

## TLA's E. coli Watershed Monitoring Program

The chart and map below show E. coli bacterial counts, the dates, and many of the locations where sampling was done for the past several years. Normal background levels in nature are generally below 100 colonies forming units per 100 ml (cfu/100ml). Values in excess of 300 cfu/100ml suggest the possibility of contamination from fecal sources (human or wildlife) and warrant retesting, with follow-up to locate the source if persistent elevations are detected.

### E. coli counts (cfu/100ml) Over Time

Map Symbol	Location	8/13/2009	6/23/2009	8/26/2008	7/29/2008	6/27/2008	10/2/2007	9/21/2007	8/30/2007	8/6/2007
A	Eastport Creek @ M88	201	1414	*227	387	210				206
B	Wilkinson Creek @ NETLD	77	147	727	99	99				158
C	Meggison Creek @ NETLD	36	365	55	31	54			219	
D	West Butler Creek @ Bellaire Hwy	11	70	148	11	20			165	
E	Cedar River @ Schuss Mt Rd	11	7	26	29	9			19	
F	Shanty Creek @ M88	48	12	26	41	17			26	
G	Maury Creek @ Fshmn Paradise Rd	150	166							
H	Cold Creek @ Tyler Rd	15	14	39	10	56			22	
I	Finch Creek @ Alden Hwy	10	7	13	6	13			20	
J	Spencer Creek @ Alden Harbor	51	119	75	82	93			144	
K	Torch Lake @ Torch River Bridge	0	4							
L	Creek @ Campbell & NWTLD	39	77	50	33	172				
M	Creek @ McLachlan & NWTLD	411	99	326	36	49	133	1393		451
N	Creek @ 6049 NWTLD	308	88	285	115	155		225		700

\* = geometric mean of samples

Map Symbol	Location	8/13/2009	7/16/2009	6/23/2009	8/26/2008	7/29/2008	6/27/2008	6/19/2008
T1	Torch Lake @ Torch River DNR Launch	0		4				
T2	Torch Lake @ Eastport DNR Launch	106						
T3	Torch Lake @ 6543 NW Torch Lake Dr				270	2419		
T4	Torch Lake @ 322 Sugarbush						11	
B1	Lake Bellaire @ Steiner Rd End Access		1					
C1	Clam Lake @ 8181 Clam Lake Rd							19



## Interpreting E. coli Test Results

Testing for E. coli is usually done as an “indicator” test. That is, if E. coli levels are high, it is likely that other pathogens are also high. E. coli comes from animal waste including human waste. So, the presence of E. coli indicates that fecal contamination is present in the water and that care should be taken with drinking, bathing, or other human use of the water.

The Health Department does not recommend drinking from any of our streams and lakes because virtually all of them have giardia, a parasite that comes from the intestinal tract of animals. Giardia is one of the most common waterborne diseases in Michigan. It is frequently misdiagnosed and can be serious. E. coli itself can also cause serious disease in humans. One reads about outbreaks around the country from time to time that are usually associated with unwashed vegetables and fruits or uncooked meat. However, the type of strain of E. coli that makes people sick is but a handful of all the very many strains of E. coli that exist. So, the E. coli that our tests indicate could be any of the many, mostly benign strains, of E. coli, not necessarily the ones that cause sickness. When cases of E. coli sickness occur, both local Health Departments and Federal Agencies become quickly involved. They need to find the source and eliminate it before it becomes widespread. However, cases of E. coli caused sickness, not related to food contamination, in our area are rare to non-existent.

Fortunately, we live in an age in which many of the other waterborne diseases that E. coli would be a good marker for have been largely eradicated. Dysentery, cholera, scarlet fever, typhoid fever, polio, hepatitis, and many others that are not so well known do not plague us like they did 100 years ago. Today we have good medical care, vaccinations, and as a result, fewer individuals that can contaminate the water supply. Most importantly, we have a good set of rules governing our waste water. TLA has tried to concentrate attention on the most important health and water quality issues. Identifying sources of E. coli or other waterborne contamination is high on our list, but not necessarily because E. coli is likely to cause sickness directly. High E.coli counts may or may not indicate that there is a failure in wastewater disposal systems or the presence of pathogens.

## **E. coli Testing Plans for 2010**

In 2010 the E. coli testing and a cladophora surveys will be combined. As in 2008 and 2009, water samples from the thirteen tributary sites (see Table) will continue to be tested for E.coli, and the results will be posted to our web site ([www.3lakes.com](http://www.3lakes.com)) within a few days of receipt from the laboratory. A TLA Alert (short e-mail note) will be e-mailed to the subscribers to the TLA Alert system notifying them that new E.coli test results can be viewed by clicking on a link.

At the same time the TLA High School Internship program will be surveying the entire lake perimeters noting the location of significant cladophora blooms. The survey will take the entire summer, so the information will not be a snapshot of lakeshores at a specific time like the E. coli tests. However, TLA plans to collect lake water from around these cladophora beds to determine E. coli counts near these potential “hot spots” along the lake shore. To be scientifically valid, a number of samples at “cold spots” will be taken as well.

As a new aspect of our E. coli monitoring program, results from each sample collection will be posted on TLA website ([www.3lakes.com](http://www.3lakes.com)) shortly after the results have been received and compiled, and an Alert e-mail message will be sent to each subscriber to TLA’s Alert system. Anyone can become a subscriber by filling out and submitting their name and e-mail address on the lower right hand side of TLA’s website homepage.

E. coli results from samples around cladophora beds based on our 2010 Summer Internship project will take longer to appear on the Website. Typically, the students write a report in August and make a presentation to the TLA Board and to their own school boards immediately afterward. However, the TLA High School Internship report will appear on the Website in September about the same time as results are available for the late summer tributary E. coli sampling in August. In the case of the tributary sampling, these dates have to be adjusted around significant rain events that can skew the results. Finally, the October TLA Newsletter will include a summary of E. coli monitoring results.

Occasionally individuals and other organizations ask for E. coli monitoring. TLA encourages this and responds to these requests. Any individual or group can get sample bottles from the NW Michigan Health Department and do E. coli sampling their own. In the past, we have taught interested groups how to do this. TLA anticipates such requests again this year, and would be pleased to respond to them in a neighborly way. We would expect the requesters to cover the out-of-pocket costs of such assistance. In the event that some untoward information is discovered, TLA would like to

participate in any follow up testing as well. However, TLA insist on utter discretion in the handling of such information, as it has in the past, and encourages individuals to act responsibly.

TLA has been trying to understand why E. coli is present in many of our streams that seem to have no obvious source. The conventional wisdom has been that E. coli dies off within a day or so of leaving a living creature. Thus its presence was thought to be an indication of fresh contamination. However, recent scientific research and TLA studies on our creeks and their sediments now conclude that at least some E. coli can live in the environment outside of animal intestines for months, if not years. Of course this makes the interpretation of E. coli tests more difficult and raises the issue of what might happen if one of the “bad” E. coli strains happens to be the one that doesn’t die off. So far we have no evidence that this is happening. In fact, this a good research project for our Health Department or one of our universities. TLA has discussed the issue with both groups and hopes that a pilot study can be mounted. However, a full analysis of this is beyond the capability and resources of our organization.

### **TLA’s Environmental Lake Watch Program**

TLA’s Environmental Lake Watch program has used E. coli as a marker for suspect septic systems for many years. Septic system failures have been identified either by individual homeowners or with cladophora surveys conducted along the lakeshore every five years or so. The last of these surveys was in 2004 ([http://3lakes.com/downloads/shoreline\\_survey.pdf](http://3lakes.com/downloads/shoreline_survey.pdf)) and the next one will be in 2010. E. coli tests and dye tests are usually sufficient to identify the location of the failure. However, these tests have all been done with the cooperation and permission of the property owner or group of residents who suspect a problem. TLA has identified and mitigated over 100 of these requests since the early 1980s. Virtually none of these has reached the stage where direct intervention by the Health Department or legal action has been required. Apparently, none of our residents want to be responsible for polluting our lakes and have all had their systems repaired in compliance Antrim County waste water policies.

Unfortunately, this process is neither straightforward nor quick. Time is required to do the tests, understand the results, and frequently, do them over again slightly differently. Furthermore, as TLA has learned at Eastport, creeks are frequently a source of E. coli even without known septic failures. When TLA first tried to locate a septic failure in that area in 2004, E. coli from Eastport Creek made identification of the location difficult to find. As a result of this, TLA began to investigate the source of E. coli in Eastport Creek itself. Eastport Creek extends over a large area and has several tributaries. E. coli

can come from animals living upstream, both wild and domestic, and as TLA has learned recently, can persist in the stream sediments for years. TLA is continuing to work there.

TLA decided to expand its E. coli testing starting in 2008. TLA wondered if E. coli was an issue in other tributaries as well. The tables presented here give the results of these tests for the last two years on thirteen tributaries, seven in Torch Lake, that contribute 99% of the water to our three lakes. Some are quite small and seasonal. And some, like Torch River, appear to have a very low count and TLA has decided not to test it as often. In fact, TLA did a survey of beaches in 2003 covering Woodenshoe Park in Ellsworth, Thurston Park in Central Lake, Riccardi Park in Bellaire, and the sand bar in Torch Lake each week through July and August. All these beaches were found to be well within Health Department guidelines for E. coli and the sand bar consistently tested the lowest. The testing was done on a Tuesday, however, several days after the large collection of boats had left. For E. coli levels found in our area streams, it is extremely unlikely that waterfront areas nearby pose a health risk. In fact, testing at the DNR site in Eastport, immediately adjacent to Eastport Creek, has shown little E. coli activity.

In the last two years TLA E. coli testing has been done over several summer months, one series of tests in June and one in August. In 2008 TLA also sampled in July. These tests are not a single sample but several including null samples to check the testing laboratory. A total of twenty three sites were sampled in both 2008 and 2009, most on the tributaries identified in the table but at different locations. On the first sampling event in June of 2009 there were two streams, Meggison Creek at North East Torch Lake Drive and Eastport Creek at M-88 in Eastport, with E. coli counts in excess of 300 cfu/100ml (the Michigan Water Quality Standard – WQS -- upper limit for body contact with water). On the August sampling in 2009 the two streams with high readings were back below the WQS limits but three different streams had elevated counts above the WQS. Two of the streams with elevated counts in 2009, Eastport Creek and an unnamed creek just south of McLachlan Road have a history of intermittently elevated E. coli counts. We have focused attention this year on mapping Eastport Creek upstream of our sampling site in an effort to identify remediable causes of elevated E. coli counts. The 2008 and 2009 E. coli results were originally published in the October TLA Newsletters for those years and available on the TLA website ([www.3Lakes.com](http://www.3Lakes.com)).