Mississippi Valley Conservation

State of the Lake Environment Report 2008

McCausland Lake

WATERSHED WATCH

McCausland Lake

McCausland Lake is located in the Township of North Frontenac. The lakes perimeter is 3.22 kilometres, with the deepest point at about 23 metres. McCausland Lake supports a cold water fishery, in particular Splake. There are only 5 cottages on the lake.

Limited water quality data is available for McCausland Lake. Records indicate that shoreline property owners have not yet formed a McCausland Lake Association or participated in the Ministry of Environment's Self-Help or Lake Partner Program. However, the lake is part of the Ompah Conservation Association. Comprehensive testing in 1998, 2003 and 2008 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a 5 year comparison between water quality conditions as they exist now. Continuing to collect 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.

McCausland Lake has one sampling station on the lake at the deepest point. The average secchi disc reading for 2008 was 8.2 metres, compared to 5 years ago, when the average was 5.5 metres. Thus indicating that McCausland 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 Objective for phosphorus levels in cold water lakes is 10 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 7.0 *ug*/L, up from the 2003 reading of 3.5 ug/L. The 2008 mean for the samples taken one metre off the bottom was 17.5 *ug/*L a increase from the 2003 reading of 6.0 ug/L and well above the provincial objective.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling stations was 1.2 *ug/*L. Thus, indicating a low algal density for McCausland Lake in 2008. In 1998, chlorophyll a levels were extremely high at 12.0 *ug*/L. By dropping the chlorophyll a levels, McCausland Lake has improved the conditions essential to sustain lake trout habitat.

Lake trout require more pristine environmental conditions than most native fish species. Therefore, lake trout can act as an environmental barometer. The dissolved oxygen and temperature profiles conducted in July of 2003 at the sampling station indicate sufficient optimal habitat is present to support lake trout in McCausland Lake. However, due to lack of access onto the lake MVC was unable to collect the September sample.

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.

Residents and users of McCausland 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/Property 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. 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. Because lake trout are very sensitive to changes in their environment, we all have a responsibility to preserve this most precious resource for future generations, so they may catch lake trout in McCausland Lake.

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 removed. 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

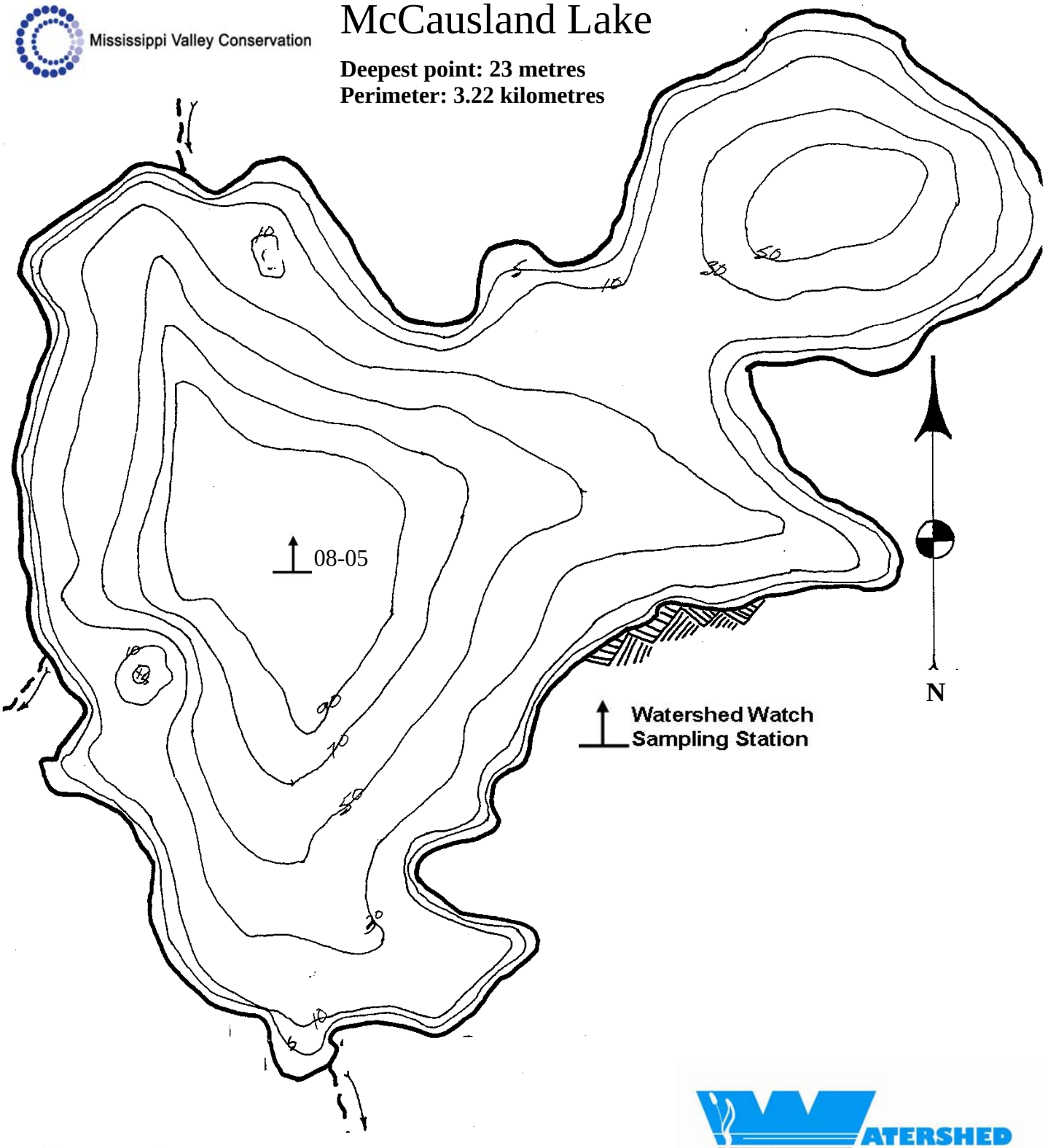
Restoration

Clear areas are planted with native species.

Mississippi Valley Conservation

McCausland Lake

Deepest point: 23 metres
Perimeter: 3.22 kilometres



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

WATERSHED WATCH

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

MVC and OFAH need your help to Stop the Invasion!

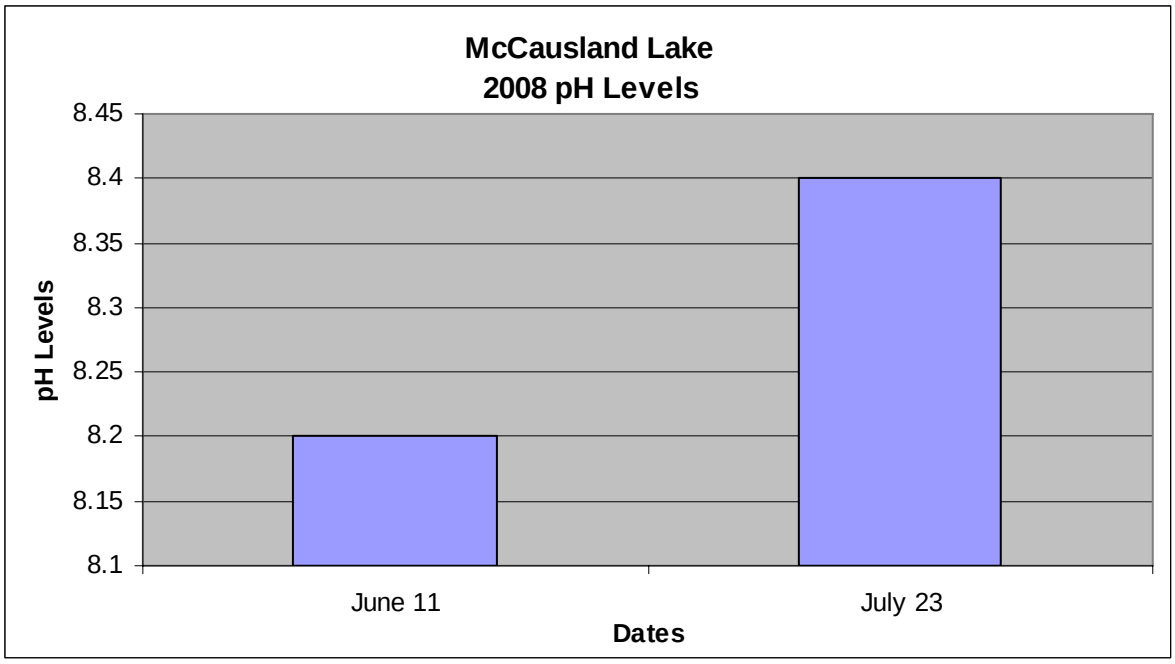
Check & clean your boat every time you change water bodies

McCausland 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. McCausland Lake did not have spiny water flea present but zebra mussel veligers (larvae) were detected 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.

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

Evaluating your pH Results

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



How Does McCausland Lake Measure Up?

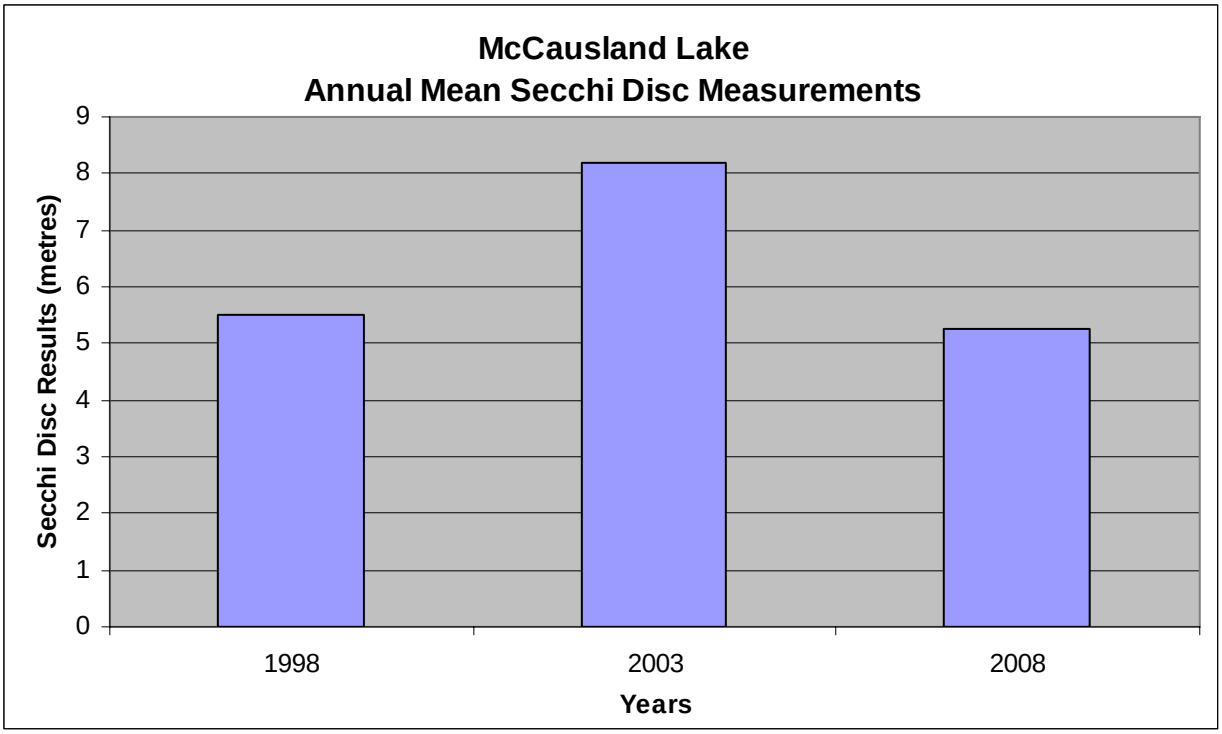
1998 - 2008 WATER QUALITY RESULTS - McCausland Lake

Sample Year [Various Stations]	Secchi Disc Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/Litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/Litre]	Chlorophyll a Composite [Micrograms/Litre]
*1998	5.5	1.5	4	12
*2003	8.2	3.5	6	1.1
*2008	5.25	7	17.5	1.2
n	2	2	2	2
Minimum	5.5	1.50	4.00	1.10
Maximum	8.2	3.5	6.00	12.0
Mean	6.9	2.5	5.0	6.6
Standard Deviation	1.90918831	1.414213562	1.414213562	7.707463915

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

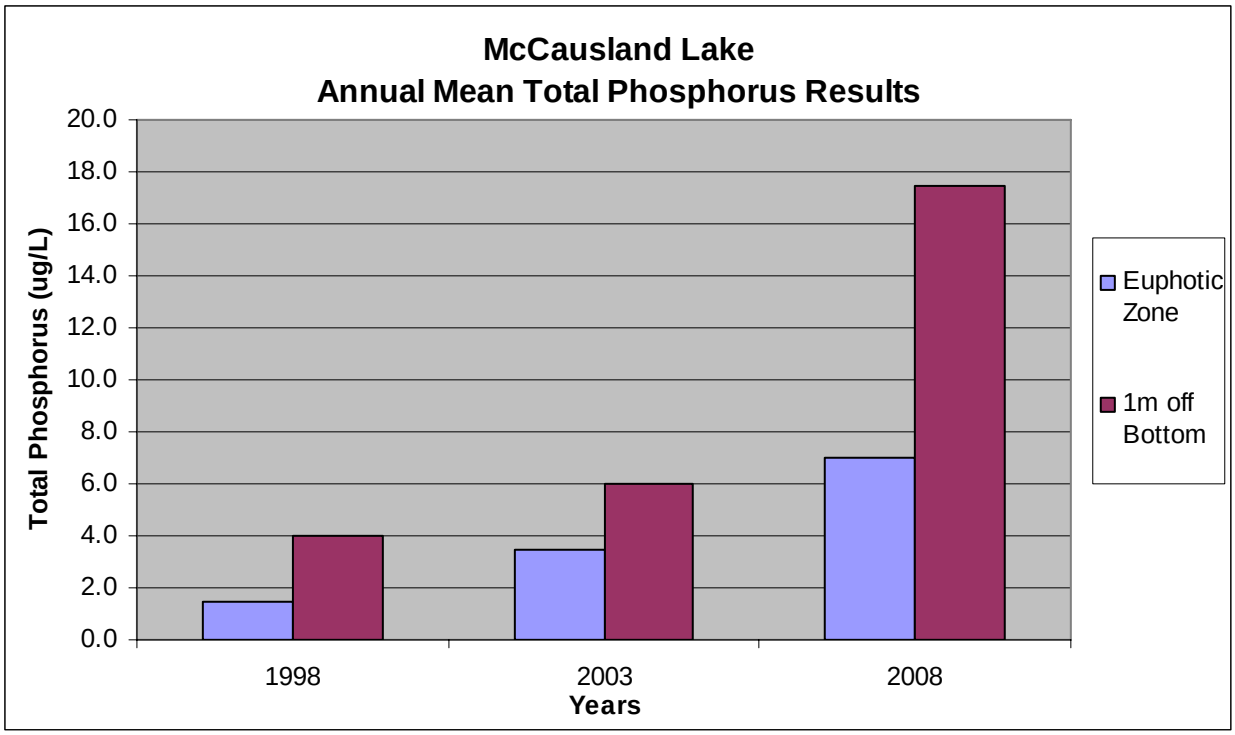
Interpreting Secchi Disc Readings

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 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 is measured.



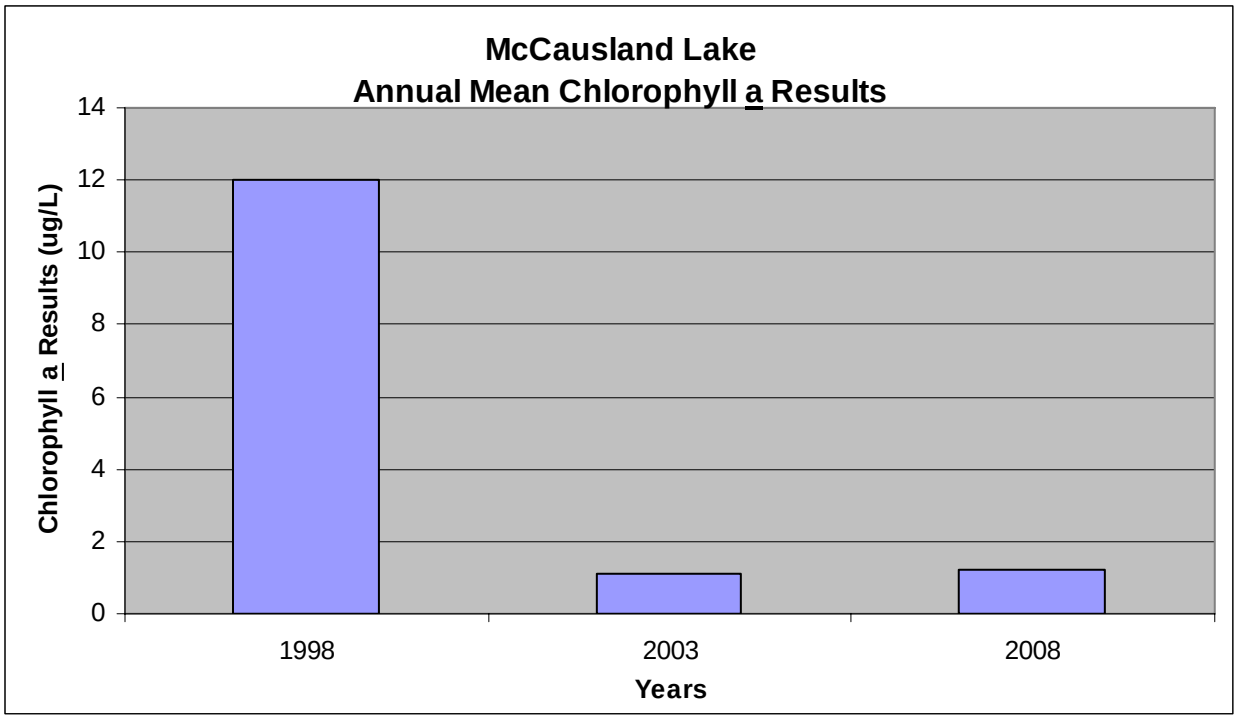
INTERPRETING YOUR TOTAL PHOSPHORUS RESULTS	
Total Phosphorus	**Lake Nutrient Status**
10ug/L or less	Oligotrophic - unenriched, few nutrients
11 to 20ug/L	Mesotrophic – moderately enriched, some nutrients
21ug/L or more	Eutrophic – enriched, higher levels of nutrients

FIVE EASY STEPS TO IMPROVE WATER QUALITY

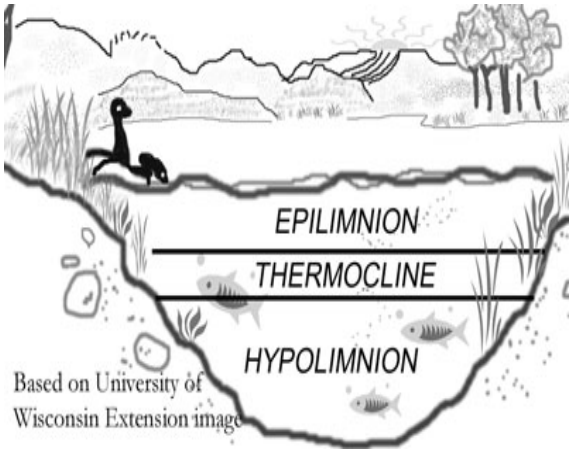
1. Build at least 30 metres away from the shoreline.
2. Keep your lot well treed and preserve or replant native vegetation along the shoreline.
3. Pump out your septic tank every three to five years.
4. Reduce water use and use phosphate free soaps and detergents.
5. Keep the size of your lawn to a minimum; do not use fertilizers, herbicides or pesticides.

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.



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)

MCCAUSLAND LAKE - MAIN BASIN

DISSOLVED OXYGEN/TEMPERATURE PROFILE

MOE Rec.Lks. Station 18-3430-752-01 MVC Station 08-05
Date: June 11, 2008
Depth: 24.0 Metres
Euphotic Zone (Penetration of Light) = 10.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	21.7	8.0	88	
1	21.6	7.9	86	Epilimnion
2	21.6	8.0	86	
3	18.8	8.7	88	
4	17.8	9.1	92	Metalimnion
5	16.0	9.8	96	or Thermocline
6	12.7	11.0	99	
7	10.4	11.1	97	
8	8.7	11.3	95	
9	7.8	11.1	91	
10	7.0	11.3	92	
11	6.1	10.9	86	
12	5.6	10.6	82	
13	5.2	9.3	71	Hypolimnion
14	4.8	9.0	68	
15	4.6	7.6	57	
16	4.5	7.0	53	
17	4.4	6.6	49	
18	4.3	6.5	48	
19	4.3	6.2	46	
20	4.3	5.4	39	
21	4.2	4.3	31	
22	3.9	4.2	30	
23	4.2	3.2	23	
24	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries =
greater than 6 mg/L DO at less than 10 degrees celsius

Vital Habitat for Cold Water Fisheries =
greater than 4 mg/L DO at less than 15.5 degrees celsius

MCCAUSLAND LAKE - MAIN BASIN - CONTINUED

MOE Rec.Lks. Station 18-3430-752-01 MVC Station 08-05
Date: July 23, 2008
Depth: 23 Metres
Euphotic Zone (Penetration of Light) = 18.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	23.5	8.0	90	
1	23.6	8.3	94	
2	23.5	8.4	94	
3	23.5	8.3	94	Epilimnion
4	23.5	8.5	95	
5	22.9	7.8	86	
6	15.7	9.2	90	
7	12.5	9.7	88	Thermocline # 1
8	10.4	9.9	86	
9	9.9	9.9	85	Thermocline # 2
10	7.6	9.7	78	
11	5.9	9.3	72	Thermocline # 3
12	5.2	9.0	68	
13	5.8	8.0	62	
14	5.4	7.4	57	
15	5.0	5.9	45	
16	4.8	5.5	41	
17	4.7	4.5	34	
18	4.6	4.3	32	Hypolimnion
19	4.5	3.5	26	
20	4.4	2.9	21	
21	4.4	2.2	16	
22	4.3	1.3	9	
23	4.3	4.0	29	
24	4.3	3.1	23	
25	4.3	3.1	23	
26	4.3	2.0	14	
27	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries =
greater than 6 mg/L DO at less than 10 degrees celsius

Vital Habitat for Cold Water Fisheries =
greater than 4 mg/L DO at less than 15.5 degrees celsius

Mississippi Valley Conservation

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

WATERSHED WATCH