

# **Environmental Evaluation of Shediac Bay Phase 1**

## **Final Report**



**The Shediac Bay Watershed Association Inc.**

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# Acknowledgements

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# *1 Introduction*

## *1.1 Description of the Shediac Bay Watershed Association*

The Shediac Bay Watershed Association (SBWA) was founded in 1999 as a result of growing concerns from local community residents over the ecological health of Shediac Bay. In order to establish a long-term water quality-monitoring program, a community-based association was formed.

The Shediac Bay Watershed Association vision and mission statements are as follows:

**Our Vision** – Communities working together to foster a healthy ecosystem that will sustain the quality of water for future generations.

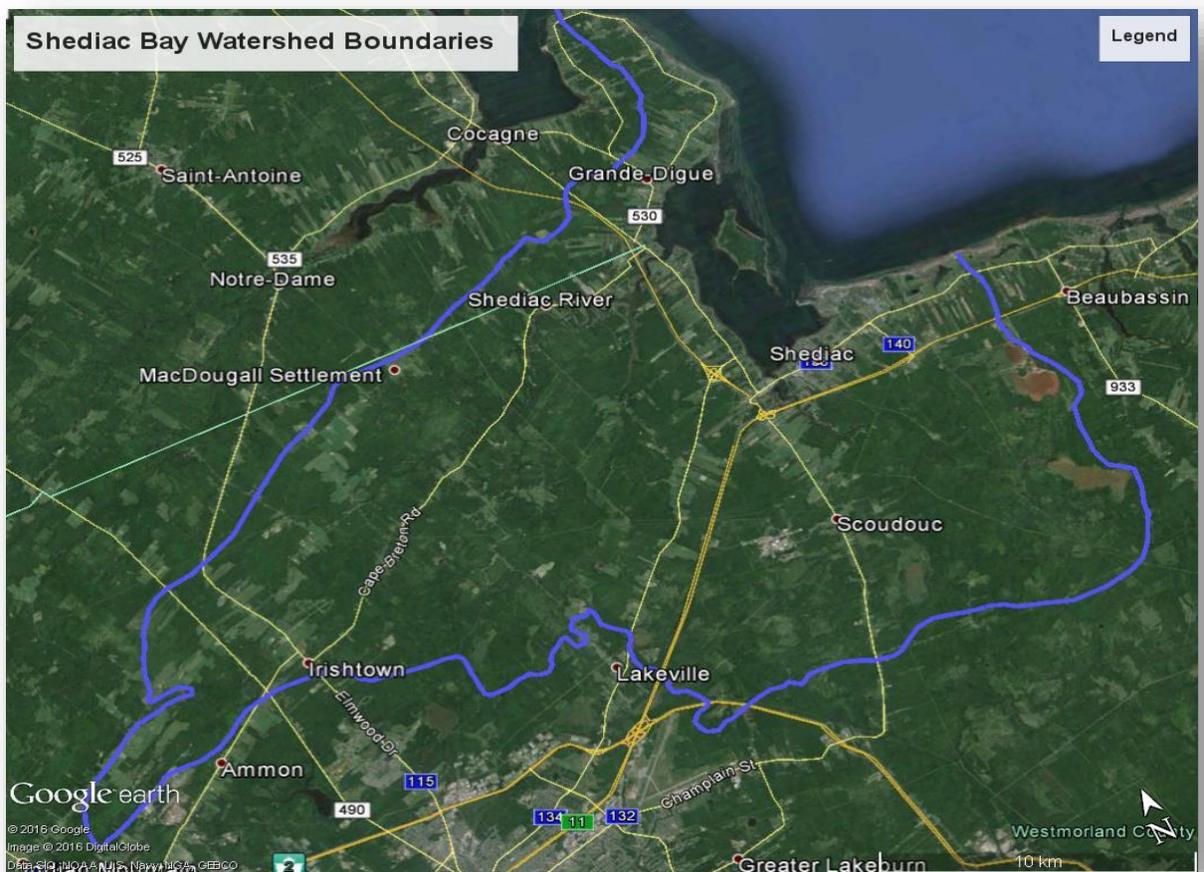
**Our Mission** – The SBWA will accomplish its vision through education and community stewardship.

The Board of Directors is composed of the following members:

Mr. Armand Robichaud, President	Mr. Gerry Dionne	Ms. Germaine Gallant
Mr. Denis Haché, Vice-President	Mr. Claude Léger	
Mr. David Dunn, Past President	Mr. Léo-Paul Bourgeois	
Ms. Helen Hall, Treasurer	Mr. Victorin Mallet,t	
Ms. Frances Kelly, Secretary	Mr. Joe Caissie	
Ms. Connie Doyle	Mr. Marc Fougère	
Mr. Pierre Landry	Mr Arthur Melanson	

## 1.2 Overview of the Shediac Bay Watershed

The Shediac Bay Watershed covers 420 km<sup>2</sup> of land area and stretches along 36 km of coastline, from Cap Bimet to Cap de Cocagne (Fig. 1). The Shediac Bay Watershed is composed of two major river systems emptying into Shediac Bay: the Shediac River and the Scoudouc River. The Shediac and the Scoudouc Rivers are characterized by small tributaries covering a watersheds of 201.8 and 143.3 km<sup>2</sup>, respectively. The Shediac River is composed of two major water arms. The northern water arm is created by the convergence of the McQuade Brook, the Weisner and the Calhoun Brook. The southern water arm of the Shediac River is the continuation of the Batemans Brook. Water velocity in both rivers is generally weak due to the gentle regional elevation. The watershed boundaries stretch into both Kent and Westmorland County and cross into both the Shediac and Moncton Parish.



Map of Shediac Bay watershed boundaries

### 1.3 *Purpose of project*

This project is a first phase to put in place a program to evaluate coastal habitats and water quality in the Shediac Bay.

The Association has been monitoring water quality in the Shediac River and Scoudouc River watersheds since 2000. The freshwater sampling is done on sites determined during the NB water classification program. While the Association has done educational and restoration projects in Shediac Bay, funding for water monitoring has been concentrated on freshwater. The aim of sampling done in saltwater in 2015-16 is to determine areas to concentrate our efforts for restoration projects. The Association has also done DNA tests following the protocol developed by Vision H2O to determine possible sources of bacterial contamination.

In partnership with the Southern Gulf of Saint Lawrence Coalition on Sustainability, we have put in place transects for eelgrass monitoring. Eelgrass beds are important habitat and help in improving water quality.

The Marsh Monitoring Program from Bird Studies Canada was put in place to help compare two marshes. The first marsh is in a natural setting, while the second marsh is more in an urban area. The staff have also begun a visual survey of salt marshes to determine their state.

Data has been mapped on QGIS and Google Earth to be able to prepare visuals for presentations and reports.

Finally, the SBWA has done some education work including improving the website, interpretation panels, beach sweeps and special events.

## 2 Water Quality sampling in Shediac Bay

For this section of the project, the Shediac Bay Watershed Association did a quick overview of bacterial monitoring around the Shediac Bay. A more detailed analysis with bigger data sets is being undertaken by the University of Mount Allison in 2017. The purpose of the samples taken by the SBWA is to determine priority areas where the association can implement restoration programs. The data is not used to determine the safety of the recreational use of the bay.

The Shediac Bay Association started taking samples and water quality parameters in the Shediac Bay in 2015, in conjunction with the green crab monitoring project. Little monitoring has been done in saltwater before, as the funding criteria for the grants received by the SBWA favoured work in freshwater.

However, the SBWA did implement different programs to improve the water quality of the bay since 2000. A green boating education program was initiated in 2001 and continued from 2005 to 2009. In 2004-2006 the Association built oyster reefs in the bay. Oyster's help filter and clean water naturally. The NB environmental trust fund had a septic system replacement and repair grant that was managed by the SBWA from 2003 to 2007. Septic systems near the bay were prioritized for the grants. A total of 40 systems were replaced or repaired during this program.

The quality of the water that flows into the bay from the Shediac and Scoudouc rivers influences the water quality in the bay. The Shediac Bay Association has 17 years of monitoring in both rivers that was initiated by the NB water classification program. During the past 17 years, we worked on many projects to improve river habitat and restore riverside habitat.

All program reports are archived on our new website:  
<http://www.shediacbayassociation.org/reports-archives/>

A report was released in November 2016 regarding the sampling done by the SBWA. The report contains more detail on methodology and data that was collected by the Association. This report is in annex A.

There are many different guidelines for determining water quality. The most common guidelines used for water quality in Canada are developed by the Canadian Council of Ministers of the Environment. These Canadian Environmental Quality Guidelines are divided into different categories. There are water guidelines for recreational uses, the protection of aquatic life and for the protection of agricultural uses. These guidelines are not regulations but may be used by government bodies to develop regulations.

The guidelines for recreational use of water falls under the mandate of Health Canada. The two main indicators recommended for water quality is the concentration of *Escherichia coli* (*E. coli*) in freshwater and Enterococci in salt water.

There are two numbers recommended in the guideline regarding recreational use depending on sampling techniques. In marine water, the guideline value for recreational use is set at a geometric mean of  $\leq 35$  enterococci/100 mL if a minimum of 5 samples are taken and  $\leq 70$  enterococci/100mL for single samples. In freshwater the guideline value for recreational use is Geometric mean concentration (minimum of five samples):  $\leq 200$  *E. coli*/100 mL or a single-sample maximum concentration:  $\leq 400$  *E. coli*/ 100 mL.

Both can be used in freshwater and marine settings but it is recommended that samples should be examined for both sets of indicators for extended periods to determine whether a positive relationship exists.

For shellfish closures, the standard is  $\leq 200$  *E coli*/100 mL. Federal guidelines applications can vary from provinces or organizations.

The following section will look at monitoring done in the Shediac Bay Watershed by the SBWA, Environnement Canada and Parlee Beach. Bacterial levels above the CCME guidelines will be indicated in red. Since the number of samples are insufficient (below 5 per site) to use the geographic mean the guideline for single samples of  $\leq 70$  enterococci/100ml and  $\leq 400$  *E coli*/100 mL will be used.

## 2.1 *Pointe du Chêne Area*

Three sites were monitored in the Pointe-du-Chêne area by the SBWA. Two sites are situated at the limits of Parlee Beach. The SBWA chose to place two points at the limit of the beach to be able to add their data to the sampling already done by the staff at Parlee Beach. The third site is situated in South Cove. Environment Canada has some sampling sites all along the bay. The data in the tables looks at points near our sampling sites.

### Approximate site locations for sampling in the Pointe-du-Chêne area



#### 2.1.1 Site A – Mouth of Lagoon Outlet

The most eastern site sampled by the SBWA is at the end of Parlee Beach, near the mouth of the lagoon outlet. An Environment Canada sampling site is situated at the same location but further in the bay. This site was also chosen to do DNA analysis to determine potential sources of contamination.

The following table compiles data from the SBWA sampling for 2015-16 with Environment Canada sampling for Shellfish (site 5). The data is for the most probable number (MPN) of E.coli in the 100 ml sample.

<b>2001</b>	<b>May 30</b>	<b>June 5</b>	<b>June 7</b>	<b>Aug 2</b>	<b>Aug 13</b>	
MPN/100 ml	1.9	2	2	11	1.9	
<b>2004</b>	<b>Jn 1</b>	<b>Jn 22</b>	<b>Jl 12</b>	<b>Jl 27</b>	<b>Au 16</b>	
MPN/100 ml	1.9	1.9	5	1.9	22	
<b>2007</b>	<b>Ma 8</b>	<b>Jn 8</b>	<b>Jn 27</b>	<b>Au 28</b>	<b>Au 29</b>	
MPN/100 ml	1.9	1.9	4	1.9	2	
<b>2010</b>	<b>Jn 4</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>	
MPN/100ml	1.9	5	2	1.9	110	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Jn 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	9	1.9	1.9	1.9	11	
<b>2013</b>	<b>Ma 22</b>	<b>Jn 21</b>	<b>Jl 9</b>	<b>Jl 25</b>	<b>Au 7</b>	
MPN/100ml	1.9	1.9	8	23	1.9	
<b>2014</b>	<b>Ma 14</b>	<b>Ma 27</b>	<b>Jn 10</b>	<b>Jl 1</b>	<b>Au 5</b>	
MPN/100ml	1.9	1.9	1.9	1.9	5	
<b>2015</b>	<b>Ma 19</b>	<b>Jn 11</b>	<b>Jl 1</b>	<b>Ju 14</b>	<b>Jl 29</b>	
MPN/100ml	1.9	1.9	1.9	1.9	1.9	
<b>SBWA 2015</b>	<b>SBWA</b>	<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		2	7	2	79	
<b>2016</b>	<b>Ma 11</b>	<b>Jn 20</b>	<b>Jl 6</b>	<b>Jl 25</b>	<b>Au 16</b>	
MPN/100 ml	1.9	1.9	23	1.9	1.9	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	<b>Oc11</b>
MPN/100 ml	0	4	23	240	19	1700

Environment Canada samples have no samples higher than 200 MPN/100 mL.

The sampling done by the SBWA in 2015 and 2016 has somewhat higher numbers. The sample taken on October 11, 2016, was after an extreme rain event. The run-off from the rain causes higher bacterial counts.

### DNA analysis

DNA tests done on October 11<sup>th</sup> showed that Site A 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 bacteria from dogs are present everywhere and may impact water quality.

The results of the DNA analysis were presented to the Greater Shediac Sewerage Commission and the Town of Shediac. A survey should be done along the brook to identify potential causes of this contamination.

### 2.1.2 Parlee Beach Sites

Parlee Beach does 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.

When determining recommendations for swimming, Parlee Beach does not follow CCME guidelines but uses their own guidelines that were developed in 1999. The bacteriological Guideline for Parlee Beach ‘poor’ water rating is 30 MPN/100ml 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 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  $\leq 70$  enterococci it was surpassed on 4 weeks. It’s interesting to note that the water was resampled after high counts on August 6<sup>th</sup> and 14<sup>th</sup>. 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
	<i>E.coli</i>	Faecal Strep.	<i>E.coli</i>	Faecal Strep	<i>E.coli</i>	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 3<sup>rd</sup> and August 19<sup>st</sup>. 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
	<i>E.coli</i>	Faecal Strep.	<i>E.coli</i>	Faecal Strep	<i>E.coli</i>	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 10<sup>th</sup>. Enterococci/was at poor levels on July 6<sup>th</sup> and August 4<sup>th</sup>, 10<sup>th</sup>, 17<sup>th</sup>and August 24<sup>th</sup>

2015	West End Beach	West End Beach	Center Beach	Center Beach	East End Beach	East End Beach
	<i>E.coli</i>	Faecal Strep.	<i>E.coli</i>	Faecal Strep	<i>E.coli</i>	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 26<sup>th</sup> and August 2<sup>nd</sup> and another on August 16<sup>th</sup>. Enterococci 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
	<i>E.coli</i>	Faecal Strep.	<i>E.coli</i>	Faecal Strep	<i>E.coli</i>	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

Environment Canada has two sampling sites offshore in front of Parlee Beach for *E.coli*. From 2001-2013 there no instances of counts in these sites that surpassed the CCME guideline of 400 MPN/ml or the Parlee Beach guideline of 175 MPN/100mL. There seems to be more contamination along the shoreline.

Concerns were legitimately raised in 2015 and 2016 regarding water quality monitoring at Parlee Beach and the methods used for reporting water quality. The protocols were established in 2001 and had not been revised or updated. The guideline used by Parlee beach for indicating ‘poor’ water quality were set at 30 MPN/100mL for a single sample. In 2016, the geometric mean was used instead of the single sample value. There were not enough samples taken to use the guideline for a geometric mean and the water quality of the beach was misreported.

The sampling done at Parlee beach is insufficient for the importance and use of this recreational area. More frequent sampling would give a better picture of water quality. A ‘poor’ rating taken at the beginning of the week stays posted even if water quality can improve. A ‘good’ rating may also degrade in a period of one week. The increase of sampling would also help better determine causes of the contamination.

The provincial government has organized a committee to reexamine the protocols for reporting water quality in Parlee Beach and determine the sources of contamination. Details of the work plan of this committee can be found at:

<http://www2.gnb.ca/content/gnb/en/corporate/promo/ParleeBeach.html>

There are many factors that can cause contamination and more studies are needed to determine the exact causes that influence Parlee Beach. The Shediac Bay Watershed Association will work with different partners to share information and educate the public.

For example, the second phase of this project aims to partner with local marinas to help educate recreational boaters on the importance of using pump-out facilities, instead of dumping waste from holding tanks into the bay.

The Shediac Bay Watershed has also been in contact with Professor Douglas Campbell from the University of Mount Allison and will be able to help with monitoring if needed.

We also have some river bank restoration work using native tree plantings proposed for sections of the small stream that empties at Cap Brulé. This will help reduce runoff.

To improve the water quality at Parlee Beach, there will have to be a concerted effort on many fronts to improve the environment.

### 2.1.3 Site B – Parlee Beach Limit

Site B is situated at the other end of Parlee Beach closer to the marina, where small drainage stream exist near the curve of Pt. du Chene Rd., corner of the parking lot.

The following table compiles data from the SBWA sampling for 2015-16 with Environment Canada sampling for Shellfish (site 2). The data is for the most probable number (MPN) of E.coli in the 100 ml samples.

#### SITE B

<b>2001</b>	<b>Ma 30</b>	<b>Jn 5</b>	<b>Jn 7</b>	<b>Au 2</b>	<b>Au 13</b>	
MPN/100 ml	1.9	8	49	8	33	
<b>2004</b>	<b>Jn 1</b>	<b>Jn 22</b>	<b>Jl 12</b>	<b>Jl 27</b>	<b>Au 16</b>	
MPN/100 ml	2	4	17	8	23	
<b>2007</b>	<b>Ma 8</b>	<b>Jn 8</b>	<b>Jn 27</b>	<b>Au 28</b>	<b>Au 29</b>	
MPN/100 ml	8	2	5	33	5	
<b>2010</b>	<b>Jn 4</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>	
MPN/100ml	1.9	49	1.9	8	170	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Jn 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	33	8	2	2	70	
<b>2012</b>	<b>Ma 24</b>	<b>Jn 20</b>	<b>Jl 4</b>	<b>Jl 31</b>	<b>Au 23</b>	
MPN/100ml	1.9	1.9	8	2	8	
<b>2013</b>	<b>Ma 22</b>	<b>Jn 21</b>	<b>Jl 9</b>	<b>Jl 25</b>	<b>Au 7</b>	
MPN/100 ml	-	1.9	ND -	ND -	ND -	
<b>SBWA 2015</b>		<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		11	8	350	33	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	<b>Oct 11</b>
MPN/100 ml	2	8	23	46	0	1700

Site B has some higher counts than site A, but there's no consistent contamination in all the years sampled by Environment Canada. Again, the SBWA sampled closer to the shore than Environment Canada.

### DNA Analysis

DNA tests done on October 11<sup>th</sup> showed that Site B 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. Dog DNA was positive at this site as well.

### 2.1.4 Site C – South Cove

The site is located at the mouth of the lagoon where walking bridge is adjacent to Pt. du Chêne Rd. The Environment Canada site is further in the bay than the SBWA.

The following table compiles data from the SBWA sampling highlighted in blue for 2015-16 with Environment Canada sampling for Shellfish (site 30). The data is for the most probable number of E.coli in the 100 ml sample.

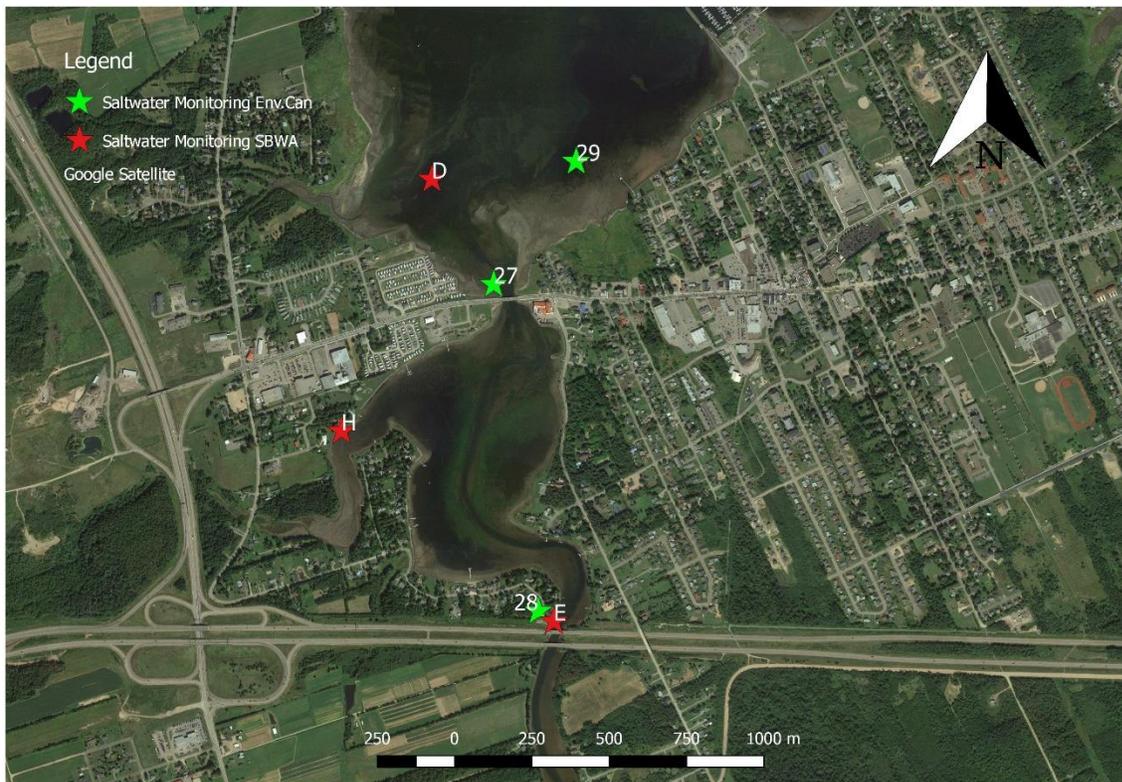
<b>2001</b>	<b>May 22</b>	<b>June11</b>	<b>June 20</b>	<b>July 4</b>		
MPN/100 ml	17	2	1.9			
<b>2004</b>	<b>Jn 2</b>	<b>Jn 15</b>	<b>Jl 8</b>	<b>Jl 29</b>	<b>Au 6</b>	<b>Au 18</b>
MPN/100 ml	1.9	1.9	1.9	1.9	1.9	1.9
<b>2007</b>	<b>Ma 7</b>	<b>Jn 7</b>	<b>Jn 30</b>	<b>Jl 18</b>	<b>Au 29</b>	
MPN/100 ml	2	2	5	2	1.9	
<b>2010</b>	<b>Ma 10</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>	
MPN/100ml	1.9	49	1.9	2	13	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Ju 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	46	7	1.9	1.9	5	
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>	
MPN/100ml	1.9	2	1.9	1.9	1.9	
<b>2013</b>	<b>Jn 13</b>	<b>Jn 20</b>	<b>Jl 5</b>	<b>Jl 25</b>	<b>Au 7</b>	
MPN/100ml	1.9	4	5	1.9	1.9	
<b>2014</b>	<b>Ma 14</b>	<b>Ma 27</b>	<b>Jn 10</b>	<b>Jl1</b>	<b>Au 5</b>	
MPN/100ml	1.9	1.9	1.9	1.9	14	
<b>2015</b>	<b>Ma 21</b>	<b>Jn 11</b>	<b>Jl 1</b>	<b>Jl 14</b>	<b>Jl 29</b>	
MPN/100ml	1.9	1.9	1.9	1.9	2	
<b>SBWA 2015</b>	<b>SBWA</b>	<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		11	130	17	8	
<b>2016</b>	<b>Ma 11</b>	<b>Jn 20</b>	<b>Jl 6</b>	<b>Jl 25</b>	<b>Au 16</b>	
MPN/100 ml	2	2	1.9	2	49	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	
MPN/100 ml	13	79	130	<b>350</b>	49	

The contamination was low for the Environment Canada site and higher for samples that were taken by the SBWA. The samples taken in August 2016 by the SBWA in most sites were higher as well as the site from Environment Canada. No DNA analysis was done at this site.

## 2.2 *Scoudouc River Area*

Samples were taken in different locations at the mouth of the Scoudouc river.

### Approximate locations of samples taken in the Scoudouc River area



#### 2.2.1 Site D – Scoudouc River Estuary

Site D is roughly in front of the bridge off Route 133, at the entrance of town. The Environment Canada site is situated in front of the town hall marsh.

The following table compiles data from the SBWA sampling for 2015-16 with Environment Canada sampling for Shellfish (site 29). The data is for the most probable number (MPN) of E.coli in the 100 ml sample.

<b>2001</b>	<b>May 22</b>	<b>June 11</b>	<b>June 20</b>	<b>July 4</b>	
MPN/100 ml	2	2	1.9-	2	
<b>2004</b>	<b>Jn 2</b>	<b>Jn 15</b>	<b>Jl 8</b>	<b>Jl 29</b>	<b>Au 6</b>
MPN/100 ml	1.9	22	1.9	14	14
<b>2007</b>	<b>Ma 7</b>	<b>Jn 7</b>	<b>Jn 30</b>	<b>Jl 18</b>	<b>Au 29</b>
MPN/100 ml	1.9	33	23	17	46
<b>2010</b>	<b>Ma 10</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>
MPN/100ml	1.9	33	1.9	7	49
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Ju 13</b>	<b>Jn 27</b>	<b>Au 11</b>
MPN/100 ml	33	13	49	-	79
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>
MPN/100 ml	5	5	1.9	23	5
<b>SBWA 2015</b>		<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>
MPN/100 ml		4	2	4	5
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>
MPN/100 ml	0	49	49	23	49

The samples have higher numbers in August for most years but not surpassing CCME guidelines.

### 2.2.2 Site E - Mouth of Scoudouc River – Highway 15

Site E is at the mouth of the Scoudouc river near the bridge of Highway 15.

The following table compiles data from the SBWA sampling highlighted for 2015-16 with Environment Canada sampling for Shellfish (site 28). The data is for the most probable number (MPN) of E.coli in the 100 ml sample.

<b>2004</b>	<b>Jn 2</b>	<b>Jn 15</b>	<b>Jl 8</b>	<b>Jl 29</b>	<b>Au 6</b>	<b>Au 18</b>
MPN/100 ml	33	13	33	130	130	33
<b>2007</b>	<b>Ma 7</b>	<b>Jn 7</b>	<b>Jn 30</b>	<b>Jl 18</b>	<b>Au 29</b>	
MPN/100 ml	1.9	1.9	4	1.9	2	
<b>2010</b>	<b>Ma 10</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>	
MPN/100ml	49	33	33	79	49	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Ju 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	9	49	46	140	33	
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>	
MPN/100 ml	49	49	130	46	33	
<b>SBWA 2015</b>		<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		49	33	49	23	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	<b>Oc 11</b>
MPN/100 ml	23	17	240	79	49	350

It has shown higher levels more than other sites, even in early 2001 and up to 2016. So higher levels of bacterial contamination coming down the Scoudouc river seems apparent. Higher numbers seem to appear in the warmer months of July and August.

### DNA Analysis

The DNA analysis revealed that contamination on October 11th 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. Finding funding for farmers to improve environmental management in this area will be a priority for the association.

### 2.2.3 Site H – Cornwall Brook

The site is located at the outlet of the Cornwall brook, around the big lobster and to right into the small cove. The Environment Canada site is at the bridge of route 133.

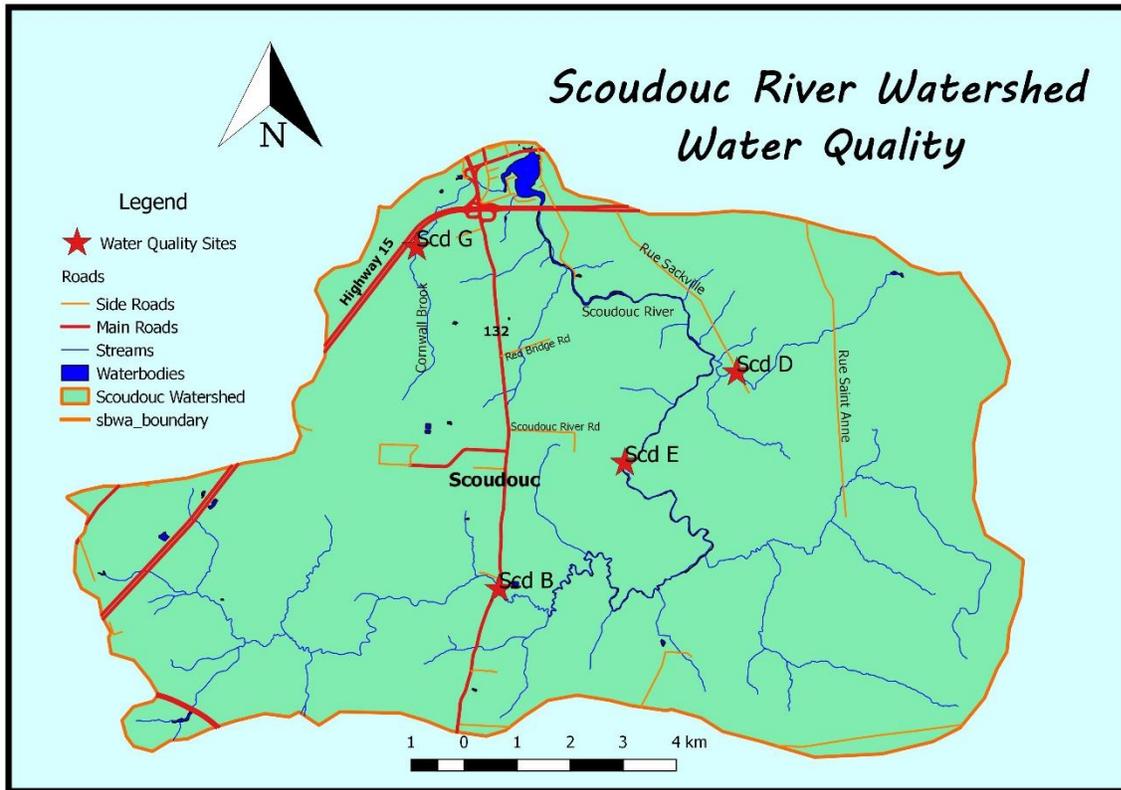
The following table compiles data from the SBWA sampling for 2016 with Environment Canada sampling for Shellfish (site 27). The data is for the most probable number of E.coli in the 100 ml sample.

<b>2001</b>	<b>May 22</b>	<b>June 11</b>	<b>June 20</b>	<b>July 4</b>		
MPN/100 ml	13	11	13	14		
<b>2004</b>	<b>Jn 2</b>	<b>Jn 15</b>	<b>Jl 8</b>	<b>Jl 29</b>	<b>Au 6</b>	<b>Au 18</b>
MPN/100 ml	5	1.9	5	17	17	5
<b>2007</b>	<b>Ma 7</b>	<b>Jn 7</b>	<b>Jn 30</b>	<b>Jl 18</b>	<b>Au 29</b>	
MPN/100 ml	1.9	17	110	5	17	
<b>2010</b>	<b>Ma 10</b>	<b>Jn 9</b>	<b>Jn 24</b>	<b>Jl 8</b>	<b>Au 5</b>	
MPN/100ml	4	33	23	2	2	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Ju 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100 ml	17	49	8	33	110	
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>	
MPN/100 ml	13	4	23	5	31	
<b>2016 SBWA</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	
MPN/100 ml	33	79	79	31	170	

There are occasional higher numbers but the numbers are higher upstream.

### 2.3 Freshwater Monitoring for the Scoudouc River

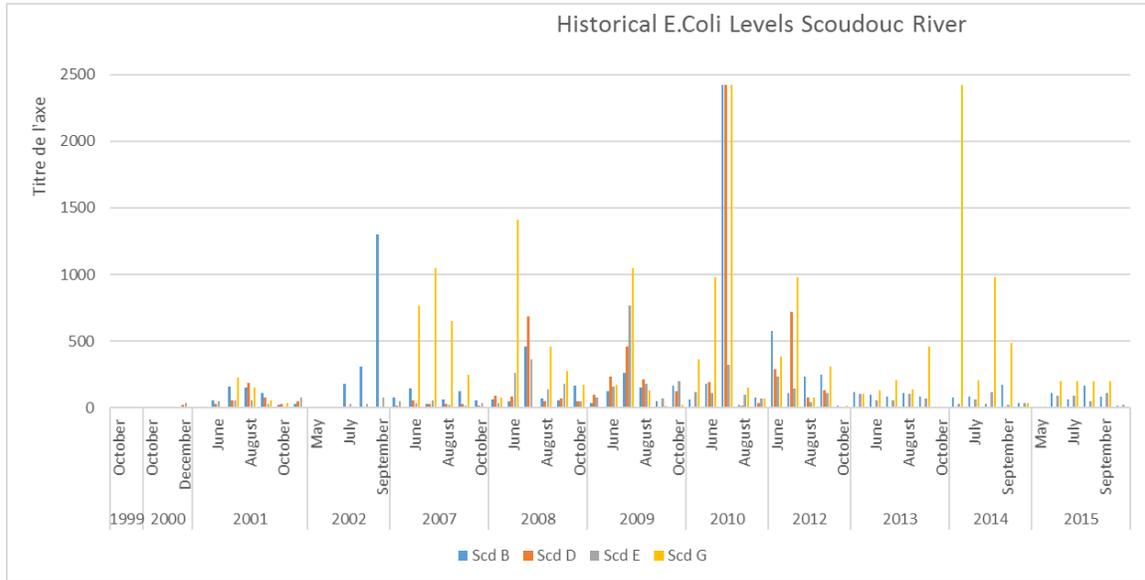
The Shediac Bay Watershed Association has been monitoring E.coli in the freshwater of the Scoudouc river. Four sites have been monitored for water quality from 2000-2016.



Scoudouc river water quality monitoring sites

When we look at E.coli numbers for the Scoudouc rivers, all the sites experience high E.coli counts at some point. The highest results are during the summer. The following charts shows all results from monitoring in 2000-01 and from 2007-15. A guideline of under 200 MPN/100 ml for a class A river was developed for the NB water classification program and is used by the SBWA.

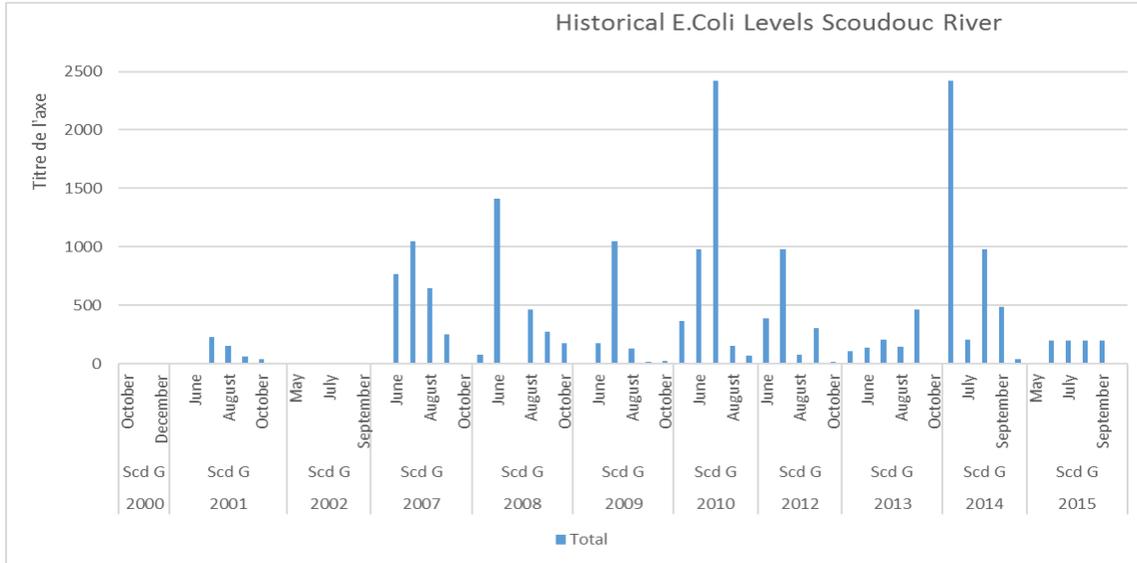
There was a heavy rainfall before the sampling of July 2010 that increased the numbers on all sites.



### 2.3.1 Cornwall Brook (Site Scd G)

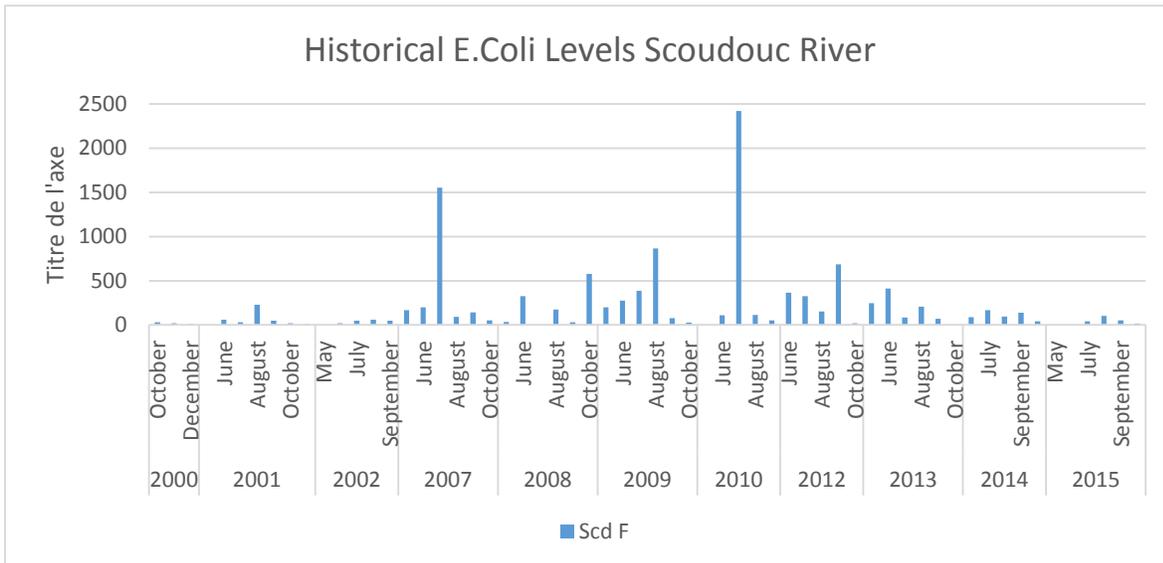
The site situated in the Cornwall Brook is in a small tributary that exit near the mouth of the Scoudouc river. It crosses an agricultural zone. This site is the one with the most contamination from E.coli.

A project has been proposed for 2017 to replant a streamside buffer zone on fields that border the Cornwall Brook. Some restoration activities have also been done in the past in this area.



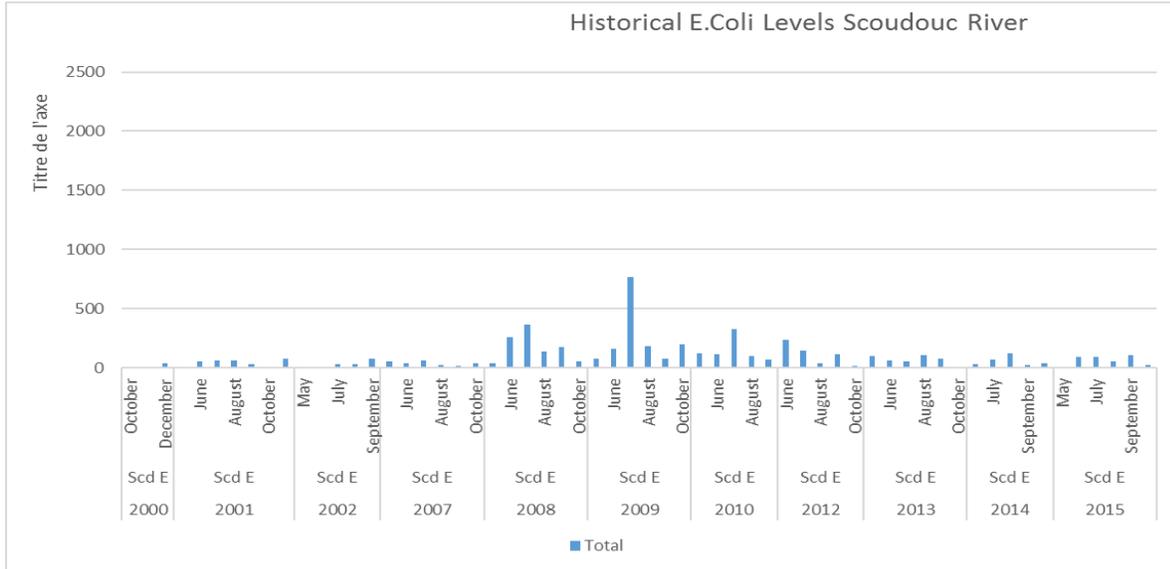
### 2.3.2 Pellerin Road (Site Scd F)

The next site is situated above agricultural zones in a wooded area accessed by taking Pellerin Road. The highest counts of E.coli occurred after the rain event in July of 2010.



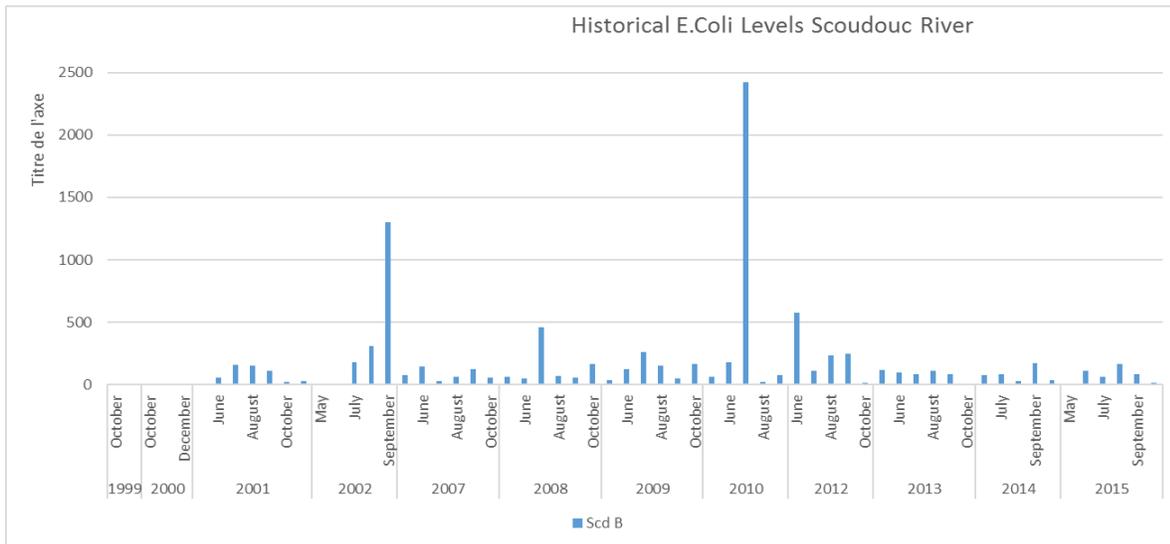
### 2.3.3 Scoudouc River off Scoudouc River Road (Scd E)

The next site is further upstream and accessed off Scoudouc River Road. The area is mostly wooded and has lower levels of bacterial contamination compared to the other sites. This site is downstream of the Greater Shediac Sewage Commission's waste water treatment lagoons. The discharge pipe of the lagoons is located approximately 11.5 km upstream.



### 2.3.4 Scoudouc River Main Branch at Route 134 ( Site Scd B)

The site is where the main branch of the Scoudouc River crosses Route 134. It's situated in a residential zone. The counts are generally low, but has high counts on some occasions. The higher counts are after heavy rainfalls in July 2010 and June 2012. No notes on weather was taken in 2002.



## 2.4 Shediac River Area

Two sites were chosen in the Shediac Bridge area for the study. One is located at the mouth of the Shediac River and the second is situated at the mouth of Albert Gallant brook.

**Approximate locations of sampling sites in the Shediac River Area**



### 2.4.1 Site G Albert Gallant Brook

The first site is located at the mouth of Albert Gallant Brook, in front of the first cove near the start of Route 530, close to LeBlanc Street. Environment Canada samples in the same area.

The following table compiles data from the SBWA sampling for 2015-16 with Environment Canada sampling for Shellfish (site 9). The data is for the most probable number (MPN) of E.coli in the 100 ml sample.

<b>2004</b>	<b>Jn 2</b>	<b>Jn 15</b>	<b>Jl 8</b>	<b>Jl 29</b>	<b>Au 18</b>	
MPN/100 ml	2	11	33	2	1.9	
<b>2007</b>	<b>Ma 7</b>	<b>Ma 30</b>	<b>Jn 26</b>	<b>Jl 18</b>	<b>Au 29</b>	
MPN/100 ml	17	11	5	2	1.9	
<b>2010</b>	<b>Ma 10</b>	<b>Ju 24</b>	<b>Jl 8</b>	<b>Jl 9</b>	<b>Au 5</b>	
MPN/100 ml	8	22	79	23	79	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Jn 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	21	540	13	23	220	
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>	
MPN/100ml	33	8	2	2	70	
<b>2013</b>	<b>Jn 3</b>	<b>Jn 20</b>	<b>Jl 5</b>	<b>Jl 25</b>	<b>Au 7</b>	
MPN/100ml	23	8	79	11	8	
<b>2014</b>	<b>Ma 14</b>	<b>Ma 27</b>	<b>Jn 10</b>	<b>Jl 1</b>	<b>Au 5</b>	
MPN/100 ml	2	1.9	13	33	1.9	
<b>2015</b>	<b>Ma 19</b>	<b>Ju 11</b>	<b>Jl 1</b>	<b>Jl 14</b>	<b>Jl 29</b>	
MPN/100ml	2	23	5	14	30	
<b>SBWA 2015</b>	<b>SBWA</b>	<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		240	23	280	13	
<b>2016</b>	<b>Ma 19</b>	<b>Ju 11</b>	<b>Jl 1</b>	<b>Jl 14</b>	<b>Jl 29</b>	
MPN/100 ml	2	23	5	14	30	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	<b>Oc 11</b>
MPN/100 ml	33	17	17	23	13	920

The site has some high readings that are detected both by the Association and Environment Canada. There seems to be some sporadic contamination.

#### DNA analysis

The 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.

## 2.4.2 Site F - Shediac River at Route 134

The site is at the mouth of the Shediac River at the bridge off Route 134. This site is done in the same location for the SBWA and Environment Canada.

The following table compiles data from the SBWA sampling highlighted in blue for 2015-16 with Environment Canada sampling for Shellfish (site 11). The data is for the most probable number (MPN) of E.coli in the 100 ml sample.

<b>2004</b>	<b>June 2</b>	<b>June 15</b>	<b>July 8</b>	<b>July 29</b>	<b>Aug 18</b>	
MPN/100 ml	2	2	1.9	5	7	
<b>2007</b>	<b>Ma 7</b>	<b>Ma 30</b>	<b>Jn 26</b>	<b>Jl 18</b>	<b>Au 29</b>	
MPN/100 ml	1.9	23	4	1.9	13	
<b>2010</b>	<b>Ma 10</b>	<b>Ju 24</b>	<b>Jl 8</b>	<b>Jl 9</b>	<b>Au 5</b>	
MPN/100 ml	14	17	23	79	23	
<b>2011</b>	<b>Ma 13</b>	<b>Ma 31</b>	<b>Jn 13</b>	<b>Jn 27</b>	<b>Au 11</b>	
MPN/100ml	79	23	350	49	70	
<b>2012</b>	<b>Ma 24</b>	<b>Ju 20</b>	<b>Jl 4</b>	<b>Jl 30</b>	<b>Au 21</b>	
MPN/100ml	17	5	23	70	49	
<b>2013</b>	<b>Jn 3</b>	<b>Jn 20</b>	<b>Jl 5</b>	<b>Jl 25</b>	<b>Au 7</b>	
MPN/100ml	33	8	170	13	13	
<b>2014</b>	<b>Ma 14</b>	<b>Ma 27</b>	<b>Jn 10</b>	<b>Jl 1</b>	<b>Au 5</b>	
MPN/100 ml	1.9	11	23	33	33	
<b>2015</b>	<b>Ma 19</b>	<b>Ju 11</b>	<b>Jl 1</b>	<b>Jl 14</b>	<b>Jl 29</b>	
MPN/100ml	1.9	11	23	33	33	
<b>SBWA 2015</b>	<b>SBWA</b>	<b>Jl 7</b>	<b>Au 11</b>	<b>Au 25</b>	<b>St 14</b>	
MPN/100 ml		2	7	7	110	
<b>2016</b>	<b>Ma 19</b>	<b>Ju 11</b>	<b>Jl 1</b>	<b>Jl 14</b>	<b>Jl 29</b>	
MPN/100 ml	2	8	11	33	17	
<b>SBWA 2016</b>	<b>Jn 20</b>	<b>Jl 19</b>	<b>Au 18</b>	<b>Au 30</b>	<b>Se 19</b>	<b>Oc11</b>
MPN/100 ml	22	11	79	22	4	79

The Shediac river has sporadic higher numbers that tend to be higher during the summer months.

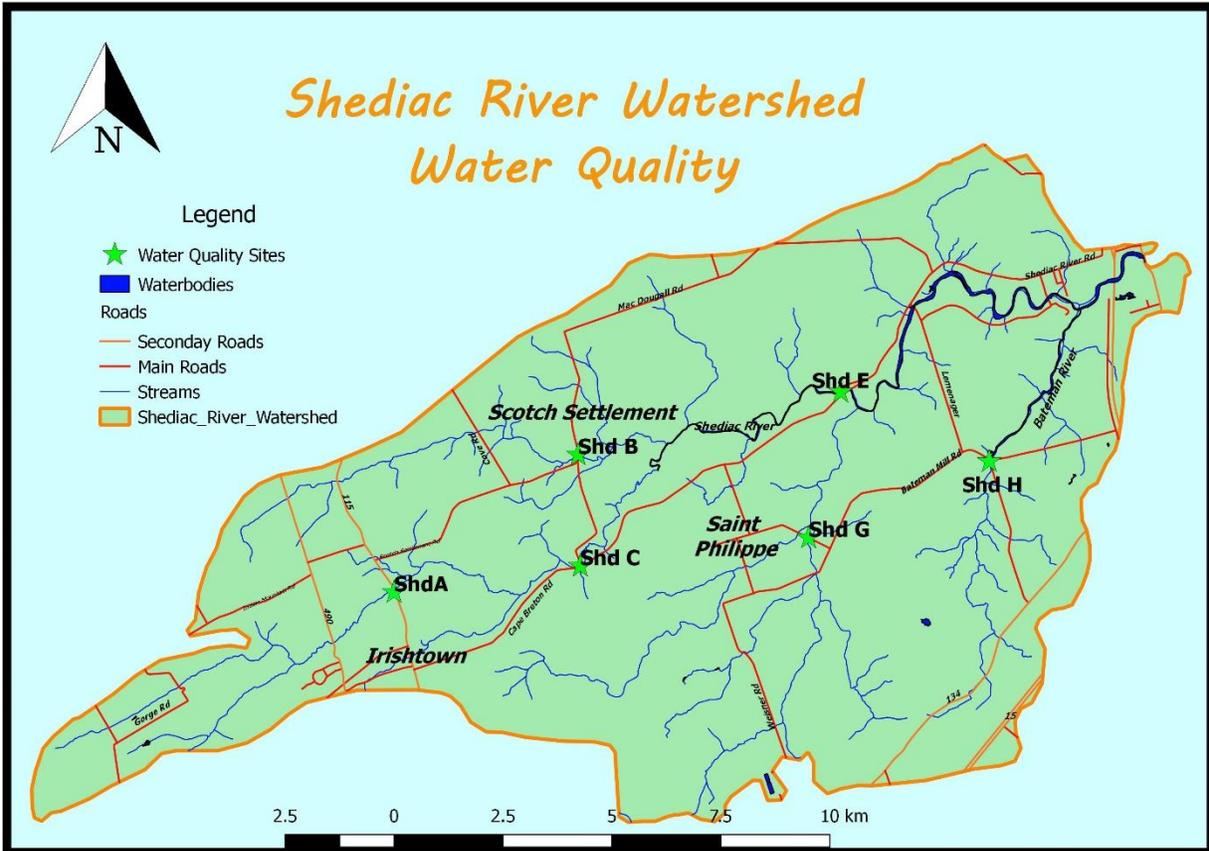
### DNA Analysis

This site 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.

The Shediac Bay Watershed has been doing some restoration work along in the upper watershed. New areas needing restoration will be identified especially near agricultural zones.

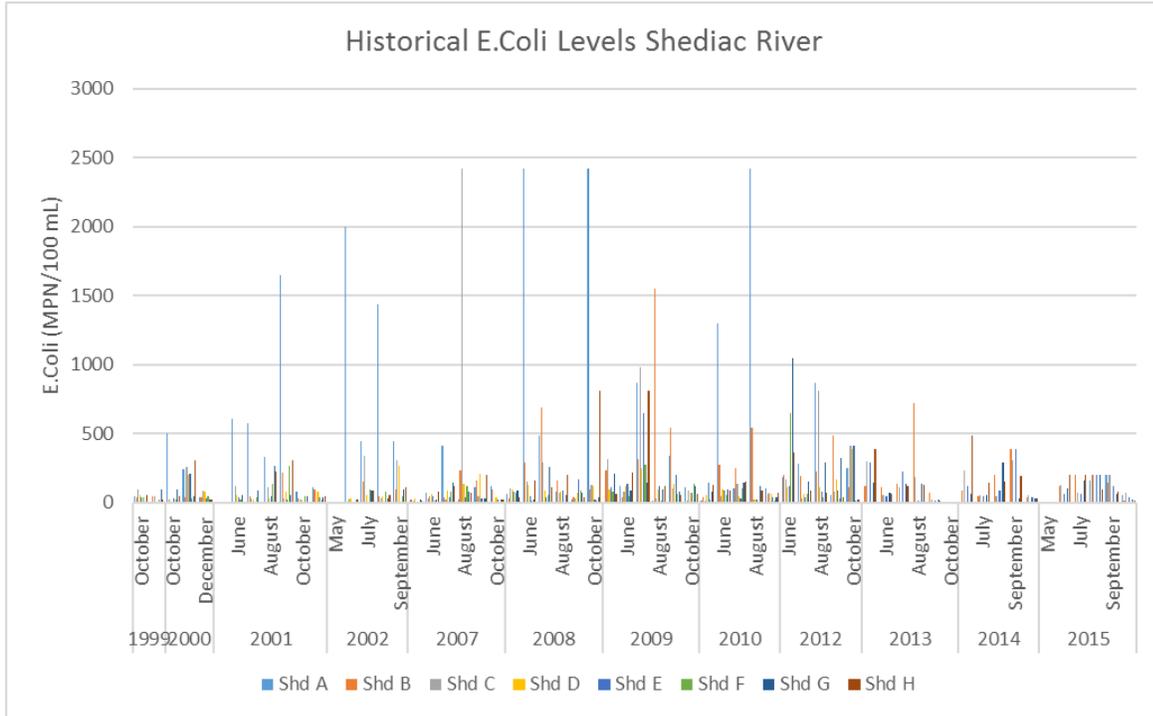
## 2.5 Freshwater Monitoring Results for the Shediac River

The Shediac Bay Watershed Association has been monitoring E.coli in the freshwater of the Shediac river from 2000-2016. Seven sites have been monitored. The guideline developed for the water classification program for a class A river is under 200 MPN/100 ml.



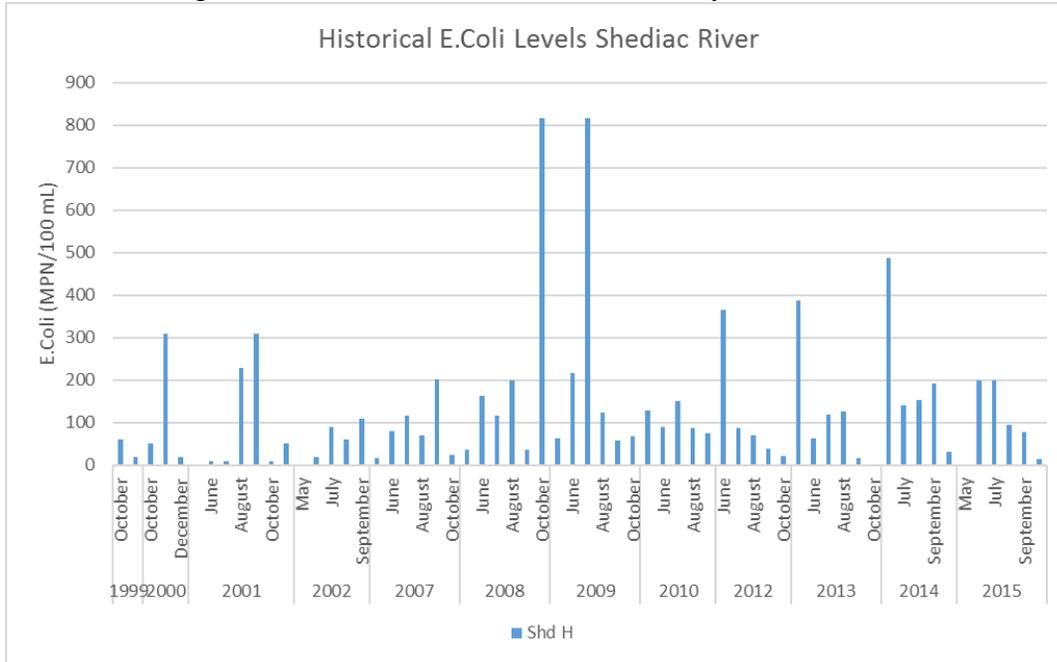
Shediac River Monitoring sites

When we look at E.coli numbers for the Shediac rivers, all the sites experience high E.coli counts at some point.. The following charts shows all results from monitoring in 2000-01 and from 2007-15.



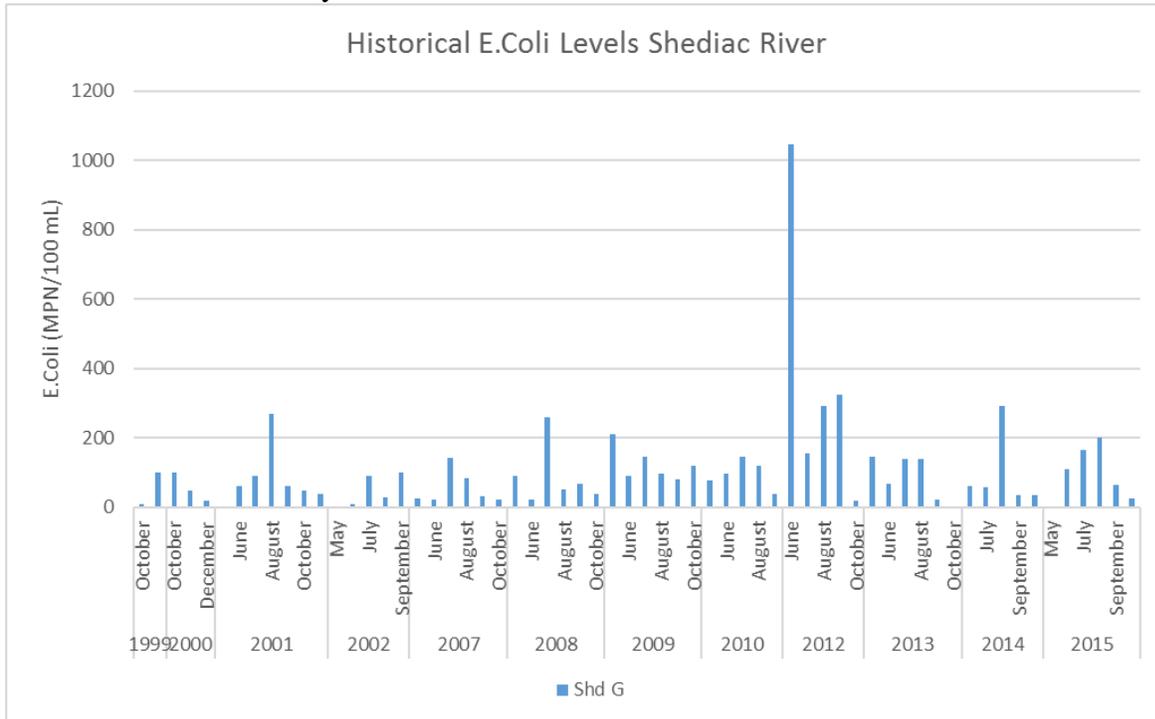
### 2.5.1 Bateman Mill – Site Shd H

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.



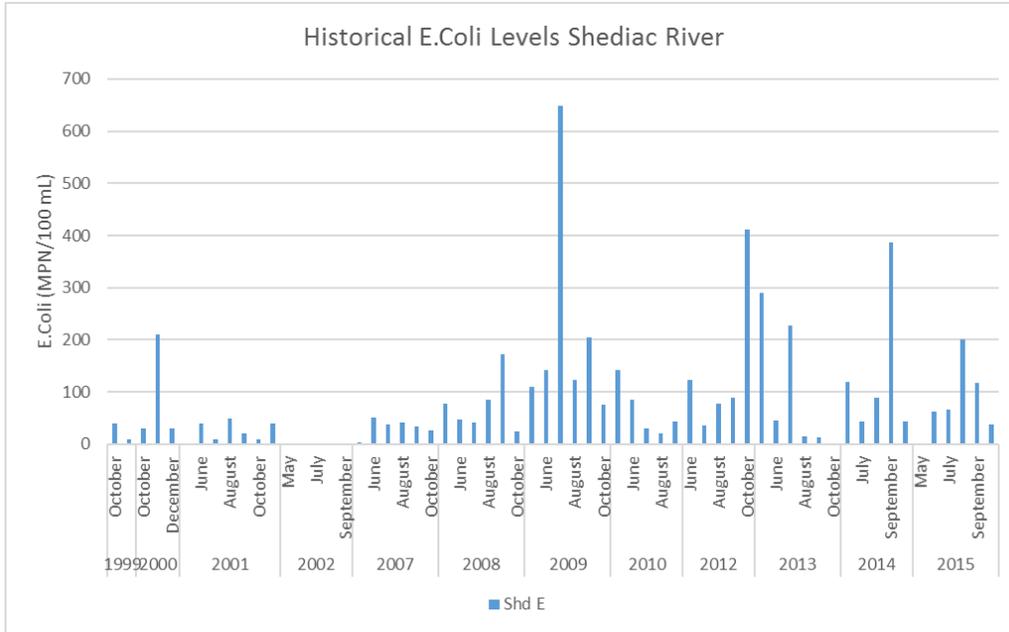
### 2.5.2 Weisner Brook – Site Shd G

The site for the Weisner Brook is located in Saint Philippe. The brook crosses agricultural lands and is influenced by beaver dams.



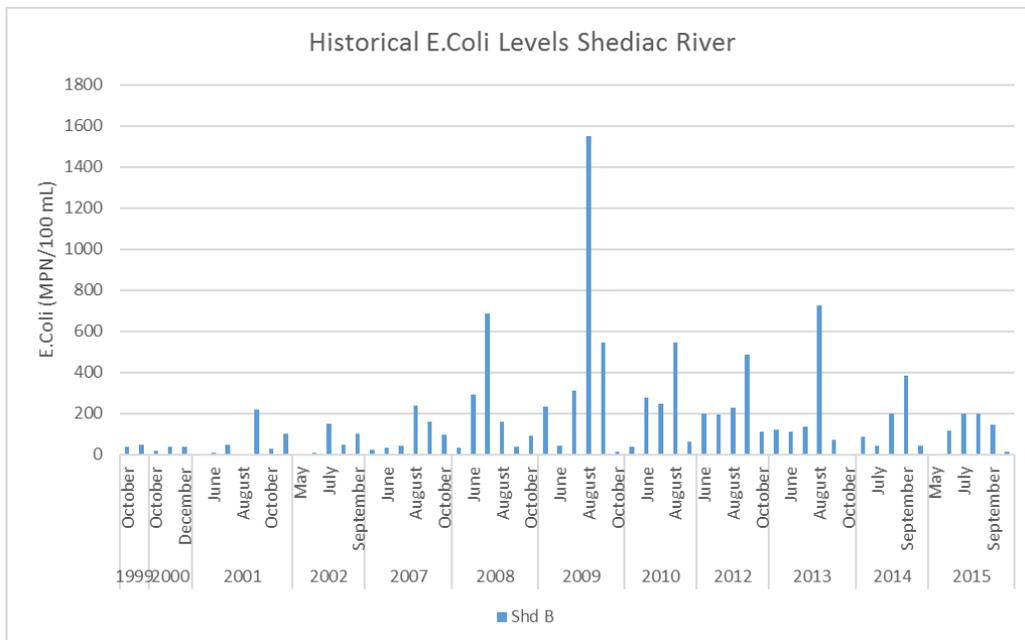
### 2.5.3 Main Branch Shediac River – Shd E

There's a site where the main branch of the Shediac river crosses the Shediac River road. The area is mostly forest lands.



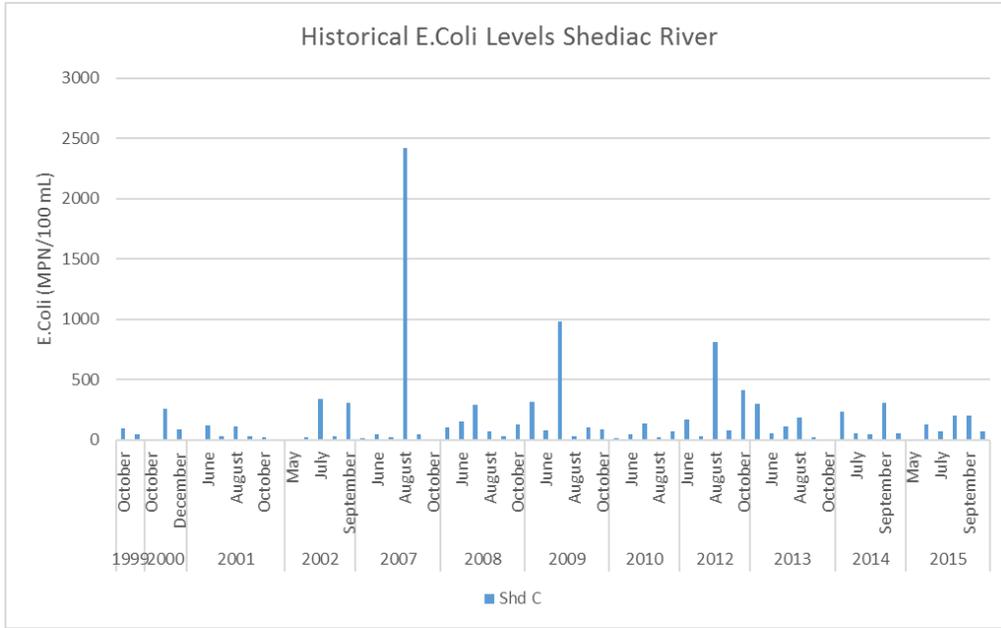
### 2.5.4 McLean Cross Rd – Site Shd C

The site is where the main branch of the Shediac river passes under McLean Cross Road, off Shediac River Road. The area is mostly residential and forested. There are occasional high counts of E.coli.



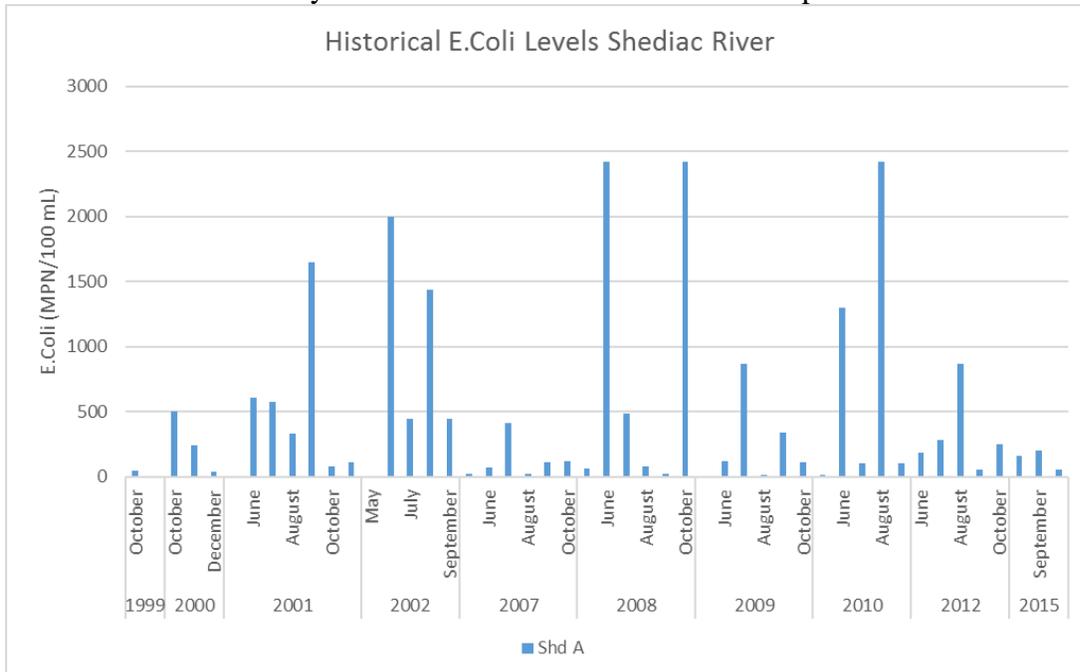
### 2.5.5 McQuade Brook – Site Shd B

The site is of Scotch Settlement Road. There has been some beaver activity upstream from this site noted in 2007 and 2008.



### 2.5.6 Irishtown – Shd A

The site is located in the upper reaches of the watershed in Irishtown of route 115. 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.

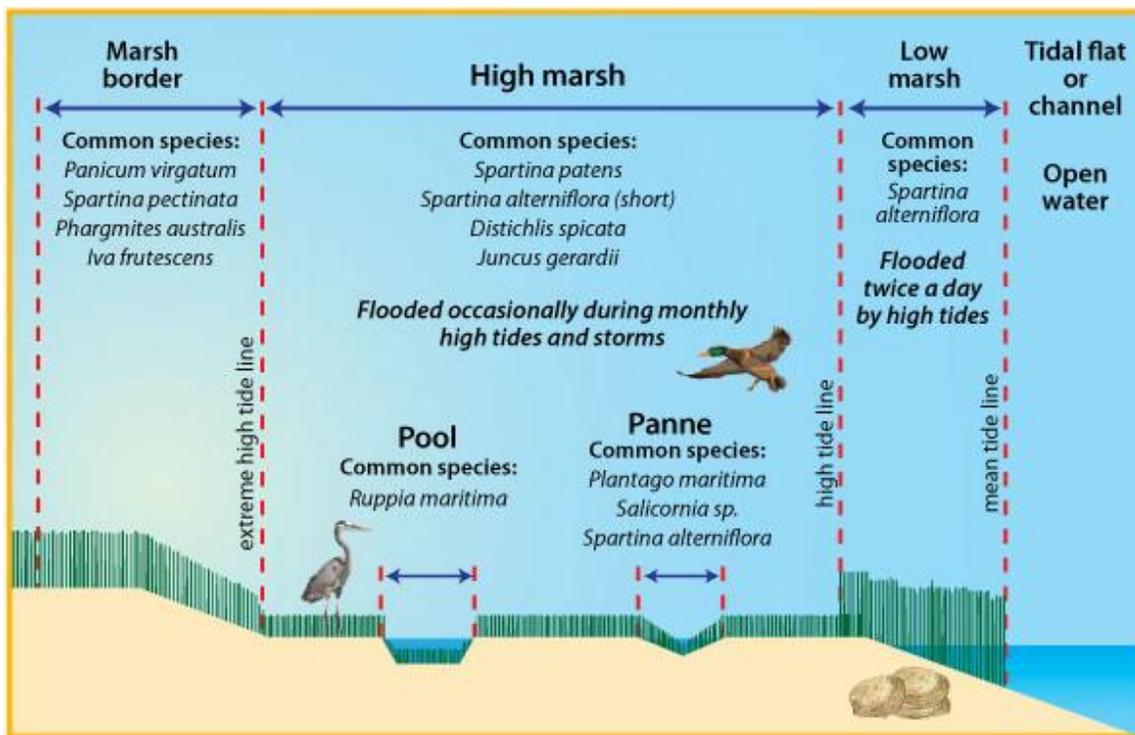


### 3 Salt marsh inventory

As part of the evaluation of Shediac Bay a quick visual survey was done for salt marshes along the coastline. A total of 23 marshes were surveyed. There are still quite a few marshes that could be evaluated especially in the Shediac Cape area.

Two staff would walk along the marshes and take note of the vegetation found and land uses around the marsh. Specifically, the staff was looking for the presence of the three vegetation zones that characterize salt marshes in the area. Also noted was plants that indicated sand dunes.

The following illustration list the common plant communities found in the different zones of salt marshes. The *Spartina* genus is particularly indicative of the marsh zones.



The purpose of the inventory was to provide a quick overview of the status of the marshes around the bay to determine the need for restoration or educational activities. This is not a scientific research but for researchers interested in marsh plants, presence data will be kept at the SBWA office.

### 3.1 *Grande Digue Area*



Three marshes were surveyed in the Grande-Digue area.

### 3.1.1 Grande-Digue -1



GD-1: Area 37,316 sq/m  
Perimeter 964m

This saltwater marsh is located a few kilometres north of the Shediac Bridge.

The surrounding area is dominated by shrubs and field species. The main shrubs found are meadow sweet and cranberries. 5 species of field plants were identified. The marsh border has 7 species dominated by *Spartina pectinate*. The presence of Narrow-leaved cat-tail indicates areas that have mostly freshwater influx. The high marsh zone has 4 species dominated by *Spartina patens* and *distichlis spicata*. The lower marsh zones also have 4 species dominated by *Spartina alterniflora*. Sapphire greens were found in small quantities.

The marsh has good biodiversity in the plant community. Also Nelson's sparrow was heard during the survey and ducks were observed.

The wetland GD-1, has little development within the 30m wetland buffer but has a large amount of abandoned field around the marsh. Very little trees remain in the area as the area is frequently brush cut. The two most northern parcels were mowed within the salt marsh zone. The main issue with this marsh is brush cutting that disturbs approximately 1/3 of the marsh area mostly in the northern section. A new construction was done just west of the wetland and a small portion of the wetland has been infilled for the house.

This is one site that could benefit from a targeted education program on wetlands. There is also a possibility of more private properties being developed around the wetland in the future.

### 3.1.2 Grande-Digue -2



GD-2: Area 10,708 sq/m  
Perimeter 626m

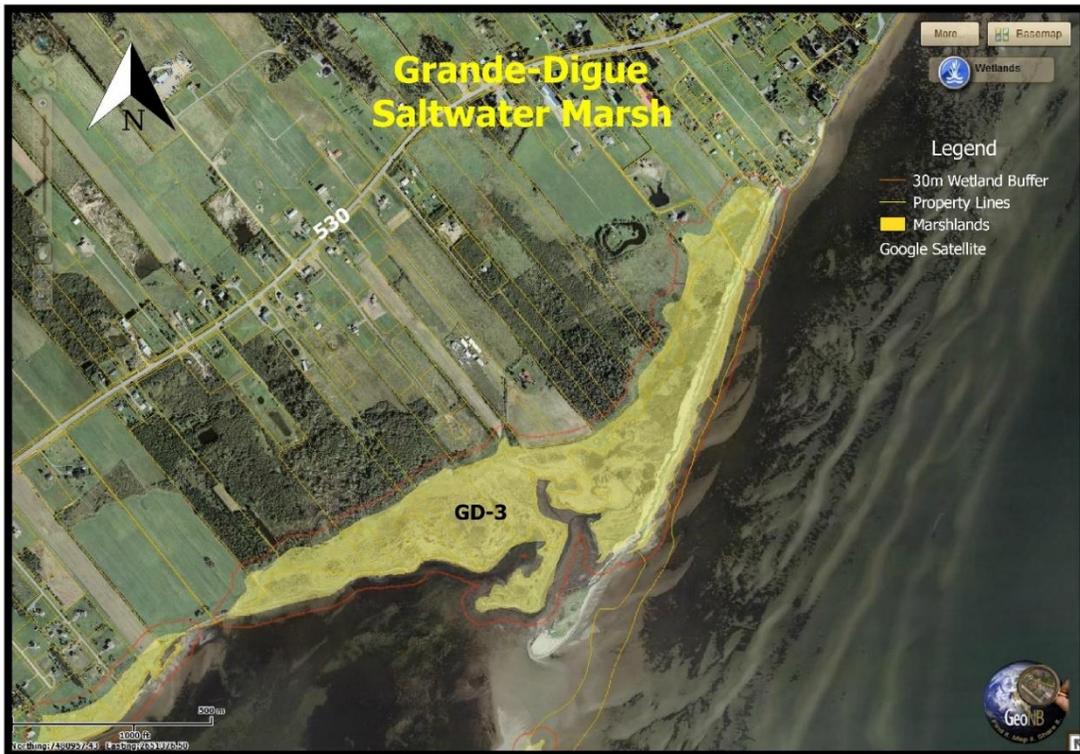
This saltwater marsh is located behind the community centre Notre Centre off Route 530. The total area identified by GeoNB is 10708 sq/m but the actual size is much smaller.

The wetland GD-2, has had considerable development near and adjacent to the wetland. Very little trees remain near the marsh. The location has undergone a lot of environmental alteration over the years, a small paved road is located to the east, and a large amount of area within the wetland shape is used and mowed by local residents.

The marsh border zone is very small and contains 7 species. It has been infilled and mowed extensively. There is the presence of *Spartina pectinate* and sea aster that is specific to salt marshes. The other plants are indicative of frequent disturbance. There is a small high marsh area with *Spartina patens* and salt marsh bulrush that indicate that the marsh is a tidal zone. Plants in the lower marsh include *Spartina Alterniflora*, *Salicornia* and *Sueda*. They are present but not very extensively.

This marsh seems to have suffered a considerable amount of both infilling and erosional activity. This site could use restoration and rehabilitation although it would be difficult with all the infilling that has been done. There is also a high potential of more private properties being development nearby in the future, according to the empty building lots on the eastern side.

### 3.1.3 Grande-Digue -3



GD-3: Area 365,316 sq/m  
Perimeter 4,650m

This saltwater marsh is located off route 530 approximately 3 km for the village centre.

This marsh has an excellent diversity of plant species. The three zones of *Spartina* are well represented and the wetland has a variety of habitats.

The wetland has had little development near or adjacent. A large amount of forest remains near and along the marsh, the location has undergone some environmental alteration over the years by residential properties, some of the local residential properties have fields that go right up to the marsh and is being mowed or cultivated. This site is the largest in area and function and could face further development in the future, but currently remains in good health.

The three main areas of concern are the northern end where the most residential properties are found, near the middle where the fields are cultivated and finally near the southern edge, where large fields are found adjacent to the marsh. Some drainage ditches are present in the marsh.

There is some light human disturbance as a hunting blind and ATV trail were observed.

Work could be done to put this marshland in conservation. A study could also be done to see the impact of ditches on natural flow of the marsh. A restoration project could be undertaken to restore the natural water flow.

## **Grande-Digue dune**

The dune at the tip of the salt marsh was also visited on the 7<sup>th</sup> of October.

The plant community on the dune is representative of the dune ecosystem with 95 % of the vegetation comprising of Marram grass (*ammophila breviligulata*). Other dune plants such as beach peas, sea lyme grass and sea lovage were present. A total of 15 species were found on the dune. There's also the presence of poison Ivy on much the dune.

The sand dune is in a state of erosion and is now separated from the mainland. There's no channel between the marsh and the dune and the dune is easily accessible at low tide. Some sand mining has occurred on the dune in the 1950's and 60's that has removed a lot of sand. With sea-level rise and climate change this ecosystem is very vulnerable to storm surges.

Grande-Digue community members have expressed interest in restoring the dune to rebuild it to its original length. Options for this project are being considered and consultation meetings have been organized with the Université de Moncton and the Department of Energy and Resource Development.

While the Shediac Bay Watershed Association will not be leading this project, the manager participates in the meetings and will look at the opportunities for collaboration.

## 3.2 Shediac Bridge area



Three marshes were surveyed in the Shediac Bridge area. These saltwater marshes are located in Shediac Bridge near the bridge of route 134.

### 3.2.1 Shediac Bridge 1 – Indian point

SB-1: Area 17,870 sq/m  
Perimeter 690 m

The marsh was surveyed on August 8<sup>th</sup> and was accessed by a sampling site for CAMP (Community Aquatic Monitoring Program) already established at the end of chemin Lucille.

The marsh is in a natural state with the three vegetation zones characteristic of salt marshes visible. The marsh border zone dominated by *Spartina pectinate* represents 50% of the area and has 5 species of plants and 2 species of native shrubs. The high marsh zone represents 40% of the marsh area and is comprised of 100% cover of *Spartina patens* with some ponds. The lower marsh area that represent 10% of the area is mostly *Spartina alterniflora*. There is also a dune system on the edge with marram grass and 5 other dune species.

The marsh has some residential and cottage development within the 30m wetland buffer. There is some mowing done within the wetland at the southern end. However, this wetland has a good amount of tree cover remaining, but could face more development in the near future.

### **3.2.2 Shediac Bridge 2 – Residential area next to route 134**

SB-2: Area 25,490 sq/m Perimeter 738 m

This wetland was not surveyed for plants but surveyed visually by boat.

The lower and middle parts of the wetland are present but the upper section of the wetland is completely absent. There's large amount of deforestation in the surrounding area. Very little tree cover remains near the wetland. Some residential development is located within the 30m buffer in addition to a heavy amount of mowing and landscaping within the wetland shape.

This wetland could use a considerable amount of reforestation and rehabilitation for erosion control and habitat creation.

### **3.2.3 Shediac Bridge 3 - Behind Chez Leo Take Out**

SB-3 South: Area 46,258 sq/m Perimeter 950m  
SB-3 North Area 18,000 sq/m Perimeter 580m

The following marshes were surveyed on August 8<sup>th</sup>. Access was from the shore off route 134.

The southern marsh identified as SB-03 has the presence of the 3 zones of marsh plants present. The lower Marsh zone has 4 species dominated by *Spartina Alterniflora*, the high marsh zone has three species dominated by *Spartina patens*, and the marsh border zone had 5 species dominated by *Spartina pectinate*. Six other plant species and three species of native shrubs were identified.

The marsh has also undergone a considerable amount development in and around its perimeter. The drainage has been modified with ditches and berms. A part of the upper marsh has been infilled for residential development.

From the aerial photograph we can clearly see mowing and brush cutting practices within the 30m buffer. There remains approximately 5-10% forest cover along the edges and could potentially undergo more development of private properties in the future also.

The northern marsh identified as SB-03 also has the presence of the 3 zones of marsh plants present. The lower Marsh zone has 4 species dominated by *Spartina Alterniflora*, the high marsh zone has three species dominated by *Spartina patens*, and the marsh border zone had 5 species dominated by *Spartina pectinate*. Ten other plant species and three species of native shrubs were identified.

Some berms and drainage ditches are present in the marsh area to prevent flooding in the residential area. The area around the wetland has lost most of its forest cover over the years. There have been some residential development within the wetland shape and has also suffered from mowing and a moderate amount of degradation. Strong potential of future development.

### 3.3 *Pointe-du-Chêne area*

One marsh was surveyed in South Cove.



ES-1 : Area 43,452 sq/m Perimeter 1,448m	ES-2: Area 32,170 sq/m Perimeter 1,552m
ES-3: Area 52,692 sq/m Perimeter 1,198m	ES-4: Area 118,330m Perimeter 2,485m

In total, the area consists of 246,644 sq/m, with a perimeter of 6,683m.

The salt water marsh has the three zones of vegetation present in most sections. The ES-2 section is impacted by berms and infilling that affect the lower marsh and marsh border. The section ES-01 has the best diversity of plants representing salt marshes.

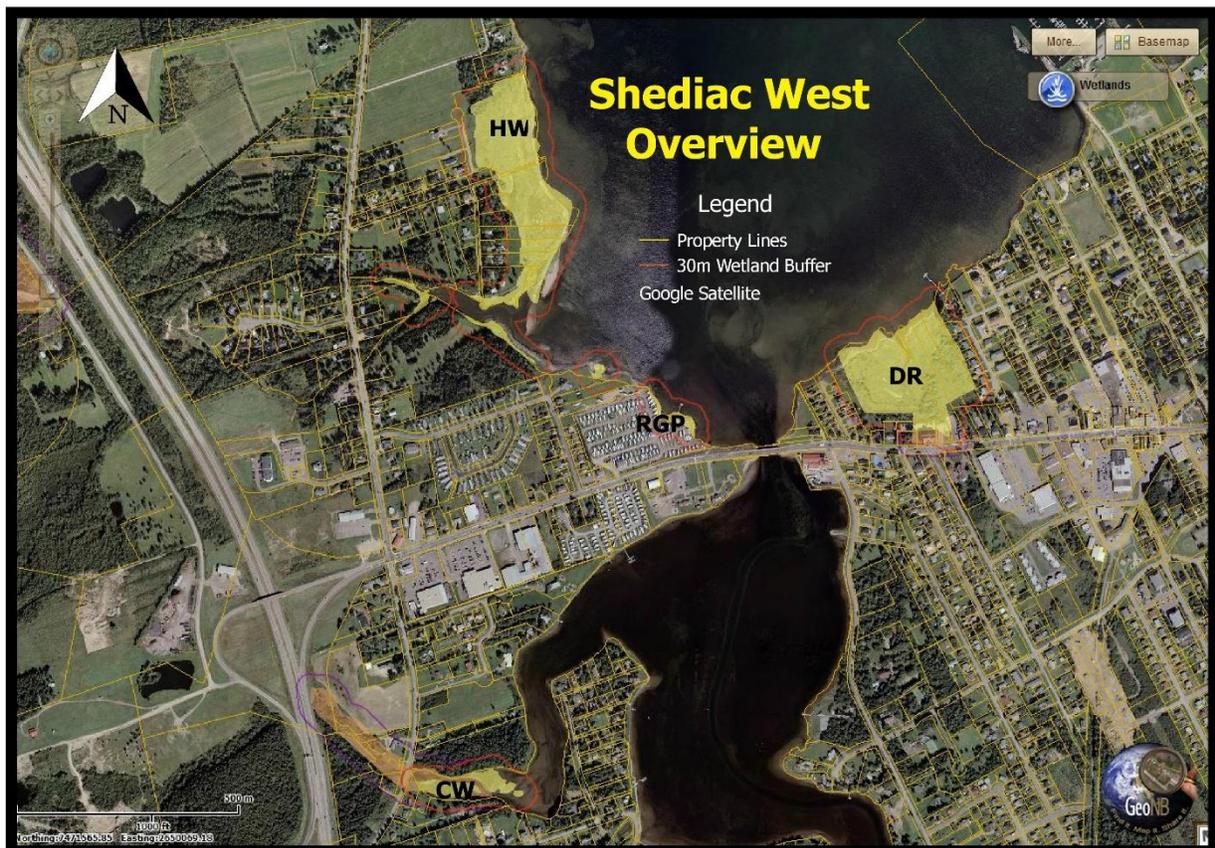
The wetland is surrounded by development, residential lots and some forested wetland. Over time, development has encroached into the wetland in some areas and other areas have been filled-in and has led to a loss of wetland function. According to the shape layer retrieved from Geo NB, a considerable amount of building lots are situated within the proposed 30m buffer of the mapped salt water marsh.

The areas of concern with the most loss of function due to development, seem to be the ES-4 wetland and the northern section of ES-1, the attached maps clearly show where the properties have been built into or adjacent to the wetland. These areas will be of highest risk to flooding or erosion, and would be the targeted areas for restoration work. In the ES-4 portion, most of the development is situated within the proposed 30m buffer of the salt water marsh and has been subject to alteration and ultimately loss of function, biodiversity and erosion control.

There's a proposed campground development in the wooded area south of ES-2. The campground plan is situated outside the 30m buffer zone. However, the removal of trees will have an impact on the water flow into the marsh.

### 3.4 *Shediac area*

Four marshes were surveyed in the Shediac Area



### 3.4.1 Dock Road – Behind Town Hall



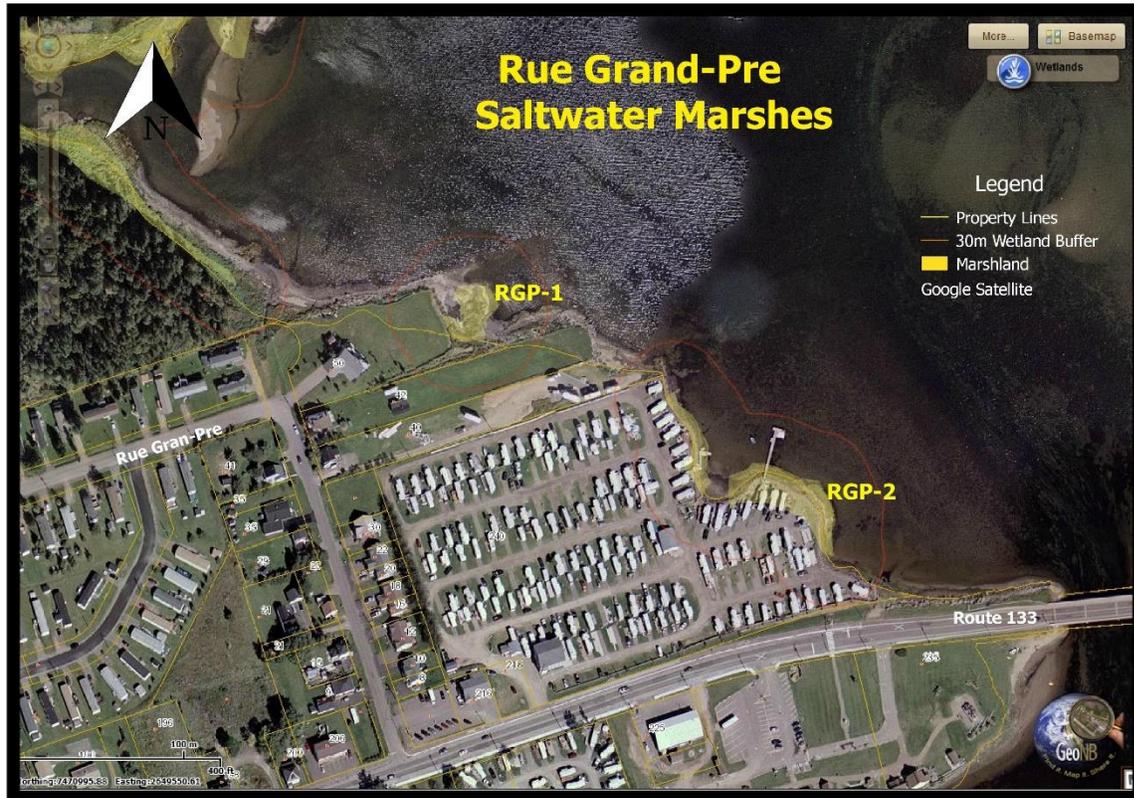
DR: Area 46,545 sq/m  
Perimeter 886m

The marsh was surveyed on July 13<sup>th</sup>. This marsh is mainly dominated by shrubs and plants from the upper marsh zone such as *Spartina pectinate*. The high and lower marsh zones are present but have less diversity of plants than other marshes surveyed (3 each). However, there's a good variety of marsh border plants including some species that are associated with freshwater.

Some berms are present is cutting the high marsh zone. Lots of wood debris and an old dock can be found.

Some of the residential development is located within the 30m buffer. . Very little forested edge remains along the wetland, approximately 5-10% forest cover currently remains. Development is found on all three sides of the wetland and could profit of some restorative work by planting local native trees and shrubs to secure more erosion or sedimentation control along the perimeter and help increase the biodiversity by creating more wildlife habitat simultaneously.

### 3.4.2 Rue Grand Pré Camping at Entrance of Town



RGB-1: Area 2,412 sq/m  
Perimeter 396 m

RGB-2: Area 1,874 sq/m  
Perimeter 192 m

This salt water marsh is located behind a campground. The wetland looks to have lost most of its functionality and integrity and has undergone a large amount of degradation and alteration. There's still presence of marsh plants from the three zones. The marsh border is infilled with rocks used as a breakwater for the campground.

We can still find some species of the lower marsh zones and higher marsh zones but with few species (2 lower, 3 species higher). The Marsh border has 3 species associated with salt marshes and 3 species of other marsh plants. The diversity for this site is low.

No forested edges remain along the wetland. Development is found along the entirety of the wetland and could profit from restorative work mostly for erosion control and habitat restoration. The northern most wetland, RGP-2 is located next to a residential property who seems to mow their lawn right up to the edge of the wetland, limiting natural regrowth and habitat.

### 3.4.3 Heron Way



HW-1: Area 64,130 sq/m  
Perimeter 1,816 m

HW-2: Area 4,020 sq/m  
Perimeter 364 m

These salt-water marshes are located east of route 133. A large amount of the local private properties are found within the 30m proposed buffer.

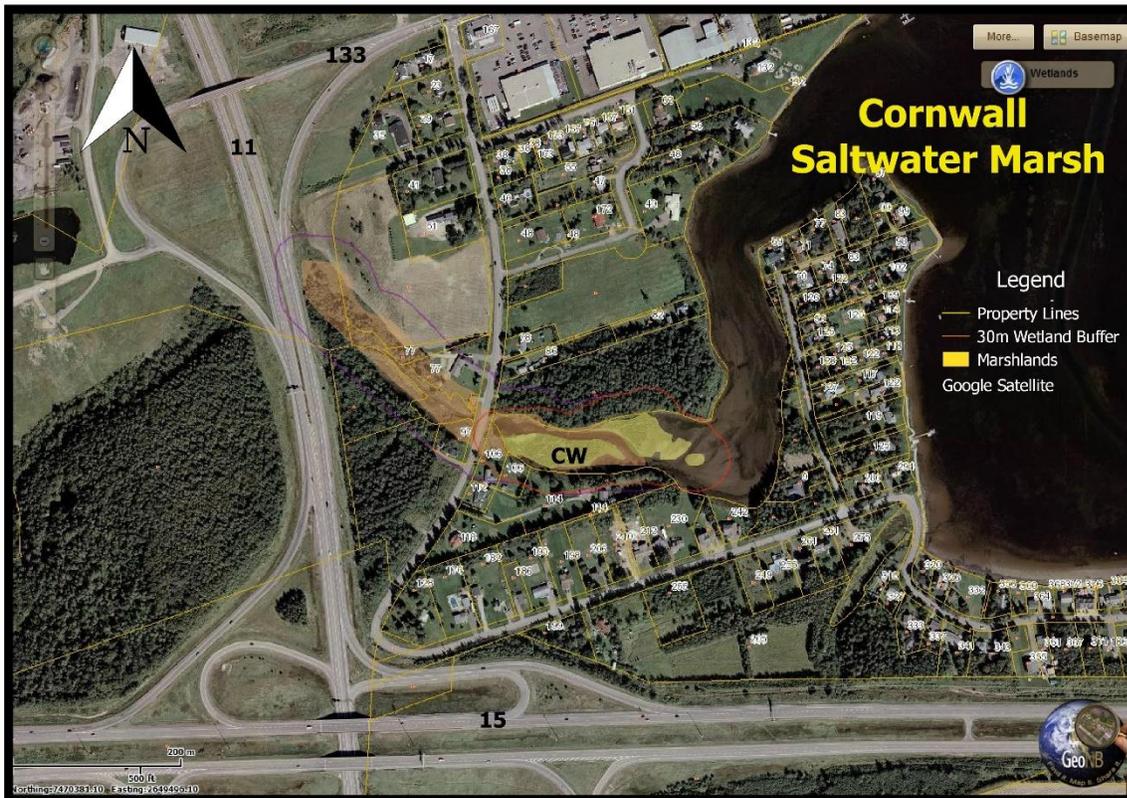
This site had good diversity in the various coastal plants. The three marsh zones were present. The low marsh zone had 4 species of plants found. The high marsh zone had 15 species present and the marsh border had 17 species present. There was also an area of sand dune ecosystem with 10 species of plants.

On the northern and southern parts is where most of the removal of forested land took place, along with the south-west area of the southern piece. The wetland looks to have maintained most of its functionality and integrity and has undergone a moderate amount of degradation and alteration, mostly due to the establishment of the adjacent private properties. Some infilling and brush cutting was observed in the marsh border zone.

A lift station from the Greater Shediac Sewerage Commission is found in the area. The marsh is also accessed by ATV's as trails are present.

A large amount of forested edge remains along most of the wetlands. HW-2 has retained most of its forested edge, and same with the southern wetland piece of HW-1. The area with the most cleared forest, is near the northern portion of HW-1, where trails have been cut to the ocean's coast. Lawn mowing is also clearly visible along the edges and could use some restoration, which could help with wind, erosion and esthetics.

### 3.4.4 Cornwall brook



CW: Area 24,600 sq/m  
Perimeter 1,338m

This saltwater marsh is located east of highway 11 and north of highway 15. Only a few of the local private properties are found within the 30m proposed buffer, the majority of the length of the wetland is covered in trees.

The lower marsh zone had sapphire-green *Salicornia* and the high marsh zone was comprised of *Spartina patens* with *distichlis*. The marsh border had 4 species and was dominated by wild rose. Some freshwater marsh plants were also observed.

There was a large quantity of sea lettuce in the water around the brook. This can indicate an overabundance of nutrients. Oysters were also observed on site.

Development of private properties haven taken place mostly in the northern part. The wetland seems to have maintained most of its functionality and integrity and have undergone a small to minimal amount of degradation and alteration, mostly due to the establishment of the adjacent private properties over the years.

A large amount of forested edges remains along most of the edges of the wetland. This wetland could use some restoration work along its edges where some of their functions might have been lost due to the use of fields for cultivation and lawns mowed up the marsh.

### 3.5 Bateman Mills area



The salt marshes along Bateman Mill's were surveyed by canoe on September 7<sup>th</sup>. Staff accessed the bigger marshes for investigation and observed the smaller marshes from the canoe.

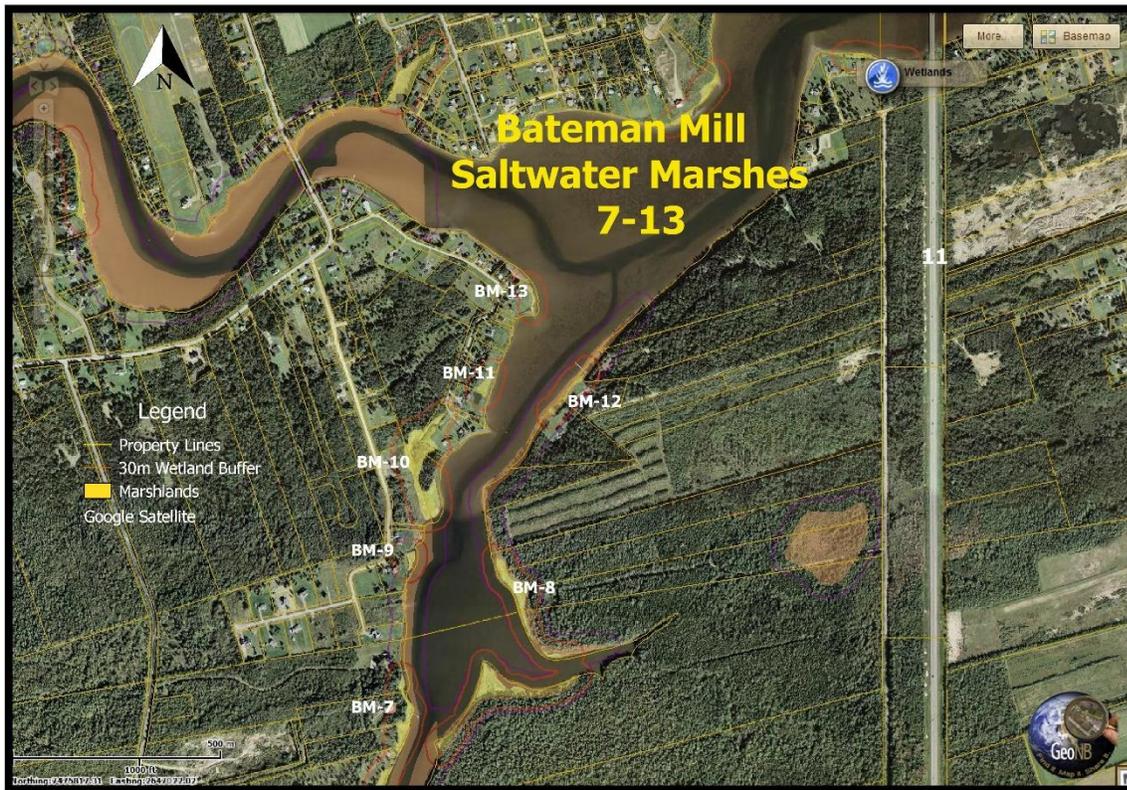
### 3.5.1 Bateman Mill marshes 1-10



This series of wetlands, 1 through 10, higher up the river, are surrounded by forested land. Local residential lots have been very respectful of the sensitive marsh sites and have kept a considerable distance from them. The only potential degradation in this area, that could impede in the health of these systems, is located to the south east off the number 11 highway, what seems to be a large gravel pit which could have the possibility of an increase in turbidity, erosion or sedimentation from the runoff. This is the biggest area of concern in this location.

The larger wetlands had the three marsh zones present. Some of the smaller ones were comprised of the lower marsh and marsh border. The marsh BM-05 had the presence of a berm that eliminated part of the marsh border.

### 3.5.2 Bateman Mill marshes 7-13



This series of small saltwater marshes are found along the end of the Bateman Mill Stream where it connects to the Shediac River near the Shediac Bridge. Development has occurred near wetland 9 through 13, the remaining marshes are more isolated and seem to have kept their functionality and integrity over the years. Yet, many developers and residential lot owners sometime seem to take little notice of these smaller marshes and could be subject to more development in the future. Many of these wetlands can be reached via roads or possibly boat. There exists some minor industrial activity in proximity to the river, and could be a possible source of pollution and erosion.

## *4 Maritime Marsh Monitoring Program*

The Shediac Bay Watershed participated in the Maritime Marsh Monitoring program this summer.

Two marshes were selected for the program, one in Grande-Digue and one in Pointe-du-Chêne. The first marsh in Grande-Digue is in a natural setting with little disturbance. The second one is located in a more urban area that has a campground planned in the vicinity. With this study we hope to be able to determine the impact of development on the shorebirds that use the Salt marshes in Shediac Bay.

The Marsh Monitoring Program (MMP) is managed by Bird Studies Canada. More information and access to the protocols can be obtained by contacting Holly Lightfoot of Bird Studies Canada.

The lateness of funding announcements left little time to train staff in bird identification. Roland Chiasson of the Aster Group was hired to do the surveys three times over a six week period.

Nelson's sparrow is the primary species that is of interest for this program in salt marshes. The abundance of Nelson's sparrow was higher for the Grande-Digue marsh than the Pointe-du-Chêne marsh. The richness of bird species was variable between the visits but similar across the two marshes.

The data is entered in the MMP and with continued monitoring will be used to establish multi-year abundance of key species. The report on the monitoring done for the Shediac Bay Watershed is included in annexe 2.



## *6 Public Education and Involvement*

### *6.1 Beach sweep*

In celebration of World's Oceans Day, a public beach sweep event is organized every year by the SBWA, in partnership with the Town of Shediac. This activity aims to combat marine litter, to raise awareness, and contribute to the protection and conservation of our marine environment in the Shediac Bay. The event was advertised to begin at the Homarus Eco-Centre, at the Pointe-du-Chêne wharf on Saturday, June 11, 2016.

For the first time in several years of this traditional event, it was a beautiful warm sunny day instead of the usual cold and/or rainy weather. Approximately 15 volunteers showed up to pick up trash, which is a lower turnout than the usual crowd. It is possible the first beautiful day of summer had a negative effect on the number of people wanting to volunteer.

The SBWA staff greeted volunteers and provided them with gloves, garbage bags and small handout gifts to thank them for their work. The Shediac Tim Hortons donated the gloves and "Clean Community" T-shirts, in addition to coffee and Timbits.

People were directed to different parts of the coastline in order to cover as much ground as possible. There were designated drop-off points for their garbage bags, which would then be picked up by staff of the Town of Shediac. Our volunteers were then invited to a lunch of subs donated by the Shediac Subway, along with fruit and vegetable platters.

It is difficult to estimate the amount of garbage bags filled, as most of the volunteers chose to use one of the designated drop off points. The Town of Shediac workers made the collection of the trash bags, but did not provide a final count. Each volunteer took at least one bag, a few of them brought 2-3 bags with them, and SBWA staff collected trash around the Pointe-du-Chêne Marina. We can safely assume that approximately 20 large garbage bags or more were filled with marine litter that day.



Annual Beach Sweep June 11, 2016

## 6.2 *Celebration of Coastal Habitats in Southeast New Brunswick*

On September 10, the groups *Vision H2O* in Cap-Pele and *Bird Studies Canada* in Bouctouche organized an activity at the “Emery Leger Beach” in Grand-Barachois, and asked the SBWA to participate. A table full of displays on shorebirds, shells and educational pamphlets of all kinds were displayed. There was also a refreshment table with a celebration cake, to mark the end of the summer season.

A representative of each group was there to talk to people about various projects done during the summer. The activity ended by giving garbage bags and gloves to approximately 10 people for a beach cleanup.

## 6.3 *Educational Kiosks*

### 6.3.1 *Shediac Farmer’s Market*

An education Kiosk was displayed on Sundays at the Shediac Farmer’s market, for 10 weeks out of the summer. In the summer of 2016, staff spoke to over 1,200 visitors about the watershed group, local environmental issues and projects realized to mitigate these issues.



## 6.4 *Homarus Eco-Centre*

Every summer, a partnership with Homarus Eco-centre at the Pointe-du-Chêne wharf is maintained by sharing one of our summer students to work part-time at the centre. The student is trained to give presentations to groups of visitors of all ages. In the summer of 2016, there were approximately 5,700 visitors at the eco-centre.

Visitors included:

- Groups from schools, summer camps, child day cares
- Families both local and visiting tourists
- Couples and individuals



## 6.5 *Communications and Outreach*

### 6.5.1 Newsletter

Two bilingual newsletters were produced during the 2016-2017 fiscal year. The newsletter display information and photos on the various projects that the SBWA has been doing in the year. The Association had 250 copies produced for each edition, printed on 100% recycled paper. The newsletters are distributed to various businesses, medical offices, hair salons, and anywhere else that had a waiting area or that was appropriate to leave newsletters for the public to take. The rest were distributed during the Shediac Market, during public presentations and other meetings. The newsletters can be found on the Shediac Bay Watershed Association website.

## 6.5.2 Website

The SBWA is very proud to present a brand new website. The new format has arranged the Water Quality and Education programs in their own pages, and all other projects in another. There is also a complete archive of all project reports in electronic format since the beginning of the Association in 1999. The website also includes a map on water quality testing sites and datasets displaying water quality results. [www.shediacbayassociation.org](http://www.shediacbayassociation.org)



The Shediac Bay Watershed Association is a non-profit environmental organization that works to protect and enhance the Shediac Bay Watershed. The organisation envisions communities working together to foster healthy ecosystems that will sustain the quality of water for future generations.

## 6.5.3 Interpretation Panels

For this project two interpretation panels were designed and will be placed next to a coastal walking trail. The first panel is on salt marshes and the second panel is on eelgrass.

# MARAIS SALÉ

Un marais salé est un écosystème côtier qui est à la fois aquatique et terrestre. Inondée en partie ou en entier selon le cycle des marées, sa végétation est dominée par des peuplements denses de plantes tolérantes au sel tels que des joncs, des graminées et de petits arbustes.

Les marais salés sont des écosystèmes très productifs qui jouent un rôle important dans la chaîne alimentaire. Plusieurs espèces de plantes, d'insectes, de poissons, de mollusques, de crustacés, de vers, d'oiseaux et de mammifères y trouvent refuge. Pouvant aussi pousser très vite, meurent et se décomposent, les plantes occupent une place importante dans cette productivité. L'oxygène produit par les plantes qui dégageant parties les marais salés est le résultat de cette décomposition.

Grâce au mouvement des marées, une part importante des matières organiques et des substances nutritives produites par les marais salés est transportée dans les baies et les estuaires avoisinants, nourrissant ainsi les poissons, mollusques, crustacés et autres espèces qui y vivent.

Les marais agissent également comme une zone tampon entre la terre et la mer, absorbant le choc des vagues et

# SALT MARSHES

A salt marsh is a coastal ecosystem that includes both water and land. Partly or completely flooded according to the tidal cycles, its vegetation consists predominantly of dense groupings of salt-tolerant plants, such as rushes, grasses, and small bushes.

Salt marshes are very productive ecosystems that play an important role in the food chain. Several species of plants, insects, fish, molluscs and crustaceans, worms, birds, and mammals take shelter there. Since they grow very quickly, die and decompose, plants are a significant factor in the productivity. Decomposition is what causes the particular odor that occasionally emanates from salt marshes.

Thanks to the ebb and flow of tides, a large part of the organic matter and nutrients produced in saltwater marshes is transported to neighbouring bays and estuaries, bringing food to fish, molluscs and crustaceans, and other species that live there.

Marshes also act as a buffer zone between the land and the sea, absorbing the shock of the waves, thus preventing shoreline erosion during storms. The buffer zone also reduces the risks of flooding and filters the fertilizers,

**Grand Grèbe / Grand Grèbe**  
Puffin Grèbe

**Saltmarsh Cordgrass / Graminée à tige dure**  
Cordgrass

**Rudbeckia / Rudbeckie**  
Black-eyed Susan

**Fish sign / Piquet à poisson**  
Fish sign

**Herring Gull / Merganser à bec crochu**  
Herring Gull

**Saltmarsh Cordgrass / Graminée à tige dure**  
Cordgrass

Chaque panneau de lecture est conçu pour être lu par un groupe de personnes. Les panneaux sont conçus pour être lus par un groupe de personnes. Les panneaux sont conçus pour être lus par un groupe de personnes.

The Shediac Bay Watershed Association is a non-profit environmental organization that works to protect and enhance the Shediac Bay Watershed. The organization envisions communities working together to foster healthy ecosystems that will sustain the quality of water for future generations.

## *7 Conclusion*

This project is the first phase to start implementing more projects in the saltwater portion of the watershed.

Collaborations between groups are important and we were glad to be able to contribute to two large monitoring programs, the Marsh Monitoring Program and the Global Seagrass Monitoring Network.

The Marsh Monitoring Program will help monitor the effects of development around the Pointe-du-Chêne marsh compared to a marsh in a more natural setting. There's a campground planned in the area and the monitoring done this year will provide some data before development.

The Global Seagrass Monitoring Network will be useful to determine the state of eelgrass beds in the Shediac Bay. There are many threats to the health and abundance of eelgrass such as nutrients overloads and the invasive green crab. For the second phase of this project we will monitor an eelgrass bed near the Shediac river and undertake an experimental restoration site where eelgrass is absent.

Water quality is an important topic that received much media attention in 2016. Many different groups are concerned about the situation. The Shediac Bay Watershed Association has been contacted and reached out to other groups to form collaborations. The second phase of this monitoring project will look at small streams that empty in the bay. No monitoring or data is currently available. We will consult with the NB department of Environment and Douglas Campbell of Mount Alison University to develop monitoring protocols that are useful for the different partners.

A part of the education component will be focusing on boaters at the local marinas. Best practices and use of pump out stations will be promoted. Also some targeted educational material will be produced on salt marshes importance and best stewardship practices.

There's much work that can be done to improve the environment around Shediac Bay. The association hopes to continue to expand their programs with the help of the Environmental Trust Fund and other partners around the bay.

*Annexe 1 – Water sampling in the Shediac Bay 2015-2016 by the  
Shediac Bay Watershed Association*

*Annexe 2 – Maritime Marsh Monitoring Program Report for Shediac Bay Watershed Association*