



Mississippi Valley Conservation

*State of the Lake
Environment Report
2006*

Black Lake



“THE RIBBON OF LIFE” Where the Land Meets the Water

Water quality is affected by many things: erosion and runoff from clearing of shorelines, the use of artificial fertilizers and leachate from sewage disposal systems resulting in too many nutrients reaching the lake. Phosphorus is the key nutrient of concern, too many nutrients can cause weed and algae growth and threatens fish habitat by reducing oxygen levels.

The shallow waters and first 10 metres of shore land form a "Ribbon of Life" around our lakes. This ribbon - where the land meets the water - is where much of the lake life is born, raised and fed. Many landowners, unaware of the importance of this area, have cleared the shorelines of native vegetation and replaced it with lawns, non-native ornamental vegetation, retaining walls and boathouses. This has had a negative affect on fish and wildlife habitat and water quality. Natural vegetation retained or restored along the shoreline helps prevent erosion and improves water quality by binding nutrients before they can enter the lake.

Mississippi Valley Conservation has long recognized the recreational and aesthetic value of lakes within the watershed and is committed to maintaining and protecting water quality and fish habitat. Mississippi Valley Conservation has joined together with volunteer Lake Stewards throughout the watershed to take steps to protect and restore water quality by launching the *Watershed Watch* program in 1998. *Watershed Watch* is an environmental monitoring and awareness program. The objectives of the program are to collect reliable environmental data to document current water quality conditions and use the data as an essential educational tool to encourage residents to adopt sound stewardship practices aimed at preserving and protecting water quality. Together we will encourage and assist shoreline residents, both seasonal and permanent, to become personal stewards of their lake by taking an active role in restoring and enhancing their shoreline to maintain water quality and a healthy lake environment.

Recreational water quality is generally expressed in terms of how clear the water appears. Water clarity is influenced by the amount of phytoplankton or microscopic algae present in the water; **chlorophyll a** is the green pigment in the phytoplankton. Water clarity is measured with a **Secchi Disc**, a 20 cm black and white disk attached to a measured line and lowered into the lake until it is no longer visible. The amount of nutrients entering the lake, in particular **phosphorus**, influences the amount of algae growing in the lake. Water clarity decreases with elevated concentrations of algae and therefore Secchi disc values are less. After the spring warming period there is a continuous supply of algae in the surface waters of the lake to the deep water areas where it decomposes and uses up the natural supply of oxygen. In severe circumstances this may eliminate habitat for fish species which require the cold, deep water portions to survive. Through *Watershed Watch* forty-two base lakes in the watershed will be monitored for these key water quality indicators; **total phosphorus, chlorophyll a, dissolved oxygen and temperature profiles and water clarity.**

BLACK LAKE

Black Lake is a warm water lake located in the amalgamated Township of Central Frontenac. Located within Sharbot Lake Provincial Park the deepest point is 19.2 metres. While the majority of the lake is situated in the park there are a few cottages located along the eastern shore.



Limited water quality data is available for Black Lake. Records indicate that shoreline property owners have not yet formed a Lake Association or participated in the Ministry of Environment's Self-Help Program. As well, Black Lake was not monitored by the Ministry of the Environment under the Recreational Lakes Program during the 1970's and early 1980's. Comprehensive testing under the Watershed Watch Program in 2001 and 2006, provides for a baseline of the water quality conditions as they exist now, and can therefore, be used for future comparison of data.

In general the water quality in Black Lake is good. There is one sampling station at the deepest point as indicated on the map included in this report. This station was sampled three times for 2006. Graphs will follow that show water clarity, as measured by Secchi Disc. The mean for 2006 is 5.2 metres indicating that Black 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 Water Quality Objective for Total Phosphorus for

Black Lake is 20 micrograms/litre (*ug/L*). An average calculated from the total phosphorus results for 2006 for the euphotic zone (penetration of light) was 4.7 indicating a unenriched or oligotrophic lake. The average for the sample taken one metre off the bottom was 17.7 *ug/L*, indicating a moderately enriched or mesotrophic lake.

Chlorophyll *a* is a measure of the algal density in the lake. The average chlorophyll *a* densities for the sampling station in 2006 was 2.8micrograms/litre indicating a moderate algal density for Black Lake.

It is not all good news, 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 poor by late summer. Warm water fish species, such as pike and bass, are squeezed into the upper eight metres of the lake by late summer. Therefore, residents and users of Black Lake cannot afford to be complacent. Every effort should be made to reduce nutrient loading into the lake from land use activities

Black Lake was also tested for invasive species in 2006, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters. Black Lake did not have spiny water flea or zebra mussel veligers (larvae) present in the samples collected. 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.

Residents and users of Black Lake need to adopt a stewardship approach to limit the amount of nutrients entering the lake. A 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*. We all have a responsibility to preserve this precious natural resource for future generations.

How Does Black Lake Measure Up?

2001 – 2006 WATER QUALITY RESULTS – MAIN BASIN

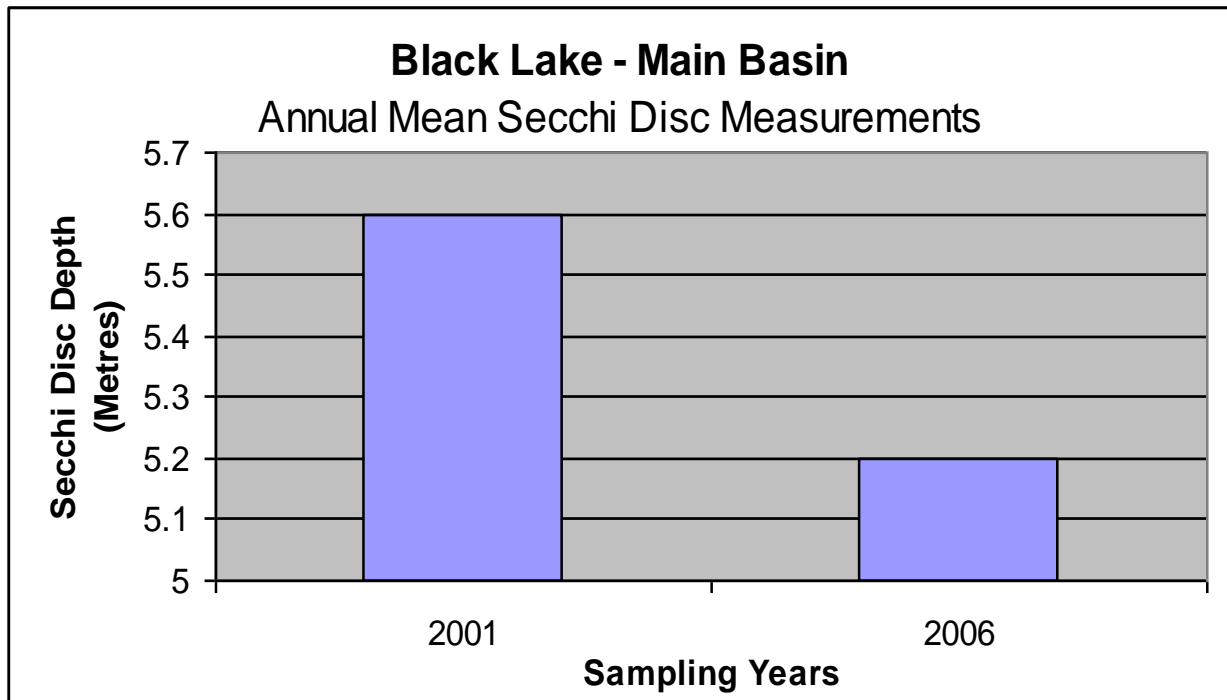
Sample Year Mean	Secchi Disc Depth (Metres)	Total Phosphorus Euphotic Zone (Micrograms/litre)	Total Phosphorus 1 Metre off Bottom (Micrograms/litre)	Chlorophyll a Composite (Micrograms/litre)
*2001	5.6	9.3	9.3	1.9
2006	5.2	7.0	17.7	2.8
N	2	2	2	2
Mean	5.4	8.15	13.5	2.35
Standard Deviation	0.28	1.63	5.94	0.64

*Mean based on 8 measurements.



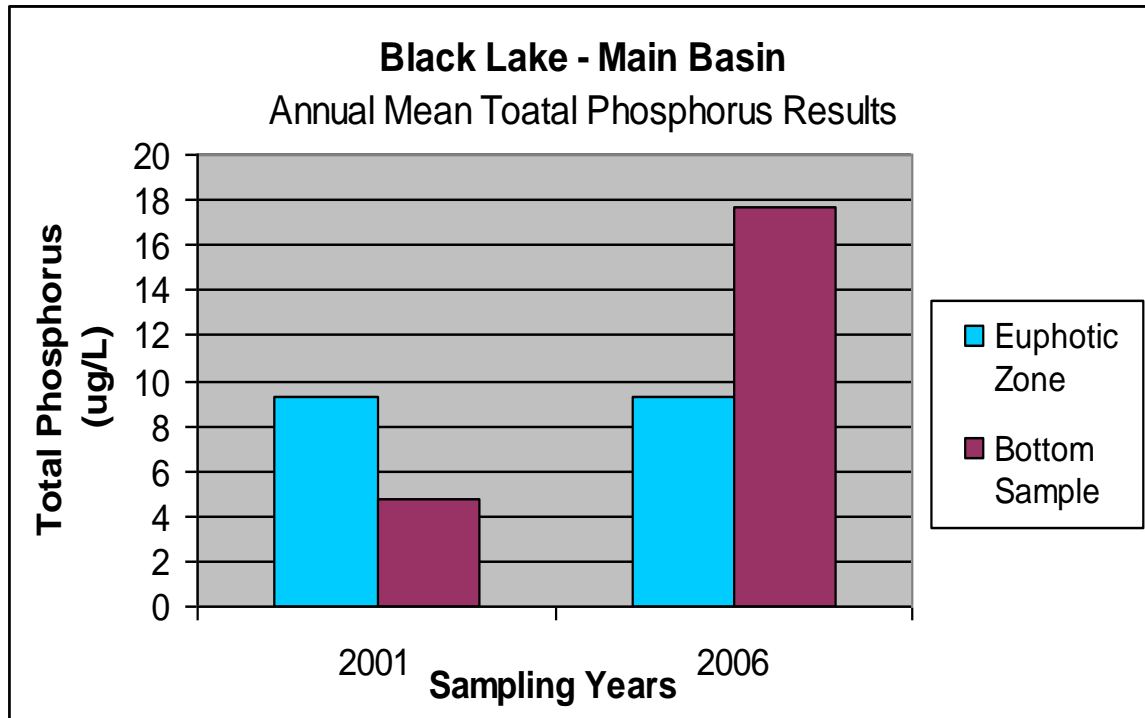
The higher the Secchi Disc measurement the clearer your lake is!

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



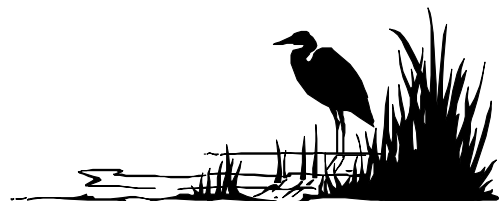
The lower the phosphorus reading, the clearer your lake is!

Nutrient Loading and How to Interpret the Water Quality Result :	
If the Total Phosphorus Reading is...	Your Lake is...
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



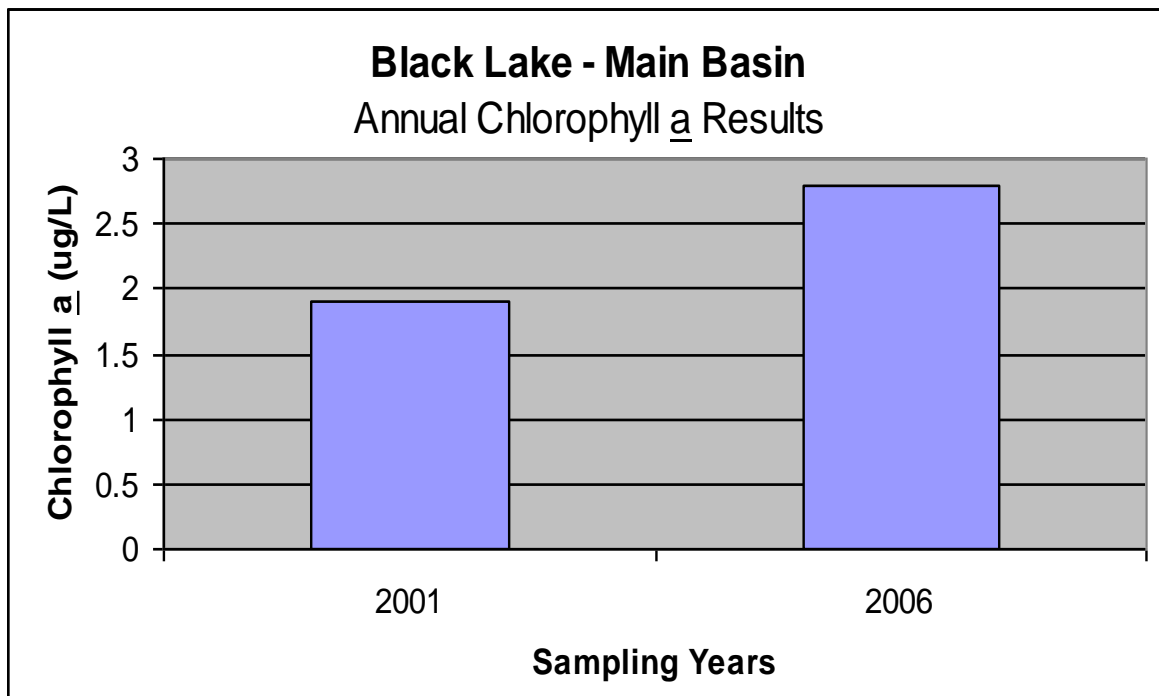
FIVE EASY STEPS TO IMPROVE WATER QUALITY

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.



The lower the Chlorophyll a density, the clearer your lake is!

Nutrient Loading and How to Interpret the Water Quality Result :	
If the Chlorophyll <u>a</u> density is...	Your Lake is...
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

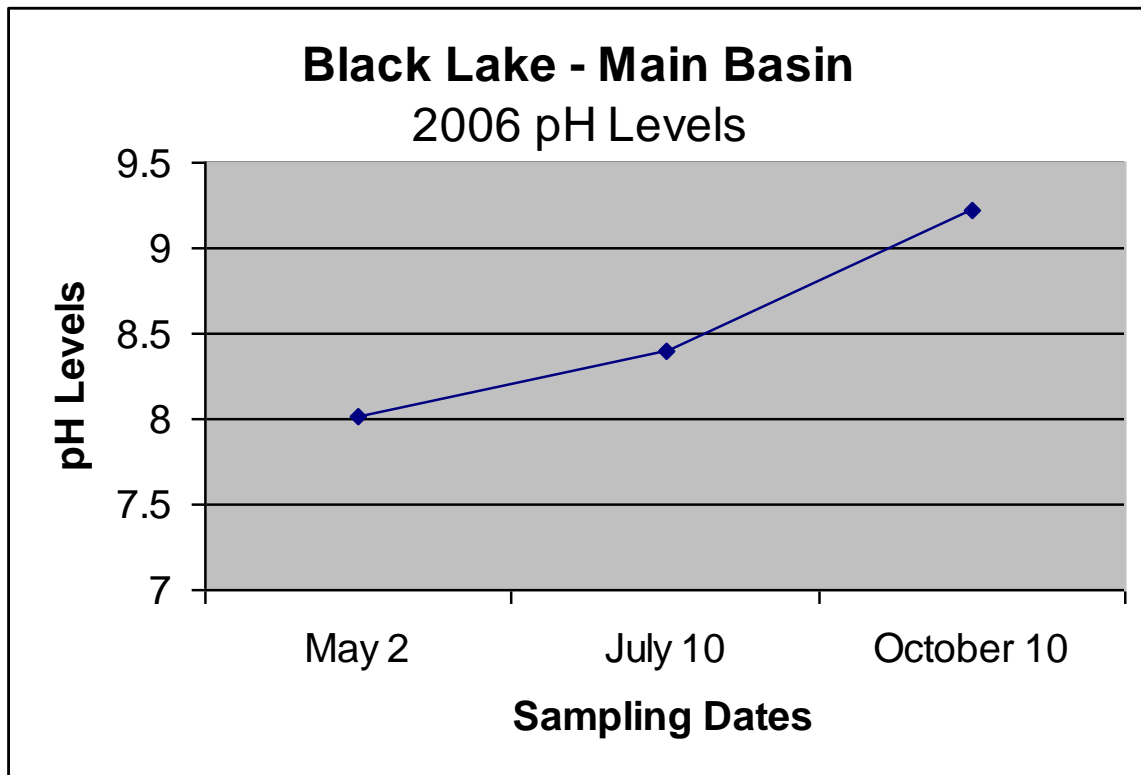


For more information on lakes in the
Mississippi Valley Watershed, visit MVC
online at

www.mvc.on.ca

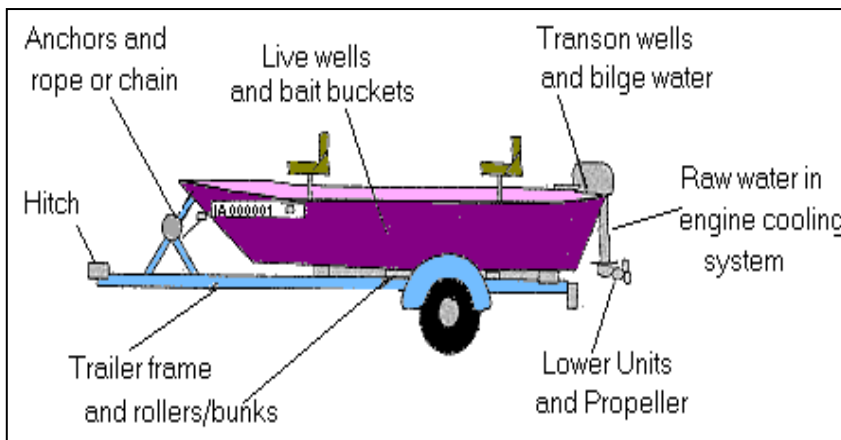


Lakes with pH levels of 7.3 or higher are vulnerable to zebra mussel invasives!



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.

BLACK LAKE – MAIN BASIN
DISSOLVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 06-02

Date: May 2, 2006

Depth: 18 Metres

Euphotic Zone (Penetration of Light) = 13 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	22.3	11.0	121	Epilimnion
1.0	21.9	11.0	120	
2.0	21.2	10.2	110	
3.0	19.0	10.9	118	Thermocline
4.0	16.3	10.8	106	
5.0	14.0	11.3	106	
6.0	11.5	11.8	105	
7.0	9.0	12.1	101	
8.0	7.5	11.4	93	
9.0	6.2	7.6	59	
10.0	5.6	6.0	46	Hypolimnion
11.0	4.9	3.3	24	
12.0	4.8	2.3	17	
13.0	4.6	1.7	12	
14.0	4.5	1.3	9	
15.0	4.3	1.2	9	
16.0	4.3	0.9	7	
17.0	4.3	0.8	6	
18.0	Bottom	Bottom	Bottom	

Warm Water Fish Habitat (Bass, Walleye, Pike, Perch) = Dissolved Oxygen greater than 4 mg/L at less than 25 Degrees Celsius

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

BLACK LAKE – MAIN BASIN

DISSOLVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 06-02

Date: July 10, 2006

Depth: 18 Metres

Euphotic Zone (Penetration of Light) = 8 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	24.1	8.0	92	Epilimnion
1.0	24.1	7.8	90	
2.0	24.1	8.1	93	
3.0	24.0	8.0	92	
4.0	20.8	10.1	107	Thermocline
5.0	16.8	11.2	111	
6.0	12.2	12.3	111	
7.0	9.5	11.4	97	
8.0	7.8	8.6	69	
9.0	6.9	5.7	44	Hypolimnion
10.0	6.0	2.8	21	
11.0	5.6	1.9	14	
12.0	5.3	1.0	7	
13.0	5.1	0.6	4	
14.0	5.2	0.4	3	
15.0	5.2	0.4	3	
16.0	5.2	0.3	3	
17.0	5.2	0.3	3	
18.0	Bottom	Bottom	Bottom	

Warm Water Fish Habitat (Bass, Walleye, Pike, Perch) = Dissolved Oxygen greater than 4 mg/L at less than 25 Degrees Celsius

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

3.) **ENHANCEMENT** – Native species are planted 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.



BLACK LAKE – MAIN BASIN
DISSOLVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 06-02

Date: October 10, 2006

Depth: 18 Metres

Euphotic Zone (Penetration of Light) = 10 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	14.0	10.0	93	Epilimnion
1.0	14.0	10.1	94	
2.0	14.0	10.2	95	
3.0	14.0	10.3	96	
4.0	13.8	10.3	96	
5.0	13.8	10.3	96	
6.0	13.8	10.3	96	
7.0	13.7	10.1	93	
8.0	12.5	8.6	76	
9.0	8.2	3.5	28	Thermocline
10.0	7.7	3.2	25	Hypolimnion
11.0	6.6	1.7	13	
12.0	5.8	1.3	9	
13.0	5.5	1.0	7	
14.0	5.0	0.9	7	
15.0	4.8	0.7	5	
16.0	4.7	0.7	5	
17.0	4.6	0.6	4	
18.0	4.5	0.6	4	
19.0	Bottom	Bottom	Bottom	

Warm Water Fish Habitat (Bass, Walleye, Pike, Perch) = Dissolved Oxygen greater than 4 mg/L at less than 25 Degrees Celsius



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. A special thanks to the staff of Sharbot Lake Provincial Park for access to their boat launch.

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