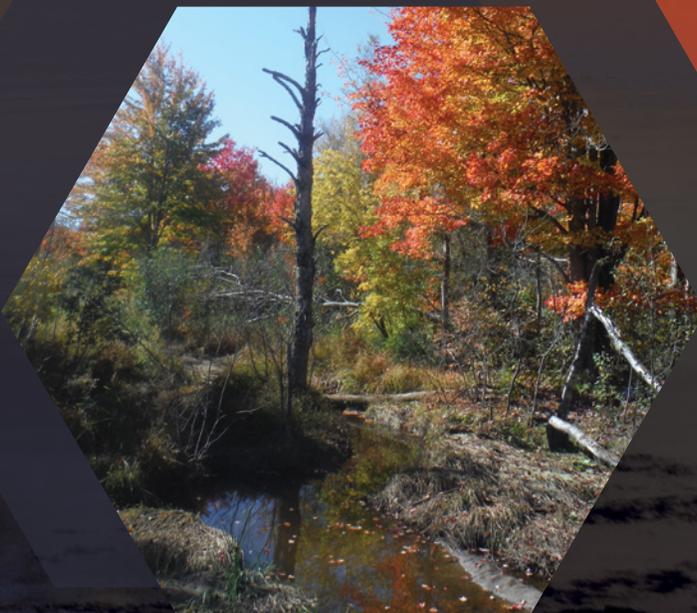


STATUS OF THE SHEDIAC BAY AND ITS WATERSHED

VOLUME 2 - THE ASSOCIATION





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THE SHEDIAC BAY WATERSHED ASSOCIATION: PEOPLE SERVING THEIR COMMUNITY

The Shediac Bay Watershed Association (SBWA) was founded in 1999 to empower the community to restore, remediate and maintain the quality of the watercourses that flow into Shediac Bay. Achieving this goal requires the cooperation of government authorities, communities and inhabitants of the entire watershed area.

Every year, the SBWA must assemble the required documentation to obtain the necessary resources from various funding agencies to continue its work. One of the SBWA's proudest achievements has been its ability to maintain its water quality monitoring and public awareness activities in the Shediac Bay area without the benefit of a long-term operating budget. This document summarizes what the SBWA has accomplished in its 18 years of existence. It provides an up-to-date assessment of the watershed and an overview of the efforts spearheaded by the SBWA to continue to keep the water in the area clean.

We hope that the following pages provide you with sufficient information about what we do and the positive impact we have had on the local environment. We encourage you to partner with the SBWA so we can work together to improve our shared habitat.

The Shediac Bay Watershed Association (SBWA) is a non-profit organization. Funding for its activities comes from various sources, both public and private. The aim of the SBWA is to provide the people of the watershed with the healthiest environment possible, one in which rivers, their tributaries and their shores are protected so that everyone can enjoy outdoor activities in this natural environment with its rich diversity of water resources, flora and fauna.

The funds received by the SBWA are used to pay staff members tasked with monitoring water quality, cleaning watercourses and shorelines, and educating and informing the public about the best ways to address the multiple challenges involved in maintaining a clean, healthy and sustainable environment.

The success of the SBWA's undertakings is rooted in the collaboration and engagement of local communities, the stakeholders who use these resources, and residents determined to fight for a cleaner environment. The SBWA has no legal or regulatory authority to impose the cleanup measures deemed necessary. The Association's cleanup initiatives can only be carried out if it obtains the authorization of the landowners, the farmers and the authorities responsible for the environment.



HISTORY

In 1997, the New Brunswick Department of Health reported, for the third year in a row, that the water contamination in Shediac Bay exceeded acceptable levels. The quality was so poor, in fact, that authorities considered closing Shediac Bay, including Parlee Beach, to human activity out of a concern for public health.

In April 1998, an ad hoc committee chaired by the Beaubassin District Planning Commission (BDPC) was set up to oversee the required work to improve water quality. In addition to the BDPC, the committee members included representatives of the Town of Shediac, the Greater Shediac Sewerage Commission, Mount Allison University in Sackville and the provincial departments of the environment, economic development and tourism, and health and community services. In support of

the ad hoc committee's efforts, Fisheries and Oceans Canada led a technical committee to define the scope of the work to be carried out and ensure that it met environmental standards to implement a plan to restore and improve the water quality in Shediac Bay.

In September 1999, in partnership with Mount Allison University and other committee members, the firm Henderson Environmental Consulting Ltd., based in Kelowna, British Columbia, issued its first report on the main factors influencing the water quality in Shediac Bay.

After the report had been issued, the ad hoc committee recommended the creation of the SBWA to oversee the efforts required to restore the water quality of the designated area.

DELINEATION OF THE SHEDIAC BAY WATERSHED

The boundaries of the watershed are determined by several factors, starting with the area surrounding the two major rivers (Shediac and Scoudouc) and their tributaries including various streams and wetlands flow into the Shediac Bay. The headwaters

of the Shediac River are located near Lutes Mountain in Irishtown, whereas the tributaries of the Scoudouc River begin near Meadow Brook. The entire Shediac Bay watershed covers an area of 420 square kilometres.



CREATION, FUNDING, COMMUNITY SUPPORT AND PARTNERSHIPS

Funding for the creation of the SBWA was provided in large part by the Environmental Trust Fund of the New Brunswick Department of Environment and Local Government, thereby allowing it to move quickly with its improvement initiatives.

These funds allowed the SBWA to hire staff to assess water quality and commission studies to guide future action.

Over the years, the SBWA has attracted additional community and government funding partners. Community partners include the Shediac CO-OP-IGA, the TD Friends of the Environment Foundation, the Friends of Kouchibouguacis, the Atlantic Salmon Conservation Foundation, the Shediac Rotary Club and Encorp Atlantic.

The SBWA maintains working relationships and professional contacts with Vision H₂O, the Miramichi River Environmental Assessment Committee, the Homarus Eco-Centre, G3E and the Scoudouc River Canoe Club. It also receives donations from local organizations, private companies and individuals.

Water quality monitoring in the Shediac Bay watershed is the subject of detailed reports by provincial environment authorities. The SBWA also receives funding from the New Brunswick Wildlife Trust Fund, administered by the Department of Natural Resources and Energy and the New Brunswick Wildlife Council.

Through programs run by Environment and Climate Change Canada and the support of Fisheries and Oceans Canada, the federal government is also an ongoing funding partner for the SBWA's activities.

In addition, the Town of Shediac and the Beaubassin-est Rural Community are two local governments that contribute to the SBWA.

The diligent and dedicated members of the SBWA board of directors have leveraged their professional and personal relationships to enable the various partners to work together toward the organization's objectives.



CONDITION OF THE WATERSHED AT PROJECT INCEPTION

Activities Launched, Initial Observations and Findings

The Test samples taken by the New Brunswick Department of Health and Environment Canada in 1997 raised concerns about the quality of the water in Shediac Bay. According to the Henderson Report published in 1999, five Shediac Bay sample sites showed higher-than-acceptable contamination levels. Persistently high levels of bacteriological contaminants (E. coli and enterococcus) were also observed in 1995 and 1996.

In 1998, the ad hoc committee recommended that the New Brunswick Department of Economic Development and Tourism fund new water sample sites. The Department of Environment and Local Government also took samples, and the Department of Health increased the number of sample sites. The purpose of stepping up these efforts was to pinpoint, with as much precision as possible, the sources of contamination that were affecting the water quality in Shediac Bay.

The 1999 Henderson Report summarized the test results of these sources of contamination, suggesting that they were linked to domestic or industrial sewer emissions and accumulated agricultural runoff. Although some of the contamination sources were determined to be sporadic, sampling showed that both the Shediac and the Scoudouc rivers could themselves be the two largest sources of bacteria over a longer period of time.

In light of these observations, priority was immediately placed on remediating the quality of the water in the two rivers and their respective tributaries. Accordingly, the SBWA's work focused first and foremost on activities affecting the designated inland watercourses rather than Shediac Bay itself.



REPORT ON THE ACTIVITIES SUPPORTED BY THE PROJECT

Team

The first team of the SBWA was composed of a project coordinator, a technician and a summer student.

By 2017, the team had expanded to include a manager, a project coordinator and three environmental technicians, in addition to two or three summer students.



Recurring Activities

Initial observations

In its first annual report in 2001, the SBWA identified key remediation-related issues and challenges for Shediac Bay.

Among the environmental concerns mentioned in the report were the discharge of industrial water, improper agricultural and forestry practices, private and public sewage treatment, infilling of salt marshes for residential development, open quarry mining, haphazardly abandoned vehicles and coastal flooding resulting in erosion in certain areas. The challenges were therefore numerous and varied, and required action throughout the watershed area.

During the organization's first year of operation, SBWA staff reported identifying and working with fishing, agricultural and

forestry stakeholders and residents toward a common goal, namely to raise awareness of the environmental issues at stake in the area and the available solutions.

A few years later, in 2006, the annual report emphasized the SBWA's limited resources: a sole full-time employee and a volunteer board and science committee members. That year, the SBWA identified and documented a serious case of pollution caused by the outflow of sewage from a senior residence into the Scoudouc River. Despite a series of meetings held by the SBWA with stakeholders and authorities, the problem persisted. The following year, however, thanks to the information gathered and provided by the SBWA, a peat moss filtering system was installed and the issue was resolved.

Beach sweep

Every year since 2002, usually coinciding with World Oceans Day, the SBWA has organized a cleanup operation in Shediac Bay. Volunteers join SBWA staff to comb through six to eight kilometres of coastline for refuse.

During this annual community undertaking, the coastline of Shediac Bay are rid of discarded tires and various types of litter (metal, paper, cardboard, polystyrene containers, etc.). tens of garbage bags are filled every year by devoted volunteer crews.

Status of Shediac Bay

In 2015–16, the SBWA spearheaded a project to assess habitat and water quality in Shediac Bay.

Samples of the salt water were taken in Shediac Bay in order to zero in on where habitat restoration work was most needed. A protocol developed by Vision H₂O to analyze the DNA of water samples from the bay was adopted, in keeping with the goal of identifying the nature of fecal coliform contamination from human and animal sources and, in the latter case, to specify the type of animals responsible.

The SBWA also monitored and analyzed eelgrass, the aquatic vegetation that helps maintain salt water quality, and assessed salt marshes and their ability to filter runoff water before it flows into Shediac Bay.

These initiatives have followed in the footsteps of numerous efforts introduced by the SBWA since 2000, notably the replacement or installation of 40 septic fields between 2003 and 2007. The next few pages provide more details on these critical efforts to improve the water quality in the Shediac Bay watershed.



Assessing water quality

The SBWA has always held the same view when it comes to addressing water quality issues: it is impossible to improve the water in Shediac Bay without also focusing on the watershed's many tributaries.

In 2010–11, the SBWA's annual report showed progress in identifying and monitoring factors that affect water quality, in terms of the diversity of activities and sources of funding. These remedial efforts are ongoing, with an even broader range of field operations and funding, in order to roll out further efforts to improve the water quality in the area.

Three key elements have been identified through sample sites on the Shediac and Scoudouc rivers, namely water temperature, dissolved oxygen and pH range.

WATER TEMPERATURE

Water temperature is important to organisms that live in a river. If the water is too warm, it will contain less dissolved oxygen, which will have a negative impact on aquatic plant and animal life. Adverse outcomes are generally observed at temperatures higher than 26°C–29°C. The average temperatures of the two rivers in the Shediac Bay watershed were 15.26°C in 2010 and 14.6°C in 2015, which are well under the acceptable limit.

DISSOLVED OXYGEN

A sufficient level of dissolved oxygen is essential to the health of aquatic life. According to the water quality guidelines issued by the Canadian Council of Ministers of the Environment (CCME), the minimal amount of dissolved oxygen for early life stages is 9.5 mg/l and stands at 6.5 mg/l for later stages. In 2010, the dissolved oxygen mean was 7.33 mg/l in the Scoudouc River and 8.27 mg/l in the Shediac River. In 2015, these concentrations were 8.10 mg/l and 9.03 mg/l, respectively. Both rivers therefore comply with Canadian environmental standards.

PH LEVEL

The pH level is critical to measure how well a river is resisting the effects of human activity. For example, the storm runoff of pesticides and other chemicals can increase the level of acidity in the water enough to threaten the survival of the living organisms it contains. The CCME's water quality guidelines indicates ideal pH levels at a range between 6.5 and 9.

E. COLI

Water samples are analyzed to monitor for Escherichia coli (E. coli) and evaluate the corresponding risk to recreational water users. The acceptable standard for health prevention purposes is 400 MPN (most probable number) per 100 millilitres (ml) of water.

Tests in 2010 revealed that the levels of E. coli in the Scoudouc and Shediac rivers occasionally exceeded this standard. The mean for the Scoudouc River was 489.7 MPN/100 ml, compared with 181 MPN/100 ml for the Shediac River.

In 2010, the pH of the water in the Scoudouc River was 7.91, and the pH for the Shediac River was 8.18, yielding an overall mean of 8.04. By 2015, this mean had lowered to 7.55. The most significant change over the five-year period was observed in the Shediac River, where the pH levels had dropped from 8.18 to 7.61. Once again, however, the reported levels fell within the CCME's recommended range.

The 2016 figures were 107.8 MPN/100 ml in the Shediac River and 232.2 MPN/100 ml in the Scoudouc River.

The data have varied enormously from year to year, between the first sample year and the present day. They are greatly influenced by the volume of rain during the sampling period. Contamination points are therefore short-lived and attributable to storm runoff.



INSECTS

Another way to assess water quality is to count the variety of insects (invertebrates) in a river. The ability of different species to resist contaminants varies from one invertebrate to another. Some are more tolerant, whereas others succumb more easily to pollutants. A precise inventory will provide an overall index of the state of a river's health. A mixed, balanced population of resistant and vulnerable species is a sign of a robust watercourse. However, if the population is dominated by contaminant-resistant organisms, it may indicate that the river is constantly under attack by pollutants poised to undermine the river's fundamental characteristics.

In 2010, the river quality index, based on aquatic insect inventories, indicated that both rivers were in relatively good health, despite the presence of primarily organic pollutants.

The SBWA is now linked to the Canadian Aquatic Biomonitoring Network (CABIN).

SBWA staff have been trained and certified under this program. Annual insect inventories are conducted in accordance with CABIN protocols, and the resulting data are now entered into the database, which helps provide objective measurements of the progress being made as well as the problem periods and zones in the watershed area.

CABIN has categorized both the Scoudouc and the Shediac rivers as "satisfactory" based on the analysis of the SBWA staff's test results. Rivers that qualify as "good" or "excellent" are not exposed to human, agricultural and industrial activities.



Special Activities and Projects

The SBWA has been involved in a number of habitat remediation, redevelopment and enhancement projects in the Shediac Bay

Shellfish restoration project in Cocagne Bay and Shediac Bay

In 2004 and 2005, in partnership with Fisheries and Oceans Canada, the SBWA carried out a habitat destruction compensation project in Cocagne Bay and Shediac Bay. Shellfish play a critical role in water quality by filtering significant amounts of water. A lack of shellfish leads to the proliferation of undesirable marine algae.

Following the ravages of Malpeque disease, which wiped out oyster stocks in the late

watershed. The following are a few examples of past and ongoing efforts in this regard.

1950s, the oyster population in these bays was practically non-existent. The clam population had also dipped to dramatically low levels.

The project involved creating artificial oyster reefs in both bays, where young oysters (spat) could settle and grow in order to increase the population. The initiative made it possible to reintroduce shellfish in these habitats and document the conditions necessary for shellfish growth.

Alternative tern colony habitat

Since 2014, the SBWA has been building a platform for a colony of common terns established on a barge that had been set up to create a breakwater for the Shediac Bay Marina. When the barge had to be removed, the colony lost its home.

The SBWA therefore set up a platform where the birds could nest and raise their chicks. The initiative has been a success: the colony has increased in number and visibly embraced this new habitat.

In 2015, the Shediac Bay Yacht Club donated floating docks to expand the platform and accommodate the growing colony. The artificial habitat has, by all measures, delivered very real results.



Freshwater mussels

Freshwater mussels found in the rivers of the Shediac Bay watershed play a vital role in the ecosystem: they filter the water by digesting micro-organisms and organic materials that accumulate in the water column. However, overpopulation can threaten their very existence.

Environment Canada's Biodiversity Convention Office reports that 55 species of freshwater mussels in North America have become endangered or disappeared altogether. These shellfish are sedentary and can live up to 120 years. Their presence in rivers is therefore an excellent ecological indicator of water quality and ecosystem integrity.

As early as 2005, aware of the importance of freshwater mussels in the ecosystem, the SBWA conducted an inventory and analysis of the population in the tributaries of Shediac Bay.

In 2009, the Brook Floater (*Alasmidonta varicose*), one of the freshwater mussels found in the Shediac Bay watershed, was given the status of special concern when the species began to disappear from its habitat.

More recently, Fisheries and Oceans Canada tasked the SBWA with tracking the presence of this mussel in the hydrological network of the Shediac Bay watershed. So far, these efforts have not proven fruitful, although the search is ongoing.



Shoreline and watercourse enhancement

While inspecting the banks of the Scoudouc and Shediac rivers and their tributaries, the successive teams of the SBWA repaired and corrected problems contributing to the temporary, albeit sometimes serious, deterioration of various watercourses.

Cleanup operations targeted commonplace litter along with some surprising items such as automobile hulks.

A few beaver dams had been keeping a growing volume of contaminants upstream and were slowing down the flow of the watercourse.

The dams were dismantled, which helped restore the oxygen levels in these previously blocked rivers or streams. This also halted the accumulation of contaminated sediment that threatened nearby aquatic life.

Some shorelines had been damaged for and by tractors and recreational vehicles, resulting in the deterioration of the waterbed. These damages were repaired wherever possible and where permitted.

In sites where the artificial expansion of the watercourse led to a loss in water depth and hindered the free movement of fish, the SBWA set up deflectors to narrow and deepen the water in order to facilitate the movement of various fish species, among them salmon and trout.

Specifically with regard to salmon, a fish ladder was installed in McQuade Brook, a major tributary of the Shediac River, to bypass an elevated culvert that was identified as an impediment to fish migration. The fish now use this ladder to travel upstream.

Tree planting along the banks of various streams and rivers, along with the construction and development of retaining walls, are other solid examples of the work done by the SBWA to improve the hydrological network and water quality.



DNA testing

The SBWA ran tests on the DNA of the fecal matter found in the contaminated water samples. The analysis helps identify the origin of the fecal matter and determine the possible courses of action to take.

For example, if the fecal matter is of human origin, it can be concluded that domestic sewage is being discharged into the hydrological network or that local septic tanks are malfunctioning. The results of

the DNA testing showed that, of the five sites sampled, three showed signs of human fecal contamination.

The study also confirmed that canine fecal matter is widespread throughout the area, whereas fecal matter from ruminant animals such as cows was detected in three of the five sites tested. Unsurprisingly, these three sites were located in agricultural zones.

| Site | E. Coli MPN/100ml | Human | Ruminant (cow/sheep) | Pig | Horse | Dog | Gull |
|------|-------------------|-------|----------------------|-----|-------|-----|------|
| 1 | 1700 | + | - | - | - | + | - |
| 2 | 1700 | + | - | - | - | + | + |
| 3 | 350 | - | + | + | - | + | - |
| 4 | 920 | + | + | - | - | + | - |
| 5 | 79 | - | + | - | - | ? | - |

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



Green strategy

At the end of May 2017, the communities of Shediac, Cap-Pelé and Beaubassin-est, along with the Chambers of Commerce of Greater Shediac and Cap-Pelé/Beaubassin-est and the Greater Shediac Sewerage Commission, announced a partnership involving a regional green strategy to embrace long-term initiatives to protect the environment.

In collaboration with Vision H₂O, the SBWA will undertake a series of specific actions designed to improve the local environment. These actions will focus on educating the public through signs, brochures, presentations and workshops, organizing community activities such as cleanup operations and tree planting, and visits to nature sites targeted for

protection or enhancement. Other projects related to stormwater management and reforestation will also be part of the regional green strategy that the SBWA will help implement in the coming years.

In collaboration with local stakeholders, the regional green strategy will aim to obtain Blue Flag certification for the area's marinas and beaches. This will be achieved by setting various measures in motion to maintain high levels of water quality by adopting sound environmental practices in accordance with a regional perspective that extends to two major watersheds in the southeastern part of the province.

Monitoring and analysis of eelgrass and salt marshes

Eelgrass is a marine plant that helps filter the water column and stabilize sediment, thereby creating a buffer zone between land and water. The SBWA monitors and analyzes eelgrass beds in Shediac Bay on an ongoing basis. Receding or disappearing beds are an indicator of detrimental human activity. Eelgrass health is therefore important to water quality.

The SBWA monitors eelgrass in partnership with the Southern Gulf of St. Lawrence Coalition on Sustainability. The Coalition has received funding from Environment and Climate Change Canada since 2015 for these monitoring activities, which are part of a global seagrass watch movement.

A similar initiative is in effect for the salt marshes along the Shediac Bay coastline. The maintenance and, where necessary, remediation of salt marshes contribute to overall water quality, given their role as a filter that purifies the surface water that runs into watercourses.

In 2016, the SBWA took part in a Marsh Monitoring Program for the Maritime Provinces administered by Bird Studies Canada, the mission of which is to conserve the wild birds of Canada. Many species of birds can be found in healthy salt marshes.



Awareness and information programs

The SBWA's awareness, education and information efforts are ongoing in partnership

with local schools and community organizations.

FISH FRIENDS

The SBWA introduced the Fish Friends program in March 2016 at École Mgr-François-Bourgeois in Shediac and Shediac Cape School. The purpose of the program is to spark students' interest in local aquatic life. After watching a few presentations on the subject, they take part in several hands-on activities.

At École Mgr-François-Bourgeois, the SBWA set up an aquarium with 200 salmon eggs. Students could watch them hatch and grow to fry before being taken to the riverfront in the spring and released.

Shediac Cape School students participated in a similar activity with 300 trout eggs. They observed the transformation in the aquarium before releasing them into the wild.

CURRENT STATUS OF THE SHEDIAC BAY WATERSHED

After almost 20 years, the SBWA has remained true to its vision of helping communities work together to promote healthy, sustainable ecosystems and ensure the best possible water quality in the watershed for generations to come.

The founders of the SBWA understood that any remedial work in Shediac Bay would be impossible without the ongoing voluntary collaboration of a wide range of stakeholders, from business professionals to cottage owners, from scientists to students, from city-dwellers to residents of rural and coastal communities.

Addressing this challenge has meant intervening directly in nature on multiple fronts: studying the overall situation of the watershed, identifying and understanding the causes of water contamination outbreaks in Shediac Bay, and raising the awareness of the entire watershed population about water condition and quality and the corrective action to be taken.

The numerous information, awareness and education initiatives undertaken in recent years by the SBWA all share one goal: to promote the adoption of eco-friendly actions by every stratum of the local population. The quality of the water in Shediac Bay will improve only if everyone embraces recognized environmental practices to ensure sound watershed management.

The SBWA will strive to forge even stronger ties with marinas, farmers and local water users and encourage everyone to join forces to promote a healthier, more sustainable environment throughout the Shediac Bay watershed.

Improving water quality in this area is a long-term commitment that requires the participation of everyone at every level of society. Significant inroads have been made in this regard since 2000, but much work remains to be done—together

COMMUNITY INFORMATION WORKSHOPS AND HANDS-ON INITIATIVES

Inspired by its mission to reach out to the community and have people play a direct role in improving and protecting their environment, the SBWA works hand in hand with a number of local organizations.

From day one, the SBWA has collaborated with marina users and fishers on formulating responsible practices for the marine environment.

The SBWA also introduced the Adopt-a-Stream program for students in Grades 6 through 8 to learn more about insect inventories and aquatic biomonitoring.

In 2016, the SBWA introduced a water conservation and stormwater management project. The two-year project consists of two thrusts: public education focused on concrete initiatives, such as the distribution of rain

barrels, along with information on how to use collected rainwater.

Community activities such as tree planting educate people about the importance of land use planning. On October 15, 2016, SBWA volunteers gathered together to plant 150 trees during this day-long activity.

The Homarus Eco-Centre works in tandem with the SBWA and other organizations, serving as the host of summer information and training sessions for visitors to the Pointe-du-Chêne wharf.

Starting in 2015, the SBWA put up interpretive panels to enlighten people about the environment. The SBWA's panels contain helpful information on tree swallows, the Acadian forest, the importance of biodiversity, salt marshes and marine eelgrass.



For more information on how you can get involved
in your community to help keep the Bay and its rivers clean,
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