Mississippi Valley Conservation

State of the Lake Environment Report 2007

Park Lake

WATERSHED WATCH

Park Lake

Park Lake is situated in the Township of Lanark Highlands, in Lanark County. It is one in a chain of four lakes (Bower, Park, Wood and Horne). Park Lake is at an elevation of 235 metres above sea level. The lake perimeter is approximately 6.3 kilometres, with a maximum depth of 13.7 metres. Park Lake supports a warm water fishery. Common species include Yellow Pickerel, Northern Pike and Smallmouth Bass. At last count in 1983, there were 10 cottages on the lake.

Limited water quality data is available for Park Lake. Records indicate that shoreline property owners have not yet formed a Lake Association or participated in the Ministry of Environment's Self-Help or Lake Partner Program. Comprehensive testing in 2002 and 2007 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a comparison between water quality conditions as they exist now, to results obtained 24 years ago through the MOE Recreational Lakes Program.

In general, the water quality in Park Lake is fair. There is one sampling station at the deepest point, in the upper basin of the lake. This station was sampled three times for 2007. Graphs will follow that show water clarity, as measured by secchi disc. The average reading for 2007 is 4.5 metres, indicating that Park Lake is a moderately enriched (some nutrients) or mesotrophic lake. Twenty four years ago, the average secchi disc depth was 5.1 metres, indicating a reduction 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 2007, the mean for the euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth) was 8.6 *ug*/L. The mean for the sample taken one metre off the bottom was 110.0 *ug/*L. Twenty four years ago, the average phosphorus level was 19.7 *ug/*L in the euphotic zone and 94.0 *ug/*L one metre off the bottom, both over the Provincial Objective. Park Lake decreased its average phosphorus level in euphotic zone, putting it well below the Provincial Objective, but levels increased one metre off the bottom.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling station was 6.3*ug/*L, indicating a high algal density for Park Lake in 2007. In 1983, chlorophyll a levels were lower at 2.7*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 2007, 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 upper basin, indicate oxygen concentrations in the deep water portion could use improvement in the spring as it decreases over the summer. Warm water fish species, such as pike and pickerel, are squeezed into the upper 10 metres of the lake in May and by September into upper 5 meters. Therefore, residents and users of Park Lake cannot afford to be complacent. Every effort should be made to reduce nutrient loading into the lake from land use activities.

Park Lake was also tested for invasive species in 2007, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters (OFAH). Park Lake did *not* have zebra mussel veligers (larvae) or spiny water flea present in the samples 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 Park Lake. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.

Residents and users of Park Lake need to adopt a stewardship approach to limit the amount of nutrients entering the lake. 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 Park Lake. Additional water quality data, current and historic, is available for Park 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.

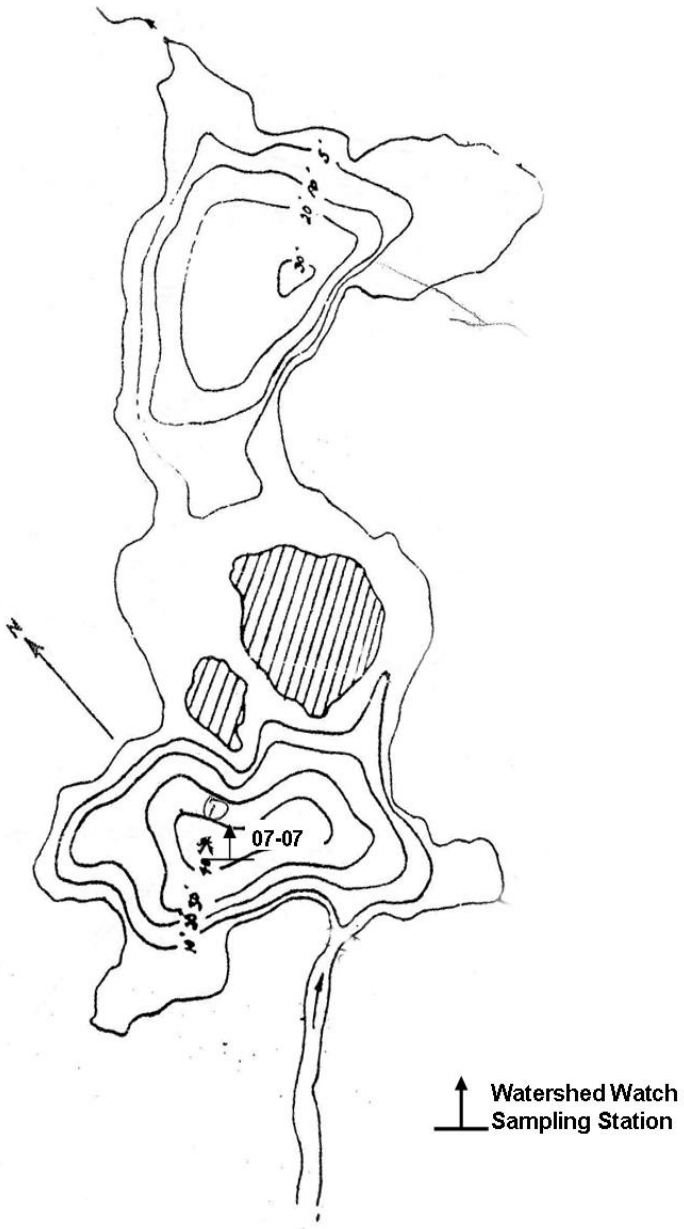
Park Lake

A Secchi Disc visually measures water clarity. The depth at which the disc disappears indicates the level of nutrients and algae growth. The higher the reading, the clearer the lake. The more nutrients that run into the lake, the more algae growth, thus causing reduced water clarity.

Secchi disc readings taken in 2007 indicate good clarity with the mean being 4.5 m, indicating a moderately enriched or mesotrophic lake.

This lake was last surveyed using imperial measurements, therefore the original bathymetric (depth) measurements are recorded in feet rather than metres.

3.28 ft = 1 m 1ft = 0.3048 m



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

Most Common Fish Species
Yellow Pickerel
Northern Pike
Smallmouth Bass

Latitude	**45° 05'**
Longitude	**76° 10'**
Max. Depth	**13.7 m**
Mean Depth	**4.5 m**
Perimeter	**6.3 km**
Surface Area	**55.89 ha**
Volume	**6.36 m^3 x 10^7**
Height above sea level	**235 m**

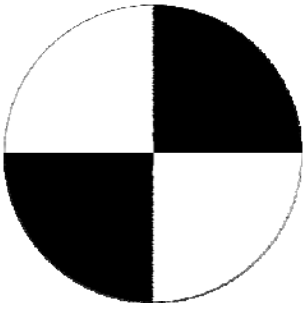
Remember
Use non-lead sinkers to protect the health of the fish and this lake.

How Does Park Lake Measure Up?

1983-2002 Water Quality Results

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]
****1983**	5.1	19.7	*94.0	2.7
2002	4.3	17.5	103.0	4.7
2007	4.5	8.6	110	6.3
n	**3**	**3**	**3**	**3**
Minimum	**4.3**	**17.5**	**94.0**	**2.7**
Maximum	**5.1**	**19.7**	**103.0**	**4.7**
Mean	**4.6**	**15.3**	**102**	**4.6**
Standard Deviation	**0.416333**	**5.877358**	**8.020806**	**1.8037**

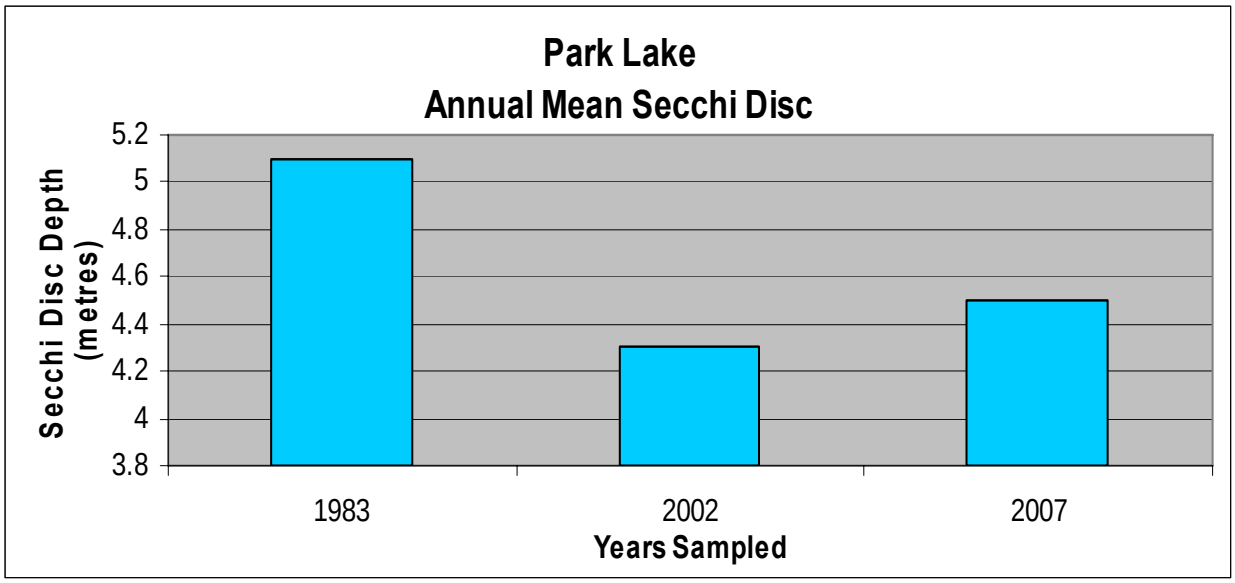
*Mean based on less than 6 measurements **Includes Recreational Lakes Program Data
Chlorophyll a data prior to 1985 has been adjusted to reflect new lab procedures filtering resulting in an increase in chla concentrations by 35%.



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 between black and white, is called the secchi depth. **The higher the Secchi Disc measurement the clearer your lake.**

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

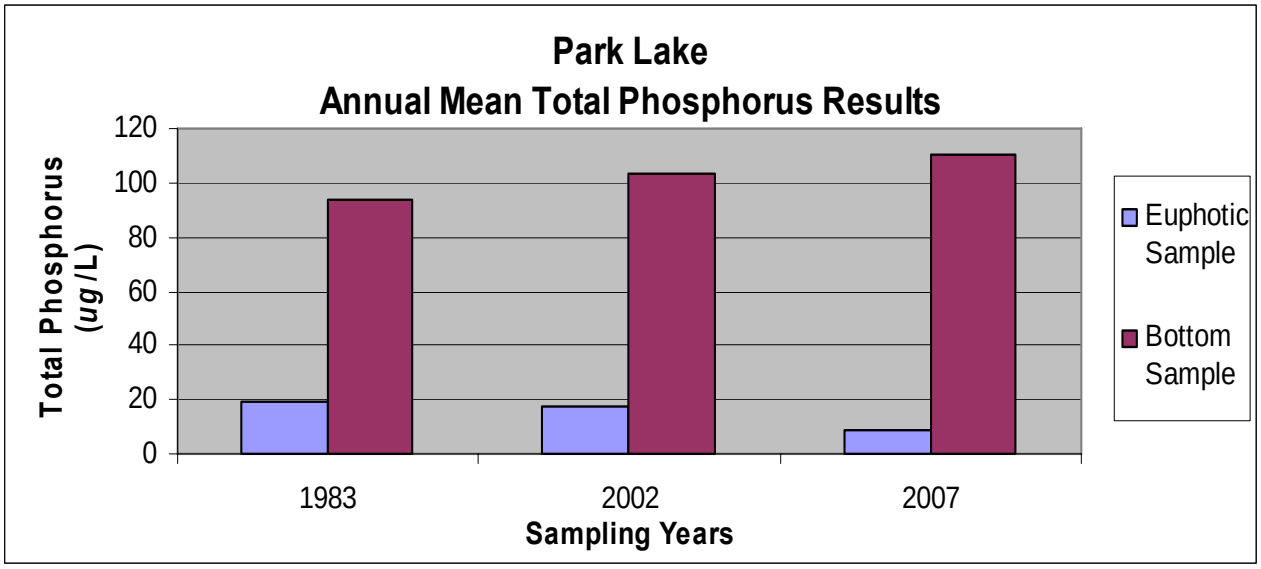


Interpreting Total Phosphorus Results:

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.

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

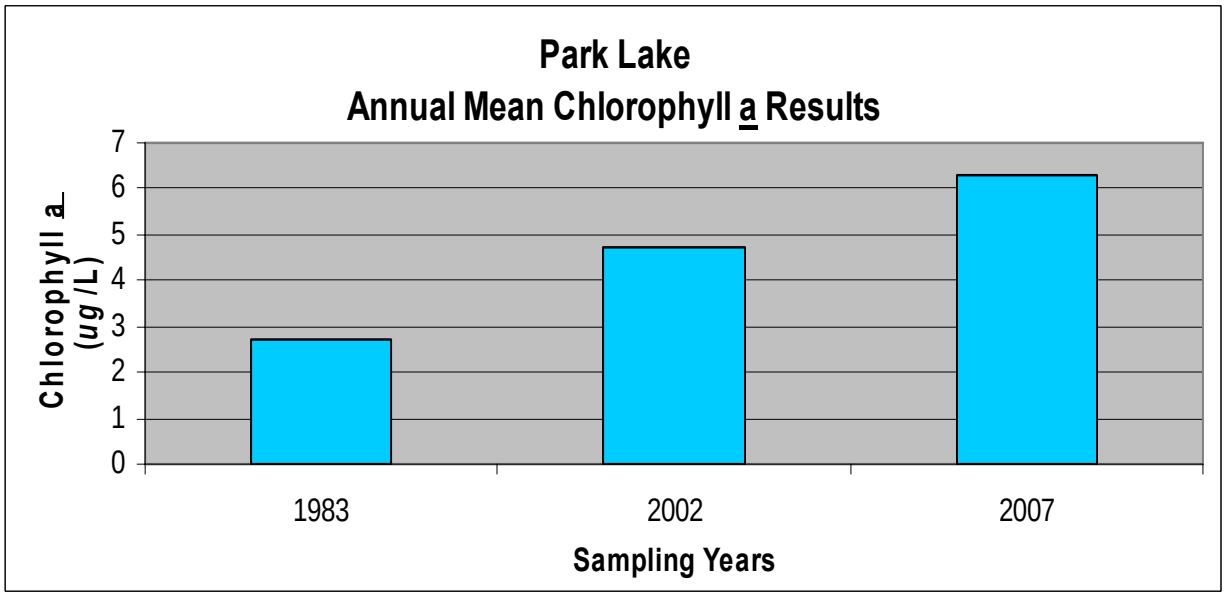
LOW PHOSPHORUS LIFESTYLE	Amount of Phosphorus (grams)	HIGH PHOSPHORUS LIFESTYLE	Amount of Phosphorus (grams)
Human waste	535	Human waste	535
No dishwasher	0	Dishwasher using powdered detergent once per day	650
No fertilizer	0	Lawn fertilized once/year	1960
Trees not cut down	20	Lot cleared of trees	30
Uses phosphate-free products	20	Uses products with phosphate	180
TOTAL	**575 grams**	**TOTAL**	**3355 grams**



Interpreting Chlorophyll a Results:

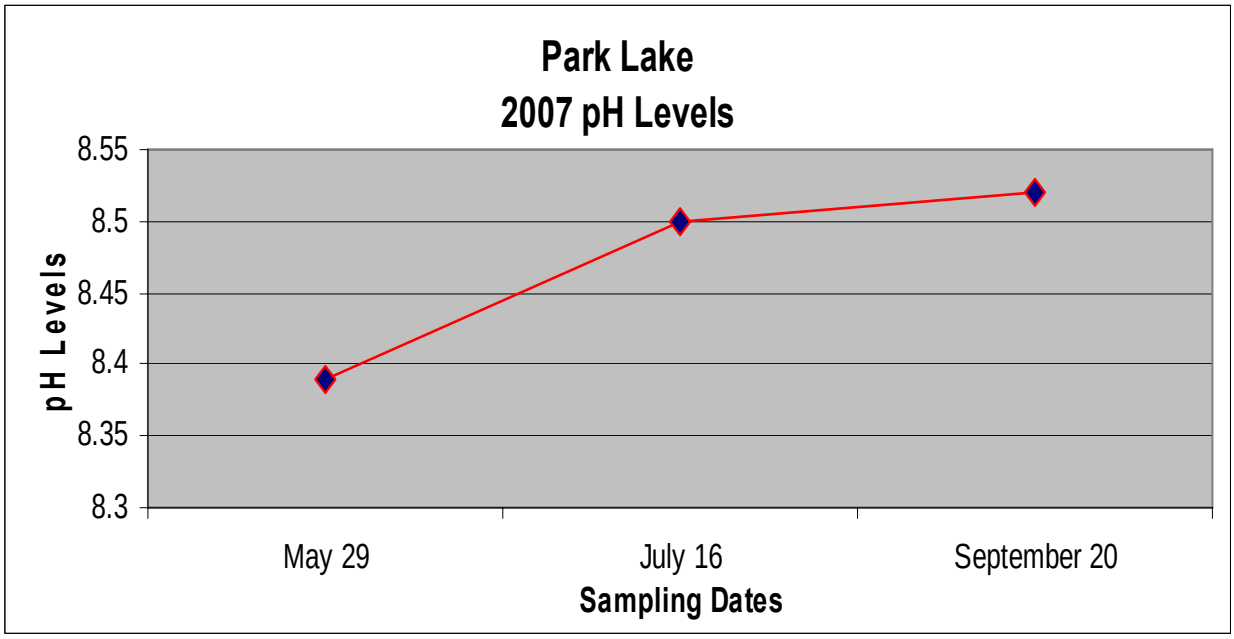
Chlorophyll a, is a measure of the algal density in the lake. The lower the chlorophyll a density in your lake, the clearer your lake is. Chlorophyll a, is directly affected by the amount of total phosphorus in your lake. The more phosphorus there is in the water, the more algal growth will occur.

INTERPRETING YOUR CHLOROPHYLL-a RESULTS	
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 pH Results:

The pH value is a measure of the concentration of hydrogen ions of a substance, which ranges from very acidic (pH = 1) to very alkaline (pH = 14). At a normal to neutral acidity level, a lake supports a diversity of life. A pH of 7 is neutral and most lake waters range between 6 and 9. pH values less than 6 are considered acidic, and most life forms cannot survive at a pH of 4.0 or lower. This parameter directly influences the types of plants and animals that live in the lake. Lakes with pH levels at 7.3 or higher are vulnerable to zebra mussels invasive.



How to protect or restore depends on the conditions of the site and the energy and resources of the owner.

There are four main strategies to choose from:

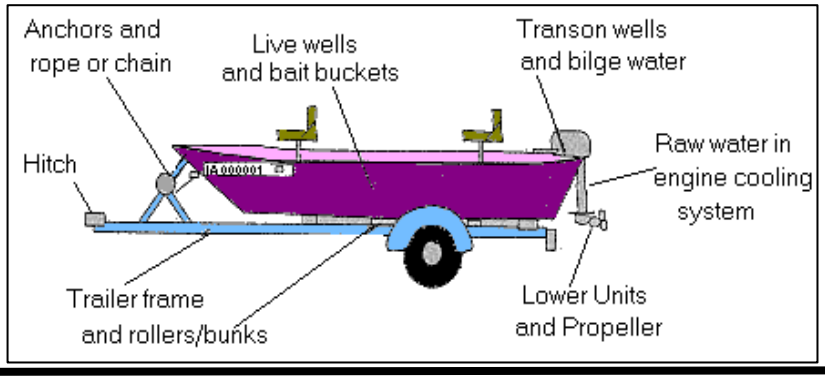
- **Preservation—When purchasing lake front property, natural shoreline is retained and access to the lake is designed to avoid shoreline damage.**
- **Naturalization—Degraded shorelines are left alone to return to their natural state.**
- **Enhancement—native species are planted and non-native species are removed**
- **Restoration—Cleared areas are planted with native species**

Mississippi Valley Conservation and the Ontario Federation of Anglers and Hunters (OFAH) need your help to *Stop the Invasion*!

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

CLEAN ALL THESE AREAS WHEN MOVING YOUR BOAT

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



PARK LAKE – Upper Basin

DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-759-01, MVC Station # 07-07

Date: May 29, 2007 Depth: 13.0 m Euphotic Zone (Penetration of Light) = 9.0 m

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.1	12.7	135	
1.0	19.3	15.7	*	Epilimnion
2.0	18.4	14.5	150	
3.0	16.1	13.9	136	
4.0	11.4	16.5	146	Thermoclince
5.0	8.5	14.2	120	
6.0	6.1	13.0	103	
7.0	5.3	6.0	46	
8.0	4.6	5.0	37	
9.0	4.4	4.3	32	Hypolimnion
10.0	4.2	4.4	32	
11.0	4.0	3.6	26	
12.0	4.0	2.8	21	
13.0	Bottom	Bottom	Bottom	

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

Date: July 16, 2007 Depth: 12.0 m Euphotic Zone (Penetration of Light) = 8.0 m

Depth [Metres]	**Temperature [Degrees Celsius]**	**Dissolved Oxygen [Milligrams/Litre]**	**Percent % Saturation**	**Thermal Stratification**
0.1	22.0	10.9	120	
1.0	21.9	10.3	111	Eplimnion
2.0	21.8	9.6	105	
3.0	21.5	8.4	93	
4.0	17.3	7.7	76	
5.0	12.3	7.6	68	
6.0	8.8	7.2	60	Thermocline
7.0	6.8	5.1	40	
8.0	5.8	4.8	37	
9.0	5.3	4.1	31	
10.0	4.7	3.5	26	Hypolimnion
11.0	4.6	2.6	19	
12.0	Bottom	Bottom	Bottom	

Date: September 20, 2007 Depth: 12.0 m Euphotic Zone (Penetration of Light) = 10.0 m

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	18.5	9.0	94	
1.0	18.4	9.4	96	
2.0	18.2	9.5	97	Epilimnion
3.0	18.1	9.3	95	
4.0	17.7	9.0	90	
5.0	17.1	8.3	85	
6.0	12.0	0.5	4	
7.0	8.5	0.1	1	Thermocline
8.0	7.2	0.1	0.5	
9.0	6.4	0.1	0.5	
10.0	5.5	0.0	0.0	Hypolimnion
11.0	5.2	0.0	0.0	
12.0	Bottom	Bottom	Bottom	

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

The Watershed Watch Program was made possible thanks to the generous support of the Ministry of the Environment, Lake Associations, Area Stewardship Councils, The Lake Stewardship Network, concerned citizens and Waste Management.

For more information about 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 613-259-2421 ext. 235 or slee@mvc.on.ca.

Mississippi Valley Conservation

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

www.mvc.on.ca