# Maple Harbor Sampling

On Tuesday, August 23, 2016, Andy Hogarth and Bob Kingon representing the Elk-Skegemog Lakes Association paddled along the Terrace Avenue shoreline. The wind was out of the south with significant wave action at the shoreline.

We began our assessment at the southern end of Terrace Avenue at 10:50 am and proceeded northerly within very few feet of the shoreline. Our objectives were to identify any pipes or visible springs feeding directly into the lake, look for growth of Cladophora (a filamentous green algae), and take water samples for E. coli testing at suspicious sites.

We took nine water samples. All water samples were collected at the shoreline where there was Cladophora growth. The samples were obtained at 8 different parcels, all with homes. The amount of Cladophora growth varied by parcel from intermittent small patches on rocks to abundant growth with 1 -2 inch filaments.

We did not identify any pipes or springs.

Cladophora growth at the shoreline of Elk Lake is indicative of phosphorus loading that usually occurs because of seepage from septic systems or the recent use of fertilizers that contain phosphorous.

The water samples were placed in previously sealed 100ml bottles that were prepared for E. coli testing by SOS Analytical. The bottles were immediately placed in a cooler and delivered to the SOS Analytical laboratory within the required 6-hour timeframe.

E. coli was identified in every sample collected (see attachment). The range of concentrations was from 160 per 100ml to 313 per 100ml. The median was 228 per 100ml, with 2 samples over 300. The geometric mean was 226.4 per 100ml.

The public health standards for Michigan include both a maximum standard and a seasonal (30 day) standard.[1] A seasonal geometric mean of not greater than 130 E.

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[1] *E. coli* standards for water used for total body contact recreation are provided in the Michigan Public Health Code and Rule 323.1062(1) of the Part 4. Water Quality Standards (Promulgated pursuant to Part 31 of the Natural Resources and Environmental Protection Act, 1997 PA 451, as amended). R 323.1062(1) states, "All waters of the state protected for total body contact recreation shall not contain more than 130 Escherichia coli (*E. coli*) per 100 milliliters (ml), as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during five or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of three or more samples taken at representative locations within a defined sampling area. At no time shall the water of the state protected for total body contact recreation

coli per 100 ml is considered safe for swimming. The geometric mean for the 9 samples collected is 226.4 per 100ml. To establish a seasonal mean at least 3 samples would need to be taken on five occasions over a 30-day period. The standard for samples collected during a one day sampling event is based on the geometric mean of three or more samples and is 300 E. coli per 100 ml.

The highest level of E. coli among our 9 samples was at the site where our field notes indicate we saw the most abundant Cladophora.

The highest levels of E. coli at public beaches most often occur the day after a heavy rainfall. The most recent heavy rainfall prior to our collection on Tuesday was the previous Saturday.

The presence of waterfowl may also influence the level of E. coli. At the time of our collection there was a group of 9 juvenile mallards about 100 feet offshore.

The effect of the wave action is not known. Wave action may have moved E. coli contaminated waters toward the shore. The wave action may also have diluted E. coli concentration at the shoreline.

However, the correlation between the presence of Cladophora and the presence of E. coli in the samples we collected tends to negate that the E. coli contamination is a result of the wildlife. The presence of Cladophora and the E. coli results strongly suggest a chronic condition resulting from groundwater affected by septic system seepage migrating into the lake.

Date: August 29, 2016

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contain more than a maximum of 300 *E. coli* per 100 ml. Compliance shall be based on the geometric mean of three or more samples taken during the same sampling event at representative locations within a defined sampling area."

ATTACHMENT

SOS ANALYTICAL

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

COMPANY: ELK-SKEGEMOG LAKES ASSOCIATION
NAME:
PROJECT NO:
WSSN:
WELL PERMIT:
TAX ID:
LOCATION: MAPLE HARBOR

MI

COUNTY:
TWP:

SOS PROJECT NO: 164250
SAMPLED BY: ANDY HOGARTH/BOB KINGON

DATE SAMPLED: 8/23/2016
TIME SAMPLED: 10:30 AM
SAMPLE MATRIX: SURFACE WATER
DATE RECEIVED: 8/23/2016
TIME RECEIVED: 3:55 PM

## BACTERIA

| No: | Analysis | Concentration | Units | Analyst | Date Completed |
|---|---|---|---|---|---|
| SAMPLE ID: MH1 | | | | | |
| 1 | E.COLI SM9223-B MPN | 160 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH2 | | | | | |
| 2 | E.COLI SM9223-B MPN | 185 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH3 | | | | | |
| 3 | E.COLI SM9223-B MPN | 272 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH4 | | | | | |
| 4 | E.COLI SM9223-B MPN | 228 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH5 | | | | | |
| 5 | E.COLI SM9223-B MPN | 308 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH6 | | | | | |
| 6 | E.COLI SM9223-B MPN | 183 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH7 | | | | | |
| 7 | E.COLI SM9223-B MPN | 261 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH8 | | | | | |
| 8 | E.COLI SM9223-B MPN | 185 | Colonies/100 mL | KMJ | 8/24/2016 |
| SAMPLE ID: MH9 | | | | | |
| 9 | E.COLI SM9223-B MPN | 313 | Colonies/100 mL | KMJ | 8/24/2016 |

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

APPROVED BY: Kelly M Janisse
SHANNA SHEA
LAB MANAGER