

# Honeoye Lake Watershed Task Force

## State of the Lake

### Saturday July 9th, 2016

Terry Gronwall  
Chairman  
585-367-3000  
[watershedtaskforce@gmail.com](mailto:watershedtaskforce@gmail.com)

# Agenda

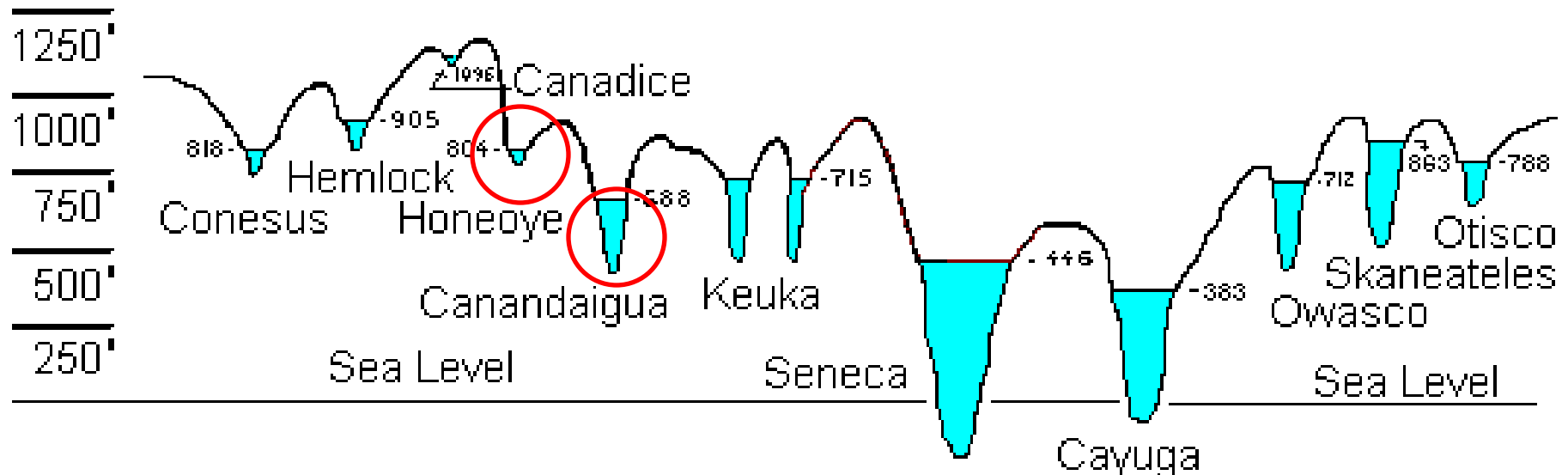
- What type of Lake is Honeoye compared to other Finger Lakes?
- What's happening in the watershed?
- How we are monitoring the lake?
- Our new collaborative research projects?
- What changes have been observed on Honeoye Lake conditions?

What type of Lake is Honeoye  
compared to other Finger Lakes?



# A Tale of Two Lakes: Basic Understanding of Lake Ecology

- physical dimensions
- water quality
- aquatic habitats and organisms  
(including food-web relationships)



## Physical Dimensions

### Canandaigua

10,500

lake surface area (acres)

111,360

watershed area (acres)

10.6 : 1

watershed: lake ratio

### Honeoye

1,805

24,500

13.6 : 1





# Honeoye Lake

Length = 4.1 miles

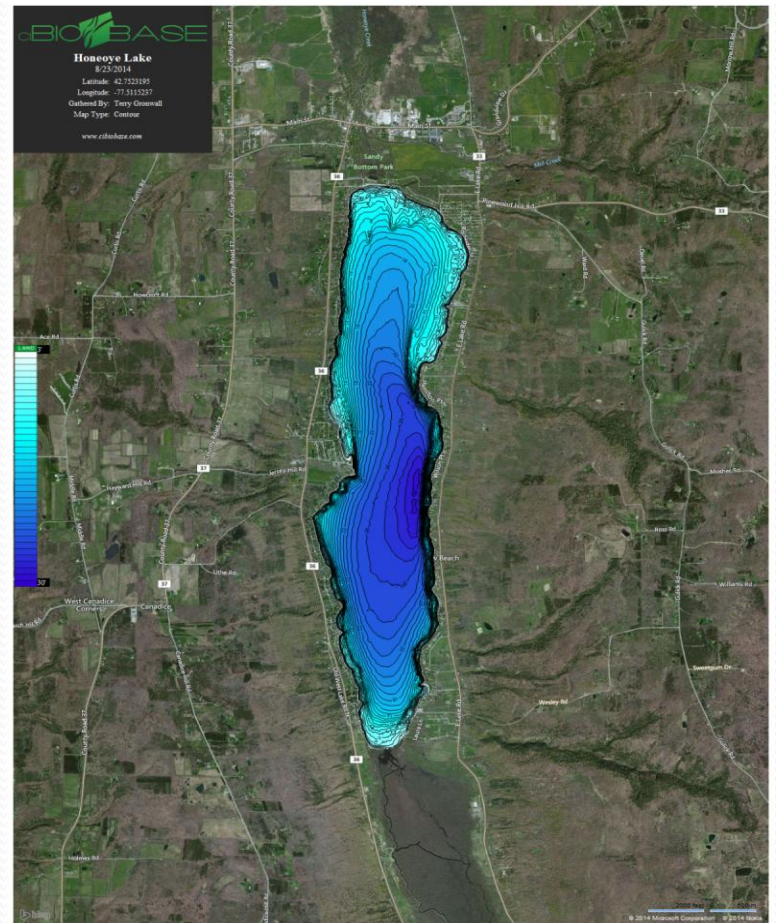
Width = 0.88 miles

Maximum depth = 30.2 feet

Mean depth = 16.1 feet

Volume = 9.2 billion gallons

Flushing rate = 0.75 years  
(but varies seasonally)



# Canandaigua Lake

Length = 15.5 miles

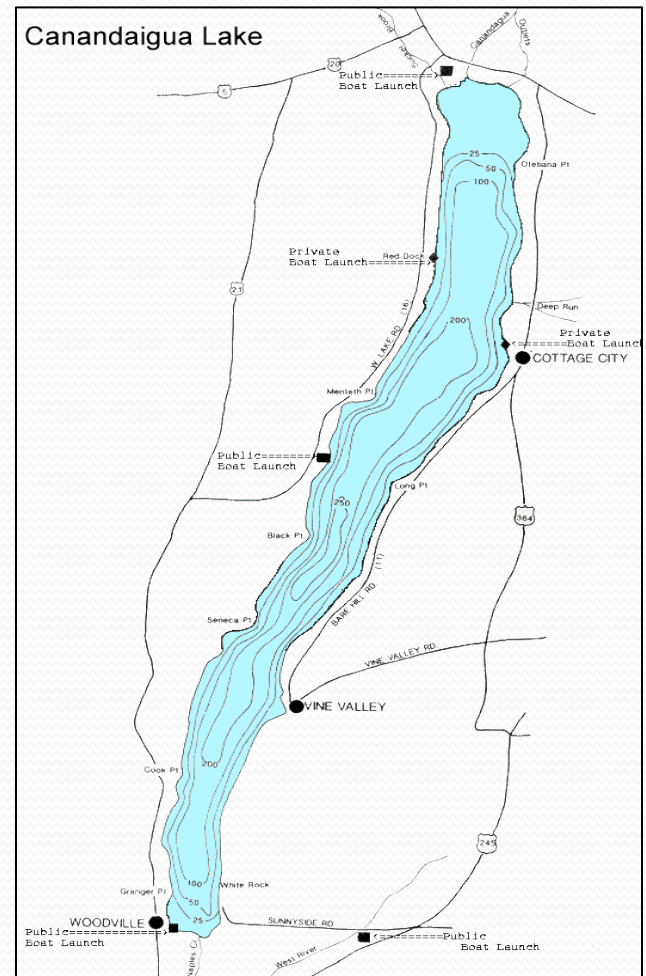
Width = 1.10 miles

Maximum depth = 276 feet

Mean depth = 127 feet

Volume = 429 billion  
gallons

Flushing rate = 13.4 years



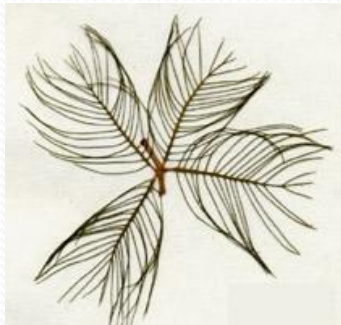
# Water Quality

## Canandaigua

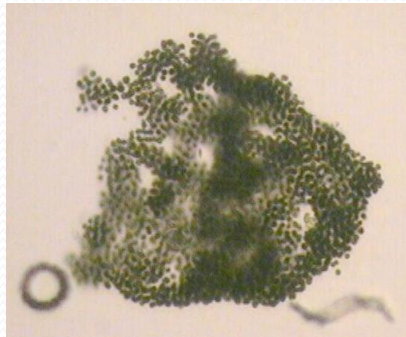
70-75	summer temperatures (°F)
3-9	phosphorus levels (µg/L)
1-6	chlorophyll a (µg/L)
6-10	secchi disk clarity (m)

mesotrophic

trophic condition



Eurasian water milfoil



*Microcystis* sp.



Curly-leaf pondweed

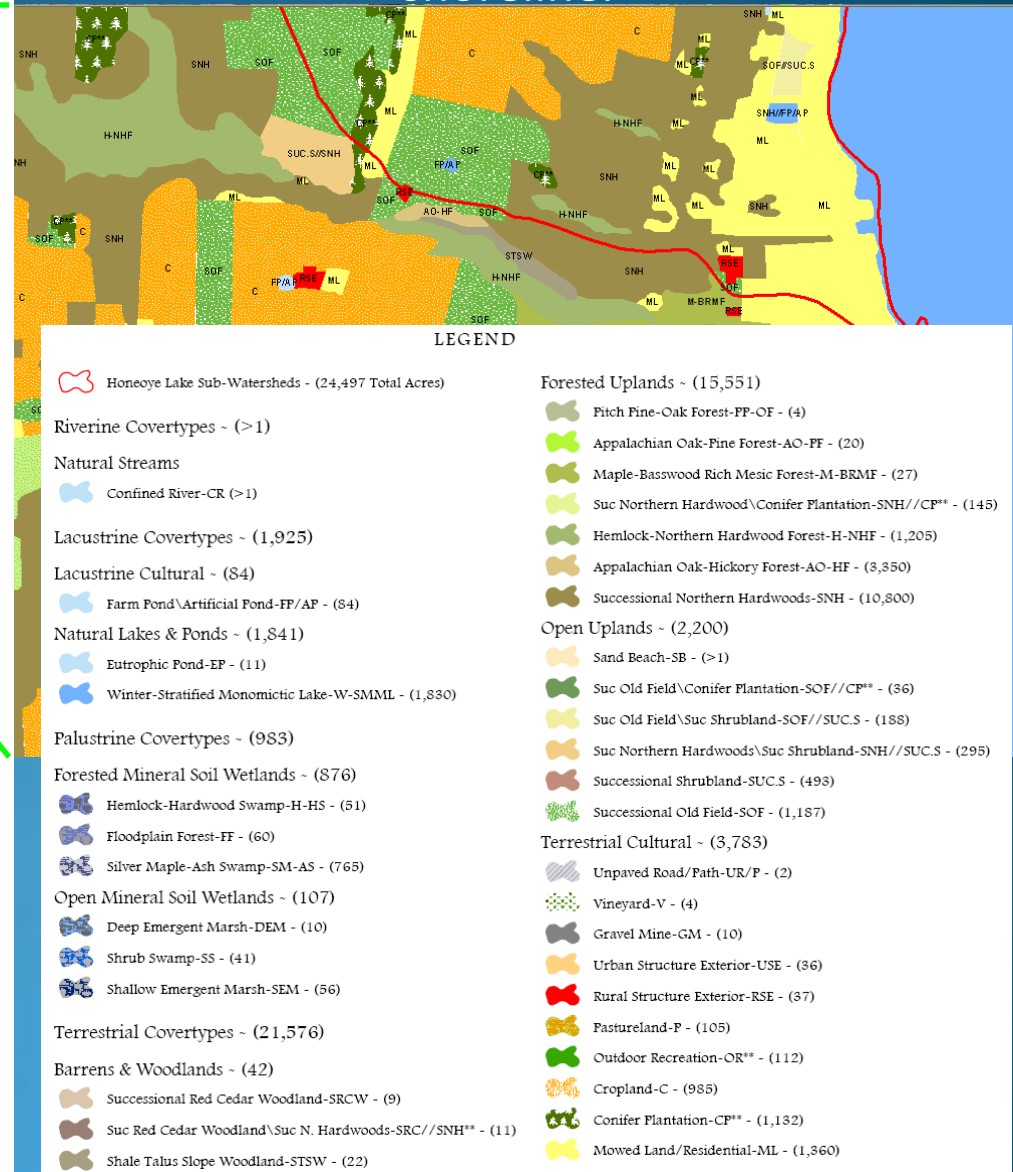
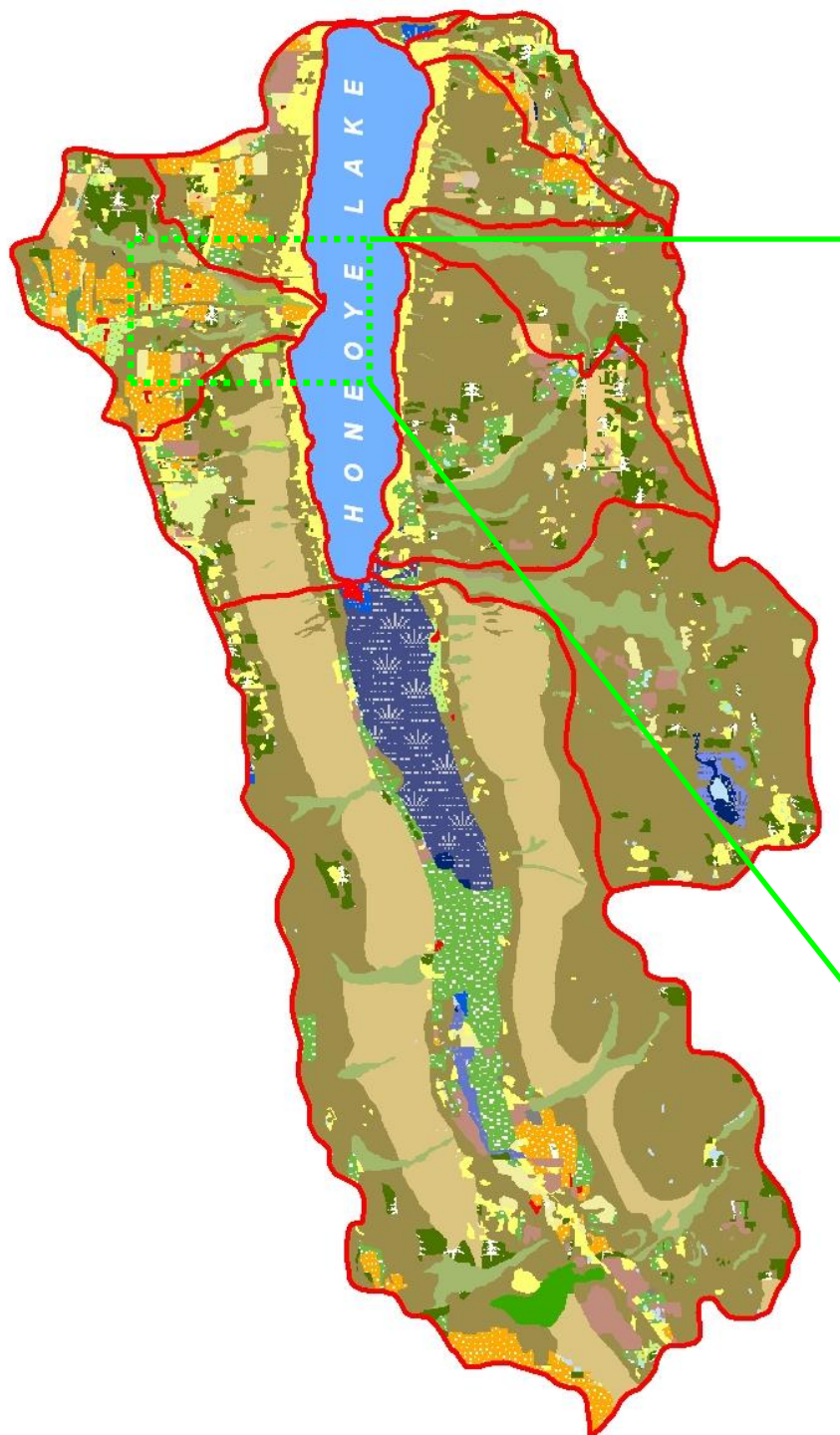
## Honeoye

80-85
14-42
4-26
2-4

eutrophic



What happens in the watershed may be just as important as what occurs along the shoreline.



# Land Cover Comparison

Land Cover Type	Honeoye Lake	Canandaigua Lake
Forest	70%	42%
Agriculture	4%	27%
Grass & Shrub Land	9%	16%
Residential	5%	9%
Wetlands	4%	5%
Commercial	0%	1%
Open Water	7%	0%
Other	1%	0%
Total	100%	100%

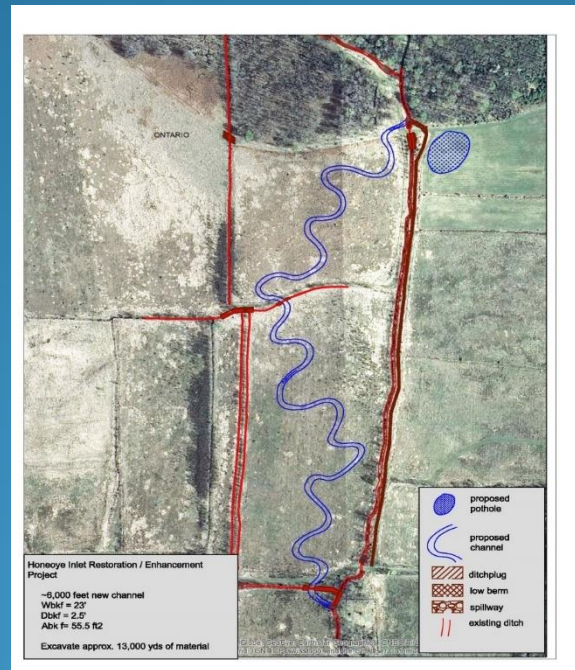
# Honeoye Lake Algal Bloom, 1940's

(note open farmland in the watershed)

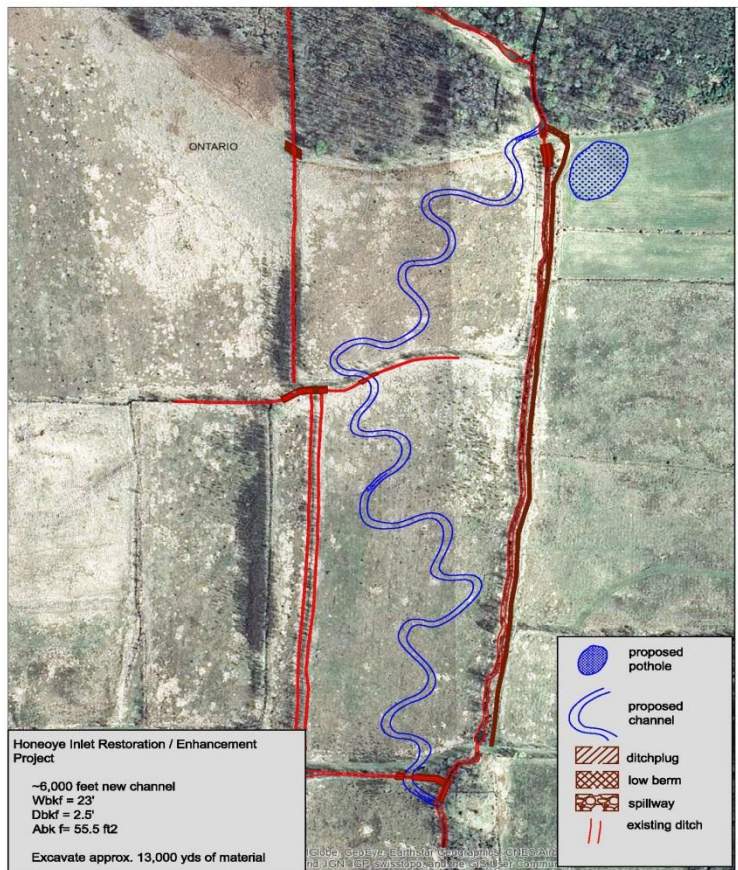




# What's happening in the watershed?



# Honeoye Lake Inlet Restoration Project Update



- Partnership between The Nature Conservancy, US Fish & Wildlife Service, and Ontario County Soil and Water, DEC Region 8, and the Honeoye Lake Watershed Task Force
- Ontario County Soil & Water received a DEC WQIP Grant Award for \$300,000 to fund the project implementation
- WQIP Grant will require ~\$100,000 of local in-kind and cash match
  - TNC has raised ~49,000 to-date
  - Remainder will be in-kind match
- DEC has accepted our permit application
  - Expect permit to be issued in early Aug.
- Construction RFP currently being prepared



# Honeoye Watershed Task Force

- **WQIP Round 11 Grant Project \$135,000 & \$35,000 of In-kind Match**
  - Project work has started
  - Stream bank stabilization in road right a ways, 3 sediment basins, several debris guards, and ten vernal pools at:
    - Harriet Hollister Spencer State Rec Area- 2
    - Muller Field Station-2
    - FLLT Wesley Hill Preserve- 3
    - Cummings Nature Center-3
- **DEC Honeoye Lake Total Maximum Daily Load (TMDL) analysis project**
  - TMDL process will model the various external nutrient sources that contribute to our lake's water quality issues, set target nutrient levels for each controllable nutrient source, and our future grant proposals to address the actions recommended in the 2016 DEC TMDL Final Report will receive a higher priority for funding

# WQIP Round 11 Grant Project

## Vernal Pools

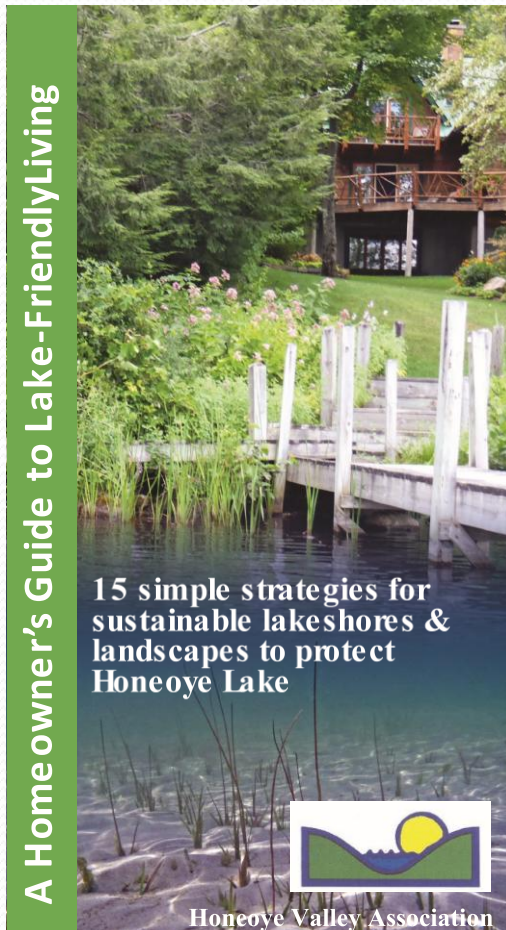


## Storm Water Detention Structure





# A Home Owners Guide to Lake-Friendly Living



1. Reduce Impermeable Surfaces
2. Limit Lawn Size
3. Use Water Wisely
4. Minimize Erosion
5. Be Smart About Lawn Care
6. Use Phosphorus-Free Fertilizer
7. Maintain Your Septic System
8. Don't Flush Your Drugs
9. Maintain Your Vehicles
10. Conserve Water
11. Install a Vegetative Buffer
12. Reduce Household Hazardous Wastes
13. Plant a Rain Garden
14. Go Native
15. **Join the HVA Today!**

# How we are monitoring the lake?



# Water Quality Data Collection

**Secchi Disk**

**Used to Measure Water Clarity**





# Water Quality Data Collection

YSI Temperature & Dissolved  
Oxygen Meter



Temperature & Dissolved  
Oxygen Profiles

A hand is holding a spiral notebook with handwritten data. The text includes the date 'June 17, 2013', location 'Purba Bala', weather 'clear sky & SW Wind', and '50-60°F'. Below this is a table of data for 'Tachic' at '3.25m'. The table has three columns: 'Surf', 'Temp', and 'DO'. The data is as follows:

Surf	Temp	DO
1	20.9	8.79
2	20.8	8.82
3	20.7	8.87
4	20.6	8.95
5	20.5	8.92
6	20.4	8.88
7	20.3	8.66
8	20.2	8.52
9	18.8	8.44

# Water Quality Data Collection

Surface Water Sample Collection  
Integrated Column

Deep Water Sample Collection  
Van Dorn Bottle



# Water Quality Data Collection Protocols

**Monday & Friday  
May – October  
Water Clarity &  
Temp/DO Profiles**

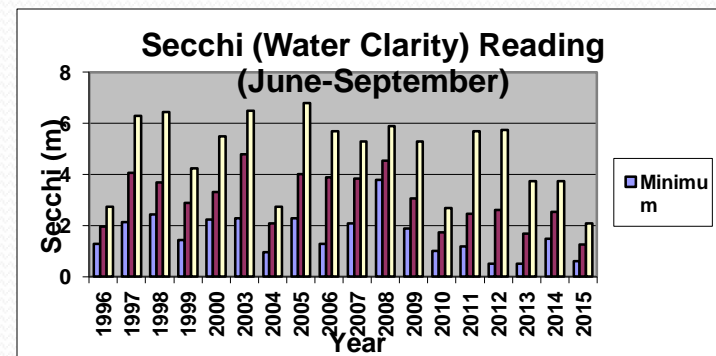
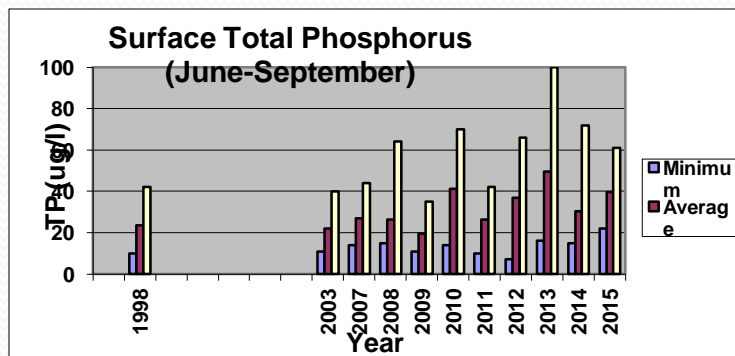
Secchi (Water Clarity)  
Temperature & Dissolved  
Oxygen Profiles

**Twice a Month  
June-September  
Chl-a & Phosphorus**

Total Chl-a (Algae) at Surface  
Total Phosphorus & Soluble  
Reactive Phosphorus  
at Surface & ~26 Feet

**Twice a Month  
June-September  
Nitrogen**

Nitrate/Nitrite, TKN, &  
Ammonia  
at Surface



# Honeoye Lake

## Blue-Green Algae Monitoring



- Started July 2013 at the request of NYSDEC
- Weekly June–mid October
  - 10 BGA Monitoring Sites
  - Send 3-6 BGA Samples to SUNY ESF for Testing every Monday
  - Visual Surveillance with Digital Pictures every Monday & Friday
- BGA visual observations and SUNY ESF test results posted on DEC BGA web site late every Friday afternoon
- Very positive feedback
- BGA - Blue-Green Algae



# NYSDEC Harmful Algal Blooms (HABs) Notifications Page

## <http://www.dec.ny.gov/chemical/83310.html>

Waterbodies with HABs Notifications

Map Number	Waterbody Name	County	Bloom Status	Extent of Bloom	Status Date	Type of Report	Change in Status
1	Agawam Lake	Suffolk	Confirmed	Large Localized	6/21/16	Lab sample	Updated Listing
2	Andover Pond	Allegany	Suspicious	Widespread	6/15/16	Visual report	New
3	Avon Marsh Dam Pond	Livingston	Confirmed with High Toxins	Small Localized	6/20/16	Visual report	Updated Listing
4	Beaver Dam Lake	Orange	Confirmed	Large Localized	6/20/16	Lab sample	New
5	Boerne Pond	Queens	Confirmed	Large Localized	6/14/16	Lab sample	No Change
6	Cornelus Lake*	Livingston	Suspicious	Small Localized	6/15/16	Lab sample	New
7	Crane Lake	Madison	Suspicious	Small Localized	6/22/16	Visual report	New
8	Deans Pond	Cortland	Confirmed	Widespread/Lakewide	6/16/16	Lab sample	Updated Listing
9	Indian Lake	Bronx	Confirmed	Large Localized	6/22/16	Lab sample	New Listing
10	Lake Ronkonkoma*	Suffolk	Confirmed	Small Localized	6/22/16	Lab sample	Updated Listing
11	Mamotoka Lake	Suffolk	Confirmed with High Toxins	Widespread/Lakewide	6/20/16	Lab sample	Updated Listing
12	Mill Pond (Watermill)	Suffolk	Confirmed with High Toxins	Widespread/Lakewide	6/21/16	Lab sample	Updated Listing
13	Montgomery Lake	Sullivan	Confirmed	Not reported	6/16/16	Lab sample	Updated Listing
14	Moon Lake	Jefferson	Suspicious	Large Localized	6/23/16	Visual report	New
15	Old Town Pond	Buffalo	Confirmed	Widespread/Lakewide	6/21/16	Lab sample	New
16	Prospect Park Lake	Kings	Confirmed with High Toxins	Small Localized	6/21/16	Lab sample	Updated Listing
17	The Lake in Central Park	New York	Confirmed with High Toxins	Widespread/Lakewide	6/22/16	Lab sample	Updated Listing
18	Turtle Pond	New York	Confirmed	Widespread/Lakewide	6/22/16	Lab sample	New
19	Warners Lake	Albany	Confirmed	Small Localized	6/22/16	Lab sample	New

\* blooms in large lakes may be limited to specific shorelines or confined bays. Portions of any of these lakes may be clear and fully support recreational uses

This table reflected the status of harmful algal blooms as reported to DEC; public beach closure and drinking water information is available from your local health department.

The 2016 DEC Lake Monitoring Program includes the [Lake Classification and Inventory Survey \(LCI\)](#), the [Citizens Statewide Lake Assessment Program \(CSLAP\)](#) and several individual lake sampling programs. The map above shows locations sampled within the previous three weeks. For specific information about the current sampling results for lakes sampled through the 2016 DEC Lake Monitoring Program, contact the Division of Water at 518-402-8179.

Lake Champlain blooms are not reported here. For information about blue-green algae on Lake Champlain, visit the [Lake Champlain Committee monitoring page](#) and the [Vermont Department of](#)

Bloom Status

DEC HABs Program staff use visual observations, digital photographs and laboratory sampling results to determine whether a bloom consists of cyanobacteria (also known as blue-green algae) or another type of algae. A waterbody with a bloom may have one of three statuses: Suspicious, Confirmed or Confirmed with High Toxins Bloom.

- Suspicious Bloom:** DEC staff determine that conditions fit the description of a cyanobacteria bloom (HAB), based on visual observations and/or digital photographs. It is not known if there are harmful toxins or other compounds in the water. The bloom may be present in all or part of the waterbody. Laboratory analysis has not been done to determine if this is a HAB. Cyanobacteria are infants to some people even if toxins are not present so all contact with the bloom should be avoided. Blooms may be present in all or part of the waterbody.
- Confirmed Bloom:** Water sampling results have confirmed the presence of a cyanobacteria HAB which may produce toxins or other harmful compounds.
- Confirmed with High Toxins Bloom:** Water sampling results have confirmed that there are toxins present in enough quantities to potentially cause health effects when people and animals come in contact with the water through swimming or drinking.

Extent of Bloom

The extent of the bloom is a rough estimate of the size of the bloom within the waterbody and is recorded by monitoring program staff or from public reports.

- Small Localized:** Bloom affects a small area of the waterbody, limited from one to several neighboring properties.
- Large Localized:** Bloom affects many properties within an entire cove, along a large segment of the shoreline, or in a specific region of the waterbody.
- Widespread/Lakewide:** Bloom affects the entire waterbody, a large portion of the lake, or most to all of the shoreline.
- Open Water:** Sample was collected near the center of the lake and may indicate that the bloom is widespread and conditions may be worse along shorelines or within recreational areas. Special precautions should be taken in situations when a Confirmed with High Toxins Bloom is reported with an Open Water extent because toxins are likely to be even higher in shoreline areas.

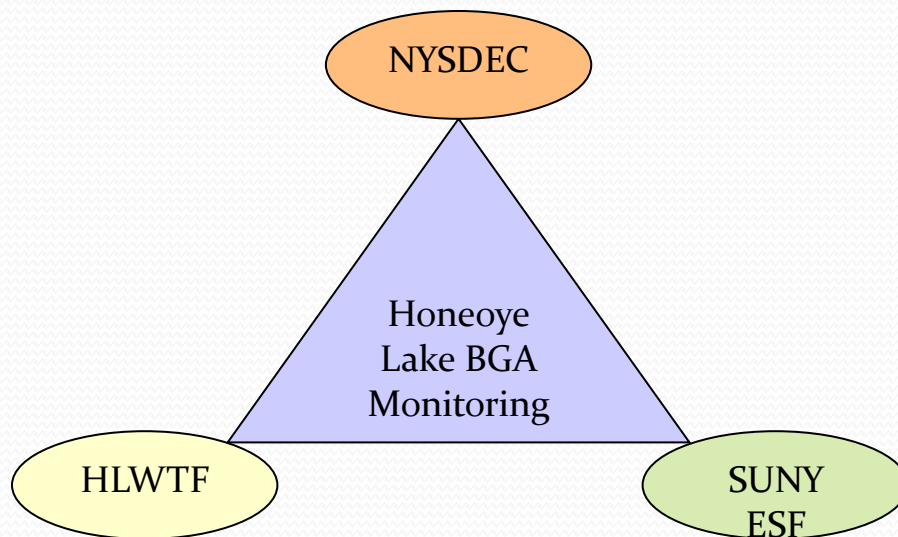
Important things to Know About HABs

- If you see it - avoid it**
- People, pets and livestock should avoid contact with water that is discolored or has algae scums on the surface. Colors can include shades of green, blue-green, yellow, brown or red. If contact does occur, rinse thoroughly with clean water to remove algae.
- Never drink untreated surface water, whether or not algae blooms are present.** Untreated surface water may contain other bacteria, parasites or viruses, as well as cyanotoxins that could cause illness if consumed.
- People not on public water supplies should not drink surface water during an algal bloom, even if it is treated, because in-home treatments such as boiling, disinfecting water with chlorine or ultraviolet (UV), and water filtration units do not protect people from HABs toxins.
- Stop using water and seek medical attention immediately if symptoms such as vomiting, nausea, diarrhea, skin, eye or throat irritation, allergic reactions or breathing difficulties occur after drinking or having contact with blooms or untreated surface water.
- Please report any health symptoms to your physician and NYS Department of Health at [harmfulalga@health.ny.gov](mailto:harmfulalga@health.ny.gov) or your local health department.



# BGA Testing Results

	# of Wks	# of Samples	% > DEC BGA Bloom Criteria	High Toxin
• 2013	10	26	54%	6
• 2014	18	58	33%	0
• 2015	20	71	15%	1
• 2016	5	15	0%	0 (6/1-7/5)



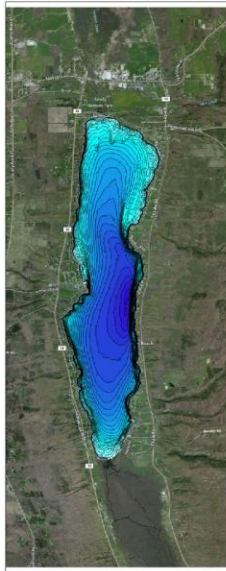
# HONEOYE LAKE

## STATE OF THE ART MAPPING

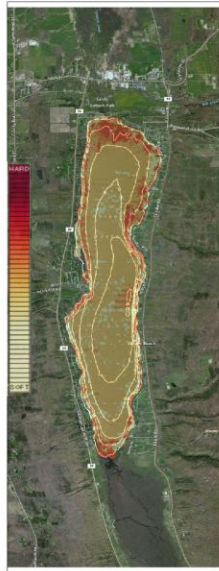
Terry Gronwall, Honeoye Lake Watershed Task Force  
585-750-4420, tgronwall@taurusgroupllc.com



Sampling  
transects



One foot  
contours



Bottom  
hardness

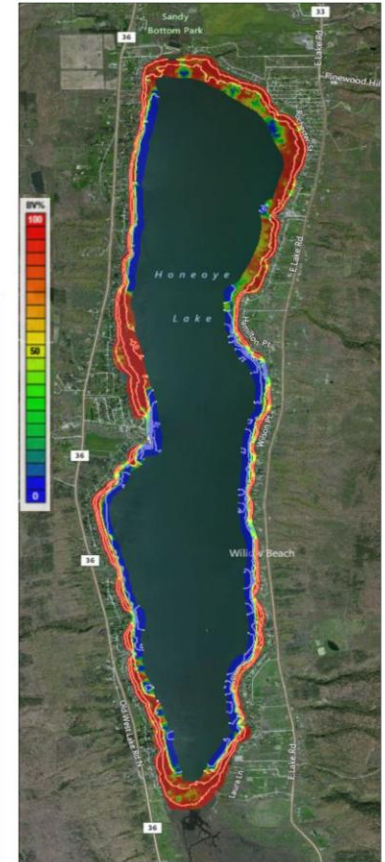


This research project used the new ciBioBase lake mapping service to create new bathymetric, bottom hardness, and macrophyte maps of Honeoye Lake.

The bathymetric and bottom hardness maps were created by spending over 30 hours on the lake collecting GPS coordinates and depth readings using a Lowrance GPS/Depth Finder every 5 seconds while traveling at 5 MPH along East West transects spaced approximately 200' apart. These maps will be invaluable for future Honeoye lake research projects.

The macrophyte maps have been used to make Honeoye Lake's aquatic vegetation harvesting operation more efficient by concentrating efforts on areas in the lake that have aquatic vegetation growing through most of the water column. This is shown as the red zone on the vegetation map.

The effort to create new Honeoye Lake macrophyte, bathymetric, and bottom hardness maps was sponsored by the Honeoye Lake Watershed Task Force and supported by grant funding from the Ontario County Water Resources Council.

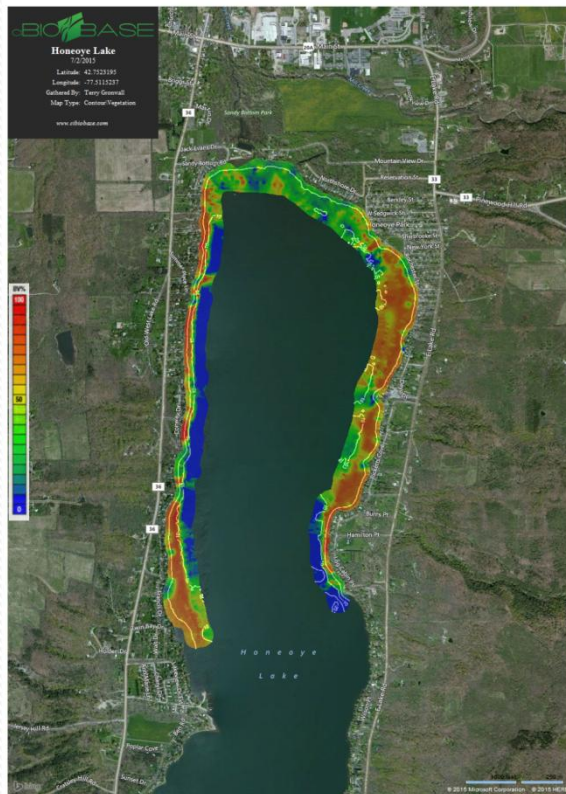


Macrophyte bio-volume

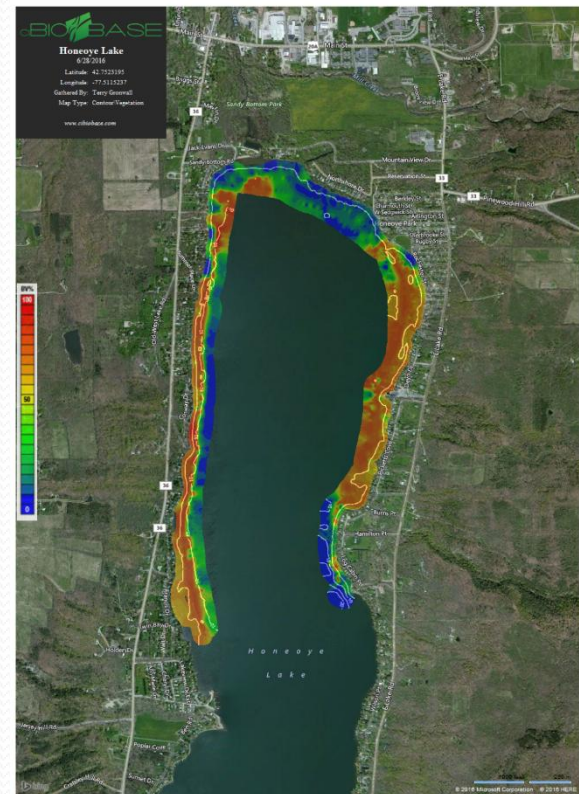


# Northern Lake Basin Aquatic Vegetation Map

July 2, 2015



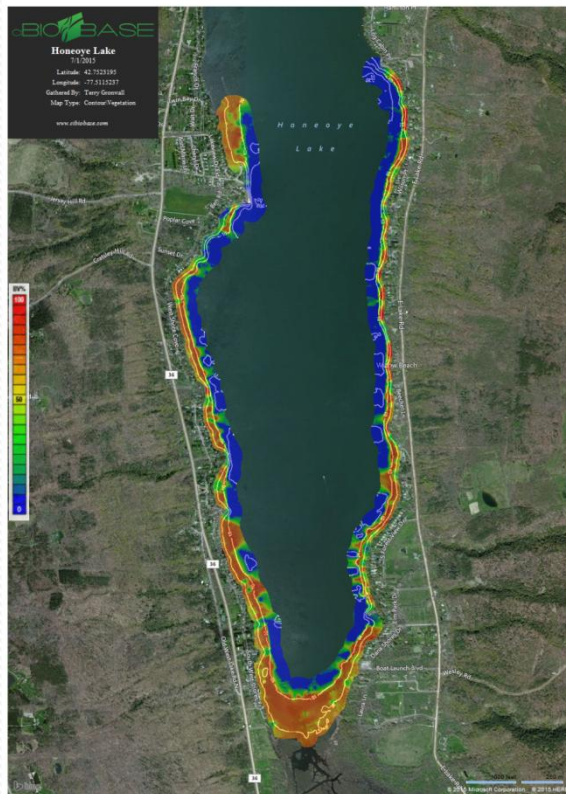
June 28<sup>th</sup>, 2016



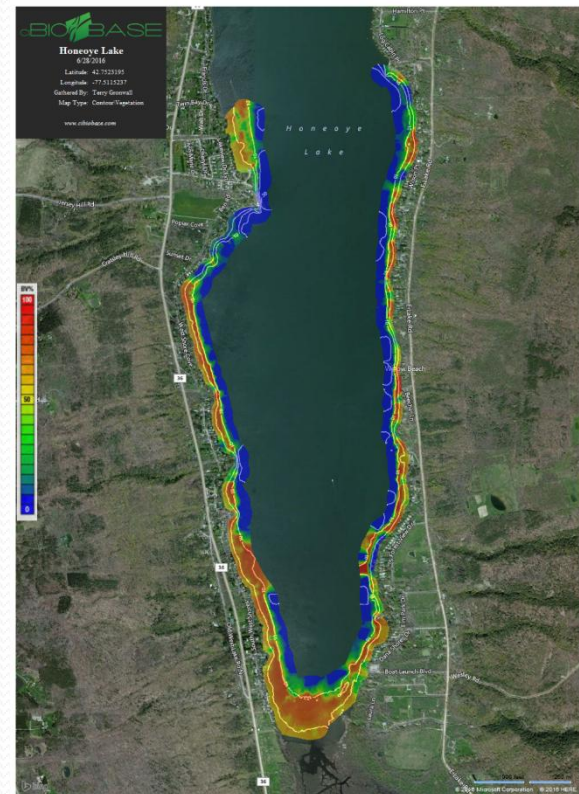


# Southern Lake Basin Aquatic Vegetation Map

July 1, 2015



June 28<sup>th</sup>, 2016



# Our new collaborative research projects?





# Cornell University & Finger Lakes Community College

## *Effects of Climate Warming in NY's Shallow Large Lakes: Temperature Stratification and Water Quality*



- Researcher's
  - Dr. Nelson Hairston Jr., Cornell
  - Dr. Bruce Gilman, FLCC
- Lakes - Honeoye & Oneida Lakes
- Time Period - 3 Years
- Research Funded by Grants
  - US Department of Agriculture
  - Cornell's Atkinson Center for a Sustainable Future
- Hypothesis
  - Climate warming is causing the surface water to be warmer creating stronger and longer time periods of stratification in the water column. This causes the water near the lake bottom to be anoxic (no oxygen) for longer periods of time increasing the amount of legacy phosphorus being released from bottom sediments

# Cornell University & Finger Lakes Community College

## *Effects of Climate Warming in NY's Shallow Large Lakes: Temperature Stratification and Water Quality*



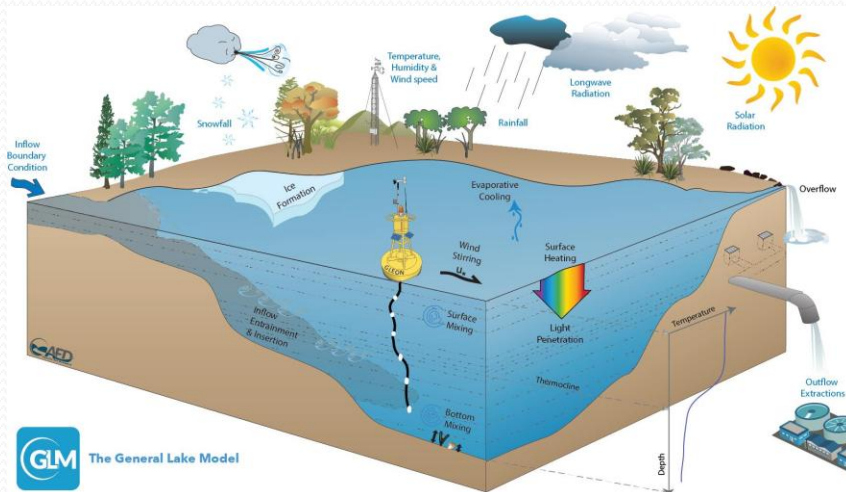
- Water Quality Data being Collected and Analyzed
  - Weather data – Air temperature, wind direction & speed, rainfall, humidity, ...
  - Water Temperature (minute) every meter (~3.3 feet) from lake bottom to surface

### Water column monitoring

- Temperature & DO Profiles
- Chlorophyll-a at surface
- Zooplankton & Phytoplankton
- Phosphorus, Nitrogen, & iron samples 5 different water depth

# Cornell University & Finger Lakes Community College

## Effects of *Climate Warming in NY's Shallow Large Lakes:* *Temperature Stratification and Water Quality*



- 2016
  - Collect first year data
- 2017
  - Use the “General Lake Model” platform to model Honeoye Lake
  - Collect 2<sup>nd</sup> year data
  - Use year 2 data to refine model
- 2018
  - Collect year 3 data –validate model
  - Determine effects of the warming climate on Honeoye Lake
  - Make specific recommendations on how to mitigate the effects of the legacy phosphorus in the lake bottom to reduce nutrients levels in the water that enable blue-green algae blooms



# Finger Lakes Institute

## *A preliminary study of the role of nitrogen in harmful algal blooms (HABs) in the Finger Lakes*



- **Where?** Honeoye Lake  
**What?** Role of nitrogen in the occurrence of harmful algal blooms  
**Collaborators?** Roxanne Razavi, FLI; Mark McCarthy and Silvia Newell, Wright State University; Terry and Dorothy Gronwall, HLWTF  
**Funding Agency?** Ontario County WRC
- **Project Summary**  
Freshwater systems are generally thought to be phosphorus limited
- Research shows cyanobacteria growth is higher with the addition of both phosphorus & nitrogen compared to either nutrient alone
- This project will quantify the most bio-available form of nitrogen, ammonium to assess the availability of this essential growth factor in causing HABs



# Finger Lakes Institute

## *Water quality and algal community dynamics in the Finger Lakes*



- **Where?** Honeoye & Canandaigua Lakes.  
**What?** Nearshore water quality and algal community composition  
**Collaborators?** Roxanne Razavi, FLI; Terry and Dorothy Gronwall, HLWTF
- **Funding Agency?** NYS Water Res. Inst.
- **Project summary**  
This project aims to characterize algal blooms throughout the summer
- Determine water chemistry conditions before, during, and after successive algal blooms to assess what factors are associated with HABs
- FluoroProbe will be used to differentiate four major phytoplankton groups (green algae, diatoms, cryptophytes, and cyanobacteria) in the water column in open water and nearshore areas

# Thiamine measurement at Honeoye Lake by Binbin Wang

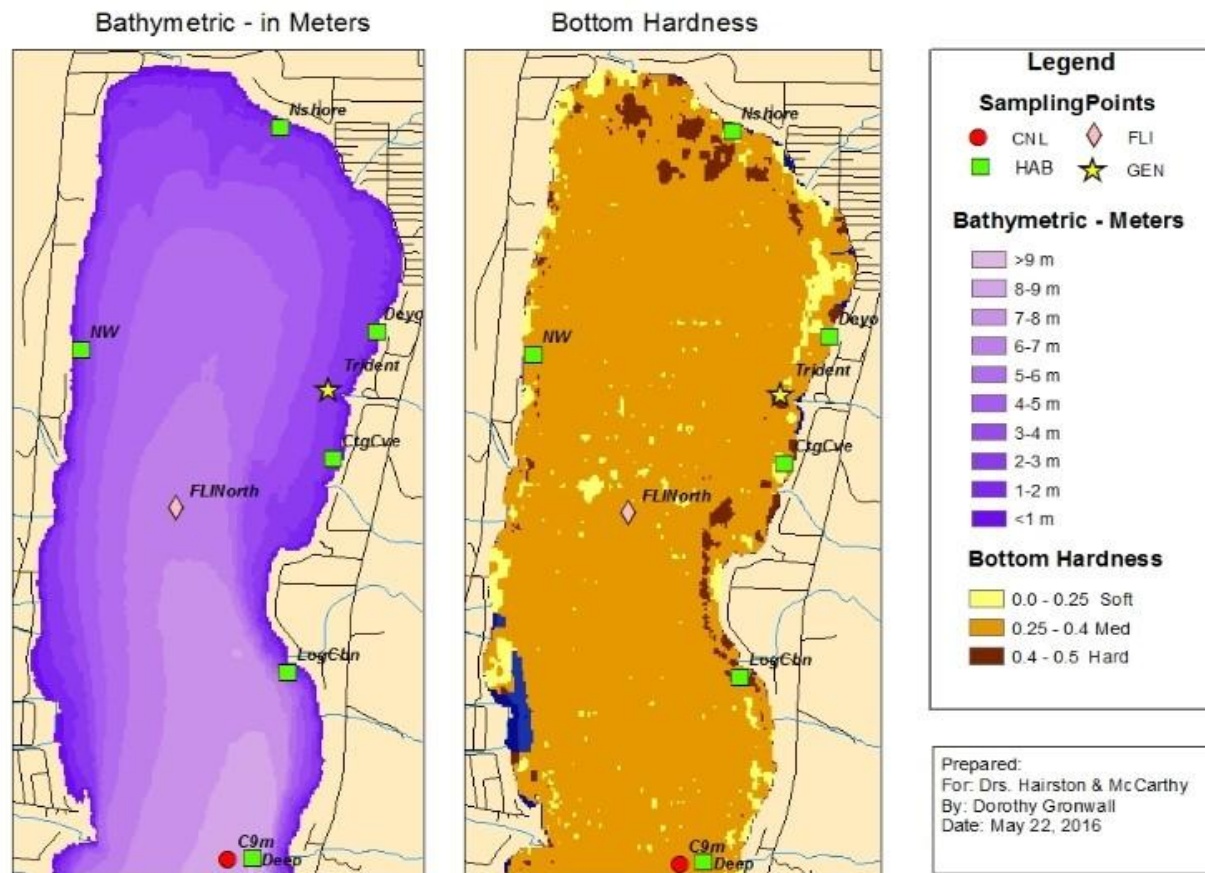
## PhD candidate from Cornell University



- ***Where?*** Honeoye Lake
- ***What?*** Thiamine concentration determination & relationship with phytoplankton
- ***Collaborators?*** Roxanne Razavi, FLI; Terry and Dorothy Gronwall, HLWTF
- ***Project summary***
- Many blue-green algae cannot produce the vitamins (Thiamine Vitamin B<sub>1</sub>) they require on their own
- Thiamine is an essential micronutrient for these phytoplankton groups
  - Ingest thiamine from environment
- Objective is to get a clear understanding of the role of thiamine to algae blooms by determining the concentrations of thiamine and the changes in community composition and biomass of the algae in Honeoye Lake

# Water Quality Monitoring Locations

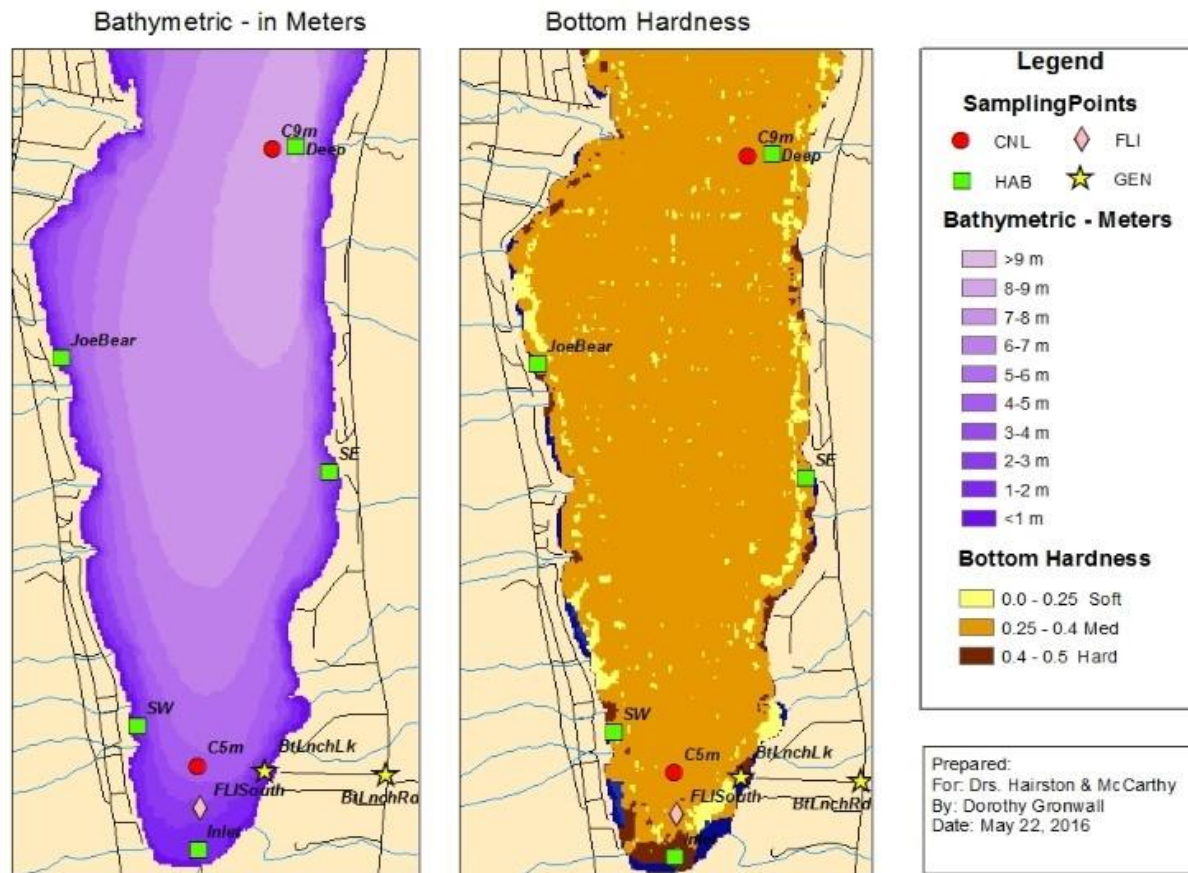
## Honeoye Lake North Basin





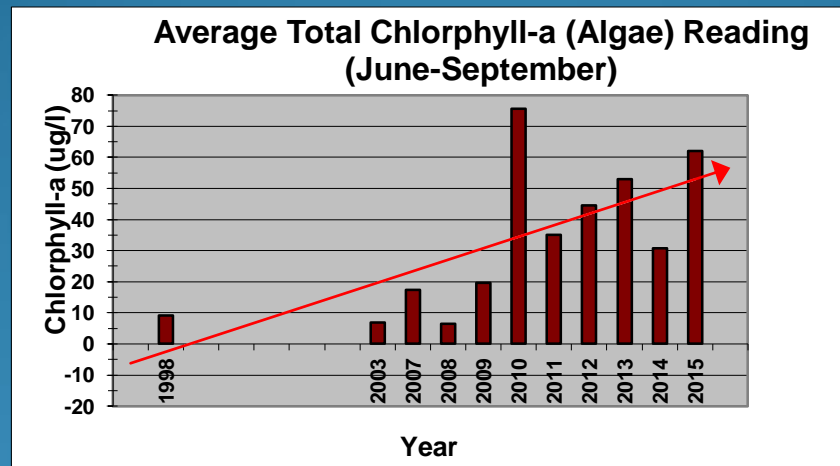
# Water Quality Monitoring Locations

## Honeoye Lake South Basin



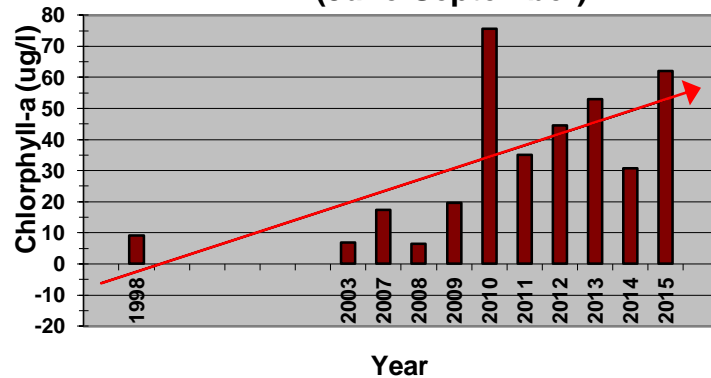


# What changes have been observed on Honeoye Lake conditions?

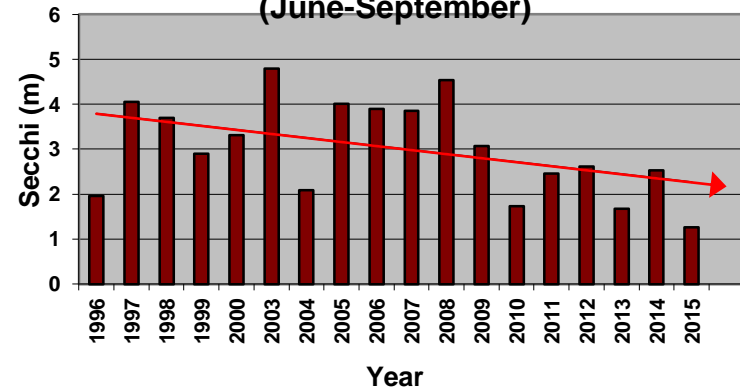


# Long Term Water Quality Data Trends

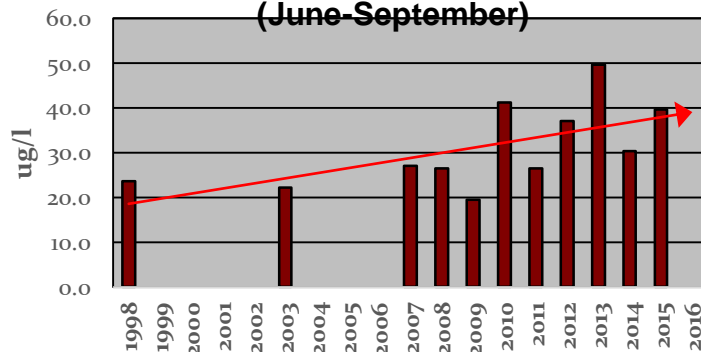
**Average Total Chlorophyll-a (Algae) Reading  
(June-September)**



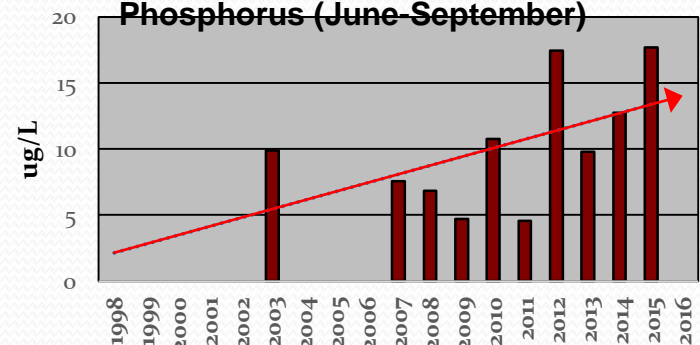
**Average Secchi (Water Clarity) Reading  
(June-September)**



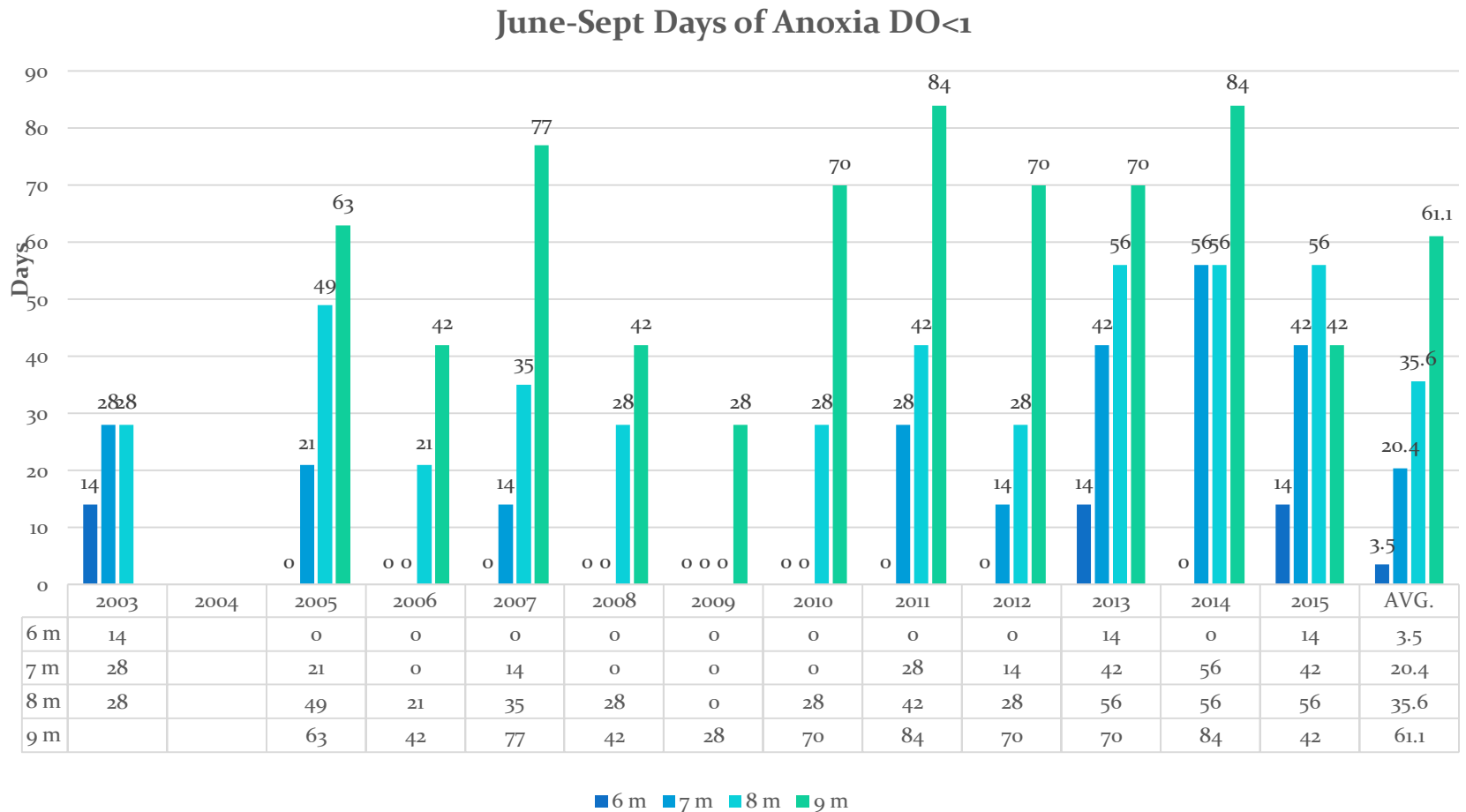
**Average Surface Total Phosphorus  
(June-September)**



**Average Surface Soluble Reactive  
Phosphorus (June-September)**



# 2003-2015 June-Sept Days of Anoxia DO<1



# Potential Contributing Factors

## Physical

- Warming Surface Water Trend
- Mild Winters with Early Ice Out 2010-2013
- More Frequent Severe Storm Events (3 “100 yr.” Storms in Last 2 Years)
- Land Use Practices
- Shoreline Development
- Roadside Ditch Cleaning Practices
- Disturbing the Shallow Water Sediments

## Chemical

- TP & SRP Levels 25%-~100% increased 2010-2015 versus 1996-2009
- Very Low Nitrogen Levels
- Alum Treatment 2006-2007
- Alum Treatment only effective 2007-2009

## Biological

- Average Chl-a has increased 4x 2010-2015 versus 1996-2009
- Gloeotrichia Algae Blooms 2007-2014 (None in 2015 & YTD 2016)
- Weed Line has Moved from 17' in 2002 to 12' in 2014-2016
- Zebra Mussel Population Decline (33% 2002-2014)
- Walleye Population Decline (32,000 to 6,000 from 1999 to 2012)



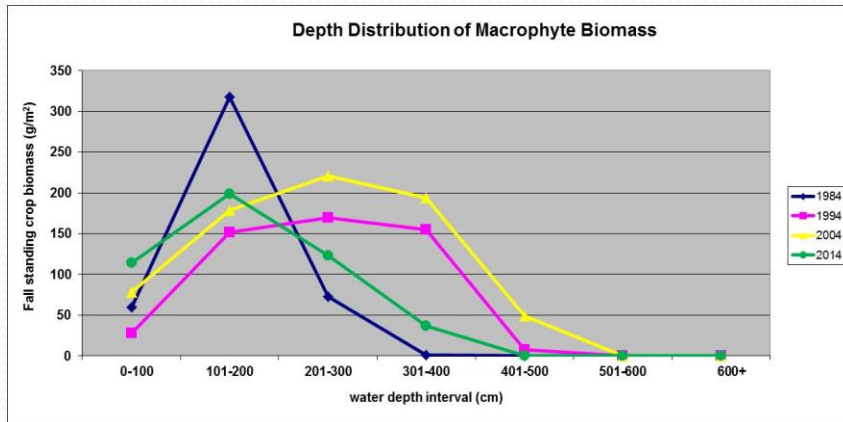
# Three “100” Year Storms in last 2 Years



- May & July 2014
- June 2015



# Aquatic Vegetation Trends



- Weed Line has moved from 16+ feet to 12 feet

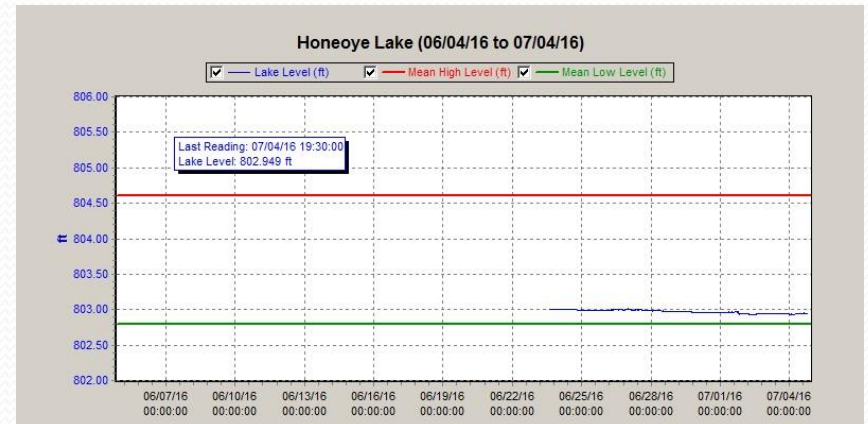
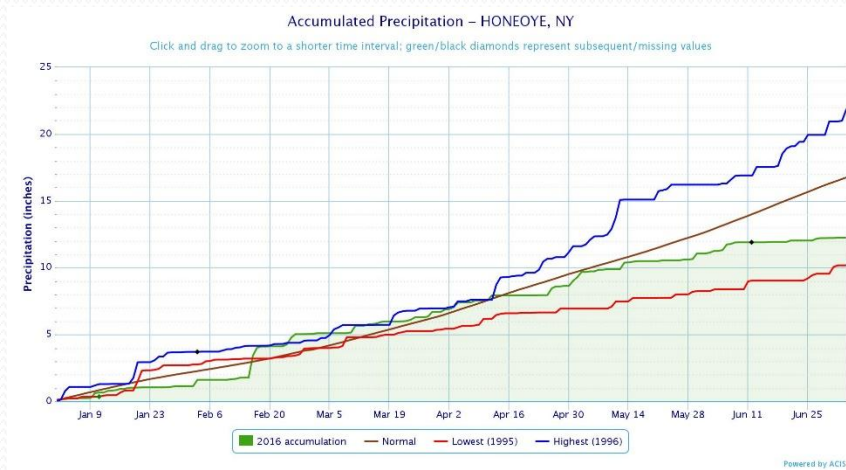
# Gloeotrichia Algae Blooms



- Gloeotrichia Algae Blooms mid-June through mid-July 2007-2014
- Gloeotrichia acts like a shallow water Phosphorus pump
  - It acquires nutrients directly from shallow water sediments
  - Usually blooms in June-July in Shallow Water
  - Dies off in mid-July releasing phosphorus into the water column to provide nutrients for the late summer blue-green algae blooms
- No Gloeotrichia Bloom in 2015



# Weather Through June 2016



# DEC will be requiring Benthic/Weed Mat Permits Starting in 2017



- DEC will develop an abbreviated permitting process over the next few months for the use of benthic/Weed mats in Region 8
- More information to follow as it becomes available
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# Thank You Questions

