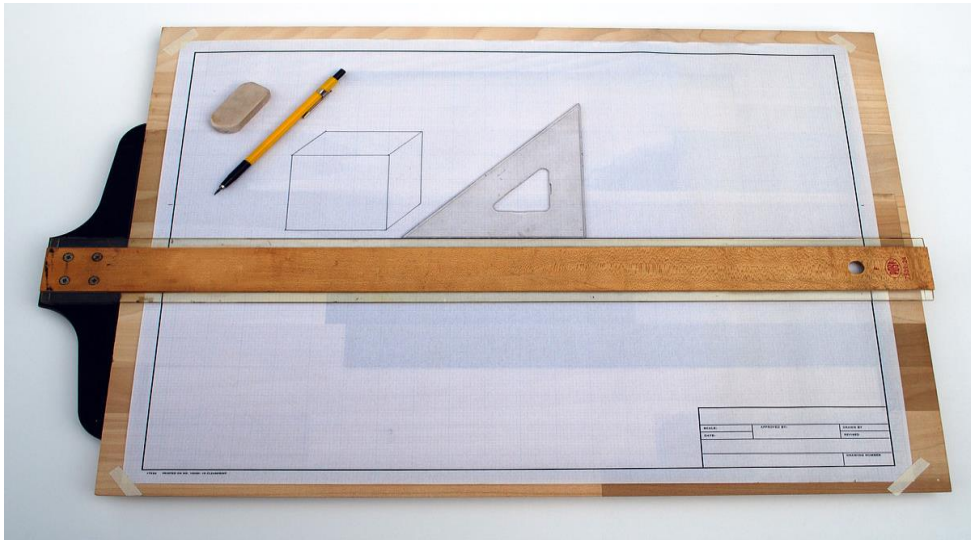
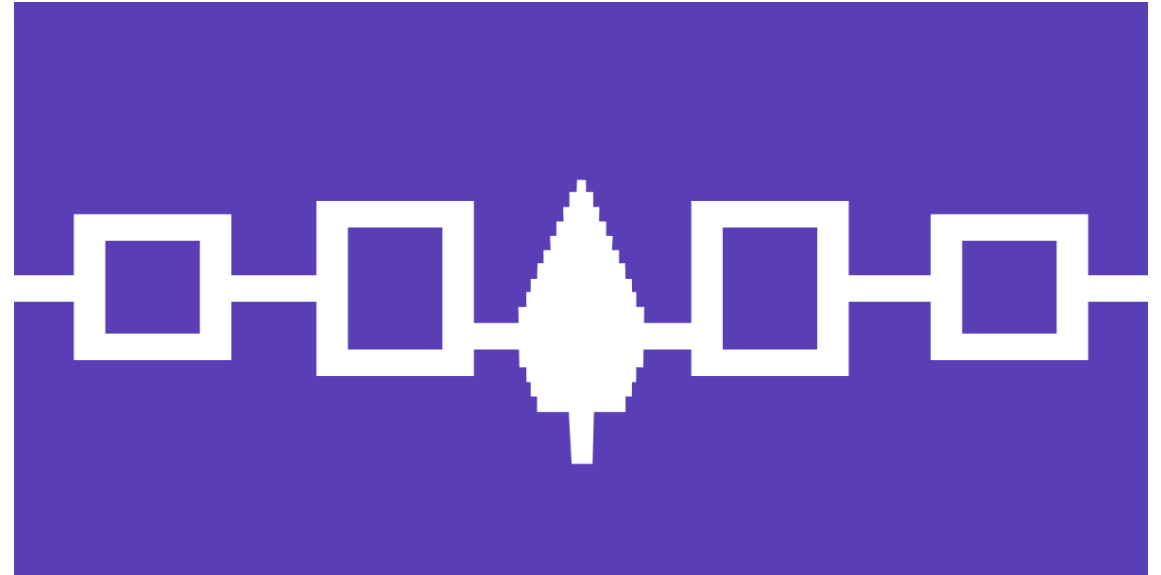


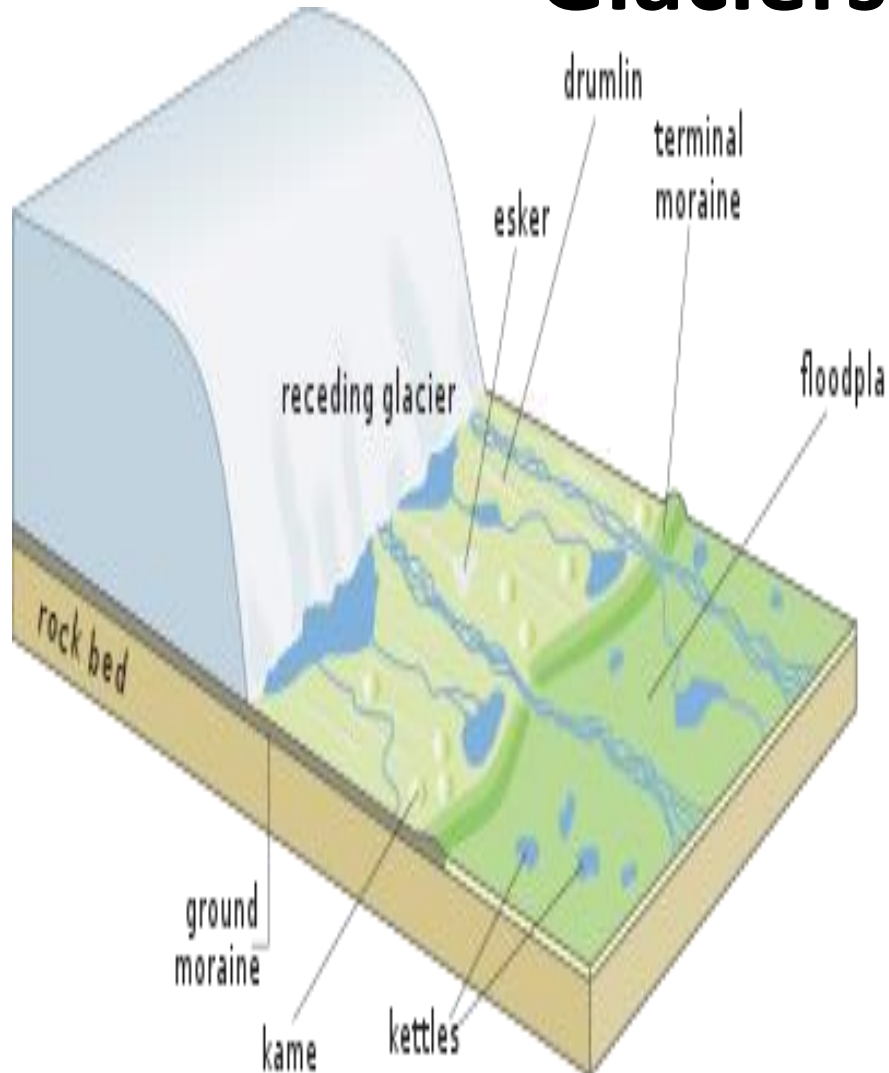
Crooked Lake – Glacier to Community



A photograph of a lake with a large piece of driftwood in the foreground and dense green foliage in the background. The water is calm, reflecting the surrounding greenery. In the lower-left foreground, there are some lily pads and a small yellow buoy. The text is overlaid on the left side of the image in a white, sans-serif font.

“Kettlehole “ Lake
115 Acre Surface Area
2230 Acre Watershed
16 Feet Mean Depth
68 Feet Deepest Point

Glaciers – Sandurs – Seracs



11,000 BCE

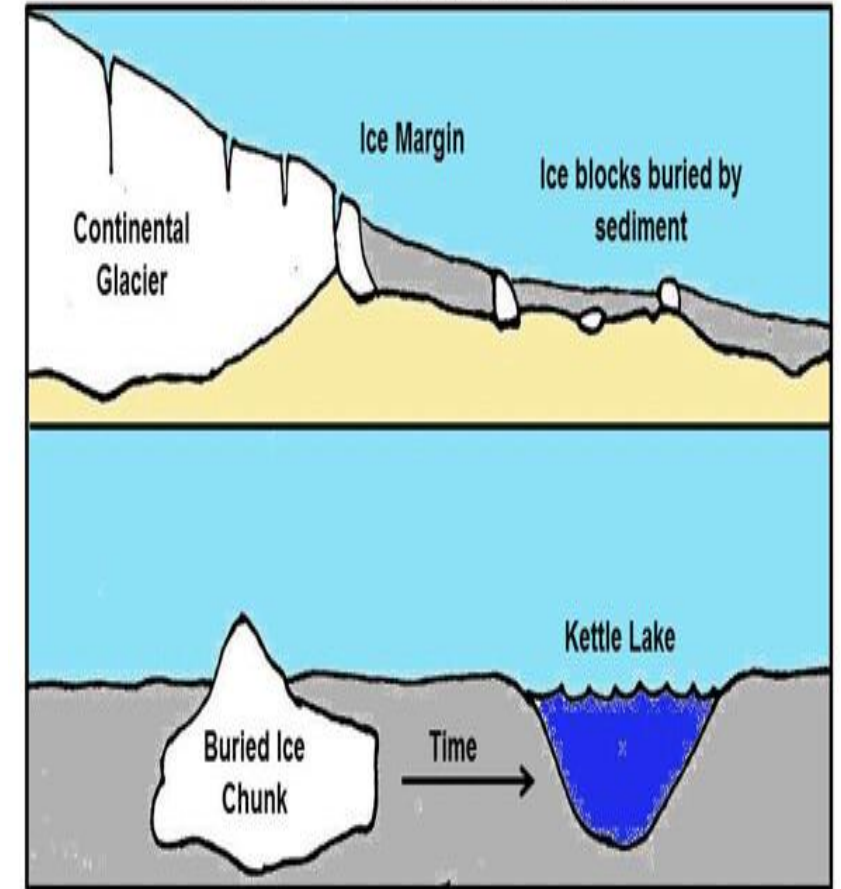
Wisconsinan Glaciation

Valley Heads Moraine

Lakes, Ponds & Depressions :

- Green, Tully, Crooked, Song, Tracy, and Mud Lakes
- Gatehouse, Round etc Ponds
- Seasonally wet and dry Kettleholes

Formation of Kettle Lakes

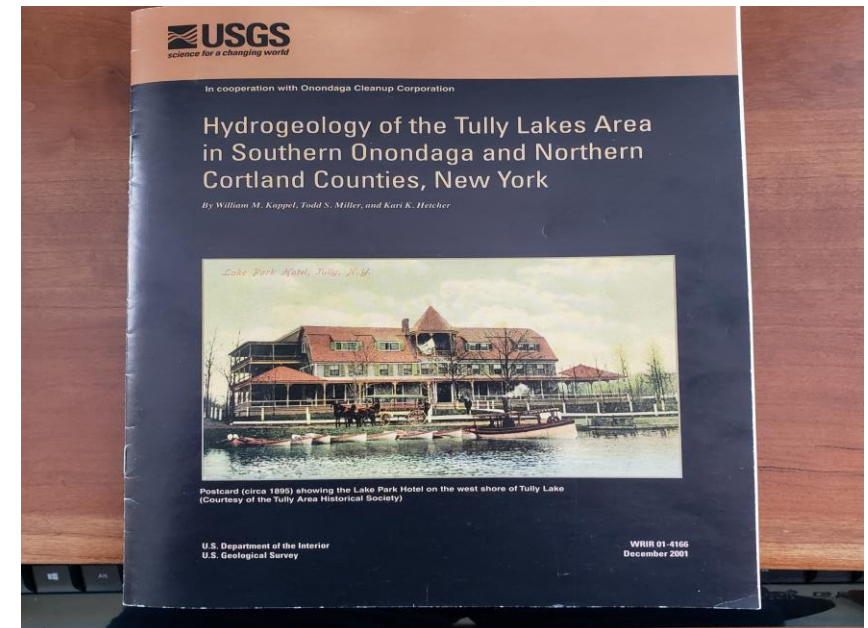
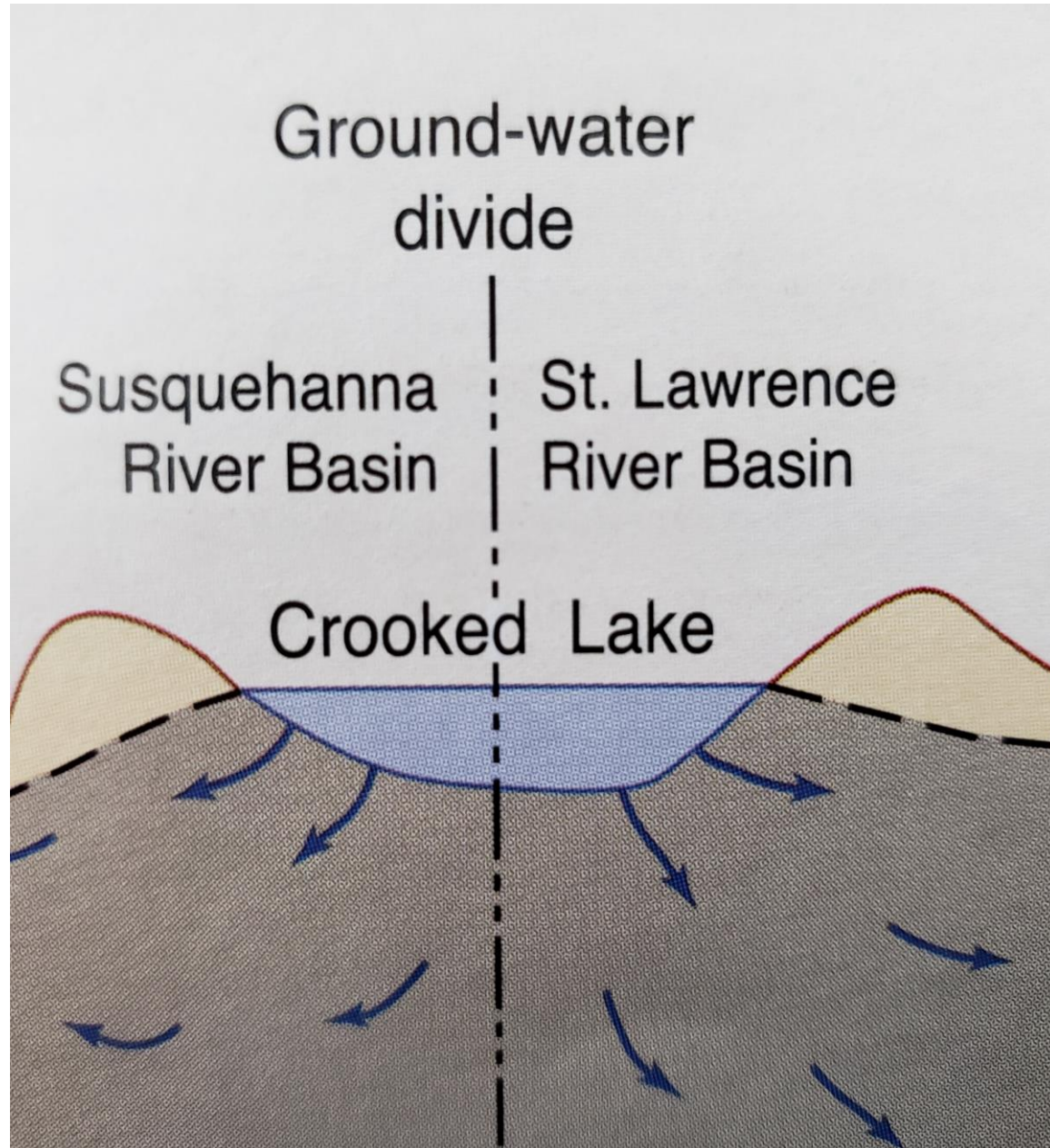


Hydrology

“Perched”

Snow Melt, Rain Water, Seasonal Steams,
Subsurface Springs

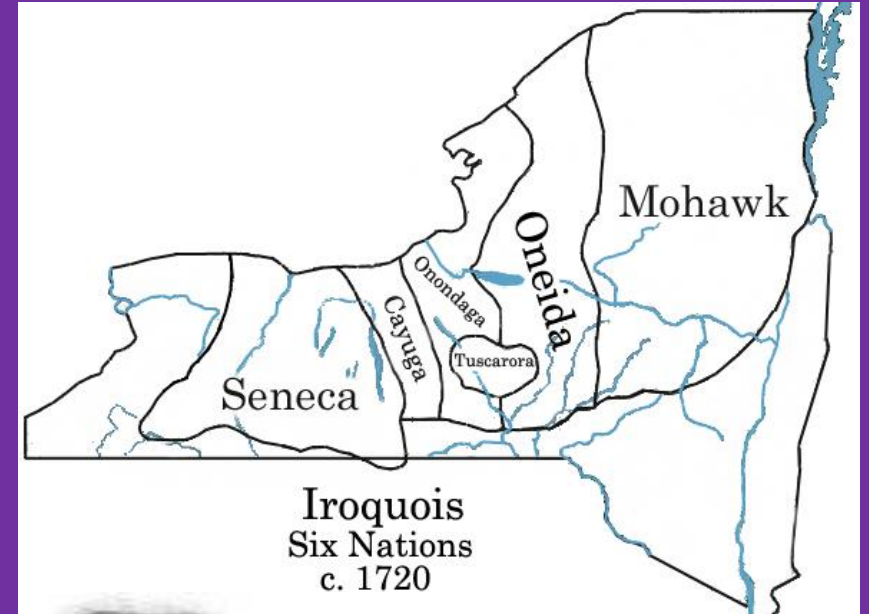
Ground Water & Seasonal Overflow Pipe



Iroquois Confederacy & Onondaga Nation



- Haudenosaunee “People of the Long House”
- 1450 ~ 1660 (est)
- Peace between Nations
- Mohawk, Onondaga, Oneida
Cayuga, Seneca & Tuscarora
- Clan Mothers
- Onondagas “Keepers of the Fire”
- Onondaga Homeland

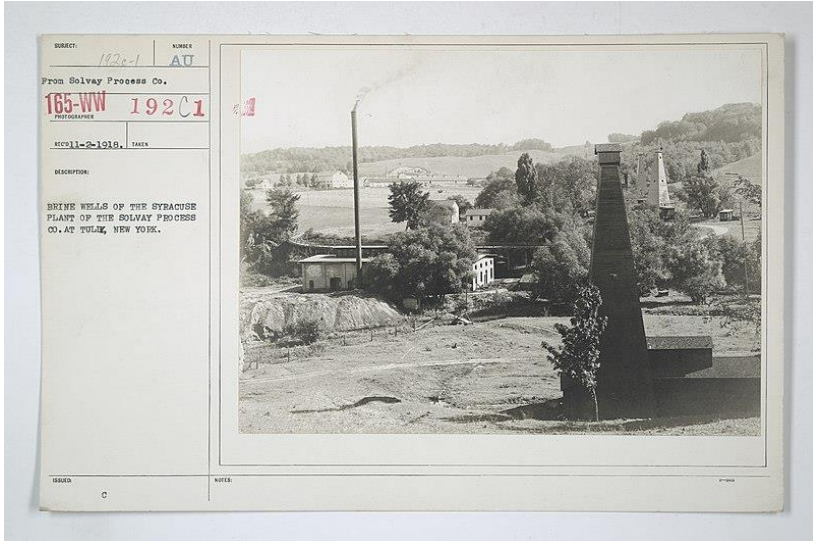




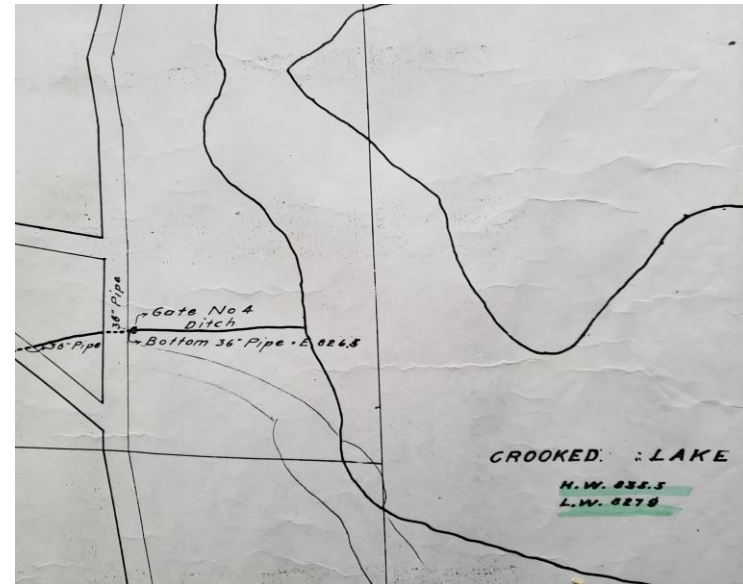
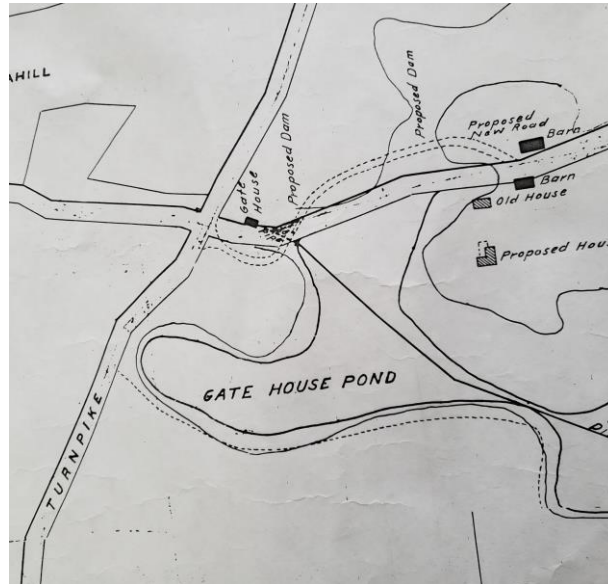
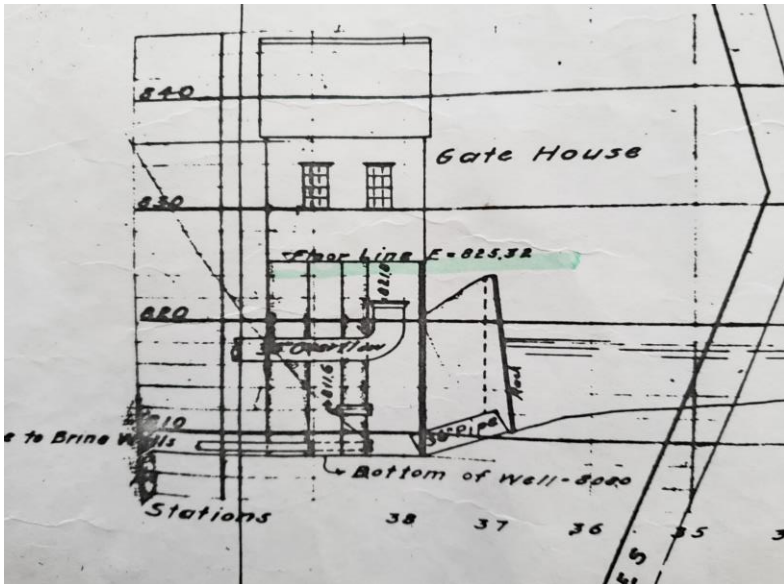
Onondaga County & Tully

- 1799 Act of Congress Creates Military Tracts in Central New York
- 60,000 acre “Townships” of 100 “Farm Lots” Surveyed
- 600 acre “Farm Lots”
- 1794 Onondaga NY’s 21st County
- 1803 Tully Created
- 1859 County Map Crooked Lake “Farm Lots” 37 & 47

Solvay Process Company



- 1881 Founded
- Soda Ash (Sodium Carbonate)
- Water Source land Acquisition
- Gatehouse [Road] Flow Controls
- 96 Years Halite extraction
- 170 Brine Wells
- 1947 Allied Chemicals
- 1972 Chapman land purchase



Camp Loyalty 1913 - 1929

“We sang, we played, we ate, we studied, we thrived. Who could ask for more? We had morning details kitchen, boats, campus, perch, garden, wood, ice, garbage, etc”

[Philip Marlow (1980) : Camper 1918-1925 , Eagle Scout, Life Guard, Merit Badges, Deputy Regional Scout Executive Region 4]



Building Character

classes, campfires, local picnic ground, F.R.Hazard Lodge, grove of trees, lanterns, tents, “guard duty”, Ice House, Hospital Tent, Trading Post, Handicraft Lodge, vegetable garden, Skaneateles Skiffs and Old Town Canoes, “high adventure programs”, uniforms, hiking, flag pole, ball diamond, Army Pyramid tents, coal and wood stoves, dishwashing, KP duties, boat rentals, Scout Craft Classes, first aid, knife and axe, cooking, compass, mapping, Merit Badge Instruction, swimming, life saving, pioneering, personal health, bird study, marksmanship, athletics, plumbing, painting, photography, forestry, canoeing, rowing, masonry



Resources & Support

- Churches
- Businesses
- Social Clubs
- Community Leaders
- Volunteers
- Donated Funds, Materials & Supplies
- WW1 Surplus



Chapman Lumber Planning & Development



Options : Golf Course, High Density or Single Family
Teams : Architects, Planners, Realtors, County & Local Officials

Considerations : Permitting, County Subdivision Requirements (survey, percolation & well testing), Zoning, Constructability, Infrastructure, Marketability, Local Citizen's Input, Near Song Mountain

Decision : Single Family Home Lots w/ Lake Frontage or Deeded Access, Phased Development, Covenants Protecting the Lake and Guiding Sense of Community



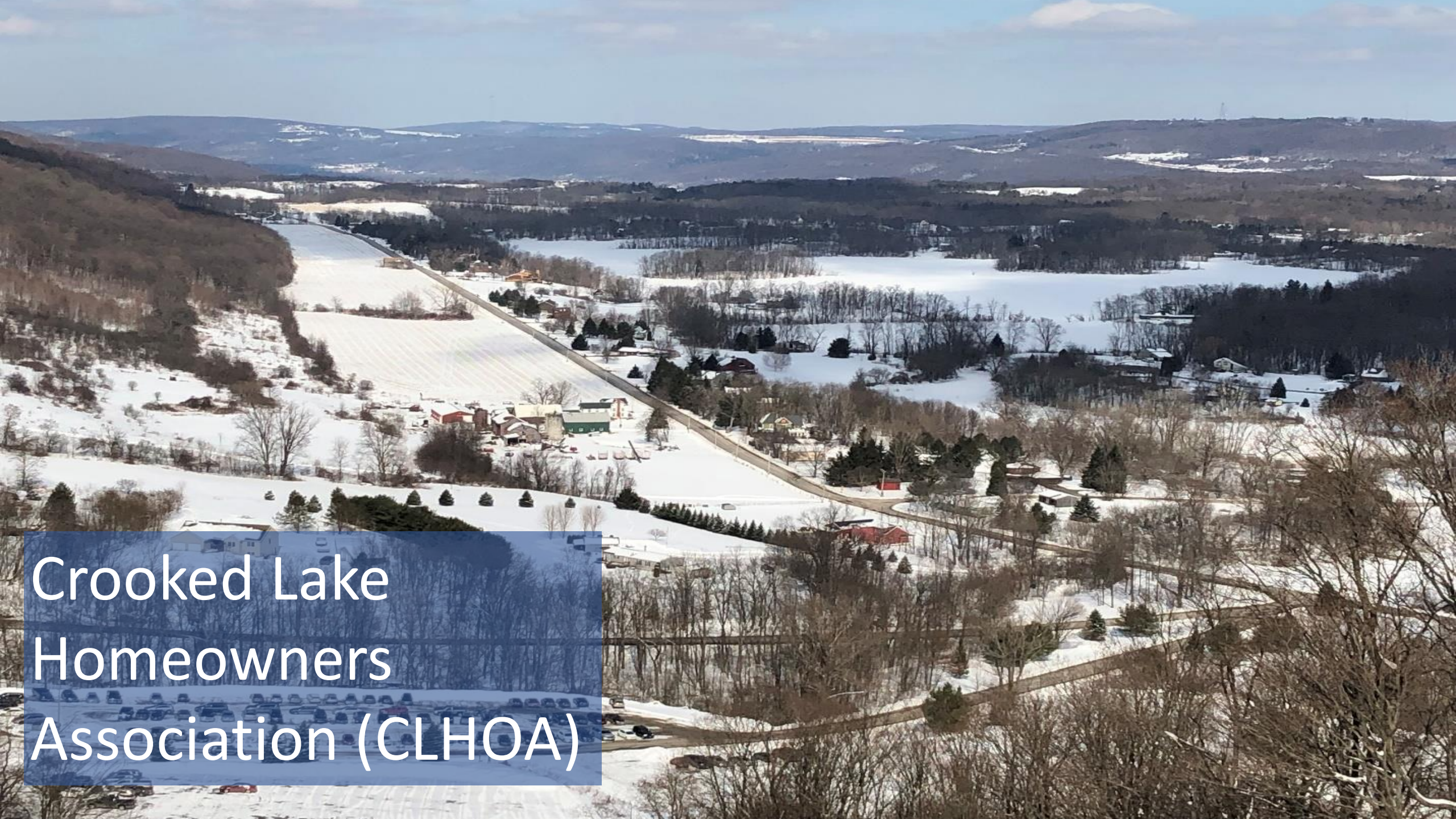
- **1975 – Crooked lake Tracts Section B – 25 lots – 21 homes Long Road & 1 Gatehouse Road**
- **1983 – Song Mountain Lake Properties Section A – 5 Lots & Homes Gatehouse Road**
- **1982 – Crooked Lake Tract Section C – 23 Lots – 7 Homes Long Road, 3 Homes Lake Road & 13 Homes Crooked lake Road – Deeded Right Of Way Access (Crooked Lake Road Constructed)**
- **1984 – Song Mountain Lake Properties Section B – 7 Lots – 6 Homes Peninsula Road & 1 Gatehouse Road (Peninsula Road Constructed)**
- **1985 – Crooked lake Tract Section D – 2 Lots – 1 Home Crooked Lake Road & 1 Home Lake Road**
- **Four Large Individual Lots & Homes Lake Road**
- **Two Deeded Islands**
- **One Deeded Wetland**
- **102.1 acres “Underwater” Deeded to State of New York**

Phases

Living The dream







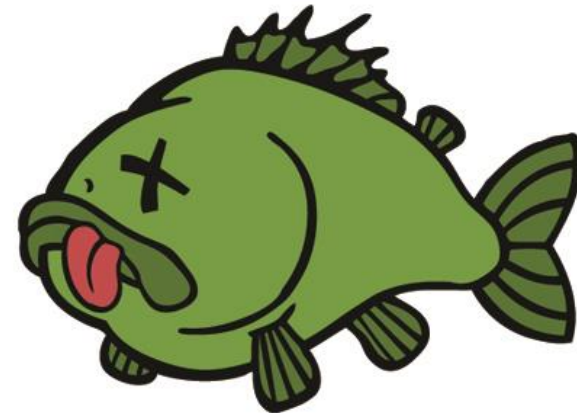
Crooked Lake
Homeowners
Association (CLHOA)

Where have we been, and
where are we going???



In 2011 the residents of Crooked Lake received some bad news.

They were told by Dr. Kimberly Schultz, Associate professor, SUNY College of Environmental and Forest Biology in Syracuse, that if they didn't act immediately to prevent further deterioration of the ecosystem of our lake, within 5 years the lake would most likely approach eutrophication. This results in dense plant growth and death of animal life due to water anoxia.



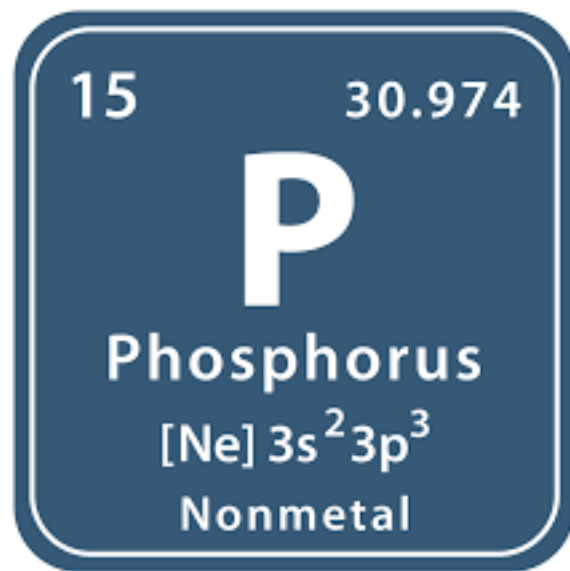
Of course, saving the lake was a priority, but what else did we wish to accomplish?

The priorities for the Crooked Lake Homeowners Association (CLHOA) included:

- Make certain everyone was able to peacefully enjoy the lake, by facilitating responsible guest behavior, and ensuring Crooked Lake homeowners and their guests treat each other in a kind and respectful manner.
- Invasive species prevention
- Improve water quality (reducing phosphorus)
- Continue covenants set to expire, including a ban on motorboats and keyholing



What's all the fuss about
phosphorous??



Phosphorus and Water

Phosphorus is a common constituent of agricultural fertilizers, manure, and organic wastes in sewage and industrial effluent.

It is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients).

Soil erosion is a major contributor of phosphorus to streams, erosion transports a lot of phosphorous from the riverbanks and adjacent land into a water body.

How can phosphorus effect a lake?

Crooked Lake



Oligotrophic
Really really clear



Mesotrophic - Us!
Great for swimming, boating, fishing, but some areas have excessive plant growth



Eutrophic
High phosphorus, rampant plant/algae growth – not good.

This is what we are working to avoid.

Increased phosphorous:

High levels of Phosphorous can lead to toxic algae blooms

Certain varieties of blue-green algae can produce toxins that are linked to illness in humans and animals



Potential sources of phosphorous include:

- Farm run off
- Residential septic
- Lawn fertilizer
- Streams flowing into Crooked Lake
- Geese???

Farm Run Off

- Has there really been that much of an increase in farming in the last thirty years around Crooked Lake to account for the increase in Phosphorous in the water?
- Unlikely. Be we need to be continually vigilant in monitoring farming practices surrounding the lake.

Residential Septic?

A series of experts and consultants have identified a range of possible phosphorous sources. A potential source that is invariably identified are the septic tanks employed by the 61 homes surrounding the lake as their on-site sewage treatment systems. Their resulting recommendation is frequent pumping of these septic systems in order to reduce the amount of phosphorous entering Crooked Lake.

This recommendation is supported by scientific literature resulting from studies of many other lakes and ponds across the country.

But Crooked Lake is different:

- 1) History of development and septic system design - The planned development began in the 1970's (unlike other lake communities where development started long ago and gradually increased over time). Covenants required standards of the Onondaga County Health Department had to be followed
- 2) Occupancy - currently most homes are owned by "empty nesters"
- 3) Age of homes versus phase out of phosphorous in household cleaning products - Cleaning products became phosphate free in 1973, before development
- 4) Ground water flows away from Crooked Lake beneath 43% of septic systems - Ground water flows to the South East away from the Southern shores and due North away from the Northern shores of Crooked Lake primarily because it is a "kettle hole" lake left behind by the last glacier and thus is perched on the "ground-water divide" between the Susquehanna and St. Lawrence River basins.
- 5) Documented Iron, Aluminum and Manganese concentrations of soils surrounding Crooked Lake and their literature supported attenuation of leachate phosphorous.

In May 2020 CLHOA undertook a project to determine the amount of these metals in soils adjacent to Crooked Lake. Soil Samples were taken from Long Road, Lake Road and Peninsula Road and forwarded to Alpha Analytical, Westborough, MA.

for metals analysis and PH. Alpha's findings were:

	Iron mg/l	Aluminum mg/l	Manganese mg/l	PH
Long Road	20,400	8,660	726	7.2
Lake Road	20,800	8,820	846	6.1
Peninsula Road	19,900	8,110	664	7.7
Average	20,367	8,530	745	7.0

Alpha's findings demonstrate that the glacial till soils surrounding

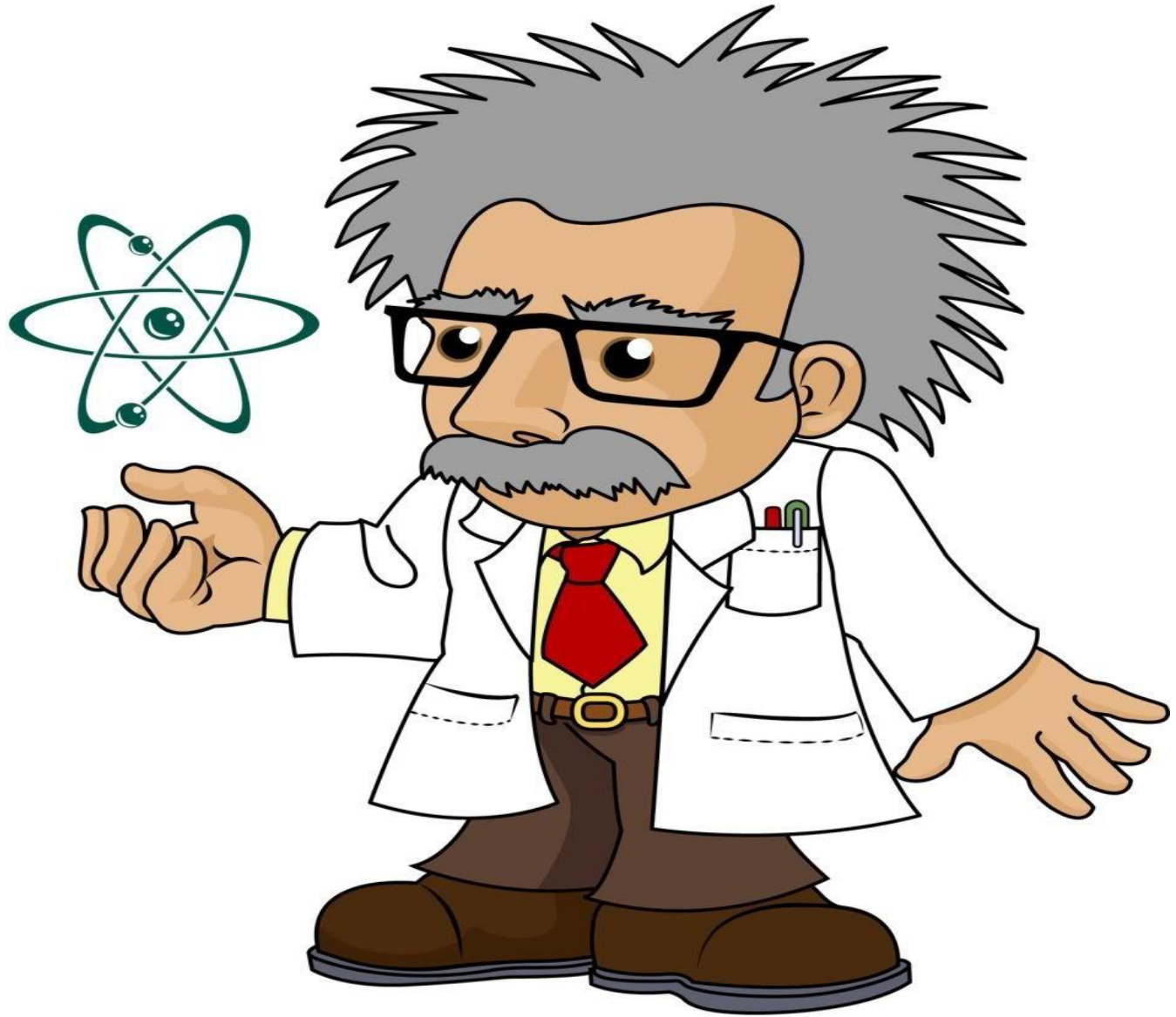
Crooked Lake are rich in the exact metal

the literature states are the most effective in attenuating phosphorous from septic field leachate and thus preventing its entering Crooked Lake.

For further reading, please see :

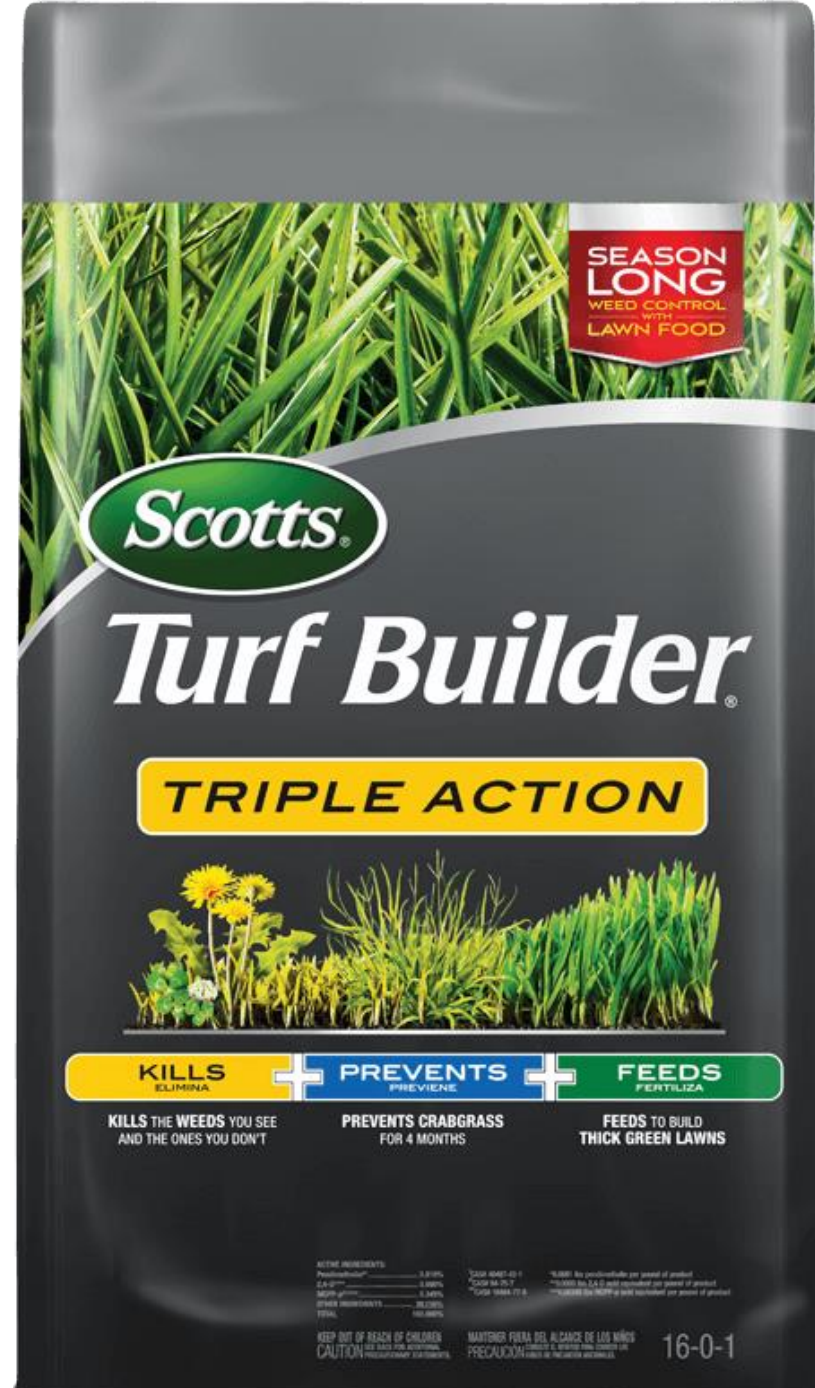
Crooked Lake Septic Systems and
their Impact upon Lake Water
Phosphorous

By
Gary Kittell



Lawn fertilizer

- Residents are encouraged to test soil before applying phosphorous fertilizers, no need to add phosphorous if level is above 20 on the Bray P-1 test. Testing is offered through Onondaga Soil and Water
- Scotts eliminated phosphorous in 2012 as did others.
- If you have questions about what you are putting on your lawn/garden, phosphorus content is the 2nd number in the series of three on the label.



Shorescaping and Riparian Borders

- Spring seeding sale through the DEC - A great resource for those who want to establish or enhance riparian borders or add native trees, shrubs or bushes to their landscape
- Link for the “Buffer in a Bag” initiative. This provides landowners with a free bag of bare-root trees to enhance the stream side areas of their property:
<http://www.dec.ny.gov/animals/115903.html>
- We continue to plan data collection of water sources (inlets), and continue efforts for shorescaping and streamscaping on Crooked Lake

Geese

There has been a significant increase in the resident goose population over the past several years.

Increase in lake phosphorus levels (especially at the lake floor) has been associated with geese.

1 goose lets loose up to 1.5 pounds of manure per day



In the fall of 2010, it was estimated that there were about 1000 migrating geese on Crooked Lake on a given day.

In the fall of 2012 bird whistlers were used to chase the geese off of the lake. About 5-6 residents participated in this effort to disperse the geese. There was also limited hunting of geese allowed on Crooked Lake.

There were far fewer geese on the lake in the fall of 2012 , and the trend has continued downward.

BIRD WHISTLERS®
FEL is NOT required for purchase

Bird Whistlers® (15 mm green colored cartridge) make a very loud "SCREECH" sound that scares pest birds and wildlife. They're fired from a hand held launcher, and will screech for 250 - 300 feet. Actual range varies depending on firing angle and wind factor.



Bird Whistlers® cartridge is 2-inches long x 15 mm diameter.

Bird Whistlers® are sold in increments of 100 as pictured above (pic shows 2 boxes of 50 rounds + 1 can of 100 rounds).

\$45 per unit of 100 rounds

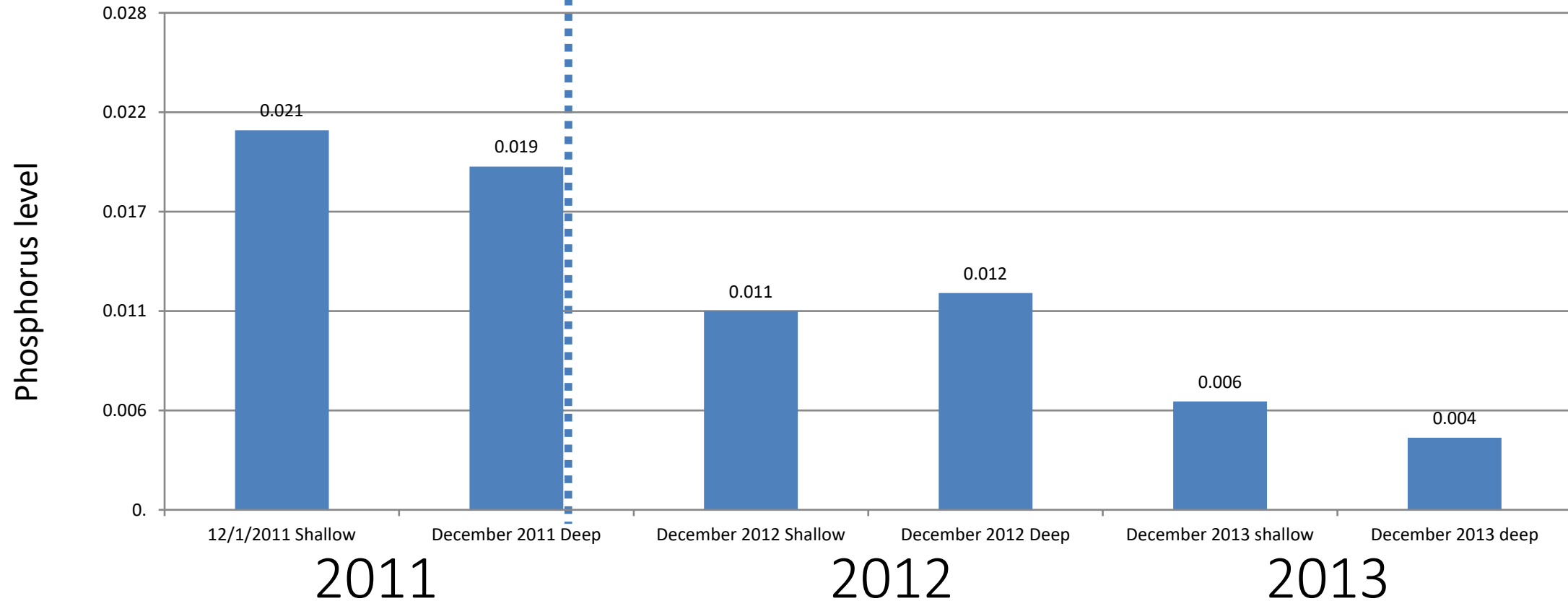
Effective May 26, 2012, Sullin Ag's Bird Whistlers® are no longer regulated by ATF. Purchases are not required to hold an FEL, but your Declaration of Use form (available upon request) is required to be on file with Sullin Ag prior to purchase. Shipment is subject to hazardous materials handling fees imposed by the carrier (currently \$27.00 per package; up to 2,000 rounds of Bird Whistlers® can be shipped in a single package).



Testing conducted during winter 2011 to 2013 shows lower phosphorus at surface and deep levels after geese gone

**Winter 2011 –
With 1000 geese**

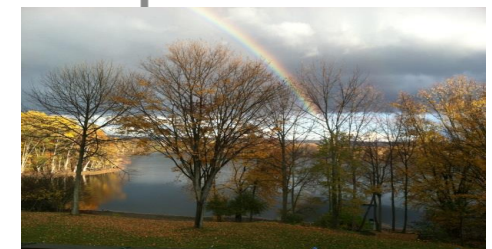
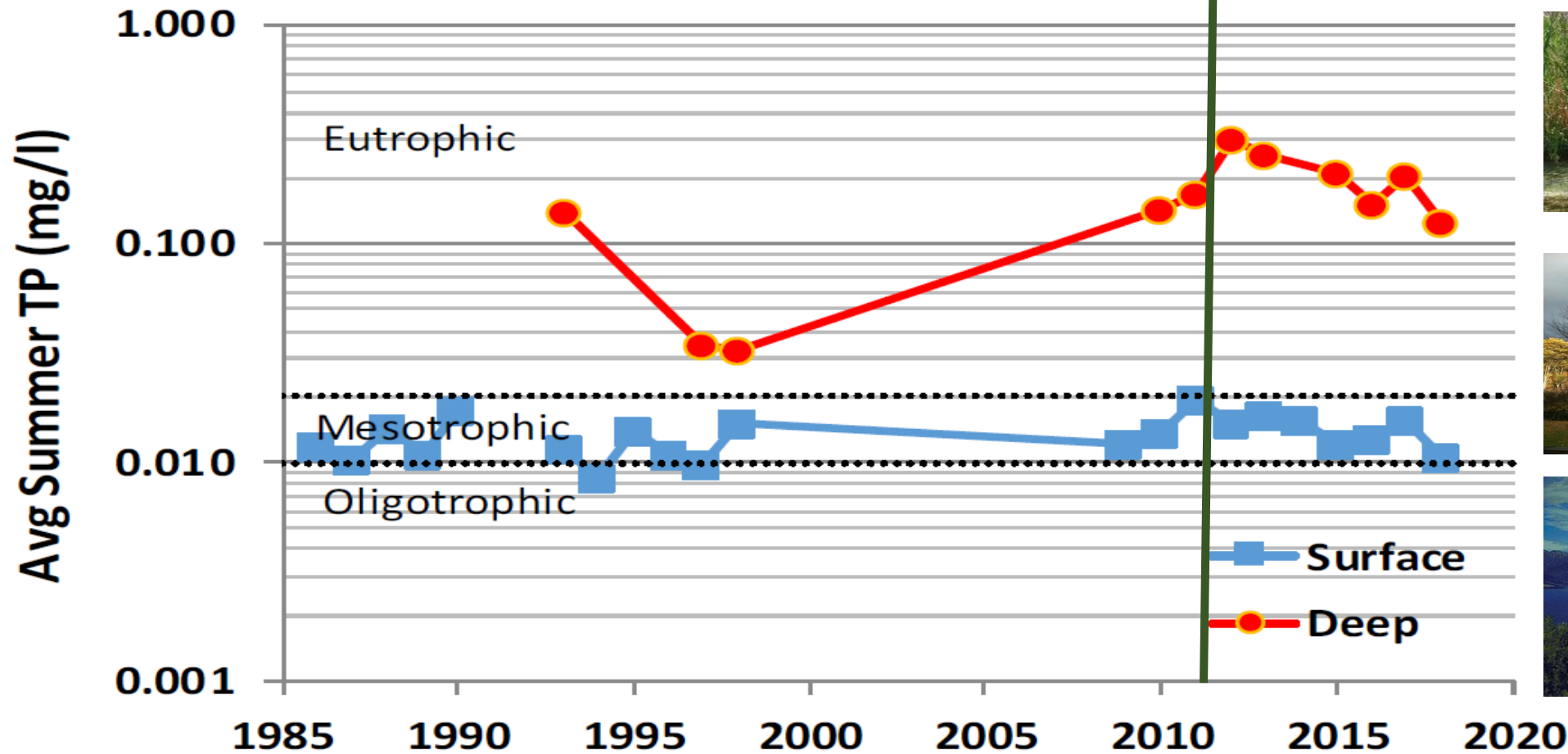
**Winter 2012 and 2013 –
Fewer geese after dispersion efforts**



Lower Trends for Phosphorus also seen in CSLAP Data 2011-2018 Deep is especially a concern

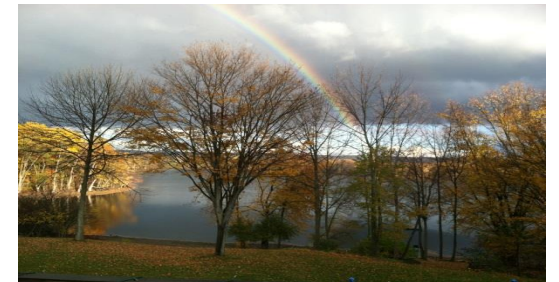
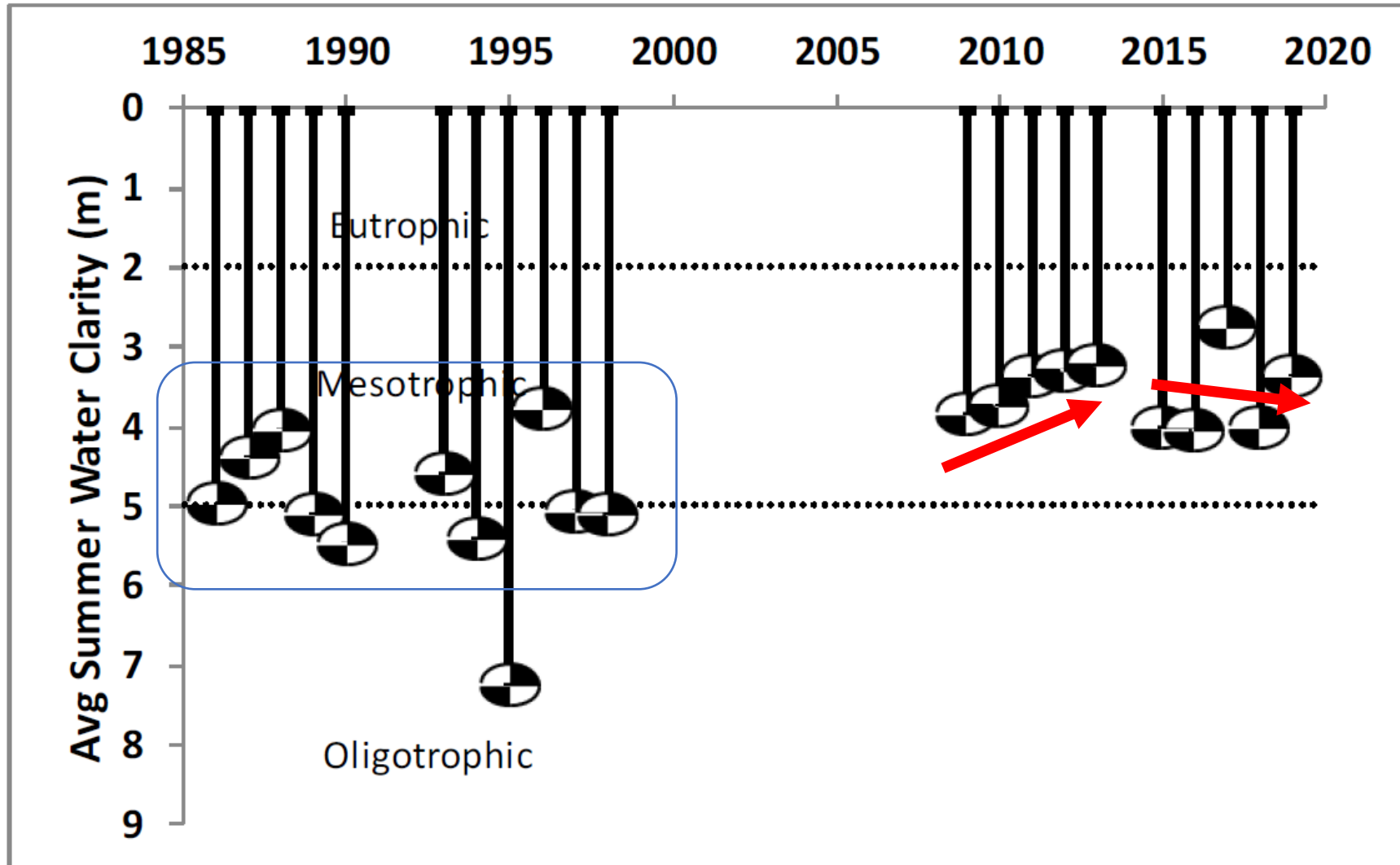
Surface and Deep Phosphorus

Geese Harassment Starts 2011



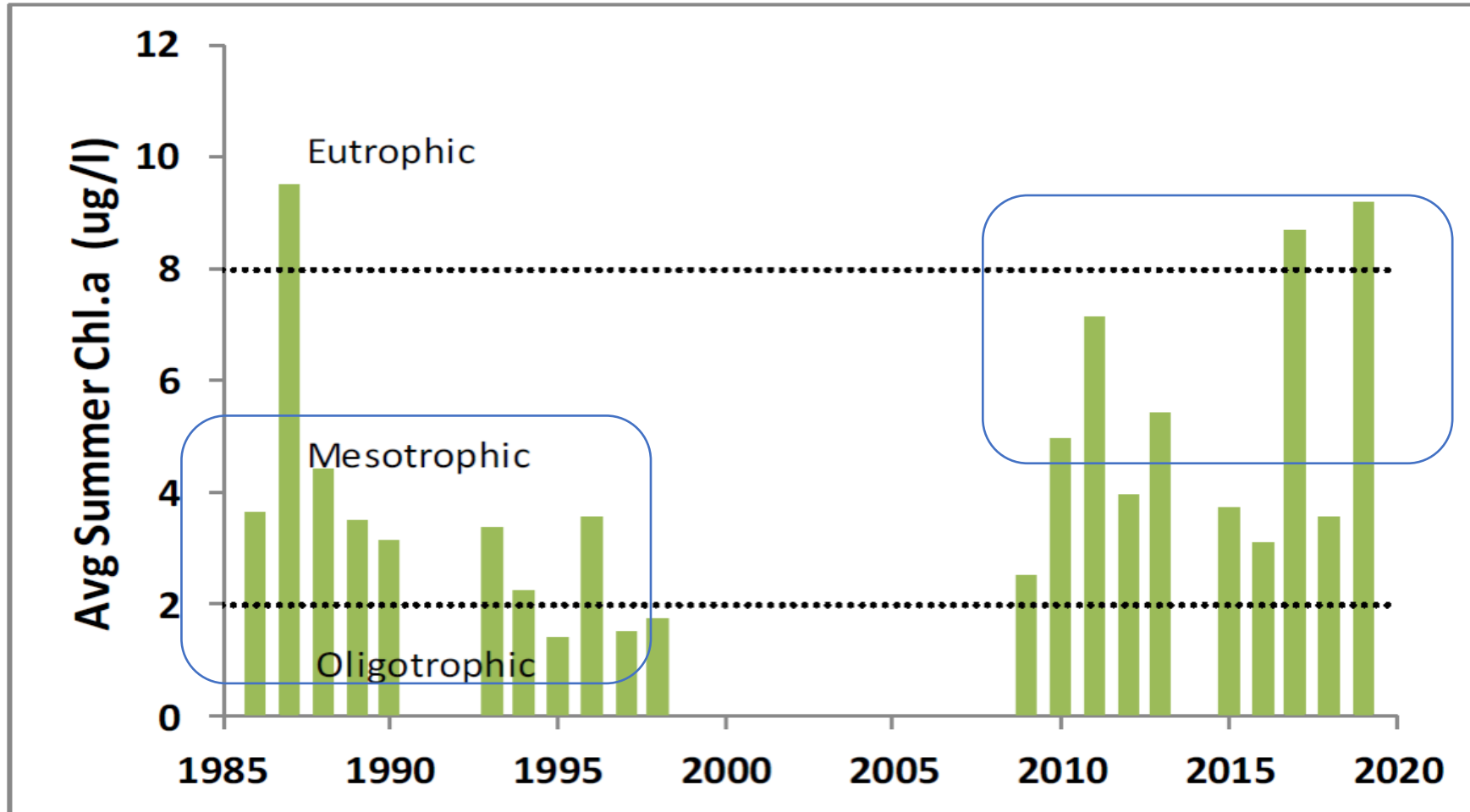
CSLAP Data – How clear is the water over time?

Clarity



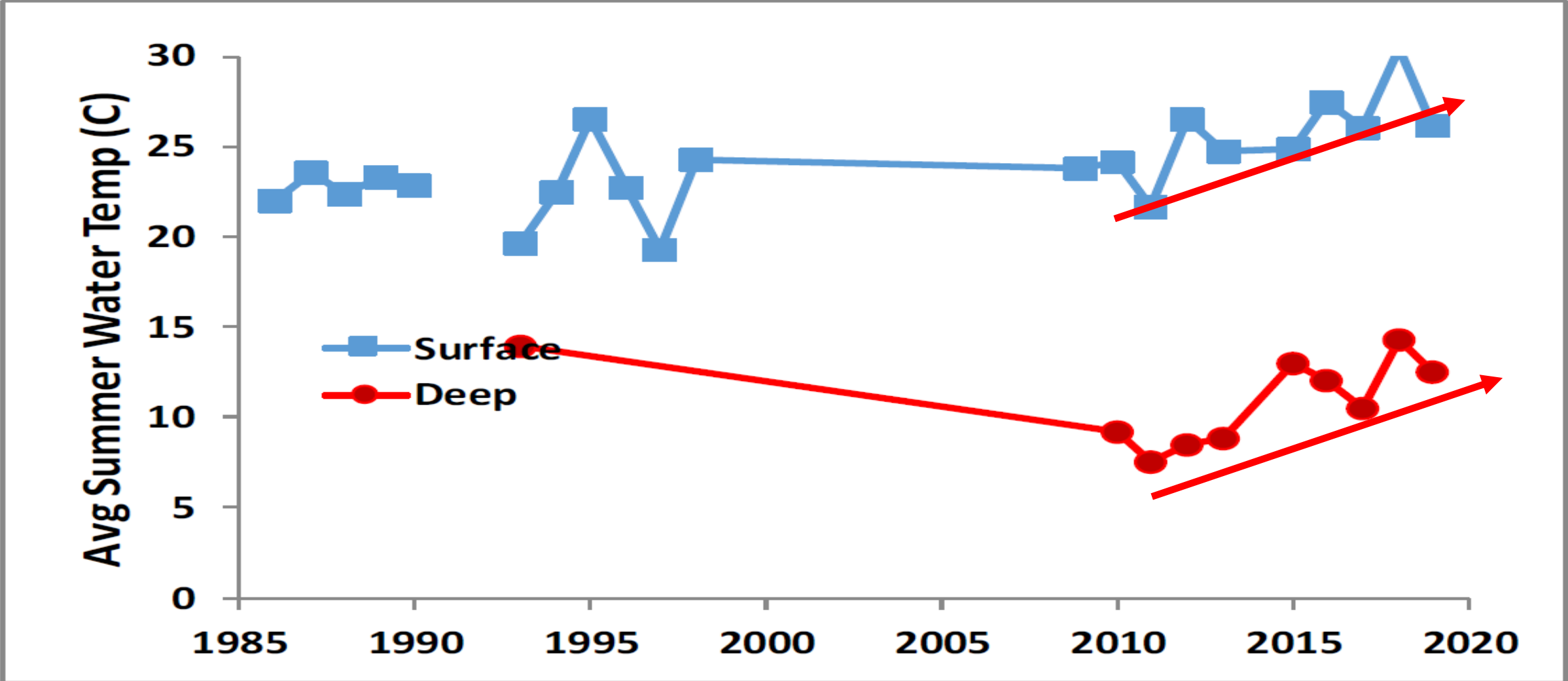
CSLAP Data – Chlorophyll reflects productivity due to plants. Plants die in winter and add more Phosphorus

Chlorophyll *a*



CSLAP Data – Surface and Deep temps rising making lake more productive (plants). We are fighting an uphill battle!

Surface and Deep Temperature



It is hoped that decreasing phosphorus will help to slow weed growth as phosphorus is the gatekeeper nutrient source for aquatic plants and algae. We want to make special efforts to identify and protect against these two invasive species

Eurasian Milfoil



Hydrilla



Other efforts to reduce weed growth

- In the summer of 2011 four households in the north cove used their own funds to hire a weed harvester. This effort met with limited success as most of the weeds came back in the following years.
- In 2013 four households on the north cove of Crooked Lake obtained a three year DEC permit for **600 grass carp with their own funds and stocked 200 in the spring of 2013, 2014 and 2015**

We will no longer stock grass carp, However there is some opinion that the north channel and north pond have fewer weeds

Zebra Mussels (or lack there of!) an unfortunate stowaway on personal watercraft

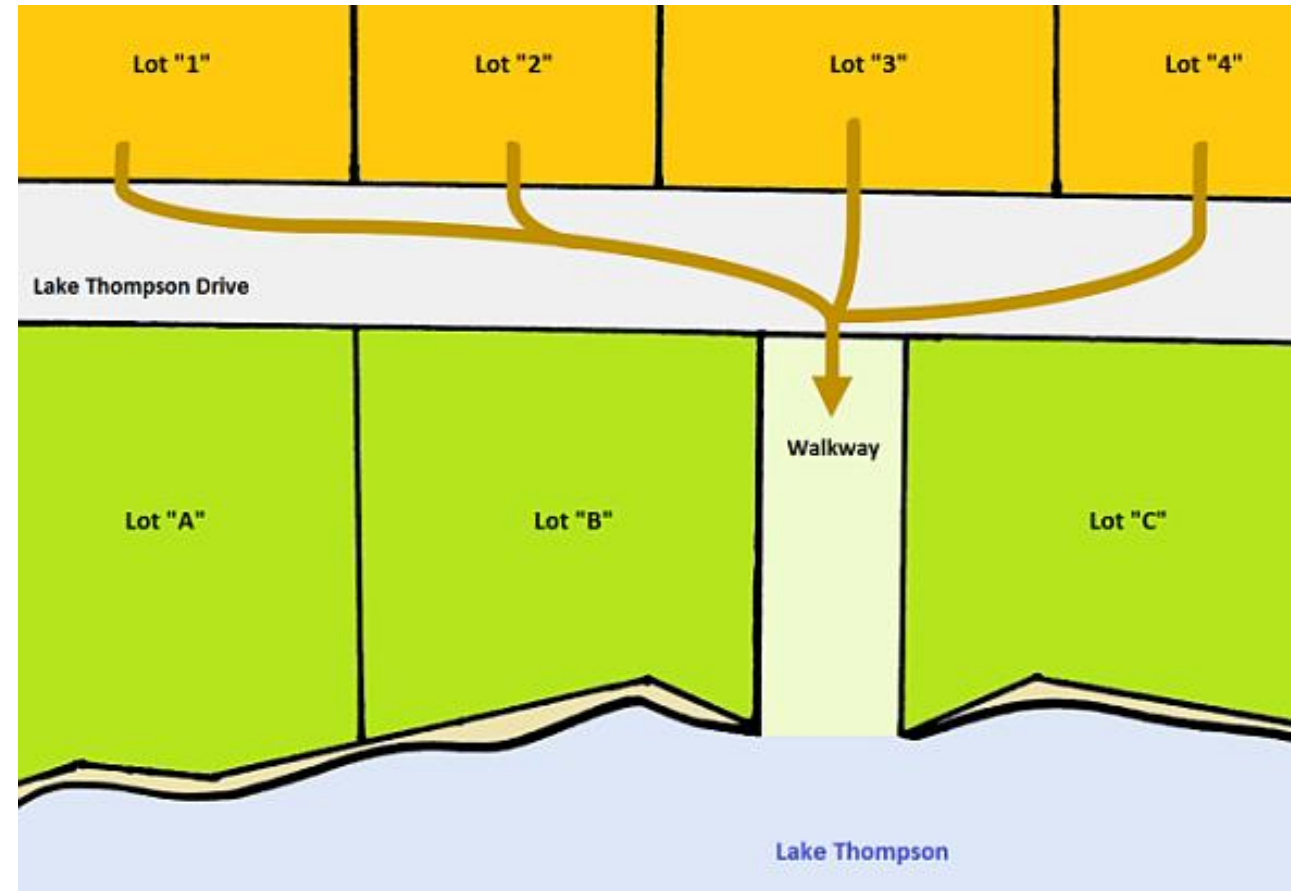
We are fortunate to have no Zebra mussels in Crooked Lake, likely for several reasons:

- No motorboats (mussel larvae hide in engine cooling systems and on mud attached to anchors)
- No public boat launch
- “Pass” system established in 2017 to ensure lake guests have access granted by a homeowner
- Residents are provided with information each year regarding proper cleaning of boats



One final item: Keyholing,

- Keyhole development allows the use of a riparian's waterfront to provide water access to back lot owners who would not normally have access.
- Seth Aldrich and Colleen Zawadzki with assistance from Tarki Heath were instrumental in influencing the Tully Town Board to revise the law restricting Keyholing, modeled after legislation initiated on Song Lake.



In summary, our current efforts to control weeds and improve lake water quality include:

- Lake management plan
- Harassment of geese
- Working with Onondaga Soil and Water to increase awareness and improve farmer practices with manure (Thanks COFOKLA and Tom Cappa, our Liaison).
- Shore-scaping and stream-scaping
- Keyholing law passed by Town of Tully
- Monitoring those who come onto Crooked Lake (boats from other lakes potentially with invasive species). Pass system on Crooked Lake Rd
- Keeping homeowners aware of threats
- Educating homeowners about the importance of cleaning boats that have been on other water bodies (and how to do it)
- Monitoring water quality (CSLAP, ESF - zebra mussels) and acting on the data

Organizations We Work with to Protect Crooked Lake

NY Federation of Kettle Lakes Assoc. (NYSFOLA)

- Coordinate Water Testing (CSLAP)
- Support lakes throughout NY state

Cortland Onondaga Federation of Kettler Lakes Assoc. (COFOKLA)

- Coordinate and strengthen efforts of several lakes (e.g., helped to pass keyholing law in Tully)
- Seek sources of funding/support
- Provide educational opportunities
- Procure involvement of institutions that provide essential information (SUNYs USCA, Princeton Hydro)

SUNY ESF

- Collect and interpret lake data (e.g., phosphorus, zebra mussels)

Princeton Hydro

- Collect and interpret lake data

Alpha Analytic

- Conduct water testing data

SUNY Oneonta

- Informed lake management plan
- Collect and interpret lake data (e.g., phosphorus, weed and fish studies)

Department of Environmental Conservation (DEC)

- Enforce environmental protections (farm run off, poaching, wetland protection)

Crooked Lake Homeowners

- Support CLHOA (e.g., dues)
- Inform CLHOA Board of lake needs, protections
- Work as a community to maintain peaceful enjoyment

Crooked Lake Homeowners Assoc. (CLHOA)

- Work to enforce Crooked Lake Bylaws
- Conduct water testing (CSLAP)
- Communicate with Town of Tully
- Communicate with homeowners to problem solve as issues arise
- Collaborate and educate

Town of Tully

- Enforce zoning
- Passed keyholing law

Onondaga Soil and Water

- Support CSLAP*
- Support shore/stream-scaping

Upper Susquehanna Conservation Alliance (USCA)

- Support shore/stream-scaping



