State of the Lake Environment Report 2010

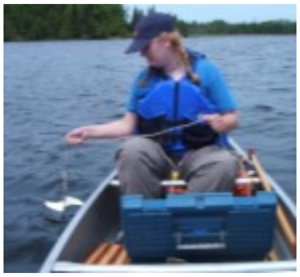
Palmerston Lake

Mississippi Valley Conservation

Why Watershed Watch?

The Ribbon of Life is the shallow waters and first 10 metres of shore land around our lakes where the land meets the water. This ribbon—where 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 effect 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.

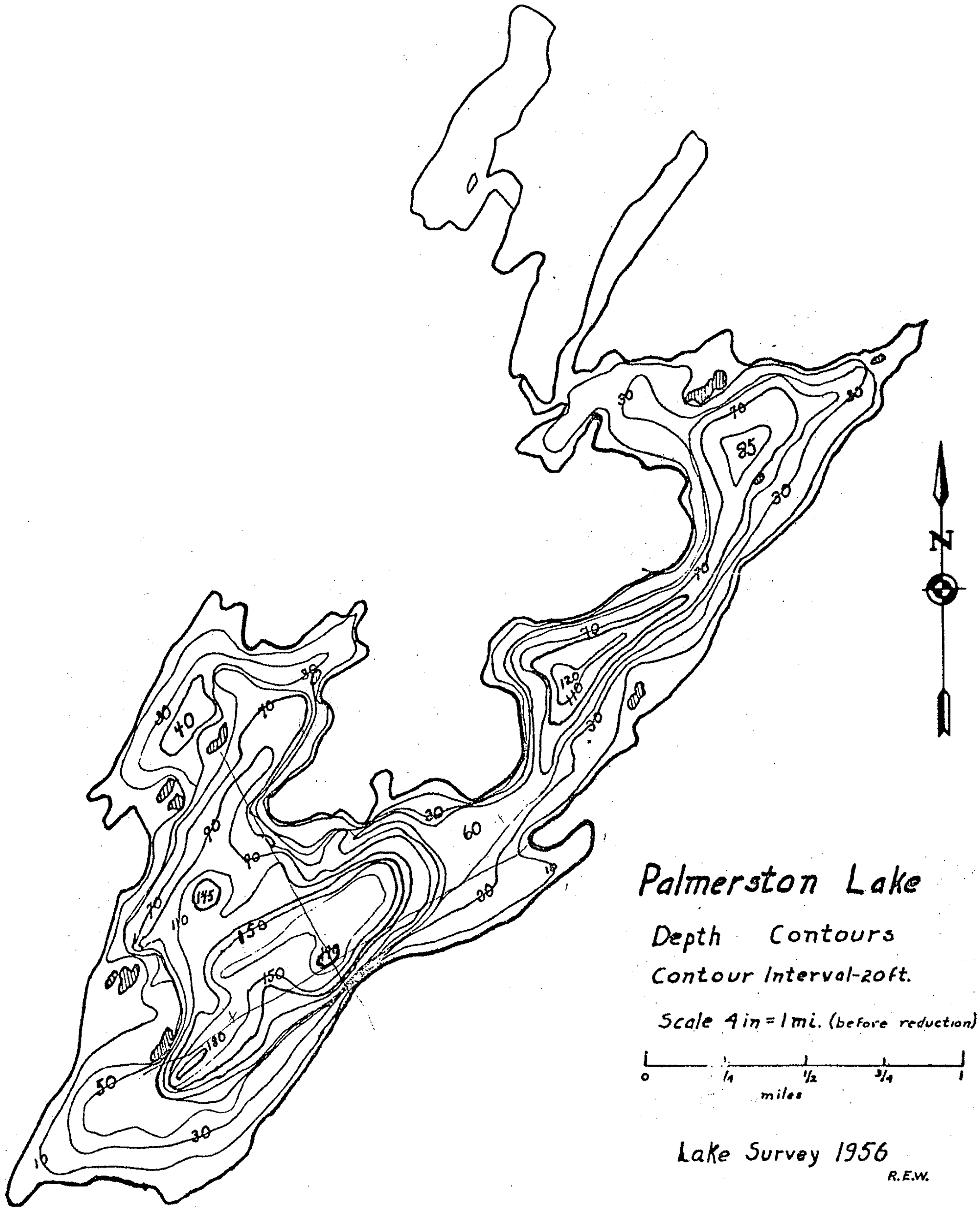
Mississippi Valley Conservation (MVC) has long recognized the recreational and aesthetic value of lakes within the watershed and is committed to maintaining and protecting water quality and fish habitat. MVC has joined together with volunteer lake stewards throughout the watershed to take steps to protect 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.



Easy steps to improve water quality

Build at least 30 metres (100 feet) away from the shoreline
Keep your lot well treed
Preserve or replant native vegetation along the shoreline
Pump out your septic tank every three to five years
Reduce water usage
Use phosphate free soaps and detergents
Keep the size of your lawn to a minimum
Limit use of fertilizers, herbicides and pesticides

Palmerston Lake



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

- ≈ Located in the Township of North Frontenac
- ≈ Elevation of 271 metres above sea level.
- ≈ Deepest point is 58.4 metres (south basin) and 26 metres (north basin)
- ≈ Cold water fishery, particularly Smallmouth Bass, yellow Perch, Lake Herring and Lake Trout.

How Does Palmerston Lake Measure Up?

1995 – 2010 WATER QUALITY RESULTS – NORTH 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)
1995	8.2			1.0
2000	6.7	*10.2	*45.0	0.7
2005	5.6	3.3	4.0	1.5
2010	7.0	2.3	5.7	2.3
n	4	3	3	4
Minimum	5.6	2.3	4	0.73
Maximum	8.2	10.2	45	2.3
Mean	6.9	5.3	18.2	1.4
Standard Deviation	1.069	4.388	21.020	0.690

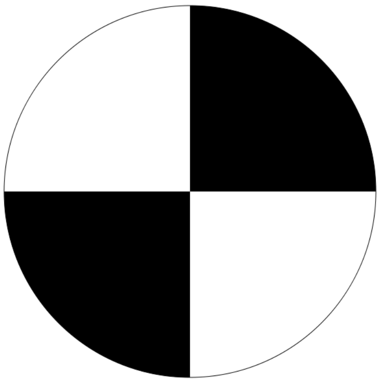
* Mean based on less than 6 measurements ** Includes Recreational Lakes Program Data. Chlorophyll a data prior to 1985 has been adjusted to reflect new lab procedures in filtering resulting in an increase in chla concentrations by 35%.

How Does Palmerston Lake Measure Up?

1973 – 2010 WATER QUALITY RESULTS – SOUTH 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)
**1973	8	9		1.5
1977	7.1			2.4
1978	8.2			2.1
1979	8.8			2.4
**1980	8.3	*3.6	*11.0	2.2
1981	8.1			1.8
1993	9.4			1.1
1995	*8.1			*1.07
2000	7.5	9.5	*2.0	0.68
2005	5.5	2	1.3	1.13
2010	7.5	4.7	1.7	2.9
n	11	5	4	11
Minimum	5.5	2	1.3	0.68
Maximum	9.4	9.5	11	2.9
Mean	7.9	5.8	4.0	1.8
Standard Deviation	1.005	3.673	3.260	0.705

* 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%.



Secchi Disc Measurements

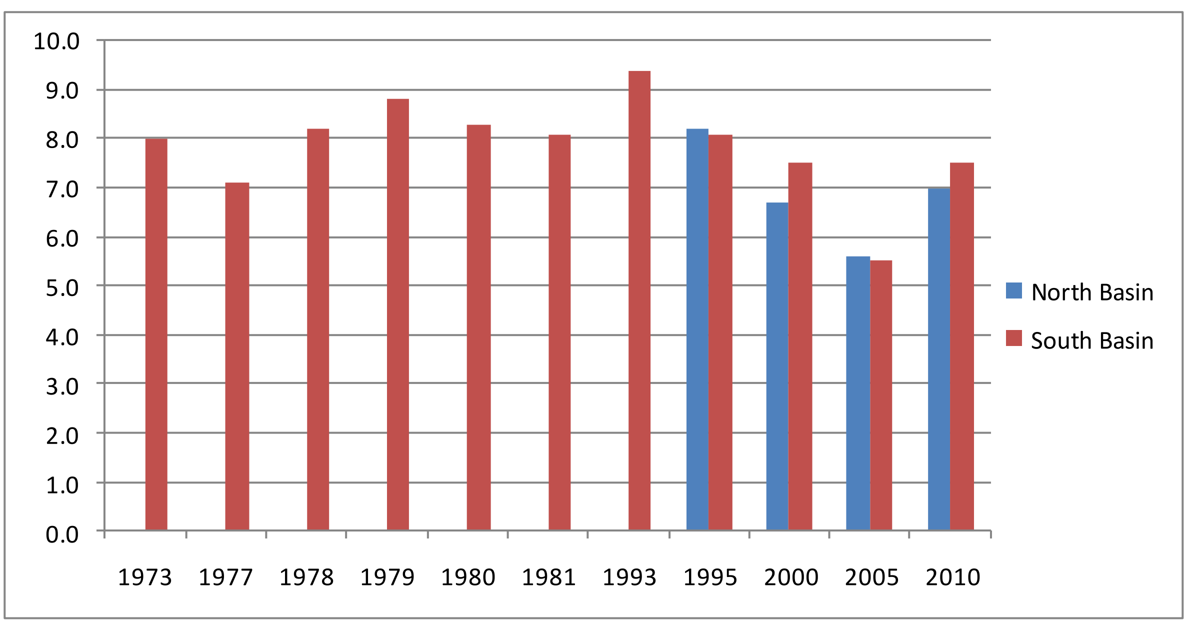
A *Secchi Disc* is a black and white coloured disc used to determine water clarity. The disc is lowered into the water. The point, at which you can no longer distinguish the black and white, is called the Secchi depth. The higher the Secchi Disc measurement, the more clear your lake.

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 and, usually, least fertile lakes; they tend to be deep with sparse aquatic vegetation and few fish. 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.

Eutrophic lakes eventually reach the point where demand for oxygen exceeds the oxygen supply. Eutrophic lakes have many aquatic life forms that eventually die and decompose; decomposition uses up oxygen that could have supported additional life. Decomposing material, detritus, collects on the lake's bottom making the lake shallower. As oxygen becomes sparse, lakes approach *senescence*, full maturity to death.

Interpreting 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

Palmerston Lake—North and South Basin
Annual Mean Secchi Disc Measurements (Metres)

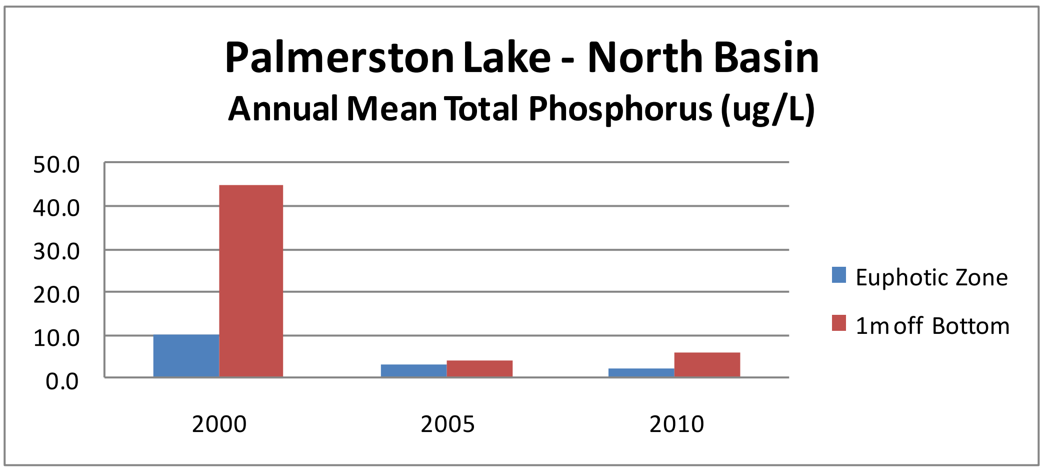


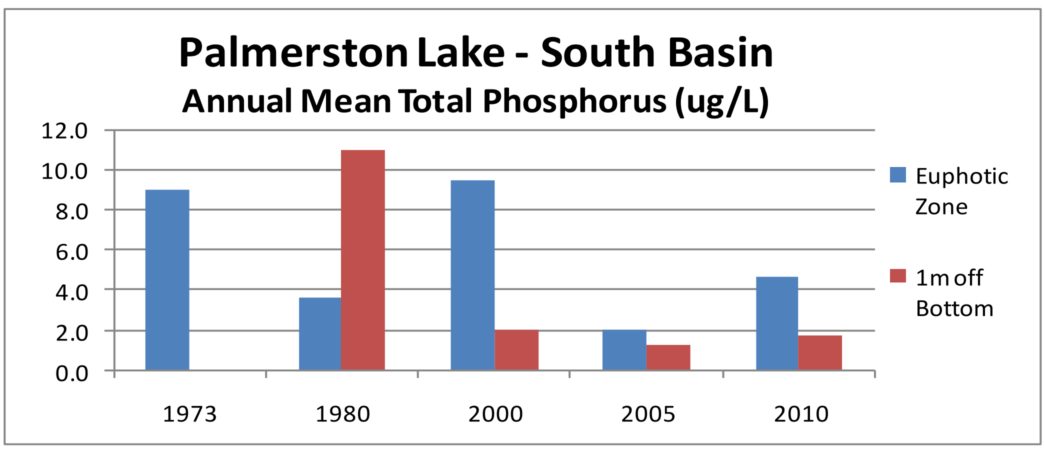
Interpreting Total Phosphorus Results

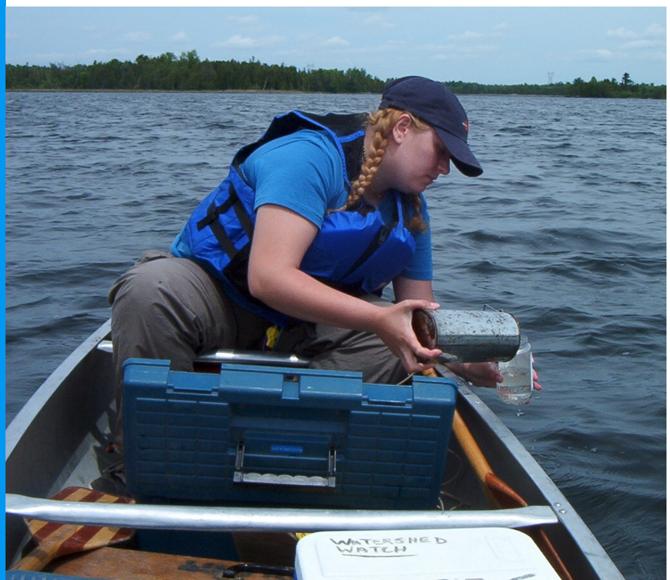
Phosphorus is the nutrient that controls the growth of algae in most Ontario lakes. For this reason any increase in phosphorus in the lake will increase the quantity of algae that can grow. High levels of phosphorus can lead to algal blooms and in some cases affect the habitat of cold water fish such as lake trout. A general guideline exists to characterize your lake based on the total phosphorus that is measured.

The Kremmerer Bottle (pictured above) is used for sampling water at specific depths. The bottle is lowered with both ends open to the required depth, a weight (on the rope) is dropped, when the weight hits the bottle the 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







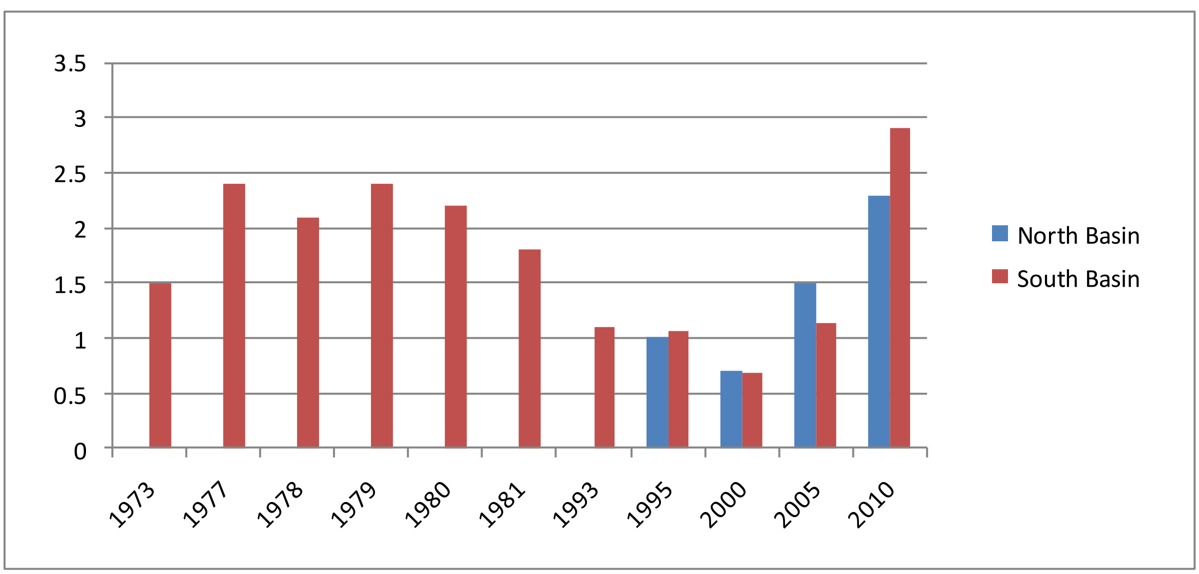
Evaluating Chlorophyll a Results:

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.

The Composite Sampler (pictured above) is used for water samples similar to a core sample. The tin is dropped into the water. When it reached the required depth it is slowly pulled back to the surface. The tube is filled as water enters one tube while air escapes the other. It is essential that some air is left in the tin to ensure collection throughout the entire 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

Palmerston Lake
Annual Mean Chlorophyll a Results (ug/L)



Help MVC and the Ontario Federation of Anglers and Hunters (OFAH)
Stop the Invasion!

Palmerston Lake was also tested for invasive species in 2010, in particular, for zebra mussels and spiny water flea, in partnership with the Ontario Federation of Anglers and Hunters (OFAH). Palmerston 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 Palmerston Lake. Another recommendation is for residents to begin participation in the invasive species monitoring program through MVC.

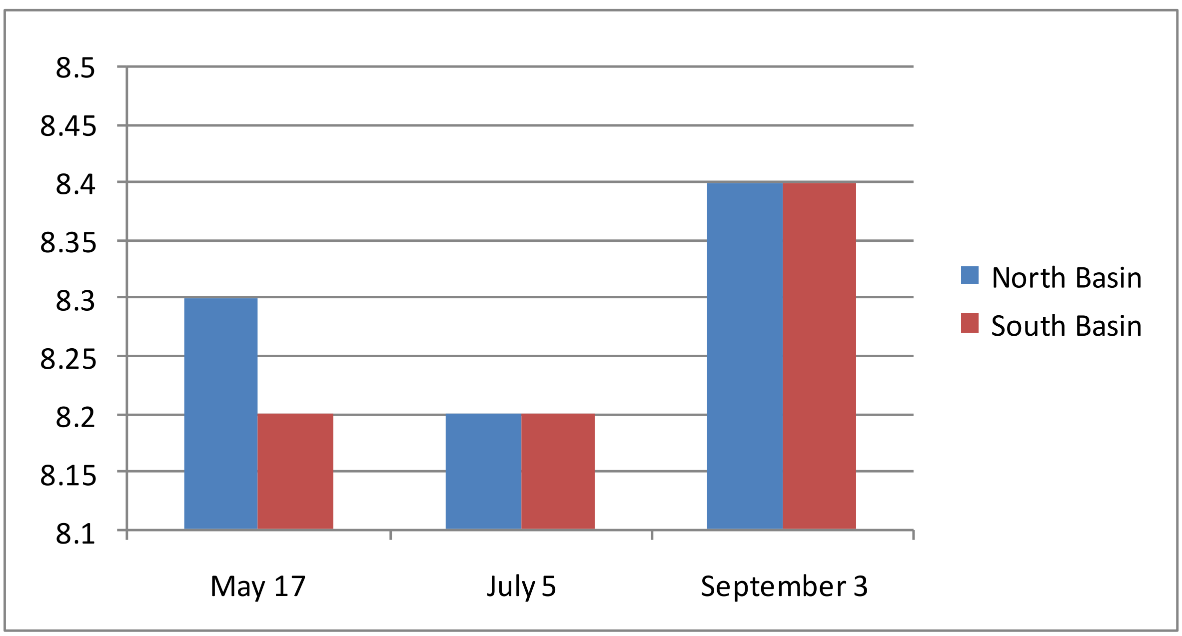
The plankton haul net (pictured above) looks like a windsock with a plastic cup attached to the end. The mesh size of the net is 63 microns, which can filter microscopic organisms (plankton) like the spiny water flea and the zebra mussel veligers from the water. The plastic cup portion of the net is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

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

Evaluating pH Results

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

Palmerston Lake
2010 pH Levels



Call MVC at (613) 259-2421 or the Invading Species Hotline 1-800-563-7711

Palmerston Lake Sampling Results—North

Palmerston Lake—North Basin #10-10 May 17/2010 11:20 AM

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	13.8	10.71	103.3	
1	12.8	10.85	102.6	
2	12.2	10.99	102.4	Epilimnion
3	11.9	11.08	102.4	
4	11.4	11.14	102.0	
5	11.1	11.19	101.6	
6	10.7	11.25	101.3	
7	10.5	11.26	101.0	
8	10.1	11.33	100.6	
9	10.0	11.31	100.2	
10	9.7	11.36	99.8	
11	9.3	11.37	98.8	
12	9.0	11.33	98.0	
13	8.5	11.30	96.6	
14	8.2	11.22	95.1	
15	7.8	11.09	93.2	
16	7.4	10.96	91.2	
17	7.2	10.93	90.4	
18	6.8	10.72	87.9	
19	6.6	10.71	87.3	
20	6.5	10.63	86.4	
21	6.3	10.57	85.6	
22	6.2	10.50	84.8	
23	6.0	10.39	83.5	
24	5.9	10.33	82.7	
25	5.8	10.21	81.6	Hypolimnion
26	5.7	10.05	80.1	
27	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

Palmerston Lake—North Basin #10-10 July 5/2010 12:30 PM

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	23.0	8.82	102.8	Epilimnion
1	22.9	8.83	102.8	
2	22.8	8.83	102.4	
3	22.7	8.81	102.1	
4	22.4	8.83	101.8	
5	21.9	8.95	101.9	
6	21.8	8.95	101.6	
7	20.1	9.27	102.5	Thermocline
8	14.3	11.85	115.7	
9	13.1	11.86	112.4	
10	11.6	11.66	107.0	
11	10.6	11.31	101.5	
12	10.0	10.99	97.1	Hypolimnion
13	9.1	10.60	91.8	
14	8.8	10.31	88.6	
15	8.6	10.21	87.1	
16	8.0	9.78	82.2	
17	7.5	9.55	79.4	
18	7.4	9.43	78.4	
19	7.2	9.37	77.4	
20	7.0	9.26	75.9	
21	6.7	9.04	73.6	
22	6.6	8.89	72.3	
23	6.6	8.73	70.8	
24	6.4	8.58	69.7	
25	6.4	8.44	68.4	
26	6.4	8.32	66.4	
27	6.3	7.76	62.2	
28	6.3	0.58	4.0	
29	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

Palmerston Lake—North Basin #10-10 September 3/2010 10:35 AM

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	23.5	8.14	95.8	
1	23.5	8.10	95.5	
2	23.4	8.14	95.8	Epilimnion
3	23.4	8.14	95.5	
4	23.2	8.19	95.5	
5	22.8	8.29	96.1	
6	22.3	8.36	96.1	
7	21.9	8.42	95.9	
8	21.5	8.43	95.3	
9	21.3	8.46	95.2	
10	14.9	10.92	108.5	
11	12.5	10.64	99.5	Thermocline
12	11.1	10.12	91.6	
13	9.9	9.42	83.3	
14	9.3	8.95	77.2	
15	8.7	8.40	71.4	
16	8.3	8.11	68.1	
17	7.8	7.71	64.8	
18	7.9	7.63	63.8	
19	7.6	7.45	62.0	
20	7.3	7.34	60.9	
21	7.1	7.22	59.5	
22	7.0	7.01	57.6	
23	6.9	6.82	55.8	
24	6.8	6.65	54.3	
25	6.8	6.56	53.7	Hypolimnion
26	6.8	6.49	53.0	
27	6.7	4.50	33.0	
28	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

Palmerston Lake Sampling Results—South

Palmerston Lake—South Basin #10-11 May 17/2010 12:35 PM

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	14.4	10.72	104.5	
1	12.6	10.70	102.6	
2	12.1	11.07	102.6	Epilimnion
3	11.9	11.03	102.2	
4	11.5	11.12	101.8	
5	11.4	11.15	102.0	
6	11.3	11.17	101.8	
7	10.9	11.19	101.0	
8	10.2	11.24	100.3	
9	10.0	11.31	100.0	
10	9.7	11.31	99.3	
12	8.0	11.23	94.9	
14	7.4	11.02	91.7	
16	7.0	10.93	90.0	
18	6.3	10.77	87.2	
20	6.1	10.69	85.9	
22	5.8	10.58	84.7	
24	5.7	10.56	84.0	
26	5.6	10.53	83.5	
28	5.3	10.38	81.8	
30	5.2	10.34	81.4	
32	5.1	10.29	80.6	
34	5.0	10.22	80.0	
36	4.9	10.11	79.0	
38	4.8	9.98	77.7	
40	4.8	9.88	77.0	Hypolimnion
42	4.7	9.80	76.2	
44	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

Palmerston Lake—South Basin #10-11 July 5/2010 11:20 AM

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	22.5	8.82	101.2	
1	22.1	8.88	101.6	
2	21.9	8.87	101.7	Epilimnion
3	21.8	8.95	101.8	
4	21.7	8.95	101.7	
5	21.5	8.99	101.4	
6	21.3	9.08	101.3	
7	18.3	10.9	12.2	
8	14.8	11.67	114.5	Thermocline
9	11.5	11.81	109.5	
10	11.1	11.67	105.7	
12	9.3	11.19	97.5	
14	8.4	10.88	92.2	
16	7.5	10.58	88.8	
18	6.9	10.22	83.8	
20	6.7	10.03	82.0	
22	6.7	9.87	80.3	
24	6.4	9.47	76.9	
26	6.0	9.26	74.7	
28	5.9	9.27	74.4	
30	5.7	9.25	73.7	
32	5.7	9.19	73.0	
34	5.5	9.12	72.4	
36	5.4	9.18	72.7	
38	5.4	9.22	73.0	
40	5.1	9.15	71.6	Hypolimnion
42	4.9	8.90	69.5	
44	4.8	8.75	67.5	
46	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

Palmerston Lake—South Basin #10-11 **September 3/2010** **12:10 PM**

Depth (Metres)	Temperature (Degrees Celsius)	Dissolved Oxygen (Milligrams / Litre)	Percent % Saturation	Thermal Stratification
0.1	23.0	8.26	96.4	Epilimnion
1	22.9	8.32	97.0	
2	22.8	8.34	96.8	
3	22.5	8.38	96.7	
4	22.1	8.43	96.4	
5	21.9	8.45	96.4	
6	21.8	8.46	96.4	
7	21.7	8.48	96.2	
8	21.4	8.50	96.1	
9	21.3	8.47	95.4	
10	20.2	8.90	97.7	
12	18.6	10.35	112.1	Thermocline
14	14.0	11.41	111.9	
16	14.4	11.56	113.0	
18	11.6	11.02	101.5	
20	10.7	10.72	96.8	
22	9.0	10.32	88.8	Hypolimnion
24	8.4	10.03	84.4	
26	7.7	8.78	73.0	
28	7.4	8.50	70.8	
30	6.9	7.87	63.5	
32	6.5	7.65	62.8	
34	6.9	8.07	66.2	
36	6.7	7.76	63.6	
38	6.6	7.70	62.5	
40	6.4	7.51	60.9	
42	5.6	7.56	60.2	
44	5.3	7.51	59.2	
46	5.3	7.51	59.3	
48	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

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 weight 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 2010 field season to help expand our knowledge of each lake beyond just its chemistry. Netting was conducted in July and August to avoid disturbing sensitive nesting, and breeding sites. A good variety of game fish and bait fish were found at all boat launch sites, except one, and the species summary can be found in Table 1.

The majority of the individual fish captured with the seine net are bait fish such as minnows and cyprinids; 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 curious about 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 MVC office.

Lake	Fish Species Caught
Palmerston Lake	Spottail Shiner
	Yellow Perch
	Bluntnose Minnow
	Emerald Shiner

MVC 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 the
MVC Monitoring Program
please call: 613.259.2421 ext. 235 or
email: monitoring@mvc.on.ca or
visit: www.mvc.on.ca

We are located at
4175 Hwy 511
Lanark Ontario
K0G 1K0

Mississippi Valley Conservation
community • environment • balance