LAKE COUNTY, ILLINOIS

2011 GAGES LAKE SUMMARY REPORT

PREPARED BY THE
LAKE COUNTY HEALTH DEPARTMENT
Population Health Environmental Services

Cambridge at Waters Edge, Gages Lake

Gages Lake, located in Warren Township, is a glacial lake, created over 10,000 years ago by receding glaciers. The lake has a surface area of 143.4 acres and mean and maximum depths of 6.7 feet and 54 feet, respectively. It is located entirely in unincorporated Lake County and is predominantly managed by the Gages Lake Conservation Committee (GLCC) and the Wildwood Park District. It is used by residents for swimming, boating and fishing. There are a small number of beaches, parks and boat launches on the lake. Water quality parameters, such as nutrients, suspended solids, oxygen, temperature, and water clarity were measured and the plant community was assessed each month from May-September 2011. Many water quality parameters have improved since the 2003 lake study. Total phosphorus in Gages Lake averaged 0.020 mg/L which is a 41% decrease from the 2006 concentration of 0.034 mg/L and significantly below 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 concentration for Gages Lake was 0.97 mg/L, which

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LAKE FACTS

Major Watershed:
Des Plaines
Sub-Watershed:
Mill Creek
Surface Area:
142.96 acres
Shoreline Length:
3.71 miles
Maximum Depth:
53.6 feet
Average Depth:
6.7 feet
Lake Volume:
958.7 acre-feet
Watershed Area:
521.74 acres
Lake Type:
Glacial
Management Entity:
Gages Lake Conservation Committee (GLCC) and the Wildwood Park District
Current Uses:
swimming, fishing, gas powered boating

Picture Source:

- Wild Wood Park District
- Grayslake Heritage Center & Museum

LAKE SUMMARY (CONTINUED)

was below the 2011 county median of 1.18 mg/L and lower than the 2006 concentration by 17% (1.17 mg/L). A total nitrogen to total phosphorus (TN:TP) ratio of 52:1 strongly indicates phosphorus was the nutrient limiting aquatic plant and algae growth in Gages Lake. Also using phosphorus as an indicator, the trophic state index (TSIp) ranked Gages Lake as mesotrophic with a TSIp value of 47.2.

The 2011 average total suspended solids (TSS) concentration for Gages Lake was 4.8 mg/L, which was less than the county median and down from the 2006 average of 7.0 mg/L. Water clarity was measured by Secchi depth, with the lowest reading in August (3.00 feet) corresponding to the highest TSS concentration (9.4 mg/L). The average Secchi depth for the season was 5.45 feet, which was also higher than the county median (2.95 feet).

Conductivity concentrations, are correlated with chloride concentrations, the average conductivity reading for Gages Lake in 2011 was 1.0223 mS/cm, which was above the county median (0.7821 mS/cm). This was a 24% decrease from the 2006 average (1.3440 mg/L). The chloride concentration in Gages Lake in 2011 was 246 mg/L which was significantly above the county median of 145 mg/L.

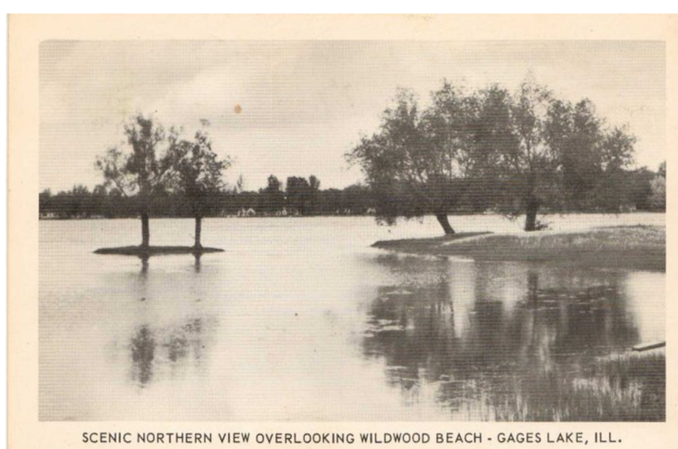
Aquatic plant sampling was conducted on Gages Lake in July. Seven species of submerged aquatic plants and one macro-algae were present covering 73% of the lake bottom. Similar to 2006 Eurasian Watermilfoil was the dominant species with plants present at 39% of the sites. Curlyleaf Pondweed was also found in the lake. Eurasian Watermilfoil and Curlyleaf Pondweed are invasive, exotic species that tend to crowd out native species.

The shoreline of Gages Lake was assessed in 2011 for erosion. Approximately 31% of the shoreline had some degree of erosion. Overall, 69% of the shoreline had no erosion, 10% had slight erosion, 10% had moderate, and 11% had severe erosion.

HISTORY

Gages Lake is of glacial origin, created approximately 10,000 years ago during the last ice age. The area around the lake was settled in the 1840's. The north shore was settled by John and George Gage. The south shore area was owned by the Richard W. Sears and Allen families. In the early 1900's, the lake attracted visitors as a very popular resort destination. By the 1930's, many cottages were built around the lake. In the 1940's, the Sears land was subdivided and developed into what would later become the community of Wildwood. The Gages Lake Conservation Committee (GLCC) was formed in the 1970's, and management activities on the lake began at that time. The committee still exists today. Large-scale management activities of the lake are controlled by the GLCC and the Wildwood Park District.

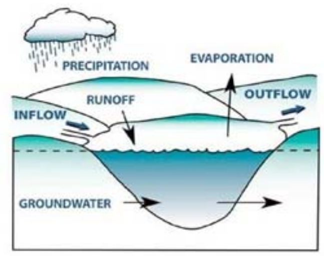
THE LAGOON - GAGES LAKE - GRAYSLAKE, ILLINOIS 90704



SCENIC NORTHERN VIEW OVERLOOKING WILDWOOD BEACH - GAGES LAKE, ILL.

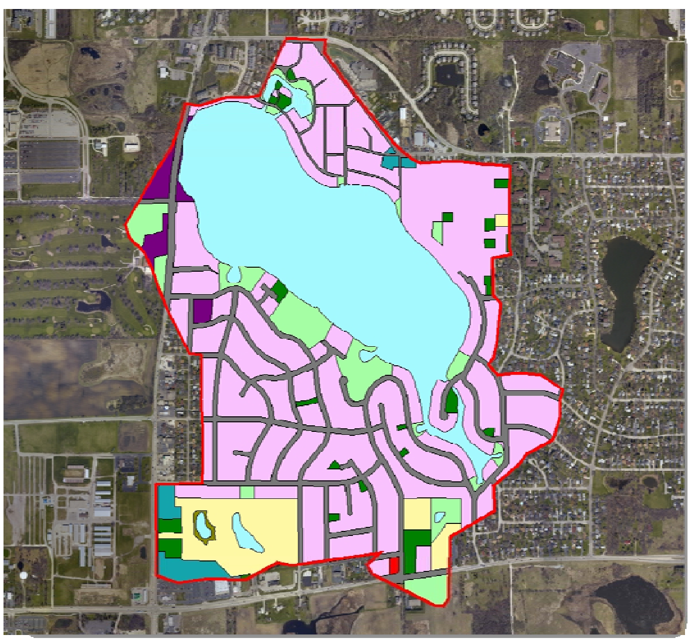
Watershed

The source of a lake's water supply is very important in determining its water quality and choosing management practices to protect the lake. A watershed is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream. The watershed of Gages Lake encompasses approximately 521.74 acres, draining large residential areas to the south and north of the lake. The size of the watershed feeding the lake relative to the lakes size is also an important factor in determining the amount of pollutants in the lake. The watershed to lake surface area ratio of 3:1 is very small. This is positive in that it may help prevent serious water quality problems that often accompany a larger watershed to lake ratios. The outlet of Gages Lake is located on the northwest side of the lake. The Drain flows north and enters Mill Creek near Third Lake, eventually draining into the Des Plaines River. Retention time, the amount of time it takes for water entering a lake to flow out of it again, was calculated to be approximately 2.38 years. Based on the 2011 data, the current external sources affecting Gages Lake were from the following land uses: single family homes (43%),and transportation (12%). Based on the amount of impervious surfaces each land use contributes varied amounts of runoff. Because impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground, more runoff is generated than in the undeveloped condition. The major sources of runoff for Gages Lake were single family homes (45%), and transportation (37%). The lack of wetland, forest, and grassland areas around the lake increases pollution as runoff and nutrients don't have a chance to be absorbed before entering the lake. Controlling water that runs from the land's surface into the lake is important for drainage lakes.



DRAINAGE LAKE

A LAKE FED BY STREAMS, GROUNDWATER, PRECIPITATION AND RUNOFF AND DRAINED BY A STREAM



2011 LAND USE IN THE GAGES LAKE WATERSHED

Land Use	Acreage	Runoff Coeff.	Estimated Runoff, acft.	% Total of Estimated Runoff
Agricultural	0.12	0.05	0.0	0.0%
Forest and Grassland	11.70	0.05	1.6	0.4%
Government and Institutional	7.69	0.50	10.6	2.6%
Multi Family	30.15	0.30	24.9	6.2%
Public and Private Open Space	32.28	0.15	13.3	3.3%
Retail/Commercial	8.11	0.85	18.9	4.7%
Single Family	221.48	0.30	182.7	45.4%
Transportation	64.04	0.85	149.7	37.2%
Utility and Waste Facilities	0.52	0.30	0.4	0.1%
Water	144.75	0.00	0.0	0.0%
Wetlands	0.90	0.05	0.1	0.0%
TOTAL	**521.74**		**402.3**	**100.0%**

VOLUNTEER LAKE MONITORING PROGRAM (VLMP)

The VLMP was established in 1981 to gather information on Illinois inland lakes, and to provide an educational program for citizens. The primary measurement by volunteers is the Secchi depth (water clarity). Other observations such as water color, suspended algae and sediment, aquatic plants and odor are also recorded. The sampling season is May through October with measurements taken twice a month. In 2011, there were **42 lakes** that participated in Lake County.

For more information visit: www.epa.state.il.us/water/vlmp/index.html

WATER CLARITY

Water clarity is an indicator of water quality related to chemical and physical properties.

Measurements taken with a Secchi disk indicate the light penetration into a body of water.

Algae, microscopic animals, water color, eroded soil, and resuspended bottom sediment are factors that interfere with light penetration and reduce water transparency.

The 2011 average water clarity in Gages Lake was 4.60 feet; this was a 26% increase in the lake's transparency since 2003 (4.06 feet) and the water clarity was above the county median of 2.95.

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.

WATER CLARITY-VOLUNTEER LAKE MONITOR PROGRAM

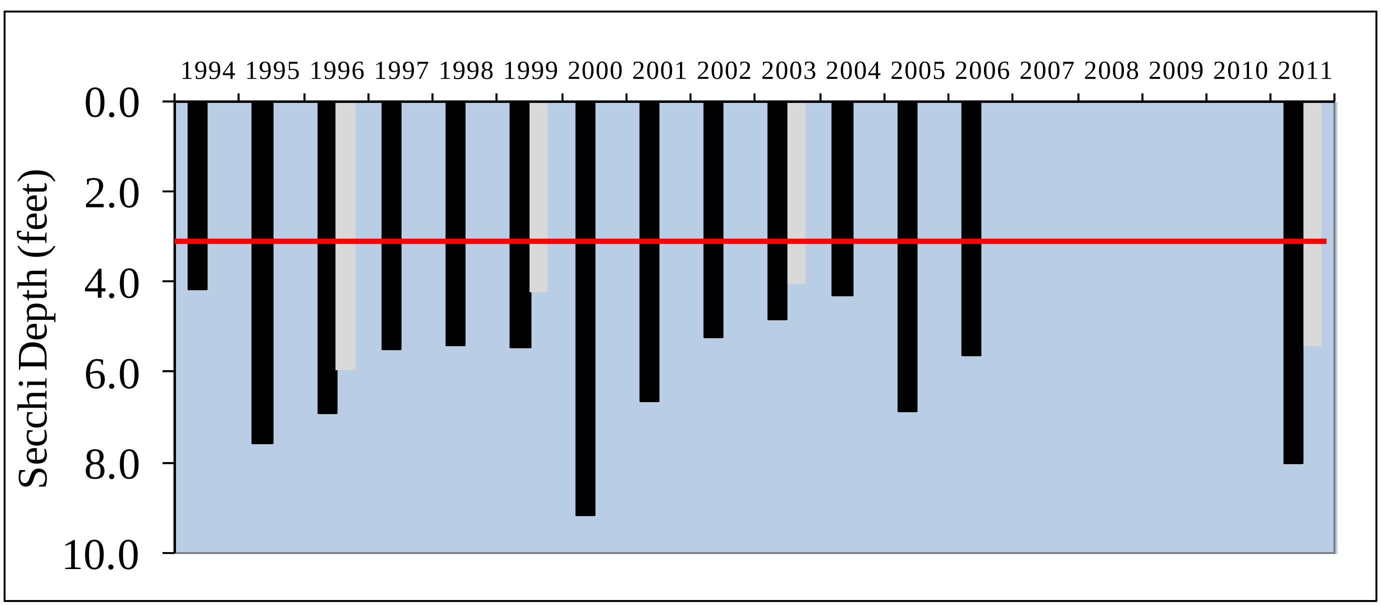
Additional water clarity measurements were taken in Gages Lake through participation in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program (VLMP). Gages Lake residents Matt Brueck and family participated in the program in 2011 and will continue to monitor in 2012. Gages Lake also had historical VLMP data from 1994 and 2003. Participation in the VLMP program has provided Gages Lake with baseline data that can be used to determine long-term water quality trends and support current lake management decision making. The average VLMP Secchi disk depth from 2011 was 8.00 feet. Monthly VLMP readings have varied from 3.00 feet in August 2002 to 14.00 feet in May 2000. The volunteers on Gages Lake have provided data that is vital for the continued monitoring and management of this lake. The LCHD-ES would like to thank them for their efforts and recommend continued involvement in the future.

SECCHI DISK AVERAGES FROM VLMP AND LCHD RECORDS FOR GAGES LAKE 1994—2011.

VLMP

LCHD

LAKE COUNTY 2011 MEDIAN 2.95 FEET



TOTAL SUSPENDED SOLIDS

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

2011 TSS concentrations averaged 4.8 mg/L which was below the county median of 8.6 mg/L and a 31% reduction in the 2006 average concentration of 7.0 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.

Calculated nonvolatile suspended solids (NVSS) was 2.4 mg/L. This means that 50% of the TSS concentration in 2011 can be attributed to organic particles, such as algae and 50% can be attributed to non-organic particles such as sediment. Turbidity caused by algae and sediment reduced the water clarity in Gages Lake. The highest TSS concentration occurred in August this corresponded with the lowest Secchi depth of the sampling season of 3.0 feet.

Algae blooms were documented throughout the season in 2011. These were mostly noted as being planktonic, algae that float or drift, in nature. However in July 2010 a filamentous, algae that form mats, occurred primarily composed of Mougeotia sp. This species is non toxic and forms loosely dense mats in shallow areas.

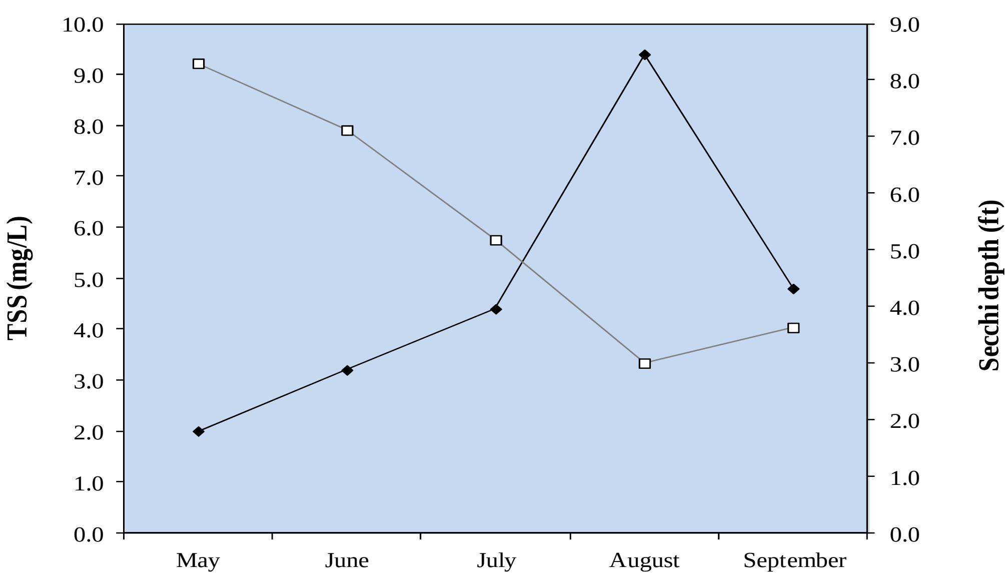
DATE	TSS	SECCHI
May	2.0	8.30
June	3.2	7.12
July	4.4	5.18
August	9.4	3.00
September	4.8	3.63

Monthly Total Suspended Solid Concentrations and Secchi Depth in Gages Lake,

***2011 Lake County median TSS = 8.6 mg/L**

Mougeotia *Sp.*

Green Filamentous Algae Bloom Gages Lake 2010



Monthly Total Suspended Solid Concentrations and Secchi Depth in Gages Lake, 2011.

TSS (mg/L)

Secchi Depth (feet)

WHAT HAS BEEN DONE TO REDUCE PHOSPHORUS LEVELS IN ILLINOIS

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.

YEAR	TP
2011	0.020
2003	0.034
1999	0.022

Phosphorus Concentrations for Gages Lake 1999-2011

WHAT YOU CAN DO TO HELP LOWER PHOSPHORUS LEVELS IN WATERFORD LAKE

*Do not throw leaves, grass clippings, pet waste, other organic debris into the street or driveway. Runoff carries these through storm sewers, directly to Waterford Lake

*Build a rain garden to filter run-off from roofs, driveways, streets. This allows the phosphorus to be bound to the soil so it does not reach surface waters.

*Sweep up fertilizer that is spilled or inadvertently applied to hard surface areas, do not hose it away.

NUTRIENTS

Organisms take nutrients in from their environment. In a lake, the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warmth, and nitrogen. In Gages Lake, the limiting nutrient was phosphorus, phosphorus has a direct effect on how much aquatic plants and algae can grow in lakes

The 2011 average total phosphorus concentration in Gages Lake was 0.020 mg/L this was a 41% reduction from the 2003 concentration (0.034 mg/L) and below the 2011 county median of 0.066 mg/L. Lakes with concentrations exceeding 0.050 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 (TKN) is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2011 TKN for Gages Lake was 0.97 mg/L, which was also lower than the county median of 1.18 mg/L.

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. However, human activities that supply lakes with additional phosphorus that drives eutrophication is speeding up this process significantly. The TSIp index classifies the lake into one of four categories: oligotrophic (nutrient-poor, biologically unproductive), mesotrophic (intermediate nutrient availability and biological productivity), eutrophic (nutrient-rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2011, Gages Lake was mesotrophic with a TSIp value of 47.2. Based on the TSIp, Gages Lake ranked 10th out of 171 lakes studied by the LCHD-ES from 2000-2011. Since 2003 Gages Lake has increased its ranking by 29 positions.

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

MESOTROPHIC:

Lakes lie between the oligotrophic and eutrophic stages. Devoid of oxygen in late summer, their hypolimnions 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.

NEW PERMIT REQUIREMENTS FOR APPLYING PESTICIDES IN WATERS

New regulations are now in effect that will significantly affect how pesticides are used in Illinois waters. A National Pollutant Discharge Elimination System (NPDES) permit will now be required to apply any type of pesticides over or into waters of the State. In Illinois, the permitting process will be administrated through the Illinois Environmental Protection Agency (IEPA).

Who has to get a permit? According to the language in the permit, anyone who qualifies as an "operator", which is defined as: "any person, persons, group, or entity in control over the financing for, or over the decision to perform pest control activities, or applying pesticides that will result in a discharge to waters of the State". Homeowner associations or even individuals may need to get a permit. Regardless of the size of treatment, a permit will be needed. If the treatment area or total annual area exceeds certain thresholds then additional requirements will be required such as a Pesticide Discharge Management Plan and an annual report. The thresholds vary depending on type of treatment. For weed and algae control, the threshold is 80 acres of treatment or 80 linear miles along the water's edge. The threshold is an annual total, so for example, algaecides applied to five acres four times during the year, would meet this 80 acre threshold requirement.

Anyone or any group planning to treat their pond or lake with pesticide this year should take into account these new requirements.

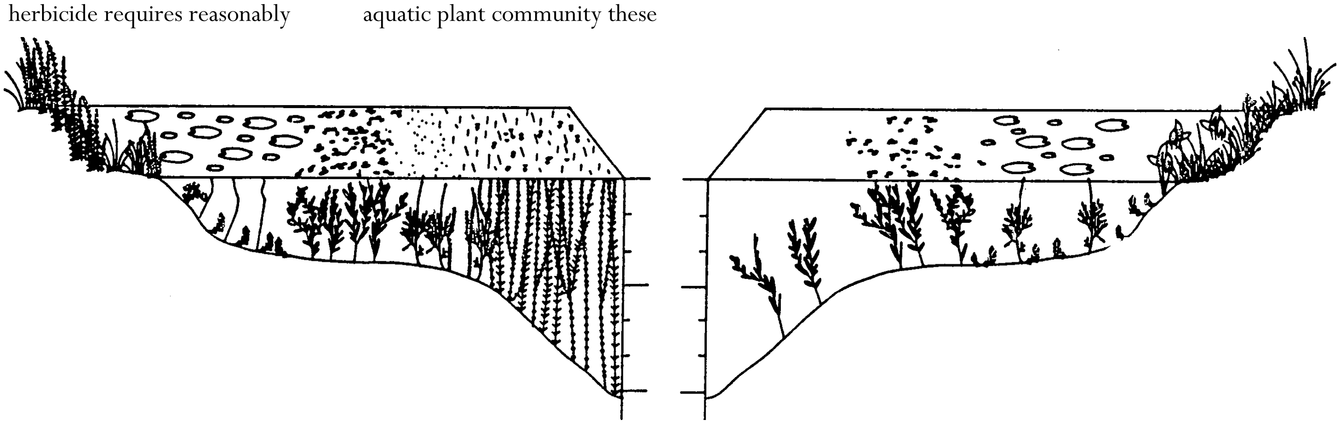
FOR FULL DETAILS OF THE RULE SEE:

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

AQUATIC HERBICIDES-ENDOTHALL AND 2, 4-D

In 2011 Clarke Aquatic Services was contracted through the Gages Lake Conservation Committee to reduce Curlyleaf Pondweed and Eurasian Watermilfoil populations. A total of 23.22 acres were treated with two herbicides Aquathol K™ and 2, 4D. Aquathol K™ is a herbicide produced from endothall salts, this potassium salt formulation does not adversely affect fish populations when applied correctly. Aquathol K™ is a contact herbicide that causes localized injury to plant tissue where contact occurs. While this herbicide requires reasonably good distribution to be effective it is also subject to rapid microbial breakdown persisting in the water for about 15 to 16 days. This herbicide is used to reduce the populations of a broad range of aquatic leafy plants. Treatments specifically targeted the exotic aquatic plants Eurasian Watermilfoil and Curlyleaf Pondweed. This product should to be applied while the exotics are actively growing and before our native plants emerge. Sago Pondweed and Coontail are plants in Gages Lake that are also sensitive to Aquathol K™. For a healthy aquatic plant community these populations need to expand, so special care in the timing of the applications should be considered. Another herbicide used in 2011 was 2, 4D a relatively fast-acting, systemic, selective herbicide used for the control of Eurasian Watermilfoil and other broad-leaved species. Both the granular and liquid formulations can be effective for spot treatment of Eurasian Watermilfoil. 2,4-D has been shown to be selective to Eurasian Watermilfoil when used at the labeled rate, leaving native aquatic species relatively unaffected.

A KEY TO A HEALTHY LAKE IS A WELL-BALANCED AQUATIC PLANT POPULATION



TIPS

1. De-icers melt snow and ice. They provide no traction on top of snow and ice.
2. Anti-icing prevents the bond from forming between pavement and ice.
3. De-icing works best if you plow/shovel before applying material.
4. Pick the right material for the pavement temperatures.
5. Sand only works on top of snow as traction. It provides no melting.
6. Anti-icing chemicals must be applied prior to snow fall.

THE CRITICAL VALUE FOR CHLORIDES IN AQUATIC SYSTEMS IS 230 MG/L.

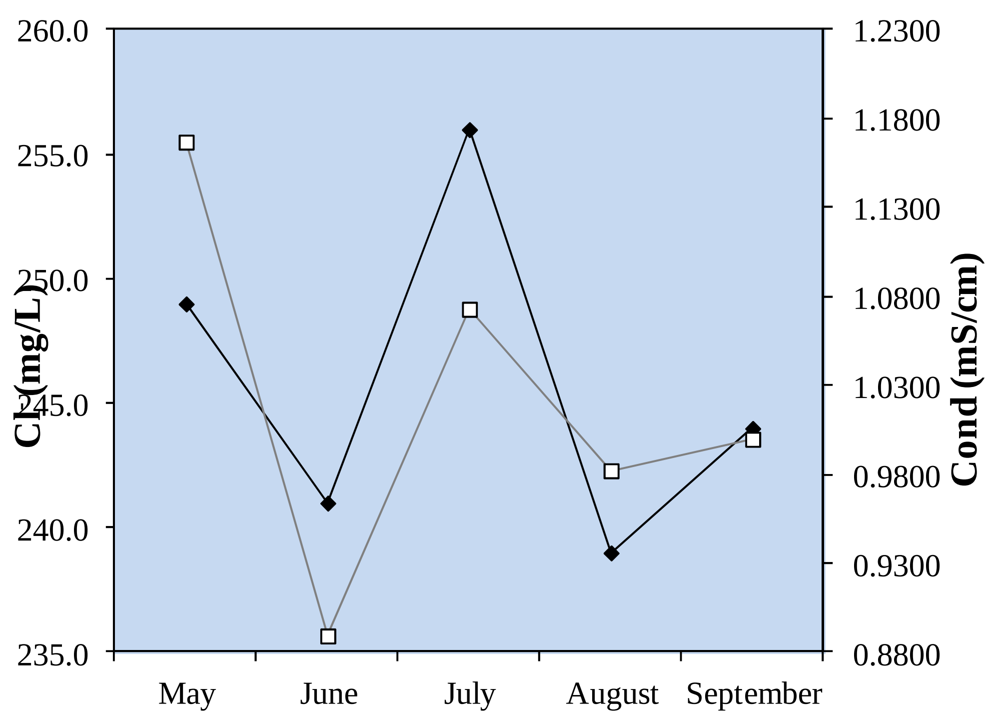
230 mg/L = 1 teaspoon of salt added to 5 gallons of water.

DATE	COND	Cl^-
May	1.1670	249
June	0.8893	241
July	1.0730	256
August	0.9822	239
September	0.9999	244

Monthly Chloride Concentrations (CL-) and Conductiviy for Gages Lake, 2011.

Conductivity and Chloride

Another parameter measured during 2011 that is important in comparing data from year to year is conductivity. Conductivity is the measure of different chemical ions in solution. As the concentration of these ions increases, conductivity increases. The conductivity of a lake is dependent on the lake and watershed geology, the size of the watershed flowing into the lake, the land uses within that watershed, and evaporation and bacterial activity. Conductivity has been shown to be highly correlated (in urban areas) with chloride ions found in road salt mixtures. Water bodies most subject to the impacts of road salts are streams, wetlands or lakes draining major roadways. In 2011, Gages Lake average conductivity was 1.0223 mS/cm. This parameter was above the county median of 0.7821 mS/cm and 24% decrease from the 2003 value 1.3440 mS/cm. Conductivity concentrations in the lake were highest in May and the largest decrease in concentration occurred in June following 6.23 inches of rain indicating that over the sampling season a flushing effect occurred. One of the most common dissolved solids is road salt used in winter road deicing. Most road salt is sodium chloride, calcium chloride, potassium chloride, magnesium chloride or ferrocyanide salts. Gages Lake 2011 average chloride concentration was 246 mg/L. Conductivity and Chloride concentrations were the only parameters in 2011 that exceeded county medians. These values are influenced by the winter road maintenance of highway 45. 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. 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.



Average Conductivity (mS/cm) and Chloride Concentrations in Gages Lake May through September, 2011.

CHLORIDES: WHAT HAS BEEN DONE TO REDUCE CHLORIDE LEVELS IN GAGES LAKE

Village of Grays Lake Public Works:

Uses an environmentally friendly alternative to salt a liquid by-product consisting of salt brine mix (70%), beet juice (20%) (beet by-product) and calcium chloride (10%). This product will be mixed with the salt on the trucks to create an oatmeal like substance, and then applied to the streets.

This liquid has several advantages:

1. Beet juice adds moisture to help salt work better.
2. Lowers the working temperature of salt to below zero.
3. Creates a composition that sticks to the pavement versus dry salt that can bounce off of the pavement.
4. Reduces salt use by 20%.
5. Environmentally friendly product.

Lake County Division of Transportation:

Is enhancing efficiency of snow removal, and going green through innovation and technology. Global positioning systems (GPS) on snow plows are providing real-time tracking of these vehicles, as well as the application of salt and de-ice materials. The data is then used to better coordinate and target services, saving on salt

Effectiveness of Salt as a Deicing Agent Based on Pavement Temperature °F

Pavement Temp. °F	One Pound of Salt (NaCL) melts	Melt Times
30°	46.3 lbs of ice	5 min.
25°	14.4 lbs of ice	10 min.
20°	8.6 lbs of ice	20 min
15°	6.3 lbs of ice	1 hour
10°	4.9 lbs of ice	Dry salt is ineffective and will blow away before it melts the ice

SWIMMING BEACH MONITORING

There are three state licensed swimming beaches on Gages Lake: Cambridge at Waters Edge, Pebble Beach, and Willow Park. They were sampled for the bacteria Eschericia coli (E. coli) levels every two weeks, from mid May to the end of August, by the LCHD-ES in 2011. The water samples are tested for E. coli bacteria, which are found in the intestines of warm-blooded animals. While not all strains of E. coli are the same, certain strains can make humans sick if ingested in high enough concentrations. If water samples come back high for E. coli (>235 E. coli/100 ml), the management body for the bathing beach is notified and a sign is posted indicating the swim ban. E. coli is used as an indicator organism, meaning that high concentrations of E. coli might suggest the presence of harmful pathogens such as, Salemnella, Giardia, etc.

There are many ways E.coli can end up in a swimming beach. Heavy rainfall and strong wind associated with storms can cause the water to become cloudy with sediment from the lake bottom. Stormwater from rain can also wash in other particles from lawns, streets, and buildings. This sediment and stormwater may contain high concentrations of E. coli. Another source of E. coli contamination is the feces of gulls, geese, and other wildlife.

From 2007 through 2011 at Pebble beach the most seven bacteria related swim bans occurred in 2007 while there was no recorded closures from 2004-2006, 2009, and 2011. Cambridge at Waters Edge also did not have a closure in 2011, while Willow Park had one.

TIPS

Practicing common sense and good hygiene will go a long way in preventing illness from swimming beaches.

- If you are sick, do NOT swim.
- Do NOT drink the water while swimming.
- Avoid swimming during heavy algae blooms.
- Keep geese off the beach.
- 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.

Kerry McCaughey LCHD Lab staff uses black light technology to report E. coli

SWIM BANS ON GAGES LAKE LICENSED BEACHES FROM 2004 - 2011.

Beach	2011	2010	2009	2008	2007	2006	2005	2004
Cambridge at Waters Edge	0	0	NA	NA	NA	NA	NA	NA
Pebble Beach	0	3	0	5	7	0	0	0
Willow Park	1	NA	NA	NA	NA	NA	NA	NA

AQUATIC PLANT SAMPLING

SKUNKWEED, MUSKGRASS
CHARA SPP.
IS NATIVE AND COMMON IN LAKE COUNTY AND ILLINOIS.

Although these common lake inhabitants look similar to many underwater plants, there are actually ALGAE!

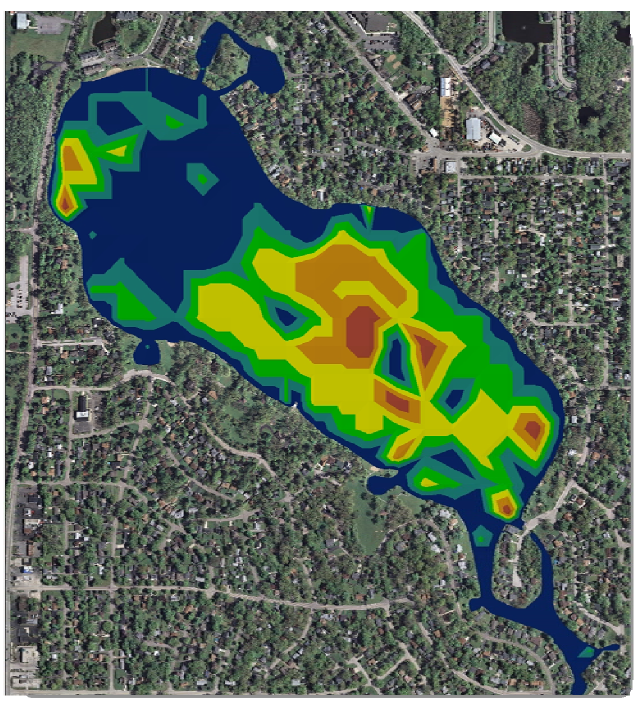
Plants growing in our lakes, ponds, and streams are called macrophytes. These aquatic plants appear in many shapes and sizes. Some have leaves that float on the water surface, while others grow completely underwater. In moderation, aquatic plants are aesthetically pleasing and desirable environmentally. Their presence is natural and normal in lakes.

Aquatic plant sampling was conducted on Gages Lake in July 2011. There were 160 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 116 of the sites (73 % total lake coverage) that included 8 aquatic plant species, including two exotic invasive species: Curlyleaf Pondweed and Eurasian Watermilfoil and one macro-algae, Chara. There was an increase in species diversity from 2003 with the addition of Coontail, Elodea, and Sago Pondweed to the aquatic plant community. In 2011 the most common species was Eurasian Watermilfoil and Chara at39% and 38% of the sampled sites, respectively while Curlyleaf Pondweed (19%) and Sago Pondweed (13%) were the next most abundant species. The overall aquatic plant density has changed significantly since 2003. This is mostly contributed to the significant increase in the Chara population. In 2003 Eurasian Watermilfoil was found at 25% of the sites sampled in June. The 2011 Chara population has significantly expanded from the 2003, when lake occurrence was 7%. Chara often has a "grainy" or "crunchy" texture and is often called Skunkweed or Muskgrass because of it foul, musty almost garlic odor. Chara will not extend above the water's surface and provides protection for invertebrates and young fish, and is a food source for waterfowl.

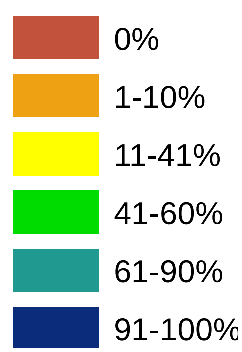
The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When the light level in the water column falls below 1% of the surface light level, plants can no longer grow. The 1% light level in Gages Lake ranged from 12-22ft. during the sampling season. Plants were found at a maximum depth of 10.0 feet. A healthy aquatic plant population is critical to good lake health. Aquatic vegetation provides important wildlife habitat and food sources. Additionally, aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available resources.

AQUATIC PLANT DENSITY AT 160 SITES ON GAGES LAKE JULY, 2011 , MAXIMUM DEPTH THAT PLANTS WERE FOUND WAS 10.0 FEET.

Rake Density (coverage)	# of Sites	% of Sites
No Plants	30	18.8
>0-10%	27	16.9
10-40%	34	21.3
40-60%	35	21.9
60-90%	13	8.1
>90%	7	4.4
Total Sites with Plants	116	72.5
Total # of Sites	160	100.0



DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLES SITES JULY, 2011

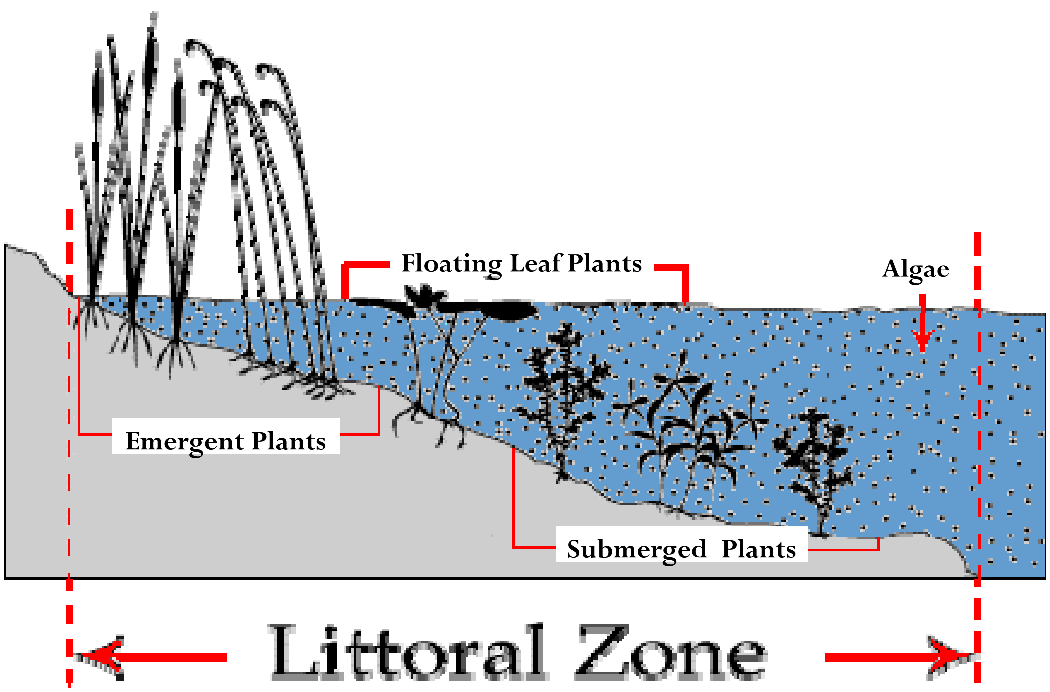


FLORISTIC QUALITY INDEX

Floristic quality index (FQI) is an assessment tool designed to evaluate the closeness 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. An FQI is calculated by multiplying the average of these numbers by the square root of the number of these plant species found in the lake. A high FQI number indicates that a large number of sensitive, high quality plant species present in the lake. Non-native species were also included in the FQI calculations for Lake County lakes. The median FQI for Lake County lakes from 2000-2011 was 14.3. Gages Lake had an FQI of 12.5 ranking 97st out of 158.

Lake County Average

FQI = 14.3



Source: Minnesota Department of Natural Resources

AQUATIC PLANTS: WHERE DO THEY GROW?

Littoral Zone– the area that aquatic plants grow in a lake.

Algae– have no true roots, stems, or leaves and range in size from tiny, one-celled organisms to large, multicelled plant-like organisms.

Submerged Plants– have stems and leaves that grow entirely underwater, although some may also have floating leaves.

Floating-leaf Plants– are often rooted in the lake bottom, but their leaves and flowers flat on the water surface.

Emergent Plants– are rooted in the lake bottom, but their leaves and stems extend out of the water.

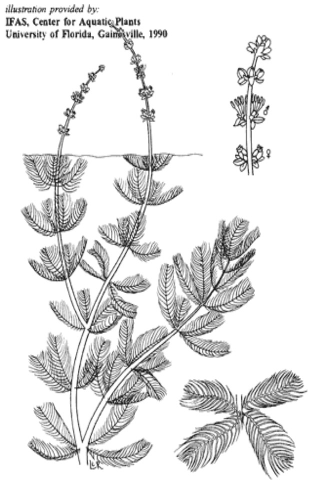
IN MANY LAKES MACROPHYTES CONTRIBUTE TO THE AESTHETICALLY PLEASING APPEARANCE OF THE SETTING AND ARE ENJOYABLE IN THEIR OWN RIGHT. BUT EVEN MORE IMPORTANT, THEY ARE AN ESSENTIAL ELEMENT IN THE LIFE SYSTEMS OF MOST LAKES.

- Macrophyte leaves and stems provide a habitat or home for small attached plants and animals. Some are microscopic in size and some are larger. These attached organisms are valuable as food for animals higher in the food chain, such as fish and birds.
- Many types of small organisms live in the sediment. There are insects that spend the immature stages of life in the sediments, leaving when they become adults. Decomposing plant life provides part of the food supply for these sediment-dwelling organisms and the emerging insects, in turn, are food for fish.
- The submerged portions of macrophytes provide shelter and cover for small or young fish from larger fish that would feed on them.
- Types of plants that extend above the water can provide cover for waterfowl and their young, and many plants can serve directly as food for certain types of waterfowl.
- Aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available nutrients.

Excerpt: Department of Ecology, Washington state

Eurasian Watermilfoil

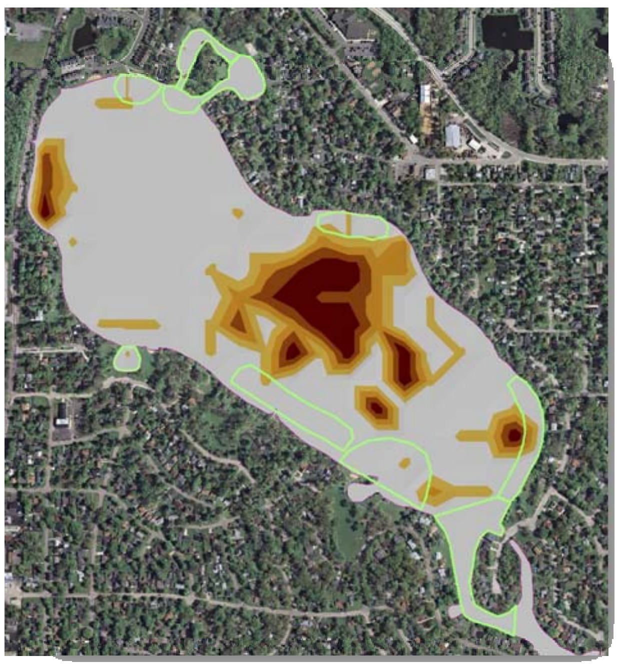
Illustration of Eurasian Watermilfoil

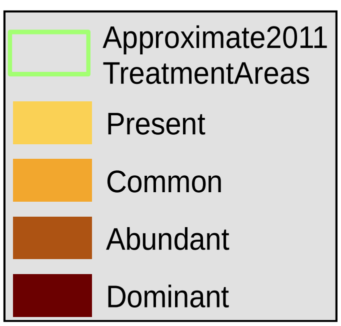


Eurasian Watermilfoil (EWM) is a feathery submerged aquatic plant that can quickly form thick mats in shallow areas of lakes and rivers in North America. These mats can interfere with swimming and entangle propellers, which hinders boating fishing, and waterfowl hunting. Matted milfoil can displace native aquatic plants, impacting fish and wildlife. Since it was discovered in North America in the 1940's, EWM has invaded nearly every US state and at least three Canadian Provinces. Milfoil spreads when plant pieces break off and float on water currents. It can cross land to new waters by clinging to sailboats, personal watercraft, powerboats, motors, trailers, and fishing gear.

The abundance of EWM in Gages Lake has increased by 14% since 2003. EWM was present at most sample sites with plants. Populations were most dense in the center of the lake at depths between four and six feet. In 2011 chemical applications greatly reduced the EWM populations near the shoreline. An aquatic plant management plan is critical to maintaining the health of the lake and a balanced aquatic plant community. The plan should be based on the management goals of the lake and involve usage issues, habitat maintenance/restoration, and limitations of the lake. The primary focus of the plan must include the control of exotic aquatic species including EWM and Curlyleaf Pondweed. Follow up is critical to achieve long-term success. A good aquatic plant management plan considers both the short and long -term needs of the lake.

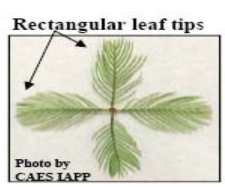
Erasian watermilfoil density at 160 sites on Gages Lake in July, 2011, Maximum depth that plants were found was 10.0 feet.

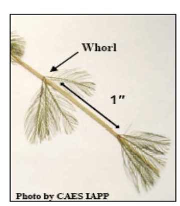




Distribution of eurasion watermilfoil

Myriophyllum spicatum Exotic*





Common Names:
Eurasian watermilfoil

Origin: EXOTIC
Europe and Asia. Found throughout Lake County and Illinois

Importance:
This invasive plant spreads rapidly, crowding out native species, clogging waterways, and blocking sunlight and oxygen from underlying waters.

Look alikes:
Northern watermilfoil
Which has fewer than 12 leaflet pairs per leaf, and generally has stouter stems.

Key Features:

Stem: Long, often abundantly branced stems form a reddish or olive-green surface mat in summer.

Leaf: Leaves are rectangular with ≥12 pairs of leaflets per leaf and are dissected giving a feathery appearance, arranged in a whorl, whorls are 1 inch apart.

Flower: Small pinkish male flowers that occur on reddish spikes, female flowers lack petals and sepals and 4 lobed pistil.

CURLYLEAF PONDWEED

Curlyleaf Pondweed (CLP) is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia. It was accidentally introduced to United States waters in the mid-1880s by hobbyists who used it as an aquarium plant. The leaves are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. This aquatic plant has an unusual life history. Unlike our native pondweeds it begins growing in the early spring. CLP has even been documented growing under the ice in lakes! The plant then reaches maturity in mid summer typically June in Lake County when our natives are starting to emerge. CLP becomes invasive in some areas because of its adaptations for low light tolerance and low water temperatures which allow the plant to get a head start and outcompete native plants in the spring. In mid-summer, when most aquatic plants are growing, CLP plants are dying off. Plant die-offs may result in a critical loss of dissolved oxygen. Large populations of CLP also can cause changes in nutrient availability. In midsummer, CLP plants usually die back which is typically followed by an increase in phosphorus availability that may fuel nuisance algal blooms. CLP can form dense mats that may interfere with boating and other recreational uses. In July 2011 in Gages Lake CLP were common, plants being found at 31 sampled sites (19% of lake). This is a significant increase from 2003 when CLP was found at 1% of the sampled sites. At this time the density of CLP is not causing fluctuations in nutrient availability. The Gages Lake aquatic plant management plan should prioritize the reduction in CLP populations in an effort to increase the abundance and diversity of native aquatic plants.

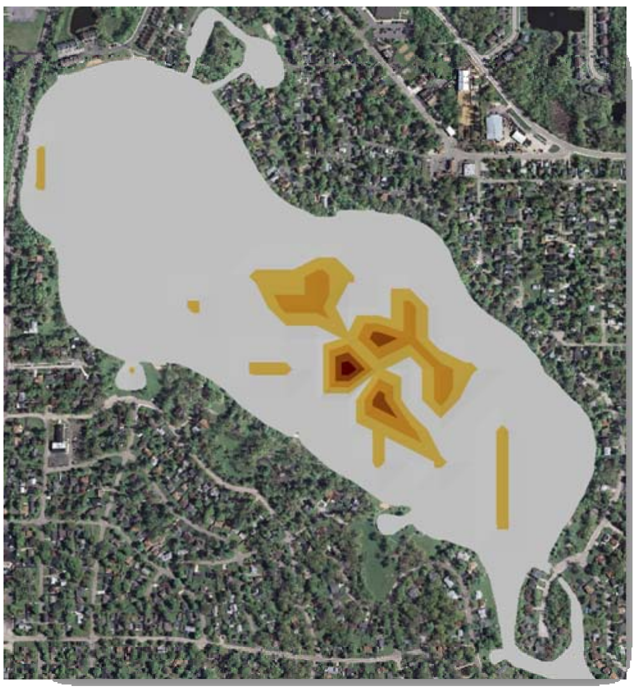
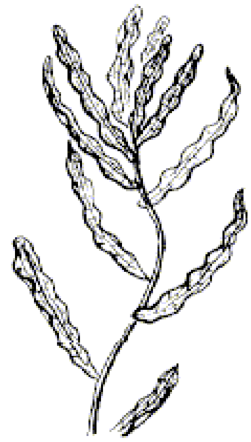
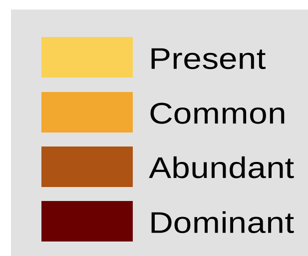


ILLUSTRATION OF CURLYLEAF PONDWEED



CURLYLEAF PONDWEED DENSITY AT 160 SITES ON GAGES LAKE IN JULY 2011, MAXIMUM DEPTH THAT PLANTS WERE FOUND WAS 10.0 FEET,



POTAMOGETON CRISPUS EXOTIC*

Turion

KEY FEATURES:

STEM: ARE FLATTENED, BRANCHED, CAN FORM DENSE STANDS IN WATER UP TO 15 FEET DEEP.

LEAF: ALTERNATE ALL SUBMERSED, OBLONG, STIFF, TRANSLUCENT LEAVES HAVE DISTINCTLY WAVY EDGES WITH FINE TEETH AND 3 MAIN VEINS.

FLOWER: TINY, WITH 4 PETAL-LIKE LOBES. IN SPIKES 1-3CM LONG ON STALKS UP TO 7CM LONG. (MAY SEE TURIONS WHICH OVER WINTERS AS A HARD, BROWN, BUR-LIKE BUD WITH CROWDED, SMALL HOLLY-LIKE LEAVES).

COMMON NAMES:
CURLY LEAF PONDWEED

ORIGIN: EOXTIC*
ASIA, AFRICA, AND EUROPE FOUND THROUGH-OUT LAKE COUNTY AND ILLINOIS

IMPORTANCE:
INVASIVE: HAS A TOLERANCE FOR LOW LIGHT AND WATER TEMPERATURES THAT ALLOW THE PLANT TO GET A HEAD START ON NATIVE PLANTS. BY MID SUMMER WHEN MOST AQUATIC PLANTS ARE GROWING, CURLYLEAF PLANTS ARE DYING OFF. WHICH MAY RESULT IN A CRITICAL LOSS OF DISSOLVED OXYGEN AND AN INCREASE IN NUTRIENTS.

LOOK ALIKES:
NONE

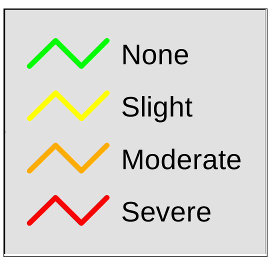
SHORELINE EROSION

EXAMPLE OF A PERMANENT STAFF GAGE

Erosion is the natural process of weathering and transport of solids (sediment, soil, rock and other particles) in the natural environment. It usually occurs due to transport by wind, water, or ice; by down-slope creep of soil and other material under the force of gravity; or by living organisms, such as burrowing animals. However this process has been increased dramatically by human land use, especially industrial agriculture, deforestation, and urban sprawl.

The shoreline was reassessed in 2011for significant changes in erosion since 2003. Based on the 2011 assessment, there was a significant increase in shoreline erosion with approximately 41% of the shoreline having some degree of erosion. Overall, 59% of the shoreline had no erosion, 21% had slight erosion, 9% had moderate, and 11% had severe erosion. In the past shoreline erosion on Gages Lake has been minimal. The areas of moderate and severe erosion were mostly located along the island across the North Shore Drive, Willow Point Park, and along the north shoreline near highway 45. These areas should be addressed soon; it is much easier and less costly to mitigate slightly eroding shorelines than those with more severe erosion. Very few homeowners have installed buffer strips of emergent vegetation along their shorelines. Buffers are excellent features for providing erosion control and wildlife habitat and for reducing sediment and nutrient load to the lake. It is recommended that these emergent types of buffer strips, as well as upland buffer strips, be installed along as many shorelines as possible. Upland buffers can even be installed above rip rap or seawalled shorelines to help filter non-point runoff before it enters the lake.

SHORELINE EROSION ON GAGES LAKE, 2011



MONTHLY WATER LEVELS IN GAGES LAKE, 2011 AND LAKE COUNTY STORMWATER MANAGEMENT COMMISSION RAIN GUAGE DATA FROM THE GAGES LAKE RAIN GAUGE

2011	Level (ft)	Rain (in)
May	3.42	4.05
June	3.54	6.23
July	3.88	3.58
August	3.50	5.42
September	3.83	1.94

LAKE LEVEL

Lakes with stable water levels potentially have less shoreline erosion problems. Small fluctuations in lake levels were observed during the 2011 sampling season. Data from the Stormwater Management Commission's Gages Lake rain gauge was correlated to rain events and lake levels increases. Over the sample period May to September the lake level decreased 0.42 inches. The highest water level occurred in May and the lowest level in July. Gages Lake does not appear to be greatly influenced by rain events. The relatively small watershed and large lake size helps reduce fluctuations in lake level. In order to accurately monitor water levels it is recommended that a staff gauge be installed and levels measured and recorded frequently (daily or weekly).

RAIN GAUGE

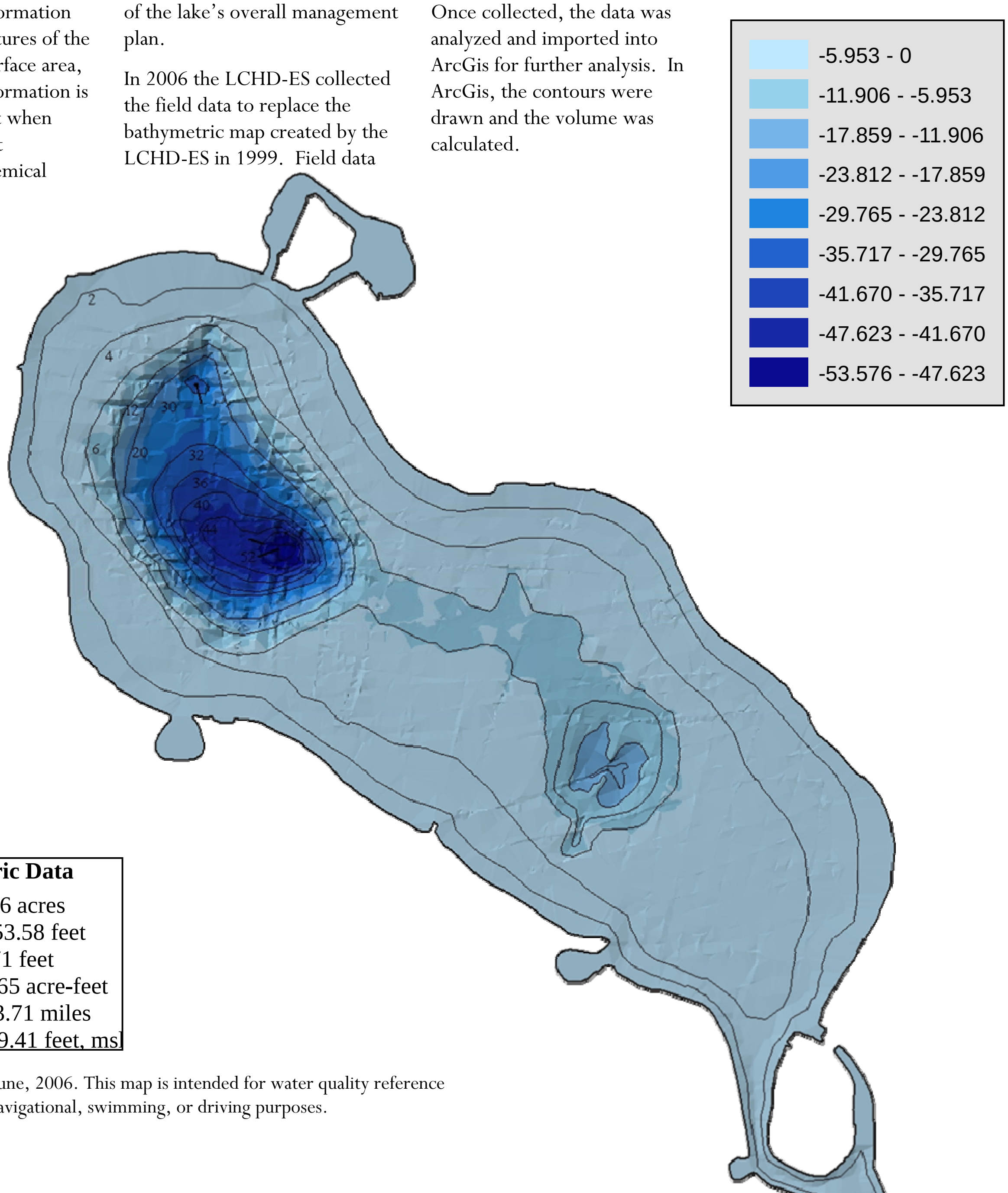
PHOTO: LAKE COUNTY STORMWATER MANAGEMENT COMMISSION

BATHYMETRIC MAP

A bathymetric (depth contour) map is an essential tool for effective lake management since it provides critical information about the physical features of the lake such as depth, surface area, and volume. This information is particularly important when intensive management techniques such as chemical treatments for plant or algae control, dredging, fish stocking or habitat enhancement are part of the lake's overall management plan.

In 2006 the LCHD-ES collected the field data to replace the bathymetric map created by the LCHD-ES in 1999. Field data was collected using Biosonics equipment along with a Trimble GPS unit with sub-foot accuracy. Once collected, the data was analyzed and imported into ArcGis for further analysis. In ArcGis, the contours were drawn and the volume was calculated.

GAGES LAKE MORPHOLOGICAL FEATURES



Morphometric Data

Surface Area: 142.96 acres
Maximum Depth: 53.58 feet
Average Depth: 6.71 feet
Lake Volume: 958.65 acre-feet
Shoreline Length: 3.71 miles
Lake Elevation: 779.41 feet, msl

Survey Data Collected June, 2006. This map is intended for water quality reference only, not intended for navigational, swimming, or driving purposes.

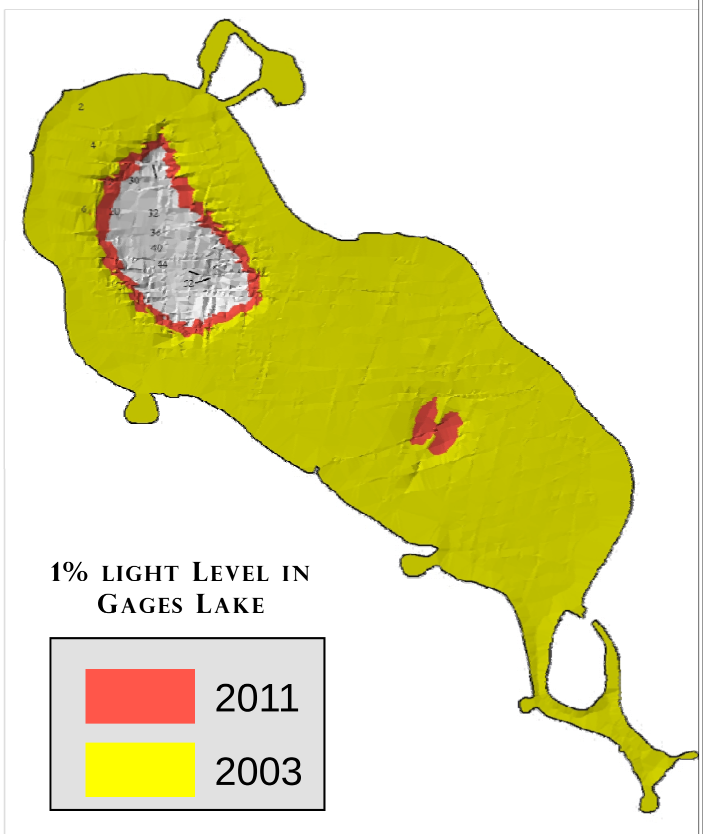
GAGES LAKE SIDE VIEW

ZEBRA MUSSELS

In 2002, zebra mussels (Dreissena polymorpha) were discovered in Gages Lake. These mussels are believed to have been spread to this country in the mid 1980's by cargo ships from Europe that discharged their ballast water into the Great Lakes. The mussels spread throughout the Great Lakes and by 1991 had made their way into the Illinois and Mississippi Rivers. In 1999, the first sighting of the mussel in Lake County (besides Lake Michigan and the Chain of Lakes) occurred. Currently, 22 inland lakes in the county are known to be infested with the zebra mussel, but this number could be much higher, since the mussel has probably gone unnoticed in many lakes. Due to their quick life cycle and explosive growth rate, zebra mussels can quickly edge out native mussel species. Negative impacts on native bivalve populations include interferences with feeding, habitat, growth, movement and reproduction. The impact that the mussels have on fish populations is not fully understood. However, zebra mussels feed on algae, which is also a major food source for planktivorous fish, such as bluegills, which are food for bass and pike. Zebra mussels have also caused economic problems for large power plants, public water supplies, and industrial facilities, where they clog water intake pipes. Studies on the transport of the zebra mussel have shown that they can be found in any area of a boat that holds water, including the engine cooling system, bilge water, and bait buckets used in fishing. The researchers also found that many of the mussel larvae were being transported via aquatic plants that were taken from one lake to another on boats or boat trailers. The larvae did not appear to be transported by attaching to the sides of the boats themselves.

In Gages Lake the 2011 zebra mussel population was not quantified, however their presence may have influenced the water clarity. The improved water clarity nearly doubled the 1% light depth. In 2003 the 1% light level ranged from 8-12 feet, where as the 2011 1% light level ranged from 12-22 feet. While the depth at which plants could grow significantly increased, the area of Gages Lake that plants could expand was extremely limited in comparison. This is due to the morphological features of Gages Lake. The 0-12 foot contours of Gages Lake accounts for 88% of the total acres of the lake and the total acres for the contours 0-22 feet is 92% total acres of the lake. The 2011 increase in water clarity and light level only allowed for aquatic plants to expand an additional 4% in Gages.

Although it is too late to prevent the infestation of Gages Lake, several steps can be taken to prevent the introduction of the mussel into other lakes via transport by boat. It is recommended that residents (1) educate themselves on what the species looks like and how it can be spread; (2) remain diligent about removing plants and emptying all sources of water from boats being transferred from Gages Lake to other lakes; and (3) Continue to post signs at the all boat launches educating boaters about the presence of zebra mussels (and Eurasian Watermilfoil, Curlyleaf Pondweed), the negative impacts it can have on a lake and ways to prevent the spread.



1% LIGHT LEVEL IN GAGES LAKE

Environmental Services

Senior Biologist: Mike Adam

madam@lakecountyil.gov

Population Health Services
500 W. Winchester Road
Libertyville, Illinois 60048-1331

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.

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.

Lake Recommendations

Gages Lake's water quality has notably improved since the 2003 study and all parameters exceed Lake County medians. Total phosphorus, and total suspended solids concentrations have decreased and water clarity increased, however these parameters were influenced by the presence of exotic Zebra Mussels. The aquatic plant community has also significantly improved in diversity. However the population increase of the exotic invasive Curlyleaf Pondweed population is a concern.

Gages Lake, lake's management is administered by Gages Lake Conservation Committee (GLCC) and the Wildwood Park District. To improve the overall quality of Gages Lake, the ES (Environmental Services) has the following recommendations:

- **Decrease Curlyleaf Pondweed populations**
- **Decrease Eurasian Watermilfoil population**
- **Continue Participation in Volunteer Lake Monitoring Program**
- **Participate in the Clean Waters Clean Boats Program**
- **Mitigate shoreline exhibiting erosion**
- **Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips**
- **Continue fish work with Illinois Division of Natural Resources**
- **Use salt alternatives and proper application**

Water quality data for Gages Lake 1999, 2003, and 2011.

2011	Epilimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
11-May	3	137	0.62	<0.1	0.3	0.013	<0.005	NA	249	2.0	646	113	8.3	1.1670	8.26	10.03
22-Jun	3	105	0.51	<0.1	<0.05	0.024	<0.005	NA	241	3.2	578	93	7.12	0.8893	8.74	8.71
22-Jul	3	117	0.65	<0.1	<0.05	0.020	<0.005	NA	256	4.4	640	106	5.18	1.0730	8.43	7.94
17-Aug	3	113	2.34	<0.1	<0.05	0.026	<0.005	NA	239	9.4	600	99	3	0.9822	8.7	8.99
21-Sep	3	113	0.73	<0.1	<0.05	0.016	<0.005	NA	244	4.8	603	106	3.63	0.9999	8.46	8.87
	Average	117	0.97	<0.1	0.103[k]	0.020	<0.005	NA	246	4.8	613	103	5.45	1.0223	8.52	8.91

2003	Epilimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
6-May	3	150	1.18	<0.1	<0.05	0.046	<0.005	684	NA	11.0	776	161	2.97	1.2950	8.63	9.77
3-Jun	3	151	1.20	<0.1	<0.05	0.029	<0.005	716	NA	4.2	776	137	4.59	1.2890	8.42	8.89
8-Jul	3	156	1.21	<0.1	<0.05	0.037	0.007	794	NA	7.8	802	174	3.94	1.3420	8.11	5.62
5-Aug	3	166	1.07	<0.1	<0.05	0.03	0.005	808	NA	5.1	824	184	5.38	1.3640	8.29	6.15
9-Sep	3	175	1.19	<0.1	<0.05	0.027	<0.005	804	NA	6.9	851	178	3.41	1.4300	8.35	7.54
	Average	160	1.17	<0.1	<0.05	0.034	0.006[k]	761	NA	7.0	806	167	4.06	1.3440	8.36	7.59

1999	Epilimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
11-May	3	150	1.56	<0.1	0.241	0.023	<0.005	560	NA	4.7	658	175	5.60	NA	8.3	8.8
15-Jun	3	136	0.82	<0.1	0.084	0.029	<0.005	600	NA	5.2	615	120	5.60	0.991	8.22	8
13-Jul	3	146	0.85	<0.1	<0.05	0.012	<0.005	620	NA	5.4	641	115	2.50	1.093	8.07	7.8
17-Aug	3	147	1	<0.1	<0.05	0.02	<0.005	652	NA	7.0	704	168	3.60	1.12	8.18	8.32
14-Sep	3	149	0.73	<0.1	<0.05	0.027	<0.005	634	NA	5.0	677	120	3.90	1.1600	8.03	7.4
	Average	146	0.99	<0.1	0.163[k]	0.022	<0.005	613	NA	5.5	659	140	4.24	1.091	8.16	8.06

Glossary

ALK = Alkalinity, mg/L CaCO3
TKN = Total Kjeldahl nitrogen, mg/L
NH3-N = Ammonia nitrogen, mg/L
NO3-N = Nitrate nitrogen, mg/L
TP = Total phosphorus, mg/L
SRP = Soluble reactive phosphorus, mg/L
TDS = Total dissolved solids, mg/L
TSS = Total suspended solids, mg/L
TS = Total solids, mg/L
TVS = Total volatile solids, mg/L
SECCHI = Secchi Disk Depth, ft
COND = Conductivity, milliSiemens/cm
DO = Dissolved oxygen, mg/L

Note: "k" denotes that the actual value is known to be less than the value presented
NA = Not Applicable

2011	Hypolimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
11-May	50	151	1.29	0.714	0.2	0.026	0.006	NA	250	2.5	619	77	NA	1.1830	7.42	4.85
22-Jun	46	156	1.51	0.946	0.1	0.026	<0.005	NA	251	2.1	660	117	NA	0.9620	7.11	0.27
22-Jul	50	163	2.20	1.54	<0.05	0.042	0.007	NA	250	3.0	655	108	NA	1.0880	6.99	0.22
17-Aug	50	174	2.34	1.78	<0.05	0.029	0.006	NA	252	2.5	648	104	NA	1.0830	6.94	0.23
21-Sep	45	184	3.05	2.48	<0.05	0.028	<0.005	NA	245	2.8	652	111	NA	1.0930	6.86	0.25
	Average	166	2.08	1.492	0.072[k]	0.030	0.006[k]	NA	250	2.6	647	103	NA	1.0818	7.06	1.16

2003	Hypolimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
6-May	47	160	2.05	1.1	<0.05	0.063	0.006	700	NA	4.4	740	131	NA	1.3110	7.29	0.05
3-Jun	51	172	3.03	1.93	<0.05	0.152	0.098	732	NA	4.3	786	157	NA	1.3135	7.18	0.01
8-Jul	49	179	3.05	2.12	<0.05	0.162	0.106	726	NA	4.7	775	149	NA	1.3140	7.24	0.00
5-Aug	50	185	2.84	1.88	<0.05	0.048	0.005	698	NA	3.5	762	132	NA	1.3340	7.17	0.00
9-Sep	45	222	4.97	3.52	<0.05	0.046	<0.005	730	NA	4.5	775	149	NA	1.3630	7.10	0.00
	Average	184	3.188	2.11	<0.05	0.094	0.054[k]	717	NA	4.3	768	144	NA	1.3271	7.20	0.01

1999	Hypolimnion															
DATE	DEPTH	ALK	TKN	NH3-N	NO3-N	TP	SRP	TDS	Cl-	TSS	TS	TVS	SECCHI	COND	pH	DO
11-May	45	157	1.39	0.62	0.146	0.056	0.008	556	NA	6.3	691	211	NA	NA	7.9	0.75
15-Jun	51	169	2.15	1.52	<0.05	0.178	0.134	658	NA	6.0	673	151	NA	1.037	7.37	0.06
13-Jul	49	187	2.69	2.05	<0.05	0.132	0.0960	606	NA	4.7	649	120	NA	1.109	7.4	0.065
17-Aug	50	204	3.47	2.68	<0.05	0.051	0.0150	658	NA	3.9	686	150	NA	1.11	7.01	0.05
14-Sep	51	222	4.23	3.3	<0.05	0.051	0.013	616	NA	3.7	656	122	NA	1.1490	7.05	0.08
	Average	188	2.79	2.034	0.146[k]	0.094	0.053	619	NA	4.9	671	151	NA	1.10125	7.35	0.20

Glossary
ALK = Alkalinity, mg/L CaCO3
TKN = Total Kjeldahl nitrogen, mg/L
NH3-N = Ammonia nitrogen, mg/L
NO3-N = Nitrate nitrogen, mg/L
TP = Total phosphorus, mg/L
SRP = Soluble reactive phosphorus, mg/L
TDS = Total dissolved solids, mg/L
TSS = Total suspended solids, mg/L
TS = Total solids, mg/L
TVS = Total volatile solids, mg/L
SECCHI = Secchi Disk Depth, ft
COND = Conductivity, milliSiemens/cm
DO = Dissolved oxygen, mg/L

Note: "k" denotes that the actual value is known to be less than the value presented
NA = Not Applicable

Gages Lake 2011 IEPA Ranking

				Weighting Criteria	Points	Overall Use Support Points	Degree of Support
TROPHIC STATUS			**AQUATIC LIFE USE IMPAIRMENT INDEX**				
Carlson's TSIp	47.2	Mesotrophic	Mean Trophic State	47.2	40		
			Macrophyte Impairment	Substantial	15		
IMPAIRMENT ASSESSMENTS			Sediment Impairment (NVSS)	Minimal	0		
Total Phosphorus	None		Degree of Use Support		**55**	0	**Full**
Total Nitrogen	None						
pH	None		**RECREATION USE IMPAIRMENT INDEX**				
Low DO	None		Mean Trophic State Index	47.2	47.2		
Total Dissolved Solids	None		Macrophyte Impairment	Substantial	15		
Total Supended Solids	None		Sediment Impairment (NVSS)	Minimal	0		
Aquatic Plants-Native	Yes		Degree of Use Support		**62.2**	1	**Partial**
Non-Native Aquatic Plants	None						
Non-Native Animals	None		**Overall Use Index**			**0.50**	**Partial**

Lake County average TSI phosphorus (TSIp) ranking 2000-2011.

RANK	LAKE NAME	TP AVE	TSIp
1	Lake Carina	0.0100	37.35
2	Sterling Lake	0.0100	37.35
3	Indpendence Grove	0.0130	41.14
4	Lake Zurich	0.0135	41.68
5	Druce Lake	0.0140	42.00
6	West Loon	0.0152	43.00
7	Windward Lake	0.0160	44.13
8	Sand Pond (IDNR)	0.0165	44.57
9	Cedar Lake	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	Cross Lake	0.0220	48.72
19	Dog Training Pond	0.0220	48.72
20	Sun Lake	0.0220	48.72
21	Cranberry Lake	0.0230	49.00
22	Deep Lake	0.0230	49.36
23	Lake of the Hollow	0.0230	49.36
24	Round Lake	0.0230	49.36
25	Stone Quarry Lake	0.0230	49.36
26	Little Silver Lake	0.0250	50.57
27	Bangs Lake	0.0260	51.00
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	Hendrick Lake	0.0340	55.00
39	Honey Lake	0.0340	55.00
40	Sand Lake	0.0380	56.00
41	Diamond Lake	0.0370	56.22
42	Sullivan Lake	0.0370	56.22
43	Channel Lake	0.0380	56.60
44	Ames Pit	0.0390	56.98
45	East Loon	0.0400	57.00
46	Schreiber Lake	0.0400	57.34

Lake County average TSI phosphorus (TSIp) ranking 2000-2011.

RANK	LAKE NAME	TP AVE	TSIp
47	Waterford Lake	0.0400	57.34
48	Hook Lake	0.0410	57.70
49	Duck Lake	0.0430	58.39
50	Nielsen Pond	0.0450	59.04
51	Seven Acre Lake	0.0460	59.36
52	Turner Lake	0.0460	59.36
53	Willow Lake	0.0460	59.36
54	East Meadow Lake	0.0480	59.97
55	Lucky Lake	0.0480	59.97
56	Old Oak Lake	0.0490	60.27
57	College Trail Lake	0.0500	60.56
58	Hastings Lake	0.0520	61.13
59	Lake Lakeland Estates	0.0520	61.13
60	Butler Lake	0.0530	61.40
61	West Meadow Lake	0.0530	61.40
62	Little Bear Lake	0.0550	61.94
63	Lucy Lake	0.0550	61.94
64	Lake Linden	0.0570	62.45
65	Lake Napa Suwe	0.0570	62.45
66	Lake Charles	0.0580	62.70
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	Mary Lee Lake	0.0680	65.00
81	Wooster Lake	0.0690	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	Harvey Lake	0.0770	66.79
89	Broberg Marsh	0.0780	66.97
90	Countryside Lake	0.0780	67.00
91	Sylvan Lake	0.0790	67.16
92	Big Bear Lake	0.0810	67.52

Lake County average TSI phosphorus (TSIp) ranking 2000-2011.

RANK	LAKE NAME	TP AVE	TSIp
93	Redwing Slough	0.0822	67.73
94	Petite Lake	0.0830	67.87
95	Forest Lake	0.0820	68.00
96	Lake Marie	0.0850	68.21
97	Potomac Lake	0.0850	68.21
98	Timber Lake (South)	0.0850	68.21
99	White Lake	0.0862	68.42
100	Grand Ave Marsh	0.0870	68.55
101	North Churchill Lake	0.0870	68.55
102	McDonald Lake 1	0.0880	68.71
103	North Tower Lake	0.0880	68.71
104	Long Lake	0.0850	69.00
105	Rivershire Pond 2	0.0900	69.04
106	South Churchill Lake	0.0900	69.04
107	McGreal Lake	0.0910	69.20
108	Deer Lake	0.0940	69.66
109	Dunn's Lake	0.0950	69.82
110	Eagle Lake (S1)	0.0950	69.82
111	International Mine and Chemical Lake	0.0950	69.82
112	Valley Lake	0.0950	69.82
113	Fish Lake	0.0960	69.97
114	Lochanora Lake	0.0960	69.97
115	Island Lake	0.0990	70.41
116	Woodland Lake	0.0990	70.41
117	Nippersink Lake	0.1000	70.56
118	Longview Meadow Lake	0.1020	70.84
119	Lake Barrington	0.1050	71.26
120	Lake Forest Pond	0.1070	71.53
121	Bittersweet Golf Course #13	0.1100	71.93
122	Fox Lake	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

Lake County average TSI phosphorus (TSIp) ranking 2000-2011.

RANK	LAKE NAME	TP AVE	TSIp
139	Lake Matthews	0.1520	76.59
140	Buffalo Creek Reservoir	0.1550	76.88
141	Middlefork Savannah Outlet 2	0.1590	77.00
142	Pistakee Lake	0.1590	77.24
143	Grassy Lake	0.1610	77.42
144	Salem Lake	0.1650	77.78
145	Half Day Pit	0.1690	78.12
146	Lake Eleanor	0.1810	79.11
147	Lake Farmington	0.1850	79.43
148	Lake Louise	0.1850	79.43
149	ADID 127	0.1890	79.74
150	Patski Pond	0.1970	80.33
151	Dog Bone Lake	0.1990	80.48
152	Summerhill Estates Lake	0.1990	80.48
153	Redwing Marsh	0.2070	81.05
154	Stockholm Lake	0.2082	81.13
155	Bishop Lake	0.2160	81.66
156	Ozaukee Lake	0.2200	81.93
157	Hidden Lake	0.2240	82.19
158	McDonald Lake 2	0.2250	82.28
159	Fischer Lake	0.2280	82.44
160	Oak Hills Lake	0.2790	85.35
161	Loch Lomond	0.2950	86.16
162	Heron Pond	0.2990	86.35
163	Rollins Savannah 1	0.3070	87.00
164	Fairfield Marsh	0.3260	87.60
165	ADID 182	0.3280	87.69
166	Slough Lake	0.3860	90.03
167	Flint Lake Outlet	0.5000	93.76
168	Rasmussen Lake	0.5030	93.85
169	Rollins Savannah 2	0.5870	96.00
170	Albert Lake, Site II, outflow	1.1894	106.26
171	Almond Marsh	1.9510	113.00

Aquatic vegetation species found at the 160 sampling sites on Gages Lake, July 2011. Maximum depth that plants were found was 10.0 feet.

Plant Density	Chara	Coontail	Curlyleaf	Elodea	Eurasian Watermilfoil	Largeleaf Pondweed	Sago Pondweed	Unknown
Present	8	3	19	12	31	0	13	1
Common	26	4	9	7	12	2	4	1
Abundant	26	1	2	2	7	0	3	0
Dominant	0	1	1	1	13	0	0	0
% Plant Occurrence	37.5	5.6	19.4	13.8	39.4	1.3	12.5	1.3

Distribution of rake density across all sampling sites.

Rake Density (coverage)	# of Sites	% of Sites
No Plants	30	18.8
>0-10%	27	16.9
10-40%	34	21.3
40-60%	35	21.9
60-90%	13	8.1
>90%	7	4.4
Total Sites with Plants	116	72.5
Total # of Sites	160	100.0

Lake County average Floristic Quality Index (FQI) ranking 2000-2011.

RANK	LAKE NAME	FQI (w/A)	FQI (native)
1	Cedar Lake	38.4	37.0
2	East Loon Lake	37	35.6
3	West Loon Lake	33.7	32.3
4	Little Silver	31.6	29.6
5	Deep Lake	31.2	29.7
6	Round Lake Marsh North	29.9	29.1
7	Cranberry Lake	28.9	28.0
8	Sullivan Lake	28.5	26.9
9	Independence Grove	27.5	24.6
10	Fourth Lake	27.1	24.7
11	Lake Zurich	27.1	24.3
12	Bangs Lake	26.9	25.2
13	Sterling Lake	26.9	24.5
14	Sun Lake	26.1	24.3
15	Round Lake	25.9	23.5
16	Honey Lake	25.1	23.3
17	Lake of the Hollow	24.8	23.0
18	Schreiber Lake	24.8	23.9
19	Lakewood Marsh	24.7	23.8
20	Redwing Slough	24.0	25.8
21	Deer Lake	23.5	24.4
22	Butler Lake	23.1	21.4
23	Duck Lake	22.9	21.1
24	Countryside Glen Lake	22.8	21.9
25	Cross Lake	22.4	24.2
26	McGreal Lake	22.1	20.2
27	Druce Lake	21.8	19.1
28	Third Lake	21.7	13.2
29	Broberg Marsh	21.4	20.5
30	Davis Lake	21.4	21.4
31	Fish Lake	21.2	19.3
32	Redhead Lake	21.2	19.3
33	Turner Lake	21.2	18.6
34	Wooster Lake	21.1	19.4
35	Timber Lake (North)	20.9	23.4
36	Lake Kathryn	20.7	19.6
37	ADID 203	20.5	20.5
38	Salem Lake	20.2	18.5
39	Old Oak Lake	19.1	18.0
40	Grandwood Park Lake	19.0	17.2
41	Highland Lake	18.9	16.7
42	Lake Miltmore	18.7	16.8
43	Lake Helen	18.0	18.0
44	Bresen Lake	17.8	16.6
45	Potomac Lake	17.8	17.8
46	Hendrick Lake	17.7	17.7
47	Lake Barrington	17.7	16.7
48	Long Lake	17.7	15.8
49	Rollins Savannah 2	17.7	17.7
50	Windward Lake	17.6	16.3
51	Diamond Lake	17.4	16.3
52	Almond Marsh	17.3	16.3
53	Osprey Lake	17.3	15.5
54	Owens Lake	17.3	16.3

Lake County average Floristic Quality Index (FQI) ranking 2000-2011.

Rank	LAKE NAME	FQI (w/A)	FQI (native)
55	Forest Lake	17.0	15.9
56	Lake Tranquility (S1)	17.0	15.0
57	McDonald Lake 1	16.7	17.7
58	Island Lake	16.6	14.7
59	Countryside Lake	16.3	15.2
60	Grand Avenue Marsh	16.3	14.3
61	Lake Fairview	16.3	15.2
62	Lake Nippersink	16.3	14.3
63	Taylor Lake	16.3	14.3
64	Grays Lake	16.1	16.1
65	White Lake	16.0	17.0
66	Dog Training Pond	15.9	14.7
67	Dog Bone Lake	15.7	15.7
68	Ames Pit	15.5	13.4
69	Seven Acre Lake	15.5	17.0
70	Dugdale Lake	15.1	14.0
71	Eagle Lake (S1)	15.1	14.0
72	Heron Pond	15.1	15.1
73	Mary Lee Lake	15.1	13.1
74	Old School Lake	15.1	13.1
75	Bishop Lake	15	13.4
76	Hastings Lake	15.0	17.0
77	North Churchill Lake	15.0	15.0
78	Timber Lake (South)	14.7	12.7
79	Buffalo Creek Reservoir	14.3	13.1
80	Lake Carina	14.3	12.1
81	Lake Leo	14.3	12.1
82	Lambs Farm Lake	14.3	12.1
83	Crooked Lake	14.0	16.0
84	Dunn's Lake	13.9	12.7
85	Lake Minear	13.9	11.0
86	Lake Napa Suwe	13.9	11.7
87	Longview Meadow Lake	13.9	13.9
88	Summerhill Estates Lake	13.9	12.7
89	Stockholm Lake	13.5	12.1
90	Antioch Lake	13.4	11.3
91	Hook Lake	13.4	11.3
92	Lake Charles	13.4	11.3
93	Rivershire Pond 2	13.3	11.5
94	Flint Lake	13.0	11.8
95	Harvey Lake	13.0	11.8
96	Briarcrest Pond	12.5	11.2
97	**Gages Lake**	**12.5**	**10.2**
98	Lake Naomi	12.5	11.2
99	McDonald Lake 2	12.5	12.5
100	Pulaski Pond	12.5	11.2
101	Rollins Savannah 1	12.5	12.5
102	Stone Quarry Lake	12.5	12.5
103	Loch Lomond	12.1	9.4
104	Pond-A-Rudy	12.1	12.1
105	Grassy Lake	12.0	12.0
106	Lake Matthews	12.0	12.0
107	Nielsen Pond	12.0	10.7
108	Werhane Lake	12.0	9.8
109	Lake Lakeland Estates	11.5	10.0
110	Big Bear Lake	11.0	9.5
111	Fischer Lake	11.0	9.0

Lake County average Floristic Quality Index (FQI) ranking 2000-2011.

Rank	LAKE NAME	FQI (w/A)	FQI (native)
112	Little Bear Lake	11.0	9.5
113	Redwing Marsh	11	11.0
114	Tower Lake	11.0	11.0
115	West Meadow Lake	11.0	11.0
116	Lake Holloway	10.6	10.6
117	Lake Fairfield	10.4	9.0
118	Lake Louise	10.4	9.0
119	Sand Lake	10.4	8.0
120	College Trail Lake	10.0	10.0
121	Valley Lake	9.9	9.9
122	Woodland Lake	9.9	8.1
123	Lake Christa	9.8	8.5
124	Lake Farmington	9.8	8.5
125	Lucy Lake	9.8	8.5
126	Banana Pond	9.2	7.5
127	Columbus Park Lake	9.2	9.2
128	Sylvan Lake	9.2	9.2
129	Waterford Lake	9.2	9.2
130	Leisure Lake	9.0	6.4
131	Albert Lake	8.7	7.5
132	Fairfield Marsh	8.7	7.5
133	Lake Eleanor	8.7	7.5
134	Ozaukee Lake	8.7	6.7
135	East Meadow Lake	8.5	8.5
136	Lake Forest Pond	8.5	6.9
137	Peterson Pond	8.5	6.0
138	South Churchill Lake	8.5	8.5
139	Bittersweet Golf Course #13	8.1	8.1
140	Lake Linden	8.0	8.0
141	IMC Lake	7.1	5.0
142	Patski Pond	7.1	7.1
143	Rasmussen Lake	7.1	7.1
144	Slocum Lake	7.1	5.8
145	Lucky Lake	7.0	7.0
146	Deer Lake Meadow Lake	6.4	5.2
147	ADID 127	5.0	5.0
148	Half Day Pit	5.0	2.9
149	Liberty Lake	5.0	5.0
150	Lochanora Lake	5.0	2.5
151	Oak Hills Lake	5.0	5.0
152	Sand Pond (IDNR)	5.0	3.5
153	Slough Lake	5.0	5.0
154	Echo Lake	0.0	0.0
155	Hidden Lake	0.0	0.0
156	North Tower Lake	0.0	0.0
157	St. Mary's Lake	0.0	0.0
158	Willow Lake	0.0	0.0
	Mean	**15.2**	**14.1**
	Median	**14.3**	**13.1**

Morphometric Features of Gages Lake ~
Data From the June 2006 Bathymetric Survey, LCHD Lakes Management Uni

Contour (Feet)	Area Enclosed (Acres)	Percent of total acres	Volume (Acre-feet)	Depth Zone (Feet)	Area (Acres)	Percent (Depth zone to total acres)	Percent (Acre-feet to Total Volume)
0	142.96	100%	140.50	0 - 1	4.91	3.4%	12.6%
1	138.05	97%	132.47	1 - 2	11.08	7.8%	11.9%
2	126.97	89%	121.38	2 - 3	11.09	7.8%	10.9%
3	115.88	81%	108.22	3 - 4	15.14	10.6%	9.7%
4	100.74	70%	87.48	4 - 5	25.89	18.1%	7.9%
5	74.85	52%	60.46	5 - 6	27.71	19.4%	5.4%
6	47.14	33%	40.07	6 - 7	13.75	9.6%	3.6%
7	33.39	23%	29.51	7 - 8	7.60	5.3%	2.7%
8	25.79	18%	24.68	8 - 9	2.21	1.5%	2.2%
9	23.58	16%	22.75	9 - 10	1.65	1.2%	2.0%
10	21.93	15%	21.26	10 - 11	1.33	0.9%	1.9%
11	20.60	14%	19.96	11 - 12	1.28	0.9%	1.8%
12	19.32	14%	18.78	12 - 13	1.07	0.7%	1.7%
13	18.25	13%	17.78	13 - 14	0.94	0.7%	1.6%
14	17.31	12%	16.88	14 - 15	0.87	0.6%	1.5%
15	16.44	12%	16.07	15 - 16	0.74	0.5%	1.4%
16	15.71	11%	15.32	16 - 17	0.77	0.5%	1.4%
17	14.93	10%	14.64	17 - 18	0.59	0.4%	1.3%
18	14.35	10%	14.09	18 - 19	0.50	0.4%	1.3%
19	13.84	10%	13.60	19 - 20	0.49	0.3%	1.2%
20	13.36	9%	13.11	20 - 21	0.48	0.3%	1.2%
21	12.87	9%	12.62	21 - 22	0.50	0.3%	1.1%
22	12.38	9%	12.12	22 - 23	0.50	0.4%	1.1%
23	11.87	8%	11.62	23 - 24	0.51	0.4%	1.0%
24	11.36	8%	11.09	24 - 25	0.54	0.4%	1.0%
25	10.82	8%	10.56	25 -26	0.53	0.4%	0.9%
26	10.29	7%	10.00	26 - 27	0.58	0.4%	0.9%
27	9.71	7%	9.41	27 - 28	0.59	0.4%	0.8%
28	9.12	6%	8.79	28 - 29	0.64	0.5%	0.8%
29	8.47	6%	8.16	29 - 30	0.62	0.4%	0.7%
30	7.85	5%	7.53	30 - 31	0.63	0.4%	0.7%
31	7.22	5%	6.94	31 - 32	0.55	0.4%	0.6%
32	6.67	5%	6.41	32 - 33	0.51	0.4%	0.6%
33	6.15	4%	5.89	33 - 34	0.52	0.4%	0.5%
34	5.63	4%	5.38	34 - 35	0.50	0.4%	0.5%
35	5.13	4%	4.93	35 - 36	0.40	0.3%	0.4%
36	4.73	3%	4.56	36 - 37	0.33	0.2%	0.4%
37	4.39	3%	4.20	37 - 38	0.39	0.3%	0.4%
38	4.01	3%	3.81	38 - 39	0.40	0.3%	0.3%
39	3.61	3%	3.41	39 - 40	0.40	0.3%	0.3%
40	3.21	2%	3.02	40 - 41	0.38	0.3%	0.3%
41	2.83	2%	2.65	41 - 42	0.37	0.3%	0.2%
42	2.46	2%	2.29	42 - 43	0.34	0.2%	0.2%
43	2.12	1.5%	1.94	43 - 44	0.35	0.2%	0.2%
44	1.77	1.2%	1.59	44 - 45	0.36	0.3%	0.1%
45	1.41	1.0%	1.22	45 - 46	0.36	0.3%	0.1%
46	1.05	0.7%	0.84	46 - 47	0.40	0.3%	0.1%
47	0.65	0.5%	0.56	47 - 48	0.18	0.1%	0.05%
48	0.47	0.3%	0.40	48 - 49	0.14	0.1%	0.04%
49	0.33	0.2%	0.28	49 - 50	0.09	0.1%	0.03%
50	0.24	0.2%	0.20	50 - 51	0.08	0.1%	0.02%
51	0.16	0.1%	0.12	51 - 52	0.07	0.1%	0.011%
52	0.09	0.06%	0.043	52 - 53	0.08	0.05%	0.0038%
53	0.010	0.007%	0.0047	53 - 54	0.010	0.007%	0.00042%
54+	0.00	0.001%	0.0003	54+	0.001	0.001%	0.00002%
			1111.59		142.96	100%	100%

Maximum Depth of Lake: 54.82 Feet
Average Depth of Lake: 7.78 Feet
Volume of Lake: 1111.59 Acre-Feet

Area of Lake: 142.96 Acres
Shoreline Length: 3.71 Miles
Water elevation at 779.41 feet above mean sea leve

LakeCounty
Health Department and
Community Health Center

Gages Lake 2011 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	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											#NUM!
51811	0.25	0.24	14.22	10	100.6	1.1660	8.19	315	Surface		
51811	1	1.05	14.22	10	100.5	1.1660	8.26	738	Surface	100%	
51811	2	1.99	14.23	10	100.5	1.1660	8.26	189	0.32	26%	4.26
51811	3	3.15	14.23	10	100.7	1.1670	8.26	167	1.48	23%	0.08
51811	4	3.95	14.23	10	100.4	1.1660	8.26	169	2.28	23%	-0.01
51811	6	6.01	14.23	9.98	100.2	1.1670	8.26	111	4.34	15.0%	0.10
51811	8	7.97	14.22	9.98	100.3	1.1670	8.27	75	6.30	10.2%	0.06
51811	10	10.06	14.23	9.96	100	1.1670	8.26	62	8.39	8.4%	0.02
51811	12	12.02	14.21	9.95	99.9	1.1660	8.27	47	10.35	6.4%	0.03
51811	14	14	14.11	9.97	99.9	1.1660	8.27	34	12.33	4.6%	0.03
51811	16	16	14.1	9.99	100	1.1650	8.27	26	14.33	3.5%	0.02
51811	18	18	13.57	9.78	96.8	1.1660	8.21	21	16.33	2.8%	0.01
51811	20	20	13.3	9.42	92.7	1.1660	8.17	15	18.33	2.0%	0.02
51811	22	21.97	13.06	9.11	89.2	1.1660	8.13	10	20.30	1.4%	0.02
51811	24	24.02	12.73	8.79	85.4	1.1660	8.09	7	22.35	0.9%	0.02
51811	26	25.98	10.73	7.73	71.8	1.1760	7.85	5	24.31	0.7%	0.01
51811	28	28.01	8.27	7.3	64.0	1.1790	7.71	4	26.34	0.5%	0.01
51811	30	30.02	7.81	7.19	62.2	1.1760	7.68	3	28.35	0.4%	0.01
51811	32	32.02	7.65	7.13	61.5	1.1760	7.63	2	30.35	0.3%	0.01
51811	34	33.98	7.51	6.91	59.4	1.1770	7.6	1	32.31	0.1%	0.02
51811	36	35.84	7.44	6.56	56.3	1.1780	7.56	1	34.17	0.1%	0.00
51811	38	38.01	7.45	6.46	55.4	1.1780	7.55	1	36.34	0.1%	0.00
51811	40	40.02	7.36	6.47	55.4	1.1790	7.52	0	38.35	0.0%	#NUM!
51811	42	42.01	7.36	6.22	53.2	1.1800	7.52	1	40.34	0.1%	#NUM!
51811	44	44.02	7.31	5.8	49.6	1.1820	7.47	1	42.35	0.1%	0.00
51811	46	46	7.27	5.1	43.5	1.1830	7.43	1	44.33	0.1%	0.00
51811	48	48.02	7.27	4.58	39.1	1.1830	7.41	1	46.35	0.1%	0.00
51811	50	50.02	7.29	4.85	41.4	1.1830	7.42	1	48.35	0.1%	0.00
51811	52	51.91	7.24	3.88	33.1	1.1870	7.37	0	50.24	0.0%	#NUM!
	54								-1.67		

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											0.094
62211	0.25	0.42	24.82	8.7	109.7	0.8893	8.74	4696	Surface		
62211	1	1.06	24.86	8.69	109.7	0.8886	8.74	2127	Surface	100%	
62211	2	2.02	24.88	8.71	109.9	0.8883	8.74	1545	0.35	73%	0.91
62211	3	3.01	24.88	8.71	109.9	0.8892	8.74	1584	1.34	74%	-0.02
62211	4	4.08	24.87	8.76	110.5	0.8884	8.74	599	2.41	28%	0.40
62211	6	6.04	24.87	8.74	110.3	0.889	8.74	403	4.37	19%	0.09
62211	8	8.06	24.83	8.71	109.8	0.8884	8.74	180	6.39	8%	0.13
62211	10	10.04	24.39	8.41	105.1	0.888	8.7	110	8.37	5%	0.06
62211	12	12.01	21.11	8.52	100.1	0.8842	8.67	73	10.34	3%	0.04
62211	14	14.02	19.67	7.65	87.4	0.8895	8.49	53	12.35	2%	0.03
62211	16	16.05	18.23	7.13	79	0.9039	8.23	43	14.38	2.0%	0.01
62211	18	18.02	16.52	6.73	72.1	0.9196	8.02	27	16.35	1.3%	0.03
62211	20	19.94	15.07	5.41	56.2	0.9295	7.8	17	18.27	0.8%	0.03
62211	22	22.02	12.86	3.23	32	0.9455	7.53	11	20.35	0.5%	0.02
62211	24	24.01	11.82	2.03	19.6	0.95	7.41	8	22.34	0.4%	0.01
62211	26	26.03	11.04	1.6	15.2	0.952	7.34	6	24.36	0.3%	0.01
62211	28	28.05	10.52	1.5	14.1	0.953	7.31	6	26.38	0.28%	0.00
62211	30	30.09	9.51	1.59	14.5	0.9565	7.28	4	28.42	0.19%	0.01
62211	32	32.04	9.01	1.46	13.2	0.9576	7.24	4	30.37	0.19%	0.00
62211	34	34.03	8.74	1.07	9.6	0.9594	7.21	3	32.36	0.14%	0.01
62211	36	36.04	8.48	0.91	8.1	0.9591	7.19	2	34.37	0.09%	0.01
62211	38	38.08	8.33	0.69	6.1	0.9596	7.17	2	36.41		
62211	40	39.99	8.26	0.58	5.1	0.9594	7.16	2	38.32		
62211	42	42.09	8.05	0.44	3.9	0.9606	7.15	2	40.42		
62211	44	44.07	7.95	0.29	2.6	0.9616	7.13	1	42.40		
62211	46	46.01	7.88	0.27	2.4	0.9623	7.13	1	44.34		
62211	48	48.08	7.83	0.26	2.2	0.9627	7.12	1	46.41		
62211	50	49.47	7.8	0.24	2.1	0.967	6.86	0	47.80		

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											0.215
72011	0.25	0.32	29.59	7.92	107.9	1.073	8.41	3236	Surface		
72011	1	1.05	29.61	7.93	108	1.074	8.44	3459	Surface	100%	
72011	2	1.98	29.62	7.96	108.5	1.074	8.44	1217	0.31	35%	3.37

72011	3	3.02	29.61	7.94	108.1	1.073	8.43	814	1.35	24%	0.30
72011	4	4.01	29.59	7.86	107	1.073	8.42	285	2.34	8%	0.45
72011	6	5.97	29.56	7.73	105.2	1.073	8.4	322	4.30	9%	-0.03
72011	8	8.14	28.78	7.53	101.2	1.073	8.34	198	6.47	6%	0.08
72011	10	10	27.16	6.87	89.6	1.067	8.2	93	8.33	3%	0.09
72011	12	12.11	24.99	4.35	54.6	1.056	7.85	58	10.44	2%	0.05
72011	14	14.02	23.11	2.07	24.8	1.042	7.6	37	12.35	1.1%	0.04
72011	16	15.94	20.42	0.71	8.1	1.03	7.49	26	14.27	0.8%	0.02
72011	18	18	16.75	0.4	4.2	1.043	7.42	18	16.33	0.5%	0.02
72011	20	19.95	15.05	0.41	4.2	1.053	7.34	12	18.28	0.3%	0.02
72011	22	22.03	14.07	0.36	3.6	1.058	7.3	8	20.36	0.2%	0.02
72011	24	24.01	12.77	0.28	2.8	1.064	7.22	5	22.34	0.1%	0.02
72011	26	26.02	11.09	0.29	2.7	1.072	7.18	3	24.35	0.1%	0.02
72011	28	28	9.72	0.23	2.1	1.078	7.12	2	26.33	0.1%	0.02
72011	30	30.11	9.28	0.22	2	1.081	7.07	1	28.44	0.0%	0.02
72011	32	31.98	9.12	0.23	2	1.08	7.06	1	30.31	0.0%	0.00
72011	34	34.06	8.94	0.22	2	1.081	7.05	1	32.39	0.0%	0.00
72011	36	35.98	8.71	0.22	2	1.082	7.04	1	34.31	0.0%	0.00
72011	38	37.95	8.45	0.23	2	1.085	7.02	1	36.28	0.0%	0.00
72011	40	40.06	8.36	0.22	2	1.085	7.01	1	38.39	0.0%	0.00
72011	42	41.95	8.28	0.22	2	1.086	7	0	40.28		
72011	44	43.96	8.21	0.22	2	1.087	7	0	42.29		
72011	46	45.99	8.19	0.22	1.9	1.087	7.03	0	44.32		
72011	48	47.92	8.19	0.22	1.9	1.088	6.99	0	46.25		
72011	50	50.13	8.17	0.22	1.9	1.088	6.99	0	48.46		
72011	52	51.93	8.16	0.22	1.9	1.088	6.99	0	50.26		

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											#NUM!
81711	0.25	0.28	25.06	8.99	111.8	0.9813	8.68	3543	Surface		
81711	1	1.04	25.06	9.02	112.2	0.9814	8.7	3648	Surface	100%	
81711	2	1.95	25.05	8.99	111.8	0.9815	8.7	1044	0.28	29%	4.47
81711	3	2.95	25.05	8.99	111.8	0.9813	8.7	900	1.28	25%	0.12
81711	4	3.99	25.05	8.99	111.8	0.9814	8.7	433	2.32	12%	0.32
81711	6	6	25.04	8.97	111.6	0.9821	8.7	196	4.33	5%	0.18
81711	8	8	24.88	8.73	108.2	0.9821	8.67	79	6.33	2%	0.14
81711	10	10	24.27	8.32	102	0.9804	8.59	42	8.33	1%	0.08
81711	12	11.95	23.83	7.49	91.1	0.9814	8.5	23	10.28	1%	0.06
81711	14	14.04	23.65	6.97	84.5	0.9834	8.41	10	12.37	0.3%	0.07

81711	16	15.97	22.9	4.83	57.7	0.9933	8.15	3	14.30	0.1%	0.08
81711	18	18.04	19.18	0.86	9.5	1.037	7.6	2	16.37	0.1%	0.02
81711	20	19.97	16.49	0.36	3.7	1.042	7.45	0	18.30	0.00%	#NUM!
81711	22	22.04	14.6	0.28	2.8	1.051	7.35	0	20.37	0.00%	#NUM!
81711	24	22.02	14.65	0.27	2.7	1.049	7.34	0	20.35	0.00%	#NUM!
81711	26	24.08	12.92	0.25	2.4	1.058	7.26	0	22.41	0.00%	#NUM!
81711	28	26.03	11.29	0.24	2.3	1.066	7.14	1	24.36	0.03%	#NUM!
81711	30	28.09	10.59	0.24	2.3	1.07	7.12	0	26.42	0.00%	#NUM!
81711	32	30.05	10.03	0.24	2.2	1.072	7.06	0	28.38	0.00%	#NUM!
81711	34	32.05	9.83	0.24	2.2	1.073	7.03	1	30.38	0.03%	#NUM!
81711	36	34.03	9.64	0.24	2.1	1.075	7.02	1	32.36	0.03%	0.00
81711	38	36.07	9.28	0.23	2.1	1.076	7	1	34.40	0.03%	0.00
81711	40	38.07	9.01	0.23	2.1	1.08	6.97	0	36.40	0.00%	#NUM!
81711	42	39.98	8.95	0.23	2	1.08	6.96	0	38.31	0.00%	#NUM!
81711	44	41.99	8.85	0.23	2.1	1.082	6.95	1	40.32		
81711	46	44.01	8.81	0.23	2.1	1.082	6.95	1	42.34		
81711	48	45.95	8.79	0.23	2	1.082	6.94	0	44.28		
81711	50	48.03	8.79	0.23	2	1.083	6.94	0	46.36		
81711	52	50.01	8.78	0.23	2	1.083	6.94	0	48.34		
81711	54	52	8.78	0.23	2	1.083	6.94	1	50.33		

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											0.201
92111	0.25	0.5	18.52	8.88	98	0.9996	8.43	3996	Surface		
92111	1	1.1	18.53	8.84	97.5	0.9999	8.43	3966	Surface	100%	
92111	2	2.08	18.53	8.87	97.9	0.9996	8.43	1561	0.41	39%	2.27
92111	3	3.04	18.53	8.87	97.8	0.9999	8.42	1050	1.37	26%	0.29
92111	4	3.92	18.52	8.86	97.8	0.9999	8.41	852	2.25	21%	0.09
92111	6	5.93	18.51	8.86	97.7	0.9998	8.41	484	4.26	12%	0.13
92111	8	8.25	18.49	8.83	97.4	1	8.39	319	6.58	8%	0.06
92111	10	10.09	18.48	8.81	97.1	0.9999	8.39	169	8.42	4%	0.08
92111	12	12	18.42	8.79	96.8	0.9998	8.39	112	10.33	3%	0.04
92111	14	14.27	18.19	8.73	95.6	0.9977	8.35	63	12.60	1.6%	0.05
92111	16	16.08	17.74	8.36	90.7	0.9987	8.3	41	14.41	1.0%	0.03
92111	18	18.03	17.63	8	86.7	0.9997	8.27	26	16.36	0.7%	0.03
92111	20	20.07	17.53	7.72	83.2	1	8.23	16	18.40	0.4%	0.03
92111	22	22.34	16.71	6.55	69.6	1.009	7.91	9	20.67	0.2%	0.03
92111	24	23.96	15.25	0.36	3.7	1.044	7.34	6	22.29	0.2%	0.02
92111	26	26.15	12.69	0.37	3.6	1.06	7.24	3	24.48	0.1%	0.03

92111	28	27.99	11.63	0.29	2.8	1.061	7.17	2	26.32	0.1%	0.02
92111	30	29.98	10.92	0.29	2.7	1.068	7.12	1	28.31	0.0%	0.02
92111	32	31.92	10.27	0.28	2.6	1.073	7.07	1	30.25		
92111	34	33.82	9.99	0.26	2.4	1.075	7.03	1	32.15		
92111	36	36.29	9.45	0.26	2.4	1.078	6.99	1	34.62		
92111	38	38.32	9.18	0.26	2.4	1.083	6.94	1	36.65		
92111	40	40.31	9.06	0.26	2.3	1.087	6.92	1	38.64		
92111	42	41.97	8.99	0.25	2.3	1.09	6.9	0	40.30		
92111	44	43.98	8.98	0.25	2.3	1.091	6.89	1	42.31		
92111	46	46.1	8.96	0.25	2.2	1.092	6.88	0	44.43		
92111	48	47.91	8.97	0.25	2.2	1.093	6.83	0	46.24		
	50								-1.67		
	52								-1.67		
	54								-1.67		