2007 ST. MARYS RIVER – SUGAR ISLAND MONITORING: A FINAL REPORT OF THE SUGAR ISLAND MONITORING WORK GROUP

April 2008

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Executive Summary

The Sugar Island Monitoring Workgroup was established in February 2007 in response to reports of floating solids with high *Escherichia coli (E. coli)* levels periodically found in the Lake George channel of the St. Marys River. The multi-agency, bi-national workgroup was tasked by the Four Party Management Committee (consisting of representatives from the U.S. Environmental Protection Agency, Environment Canada, Michigan Department of Environmental Quality, and Ontario Ministry of the Environment) to develop and implement a monitoring plan to determine the source and nature of the floating materials and the cause(s) responsible for the periodic high levels of *E. coli* at the Sugar Island Township Park beach.

The monitoring plan consisted of a surveillance program involving daily inspection of the river for floating materials and weekly water monitoring of 30 stations by Chippewa County Health Department, Sault Ste. Marie Tribe of Chippewa Indians, Algoma Public Health and the Ontario Ministry of the Environment. Two additional sites (upstream and downstream of Gull Islands) were added in early August. A Quality Assurance Project Plan was developed to ensure data quality and consistency among the agencies. The monitoring plan also called for a sediment assessment survey, an inventory of outfalls, and site inspections of the wastewater treatment facilities on the Michigan and Ontario sides of the river.

The 2007 sampling season ran from June 1st to October 3rd. Water samples were collected and tested for *E. coli*, coliform and other parameters (e.g. suspended sediments, alkalinity, 5-day biological oxygen demand); only *E. coli* concentrations are reported and discussed in this report. Physical parameters and general environmental observations were recorded. The Chippewa County Health Department also conducted a sanitary survey at the Sugar Island Township Park to determine the influence of a rainfall event and to evaluate potential sources of contamination to the beach.

There were five incidents of floating material reported during the 2007 season; four were determined to be algae- and/or detritus-based and one as pollen. There were no incidents of floating material reported after July 3, 2007.

The results of the water testing were mapped on a weekly basis, integrating data taken within a 48 hour period. A total of 36 samples exceeded the 300 cfu/100 mL threshold set by the Sugar Island Monitoring Work Group (based on the Michigan Water Quality Standard). Of these exceedances, 15 were detected at Canadian storm sewer outfalls, six at Fort Creek (a tributary on the Canadian side that receives stormwater), one at a near-shore site near the former outfall of the Sugar Shack lagoons on Sugar Island, and one at a mid-river location. The remaining 13 samples with elevated *E. coli* levels were found at various near-shore locations on both sides of the river. Despite episodic, localized exceedances of the 300 cfu/100 mL threshold, the data never indicated that the exceedances affected river concentrations across the channel.

Inspections were conducted on the two Ontario wastewater treatment plants, the Michigan wastewater treatment plant and the Sugar Shack Lagoon area on Sugar Island. Data and observations indicate that the wastewater treatment plants were functioning properly in 2007, except for one violation of fecal coliform limits at the Sault Ste. Marie Michigan treatment plant in March 2007. There were no overflows. Inspections of the Sugar Shack Lagoons

showed no apparent direct connection from the lagoons to the river, although water was observed coming from an old discharge pipe (not visibly connected to the lagoons) during a November site visit.

Sediment monitoring was carried out in September 2006 and September 2007 to assess surficial sediment quality along the Lake George channel. Core samples were taken to determine the extent of any bacterial contamination, among other parameters. The 2007 study assessed sites on the U.S. shoreline, storm sewer outfalls not regularly monitored, selected sites of interest (beach and lagoon), and augmented the 2006 study by re-sampling a limited number of sites. The levels of *E. coli* in 2006 ranged from <10 colony forming units (cfu)/g to 660 cfu/g wet weight; the levels taken in 2007 for non-storm sewer outfall sites ranged from <10cfu/g to 90 cfu/g wet weight. While *E. coli* values can vary substantially over small areas, and there were a larger number of sand samples taken the second year, overall the values were much lower.

Next steps for the workgroup include continued monitoring of *E. coli* and floating material in 2008 following a modified monitoring plan, increased monitoring for *Bacteriodes* (bacteria DNA), and further investigations into potential sources that have been identified.

Section 1: Introduction

Background

The St. Marys River starts as the outlet of Lake Superior at Whitefish Bay and flows southeasterly through several channels to Lake Huron, a distance of 100-120 kilometers depending on the route. The average flow volume is 2,144 cubic meters per second. Several islands were formed when the river divided into its numerous channels. Sugar Island is the largest upstream island, which separates Lake George (east) and Lake Nicolet (west). The watershed includes all of the Lake Superior drainage basin as well as a number of small tributaries which drain directly into the river. Michigan tributaries include the Waiska, Charlotte, Little Munuscong, Munuscong, and Gogomain Rivers, as well as other small streams. In Ontario, the main tributaries are the Big Carp, Little Carp, Root, Garden, Echo, and Bar Rivers, as well as East Davignon Creek, West Davignon Creek, and Fort Creek.

The St. Marys River was identified in 1985 by the International Joint Commission as one of 42 Areas of Concern (AOC) in the Great Lakes basin. The St. Marys River AOC boundary extends from Whitefish Bay between Point Iroquois, Michigan and Gros Cap, Ontario; east and downstream between Quebec Bay and Humbug Point, Ontario in the St. Joseph Channel; between the Michigan side of the river and St. Joseph Island, downstream to the De Tour Passage, Michigan. The St. Marys River was listed as an AOC due designated use impairments caused by problems associated with bacteria, metals, trace organics, contaminated sediments, and impacted biota. The primary sources of these contaminants were industrial and municipal point sources, as well as historic combined sewer overflows. The Stage 1 Remedial Action Plan (RAP) identified and defined the causes of the use impairments (Ontario Ministry of the Environment and Michigan Department of Natural Resources, 1992); the Stage 2a report determined what remedial actions were needed to rectify the impairments (Environment Canada [EC], U.S. Environmental Protection Agency [EPA], Ontario Ministry of the Environment [MOE], and Michigan Department of Environmental Quality [MDEQ], 2002). Algoma Public Health (APH) also produced water quality reports on the Canadian near-shore in 1976 and 1982.

A great deal of monitoring in the St. Marys River has occurred over the last 20 years, primarily in response to its designation as an AOC. These data collection efforts are described in the 1992 and 2002 RAP documents. Since 2001, the Chippewa County Health Department (CCHD) has conducted *E. coli* monitoring at three beaches along the St. Marys River (Four Mile Beach, Sherman Park Beach, and Sugar Island Township Park Beach). During summer 2006, residents along the north shore of Sugar Island reported episodes of contaminants, floatable materials, and other indicators suggestive of sewage to the CCHD. These complaints were accompanied by photographs and water samples.

In response to the citizen complaints, water quality agencies in Canada and the U.S. conducted extensive monitoring to characterize the severity of water quality impairment, describe the floating solids, and identify potential sources of bacteria and solids. The CCHD collected and analyzed nearly 70 samples at or near the East End Wastewater Treatment Plant (Ontario) discharge site, nearly 100 samples from residential shoreline areas, and a small number of samples at or near the Sault Ste. Marie, Michigan Wastewater Treatment Plant. Beach and river water samples were analyzed for *E. coli* and total coliform; river water samples also were analyzed for total suspended solids, total dissolved solids, and ortho-phosphorus. The results

are summarized in two reports (Daley et al., 2007; MDEQ, 2007). Based on these sampling results, and complaints from area residents, the CCHD issued a no body contact advisory in 2006 for a portion of the St. Marys River along the north shore of Sugar Island.

The MOE, Health Canada, and APH also extensively monitored water quality in the St. Marys River in 2006. Samples were collected weekly from 15 locations in the St. Marys River, from July 19 through October 24, 2006. Sites were located above, at, and below the East End Wastewater Treatment Plant (Ontario). Samples were analyzed for *E. coli*, and the data are available upon request. Based on the 2006 sampling results, no advisories were issued for the Canadian shore of the St. Marys River.

MDEQ reviewed all of the 2006 data collected by the CCHD, MOE, and APH, and summarized the findings in a report (MDEQ 2007). This review found that: 1) the number of samples exceeding Michigan Water Quality Standards (MWQS) for *E. coli* (300 colony forming units [cfu] /100 mL) generally was less than 10%; 2) elevated bacteria levels were perhaps more common at or downstream of the previous and current East End Wastewater Treatment Plant discharge points (16%); 3) samples exceeding MWQS were found all along the St. Marys River; and 4) no exceedances occurred after September 11, 2006. The report recommended that the various agencies implement a coordinated, bi-national sampling program under a common Quality Assurance Project Plan to ensure data quality, comparability, and consistency (MDEQ 2007).

In August 2006 the East End Wastewater Treatment Plant finished an upgrade from a primary to a secondary facility and relocated the outfall to faster, deeper water 1 km downstream of the original site. The upgrade included a change in initial screening from ½" mesh to ¼" mesh size. The secondary treatment includes biological nutrient removal and secondary clarifiers. Disinfection was changed from chlorine to ultraviolet light.

EC sampled the Lake George Channel of the St. Marys River in September 2006 to characterize the sediment downstream of the East End Wastewater Treatment Plant and to determine if contaminated sediment contributes to impaired water quality. Surficial sediments were collected at eight transects across the channel, with each transect consisting of 4-5 sites. Sediment cores also were taken to assess historical contamination of the river bottom. Samples were analyzed for *E. coli*, total phosphorus (TP), total kjeldahl nitrogen (TKN), metals, pesticides, PAHs, total organic carbon, grain size, PCBs, and total petroleum hydrocarbons (TPH). Partial results indicate that levels of *E. coli*, TP, and TPH were highest near the Canadian shore and downstream near Little Lake George (Environment Canada 2007). Concentrations were similar to those found in the St. Marys River upstream of the Lake George Channel. Core samples indicated historical contamination of TPH, but not TP or TKN.

Description of 2007 Monitoring

The Sugar Island Monitoring Work Group (SIMWG) was formed in 2007 to develop a comprehensive, coordinated monitoring plan for the St. Marys River/Sugar Island. The SIMWG consists of representatives from local, tribal, state, provincial, and federal agencies in Canada and the U.S. Specifically, these include APH; CCHD; MOE; MDEQ; EC; EPA; Health Canada; Bay Mills Indian Community; Sault Ste. Marie Tribe of Chippewa Indians (Sault Tribe); and Garden River First Nation.

The SIMWG was charged with the following tasks:

1. Review previous water and sediment monitoring data, as well as various agency monitoring activities;
2. Identify data gaps and future monitoring needs;
3. Update/enhance the Sugar Island Incidence Response Protocol; and
4. Develop an interagency monitoring plan for 2007 that incorporates ambient and event-response monitoring activities.

Based on this charge, the SIMWG developed a monitoring plan for 2007 (Appendix A). This plan outlined the following objectives:

a) Determine the nature of solid floatable material episodically impacting the north shore of Sugar Island reach of the Lake George Channel.
b) Facilitate international cooperation and sampling to ensure data quality, consistency, and comparability.
c) Assess current water quality conditions and water quality standards attainment status along the Sugar Island reach.
d) Assess the final effluent quality of select point source discharges determined to have the potential to impair water quality conditions along the Sugar Island reach of the Lake George Channel.
e) Identify authorized/unauthorized point source or non-point source discharges and whether sediments are impairing water quality conditions or are responsible for any beach closures or health advisories.
f) Determine any other potential ecological sources or processes (e.g. birds, groundwater, sediment resuspension, algal mats, etc.) that are impairing or could potentially impair water quality conditions and/or are responsible for any closure of the Sugar Island Township Park (SITP) beach or health advisories along the Sugar Island reach of the Lake George Channel.

A coordinated monitoring effort requires a unified Quality Assurance Project Plan (QAPP), which describes the sampling and analytical protocols to be used by all agencies with monitoring responsibilities. A QAPP document was jointly prepared by the agencies prior to the field season. All sample collection and analysis procedures were fully consistent with the QAPP, ensuring data quality and comparability. Quality assurance results are included in this report, and the QAPP is included as Appendix B.

Project Scope

The 2007 monitoring activities were specifically designed to: 1) assess water quality conditions and potential impacts on the north shore of Sugar Island in the St. Marys River; 2) sample ambient water at other selected sites in the Lake George Channel of the St. Marys River, discharges from point and non-point sources, sediment, and floating material for relevant water quality indicators, especially *E. coli*; and 3) identify sources/causes of water quality impairment, aesthetic impairment, beach closures, and/or health advisories.

Sugar Island Monitoring Work Group Members

Co-chairs
Debbie Burniston (Environment Canada)
Gary Kohlhepp (Michigan Department of Environmental Quality)

Amanda Bosak (Bay Mills Indian Community)
Thuan Chau (Health Canada)
Sherri Cleaves (Algoma Public Health)
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Jennifer Francella (Algoma Public Health)
Lilian Keen (Ontario Ministry of the Environment)
Robert Lehto (Sault Ste. Marie Tribe of Chippewa Indians)
Chris Marvin (Environment Canada)
David Rockwell (Environment Protection Agency)
Rod Stewart (Ontario Ministry of the Environment)
Dan Tadgerson (Sault Ste. Marie Tribe of Chippewa Indians)
Kate Taillon (Environment Canada)

Section 2: Methods

Sampling Area

The 2007 monitoring effort focused on the Lake George Channel of the St. Marys River, particularly along the north shore of Sugar Island, and upstream as appropriate to characterize the extent of contamination and to identify potential contamination sources. A total of 30 stations were monitored in 2007 (Appendix C). Most were sampled from June 6 through October 3, although a few sites were added during the summer as additional potential contaminant sources were identified (upstream and downstream of Gull Islands). Thirteen of the sites were located in the St. Marys River channel, while the others were along the Canadian and U.S. shores (including public beaches). Some of the shore locations were at or near stormwater outfalls.

Sample Collection

Coordinated sampling was conducted weekly from June 6 through October 3 by the CCHD, APH, MOE, and the Sault Tribe. Agencies generally sampled on Wednesday of each week. The CCHD and APH used essentially the same sampling procedures for beaches. Three water samples (replicates) were collected at each beach/near-shore location. Samples collected in the St. Marys River by the MOE and Sault Tribe generally consisted of single grab samples at each monitoring station (triplicate samples were taken at one location on each sample date). *E. coli* samples were collected in sterilized bottles and preserved with sodium thiosulfate. Similar procedures were followed when collecting samples for other analytical parameters (total suspended solids, phosphorus), except that sodium thiosulfate was not added to the bottles and sample size was larger. Samples were immediately placed in a cooler with ice or cooler packs for delivery to the appropriate laboratory, within 6 hours of collection. Detailed sample collection procedures for all agencies can be found in the QAPP.

In addition to routine weekly monitoring, potential point and non-point sources of contamination were identified. Daily effluent samples were collected by the operating authorities on weekdays from the East End Wastewater Treatment Plant and the Sault Ste. Marie Michigan Wastewater Treatment Plant. MOE also sampled the effluent from the East End Treatment Plant on a weekly basis. Starting in July, the Sault Tribe sampled weekly at the mouth of an inlet to the Sugar Shack lagoons located on Sugar Island just inland of the Lake George Channel. Using a grant from EPA, the CCHD conducted a sanitary survey at the SITP beach to determine the influence of a rainfall event and to evaluate potential sources of contamination to the beach. The SIMWG wanted to collect several samples during and after wet weather, but such events were rare as 2007 was a relatively dry summer and wet weather sampling was minimal.

Sediment sampling was conducted at numerous sites in the Lake George Channel by EC in 2007. Some 2006 sites were re-sampled, and several new sites (especially in U.S. near-shore areas) were monitored. Core samples were collected at selected locations using a gravity corer, and surficial sediments were collected at other sites using ponar grabs. Detailed sample collection procedures are described in a January 2007 EC interim report (Burniston and Kraft, 2007).

Area residents and others frequently on the river served as volunteers to alert the local health departments when excessive floating material was observed. The intent of the monitoring was to obtain a sample of floating material for identification. The identification of material from a non-natural source would have initiated further monitoring/surveillance. In five instances in 2007, floatable samples were reported to the CCHD, APH, MDEQ, and MOE. Samples from two events were collected for analysis.

Sample Analysis

All samples were analyzed using approved methods and according to standard protocols. *E. coli* water samples collected by APH and MOE were analyzed by the Ontario Ministry of Health and Long-term Care using the membrane filtration technique (SOP-SD-W-006-006). MOE samples also were analyzed for other parameters, including total suspended solids (TSS), alkalinity, and total phosphorus. *E. coli* water samples collected by the CCHD and the Sault Tribe were analyzed by Lake Superior State University using an EPA-approved method, Colilert 18.

Analytical procedure details are available in the QAPP. Each laboratory followed its own QA/QC procedures during the study.

Quality Assurance/Quality Control

A number of quality control activities were implemented in 2007 to ensure data reliability and comparability among the participating agencies. In May and June, proficiency tests were conducted to evaluate analytical comparability. These tests were conducted for *E. coli*, total suspended solids, total solids, and conductivity. Sets of four bottles with water containing known concentrations of the target parameters were provided to LSSU, the Ontario Ministry of Health and Long-Term Care Public Health Laboratory, and Whitewater Associates. These proficiency tests were intended to demonstrate the level of analytical comparability among the participating laboratories. The 2007 proficiency studies carried out under the SIMWG QAPP, as well as a 2006 comparison study between Whitewater Associates and LSSU, yielded similar results.

Sampling crews conducted side-by-side sampling events on a rotating basis throughout the monitoring season. These events consisted of sampling crew representatives from each agency (i.e. APH, CCHD, MOE, Sault Tribe) going to the same locations at the same time, collecting sample replicates according to each of their respective sampling protocols, and sending the samples to each of the participating laboratories. This quality control (QC) check evaluated sample collection and analysis procedures for data consistency and comparability. Acceptable inter-agency variation for samples with *E. coli* values between 100 and 500 cfu/100 mL was defined as 50% or less.

Other QC checks included field blanks, field replicates, duplicates, and method blanks. Field blanks monitored potential contamination introduced into the samples by collection and handling procedures. The blanks were generated at the sample collection site by filling an empty sample bottle with distilled/deionized water. The blanks were delivered from the field to the laboratory in the same manner as the regular samples. The field blanks were collected at a frequency of one per sampling trip. Field blanks should fall below 10 cfu/100 mL.

Field replicates assessed the consistency and precision of field sampling procedures. The replicates were collected by filling additional sample bottles within 15 minutes of the first sample, from the same source as the first sample using identical procedures. The replicates were delivered to the laboratory in a cooler with the regular samples. The field replicates were collected by each sampling agency at a frequency of one per sampling trip, and were also collected during the side-by-side sampling. Acceptable field replicate variation was defined as 30% or less.

Internal QC procedures for each laboratory were specified in its standard procedures. Method blanks, to be used at the discretion of the laboratories, were conducted by passing clean matrix through the analytical method steps to assess contamination resulting from laboratory procedures. Other types of QC checks (reagent/preparation blanks, matrix spike, and matrix spike duplicated, calibration standards, internal standards, surrogate standards, the frequency of each audit, the specific calibration check standards, duplicate analyses) also were employed by the laboratories according to their internal procedures. Laboratory blanks should fall below 10 cfu/100 mL.

The QA/QC results are discussed in Section 8 of this report.

Data Management and Reporting

Analytical results were transmitted from the laboratories to the sample collection agencies as individual measurements for all parameters. Immediately after receiving analytical results from the laboratories each week, the sample collection agencies provided the data to MOE. All results were consolidated by MOE into an Excel spreadsheet which was made available to the SIMWG through an e-mail distribution list. A web site was established by the EPA, allowing the agencies to access the water quality data.

At the conclusion of the 2007 monitoring, each sampling agency prepared individual reports (available upon request) that summarized the results, explained whether high contaminant levels were observed, and identified potential contaminant sources. The individual reports served as the basis for this report, and can be obtained through the contacts listed in Section 4.

In this report, *E. coli* levels above 300 cfu/100 mL are referred to as an **exceedance**, while values between 100-300 cfu/100 mL are often reported as **elevated**.

Section 3: Incident Reports

One component of the 2007 monitoring work plan was the reporting of any unusual floating material observations by Sugar Island residents, agencies, organizations frequently on the St. Marys River (e.g. Ontario Provincial Police, U.S. Coast Guard), and the general public. Observers were encouraged to immediately report such incidents to the local jurisdictions (i.e., CCHD or APH). The SIMWG developed an Incident Response Protocol to immediately notify all agencies on the SIMWG, take photographs and collect samples if possible. Samples were sent to MDEQ and/or EC for analysis when available.

There were five incidents reported to the SIMWG during 2007. These reports were received between May and early July. A summary of these incidents and associated findings are presented below, with individual reports listed in Appendix D.

Samples were taken for two of the five incidents. These samples were sent to LSSU, MDEQ, and Environment Canada for identification and analysis. Both samples were dominated by detritus and two types of filamentous algae: a green algae (Spirogyra) and a cyanobacteria (a blue-green algae). Spirogyra is common and can flourish in quiet waters and form tangled mats or globs. These mats can be benthic (but not attached to the substrate), but when conditions are right the algae begin to photosynthesize, grow, produce gases, and change buoyancy. When this happens the mats can rise and begin to float.

The samples taken on 5/10/07 had minimal *E. coli* concentrations but did have coliform counts of up to >2400 cfu/100mL. All were negative for the human *Bacteriodes* marker. Samples taken on 6/3/07 had *E. coli* concentrations of 600 cfu/100mL - 4900 cfu/100mL. Neither sample contained the human *Bacteriodes* marker.

Figure 3.1: Photo of samples taken May, 10, 2007

Section 4: Weekly Beach and River Monitoring Results

Overall *E. coli* levels found during the 2007 field season were low, with a large majority of samples below 100 cfu/100 mL. Of the hundreds of date/location combination of samples taken by the SIMWG members, only 36 exceeded the MWQS of 300 cfu/100 mL (Figure 4.1). Of these, 15 (42%) were taken at stormwater outfalls. To improve graphic representation, *E. coli* concentrations greater than 1000 cfu/100 mL are plotted in Figures 4.1 – 4.5 as 1000 cfu. All individual sample results are listed in Appendix E.

Weekly sampling results were plotted on maps to allow for an integrated assessment of water quality along the St. Marys River (Appendix F). The results of the QA/QC sampling (Section 8) indicated that integrating data from various agencies was appropriate. Data were integrated for sampling done within a 48 hour period, usually for the Tuesday, Wednesday, and Thursday of each week. On two occasions, July 9 and July 23, sampling was done by the Sault Tribe and MOE, respectively, outside of the 48 hour window of the other agencies' sampling. The SIMWG considered results more than 48 hours apart as separate sampling events. Therefore, two maps were prepared for the week of July 9; one integrating data from July 9-11, the other combining data from July 10-12. While the overall levels of *E. coli* were relatively low throughout the season, a few patterns in the spatial distribution were evident. Higher levels, including exceedances of the MWQS (>300 cfu/100 mL), were found at storm sewer outfalls along the Canadian shore. *E. coli* levels greater than 300 cfu/100 mL were found at one or more storm sewer outfall sites during several weeks of this study, including June 6, 13, and 20; July 12 and 23; August 1, 7, and 15; September 12; and October 3.

Elevated *E. coli* levels occurred at many sites on the river on July 9 and 12, including three storm sewer outfalls along the Canadian shore and six locations along the U.S. shore. A heavy rain occurred just prior to July 12. Rain events are known to transport *E. coli* into surface waters, and the elevated levels found across the sampling area on this date support this observation. Elevated *E. coli* levels also occurred along Canadian and U.S. shoreline sites on August 1, despite the absence of a rain event. *E. coli* was low at mid-river locations.

September 26 was the only sampling date on which a mid-river location exceeded 300 cfu/100 mL). Two sites close to SITP beach had *E. coli* levels greater than 300cfu/100 mL on June 27. However, none of the other locations had exceedances on this date, including Canadian storm sewers outfalls. The sampling period was not influenced by rain.

Table 4.1 lists all of the exceedances, in order by date, for the 2007 sampling season. In addition to the influence of stormwater, other primary causes of high *E. coli* levels appeared to be heavy precipitation, high winds, and the presence of waterfowl. Shallow sampling sites are more susceptible to these factors than fast-moving, deeper channel sampling locations. The results of individual sampling agencies are discussed in more detail in this chapter.

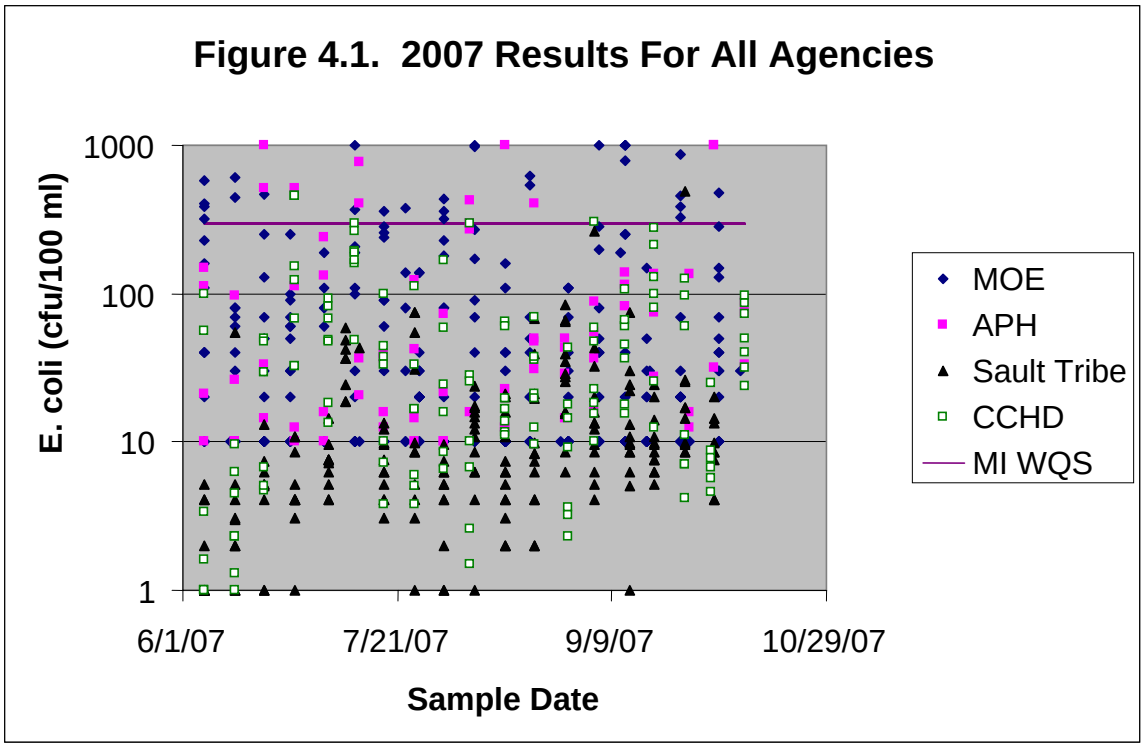


Figure 4.1. 2007 Results For All Agencies
E. coli (cfu/100 ml)
1000
100
10
1
6/1/07
7/21/07
9/9/07
10/29/07
Sample Date
MOE
APH
Sault Tribe
CCHD
MI WQS

TABLE 4.1 SIMWG Exceedences for the 2007 Sampling Season (May 29 – October 10)

Agency	Sample Description	Sample Date (yy/mm/dd)	Reported E.coli values (single value and geometric mean)	Water Temperature (degrees Celsius)	NOAA WIND DATA (daily average - mph)	NOAA WIND DATA (direction, 360 = true N)	NOAA PRECIP DATA (US in., 48 hour)	Presence of Waterfowl
MOE	Dacey Road Outfall	6/6/2007	320	n/a	6.7	200	0	N
MOE	Fort Creek (geo mean)	6/6/2007	449	n/a	6.7	200	0	N
MOE	Queen Street Outfall	6/13/2007	450	n/a	3.7	300	0	N
MOE	Dacey Road Outfall	6/13/2007	600	n/a	3.7	300	0	N
MOE	Queen Street Outfall	6/20/2007	470	15	5.7	310	0.44	Y
APH	River Road A	6/20/2007	508	14	5.7	310	0.44	Y
APH	River Road B	6/20/2007	1000	15	5.7	310	0.44	Y
APH	River Road B	6/27/2007	509	15.4	8.1	310	0	Y
CCHD	Bumstead 55-n. Westshore Dr.	6/27/2007	461	20.1	8.1	310	0	Y
CCHD	Eitrem COVE-182 N. Westshore Dr.	6/27/2007	461	20	8.1	310	0	N
Sault Tribe	Mouth of Sugar Island Lagoons	7/9/2007	1986	17.9	6.2	330	0.26	N
MOE	Fort Creek	7/11/2007	>1000	16	12.6	280	0.14	Y
MOE	Bellevue Park SSO	7/11/2007	370	17	12.6	280	0.14	Y
APH	River Road A	7/12/2007	407	17	7.4	290	0.23	Y
APH	River Road B	7/12/2007	766	17.6	7.4	290	0.23	Y
MOE	Fort Creek	7/23/2007	380	15	5.38	230	0	N
MOE	Dacey Road Outfall	8/1/2007	320	24	13	200	0	N
MOE	Fort Creek	8/8/2007	970	26	7.1	260	0	N
APH	River Road B	8/7/2007	423	n/a	5.9	150	0.06	Y
MOE	Queen Street Outfall	8/8/2007	>1000	26	7.1	260	0.06	Y
APH	Clergue Park	8/15/2007	1000	23.5	4.3	330	0.02	Y
MOE	Queen Street Outfall	8/21/2007	540	20	9.1	140	0	Y
MOE	Dacey Road Outfall	8/21/2007	620	20.5	9.1	140	0	Y
APH	Clergue Park	8/22/2007	404	19.1	4	130	0.11	N
CCHD	Eitrem COVE-182 N. Westshore Dr.	9/5/2007	302	18.33	5.9	130	0.55	Y
MOE	Dacey Road Outfall	9/6/2007	>1000	20	7.4	210	0.15	N
MOE	Fort Creek	9/12/2007	>1000	15	5.9	310	0.79	Y
MOE	Bellevue Park SSO	9/12/2007	780	15	5.9	310	0.79	N
MOE	Queen Street Outfall	9/12/2007	>1000	15	5.9	310	0.79	N
MOE	Dacey Road Outfall	9/12/2007	>1000	18	5.9	310	0.79	N
MOE	Fort Creek	9/25/2007	860	17	8.3	310	0.14	Y
MOE	Bellevue Park SSO	9/25/2007	460	17	8.3	310	0.14	N
Sault Tribe	downstream EETP	9/26/2007	488	14.4	8.8	300	0	N
APH	River Road A	10/3/2007	1000	15.2	11.4	230	0.07	N
APH	River Road B	10/3/2007	1000	15.7	11.4	230	0.07	N
MOE	Bellevue Park SSO	10/4/2007	480	15	6.4	200	0.06	Y
MINISTRY OF THE ENVIRONMENT								
ALGOMA PUBLIC HEALTH								
CHIPPEWA COUNTY HEALTH DEPARTMENT								
SAULT TRIBE								

Algoma Public Health

APH collected all samples from the shore with a sampling rod in shallow water areas. It recorded ten incidents (geometric means) of *E. coli* levels greater than 300 cfu/100 mL, which occurred at three of the four APH sampling locations (Figure 4.2). Most were found at the River Road Dock sites (A and B). Rainfall, waterfowl, and high winds with low water levels at sampling locations were potential factors contributing to the high *E. coli* levels.

A copy of the APH 2007 report can be obtained by contacting Sherri Cleaves at (705) 541-7347 or scleaves@algomapublichealth.com.

Chippewa County Health Department

The CCHD sampled seven locations in slow-moving water; five were in shallow waters while two were deeper areas. The CCHD found only three instances (geometric means) where *E. coli* levels exceeded 300 cfu/100 mL in 2007 (Figure 4.3). All three were at shallow-water sites. While there were several possible point and non-point sources of contamination, high wildlife and waterfowl populations were the most probable sources. The CCHD also completed a Sanitary Survey Pilot Project, which is discussed in Section 7.

A copy of the CCHD 2007 report can be obtained by contacting Christine Daley at (906) 635-3602 or cdaley@chippewahd.com.

Figure 4.2. APH 2007 Results

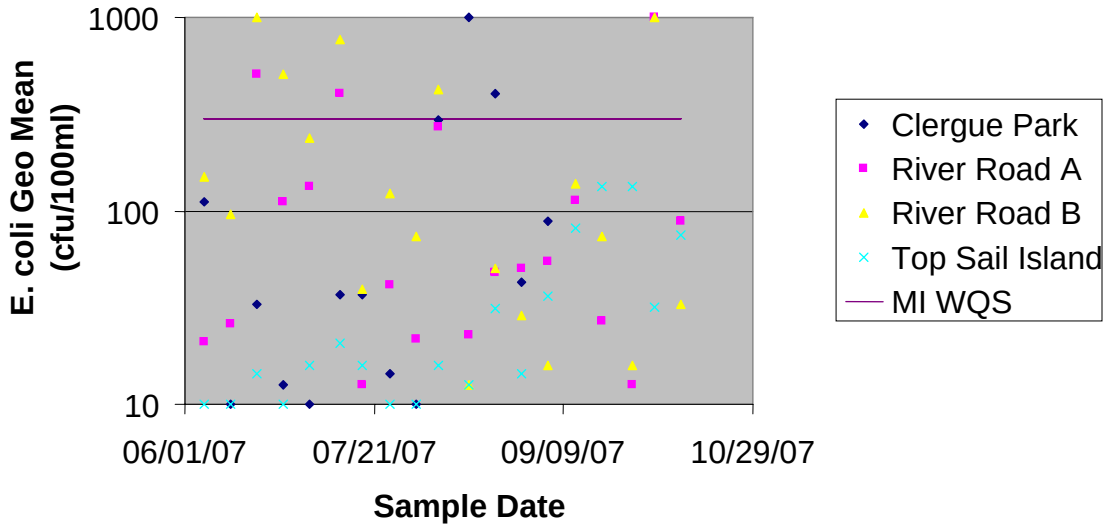
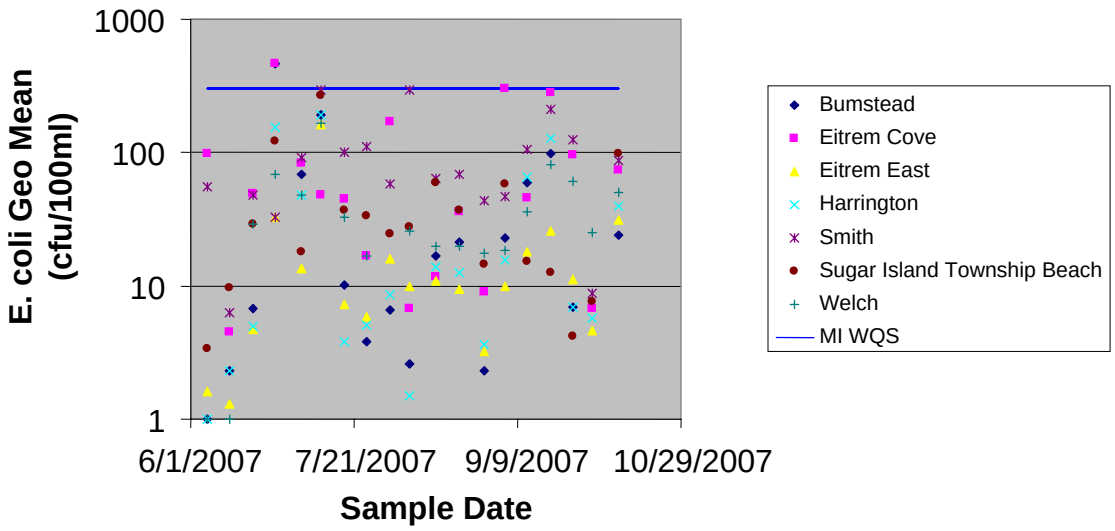


Figure 4.3. CCHD 2007 Results



Ontario Ministry of the Environment

The MOE found 21 exceedances in 2007 (based on a combination of geometric means and single samples), more than any other agency (Figure 4.4). The majority of these came from three locations. Two were stormwater outfalls, Dacey Road outfall, and Queen Street outfall. The third site, Fort Creek, was sampled at the mouth of the creek. Fort Creek has storm sewer outfalls emptying into it. These locations also are shallow-water sampling locations. The MOE sampled four deep-water locations, none of which produced elevated *E. coli* levels. The high *E. coli* levels likely were caused by the presence of wildlife and the shallow depth at which the water samples were taken. There also appears to be no correlation between high *E. coli* levels and weather conditions.

A copy of the MOE 2007 report can be obtained by contacting Rod Stewart at (705) 942-6384 or rod.stewart@ontario.ca.

Sault Ste. Marie Tribe of Chippewa Indians

The Sault Tribe sampled eight deep-water locations and three shallow-water locations. Sault Tribe found only two incidents where *E. coli* exceeded 300 cfu/100 mL (Figure 4.5). These occurred on separate days at different shallow-water locations. Although both samples were collected during or after rainfall events, the overall data do not suggest a strong correlation between rain and high *E. coli* levels.

A copy of the Sault Tribe 2007 report can be obtained by contacting Bob Lehto at (906) 635-3602 or rlehto@saulttribe.net.

Garden River First Nation

The Garden River First Nation began sampling in late June along the northern shore of the Lake George Channel. Six exceedances of the 300 cfu/100 mL WQS between June 27 and August 14 were recorded.

A copy of the Garden River 2007 report can be obtained by contacting Ralph Condotta at (705) 671-4109 or ralph_condotta@hc-sc.gc.ca.

Bacteria DNA Testing

In addition to analyzing for the number of *E. coli*, selected water and sediment samples were screened for the presence of strains of the anaerobic bacterium *Bacteroides* associated with human fecal pollution by the Environment Canada Laboratory in Burlington Ontario. This assay involves filtering as much water as feasible and extracting total genomic DNA from the filter using a beadbeater extraction method. DNA was purified and used as template in a polymerase chain reaction (PCR) assay using primers to amplify the human *Bacteroides* DNA sequence if it was present in the sample. Since sample water temperature, condition, and the period between time of sample collection and analysis varied, and no control samples were processed, the results from these tests should only be viewed as exploratory. The sampling was conducted as a preliminary investigation to indicate whether a more intensive study is warranted in the future.

DNA testing results were obtained for 19 water samples in 2007, and these concentrations were below 100 cfu/100 mL except for one sample on May 11 (125 cfu/100 mL) and from floating algae material from the river on July 3 (4,900 cfu/100 mL). The only other water samples

where *E. coli* concentrations exceeded 12 cfu/100 mL were from the Sugar Shack lagoon mouth on July 19 (72 cfu), site 07C1-P1 (EC sediment sapling site) on August 14 (57 cfu) and site OMOL-TB2 (MOE outfall site) on July 12 (26 cfu). *Bacteroides* results were obtained for 29 water samples; three were positive for the human *Bacteroides* DNA marker. One was from the Dennis Street outfall site on September 12, and another was from the Holiday Inn boat slip site collected on the same day. A field blank sample collected on September 26 was also positive, but water samples in this courier shipment had broken open during transit.

Figure 4.4. MOE 2007 Results

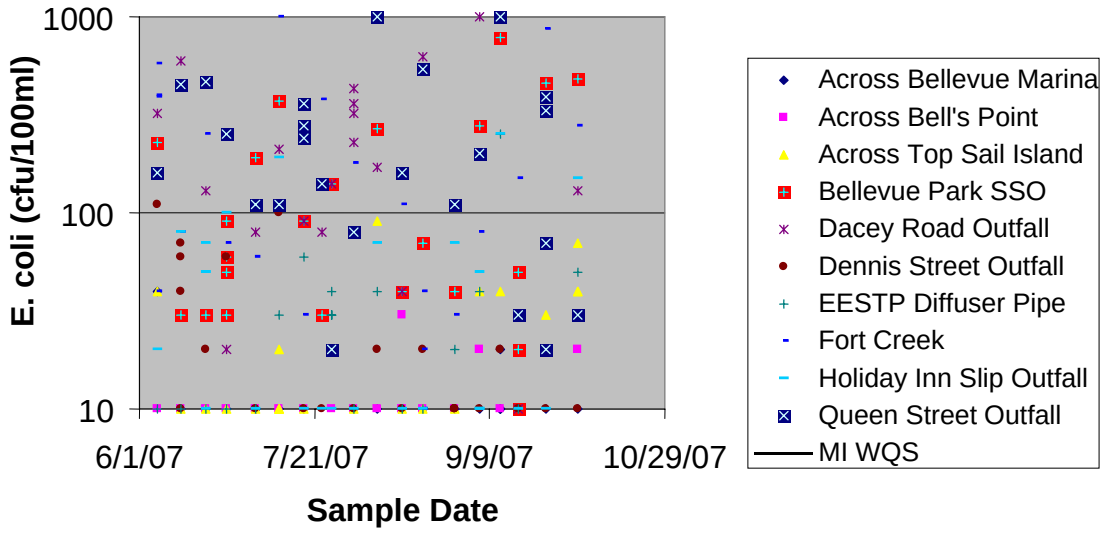
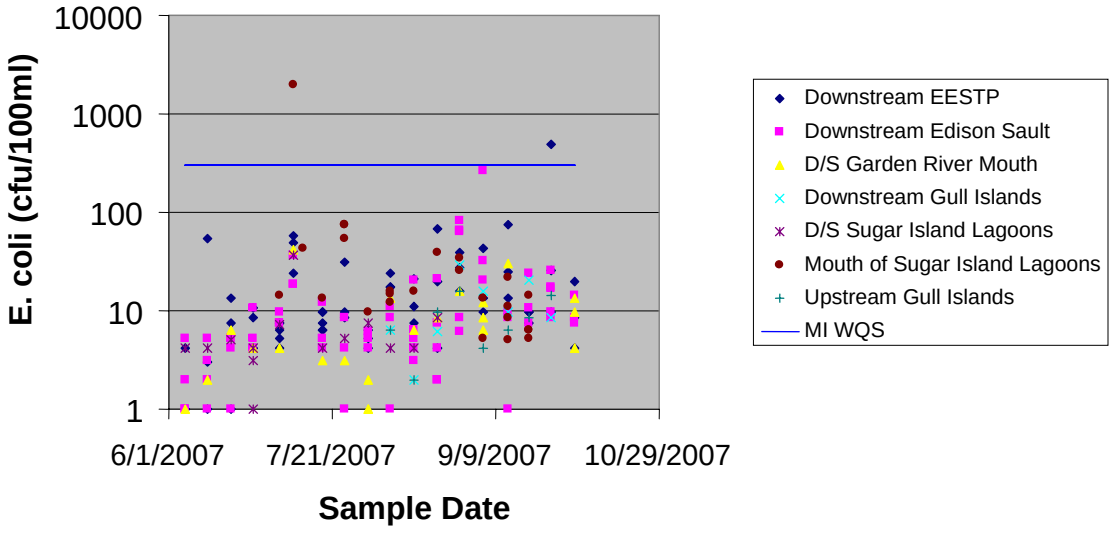


Figure 4.5. Sault Tribe 2007 Results



Section 5: St. Marys River Sediment Sampling

The purpose of the sediment sampling survey was to assess sediment quality in the Lake George Channel of the St. Marys River where high levels of *E. coli* in the water have previously been reported. There were two sampling periods, one immediately after the secondary upgrade of the East End Wastewater Treatment Plant. The 2006 sampling was designed to determine spatial contamination down the channel. While every effort was made to have comprehensive coverage of the channel, there were limitations. Sample sites were limited to depositional areas and areas on the American side of the channel accessible by boat. The area between the main channel and the East End Wastewater Treatment Plant had very little sediment as did several sites mid-stream. Samples from areas having little sediment and mainly sand were analyzed for *E. coli* and nutrients only. Shallow, inaccessible areas near the Sugar Island shore left gaps in the spatial coverage. The second field study took place one year later. The objectives of the second field study were to a) determine the sediment quality in areas not assessable in 2006; b) screen areas that were identified as potential sources (tributaries, SSO and potential lagoon outfalls); and c) determine the quality of the sediment along the front of the Sugar Island Township Park Beach, an area that has historically reported high levels of *E. coli* in the water. Five cores were taken in 2006 to assess historic contamination. The single core in 2007 was taken at one of the depositional zones where, in 2006, *E. coli* was found in subsurface slices.

Sample Collection

Substrate mapping of the Lake George channel was undertaken by the National Water Research Institute prior to sample collection. Roxann, an acoustic seabed classification system, was used to classify bottom-sediment type by extracting data on sediment roughness and hardness from sounder echoes. Data on time, position, depth, and classification parameters were logged to a computer file which was used to export data to a geographic-information system (GIS) for post-processing (Rukavina, Norm 1997). The resulting maps were used to determine sample sites for surficial sediment and to locate deep soft sediment locations for core sampling.

Sediment sampling was done from a 23-foot P class survey launch, or from shore (2007) where water levels were too low. In 2006, surficial sediment samples were collected in a grid-like fashion down the channel. Four to five samples were collected across the channel beginning just upstream of the old East End Wastewater Treatment Plant outfall. A lack of substrate limited the sampling to two reference samples between the upstream East End Wastewater Treatment Plant site and the main channel. Sample locations, specifically shore locations, were physically limited by the depth of the water accessible by boat. There were some locations which were altered from the grid due to a lack of substrate. This was most common mid-stream. Three depositional areas upstream of the sampling grid were located using Roxann, and included one site upstream of the main channel and two sites just east of the main channel. These upstream sites were used as reference sites. In 2007, the study was designed to collect samples in shallow nearshore areas not assessable in 2006, as well as to collect samples in areas of special interest and sites near potential sources of *E. coli* (i.e., SITP beach, storm sewer outfalls not regularly monitored, and the Sugar Shack Lagoon former outfall site). Since many of the upstream samples collected in 2006 had higher *E. coli* values than the samples taken in the Lake George channel, a cross section of seven samples was taken further upstream. In 2007, 48 sediment samples were taken including seven upstream samples, two tributary

samples, six SITP beach front samples, three Sugar Shack Lagoon area samples, and one core sectioned into ten 1 cm samples. *E. coli* concentrations can differ considerably in small areas. Samples taken at locations of the same coordinates can not be relied upon to be exactly the same site. For this reason it was not the intent of the 2007 survey to repeat a large number of sites with the idea of showing concentration change over time. Some sites, however, were repeated for a general indication of change.

To help reduce variability, a single sample consisted of a composite of more than three ponar grabs taken from the same location. A Wildco petit ponar, rinsed in ambient river water, was dropped and the soft sediment sieved through a 2-mm stainless steel sieve to remove the larger size fractions and to assist with homogenization of the sample. The sample was further homogenized by mixing with a stainless steel spoon for approximately two minutes. Several sample jars were filled at each site. The jars filled included:

- One 125-mL glass jar filled with no headspace for *E. coli* analysis;
- One 125-mL polyethylene container filled ½ full for total organic carbon, LOI and grain size.

Core samples were taken at five locations in 2006 where RoxAnn indicated soft sediment of greater than 20 cm. In 2007, a core at site A depositional area which transected the channel was located just upstream of Little Lake George. Four core samples were taken at this location. In addition to this transect a core was taken just downstream of the East End Wastewater Treatment Plant old outflow on the Canadian side of the channel. Cores were collected using an EC technical operations gravity corer and sub-sampled in 1 cm increments for the first 15 cm, then sub-sampled in two cm increments for the remainder of the core. The cores ranged in length from 15 cm to 25 cm. Each section was collected in a separate zip lock polyethylene bag. Twelve cores were collected for each site with corresponding "depths" homogenized together. The sample jars filled at each site included.

- One 125-mL glass jar filled with no headspace for *E. coli* analysis;

The remainder of the sample was left in the bag on ice and transferred to a 250 mL jar at the laboratory. After the appropriate sample jars were filled, the sampling equipment was thoroughly rinsed in the ambient river water.

Several blank samples were taken using Ottawa sand as a substrate. Ottawa sand was exposed to the sampling environment and jarred for analysis. Blanks taken during coring were a composite of approximately 10 grams of Ottawa sand added to the sample bag during each of the twelve cores taken per sample. Blanks were stored and submitted with field samples. Duplicate samples were also taken at various times during the five sampling days. The site location was recorded using a Magnavox MX 300 geographic positioning system (GPS). Samples were immediately stored on ice.

Laboratory Processing

Maxxam Analytical Inc has Canadian Association for Environmental Analytical Laboratories (CAEL) accreditation for the analyses. Their QA/QC program consisted of blanks, spiked blanks, and duplicate samples (i.e., laboratory replicate runs). Laboratory methods used for the analysis in this report were:

E. coli (CFU/g)-MOEE E3433 (ref MOEE E3433)
Moisture- Ont SOP-0114 (ref MOE Handbook (1983))

Results

Only *E. coli* results are discussed in this report. Half detection limit values replaced non-detects for calculations of means. *E. coli* is reported in wet weight; moisture and grain size information is available.

E. coli was detected in 92% of the surficial samples ranging from <10 cfu/g-660 cfu/g wet weight in 2006, and in 69% of the samples ranging from <10 cfu/g - 90 cfu/g in 2007, excluding storm sewer sites (Figures 5.1 and 5.2). Storm sewers sampled in 2007 had concentrations of 120, 140 and 1400 cfu/g wet wt. Mean concentrations expressed as wet weight were 114 cfu/g ± 170 cfu/g (n=62) for 2006 and 13 cfu/g ±10 cfu/g (n=20) in 2007 for cross section sites only. SITP beach front samples (N=6) had a mean value of 29 cfu/g. In 2006 core one exhibited a decreasing concentration profile from the surface to a 7 cm depth, declining rapidly from a surface concentration of 620 cfu/g to 120 cfu/g at the 2 cm depth. Levels were found above detection in the top four cm of cores 3 and 4 but at much lower concentrations ranging between 10-40 cfu/g. Core 2 had shallow detections at 10 cfu/g wet wt. Core five taken just downstream from the EEWWTP had a surface concentration of 90 cfu/g and levels generally just above detection for the next 6 cm. In 2007, a core was taken at the same location as core 1. Levels of *E. coli* were found only in the surficial section at a concentration of 10 cfu/g wet wt.

In 2006, two of the three samples upstream from the sampling grid had *E. coli* concentrations above detection. Ponar 1 and Ponar 3 had values of 333 cfu/g and 102 cfu/g wet wt, respectively. Eighty four percent of the samples were less than ponar 1 while forty one percent were less than Ponar 3. In 2007, the upstream sites (different from 2006 sites) ranged from <10-70 cfu/g, mean 24 cfu/g ± 22 cfu/g. The upstream site of 70 cfu/g was the highest non SSO/tributary sample taken in the 2007 survey. Sample locations in common (2006 and 2007) (n=7) were much lower in 2007 than the samples taken in 2006.

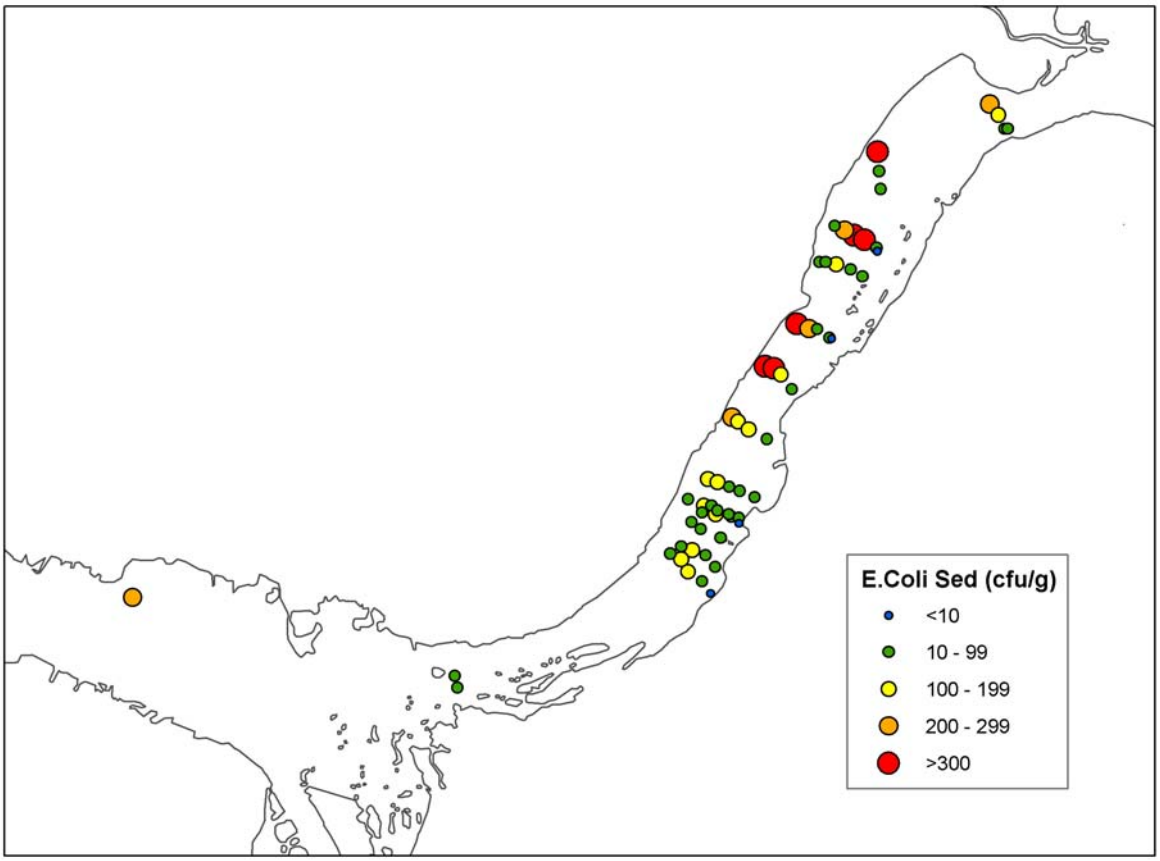


Figure 5.1. *E. coli* Concentrations (cfu/g) in Lake George Channel Sediment in 2006.

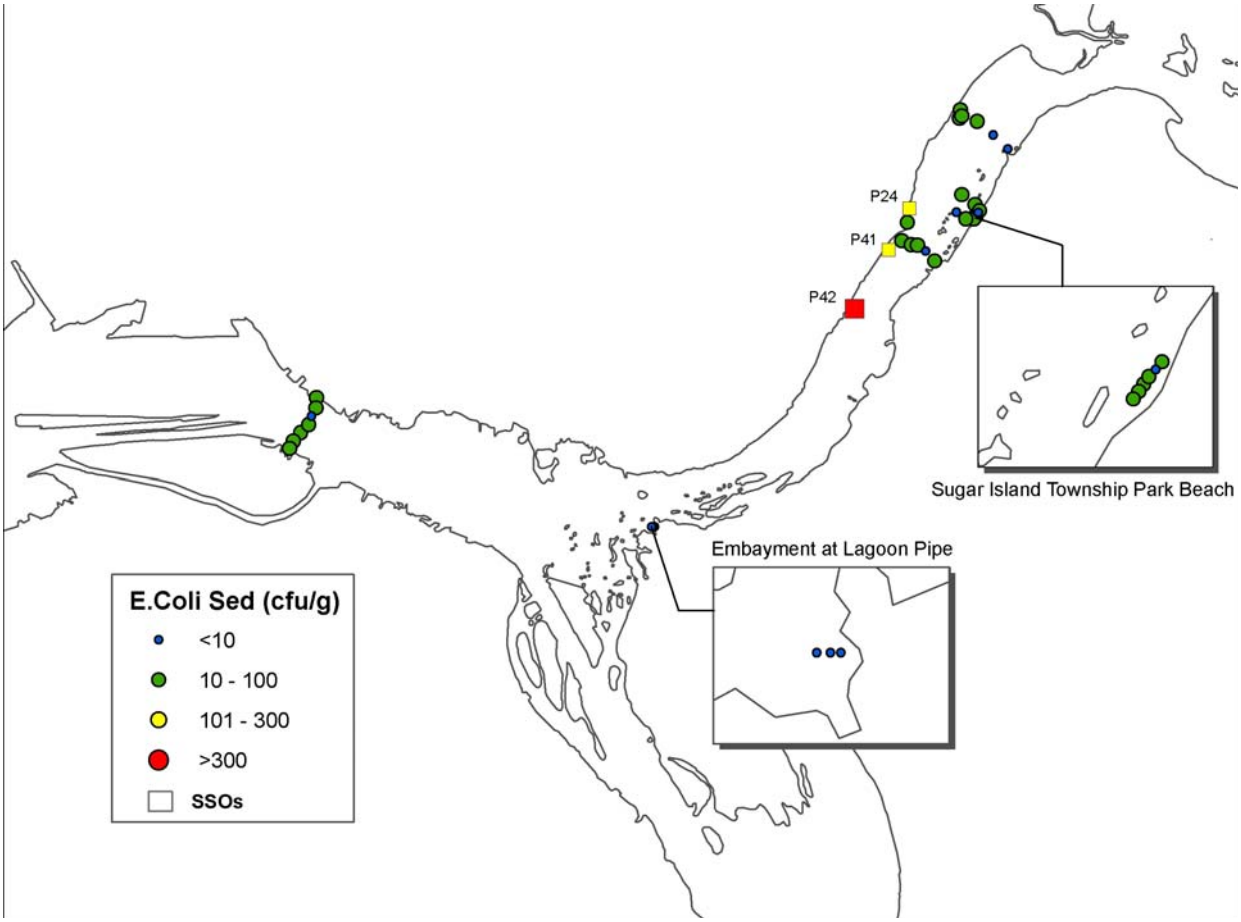


Figure 5.2. *E. coli* Concentrations (cfu/g) in Lake George Channel Sediment in 2007.

Discussion

In general, higher levels were found in 2006 in the sediment along the north side of the channel which concurred with the depositional areas identified by Roxann. In 2006, levels of *E. coli* in sediment at some upstream locations of the Sugar Island township beach had concentrations in excess of 300 cfu/g. While these sites were not adjacent to the American shore, resuspended sediment could have contributed to the high levels of *E. coli* measured downstream in the water at the beach. It is less likely however that the sediment, with the levels measured in this survey, contributed to the concentrations *E. coli* of >10,00cfu/100mL measured in the floating material sample in 2006. A mid-river upstream site in 2007 was the highest non-SSO/tributary sample taken while two upstream sites were higher than 90% of all non SSO/tributary sites.

Many of the sites in the 2007 survey were located near potential sources of *E. coli*. Sediment analyzed from these sites could indicate an ongoing source of *E. coli* to the river. Three samples taken in an embayment near the old sewage lagoon outfall pipe had no *E. coli* detected. Since the river flow in this area is low (high flow may not allow for deposition), the results suggest that the area does not currently receive waters high in *E. coli*.

Samples taken at the storm sewers not regularly monitored on the Canadian side had levels that were elevated, indicating ongoing contamination to the river. While storm sewers are not an uncommon source of *E. coli*, these results suggest that further work at these sites should be done to determine the extent of localized impairment and river impact. Samples taken across the front of Sugar Island Township beach indicated that there is no ongoing contamination to the area and that there is no sediment impairment caused by historic *E. coli* concentrations. Samples taken upstream in cross section of the river indicated no ongoing significant inputs of *E. coli* from upstream sources, although the higher flows in this area are not supportive of deposition.

A copy of the sediment reports can be obtained by contacting Debbie Burniston at (905) 336-4703 or debbie.burniston@ec.gc.ca.

Section 6: 2007 Inspections, Audits and Site Visits

As part of the St. Marys River Sugar Island Monitoring Plan (Appendix A), several activities surrounding the operations of wastewater pollution control facilities were undertaken during 2007. These included formal regulatory inspections (completed to evaluate compliance with legal instruments such as Certificates of Approval), audits (where samples of effluent were obtained to verify effluent quality and laboratory reporting), and site visits (shared on-site information related to general operations, location and facility ownership). This section reports on the results of the following activities:

Inspections:

i) MOE inspection of the City of Sault Ste. Marie East End Wastewater Treatment Plant: Inspection Number dated November 20, 2007, along with R1 & R2 data and Inspection Form.
ii) MOE inspection of the City of Sault Ste. Marie West East End Wastewater Treatment Plant: Inspection Number dated October 22, 2007 along with R1 & R2 data and Inspection Form.
iii) MDEQ inspection of the City of Sault Ste. Marie Michigan Wastewater Treatment Plant in 2007.
iv) CCHD inspection of Sugar Island Sugar Shack Sewage Lagoons dated July 16, 2007. Letter Inspection Form.

Audits:

i) Weekly bacteriological effluent sampling of the City of Sault Ste. Marie East End Wastewater Treatment Plant.

Site Visits:

i) MOE/CCHD/MDEQ – Site Visit to Sugar Island Sugar Shack Sewage Lagoons on November 15, 2007.
ii) City of Sault Ste. Marie Ontario Tours of East End Wastewater Treatment Plant – Summary of Activities.

<u>Inspections</u>

- MOE Inspection of the City of Sault Ste. Marie East End Wastewater Treatment Plant: Inspection Number dated November 20, 2007.

On November 20, 2007, Provincial Officer Kirk Crosson completed a compliance inspection of the East End Wastewater Treatment Plant in Sault Ste. Marie, Ontario. The plant is identified as Sewage Works Number 110000640, and as a Class IV facility. Six operators at the plant are properly certified at an appropriate level.

The plant is owned by the City of Sault Ste. Marie Ontario, and operated under contract by the Sault Ste. Marie Public Utility Commission Services Inc. MOE Certificates of Approvals, issued in accordance with the Ontario Water Resources Act, govern the operations at the plant; the primary Certificate is Certificate Number is 9666-5WFKUC issued on June 18, 2004 prior to plant construction.

Figure 6.1. View of Sludge Dewatering Building.

The wastewater treatment plant is designed as secondary treatment with ultra violet light disinfection. The plant is currently operating as a modified conventional activated sludge treatment plant while the fermenter and other works are brought on line to eventually operate as a Biological Nutrient Reduction facility.

Effluent quality was assessed based on plant laboratory submission and analysis records and effluent treatment limits as specified in the Certificate of Approval.

Table 6.1. 2007 Effluent Quality Evaluations

Parameter	Average Result	Effluent Limit
Biological Oxygen Demand	2.4	25
Suspended Solids	3.5	25
Total Phosphorus	0.13	1.0

All results in milligrams per litre
(For samples submitted by the plant operator)

The plant is also required to sample for Acute Lethality tests for Rainbow Trout and *Daphnia magna* as well as geometric monthly mean of *E. coli*. The data confirm compliance.

Capacity assessment of the plant was considered as part of the inspection. Data for the years 2005 through 2007 were considered. Units for daily flow are 1000 cubic metres/day. The average daily flow was 25,500 cubic metres/day or roughly 70% of design capacity.

Disinfected blended plant bypass occurred 12 times in 2007 for a duration of 88 hours and a total flow of 11,400 cubic metres due to rain events. Monitoring done during these events showed no elevated levels of *E. coli* in the Channel. No raw sewage was bypassed.

Excess sludge for the plant is centrifuge dewatered and shipped to certified landfill for disposal. Site Certificate A560102 Sault Ste. Marie.

The plant passed inspection.

- **MOE Inspection of the City of Sault Ste. Marie West End Wastewater Treatment Plant:** Inspection Number dated October 22, 2007.

On October 22, 2007, Provincial Officer Kirk Crosson completed a compliance inspection of the West End Wastewater Treatment Plant in Sault Ste. Marie, Ontario. The plant is identified as Sewage Works Number 110002540, and as a Class III facility. Five operators at the plant are properly certified at an appropriate level.

The plant is owned by the City of Sault Ste. Marie and operated under contract by the Sault Ste. Marie PUC Service Inc. MOE Certificates of Approvals govern the operations at the plant; the primary Certificate is Certificate is Number 3-1210-83-846 issued on February 15, 1984, prior to the plant's construction.

The wastewater treatment plant is designed as secondary treatment with phosphorus removal and seasonal chlorine disinfection. The plant is operating as a conventional activated sludge treatment plant.

Figure 6.2. View of the West End Plant.

Effluent quality was assessed based on plant laboratory submission records and effluent treatment limits as specified in the Certificate of Approval.

Table 6.2. Effluent Quality Evaluation.

Parameter	Average Result	Effluent Limit
Biological Oxygen Demand	6.4	20
Suspended Solids	6.3	20
Total Phosphorus	0.47	1.0

All results in milligrams per litre
(For samples submitted by the plant operator)

Capacity Assessment of the plant was evaluated as part of the compliance inspection. Data for the years 2006 and 2007 were considered. The average daily flow was 12.7 1000 cubic metres per day or roughly 64% of design capacity.

Blended plant bypass occurred 6 times in 2007 for a duration of 34 hours and a total flow of 8.324 1000 cubic metres due to rain events. No raw sewage was bypassed. Monitoring done during these events showed no elevated levels of *E. coli* in the Channel.

Excess sludge for the plant is dewatered and shipped to certified landfill for disposal. Site Certificate A560102 Sault Ste. Marie.

The plant passed inspection.

- **MDEQ Inspection of the City of Sault Ste. Marie Michigan**

The MDEQ conducts inspections of National Pollutant Discharge Elimination System (NPDES) facilities discharging to surface water. The level and frequency of inspection is negotiated with the EPA. The inspection levels consist of full evaluations of the treatment plant and collection sewer including sampling of discharge quality; full evaluations without sampling; and reconnaissance inspections for specific portions of the wastewater treatment process. The inspections are conducted in order to determine facility compliance with NPDES Permit limits and conditions.

The Sault Ste. Marie Michigan Wastewater Treatment Facility consists of rotating biological contactors for secondary treatment with 8 million gallons per day (MGD) capacity. The hydraulic and primary settling capacity of the plant is 17 MGD. The current NPDES Permit is being contested by the City of Sault Ste Marie, Michigan, regarding the MDEQ-imposed combined sewer separation project schedule revision from year 2020 to 2015. The proposed schedule condition is stayed pending ongoing negotiations and resolution.

Table 6.3. Sault Ste. Marie, Michigan, Wastewater Treatment Plant Effluent Quality Evaluation.

Parameter	Result in FY07	Effluent Limit
Carbonaceous Biological Oxygen Demand	12.58/17.25	25 - monthly average/40 - 7 day average
Suspended Solids	9.92/16.08	30 - monthly average/45 - 7 day average
Total Phosphorus	0.55	1.0

All results and limits in milligrams per liter

Parameter	Average Result in FY07	Effluent Limit
Discharge flow (million gallons per day)	3.2 MGD daily average/6.67 maximum daily	
Fecal coliform (colony forming units per 100mL)	70.8 cfu/309 cfu	200 cfu monthly geometric mean/400 cfu 7 day geometric mean
Mercury (nanograms per liter)	5.77 ng/L	Report only, 10 ng/L – 12 month running average beginning November 1, 2008

Figure 6.3. View of Sault Ste. Marie Michigan Plant.

The City of Sault Ste. Marie Michigan has complied with their permit requirements to develop and submit to MDEQ a Mercury Pollutant Minimization Plan. In addition to routine 5 times per week monitoring, the City has sampled and analyzed its discharge quality in 2007 for whole effluent toxicity, metals, and organics per the requirements of the permit. No toxicity or elevated concentrations were detected. No combined sewer overflows have been reported since spring of 2004. Overflows and noncompliant discharge quality are required to be reported to MDEQ. The MDEQ-Upper Peninsula District has not yet imposed a requirement to report treatment unit bypasses.

Inspections that included MDEQ sampling of the discharge were conducted in 2003. In March 2005, a reconnaissance inspection was conducted that confirmed the effluent sample line is flushed to remove organics and representatively sample chlorine residual. The water bath incubator for fecal analysis was confirmed at 44.5 degrees Celsius. Sewer separation certification was requested by MDEQ and guidance was provided to the City regarding petitioning for reduced percent removal limits.

In December 2005, a reconnaissance inspection of the treatment plant was conducted and information was requested regarding the City's completed sections of combined sewer separation and user rates. A joint inspection with the MOE was conducted in July 2006. An

MDEQ follow-up letter identified non-compliance with the 7 day geometric mean for fecal coliform bacteria in March 2006; however, the monthly average met Permit limits. Primary clarifier cleaning and maintenance were noted, as well as a rotating biological contactor drum that was out of service. Procedures to conduct combined sewer outfall flow monitoring were requested.

On April 12, 2007, a reconnaissance inspection specific to the location and status of combined sewer overflow manholes was conducted. A post inspection report was completed. Subsequent conversations identified that some portions of separated sewer remain vulnerable to inflow and infiltration and, in order to protect basements from flooding, do not warrant bulkheads at this time.

A meeting with the Superintendent at the DPW building on November 29, 2007, resulted in confirmation that the chlorine delivery capacity will be increased prior to spring melt conditions.

- CCHD Inspection of Sugar Island Sugar Shack Sewage Lagoons

On July 5, 2007, the CCHD conducted an investigation of sewage waste lagoons located at the Sugar Shack Campground on Sugar Island. The CCHD officials dye tested the sewage system and obtained bacteriological samples of surface water along the shore. Results are discussed in the following Section (Section 7).

Figure 6.4. View of Sugar Island Lagoons.

A report dated July 16, 2007 (available on request), concludes that a pipe observed on the shore was dry and broken. Three *E. coli* samples from that date reported *E. coli* values of 8.8 cfu / 100 mL, and that no evidence of dye was found along the shoreline.

The report also references elevated *E. coli* from a July 9, 2007 sample taken at the mouth of the Sugar Shack inlet. The field notes taken for the sample report rainfall for the period and nesting gulls observed near the sample location. A full copy of the CCHD Sugar Island Sewage Lagoon Inspection report is available on request.

Audits

- **Weekly Bacteriological Sampling of the City of Sault Ste. Marie East End Wastewater Treatment Plant.**

In support of the 2007 work plan, additional samples for *E. coli* were taken of the effluent of the East End Wastewater Treatment Plant. Table 6.4 summarizes the data. The data are based on testing by the Ontario Ministry of Health and Long Term Care Laboratory in Sault Ste. Marie Ontario, and are expressed in cfu /100 mL from the membrane filter test procedure (as outlined in the SIMWG QAPP).

Table 6.4. Data from the East End Wastewater Treatment Plant effluent in 2007.

East End Wastewater Treatment Plant 2007 *E. coli* results from sampling at UV Chamber		
Date	**Time**	**E.coli (cfu/100 mL)**
2007/06/06	12:50	<10
2007/06/12	13:00	<10
2007/06/20	8:55	<10
2007/06/25	14:30	30
2007/07/04	14:48	10
2007/07/12	11:50	<10
2007/07/18	11:37	<10
2007/07/25	11:24	10
2007/08/01	8:19	20
2007/08/08	13:06	<10
2007/08/15	13:07	<10
2007/08/21	12:55	50
2007/08/28	13:20	<10
2007/09/05	10:20	<10
2007/09/11	14:02	190
2007/09/18	14:43	30
2007/09/27	15:10	<10
2007/10/04	14:00	<10
2007/10/09	11:50	30

A range of <10 to 190 cfu per 100 mL and an average *E. coli* of 25 cfu per 100 mL (where for statistical purposes <10 is 10 for worse case situation) was noted.

Site Visits

On November 15, 2007, officials from CCHD, MDEQ, the City of Sault Ste. Marie, Ontario, and the MOE visited the Sugar Shack Campground sewage lagoons on Sugar Island.

Figure 6.5. Pumping station at Sugar Shack Lagoon.

The pumping station was operating during the visit. Observations included:

- Sewage is discharged to the lagoons;
- The lagoons appear to discharge to surface water ditch; the ditch was not seen to empty into the St. Marys River;
- Water was observed coming from the pipe at the shore, although the pipe is not connected to the sewage lagoons. The source of the discharge is not clear.

Several East End Wastewater Treatment Plant tours were provided for agencies and individuals involved in the SIMWG. The City of Sault Ste. Marie Ontario is continuing efforts to provide tours to as many officials as possible.

Tours in 2007 included the following agencies:

Sault Tribe of Chippewa Indians – Dan Tadgerson, Robert Lehto
Bay Mills Indian Community - Amanda Bosak
MDEQ – Gary Kohlhepp
CCHD– Christine Daley
LSSU– Barb Keller and students
Sault Ste. Marie Conservation Authority – Loralei Premo, several staff and board members
EC – Kate Taillon

Tours in 2006 included the following agencies:

City of Sault Ste. Marie, Michigan – Spencer Nebel, Mayor Anthony Bosbous
US Consul General John Nay
Sault Tribe of Chippewa Indians – Dan Tadgerson, Robert Lehto and other staff
MDEQ – Randy Conroy
CCHD– Dave Martin
Soo Evening News (Michigan) – Scott Brand, Jude McConkey

Sugar Island Township – Sheila Miller and roads superintendent
Congressman Stupak's Office – Jamie Euken (Legislative Assistant)
Associated Press – John Flesher
Ontario media at grand opening
St. Marys River Binational Public Advisory Council (BPAC) Committee members
APH– Sherri Cleaves and staff
Member Provincial Parliament (Ontario) – Tony Martin

Tours in 2005 included the following agencies:

City of Sault Ste. Marie – Jim Atkins, Jim Moreau
Sault Tribe of Chippewa Indians – Dan Tadgerson
Sugar Island resident Wayne Welch

Stormwater Outfalls

The SIMWG Work Plan called for the identification of point sources along the St. Marys, which was important for contingency monitoring should high levels of *E. coli* or floating solids be detected. Outfalls are the most common point source on both sides of the river. The 10 Canadian outfalls identified on the north side of the river have been separated. Most of these were monitored on a regular basis over the 2007 season. Identified sites along the northern shore of Lake George channel that were not monitored regularly were sampled for sediment during the EC sediment survey. There are no sewer outfalls on Sugar Island, which has private septic systems. A historic outfall (tributary) from the Sugar Shack Lagoon area was regularly monitored. The historic Sugar Shack Lagoon outfall pipe area was sampled for sediment during EC's sediment survey. Sault Ste. Marie Michigan has combined sewer outfalls and storm sewer outfalls. The coordinates for storm sewer outfalls were not available at this time. There are 15 combined sewer outfalls identified (Appendix G). There were no overflows reported in 2007. The outfalls were not regularly monitored by the SIMWG as this was considered contingency monitoring in the plan.

Summary and Recommendations

Significant efforts were made to inspect, sample, and visit wastewater treatment facilities discharging to the St. Marys River. Data and observations indicate that these facilities were functioning properly in 2007, except for one violation of fecal coliform limits at the Sault Ste. Marie, Michigan treatment plant in March 2007. It is recommended that compliance inspections continue in 2008 for the facilities described in this section.

Section 7: Sugar Island Sanitary Survey Project

The CCHD was awarded a sanitary survey grant in 2007 by the EPA. This grant provided an opportunity to identify point and non-point contamination sources at the SITP and surrounding areas. This survey was conducted in addition to the routine beach monitoring described in Section 4. CCHD staff collected water samples and associated information at locations in the vicinity of the SITP. Studies were conducted on nearby watersheds, beach sand water, sediments, and the swash zone of the SITP. There were over 50 sampling events during the project, including several samples collected based on predictive assessments using previous data.

Land Use

The majority of residents on Sugar Island are seasonal; a small number are permanent residents. All private and commercial properties use on-site sewage disposal. The Sugar Shack Campground, upriver from the SITP, uses large oxidation ponds that currently operate as subsurface discharge. In the 1980's, the Sugar Shack lagoons were permitted for above-ground discharge to the St. Marys River by the Michigan Department of Natural Resources. Commercial development on Sugar Island is minimal, with some seasonal resorts downriver and on the south side of the island.

Weather Conditions

2007 was an extremely dry summer for northern Michigan and Ontario. Sault Ste Marie was in drought conditions from June through August. There were only a few days with rainfall, which were designated as additional monitoring days.

Bather Load

It is unlikely that bathers contributed towards elevated *E. coli* levels. To test this hypothesis, surface water samples were collected using a sterile extended dipper without disturbance to the river bottom in the swimming area. The technician then waded through the swimming area at 24-inch depth water. Additional surface water samples were collected after wading through the water releasing sediment/sand from the shoreline river bottom.

Sampling Locations

Because of the extent of the St. Marys River contamination in 2006, additional grant projects were used to support the sanitary survey project. Samples were collected at five private shoreline locations upriver from the SITP on a routine basis. These samples were collected from tributaries, outlet streams, and shorelines affected in 2006. SITP was sampled during various weather conditions, in addition to routine monitoring for the St. Marys River project. Locations were based on the swimming area and upstream potential sources of contributing contamination. The Sugar Shack lagoons were sampled at the outlet of the former discharge pipe, which is still visible near the shore.

Advisories/Closings

There was one closure during this project, which immediately followed a heavy rainfall. The closure was issued on July 11, 2007, and lifted on July 13, 2007. The location extended just west from the Sugar Shack Campground to the SITP. *E. coli* levels also were elevated at many other sites in the St. Marys River on that day.

Potential Pollutant Sources

Potential contamination sources in the area surrounding the SITP include:

- **Municipal Wastewater Treatment Plants**: Bypasses from wastewater treatment plants in Sault Ste Marie, Michigan, and Sault Ste Marie, Ontario, are not unusual during and after heavy rain events. Prior to August 2006, the Sault Ste Marie, Ontario East End Wastewater Treatment Plant was a primary treatment facility, releasing primary effluent into the St. Marys River. Since then, the facility was upgraded to operate with secondary treatment and disinfection by ultra-violet light.

- **Commercial Sewage Oxidation Ponds**: The Sugar Shack Campground, upriver from the SITP, uses large oxidation ponds that currently operate as subsurface discharge. A dye test and evaluation of the Sugar Shack sewage lagoons in 2007 did not indicate that the large oxidation ponds were a potential source of contamination at the time of testing.

Sanitary Facilities

There is a vault-type outhouse located upland from the SITP beach, which is used by the public. This outhouse is near a possible outlet to the river just west of the beach. CCHD used a dye test to confirm the outhouse is not contributing to beach contamination.

Results of Sanitary Survey by CCHD

Three sampling events occurred when swimmers were present at the SITP beach. These samples had low *E. coli* levels. Additional samples collected before and after wading through the water also showed low bacteria levels. The beach sand itself has a history of contamination by several types of floating material, both natural and non-natural. Allowing the surface water from the river to fill the holes dug at the beach showed higher levels of *E. coli* within the surface water of the holes.

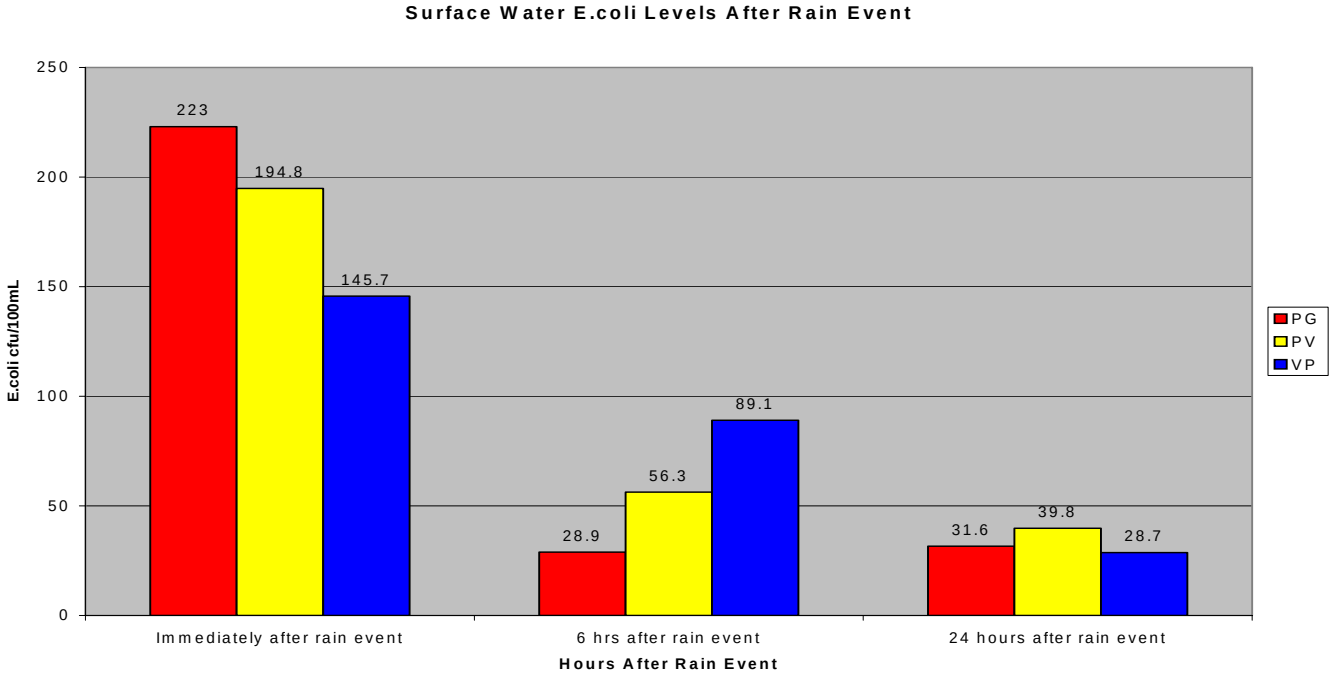
Five locations upriver from the SITP were monitored at stream outlets and tributaries that could influence beach conditions. All of these locations had reasonably safe levels of *E. coli*, with only one exceedance immediately after a heavy rain event. The spike in *E. coli* counts at the SITP immediately following the rain event likely were from storm runoff from the upland area by the park. Results show a decrease in *E. coli* levels after the rain event (Figure 7.1).

Improvement to the SITP beach was substantial in 2007 compared to recent years. In 2006, floating and deposited solid material were observed in the St. Marys River and along the north shore of Sugar Island, including the SITP. Sample analysis by Michigan State University suggested that these solids included untreated/partially treated sewage. The CCHD believes the primary source of contamination in 2006 was a municipal wastewater treatment plant. In 2007, samples of material described by residents as “sewage-like” were collected and identified as algae and/or detritus. There was no observation of sewage-like floating debris in the water or beach during the sanitary survey project. There was one beach closure.

Conclusions

Currently, there is a lag time between collecting surface water samples and receiving *E. coli* results because of testing method time constraints. A change to the notification protocol for a public beach with consistent contamination problems is essential to protect public health. Based on the data collected in 2006 and 2007, the CCHD believes faster public notification can be given when a potential bacteriological exceedance is likely to occur, rather than waiting until *E. coli* results are in hand. Heavy rains contributed towards elevated levels of *E. coli* in the swimming area at the SITP. This is likely due to stormwater run-off from the road, park area, the presence of waterfowl, and upland areas. The data support the notion, that if heavy rainfall is forecast, beach closures can occur prior to sampling and bacterial testing. The posting that occurred in 2007, due to *E. coli* levels exceeding the Total Body Contact Standards, followed a heavy rain event (the first rain in several weeks). Other rain events also showed spiked *E. coli* counts, with numbers under the 300 *E. coli* cfu/100 mL action level. Likewise, using the Incident Response Protocol developed by local, state, and provincial governments from Michigan and Ontario, local officials can close beaches immediately after sewage overflows from wastewater treatment plants. By closing beaches prior to or during a heavy rainfall, and prior to sample collection, these advisories will prevent the public from coming into contact with contaminated surface water.

Figure 7.1. PG, PV, and VP refer to specific sampling stations along the SITP beach.



Section 8: Quality Assurance and Quality Control

To ensure the integrity of data upon which management decisions are made regarding responses to elevated *E. coli* contamination or floating solids, the SIMWG developed a QAPP detailing quality assurance and quality control (QA/QC) measures associated with the sampling, custody, analysis, and data reporting on samples collected in the St. Marys in support of the overall mission of the SIMWG.

Performance testing evaluation (proficiency testing) for basic water chemistry and *E. coli* was conducted to assess the validity of inter-laboratory data comparisons. Samples were provided by the organic chemistry laboratory of the Centre d'expertise d'analyse environnmentale of the Ministry of the Environment of Quebec. This laboratory is an accredited testing laboratory by the Standards Council of Canada in accordance with the requirements of ISO 17025(309). Results from the three participating laboratories were compared to the reference values. Participating laboratories were Lake Superior State University, White Water Associates Inc., and the Sault Ste Marie Office of the Ontario Ministry of the Environment. Overall, the results of the proficiency testing were excellent; only 1 result (>20% deviation from reference for total suspended solids) of 60 test results fell outside the accepted deviation from reference. All E. coli results were within 20% deviation.

It is imperative that the SIMWG monitoring program have a high degree of confidence in data for samples in which *E. coli* levels range between 100 and 500 cfu/100 mL, as these values are likely to trigger a response on the part of the agencies. As described in the QAPP:

"The primary study objective for this monitoring effort is to identify incidents of high E. coli levels (defined as exceeding the Michigan Water Quality Standard of 300 cfu/100mL on any given day or a 5-sample geometric mean of 130 cfu/100mL over 30 days) in the St. Marys River and associated beaches. The secondary objective is to identify the potential source(s) of elevated bacteria. Therefore, we are less concerned about sample and analytical variability at very low (e.g. < 50 cfu) or very high (e.g. > 1000 cfu) levels. Values between 100 and 500 cfu/100 mL are the most critical, since the exact value within that range likely would be important in determining the agencies' response to the result. For analyses within this range, a difference of 50% between laboratories is deemed acceptable, based on our knowledge of typical variations in field replicates and inter-run analytical variation."

Therefore, the SIMWG focused on checking samples with values within the range of 100 – 500 cfu/100 mL, field replicates, blanks, and side-by-side samples. The summary of quality control checks is as follows:

1. All field and laboratory blanks were less than the 10 cfu/100 mL threshold;

2. Field triplicate samples with values in the 100 – 500 cfu/100 mL range all fell within acceptable criteria; standard deviations for these samples ranged from 23% to 29% for the 2007 sampling campaign.

3. Results of side-by-side sampling generally were within acceptable variation criteria (50%). Five pairs of side-by-side samples out of a total of 133 (~ 4%) fell outside of acceptable limits. However, there was only one case where side-by-side sampling

yielded a problematic result in terms of decision-making criteria; on August 8th, 2007, side-by-side samples by the OME and APH collected at the Dacey Road outfall yielded *E. coli* values of >1000 cfu/100 mL and 170 cfu/100 mL, respectively. The discrepancy likely is due to the differing depths at which samples were collected. The samples were taken approximately two meters apart, with the APH sample at a much shallower depth.

In summary, the SIMWG has no concerns related to the quality of data collected in 2007 by any of the agencies.

Section 9: Public Outreach

Context

This section is presented as a product of the Four Agency Work Group members working on the St. Marys RAP, who acted as the Communications Committee for the SIWMG. The 2000 Four Agency Compendium of Position Papers, which includes a Public Involvement and Outreach component, guided the communication and public involvement activities highlighted below.

May 15, 2007 Sugar Island and Lake George Channel Public Symposium

The Sugar Island and Lake George Channel Symposium was held on May 15, 2007, from 9 am to 4 pm at the Cisler Center, Lake Superior State University in Sault Ste. Marie, Michigan. The Symposium was held in May to ensure that the public were informed prior to the start of the swimming season and prior to any beach closures or incidents of floating material. The purpose of the Symposium was to provide the public with information about water quality impairments observed in 2006 on the north shore of Sugar Island and in the Lake George Channel, and to discuss the coordinated monitoring and event response procedures planned by the SIMWG for 2007.

In consultation with the SIMWG, a letter of invitation, press release, and agenda for the Symposium were prepared. The press release was drafted by the Communication Committee and issued by the Canadian and U.S. local health agencies. The MDEQ also issued a press release. An agenda package, including an agenda, contact information, and summaries of the presentations, was distributed to participants at the Symposium. A facilitator was engaged to chair the Symposium and talking points were prepared for his use. A SIMWG display was also created for the Symposium to highlight the purpose of the coordinated monitoring effort (see display and Symposium photographs below).

Representatives of the SIMWG made presentations and answered questions related to the 2006 water quality monitoring results and their agencies role in the 2007 coordinated monitoring activities. Copies of the Symposium presentations were made available upon request.

Of the 70 people in attendance:

- 4 from elected officials offices
- 12 from Tribes/First Nations
- 8 from federal government agencies
- 9 from provincial/state government agencies
- 14 from local government agencies (including 5 from local health departments)
- 3 from Universities
- 3 from environmental non-government organizations
- 14 local residents (10 from Sugar Island)
- 3 from the media

In general, anecdotal feedback from attendees indicated that the Symposium was positively received. Most people were encouraged by the level of bi-national cooperation, organization, and activity on the issue, and were also satisfied with the quality and quantity of information

presented at the event. Some, however, felt that physical cleanup was needed in addition to monitoring.

SIMWG Display

May 15, 2007 Sugar Island and Lake George Channel Public Symposium

Follow-up

At the Symposium, attendees were given the opportunity to join an E-mail distribution list for future correspondence on this issue. On July 25, 2007, a monitoring update was sent to those on that list. A second update was distributed on December 12, 2007. Additional follow-up information on the SIMWG 2007 activities and monitoring recommendations for 2008 will be developed and distributed once the final SIMWG report has been approved by the Four Agency Management Committee.

BPAC Updates

The St. Marys River BPAC was kept informed through Four Agency updates prepared for 2007 BPAC meetings on March 14, May 3, and September 19.

Section 10: Conclusions

Process

- The SIMWG, which included several local, tribal, state, provincial, and federal agencies, worked together effectively to develop a comprehensive, cooperative monitoring plan in a relatively short period of time.
- Frequent communication among the agencies was maintained during the 2007 field season by regular conference calls held once every two weeks. Cooperation and communication among the agencies were excellent, except for some isolated incidents.

Incident Reports

- Only five incident reports from area residents were received in 2007. The first occurred on May 10, and the last was received on July 3.
- All incidents were quickly investigated according to the Incident Response Protocol. Floating algae and detritus were identified as the cause of four reports; pollen was identified as the cause of one report. Sewage was not found in response to any of the complaints.
- Two of the samples (May 10 and July 3) were analyzed for *E. coli*. As expected in algal mats, *E. coli* numbers were elevated. However, DNA analysis of these two samples indicated bacteria was not from a human source.
- The Incident Response Protocol, jointly developed the CCHD, APH, MOE, and MDEQ, generally worked well in facilitating inter-agency communication. There were isolated instances where an agency failed to report *E. coli* values greater than 300 cfu/100 mL to the others. In late September, there was a delay (occurred on a Friday afternoon, reported the following Monday morning) in the reporting of a wastewater treatment plant partial blended bypass, which sometimes occur after rain events and are not routinely reported by Canadian or U.S. treatment facilities. The result was the issuance of a no contact advisory by the CCHD and some inaccurate information being published in local newspapers.

Weekly Sampling

- Overall, *E. coli* levels were low during the 2007 sampling season. Of the more than 450 samples collected (excluding QA/QC samples), only 97 (~ 21%) had *E. coli* levels greater than 100 cfu/100 mL. Only 36 samples (~ 8%) had *E. coli* levels greater than the Michigan Water Quality Standard of 300 cfu/100 mL.
- Of the 36 samples exceeding 300 cfu/100 mL, 15 (~42%) were collected from sites at or near stormwater outfalls.
- High *E. coli* levels were often found during and soon after rain events. However, occasional high levels also were found at times when rain was not a factor.
- In addition to rain and stormwater outfalls, other factors likely to contribute to high bacteria levels included shallow water, high winds, and the presence of waterfowl.
- A total of 29 samples were analyzed for bacterial DNA markers. Three tested positive for the human *Bacteriodes* marker. Two occurred on September 12, one at the Dennis Street outfall and one at the Holiday Inn boat slip outfall. The third positive result was on a September 26 field blank sample that broke open in transit.

Inspections, Audits, and Site Visits

- Appropriate local, state, and provincial officials inspected the East End Wastewater Treatment Plant (Ontario), West End Treatment Plant (ON), the Sault Ste. Marie Wastewater Treatment Plant (Michigan), and the Sugar Island Sugar Shack lagoons during 2007. No major issues were identified. The Michigan plant was in noncompliance for fecal coliform in late March 2007, but steps were taken to address the problem and no further violations have occurred.
- Audit samples were collected in 2007 from the East End Treatment Plant (Ontario) effluent. *E. coli* levels were low, with only one sample above 50 cfu/100 mL.
- Site visits were made to the Sugar Island Sugar Shack lagoons and the East End Wastewater Treatment Plant.

Sugar Island Sanitary Survey

- The CCHD was awarded a grant from EPA to conduct a sanitary survey of point and non-point pollution sources at the Sugar Island Township Park and surrounding areas.
- A dye test and evaluation of the Sugar Shack lagoons indicated that the lagoons are not a source of sewage contamination to the St. Marys River at the time of testing.
- There was only one closing of the Sugar Island Township Park beach in 2007, from July 11 to July 13.
- Swimming activity at the SITP beach did not appear to cause an increase in *E. coli* levels.
- Consistent with the results of the weekly sampling, data from the sanitary survey suggested that rain events, via storm runoff, contribute to elevated *E. coli* levels.

Quality Assurance

- QA/QC results strongly suggest that data collected by each of the four sampling agencies are comparable and can be integrated into one comprehensive report.
- Analysis of all field blank samples resulted in *E. coli* levels < 10 cfu/100 mL, indicating that sample contamination did not occur problem during this project.
- Field triplicate samples with values in the 100 – 500 cfu/100 mL range all fell within acceptable criteria; standard deviations for these samples ranged from 23% to 29%.
- Results of side-by-side sampling generally were within acceptable variation criteria (50%). Five pairs of side-by-side samples out of a total of 133 (~ 4%) fell outside of acceptable limits. However, there was only one case where side-by-side sampling yielded a problematic result in terms of decision-making criteria; on August 8th, 2007, side-by-side samples by the APH and MOE collected at the Dacey Road outfall yielded *E. coli* values of >1000 cfu/100 mL and 170 cfu/100 mL, respectively. The discrepancy likely is due to the differing depths at which samples were collected. The samples were taken approximately two meters apart, with the APH sample at a much shallower depth.

Section 11: Next Steps for 2008

1. The SIMWG will continue as constituted, to develop and implement a monitoring plan for 2008.

2. The SIMWG will continue to respond to reports of floating material from area residents, as was done in 2007. A multi-agency response to these incidents will assure an accurate assessment of the complaint, and if appropriate, identification of potential sources.

3. The Four Party Management Committee will clarify the types of events to be reported among the SIMWG agencies through the Incident Response Protocol, such as if wet-weather bypasses from wastewater treatment plants, in which some disinfected wastewater is blended with treated effluent, require inter-agency notification.

4. Water quality monitoring will continue in 2008, as 2007 was an unusually dry year. Adjustments affecting the river water levels in 2007 potentially also may have influenced water quality. It is important to collect another year of data to ensure that the 2007 results are representative of current St. Marys River water quality. It would be especially helpful to have data during a wet year.

5. Routine monitoring frequency can be reduced from weekly to every other week. However, the agencies should be prepared to sample during wet-weather events that may occur between regularly-scheduled intervals.

6. There was only one instance of *E. coli* exceeding 300 cfu/100 mL in a mid-channel station. Some mid-channel sampling should continue, especially in the segment of the St. Marys River near the Sugar Island Township Park beach, and during rain events. However, the number of mid-channel stations can be reduced in 2008, especially those stations either farthest upstream and/or downstream.

7. Near-shore and beach monitoring will continue in 2008 at comparable levels. Agencies should take action where there are known sources of *E. coli*. Canadian federal and provincial authorities are investigating stormwater outfalls where elevated bacteria levels were common in 2007, and working to eliminate/reduce potential sources. The Garden River First Nation found six instances of *E. coli* greater than 300 cfu/100 mL in near-shore locations; additional monitoring with appropriate QA/QC in 2008 is warranted.

8. More DNA testing of bacteria should be conducted in 2008 to better identify potential contaminant sources. The number and location of samples analyzed for DNA will be based on 2007 results, cost, and laboratory capacity.

9. In addition to stormwater assessment, monitoring and inspection of other known and suspected point and non-point sources should continue in 2008.

10. Agencies will continue to follow the QAPP by collecting extensive QA/QC data to ensure data quality and comparability.

11. Another symposium should be convened in spring 2008 to report on the results from the 2007 coordinated monitoring effort, and to seek input on the SIMWG proposed plans for 2008 monitoring. All stakeholders would be invited, including municipalities, the Bi-National Public Advisory Committee, Tribes/First Nations, and area residents.

Section 12: Acknowledgements

Members of the SIMWG would like to acknowledge and thank the following people/agencies for their work on this program:

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