Mississippi Valley Conservation

State of the Lake Environment Report December 2003

Shabomeka Lake

Watershed Watch

Shabomeka Lake

Shabomeka Lake is located in the Township of North Frontenac. Shabomeka Lake is at an elevation of 268 metres above sea level. The lake perimeter is 14 kilometres and the deepest point is 32 metres. Shabomeka Lake supports a cold water fishery, in particular lake trout. At last count in the late 1970's, there were approximately 104 cottages on the lake. Much of this development took place in the early 1960's.

Members of the Lake Association have volunteered their time to provide consistent water quality testing through the Ministry of Environment Self Help Program since 1976. This data provided a general picture of water quality conditions over the past twenty-seven years. Continuing to collect this data is extremely important and will become valuable with each year that passes; the data will provide a general picture of water quality conditions. Comprehensive testing in 1998 and 2003 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a comparison between water quality conditions as they exist now, to results obtained 27 years ago through the Ministry of Environment Recreational Lakes Program.

In general, the water quality in Shabomeka Lake remains very good**.** There is one sampling station on the lake at the deepest point. You will find graphs which follow, that water clarity, as measured by Secchi Disk readings, were observed as very good. The average for 2003 is 6.35 metres, compared to 5 years ago, when the average was 5.6 metres. Thus indicating that Shabomeka Lake is an unenriched (few nutrients) or oligotrophic lake.

Directly related to water clarity is the amount of nutrients, in particular phosphorus, entering the lake. The Provincial Objective for phosphorus levels in cold water lakes is 10 micrograms per litre (ug/L). In 2003, the mean for the euphotic zone (depth at which sunlight can penetrate or two times the secchi disk depth) was 4.67 *ug*/L. The mean for the samples taken one metre off the bottom was also 7.0 *ug*/L, , both below the Provincial Objective, conditions essential to sustain lake trout habitat. Five years ago, the average phosphorus level was 4.6 *ug*/L, in the euphotic zone and 5.1 *ug*/L, one metre off the bottom of the lake. Therefore there was a slight increase in levels over the past 5 years.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling stations was 1.87 *ug*/L. Thus, indicating a low algal density for Shabomeka Lake in 2003. In 1998, chlorophyll a levels were lower at 1.7 *ug*/L. Thus indicating that Shabomeka Lake remains an unenriched (few nutrients) or oligotrophic lake.

It is not all good news, plants and animals are a direct reflection of their environment. Lake trout are no exception, because lake trout require more pristine environmental conditions than most native fish species, lake trout can act as an environmental barometer. The most critical time of year for conducting dissolved oxygen and temperature profiles is after August 31. Profiles are generally conducted at this time of year and at the deepest point in the lake. Aquatic vegetation and algae that has grown over the summer, has died off and settled on the bottom, using the available oxygen necessary to sustain aquatic life in the lower portion of the lake or the hypolimnion.
The dissolved oxygen and temperature data indicate typical conditions for a lake of 32 metres in depth. While oxygen values are adequate to support lake trout there is only a narrow layer of water from 12 to 14 metres having optimal conditions for the lake trout to survive by the end of the summer. Due to this relatively small volume of water available, the MOE and MNR classified Shabomeka Lake as highly sensitive to further loss of the optimal habitat.

Despite excellent water quality conditions in the lake, residents and users of Shabomeka Lake cannot afford to be complacent. Every effort should be made to reduce nutrient loading into the lake from land use activities. Human sources of phosphorus include leachate from sewage disposal systems, erosion from the clearing of shorelines and the use of lawn fertilizers. Because lake trout are very sensitive to changes in their environment, we all have a responsibility to preserve this most precious resource for future generations, so they may catch lake trout in Shabomeka Lake. There are helpful tips throughout this report to help reduce your impact on Shabomeka Lake. Additional water quality data, current and historic, is available for Shabomeka Lake and many other lakes in the Mississippi Valley watershed. Contact MVC for more information on how you can become a good lake steward for your lake.

FIVE EASY STEPS TO IMPROVE WATER QUALITY

1. Build at least 30 metres away from the shoreline.
2. Keep your lot well treed and preserve or replant native vegetation along the shoreline.
3. Pump out your septic tank every three to five years.
4. Reduce water use and use phosphate free soaps and detergents.
5. Keep the size of your lawn to a minimum; do not use fertilizers, herbicides or pesticides.

LOW PHOSPHORUS LIFESTYLE	Amount of Phosphorus (grams)	HIGH PHOSPHORUS LIFESTYLE	Amount of Phosphorus (grams)
Human waste	535	Human waste	535
No dishwasher	0	Dishwasher using powdered detergent once per day	650
No fertilizer	0	Lawn fertilized once/year	1960
Trees not cut down	20	Lot cleared of trees	30
Uses phosphate-free products	20	Uses products with phosphate	180
TOTAL	**575 grams**	**TOTAL**	**3355 grams**

How Does Shabomeka Lake Measure Up?

1976 – 2003 Water Quality Results

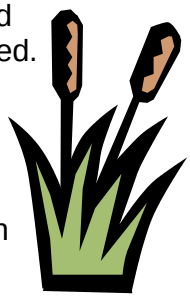
Sample Year [Various Stations]	Secchi Disk Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/Litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/Litre]	Chlorophyll a Composite [Micrograms/Litre]
**1976	5.1	9		1.8
1980	5.1	7.6	20	2.5
1981	4.4			2.1
*1983	4.8			1.4
1984	5.2			2.1
1985	4.3			2.5
1986	4.5			2.4
1987	4.9			2.5
1988	5.2			2.0
1989	5.1			2.5
1990	5.4			2.4
1991	5.2			2.3
1992	5.8			2.3
1993	5.3			2.2
*1996	5.7			
*1997	5.4			
1998	5.6	4.6	5.1	1.7
*1999	5.9			
*2000	4.1			
*2001	4.8			
*2002	3.7			
*2003	6.35	4.67	7	1.87
n	22	4	3	16
Minimum	3.7	4.60	5.10	1.40
Maximum	6.4	9.0	20.00	2.5
Mean	5.1	6.5	10.7	2.2
Standard Deviation	0.62552575	2.192006311	8.109870529	0.332073662

*Mean based on less than 6 measurements **Includes Recreational Lakes Program Data
Chlorophyll-a data prior to 1985 has been adjusted to reflect new lab procedures
in filtering resulting in an increase in chla concentrations by 35%

How to protect or restore a shoreline depends on the conditions of the site and the energy and resources of the owner.

There are four main strategies to choose from:

- **PRESERVATION**
  When purchasing a lakefront property, a natural shoreline is retained and access to the lake is designed to avoid shoreline damage.
- **ENHANCEMENT**
  Native species are planted and non-native species are removed.
- **NATURALIZATION**
  Degraded shorelines are left alone to return to their natural state.
- **RESTORATION**
  Cleared areas are planted with native species.

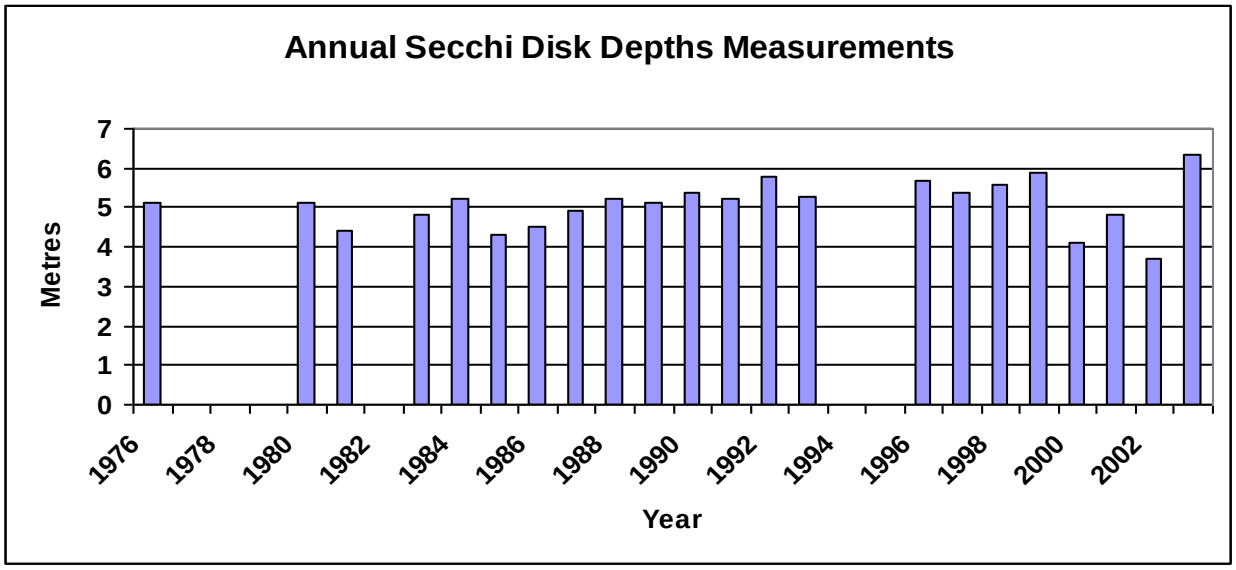


Interpreting Secchi Disc Readings:

A Secchi disk is a black and white coloured disk used to determine water clarity. The disk is lowered into the water. The point, at which you can no longer distinguish the black and white, is called the Secchi depth.

The higher the Secchi Disk measurement the clearer your lake is.

INTERPRETING YOUR SECCHI DISC RESULTS	
Secchi Reading	**Lake Nutrient Status**
Over 5 metres	Oligotrophic - unenriched, few nutrients
3.0 to 4.9 metres	Mesotrophic – moderately enriched, some nutrients
Less than 2.9 metres	Eutrophic – enriched, higher levels of nutrients

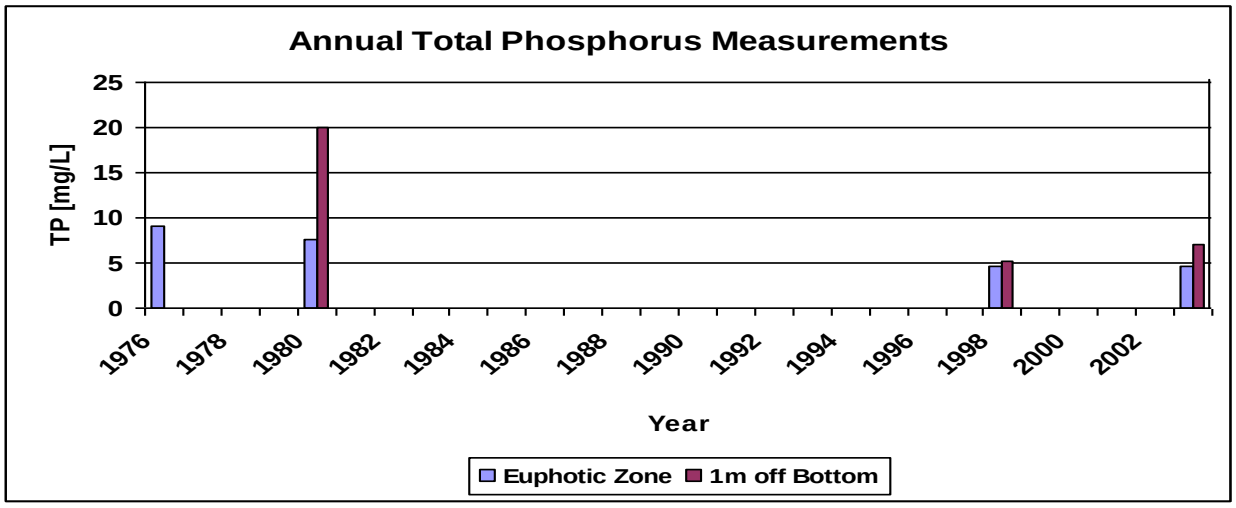


For more information on lakes in the Mississippi Valley Watershed, visit MVC online at
www.mvc.on.ca

Interpreting Total Phosphorus Results:

Phosphorus is the nutrient that controls the growth of algae in most Ontario lakes. For this reason any increase in phosphorus in the lake will increase the quantity of algae that can grow. High levels of phosphorus can lead to algal blooms and in some cases affect the habitat of cold water fish such as lake trout. A general guideline exists to characterize your lake based on the total phosphorus that is measured.

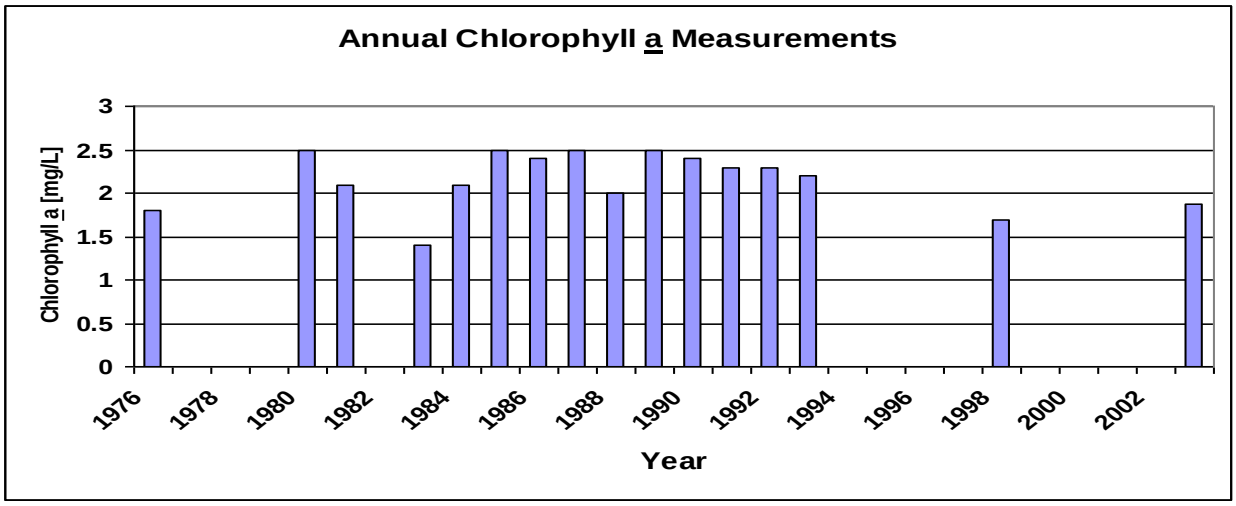
INTERPRETING YOUR TOTAL PHOSPHORUS RESULTS	
Total Phosphorus	**Lake Nutrient Status**
10ug/L or less	Oligotrophic - unenriched, few nutrients
11 to 20ug/L	Mesotrophic – moderately enriched, some nutrients
21ug/L or more	Eutrophic – enriched, higher levels of nutrients



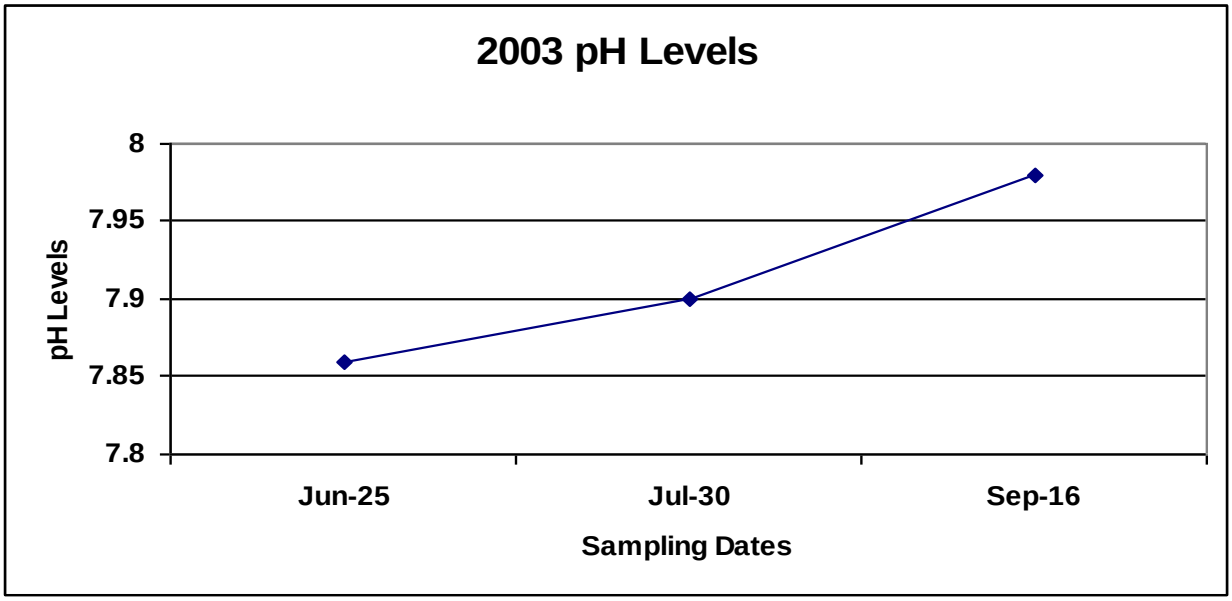
Evaluating your Chlorophyll a Results:

The lower the chlorophyll a density in your lake, the clearer your lake is. Chlorophyll a is directly affected by the amount of total phosphorus in your lake. The more phosphorus there is in the water, the more algal growth will occur.

INTERPRETING YOUR CHLOROPHYLL A RESULTS	
Secchi Reading	**Lake Nutrient Status**
Up to 2 ug/L - low algal density	Oligotrophic - unenriched, few nutrients
2-4 ug/L - moderate algal density	Mesotrophic - moderately enriched, some nutrients
More than 4 ug/L- high algal density	Eutrophic - enriched, higher levels of nutrients



Evaluating your pH Results: Lakes with pH levels at 7.3 or higher are vulnerable to zebra mussels invasive.



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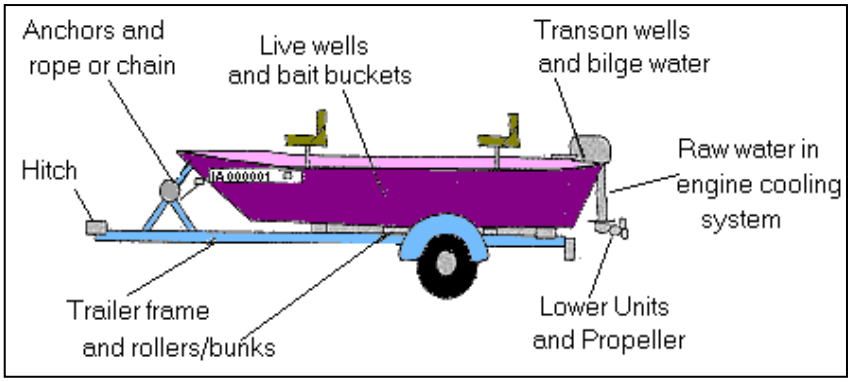
MVC and O.F.A.H. need your help to Stop the Invasion!

Check & clean your boat every time you change water bodies



Working with Lake Associations, we hope to improve signage at public launching areas to identify lakes where zebra mussels and spiny water fleas are already present. We hope to focus on an ambitious educational campaign to help reduce their spread to lakes where they are not yet present.

For more information call MVC at (613)259-2421, the Invading Species Hotline 1-800-563-7711.

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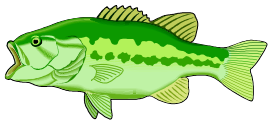
SHABOMEKA LAKE – Main Basin

DISSOLVED OXYGEN/TEMPERATURE PROFILES
MOE Rec. Lks. Station 18-3430-722-01 MVC Station # 03-01



Date: July 30, 2003
Depth: 27 Metres
Euphotic Zone (Penetration of Light) = 12.6 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	22.4	8.9	98	
1.0	22.3	8.9	98	
2.0	22.0	8.9	97	
3.0	22.0	8.9	97	Epilimnion
4.0	21.8	8.8	96	
5.0	21.7	8.8	95	
6.0	18.2	10.4	107	
7.0	13.9	12.1	111	Metalimnion
8.0	10.5	12.5	108	or Thermocline
9.0	9.4	12.6	106	
10.0	7.5	12.0	97	
11.0	6.4	11.6	90	
12.0	6.0	10.1	78	
13.0	5.7	9.3	72	
14.0	5.5	9.0	69	
15.0	5.4	8.6	66	
16.0	5.4	8.3	64	
17.0	5.4	8.3	64	
18.0	5.2	8.3	63	Hypolimnion
19.0	5.0	8.3	62	
20.0	4.9	8.0	61	
21.0	4.9	7.5	57	
22.0	4.8	7.3	55	
23.0	4.8	7.2	54	
24.0	4.8	7.2	54	
25.0	4.8	7.2	54	
26.0	4.8	7.2	54	Bottom

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Note: Warm Water Fisheries Habitat (Bass, Walleye, Pike, Perch) = DO > 4 mg/L at < 25°C.

SHABOMEKA LAKE – Main Basin Continued…

Date: September 16, 2003
Depth: 27 Metres
Euphotic Zone (Penetration of Light) = 14.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.1	7.6	80	
1.0	20.2	7.6	80	
2.0	20.2	7.6	80	
3.0	20.2	7.4	79	Epilimnion
4.0	20.2	7.4	79	
5.0	20.2	7.5	80	
6.0	19.6	7.6	79	
7.0	19.6	7.1	73	
8.0	16.8	7.9	77	
9.0	13.4	9.2	85	Metalimnion
10.0	11.6	8.9	78	or Thermocline
11.0	10.9	8.7	75	
12.0	9.9	7.8	66	
13.0	7.5	6.3	51	
14.0	7.1	6.0	48	
15.0	6.7	5.5	43	
16.0	6.3	5.1	40	
17.0	6.1	5.4	42	
18.0	5.9	5.3	40	Hypolimnion
19.0	5.8	5.2	40	
20.0	4.6	4.5	34	
21.0	5.4	4.4	34	
22.0	5.3	4.2	42	
23.0	4.9	4.3	33	
24.0	4.9	4.0	30	
25.0	4.9	3.8	29	
26.0	4.9	3.7	28	
27.0	4.9	3.5	27	Bottom

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Note: Warm Water Fisheries Habitat (Bass, Walleye, Pike, Perch) = DO > 4 mg/L at < 25°C.

The Watershed Watch program was made possible thanks to the generous support of the Ministry of Environment, Lake Associations, area Stewardship Councils, the Lake Stewardship Network and concerned citizens. ***Special Thanks to Wayne Marsh for volunteering his time and resources to this program.***

For more information regarding *Watershed Watch* or for free advice on how you can help protect or enhance your lake environment, contact Melissa Dakers, Water Quality Technician, Mississippi Valley Conservation at (613) 259-2421 or mdakers@mvc.on.ca