



Mississippi Valley Conservation

*State of the Lake
Environment Report
December 2004
Buckshot Lake*



Buckshot Lake

Buckshot Lake is located in the Township of North Frontenac. Buckshot Lake is at an elevation of 291 metres above sea level. The lake perimeter is 19 kilometres, with the deepest point at about 33 metres. Buckshot Lake supports a cold water fishery, in particular Lake Trout, as well as, walleye, smallmouth and largemouth bass. At last count in the late 1970's, there were approximately 122 cottages on the lake.



Members of the Lake Association have volunteered their time to monitor water quality through the Ministry of Environment's (MOE) Self Help and Lake Partner Programs in 1979, 1981, 1997-2004. 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. Buckshot Lake was monitored by the MOE in 1976 and 1980 under the Recreational Lakes Program. Comprehensive testing in 1999 and 2004 through Mississippi Valley Conservation's (MVC) *Watershed Watch Program* provides for a comparison between water quality conditions as they exist now, to results obtained twenty-eight years ago.

In general, the water quality in Buckshot Lake remains very good. There is one sampling station on the lake at the deepest point as indicated on the bathymetric map included in this report. You will find graphs which follow, that water clarity, as measured by Secchi Disk readings, were observed as very good. The average for 2004 is 5.6 metres, thus indicating that Buckshot Lake is an unenriched (few nutrients) or oligotrophic lake, compared to 5 years ago, when the average was slightly higher at 6.0 metres.

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 ($\mu\text{g/L}$). In 2004, the mean for the euphotic zone (depth at which sunlight can penetrate or two times the secchi disk depth) was $8.7 \mu\text{g/L}$. The mean for the samples taken one metre off the bottom was also $3.3 \mu\text{g/L}$ both below the Provincial Objective. Five years ago, the average phosphorus level was $8.1 \mu\text{g/L}$ in the euphotic zone and $11.9 \mu\text{g/L}$ one metre off the bottom of the lake (above the Provincial Objective). Buckshot Lake has decreased its average phosphorus levels and remains an Oligotrophic lake.

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the sampling stations was $0.70 \mu\text{g/L}$. Thus, indicating a low algal density for Buckshot Lake in 2004. In 1999, chlorophyll a levels were slightly higher at $0.86 \mu\text{g/L}$. Therefore Buckshot Lake remains an unenriched (few nutrients) or oligotrophic lake.

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 2004 at the sampling station indicate sufficient optimal habitat is present to support lake trout in Buckshot Lake. Results obtained in September, the most critical time of year, indicates there is only a 22 metre layer of water from 10 to 31 metres in the main basin having vital conditions for the lake trout to survive. By September, the dissolved oxygen concentrations and temperatures indicate adequate warm water fishery habitat for the entire season.



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.

Buckshot Lake was also tested for invasive species in 2004, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters (OFAH). Buckshot Lake did *not* have zebra mussel veligers (larvae) and spiny water flea present. 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 Buckshot Lake. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.

Residents and users of Buckshot 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. The Lake Association should continue monitoring the water quality. Monitoring over time is essential to determine 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 Buckshot Lake. Additional water quality data, current and historic, is available for Buckshot 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.

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

How Does Buckshot Lake Measure Up?

1976 – 2003 Water Quality Results

Sample Year [Various Stations]	Secchi Disk Depth [Metres]	Total Phosphorus Euphotic Zone [Micrograms/Litre]	Total Phosphorus 1 Metre off Bottom [Micrograms/Litre]	Chlorophyll <u>a</u> Composite [Micrograms/Litre]
**1976 Mean	5.5	8.5	10.0	1.73
**1980 Mean	5.3	5.2	10.0	1.95
1999 Mean	6.0	8.1	11.9	0.86
*2004 Mean	5.6	8.7	3.3	0.70
n	4	4	4	4
Minimum	5.3	5.2	3.3	0.70
Maximum	6.0	8.7	11.9	1.95
Mean	5.6	7.6	8.8	1.31
Standard Deviation	0.29456182	1.629281539	3.759905806	0.621986066

*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%

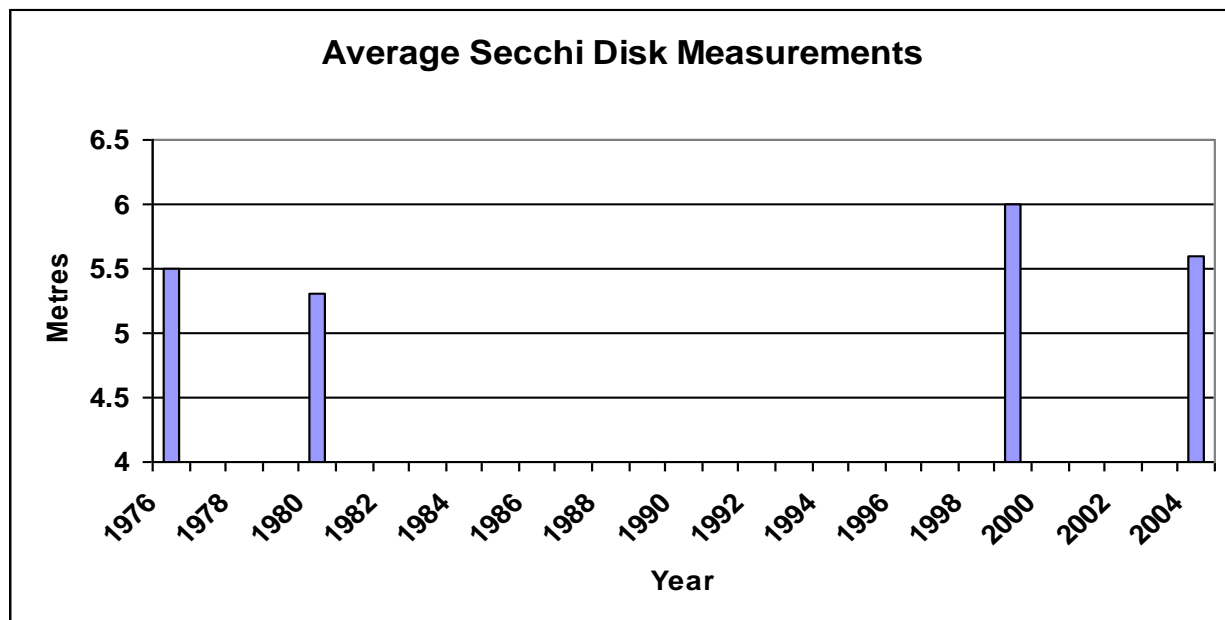
Interpreting Secchi Disc Readings:

A Secchi disk is a black and white coloured disk used to determine water clarity. The disk 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 Disk measurement the clearer your lake is.

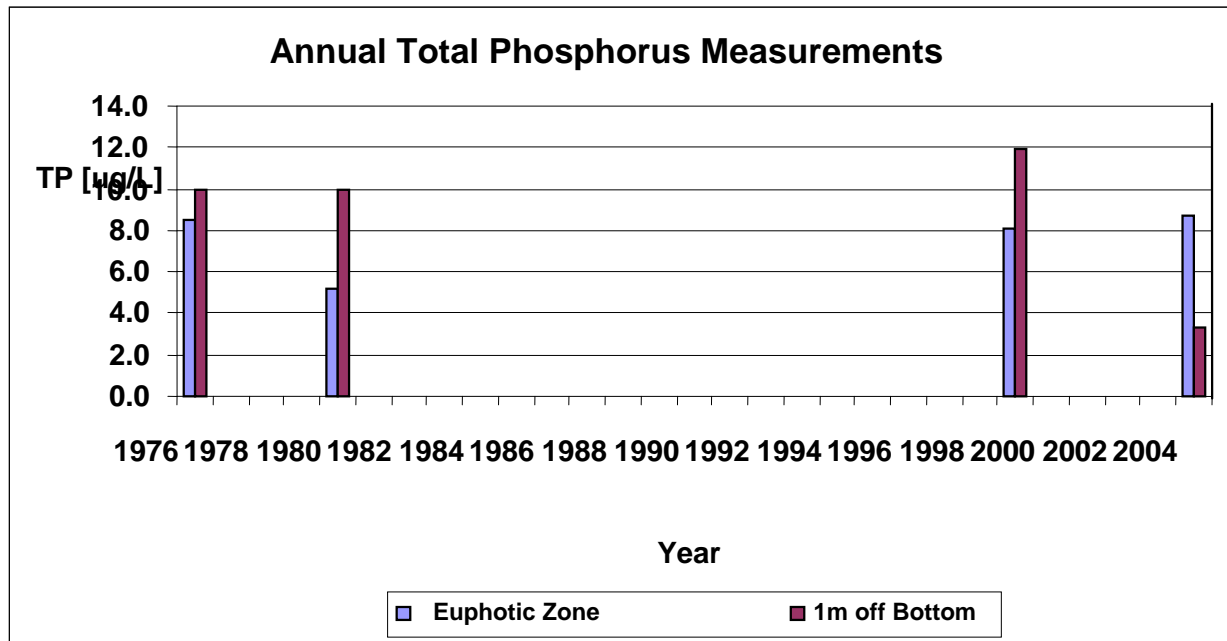
INTERPRETING YOUR SECCHI DISK RESULTS	
Secchi Reading	Lake Nutrient Status
Over 5 metres	Oligotrophic - unenriched, few nutrients
3.0 to 4.9 metres	Mesotrophic – moderately enriched, some nutrients
Less than 2.9 metres	Eutrophic – enriched, higher levels of nutrients



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



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 access to the lake is designed to avoid shoreline damage.

ENHANCEMENT

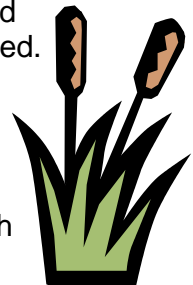
Native species are planted and non-native species are removed.

NATURALIZATION

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

RESTORATION

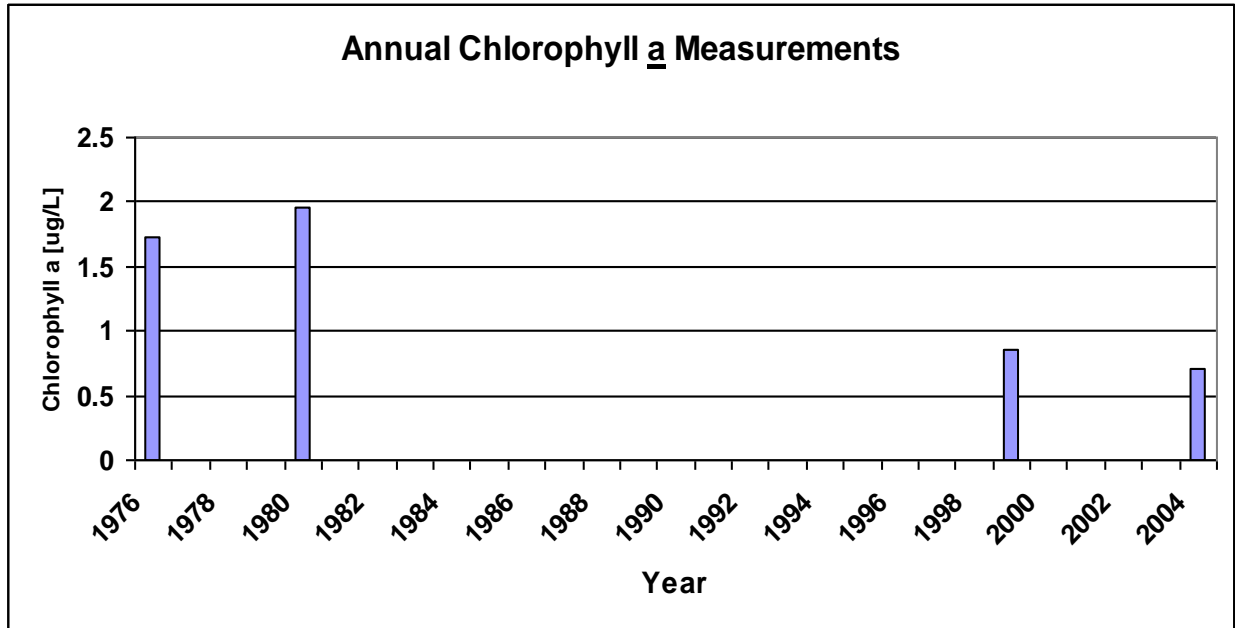
Cleared areas are planted with native species.



Evaluating your Chlorophyll a Results:

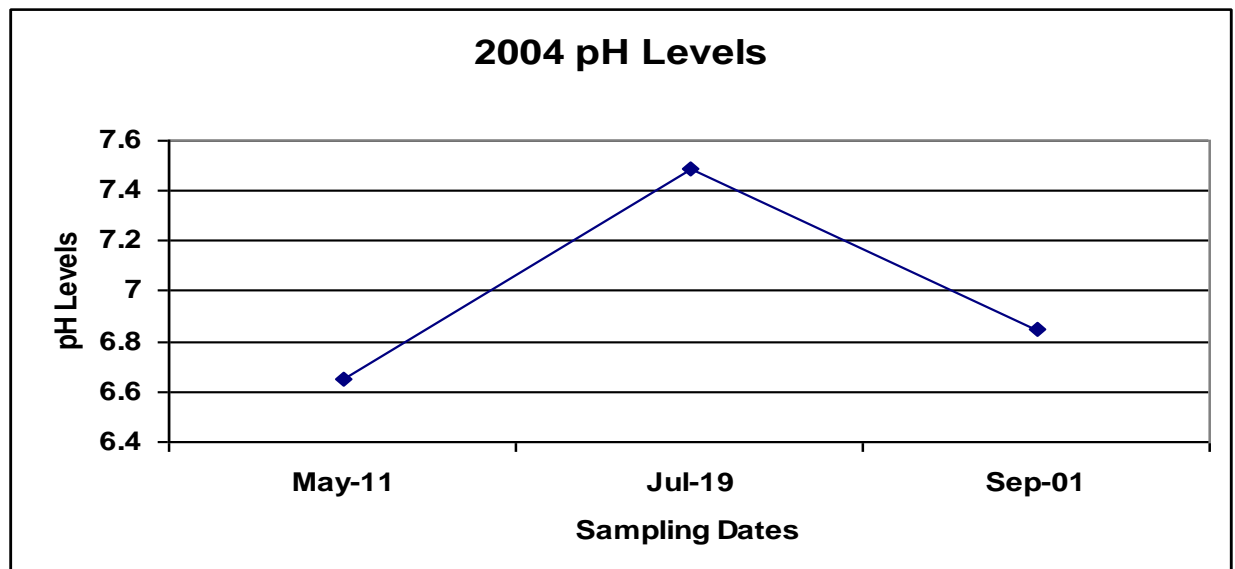
The lower the chlorophyll a density in your lake, the clearer your lake is. Chlorophyll a is directly affected by the amount of total phosphorus in your lake. The more phosphorus there is in the water, the more algal growth will occur.

INTERPRETING YOUR CHLOROPHYLL A RESULTS	
Chlorophyll <u>a</u> 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



Evaluating your pH Results:

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



BUCKSHOT LAKE – Main Basin

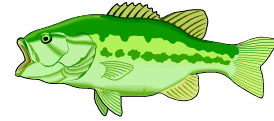
DISSOLVED OXYGEN/TEMPERATURE PROFILES

MOE Rec. Lks. Station 18-3430-704-01 MVC Station # 04-18


Date: May 11, 2004

Depth: 27.0 Metres

Euphotic Zone (Penetration of Light) = 10.0Metres



Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	12.1	8.5	76	
1.0	11.5	8.6	76	
2.0	10.6	8.7	75	
3.0	10.3	8.7	75	
4.0	9.9	8.7	74	
5.0	9.6	8.6	73	
6.0	9.5	8.6	72	
7.0	8.9	8.6	71	
8.0	8.8	8.6	71	
9.0	8.8	8.6	71	
10.0	8.6	8.5	70	Epilimnion
11.0	8.5	8.5	70	
12.0	8.1	8.4	68	
13.0	7.8	8.4	68	
14.0	7.5	8.4	67	
15.0	7.3	8.4	67	
16.0	7.0	8.1	65	
17.0	6.8	8.3	66	
18.0	6.7	8.3	66	
19.0	6.6	8.3	66	
20.0	6.6	8.3	66	
21.0	6.5	8.3	65	
22.0	6.5	8.2	64	
23.0	6.4	8.1	64	
24.0	6.3	8.1	64	
25.0	6.3	8.0	63	
26.0	6.2	8.0	63	
27.0				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.


BUCKSHOT LAKE – Main Basin Continued...

Date: July 19, 2004

Depth: 28.0 Metres

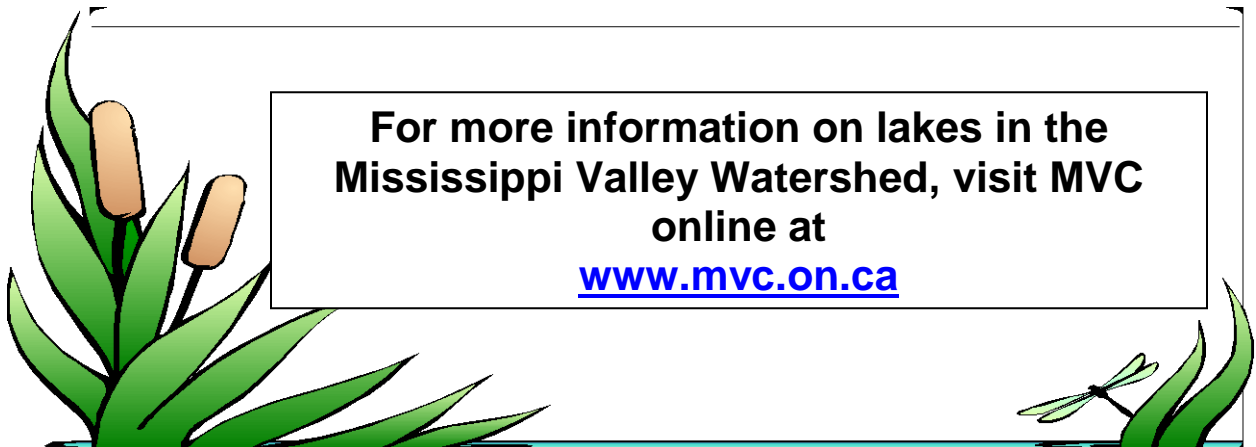
Euphotic Zone (Penetration of Light) = 12.0 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	23.6	8.0	90	Epilimnion
1.0	23.2	8.2	92	
2.0	22.9	8.3	93	
3.0	22.7	8.2	91	
4.0	22.3	8.1	90	
5.0	19.1	7.5	78	Metalimnion or Thermocline
6.0	17.8	7.0	70	
7.0	14.9	6.1	58	
8.0	12.6	6.2	56	
9.0	11.2	6.6	58	
10.0	9.9	7.2	62	Hypolimnion
11.0	9.4	7.6	65	
12.0	8.8	7.9	66	
13.0	8.5	8.1	68	
14.0	8.1	8.4	69	
15.0	7.9	8.4	68	
16.0	7.6	8.6	69	
17.0	7.5	8.7	70	
18.0	7.4	8.5	68	
19.0	7.2	8.4	67	
20.0	7.0	8.3	66	
21.0	6.9	8.4	67	
22.0	6.9	8.3	66	
23.0	6.8	8.1	65	
24.0	6.8	7.9	63	
25.0	6.7	7.4	58	
26.0	6.7	7.0	55	
27.0	6.6	6.8	54	
28.0				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.




BUCKSHOT LAKE – Main Basin Continued...

Date: September 1, 2004

Depth: 31.0 Metres

Euphotic Zone (Penetration of Light) = 11.5 Metres

Depth [Metres]	Temperature [Degrees Celsius]	Dissolved Oxygen [Milligrams/Litre]	Percent % Saturation	Thermal Stratification
0.1	20.5	7.8	84	Epilimnion
1.0	20.5	7.9	84	
2.0	20.5	7.9	84	
3.0	20.5	7.8	84	
4.0	20.5	7.8	84	
5.0	20.4	7.8	84	
6.0	20.3	7.7	83	
7.0	19.7	7.1	74	
8.0	18.7	6.4	65	
9.0	13.9	4.2	38	Metalimnion or Thermocline
10.0	11.0	4.2	37	
11.0	10.3	4.4	38	
12.0	9.5	5.0	43	Hypolimnion
13.0	9.3	5.1	43	
14.0	9.0	5.4	45	
15.0	8.5	5.8	48	
16.0	8.4	5.9	49	
17.0	8.1	6.2	51	
18.0	7.8	6.4	52	
19.0	7.7	6.4	52	
20.0	7.5	6.5	53	
21.0	7.3	6.4	52	
22.0	7.2	6.4	52	
23.0	7.1	6.3	51	
24.0	7.0	6.0	48	
25.0	7.0	6.1	49	
26.0	7.0	6.1	49	
27.0	7.0	6.0	48	
28.0	6.9	5.7	45	Bottom
29.0	6.8	5.6	44	
30.0	6.7	5.1	40	
31.0				

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

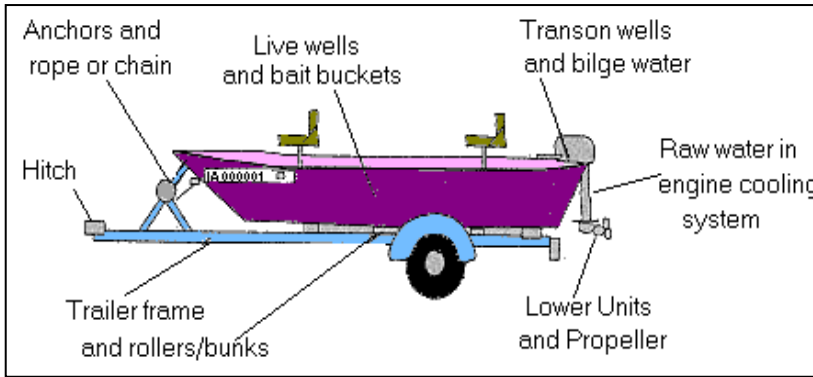
 Vital Habitat for Cold Water Fisheries (Trout) = DO > 4 mg/L at < 15.5°C.

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

ΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦΒΦ

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.

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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. **Special thanks Bob Ratz for supplying the Watershed Watch crew with his time, a boat & fuel during the 2004 sampling season.***

For more information regarding Watershed Watch or for advice on how you can help protect or enhance your lake environment, contact Melissa Dakers, Water Quality Technician, Mississippi Valley Conservation at (613) 259-2421 or mdakers@mvc.on.ca

