LAKE COUNTY, ILLINOIS

2014 GRASS LAKE SUMMARY REPORT

PREPARED BY THE ECOLOGICAL SERVICES

LAKE COUNTY HEALTH DEPARTMENT

POPULATION HEALTH

Grass Lake

Grass Lake is a glacially formed lake located in Antioch Township near the Villages of Spring Grove, Antioch, and Fox Lake. The lake has a surface area of 1623.42 acres and a maximum depth of 6 feet and a mean depth of 2.25 feet. The Fox Waterway Agency, and the Illinois Department of Natural Resources (IDNR) actively manages the lake for boating, fishing, swimming, and aesthetics. Grass Lake has been a participant in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program since 1997.

The Grass Lake shoreline length is 20.87 miles, and is surrounded by low density residential development and wetlands. Grass Lake receives water primarily from the Fox River and Lake Marie; water enters the lake from its approximately 13,844 acre watershed in Illinois and an additional 600,046 acres in Wisconsin. Water exits at Grass Lake Bridge located on the south end of the lake, then flows into Nippersink Lake and Pistakee Lake, and eventually reforms into the Fox River. During the spring thaw, the rising water will flow north into Lake Marie as the Chain fills back up into summer pool level. The primary land uses within the Grass Lake watershed are agriculture and single family homes. Gas motors are permitted on the lake and multiple boat launches are located through out the

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LAKE FACTS

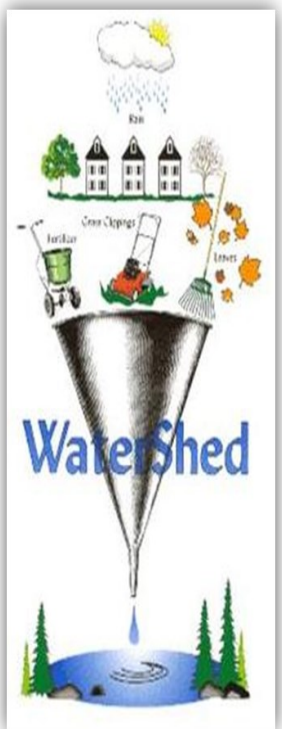
Major Watershed:
Fox River
Sub-Watershed:
Upper Fox River
Surface Area:
1623.42 acres
Shoreline Length:
20.87 miles
Maximum Depth:
6.0 feet
Average Depth:
2.25 feet
Lake Volume:
3652.7 acre-feet
Watershed Area:
13,844 acres (Illinois)
600,046 acres (Wisconsin)
Lake Type:
Impoundment
Current Uses: Fishing, boating, swimming and aesthetics

Fox Chain O' Lakes. The Chain O' Lakes State Park and Oak point has a free public launch ramp.

Water quality parameters, such as nutrients, suspended solids, oxygen, temperature, water clarity were measured from May-September 2014. The plant community was assessed in early September when most of the plants are likely to be present. Historically Grass Lake has had a variety of lake quality issues including excessive turbidity, abundance of carp, severe algal blooms, sediment and nutrient enrichment. In general the water quality in Grass Lake is poor due to a large amount incoming sediment from the Fox River and wave activity from wind and boat traffic. Total phosphorus concentration in Grass Lake averaged 0.109 mg/L which is a 62% decrease from the 2002 concentration of 0.290 mg/L and but still significantly higher than the Illinois Environmental Protection Agency impairment rate of 0.050 mg/L.

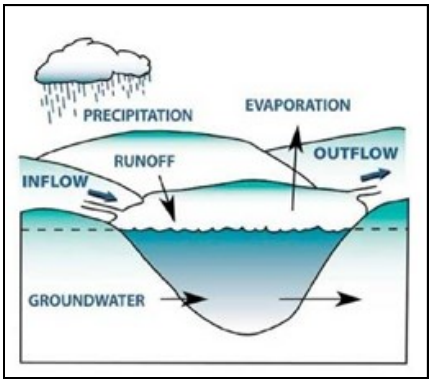
Nitrogen is the other nutrient critical for algal growth. The average Total Kjeldahl nitrogen (TKN) concentration for Grass was 1.520 mg/L, which was higher than the county median of 1.200 mg/L. A total nitrogen to total phosphorus (TN:TP) ratio of 18:1 indicates that phosphorus was only slightly limiting aquatic plant and algae growth in Grass Lake. By using phosphorous as an indicator, the trophic state index (TSIp) ranked Grass Lake as euthrophic with a TSIp value of 69.97. This means that the lake has high nutrients which can result in high plant density and algae growth. The 2014 average total suspended solids (TSS) concentration for Grass Lake was 38.7 mg/L, which was higher than the county median of 8.2 mg/L and a 16.9% decrease from the 2002 average of 46.6 mg/L.

Water clarity was measured by Secchi depth, with the lowest reading in June (0.70 ft) and the deepest was in July (1.83 ft). The average Secchi depth for the season was 0.78 ft, which was shallower than the county median (2.95 ft). The conductivity of Grass Lake was 0.8172 mS/cm which is slightly higher than the county median (0.7900 mS/cm). This was a 6.04% increase from the 2002 average (0.7706 mS/cm). The average chloride concentration in Grass Lake in 2014 was 115 mg/L which was lower than the county median of 139 mg/L.

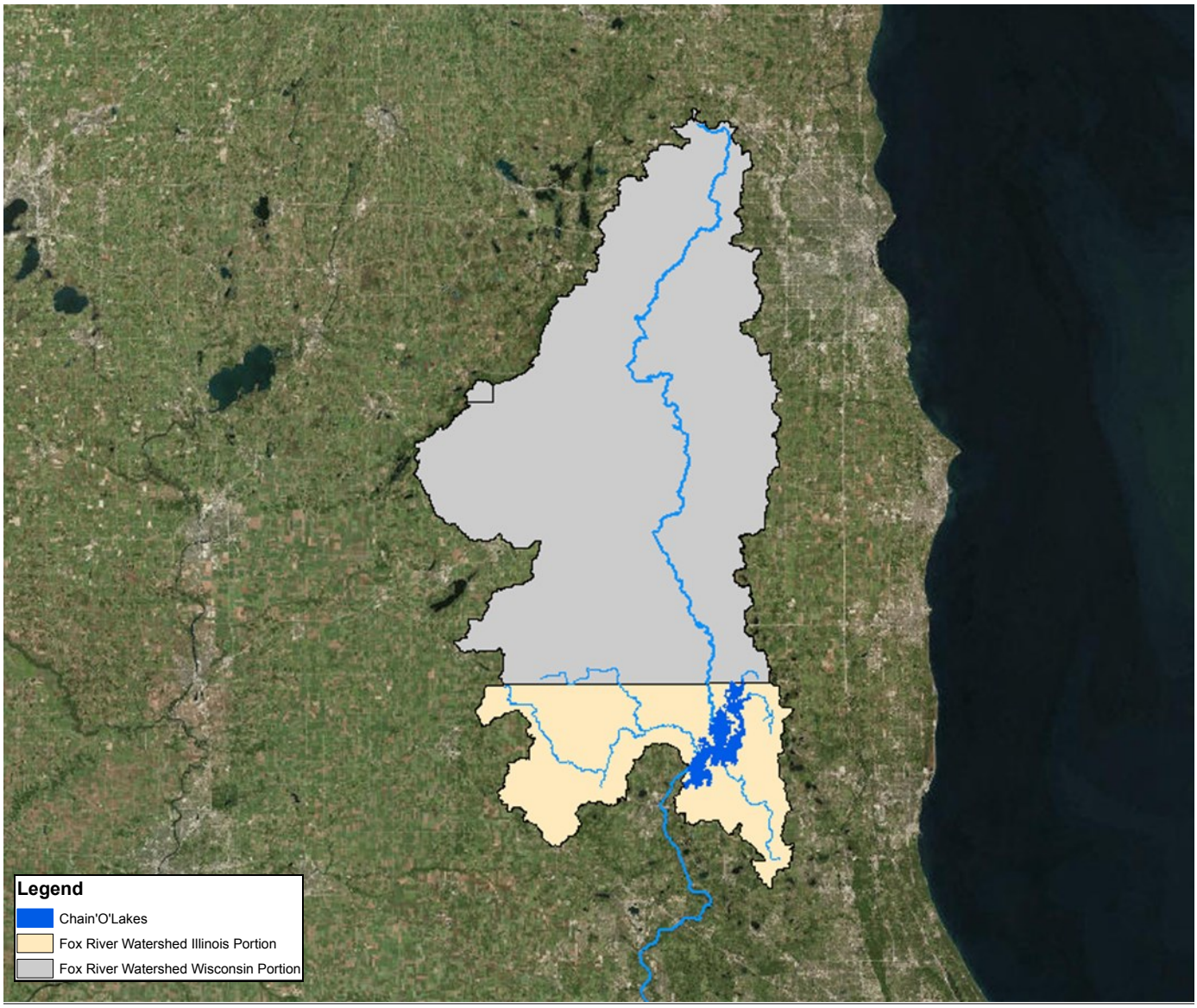


GRASS LAKE WATERSHED

Grass Lake is located in the Upper Fox River sub basin, within the Fox River watershed. A watershed is a drainage basin where water from rain or snow melt drains into a body of water, such as a river, lake, reservoir, wetland or storm drain. The Illinois portion of this watershed covers 13,844 acres and 600,046 acres in Wisconsin. The source of a lakes water supply is very important in determining its water quality and choosing management practices to protect the lake. Lakes like Grass Lake that receive the majority of their water from streams often have variable water quality that is heavily influenced by human activity. Grass Lake receives water from the Fox River and Lake Marie. The watershed to lake surface area ratio is extremely large and which contributes to a higher nutrient and sediment load. The Stratton Locke and Dam, located approximately 10 miles downstream, controls the flow and water level of Grass Lake and the rest of the Fox Chain O' Lakes. The retention time, the time it takes for water entering a lake to flow out again was calculated to be approximately 4.3 days and less so during flood events. The major sources of runoff for Grass Lake were public and private open lands (28%), water (25%), and residential (16%). The impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground. Land management practices of the large amount of residential area in the water shed impacts the lake. Controlling water that runs from the land's surface into the lake is important for drainage lakes.



Grass Lake Watershed



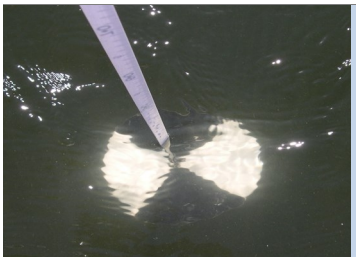
Grass Lake Watershed

The Upper-Fox River (600,046 acres) watershed drains into Grass lake. It also receives water from Lake Marie as well as creeks and storm drains around the lake. The majority of the watershed is located on the north east side of which a majority is agricultural, open space, and residential. The water flows out of Grass Lake at Grass Lake Bridge and into Nippersink Lake which flows into Pistakee Lake and eventually reforming into the Fox River. Public and private open lands and make up the largest source of runoff for Grass Lake followed by water and residential. The retention time was calculated to be approximately 4.3 days, less during flood events.

WATER CLARITY

Turbid waters become warmer as suspended particles absorb heat from sunlight, causing oxygen levels to fall. (Warm water holds less oxygen than cooler water.) Photosynthesis decreases with lesser light, resulting in even lower oxygen levels.

Water clarity is an indicator of water quality related to chemical and physical properties. Measurements taken with a Sechhi disk indicate the light penetration into a body of water. Algae, microscopic animals, water color, eroded soil, and resuspension of bottom sediment are factors that interfere with light penetration and reduce water transparency. If light penetration is reduced significantly, macrophyte growth may be decreased which would in turn impact the organisms dependent upon them for food and cover. The 2014 average clarity for Grass Lake was 0.86 feet (LCHD); this was a 31% decrease in the lakes transparency since 2002 (1.26 feet) and the water clarity was below the county median of 2.95 feet. Heavy rains in June and August the day before the Secchi depth was taken may have contributed to the lower readings. The shallowest Secchi depth for Grass was in June and the deepest was in July at 0.70 feet and 1.83 feet respectively, while the average Secchi was 1.26 feet (VLMP) since 1997.



A Secchi disk is an eight-inch diameter weighted metal plate painted black and white in alternating quadrants. A calibrated rope is used to lower the disc into the water and measure the depth to which it is visible.

VOLUNTEER LAKE MONITOR PROGRAM

Volunteers measure water clarity using the Secchi disk twice a month May through October. In 2014 there were 48 lakes participating in Lake County.

If you would like more information please contact:

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(847) 377-8009

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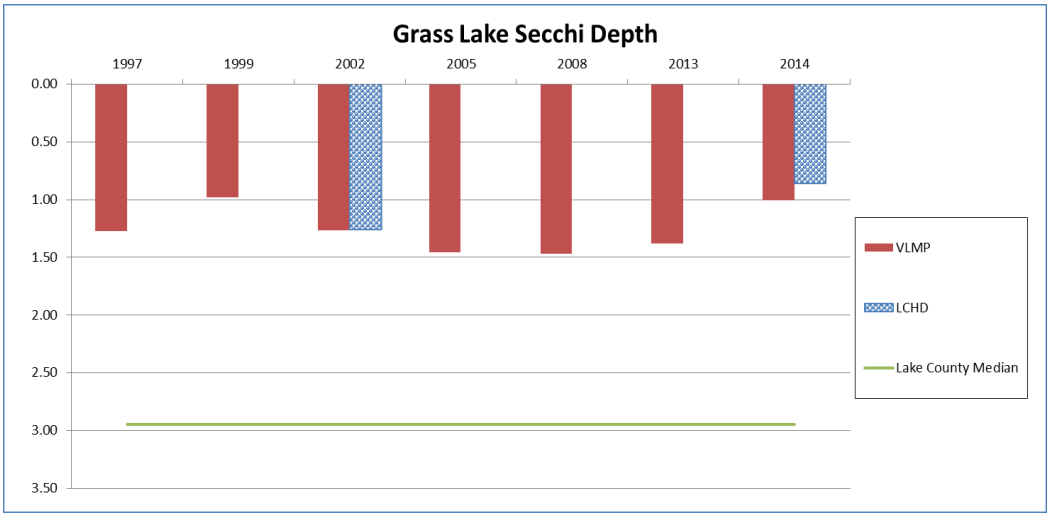
www.epa.state.il.us/water/vlmp/index.html

VLMP —WATER QUALITY

Additional water clarity measurements were taken in Grass Lake through participation in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program (VLMP). Grass Lake has participated in the program since 1997. Participation in the VLMP program has provided Grass Lake with annual baseline data that can be used to determine long term water quality trends and support current lake management decision making. The shallowest average VLMP reading was in 1999 and the deepest was in 2008 at 0.98 feet and 1.47 feet, respectively. The volunteers on Grass Lake have provided data that is vital for the management of this lake. If you would like to participate or need more information about becoming a VLMP please contact the LCHD-ES.

Year	VLMP (ft)
1997	1.27
1999	0.98
2002	1.27
2005	1.46
2008	1.47
2013	1.38
2014	1.00



TOTAL SUSPENDED SOLIDS

Another measure of water clarity is turbidity, which is caused by particles of matter rather than the dissolved organic compounds. Suspended particles dissipate light, which may limit the depth plants can grow. The total suspended solid (TSS) parameter (turbidity) is composed of nonvolatile suspended compounds (NVSS), non-organic clay or sediment materials, and volatile suspended solids (TVS) (algae and other organic matter).

Seasonal Secchi readings changes are affected by algal growth. The absence or low density of algae in early spring usually provides deeper clarity but as the water warms clarity decreases with more algae present in the water. The 2014 TSS concentrations in Grass Lake averaged 38.7 mg/L which was above the county median of 8.2 mg/L and 20.4% lower than the 2002 average concentration of 46.6 mg/L. High TSS values are typically correlated with poor water clarity (Secchi disk depth) and can be detrimental to many aspects of the lake ecosystem including the plant and fish communities.

There are external and internal sources of sediment affecting the turbidity in Grass Lake. External sources include nutrients and sediments that are transported into the lake from the Fox River, bank erosion and other sources in the watershed. About 70,000 cubic yards of sediments enter Grass Lake from the Fox River. This accounts for 72% of all the incoming sediments on the Chain.

Internal sources of sediment resuspension include boat traffic, wind and waves, and high carp population. Carp are one of the most damaging aquatic invasive species due to their spawning and bottom feeding behavior that disrupts shallowly rooted plants causing turbidity to increase. Due to the large amount of recreational boaters in this shallow lake, the resuspension of sediments during the weekend increases. The average calculated nonvolatile suspended solids (NVSS) was 19.95 mg/L. The high NVSS means that the majority of the TSS concentration in 2014 can be attributed to solids that are inorganic in nature.

The Secchi depths in 2014 were at its shallowest in June (0.70 feet) and the deepest was in July (1.83 feet). The June reading corresponded with the highest TSS concentration (57.6 mg/L) and the NVSS was 37.18 mg/L, which means that 55% of the suspended solids in the water is made up of sediments. The month of June also had a 6.93" of rain which contributed a large amount of runoff into the lake. The lake level may not show significant changes since the Stratton Dam regulates the water level of the entire Fox Chain. The water quality samples were taken on Tuesday or Wednesday, which means that the lake's sediments would have had a chance to settle

TSS
Total Suspended Solids

TSS are particles of algae or sediment suspended in the water column.

TVS
Total Volatile Solids

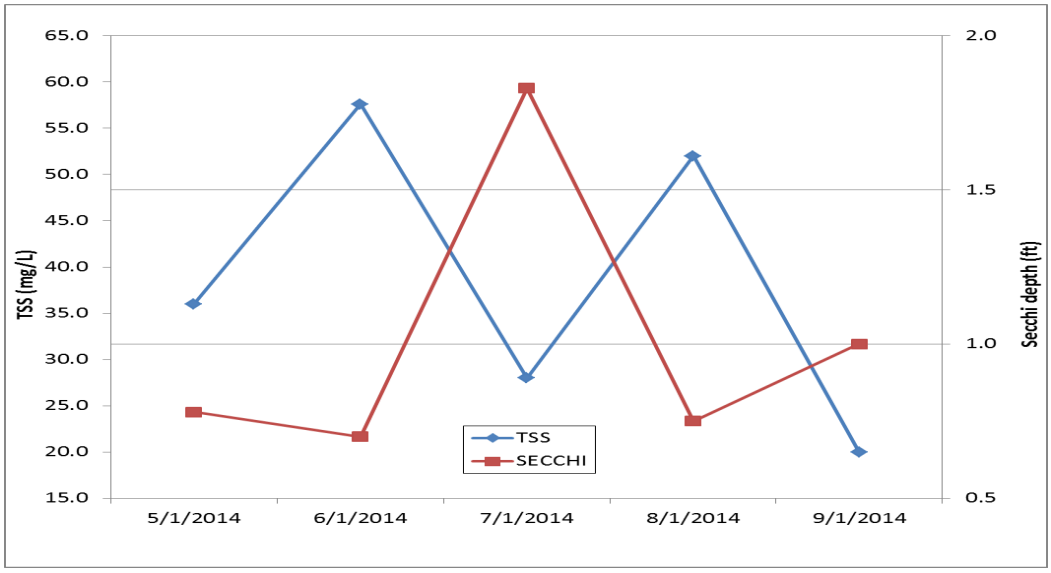
TVS represents the fraction of total solids that are organic in nature, such as algae cells

NVSS
Non-Volatile Suspended Solids

NVSS represents the non-organic clay and sediments that are suspended in the water column.

TDS
Total Dissolved Solids

TDS are the amount of dissolved substance such as salts or minerals in the water after evaporation.



DATE (2014)	TSS (mg/L)	SECCHI (ft)
May	26.0	1.0
June	31.0	0.70
July	21.0	1.40
August	22.0	1.40
September	17.0	1.30

WHAT HAS BEEN DONE TO REDUCE PHOSPHORUS LEVELS IN GRASS LAKE

July 2010- The State of Illinois passed a law to reduce the amount of phosphorus content in dishwashing and laundry detergents.

July 2010- The State of Illinois passed another law restricting the use of lawn fertilizers containing phosphorus by commercial applicators.

Storm drains lead to the nearest lake, river, pond or wetland. They do not go to a treatment plant.

Salts dissolve and move downhill or into the nearest storm drain with storm-water and snowmelt runoff to the nearest lake, river or pond. They do not settle out; they remain in the water cycle virtually forever.

NUTRIENTS

The nutrients organisms need to live or grow are typically taken in from the environment. In a lake the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, including Grass Lake, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warm temperature, and nitrogen.

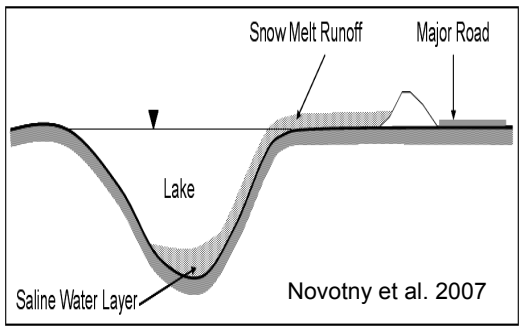
Phosphorus has a direct effect on the amount of plant and algal growth in lakes. The 2014 average total phosphorus epilimnion (near surface sample) concentration in Grass Lake was 0.109 mg/L, this was an 15.5% decrease from the 2002 concentration (0.129 mg/L). Lakes with concentrations exceeding 0.05 mg/L can support high densities of algae and aquatic plants, which can reduce water clarity and dissolved oxygen levels and are considered impaired by the IEPA. Phosphorus originates from a variety of sources, many of which are related to human activities which include: human and animal waste, soil erosion, detergents, septic systems, common carp, and runoff from farmland and lawns.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2014 TKN for Grass Lake was 1.520 mg/L. If inorganic nitrogen concentrations exceed 0.3 mg/L in spring, sufficient nitrogen is available to support summer algae blooms. However, low nitrogen levels do not guarantee less algae blooms. The TN:TP ratio for Grass Lake was 18:1, This means the limiting nutrient for aquatic plants was phosphorus.

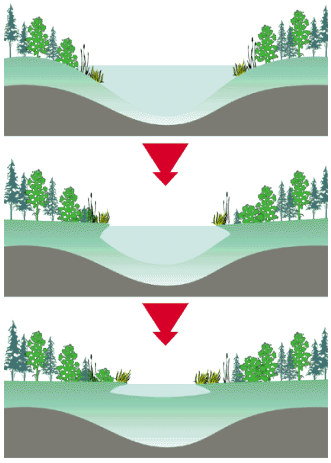
CONDUCTIVITY AND CHLORIDE

Conductivity is a measure of a waters ability to conduct electricity, measured by the water's ionic activity and content. The higher the concentration of (dissolved) ions the higher the conductivity becomes. Conductivity readings, which are influenced by chloride concentrations, have been increasing throughout the past decade in Lake County. Lakes with residential and/or urban land uses in their watershed often have higher conductivity readings and higher Cl^- concentrations because of the use of road salts. Storm water run-off from impervious surfaces such as roads and parking lots can deliver high concentrations of Cl^- to nearby water bodies. Road salt used in the winter road maintenance consists of the following ions: sodium chloride, calcium chloride, potassium chloride, magnesium chloride, or ferrocyanides which are detected when chlorides are analyzed.

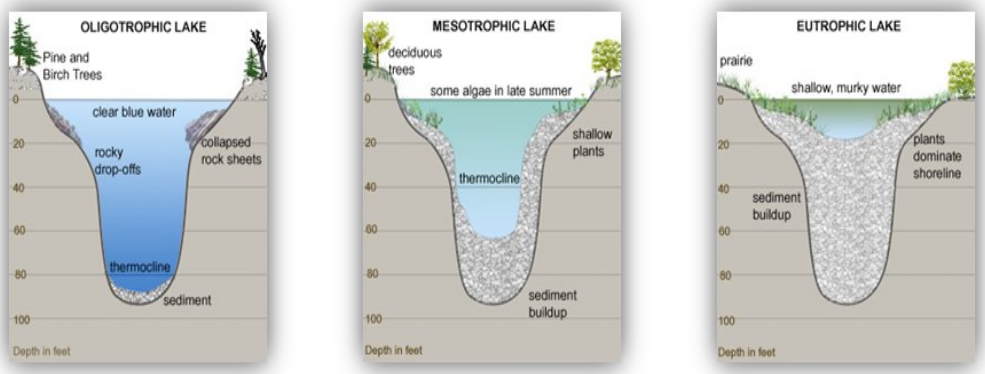
The 2014 average conductivity for Grass Lake 0.8172 mS/cm. This parameter was above the county median of 0.7900 mS/cm and which is a 6.0% increase from the 2002 value of 0.7706 mS/cm. These values are influenced by the winter road maintenance in Wisconsin, Route 173 and the surrounding residential areas. The United States Environmental Protection Agency has determined that chloride concentrations higher than 230 mg/L can disrupt aquatic systems and prolonged exposure can harm 10% of aquatic species. Grass Lake's Cl– concentration was 115 mg/L. Chlorides tend to accumulate within a watershed as these ions do not break down and are not utilized by plants or animals. High chloride concentrations may make it difficult for many of our native species to survive. However, many of our invasive species, such as Eurasian Watermilfoil, Cattail and Common Reed, are tolerant to high chloride concentrations.



TROPHIC STATE INDEX



Another way to look at phosphorus levels and how they affect lake productivity is to use a Trophic State Index (TSI) based on phosphorus (TSIp). TSIp values are commonly used to classify and compare lake productivity levels (trophic state). A lakes response to additional phosphorus is an accelerated rate of eutrophication. Eutrophication is a natural process where lakes become increasingly enriched with nutrients. Lakes start out with clear water and few aquatic plants and over time become more enriched with nutrients and vegetation until the lake becomes a wetland. This process takes thousands of years to take place. However, human activities on a lake or in the watershed accelerate this process by resulting in rapid soil erosion and heavy phosphorus inputs. This accelerated aging process on a lake is referred to as cultural eutrophication. The TSIp index classifies the lake into one of four categories: oligotrophic (nutrient-poor, biologically unproductive), mesotrophic (intermediate nutrient availability and biological productivity), and eutrophic (nutrient rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2014, Grass Lake was hypertrophic with a TSIp Value of 70, placing it 120th out of 173 lakes in the county. Lake Carina was 1st with a TSIp Value at 37.35.



Source: RMB Environmental

"When human activities accelerate lake eutrophication, it is referred to as cultural eutrophication. Cultural eutrophication may result from shoreline erosion, agricultural and urban runoff, wastewater discharges or septic seepage, and other non-point source pollution sources."

LAKE LEVEL

The water level was obtained from the USGS automated staff gauge located in Fox Lake. The lake level was at its lowest in September when the lake was measured at 49.44" which is 6.39" lower than the May level. The lake water level continued to drop from May to September but maintained a summer pool level around 51". Grass Lake has a large watershed that covers 13,844 acres in Illinois and 600,046 in Wisconsin, which helps replenish water lost through evaporation during the summer. There are several automated staff gauges is located in the Fox Chain O' Lakes watershed in Illinois and Wisconsin. The data provides lake managers a much better idea of lake level fluctuations relative to rainfall events and can aid in future decisions regarding lake level. A staff gauge is a great tool for measuring water level in lakes, rivers, reservoirs. Data collected can be compiled to help understand the natural fluctuations of the lake. Large fluctuations in lake level can lead to shoreline erosion.

2014	Level (in)	Seasonal Change	Monthly change (in)
May	55.83		
June	54.07	1.76	1.76
July	50.41	5.42	3.66
August	51.10	4.73	-0.69
September	49.44	6.39	1.66

THE USGS LINK FOR THE LAKE LEVELS ON THE FOX CHAIN O' LAKES CAN BE FOUND AT THE FOX WATERWAY AGENCY'S WEBSITE.

www.foxwaterway.state.il.us/waterlevel.htm

FLORISTIC QUALITY INDEX

LAKE COUNTY AVERAGE FQI = 14.1

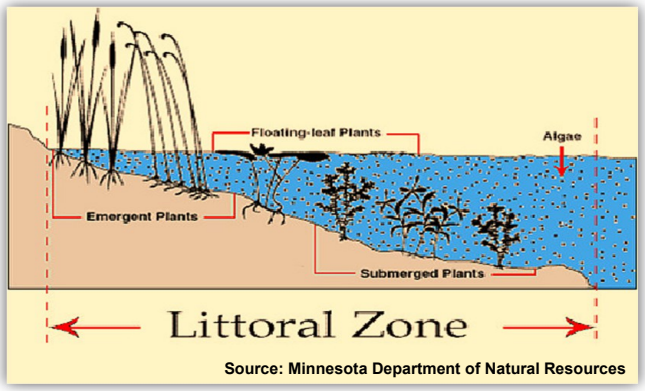
GRASS LAKE FQI = 21.5

RANK = 28 /170

AQUATIC PLANTS SPECIES OBSERVED = 12

Floristic quality index (FQI; Swink and Wilhelm 1994) is an assessment tool designed to evaluate the closeness that the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic trends, and 4) monitor habitat restoration efforts. Each aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. These numbers are averaged and multiplied by the square root of the number of species present to calculate an FQI. A high FQI number indicates that there are a large number of sensitive, high quality plant species present in the lake. Non-native species were counted in the FQI calculations for Lake County lakes. In 2014, Grass had an FQI of 21.5 ranking 28 out of 170 in Lake County. The median FQI of lakes that we have studied from 2000-2014 is 13.4. Cedar Lake is 1st with an FQI of 37.4.

In many lakes macrophytes contribute to the aesthetically pleasing appearance of the setting and are enjoyable in their own right. They are an essential element in the life systems of most lakes.



BATHYMETRIC MAPS PROVIDE LAKE MANAGERS WITH AN ACCURATE LAKE VOLUME THAT CAN BE USED FOR HERBICIDE APPLICATION AND HELP ANGLERS FIND POTENTIAL FISHING SPOTS.

BATHYMETRIC MAPS

Bathymetric maps, also known as depth contour maps, display the shape and depth of a lake. They are valuable tools for lake managers because they provide information about the surface area and volume of the lake at certain depths.

This information can then be used to determine how much of the lake loses dissolved oxygen in the summer, how much of the lake bottom can be inhabited by plants. This is essential in the application of whole-lake herbicide treatments, harvesting activities and alum treatments of your lake. Other common uses for the map include sedimentation control, fish stocking, and habitat management.

The LCHD-ES collects field data using echosounders along with a Trimble GPS unit with sub-foot accuracy. Once collected, the data will be analyzed and imported into ArcGIS for further analysis. In ArcGIS, the contours are drawn and the lake volume is calculated. The Lake County-ES has created bathymetric maps for many of the larger lakes in the county.

The LCHD-ES recommends the creation of a bathymetric map for all lakes larger than six acres and can provide the names of several companies that can be hired to do the work. If you are interested in the creation of a bathymetric map of your lake, please contact the LCHD-ES at (847) 377-8030.

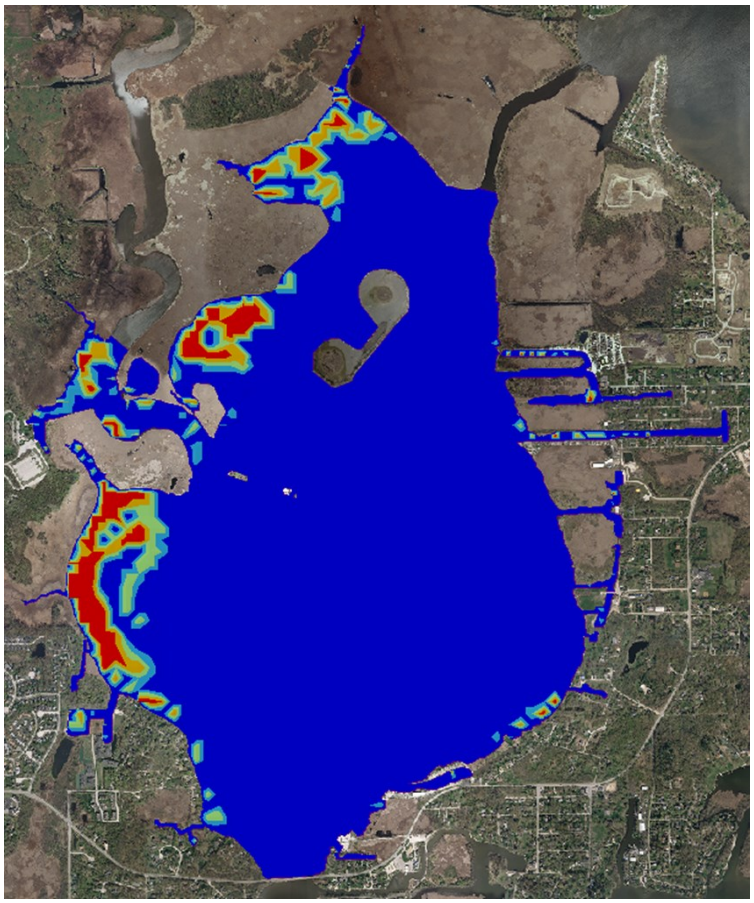
Aquatic Plants

Aquatic plant mapping survey provides information based on the species, density and distribution of plant communities in a particular lake. An aquatic plant sampling was conducted on Grass Lake on September 2014. There were 1850 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 315 of the sites (17% total lake coverage). Lotus was found in 12.5% and Coontail was present at 5.8% of the sampled locations. There were 10 different plants sampled in 2014 (American Pondweed, Bladderworth, Coontail, Duckweed, Elodea, Eurasian Watermilfoil, Floating Leaf Pondweed, Lotus, Giant Duckweed, Sago Pondweed, Water Stargrass, White Water Lily). The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When light level in the water column falls below 1% of the surface light level, plants can no longer grow. The extent of the 1% light can be obtained by doubling the Secchi disk reading. The average Secchi disk reading for 2014 was 0.86 feet. The deepest aquatic plant was lotus and it was found in 4 feet of water. American Lotus once covered 700 acres of Grass Lake in 1939 and there was none recorded in 1959. No wake and no motor areas have been established in 1996 on Grass Lake to help minimize resuspension of sediments caused by boats. In 2012 there was 46 acres of Lotus in Grass Lake, which has increased to 173 acres in 2014. Aquatic plants play an important role in the lakes ecosystem by providing habitat for fish and shelter for aquatic organism. Plants provide oxygen, reduce nutrients such as phosphorus to prevent algae bloom, and help stabilize sediment. Native plant communities tend to be diverse and usually do not impede lake activities such as boating, swimming and fishing. Non-native plants often crowd out native plants by growing earlier in the year or by forming canopies that block sunlight.

Heavy boat traffic on the main part of the lake and wind-wave activity stirs up bottom sediment blocking sunlight need by plants to grow. Vertical seawalls reflect wave energy, which can cause scouring of the lake bottom, preventing aquatic plants from establishing near shore. Re-facing a vertical seawall with stone, or native plants planted in front of the seawall helps absorb wave energy and stabilize lake sediment.

Rake Density (coverage)	# of Sites	% of Sites
No Plants	1535	83
>0-10%	49	3
10-40%	55	3
40-60%	74	4
60-90%	58	3
>90%	81	4
Total Sites with Plants	315	17
Total # of Sites	1850	100

Aquatic plant map for August 2014



LCHD Staff identifying plants during sampling.

PESTICIDE PERMIT REQUIREMENTS FOR PESTICIDE APPLICATION

A National Pesticide Elimination System (NPDES) permit is required when pesticides are applied to, over or near the waters of the State. This permit applies to all public waters that have an outflow to the State waters. A Notice of Intent (NOI) must be filled and submitted electronically to the Illinois Environmental Protection Agency (IEPA) at least 14 days prior to any application of pesticides. In addition to the NPDES, the application of herbicides into waters of the Fox Chain O' Lakes requires a permit by the Illinois Department of Natural Resources (IDNR) per Administrative Code, Part 895. In order to obtain the permit an application needs to be filed with the IDNR requesting a permit for pesticide application, the application can be filled out by the applicant or their representative (which is usually the pesticide consultant).

- When is a NPDES permit needed?

Prior to any pesticide application made directly to, over or near waters of the state.

- Who should obtain NPDES permit coverage?

The individual pond owner who will apply the herbicide. If the pond owner hires a contract applicator either the contract applicator or the pond owner could apply for NPDES coverage.

- How do I apply for NPDES permit coverage?

File a Notice of Intent (NOI) with the IEPA. The form can be printed from the site listed above. Don't forget the 14 day public notice period and the information regarding the approval and notification process listed above, so plan ahead

- What does the permit cost?

Currently there is no fee however fees may be introduced at a later date.

- How long is the permit good for?

Five years from the date of issuance but not from the date of coverage.

- Is anything else needed besides the permit?

An Adverse Incident Report is needed if there are any adverse impacts related to the application such as spills or accidental overdosing. The incident must be reported to the Illinois Emergency Management Agency immediately and the report must follow within 15 days.

A Pesticide Discharge Management Plan (PDMP) is required if the annual threshold of 80 acres is past and if you do not meet any of the additional exemptions within the permit. The threshold is determined not only by the size of the pond or lake but by the number of treatments. For example, if a 10 acre pond is treated 9 times with different herbicides within a one-year period, it would be counted as 90 treatment acres and the 80 acre threshold limit would have been passed. This would trigger the need for a PDMP. If treated with the same herbicide 9 times, the additional treatments would not count toward the threshold.

- Additional things to remember

You are allowed to apply only a pesticide that is labeled for aquatic use. The General NPDES permit only applies to pesticide applications that will be made directly to or over waters of the State or at water's edge. Pesticide applications to dry ditches which discharge into waters of the State may also require General NPDES permit coverage.

You must file an updated NOI to modify your NPDES permit coverage to add additional use patterns or treatment areas at least 14 days prior to beginning the pesticide applications. The General NPDES permit coverage is good for 5 years from the issuance date on the permit.

Excerpt : Illinois Department of Natural Resources

FOR FULL DETAILS OF THE RULE SEE:

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

AND

HTTP:// WWW.FOXWATERWAY.COM/PDFATTACHMENTS/HERBICIDE.PDF

SHORELINE EROSION

Erosion is a natural process primarily caused by water which results in the loss of material from the shoreline. Disturbed shorelines caused by human activity such as clearing of vegetation, beach rocks, and increasing runoff will accelerate erosion. Rain, melting snow and wave action are the main causes of erosion. Rain can loosen soil and wash it down gradient towards the lake. Creating a native plant buffer helps prevent soil erosion as well as filter out pollutants and unwanted nutrients from entering the lake. Native plants can be planted along the shoreline since plant roots hold the soil particles in place so they are not easily washed away during a rain event, melting snow or wave action. Loose rocks and gravel placed on top of a filter fabric prevents soil from washing away before newly planted seed and vegetation has a chance to grow. Eroded materials cause turbidity, sedimentation, nutrients, and pollutants to enter a lake. Shore line buffer zone planted with native vegetation not only reduces runoff by increasing water infiltration into the ground, it also offers food and habitat for wildlife. Less runoff means less nutrients, sediments and other pollutants entering the lakes and streams. Excess nutrients are the primary cause of algal blooms and increased aquatic plant growth. Once in the lake, sediments, nutrients and pollutants are harder and more expensive to remove.

"VEGETATIVE BUFFER ZONES CAN PLAY A KEY ROLE IN LIMITING NEGATIVE WATER QUALITY IMPACTS FROM DEVELOPED SHORELAND PROPERTY"

PLANTS HELP STABILIZE THE SHORELINE FROM BEING WASHED AWAY DURING A RAIN EVENT OR WIND AND WAVE ACTION.

Vertical seawalls reflect wave energy, which can cause scouring of the lakebed, increased turbidity and habitat loss for lake organisms. This can make it difficult for aquatic plants to grow, near the seawall edge. A significant portion of the shoreline in the Fox Chain'O'Lakes is vertical seawall and may contribute to poor plant coverage near shore.

Stone re-facing is adding layers of stone in front of an existing seawall to create a more natural shoreline. The stones help absorb wave energy that would otherwise reflect back and scour the bottom of the lake. This provides excellent habitat for fish, turtles and other aquatic animals. This minimizes the negative effects of an inflexible vertical seawall. Permits maybe required with local and state government agencies prior to repair or alteration of shoreline.

INFORMATION ON SHORELINE REGULATION AND PERMITS CAN BE FOUND ON THE ILLINOIS DEPARTMENT OF NATURAL RESOURCES' WEBSITE.

HTTP://WWW.DNR.ILLINOIS.GOV/WATERRESOURCES/DOCUMENTS/3704.PDF

SWIMMING BEACH MONITORING

All licensed inland beaches are tested bi-weekly from May to September by the Lake County Health Department's Ecological Services Department. The water samples are tested for E. coli bacteria, which are found in the intestines of almost all warm-blooded animals. E. coli is used as an indicator organism, meaning that high concentrations of E. coli might suggest the presence of harmful pathogens such as, Salmonella, Giardia, etc. While not all strains of E. coli are the same, certain strains can make humans ill if ingested in high enough concentrations. If water samples come back high for E. coli (>235 E. coli/100 ml), LCHD informs the management body for the bathing beach that the beach is closed and a sign is posted indicating the beach closure.

There were sixteen licensed beaches sampled on the Fox Chain O' Lakes in 2014. These lakes were divided into the North and South group of lakes. During the summer of 2014, there were three beaches that exceeded 235 E. coli/100 ml. out of the 13 beaches samples. Highland Beach, located on a channel between Spring and Petite Lake, exceeded the limit sixteen times between June13, 2014 and August 1, 2014. There was very little current flowing between the lakes, along with the constant presence of waterfowl observed at the beach. Stanton Bay (Fox Lake) and Vacation Village (Dunns Lake) each had one sample that exceed the maximum allowable limit.

HOW TO PREVENT ILLNESS AND BEACH CLOSURE

- If you are sick, do NOT swim.
- Do NOT drink the water while swimming.
- Avoid swimming during heavy algae blooms.
- Keep pets off the beach.
- Do not feed water fowl in or around the beach area.
- Children who are not toilet trained should wear tight-fitting rubber or plastic pants.
- Take a shower before entering the water, and have kids take frequent bathroom breaks.
- Wash your hands after exiting the lake.
- Identify sources of pollution near the beach (ex: failing septic, stagnant water, creeks and storm drains).

PROTECT YOUR WATERS

- Remove all plants, mud, fish, or animals before transporting equipment.
- Eliminate all water from equipment before transporting equipment.
- Dry anything that comes in contact with water (boat, trailers, equipment, clothing, etc.).
- Remove all mud and dirt since it might contain aquatic hitchhikers.
- Never release plants, fish or animals into a body of water unless they came out of that body of water.
- Do not release bait into the waters you are fishing.
- Do not release aquarium fish or aquatic pets in to the lake.

LakeCounty
Health Department and
Community Health Center

ECOLOGICAL SERVICES

Senior Biologist: Mike Adam

madam@lakecountyil.gov

Population Health Services
500 W. Winchester Road

Phone: 847-377-8030
Fax: 847-984-5622

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.

Ecological 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.

LAKE RECOMMENDATIONS

Grass Lake's water quality had improved since 2002 with decrease in total phosphorus (TP) and conductivity. There was also an increase in the lotus beds since 2012. However, the total suspended solids (TSS) increased causing the water clarity to decrease. Grass Lake management is administered by the Illinois DNR and the Fox Waterway Agency.

To improve the overall quality of Grass Lake, ES (Ecological Services) has the following recommendations:

- **Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips**
- **Stone re-facing of vertical seawalls**
- **Create an aquatic plant management program that would restore plant diversity and density**
- **Participation in the Volunteer Lake Monitoring Program**
- **Participate in the Clean Waters Clean Boats Program**
- **Help reduce Cl^- by supporting wise use of road salt in the watershed**
- **Maintain septic system and pump out septic tanks at least once a year**
- **Observe No Wake / No Motor Areas**