DRBC Science & Water Quality Management Monitoring Updates

May 14, 2024

Annual STAC-MACC Joint Meeting

Delaware River Basin Commission

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Special Protection Waters Program

- Special Protection Waters (SPW) Objective: **Antidegradation** of Existing Water Quality (EWQ)
  - SPW rules cover ~6,780 of the 13,800 mi^2 DRB watershed (197-mile stretch)
    - Monitored by DRBC and NPS

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How is SPW implemented?

- New and expanding WWTPs must demonstrate to DRBC no changes to Existing Water Quality (EWQ)
- Stricter regulations
- SPW Monitoring program in place to ensure efficacy of implementation

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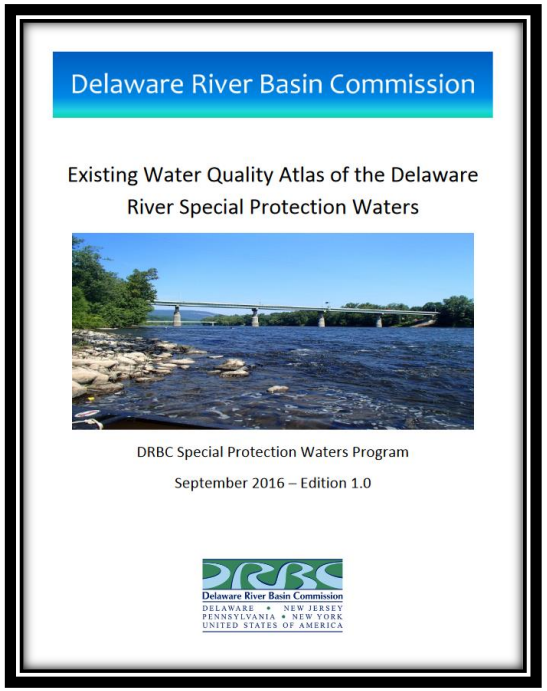
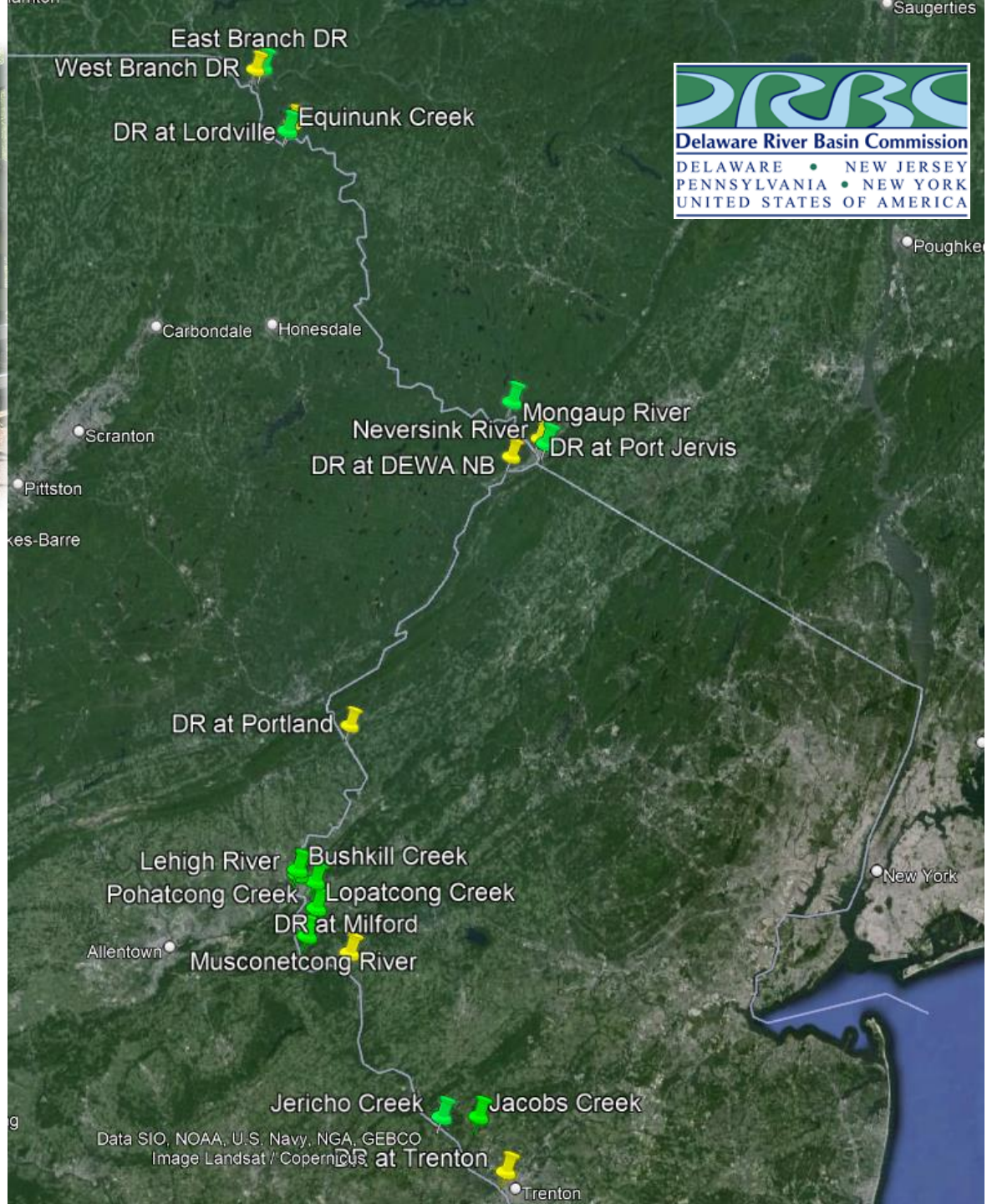
Special Protection Waters Monitoring





Results from Lower Delaware Measurable Change Assessment (2009-2011)

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 Lambrtvlle	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 cha

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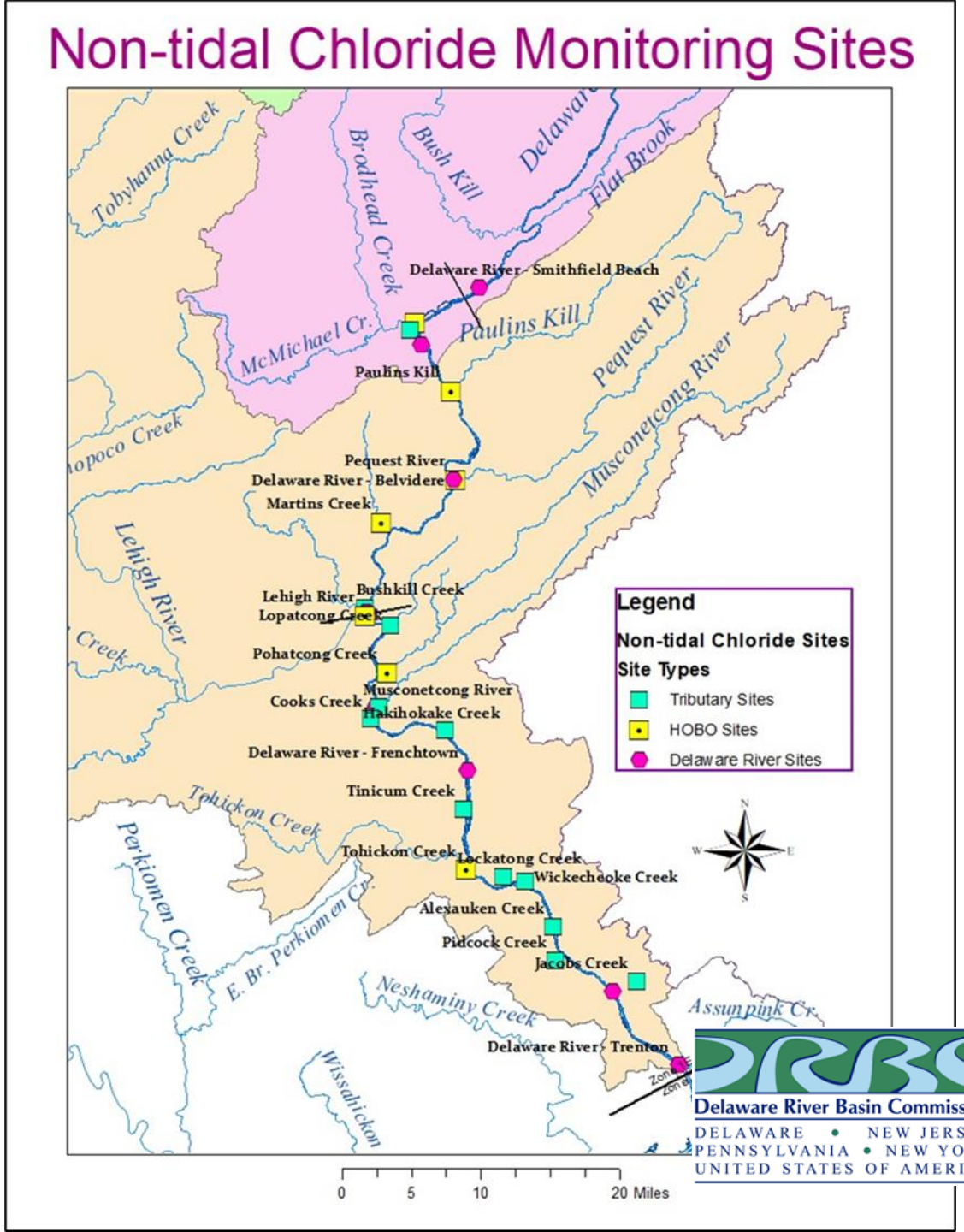
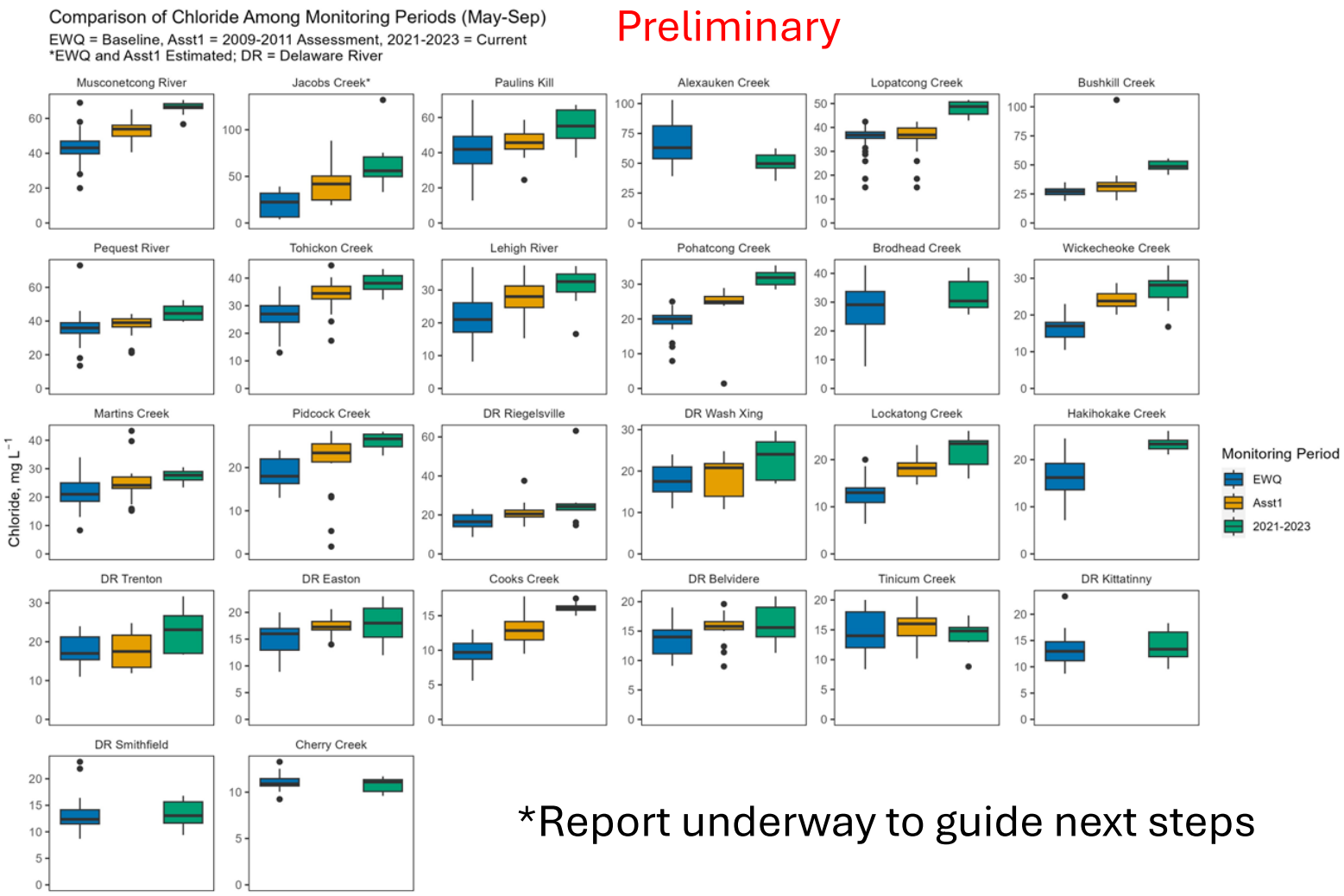
Trends prompted targeted monitoring

- May 2021 – April 2023
- 27 locations
  - 19 tributaries
  - 8 mainstem sites
- Year-round monitoring
  - SPW Monitoring routinely occurs May – September
- Monitored monthly for chloride, TDS, and conductivity
- Deployed and maintained continuous conductivity and temperature loggers in 7 tributaries



Non-tidal Chloride Monitoring



*Report underway to guide next steps

2021 – 2023 results suggest further chloride increases from 2009-2011 assessment

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SIFT (Salinity Impacts Freshwater Toxicity) Workgroup

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- Regional workgroup formed through the WQAC by DRBC in late 2022
- Collaboratively *sift* through the escalating issue of freshwater salinization and increasing chlorides in rivers and streams
- Discussions focus on strategies for potential regulatory approaches to address salt pollution

New Jersey Department of Environmental Protection
The Watershed Institute
United States Environmental Protection Agency
pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION
Stroud Water Research Center
National Park Service
Balgowan Forensic & Engineering Services
Brick Township Municipal Utilities Authority
USGS science for a changing world
Philadelphia Water Department
Partnership for the Delaware Estuary
Maryland Department of the Environment
DEQ Virginia Department of Environmental Quality
Sage Services LLC

Cyanotoxins and Microcystin Congener Monitoring

- Completed screening study of both tidal and non-tidal DR (2022 and 2023)
  - Microcystin present across all sites
- 2024: adding microcystin congener analysis (analyzed by DNREC) to determine composition and toxicity

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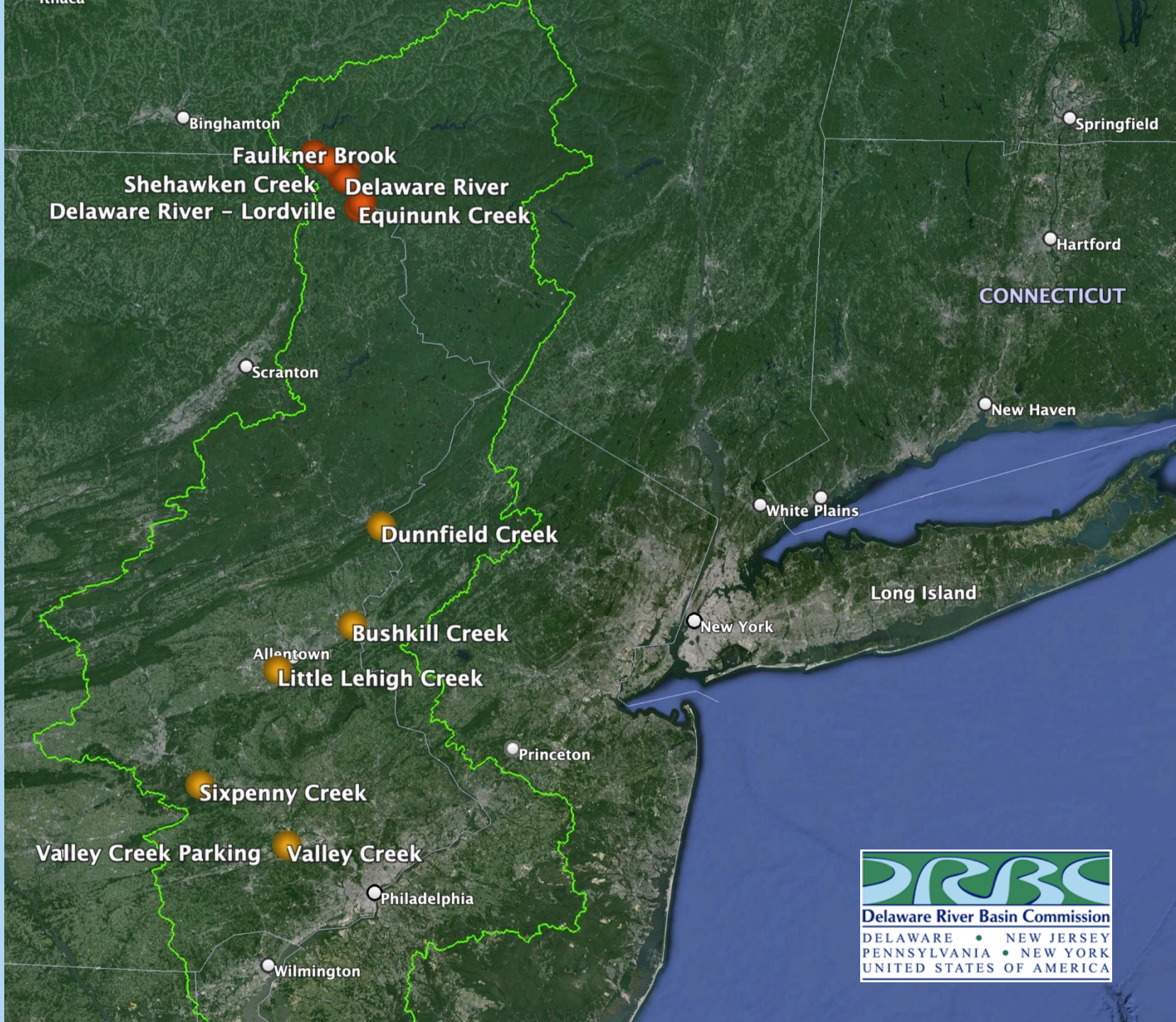
6-PPDq Monitoring



PCB Monitoring

PASSIVE SAMPLING

SEDIMENT GRAB SAMPLES

FROM LEWES TO TRENTON

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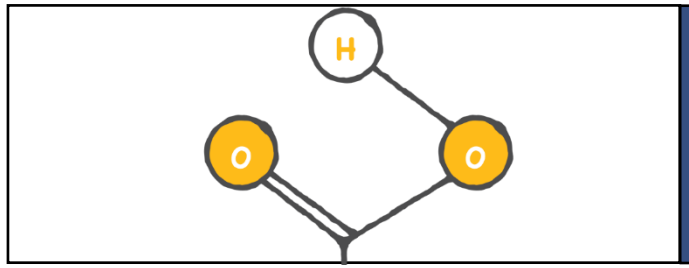
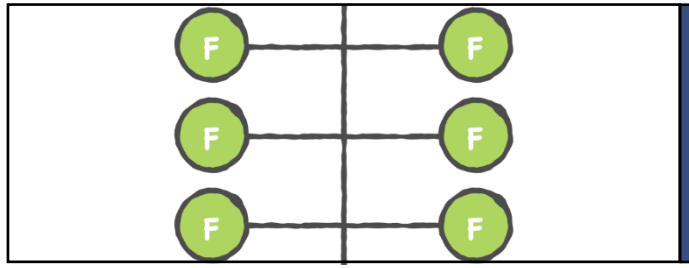
PDE BIL Tributary Monitoring

- Pollutant loads in 12 tributaries
  - PFAS
  - PCBs
  - Dioxins
  - Furans
  - PAHs
  - Neonicotinoids
  - organochlorines

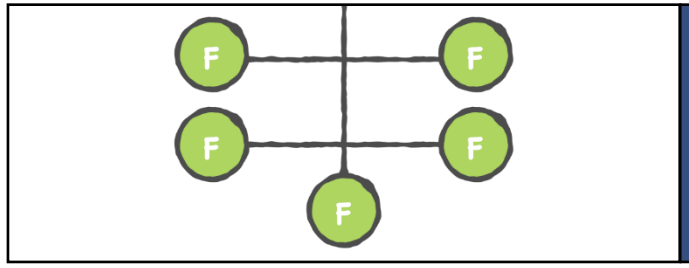
PFAS Monitoring



NFWF: Years 1, 2 & 3



PA CZM: Years 1 & 2



PFAS Synthesis

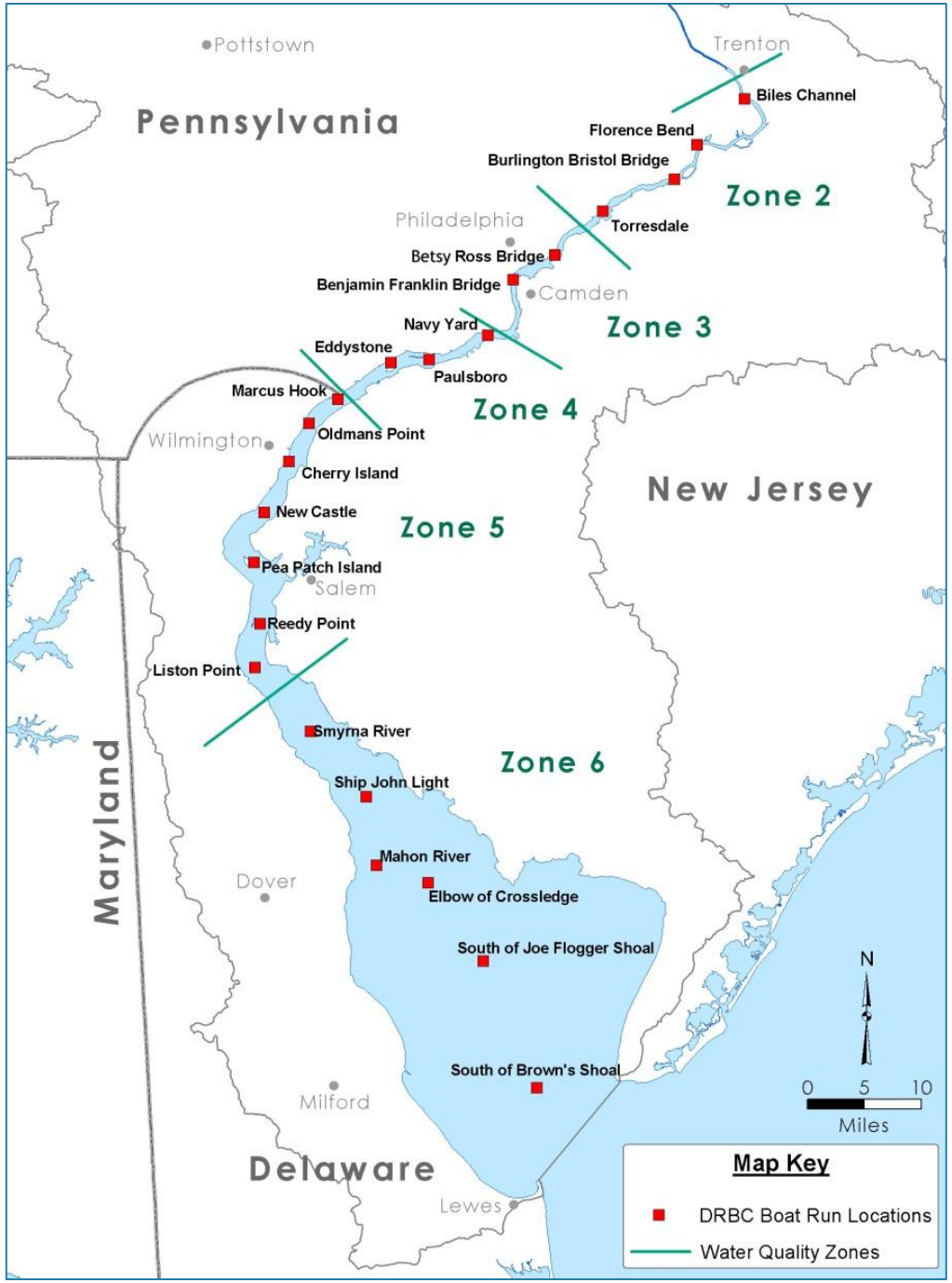
DRBC PFAS website w/all DRBC reports and presentations as well as general PFAS background information.

Delaware Estuary Water Quality Monitoring (Boat Run)

- Since mid-1960's

- 22 Sites
- Once per month, April-October (typical)

- Parameter Groups
  - Dissolved Oxygen, pH, temperature, specific conductance, turbidity, secchi depth, PAR
  - Nutrients (ammonia, nitrate + nitrite, phosphorus)
  - Sodium, chloride, Chlorophyll a
  - Bacteria
  - Metals
  - Semi-volatiles
  - PFAS (2/year)



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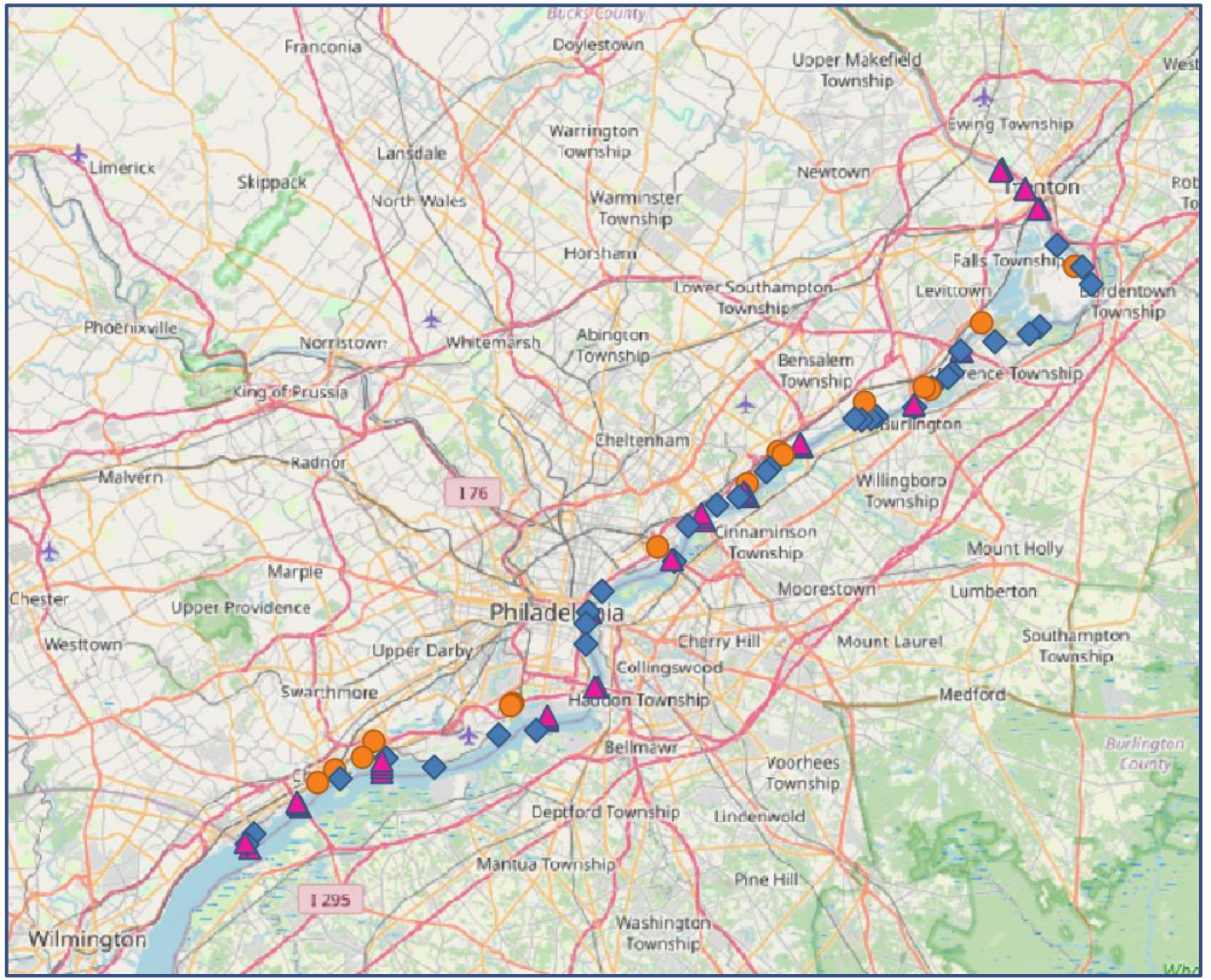
Bacteria 1 of 3: PADEP Support Delaware Estuary Bacterial Monitoring

- Up to 89 sites (transects, single stations, tidal tributaries)
- Up to 6 sampling events targeting a 30-day period
- Bacteria (E. Coli, Enterococci, Fecal Coliform)
- Smaller subset for qPCR
- Summer 2024 & potentially Summer 2025
- Still in the planning stages

- NJ Sites 46
- Tryptophan (more later)



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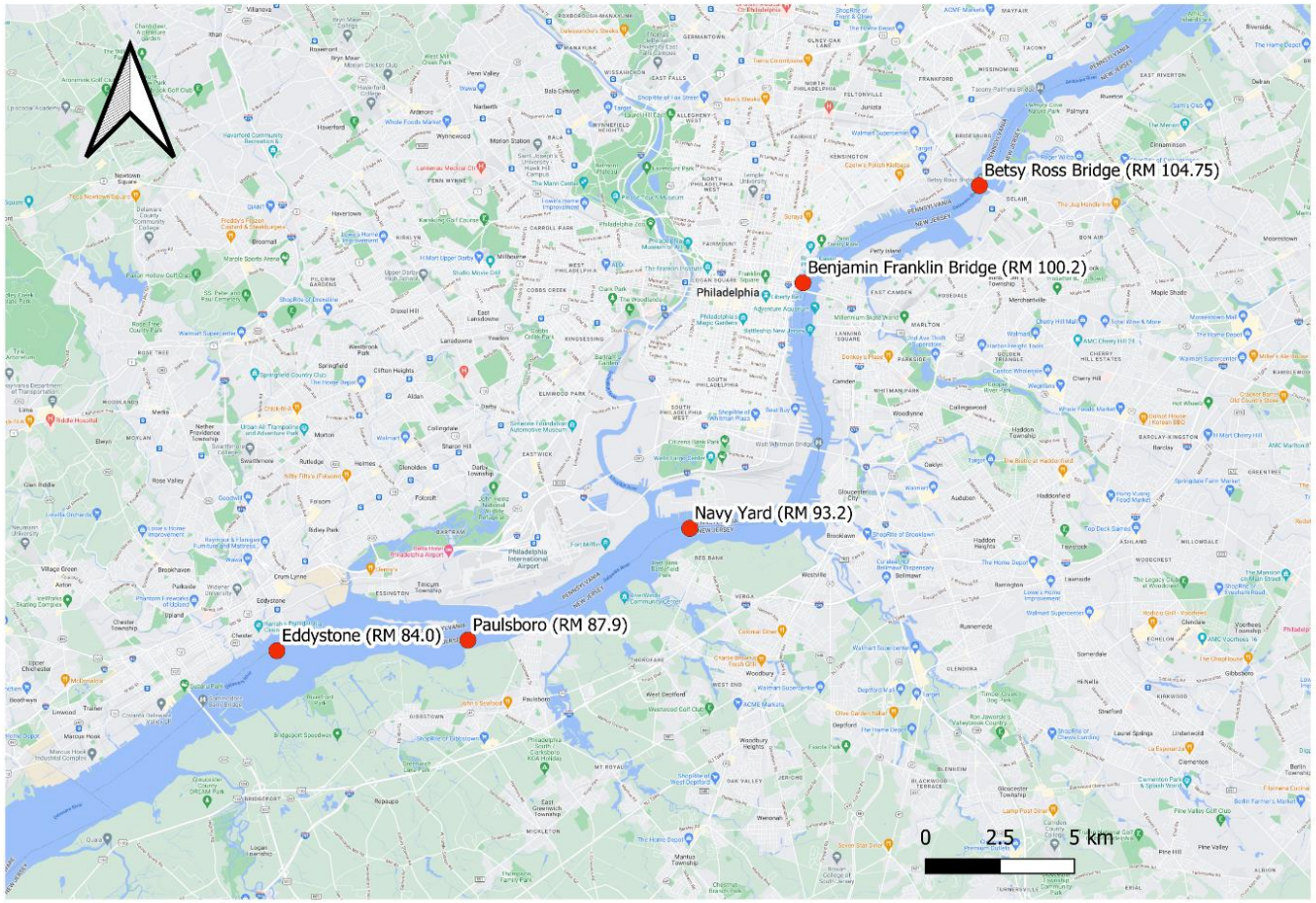
Bacteria 2 of 3: Over-the-Hydrograph Bacterial Monitoring

- 5 sites (boat run sites within secondary contact area)
- 3 Rain events (> 0.75-inch within 24-hours)
- Before, during, after rain event

- Originally planned for 2023 but deferred to 2024



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Bacteria 3 of 3:
Tryptophan Logger

Concurrent bacterial and tryptophan measurement - comparison to determine whether a relationship between bacterial and tryptophan measurement can be defined

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NJDEP Tributary Nutrient Monitoring Support

- Part of a larger project
- Blacks Creek, Crosswicks Creek, Pennsauken Creek
- Deploy data sondes for DO, temp, pH, SC, turbidity, phycocyanin
- Nutrient grab samples every other week
- Starting 2023 or 2024
- Continuing possibly through 2028

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Winter Chloride Monitoring: Daily Assessment via DRBC Water Quality Dashboard

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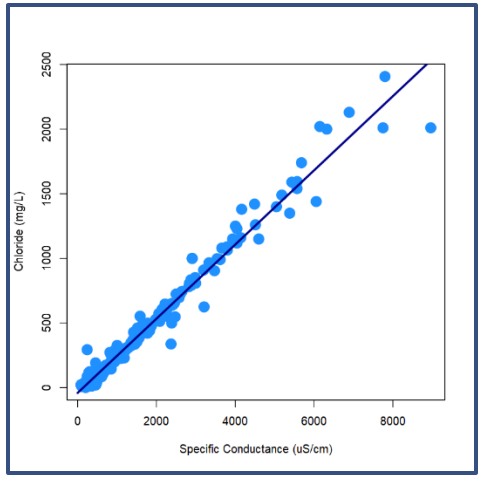
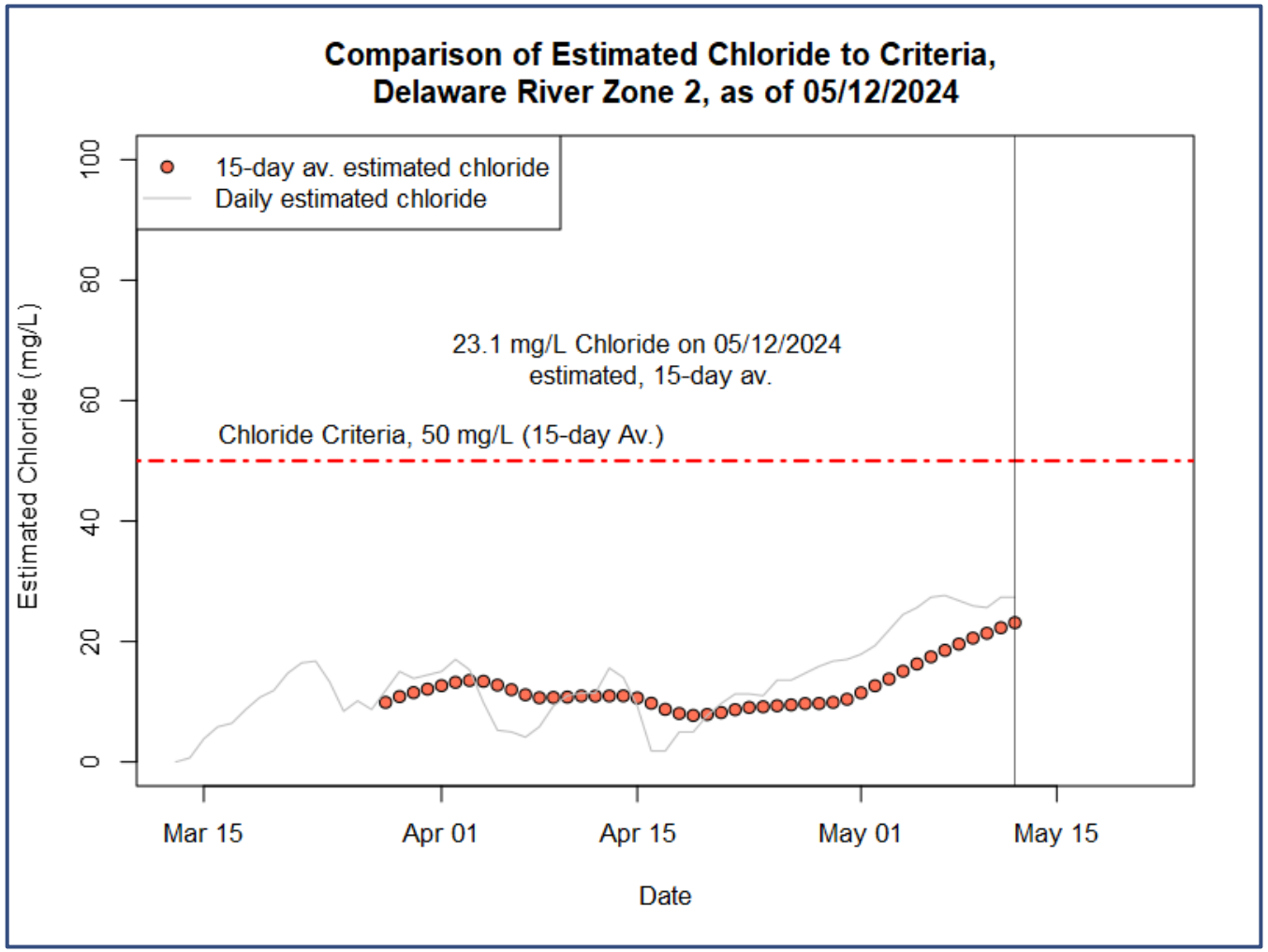
Continuous real-time Specific Conductance (USGS)



Compute estimated Rolling Mean Chloride

Plot estimated Rolling Mean Chloride Compared to Criteria

https://drbc.net/Sky/waterq.htm



Apparent Criteria Exceedances have occurred in Zone 2

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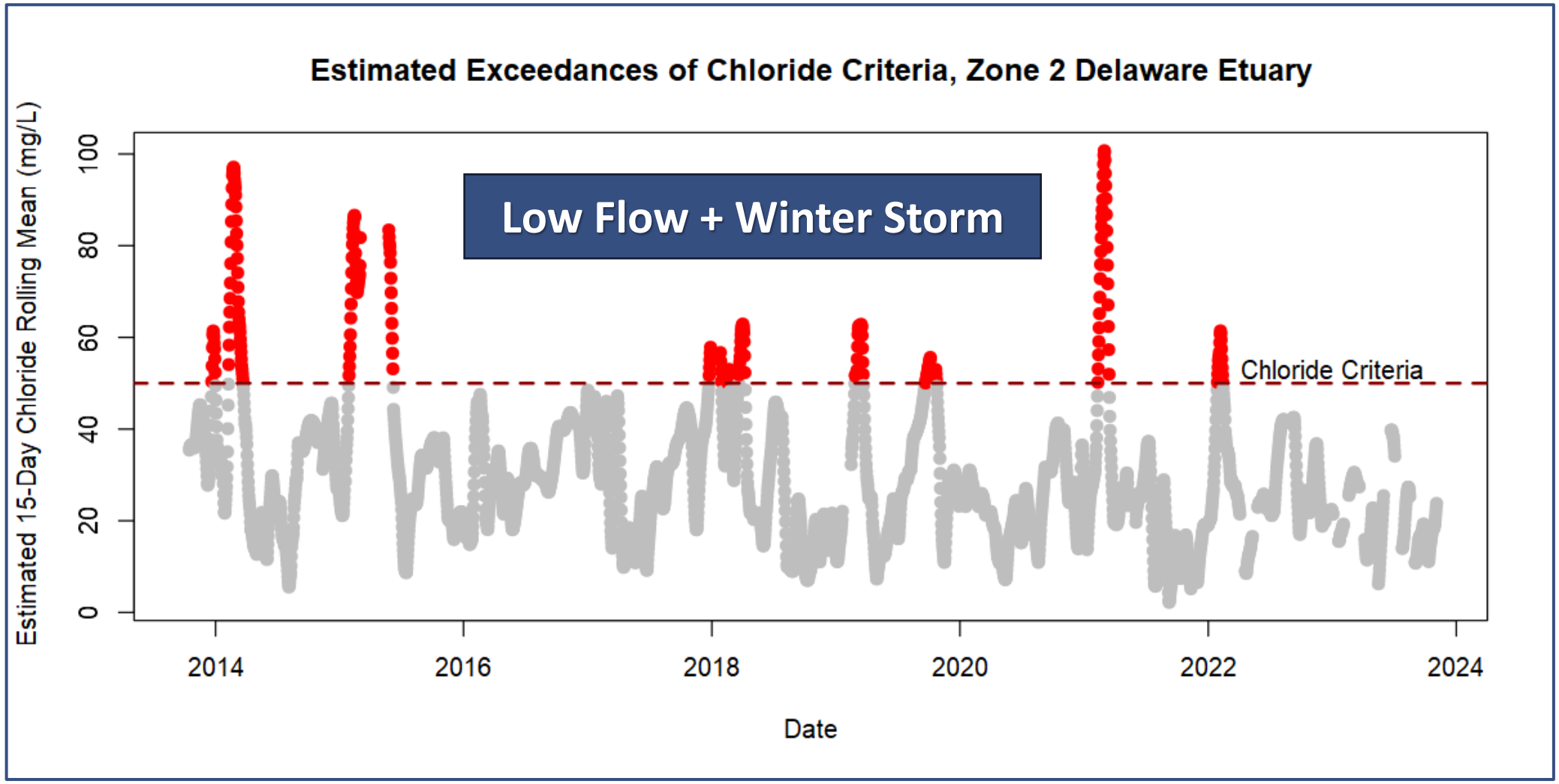

Winter Chloride Monitoring, Zone 2

- 1 sample per day
- 1 location (Bristol Wharf, Zone 2)
- Analyzed for Chloride
- Initiated when conditions suggest that exceedance of criteria is likely
- Terminated when exceedance is confirmed or determined to be no longer likely
- Conditions didn’t cooperate in 2023 so deferred to 2024

- Provide more leverage to pursue remedial action

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Drone Based Monitoring

- Acquired a drone with thermal imaging camera
- Planned work:
  - Heat dissipation areas
  - Pre- and during flood inundation at selected locations
- Open to other technical applications

Drone Based Monitoring: Pre- & Post-Flood

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January 9th & 10th 2024

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2024 Monitoring News Byte

Questions?