



Mississippi Valley Conservation

# State of the Lake Environment Report 2008

## Marble Lake



# Marble Lake

**Marble Lake is located in the Township of North Frontenac. Marble Lake is at an elevation of 274 metres above sea level. The lake perimeter is 9.6 kilometres and the deepest point is 18.3 metres. Marble Lake supports a warm water fishery. At last count in 1976, there were approximately 71 cottages, 4 resorts and 1 permanent residence on the lake.**

Shoreline residents of Marble Lake have not yet formed a Lake Association as of 1998. As well, residents have not participated in water quality testing available through the Ministry of Environment Self Help Program or the Lake Partner Program. Limited water quality data is available for Marble Lake. 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 in 1976, (32 years ago), through the Ministry of Environment Recreational Lakes Program.



In general, the water quality in Marble Lake remains good. There is one sampling station on the lake at the deepest point which was sampled three times in 2008, graphs will follow that show water clarity and quality results.

Secchi Disc readings were observed as good. The average for 2008 is 4.7 metres, compared to 5 years ago, when the average was 6.7 metres. Thus indicating that Marble Lake is an 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 2008, the mean for the euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth) was 9.3 ug/L, slightly higher than the reading of 7.0ug/L in 2003. The mean for the samples taken one metre off the bottom was 13.3 ug/L, a drop from the 2003 reading of 22.3ug/L. Both readings indicate Marble lake as moderately enriched or mesotrophic lake.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling station was 1.8 ug/L. In 1998, chlorophyll a levels were lower at 1.0 ug/L. Thus indicating that Marble Lake is a unenriched (few nutrients) or oligotrophic 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.

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 late summer. Warm water fish species, such as pike and pickerel, are squeezed into the upper 9 metres of the lake by October. However, this has been a slight improvement since 2003, where the fish habitat was squeezed into the upper 7 metres of the lake.

Marble 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 (OFAH). Marble Lake did *not* have zebra mussel veligers (larvae) or spiny water flea present in the sample collected. 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 Horne Lake. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.

Residents and users of Marble 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 first step to achieve this is to form a Lake Association. It is recommended that a Lake Steward be appointed to undertake ongoing water quality testing and to join the Mississippi Valley Lake Stewardship Network. 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 Marble Lake. Additional water quality data, current and historic, is available for Marble 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.

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## **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.



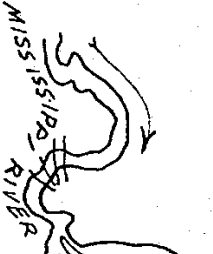


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# Marble Lake

Perimeter: 9.6 km

Deepest Point: 18.3 meters



MISSISSIPPI RIVER

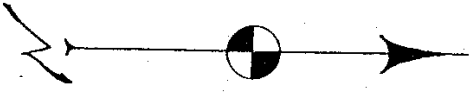
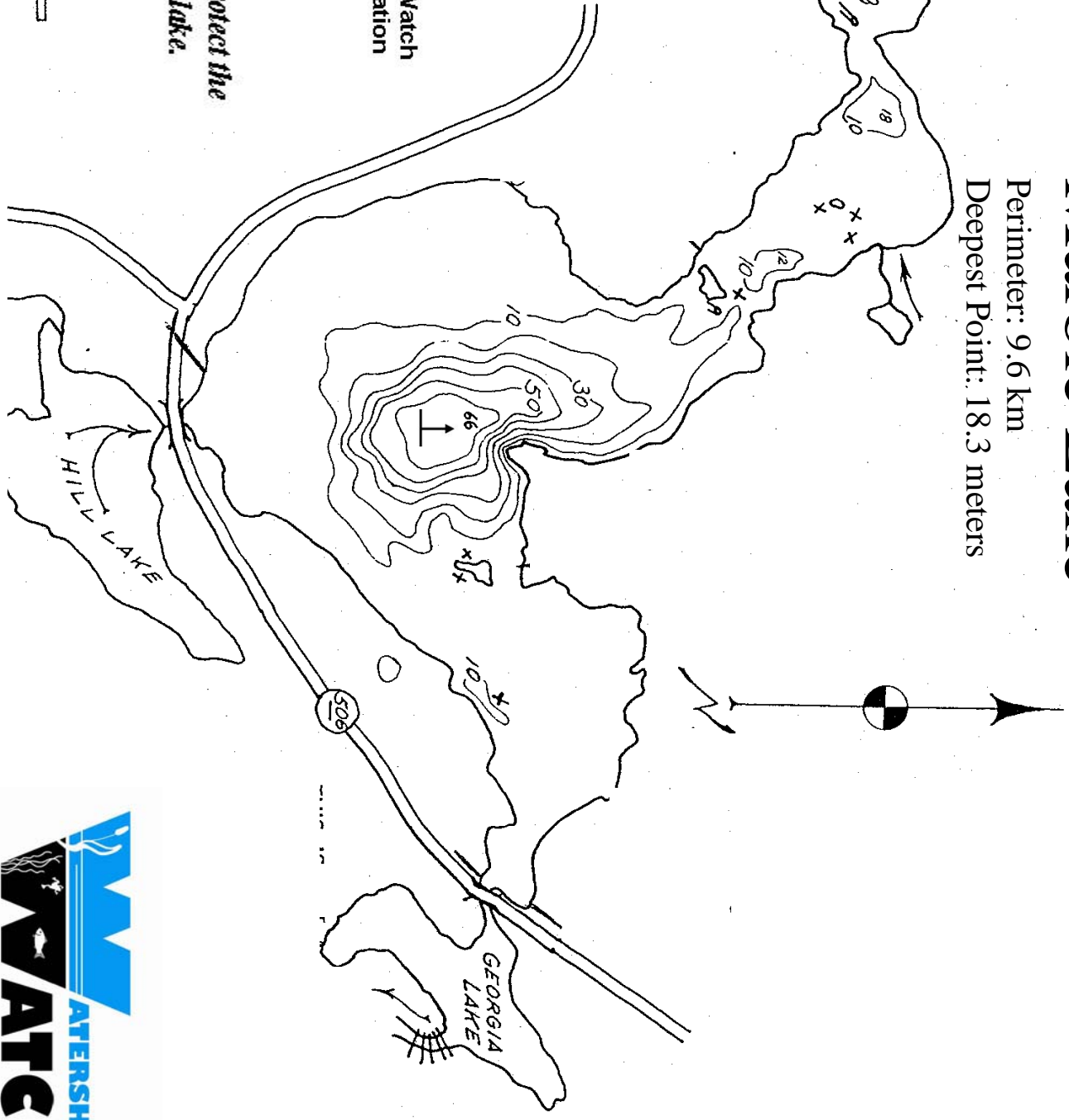
↑ Watershed Watch  
Sampling Station

## Remember

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



1/4 MILE 1/2



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



# How Does Marble Lake Measure Up?

## 1976 - 2003 WATER QUALITY RESULTS - Marble Lake

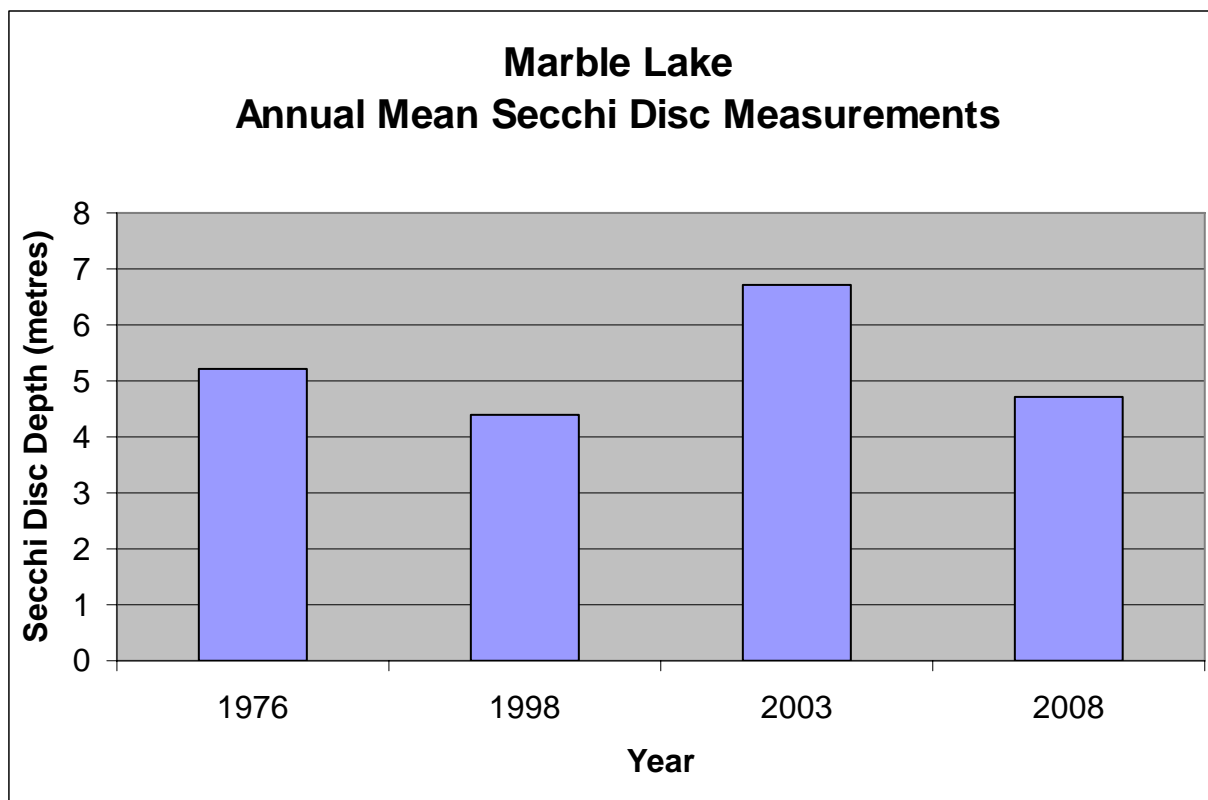
Sample Year [Various Stations]	Secchi Disc Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/Litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/Litre]	Chlorophyll <i>a</i> Composite [Micrograms/Litre]
1976	5.2	8.8		1.5
1998	4.4	9.9	15.3	1.0
*2003	6.73	7.0	22.33	2.93
*2008	4.7	9.3	13.3	1.8
n	4	4	3	4.0
Minimum	4.4	7.00	13.30	1.0
Maximum	6.7	9.9	22.33	2.9
Mean	5.3	8.8	17.0	1.8
Standard Deviation	1.03564392	1.250333289	4.742745337	0.817857975

\* 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%

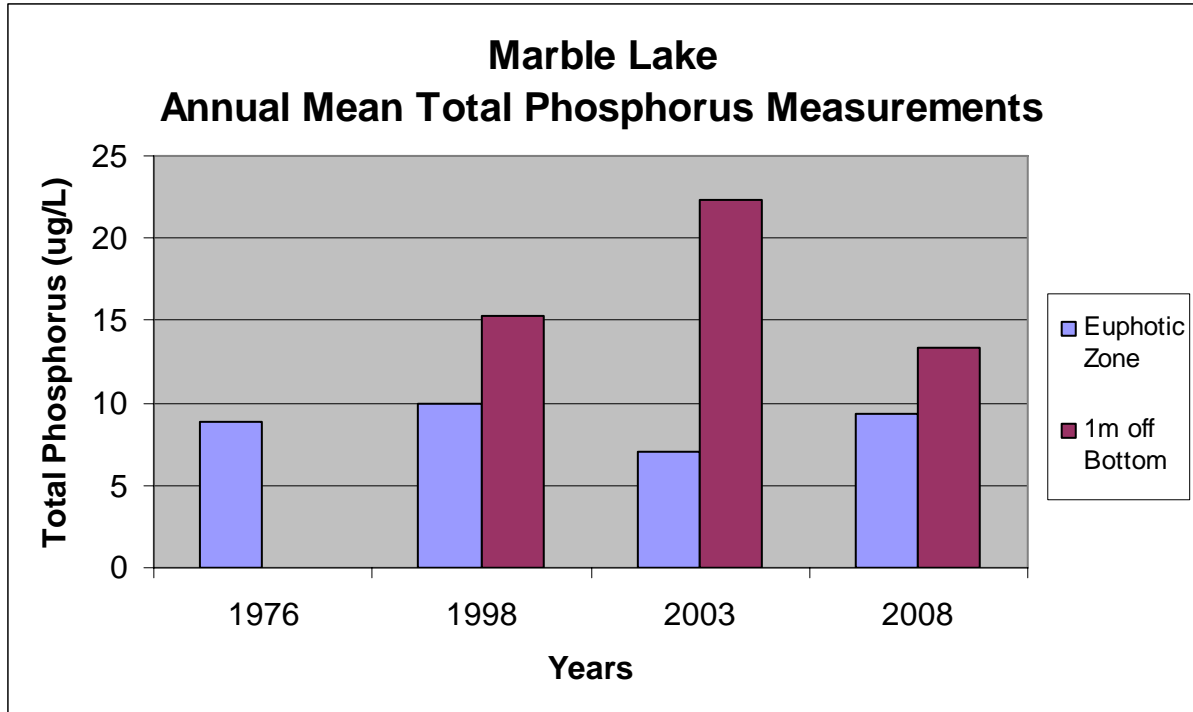
## Interpreting Secchi Disc Readings

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.



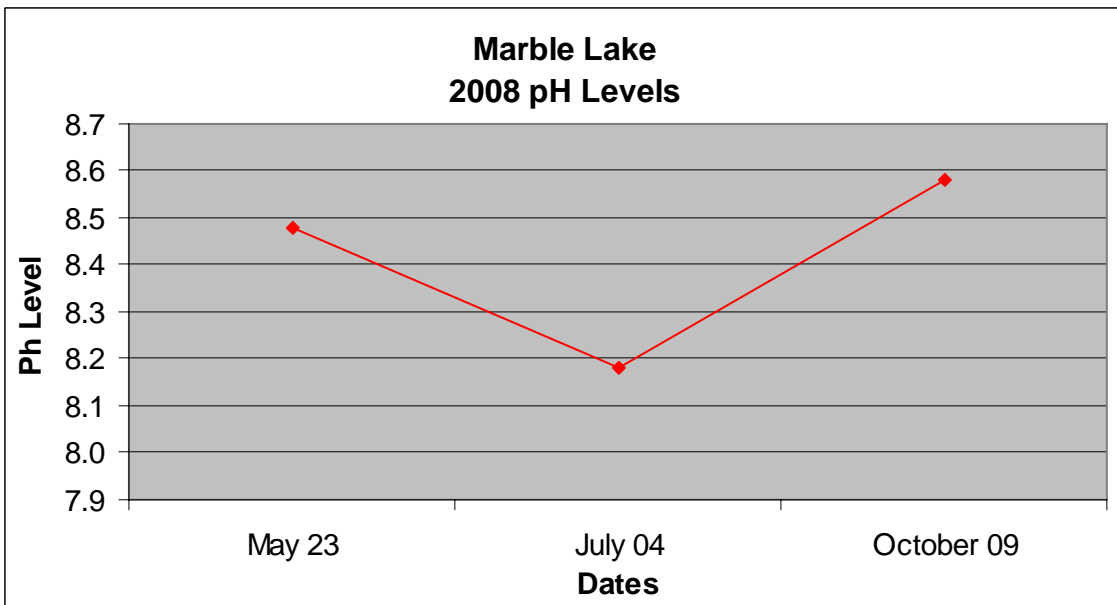
## Interpreting Total Phosphorus Results

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



## Evaluating your pH Results

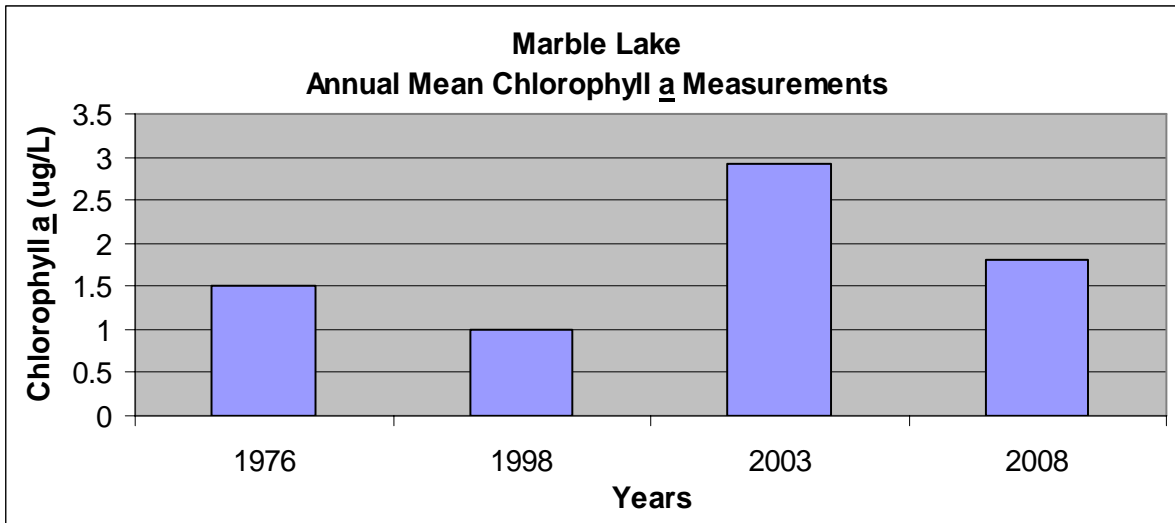
Lakes with pH levels at 7.3 or higher are vulnerable to zebra mussels invasive.



**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



**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**

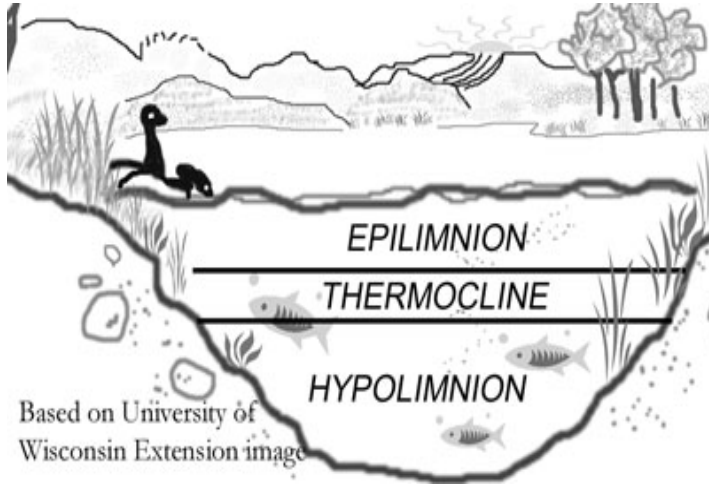
Degraded shorelines are left alone to return to their natural state.

**RESTORATION**

Cleared areas are planted with native species.



## Lake Stratification



**Epilimnion** (warm surface layer)

**Thermocline or Metalimnion**  
(transition zone between warm and cold water, depth can change throughout the day)

**Hypolimnion** (cold bottom water)

### MARBLE LAKE - MAIN BASIN DISSOLVED OXYGEN/TEMPERATURE PROFILE

MOE Rec.Lks. Station 18-3430-714-01 MVC Station 08-04

Date: May 23, 2008

Depth: 20.0 Metres

Euphotic Zone (Penetration of Light) = 8.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	12.9	10.0	90	Epilimnion
1	12.9	10.1	91	
2	12.8	9.9	90	
3	12.7	9.9	90	
4	12.7	9.9	90	
5	12.7	9.9	90	
6	12.6	9.9	89	
7	9.3	9.9	84	Thermocline # 1
8	8.6	10.2	85	Thermocline # 2
9	8.1	10.1	83	
10	7.3	10.0	80	
11	6.2	9.8	76	Hypolimnion
12	6.0	9.5	73	
13	5.8	9.4	72	
14	5.6	8.9	68	
15	5.5	8.6	65	
16	5.4	8.5	65	
17	5.4	8.4	64	
18	5.4	8.2	63	
19	5.4	8.2	63	
20	Bottom	Bottom	Bottom	

Warm Water Fisheries = greater than 4 mg/L DO at less than 25 degrees celsius




MOE Rec.Lks. Station 18-3430--01 MVC Station 08-04

Date: July 04, 2008

Depth: 20.0 Metres

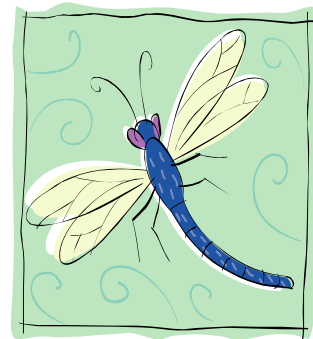
Euphotic Zone (Penetration of Light) = 11.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	22.6	8.0	89	Epilimnion
1	22.4	7.9	86	
2	22.3	7.8	86	
3	22.1	7.7	85	
4	22.1	7.8	86	
5	18.2	6.9	69	Thermocline
6	14.5	7.4	69	
7	12.7	7.2	65	
8	9.3	7.7	65	
9	8.5	8.1	67	Hypolimnion
10	7.6	8.1	65	
11	6.7	7.7	60	
12	6.5	7.7	60	
13	6.2	7.4	57	
14	6.0	7.2	56	
15	5.9	6.8	53	
16	5.8	6.7	52	
17	5.8	6.3	48	
18	5.8	6.2	48	
19	5.7	5.9	45	
20	Bottom	Bottom	Bottom	Bottom

 Warm Water Fisheries = greater than 4 mg/L DO at less than 25 degrees celsius

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

[www.mvc.on.ca](http://www.mvc.on.ca)



MOE Rec.Lks. Station 18-3430--01 MVC Station 08-04

Date: October 09, 2008

Depth: 18.0 Metres

Euphotic Zone (Penetration of Light) = 9.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	12.9	11	100	Epilimnion
1	12.9	11.4	104	
2	12.9	11.4	104	
3	12.9	11.4	104	
4	12.9	11.4	104	
5	12.9	11.4	104	
6	12.7	11.4	103	
7	12.7	11.4	103	
8	12.7	11.4	103	
9	12.5	11.3	102	
10	8.1	2.4	18	Thermocline
11	6.9	2.1	16	
12	6.4	2	15	Hypolimnion
13	6.1	1.4	11	
14	5.9	1.3	10	
15	5.9	0.9	6	
16	5.9	0.6	4	
17	5.7	0.4	3	
18	Bottom	Bottom	Bottom	Bottom

*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 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](mailto:slee@mvc.on.ca)**



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