# 1. INTRODUCTION TO THE SBWA

## 1.0 Description of the Shediac Bay Watershed Association (SBWA)

### Background

The Shediac Bay Watershed Association 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

Funding is provided mostly by the New Brunswick Environmental Trust Fund, with other generous contributions obtained through grants or donations by various organizations such as the New Brunswick Wildlife Trust Fund. Many other in-kind contributions have been made by various groups and organizations as well.

The Shediac Bay Watershed Association has the following vision and mission statements:

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

**Mission –** The Shediac Bay Watershed Association will accomplish its vision through education and community stewardship.

### The SBWA Board of Directors, Partners and Stakeholders

The Shediac Bay Watershed Association is managed by a Board of Directors consisting of thirteen members representing the various regions and interest groups of the watershed. The Board of Directors meets on a monthly basis and includes the following members:

Mr. Pierre Landry, President
Mrs. Odette Babineau, 1st Vice-President
Mr. André Veniot, 2nd Vice-President
Mr. Armand Bannister, Treasurer
Ms. Helen Hall, Secretary
Mr. William Murray, Immediate Past President
Mr. Greg Murphy
Mr. Louis LeBlanc
Mr. Ron Boudreau
Mr. Edgar Hachey
Mr. Frank Boudreau
Mr. Adrien Léger
Mr. Martin Mallet
Mr. Neil LeBlanc
Mr. André Touchburn

The Shediac Bay Watershed Association gratefully receives guidance, donations and in-kind support from various organizations and interest groups. Of the many important partners, SBWA has a list of over 300 stakeholders consisting of business-owners, industry, foresters, farmers, local residents, cottage owners, recreationalist, conservation groups and community organizations within the Shediac Bay watershed.

## 1.2 OUR PAST PROJECTS

## 1.3 OVERVIEW OF THE SBWA STUDY AREA

**Watershed Boundary**

The Shediac Bay watershed covers 400KM$^2$ of land area and stretches along 40KM of coastline, from Cap Bimet to Cap de Cocagne. The watershed also reaches inland as far as Lutes Mountain near Moncton. The Shediac Bay watershed is composed of two major river systems: the Shediac River and the Scoudouc River. Both rivers empty into Shediac Bay. The watershed also has many smaller tributaries that empty either into one of the two major rivers or directly into the bay. The watershed boundaries stretch into both Kent and Westmorland County and cross into both the Shediac and Moncton Parish. A total of ## wetlands are found within the boundaries of the Shediac Bay Watershed.

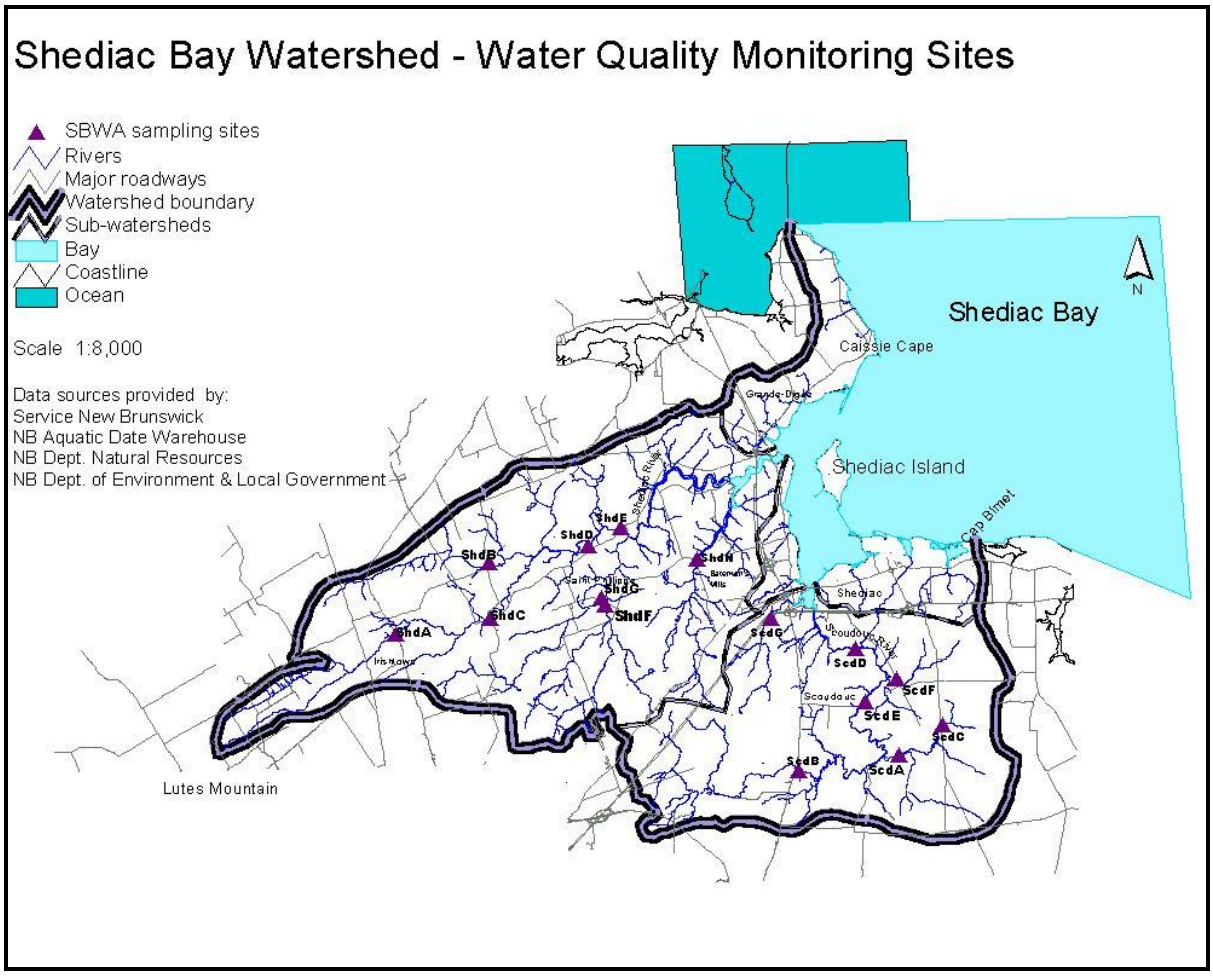


Figure 1. Map of Shediac Bay watershed boundaries and sampling sites

**Communities and Land-Use of the Shediac Bay Watershed**

The Shediac Bay watershed consists of a population of approximately 15,000 people and includes the following communities:

| | |
|---|---|
| Bateman's Mill | MacDougall Settlement |
| Boudreau Office | Old Shediac Road |
| Caisse-Cape | Pointe du Chêne |
| Cap Bimet | Scotch Settlement Road |
| Cap Brulé | Scoudouc |
| Cape Breton Road | Shediac Bridge |
| Cap de Cocagne (eastern portion) | Shediac Cape |
| Grand Barachois | Shediac River |
| Grand Digue | Saint-Philippe |
| Irishtown | Shediac Road |
| Indian Mountain | Town of Shediac |

The Shediac Bay watershed is home to a wide variety of flora and fauna where a rich ecosystem and habitats are found. The watershed also plays host to a variety of important activities such as forestry, agriculture, industry and tourism. The area is rich in culture and history. Well-known destinations such as Parlee Beach can be found within the watershed boundaries. The tributaries of the watershed flow through a kaleidoscope of different areas such as wetlands, forested, residential, industrial and agricultural land.

# 2. WETLANDS : AN OVERVIEW

## 2.1 DEFINITION OF A WETLAND

A Wetland is defined as: "land that has the water table at, near, or above the land's surface, or which is saturated, for long enough to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activity adapted to the wet environment."

Wetlands constitute critical habitat for a variety of aquatic plants, animals and birds. By definition, wetlands are associated with such features as ponds, swamps, bogs, coastal marshes, inland marshes, floodplains and other related aquatic environments.

## 2.2 THE FUNCTION AND IMPORTANCE OF WETLANDS

Wetlands play a vital role in the formation of local animal and fowl habitation. A variety of plant and animal species rely on wetland habitat for survival. Wetlands are also a safe haven for endangered species and special status species such as the Maritime Ringlet Butterfly, the Gulf of St. Lawrence Aster.

Wetlands also have a great importance to the local human population for a number of reasons. Wetlands for example protect our drinking water by storing and purifying surface and ground water. A wetland that is 100m by 100m and 30cm deep for example holds 600 000 gallons of water. In addition, plants found in wetlands actively take up water and release it to the atmosphere through evapotranspiration during the growing season. This process reduces the amount of water in wetland soil and increases the capacity for absorption of additional precipitation or surface water flow. As a result, water levels and outflow from the wetland are less than when plants are dormant. Larger plants and plants with more surface area will transpire more. Wetlands also store precipitation and surface water and then slowly release the water into associated surface water resources, ground water, and the atmosphere. This capacity differs depending on the type of wetland. Different types of wetland have different physical and biological characteristics, including: landscape position, soil saturation, the fiber content/degree of decomposition of the organic soils, vegetation density and type of vegetation (Taylor et al. 1990).

Local economies are also directly and indirectly dependent on the wetlands. Wetlands are a source of food for economically important wildlife as well such as gaspereau, oysters, waterfowl, and pickerel. With over 600 animal species and far more plant species, the bio-diversity and the natural systems of wetlands help to support the local ecology. The diversity found in wetlands provides nourishment for organisms lower on the food chain as well as foraging areas for waterfowl. Inland and coastal wetlands protect infrastructures such as roads, houses and communities against flooding and storm surges by acting as buffer zones. Furthermore, wetlands prevent the erosion of beaches and areas upstream in rivers. As well, they provide recreational areas and food production and often have commercial benefits. Wetlands can serve as part of the local tourist attractions, which generates new revenue for the local economy.

There is presently only four per cent of New Brunswick's land base that remains as wetland habitat, representing 300,000 hectares. Wetlands are classified as coastal marsh (three per cent), St. John River floodplain wetlands (seven per cent), freshwater inland wetlands (41 per cent), and inland bog (49 per cent). Coastal marsh and the Saint John River flood plain wetlands are considered provincially significant due to their unique character. The remaining 90 per cent of wetlands consists of fresh water inland wetlands and bogs.

## 2.3 WETLAND WILDLIFE AND VEGETATION

Wetlands create homes for a myriad of plant and animal species. Wetland plants play an integral role in the ecological health of a watershed by providing breeding, nursery sites, food, resting locations for migratory species and refuge from predators. Countless species of mammals, reptiles, amphibians, and birds depend on wetlands for food, water, and habitat. As well, different species depend on different wetland types for survival. Waterfowl such as ducks and herons for example are commonly associated with marshes, other birds, such as songbirds and hawks, also feed on the life generated within wetlands. Many bird species such as warblers and wood ducks breed, nest, and feed in bog habitats. Many species of birds such as crane, great gray owl, short-eared owl, sora rail, and sharp-tailed sparrow depend entirely on bogs and fens for survival (Mitsch and Gosselink 1993). Bogs can also be important habitat for many species of fish such as pike, walleye, bluegill, and smallmouth bass when pH is greater than 4.5. Tidal freshwater marshes can provide habitat for certain fish species in which they spend their entire life cycle while other fish and shellfish rely on the freshwater marshes for parts of their life cycle and spend the remainder of their lives in the marine environment

The species found in a particular wetland depend on a variety of conditions and factors. The size and shape of a wetland for example will determine what species of wildlife will consider it a suitable habitat.

The shape and size of the wetland can also play a role in determining the species inhabiting the area due to the possibility of movement within the wetland. Larger, wide-ranging animals such as moose using the wetland for food and refuge depend greatly on its vast undeveloped and undisturbed area.

## 2.4 WETLAND PRODUCTIVITY AND CHEMISTRY

Wetlands are unique in their wide range of chemical and biological productivity they offer. They are among the most productive ecosystems in the world. Wetlands also have a number of chemical processes which are essential to life and a healthy ecosystem. These processes include ground water recharge, climate control, oxidation-reduction, hydrologic flux and life support and the filtering of suspended solids. Many nutrients are also processed and handled by wetlands such as nitrogen, phosphorus, carbon, sulfur and metals.

Such processes give wetlands unique characteristics. Ground water recharge for example occurs by means of mineral soils most often located around the edges of wetlands. The extent of such ground water recharge depends on a variety of characteristics such as soil, vegetation, location, size ratio, and water table gradient. It is interesting to note that the soil under most wetlands is rather impermeable.

In addition, wetlands help moderate temperature extremes in nearby uplands and return two-thirds of their annual water inputs to the atmosphere by means of evapotranspiration. Oxidation-reduction which is controlled in wetlands by the fluctuating water levels can play an important role in recycling nutrients and in controlling their availability and export. Decomposition and the availability and export of metals are all influenced by such fluctuating water levels not to mention pH levels, vegetation composition and the accumulation of sediment and organic matter.

Wetlands allow the passage of aquatic life between systems, the exchange of nutrients and detritus by means of the hydrologic flux. As well, water supply and quality, flood and erosion control and wildlife support are some of the many values that are effected by hydrologic flux.

Many nutrients are processed as a result of entering wetland habitat. The presence of clays, humic materials, aluminum, iron or calcium in wetlands for example are capable of removing metals from surface and ground water. Other potentially hazardous components such a phosphorus in water are also treated when they enter wetlands. Furthermore, many nutrients such as carbon are stored or recycled and made available once again for use by the environment.

## 2.5 WETLAND TYPES

Wetlands are categorized based on significant determinant characteristics such as water chemistry, soil type, plant and animal species that are present, hydrology and other such factors. The following descriptions represent the various categories in which wetlands are classified:

**BOGS:**

A bog is an inland wetland considered very oxygen poor. The foundation of a bog is made of peat moss

layers also known as Sphagnum. Bogs form as a result of prehistoric lake basins or depressions in the landscape becoming slowly filled with plant debris. There is little or no surface inflows from other water sources, but bogs may at times act as headwaters. Bogs are nutrient-poor and usually highly acidic. The pH of a bog can be as low as 3.0 to 4.0. The high acidity causes decomposition in the soil. The water in bogs is often reddish-brown in colour. The acidity of the water and low productivity make it so that bogs do not support large numbers of animals. Bogs are often in remote areas and not developed and therefore provide important habitat for moose, beavers, deer and other such species. As well, bogs provide habitat for a variety of plant species such as Leatherleaf, Sweetgale and the carnivorous pitcher plant and Sundew.

## FENS:

Fens can be thought of as developing bogs, slowly being filled in by vegetation. Unlike bogs, however, fens are calcium and nutrient rich because they have less peat build up and ground water can also seep to the surface. Such ground water influence also creates a less acidic environment since this water tends to be neutral or alkaline. The pH of fens is can range anywhere between 4.0 to 8.0. Fens are also less acidic than bogs due to having little or no sphagnum. Fens are often thought to resemble meadows with various herbaceous species of plants such as sedge and grasses inhabiting these areas. Several species of orchid considered rare in New Brunswick are also found in fens.

## EMERGENT WETLANDS (MARSHES):

Emergent wetlands are very productive and diverse ecosystems often forming a transition zone between terrestrial and aquatic environments. Usually located in low-lying areas, these wetlands may be periodically or permanently flooded with water. Emergent wetlands are often found in association with streams or other watercourses and can also be fed by ground water sources. These wetland types are very efficient at supplying water and nutrients to nearby vegetation. The types of vegetation commonly found in these wetlands include grasses and non-woody, soft-stemmed plants found either above or below the water surface. Water lilies, cattails and rushes are common examples of plants found in emergent wetlands.

## SHRUB WETLANDS:

Shrub wetlands can most often be identified by the presence of alders and are usually composed of shrubby vegetation and small trees less than 6 meters in height. Other vegetation frequently found in shrub wetlands include blueberry, elderberry, chokeberry and sweetgale. The water level in shrub wetlands is most commonly just below the soil surface and leaves the area ranging anywhere between moist to very wet.

## AQUATIC BEDS (SHALLOW WATER):

Aquatic beds are characterized by having open water with aquatic vegetation at or below the water surface such as the Lily. They are often associated with rivers or other major watercourses.

## FORESTED WETLANDS (SWAMPS):

Either permanently or occasionally flooded, forested wetlands are composed of full sized trees and woody vegetation. These types of wetlands have rich organic mineral soils that are poorly drained and

remain wet and saturated during flooding. Forested wetlands, however, do have better drainage than other types of wetlands because they are only flooded with water on a seasonal basis. Common trees and shrubs found in theses wetlands include cedar, willow, tamarack, dogwood, maples and black spruce.

### COASTAL MARSHES:

Typically found near the mouths of rivers, in bays and coastal areas affected by the tides, salt marshes remain protected from the full force of the surf. These wetlands drain directly into coastal waters and have salt water influence. Salt marshes are characterized with having the highest primary productivity of all wetland systems and of most upland systems. Species found in coastal marshes range from salt tolerant, brackish and freshwater. Coastal wetlands provide habitat and food for both permanent and temporary marine residents such as oysters and mussels. Common vegetation includes various march grasses such as Spartina and other salt tolerant species.

## 2.4 PROBLEMS AND ISSUES ASSOCIATED WITH WETLANDS

Each wetland type faces different degrees and forms of human activity that threatens its health and existence. Development, pollution and other human disturbances have led to a rapid decline in the number of wetlands remaining in New Brunswick.

Of the many threats to wetlands, urbanization is one of the major causes of wetland impairment and loss. Changes in water quality, quantity and flow rates; increases in pollution entering the wetland and the introduction of non-native species are all the result of activities associated with urbanization near or within a wetland. Pollutants such as road salts, heavy metals, nutrients, sediments, oxygen-demanding substances, hydrocarbons, bacteria and viruses increase in wetlands due to the increase in human activity. Various activities associated with urbanization that are destructive to wetlands include the construction of impervious surfaces such as parking lots, buildings and roads; pollution from wastewater and stormwater runoff and the construction of roads and bridges across wetlands.

In addition, agricultural activity performed near or directly in wetlands can be potentially hazardous to their ecology. Activities such as drainage, irrigation ditches, farming roads, pesticide and other toxic compound usage and livestock grazing can also harm wetlands if not properly contained and managed.

Forestry practices can also be detrimental to wetlands if not managed correctly. Drainage, cleaning, road construction, rutting and ditching of forested wetlands can impact wetlands. If done correctly, however, forestry practices can alter wetland temporally and should allow wetlands to recover after one to three years. Also, the use of pesticides and fertilizers used in silviculturel operations can have adverse effects on wetlands if runoff or other forms of deposition are permitted to seep into these habitats.

The mining of bogs for peat moss can significantly modify and transform the ecology of the wetland and create an open water habitat. Peat mining essentially removes the peat and involves clearing other vegetation, creating roads and draining the wetland. A portion of the wetland is destroyed as a result.

Other types of mining operations can also threaten wetlands. Acid draining for example from active or abandoned mines can be very harmful. Over-saturation of wetlands with such pollutants will eventually result in the mortality of many wetland species.

Atmospheric deposition of various pollutants such as heavy metals, hydrocarbons and nitrous oxides is yet another example of sources emanating from various human activities that damage wetlands.

### 2.5 Legislation and The Coastal habitat Program

The goal of New Brunswick's wetland conservation programs and wetland legislative initiatives are to protect and conserve our precious wetland habitats and the flora and fauna that depend upon them.

The Department of Natural Resources and Energy's Wetlands and Coastal Habitat Program identifies, secures and protects key wetland and coastal habitats across New Brunswick. This program involves managing wetlands and coastal habitats in a manner that will benefit the province ecologically, economically and socially. The program also involves employing Provincial policies, regulations and developing partnerships to further ensure the conservation of New Brunswick's wetland and coastal habitats. Public education, community based projects and international initiatives for wetland conservation are also an important component of this program.

Many policies and laws have also been adopted in order to protect New Brunswick's wetlands. The Provincial Wetlands Conservation Policy is an example of one of the policies adopted to protect Provincially Significant wetlands. Such wetlands are defined as wetlands greater than 1 hectare in size or those of special interest such as home to an endangered species for example. This policy aims to protect these areas from being drained, infilled or otherwise being negatively impacted. In addition, the policy seeks to manage activities near or within wetlands to ensure that they do not lose their critical functions. The provincial government has the intention of also strengthening commitments to secure wetlands and to promote and facilitate wetland stewardship, awareness and education.

Copies of the Provincial Wetlands Conservation Policy can be obtained any the local regional or district offices of the Department of Natural Resources and Energy or of the Department of Environment and Local Government. The following web address can also be helpful in downloading an electronic copy of the policy: http://www.gnb.ca/0078/reports/wetlands/index-e.asp

Other legislative initiatives exist to protect wetlands including the Watercourse Alteration Regulation, which states that nay activity within 30 meters of a wetland requires a permit. Another such example is the Environmental Impact Assessment Regulation that was also adopted to protect the environment including wetland habitats.

### 2.7 WATERSHED MANAGEMENT APPROACH

A watershed can be defined as the area in which all water courses and other sources of water, sediments and disclosed materials flow into a larger body of water such as a bay. Wetlands play an important link between land and water resources and regulate the management of water within a watershed.

Rather than attempting to resolve a problem by focusing on a specific source of pollution, the watershed management approach can uncover the many stressors and factors that affect a watershed and are causes for the environment declines. Actions and ways to improve and protect the environment are much better

determined with a full view of the watershed situation. The Watershed Management Approach involves wetland protection and conservation while considering the entire system at work such as other water resources and land use. The protection of our water resources including wetland habitat is usually best accomplished by means of a watershed management approach. It is the premise that water resource problems are best resolved at the watershed level rather than at the individual water body or discharge level. This approach includes promoting community stewardship and stakeholder involvement, privatizing the resolution of the most important problems, monitoring and data gathering and uniting various agencies together in order to resolve issues.

Such management often proves to be more efficient by increasing the collaboration of agencies with natural resource responsibilities resulting in coordinated efforts, reinforcing each other's activities, the avoidance of duplication and greater resources to achieve greater results. This approach also can save time and money by streamlining the workload.

# 3. PROJECT OUTLINE

## 3.1 PROJECT OBJECTIVES

The objectives of the Community Wetlands Atlas project were to provide a comprehensive digital GIS atlas of the Shediac Bay Watershed's coastal and inland wetlands. This atlas was to include a current, spatially referenced GIS map and database of wetlands located within this area.

The information to be gathered on wetlands for the atlas includes wetland type, site information, significance and status, stressors affecting the wetland and biodiversity data.

The data was collected for the community wetlands atlas with the intention of having the following uses:

- Assess and monitor the status, losses of and changes in coastal wetlands;
- Assist in land-use planning exercises;
- Develop habitat management strategies;
- Target limited resources for conservation and restoration programs;
- Set goals for biodiversity and endangered species recovery plans;
- Support New Brunswick environmental policies and wetland conservation programs; and
- Identify information gaps.

In addition, an objective of the Community Wetland Atlas was to collect data that could provide a record of the current state of the wetlands in the Shediac bay watershed. The information was to be recorded with the intention of improving the effectiveness and efficiency of wetland health monitoring. The project aimed to develop a consistent methodology for mapping and monitoring the wetlands within the Shediac bay Watershed. The goal of the project was also to benefit various agencies, groups and community members by sharing resources and valuable information as well as, strengthening and building partnerships with these groups, in order to create a continued effort towards monitoring and protecting wetlands in the area.

# 4. METHODOLOGY

Wetland locations were identified using the wetlands geographical information systems (GIS) layer provided by the Department of Natural Resources and Energy of New-Brunswick (NBDNRE).

This electronic GIS file illustrating the wetland polygons was from the result of the 2001 aerial photo interpretation done by NBDNRE. The electronic file was provided to us through the Department of Environment and Local Government of New-Brunswick (NBDELG), since they provide the watershed groups with access to the department's databases.

Following the receipt of the file, we were able to prioritize which wetlands to be surveyed since we didn't have time to visit them all. A total of 39 wetlands were visited. Digital pictures were taken using a KodakEasyShare CX6230 digital camera. A Silva Ranger compass, a global positioning system (GPS) model GPS 12 XL by GARMIN, the New-Brunswick Atlas and a copy of the 1996 aerial photographs covering the Shediac Bay watershed area were consulted to navigate when attempting to locate the wetlands on the field.

An identification number was given to the wetlands on the GIS layer which helped in the collection of field data. This number was then matched with the Canadian Wildlife Service Wetland's Atlas number which represented the same wetland. Other information was then added on to the polygon.

Indictor vegetation species and presence of wildlife were noted to add to the information to help better classify the different types of wetlands. The different classes were based on the NBDNRE system that describes bogs, fens, emergent wetlands, shrub wetlands, aquatic beds, forested wetlands and salt marshes.

A copy of the Wetlands Atlas was obtained through the Canadian Wildlife Service. By matching the wetland polygons with the ones received by the NBDELG we were able to add information to our database. A copy of the 1940 aerial photos covering the watershed was also obtained to help illustrate the evolution of the wetlands throughout the last 60 years.

# 5. RESULTS

## 5.1 INTERACTIVE MAP OF WETLANDS

## 5.2 AERIAL PHOTOGRAPHS

## 5.3 ATTRIBUTE TABLE

# 7. DISCUSSION

## 7.1 STATE OF OUR WETLANDS

## 7.2 WHAT CAN WE DO TO HELP

There are many things we can do to help maintain or improve the health of our wetlands. These can be summarized by:

-Value and enjoy your wetland
-Maintain a buffer strip at least 30m
-Fence livestock
-Leave dead or dying trees at wetland edges
-Set up nest boxes
-Educate others and promote stewardship in your community
-Learn more about New-Brunswick's Provincially Significant Wetlands

-Familiarize yourself with wetlands policies and legislation
-Stewardship options that can take the form of verbal agreements, written agreements, property lease, sales, donations and conservation easements

## 8. CONCLUSION

### WHAT HAVE WE LEARNED FROM THE PROJECT?

### HOW CAN WE FURTHER DEVELOP THIS PROJECT?

## 9. REFERENCES

## 10. APPENDICES

### APPENDIX A. ATTRIBUTE TABLE

### APPENDIX B. SBWA NEWSLETTER

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