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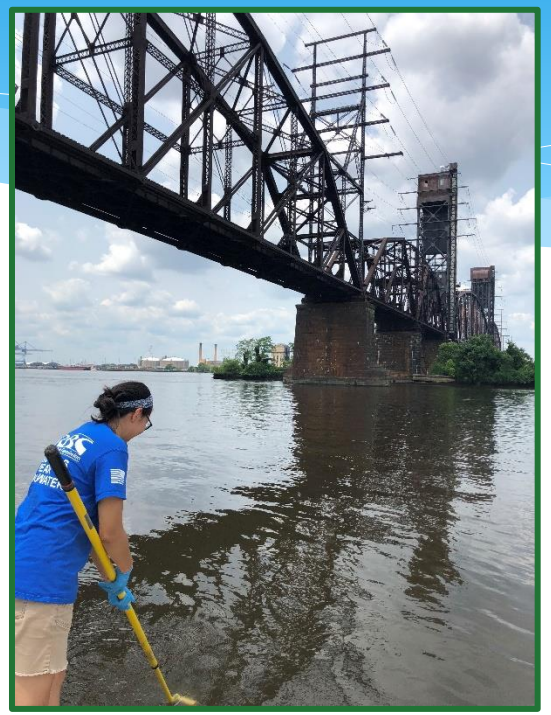

Monitoring Updates

MACC Meeting

December 16, 2021

John Yagecic, PE

Manager, Water Quality Assessment DRBC

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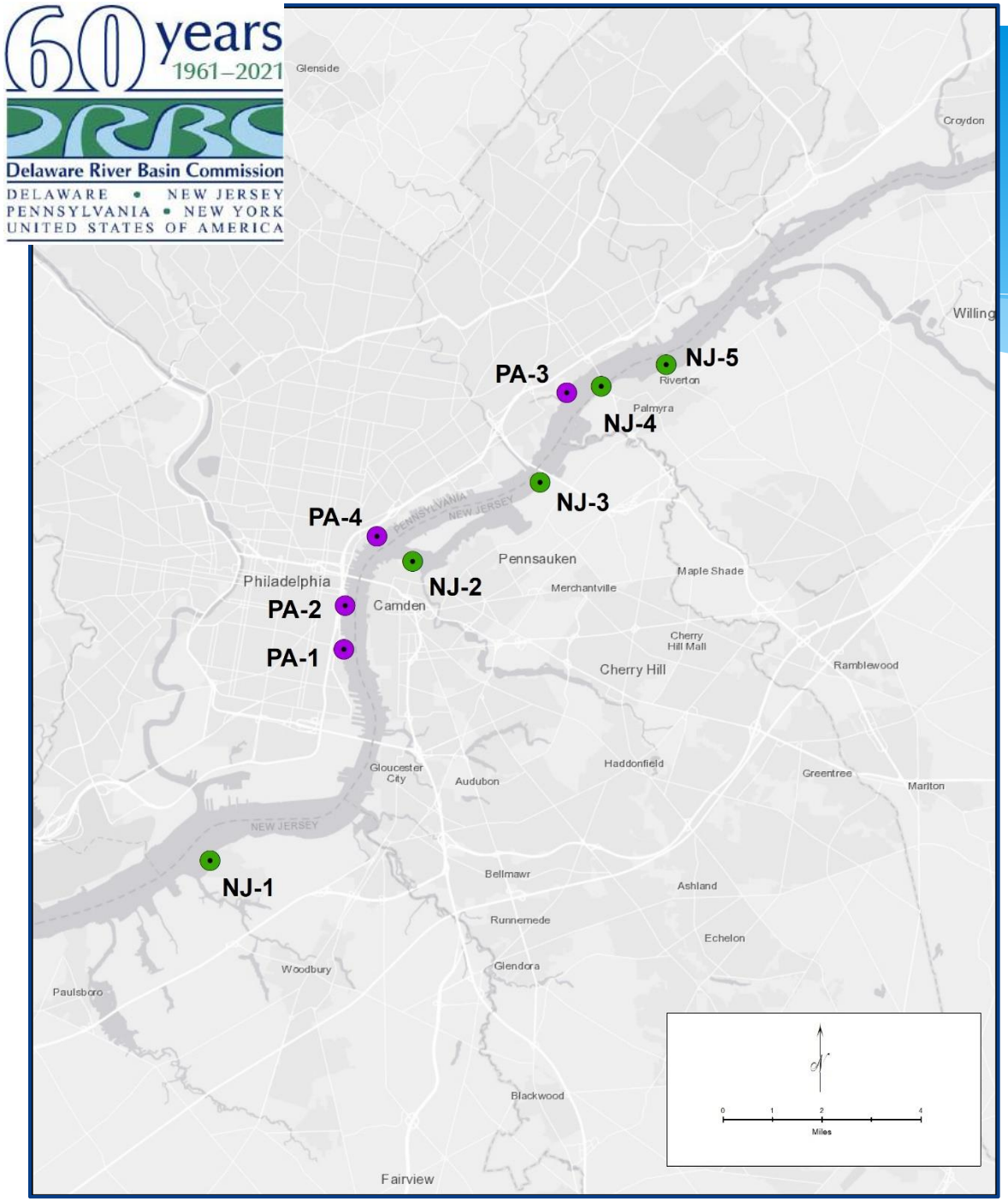
Bacteria Monitoring Microbial Source Tracking Summer 2022



- Enhanced bacterial monitoring since 2019
- Bacterial concentrations don't appear to be tightly coupled to recent precipitation

Microbial Source Tracking in 2022

- New Jersey Center for Water Science and Technology at Montclair State University for the analysis of MST water samples
- Human, bovine, Canada goose, deer, horse, and canine (other by difference)
- 3 wet-weather targeted, 3 dry-weather targeted

DNA Marker Confirmation

- Collecting samples now to confirm that Montclair's library is consistent with DRB sample (QC step)
- 2 samples cow, horse, Canada goose, dog, and deer (1 each PA & NJ near estuary)

Boat Run 2022

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- 22 Stations
- Center Channel
- Monthly, March through October
- Nutrients, metals, toxics, DO
- Continue 1,4-dioxane

Canopy Shading Study

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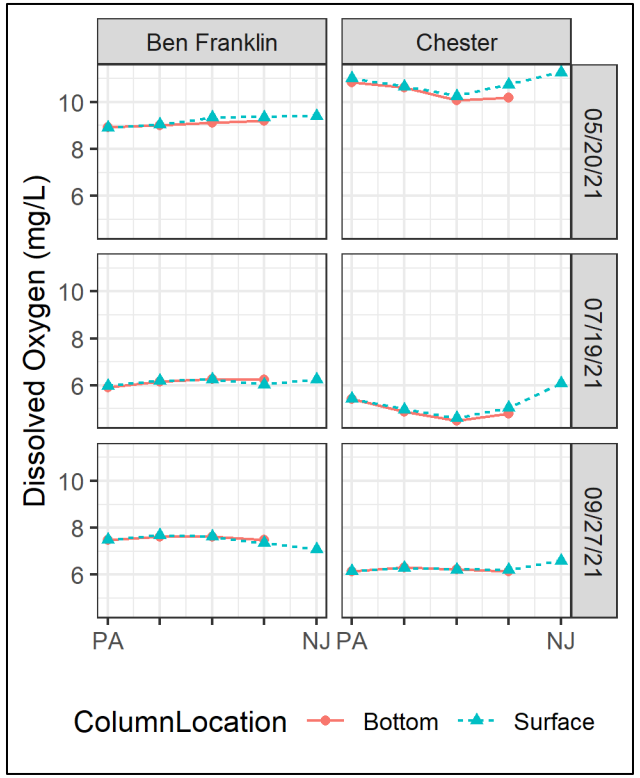
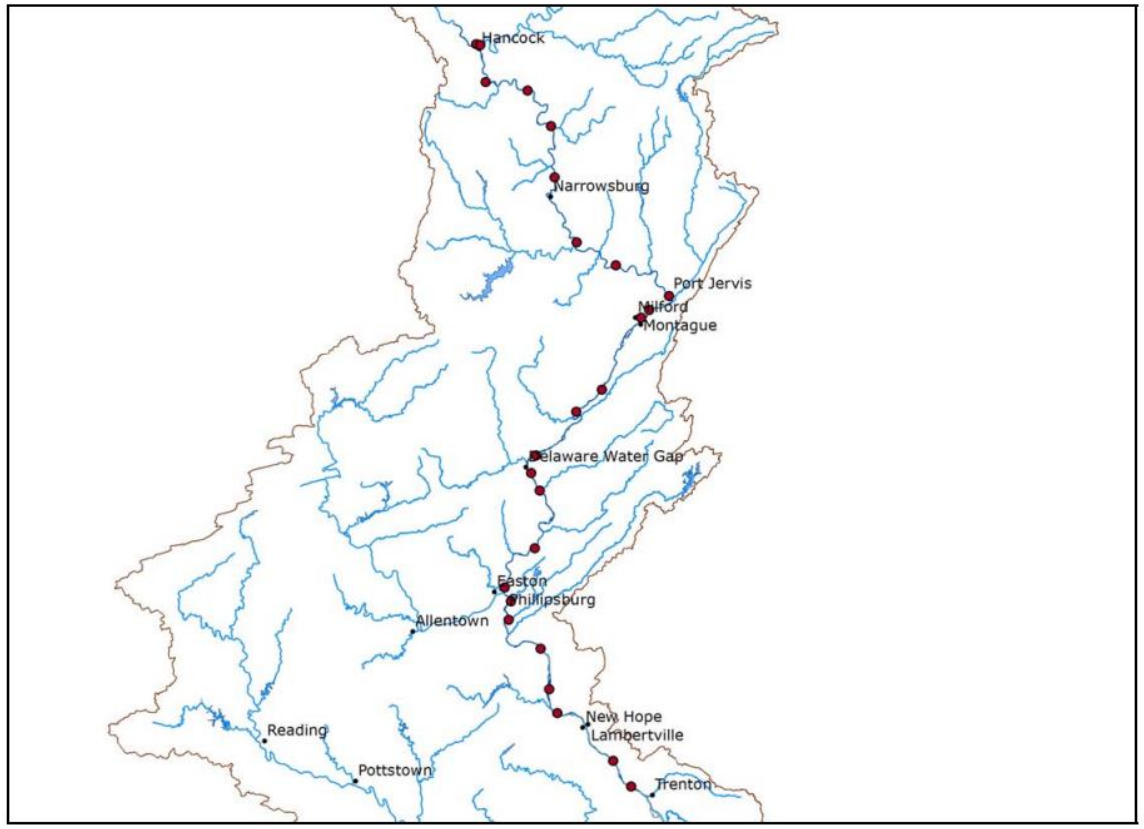
Dissolved Oxygen Profiles

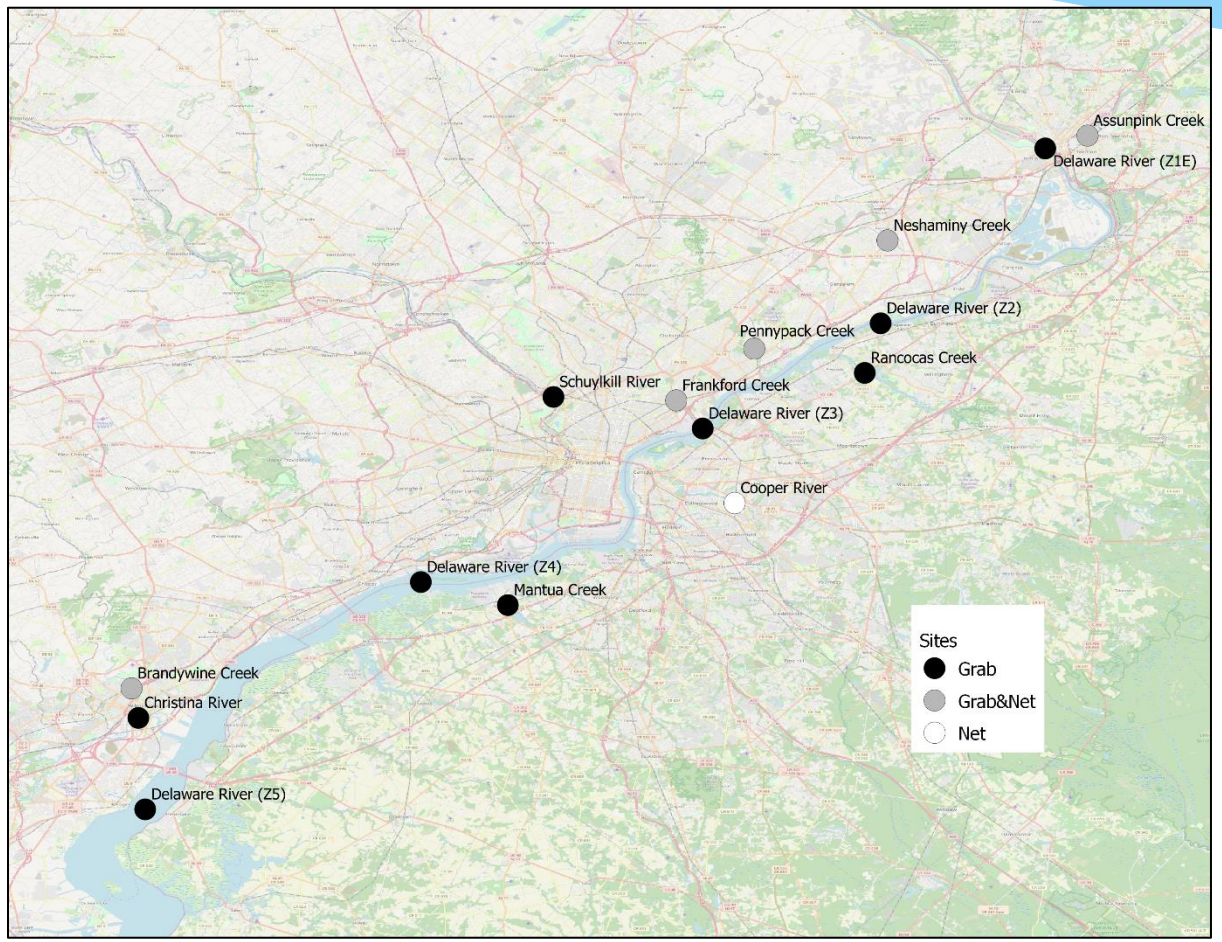


Biological Monitoring



- 25 Stations from Trenton to Hancock
- August and September Index Period
- High Flows Interrupted Sampling

Microplastics Monitoring



- Microplastics collected from 2019 – 2021
- Methods included both net and grab sample
- Report to come in early 2022

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Non-tidal Chloride Monitoring

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MACC Meeting

December 16, 2021

Elaine Panuccio

Water Resource Scientist, Science & Water Quality Management, DRBC

Lower Delaware River SPW Assessment of Measurable Changes to Existing Water Quality

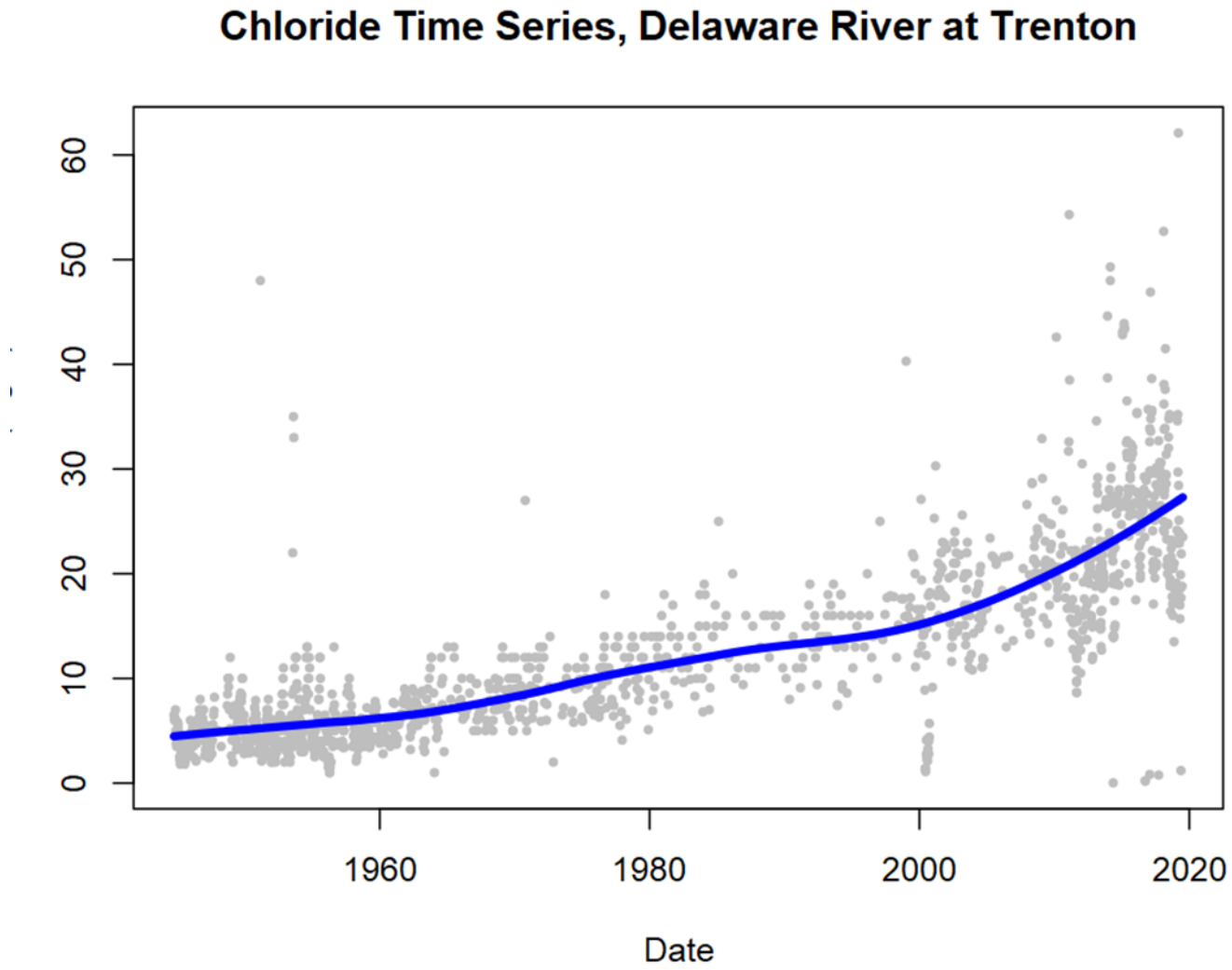
Summary Matrix of Water Quality Changes at Lower Delaware Control Points: 2000-2004 Baseline vs. 2009-2011 Assessment Round 1

Site Color Key: Dark Blue = Interstate Control Point (ICP); Dark Red = Pennsylvania Tributary Boundary Control Point (BCP); Dark Green = New Jersey Tributary Boundary Control Point (BCP)

	Parameter / Site--->	Del. River at Trenton	Del. River at Washngtn Crossing	Pidcock Creek, PA	Delaware River at Lambrtville	Wicke-cheoke Creek, NJ	Lockatong Creek, NJ	Delaware River at Bulls Island	Pauna-cussing Creek, PA	Tohickon Creek, PA	Tinicum Creek, PA	Nishi-sakawick Creek, NJ	Del. River at Milford	Cooks Creek, PA	Musco-netcong River, NJ	Del. River at Rieglsvll	Pohat-cong Creek, NJ	Lehigh River, PA	Del. River at Easton	Bushkill Creek, PA	Martins Creek, PA	Pequest River, NJ	Del. River at Belvidere	Paulins Kill River, NJ	Del. River at Portland
	Site Number--->	1343 ICP	1418 ICP	1463 BCP	1487 ICP	1525 BCP	1540 BCP	1554 ICP	1556 BCP	1570 BCP	1616 BCP	1641 BCP	1677 ICP	1737 BCP	1746 BCP	1748 ICP	1774 BCP	1837 BCP	1838 ICP	1841 BCP	1907 BCP	1978 BCP	1978 ICP	2070 BCP	2074 ICP
Field	Dissolved Oxygen (DO) mg/l											~													
	Dissolved Oxygen Saturation %											~													
	pH, units																								
	Water Temperature, degrees C																								
Nutrients	Ammonia Nitrogen as N, Total mg/l																								
	Nitrate + Nitrite as N, Total mg/l																**								
	Nitrogen as N, Total (TN) mg/l																**								
	Nitrogen, Kjeldahl, Total (TKN) mg/l																								
	Orthophosphate as P, Total mg/l																								
	Phosphorus as P, Total (TP) mg/l																								
Bacteria	Enterococcus colonies/100 ml	~			~																				
	Escherichia coli colonies/100 ml	**	**	**	**	**	**			**	**	**													
	Fecal coliform colonies/100 ml																								
Conventionals	Alkalinity as CaCO3, Total mg/l																								
	Hardness as CaCO3, Total mg/l											~													
	Chloride, Total mg/l			**		**	**	**	**	**		**	**	**	**	**	**	**	~	**	**	**	**		**
	Specific Conductance µmho/cm			**		**	**	~	**	**	**	**	**	**	**	~	**	**	~	~	~	**	~		
	Total Dissolved Solids (TDS) mg/l																								
	Total Suspended Solids (TSS) mg/l																								
	Turbidity NTU																								

KEY: = No indication of measurable change to EWQ; ** = Indication of measurable water quality change toward more degraded status; ~ = Weak indication of measurable water quality change toward more degraded status

Chloride data trend for Delaware at Trenton



Freshwater Salinization Syndrome

- **Many recent articles & more public awareness**
- **Complex interactions & "chemical cocktails"**

1. **Road salts and freshwater salinization syndrome**

S. Himmelstein | April 26, 2021

The application of deicing salt reduces the potential for weather-related travel accidents on roads and walkways during winter but increases the potential for freshwater quality degradation as these chemicals are washed into waterways. Researchers from the University of Maryland and University of Connecticut have labeled the cascading effects of introduced salts Freshwater Salinization Syndrome (FSS), which exerts detrimental impacts on drinking water quality, human health, agriculture, infrastructure and wildlife.

2. LETTER • OPEN ACCESS

Trends and legacy of freshwater salinization: untangling over 50 years of stream chloride monitoring

Bhaswati Mazumder[3,1], Christopher Wellen[1], Georgina Kaltenecker[2], Ryan J Sorichetti[2] and Claire J Oswald[3,1]

Published 12 August 2021 • © 2021 The Author(s). Published by IOP Publishing Ltd

Open Access | Published: 12 April 2021

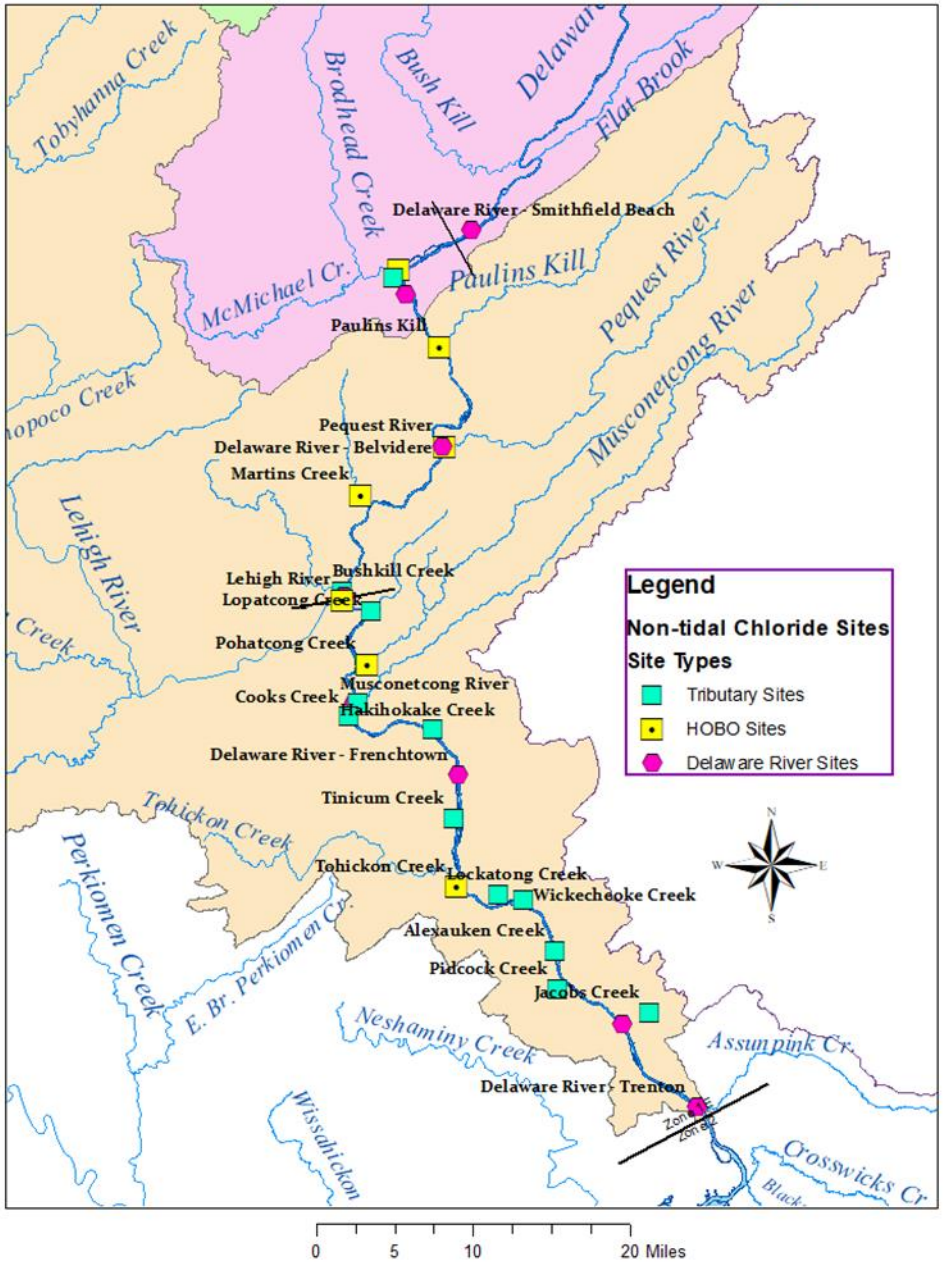
3. Freshwater salinization syndrome: from emerging global problem to managing risks

Sujay S. Kaushal, Gene E. Likens, ... Seyram A. Woglo + Show authors

Biogeochemistry **154**, 255–292 (2021) | Cite this article

1. https://insights.globalspec.com/article/16424/road-salts-and-freshwater-salinization-syndrome
2. https://iopscience.iop.org/article/10.1088/1748-9326/ac1817
3. https://link.springer.com/article/10.1007/s10533-021-00784-w

Non-tidal Chloride Monitoring Sites



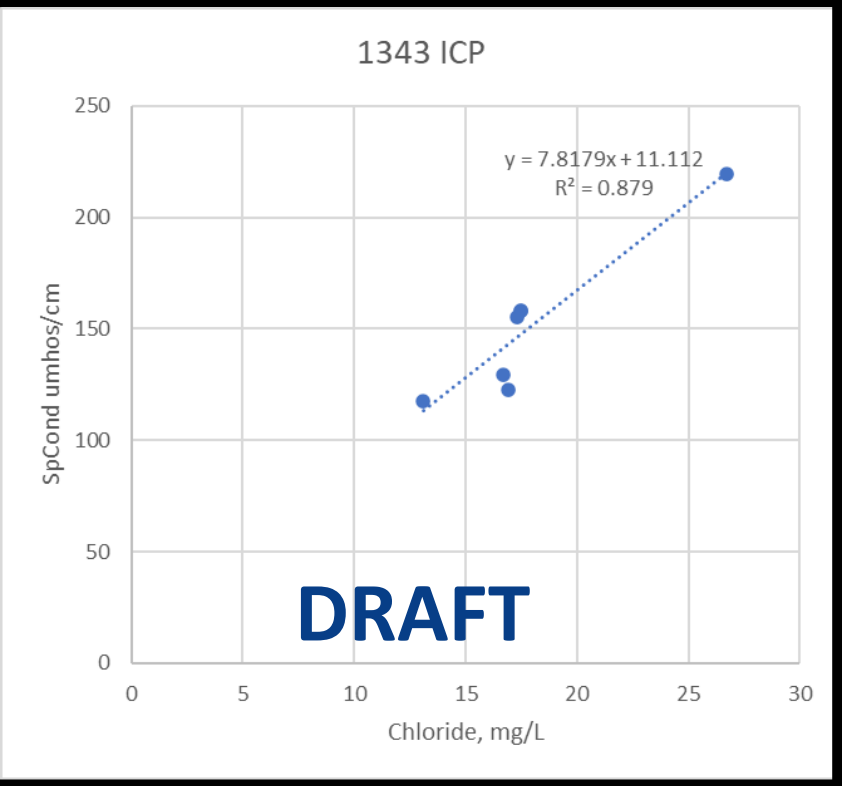
Non-tidal Chloride Monitoring Program 2021

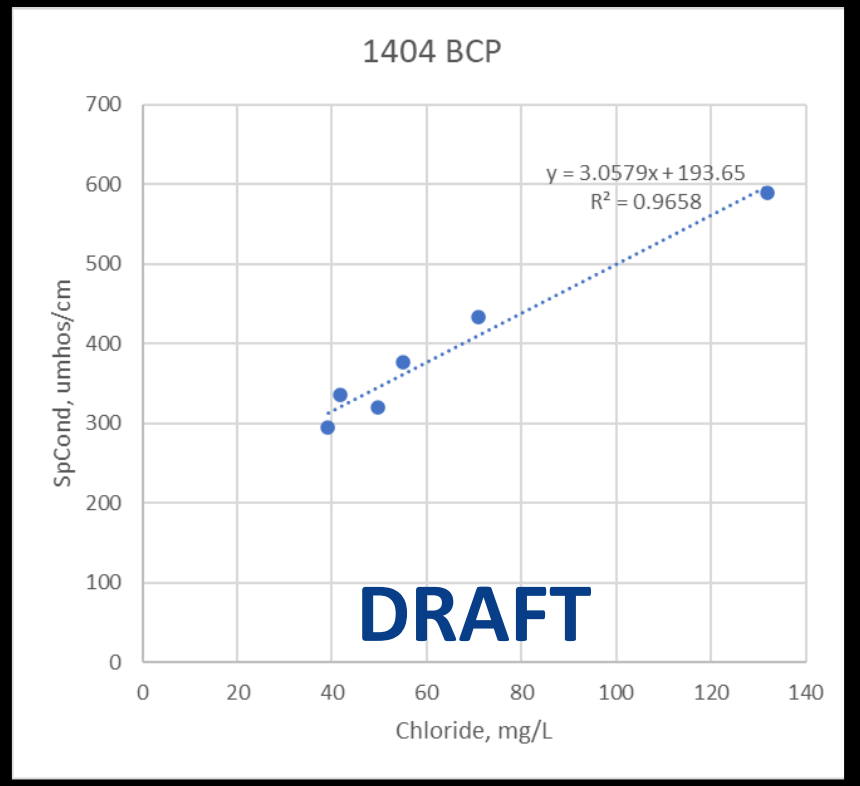
- 27 sites (19 tributaries & 8 mainstem Delaware River)
- Once per month monitoring
- Twice per month continuous conductivity logger maintenance
- Chloride is a good tracer as it is conservative in the environment

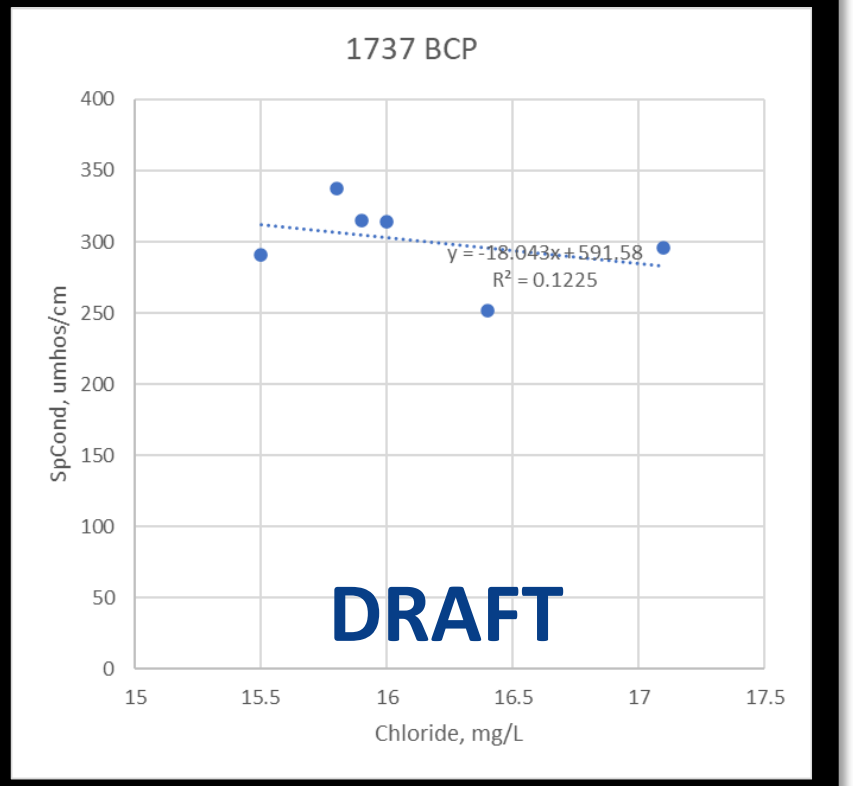
Continuous Conductivity Loggers

- Deployed continuous conductivity loggers in 7 tributaries (Brodhead Creek, Paulins Kill, Pequest River, Martins Creek, Lehigh River, Pohatcong Creek, and Tohickon Creek)
- Year-round deployment
- Lost 1 logger at Paulins Kill during flood events (hurricanes in early September)
- Another logger stopped working at Brodhead Creek

Chloride Results 2021







Non-tidal Chloride Monitoring in 2022

- **Expanding parameter list in 2022**
  - **Added:**
    - **Nitrate, calcium, magnesium, sodium, potassium, sulfate, total silica, total alkalinity, dissolved inorganic carbon, and total phosphorus**
  - **Recommendations welcome (budget is a restraint)**

Future Work

- Chloride/Freshwater Salinization monitoring workgroup
- Assess relationships of various ions to conductivity in streams and mainstem river
- Chloride mass-balance model of SPW mainstem and tributaries
- Identify sites that indicate evidence of improvements and/or degradation
  - Trackdown areas of concern

Why collect PFAS data?

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Harrisburg PA., 17120

FOR IMMEDIATE RELEASE
10/13/2021

CONTACT:
Neil Shader, DEP
717-703-3564
Mike Parker, PFBC
717-705-7806

FCA in Neshaminy creek, PA 10/13/2021

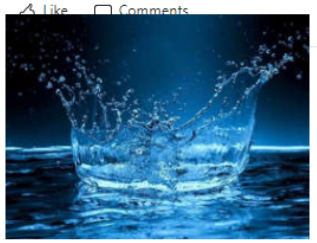
Anglers Warned to Not Eat Fish from Neshaminy Creek Basin
Perfluorooctane Sulfonate (PFOS) risk from all species

Harrisburg, PA – The Pennsylvania departments of Environmental Protection (DEP), Agriculture (PDA), and Health (DOH), along with the Pennsylvania Fish and Boat Commission (PFBC), announced a "Do Not Eat" advisory for all fish species caught in the Neshaminy Creek basin in Bucks and Montgomery counties due to extremely high levels of Perfluorooctane Sulfonate (PFOS). The advisory extends to all fish throughout the Neshaminy Creek basin, including Neshaminy Creek State Park and Tyler State Park.

Patch — + Follow

Bucks, MontCo Residents Can Enroll In PFA Research Study

John Fey · 32 mins ago



© Shutterstock High blood pressure and developmental issues in children have also been contributed to long-term exposure to the chemicals, according to researchers.

WARMINSTER, PA — Researchers re seeking up to 1,000 adults and 300 children for a new study on the relationship between cancer and PFAS, a type of chemical that was found to be present in local drinking water during 2005 to 2017.

The Agency for Toxic Substances and Disease Registry (ATSDR), which is a part of the Centers for Disease Control and Prevention (CDC), is conducting the research to find if the manmade chemicals are directly related to a series of health issues for those who were exposed to it on a long-term basis. The main result they aim to find is if the chemicals cause cancer.

https://patch.com/pennsylvania/warminster/bucks-montco-residents-can-enroll-pfa-research-study

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PFOA, PFOS and Other PFAS — CONTACT US

- PFAS Home
- PFAS Explained
- EPA actions to address PFAS
- PFAS Strategic Roadmap
- Data and Tools
- State Information

PFAS Strategic Roadmap: EPA's Commitments to Action 2021–2024

On October 18, 2021, EPA Administrator Michael S. Regan announced the agency's PFAS Strategic Roadmap—laying out a whole-of-agency approach to addressing PFAS.

The roadmap sets timelines by which EPA plans to take specific actions and commits to bolder new policies to safeguard public health, protect the environment, and hold polluters accountable. The actions described in the PFAS Roadmap each represent important and meaningful steps to safeguard communities from PFAS contamination. Cumulatively, these actions will build upon one another and lead to more enduring and protective solutions.

Lea en español

Infórmese acerca del Mapa estratégico sobre PFAS: Los compromisos de la EPA para tomar acción en 2021-2024

https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024

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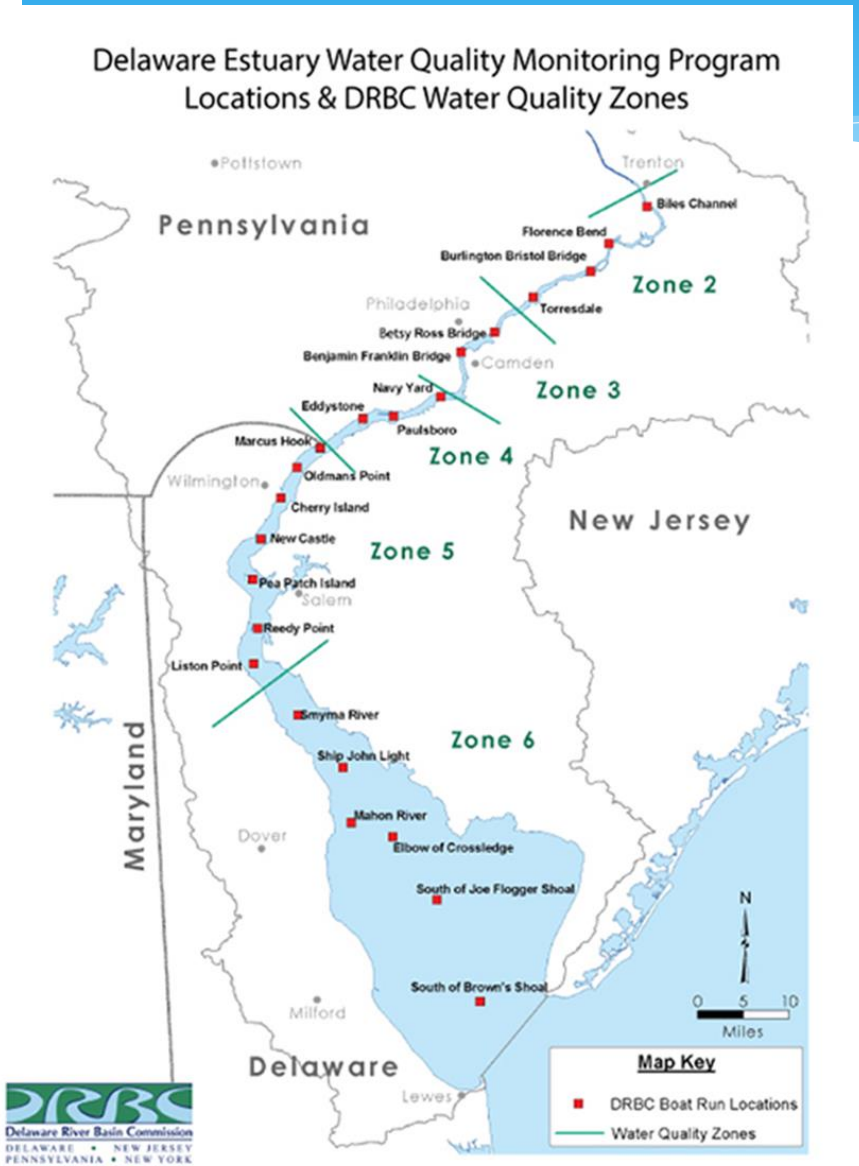
COVID-19 VACCINES | WATERSHED

Does PFAS exposure affect COVID-19 illness and vaccine effectiveness? Researchers want to know

By Zoë Read · November 16, 2021

https://whyy.org/articles/does-pfas-exposure-affect-covid-19-illness-and-vaccine-effectiveness-researchers-want-to-know/

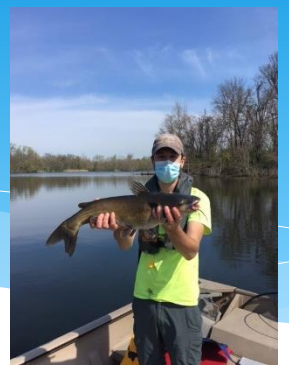
PFAS Ambient Monitoring Update



- **Surface water samples** added to the estuary monitoring (DRBC's BoatRun) program under 106 grant in 2021
- Data in review and is on agenda of the next DRBC TAC meeting.

PFAS Ambient Monitoring Update





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- Sample collection of **surface water, sediment and fish** in 2021:
  - Tidal main stem and PA trib sites under PACZM grant. Samples submitted to analytical lab.
  - Non-tidal and Zone 5 sites under DWCF grant. Samples submitted to analytical lab.
  - Freshwater mussels (caged non-tidal and wild tidal) submitted to analytical lab.
  - Analytical data in review as received.
  - Additional sampling and analysis for PFAS is scheduled for 2022.

2022 PCB and Other Contaminants in Fish

- PCBs, dioxins/furans, OC pesticides, total mercury and methylmercury analysis of fish fillet from two species at 4 sites in non-tidal river and 5 sites in tidal estuary
- Fish collection in cooperation with basin state agencies
- Outcome is information for assessment and management including providing data for fish consumption advisories in the Delaware River by basin state agencies