

LAKE COUNTY, ILLINOIS

2011 DRUCE LAKE SUMMARY REPORT

PREPARED BY THE ENVIRONMENTAL SERVICES
 LAKE COUNTY HEALTH DEPARTMENT
 POPULATION HEALTH ENVIRONMENTAL SERVICES



Druce Lake

Druce Lake, located partially in Avon Township and partially in Warren Township, is a glacial lake that was dammed in 1958. Approximately 2/3 of the lake is located within the Village of Third Lake. The lake is dominated by a residential shoreline and is managed by the Village of Third Lake.

Druce Lake has a surface area of 88.3 acres with a mean of 9.3 and maximum depths of 32.5 feet. It is

used by residents for swimming, fishing, and aesthetics, with a boat launch on the south shore and many beaches around the perimeter of the lake. No gas motors are permitted on the lake.

Water quality parameters, such as nutrients, suspended solids, oxygen, temperature, water clarity were measured from May-September 2011. The plant community was assessed in

July when most of the plants are likely to be present.

There were some water quality parameter changes since 2001 which may have been caused by the introduction of zebra mussels in 2004.

Total phosphorus in Druce Lake averaged 0.014 mg/L which is a 41% decrease from the 2001 concentration of 0.024 mg/L and

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Lake Facts:

Major Watershed: Des
Plaines

Sub-Watershed: Mill
Creek sub basin.

Location: T 45N, R 10-
11E, S 19, 24

Surface Area: 88.3 acres

Shoreline Length: 1.5
miles

Maximum Depth: 32.5

Average Depth: 9.3

Lake Volume: 1228.6
acres

Watershed Area: 2499
acres

Lake Type: Glacial

Management Entity:
Associations

Current Uses: swimming
fishing, and sailing.

Access: Private

significantly lower than the Illinois Environmental Protection Agency impairment rate of 0.050 mg/L.

Nitrogen is the other nutrient critical for algal growth. The average Total Kjeldahl nitrogen (TKN) concentration for Druce Lake was 0.60 mg/L, which was lower than the county median of 1.18 mg/L and the 2001 concentration by 39.4% (0.99 mg/L). A total nitrogen to total phosphorus (TN:TP) ratio of 49:1 indicates that phosphorus was the nutrient limiting aquatic plant and algae growth in Druce Lake.

By using phosphorous as an indicator, the trophic state index (TSI_p) ranked Druce Lake as mesotrophic with a TSI_p value of 42.41. This means that the lake is a moderately enriched system with good water quality. The 2011

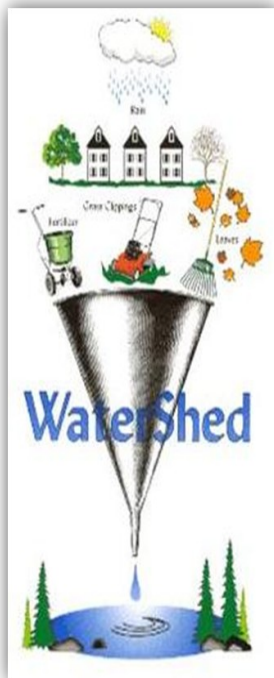
average total suspended solids (TSS) concentration for Druce Lake was 1.7 mg/L, which was less than the county median and a 22.7% decrease from the 2001 average of 2.2 mg/L. Water clarity was measured by Secchi depth, with the lowest reading in May (6.5 ft) and the highest was in June (18.80 ft). The average Secchi depth for the season was 12.25 ft, which was deeper than the county median (2.95ft).

The conductivity of Druce Lake was 1.1650 mS/cm which is higher than the county median (0.7821 mS/cm). This was a 4% decrease from the 2001 average (1.2136mg/L). The chloride concentration in Druce Lake in 2011 was 276 mg/L which was higher the county median of 145 mg/L. Druce Lake has

a large watershed that contributes to the high concentrations of chloride in the lake primarily from road salts. Conductivity was much higher than the County average and had increased dramatically since 1996.

Druce Lake has a diverse and healthy plant community, with 14 different aquatic plant species observed covering 68% of the lake. Curlyleaf pondweed and Eurasian Watermilfoil, which are both non-native plants, were also present. Zebra mussels were discovered in Druce Lake may have entered the lake via storm flow from Gages Lake or transferred by a boat and trailer. These are exotic and invasive species that tend to crowd out native species when left untreated.

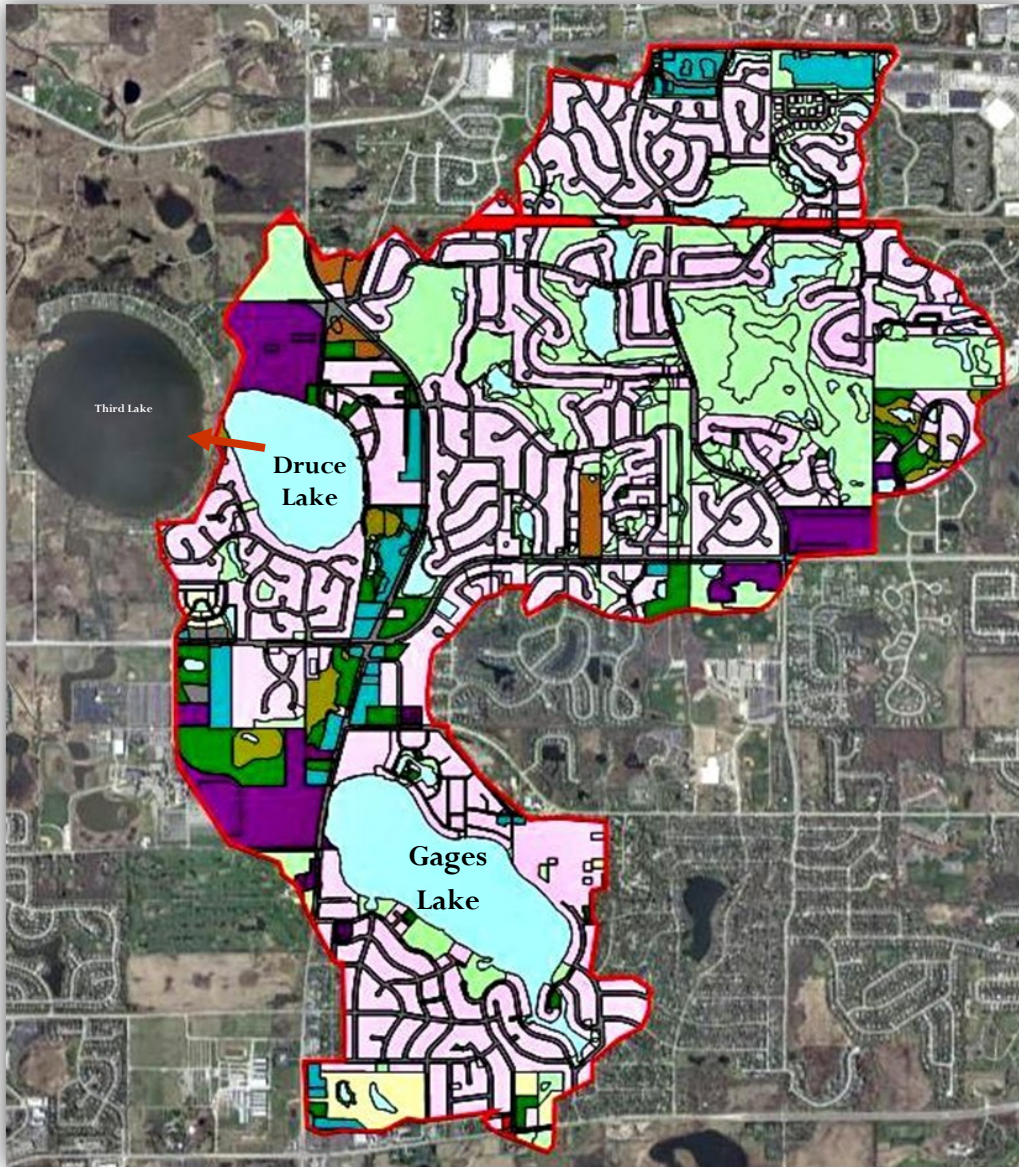
DRUCE LAKE WATERSHED



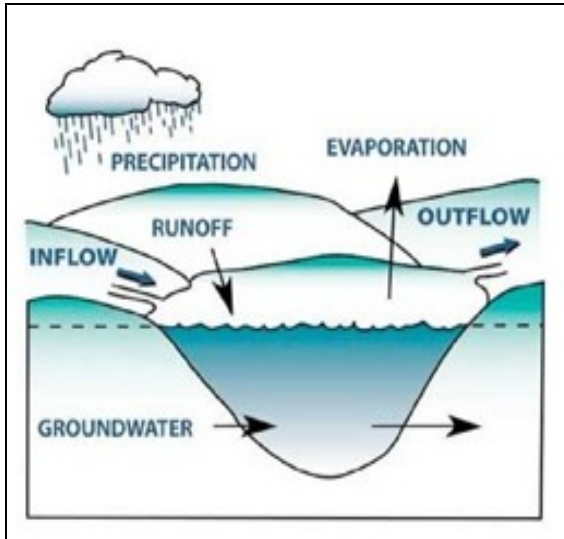
The lake is located in the Mill Creek sub basin, within the Des Plaines River watershed. A watershed is a drainage basin where water from rain or snow melt drains into a body of water, such as a river, lake, reservoir, wetland or storm drain. This watershed covers 2499 acres of which 978 acres are residential areas. The source of a lakes water supply is very important in determining its water quality and choosing management practices to protect the lake. Druce Lake re-

ceives water from Gages Lake through a storm water pipe on the south shore and empties into Third Lake through an outlet stream on the northwest shore. Druce Lake also receives water through an inlet creek from several detention basins draining Mariner's Cove subdivision southwest of the lake and from a storm water inlet draining an older neighborhood on the east shore. The retention time, the time it takes for water entering a lake to flow out again was calculated to be approximately 126.74 days.

The two major sources of runoff for Druce Lake were transportation (36.6%) and single family (34.2%). The impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground. Land management practices of the large amount of residential area in the water shed impacts the lake. The developed area in the Druce Lake watershed is 62.9%. Controlling water that runs from the land's surface into the lake is important for drainage lakes.



2011 Land use in the Druce Lake watershed	
	Water
	Disturbed Land
	Transportation
	Agricultural
	Government and Institutional
	Wetlands
	Utility and Waste Facilities
	Single Family
	Office
	Retail/Commercial
	Industrial
	Multi Family
	Forest and Grassland
	Public and Private Open Space



DRUCE LAKE WATERSHED

The Gages Lake watershed drains into Druce Lake via storm water pipe. It also receives water from the Mariners Cove subdivision from the South-west. A majority of the watershed is located on the east side of Route 45. The water flows out of Druce Lake and into Third Lake from a small channel. Third Lake drains over a dam that eventually flows into the Des Plains River.

WATER QUALITY

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

Water clarity is an indicator of water quality related to chemical and physical properties. Measurements taken with a Secchi disk indicate the light penetration into a body of water. Algae, microscopic animals, water color, eroded soil, and resuspension of bottom sediment are factors that interfere with light penetra-

tion and reduce water transparency. If light penetration is reduced significantly, macrophyte growth may be decreased which would in turn impact the organisms dependent upon them for food and cover. The 2011 average clarity for Druce Lake was 12.25 feet; this was a 62% increase in the lakes transparency since

2001(7.67 feet) and the water clarity was above the county median of 2.95feet. The average Secchi depth for Druce Lake changed substantially since 2001 since the introduction of the Zebra mussel. Druce Lake ranks 5th out of 157 lakes and it was 27th out of 156 lakes in 2000-2005 surveys.

VOLUNTEER LAKE MONITOR PROGRAM

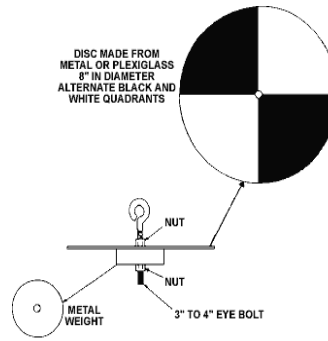
Volunteers measure water clarity using the Secchi disk twice a month May through October. In 2011 there were **42 lakes** participating in Lake County.

If you would like more information please contact:

Kelly Deem
(847) 377-8009

SECCHI DISK AVERAGES
FROM VLMP AND LCHD
RECORDS FOR DRUCE LAKE
1986—2011.

■ Average Depth (feet) VLMP
■ Average Depth (feet) LCHD

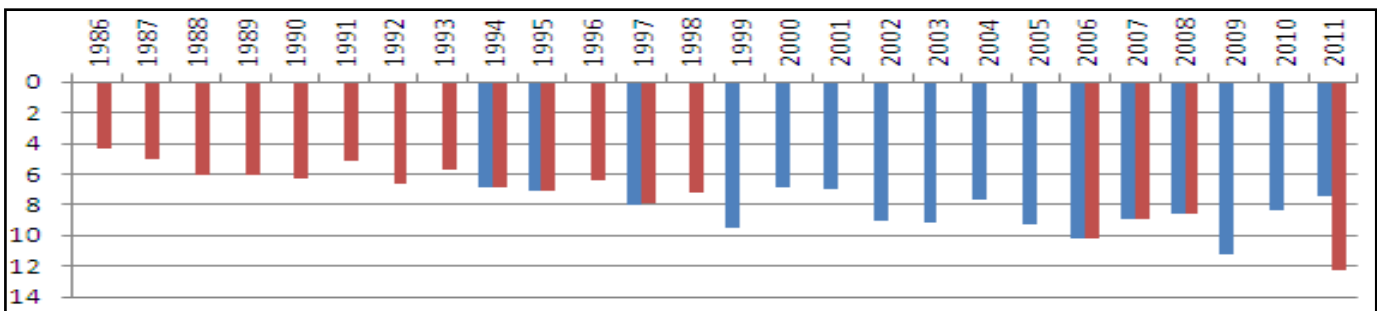


VLMP — WATER QUALITY

Additional water clarity measurements were taken in Druce Lake through participation in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program (VLMP). Druce Lake has participated in the program since 1986 and has a historical VLMP data from 1994. Participation

in the VLMP program has provided Druce Lake with annual 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 2001 was 7.42 feet. Annual VLMP readings have varied

from 4.40 feet in 1986 to 11.22 feet in 2009. The volunteers on Druce 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.



TOTAL SUSPENDED SOLIDS

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

Seasonal Secchi readings changes are affected by algal growth. The absence of algae early in early spring usually provides deeper clarity but as the water warms clarity de-

creases with more algae present in the water.

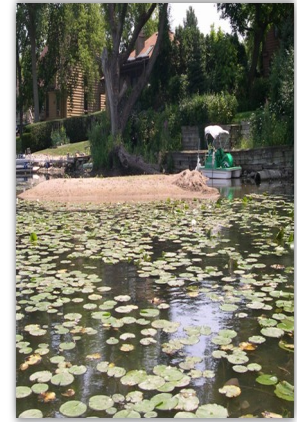
The 2011 TSS concentrations in Druce Lake averaged 1.74 mg/L which was below the county median of 8.6 mg/L and 23% lower than the 2001 average concentration of 2.2 mg/L. The calculated non-volatile suspended solids (NVSS) was 1.03 mg/L. This means that the majority of the TSS concentration in 2011 can be contributed to organic particles. This means that the occasional increase in turbidity could be caused by algae.

Druce Lake's TSS values are typically correlated with good water clarity (Secchi disk depth) which reflects to a

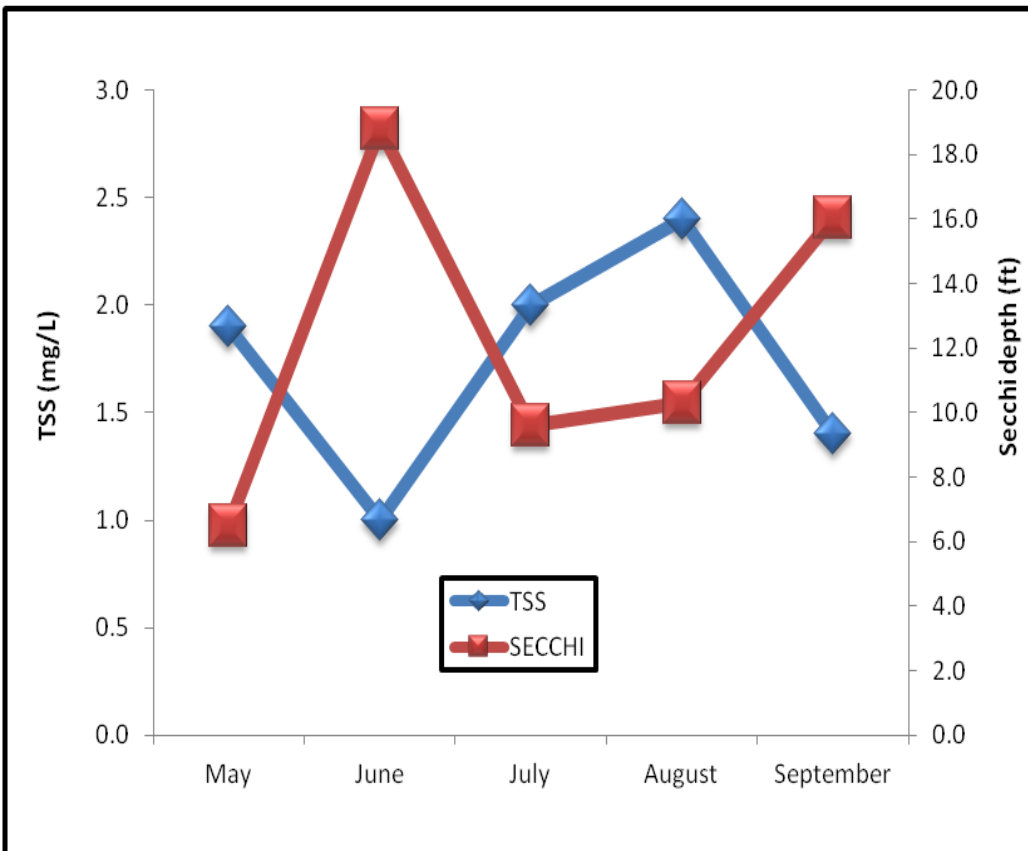
healthy lake ecosystem including plant and fish communities.

The shallowest Secchi recorded depth in 2011 occurred in May (6.50 feet) and the deepest was in June (18.80 feet) corresponding with the lowest 2011 TSS concentration (1.0 mg/L). This may have been affected by wind and rainstorms causing erosion and runoff from streams causing a higher concentrations of suspended particles flowing into the lake.

In June, the deepest Secchi reading for the season, was recorded. Clarity gradually decreased as the water temperature increased in July and August.



Sediments entering Druce Lake from an inlet



DATE (2011)	TSS (mg/L)	SECCHI (ft)
May	1.9	6.50
June	1.0	18.80
July	2.0	9.60
August	2.4	10.30
September	1.4	16.05

**WHAT HAS BEEN DONE
TO REDUCE PHOSPHORUS
LEVELS IN DRUCE LAKE**

January 2008-

Third Lake passed an ordinance prohibiting the use of lawn fertilizers containing phosphorus.

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

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



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

NUTRIENTS

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

2011 average total phosphorus Epilimnion concentration in Druce Lake was 0.014 mg/L, this was an 42% decrease from the 2001 concentration (0.024 mg/L). Lakes with concentrations exceeding 0.05 mg/L can support high densities of algae and aquatic plants, which can reduce water clarity and dissolved oxygen levels and are considered impaired by the IEPA.

Phosphorus originates from a variety of sources, many of which are related to human

activities which include: human and animal waste, soil erosion, detergents, septic systems, common carp, and runoff from farmland and lawns.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2011 TKN for Druce Lake was 0.601 mg/L and an 39% decrease from the 2001 concentration (0.99 mg/L).

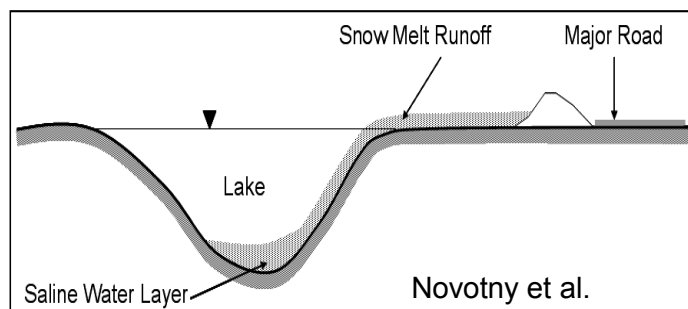
CONDUCTIVITY AND CHLORIDE

Conductivity is a measure of a water's ability to conduct electricity, which is a measure of the water's ionic activity and content. The higher the concentration of (dissolved) ions the higher the conductivity becomes.

Conductivity readings, which are influenced by chloride concentrations, have been increasing throughout the past decade in Lake County. Lakes with residential and/or urban land uses in their watershed often have higher conductivity readings and higher Cl⁻ concentrations because of the

use of road salts. Storm water run-off from impervious surfaces such as roads and parking lots can deliver high concentrations of Cl⁻ to nearby water bodies. Road salt used in the winter road maintenance consists of the following ions: sodium chloride, calcium chloride, potassium chloride, magnesium chloride, or ferrocyanides which are detected when chlorides are analyzed. The 2011 average conductivity for Druce Lake was 1.1650 mS/cm. This parameter was above the county median of

0.7821 mS/cm and which is a 4% decrease from the 2001 value of 1.214 mS/cm. These values are influenced by the winter road maintenance of Route 45 and the surrounding residential areas. The United States Environmental Protection Agency has determined that chloride concentrations higher than 230 mg/L can disrupt aquatic systems and prolonged exposure can harm 10% of aquatic species. Druce Lake's Cl⁻ was 276 mg/L. Chlorides tend to accumulate within a watershed as these ions do not break down and are not utilized by plants or animals. High chloride concentrations may make it difficult for many of our native species to survive. However, many of our invasive species, such as Eurasian watermilfoil, Cattail and Common Reed, are tolerant to high chloride concentrations.

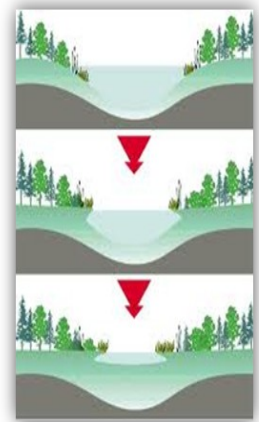


TROPHIC STATE INDEX

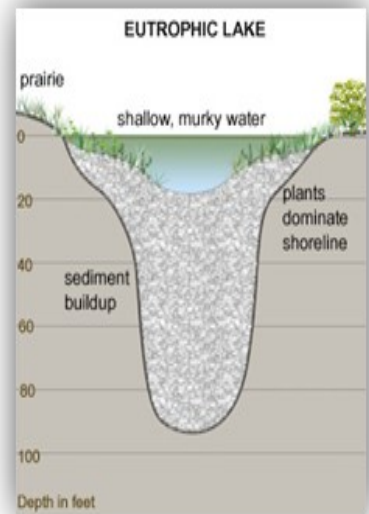
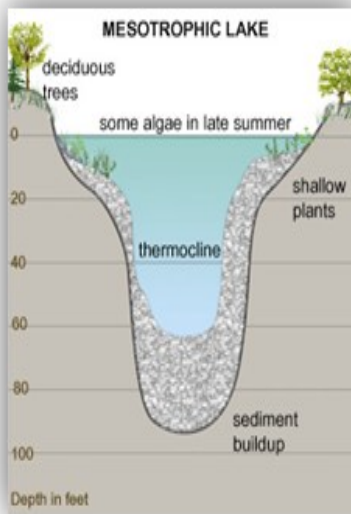
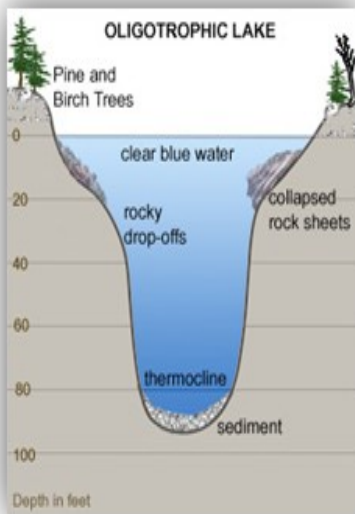
Another way to look at phosphorus levels and how they affect lake productivity is to use a Trophic State Index (TSI) based on phosphorus (TSIp). TSIp values are commonly used to classify and compare lake productivity levels (trophic state). A lakes response to additional phosphorus is an accelerated rate of eutrophication. Eutrophication is a natural process where lakes become increasingly enriched with nutrients.

Lake start out with clear water and few aquatic plants and over time become more enriched with nutrients and vegetation until the lake becomes a wetland. This process takes thousands of years to take place. However, human activities 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), and eutrophic (nutrient rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2011, Druce Lake was mesotrophic with a TSIp Value of 42.0, placing it 5th out of 171 lakes in the county. Lake Carina was 1st at 37.35



Eutrophication Process



Source: RMB Environmental

BATHING BEACH, DRUCE LAKE



SWIMMING BEACH MONITORING

All licensed inland beaches are tested bi-weekly from May to September by the Lake County Health Department's Environment Services Department. The water samples are tested for E. coli bacteria, which are found in the intestines of almost all 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), LCHD informs the management body for the bathing beach that the beach is closed and a sign is posted indicating the beach closure. There are multiple reasons for high E. coli counts. Sewage runoffs from septic fields, storm drains, fecal contamination from waterfowl, dogs and cats, surface run-off from poorly drained areas adjacent to the beach, high concentrations from nearby creeks, and poor water circulation in the swimming area may contrib-

ute to the high bacterial counts.

During the summer of 2011, E. coli counts at Mariner's Cove Beach had one sample that exceeded the maximum allowable limit when the June 11, 2011 sample registered 1120 FC colonies/100 ml. Mariners Cove Beach had one high coliform count out of eight samples from May through August in 2011. This indicates that fecal contamination was not a problem at the beach that summer.

HOW TO PREVENT ILLNESS AND BEACH CLOSURE



**SWIMMING
PROHIBITED
BEACH CLOSED**

- If you are sick, do NOT swim.
- Don't swim when you have diarrhea. You can spread germs in the water.
- Take a shower prior to entering the beach area.
- Children who are not toilet trained should wear tight fitting rubber or plastic pants.
- Pick up garbage around the beach area.
- Avoid swimming during algae blooms.
- Do not ingest the water while swimming.
- Keep pets, ducks and geese out of the beach area.
- Identify sources of pollution (ex: failing septic systems, stagnant standing water near the beaches, creeks and storm drains).

PROTECT YOUR WATERS



**STOP AQUATIC
HITCHHIKERS!™**

Prevent the transport of nuisance species
Clean all recreational equipment.

www.ProtectYourWaters.net

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

BLUE-GREEN ALGAE

Algae are important to the freshwater ecosystems, and most species of algae are not harmful. Algae blooms are often caused by blue-green algae, or “cyanobacteria”, which are similar to bacteria in structure but utilize photosynthesis to grow. They have no nucleus and lack the photosynthetic pigments found in algae. They usually are too small to be seen individually, but can form visible colonies that can cover large areas of lakes. Certain species of blue-green algae can produce toxins that could pose a health risk to people and animals when they are exposed to them in large enough quantities.

Blooms can last for an ex-

tended period of time, which prevents sunlight from reaching underwater plants and algae that are important to the ecosystem.

The water can appear blue-green, bright green, brown, or red and may look like paint floating on the water.

Not all blue-green algae produce harmful toxins. The three types of cyanobacteria that are often associated with Harmful Algal Bloom (HAB) are the Anabaena, Aphanizomenon, and Microcystis.

The presence of these cyanobacteria does not generally mean that the toxins are present in the water. The presence of toxins can only be verified through a sample analyzed in the lab.

Poisoning has caused the death of cows, dogs, and other animals. Most human cases occurred when people swim or ski in affected recreational water bodies during a bloom.

If you suspect that you are experiencing symptoms related to exposure to blue-green algae such as stomach cramps, diarrhea, vomiting, headache, fever, muscle weakness, or difficulty breathing contact your doctor or the poison control center. For more information or to report a blue-green algae bloom, contact the Lake County Health Department Environmental Services (847) 377-8030.

FOR MORE INFORMATION ON BLUE-GREEN ALGAE:
www.epa.state.il.us/

[water/surface-water/blue-green-algae.html](http://www.epa.state.il.us/water/surface-water/blue-green-algae.html)

TO REPORT BLUE-GREEN ALGAE BLOOM:
 Lake County Health Department

847-377-8030



Anabaena Sp.



Microcystis Sp.



Aphanizomenon Sp.

BATHYMETRIC MAPS

MORPHOMETRIC DATA

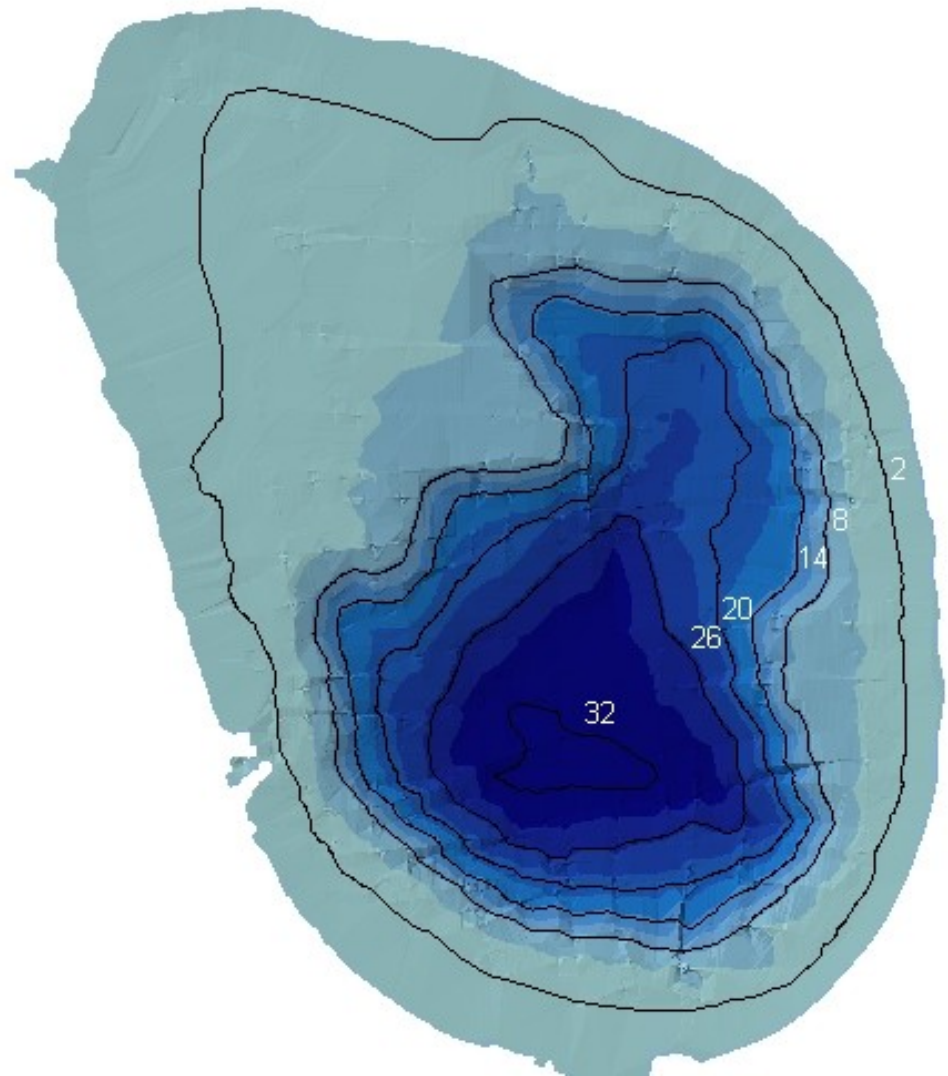
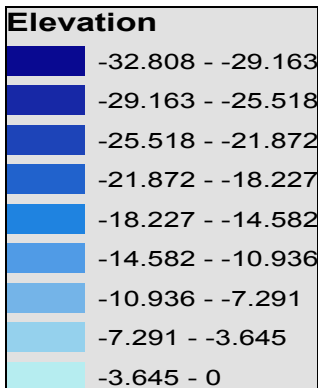
SURFACE AREA:
86.5 ACRES
MAXIMUM DEPTH:
32.80 FEET
AVERAGE DEPTH:
9.12 FEET
LAKE VOLUME:
789.66 ACRE-Feet
SHORELINE LENGTH:
1.55 MILES
LAKE ELEVATION:
765.00 FEET, MSL

A bathymetric (depth contour) map provides information about Druce lake that is essential for proper management. The lake is plotted using Global Positioning System (GPS) and sonar. There are thousands of GPS points collected across the lake, each point is paired with a corresponding depth, a three-dimensional model of the lake is created. This provides the

exact surface area, depths, and volume of your lake which are critical tools for management. This information allows for accurate volume calculations used for chemical application for plant or algae control. Other common uses for the map include sedimentation control, fish stocking, and habitat management. In November of 2006 the LCHD-ES collected field

data to replace the bathymetric map created by the LCHD-ES in 1994. The 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.

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



Survey Data Collected November 2006

This map is intended for water quality reference only, not intended for navigational, swimming, or diving purposes.

AQUATIC PLANTS

Aquatic plant mapping survey provides information based on the species, density and distribution of plant communities in a particular lake. An aquatic plant sampling was conducted on Druce Lake on July 2011. There were 99 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 67 of the sites (67.7% total lake coverage) that included 14 aquatic plant species, including 2 exotic invasive species: Curlyleaf Pondweed and Eurasian water milfoil. The most commonly occurring species were Sago Pondweed and White Water Lily at 33.3%, and 30.3% respectively, while Eurasian watermilfoil (29.3%), Illinois

Pondweed (23.2%), and Spiny Naiad (9.1%) were the next abundant species. The algae Chara, was found in 51% sites. There were 5 plants observed 2001 that were not sampled in 2011 (Leafy pondweed, Slender naiad, Southern naiad, Threadleaf pondweed, and Yellow water lily) and there was also a decrease in the Largeleaf pondweed population. The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When light level in the water column falls below 1% of the surface light level, plants can no longer grow. The

1% light level in Druce Lake ranged from 18-22 ft. during the 2011 sampling season. Plants were found at a maximum depth of 12.1 feet. Aquatic plants play an important role in the lakes ecosystem by providing habitat for fish and shelter for aquatic organism. Plants provide oxygen, reduce nutrients such as phosphorus to prevent algae bloom, and help stabilize sediment. A native plant community tends to be diverse and usually does not impede lake activities such as boating, swimming and fishing. Non-native plants often crowd out native plants by growing earlier in the year or by forming canopies that block sunlight.



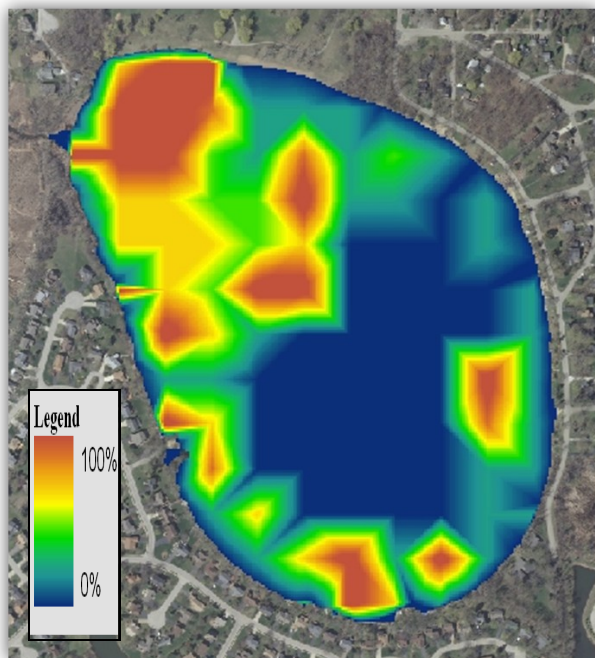
Sago Pondweed



White Water Lily



Illinois Pondweed



DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLES SITES IN 2011

Rake Density (Coverage)	# of Sites	%
No plants	10	10.1
>0 to 10%	26	26.3
>10 to 40%	6	6.1
>40 to 60%	14	14.1
>60 to 90%	4	4.0
>90%	17	17.2
Total Sites with Plants	67	67.7
Total # of Sites	99	100.0



LCHD Staff identifying plants during sampling.

FLORISTIC QUALITY INDEX

LAKE COUNTY
AVERAGE
FQI = 15.2

DRUCE LAKE
FQI = 21.8

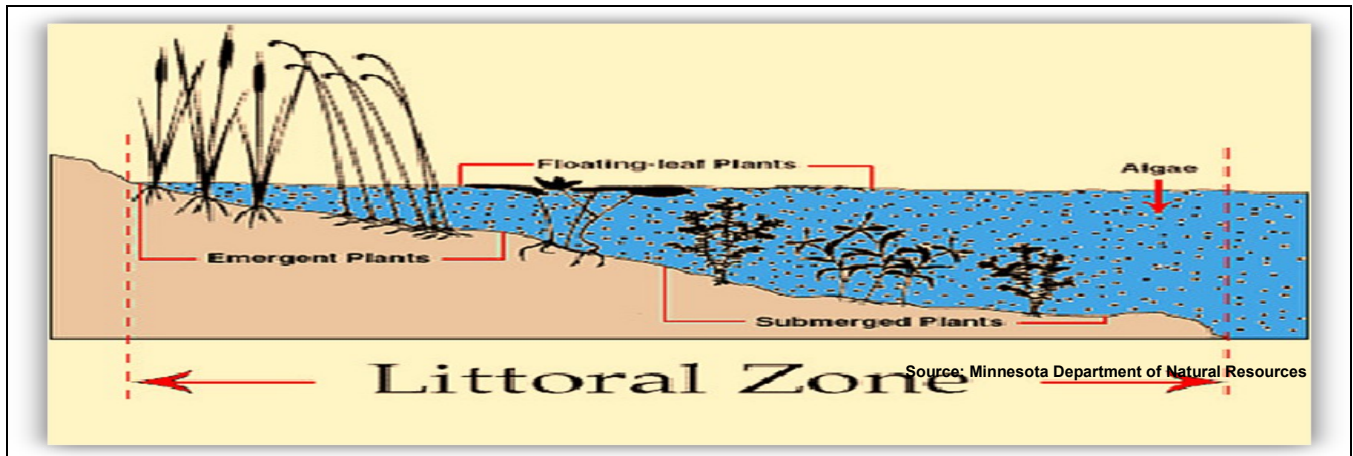
RANK = 27 /158

AQUATIC PLANTS
SPECIES
OBSERVED = 14

Floristic quality index (FQI; Swink and Wilhelm 1994) is an assessment tool designed to evaluate the closeness that the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic trends, and 4) monitor habitat restoration

efforts. Each aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. These numbers are averaged and multiplied by the square root of the number of species present to calculate an FQI. A high FQI number indicates that there

are a large number of sensitive, high quality plant species present in the lake. Non-native species were counted in the FQI calculations for Lake County lakes. In 2011, Druce had an FQI of 21.8 ranking 27 out of 158 in Lake County. The median FQI of lakes that we have studied from 2000-2011 is 14.3.



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. They perform a number of useful functions in maintaining the food chain of life in the lake.

- 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

Eurasian watermilfoil (EWM) is a feathery submerged aquatic plant that can grow up to 10 feet in length and 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. Eurasian watermilfoil was commonly found at a majority of the sampling sites in 2001 and in July 2011 it was observed at 29.3% of the sampling sites in Druce Lake. This exotic plant species invaded Druce Lake in the early 1990's and by 1994 had formed a ring around the eastern and southern half of the lake. Plant surveys in 1995 showed a decrease in EWM density and in 2001 the

EWM at the boat launch and the southern shore exhibited damage characteristic of milfoil weevil activity. There has been success in controlling EWM density by milfoil weevil in Druce Lake. Since weevil population correlates with the EWM density, a cyclical resurgence of EWM infestation occurs. Treatment with chemicals or hand pulling with a rake in areas that have high density of the invasive plant maybe necessary to control EWM.

Eurasian Watermilfoil

Scientific name:

Myriophyllum spicatum

Origin:

Europe and Asia

Characteristics:

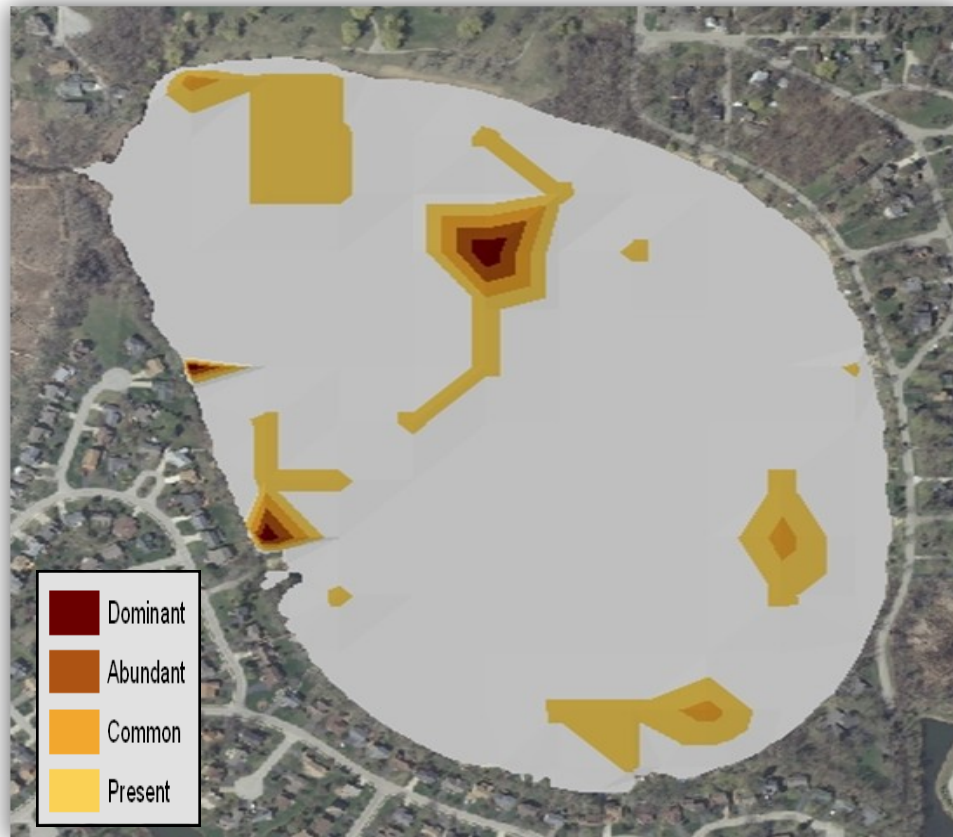
Found in less than 20 feet of water.

May form surface mats in shallow water.

Spreads rapidly, crowding out native species by blocking out sunlight.

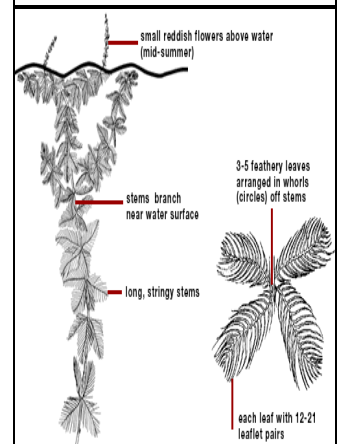
Often confused with the native Northern Watermilfoil which has 5-10 pairs of rigid leaflets per leaf.

ERASIAN WATERMILFOIL DENSITY AT 29 SITES ON DRUCE LAKE IN JULY, 2011, MAXIMUM DEPTH THAT PLANTS WERE FOUND WAS 10.1 FEET.



Milfoil Weevil feed specifically on Eurasian Watermilfoil. The weevils lay their eggs on the stems and once they hatch, the larva starts to burrow into the stem and starts to feed from within.

ILLUSTRATION OF EURASIAN



**FOR FULL
DETAILS OF
THE
RULE SEE:**

[HTTP://
WWW.EPA.STAT
E.IL.US/WATER/
PERMITS/
PESTICIDE/
INDEX.HTML](http://www.epa.state.il.us/water/permits/pesticide/index.html)

PESTICIDE PERMIT REQUIREMENTS FOR PESTICIDE APPLICATION

A National Pesticide Elimination System (NPDES) permit is required when pesticides are applied to, over or near the waters of the State. This permit applies to all public waters that have an out-flow to the State waters. A Notice of Intent (NOI) must be filled and submitted electronically to the Illinois Environmental Protection Agency (IEPA) at least 14 days prior to any application of pesticides.

- When is a NPDES permit needed?

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

- Who should obtain NPDES permit coverage?

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

- How do I apply for NPDES permit coverage?

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

- What does the permit cost?

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

- How long is the permit good for?

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

- Is anything else needed besides the permit?

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

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

- Additional things to remember

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

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

HERBICIDE 2,4-D

Aquatic herbicide 2,4-D can be applied to the water in either a liquid or pellet form. 2,4-D is 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 many native aquatic species relatively unaffected. 2,4-D herbicides will affect only dicots, broad leaved plants like Eurasian watermilfoil. Most native aquatic plants in our lakes are mono-

cots. Proper planning should be taken when applying herbicides. If large quantities of aquatic plants are killed, their decomposition can reduce the amount of dissolved oxygen that can lead to fish kill. Rain, wind direction, boating activity, and water temperature may affect the effectiveness of the applied chemical.



Aquatic Rake with Blade



Before EWM Treatment



After EWM Treatment



Double-sided Throwable Rake

MANUAL REMOVAL OF AQUATIC PLANTS

Controlling exotic aquatic plants by hand removal is effective on small areas and if done prior to heavy infestation. Eurasian watermilfoil can be controlled to some degree by hand pulling or raking of entire plants including the roots. Just before the peak growth is the best time for removal to prevent regrowth and plant seed dispersal. Working in windblown areas will help contain fragments near shore which

makes cleanup easier. All fragments of EWM plants must be removed to achieve adequate control. Most regeneration are from fragmented stems that drift into different areas of the lake and form new colonies. Removal by hand is labor intensive but it can be a cheaper alternative if home owners are willing to put in the time. This method also eliminates or reduces the need for chemicals treatments that can impact native vegeta-

tion and fish. There are different types of rakes. First is a bladed rake that can be used to cut the stems of plants. Secondly, a throw able double sided rake that can be used to pull plants from deeper water or further distances and lastly a long handled rake for working the shoreline and the boat dock area. Its important to remove the entire plant including the roots to prevent regeneration.



Aquatic Plant Rake

ZEBRA MUSSELS



ZEBRA MUSSEL

For more information:

<http://www.seagrant.wisc.edu/zebramussels/faqs.html>



Zebra mussel form a colony called "Drusses"

Zebra mussels (*Dreissena polymorpha*) 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. In 2001, zebra mussels was discovered in Gages Lake, which drains into Druce Lake. As of 2004, zebra mussels have been found in Druce Lake. Currently, 34 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. The changes in water quality from 2001-2011 are like caused by Zebra mussels filtering the water. 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 are also a major food source for planktivorous fish, such as bluegills, which in turn are food for predators like bass and pike. Recent 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. Researchers found that many of the mussel larvae were being transported via aquatic plants that were taken from one lake to another on boats and trailers. It is important that all boats and trailers entering or leaving Druce Lake are inspected for aquatic plants, zebra mussels and that all water from the bilge and motors are drained. A biocide called Zequanox is currently under testing in a Du Page county lake. Zequanox has shown to be effective in controlling zebra mussels in lab studies and it is not toxic to humans, native bivalves, and fish.

LAKE LEVEL

The water level in Druce Lake did not vary by more than 0.58 feet throughout the summer. The lake level was at its lowest in July when the lake surface water was measured 7" lower than the May level. The lake levels dropped from spring to summer and returned close to the spring level around September.

Druce Lake has a large watershed that covers 2500 acres, which helps replenish water lost through evaporation during the summer. It is recommended that in the future, staff gauge readings be taken weekly or bi-weekly if possible. This will give lake managers a much better idea of lake level fluctuations relative

to rainfall events and can aid in future decisions regarding lake level. Staff gauge is a great tool for measuring water level in lakes, rivers, reservoirs. The data collected can be compiled to help understand the natural fluctuations of the lake. Large fluctuations in lake level can lead to shoreline erosion.



PERMANENT STAFF GAGE AT THIRD LAKE

2011	Level (in)	Seasonal Change	Monthly change (in)
May	28		
June	32	-4	-4
July	35	-7	-3
August	32	-4	3
September	28.75	-0.75	3.25

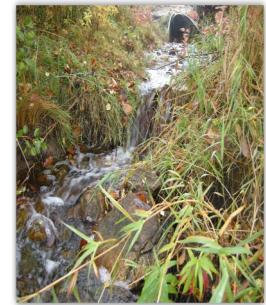
SHORELINE EROSION

Erosion is a natural process primarily caused by water which results in the loss of material from the shoreline. Disturbed shorelines caused by human activity such as clearing of vegetation and beach rocks, and increasing runoff will accelerate erosion. Rain and melting snow and wave action are the main causes of erosion. Rain can loosen soil and wash it down gradient towards the lake. A shoreline assessment was conducted at Druce Lake on Sept. 23, 2011. Based on the 2011 assessment, there was a significant increase in shoreline erosion with approximately 40% of the shoreline

having some degree of erosion. Overall, 60% of the shoreline had no erosion, 27% had slight erosion, 8% had moderate, and 5% had severe erosion which is up from the previous assessment. In 2001, Druce Lake had only 2% erosion along its shores. Creating a buffer helps prevent soil erosion as well as filter out pollutants and unwanted nutrients from entering the lake. Plant roots hold the soil particles in place so they are not easily washed away during a rain event, melting snow or wave action. Loose rocks and gravel placed on top of a filter fabric prevents soil from washing away

before newly planted seed and vegetation has a chance to grow. Eroded materials cause turbidity, sedimentation, nutrients, and pollutants to enter a lake. Shore line buffer zone planted with native vegetation not only reduces runoff by increasing water infiltration into the ground, it also offers food and habitat for wildlife. Less runoff means less nutrients and other pollutants entering the lakes and streams. Excess nutrients are the primary cause of algal blooms and increased aquatic plant growth. Once in the lake, sediments, nutrients and pollutants are harder and more expensive to remove.

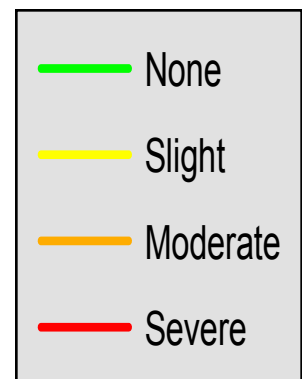
“VEGETATIVE BUFFER ZONES CAN PLAY A KEY ROLE IN LIMITING NEGATIVE WATER QUALITY IMPACTS FROM DEVELOPED SHORELAND PROPERTY”



DRUCE LAKE INLET LINED WITH ROCKS AND VEGETATION TO PREVENT EROSION



EROSION	2011	2001
None	60	98
Slight	27	1
Moderate	8	1
Severe	5	0
	100	100





ENVIRONMENTAL SERVICES

Senior Biologist: Mike Adam

madam@lakecountyil.gov

Population Health Services
500 W. Winchester Road

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

For more information visit us at:

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

Druce Lake's water quality had improved since 2001 with decreases in total phosphorus (TP) and total nitrogen (TN) which means that there are fewer nutrients available for algae-blooms to occur. The total suspended solids (TSS) also decreased. The increase in shoreline erosion was significant and should be addressed in future management plans. The chloride level in 2011 was almost double than the county median.

Druce Lake, management is administered by the Mariners Cove Community Association in cooperation with the Village of Third Lake.

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

- **Mitigate shorelines exhibiting erosion**
- **Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips**
- **Create a Eurasian Watermilfoil management before the population expands more.**
- **Continue Participation in Volunteer Lake Monitoring Program**
- **Participate in the Clean Waters Clean Boats Program**
- **Install a staff gage to monitor lake level fluctuations**
- **Assess current fish population**
- **Help reduce Cl⁻ by supporting wise use of road salt in the watershed.**

