

# Report of the 2017 Sandbar Pollution Study

Prepared by Becky Norris for the Three Lakes Association, the Torch Lake Protection Alliance,  
and the Elk-Skegemog Lake Association

7/23/2017



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## Executive Summary

Three study sites, selected as representative of the locations where exposure to human-related pollution might occur with high human occupancy, were sampled for selected assays on three occasions in proximity to the Fourth of July holiday period in 2017. Geometric means of triplicate E. coli counts and nitrate nitrogen levels remained within ranges generally considered to be safe for water contact. Human sewage-related odors were detected by trained dogs during the higher-occupancy sampling occasions.

Based on the results of the limited testing done, exposure to the water at the sandbar was not found to be associated with a significant health risk. An important caveat to this conclusion is that the test sites were very limited and the scope of health-risk related analytes was also very limited.

This study did not address, and did not reach any conclusions concerning, environmental harm that may be generated by garbage contamination of the area.

## Introduction

The sandbar at the south end of Torch Lake is a site where numerous people congregate to boat, wade, swim and, in general, enjoy the lake during week-ends and holidays. The Fourth of July holiday, in particular, has recently been seeing a dramatic increase in human occupancy at the sandbar. In the interest of the health, safety, and welfare of the users of the sandbar area as well as of the riparian owners in the vicinity, it was desired to compare elements relevant to water quality at times of low and of high human occupancy at the sandbar. Available financial support permitted a limited number of study sites, study episodes, and study parameters. Selection of the study elements included was based on historical choices for water quality testing. Selection of the times and locations of water sampling was based on our best guesses as to where and when pollution of potential risk to human health might occur.

## Study Methods

**Sites:** Samples were collected from three sites, Torch River at Fabiano's dock, the Lake Street Public Access, and the Division Street Public Access. These sites were chosen to reflect water quality downstream of the sandbar (Torch River), at the location of greatest congregation (Lake Street), and at a site which may and may not be impacted by an eastward eddy current along the sandbar.

**Sampling Times:** Samples were collected at approximately 3 PM on three dates.

1. June 26, a day expected to have low human occupancy and represent baseline water quality conditions.
2. July 3, a day expected to have high human occupancy due to its being in the midst of the Fourth of July holiday period, the time water quality would be most likely to be affected by human occupancy.
3. July 10, a day expected to have low human occupancy and represent baseline water quality conditions. It was expected that any change in water quality that may have occurred during the Fourth of July holiday period would have dissipated and conditions have returned to baseline.

**Sampling Parameters:**

1. E. coli counts, the standard test to gauge fecal contamination of water. Samples were collected in triplicate using sealed, sterile bacteriology bottles obtained from the SOS Analytical Laboratory in

Traverse City. Triplicate samples fulfill the MDEQ requirements for water quality testing. Samples were stored on ice from the time of collection until delivered to the SOS Analytical Laboratory, approximately 1 ½ hours after collection, and well within the 6 hour maximal holding time.

2. Nitrate nitrogen levels, as an indication of nitrogen pollution of the water potentially occasioned by urination in the lake. Samples were collected as singles in clean chemistry bottles obtained from the SOS Analytical Laboratory in Traverse City. Samples were stored on ice from the time of collection until delivered to the SOS Analytical Laboratory, along with the E. coli samples.
3. Sewage odor samples, as another gauge of human pollution of the water. Samples were collected in new, never used laboratory specimen containers in accordance with the collection protocol provided by Environmental Canine Services LLC ([www.ecsk9.com](http://www.ecsk9.com)) and shipped by priority mail for examination. The examination consisted of having the reactions of dogs who have been trained to detect odors unique to human sewage observed and recorded. This service included quality controls provided through challenging more than one dog with each sample, repeat assessment by the dogs, and positive and negative control samples.

Results

E. coli levels, expressed as cfu/100 ml, are shown in Table 1, below.

Date	Site	Sample 1	Sample 2	Sample 3	Geometric Mean
6/26/22017	Torch River at Fabiano’s	1	0	0	0.00
	Torch Lake at Lake St Access	20	15	22	18.76
	Torch Lake at Division St Access	4	6	4	4.58
7/3/2017	Torch River at Fabiano’s	1	1	2	1.26
	Torch Lake at Lake St Access	5	6	4	4.93
	Torch Lake at Division St Access	27	25	19	23.41
7/10/2017	Torch River at Fabiano’s	1	2	1	1.26
	Torch Lake at Lake St Access	101	3	9	13.97
	Torch Lake at Division St Access	461	14	22	52.17

The markedly elevated E. coli level detected at the Division Street access on 7/10/2017 in one of the three samples is a bit unusual in my experience; typically the three samples are numerically much closer to each other. Since the water quality determination is based on the geometric mean of the three samples, this one high reading does not demonstrate a condition where beach closure would be indicated.

Nitrate-nitrogen levels, expressed as mg/L, are shown in Table 2, below.

Date	Site	Result
6/26/22017	Torch River at Fabiano's	0.21
	Torch Lake at Lake St Access	0.22
	Torch Lake at Division St Access	0.19
7/3/2017	Torch River at Fabiano's	0.21
	Torch Lake at Lake St Access	0.21
	Torch Lake at Division St Access	0.18
7/10/2017	Torch River at Fabiano's	0.31
	Torch Lake at Lake St Access	0.10
	Torch Lake at Division St Access	0.10

The nitrate nitrogen levels detected are well within levels considered safe for bodily contact and even for drinking water.

Human sewage odor results, expressed as positive (Y) or negative (N), are shown in Table 3, below.

Date	Site	Dog 1	Dog 2	Interpretation
6/26/22017	Torch River at Fabiano's	N	Y	±
	Torch Lake at Lake St Access	Y	Y	Y
	Torch Lake at Division St Access	N	Y	±
	Positive Control	Y	Y	Y
	Negative Control	N	N	N
7/3/2017	Torch River at Fabiano's	Y	Y	Y
	Torch Lake at Lake St Access	Y	Y	Y
	Torch Lake at Division St Access	Y	Y	Y
	Positive Control	Y	Y	Y
	Negative Control	N	N	N
7/10/2017	Torch River at Fabiano's	N	N	N
	Torch Lake at Lake St Access	N	N	N
	Torch Lake at Division St Access	N	N	N
	Positive Control	Y	Y	Y
	Negative Control	N	N	N

It is known that all of the dogs trained and utilized by Environmental Canine Services LLC do not show a positive response to waste from non-human sources. It is not known, however, in specific detail what odors associated with human sewage each of the dogs does detect. The positive responses by both dogs to the samples collected 7/3/2017 at all three testing sites is a reliable indication that some odor-emitting substance (or substances) found in human sewage was present in the water. Since the E. coli

counts on that date were not elevated, it is a reasonable guess that some other bacterial constituent found in human feces, such as Bacteroides, was present. DNA testing that has been used elsewhere but was not available to us for this study could have resolved this issue.

### Discussion and Recommendations

This modest and limited study demonstrated a detectable change in water quality as represented by human sewage-associated odor but not by E. coli counts or nitrate nitrogen between times of low and high human occupancy in the sandbar area.

Unmeasured potential threats to human health from human-associated pollution do exist and include, for example, protozoans, such as Giardia, and viruses, such as hepatitis. These measurements, as well as DNA evidence of human-source fecal bacteria, would have made for a more robust conclusion on the potential for human health risk associated with high occupancy of the sandbar area but were beyond the resources available for our study.

Since the majority of people exposed to the water in the sandbar area over holidays are not local to this region, we do not receive information on illnesses these people may develop, such as diarrhea, gastroenteritis, eye or ear infections, after wading and swimming there. That notwithstanding, the continued popularity of this site for holiday play by visitors to the area suggests that there have been no major health issues that people associate with the sandbar.

A more elaborate study<sup>1</sup> of E. coli and ammonia levels was performed by the Three Lakes Association in 2015, the results of which were hampered by lack of laboratory support on holidays. This caused sample deliveries to the laboratory to be delayed beyond standard holding times and potentially resulted in bacteriological contamination to be missed due to die-off of bacteria during refrigerated storage. A modest follow-on study<sup>2</sup> of E. coli levels was performed by the District Health Department #10 in 2016. The Health Department kept its laboratory open to receive samples, so holding times were not an issue. However, the travel time required to transport the samples to the laboratory was such that sample collections were carried out when human occupancy was not high. The Health Department recommended that ongoing surveillance be continued by volunteers from the local lake associations.

It seems reasonable to suggest maintaining vigilance concerning the potential for health risks associated with dense human occupancy of the sandbar area. If resources can be found to support it, DNA testing for human-source E. coli and Bacteroides during holidays would be particularly helpful. It is not clear that continuing standard E. coli monitoring would result in a more definitive conclusion concerning health risks associated with high human occupancy of the sandbar area.

## References

1. Rebecca M. Norris and Trish Narwold. August 14, 2015. 2015 Torch Lake Sandbar Study: Health and Safety Considerations.
2. District Health Department #10. Sandbar 2016. Torch Lake Water Quality: Results of Beach Condition Monitoring.

Appendices: Notes

Note 1: The reports that follow identify the study sites by code names.

Torch River at Fabiano's is code-names R006AA

Torch Lake at the Lake St Access is code-named L001BL

Torch Lake at the Division St Access is code-named L001BM (and by typographic error on some of the dog odor reports as L0018M)

Note 2: The report from Environmental Canine Services dated July 17, 2017 contains results for the July 10 sandbar sampling and also results from an unrelated sampling from July 11.



Appendix A: Reports from SOS Analytical



4125 Cedar Run Rd., Suite B  
 Traverse City, MI 49684  
 Phone 231-946-6767  
 Fax 231-946-8741  
 www.sosanalytical.com

COMPANY: THREE LAKES ASSOCIATION  
 NAME:  
 PROJECT NO:  
 WSSN:  
 WELL PERMIT:  
 TAX ID:  
 LOCATION: SOUTH TORCH LAKE SAND BAR  
 TORCH LAKE  
 MI

SOS PROJECT NO: 172845  
 SAMPLED BY: RM NORRIS  
 DATE SAMPLED: 6/26/2017  
 TIME SAMPLED: 2:53 PM  
 SAMPLE MATRIX: SURFACE WATER  
 DATE RECEIVED: 6/26/2017  
 TIME RECEIVED: 4:45 PM

COUNTY:  
 TWP:

**BACTERIA/INORGANICS**

No.	Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Reg Limit(MCL)
	SAMPLE ID: R006AA-1						
1	E.COLI SM9223-B MPN	1		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: R006AA-2						
2	E.COLI SM9223-B MPN	0		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: R006AA-3						
3	E.COLI SM9223-B MPN	0		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BL-1						
4	E.COLI SM9223-B MPN	20		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BL-2						
5	E.COLI SM9223-B MPN	15		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BL-3						
6	E.COLI SM9223-B MPN	22		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BM-1						
7	E.COLI SM9223-B MPN	4		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BM-2						
8	E.COLI SM9223-B MPN	6		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: L001BM-3						
9	E.COLI SM9223-B MPN	4		Colonies/100 mL	KMJ	6/27/2017	
	SAMPLE ID: R006AA-4						
10	NITROGEN, NITRATE - EPA 300.0	0.21	0.10	mg/L (PPM)	KMJ	6/28/2017	
	SAMPLE ID: L001BL-4						
11	NITROGEN, NITRATE - EPA 300.0	0.20	0.10	mg/L (PPM)	KMJ	6/28/2017	
	SAMPLE ID: L001BM-4						
12	NITROGEN, NITRATE - EPA 300.0	0.19	0.10	mg/L (PPM)	KMJ	6/28/2017	

ND = NOT DETECTED  
 LOD = LIMIT OF DETECTION  
 SMCL = FEDERAL NON-ENFORCEABLE LIMIT  
 MCL = MAXIMUM CONTAMINANT LEVEL  
 s.u. = STANDARD pH UNITS REPORTED AT 25 C  
 DISS = DISSOLVED  
 SOS ANALYTICAL, INC. IS CERTIFIED FOR COMPLIANCE MONITORING UNDER THE SAFE DRINKING WATER ACT.

APPROVED BY: *Shanna Shea*  
 SHANNA SHEA  
 LAB MANAGER



4125 Cedar Run Rd., Suite B  
 Traverse City, MI 49684  
 Phone 231-946-6767  
 Fax 231-946-8741  
 www.sosanalytical.com

COMPANY: THREE LAKES ASSOCIATION  
 NAME:  
 PROJECT NO:  
 WSSN:  
 WELL PERMIT:  
 TAX ID:  
 LOCATION: SOUTH TORCH LAKE SANDBAR  
 TORCH LAKE  
 MI

SOS PROJECT NO: 173041  
 SAMPLED BY: RM NORRIS  
 DATE SAMPLED: 7/3/2017  
 TIME SAMPLED: 2:57 PM  
 SAMPLE MATRIX: SURFACE WATER  
 DATE RECEIVED: 7/3/2017  
 TIME RECEIVED: 6:00 PM

COUNTY:  
 TWP:

**BACTERIA**

No:	Analysis	Concentration	Units	Analyst	Date Completed
	SAMPLE ID: R006AA-1				
1	E.COLI SM9223-B MPN	1	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: R006AA-2				
2	E.COLI SM9223-B MPN	1	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: R006AA-3				
3	E.COLI SM9223-B MPN	2	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BL-1				
4	E.COLI SM9223-B MPN	5	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BL-2				
5	E.COLI SM9223-B MPN	6	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BL-3				
6	E.COLI SM9223-B MPN	4	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BM-1				
7	E.COLI SM9223-B MPN	27	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BM-2				
8	E.COLI SM9223-B MPN	25	Colonies/100 mL	JFN	7/4/2017
	SAMPLE ID: L001BM-3				
9	E.COLI SM9223-B MPN	19	Colonies/100 mL	JFN	7/4/2017

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 SAMPLE MATRIX: SURFACE WATER  
 DATE RECEIVED: 7/3/2017  
 TIME RECEIVED: 6:00 PM

COUNTY:  
 TWP:

**INORGANICS**

No:	Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Reg Limit(MCL)
SAMPLE ID: R006AA-4							
10	NITROGEN, NITRATE - EPA 300.0	0.21	0.10	mg/L (PPM)	KMJ	7/5/2017	
10	NITROGEN, NITRITE - EPA 300.0	ND	0.05	mg/L (PPM)	KMJ	7/5/2017	
SAMPLE ID: L001BL-4							
11	NITROGEN, NITRATE - EPA 300.0	0.21	0.10	mg/L (PPM)	KMJ	7/5/2017	
11	NITROGEN, NITRITE - EPA 300.0	ND	0.05	mg/L (PPM)	KMJ	7/5/2017	
SAMPLE ID: L001BM-4							
12	NITROGEN, NITRATE - EPA 300.0	0.18	0.10	mg/L (PPM)	KMJ	7/5/2017	
12	NITROGEN, NITRITE - EPA 300.0	ND	0.05	mg/L (PPM)	KMJ	7/5/2017	

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COMPANY: THREE LAKES ASSOCIATION  
 NAME:  
 PROJECT NO:  
 WSSN:  
 WELL PERMIT:  
 TAX ID:  
 LOCATION: SOUTH TORCH LAKE SAND BAR  
 TORCH LAKE  
 MI

SOS PROJECT NO: 173172  
 SAMPLED BY: RM NORRIS  
 DATE SAMPLED: 7/10/2017  
 TIME SAMPLED: 2:36 PM  
 SAMPLE MATRIX: SURFACE WATER  
 DATE RECEIVED: 7/10/2017  
 TIME RECEIVED: 3:55 PM

COUNTY:  
 TWP:

**BACTERIA**

No:	Analysis	Concentration	Units	Analyst	Date Completed
	SAMPLE ID: R006AA-1				
1	E.COLI SM9223-B MPN	1	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: R006AA-2				
2	E.COLI SM9223-B MPN	2	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: R006AA-3				
3	E.COLI SM9223-B MPN	1	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BL-1				
4	E.COLI SM9223-B MPN	101	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BL-2				
5	E.COLI SM9223-B MPN	3	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BL-3				
6	E.COLI SM9223-B MPN	9	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BM-1				
7	E.COLI SM9223-B MPN	461	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BM-2				
8	E.COLI SM9223-B MPN	14	Colonies/100 mL	KMJ	7/11/2017
	SAMPLE ID: L001BM-3				
9	E.COLI SM9223-B MPN	22	Colonies/100 mL	KMJ	7/11/2017

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 TAX ID:  
 LOCATION: SOUTH TORCH LAKE SAND BAR  
 TORCH LAKE  
 MI

SOS PROJECT NO: 173172  
 SAMPLED BY: RM NORRIS  
 DATE SAMPLED: 7/10/2017  
 TIME SAMPLED: 2:36 PM  
 SAMPLE MATRIX: SURFACE WATER  
 DATE RECEIVED: 7/10/2017  
 TIME RECEIVED: 3:55 PM

COUNTY:  
 TWP:

**INORGANICS**

No:	Analysis	Concentration	LOD	Units	Analyst	Date Completed	Drinking Water Reg Limit(MCL)
	SAMPLE ID: R001AA-4						
10	NITROGEN, NITRATE - EPA 300.0	0.31	0.10	mg/L (PPM)	KMJ	7/12/2017	
	SAMPLE ID: L001BL-4						
11	NITROGEN, NITRATE - EPA 300.0	0.30	0.10	mg/L (PPM)	KMJ	7/12/2017	
	SAMPLE ID: L001BM-4						
12	NITROGEN, NITRATE - EPA 300.0	0.30	0.10	mg/L (PPM)	KMJ	7/12/2017	

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 LAB MANAGER

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Appendix B: Reports from Environmental Canine Services



## REPORT OF CANINE SCENT TESTING RESULTS FOR SHIPPED WATER SAMPLES

**Prepared for: Becky Norris, Three Lakes Association**  
**Prepared by: Karen Reynolds, Environmental Canine Services LLC**  
**Date: July 6, 2017**

### Background

Canine scent detection by Environmental Canine Services LLC (ECS) has been nationally recognized for the past eight years as an effective tool for assisting with detection of illicit sewage discharges into stormwater systems and surface waters. ECS canines have been utilized in over 70 sewage detection field investigations in thirteen different states since the company began in 2009.

A new rapid and cost effective method for screening water samples anywhere in the country for the presence of sewage contamination was added by ECS in 2014. The method, called "Ship and Sniff", consists of collecting water samples from areas of concern and shipping them to ECS, using strict quality control protocol, for the canines to scent test. The canines only alert to the presence of human sewage, not to animal fecal contamination. The screening results can help provide valuable information for further monitoring efforts or planning source tracking investigations.

### Scent Testing Procedures

Three water samples collected by Three Lakes Association (TLA) on June 26, 2017 were packaged and shipped, using the ECS quality control protocol, to the ECS Midwest Team site in East Lansing, MI. The samples were received by ECS on June 30 and scent tested by canine/handler teams Abbey/Dan Ringel and Kenna/Laura Symonds on July 5.

As an extra precaution to prevent the canines from smelling possible cross-contamination of scents on sample bottles during collection or shipping, the contents of each of the sample bottles were poured into new scent testing containers. Plastic wrap with punched holes was placed over each container to prevent the canines from contact with the sample water while closely scent testing the containers.

As a negative control, one field blank was prepared for the canines to scent test along with the samples. The field blank was prepared by pouring distilled water into a new scent testing container, identical to the ones used for the samples and covered with plastic wrap with punched holes.

As a positive control, waste water treatment plant sewage influent was prepared for the canines to scent test along with the samples. The sewage sample was poured into a new scent testing container, identical to the ones used for the samples and covered with plastic wrap with punched holes.



Canines Abbey and Kenna scent tested each of the TLA samples, negative control, and positive control containers and their responses to each were recorded. The canines alert to the presence of sewage by sitting after smelling the container being tested. Due to mixed responses to the L0018M-5 and R006AA-5 samples by the canines on the first scent test, both canines were immediately re-tested on those samples.

**Scent Testing Results**

Results of the canine scent testing are shown in the following table:

Y = Alert to the presence of sewage N = No alert to the presence of sewage

Sample #	N or P Control	K9 Abbey 1 <sup>st</sup> Response	K9 Kenna 1 <sup>st</sup> Response	K9 Abbey Retest Response	K9 Kenna Retest Response
	P	Y	Y		
	N	N	N		
L001BL-5		Y	Y		
L0018M-5		N	Y	N	Y
R006AA-5		N	Y	N	Y

Both canines correctly did not alert on the field blank and both correctly alerted on the sewage sample, which lends to the validity of the sample scenting results.

Both canines alerted to the presence of sewage in sample L001BL-5. The quantity of sewage in the sample and its various components, such as fecal bacteria is not known to ECS since the canines only indicate presence or absence of sewage. However, when both canines alert, it is a strong indication of the presence of sewage. Laboratory testing for fecal bacteria counts paired with the canine results may provide further information on the level and significance of the sewage contamination.

The canines had mixed responses to samples L0018M-5 and R006AA-5. Their responses remained mixed and consistent on the retest of both of those samples. Due to differences in the scent detection levels of each canine and sewage components they detect, it is common to occasionally have mixed results among the canines for sample scenting, especially when the sample contains a low amount of sewage. The quantity of sewage in the samples and its various components, such as fecal bacteria is not known to ECS since the canines only indicate presence or absence of sewage. However, it is likely that both samples contain a low level of sewage, which is detectable by canine Kenna but not by canine Abbey. Laboratory testing for fecal bacteria counts paired with the canine results may provide further information on the level and significance of the sewage contamination.



## REPORT OF CANINE SCENT TESTING RESULTS FOR SHIPPED WATER SAMPLES

**Prepared for: Becky Norris, Three Lakes Association**  
**Prepared by: Karen Reynolds, Environmental Canine Services LLC**  
**Date: July 11, 2017**

### Background

Canine scent detection by Environmental Canine Services LLC (ECS) has been nationally recognized for the past eight years as an effective tool for assisting with detection of illicit sewage discharges into stormwater systems and surface waters. ECS canines have been utilized in over 70 sewage detection field investigations in thirteen different states since the company began in 2009.

A new rapid and cost effective method for screening water samples anywhere in the country for the presence of sewage contamination was added by ECS in 2014. The method, called "Ship and Sniff", consists of collecting water samples from areas of concern and shipping them to ECS, using strict quality control protocol, for the canines to scent test. The canines only alert to the presence of human sewage, not to animal fecal contamination. The screening results can help provide valuable information for further monitoring efforts or planning source tracking investigations.

### Scent Testing Procedures

Three water samples collected by Three Lakes Association (TLA) on July 3, 2017 were packaged and shipped, using the ECS quality control protocol, to the ECS Midwest Team site in East Lansing, MI. The samples were received by ECS on July 7 and scent tested by canine/handler teams Abbey/Dan Ringel and Kenna/Laura Symonds on July 9.

As an extra precaution to prevent the canines from smelling possible cross-contamination of scents on sample bottles during collection or shipping, the contents of each of the sample bottles were poured into new scent testing containers. Plastic wrap with punched holes was placed over each container to prevent the canines from contact with the sample water while closely scent testing the containers.

As a negative control, two field blanks were prepared for the canines to scent test along with the TLA samples. The field blanks were prepared by pouring distilled water into new scent testing containers, identical to the ones used for the samples and covered with plastic wrap with punched holes.

As a positive control, one waste water treatment plant sewage influent sample was prepared for the canines to scent test along with the TLA samples. The sewage sample was poured into a new scent testing container, identical to the ones used for the samples and covered with plastic wrap with punched holes.

Canines Abbey and Kenna scent tested each of the TLA samples, negative controls, and positive control scenting containers and their responses to each were recorded. The canines alert to the presence of sewage by sitting after smelling the container being tested.

**Scent Testing Results**

Results of the canine scent testing are shown in the following table:

Y = Alert to the presence of sewage N = No alert to the presence of sewage

Sample #	N or P Control	K9 Abbey 1 <sup>st</sup> Response	K9 Kenna 1 <sup>st</sup> Response	K9 Abbey Retest Response	K9 Kenna Retest Response
	N	N	N		
L001BL-5		Y	Y		
	P	Y	Y		
R006AA-5		Y	Y		
	N	N	N		
L0018M-5		Y	Y		

Both canines correctly did not alert on the two field blanks and both correctly alerted on the sewage sample, which lends to the validity of the sample scenting results.

Both canines alerted to the presence of sewage in all three TLA samples, therefore no replicate testing of samples was needed. The quantity of sewage in the samples and its various components, such as fecal bacteria is not known to ECS since the canines only indicate presence or absence of sewage. However, when both canines alert, it is a strong indication of the presence of sewage. Laboratory testing for fecal bacteria counts paired with the canine results may provide further information on the level and significance of the sewage contamination.



## REPORT OF CANINE SCENT TESTING RESULTS FOR SHIPPED WATER SAMPLES

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**Date: July 17, 2017**

### Background

Canine scent detection by Environmental Canine Services LLC (ECS) has been nationally recognized for the past eight years as an effective tool for assisting with detection of illicit sewage discharges into stormwater systems and surface waters. ECS canines have been utilized in over 70 sewage detection field investigations in thirteen different states since the company began in 2009.

A new rapid and cost effective method for screening water samples anywhere in the country for the presence of sewage contamination was added by ECS in 2014. The method, called “Ship and Sniff”, consists of collecting water samples from areas of concern and shipping them to ECS, using strict quality control protocol, for the canines to scent test. The canines only alert to the presence of human sewage, not to animal fecal contamination. The screening results can help provide valuable information for further monitoring efforts or planning source tracking investigations.

### Scent Testing Procedures

Seven water samples collected by Three Lakes Association on July 10-11, 2017 were packaged and shipped, using the ECS quality control protocol, to ECS headquarters in Otisfield, ME. The samples were received by ECS on July 13 and scent tested by canines Sable and Remi on July 15.

As an extra precaution to prevent the canines from smelling possible cross-contamination of scents on sample bottles during collection or shipping, the contents of each of the sample bottles were poured into new scent testing containers.

As a negative control, one field blank was prepared for the canines to scent test along with the shipped samples. The field blank was prepared by pouring distilled water into a new scent testing container, identical to the ones used for the shipped samples.

As a positive control, one sewage sample was prepared for the canines to scent test along with the shipped samples. The sewage sample was prepared by pouring septage from a residential septic system into a new scent testing container, identical to the ones used for the shipped samples.

Canines Sable and Remi scent tested each of the shipped sample, negative control, and positive control scenting containers and their responses to each were recorded. Sable alerts to the presence of sewage by barking after smelling the container being tested. Remi alerts to the presence of sewage by sitting after smelling the container being scent tested.

**Scent Testing Results**

Results of the canine scent testing are shown in the following table:

Y = Alert to the presence of sewage N = No alert to the presence of sewage

Sample #	N or P Control	K9 Sable Response	K9 Remi Response
	P	Y	Y
L001BL-5		N	N
R006AA-5		N	N
L001BM-5		N	N
	N	N	N
L001AW-GW		N	N
L003AF-LW		N	N
L003AF-GW		N	N
L001AW-LW		N	N

Both canines correctly did not alert on the field blank and both correctly alerted on the sewage sample, which lends to the validity of the sample scenting results.

Both canines did not alert to the presence of sewage in all seven shipped samples, therefore no replicate testing of samples was needed. When both canines do not alert, it is a strong indication that sewage is not present in the samples or that it is present in a very low amount that the canines are not able to detect.