



Department of  
Environmental  
Conservation

# The NYSDEC Approach to Harmful Algal Blooms

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5/8/2026

## Outline of presentation

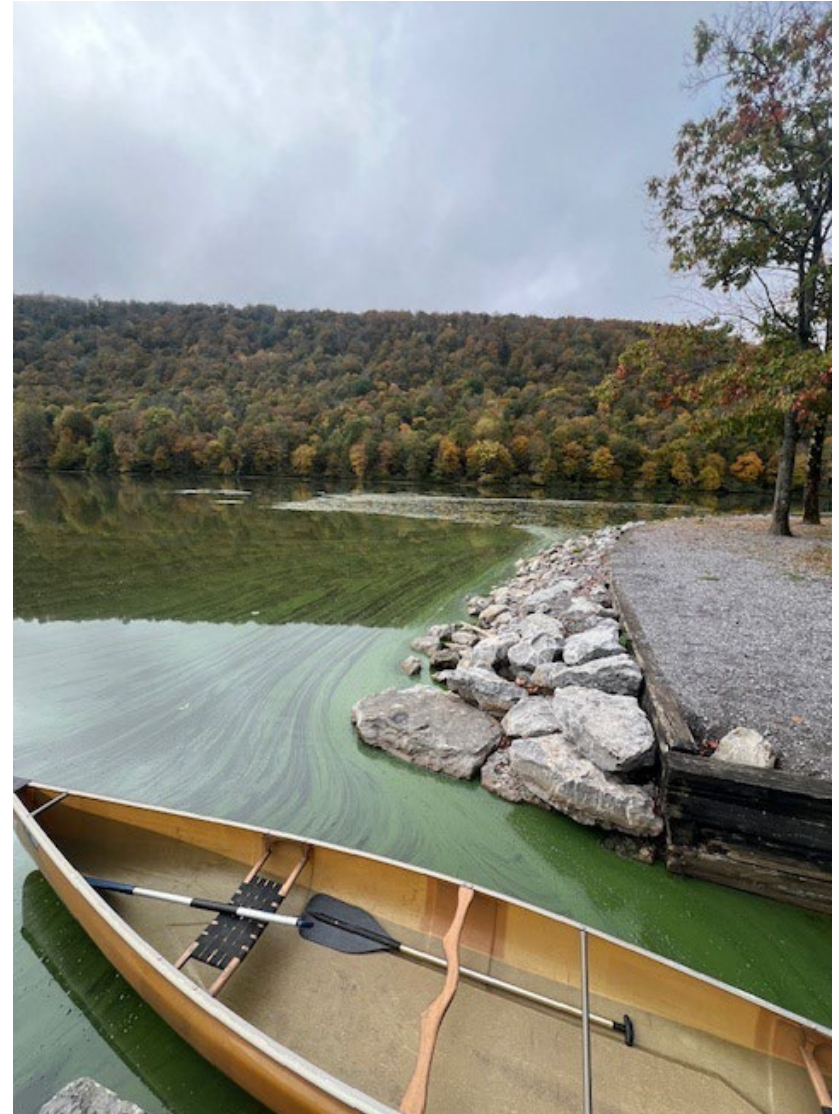
Background

Foundational Research

Holistic Approach to HABs

Research Projects

HABs Roadmap



## Background

HABs reports have increased across the world and across the United States in recent decades.

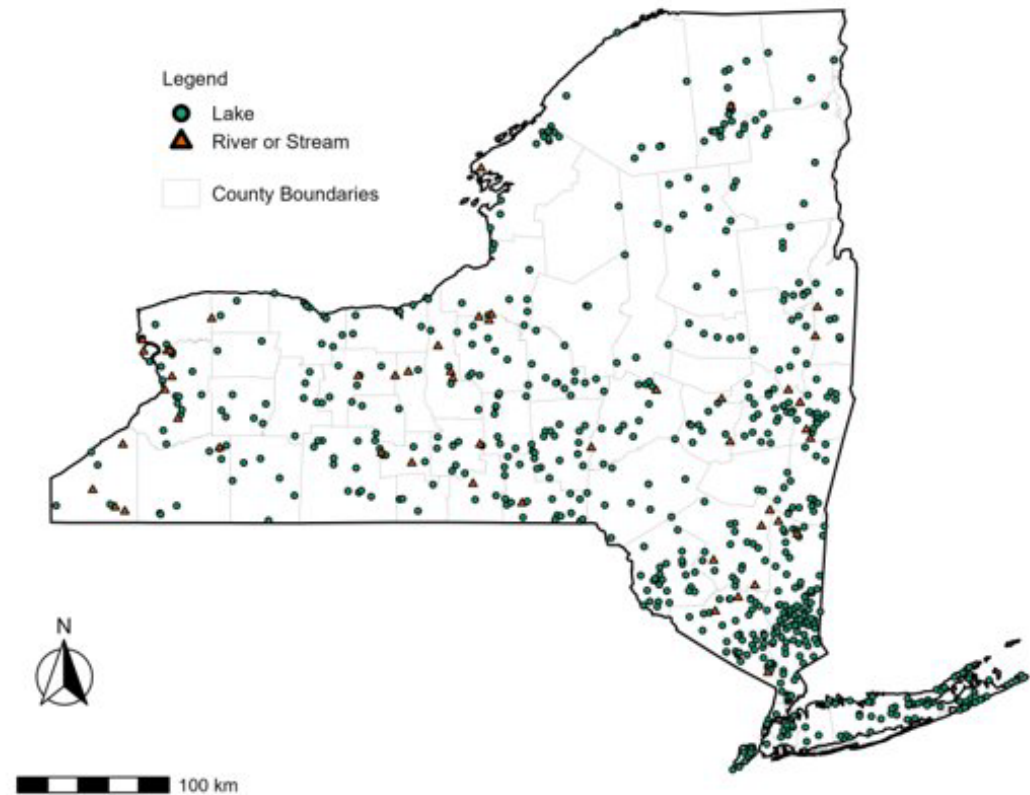
Between 2012 and 2025 NYSDEC confirmed reports of freshwater HABs in over 700 waterbodies statewide

- Each year HABs are reported in new waterbodies

The New York Harmful Algal Bloom System (NYHABS) was established in 2019.

- Version 2.0 updated in 2025
- Visual based observation and reporting
- Interagency collaborative effort (DEC, OPRHP, DOH)

Waterbodies with HAB Reports 2012-2025



# Challenges to Managing HABs

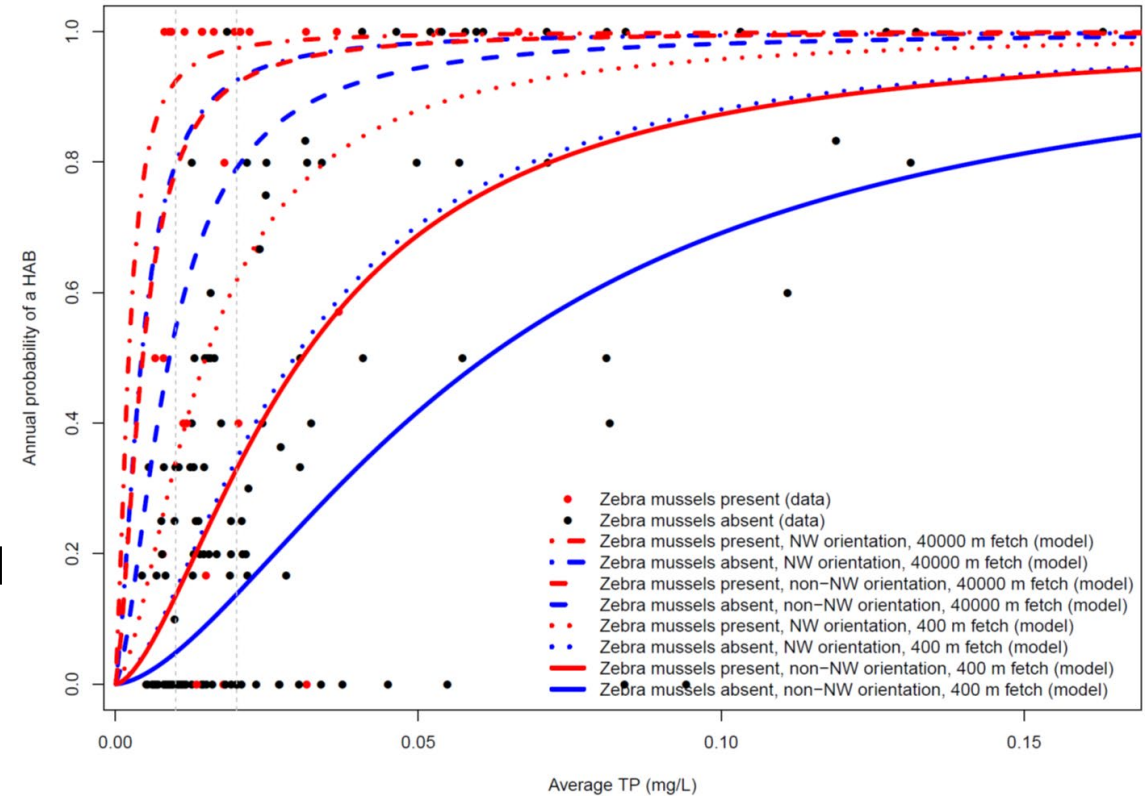
- Highly specialized and competitive ancient microscopic bacteria
- Widely distributed in lakes and lake sediments
- Blooms are dynamic:
  - Spatial, temporal & toxin gene expression
    - Symptoms possible with or without toxins
  - Bloom formation is difficult to predict
  - Blooms are difficult to remove
- Challenging to characterize and quantify impacts to a waterbody and its uses
  - Spatial coverage and temporal representativeness



# **Applied Research and Program Applications**

# Primary Drivers of HABs in New York State

- Dreissenid mussel presence
- Length of lake fetch
- Compass orientation of max fetch
- Phosphorus - **Phosphorus is the only controllable primary driver of HABs**
- These drivers coupled with sunlight, calm winds, and warm temperatures make conditions favorable for HAB formation



# Patterns in frequency, intensity, and duration, 2012 - 2020

LAKE AND RESERVOIR MANAGEMENT  
2023, VOL. 39, NO. 1, 21–36  
<https://doi.org/10.1080/10402381.2022.2161436>

 **Routledge**  
Taylor & Francis Group

 OPEN ACCESS 

## Detections of cyanobacteria harmful algal blooms (cyanoHABs) in New York State, United States (2012–2020)

Rebecca M. Gorney , Stephanie G. June, Karen M. Stainbrook and Alexander J. Smith

Division of Water, New York State Department of Environmental Conservation, Albany, New York, USA

### ABSTRACT

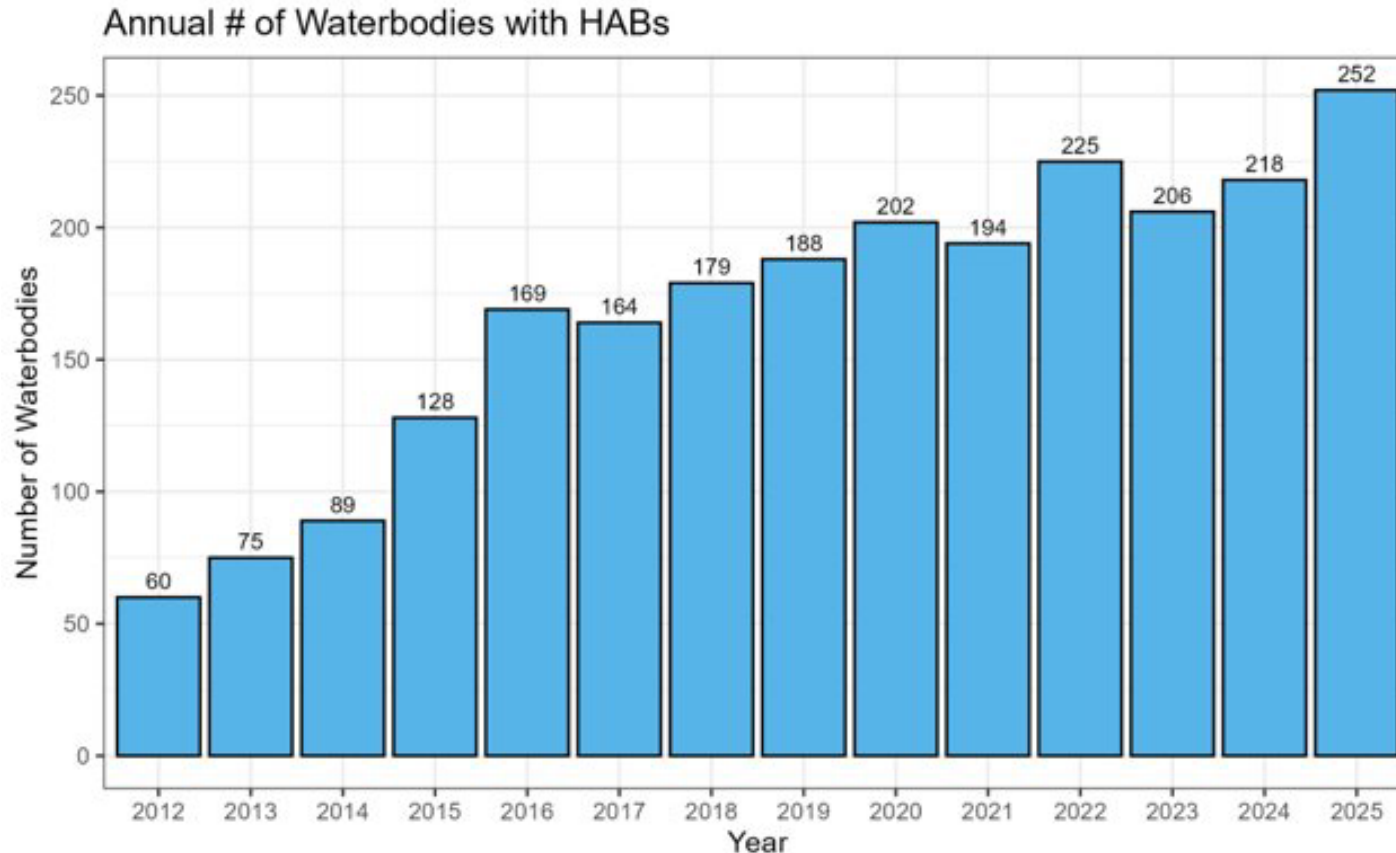
Gorney RM, June SG, Stainbrook KM, Smith AJ. 2023. Detections of cyanobacteria harmful algal blooms (cyanoHABs) in New York State, United States (2012–2020). *Lake Reserv Manage.* 39:21–36.

Patterns in frequency, intensity, and duration of cyanobacteria harmful algal blooms (cyanoHABs) were evaluated in New York State from 2012 to 2020. The dataset included information from formal monitoring efforts, beach closures, and public reports. The total dataset included more than 24,000 records from 655 waterbodies and included cyanoHAB reports from 477 lakes. Nearly half of those lakes (49.6%) had only 1 year in which a cyanoHAB was documented. Less than 1% (6 lakes) had cyanoHABs documented in every year of the study. We noted a significant increase in the number of cyanoHABs reports each year ( $P < 0.001$ ), but not an overall increase in intensity, based on evaluation of chlorophyll levels in mid-lake samples collected on a routine basis. The analysis indicated that cyanoHABs duration did not lengthen over the study period, based on beach closure data captured on a daily observation basis. This study addresses the limitations of monitoring data for analysis of patterns in cyanoHABs, based on the structure of the programs and frequency of observations. We provide retrospective feedback on the design of monitoring programs to improve future data collection and our ability to evaluate cyanoHABs in a wide range of waterbodies.

### KEYWORDS

Cyanobacterial harmful algal blooms; harmful algae; limnology; monitoring programs

## HAB Frequency - Confirmed HAB Reports over the years

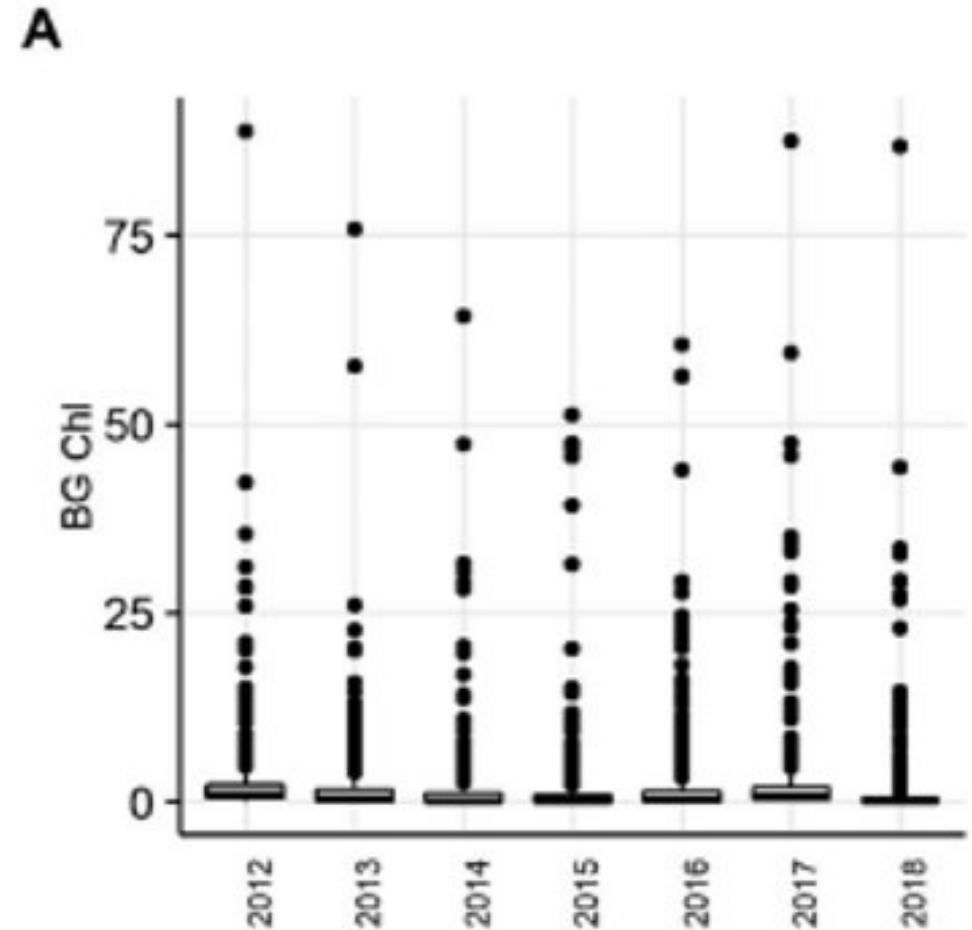


Increased reports on distinct waterbodies as well as number of confirmed reports per waterbody increased through 2016, then there is a leveling out of reporting

Are increasing HAB reports due to increasing HAB awareness across the state?

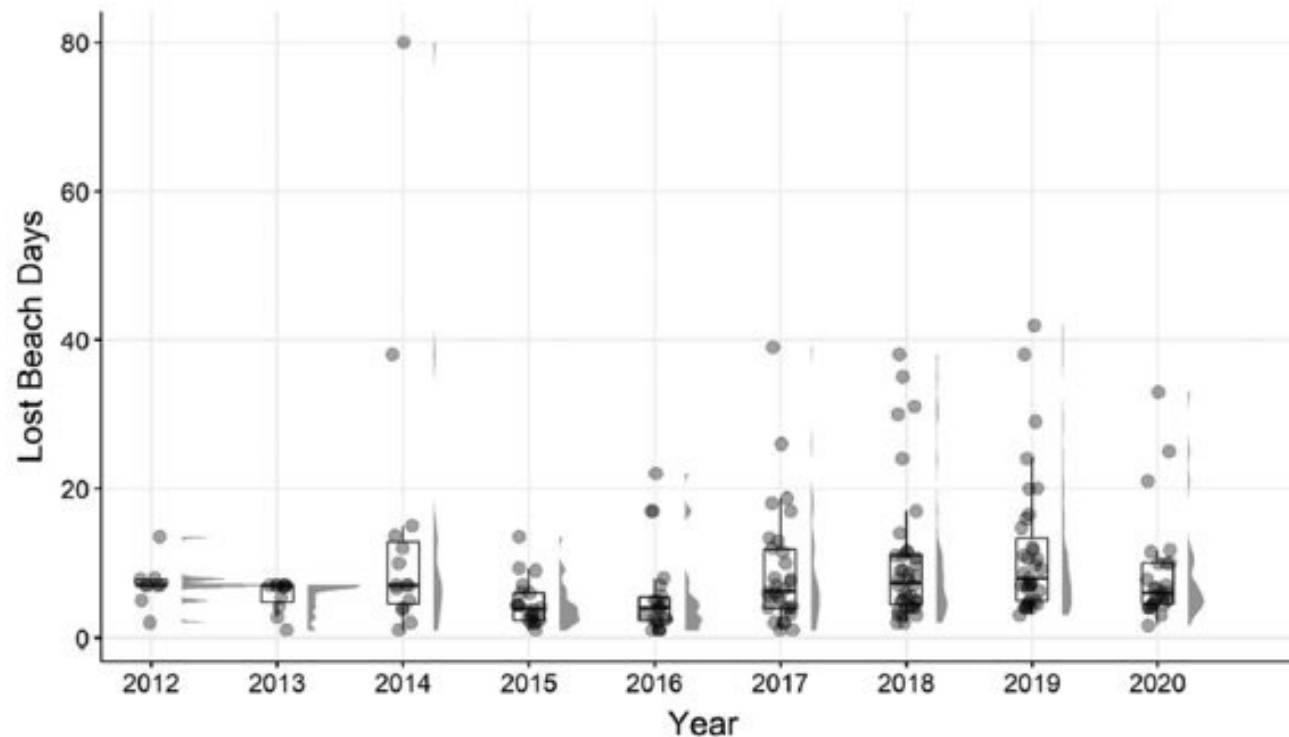
## HAB Intensity

- No increase in open water HAB intensity (blue-green concentrations as measured by fluoroprobe)
- Shoreline bloom collections were inconsistent and not representative



## HAB Duration

Duration of blooms has not increased based on beach closure data



**Figure 5.** Summary of beach closure days during the study period, shown as box and whiskers plots, with gray points indicating average lost beach days per lake annually, and gray density distribution (right of boxplots) showing the distribution of data points. Some lakes had multiple beaches that may have closed or reopened independently of one another.

# HABs and Programmatic Considerations

Opportunity for program retrospective

- HAB awareness = HAB reporting = Public Safety
- Deliberate and objective HAB monitoring approach needed
  - Representative HAB monitoring through core programs (Lake Classification and Inventory)
  - Continued NYHABS surveillance and reporting
- Continue applied research to advance understanding and management of HABs
- Both long and short-term considerations for HAB mitigation
  - Address controllable factors (phosphorus) in clean water planning
  - Consider HAB mitigation options for short-term protection of uses



# **NYSDEC's Holistic Approach to HABs**

## **NYSDEC's Holistic approach to HABs**

### 1. Watershed Management

- Monitoring, phosphorus guidance values, Clean Water Planning and pollutant reduction strategies to address long-term controllable causes

### 2. Funding projects to reduce occurrence of HABs – Water Quality Improvement Project Program, and Non-point Source Planning and Mapping Grants

- To date: over \$614 million to nutrient reduction projects

### 3. Research HABs and their causes

- Focus on prevention, mitigation, monitoring, and modeling to understand causes - NYSDEC [HAB Research Guide](#)
- To date: over \$14 million for research

### 4. In-Waterbody Mitigation

- Development, implementation, and evaluation to help control bloom size and formation

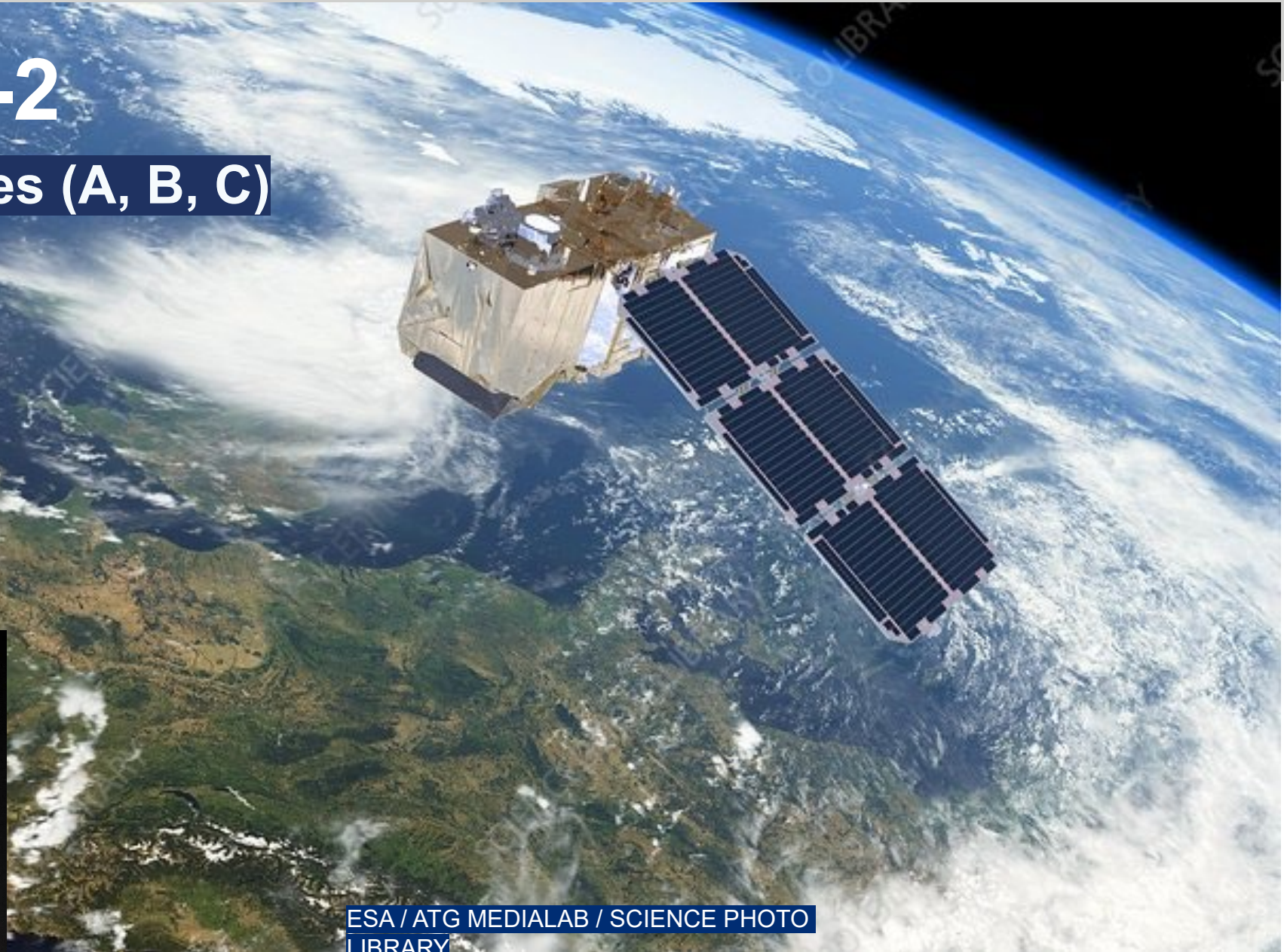
# Research Projects

# Sentinel-2

- Three satellites (A, B, C)
- Multispectral
- R,G,B, VNIR
- 10m pixels
- 5-day revisit
- Free to use

Sentinel 2 C  
4 Sept 2024

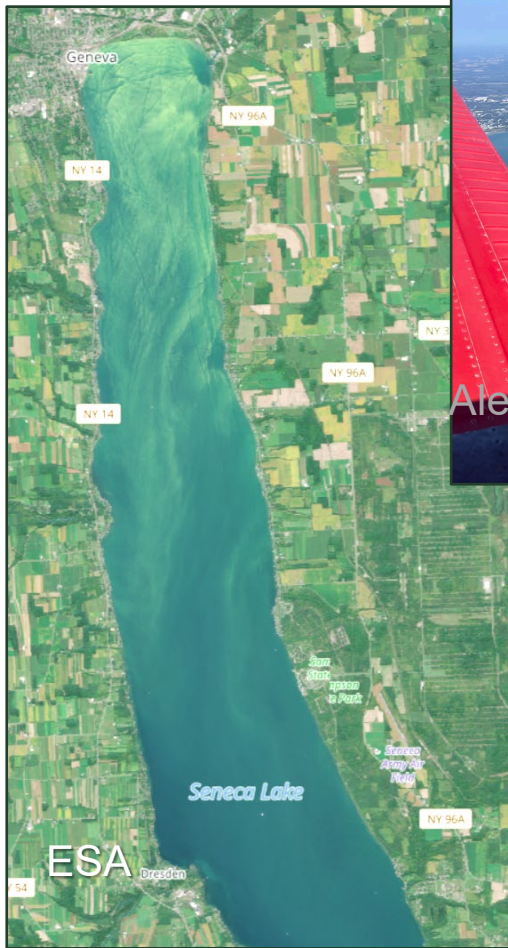
ESA / ATG MEDIALAB / SCIENCE PHOTO  
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# Validation - Comparison with NYHABS reports – Seneca Lake 2024



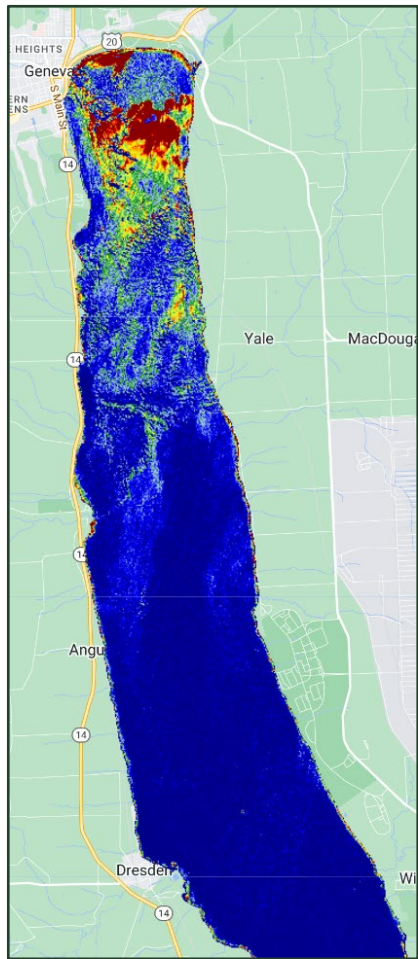
NYHABS reports, 9/1 – 9/19



Sentinel 2, 9/14



Plane, 9/15



DEC study, 9/1 – 9/19

# Characterizing the universe of benthic HABs in NYS

## Streams

Sampled 2017-2021

- >1000 sites over 5 years
- All screening sites over 5 years (included spatially balanced and targeted sites)
- Scrape and water column samples



## Lakes

Sampling 2024-2025

- 80 sites over 2 years
- Spatially balanced site selection (Probabilistic)
- Scrape, integrated disturbance sample and floating mat samples



## Electrochemical Oxidation Project

- Partnership with Clarkson University
- Used electrochemical oxidation devices to see if cyanobacteria toxins could be eradicated in Lake Neatawantah
  - Electrochemical oxidation is the process of releasing electricity into the water to oxidize and remove pollutants
- Effort was successful on small portion of lake
- Full lake implementation would be labor, cost, and energy intensive



## Ultrasonic Debrief

- Currently no peer-reviewed literature to demonstrate that ultrasonic devices are effective in removing HABs in a large-scale environment
- Ultrasonic has been effective in benchtop experiment environments with high frequencies
  - These frequencies cannot be used in a large-scale environment due to the damage it would cause to non-target organisms
- Expensive devices (near \$60,000 each) to implement
- Ultrasonic implementation has been attempted in Lake Agawam, Owasco, and Welch so far



## HABs Mitigation Fact Sheets

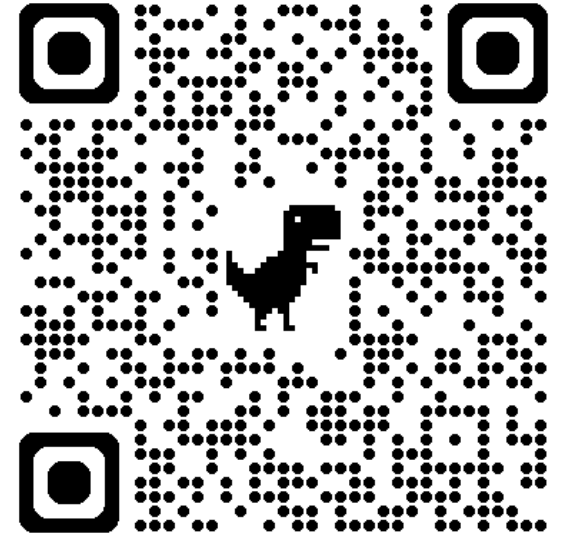
Currently have one fact sheet on the website:

Electrochemical oxidation

Coming soon:

Ultrasonic technology

USACE harvester and HABITAT collaboration projects



# **Looking Ahead: HAB Roadmap**

## NYSDEC HAB Roadmap

The HAB Roadmap provides a strategic guide for DEC, the public, and other researchers to further the statewide mission to address HABs and their impacts on water quality.

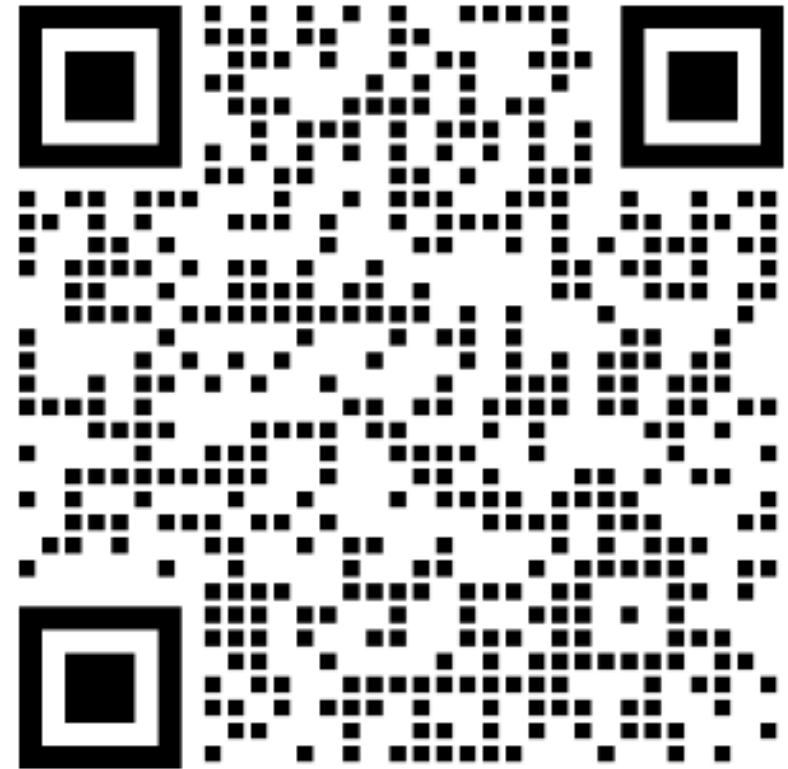
- Six focus areas covering important aspects of managing HABs
- Each focus area includes a goal statement and associated projects and tasks to:
  - Improve the understanding of HAB drivers,
  - Reduce impacts to health and recreation,
  - Take Action - Short- (1-5 yrs) and long-term (5 yrs or later).



# Looking Ahead: The NYSDEC HAB Roadmap

## Focus Areas

1. Monitoring and Assessment
2. Water Quality Standards/Regulatory Thresholds
3. Planning and Implementation
4. General and In-Waterbody Mitigation Research
5. Permitting In-Waterbody Mitigation Practices
6. Public Outreach and Reporting



## Summary

Division of Water, NYSDEC is committed to managing HABs by focusing on:

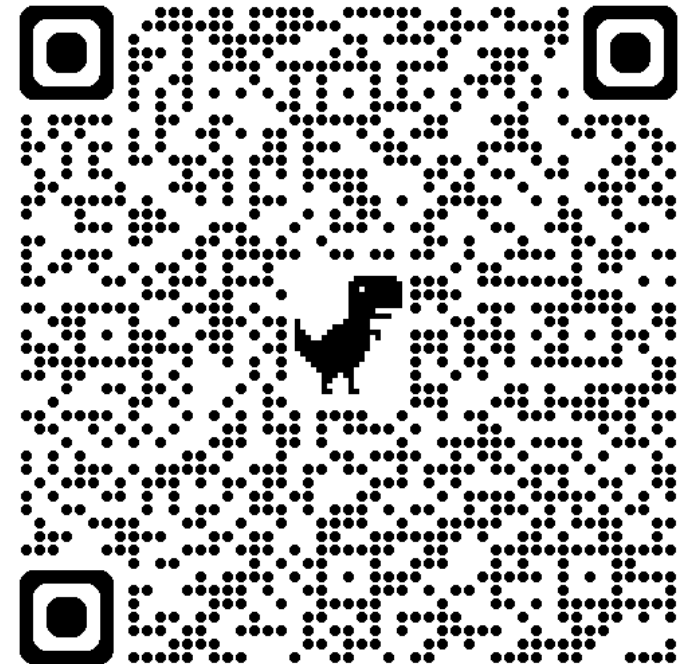
Holistic long- and short-term solutions

Nutrient reduction and funding to support those efforts

Roadmap: Monitoring, assessment, planning, research, permitting and reporting of HABs

## New as of...yesterday!

- NYS DEC has just released a request for applications for HABs research
- Research focus areas include
  - Prevention and Mitigation
  - Causes of HABs
  - Monitoring and Modeling
  - Communication, Engagement, and Outreach
- Applications due September 15<sup>th</sup>, 2026



## NYHABs Dashboard 2026

NYHABS is scheduled to go live around Memorial Day!

Public HABs Form: **[on.ny.gov/habform](https://on.ny.gov/habform)**

Works on any platform (desktop, mobile, tablets)

Form can be filled out anywhere, but ideally in the field for exact location

Photos required for bloom report

Help keep the state of New York safe from HABs exposure!

# Thanks!

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