STATE OF THE LAKE
Environment Report
2013

SHABOMEKA LAKE

Watershed Watch

Mississippi Valley Conservation Authority

WHY WATERSHED WATCH?

A lake monitoring program of the Mississippi Valley Conservation Authority

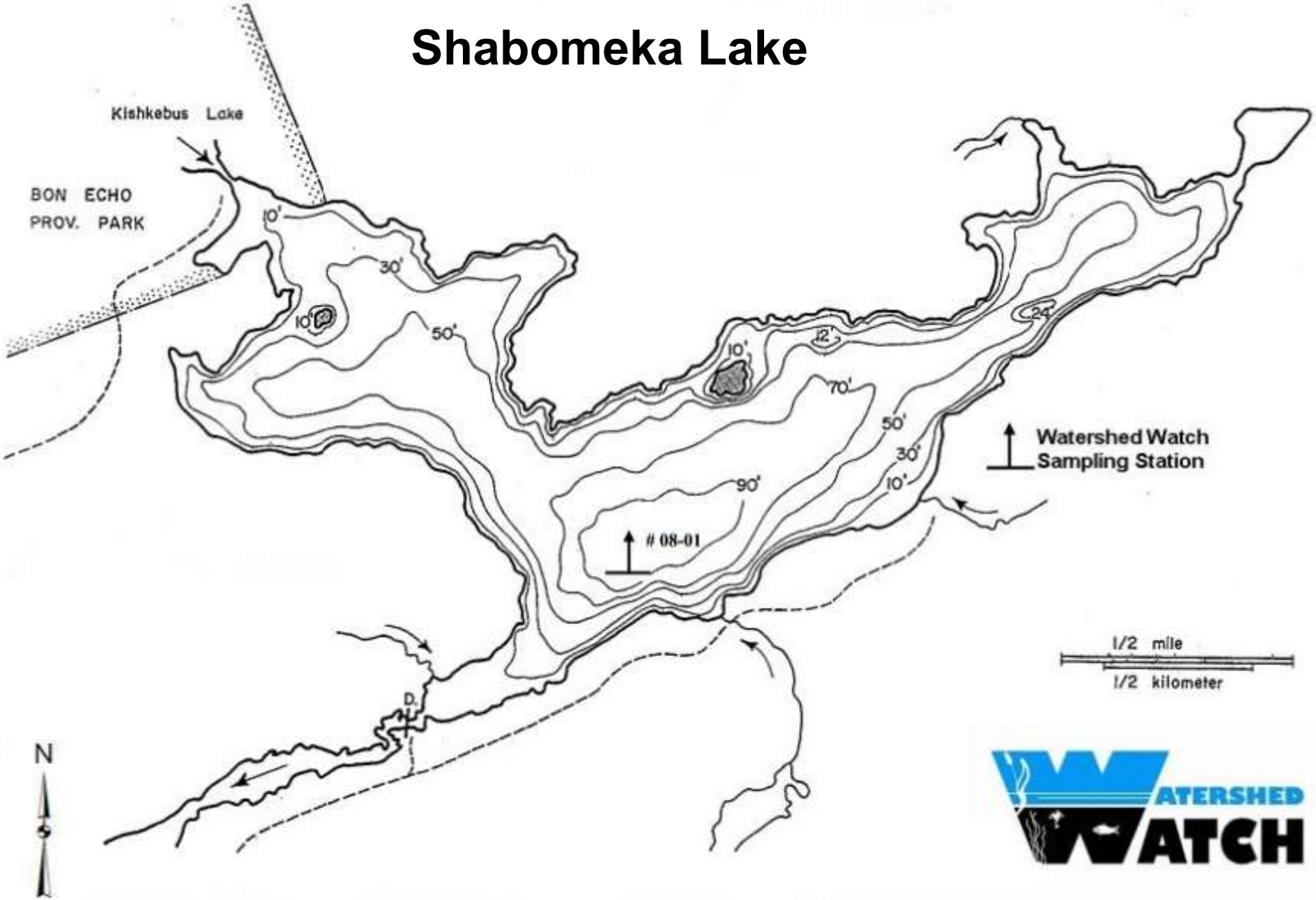
Mississippi Valley Conservation Authority (MVCA) has long recognized the recreational and aesthetic value of lakes within the watershed and is committed to preserving and protecting water quality and fish habitat. Since the launch of the Watershed Watch program in 1998, MVCA has joined together with volunteer lake stewards throughout the watershed to take steps in restoring and protecting water quality.

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. This data is used as an essential educational tool to encourage residents to adopt sound stewardship practices aimed at maintaining water quality. We will assist shoreline residents, both seasonal and permanent, to become personal stewards of their lake by encouraging them to take on an active role in restoring and enhancing their shorelines. In this way, we will work together to maintain healthy lake environments throughout the watershed.

ABOUT SHABOMEKA LAKE

- Located in the Township of North Frontenac.
- Elevation of 268 metres above sea level.
- Lake perimeter is 14 kilometres.
- Deepest point is 32 metres.
- Cold water fishery, particularly: Lake Trout.
- As of the late 1970s, there were 104 cottages on the lake.

Shabomeka Lake



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

HOW DOES SHABOMEKA LAKE MEASURE UP?

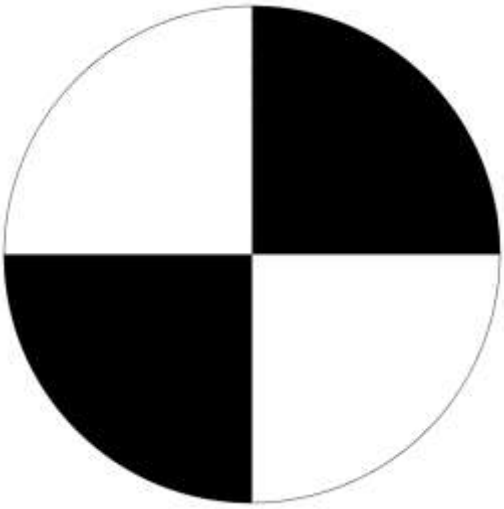
WATER QUALITY RESULTS (1976 - 2013) - SHABOMEKA LAKE - MAIN BASIN

Sample Year	Secchi Disk Depth (Metres)	Total Phosphorus Euphotic Zone (Micrograms/Litre)	Total Phosphorus 1 Metre off Bottom (Micrograms/Litre)	Chlorophyll a Composite (Micrograms/Litre)
**1976	5.1	9		1.8
1980	5.1	7.6	20	2.5
1981	4.4			2.1
1983	4.8			1.4
1984	5.2			2.1
1985	4.3			2.5
1986	4.5			2.4
1987	4.9			2.5
1988	5.2			2.0
1989	5.1			2.5
1990	5.4			2.4
1991	5.2			2.3
1992	5.8			2.3
1993	5.3			2.2
1996	5.7			
1997	5.4			
1998	5.6	4.6	5.1	1.7
1999	5.9			
2000	4.1			
2001	4.8			
2002	3.7			
2003	6.35	4.67	7	1.87
2008	4.7	12	15	2.5
2013	4.67	12.67	9.67	2.13
n	24	6	5	18
Minimum	3.7	4.60	5.10	1.40
Maximum	6.4	12.7	20.00	2.5
Mean	5.1	8.4	11.4	2.2
Standard Deviation	0.608254214	3.479727959	6.102301205	0.322208474

** Includes Recreational Lakes Program Data.

MVCA Monitoring Staff use 4 different sampling procedures to measure water quality.

WATER CLARITY

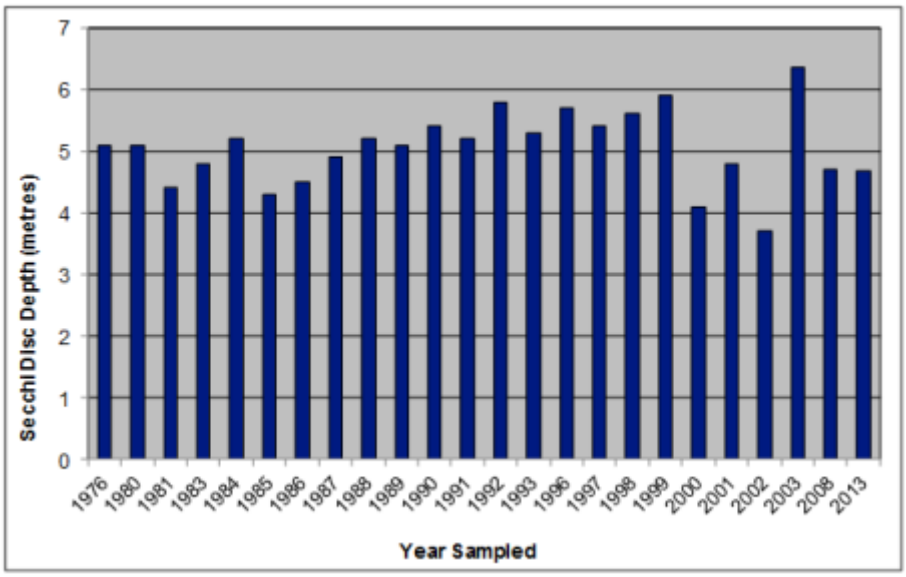


A Secchi Disc is a black and white coloured disc used to determine water clarity. The disc is lowered into the water. The point at which you can no longer distinguish the black and white is called the Secchi depth. The higher the Secchi Disc measurement, the more clear your lake.

Lakes are classified as oligotrophic, mesotrophic, or eutrophic, depending on age and whether they have little, some, or a lot of life, respectively. Oligotrophic lakes are the youngest, mesotrophic lakes are middle-aged lakes that are less deep and more fertile than oligotrophic lakes, and eutrophic lakes (the oldest lakes) are most fertile and even more shallow than Mesotrophic lakes.

Interpreting SECCHI DISC Results	
Secchi Depth	**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

SHABOMEKA LAKE — MAIN BASIN
ANNUAL MEAN SECCHI DISC DEPTHS (metres)



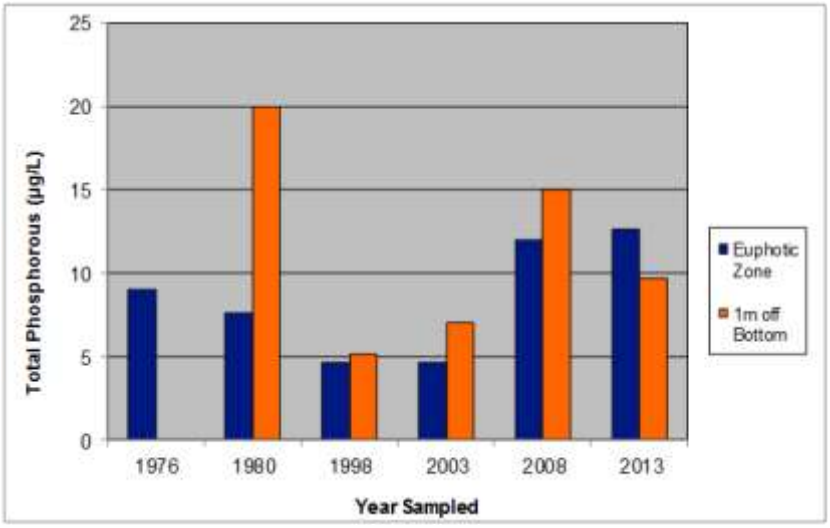
PHOSPHORUS LEVELS

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.

A Kremmerer Bottle (pictured to the right) is used to sample water at specific depths. The bottle is lowered to the required depth with both ends open. A weight on the rope is dropped. When the weight hits the bottle it causes both ends to close, sealing the sample water in the bottle.

Interpreting 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

SHABOMEKA LAKE - MAIN BASIN
ANNUAL MEAN TOTAL PHOSPHORUS RESULTS (ug/L)



CHLOROPHYLL a

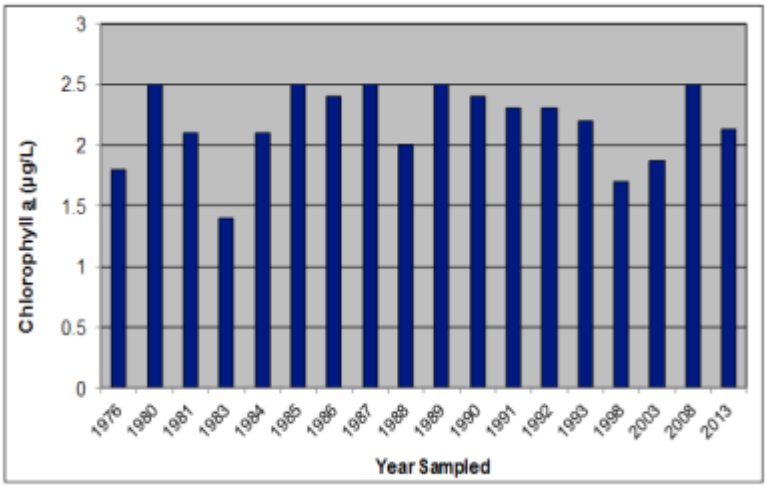
Water clarity is influenced by the amount of phytoplankton or microscopic algae present in the water. Chlorophyll a is the green pigment in phytoplankton.

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.

A Composite Sampler (pictured above) is used by dropping the tin container into the water. When it reaches the required depth it is slowly pulled back to the surface. The tin is filled as water enters one tube and air escapes the other. Some air remains in the tin to ensure collection throughout the haul to the surface.

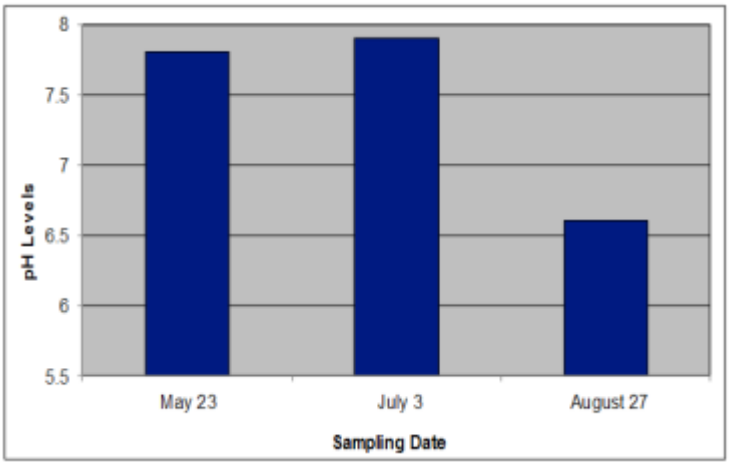
Interpreting CHLOROPHYLL a Results	
Chlorophyll a Reading	**Lake Nutrient Status**
Up to 2 ug/L – low algal density	Oligotrophic – unenriched, few nutrients
2 – 4 ug/L – moderate algal density	Mesotrophic – moderately enriched, some nutrients
More than 4 ug/L – high algal density	Eutrophic – enriched, higher levels of nutrients

SHABOMEKA LAKE - MAIN BASIN
ANNUAL MEAN CHLOROPHYLL a RESULTS (ug/L)



pH LEVELS

SHABOMEKA LAKE - MAIN BASIN
2013 pH LEVELS



Help MVCA and the Ontario Federation of Anglers and Hunters Stop the Invasion!

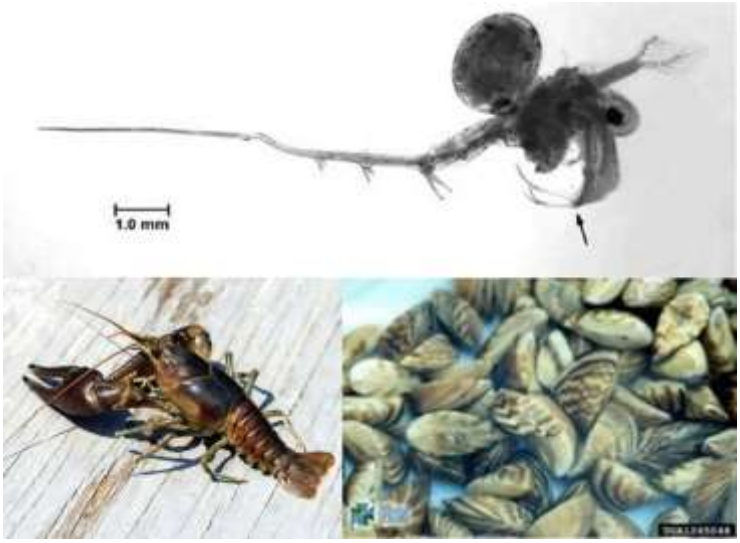
Shabomeka Lake was tested for invasive species, particularly zebra mussels, spiny water flea, and rusty crayfish, in partnership with the Ontario Federation of Anglers and Hunters (OFAH). In 2013, spiny water flea and zebra mussels were not present in the samples collected.

Residents and property owners need to ensure that all access points to the lake have posted signs indicating the precautions that boaters and anglers can take to prevent the spread of invasive species into Shabomeka Lake and beyond. Residents are also invited to participate in the Invading Species Awareness Program (www.invadingspecies.com) through MVCA and OFAH.

The plankton haul net (pictured above) looks like a wind sock with a plastic cup attached to the end. The mesh size of the net is 63 microns, which can filter microscopic organisms (plankton) like spiny water flea and zebra mussel veligers from the water. The plastic cup portion of the net is called the cod end. It collects the plankton sample as water passes through the net.

Check and clean watercraft every time it is moved to a different water body!

Baited minnow traps (pictured right) with slightly widened openings on each end are used to sample for rusty crayfish. Traps are placed in shallow areas along the shoreline. Traps are left for a minimum of 24 hours. If crayfish are found in the sample, MVCA staff identify the species and release native crayfish back into the lake.



For more information on these and other invasive species, visit www.invadingspecies.com/invaders or call the Invading Species Hotline at 1-800-563-7711.

If you would like to help monitor and prevent the spread of invasive species in the Mississippi Valley watershed, email monitoring@mvc.on.ca or call us at 613-253.0006.

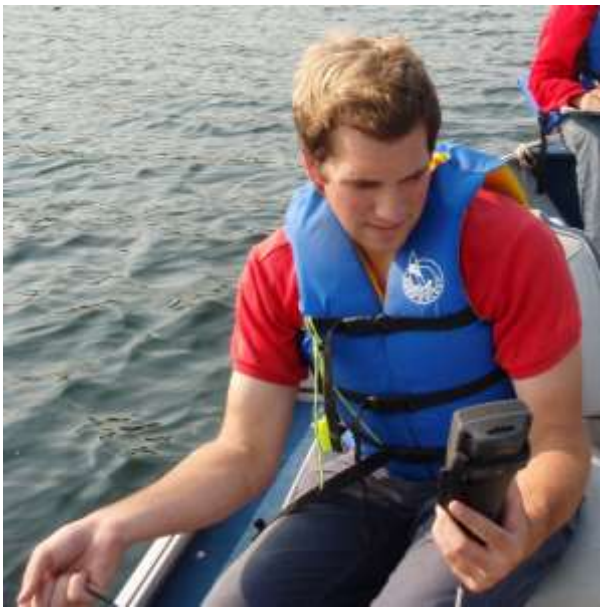
Top: Spiny water flea. Photo: Cathy Darnell
Left: Rusty Crayfish. Photo: Doug Watkinson, DFO
Right: Zebra mussels. Photo: Amy J. Benson, US Geological Survey.

SHABOMEKA LAKE SAMPLING RESULTS—MAIN BASIN

Dissolved Oxygen (DO) is a dissolved form of oxygen vital for all underwater plants and animals to survive; it's what they need to breath. Adequate dissolved oxygen is important for good water quality and necessary to all forms of life. Poor (low) DO levels will cause stress on fish and may result in fish kills (mass death of a species in a season).

MVCA takes three DO readings each sample season. By monitoring the DO levels of our lakes we can develop lake profiles showing the lake stratification and the state of the lake.

Lake Stratification is the separation of lakes into three layers:



The Dissolved Oxygen Metre is used to gather DO and temperature readings. The probe is lowered into the lake and readings are taken at every metre from the hand-held screen.

Epilimnion (top layer of the lake)	Warmer water with higher D.O. concentrations.
Thermocline (middle layer of the lake)	Distinct layer in which temperature changes more rapidly with depth than it does in the layers above and below.
Hypolimnion (bottom layer of the lake)	Typically the denser and colder water at the bottom of the lake.

SHABOMEKA LAKE SAMPLING RESULTS—MAIN BASIN continued

SHABOMEKA LAKE - MAIN BASIN #13-01 MAY 23/2013

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/ Litre)	Percent % Saturation	Thermal Stratification
0.1	16.8	10.11	104.4	Epilimnion
1	14.8	10.44	104.2	
2	14	10.83	104.9	Thermocline # 1
3	13.4	10.97	105	
4	12	11.27	104.3	
5	10.8	11.33	102.2	Thermocline # 2
6	10	11.39	100.9	
7	8.9	11.22	96.4	Thermocline # 3
8	7.9	11.04	92.8	
9	7.1	10.89	89.7	
10	6.5	10.67	86.2	
11	5.9	10.41	83.2	
12	5.7	10.28	81.9	
13	5.4	10.17	80.4	
14	5.2	10.04	78.9	
15	5.1	9.93	77.9	
16	4.9	9.75	76	
17	4.8	9.54	74.1	
18	4.7	9.4	72.9	
19	4.6	9.35	72.4	Hypolimnion
20	4.6	9.31	72.1	
21	4.5	9.33	72.1	
22	4.5	9.28	71.7	
23	4.5	9.25	71.5	
24	4.4	9.2	71	
25	4.4	9.15	70.5	
26	4.4	9.04	69.6	
27	4.4	8.85	68	
28	4.4	8.68	66.9	
29	4.4	8.59	66.2	
30	4.4	8.46	65.1	
31	4.4	8.4	64.6	
32	Bottom	Bottom	Bottom	

Optimal Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 10°C.

Vital Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 15.5°C.

SHABOMEKA LAKE SAMPLING RESULTS—MAIN BASIN continued

SHABOMEKA LAKE - MAIN BASIN #13-01 JULY 3/2013

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/ Litre)	Percent % Saturation	Thermal Stratification
0.1	22.7	8.99	104.4	
1	22.1	9	103.3	
2	21.8	9	102.3	Epilimnion
3	21.6	9.01	102.2	
4	21.5	9.01	102.1	
5	18.2	9.99	106	
6	15.3	10.59	105.6	Thermocline # 1
7	128	11.1	104.7	
8	10.7	11.4	99.9	
9	10.1	11.3	95	Thermocline # 2
10	7	10.44	85.3	
11	6.3	10.16	82	
12	5.8	9.58	76.3	
13	5.5	9.37	73.5	
14	5.3	9.2	72.6	
15	5.2	9.11	71.7	
16	5	9.07	71	
17	4.9	8.85	69.1	
18	4.9	8.17	63.6	
19	4.8	8.13	63.4	
20	4.7	8.34	64.8	Hypolimnion
21	4.6	8.23	63.8	
22	4.6	8.21	63.6	
23	4.5	8.06	62.3	
24	4.5	7.94	61.4	
25	4.5	7.62	58.9	
26	4.5	7.23	55.7	
27	4.5	7.04	54.1	
28	4.5	6.6	51	
29	4.5	6.4	49.4	
30	4.5	6.07	47	
31	Bottom	Bottom	Bottom	

Optimal Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 10°C.

Vital Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 15.5°C.

SHABOMEKA LAKE SAMPLING RESULTS—MAIN BASIN continued

SHABOMEKA LAKE - MAIN BASIN #13-01 AUGUST 27/2013

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams/ Litre)	Percent % Saturation	Thermal Stratification
0.1	23.1	8.63	101.4	
1	22.4	8.7	100.3	
2	22.3	8.68	99.8	Epilimnion
3	22.2	8.66	99.4	
4	22.2	8.62	99	
5	22.1	8.55	97.9	
6	20.6	8.55	95	
7	15.6	10.2	102.4	
8	12	10.34	96	Thermocline
9	9.2	9.71	84.2	
10	7.8	9.15	76.8	
11	7	8.65	70.6	
12	6.2	8.31	66.8	
13	5.9	7.99	63.8	
14	5.8	7.86	62.7	
15	5.4	7.83	62	
16	5.2	7.79	61.3	
17	5.1	6.93	54.3	
18	5	6.62	51.7	
19	5	6.42	50.3	
20	4.9	6.2	48.3	Hypolimnion
21	4.8	6.08	47.3	
22	4.7	5.78	44.9	
23	4.6	5.61	43.4	
24	4.6	5.42	41.9	
25	4.6	5.14	39.7	
26	4.5	4.83	37.3	
27	4.5	4.33	32.5	
28	4.5	3.65	28	
29	4.5	3.03	23.1	
30	4.5	2.4	18.2	
31	4.5	1.52	11.1	
32	Bottom	Bottom	Bottom	

Optimal Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 10°C.

Vital Cold Water Fisheries Habitat defined as Dissolved Oxygen Concentrations greater than 6 mg/L at temperatures less than 15.5°C.

SEINE NETTING

Seine netting by hand is a way of sampling fish species that may live or visit the near shore areas of a waterbody. A seine net is a type of fishing net that has floats along one edge and weights along the other edge, to keep it upright in the water. It is then dragged through a section of water, encircling it, thus collecting all the fish within that area. The depth of the testing area is limited to areas wadeable by the field crew. This method has a very limited impact on the health of the fish sampled and is affordable, easy to do, and portable.

Seine netting was conducted at the boat launch sites of all the Watershed Watch lakes of the 2013 field season to help expand our knowledge of each lake beyond just its chemistry. Netting was conducted in August to avoid disturbing sensitive nesting and breeding sites.

The majority of the individual fish captured with the seine net are bait fish such as minnows and cyprinids, however some juvenile and adult game fish were also caught. Both groups (bait fish and juvenile game fish) tend to stick close to shore to avoid predation from larger fish that can be found in deeper waters. Near shore areas may also contain aquatic vegetation which is ideal camouflage for all sizes of fish that are either hiding from predators, or waiting to surprise prey, explaining why some adult game fish were caught.

It is important to note that if something was not caught in the seine we cannot conclude that the fish species is not in the lake, rather that the species was not in the sampling zone when the sampling was done.

Most stakeholder interest in fish species within a water body has to do with game fish. However, baitfish far outnumber game fish and thus play a critical role within their ecosystem and the food chain. It is important to take note of their presence, and provide them the same consideration you would for larger fish. If you are interested in learning more about baitfish, and how to identify the different species, please refer to the Department of Fisheries and Oceans *Baitfish Primer*. It is available online and at the MVCA office.

SHABOMEKA LAKE SEINE NETTING RESULTS - FISH SPECIES CAUGHT

- Pumpkinseed
- Smallmouth Bass
- Largemouth Bass

MVCA would like to thank the many dedicated volunteers and the Lake Steward Network for their assistance with and support of the Watershed Watch program.

For more information about
MVCA Monitoring Programs
please call: 613.253.0006 ext. 235 or
email: monitoring@mvc.on.ca
or
visit: www.mvc.on.ca

We are currently located at

10970 Hwy 7
Carleton Place, Ontario
K7C 3P1

Mississippi Valley Conservation Authority