DRBC Science & Water Quality Management Monitoring Updates

December 19, 2024

Autumn/Winter MACC Meeting

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Special Protection Waters (SPW) Monitoring

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Assessment Period 2023 – 2025

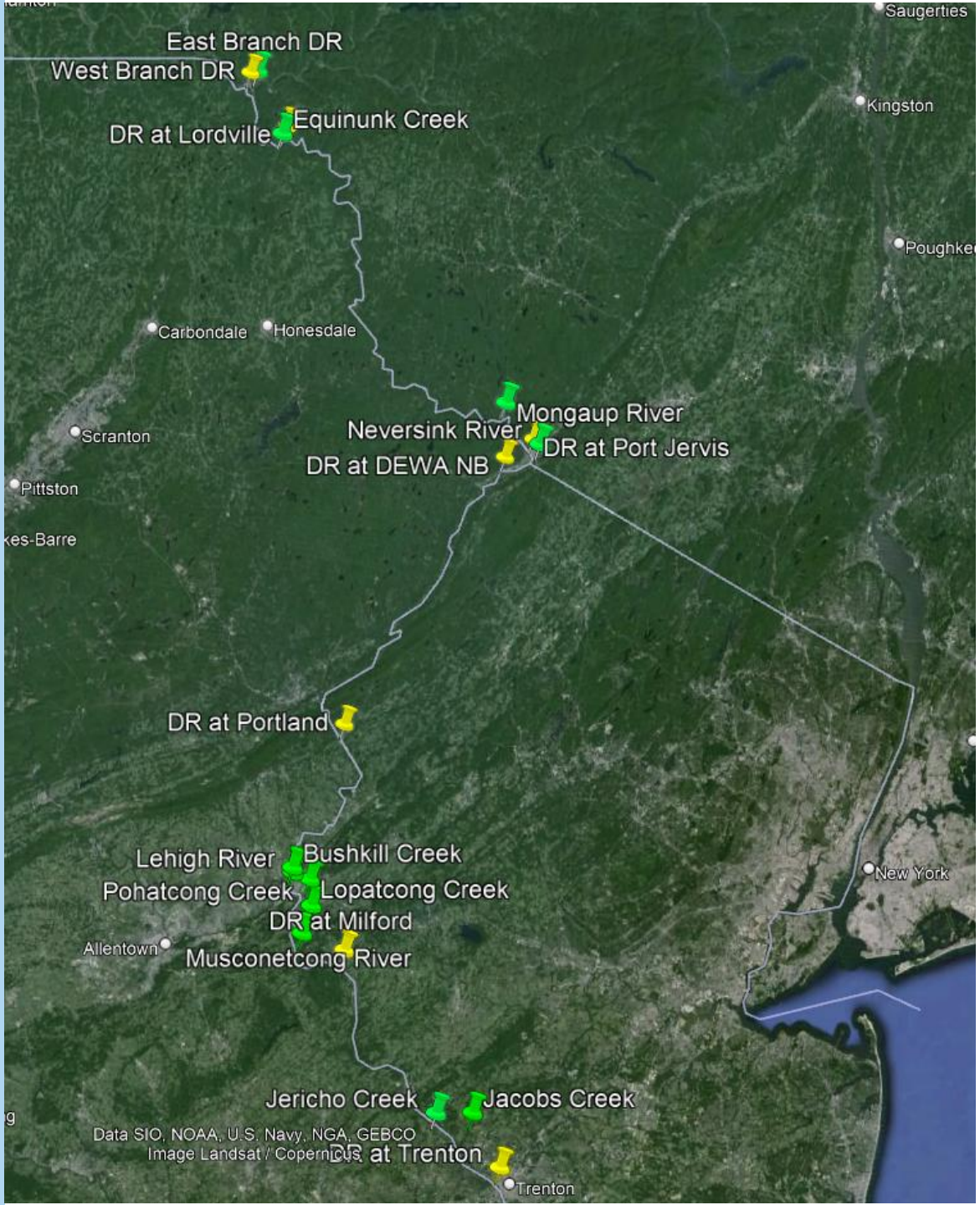
- Last assessment done for 2009 – 2011
- Rotating site basis vs. reach-wide

NPS Partners

- DEWA and UPDE
- DRBC monitors the Lower Delaware (LDEL)

Monitoring plan

- Twice monthly
- May – September
- 7 mainstem sites (ICPs)
- 11 tributaries (BCPs)
- Alkalinity, hardness, nutrients, ions, and in-situ parameters



"No measurable change shall occur"

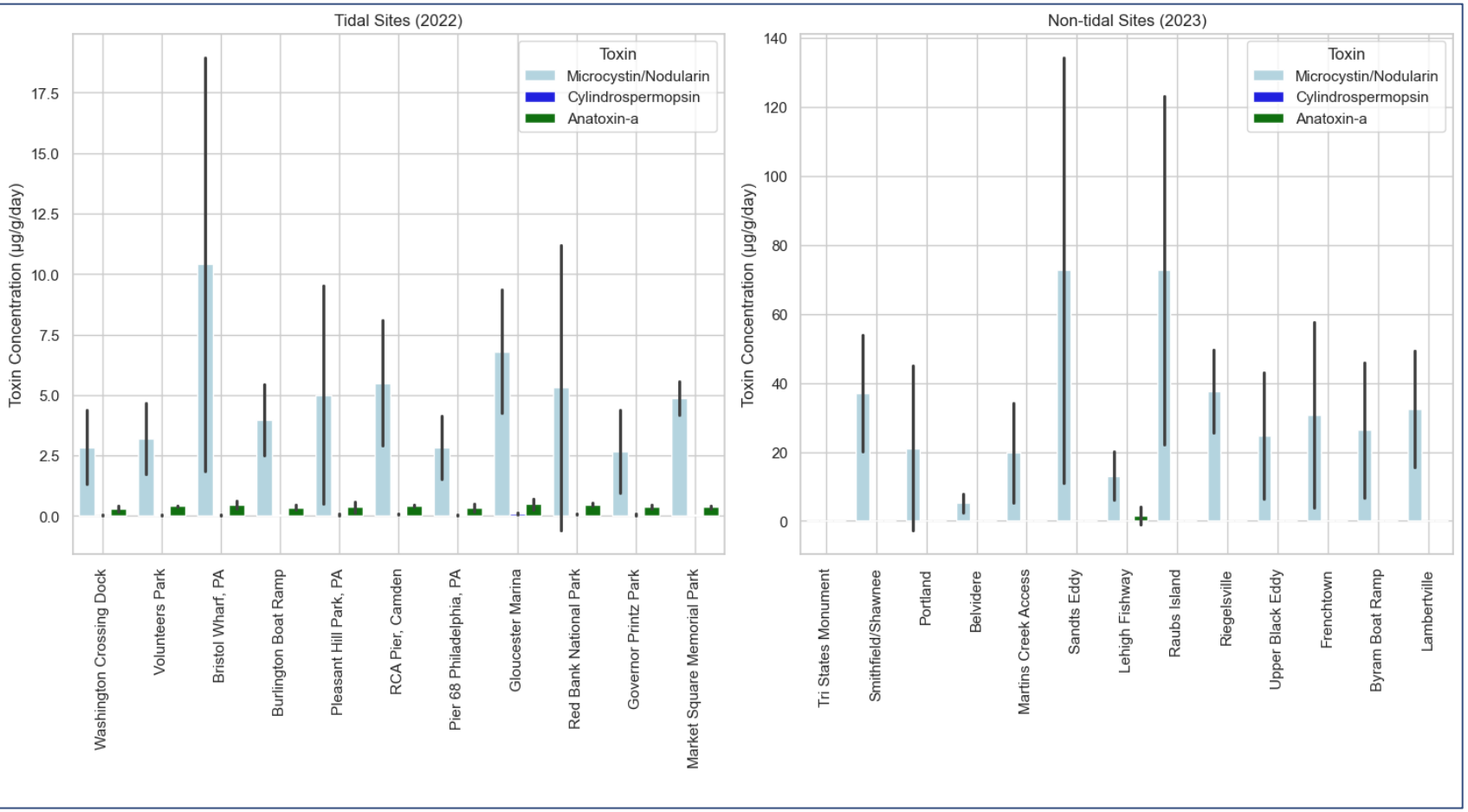
Cyanotoxins Monitoring

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

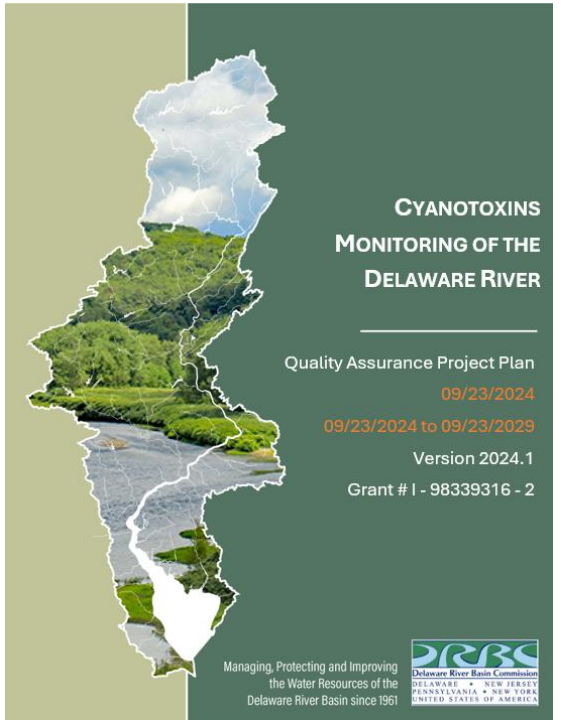
SPATT (Solid Phase Adsorption Toxins Tracking) Pilot Study Conducted 2022 – 2023

Next steps: Identify congeners (e.g., MC-LR) in SPATT bags and estimate cyanotoxin concentrations in the mainstem



*Note different y-axes

Cyanotoxin	10-day Drinking Water Health Advisory (EPA)
Cylindrospermopsin	0.7 – 3.0 µg/L
Microcystin	0.3 – 1.6 µg/L

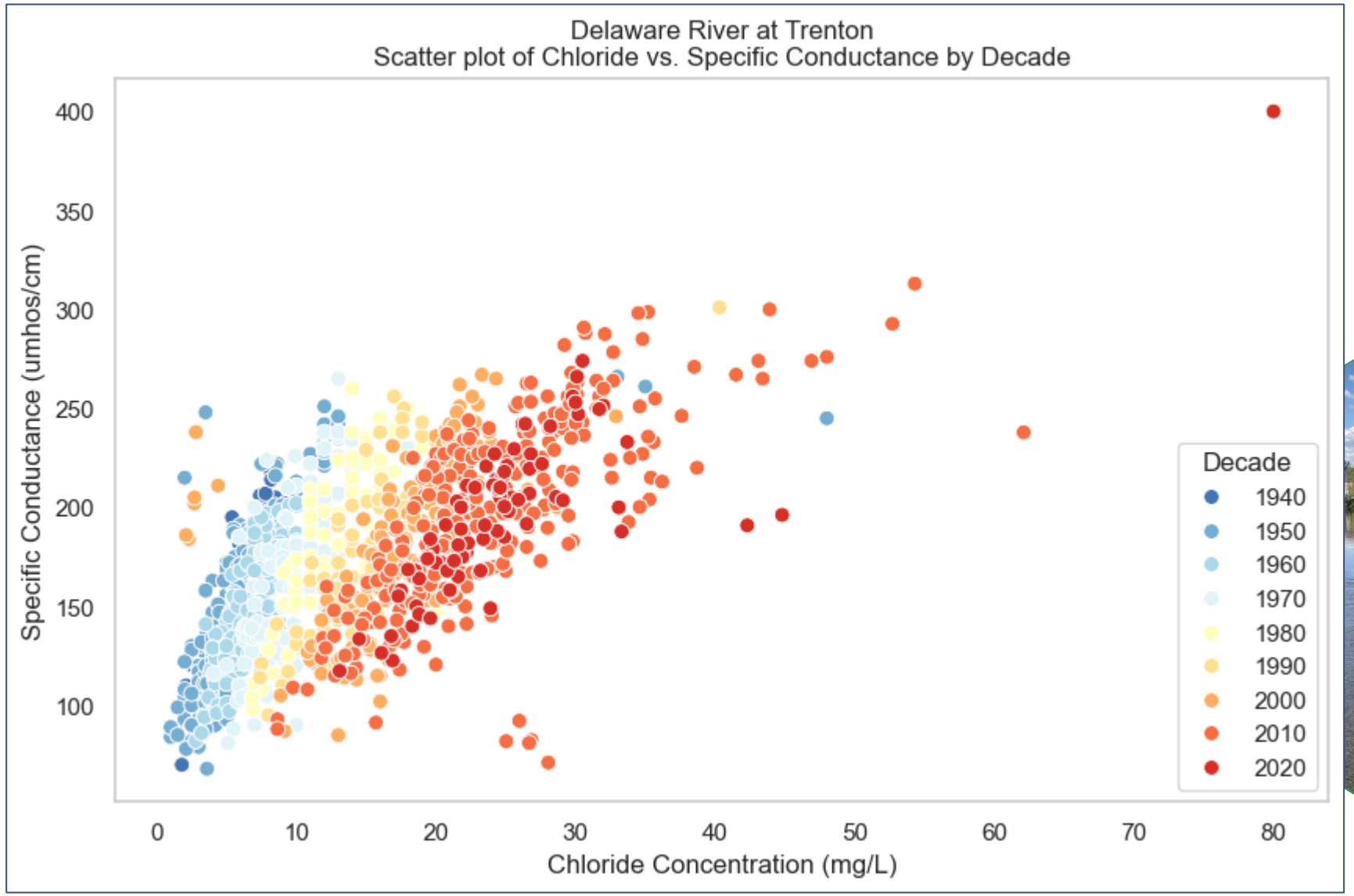


Chloride Monitoring

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

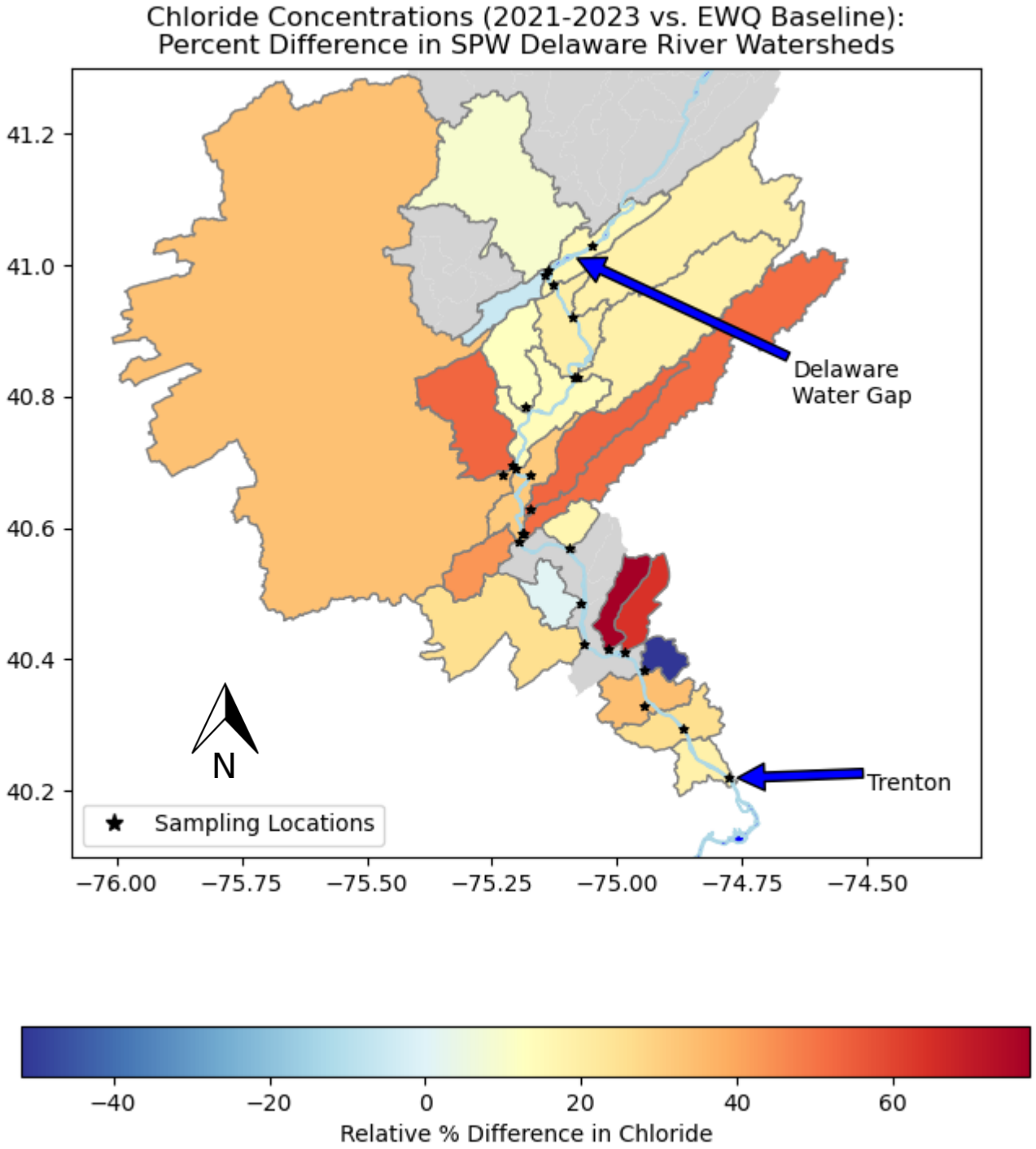
Increasing Chloride Trends in the Non-tidal Delaware River



- Historical monitoring site
- Non-tidal boundary location

Non-tidal Chloride Monitoring

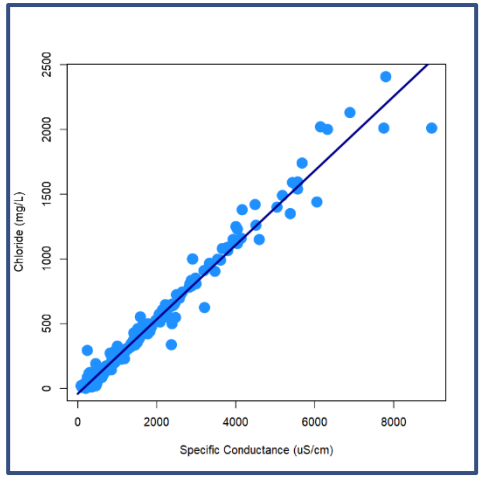
- 2016 SPW Lower Delaware Measurable Change Assessment results prompted monitoring at 27 locations
- Increasing trends prevalent
- Chloride levels are well below state criteria
  - Aquatic life
    - 860 and 230 mg/L (acute and chronic)
  - Drinking water
    - 250 mg/L



Downstream of Delaware at Trenton (into Zone 2): Daily Assessment via DRBC Water Quality Dashboard

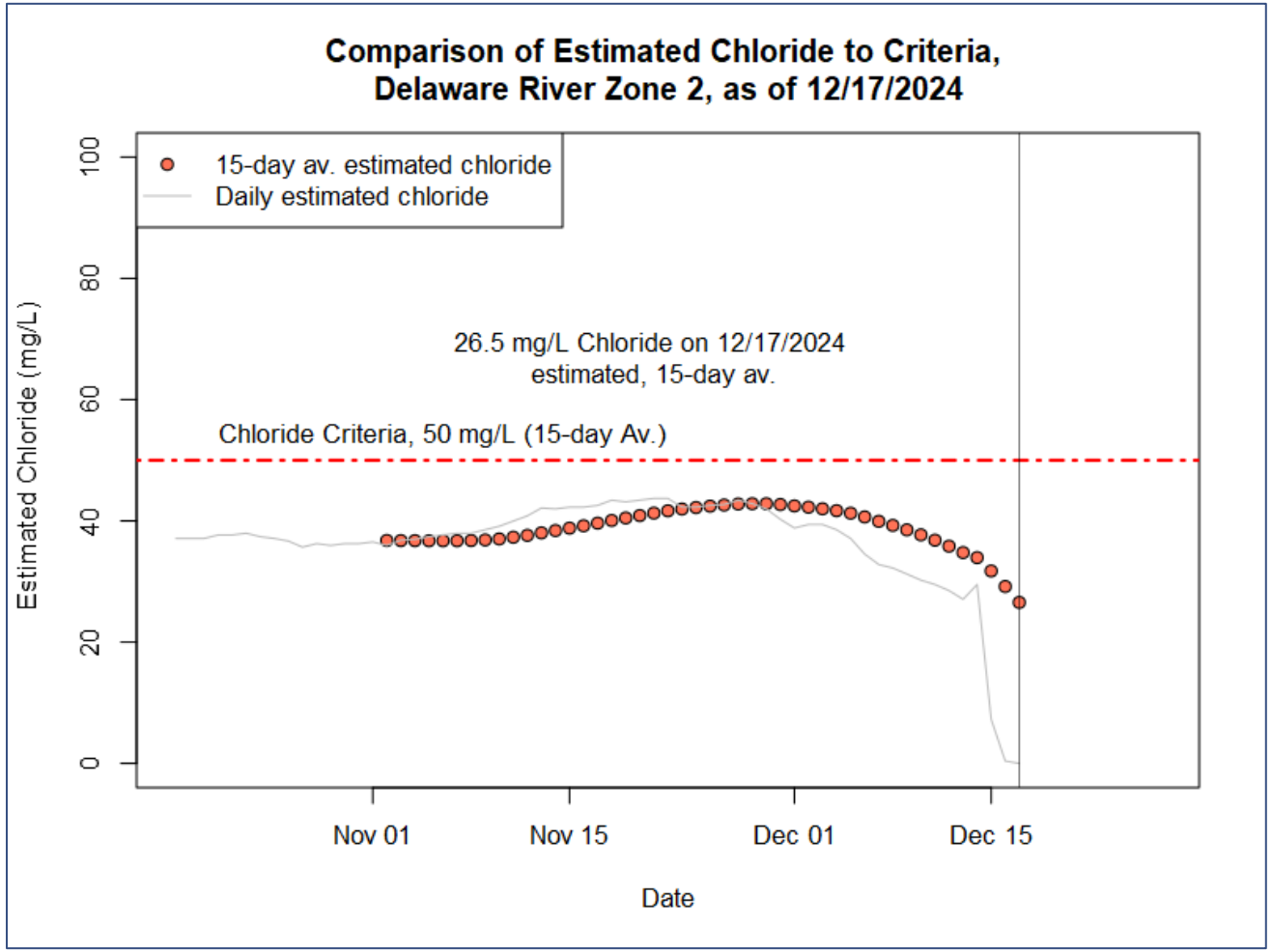
Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Continuous real-time Specific Conductance (USGS)



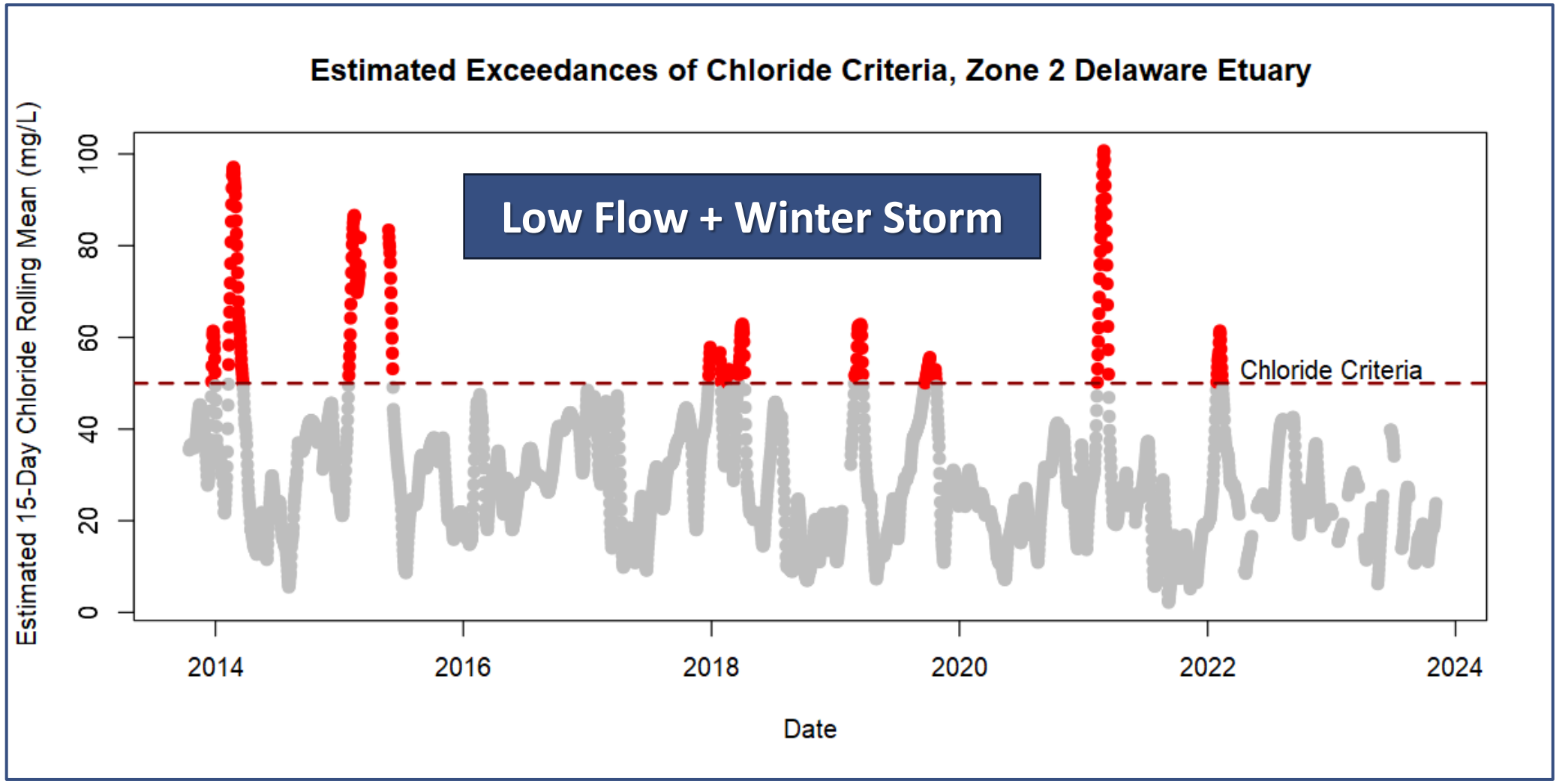
Compute estimated Rolling Mean Chloride

Plot estimated Rolling Mean Chloride Compared to Criteria



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

Apparent DRBC Criteria Exceedances (more stringent) have occurred in Zone 2



Antimicrobial Resistance (AMR) Monitoring: Pilot Study 2025

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

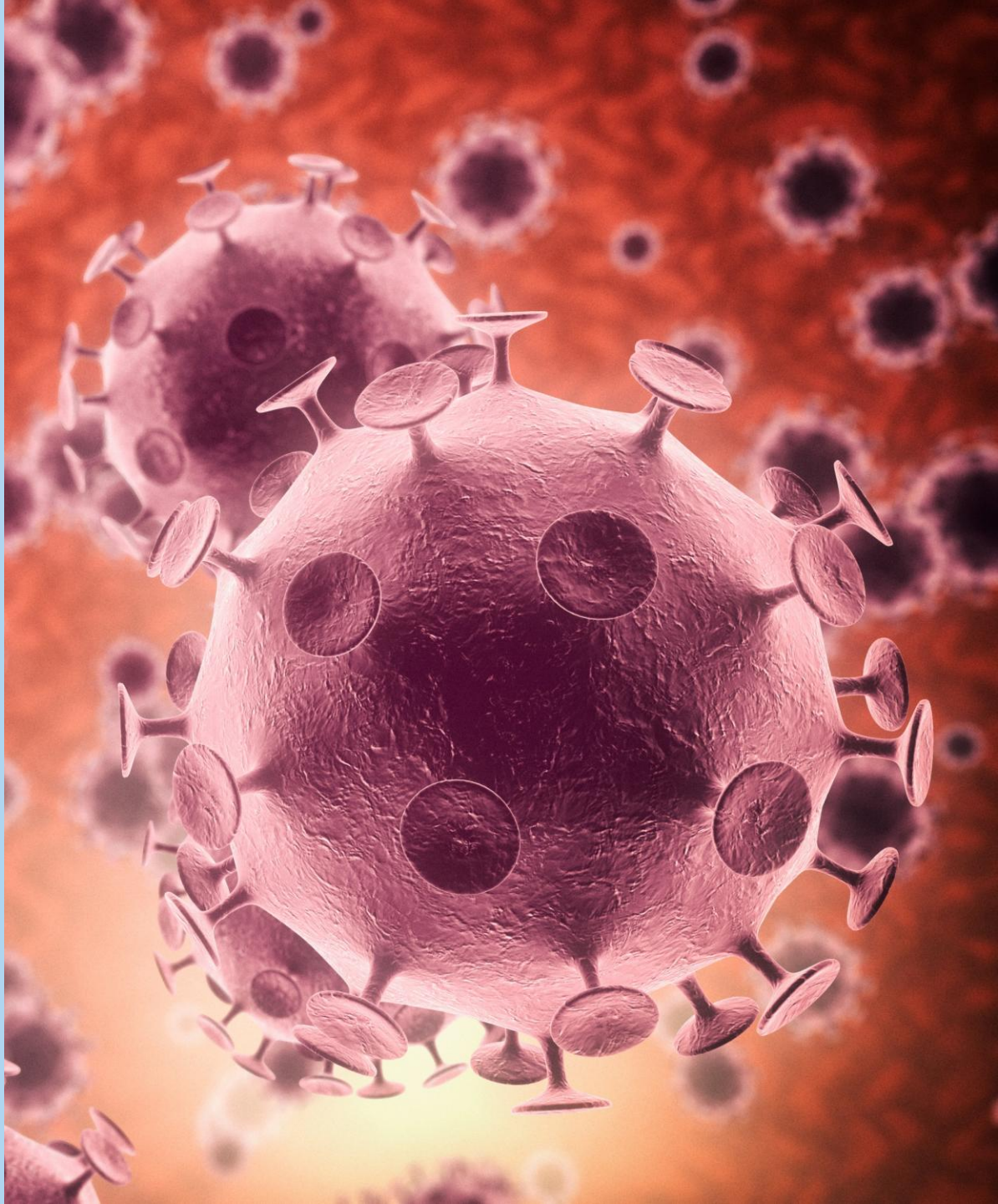
What is Antimicrobial Resistance?

- AMR occurs when bacteria and other microorganisms become resistant to drugs like antibiotics, making infections harder to treat.

Why Monitor AMR?

- Aquatic environments spread drug-resistant pathogens, posing risks to public health.

- **Goals for 2025**:
  - Develop a monitoring approach (with QAPP)
  - Conduct a sampling event targeting sites in the populated urban corridor

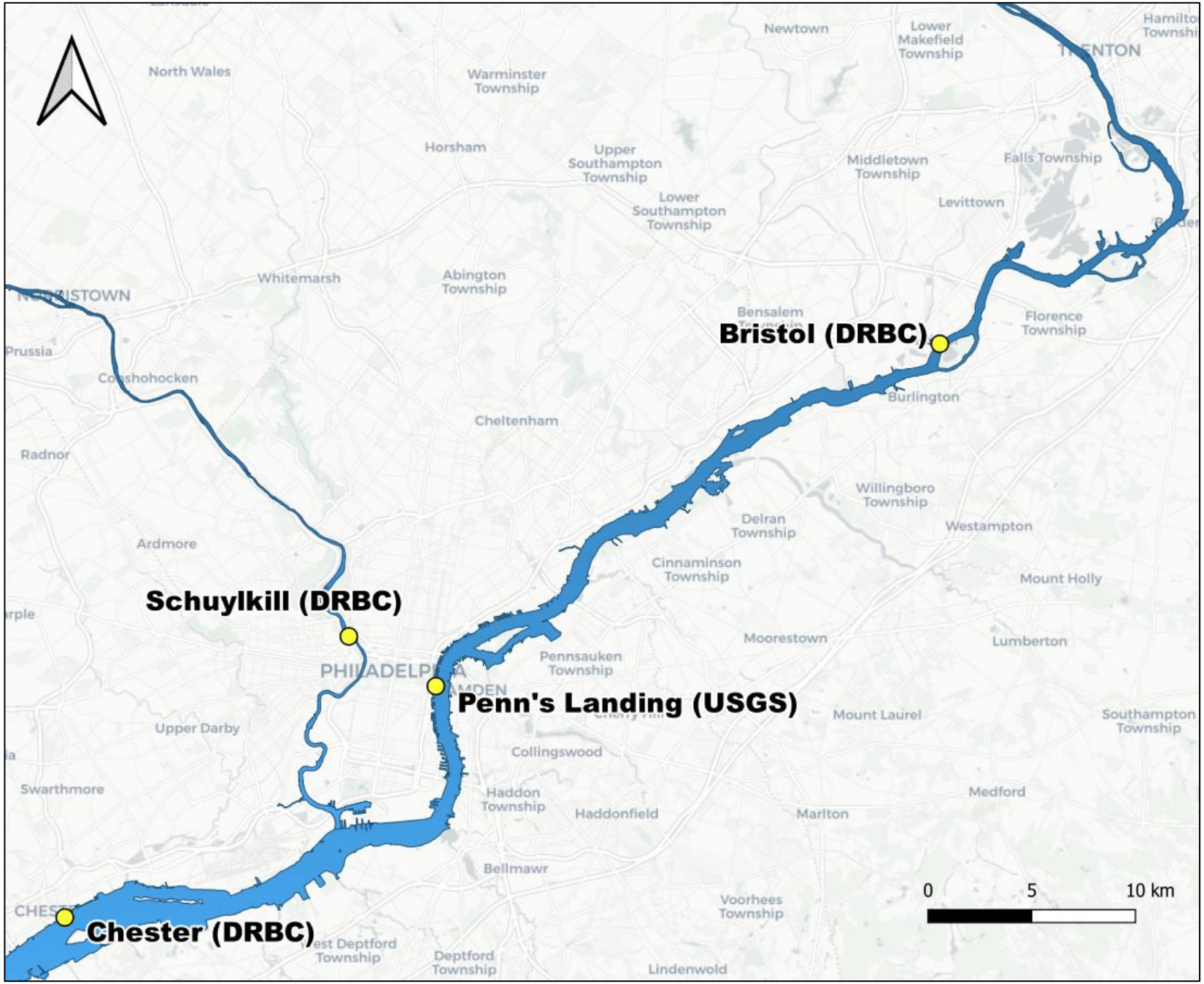


Delaware Estuary Phytoplankton Monitoring

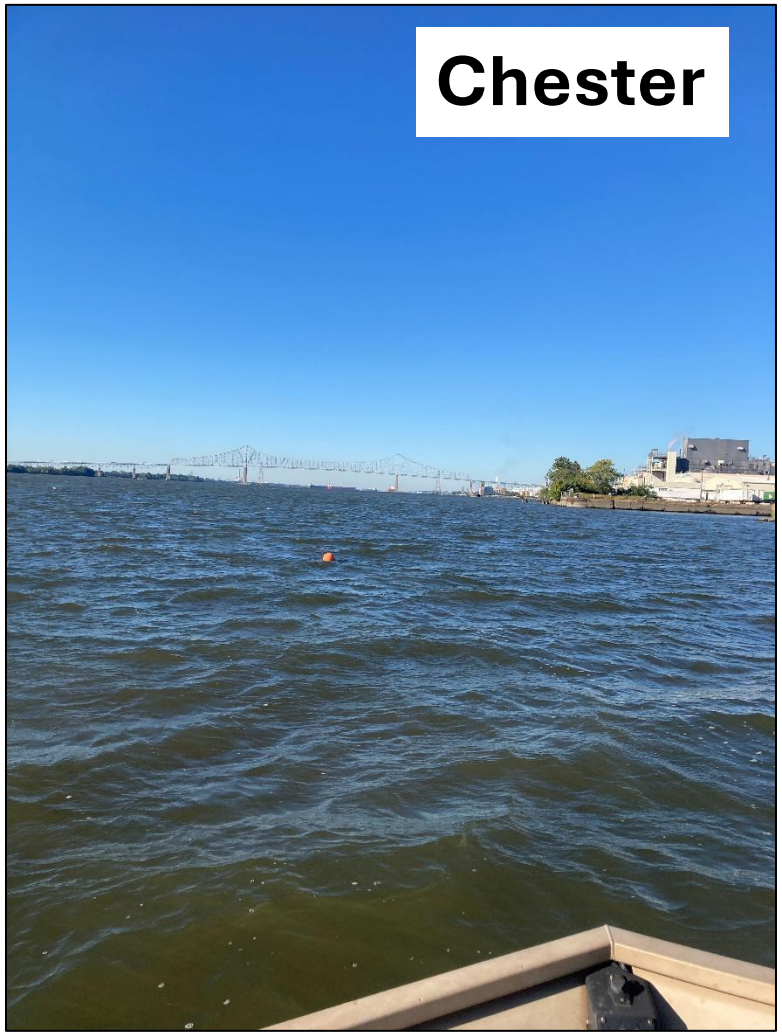
Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

- DRBC loggers
  - Bristol (zone 2)
  - Chester (zone 4)
  - Schuylkill above head of tide
- USGS logger
  - Penn's Landing (zone 3)
- Monitoring period April – October
- 20 grab samples
  - Chlorophyll a
  - Algal community composition



Monitoring Locations

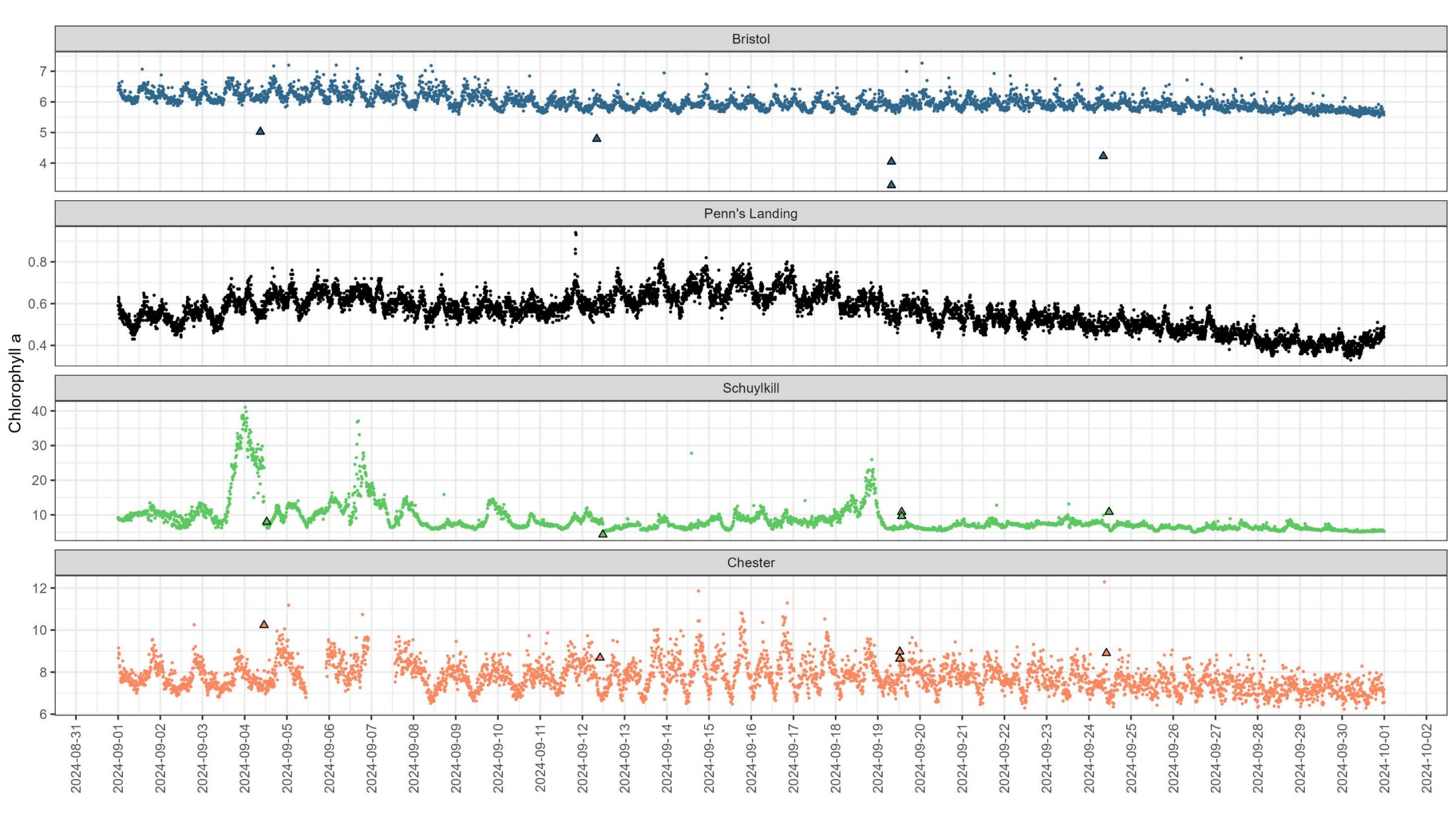


Continuous Chlorophyll a Loggers

Bristol

Chester

Schuylkill

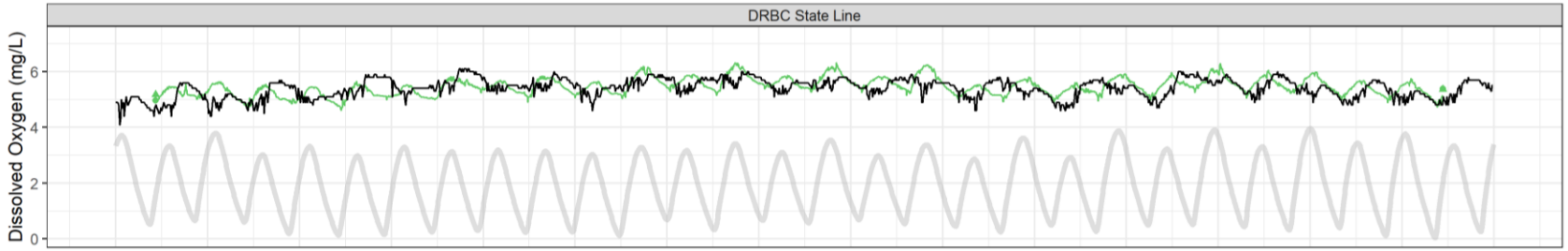

Bristol
Penn's Landing
Schuylkill
Chester
Chlorophyll a
7
6
5
4
0.8
0.6
0.4
40
30
20
10
12
10
8
6
2024-08-31
2024-09-01
2024-09-02
2024-09-03
2024-09-04
2024-09-05
2024-09-06
2024-09-07
2024-09-08
2024-09-09
2024-09-10
2024-09-11
2024-09-12
2024-09-13
2024-09-14
2024-09-15
2024-09-16
2024-09-17
2024-09-18
2024-09-19
2024-09-20
2024-09-21
2024-09-22
2024-09-23
2024-09-24
2024-09-25
2024-09-26
2024-09-27
2024-09-28
2024-09-29
2024-09-30
2024-10-01
2024-10-02

DO Monitoring in Sturgeon Habitat

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

- Current USGS logger at Chester is several miles upstream of important sturgeon nursery grounds
- Collect enhanced spatial resolution DO data in portion of the estuary important to young-of-year Atlantic sturgeon
- Deploy several top/bottom DO loggers at multiple locations
- Target low DO time of year (July-September)

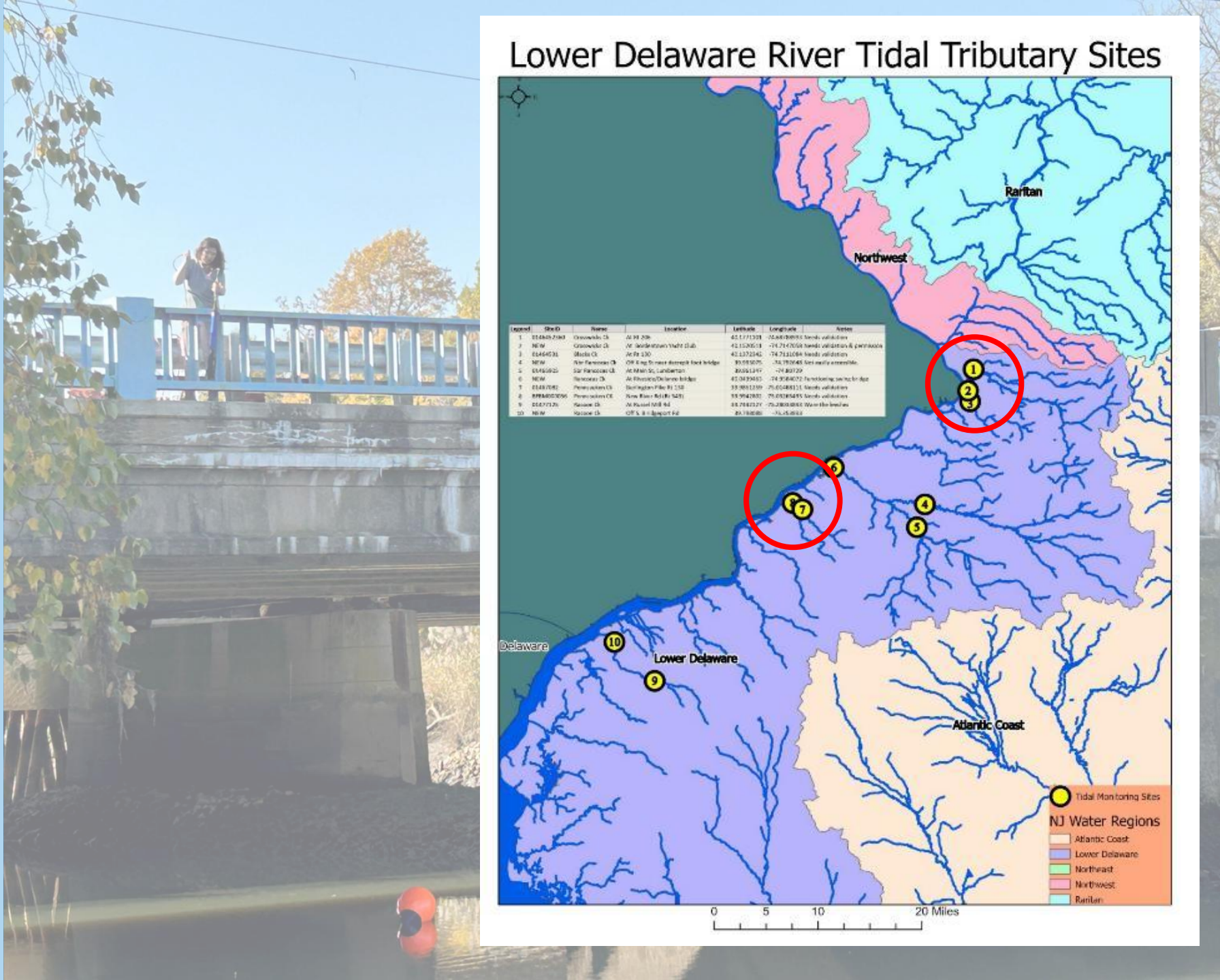


Tributary Nutrient Monitoring with NJDEP

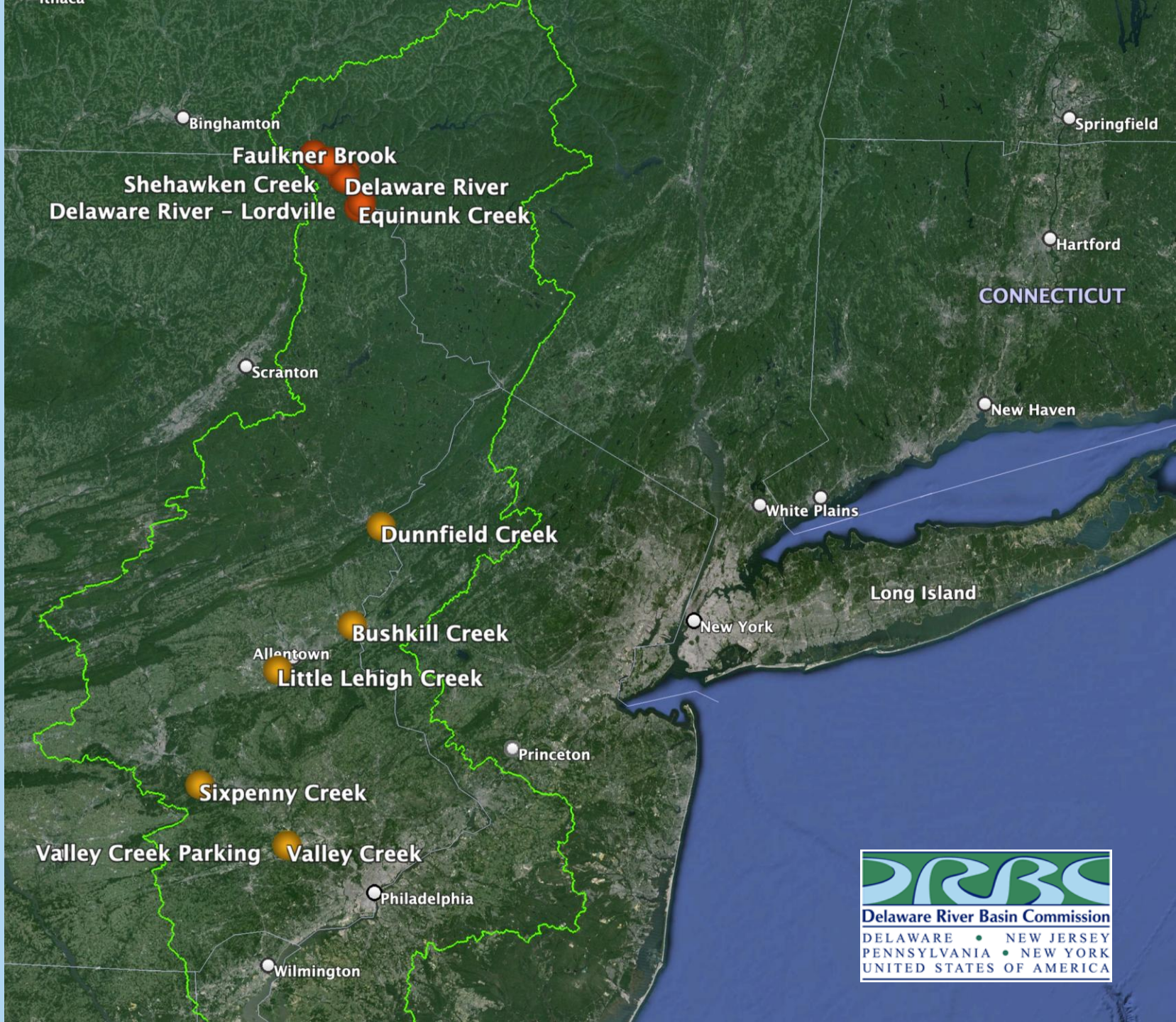
Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

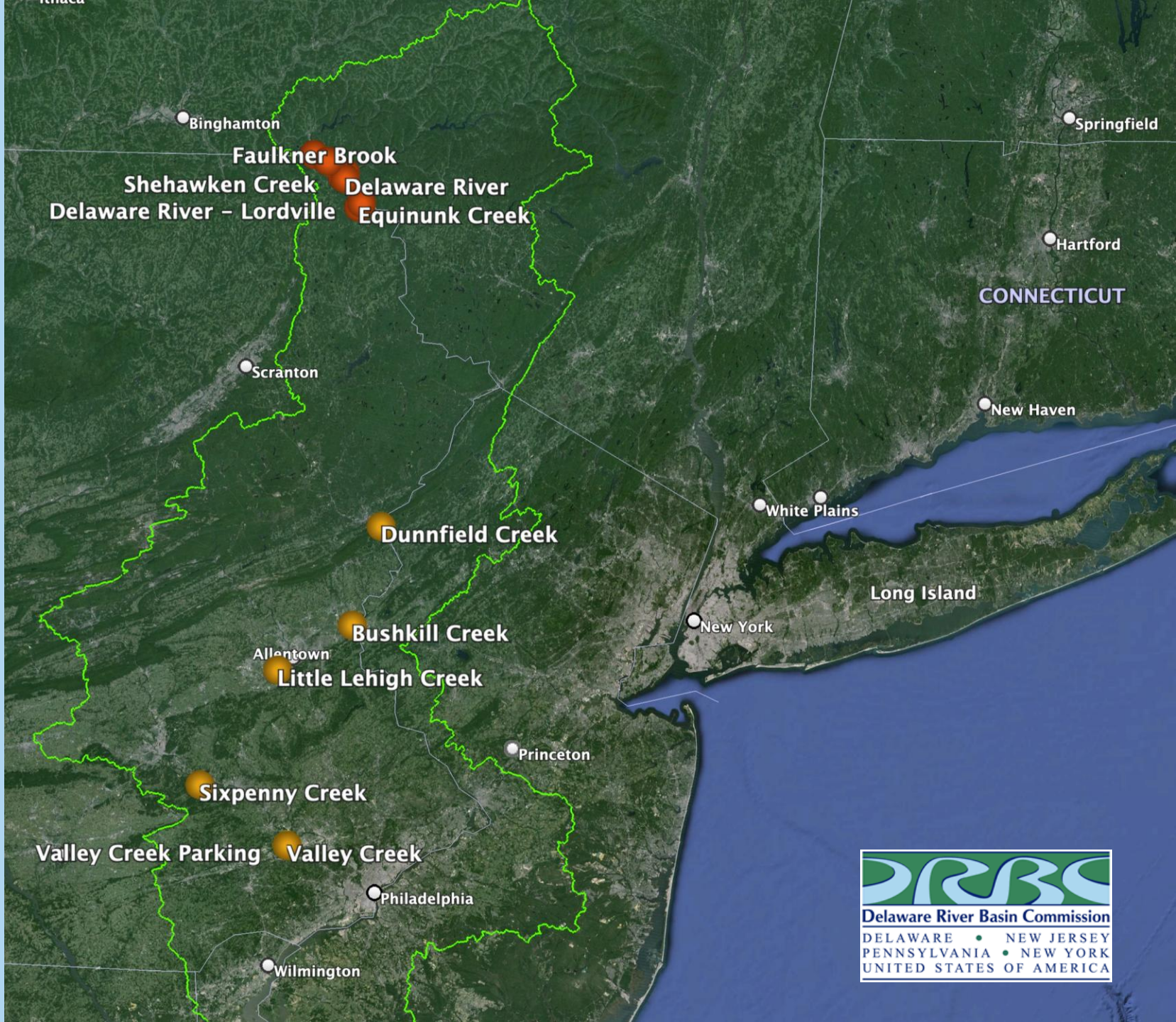
- Support NJ efforts to monitor several tidal tributaries for nutrients and water quality
- DRBC will assist on Crosswicks, Blacks, and Pennsauken creeks
- Installation of sondes to measure Temperature, Specific Conductance, Dissolved Oxygen, pH, and Turbidity
- Grab samples for nutrients



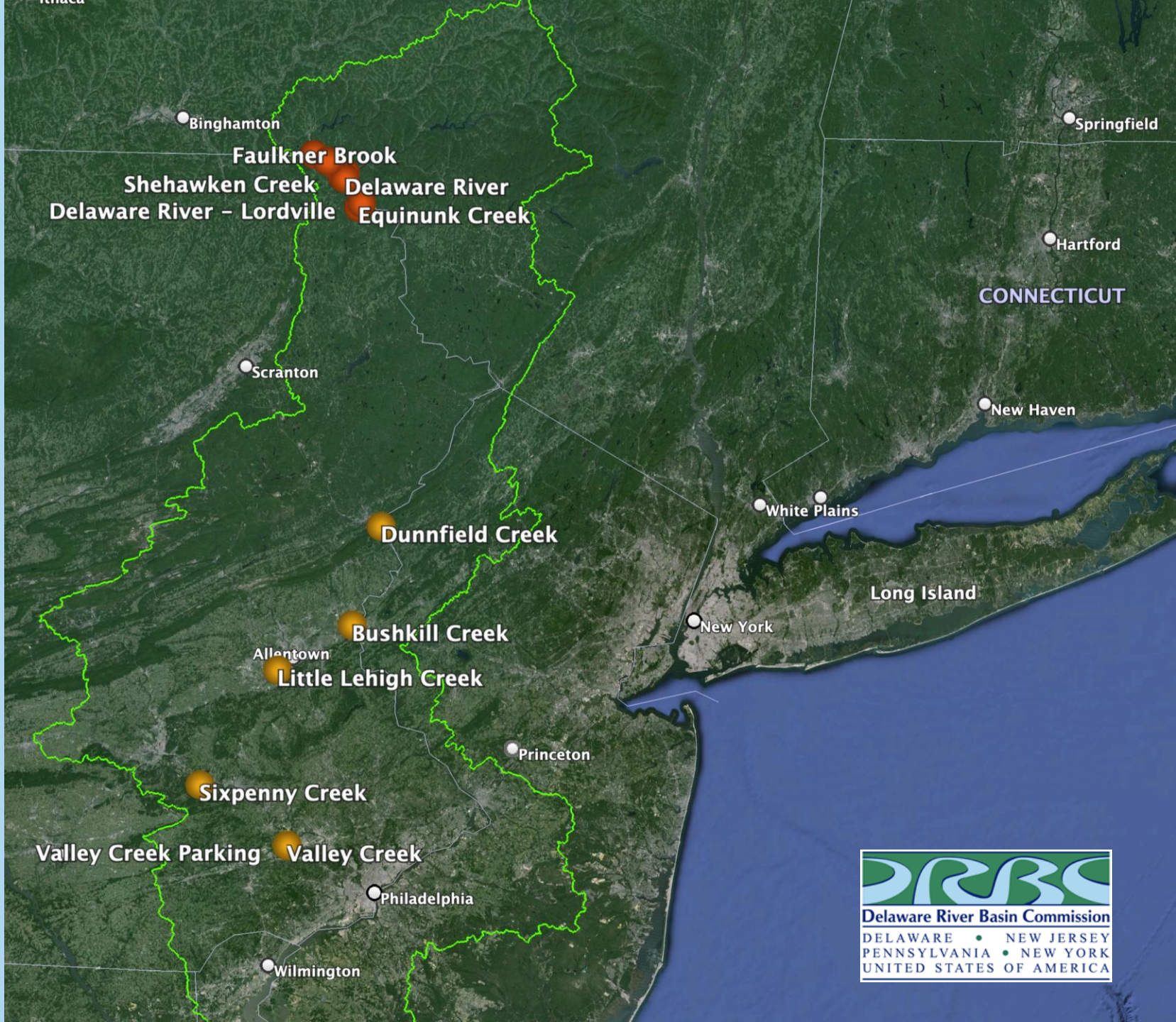
6-PPDq Monitoring



6-PPDq Monitoring

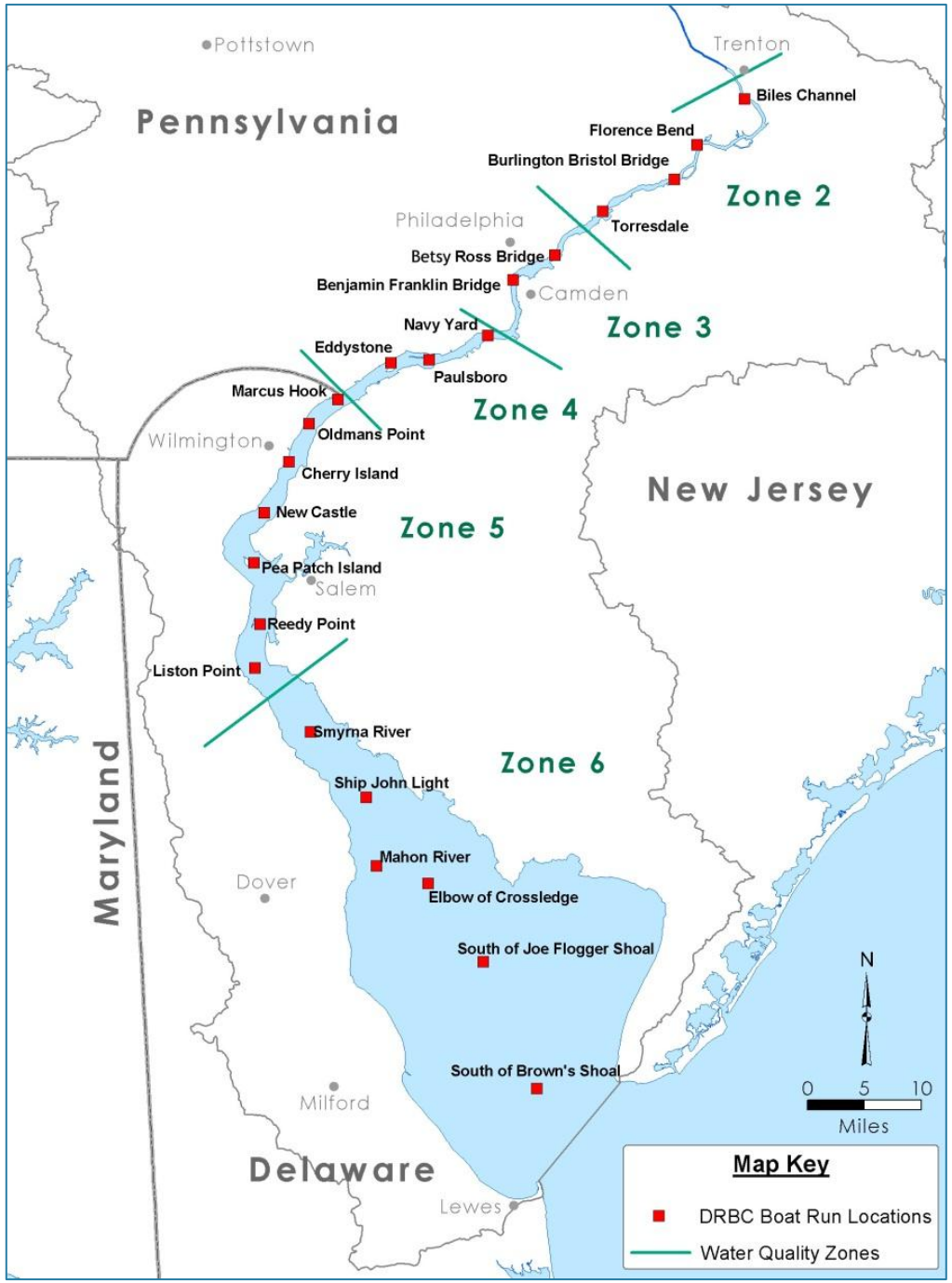


6-PPDq Monitoring



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
  - Bromide (lower level)

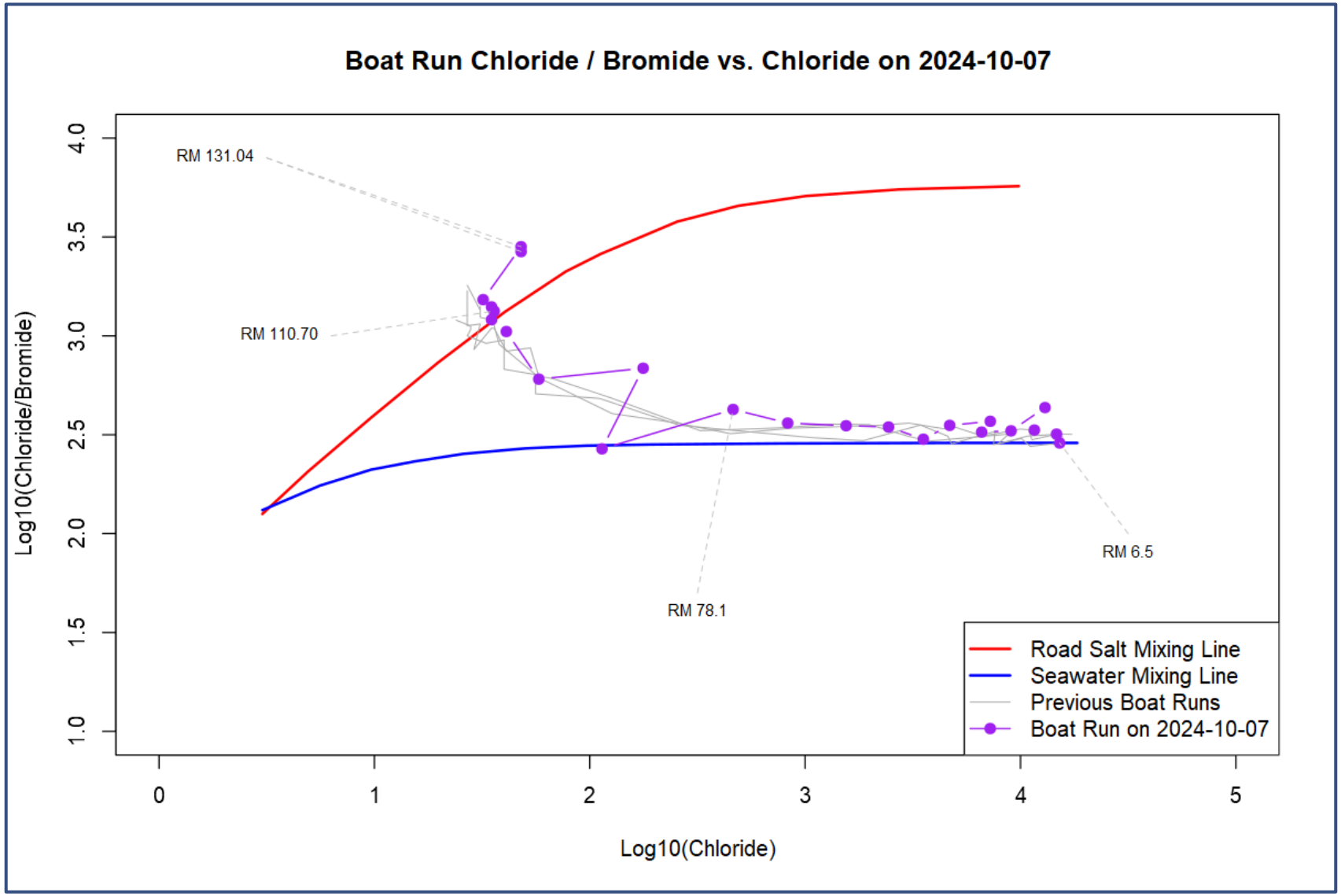


Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Chloride / Bromide Ratio Plots

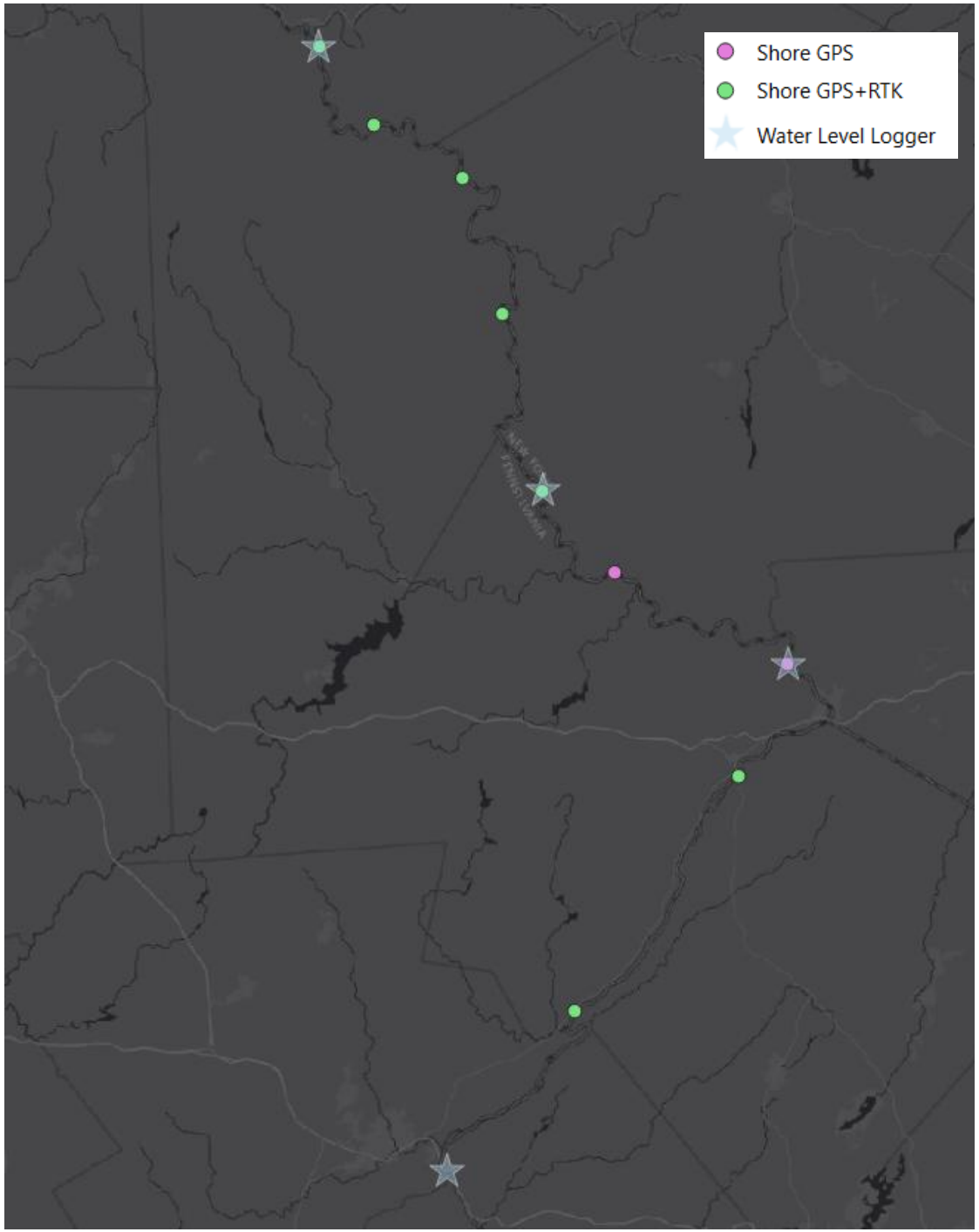
Help determine source of salts mid-estuary

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA



Additional Low Flow Monitoring

- HOBO water level loggers at 4 locations
- RTK-GPS shore location measurements at multiple locations
- In support of low-flow habitat model development



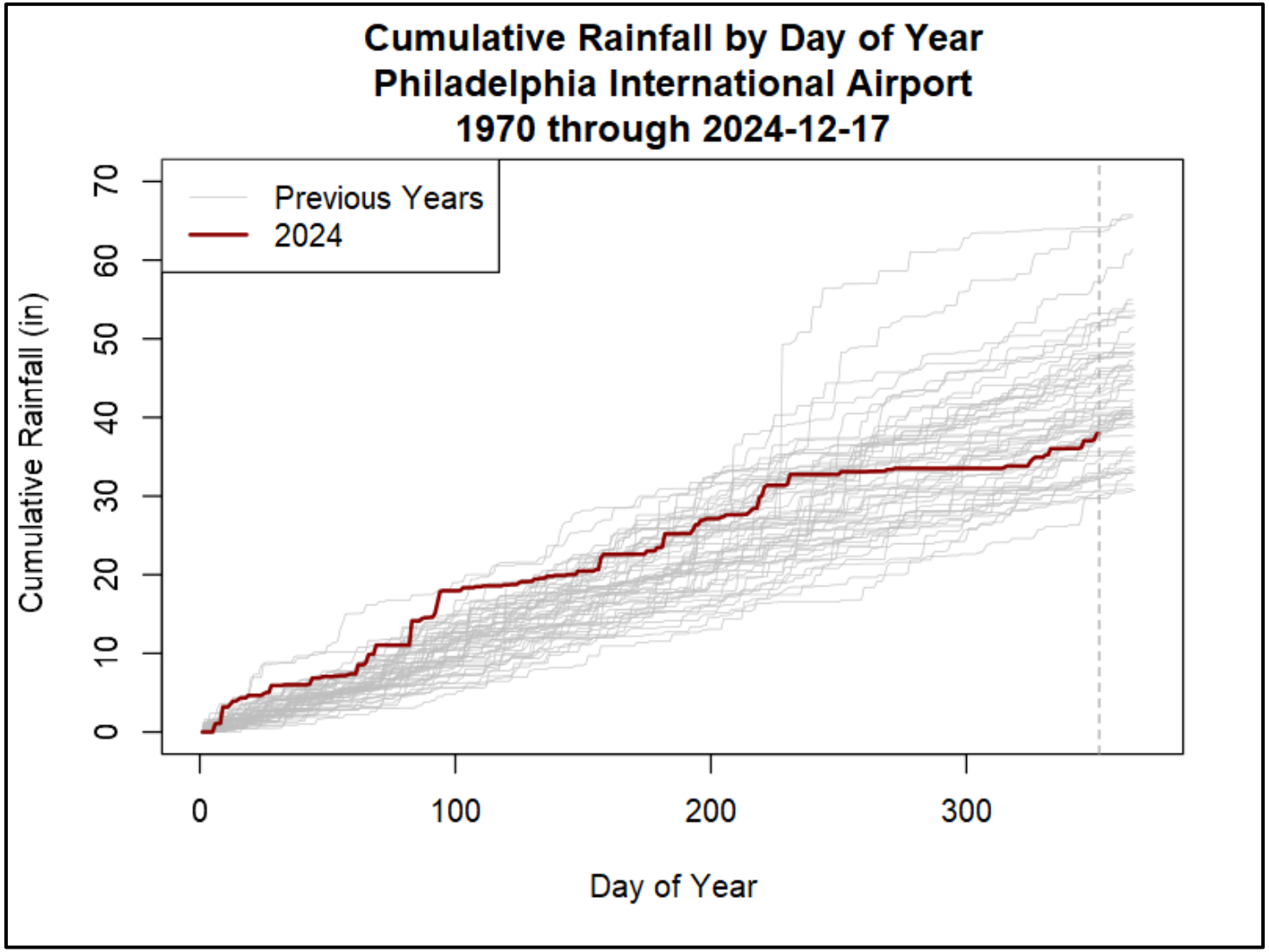
Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Additional Low-Flow Monitoring

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

New daily dashboard images

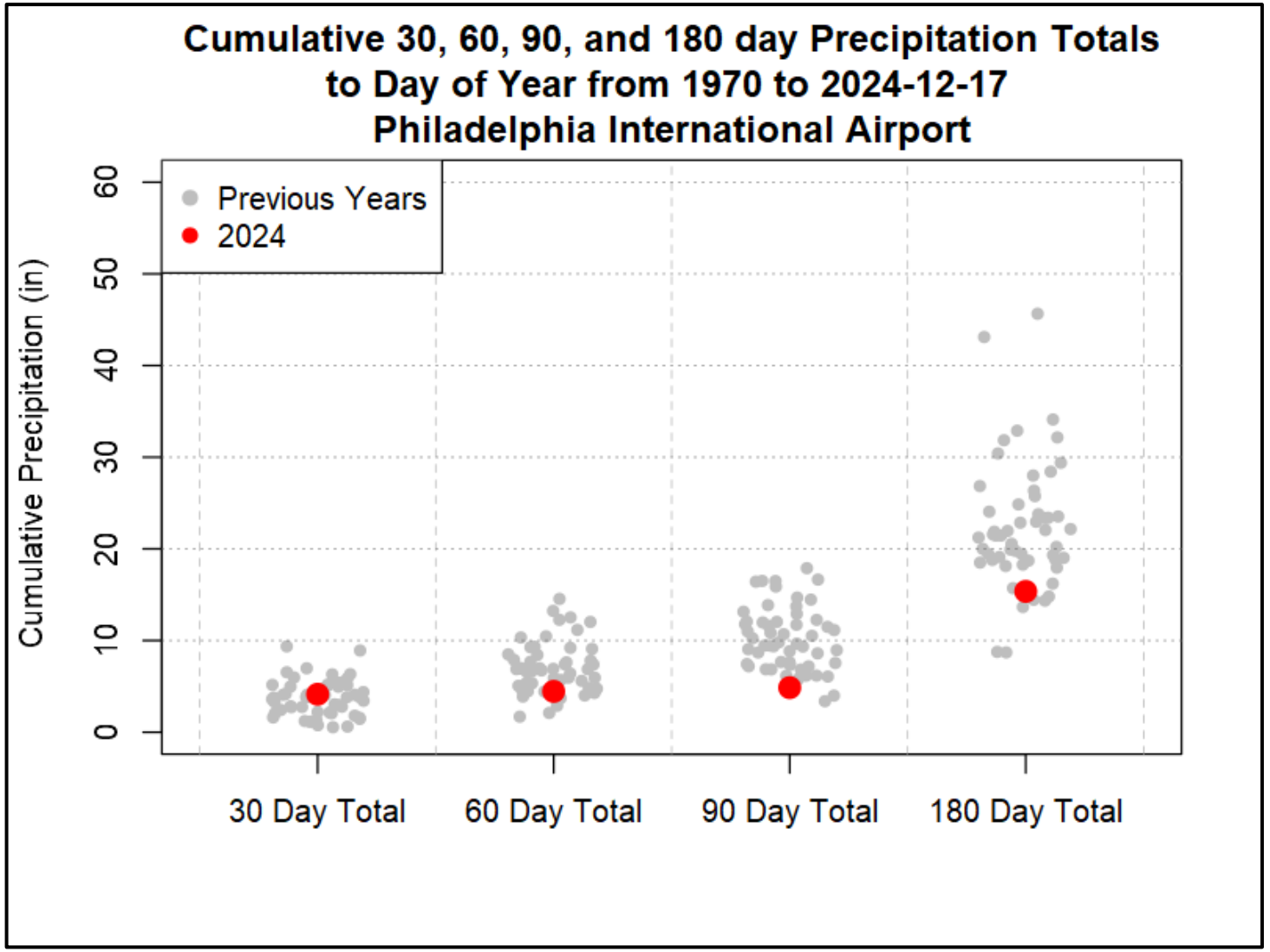
https://drbc.net/Sky/flows.htm



Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

New daily dashboard images

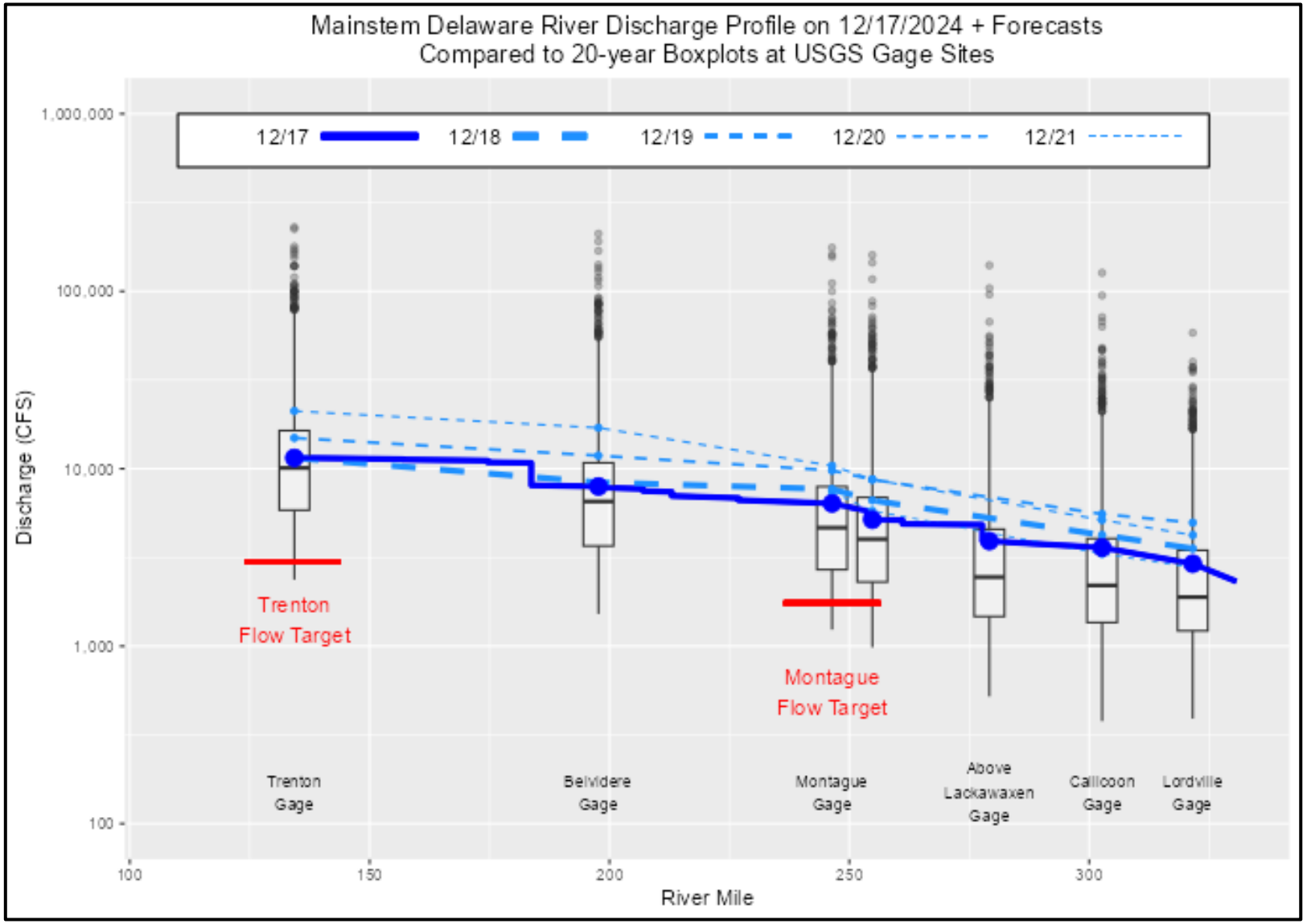
https://drbc.net/Sky/flows.htm



Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

New daily dashboard images

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



~~Drone~~ sUAS Based Monitoring

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

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Delaware River at Raub's Island (near River Mile 177). Low flow photo was taken on November 6th when daily mean flow at Trenton was 2,900 CFS (~ 3rd percentile since 1982).

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Mid flow photo taken on November 30th when daily mean flow at Trenton was 8010 CFS (~ 43rd percentile).

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

High flow photo taken on December 13th when daily mean flow at Trenton was 37,200 CFS (~ 96th percentile).

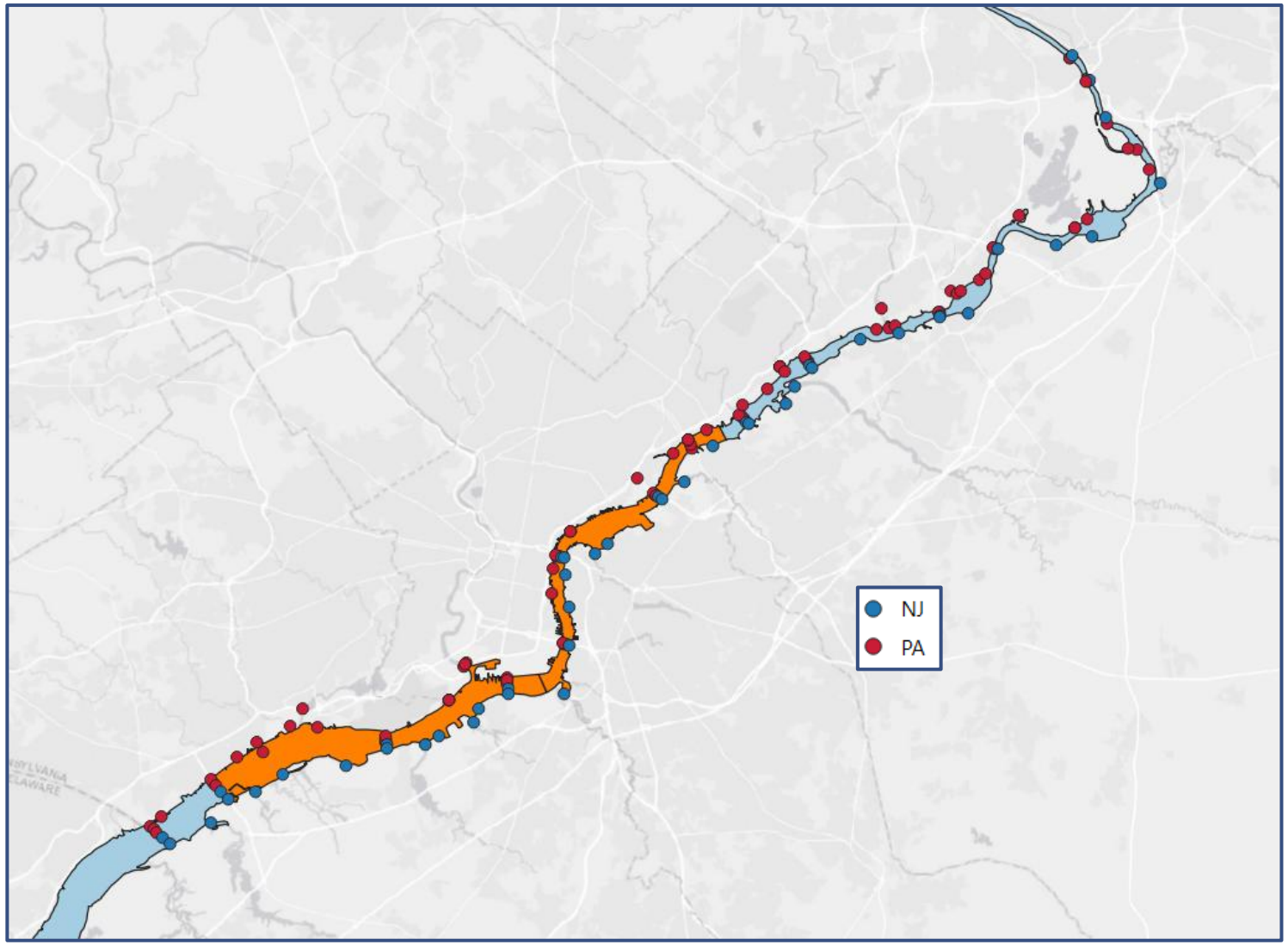
Photos from the Delaware River at Bull's Island and Lumberville-Raven Rock Bridge (near River Mile 155.4). Low flow photo was taken on October 28th when daily mean flow at Trenton was 3,030 CFS (~ 4th percentile since 1982). High flow photo taken on December 13th when daily mean flow at Trenton was 37,200 CFS (~ 96th percentile).

PADEP & NJDEP Support Delaware Estuary Bacterial Monitoring

- 135 sites
- 6 sampling events within a 30-day window
- June & July 2024

- E. Coli
- Enterococcus
- Fecal Coliform
- QPCR (PA sites)

- Paired tryptophan (subset)



Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA