Mississippi Valley Conservation

State of the Lake Environment Report 2008

Shabomeka Lake

Shabomeka Lake

Shabomeka Lake is located in the Township of North Frontenac, with a 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 32 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, 2003 and 2008 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a comparison between water quality conditions as they exist now, to results obtained 32 years ago through the Ministry of Environment Recreational Lakes Program.

Shabomeka Lake has one sampling station on the lake at the deepest point. Water clarity, as measured by secchi disc readings, were observed as good. The average for 2008 is 4.7 meters, compared to the 2003 reading of 6.35 metres. Thus indicating Shabomeka Lake as a moderately enriched (some nutrients) or mesotrophic 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 2008, the mean for the euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth) was 12.0 *ug*/L increased from the 2003 reading of 4.67ug/L. The mean for the samples taken one metre off the bottom was 15.0*ug/*L, again a increase from the 2003 reading of 7.0. Both 2008 readings are above the Provincial Objective of 10.0ug/L, conditions essential to sustain lake trout habitat.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling stations was 2.5 *ug/*L. Thus, indicating a moderate algal density for Shabomeka Lake in 2008. In 2003, chlorophyll a levels were lower at 1.87 *ug*/L. Shabomeka Lake is a moderately enriched (some nutrients) or mesotrophic lake.

Plants and animals are a direct reflection of their environment and 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 9 to 11 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.

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.

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 removed. Access to the lake is designed to avoid shoreline damage.

Enhancement

Native species are planted and non-native species are removed

Naturalization

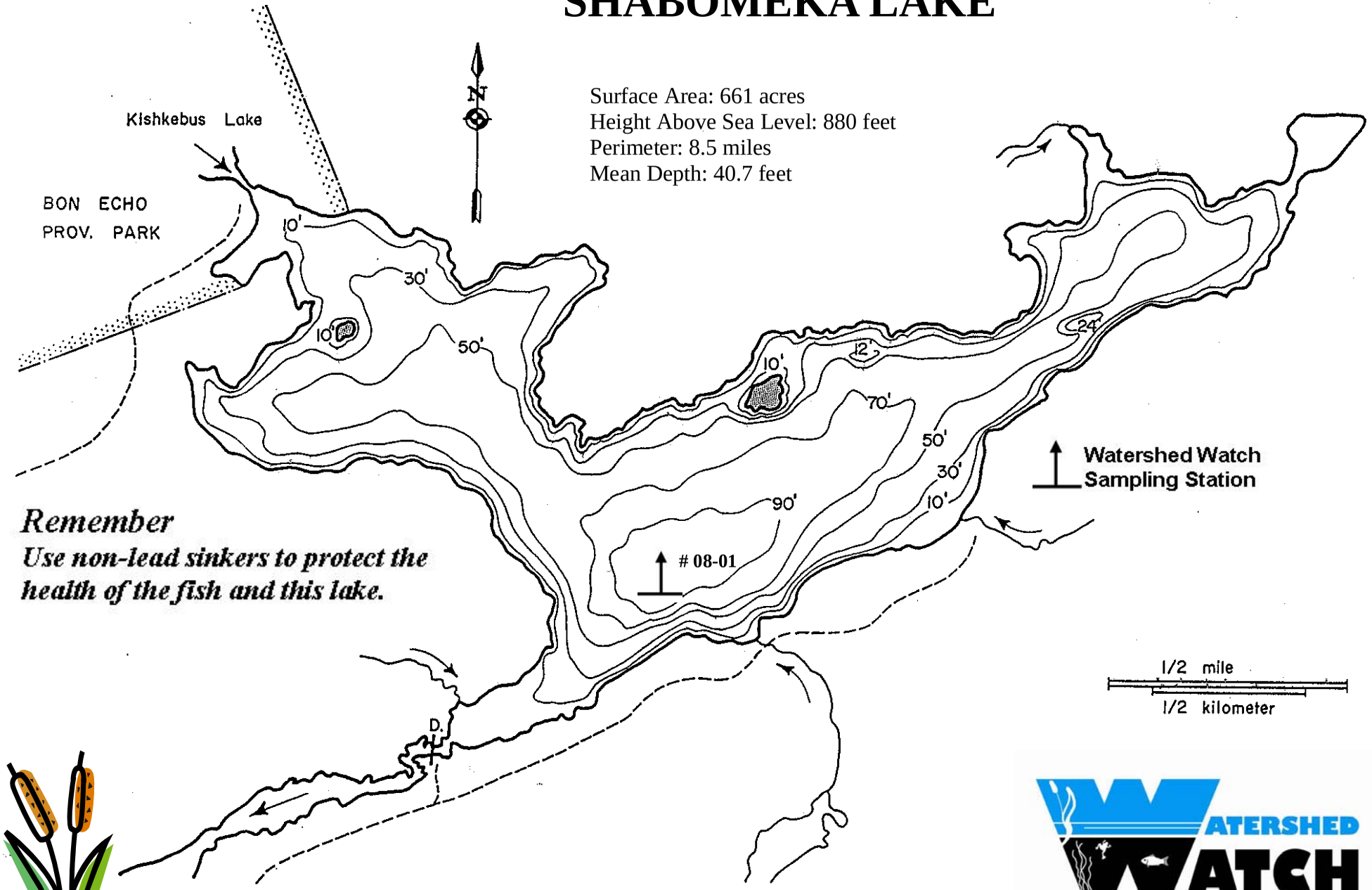
Degraded shorelines are left alone to return to their natural state.

Restoration

Clear areas are planted with native species.

Mississippi Valley Conservation

SHABOMEKA LAKE



Surface Area: 661 acres
Height Above Sea Level: 880 feet
Perimeter: 8.5 miles
Mean Depth: 40.7 feet

Remember
Use non-lead sinkers to protect the health of the fish and this lake.

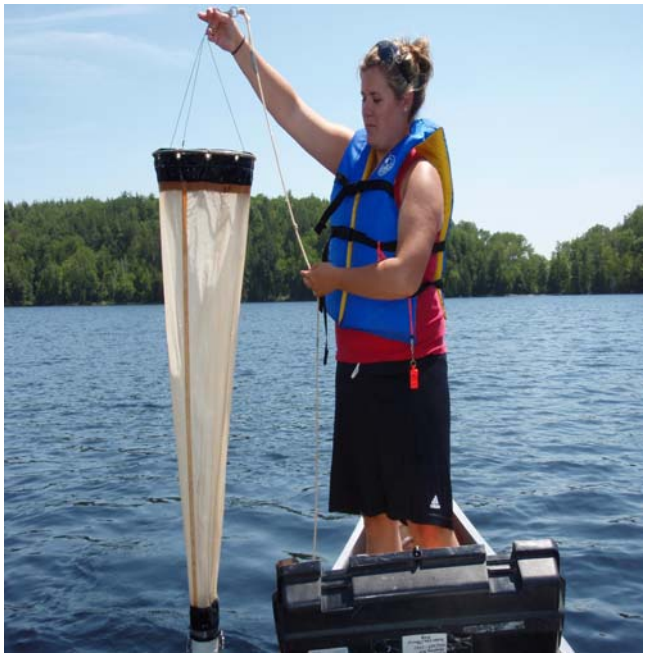
WATERSHED WATCH

This map is intended for illustration only; it should not be used as a navigation guide.

MVC and OFAH need your help to Stop the Invasion!

Check & clean your boat every time you change water bodies

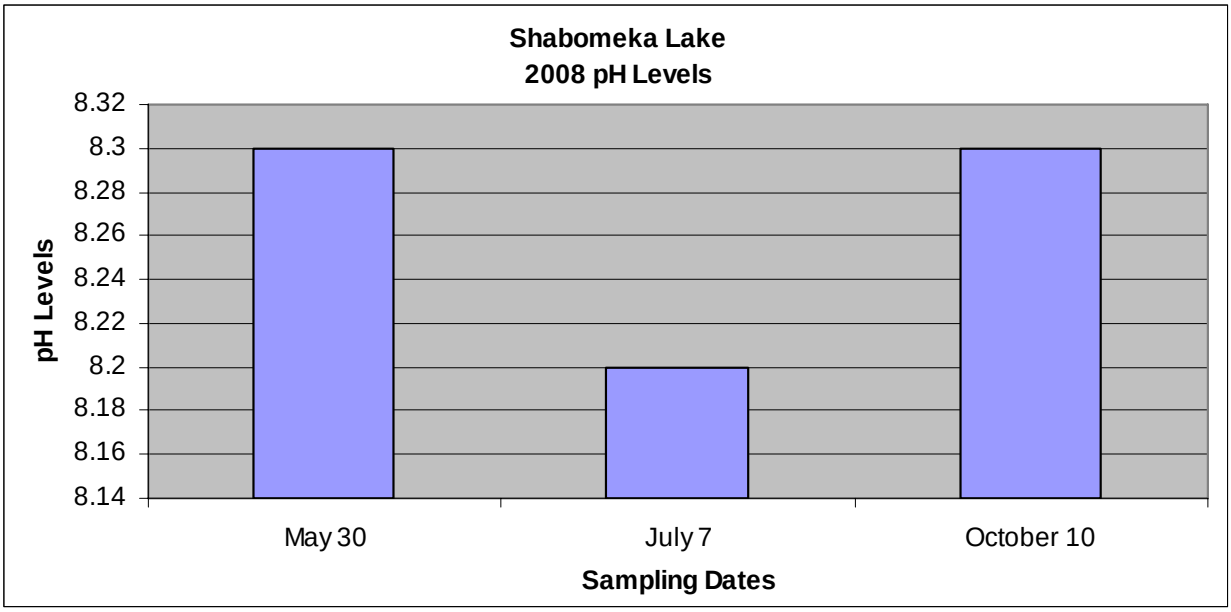
Shabomeka Lake was also tested for invasive species in 2008**,** in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters. Shabomeka Lake did not have spiny water flea or zebra mussel veligers (larvae) present in the sample collected in 2008. However, in previous years zebra mussels veligers have been detected. Residents and property owners need to ensure that all access points to the lake have posted signs indicating the presence of zebra mussels and the precautions they can take to avoid the spread of invasive species to other lakes.



Katie Linton, 2008 Summer Student with OFAH and MVC.

Evaluating your pH Results

Lakes with pH levels at 7.3 or higher are vulnerable to zebra mussels invasive.



How Does Shabomeka Lake Measure Up?

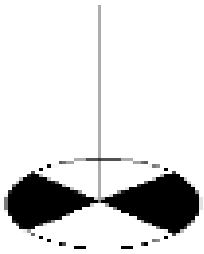
1976 - 2008 WATER QUALITY RESULTS - Shabomeka Lake

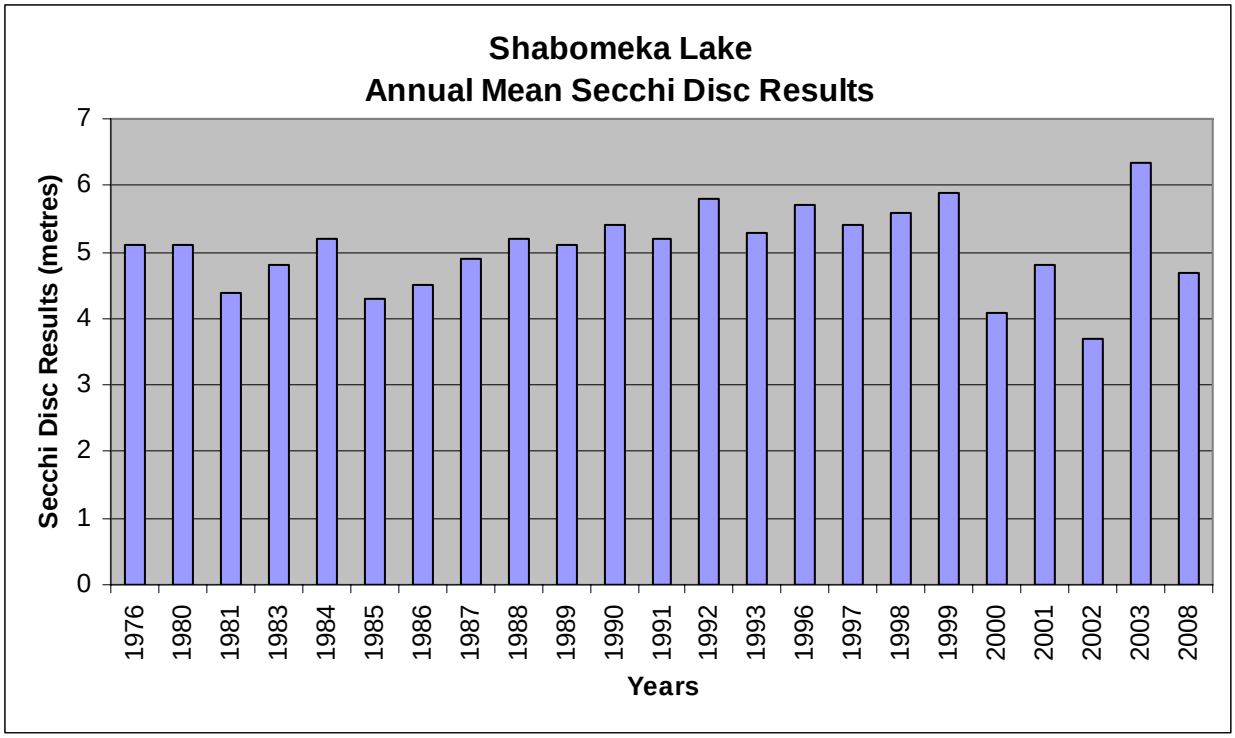
Sample Year [Various Stations]	Secchi Disk Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/Litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/Litre]	Chlorophyll a Composite [Micrograms/Litre]
**1976	5.1	9		1.8
1980	5.1	7.6	20	2.5
1981	4.4			2.1
*1983	4.8			1.4
1984	5.2			2.1
1985	4.3			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
*2008	4.7	12	15	2.5
n	23	5	4	17
Minimum	3.7	4.60	5.10	1.40
Maximum	6.4	12.0	20.00	2.5
Mean	5.1	7.6	11.8	2.2
Standard Devia-	0.61636926	3.118554152	6.961980082	0.331897397

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

Interpreting Secchi Disc Readings

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



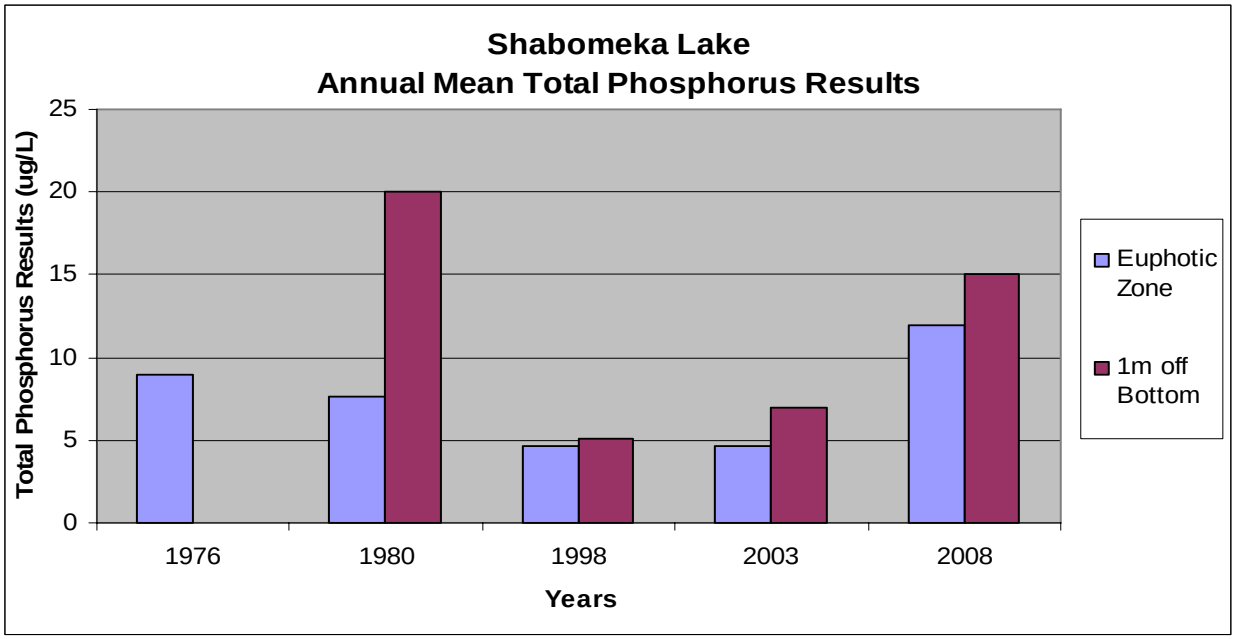


The higher the Secchi Disc measurement the clearer your lake is.

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

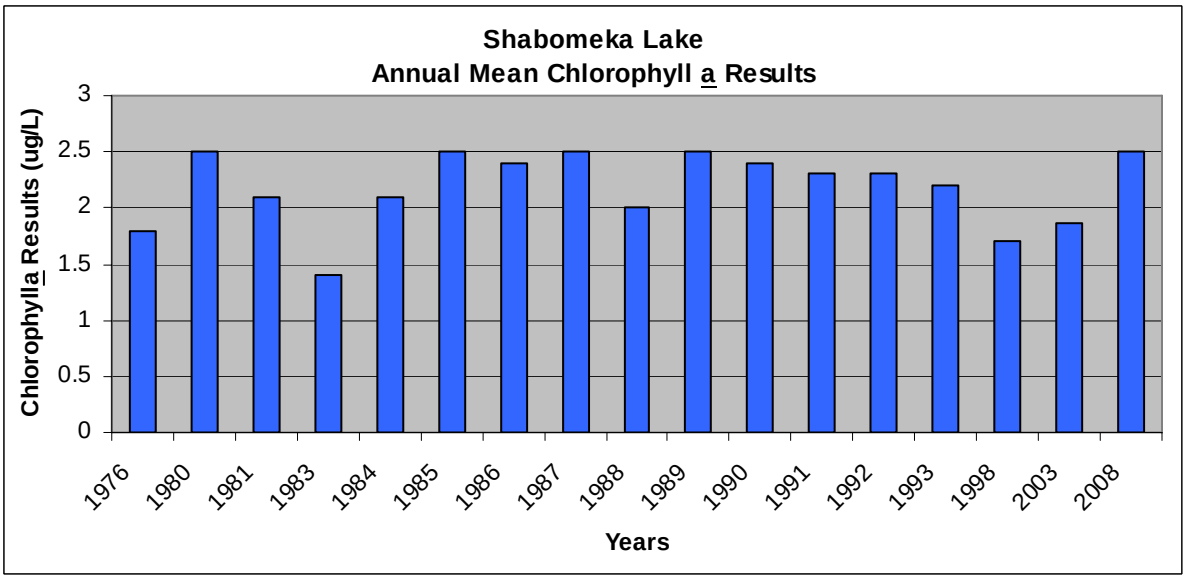
Interpreting Total Phosphorus Results

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.



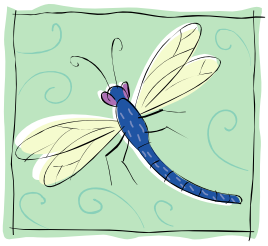
Evaluating your Chlorophyll a Results

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.



SHABOMEKA LAKE - MAIN BASIN

DISSOLVED OXYGEN/TEMPERATURE PROFILE



MOE Rec.Lks. Station 18-3430-7-01 MVC Station 08-01
Date: May 30, 2008
Depth: 29.0 Metres
Euphotic Zone (Penetration of Light) = 8.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	16.4	9.9	96	
1	15.7	9.9	95	
2	15.4	10.0	95	Epilimnion
3	15.2	10.1	96	
4	15.0	10.2	97	
5	14.8	10.3	98	
6	13.0	10.5	96	
7	10.4	10.6	92	Metalimnion
8	8.5	10.1	84	or Thermocline
9	7.7	9.5	76	
10	6.8	9.5	75	
11	6.4	9.1	71	
12	6.0	9.0	70	
13	5.8	8.7	67	
14	5.5	8.5	65	
15	5.4	8.7	66	Hypolimnion
16	5.3	8.8	66	
17	5.2	8.8	68	
18	5.2	8.9	68	
19	5.0	8.8	67	
20	4.9	8.8	66	
21	4.9	8.9	67	
22	4.9	8.9	67	
23	4.8	8.9	66	
24	4.7	8.9	66	
25	4.7	8.8	66	
26	4.6	8.7	65	
27	4.6	8.6	64	
28	4.6	8.4	63	
29	Bottom	Bottom	Bottom	Bottom

Optimal Habitat for Cold Water Fisheries =
greater than 6 mg/L DO at less than 10 degrees celsius

Vital Habitat for Cold Water Fisheries =
greater than 4 mg/L DO at less than 15.5 degrees celsius

MOE Rec.Lks. Station 18-3430-7-01 MVC Station 08-01
Date: July 7, 2008
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	24.4	9.0	103	
1	24.2	9.0	102	Epilimnion
2	23.6	9.1	103	
3	23.2	8.9	100	
4	19.1	9.0	94	
5	19.1	10.1	109	
6	16.3	11.0	108	Metalimnion
7	12.7	11.0	0	or Thermocline
8	10.1	10.7	92	
9	8.6	10.6	85	
10	7.4	10.0	80	
11	7.0	9.5	75	
12	6.3	9.5	74	
13	6.1	9.0	70	
14	5.8	9.0	69	
15	5.7	8.5	65	
16	5.4	8.5	65	
17	5.3	8.4	64	
18	5.2	8.5	64	Hypolimnion
19	5.2	8.4	64	
20	5.1	8.3	64	
21	5.0	8.3	65	
22	4.9	8.2	62	
23	4.8	7.9	60	
24	4.8	7.8	59	
25	4.8	7.6	57	
26	4.8	7.4	56	
27	4.7	7.0	53	
28	4.7	7.0	53	
29	4.7	6.6	50	
30	4.6	6.3	47	
31	4.6	4.8	36	
32	4.1	4.6	34	
33	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries =
greater than 6 mg/L DO at less than 10 degrees celsius

Vital Habitat for Cold Water Fisheries =
greater than 4 mg/L DO at less than 15.5 degrees celsius

MOE Rec.Lks. Station 18-3430-7-01 MVC Station 08-01
Date: October 10, 2008
Depth: 31.0 Metres
Euphotic Zone (Penetration of Light) = 9.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	12.7	10.0	91	
1	12.5	10.0	91	
2	12.5	9.9	90	Epilimnion
3	12.5	9.9	90	
4	12.4	9.9	90	
5	12.3	9.9	89	
6	12.2	9.9	89	
7	12.2	9.8	88	
8	10.4	7.9	78	Metalimnion
9	9.3	7.0	59	or Thermocline
10	7.0	6.5	52	
11	6.5	6.1	48	
12	6.1	5.9	46	
13	5.7	4.7	37	
14	5.5	4.8	37	
15	5.4	5.3	40	Hypolimnion
16	5.3	5.2	39	
17	5.3	5.2	39	
18	5.1	4.9	38	
19	5.0	4.3	33	
20	4.9	4.1	31	
21	4.7	3.5	26	
22	4.7	3.3	25	
23	4.7	3.0	22	
24	4.5	2.9	22	
25	4.5	2.6	19	
26	4.5	2.3	17	
27	4.4	1.9	14	
28	4.4	1.5	11	
29	4.4	1.2	9	
30	4.4	0.9	7	
31	Bottom	Bottom	Bottom	Bottom

Optimal Habitat for Cold Water Fisheries =
greater than 6 mg/L DO at less than 10 degrees celsius

Vital Habitat for Cold Water Fisheries =
greater than 4 mg/L DO at less than 15.5 degrees celsius

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

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.

For more information regarding *Watershed Watch* or for free advice on how you can help protect or enhance your lake environment, contact Susan Lee, Watershed Monitoring Supervisor, Mississippi Valley Conservation at (613) 259-2421 or slee@mvc.on.ca

Mississippi Valley Conservation

WATERSHED WATCH