



Mississippi Valley Conservation

*State of the Lake
Environment Report
December 2002
Robertson Lake*



Robertson Lake

Robertson Lake is a scenic lake situated in the Township of Lanark Highlands, in Lanark County. Robertson Lake is at an elevation of 286 metres above sea level. The lake perimeter is approximately 8.2 kilometres, with a maximum depth of 30.5 metres. Robertson Lake supports a warm water fishery. Common species include Northern Pike, Smallmouth and Largemouth Bass. At last count in 1996, there were 44 cottages and 17 permanent residences on the lake.



Water Quality records collected from Robertson Lake date back as far as 1965. Residents of Robertson Lake have volunteered their time in the past, to provide water quality testing, through the Ministry of the Environment (MOE) Self-Help Program and the Lake Partner Program. Collecting 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 2002 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a comparison between water quality conditions as

they exist now, to results obtained 25 years ago through the MOE Recreational Lakes Program.

In general, the water quality in Robertson Lake is improving. There is one sampling station at the deepest point, in the middle of the lake. This station was sampled eight times for 2002. You will find graphs which follow, that water clarity, as measured by Secchi Disk readings, were observed as very good. The average for 2002 is 7.24 metres, indicating that Robertson Lake is an unenriched (few nutrients) or oligotrophic lake. Thirty-seven years ago, the average Secchi Disk depth was 5.2 metres, indicating an improvement in water clarity.

Directly related to water clarity is the amount of nutrients, in particular phosphorus, entering the lake. The Provincial Objective for phosphorus levels in shield lakes is a maximum of 20 micrograms per litre (ug/L). In 2002, the average total phosphorus level in the euphotic zone (depth at which sunlight can penetrate or two times the secchi disk depth), was $7.6 ug/L$, indicating an oligotrophic lake environment. The average for the sample taken one metre off the bottom was $61.1 ug/L$, which is fairly high, indicating an enriched (higher amount of nutrients) or euphotic lake environment. Twenty-five years ago, the average phosphorus level was $14.0 ug/L$ in the euphotic zone and $92.0 ug/L$ one metre off the bottom of the lake. Robertson Lake decreased its average phosphorus level in both zones but by more than $30 ug/L$ in the bottom of the lake.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling station was $0.97 ug/L$, indicating a very low algal density for Robertson Lake. In 1977, chlorophyll a levels were slightly higher at $1.95 ug/L$.

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

2002, one in May and one in July, in order to generate a more concise picture of the oxygen content of the lake.

The dissolved oxygen and temperature data, measured at the deepest point in the main basin, indicate oxygen concentrations in the deep water portion are reduced by mid-summer and decrease over late summer. Warm water fish species, such as pike and bass, are squeezed into the upper 13 metres of the lake by July and by September into upper 10 meters. Therefore, residents and users of Robertson Lake cannot afford to be complacent. Every effort should be made to reduce nutrient loading into the lake from land use activities.

Robertson Lake was also tested for invasive species in 2002, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters. Robertson Lake did *not* have zebra mussel veligers (larvae) or 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 into Robertson Lake. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.



Residents and users of Robertson Lake should continue their stewardship approach to limit the amount of nutrients entering the lake. Continuing to monitor the lake over time is essential in determining 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 Robertson Lake. Additional water quality data, current and historic, is available for Robertson 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. We all have a responsibility to preserve this precious natural resource for future generations.

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 Robertson Lake Measure Up?

1965 – 2002 Water Quality Results

Sample Year	Secchi Disk Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/litre]	Chlorophyll a Composite [Micrograms/Litre]
1965	5.2			
1968	5.2			
**1977	6.5	14.0	92.0	2.00
1978	6.4			2.25
1979	6.9			3.60
**1980	5.9	6.0	14.0	3.40
1981	6.7			1.50
1982	6.4			1.40
1983	5.8			1.20
1984	6.6			2.40
1985	6.3			
1986				
1987				
1988				
1989				
1990	6.2			0.90
1991	6.8			0.90
1992	6.8			0.70
1993	7.3			0.80
1994	8.2			1.10
1995				
1996	9.9	10.0		
1997	9.1	8.0		
1998	8.1	6.0		
1999	9.0	7.0		
2000	7.5	10.0		
2001				
2002	7.3	7.6	61.1	0.97
n	22	8	3	14
Minimum	5.2	6.0	14.0	0.70
Maximum	9.9	14.0	92.0	3.60
Mean	7.0	8.6	55.7	1.7
Standard Deviation	1.224153	2.687917	39.279384	0.949185

**Includes Recreational Lakes Program Data

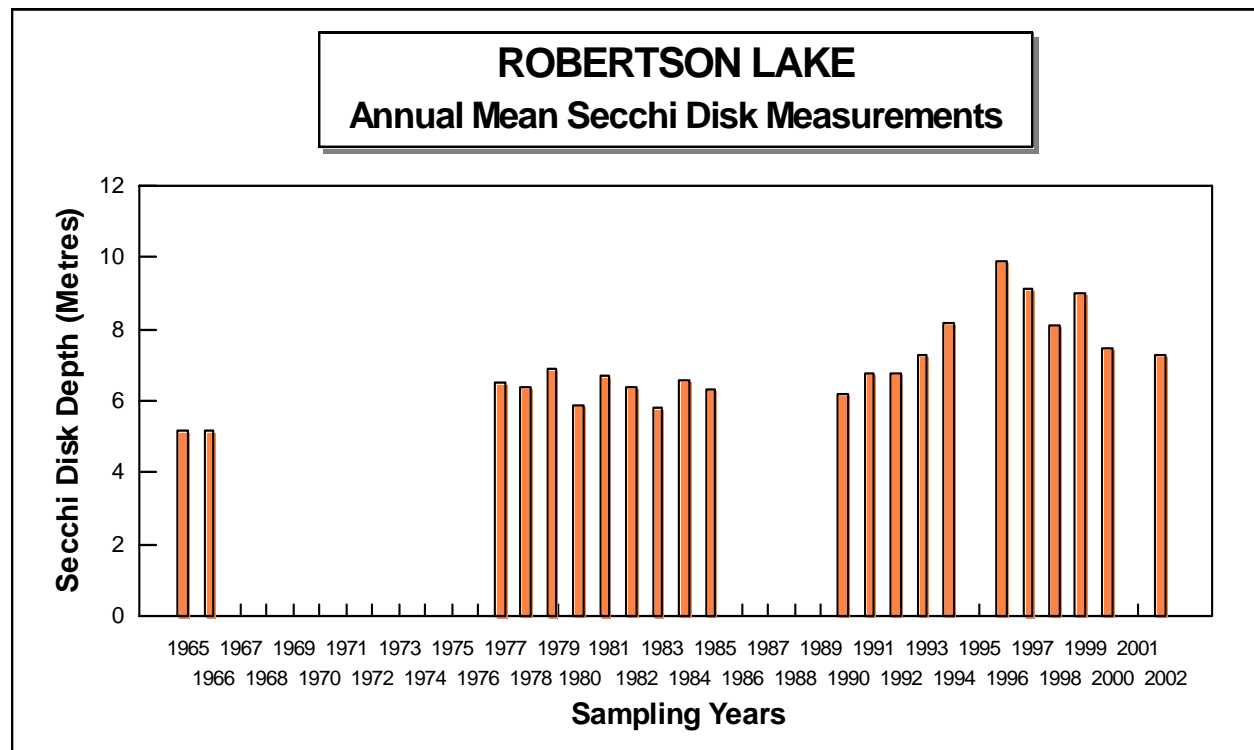
Chlorophyll a data prior to 1985 has been adjusted to reflect new lab procedures in filtering, resulting in an increase in chla concentrations by 35%.

Evaluating Secchi Disk 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.



INTERPRETING YOUR SECCHI DISK 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



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.

③ ENHANCEMENT

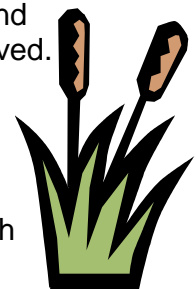
Native species are planted and non-native species are removed.

② NATURALIZATION

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

④ RESTORATION

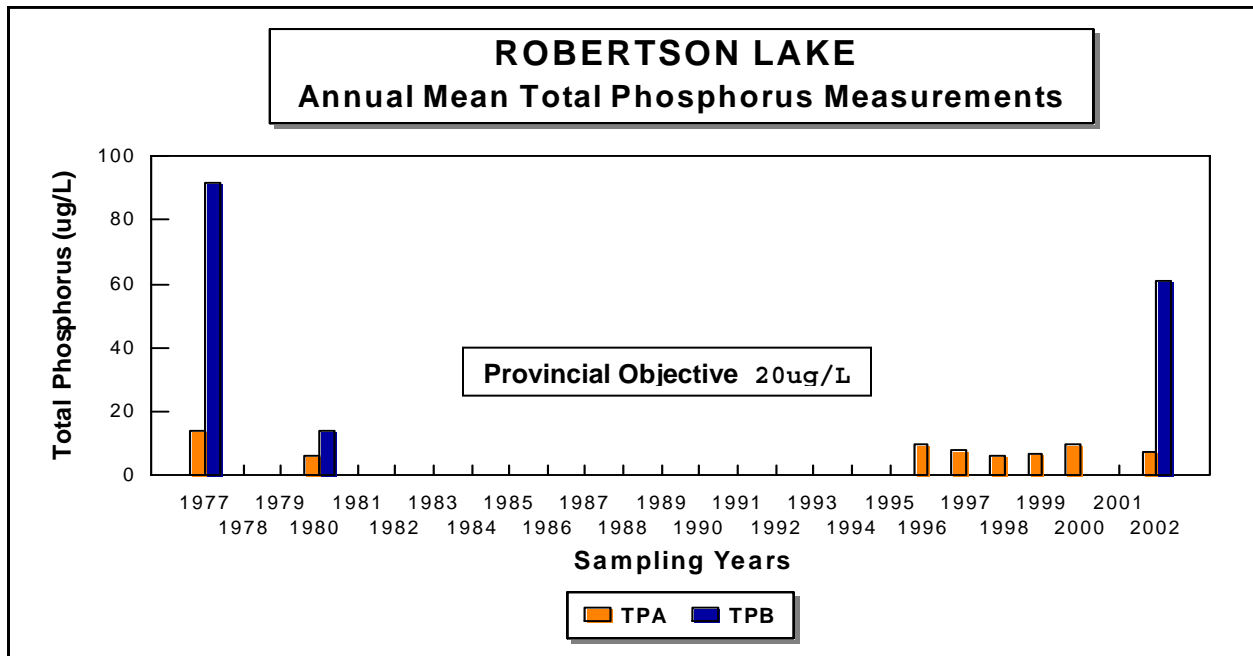
Cleared areas are planted with native species.



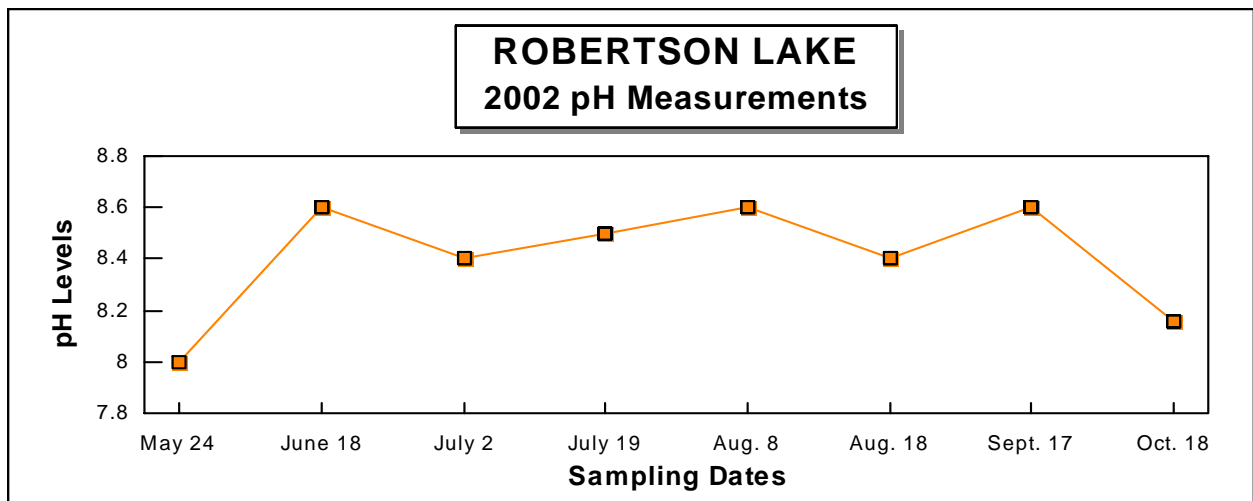
Evaluating Total Phosphorus Results:

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



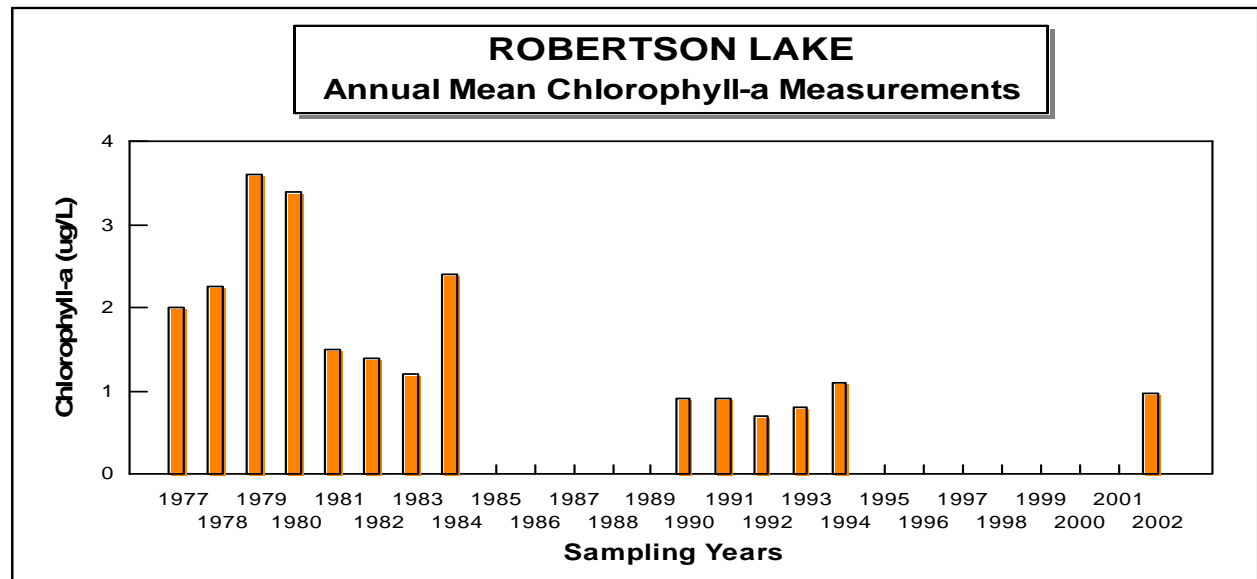
Evaluating your pH Results: Lakes with pH levels at 7.3 or higher are vulnerable to zebra mussels invasive.



Evaluating your Chlorophyll-a Results:

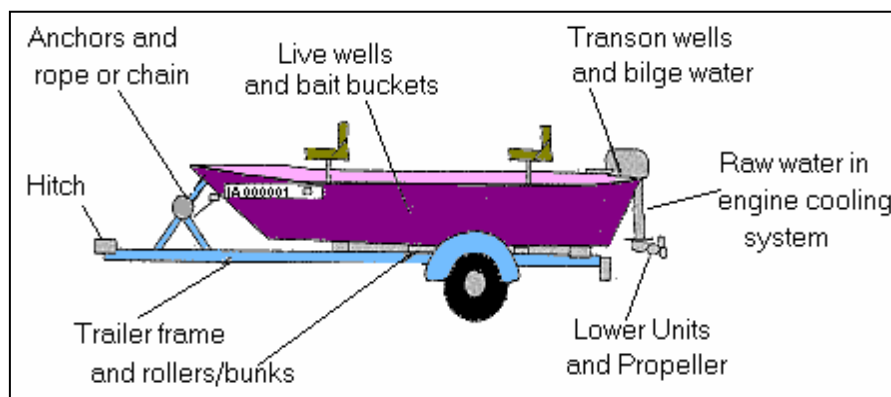
Chlorophyll-a is a measure of the algal density in the lake. The lower the chlorophyll-a density in your lake, the clearer your lake is. Chlorophyll-a is directly affected by the amount of total phosphorus in your lake. The more phosphorus there is in the water, the more algal growth will occur.

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



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

Check & clean your boat everytime 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.

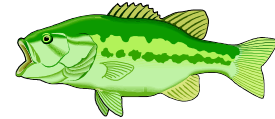
For more information call MVC at (613)259-2421, the Invading Species Hotline 1-800-563-7711.



ROBERTSON LAKE

DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-701-01, MVC Station # 02-05



Date: May 24, 2003

Depth: 30.5 Metres

Euphotic Zone (Penetration of Light): 20.0 Metres

Depth [Metres]	Temperature [Degrees Celcius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	11.8	10.7	97	Epilimnion
1.0	11.7	10.9	100	
2.0	11.6	11.0	100	
3.0	11.4	11.2	102	
4.0	11.3	11.3	102	
5.0	11.0	11.3	101	
6.0	10.8	11.1	100	
7.0	10.7	11.3	100	
8.0	10.6	11.2	100	
9.0	10.0	11.1	97	
10.0	9.7	11.1	97	Metalimnion or Thermocline
11.0	8.5	9.3	79	
12.0	7.0	7.3	60	
13.0	6.0	6.4	52	Hypolimnion
14.0	5.5	5.4	44	
15.0	4.9	4.6	36	
16.0	4.8	4.1	32	
17.0	4.7	4.1	31	
18.0	4.6	3.9	29	
19.0	4.4	3.6	28	
20.0	4.4	3.3	25	
21.0	4.4	3.3	25	
22.0	4.3	3.3	25	
23.0	4.3	3.2	24	
24.0	4.3	3.2	24	
25.0	4.2	3.2	23	
26.0	4.2	3.2	23	
27.0	4.2	3.1	23	
28.0	4.2	3.1	23	

Warm Water Fisheries Habitat (Bass, Walleye, Pike and Perch) defined as Dissolved Oxygen Concentrations greater than 4 mg/L at Temp. less than 25°C

ROBERTSON LAKE

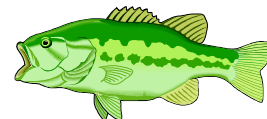
DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-701-01, MVC Station # 02-05

Date: July 19, 2003

Depth: 30.5 Metres

Euphotic Zone (Penetration of Light): 13.0 Metres



Depth [Metres]	Temperature [Degrees Celcius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	23.5	8.4	97	Epilimnion
1.0	23.4	8.4	97	
2.0	23.3	8.3	96	
3.0	23.2	8.5	99	
4.0	23.2	8.3	98	
5.0	20.7	9.4	104	
6.0	16.8	11.0	112	Metalimnion or Thermocline
7.0	14.8	11.4	111	
8.0	13.2	11.2	104	
9.0	11.7	11.0	98	
10.0	10.5	9.9	86	
11.0	9.6	8.8	75	Hypolimnion
12.0	8.3	6.1	51	
13.0	7.1	4.3	34	
14.0	6.3	3.0	24	
15.0	5.7	2.7	21	
16.0	5.3	1.7	13	
18.0	4.8	1.2	9	
20.0	4.7	0.5	4	
22.0	4.6	0.3	2	
24.0	4.5	0.3	2	
26.0	4.4	0.3	2	
28.0	4.4	0.3	2	
30.0	4.4	0.3	2	

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

www.mvc.on.ca

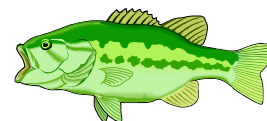
ROBERTSON LAKE - DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-701-01, MVC Station # 02-05


Date: September 17, 2003

Depth: 30.5 Metres

Euphotic Zone (Penetration of Light): 12.5 Metres



Depth [Metres]	Temperature [Degrees Celcius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.1	8.9	97	Epilimnion
1.0	19.7	9.0	96	
2.0	19.5	9.2	99	
3.0	19.5	9.2	99	
4.0	19.5	9.2	99	
5.0	19.4	9.1	98	
6.0	19.4	9.1	98	
7.0	19.3	9.1	98	
8.0	19.3	8.5	90	
9.0	14.0	7.7	74	Metalimnion or Thermocline
10.0	12.7	7.3	68	
11.0	9.8	3.3	29	Hypolimnion
12.0	8.6	1.4	11	
13.0	7.9	0.5	4	
14.0	6.9	0.2	2	
15.0	6.1	0.1	1.5	
16.0	5.7	0.1	1.5	
17.0	5.4	0.1	1.5	
18.0	5.2	0.1	1.5	
19.0	5.1	0.1	1.5	
20.0	4.9	0.0	0	
21.0	4.8	0.0	0	
22.0	4.7	0.0	0	
23.0	4.6	0.0	0	
24.0	4.6	0.0	0	
25.0	4.6	0.0	0	
26.0	4.5	0.0	0	
27.0	4.5	0.0	0	
28.0	4.5	0.0	0	

 Warm Water Fisheries Habitat (Bass, Walleye, Pike and Perch) defined as Dissolved Oxygen Concentrations greater than 4 mg/L at Temp. less than 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 Arnold Johnson 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