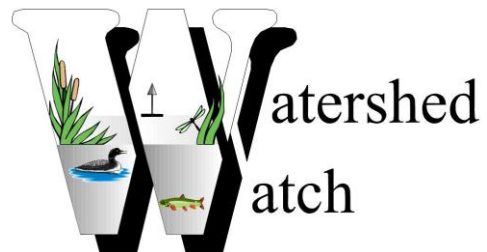




Mississippi Valley Conservation

*State of the Lake
Environment Report
2007*

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 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 30 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 three times for 2007, graphs will follow that show water clarity, as measured by secchi disc. The average reading for 2007 is 6.8 metres, indicating Robertson Lake is an unenriched (few nutrients) or oligotrophic lake. Forty two years ago, the average secchi disc 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 ($\mu\text{g/L}$). In 2007, the average total phosphorus level in the euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth), was $6.0 \mu\text{g/L}$ down from $7.6 \mu\text{g/L}$ in 2002, indicating an oligotrophic lake environment. The average for the sample taken one metre off the bottom was $57.7 \mu\text{g/L}$, which is fairly high, indicating an enriched (higher amount of nutrients) or euphotic lake environment. Thirty years ago, the average phosphorus level was $14.0 \mu\text{g/L}$ in the euphotic zone and $92.0 \mu\text{g/L}$ one metre off the bottom of the lake. Robertson Lake decreased its average phosphorus level by more than $30 \mu\text{g/L}$ 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 $1.3 \mu\text{g/L}$, indicating a very low algal density for Robertson Lake. In 1977, chlorophyll a levels were slightly higher at $1.95 \mu\text{g/L}$.

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 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 5 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 2007, 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 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 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 |

Robertson Lake



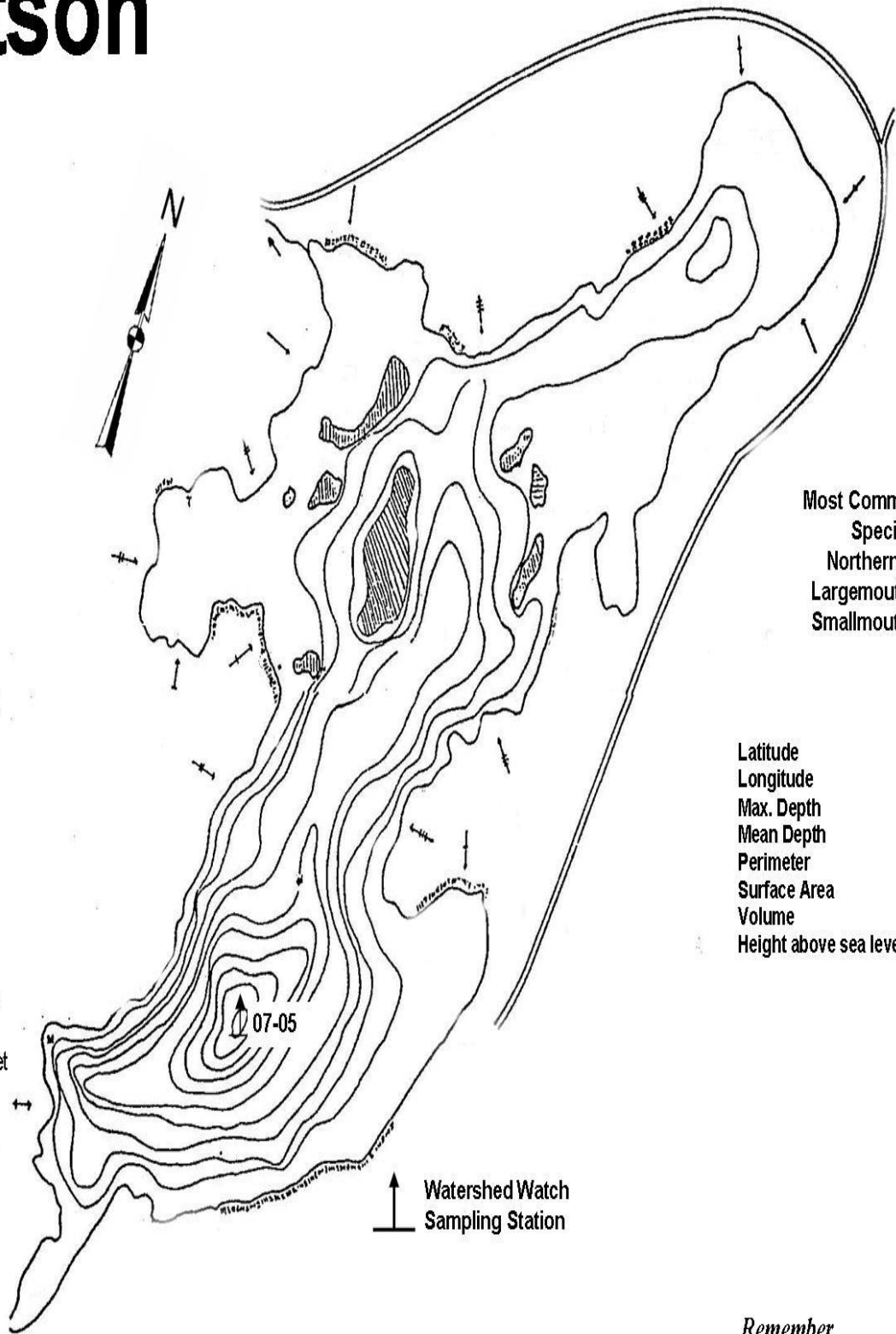
A Secchi Disc visually measures water clarity. The depth at

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 an unenriched, few nutrients or oligotrophic lake, with a mean of 6.8m.

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



Most Common Fish Species
 Northern Pike
 Largemouth Bass
 Smallmouth Bass

| | |
|------------------------|---------------------------------------|
| Latitude | 45° 05' |
| Longitude | 76° 10' |
| Max. Depth | 30.5 m |
| Mean Depth | 6.8 m |
| Perimeter | 10.3 km |
| Surface Area | 0.64 km ² |
| Volume | 6.36 m ³ x 10 ⁷ |
| Height above sea level | 286 m |

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

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

How Does Robertson Lake Measure Up?

1965 – 2007 Water Quality Results

| Sample Year | Secchi Disc 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 | | |
| 2002 | 7.3 | 7.6 | 61.1 | 0.97 |
| 2007 | 6.8 | 6.0 | 57.5 | 1.3 |
| n | 23 | 9 | 4 | 15 |
| Minimum | 5.2 | 6.0 | 14.0 | 0.70 |
| Maximum | 9.9 | 14.0 | 92.0 | 3.60 |
| Mean | 7.0 | 8.3 | 56.1 | 1.6 |
| Standard | 1.196768 | 2.655393 | 32.08411 | 0.919147 |

| | | | | |
|-----------|--|--|--|--|
| Deviation | | | | |
|-----------|--|--|--|--|

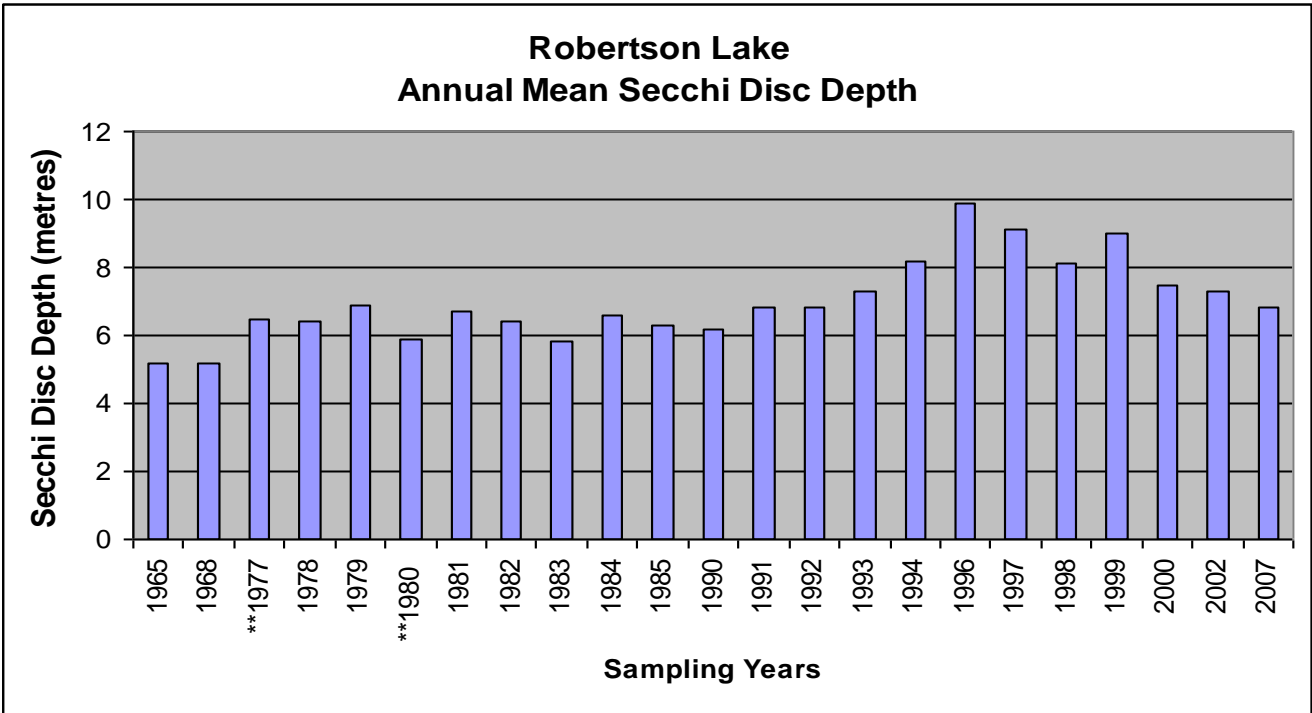
**Includes Recreational Lakes Program Data
 Chlorophyll *a* data prior to 1985 has been adjusted to reflect new lab procedures in filtering,
 resulting in an increase in chla concentrations by 35%.

Evaluating Secchi 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 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 |



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:

| | |
|---|---|
| <input type="checkbox"/> PRESERVATION When purchasing a lakefront property, a natural shoreline is retained and access to the lake is designed to | <input type="checkbox"/> ENHANCEMENT Native species are planted and non-native species are removed. |
|---|---|

avoid shoreline damage.

☐ NATURALIZATION

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

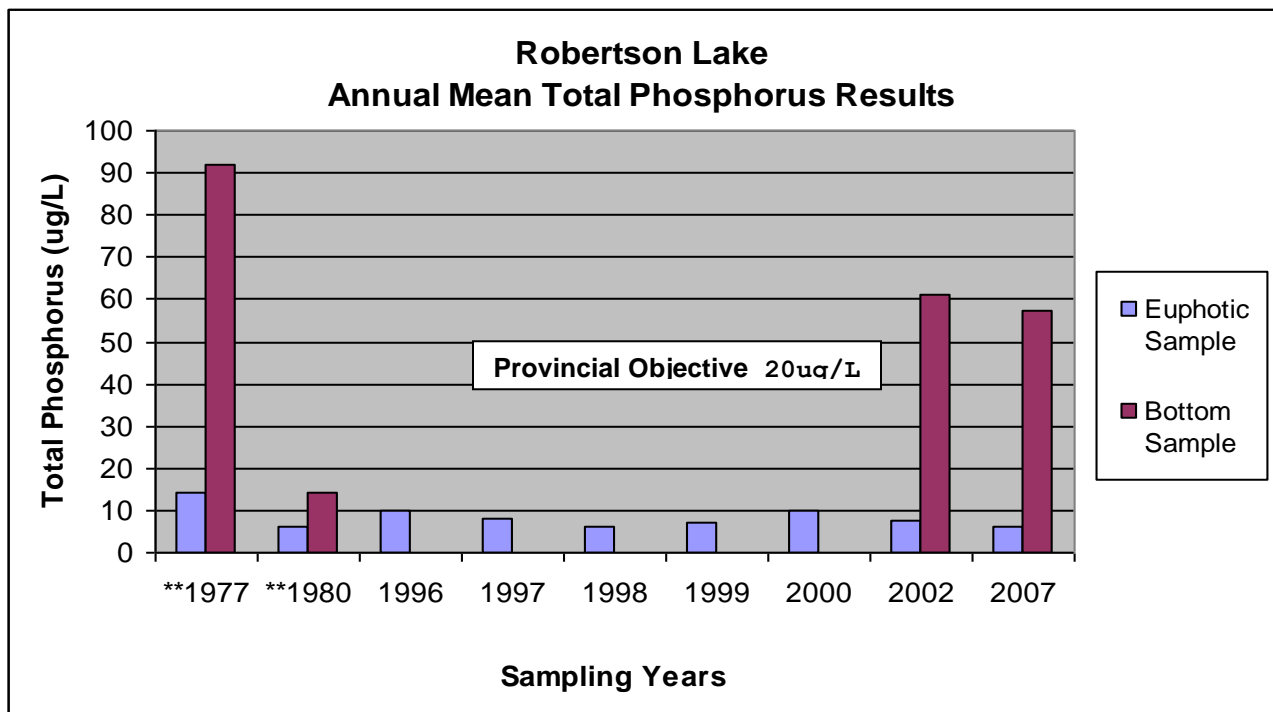
☐ RESTORATION

Cleared areas are planted with native species.

Evaluating Total Phosphorus Results:

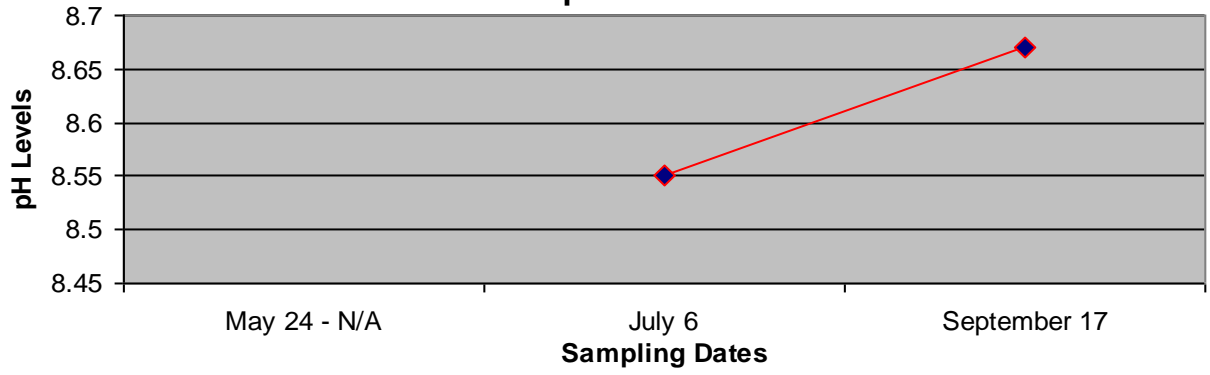
Phosphorus is the nutrient that controls the growth of algae in most Ontario lakes. For this reason any increase in phosphorus in the lake will increase the quantity of algae that can grow. High levels of phosphorus can lead to algal blooms and in some cases affect the habitat of cold water fish such 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.

Robertson Lake 2007 pH Levels





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

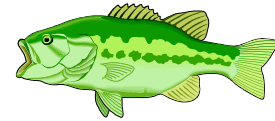
DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-701-01, MVC Station # 07-05

Date: July 06, 2007

Depth: 30.0 Metres

Euphotic Zone (Penetration of Light): 16.0 Metres



| Depth [Metres] | Temperature [Degrees Celsius] | Dissolved Oxygen [Milligrams/Litre] | Percent % Saturation | Thermal Stratification |
|----------------|-------------------------------|-------------------------------------|----------------------|----------------------------|
| 0.1 | 21.0 | 9.60 | 103 | Epilimnion |
| 1.0 | 21.1 | 8.50 | 91 | |
| 2.0 | 21.1 | 7.76 | 83 | |
| 3.0 | 21.1 | 6.1 | 65 | |
| 4.0 | 21.0 | 5.3 | 55 | |
| 5.0 | 21.0 | 4.4 | 46 | |
| 6.0 | 19.3 | 3.8 | 38 | Metalimnion or Thermocline |
| 7.0 | 16.1 | 3.5 | 33 | |
| 8.0 | 13.2 | 3.4 | 30 | |
| 9.0 | 10.9 | 3.5 | 29 | |
| 10.0 | 9.1 | 3.4 | 28 | |
| 11.0 | 7.6 | 3.5 | 28 | |
| 12.0 | 6.8 | 3.5 | 27 | Hypolimnion |
| 13.0 | 6.3 | 3.5 | 27 | |
| 14.0 | 5.7 | 3.4 | 26 | |
| 15.0 | 5.7 | 3.5 | 27 | |
| 16.0 | 5.1 | 3.9 | 29 | |
| 17.0 | 4.9 | 3.7 | 27 | |
| 18.0 | 4.7 | 3.5 | 26 | |
| 19.0 | 4.6 | 3.0 | 22 | |
| 20.0 | 4.5 | 2.7 | 20 | |
| 21.0 | 4.5 | 2.2 | 16 | |
| 22.0 | 4.4 | 1.9 | 14 | |
| 23.0 | 4.4 | 1.7 | 12 | |
| 24.0 | 4.3 | 1.7 | 12 | |
| 25.0 | 4.3 | 1.5 | 11 | |
| 26.0 | 4.3 | 1.5 | 11 | |
| 27.0 | 4.3 | 1.4 | 10 | |

| | | | |
|------|--------|--------|--------|
| 28.0 | 4.3 | 1.4 | 10 |
| 29.0 | 4.3 | 1.3 | 9 |
| 30.0 | Bottom | Bottom | Bottom |

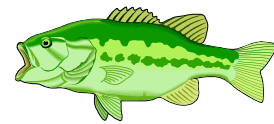
ROBERTSON LAKE - DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-701-01, MVC Station # 07-05

Date: September 17, 2007

Depth: 26.0 Metres

Euphotic Zone (Penetration of Light): 14.0 Metres



| Depth [Metres] | Temperature [Degrees Celsius] | Dissolved Oxygen [Milligrams/Litre] | Percent % Saturation | Thermal Stratification |
|----------------|-------------------------------|-------------------------------------|----------------------|----------------------------------|
| 0.1 | 18.3 | 10.0 | 101 | Epilimnion |
| 1.0 | 18.3 | 10.5 | 108 | |
| 2.0 | 18.2 | 10.6 | 109 | |
| 3.0 | 18.2 | 10.3 | 105 | |
| 4.0 | 18.2 | 10.1 | 103 | |
| 5.0 | 18.1 | 9.8 | 99 | |
| 6.0 | 18.0 | 9.5 | 96 | |
| 7.0 | 18.0 | 9.4 | 95 | |
| 8.0 | 16.9 | 9.3 | 92 | Metalimnion or Thermocline |
| 9.0 | 13.0 | 7.0 | 63 | |
| 10.0 | 10.3 | 5.4 | 45 | |
| 11.0 | 8.3 | 2.7 | 22 | Hypolimnion |
| 12.0 | 7.6 | 2.4 | 18 | |
| 13.0 | 6.8 | 0.8 | 6 | |
| 14.0 | 6.1 | 0.4 | 3 | |
| 15.0 | 5.6 | 0.1 | 2 | |
| 16.0 | 5.3 | 0.0 | 1 | |
| 17.0 | 5.2 | 0.0 | 1 | |
| 18.0 | 4.9 | 0.0 | 0 | |
| 19.0 | 4.8 | 0.0 | 0 | |
| 20.0 | 4.6 | 0.0 | 0 | |
| 21.0 | 4.5 | 0.0 | 0 | |
| 22.0 | 4.5 | 0.0 | 0 | |
| 23.0 | 4.5 | 0.0 | 0 | |

| | | | |
|------|--------|--------|--------|
| 24.0 | 4.5 | 0.0 | 0 |
| 25.0 | 4.5 | 0.0 | 0 |
| 26.0 | Bottom | Bottom | Bottom |

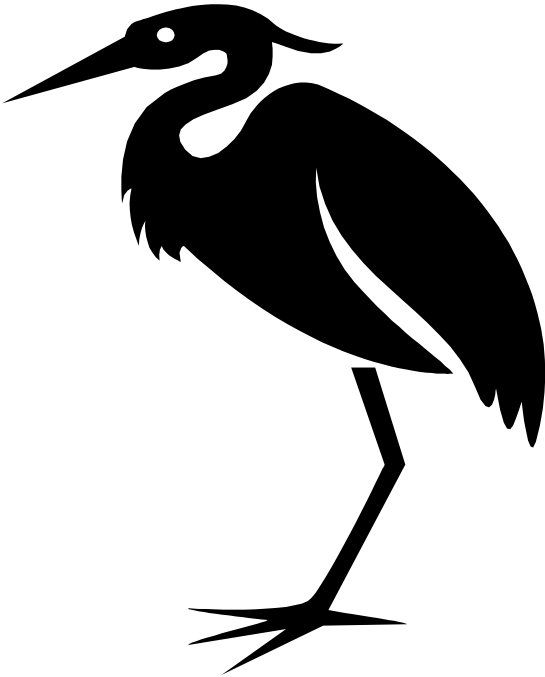
Warm Water Fisheries Habitat (Bass, Walleye, Pike and Perch) defined as Dissolved Oxygen Concentrations greater than 4 mg/L at Temp. less than 25°C



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

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



Mississippi Valley Conservation

