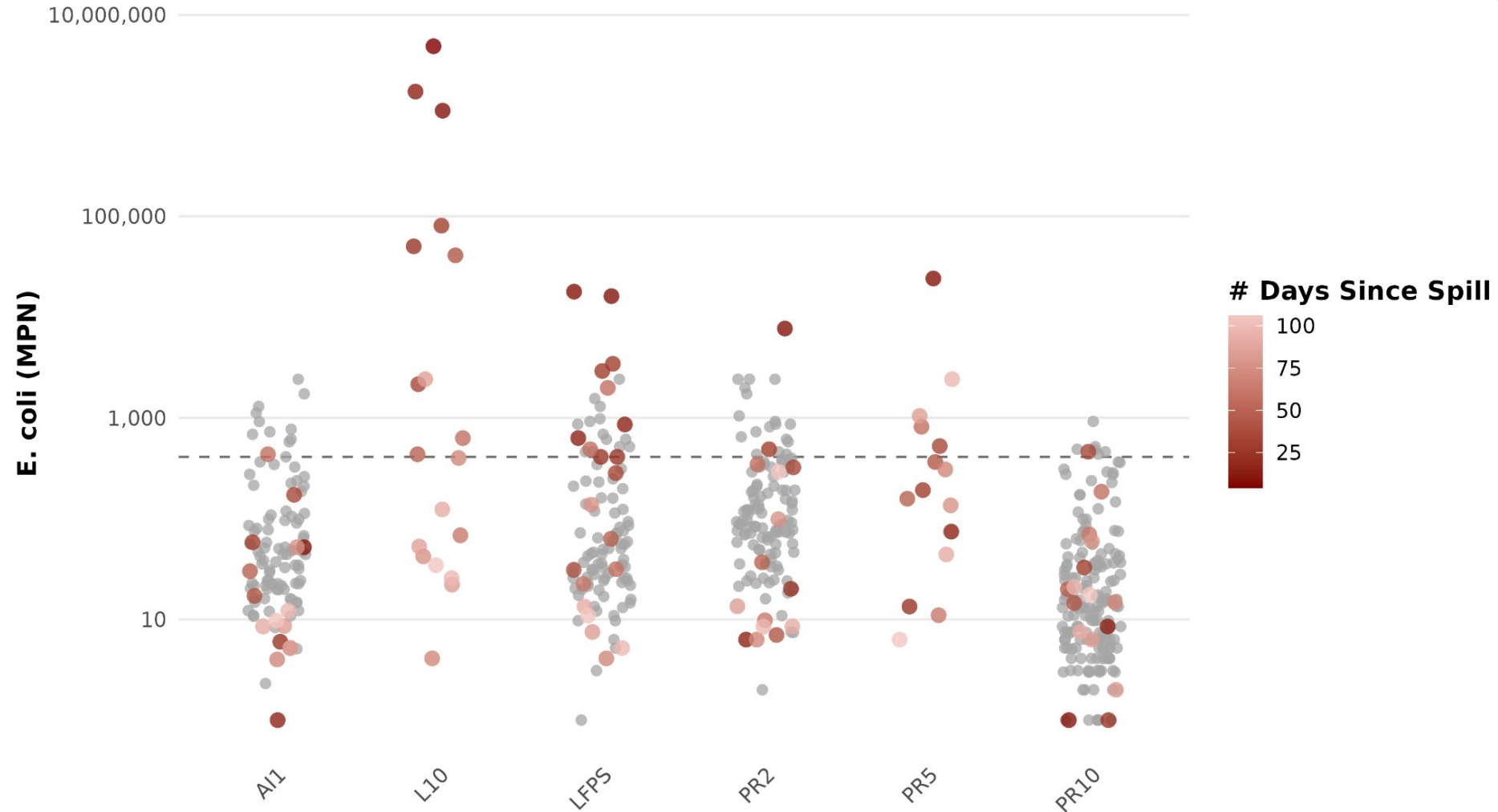


Potomac Spill – Before and After

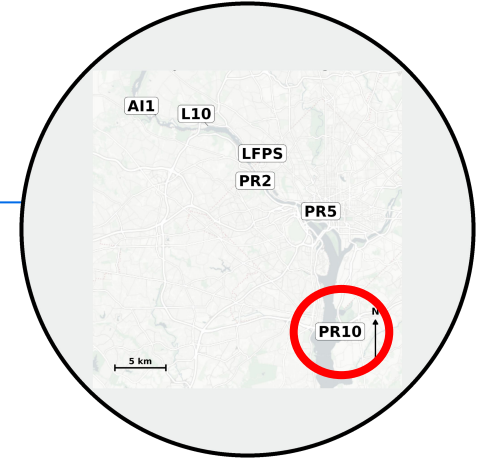


E. coli (MPN) at Potomac Sites

pre-spill monitoring gray, post-spill red gradient by # days since
darker red = closer to spill date; lighter red = more recent

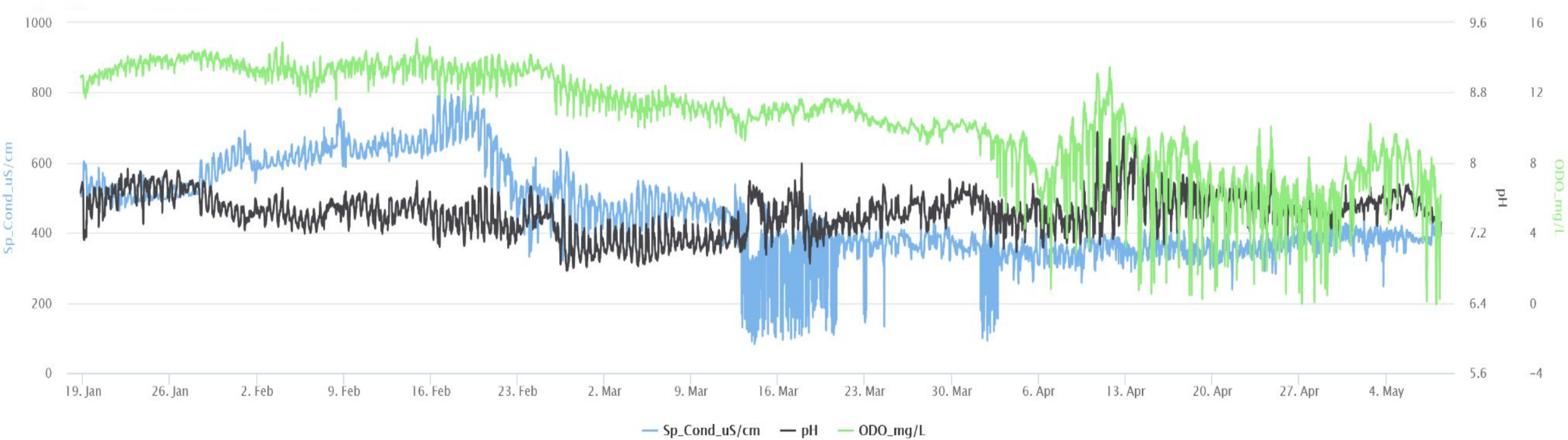


Potomac Spill – Changing Environment

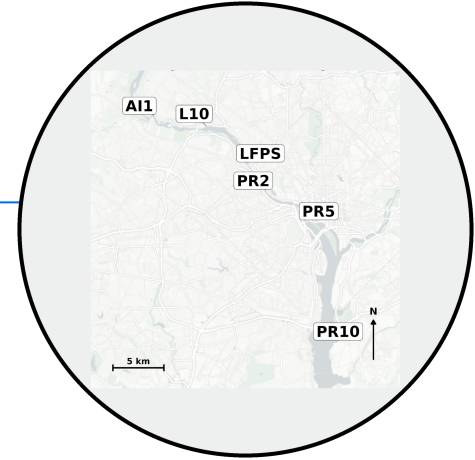


National Harbor

Displayed times are adjusted for time zone and DST based on your browser settings.



Potomac Spill – Evolving Questions



The New York Times

A Huge Sewage Spill Is Over, but Contamination Lingers in the Potomac

Though river monitoring shows bacteria levels have declined, scientists and environmentalists said a full recovery isn't yet assured.

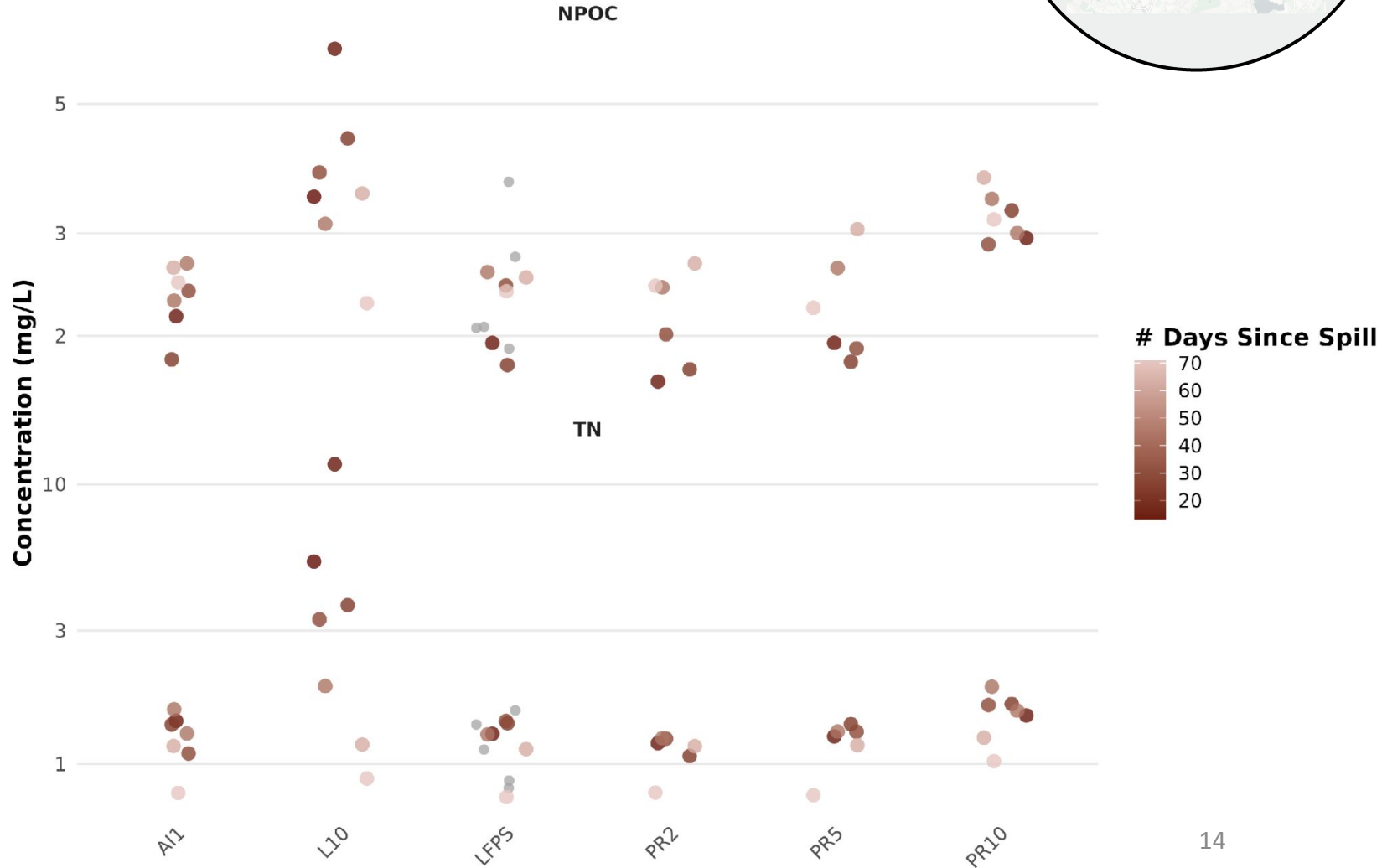
The New York Times CLIMATE | A Huge Sewage Spill Is Over, but Contamination Lingers in the Potomac



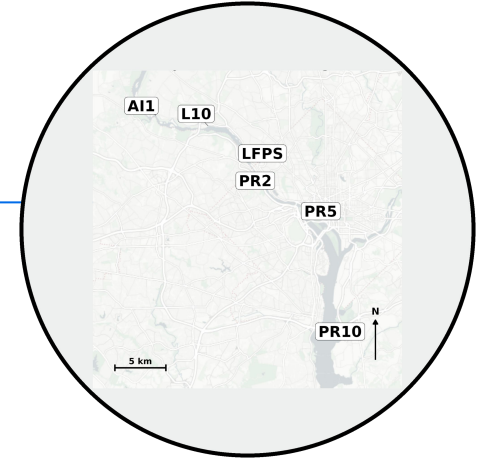
From left, researchers Ryan Woodland, Judy O'Neil, Kristen Heyer and Javier Lloret with water samples gathered from affected areas of the Potomac River. Michael Noble Jr. for The New York Times

NPOC and TN at Potomac Sites

pre-spill monitoring gray, post-spill red gradient by # days since darker red = closer to spill date; lighter red = more recent



Potomac Spill – Targeted Studies



Potomac Sediment Sampling Plan COG-UMD Potomac Interceptor Monitoring Project 2026



● transect site

--- transect

○ transect site

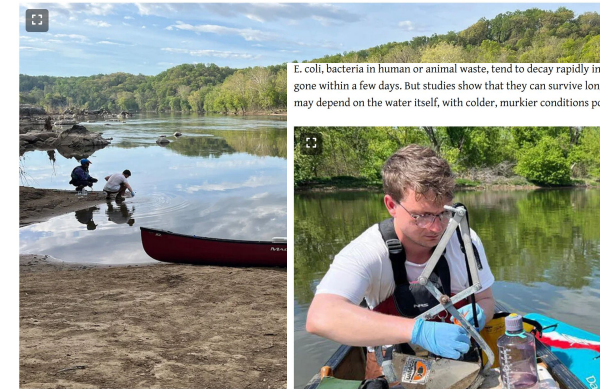
Basemap: © OpenStreetMap contributors

BAY JOURNAL

How long will the Potomac River suffer sewage spill impacts?

Timothy B. Wheeler & Jeremy Cox May 1, 2026 0

f x e m b

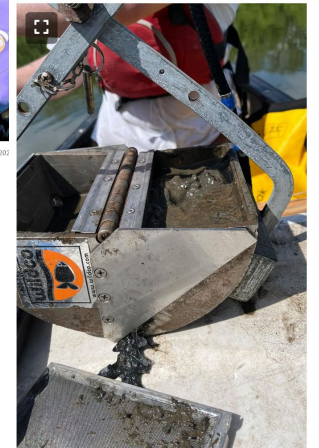


E. coli, bacteria in human or animal waste, tend to decay rapidly in water. In many cases, those and other pathogens can be gone within a few days. But studies show that they can survive longer – for weeks and perhaps months. Their persistence may depend on the water itself, with colder, murkier conditions potentially prolonging their lives.

A volunteer and a graduate student at the University of Maryland collect water from the Potomac Riverkeeper Network.



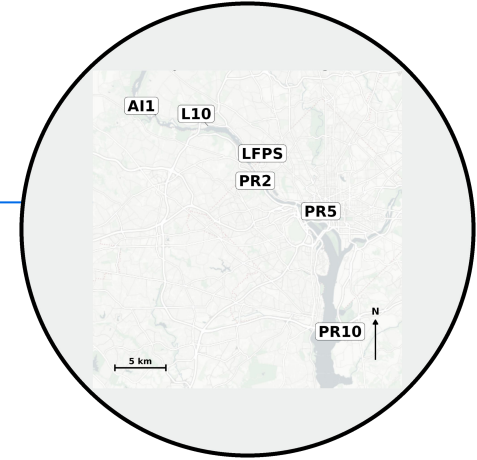
A volunteer and a graduate student at the University of Maryland collect water and sediment samples from the Potomac River in mid-April.



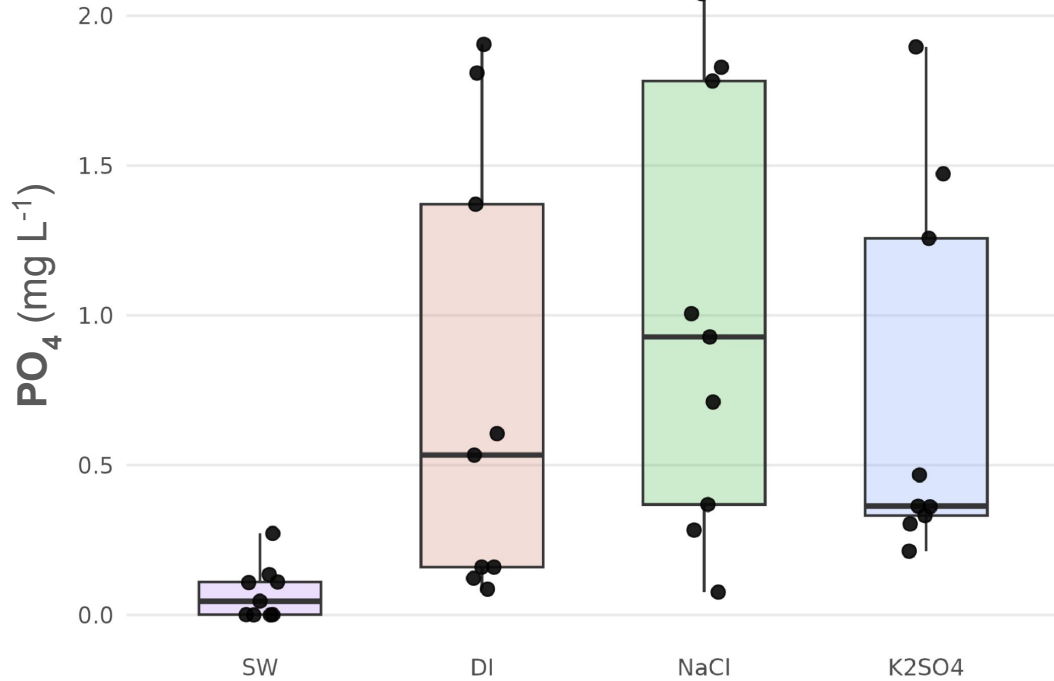
A sampling device holds muck grabbed from the Potomac River bottom during a mid-April monitoring paddle organized by the Potomac Riverkeeper Network.

Chesapeake Bay Journal, May 1st 2026

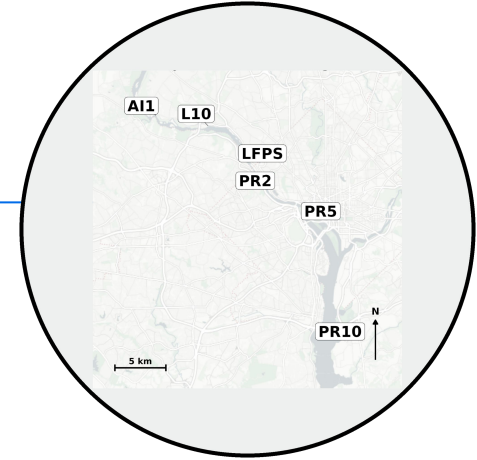
Potomac Spill – Targeted Studies



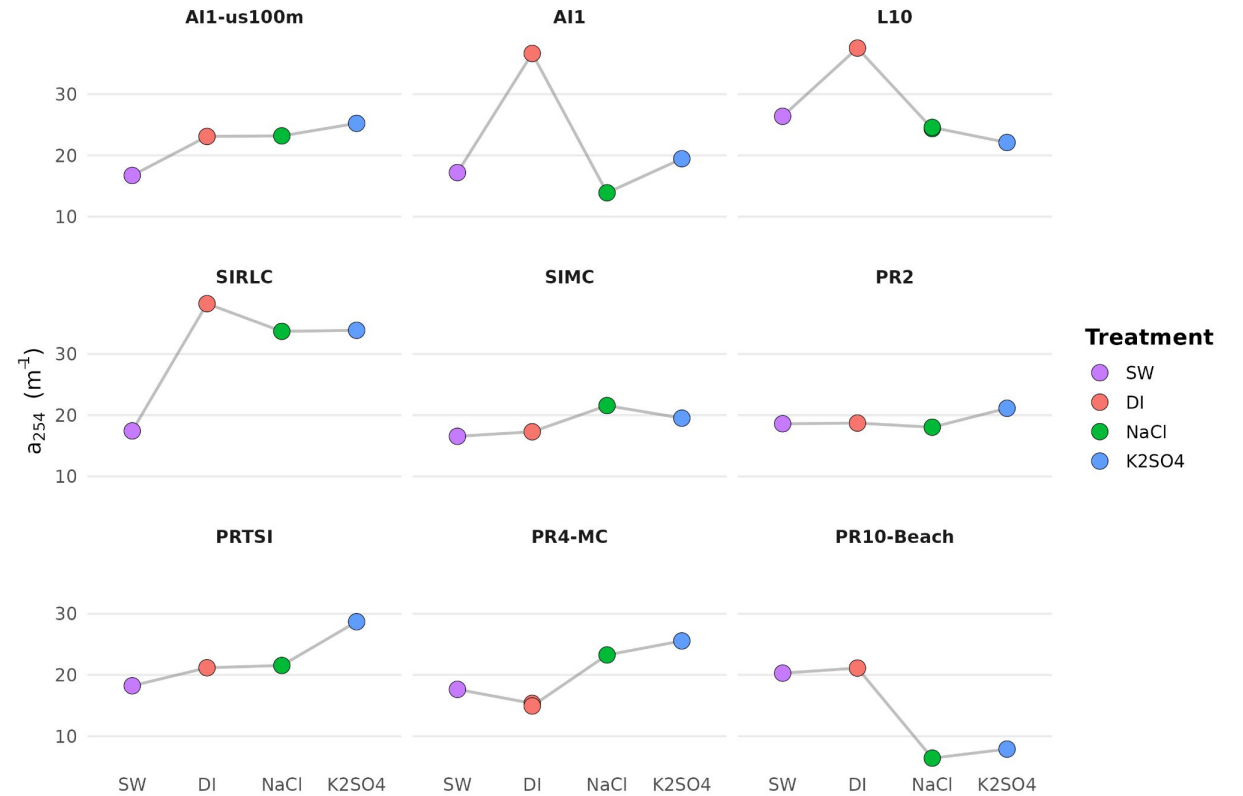
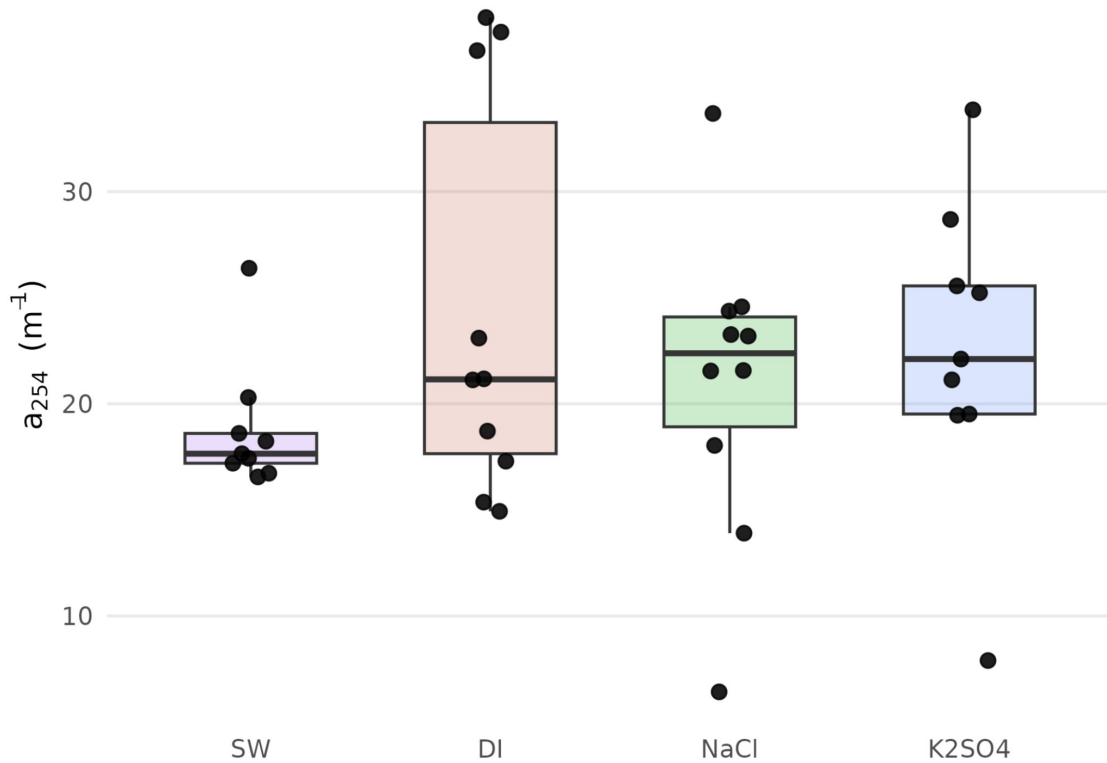
UMD-COG Potomac Boat Survey April 14th 2026
 Surface Water and Sediment Extractant Experiment, PO₄ (mg L⁻¹)



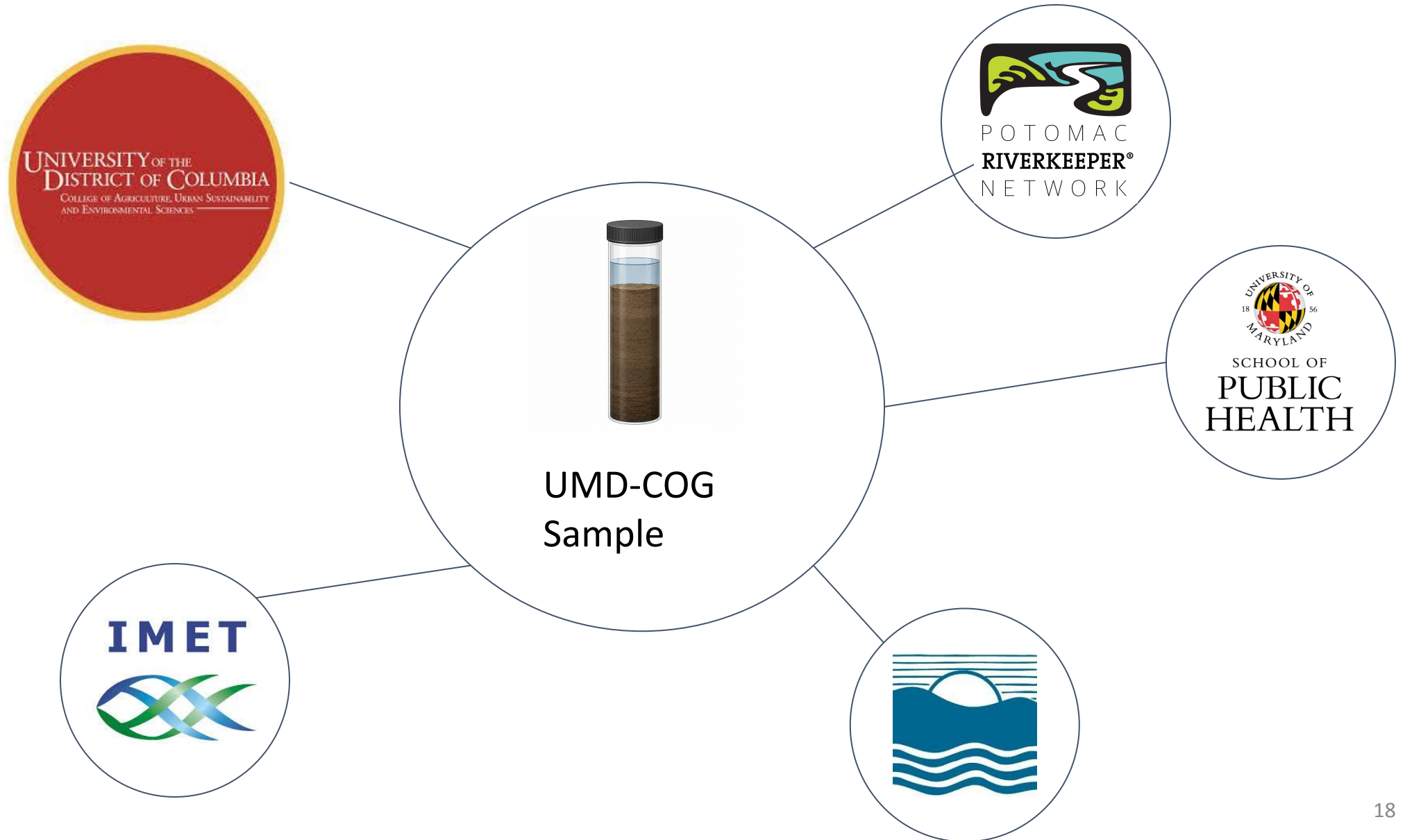
Potomac Spill – Targeted Studies



UMD-COG Potomac Boat Survey April 14th 2026
 Surface Water and Sediment Extractant Experiment, a_{254} (m^{-1})



Potomac Spill – Collaborations



Potomac Spill – Answering (Your) Questions

Q: Is E. Coli in DC-area Potomac surface water going down overall?

A: Yes.

Q: Is there evidence for bacterial and nutrient entrapment in sediments?

A: Preliminary data suggests yes.

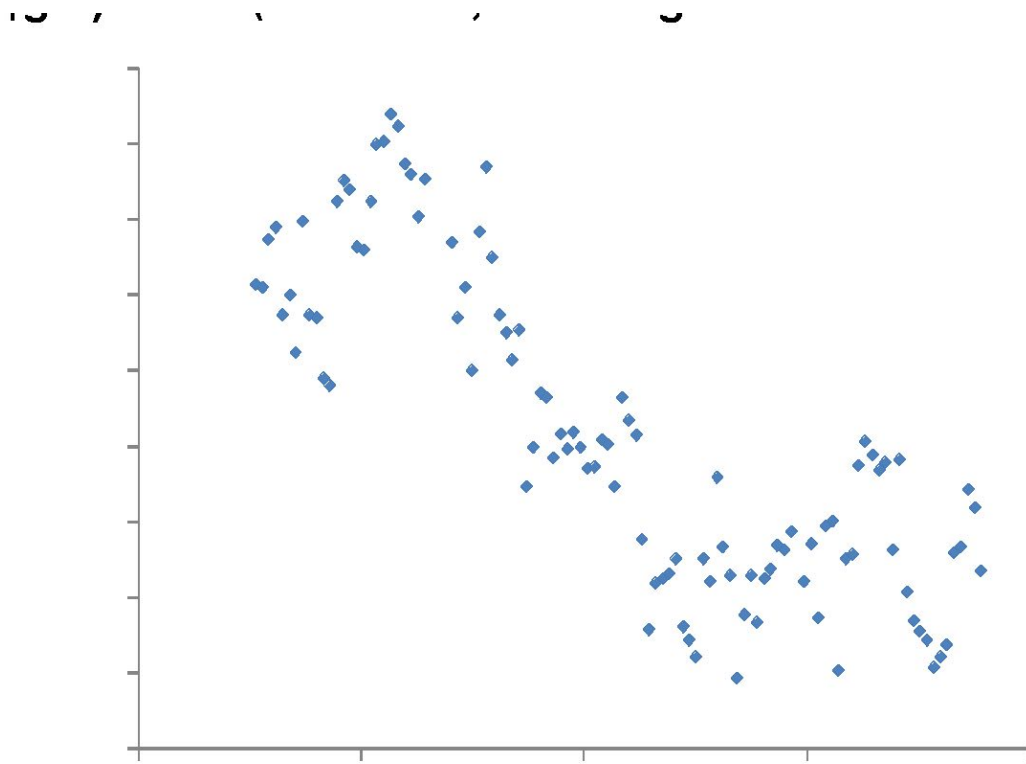
Q: Is the amount of sediment-bound nutrients cause for heightened algal bloom and hypoxia concerns?

A: Requires further study.

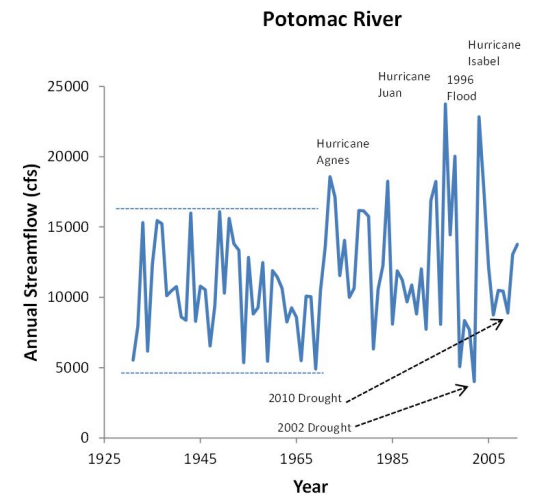
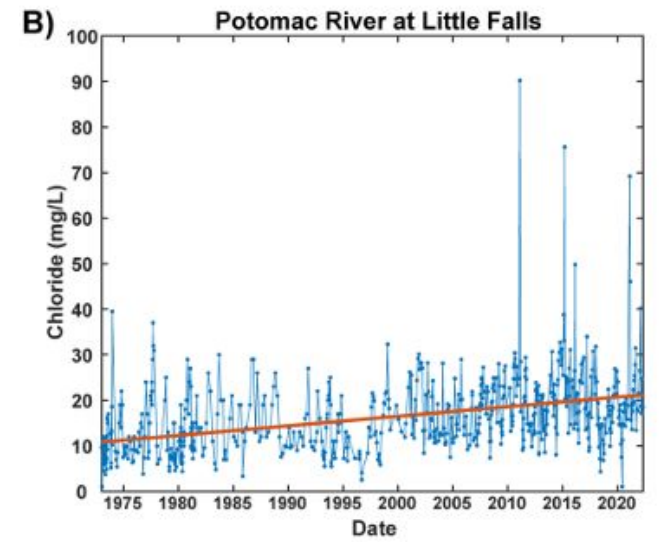
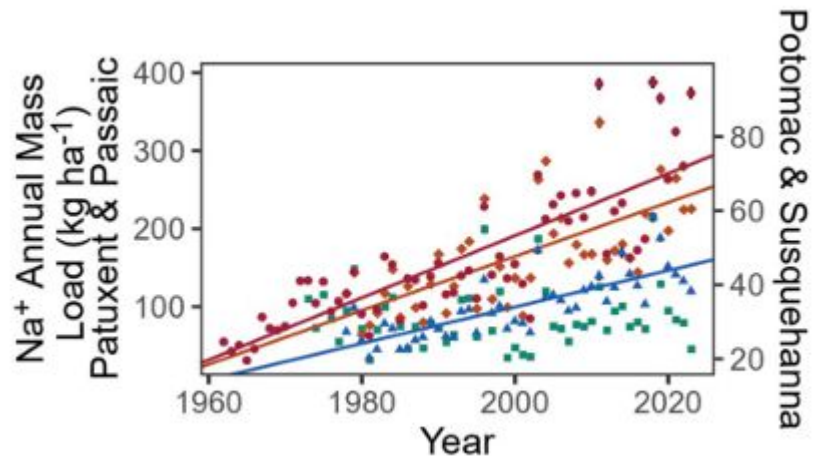
Conclusions

- Need for Scientific Rapid Response Teams (Thx – MWCOCG)
- Need for Holistic Assessments of River Recovery
- Monitoring Approaches across Space-Time
- Unanswered Questions

Water Quality Improvements Over Time



Kaushal et al. (2016)



Supplemental

Buzzard Point

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Chart View

Table View

Site Information

Exo1Data

Parameters

Studies

01/19/2026 - 05/07/2026

Y-axis scaling

Min

Max

Clear



Kingman Island

Displayed times are adjusted for time zone and DST based on your browser settings.

Chart View

Table View

Site Information

Exo1Data

Parameters

Studies

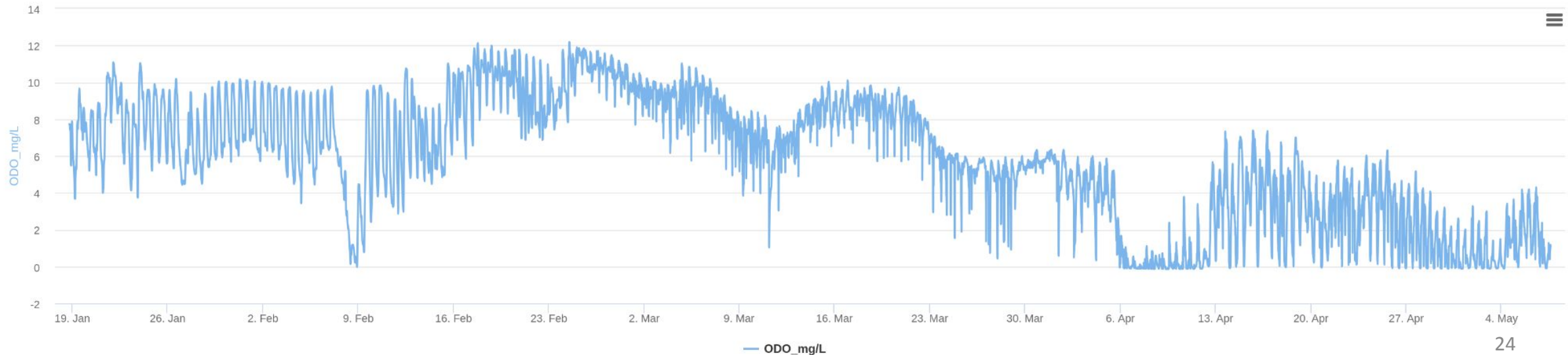
01/19/2026 - 05/07/2026

Y-axis scaling

Min

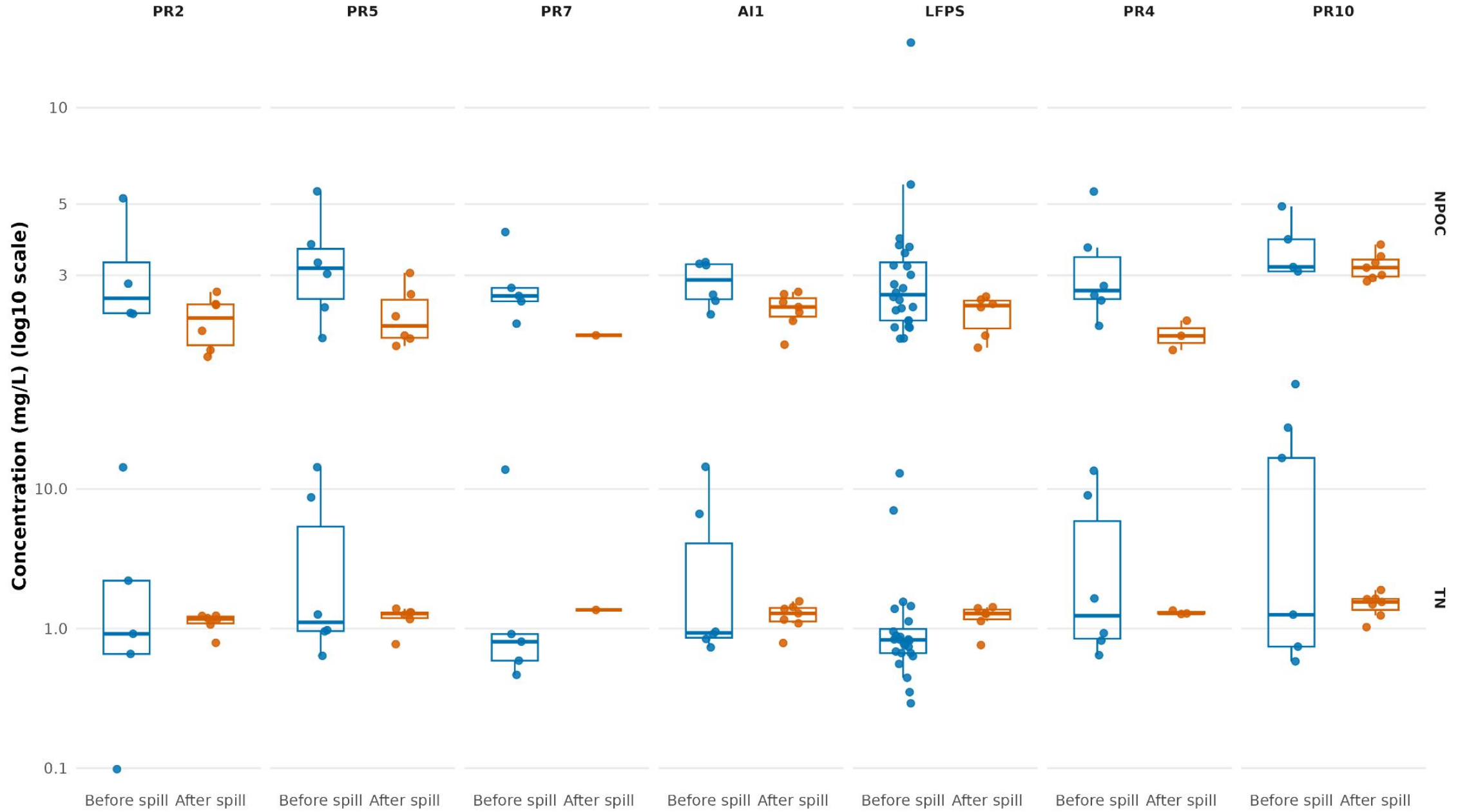
Max

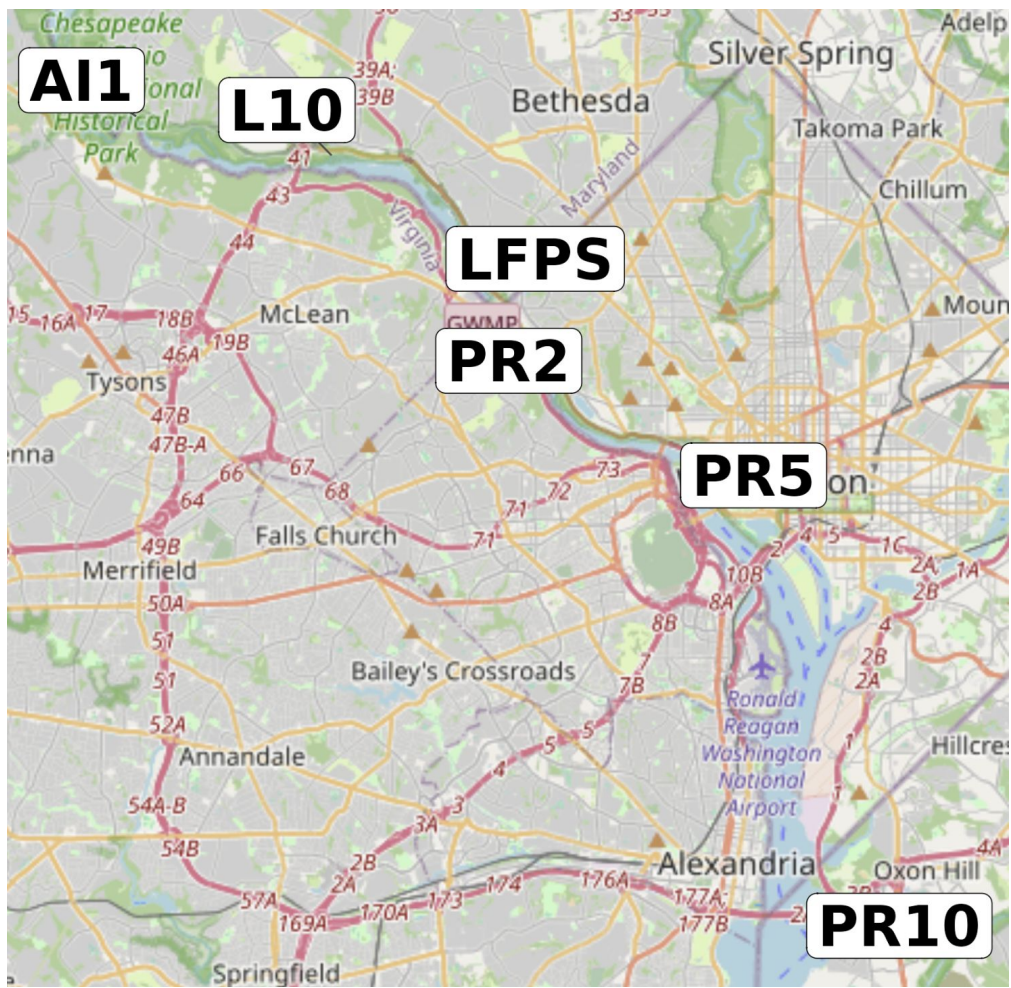
Clear



Before vs after at matched sites (allmonths)

NPOC and TN only







HUNDREDS OF MILLIONS
OF GALLONS OF



MASSIVE SEWAGE SPILL INTO

Massive Potomac sewage spill could take months to clean up

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we



Construction in the 1960s of the sewer line now known as the Potomac Interceptor. (D.C. Water)

