Mississippi Valley Conservation

State of the Lake Environment Report 2008

Mazinaw Lake

WATERSHED WATCH

Mazinaw Lake

Mazinaw Lake is situated in portions of North Frontenac and Addington Highlands Townships. It's located in the headwaters for the Mississippi River which flows 212 km before entering the Ottawa River. Part of the lake is within the boundary of Bon Echo Provincial Park.
Mazinaw Lake is at an elevation of 268 metres above sea level. The lake perimeter is approximately 49 kilometres and the deepest point is 144.8 metres. Mazinaw Lake supports a cold water fishery, in particular lake trout, other species include Walleye, Smallmouth and Largemouth Bass. Currently, accurate shoreline development information is not available. However at last count in the early 1970's, there were approximately 254 cottages on the lake.

Members of the Lake Association have volunteered their time to provide consistent water quality testing through the Ministry of Environment Self Help Program since 1975. This data is extremely valuable because it provides a general picture of water quality conditions over the past thirty-three years. Comprehensive testing in 1998, 2003 and 2008 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program*, provides for a comparison between water quality conditions as they exist now, to results obtained in 1971, (37 years ago), through the Ministry of Environment Recreational Lakes Program.

There are two sampling stations on the lake. The south basin station is near Snyder Bay and the second station is in Campbell Bay. Each station was sampled eight times in 2008, thanks to continued support from Waste Management.
The average Secchi Disc reading for the two stations, were observed as very good. The average for the two stations in 2008 was 5.2 meters. Ten years ago the reading was also 5.2 meters, thus indicating that Mazinaw 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 two stations in the euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth) was 9.0 ug/L, indicating a oligotrophic lake or unenriched. The mean for the samples taken one metre off the bottom was 14.5, indicating a mesotrophic lake or moderately enriched, a noticeable increase from the 2003 reading of 4.09 *ug/*L.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the two sampling stations was 1.6 *ug/*L. Thus, indicating a low algal density for Mazinaw Lake in 2008. In 1998, chlorophyll a levels were approximately in the same range, conditions essential to sustain lake trout habitat.

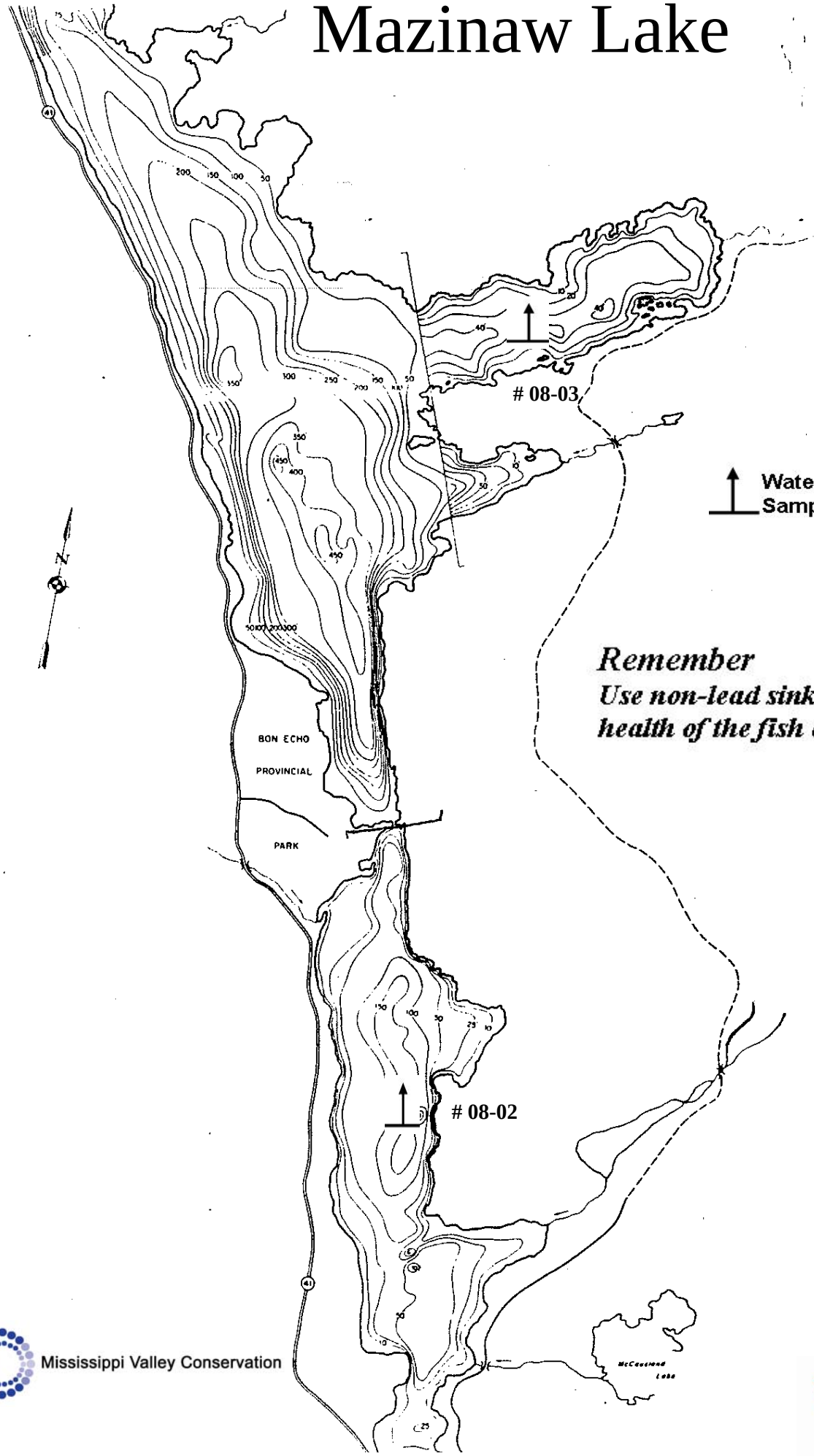
Lake trout require more pristine environmental conditions than most native fish species. Therefore, lake trout can act as an environmental barometer. The dissolved oxygen and temperature profiles conducted in 2008 at the two stations indicate sufficient optimal habitat is present to support lake trout in Mazinaw Lake. However, in October at the Campbell's Bay basin optimal habitat only occupies 3 metres.
Results obtained in 2003 confirm results outlined in the *1993 Inland Lake Trout Management Report* which classified the lake as moderately sensitive to loss of the remaining optimal lake trout habitat as a result of additional nutrient loadings. Mazinaw Lake was given a sensitivity index to predicted percentage change in optimal habitat of 1, the least sensitive of all lake trout lakes in the south-eastern region. This low sensitivity is due to the lake's very large size and other physical features. At the most critical time of year, in late summer, there remains a 34 metre layer of water from 12 to 46 metres in the south basin having optimal conditions for the lake trout to survive.

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 (DO) and temperature data, measured at the two sampling stations, indicate adequate levels all the way to the bottom for most of the ice-out season. However, data collected in September and October, revealed that the temperature readings in both South Basin and Campbell Bay were fairly warm, pushing cold water fish such as trout, down to below the 12 metre mark in the south basin and the 13 metre mark in Campbell's Bay. Warm water fish species, such as pike and bass, received adequate DO levels throughout the season. Overall, there is a noticeable improvement in DO levels from 1998.

Despite excellent water quality conditions in the lake, residents and users of Mazinaw Lake cannot afford to be complacent. 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 Mazinaw Lake. There are helpful tips throughout this report to help reduce your impact on Mazinaw Lake. Additional water quality data, current and historic, is available for Mazinaw 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.

Mazinaw Lake



Remember

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

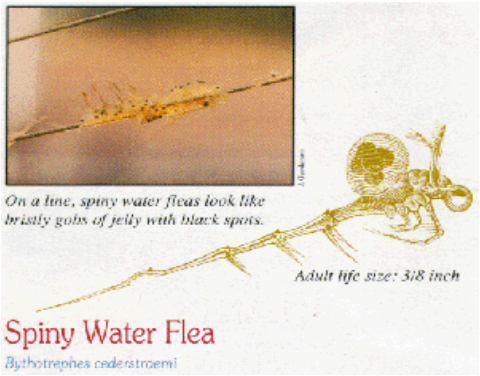
Mississippi Valley Conservation

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!

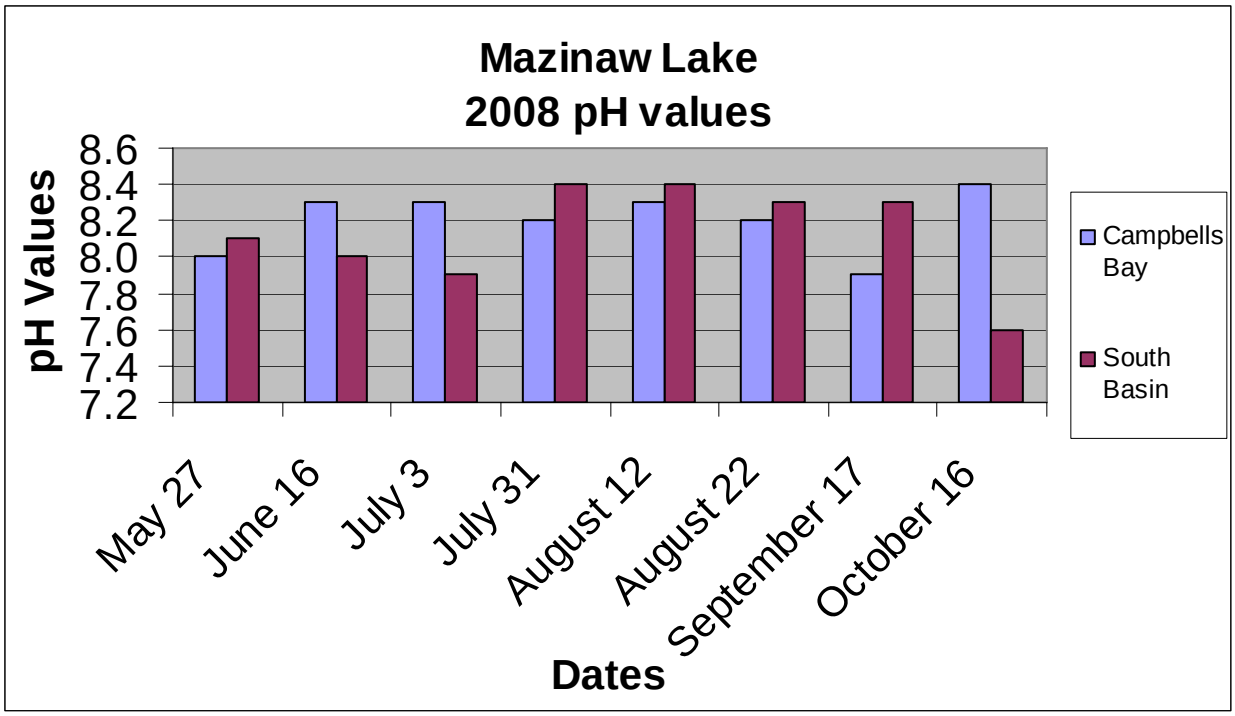
Check & clean your boat every time you change water bodies



Mazinaw 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. Mazinaw Lake did *not* have spiny water flea or zebra mussel veligers (larvae) present is the samples collected however, zebra mussel veligers have been detected in previous years. 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.

Evaluating your pH Results

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



How Does Mazinaw Lake Measure Up?

1974 – 2008 Water Quality Results

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]
*1971	5.6	9.0		0.8
1972				
1973				
1974				
1975	5.6			1.5
1976	5.6			1.8
1977	5.7			1.8
1978	5.6			1.5
1979	5.2			2.1
1980	4.9			2.1
1981	4.7			1.8
1982	3.5			1.8
**1983	3.6			1.5
1984	4.0			2.2
1985	3.6			1.7
1986	3.7			1.7
1987	3.6			1.3
1988	4.1			0.9
1989	3.8			1.7
1990	4.9			1.7
1991	4.5			1.1
1992	4.8			1.1
1993	4.3			1.0
1994				
1995				
1996				
1997				
1998	5.2	7.7	10.95	1.3
1999	5.8			
2000	4.35			
2001	6.15			
2002	4.15			
2003	6.8	4.09	4.09	1.36
2008	5.3	9.0	14.5	1.6
n	27	4	3	23
Minimum	3.5	4.09	4.09	0.8
Maximum	6.8	9.0	14.5	2.2
Mean	4.8	7.4	9.8	1.5
Standard Deviation	0.900775	2.320709	5.291978	0.383017

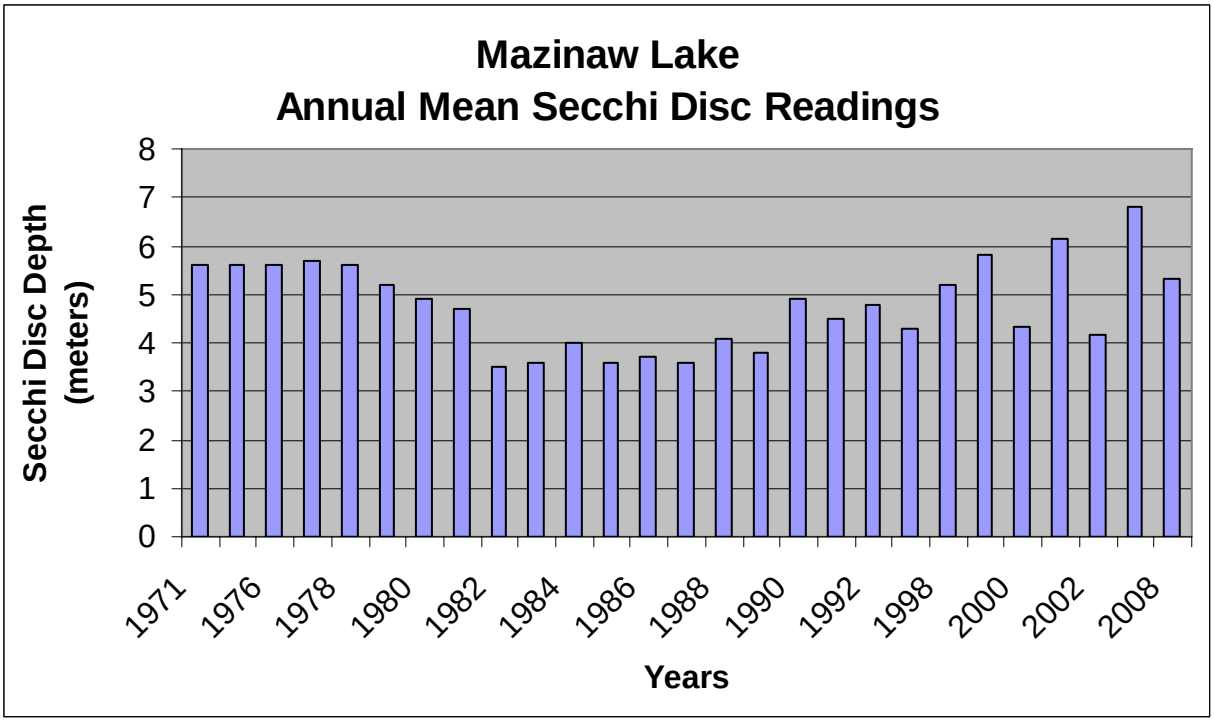
*Mean based on less than 6 measurements **Includes Recreational Lakes Program Data
Chlorophyll-a data prior to 1985 has been adjusted to reflect new lab procedures
in filtering resulting in an increase in chla concentrations by 35%

Interpreting Secchi Disc Readings:

A Secchi disc is a black and white coloured disk 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.

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

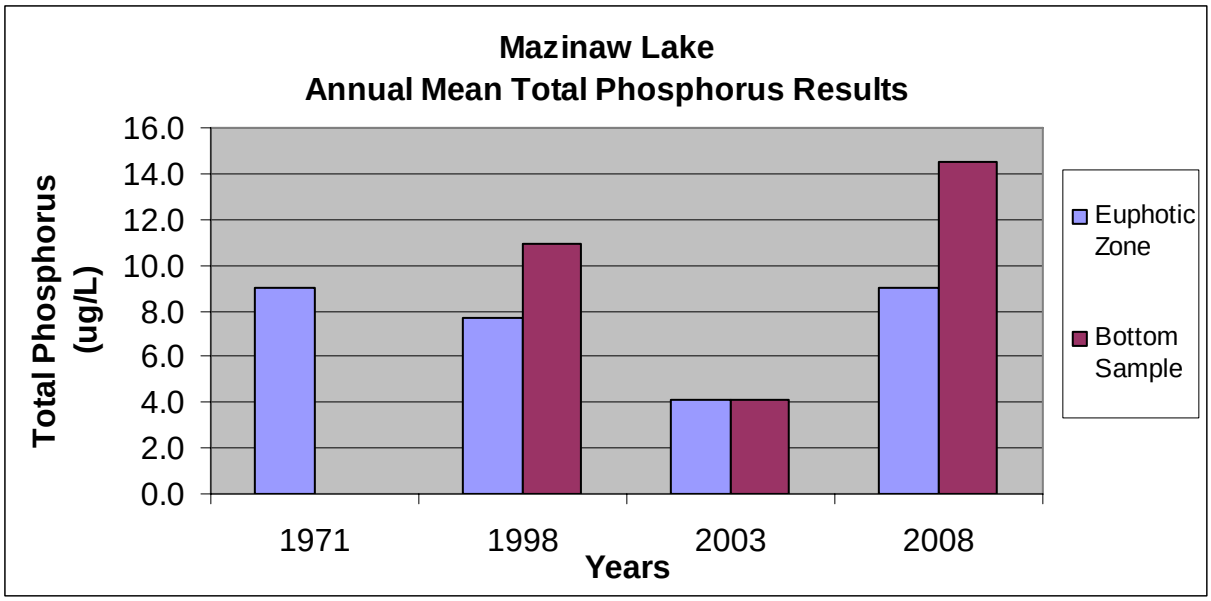


For more information on lakes in the Mississippi Valley Watershed, visit MVC online at www.mvc.on.ca

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**
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

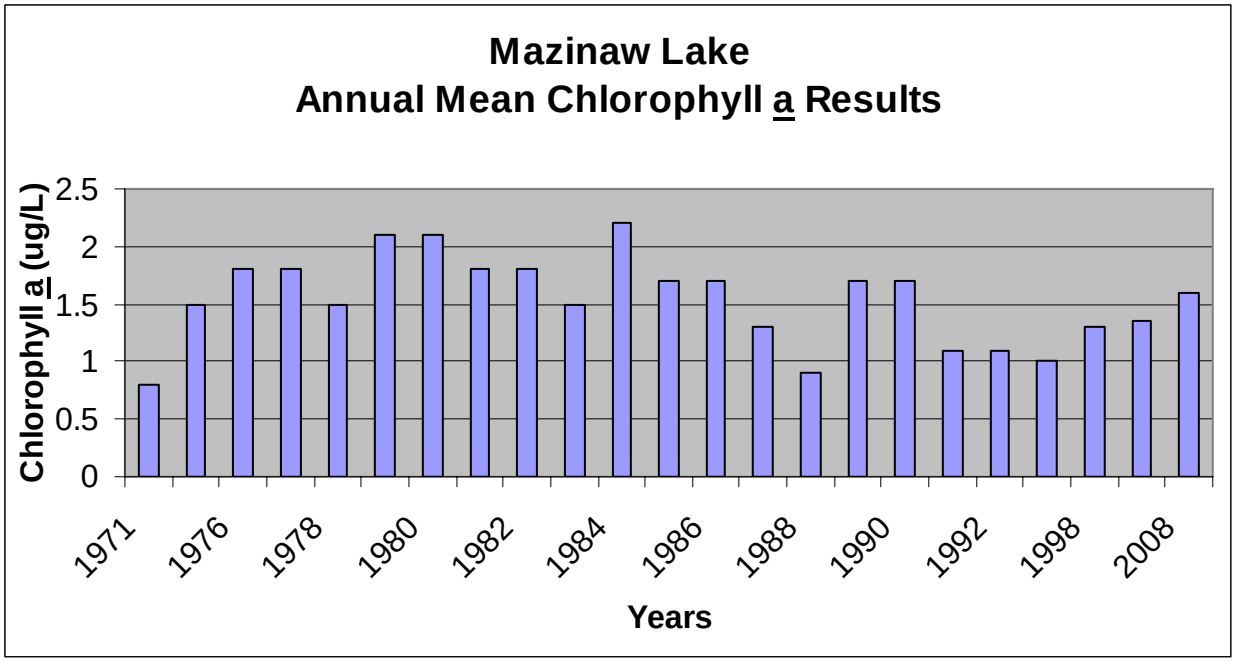
1. Build at least 30 metres away from the shoreline.
2. Keep your lot well treed and preserve or replant native vegetation along the shoreline.
3. Pump out your septic tank every three to five years.
4. Reduce water use and use phosphate free soaps and detergents.
5. Keep the size of your lawn to a minimum;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

Interpreting Chlorophyll a Results

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.

INTERPRETING YOUR CHLOROPHYLL A RESULTS	
Secchi 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



MAZINAW LAKE – South Basin

DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station # 19-3430-737-01, MVC Station # 08-02

Mazinaw Lake - South Basin
Date: June 16, 2008
Depth: 46 Metres
Euphotic Zone (Penetration of Light) = 13.0

Depth (metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.8	7.6	83	
1.0	21.7	8.0	87	Epilimnion
2.0	21.2	8.1	88	
3.0	21.1	7.8	85	
4.0	18.5	8.0	82	
5.0	16.3	8.6	85	
6.0	13.6	8.9	83	
7.0	12.6	9.0	81	Thermocline
8.0	11.2	9.1	80	
9.0	10.2	8.9	77	
10.0	8.9	9.1	76	
11.0	8.2	9.1	75	
12.0	7.9	9.2	75	
13.0	7.7	9.1	73	
14.0	7.3	9.2	73	
15.0	6.9	9.1	72	Hypolimnion
16.0	6.7	9.2	72	
17.0	6.5	9.3	73	
18.0	6.4	9.3	73	
19.0	6.3	9.3	73	
20.0	6.2	9.4	73	
22.0	6.1	9.2	72	
24.0	5.8	9.2	71	
26.0	5.7	9.2	70	
28.0	5.5	9.2	70	
30.0	5.4	9.1	69	
32.0	5.2	9.0	68	
34.0	5.1	8.9	68	
36.0	5.1	8.6	65	
38.0	5.0	8.5	64	
40.0	5.0	8.1	62	
42.0	5.0	7.3	55	
44.0	5.0	6.6	50	
46.0	End of Cable	End of Cable	End of Cable	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Mazinaw Lake - South Basin
Date: August 12, 2008
Depth: 46.0 Metres
Euphotic Zone (Penetration of Light) = 10.0 Metres

Depth (metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.5	8.0	87	
1.0	21.5	8.0	87	
2.0	21.5	8.0	87	Epilimnion
3.0	21.5	8.0	87	
4.0	21.5	8.0	87	
5.0	21.5	8.0	87	
6.0	21.1	7.9	85	
7.0	21.9	7.9	85	
8.0	14.7	8.0	76	
9.0	11.1	8.5	74	Thermocline
10.0	9.5	8.6	72	
11.0	8.5	8.6	70	
12.0	8.3	8.7	71	
13.0	7.9	8.7	70	
14.0	7.8	8.7	70	
15.0	7.6	8.8	70	Hypolimnion
16.0	7.1	8.7	68	
18.0	6.5	9.0	70	
20.0	6.3	9.0	70	
22.0	6.1	8.9	68	
24.0	5.9	9.0	69	
26.0	5.7	9.0	68	
28.0	5.7	9.0	68	
30.0	5.4	9.0	68	
32.0	5.3	9.0	67	
34.0	5.4	9.0	68	
36.0	5.3	8.9	67	
38.0	5.3	8.8	67	
40.0	5.3	8.7	66	
42.0	5.4	8.6	65	
44.0	5.3	8.6	65	
46.0	End of cable	End of cable	End of cable	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Mazinaw Lake - South Basin
Date: September 17, 2008
Depth: 45.0 Metres
Euphotic Zone (Penetration of Light) = 10.0 Metres

Depth (metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	19.4	10.0	104	
1.0	19.4	10.0	104	
2.0	19.4	10.0	104	
3.0	19.4	10.0	104	Epilimnion
4.0	19.3	9.9	103	
5.0	19.3	9.9	103	
6.0	19.3	9.9	103	
7.0	19.3	9.9	103	
8.0	19.3	9.9	103	
9.0	19.3	9.9	103	
10.0	19.2	9.9	103	
11.0	11.5	9.2	81	Thermocline # 1
12.0	9.1	9.2	77	
13.0	9.7	9.5	81	Thermocline # 2
14.0	9.2	9.2	77	
15.0	7.7	9.4	76	
16.0	7.5	9.3	74	
17.0	7.4	9.3	74	
18.0	7.1	9.3	74	
19.0	7.0	9.2	72	Hypolimnion
20.0	7.3	9.1	73	
22.0	5.9	9.1	70	
24.0	5.5	9.2	70	
26.0	5.5	9.3	71	
28.0	5.5	9.3	71	
30.0	5.5	9.3	71	
32.0	5.4	9.5	73	
34.0	5.5	9.5	73	
36.0	5.5	9.4	71	
38.0	5.7	9.4	71	
40.0	5.7	9.3	72	
42.0	5.3	9.4	72	
44.0	5.3	9.3	72	
46.0	End of cable	End of cable	End of cable	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

MAZINAW LAKE – Campbell Bay

DISSOLVED OXYGEN/TEMPERATURE PROFILES
MOE Rec. Lks. Station # 19-3430-741-01, MVC Station # 08-03

Date: June 16, 2008
Depth: 17.0 Metres
Euphotic Zone: 9.0 Meters

Depth (Meters)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	20.5	8.0	85	
1.0	20.5	8.0	85	
2.0	20.5	8.0	85	Epilimnion
3.0	20.0	8.0	84	
4.0	19.4	8.1	83	
5.0	16.6	8.7	86	
6.0	15.3	9.0	87	Thermocline
7.0	11.8	9.5	85	
8.0	11.1	9.7	85	
9.0	10.1	9.8	85	
10.0	9.3	9.8	83	
11.0	9.1	9.8	83	Hypolimnion
12.0	9.0	9.8	83	
13.0	8.9	9.9	83	
14.0	8.8	9.9	83	
15.0	8.6	9.8	81	
16.0	8.3	9.9	83	
17.0	7.3	10.0	78	
18.0	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Note: Warm Water Fisheries Habitat (Bass, Walleye, Pike, Perch) = DO > 4 mg/L at < 25°C

Mazinaw Lake- Campbells Bay #08-03

Date: August 12, 2008
Depth: 20.0 Metres
Euphotic Zone: 11.0 Metres

Depth (Meters)	Temperature (Degree Celsius)	Dissolved Oxygen (Milligrams/Litre)	Percent % Saturation	Thermal Stratification
0.1	21.9	7.9	87	
1.0	21.9	8.0	87	
2.0	21.7	8.0	87	Epilimnion
3.0	21.5	8.0	87	
4.0	21.5	8.0	87	
5.0	21.3	7.9	86	
6.0	21.0	7.9	85	
7.0	19.6	7.9	83	
8.0	12.8	8.6	78	Thermocline
9.0	11.1	8.9	77	
10.0	9.7	9.6	81	
11.0	8.8	9.6	79	
12.0	8.3	9.8	80	
13.0	8.0	9.9	80	Hypolimnion
14.0	8.0	9.8	81	
15.0	7.2	9.8	80	
16.0	7.1	9.9	81	
17.0	6.8	9.9	80	
18.0	6.6	10.0	81	
19.0	6.5	10.0	80	
20.0	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Note: Warm Water Fisheries Habitat (Bass, Walleye, Pike, Perch) = DO > 4 mg/L at < 25°C

Mazinaw Lake- Campbells Bay # 08-03

Date: October 16, 2008
Depth: 16.0 Metres
Euphotic Zone: 11.0 Metres

Depth (Metre)	Temperature (Degree Celsius)	Dissolved Oxygen (Milligrams Liter)	Percent % Saturation	Thermal Stratification
0.1	12.3	8.9	78	
1.0	12.3	8.8	79	
2.0	12.3	8.8	79	
3.0	12.3	8.7	78	
4.0	12.3	8.7	78	
5.0	12.3	8.7	78	Epilimnion
6.0	12.2	8.7	78	
7.0	12.2	8.5	76	
8.0	12.2	8.5	76	
9.0	12.0	8.5	76	
10.0	12.5	8.5	76	
11.0	11.9	8.3	74	
12.0	11.4	8.3	73	
13.0	9.4	8.2	69	Thermocline
14.0	9.4	8.4	71	
15.0	7.9	8.5	69	Hypolimnion
16.0	Bottom	Bottom	Bottom	

Optimal Habitat for Cold Water Fisheries (Trout) = DO > 6 mg/L at < 10°C.

Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

Note: Warm Water Fisheries Habitat (Bass, Walleye, Pike, Perch) = DO > 4 mg/L at < 25°C

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 very special Thanks to Waste Management for adopting Mazinaw Lake with a generous donation. We would also like to thank our friends at Smart's Marina for supplying the Watershed Watch crew with a boat & fuel for the 2008 sampling season.

For more information regarding *Watershed Watch* or for free 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

Wayne French and Jody Falls (Waste Management), Susan Lee (MVC), Steve Smart (Smart's Marina)

WASTE MANAGEMENT

SMART'S MARINA
Owners/Operators: Steve & Pauline Smart
R.R. # 1, Hwy # 41 N. Mazinaw Lake, Cloyne, Ontario K0H 1K0
phone: (613) 336-2222 fax: (613) 336-8773

WATERSHED WATCH