2014 Three Mile Lake Water Testing Summary

Water testing committee members: Jim Douey, Dan and Barb Leonard, Arnie and Nancy Pundsack, Tim Taylor and Rod Ward.

Overview : As it did last year, the water testing committee members took water samples from the deep part of the lake six times during the summer for analysis of the phosphorus content by The Lake Partner Program. Also sampling was done three times at five spots during the summer to measure the E.Coli and coliform content of the water. The water clarity was determined using a secchi disk several times during the summer. In addition, students from the University of Waterloo continued their expanded testing of the water twice in July. The results of all of these measurements follow.

Impact of weather on the lake: Before giving the results of the above testing we would like to discuss the impact of weather, particularly the temperature and rainfall. We all know that the summer was not very warm and that it was kind of wet. The average monthly high temperature, for the period of May to October, is shown in table 1.

Date	May	June	July	August	September	October
Ave high Temp(C)	17.9	24.0	23.4	24.5	20.8	13.7

Table 1

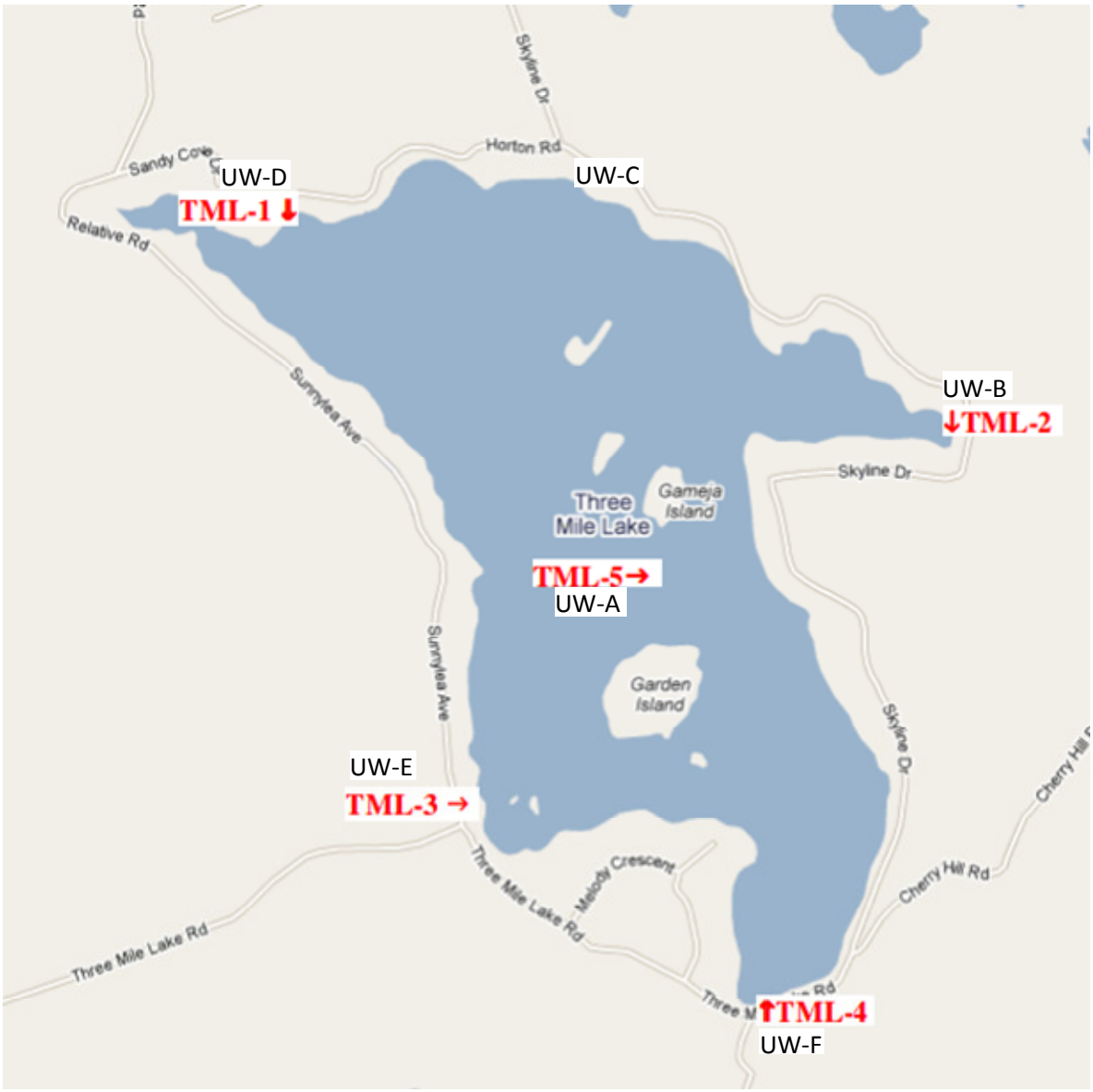
As shown in table 1, about 24 C was the highest average monthly high temperature. There weren't many really hot days to make a lot of water evaporation.

We also had significant rainfall during the summer, particularly in June and September. The total rainfall for each month of the summer is shown in table 2.

Date	May	June	July	August	September	October
Rain (mm)	71.2	102.4	52.6	58.9	111.7	182.7

Table 2

If we add up the rainfall for the months of May to October it totals 579.2 mm or 22.8 inches. If we assume that an equivalent amount enters the lake from runoff, we are adding about 4 feet of water to the lake. The maximum depth of Three Mile Lake is about 26 feet. So mixing in 4 feet of rain water is a significant part of our water. We really need to manage water runoff with shoreline barriers to help to keep our lake clean.



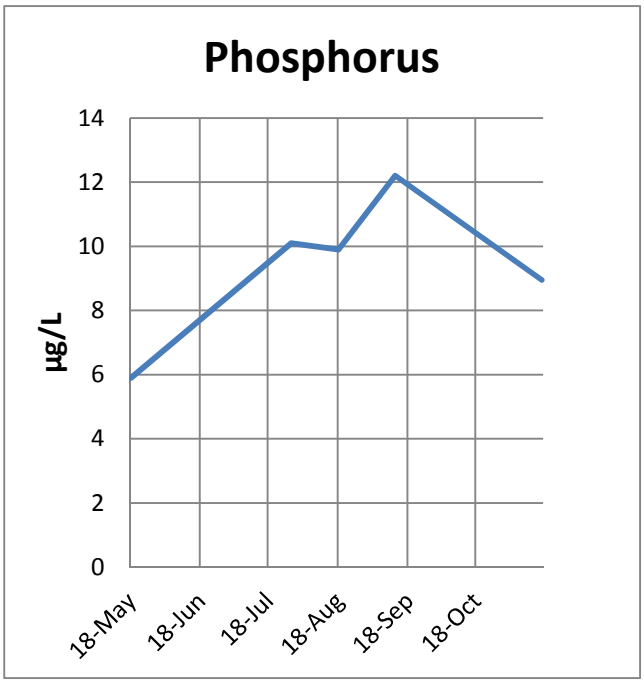
Test sites for water sampling in Three Mile Lake

***E.Coli* and Coliform results**: In general, the *E.coli* and coliform levels were below the Ontario recreational water use thresholds of 100 cfus for *E.coli* and 1000 cfus for coliform. We did have one very high (2424 cfus) coliform reading from the northwest part of the lake. We believe this water sampling bottle was contaminated as repeat testing, with a sterilized bottle, in the same area gave a more typical value of 240 cfus. The *E.coli* levels were all below 8 cfus. (Cfu is the abbreviation for colony forming units.)

E.Coli	TML-1	TML-2	TML-3	TML-4	TML-5
May 18	<3	8	<3	<3	<3
Aug 24	8	<3	16	3	<3
Sept 12	<3	<3	<3	<3	No test

Coliform	TML-1	TML-2	TML-3	TML-4	TML-5
May 18	16	8	13	8	<3
Aug 24	>2424-suspect reading 240 on repeat of test	55	76	102	25
Sept 12	177	156	79	233	No test

Phosphorus: The Lake Partner data from testing five times in the deepest part of the lake gave phosphorus values of between 5.8 to 12.8 µg /L. These values are representative of a healthy lake. The University of Waterloo students also measured the phosphorus levels in six spots around the lake in shallow water and found that the northwest corner of the lake gave high values of 20-23 µg /L. A phosphorus levels of 20 or above is one of the triggers for significant algae blooms. There is also significant weed growth in this area. Testing will be repeated in 2015 to see if these results are repeated.

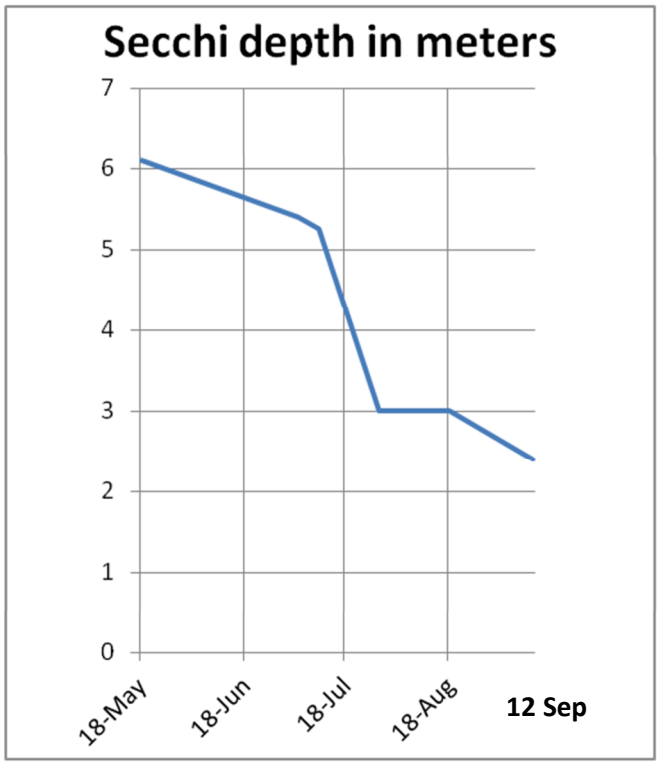


Dissolved Oxygen: Sufficient dissolved oxygen is important for the abundance and health of aquatic life. The MOE states an acceptable value for warm water lakes is at least 4-7 mg/L. The TML values were between 8.3-9.1 mg/L which are good values to support fish growth.

pH: According to the Credit Valley Conservation Authority pH values below 6.5 are considered to be highly acidic while values higher than 9 are highly basic. Health Canada guidelines for Recreational Water Quality states that pH should be between 5-9. The TML values range between 6.6 and 6.8. Enjoy your swim!

Nitrates and Nitrites: High levels of these nutrients combined with high levels of phosphorus (>20 µg/L) often leads to increased algae growth. Our levels of these nutrients is low (<.001-.004 mg/L).

Water Clarity: We measure the water clarity using a secchi disk. As is usual for TML we had high clarity in the spring with the secchi disc visible to depths of 6.1 meters in May. The visible depth decreased to 2.4 m by mid-September. Some of this loss of clarity may be due to water runoff as is often seen in rivers after a rain.



University of Waterloo Three Mile Lake Lab Data and Results

Site	DO (mg/L)	pH	Conductivity (µS/cm)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	TP (µg/L)
A1 (TML 5)	8.3	6.8	40.8	<0.01	0.004	0.16	11
A2	9.0	6.6	35.2	<0.01	0.002	0.04	9
B1 (TML 2)	8.5	6.7	39.1	<0.01	0.003	0.08	14
B2	8.9	6.6	35.6	<0.01	0.003	0.04	9
C1 (north shore)	8.9	6.8	39.2	<0.01	0.003	0.11	11
C2	9.0	6.6	35.5	<0.01	0.001	0.05	19
D1 (TML 1)	8.5	6.7	39.4	<0.01	0.004	0.08	23
D2	9.1	6.7	35.7	<0.01	0.003	0.05	20
E1 (TML 3)	8.5	6.7	39.2	<0.01	0.002	0.12	16
E2	9.0	6.7	35.7	<0.01	0.002	0.05	10
F1 (TML 4)	8.5	6.7	39.3	<0.01	0.003	0.16	14
F2	9.1	6.7	35.8	<0.01	0.004	0.05	11
Mean	8.77	6.68	37.54	0.01	0.00	0.08	13.92
Standard Deviation	0.29	0.06	2.10	0.00	0.00	0.04	4.66
Minimum	8.32	6.59	35.20	0.01	0.00	0.04	9.00
Maximum	9.10	6.76	40.80	0.01	0.00	0.16	23.00
T-test: P (same mean)	0.00	0.02	0.00	1.00	0.24	0.00	0.41

* TP for site D is higher than normal range (under 20).

Summary: TML appears to be a healthy lake and has been so for several years. We still need to be vigilant in controlling contaminants coming into the lake particularly via water runoff.

Kearney has a new bylaw to control how water enters the lake through culverts. It might be a good idea for TML to get a similar bylaw passed.