

Sustainable Remediation of Georgica Pond

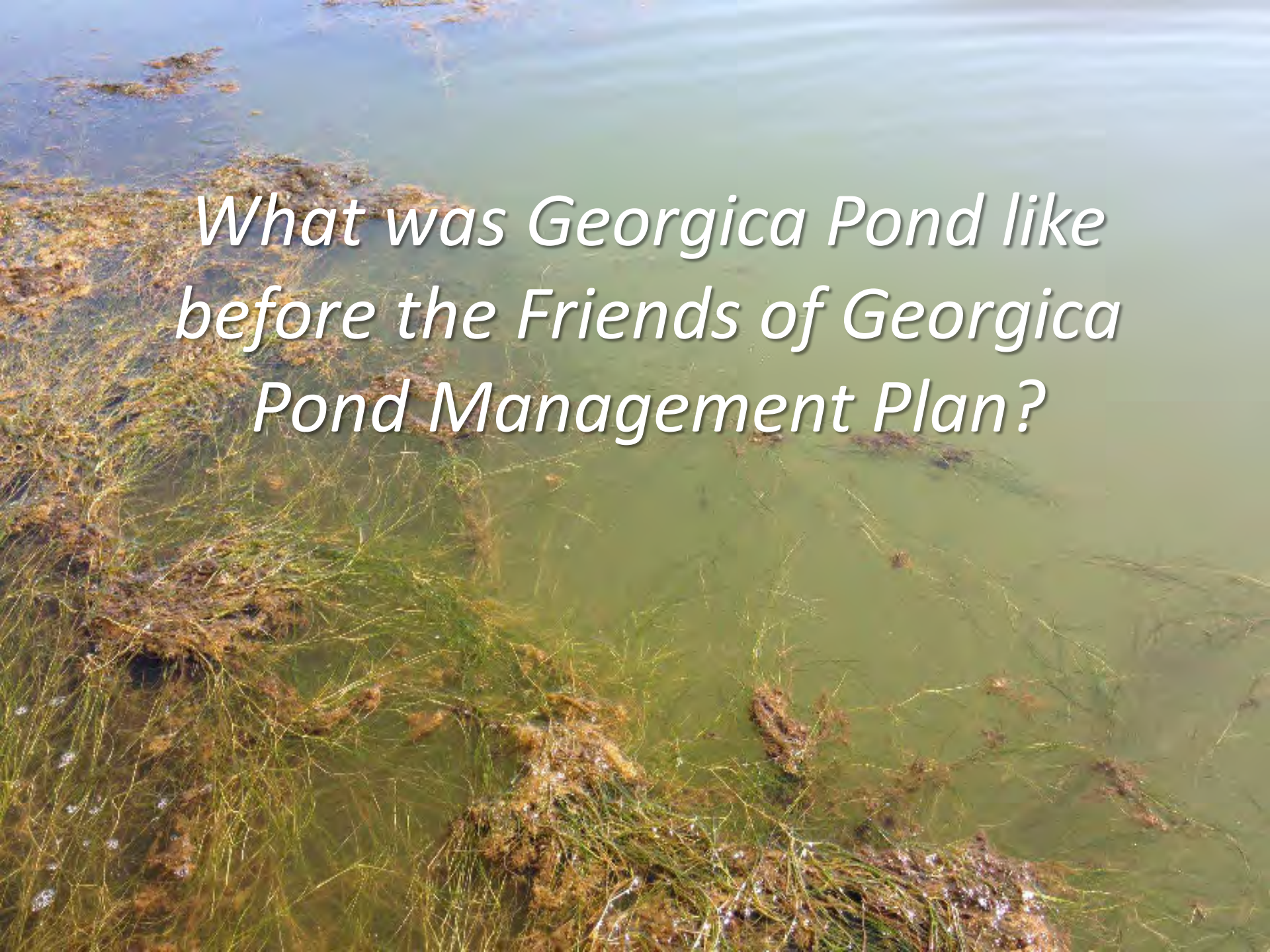


Christopher J. Gobler, PhD



Stony Brook University
*School of Marine and
Atmospheric Sciences*



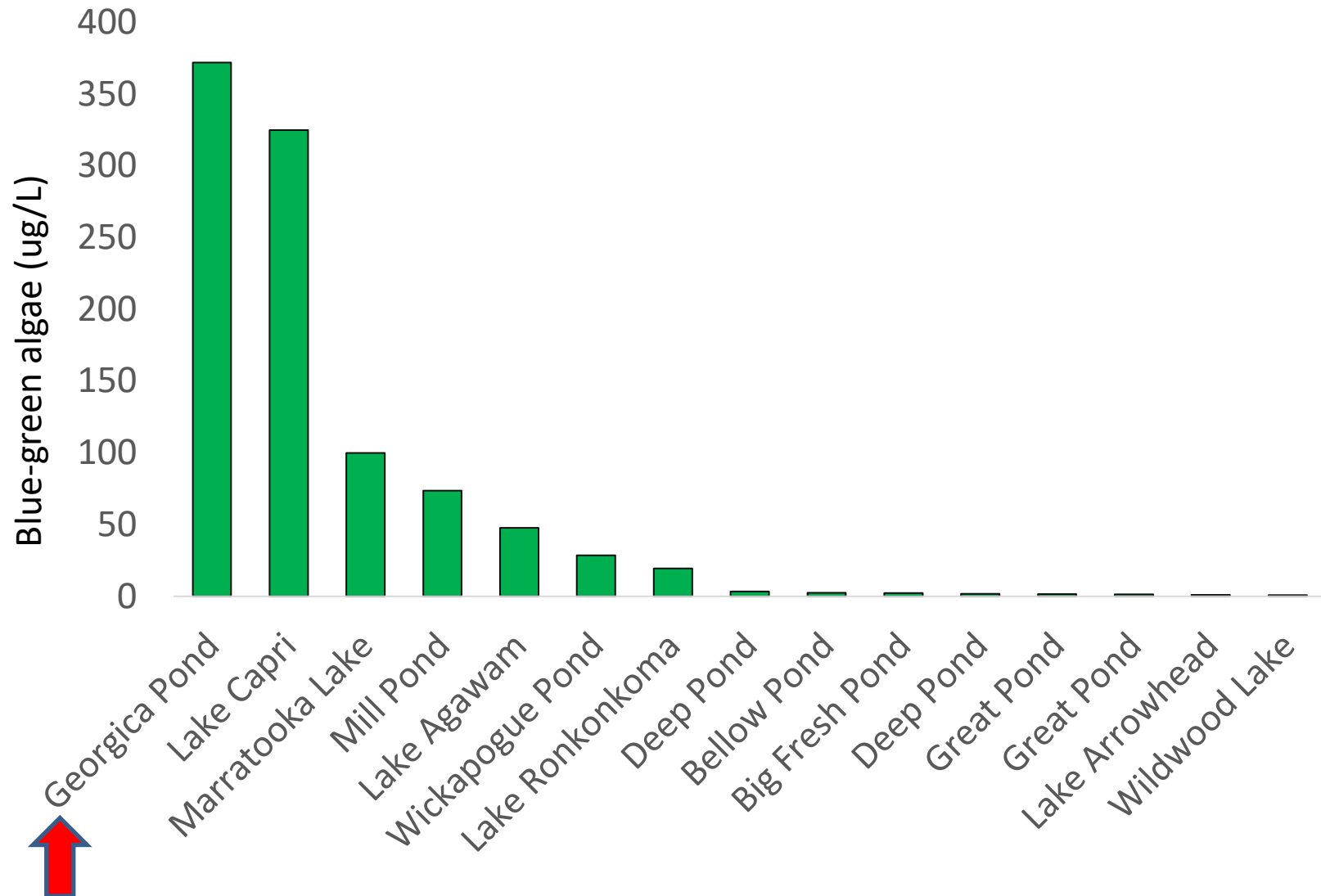


*What was Georgica Pond like
before the Friends of Georgica
Pond Management Plan?*



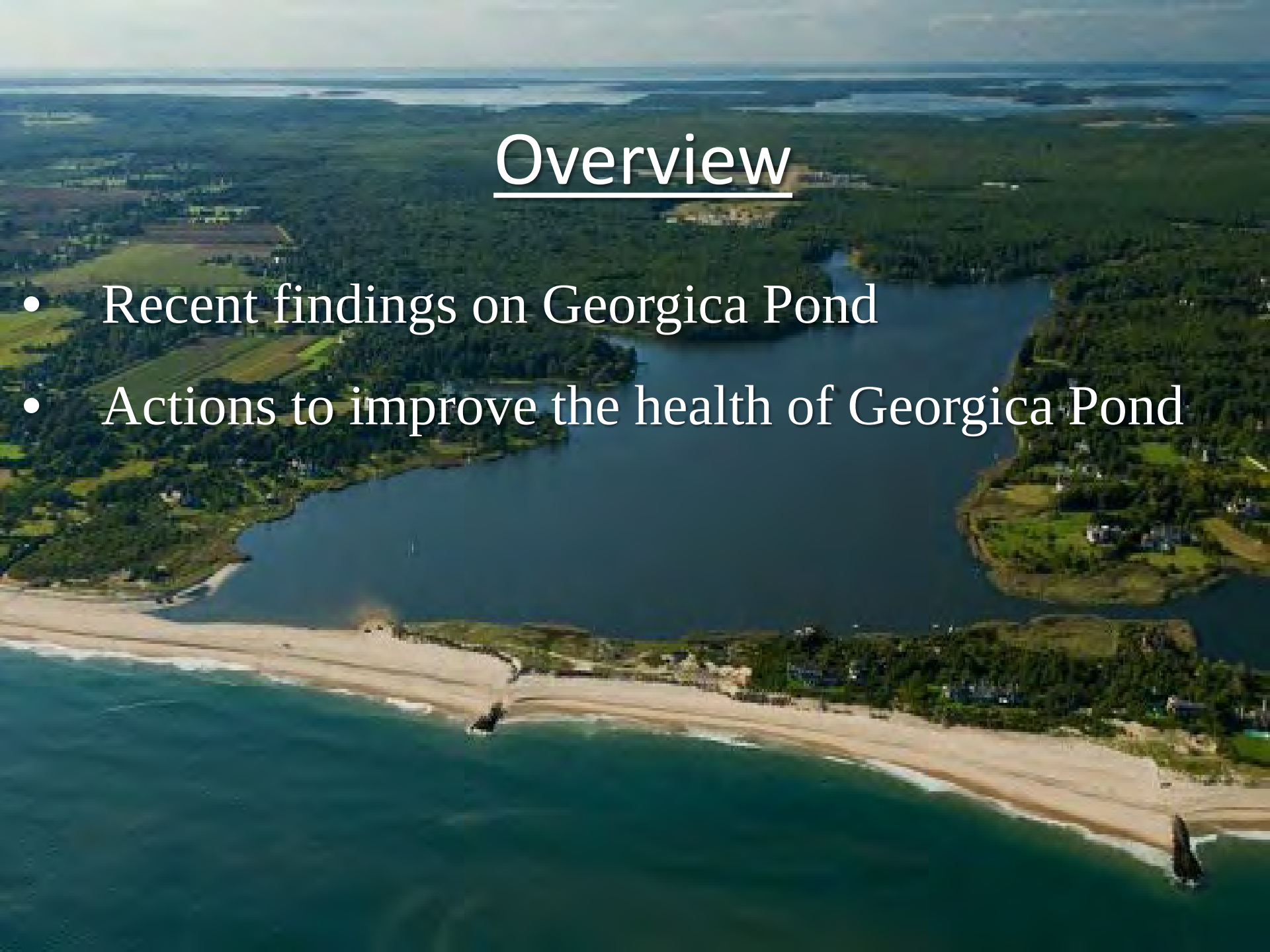


Blue green algae, August 2015



Why remediate Georgica Pond?

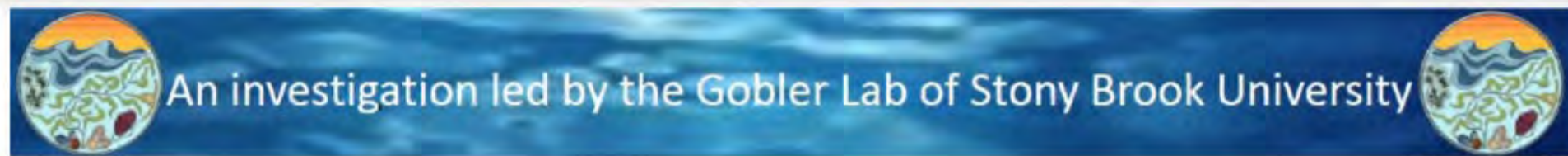
- Blooms of macroalgae
- Blooms of toxic blue-green algae
- Low oxygen
- Kills of fish, eels, birds, dogs
- Pathogenic bacteria

An aerial photograph of Georgica Pond, a large body of water surrounded by dense green forest. The pond is situated near a sandy beach and the ocean, with a small sailboat visible in the water. The text 'Overview' is overlaid on the image.

Overview

- Recent findings on Georgica Pond
- Actions to improve the health of Georgica Pond

Real-time monitoring buoy



Georgica Pond

Chart View

Table View

Site Information

GP_south

Site Id

40.934192

Latitude

-72.22572

Longitude

Georgica Pond Buoy - The Gobler Lab of
Stony Brook University

Description

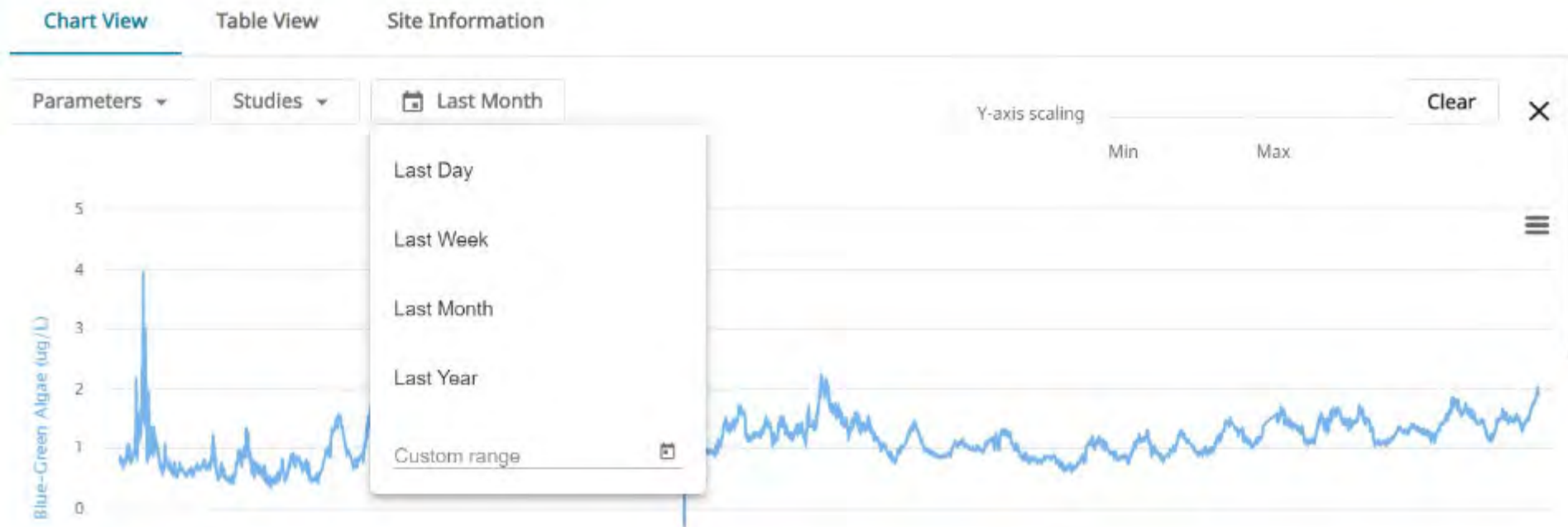
As part of The Georgica Pond Project, the Gobler laboratory has installed a water quality monitoring buoy in Georgica Pond. This device is making continuous, real-time measurements of key water quality indicators that are instantly telemetered to this web site.



Real-time monitoring buoy



Georgica Pond

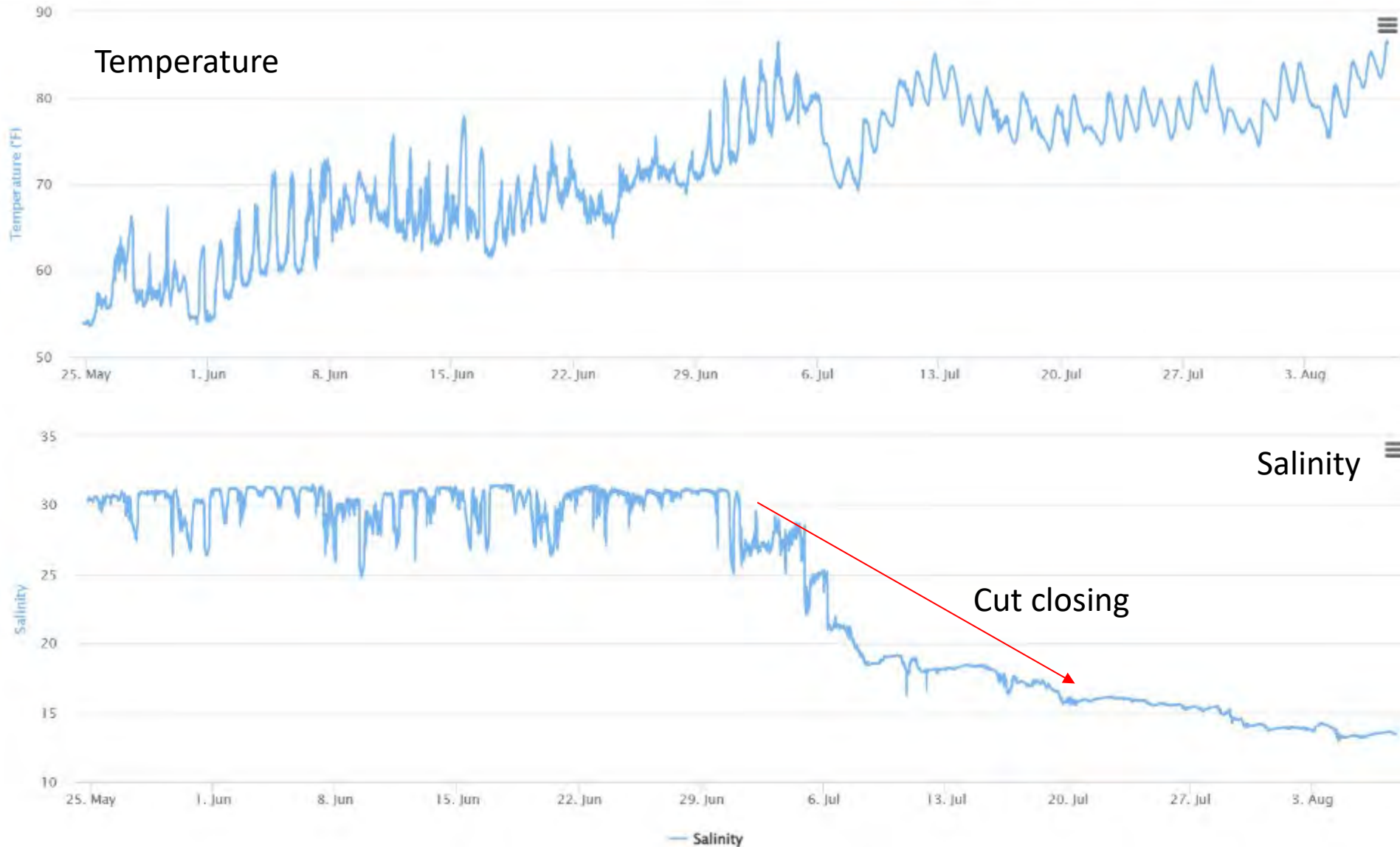


Cut remained opened through July



Temperature, salinity, 2026

Blue-green algae blooms threat when salinity < 15

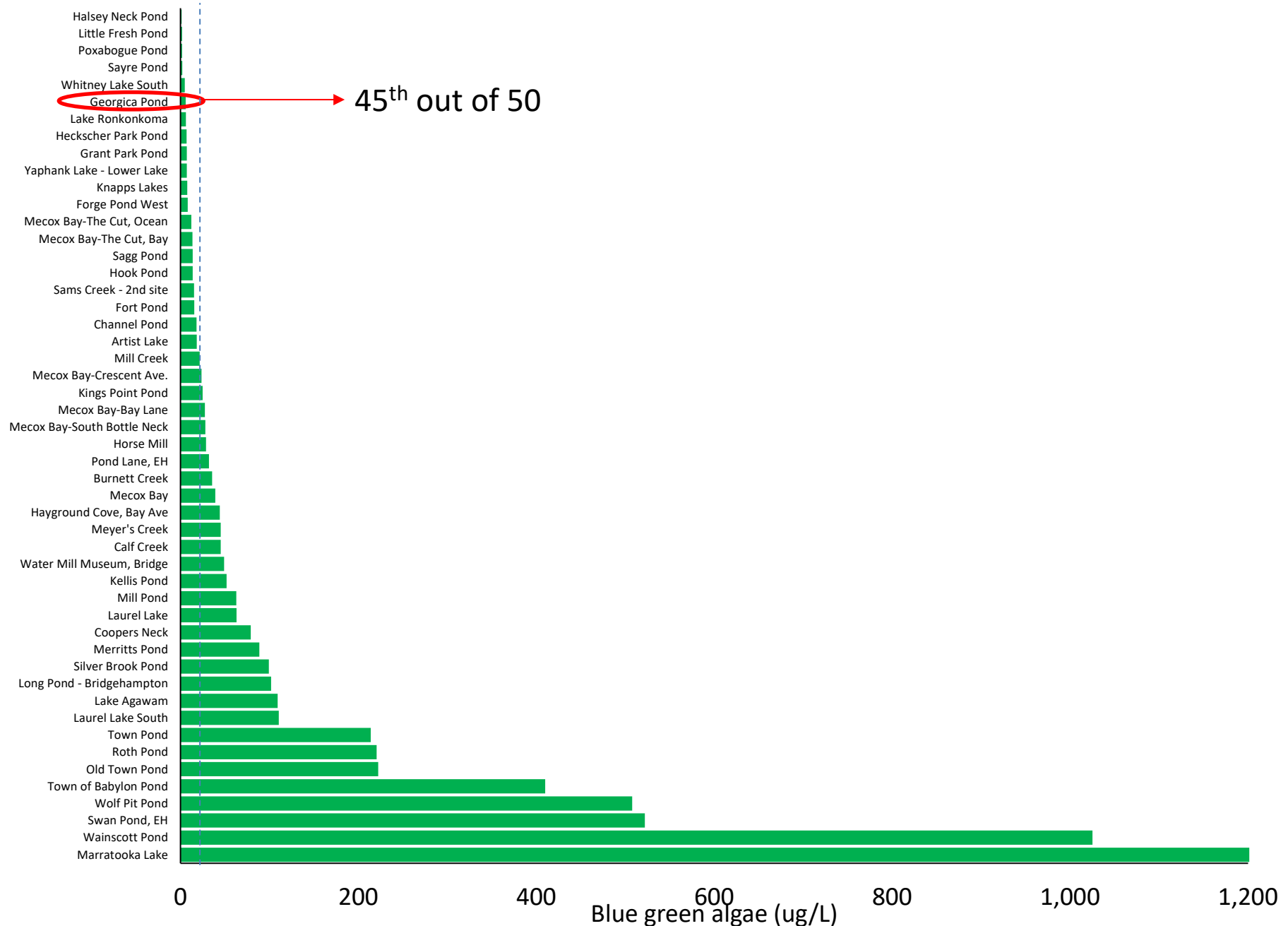


Dissolved oxygen, 2026

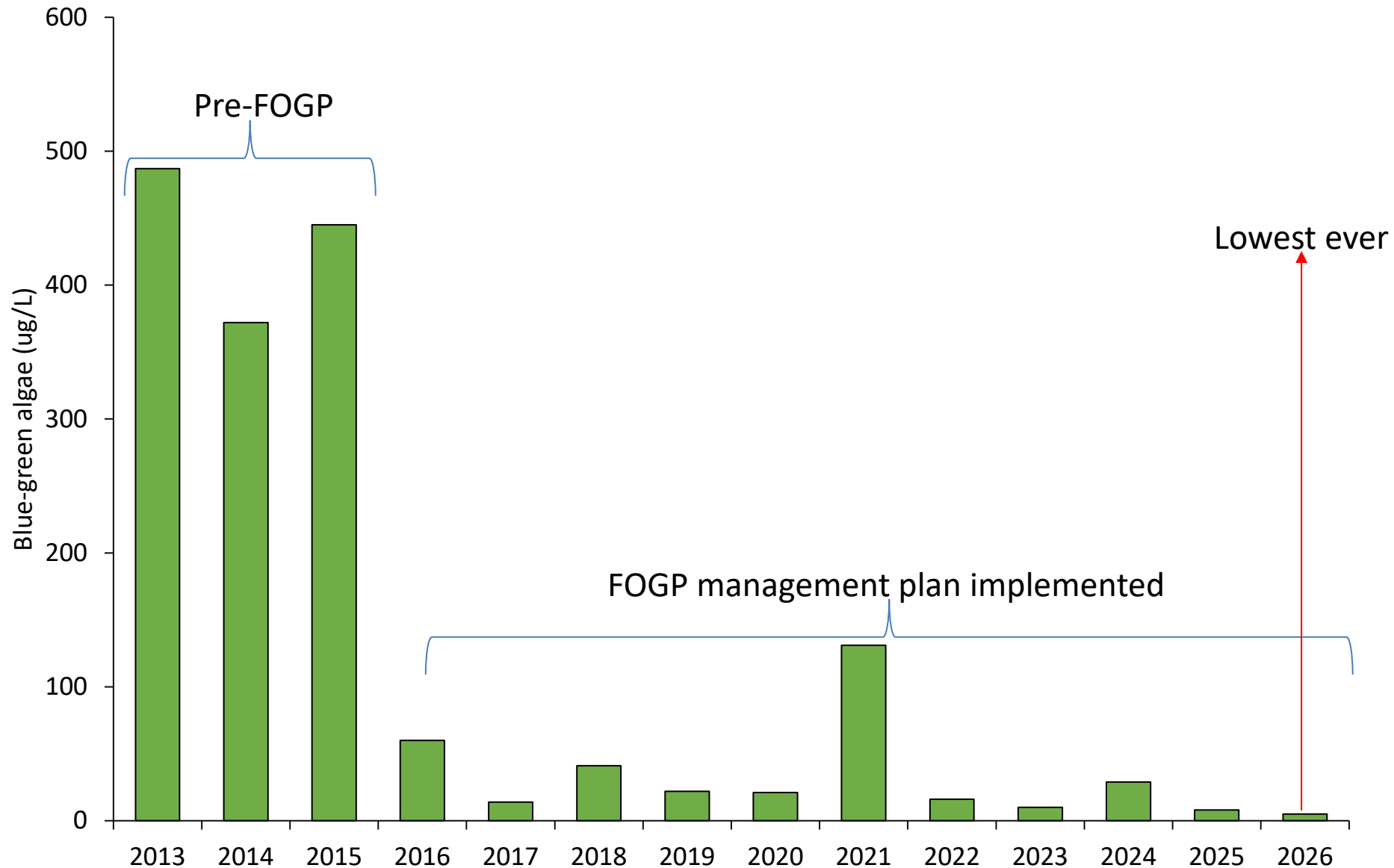
NYSDEC minimum standard = 3mg/L



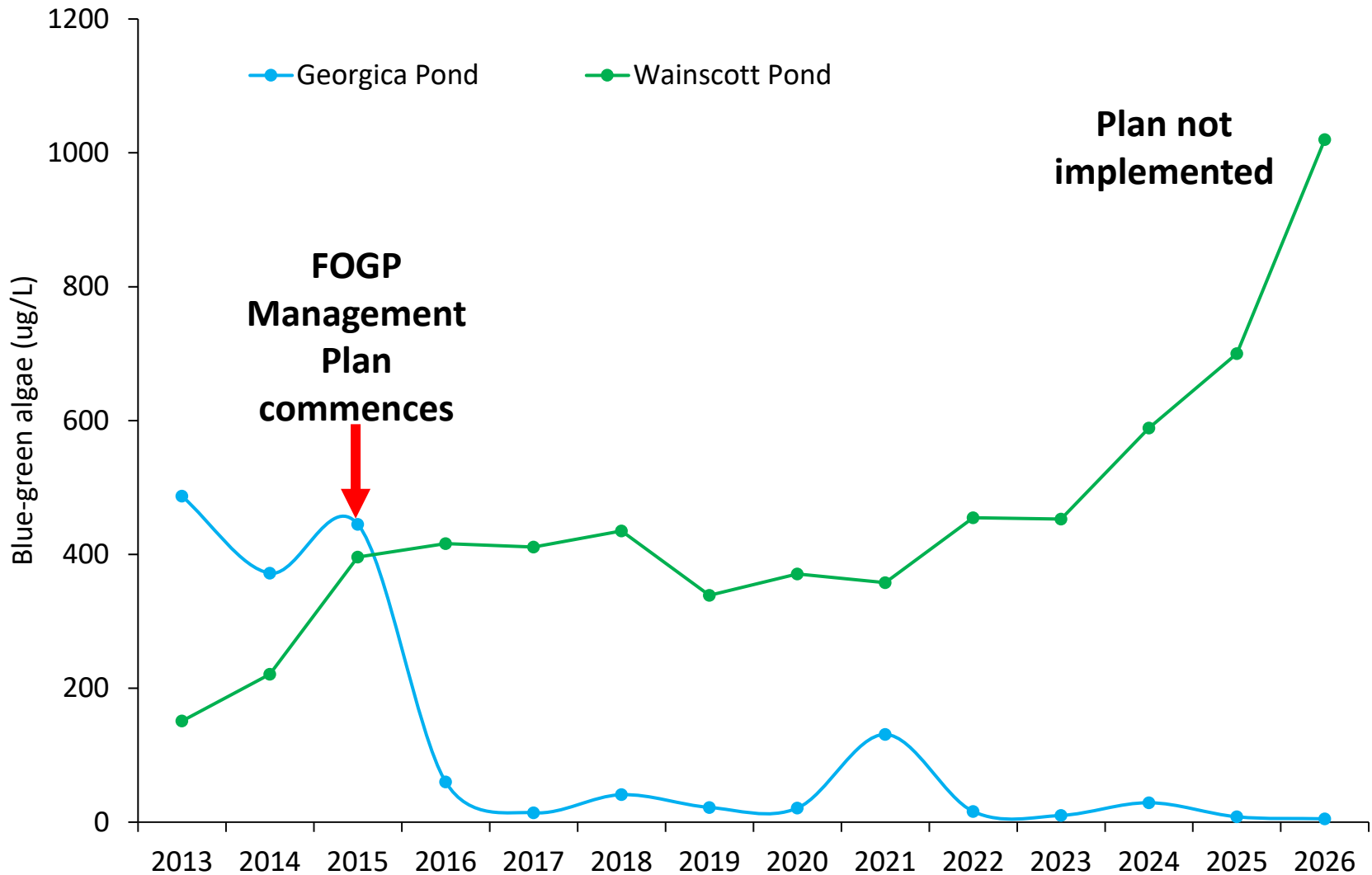
Comparison of 50 local ponds, peak blue-green algae, 2026



14-year trend in blue-green algae



FOGP management plan is working!



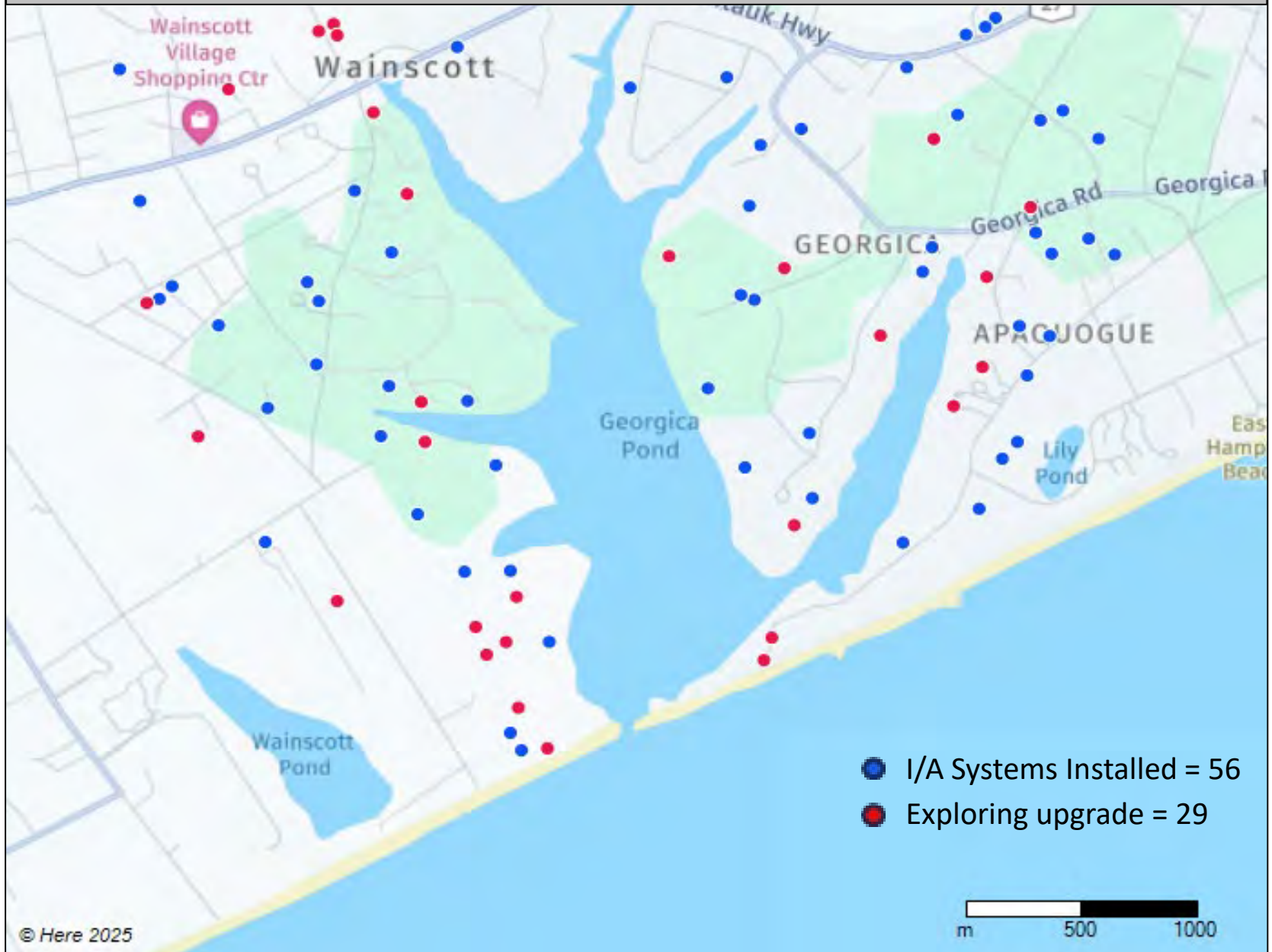
Aquatic weed harvester, 2016-2025

- Removed nearly **340,000 lbs** of macrophytes from 2016- 2025.
- **> 1,000 lbs of nitrogen removed.**
- **Removed** a key source of **blue-green algae** and toxins removed.
- One key to decadal success.



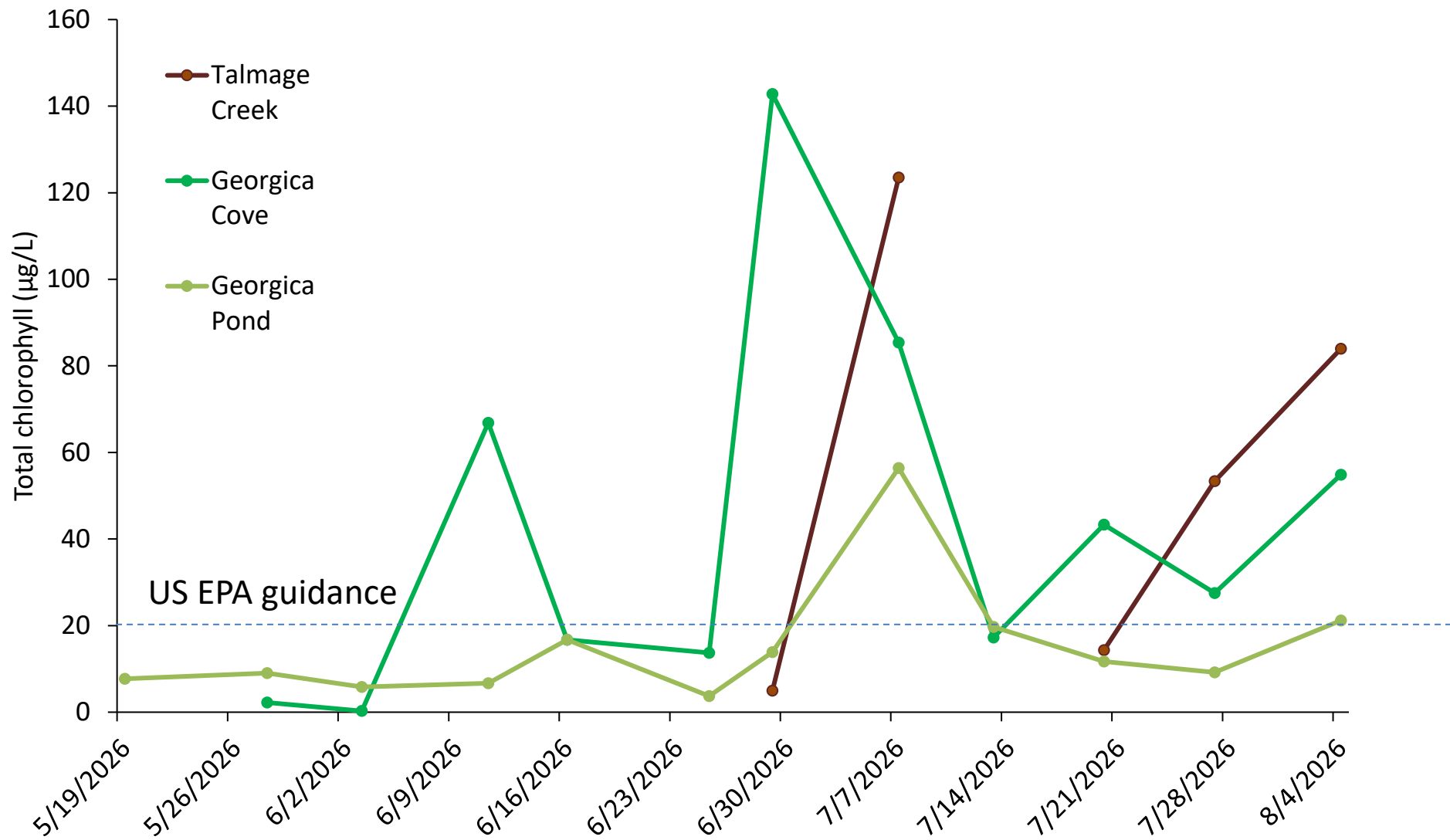
Nitrogen removing septic system installations

Most I/A systems install on a single water body anywhere in NY.



Total algae, 2026

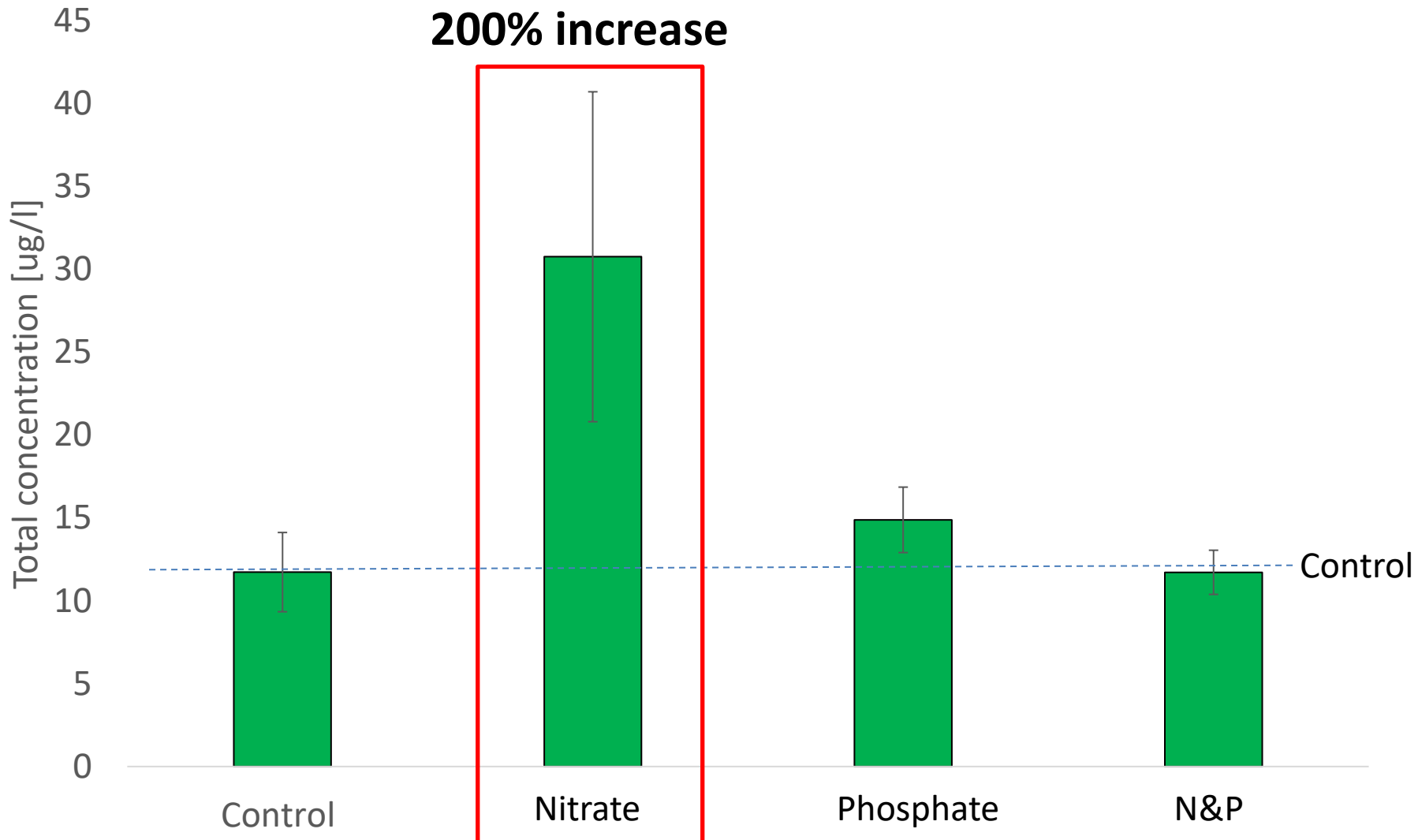
Still work to be done!



What promotes algal blooms in Georgica Pond?

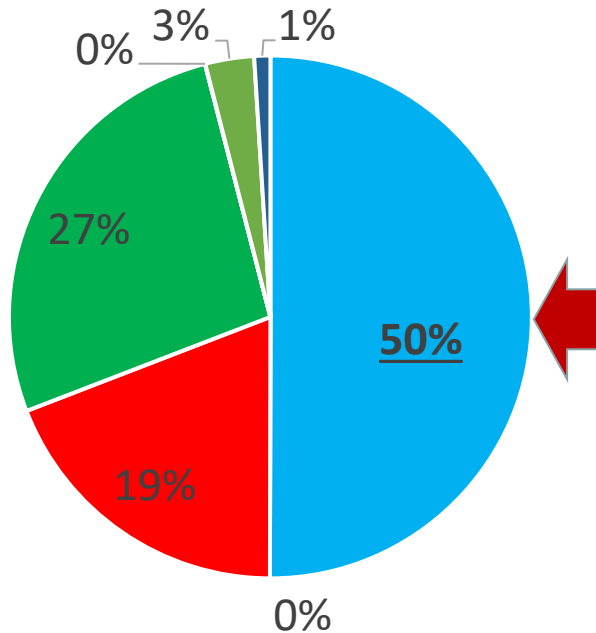


Nutrients controlling blue-green algae



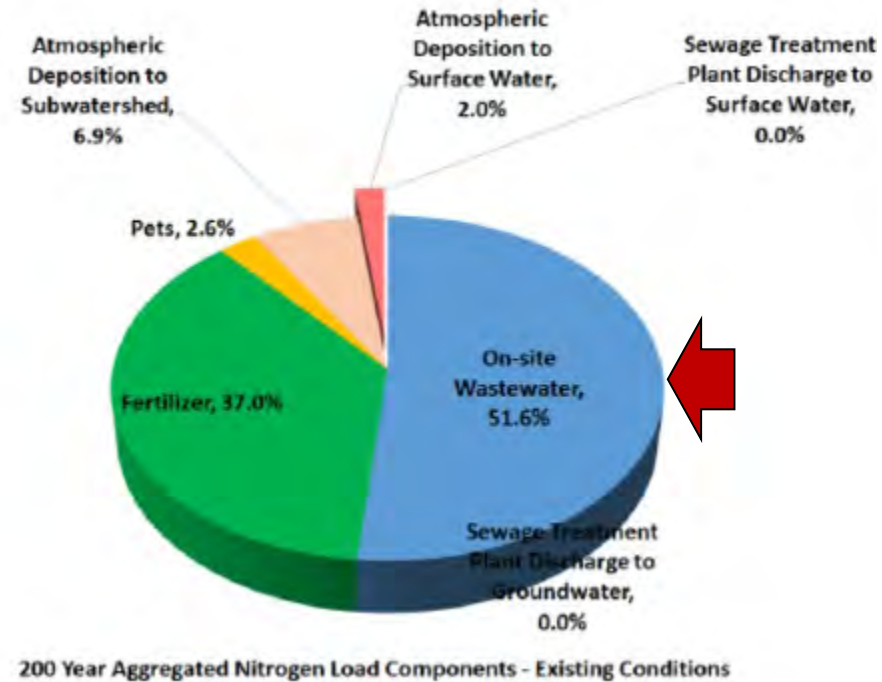
Sources of N to Georgica Pond

Gobler study

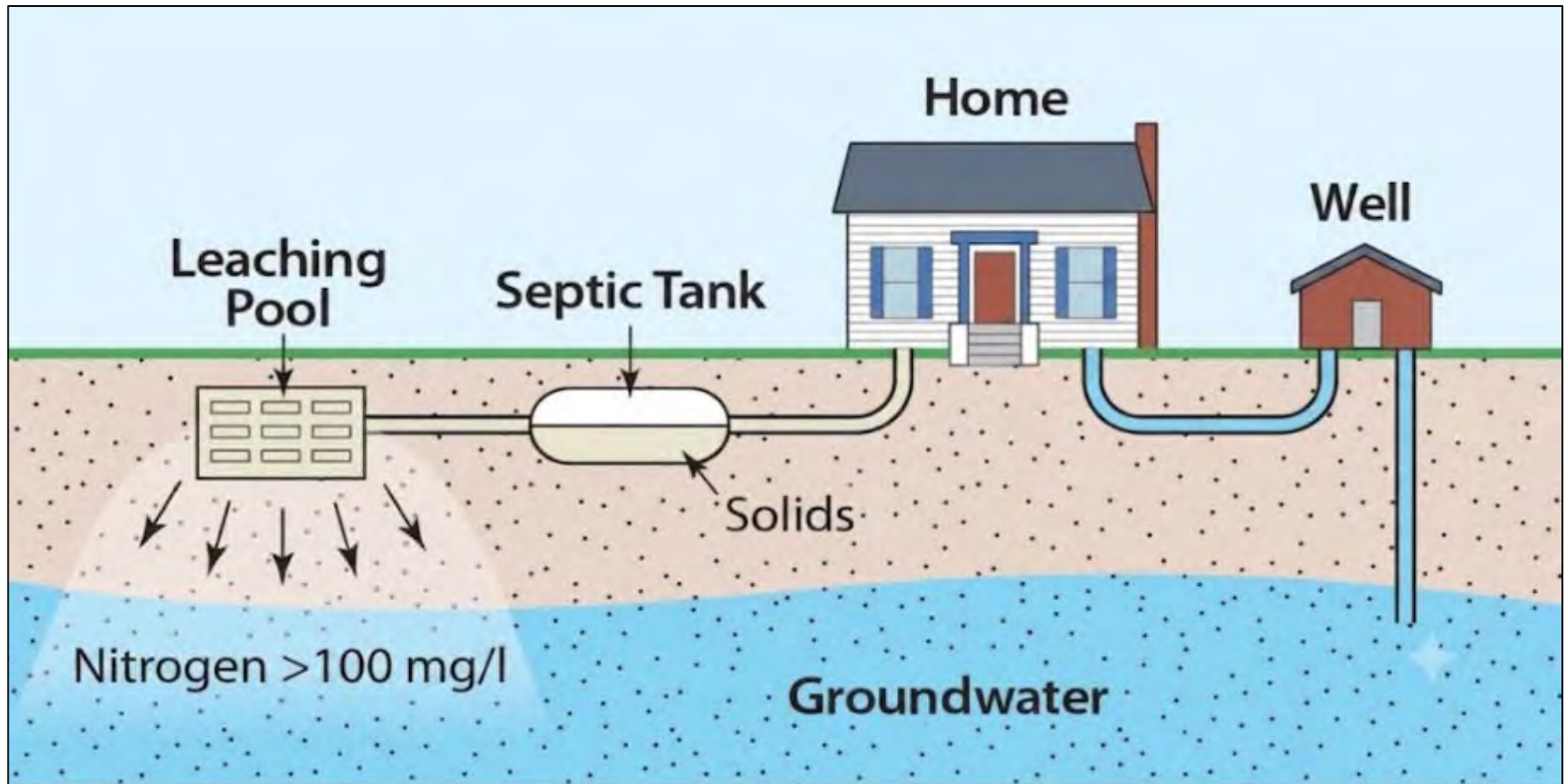


- Cesspool/Septic
- Atmospheric
- Parks and Golf Lawns
- Pets
- STP
- Residential Lawns
- Agriculture

Suffolk County study



Suffolk County septic systems



Georgica Pond Watershed Manager – Tom Varley



- 40 years experience in wastewater treatment specializing in operation & maintenance
- Certified Grade 4 Wastewater Operator in NY, NJ & CT
- Experience in groundwater remediation
- Working with Georgica Pond and Sagaponack Pond homeowners on septic upgrade.
- **Tom is here to help you seamlessly upgrade your septic systems:** System selection, system design, obtaining grants, installation, operation and maintenance.



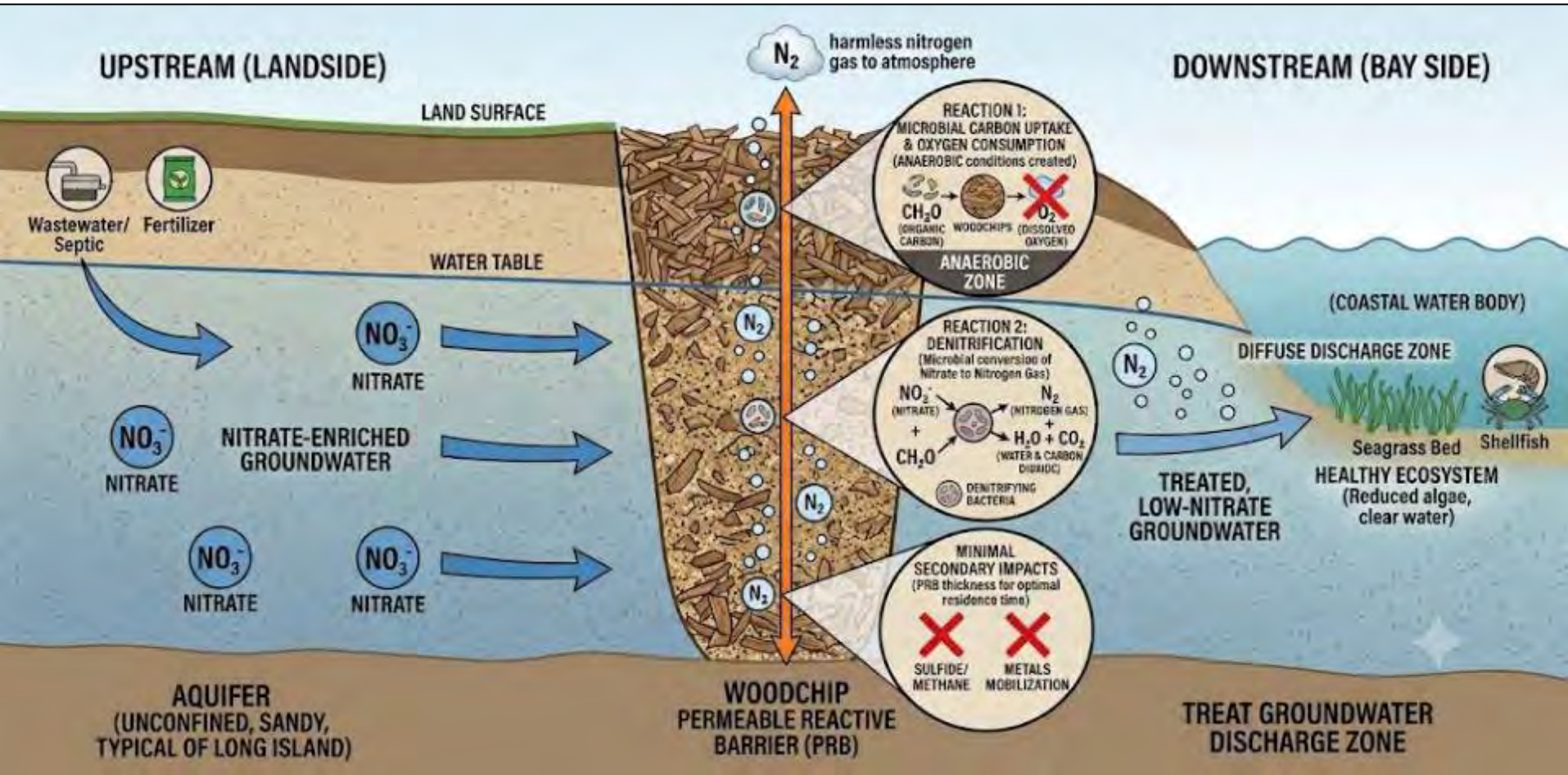
Stony Brook
University

*NYS Center for Clean
water Technology*

PECONIC LAND TRUST



Permeable reactive barriers

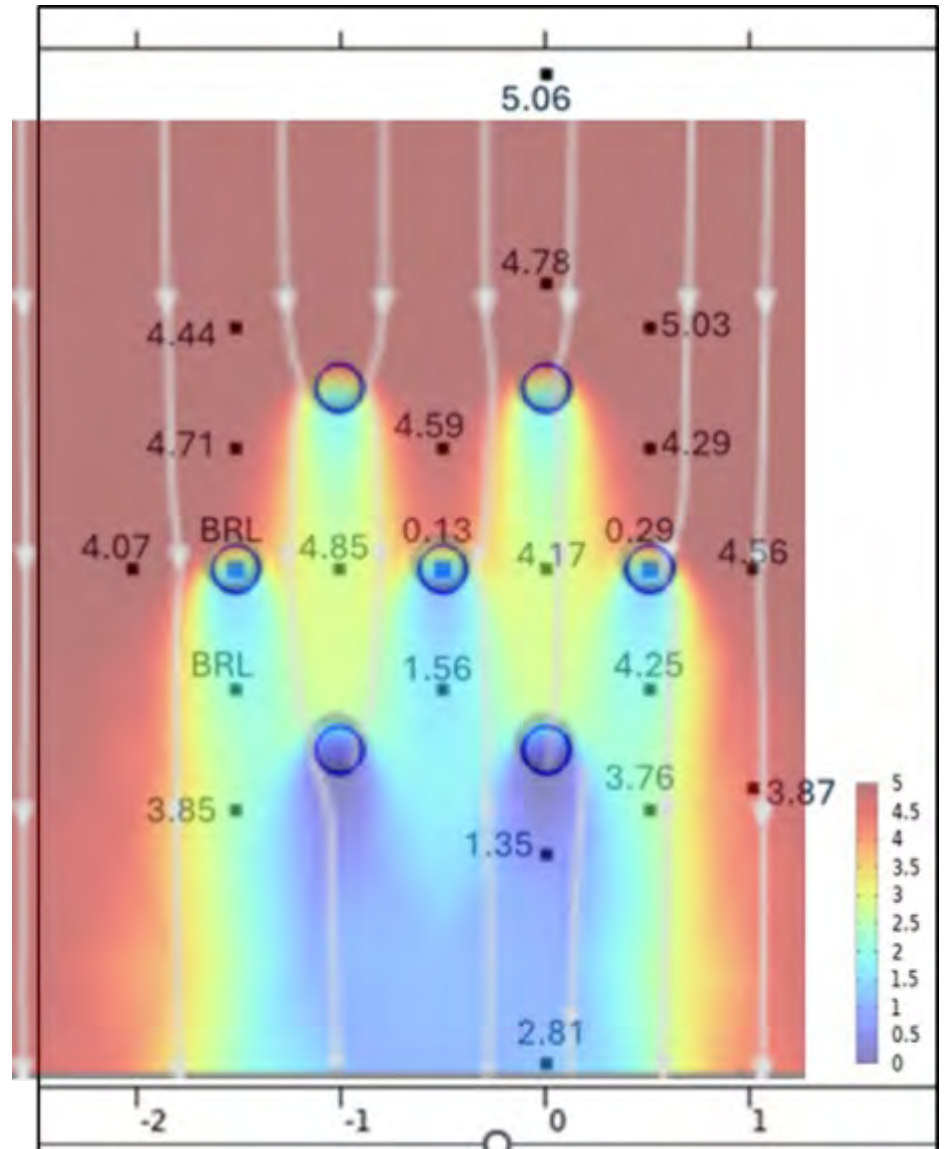


Carbon array installation at The Creeks, Georgica Pond

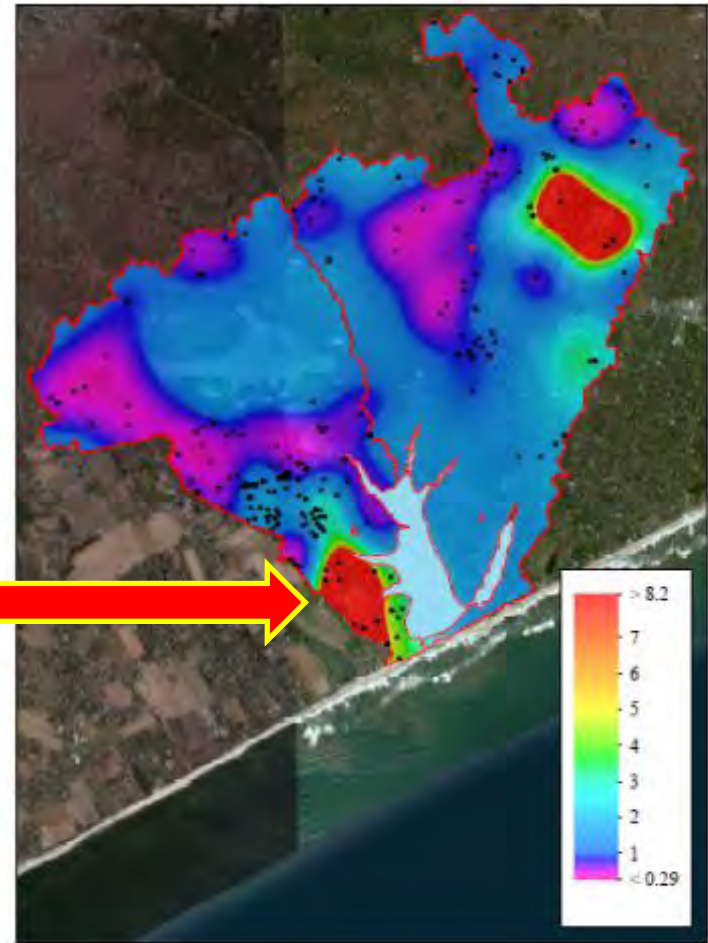


Carbon Array

- Nitrate completely removed in the center of woodchip columns
- Lower nitrate concentrations downstream
- Matches model simulation



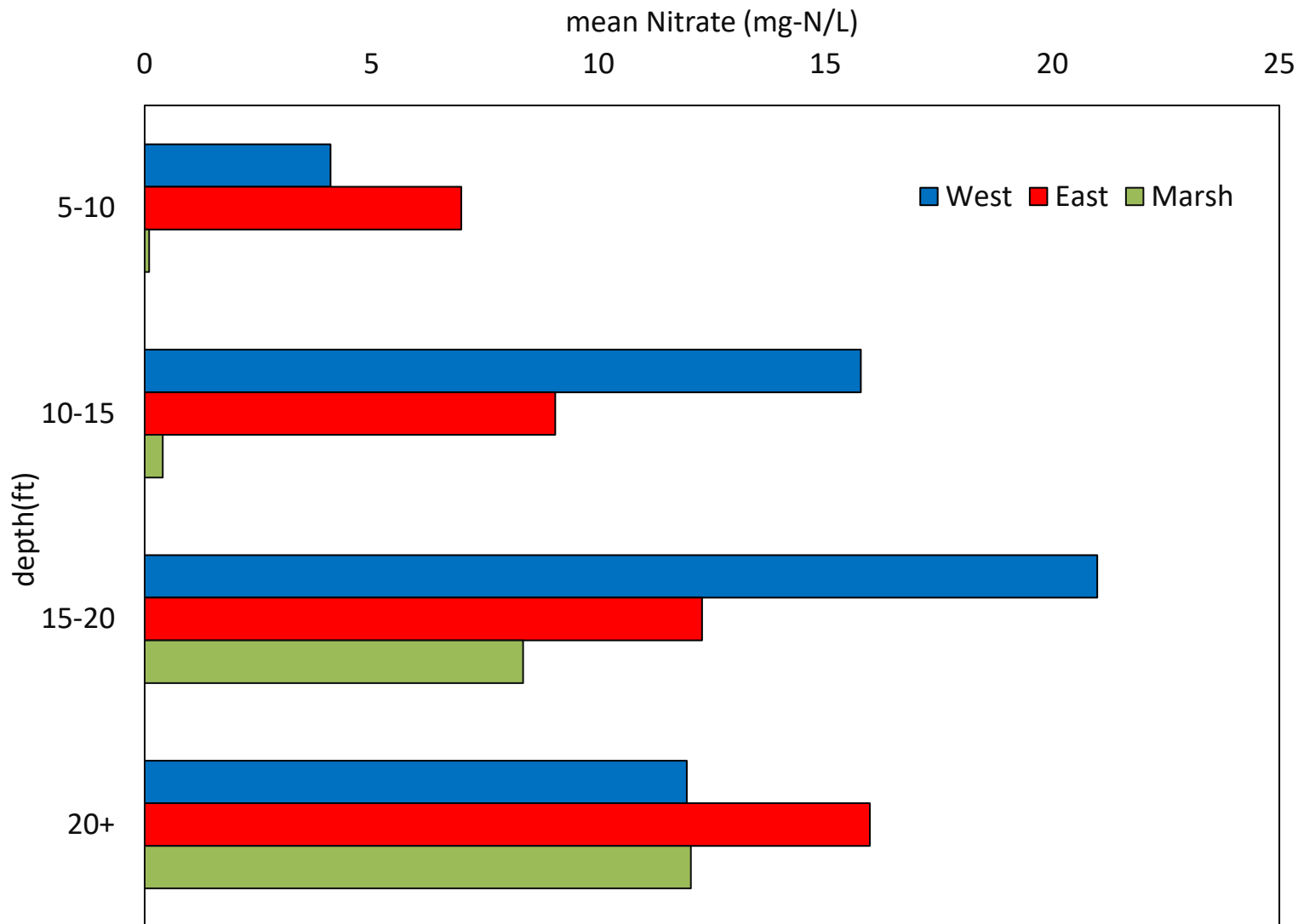
High nitrate plume entering Eel Cove



Piezometer wells installed on Kagan and Yass properties at Eel Cove, Georgica Pond

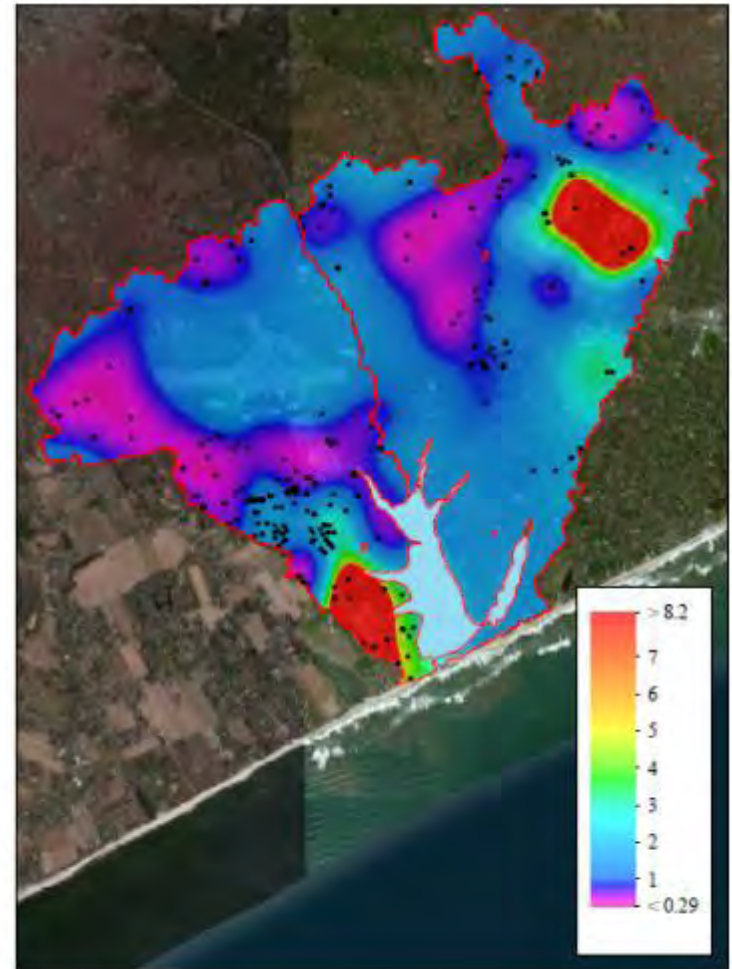


Nitrogen pollution at Eel Cove



High nitrate plume entering Eel Cove

- These are the highest groundwater N levels ever measured in in East Hampton Town.
- CCWT seeking to submit a grant application to the Town of East Hampton CPF fund for a PRB to remediate this N source.



Is Georgica Pond swimmable?



LONG ISLAND

Flesh-eating bacteria found in Long Island waters leave victims with 20% chance of dying in 48 hours

By [Brandon Cruz](#)

Published April 22, 2026, 4:23 p.m. ET

 265 Comments

***Vibrio vulnificus*: high-consequence, low-probability**

High consequence: 20% of people infected die in 24 – 48 hours (CDC).

Low probability:

- Organism is most abundant in warm water.
- In the Gulf of Mexico, where the organism is much more common, the risk of infection to swimmers has been estimated as 0.0003%.
- In NY, one deaths in four years: less than a **one in a 100 million** event for beach bathers.
- 500X more likely to drown.

Reducing one in a 100 million probability even further:

- Open wounds are a point of entry for bacteria; cover wounds or stay out with a serious open wound.
- Immuno-compromised are most vulnerable; 80x more likely to get blood infections; take extra caution.

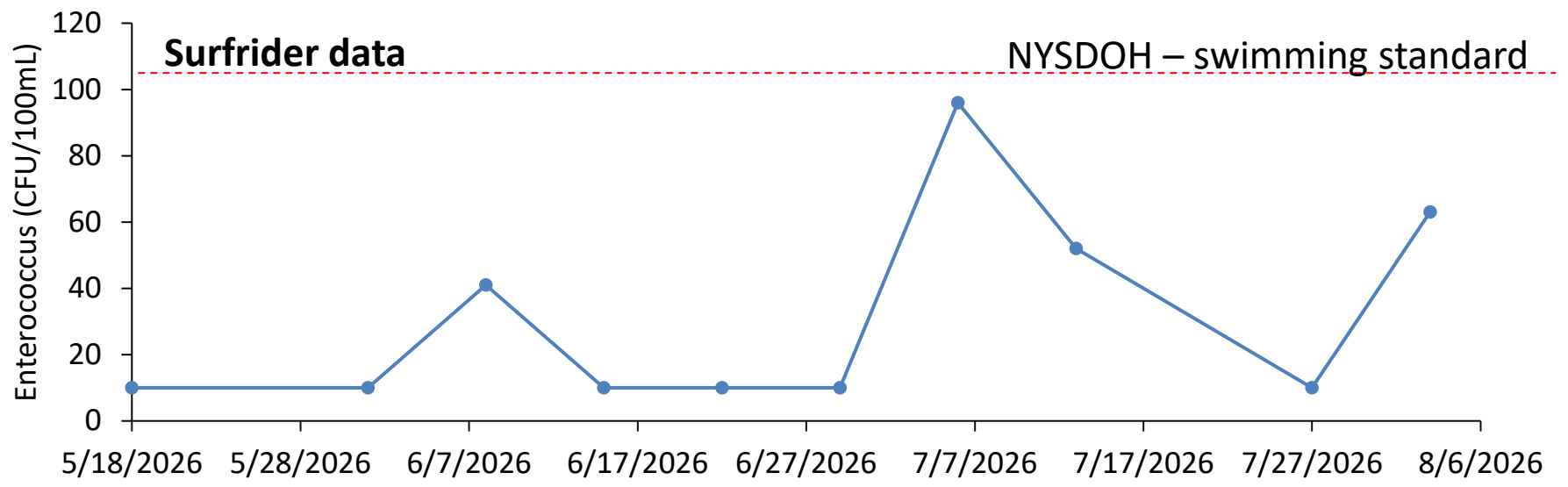
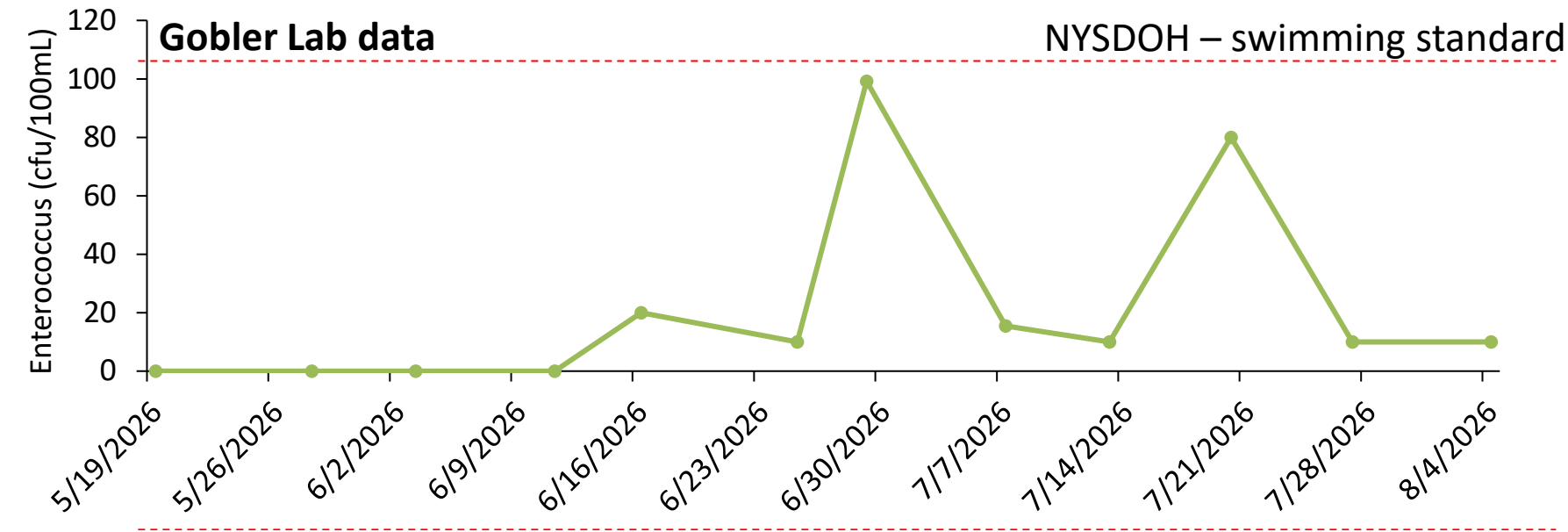
Everything is everywhere:

- *Vibrio vulnificus* in in all marine waters; if you have gone swimming in marine waters, you have literally ‘bumped into *Vibrio vulnificus*’.

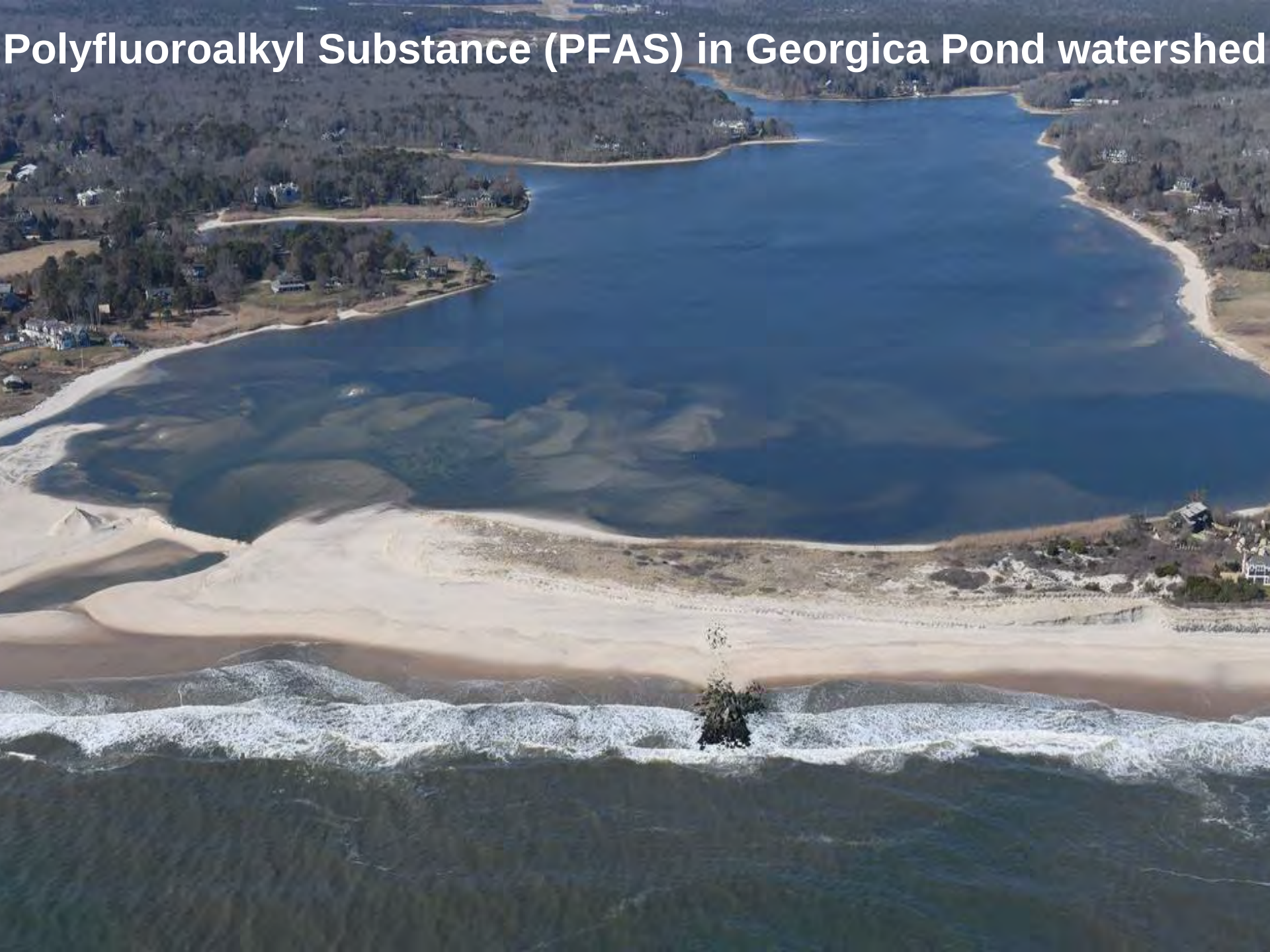
Is Georgica Pond swimmable?



According to NYS standards, Georgica Pond is swimmable.



Polyfluoroalkyl Substance (PFAS) in Georgica Pond watershed



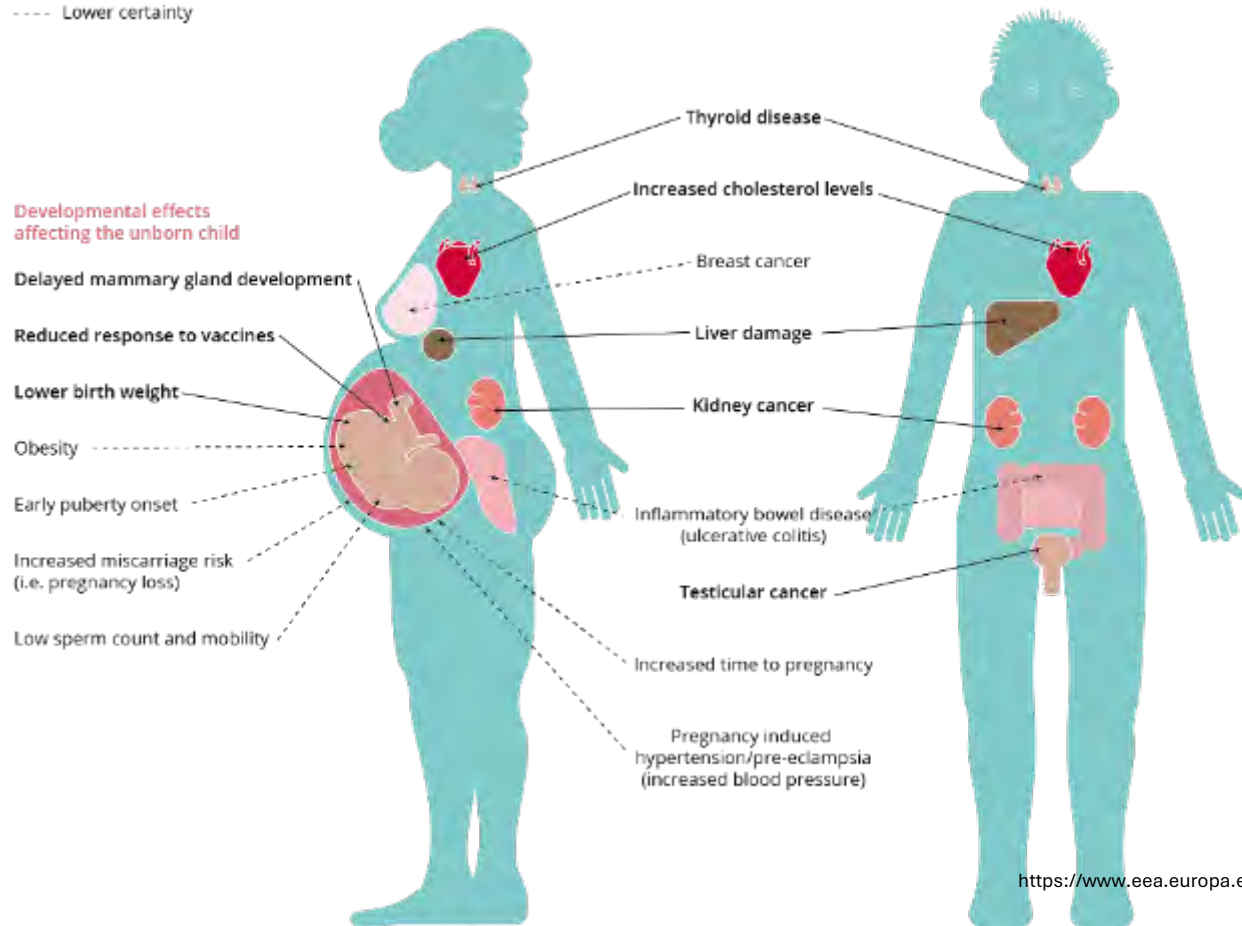
Per- and Polyfluoroalkyl Substances (PFAS)

- Commercial and industrial uses
- Oil, water, and heat resistant
- Environmental release during production, disposal, AFFF
- Mobile in water and air
- Resistant to degradation



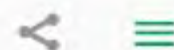
PFAS Health Risks

— High certainty
---- Lower certainty

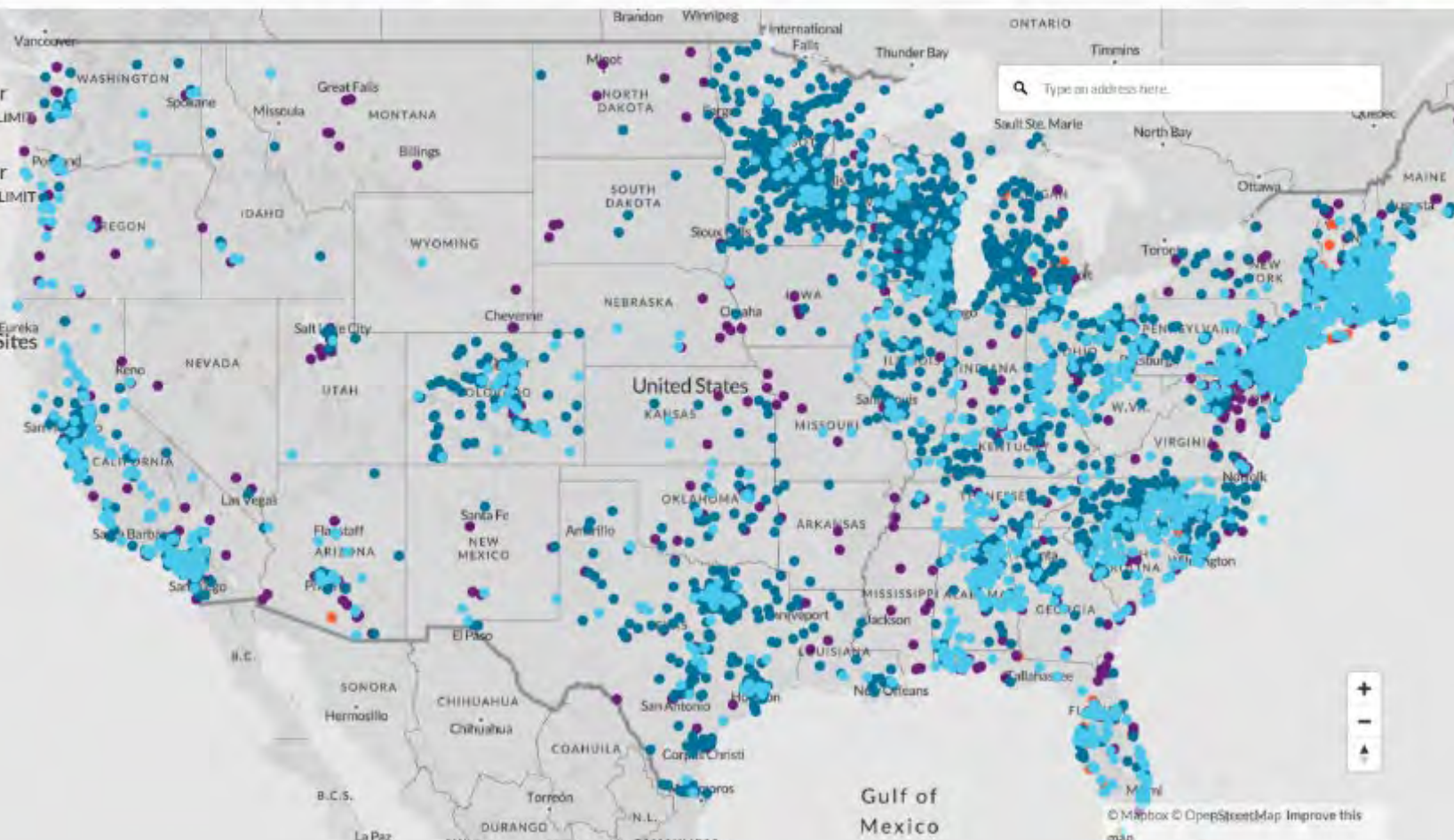


- Toxic: adverse health effects
(Sunderland et al., 2019; Wang et al., 2017)
- Perfluorooctanoic acid (PFOA): classified as a **possible human carcinogen** by International Agency for Research on Cancer (IARC)

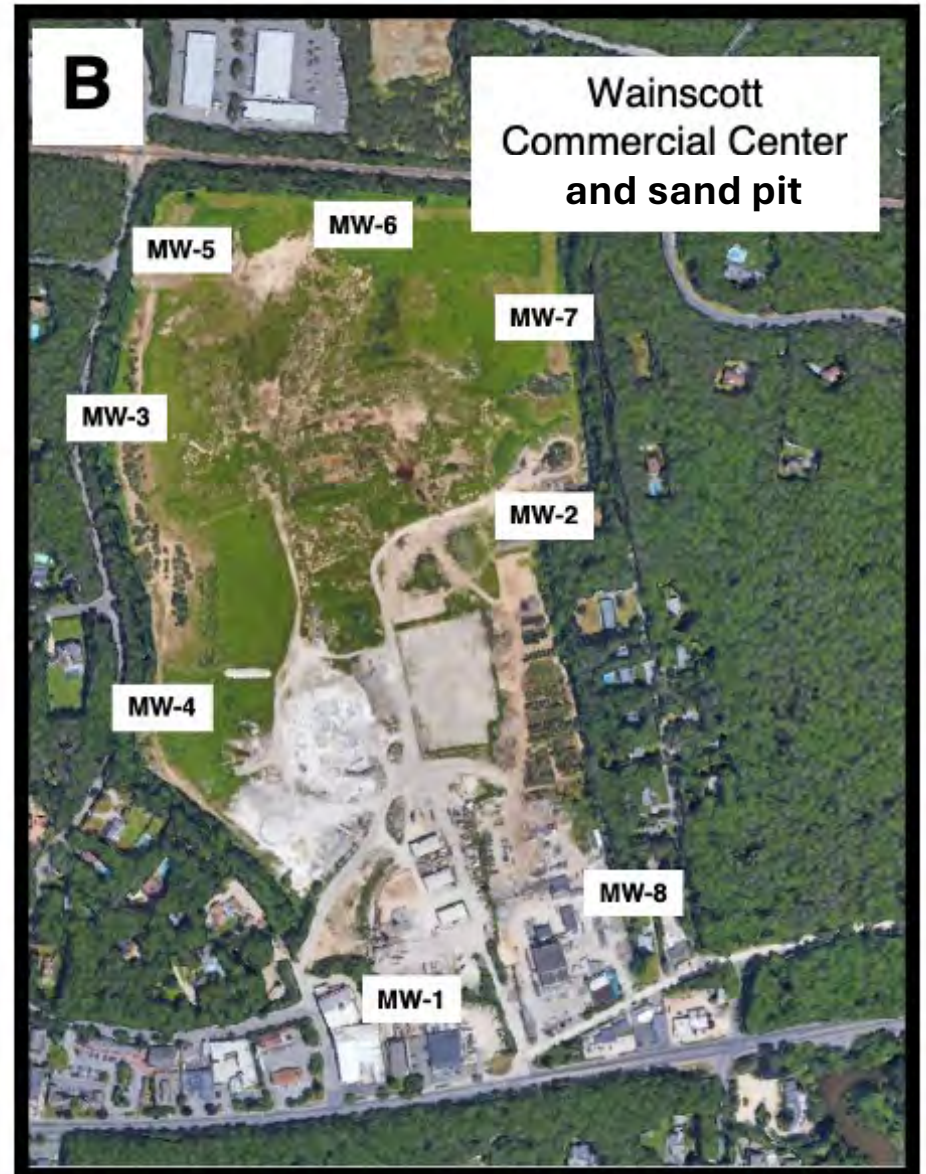
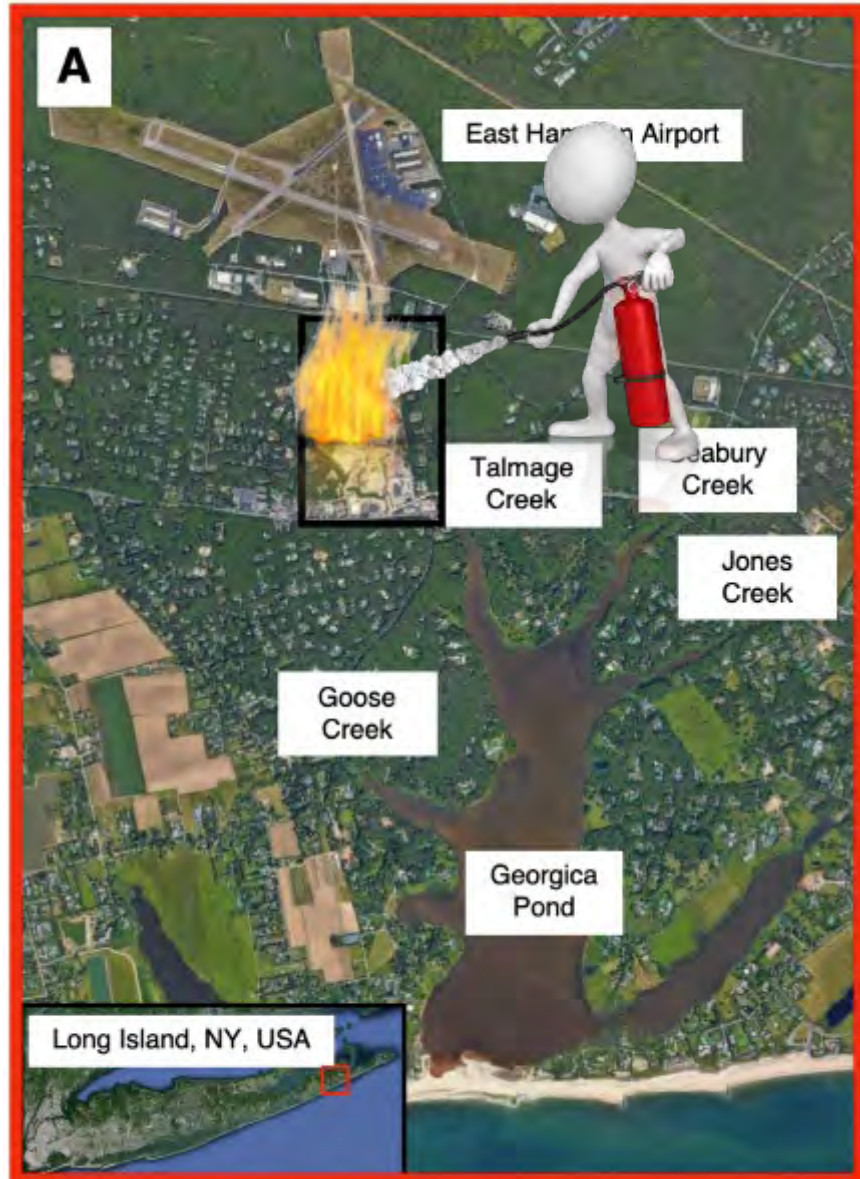
PFAS Contamination in the U.S. (May, 2026)



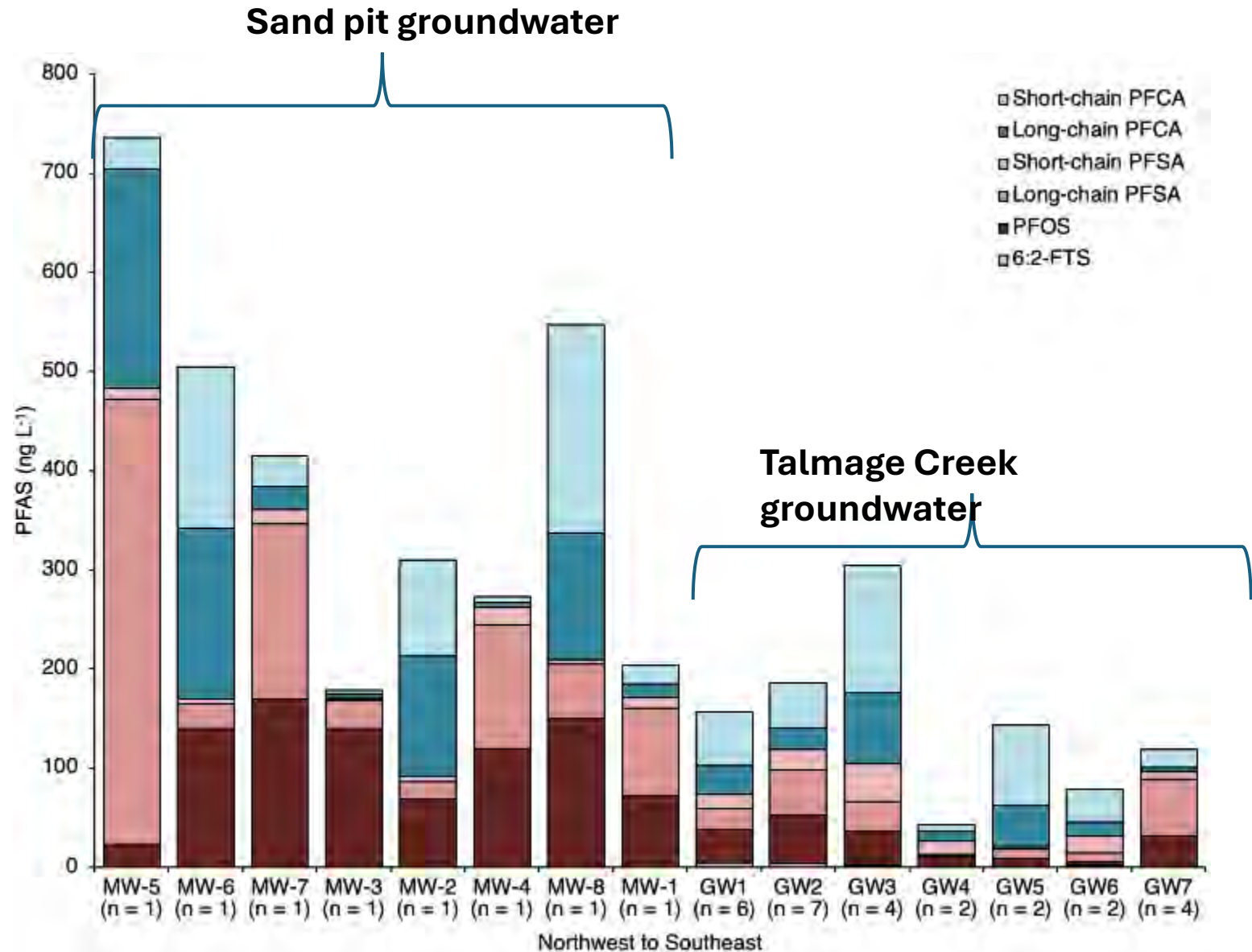
- On Drinking Water ABOVE PROPOSED LIMIT
- On Drinking Water BELOW PROPOSED LIMIT
- On Military Sites
- On Other Known Sites



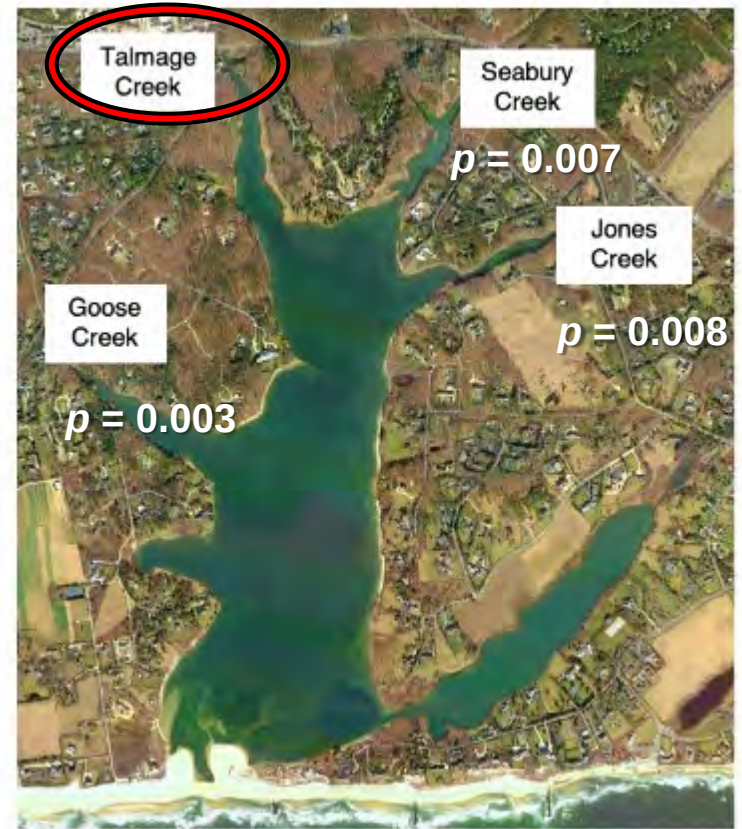
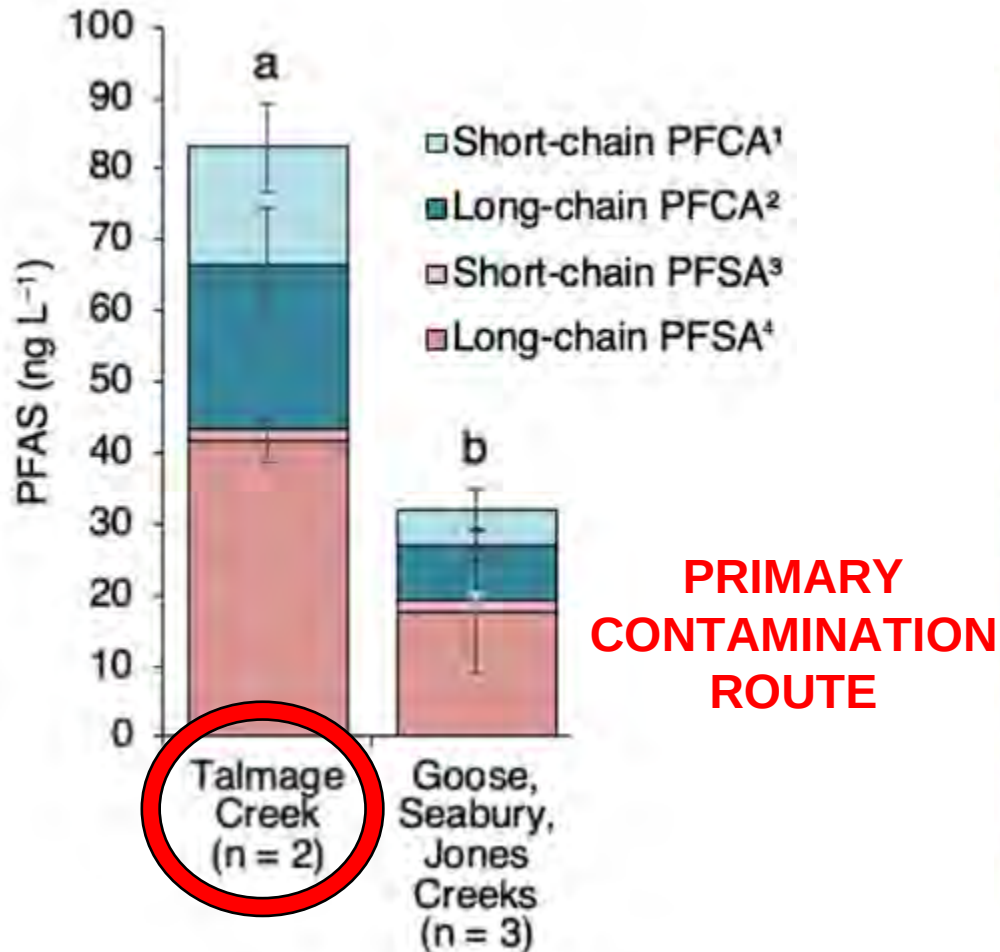
Georgica Pond Watershed



PFAS Transport to Georgica Pond



Route of PFAS to Georgica Pond: Tributary Comparison





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

Science of the Total Environment

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



Accumulation and trophic transfer of per- and polyfluoroalkyl substances (PFAS) in estuarine organisms determined via stable isotopes

Kevin W. Shaffer^{a,b}, Xiayan Ye^{b,e}, Cheng-Shiuan Lee^{b,d}, Oliver N. Shipley^a,
Carrie A. McDonough^e, Arjun K. Venkatesan^f, Christopher J. Gobler^{a,b,*}

^a School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY, United States

^b New York State Center for Clean Water Technology, Stony Brook University, Stony Brook, NY, United States

^c Lerner Research Institute, Cleveland Clinic, Cleveland, OH, United States

^d Research Center for Environmental Changes, Academia Sinica, Taipei 115201, Taiwan

^e Carnegie Mellon University, Department of Chemistry, Pittsburgh, PA, United States

^f New Jersey Institute of Technology, Department of Civil and Environmental Engineering, Newark, NJ, United States

Environmental Pollution 390 (2026) 127455



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

Environmental Pollution

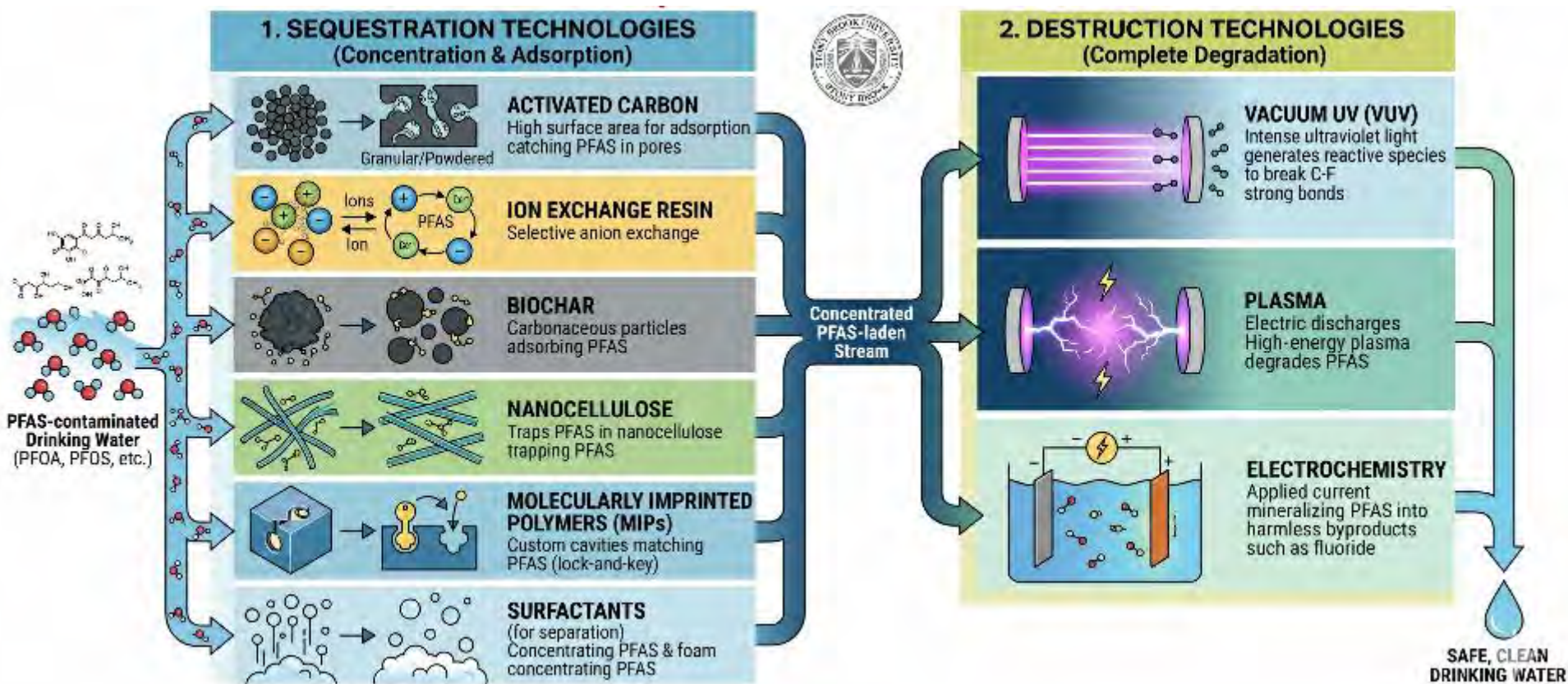
journal homepage: www.elsevier.com/locate/envpol



Fate and transport of per- and polyfluoroalkyl substances (PFAS) across the groundwater-to-estuary continuum in an aqueous film forming foam (AFFF)-impacted watershed[☆]

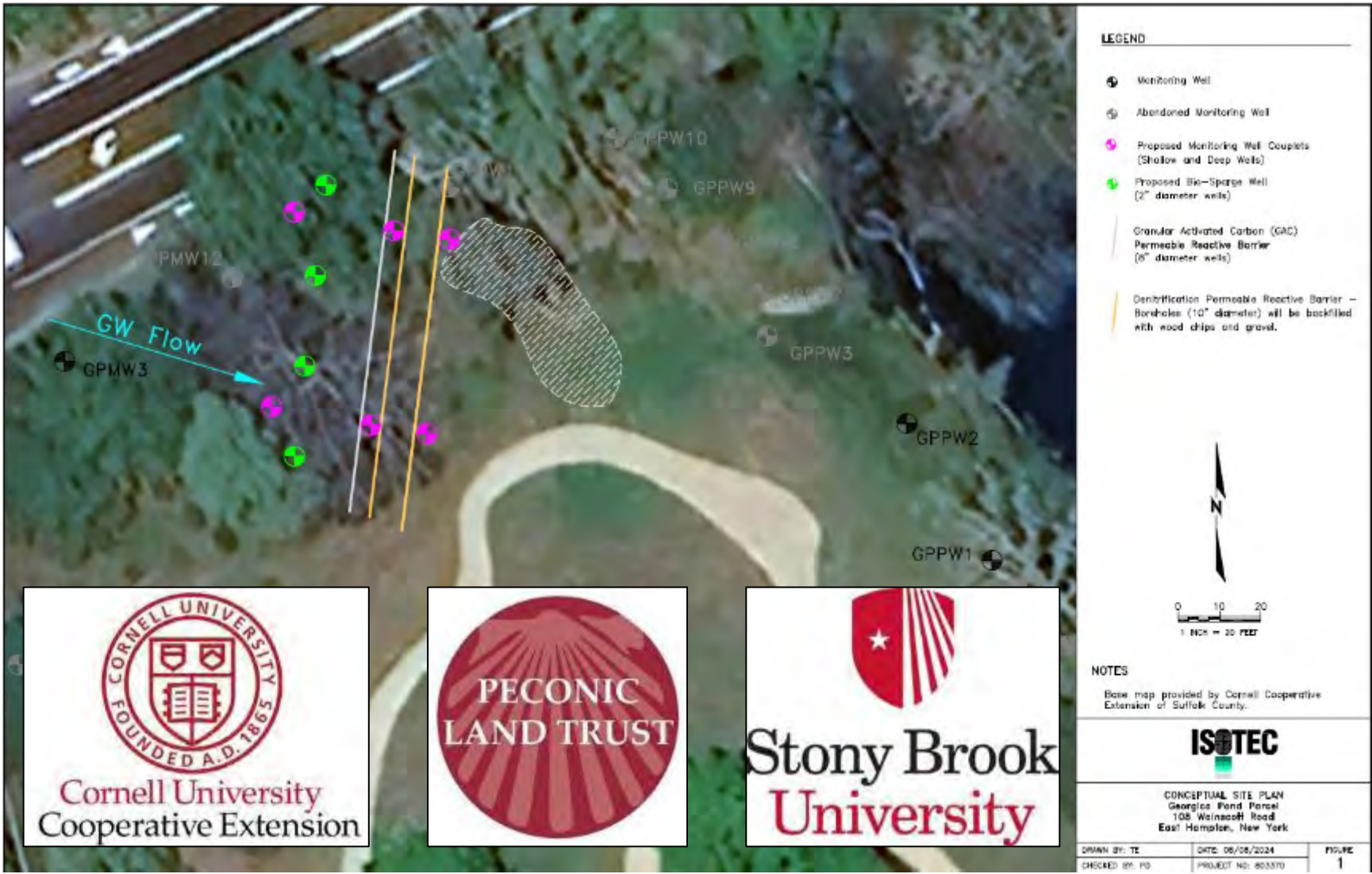
Kevin W. Shaffer^{a,b}, Cheng-Shiuan Lee^{b,c}, Xiayan Ye^{b,d}, Molly Graffam^e,
Ronald J. Paulsen^{c,f}, Carrie A. McDonough^e, Arjun K. Venkatesan^h,
Christopher J. Gobler^{a,b,*}

Removing PFAS from water



New Talmage Creek permeable reactive barrier to remove PFAS and nitrogen grant from East Hampton CPF

-First ever project to remove PFAS from groundwater on Long Island



Repurposing invasive species, waste material to clean water

Bamboo (invasive)



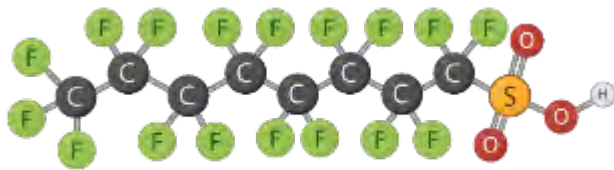
Pyrolysis (700°C, no O₂)



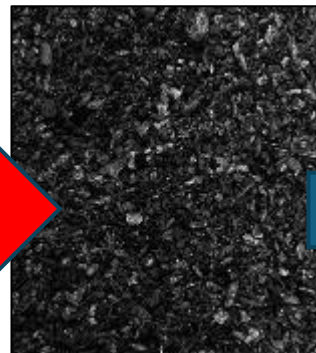
Biochar



Bamboo biochar barrier



PFAS-contaminated groundwater



Clean groundwater





ONLY IN NEWSDAY

Remembering Flight 800, 30 Years Later

Liers, family
members share
their stories

A6-8 | VIDEO AT NEWSDAY.TV



A truck moves the reconstructed wreckage from a Calverton hangar.

Trump Questions Past Elections In Speech to Nation

Releases formerly
classified documents,
offers no proof
outcomes were altered

A2

ONLY IN NEWSDAY

HIGH LEVELS OF TOXIN IN TEST WELLS

The four recent wells, near an East Hampton battery storage plant that caught fire, showed levels of a forever chemical well above drinking standards

A3 | UPDATES AT NEWSDAY.COM

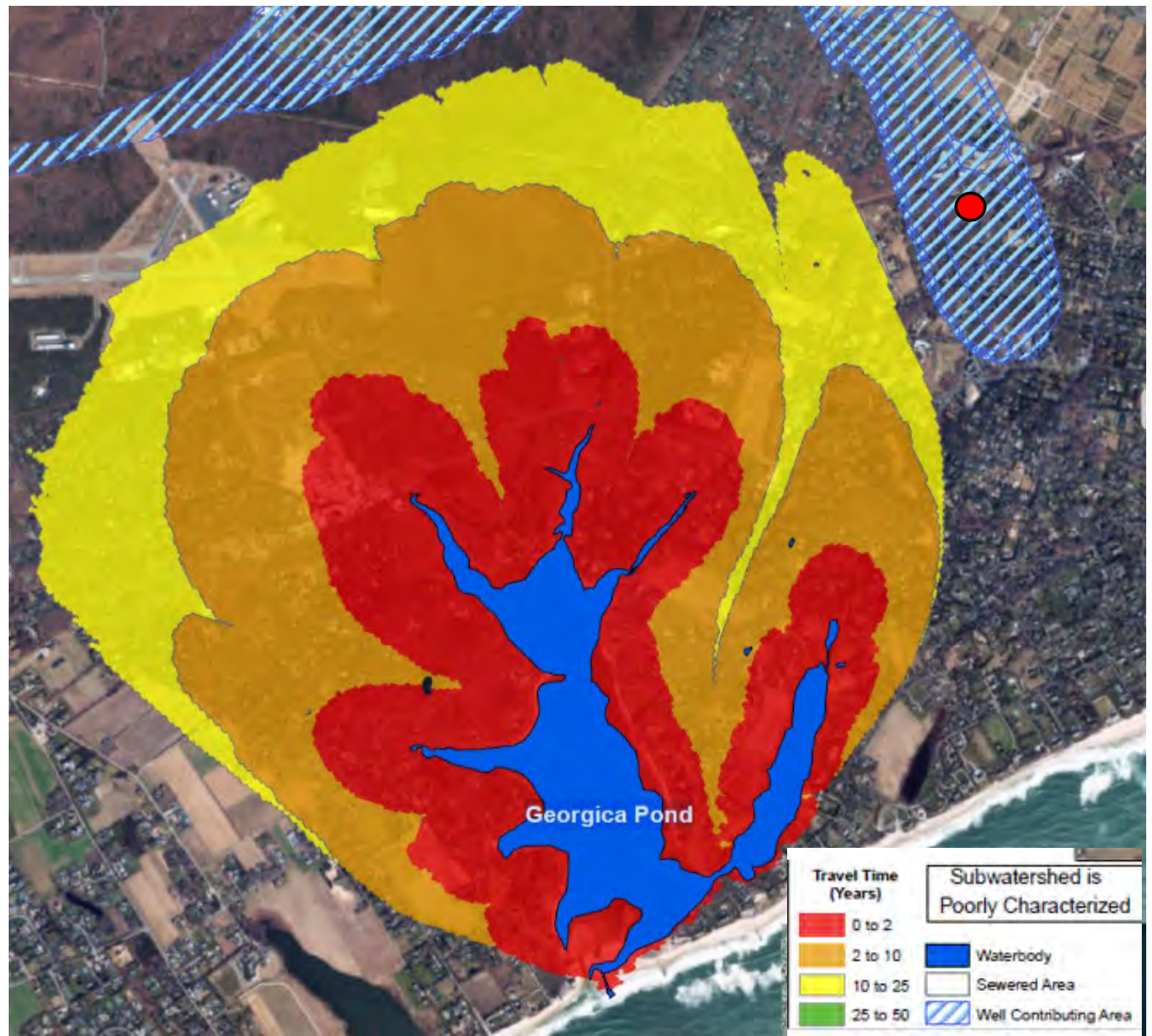
This battery storage plant in East Hampton experienced a fire in 2023.



PFPrA Detection

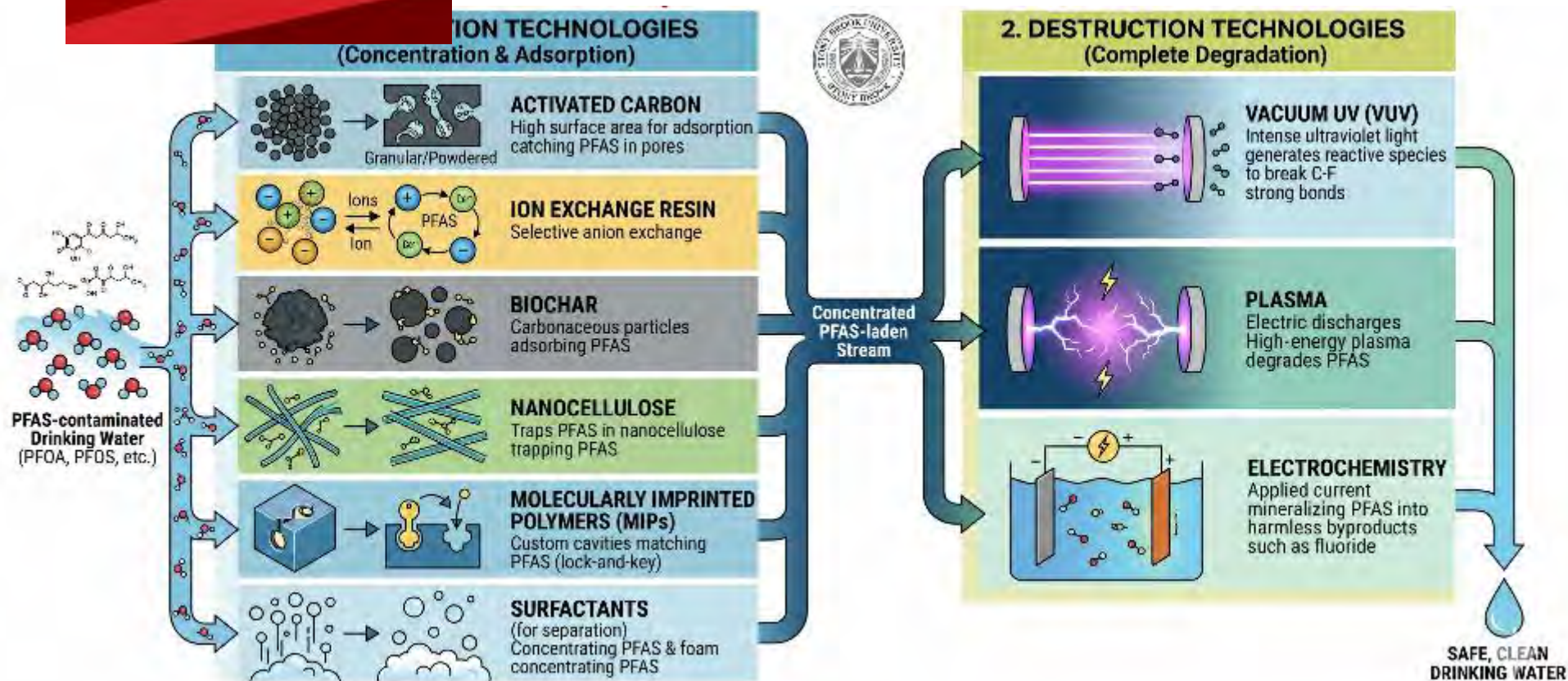
- >1,000,000 ppt Perfluoropropionic acid (PFPrA) has been detected in the groundwater plume near Cove Hollow Road.
- The source of the PFPrA contamination has not been confirmed.
- Multiple agency clean-up effort.
- All effected drinking water wells have been taken offline.



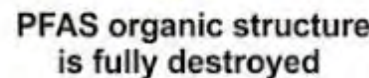


NYS CENTER FOR CLEAN WATER TECHNOLOGY

Removing PFAS from water



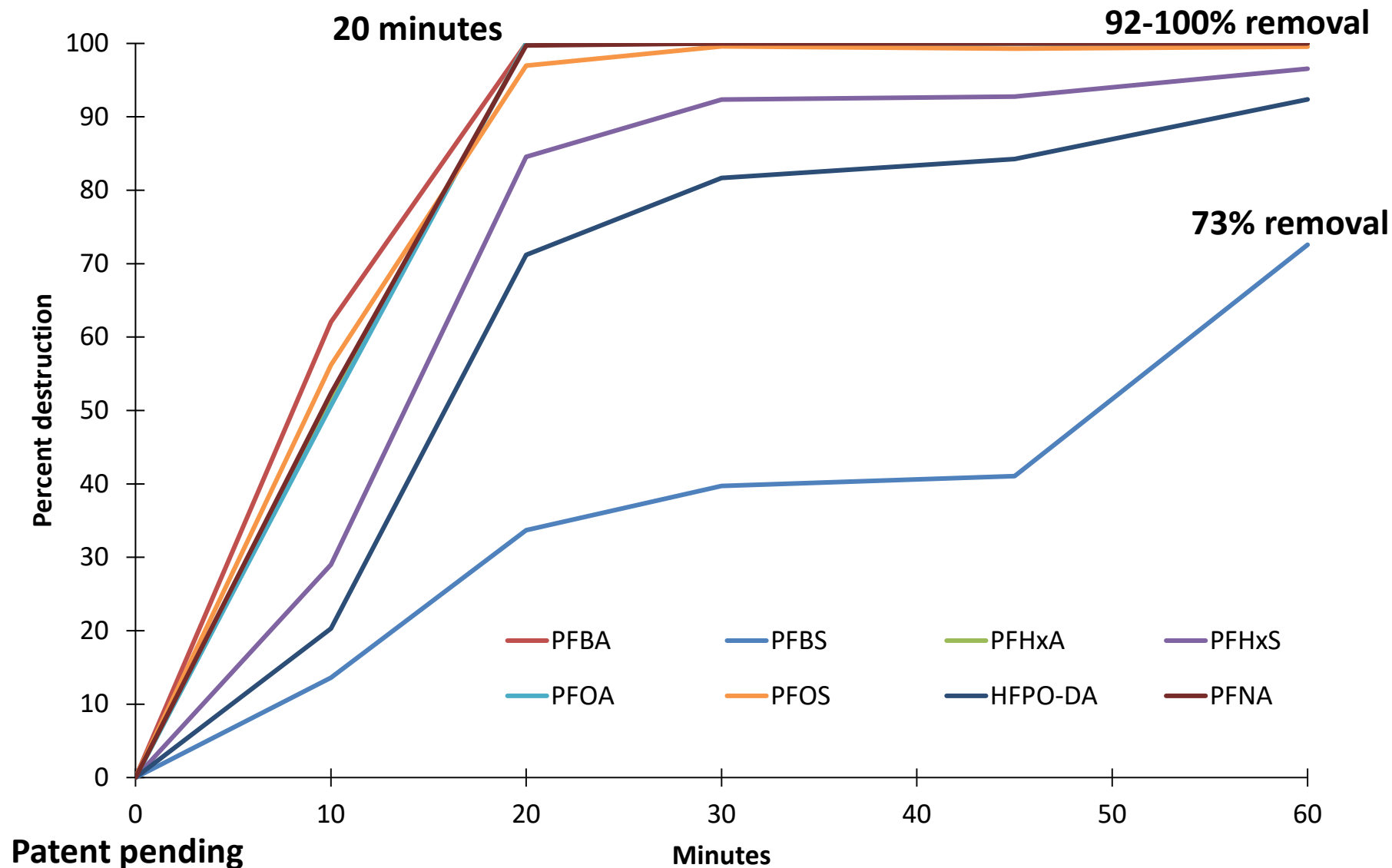
**NYS
CENTER FOR
CLEAN WATER
TECHNOLOGY**



Patent pending

VUV destruction of 8 PFAS

Electrical Energy per Order (EE/o) = 10



OYSTERS in Georgica Pond 2019 - 2026



Grow-out Experiments

- Initial experiments conducted to map oyster survivorship, growth, and disease across Georgica Pond
- Oysters placed in cages at three study sites (North, Central, South)
 - **Single-seed oyster seed deployed in 2019**
 - **Spat-on-shell deployed in 2021**

Single-set seed



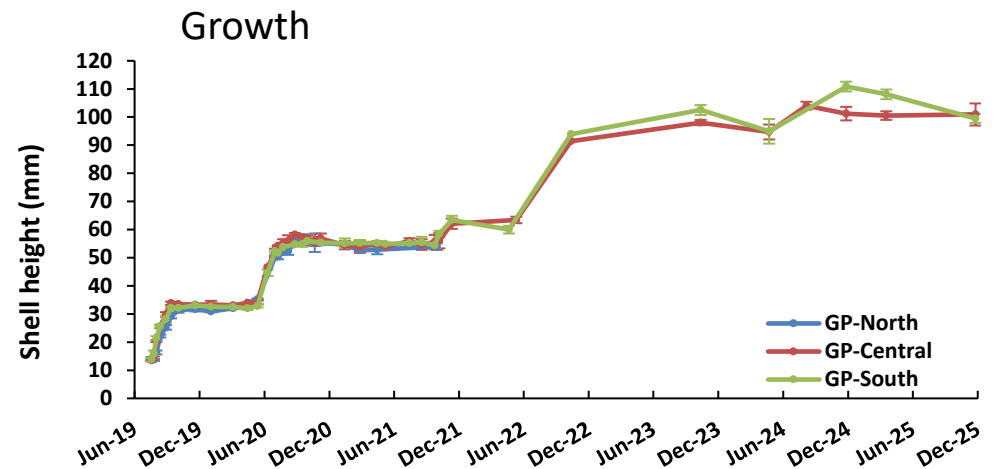
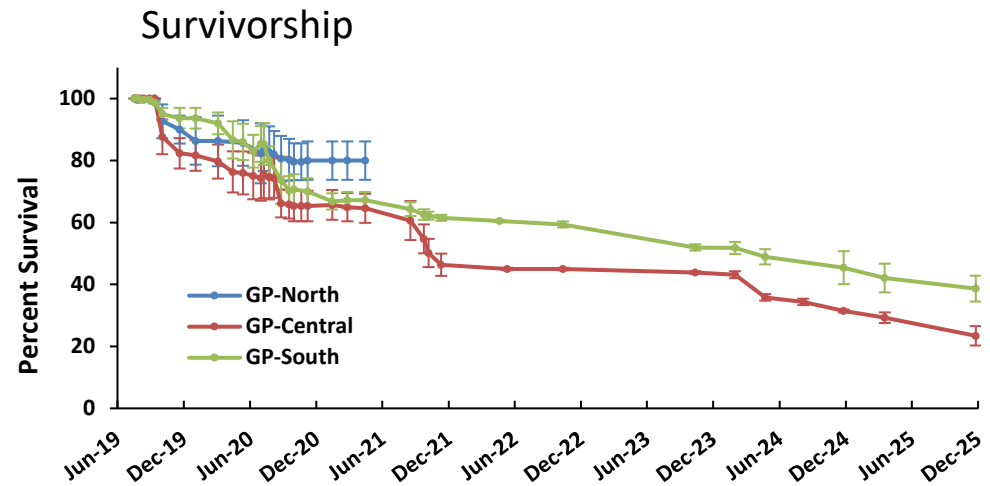
Spat-on-shell



Cage experiments - Oyster seed

➤ High survivorship and growth of single-set oysters in cages for almost **6 years!**

- 25 and 40% survival of oysters after 6 years at central and south sites, respectively
- 6-year old oysters currently about 4-inches long!



July 18, 2019



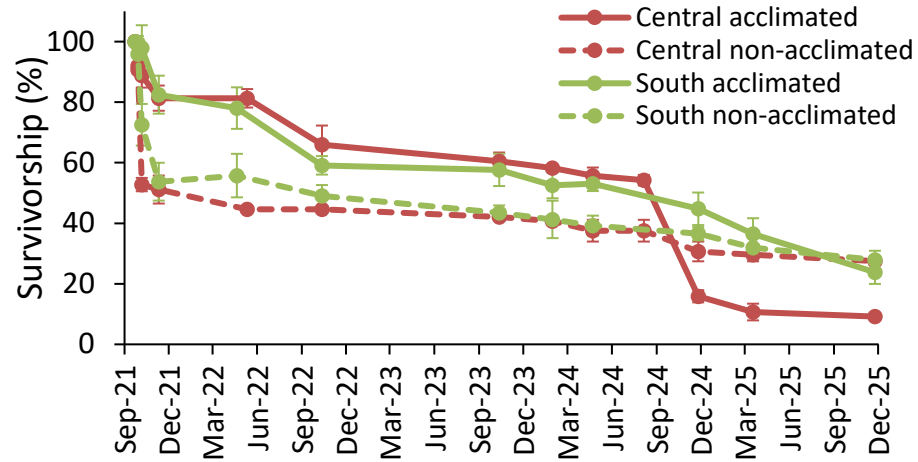
November 24, 2025



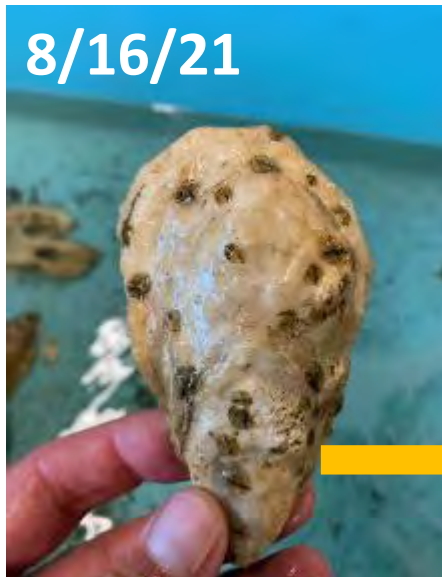
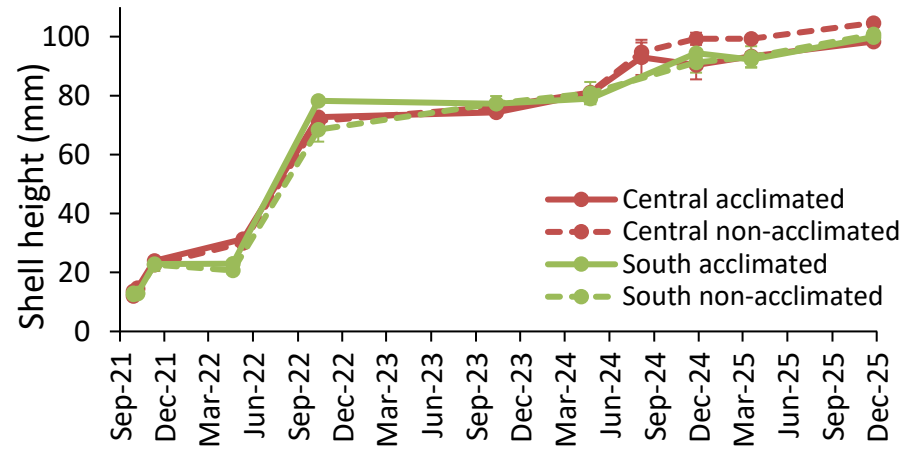
Cage experiments – Spat-on-shell

- High survivorship and growth of spat-on-shell in cages for **4 years!**
- Higher initial survival when spat is acclimated to low salinity

Survivorship

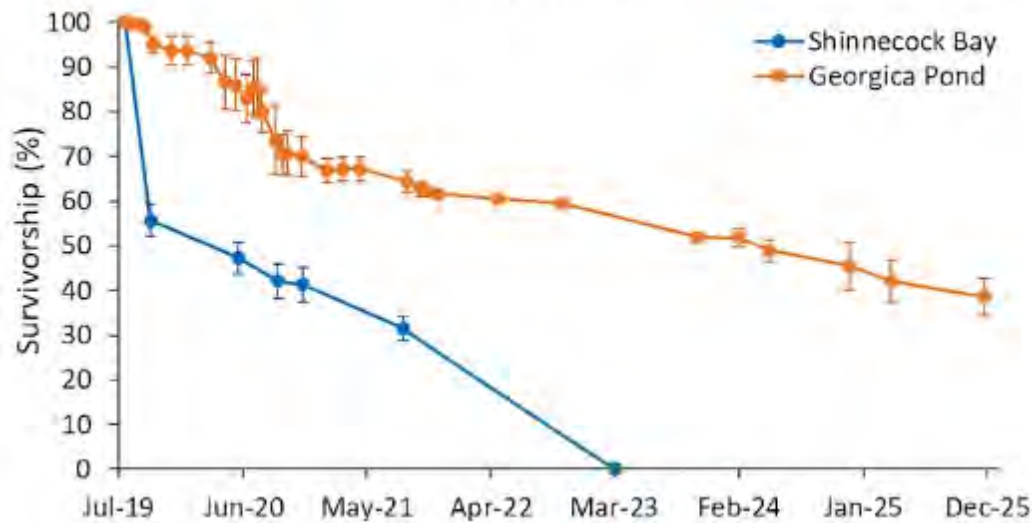


Growth

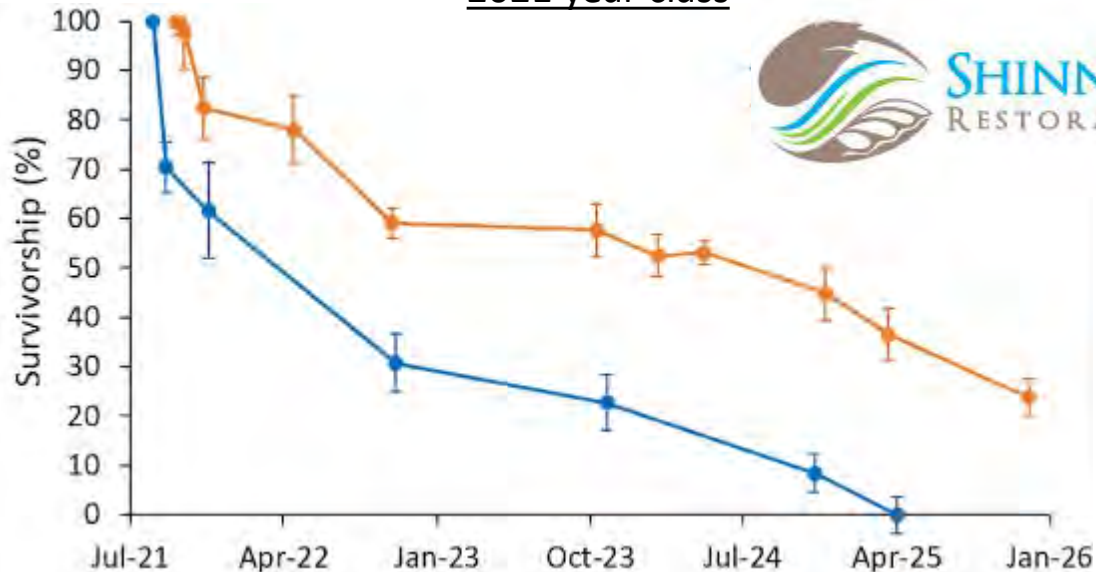


High long-term survival of oysters in Georgica Pond vs. Shinnecock Bay

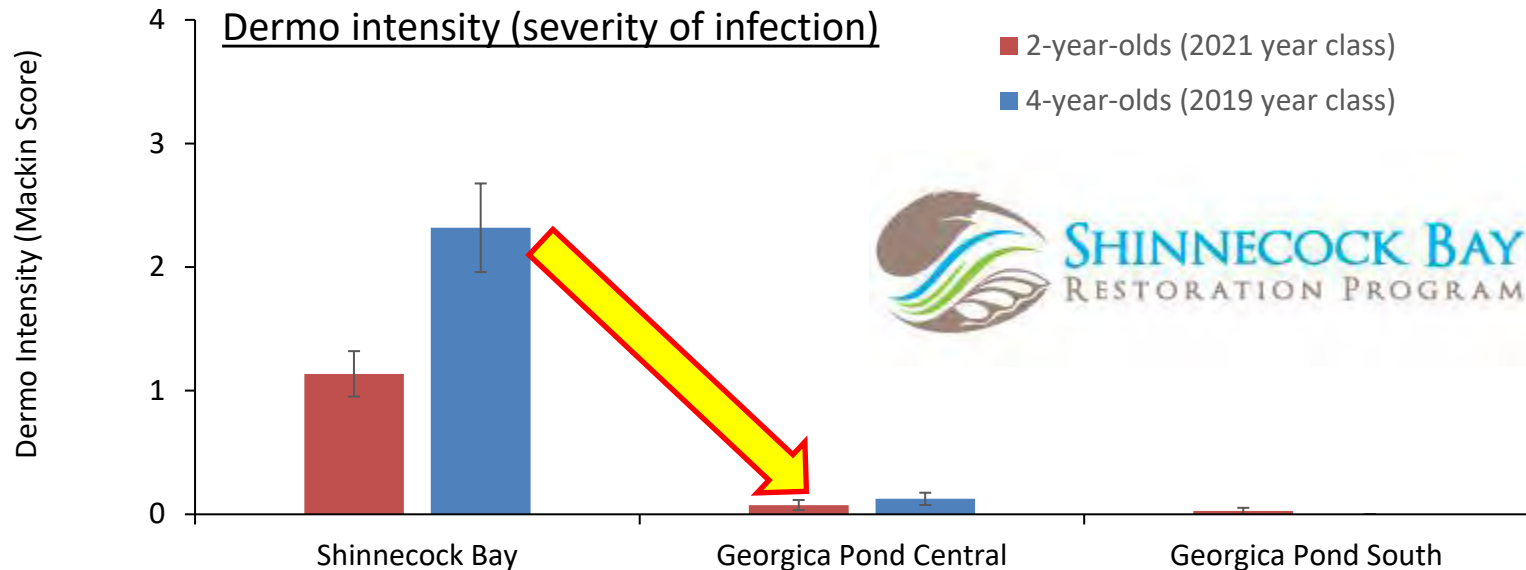
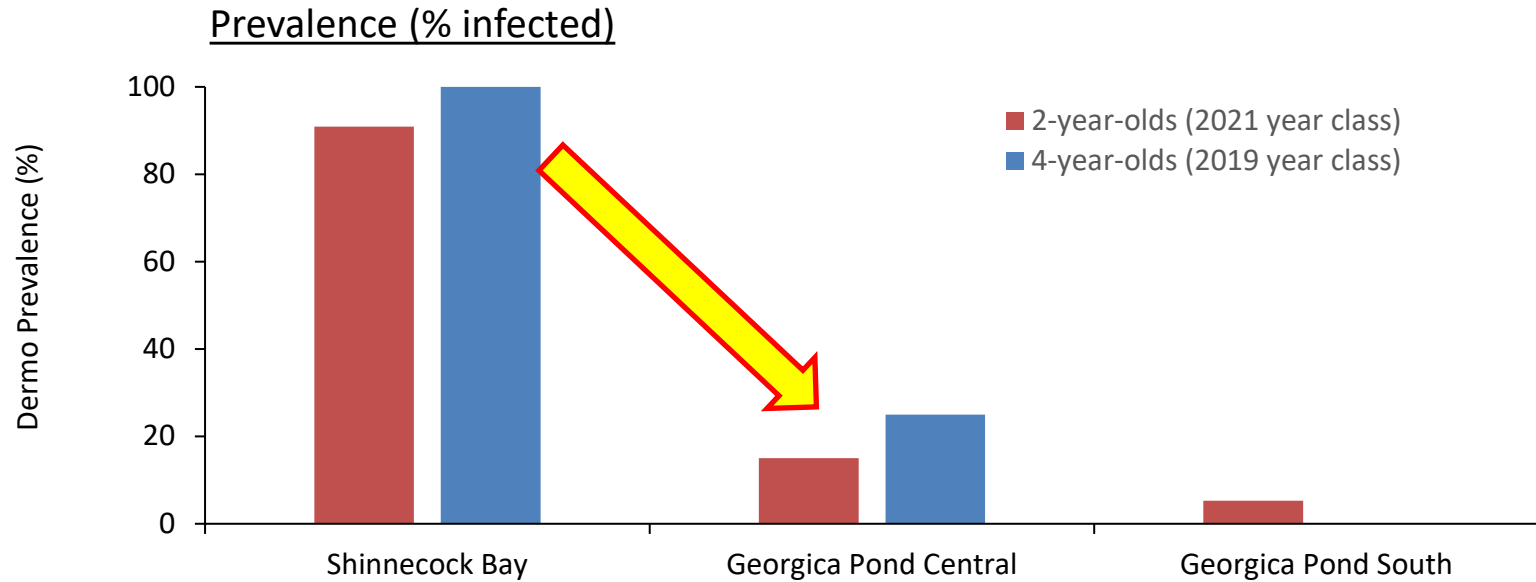
2019 year class



2021 year class



Low prevalence of the oyster disease Dermo in Georgica Pond



Pilot Oyster Reefs

- Installed small test oyster reefs at two sites (central and south) in fall 2022
- Reefs constructed using shell bags containing oyster spat-on-shell



Pilot Oyster Reefs



Pilot oyster reefs – results to data

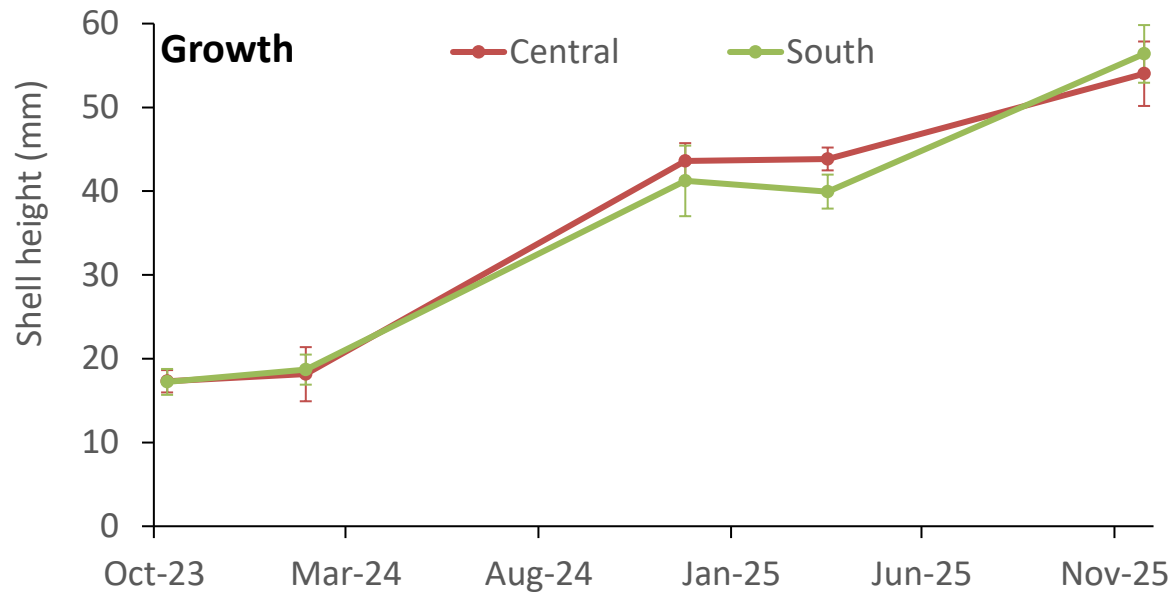
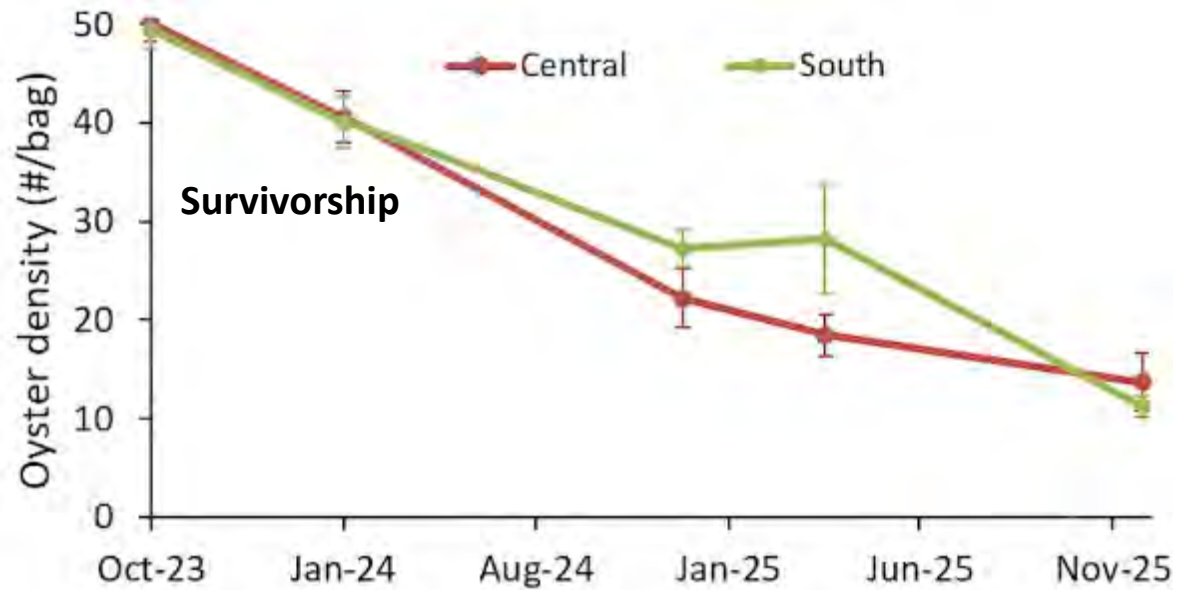
Oyster scars: Evidence of crab predation



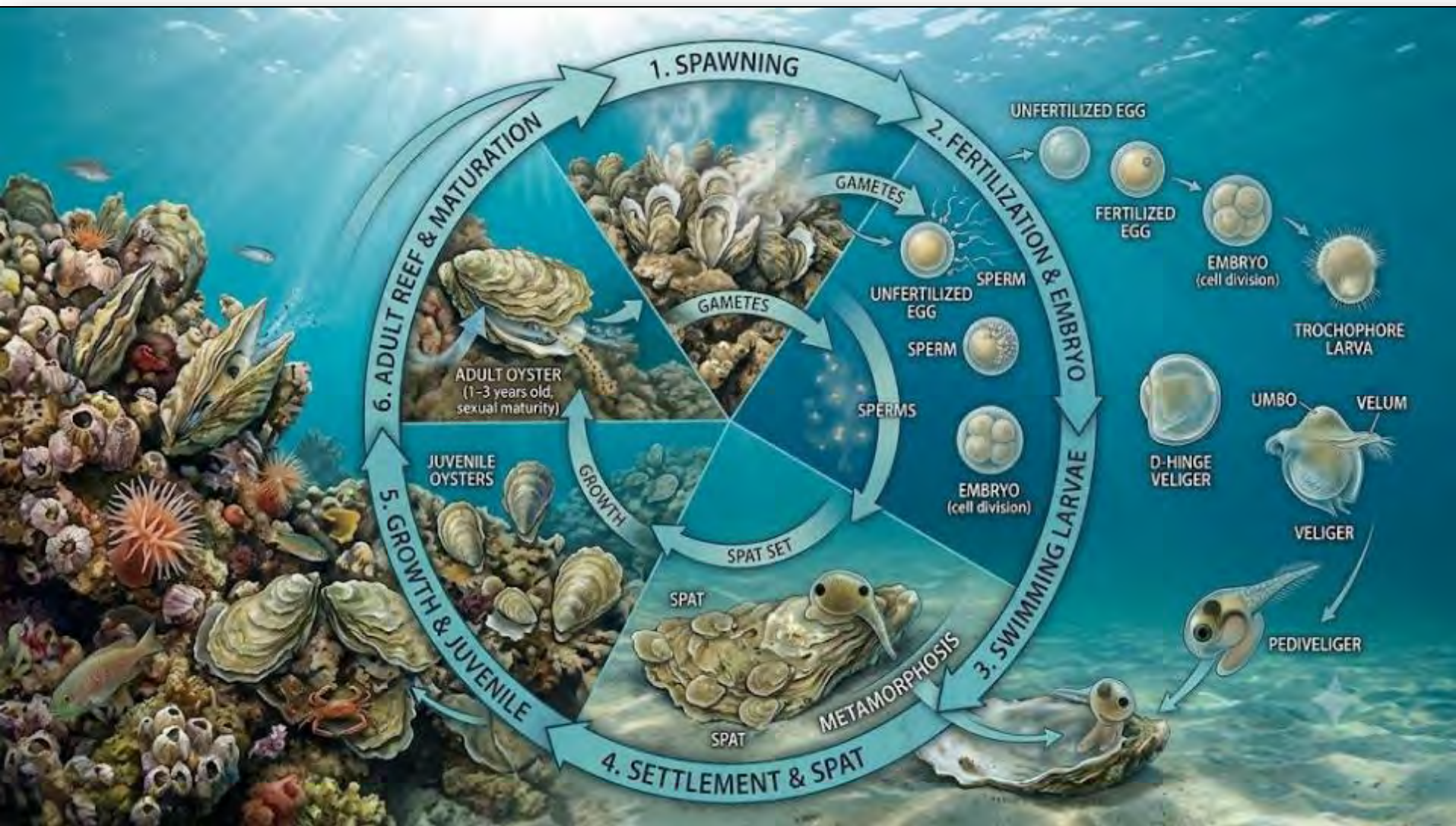
Two-year old shell bag, emergent oysters



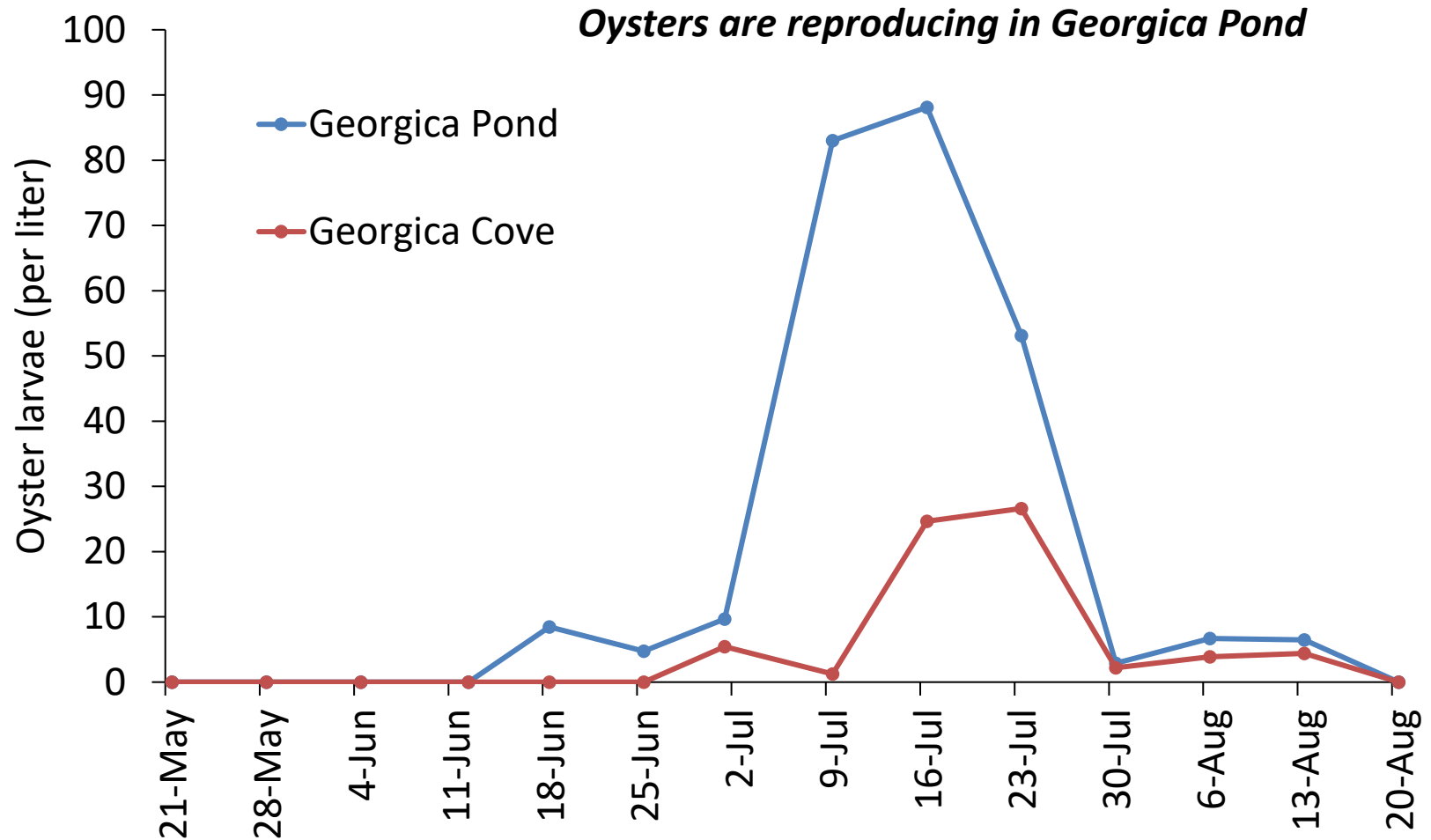
Pilot Oyster Reefs-results to date



Oyster life cycle



Dynamics of oyster larvae in Georgica Pond, 2025



Conclusions:

- Georgica Pond has experienced algal blooms, toxic blue-green algae, low oxygen, and fish kills.
- Algal blooms are promoted by excessive nitrogen.
- Most of the nitrogen entering Georgica Pond comes from wastewater.
- Accelerating the removal of nitrogen from wastewater is the central to continued remediation.
- Legacy agricultural nitrogen is entering the Pond via groundwater flow and required remediation.
- PFAS chemicals are a threat to Georgica Pond surface water and drinking water but remediation plans are underway.
- Oysters are thriving in Georgica Pond and can be part of long-term remediation.

Acknowledgements:

Sincere gratitude for:

The support from the Friends of Georgica Pond

The commitment of the East Hampton Town Trustees and Town of East Hampton.

Thank you to Jennifer Goleski, Marcella Wallace, and others for field sampling, laboratory work, and data analysis support.

Thank you for your attention.



Stony Brook University
*School of Marine and
Atmospheric Sciences*

