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SECTION 1 Executive Summary

The Covehead-Brackley watershed is located on the North Shore of Prince Edward Island. It is approximately 72km² (7,300 hectares or 18,039 acres) and includes the communities of Brackley Beach, Brackley Point, Covehead Road, Harrington, North Milton, Stanhope, West Covehead, Winsloe North, and Union Road. The five streams that make up the watershed are, from east to west, Parson's Creek, Auld's Creek, Bell's Creek, Black River, and MacCallum's Creek. These five streams empty into the two bays, Brackley and Covehead. The bays are separated by a small channel at MacMillan's Point and eventually empty out into the Gulf of St. Lawrence at the mouth of Covehead Bay.

Traditionally this watershed has relied on industries such as fishing and farming for people's livelihoods. More recently, many of the communities in the watershed are becoming "bedroom communities" where people are seeking both part-time and full-time residence outside of the capital city of Charlottetown. On the Stanhope peninsula, in particular, housing and cottage development has been the main concern on the water supply. There have been increased incidences of salt water intrusion into wells, as well as coliform and e-coli bacterial contaminations.

Land use has been divided more heavily on developed land and agriculture than on forested land, although the percentage of forested land has increased between 1935 and 2000. The topography of the watershed is highest in the southwestern portion of the watershed, around the communities of Harrington, North Milton, Union Road, and Winsloe North, which is also where some of the highest percentages of agricultural land are found.

The Friends of Covehead-Brackley Bay watershed management group formed in 2001 and began annual clean-ups of the streams in the watershed. From early on the participation from community residents was enthusiastic and supportive. In 2007, the group hired a Watershed Coordinator and began the process of developing the document at hand, a Watershed Management Plan for the Covehead-Brackley area.

This process began with meetings among interest groups such as farmers, fishermen, landowners, and tourism & recreation representatives. Public meetings and a series of workshops to formulate the management plan were also held early in 2008. The result of this work is the majority of the information laid out on these pages: the issues, concerns, goals, and objectives were ideas brought forward by members of the communities in this watershed.

It is the hope of the Friends of Covehead-Brackley Bay that this management plan will stand as a resource and a guide to the future improvement and enhancement of the watershed area. With clear goals, objectives, and timelines the plan should help to steer watershed enhancement activities in the right direction and help the group to achieve their overall mandate:

"...to create a watershed area that is healthy: one which nourishes the land and water, one which is sustainable to native flora and fauna, and also balances the interests of residents, including those working in aquaculture, forestry, agriculture, and tourism."

SECTION 2

Acknowledgements

Major Funders:

- Watershed Management Fund, PEI Department of Environment, Energy & Forestry
- Wildlife Conservation Fund
- Employment Development Agency/Jobs for Youth
- Canada Summer Jobs
- Eco-Action
- Shell Environmental Fund
- Greening Spaces Program

Friends of Covehead-Brackley Bay Board Members & Associate Members:

- David Latimer: Co-Chair, Landowner
- Verner Smitheram: Co-Chair, Landowner
- John Baird: Secretary, Landowner
- Peter Vriends: Treasurer, Landowner, Farmer
- Barry Cudmore: Board Member, Landowner, Farmer
- Gordon MacCallum: Board Member, Landowner, Tourism
- Lorne Kielly: Board Member, Landowner
- Pat Morrison: Board Member, Landowner
- Myron MacDonald: Board Member, Landowner
- Glenn Roberts: Associate Member, Landowner
- H  l  ne Robichaud: Associate Member, Landowner
- Richard Watts: Associate Member, Landowner, Fisherman
- Dianne Morrow: Associate Member, Landowner
- Ken Hubley: Associate Member, Landowner, North Shore Community Council
- Andrew Morrow: Associate Member, Landowner
- Robert Vanderzwaag: Associate Member, Landowner
- Gerry Lajeunesse: Associate Member, Landowner, Summer Resident
- Lorne Stevenson: Associate Member, Landowner
- Wanson Hemphill: Associate Member, Landowner
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- Fred Cheverie, Souris River Watershed Coordinator and Souris & Area Branch PEI Wildlife Federation Coordinator
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- John Jamieson, West River Watershed & President of Central Queens Wildlife Federation
- Dale Thompson: Advisor & Watershed Coordinator – Eastern PEI, PEI Department of Environment, Energy & Forestry

A special thank you also goes out to all of the participants at the various stakeholder meetings, public meetings, and workshops held in 2008/2009, and to all of those people who took the time to fill out surveys and comments online. Without the valuable input and participation of the part-time and full-time residents of these communities, this plan could not have been completed.

SECTION 3 Introduction

The Covehead-Brackley watershed area is comprised of several different North Shore communities: Brackley Beach, Brackley Point, Covehead Road, Harrington, North Milton, Stanhope, West Covehead, Winsloe North, and Union Road. The history of these communities is varied, with Stanhope itself being one of the oldest settlements on Prince Edward Island. Economic activity for much of the watershed has focused mostly on farming, fishing, and tourism. Stanhope, in addition to having a large number of “part-time”, or summer, residents, has also become a popular “bedroom community” for people working in Charlottetown but looking for a home outside of the capital city. This has meant an increase in permanent residents over the last number of years.

FCBB is a community-based volunteer organization established in 2000, incorporated in 2001. It was formed by a group of community members concerned with the health and sustainability of the Covehead-Brackley watershed area. Its mandate is to create a watershed area that is healthy: one which nourishes the land and water, one which is sustainable to native flora and fauna, and also balances the interests of residents, including those working in aquaculture, forestry, agriculture, and tourism.

Since 2001 FCBB has been successful in securing summer crews for work in stream and watershed enhancement. Because of this they have been able to achieve many improvements such as:

- Almost 2,000 native trees and shrubs planted to enhance **riparian zones** and hedgerows
- Multiple blockages of alders and fallen trees cleared in and along streams
- Over 50 **brush mats** installed to collect silt and correct the flow of streams
- Water tested in all streams and at least one pond. Testing included water temperature, dissolved oxygen, turbidity (water flow), conductivity, dissolved solids, salinity, and pH
 - Silt trap installation (Bell's & Black River)
 - Multiple springs cleared and/or dug out to improve water flow
 - Reduction of siltation in waterways
 - Abandoned beaver dams cleared



A **BRUSH MAT** is a mat made of branches or boughs, tied to stakes and placed in the water along banks. It is used to capture sediment and to narrow wide sections of stream.



A **RIPARIAN ZONE** is the area of land immediately adjacent to a body of water.

In addition, FCBB has had yearly Stream Enhancement Volunteer Days and Road Clean-Up Days, where members of the watershed have come out to help with watershed enhancement activities. These have drawn large numbers of local residents and landowners and helped to get them involved in the group and its enhancement activities.

In October 2007, due to the availability of money through PEI's Watershed Management Fund, FCBB was able to hire a Watershed Coordinator to develop a long-term Watershed Management Plan for the area.

In detail, here are some of the enhancement activities that have been completed over the years, and where in the watershed they have been done.

2001

- Development of tree nursery
- 1,900 trees planted (White Ash, Red Oak, Yellow Birch, Eastern Larch, White Pine)

2002

Bell's Creek

- Alder clean-up
- Five brush mats constructed
- In-stream silt trap installed
- Several springs dug out to improve water flow/temperature

2003

Bell's Creek

- Added 800 trees to nursery (totaling 2,700)
- Brush mats constructed
- Cleared alders and fallen branches
- Seventeen blockages cleared
- Beaver dam cleaned out

2004

Bell's, Parson's, and Auld's Creeks

- One spring dug out (Parson's)
- Cleared blockages
- Walked/assessed all of Bell's Creek, half of Black River, all of Auld's Creek
- Another 150 trees planted in nursery (total now 2,850)

2005

Auld's, Bell's Creeks

- Cleared blockages
- Six brush mats constructed on Auld's
- Nine brush mats constructed on Bell's
- 591 native trees & shrubs planted

2006

- Six brush mats constructed
- Digger logs installed (Auld's)
- 1km of stream restoration (blockages, etc.) completed on Black River
- Total of 850 native trees and shrubs planted up to this point – Bell's, Brackley Point Road, Black River Road, North Winsloe, Reardon's, Jay Carr's Pond, Kilkenny Road site

2007

- Nursery dismantled (J. Frank Gaudet Nursery now supplying native trees & shrubs for watersheds)
- Auld's Creek work
 - Gravel used for rehabilitation of springs along creek
 - Cleared alders
 - Nine brush mats installed
 - Springs dug out
 - Water samples taken at all streams

- 170 trees planted
- Removed fence in Auld's
- Installed three digger logs and stone pool
- 357 trees planted (170 on Auld's, 135 on Bell's, 52 on Millstream)
- Installed silt trap on Black River (Murray Hill Farm) – seeded and mulched spoils

2008

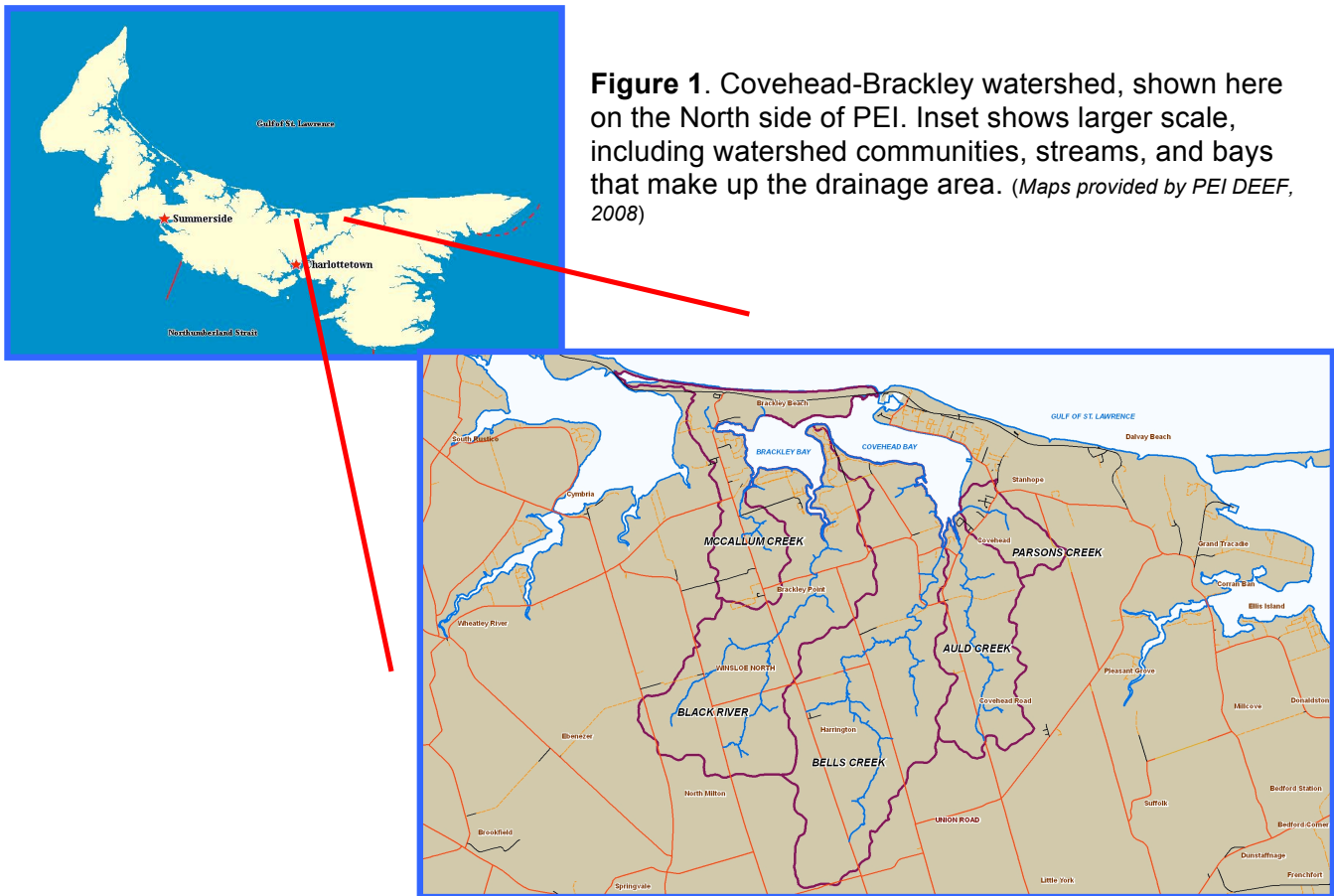
- May 2008 – stream survey completed
- General stream enhancement on MacCallum's Creek, Parson's Creek, Auld's Creek, ½ of Bell's Creek, and a small portion of Black River.
- Alders and other blockages (fallen trees, old railway ties, etc.) cleared from streams to improve water flow
- Installed over 20 new brush mats on Auld's Creek, Bell's Creek, and Black River. Refurbished several more.
- Installed a series of three digger logs on Auld's Creek
- Picked up garbage along streams and roads
- Planted almost 300 trees

SECTION 4 Covehead-Brackley Watershed Description

4.1 Physical & Natural Features

4.1.1 Watershed Boundaries & Hydrology

The Covehead-Brackley watershed is an area of approximately 73km² (7,300 hectares or 18,039 acres) along the North Shore of Prince Edward Island. Its drainage area includes five streams, two bays, and comprises seven communities. (See Figure 1 below)



On the far western side of the watershed, MacCallum's Creek is one of two streams emptying into Brackley Bay. The other is Black River and together the two of them have a total length of approximately 10km of stream in the communities of Brackley Beach, Brackley Point, Winsloe North, North Milton & Harrington.

On the eastern side of Black River, the next stream in the watershed area is also the longest - Bell's Creek (approximately 10 km in length). This stream starts in Harrington and flows through Union Road and West Covehead, eventually emptying into Cass' Pond and then into Covehead Bay.

Further to the east are Auld's Creek, approximately 5km long, and Parson's Creek, 1km in length, which both empty into Covehead Bay as well. Auld's Creek flows into Marshall's Pond

before emptying into the bay. They flow through the communities of Covehead Road and Stanhope and make up the far eastern side of the total watershed boundary.

Both Covehead and Brackley Bays share a narrow mouth between them, with Covehead Bay emptying into the Gulf of St. Lawrence.

The Covehead-Brackley watershed is also bordered on the far northeastern side by the province's only national park, Prince Edward Island National Park - specifically the Dalvey-Brackley section. The watershed group enjoys a strong working relationship with the park, with a staff member sitting as an advisor to the board.

4.1.2 Topography

Generally the topography of the land is that of rolling hills, with a maximum elevation of approximately 62 metres (200 feet) above sea level on the far southern and western edges (communities of Union Road, Winsloe North, North Milton, and Harrington).

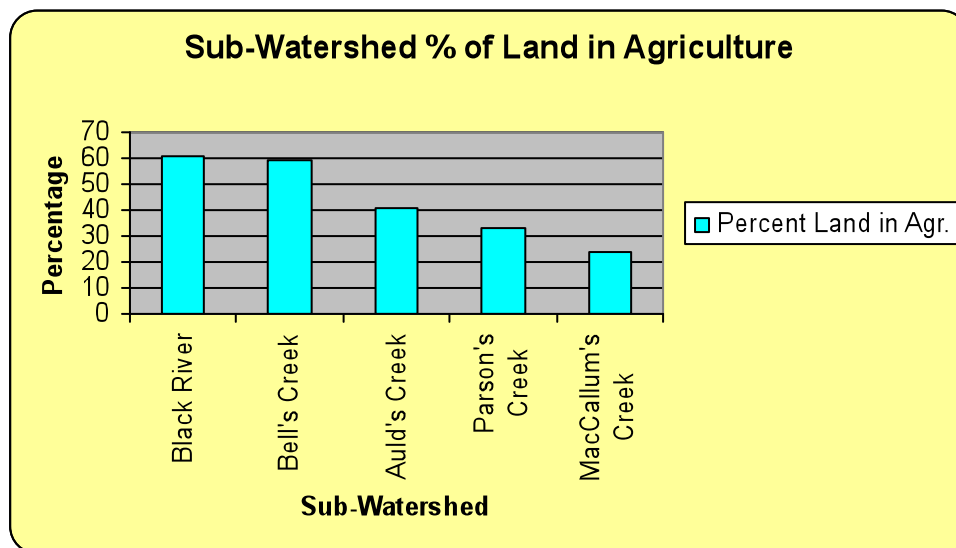
Comparing this topographical information with that of the land use maps (See Figures 6 and 7 on pages 21 and 22) one can see that the highest elevations in the watershed are also the areas with the highest percentage of land under agricultural use. This means that these areas pose the greatest risk of sedimentation into waterways, particularly under heavy storm run-off events. The waterways likely to be most affected by this are the upper reaches of Black River and Bell's Creek.

Compounding this potential water quality problem is the fact that the two sub-watersheds with the highest percentage of land in agriculture also have significant acreages of land sloped at 9% or greater: a total of 274 acres (111 hectares or 1 km²) combined between Black River and Bell's Creek.

In 2002 the PEI Agricultural Crop Rotation Act legislated that any area of land greater than 1 hectare (2.5 acres) with a slope of 9% or more shall either not be planted with a regular crop or, if planted, requires an approved management plan. The reason for this is that land slopes of 9% or greater pose more risk for sedimentation and run-off during storm events.

The key to understanding the risk in this however is in knowing what type of agriculture is happening in this area. Depending whether it is crop production, pasture land, spring vs. fall plowed, etc. will all make a difference in how it affects the water on the downward slope.

Figure 2. Agriculture Land in Covehead-Brackley, by Sub-Watershed



(Figure adapted from data supplied by PEI DEEF, 2008)

4.1.3 Climate

Prince Edward Island is part of the wet Atlantic Maritime hydrological ecozone (Water Survey of Canada, 2004). There is a major Maritime influence on our climate, with an average annual precipitation of 1,100mm. Of this figure about 370mm (34%) goes to groundwater recharge, 290mm (26%) is runoff, and 440mm (40%) is lost in **evapotranspiration** (Personal communication, B. Raymond, January 2009).

Environment Canada lists some of the common water issues that Prince Edward Island deals with on a regular basis as:

- Sizing of instream structures
- Irrigation
- Stock watering
- Land drainage
- Soil erosion & nutrient losses
- Wastewater discharges
- Salt storage, and
- Snow disposal

In addition, the 2007 report, *We Are All Downstream. We Are All Upstream. We Are All Part of a Watershed*, local impacts of climate change were listed as a major concern among many watershed groups, with erosion and siltation in watercourses being said to be

caused by milder winters, less snow cover, and more extreme weather events. These factors certainly affect this watershed as much as any other on the Island and therefore ongoing **climate change** is indeed an issue moving forward.

Scientists predict that temperatures worldwide could rise between 1.4^o and 5.8^oC by the end of the 21st century and in Canada the average temperature could rise between 5^o and 10^oC. What this could mean is more severe weather events, thunderstorms and heavy rains, more droughts increasing the risk of forest fire, and rises in sea levels, a particular concern for a small coastal province such as PEI. Rises in sea levels could lead to flooding and erosion along our coastline, with more water heading inland to do more damage in heavy rain events. (Our Climate is Changing, 2002)

In particular, climate warming is expected to increase the global sea-level rise by a few decimeters (about a foot) in the next century. In Atlantic Canada this means increases in historical rates of sea-level rise along our coasts. Global sea level rise has increased approximately 17cm (7 inches) per century in the Gulf of St. Lawrence. Charlottetown, over the last 95+ years, has shown **an increase of 32cm (13 inches)**. (Impacts of Sea Level Rise and Climate Change on the Coastal Zone of Southeastern New Brunswick, 2006)

The impacts of sea-level rise are multiple. During large storm events flooding can occur along the coast, erosion can occur due to high tidal action, and sea ice can be pushed onto the coast, causing serious damage inland to buildings, roads, bridges, and plant and animal life. (Impacts



EVAPOTRANSPIRATION is the combination of evaporation and transpiration. Evaporation refers to water from the earth's surface, such as streams, rivers, and bays changing into an invisible gas called vapour. Transpiration is when plants use the sun's energy to release water into the air as they take food and water from the soil.



CLIMATE CHANGE is the change in earth's climate, such as rising temperatures and extreme weather events, based on changes in the atmosphere through the build-up of greenhouse gases.

of Sea Level Rise and Climate Change on the Coastal Zone of Southeastern New Brunswick, 2006)

It is these types of climate predictions and events that are causing concern for other watershed groups, and should be a serious concern for Covehead-Brackley, considering the proximity that the watershed has to the Gulf of St. Lawrence. Obviously climate change is a much larger issue that needs to be dealt with on a provincial, national, and indeed global basis, however, education and communication of why climate change affects this watershed will be an essential component of the plan moving forward.

4.1.4 Habitat

By far, one of the most productive and important habitats is the riparian zone.

A riparian zone is the area of land immediately adjacent to a river, stream, lake, pond, or wetland. It can be covered with mature forest, alders, fields, pastures, or marshes. There are no definite boundaries and these zones can include streambanks, floodplains, and plant and animal communities. Some of the benefits of riparian zones include (Guignion et al., 1994, Technical Manual for Stream Improvement on Prince Edward Island; Best Management Practices for Riparian Zones in Nova Scotia, 2006):

- Filter sediments, nutrients, debris and other run-offs from land
- Protect stream banks from erosion
- Provide food, water, and cover for many different types of animals
- Provide travel corridors for wildlife
- Provide shade, food, and reduce water temperature for fish and other aquatic organisms
- Provide leaf litter and woody debris to the stream
- Decrease flood severity by soaking up excess water and storing it in the **flood plains** for slower distribution downstream after high run-off events

The riparian zones in the Covehead-Brackley watershed have been assessed in the fall of 2008, using a Riparian Health Assessment tool developed by the PEI Soil and Crop Association. This tool uses **GPS** technology and equipment to assess riparian areas, identifying such things as invasive species, use of the riparian area for other activities (ie. cattle access or forestry), and stability of stream banks. Riparian areas are then given a health ranking based on the scores provided by the assessor for each of twelve questions.



GPS stands for Global Positioning System. This pinpoints your position on Earth using satellites.

Two staff people have provided training on this assessment tool to the Watershed Coordinator and 2008 Crew Supervisor. Riparian assessments have been completed for each of the five streams to help develop a broad picture of the health of our riparian areas and how various ranking scores may affect surface or groundwater quality in a particular area (for more information see Section 4.3.5).

Relatively few studies can be found on assessment of other habitats, such as fish & aquatic organisms, wetlands, and effects of increasing development in PEI, and much fewer still specifically within the Covehead-Brackley area. However, one study conducted in 1994, titled Suitability of Existing Impoundment Habitat on PEI for Resident and Anadromous Fish Species, used Cass' Pond as one of its test sites, to assess its suitability



A FLOOD PLAIN is a plain bordering a water body that is subject to flooding.

for fish habitat. The researchers stated that they chose Cass' Pond because it had been reported as being a more productive angling impoundment than some others on PEI.

The study was concerned with man-made impoundments since they can provide good habitat for many wildlife species but can also degrade with age. Signs of degradation include "in-filling with sediments, massive vegetation growth, loss of critical nutrients, poor water quality, stagnation, and inadequate fish passage." All of these signs, once exhibited, can affect water quality and cause concern for resident and anadromous fish species using the area. The study looked at such things as temperature, dissolved oxygen (D.O.), groundwater influence, impoundment depth, water discharge and residence time, overall shape and orientation of the impoundment, recreational fisheries potential, and chemical parameters.

In this study, Cass' Pond was ranked highest out of the six for suitable habitat for resident and anadromous fish species. Temperatures ranged between 12 and 13.6 °C (see *Table 1* for preferred temperatures of various fish species), and chemical analyses showed suitable levels of total alkalinity, conductivity, calcium, magnesium, pH, nitrates and phosphorous. Nitrate levels were slightly higher than ideal but at the time of the study the researchers did not feel that this posed a problem.

Fish Species	Preferred Temperature Range (°C)	Average Temp. Tolerance (°C)	Dissolved Oxygen (DO)
Brook Trout	12-16	20	Resident & anadromous fish species require DO levels of 6.5mg/L. They will tolerate 5.0mg/L. The preferred level for all species is 9.5mg/L.
Atlantic Salmon	12-18	22	
Gaspereau	14-18	23	
Rainbow Smelt	8-14	15.6	
Striped Bass	15-25	NA	
American Eel	Unknown	NA	
White Perch	10-25	26.7	
Atlantic Silverside	15-21	NA	

*NA = data not available

(Table & data modified from *Suitability of Existing Impoundment Habitat on PEI for Resident and Anadromous Fish Species, 1994*)

Table 1: Shows preferred temperature ranges and dissolved oxygen measurements required for a variety of resident and anadromous fish species found in Prince Edward Island.

The overall shape and orientation of Cass' is also ideal. It is 4.7 hectares in size, has a long and narrow shape, and a North-South orientation. The only drawback is that at its maximum depth it was measured at 1.5 metres, where a more suitable impoundment habitat would be at least 3 metres deep.¹

¹ Impoundment Depth: Shallow impoundments (<2m) are "usually associated with sedimentation, aging, and loss of critical nutrients".

Impoundment Shape, Orientation, and Basin Configuration: Long, narrow impoundments, in a North-South orientation, >3m deep, and about 2-4 hectares in size appear most suitable for salmonid production.

There are two drawbacks to this study. The first is that it was conducted in the winter season, between January and March, and the second is that it is now quite dated, being more than ten years old. It is likely that the ideal conditions reported on do not continue into the warmer summer months. This may be especially true given the fact that local residents report heavy algae growth and foul smells occurring more frequently on Cass' Pond in recent years. More recent studies are required.

As a small measure of change between the years, and of the time of year data was gathered, Friends of Covehead-Brackley Bay conducted dissolved oxygen measurement tests on several systems in the watershed in August 2008. Cass' temperature at this time of year ranged between 16.6-18.8 °C and the DO measured at approximately 8.5 mg/L fairly consistently. This temperature range is on the high end for fish species such as Brook Trout, Gaspereau and Rainbow Smelt but the dissolved oxygen level is only slightly lower than the preferred DO measurement for all species of fish (Table 1).

Elsewhere in the watershed temperatures ranged between 10.4 °C (Mill Stream Pond) and 18.2 °C (Marshall's Pond) and dissolved oxygen measured between 3.53 mg/L (Marshall's Pond) and 11.39 mg/L (Black River). Far from being scientifically sound, this does however provide a snapshot of measurements of two important water quality factors, particularly for production of fish and other aquatic organisms.

Tidbit data loggers, used to measure water temperature, were installed in 2007 on Auld's Creek, with the assistance of Parks Canada. The average temperatures recorded at those stations were consistent with the temperatures found while doing dissolved oxygen tests in 2008 and are within safe guidelines for most species of resident and anadromous fish, indicating that there may be no immediate concern for fish habitat on this waterway.

For further information on water quality refer to Section 8: Waterbody and Watershed Conditions.

4.1.5 Wildlife

Generally, wildlife and plant life (flora and fauna) in this watershed can be expected to be similar to that of the rest of Prince Edward Island.

Aquatic Life:

PEI has a limited number of freshwater fish species such as:

- Brook Trout or Sea Trout, *Salvelinus fontinalis*
- Rainbow Trout, *Oncorhynchus mykiss*
- Atlantic Salmon, *Salmo salar*
- American Eel, *Anguilla rostrata*
- Alewife, *Alosa pseudoharengus*
- Blue-Back Herring, *Alosa aestivalis*
- Rainbow Smelt, *Osmerus mordax*
- White Perch, *Morone americana*

A study titled *Distribution and relative abundance of salmonids in streams and rivers on Prince Edward Island*, used three of our five streams as test sites. Auld's Creek, Bell's Creek, and Black River were part of 68 major watercourses that were electrofished in 2000, as part of the study, to determine estimates of salmonid populations: specifically brook trout, rainbow trout, and Atlantic salmon. Brook trout were found to be the most abundant in this watershed. No rainbow trout were found and one single salmon parr was found in Bell's Creek, and another on Black River. Researchers feel that with salmon populations this low chances of recovering this particular salmonid population are very unlikely. (Guignion, et al. 2002)



A SALMONID is a member of the fish family, Salmonidae. This includes trout, salmon, charr, and whitefish.

Population densities of total salmonids on Island streams in this study ranged between 0/100m² and 416.5/100 m². The highest density found in the Covehead-Brackley watershed was on Auld's Creek (235.1/100 m²). The lowest was on Black River (7.1/100 m²). Researchers noted that rivers with low salmonid densities also had higher water temperatures in the summer months. They stated that most Island streams had good population densities unless the water quality was otherwise compromised by high temperatures or low dissolved oxygen. Interestingly, the water temperature recorded at the time of electrofishing the Black River system was only 8.8 °C while Bell's Creek had a higher water temperature of 12.6 °C, where the brook trout population was higher at 99.8/100 m² (Guignion et al. 2002). Densities however reflect various habitats, timing and behavioural factors of fish and therefore shouldn't be used as the only tool to measure the success of salmonid populations (Personal communications, D. Guignion, November 2008).

The low numbers on Black River could still indicate an overall higher average temperature, or lower dissolved oxygen, and should perhaps be looked at more closely in the future. Subsequent electrofishing data from 2007 on Black River showed only brook trout again, and at a density of 13.2/100 m² (Guignion, et al. 2007).



A RIFFLE is a section of rocky bottom substrate in a stream, just below the surface of the water.

In addition to the conservative number of salmonids electrofished here, average sizes of the fish captured were small. On all Covehead-Brackley systems the majority of the fish measured were between 3-7cm (1-3 inches) in length. In fact researchers stated that because most of the sites had relatively small pools, and were largely riffle habitat, larger trout were rarely encountered. (Guignion et al. 2002)

Studies that have been conducted to determine eel populations in the watershed demonstrate fairly low numbers, from a mere one caught between May and August 2001 to 31 and 32 caught in Covehead and Brackley Bays respectively, between June and August 2003. Numbers caught in Brackley Marsh are equally low, with up to 17 caught between May and August 2001. Overall, eel landings between 1917 and 2005 show a general decline along the North Shore of Prince Edward

Island. (Cairns et al. 2007)

There are currently eight shellfish leases on Brackley and Covehead Bays: four bottom culture oyster, one off-bottom oyster, and three surface mussel culture leases. As of 2008 most areas of the two bays are open to shellfish harvesting (see Figure 3) with the exception of the upper estuaries, which is common in many estuaries on PEI.

Invasive species such as the Clubbed Tunicate (*Styela clava*), Violet Tunicate (*Botrylloides violaceus*), Golden Star (*Botryllus schlosseri*), and Vase Tunicate (*Ciona intestinalis*) have been identified on PEI, however to date, have not been found in the Covehead-Brackley watershed

(Delephina Keen, DFO and Peter Warris, PEI Aquaculture Alliance, personal communications, October-November 2008).



The Department of Fisheries and Oceans feels that it is only a matter of time before the invasion spreads to other areas in PEI, due to transfer by boats, cargo ships, recreational crafts, and seed transfer among locations. (Economic Analysis of the Mussel Industry in Prince Edward Island, 2006)

Figure 3: Map showing shellfish classifications for the Covehead and Brackley Bays in one of three categories – approved, conditional, or closed. As the map shows, the upper estuaries of both bays are closed to shellfish harvesting, either commercially or recreationally, due to bacteriological contamination. The majority of both bays, as of 2008, are approved for shellfish harvesting.

(Environment Canada.
<http://www.atl.ec.gc.ca/epb/sfish/maps/pei/area3.html>)

Mammal Life:

Mammals on Prince Edward Island include many species that thrive particularly well in small wooded areas, edge (area between field and woods), and those that can benefit from leftover grain in the many fields on PEI. Some examples of common mammals that can be found in PEI, including within this watershed, are (Plants and Animals, PEI DEEF):

- Red Fox, *Vulpes vulpes*
- Snowshoe Hare, *Lepus americanus*
- Eastern Coyote, *Canis latrans*
- Beaver, *Castor Canadensis*
- Muskrat, *Ondatra zibethicus*
- Mink & Ermine, *Mustela vison & Mustela erminea*
- Raccoon, *Procyon lotor*
- Striped Skunk, *Mephitis mephitis*
- Red Squirrel, *Tamiasciurus hudsonicus*

- Meadow Vole, *Microtus pennsylvanicus*
- Deer Mouse, *Peromyscus maniculatus*

Bird Life:

Some examples of the many upland game birds, waterfowl, and other birds on PEI, again many of which are found in this area, are:

- Gray (Hungarian) Partridge, *Perdix perdix*
- Ruffed Grouse, *Bonasa umbellus*
- American Wigeon, *Anas americana*
- Northern Pintail, *Anas acuta*
- Gadwall, *Anas strepera*
- Black Duck, *Anas rubripes*
- Wood Duck, *Aix sponsa*
- Mallard, *Anas platyrhynchos*
- Canada Goose, *Branta canadensis*
- Red-winged Blackbird, *Agelaius phoeniceus*
- Black-capped Chickadee, *Parus atricapilla*
- Bald Eagle, *Haliaeetus leucocephalus*
- Osprey, *Pandion haliaetus*
- White-throated Sparrow, *Zonotrichia albicollis*
- Black & White Warbler, *Mniotilta varia*
- Black-throated Green Warbler, *Dendroica virens*
- Hermit Thrush, *Catharus guttatus*
- Winter Wren, *Troglodytes troglodytes*
- Common Raven, *Corvus corax*
- Pied-billed Grebe, *Podilymbus podiceps*
- Blue Jay, *Cyanocitta cristata*
- American Kestrel, *Falco sparverius*
- American Robin, *Turdus migratorius*
- Hairy & Downy Woodpeckers, *Picoides villosus* & *Picoides pubescens*

Trees, Shrubs & Wildflowers:

Trees, shrubs, and wildflowers common to the area would be those plants that are typical of Acadian Forest and Atlantic Maritime Ecozone settings, such as (Schneider, 1995):

- Red & Sugar Maple, *Acer rubrum* & *Acer saccharum*
- Red Oak, *Quercus rubra*
- White & Black Spruce, *Picea glauca* and *Picea mariana*
- Balsam Fir, *Abies balsamea*
- Eastern Hemlock, *Tsuga canadensis*
- Yellow & White Birch, *Betula alleghaniensis* & *Betula papyrifera*
- Wild Rose, *Rosa* sp.
- Red-Osier Dogwood, *Cornus stolonifera*
- Red-berried & Common Elder, *Sambucus pubens* & *Sambucus canadensis*
- Wild Raisin, *Viburnum cassinoides*
- Serviceberry, *Amelanchier* sp.
- Spotted Touch-Me-Not, *Impatiens capensis*
- New York Aster, *Symphotricum novi-belgii*
- Goldenrod, *Solidago* sp.

- Fireweed, *Epilobium angustifolium*
- Wild Sarsparilla, *Aralia nudicaulis*
- Bunchberry, *Cornus canadensis*, and
- Painted Trillium, *Trillium undulatum*

This is just a small example of the large number of flora and fauna that can be found in this watershed in different ecosystems such as wetlands, roadsides, and woodlands.

Some flora and fauna should be of particular concern when considering ongoing improvement and management of the watershed - those species of animals and plants that are listed as threatened, endangered, or of special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Species at Risk Act (SARA), or Environment Canada.

Some plants and animals that may be of particular concern because they are listed as threatened or endangered and because they live and/or breed near or in the watershed include the Piping Plover (*Charadrius melodius*), St. Lawrence Aster (*Symphyotricum laurentianum*), Short-eared Owl (*Asio flammeus*), Common Nighthawk (*Chordeiles minor*), and American Eel (*Anguilla rostrata*).

The Piping Plover and the St. Lawrence Aster in particular are highlighted as species of concern with the PEI National Park, our neighbouring lands on the eastern side. Since the early 80's the park has been heavily involved in trying to protect the endangered piping plover by monitoring breeding pairs within the park, closing off potential high traffic areas, and working with the public to educate them on this shorebird and its habitat.

Efforts are currently underway by the park to increase the population of the St. Lawrence Aster through preservation of important areas, plantings and public education of this nationally threatened species.

4.2 Land Use and Population Characteristics

4.2.1 Land Use and Land Cover

Land use in the Covehead-Brackley watershed area has been tracked since 1935.

In 1935, the Covehead-Brackley area was mostly developed land (71%), which included *both* housing and farmland (these statistics were not separated at the time). It is likely that the majority of this percentage was in fact farmland, given the fact that the population was smaller back then and agriculture was a prominent fixture in the landscape. Forested land accounted for 25%, with reverting land² and wetland at 3% and 1% respectively. (See Figure 6 on page 21)

In 2000, the latest date for which there is information available, agricultural land accounted for the largest portion of land use, at approximately half of all land use, followed by forested land at 34%. Developed land was now tracked separate from farmland, and accounted for 8% of land use. Finally, 6% of the Covehead-Brackley watershed in 2000 was wetland. (See Figure 4 on page 19)

It is difficult to make direct comparisons between these two sets of statistics for a number of reasons. Farmland and developed land (housing) were presented differently in each of these

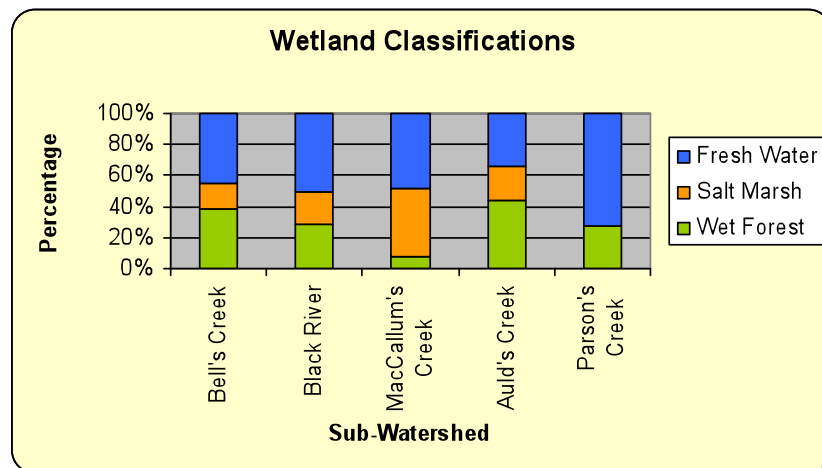
² Reverting land is abandoned farmland left to old growth.

years, reverting land was not tracked in 2000 so no comparison can be made, and wetlands were better tracked and identified in 2000 than in 1935. Even in the 2000 inventory, which is based on aerial photographs, some smaller wetlands may not appear. Additionally, the latest statistics are still rather out-of-date, being eight years old. It is felt by the watershed group that if newer statistics were to be obtained, they would show that agriculture is less than the 52% reported in 2000, and that development is higher than the 8% reported, based on observations and increasing development in some areas, such as the Stanhope peninsula (see Section 4.2.2 Population Trends).

However, these figures do give us a general snapshot of the watershed area, showing that in 65 years, agriculture has been an important land use practice. Forested lands have increased, and there is a relatively small amount of wetland in the watershed. At 6%, that equals 438 hectares designated as wetlands, or approximately 1,082 of a total 18,039 acres in this watershed.

In the figure below wetlands have been divided into wet forest, salt marsh, and fresh water. Total percentages for each sub-watershed and wetland type are shown. Salt marsh, a particularly productive wetland environment seems to be most prominent in the MacCallum's Creek sub-watershed, followed by Auld's Creek and Black River.

Figure 4.
Wetland Classification in
Covehead-Brackley
Watershed



(Figure adapted from data supplied by PEI DEEF, 2008)

The focus for future improvement of this watershed area is likely to include strategies for dealing with the amount and distribution of agricultural, urban developed, and forested land use practices. The PEI Government web site quotes a recent watershed study completed in Wisconsin that analyzed watershed land use and wildlife habitat quality. The study is considered to be pertinent because this state has a similar pattern of resource land use to PEI and the impacts on habitat quality are considered relevant. The study found that if agricultural land use exceeds 50% there is a direct decline in habitat quality. (Wang, L. 1997)

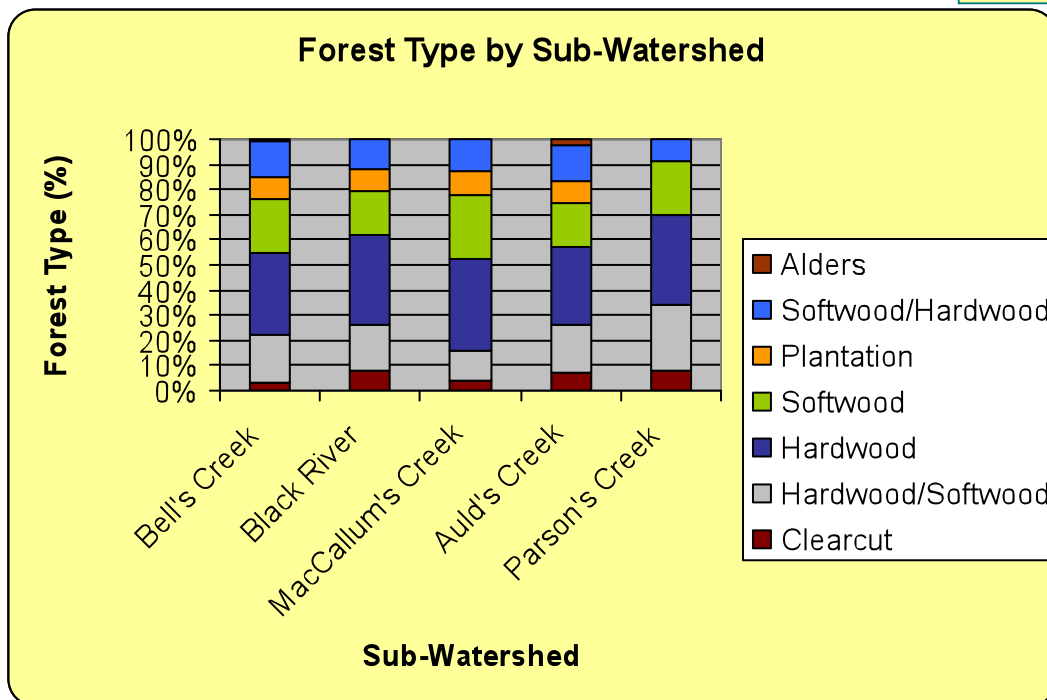
Urban development in the same study was found to be “strongly associated with poor biotic integrity”, with the maximum threshold being 10-20%. Furthermore, the study suggests that a minimum of 50% forest cover is required to provide good habitat for aquatic organisms and terrestrial wildlife.

In short, the ideal conditions for a healthy watershed and good quality habitat is to have less than 50% land use in agriculture, at least 50% forested, and no more than 10-20% in urban development. The Covehead-Brackley watershed, as of 2000, had approximately half of land use in agriculture, 34% in forested land, and slightly less than 10% developed land. Assuming the 2000 statistics are still relevant, these numbers show a relatively healthy watershed in terms of habitat quality, although more effort could be put towards increasing the amount of forested land. Moving forward, care should be taken to ensure that land use remains similar, to ensure good quality habitat for future generations.

While the amount of forested land increased between 1935 and 2000 it is important to understand the breakdown of that reforestation. For instance, as shown in the figure below, 2000 data includes clearcuts and plantations, accounting for 13% of the total forested land among all of the sub-watersheds together. Some feel that clear-cutting, road building, and artificial replanting harm the **biodiversity** of a region. While there are many views, and more ecological research is required, it is important to take this opinion into account. (Forest Biological Diversity, 2005.)



BIODIVERSITY is biological diversity; that is, the number, variety and variability of living organisms.



(Figure adapted from data supplied by PEI DEEF, 2008)

Figure 5: Forest type per sub-watershed in Covehead-Brackley

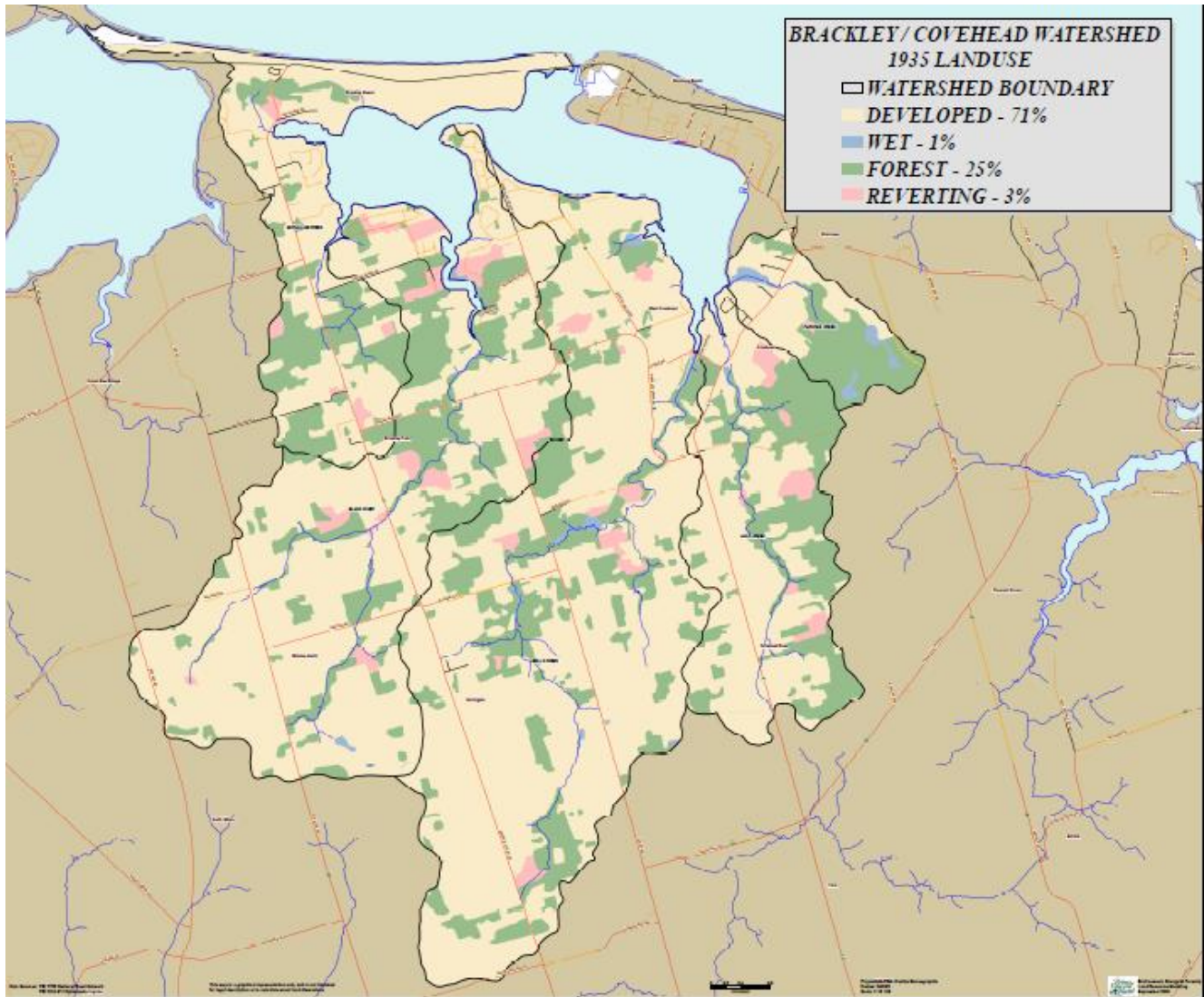
Some of the communities within the watershed have an official municipal plan, which works towards supporting these types of land use ideals. The North Shore Council represents Covehead, West Covehead, and Stanhope. The official plan for this area was developed in 2004 and is intended to be valid until 2014. (North Shore Official Plan, 2005)

The main goal of the plan is stated as:

“The primary goal with regard to future land use in the Community of North Shore is to encourage a limited amount of new non-agricultural development within the Community, while maintaining the overall character of the Community as a rural, resource-based community.”

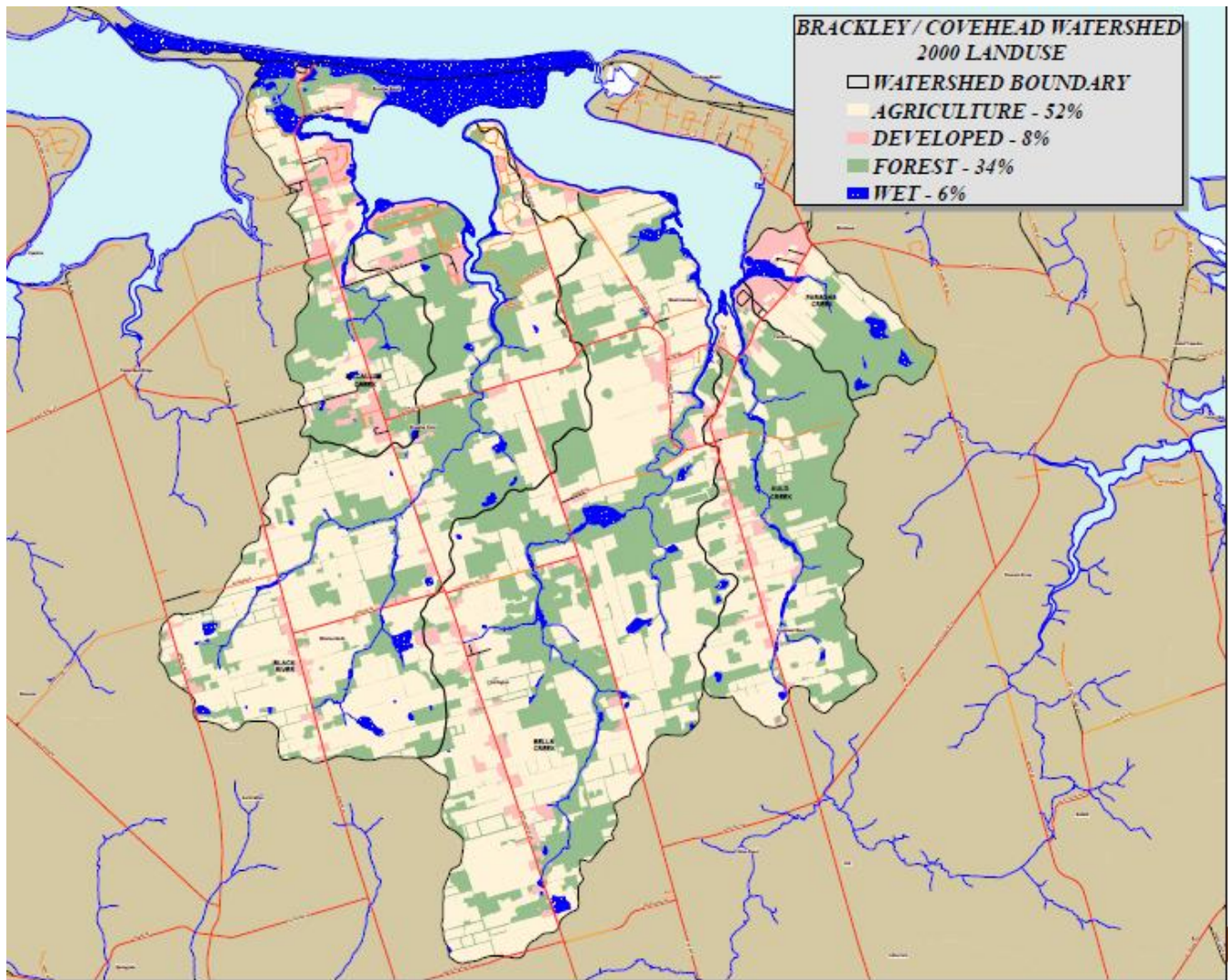
In the plan the agricultural policy states that any land not being used for agricultural purposes may be converted to forestry use. The residential policy also states that development will continue at a reduced rate, accommodating for present and future demand but maintaining a low density of housing.

Most importantly, however, the plan officially recognizes the importance of natural areas and the role they play in the natural ecology of the Island. The plan’s objective is to work with the provincial department of Environment, Energy & Forestry, as well as community groups, to maintain this integrity. They support provincial buffer zone regulations between watercourses and nearby developments and any alterations to watercourses or wetlands shall only be undertaken with the appropriate permission from the province.



(PEI Department of Environment, Energy & Forestry Land Use Inventory, 2000)

Figure 6. Land use information for the Covehead-Brackley watershed area, 1935. Developed land (71%) included farmland and housing. Wetland accounted for 1% of land use, forested land, 25%, and reverting land 3%.



(PEI Department of Environment, Energy & Forestry Land Use Inventory, 2000)

Figure 7. Land use information for the Covehead-Brackley watershed area, 2000. Agriculture and developed land are now separated at 52% and 8% respectively. Forested land increased over 1935 data, to 34%, and wetlands in 2000 accounted for 6% of total land use in the watershed.

4.2.2 Population Trends

The majority of the watershed area is covered in the map lots of #33, #34, and Miltonvale Park, according to Statistics Canada. Data from the 2006 Census shows that population levels have decreased slightly (- 0.9%) from 2001 in all three areas.

These numbers are very rough figures since not all of each map lot lies within the watershed boundary. Watershed population numbers are likely lower than the estimates presented here. (2006 Community Profiles, 2006)

The number of private dwellings for all three areas is approximately 2,130. At an average number of persons per household estimated at 2.7 (*Statistics Canada*), the rough estimate on the population for the area is 5,751. The number of part-time residents accounts for 29%, 35%, and 3.8% for Lots 33, 34, and Miltonvale Park respectively.

The Stanhope Water Study (2008), currently in draft phase, presents some potential problems with population density and water concerns, specifically for the Stanhope peninsula area. Their data shows that since 1988, the number of properties in year round use increased by 67%, while seasonal property use increased by a more modest 17%. The percentage of land in year round use has continued to increase since the year 2000 (by an additional 20%), while land in seasonal use has decreased by 26%. During the same period the amount of undeveloped land declined by 36% and statistics show a corresponding population growth, indicating that more land is being developed to accommodate a growing permanent population.

Some of the issues that the area is starting to see as a result of these statistics are salt water intrusion in wells, coliform and e-coli bacterial contaminations, and iron and manganese problems. The North Shore Municipal Council is in the process of trying to address these problems by doing studies on water and sewage systems for the area, as well as encouraging more efficient consumption of water and fewer pollutants and contaminants used that could flow into Covehead Bay, affecting surface water quality.

4.3 Waterbody and Watershed Conditions

The following are reports, studies, and surveys that pertain, either in whole or in part, to the Covehead-Brackley watershed. Results presented here help to formulate a picture of water quality in the watershed area.

4.3.1 PEI Water Quality Interpretive Report

In 1999 Environment Canada and the Province of PEI's Technology and Environment Department (currently the Department of Environment, Energy, and Forestry) published a report on the quality of water on the Island. At that time, some of the main concerns highlighted by the report were nitrate levels in groundwater, nutrient enrichment of surface water, a strong link between land use and higher nitrate concentrations in surrounding water, and low dissolved oxygen levels in some estuarine environments.

The main watersheds studied for this report were Mill River, Wilmot River, Dunk River, West River, Montague River, and Bear River. Brackley Bay was also listed as one of the estuaries in that study that showed anoxic conditions and eutrophic symptoms. Almost a decade later, we find the watershed group dealing with many of these same problems.

4.3.2 Water Quality in Covehead/Brackley Bay and PEI Estuaries Study

There are several studies on water quality and habitat available for the Covehead-Brackley watershed area. One of the major studies on water quality was one that was undertaken by the PEI Department of Environment and Energy in 2000. The study, entitled *Water Quality in Covehead/Brackley Bay*, took place between June 16 and October 18 of that year. The goal was “to determine the extent and possible causes of poor water quality conditions.”

Researchers looked at the following:

- Dissolved oxygen
- Salinity
- Suspended solids
- Nutrients (ammonium, nitrate, total nitrogen, and total phosphorous), and
- Chlorophyll

The results of this study showed that Brackley Bay had particularly low dissolved oxygen levels and higher suspended solids than in Covehead, posing significant challenges in that system for aquatic life. Nitrogen loading was highest in Covehead and correlated strongly to land use, where greater percentages of agricultural land *surrounding* the water meant higher nitrate and total nitrogen concentrations *in* the water. The upper estuaries of both bays had nitrate, nitrogen, and chlorophyll levels indicating **eutrophic conditions**.

Compounding these problems, the study found that the tidal volume for both bays is less than the total tidal range available, indicating a barrier to tidal flow and subsequent flushing of the bays. Brackley Bay has a particular challenge with tidal flushing due to the narrow mouth at MacMillan’s Point, which separates Brackley and Covehead Bays. All water needs to flush through this point first, before being able to flush out into the Gulf from Covehead Bay, creating a funnel effect and reducing water flow.

The PEI Estuaries Study, a long-term study of twenty-one estuaries in the province, including Brackley and Covehead Bays, looked at some of the same parameters as the Water Quality study mentioned above and were included in those results. Some significant findings in this watershed from the Estuaries study are:

- Brackley Bay was among the top ten highest concentrations of chlorophyll levels among PEI estuaries, indicating eutrophic conditions present.
- Dissolved oxygen levels were found to be below water quality guidelines for the protection of aquatic life at least once in each sampling station of both bays between 1998 and 2003.
- Total nitrogen concentrations increased between 2000 and 2004. Covehead Bay was consistently higher than Brackley in that timeframe and all but one sampling station showed values consistent with eutrophic conditions.



A EUTROPHIC CONDITION is water that is high in minerals and nutrients, enough to produce large amounts of plant life (algae). This reduces dissolved oxygen in the water as it dies off, suffocating other aquatic organisms.

4.3.3 Report on the Streams in the Covehead-Brackley Bay Watershed

When Friends of Covehead-Brackley Bay determined that a long-term management plan was indeed going to be developed, they decided to take stock of the watershed systems and assess potential stream enhancement sites on the five streams leading into the bays. This survey was completed in May 2008 by a local watershed resident and contractor and the results were incorporated into a report titled *Report on the Streams in the Covehead-Brackley Bay Watershed*.

The goal of this report was to provide a broad overview of the state of the streams and bays in the watershed area, identify potential stream enhancement activities and issues to be addressed, and prioritize the findings according to severity. The goal of the study was to look at the streams themselves, although at times notes were made on the area surrounding the stream, if causes of water deterioration were immediately apparent (ie. Cattle access into a stream). Each stream was walked, potential problem areas were identified using a Global Positioning System (GPS) and field notes. All GPS points were downloaded using a GPS/GIS software and were overlaid onto a map of the watershed area. The results being that the group now possesses a written and visual report on the problems affecting the watershed.

“Hot Spots”, being of the highest severity or having potentially the most detrimental effects on water quality, were found to be cattle access in two spots. One access was on MacCallum’s Creek³ near Britain Shore Road, the other on Bell’s Creek, on Estries Pond. A third hot spot was noted on Guerney Road where it appeared that sand and silt could potentially be washing into the stream from the dirt road.

“Areas of Attention”, the next level of severity, were found on all streams but Parson’s Creek. They included beaver dams that were potentially blocking good fish passage on an otherwise healthy populated stream⁴; partial blockages of woody debris, algae or other materials; partially blocked & submerged culverts; possible cattle access to a spring on Bell’s Creek; apparent clear cutting within a riparian zone; rusted car frames left in streams; and culverts that are too high and blocking potential fish passage.

Finally, “General Enhancement Areas” were found to be just that; areas where stream enhancement should take place but with no immediate detrimental effect to water quality. These included partially crushed (but not blocked or submerged) culverts, culverts that were too small for water flow, general debris/wood blockages, and springs to be dug out to help reduce the temperature of the water and improve the flow.

In addition to these three severity levels, several areas of potential tree-planting opportunities were identified. To date, two of the five suggestions have been planted, one landowner has been contacted and is not interested at this time, and two others have yet to be contacted.

³ This location had already been identified and the owner spoken with in 2007. The cattle had been fenced out of this watercourse early in 2008 and a planting of native trees, shrubs, and grasses was completed in June 2008 on the farmer’s property.

⁴ Please note that beaver dams, while sometimes blocking fish passage, can have beneficial properties such as creating waterfowl nesting and feeding areas. They were listed in the report as areas of attention but will be assessed individually in the future for potential benefits versus blockages.

Overall this report provides a good general overview of the conditions in the watershed and identifies areas that have either already been enhanced by the 2008 summer crew or are good potential projects for future funding applications.

4.3.4 Nitrates in Covehead-Brackley

Cultivating Island Solutions (1997), PEI Water Quality Report (1999), the Covehead-Brackley Bay study (2000), Government of PEI State of the Environment Report (2003), and most recently the Report of the Commission on Nitrates in Groundwater (2008) have all brought forward the issue of increasing nitrates in Island groundwater.

Nitrates are a form of nitrogen that are water soluble and, when found in excess, will penetrate groundwater and make their way into surface waters. High amounts of nitrates lead to increased plant growth in the water, such as sea lettuce. That sea lettuce, once it begins to die, uses up oxygen in the water and creates anoxic conditions. This leads to suffocation by fish, shellfish, and other aquatic organisms using that water.

Average groundwater concentrations of nitrates in the Covehead-Brackley area have remained relatively stable since 2000. On average, the area shows levels between 3-5 mg/L. The upper limit considered safe for human consumption is 10 mg/L. Beyond that there are risks to certain populations, particularly infants who can contract a condition known as methemoglobinemia or Blue Baby Syndrome. There is also concern that nitrates are linked to certain types of cancer, such as stomach or gastrointestinal cancers (Report of the Commission on Nitrates, 2008).

In 2007/2008, as part of an early recommendation from the Report on Nitrates, the Province of PEI held several free nitrate testing clinics across the Island. Covehead-Brackley held a clinic in February, with almost 250 people attending (165 of which were residents of this watershed) and again in July, where 138 people attended.

Overall, results from these clinics show an average groundwater nitrate concentration of 3-5 mg/L in the Covehead-Brackley watershed. Results from the July clinic have not been broken down by community, however, results from the February clinic show that the majority of people who tested their water fell within a range of 1-5 mg/L (51%), followed by those in the range of 5-8 mg/L (22%). Eleven percent (11%) of samples tested at or over 8 mg/L and 4% of those were over the "safe" drinking limit of 10 mg/L.

In the table below (Table 2) blocks shown in green are higher incidences of relatively low nitrate ranges, found in Brackley Beach, Covehead, West Covehead, and Stanhope. The blocks in red are higher incidences of elevated, even dangerous, levels of nitrates found in well water in Covehead, Stanhope, Brackley, and North Winsloe. Covehead and Stanhope are highlighted in both the low and high ranges of nitrates here. Further research would be needed to determine if the higher levels found in well water were in a concentrated area of these communities.

The numbers are few and not statistically significant but this could suggest that future research is needed to determine the overall nitrate concentration in these areas and whether or not there is a direct link to activities such as agriculture and development.

Community	Total N	Range (mg/L)
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	Samples	≤ 1	1 - 5	5 - 8	8 - 10	≥ 10
Brackley	11	2	4	3	2	
Brackley Beach	24	5	13	5	1	
Covehead	31	1	15	10	3	2
Harrington	9	1	3	5		
North Winsloe	3		1		1	1
Stanhope	52	16	25	5	4	2
Union Road	12	1	9	1		1
West Covehead	23	2	14	7		
SUMMARY	165	28	84	36	11	6

Table 2: Nitrate clinic results for February 2008, broken down by specific Covehead-Brackley watershed communities *(Adapted from community breakdown results for nitrate clinics held in 2008, PEI DEEF)*

4.3.5 Covehead-Brackley Riparian Assessment

In October and November of 2008 staff from the PEI Soil and Crop Association made a presentation and delivered training on a new tool, adopted from the Alberta Cows and Fish Program, called a Riparian Health Assessment.

The tool does just that – assesses the health of riparian zones – through field work and a series of eleven questions that help the assessor categorize any given area of riparian zone into healthy or needing work. Plant communities play an important role in this assessment. The questions cover the following topics:

1. Vegetative Cover of Floodplain and Streambanks.
- 2a. Total Canopy Cover of Invasive Plant Species (Weeds).
- 2b. Density/Distribution Pattern of Invasive Plant Species (Weeds).
3. Disturbance-Increaser Undesirable Herbaceous Species.
4. Preferred Tree and Shrub Establishment and/or Regeneration.
5. Utilisation of Preferred Trees and Shrubs.
6. Standing Decadent and Dead Woody Material.
7. Streambank Root Mass Protection.
8. Human-Caused Bare Ground.
9. Streambank Structurally Altered by Human Activity.
10. Human Physical Alteration to the Rest of the Polygon.
11. Stream Channel Incisement (Vertical Stability).

Once the assessments are completed in the field, the data is downloaded into a software that provides the user with a visual of their riparian health. This data will prove to be very useful moving forward as it will be used to assess areas for improvement in future watershed enhancement activities.

Figure 8, on the following page, is the map of riparian health in the Covehead-Brackley watershed, developed from the assessments in October and November. The green lines

indicated healthy riparian areas, while the yellow and red lines indicate potential problem areas that may need to be addressed.

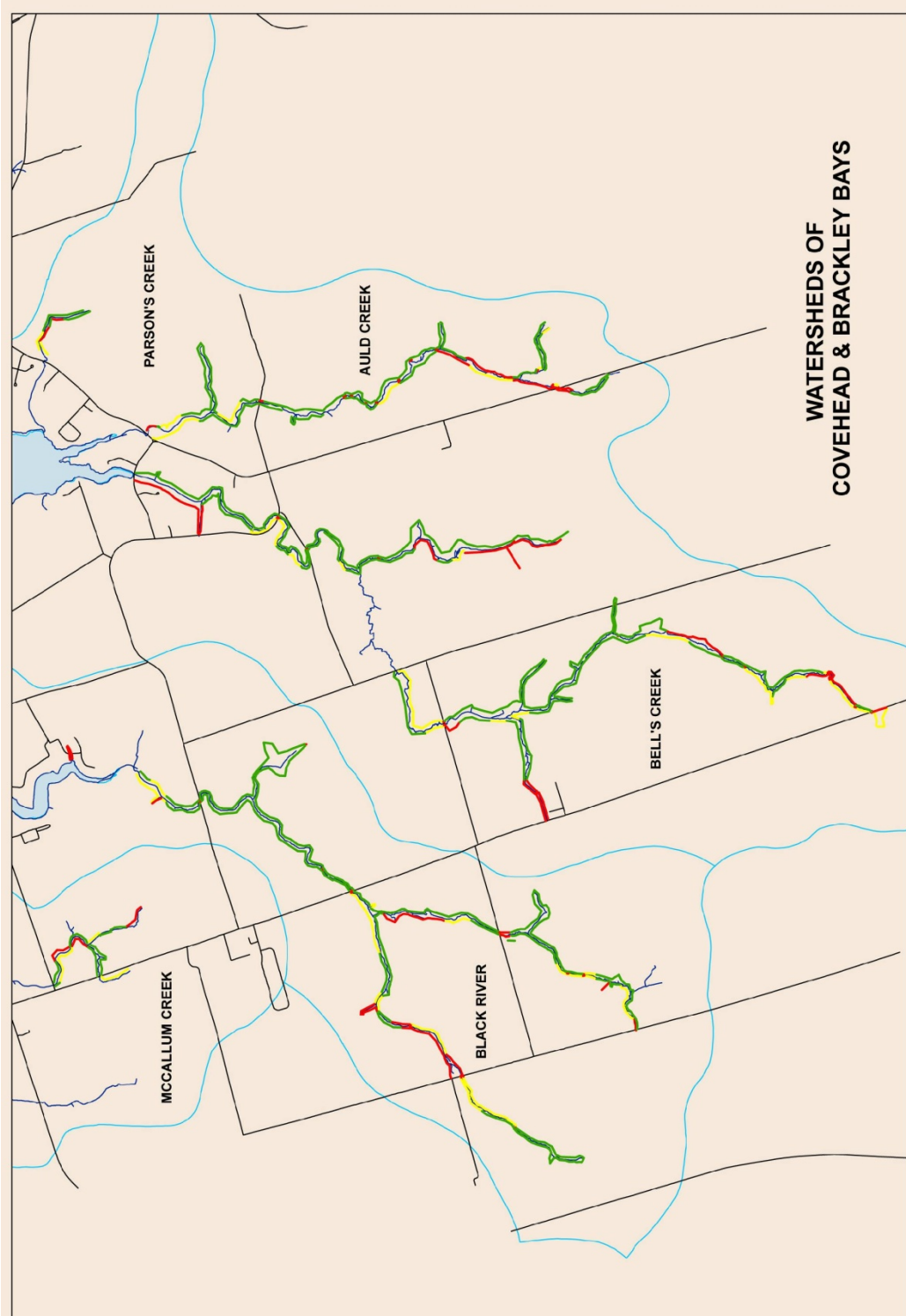


Figure 8: Riparian Health Assessment completed in the Covehead-Brackley watershed, Fall 2008. (*PEI Soil and Crop Association, 2008*)

SECTION 5 Watershed Management Planning Process

While stream enhancement activities since 2001 have been successful, Friends of Covehead-Brackley Bay (FCBB) recognized the necessity for long-term planning for real improvement and sustainability of the watershed area.

With funds received in October 2007 through the Watershed Management Fund, FCBB set out to hire a Watershed Coordinator. A Coordinator was hired in November 2007 and began immediately to work with board members and associates to develop a Watershed Management Plan.



Figure 9: Public meeting with watershed residents, March 2008.

The first step in this process was to involve the community and obtain input from them on watershed issues, concerns, and general history of the area. Several meetings, workshops and presentations were held between January and March 2008.

In particular, stakeholder meetings were held with farmers, fishermen, tourism & recreation people, and people owning land along one of the five streams in the watershed. Two public meetings were held. The first, held in February, hosted guest speaker, Cindy Crane, discussing results of a study conducted on water quality in Covehead and Brackley Bays in 2000.

Three smaller workshops were held in March, where landowners began to shape the issues and concerns that had come out of the public meetings into a framework for a Management Plan. This involved developing a vision statement for the watershed, as well as goals, objectives, and strategies to address the issues and to prioritize those strategies into short-term and long-term solutions.

A second public meeting was held in late March where the Watershed Management Plan development to date was presented to watershed residents.



Friends of Covehead-Brackley Bay hope to use this document to direct long-term planning and improvements within the Covehead-Brackley watershed area, while recognizing that it is a living document that can be adjusted as required to fit the needs of the community and the group moving forward.

Figure 10: Watershed residents discussing the management plan at a workshop, March 2008.

Ongoing efforts will include enhancements to the waterways themselves, land surrounding them, and valuable collaborations with area residents, government, and non-profit organizations.

SECTION 6

Issues and Concerns in Covehead-Brackley

Below are the main issues and concerns that were brought up by residents and landowners in the watershed between January and March 2008. While the comments are subjective and may or may not represent actual circumstances, they are certainly perceived concerns by residents in the watershed area and, therefore, are valid issues to research and address in long-term watershed planning and enhancement.

Many of these issues are similar to those that were brought up in consultations and a subsequent report distributed in 2007 titled "*We are all Downstream, We are all Upstream. We are all Part of a Watershed*" highlighting the fact that many watersheds in PEI face similar issues. Topics presented in that report were: siltation, nutrient enrichment, decreased biodiversity, pesticides, poor tidal exchange, and local impacts of climate change. Some of the contributing factors that were named in those consultations as causes of these problems were: agricultural practices, regulations and enforcement, deforestation, development, land use planning, and Transportation and Public Works' activities.

The issues below have been divided into eight categories. All items that are bulleted under each numbered category are examples of comments that were heard at meetings, through survey feedback, or online at the North Shore Municipality web site.

6.1 Soil Erosion

- Clay roads, improper ditching & culverts
- Run-off from fields
- Ponds excavated, still too much silt & weeds for wildlife
- Depth of ponds, streams, etc. shallower
- Silt in bays about 3 feet deep
- Erosion of banks along Covehead Bridge
- Heavy amounts of silt and run-off in 2007
- At low tide, river is a virtual mud flat
- Silt 1-2 feet deep covers over natural gravel bed
- Stream enhancement work being filled in again with silt

6.2 Deforestation

- Not enough hedgerows
- Tree planting along roads – windbreaks
- Need to improve buffer zones
- Need to increase tree planting
- Need to go beyond current government regulations for buffer zones, hedgerows, etc.

6.3 *Anoxic Events: Nutrient Enrichment in Streams and Bays*

- Pesticide run-off a problem
- Chemicals sprayed impede blueberry growth
- Cow manure found in stream
- Nutrients draining into water
- Lots of sea lettuce growth
- Water stagnant and green
- Covehead is a dying bay
- More algal blooms happening
- Sea lettuce covering fish habitat

6.4 *Poor Water Flow in Streams and Poor Tidal Flushing in Bays*

- Poor water flow at Marshall's Pond – water stops, becomes stagnant
- Need to increase the amount of cold water flow in streams
- Stagnant water attracting mosquitoes
- Low tidal flushing in bays
- Springs cleaned out, water flow still poor

6.5 *Human Development*

- Concern over freshwater supply, water quality
- Salt-water intrusion a concern – changing demographics, more long-term residents
- Wells need to be dug deeper
- Old, improper, and leaking septic systems a problem in some areas – affects groundwater

6.6 *Wildlife Habitat*

- By June/July number and size of trout greatly reduced
- Fish kills, shellfish closures
- Fish ladders inadequate for fish, ok for eels
- Sea lettuce covering up fish habitat
- Mosquito habitat increasing with stagnant water

6.7 *Water Blockages*

- Garbage being dumped in creeks
- Shale placed in brook for crossings washes out regularly
- Build-up of garbage along and in streams
- Inadequate culverts

6.8 Watershed Resident Education and Communication (Long-Term and Seasonal Residents)

Based on the first workshop held to develop the Watershed Management Plan, this was brought up as the 8th issue for the plan. To date there has largely not been a great amount of ongoing education and communication due to lack of funding and coordination of such activities. Residents would like to see a special emphasis on this, particularly with the unique situation that exists here with the high number of seasonal residents, as well as long-term residents. A special challenge will exist on how to reach both of these demographics on an ongoing basis.

In addition to the above issues and concerns that were presented by watershed residents in the winter of 2007/2008 the following vision statement, guiding principles, and goals/objectives were developed through a series of workshops with watershed residents.

SECTION 7 Vision Statement

The vision statement below was adopted from the vision statement in the Souris Watershed Management Plan, which residents felt was well-developed and generally represented the vision of the Covehead-Brackley area as well. Adjustments were made to ensure that the statement applied to the unique needs and demographics of the Covehead-Brackley watershed.

A healthy sustainable community, based on environmental, educational, economic, and social values whose residents work together in harmony with activities such as agriculture, tourism, recreation, fisheries, forestry, and aquaculture.

SECTION 8 Guiding Principles

Potential “guiding principle” ideas that Friends of Covehead-Brackley Bay should follow moving forward, based on comments heard in meetings.

1. Landowners are the key to success in the Covehead-Brackley watershed area. Friends of Covehead-Brackley Bay (FCBB) will ensure that they are included at all levels of ongoing enhancement efforts.
2. FCBB will strive to maintain the highest level of ongoing communication, education, and awareness with watershed communities to ensure that people are involved and informed of activities and successes.
3. Communication initiatives will take into consideration the unique demographics of the Covehead-Brackley watershed area, with a high number of both long-term and seasonal residents and landowners, and will endeavor to ensure that both are equally involved and included.
4. FCBB will encourage good stewardship and ensure that it is recognized and promoted to all watershed communities so that people in the area can learn from each other.

SECTION 9 Goals

Goals from both the Stanley/Hope River and Souris Watershed Management Plans were presented at the first workshop, then objectives (*ideas* on how we can reach our goals) and strategies (*specific actions* we can take to reach our goals) were discussed in the second workshop. Based on these discussions, the following list was compiled as potential goals, objectives and strategies for the Covehead-Brackley plan. All strategies were prioritized by residents as immediate action items to be addressed (within 1-3 years), short-term action items (4-6 years), and long-term action items (7+ years).

GOAL #1 Improve and protect the quality of groundwater and surface water

Objective #1

Reduce the negative impacts of poor land and water use practices on groundwater and surface water quality, and restore water quality measures to within proven and accepted healthy standard ranges within ten years.

Immediate Action Items (1-3 years)

- Strategy:* Work with the Department of Environment, Energy & Forestry to determine nutrient loading targets (ie. nitrates) for the Covehead-Brackley watershed and estuary.
- Strategy:* Determine sources of water quality degradation within the watershed (eg. Nutrient inputs such as nitrates, mussel farming impact on water quality, etc.)
- Strategy:* Identify major run-off areas in the watershed and consult with provincial/federal governments and water experts to determine if installation of “filter ponds” to catch run-off would be a viable solution.
- Strategy:* Develop policy on repair and replacement of in-stream crossings, such as culverts and bridges, on private lands in watershed. Focus will be collaboration with landowners while reducing liability for organization.
- Strategy:* Work with provincial departments of Transportation and Public Works, and Environment, Energy & Forestry to identify areas of flooding and major road run-off and minimize these impacts through repair/replacement of inadequate culverts, installation of erosion control structures, and development of maintenance guidelines.
- Strategy:* Identify dump sites in and near streams and bays, and remove debris from the area. Address illegal dumping problems with provincial environmental enforcement officials and try to minimize illegal dumping through community education.

Goal #1, Objective #1 Continued...

Strategy: Encourage residents and homeowners to take full responsibility and accountability for the upkeep and maintenance of their sewage septic systems.

Strategy: Review 2008 Commission on Nitrates Report and work with landowners, government, and non-governmental organizations to incorporate key recommendations into Covehead-Brackley watershed enhancement.

Strategy: Research potential for mussel mud harvesting in Covehead and Brackley Bays with business offices such as that at UPEI.

Short-Term Action Items (4-6 years)

Strategy: Encourage and promote farmers' efforts in using Beneficial Management Plans (BMPs), Environmental Farm Plans, and other similar programs meant to minimize negative environmental impacts of agriculture. Encourage farmers and agrologists to work together to achieve BMPs.

Long-Term Action Items

Strategy: Reduce the residential and commercial use of pesticides and chemical fertilizers throughout the watershed and encourage alternatives that are effective and economically feasible.

Objective #2

Develop annual stream enhancement and water quality monitoring systems for streams and bays to determine water quality measurements and enhancement opportunities for staff and volunteers.

Immediate Action Items (1-3 years)

Strategy: Work with the Department of Environment, Energy & Forestry's annual efforts in monitoring the Covehead-Brackley watershed, where each of the five streams and two bays are monitored on an annual basis for general water quality (nitrates, temperature, dissolved oxygen, flow, etc.). This will provide historical and ongoing research results and documented data on water quality trends.

Strategy: Utilize existing federal and provincial data sites, such as the DEEF annual water quality monitoring site, to develop a web page for Covehead-Brackley, which will provide water quality information to residents.

Strategy: Assess degree of sedimentation in ponds, silt traps, and estuaries annually using probes to measure silt depths accumulated at the bottom of these systems. Determine if historic data on these measurements is available for comparison.

Goal #1, Objective #2 Continued...

Strategy: Consult and collaborate with oceanographic experts and federal/provincial governments (eg. DFO, Parks Canada) to research tidal flushing/dredging in

Covehead and Brackley Bay, breakwater development, Covehead bridge structure, and Robinson's Island causeway. Community support is strong for at least dredging the channels where siltation and plant growth are the biggest problems.

Strategy: Annually survey streams and bays, determine high/medium/low priority areas for improvement, and utilize proven successful stream enhancement activities to restore the environmental integrity of the identified areas.

Long-Term Action Items

Strategy: Identify and evaluate natural and man-made ponds within the watershed to determine the amount of siltation, possible actions to take for clean-up efforts, and ongoing maintenance to remove and reduce silt in the water.

GOAL #2 Restore and protect fish and wildlife habitat

Objective #1

Restore stream and riparian habitat in the watershed area so that a minimum of 80% of these areas reach a status of high quality & biologically diverse habitat within ten years.

Immediate Action Items (1-3 years)

Strategy: Assess and enhance a minimum length of 5km of stream and riparian habitat annually, and to a width of the minimum current buffer zone legislation.

Strategy: Work with landowners and community groups to identify and enhance riparian zones where minimal cover exists, through plantings of a variety of native species of trees, shrubs, and grasses. This will help to protect waterways from sedimentation, reduce water temperature, provide shady habitat for fish and other wildlife in the stream, and increase biodiversity.

Strategy: Encourage and cooperate with landowners to restore fish and wildlife habitat on their property.

Goal #2, Objective #1 Continued...

Short-Term Action Items (4-6 years)

Strategy: Assess particularly poor sections of streams in watershed where sediment is in greatest amounts and work to stop sedimentation at its source, through collaboration with landowners and government.

Strategy: Where sedimentation cannot be stopped, install silt traps, reducing heavy silt loads downstream. Work with provincial/federal departments to determine optimal placement of these structures for maximum effectiveness.

Long-Term Action Items

Strategy: Where possible, surpass minimum provincial buffer zone regulations along streams and bays in order to reduce soil erosion entering the waterway and increase amount of shade for fish and wildlife habitat.

Objective #2

Improve fish habitat in ponds and streams by reducing water temperature and sedimentation to proven acceptable and sustainable standards within ten years.

Immediate Action Items (1-3 years)

Strategy: Seek sufficient financial resources and work with Provincial Department of Environment, Energy & Forestry to determine logistics of draining and cleaning Marshall's, Cass' and Parson's Creek Ponds to remove silt, weeds, and algal growth, helping to restore the environmental health of these habitats by improving the flow capacity and temperature of the water.

Strategy: Develop a beaver management strategy so that there is a balance in the watershed of healthy and productive natural ponds, as well as suitable habitat and access for salmonids such as trout and salmon.

Strategy: Working with landowners; Daryl Guignon, a UPEI professor who has done extensive work on Island streams; and referring to historical maps identify spring locations on all streams, dig out all springs that are filled in with silt, and check annually during stream surveys.

Short-Term Action Items (4-6 years)

Strategy: Determine average/peak temperatures and degree of siltation in ponds and streams and take actions to reduce those levels that exceed the maximum allowable requirements to support fish survival.

Strategy: Research historical and current populations of common species fished recreationally [Eg. Brook Trout (*Salvelinus fontinalis*), Rainbow Trout (*Oncorhynchus mykiss*), Atlantic Salmon (*Salmo salar*)] in the watershed. Improve fish and wildlife habitat first where populations of streams and ponds have declined or are altogether non-existent from past data.

GOAL #3 *Manage and maintain watershed resources through community collaboration*

Objective #1

Develop and deliver at least one awareness activity or communication focusing on each sector of the watershed, including agriculture, tourism & recreation, fishing, forestry, aquaculture, and full-time & seasonal residents & landowners, within five years.

Immediate Action Items (1-3 years)

Strategy: Qualified personnel from watershed management groups, or other resource persons, to walk stream sections with landowners to identify problems, solutions, and ongoing maintenance issues.

Strategy: Qualified personnel from watershed management group to work with landowners regarding forest or woodlot enhancement opportunities, tree planting opportunities & funding accessibility.

Strategy: Work with community groups & individuals to develop and deliver watershed restoration and educational activities.

Strategy: Work with local educational institutions to develop watershed enhancement courses, including a practical component of work within the watershed. Utilize course graduates for supervisory and returning roles season after season.

Strategy: Identify and complete one or two small projects in the watershed and publicize their success to get people interested and involved moving forward.

Strategy: Focus on one segment of the watershed in each issue of a quarterly newsletter and highlight their environmental issues of concern, challenges & successes. Update web site with this new information each quarter.

Short-Term Action Items (4-6 years)

Strategy: Develop and support youth involvement in watershed restoration and educational activities (4H clubs, scouts, girl guides, and local schools).

Strategy: Develop a "work project day" with participation from each of the different sectors in the watershed (forestry, fishing, agriculture, tourism & recreation, and aquaculture).

Objective #2

Provide at minimum one opportunity per proposed development project for public consultation with watershed residents on initiatives that may impact the environmental quality of the Covehead-Brackley watershed area.

Goal #3, Objective #2 Continued...

Immediate Action Items (1-3 years)

Strategy: Promote and encourage community attendance at meetings where new legislation or programs and services that will aid watershed work are being discussed or proposed.

Strategy: Promote community involvement in monitoring issues that arise throughout development processes.

Long-Term Action Items

Strategy: Support developments that are compatible with environmental regulations of both the province and watershed municipalities' official plans.

Strategy: Watershed management group and watershed municipalities to ensure that existing provincial/municipal regulations are adhered to for proposed developments.

Strategy: Ensure that all issues related to the development stay within the defined boundaries of the property, eg. Silt traps, brush mats, etc.

Strategy: Work with provincial government on development of environmental regulations and programs to support and encourage good land use.

GOAL #4 Promote and recognize good environmental stewardship

Objective #1

Increase involvement in existing land and water stewardship programs available to watershed residents and landowners by 50% in five years.

Immediate Action Items (1-3 years)

Strategy: Research & identify all existing land and water stewardship programs and determine current levels of involvement by individuals and businesses within the watershed. Determine guidelines on accessibility and eligibility and share this information with watershed residents.

Strategy: Promote and encourage participation in provincial Forest Enhancement Program for woodlot owners.

Short-Term Action Items (4-6 years)

Strategy: Encourage and facilitate, where appropriate, involvement of watershed residents and landowners in initiatives that reward good environmental stewardship.

Goal #4, Objective #1 Continued...

Strategy: Research business-oriented programs to provide economic solutions for environmental problems.

Objective #2

Increase awareness of good stewardship activities, initiatives and best practices by providing annual “good steward” awards, developing/distributing quarterly newsletters, and creating/publishing press and web content at minimum four times per year.

Immediate Action Items (1-3 years)

Strategy: Encourage ideas and input for improvements from area residents and landowners at public meetings, through feedback on the web site, discussions with watershed management group, etc.

Strategy: Organize field trips for community members to see good environmental stewardship examples first-hand.

Short-Term Action Items (4-6 years)

Strategy: Promote programs that reward land and water stewardship to watershed residents and landowners through newsletters, web site, and community meetings.

Strategy: Acknowledge watershed residents and landowners who are initiating good stewardship activities in quarterly newsletter, on web site, and through media coverage.

Strategy: Develop and install signage to identify and promote areas where good environmental stewardship examples are taking place.

Long-Term Action Items

Strategy: Develop a watershed management “good stewardship” fund, which could support the cost of award plaques, signage, or any other means of recognition agreed upon by the watershed communities.

Strategy: Support clean engine practices through signage & awareness initiatives & discourage use of less environmentally friendly two-stroke engines (eg. Outboard motors).

GOAL #5 Implement and support ongoing communication, education, and awareness activities

Objective #1

Establish membership program with the Friends of Covehead-Brackley Bay watershed management group and increase membership by fifty people per year.

Immediate Action Items (1-3 years)

- Strategy:* Establish membership program, cost, and benefits of membership.
- Strategy:* Promote watershed membership program with community groups, schools, public meetings, media, newsletters, and web site.
- Strategy:* Position Friends of Covehead-Brackley Bay as the “go to” group in the watershed – new ideas, new initiatives, watershed enhancement, etc.

Objective #2

Enhance communication of watershed activities/meetings and environmental awareness through quarterly and annual media and communication initiatives, and through monthly, quarterly, or annual community activities.

Use Opportunities as They Arise (Immediate, Short-Term and Long-Term)

- Strategy:* Establish volunteer list and maintain regular contact with people on this list, to encourage involvement in communication and educational initiatives.
- Strategy:* Use readable, concise, and recurring messages to gain resident attention to water and land use in all published educational and communication pieces.
- Strategy:* Develop and distribute quarterly newsletter that informs residents and landowners of watershed education, issues, successes, etc. and distributes knowledge on regular activities that residents/landowners can take to positively affect land and water quality.
- Strategy:* Use signage as a key means of communication to area residents, landowners, and visitors to the area to highlight good environmental practices and stewardship, boundaries of Covehead-Brackley watershed, and sites of environmental/historical significance (eg. Old mills).
- Strategy:* Work with local ‘Northern Star’ newspaper to develop a regular column on environmental activities, good stewardship, upcoming events, etc. for the Covehead-Brackley watershed area.
- Strategy:* Develop and implement an annual event such as a fishing derby to highlight the successes of the Covehead-Brackley watershed area in developing recreational activities, improving the health of the environment, and enhancing the natural habitat for fish and other wildlife.

Goal #5, Objective #2 Continued...

- Strategy:* Through a combined effort with residents, landowners, and other partnerships, organize and deliver a festival which celebrates the environment in general and the Covehead-Brackley watershed area specifically.

Strategy: Utilize existing Community Volunteer Days to promote conservation and environmental stewardship through educational displays, guest speakers, and demonstrations.

GOAL #6 *Improve and support active living and recreational opportunities*

Objective #1

Enhance existing access points and develop two new access points to the streams and bays in the area, within five years.

Immediate Action Items (1-3 years)

Strategy: Work with landowners and government to develop a trail along at least one stream in the watershed, including signage that promotes enhancement work that has been done, good examples of healthy riparian habitat, and natural features of a healthy watershed system.

Strategy: Identify areas of environmental sensitivity along bays and streams and ensure that they are protected from over-trafficking.

Strategy: Repair any damaged existing access points to streams and bays and develop signage & maps so that public access to these areas is evident.

Short-Term Action Items (4-6 years)

Strategy: Work with community and fishermen to develop public slipways and repair existing structures, for recreational use on the Covehead and Brackley Bays.

Objective #2

Develop annual recreation and tourism activities, and minimum quarterly communication to residents and landowners, which will help to increase awareness of activities and environmental/watershed education.

Long-Term Action Items

Strategy: Work with landowners and tourism & recreation sector to develop a map of eco-tourism opportunities and access to nature trails located within the watershed.

Goal #6, Objective #2 Continued...

Strategy: Research the possibility of developing eco-vacations for tourists visiting the Island, to assist with general stream enhancement activities and increase public awareness of watersheds.

Strategy: Use Community Volunteer Days to promote active living and recreation in the watershed, through organized group activities such as canoeing, kayaking,

hiking, animal tracking, bird watching, nature photography, and any other outdoor activity that watershed residents would like to promote.

Objective #3

Develop and communicate appropriate safety messages for all active living/recreational opportunities delivered by the watershed.

As Needed - Immediate, Short-Term, Long-Term Action Items

Strategy: Post safety signage at public access points to bays, streams, and nature trails in the watershed area.

Strategy: Include general safety tips for outdoor recreation as part of eco-tourism opportunities map to be developed for watershed.

Objective #4

Establish and develop partnerships with youth and senior groups located in the watershed, to participate in and promote recreational and active living opportunities.

Immediate Action Items (1-3 years)

Strategy: Identify and work with North Shore and other community councils, community clubs such as 4H, Girl Guides, Scouts, church and school groups, and others to promote and encourage active living opportunities within the watershed.

Strategy: Identify and work with seniors groups in the watershed to promote and encourage active living opportunities.

Strategy: Collaborate with youth groups on activities that will enhance the watershed environment, such as garbage day clean-up at streams, tree planting, or volunteering at community volunteer days, festival, or other watershed activities.

GOAL #7 Preserve sites of environmental and historical significance

Objective #1

Identify, recognize and preserve all potential sites of environmental and historical significance in cooperation with landowners and the watershed community within ten years.

Immediate Action Items (1-3 years)

Strategy: Identify potential sites through watershed inventory, discussions with watershed residents and landowners (particularly older residents who can point out site locations and provide history from experience), and review of historical maps and atlases for sites such as old mills and other such historical significance.

Strategy: In promotion of environmentally and historically significant sites, include any connections to water and how it was used in the past.

Short-Term Action Items (4-6 years)

Strategy: Provide incentives to landowners through recognition or awards for preservation of identified sites of significance.

Strategy: Once sites of significance are developed develop media exposure to promote these areas to the general public.

Strategy: Identify sites of environmental and historical significance with plaques and trails leading in to them, where appropriate.

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Appendix A: Board Members and Authorship

The Covehead-Brackley Watershed Management Plan has been developed between January 2008 and March 2009 in conjunction with watershed residents in Brackley Beach, Brackley Point, Harrington, Covehead Road, Stanhope, West Covehead, North Milton, Winsloe North, and Union Road.

Overall ideas regarding the vision statement, issues, concerns, goals, objectives, and strategies have been provided by watershed residents at meetings and workshops held during this time. The document has been written, based on this input, by Jennifer Roma, Watershed Coordinator. Technical reviews, board reviews, and final community reviews of the document took place between October 2008 and March 2009. See Acknowledgements for list of reviewers/commenters.

As evidenced by the signatures of Friends of Covehead-Brackley Bay Inc. board members below, the above document is recognized as the official and accepted Watershed Management Plan for the Covehead-Brackley watershed.

Board Executive:

Co-Chair: Dave Latimer _____
(Stanhope resident)

Verner Smitheram _____
(West Covehead resident)

Secretary: John Baird _____
(Stanhope resident)

Treasurer: Peter Vriends _____
(Covehead resident, Agriculture sector representation)

Board Members:

Barry Cudmore _____
(Brackley resident, Agriculture sector representation)

Gordon MacCallum _____
(Brackley resident, Tourism sector representation)

Lorne Kielly _____
(Stanhope resident)

Pat Morrison _____
(Covehead resident, Fisheries sector representation)