Lake County, Illinois

2010 Potomac Lake Summary Report

Prepared by the

LAKE COUNTY HEALTH DEPARTMENT

Population Health Environmental Services

Potomac Lake

Picture provided by: Lake Lindenhurst Lake Commission

Potomac Lake, located entirely within the village limits of Lindenhurst, was originally a wetland that was dredged and then flooded. The lake has a surface area of 14.6 acres and a mean depth of 2.3 feet. It is managed by the Lindenhurst Lake Commission and is used by private homeowners and Lindenhurst residents for swimming, fishing and non-gas powered boating. It has no public beaches, but some property owners have beaches along their shoreline.

Potomac Lake receives water from its approximate 77 acre watershed and drains into Waterford Lake. The primary land uses contributing runoff to the Potomac Lake watershed were single family homes and transportation.

Some water quality parameters have changed since the 2006 lake study.

Total phosphorus concentrations in Potomac Lake averaged 0.085 mg/L which is more than double the 2006 concentration of 0.042 mg/L and is above the IEPA's impairment rate of 0.050 mg/L. Nitrogen is the other nutrient critical for plant growth. The average Total Kjeldahl nitrogen concentration for Potomac Lake was 1.00 mg/L, which was slightly lower than the county median of 1.18 mg/L

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Special points of interest:

- *Impaired for total phosphorus*
- *Single Family Homes primary land use*
- *Increase in diversity of aquatic plant community*

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Lake Facts:

Major Watershed: Des Plaines

Sub-Watershed: North Mill Creek

Location: T46N, R10E, Section 26

Surface Area: 14.6 acres

Shoreline Length: 0.9 miles

Maximum Depth: 3.5 feet

Average Depth: 1.75 feet

Lake Volume: 25.6 acre-feet

Watershed Area: 77.01 acres

Lake Type: Glacial

Management Entity: Lindenhurst Lakes Commission

POTOMAC LAKE SUMMARY (CONTINUED)

and the 2006 concentration (1.04 mg/L). A total nitrogen to total phosphorus (TN:TP) ratio of 12:1 indicate there is enough of both nutrients for excessive algal growth. Also using phosphorus as an indicator, the trophic state index (TSPp) ranked Lake Linden as eutrophic with a TSIp value of 68.3.

The 2010 average total suspended solids (TSS) concentration for Potomac Lake was less than 2.7 mg/L which was less than the county median (7.9 mg/L) and a 26% reduction from the 2006 concentration of 3.4 mg/L. Water clarity is measured by Secchi Depth. Due to the shallow nature of the lake, water clarity data could not be quantified as the Secchi Depth readings were obstructed by the lake bottom throughout the sampling season.

Conductivity concentrations are correlated with chloride concentrations, the average conductivity reading for Potomac Lake in 2010 was 0.8880 mS/cm, which was above the county median (0.7910 mS/cm). This was a 75% decrease from the 2006 average (1.5530 mS/cm). The 2010 chloride concentration in Potomac Lake was 195 mg/L which is also above the county median of 145 mg/L.

The aquatic plant community in the lake has improved dramatically since 2006, when only *Chara* spp. a macro algae was present. Aquatic plant sampling was conducted in July for the 2010 study. The aquatic plant community consisted of eight native species and plants were found at 100% of the sites sampled. Duckweed and Flatstem Pondweed were the dominant species at 71% and 41% of the sites sampled, respectively. Additionally Small Pondweed was documented in September.

The shoreline of Potomac Lake was assessed in 2010 for shoreline erosion. Approximately 89% of the shoreline had some degree of erosion. Overall, 11 % of the shoreline had no erosion, 51% has slight erosion, 12% had moderate, and 25% has severe erosion.

POTOMAC LAKE WATERSHED

The source of a lake's water supply is very important in determining its water quality and choosing management practices to protect the lake. The lake was originally a wetland that was dredged and then flooded. Potomac Lake is in the North Mill Creek watershed and receives water from its small watershed and drains into Waterford Lake from the south outlet. The 77.01 acre watershed carries storm water and pollutants into Potomac Lake. The external sources affecting Potomac Lake were from the following land uses: single family homes (50%) and transportation (12%). Based on the amount of impervious surfaces each land use contributes varied amounts of runoff. Because impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate the ground, more runoff is generated than in the historical undeveloped condition.

The two major sources of runoff for Potomac Lake were single family homes (58%) and transportation (24%). The lake is surrounded by developed land which provides the lake with little protection from runoff and nutrients before it enters the lake.

The size of the watershed feeding the lake relative to the lakes size is also an important factor in determining the amount of pollutants in the lake. The retention time, the amount of time it takes for water entering a lake to flow out of it again was calculated to be approximately 109 days.

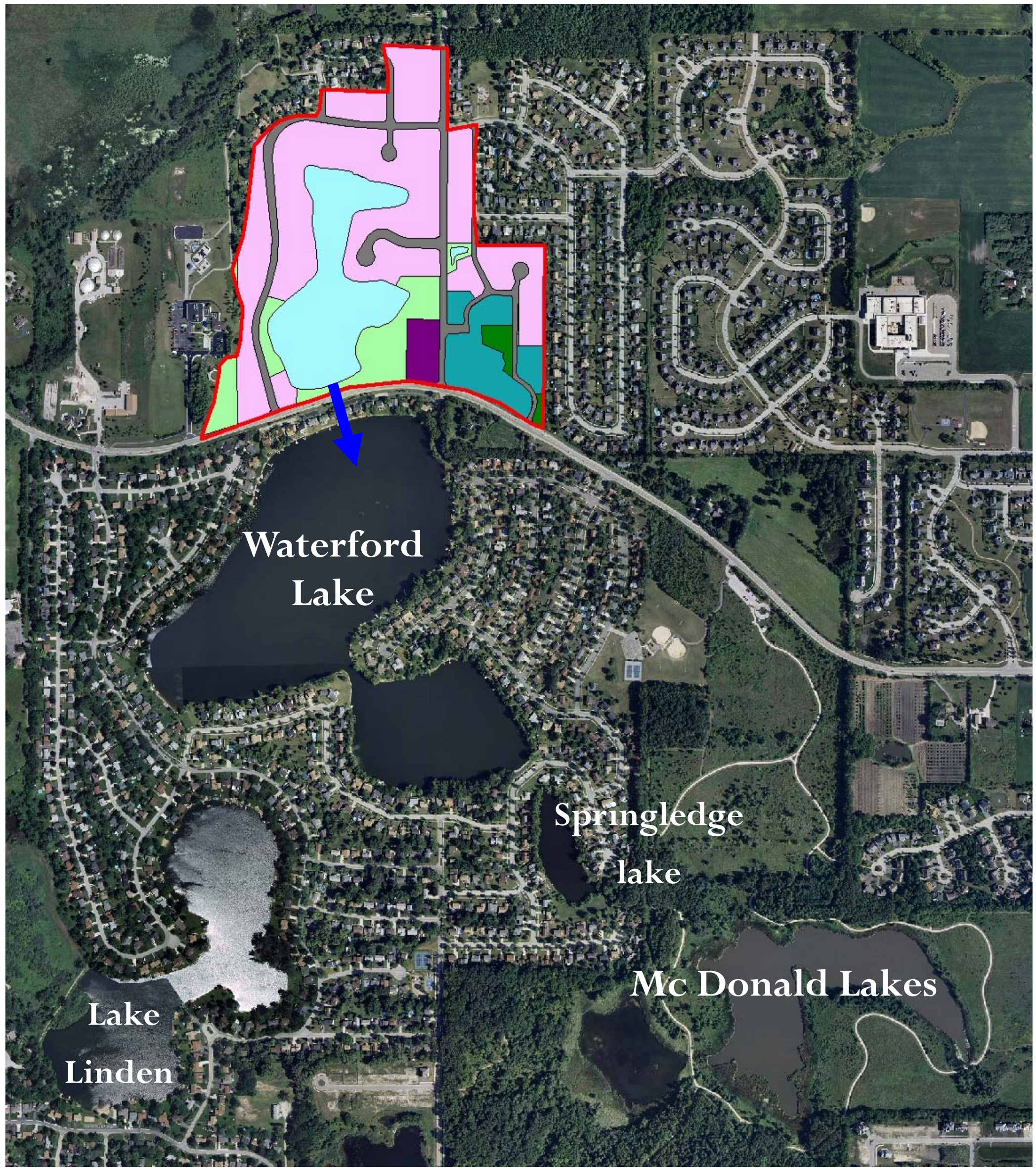
Typically water quality declines as pollutants accumulate from the top to the bottom of the watershed and as the watershed area increases. However the water quality actually improves as it travels downstream to Waterford Lake, another lake in a highly residential setting.

Everyone lives in a watershed! A watershed is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream.

Which watershed do you live in?

POTOMAC WATERSHED

2010 Land use in the Potomac Lake watershed



Direction of watershed:

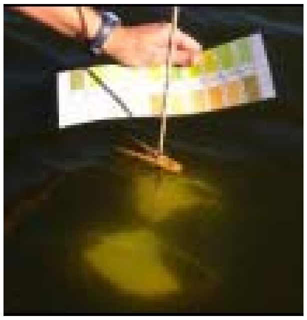
Potomac Lake drains into Waterford Lake from the south outlet. Waterford Lake drains south into Springledge Lake that drains into McDonald #2 and eventually enters North Mill Creek

Lake	Potomac Lake	Potomac Lake	Potomac Lake	Waterford Lake	Waterford Lake	Waterford Lake
Year	**2000**	**2006**	**2010**	**2000**	**2006**	**2010**
TSS (mg/L)	3.9	3.4	2.7k	2.7	12	3.9
TP (mg/L)	0.032	0.042	0.085	0.066	0.068	0.052
Conductivity (milliSiemens/cm)	0.8576	1.55325	0.8883	0.8536	1.2022	0.8375

2000 to 2010 Comparisons for epilimnetic averages for total suspended solids, total phosphorus, and conductivity readings for Potomac Lake and Waterford Lake.

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

WATER CLARITY



Potomac Lake average water color

2010

2006

2000

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

Measurements taken with a Secchi disc indicate the light penetration into a body of water. Algae, microscopic animals, water color, eroded soil, and resuspended bottom sediment are factors that interfere with light penetration and reduce water transparency.

The 2010 average Secchi disk transparency in Potomac Lake was not calculated. Accurate readings could not be obtained, as the Secchi disk was still visible on the bottom during each sampling event. A better measurement of water clarity in Potomac Lake is shown by the analysis of total suspended solids (TSS).

The Secchi disk was also used to document the color of the lake water. Potomac water was an unnatural blue color that faded in intensity over the summer. Typically a lakes water color can be used to help identify potential water quality concerns; ie a brown color could indicate sediments suspended in the water column or a deep green color may be caused by an algae bloom. Potomac's water color was altered by the addition of 1920 ounces of Aqua Blue Lake Dye from Blue Valley Labs on May 5, 2010. This type of management application is used to control algae and aquatic plants. The dye can help hide submerged aquatic plants and give the lake a deeper appearance.

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

2010 Potomac Lake monthly total suspended solids concentrations

DATE	TSS
18-May	<1
15-Jun	1.3
20-Jul	3.6
17-Aug	5.0
20-Sep	2.5
Average	2.7^k

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

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

TSS concentrations averaged <2.7 mg/L which was below the county median of 8.1 mg/L. This is a 21% decrease since 2006 (3.4 mg/L). High TSS values are typically correlated with poor water clarity and can be detrimental to many aspects of the lake ecosystem including the plant and fish communities. Calculated nonvolatile suspended solids (NVSS) was 0.1 mg/l, indicating that the majority of the TSS concentration can be attributed to volatile solids (organic particles, such as algae). Algae blooms were documented throughout the sampling season.

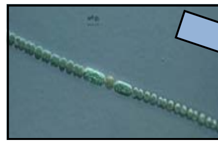
The main type of algae documented during the 2010 sampling season was a filamentous algae that collected along the shoreline and clung to aquatic plants. These algal mats primarily consisted of *Mougeotia* sp. a non branching filamentous green algae. In September 2009 a planktonic (free floating) algae bloom was documented, similar to the algal blooms that occurred in August 2010 in Lake Linden and Waterford Lake. These blooms consisted of a blue-green algae consisting primarily of *Anabaena* sp.

August 2010 had the highest recorded TSS (5.0 mg/L) and NVSS (0.78 mg/L) concentrations since June 2000 (TSS (6.4 mg/L) NVSS (1.74 mg/L). This increase in non-organic materials and sediments can be attributed to stormwater runoff as 4.55 inches of rain fell between the July and August sampling events.

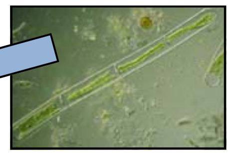
POTOMAC LAKE ALGAE

Green Filamentous Algae Bloom

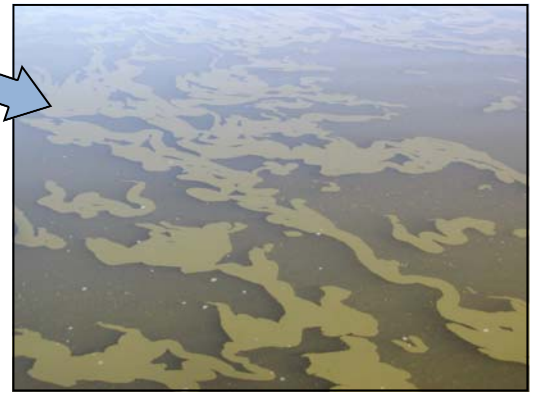
Potomac Lake July 2010



Anabaena *Sp.*



Mougeotia *Sp.*



Blue-green Planktonic Algae Bloom

Potomac Lake September 2009

AQUATIC HERBICIDES-COPPER SULFATE

Copper salts is one of the earliest know herbicides for terrestrial and aquatic weed control. Copper sulfate which is used strictly for algae control was first used in 1904. The use of copper sulfate is appealing because it has little or no effect on flowering plants at normal use rates and there are no restriction on the use of water following a treatment. McCloud Aquatic Services treated Potomac Lake for algae every two weeks from April through August with copper sulfate. The highest concentration applications occurred on Potomac Lake May19, 2010 and August 23, 2010 to treat moderate filamentous algae blooms and moderate Chara sp. growth. The efficiency of copper sulfate is greatly affected by the carbonate alkalinity ($CaCO_3$) concentrations in the water. The copper will combine with the carbonates and precipitate out of the water preventing the copper from entering the algal cells. Potomac Lake average alkalinity concentration in 2010 was 128 mg/L. Alkalinity concentrations of 50 to 250 mg/L provide effective treatment and protect fish from lethal doses of copper. Copper sulfate is a contact herbicide. Therefore, direct exposure of the algae to the compound is required. Copper sulfate has a fairly short active period, and is quickly absorbed into the sediment. Over time a build up of copper can occur in the sediment. Copper is toxic to invertebrates, which are aquatic bugs that live in the sediment. This can cause a disruption in the food chain from the bottom up resulting in a reduction in growth rates in the fish community.

Herbicide treatments are one the many tools available to lake managers when used alone they provide a quick fix, that does not address the source of the problem, high nutrient levels.

Copper Sulfate Application

CHEMICAL APPLICATIONS FOR ALGAE IS A **TEMPORARY** SOLUTION THAT OFTEN REQUIRES **MULTIPLE** APPLICATIONS AS THE TREATED ALGAE SINK TO THE BOTTOM TO **DECOMPOSE** (USE OXYGEN) THEY **RELEASE NUTRIENTS** THAT THE SURVIVING ALGAE USES TO **REBOUND.**

AQUATIC HERBICIDES-DIQUAT (REWARD)

Diquat is a contact herbicide that is only available in liquid form and provides a broad spectrum of control for aquatic plants. The effectiveness of this application is determined by direct contact with the plant, either by complete dispersal in the water or by direct spraying on the plant. Diquat is formulated as a bromine salt, but when it is added to water the solution becomes attracted to clay and organic matter. Diquat is only used in lakes with low suspended sediments to increase efficiency. Diquat persists in the water from 4 to 12 days. It is removed from the water by absorption to suspended sediment and plant material, which then settles to the bottom.

McCloud Aquatic Services applied Reward in Potomac Lake on July 26, 2010 to reduce Waterstargrass and Sago Pondweed populations.

Nutrients-Phosphorus/Nitrogen

What Has Been Done to reduce phosphorus levels in Potomac Lake

January 2009- Lindenhurst passed an ordinance prohibiting the use of lawn fertilizers containing phosphorus

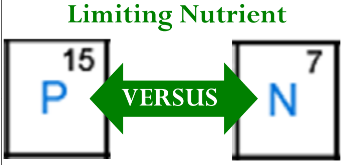
July 2010- The state of Illinois passed a law to reduced the amount of phosphorus content in dishwashing and laundry detergents

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

YEAR	TP
2010	0.085
2006	0.042
2000	0.032

Phosphorus Concentrations for Potomac Lake 2000-2010

Limiting Nutrient



Unlike nitrogen, the properties of phosphorus make it the ideal nutrient to manage reductions from surface water inputs because it has no gas phase in the atmosphere. The relative contribution of this nutrient from the air or by rainfall is generally low and as water moves through soil, phosphorus binds to particles so that the concentration in ground water is also low.

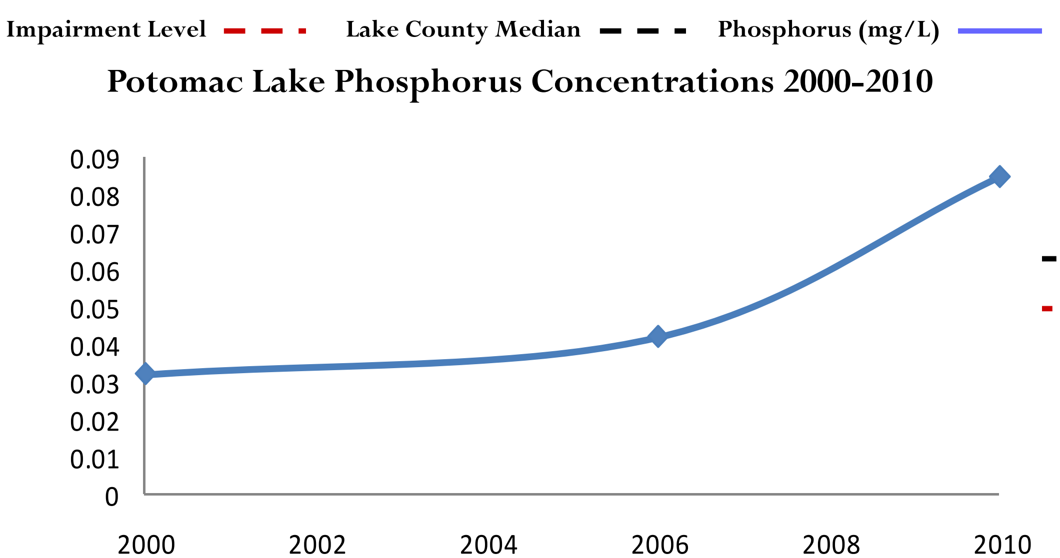
Organisms take nutrients in from their environment. In a lake the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warmth, and nitrogen. Phosphorus has a direct effect on how much aquatic plants and algae can grow in lakes. In Potomac Lake the limiting nutrient varied throughout the sampling season. In May and June phosphorus was limiting, in July nitrogen was limiting, and in August and September there was sufficient amounts of both nutrients to support heavy algae blooms.

The 2010 average total phosphorus concentration in Potomac Lake was 0.085 mg/L. This was more than double the 2006 concentration (0.042 mg/L) and higher than the Lake County median of 0.065 mg/L. The most significant total phosphorus concentration occurred in July (0.149 mg/L), which was almost three times higher than the June concentration (0.049 mg/L). Total phosphorus concentrations in Potomac Lake have been compounding for the last ten years. For the first time Potomac Lake will be on the Illinois Environmental Protection Agency (IEPA) 303 (d) list for impaired waters as phosphorus concentrations exceeded the impairment level of 0.050 mg/L. Concentrations above the impairment level can support high densities of algae and aquatic plants which can reduce water clarity and dissolved oxygen levels.

Phosphorus originates from a variety of sources in the Potomac Lake watershed, many of which are related to human activities: human and animal waste, soil erosion, detergents, septic systems, common carp, and runoff from driveways and lawns.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen (TKN) is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2010 TKN for Potomac Lake was 1.00 mg/L, which was lower than the county median of 1.18 mg/L and a slight decrease from the 2006 concentration of 1.04 mg/L. Inorganic forms of nitrogen include ammonia and nitrite/nitrate nitrogen. These can be used by aquatic plants and algae. Ammonia and nitrite/nitrate was only at detectable levels in Potomac Lake in June, 0.274 mg/L and 0.149 mg/L, respectively. These concentrations occurred after the Potomac Lake watershed received 0.15 inches of rain within 24 hours of our June sampling event.

Nitrogen originates from a variety of human related and non-human related sources in the Potomac Lake watershed including: air, precipitation, ground water, human and animal waste, septic systems, and lawn fertilizer.



POTOMAC LAKE PHOSPHORUS

GEESE FECES = NUTRIENTS =ALGAE

Potomac Lake July 2010

HOMEOWNERS CAN HELP REDUCE NUTRIENT CONCENTRATIONS IN POTOMAC LAKE BY PROMOTING THE FOLLOWING LAND MANAGEMENT PRACTICES:

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

***Plant and maintain native plant filter strips along shorelines of lakes, ponds, and streams.**

***Clean up animal waste.**

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

***Use phosphorus free fertilizers and only where truly needed.**

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

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 lake's response to additional phosphorus is an accelerated rate of Eutrophication. Eutrophication is a natural process where lakes become increasingly enriched with nutrients. Lakes start out with clear water and few aquatic plants and over time become more enriched with nutrients and vegetation until the lake becomes a wetland. This process takes thousands of years. However, human activities that supply lakes with additional phosphorus that drives Eutrophication is speeding up this process significantly. The TSIp index classifies the lake into one of four categories: oligotrophic (nutrient-poor, biologically unproductive), mesotrophic (intermediate nutrient availability and biological productivity), eutrophic (nutrient-rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2010, Potomac Lake was eutrophic with a TSIp value of 68.3. Based on the TSIp, Potomac Lake ranked 93rd out of 162 lakes studied by the ES from 2000-2010. The 2010 value has dropped 45 spots from the 2006 TSIp value of 58.2.

OLIGOTROPHIC:

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

MESOTROPHIC:

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

EUTROPHIC:

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

CONDUCTIVITY AND CHLORIDE

YEAR	COND	Cl^-
2000	0.858	NA
2006	1.553	391
2010	0.888	195

CHLORIDE CONCENTRATIONS (CL-) AND CONDUCTIVIY FOR LAKE LINDEN 2000-2010

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

230 mg/L = 1 teaspoon

of salt added to

5 gallons of water.

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. Conductivity readings, which are influenced by chloride concentrations, have been increasing throughout the past decade in Lake County. Road salts used in winter road maintenance consist of the following ions: sodium chloride, calcium chloride, potassium chloride, magnesium chloride or ferrocyanides which are detected when chlorides are analyzed. The 2010 average conductivity reading for Potomac Lake was 0.8880 mS/cm. This parameter was above the county median of 0.7800 mS/cm and a 43% decrease from 2006 (1.203 mS/cm). This reduction was influenced by the weather. In 2010 there was significantly more rain events than 2006 causing some of the Cl- ions to be diluted or flushed out of the lake. Concentrations averaged 195 mg/L for the season and were above the county median of 142 mg/L. 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. Additionally, shifts in algal populations were associated with chloride concentrations as low as 12 mg/L. To illustrate the critical value concentration, 1 teaspoon of table salt added to 5 gallons of water is equivalent to 230 mg/L.

It appears that road salt is compounding in many lakes in the county. Some lakes in the county have seen a doubling of conductivity readings in the past 10-15 years particularly lakes within watersheds that have transportation as a primary land use. Compared to lakes in undeveloped areas, 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. Potomac Lake had slightly higher conductivity readings than Waterford Lake. Deicing applications to Grass Lake Road was a major source of chlorides. 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.

***2010 Lake County medians**

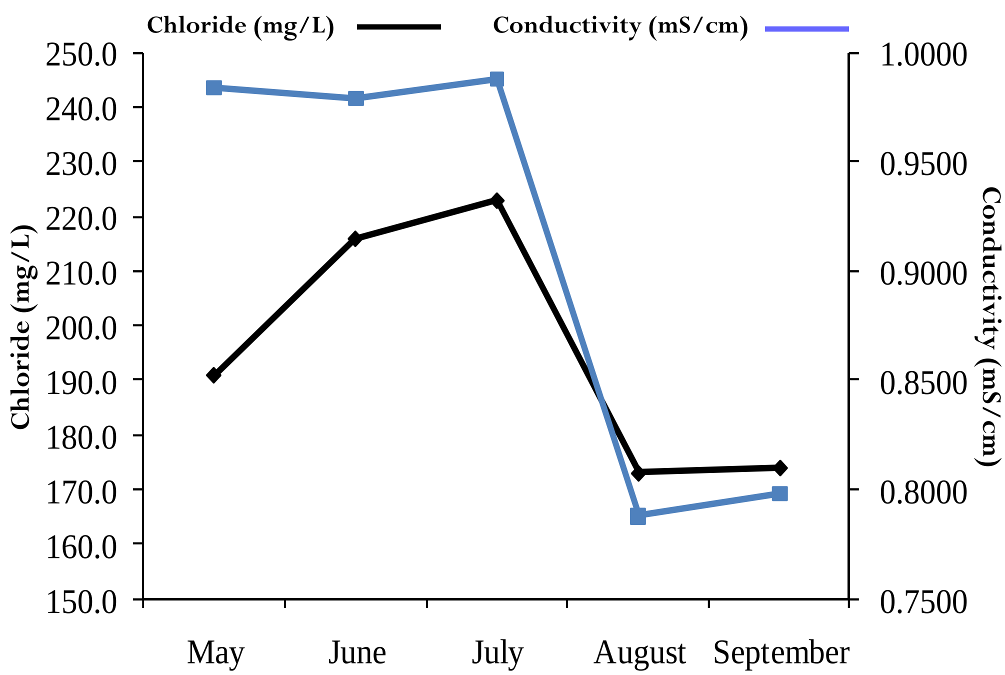
Conductivity = 0.7800 mS/cm

Chloride= 142mg/L

DATE	COND	Cl^-
May	0.984	191
June	0.979	216
July	0.988	223
August	0.788	173
September	0.798	174

MONTHLY CHLORIDE CONCENTRATIONS (CL-) AND CONDUCTIVITY FOR POTOMAC LAKE, 2010.

Monthly Chloride Concentrations (CL) Vs. Conductivity in Potomac Lake, 2010.



CHLORIDES: WHAT HAS BEEN DONE TO REDUCE CHLORIDE LEVELS IN POTOMAC

Village of Lindenhurst Public Works:

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

This liquid has several advantages.

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

Lake County Division of Transportation:

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

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

Pavement temperature greatly influences the efficiency of salt to melt ice.

TIPS

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

NEW PERMIT REQUIREMENTS FOR APPLYING PESTICIDES IN WATERS

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

Who has to get a permit? According to the language in the permit, anyone who qualifies as an "operator", which is defined as: "any person, persons, group, or entity in control over the financing for, or over the decision to perform pest control activities, or applying pesticides that will result in a discharge to waters of the State".
Homeowner associations or even individuals may need to get a permit. However, it is believed that it will be primarily aimed at commercial applicators.
Regardless of the size of treatment, a permit will be needed. If the treatment area or total annual area exceeds certain thresholds additional requirements will be required such as a Pesticide Discharge Management Plan and an annual report. The thresholds vary depending on type of treatment. For weed and algae control, the threshold is 20 acres of treatment or 20 linear miles along the water's edge. The threshold is an annual total, so for example, algaecides applied to five acres four times during the year would meet this 20 acre threshold requirement.

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

FOR FULL DETAILS OF THE RULE SEE:

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

Excerpt from Winter 2011 Cattail Chronicles.

AQUATIC PLANT SAMPLING

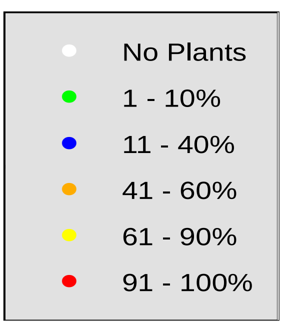
Plants growing in our lakes, ponds, and streams are called macrophytes. These aquatic plants appear in many shapes and sizes. Some have leaves that float on the water surface, while others grow completely underwater. In moderation, aquatic plants are aesthetically pleasing and desirable environmentally.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

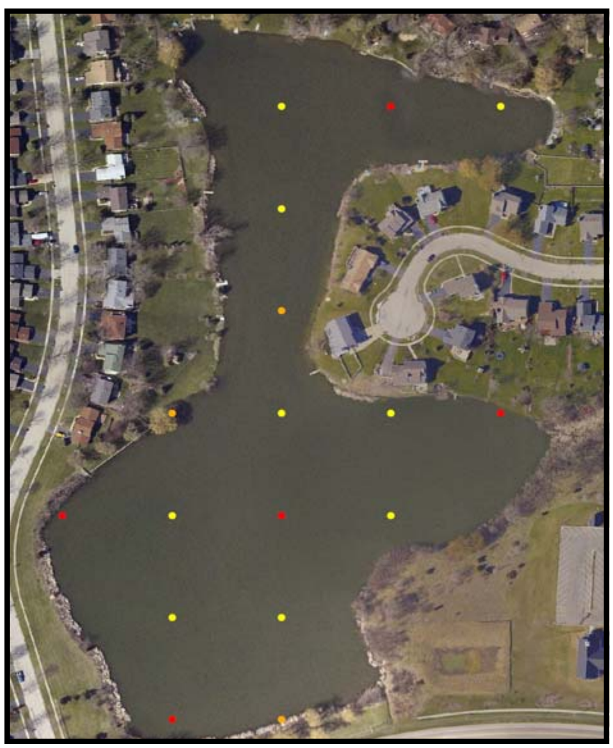
Aquatic plant sampling was conducted on Potomac Lake in July 2010. There were 17 points generated based on a computer grid system with points 60 meters apart. Aquatic plants existed at 17 of the sites that included 7 native aquatic plant species, no exotics species were present. In addition Leafy Pondweed was noted in abundance in September. This was a significant increase in species diversity from the 2006 monoculture of Chara spp. (macroalgae). Five submerged species, one floating species (Duckweed) and one macroalgae (Chara spp.) was noted in July. The most common species was Duckweed at 71% of the sampled sites, while Flatstem Pondweed (47%) and Waterstargrass (41%) were the next most abundant species. A truly healthy aquatic plant community contains a large number of plant species that provide different types of habitat and structure to the lake that covers 30-40% of the lake. In 2010 Potomac Lake aquatic plants covered 100% of the lake bottom. The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When the light level in the water column falls below 1% of the surface light level, plants can no longer grow. The 1% light level in Potomac Lake reached the bottom of the lake throughout the sampling season. Potomac Lake's shallow morphology and wetland origin are obstacles when establishing an effective plant management plan. Abundant aquatic plants are sometimes viewed as undesirable and can reduce recreational activities. In the past ten years Potomac Lake's aquatic plant community has been managed for a variety of lake issues. In 2000 the lake was treated to control Curlyleaf Pondweed an exotic invasive species and in 2006 aquatic plant diversity was extremely low. The 2010 aquatic plant community contained no exotic species and an increase in species diversity. The 2011 management plan should incorporate additional native species that do not "top out" so that the lake has a deeper appearance. In addition the Duckweed populations should be monitored throughout the season; this plant while small in size has the ability to explode in abundance with adequate nutrients, which are available in Potomac Lake. A healthy aquatic plant population is critical to good lake health and provides important wildlife habitat and food sources. If managed aquatic plants provide many water quality benefits such as sediment stabilization and competition with algae for available resources.

DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLES SITES

Rake Density (coverage)	# of Sites	% of Sites
No Plants	0	0.0
>0-10%	0	0.0
10-40%	0	0.0
40-60%	3	17.6
60-90%	9	52.9
>90%	5	29.4
Total # with Plants	17	100.0
Total # of Sites	17	100.0

AQUATIC PLANT DENSITY AT 17 SITES ON POTOMAC LAKE IN JULY 2010, MAXIMUM DEPTH THAT PLANTS WERE FOUND WAS 4.8 FEET.



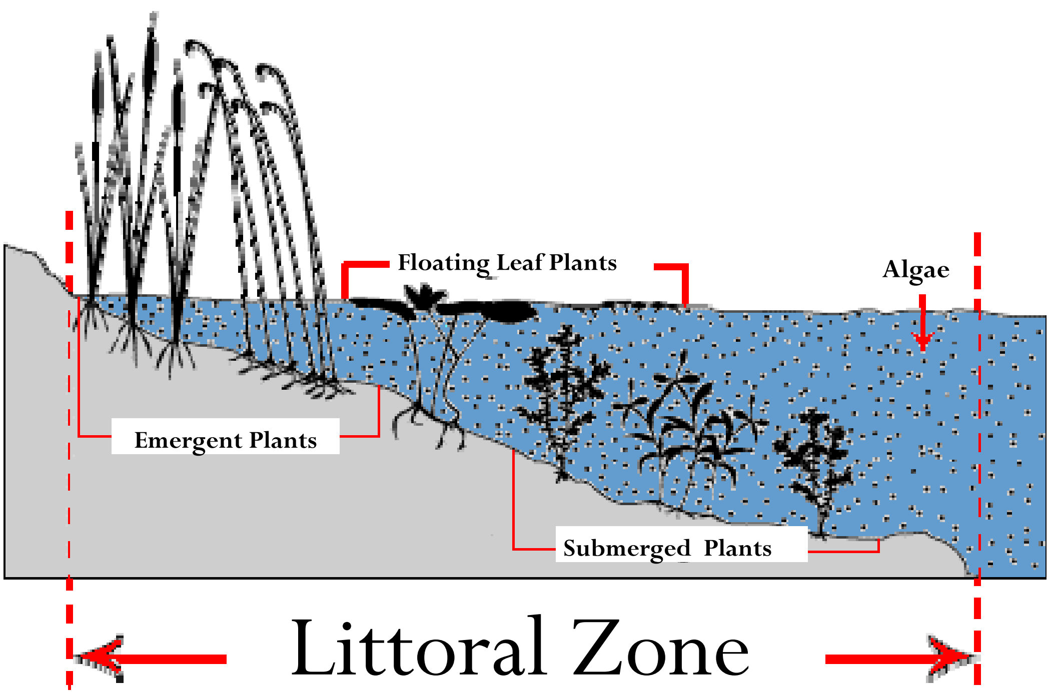


Plant Density	Chara	Duckweed	Flatstem Pondweed	Sago Pondweed	Slender Naiad	Southern Naiad	Water Stargrass
Absent	14	5	9	14	16	16	10
Present	0	4	1	0	0	0	1
Common	0	4	1	0	0	0	1
Abundant	3	0	5	3	1	1	4
Dominant	0	4	1	0	0	0	1
% Plant Occurrence	17.6%	70.6%	47.1%	17.6%	5.9%	5.9%	41.2%

FLORISTIC QUALITY INDEX

Floristic quality index (FQI) is an assessment tool designed to evaluate the closeness the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic trends, and 4) monitor habitat restoration efforts. Each aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. An FQI is calculated by multiplying the average of these numbers by the square root of the number of these plant species found in the lake. A high FQI number indicates that a large number of sensitive, high quality plant species present in the lake. Non-native species were also included in the FQI calculations for Lake County lakes. The average FQI for Lake County lakes from 2000-2010 was 14.4. Potomac Lake has an FQI of 17.5 ranking 45th out of 154.

The Average FQI for Lake County Lakes = 14.4



Source: Minnesota Department of Natural Resources

AQUATIC PLANTS: WHERE DO THEY GROW?

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

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

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

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

Emergent Plants– are rooted in the lake bottom,

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

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

Excerpt: Department of Ecology, Washington state

Shoreline erosion

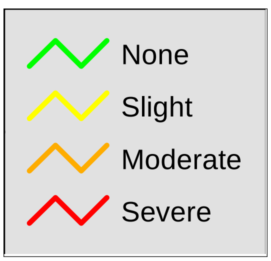
Proportion of Shorelin erosion on Potomac Lake 2010

Classification	% Erosion
none	11
slight	51
moderate	12
severe	25

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

The shoreline was reassessed in 2010 for significant changes in erosion since 2006. Based on the 2010 assessment, there was a slight increase in shoreline erosion with approximately 89% of the shoreline having some degree of erosion. Overall, 11% of the shoreline had no erosion, 51% had slight erosion, 12% had moderate, and 25% had severe erosion. The areas of moderate and severe erosion occur aound the lake these should be addressed soon. It is much easier and less costly to mitigate slightly eroding shorelines than those with more severe erosion. While some residents have installed filter strips along their lakefront, many areas of manicured lawn remain with many erosion problems. The roots of lawn grass do not provide the stabilization needed to hold sediment in place. Additional native filter strips and repaired seawalls and riprap should be installed to prevent further erosion.

Shoreline erosion on Potomac Lake, 2010



Monthly Water Levels in Potomac Lake, 2010 and Lake County Stormwater Management Commission Rain guage data from the Lindhurst rain gauge

2010	Level (in)	Rain (in)
May	19.00	
June	19.25	3.26
July	23.04	3.18
August	19.00	7.34
September	21.25	3.26

Waterlevel was measured from the top of a seawall to the water surface

Lake Water Level

Lakes with stable water levels potentially have less shoreline erosion problems. The lake level in Potomac Lake was measured from the top of a dock to the waters surface. The water level fluctuations in Potomac Lake were generally stable. The lake level decreased by 2.25 inches from May to September. The highest water level occurred in May and August with the lowest level in July. The most significant water level fluctuation occurred from July to August with an decrease in the lake level of 4 inches. Potomac Lake's water level does not appear to be significantly influenced by rain events. The watershed is small (77.01 acres). The primary landuse of single family homes surrounding the lake has the potential to deliver significant amounts of stormwater. In order to accurately monitor water levels it is recommended that a staff gauge be installed and levels measured and recorded frequently (daily or weekly).

Lindenhurst Rain Gauge
Photo: Lake County Stormwater Management Commission

2009 summer fish kill

On July 25, 2009 a fish kill was reported to the LCHD. Hundreds of Bluegill of various age classes, and several Largemouth Bass and tadpoles lined the shore. There were no signs of lesions or body deformities to suggest disease and the variation is size class and species affected indicated that the probable cause was low dissolved oxygen concentrations.

Oxygen production in lakes is highest during the summer. This is because warm water and long hours of daylight can result in large amounts of algae and aquatic plants undergoing photosynthesis (the production of oxygen). However, oxygen-using processes, including animal and plant respiration and organic matter decomposition are also at their highest levels in summer, additionally warmer water holds less dissolved oxygen than cool water. In most lakes, the oxygen produced during the daylight far exceeds the amount used by decomposition and respiration. However, there are summer situations and lake characteristics that can lead to fish kills.

Based on Potomac Lake's shallow morphology, and abundant plant community a couple of scenarios or a combination could produce low oxygen levels. The first scenario is excessive vegetation coupled with high water temperatures. High densities of aquatic plants and/or algae combined with cloudy weather can cause a fish kill. The substantial reduction in sunlight causes the amount of oxygen produced to decline while oxygen consumption remains unchanged. Thus, oxygen levels slowly decline. The second scenario that may lead to low dissolved oxygen is a late summer herbicide treatment. Soon after treatment, a massive die-off of the treated vegetation will occur. The actual timing of the die-off depends on the herbicide used, and other conditions (such as depth, water temperature, etc). The decomposition of the treated material requires large amounts of oxygen to complete.

There are a few steps that can be taken in Potomac Lake to reduce the likelihood of a summer fish kill. First is to apply chemical treatments early in the summer before populations reach high densities and/or treat the lake in sections. Treat about 1/4 of the pond every 2-3 weeks. This spreads decomposition over a longer period of time as compared to total lake vegetation treatment.

During the 2010 sampling season dissolved oxygen levels were adequate. A healthy fishery requires oxygen levels to remain above 5.0 mg/L throughout the year to minimize stress. June had the lowest recorded average dissolved oxygen concentration 4.67 mg/L. Perhaps the most effective way to prevent a summer fish kill in Potomac Lake is to install an aeration system. Aeration continuously adds oxygen to the water, which is important if oxygen begins to approach critically low levels. Aeration does not need to be a 365 day, 24 hours a day activity in Potomac Lake. Using aeration during the May to September period may help prevent summer fish kills.

Many fish were affected by the 2009 fish kill but the population in Potomac Lake was not decimated. During the 2010 sampling season several bluegill nesting areas were observed and several frogs were also noted throughout the summer.

Summer Fish Kill

Potomac Lake July 2009

Aquatic Life Rebounds in Potomac Lake

Bluegill Nest

Potomac Lake July 2010

LakeCounty Health Department and Community Health Center

Environmental Services

Senior Biologist: Mike Adam

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Libertyville, Illinois 60048-1331

Phone: 847-377-8030
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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.

Lake Recommendations

Potomac Lake has experienced significant changes since 2006. Total phosphorus concentrations have doubled since the 2006 lake study and for the first time Potomac Lake will be on the IEPA's 303d list for impaired waters. On the other hand Potomac Lake's aquatic plant community has greatly increased in diversity to include a total of 6 submergent species, one macro-algae, and one floating species.

Potomac Lake, lake's management is administered by Lindenhurst Lakes Commission. To improve the overall quality of Potomac Lake, the ES (Environmental Services) has the following recommendations:

- **Reduce phosphorus from external sources**
- **Develop an aquatic plant management plan that involves early and proportional lake treatments to reduce the risk of low dissolved oxygen**
- **Assess the need of installing an aerator**
- **Assess Potomac Lake fish population. The last fish survey occurred in 2009**
- **Mitigate shoreline exhibiting erosion**
- **Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips**
- **Install a staff gauge to monitor lake level fluctuations**

Water quality data for Potmac Lake 2000, 2006, and 2010.

2010	Surface															
DATE	DEPTH	ALK	TKN	NH_3-N	NO2+NO3*	TP	SRP	Cl^-	TDS	TSS	TS	TVS	SECCHI	COND	pH	DO
18-May	0	141	0.66	<0.1	<0.05	0.027	<0.005	191	NA	<1	540	78	0**	0.984	8.57	10.91
15-Jun	0	139	0.94	0.274	0.149	0.049	0.009	216	NA	1.3	548	93	0**	0.979	8.06	4.67
20-Jul	0	119	1.06	<0.1	<0.05	0.173	0.072	223	NA	3.6	537	87	0**	0.988	8.96	6.09
17-Aug	0	123	1.20	<0.1	<0.05	0.097	0.009	173	NA	5.0	458	90	0**	0.788	8.66	7.73
20-Sep	0	116	1.15	<0.1	<0.05	0.08	0.007	174	NA	2.5	455	87	0**	0.798	8.4	8.13
	Average	128	1.00	0.135^k	0.070^k	0.085	0.024^k	195	NA	2.7^k	508	87	NA	0.888	8.52	6.66

2006	Surface															
DATE	DEPTH	ALK	TKN	NH_3-N	NO2+NO3*	TP	SRP	Cl^-	TDS	TSS	TS	TVS	SECCHI	COND	pH	DO
17-May	0	153	0.97	<0.1	<0.05	0.056	0.008	358	NA	4.0	788	120	0**	NA	NA	NA
21-Jun	0	148	0.87	<0.1	<0.05	0.032	<0.005	374	NA	3.5	828	146	0**	1.509	7.63	8.14
19-Jul	0	133	1.06	<0.1	<0.05	0.042	<0.005	398	NA	3.0	838	122	0**	1.585	7.79	6.72
16-Aug	0	126	1.07	<0.1	<0.05	0.045	<0.005	432	NA	3.9	883	129	0**	1.636	8.93	8.38
20-Sep	0	122	1.25	<0.1	<0.05	0.037	<0.005	391	NA	2.7	801	111	0**	1.483	8.71	10.14
	Average	136	1.04	<0.1	<0.05	0.042	0.008^k	391	NA	3.4	828	126	NA	1.553	8.27	8.35

2000	Epilimnion															
DATE	DEPTH	ALK	TKN	NH_3-N	NO_3-N	TP	SRP	Cl^-	TDS	TSS	TS	TVS	SECCHI	COND	pH	DO
1-May	2	136	1.37	<0.1	0.061	0.032	<0.005	NA	638	1.0	672	164	0**	1.076	8.79	9.20
5-Jun	2	155	1.80	0.782	0.088	0.038	<0.005	NA	530	6.4	571	151	0**	0.918	7.75	6.30
10-Jul	2	152	0.88	0.157	0.094	0.029	<0.005	NA	448	5.2	482	122	0**	0.781	7.79	6.10
7-Aug	2.5	119	1.10	<0.1	0.053	0.012	<0.005	NA	408	2.6	445	113	0**	0.724	7.97	4.20
5-Sep	1	145	1.06	<0.1	<0.05	0.048	<0.005	NA	458	4.3	480	98	0**	0.789	7.77	3.10
	Average	141	1.24	0.470^k	0.074^k	0.032	$<0.005^k$	NA	496	3.9	530	130	NA	0.858	8.01	5.78

Glossary

ALK = Alkalinity, mg/L $CaCO_3$
TKN = Total Kjeldahl nitrogen, mg/L
NH_3-N = Ammonia nitrogen, mg/L
NO_3-N = Nitrate + Nitrite nitrogen, mg/L
NO2+NO3 = Nitrite and Nitrate nitrogen, mg/L
TP = Total phosphorus, mg/L
SRP = Soluble reactive phosphorus, mg/L
Cl^- = Chlorides, 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

k = Denotes that the actual value is known to be less than the value presented.
NA= Not applicable
* = Prior to 2006 only Nitrate was analyzed
** = secchi was visible on bottom

Potomac Lake 20109 IEPA Ranking

TROPHIC STATUS		
Carlson's TSIp	68.2	Eutrophic

IMPAIRMENT ASSESSMENTS	
Total Phosphorus	Yes
Total Nitrogen	None
pH	Yes
Low DO	None
Total Dissolved Solids	None
Total Supended Solids	None
Aquatic Plants-Native	Yes
Non-Native Aquatic Plants	None
Non-Native Animals	None

	Weighting Criteria	Points	Overall Use Support Points	Degree of Support
AQUATIC LIFE USE IMPAIRMENT INDEX				
Mean Trophic State	68.2	50		
Macrophyte Impairment	Substantial	15		
Sediment Impairment (NVSS)	Minimal	0		
Degree of Use Support		**65**	0	**Full**
RECREATION USE IMPAIRMENT INDEX				
Mean Trophic State Index	68.2	68.2		
Macrophyte Impairment	Substantial	15		
Sediment Impairment (NVSS)	Minimal	0		
Degree of Use Support		**83.2**	1	**Partial**
Overall Use Index			**0.50**	**Partial**

Comparison of epilimnetic averages for Secchi disk transparency, total suspended solids, total phosphorus and conductivity readings in the Potomac Lake watershed (Potomac Lake, and Waterford Lake).

Lake	Potomac Lake	Potomac Lake	Potomac Lake	Waterford Lake	Waterford Lake	Waterford Lake
Year	**2000**	**2006**	**2010**	**2000**	**2006**	**2010**
TSS (mg/L)	3.9	3.4	2.7k	2.7	12	3.9
TP (mg/L)	0.032	0.042	0.085	0.066	0.068	0.052
Conductivity (milliSiemens/cm)	0.8576	1.55325	0.8883	0.8536	1.2022	0.8375

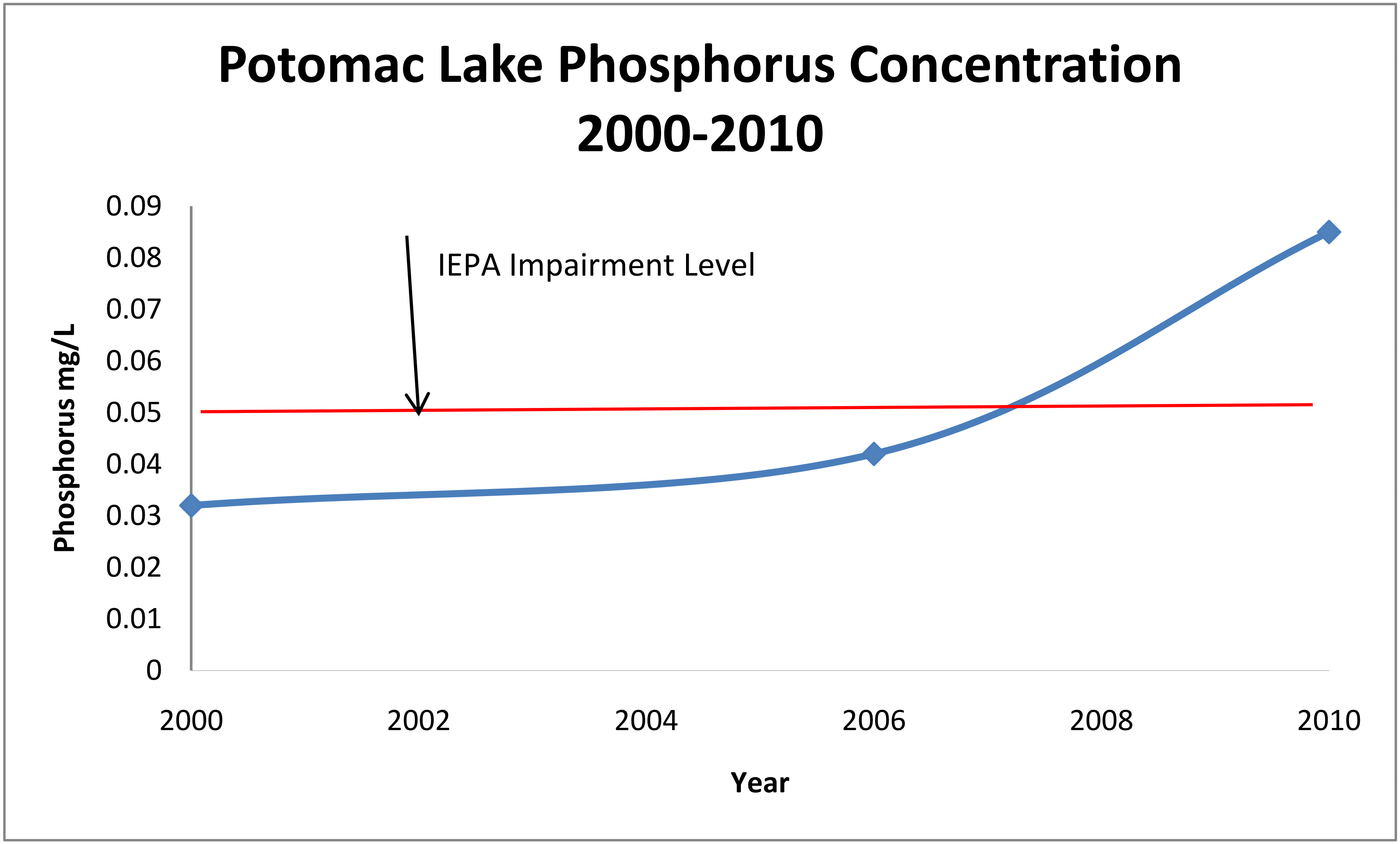
Direction of Watershed Flow

Landuse in the Potomac Lake watershed, 2010.

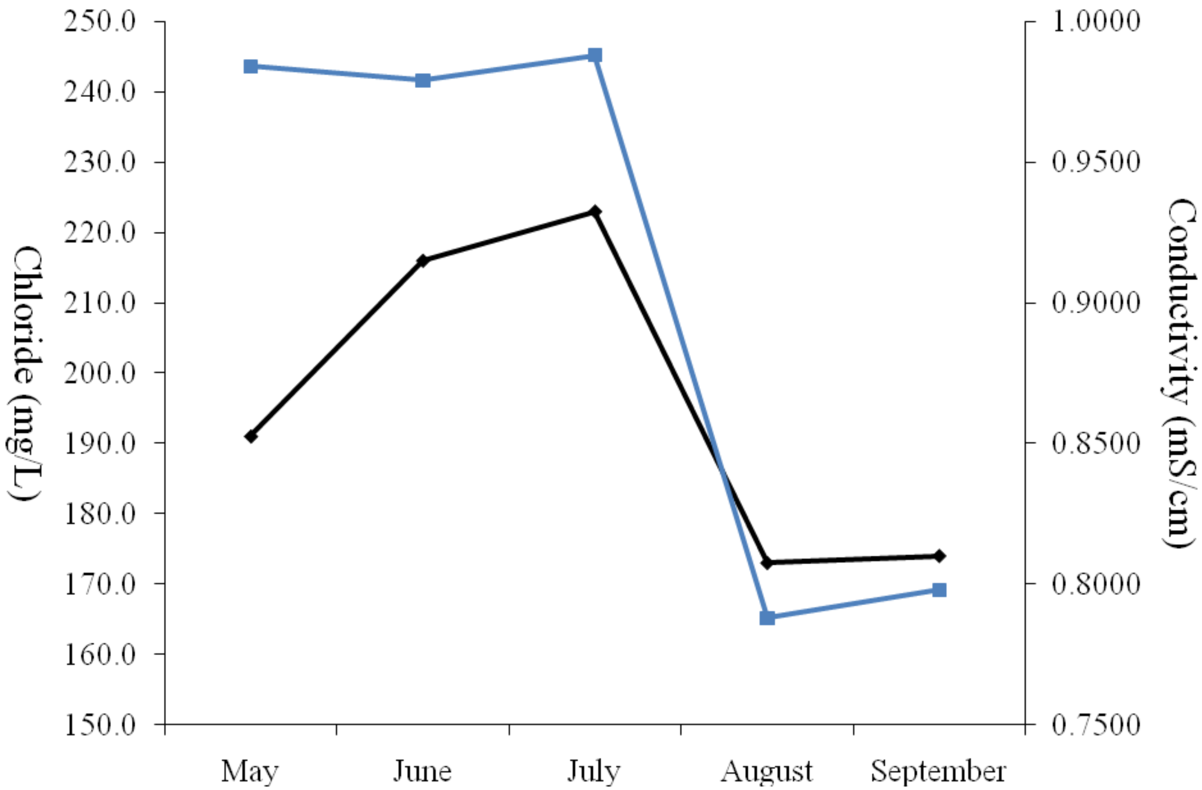
Land Use	Acreage	% of Total
Forest and Grassland	1.12	1.5%
Government and Institutional	1.92	2.5%
Public and Private Open Space	7.67	10.0%
Retail/Commercial	6.68	8.7%
Single Family	36.10	46.9%
Transportation	8.95	11.6%
Water	14.55	18.9%
Total Acres	**76.97**	**100.0%**

Land Use	Acreage	Runoff Coeff.	Estimated Runoff, acft.	% Total of Estimated Runoff
Forest and Grassland	1.12	0.05	0.2	0.2%
Government and Institutional	1.92	0.50	2.6	3.1%
Public and Private Open Space	7.67	0.15	3.2	3.7%
Retail/Commercial	6.68	0.50	9.2	10.7%
Single Family	36.10	0.50	49.6	57.9%
Transportation	8.95	0.85	20.9	24.4%
Water	14.55	0.00	0.0	0.0%
TOTAL	**76.97**		**85.7**	100.0%

Lake volume	**25.60**	**acre-feet**
Retention Time (years)= lake volume/runoff	**0.30**	**years**
	109.05	**days**


Potomac Lake Phosphorus Concentration
2000-2010
IEPA Impairment Level
Phosphorus mg/L
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
2000
2002
2004
2006
2008
2010
Year

Chloride (Cl^-) concentration vs. conductivity for Potomac Lake, 2010.



Aquatic plant density at 17 sites on Potomac lake in july 2010, Maximum depth that plants were found was 4.8 feet.

Plant Density	Chara	Duckweed	Flatstem Pondweed	Sago Pondweed	Slender Naiad	Southern Naiad	Water Stargrass
Absent	14	5	9	14	16	16	10
Present	0	4	1	0	0	0	1
Common	0	4	1	0	0	0	1
Abundant	3	0	5	3	1	1	4
Dominant	0	4	1	0	0	0	1
% Plant Occurrence	17.6%	70.6%	47.1%	17.6%	5.9%	5.9%	41.2%

Distribution of rake density across all sampling sites

Rake Density (Coverage)	# of Sites	%
No plants	0	0.0
>0 to 10%	0	0.0
>10 to 40%	0	0.0
>40 to 60%	3	17.6
>60 to 90%	9	52.9
>90%	5	29.4
Total Sites with Plants	17	100.0
Total # of Sites	17	100.0

Site: Potomac
Locale:
Date: July 2010 4 hours
By: Paap
File: Untitled study

FLORISTIC QUALITY DATA						
7 NATIVE SPECIES	Native	7	100.0%	Adventive	0	0.0%
7 Total Species	Tree	0	0.0%	Tree	0	0.0%
6.7 NATIVE MEAN C	Shrub	0	0.0%	Shrub	0	0.0%
6.7 W/Adventives	W-Vine	0	0.0%	W-Vine	0	0.0%
17.8 NATIVE FQI	H-Vine	0	0.0%	H-Vine	0	0.0%
17.8 W/Adventives	P-Forb	4	57.1%	P-Forb	0	0.0%
-5.0 NATIVE MEAN W	B-Forb	0	0.0%	B-Forb	0	0.0%
-5.0 W/Adventives	A-Forb	3	42.9%	A-Forb	0	0.0%
AVG: Obl. Wetland	P-Grass	0	0.0%	P-Grass	0	0.0%
	A-Grass	0	0.0%	A-Grass	0	0.0%
	P-Sedge	0	0.0%	P-Sedge	0	0.0%
	A-Sedge	0	0.0%	A-Sedge	0	0.0%
	Cryptogam	0	0.0%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOGNOMY	COMMON NAME
HETDUB	8	Heteranthera dubia	-5	OBL	Nt P-Forb	WATER STAR GRASS
LEMMIO	5	Lemna minor	-5	OBL	Nt A-Forb	SMALL DUCKWEED
NAJFLE	6	Najas flexilis	-5	OBL	Nt A-Forb	SLENDER NAIAD
NAJGUA	8	Najas guadalupensis	-5	OBL	Nt A-Forb	SOUTHERN NAIAD
POTPEC	5	Potamogeton pectinatus	-5	OBL	Nt P-Forb	SAGO PONDWEED
POTPUS	7	Potamogeton pusillus	-5	OBL	Nt P-Forb	SMALL PONDWEED
POTZOS	8	Potamogeton zosteriformis	-5	OBL	Nt P-Forb	FLAT-STEMMED PONDWEED

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
											-1.019
51810	0.25	0.474	15.66	10.91	110.0	0.984	8.57	1151.9	Surface		
51810	1	0.580	15.66	10.99	110.8	0.984	8.55	1141.3	Surface	100%	
51810	2	0.904	15.66	11.04	111.4	0.984	8.54	463.6	-0.77	41%	-1.18
51810	3	1.436	15.66	11.09	111.8	0.984	8.54	286.0	-0.23	25%	-2.06
51810	4	2.255	15.64	11.09	111.8	0.983	8.53	257.1	0.59	23%	0.18

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
											1.953
61510	0.25	0.25	22.02	4.67	53.5	0.979	8.06	2122.1	Surface		
61510	1	1	21.79	4.55	51.9	0.981	8.02	2161.8	Surface	100%	
61510	2	2	21.54	5.23	59.5	0.980	7.98	644.0	0.33	30%	3.67
61510	3	3	21.43	5.33	60.5	0.979	7.96	469.7	1.33	22%	0.24

Date MMDDYY	Text Depth feet	Dep25 feet	Temp øC	DO mg/l	DO% Sat	SpCond mS/cm	pH Units	PAR æE/s/mý	Depth of Light Meter feet	% Light Transmission Average	Extinction Coefficient
											0.469
72010	0.25	0.25	27.54	6.09	77.4	0.988	8.96	1034.1	Surface		
72010	1	1	27.53	5.93	75.3	0.987	8.99	1042.9	Surface	100%	
72010	2	2	27.53	5.74	72.9	0.987	9.05	831.0	0.33	80%	0.69
72010	3	3	27.50	5.80	73.6	0.987	9.08	596.9	1.33	57%	0.25

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
											2.740
81710	0.25	0.25	24.67	7.73	93.2	0.788	8.66	1543.2	Surface		
81710	1	1	24.69	8.05	97.0	0.789	8.76	1461.4	Surface	100%	
81710	2	2	24.66	7.84	94.5	0.786	8.80	591.7	0.33	40%	2.74

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
											NA
92010	0.5	0.5	18.09	8.13	86.2	0.798	8.40	NA	Surface		
92010	1	1	18.07	7.31	77.5	0.798	8.47	NA	Surface	NA	
92010	2	2	18.00	6.97	73.8	0.796	8.54	NA	0.33	NA	NA
92010	3	3	17.96	6.87	72.7	0.7960	8.58	NA	1.33	NA	NA