



Mississippi Valley Conservation

*State of the Lake
Environment Report
December 2004
Shawenegog Lake*



Shawenegog Lake

Shawenegog Lake, also known locally as McClintock Lake, is located in the Township of North Frontenac. Shawenegog Lake is at an elevation of 268 metres above sea level. The lake perimeter is 18.0 kilometres; the deepest point is 28 metres. Shawenegog Lake supports a warm water fishery, in particular, Walleye, Northern Pike, Smallmouth Bass, and White Fish. There are approximately 36 properties on the lake, according to the Lake Association.



Limited water quality data is available for Shawenegog Lake. Records indicate that members of the Lake Association have volunteered their time to provide water quality testing through the Ministry of Environment's (MOE) Self Help and Lake Partner Program for five years between 1989 to 1993, and 2003. This data is extremely valuable because it provides a general picture of water quality conditions over the time. Comprehensive testing in 1999 and 2004 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program*, provides for a comparison between water quality conditions as they exist now, to results obtained in 1976, (28 years ago), through the MOE Recreational Lakes Program.

In general, the water quality in Shawenegog Lake remains very good. There are two sampling stations at the deepest points in the north and in the south basins on the lake, as indicated on the bathymetric map included in this report. Each station was sampled three times for 2004. You will find graphs which follow, that water clarity, as measured by Secchi Disk readings, were observed as slightly declining. The average for the two stations for 2004 is 3.92 metres, compared to 5 years ago, when the average was slightly higher at 4.25 metres. Thus indicating that Shawenegog Lake is 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 warm water lakes is 20 micrograms per litre (ug/L). In 2004, the mean for the two stations in the euphotic zone (depth at which sunlight can penetrate or two times the secchi disk depth) was 5.0 ug/L . The mean for the samples taken one metre off the bottom was 8.0 ug/L . Five years ago, the average phosphorus level was 11.5 ug/L in the euphotic zone and 8.0 ug/L one metre off the bottom of the lake, both under the Provincial Objective. Shawenegog Lake decreased its average phosphorus levels, moving it to an Oligotrophic lake status and putting it well below the Provincial Objective.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the two sampling stations was 2.09 ug/L . Thus, indicating a moderate algal density for Shawenegog Lake in 2004. In 1999, the chlorophyll a levels were slightly higher at 2.14 ug/L . Therefore Shawenegog Lake remains a moderate (some nutrients) or mesotrophic lake.

Plants and animals are a direct reflection of their environment. 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. Two other profiles were conducted in 2004, in order to generate a more concise picture of the oxygen content of the lake.

The dissolved oxygen (DO) and temperature data, measured at the two sampling stations, indicate oxygen concentrations in the deep water portion are reduced by late-summer. Warm water fish species, such as smallmouth bass, are squeezed into the upper 6 metres of the lake by September.



Shawenegog Lake was also tested for invasive species in 2004, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters (OFAH). Shawenegog Lake tested *positive* for zebra mussel veligers (larvae) and *negative* spiny water flea present. Residents and property owners need to ensure that all access points to the lake have posted signs indicating the precautions they can take to avoid the spread of invasive species from Shawenegog Lake to other lakes. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.

Residents and users of Shawenegog 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. The Lake Association should continue monitoring the water quality. Monitoring over time is essential to determine long term trends and changes. Resources and information are readily available through the *Watershed Watch Program*. There are helpful tips throughout this report to help reduce your impact on Shawenegog Lake. Additional water quality data, current and historic, is available for Shawenegog 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 Shawenegog Lake Measure Up?

1976 – 2004 Water Quality Results – North Basin

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	5.0	11.0	6.5	4.11
1989	5.6			6.00
1990	5.3			4.00
1991	6.0			2.90
1992	5.8			4.30
1993	5.6			3.10
1999	4.4	11.5	8.0	2.60
2003	4.8			
*2004	4.0	5.3	7.0	2.00
n	9	3	3	8
Minimum	4.0	5.3	6.5	2.0
Maximum	6.0	11.5	8.0	6.0
Mean	5.2	9.3	7.2	3.6
Standard Deviation	0.67082039	3.444318994	0.763762616	1.2515469

1976 – 2004 Water Quality Results – South Basin

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	10.2		3.93
1999	4.1	14.5	15.8	1.68
*2004	3.8	4.7	9.0	2.17
n	3	3	2	3
Minimum	3.8	4.7	9.0	1.7
Maximum	5.1	14.5	15.8	3.9
Mean	4.3	9.8	12.4	2.6
Standard Deviation	0.66905406	4.912229636	4.808326112	1.183230042

*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 chl.a 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:

① PRESERVATION

When purchasing a lakefront property, a natural shoreline is retained and access to the lake is designed to avoid shoreline damage.

② NATURALIZATION

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

③ ENHANCEMENT

Native species are planted and non-native species are removed.

④ RESTORATION

Cleared areas are planted with native species.



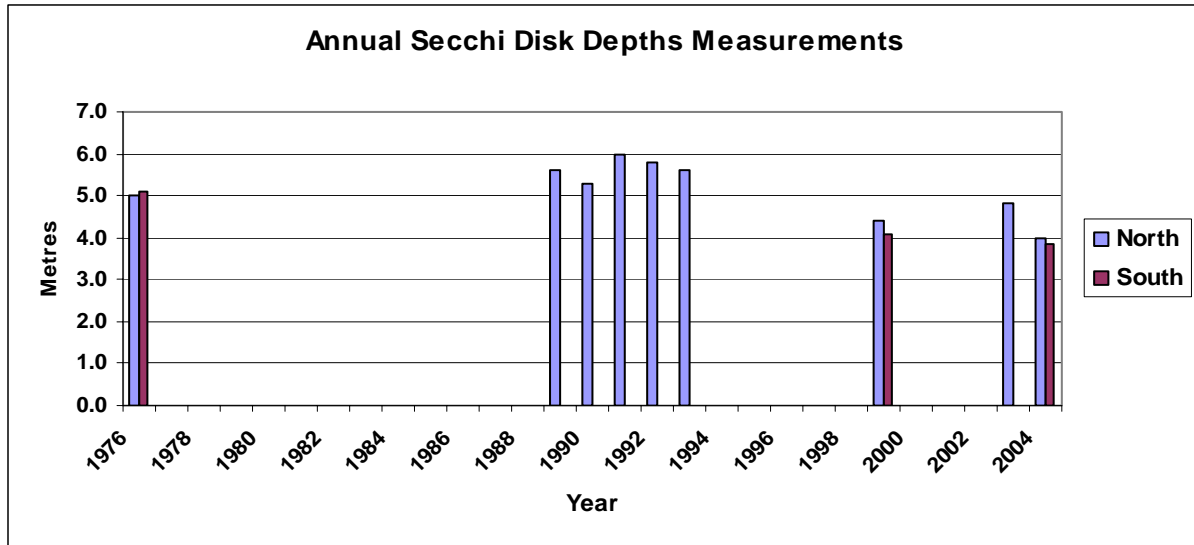
Interpreting Secchi Disc Readings:

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.

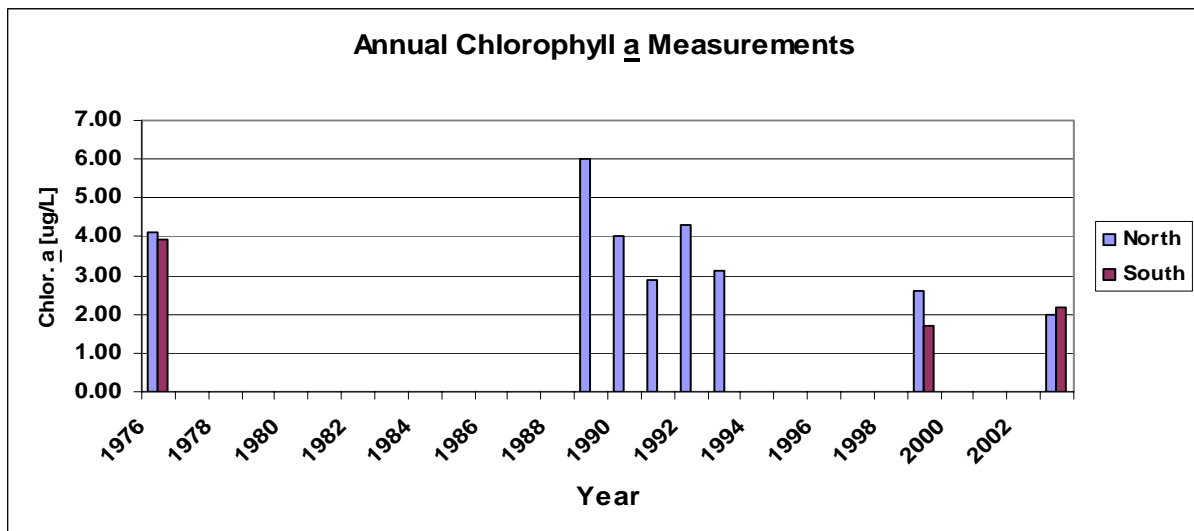
INTERPRETING YOUR SECCHI DISC RESULTS	
Secchi Reading	Lake Nutrient Status
Over 5 metres	Oligotrophic - unenriched, few nutrients
3.0 to 4.9 metres	Mesotrophic – moderately enriched, some nutrients
Less than 2.9 metres	Eutrophic – enriched, higher levels of nutrients



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.

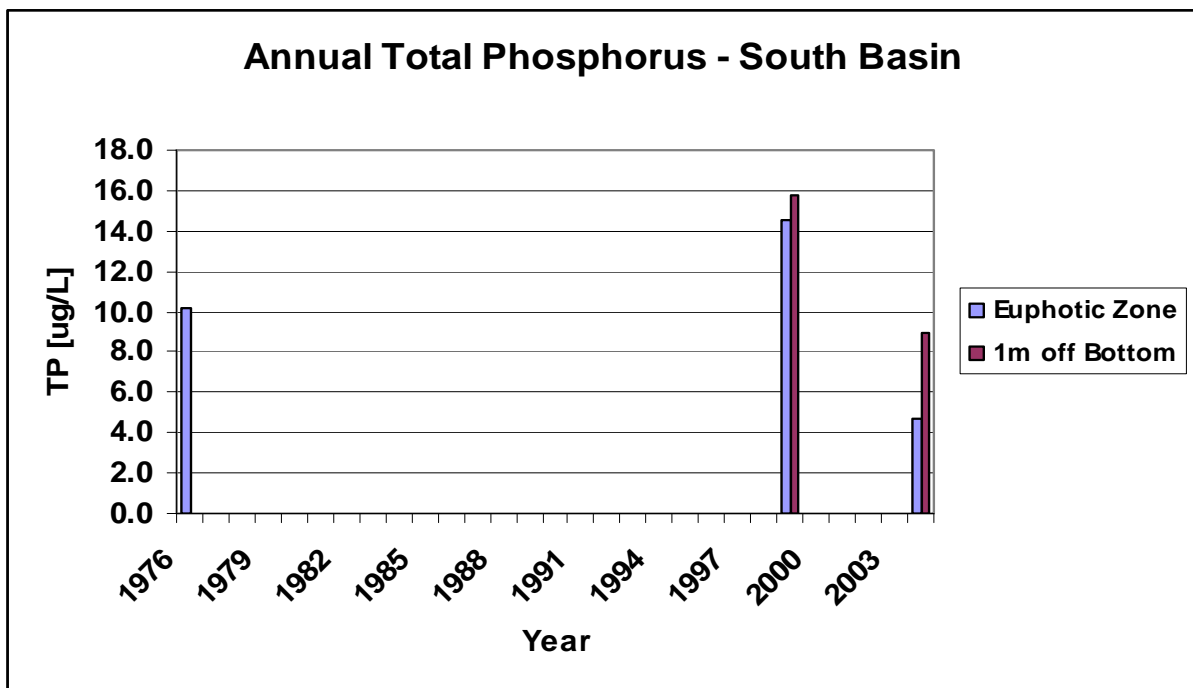
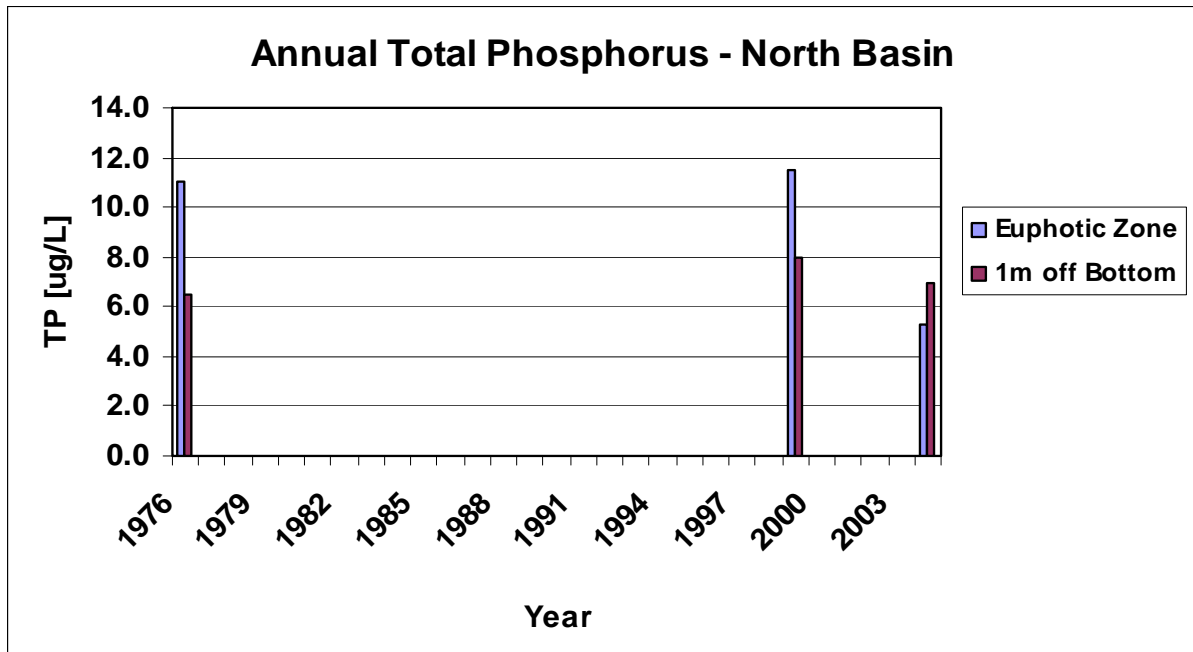
INTERPRETING YOUR CHLOROPHYLL A RESULTS	
Chlorophyll a Reading	Lake Nutrient Status
Up to 2 ug/L - low algal density	Oligotrophic - unenriched, few nutrients
2-4 ug/L - moderate algal density	Mesotrophic - moderately enriched, some nutrients
More than 4 ug/L- high algal density	Eutrophic - enriched,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



Interpreting Total Phosphorus Results:

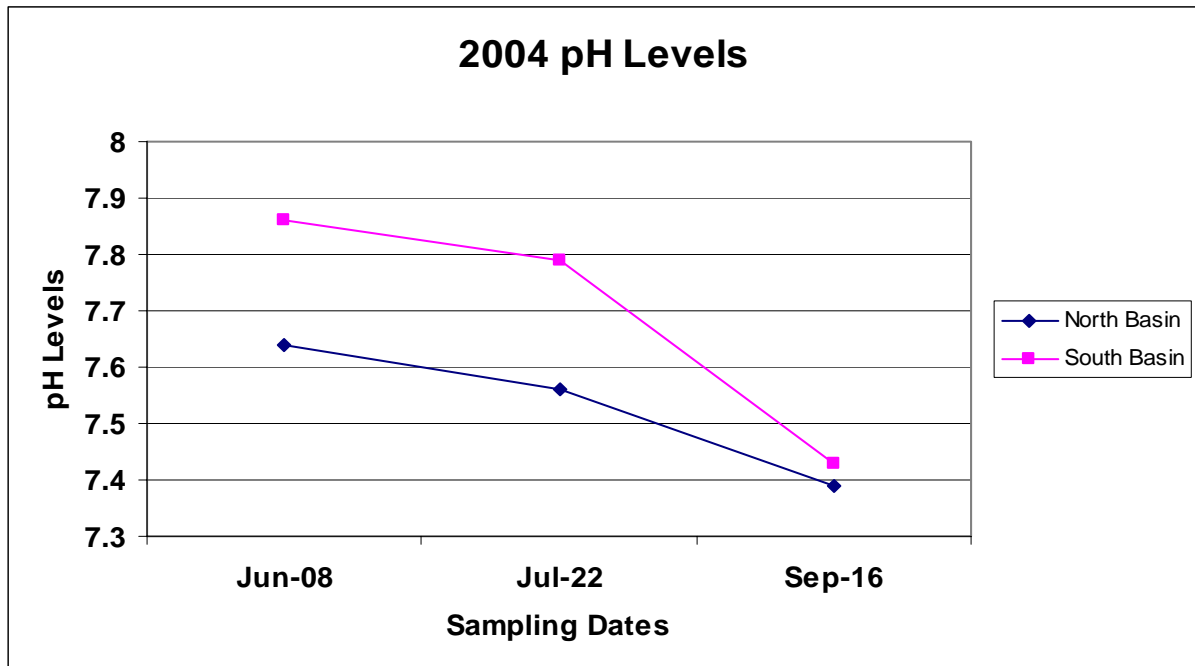
Phosphorus is the nutrient that controls the growth of algae in most Ontario lakes. For this reason any increase in phosphorus in the lake will increase the quantity of algae that can grow. High levels of phosphorus can lead to algal blooms and in some cases affect the habitat of cold water fish such 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
10 ug/L or less	Oligotrophic - unenriched, few nutrients
11 to 20 ug/L	Mesotrophic – moderately enriched, some nutrients
21 ug/L or more	Eutrophic – enriched, higher levels of nutrients



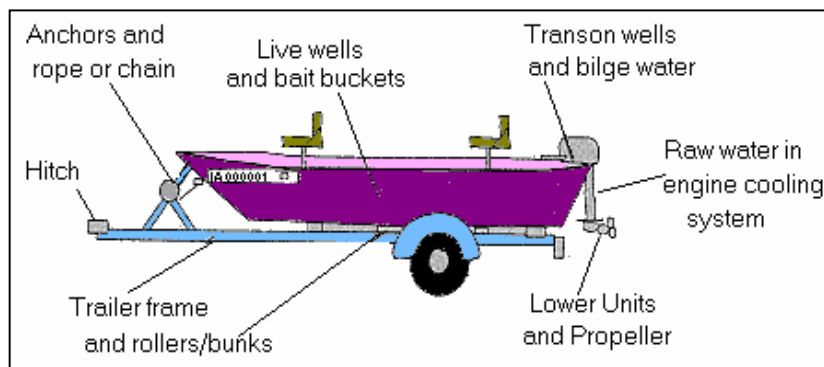
Evaluating your pH Results:

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



MVC and OFAH need your help to Stop the Invasion!

Check & clean your boat every time you change water bodies



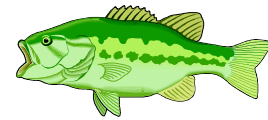
Working with Lake Associations, we hope to improve signage at public launching areas to identify lakes where zebra mussels and spiny water fleas are already present. We hope to focus on an ambitious educational campaign to help reduce their spread to lakes where they are not yet present.

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



SHAWENEGOG LAKE – North Basin

DISSOLVED OXYGEN/TEMPERATURE PROFILES
 MOE Rec. Lks. Station # 19-3430-723-01, MVC Station # 04-15



Date: June 8, 2004
 Depth: 27.0 Metres
 Euphotic Zone (Penetration of Light) = 8.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	21.1	8.2	89	Epilimnion
1.0	20.8	8.4	90	
2.0	20.6	8.4	90	
3.0	20.2	8.4	90	
4.0	16.4	8.5	83	Metalimnion or Thermocline
5.0	13.9	8.5	78	
6.0	11.3	7.8	69	
7.0	10.1	7.6	65	
8.0	9.6	7.5	64	Hypolimnion
9.0	8.7	7.4	62	
10.0	8.5	6.0	50	
11.0	7.1	6.4	52	
12.0	7.0	6.4	52	
13.0	6.7	6.2	49	
14.0	6.5	5.9	46	
15.0	6.0	5.5	42	
16.0	5.7	5.3	40	
17.0	5.4	5.0	38	
18.0	5.3	4.8	37	
19.0	5.2	4.7	36	
20.0	4.9	4.6	35	
21.0	4.8	4.4	33	
22.0	4.8	4.4	33	
23.0	4.8	4.3	32	
24.0	4.8	4.3	32	
25.0	4.7	4.3	32	
26.0	4.7	4.3	32	
27.0	4.7	4.3	32	
28.0				Bottom

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

Date: July 22, 2004

Depth: 28.0 Metres

Euphotic Zone (Penetration of Light) = 8.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	24.5	7.0	80	Epilimnion
1.0	24.5	7.1	80	
2.0	24.4	7.0	80	
3.0	24.4	7.0	80	
4.0	21.9	6.9	75	
5.0	18.9	6.3	65	Metalimnion or Thermocline
6.0	14.2	5.7	54	
7.0	12.6	5.3	48	
8.0	11.1	4.4	39	
9.0	8.9	4.5	38	
10.0	8.1	4.4	36	Hypolimnion
11.0	7.2	4.2	34	
12.0	6.7	3.7	29	
13.0	6.2	3.6	28	
14.0	5.9	3.3	25	
15.0	5.6	3.1	23	
16.0	5.5	2.9	22	
17.0	5.3	2.5	19	
18.0	5.1	2.4	18	
19.0	5.0	2.2	16	
20.0	5.0	2.1	15	
21.0	4.9	2.1	15	
22.0	4.9	2.0	14	
23.0	4.9	1.9	13	
24.0	4.8	1.8	13	
25.0	4.8	1.8	13	
26.0	4.8	1.5	11	
27.0	4.8	1.4	10	
28.0				Bottom

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

SHAWENEGOG LAKE – North Basin Continued...

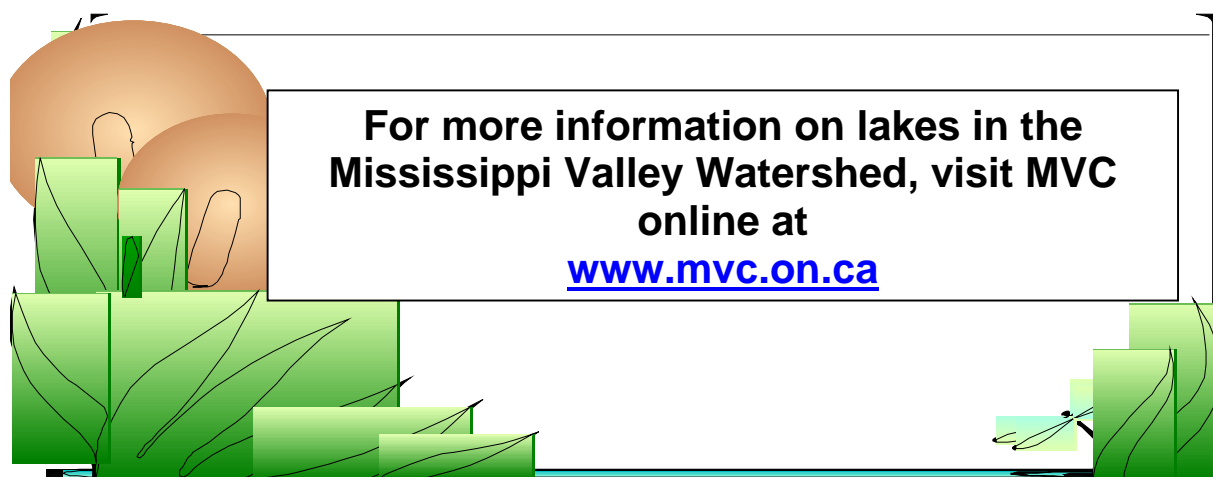
Date: September 16, 2004

Depth: 28.0 Metres

Euphotic Zone (Penetration of Light) = 8.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.2	7.9	84	Epilimnion
1.0	20.2	8.0	85	
2.0	20.2	8.0	85	
3.0	20.1	8.0	85	
4.0	20.0	8.0	85	
5.0	19.1	7.6	79	
6.0	18.1	6.8	69	Metalimnion or Thermocline
7.0	14.6	3.7	36	
8.0	12.0	2.4	20	
9.0	10.8	2.0	17	
10.0	9.3	1.7	13	
11.0	8.3	1.5	12	
12.0	6.8	1.4	11	Hypolimnion
13.0	6.3	1.5	12	
14.0	6.0	1.5	11	
15.0	5.7	1.2	9	
16.0	5.4	0.9	6	
17.0	5.2	0.8	6	
18.0	2.1	0.7	4	
19.0	5.0	0.6	4	
20.0	5.0	0.5	4	
21.0	5.0	0.4	3	
22.0	5.0	0.3	2	
23.0	5.0	0.2	2	
24.0	5.0	0.2	2	
25.0	4.9	0.2	2	
26.0	4.9	0.1	1	
27.0	4.9	0.1	1	
28.0				Bottom

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

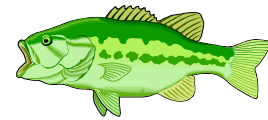


**For more information on lakes in the
Mississippi Valley Watershed, visit MVC
online at**

www.mvc.on.ca

SHAWENEGOG LAKE – South Basin

DISSOLVED OXYGEN/TEMPERATURE PROFILES
 MOE Rec. Lks. Station # 19-3430-724-01, MVC Station # 04-24



Date: June 8, 2004

Depth: 16.0 Metres

Euphotic Zone (Penetration of Light) = 7.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.4	8.3	89	Epilimnion
1.0	20.4	8.4	90	
2.0	20.4	8.4	90	
3.0	18.9	8.5	87	Metalimnion or Thermocline
4.0	16.3	8.5	84	
5.0	15.3	8.5	82	
6.0	11.2	7.3	64	
7.0	10.4	6.7	57	Hypolimnion
8.0	9.5	5.8	49	
9.0	9.1	5.5	46	
10.0	8.1	4.2	34	
11.0	6.2	2.4	18	
12.0	5.8	1.9	13	
13.0	5.5	1.5	12	
14.0	5.3	1.0	7	Bottom
15.0	5.2	0.7	5	
16.0				

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

Date: July 22, 2004

Depth: 15.0 Metres

Euphotic Zone (Penetration of Light) = 7.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	24.8	6.9	78	Epilimnion
1.0	24.7	7.0	80	
2.0	24.5	7.1	81	
3.0	23.0	7.1	79	Metalimnion or Thermocline
4.0	20.7	6.5	69	
5.0	16.2	5.1	50	
6.0	12.6	3.8	34	
7.0	10.8	2.5	21	Hypolimnion
8.0	10.0	2.1	17	
9.0	9.2	1.6	13	
10.0	6.6	0.5	4	
11.0	6.0	0.3	2	
12.0	5.8	0.2	2	
13.0	5.8	0.2	2	
14.0	5.8	0.2	2	
15.0				Bottom

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

SHAWENEGOG LAKE – South Basin Continued...

Date: September 16, 2004

Depth: 16.0 Metres

Euphotic Zone (Penetration of Light) = 9.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.0	7.9	84	Epilimnion
1.0	20.0	8.0	85	
2.0	19.9	8.1	85	
3.0	19.5	7.8	82	
4.0	19.2	7.6	80	
5.0	18.7	7.0	72	Metalimnion or Thermocline
6.0	16.5	4.5	45	
7.0	12.8	0.7	6	
8.0	10.8	0.3	3	
9.0	8.8	0.3	3	Hypolimnion
10.0	7.8	0.2	3	
11.0	7.1	0.2	3	
12.0	6.6	0.2	2	
13.0	6.6	0.2	2	
14.0	6.6	0.2	2	
15.0	6.5	0.2	2	
16.0				Bottom

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



Mississippi Valley Conservation

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 Dan Tymchuk and the Shawenog Lake Association for volunteering their time and resources to this program.

For more information regarding Watershed Watch or for 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



