Little York
Preservation Society, Inc.

Lake Management Plan
for
Little York Lake
Cortland County, NY

Revision History

First Draft – 2/22/2017
Second Draft – 3/1/2017
Third Draft – 3/31/2017
Fourth Draft – 5/31/2017

Acknowledgements

The following individuals participated in the development of this plan and we thank them for their generous contribution of time, insight and energy:

Amanda	Barber	CCSWCD
John	Congdon	LYPS
Don	Fisher	Town of Preble
Gary	Lawrence	LYPS
Bob	Maurinus	LYPS
Chris	Newell	Cortland County
Mike	Park	Town of Homer
Jim	Reeners	LYPS

Executive Summary

In a little over 200 years, a lake that was formed by the retreat of the glaciers, has been dammed, developed and is now in danger. Cultural eutrophication is quickly claiming this lake accelerated by the introduction of aquatic invasive species (AIS).

Sediment buildup and excessive vegetation have lead to impacts to all of the following uses of the lake

- Fishing
- Swimming
- Aesthetics
- Boating
- Property value/use
- Use of shoreline

The planning team identified the following objectives in priority order:

A. Reduce sediment and sedimentation in the lake.
B. Manage aquatic vegetation including invasives such as variable leaf milfoil.
C. Establish an active and ongoing management process to restore and maintain the lake and its ecosystem.

The planning team evaluated 10 tools for their applicability to meeting the objectives.

The following table summarizes key attributes of these tools along with their fit in the overall lake management process within the stated goals:

Tool	Pros	Cons	Fit
1. Benthic Barriers	Effective Inexpensive	Tactical only Labor intensive Permits required Weeds only	May be good for quick tactical response to new infestations
2. Hand Harvesting	Effective Immediate results	Labor intensive May be expensive at start Permits required Weeds only	Good for ongoing maintenance of weed problem
3. Drawdown	May reduce weed and other AIS populations May reduce sediment	Uncertain impact Will require approval in order to impact sediment	May be a tool in a maintenance program but unclear
4. Aeration	Reduces sediment May reduce weeds	Program price Uncertain results Ongoing operations (multi-year)	May be useful for maintenance of sediment base

5. Biologicals	Reduces weeds over time	Weeds only Insects are not scalable Carp faces permitting challenges	Probably not useful
6. Herbicides	Effective	Requires (almost) annual application Expensive Permitting issues	Probably not useful in our situation
7. Dredging	Effective Immediate results Impacts primary objective	Expensive	Recommended primary tool for restoration
8. Boat wash/ Stewards	Changes behaviors Protects on an ongoing basis	Expensive No direct results	Important as an ongoing maintenance tool
9. Shoreline Restoration	Improves overall lake health	Requires individual action	Promote as part of ongoing education
10. Septic Management	Improves overall lake health	Requires individual action	Promote as part of ongoing education

Based on this analysis and in order to meet the objectives, the planning team agreed on the following recommendations:

Recommendation 1

Dredging areas of the lake that are particularly susceptible to sediment accumulation from the dam (i.e. in the original flow of the Tioughnioga river) is a primary recommendation. This will restore the lake to its original (post-dam) form and provide additional flood-control facilities for the region. It also provides a potential resource for farms in the region as climate change impacts are increasingly felt.

Recommendation 2

Once dredging is accomplished, native plants should be re-introduced to ensure a healthy ecosystem. These will include [list of native plants to promote].

Recommendation 3

Build a hand-harvesting program to control the potential re-expansion of the Variable Leaf Milfoil through the dredged (and other) areas.

Recommendation 4

Develop a long-term funding plan for the ongoing maintenance of Little York Lake.

Recommendation 5

Review and update this plan on an annual basis.

Timeline

We recommend a timeline with the following structure:

Timeframe	Years 1-3	Years 3-5	Years 5+
Phase	Restoration	Improvement	Maintenance
Activities	Establish long-term funding program Dredge lake	Plant re-introduction, hand harvesting, Benthic mats	Lakeshore restoration, septic system maintenance, aeration

Contents

1 Background Data

1.1 Historical Perspective

Upper Little York Lake (referred to as Little York Lake through this document) is a kettle lake adjacent to the west branch of the Tioughnioga river, part of the headwaters of the Susquehanna River and, ultimately, the Chesapeake Bay. The lake has a long history in Native American lore and had its first full-time European residents take occupancy around 1807 when Jabez Cushman purchased 550 acres of Lot 6 in the Homer revolutionary tract and settled on 40 acres south of today's Little York Crossing Road and adjacent to the stream flowing south from the lake. By 1810 he had built the crossroad, the dam, a bridge and a sawmill. In 1813 he built a gristmill which was operational for 130 years.[1]

The dam expanded the lake to its current borders and introduced an important, man-made change to the river system. The original dam was ultimately replaced and taken on by the county in the early 1900's and then replaced again in 2016.

Over time, the lower end of the lake, near the dam, became a recreational area with a hotel, pub, swimming area and even a steam boat to take people on tours of the lake. In the early 1900's the Cortland Traction Company acquired a farm at the north end of the lake and, in c.a. 1906, built the Pavilion and a park to attract travelers. This spurred development around the lake and over the next few decades lakefront property was virtually completely developed.

In a little over 200 years, a lake that was formed by the retreat of the glaciers, has been dammed, developed and is now in danger. Cultural eutrophication is quickly claiming this lake accelerated by the introduction of aquatic invasive species (AIS).

Little York Improvement Society (LYIS) was incorporated in 1938 to preserve and protect the lake. It has been an active and vigorous voice for its welfare. In 2016 LYIS was re-incorporated as Little York Preservation Society Inc. to facilitate registration as a 501(c)(3). Its mission was, and remains, to preserve and manage Little York Lake as a vibrant asset for area residents.

1.2 Location

Little York Lake is a glacially formed kettle lake that lies within the glacial outwash deposits of the Cortland-Homer-Preble aquifer system. The lake is located at 42º41'22" N Latitude and 76º09'44" W Longitude at 1150 feet elevation (Greeson and Williams, 1970). It is situated within the towns of Preble and Homer, Cortland County, New York. Little York Lakes is part of the Upper Tioughnioga (West Branch) drainage basin. The watershed is a subunit of the Susquehanna River basin. The lake's inlets are Green Lake, to the north, and Goodale Lake, to the west. Major transportation routes (Interstate 81, New York State Route 281 and a railroad line) abut the lake.

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[1] Little York by Marin Sweeney, Historian, town of Homer, Homer News October-November 2013

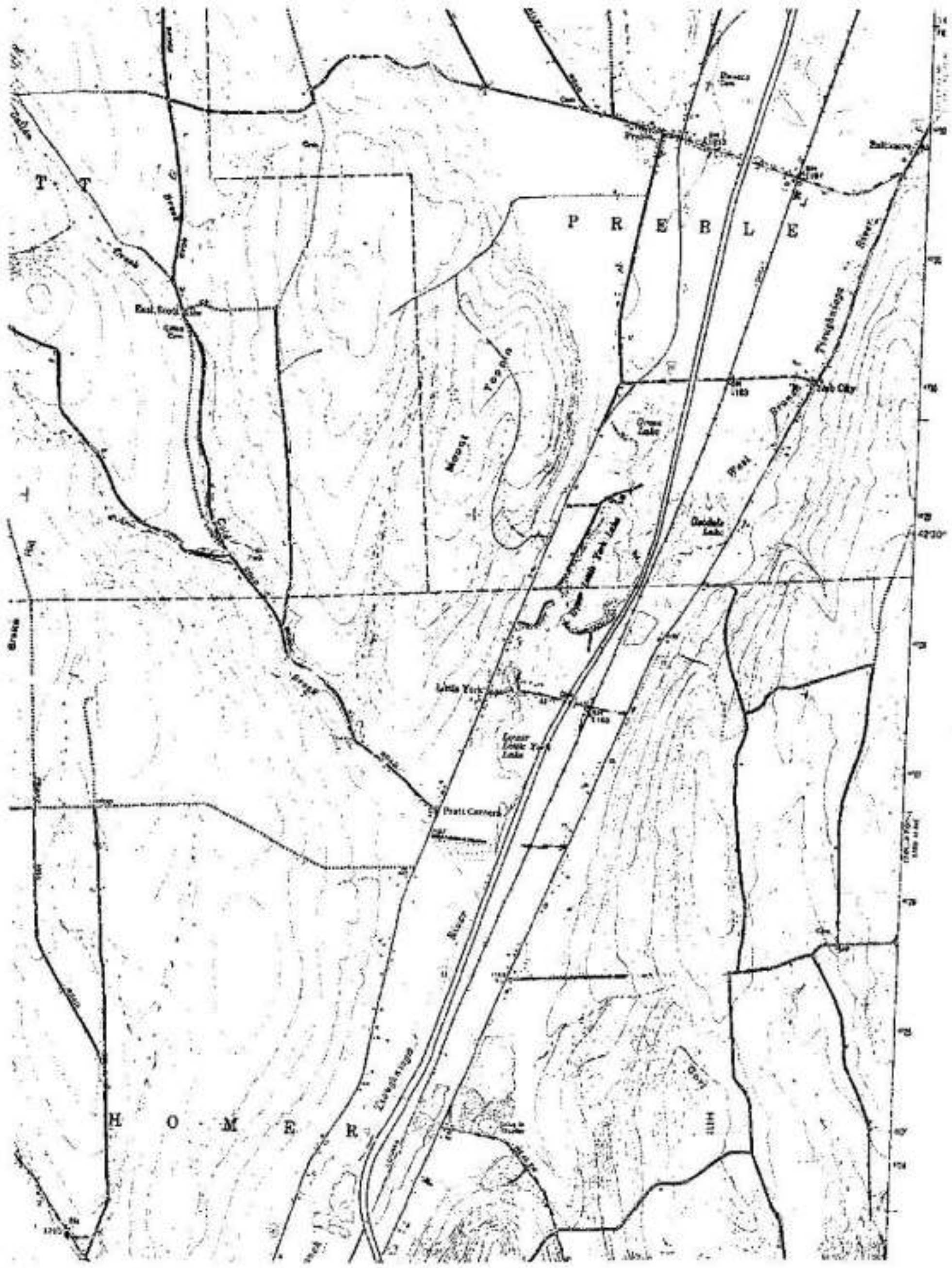

Figure 1. Location of Little York Lake.
Source: U.S. Geological Survey Topographic Map
7.5 Minute Series, Homer Quadrangle, 1955 (Photo revised 1978)

1.3 Public Access and Recreational Use

Dwyer Memorial Park, located at the northern end of Upper Little York Lake, is a county owned recreational area. The fifty five acre park is open during the summer from mid-May to early

October. Fishing access is available from the shores and an undeveloped public boat launch area. The park is used mainly for picnicking, fishing, and general recreation during the summer with light use during the winter. Ice fishing is popular during the winter.

Recreational use of the lake is heaviest in the summer months when the park is open. Lakeshore owners use the lake for fishing, swimming, and boating during the summer, as well as limited fishing and general recreation during the winter.

1.4 Physical Characteristics

LITTLE YORK LAKE
MORPHOMETRIC FEATURES

Description (units)		Source
Latitude at Outlet	42° 41' 46" N	Greeson and Williams (1970)
Longitude at Outlet	76° 09' 44" W	Greeson and Williams (1970)
Surface Area (mi^2)	0.17 (Upper) 0.03 (Lower)	Greeson and Williams (1970)
Length of Shoreline (mi)	2.1 (Upper) 1.3 (Lower)	Greeson and Williams (1970)
Length of Lake (max, ft)	4752	USGS Topographic Quadrangle
Width of Lake (max, ft)	1320	
Elevation (ft)	1150	USGS Topographic Quadrangle
Maximum Depth (ft)	75	Greeson and Williams (1970)
Mean Depth (ft)	11.5	
Lake Volume (est, ft^3)	5.4×10^7	Werner and Dexter (1988)
Annual Precipitation (in)	42	

Table 1. Summary of the Major Characteristics of Little York Lake.

Little York Lake averages about 11.5 feet deep with the maximum depth of approximately 75 feet at mid-lake (Appendix II). A dam on the southern end of the lake controls the elevation. During winter months, the water level is drawn down 18 inches by the Cortland County Highway Department. The lake flows north to south, draining into the Tioughnioga River. There are two tributaries to the lake that receive and unknown amount of groundwater flow.

Little York Lake is in the humid continental climatic region of the northeastern United States. Precipitation has historically been moderate and well distributed throughout the year, averaging 42 inches. However, as noted in a 2015 DEC report on the impacts of climate change, "past climate will likely be a less consistent predictor of future climate, and, in turn, past climate records may not suffice as benchmarks for forecasting."

Except during abnormally warm winters, Little York Lake freezes by mid-December and is is usually gone by early April. The lake is thermally stratified during the summer, with a major thermocline occurring at about 13 feet.

1.5 Lake and Watershed Characteristics

Little York Lake has a surface area of about 110 acres. It averages about 11.5 feet deep, with a maximum depth of approximately 75 feet. The variability of water depth in the lake (bathymetry) is shown in Figure 1. The volume of the lake is approximately 400 million gallons.

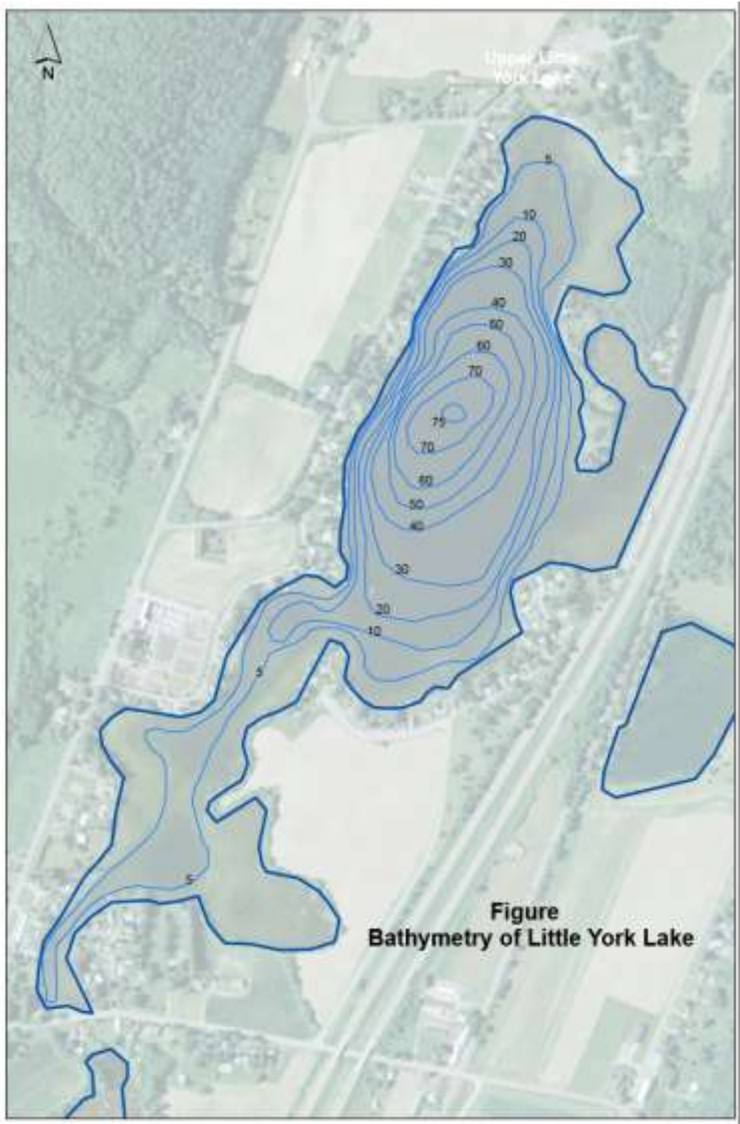

Figure 1

Annual average flow into the lake is estimated to be about 51 cubic feet per second (cfs). The average residence time of water in the lake, as determined from inflow relative to lake volume, is estimated to be about two weeks. This is a short residence time relative to many lakes. However, the configuration of the lake may result in a high degree of variability in residence time in different portions of the lake. Residence time may be considerably longer in the deep northern end than the shallower southern end.

The lake is thermally stratified. In summer, the colder bottom layer is essentially isolated from the warmer surface layer. In winter the reverse occurs. Stratification may occur primarily in the deeper parts. The shallower areas may remain mixed due to wind action and other factors. Numerous temperature profiles conducted over the years show that the transition from top layer to bottom layer (thermocline) occurs over about a 20 foot distance, starting at a depth of 15 feet and extending down to about 35 feet,

The lake is considered dimictic, meaning it mixes from surface to bottom twice each year (spring and fall). Mixing occurs due to unstable stratification, as the water temperature near the surface converges toward the water temperature near the bottom. This phenomenon may only occur in the deeper parts of the lake.

1.5.1 New Dam

The dam at the southern end of the lake controls the lake level, and is owned by Cortland County. The current dam was recently constructed to replace one in need of repair, and that did not meet dam safety requirements. The new dam has a labyrinth spillway design and gates to control outflow.

1.5.2 Watershed

Little York Lake has a watershed area of about 29.4 square miles. About 2/3 of it is located in Cortland County, and the rest is in Onondaga County. Figure 2 shows the watershed boundary.

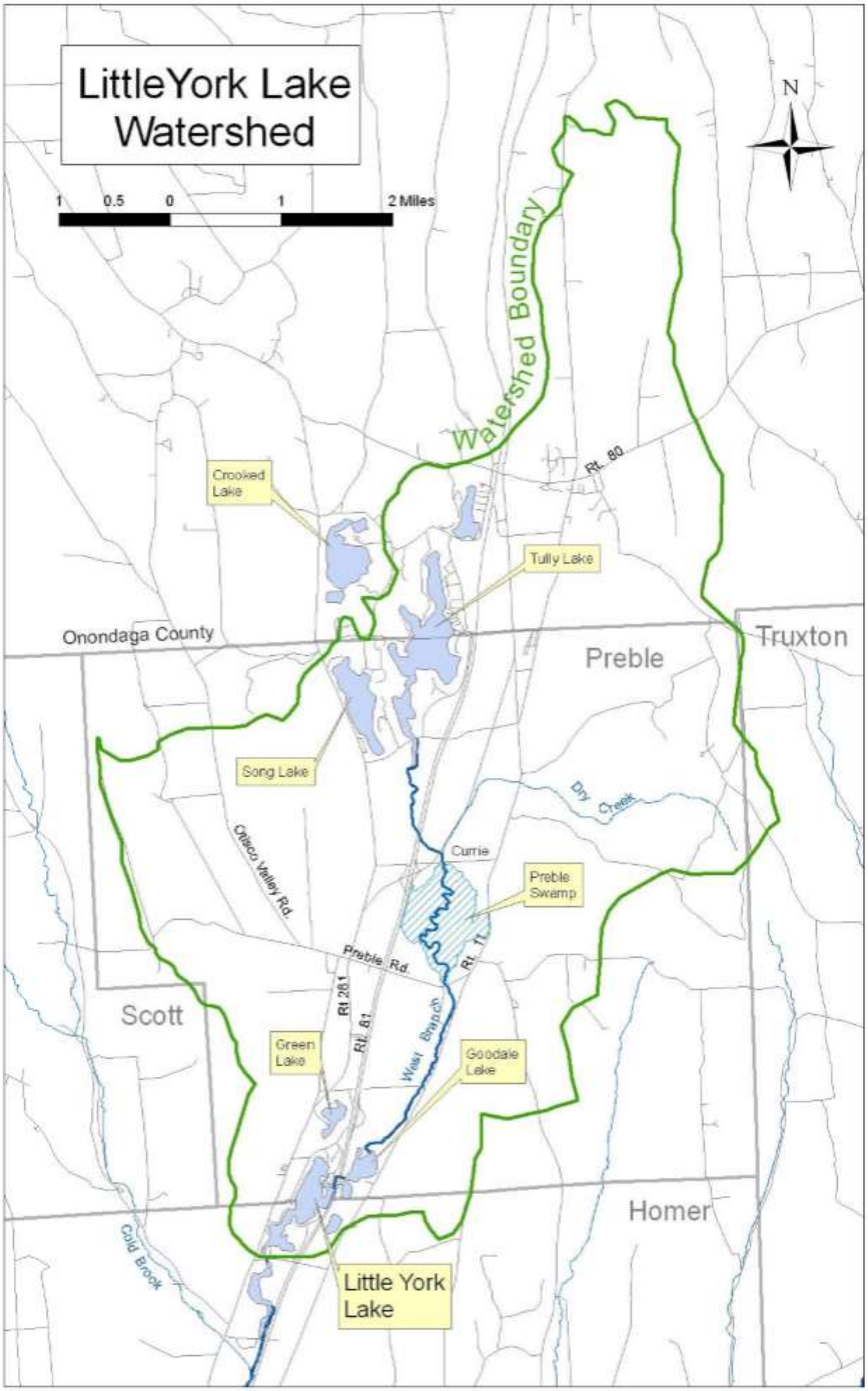
LittleYork Lake
Watershed
1
0.5
0
1
2 Miles
N
Watershed Boundary
Rt. 80
Crooked Lake
Tully Lake
Onondaga County
Truxton
Preble
Song Lake
Dry Creek
Otisco Valley Rd.
Currie
Preble Swamp
Preble Rd.
Rt. 11
Rt 281
Rt. 81
West Branch
Scott
Green Lake
Goodale Lake
Homer
Cold Brook
Little York Lake

Figure 2

Figure 3 shows land use in the watershed. It is largely forest and agricultural land. Forested areas are predominantly in the uplands. Much of the agricultural land is in the valleys, but there are farms in the uplands as well. The remainder of the watershed is comprised of low density residential land, transportation corridors, and some commercial/industrial land. The Hamlet of Preble and the Village of Tully (Onondaga County) are the only areas that would be considered higher density residential land.

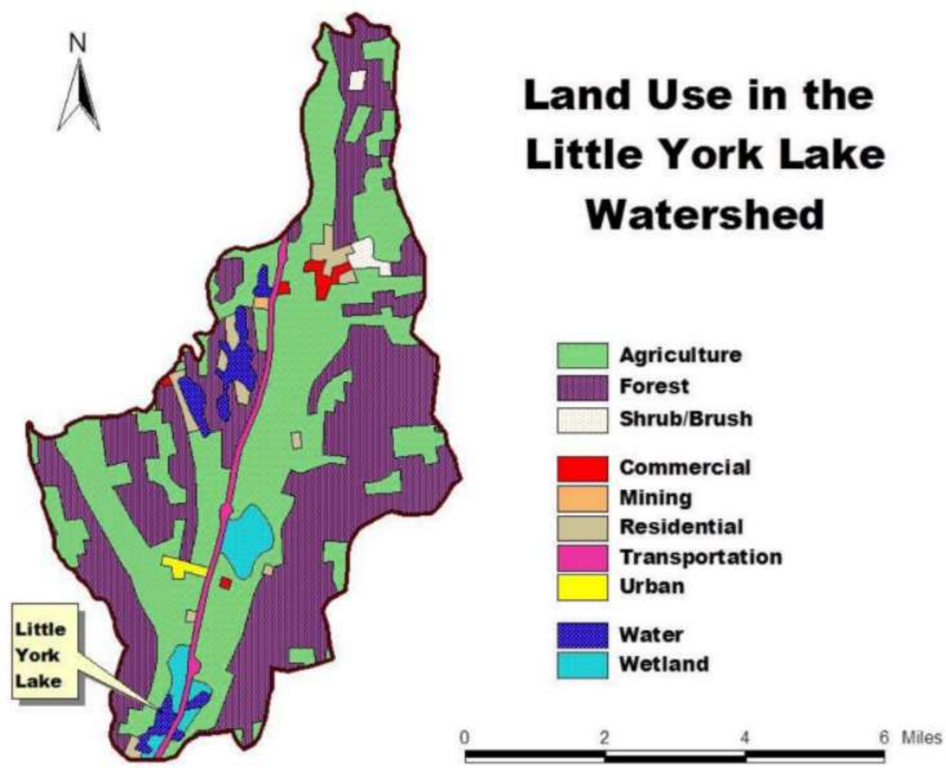

Figure 3

Goodale Lake is located immediately east of LYL, across State Route 81 and the county-owned railroad tracks. The West Branch Tioughnioga River is the main source of water to LYL. It passes through Goodale Lake, and then into LYL. Green Lake is located immediately north of LYL. Green Lake discharges into a short channel that passes through Dwyer Park and enters LYL near the public boat launch. Green Lake has no significant inflow of surface water, and is largely fed by groundwater.

The WBTR probably contributes 75 percent or more of the total inflow to LYL. Green Lake, groundwater, and storm drain outfalls are other inflow sources that are probably relatively small compared to WBTR. While the dam is the main outlet, the lake might lose some water to groundwater at the southern end because of the dam holding the water level artificially high. Any loss to groundwater is likely relatively small.

1.5.3 Climate

Little York Lake is in the humid continental climatic region of the northeastern United States. Precipitation is moderate and well distributed throughout the year, averaging about 40 to 42 inches. Except during abnormally warm winters, Little York Lake freezes by early December and ice is usually gone by mid-April.

1.6 Current Water Quality and Water Quality Trends

Water quality data have been collected from LYL for several decades. The focus has largely been on nutrients and factors that affect the growth of aquatic vegetation.

Overall water chemistry in the lake is normal, but conditions are favorable for growth of aquatic plants. Nuisance levels of vegetation exist in all the shallower parts of the lake. This section focuses on a discussion of nutrients and other factors that affect plant growth.

NYSDEC's publication "Diet for a Small Lake" provides typical characteristics of different types of lakes. LYL fall into the category of a stratified lake that is greater than 20 feet deep. Below are typical characteristics for this type of lake, as well as for LYL.

	Typical	LYL
Water Clarity	10 to 13 feet	10 to 20 feet
Phosphorous Level	10 to 15 ppb	10 to 20 ppb
Water Color	Faint	Faint
pH	Basic (> 7.5)	Basic (> 7.5)

LYL is generally a little clearer than typical, and generally has somewhat more phosphorus. Water color is typical for this class of lake, as is pH.

Described below are water quality data recently collected under the CSLAP program, by SWCD from 2001 to 2005, and by Werner and Dexter in 1988.

1.6.1 Water Clarity

Water clarity can be affected by algae, suspended particles, and natural color. Water clarity is measured by Secchi depth, which is how far into the water a person can see a black and white plate.

LYL is a relatively clear lake. Figure 4 shows Secchi depth over time. Most measurements are between 10 and 15 feet. In recent years, about 20 percent of measurements have been between 15 and 25 feet. From June through August, Secchi depth averages about 14 feet. It generally increases somewhat in September and October, possibly due to less algae growth.

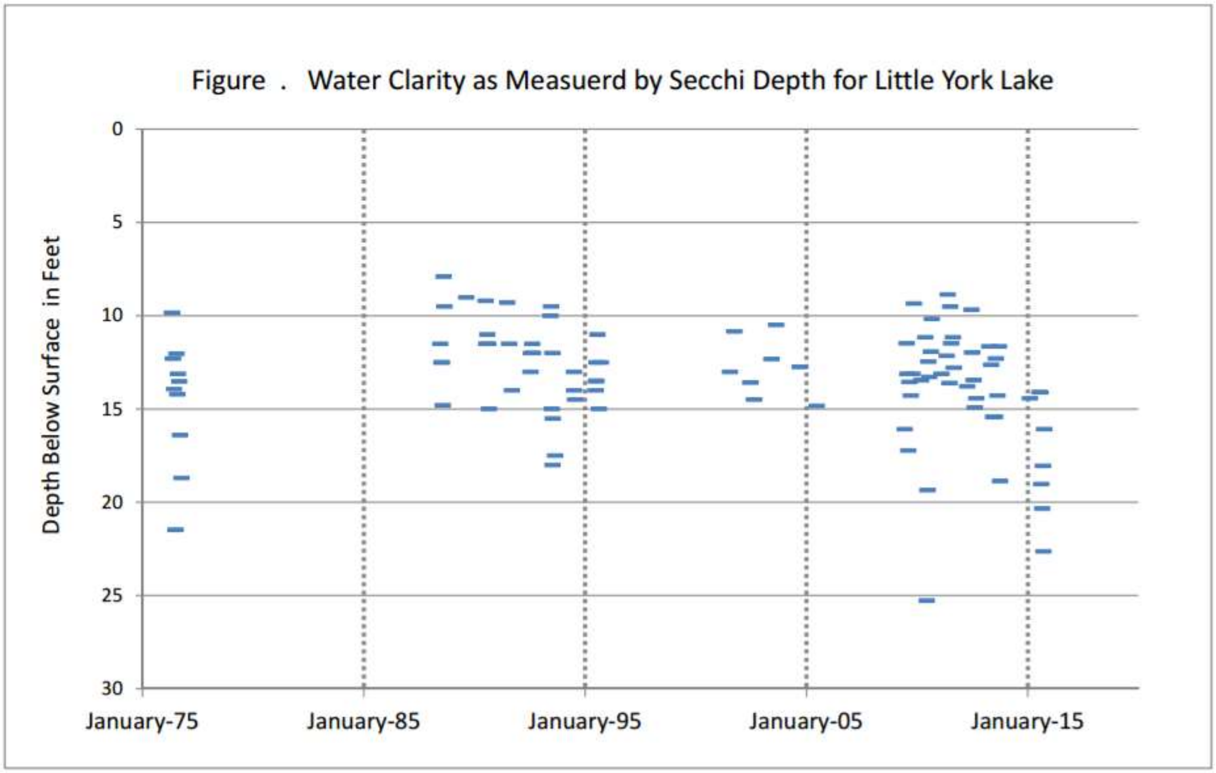

Figure 4

There has not been a significant change in water clarity over time, dating back to 1988. But there is some indication that the lake, at times, is clearer in recent years.

1.6.2 Phosphorous

Figure 5 shows total phosphorus (TP) levels measured in samples collected near the surface, at the deepest part of the lake. Over time, TP has averaged about 16 ppb, and there has not been a significant trend, either up or down. The NYSDEC does not have a regulatory water quality standard for TP, but does have a guidance value of 20 ppb. TP in LYL is generally below the guidance value, but occasionally exceeds it.

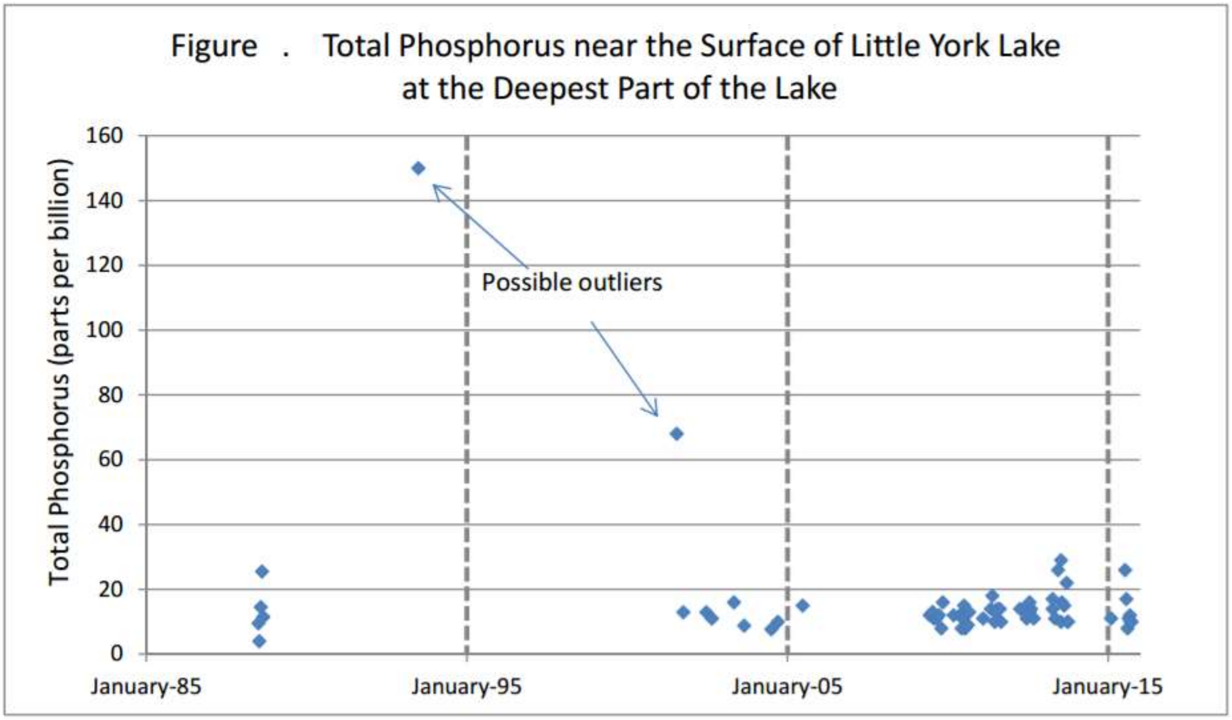

Figure 5

In 2001 to 2005, SWCD measured TP at the two main inlets to LYL (Goodale Lake and Green Lake), and at the dam outlet. Figure 6 shows these results. TP from Goodale Lake is generally similar to the in-lake concentration. Both are somewhat higher than TP at Green Lake and at the dam. TP from Green Lake may be lower because it is groundwater fed, and phosphorus does not readily travel in groundwater. TP may be lower at the dam because suspended sediment may settle to the bottom before reaching the dam.

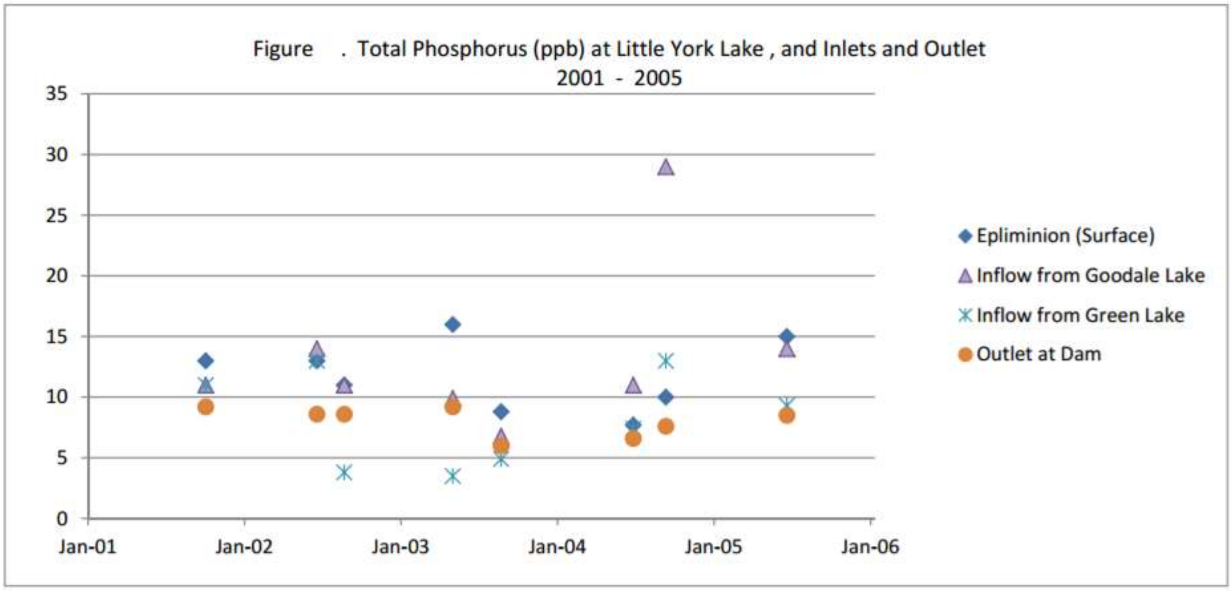

Figure 6

1.6.3 Phosphorous Loads

The WBTR, by way of Goodale Lake, is probably by far the largest source of external phosphorus to LYL. It is the largest source of water, and has the highest TP concentrations. Green Lake is a relatively small source of phosphorus compared to Goodale Lake. Other possible phosphorus sources include lake shore septic systems, storm drain inflows, and direct runoff from nearby lawns or farm fields. There is insufficient information to quantify these potential sources, but they are likely to be relatively small compared to WBTR/Goodale Lake.

1.6.4 Phosphorous Recycling

Phosphorus can accumulate in bottom sediments as dead algae and suspended solids settle to the bottom. Often this phosphorus is attached to solids, not in dissolved form. Under the anaerobic conditions often found in bottom sediments, phosphorus can be released in dissolved form and enter back into the water column.

In the early 2000s, SWCD collected surface, mid-depth and bottom TP samples. The results are shown in Figure 7. On average, the mid-depth and bottom TP levels were somewhat higher than surface TP levels. But it is unclear from this data if significant phosphorus recycling is occurring.

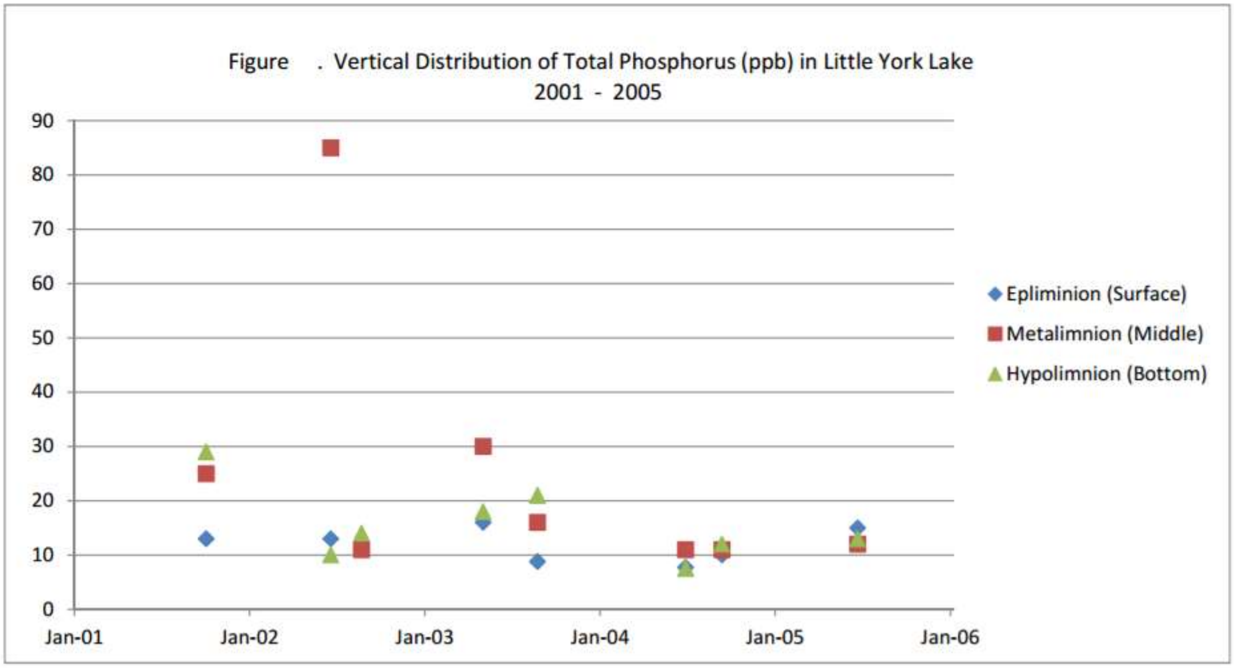

Figure 7

1.6.5 Nitrogen

Figure 8 shows total nitrogen (TN) levels measured in samples collected near the surface, at the deepest part of the lake. Nitrogen levels in LYL are relatively high. Since 2000, TN has generally been in the 1 to 2 ppm range. Average TN for the Mostly Glaciated Dairy Ecoregion is less than 0.5 ppm (LYL is within this ecoregion).

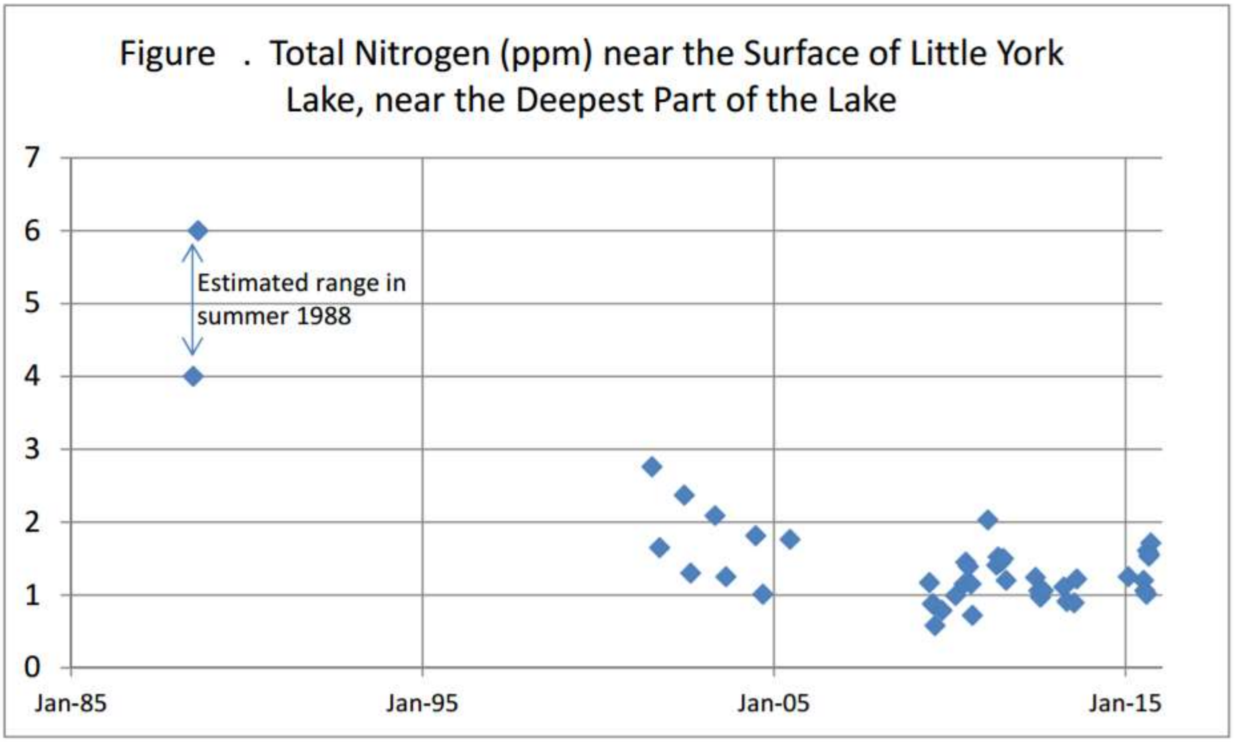

Figure 8

The data from 1988 is for nitrate, not total nitrogen. The 1988 results appear to suggest that nitrogen levels were significantly higher than in recent years, but this may not be the case. Nitrate can be reported as just the nitrogen component, or as the nitrogen and oxygen components (which is higher by a factor of 4.4). How the 1988 are reported is unknown, but if reported as nitrate, the results are more in line with recent data.

1.6.6 Nitrogen Loads

Figure 9 shows the 2001 to 2005 SWCD data for the two main inlets to LYL, and at the dam outlet. TN from Goodale Lake and at the dam is generally similar to the in-lake concentration. TN from Green Lake is significantly higher. This is likely due to Green Lake being mainly fed by groundwater from the Preble Valley Aquifer. Nitrogen levels in the aquifer are known to be relatively high in some areas.

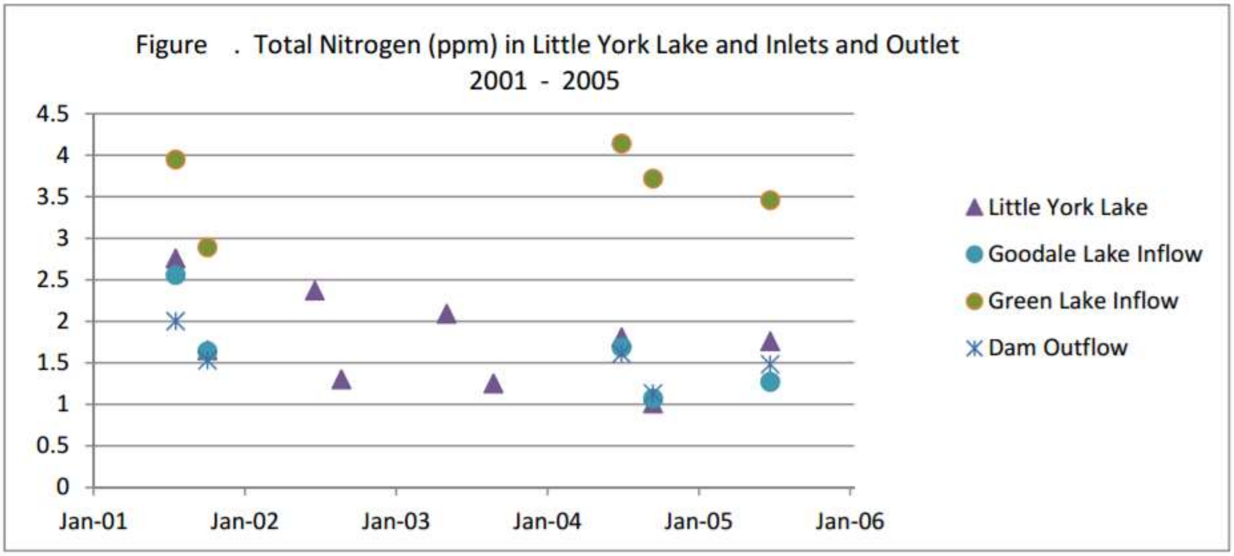

Figure 9

Despite the higher TN levels coming from Green Lake, the WBTR/Goodale Lake may be a larger source because of the much higher inflow rate. Other possible nitrogen sources include lake shore septic systems, storm drain inflows, and direct runoff from nearby lawns or farm fields. There is insufficient information to quantify these potential sources.

Nitrogen levels are relatively high compared to phosphorus in LYL. Because of this, phosphorus is likely the limiting nutrient for plant growth, and a reduction in nitrogen would not necessarily reduce aquatic vegetation, but a reduction in phosphorus might.

1.6.7 Algae (Chlorophyll_a)

Chlorophyll_a is a measure of the how much algae is present in a sample. Figure 10 shows results for Chlorophyll_a over time. Recent CSLAP results average in the 3 to 4 range, with some of the higher results occurring in 2015 and 2016. Over time there appears to be a generally increasing trend, however, the current results are within a typical range for NYS lakes. The relatively high degree of water clarity in LYL suggests algae are not overly abundant, but the increasing trend is worth noting.

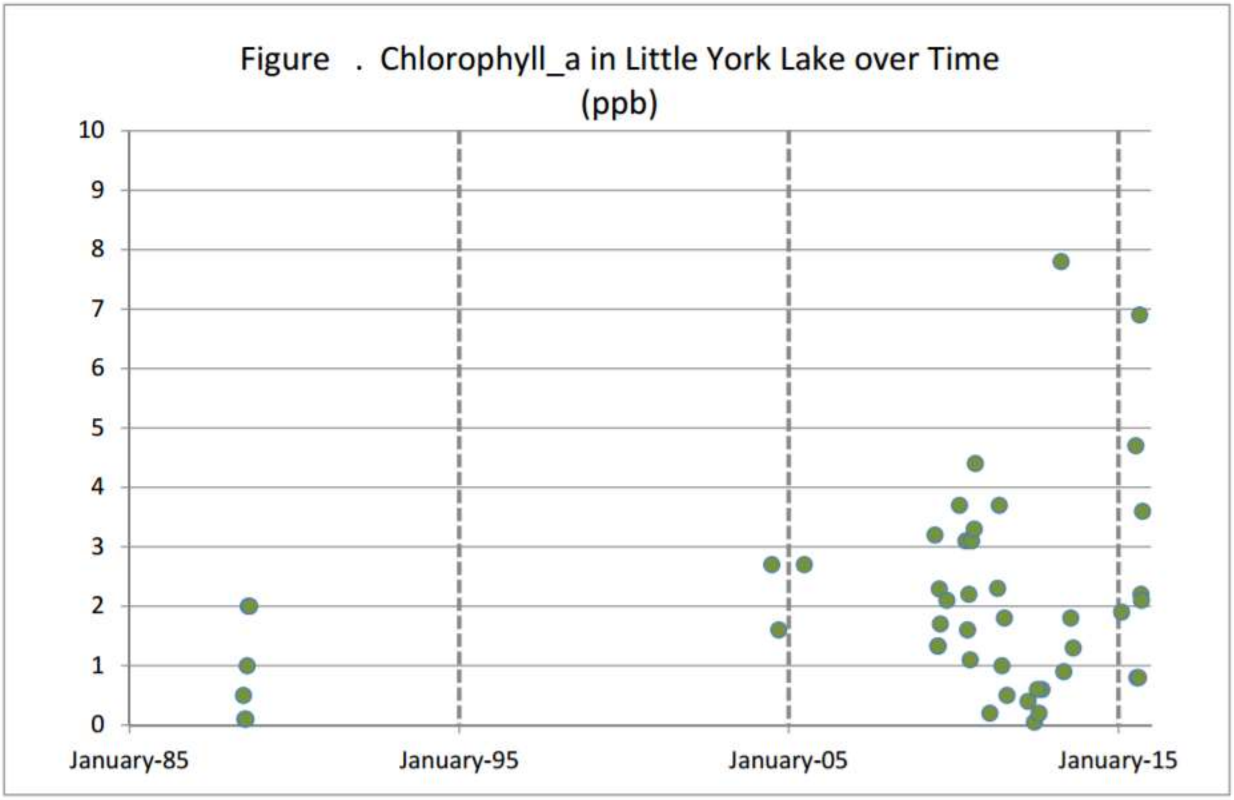

Figure 10

Trophic Status

Trophic status is a measure of the productivity of a lake from the perspective of aquatic vegetation. The range of values used to assess trophic status are shown in the accompanying table. LYL is probably best described as mesotrophic.

2 Goal

This management plan is intended to identify strategies and techniques for restoring and/or maintaining Little York Lake while recognizing its natural aging, impacts from human activities, and changing climate.

3 Impacted Uses and Probable Causes

Sediment buildup and excessive vegetation have led to impacts to all of the following uses of the lake

- Fishing
- Swimming
- Aesthetics
- Boating
- Property value/use

- Use of shoreline

Note that Little York Lake is included in a list of specific waterbodies with low dissolved oxygen from undetermined causes (natural or other) that USEPA requested be added to the Section 303(d) List (impaired waterbodies). The 2014 EPA Waterbody Quality Assessment Report can be accessed here.

As climate change continues to impact our environment, we are seeing a change in rainfall patterns. As published by DEC at the end of 2015 in a report titled *Observed and Projected Climate Change in New York State: An Overview*

> In addition to increased mean annual precipitation across New York State, year-to-year (and multiyear) variability of precipitation has become more pronounced. The pattern of precipitation has changed with increased precipitation in the winter and decreased precipitation in the summer, raising the risk of drought while adversely affecting drinking water supply.
>
> The northeastern United States has experienced a greater recent increase in extreme precipitation than any other region in the United States; between 1958 and 2010, the northeast saw more than a 70% increase in the amount of precipitation falling in very heavy events (defined as the heaviest 1% of all daily events).

This creates an opportunity to consider future uses for Little York Lake in supporting climate resiliency plans in terms of flood control and irrigation resources.

4 Objectives

1. Reduce sediment and sedimentation in the lake.

2. Manage aquatic vegetation including invasives such as variable leaf milfoil.

3. Establish an active and ongoing management process to restore and maintain the lake and its ecosystem.

5 Management Strategies

5.1 Lake Management

There are several tools to consider in meeting our objectives including:

1. Benthic Barriers
2. Hand harvesting
3. Drawdown
4. Aeration
5. Biologicals
6. Herbicides
7. Dredging
8. Boat wash/stewards

9. Shoreline restoration
10. Septic management

Each of these will be discussed in the following paragraphs.

5.1.1 Benthic Barriers

From NYSFOLA Diet for a Small Lake, Chapter 6: Aquatic Plants: Not Just Weeds, Benthic Barriers (pg. 129)

> Benthic barrier mats can be placed on the lake bottom to kill water plants by blocking their access to light during the growing season. Benthic barriers are most effective when used in small areas such as between docks or when a new population is found. They are being considered as one method for halting the spread of hydrilla since they are considered one of the safest and least detrimental.
>
> Mats should be installed when plant growth is low -in early spring or in late summer after there's been a physical removal. They can be made and installed by professionals (~$15,000/acre) or homemade (An Insider's Guide to Benthic Barriers, NYSFOLA Diet for a Small Lake, Chapter 6, pg. 131). Commercial benthic barriers are made of plastic, fiberglass, nylon, or other non-toxic materials. Homemade barriers can be opaque garden tarps with PVC pipe frames constructed to hold them in place. l methods for controlling aquatic weeds. In addition to smoothing existing plants, they can prevent germination.
>
> Unfortunately, their overall benefits are often counteracted by the difficulty in installation, difficult maintenance, and the high cost. Benthic mats need to be anchored securely so they are not a hazard. Zebra mussels can colonize the mats and sediment builds up meaning they must be removed at the end of each season.

In the summer of 2015, LYPS conducted a trial installation of benthic barriers using a product called Lake Bottom Blankets. In conjunction with SWCD, we purchased 7 blankets 10’x40’ in size and deployed 3 for a 4-week period in early August. Results were inconclusive and further testing is in order. Specifically:

- Each site represented a different section of the shoreline - (a) shallow, (b) sediment-filled, and (c) relatively deep. All sites had heavy coverage of milfoil.
- All sites benefited from immediate covering and depression of the existing milfoil, facilitating dock access
- Upon removal, the two shallow sites (a and b) experienced almost complete milfoil dieback while the deep site (c) had some residual milfoil
- On removal, the barriers had significant coverage from zebra mussels
- Anecdotally, there was little impact on the milfoil in the covered sites at the start of

the following season

In 2016, NYS DEC instituted a new General Permit for Management of Invasive Species which covers the use of benthic barriers:

Benthic barriers (mats) are a natural or synthetic material used to kill aquatic invasive species by eliminating sunlight. Benthic barriers are authorized only for eradicating new infestations identified within the past two years.

Mats may not to be installed over active spawning beds, or between March 15 and June 30 unless area is confirmed by DEC to not include active spawning beds.

Mats must be anchored. No natural stone from lake bottom shall be used to anchor mats.

Benthic barriers and all materials used to anchor them must be removed within three months from the date of installation.

Benthic mats must be limited to a one acre area.

The Permittee must notify the DEC Regional Office of Fish, Wildlife and Marine Resources when benthic mats have been removed.

Given the new DEC rules, the limited size/coverage and the annual deployment requirement, these should only be considered as a tactical solution for specific, short-term treatment options.

5.1.2 Hand Harvesting

Hand harvesting is the technique of physically pulling plants from the sediment including their roots. Beyond very shallow arrows, this is most efficiently accomplished by divers with some sort of oxygen supply.

A case study was presented at the North American Lake Management Society meeting in November, 2015 by Mercedes Gallagher from Center Pond in MA. Center Pond is ~125 acres, ground water fed and typically under 20 feet deep.

Facing a large invasion of Eurasian milfoil, the association developed an approach to bring divers in and harvest bags of milfoil with the goal of reducing and controlling the population. They developed a program to train their own divers in a specialized pulling technique and aggressively skim fragments surrounding the dive zone.

In 2009, at the start of the program, 600 bags of milfoil were harvested. By 2013 the total was down to ~20. Annual costs went from $12,000 to $4,000. The cost per acre is in the range of $300 to treat.

Another case study was presented at the NYSFOLA conference in April 2016 by Guy Middleton of Upper Saranac Lake Foundation. They have retained Aquatic Invasive Management Inc. to provide hand harvesting services for their milfoil problem. Along with proactive monitoring, their program has dramatically reduced the occurrence of milfoil and reduced the cost per acre to manage from an initial cost of $450 per acre to $91 per acre.

Note that neither lake reported complete elimination of milfoil through hand harvesting, though both report substantial success in reducing its impact on lake utilization. While both lakes are primarily dealing with Eurasian milfoil, Upper Saranac discovered variable leaf milfoil in 2014. The hand harvesting techniques seem to be equally effective with both types of milfoil (as well as other AIS).

5.1.3 Drawdown

Source: Washington State DEC

> Lowering the water level of a lake or reservoir can have a dramatic impact on some aquatic weed problems. Water level drawdown can be used where there is a water control structure that allows the managers of lakes or reservoirs to drop the water level in the waterbody for extended periods of time. Water level drawdown often occurs regularly in reservoirs for power generation, flood control, or irrigation; a side benefit being the control of some aquatic plant species. However, regular drawdowns can also make it difficult to establish native aquatic plants for fish, wildlife, and waterfowl habitat in some reservoirs.
>
> Lowering the water level in the winter exposes the sediment to both freezing and loss of water. Freezing can have a dramatic impact on aquatic plants (such as Eurasian watermilfoil or Brazilian elodea) that have no overwintering structures such as viable seeds, turions, tubers, or winter buds. Prolonged exposure to freezing temperatures is often fatal. Freezing of the sediments can also impact species like frogs, turtles, and invertebrates that may over winter in the drawn down area. Drawdowns may impact aquatic mammals such as beavers and muskrats.
>
> Lowering the water levels in the summer can expose the sediments to desiccation and high temperatures (depending on the climate). These conditions can also kill some aquatic plants.
>
> Drawdowns that expose greater areas of sediment (and plant beds) will be most effective in controlling aquatic plants. However, if the drawdown does not occur on a regular basis, the plants will recolonize and reestablish in these areas. Be aware that the growth of some aquatic plant species may be enhanced by water level drawdowns. Know what species you want to control before selecting this method of control. Results from Vermont's Lake Bomoseen drawdown indicate that single winter drawdowns on lakes with major deepwater wetlands can cause catastrophic and possible long-lasting changes in the plant communities.

A winter 1981-82 drawdown of Blue Lake, Oregon reduced dense beds of Eurasian watermilfoil that had maintained position and density in the lake relatively unchanged since 1973. However regrowth of new stems from surviving root crowns was widespread (N. Stan Geiger - Winter drawdown for the control of Eurasian watermilfoil in an Oregon oxbow lake (Blue Lake, Multnomah County, published in Lake Restoration Protection and Management, EPA 440/5-83-001).

G. Dennis Cook in the 1980 article "Lake level drawdown as a macrophyte control technique" recommended lake level drawdown for macrophyte control in situations where prolonged (one month or more) dewatering of lake sediments in possible under rigorous conditions of cold or heat, and where susceptible species are the major nuisances. (Water Resources Bulletin, Vol. 16, No. 2). The author points out that rigorous conditions suitable for macrophyte control may not occur with heavy snowfall or in milder, rainy winters.

In Washington, Lake Chelan is drawn down significantly on a regular basis for power generation. This exposes Eurasian watermilfoil plants to freezing/desiccation and as a result milfoil has not become a problem in Lake Chelan. The same situation occurs in Lake Roosevelt, the reservoir formed behind the Grand Coolie Dam. Although Lake Roosevelt is being continuously fed milfoil fragments from the Pend Oreille River which enters the Columbia River in Canada, milfoil has not established nuisance populations in Lake Roosevelt. We believe that extensive drawdowns for power generation have had the side benefit of controlling milfoil. However, native aquatic plants have not established to any degree either.

Advantages:

- If a water control structure is in place, drawdown can be a very cost effective way of controlling plants like Brazilian elodea and Eurasian watermilfoil.
- The expansion of native aquatic plants in areas formerly occupied by exotic species can be enhanced by drawdown.
- Game fish are reported to experience enhanced populations after drawdown.
- Drawdowns provide an opportunity to repair and improve docks and other structures.
- Loose, flocculent sediments can become consolidated after drawdown occurs.

Disadvantages:

- To be cost effective, a water level control structure must be in place, otherwise high capacity pumps must be used.
- The growth of some aquatic plants may be enhanced by water level drawdowns - know the species that you want to control.
- Winter weather may influence the success in killing the target species. Snow before a hard freeze may insulate the sediment and prevent freezing to a depth

that will kill the roots; milder climates may not experience the freezing or dewatering conditions needed to kill the exposed plant roots and rhizomes.

- Docks are left high and dry, water intakes may no longer be in the water, it may not be possible to launch boats, and some people will complain about aesthetics of the waterbody.
- There will be significant impacts to fish and aquatic wildlife by lowering the water and exposing the sediments, particularly to outmigrating salmon.
- Algal blooms have been reported to occur after drawdowns have occurred.
- Water levels may be lower in wells during drawdowns.

Permits:

Permits are required for many types of projects in lakes and streams. Check with your state and local jurisdictions before proceeding with a water level drawdown.

Costs:

If a water level structure is in place, costs may be minimal.

5.1.4 Aeration

At the 2015 North American Lake Society International Symposium, Jennifer Jermalowicz-Jones presented data on the use of aeration in a talk titled: *Inversion Oxygenation and Bio augmentation Reduces Invasive Eurasian Watermilfoil Growth in Four Michigan Inland Lakes*.

From the abstract:

> Over the past 2-4 years, a series of 4 Michigan inland lakes have implemented this technology for Eurasian waterfilfoil reduction among other water quality improvements. Rigorous Point Intercept grid surveys of the treatment areas demonstrate that this technology has significantly reduced Eurasian watermilfoil in four inland lakes located geographically throughout the state. On two of the study lakes, a >75% reduction in Eurasian watermilfoil was measured over a two-year evaluation period. Possible mechanisms for these measured reductions in Eurasian watermilfoil were also investigated and included similar sediment characteristics such as sediment porosity and organic and ammonia content among the studied lakes. It is therefore likely that inversion oxygenation technology with bio augmentation interacts with some lake sediments to reduce susceptible species of rooted aquatic vegetation …”
>
> The technique involves installing diffusers to oxygenate the water and sediment. Incorporating bacteria further breaks down the organic material in the sediment and reduces “muck”.

The following are notes from the presentation.

Austin Lake, Kalamazoo MI

* Lake filling with sediment
* Looking for cheaper alternatives to dredging

* ceramic aerators and bio enzymes
* After 3 years of aeration EWM was eliminated
* High levels of 0M and NH and NITRATES
* NH and Nitrates dropped dramatically
* Sediment reduced by avg 2 feat

Indian Lake

* 87% Ewm
* Almost eliminated in 2 years
* Similar changes in sediment

Paradise Lake

* 400 acres
* Very dense coverage
* EWM cut in half but now at standstill

Pickerel Lake

* 135 acres
* Max depth 10 feet
* Only preliminary data available

While this technique offers promise as a sediment reduction tool (and consequently a tool for reducing milfoil), results are somewhat less predictable than e.g. dredging. As a consequence, it should be explored as a fallback position to dredging or as an ongoing maintenance tool.

5.1.5 Biologicals

Excerpts from: Lakewide/Whole Lake Management Activities – NYS DEC

The biological control of aquatic plants focuses on the selection and introduction of organisms (parasite, predator or pathogen) that have an impact on the growth or reproduction of a target plant. Theoretically, by stocking an infested waterbody or wetland with these organisms, the target plant can be reduced and native plants can recover.

Within the broad category of biological control, two of the more studied options of biological control of Eurasian watermilfoil are the Grass Carp and Herbivorous Insects. Herbivorous Insects (Weevils, Midges, Aquatic Moths, and Flies) are insects that are identified as natural predators of certain problem weeds. These insects are then purposely added or “stocked” into a lake or pond to eat the problem weed.

5.1.5.1 Biological Control: Herbivorous Insects

Principle

In the 1980s, it was reported that the populations of Eurasian watermilfoil had crashed in the northern end of Cayuga Lake, resulting in a shift in the plant communities from invasive to desirable native plants. Such a dramatic change in plant densities could have in theory been attributable to some combination of wishful thinking, illegal herbicide treatments, bad data, or weather. However, in this case, an evaluation by Cornell University determined that the milfoil populations were being significantly preyed upon by an herbivorous aquatic moth, Acentria ephemerella, which, while not considered native to the area, was actually found in most nearby New York State lakes. Meanwhile, research on several fronts, including Vermont and Minnesota, found that similar damage was being inflicted on milfoil plants by a native herbivorous weevil, and other insects in lakes and ponds in other locations in North America.

The mode of action of these various herbivores varies somewhat. The aquatic moth lays its eggs down near the bottom of Eurasian watermilfoil plants. When the caterpillars hatch, they crawl up the plant and feed on the growing tips (meristems) of the plants through various stages of development. Research suggests that nearly one moth per stem of milfoil is necessary to significantly impact the plant populations. Once achieving adulthood (for two days only!), the adult males mate with the mostly wingless females, and then the female swims down to lay her eggs on the lower plant leaflets. The caterpillars overwinter on plants near the lake bottom, and begin feeding in May.

Thee milfoil weevil adults swim and climb from plant to plant, feeding on leaflets and stem material. Females lay one egg per watermilfoil meristem per stem, usually two stems per day. Once hatched, the larvae first feed on the growing tip, and then mine down into the stem of the plant, consuming internal stem tissue along the way. Weevils pupate inside the stem, and adults emerge from the pupal chamber to mate and lay eggs. The weevils generally spawn 2 to 4 generations per year.

Advantages

Herbivorous insects appear to be the ideal control agent. They are small and unobtrusive, often invisible to even interested observers. Both the weevil and moth impact the growth of Eurasian watermilfoil, with no or very minimal damage to native plants that might thrive in the absence of the Eurasian watermilfoil, and no apparent damage to other parts of the aquatic ecosystem. The relative slow reduction in plant biomass minimizes the risk of inducing significant oxygen loss through the microbial breakdown of decaying plant matter.

Disadvantages

The practice of rearing, transporting, and stocking herbivorous insects has not successfully replicated what Mother Nature has done in several New York State lakes. Part of this problem has been due to a problem with scale. The lakes that have experienced successful milfoil control via indigenous populations of these herbivorous insects have shown to have upwards of 2 insects per milfoil plant, which can be extrapolated to literally millions of these insects chomping away at these plants, numbers several orders of magnitude larger than what has been “produced” in all of the labs and commercial operations in the business of making bugs. Moreover, even if these bugs could be more readily mass produced (and a lake community would be willing to pay for all those bugs), it could be argued that the reason that many of these lakes do not have naturally high densities of these insects is that these lake environments are simply not hospitable to large populations, either due to competitors, predators, or other impediments to their survival. Moreover, some New York State lakes with naturally high levels of these insects still are overwhelmed with Eurasian watermilfoil beds, suggesting that more than just lots of insects are needed to control milfoil growth.

Costs

The costs for whole lake plant management using these insects cannot be easily determined, since none of the stocking projects have seen either the stocked insects spread to the entire lake or milfoil control beyond the limited stocking area. As a general rule, stocking costs have been approximately $1 per insect (weevil or moth), and about 1000 insects have been stocked per acre, translating to about $1000 per acre.

Biological control utilizing herbivorous insect stockings remain a very promising but thus far elusive aquatic plant control strategy. While in theory this should be identified as a lakewide control strategy, the limited use stocked insects in New York State lakes has resulted in only limited control of plants in small beds close to the areas where the insects have been stocked. The potential benefits are substantial, and the promise of a “natural” control method, particularly in light of the very minimal side effects, remain very high. Nonetheless, it cannot be stated with any certainty that this promise will ultimately translate into a viable control strategy.

5.1.5.2 Biological Control: Grass Carp

Principle

Grass carp (Ctenopharyngodon idella , or white amur) physically remove vegetation from lakes. These are essentially “biomanipulation” tools- as a general class of lake management. The carp, less than one pound in weight and two feet in length (less than one foot may be preyed upon by largemouth bass), are stocked at a rate of about 15-40 per acre of surface area. They can grow up to 6 pounds per year, and may ultimately consume 20-100% of their body weight each day in vegetation.

The fish will selectively feed on particular types of plants; although the carp are reported to have particular favorites among the plant species, these preferences may be a function of specific lake conditions, and eating habits may not be reproducible from lake to lake.

Only sterile grass carp (called triploid) are presently allowed for stocking in New York state, as in 14 other states (15 states allow both sterile and fertile carp, and 19 states do not allow importation of these fish). Grass carp have a strong tendency to follow flowing water, such as inlet and outlet streams. Unless these streams are adequately screened, the fish are likely to move out of the lake. Not only is the investment in fish lost, but the nuisance weeds remain in the lake, and the carp may destroy desirable aquatic plants in the streams.

In most of the 35 or so states that allow their use, grass carp are restricted to lakes with no sustainable outflow, to reduce the possibility of escape, and to maximize the control of vegetation within the target lake. However, fish cannot be expected to control weeds at a specific part of a lake, such as a beach or an individual dock. Since fish have access to the entire lake, grass carp treatment is necessarily a full-lake treatment.

Advantages

Grass carp are perceived as a “natural” aquatic plant control agent (and are certainly among the “less visible” plant control strategies), even if they are not native to a lake, and as such this plant control method avoids some of the opposition to other more invasive or controversial control strategies. If stocked at a high enough rate, grass carp can significantly reduce weed populations within a year, although most acceptable (i.e. permittable) stocking rates in New York State are not high enough to result in significant first season control. In fact, many of the less successful experiments with grass carp have resulted from not waiting long enough for the carp to effectively control excessive weed growth, particularly in lakes with stocking rates kept fairly low to prevent eradication of all plants. As long as grass carp populations, particularly voracious younger fish, remain high, multiple years of control can be expected. Population dynamics can be well controlled due to the sterilization required for fish stocked in New York State lakes.

Disadvantages

Grass carp do not meet any of the criteria for an "ideal" candidate for introduction to an aquatic system: they do not co-adapt with other aquatic species, do not have a narrow niche, are not easily controlled after escape, and are not free from exotic diseases and parasites.

The most significant drawback of using grass carp is the potential for complete eradication of vegetation. A complete removal of all types of vegetation may occur after the grass carp have exhausted the supply of target plants, and would have severe detrimental effects on the plant community and entire ecosystem. This is a distinct possibility in the event of overstocking; however, excessive growth of smaller populations of fish could cause the same problem. At the other extreme, understocking or insufficient consumption of vegetation may result in the control or eradication of non-target plants, since the eating habits of grass carp are not completely predictable. In the absence of competitive native species, this could allow the exotic target plants to dominate the plant community.

Grass carp can also escape downstream, particularly given their propensity to migrate to moving water. Permits are only issued in larger New York State lakes with inlets or outlets if steps are taken to prevent movement of the fish out of the lake.

Costs

Grass carp offer one of the least expensive lake management techniques for controlling nuisance aquatic vegetation. Costs are a function of vegetation density and stocking rate, and usually run from $50 to $100 per acre, based on a “standard” allowable New York State stocking rate of about 10-15 fish per vegetated acre. These costs can be amortized over several years, since the grass carp application requires only capital expenses.

Grass carp may offer an excellent vegetation control option for some situations. There is a great deal of interest in using this species for biological control of nuisance aquatic plants rather than chemical and/or mechanical means. Unfortunately, grass carp are not the instant solution to all aquatic vegetation problems. The experiences in New York State have been somewhat variable. In nearly all cases, when stocking rates are high, grass carp have effectively removed submergent aquatic plants. In other locations, long term eradication of nearly all plant material has accompanied grass carp introduction, to the detriment of the aquatic ecosystem. At lower stocking rates, non-target aquatic plants have often been controlled, particularly when the target plant is Eurasian watermilfoil.

With the challenges of scaling insect populations and the regulatory challenges posed by grass carp, it appears that this tool is best considered for long-term maintenance of the lake.

Note that Song Lake ran a grass carp project and it completely depopulated the plant population with negative results. The lake is now susceptible to harmful algal blooms (HABs), preventing all uses of the water for periods of time. Before embarking on a grass carp project, we should review the full details of the Song Lake project.

5.1.6 Herbicides

In 2014-15 the association evaluated and pursued treating LYL with herbicides. After issuing an RFP, the association selected A-Tip Control in Dansville NY and decided on Renovate OTF as the target treatment.

The association submitted an application to DEC and were subsequently informed of a requirement to notify riparian owners south to the state border. This being viewed as impractical, the association shelved the plan.

5.1.7 Dredging

In correspondence with LYPS during the fall of 2016, Sam Robinson, Project Engineer with Dredge America, Inc. made the following conversations in a question regarding dredging Little York Lake:

This is a typical question from HOA's when deciding to spend the money for a full scale dredging project. The first thing I would like to point out is that chemical control and weed harvesting are temporary fixes that require an annual maintenance schedule in order to achieve the desired result. Essentially, you are masking the problem and not fixing it long term. By dredging the shallow areas in the lake, you will increase the overall water depth and help to eliminate algae and surface vegetation. This will also increase your access to all areas of the lake and improve the end user's experience. There still may be a need for minor vegetation removal or small chemical control to maintain the overall health of the lake, but this is typical for many bodies of water across the United States.

The question of mechanical dredging versus hydraulic dredging is something that I hear every day, and there is a different answer for almost every project. For your project, mechanical dredging would be a very "ugly" process that would require draining the lake, building haul roads, moving in heavy earth moving equipment, and having haul trucks constantly moving over your local roads. This causes a large mess for the local community, working days are limited by the weather (rain, snow, etc), material has to be removed from the site immediately, kills the fish that are present in the lake, and the risk of costly damage to roads that you will be responsible for at the end of the project. Hydraulic dredging is a much less invasive process that allows you to leave the water in your lake, minimize heavy equipment onsite, minimize environmental impacts to the lake and aquatic life, reduces overall risk of budget/schedule overruns, and will have almost zero effect on the surrounding community during the construction process.

A detailed dredging study was conducted in 1997 and can be viewed here. Hydraulic dredging is reasonable tool for reducing sedimentation and, indirectly, AIS control. Its primary drawback is expense.

5.1.8 Boat wash/stewards

Boat stewards and accompanying boat washes are intended to prevent the spread of aquatic invasive species (AIS). New York State has invested significantly in these programs following successful development in the Adirondacks.

In 2016 C-OFOKLA, of which LYPS is a founding member, won a 3-year DEC grant to implement a boat steward program. This is a necessary precursor to DEC funding for a boat wash station.

Additional grants will be sought for a boat wash station in the future.

The goal of a boat wash with stewards is preventative. This technique will come into play as a maintenance tool.

5.1.9 Shoreline Restoration

Managing the shoreline of Little York Lake is an important maintenance program. The majority of the developed shoreline consists of "hard" surfaces. The following extract from the DEC article on shoreline stabilization gives the latest thinking on this topic:

> Soft or natural approaches to shoreline stabilization are recognized now as being more environmentally effective. When shoreline repair or stabilization becomes necessary, these methods should be considered first.
>
> Natural approaches seek to restore hydrological and ecological balance by using methods that are structurally sound as well as economically feasible and ecologically sustainable. While there are many ways to protect an existing shoreline or restore an eroded one, choosing appropriate materials and design is important. Soft methods may include planting native, deep-rooting vegetation, as well as bioengineering. In all cases, the proposed stabilization method should follow the natural contour of the shoreline.

5.1.10 Septic Management

Failing septic systems are a source of nutrients to lake "weeds". Effectively managing septic systems to eliminate the flow of nutrients into the lake is an important long-term strategy. Here are some notes from a DEC article on this approach:

> Septic systems are designed to treat liquid wastes from your house in order to prevent contamination of your well and nearby waterbodies. The problem is that all septic systems will eventually fail. Adding to that problem, due primarily to the fact that these systems are underground, many homeowners don't regularly think about their septic system and don't perform the necessary maintenance required to ensure that their septic system operates properly. As a result, the homeowner often doesn't realize there is a problem with their septic system until contamination has occurred and manifests itself at the surface.
>
> Detection of failing shoreline septic systems is an important component of maintaining water quality on lakes with development along their shorelines. However, the current method for detecting failing shoreline septic systems, Bacteria Source Tracking, requires a series of genetic tests and often carries a price tag too large to make the test affordable for a typical lake association. In an effort to develop a cost-effective, relatively inexpensive approach to test for failing shoreline septic systems, staff from Adirondack Community College and staff from Warren County Soil and Water Conservation District developed such a method, based on sampling for relatively simple water quality metrics.
>
> As a pilot study used to develop an inexpensive detection protocol, the shoreline of an Adirondack lake was divided into approximately 350 ft. zones in

which samples for fecal bacteria, chlorine and phosphorus were collected, once a month from May to August. Fecal bacteria levels were found to correlate positively with chlorine levels but not phosphorus levels. Although the fecal bacteria could not be positively identified as being from a human source (i.e. a failing septic system), when combined with positive readings for chlorine, a man-made substance not naturally found in nature, researchers were able to use the results of the sampling to isolate areas of probable septic system failure. Phosphorus levels were not found to be a good predictor of septic system failure.

By using this method to focus in on a limited span of the shoreline in which septic system failure is most likely occurring, traditional “flush” testing can be performed on a limited number of houses in order to determine which septic system is the source of the input. This protocol greatly reduces the cost of finding failing shoreline septic systems and makes it economically feasible for the average lake association.

This is an important part of the long-term lake management strategy.

5.1.11 Summary

The following table summarizes key attributes of these tools along with their fit in the overall lake management process within the stated goals:

Tool	Pros	Cons	Fit
Benthic Barriers	Effective Inexpensive	Tactical only Labor intensive Permits required Weeds only	May be good for quick tactical response to new infestations
Hand Harvesting	Effective Immediate results	Labor intensive May be expensive at start Permits required Weeds only	Good for ongoing maintenance of weed problem
Drawdown	May reduce weed and other AIS populations May reduce sediment	Uncertain impact Will require approval in order to impact sediment	May be a tool in a maintenance program but unclear
Aeration	Reduces sediment May reduce weeds	Program price Uncertain results Ongoing operations (multi-year)	May be useful for maintenance of sediment base
Biologicals	Reduces weeds over time	Weeds only Insects are not scalable Carp faces permitting challenges	Probably not useful

Herbicides	Effective	Requires (almost) annual application Expensive Permitting issues	Probably not useful in our situation
Dredging	Effective Immediate results Impacts primary objective	Expensive	Recommended primary tool for restoration
Boat wash/ Stewards	Changes behaviors Protects on an ongoing basis	Expensive No direct results	Important as an ongoing maintenance tool
Shoreline Restoration	Improves overall lake health	Requires individual action	Promote as part of ongoing education
Septic Management	Improves overall lake health	Requires individual action	Promote as part of ongoing education

5.2 Tributary Monitoring

5.3 Watershed Management

5.4 Education

6 Recommendation and Action Plans

Little York Lake has a long history as a lake. The installation of a dam has caused the lake to both expand and to fill in with sediment. Restoring the lake to a point closer to its original state and maintaining it is the objective of the action plan recommended here.

In a 1987 study commissioned by the Cortland County Planning Department, the author, Dr. Gary L. Miller, made the following statement:

> Proper aquatic plant management may require both short-term and long-term strategies. Short-term refers to the direct control of attached and floating aquatic plants and algae by physical or chemical means. It is immediate in impact, relatively easy to produce, but variable in cost. Long-term control refers to the indirect control of aquatic plants through the manipulation of factors in the immediate environment or in the watershed, such as the availability of necessary rooting sediments or dissolved nutrients...Long-term management is difficult to produce because of the need for governing bodies, citizens organizations and/or farming concerns to effectively work together. It's [sic] impact is both less direct and immediate. Over the long-term, however, its impact may be superior. *The remainder of the discussion will focus on short-term options.* [emphasis added]

The short-term recommendations were focused on weed-harvesting. While several other options were presented, they were either regarded as too expensive (dredging), problematic from permitting and public acceptance (chemical treatments), or too tactical (benthic barriers).

The county has indeed implemented a weed-harvesting program but this has proven ineffective in dealing with the current lake conditions because it doesn't address the root-cause of increased sedimentation.

With our 3 objectives:

1. 0Reduce sediment and sedimentation in the lake.
2. Manage aquatic vegetation including invasives such as variable leaf milfoil.
3. Establish an active and ongoing management process to restore and maintain the lake and its ecosystem.

our priorities in 2017 should be focused on reducing sedimentation and then managing the re-introduction of appropriate aquatic species.

6.1 Recommendation 1

Dredging areas of the lake that are particularly susceptible to sediment accumulation from the dam (i.e. in the original flow of the Tioughnioga river) is a primary recommendation. This will restore the lake to its original (post-dam) form and provide additional flood-control facilities for the region. It also provides a potential resource for farms in the region as climate change impacts are increasingly felt.

6.2 Recommendation 2

Once dredging is accomplished, native plants should be re-introduced to ensure a healthy ecosystem. These will include [list of native plants to promote].

6.3 Recommendation 3

Build a hand-harvesting program to control the potential re-expansion of the Variable Leaf Milfoil through the dredged (and other) areas.

6.4 Recommendation 4

Develop a long-term funding plan for the ongoing maintenance of Little York Lake.

6.5 Recommendation 5

Review and update this plan on an annual basis.

6.6 Timeline

We recommend a timeline with the following structure:

Timeframe	Years 1-3	Years 3-5	Years 5+
Phase	Restoration	Improvement	Maintenance
Activities	Establish long-term funding program Dredge lake	Plant re-introduction, hand harvesting, Benthic mats	Lakeshore restoration, septic system maintenance, aeration