State of the Bay
Water Quality Surveys for
E.coli in the Shediac Bay Watershed
2000-2017

Rémi Donelle
Shediac Bay Watershed Association

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1 Introduction:

In 2015 and 2016 concerns were raised about water quality at Parlee Beach and monitoring done to advise beach users of the quality of the water.

In 2017 the government of New Brunswick instated a new monitoring protocol and put in place a steering committee to recommend actions to improve water quality and better understand sources of contamination. Measures put in place include increasing EIA requirements for the Watersheds along Parlee Beach, upgrades to the Parlee Beach lift stations, pump out stations for local marinas and improving wastewater infrastructure.

The Shediac Bay Watershed Association increased their monitoring for water quality in 2016 and 2017 to include small streams and DNA testing. The Watershed Association also produced educational materials for boaters and presented water quality data at the local farmers' market.

This report will present the latest E.coli test that have been done in the Shediac Bay Watershed by the Association and other organizations.

1.1 Shediac Bay Watershed Association water quality monitoring

The Shediac Bay watershed has been sampling freshwater quality sites in the Shediac and Scoudouc rivers starting with the NB Water classification program in 2000. The sites have been selected by the watershed group in partnership with the Department of Environment and Local Government. The sites were chosen according to topography, water flow, drainage area and access. Monitoring on these sites have been maintained by the SBWA to detect long-term trends and guide the restoration activities of the Association.

While the initial samplings were taken by volunteers trained by the Department of Environment, sampling in subsequent years was done by the staff of the Association.

Basic parameters on the physical properties of the water were taken on each sampling such as temperature, dissolved oxygen, conductivity, pH and salinity. These were taken in the field with a hand-held monitoring device.

In addition to these parameters some years also considered chemical characteristics of the water. From 2000 to 2002 a wide spectrum of inorganic parameters were measured. These included alkalinity, aluminum, antimony, arsenic, cadmium, calcium, chloride, chromium, colour, conductivity, copper, fluoride, iron, lead, magnesium, manganese, nickel, nitrate, nitrate & nitrite, part hydrogen, potassium, sodium, sulfate, suspended solids, total ammonia, total hardness, total organic carbon, total phosphorus, turbidity, zincs. Because of the high cost of analysis these parameters were only monitored again in 2017. The results will be published in the Environmental Trust Fund project report in March 2018. The results are also available at the SBWA office.

1.2 Considerations for proper sample collection to achieve reliable results

When gathering ambient water quality samples, it is crucial that samples be collected in a consistent and proper manner with the appropriate equipment, so the analytical results or field measurements will reflect the environmental conditions at the time of sampling. There is the potential during any sampling effort, to inadvertently generate sampling errors. They may be themselves minute in nature. However, several errors can combine into one significant error from any one sample collection. This can lead to poor samples collected, money wasted to test the poor samples, erroneous results generated, and lead to poor conclusions derived.

The sample temperature should be collected immediately from a standalone sample; no other variables should be tested from this sample. It is usual for the laboratory to measure the temperature of a sample upon arrival. Temperature is an excellent indicator to identify if the samples have been shipped correctly (i.e. with enough ice for ambient air conditions).

Each parameter has a specific hold time that ensures the results generated are accurate. If this maximum time frame (i.e. hours or days) has passed, the data generated through sample analysis should not be used since its accuracy cannot be confirmed. Some variables must be analyzed within 48 or 72 hours from the time of collection or as in the case with our chosen laboratory, less than 24 hours and preferable 8 hours. It is therefore essential that samples be shipped to the laboratory as soon as possible. It is important to avoid a lengthy time delay before laboratory analysis. It may be necessary to ship the sample on the same day as collection to preserve the variables. It is the responsibility of the sampler to determine which variables are time sensitive and ensure the hold times are met. When shipping samples, aim to maintain the shipment temperature between 10^{o} C and 4^{o} C, temperature ranges may require adjustment with specific sample parameters.

Temperature control for shipping during warmer months can be through ice packs placed in the coolers.
The physical measurements taken at the time of collection will be recorded on site at the same time as the water sample was taken. Instruments designed for this purpose will measure dissolved oxygen, pH, salinity, conductivity and water temperature. Timing of taking the sample in salt water is best after the tide begins to drop as source waters are now flowing into the bay.

1.2.1 Quality Assurance/Control in Sampling

Improper sampling techniques can lead to non-representative test results, which do not represent the media/matrix being sampled. Improper sampling techniques can lead to erroneous conclusions and management actions. A field quality assurance program is a systematic process, and together with a laboratory and data storage quality assurance program, ensures a specified

degree of confidence in the data collected for an environmental survey. The first step in ensuring proper sampling techniques is to provide staff with training for the sampling conditions they encounter. A sampling plan should also be established for each program or investigation. The sampling plan should outline such items as:

When samples are to be collected (weekly, bi-weekly, monthly, quarterly, etc.)
Where samples are to be collected
types of sample collection devices and containers to be used
what types of samples are to be collected at each site
which method to use
how these samples should be preserved
which field measurements (and notes) are to be made
which laboratories the samples are to be shipped to.

Hard copies of sampling plans should be carried into the field with the contact name and information of the principal investigator to be contacted should questions arise in the field. A sampling plan ensures that all data are collected to the same standard using the same protocols. A sampling plan should contain enough detail for substitute field personnel to carry out the program/survey/investigation. Sample bottles should be kept in a clean environment, away from dust, dirt, fumes and grime. As well, bottles must be capped at all times and stored in clean shipping containers (coolers) both before and after the collection of the sample. Vehicle cleanliness is an important factor in eliminating contamination problems (RISC 1994). As stated previously samples must never be permitted to get warm and should be stored in a cool, dark place. Most samples must be cooled to 4 to 10°C during transit to the laboratory; ensure copious quantities of ice packs or dry ice are used to keep samples cool. Samples should be cooled as quickly as possible in order to reduce biological and chemical activity in the sample. Sample collectors should keep their hands clean, wear gloves when sampling and refrain from eating or smoking while working with water samples. Exhaust fumes and cigarette smoke can contaminate samples with lead and other heavy metals. Bottles, dissolved oxygen samplers for grab samples and composite samplers need to be properly washed and rinsed.

1.2.2 Storage and Shipment of Samples

Water samples must remain in a prescribed chain of events that prevents contamination and possibly making the sample unusable. Our plan calls for collecting and delivery on the same day. If this becomes impossible, then refrigeration overnight and delivery early next day will occur. This would allow us to remain in a 12-18 hour window that is within the acceptable 24 hour guideline.

1.2.3 Safety in Sampling

It is crucial that samples are collected in a safe manner. This includes having first aid equipment, communication equipment, survival gear, wearing proper footwear, gloves, life jackets or flotation devices, and personal safety devices for confined entry situations. It also means that samples are usually collected by teams of two individuals, one of whom is the support person who can provide help to the other should the sampler encounter an unsafe situation from which they cannot remove themselves. The field crew must be trained for the situations to be encountered; experienced with the proposed program and the potential hazards; a detailed job safety analysis must be prepared, this should include very specific emergency response plans; and the crew must be aware of any special safety considerations.

1.2.4 Safety in Sampling from Boats

When sampling from a boat, the captain has final say regarding operational details such as loading of equipment, weather conditions under which the trip can be performed safely, safety information and other boating related procedures. A personal flotation device (PFD) should always be used. When sampling from a boat, you should perform a visual inspection of the surroundings paying close attention to wave height and direction. Individuals should move within the boat using slow, calculating motions, thereby minimizing risk and should not stand in the boat to obtain the water sample. The boat must be maintained in a safe condition. Prior to collecting a sample, it must be ensured that the anchor is secure and the boat is pointed into the wind. When sampling from a boat, be aware of other boat traffic and natural hazards. All power-driven vessels must yield the right-of-way to those not operating under power such as canoes. Two paddles, a bailer and an anchor must be on board. All Transport Canada regulations regarding equipment required relative to the type/size of boat being used should be adhered to. Samplers should position themselves securely on the floor of the boat or on one of the seats. Move within the boat using slow, calculating motions, thereby minimizing risk to oneself as well as others in the boat. Do not stand in the boat to obtain the water sample. Position yourself securely on the floor of the boat or on one of the seats. Prior to collecting a sample, the other crew members in the boat should be informed that a sample is going to be collected and they should counter balance the boat by positioning themselves on the opposite side to which the sample will be collected.

1.2.5 Bacteriological Sampling

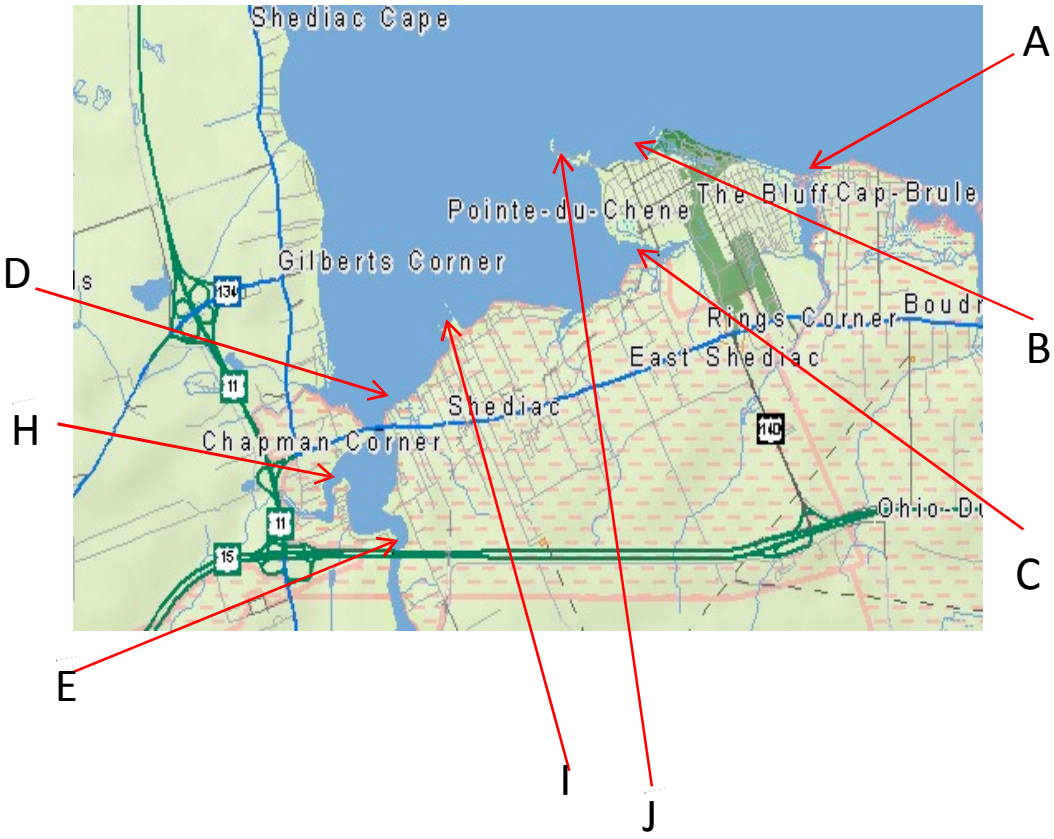
Samples are typically analyzed for a combination of the following bacterial parameters: total (rarely) and fecal coliforms, Escherichia coli (E. coli), fecal streptococci, and enterococci. Due to the high risk of potential contamination of the sample during collection, care must be taken when collecting bacteriological samples to ensure sterile conditions. Sample containers should be filled as per laboratory instructions and samples should be kept out of the light and chilled on ice (do not allow to freeze). Always collect bacteriological samples first, if sampling from a boat, obtain the sample from the upstream side of the boat.

Samples from the bow of the boat to prevent potential contamination from the boat or the outboard motor. Keep sample bottles closed until needed. Take a sample at arm's length from the boat and sample facing towards the current (the direction the boat is facing). Always hold bottle upright and by the base. In one continuous motion submerge till the bottle opening is approximately 30 cm below the water surface or other specified depth. Uncap and fill the sample bottle as required by the laboratory, cap and bring to the surface. Immediately place the bottle in a closed cooler with ice packs or hot-water bottles, depending on the season. Ensure that the person in the stern is providing counterbalance (working over the opposite side of the boat). Do not rinse the bottle or touch the inside of the bottle or cap, and always hold bottle upright and by the base. Keep sample bottles closed until needed. Fill the sample bottle as required by the laboratory and immediately cap the bottle securely. Immediately place the bottle in a closed cooler with ice packs or hot-water bottles, depending on the season.

2 Results of E.coli sampling in the bay

Sampling in Shediac Bay for E.coli was done in 2015 and 2016. Seven sites were sampled in 2015 and another 4 samples were added in 2016. In 2017, the samples were retaken after a rain event in October to have some comparison with the previous years.

2.1 Scoudouc River and Pointe-du-Chêne locations



2.2 Shediac River locations

2.3 Site Locations description 2015-2016 with Sample Code (SBWA "A" to" J")

SBWA "A" 2015-6 – end of Parlee Beach at mouth of lagoon outlet, Cape Brule end
Easting 615372.7 Northing 5121556.2
N 46.237788 W 64.496411

SBWA "B" 2015-6 – other end of Parlee Beach closer to marina, where small drainage stream exits near curve of Pt. du Chene Rd., corner of parking lot
Easting 617408.5 Northing 5121998.2
N 46.241416 W 64.522916

SBWA "C" 2015-6 – mouth of lagoon where walking bridge is adjacent to Pt. du Chene Rd
Easting 617257 Northing 51209579.
N 46.232083 W 64.520694

SBWA "D" 2015-6 – roughly in front of city hall bit left towards marina
Easting 619056.7 Northing 5120084.9
N 46.223916 W 64.543805

SBWA "E" 2015-6 – where Scoudouc River is crossed by 4 lane route 133
Easting 619703 Northing 5118485.8
N 46.209416 W 64.551777

SBWA "F" 2015-6 – mouth of Shediac River by Chez Leo
Easting 621378.3 Northing 5125549.3
N 46.272666 W 64.575305

SBWA "G" 2015-6 – in front of first cove just north of Chez Leo close to LeBlanc Street
Easting 621090.9 Northing 5126226
N 46.278805 W 64.571749

New additional sites in 2016

SBWA "H" 2016 – mouth of outlet of Cornwall brook around big lobster to right
Easting 620361.3 Northing 5119131.7
N 46.215111 W 64.560472

SBWA "I" 2016 – mouth of Shediac Bay Marina
Easting 619188.2 Northing 5120592.3
N 46.228458 W 64.545638

SBWA "J" 2016 – mouth of Pointe du Chene Marina
Easting 617850.3 Northing 5121970.0
N 46.241086 W 64.528638

SBWA "E/H" 2016 – mouth of Scoudouc River by big lobster, plant, bridge into Shediac
Easting 619828.8 Northing 5119592.7
N 46.219353 W 64.553689

A summary report of the results is posted on our website or can be made available to individuals on request. The results are presented as MPN/100 ml of water.

MPN: The most probable number (MPN) of coliform or fecal coliform bacteria per unit volume of a sample. It is expressed as the number of organisms which are most likely to have produced the laboratory results noted in a particular test.
+Most Probable Number (MPN) is used interchangeably with Colony Forming Units (CFU)
In 1992, Health Canada recommended microbiological guideline values for recreational water quality. The standard is set at 400 *E coli*/100 mL for single samples.

2.4 2015 sampling results

	19-07-2015	11-08-2015	25-08-2015	14-09-2015
A	*2*	*7*	*2*	*79*
B	*11*	*8*	*350*	*33*
C	*11*	*130*	*17*	*8*
D	*4*	*2*	*4*	*5*
E	*49*	*33*	*49*	*23*
F	*2*	*7*	*7*	*110*
G	*240*	*23*	*280*	*13*
H	*added center Parlee beach inside buoys*		*5*	*2*

The sampling done in 2015 did not detect any values over the recreational water quality guideline. The highest values are in August and one site is close to the guideline for recreational use.

2.5 2016-2017 sampling results

	20-06-2016	19-07-2016	18-08-2016	30-08-2016	19-09-2016	24-10-2017
A	0	4	23	240	19	2
B	2	8	23	46	0	33
C	13	79	130	350	49	< 2
D	0	49	49	23	49	2
E	23	17	240	79	49	8
F	22	11	79	22	4	13
G	33	17	17	23	13	17
H	33	79	79	31	170	
I	0	350	46	33	11	
J	0	27	13	39	22	

The sampling done in 2016 did not detect any values over the recreational water quality guideline. However, the highest values were still found in August. Summer and fall 2017 was abnormally dry and sampling after a rainfall was only possible on the 24th of October.

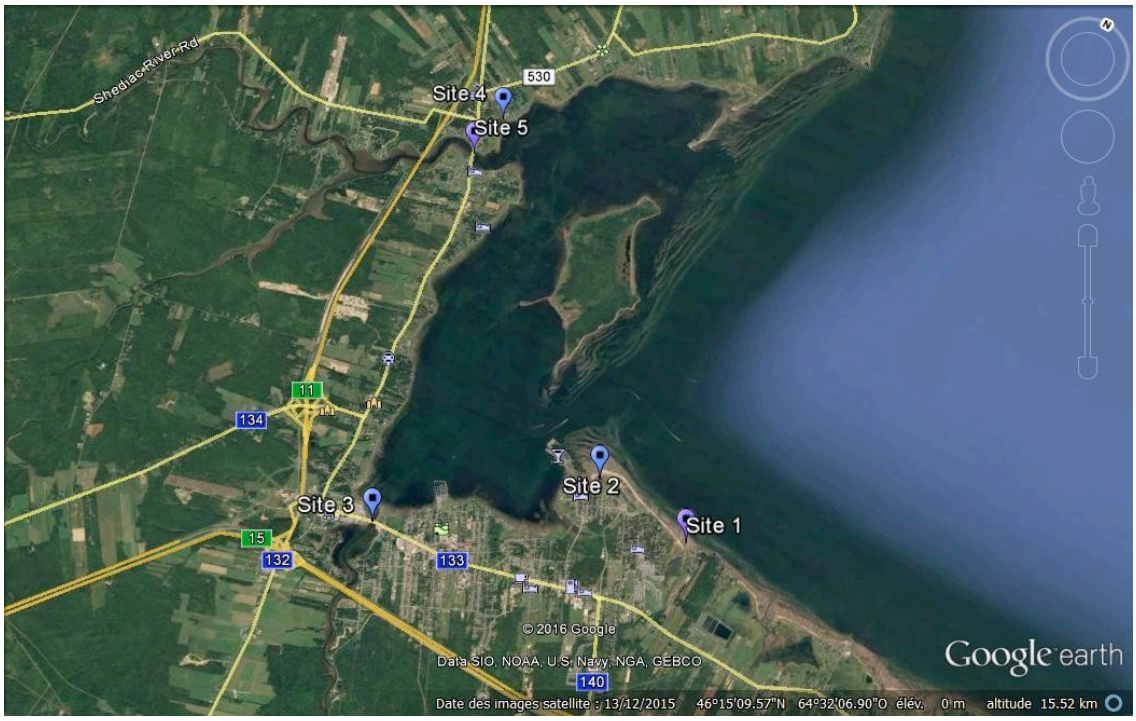
2.6 DNA sampling

In late season 2016, we collected water samples for DNA analysis. To obtain results the samples are taken after a heavy rainfall when the risk of contamination is highest. This occurred later in the season that we had. These tests are very expensive and must be shipped same day delivery to British Columbia for analysis.

There were no adequate rain events in August –September, but on October 9th and 10th there was a continuous rainfall event that resulted in accumulation of 49 mm. The run-off from this made the 11th an ideal collection day. We also collected a water sample for MPN fecal coliform taken to the local lab.

The Greater Shediac Sewage Commission was contacted for possible lift station discharges of sewage due to the heavy rain event. An electrical power outage did happen in the area in the evening of Oct 10th. However, no overflow was reported for this date as generators were used for affected lift stations. However, the UltraViolet light disinfection system was not functional at the Cap Brulé lagoon for 8 hours in the night from Oct 10th to 11th. The UV light serves for disinfecting before outflow.

2.7 DNA sampling sites



Description

1– End of Parlee Beach at mouth of lagoon outlet, Cape Brulé end

2 – Other end of Parlee Beach closer to marina, where small drainage stream exits curve of Pt. du Chene Rd., corner of parking lot

3 - Mouth of Scoudouc River by big lobster, plant, bridge into Shediac

4 - In front of first cove just north of Chez Leo close to LeBlanc-Poirier Street

5 - Mouth of Shediac River by Chez Leo

2.8 *Results from DNA sites*

	Fecal coliform MPN/100ml	General Bacteroides*	Human	Ruminants	Pig	Horse	Dog	Gull
1	1700	+	+	-	-	-	+	-
2	1700	+	+	-	-	-	+	+
3	350	+	-	+	+	-	+	-
4	920	+	+	+	-	-	+	-
5	79	+	-	+	-	-	?	-

Legend: + = detected; **-** = not detected; **?** = uncertain (potential presence; cannot be ruled out)

***BACTEROIDE mini primer**

CHARACTERISTICS: The gram-negative Bacteroides spp. or closely related genera are capsulated obligatory anaerobic bacilli that are non-spore forming, pale-staining, and some are motile by flagella, while other taxa are non-motile. They are normally commensal, found in the intestinal tract of humans (mouth, colon, urogenital tract) and other animals.
EPIDEMIOLOGY: Worldwide - *Bacteroides* spp. or closely related genera are part of the normal flora of the gastrointestinal and respiratory tract and the mouth
HOST RANGE: Humans, dogs, cats and other animals.
MODE OF TRANSMISSION: Infection results from displacement of *Bacteroides* spp. or closely related genera from normal mucosal location as a result of trauma such as animal/human bites, burns, cuts, or penetration of foreign objects, including those involved in surgery. There is no evidence that organisms are invasive on their own.
COMMUNICABILITY: Low; human-to-human transmission is possible through clenched-fist wounds and skin penetrating human bites.
RESERVOIR: Present as part of normal flora in of the gastrointestinal tract, the mouth, and other animals.
ZOONOSIS: Yes, skin penetrating animal bites could lead to infection.
SURVIVAL OUTSIDE HOST: *Bacteroides* and like genera have been detected in feces infected water by PCR for at least 2 weeks at 4°C; 4 to 5 days at 14°C; 1 to 2 days at 24°C; and 1 day at 30°C.

DNA tests done confirm that Site 1 had the presence of human and dog coliforms. The presence of coliform in this time of the year would not be from recreational activities. There's the potential that the contamination comes from an area drained by the small brook that exists at Cap Brulé. Dog DNA was positive at all sites. This pattern implies that dogs are present everywhere and the probability of feces not being adequately removed is current practice.

The results of the DNA analysis were presented to the Greater Shediac Sewage Commission and the Town of Shediac.

Site 2 had the presence of human and dog coliforms. Again, the presence of coliform in this time of the year would not be from recreational activities. It's difficult to determine exactly

where contamination comes from. Further studies using flow patterns of water may help determine potential causes. Also, ground water could be tested to determine possible contamination coming from the aquifer.

Site 3 DNA analysis revealed that contamination was from pigs, ruminants and dogs. No presence of human DNA was found. The contamination was probably caused by the increased runoff of agricultural fields in Scoudouc. The Shediac Bay Watershed Association has been in contact with the New Brunswick Agricultural Alliance to determine possible projects to improve buffer zones and capture stormwater.

Site 4 analysis has the presence of human, ruminant and dog DNA. The area is located in a local service district and no sewerage commission oversees the septic systems present. The responsibility falls on landowners and the NB Department of Health. The small brook crosses some agricultural areas. The SBWA would have to survey the area to determine actions that could be taken to improve buffer zones and reduce runoff.

Site 5 had the lowest count of coliform for the 5 samples that were taken for DNA analysis. The results indicate the presence of ruminant DNA and possibly dog DNA. The area is mostly residential but some agriculture is practised further upstream of the watershed and along the shore.

3 E.Coli sampling in small streams

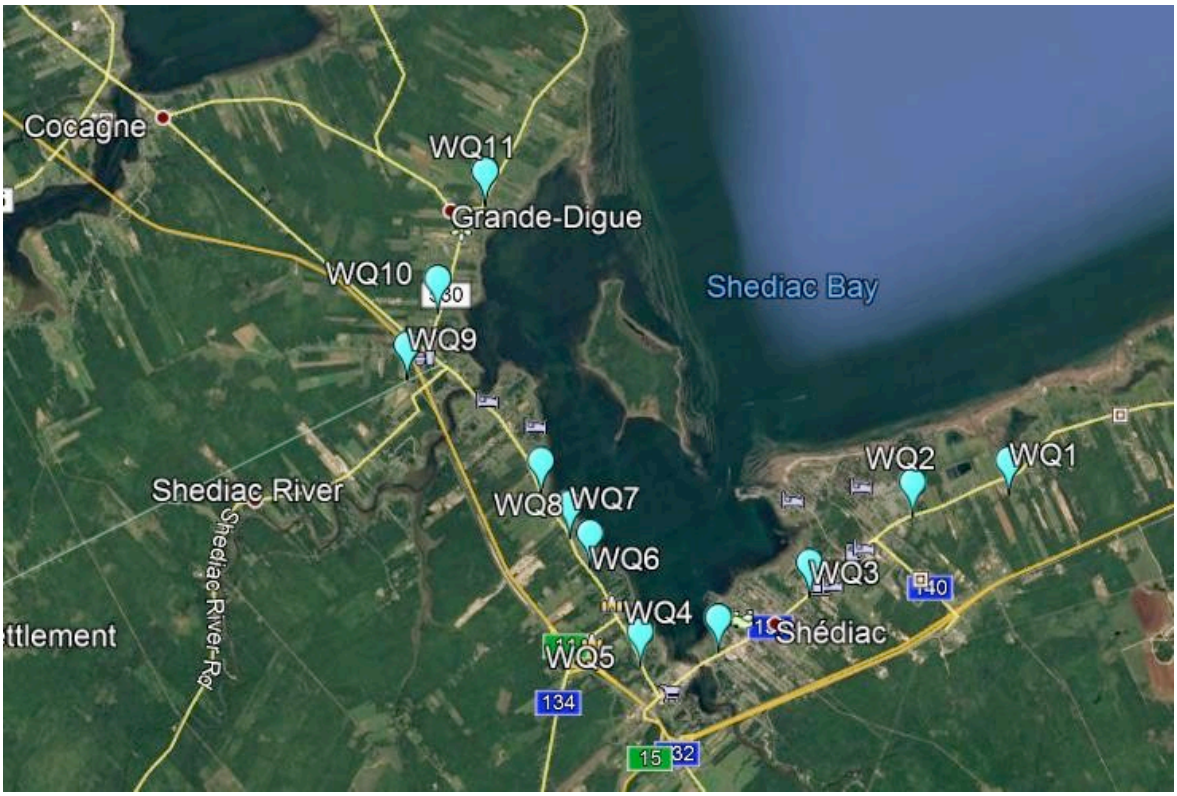
In 2017 to determine sources of bacterial contamination and better understand water quality in Shediac Bay 11 small streams around the bay were sampled for water quality. These streams had never been sampled before.

Summer 2017 was very dry and the results do not reflect normal conditions. The rain information associated with the sampling date is taken from the rain gauge data on the Parlee Beach website.

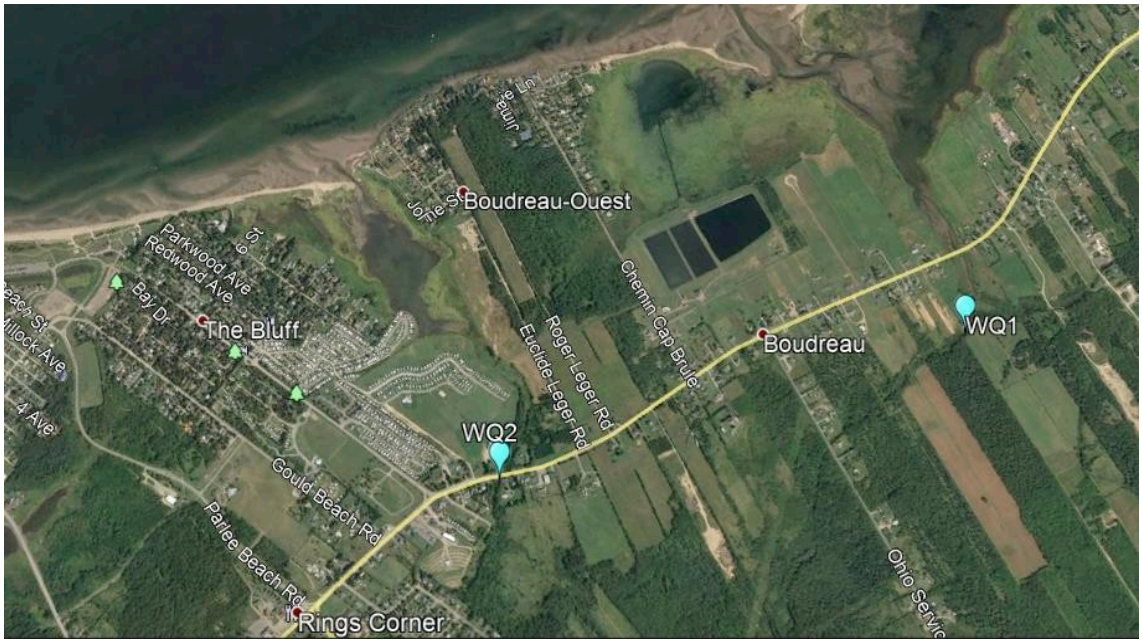
The samples were taken once per month. For June the samples were taken on June 22nd. There had been some light rain on June 21st (1.0 mm). The July samples were taken on the 19th. There was a small rain event on July 17th (13.3 mm). In August, the sampled taken on the 22nd was after a rain event of 9.1 mm on August 20th. September 20th and October 18th were both sampled during a dry period that had little rain.

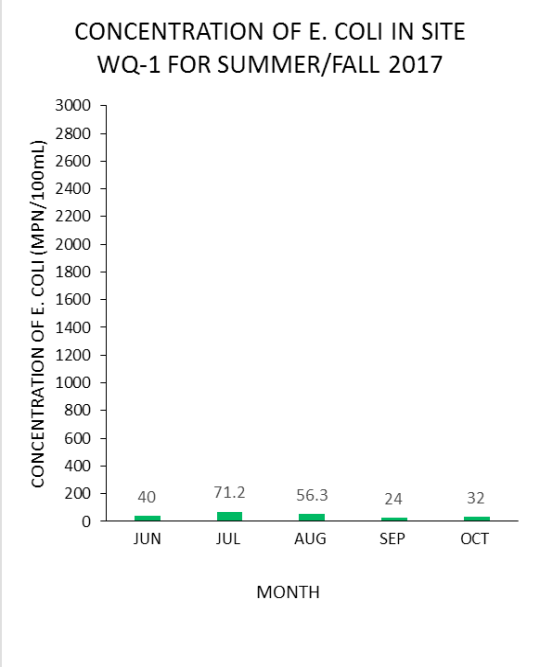
3.1 Sites and Results

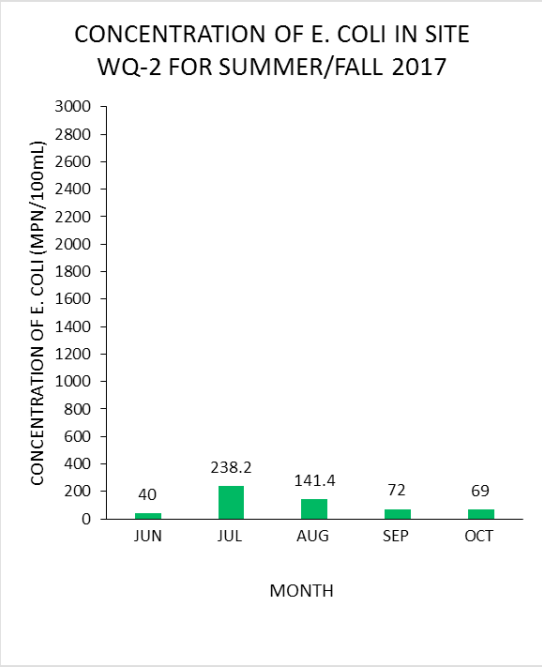
The sites were chosen to be above tidal waters and on small streams that surround the bay. A total of eleven sites were monitored in 2017. Results over the recreational limit of 400 MPN/100ml were flagged.



The first two sites were sampled on two streams in Boudreau Ouest at the crossing of route 133.

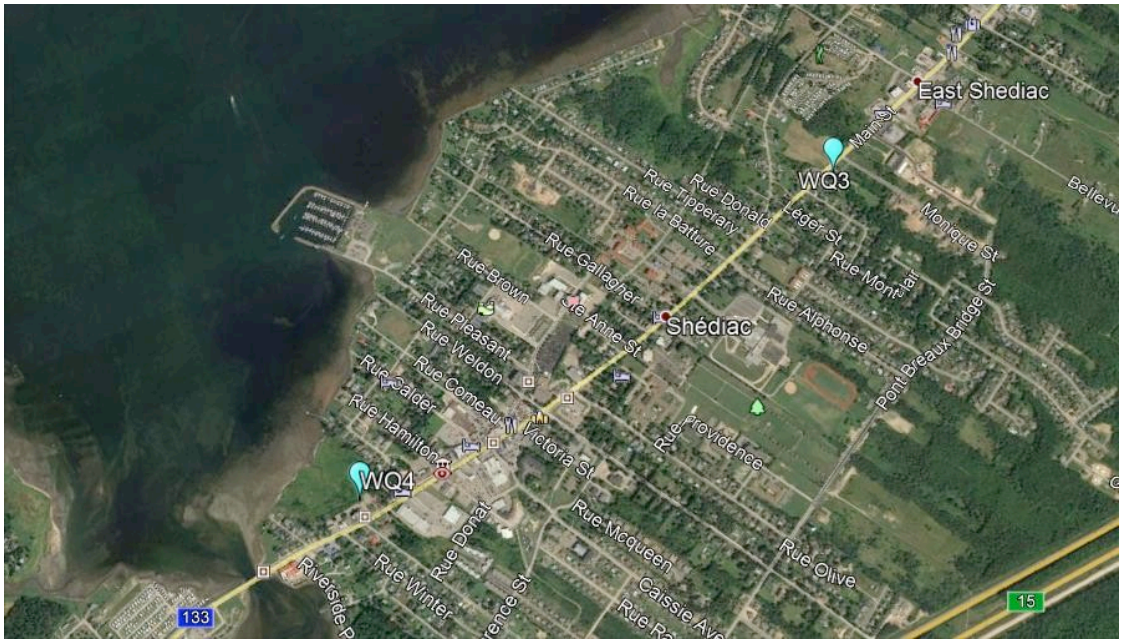


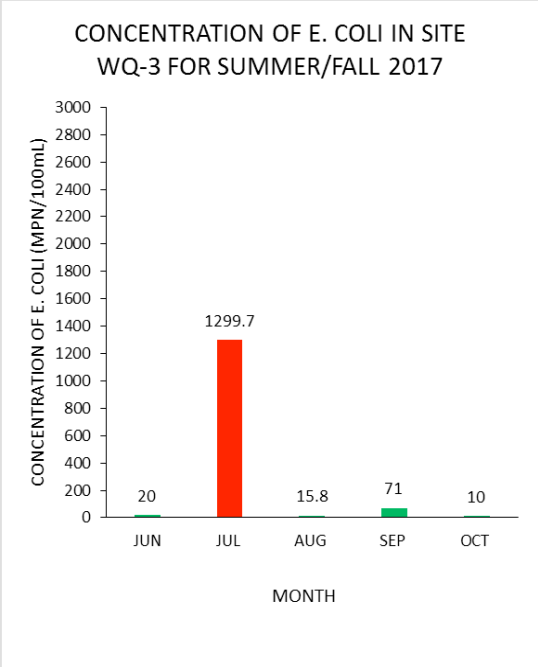


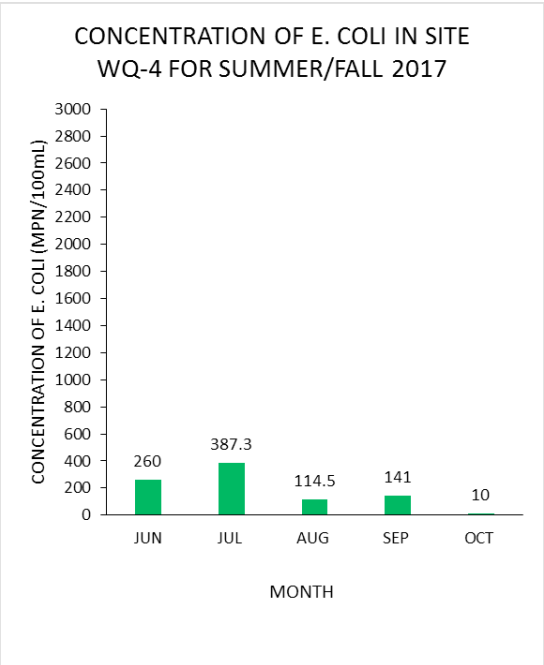


Site 1 samples a stream that crosses mostly forested areas. The agricultural fields around the site are not actively farmed and would not be a source of bacterial contamination. There was low presence of E.coli with the maximum being 71.2 MPN/100 ml in July.

Site 2 samples a stream that drains residential areas in the east of the town of Shediac up to highway 15. The concentration of E.coli was higher than site one with a peak of 238.2 MPN/100 ml in July but remained lower than the recreational guideline of 400 MPN/100 ml.

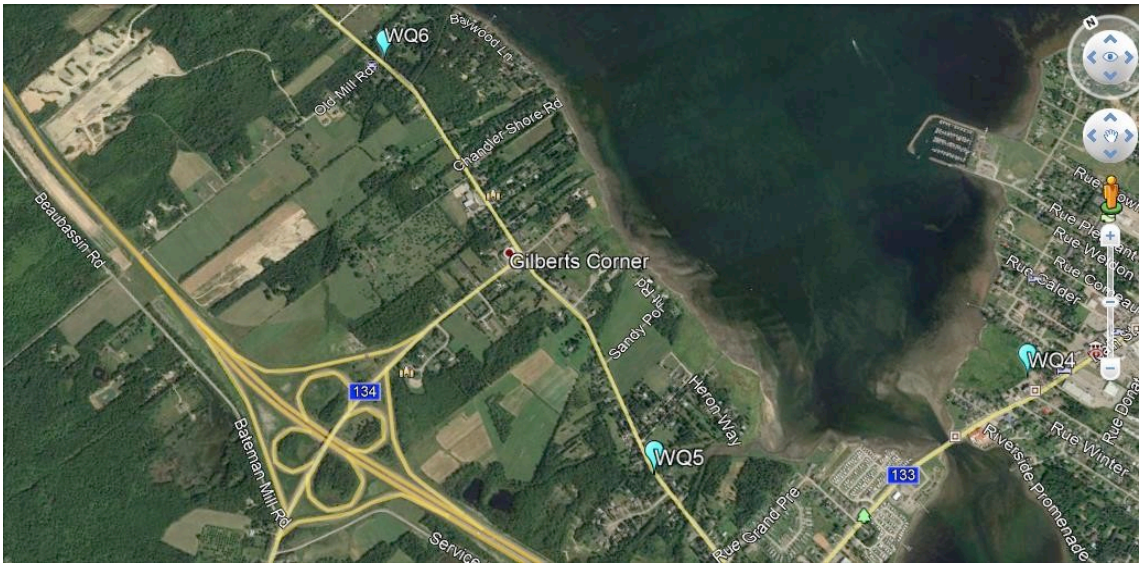


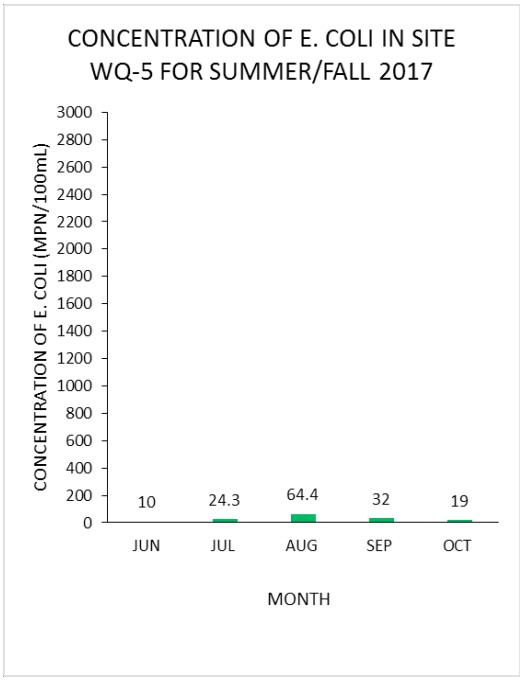


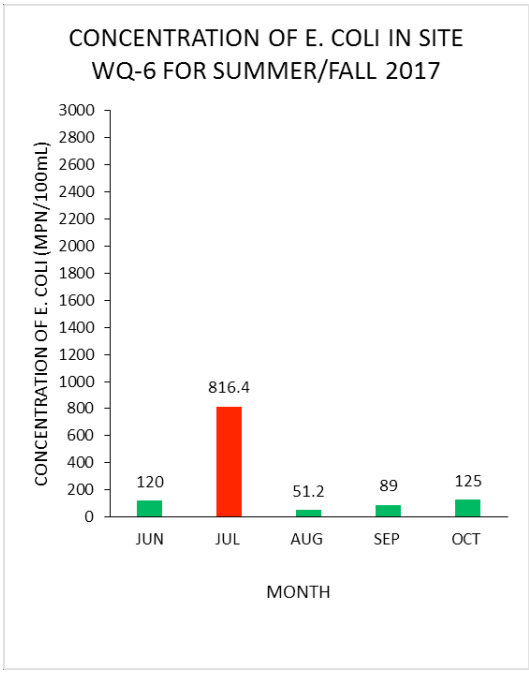


Site 3 is sampled in a more urbanized stream that crosses residential zones. The sampling in July had a high count of E.coli. However in dryer months the E.coli count remained low.

Site 4 is located behind the town hall and the stream crosses residential and commercial zones. This stream is also piped under ground for approximately 200 m. The concentrations of E.coli remained under the recommended guidelines but were close in June and July.

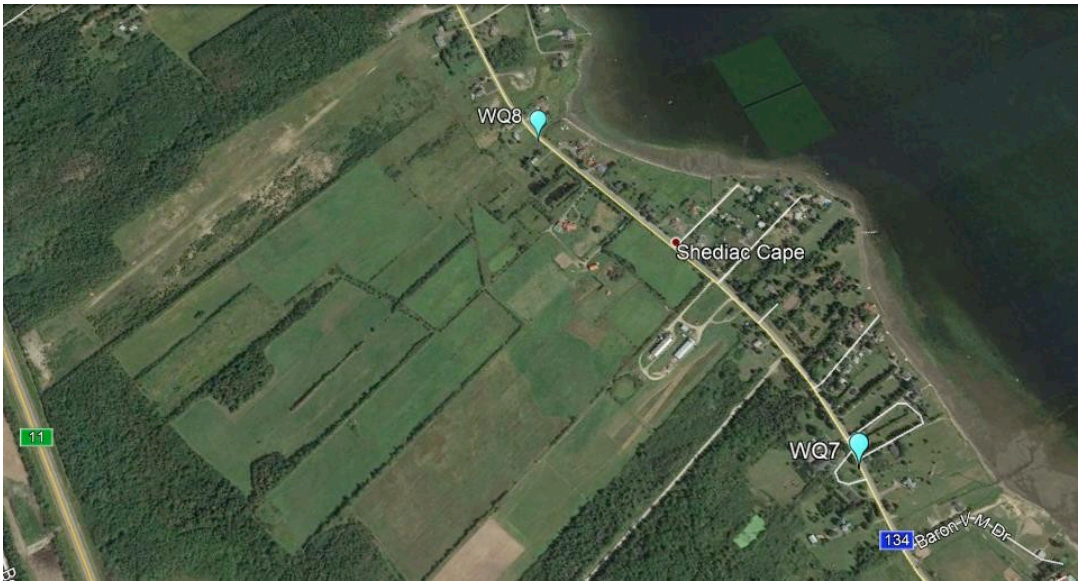


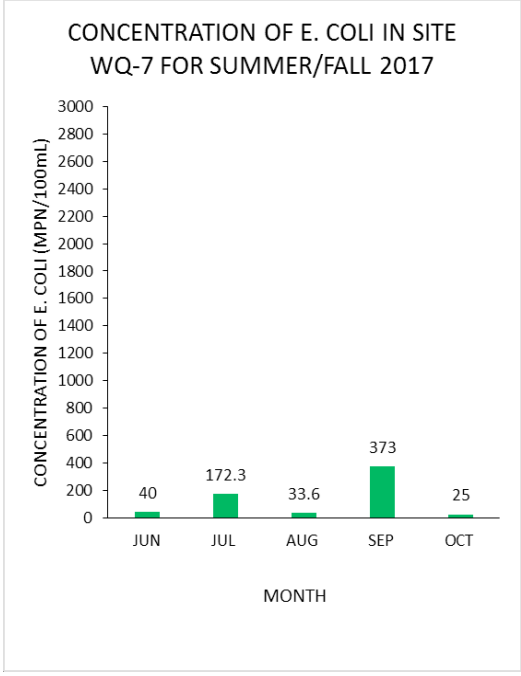


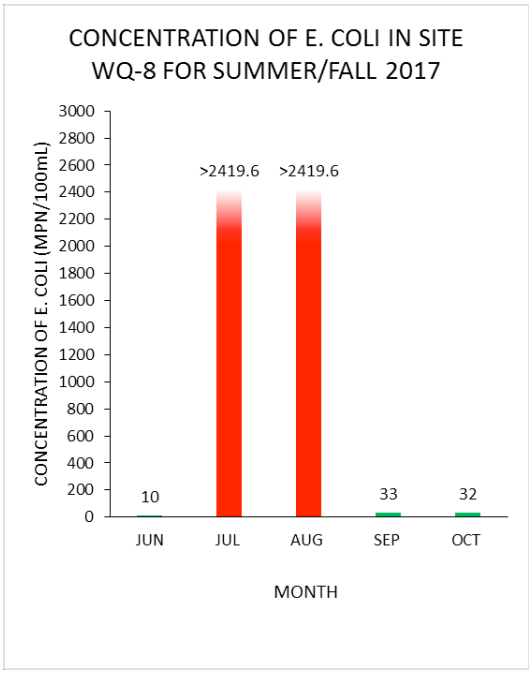


Site 5 is a small stream that ends in a residential area but mostly drains a forested area. The E.coli concentration remained low for 2017.

Site 6 is a site that captures runoff from a stream that crosses agricultural lands as well as runoff from some ditches. The July sample had high concentration of E.Coli but the remaining samples were low.

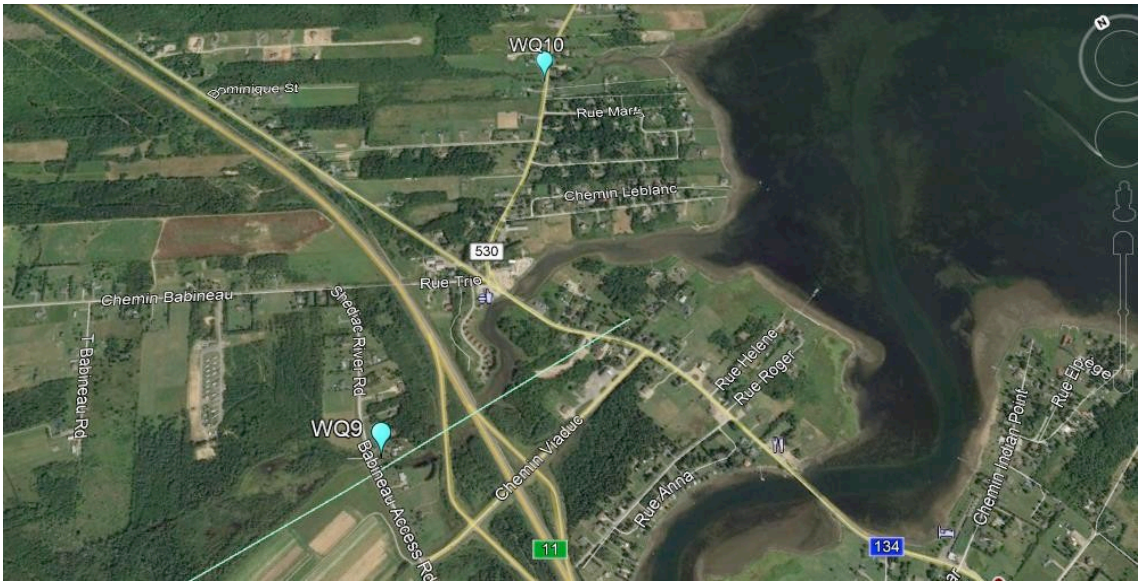


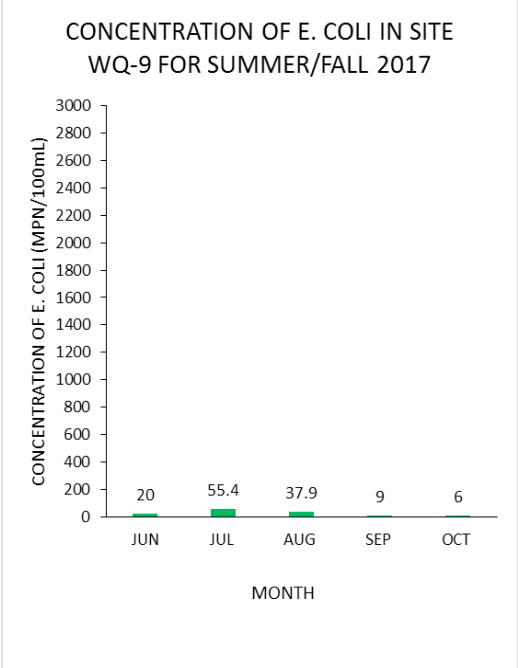


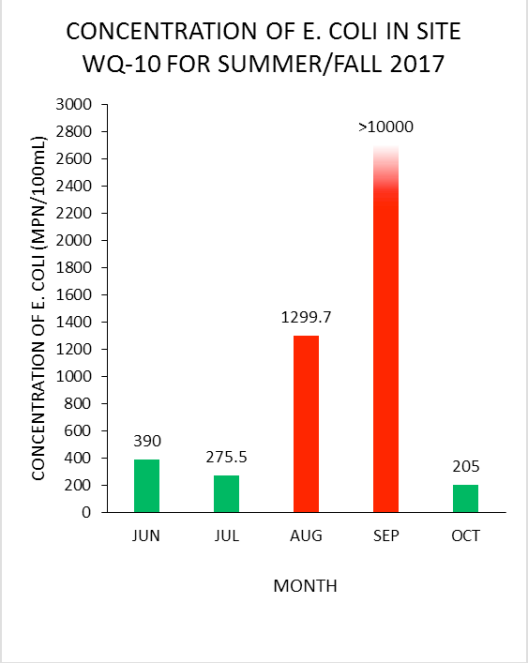


Site 7 is sampled in a stream that crosses forested areas and a hotel/cottage complex. The results were under the recreational guidelines but have higher numbers in September even with the dry weather.

Site 8 samples a stream that crosses agricultural land. The high concentration of E.coli in July and August followed by low numbers in other months is probably linked to the presence of livestock or manure spreading.

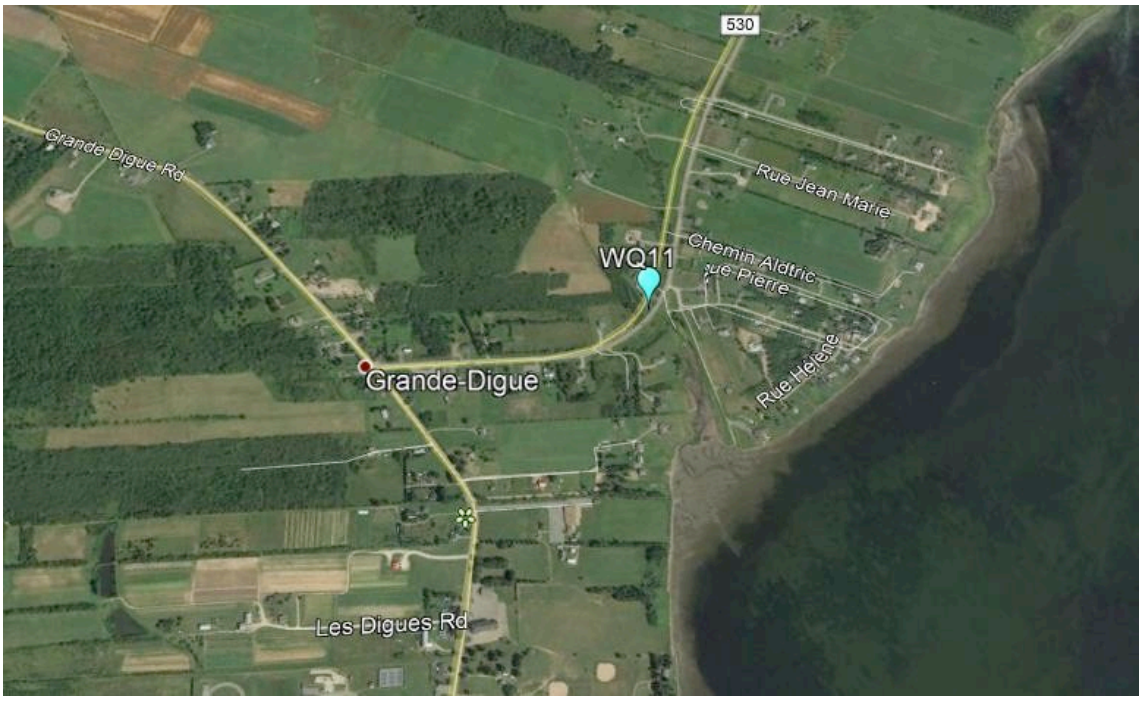


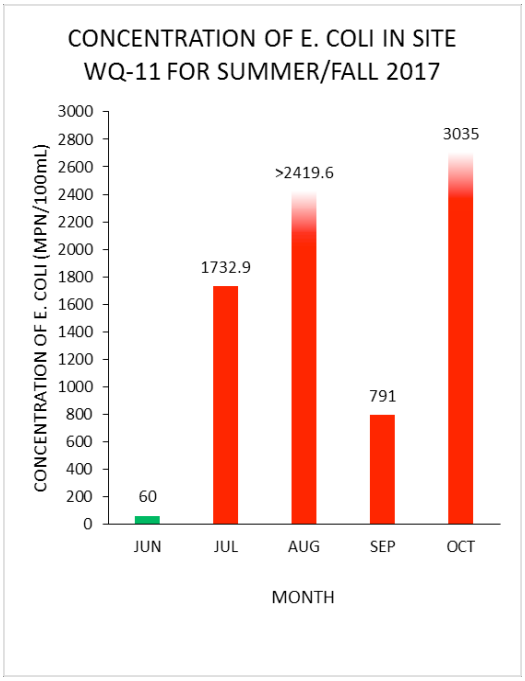




Site 9 samples a stream that drains some forested lands and some agricultural zones. The E.Coli concentration is low for this site. A marsh formed in an abandoned gravel pit is situated upstream from the site and may help in diminishing E.coli concentrations.

Site 10 is located drains and agricultural and forested zone. A hobby farm is located next to the site. The high concentration of E.coli may be attributed to manure .





Site 11 drains an agricultural area that is active as well as some drainage ditches. The water is stagnant and may incubate E.coli to the elevated levels that are recorded. The concentration was lower in June before the weather warmed.

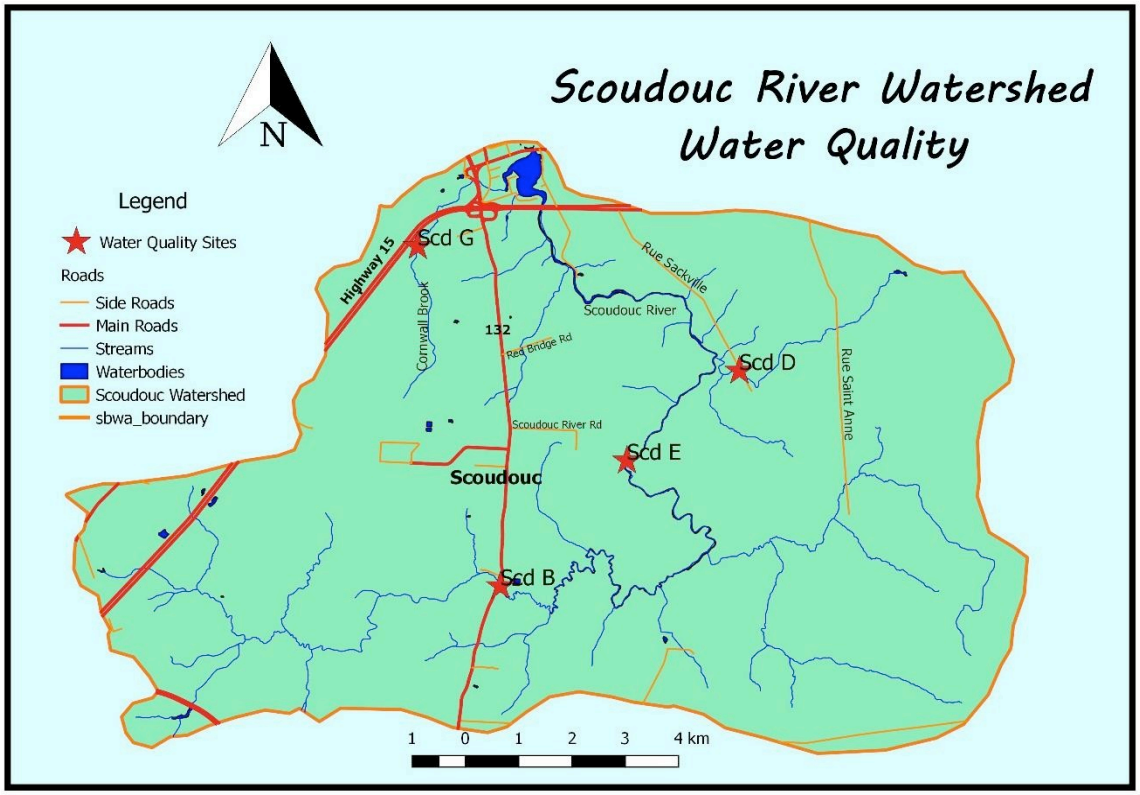
4 Monitoring of E.Coli in Freshwater sites

The freshwater sites on the rivers of the Shediac Bay Watershed have been monitored since the Water Classification program implemented in 2000-2001. These points have the biggest datasets for water quality for the association.

E.coli testing was not done every year because of funding constraints or lack of resources available to the Association. However, since 2007 there has been consistent sampling on these freshwater sites.

Four sites have been monitored in the Scoudouc River. Originally there were 7 sites chosen for the water classification program, however, because of access only 4 sites have been maintained for the long term. The site Scd G on the Cornwall brook was added later on.

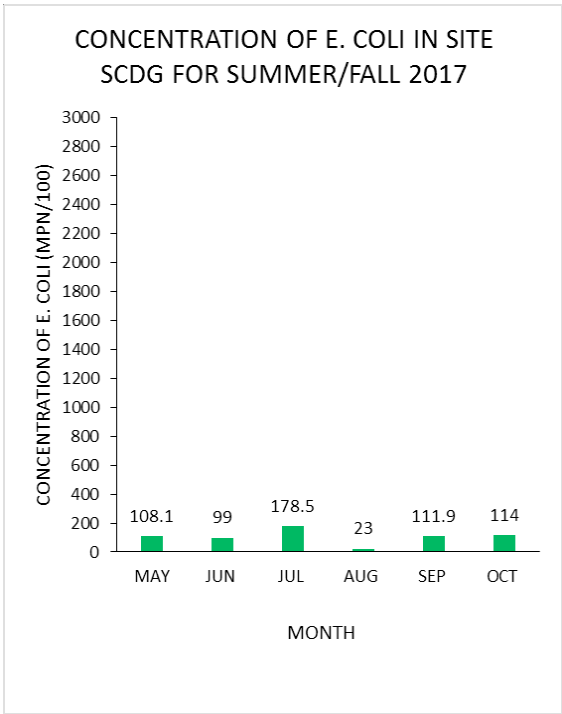
4.1 Site locations Scoudouc River



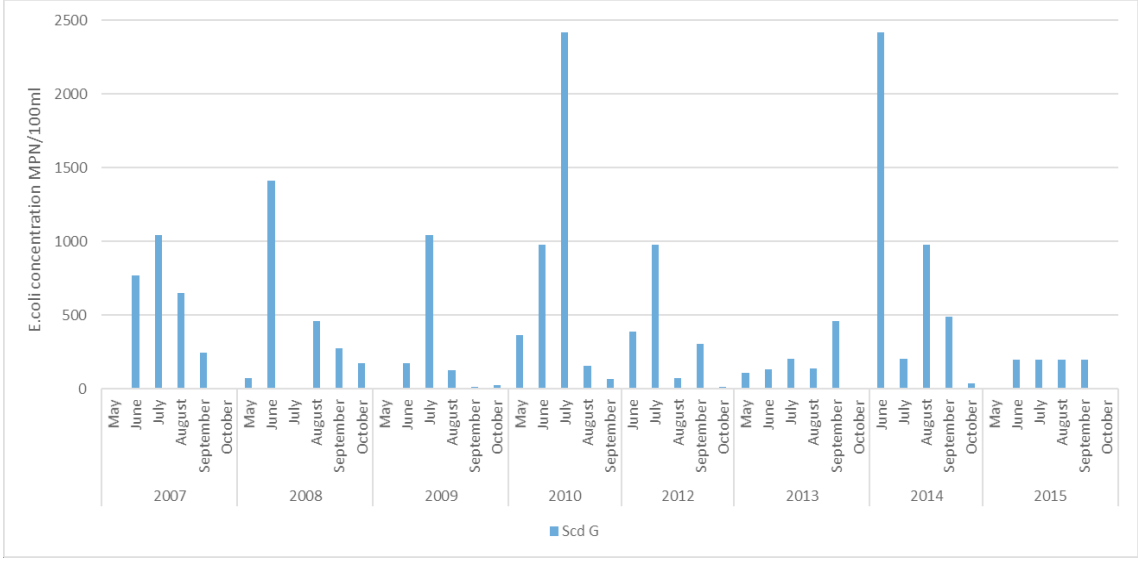
4.1.1 Scd G – Cornwall Brook

The site situated in the Cornwall Brook is in a small tributary that exit near the mouth of the Scoudouc River. It crosses an agricultural zone and an industrial zone.

In 2017, the concentration of E.Coli for this site remained low for the summer. However this site has frequently had high E.coli concentrations. This can be attributed to active agricultural activity upstream and/or active beaver activities upstream. Highest numbers are usually associated with rain events.

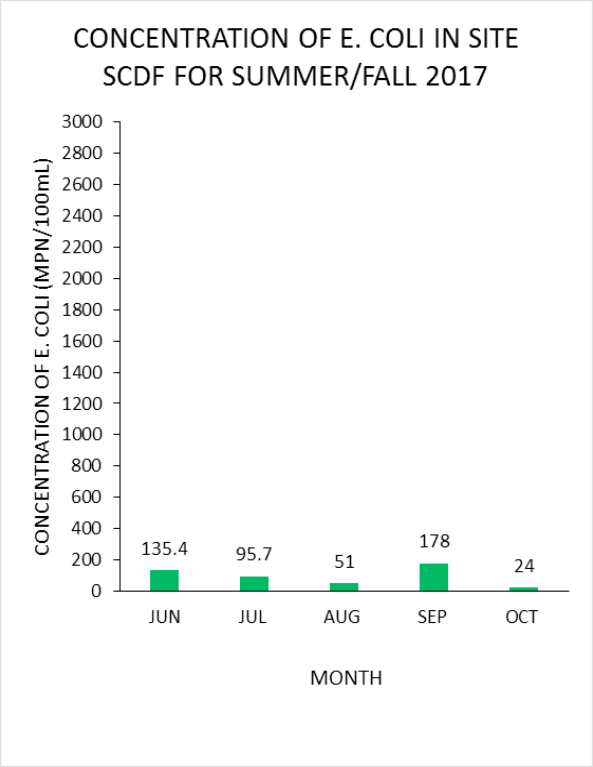


Historical concentrations of E.coli on site Scoudouc G from 2007-2015

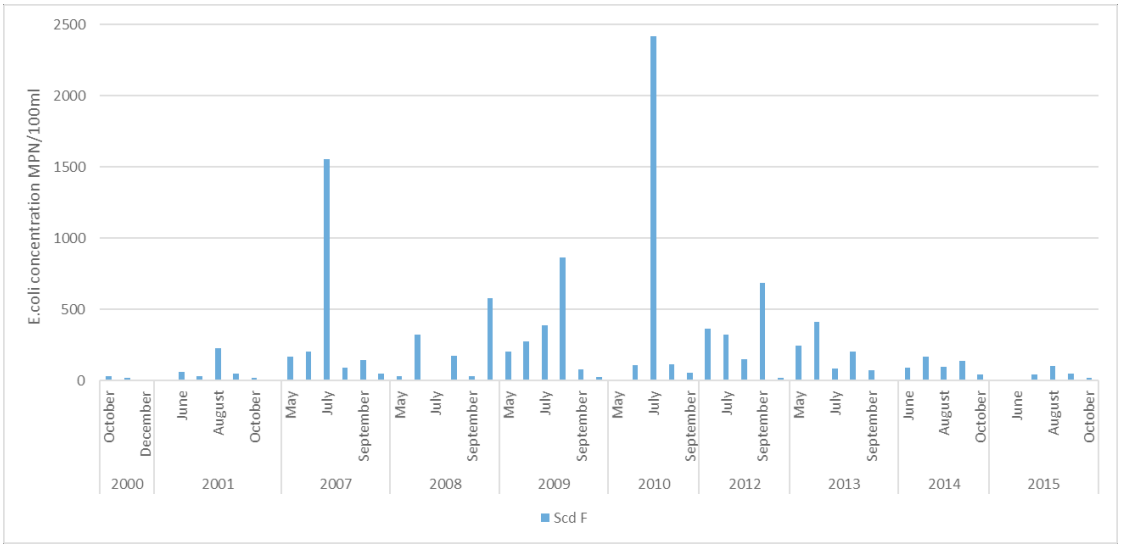


4.1.2 Scd F - Pellerin Road

The next site is situated in a wooded area accessed by taking Pellerin Road. The concentration of E.coli remained low in 2017. In previous years some samples have had high concentration of E.coli. These high concentrations may be attributed to beaver activity upstream of the site as the concentrations have diminished once the beaver activity is absent.

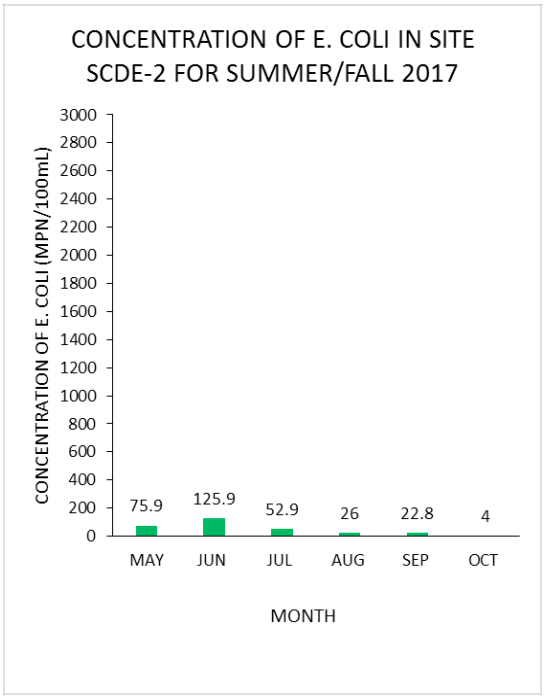


Historical values of E.coli Concentrations from 2000-2015

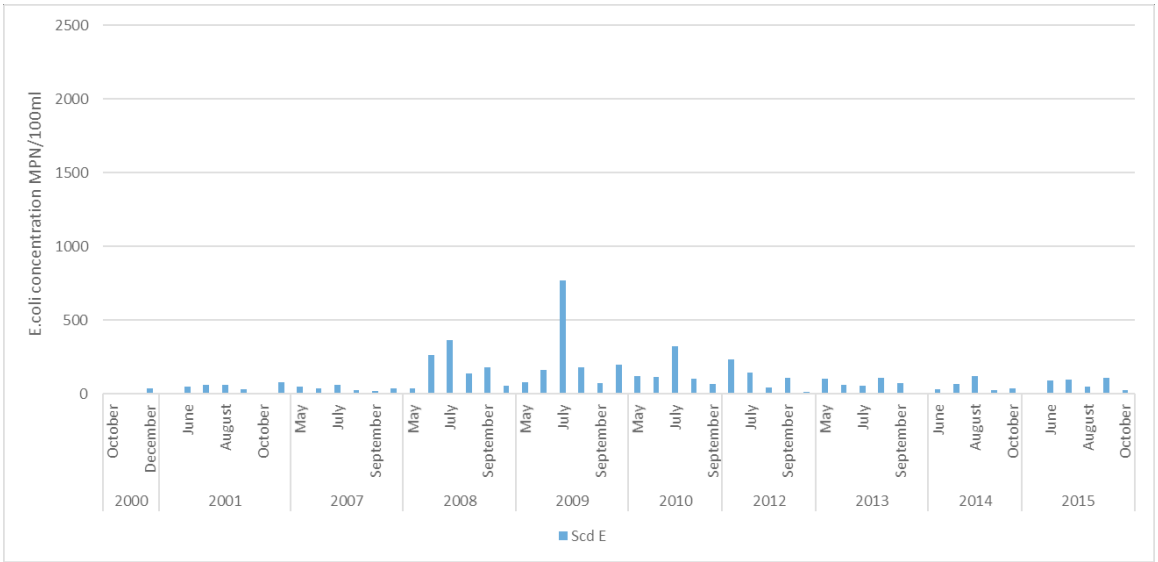


4.1.3 Scd E Scoudouc River off Scoudouc River Road

The next site is further upstream and accessed off Scoudouc River Road. The area is mostly forested with no development upstream. This is the site with the lowest levels of bacterial contamination compared to the other sites.

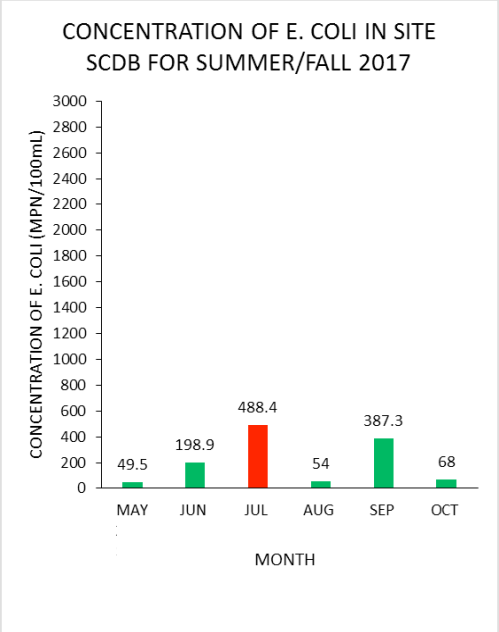


Historical values of E.coli Concentrations from 2000-2015

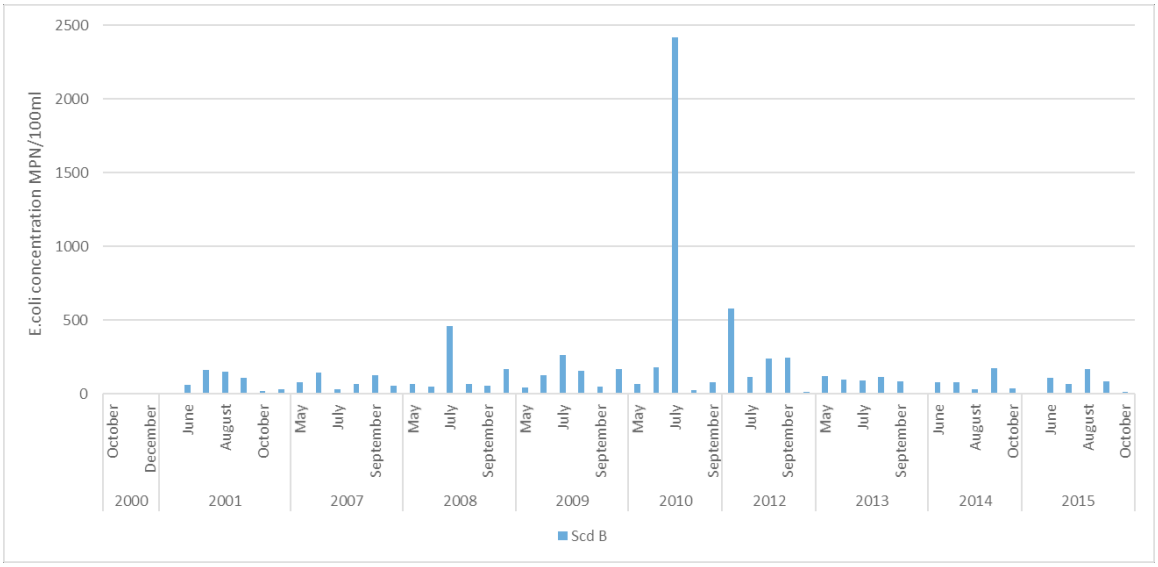


4.1.4 Site Scd B - Scoudouc River Main Branch at Route 134

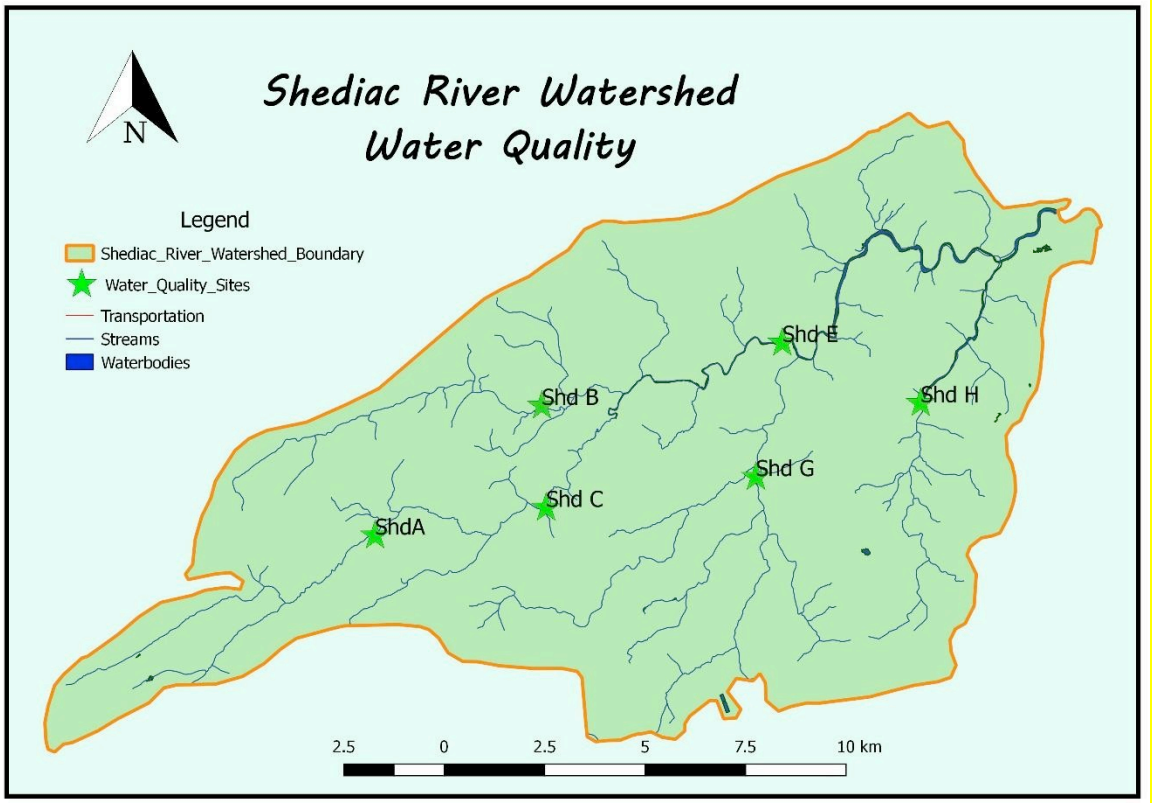
The site is where the main branch of the Scoudouc river crosses route 134. It's situated in a residential zone. In 2017 concentration of E.coli was above the recreational limit for the month of July. The concentration was higher in September as well. There's beaver activity upstream of this site in 2017. Historically, the concentrations of E.coli are generally low but the site does experience some occasional high counts. The higher counts are after heavy rainfalls in July 2010 and June 2012.



Historical values of E.coli Concentrations from 2000-2015



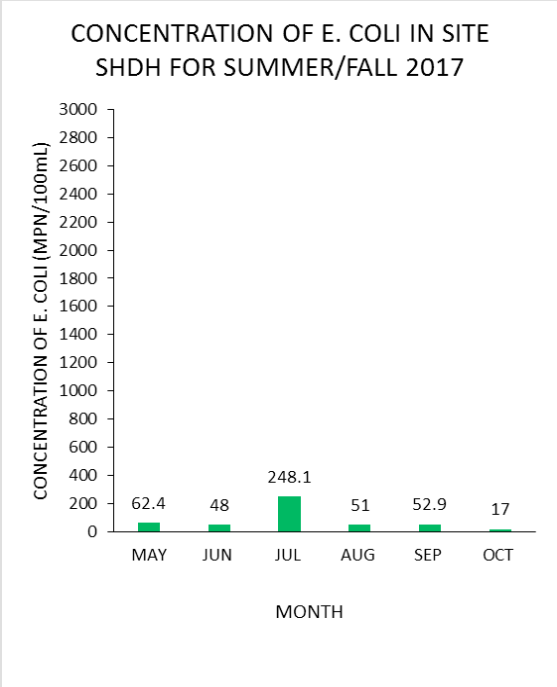
4.2 Site locations Shediac River



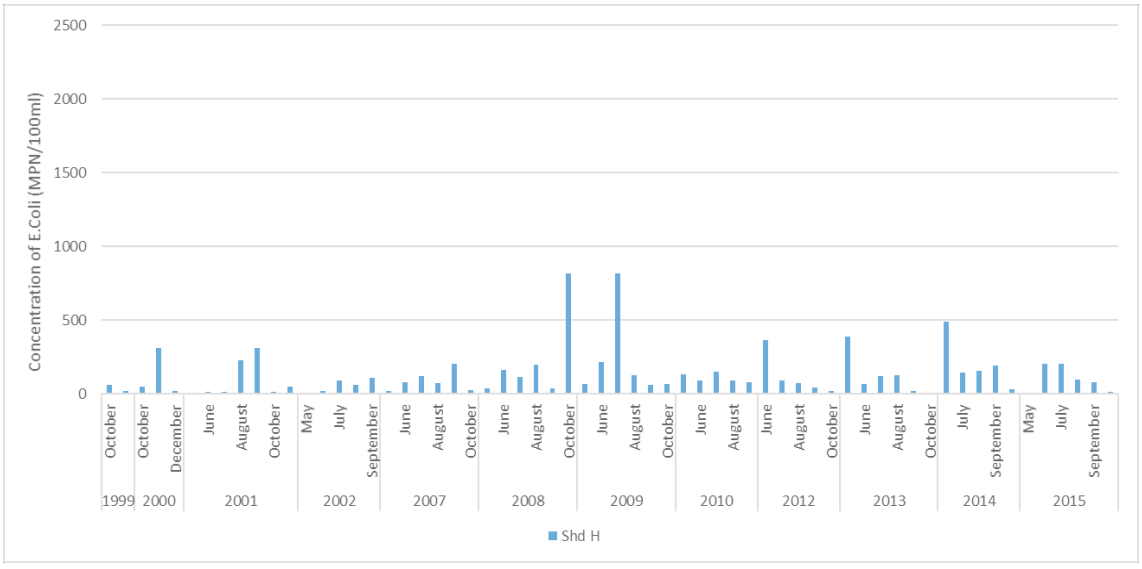
The Shediac Bay Watershed Association has been monitoring E.coli in the freshwater of the Shediac river from 2000-2017. Six sites have been monitored.

4.2.1 Shd H - Bateman Mill

Shd H is taken at the point where saltwater begins off the Bateman mills brook. The river crosses some agricultural lands and is also influenced by beaver dams. The concentration of E.coli remained low in 2017. In general the E.coli counts are low for this site.

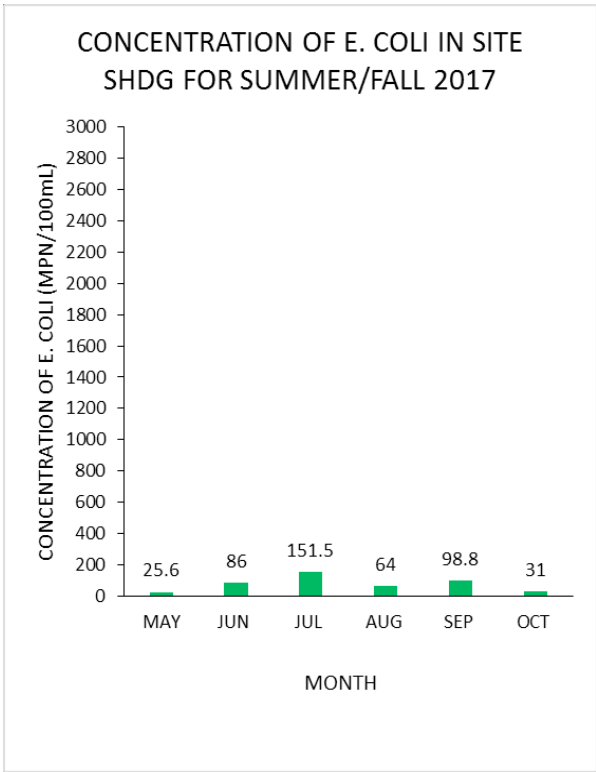


Historical values of E.coli Concentrations from 2000-2015

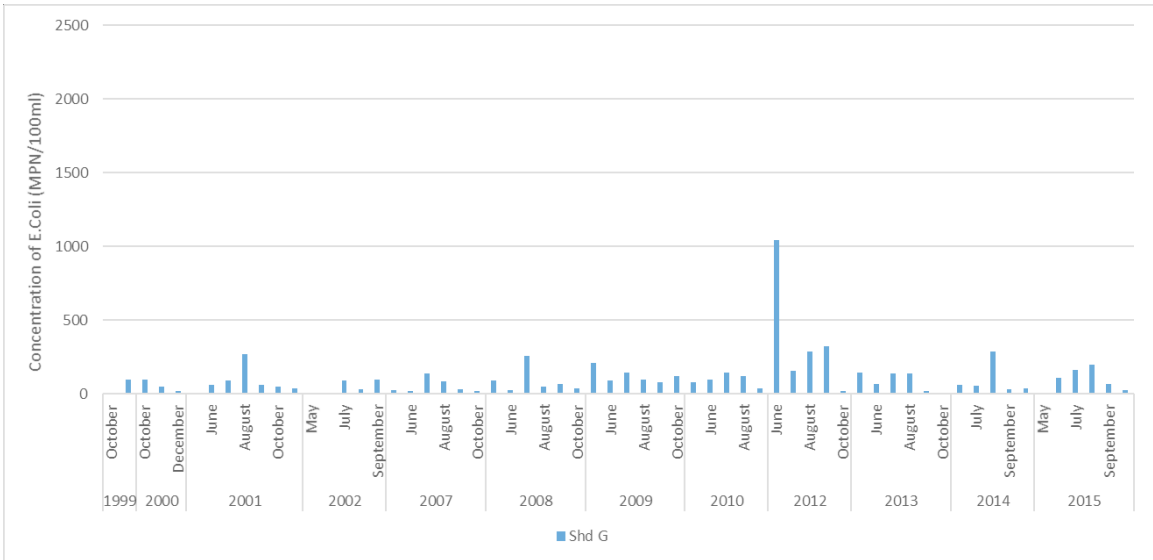


4.2.2 Shd G - Weisner Brook

The site for the Weisner Brook is located in Saint Philippe. The brook crosses agricultural lands that are mostly. Abandoned. However some beaver activities are upstream in some years.

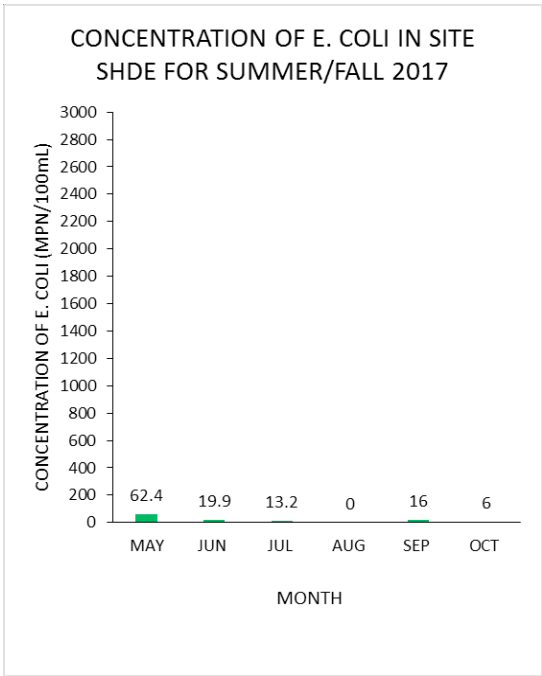


Historical values of E.coli Concentrations from 2000-2015

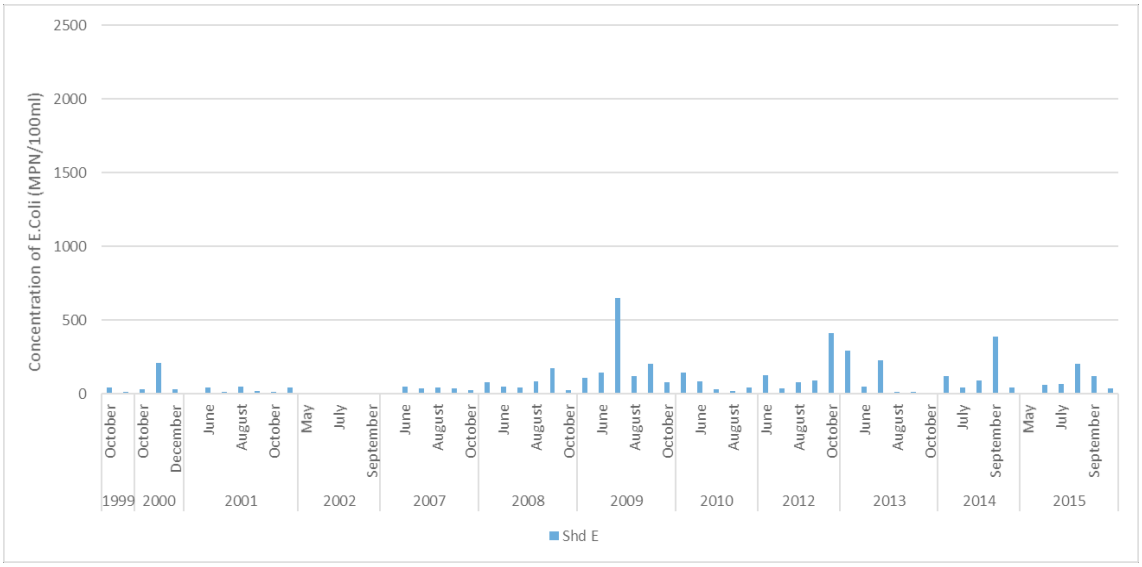


4.2.3 Shd E Main Branch Shediac River

This site is situated where the main branch of the Shediac River crosses the Shediac River Road. The area is mostly forest lands with no development upstream. Presence of bacteria is consistently very low on this site.

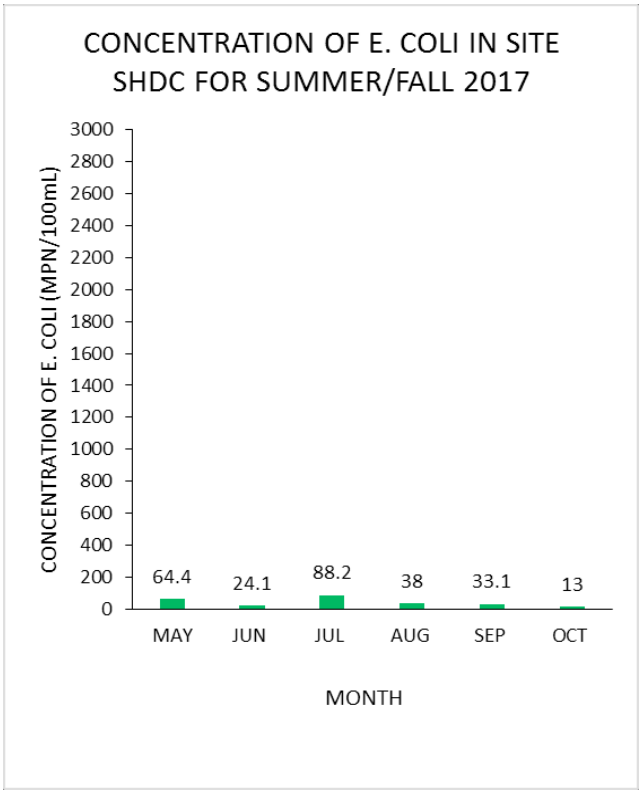


Historical values of E.coli Concentrations from 2000-2015

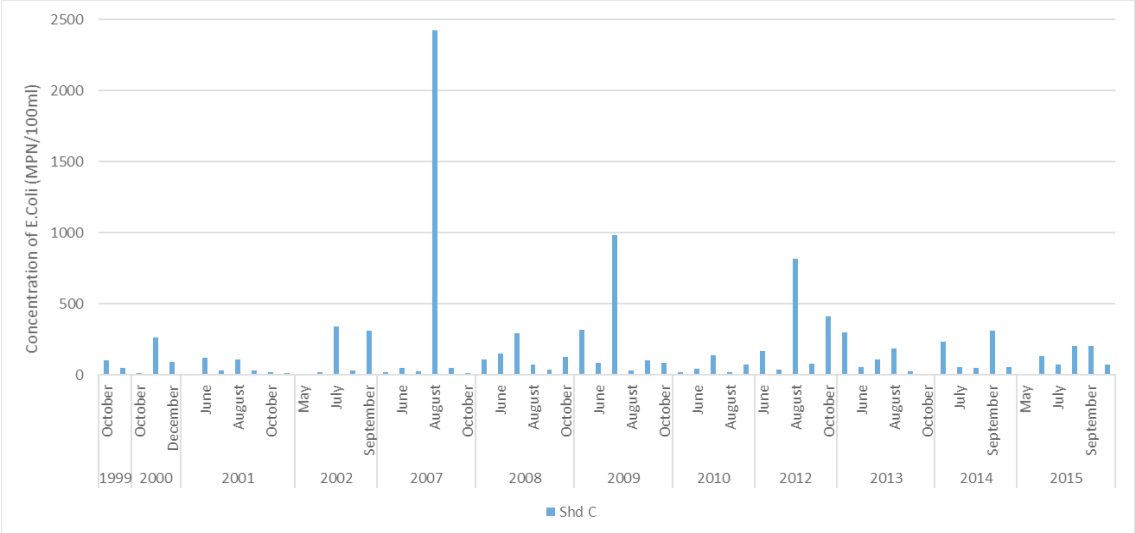


4.2.4 Shd C - McLean Cross Rd

The site where the main branch of the Shediac river passes under McLean Cross Road near Cape Breton Road. The area is mostly residential and forested. There are occasional high counts of E.coli from unknown sources.

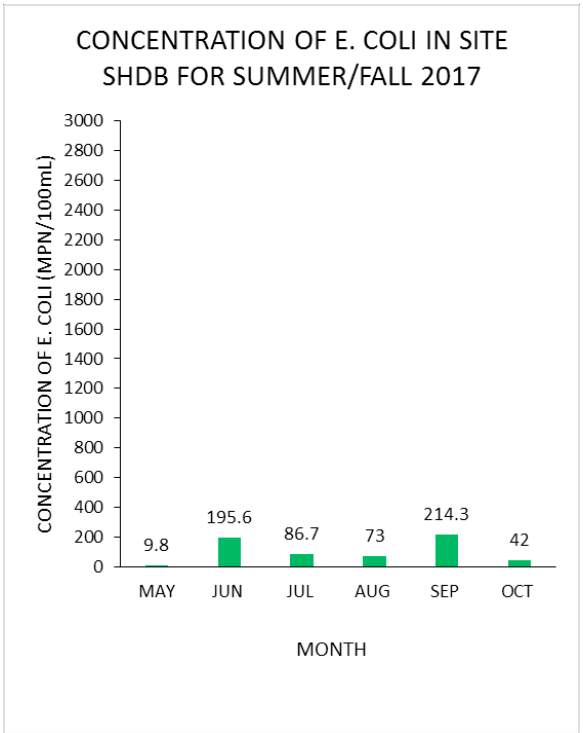


Historical values of E.coli Concentrations from 2000-2015

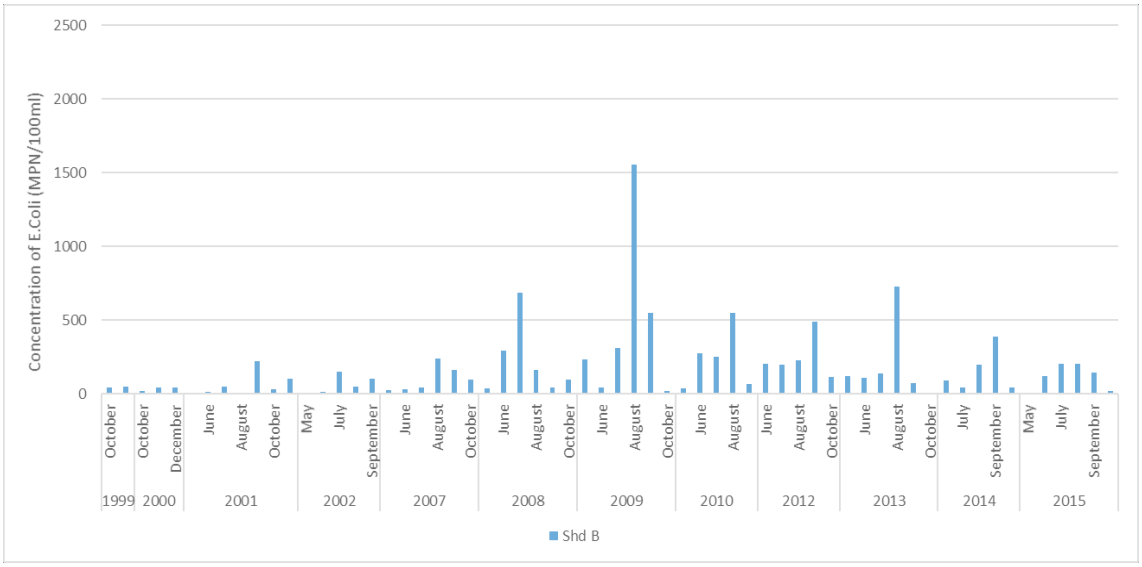


4.2.5 Shd B - McQuade Brook

The site is off Scotch Settlement Road on the McQuade Brook. There has been some beaver activity upstream from this site noted in 2007 and 2008.

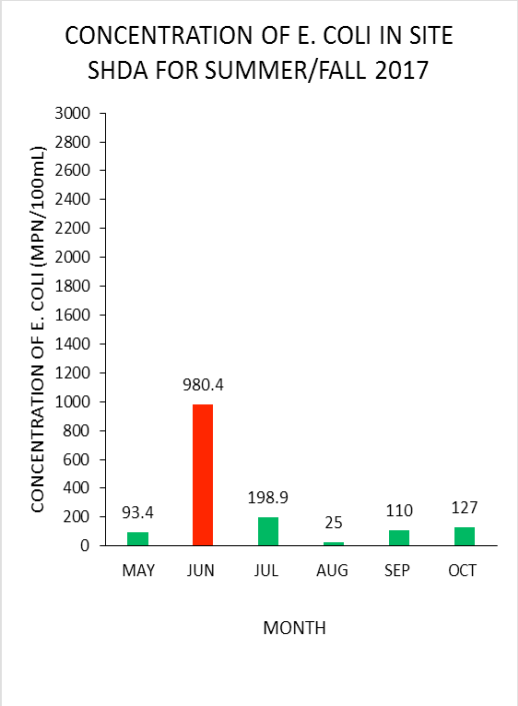


Historical values of E.coli Concentrations from 2000-2015

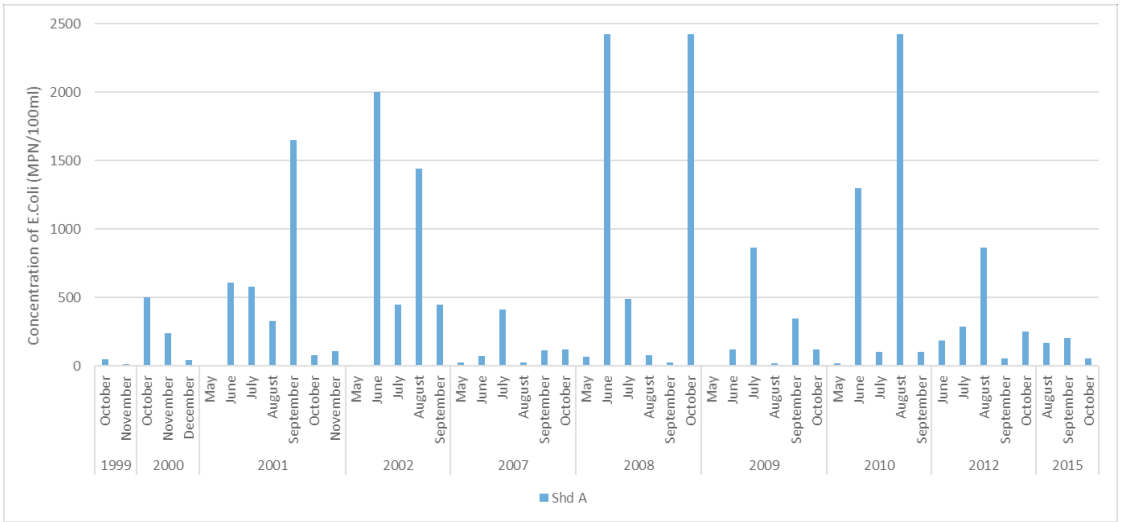


4.2.6 Shd A - Irishtown

The site is located in the upper reaches of the watershed in Irishtown of route 115 on the Main Branch of the Shediac River. The area had the highest readings of E.coli in the watershed. This is an active farming area. There has been some restoration done by the SBWA but more could be accomplished to limit run off from fields.



Historical values of E.coli Concentrations from 2000-2015



5 Parlee Beach Monitoring

From 2000-2016 Parlee Beach did sampling on three sites along the shore. In addition to E.coli, Faecal Streptococci is also measured as it is recommended by the CCME for swimming guidelines in salt water. The samples done by Parlee Beach are taken along the shore.

From 1999-2016, when determining recommendations for swimming, Parlee Beach not follow CCME guidelines but used their own guidelines. The bacteriological Guideline for Parlee Beach 'poor' water rating was a single sample over 30 MPN/100 ml for enterococci and 175 *E. coli*/100 mL. While these ratings are stricter than CCME guidelines the posting and presentation of the results to the public was not adequate. Therefore, there was much media attention as the public wanted to better understand water quality issues at Parlee Beach and in Shediac Bay.

The following tables will look at sampling from 2013 to 2016 done by Parlee Beach. The samples that are above CCME values will be in red and above past Parlee Beach guidelines in yellow.

In 2013 there were several events with high bacteria counts. Water quality would be considered poor by Parlee Beach standards on 6 of the 9 weeks. Using the CCME guideline of 70 enterococci it was surpassed on 4 weeks. It's interesting to note that the water was resampled after high counts on August 6th and 14th. The numbers were significantly lower after two days.

2013	**West End Beach**	**West End Beach**	**Center Beach**	**Center Beach**	**East End Beach**	**East End Beach**
	E.coli	**Faecal Strep.**	***E.coli***	**Faecal Strep**	***E.coli***	**Faecal Strep.**
17/06/2013	8	2	<2	26	2	10
24/06/2013	<2	10	<2	46	<2	94
02/07/2013	4	26	4	10	12	38
08/07/2013	144	166	56	54	42	58
15/07/2013	<2	6	2	2	2	6
22/07/2013	6	6	2	4	8	10
30/07/2013	<2	52	<2	12	<2	4
06/08/2013	66	184	46	680	40	1380
08/08/2013	28	42	36	16	2	20
14/08/2013	22	362	128	252	26	268
16/08/2013	<2	6	<2	14	<2	16

Over the season of 2014, there were no incidences of E.coli exceeding the guidelines with peaks on June 3rd and August 19st. Enterococci was at poor levels several occasions during the season with some days of extremely high numbers. More information on weather and beach use would be needed to interpret these results.

2014	**West End Beach**	**West End Beach**	**Center Beach**	**Center Beach**	**East End Beach**	**East End Beach**
	E.coli	**Faecal Strep.**	***E.coli***	**Faecal Strep**	***E.coli***	**Faecal Strep.**
03/06/2014	34	<2	4	<2	8	10
10/06/2014	<2	<2	2	8	12	32
14/06/2014	10	78	<2	286	4	72
21/06/2014	6	68	12	>2000	4	290
24/06/2014	2	20	<2	6	8	2
02/07/2014	<2	12	<2	18	2	54
08/07/2014	2	238	4	352	<2	216
14/07/2014	10	78	<2	286	4	72
21/07/2014	8	68	12	>2000	2	290
28/07/2014	<2	18	6	60	4	42
05/08/2014	<2	20	8	20	24	30
12/08/2014	<2	<2	4	26	<2	38
19/08/2014	16	32	18	292	32	26

Over the season in 2015, there were 2 incidences of E.coli exceeding the 175 MPN/100 mL with on peak on August 10th. Enterococci/was at poor levels on July 6th and August 4th, 10th, 17thand August 24th

2015	**West End Beach**	**West End Beach**	**Center Beach**	**Center Beach**	**East End Beach**	**East End Beach**
	E.coli	**Faecal Strep.**	***E.coli***	**Faecal Strep**	***E.coli***	**Faecal Strep.**
08/06/2015	4	<2	<2	<2	8	2
22/06/2015	<2	10	20	20	16	50
29/06/2015	4	10	10	<10	4	20
06/07/2015	8	40	2	1020	10	1260
21/07/2015	12	16	8	10	22	14
27/07/2015	<2	<10	2	10	2	<10
04/08/2015	<2	<10	<2	40	<2	630
10/08/2015	204	530	164	490	250	550
17/08/2015	6	<2	2	10	<10	50
24/08/2015	116	6	30	350	170	220

For 2016, no incidences of *E.coli* exceeding the 175 MPN /100 mL level on the days tested with a peak between July 26th and August 2nd and another on August 16th. Entorococci was high on 7 occasions using the guidelines of Parlee beach. Using the CCME guideline of 70 enterococci/100 mL the guideline would only have been surpassed on two occasions.

2016	**West End Beach**	**West End Beach**	**Center Beach**	**Center Beach**	**East End Beach**	**East End Beach**
	E.coli	**Faecal Strep.**	***E.coli***	**Faecal Strep**	***E.coli***	**Faecal Strep.**
07/06/2016	<2	2	<2	<2	2	<2
15/06/2016	<2	10	<2	2	<2	2
20/06/2016	<2	8	2	2	<2	<2
27/06/2016	<2	<2	<2	<2	<2	2
04/07/2016	<2	22	<2	26	<2	48
12/07/2016	<2	8	<2	12	<2	18
18/07/2016	2	42	<2	14	<2	34
26/07/2016	6	42	10	28	6	48
02/08/2016	8	26	4	38	14	30
03/08/2016	<2	158	<2	192	<2	28
07/08/2016	<2	2	<2	<2	6	20
16/08/2016	6	66	10	130	26	64
21/08/2016	4	32	2	28	3	66
24/08/2016	<2	2	<2	<2	<2	6

In 2017 a new protocol was developed for Parlee Beach monitoring where samples are taken every day at 5 separate locations along the beach. The samples have been taken at approximately 200m intervals along the designated swimming area. Samples were collected in the morning at a prescribed depth. More details can be found in the protocol.

The protocol is available online :
http://www2.gnb.ca/content/dam/gnb/Departments/eco-bce/Promo/Parlee_Beach/parlee_beach_water_monitoring_protocol_document.pdf

5.1 Results for Parlee Beach Monitoring 2017

5.1.1 May Results

Sampling done in May showed low concentrations of E.coli and Enterroccocus for the whole month. One no swimming recommendation was given on May 27th for rainfall amounts of over 10mm. No sample was taken on this date. This rainfall did not cause any increase in bacteria at the beach.

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-05-15	41					41
2017-05-16	10	10	20	<10	10	11,5
2017-05-17	<10	<10	10	<10	10	10
2017-05-18	<10	<10	<10	<10	<10	10
2017-05-19	<10	10	<10	<10	<10	10
2017-05-20	<10	<10	<10	<10	<10	10
2017-05-21	<10	<10	<10	<10	<10	10
2017-05-22	<10	<10	<10	<10	<10	10
2017-05-23	<10	<10	<10	<10	<10	10
2017-05-24	<10	<10	<10	<10	<10	10
2017-05-25	20	10	<10	<10	<10	11,5
2017-05-26	10	<10	20	20	10	13,2
2017-05-29	<10	<10	<10	<10	<10	10
2017-05-30	<10	10	<10	<10	<10	10
2017-05-31	<10	<10	<10	<10	<10	10

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-05-15	25					25
2017-05-16	5	3	4	5	5	4,
2017-05-17	13	21	12	11	20	14,8
2017-05-18	1	1	1	0	0	1
2017-05-19	1	3	4	0	1	1,
2017-05-20	1	1	0	2	1	1,
2017-05-21	0	0	0	0	1	1
2017-05-22	0	1	1	1	1	1
2017-05-23	0	0	0	0	0	1
2017-05-24	0	0	0	0	0	1
2017-05-25	3	0	0	0	1	1,
2017-05-26	1	1	2	2	4	1,
2017-05-29	4	3	12	10	9	6,
2017-05-30	1	2	1	3	2	1,
2017-05-31	0	0	0	0	0	1

5.1.2 June results

In June the trend continued with low concentrations of E.coli and Enterococcus for the entire month. There was a no swimming advisory for June 10 and 11th because of rainfall but there was no increase in contamination..

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	10	<10	<10	10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	<10	<10	10	10
2017-06-	<10	31	10	<10	<10	12,
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	30	<10	20	<10	<10	14,
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	31	<10	<10	10	<10	12,
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	20	<10	10	<10	<10	11,
2017-06-	<10	10	10	<10	<10	10
2017-06-	<10	20	10	10	<10	11,
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	10	<10	<10	10
2017-06-	10	10	<10	10	10	10
2017-06-	<10	<10	<10	20	<10	11,
2017-06-	<10	<10	10	<10	<10	10
2017-06-	10	<10	<10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10
2017-06-	<10	<10	20	<10	10	11,
2017-06-	<10	<10	20	20	<10	13,
2017-06-	<10	<10	10	<10	<10	10
2017-06-	<10	<10	<10	<10	<10	10

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-06-	0	0	0	0	1	1
2017-06-	6	1	1	0	0	1,
2017-06-	2	1	0	1	0	1,
2017-06-	4	1	1	3	4	2,
2017-06-	17	14	8	5	1	6,
2017-06-	3	0	2	3	7	2,
2017-06-	0	0	2	1	1	1,
2017-06-	9	1	0	1	0	1,
2017-06-	0	0	0	0	0	1
2017-06-	17	10	8	6	7	8,
2017-06-	1	0	1	0	0	1
2017-06-	7	12	10	11	19	11,
2017-06-	0	5	0	0	1	1,
2017-06-	6	3	7	6	4	5
2017-06-	8	1	4	3	0	2,
2017-06-	0	0	1	0	0	1
2017-06-	0	0	1	0	1	1
2017-06-	0	0	0	0	1	1
2017-06-	1	0	0	0	0	1
2017-06-	1	2	0	0	0	1,
2017-06-	0	4	0	2	1	1,
2017-06-	2	7	4	0	0	2,
2017-06-	0	0	3	1	1	1,
2017-06-	0	0	0	1	0	1
2017-06-	22	26	41	6	3	13,
2017-06-	0	0	0	0	0	1
2017-06-	1	2	0	0	2	1,
2017-06-	3	0	0	2	0	1,
2017-06-	0	2	0	2	0	1,
2017-06-	1	0	3	293	6	5,

5.1.3 July results

On July 10th was the first no swimming advisory linked to a sample. The sample was taken on July 8th and was slightly above the recommendation of 70MPN of Enterococcus/100 ml. There was a No swimming advisory on July 17th and 18th because of rainfall. The rainfall had not affected the water quality.

The rainfall of July 22nd caused the most contamination of the summer. Both E.coli and Enterococcus were in high numbers. The contamination gradually diminished and the advisory was lifted July 26th as it takes two dates to incubate the samples and get new results.

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-07-	<10	10	<10	<10	<10	10
2017-07-	<10	<10	<10	<10	<10	10
2017-07-	<10	<10	10	10	<10	10
2017-07-	<10	10	10	<10	10	10
2017-07-	<10	<10	<10	<10	<10	10
2017-07-	<10	20	20	<10	10	13,
2017-07-	<10	10	<10	<10	<10	10
2017-07-	74	10	20	<10	<10	17,
2017-07-	30	<10	<10	10	10	12,
2017-07-	10	20	40	<10	10	15,
2017-07-	20	<10	<10	<10	<10	11,
2017-07-	<10	<10	10	<10	10	10
2017-07-	63	<10	<10	<10	20	16,
2017-07-	<10	10	<10	<10	<10	10
2017-07-	<10	<10	<10	<10	10	10
2017-07-	20	<10	20	<10	<10	13,
2017-07-	10	<10	<10	<10	<10	10
2017-07-	10	10	<10	10	<10	10
2017-07-	<10	<10	<10	<10	<10	10
2017-07-	<10	10	10	<10	<10	10
2017-07-	<10	10	<10	<10	<10	10
2017-07-	10	233	20	86	20	38,
2017-07-	246	75	< 10,0	309	228	105,4
2017-07-	41	10	109	51	<10	29,
2017-07-	10	10	10	<10	31	12,
2017-07-	<10	<10	<10	<10	<10	10
2017-07-	10	<10	<10	<10	<10	10
2017-07-	<10	10	31	31	<10	15,
2017-07-	10	<10	20	<10	<10	11,
2017-07-	<10	<10	<10	<10	<10	10
2017-07-	<10	10	<10	<10	<10	10

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-07-	2	9	31	10	37	11,
2017-07-	2	4	4	2	0	2,
2017-07-	2	8	0	0	0	1,
2017-07-	3	6	0	1	0	1,
2017-07-	1	2	1	1	3	1,
2017-07-	1	1	0	0	1	1
2017-07-	0	1	2	4	1	1,
2017-07-	194	20	73	86	7	44,
2017-07-	15	5	6	4	6	6,
2017-07-	3	3	11	10	1	4
2017-07-	2	2	0	1	0	1,
2017-07-	8	8	3	11	5	6,
2017-07-	47	7	5	9	7	10,
2017-07-	2	1	2	1	8	2
2017-07-	0	0	0	1	1	1
2017-07-	0	0	2	0	4	1,
2017-07-	1	0	2	0	4	1,
2017-07-	3	5	14	0	1	2,
2017-07-	39	37	13	8	29	21,
2017-07-	3	23	35	11	1	7,
2017-07-	10	110	31	41	20	30,
2017-07-	84	504	41	609	211	186,1
2017-07-	605	135	52	457	364	234,3
2017-07-	250	10	134	132	31	67,
2017-07-	41	31	20	41	97	39,
2017-07-	<10	<10	10	<10	<10	10
2017-07-	10	20	41	<10	20	17,
2017-07-	20	41	41	<10	31	25,
2017-07-	142	132	107	137	135	130
2017-07-	10	3	6	2	2	3,
2017-07-	7	2	1	2	0	1,

5.1.4 August results

In August there was a no swimming advisory linked to rainfall on August 13th and 14th that had little presence of E.coli.

On August 19th the no swimming advisory was in place after the high results of Enterococcus on August 17th. There had been some light rain on the 17th.

August 22nd had the highest concentration of Enterococci and E.coli in August. There had been 9.5 mm of rain on August 20th that may have affected the water quality. The concentration was low again the next day.

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-08-	<10	<10	<10	10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	10	<10	<10	<10	10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<	10	20	<	10	11,5
2017-08-	10	10	<10	10	<10	10
2017-08-	<10	52	<10	10	<10	13,9
2017-08-	10	41	<10	10	<10	13,3
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	20	63	<10	10	<10	16,6
2017-08-	<10	10	<10	10	<10	10
2017-08-	<10	134	305	259	10	63,8
2017-08-	<10	<10	<10	31	10	12,5
2017-08-	<10	<10	<10	10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	10	<10	10	10
2017-08-	1	51	41	933	20	144,5
2017-08-	10	<10	<10	10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	31	10	<10	<10	20	14,4
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	10	10
2017-08-	10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10
2017-08-	<10	<10	<10	<10	<10	10

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-08-	4	1	0	14	7	3,
2017-08-	4	3	5	0	2	2,
2017-08-	0	6	4	2	3	2,
2017-08-	0	0	1	0	1	1
2017-08-	3	5	1	1	1	1,
2017-08-	7	29	12	17	19	15,
2017-08-	8	5	21	102	79	23,
2017-08-	48	114	57	42	16	46,
2017-08-	23	26	5	2	0	5,
2017-08-	23	26	5	2	0	5,
2017-08-	0	1	3	0	1	1,
2017-08-	13	4	6	3	2	4,
2017-08-	2	2	7	1	0	1,
2017-08-	4	0	3	0	3	2
2017-08-	0	20	16	7	2	5,
2017-08-	76	93	74	19	37	51,
2017-08-	3	26	11	3	0	4,
2017-08-	29	150	186	284	32	94
2017-08-	2	41	28	2	38	11,
2017-08-	16	14	1	26	1	5,
2017-08-	9	7	7	5	2	5,
2017-08-	22	18	9	11	23	15,
2017-08-	537	266	86	293	166	226,6
2017-08-	14	24	25	5	1	8,
2017-08-	8	2	4	0	4	3
2017-08-	39	26	21	15	38	26,
2017-08-	11	6	14	18	13	11,
2017-08-	12	10	7	7	4	7,
2017-08-	1	0	1	1	1	1
2017-08-	20	43	8	7	4	11,
2017-08-	1	4	7	1	1	1,
2017-08-	15	42	44	19	17	24,

5.1.5 September results

On September 2nd a sample was slightly over the guideline that put in place a no swimming advisory for the 4th. The same scenario was repeated on September 20th with one sample slightly over the guideline that provoked a no swimming advisory for September 22nd.

There were no swimming advisories from September 7 to 9 and September 11 to 12 because of rainfall.

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-09-	<10	<10	10	10	10	10
2017-09-	41	97	41	31	52	48,3
2017-09-	20	<10	<10	10	<10	11,5
2017-09-	<10	10	10	<10	<10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	10	<10	<10	<10	10
2017-09-	<10	31	20	<10	<10	14,4
2017-09-	10	<10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	31	20	<10	<10	<10	14,4
2017-09-	<10	10	<10	10	<10	10
2017-09-	<10	<10	<10	<10	20	11,5
2017-09-	10	<10	<10	<10	10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	20	20	10	20	<10	15,2
2017-09-	<10	20	10	10	<10	11,5
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	<10	<10	<10	<10	10	10
2017-09-	<10	<10	<10	<10	<10	10
2017-09-	31	<10	10	<10	10	12,5
2017-09-	<10	10	10	<10	<10	10
2017-09-	<10	<10	10	<10	<10	10
2017-09-	10	10	<10	10	20	11,5
2017-09-	10.0	10.0	<10	10.0	20.0	11.5

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-09-	25	30	48	57	52	40,3
2017-09-	109	117	138	101	145	120,8
2017-09-	33	2	18	19	7	11
2017-09-	3	28	6	0	2	4
2017-09-	0	0	1	2	0	1,1
2017-09-	9	6	13	3	42	9,8
2017-09-	39	35	27	36	7	24,8
2017-09-	1	0	1	1	8	1,5
2017-09-	1	0	6	7	2	2,4
2017-09-	0	7	4	0	1	1,9
2017-09-	2	9	19	6	3	5,7
2017-09-	2	4	2	3	5	3
2017-09-	20	15	11	3	4	8,3
2017-09-	8	11	1	0	5	3,4
2017-09-	43	49	26	30	56	39,2
2017-09-	41	3	7	3	1	4,8
2017-09-	5	9	15	6	111	13,5
2017-09-	7	4	2	3	6	4
2017-09-	11	29	3	19	14	12,1
2017-09-	94	162	35	408	34	94,1
2017-09-	48	60	91	14	18	36,6
2017-09-	9	3	1	12	22	5,9
2017-09-	0	2	1	8	1	1,7
2017-09-	1	3	1	1	1	1,2
2017-09-	1	3	1	1	1	1,2
2017-09-	5	12	22	25	63	18,3
2017-09-	0	3	0	1	1	1,2
2017-09-	97	45	89	101	141	88,8
2017-09-	1	3	3	4	8	3,1
2017-09-	1	3	3	1	1	1,6
2017-09-	4	2	10	2	5	3,8

5.1.6 October results

In October no samples had E.coli or Enterococcus over the guideline. There was no heavy rainfall advisories either.

Enterococcus concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-10-	<10	10.0	<10	<10	<10	10.0
2017-10-	N/A	N/A	N/A	N/A	N/A	N/A
2017-10-	10.0	<10	<10	<10	<10	10.0
2017-10-	<10	<10	<10	<10	<10	10.0
2017-10-	30.0	<10	10.0	<10	52.0	17.3
2017-10-	<10	<10	10.0	10.0	<10	10.0
2017-10-	<10	<10	<10	<10	10.0	10.0
2017-10-	<10	<10	<10	<10	<10	10.0
2017-10-	<10	<10	<10	<10	<10	10.0

E.coli concentrations (MPN/100ml)

Date	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
2017-10-	1.	0.	0.	0.	0.	1.
2017-10-	N/A	N/A	N/A	N/A	N/A	N/A
2017-10-	0.	4.	0.	0.	1.	1.
2017-10-	27.0	5.	6.	6.	1.	5.
2017-10-	47.0	47.0	43.0	190.0	206.0	82.0
2017-10-	36.0	26.0	13.0	2.	24.0	14.2
2017-10-	1.	0.	80.0	6.	0.	3.
2017-10-	1.	0.	0.	0.	1.	1.
2017-10-	0.	9.	9.	1.	3.	3.

In total there were 13 no swimming advisories days linked to rainfall and 8 linked to sampling results. The percentage of days that water is safe for swimming would be 95% for 2017. This was an exceptionally dry year and may not reflect normal conditions.

These results show that bacterial contamination at Parlee Beach is from punctual sources and not one constant source of pollution. The difficulty with identifying punctual sources is that they change depending on weather and activities around the bay. With the sampling that has been done we can see that high E.coli numbers in the streams do not necessarily cause high E.coli numbers in the bay.

6 Environment Canada Shellfish Monitoring

Environment Canada samples E.Coli for Shellfish harvesting. They have data sets that go back several years in the Shediac Bay area. The data for this report is taken from the latest summary reports released.

Personal communications with Patrice Godin confirmed that E.coli concentrations in 2017 were low throughout Shediac Bay (under 49 MPN/100 ml).

6.1 Sampling in Shediac Harbour

There are a total of 17 sites sampled once a month in the Shediac Harbour. The following table resumes sampling from 2010 to 2015. For Shellfish the guideline is 43 MPN /100 ml as the lower limit. There are no samples that are over the guideline for recreational waters of 400MPN/100 ml.

The samples taken in Aug 2011 we're higher probably due to the rain events in the previous days.

The site that had the most consistent presence of higher bacteria is site 28. This site was also tested by the SBWA in 2015 and 2016 and also higher E.coli concentrations.

Other sites that had higher E.coli concentrations were sites 22, 23 and 25. More recent samplings do not have high counts in these areas. .à

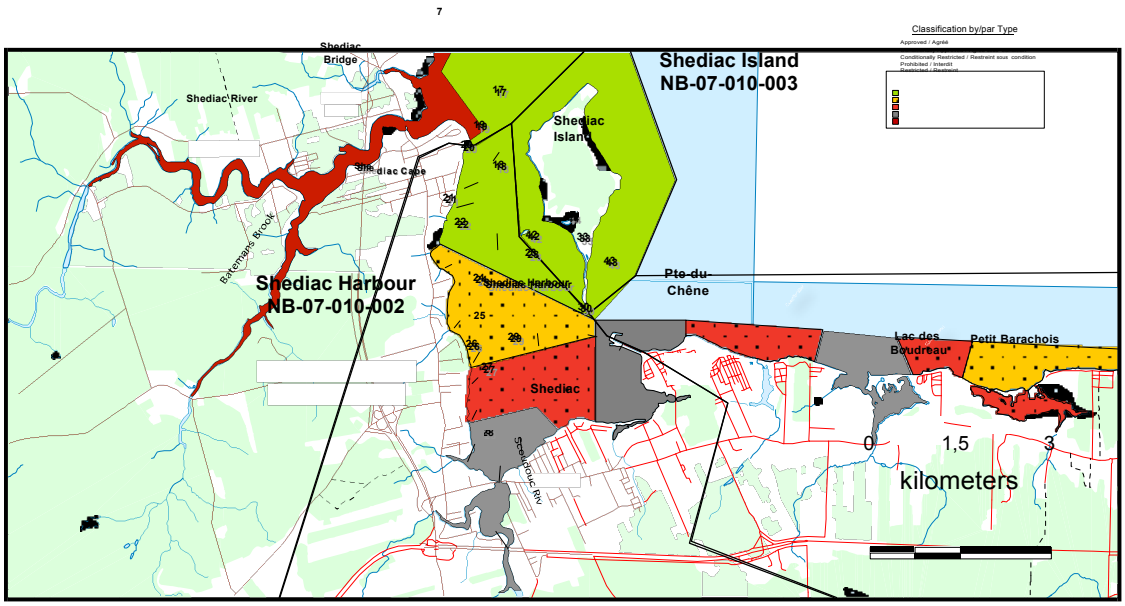


TABLE 3 FAECAL COLIFORM DENSITIES (MPN/100mL) FOR SHEDIAC HARBOUR (NB-07-010-002)

Station	10 May 10	09 Jun 10	24 Jun 10	08 Jul 10	05 Aug 10	13 May 11	31 May 11	13 Jun 11	27 Jun 11	11 Aug 11	24 May 12	20 Jun 12	04 Jul 12	30 Jul 12	21 Aug 12
17	1,9	5	1,9	1,9	1,9	22	5	1,9	1,9	49	1,9	1,9	1,9	1,9	1,9
18	1,9	13	2	1,9	1,9	33	1,9	1,9	1,9	14	1,9	1,9	240	1,9	1,9
19	8	7	1,9	1,9	1,9	33	1,9	1,9	2	13	1,9	2	1,9	1,9	1,9
20	5	1,9	1,9	1,9	2	33	1,9	1,9	1,9	13	1,9	1,9	1,9	2	2
21	1,9	5	2	5	1,9	23	1,9	2	1,9	8	1,9	1,9	2	1,9	1,9
22	1,9	11	8	1,9	8	21	1,9	1,9	5	110	1,9	1,9	1,9	4	13
23	1,9	2	13	2	5	130	1,9	2	1,9	22	1,9	1,9	1,9	1,9	1,9
24	1,9	2	1,9	1,9	33	33	1,9	1,9	1,9	49	1,9	1,9	5	1,9	2
25	1,9	13	4	1,9	140	33	1,9	2	2	49	2	1,9	11	1,9	49
26	8	14	5	2	110	49	2	1,9	2	79	23	8	23	33	5
27	4	33	23	2	2	17	49	8	33	110	13	4	23	5	31
28	49	33	33	79	49	9	49	46	140	33	49	49	130	46	33
29	1,9	33	1,9	7	49	33	13	49		79	5	5	1,9	23	5
30	1,9	49	1,9	2	13	46	7	1,9	1,9	5	1,9	2	1,9	1,9	1,9
33	1,9	49	8	1,9	5	49	2	1,9	1,9	8	1,9	1,9	1,9	1,9	1,9
42	1,9	14	1,9	1,9	13	13	1,9	2	1,9	33	2	1,9	1,9	1,9	1,9
43	1,9	33	2	1,9	1,9	79	1,9	5	5	33	1,9	1,9	2	1,9	5
44	1,9	33	1,9	1,9	1,9	79	5	2	1,9	11	1,9	2	1,9	1,9	5
Tide	LT-LR	HF-MF	HT-MF	HF-MF	HF-LF	LF-LT	HT-HT	HT-LF	HT-HF	HF-MF	HR-HT	HT-HF	MF-MF	MF-MF	HT-HF
Rain (mm)															
0-24h	4,2	0,8	0,2	0	3,8	0,7	0	0,2	0	5,8	0	0	0	0	0,6
0-48h	13,6	1	0,4	2,6	4	9,7	0,8	0,2	12	7	0	0	0	0	3,2
0-72h	14,6	32,4	1,4	2,6	4	37,3	1,4	0,8	12,2	36,4	0	0	0	0	5,2

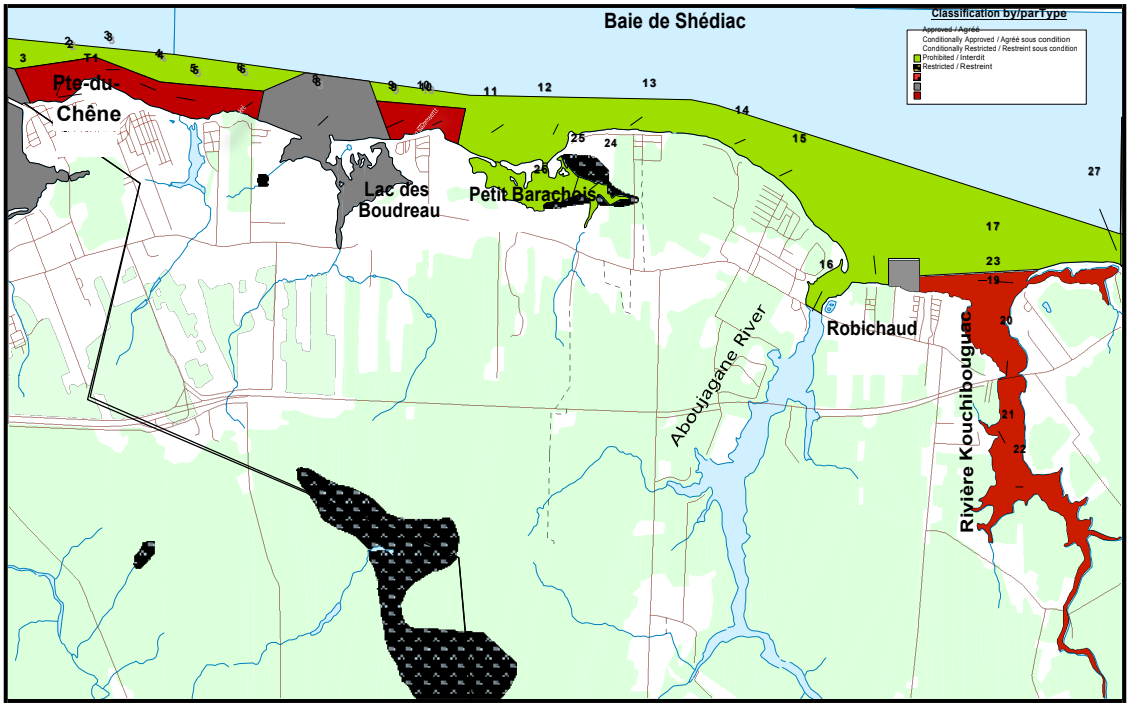
Station	13 Jun 13	20 Jun 13	05 Jul 13	25 Jul 13	07 Aug 13	14 May 14	27 May 14	10 Jun 14	01 Jul 14	05 Aug 14	21 May 15	11 Jun 15	01 Jul 15	14 Jul 15	29 Jul 15
17	1,9	1,9	1,9	1,9	1,9	1,9	1,9	2	2	2	1,9	1,9	1,9	1,9	1,9
18	1,9	1,9	2	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9
19	2	1,9	1,9	1,9	1,9	1,9	1,9	5	2	46	2	1,9	1,9	1,9	8
20	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	4	49	1,9	1,9	1,9	5	2
21	1,9	1,9	2	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	2
22	1,9	1,9	2	2	1,9	1,9	1,9	2	1,9	2	1,9	1,9	1,9	1,9	7
23	1,9	1,9	2	2	1,9	1,9	1,9	8	2	2	1,9	1,9	2	5	5
24	7	1,9	5	5	1,9	1,9	1,9	22	4	1,9	1,9	1,9	1,9	1,9	5
25	1,9	1,9	2	1,9	2	2	1,9	8	1,9	4	1,9	2	4	1,9	7
30	1,9	4	5	1,9	1,9	1,9	1,9	1,9	1,9	14	1,9	1,9	1,9	1,9	2
33	1,9	1,9	23	1,9	2	1,9	1,9	1,9	1,9	2	1,9	1,9	2	1,9	1,9
42	1,9	1,9	5	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	2
44	2	1,9	13	2	8	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Tide	LF-LT	HF-LF	HF-MF	MF-MF	MF-MF	MF-MF	HT-HF	HF-HF	LR-MR	HT-HT	LR-MR	MF-MF	HT-HF	HT-HF	HF-HF
Rain (mm)															
0-24h	19	0	0	1	0	0,2	7,4	0	0	9,1	0,2	0	0	0	0
0-48h	19	0	0	40,4	12,8	1,3	7,4	0,2	0	9,1	8,4	4,8	1,6	0,4	0,6
0-72h	19	2,8	0,8	40,4	12,8	2,6	7,4	1,2	0,2	9,1	8,4	5,4	12,8	0,4	3,6

Note: 1.9 represents < 2 MPN/100mL HT = High Tide LT = Low Tide HF = High Falling LF = Low Falling HR = High Rising LR = Low Rising MT = Mid Tide MF = Mid Falling MR = Mid Rising

6.2 *Sampling in Shediac Bay*

The highest concentrations of E.coli found in the Shediac Bay between Pte du Chêne and Robichaud is in the Kouchibouguac river.

Sites around Parlee Beach (Station 2, 3 and 4) had no samples over the recreational guideline.



Fecal Coliform Densities (MPN/100ml) for Shediac Bay

Station	01 Jun 04	22 Jun 04	12 Jul 04	27 Jul 04	16 Aug 04	08 May 07	08 Jun 07	27 Jun 07	28 Aug 07	29 Aug 07	04 Jun 10	09 Jun 10	24 Jun 10	08 Jul 10	05 Aug 10
2	2	4	17	8	23	8	2	5	33	5	1,9	49	1,9	8	170
3	1,9	1,9	5	1,9	1,9	1,9	1,9	1,9	7	1,9	1,9	49	1,9	1,9	1,9
4	1,9	1,9	2	1,9	1,9	1,9	1,9	1,9	23	1,9	2	33	1,9	1,9	22
5	1,9	1,9	5	1,9	22	1,9	1,9	4	1,9	2	1,9	5	2	1,9	110
6	1,9	2	13	33	49	1,9	1,9	2	13	8	1,9	8	63	2	11
8	1,9	1,9	13	5	11	1,9	1,9	1,9	1,9	8	5	12	1,9	1,9	79
9	1,9	1,9	1,9	2	2	1,9	1,9	1,9	1,9	1,9	1,9	5	1,9	5	1,9
10	1,9	1,9	2	1,9	1,9	1,9	2	11	1,9	2	2	2	1,9	5	1,9
11	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	8	1,9	8	1,9	1,9	13
12	1,9	1,9	2	1,9	11	1,9	25	23	11	2	2	13	1,9	1,9	33
13	1,9	1,9	1,9	1,9	1,9	1,9	5	8	1,9	1,9	1,9	13	1,9	1,9	1,9
14	1,9	1,9	4	1,9	1,9	1,9	2	7	1,9	1,9	2	7	5	1,9	22
15	1,9	1,9	1,9	1,9	1,9	1,9	1,9	5	1,9	1,9	1,9	1,9	1,9	1,9	5
16	1,9	1,9	1,9	17	5	1,9	1,9	49	1,9	5	13	49	13	17	5
17	1,9	1,9	1,9	79	2	1,9	2	1,9	2	1,9	2	33	8	1,9	33
19	1,9	1,9	2	5	2	1,9	1,9	1,9	1,9	1,9	2	70	1,9	2	2
20	1,9	1,9	1,9	2	5	1,9	1,9	7	1,9	5	46	79	23	23	49
21	1,9	1,9	1,9	5	79	1,9	1,9	33	1,9	1,9	17	49	33	23	23
22	1,9	1,9	1,9	5	5	1,9	1,9	1,9	8	1,9	130	130	27	8	11
23	1,9	1,9	1,9	2	2	1,9	1,9	2	11	2	1,9	7	8	14	49
24	4	2	1,9	11	22	1,9	8	130		1,9	350	17	2	46	13
25	5	1,9	1,9	5	7	1,9	2	130		2	13	46	2	49	23
26	1,9	1,9	1,9	8	2	1,9	2	49		8	2	33	5	2	70
27	2	1,9	2	1,9	2	1,9	1,9	5		2	1,9	1,9	1,9	2	49
Tide	HT-MF	HT-HT	HT-LF	HT-MF	HF-HT	HT-HT	HT-HF	HT-HF	HT-HT	MF-LT	LT-HR	HT-LF	HT-LF	HT-LT	MF-LT
Rain (mm)															
0-24h	0	0	4	0	0	0	1,4	19,3	0	0	21,4	0,8	0,2	0	3,8
0-48h	4,8	0,2	5,6	0	12,4	0,4	5,8	19,3	0	0	21,8	1	0,4	2,6	4
0-72h	9,4	9	19,2	5,4	12,8	1,6	7,6	39	0	0	37,6	32,4	1,4	2,6	4

Station	13 May 11	31 May 11	13 Jun 11	27 Jun 11	11 Aug 11	24 May 12	04 Jun 12	20 Jun 12	04 Jul 12	31 Jul 12	23 Aug 12	22 May 13	21 Jun 13	09 Jul 13	25 Jul 13	07 Aug 13
2	33	8	2	2	70	1,9		1,9	8	2	8		1,9			
3	40	11	2	1,9	1,9	1,9		1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9
4	14	1,9	1,9	1,9	2	2		1,9	1,9	1,9	2	1,9	1,9	2	1,9	2
5	9	1,9	1,9	1,9	11	1,9		1,9	1,9	1,9	2	1,9	1,9	8	23	1,9
6	17	2	1,9	5	8	2		23	1,9	1,9	13	1,9	1,9	8	2	2
8	40	8	1,9	17	49	1,9		1,9	2	1,9	5	8	1,9	1,9	2	1,9
9	240	2	1,9	1,9	8	1,9		1,9	2	2	1,9	1,9	1,9	1,9	2	5
10	79	8	2	1,9	17	1,9		1,9	1,9	2	11	1,9	1,9	2	2	1,9
11	79	1,9	1,9	1,9	23	2		1,9	1,9	1,9	1,9	1,9	2	1,9	2	1,9
12	14	1,9	22	2	1,9	1,9		1,9	1,9	13	2	1,9	1,9	2	1,9	1,9
13	23	1,9	1,9	1,9	2	1,9		1,9	1,9	1,9	1,9	1,9	1,9	1,9	2	2
14	5	1,9	1,9	1,9	13	4		5	1,9	4	2	1,9	1,9	8	1,9	2
15	5	1,9	1,9	2	23	2		1,9	1,9	1,9	2	1,9	1,9	1,9	1,9	1,9
16	79	5	8	2	33	1,9		1,9	2	5	5	5	1,9	2	1,9	5
17	33	5	1,9	5	23	1,9		1,9	1,9	2	2	2	2	2	1,9	2
19	170	2	2	1,9	49	1,9		2	5	14	2	1,9	1,9	5	5	1,9
20	350	49	13	5	920	33		17	13	13	79	2	5	130	170	46
21	240	8		13	920	5		1,9	8		13	5	5	17	4	7
22	49	49		8	130	8		1,9	23		23	2	2	33	33	17
23	79	5	1,9	2	23	2		1,9	4	4	2	5	2	5	8	2
24							17	70	130	2	13	1,9	49	49	49	170
25							2	8	33	5	23	1,9	5	33	5	49
26							1,9	13	33	22	13	1,9	5	23	1,9	2
27	14	1,9	1,9	1,9	8	1,9			1,9	1,9	2	1,9	1,9	1,9	2	2
Tide	MF-LF	HR-HT	HT-LF	HT-HT	HF-MF	HR-HT	HF-MF	HT-LF	HT-HF	MF-LR	HR-HT	HF-HF	HT-LF	HF-HF	HR-HT	HT-HF
Rain (mm)																
0-24h	0,7	0	0,2	0	5,8	0	0	0	0	0	0	0,2	0	0	1	0
0-48h	9,7	0,8	0,2	12	7	0	0	0	0	0	0	1,8	0	11	40,4	12,8
0-72h	37,3	1,4	0,8	12,2	36,4	0	0,2	0	0	0	0,6	1,8	0	11	40,4	12,8

Note: 1.9 represents < 2 MPN/100mL
HT = High Tide
LT = Low Tide
HF = High Falling
LF = Low Falling
HR = High Rising
LR = Low Rising
MT = Mid Tide
MF = Mid Falling
MR = Mid Rising

6.3 *Sampling in Shediac River*

In the Shediac River area the E.coli concentrations are highest in the Shediac River on sites 14 12 11 15 and10. The highest counts are located on site 14 which is near the limit of the salt water

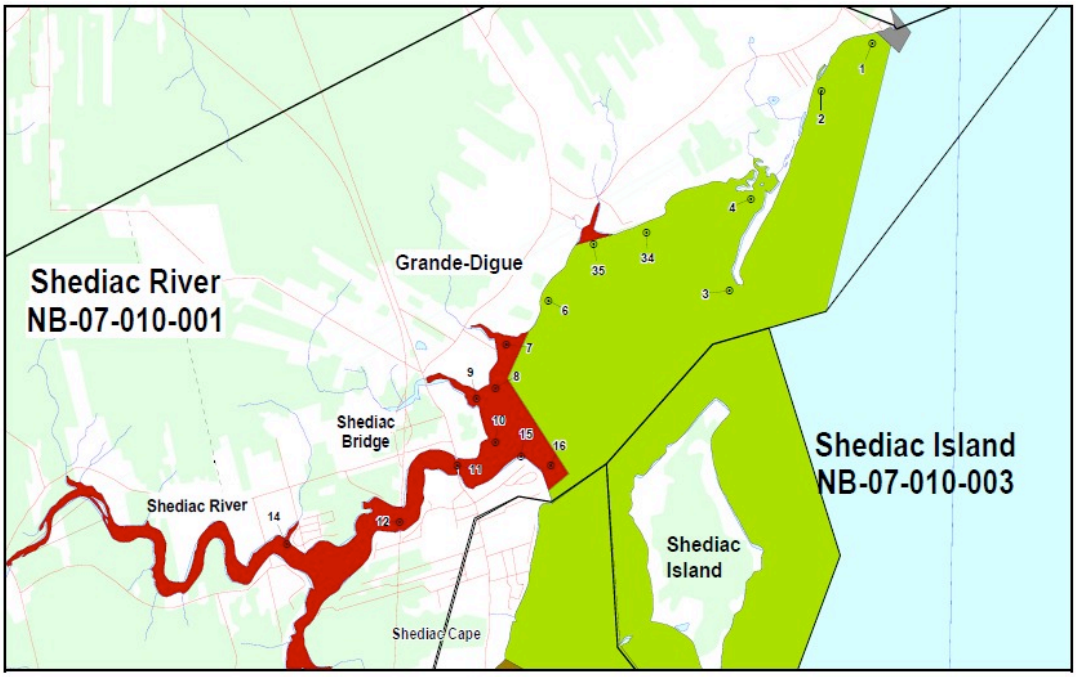


TABLE 3 FAECAL COLIFORM DENSITIES (MPN/100mL) FOR SHEDIAC RIVER (NB-07-010-001)

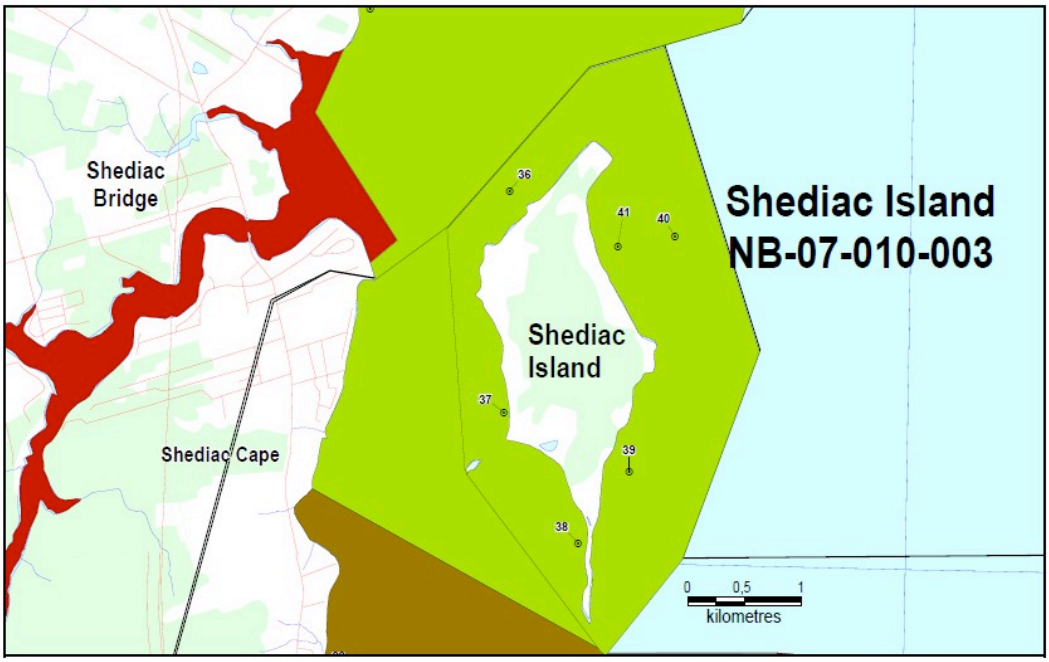
Station	02 Jun 04	15 Jun 04	08 Jul 04	29 Jul 04	18 Aug 04	07 May 07	30 May 07	26 Jun 07	16 Jul 07	29 Aug 07	10 May 10	24 Jun 10	08 Jul 10	09 Jul 10	05 Aug 10
1	13	2	1,9	2	1,9	1,9	2	5	1,9	1,9	1,9	2	2	2	2
2	1,9	1,9	1,9	2	2	1,9	1,9	2	1,9	1,9	1,9	1,9	2	1,9	17
3	2	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	2	23	5
4	1,9	1,9	1,9	8	33	1,9	2	1,9	1,9	1,9	1,9	1,9	1,9	23	2
6	1,9	5	1,9	9	1,9	1,9	1,9	1,9	2	2	1,9	2	33	2	1,9
7	1,9	1,9	2	5	1,9	1,9	2	1,9	2	2	8	4	49	33	33
8	1,9	1,9	1,9	2	1,9	1,9	23	1,9	2	1,9	70	2	11	4	2
9	2	11	33	2	1,9	17	11	5	2	1,9	8	22	79	23	79
10	1,9	1,9	2	2	1,9	1,9	5	17	2	33	70	23	2	79	8
11	2	2	1,9	5	7	1,9	23	4	1,9	13	14	17	23	79	23
12	1,9	1,9	1,9	2	1,9	1,9	17	8	11	8	49	130	33	540	11
14	5	2	4	13	5	1,9	70	170	20	7	33		130		33
15	1,9	1,9	1,9	7	2	1,9	8	2	2	17	11	5	5	79	13
16	1,9	1,9	1,9	4	1,9	1,9	11	5	1,9	7	49	1,9	33	70	46
34	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	5	1,9
35	1,9	1,9	1,9	1,9	1,9	1,9	21	13	2	1,9	1,9	1,9	1,9	8	2
Tide			MF-LT	HF-MF	HT-HT	HT-HT	HT-HT	MF-LF	HT-HT	HT-MF	LT-LR	HT-HF	HT-HF	HT-MF	MF-MF
Rain (mm)															
0-24h	0	0,4	0	1,4	0,4	0,4	0	0	0	0	4,2	0,2	0	0	3,8
0-48h	0	0,4	1,2	1,4	0,4	1,6	5,2	19,7	0	0	13,6	0,4	2,6	0	4
0-72h	4,8	0,4	2,2	1,4	0,4	2	5,2	26,5	0	0	14,6	1,4	2,6	2,6	4

Station	13 May 11	31 May 11	13 Jun 11	27 Jun 11	11 Aug 11	24 May 12	20 Jun 12	04 Jul 12	30 Jul 12	21 Aug 12	03 Jun 13	20 Jun 13	05 Jul 13	25 Jul 13	07 Aug 13
1	2	2	1,9	1,9	33	7	1,9	1,9	17	1,9	1,9	1,9	2	1,9	1,9
2	1,9	1,9	5	2	8	1,9	1,9	5	5	1,9	1,9	1,9	5	1,9	1,9
3	17	2	1,9	7	23	1,9	2	1,9	1,9	1,9	1,9	1,9	14	1,9	1,9
4	1,9	2	1,9	2	8	1,9	2	1,9	2	8	1,9	2	11	1,9	1,9
6	2	2	9	1,9	240	1,9	8	49	1,9	1,9	2	1,9	8	1,9	1,9
7	1,9	6	1,9	540	350	1,9	2	23	31	5	2	23	13	1,9	8
8	1,9	350	2	33	94	5	1,9	8	5	1,9	33	8	33	1,9	2
9	21	540	13	23	220	5	1,9	2	33	5	23	8	79	11	8
10	23	7	2	11	130	5	2	1,9	14	1,9	17	5	49	8	33
11	79	23	350	49	70	17	5	23	70	49	33	8	170	13	13
12	79	31		79	79	22	11			17	23	11	240	17	79
14	130	170		79	540	49	33			8	33	23	130	79	79
15	23	23	1,9	13	49	2	2	2	33	5	8	8	240	1,9	5
16	49	5	1,9	23	49	8	1,9	13	23	1,9	1,9	2	33	2	8
34	1,9	2	1,9	1,9	33	1,9	1,9	1,9	1,9	1,9	1,9	1,9	11	1,9	5
35	2	1,9	1,9	1,9	170	1,9	1,9	2	5	1,9	1,9	1,9	23	8	2
Tide	HT-LT	MF-LF	HT-HT	HT-LF	HF-HF	MR-HR	HT-HT	HF-MF	MF-MF	HT-HT	LF-LT	HF-MF	HF-MF	HR-HF	HF-MF
Rain (mm)															
0-24h	0,7	0	0,2	0	5,8	0	0	0	0	0,6	0	0	0	1	0
0-48h	9,7	0,8	0,2	12	7	0	0	0	0	3,2	6,4	0	0	40,4	12,8
0-72h	37,3	1,4	0,8	12,2	36,4	0	0	0	0	5,2	8,6	2,8	0,8	40,4	12,8

Note: 1.9 represents < 2 MPN/100mL HT = High Tide LT = Low Tide HF = High Falling LF = Low Falling HR = High Rising LR = Low Rising MT = Mid Tide MF = Mid Falling MR = Mid Rising

6.4 *Sampling Shediac Island*

Around Shediac Island there are no samples that surpasse recreational guidelines and generally the E.coli concentrations are low.



Station	02 Jun 04	15 Jun 04	08 Jul 04	29 Jul 04	18 Aug 04	07 May 07	30 May 07	26 Jun 07	18 Jul 07	29 Aug 07	10 May 10	09 Jun 10	24 Jun 10	08 Jul 10	05 Aug 10
36	1,9	1,9	1,9	5	1,9	1,9	1,9	1,9	1,9	2	2	23	1,9	1,9	8
37	1,9	1,9	1,9	2	4	1,9	1,9	1,9	1,9	8	1,9	170	1,9	1,9	1,9
38	2	1,9	1,9	8	23	2	1,9	2	1,9	5	1,9	33	1,9	2	1,9
39	1,9	1,9	5	1,9	8	2	1,9	2	1,9	23	1,9	5	1,9	8	5
40	2	1,9	2	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9	23	1,9	1,9	1,9
41	1,9	1,9	2	1,9	4	1,9	1,9	1,9	1,9	1,9	1,9	17	1,9	2	2
Tide			HF-LF	HF-MF	HT-HF	HT-HT	HT-HT	MR-LF	HT-HT	HT-MF	LT-LR	HT-HT	HF-HF	HT-MF	HF-LF
Rain (mm)															
0-24h	0	0,4	0	1,4	0,4	0,4	0	0	0	0	4,2	0,8	0,2	0	3,8
0-48h	0	0,4	1,2	1,4	0,4	1,6	5,2	19,7	0	0	13,6	1	0,4	2,6	4
0-72h	4,8	0,4	2,2	1,4	0,4	2	5,2	26,5	0	0	14,6	32,4	1,4	2,6	4

Station	13 May 11	31 May 11	13 Jun 11	27 Jun 11	11 Aug 11	24 May 12	20 Jun 12	04 Jul 12	30 Jul 12	21 Aug 12	21 May 13	03 Jun 13	20 Jun 13	05 Jul 13	07 Aug 13
36	2	1,9	1,9	2	17	1,9	1,9	1,9	49	5	1,9	1,9	1,9	1,9	5
37	8	1,9	1,9	1,9	2	1,9	1,9	1,9	2	2	1,9	1,9	1,9	1,9	1,9
38	8	2	2	1,9	8	1,9	1,9	2	2	5	2	2	1,9	13	1,9
39	33	1,9	1,9	31	13	2	2	2	33	1,9	1,9	1,9	13	13	11
40	1,9	1,9	1,9	5	5	1,9	1,9	1,9	2	1,9	1,9	1,9	2	2	1,9
41	1,9	13	1,9	1,9	2	1,9	1,9	2	1,9	1,9	1,9	1,9	1,9	1,9	2
Tide	LF-LF	HR-HT	HR-HT	HR-HT	HF-MF	MR-HT	HR-HF	HF-MF	HF-MF	HR-HT	MF-MF	LT-LT	HF-MF	HF-MF	HF-MF
Rain (mm)															
0-24h	0,7	0	0,2	0	5,8	0	0	0	0	0,6	1,6	0	0	0	0
0-48h	9,7	0,8	0,2	12	7	0	0	0	0	3,2	1,6	6,4	0	0	12,8
0-72h	37,3	1,4	0,8	12,2	36,4	0	0	0	0	5,2	4	8,6	2,8	0,8	12,8

Note:	1.9 represents < 2 MPN/100mL	HT = High Tide	HF = High Falling	HR = High Rising	MT = Mid Tide	MF = Mid Falling	MR = Mid Rising
		LT = Low Tide	LF = Low Falling	LR = Low Rising			

7 Discussion

Testing done by the different organizations for E.coli concentrations in the Shediac Bay Watershed show similar results that most samples have low concentrations of E.coli. However, there are occasional spikes in bacteria found in the different parts of the watershed.

The Department of Environment and Local Government with the Department of Health has done some sampling in partnership with the SBWA in different variety of areas around the watershed. The sampling targeted storm water drains, agricultural zones and small streams. Adding those results to this report will help better understand different potential sources of contamination.

The DNA test done in 2016 gave a picture after a major rain event in the fall but could have different results in the summer or the spring.

Sampling of small tributaries has given some interesting new results as some smaller tributaries had high E.coli concentrations even in dry weather. The Shediac Bay Watershed will continue to sample small tributaries and use this data to prioritize areas that may need some restoration.

All data shows that E.coli numbers are higher in August that corresponds to the warmer weather and an increased presence of people along the bay. We observe the same trend with sampling in streams with higher concentrations found in the warmer months of July and August.

8 Conclusion

It is difficult to determine exact sources of contamination as sources are punctual. Rainfall is the biggest factor influencing the concentration of bacteria in the bay.

The regions at the mouth of the Scoudouc and Shediac rivers are the ones that have the most constant presence of bacterial contamination. The presence of cattle and manure spreading is the probable cause for some of the high counts in the Scoudouc River sites and some of the smaller tributaries around Shediac Cape and Grande-Digue. There is no data taken on the spreading of manure or the locations of cattle in the watershed. Work could be done to improve farm management practices to increase buffer zones around stream and limit access to cattle.

Dog feces were present a bit everywhere as indicated by the E.coli test. Some smaller tributaries and drainage areas may have very low flows and incubate bacteria to higher levels. Education on proper waste management and disposal of dog waste can be undertaken by the municipality of Shediac. Efforts have been put in Pointe-du-Chêne by the Red Dot group by providing dog bags on trails in Pointe-du-Chêne.

In Shediac Cape, Shediac Bridge and Grande-Digue septic systems are not under a sewage commission but managed by property owners. There may be some older systems that would need replacement. Unfortunately no inspections are done unless a building permit is applied for. An education campaign on responsibilities for septic system management could help better educate home owners in the region.

Recreational boating is popular in Shediac Bay and many boats park in front of Parlee Beach during summer months when the wind conditions are favourable. Both local marinas have pump-out stations available free of charge for boaters. The SBWA developed educational posters and pamphlets for boaters to encourage the use of pump out stations. We will continue this program next year.

The Greater Shediac Sewage Commission has occasional overflows from lift stations mostly during the spring when water infiltration in the pipes. Overflows can also happen in extended power outages. THE GSSC is continually upgrading their system and adding portable generators for main to prevent overflows. The improvements around Parlee Beach and the lift station will help lessen the risk of contamination from this source.

Surface water management especially in more urban areas can help improve water quality when heavy rainfall events occur. By putting in place systems that capture water and release it more slowly in the environment there's less runoff and more absorption in the soil.

Wetlands also have an important role to play in clean water and healthy ecosystems. Marshes should be preserved from infilling and restored to natural flows when possible.

All levels of governments and citizens have a role to play in helping better the environment in the Shediac Bay Watershed. Although E.coli contamination is generally low for the bay there are still improvements to be made. The Shediac Bay Watershed will continue to provide projects to help restore nature habitats and monitor the waterways around Shediac Bay.

9 References

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