Mississippi Valley Conservation

State of the Lake Environment Report 2007

White Lake

WATERSHED WATCH

"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, a warm water lake is located within Renfrew County and Lanark Highlands, a new municipality created in 1998 by the amalgamation of the Village of Lanark, Townships of Dalhousie, Darling, North Sherbrooke, Lanark and Lavant. Access onto the south end of White Lake is available via highway #511.

White Lake Facts

Elevation: 162m. above sea level
Area: 22.69 km^2
Depth Mean: 3.5m
Fisheries Include: Small / Largemouth Bass
Pickerel
Pike
Pan Fish

Limited water quality data is available for White Lake. Records indicate that shoreline property owners have formed a Lake Association called the White Lake Property Owner's Association Environment Committee and have participated in the Ministry of Environment's Self-Help Program also known as the Lake Partner Program. Comprehensive testing in 2007 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides a comparison between water quality conditions as they exist now, to results obtained 32 years ago through the MOE Recreational Lakes Program.

In general the water quality in White Lake is good. There are three sampling station Sunset Bay, Three Mile Bay and Pickeral Bay (Bennett Bay) which were sampled three times in 2007. Maps are provided in this report for exact sampling locations. Graphs will also follow that show water clarity, as measured by Secchi Disc. The mean for 2007 was 4.1 metres indicating that White Lake is a moderately enriched (some nutrients) or a 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 2007 was 12.8 *ug*/L indicating a moderately enriched (some nutrients) or a mesotrophic lake. The mean for the sample taken one metre off the bottom was 10.7 *ug*/L, indicating an unenriched (few nutrients) or an oligotrophic lake.

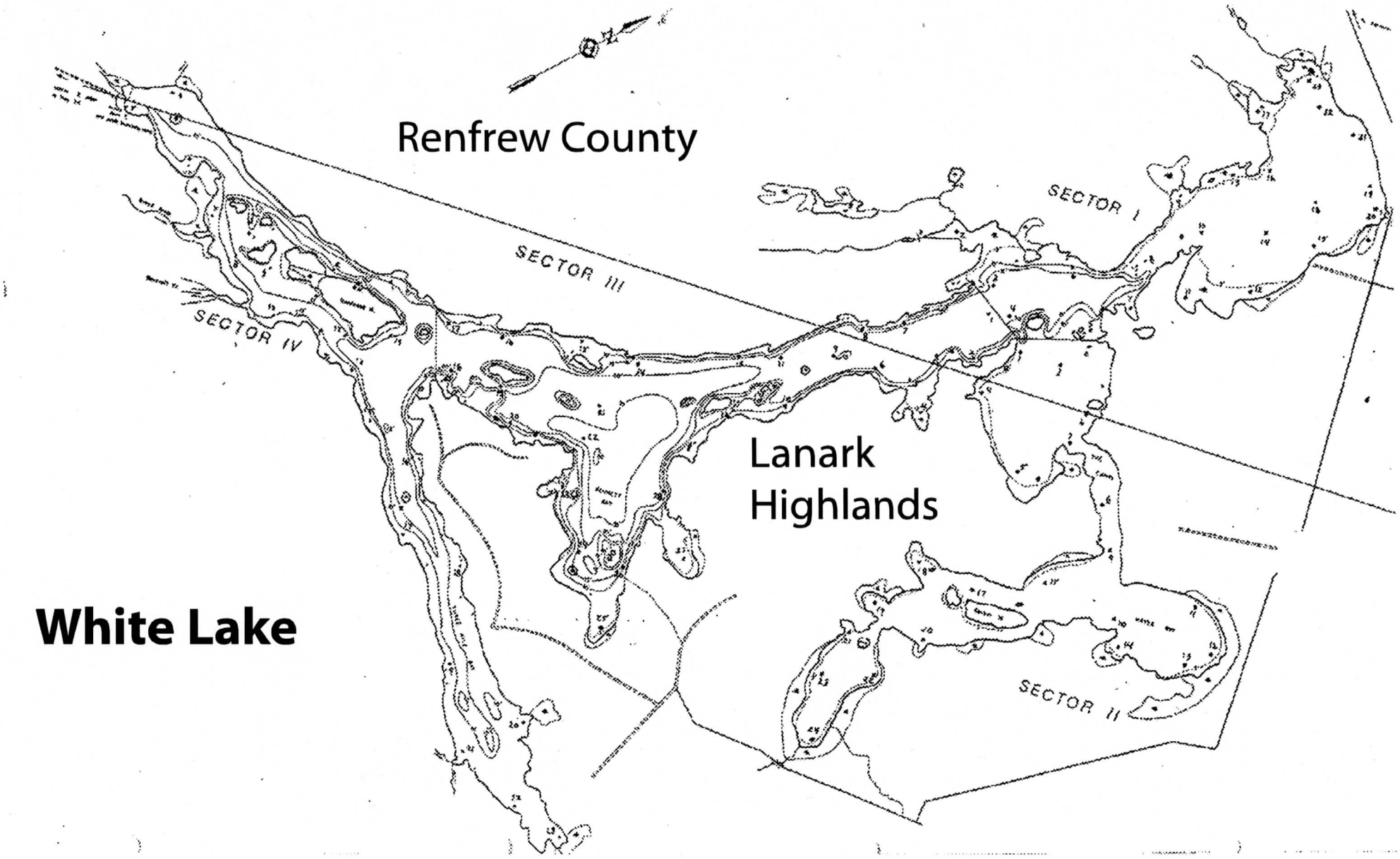
Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a densities for White Lake in 2007 was 4.6 micrograms/litre, indicating a high algal density.

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 profiles were measured at all three sampling stations throughout the summer. The profiles indicate by late summer warm water fish species, such as bass, are still able to inhabit the majority of the water column with the exception of Pickeral Bay whose oxygen concentrations are poor by September. However, with White Lake's shallow depth, residents and users 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 2007, 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 precautions they can take to avoid the spread of invasive species into White Lake.

Residents and users of White Lake should continue a stewardship approach to limit the amount of nutrients entering the lake. There are useful tips throughout this report to help reduce your impact on White Lake. Continued Monitoring over time is essential to determine long term trends and changes, resources and information are readily available through the *Watershed Watch Program* at Mississippi Valley Conservation. We all have a responsibility to preserve this precious natural resource for future generations


Renfrew County
SECTOR I
SECTOR III
SECTOR IV
Lanark
Highlands
White Lake
SECTOR II

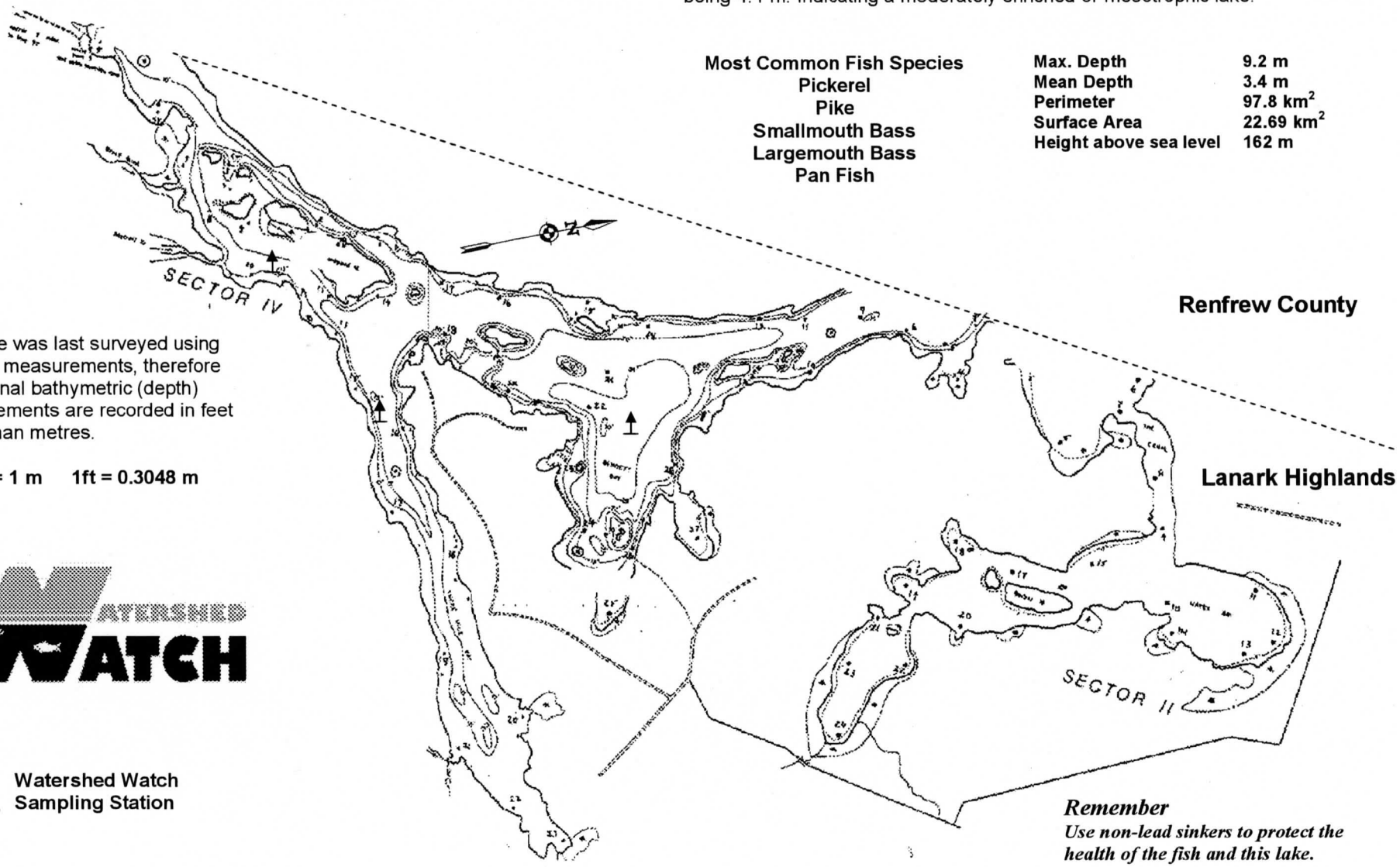
White Lake

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.

Readings taken in 2007 indicate good clarity with the average for three stations being 4.1 m. Indicating a moderately enriched or mesotrophic lake.

Most Common Fish Species
Pickerel
Pike
Smallmouth Bass
Largemouth Bass
Pan Fish

Max. Depth	**9.2 m**
Mean Depth	**3.4 m**
Perimeter	**97.8 km^2**
Surface Area	**22.69 km^2**
Height above sea level	**162 m**



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

Watershed Watch Sampling Station

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

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

How Does White Lake Measure Up?

1975 – 2007 WATER QUALITY RESULTS – PICKEREL BAY

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)
*1975	3.3	21		4.7
1996	2.8			
1997	3.4			
2003	2.9			
2004	2.9			
2005	2.7	**60		
**2006				
***2007	3.3	13.3	10.7	5.3
N	7	3	1	2
Mean	3.0	31.4	10.7	5.0
Standard Deviation	0.28	25.03	10.7	0.42

All data from Ministry of the Environment, Lake Partner Program with the exception of, *Ministry of the Environment, Recreational Lake Program, ** White Lake Property Owners Association Data and ***MVC Data.

1975 – 2007 WATER QUALITY RESULTS – THREE MILE BAY

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)
*1975	3.5	22		3.5
1996	2.5			
1997	3.2			
1998	2.9			
1999	2.6			
2000	3.1			
2001	3.2			
2003	3.0			
2004	2.8			
2005	3.2	**60		
**2006		17		
***2007	4.7	12.3	12.3	3.3
N	11	4	1	2
Mean	3.1	27.8	14.6	3.4
Standard Deviation	0.59	21.8	12.3	0.14

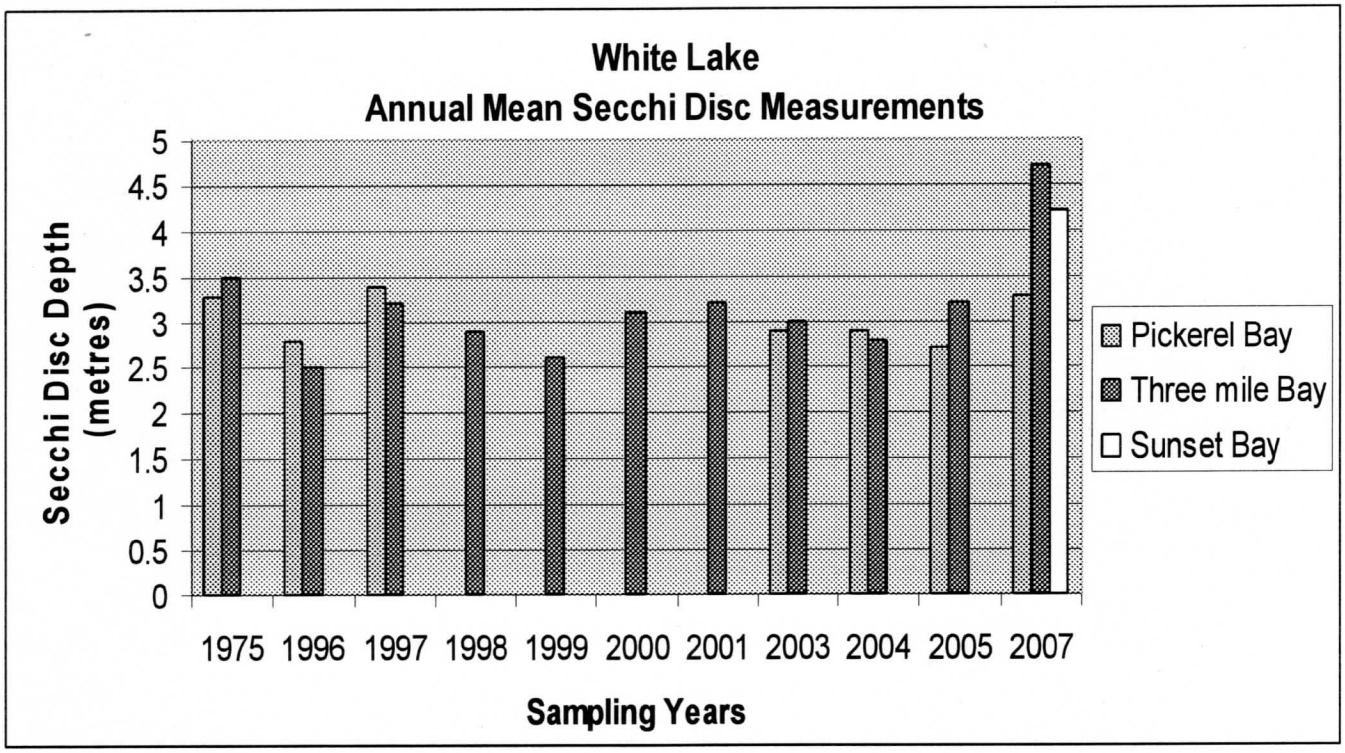
All data from Ministry of the Environment, Lake Partner Program with the exception of, *Ministry of the Environment, Recreational Lake Program, ** White Lake Property Owners Association Data and ***MVC Data.

2007 WATER QUALITY RESULTS – SUNSET BAY

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)
**2005		40		
**2006		18		
***2007	4.2	12.7	12.7	5.3
N	1	3	1	1
Mean	4.2	23.5	12.7	5.3
Standard Deviation	4.2	14.47	12.7	5.3

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

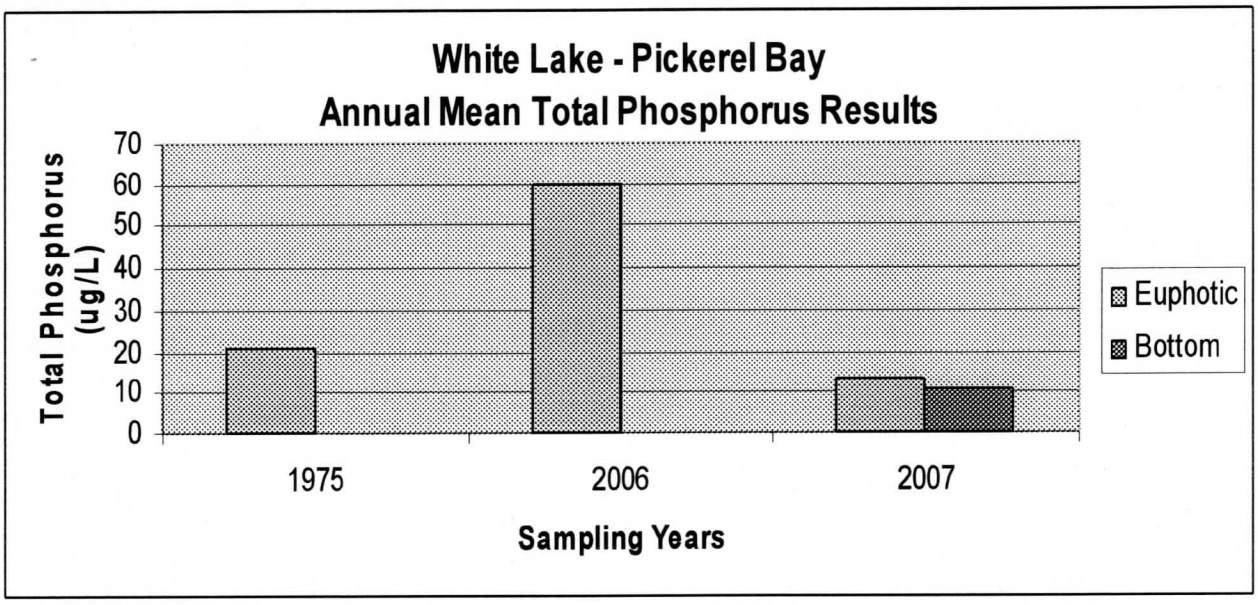


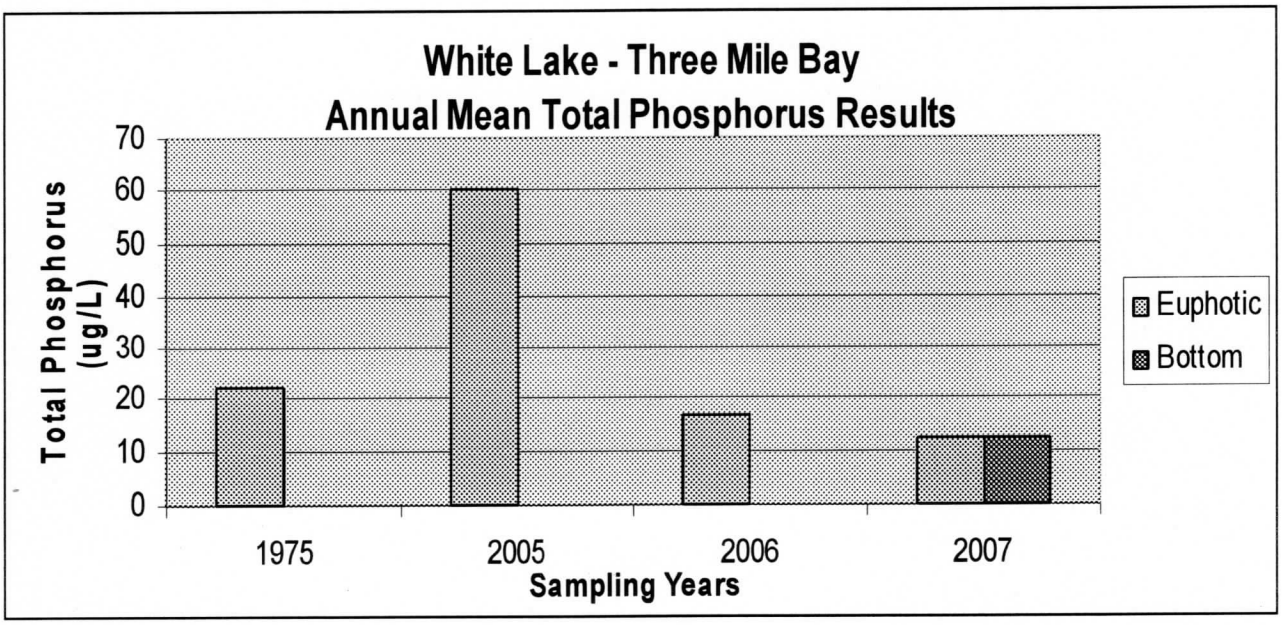
For more information on lakes in the Mississippi Valley Watershed, visit MVC online at

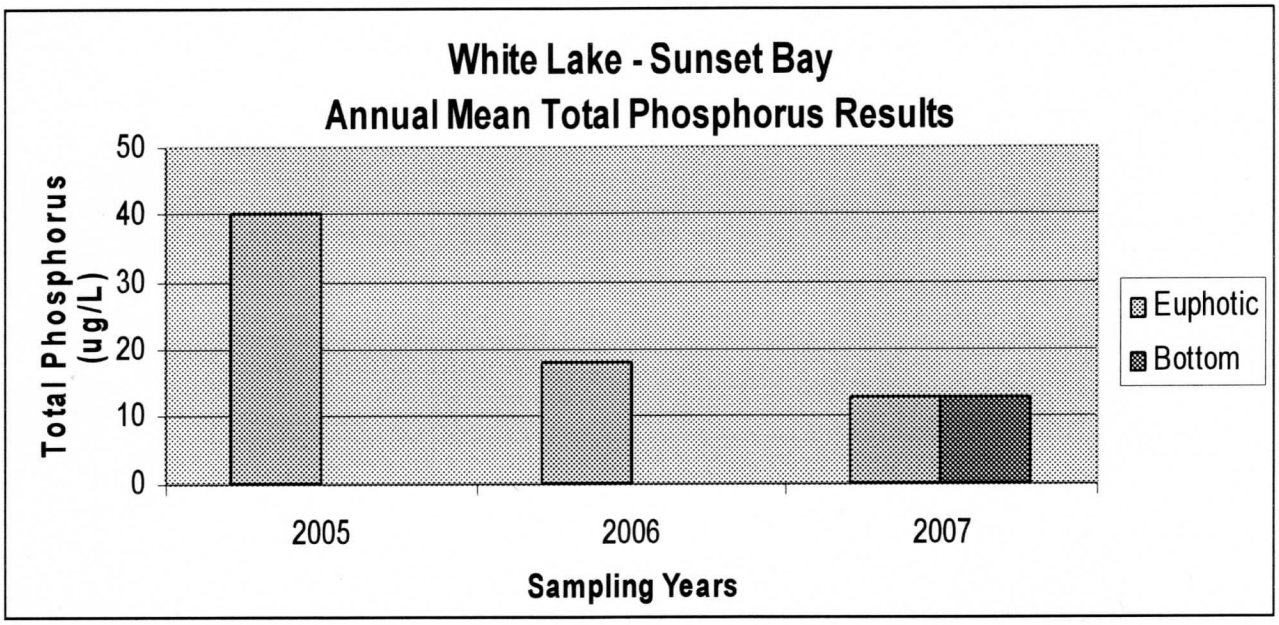
www.mvc.on.ca

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





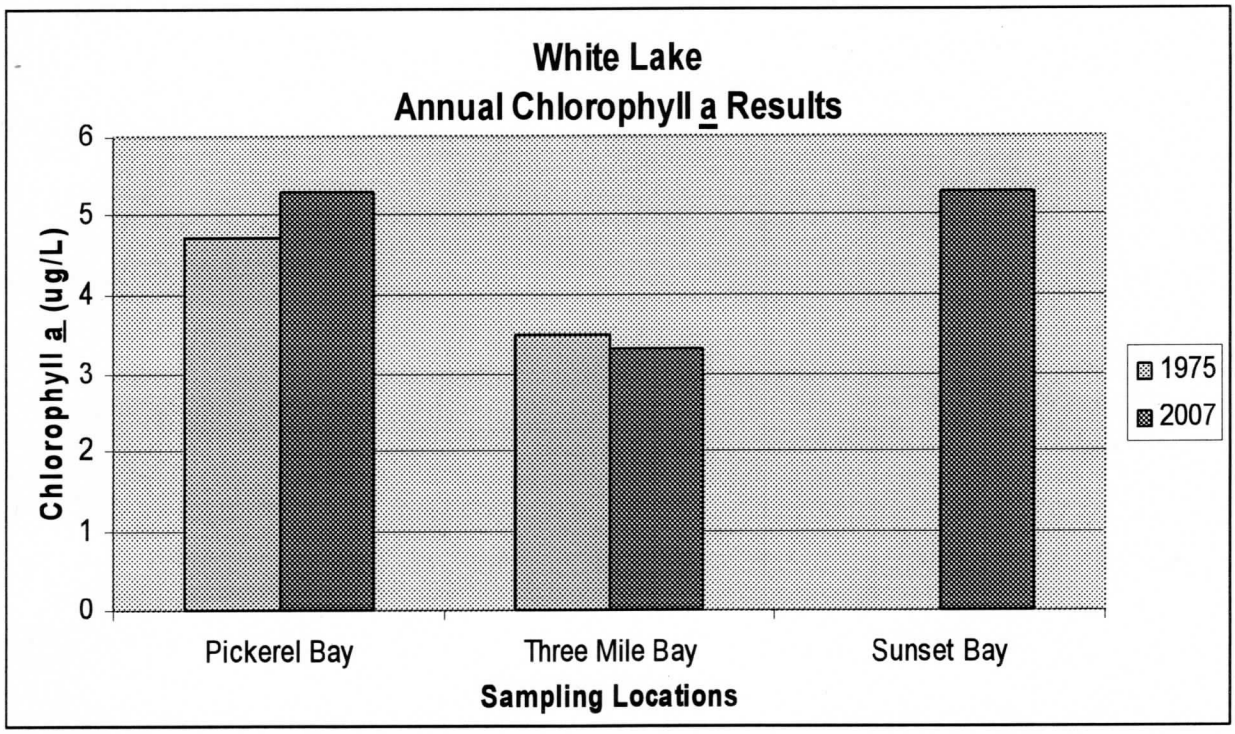


FIVE EASY STEPS TO IMPROVE WATER QUALITY

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.

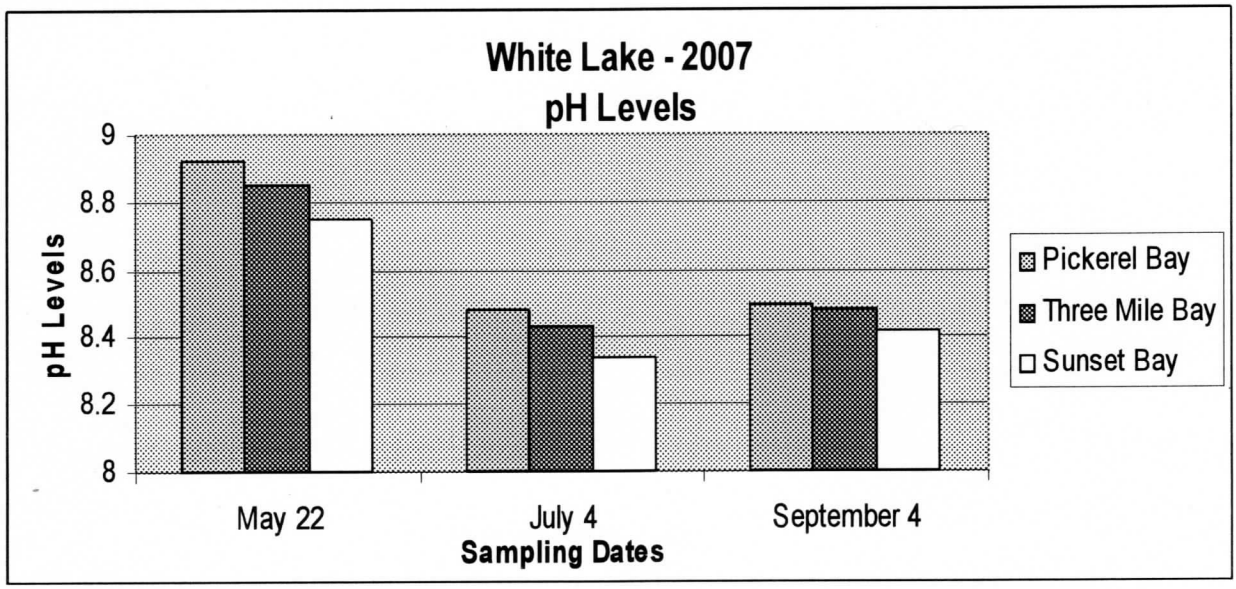
The lower the Chlorophyll a density, the clearer your lake is!

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



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**

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



WHITE LAKE – PICKEREL BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-14
Date: May 22, 2007
Depth: 10.0 Metres
Euphotic Zone (Penetration of Light) = 9.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	16.1	5.0	48	
1.0	15.4	5.8	54	
2.0	15.1	6.5	61	
3.0	15.1	6.8	64	
4.0	14.9	6.9	64	Epilimnion
5.0	14.9	6.4	60	
6.0	14.7	5.1	47	
7.0	14.7	4.5	41	
8.0	14.4	4.1	37	
9.0	14.4	3.7	33	
10.0	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 – THREE MILE BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-15
Date: May 22, 2007
Depth: 6.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	16.9	4.8	46	
1.0	16.3	5.7	55	
2.0	15.7	6.2	59	Epilimnion
3.0	15.6	6.8	64	
4.0	15.6	7.2	69	
5.0	15.5	7.3	70	
6.0	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 – SUNSET BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-16
Date: May 22, 2007
Depth: 6.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	17.8	4.8	47	Epilimnion
1.0	16.3	5.8	55	Thermocline
2.0	15.7	6.9	66	
3.0	15.4	7.4	70	
4.0	15.1	6.2	59	Hypolimnion
5.0	15.1	5.9	56	
6.0	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 – PICKEREL BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-14
Date: July 4, 2007
Depth: 10.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.9	8.9	96	
1.0	21.9	9.9	112	
2.0	21.8	9.0	98	
3.0	21.8	6.8	74	Epilimnion
4.0	21.7	6.0	64	
5.0	21.7	5.0	54	
6.0	21.5	4.4	46	
7.0	21.2	3.7	37	
8.0	19.7	3.2	32	
9.0	18.6	2.3	22	Thermocline
10.0	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 – THREE MILE BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-15
Date: July 4, 2007
Depth: 6.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.4	9.6	104	
1.0	21.8	10.7	116	
2.0	21.8	10.1	109	Epilimnion
3.0	21.7	8.0	83	
4.0	21.4	6.6	73	
5.0	21.2	5.4	57	
6.0	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 – SUNSET BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-16
Date: July 4, 2007
Depth: 5.0 Metres
Euphotic Zone (Penetration of Light) = 5.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	20.9	10.0	107	
1.0	21.1	10.8	116	
2.0	21.1	9.4	100	Epilimnion
3.0	21.1	8.7	94	
4.0	20.9	4.8	50	
5.0	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 – PICKEREL BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-14
Date: September 4, 2007
Depth: 9.0 Metres
Euphotic Zone (Penetration of Light) = 5.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.7	8.0	87	
1.0	21.7	6.6	70	
2.0	21.7	5.5	58	
3.0	21.6	4.6	48	Epilimnion
4.0	21.6	4.2	43	
5.0	21.6	3.7	38	
6.0	21.6	3.4	35	
7.0	21.6	3.1	32	
8.0	21.5	2.9	30	
9.0	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 – THREE MILE BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-15
Date: September 4, 2007
Depth: 6.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.8	8.5	91	
1.0	21.8	8.4	91	
2.0	21.7	6.8	73	Epilimnion
3.0	21.7	5.6	59	
4.0	21.6	4.9	52	
5.0	21.6	4.1	43	
6.0	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 – SUNSET BAY

DISSOVED OXYGEN / TEMPERATURE PROFILE

MVC Station # 07-16
Date: September 4, 2007
Depth: 6.0 Metres
Euphotic Zone (Penetration of Light) = 6.0 Metres

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.6	8.7	95	
1.0	21.7	8.1	89	
2.0	21.5	7.4	80	Epilimnion
3.0	21.5	5.8	61	
4.0	21.5	5.4	56	
5.0	21.5	4.6	48	
6.0	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.

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.

The sampling of White Lake as part of MVC's ***Watershed Watch program*** *was made possible thanks to the initiative and support from Lanark Highlands.*

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

Mississippi Valley Conservation

Balancing the Needs of the Natural Environment with the Needs of the Community