

The Evaluation of Innovative Treatment Strategies to Proactively and Reactively Control Near-Shore HABS

Lake Hopatcong, New Jersey

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2026 New York State Federation of Lake Associations Conference
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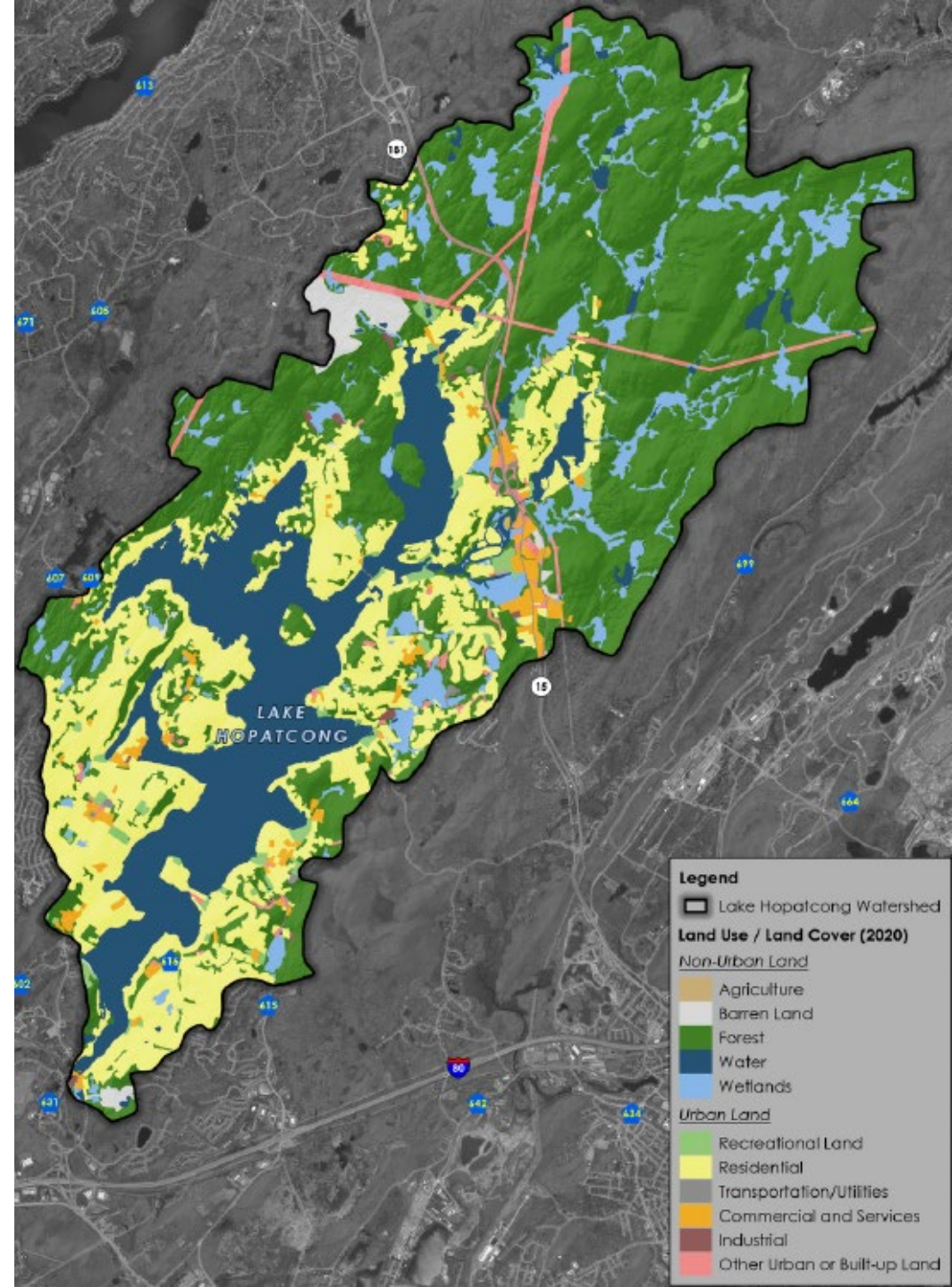
USACE ERDC HAB Demonstration Program

- “Harmful Algal Blooms (HABs) represent a significant and costly threat to our Nation’s economy and natural resources. The U.S. Army ERDC seeks innovative, cost-effective, and scalable technologies for early detection, prevention, and management of HABs”



Lake Hopatcong, Sussex and Morris Counties, New Jersey

- Largest lake in NJ (2,686 acres)
- 16,215-acre watershed (6:1)
- Maximum depth: 16.7 meters
- Average depth: 5.6 meters
- Recent increase in HABs

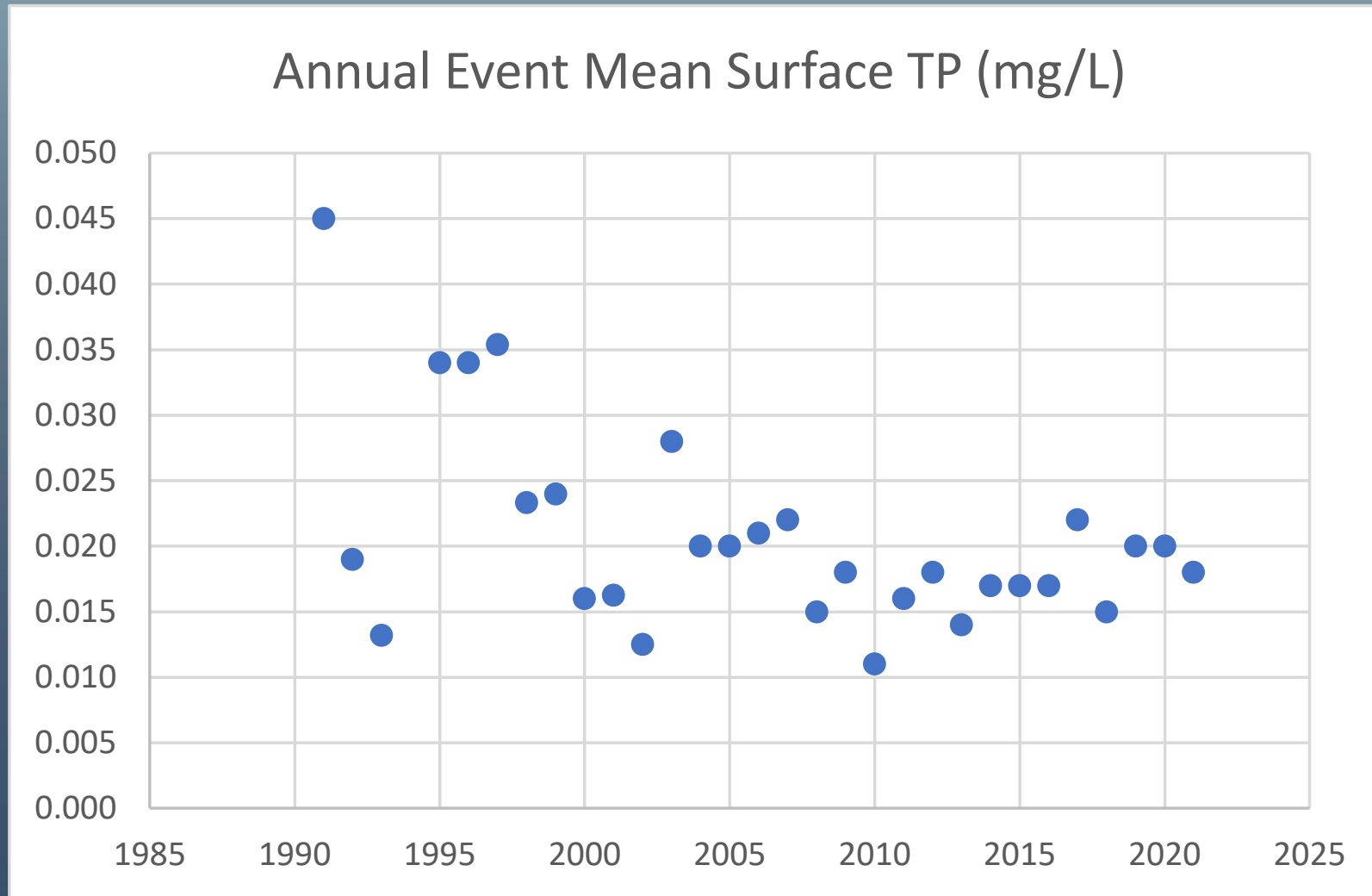


Factors That Lead to Cyanobacteria Blooms

- High seasonal temperatures
- Still water conditions / thermal stratification
- Elevated phosphorus concentrations

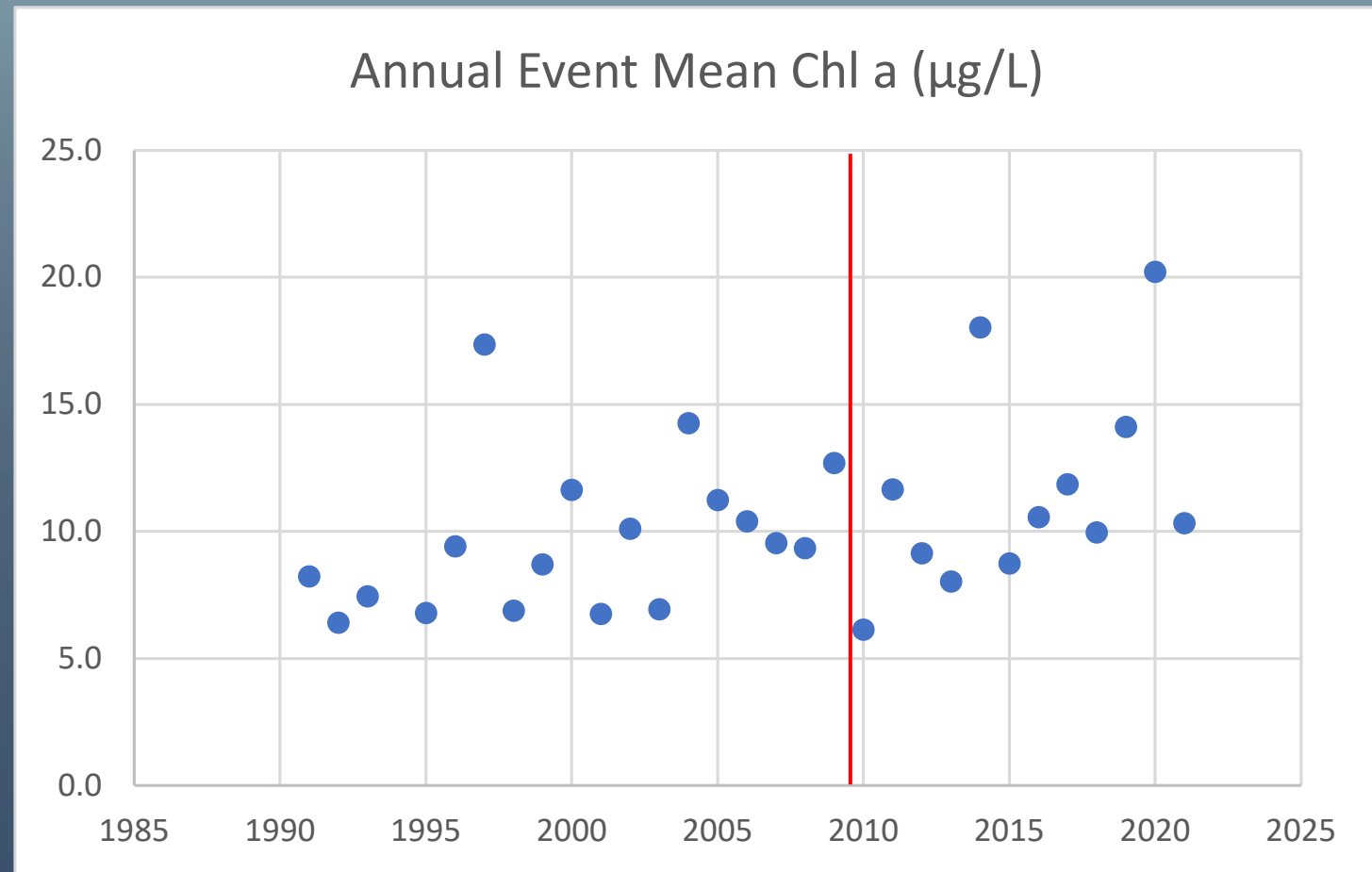


Annual Mean Surface Total Phosphorus

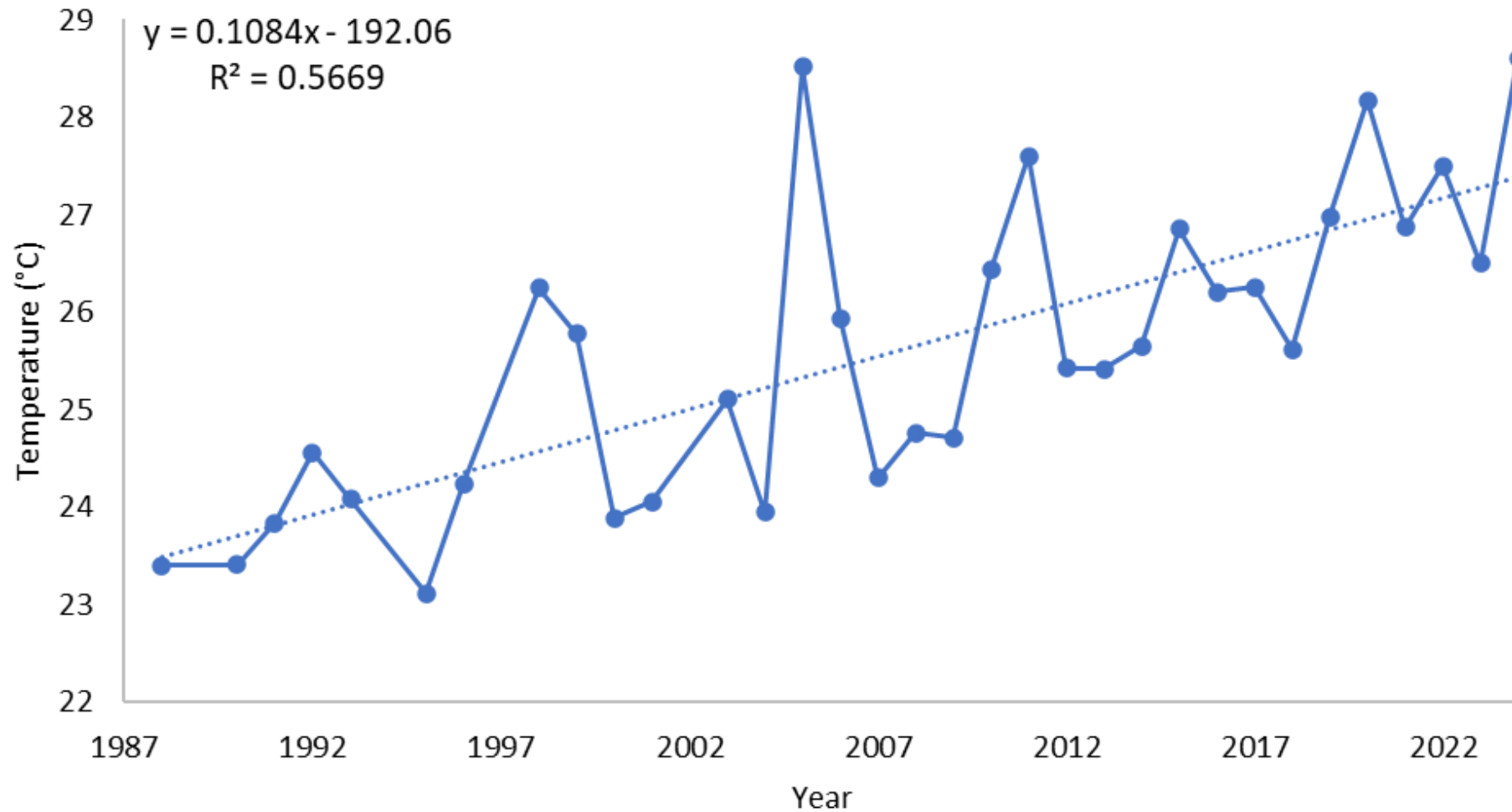


Annual Mean Surface Chlorophyll a

- ✓ Increasing trend over the last 30 years
- ✓ 1991-2009: 9.74 $\mu\text{g/L}$
- ✓ 2010 – 2021: 11.55 $\mu\text{g/L}$
 - 18.5% increase
- ✓ Surface TP decreased 26% from 1991 - 2021

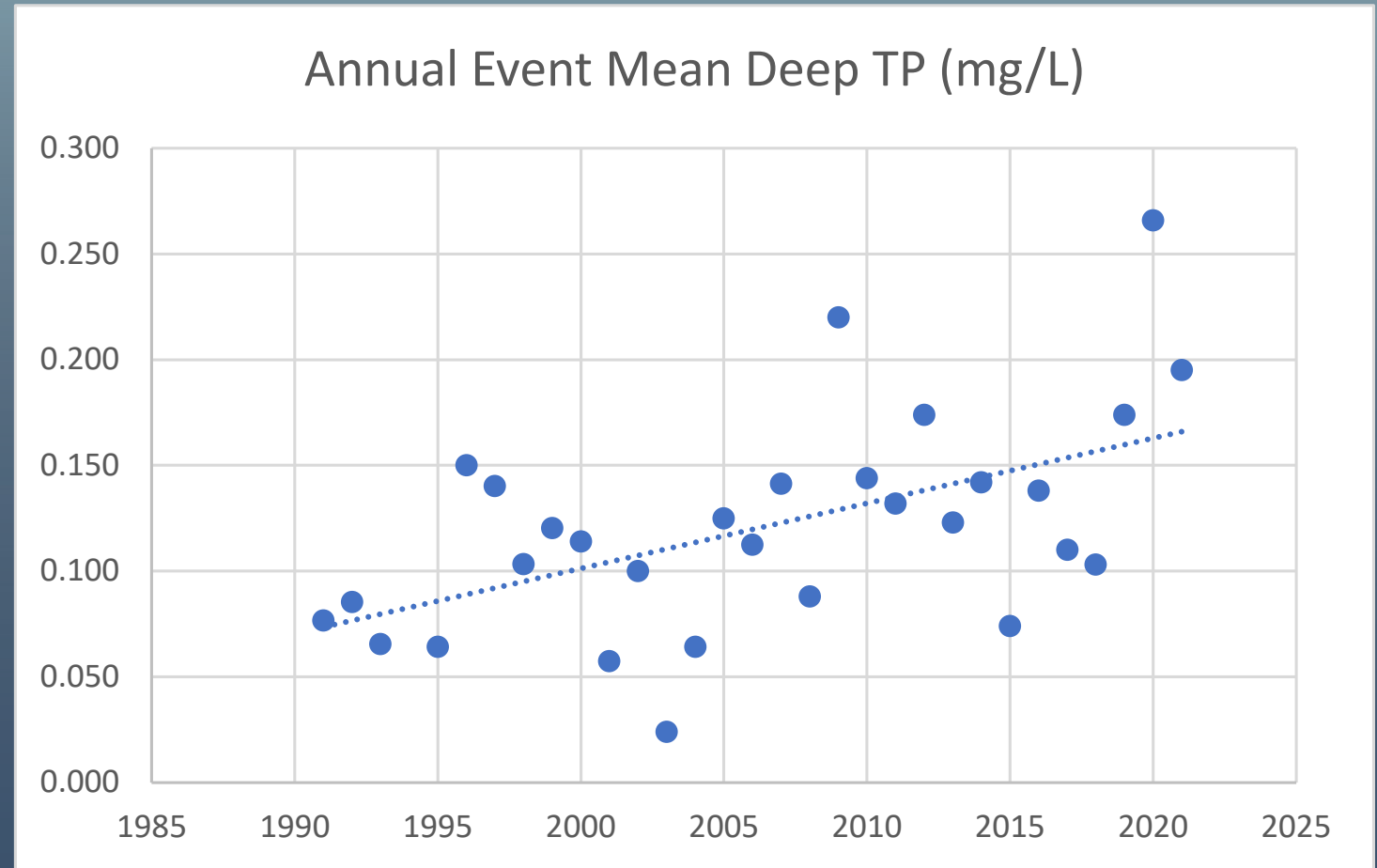


Lake Hopatcong July Surface Temperature, Station 2



Annual Mean Deep Total Phosphorus

- ✓ Mean hypolimnetic TP concentrations
- ✓ Annual variability but increasing trend
 - 1991 – 1995: < 0.10 mg/L
 - 1996 – 2021: > 0.10 mg/L (81%)
 - 2019 – 2021: 0.208 mg/L

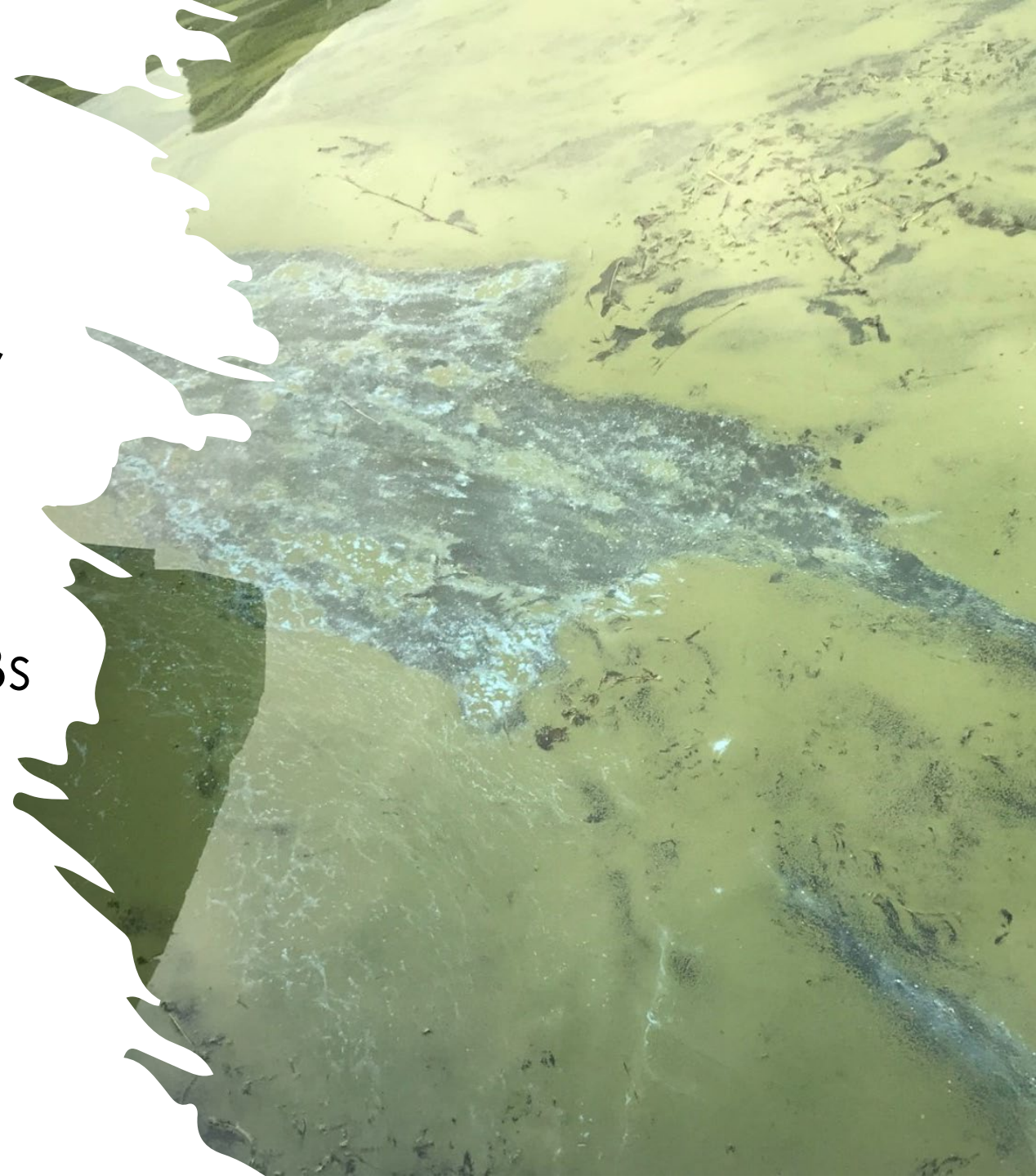


Problem Statement

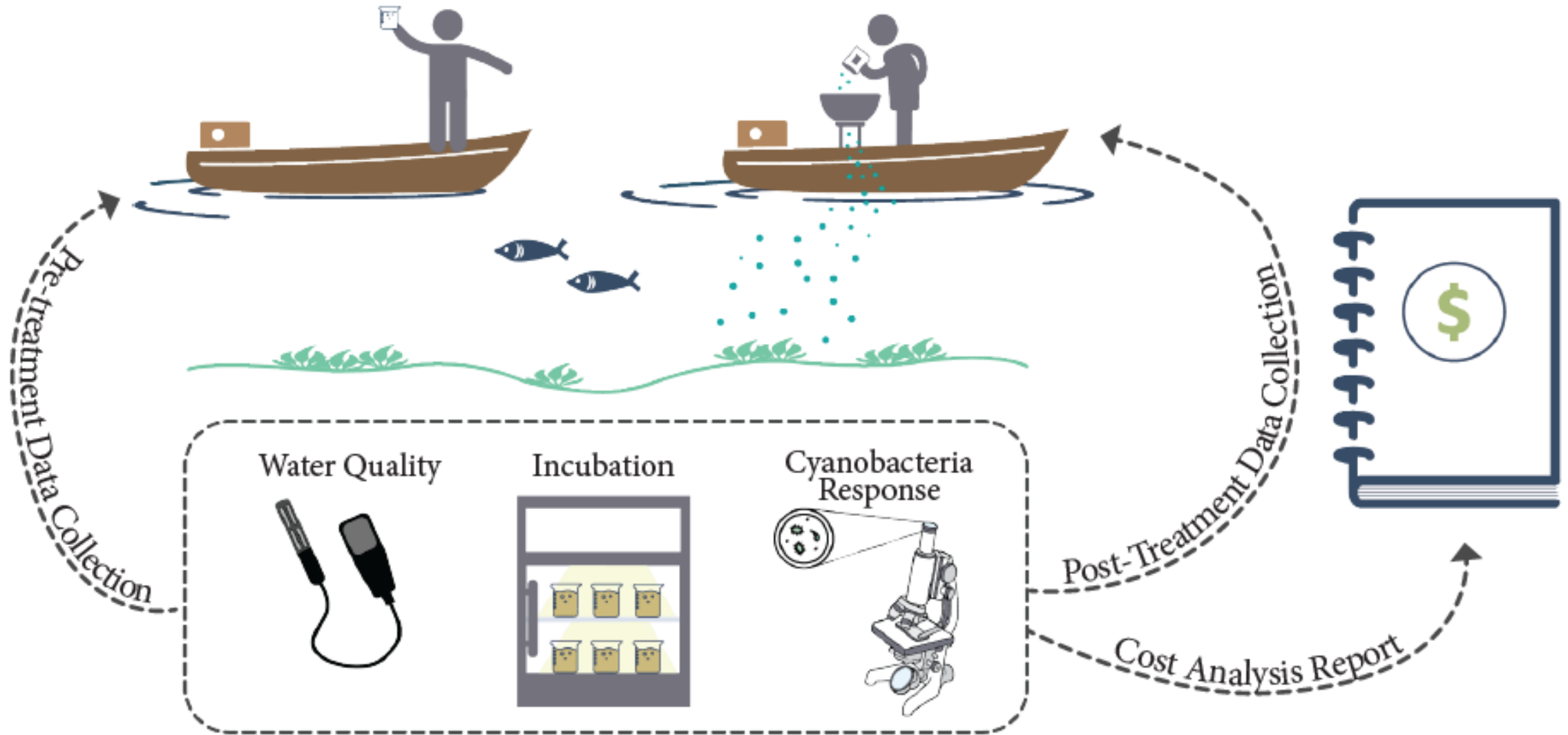
- ✓ Problem: External nutrient loading
 - Solution: Watershed management
- ✓ Problem: Internal nutrient loading
 - Solution: Aeration, oxygenation, nutrient inactivation
- ✓ **Problem: Shallow, nutrient-rich sediments**
 - **Solution: ???**
 - **This project will focus on addressing cyanobacteria that originate from the shallow sediments of a lake**

Objective

Evaluate if innovative treatments, using a combination of non-pesticidal products and early season benthic applications of algaecides, can proactively and reactively control near-shore HABs



Approach

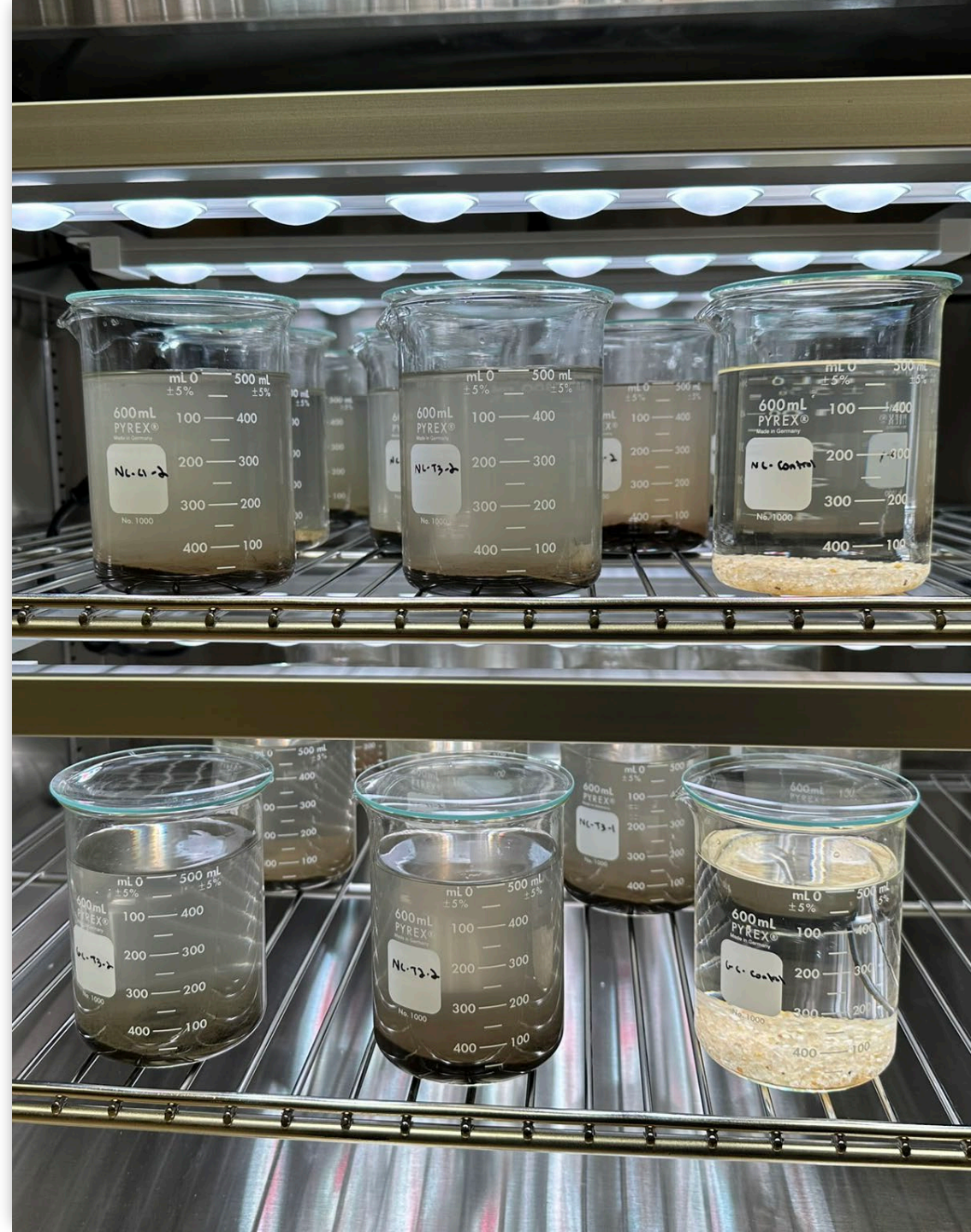


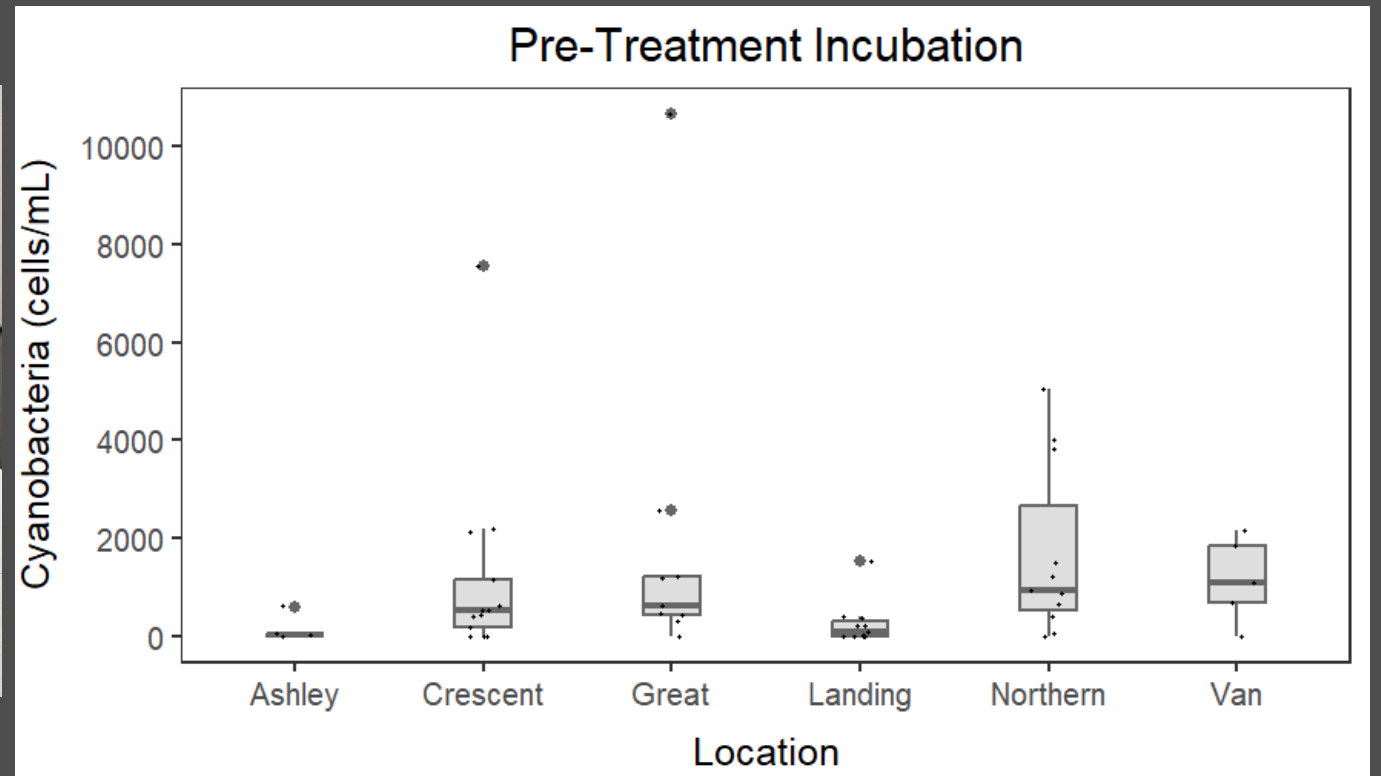
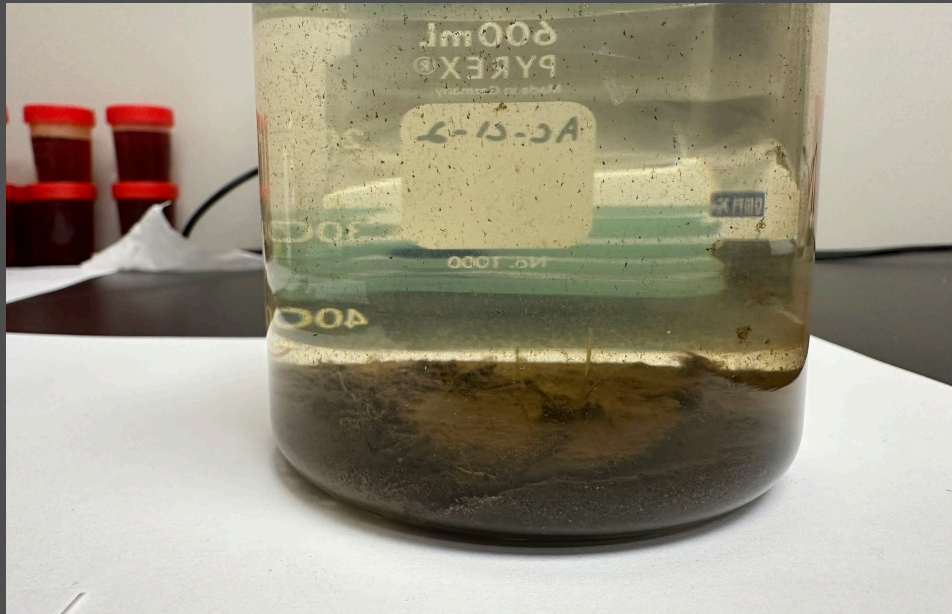


Locations

Pre- and Post-Treatment Incubation Studies

- Spring 2025 and spring 2026
- Sediment and water samples collected from inside (treatment) and outside (control) each treatment area
- Water samples filtered in lab
- Incubate beakers with lake sediment and filtered water for 14 days
- Collect data after 7 and 14 days
- Does cyanobacteria bloom from sediment?





Pre- and Post-Treatment Field Monitoring

- ✓ **Pre-Treatment:** One-week pre-treatment
- ✓ **Immediate:** One-week post-treatment
- ✓ **Short Term:** One-month post-treatment
- ✓ **Long-Term:** One-year post-treatment
- ✓ **Parameters:**
 - In-situ, water clarity, phycocyanin (blue-green pigment), phycoerythrin (reddish pigment), chl a
 - Cyanobacteria, cyanotoxins (Abraxis and qPCR)
 - Various lab parameters (TP, TSS, etc.)
 - Submerged Aquatic Vegetation (SAV) biomass

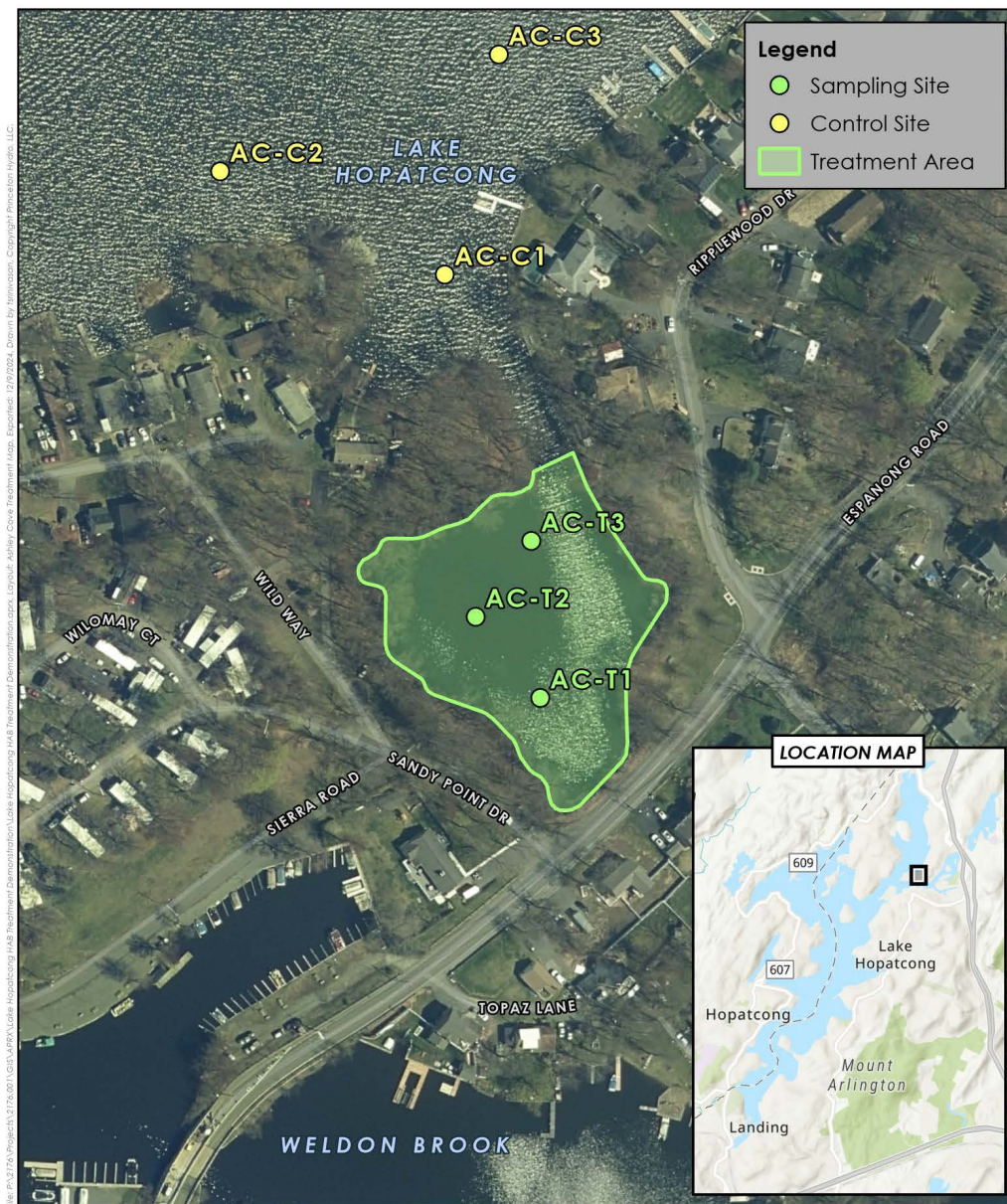
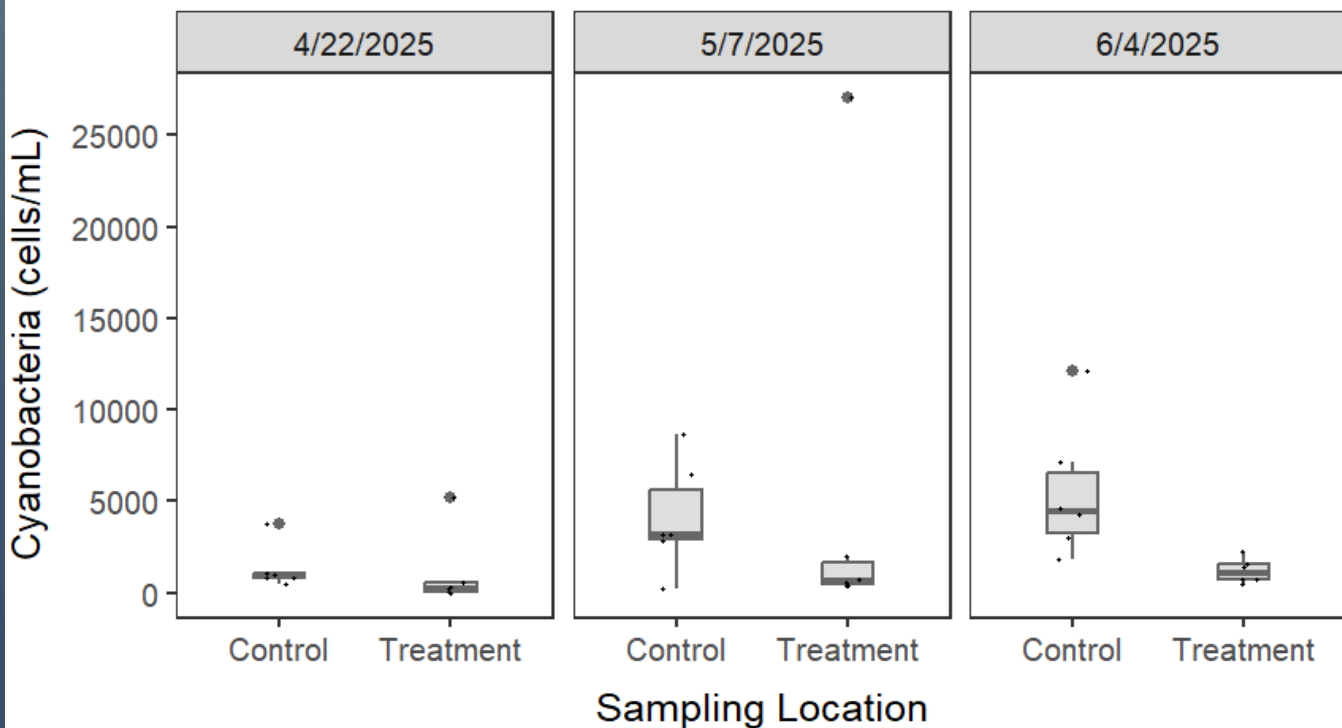
Spring Treatments

Ashley Cove and Crescent Cove

Ashley Cove

- ✓ **Size:** 2 acres
- ✓ **Product:** Cutrine-Plus Granular Algaecide
- ✓ **Rate:** 60 lbs per acre
- ✓ **When:** 28 April 2025

Ashley Cove: 2025 Field Data



NOTES:
 1. Sampling sites, control sites, and treatment areas are approximate.
 2. Streams obtained from the United States Geological Survey's (USGS) National Hydrography Dataset (NHD).
 3. Roads and 2020 orthorectification obtained from the NJ Geographic Information Network (NJGIN) Open Data portal: <https://njgin.nj.gov/>

Spatial Reference: NAD 1983 2011 StatePlane New Jersey FIPS 2900 FT US

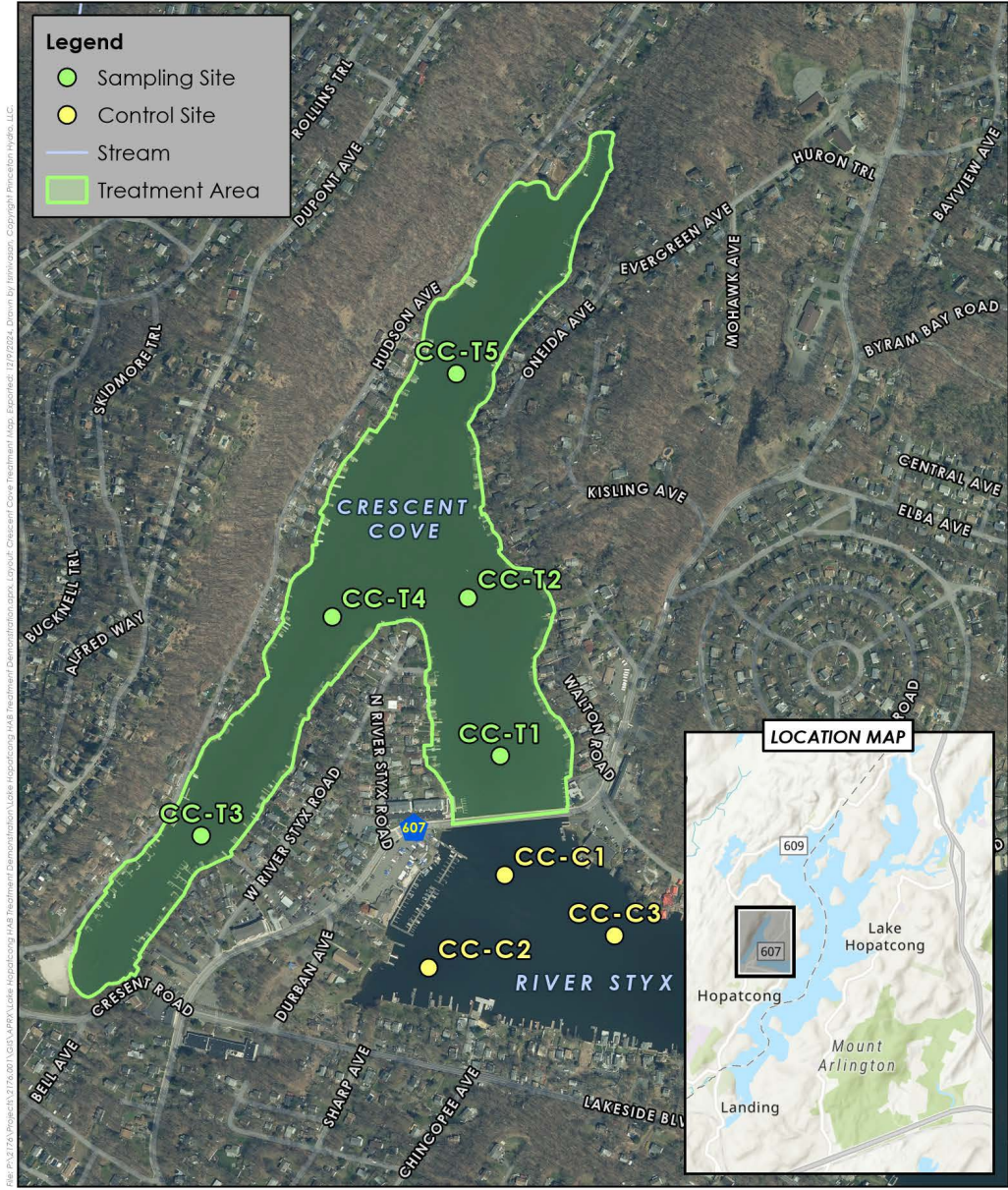
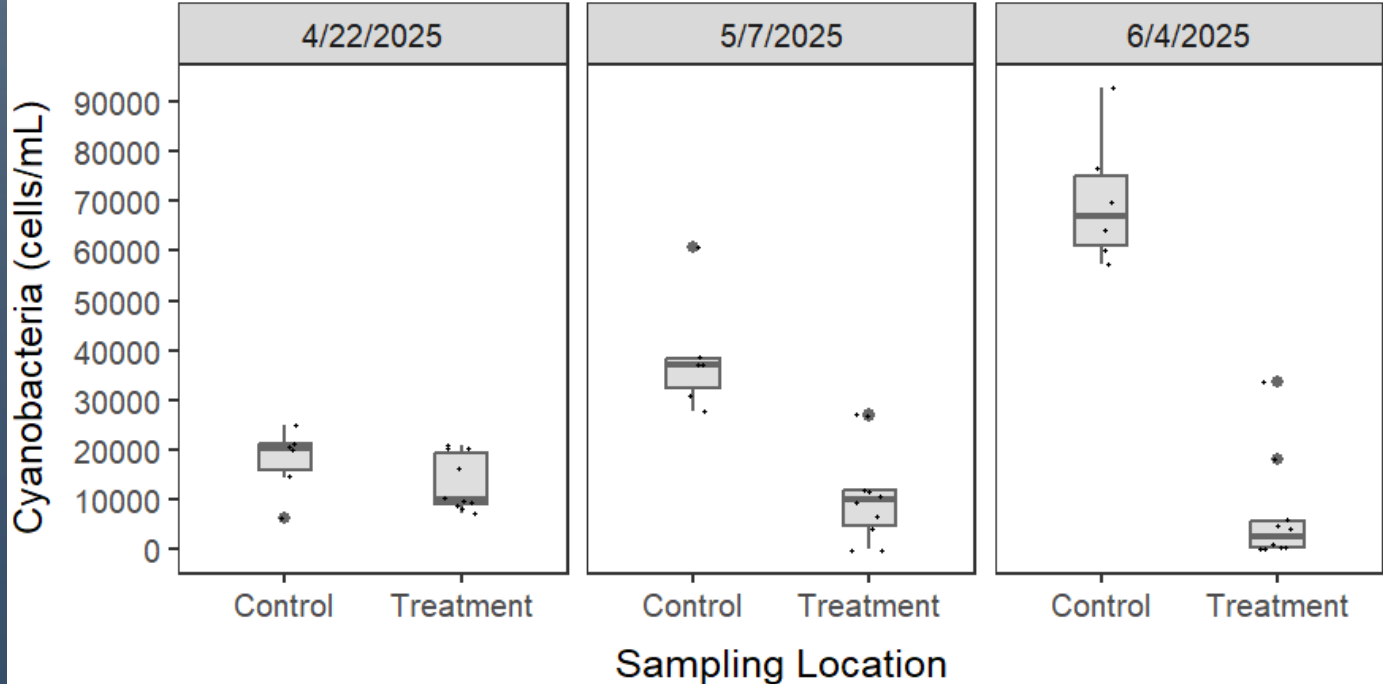
ASHLEY COVE TREATMENT MAP
 HAB TREATMENT DEMONSTRATION PROJECT
 LAKE HOPATCONG
 SUSSEX AND MORRIS COUNTY, NEW JERSEY



Crescent Cove

- ✓ Size: 57 acres
- ✓ Product: PAK 27
- ✓ Rate: 100 lbs per acre
- ✓ When: 29 – 30 April 2025

Crescent Cove: 2025 Field Data
Cyanobacteria



NOTES:
 1. Sampling sites, control sites, and treatment areas are approximate.
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 3. Roads and 2020 orthorectification obtained from the NJ Geographic Information Network (NJGIN) Open Data Portal: <https://njgin.nj.gov/>

Spatial Reference: NAD 1983 2011 StatePlane New Jersey FIPS 2900 Feet

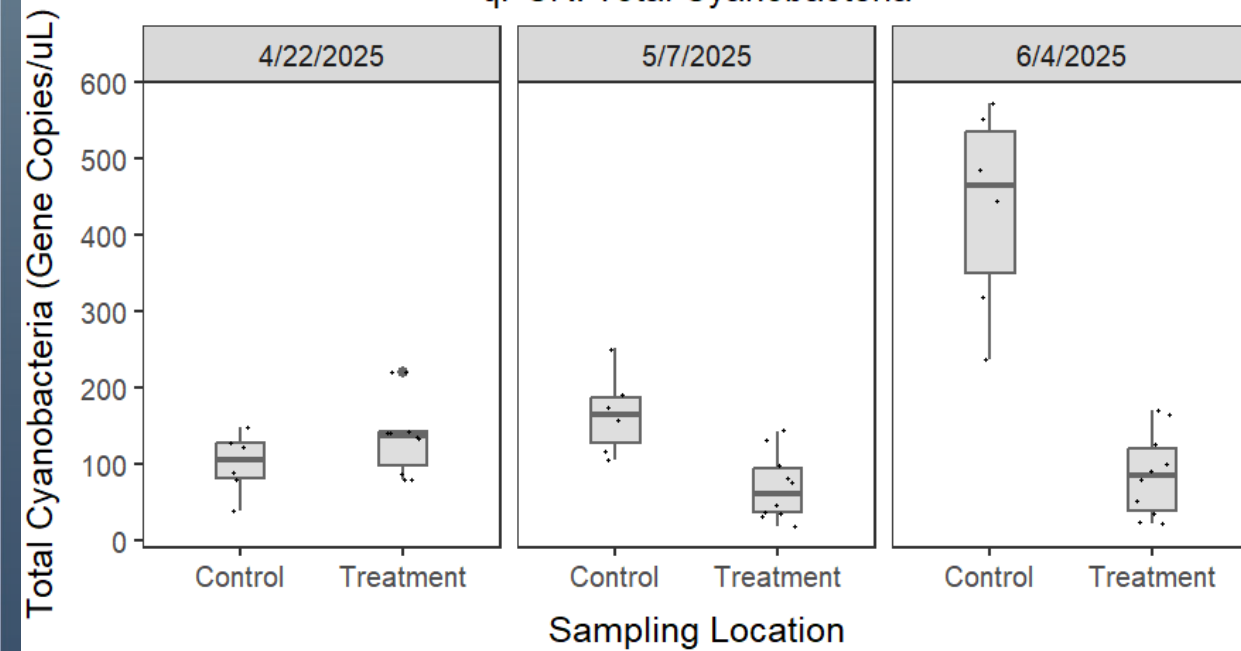
CRESCENT COVE TREATMENT MAP
 HAB TREATMENT DEMONSTRATION PROJECT
 LAKE HOPATCONG
 SUSSEX AND MORRIS COUNTY, NEW JERSEY



Crescent Cove

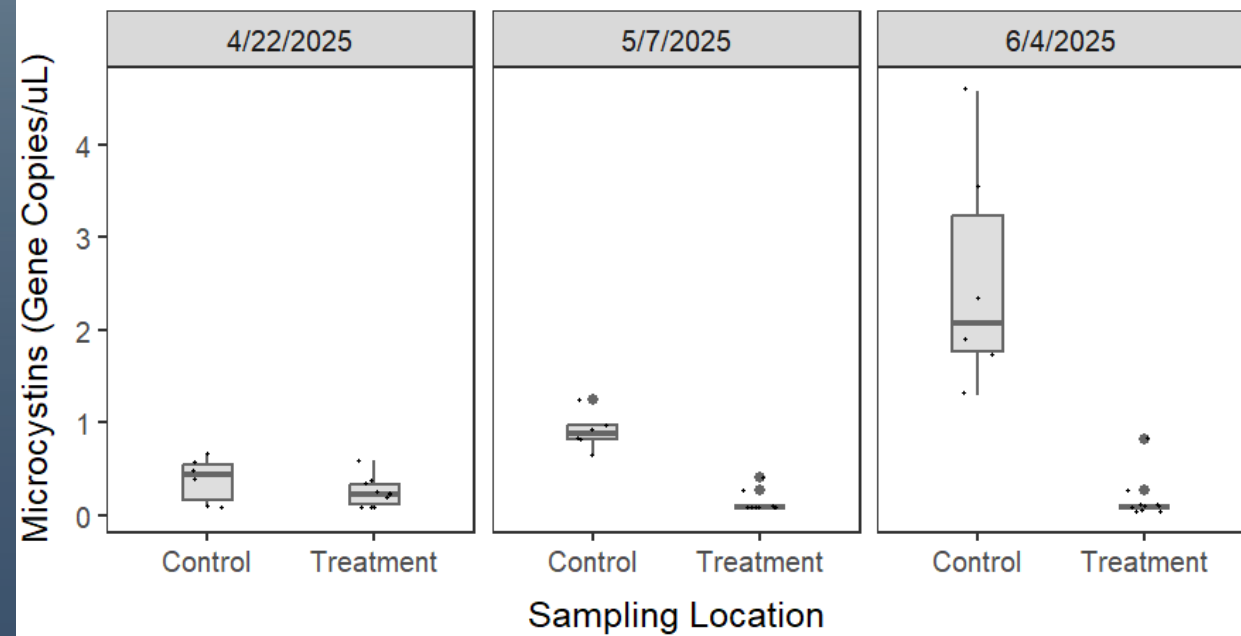
Crescent Cove: 2025 Field Data

qPCR: Total Cyanobacteria



Crescent Cove: 2025 Field Data

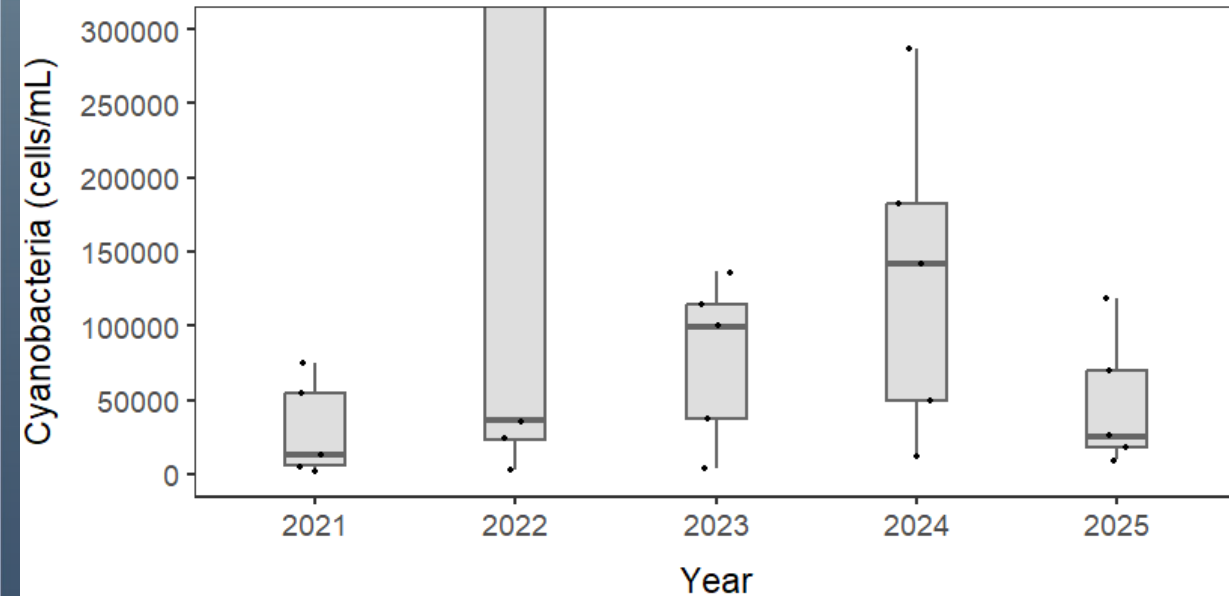
qPCR: Microcystins



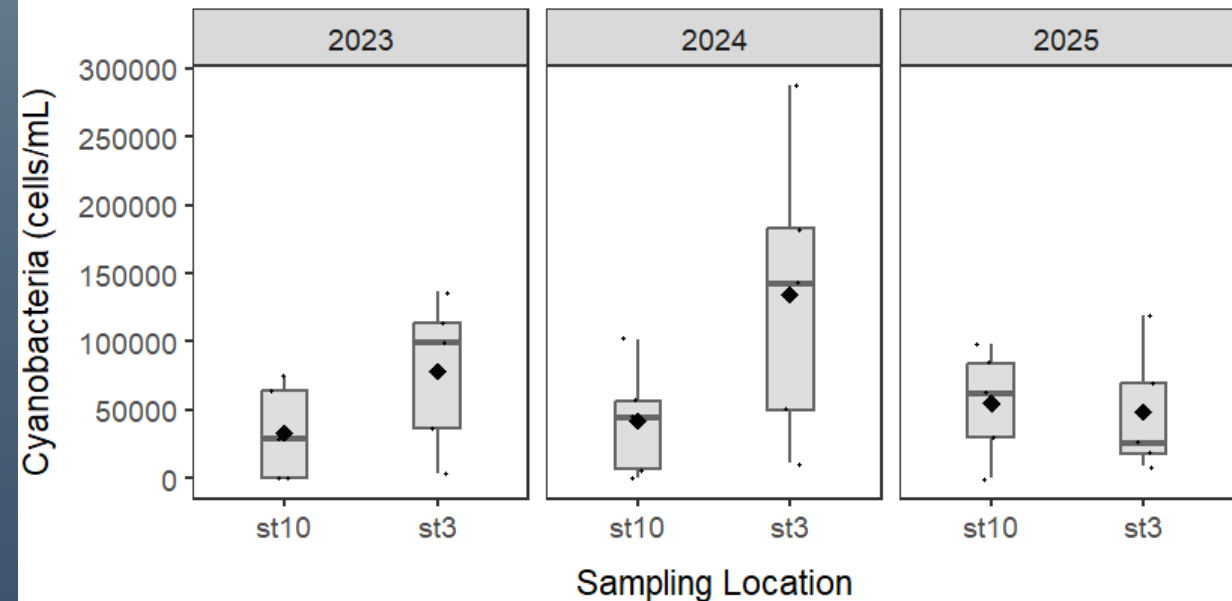
Crescent Cove

- **July 2022:** 750,000 cells/mL
- **August 2022:** 470,000 cells/mL

Crescent Cove: Annual Data
Cyanobacteria



Crescent Cove (ST3) and Woodport Bay (ST10)
Annual Cyanobacteria Data

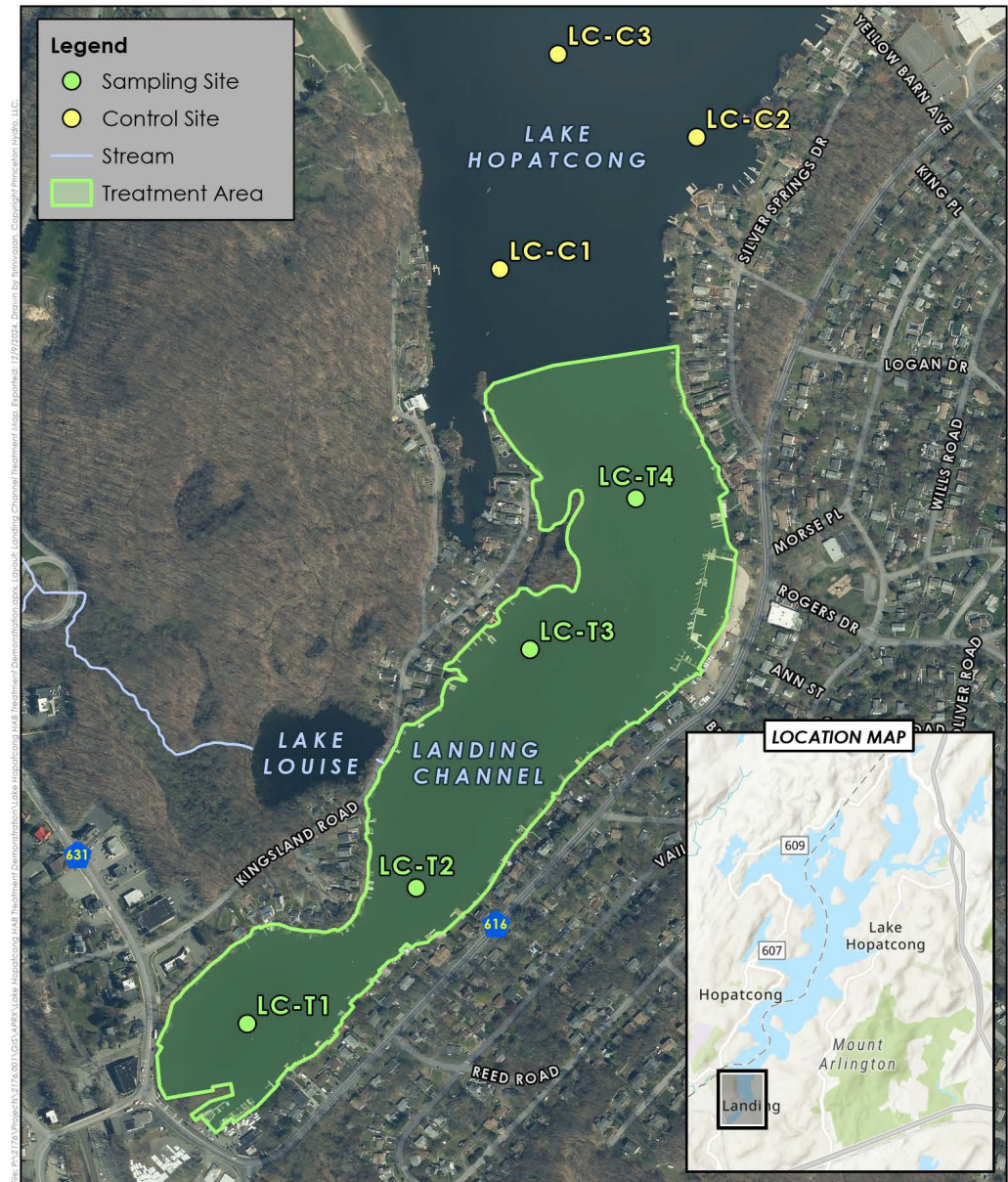


Late Summer Treatments

Landing Channel and Northern Cove

Landing Channel: Floc and Lock

- ✓ **Size:** 50 acres
- ✓ **Products:** LiquiFloc 1% (chitosan) and EutroSORB G
- ✓ **Rates:**
 - LiquiFloc 1%: 50 mg/L (0.50 mg/L chitosan)
 - EutroSORB G: 250 lbs per acre
- ✓ **Applicator:** Princeton Hydro
- ✓ **When:** 23 Sep – 1 October 2025



NOTES:
1. Sampling sites, control sites, and treatment areas are approximate.
2. Streams obtained from the United States Geological Survey's (USGS) National Hydrography Dataset (NHD).
3. Roads and 2020 orthorectification obtained from the NJ Geographic Information Network (NJGIN) Open Data portal: <https://njgin.nj.gov/>

0 250 500 Feet
Spatial Reference: NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

LANDING CHANNEL TREATMENT MAP

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LAKE HOPATCONG
SUSSEX AND MORRIS COUNTY, NEW JERSEY

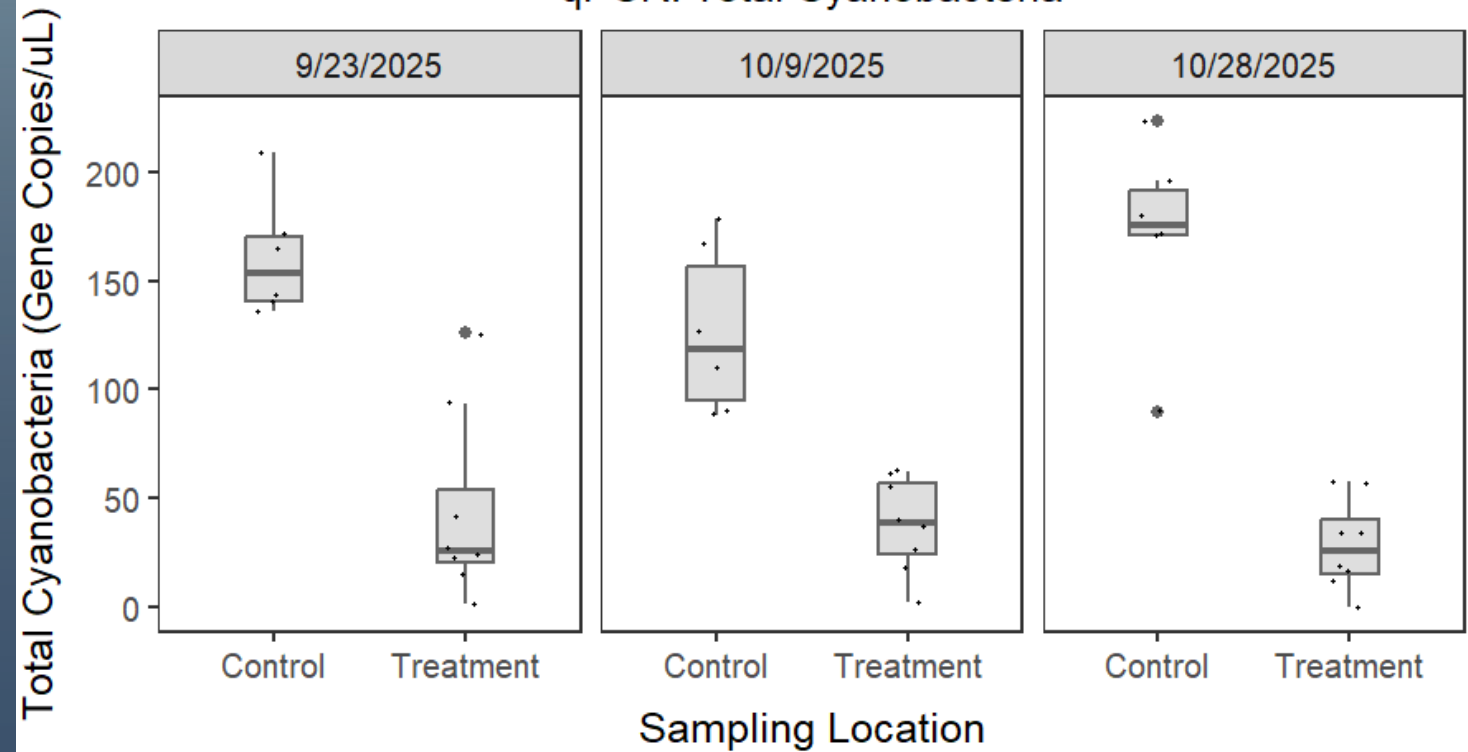


Landing Channel



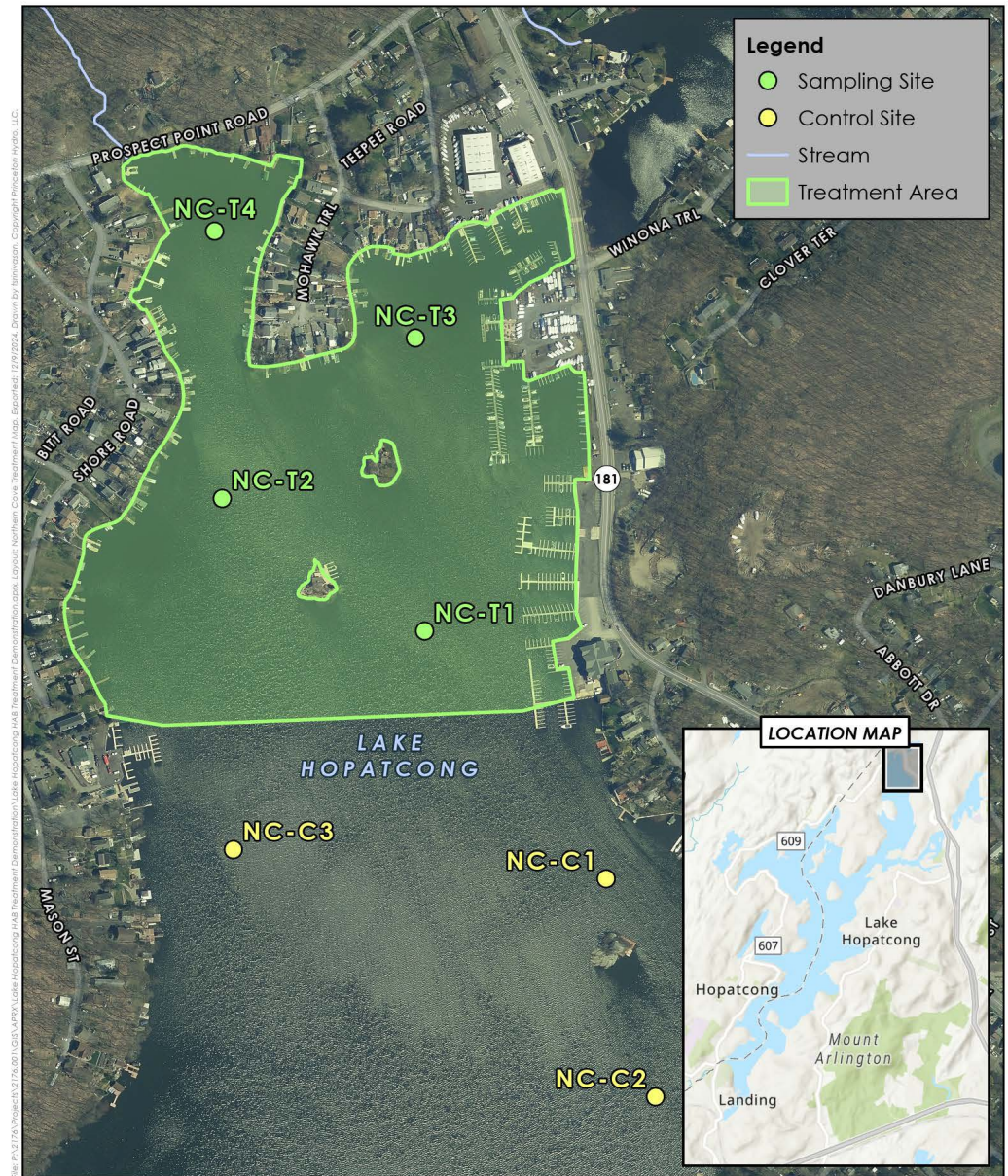
Landing Channel: 2025 Field Data

qPCR: Total Cyanobacteria



Northern Cove: Floc and Sink

- ✓ **Size:** 47 acres
- ✓ **Products:** Alum(floc) and EutroSORB G (sink)
- ✓ **Rates:**
 - Alum: 100 gal per acre
 - EutroSORB G: 500 lbs per acre
- ✓ **When:** 15 Sep – 23 Sep
 - Includes staging and breakdown
 - No weekend work



NORTHERN COVE TREATMENT MAP

HAB TREATMENT DEMONSTRATION PROJECT
LAKE HOPATCONG
SUSSEX AND MORRIS COUNTY, NEW JERSEY



Northern Cove



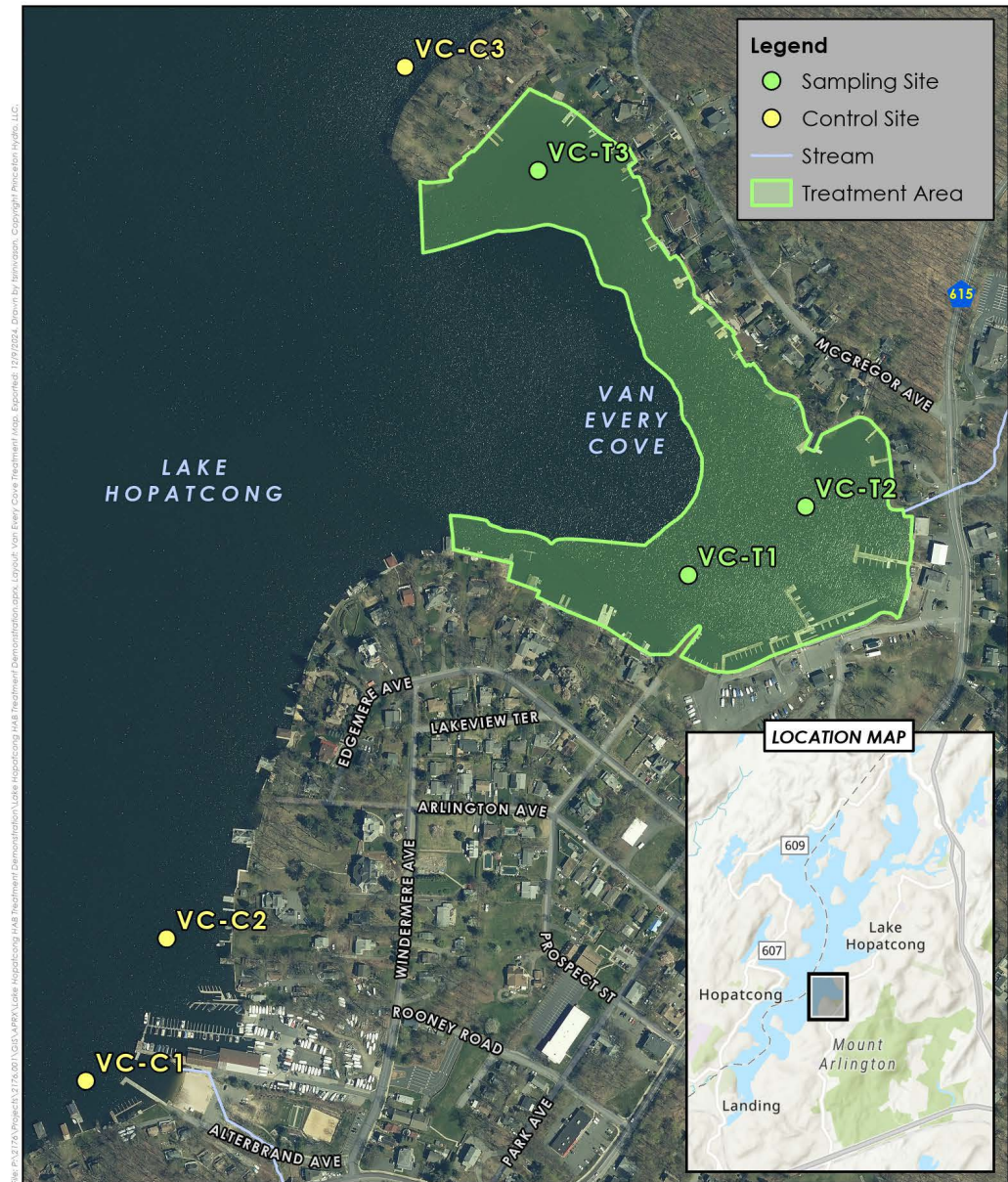
Northern Cove

Late Summer / Early Fall

Great Cove and Van Every Cove

Van Every Cove: Kill and Sink

- ✓ **Size:** 23 acres
- ✓ **Products:** GreenClean(kill)and EutroSORB G (sink)
- ✓ **Rates:**
 - GreenClean: 2.8 gal per acre-ft
 - EutroSORB G: 500 lbs per acre
- ✓ **When:** 7 – 8 October



NOTES:
1. Sampling sites, control sites, and treatment areas are approximate.
2. Streams obtained from the United States Geological Survey's (USGS) National Hydrography Dataset (NHD).
3. Roads and 2020 orthorectification obtained from the NJ Geographic Information Network (NJGIN) Open Data portal: <https://njgin.nj.gov/>

Spatial Reference: NAD 1983 2011 StatePlane New Jersey FIPS 2900 FT US

VAN EVERY COVE TREATMENT MAP

HAB TREATMENT DEMONSTRATION PROJECT
LAKE HOPATCONG
SUSSEX AND MORRIS COUNTY, NEW JERSEY



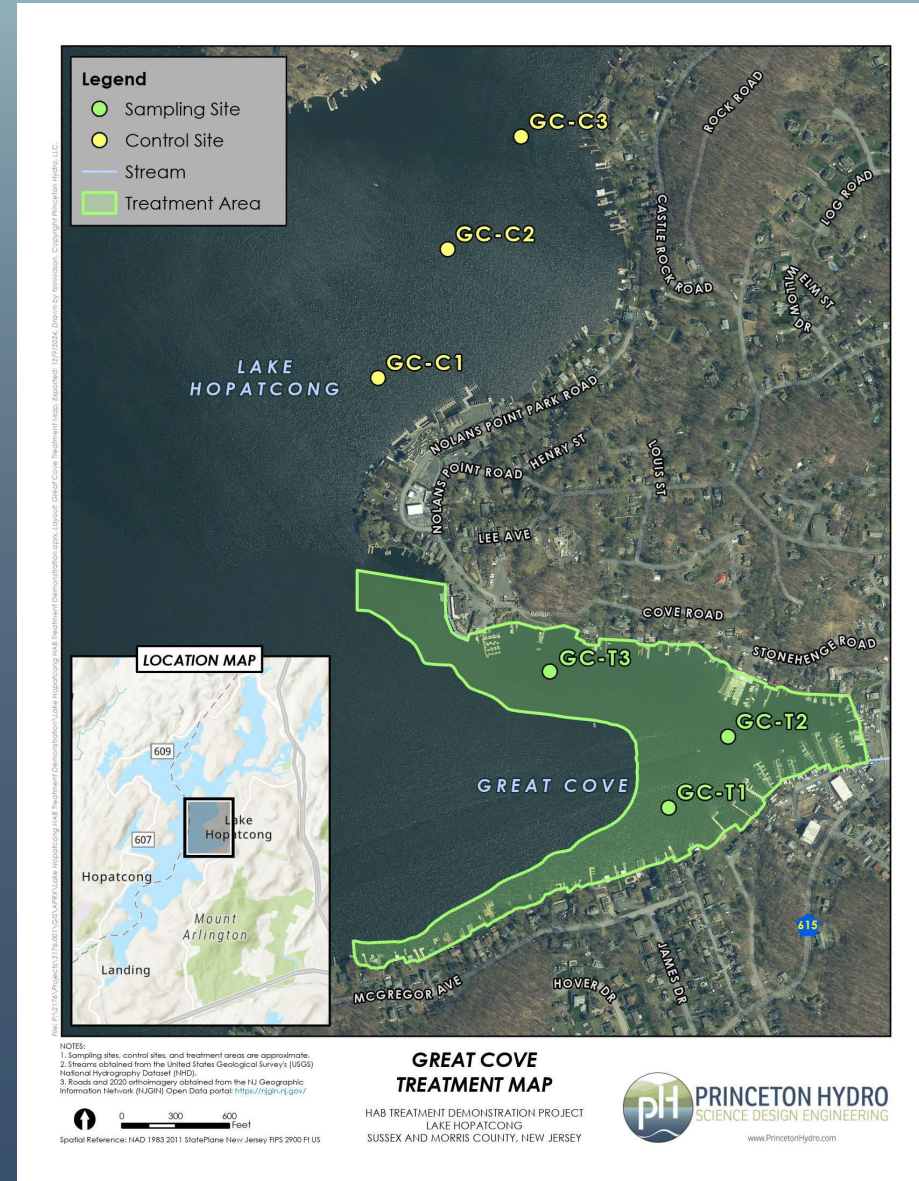
Van Every Cove



SCIENCE
ENGINEERING
DESIGN

Great Cove: Kill, Floc, and Sink

- ✓ **Size:** 44 acres
- ✓ **Products:** GreenClean(kill), LiquiFloc 1% (floc), and EutroSORB G (sink)
- ✓ **Rates:**
 - GreenClean: 2.8 gal per acre-ft
 - LiquiFloc 1%: 50 mg/L (0.50 mg/L chitosan)
 - EutroSORB G: 500 lbs per acre
- ✓ **When:** 9 October – 23 October
 - Includes staging and breakdown
 - No weekend work
 - Weather delays (wind and waves a safety concern)



Data Analysis and Cost Effectiveness

- ✓ **Incubation data will be analyzed temporally:**
 - 2025 (pre-treatment) vs 2026 (post-treatment)
 - Do we see a reduction in cyanobacteria densities?
- ✓ **Field data will be analyzed temporally:**
 - Pre- and post-treatment at immediate, short-term, and long-term intervals
 - Do we see a reduction in relevant metrics?
- ✓ **Field data will be analyzed spatially:**
 - Treatment zones vs control zones
 - Do we see a reduction in treatment zones relative to control?
- ✓ **Cost effectiveness study on a per-acre basis**

QUESTIONS?



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*THANK
YOU!*

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