NEW YORK STATE | Department of Environmental Conservation

Cayuga Lake Water Quality, Harmful Algal Blooms, and Watershed Progress

Tony Prestigiacomo, NYSDEC Division of Water, Finger Lakes Watershed Program
June 20, 2024

Who Am I?

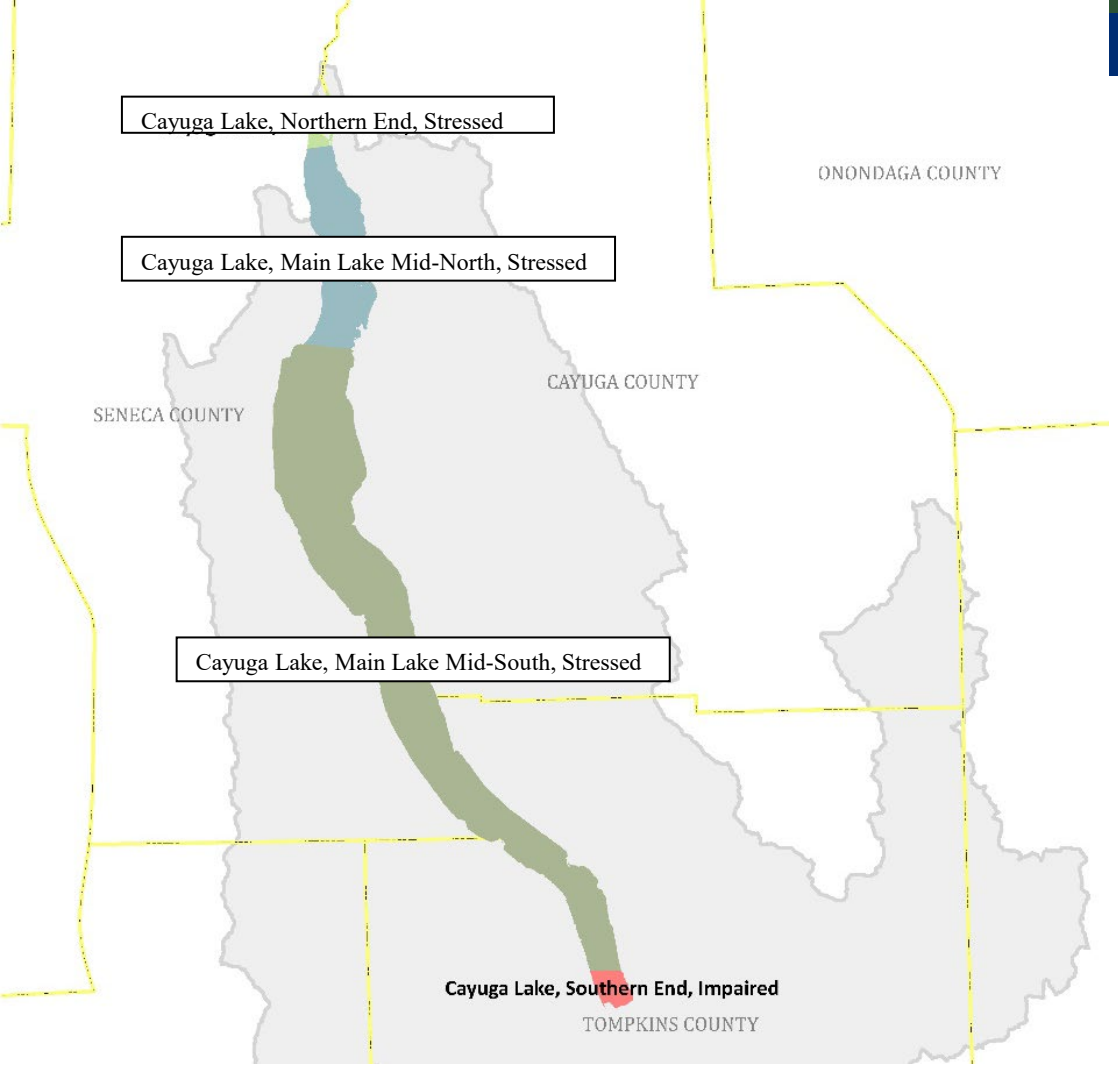
- Grew up in Dolgeville, NY
- College in Herkimer, NY; College in Syracuse, NY
- Work in Syracuse, NY; Albany, NY
- Live in Cortland, NY

MAMTA POPAT/

Tony Prestigiacomo, a research assistant, pours a solution into a water sample taken from Cayuga Lake to preserve the oxygen content so that it may be tested in a lab. The Lake Source Cooling Proje last July began cooling 7 on Cornell University campus using lake wate are taken from nine ferent sites and at varying

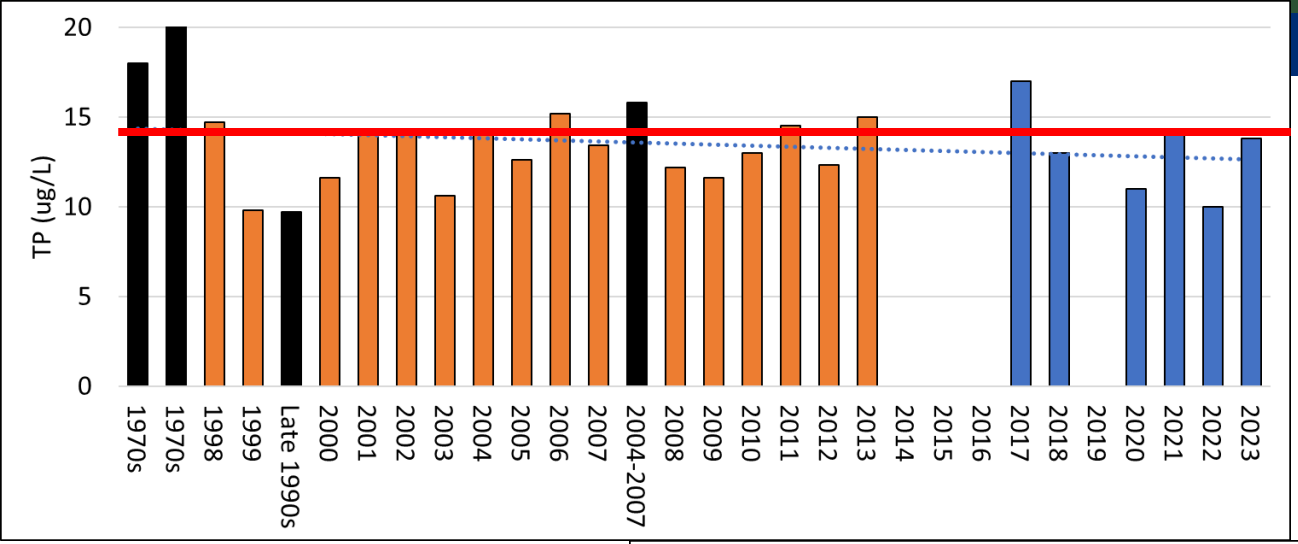
NEW YORK STATE | Department of Environmental Conservation

Water Quality



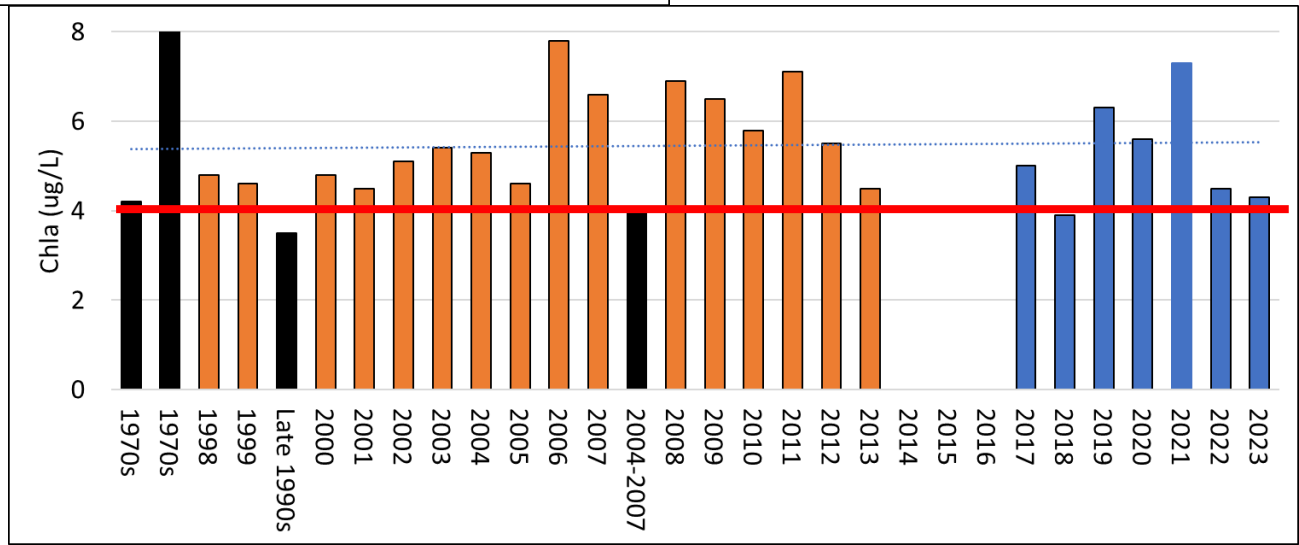
The Main Lake, Mid-South AA and Main Lake, Mid-North Class A segments make up 96% of the Cayuga Lake's surface area.

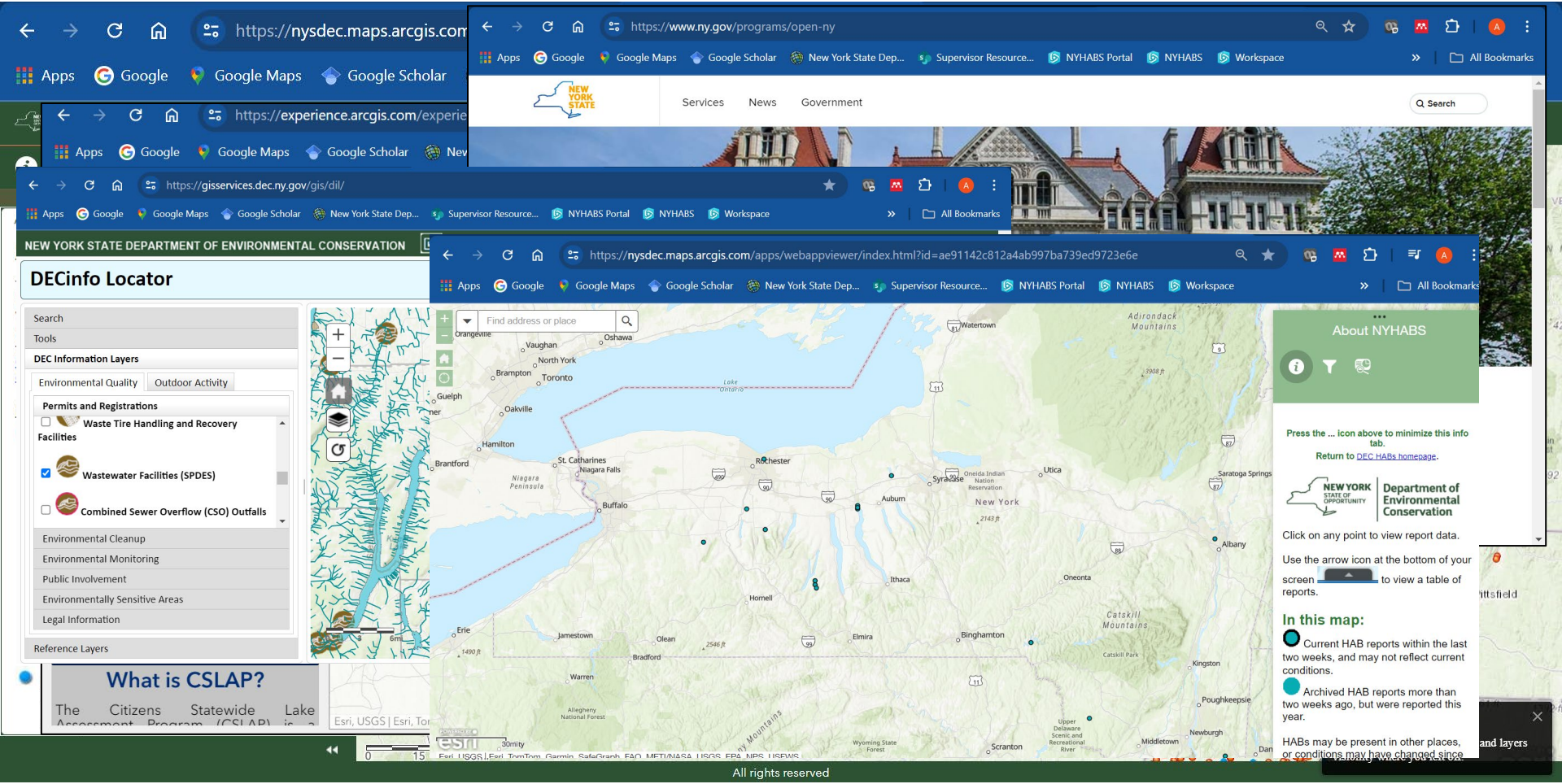
NEW YORK STATE | Department of Environmental Conservation



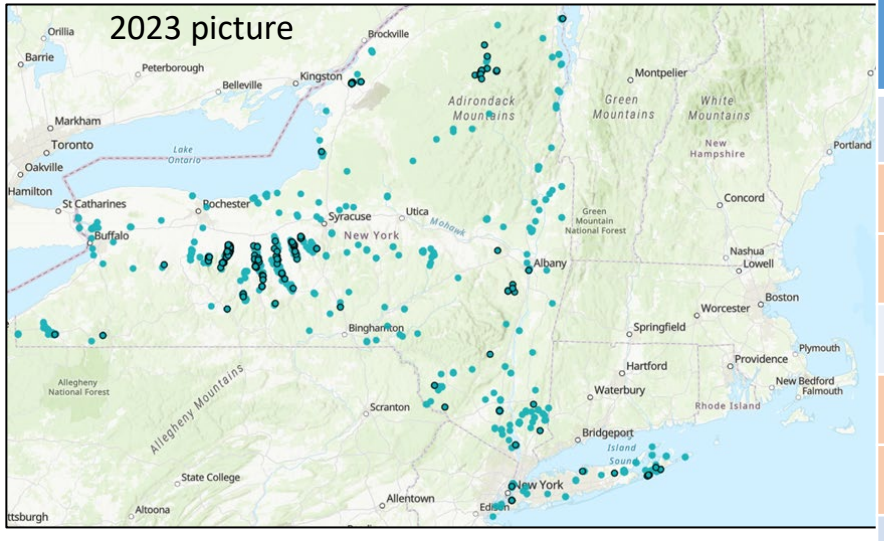
- TP – slight decline since the 1970s
- ~ unchanged since 1990's

- Chl-a – slight increase since the 1970s
- slight increase since 1990's
- Consistent with statewide patterns





NY HABS Reports - NYHABS



Orange highlighted Finger Lakes have summer TP < 10 µg/L

* Hemlock and Canadice watershed are ~ 73 % forested and water

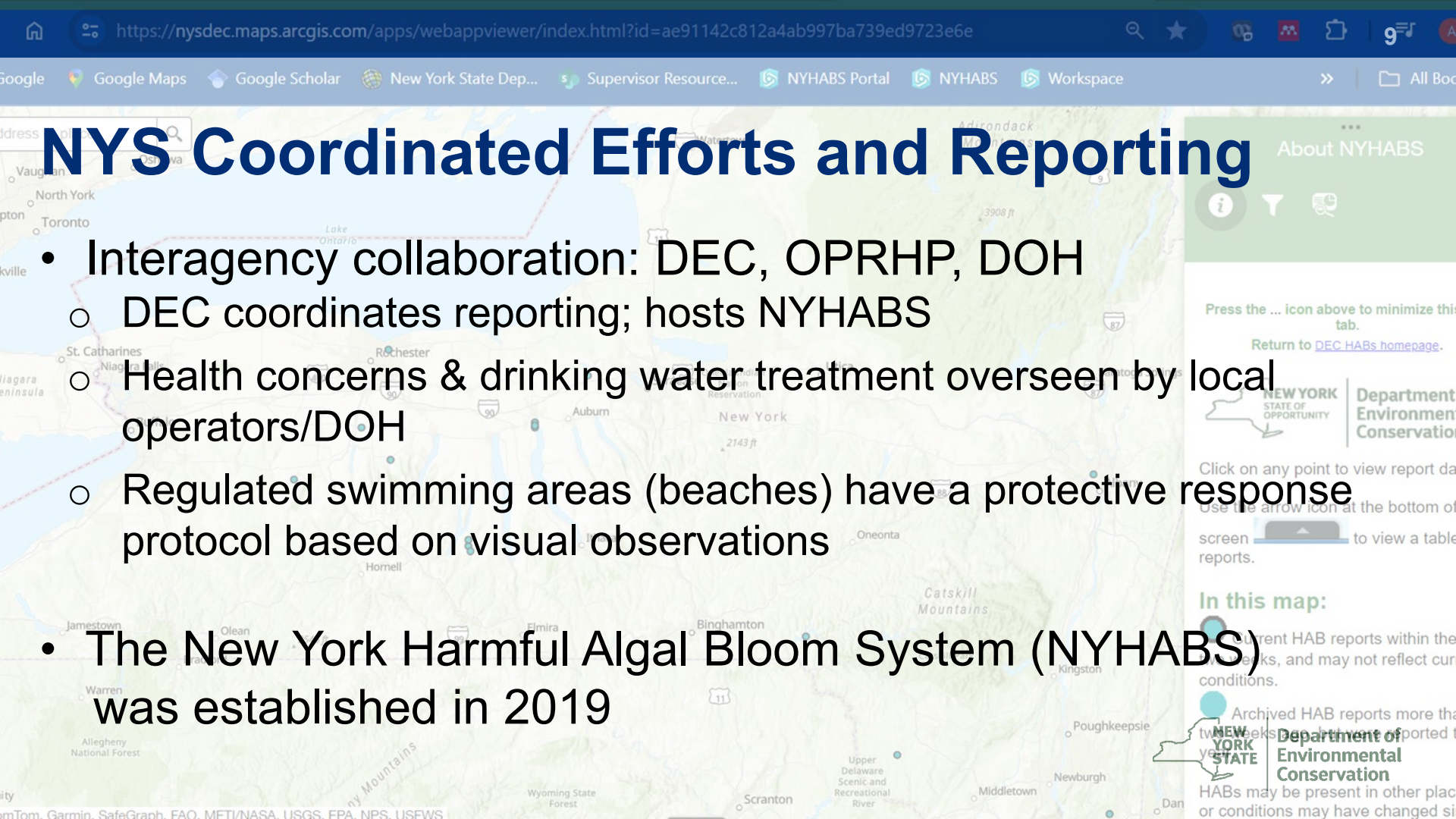
Finger Lake	‘23	‘22	‘21	‘20	‘19	‘18	‘17
Conesus	X	X	X	X	X	X	X
Hemlock*	X	X	X	X	X	X	X
Canadice*	X	X			X		X
Honeoye	X	X	X	X	X	X	X
Canandaigua	X	X	X	X	X	X	X
Keuka	X	X	X	X	X	X	X
Seneca	X	X	X	X	X	X	X
Cayuga	X	X	X	X	X	X	X
Owasco	X	X	X	X	X	X	X
Skaneateles	X	X	X	X	X	X	X
Otisco	X	X	X	X	X	X	X

What is DEC Doing About HABs

NYS Coordinated Efforts and Reporting

- Interagency collaboration: DEC, OPRHP, DOH
  - DEC coordinates reporting; hosts NYHABS
  - Health concerns & drinking water treatment overseen by local operators/DOH
  - Regulated swimming areas (beaches) have a protective response protocol based on visual observations

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



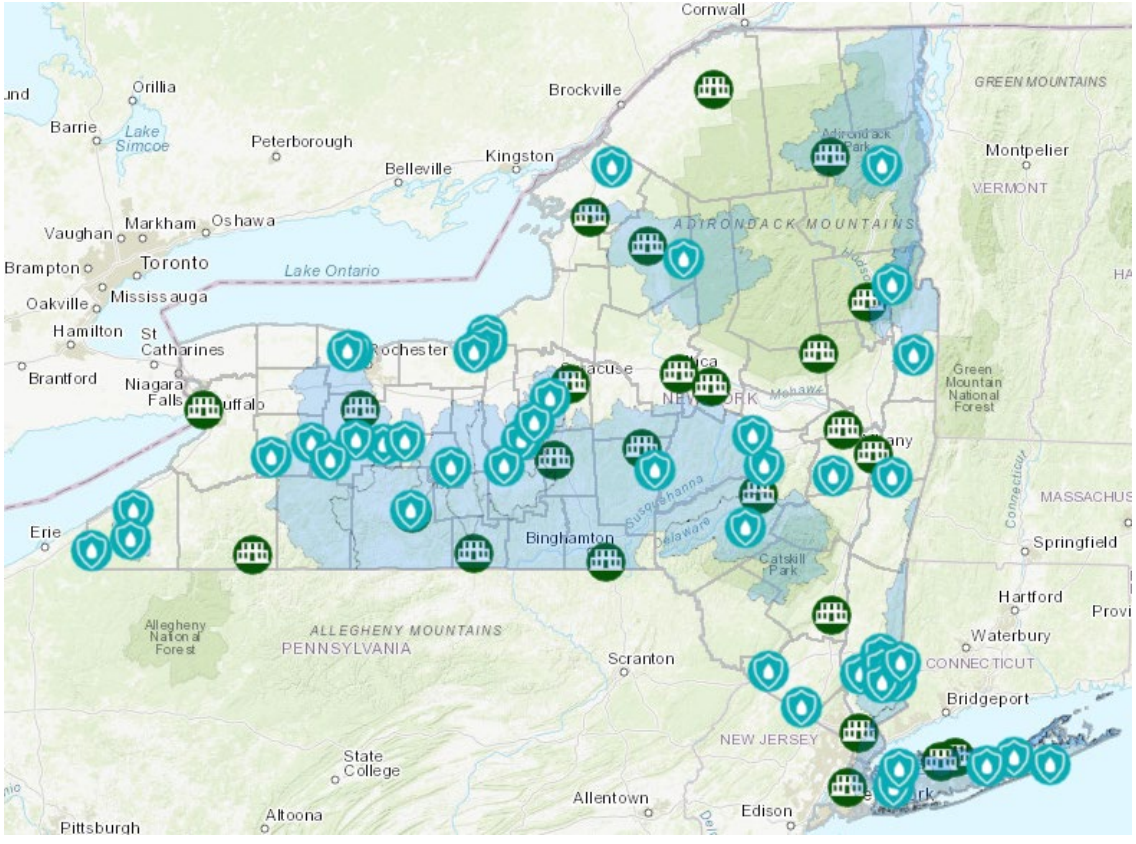
NYSDEC's Holistic Approach to HABs

1. **Monitoring and Watershed Management**
   - Monitoring, Clean Water Planning and pollutant reduction strategies to address long-term controllable causes
2. **Funding projects to reduce occurrence of HABs – WQIP, NPG**
   - To date: over $428 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

NEW YORK STATE Department of Environmental Conservation

Monitoring and Watershed Management

Clean Water Plans in New York State

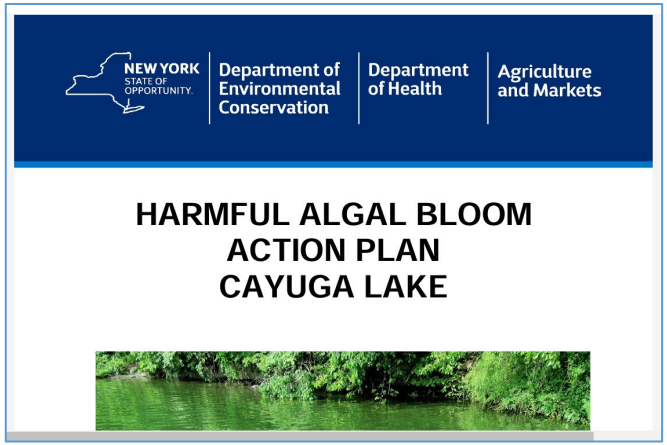


NEW YORK STATE | Department of Environmental Conservation

Cayuga's Clean Water Plans

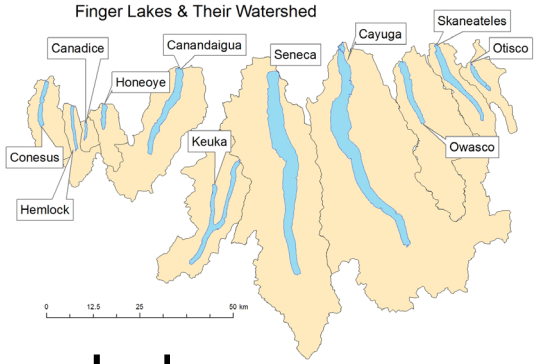
Existing and On-going Planning Documents

1. HAB Action Plan (DEC, Cayuga)
   – complete/implementation ongoing
2. TMDL (DEC)
   – drafted/implementation ongoing
3. DWSP2s (DEC, Cayuga)
   – several in development
4. Cayuga Lake WRPP (DOS, Cayuga)
   – complete/implementation ongoing
5. SWCD Strategic Plans (SWCDs)
   – complete/implementation ongoing



NEW YORK STATE Department of Environmental Conservation

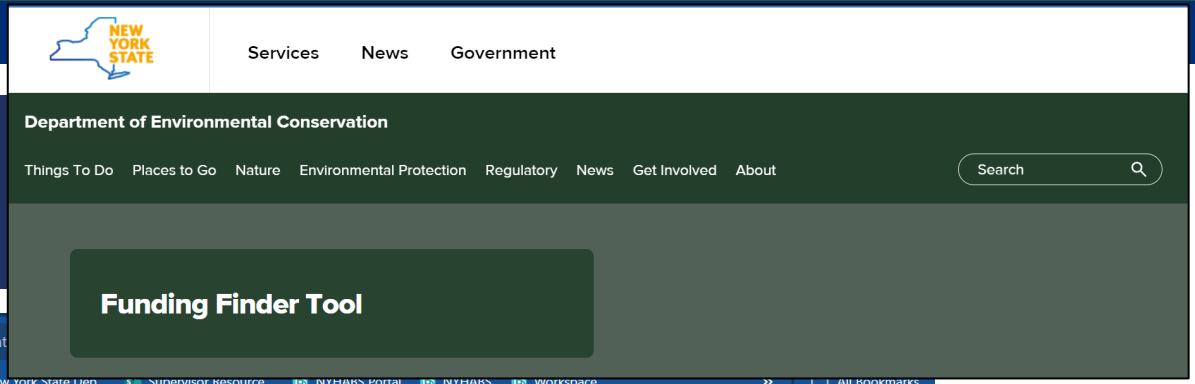
Implementation/Capacity Building in the Finger Lakes

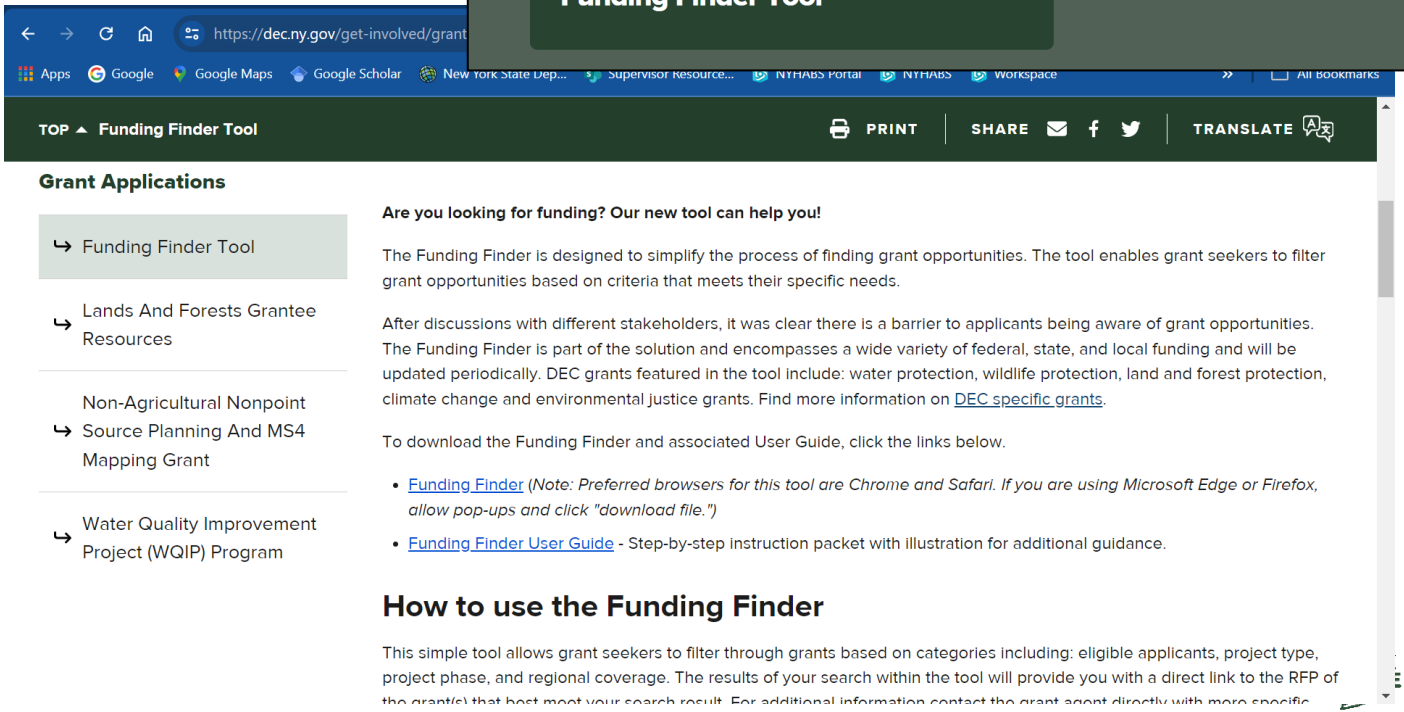


- DEC is working with GLP to increase acquisition of federal funding (GLRI) in Finger Lakes
- Working to secure *supplemental* funding to build upon existing programs
- DEC and AGM working closely with SWCDs to build capacity for BMP implementation within the Finger Lakes region

NEW YORK STATE | Department of Environmental Conservation

Grant Funding





Department of Environmental Conservation

Non-agricultural Nonpoint Source Planning and MS4 Mapping Grant (NPG)

Types of Projects

- Planning/design for future implementation projects
- Mapping MS4 systems

Priorities

- Initial planning of non-agricultural nonpoint source, climate resiliency and dam safety projects
- Regulated MS4 mapping

Available funding: Up to $3 million

- $50,000 - $400,000 per project (dependent on project type)

Match requirements:

- 10 % of requested funding

Eligibility: (dependent on project type)

- Municipalities, including Indian Nations (ECL §56-0101)
- Soil and water conservation districts

NEW YORK STATE | Department of Environmental Conservation

Water Quality Improvement Project Program (WQIP)

Types of Projects

- Implementation

Priorities

- Improve water quality or habitat
- Promote flood risk reduction restoration, and enhanced flood and climate resiliency
- Protect a drinking water source

Available funding: At least $215 million

- $100,000 - $15 million per project (dependent on project type)

Match requirements:

- 25 % of requested funds/award

Eligibility: (dependent on project type)

- Municipalities, including Indian Nations
- Soil and water conservation districts
- Not-for-profit corporations

NEW YORK STATE | Department of Environmental Conservation

Research

Cyanobacteria and Low Nutrient Lakes

- HABs have been increasingly reported in low- and moderate- nutrient lakes

- 2018 NYSDEC HABs Action Plans (12 lakes in NY, 5 Finger Lakes, incl. Cayuga Lake)
  - (1) the presence of dreissenids,
  - (2) lake fetch length,
  - (3) lake orientation,
  - (4) phosphorus levels

Mussels, fetch, orientation are not controllable

Bramburger et al. 2021
Callieri et al., 2014;
Carey et al., 2014;
Ewing et al. 2020
Favot et al. 2023;
Freeman et al., 2020;
Gorney et al. 2023;
Knoll et al. 2008
Prestigiacomo et al. 2023;
Raikhow et al. 2004;
Reinl et al., 2021; 2023
Sarnelle et al. 2005, 2012
Sorichetti et al., 2014;
Sterner et al., 2020;
Stetler et al. 2021
Winter et al., 2011;
Vershoor et al. 2017

DEC HAB Collaborative Research

1. HABs Research Guide (2021)
2. Statewide trends and drivers of HABs – Action Plans, publications
   - Gorney et al. (2023)
   - Prestigiacomo et al. (2022), Prestigiacomo (2023).
3. Cyanotoxin degradation study
2. Riverine HABs distribution and frequency
3. HAB Formation and Foodweb Interactions
4. Remote Sensing – Satellite paired Chl-a and Phycocyanin
5. Cyanotoxin method development and validation
6. DEC-USGS Finger Lakes Advanced Monitoring
7. Inter-state, inter-agency workgroups, Great Lakes HABs Collaborative

What's happening with the HABs Collaborative?

HABs in Ontario's Headwaters: Impacts to New York's Finger Lakes

Anthony Prestigiacomo, New York State Department of Environmental Conservation Finger Lakes Watershed Hub

New York State's Finger Lakes Region – Great Lakes Connection

The Finger Lakes of central and western New York are the combined area of 11 glacially formed freshwater lakes and their watersheds. This area (see Figure 1) is approximately 4,600 square miles, extends into all or parts of 13 counties, and includes three of the ten largest lakes within New York state (NYS). Seven of the Finger Lakes are within the Seneca River basin and four are in the Genesee River basin. All drain and ultimately flow north to Lake Ontario.

Tying Finger Lakes to Lake Ontario basin

NEW YORK STATE | Department of Environmental Conservation

LAKE AND RESERVOIR MANAGEMENT
2023, VOL. 39, NO. 1, 21–36
https://doi.org/10.1080/10402381.2022.2161

https://www.tandfonline.com/doi/full/10.1080/10402381.2022.2129525

Apps Google Google Maps Google Scholar New York State Dep... Supervisor Resource... NYHABS Portal NYHABS Workspace All Bookmarks

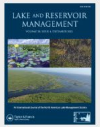
Taylor & Francis Online

Browse Search Publish Login | Register

Home ▶ All Journals ▶ Lake and Reservoir Management ▶ List of Issues ▶ Volume 38, Issue 4 ▶ An evaluation of a spectral fluorometer ....

https://awwa.onlinelibrary.wiley.com/do

Apps Google Google Maps Google Scholar New Y



Lake and Reservoir Management ›
Volume 38, 2022 - Issue 4

Enter keywords, authors, DOI, etc | This Journal | Advanced search

Submit an article | Journal homepage

1,064
Views
0
CrossRef citations to date
2
Altmetric

Listen

Open access

Articles

An evaluation of a spectral fluorometer for monitoring chlorophyll *a* in New York State lakes

A. R. Prestigiacomo, S. G. June, R. M. Gorney, A. J. Smith & A. C. Clinkhammer

Pages 318-333 | Published online: 15 Nov 2022

Cite this article | https://doi.org/10.1080/10402381.2022.2129525 | Check for updates

AWWA WATER SCIE

ORIGINAL RESEARCH | Open Access

Patterns and impacts of cya thermally stratified, oligotrophic lake

Anthony R. Prestigiacomo, Rebecca M. Gorney, James B. Hyde, Courtney Davis, Aimee Clinkhammer

First published: 29 March 2023 | https://doi.org/10.1002/aws2.1326 | Citations: 1

Guest Associate Editor: Dionysios D. Dionysiou

Figures References Rela

View PDF

Recommended

Department of Environmental Conservation

https://dec.ny.gov/environmental-protection/water/water-quality/harmful-algal-

Apps Google Google Maps Google Scholar New York State Dep... Supervisor Resource...

On this page

The HABs Advanced Monitoring Pilot

In a NYS review of HABs, monitoring data was identified as a key component in waterbody management because monitoring data supports outreach efforts, research, water quality assessments, model development, and the ability to evaluate the success of restoration, mitigation and management efforts. To advance to the state of HABs monitoring, DEC initiated a HABs Advanced Monitoring Pilot, in collaboration with the United States Geological Survey (USGS) NY Water Science Center, to monitor and understand HABs in the Finger Lakes region. The USGS, in cooperation with DEC and DOH, developed and implemented a comprehensive monitoring strategy in four Finger Lakes that have recently been affected by HABs. This pilot was conducted on Owasco Lake, Seneca Lake, Canandaigua Lake, and Skaneateles Lake from the summer of 2018 to the fall of 2020.

For an overview of the HABs Advanced Monitoring Pilot, please see Advancing the Understanding of HABs in New York State: The HABs Advanced Monitoring Pilot Fact Book.

For a summary of the Pilot's Purpose, Scope, and Objectives, Summary of Major Findings, Data Products and Publications, and Additional Information, please see NYSDEC/USGS HABs Advanced Monitoring Pilot: Project Summary.

NEW YORK STATE | Department of Environmental Conservation

Accomplishments:

- 2 websites
- beer-reviewed papers
- s (all data publicly
- cience thesis
- rance plans, other docs

https://dec.ny.gov/environmental-protection/water/water-qual

Apps Google Google Maps Google Scholar New York State Dep... Supe

HABs Advanced Mon
Project Summary

Home > Environmental Protection > Water > Water Q Monitoring Pi...

On this page

Purpose, Scope, and Objectives

Summary of Major Findings, Date Products, and

NYS Monitoring Pilot:
Proj

Purpose, Scope, and Objectives

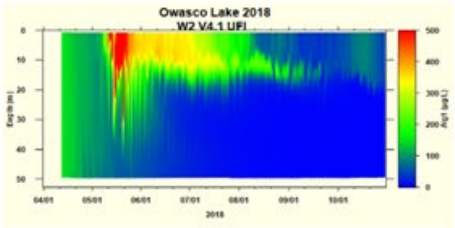
Monitoring data has been identified as a key component in harmful algal bloom (HAB) management because it supports

Owasco Lake Model

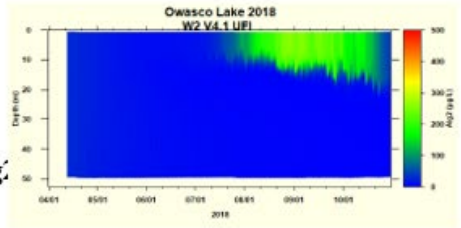
With Mussels “On” – higher Cyano levels near surface

Current

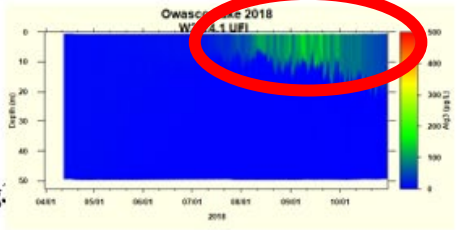
Diatoms (a)



Greens (b)



Cyanos (c)



In-Waterbody Mitigation

In-Waterbody Mitigation Research

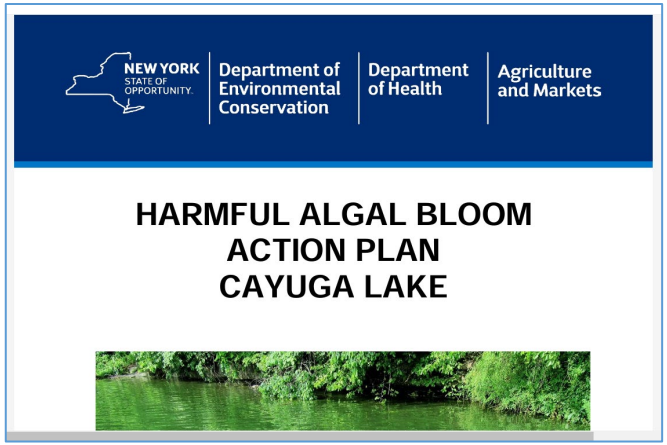
1. Approaches in combination – chemical (algaecides) and physical; scale of treatments
2. Ultrasonic devices – Lake Carmel, Lake Agawam, Lake Welch
3. Ultrasonic Zooplankton/Phytoplankton Study
4. Ultrasonic Fish Response – mesocosm and in-situ
5. In-lake feasibility study – Honeoye, Conesus Lakes
6. Agawam algal skimmer and hydrogen peroxide/oxidation
7. Electrochemical Oxidation and Hydrodynamic Cavitation

Progress in Cayuga's Watershed

Cayuga's Clean Water Plans

Existing and On-going Planning Documents

1. HAB Action Plan (DEC, Cayuga)
   – complete/implementation ongoing
2. TMDL (DEC)
   – drafted/implementation ongoing
3. DWSP2s (DEC, Cayuga)
   – several in development
4. Cayuga Lake WRPP (DOS, Cayuga)
   – complete/implementation ongoing
5. SWCD Strategic Plans (SWCDs)
   – complete/implementation ongoing



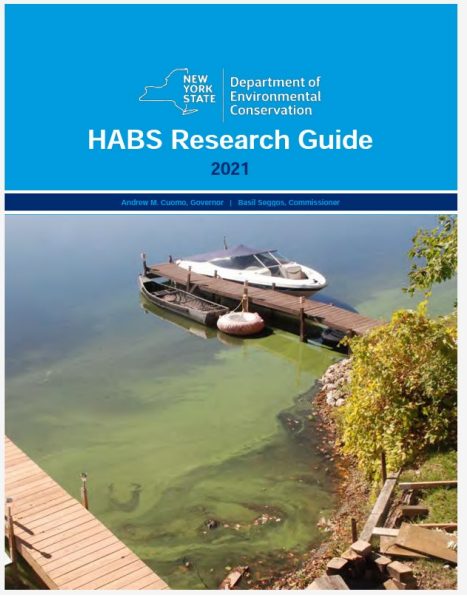
NEW YORK STATE Department of Environmental Conservation

Funding for Implementation: DEC

Historic investments, current high allocations for water and environmental issues

DEC Funding for HABs Initiative (since 2017)

- ~$428M in grants statewide to reduce the frequency of algal blooms



NEW YORK STATE | Department of Environmental Conservation

Cayuga Specific Funds for Phosphorus Reduction

- Using Cayuga's Clean Water Plans
- Implemented Projects – Cayuga L., 2013-2022
- **40 implementation projects awarded**

- **More than $14 M in funding to Cayuga, more than 39,000 lbs P/yr reduced**
  - nutrient management, cover crops;
  - streambank stabilization, hydroseeding;
  - land acquisition, buffers, exclusion;
  - septic pump outs;

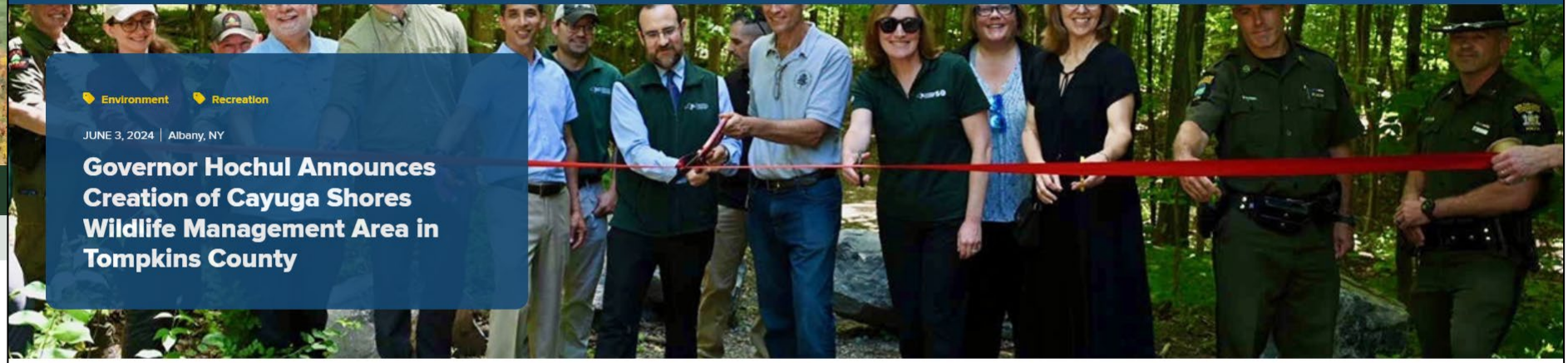
Upgrades to WWTPs
TMDL recommendations for Freeville and Interlaken being implemented

Other Great Lakes/Finger Lakes Funding

- Finger Lakes Cover Crops Rnd 1/Rnd 2 ($670,000 total)
- Finger Lakes Small Grants – Rnd 1 ($350,000 available)
- Great Lakes Program Small grants
- Great Lakes Sediment Nutrient Reduction Program
- Sustain our Great Lakes Program

➢ Great Lakes Action Agenda

➢ Finger Lakes Action Agenda (in development)



Environment Recreation

JUNE 3, 2024 | Albany, NY

Governor Hochul Announces Creation of Cayuga Shores Wildlife Management Area in Tompkins County

$2.5 Million Investment in Former Bell Station Property Will Permanently Protect 3,500 Feet of Pristine Cayuga Shoreline From Development and Enhance Recreational Opportunities

Governor Kathy Hochul today announced the permanent protection of the 287-acre Cayuga Shores Wildlife Management Area, which provides public access to 3,500 feet of pristine shoreline on the east side of Cayuga Lake in Tompkins County. Located in the town of Lansing, the Cayuga Shores Wildlife Management Area features a variety of exceptional fish and wildlife habitat including multiple streams, wooded hillsides and extensive fields

Tony Prestigiacomo

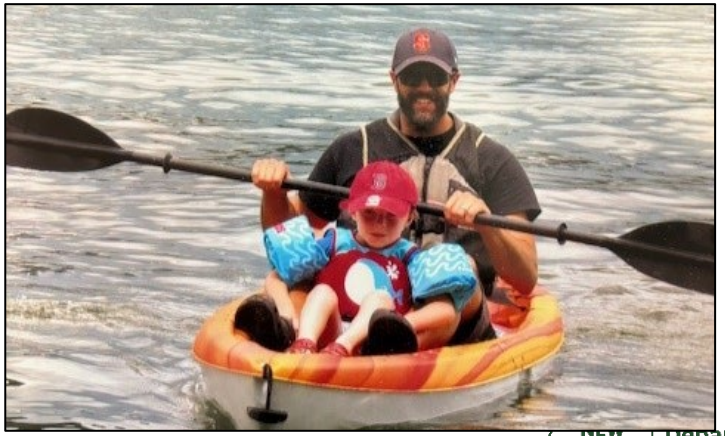
Research Scientist 3

Supervisor Finger Lakes Watershed Hub

615 Erie Bvd. West; Syracuse, NY 13204

anthony.prestigiacomo@dec.ny.gov

(315) 426-7452



NEW YORK STATE Department of Environmental Conservation