LAKE COUNTY, ILLINOIS

# 2010 DEER LAKE SUMMARY REPORT


PREPARED BY ENVIRONMENTAL SERVICES

**LAKE COUNTY HEALTH DEPARTMENT**

POPULATION HEALTH ENVIRONMENTAL SERVICES

**The outlet structure of Deer Lake, July 2010**

Deer Lake is a 59-acre glacial lake east of Antioch in northern Lake County. Deer Lake is the receiving waterbody of Redwing Slough and drains to North Mill Creek. The Lake County Health Department - Environmental Services (LCHD-ES) sampled the lake and stream water quality of the North Mill Creek watershed in 2010. Other lakes sampled include Redwing Slough, Timber Lake, White Lake, Lake Linden, Waterford Lake, Potomac Lake, McDonald Lake 1, McDonald Lake 2, Hastings Lake, Crooked Lake, and Slough Lake. Reports for these lakes can be found in the detailed lake reports section of our website: LCHD-ES Lake Reports.

Deer Lake is listed as an ADID (advanced identification) wetland by the U.S. Environmental Protection Agency and an Illinois Natural Areas Inventory (INAI) by the state of Illinois. This indicates that the lake and surrounding natural environments have potential to have high quality aquatic resources based on water quality and hydrology values.

Deer Lake and the land surrounding it are primarily owned by the Illinois Department of Natural Resources (IDNR). There is one privately owned parcel on the southeast portion of the lake.

The lake is used primarily for waterfowl hunting and fishing. Waterfowl hunters must successfully draw a permit from the IDNR to use Deer Lake during the fall hunting season.

In 2010 the LCHD-ES collected water samples May - September, conducted an aquatic plant survey in July, and created a bathymetric map based on depth information collected during the aquatic plant sampling.

### SPECIAL POINTS OF INTEREST:

- *ADID wetland*
- *Managed by IDNR*
- *Waterfowl hunting program*
- *Abundant wildlife*
- *Well buffered and a low impact lake*

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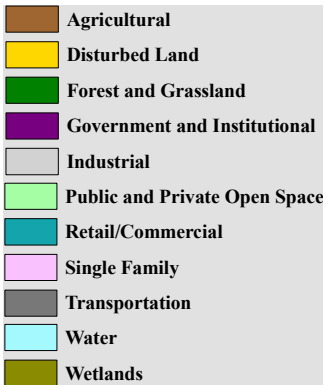
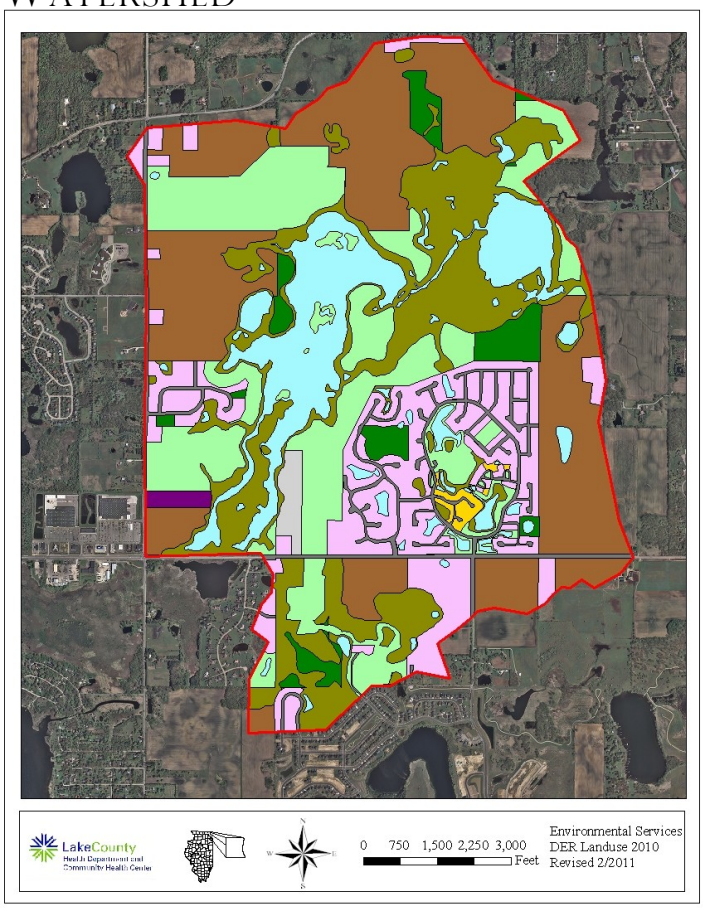
# WATERSHED




**Land use within the Deer Lake watershed**




The health of a lake is directly affected by the health of its watershed. This means that any management of the land within the watershed can directly affect the lake. Deer Lake has a watershed area of 2294 acres that carries nutrients and pollutants to the lake with each rainfall. Deer Lake is part of the North Mill Creek Watershed. The LCHD-ES sampled all the lakes within the North Mill Creek watershed except for Rasmussen Lake in 2006 and 2010 and some comparisons will be made to that data. Rasmussen Lake was not sampled because the dam is in the process of being removed.

Generally, the lake health decreases from top to bottom of the watershed due to increased inputs. This is indeed the case with Deer Lake. The only other lake in Deer Lake's immediate watershed, Redwing Slough, had better water quality in the form of lower average total phosphorus and chloride concentration in 2010.

The major land uses within the Deer Lake watershed were agriculture (27%), public and private open space (19%), wetland (19%), and single family (14%). Each type of land use contributes differently to the stormwater run-off. The developed land uses contain more impervious surface and allow less infiltration. Single family (31%) and transportation (23%) were the land uses contributing the highest percentages of estimated run-off. Any increase in urban and transportation land use will likely increase the amount of chlorides ($Cl^-$) entering the lake due to the increased surface area that will require winter de-icing. It is important to keep in mind that although the amount of estimated run-off from certain areas may be low, those areas can still deliver high concentrations of sediment and nutrients.

To reduce impacts to the lake residents should apply phosphorous free fertilizer to their lawns, have their septic systems pumped and serviced regularly, and use alternative to salt for winter de-icing. The use of rain gardens can help stormwater infiltrate into the ground producing less run-off and help recharge groundwater. Also, increased impervious surface creates increased run-off which can raise lake levels. Increased water in a lake creates a larger volume of water which can hold more nutrients and can also lead to flooding.

The retention time (the amount of time it takes for water entering a lake to flow out of it again) of Deer Lake was calculated to be approximately 111days.

It is also important to monitor any existing and future development within the watershed and encouraged the lake health be considered in the development plans.

We all live in a watershed. A watershed is the land and water around a lake that drains to that lake. This means that any management of the land within the watershed can directly affect the lake.

**What can you do to help protect Deer Lake?**

# WATER CLARITY

Water clarity is the most commonly used indicator of water quality. Generally, clearer water indicates better water quality. The water is clearer due to less algae, sediment, or microscopic animals in the water column. It is important to remember that to have a balanced lake ecosystem there has to be some algae and microscopic animals present.

A way for residents to monitor the lakes health is to participate in the Illinois Environmental Protection Agency (IEPA) sponsored Volunteer Lake Monitoring Program (VLMP). This data provides valuable information on the annual water clarity trends of the lake.

In 2000 the LCHD-ES average Secchi depth was 5.99 feet. This decreased to 5.59 feet in 2006 and continued to decrease to the 2010 average of 4.20 feet which was still greater than the County median of 2.95 feet. The decrease is likely due to a reduction in rooted aquatic plants in the main body of the lake which resulted on increased algae blooms. In addition, the lack of rooted aquatic plants allowed sediment from the bottom to be suspended into the water column by wind and wave action.

### VOLUNTEER LAKE MONITOR PROGRAM

Volunteers measure water clarity using the Secchi disk twice a month May through October. In 2010 there were **43 lakes** participating in Lake County.

If you would like more information please contact:

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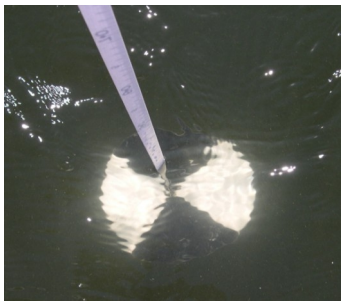
www.epa.state.il.us/water/vlmp/index.html



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.

# TOTAL SUSPENDED SOLIDS

Generally, Secchi depth is inversely correlated with total suspended solid (TSS) concentrations, meaning a decrease in Secchi depth would indicate an increase in TSS. This was indeed the case in 2010. The 2010 average TSS value of 7.8 mg/L was more than double the 2006 average of 3.0 mg/L and more than three times the 2000 average of 2.5 mg/L.

TSS is comprised of nonvolatile suspended solids (non-organic clay or sediment materials), and volatile suspended solids (algae and other organic matter).

The increase in TSS is likely due to the same reason as the poor water clarity, the lack of rooted aquatic plants allowed algae blooms and sediment from the bottom to be suspended into the water column by wind and wave action.

Although Deer Lake is well buffered and relatively a low impact lake, development in the watershed can have negative impacts on TSS by the improper erosion control allowing sediment to leave any construction site.

### Lake Facts:

**Major Watershed:** Des Plaines River

**Sub-Watershed**: North Mill Creek

**Location:** T46N, R10E, Sections 11, NW 1/4

**Surface Area:** 49.7 acres

**Shoreline Length:** 1.2 miles

**Maximum Depth**: 8.9 feet

**Average Depth:** 5.3 feet

**Lake Volume:** 241.2 acre-feet

**Watershed Area:** 2293.5 acres

**Lake Type:** Glacial

**Management Entity:** Illinois Department of Natural Resources

**Current Uses:** Hunting and fishing

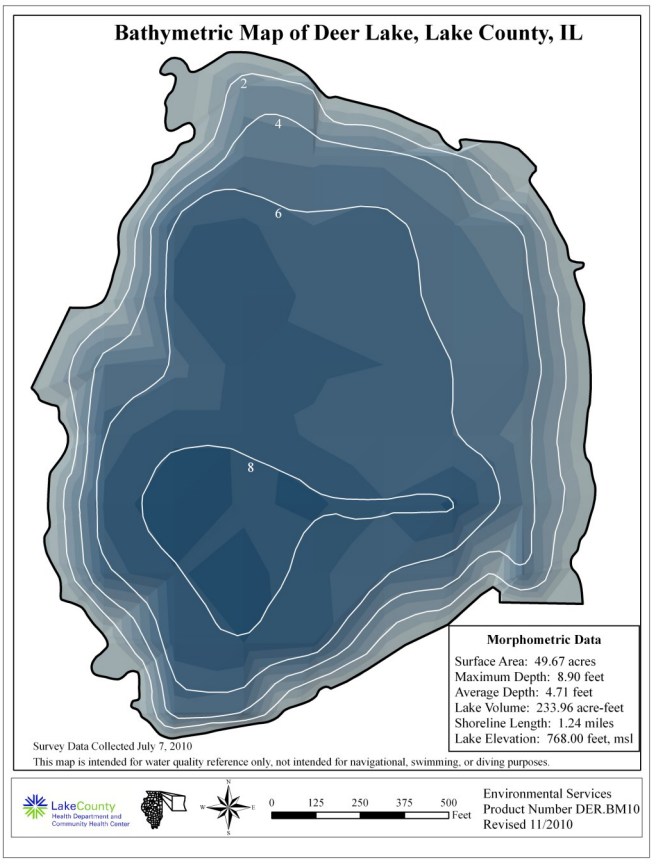
# BATHYMETRIC MAP

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. It was recommended in the 2006 report that a bathymetric map be created since no previous map was available.

The LCHD-ES used ArcGis software to create a 60 meter grid of the lake for a total of 51 sampling points. Each point was navigated to using a Trimble GPS unit with sub-foot accuracy and the depth was recorded.

Once collected, the data was imported into ArcGis for further analysis. In ArcGis, the contours were drawn and the volume was calculated.

Deer Lake had an elevation of 768.00 feet above mean sea level, the surface area was 49.67 acres, the maximum depth was 8.90 feet, the average depth was 4.71 feet, the shoreline length was 1.24 miles, and the volume was 233.96 acre-feet.



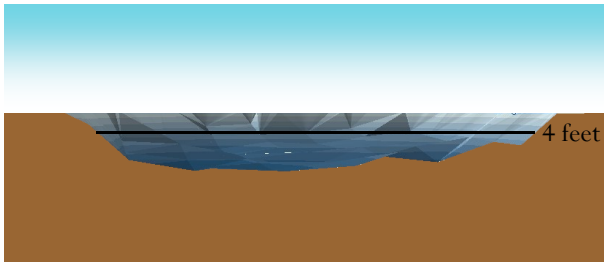

**2010 Bathymetric Map**

**Click here for more Lake Maps**

# DISSOLVED OXYGEN

Due to the shallow nature of the lake, wind and wave action generally keeps the waters well mixed. A dissolved oxygen (DO) concentration of greater than 5.0 mg/L is required to maintain a healthy fishery in a lake, since fish can suffer oxygen stress below this amount. A concentration of at least 5.0 mg/L was recorded at the surface of Deer Lake the entire sampling season. However, in August the DO concentration was less than 5.0 mg/L below one foot. This could be due to the decay of algae. In July a major planktonic algae bloom was noted. The algae bloom caused the DO concentration to be elevated in the upper layers of the water column where the algae was concentrated. The low DO levels near the bottom were likely a result of the highly organic bottom in the lake.

Deer Lake did thermally stratify in July and August. Thermal stratification occurs when a lake divides into an upper, warm water layer (epilimnion) and a lower, cold-water layer (hypolimnion). The lake was weakly stratified at approximately 4 to 5 feet during July and August which corresponded with the anoxic (DO <1.0 mg/L) boundary. This represented 79% to 89%, respectively, of the lake volume based on the bathymetric map created by the LCHD-ES in 2010. In fact during the August sampling fish were coming to the water's surface for air.




**An illustration of Deer Lake looking north showing the anoxic boundary, August 2010.**

According to the Illinois Department of Natural Resources (IDNR), Deer Lake has a history of fish kills with the most recent during the winters of 2001-2002 and 2008-2009. The IDNR is attributing these events to low dissolved

# NUTRIENTS

**Tips to limit phosphorus**

- ⇒ Use phosphorus free lawn fertilizers
- ⇒ Have your septic system maintained on a regular basis
- ⇒ Do not burn leaves/ brush where ashes will was into the lake
- ⇒ Install buffer strips or rain gardens to filter run off.
- ⇒ Do not feed wildlife such as waterfowl and fish.

Nutrient concentrations can also play a role in lake health. Elevated levels of the nutrients Nitrogen or Phosphorus are a common cause of poor lake health. A ratio of Total Nitrogen (TN) to Total Phosphorus (TP) is used to determine which nutrient is limiting the lakes productivity. In 2010, Deer Lake had a TN:TP ratio of 17:1 indicating that phosphorus was the limiting nutrient. This is consistent with previous monitoring. In 2000 the TN:TP ratio was 19:1 and in 2006 it was 32:1. This being the case, any addition of phosphorus to Deer Lake would likely cause an increase in plant and/or algal growth.

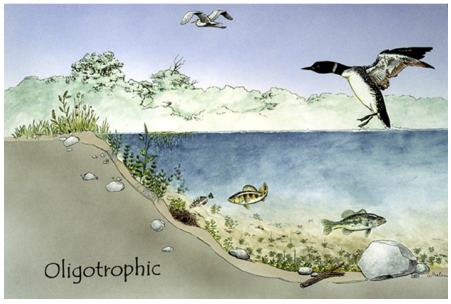
In 2010 the epilimnetic total phosphorus (TP) concentration was greater than the county median (0.065 mg/L) at 0.094 mg/L. This was a 119% increase from 2006 (0.043 mg/L) and a 74% increase from the 2000 concentration of 0.054 mg/L. The IEPA TP standard for TP is 0.050mg/L in at least one sample during the monitoring year. Deer Lake exceeded the standard each month in 2010.

This increase could be related to a reduction in aquatic plants. Excess nutrients would normally be bound up in the aquatic plants, but the reduction in plants yielded more available nutrients as indicated by an increase in soluble reactive phosphorus (SRP) which is the form readily available for growth. The SRP increased from 0.009mg/L in 2006 to 0.011 mg/L in 2010. This increase in SRP yielded more algal growth in the summer of 2010.

# TROPHIC STATE INDEX

Total phosphorous can be used to calculate the trophic state index (TSIp), which classifies lakes according to the overall level of nutrient enrichment. The trophic state of Deer Lake in terms of its phosphorus concentration during 2000 was eutrophic, with a TSIp score of 61.8. In 2006 the TSIp score decreased to 58.5, but still classified Deer Lake as eutrophic. In 2010 the TSIp increased to 69.6, still eutrophic, and ranking 104th out of 165 lakes in Lake County based on average TP concentrations.

It is strongly recommended that homeowners within the watershed only use lawn fertilizers that contain no phosphorus unless a soil test indicates the need for phosphorus. This would help reduce further inputs of phosphorus to Deer Lake.




Oligotrophic lakes have low nutrient levels. They are often clear lakes with little aquatic plant and/or algae growth. Oligotrophic lakes have a TSIp score less than 40.

Mesotrophic lakes have moderate nutrient levels. These lakes are generally clear with beds of submersed aquatic vegetation. Mesotrophic lakes have a TSIp score between 40 and 50.

Eutrophic lakes are nutrient rich and productive in the terms of aquatic plants and/or algae. Eutrophic Lakes have a TSIp score between 50 and 70. Lakes with a TSIp score of greater than 70 would be classified as Hypereutrophic.

**Illustrations from the Wisconsin Department of Natural Resources**

# IEPA ASSESSMENT

The Illinois Environmental Protection Agency (IEPA) has assessment indices to classify Illinois lakes for their ability to support aquatic life and recreational uses. The guidelines consider several aspects, such as water clarity, phosphorus concentrations (TSIp), and aquatic plant coverage. According to this index, Deer Lake provided *Full* support of aquatic life and *Partial* support of recreational activities. The lake provided *Partial* overall use.

| DATE | COND | $Cl^-$ |
|---|---|---|
| 2000 | 0.3653 | NA |
| 2006 | 0.5468 | 64 |
| 2010 | 0.4654 | 42 |

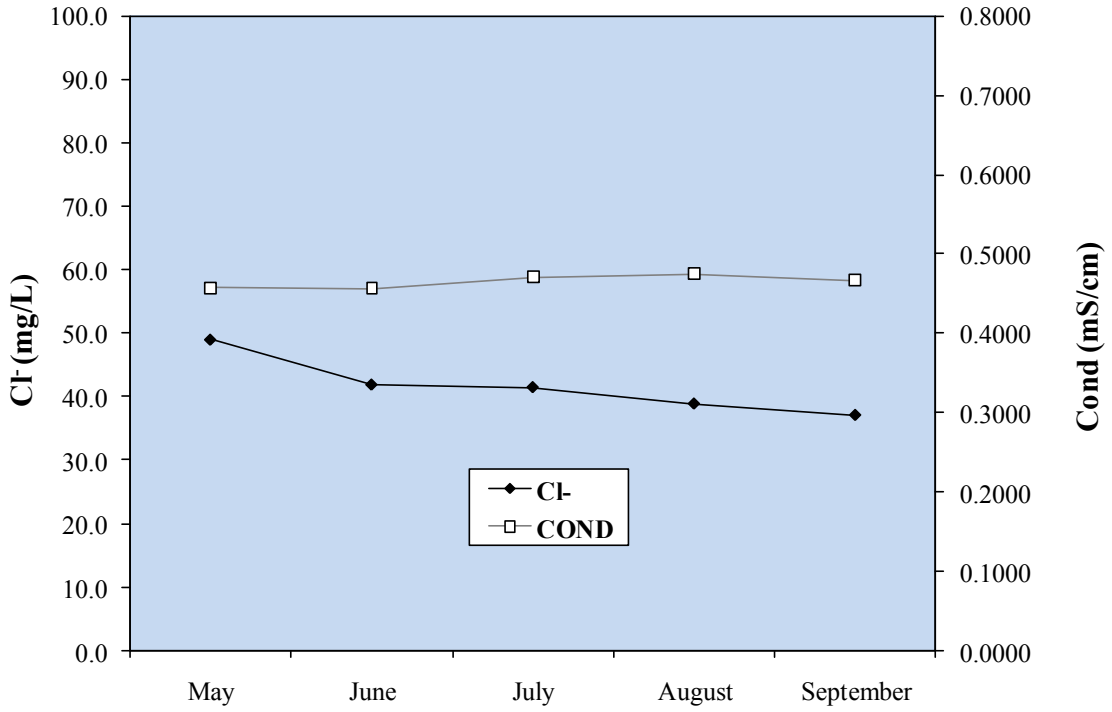
# CONDUCTIVITY/CHLORIDES

Conductivity is a measurement of water's ability to conduct electricity and is correlated with chloride ($Cl^-$) concentrations. Lakes with residential and urban land uses in their watershed often have higher conductivity readings and $Cl^-$ concentrations because of the use of road salts, compared to lakes in undeveloped areas. Stormwater runoff from impervious surfaces such as roads and parking lots can deliver high concentrations of $Cl^-$ to nearby waterbodies. The Lake County epilimnetic median conductivity reading was 0.7800 milliSiemens/cm (mS/cm). During 2010, the Deer Lake average epilimnetic conductivity reading was lower, at 0.4654 mS/cm. This was lower than the 2006 average (0.5468 mS/cm) but greater than the 2000 average (0.3653 mS/cm). The decrease from 2006 to 2010 is likely due to the rains of 2009 and 2010 "flushing" the $Cl^-$ out of the lake.

The $Cl^-$ concentration in Deer Lake was lower than the Lake County epilimnetic median of 142 mg/L during 2010, with an epilimnetic average of 42 mg/L. The $Cl^-$ concentration in 2010 had increased from the 2006 average of 64 mg/L.

Deer Lake is considered a low impact lake due to very little development within its watershed. As a low impact lake, Deer Lake seems to be less affected by activities within the watershed. Deer has seen some changes in both conductivity and $Cl^-$ since 2000, however the fluctuations seem to be more a product of the amount of precipitation than impacts of land use.

It has been determined by Environment Canada that chloride concentrations higher than 230 mg/L have a negative impact on aquatic systems and prolonged exposure can harm up to 10% of aquatic species. Additionally, shifts in algal populations were associated with chloride concentrations as low as 12 mg/L. The USEPA limit of 230 mg/L is equal to 1 teaspoon of table salt added to 5 gallons of water.




**An illustration of the positive correlation between chloride concentration and conductivity**

# Aquatic Plants - Summary

In July of 2010, the LCHD-ES conducted an aquatic plan survey of Deer Lake. Using ArcGIS mapping software, the LCHD-ES created a sampling grid consisting of 63 points with each point being 60 meters apart. This was the same grid used during the 2006 sampling.

In July 2010, 62 points were sampled with plants being found at 60 sites. The maximum depth plants were found was 9.0 feet. However, 12 of the sites with plants contained free floating plants that are easily moved around the lake by the wind. The maximum depth with rooted aquatic plants was 8.4 feet.

The most abundant plant found in 2010 was Coontail at 79% of the sampled sites. The next most common species were Star Duckweed (68%), White Water Lily (42%), Duckweed (32%), Watermeal (19%), and Giant Duckweed (16%). There were 14 aquatic plant species and one macro-algae species (Chara) found. This was a decrease in plant diversity from 2006 when 20 aquatic plant species and one macro-algae (Chara) were found. In 2006, Coontail (92%) was the most abundant plant followed by Eurasian Watermilfoil (77%).

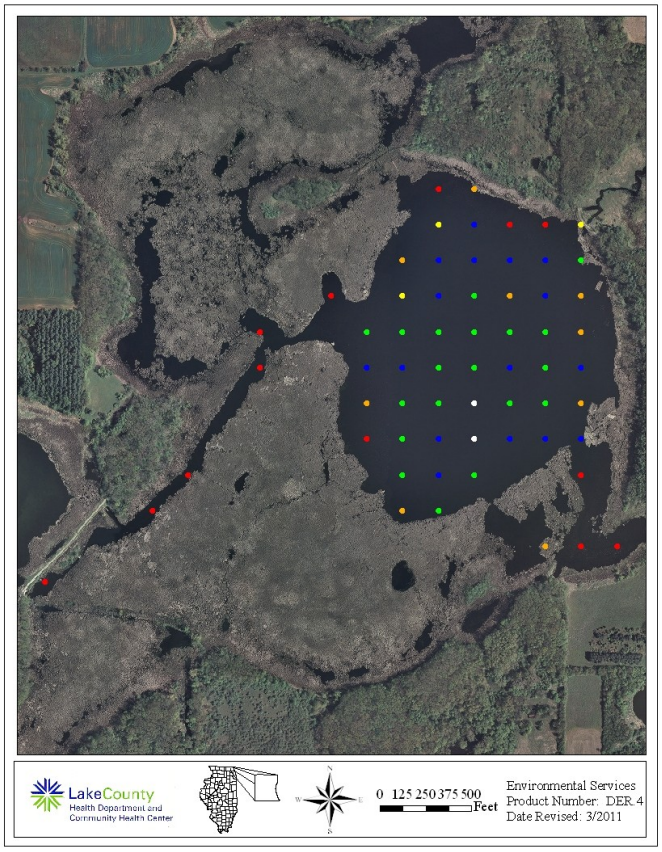
In 2010 the only exotic plant species found in Deer Lake was Curlyleaf Pondweed (CLP), and only at one site. The density of CLP may be misrepresented in this survey. Since the survey was done in July, most of the CLP had already died off for the season. In fact, it was noted during the June sampling that CLP was seen throughout the channel from the launch to the main body of the lake.

The overall abundance of aquatic plants in Deer Lake has decreased from 2006 to 2010. In 2006, 57 % of the sample sites had a rake density of over 90% coverage and 92% of the sample sites had a rake density of greater than 40% coverage. This dropped to 21% of the sampled sites having a rake density over 90% coverage and 40% of the sampled sites having a rake density of greater than 40% coverage. As can be seen in illustration below, most of these sites were in the channels or near shore areas. The main part of the lake had low plant abundance. This reduction is of interest as the lake has no known aquatic plant management program.

A floristic quality index (FQI) has been developed to rank lakes on there plant diversity and abundance. A high FQI number indicates that there was a large number of sensitive, high quality plant species present in the lake. Deer Lake had a FQI of 23.5 ranking it 22nd among lakes in Lake County. This is a decrease from the 2006 value of 28.2 and is due to the reduction in plant species.

Any aquatic plant management of Deer Lake should consider the long term goals and not just quick fix strategies. The goal should be to preserve and promote the native plant population.

**Aquatic Plant Sampling on Deer Lake, July 2010**




| | |
|---|---|
| ● | **No Plants** |
| ● | **1 - 10%** |
| ● | **11 - 40%** |
| ● | **41 - 60%** |
| ● | **61 - 90%** |
| ● | **91 - 100%** |

**Deer Lake Rake Density July, 2010.**

# NOTEWORTHY OBSERVATIONS

Each time the LCHD-ES visited Deer Lake they recorded any wildlife observed. Deer Lake has excellent habitat for a variety of birds, mammals, and other wildlife since it is located in a rural, undeveloped setting. Good numbers of wildlife, particularly birds, were noted on and around Deer Lake. A Sandhill Crane, a threatened species in Illinois, was noted along the dike between Redwing Slough and Deer Lake in May. Other notable animals seen on the drive into the lake include White-tailed Deer and Wild Turkey.

Habitat around Deer Lake was good. The undeveloped areas had a mix of open fields and small woods. Deadfalls and snag trees, which provide valuable habitat for cavity nesters, were located within the forested areas around Deer Lake and Redwing Slough.

Deer Lake is almost entirely surrounded by cattails, which provided habitat to a variety of wildlife. Red-wing Blackbirds, Marsh Wrens, and Gold Finches were observed within the cattails. Other birds seen while on Deer Lake included Mallard Ducks, Wood Ducks, Canada Geese, and Mute Swans along with Great Blue Herons, Egrets, Green Herons, Cormorants, and Caspian Terns.

In addition to birds, Painted Turtles, Green Frogs, Bull Frogs, and Beaver were seen inhabiting Deer Lake.

In June there was a boat of fisherman enjoying the day on Deer Lake. In the hour and a half the LCHD-ES was sampling, the fisherman boated several Northern Pike. In August fish were observed coming to the surface for air. Deer Lake has a history of fish kills, with the most recent coming during the winter of 2008 - 2009. The IDNR conducted an electrofishing survey on June 8, 2009 to assess the severity of the fish kill. The survey found seven species of fish that are able to survive low DO levels. The IDNR stocks Channel Catfish, Largemouth Bass, and Northern Pike to contain the unchecked reproduction of the fish kill surviving fish.

# CASPIAN TERN

**Caspian Tern at Illinois Beach State Park**

The Caspian Tern, *Sterna caspia,* is the world's largest tern. Adult birds have black legs, and a long thick red-orange bill with a small black tip. They have a white head with a black cap and white neck, belly and tail. The upper wings and back are pale grey while the underside of the wings are pale with dark primary feathers. In flight, the tail is less forked than other terns. Unlike other terns, the black cap is still present during the winter, but with some white streaking on the forehead.

The Caspian Tern diet consists primarily of fish. They collect the fish by hovering high over the water and then diving into the water. Other food items include large insects and the young and eggs of other birds or small rodents. They can travel over 30 miles in search of fish.

Mating occurs in spring and summer. They can lay one to three brown spotted, pale blue green eggs. They will nest together in colonies or singly in mixed colonies of other tern and gull species. The nest is on the ground among gravel and sand but can be on vegetation. The eggs are incubated for 26–28 days. The chicks are variable in plumage pattern from pale creamy to darker grey-brown. This color variation allows the parents identify their chicks when returning to the colony from feeding trips.

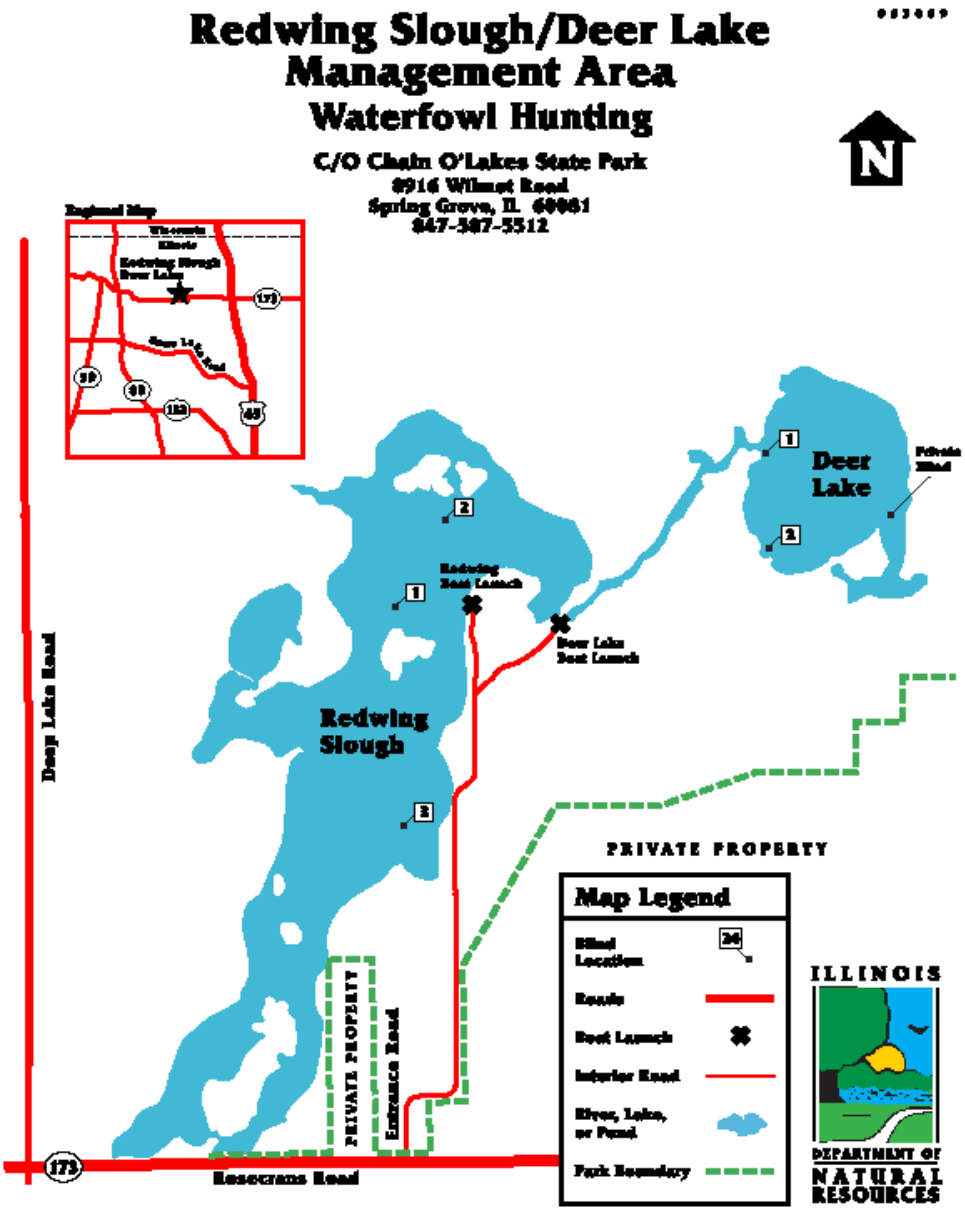
Their breeding habitat is lakes and the ocean coasts, including the Great Lakes in North America. North American birds migrate to southern coasts of the West Indies and the northern coast of South America.

**Information complied from:** www.allaboutbirds.org/guide/Caspian_Tern/lifehistory

# WATERFOWL HUNTING PROGRAM

The Illinois Department of Natural Resources is responsible for providing outdoor recreation opportunities for the residents of the State. Of particular concern is providing adequate safe hunting areas on public lands throughout the State. The waterfowl hunting program at Redwing Slough/Deer Lake provides a quality hunting experience by limiting hunting pressure to that which occurred historically on the site. The cultural heritage of waterfowl hunting on the site dates back to the days when market hunting for waterfowl was unregulated. The Department of Natural Resources is pleased to continue the tradition of waterfowl hunting on this unique site.

The number of hunters is regulated through a public drawing. Potential hunters must register in person for the drawing. The place and time for the drawing is publicly announced by the IDNR. When registering, hunters must choose whether they want to hunt Deer Lake or Redwing Slough as they are not able to register for both.




**Map courtesy of the Illinois Department of Natural Resources**

In addition to the state and federal regulations, the IDNR has some site specific regulations for the Redwing Slough/Deer Lake Management Area.

⇒ Hunting is only allowed on Saturday, Sunday, and Monday only.

⇒ Outboard motors must of six horsepower or less are permitted for blind building and hunting.

⇒ No more than four people may occupy a blind at any one time

⇒ Weeds and brush may not be controlled around the blind unless approved by the IDNR.

⇒ The use of Purple Loosestrife and Giant Reed as blind brush is prohibited.

⇒ The only waterfowl season allowed is the Northern Zone duck season.

⇒ Shooting hours are from legal opening until 1:00 p.m.

⇒ No person shall buy, sell, or commercialize hunting rights

⇒ Bogging of blinds is prohibited.

LakeCounty
Health Department and
Community Health Center

ENVIRONMENTAL SERVICES

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**For more information visit us at:**

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

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

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

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

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

## MANAGEMENT RECOMMENDATIONS

The water quality of Deer Lake has declined over the last five years. The water clarity has decreased while the TSS and TP have increased. The aquatic plant community has also changed in the last 5 years. The abundance and diversity of plants decreased. On a positive note, Eurasian Watermilfoil was one of the aquatic plants not found in 2010.

Deer Lake is primarily managed by the Illinois Department of Natural Resources for waterfowl hunting. It has experienced two fish kills over the last 10 years. To help improve the overall quality of Deer Lake, the LCHD- ES has the following recommendations:

- **Educate lake users on how to control the spread of exotic species**
- **Participate in the Volunteer Lake Monitoring Program**
- **Reduce nutrients and chlorides within the watershed**

**STOP AQUATIC HITCHHIKERS!™**

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

**When you leave a body of water:**

- Remove any visible mud, plants, fish or animals before transporting equipment.
- Eliminate water from equipment before transporting.
- Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.).
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

# Water quality data for Deer Lake, 2000, 2006 and 2010

| 2010 | Epilimnion | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | DEPTH | ALK | TKN | $NH_3$-N | $NO_2$+$NO_3$-N | TP | SRP | $Cl^-$ | TDS | TSS | TS | TVS | SECCHI | COND | pH | DO |
| 12-May | 3 | 170 | 1.02 | <0.1 | <0.05 | 0.064 | <0.005 | 49 | NA | 3.9 | 291 | 101 | 6.60 | 0.4573 | 8.40 | 7.82 |
| 9-Jun | 3 | 161 | 1.49 | 0.146 | 0.201 | 0.127 | 0.013 | 42 | NA | 7.4 | 296 | 118 | 3.77 | 0.4567 | 7.94 | 6.41 |
| 14-Jul | 3 | 174 | 1.84 | <0.1 | 0.283 | 0.092 | <0.005 | 42 | NA | 11.0 | 298 | 92 | 2.07 | 0.4709 | 8.57 | 11.33 |
| 11-Aug | 3 | 169 | 1.59 | <0.1 | <0.05 | 0.118 | 0.009 | 39 | NA | 11.0 | 296 | 97 | 2.90 | 0.4750 | 7.73 | 3.84 |
| 15-Sep | 3 | 179 | 1.36 | <0.1 | <0.05 | 0.067 | <0.005 | 37 | NA | 5.8 | 308 | 100 | 5.65 | 0.4669 | 8.49 | 9.39 |
| | **Average** | 171 | 1.46 | 0.146[k] | 0.242[k] | 0.094 | 0.011[k] | 42 | NA | 7.8 | 298 | 102 | 4.20 | 0.4654 | 8.23 | 7.76 |

| 2006 | Epilimnion | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | DEPTH | ALK | TKN | $NH_3$-N | $NO_2$+$NO_3$-N | TP | SRP | $Cl^-$ | TDS | TSS | TS | TVS | SECCHI | COND | pH | DO |
| 10-May | 3 | 177 | 1.44 | <0.1 | <0.05 | 0.041 | <0.005 | 59 | NA | 3.6 | 358 | 109 | 4.86 | 0.5810 | NA | 9.12 |
| 14-Jun | 3 | 169 | 1.18 | <0.1 | <0.05 | 0.035 | <0.005 | 62 | NA | 1.0 | 367 | 127 | 6.10 | 0.5550 | 8.31 | 10.96 |
| 12-Jul | 3 | 154 | 1.49 | <0.1 | <0.05 | 0.063 | <0.005 | 63 | NA | 4.3 | 365 | 136 | 3.96[a] | 0.5300 | 7.74 | 5.40 |
| 9-Aug | 3 | 141 | 1.39 | <0.1 | <0.05 | 0.040 | <0.005 | 66 | NA | 3.0 | 361 | 143 | 4.98 | 0.5280 | 8.31 | 6.48 |
| 13-Sep | 3 | 150 | 1.58 | 0.233 | <0.05 | 0.038 | 0.009 | 68 | NA | 2.9 | 326 | 100 | 6.43 | 0.5400 | 7.90 | 6.02 |
| | **Average** | 158 | 1.42 | 0.233[k] | <0.05 | 0.043 | 0.009[k] | 64 | NA | 3.0 | 355 | 123 | 5.59[b] | 0.5468 | 8.07[e] | 7.60 |

| 2000 | Epilimnion | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | DEPTH | ALK | TKN | $NH_3$-N | $NO_3$-N[*] | TP | SRP | $Cl^-$ | TDS | TSS | TS | TVS | SECCHI | COND | pH | DO |
| 24-May | 3 | 181 | 1.27 | <0.1 | 0.064 | 0.040 | <0.005 | NA | 296 | 1.6 | 321 | 131 | 6.23 | 0.4734 | 8.07 | 9.20 |
| 28-Jun | 3 | 125 | <0.5 | <0.1 | 0.07 | 0.045 | 0.015 | NA | 226 | 1.3 | 234 | 105 | 7.48 | 0.3177 | 7.17 | 5.10 |
| 26-Jul | 3 | 138 | 0.62 | <0.1 | 0.075 | 0.062 | <0.005 | NA | 228 | 1.9 | 234 | 105 | 5.64 | 0.3323 | 7.06 | 3.40 |
| 30-Aug | 2 | 143 | 1.3 | <0.1 | 0.077 | 0.081 | 0.006 | NA | 200 | 6.6 | 242 | 114 | 4.59 | 0.3493 | 7.37 | 3.70 |
| 27-Sep | 3 | 152 | 1.53 | 0.193 | <0.05 | 0.043 | 0.012 | NA | 240 | 0.9 | 242 | 85 | 0[c] | 0.3538 | 7.62 | 6.70 |
| | **Average** | 148 | 0.94[k] | 0.193[k] | 0.072[k] | 0.054 | 0.011[k] | NA | 238 | 2.5 | 255 | 108 | 5.99[d] | 0.3653 | 7.46 | 5.62 |

# Water quality data for Deer Lake, 2000, 2006 and 2010

**Glossary**

ALK = Alkalinity, mg/L $CaCO_3$
TKN = Total Kjeldahl nitrogen, mg/L
$NH_3$-N = Ammonia nitrogen, mg/L
$NO_2$+$NO_3$-N = Nitrate + Nitrite nitrogen, mg/L
$NO_3$-N = Nitrate nitrogen, mg/L
TP = Total phosphorus, mg/L
SRP = Soluble reactive phosphorus, mg/L
$Cl^-$ = Chloride, 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

a = Secchi depth was obstructed by plants
b = Secchi disk depth average does not include data from July because Secchi disk was obstructed by plants
c = Secchi depth was obstructed by the bottom
d = Secchi disk depth average does not include data from September because Secchi disk was on the bottom and therefore the reading could have been deeper
e = Does not include May due to bad pH probe
k = Denotes that the actual value is known to be less than the value presented.
NA= Not applicable
* = Prior to 2006 only Nitrate - nitrogen was analyzed

# Approximate land uses and retention time for Deer Lake, 2010.

| Land Use | Acreage | % of Total |
|---|---|---|
| Agricultural | 608.71 | 26.5% |
| Disturbed Land | 11.57 | 0.5% |
| Forest and Grassland | 85.47 | 3.7% |
| Government and Institutional | 10.08 | 0.4% |
| Industrial | 19.35 | 0.8% |
| Public and Private Open Space | 438.48 | 19.1% |
| Single Family | 321.86 | 14.0% |
| Transportation | 84.35 | 3.7% |
| Water | 279.83 | 12.2% |
| Wetlands | 433.78 | 18.9% |
| **Total Acres** | **2293.48** | **100.0%** |

| Land Use | Acreage | Runoff Coeff. | Estimated Runoff, acft. | % Total of Estimated Runoff |
|---|---|---|---|---|
| Agricultural | 608.71 | 0.05 | 83.7 | 9.7% |
| Disturbed Land | 11.57 | 0.05 | 1.6 | 0.2% |
| Forest and Grassland | 85.47 | 0.05 | 11.8 | 1.4% |
| Government and Institutional | 10.08 | 0.50 | 13.9 | 1.6% |
| Industrial | 19.35 | 0.85 | 45.2 | 5.3% |
| Public and Private Open Space | 438.48 | 0.15 | 180.9 | 21.0% |
| Single Family | 321.86 | 0.30 | 265.5 | 30.9% |
| Transportation | 84.35 | 0.85 | 197.2 | 22.9% |
| Water | 279.83 | 0.00 | 0.0 | 0.0% |
| Wetlands | 433.78 | 0.05 | 59.6 | 6.9% |
| **TOTAL** | **2293.48** | | **859.3** | **100.0%** |

| | | |
|---|---|---|
| **Lake volume** | **261.09** | **acre-feet** |
| **Retention Time (years)= lake volume/runoff** | **0.30** | **years** |
| | **110.90** | **days** |

**Deer Lake 2010 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1.230 |
| 51210 | 0.25 | 0.22 | 11.07 | 8.41 | 78.3 | 0.4571 | 8.59 | 894 | Surface | 100% | |
| 51210 | 1 | 1.06 | 11.07 | 8.00 | 74.5 | 0.4570 | 8.47 | 661 | Surface | 100% | |
| 51210 | 2 | 2.02 | 11.07 | 7.87 | 73.3 | 0.4576 | 8.42 | 139 | 0.27 | 21% | 5.78 |
| 51210 | 3 | 3.00 | 11.07 | 7.82 | 72.8 | 0.4573 | 8.40 | 130 | 1.25 | 20% | 0.05 |
| 51210 | 4 | 4.03 | 11.06 | 7.78 | 72.5 | 0.4570 | 8.38 | 92 | 2.28 | 14% | 0.15 |
| 51210 | 5 | 5.01 | 11.04 | 7.68 | 71.5 | 0.4571 | 8.35 | 66 | 3.26 | 10% | 0.10 |
| 51210 | 6 | 6.00 | 11.03 | 7.63 | 71.1 | 0.4573 | 8.34 | 50 | 4.25 | 8% | 0.07 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1.022 |
| 60910 | 0.25 | 0.24 | 20.28 | 6.58 | 75.3 | 0.4561 | 7.94 | 4139 | Surface | 100% | |
| 60910 | 1 | 1.00 | 20.26 | 6.60 | 75.5 | 0.4563 | 7.93 | 3678 | Surface | 100% | |
| 60910 | 2 | 2.02 | 20.24 | 6.51 | 74.5 | 0.4566 | 7.93 | 1053 | 0.27 | 29% | 4.63 |
| 60910 | 3 | 3.04 | 20.22 | 6.41 | 73.4 | 0.4567 | 7.94 | 417 | 1.29 | 11% | 0.72 |
| 60910 | 4 | 4.11 | 20.23 | 6.43 | 73.5 | 0.4564 | 7.93 | 181 | 2.36 | 5% | 0.35 |
| 60910 | 5 | 4.99 | 20.13 | 5.86 | 66.9 | 0.4576 | 7.90 | 105 | 3.24 | 3% | 0.17 |
| 60910 | 6 | 6.12 | 19.93 | 2.50 | 28.4 | 0.4669 | 7.64 | 51 | 4.37 | 1% | 0.17 |
| 60910 | 7 | 7.05 | 19.40 | 0.92 | 10.4 | 0.4922 | 7.61 | 31 | 5.3 | 1% | 0.09 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1.156 |
| 71410 | 0.25 | 0.43 | 27.61 | 11.44 | 149.3 | 0.4708 | 8.59 | 3760 | Surface | 100% | |
| 71410 | 1 | 1.00 | 27.60 | 11.47 | 149.7 | 0.4708 | 8.59 | 3747 | Surface | 100% | |
| 71410 | 2 | 1.98 | 27.58 | 11.47 | 149.6 | 0.4708 | 8.58 | 1196 | 0.23 | 32% | 4.97 |
| 71410 | 3 | 3.02 | 27.50 | 11.33 | 147.6 | 0.4709 | 8.57 | 364 | 1.27 | 10% | 0.94 |
| 71410 | 4 | 3.94 | 27.34 | 10.38 | 134.7 | 0.4713 | 8.53 | 134 | 2.19 | 4% | 0.46 |
| 71410 | 5 | 4.99 | 26.53 | 1.34 | 17.2 | 0.4758 | 7.44 | 61 | 3.24 | 2% | 0.24 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 71410 | 6 | 5.95 | 25.35 | 0.27 | 3.4 | 0.4805 | 7.11 | 27 | 4.2 | 0.7% | 0.19 |
| 71410 | 7 | 7.02 | 24.12 | 0.17 | 2.1 | 0.5676 | 6.73 | 13 | 5.27 | 0.3% | 0.14 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1.174 |
| 8/11/2010 | 0.5 | 0.50 | 26.91 | 5.00 | 63.0 | 0.4740 | 8.05 | 574 | Surface | 100% | |
| 8/11/2010 | 1 | 1.05 | 26.89 | 5.14 | 64.5 | 0.4740 | 7.92 | 475 | Surface | 100% | |
| 8/11/2010 | 2 | 2.00 | 26.77 | 4.74 | 59.3 | 0.4750 | 7.83 | 115 | 0.251 | 24% | 5.64 |
| 8/11/2010 | 3 | 3.02 | 26.50 | 3.84 | 47.8 | 0.4750 | 7.73 | 46 | 1.27 | 10% | 0.73 |
| 8/11/2010 | 4 | 3.81 | 25.64 | 0.47 | 5.8 | 0.4750 | 7.66 | 28 | 2.061 | 6% | 0.24 |
| 8/11/2010 | 5 | 4.85 | 24.83 | 0.18 | 2.2 | 0.4700 | 7.52 | 14 | 3.1 | 3% | 0.22 |
| 8/11/2010 | 6 | 5.80 | 24.08 | 0.10 | 1.2 | 0.4620 | 7.38 | 8 | 4.054 | 2% | 0.13 |
| 8/11/2010 | 7 | 6.77 | 23.20 | 0.07 | 0.8 | 0.4580 | 7.14 | 5 | 5.021 | 1% | 0.09 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1.011 |
| 9/15/2010 | 0.25 | 0.48 | 20.43 | 9.40 | 106.8 | 0.4667 | 8.40 | 3066 | Surface | 100% | |
| 9/15/2010 | 1 | 1.01 | 20.42 | 9.38 | 106.5 | 0.4671 | 8.46 | 2940 | Surface | 100% | |
| 9/15/2010 | 2 | 2.06 | 20.43 | 9.44 | 107.2 | 0.4667 | 8.49 | 920 | 0.31 | 31% | 3.75 |
| 9/15/2010 | 3 | 2.99 | 20.42 | 9.39 | 106.7 | 0.4669 | 8.49 | 412 | 1.24 | 14% | 0.65 |
| 9/15/2010 | 4 | 4.01 | 20.41 | 9.22 | 104.7 | 0.4671 | 8.48 | 193 | 2.26 | 7% | 0.34 |
| 9/15/2010 | 5 | 5.08 | 20.40 | 8.70 | 98.7 | 0.4676 | 8.44 | 97 | 3.33 | 3% | 0.21 |
| 9/15/2010 | 6 | 6.06 | 20.22 | 3.31 | 37.4 | 0.4966 | 7.93 | 59 | 4.31 | 2% | 0.12 |

# 2000 - 2010 Water Quality Parameters, Statistics Summary

| | ALKoxic <=3ft00-2010 | |
|---|---|---|
| Average | **165** | |
| Median | **160** | |
| Minimum | **65** | **IMC** |
| Maximum | **330** | **Flint Lake** |
| STD | **42** | |
| n = | **812** | |

| | ALKanoxic 2000-2010 | |
|---|---|---|
| Average | **201** | |
| Median | **192** | |
| Minimum | **103** | **Heron Pond** |
| Maximum | **470** | **Lake Marie** |
| STD | **52** | |
| n = | **249** | |

| | Condoxic <=3ft00-2010 | |
|---|---|---|
| Average | **0.8629** | |
| Median | **0.7800** | |
| Minimum | **0.2260** | **Schreiber Lake** |
| Maximum | **6.8920** | **IMC** |
| STD | **0.5215** | |
| n = | **812** | |

| | Condanoxic 2000-2010 | |
|---|---|---|
| Average | **1.0125** | |
| Median | **0.8678** | |
| Minimum | **0.3210** | **Lake Kathyrn, Schreiber Lake** |
| Maximum | **7.4080** | **IMC** |
| STD | **0.7821** | |
| n = | **248** | |

| | NO3-N, Nitrate+Nitrite,oxic <=3ft00-2010 | |
|---|---|---|
| Average | **0.489** | |
| Median | **0.160** | |
| Minimum | **<0.05** | ***ND** |
| Maximum | **9.670** | **South Churchill Lake** |
| STD | **1.054** | |
| n = | **812** | |

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

| | NH3-Nanoxic 2000-2010 | |
|---|---|---|
| Average | **2.132** | |
| Median | **1.360** | |
| Minimum | **<0.1** | ***ND** |
| Maximum | **18.400** | **Taylor Lake** |
| STD | **2.345** | |
| n = | **249** | |

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

| | pHoxic <=3ft00-2010 | |
|---|---|---|
| Average | **8.37** | |
| Median | **8.36** | |
| Minimum | **7.07** | **Bittersweet #13** |
| Maximum | **10.40** | **Summerhill Estates** |
| STD | **0.46** | |
| n = | **810** | |

| | pHanoxic 2000-2010 | |
|---|---|---|
| Average | **7.33** | |
| Median | **7.30** | |
| Minimum | **6.24** | **Banana Pond** |
| Maximum | **9.16** | **White Lake** |
| STD | **0.43** | |
| n = | **248** | |

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

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# 2000 - 2010 Water Quality Parameters, Statistics Summary (continued)

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

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

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

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

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

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

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

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

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

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

No 2002 IEPA Chain Lakes

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

No 2002 IEPA Chain Lakes.

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

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

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

Minimums and maximums are based on data from all lakes from 2000-2010 (n=1357).

Average, median and STD are based on data from the most recent water quality sampling year for each lake.

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# Lake County average TSI phosphorus (TSIp) ranking 2000-2010.

| 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 | West Loon Lake | 0.0140 | 42.21 |
| 6 | Cedar Lake | 0.0150 | 43.20 |
| 7 | Windward Lake | 0.0160 | 44.13 |
| 8 | Sand Pond (IDNR) | 0.0165 | 44.57 |
| 9 | Fourth Lake | 0.0180 | 45.83 |
| 10 | Pulaski Pond | 0.0180 | 45.83 |
| 11 | Banana Pond | 0.0200 | 47.35 |
| 12 | Lake Kathryn | 0.0200 | 47.35 |
| 13 | Lake Minear | 0.0200 | 47.35 |
| 14 | Highland Lake | 0.0202 | 47.49 |
| 15 | Timber Lake (North) | 0.0210 | 48.05 |
| 16 | Cross Lake | 0.0220 | 48.72 |
| 17 | Dog Training Pond | 0.0220 | 48.72 |
| 18 | Sun Lake | 0.0220 | 48.72 |
| 19 | Deep Lake | 0.0230 | 49.36 |
| 20 | Lake of the Hollow | 0.0230 | 49.36 |
| 21 | Round Lake | 0.0230 | 49.36 |
| 22 | Stone Quarry Lake | 0.0230 | 49.36 |
| 23 | Druce Lake | 0.0240 | 49.98 |
| 24 | Bangs Lake | 0.0250 | 50.57 |
| 25 | Little Silver Lake | 0.0250 | 50.57 |
| 26 | Lake Leo | 0.0260 | 51.13 |
| 27 | Dugdale Lake | 0.0270 | 51.68 |
| 28 | Peterson Pond | 0.0270 | 51.68 |
| 29 | Lake Miltmore | 0.0280 | 52.20 |
| 30 | Gray's Lake | 0.0300 | 53.20 |
| 31 | Lake Fairfield | 0.0300 | 53.20 |
| 32 | Lake Catherine | 0.0310 | 53.67 |
| 33 | Lambs Farm Lake | 0.0310 | 53.67 |
| 34 | Old School Lake | 0.0310 | 53.67 |
| 35 | Sand Lake | 0.0320 | 54.13 |
| 36 | Third Lake | 0.0320 | 54.13 |
| 37 | Gages Lake | 0.0340 | 55.00 |
| 38 | Hendrick Lake | 0.0340 | 55.00 |
| 39 | Honey Lake | 0.0340 | 55.00 |
| 40 | Cranberry Lake | 0.0360 | 55.82 |
| 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 | Schreiber Lake | 0.0400 | 57.34 |
| 46 | Waterford Lake | 0.0400 | 57.34 |

# Lake County average TSI phosphorus (TSIp) ranking 2000-2010.

| RANK | LAKE NAME | TP AVE | TSIp |
|---|---|---|---|
| 47 | Hook Lake | 0.0410 | 57.70 |
| 48 | Duck Lake | 0.0430 | 58.39 |
| 49 | Nielsen Pond | 0.0450 | 59.04 |
| 50 | Seven Acre Lake | 0.0460 | 59.36 |
| 51 | Turner Lake | 0.0460 | 59.36 |
| 52 | Willow Lake | 0.0460 | 59.36 |
| 53 | East Meadow Lake | 0.0480 | 59.97 |
| 54 | Lucky Lake | 0.0480 | 59.97 |
| 55 | Old Oak Lake | 0.0490 | 60.27 |
| 56 | College Trail Lake | 0.0500 | 60.56 |
| 57 | East Loon Lake | 0.0520 | 61.13 |
| 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 | Lake Naomi | 0.0620 | 63.66 |
| 70 | Lake Tranquility (S1) | 0.0620 | 63.66 |
| 71 | Liberty Lake | 0.0630 | 63.89 |
| 72 | Werhane Lake | 0.0630 | 63.89 |
| 73 | Countryside Glen Lake | 0.0640 | 64.12 |
| 74 | Davis Lake | 0.0650 | 64.34 |
| 75 | Lake Fairview | 0.0650 | 64.34 |
| 76 | Leisure Lake | 0.0650 | 64.34 |
| 77 | Wooster 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 | Crooked Lake | 0.0700 | 65.41 |
| 82 | Lake Helen | 0.0720 | 65.82 |
| 83 | ADID 203 | 0.0730 | 66.02 |
| 84 | Bluff Lake | 0.0730 | 66.02 |
| 85 | Spring Lake | 0.0730 | 66.02 |
| 86 | Harvey Lake | 0.0770 | 66.79 |
| 87 | Broberg Marsh | 0.0780 | 66.97 |
| 88 | Sylvan Lake | 0.0790 | 67.16 |
| 89 | Big Bear Lake | 0.0810 | 67.52 |
| 90 | Redwing Slough | 0.0822 | 67.73 |
| 91 | Petite Lake | 0.0830 | 67.87 |
| 92 | Lake Marie | 0.0850 | 68.21 |

# Lake County average TSI phosphorus (TSIp) ranking 2000-2010.

| RANK | LAKE NAME | TP AVE | TSIp |
|---|---|---|---|
| 93 | Potomac Lake | 0.0850 | 68.21 |
| 94 | Timber Lake (South) | 0.0850 | 68.21 |
| 95 | White Lake | 0.0862 | 68.42 |
| 96 | Grand Ave Marsh | 0.0870 | 68.55 |
| 97 | North Churchill Lake | 0.0870 | 68.55 |
| 98 | Grandwood Park Lake | 0.0880 | 68.71 |
| 99 | McDonald Lake 1 | 0.0880 | 68.71 |
| 100 | North Tower Lake | 0.0880 | 68.71 |
| 101 | Rivershire Pond 2 | 0.0900 | 69.04 |
| 102 | South Churchill Lake | 0.0900 | 69.04 |
| 103 | McGreal Lake | 0.0910 | 69.20 |
| 104 | Deer Lake | 0.0940 | 69.66 |
| 105 | Dunn's Lake | 0.0950 | 69.82 |
| 106 | Eagle Lake (S1) | 0.0950 | 69.82 |
| 107 | International Mine and Chemical Lake | 0.0950 | 69.82 |
| 108 | Valley Lake | 0.0950 | 69.82 |
| 109 | Countryside Lake | 0.0960 | 69.97 |
| 110 | Fish Lake | 0.0960 | 69.97 |
| 111 | Lochanora Lake | 0.0960 | 69.97 |
| 112 | Long Lake | 0.0970 | 70.12 |
| 113 | Island Lake | 0.0990 | 70.41 |
| 114 | Woodland Lake | 0.0990 | 70.41 |
| 115 | Nippersink Lake | 0.1000 | 70.56 |
| 116 | Forest Lake | 0.1020 | 70.84 |
| 117 | Longview Meadow Lake | 0.1020 | 70.84 |
| 118 | Lake Barrington | 0.1050 | 71.26 |
| 119 | Lake Forest Pond | 0.1070 | 71.53 |
| 120 | Bittersweet Golf Course #13 | 0.1100 | 71.93 |
| 121 | Fox Lake | 0.1100 | 71.93 |
| 122 | Osprey Lake | 0.1110 | 72.06 |
| 123 | Bresen Lake | 0.1130 | 72.32 |
| 124 | Round Lake Marsh North | 0.1130 | 72.32 |
| 125 | Deer Lake Meadow Lake | 0.1160 | 72.70 |
| 126 | Taylor Lake | 0.1180 | 72.94 |
| 127 | Columbus Park Lake | 0.1230 | 73.54 |
| 128 | Lake Nipperink | 0.1240 | 73.66 |
| 129 | Echo Lake | 0.1250 | 73.77 |
| 130 | Grass Lake | 0.1290 | 74.23 |
| 131 | Lake Holloway | 0.1320 | 74.56 |
| 132 | Redhead Lake | 0.1410 | 75.51 |
| 133 | Antioch Lake | 0.1450 | 75.91 |
| 134 | Slocum Lake | 0.1500 | 76.40 |
| 135 | Lakewood Marsh | 0.1510 | 76.50 |
| 136 | Pond-A-Rudy | 0.1510 | 76.50 |
| 137 | Lake Matthews | 0.1520 | 76.59 |
| 138 | Buffalo Creek Reservoir | 0.1550 | 76.88 |

# Lake County average TSI phosphorus (TSIp) ranking 2000-2010.

| RANK | LAKE NAME | TP AVE | TSIp |
|---|---|---|---|
| 139 | Pistakee Lake | 0.1590 | 77.24 |
| 140 | Grassy Lake | 0.1610 | 77.42 |
| 141 | Salem Lake | 0.1650 | 77.78 |
| 142 | Half Day Pit | 0.1690 | 78.12 |
| 143 | Lake Eleanor | 0.1810 | 79.11 |
| 144 | Lake Farmington | 0.1850 | 79.43 |
| 145 | Lake Louise | 0.1850 | 79.43 |
| 146 | ADID 127 | 0.1890 | 79.74 |
| 147 | Patski Pond | 0.1970 | 80.33 |
| 148 | Dog Bone Lake | 0.1990 | 80.48 |
| 149 | Summerhill Estates Lake | 0.1990 | 80.48 |
| 150 | Redwing Marsh | 0.2070 | 81.05 |
| 151 | Stockholm Lake | 0.2082 | 81.13 |
| 152 | Bishop Lake | 0.2160 | 81.66 |
| 153 | Ozaukee Lake | 0.2200 | 81.93 |
| 154 | Hidden Lake | 0.2240 | 82.19 |
| 155 | McDonald Lake 2 | 0.2250 | 82.25 |
| 156 | Fischer Lake | 0.2280 | 82.44 |
| 157 | Oak Hills Lake | 0.2790 | 85.35 |
| 158 | Loch Lomond | 0.2950 | 86.16 |
| 159 | Heron Pond | 0.2990 | 86.35 |
| 160 | Fairfield Marsh | 0.3260 | 87.60 |
| 161 | ADID 182 | 0.3280 | 87.69 |
| 162 | Slough Lake | 0.3860 | 90.03 |
| 163 | Flint Lake Outlet | 0.5000 | 93.76 |
| 164 | Rasmussen Lake | 0.5030 | 93.85 |
| 165 | Albert Lake, Site II, outflow | 1.1894 | 106.26 |

**Aquatic vegetation species found at the 63 sampling sites on Deer Lake, July 2010.**
**Maximum depth that plants were found was 9.0 feet.**

| Plant Density | Common Bladderwort | Chara | Coontail | Curlyleaf Pondweed | Duckweed | Elodea | Flatstem Pondweed | Giant Duckweed |
|---|---|---|---|---|---|---|---|---|
| Absent | 53 | 61 | 13 | 61 | 42 | 59 | 53 | 52 |
| Present | 6 | 1 | 13 | 1 | 11 | 3 | 2 | 6 |
| Common | 3 | 0 | 17 | 0 | 5 | 0 | 4 | 3 |
| Abundant | 0 | 0 | 8 | 0 | 3 | 0 | 2 | 1 |
| Dominant | 0 | 0 | 11 | 0 | 1 | 0 | 1 | 0 |
| % Plant Occurrence | 14.5% | 1.6% | 79.0% | 1.6% | 32.3% | 4.8% | 14.5% | 16.1% |

| Plant Density | Illinois Pondweed | Sago Pondweed | Spatterdock | Star Duckweed | Watermeal | Water Stargrass | White Water Lily |
|---|---|---|---|---|---|---|---|
| Absent | 61 | 56 | 59 | 20 | 50 | 61 | 36 |
| Present | 1 | 4 | 2 | 27 | 6 | 1 | 10 |
| Common | 0 | 1 | 0 | 11 | 4 | 0 | 7 |
| Abundant | 0 | 1 | 1 | 4 | 1 | 0 | 5 |
| Dominant | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| % Plant Occurrence | 1.6% | 9.7% | 4.8% | 67.7% | 19.4% | 1.6% | 41.9% |

**Distribution of rake density across all sampling sites**

| Rake Density (Coverage) | # of Sites | % |
|---|---|---|
| No plants | 2 | 3.2 |
| >0 to 10% | 19 | 30.6 |
| >10 to 40% | 16 | 25.8 |
| >40 to 60% | 9 | 14.5 |
| >60 to 90% | 3 | 4.8 |
| >90% | 13 | 21.0 |
| Total Sites with Plants | 60 | 96.8 |
| Total # of Sites | 62 | 100.0 |

# Lake County average Floristic Quality Index (FQI) ranking 2000-2010.

| RANK | LAKE NAME | FQI (w/A) | FQI (native) |
|---|---|---|---|
| 1 | Cedar Lake | 38.0 | 40.0 |
| 2 | Cranberry Lake | 34.4 | 34.4 |
| 3 | West Loon Lake | 34.3 | 35.7 |
| 4 | East Loon Lake | 33.6 | 35.0 |
| 5 | Little Silver | 31.6 | 29.6 |
| 6 | Deep Lake | 31.2 | 29.7 |
| 7 | Round Lake Marsh North | 29.9 | 29.1 |
| 8 | Bangs Lake | 29.8 | 32.0 |
| 9 | Sullivan Lake | 28.5 | 26.9 |
| 10 | Independence Grove | 27.5 | 24.6 |
| 11 | Lake Zurich | 27.1 | 24.3 |
| 12 | Sterling Lake | 26.9 | 24.5 |
| 13 | Sun Lake | 26.1 | 24.3 |
| 14 | Round Lake | 25.9 | 23.5 |
| 15 | Druce Lake | 25.2 | 22.8 |
| 16 | Honey Lake | 25.1 | 23.3 |
| 17 | Schreiber Lake | 24.8 | 23.9 |
| 18 | Fourth Lake | 24.8 | 23.0 |
| 19 | Lake of the Hollow | 24.8 | 23.0 |
| 20 | Lakewood Marsh | 24.7 | 23.8 |
| 21 | Redwing Slough | 24.0 | 25.8 |
| 22 | Deer Lake | 23.5 | 24.4 |
| 23 | Butler Lake | 23.1 | 21.4 |
| 24 | Third Lake | 23 | 24.7 |
| 25 | Duck Lake | 22.9 | 21.1 |
| 26 | Countryside Glen Lake | 22.8 | 21.9 |
| 27 | Cross Lake | 22.4 | 24.2 |
| 28 | McGreal Lake | 22.1 | 20.2 |
| 29 | Wooster Lake | 21.9 | 23.6 |
| 30 | Davis Lake | 21.4 | 21.4 |
| 31 | Broberg Marsh | 21.4 | 20.5 |
| 32 | Fish Lake | 21.2 | 19.3 |
| 33 | Redhead Lake | 21.2 | 19.3 |
| 34 | Turner Lake | 21.2 | 18.6 |
| 35 | Timber Lake (North) | 20.9 | 23.4 |
| 36 | Lake Kathryn | 20.7 | 19.6 |
| 37 | ADID 203 | 20.5 | 20.5 |
| 38 | Lake Miltmore | 20.3 | 18.4 |
| 39 | Salem Lake | 20.2 | 18.5 |
| 40 | Gray's Lake | 19.8 | 16.9 |
| 41 | Old Oak Lake | 19.1 | 18.0 |
| 42 | Highland Lake | 18.9 | 16.7 |
| 43 | Forest Lake | 18.0 | 19.0 |
| 44 | Lake Helen | 18.0 | 18.0 |
| 45 | Potomac Lake | 17.8 | 17.8 |
| 46 | Bresen Lake | 17.8 | 16.6 |
| 47 | Hendrick Lake | 17.7 | 17.7 |
| 48 | Lake Barrington | 17.7 | 16.7 |
| 49 | Windward Lake | 17.6 | 16.3 |
| 50 | Diamond Lake | 17.4 | 16.3 |
| 51 | Owens Lake | 17.3 | 16.3 |
| 52 | Osprey Lake | 17.3 | 15.5 |
| 53 | Long Lake | 17.2 | 19.0 |
| 54 | Lake Tranquility (S1) | 17.0 | 15.0 |

# Lake County average Floristic Quality Index (FQI) ranking 2000-2010.

| Rank | LAKE NAME | FQI (w/A) | FQI (native) |
|---|---|---|---|
| 55 | McDonald Lake 1 | 16.7 | 17.7 |
| 56 | Island Lake | 16.6 | 14.7 |
| 57 | Lake Fairview | 16.3 | 15.2 |
| 58 | Grand Avenue Marsh | 16.3 | 14.3 |
| 59 | Lake Nippersink | 16.3 | 14.3 |
| 60 | Taylor Lake | 16.3 | 14.3 |
| 61 | White Lake | 16.0 | 17.0 |
| 62 | Dog Training Pond | 15.9 | 14.7 |
| 63 | Dog Bone Lake | 15.7 | 15.7 |
| 64 | Seven Acre Lake | 15.5 | 17.0 |
| 65 | Ames Pit | 15.5 | 13.4 |
| 66 | Heron Pond | 15.1 | 15.1 |
| 67 | Dugdale Lake | 15.1 | 14.0 |
| 68 | Eagle Lake (S1) | 15.1 | 14.0 |
| 69 | Mary Lee Lake | 15.1 | 13.1 |
| 70 | Old School Lake | 15.1 | 13.1 |
| 71 | Hastings Lake | 15.0 | 17.0 |
| 72 | North Churchill Lake | 15.0 | 15.0 |
| 73 | Bishop Lake | 15.0 | 13.4 |
| 74 | Sand Lake | 14.8 | 12.5 |
| 75 | Countryside Lake | 14.7 | 14.7 |
| 76 | Timber Lake (South) | 14.7 | 12.7 |
| 77 | Buffalo Creek Reservoir | 14.3 | 13.1 |
| 78 | Lake Carina | 14.3 | 12.1 |
| 79 | Lake Leo | 14.3 | 12.1 |
| 80 | Lambs Farm Lake | 14.3 | 12.1 |
| 81 | Crooked Lake | 14.0 | 16.0 |
| 82 | Longview Meadow Lake | 13.9 | 13.9 |
| 83 | Dunn's Lake | 13.9 | 12.7 |
| 84 | Summerhill Estates Lake | 13.9 | 12.7 |
| 85 | Lake Napa Suwe | 13.9 | 11.7 |
| 86 | Lake Minear | 13.9 | 11.0 |
| 87 | Stockholm Lake | 13.5 | 12.1 |
| 88 | Antioch Lake | 13.4 | 11.3 |
| 89 | Hook Lake | 13.4 | 11.3 |
| 90 | Lake Charles | 13.4 | 11.3 |
| 91 | Rivershire Pond 2 | 13.3 | 11.5 |
| 92 | Flint Lake | 13.0 | 11.8 |
| 93 | Harvey Lake | 13.0 | 11.8 |
| 94 | McDonald Lake 2 | 12.5 | 12.5 |
| 95 | Stone Quarry Lake | 12.5 | 12.5 |
| 96 | Lake Naomi | 12.5 | 11.2 |
| 97 | Pulaski Pond | 12.5 | 11.2 |
| 98 | Pond-A-Rudy | 12.1 | 12.1 |
| 99 | Loch Lomond | 12.1 | 9.4 |
| 100 | Grassy Lake | 12.0 | 12.0 |
| 101 | Lake Matthews | 12.0 | 12.0 |
| 102 | Nielsen Pond | 12.0 | 10.7 |
| 103 | Werhane Lake | 12.0 | 9.8 |
| 104 | Lake Lakeland Estates | 11.5 | 10.0 |
| 105 | Redwing Marsh | 11.0 | 11.0 |
| 106 | Tower Lake | 11.0 | 11.0 |
| 107 | West Meadow Lake | 11.0 | 11.0 |
| 108 | Big Bear Lake | 11.0 | 9.5 |
| 109 | Little Bear Lake | 11.0 | 9.5 |
| 110 | Fischer Lake | 11.0 | 9.0 |
| 111 | Grandwood Park Lake | 11.0 | 9.0 |
| 112 | Lake Holloway | 10.6 | 10.6 |

# Lake County average Floristic Quality Index (FQI) ranking 2000-2010.

| Rank | LAKE NAME | FQI (w/A) | FQI (native) |
|---|---|---|---|
| 113 | Lake Fairfield | 10.4 | 9.0 |
| 114 | Lake Louise | 10.4 | 9.0 |
| 115 | College Trail Lake | 10.0 | 10.0 |
| 116 | Gages Lake | 10.0 | 5.8 |
| 117 | Valley Lake | 9.9 | 9.9 |
| 118 | Woodland Lake | 9.9 | 8.1 |
| 119 | Lake Christa | 9.8 | 8.5 |
| 120 | Lake Farmington | 9.8 | 8.5 |
| 121 | Lucy Lake | 9.8 | 8.5 |
| 122 | Columbus Park Lake | 9.2 | 9.2 |
| 123 | Sylvan Lake | 9.2 | 9.2 |
| 124 | Waterford Lake | 9.2 | 9.2 |
| 125 | Banana Pond | 9.2 | 7.5 |
| 126 | Leisure Lake | 9.0 | 6.4 |
| 127 | Albert Lake | 8.7 | 7.5 |
| 128 | Fairfield Marsh | 8.7 | 7.5 |
| 129 | Lake Eleanor | 8.7 | 7.5 |
| 130 | Ozaukee Lake | 8.7 | 6.7 |
| 131 | East Meadow Lake | 8.5 | 8.5 |
| 132 | South Churchill Lake | 8.5 | 8.5 |
| 133 | Lake Forest Pond | 8.5 | 6.9 |
| 134 | Peterson Pond | 8.5 | 6.0 |
| 135 | Bittersweet Golf Course #13 | 8.1 | 8.1 |
| 136 | Lake Linden | 8.0 | 8.0 |
| 137 | Patski Pond | 7.1 | 7.1 |
| 138 | Rasmussen Lake | 7.1 | 7.1 |
| 139 | Slocum Lake | 7.1 | 5.8 |
| 140 | IMC Lake | 7.1 | 5.0 |
| 141 | Lucky Lake | 7.0 | 7.0 |
| 142 | Deer Lake Meadow Lake | 6.4 | 5.2 |
| 143 | ADID 127 | 5.0 | 5.0 |
| 144 | Liberty Lake | 5.0 | 5.0 |
| 145 | Oak Hills Lake | 5.0 | 5.0 |
| 146 | Slough Lake | 5.0 | 5.0 |
| 147 | Sand Pond (IDNR) | 5.0 | 3.5 |
| 148 | Half Day Pit | 5.0 | 2.9 |
| 149 | Lochanora Lake | 5.0 | 2.5 |
| 150 | Echo Lake | 0.0 | 0.0 |
| 151 | Hidden Lake | 0.0 | 0.0 |
| 152 | North Tower Lake | 0.0 | 0.0 |
| 153 | St. Mary's Lake | 0.0 | 0.0 |
| 154 | Willow Lake | 0.0 | 0.0 |
| | ***Mean*** | **15.3** | **14.4** |
| | ***Median*** | **14.3** | **12.9** |