Mississippi Valley Conservation

State of the Lake Environment Report 2006

White 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.**

WHITE LAKE

White Lake is a warm water lake located in the amalgamated Township of Central Frontenac. Designated as a Fish Sanctuary, White Lake hosts the Ministry of Natural Resources Fish Hatchery. At last count in 1970, there were approximately 14 cottages on the lake.

White Lake Facts

Elevation: 213 m. above sea level
Perimeter: 8.1 kilometres
Deepest Point: 29.6 m.
Fisheries Include: Small / Largemouth Bass
Northern Pike
Walleye
Yellow Perch

Limited water quality data is available for White Lake. Records indicate that shoreline property owners have not yet formed a Lake Association but have participated in the Ministry of Environment's (MOE) Self-Help Program. Comprehensive testing in 2001 and 2006 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 White 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 was 4.0 metres, indicating White Lake as a 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 Water Quality Objective for Total Phosphorus for White Lake is 20 micrograms/litre (*ug*/L). The mean for euphotic zone (penetration of light) for 2006 is 4.0 *ug*/L indicating an unenriched (few nutrients) or an oligotrophic lake. The mean for the sample taken one metre off the bottom is higher at 11.67 *ug/*L, indicating a moderately enriched (some nutrients) 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 2.6micrograms/litre, indicating a moderate algal density for White 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 eleven metres of the lake by late summer. Therefore, residents and users of White Lake cannot afford to be complacent. Every effort should be made to reduce nutrient loading into the lake from land use activities.

White 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. White 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 White 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 White Lake Measure Up?

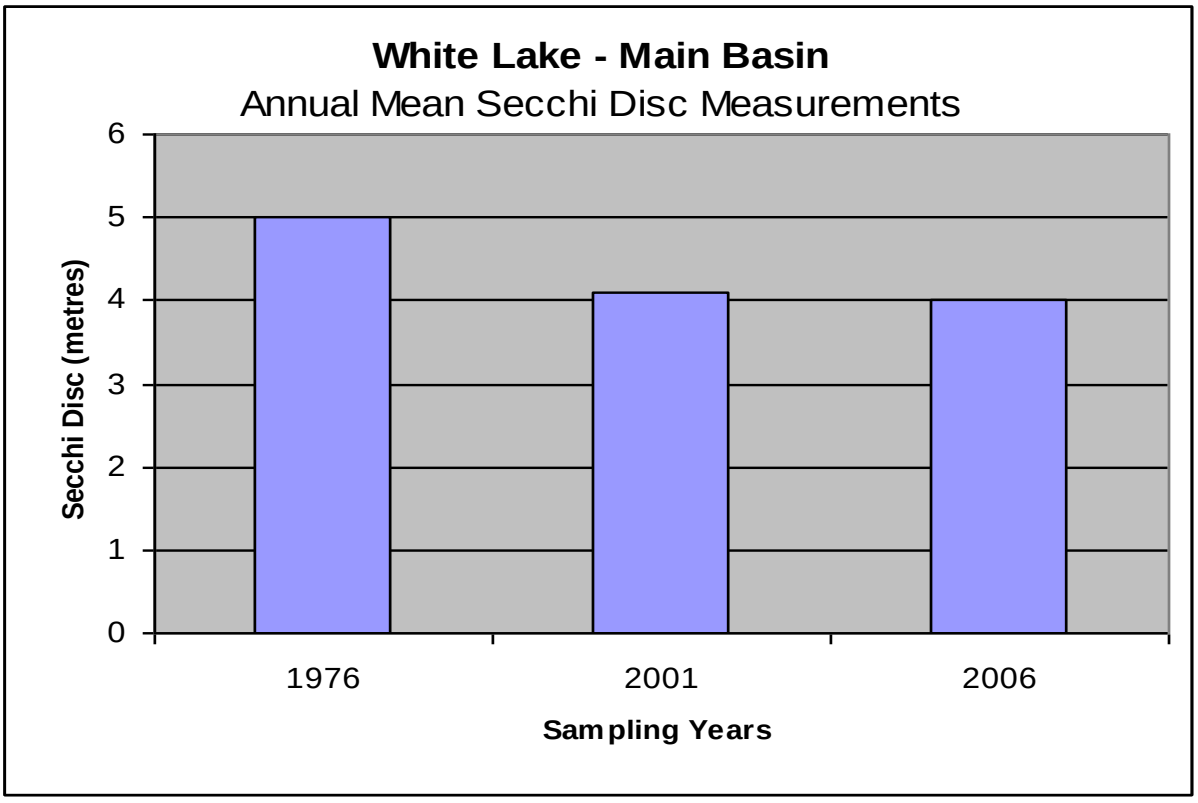
1976 – 2006 WATER QUALITY RESULTS – MAIN BASIN

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)
**1976	5.0	32.0	14.0	
2001	4.1	6.3	25.9	1.9
*2006	4.0	4.0	11.67	2.6
n	3	3	3	2
Mean	4.4	14.1	17.2	2.25
Standard Deviation	0.550757	15.54445	7.632516	0.494975

*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%

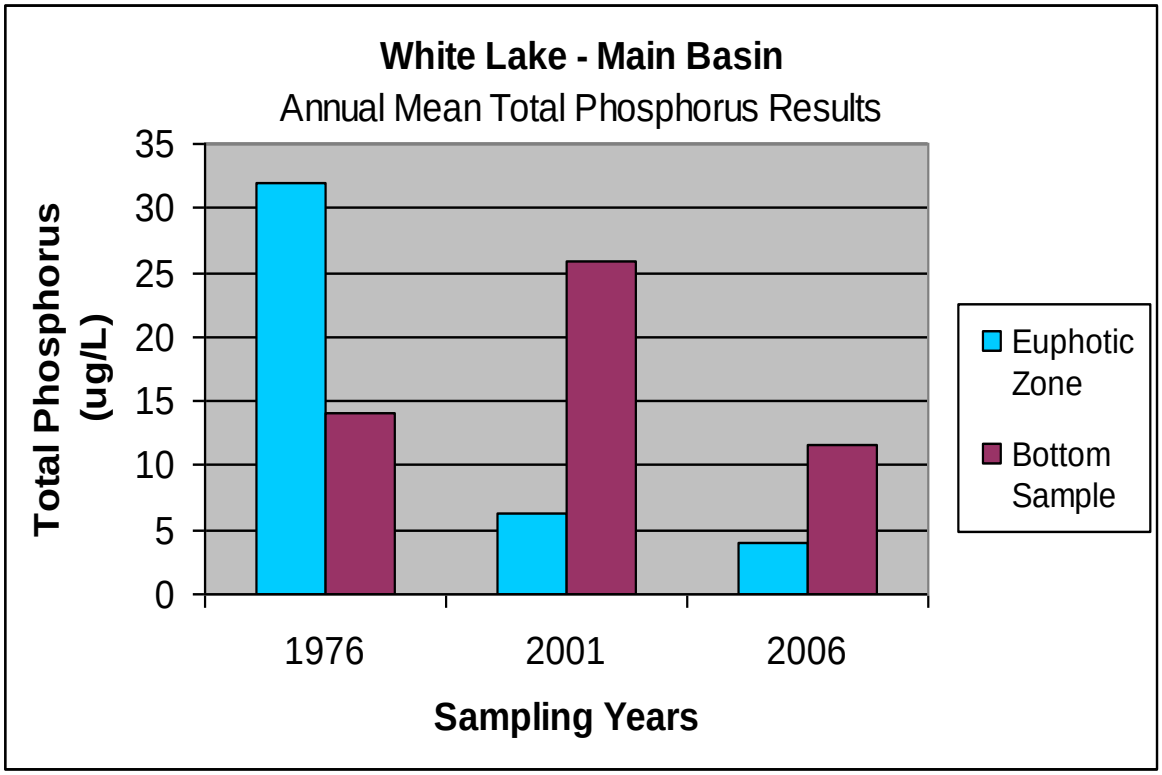
The higher the Secchi Disc measurement the clearer your lake is!

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



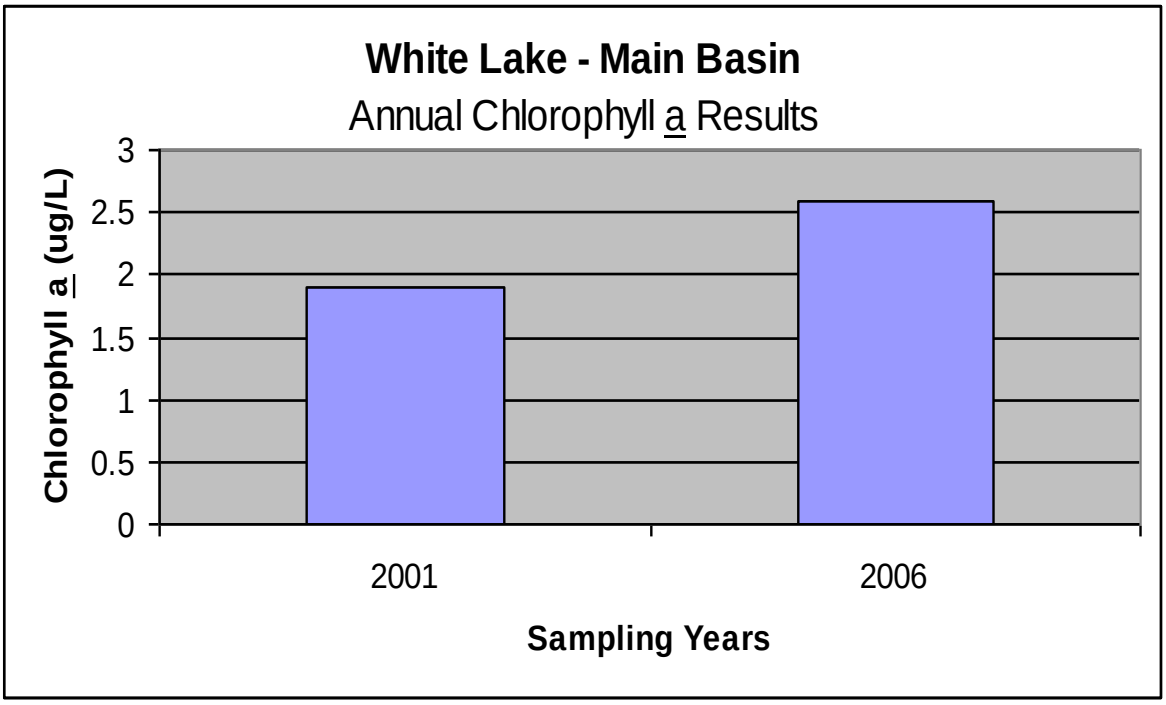
FIVE EASY STEPS TO IMPROVE WATER QUALITY

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!

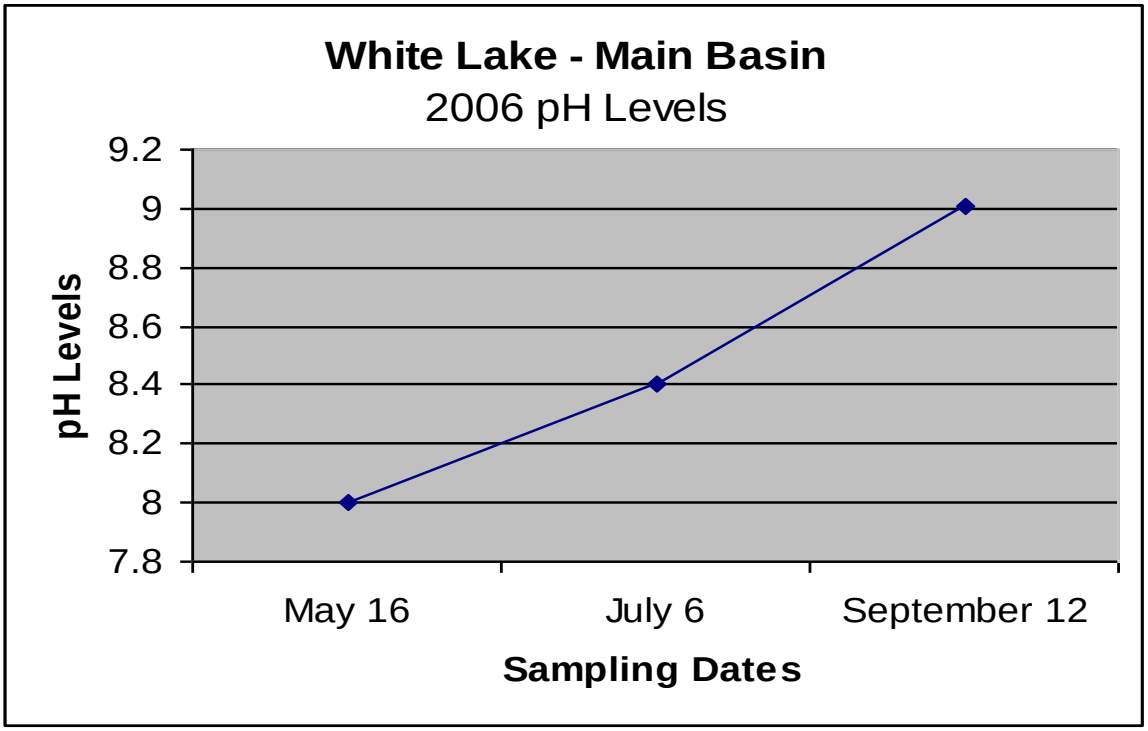
Nutrient Loading and How to Interpret the Water Quality Result : If the Chlorophyll a density is…	Your Lake is…
Up to 2 ug/L (low algal density)	Oligotrophic - unenriched, few nutrients
2 – 4 ug/L (moderate algal density)	Mesotrophic – moderately enriched, some nutrients
More than 4 ug/L (high algal density)	Eutrophic – enriched, higher levels of nutrients



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

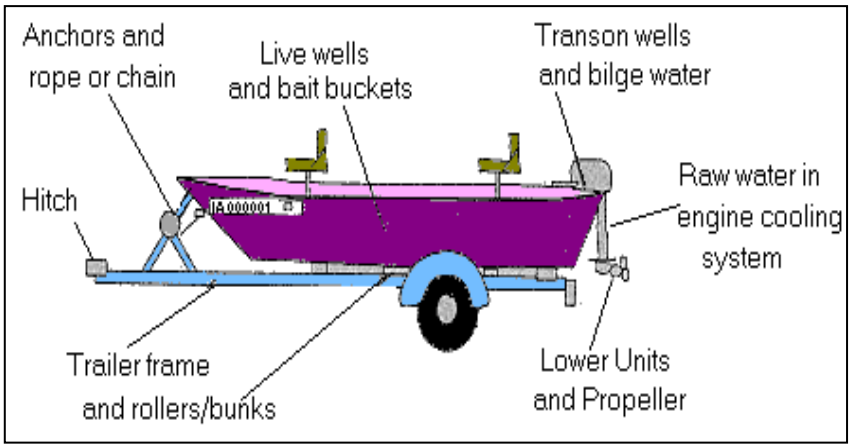
www.mvc.on.ca

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.

WHITE LAKE – MAIN BASIN

DISSOVED OXYGEN / TEMPERATURE PROFILE

MOE Rec. Lks. Station # 18-3430-747-01 MVC Station # 06-01
Date: May 16, 2006
Depth: 25 Metres
Euphotic Zone (Penetration of Light) = 8 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	15.5	10.0	96	
1.0	15.4	10.5	101	
2.0	15.2	10.4	100	Epilimnion
3.0	15.2	10.3	99	
4.0	15.1	10.3	99	
5.0	14.6	10.3	97	
6.0	12.7	11.4	104	Thermocline
7.0	9.8	12.4	106	
8.0	9.1	12.3	104	
9.0	8.5	11.8	97	
10.0	8.1	11.0	91	
11.0	7.4	9.9	79	
12.0	6.7	9.0	71	
13.0	6.3	8.6	67	
14.0	5.5	7.6	58	Hypolimnion
15.0	5.3	7.2	55	
16.0	5.1	6.6	50	
17.0	5.0	6.0	46	
18.0	4.8	7.4	56	
19.0	4.6	6.1	46	
20.0	4.5	6.6	49	
21.0	4.5	6.6	49	
22.0	4.4	6.6	49	
23.0	4.4	5.0	37	
24.0	4.3	5.0	37	
25.0	Bottom	Bottom	Bottom	

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

WHITE LAKE – MAIN BASIN

DISSOVED OXYGEN / TEMPERATURE PROFILE

MOE Rec. Lks. Station # 18-3430-747-01 MVC Station # 06-01
Date: July 6, 2006
Depth: 30 Metres
Euphotic Zone (Penetration of Light) = 7 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	23.2	7.0	78	
1.0	23.3	7.7	87	
2.0	23.3	7.7	87	Epilimnion - 1
3.0	23.2	6.8	76	
4.0	23.2	6.5	73	
5.0	23.1	6.1	67	
6.0	23.1	6.2	68	
7.0	16.3	6.8	66	Thermocline - 1
8.0	16.1	6.7	65	
9.0	13.2	6.3	57	Thermocline - 2
10.0	10.6	6.4	55	
11.0	10.4	6.0	52	
12.0	10.6	5.9	51	
13.0	10.4	5.7	49	Thermocline - 2
14.0	10.2	5.7	48	
15.0	9.3	5.6	47	
16.0	9.1	5.4	44	
17.0	8.7	5.4	43	
18.0	6.3	5.4	41	
19.0	6.1	5.0	39	Hypolimnion
20.0	6.2	5.0	39	
21.0	6.1	4.7	36	
22.0	5.9	4.6	35	
23.0	5.7	4.6	35	
24.0	5.7	4.5	34	
25.0	5.5	4.6	35	
26.0	5.4	4.0	31	
27.0	4.9	4.0	30	
28.0	4.9	3.9	29	
29.0	4.9	3.8	28	
30.0	Bottom	Bottom	Bottom	

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

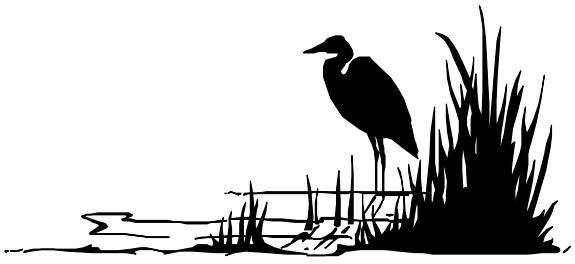
WHITE LAKE – MAIN BASIN

DISSOVED OXYGEN / TEMPERATURE PROFILE

MOE Rec. Lks. Station # 18-3430-747-01 MVC Station # 06-01
Date: September 12, 2006
Depth: 23 Metres
Euphotic Zone (Penetration of Light) = 9 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	18.1	11.1	114	
1.0	18.0	11.1	113	
2.0	18.0	11.2	114	
3.0	17.9	11.3	114	
4.0	17.9	11.3	114	Epilimnion
5.0	17.8	11.4	115	
6.0	17.8	11.3	114	
7.0	17.6	11.3	114	
8.0	17.5	11.2	113	
9.0	14.6	8.1	76	
10.0	11.6	5.6	49	Thermocline
11.0	9.5	4.7	39	
12.0	8.7	3.0	24	
13.0	7.6	2.6	20	
14.0	7.7	1.9	15	
15.0	6.3	1.7	13	
16.0	6.1	1.5	11	Hypolimnion
17.0	5.9	1.4	10	
18.0	5.8	1.3	9	
19.0	5.5	1.2	9	
20.0	5.4	1.1	9	
21.0	5.2	1.1	9	
22.0	5.1	1.0	7	
23.0	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.

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2.) **NATURALIZATION –** Degraded shorelines are left alone to return to their natural state.

3.) **ENHANCEMENT –** Native species are planted non-native species are removed.

4.) **RESTORATION –** Cleared areas are planted with native species.

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**

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 Glenn Hooper and the White Lake Fish Culture Station; for granting MVC use of their private boat launch and canoe.*

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