Water Quality Remediation and Public Outreach

Final Report

Prepared for:

The New Brunswick Environmental Trust Fund

By:

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- The office of Dominic LeBlanc, MP

Many other groups and individuals contributed to make our programs a success again this year and the SBWA wishes to extend their sincere gratitude.

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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 established.

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.

A Board of Directors consisting of eighteen members manages the Shediac Bay Watershed Association. The Board of Directors includes the following members:

Mr. Victorin Mallet, President	Ms. Kim Atkinson	Mr. Pierre Landry
Mr. Érick Bataller, 1st Vice-President	Mr. Donald Bourgeois	Mr. Louis LeBlanc
Mr. David Dunn, 2nd Vice-President	Mr. Joe Caissie	Mr. Léo-Paul Bourgeois
Ms. Connie Doyle, Treasurer	Mr. Sebastien Doiron	Mr. Michel Thibodeau
Ms. Frances Kelly, Secretary	Mr. Bob Ford	Mr. Armand Robichaud
Mr. Bill Murray, Past President	Ms. Helen Hall	Ms. Alice Parker

The Shediac Bay Watershed Association gratefully receives guidance, donations and in-kind support from various organizations and interest groups. SBWA has a database of over 300 stakeholders consisting of business-owners, industry, foresters, farmers, local residents, cottage owners, recreation boaters and swimmers, conservation groups and community organizations within the Shediac Bay Watershed.

1.2 Overview of the Shediac Bay Watershed's Region

The Shediac Bay Watershed covers 400 km^2 of land area and stretches along 36 km of coastline, from Cap Bîmet 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 dendritic patterns of small tributaries covering a watershed of 201.8 and 143.3 km^2, 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 Calhoon Brooks. The southern large water arm of the Shediac River is the continuation of the Batemans Brook. Water velocity in both rivers is 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. The Watershed region consists of a population of approximately 15,000 people.

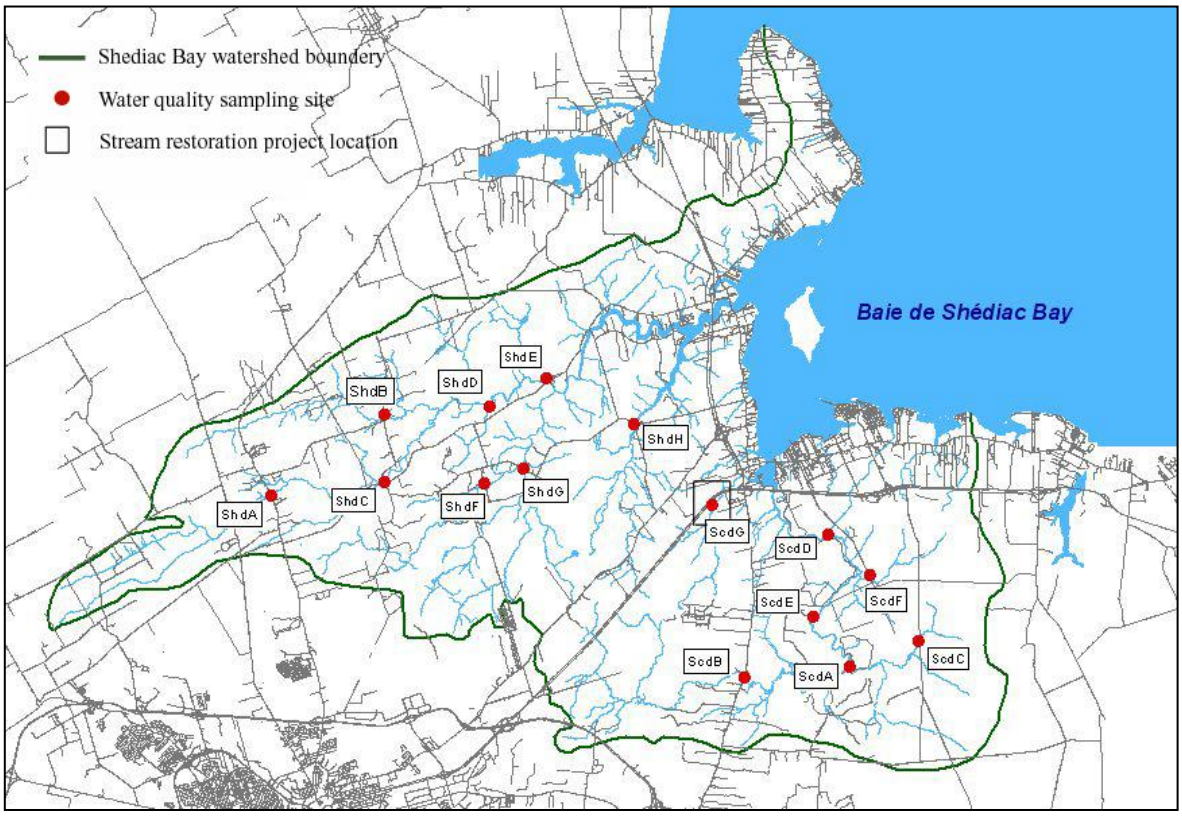

Figure 1. Map of Shediac Bay watershed including water quality sampling site and stream restoration locations

1.3 Water Quality Remediation and Public Outreach program

The *Water Quality Remediation and Public Outreach Program* will focus on continuing remediation efforts within the Shediac Bay Watershed according to the outcome of the Provisional Water Classification report of March 2003. The project will also focus on forming partnerships, public education and water quality monitoring. The following endeavors are objectives set within this project:

1) **Conduct water quality monitoring**
   - Water quality physico-chemical parameters monitoring
   - Bio-indicators monitoring (macro-invertebrates, fish abundance and diversity)
   - Creation and promotion of the annual status of the watershed fact sheet and webpage
2) **Continue public awareness projects (green boating,, website) and education in schools**
3) **Continue forming partnership with other groups and organizations**

2 SHEDIAC AND SCOUDOUC RIVERS WATER QUALITY MONITORING

2.1 Introduction

A long-term water quality monitoring program in the Scoudouc and Shediac rivers was resumed in 2011 with the analysis of basic water quality parameters such as level of dissolved O_2 (DO) and water temperature. A more detailed analysis of the water quality was initiated in 2007 and pursued in 2008, where additional parameters were measured (nitrate-nitrogen, total phosphorus and E. coli counts) on a monthly basis at each sampling sites. This monitoring program allows the monitoring of remediation efforts and to establish the actual status of our rivers. The water quality monitoring will be used to support the need for specific remediation actions and measure the effectiveness of the work. It will also be used to complete detailed sanitary surveys and be used in emergency cases. Moreover, a macro-invertebrate inventory was conducted as part of the long term water quality monitoring program.

Such monitoring will help determine if changes to the water quality occurred and if sections of the stream or river remain suitable for aquatic life. It is of outmost importance to have accurate and continuous data of water parameters for the watershed. This allows for effective management strategies and the creation of remediation plans.

2.2 Material and Methods

2.2.1 Water Quality

Water quality testing was conducted between May 27th and October 22th. Sampling sessions were conducted on a monthly basis at 14 sampling sites (former Water Classification sites) (Fig. 1). The site ScdC was not surveyed this year because of its boggy nature and limited accessibility.

Water quality sampling was performed using the protocol developed by the New Brunswick Department of Environment.

Basic water quality parameters (DO, temperature, pH, and conductivity) were measured using a water-condition instrument YSI QS600 (Fig. 4). Nitrate-nitrogen concentrations was measured a LaMotte Smart II Colorimeter. This instrument measures the amount of light that travels through a reacted sample and converts the measurement to a digital reading as mg/l. As for the Total coliform and *E.coli* values, the IDEXX Quanti-tray\2000 was used. This is a semi-automated quantification method based on the standard methods Most Probable Number (MPN) model. The Quanti-Tray sealer automatically distributes the samples/reagent mixture into separate wells. After incubation, the number of positive wells is converted to an MPN using a table provided or by using the MPN Generator Program. Laboratory analysis protocols were followed as per manufacturers' requirements.

The equipment needed to perform the stream habitat assessment included clipboard and pencils, waders, GPS unit, digital camera, water-condition instrument (YSI), reference documents (identification key), meter stick and measuring tape as well as waterproof board and field sheets, Lamotte Smart2 colorimeter, IDEXX Quanti-Tray/2000, Quanti-Tray sealer, incubator, graduated cylinders, measuring cup and pipettes.

2.2.1.1 Macro-Invertebrate Survey

A Benthic Macro-Invertebrate survey was performed in the Scoudouc and Shediac River on September 28th and 29, 2011. The protocol used was based on the Benthic Macro-Invertebrate rapid assessment described by the Eastern Charlotte Waterways in partnership with the New Brunswick Department of Environment and the Canadian Rivers Institute .Three sampling sites per rivers system where surveyed during the macro-invertebrate community study. Three replicates per site were performed within a riffle or on similar habitat. Sampling was done using a 400µm D-frame net (kick-net). Benthos was disturbed during a 2 minute period with the net facing upstream to allow collection of disturbed benthos and invertebrates in the kick-net. Large rocks in front at the net's opening were rubbed to release any attached invertebrates. All specimens were stored and preserved using 70 % ethanol. Macro-invertebrates were identified to the family level using an identification key. Taxa (EPT richness index) and species richness (Shannon Whitney index) were measured to evaluate diversity. The Family Biotic Index (FBI) and the EPT/Midge ratio were also measured to evaluate species assemblage related to pollution tolerance.

2.3 Results

2.3.1 Shediac and Scoudouc Rrivers Physico-chemical Characteristics

2.3.1.1 Water Temperature

Water temperature can fluctuate depending on the period of the day and during season changes. Values are influenced by numerous factors such as shade covering the stream, water velocity and water depth. There are no set criteria for water quality, but it is considered that water above 25 or 29 degrees Celsius ($^{\circ}$C) tends to be of poor quality because less oxygen can be dissolved. Therefore, water temperature directly influences the dissolved oxygen levels. The overall mean water temperature for both rivers was 13.2 $^{\circ}$C which is an acceptable value. The overall mean water temperatures were 13.48 $^{\circ}$C and 12.92 $^{\circ}$C for the Scoudouc River (Fig. 8) and for the Shediac River (Fig. 9), respectively. The highest temperature recorded was 21.65 $^{\circ}$C at site ScdE on June 25th and the lowest temperature recorded was 4.63 $^{\circ}$C at site ScdB on October 23th. The overall mean water temperature for both rivers during the 2011 sampling season was 13.25 $^{\circ}$C.

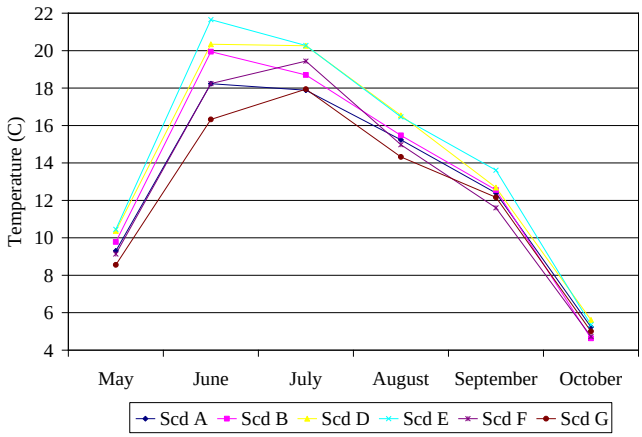

Figure 2. Water temperatures for the Scoudouc River

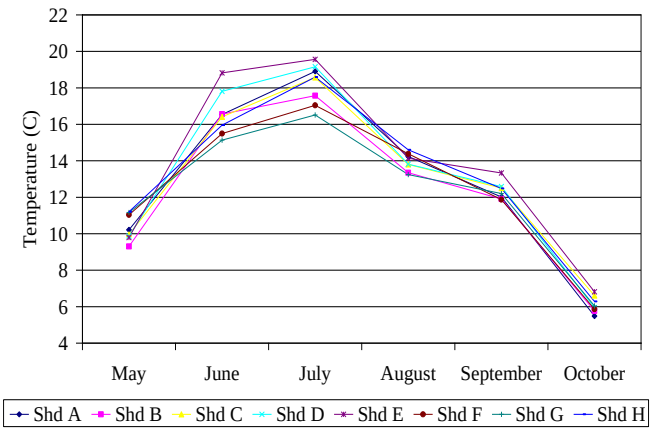

Figure 3. Water temperatures for the Shediac River

2.3.1.2 Dissolved Oxygen

Dissolved oxygen (DO) represents the concentration of oxygen in gaseous form in the water column. Most of the oxygen in the water comes from the surface atmosphere and is mixed in the water by turbulence and current. The measurement of the concentration of dissolved oxygen in surface waters is essential for measuring changes in water condition and rating water quality. It has a direct effect on aquatic life and can be influenced by stream habitat alteration. DO is essential for fish and many other forms of aquatic life. DO vary with temperature, tending to be higher when the water temperature is low. According to the Canadian Council of Ministers of the Environment's (CCME) Canadian water quality guidelines, the minimal amount of DO required for cold water aquatic life is 9.5 mg/l (early life stages) and 6.5 mg/l (other life stages).

In 2011, the overall DO mean for all the sites was 10.05 mg/l. The overall mean for the Scoudouc River (Fig. 10) and the Shediac River (Fig. 11) were 9.90 mg/l and 10.19 mg/l, respectively. The highest level recorded was 12.58 mg/l at site Scd F on October 23th and the lowest level recorded was 5.59 mg/l at site ShdB on July 23th. The overall DO mean for both rivers during season 2011 was 12.56 mg/l.

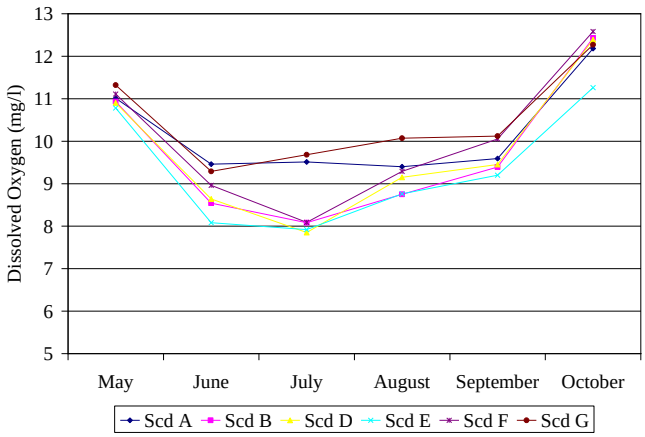

Figure 4. DO levels for the Scoudouc River

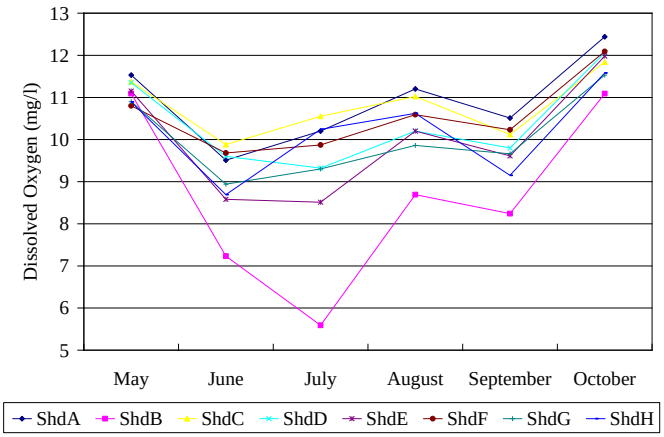

Figure 5. DO levels for the Shediac River

2.3.1.3 Potential Hydrogen

The potential hydrogen (pH) level indicates the acidity level of a stream. It affects how much other substances (such as metals) dissolve in the water. Many organisms that live in water are sensitive to changes in pH and may be adversely affected by pH that is either too high or low. The pH varies naturally depending on bedrock, climate and vegetation cover, but may also be affected by industrial or other effluents, the exposure of some kinds of rock (for example during road construction) or drainage from some mining operations. According to the CCME's Canadian water quality guidelines, pH should be between 6.5 and 9. Levels under or above these may cause some problems for aquatic life in the streams.

The overall pH mean for all the sites was 7.55. The overall pH mean for the Scoudouc River (Fig. 12) and Shediac River (Fig. 13) were 7.47 and 7.63, respectively. The highest level recorded was 8.27 at ScdD on August 20th and the lowest level recorded was 6.64 at ScdA on May 21th. The overall pH mean for last year was 7.77.

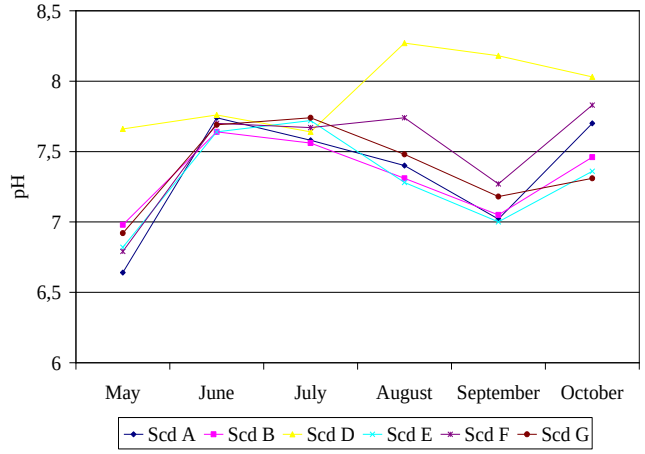

Figure 6. pH levels for the Scoudouc River

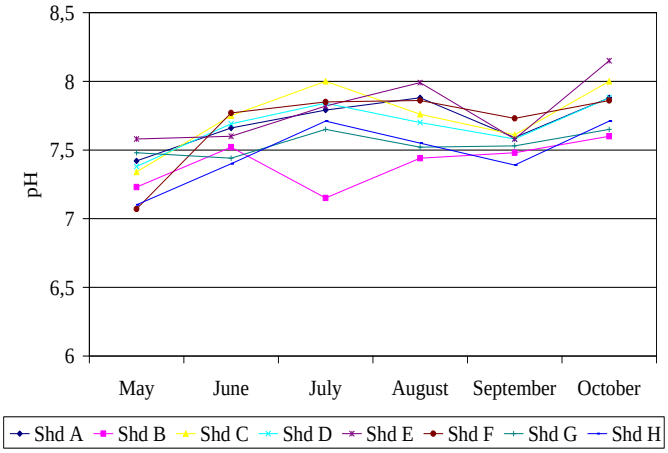

Figure 7. pH levels for the Shediac River

2.3.1.4 Conductivity

Conductivity is the measurement of the ability of water to pass an electrical current. It is affected by the amount of inorganic dissolved solids (nitrate, chloride, sulfate, sodium, etc.) found in the water. The conductivity level may be influenced by rainwater, agricultural or urban runoff and the geology of the area. There are no set criteria for conductivity levels for water quality, but the US Environmental Protection Agency states that streams conductivity levels ranging between 0.15 and 0.5 mS/cm usually seem to support a good mixed fisheries. Consequently, a higher conductivity level may indicate a higher amount of dissolved material in the water and the presence of contaminants.

The overall conductivity mean for all sites was 0.14 mS/cm. The overall conductivity mean for the Scoudouc River (Fig. 14) and for the Shediac River (Fig. 15) were 0.15 mS/cm and 0.13 mS/cm, respectively. The highest conductivity level recorded was 0.59 mS/cm at site ScdG on October 23th and the lowest level recorded was 0.03 mS/cm at site ScdF on May 21th.. The overall mean for last year was 0.155 mS/cm.

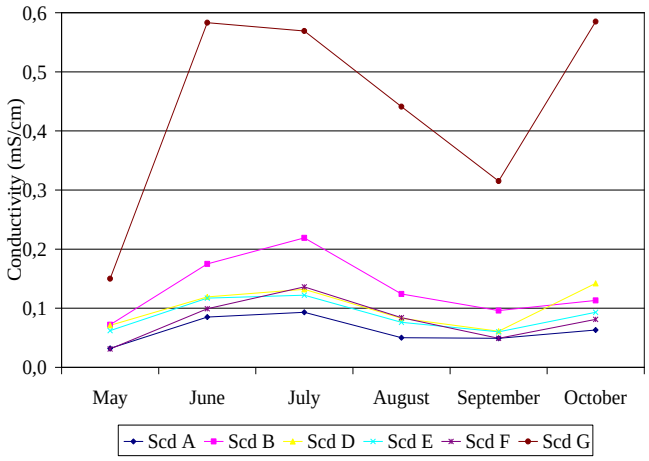

Figure 8. Conductivity levels for the Scoudouc River

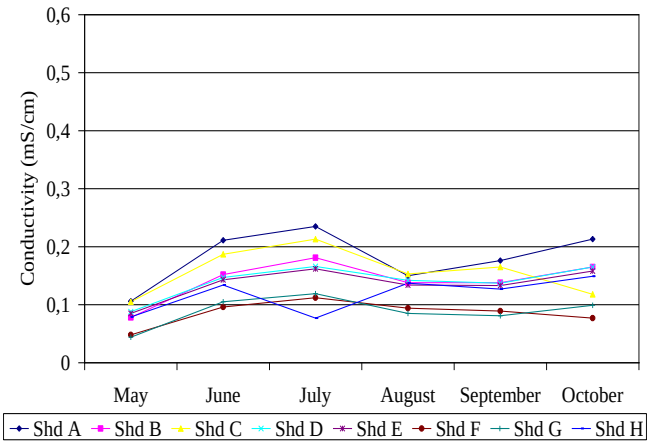

Figure 9. Conductivity levels for the Shediac River

2.3.1.5 Nitrate-Nitrogen

Nitrogen is essential for plant growth, but the presence of excessive amounts in water presents a major pollution problem. Nitrogen compounds may enter water as nitrates or be converted to nitrates from agricultural fertilizers, sewage, industrial and packing house wastes, drainage from livestock feeding areas, farm manures and legumes. The acceptable amount of Nitrate-nitrogen in water is set at 2.9 mg/l.

The overall mean for both rivers was 0.07 mg/l. The overall mean for the Scoudouc River (Fig. 16) and the Shediac River (Fig. 17) were 0.05 mg/l and 0.08 mg/l, respectively. The highest

level recorded was 0.63 mg/l at site ScdG on July 21th and the lowest level recorded was 0 mg/l at several sites. The overall mean for last year was 0.09 mg/l.

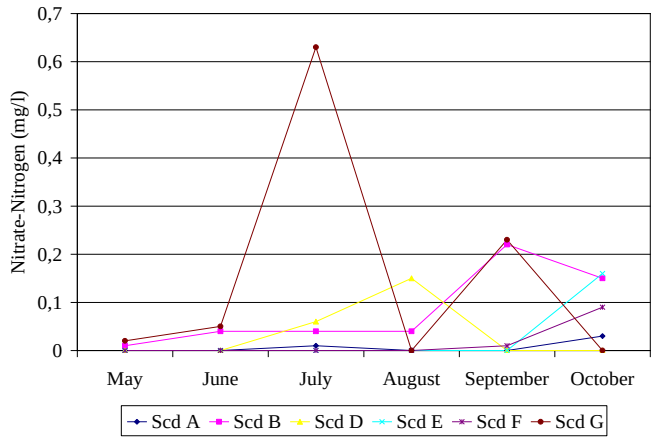

Figure 10. Nitrate-Nitrogen levels for the Scoudouc River

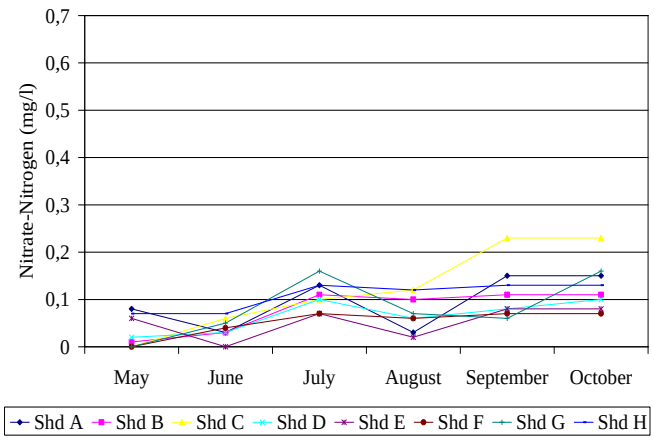

Figure 11. Nitrate-Nitrogen levels for the Shediac River

2.3.1.6 Total Phosphorus

Phosphorus is an important nutrient for aquatic plants, but can be a potential pollutant as well. Large amount of phosphorus coming from cleaning or laundry, agricultural and residential fertilizer components can cause eutrophication. CCME's guidelines suggest that total phosphorus levels should be under 0.035 mg/l to maintain a meso-eutrophic state or better. Total phosphorus levels are rarely found over 0.02 mg/l in nature.

Our results appeared to be over the highly natural limit in most cases, therefore, they were not considered in this evaluation. Further quality control evaluation will have to be done during the 2009 sampling season to evaluate potential manipulation or analysis issues.

2.3.1.7 Total Coliform

Coliforms are the commonly-used bacterial indicator of sanitary quality for food and water. Coliforms are abundant in warm-blooded animals, but can also be found in aquatic environments, in soil and on vegetation.

The acceptable count of coliforms in water is set as 200 MPN/100ml. The overall mean for both rivers was 1744.92 MPN/100ml. The overall means for the Scoudouc River (Fig. 18) and the Shediac River (Fig. 19) were 1690.10 MPN/100ml and 1799.73 MPN/100ml, respectively. Highest levels recorded (2419.6 MPN/100ml) were measured at all sites during the 2011 sampling season (except ScdA). The lowest level recorded (77.6 MPN/100ml) was measured at site ShdA on May 20th. The overall mean for last year was 763.29 MPN/100ml.

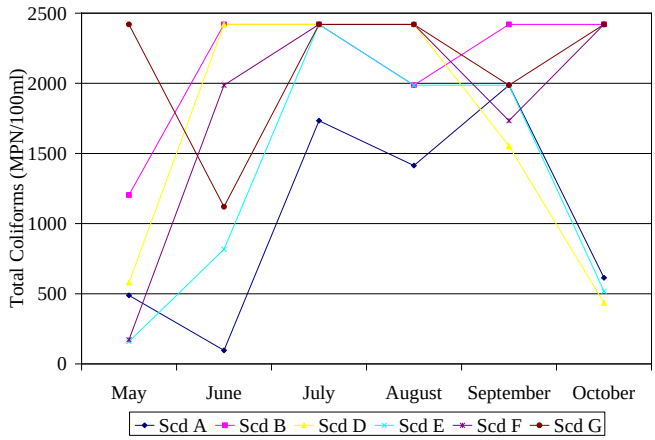

Figure 12. Total Coliforms levels for the Scoudouc River

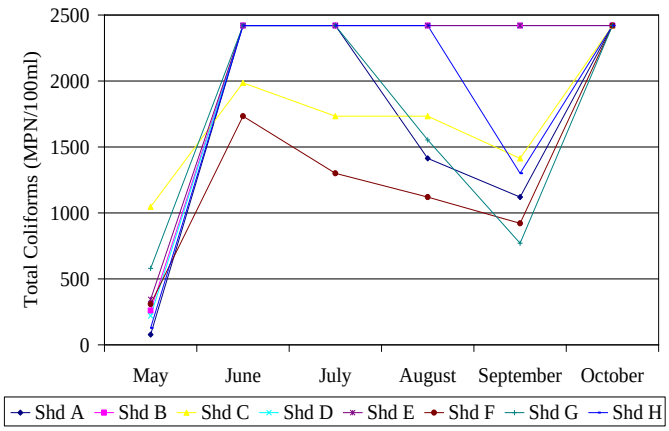

Figure 13. Total Coliforms levels for the Shediac River

2.3.1.8 Escherichia coli

Escherichia coli (E. coli) is one of many species of bacteria living in the lower intestines of mammals. The presence of E. coli in water is a common indicator of fecal contamination. The acceptable count of E.coli in water is set at 200 MPN/100ml.

The overall mean for E.coli in both rivers was 288.27 MPN. The overall mean for the Scoudouc River (Fig. 20) and the Shediac River (Fig. 21) were 351.81 MPN and 224.72 MPN, respectively. The highest levels recorded (2419.6 MPN/100ml) were measured at ShdA on June 26th and October 22th. The highest levels recorded for the Scoudouc River were measured at ScdF and ScdG on July 21th. The lowest level recorded was 7.4 MPN, August 21th on the ShdF site. The high level recorded on the ScdG site was probably related to the presence of cattle having direct access to the river. The overall mean for both rivers during season 2011 was 181.6 MPN.

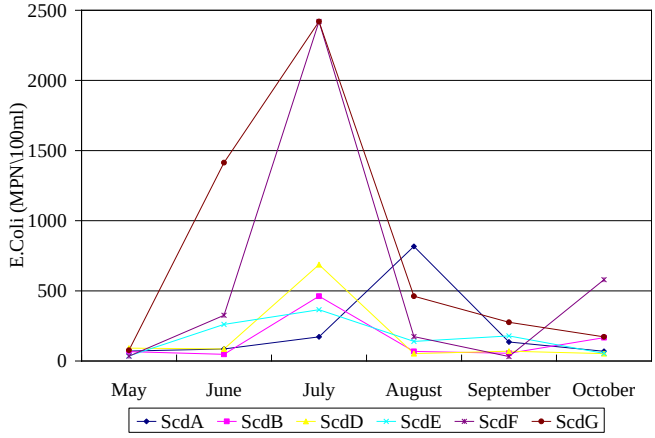

Figure 14. E. Coli levels for the Scoudouc River

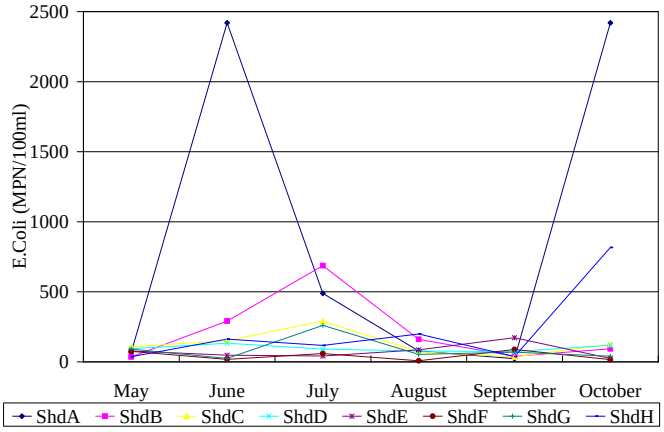

Figure 15. E. Coli levels for the Shediac River

2.3.1.9 Macro-Invertebrate Survey

Various indexes were used to evaluate water quality and habitat integrity using macro-invertebrates community as bio-indicators (Table 1). Taxa richness ranged from 21(ShdF) to 31 (ScdF and ShdE). Species richness ranged from 1.71 (ScdG) to 2.37 (ScdF). Ephemeroptera, plecoptera, trichoptera (EPT) richness ranged from 13 (ScdF and ScdG) to 20 (ShdE), which represents the diversity of pollution sensitive species. EPT average density related to midges average density ratio compares pollution intolerant with tolerant species; therefore, higher ratio values and water quality are directly proportional. The Family Biotic Index (FBI) summarizes the various pollution tolerance values of all families in a sample. On this scale, higher FBI values indicate more degraded water quality. Site ScdA show the lowest FBI value at 2.27.

Results indicate that water quality appears to be very good to excellent according to indexes measured using macro-invertebrate community. Collectors and filters are known to feed upon small particles of decomposing organic materials; whereas, shredders and scrappers are known to feed upon larger particles of organic material as well as on bacteria, fungi, and algae, respectively. The macro-invertebrates were collected where most leaves are detached from the branches and began to decompose; therefore, would explain the large amount of filters and collectors. Many factors can influence the macro-invertebrate community such as a long period of rain or taking the sample on or after a rainy day, if dissolved oxygen is low, if the flow rate is low, or if the surrounding has been modified (i.e. new fence, deforestation, fine sediment accumulation, etc). Moreover, it will be our fifth year to evaluate water quality and habitat integrity by using macro-invertebrates community as bio-indicators for our two main rivers; therefore, with the third year results, we will have an overview of the water quality for Scoudouc and Shediac River.

Table 1. Various indexes used to evaluate water quality and habitat integrity using macro-invertebrates community as bio-indicators for the Scoudouc and Shediac rivers in 2011.

Location	Taxa Richness	Shannon-W. Index	EPT Richness	EPT average density /Midge average density Ratio	FBI Index	Water Quality Rating (FBI index)	Degree of Organic Pollution
ScdF	29	2.28	13	221.00	3.28	Excellent	Unlikely
ShdA	22	2.34	14	16.91	3.34	Excellent	Unlikely
ShdE	34	2.37	20	194.33	2.99	Excellent	Unlikely
ShdF	17	2.08	14	213.00	2.69	Excellent	Unlikely
ScdA	20	2.04	14	76.67	2.27	Excellent	Unlikely
ScdG	26	1.71	13	28.47	3.80	Very good	Possible Slight

2.3.2 Shediac and Scoudouc Rrivers General Characteristics

2.3.2.1 Rivers General Morphology

The overall wet depth mean for all the sites was 0.45 meters. The overall wet depth mean for the Scoudouc River was 0.72 m and for the Shediac River it was 0.19 m. The highest level recorded was 2.5 at site ScdD on May 28th and the lowest level recorded was 0.07 m at site ShdC on July 21th.

The overall wet width mean for all the sites was 5.04 m. The overall wet width mean for the Scoudouc River was 4.3 m and for the Shediac River it was 5.79 m. The largest width recorded was 9 m at site ShdE and ShdG on May 28th and the narrowest recorded was 1.00 m at site ScdF on July 21th.

2.3.2.2 Riparian Zones

Overall, the banks where mostly composed of mixed forest (40.19%). Scoudouc River riparian zone was characterized with mixed (44.44%) forest, while the Shediac River riparian zone was mainly covered with shrubs (16.51%) and mixed forest (35.94%). In addition, many wetlands are part of the Scoudouc River system. For example, the Big Meadow area has a surface of 2.14 km^2.

2.3.2.3 Substrate

In general, the Shediac River is mostly represented by coarser substrate (rubble, gravel, rock and bedrock), while the Scoudouc River is mostly characterized by rubble and gravel (55.14%) and finer sediment (21.94%) (fine and sand). Bedrock is only found in Shediac River mainly (75%) at site ShdC.

2.4 Discussion

General water quality in both river systems was relatively good. Water temperature and pH values were acceptable. The Scoudouc River is deeper and the riparian zone is covered by danced vegetation that provides more shade. Therefore, water temperature is generally lower in the Scoudouc River. Dissolved oxygen values were generally over the recommended guidelines for cold water species (early and other life stages) except for ShdB where it reached 5.59 mg/l in July 23th. In both river systems, DO levels appeared to be reversely correlated with water temperature. One of the most impacted sites (ScdG) appeared to be presenting highest DO values, which is inconsistent with field observations. However, sampling occurred at riffle which could contribute to increase DO values. The conductivity measurements support the fact that sedimentation loading and agricultural runoff could be a problem at site ScdG, where annual mean values are of over (0.131 µS/cm) the recommended levels (0.309 µS/cm).

Nitrate-nitrogen levels were within the CCME's guidelines at all sites. However, levels were relatively good all season at the ScdG site, which is situated in an agricultural area. Elevated concentrations of nitrate can be harmful to aquatic life, and may contribute to excessive growth of algae or aquatic plants (eutrophisation). Major sources of excess nitrate include fertilizer runoff from farm fields or domestic landscaping, runoff from manure and seepage from septic systems.

Escherichia coli analysis allowed the identification of continued fecal contamination at the ScdG site and upstream areas. Sporadic increases were observed at ScdE and ShdB in June and July and at ScdF and ShdA in June, July, and October. It could be due to road runoffs or animal feces contamination. The E.coli counts were very high in June and July for ScdG and in July for ScdF for two years in a row. The ScdG and ScdF site are situated in the woods, but is surrounded by few cottages; therefore faulty septic systems or wild animal feces contamination could explain the episodic increase in high E. coli counts. Following this first year of detailed water quality analysis, the SBWA will adjust its protocol and will resample within a 24 hour period when a water sample shows high E. coli counts. This will allow for a better identification of the contamination sources.

Species richness values and pollution species indicators were evaluated using various indexes. The Family Biotic Index (FBI) summarizes pollution tolerance values of all families in a sample. FBI index is one of the most comprehensive and reliable metrics used for determining water quality (Rosenberg & Resh, 1993). Hilsenhoff (1988) ranked FBI values in order to numerically rate water quality (the maximum is 10.00). According to this ranking system, sites ScdF, ShdA, ShdE, ShdF and ScdA appear to show the highest ecological integrity and are described as excellent water quality. Richness and diversity values observed for sites ScdF, ShdA, ShdE, ShdF and ScdA showed the highest ecological integrity. Moreover, the tolerance indexes suggests that the general invertebrate benthic community is poorly composed of pollution tolerant species This was even observed at site ScdG, where other water quality values show degraded water quality. Most macro-invertebrate collected at ScdG represented the *Ephemerellidae* group at a larval stage, which could explain the variation between water quality values and macro-invertebrate indexes. However, an increase of moderate pollution tolerant specie (*Hydropsychidae*) and the presence of tolerant species (leeches and *Oligochaeta*) in ScdG indicate an organic pollution and more degraded water quality.

Based on the WQI, 7 sites showed excellent water quality, 6 sites were good and 1 site was classified as fair. The water quality appears to be mainly altered du to episodic or consistent fecal contamination. E. coli did not meet the guideline in 33% of the samples for Scoudouc River and in 17% of the samples for Shediac River. Nitrate-nitrogen and pH indicators meet the guidelines in 100% of the samples. Dissolved oxygen meet the guidelines in 99% of the samples and the lowest level recorded was 5.59 mg/l at site ShdB on July 23th. This lowest DO level appeared correlated with high water temperature recorded at this time (17.8-21.0 ºC).

E. coli concentrations are elevated where cattle appears to have access to the stream, in cottage areas or where erosion issues were noted. Stream water level is at his lowest in July at the ScdB site which is situated near the Fisher Bridge, the lagoon runoffs could contribute to increasing E. coli counts in the Scoudouc River.

Continuing to perform water quality monitoring and adopt new methods of doing so is of the utmost importance in making sure our watershed is properly managed. Such activities complement remediation work by determining not only where this work is needed most, but also if such work is accomplishing its purpose.

3 PARTNERSHIP WITH STAKEHOLDERS

3.1 Stakeholders and Partnerships

Continued industries and stakeholders partnerships are essential to pursue long term remediation efforts. The future remediation steps include the reduction of siltation in many small tributaries of the Scoudouc Rivers, where human activities such as ATV crossings are affecting the habitat integrity. Therefore, the SBWA met with the local ATV club to seek new partnership and the group agreed to be involved in our future projects and become field observers. We also developed a partnership with the Scoudouc Canoe Club and started an annual observation program for the Scoudouc River. We also have a strong partnership with Efficiency NB and Ducks Unlimited as they provide the SBWA with material during our information sessions as well as our school presentations.

Multiple complaints were received during the 2011-2012 fiscal year regarding water sedimentation issues, possible water contamination and coastal developments. The SBWA is engaged to respond to such complaints by contacting appropriate governmental agencies to verify permit compliances. In some cases formal complaints are directed to the concerned governmental bodies. The Department of Fisheries and Oceans and environment Canada were contacted when sedimentation issues or fish habitat deterioration are observed.

4 HABITAT AND WATER QUALITY ENHANCEMENT

4.1 Community Aquatic Community Program

Again this year, we were able to monitor the water quality within the Shediac Bay Watershed by partnering with the Department of Fisheries and Oceans on the Community Aquatic Monitoring Program (CAMP) from June to August of 2011. This is our seventh year of involvement in this project. This is a long-term monitoring program aiming to study ecosystem evolution and changes over time. This ecosystem assessment tool is still in the development stage and could be established in the future years. Data collection is expected to continue in the 2012 field season.

5 PUBLIC OUTREACH AND EDUCATION

5.1 Meetings and Information Sessions / Workshops

In order to accomplish the various objectives of the 2011-2012 fiscal year, regular meetings between various members and partners were required. The board of directors of the SBWA met to discuss and implement the various activities of the Association as per the following dates:

- March 10, 2011 – Regular Board Meeting
- September 15, 2010 – Regular Board Meeting
- September 29, 2010 – Executive Board Meeting
- **November 17, 2010– 2010-2011 AGM**
- January 26, 2012 – Regular Board Meeting

The 2011-2012 fiscal year Annual General Meeting took place on November 17, 2011. The guest speaker for the event was **Serge Jolicoeur, geography professor, Université de Moncton** « Coastal erosion in our region ». The meeting allowed for information about the Association to be relayed to stakeholders as well as government and non-government agencies on the activities and events that took place in the past year.

5.2 Education and Awareness

Presentations were offered to groups, such to camp adventure and to the library. Various themes were presented such as vegetation, insects, amphibians, mammals and birds, fish and recycling.

Figure 16. Awareness session from camp adventure and the library in 2010

The SBWA participated (kiosque) at the Shediac Market to promote energy efficiency and energy consumption reduction practices on June 26, July 24 and August 28 of 2011. NB efficiency provided us with over 300 CFLs light bulbs. Therefore, the SBWA organised a Light Bulb Exchange Event, where the public was invited to bring one incandescent bulb and we would exchange it for a CFL bulb. Over 250 people visited our kiosque and 67 light bulbs were exchanged.

Figure 13. Awareness session at the Park Market in Shediac to promote energy conservation.

In January and February 2011, and was continued in 2011-12 the SBWA developed and presented an interactive presentation on climate change and energy efficiency to two local schools. The goal of these presentations was to create a sense of awareness as well as to educate the students on these matters Students (4th grade) from two schools (Mgr. François Bourgeois in Shediac**,** Grande-Digue School in Grande-Digue participated at the presentations. A total of 66 students participated (6 seminars for 4 classes). 66 home surveys were distributed and 55conventional light bulbs were exchanged for CFLs bulbs. We gave certificates and we shared information on energy conservation and renewable energy power. We presented one informative climate change poster per class as well as a list of web sites containing different lessons plan on climate change and energy efficiency.

5.3 Beach Sweep

This event, which took place on June 4, 2011, in Shediac wanted to address the problem of marine garbage and to contribute to the protection and conservation of our marine environment and its natural resources.

During this beach sweep, 15 volunteers from the Shediac Bay watershed cleaned nearly 7 km of shoreline and picked up more than 21 bags of garbage and drifted material, including many tires, pieces of metal and Styrofoam (from floating docks and buoys) Common items found included various types of bottles, plastic bags, cigarette butts, plastic and Styrofoam items, as well as construction debris. This year particularly many small and big Styrofoam pieces were collected throughout the Bay. Garbage was inventoried and the results will be added to a provincial database. We salute the dedication of the residents from Shediac Bay who certainly helped contribute to the maintenance of our shorelines.

5.4 Website

The SBWA website (www.sbwa-abvbs.net) was entirely revamped in 2008. Information ad content was updated and the look was enhanced. ETF contribution is acknowledged on the website.

6 CLOSING COMMENTS

During the 2011-2012 fiscal year, the Coordinator, Julien Bourgeois, was the only full time employee working towards the development of the *Water Quality Remediation and Public Outreach Program*. Also, with the support of HRDC Summer Career Program, the SBWA hired a Environmental science student for a 12 week period.

The work performed during the development of the project included different activities related to water quality remediation planning and public outreach. Objectives were attained by starting the stream habitat assessment in the Dionne Brook and also the water quality monitoring program was continued as part of a long term monitoring program based on ecosystem indicators. This program is crucial for the management of the watershed and will allow us to gain credibility among the community. The water quality monitoring program allowed us to identify problematic areas and water quality trends.

Continuing to perform water quality monitoring and adopt new methods of doing so is very important to ensure that our watershed is properly managed. Such activities complement remediation work by determining not only where this work is needed most, but also if such work is properly accomplished. All these efforts should be distributed on a long period of time in order to produce accurate indicators of water quality and habitat integrity.

Public outreach within our watershed took many different forms throughout the year. The *Status of Shediac Bay and its Watershed – An Introduction* has gained momentum throughout the year and is well recognized by residents. The local media also plays a huge role in enhancing the association's profile. With various articles being published in local newspapers and local radio stations on announcing our projects and events (Annex B), the SBWA has built credibility among the community. When a project is taking place, we take the opportunity to make interviews with different media. This way, the public can refer to us as a complete group performing many projects to aiming to maintain the water quality. The SBWA also installed their booth a various events during the year. Hosting events such as the beach sweeps also served to raise awareness and the association's visibility while helping members of the community realize that their participation can have an enormous positive impact on our watershed.

Furthermore, developing and implementing an annual environmental education program with local schools has proven especially useful in sensitizing our youth on watershed issues and the importance of protecting our waterways. Children responded very well to our presentations and the schools greatly appreciate our efforts.

Directly working with various governmental agencies has helped in reaching many stakeholders. The Department of Fisheries and Oceans, Fisheries and Aquaculture, for example has assisted the SBWA in organizing different projects such as the Beach Sweep. Increasing our visibility among those government agencies is crucial for the long-term development of a watershed group. We believe that we can greatly contribute at multiple levels for the management of bays and watersheds.

The SBWA also enjoyed the support of multiple volunteers during the year. Their support always ensures the stability of the group and allows us to pursue great activities.

Finally, the *Water Quality Remediation and Public Outreach Program* was very successful and we accomplished many activities and events over the past year. Many endeavours remain to be completed due to the magnitude and scope of the remediation work left to be tackled.

The SBWA is definitively making a difference. Monitoring results show improvement in stream water quality. Our work needs to be performed on a long-term basis in order to obtain positive results. However, we are confident that our group can enhance and maintain the water quality for future years since action taken at a watershed scale has proven to be successful.

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