LAKE COUNTY, ILLINOIS

2012 SYLVAN LAKE SUMMARY REPORT

PREPARED BY THE

LAKE COUNTY HEALTH DEPARTMENT

Population Health Environmental Services

Late summer on Sylvan Lake, 2012.

Sylvan Lake is an approximate 31.57 acre impoundment located in Fremont Township. Sylvan Lake was created through the excavation and damming of an Indian Creek tributary in 1936. The Sylvan Lake Improvement Association (SLIA) formed shortly after lake construction and has been responsible for the lake management ever since. The SLIA and it's partners have actively been working on projects to improve the poor water quality of Sylvan Lake. For instance, they rehabilitated two inlet areas located in Maple and Ravinia Parks as part of a grant through the Illinois Environmental Protection Agency's 319 program. In 1980 an aeration system was installed in the lake to solve problems they were having with low dissolved oxygen. It was discovered that the system was not sufficient and in 2011 a fourth aerator head was installed.

Although at the surface, Sylvan Lake is aesthetically pleasing, closer observation depicts a lake with problems which still need to be addressed. Sylvan Lake had a blue-green algal bloom in the lake from July through September of 2012. High nutrients (especially phosphorus), lack of aquatic vegetation, the addition of fish feeders, and insufficient aeration all can contribute to the poor water quality found on Sylvan Lake.

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SPECIAL POINTS OF INTEREST:

- *Phosphorus impairment*
- *Total Suspended Solids*
- *Fecal coliform*

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SUMMARY (CONTINUED)

Lake Facts:

Major Watershed: Des Plaines

Sub-Watershed: Indian Creek

Location: T44N, R10E, Section 34

Surface Area: 31.57 acres

Shoreline Length: 1.31 miles

Maximum Depth: 13.0 feet.

Average Depth: 7.73 feet.

Lake Volume: 273.05 acre-feet

Watershed Area: 165.90 acres

Lake Type: Impoundment

Management Entities: Sylvan Lake Improvement Association

Current Uses: Fishing, swimming, non-motorized boating, aesthetics

Access: Private

The lake is available for use by association members for fishing, swimming, and aesthetics. Launching of gas powered watercraft is not allowed.

In 2012, Sylvan Lake was monitored for water quality by the LCHD-ES. A multiparameter sonde was used to measure temperature, pH, dissolved oxygen, and conductivity. Additionally water samples were collected using a Van Dorn sampler and tested for alkalinity, phosphorus, nitrogen, solids, and chloride. Assessments were made of aquatic vegetation, shoreline erosion, land use and the watershed.

The overall water quality of Sylvan Lake is poor. Like many of the lakes in the county, it is impaired for phosphorus, based upon the Illinois Environmental Protection Agency's (IEPA) total phosphorus standard of ≥ 0.05 mg/L. The total phosphorus (TP) concentrations in Sylvan Lake ranged from 0.032 mg/L to 0.196 mg/L. The average TP concentration increased from 0.079 mg/L in 2001 to 0.100 mg/L in 2013; and is above the median TP concentration of 0.065 mg/L for lakes in the county monitored for TP between 2000 and 2012.

Phosphorus and nitrogen are normally limiting nutrients in our region. The ratio of total nitrogen to total phosphorus (TN:TP) in 2013 was 17:1. This ratio indicates both nutrients were plentiful enough to cause algal blooms or excessive plant growth.

Total Kjeldahl Nitrogen, (TKN) ranged from 0.75 mg/L in June to 2.70 mg/L in September. The average TKN was 1.58 mg/L and is higher than the median TKN of 1.18 mg/L for lakes sampled in the county between 2000 and 2012. TKN is the organic form of nitrogen and is usually tied up in plant and algal cells and therefore is biologically unavailable. The biologically available nitrogen (nitrate, nitrite and ammonium) in the water was non-detectable from June through September. However, nitrite and nitrate were present in May at a concentration of 0.163 mg/L. This is because at that time the lake was very much limited by phosphorus (TN:TP = 31:1). Otherwise any nitrogen that became available was taken up immediately by organisms.

Carlson's Trophic State Index (TSIp) uses average TP to estimate the trophic state of lakes. The TSIp for Sylvan Lake was 70.56 and therefore it is considered an hypereutrophic or nutrient rich lake. Sylvan Lake ranked 115th out of 174 lakes in the county measured for phosphorus between 2000 and 2012.

There are many potential sources of phosphorus available in Sylvan Lake. Internal cycling of phosphorus occurs when DO concentrations become low, ≤2.0 mg/L, in the water near the lake bottom allowing for the release of phosphorus from anoxic (dissolved oxygen ≤1 mg/L) bottom sediments. In June and July, DO concentrations in bottom waters were anoxic and the lake stratified. Eroding shorelines can introduce phosphorus rich sediments into the water column. Carp can re-distribute sediments into the water column through their foraging and mating activities. Additionally, turf fertilization can contribute to the increased TP concentrations found in Sylvan. Reminding residents within the watershed to use phosphorus-free fertilizers, repair eroding shorelines, not feed waterfowl and to physically remove feces left behind by waterfowl from docks and swim platforms rather than sweeping them into the lake all can go a long way in reducing phosphorus inputs into Sylvan Lake.

A blue-green algal bloom occurred from July through September throughout most of the water column of Sylvan Lake. Additionally a filamentous bloom was noted by the LCHD-ES in August. Elevated phosphorus promotes algal growth, and high chloride levels are known to shift algal populations towards blue-green algae. The 2012 average chloride concentration was 150 mg/L and has remained unchanged since 2001. This is below the critical concentration defined by the U.S. Environmental Protection Agency for general use of 230 mg/L. The main contrib-

Summary (Continued)

uting factor of increased chlorides has been linked to deicing products such as rock salt; however, recently, water softener system discharges have also been identified as another source of chlorides. The critical chloride concentration can be attained by adding as little as 1 teaspoon of salt to 5 gallons of water. If the critical concentration is met and persists for extended periods of time, the entire lake ecosystem can be impacted.

An assessment of the aquatic vegetation at 38 randomly selected points was conducted in July, 2012. Five percent of the points sampled were colonized by aquatic vegetation and the estimated plant density was 0.1%. Plants were not diverse; Flat-stemmed Pondweed and White Water Lily were the only two species detected. No chemical treatments were performed on Sylvan Lake in 2012. Curlyleaf Pondweed is known to reside in Sylvan Lake, but was not detected in our survey. The Floristic Quality Index (FQI) score was 10.6, ranking it 114th of 160 lakes in the county whose FQI was calculated between 2000 and 2012.

The shoreline was assessed for erosion in September and 14% exhibited some degree of erosion; and of that, 6% was considered moderate and an additional 4% was evaluated as having severe erosion occurring upon it. Both the amount and severity of erosion on Sylvan Lake has increased since 2001.

Water Clarity

Water clarity is measured by Secchi disk. At each visit, the disk is lowered into the water column at the deepest part of the lake, until it is no longer visible.

In 2012, the average Secchi depth in Sylvan Lake was 1.98 feet; this is below the median Secchi depth of 2.95 feet for lakes measured for Secchi depth in the county between 2000 and 2012.

Water clarity in Sylvan Lake has decreased since 2001 when the average Secchi depth was calculated at 2.68 feet; and at 1.98 feet, it is exactly the same as it was in 1996. In 2012, Sylvan ranked 116th out of 158 lakes in the county whose average Secchi depths have been measured since 2000.

The monthly Secchi depths in 2013 ranged from 0.5 feet in September to 4.20 feet in May (Figure 1). Algal blooms were likely the cause of the decreased water clarity. From July to September a blue-green algal bloom was prevalent in the lake, and in August a filamentous bloom was noted.

Promoting submerged aquatic plants in Sylvan Lake would improve water clarity as plants compete with algae for nutrients and light; additionally they secure the bottom sediments and minimize sediment redistribution. This becomes important in shallow lakes such as Sylvan where water clarity can become compromised as wind and wave action re-distribute bottom sediments into the water column.

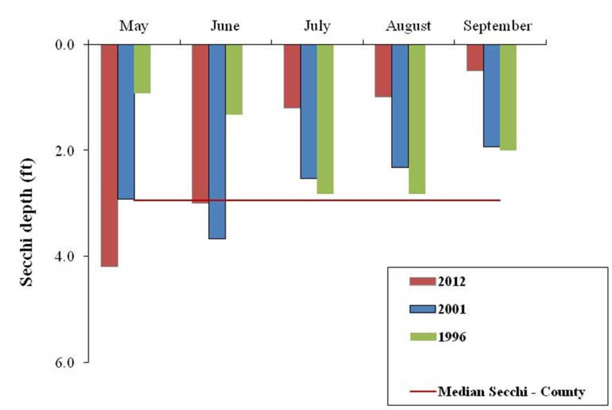


Figure 1. Water clarity in Sylvan Lake 1996, 2001, and 2012.

TOTAL SUSPENDED SOLIDS

Sylvan Lake is considered impaired for Total Suspended Solids (TSS). TSS are made up of both volatile solids (TVS), which come from organic sources such as plankton and algae; or sediments (NVSS). Both adversely affect water clarity. A lake is considered impaired for TSS when the median NVSS concentration is ≥12 mg/L. In 2012, the median NVSS concentration was 13.78 in Sylvan and the monthly concentrations ranged from 2.88 mg/L to 28.99 mg/L.

The average TSS concentration in Sylvan Lake was 17.0 mg/L. This was an 11% increase from the 2001 average TSS concentration of 15.1 mg/L; and is much greater than the county median of 8.1 mg/L for lakes measured for TSS between 2000 and 2012.

Figure 2 shows the concentrations of TVS and NVSS found in Sylvan Lake during 2012. TVS concentrations ranged from 96 mg/L to a high of 196 mg/L; and were significantly higher than NVSS concentrations. This is reflective of the persistent algal blooms that were observed from July through September. The 2012 average TVS concentration was 137 mg/L, this is higher than the county median for lakes sampled for TVS since 2000 (123 mg/L).

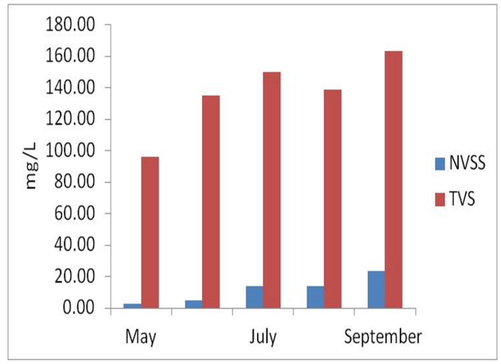


Figure 2. TVS and NVSS concentrations in

NUTRIENTS

Phosphorus and nitrogen are normally limiting nutrients in natural systems. Like many lakes within Lake County, Sylvan Lake was impaired for total phosphorus (TP). This is due to TP concentrations of ≥0.05 mg/L occurring on at least one occasion during the monitoring year. In 2012, the average TP concentration on Sylvan Lake was 0.100 mg/L. This is higher than the median TP concentration of 0.065 mg/L from lakes in the county monitored for phosphorus since 2000. The average TP concentration measured in Sylvan Lake has continually increased every year that LCHD-ES monitored the lake. The TP concentration in 2001 was 0.079 mg/L and was 0.060 mg/L in 1996.

Total nitrogen to total phosphorus ratios (TN:TP) determine which of the two nutrients (phosphorus or nitrogen) limit the growth of plants and algae. Ratios over 20:1 indicate a system limited by phosphorus, under 10:1 the system becomes limited by nitrogen. Ratios falling between 10:1 and 20:1 indicate that the system has plenty of both nutrients to support

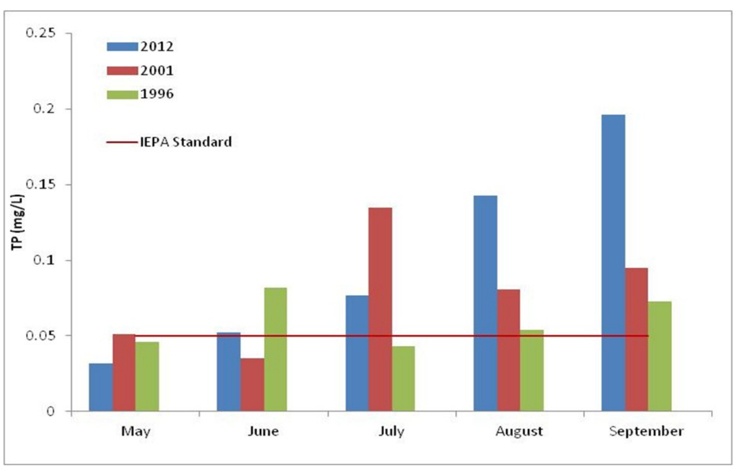


Figure 3. TP concentrations in Sylvan 2001, 2007 and 2013.

Nutrients (continued)

nuisance plant and algae growth. Sylvan Lake had a TN:TP ratio of 17:1 and therefore was not limited by either nutrient and was able to support the nuisance algal blooms observed in Sylvan Lake due to a lacking plant community.

Sylvan Lake is considered hypereutrophic based upon its Trophic State Index (TSIp) score of 71. The TSIp is based upon the total average phosphorus concentration. TSIp scores between 50 and 70 are considered eutrophic and 70 or greater are hypereutrophic. The higher the score the more nutrient enriched the lake. Sylvan Lake ranked 115th out of 174 lakes from the county that were assessed for phosphorus between the years 2000 and 2012.

Phosphorus (P) can be introduced into a system either from external sources (i.e. watershed) or internally from bottom sediments or aquatic organisms. Anoxic (≤ 1 mg/L DO) sediments release phosphorus into the water column and can occur when waters above the sediment are still oxic at approximately 2 mg/L (Nurnberg, 2013).

Sylvan Lake stratified and bottom waters became anoxic during June and July; and remained low for the remainder of the monitoring season. Due to the mixing of the waters from the four aerators the lowest hypoxia (low oxygen condition) may not always have been exhibited, meanwhile anoxic sediments continually released P into the system.

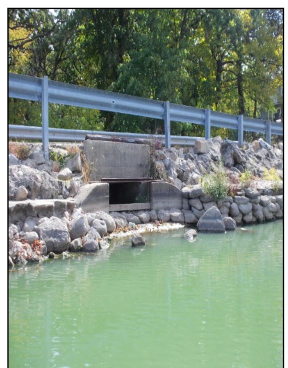
The internal cycling of phosphorus likely contributed to the algal blooms observed on Sylvan Lake, but it also could be due to the low density of plants in the lake. LCHD-ES recommends that SLIA encourage plant growth by native species in Sylvan Lake, increase the horsepower feeding the aeration system to keep the lake from stratifying, and reduce the number of fish feeders installed in the lake to just a couple. Residents should be encouraged to utilize best practices for reducing phosphorus inputs, such as minimizing goose populations, using phosphorus free fertilizers, remediating eroded shorelines and physically removing feces from dock areas and swim platforms rather than sweeping them into the lake.

OLIGOTROPHIC:

Lakes are generally clear, deep and free of weeds or large algae blooms. Though beautiful, they are low in nutrients and do not support large fish populations.

MESOTROPHIC:

Lakes lie between the oligotrophic and eutrophic stages. Devoid of oxygen in late summer, their hypolimnion limit cold water fish and cause phosphorus cycling from sediments.



EUTROPHIC: Lakes are high in nutrients, they are usually either weedy or subject to frequent algae blooms, or both. Eutrophic lakes often support large fish populations, but are also susceptible to oxygen depletion.

Figure 4. Trophic states illustrated.

WATERSHED

The watershed of Sylvan Lake is small, estimated to be 165.90 acres. Land use in the watershed is comprised of 8 categories (Appendix A, Table 1). The dominant land uses were Single Family (52.1%), and Water (21.2%). However, the percent total estimated runoff is almost exclusively from Single Family (71.1%) and Transportation (23.0%). The watershed to lake volume is about 5:1; therefore activities in the watershed can greatly impact the water quality of Sylvan Lake. Because of this, it is important for residents in the watershed to maintain their properties in such a way that they cause as little impact as possible to Sylvan Lake. Minimizing goose populations, using phosphorus free fertilizers, and being thoughtful about using deicers and being supportive of agencies responsible for winter maintenance in their area all can go a long way in alleviating water quality problems addressed in this report.

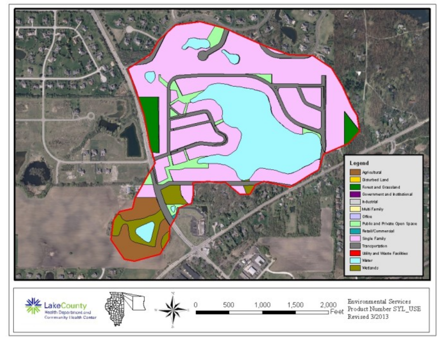


Figure 5. Land use within Sylvan watershed, (data collected from 2010 imagery).

DISSOLVED OXYGEN (DO)

Dissolved Oxygen (DO) is essential for the survival of fish and invertebrates and influences many different biological and chemical processes in lakes.

Fish become stressed when DO concentrations become low ≤5 mg/L and do not inhabit areas of a lake when DO becomes anoxic. Sixty percent of the lake volume had DO concentrations below 5 mg/L in July, of this volume, 47.1% was anoxic.

In 2012, Sylvan Lake thermally stratified during June and July, 2012 and DO concentrations were anoxic near the lake bottom making conditions right for phosphorus release. Sylvan Lake is considered impaired for phosphorus, therefore avoiding causes of increased phosphorus should be practiced.

The aerators in the lake do not seem to be strong enough to destratify the lake; therefore the LCHD-ES recommends that the SLIA increase the horsepower on the pump to a minimum horsepower of 2.64.

DO can also become supersaturated, this occurs when the % DO is elevated above 100%. If DO saturation greater than 110% is maintained in the water for extended periods of time, adverse impacts can begin occur to fish. In rare cases, excessive DO can lead to gas bubble disease, where oxygen bubbles or emboli block the blood flow through blood vessels.

Sylvan Lake had elevated % DO occurring throughout the entire water column in May. After that, the % DO remained supersaturated in the surface waters from 6 feet below the surface in June to 2 feet from the surface in August. (Appendix A, Table 3). The elevated % DO was likely due to photosynthesizing algae.

CHLORIDES/CONDUCTIVITY

It only takes1 teaspoon of salt to pollute 5 gallons of water.

Conductivity measures the amount of ions contained in a waterbody. The more ions or salts that a waterbody contains the higher its conductivity. Conductivity can be used to estimate both total dissolved solids (TDS) and chloride concentrations due to a strong correlation between these parameters. LCHD-ES has decided in more recent years to analyze chloride concentrations due to a strong relationship discovered between road salt usage (which contains 40% chloride) and lakes exhibiting increasing chloride concentrations. Even more recently the discharge of water softeners into our waters have been found to also play an important role in increasing chloride concentrations. The critical chloride concentration defined by the USEPA of 230 mg/L can be attained by adding as little as 1 teaspoon of salt (chloride) to 5 gallons of water. Once chlorides are in the water they remain there indefinitely, unless the water is somehow diluted or treated by a reverse osmosis system, the latter being a very expensive alternative.

In 2012, the average chloride concentration in Sylvan Lake was 150 mg/L; this remains unchanged from the 2001 chloride concentration and is below the critical concentration of 230 mg/L. In 2012, chlorides ranged from 136 mg/L in May to a high of 161 mg/L in September (Figure 6). Normally, higher chloride concentrations occur earlier in the season due to snowmelt runoff; however, due to the extreme drought that occurred in 2012, the chlorides may have become concentrated or perhaps there are water softener discharges occurring in Sylvan Lake. Adverse impacts and shifts in communities within the lake ecosystem have been documented when the critical chloride concentration is maintained or exceeded for prolonged periods. Shifts in algal populations toward blue-green algae have been documented at concentrations as low as 12 mg/L.

In 2012, land use by Single Family and Transportation were estimated to be the two highest contributors of runoff entering the lake from the watershed and therefore residents should be considerate of their salt usage whether it be from winter maintenance or water treatment. The "What can I do to help?" tip box that follows, provides tips on how you can reduce salt use around your home.

The LCHD-ES and Lake County Stormwater Management Commission (LCSMC) have been holding

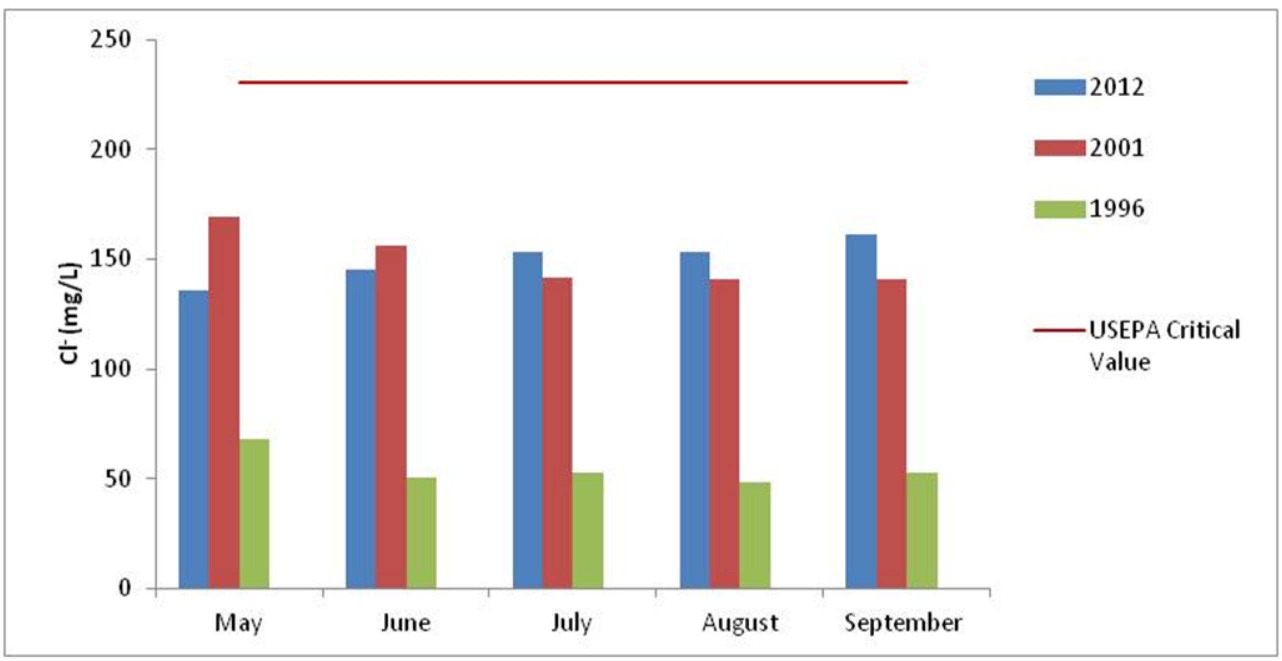


Figure 6. Chloride concentrations in Sylvan Lake, 1996, 2007 and 2013.

CHLORIDES (CONTINUED)

annual training sessions targeting deicing maintenance personnel for both public and private entities. This is an attempt to educate winter road maintenance crews on the recommended application rates for applying deicers and hopefully will reduce the amount of chloride being introduced into our environment while maintaining safe passageways.

Almost all deicing products contain chloride so it is important to read the product label for proper application. For instance, at 10º Fahrenheit, rock salt is not at all effective in melting ice and will blow away before it melts anything. Homeowners should encourage the local agency responsible for snow removal to implement practices that reduce the usage of deicing products on their properties and roadways.

What can I do to help?

- Shovel (or use a snow blower) before you use any product; never put a deicing product on top of snow.
- Read the product label, before applying product.
- Sweep up un-dissolved product after a storm is over for reuse.
- Consider switching to a non-chloride deicer.
- Support changes in chloride application in your municipality.
- Inform a neighbor about the impacts chlorides have on our lakes rivers and streams.

Modified from (DuPage River Salt Creek Workgroup , 2008)

ALGAE

Phosphorus is the underlying cause for most algal blooms and Sylvan Lake had sufficient nutrients available to support blue-green algal blooms from July through September in 2012. Blue-green algae are actually cyanobacteria and when in bloom they have the potential to produce toxins that can be harmful to human health and are therefore termed harmful algal blooms (HABs). The presence of HABs does not mean that the toxins are present; the experts are still investigating what triggers the release of these toxins by HABs. At this time, the World Health Organization (WHO) has a standard for no contact of 20 ug/L.

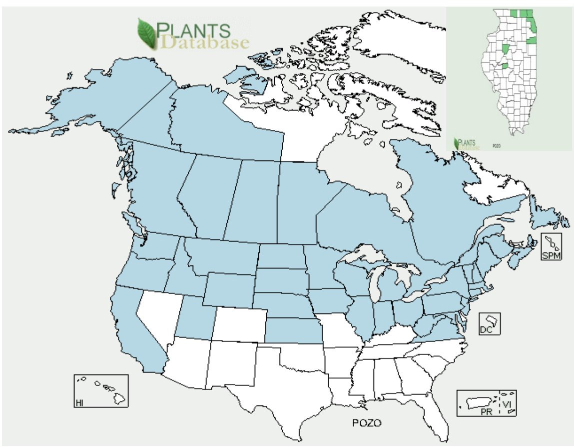
Since it remains unclear what causes HABs to release toxin, the LCHD-ES recommends that HABs not be chemically treated, but left to complete their cycle. Due to the high phosphorus concentrations and history of algal blooms found in Sylvan Lake, it is highly recommended by the LCHD-ES that an action plan be developed that will be followed in the event of future blue-green algae blooms on Sylvan Lake.

Figure 7. Blue green algae bloom in Sylvan Lake, 2012.

AQUATIC PLANTS

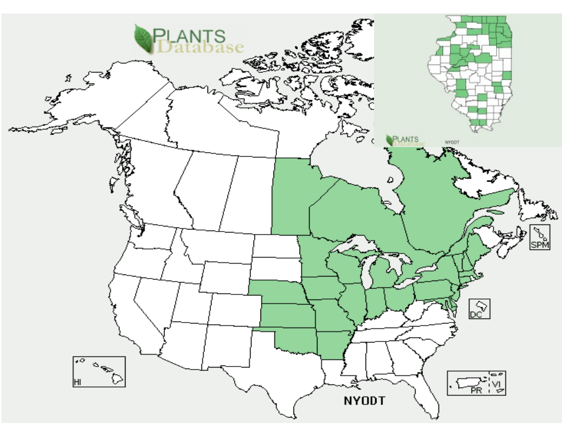
FLAT-STEMMED PONDWEED

Flat-stemmed Pondweed (*Potomogeton pusillus),* is native to northern Illinois, and can be indentified by it's lack of floating leaves and conspicuously flat stem. In the field, young plants can be confused with Sago Pondweed (S. pectinata). Flat-stemmed Pondweed is sometimes eaten by ducks.



WHITE WATER LILY

White Water Lily (*Nymphaea tuberosa),* is native to northern Illinois, and can be indentified by it's round floating leaf having a slit. A channeled stem attaches at the base of the slit on the leaf. It has a conspicuous and odorous white flower.



Aquatic plants are a critical feature in lakes as they compete against algae for nutrients, improve water quality and provide fish habitat for nesting and nursery. An aquatic vegetation survey was conducted in July, 2012. A 60-meter grid was randomly overlaid on an aerial photo of Sylvan Lake and a total of 38 points fell within the lake footprint and were assessed. Five percent of the points sampled were vegetated and it is estimated that the total plant density was 0.1%. Flat-stemmed Pondweed and White Water Lily were the only two species detected in the 2012 quantitative survey. Curlyleaf Pondweed has been documented in Sylvan Lake in the past but was not detected by LCHD-ES or the VLMP's in 2012. This could be due to the ephemeral nature of this species or that it truly was no longer present in the lake.

There were no chemical treatments were performed on Sylvan Lake during 2012. LCHD-ES recommends SLIA implement strategies that will promote the spread and establishment of native submerged aquatic vegetation in the lake. Practices such as removal of carp either through fishing pressure or by the SLIA working through the IDNR to have them removed is highly encouraged. Increasing the horsepower of the aeration system may help to suppress algal growth and allow for greater light penetration and establishment of vegetation. This will provide greater competition to algae and hopefully decrease their occurrence.

Plant diversity in Sylvan Lake is low; and therefore the floristic quality index (FQI) was low with a score of 10.6. Sylvan Lake never had a diverse flora; Sago Pondweed, Curlyleaf Pondweed, Flat-stemmed Pondweed and White Water Lily are the only species ever found by the LCHD-ES. Floristic quality assessments are used in natural areas and allow for comparison among sites. Sylvan Lake ranked 114th of 160 lakes assessed in the county for floristic quality between 2000 and 2012.

Aquatic Plant Management - Pesticides

For full details of the Pesticide rule see:

HTTP://WWW.EPA.STATE.IL.US/WATER/PERMITS/PESTICIDE/INDEX.HTML

Historically Sylvan Lake was a heavily managed lake and practices such as the introduction of grass carp and an aggressive chemical campaign to remove vegetation all have resulted in a lake that today is mostly void of plants and algal blooms are prevalent. However, it has not been treated since August 2010 according to notations by the VLMP. In the future, if treatments do occur the SLIA or its agent needs to apply for a NPDES permit to treat the lake per the details under the pesticide rule explained under the website provided to the left.

During the 2012 quantitative vegetation survey, the lake was found to have a total average plant density of 0.1%. LCHD-ES did not encounter any Curlyleaf during this survey. Blue-green and filamentous algae was observed in the lake from July - September.

The LCHD-ES recommends that the SLIA not treat any submerged vegetation in Sylvan Lake until a more robust plant population is present. Further it is not recommended to treat blue-green algal blooms until it is understood what causes release of toxins by HABs. However, removal of invasive plant species along the shoreline is recommended. Plants such as Common Buckthorn and Purple Loosestrife should be removed. Flowering Rush, a species of concern on the New Invaders Watch List, was observed along the shoreline near the launch in 2012 and should be removed. The New Invaders Watch List provides information allowing one to identify the plant for those species that are invasive or weedy under similar climate conditions that are present in the Chicago Region; other plants on the list are Hydrilla and Brazilian waterweed. You can learn more or to report species you can go to the New Invaders Watch Program website at www.newinvaders.org .

Flowering Rush (Butomus umbellatus) photo taken by Emmet J. Judziewisz

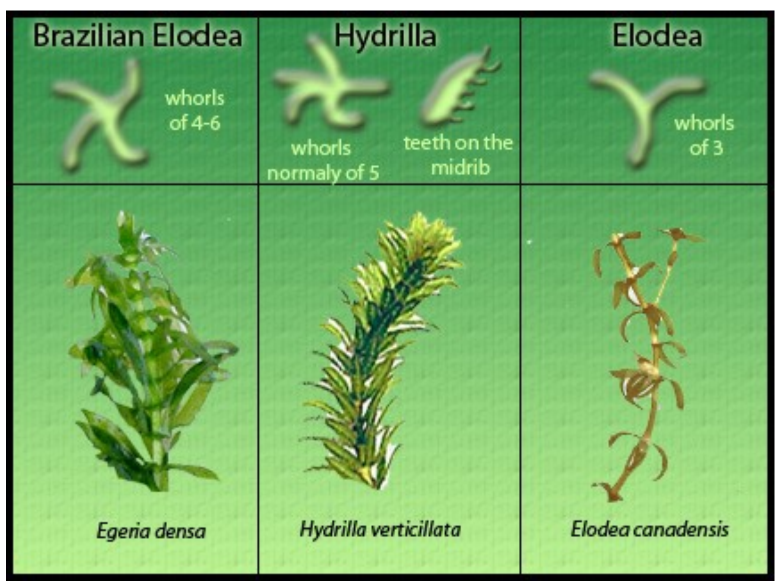


Figure 7. Identifiers of Hydrilla, Brazilian and American Elodea.

SHORELINE EROSION

Shoreline erosion contributes to poor water quality by increasing both TSS and TP concentrations with either one of two outcomes, a very weedy lake due to an increase in a normally limiting nutrient (such as phosphorus) or a lake with few weeds due to decreased water clarity from excessive amounts of sediment or algae being in the water column.

In 2012, 14% percent of the 1.31 mile shoreline was experiencing some degree of erosion (Figure 7). The amount of eroding shoreline has increased since 2001 when only 9.7% of the shoreline exhibited some degree of erosion. Also the severity of erosion has increased on areas of the shoreline; 10 percent of the shoreline was assessed as having moderate (6%) or severe (4%) erosion occurring upon it. In 2001 only 3.6% of the shoreline was assessed as having moderate erosion, and there was no severe erosion found. It is recommended that shorelines experiencing erosion be remediated, some areas may be easier to remedy than others. There are several options available to secure the shorelines, native plantings can be an attractive route to explore, they anchor the sediments with their deep root systems and also have the added benefit of providing a buffer to the lake. In other areas, it may take a combination of hardscaping and native plantings to attain the desired results.

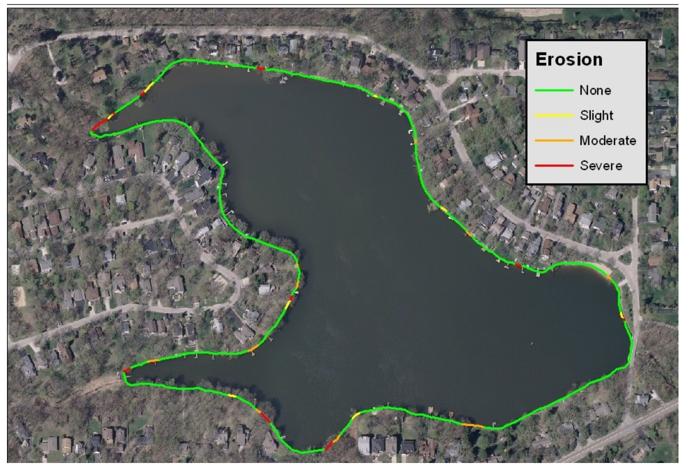


Figure 7. Shoreline erosion assessed on Sylvan Lake, 2012.

Figure 8. Example of using hardscaping and native plantings to secure shoreline.

Table 3. Degree of Erosion on Sylvan Lake, 2012.		
Erosion	Miles	Percent
None	1.13	86%
Slight	0.05	4%
Moderate	0.07	6%
Severe	0.06	4%

VLMP

There has been a great volunteer resource throughout the years on Sylvan Lake. Historically, data was collected from 1982 - 1991. More recently Bruce and Sara May monitored the lake from 2004 - 2012 at four different locations (Appendix A, Figure 7). The data collected through the VLMP is a wonderful resource providing the LCHD_ES water clarity data on the lake between monitoring years (1996, 2001, and 2012). The VLMP Secchi depth data collected between 2004 - 2012 is presented in Figure 9. In 2012, Secchi depths ranged from 2.69 feet at RGZF-1 to 2.75 feet RGZF-3; all of the average depths were below the median Secchi depths of 2.95 feet for lakes throughout the county whose Secchi depths were measured between 2000 and 2012.

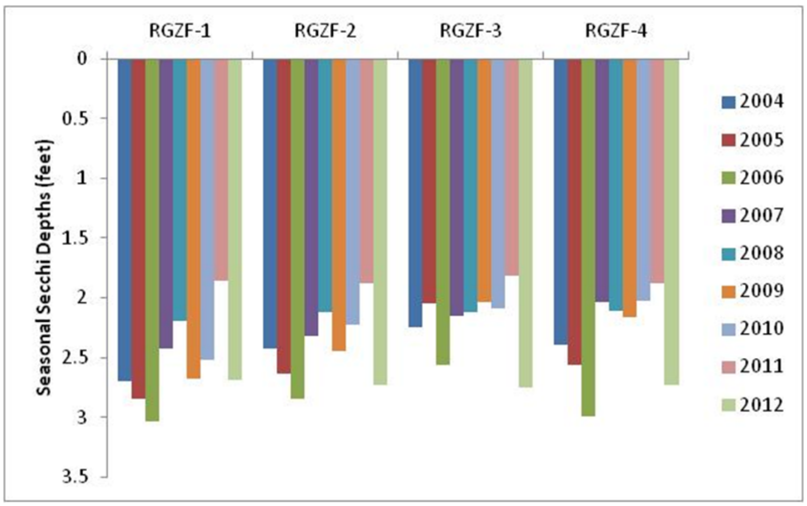
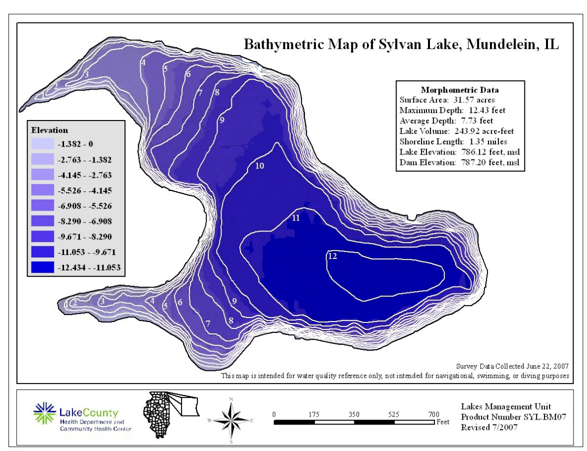


Figure 9. VLMP Secchi Depth Data, 2004 - 2012.

BATHYMETRIC MAP

Sylvan Lake has an updated bathymetric map. LCHD-ES recommends that SLIA utilize the map and morphometric data when estimating volumes for lake treatment and other decisions related to the overall plant management plan. It is also useful for evaluation of anoxic water volumes which are helpful in managing and maintaining a fishery.



Lake County Health Department and Community Health Center

ENVIRONMENTAL SERVICES

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For more information visit us at:

http://www.lakecountyil.gov/Health/want/BeachLakeInfo.htm

Protecting the quality of our lakes is an increasing concern of Lake County residents. Each lake is a valuable resource that must be properly managed if it is to be enjoyed by future generations. To assist with this endeavor, Population Health Environmental Services provides technical expertise essential to the management and protection of Lake County surface waters.

Environmental Service's goal is to monitor the quality of the county's surface water in order to:

- Maintain or improve water quality and alleviate nuisance conditions
- Promote healthy and safe lake conditions
- Protect and improve ecological diversity

Services provided are either of a technical or educational nature and are provided by a professional staff of scientists to government agencies (county, township and municipal), lake property owners' associations and private individuals on all bodies of water within Lake County.

RECOMMENDATIONS

LCHD-ES recommends the following actions for improving the water quality and overall health of Sylvan Lake:

- Consider increasing the horsepower of the 4 aerators currently installed in the lake. The current horsepower is not sufficient to prevent stratification of the lake.
- The number of fish feeders in Sylvan Lake should be reduced to only a couple and the focus of management should be on providing good habitat for fish by promoting vegetation. Promoting vegetation would support fish species such as blue gill by providing cover and increasing the food supply (plankton) as well as improving the clarity of the water for sight feeders, such as bass. It would also suppress nuisance algal blooms from occurring on Sylvan Lake.
- Development of an action plan for the handling blue-green algal blooms (HABs) so that there is a standard procedure that can be followed in upon their occurrence in the future.
- Sylvan Lake has been listed as impaired for fecal coliform by the IEPA standards. Efforts should be made to minimize both goose and gull populations. Feeding of geese by residents should be discouraged. Physical removal of feces left behind by waterfowl is recommended as opposed to sweeping it into the lake.
- Action should be taken by owners of eroding shorelines to repair them. LCHD-ES recommends planting of native vegetation as it has long roots and rhizomes which hold soils while providing a buffer for runoff. Native buffers also discourage colonization of geese as they block their view from predators. If done properly they can be an aesthetically pleasing part of the landscape. In some cases, it may be necessary due to shoreline slope to incorporate hardscaping into the area.

APPENDIX A

FIGURES AND TABLES
SYLVAN LAKE
2012

Figure 1. Water quality sampling point – Sylvan Lake, 2012.

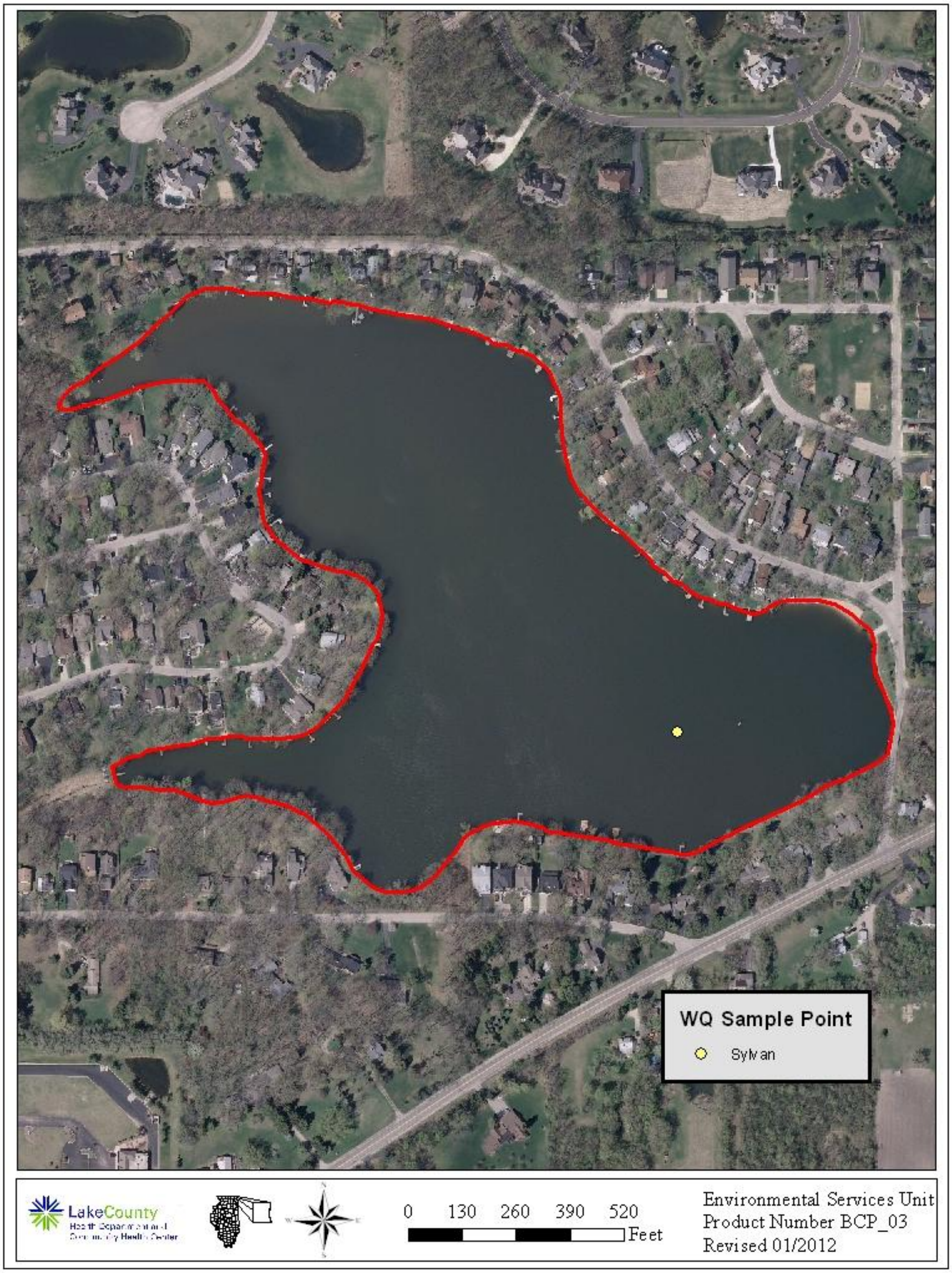


Figure 2. Watershed boundary – Sylvan Lake, 2012.

Figure 3. Land use – Sylvan Lake, 2012.

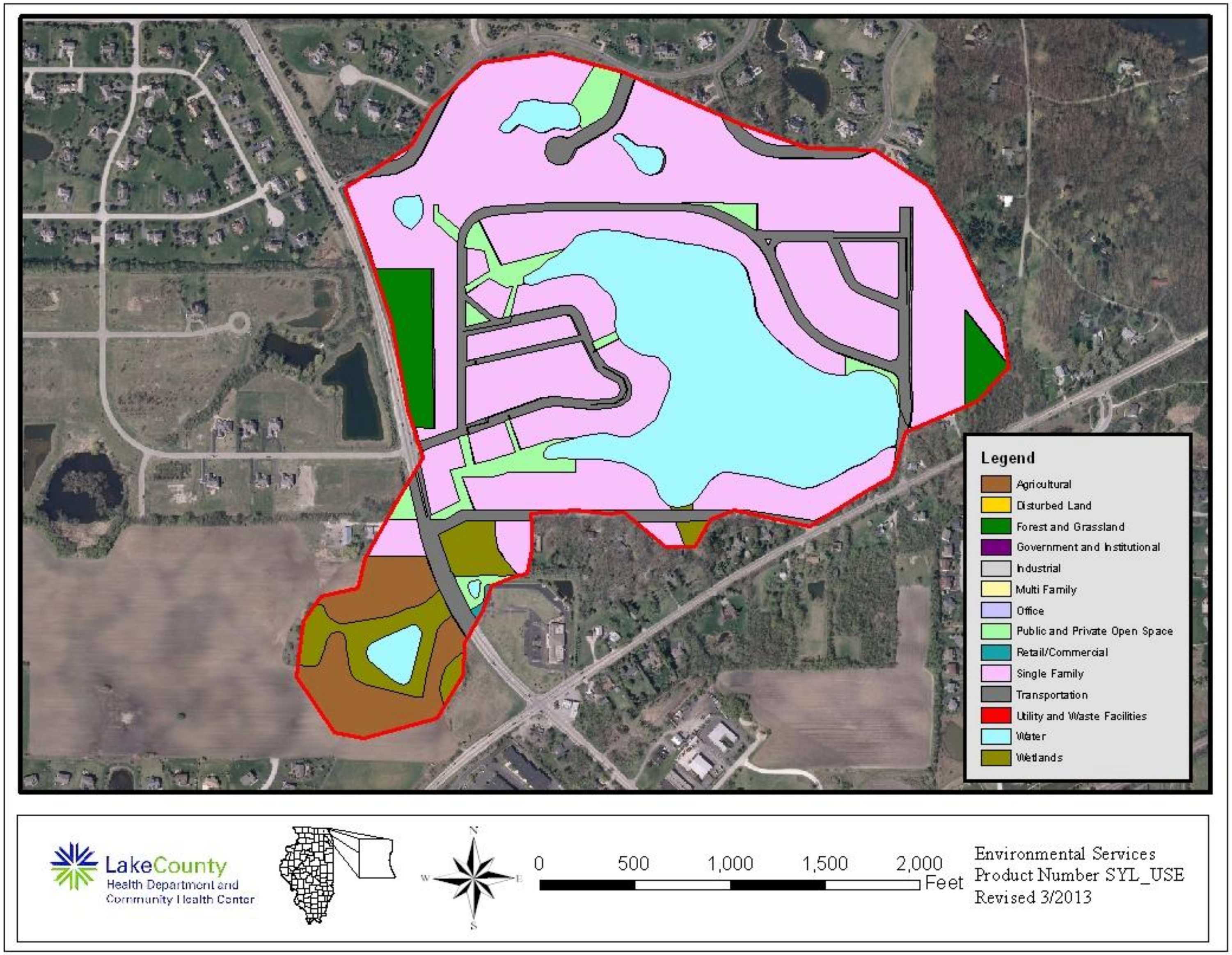


Table 1. Land use in Sylvan Lake, 2012 (Based upon 2010 imagery).

Land Use	Acreage	% of Total
Agricultural	8.66	5.2%
Disturbed Land	0.00	0.0%
Forest and Grassland	5.19	3.1%
Government and Institutional	0.00	0.0%
Industrial	0.00	0.0%
Multi Family	0.00	0.0%
Office	0.00	0.0%
Public and Private Open Space	6.82	4.1%
Retail/Commercial	0.12	0.1%
Single Family	86.45	52.1%
Transportation	16.74	10.1%
Utility and Waste Facilities	0.00	0.0%
Water	35.24	21.2%
Wetlands	6.67	4.0%
Total Acres	**165.90**	**100.0%**

Land Use	Acreage	Runoff Coeff.	Estimated Runoff, acft.	% Total of Estimated Runoff
Agricultural	8.66	0.05	1.2	1.2%
Forest and Grassland	5.19	0.05	0.7	0.7%
Public and Private Open Space	6.82	0.15	2.8	2.8%
Retail/Commercial	0.12	0.85	0.3	0.3%
Single Family	86.45	0.30	71.3	71.1%
Transportation	16.74	0.50	23.0	23.0%
Water	35.24	0.00	0.0	0.0%
Wetlands	6.67	0.05	0.9	0.9%
TOTAL	**165.90**		**100.3**	100.0%

Lake volume	**243.92**	**acre-feet**
Retention Time (years)= lake volume/runoff	**2.43**	**years**
	887.96	**days**

Table 2. Water quality summary for Sylvan Lake, 1996, 2001, and 2012.

2012	**Epilimnion**															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_2+NO_3-N	TP	SRP	Cl-	TDS**	TSS	TS	TVS	SECCHI	COND	pH	DO
16-May	3	194	0.84	<0.100	0.163	0.032	<0.005	136	496	4.8	554	96	4.20	0.8930	8.21	18.36
20-Jun	3	189	0.75	<0.100	<0.050	0.052	<0.005	145	510	8.4	588	135	3.00	0.9190	8.22	9.26
18-Jul	3	144	1.47	<0.100	<0.050	0.077	<0.005	153	442	15.0	580	150	1.20	0.7850	8.58	10.42
22-Aug	3	134	2.12	<0.100	<0.050	0.143	0.016	153	467	21.2	559	139	1.00	0.8340	8.84	9.43
19-Sep	3	140	2.70	<0.100	<0.050	0.196	<0.005	161	475	35.4	584	163	0.50	0.8510	8.59	6.11
	Average	160	1.58	<0.100	<0.050	0.100	<0.005	150	478	17.0	573	137	1.98	0.8564	8.49	10.72

2001	**Epilimnion**															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	Cl**	TDS	TSS	TS	TVS	SECCHI	COND	pH	DO
22-May	3	202	0.63	0.205	0.116	0.051	<0.005	169	592	12.0	608	184	2.92	0.9126	7.84	6.34
26-Jun	3	183	0.79	<0.100	<0.050	0.035	<0.005	156	530	6.6	589	198	3.67	0.8724	8.22	9.61
31-Jul	3	156	2.15	<0.100	<0.050	0.135	<0.005	142	506	27.7	592	224	2.53	0.8256	8.44	13.68
28-Aug	3	160	1.36	<0.100	<0.050	0.081	0.015	141	474	14.1	531	146	2.33	0.8221	8.37	9.86
25-Sep	3	160	1.39	0.396	0.075	0.095	0.009	141	504	15.0	515	147	1.94	0.8215	7.48	6.20
	Average	172	1.26	0.244[k]	0.065[k]	0.079	0.009[k]	150	521	15.1	567	180	2.68	0.8508	8.07	9.14

1996	**Epilimnion**															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_3-N	TP	SRP	Cl**	TDS**	TSS	TS	TVS	SECCHI	COND	pH	DO
5/1/1996	3	231	1.57	0.114	0.675	0.046	0.029	68	302	25.8	470	135	0.92	0.588	7.83	6.92
6/4/1996	3	160	1.33	0.107	0.830	0.082	<0.005	51	316	16.0	424	132	1.33	0.534	8.00	7.84
7/9/1996	3	166	0.87	<0.100	0.124	0.043	<0.005	53	320	11.0	439	145	2.83	0.541	8.47	11.88
8/20/1996	3	152	0.92	<0.100	<0.050	0.054	<0.005	48	311	7.1	346	115	2.83	0.525	8.57	7.59
9/10/1996	3	166	0.90	<0.100	<0.050	0.073	0.013	53	319	16.0	408	126	2.00	0.540	8.30	7.50
	Average	175	1.12	0.111[K]	0.543[K]	0.060	0.021[K]	55	314	15.18	417.4	131	1.98	0.546	8.23	8.35

Table 2. Water quality summary for Sylvan Lake, 1996, 2001, and 2012.

2012	**Hypolimnion**															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_2+NO_3-N	TP	SRP	Cl^-	TDS**	TSS	TS	TVS	SECCHI	COND	pH	DO
16-May	10	195	0.86	0.123	0.145	0.045	0.005	135	503	10.0	559	91	NA	0.9050	8.05	11.21
20-Jun	10	204	1.05	0.186	<0.050	0.213	0.077	141	518	38.0	634	126	NA	0.9350	7.72	1.55
18-Jul	9	170	1.57	0.386	<0.050	0.136	<0.005	150	451	17.0	590	143	NA	0.8035	8.345	0.37
22-Aug	9	135	2.14	0.153	<0.050	0.156	0.021	156	469	21.0	578	160	NA	0.8380	8.61	4.80
19-Sep	9	140	2.85	<0.100	<0.050	0.191	0.005	159	476	45.8	580	164	NA	0.8525	8.55	5.14
	Average	169	1.69	0.212	<0.050	0.148	0.027	148	483	26	588	137	NA	0.8668	8.26	4.61

2001	**Hypolimnion**															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_3-N	TP	SRP	Cl**	TDS	TSS	TS	TVS	SECCHI	COND	pH	DO
5/22/2001	11	206	1.07	0.547	0.057	0.156	0.022	171	552	48.4	629	174	NA	0.9202	7.45	3.16
6/26/2001	10	210	1.80	0.375	<0.050	0.123	<0.005	165	516	17.0	604	209	NA	0.8991	7.47	3.68
7/31/2001	10	193	1.68	0.619	<0.050	0.182	0.087	166	546	15.0	613	219	NA	0.9019	6.97	0.08
8/28/2001	10	174	1.75	0.702	<0.050	0.154	0.029	149	508	14.0	531	145	NA	0.8473	7.26	0.06
9/25/2001	9	159	1.38	0.396	0.075	0.096	0.009	140	503	17.2	517	151	NA	0.8208	7.45	5.86
	Average	188	1.54	0.528	0.066^K	0.142	0.0368^K	158	525	22.3	579	180	NA	0.8779	7.32	2.57

1996	**Hypolimnion**															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_3-N	TP	SRP	Cl**	TDS**	TSS	TS	TVS	SECCHI	COND	pH	DO
5/1/1996	12	282	1.90	0.36	0.160	0.029	0.017	60	331	25.8	557	173	NA	0.563	7.37	1.03
6/4/1996	12	166	0.99	0.421	0.331	0.032	<0.005	61	333	16.0	511	131	NA	0.567	7.29	3.38
7/9/1996	10	179	0.95	0.414	0.124	0.127	0.043	59	329	11.0	462	162	NA	0.560	7.56	0.95
8/20/1996	11	162	0.85	0.166	<0.050	0.076	0.013	54	321	7.10	409	131	NA	0.544	7.81	0.25
9/10/1996	11	167	0.96	<0.100	0.054	0.077	0.006	52	318	16.0	409	128	NA	0.539	8.3	7.22
	Average	191	1.13	0.34^K	0.167^K	0.068	0.0198^K	57	326	15.2	470	145	NA	0.555	7.67	2.57

Table 2. Water quality summary for Sylvan Lake, 1996, 2001, and 2012.

Glossary	
ALK = Alkalinity, mg/L $CaCO_3$	TDS = Total dissolved solids, mg/L
TKN = Total Kjeldahl nitrogen, mg/L	TSS = Total suspended solids, mg/L
NH_3-N = Ammonia nitrogen, mg/L	TS = Total solids, mg/L
NO_2+NO_3-N = Nitrate + Nitrite nitrogen, mg/L	TVS = Total volatile solids, mg/L
NO_3-N = Nitrate + Nitrite nitrogen, mg/L	SECCHI = Secchi disk depth, ft.
TP = Total phosphorus, mg/L	COND = Conductivity, milliSiemens/cm
SRP = Soluble reactive phosphorus, mg/L	DO = Dissolved oxygen, mg/L
Cl^- = Chloride, mg/L	

k = Denotes that the actual value is known to be less than the value presented.

NA= Not applicable

* = Prior to 2006 only Nitrate - nitrogen was analyzed

**=Estimated from Conductivity

Figure 4. Secchi depth (water clarity) in Sylvan Lake during 1996, 2001 and 2012.

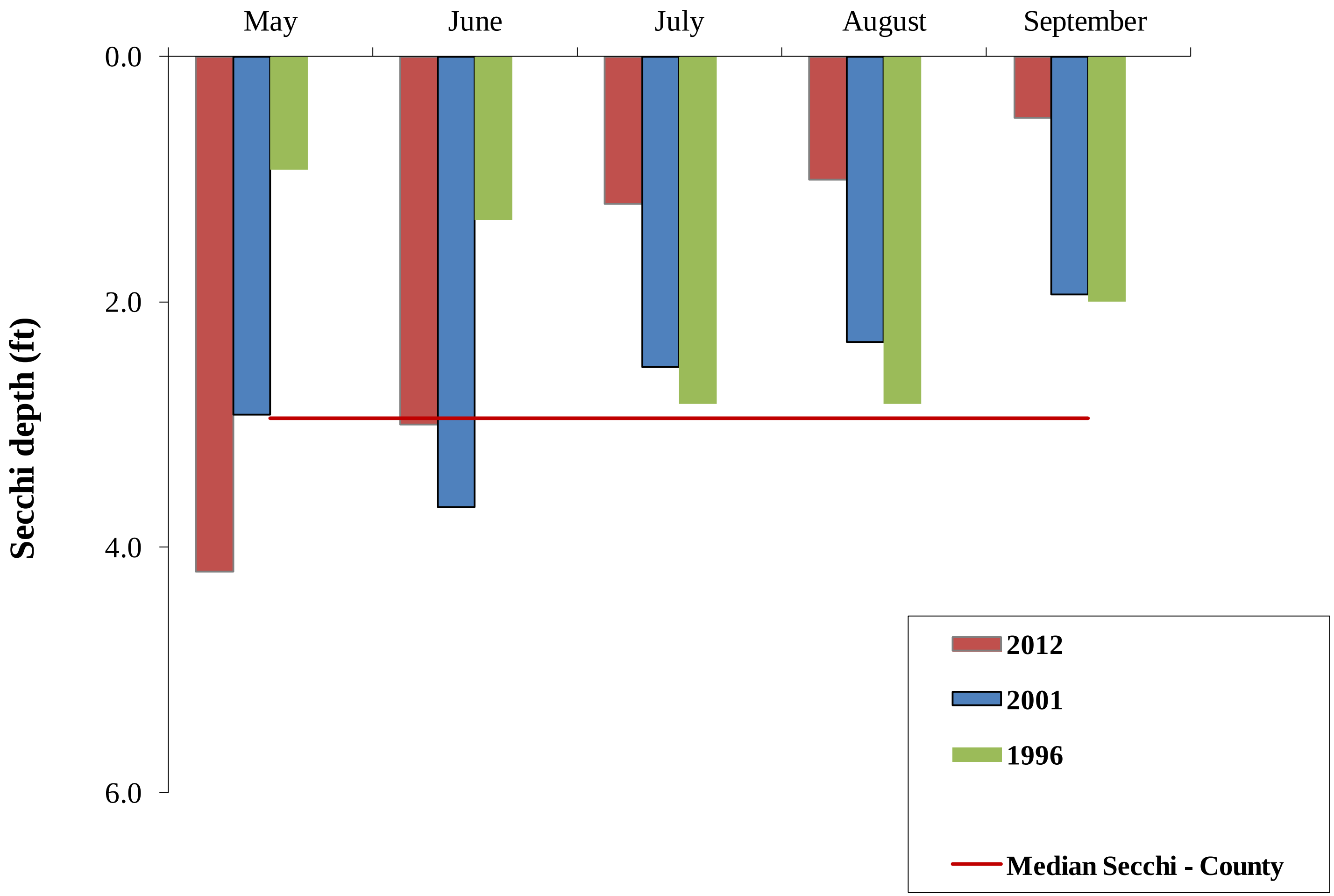


Table 3. Average Secchi depths measured from lakes in Lake County, 2000-2012.

RANK	LAKE NAME	SECCHI AVE	TSIsd
1	Windward Lake	14.28	38.79
2	Lake Carina	13.21	39.92
3	Druce Lake	12.25	41.00
4	Pulaski Pond	11.69	41.68
5	West Loon Lake	11.55	41.85
6	Independence Grove	11.50	41.92
7	Sterling Lake	11.35	42.10
8	Lake Zurich	10.40	43.37
9	Davis Lake	9.65	44.44
10	Harvey Lake	9.47	44.72
11	Little Silver Lake	9.42	44.79
12	Old School Lake	9.40	44.82
13	Lake Kathryn	9.39	44.84
14	Dugdale Lake	9.22	45.10
15	Dog Training Pond	9.04	45.39
16	Banana Pond	8.85	45.69
17	Deep Lake	8.83	45.72
18	Stone Quarry Lake	8.81	45.76
19	Lake of the Hollow	8.74	45.87
20	Bangs Lake	8.70	45.94
21	Cedar Lake	8.42	46.41
22	Cross Lake	8.18	46.83
23	Ames Pit	8.14	46.90
24	Briarcrest Pond	8.00	47.15
25	Sand Lake	7.48	48.12
26	Sand Pond (IDNR)	7.42	48.23
27	Cranberry Lake	7.40	48.27
28	Timber Lake (North)	7.37	48.33
29	Lake Miltmore	7.35	48.37
30	Lake Leo	7.31	48.45
31	Schreiber Lake	7.25	48.57
32	Nielsen Pond	7.23	48.61
33	Honey Lake	7.17	48.73
34	Lake Minear	7.13	48.81
35	Round Lake	7.01	49.05
36	Highland Lake	6.97	49.14
37	Channel Lake	6.65	49.81
38	Lake Catherine	6.58	49.97
39	Lake Helen	6.43	50.30
40	Third Lake	6.40	50.37
41	Sun Lake	6.33	50.52
42	Lake Lakeland Estates	6.31	50.57
43	Lake Barrington	6.00	51.30
44	Wooster Lake	5.92	51.49
45	Lake Fairfield	5.89	51.56
46	Lake Fairview	5.59	52.32
47	Gages Lake	5.45	52.68
48	Owens Lake	5.30	53.08
49	Valley Lake	5.05	53.78
50	McGreal Lake	5.04	53.81
51	Old Oak Lake	4.85	54.36

Table 3. Average Secchi depths measured from lakes in Lake County, 2000-2012.

RANK	LAKE NAME	SECCHI AVE	TSIsd
52	Waterford Lake	4.70	54.82
53	North Tower Lake	4.61	55.10
54	Lake Linden	4.60	55.13
55	Peterson Pond	4.51	55.41
56	Crooked Lake	4.39	55.79
57	Butler Lake	4.35	55.93
58	Mary Lee Lake	4.35	55.93
59	Tower Lake	4.31	56.07
60	Crooked Lake	4.28	56.17
61	Deer Lake	4.20	56.45
62	Seven Acre Lake	4.18	56.51
63	Lambs Farm Lake	4.17	56.54
64	Countryside Lake	4.10	56.79
65	Grays Lake	4.08	56.86
66	Lake Naomi	4.05	56.96
67	White Lake	3.96	57.29
68	Hook Lake	3.95	57.32
69	Turner Lake	3.92	57.43
70	Leisure Lake	3.85	57.69
71	Salem Lake	3.77	58.00
72	Countryside Glen Lake	3.64	58.50
73	Hastings Lake	3.52	58.99
74	Taylor Lake	3.52	58.99
75	Timber Lake (South)	3.51	59.03
76	Duck Lake	3.49	59.11
77	Bishop Lake	3.47	59.19
78	Fish Lake	3.47	59.19
79	Lake Holloway	3.40	59.49
80	Stockholm Lake	3.38	59.57
81	East Loon Lake	3.30	59.92
82	Bresen Lake	3.28	60.00
83	Summerhill Estates Lake	3.27	60.05
84	Lucky Lake	3.22	60.27
85	Diamond Lake	3.17	60.50
86	Liberty Lake	3.16	60.54
87	International Mining and Chemical Lake	3.08	60.91
88	Lake Christa	3.01	61.24
89	Lucy Lake	2.99	61.34
90	Long Lake	2.96	61.48
91	Island Lake	2.90	61.78
92	Bluff Lake	2.85	62.03
93	St. Mary's Lake	2.79	62.34
94	Werhane Lake	2.71	62.76
95	Lake Napa Suwe	2.66	63.02
96	Petite Lake	2.66	63.02
97	East Meadow Lake	2.61	63.30
98	Kemper Lake 1	2.56	63.58
99	Broberg Marsh	2.50	63.92
100	Antioch Lake	2.48	64.03
101	Spring Lake	2.46	64.15
102	Little Bear Lake	2.38	64.63

Table 3. Average Secchi depths measured from lakes in Lake County, 2000-2012.

RANK	LAKE NAME	SECCHI AVE	TSIsd
103	Lake Marie	2.25	65.44
104	Rivershire Pond 2	2.23	65.57
105	Lake Charles	2.20	65.76
106	College Trail Lake	2.18	65.89
107	Loch Lomond	2.17	65.96
108	Echo Lake	2.11	66.36
109	Eagle Lake (S1)	2.10	66.43
110	West Meadow Lake	2.07	66.64
111	Forest Lake	2.04	66.85
112	Columbus Park Lake	2.03	66.92
113	Grand Ave Marsh	2.03	66.92
114	Grassy Lake	2.00	67.14
115	Bittersweet Golf Course #13	1.98	67.28
116	Sylvan Lake	1.98	67.28
117	Fischer Lake	1.96	67.43
118	Pistakee Lake	1.88	68.03
119	Fourth Lake	1.77	68.90
120	Kemper Lake 2	1.77	68.90
121	Deer Lake Meadow Lake	1.73	69.23
122	Nippersink Lake	1.73	69.23
123	Woodland Lake	1.72	69.31
124	Lake Louise	1.68	69.65
125	Slough Lake	1.63	70.09
126	Willow Lake	1.63	70.09
127	Lake Farmington	1.62	70.17
128	Rasmussen Lake	1.62	70.17
129	Half Day Pit	1.60	70.35
130	Dunn's Lake	1.54	70.91
131	Longview Meadow Lake	1.51	71.19
132	Lake Matthews	1.41	72.18
133	Fox Lake	1.37	72.59
134	Grass Lake	1.33	73.02
135	Big Bear Lake	1.32	73.13
136	Lake Nippersink	1.28	73.57
137	Redhead Lake	1.27	73.68
138	Lake Eleanor	1.16	74.99
139	McDonald Lake 1	1.13	75.37
140	Buffalo Creek Reservoir	1.10	75.76
141	Rollins Savannah 1	1.05	76.43
142	Osprey Lake	1.03	76.70
143	Slocum Lake	1.03	76.73
144	Manning's Slough	1.00	77.13
145	Rollins Savannah 2	0.95	77.87
146	Dog Bone Lake	0.94	78.02
147	Redwing Marsh	0.88	78.97
148	Flint Lake Outlet	0.83	79.82
149	Fairfield Marsh	0.81	80.17
150	Oak Hills Lake	0.79	80.53
151	South Churchill Lake	0.73	81.67
152	Lake Forest Pond	0.71	82.07
153	ADID 127	0.66	83.12

Table 3. Average Secchi depths measured from lakes in Lake County, 2000-2012.

RANK	LAKE NAME	SECCHI AVE	TSIsd
154	Albert Lake	0.64	83.57
155	North Churchill Lake	0.61	84.26
156	Hidden Lake	0.56	85.54
157	Ozaukee Lake	0.51	86.84
158	McDonald Lake 2	0.5	87.12

Table 4. Multiparameter data, Sylvan Lake, 2012.

Sylvan lake 2012 Multiparameter data

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý
5/16/2012	0	0.51	18.99	18.4	198.40	0.8880	8.59	3162
5/16/2012	1	1.06	19.03	16.0	173.20	0.8930	8.21	3074
5/16/2012	2	2.01	19.00	16.9	183.10	0.8930	8.20	1307
5/16/2012	3	3.03	19.01	16.7	181.00	0.8930	8.21	932
5/16/2012	4	4.04	18.96	15.3	165.40	0.8930	8.22	781
5/16/2012	5	5.02	18.90	17.9	193.40	0.8940	8.22	532
5/16/2012	6	6.01	18.87	16.3	176.10	0.8930	8.21	422
5/16/2012	7	7.03	18.83	16.5	178.00	0.8930	8.20	335
5/16/2012	8	8.03	18.74	14.1	151.40	0.8930	8.19	235
5/16/2012	9	9.01	17.87	13.8	145.50	0.8950	8.14	146
5/16/2012	10	10.06	17.19	11.2	116.70	0.9050	8.05	102
5/16/2012	11	11.01	16.28	12.6	128.60	0.9010	7.95	68
5/16/2012	12	12.01	15.54	14.4	144.90	0.9000	7.82	34
5/16/2012	13	12.88	14.93	14.4	142.60	0.8700	7.63	1

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý
6/20/2012	0	0.53	26.92	9.08	114.1	0.9180	8.09	0
6/20/2012	1	1.08	26.91	9.22	115.9	0.9190	8.17	3331
6/20/2012	2	1.96	26.83	9.24	115.8	0.9190	8.20	1603
6/20/2012	3	3.03	26.68	9.26	115.8	0.9190	8.22	1118
6/20/2012	4	3.95	26.60	9.19	114.7	0.9190	8.24	842
6/20/2012	6	5.96	26.46	9.06	112.8	0.9180	8.25	396
6/20/2012	8	8.04	25.52	7.02	85.9	0.9250	8.09	162
6/20/2012	10	9.98	22.54	1.55	17.9	0.9350	7.72	67
6/20/2012	12	11.97	20.96	0.61	6.8	0.9410	7.41	3

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý
7/18/2012	0	0.55	28.81	9.33	121.1	0.7850	8.42	748
7/18/2012	1	1.02	28.83	10.40	135.1	0.7850	8.50	716
7/18/2012	2	2.01	28.82	10.46	135.8	0.7860	8.55	214
7/18/2012	3	2.99	28.82	10.42	135.3	0.7850	8.58	100
7/18/2012	4	3.98	28.81	10.24	132.9	0.7860	8.58	49
7/18/2012	5	5.01	28.63	9.38	121.4	0.7910	8.53	22
7/18/2012	6	5.98	28.22	8.25	106.1	0.7990	8.42	11
7/18/2012	7	6.99	27.70	6.37	81.1	0.8080	8.27	6
7/18/2012	8	7.99	27.23	4.32	54.6	0.8140	8.17	3
7/18/2012	9	9.00	26.70	1.96	24.5	0.8200	8.04	1
7/18/2012	10	9.98	25.87	0.37	4.6	0.8320	7.82	1
7/18/2012	11	11.01	24.82	0.24	3.0	0.8560	7.60	0
7/18/2012	12	12.01	24.05	0.26	3.1	0.8640	7.30	0

Table 4. Multiparameter data, Sylvan Lake, 2012.

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý
8/22/2012	0	0.58	23.32	10.71	125.9	0.8320	8.76	3376.2
8/22/2012	1	1.04	23.17	10.87	127.4	0.8330	8.84	0.1
8/22/2012	2	2.02	22.65	10.76	124.9	0.8660	8.84	0.1
8/22/2012	3	3.06	22.60	9.43	109.3	0.8340	8.84	0.2
8/22/2012	4	4.00	22.57	8.50	98.6	0.8350	8.81	0.2
8/22/2012	5	5.02	22.52	7.77	90.0	0.8360	8.79	-0.4
8/22/2012	6	6.01	22.50	7.21	83.4	0.8350	8.76	0.1
8/22/2012	7	6.97	22.45	6.98	80.7	0.8370	8.72	0.2
8/22/2012	8	7.98	22.38	5.72	66.0	0.8380	8.67	0.1
8/22/2012	9	9.05	22.39	4.80	55.4	0.8380	8.61	0.1
8/22/2012	10	10.08	22.32	3.92	45.2	0.8400	8.58	0.2
8/22/2012	11	11.03	22.29	3.77	43.4	0.8410	8.55	0.1
8/22/2012	12	12.00	22.16	3.08	35.5	0.8310	8.36	0.0

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý
9/19/2012	0.5	0.00	18.59	7.02	75.1	0.4200	8.54	NA
9/19/2012	1	1.00	18.65	7.02	75.2	0.8510	8.59	NA
9/19/2012	2	2.00	18.69	8.60	66.0	0.8510	8.59	NA
9/19/2012	3	3.00	18.70	6.11	65.0	0.8510	8.59	NA
9/19/2012	4	4.00	18.71	5.89	63.0	0.8510	8.58	NA
9/19/2012	6	6.00	18.71	5.60	60.0	0.8510	8.58	NA
9/19/2012	8	8.00	18.66	5.36	57.5	0.8520	8.57	NA
9/19/2012	10	10.00	18.40	4.91	52.5	0.8530	8.53	NA
9/19/2012	12	12.00	18.45	3.07	28.0	0.8510	7.96	NA

Table 5. 2000 – 2012 Water quality parameters, statistics summary.

	ALKoxic <=3ft00-2010			ALKanoxic 2000-2010	
Average	**165**		Average	**201**	
Median	**160**		Median	**192**	
Minimum	**65**	**IMC**	Minimum	**103**	**Heron Pond**
Maximum	**330**	**Flint Lake**	Maximum	**470**	**Lake Marie**
STD	**42**		STD	**52**	
n =	**812**		n =	**249**	

	Condoxic <=3ft00-2010			Condanoxic 2000-2010	
Average	**0.8629**		Average	**1.0125**	
Median	**0.7800**		Median	**0.8678**	
Minimum	**0.2260**	**Schreiber Lake**	Minimum	**0.3210**	**Lake Kathyrn, Schreiber Lake**
Maximum	**6.8920**	**IMC**	Maximum	**7.4080**	**IMC**
STD	**0.5215**		STD	**0.7821**	
n =	**812**		n =	**248**	

	NO3-N, Nitrate+Nitrite,oxic <=3ft00-2010			NH3-Nanoxic 2000-2010	
Average	**0.489**		Average	**2.132**	
Median	**0.160**		Median	**1.360**	
Minimum	**<0.05**	***ND**	Minimum	**<0.1**	***ND**
Maximum	**9.670**	**South Churchill Lake**	Maximum	**18.400**	**Taylor Lake**
STD	**1.054**		STD	**2.345**	
n =	**812**		n =	**249**	

*ND = Many lakes had non-detects (74.5%)
Only compare lakes with detectable concentrations to the statistics above
Beginning in 2006, Nitrate+Nitrite was measured.

*ND = 20.1% Non-detects from 32 different lakes

	pHoxic <=3ft00-2010			pHanoxic 2000-2010	
Average	**8.37**		Average	**7.33**	
Median	**8.36**		Median	**7.30**	
Minimum	**7.07**	**Bittersweet #13**	Minimum	**6.24**	**Banana Pond**
Maximum	**10.40**	**Summerhill Estates**	Maximum	**9.16**	**White Lake**
STD	**0.46**		STD	**0.43**	
n =	**810**		n =	**248**	

Table 5. 2000 – 2012 Water quality parameters, statistics summary.

	All Secchi 2000-2010	
		McDonald Lake
Average	**4.33**	**2/Ozaukee Lake**
Median	**2.95**	**West Loon Lake**
Minimum	**0.25**	
Maximum	**23.50**	
STD	**3.66**	
n =	**758**	

	TKNoxic <=3ft00-2010	
Average	**1.399**	***ND**
Median	**1.180**	**Fairfield Marsh**
Minimum	**<0.1**	
Maximum	**10.300**	
STD	**0.819**	
n =	**812**	

*ND = 3.8% Non-detects from 15 different lakes

	TKNanoxic 2000-2010	
Average	**2.866**	
Median	**2.130**	
Minimum	**<0.5**	***ND**
Maximum	**21.000**	**Taylor Lake**
STD	**2.302**	
n =	**249**	

*ND = 3.2% Non-detects from 4 different lakes

	TPoxic <=3ft00-2010	
Average	**0.099**	***ND**
Median	**0.065**	**Albert Lake**
Minimum	**<0.01**	
Maximum	**3.880**	
STD	**0.169**	
n =	**812**	

*ND = 2.2% Non-detects from 7 different lakes

	TPanoxic 2000-2010	
Average	**0.305**	
Median	**0.174**	
Minimum	**0.012**	**Independence Grove**
Maximum	**3.800**	**Taylor Lake**
STD	**0.394**	
n =	**249**	

	TSSall <=3ft00-2010	
Average	**15.6**	***ND**
Median	**8.1**	**Fairfield Marsh**
Minimum	**<0.1**	
Maximum	**165.0**	
STD	**20.8**	
n =	**812**	

*ND = 1.7% Non-detects from 10 different lakes

	TVSoxic <=3ft00-2010	
Average	**127.6**	
Median	**123.0**	
Minimum	**34.0**	**Pulaski Pond**
Maximum	**298.0**	**Fairfield Marsh**
STD	**39.7**	
n =	**767**	

No 2002 IEPA Chain Lakes

Table 5. 2000 – 2012 Water quality parameters, statistics summary.

	TDSoxic <=3ft00-2004	
Average	**470**	
Median	**454**	
Minimum	**150**	**Lake Kathryn, White**
Maximum	**1340**	**IMC**
STD	**169**	
n =	**745**	

No 2002 IEPA Chain Lakes.

	CLanoxic <=3ft00-2010	
Average	**193**	
Median	**111**	
Minimum	**3.5**	**Schreiber Lake**
Maximum	**2390**	**IMC**
STD	**324**	
n =	**162**	

	CLoxic <=3ft00-2010	
Average	**181**	
Median	**142**	
Minimum	**2.7**	**Schreiber Lake**
Maximum	**2760**	**IMC**
STD	**220**	
n =	**552**	

Anoxic conditions are defined <=1 mg/l D.O.
pH Units are equal to the -Log of [H] ion activity
Conductivity units are in MilliSiemens/cm
Secchi Disk depth units are in feet
All others are in mg/L

Minimums and maximums are based on data from all lakes from 2000-2010 (n=1357).
Average, median and STD are based on data from the most recent water quality sampling year for each lake.

LCHD Environmental Services ~ 01/20/2011

Table 6. Lake County average TSI phosphorus (TSIp) ranking 2000-2012.

RANK	LAKE NAME	TP AVE	TSIp
1	Lake Carina	0.0100	37.35
2	Sterling Lake	0.0100	37.35
3	Independence Grove	0.0130	41.14
4	Lake Zurich	0.0135	41.68
5	Druce Lake	0.0140	42.00
6	Cedar Lake	0.0160	44.13
7	Windward Lake	0.0160	44.13
8	Sand Pond (IDNR)	0.0165	44.57
9	West Loon	0.0170	45.00
10	Pulaski Pond	0.0180	45.83
11	Gages Lake	0.0200	47.00
12	Banana Pond	0.0200	47.35
13	Lake Kathryn	0.0200	47.35
14	Lake Minear	0.0200	47.35
15	Highland Lake	0.0202	47.49
16	Lake Miltmore	0.0210	48.00
17	Timber Lake (North)	0.0210	48.05
18	Cranberry Lake	0.0220	48.72
19	Cross Lake	0.0220	48.72
20	Dog Training Pond	0.0220	48.72
21	Sun Lake	0.0220	48.72
22	Bangs Lake	0.0230	49.36
23	Deep Lake	0.0230	49.36
24	Lake of the Hollow	0.0230	49.36
25	Round Lake	0.0230	49.36
26	Stone Quarry Lake	0.0230	49.36
27	Little Silver Lake	0.0250	50.57
28	Lake Leo	0.0260	51.13
29	Dugdale Lake	0.0270	51.68
30	Peterson Pond	0.0270	51.68
31	Fourth Lake	0.0360	53.00
32	Lake Fairfield	0.0300	53.20
33	Third Lake	0.0300	53.33
34	Lake Catherine	0.0310	53.67
35	Lambs Farm Lake	0.0310	53.67
36	Old School Lake	0.0310	53.67
37	Grays Lake	0.0310	54.00
38	Harvey Lake	0.0320	54.50
39	Hendrick Lake	0.0340	55.00
40	Honey Lake	0.0340	55.00
41	Sand Lake	0.0380	56.00
42	Sullivan Lake	0.0370	56.22
43	Channel Lake	0.0380	56.60
44	Ames Pit	0.0390	56.98
45	Diamond Lake	0.0390	56.98
46	East Loon	0.0400	57.34
47	Schreiber Lake	0.0400	57.34
48	Waterford Lake	0.0400	57.34
49	Hook Lake	0.0410	57.70

Table 6. Lake County average TSI phosphorus (TSIp) ranking 2000-2012.

RANK	LAKE NAME	TP AVE	TSIp
50	Duck Lake	0.0430	58.39
51	Nielsen Pond	0.0450	59.04
52	Wooster Lake	0.0450	59.04
53	Seven Acre Lake	0.0460	59.36
54	Turner Lake	0.0460	59.36
55	Willow Lake	0.0460	59.36
56	East Meadow Lake	0.0480	59.97
57	Lucky Lake	0.0480	59.97
58	Old Oak Lake	0.0490	60.27
59	College Trail Lake	0.0500	60.56
60	Hastings Lake	0.0520	61.13
61	Lake Lakeland Estates	0.0520	61.13
62	Butler Lake	0.0530	61.40
63	West Meadow Lake	0.0530	61.40
64	Lucy Lake	0.0550	61.94
65	Lake Linden	0.0570	62.45
66	Lake Napa Suwe	0.0570	62.45
67	Lake Christa	0.0580	62.70
68	Owens Lake	0.0580	62.70
69	Briarcrest Pond	0.0580	63.00
70	Lake Naomi	0.0620	63.66
71	Lake Tranquility (S1)	0.0620	63.66
72	Liberty Lake	0.0630	63.89
73	Werhane Lake	0.0630	63.89
74	Countryside Glen Lake	0.0640	64.12
75	Davis Lake	0.0650	64.34
76	Lake Fairview	0.0650	64.34
77	Leisure Lake	0.0650	64.34
78	Tower Lake	0.0660	64.56
79	St. Mary's Lake	0.0670	64.78
80	Little Bear Lake	0.0680	65.00
81	Mary Lee Lake	0.0680	65.00
82	Crooked Lake	0.0700	65.41
83	Lake Helen	0.0720	65.82
84	Grandwood Park Lake	0.0720	66.00
85	ADID 203	0.0730	66.02
86	Bluff Lake	0.0730	66.02
87	Spring Lake	0.0730	66.02
88	Broberg Marsh	0.0780	66.97
89	Redwing Slough	0.0822	67.73
90	Petite Lake	0.0830	67.87
91	Lake Marie	0.0850	68.21
92	Potomac Lake	0.0850	68.21
93	Timber Lake (South)	0.0850	68.21
94	White Lake	0.0862	68.42
95	Grand Ave Marsh	0.0870	68.55
96	North Churchill Lake	0.0870	68.55
97	McDonald Lake 1	0.0880	68.71
98	North Tower Lake	0.0880	68.71

Table 6. Lake County average TSI phosphorus (TSIp) ranking 2000-2012.

RANK	LAKE NAME	TP AVE	TSIp
99	Long Lake	0.0900	69.04
100	Rivershire Pond 2	0.0900	69.04
101	South Churchill Lake	0.0900	69.04
102	McGreal Lake	0.0910	69.20
103	Lake Charles	0.0930	69.40
104	Deer Lake	0.0940	69.66
105	Dunn's Lake	0.0950	69.82
106	Eagle Lake (S1)	0.0950	69.82
107	International Mine and Chemical Lake	0.0950	69.82
108	Valley Lake	0.0950	69.82
109	Big Bear Lake	0.0960	69.97
110	Fish Lake	0.0960	69.97
111	Lochanora Lake	0.0960	69.97
112	Island Lake	0.0990	70.41
113	Woodland Lake	0.0990	70.41
114	Nippersink Lake	0.1000	70.56
115	Sylvan Lake	0.1000	70.56
116	Longview Meadow Lake	0.1020	70.84
117	Countryside Lake	0.1050	71.26
118	Lake Barrington	0.1050	71.26
119	Lake Forest Pond	0.1070	71.53
120	Bittersweet Golf Course #13	0.1100	71.93
121	Fox Lake	0.1100	71.93
122	Kemper 2	0.1100	71.93
123	Middlefork Savannah Outlet 1	0.1120	72.00
124	Osprey Lake	0.1110	72.06
125	Bresen Lake	0.1130	72.32
126	Round Lake Marsh North	0.1130	72.32
127	Deer Lake Meadow Lake	0.1160	72.70
128	Taylor Lake	0.1180	72.94
129	Columbus Park Lake	0.1230	73.54
130	Lake Nipperink	0.1240	73.66
131	Echo Lake	0.1250	73.77
132	Grass Lake	0.1290	74.23
133	Lake Holloway	0.1320	74.56
134	Redhead Lake	0.1410	75.51
135	Antioch Lake	0.1450	75.91
136	Slocum Lake	0.1500	76.40
137	Lakewood Marsh	0.1510	76.50
138	Pond-A-Rudy	0.1510	76.50
139	Lake Matthews	0.1520	76.59
140	Forest Lake	0.1540	76.78
141	Buffalo Creek Reservoir	0.1550	76.88
142	Middlefork Savannah Outlet 2	0.1590	77.00
143	Pistakee Lake	0.1590	77.24
144	Grassy Lake	0.1610	77.42
145	Salem Lake	0.1650	77.78
146	Half Day Pit	0.1690	78.12
147	Lake Eleanor	0.1810	79.11

Table 6. Lake County average TSI phosphorus (TSIp) ranking 2000-2012.

RANK	LAKE NAME	TP AVE	TSIp
148	Lake Farmington	0.1850	79.43
149	Lake Louise	0.1850	79.43
150	ADID 127	0.1890	79.74
151	Patski Pond	0.1970	80.33
152	Dog Bone Lake	0.1990	80.48
153	Summerhill Estates Lake	0.1990	80.48
154	Redwing Marsh	0.2070	81.05
155	Stockholm Lake	0.2082	81.13
156	Bishop Lake	0.2160	81.66
157	Ozaukee Lake	0.2200	81.93
158	Kemper 1	0.2220	82.08
159	Hidden Lake	0.2240	82.19
160	McDonald Lake 2	0.2250	82.28
161	Fischer Lake	0.2280	82.44
162	Oak Hills Lake	0.2790	85.35
163	Loch Lomond	0.2950	86.16
164	Heron Pond	0.2990	86.35
165	Rollins Savannah 1	0.3070	87.00
166	Fairfield Marsh	0.3260	87.60
167	ADID 182	0.3280	87.69
168	Manning's Slough	0.3820	90.22
169	Slough Lake	0.3860	90.03
170	Rasmussen Lake	0.4860	93.36
171	Flint Lake Outlet	0.5000	93.76
172	Rollins Savannah 2	0.5870	96.00
173	Albert Lake, Site II, outflow	1.1894	106.26
174	Almond Marsh	1.9510	113.00

Figure 5. TP concentrations on Sylvan Lake, 1996, 2001 and 2012.

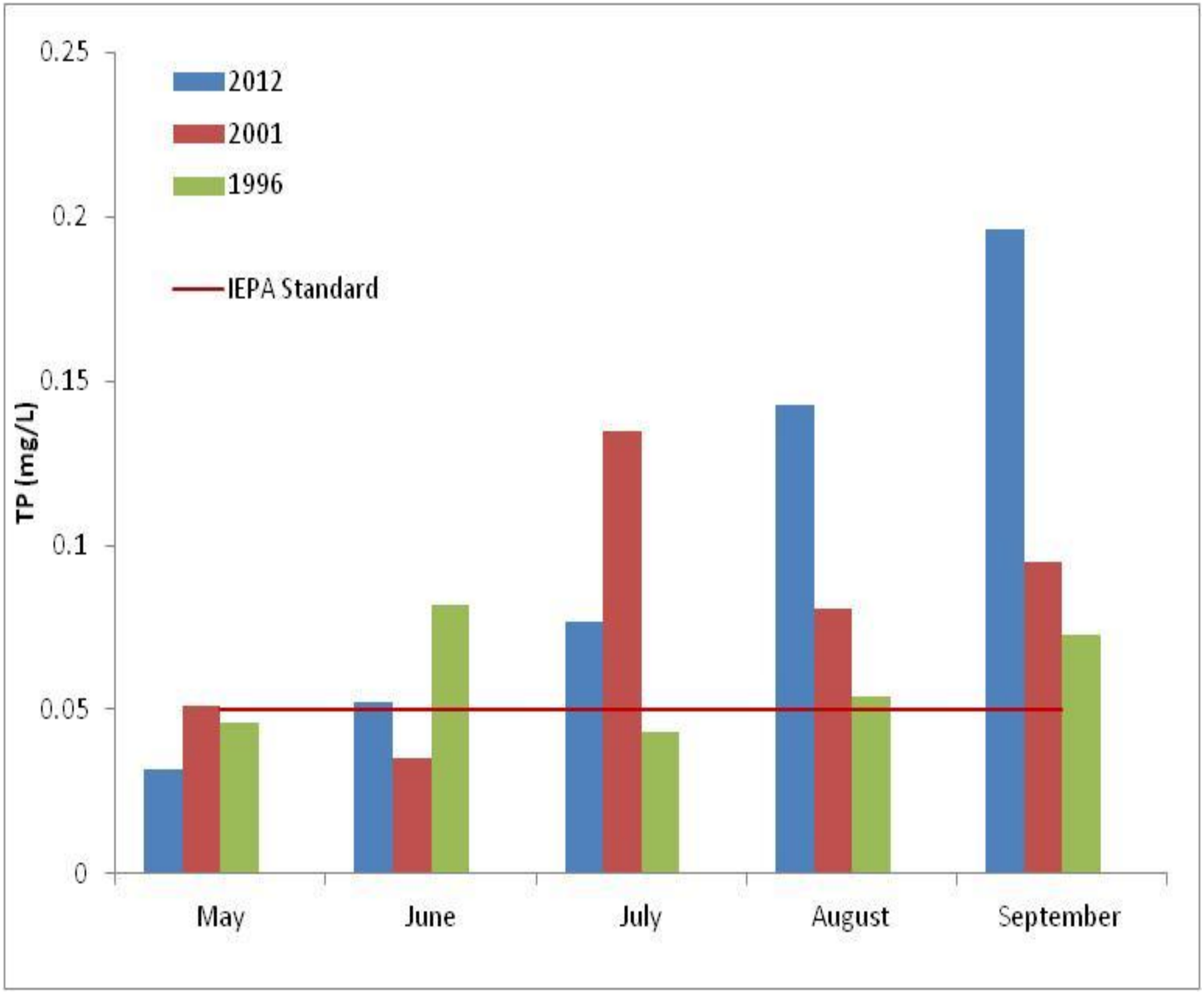


Table 7a. Aquatic vegetation species found at the 38 sampling sites on Sylvan Lake, July 2012. Maximum depth that plants were found was 1.0 feet.

Plant Density	FLT	WWL
Absent	37	37
Present	1	0
Common	0	1
Abundant	0	0
Dominant	0	0
% Plant Occurrence	2.6%	2.6%

Table 7b. Distribution of rake density across all sampling sites, Sylvan Lake, 2012.

Rake Density (Coverage)	# of Sites	%
No plants	36	94.7%
>0 to 10%	1	2.6%
>10 to 40%	1	2.6%
>40 to 60%	0	0.0%
>60 to 90%	0	0.0%
>90%	0	0.0%
Total Sites with Plants	2	5.3%
Total # of Sites	38	100.0%

Table 8. Lake County average Floristic Quality Index ranking 2000 – 2012

RANK	LAKE NAME	FQI (w/A)	FQI (native)
1	Cedar Lake	36.8	38.0
2	East Loon Lake	34.7	36.1
3	Bangs Lake	33.8	35.2
4	Little Silver Lake	29.6	31.6
5	Deep Lake	29.7	31.2
6	Round Lake Marsh North	29.1	29.9
7	Cranberry Lake	29.7	29.7
8	West Loon Lake	27.1	29.5
9	Sullivan Lake	26.9	28.5
10	Independence Grove	24.6	27.5
11	Fourth Lake	24.7	27.1
12	Lake Zurich	24.3	27.1
13	Sterling Lake	24.5	26.9
14	Sun Lake	24.3	26.1
15	Round Lake	23.5	25.9
16	Redwing Slough	24.0	25.8
17	Honey Lake	23.3	25.1
18	Lake of the Hollow	23.0	24.8
19	Schreiber Lake	23.9	24.8
20	Lakewood Marsh	23.8	24.7
21	Deer Lake	23.5	24.4
22	Cross Lake	22.4	24.2
23	Third Lake	21.4	24.0
24	Wooster Lake	22.2	23.9
25	Timber Lake (North)	20.9	23.4
26	Butler Lake	21.4	23.1
27	Duck Lake	21.1	22.9
28	Countryside Glen Lake	21.9	22.8
29	McGreal Lake	20.2	22.1
30	Druce Lake	19.1	21.8
31	Long Lake	19.6	21.5
32	Broberg Marsh	20.5	21.4
33	Davis Lake	21.4	21.4
34	Fish Lake	19.3	21.2
35	Redhead Lake	19.3	21.2
36	Turner Lake	18.6	21.2
37	Lake Kathryn	19.6	20.7
38	ADID 203	20.5	20.5
39	Salem Lake	18.5	20.2
40	Old Oak Lake	18.0	19.1
41	Grandwood Park Lake	17.2	19.0
42	Highland Lake	16.7	18.9
43	Lake Miltmore	16.8	18.7
44	Lake Helen	18.0	18.0
45	Bresen Lake	16.6	17.8
46	Potomac Lake	17.8	17.8
47	Hendrick Lake	17.7	17.7
48	Lake Barrington	16.7	17.7
49	McDonald Lake 1	16.7	17.7
50	Rollins Savannah 2	17.7	17.7
51	Windward Lake	16.3	17.6
52	Almond Marsh	16.3	17.3
53	Osprey Lake	15.5	17.3
54	Owens Lake	16.3	17.3

Table 8. Lake County average Floristic Quality Index ranking 2000 – 2012

RANK	LAKE NAME	FQI (w/A)	FQI (native)
55	Hastings Lake	15.0	17.0
56	Lake Tranquility (S1)	15.0	17.0
57	White Lake	16.0	17.0
58	Island Lake	14.7	16.6
59	Grand Ave Marsh	14.3	16.3
60	Lake Fairview	15.2	16.3
61	Manning's Slough	14.1	16.3
62	Nippersink Lake	14.3	16.3
63	Taylor Lake	14.3	16.3
64	Grays Lake	16.1	16.1
65	Crooked Lake	14.0	16.0
66	Dog Training Pond	14.7	15.9
67	Forest Lake	14.8	15.9
68	Dog Bone Lake	15.7	15.7
69	Ames Pit	13.4	15.5
70	Seven Acre Lake	17.0	15.5
71	Dugdale Lake	14.0	15.1
72	Eagle Lake (S1)	14.0	15.1
73	Heron Pond	15.1	15.1
74	Mary Lee Lake	13.1	15.1
75	Old School Lake	13.1	15.1
76	Bishop Lake	13.4	15.0
77	North Churchill Lake	15.0	15.0
78	Timber Lake (South)	12.7	14.7
79	Buffalo Creek Reservoir	13.1	14.3
80	Lake Carina	12.1	14.3
81	Lake Leo	12.1	14.3
82	Lambs Farm Lake	12.1	14.3
83	Dunn's Lake	12.7	13.9
84	Lake Minear	11.0	13.9
85	Lake Napa Suwe	11.7	13.9
86	Longview Meadow Lake	13.9	13.9
87	Summerhill Estates Lake	12.7	13.9
88	Stockholm Lake	12.1	13.5
89	Antioch Lake	11.3	13.4
90	Hook Lake	11.3	13.4
91	Kemper Lake 1	12.2	13.4
92	Rivershire Pond 2	11.5	13.3
93	Flint Lake Outlet	11.8	13.0
94	Briarcrest Pond	11.2	12.5
95	Crooked Lake	10.2	12.5
96	Gages Lake	10.2	12.5
97	Lake Naomi	11.2	12.5
98	McDonald Lake 2	12.5	12.5
99	Pulaski Pond	11.2	12.5
100	Rollins Savannah 1	12.5	12.5
101	Stone Quarry Lake	12.5	12.5
102	Loch Lomond	9.4	12.1
103	Pond-A-Rudy	12.1	12.1
104	Grassy Lake	12.0	12.0
105	Lake Matthews	12.0	12.0
106	Nielsen Pond	10.7	12.0
107	Werhane Lake	9.8	12.0
108	Lake Lakeland Estates	10.0	11.5
109	Fischer Lake	9.0	11.0
110	Redwing Marsh	11.0	11.0
111	Tower Lake	11.0	11.0
112	West Meadow Lake	11.0	11.0

Table 8. Lake County average Floristic Quality Index ranking 2000 – 2012

RANK	LAKE NAME	FQI (w/A)	FQI (native)
113	Lake Holloway	10.6	10.6
114	Sylvan Lake	10.6	10.6
115	Lake Fairfield	9.0	10.4
116	Lake Louise	9.0	10.4
117	Sand Lake	8.0	10.4
118	College Trail Lake	10.0	10.0
119	Countryside Lake	8.9	10.0
120	Valley Lake	9.9	9.9
121	Woodland Lake	8.1	9.9
122	Kemper Lake 2	8.5	9.8
123	Lake Christa	8.5	9.8
124	Lake Farmington	8.5	9.8
125	Lucy Lake	8.5	9.8
126	Banana Pond	7.5	9.2
127	Columbus Park Lake	9.2	9.2
128	Waterford Lake	9.2	9.2
129	Leisure Lake	6.4	9.0
130	Albert Lake	7.5	8.7
131	Fairfield Marsh	7.5	8.7
132	Lake Eleanor	7.5	8.7
133	Ozaukee Lake	6.7	8.7
134	East Meadow Lake	8.5	8.5
135	Lake Forest Pond	6.9	8.5
136	Peterson Pond	6.0	8.5
137	South Churchill Lake	8.5	8.5
138	Bittersweet Golf Course #13	8.1	8.1
139	Lake Linden	8.0	8.0
140	Little Bear Lake	5.8	7.5
141	International Mining and Chemical Lake	5.0	7.1
142	Slocum Lake	5.8	7.1
143	Lucky Lake	7.0	7.0
144	Deer Lake Meadow Lake	5.2	6.4
145	Diamond Lake	3.7	5.5
146	Lake Charles	3.7	5.5
147	ADID 127	5.0	5.0
148	Big Bear Lake	3.5	5.0
149	Half Day Pit	2.9	5.0
150	Harvey Lake	3.3	5.0
151	Liberty Lake	5.0	5.0
152	Lochanora Lake	2.5	5.0
153	Oak Hills Lake	5.0	5.0
154	Sand Pond (IDNR)	3.5	5.0
155	Slough Lake	5.0	5.0
156	Echo Lake	0.0	0.0
157	Hidden Lake	0.0	0.0
158	North Tower Lake	0.0	0.0
159	St. Mary's Lake	0.0	0.0
160	Willow Lake	0.0	0.0
	Mean	**13.9**	**15.2**
	Median	**12.7**	**14.3**

Figure 6. Shoreline erosion assessed on Sylvan Lake, 2012.

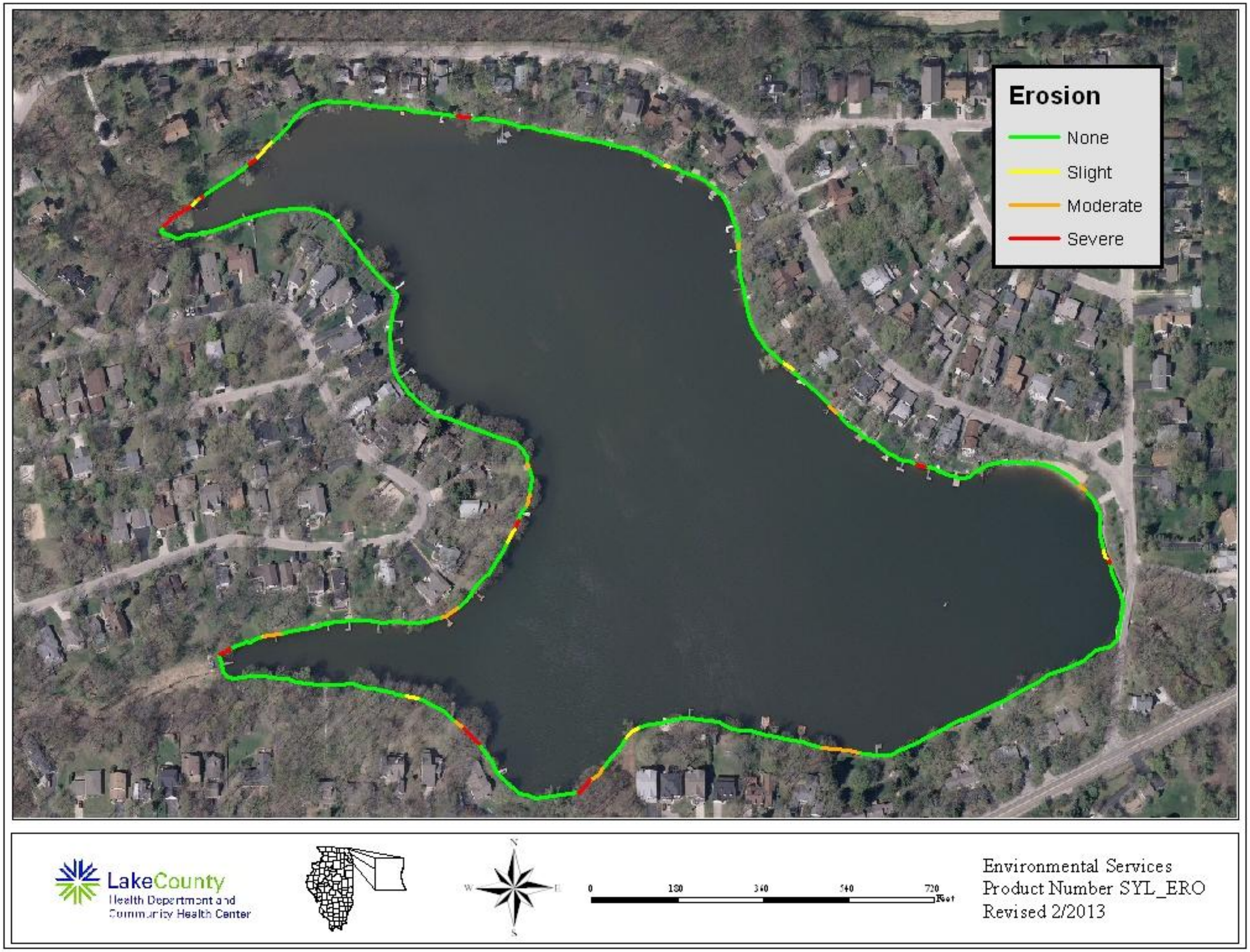
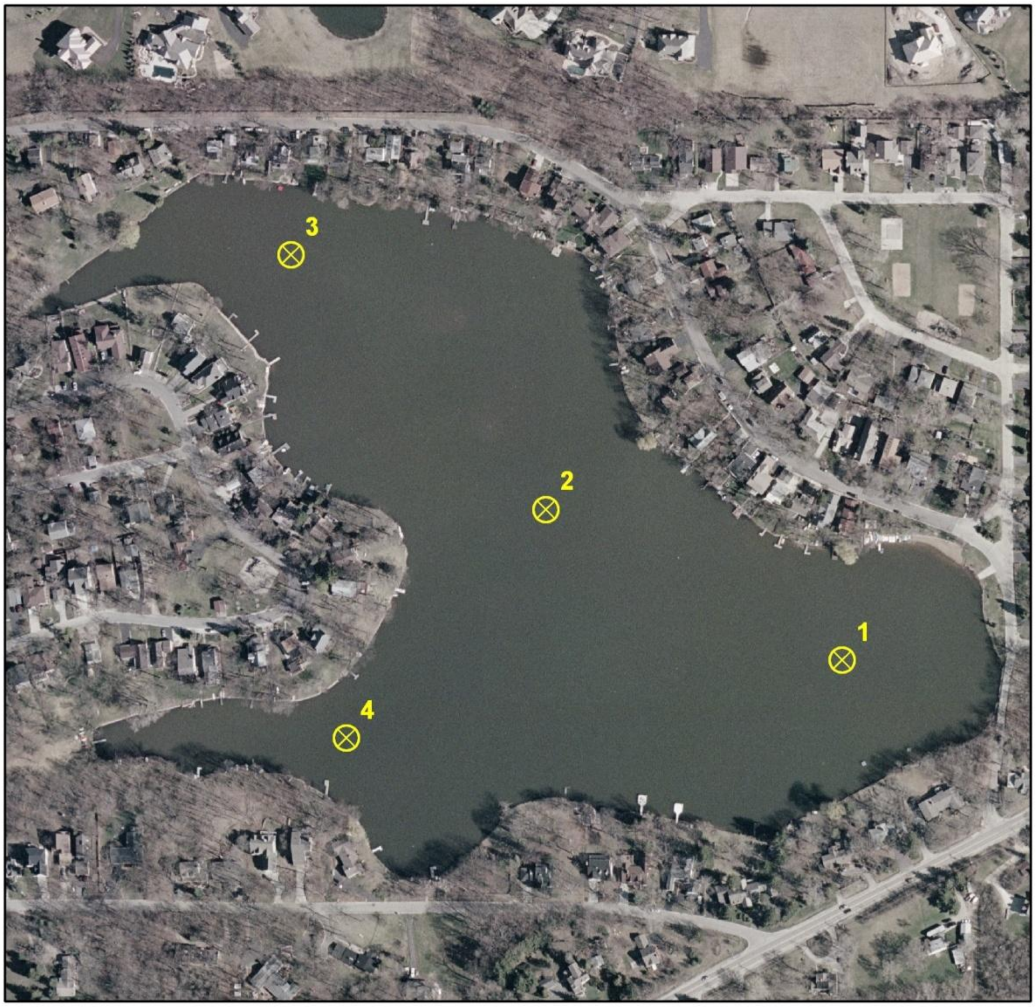


Figure 7. VLMP sample sites, Sylvan Lake, 2012.

SYLVAN LAKE / Lake Co. / RGZF



USGS 2005 color orthophotography

Site coordinates were recorded on 25 May 2009 in NAD83, UTM Zone 16N, by H. Hudson, CMAP, using Magellan Meridian Platinum handheld GPS unit.

Map prepared by J. Drennan Chicago Metropolitan Agency for Planning (CMAP) June 2009

0 200 400 800 Feet

N E S W

⊗ VLMP Monitoring Sites

Site	Easting	Northing	Latitude	Longitude	Depth (ft)
1	16 413785 E	4677212 N			13
2	16 413600 E	4677310 N			11 - 12
3	16 413442 E	4677473 N			5 - 6
4	16 413472 E	4677168 N			6 - 7