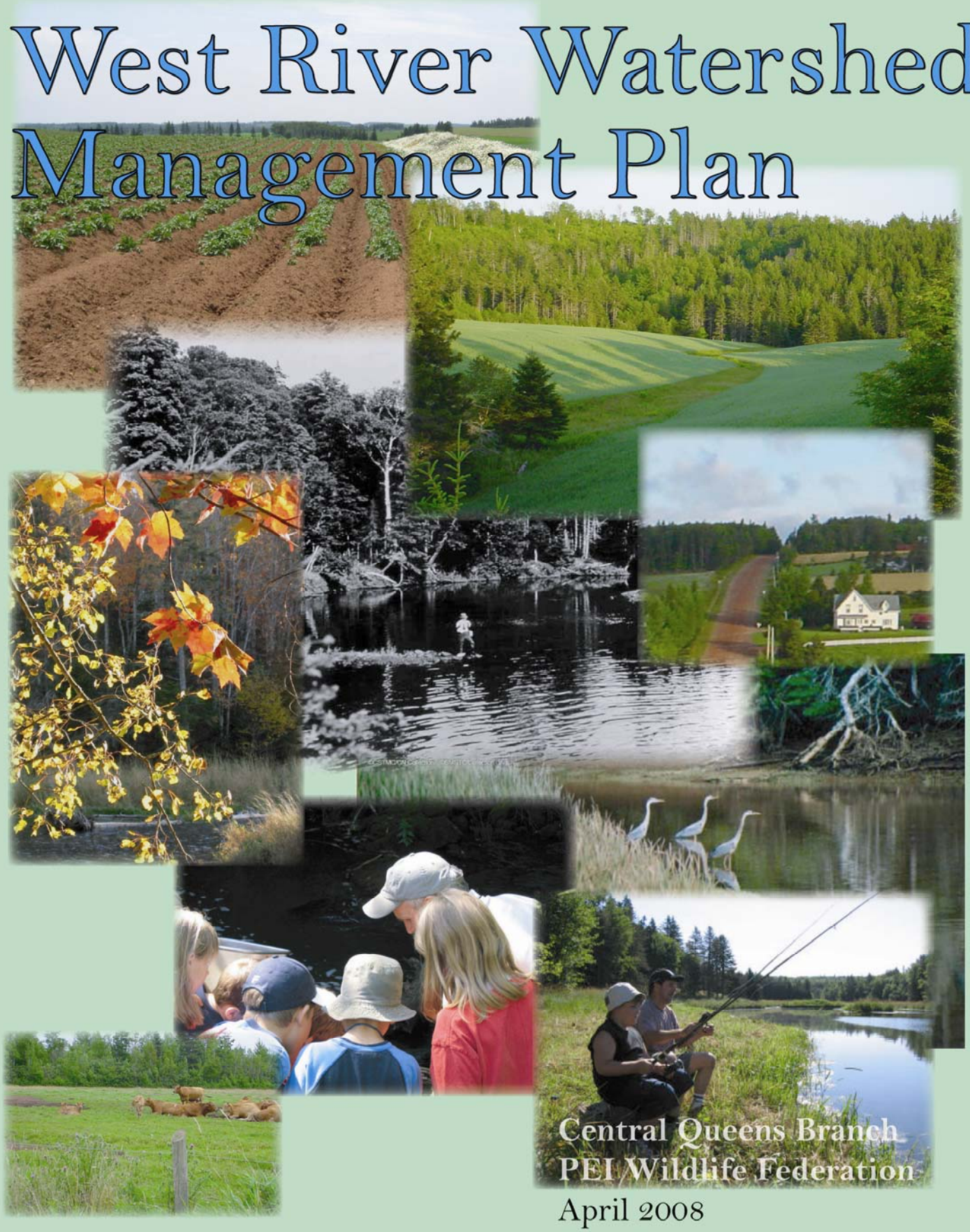
West River Watershed Management Plan



Central Queens Branch
PEI Wildlife Federation

April 2008

EXECUTIVE SUMMARY

An initiative of the Central Queens Wildlife Federation (CQWF) and residents of the West River Watershed, this plan is intended to serve as a guide for the future management of the West River watershed. The Central Queens Wildlife Federation has been a leader in the management of the Watershed since the seventies. As a volunteer group consisting of wildlife and angling enthusiasts, their focus has been the enhancement of the recreational fishery. CQWF has been very effective in building partnerships with other stakeholders as demonstrated in the restoration of Carragher's Pond. The group recognized that a more holistic approach was needed which involved **all** watershed stakeholders.

A steering committee composed of land owners and other stakeholders interested in the health of the watershed was formed. In a community driven process, the committee studied issues that were thought to threaten the future health of the West River Watershed ecosystem. The result was a draft watershed management plan which was adopted by the community in 2007.

Over the winter/spring 2008, the draft West River Watershed Management Plan was developed into an official document. Watershed parameters such as water quality, nitrates in ground water, water use, fish habitat, wetland habitat, population trends, agriculture, forest cover, and siltation are documented.

The following key issues emerge:

1. The doubling of ground water nitrate levels in the last 15 years
2. Siltation and it's impact on recreational activities and fish habitat

Increased nitrogen loading on the watershed from domestic septic systems and agriculture, and silt laden runoff from row crops and clay roads are identified as possible causes.

These issues are primarily land use and development related and beyond the mandate of a steering committee. To address these concerns, the West River Watershed Management Steering Committee must develop into a more formal and broad based community organization with representation from local community councils.

ACKNOWLEDGEMENTS

We would like to thank the countless number of residents of the West River Watershed that participated in workshops, attended presentations, and granted landowner interviews. In particular, members of the agriculture industry were generous with their time participating in kitchen table talks and focus groups. The dedication of the Steering Committee Members should also be highlighted. They worked tirelessly to ensure that a comprehensive management plan was created that reflects the needs and wishes of the local community members. The Executive and Members of the Central Queens Wildlife Federation (CQWF) and PEI Wildlife Federation should also be recognized for assisting with fundraising, and facilitating community events and volunteer days. They developed the concept of creating a management plan for the area. We thank them for their ongoing support and for championing this project over the last four years. Also, thanks to staff from the PEI Department of Environment, Energy and Forestry (DEEF), PEI Department of Agriculture, Aquaculture, and Fisheries (DAAF), Agriculture and Agri-Food Canada, and neighbouring watersheds for assisting with the development of materials, data analysis, providing feedback, and facilitating workshops. Finally, thanks to all of the other participants that helped to make this management plan a reality.

Steering Committee Members

John Jamieson - Land Owner, President, Central Queens Wildlife Federation
Rosie MacFarlane - Freshwater Fisheries Biologist, PEI DEEF
Daryl Guignion - Land Owner, Wildlife Biology Professor, University of PEI
Bill Glen - Land Owner, Retired Forester, Forest and Woodland Consultant
Wayne Gairns - Land Owner, Recreational Fisherman, Volunteer
Jackie Waddell - Land Owner, Island Nature Trust
Shelly Cole-Arbing - Environmental Officer, PEI Transportation and Public Works
Otis McInnis - Student, Recreational Fisherman, Director, CQWF
Pat Malone - Land Owner, Farmer
Art MacPhee - Land Owner,
Todd Dupuis - Land Owner, Director, Atlantic Salmon Federation
Darcy Flynn - Land Owner, Teacher
Andy Gass - Land Owner
Alan Lowther - Land Owner, Businessman
Tony Reddin - Land Owner, Environmentalist
Megan Harris - Land Owner, Researcher
Marc Dugay - Land Owner, Teacher, Recreational Fisherman, Teacher
Ben Hoteling - Land Owner, Instructor Wildlife Conservation Technology, Holland College
Alan Miller - Land Owner, Councillor Kingston Municipality
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Blair Smith - Land Owner, Shellfisherman, Queens County Shellfish Association
Jeff DeHann - Land Owner, Farmer
Steve Murphy - Recreational Fisherman, Director, CQWF
Tom Mann - Land Owner, Teacher, Recreational Fisherman, Volunteer, Director CQWF
Diane Dowling - Municipality of New Haven-Riverdale

Steering Committee Members Continued:

Regina Wells - West River Watershed Planning Coordinator
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Rob Sharkie - Trout River Watershed Coordinator
Nancy Murphy- Community Development Officer, Dept Community and Cultural Affairs
Suzanne McNeil - Agriculture Information Officer, PEI DAAF
Chris Jones - Director, Policy, Planning and Research, Tourism PEI
Jennifer Collins - Summer Student
Scott Roloson - Summer Student
Diane MacEachern - Summer Student
Candace McQuaid - Summer Student

Guest Speakers/Meeting Facilitators

George Somers - Drinking Water Management, Section Manager, PEI DEEF
Barry Thompson - Agriculture Resource Development Co-ordinator, PEI DAAF
Cindy Crane - Surface Water Biologist, PEI DEEF
Shaun MacNeil - Environment Officer, PEI DEEF
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Project Support

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Valerie Bruce - Senior Program Officer, Agriculture and Agri-Food Canada
Municipalities of Bonshaw, New Haven-Riverdale, and North Wiltshire
Bonshaw Community Council

Key Partners

Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada

Canada-PEI National Water Program
The Canada-Prince Edward Island National Water Program (CPEINWP), delivered by Agriculture and Agri-Food Canada (AAFC), provides initiatives that assist the agricultural community to address water concerns related to quantity and quality. The program is funded by the National Water Supply Expansion Program (NWSEP). The CPEINWP is carried out under the authority of the NWSEP and is structured specifically for P.E.I. producers. The CPEINWP has provided core funding for the watershed planning process in the West River watershed.

Prince Edward Island CANADA — Environment, Energy and Forestry	**Watershed Management Fund** The Watershed Management Fund (WMF) of the PEI Department of Environment, Energy, and Forestry provides support to community-based organizations that are involved in the watershed planning process, with an emphasis on a holistic watershed approach. The WMF has provided direct financial assistance and technical support to the West River Watershed Management Plan.
PRINCE EDWARD ISLAND WILDLIFE FEDERATION	The Central Queens Wildlife Federation, a branch of the PEI Wildlife Federation, is a volunteer organization that is dedicated to fostering awareness and enjoyment of the natural environment. It encourages people and groups to develop an understanding of the impact of human activities on the environment.
ATLANTIC SALMON FEDERATION • FÉDÉRATION DU SAUMON ATLANTIQUE • asf sa	The Atlantic Salmon Federation (ASF) is an international non-profit organization that promotes the conservation and wise management of wild Atlantic salmon and their environment.

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1.0 INTRODUCTION

The West River Watershed Management Plan was developed by the Central Queens Wildlife Federation (CQWF) and local residents during the fall/winter of 2005/2006. The development of the watershed management plan was a community-driven process. In December of 2007, the document was adopted by the residents and stakeholders of the West River Watershed.

A steering committee was formed to facilitate the development of the management plan. Committee members included representatives from agriculture, aquaculture, anglers, residents, government staff and local biologists. In order to guide the creation of the document the committee produced a vision statement that outlines the main purpose of the management plan:

Vision Statement

"The West River Watershed can support healthy ecosystems and meet the needs of the community for today and tomorrow, while the residents of the watershed can have fun, living and working responsibly."

The purpose of the process that resulted in the West River Watershed Management Plan was to identify the state of the watershed, the issues affecting it, and then develop a comprehensive plan of action to maintain or recover watershed health over the next 20 years. The residents who initiated the planning process saw the need to educate and encourage landowners to adopt sustainable activities, take immediate action to ensure that the watershed is not further degraded, and address watershed health issues in a comprehensive way. As the population density increases in the watershed, this document may be used as a guide for communities, developers, and government departments to ensure that activities taking place in the watershed are sustainable in nature. It is the desire of the steering committee to provide planning guidance in the absence of rural planning mechanisms.

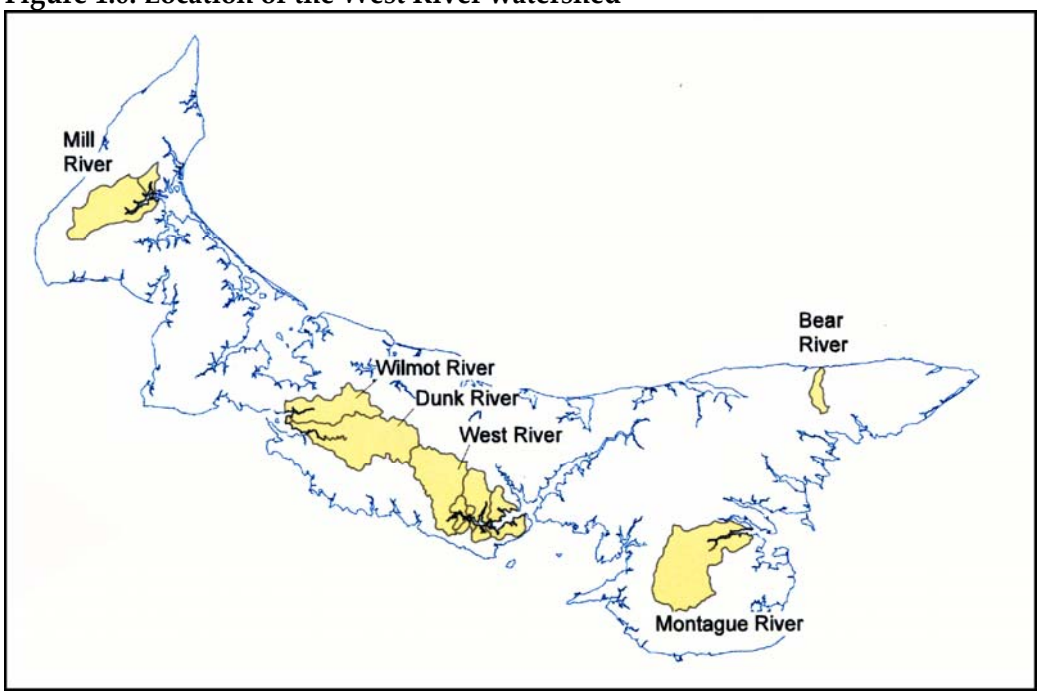
Besides encouraging community participation throughout the development of the plan, another important component of the planning process was the collection of scientific data. In order to assess the health of the watershed, biological data on the water quality and quantity was collected by the CQWF from September 2005 to April 2007. Residents of the watershed and members of the agriculture industry are reliant upon local groundwater supplies as their only water source. Therefore an assessment of the levels of contaminants in the stream systems was completed, and a model of groundwater flow was developed to accompany the management plan strategies.

Many people view the West River Watershed (Fig. 1.0) as one of the more pristine watersheds in Prince Edward Island. This is thanks in part to the stream restoration projects completed by the PEI Fly Fishers Association and the CQWF. Landowners in the area have maintained a large stream buffer in the riparian zone, and have joined programs such as the PEI Federation of Agriculture's Environmental Farm Plan to lessen their impact on their environment. The presence of mature forest within the riparian zone is one of the key factors that has led to the watershed continuing to be one of PEI's most popular freshwater fishing areas. However, even though it was and still is considered by many to be a pristine watercourse, the West River Watershed has experienced some degradation. The unique hilly topography (often referred to as PEI's "Alpine" region) presents many challenges to landowners and amplifies issues of erosion. Without intervention of community stakeholders, there is a danger that issues will go unaddressed and the health of the watershed will continue to decline. With the adoption of the recommendations contained in this plan, landowners can preserve the health of the watershed.

What is a watershed?

Watersheds are areas in which all of the water contained within the boundaries, such as groundwater, rivers and streams, flows into one point. For the West River Watershed, all of the water from the communities of North Wiltshire, Hartsville, and Brookvale drains into a single point at Bonshaw, PEI, directly below the Trans Canada Highway. Unlike municipal boundaries, watershed boundaries are created naturally, and are determined by the elevation of the surrounding area. Everyone lives on a watershed. There are over 250 watersheds on PEI alone. All of the water resources within the watershed are interconnected. Therefore, all residents have a have a stake in the health of the watershed.

Figure 1.0: Location of the West River watershed



Source: PEI Water Quality Interpretive Report 1999

2.0 COMMUNITY PARTNERSHIP

Background

Historically, various organizations have taken up the challenge of overseeing the management of the West River watershed. In the mid-1980s, the PEI Federation of Fly Fishers Ltd began working on the river. They had an ambitious fish enhancement program which included stream habitat surveys, fish trapping, angler surveys, and fish stocking. They differed from many organizations at this time by trying to address land use problems which were affecting the river. The Fly Fishers took a lead role in the education of anglers, landowners, and other users of the watershed. The organization worked with farmers and government departments to address sources of sediment entering the river. The West River Enhancement Project Committee developed from the Federation of Fly Fishers and carried on enhancement work into the mid-1990s. Other than a local landowner sponsoring projects primarily dealing with trail development and maintenance, there were a number of years without projects.

In 2001, the West River Environmental Committee formed to sponsor small-scale stream enhancement work on Quinns Brook, a sub-watershed of the West River Watershed (Fig. 4.1). Interest in developing a larger watershed management project grew. In 2004, the Central Queens Wildlife Federation (CQWF) assumed a leadership role.

Central Queens Wildlife Federation (CQWF)

The Central Queens Wildlife Federation (CQWF), a branch of the PEI Wildlife Federation, has been active in conserving wildlife populations and habitat since the 1970's. In 2003, CQWF adopted the West River Watershed, a popular angling area for many of its members, as its main conservation area.

The original goal was to increase the productivity of the sport fishery in the stream system. Volunteers participated in stream restoration projects. Students were hired to coordinate habitat assessments and additional projects such as tree planting, salmon rearing, Crosby Pond enhancement, and the restoration of Carragher's Pond. Located in Emyvale, Carragher's Pond was reopened to its former glory in September, 2005. Over the course of two years, the pond was dredged. The excess material was used to create islands for additional animal habitat in the upper section of the pond and the remaining fill was donated to local landowners. The entire project was coordinated by a resident of Emyvale and member of the Central Queens Wildlife Federation. The resident and a group of students tackled the job of improving the aesthetics of the pond by cutting trails, constructing fences, benches, and a boat dock.

The PEI Department of Transportation and Publics Works paved the parking lot. Other organizations such as Environment Canada, PEI Department of Environment, Energy and Forestry, and Human Resources and Skills Development Canada provided funding. The adjacent landowners also participated. A local farmer allowed for a section of his land to be developed as a trail system, and for pond spoils to be temporary stored on his property. In turn, he was able to set-up a nose pump system for his cattle which extracts water from newly restored pond. A nearby landowner allowed Maritime Electric to erect an osprey pole on his property.

Originally, a mill owned and operated by the late Thomas Carragher was situated on the property. In the early 1970's the PEI Department of Environment, Energy, and Forestry purchased the land from the Carragher family and designated it as a recreational fishing area. In 1984 Ducks Unlimited Canada and PEI Fish and Wildlife Division installed a fishway, dams, and overflow pipes.

The pond was transformed from a local fishing hole to a prime recreational area where anglers, bird watchers, canoeists, and local schools all regularly utilized the area. However, the pond continued to be inundated with silt. Local residents, the West River Environmental Committee, and the CQWF banded together and initiated this restoration of a popular and well loved pond.

CQWF members felt that a more holistic approach must be taken to achieve the goal of restoring fish habitat in the watershed. The decision was made to broaden the scope of their mission to include improving the health of the adjacent land along with the stream systems. They concluded that the most efficient way to improve the health of the West River was to develop a watershed management plan. CQWF worked with federal, provincial and municipal partners to garner funds for the development of a management plan for the West River Watershed. In April 2005, the CQWF obtained funds from the Agriculture and Agri-Food Canada-Prince Edward Island National Water Program (NWP) and the Department of Environment, Energy, and Forestry (DEEF) Watershed Management Fund to develop a management plan for the watershed. The West River, along with the Trout and Souris River Watersheds became three NWP demonstration projects for PEI.

A steering committee was formed, to guide the creation of the plan. It consisted of local residents, biologists and members of the aquaculture and agriculture industries. During the fall/winter of 2005/2006, steering committee members and residents participated in various presentations, focus groups, workshops, and landowner interviews designed to engage watershed residents in the planning process. In December 2007, the watershed management plan was adopted by local community members. The CQWF continues to work with community members and government to implement the community goals contained in this watershed management plan.

3.0 OVERVIEW

The West (Eliot) River Watershed discharges to the south side of PEI, and along with the North (Yorke) River and East (Hillsborough) Rivers, forms the Hillsborough Watershed complex. The West River Estuary (though publicly recognized as the "West River") is located outside the watershed boundary. The health of the West River Estuary is influenced by not only the land-use in the West River Watershed but a variety of other watersheds that drain into the area. Therefore, the West River Estuary is beyond the scope of this management plan.

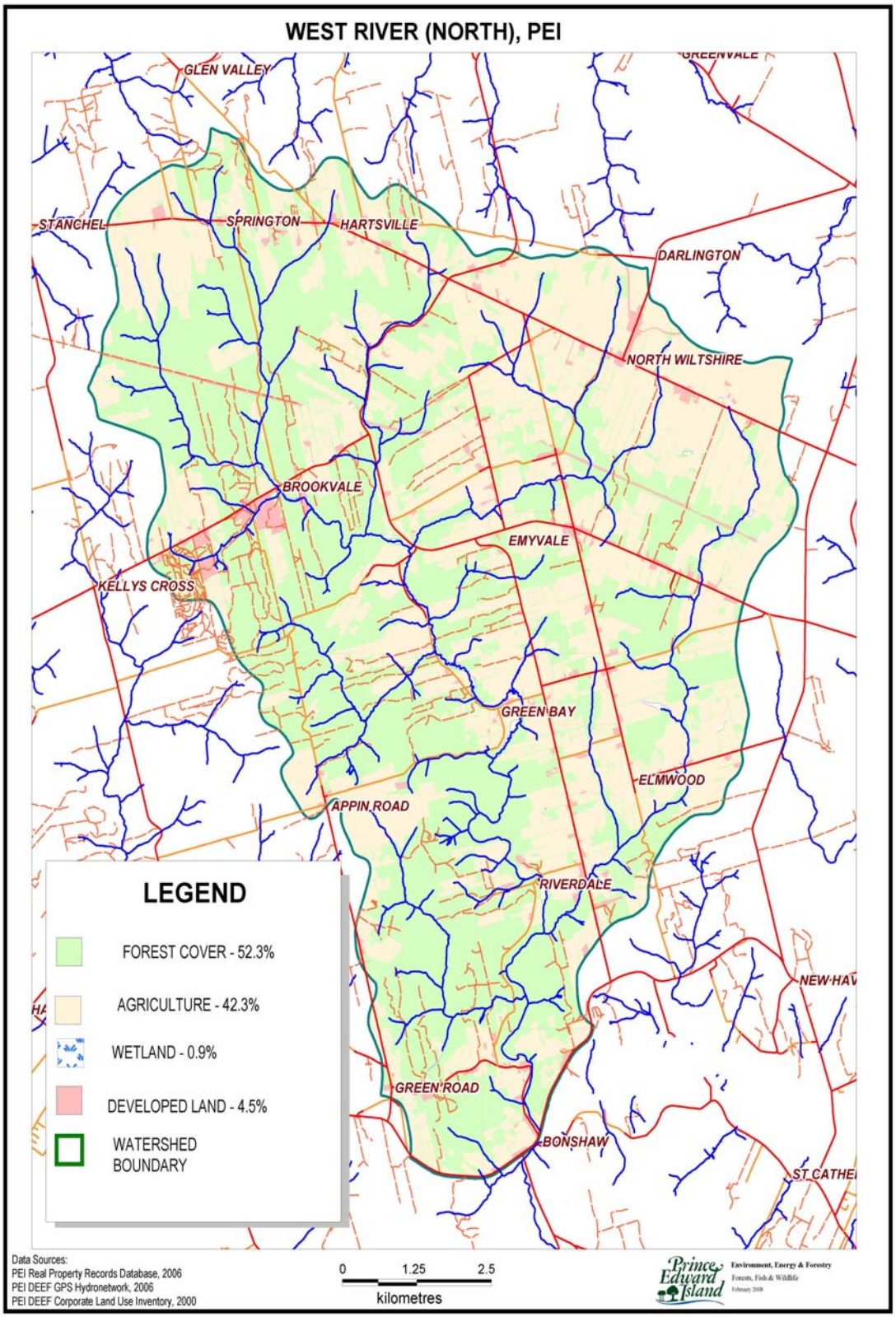
However, the health of the estuary is an indicator of the health of the West River Watershed. Eutrophic conditions (excessive growth of aquatic plants) on the West River estuary were observed in the 1980's. Water quality throughout the estuary improved after the causeway in St. Catherine's was removed in 1987 which restored natural tidal flushing. In the 1999 PEI Water Quality Interpretive Report, the West River Estuary was not included in the list of PEI estuaries with eutrophic systems. Anoxic (lack of oxygen resulting from the decomposition of excessive aquatic growth) conditions have not been observed in recent years.

The West River drains one of the hillier regions of Prince Edward Island known as the "Bonshaw Hills". The rolling landscape, with its numerous pastures, agricultural fields and winding clay roads is picturesque. Historically, the West River Watershed supported many cattle operations and row cropping was limited because of the hilly terrain.

In recent years, potato acreage on P.E.I. has increased and the West River Watershed is no exception. Former pastures have been converted to potato fields, and the steep terrain greatly enhances the potential for soil erosion and nutrient run-off. Unpaved roads throughout the West River watershed are beautiful to drive especially in autumn. However, silt laden water flowing downhill to numerous stream crossings is a perennial problem. Poorly constructed or undersized private stream crossings also contribute to siltation of the river because of frequent wash outs. The results of this combination of land use practices are publicly evident at the Bonshaw Bridge where the River runs red after heavy rainfalls.

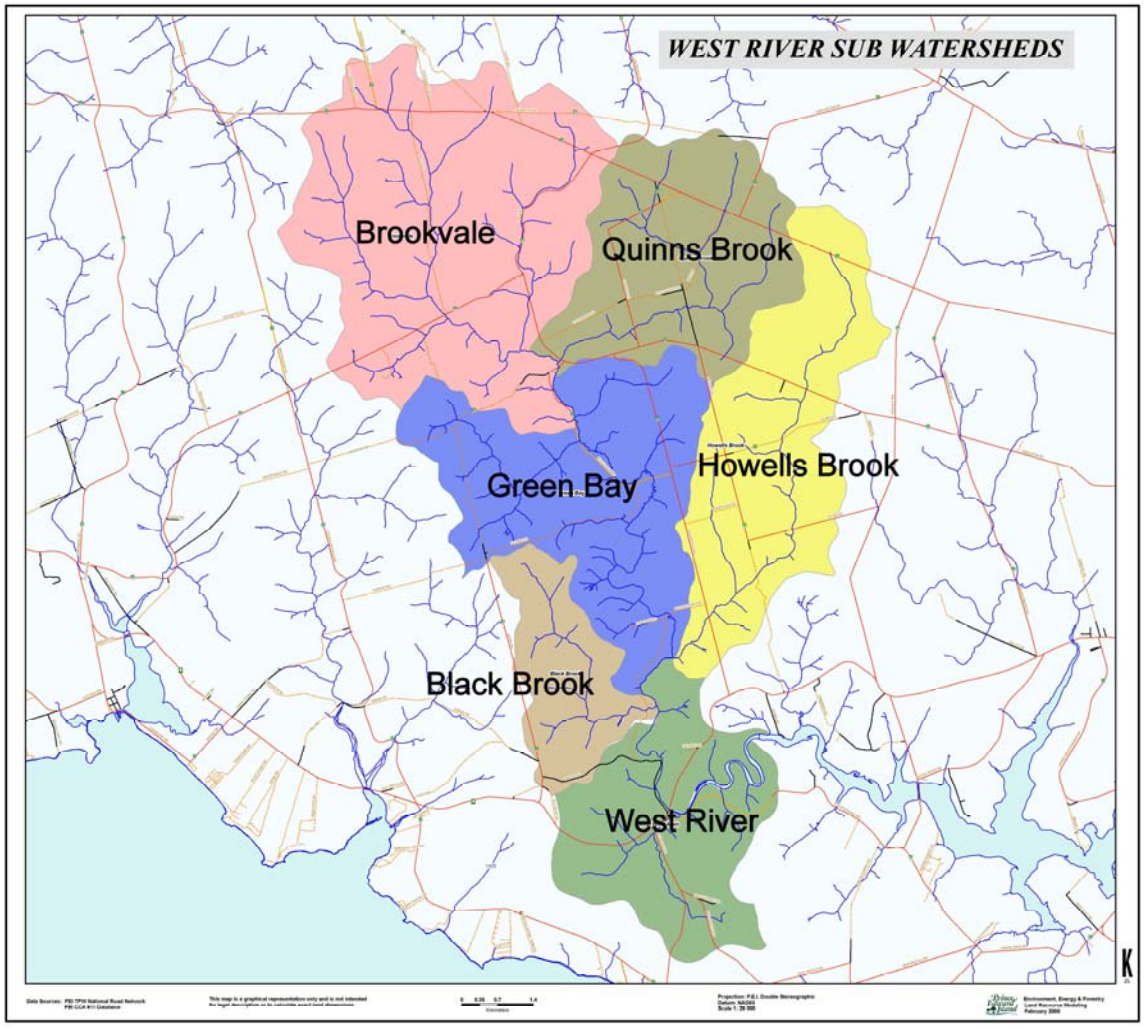
4.0 WEST RIVER WATERSHED LAND USE

Figure 4.0: West River Watershed showing land use

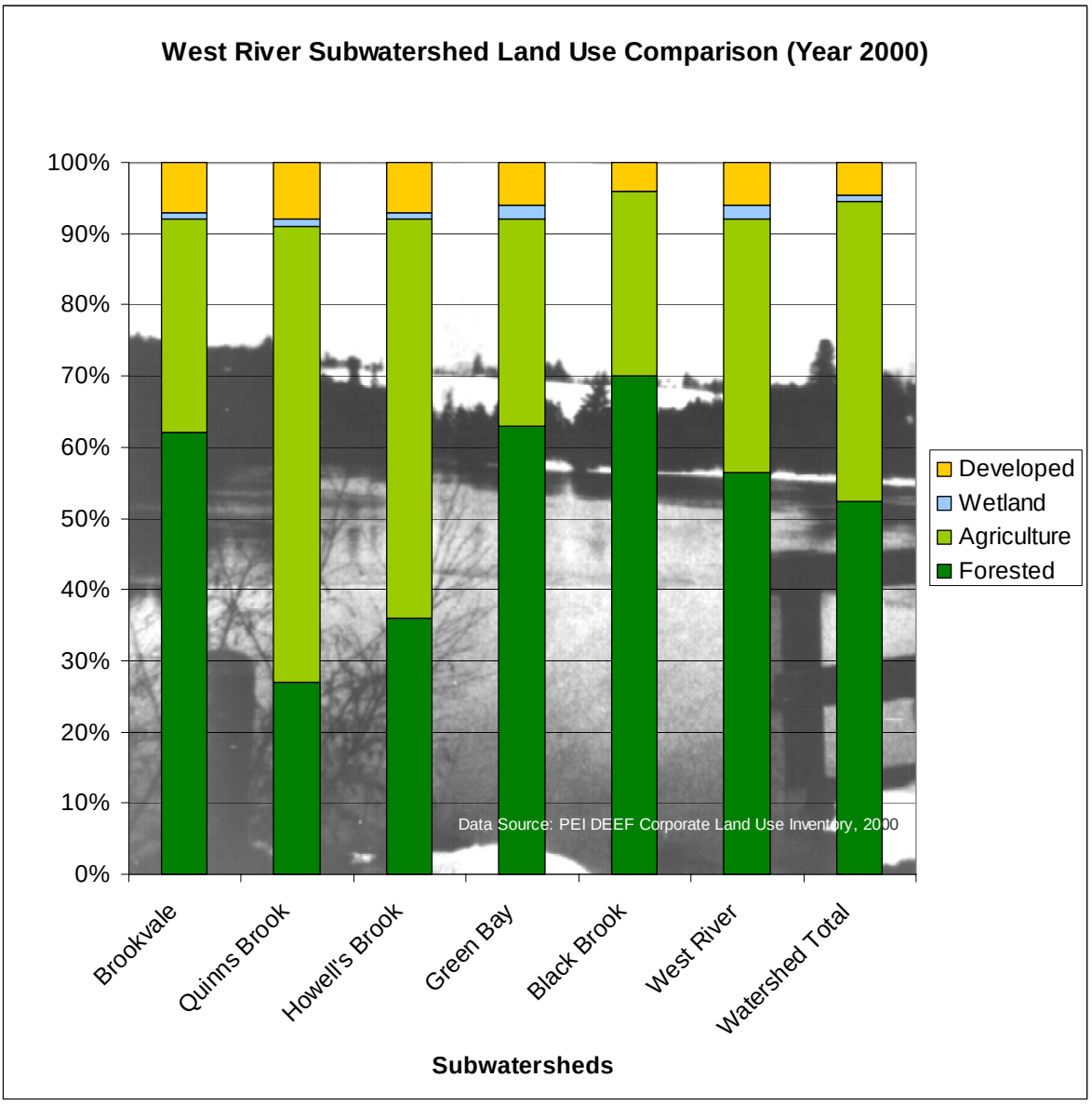


West River Watershed is approximately 11,400 hectares or 28,500 acres, and for efficient management purposes may be further divided into six subwatersheds: Brookvale, Quinns Brook, Howells Brooks, Green Bay, Black Brook and West River (Fig.4.1). A strategic action plan can then be developed around each watershed's unique mix of land use (Graph 4.0), topography, and wildlife habitat as part of an overall management plan.

Figure 4.1: Map of the West River Subwatersheds



Graph 4.0: West River Subwatersheds Land Use Comparison



5.0 WATER QUALITY

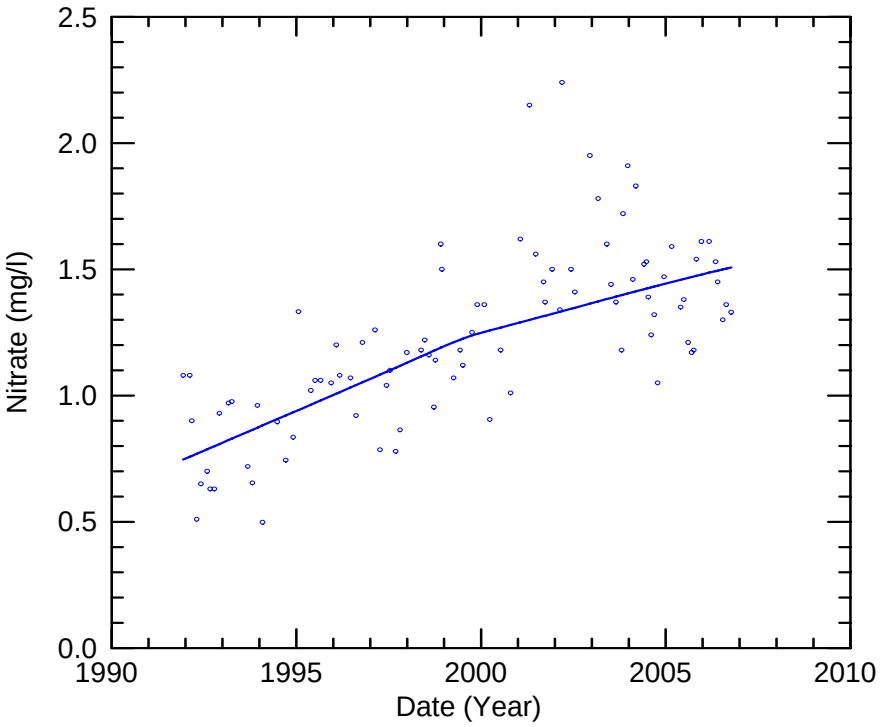
The Province of PEI and Canada jointly maintain a network of watersheds across the Island where long term monitoring of ground water and surface water is carried out. Within this network, the West River is a fully monitored watershed where ground water observation wells and stream gauges continually measure the quantity of water flowing through the watershed. In addition, grab samples are collected on a routine basis at groundwater and surface water quality monitoring stations.

As a result, the West River watershed is fortunate to have long term water quality data for the following water quality parameters, Nitrate, Total Nitrogen, Phosphorus, and Total Suspended Solids (TSS). All graphs are courtesy of the PEI Department of Environment, Energy, and Forestry, Water Management Division. The data source is the Canada/PEI Water Quality Agreement and Environment Canada. The sample site is located within the Green Bay sub-watershed near the Provincial Boy Scout camp in Riverdale, PEI.

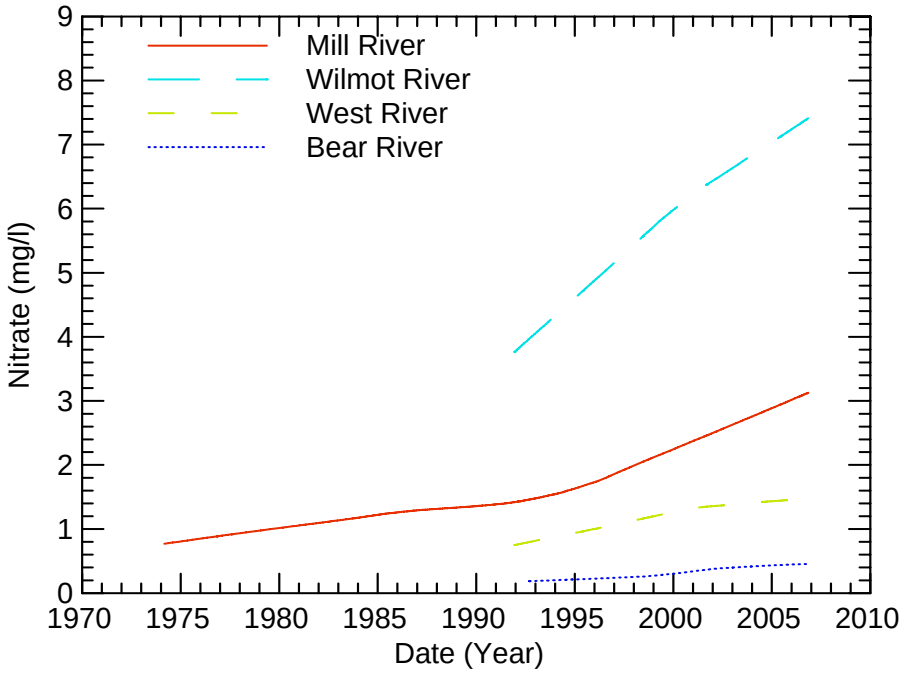
5.1 Nitrate

The Canadian Water Quality Guideline for nitrate for aquatic life (converted to Nitrate-Nitrogen which is the form of nitrate measured in the following graphs) is 2.9 mg/ litre. This guideline value is not likely protective of eutrophication in downstream estuaries. The nitrate concentration has doubled in the past 15 years (Graph 5.0) at this site. Graph 5.1 places the West River to context with other Island rivers.

Graph 5.0: Nitrate Concentration Trends West River (Riverdale site)



Graph 5.1: West River in Comparison to other Island Rivers

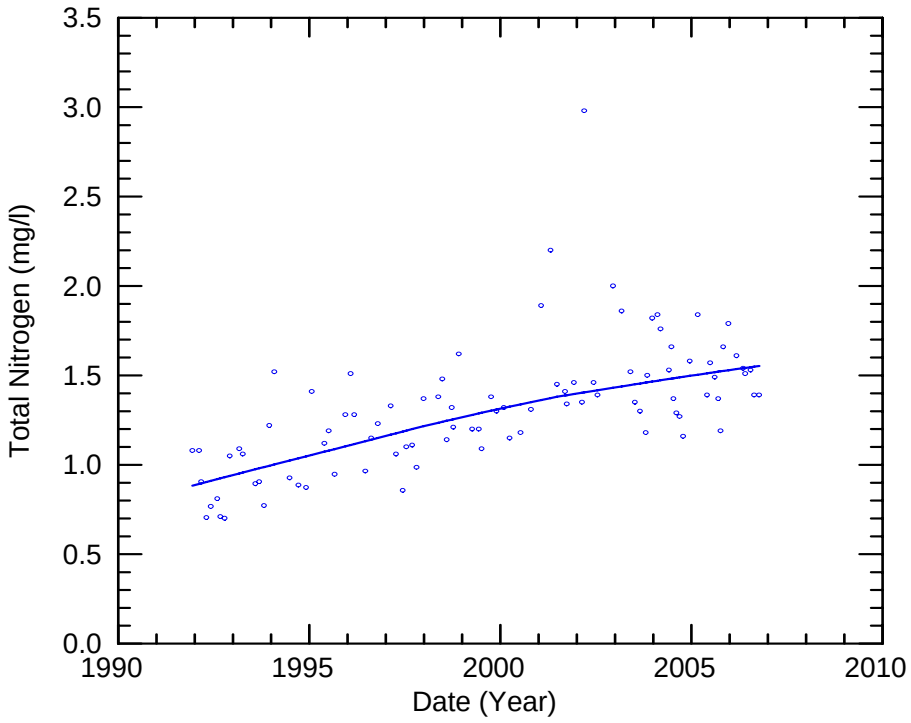


5.2 Total Nitrogen

Nitrate forms a major portion of total nitrogen in freshwater. As a result, Graph 5.2 is very similar to Graph 5.0. Nitrogen is believed to be the major limiting factor in the eutrophication process in marine systems. As a result, nitrogen loading from freshwater streams to estuaries is an important consideration.

Eutrophication is the process by which a body of water becomes enriched in dissolved nutrients that stimulate the excessive growth and decay of aquatic plant life. The normal function of the ecosystem is disrupted resulting in the depletion of dissolved oxygen, and severe reductions in water quality. In theory, the nitrogen values reported in Graph 5.0 and Graph 5.2 could support eutrophication. However, eutrophication is a complex ecological process in which many factors play a role. In recent years, it has not been an issue for the West River perhaps due the high rate of tidal exchange typical of estuaries emptying into the Northumberland Strait

Graph 5.2: **Total Nitrogen Levels Trends West River (Riverdale site)**

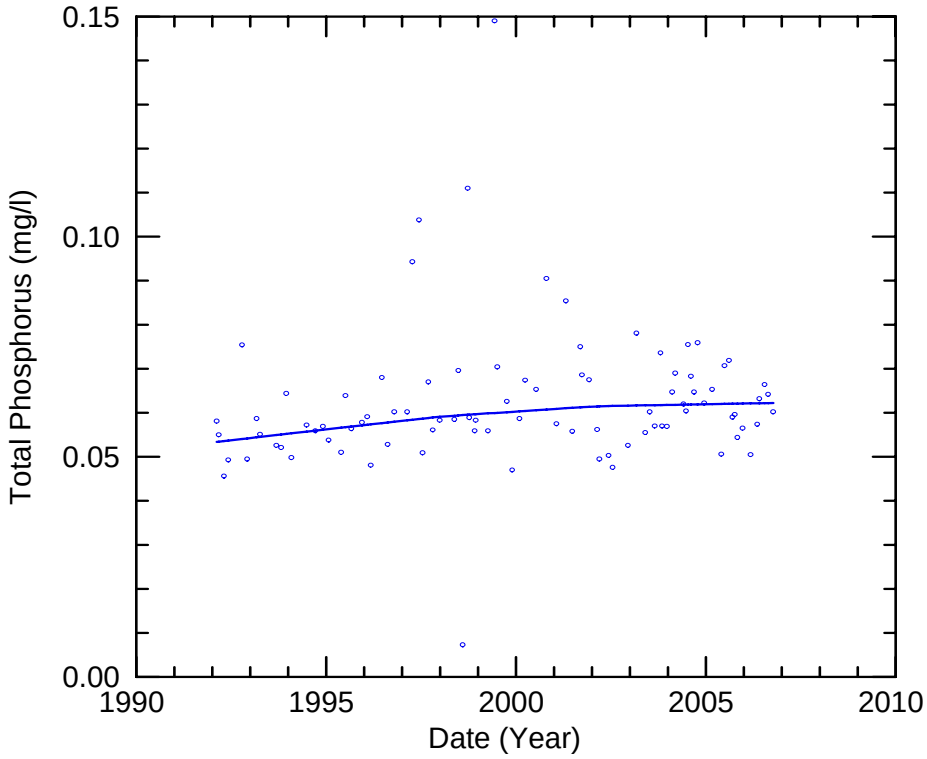


5.3 Total Phosphorus

Total Phosphorus (TP) levels appear stable for this sampling site. Because phosphorus binds with soil, the TP levels can be very high during periods of silt laden runoff. There is no toxicity guideline for TP unlike some other parameters.

Phosphorus may also play a role in eutrophication, although nitrogen is likely the main limiting element in marine systems, including estuaries. Unlike nitrogen, phosphorus levels have not shown significant upward trends in Island streams. In theory, the TP values reported in Graph 5.3 could support eutrophication. Again, this has not been an issue for the West River perhaps due the high rate of tidal exchange typical of estuaries emptying into the Northumberland Strait.

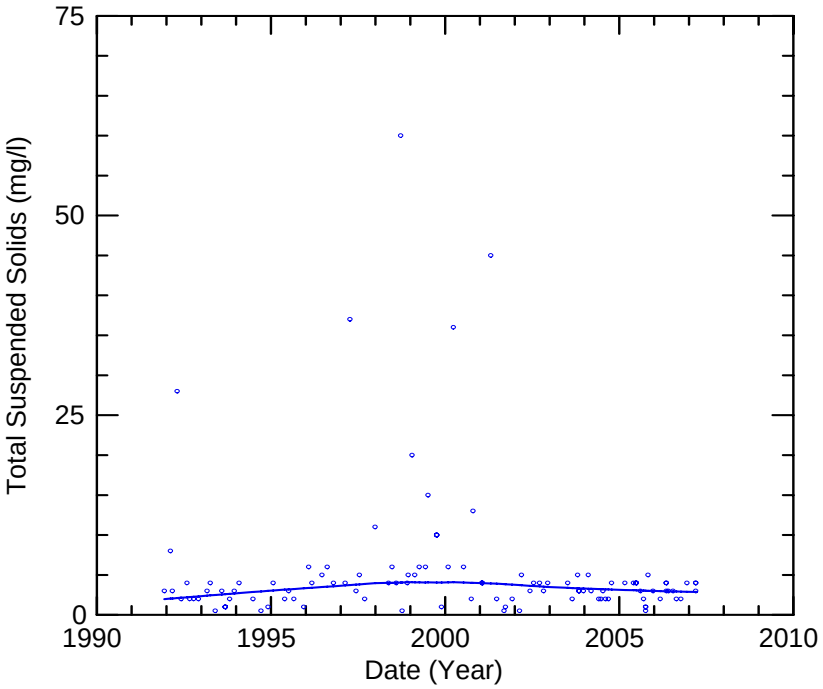
Graph 5.3: **Total Phosphorus Levels Trends West River (Riverdale site)**



5.4 Total Suspended Solids

For PEI, it has been determined that the natural background for Total Suspended Solids (TDS) should not exceed 4 mg/litre. For short term exposure, the guidelines state that the natural background should not be exceeded by 25 mg/litre. For PEI, that would make the fresh water guideline 29 mg/litre (4 mg/litre + 25 mg/litre). Because of sampling limitations, TDS does not reliably capture "red water" events on the West River.

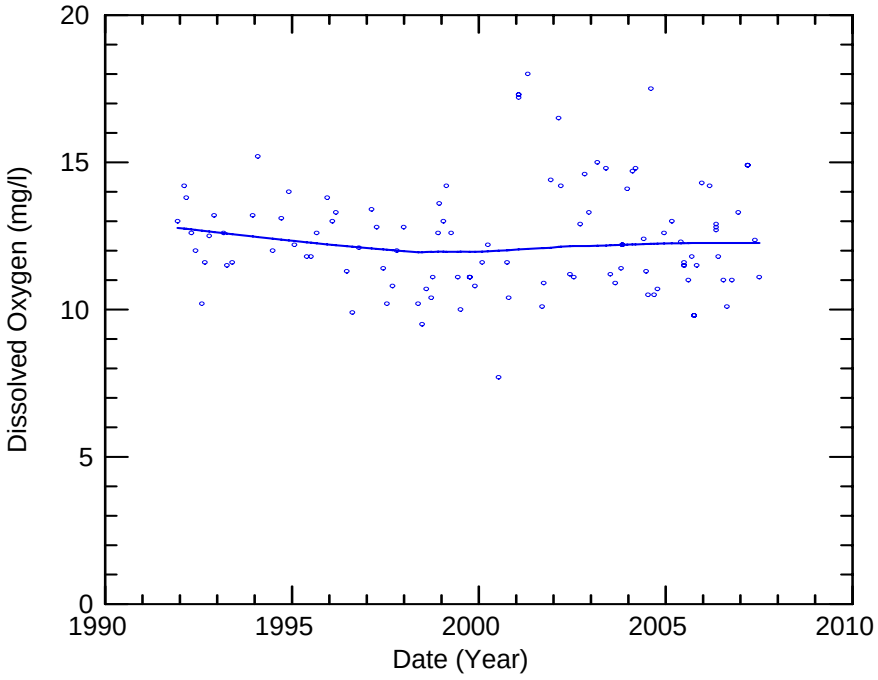
Graph 5.4: **Total Suspended Solids Trends West River (Riverdale site)**



5.5 Dissolved Oxygen

Dissolved oxygen (DO) is not an issue in Island streams. The slightly higher levels in the early nineties may be due to more sampling taking place in the winter when DO is normally higher (Graph 5.5).

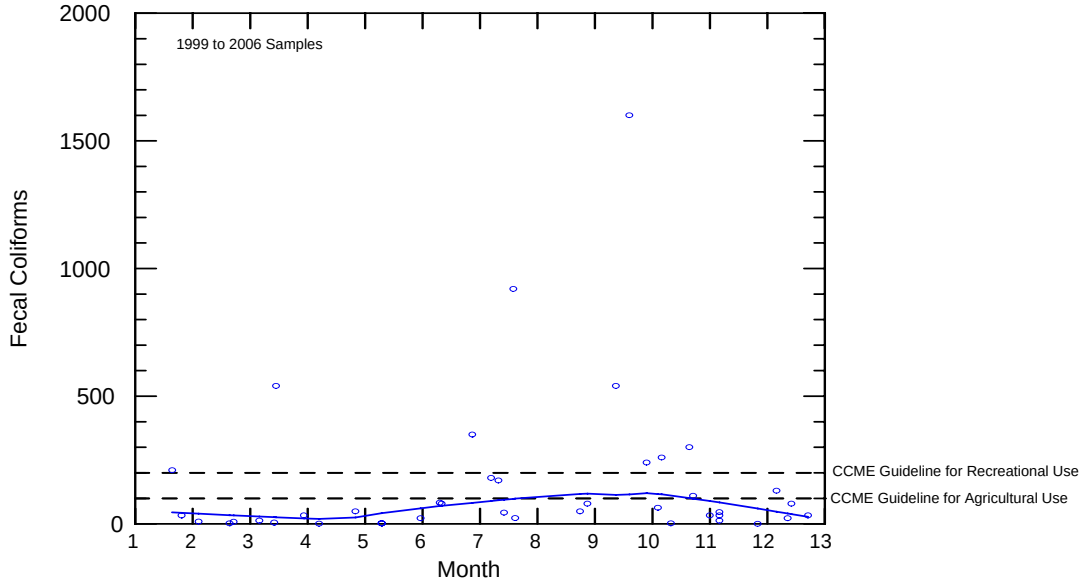
Graph 5.5: **Dissolved Oxygen Trends West River (Riverdale site)**



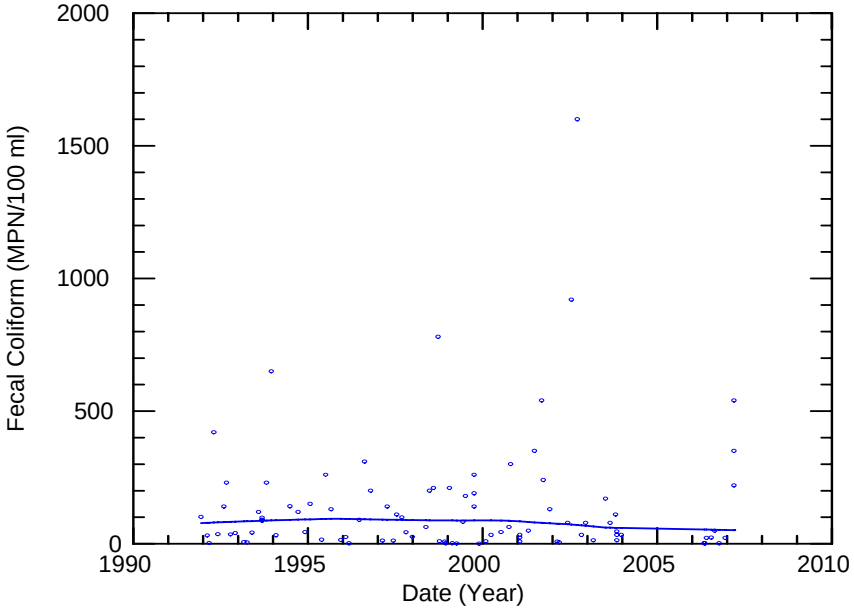
5.6 Fecal Coliform

Fecal coliform are a group of bacteria that are passed through the fecal excrement of humans, livestock and wildlife. Their presence indicates the possible presence of other pathogenic organisms. Graph 5.6 shows fecal coliform results for Riverdale site over the last 8 years of sampling (1999 to 2006). Most of the time values are below the guideline values. The values are very similar to what is seen in other Island streams and it is expected that values will be highest in mid summer. There does not appear to be any trend in fecal coliform for the Riverdale site. (Graph. 5.7)

Graph 5.6: **Fecal Coliform Results West River (Riverdale site)**



Graph 5.7: **Fecal Coliform Trends West River (Riverdale site)**

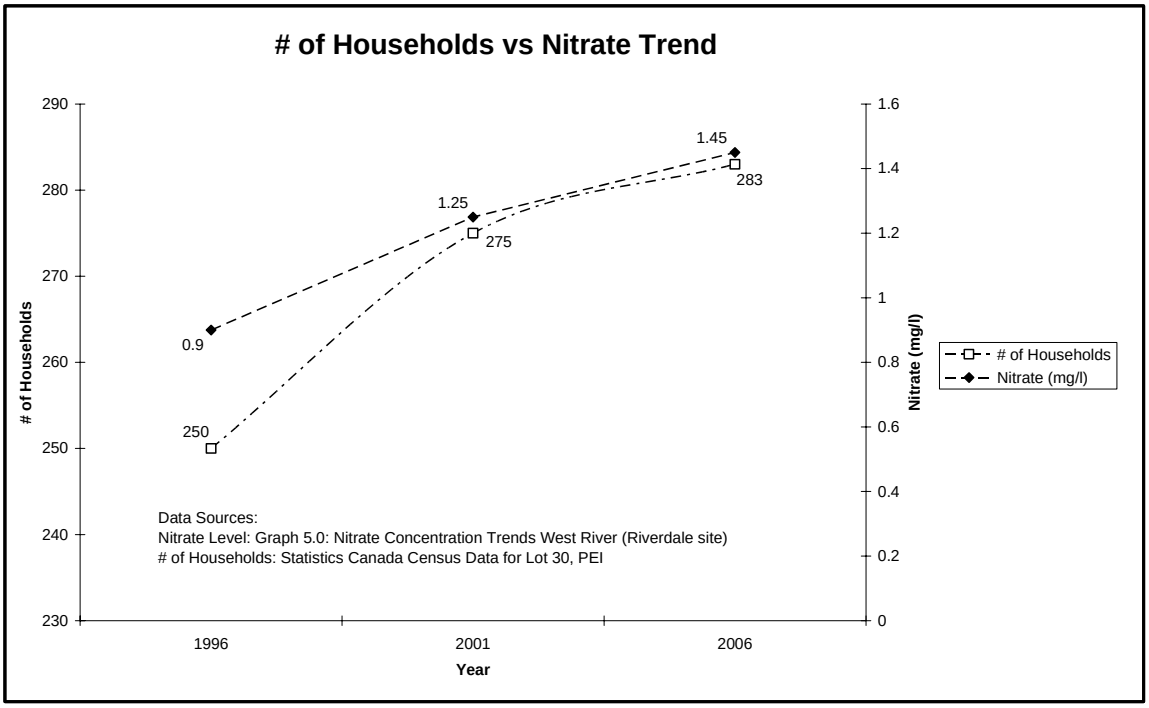


6.0 NITRATES IN GROUND WATER

Nitrate is the most common chemical contaminant found in Prince Edward Island ground water. Because it is odourless, colourless, and tasteless, it does not affect drinking water aesthetics. However, drinking water with elevated levels should be avoided as it is a recognized health risk for certain susceptible individuals. Water testing was an early recommendation by the PEI Commission on Nitrates in Groundwater chaired by the Honourable Armand DesRoches. Free public nitrate testing clinics were held across the Island beginning in November, 2007. A nitrate testing clinic was held March 1, 2008 at Bluefield High School in Hampshire. Anyone curious about the nitrate level in their drinking water was able to take a water sample in for testing, and receive the results for their sample in a few minutes. Technicians screened 175 water samples. At the Hampshire clinic, 7% of the samples tested over 8 mg of nitrate (NO3-N) mg/L and were sent for further testing. The Guidelines for Canadian Drinking Water Quality has set the maximum concentration of nitrate-nitrogen (NO_3-N) at 10 mg/L for human consumption. The percentage of samples testing over 8 mg /L at clinics to date ranged from a high of 30% to a low of 2%. A database will correlate the sample results from all clinics to civic numbers. Preliminary results from nitrate clinics held thus far indicate the average nitrate level in groundwater is between 4 and 5 mg/L of nitrate (NO3-N). However, nitrate levels vary widely within any given region.

Nitrate levels measured at the Riverdale sample site on the West River Watershed have doubled in the last 15 years (Graph 5.0). Graph 6.0 compares nitrate levels from this site and Lot 30 household numbers for 1996, 2001, and 2006.

Graph 6.0



On the West River Watershed, there appears to be a correlation between the nitrate level trend and the number of households. The treatment of domestic sewage in the West River Watershed is completely dependent on individual household septic tanks. Septic tanks may be a larger portion of the total nitrogen load on the West River Watershed than other Island watersheds. Based on estimates from American city effluent, a person is estimated to produce 4.5 kg of nitrogen per year (Pradhan 2004). Nitrate is the product of the oxidation of nitrogen by micro organisms. Most forms of nitrogen tend to be converted to nitrate. An average household on the West River Watershed is 2.6 persons (759 people/283 households)(Lot 30 Census Data 2006) and could produce 11.7 kg Nitrogen per year. A properly working septic tank removes up to 20-25% of the nitrogen produced (Costa et al 2002). The balance may find its way into the ground water. In theory, not considering any other sources of nitrogen such as lawn fertilizer, an average subdivision of 10 homes on one hectare, using septic tanks, could result in 84 kg of nitrogen per hectare per year going into the ground water.

11.7kg N x 10 homes = 117kg N – 29 kg N (117kg x 25% septic system efficiency) = 84 kg N

Potatoes, the most heavily fertilized field crop on the Island, are fertilized at the rate of 150-200 kg of nitrogen per hectare (ha) with an estimated 80% or more of the nitrogen being removed with the potatoes. This can leave 30-40 kg/ha of nitrogen left behind in crop residue and in the soil one year in a three year potato rotation. A 10 home, one hectare subdivision using septic systems may introduce twice the amount of nitrogen into the soil as hectare of potatoes but **every** year. Or 5 households are the nitrogen load equivalent to the environment of one hectare of potatoes. According to the PEI Real Property Records Database 2006, there were 635 households on the West River Watershed.

635 (Total # of Households West River Watershed)/ 5 = 127 Potato Hectare Equivalents

The 2000 Corporate Land Use Data Base reports approximately 407 hectares of potatoes grown on the West River Watershed.

The sources of nitrate, the relationship between nitrate sources, and how nitrate travels through the environment is complex. There are many sources of nitrate including deposition from the atmosphere, decomposition of plant and animal material, sewage, manures and chemical fertilizers. The proportion all these different sources contribute to the total nitrate load on a watershed will be unique to that watershed. All these sources must be examined if the trend to increased nitrate levels in ground water is to be reversed.

7.0 WATER BUDGET

A water budget is an evaluation of the relationship between the sources of water (inflow) and discharges/withdrawals (outflow) of water in a watershed. Groundwater extractions usually result in stream flow reduction because there is a direct correlation between stream levels and the amount of water pumped out of a watershed. The PEI Department of Environment, Energy, and Forestry developed a groundwater flow model as a tool to assist in analyzing this correlation. The model can be used to predict potential impacts of future groundwater withdrawals.

The Central Queens Wildlife Federation assisted in developing this model by carrying out an assessment of the West River Watershed in 2006. As part of this assessment, the water levels of 12 residential wells were sampled three times over the course of the year to determine average daily residential water use.

The following parameters for the West River Watershed were used to populate the model:
A. Total daily residential water use within the watershed boundary:

632 (# of households) × 0.9 m^3/d (Average Daily Residential Water Use) = 570 m^3/d

B. Total daily estimated livestock water use within the watershed boundary:

4083 (# of head of livestock) × 0.045 m^3/d (Daily per Head Water Use) = 184 m^3/d

C. Total estimated daily commercial water use within the watershed boundary:

2 m^3/day (Snowmaking, Brookvale Provincial Ski Park)

D. Total groundwater use in the West River Watershed (A+B+C=D):

570 m^3/d + 184 m^3/d + 2 m^3/d = 756 m^3/day or 760 m^3/day

This accounts for 0.6% (760/128,976) of mean annual recharge of the watershed.

Table 7.0 Groundwater Budget for West River Watershed

Watershed area= 113 km^2	Inflow (m^3/d)	Outflow (m^3/d)
Recharge	128,976	
River leakage (estuary)		20,037
Stream leakage	4,633	112,567
Sum	133,609	132,604

Source: Jiang,Yefang, PEI Department of Environment, Energy, and Forestry

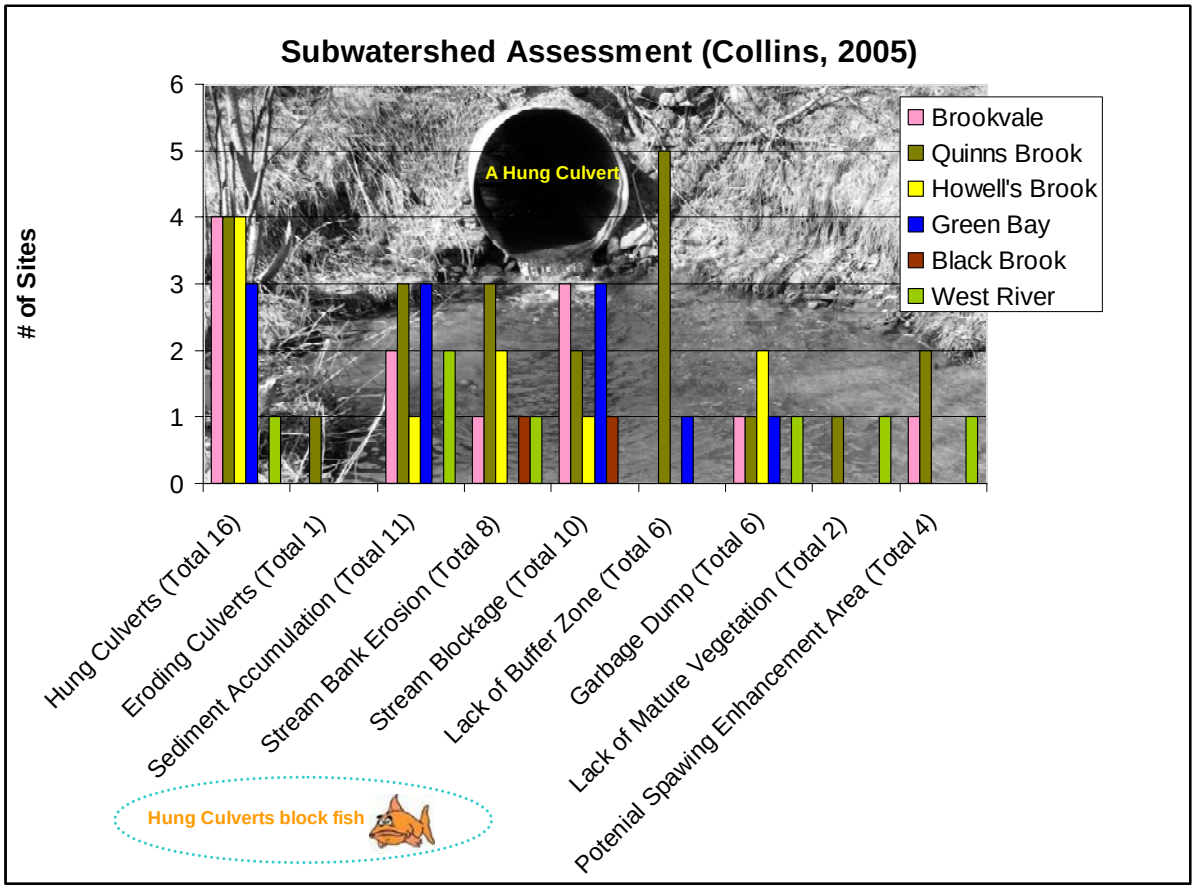
These calculations assume groundwater is withdrawn evenly over the whole watershed. Because stream levels and groundwater levels are closely related, high volume ground water use on any of the six West River subwatersheds could impact flow rates of an individual stream. Climate change models predict hotter, drier summers which may encourage ground water use for agricultural irrigation.

8.0 FISH HABITAT

The West River Watershed is a spring fed cold-water stream system and contains such fish species as brook trout (*Salvelinus fontinalis)*, rainbow trout (*Oncorhynchus mykiss)*, Atlantic salmon (*Salmo salar*), smelt (*Osmerus spps),* and Blueback herring, (*Alosa aestivalis*). The river system itself has water depths ranging from shallow areas in the upper tributaries and pools several meters in depth in the lower sections. The relatively high percentage of forested land (52.3%) for PEI and low number of sites identified with buffer zones less than 10 m (Collins, 2005) has created ideal fish cover and ensured the areas continued designation as a cold-water stream system.

During the summer of 2005, restoration staff conducted an assessment of the entire watershed (Collins, 2005) in order to quantify the number of disturbances affecting the streams in each of the subwatersheds. Issues such as hung culverts, stream bank erosion, sediment accumulation, and small buffer zones were common. In 2006, CQWF partnered with local landowners, the Dept. Transportation and Public Works and DEEF to begin restoration work focusing on the Quinns Brook subwatershed (Fig. 4.1). This subwatershed was found to have the highest number of recorded disturbances (Graph 8.0). Over the course of the summer 2006, thousands of seedlings were planted, silt traps along heritage roads were cleaned out and in-stream blockages were removed.

Graph 2.4.1: Stream Assessment by Subwatershed



9.0 FISH POPULATION

The status of the fish populations is highly variable. Studies completed in the last two decades have indicated a decrease in the Atlantic salmon population. Local fishermen have also commented on the decline in stocks over the last decade. The cause of the decline is unknown but most likely can be attributed to a variety of factors such as over fishing, poaching and alteration of fish habitat with the build up of sediment along the streambed (Johnston and Dupuis, xxxx). In addition, Atlantic salmon stocking programs have ceased due to lack of government funding.

Fish Population Surveys

The Central Queens Wildlife Federation has been partnering with the Dept. Environment, Energy and Forestry over the past two years in order to collect population data and develop a long-term data base for the West River Watershed fish populations. In the past, volunteers have had the opportunity to assist with the conducting of population surveys. Once a multi year data set has been collected, population trends will be determined and the information will be released for public review.

In the late 1980's, brook trout were identified to have the highest population size compared to other anadromous fish species present in the watershed that spend part of their life cycle in both marine and freshwater environments (Johnston and Dupuis, xxxx). This trend has continued. A recent survey of salmonids on PEI determined that the brook trout are still the most abundant salmonid in the West River Watershed (Guignon et al, xxxx). Since 2005, the CQWF volunteers have partnered with the Dept. Environment, Energy and Forestry to continue to monitor brook and rainbow trout populations (see Fish Populations Surveys).

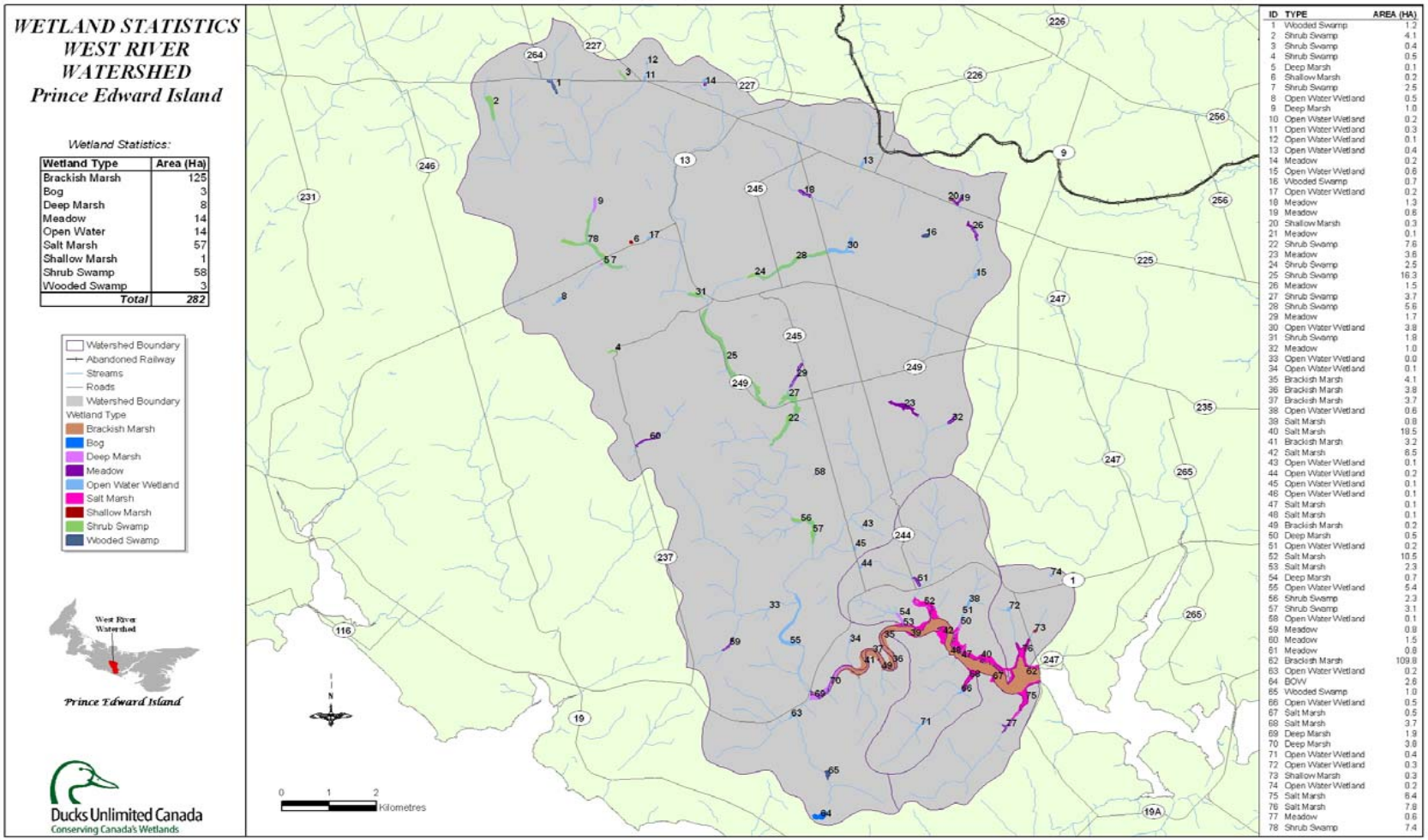
In recent history, the West River Watershed has had only one recorded fish kill that took place in June, 1971 when a fungicide entered the stream system in the Quinns Brook Subwatershed near Hampshire. It was a critical time in the season for the fish population, and large numbers of older fish brood stock were killed. The event devastated the sport fishery population, affecting trout and salmon populations. Even though the substance was released into a stream system in the upper reaches of the watershed its affects were recorded in the Bonshaw area (Johnston et al., 1990).

Over the years biologists have put forth a variety of recommendations in order to maintain or improve the health of the fish populations in the watershed. These recommendations include but are not limited to; educating anglers on sustainable fishing practices continue to implement restoration projects, and reduce the amount of sediment that has been entering the watercourses (Johnston et al. 1990). It is the hope of the CQWF that with the implementation of this management plan that these and a variety of other strategies will be put in place to improve the health of the fish populations in the West River Watershed.

From an old postcard: Fishing on Bonshaw River

10.0 WETLAND HABITAT

Watershed has limited wetland habitat which is mostly located in the West River subwatershed. It is primarily brackish march (125 ha), salt marsh (57 ha), and shrub swamp (58 ha) as show in the following map prepared by Ducks Unlimited.



11.0 POPULATION TRENDS

Statistics Canada reports census data by Lot number based on the original survey and division of the Province in 1767 into proprietary lots. Watershed boundaries and lot boundaries are very different. Figure 11.0 overlays the West River watershed boundary with the Lot boundaries. To review population trends for the watershed, census data for Lot 30 which contains 54% of the watershed (Table 11.0) was chosen as representing, if not the watershed itself, the area. Graph 11.0 plots changes in population for Lot 30 from 1991-2006.

Figure 11.0

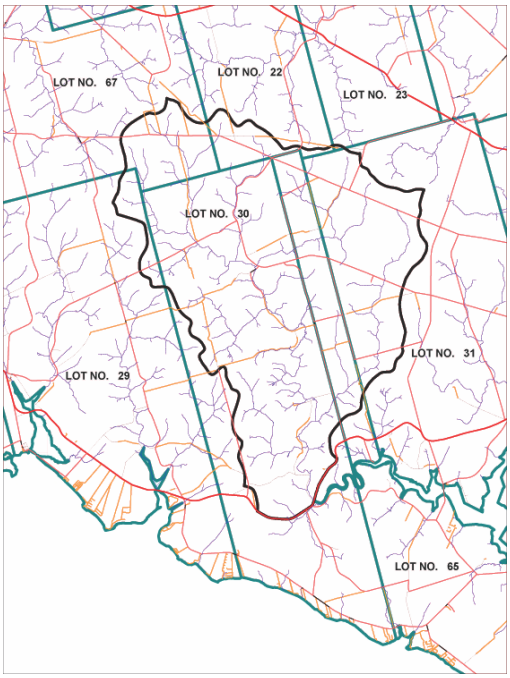
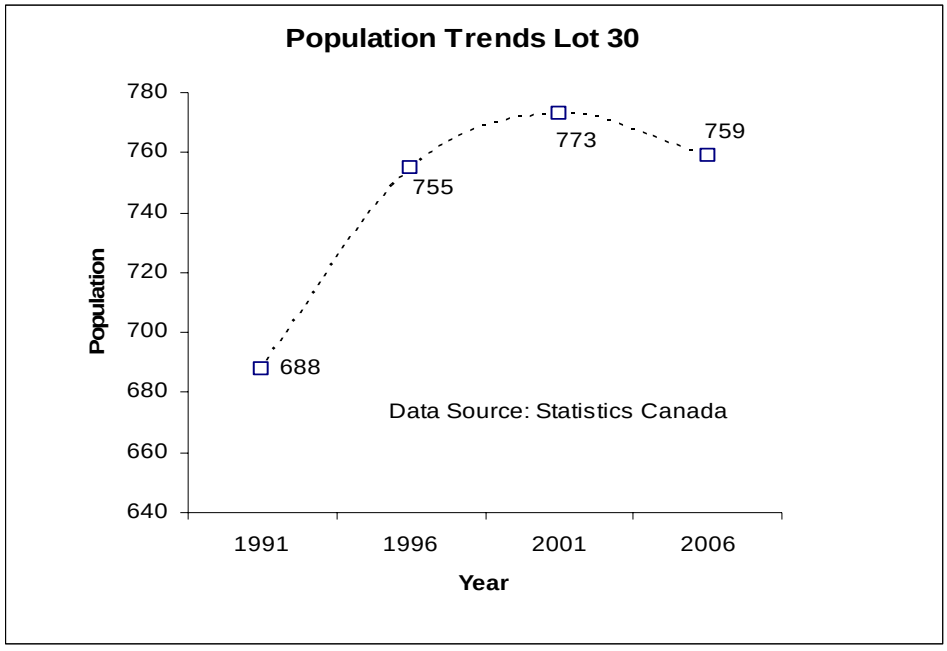


Table 11.0

Lot #	Area in Watershed (Hectares)	Total Lot Area (Hectares)	% of Watershed in Lot
30	5469	8539	54.0
31	2322	9298	25.0
65	1112	8076	13.8
67	823	9808	8.4
22	424	8567	4.9
29	269	8825	3.0
23	6.0	8479	0.1

Graph 11.0

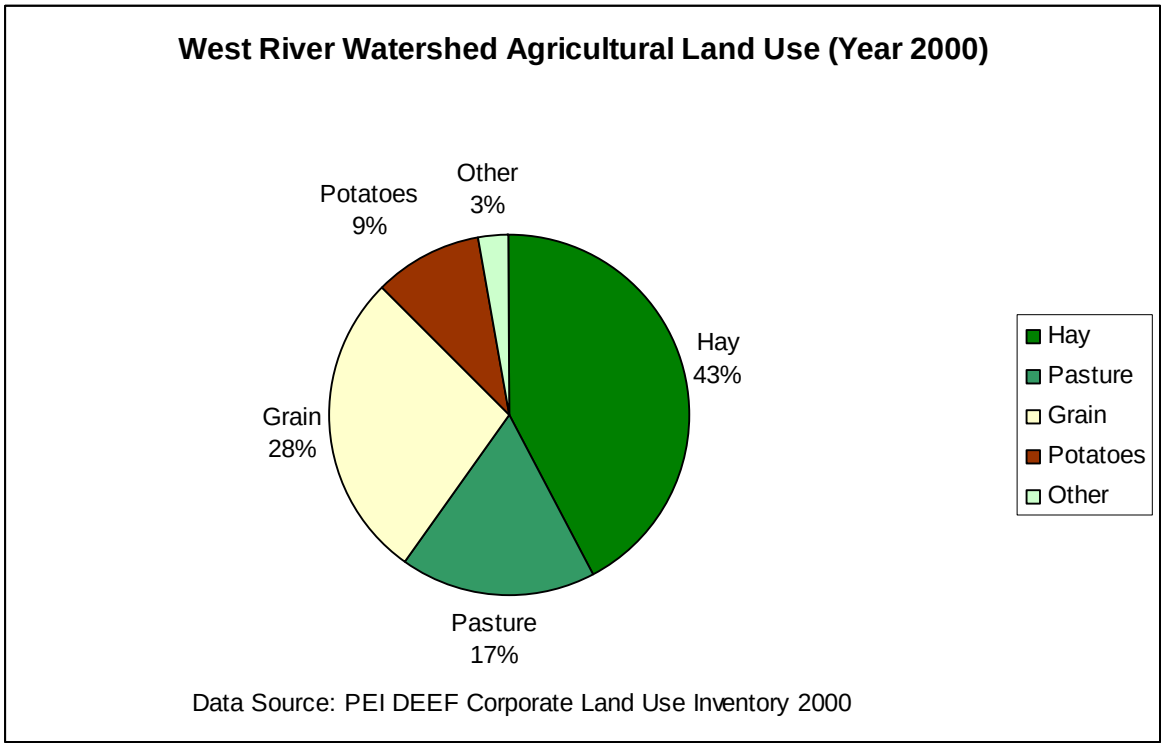


12.0 AGRICULTURE

12.1 Agricultural Land Use

According to the PEI DEEF Corporate Land Use Inventory 2000, 42.3% (4293 ha) of the total watershed was in agricultural crop use. This inventory is scheduled to be updated in 2010. In the year 2000, the largest amount of land has been allocated to hay production 43% (1818 ha), followed by grain production at 28% (1197 ha), 17% (746 ha) for pasture land and 9% (407 ha) for potato production (Graph 14.0).

Graph 14.0



The face of Prince Edward Island agriculture has changed dramatically in the last year. In the West River Watershed, beef numbers have dropped by 50%. A few of years ago, there were 5 hog farms. Now there is one. It's unclear how these and other changes will impact land use on the watershed. There are two identifiable trends.

1. Conversion of pasture or hay land to higher value row crops.
2. Conversion of land to housing development.

12.2 Agricultural Practices

The agricultural producers in the watershed have been involved in the adoption of Beneficial Management Practices for the last decade. An estimated 85% of producers have been participating in a national program implemented locally by the PEI Federation of Agriculture. The program known as the PEI Environmental Farm Plan was designed to assess and evaluate current operations, and develop a list of potential actions for each individual operation to implement. Awareness of the impact of certain agricultural practices on the environment is increased. As a result of the program, agricultural producers in the

West River Watershed have adopted such practices as; planting hedgerows to decrease soil erosion, taking land with high risk of erosion out of potato production, constructing grassed waterways, adopting strip and row cropping techniques, fencing cattle from stream systems, constructing fuel storage systems and implementing rotational grazing, and three and four year crop rotation schedules (Fig. 14.0).

Figure 14.0: Kingston Dairy Farm wins Environment Award

HON. GILBERT R. CLEMENTS AWARD FOR ENVIRONMENTAL FARM PLANNING
2006 Winner
BONZO FARMS LTD.

From the left: Hon. Gilbert R. Clements, Daniel & Naomi Bondt and Don & Monique Mowatt, with their daughter Natalie

Bonzo Farms Quick Facts

- **The farm is run** by Don & Monique Mowatt and Daniel & Naomi Bondt.
- **The farm has adopted** strict environmental techniques.
- **All cattle** have been fenced out of streams and remote watering systems have been installed.
- **The farm** has up-to-date manure storage and milkhouse waste is properly disposed of.
- **Cattle are grazed** on a rotational basis to lessen the impact on pastures
- **The farm** has developed a nutrient management plan for their land
- **The farm also participates** in the Canadian Foodgrains Bank, which involves farmers growing and harvesting grain for hungry people around the world.
- **Bonzo Farms** was nominated by the Central Queens Wildlife Federation in recognition of its assistance in the restoration of Carragher's Pond in Emyvale

A Kingston dairy farm that has demonstrated outstanding commitment to environmental conservation and protection has been named provincial environmental stewardship award winner.

Bonzo Farms Ltd, a family dairy farm, is the 2006 winners of the Hon. Gilbert R. Clements Award for Environmental Farm Planning. This award is given annually to a farm enterprise which is economically viable, environmentally sound and socially responsible in the production of high quality food from a sustainable system. It is named in recognition of the Honorable Gilbert R. Clements's commitment to the environment.

The West River Watershed is also known for having an extensive riparian zone characterized by a stream system that is surrounded by mature trees and shrubs. Landowners that wish to extend the size of their buffer zones have begun to partner with the CQWF to implement tree planting projects.

Agricultural producers in the West River Watershed are assisted in adopting Beneficial Management Practices through the Canada-Prince Edward Island Agriculture Stewardship Program (Table 12.0). Funding for this program is capped and is offered on a first come first served basis. Producers of all sectors are experiencing some the toughest economic challenges in memory. They are faced with difficult choices every day. Continued community and government support will be required to encourage producers to adopt practices that benefit everyone on the West River Watershed.

Table 12.0 (Source: Agriculture Resource Division, PEI Dept of Agriculture)
Canada-Prince Edward Island Agriculture Stewardship Program

(CPEIASP) BMP's **Current as of March/08**	Funding level	Funding Cap
1. Manure storage & transfer system	50% on first 40K; 25% on next 60K	$35,000
2. Manure treatment – Includes dewatering & nutrient recovery systems, anaerobic digesters & composting infrastructure	30%	$30,000
3. Modification to manure spreaders for improved application	30%	$10,000
4. Efficient in barn livestock watering devices & cleanout systems to reduce water use & manure volumes	30%	$20,000
5. Farmyard runoff control:		
a) Impermeable base & roof for minimizing livestock runoff	50% to 20K	
b) Constructed wetlands & wetland restoration	75% to 6K	$20,000
c) Storage and handling of on-farm fruit and vegetable processing wastewater	50% to 20K	
6. Relocating livestock facilities from riparian areas	50%	$30,000
7. Product & waste Management:		
a) On-farm fuel storage	50% on first 8K; 30% on next 5K	
b) On-farm pesticide storage	50% on first 10K; 30% on next 10K	$15,000
c) Improved on-farm silage storage	30% to 15K	
d) Milkhouse waste management	50% to 10K	
e) Heavy duty mower	30% to $15K	
f) Deadstock composting	50% to 15K	
g) Composting of fruit & vegetable culls	30% to 15 K	
8. Water well management:		
a) Sealing and capping old wells	50%	$2,000
b) Protecting wells from surface contamination	50%	$5,000
9. Riparian area management & shelterbelt establishment:		
a) Livestock fencing, alternate watering systems & stream crossings	66% to $26,400	
b) Hedgerow and buffer zone tree and shrub plantings	66% to $13,200	$26,400
c) Improved stream crossings for farm machinery	50% to $20,000	
10. Erosion control structures	66%	$26,400
11. Improved cropping systems:		
a) Modifications for low disturbance seed & fertilizer placemer	30% to $5,000	
b) Chaff collectors or spreaders for combines	30% to $5,000	
c) Controllers for variable rate fertilizer application	30% to $2,000	$15,000
d) Hand held GPS palm pilot for IPM monitoring	30% to $1,500	
e) GPS guidance systems for broadcast applications	30% to $15,000	
12. Equipment modifications for inter row seeding of cover crops	30%	$5,000
13. Improved pest management:		
a)Sprayer modifications including spray rate controllers, spray curtains, injection systems, induction tips and low drift nozzle	30% to $5,000	
b) Weather stations	30% to $5,000	$5,000
c) Biological control agents	30% to $1,500	
d) Cultural control methods including collard transplants in cole crops, mechanical weeders, vine rollers, European Corn Borer crushers and carrot foliage trimmers	30% to $5,000	
14. Recycling of water from greenhouses to recover nutrients	30%	$20,000
15. Irrigation equipment modifications to improve water or nutrient use efficiency	30% to $10,000	$10,000
Furrow Dammar Attachment to Potato Hillers	30% to $10,000	
16. Invasive alien species control	50%	$5,000
17. Preventing wildlife damage:		
a) Fencing or netting to prevent wildlife and bird damage	30%	$5,000
b) Scaring and repellent systems and devices	30%	$3,000
18. Nutrient management planning	50%	$4,000
19. Integrated pest management planning	50%	$2,000
20. Biodiversity enhancement planning	50%	$2,000
21. Strip cropping	$20/acre	$2,000
22. Pesticide risk reduction program	$5/acre to $500/yr	$1,000

In addition, the Department of Agriculture, through its Agri-Insurance program, is offering a discount on total premiums paid on insured crops to farms participating in Nutrient Management Planning. Farmers must use qualified planners and conduct a split field trial to receive the discount. The data collected from the split field trials will be used to customize and improve nutrient recommendations for Island soils, growing conditions and management practices.

A compelling reason for farmers to adopt nutrient management plans is the dramatic increases in fertilizer prices (approximately 35% since the 2007 season). Farmers are closely examining net value returns. Both Island potato processing companies are actively carrying out trials aimed at finding new potato varieties and fertility programs that will reduce fertilizer inputs but still maintain or improve net value returns to the farmer.

The Department of Environment, Energy, and Forestry recently announced the Province will participate in an Alternate Land Use Services (ALUS) program. The PEI ALUS Program is a voluntary and seeks to reward landowners for public environmental benefits in a variety of ways including financial payments, tax breaks or other options. The program is not finalized yet, and the types of activities that will receive assistance have not been determined.

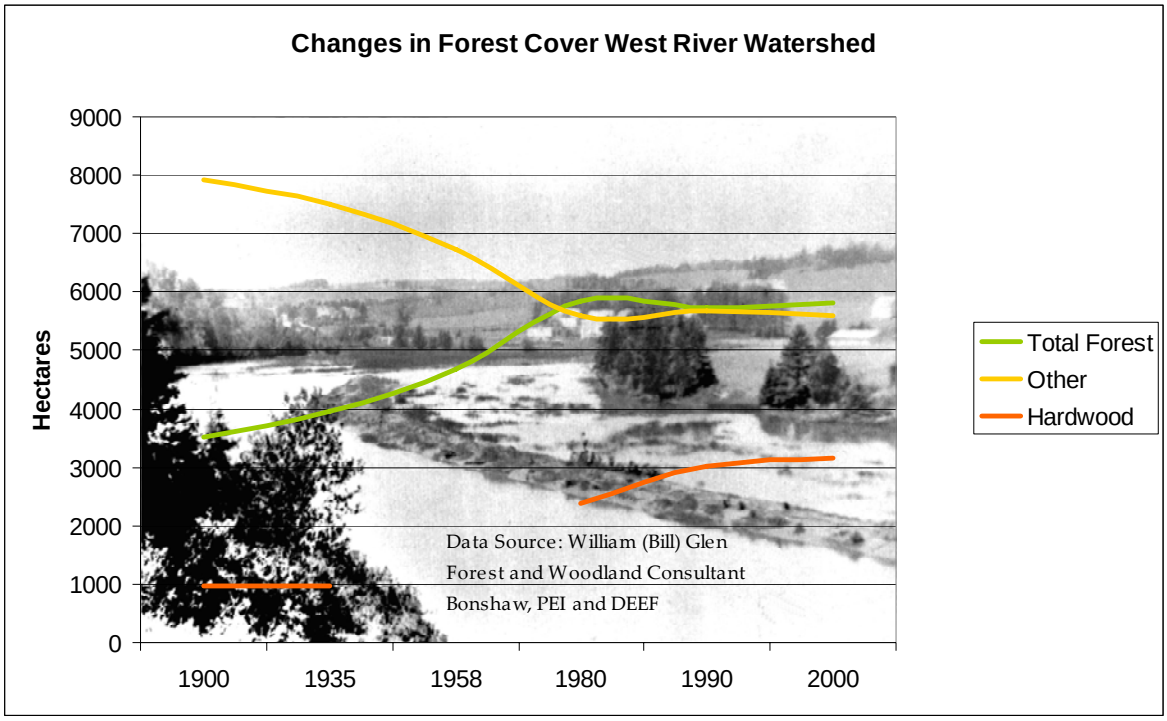
13.0 FOREST COVER

13.1 Changes in Forest Cover

Unlike many Queens County watersheds, forest cover has increased since 1900, and stabilized in the 1980's (Graph 13.0). Provincially, total forested land has decreased by 6% or 42,000 acres between 1990 and 2000 primarily due to conversion to agriculture (ERIC Final Report, 2008). The 2000 PEI DEEF Corporate Land Use Inventory reports 52.2% forest cover for the total watershed. Forest cover for the West River subwatersheds (Graph 4.0**)** ranges from 70% for Black Brook to 27% for Quinns Brook, the most intensively farmed subwatershed. Up until 1900, the hilly terrain, which ironically now discourages harvest, aided the earlier wood harvesters. It has been told that trees were simply rolled down the hills to streams and floated down to a saw mill. Now, the hilly terrain limits the use of mechanical harvesters, and restricts conversion to agriculture.

The forest cover is also predominately hardwood (Graph13.0 and 13.1). Most of the mature softwood, which regenerated on former agricultural land, has been harvested. Hardwood is not normally harvested commercially on it's own but as a by-product of softwood harvest. The pulpwood market has collapsed in recent years to the point that provincial foresters predict there will no sale of pulpwood on PEI this year. The stud wood market has also diminished, due to the decline in the US housing market (ERIC Final Report, 2008). Hardwood harvest for the firewood market, even if higher energy costs increase demand, is not likely to negatively impact the watershed unless it occurred in environmentally sensitive areas, or at very high levels. The watershed does contain stands of old growth hardwood which could be at risk to harvest for the high quality hardwood log market.

Graph 13.0

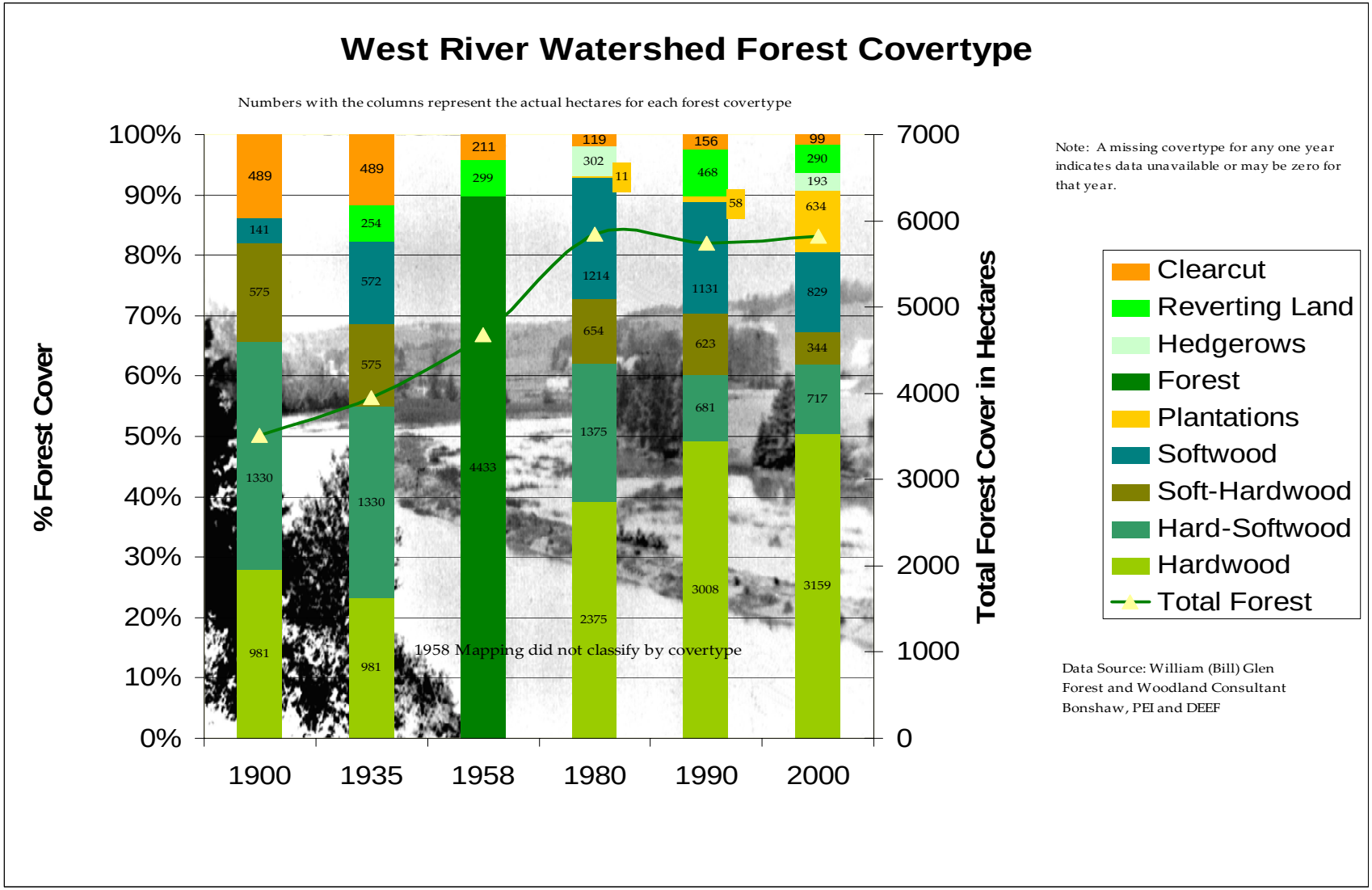


13.2 Impact of Climate Change on Forest Cover

Climate change models forecast increased temperatures and changes in precipitation patterns. Total precipitation is predicted to remain the same but summers will be hotter and drier, and the watershed will likely experience summer drought. Some species such as white pine, hemlock, maple, beech and oak are more able to handle the forecast warmer temperatures and should have some resistant to summer drought. Restocking or restoration tree planting should focus on these species. Fir, spruce, larch, red pine, the birches, and popular appear to be susceptible to climate change. Energy from the forest should focus on these vulnerable species (Glen, 2008).

The West River Watershed forest has a high esthetical and recreational value. It is a key factor to the continuing viability of the recreational fishery on the West River, and the overall health of the watershed.

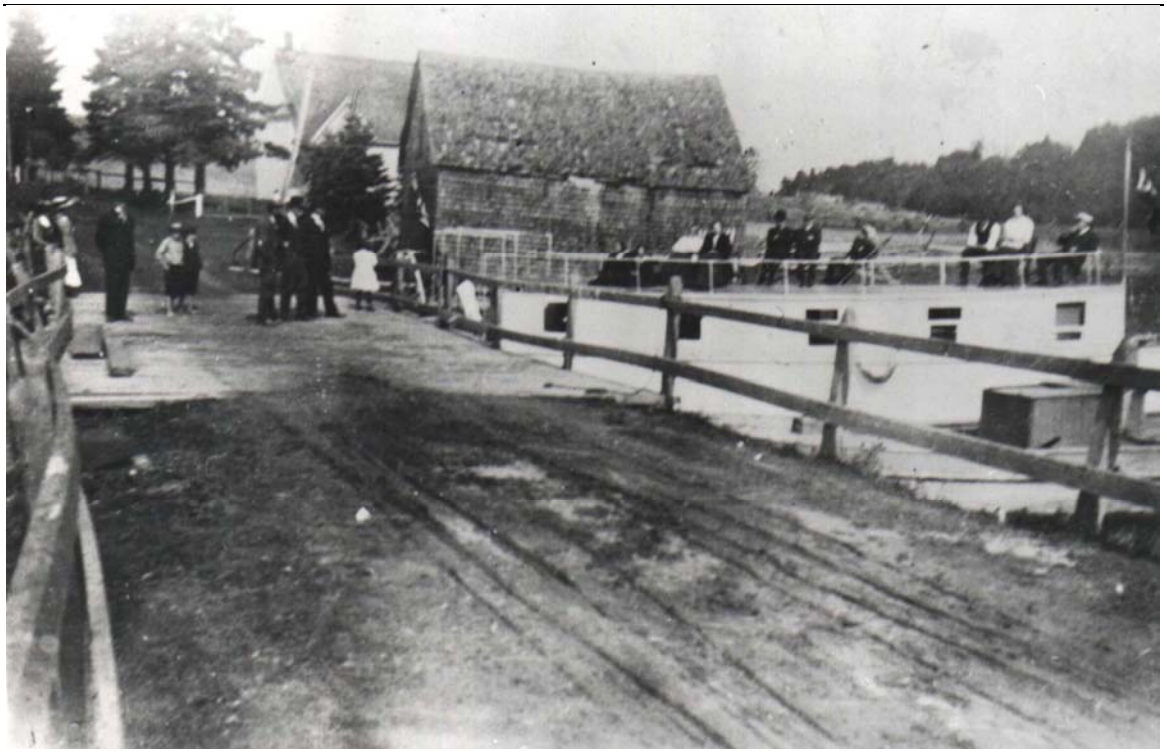
Graph 13.1


West River Watershed Forest Covertype
Numbers with the columns represent the actual hectares for each forest covertype
% Forest Cover
Total Forest Cover in Hectares
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
7000
6000
5000
4000
3000
2000
1000
0
1900
1935
1958
1980
1990
2000
489
141
575
1330
981
489
254
572
575
1330
981
211
299
4433
119
302
11
1214
654
1375
2375
156
468
58
1131
623
681
3008
99
290
193
634
829
344
717
3159
1958 Mapping did not classify by covertype
Note: A missing covertype for any one year indicates data unavailable or may be zero for that year.
Clearcut
Reverting Land
Hedgerows
Forest
Plantations
Softwood
Soft-Hardwood
Hard-Softwood
Hardwood
Total Forest
Data Source: William (Bill) Glen
Forest and Woodland Consultant
Bonshaw, PEI and DEEF

14.0 SILTATION

Siltation of Island streams, rivers and estuaries is a widespread public concern. It is highly visible after heavy rains. From May 01, 2007 to September 30, 2007, local observers counted 31 days that the Bonshaw River was coloured with silt. After a heavy rain, it takes, on average, two or three days before the River begins to clear. Pools, ponds, and springs have been filled in, shellfish beds and trout spawning areas have been covered over, and water depth has been reduced throughout the estuary. It has been more than a few years since a boat of the size show below as moored at the Bonshaw Bridge.

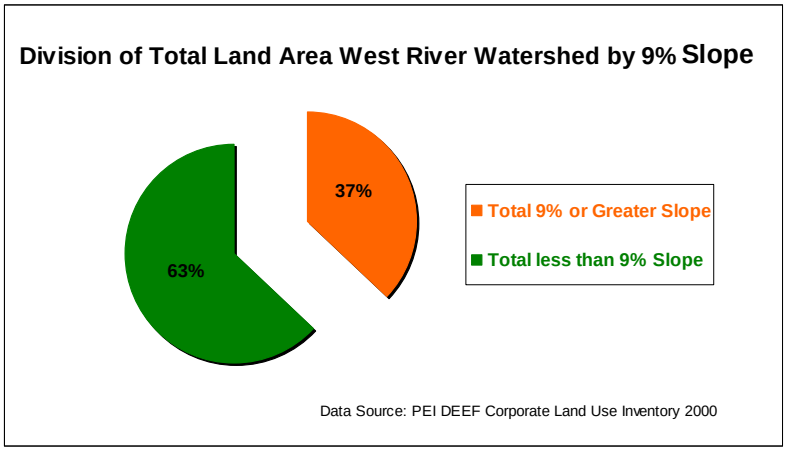
ARCHIVAL PHOTO OF THE BONSHAW BRIDGE



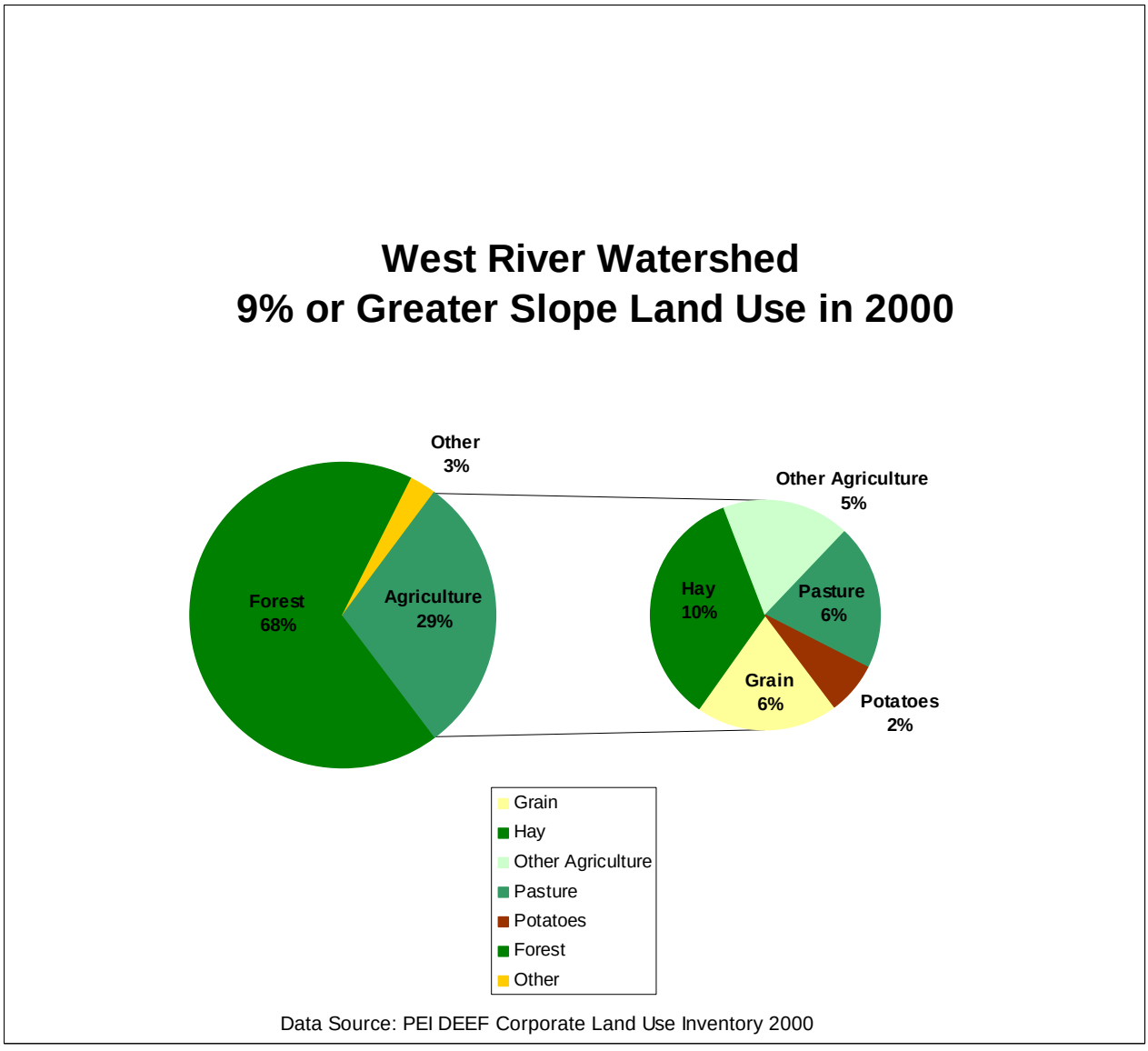
There are many factors contributing to siltation on the West River Watershed, topography, row crops, conversion of pasture to potatoes, and hilly clay roads. The same force of nature, erosion, which created our Province, is still hard at work. The challenge is to slow this process in face of the pressures of human activity and other larger forces such as climate change. A second challenge is to document and measure process or the lack of. There is little documentation other than anecdotal evidence, not for lack of concern, but because measuring siltation is more difficult than other water quality parameters.

The hilly terrain of the West River Watershed is appealing to the eye but causes the watershed to be vulnerable to the erosion. In 2002, the Province of PEI legislated restrictions on agricultural practices for land of 9% or greater slope (Agricultural Crop Rotation Act). Best Management Practices on 9% or greater land are a critical control point (Graph 14.0 and Graph 14.1).

Graph 14.0



Graph 14.1



15.0 PLANNING PROCESS

The goals, objectives and strategies for the West River Watershed Management Plan were developed by members of the West River Watershed Steering Committee during the fall/winter of 2005/2006.	

A steering committee was formed in September of 2005 to monitor the development of the management plan and advise staff. Membership of the committee consisted of local residents, members of the aquaculture and agriculture community, representatives from the Bonshaw, New Haven-Riverdale, and North Wiltshire Community Councils, staff from the DEEF Water Management and Fish and Wildlife Division, Agriculture and Agri-Food Canada, and the Atlantic Salmon Federation. The steering committee members were given the task of identifying the issues affecting the area and creating a list of strategies to address the issues. Members participated in education sessions and workshops on water quality and groundwater.

Community-wide presentations on such topics as nutrient management plans, ecological footprint, and water quality were also given. In December, 2007, the initial draft of the plan was presented to the residents of the West River Watershed. Those in attendance agreed to adopt the contents of the plan and support the implementation of the action plan and other proposed conservation initiatives that may also be developed. Newsletters and press releases were regularly distributed to inform the residents of upcoming events, solicit participation and to report the status of the management plan.

Initially the steering committee members identified the issues affecting the watershed. Examples of some of the environmental issues that were identified included:

- Uncertainty regarding water quality and quantity baselines and protection needs
- Lack of awareness surrounding the importance of wildlife habitat and ecologically significant areas
- Need to promote awareness of best management and development practices that have been already adopted by landowners on the watershed

- Need to develop partnerships with landowners to restore wildlife habitats

Strategies were then developed in order to address each particular issue. In order to develop a project timeline and prioritize the multiple programs, the strategies were separated into three separate categories. The categories included; immediate strategies which will be implemented in the first three years of the project, short-term strategies that will be adopted during year's three to five and long term strategies those that will not be implemented until the fifth year of operation.

It is the desire of the West River Watershed Steering Committee to address the issues facing the watershed on an ongoing basis over the next two decades. As new issues are identified, additional strategies to resolve or mitigate the problems will be developed by local residents and members of the steering committee.

16.0 GOALS, OBJECTIVES, AND STRATEGIES

Goal 1 - Improve & Protect Water Quality

Objective #1: Reduce soil erosion

Immediate Strategies (1-3 years)

- Continue to implement the list of recommended restoration activities from the 2005 West River Watershed Subwatershed Management Plan
- Partner with the Dept. of Transportation and Public Works and community volunteers to continue to inspect roadways three times a year and implement yearly work plans to reduce siltation in each of the subwatersheds
- Identify new and existing sediment sources from adjacent properties and partner with local landowners to decrease the amount of sedimentation, and if necessary find funding sources to implement work plans
- Continue to encourage members of agricultural community to implement Beneficial Management Practices and if necessary work with producers, government departments, and local agencies to locate funding sources to implement work plans
- Publish positive stories of landowners implementing soil conservation techniques in newsletters, local newspapers, and the project website four times a year
- Identify local community champions that have already adopted sustainable development and Beneficial Management Practices, promote them in the quarterly newsletters and present them awards on an annual basis in order to recognize their contribution to maintaining the health of the natural environment
- Develop partnerships with local commodity boards, agriculture organizations, and government agencies

Short-term Strategies (3-5 years)

- Update the details of the West River Watershed Subwatershed Management Plan by conducting additional surveys of all riparian areas in the watershed
- Lobby government to increase funding for soil conservation programs and to compensate landowners who take highly erodible land out of production
- Work with local landowners, and government and funding agencies to create one soil loss reduction and/or nutrient management demonstration site in the watershed per year

Long-term Strategies (5-20 yrs)

- In the event that any provincial government agencies or local municipalities wish to create land use plans for properties within the West River Watershed, provide them with scientific data and assist them with strategy development

Objective #2: Prevent nitrate, petroleum products, pesticide, and bacterial groundwater contamination

Immediate Strategies (1-3 years)

- Lobby government agencies to increase funding for the implementation of Nutrient Management Plans, in particular to higher additional staff to assist agricultural producers with the development, implementation, and monitoring of the plans
- Continue to encourage the members of the agricultural community to implement recommendations from their Environmental Farm Plans and other types of Beneficial Management Practices and if necessary work with producers, government departments, and local agencies to locate funding sources to implement work plans
- In subwatersheds with water quality parameters which continually have exceeded water quality guidelines, design and implement a more rigorous water sampling regime in order to identify and address sources of contamination
- Identify local community champions that have already adopted sustainable development and Beneficial Management Practices, promote them in the quarterly newsletters and present them awards in order to recognize their contribution to maintaining the health of the natural environment
- Partner with local farm commodity boards, agriculture organizations, and government agencies

Short-term Strategies (3-5 years)

- In areas in which contamination sources have been identified partner with local landowners to decrease the amount of nutrient enrichment, if necessary find funding sources to implement work plans and project partners
- Work with local landowners, government and funding agencies to create nutrient management demonstration sites within the watershed
- Monitor and inventory illicit dump sites found within the watershed

Long-term Strategies (5-20 yrs)

- Continue to research and inform landowners of any new alternative land use practices that may decrease nutrient enrichment and set up pilot projects to test the effectiveness of the practice whenever possible

Objective #3: Increase public awareness of water quality issues

Immediate Strategies (1-3 years)

- Implement an education program designed to encourage homeowners to regularly test their residential well water quality and protect their wells from future contamination sources
- Implement a program designed to educate landowners on proper disposal of hazardous substances
- Publish local water quality sampling results in quarterly newsletters, local publications and the project website
- Hold yearly public information sessions to update residents on current water quality trends

- Implement an effective communications strategy for Central Queens Wildlife Federation and the West River Watershed Steering Committee

Short-term Strategies (3-5 years)

- Implement a program to assess residential septic systems in order to prevent future bacterial contamination
- Lobby government agencies to assist homeowners with the cost of septic system upgrades and maintenance
- Partner with local waste management organizations to develop education and monitoring programs designed to curb illicit dumping in the watershed
- Create and/or adopt community water quality monitoring programs for residents or students in the surrounding areas to participate in to assist with the collection of both chemical and biological water quality data

Long-term Strategies (5-20 yrs)

- Continue to inform the public of water quality trends and strategies they can implement to enhance the water quality in the West River Watershed

Objective #4: Establish water quality baseline information and develop long-term trends

Immediate Strategies (1-3 years)

- Implement a long term water quality monitoring sampling regime for all of the subwatersheds in order to identify and address sources of contamination
- Lobby government agencies to increase funding for water quality sampling programs

Short-term Strategies (3-5 years)

- Establish partnerships with local educational institutions to assist with the collection of water quality data

Long-term Strategies (5-20 yrs)

- Continue to research more efficient and cost effective ways to identity water quality trends
- In 2017, create a West River Watershed water quality status report for public review

Goal 2 - Enhance & Protect Fish & Wildlife Habitat

Objective #5: Increase awareness and understanding of wildlife habitat issues

Immediate Strategies (1-3 years)

- Hold yearly public information sessions to update residents on wildlife habitat issues
- Implement an effective communications strategy for the Central Queens Wildlife Federation and the West River Watershed Steering Committee

Short-term Strategies (3-5 years)

- Provide opportunities for residents to assist with the collection of biological data and habitat enhancement projects
- Publish any relevant data in the quarterly newsletters, local newspapers, and the project website

Long-term Strategies (5-20 yrs)

- Implement education programs to encourage residents to participate in wildlife friendly landscaping

Objective #6: Improve the health of riparian, wetland, and terrestrial habitats

Immediate Strategies (1-3 years)

- Continue to implement the list of recommended enhancement activities from the 2005 West River Watershed Subwatershed Management Plan
- Partner with local government and education institutions to collect biological data for all habitat types

Short-term Strategies (3-5 years)

- Partner with local government and non-government technical representatives to assess and prioritize potential wildlife habitat improvement projects
- Meet with local foresters, anglers, hunters, and trappers to discuss strategies for how to maintain local wildlife populations within watershed
- Present wildlife population management strategies to provincial government agencies and encourage them to develop policies that assist with preservation of plant and animals in the West River Watershed

Long-term Strategies (5-20 yrs)

- In 2017, using long-term data from the various biological studies, create a wildlife habitat improvement plan for the watershed
- Work with stakeholders from the forest industry to assess the health of the forested areas in the watershed and create a forestry sustainability plan for the watershed
- Apply for funds to develop programs to monitor the effects of climate change on the plant and animal species in the West River Watershed, partner with government and educational institutions to develop studies

Objective #7: Ensure that current and future development (i.e. agriculture, forestry, landowners) projects do not negatively affect adjacent wildlife

Immediate Strategies (1-3 years)

- Monitor current development projects and work with developers to ensure that soil loss mitigation strategies are in place and are working properly
- In areas in which contamination sources have been identified, partner with local landowners to reduce contamination, and if necessary find funding sources to implement work plans

- Continue to encourage members of agricultural community to implement recommendations from their Environmental Farm Plans, adopt other types of Beneficial Management Practices, and if necessary work with producers, government departments, and local agencies to locate funding sources to implement work plans

Short-term Strategies (3-5 years)

- Assist government agencies with the development of public polices that will ensure the protection of fish and wildlife habitat
- Work with local landowners, government and funding agencies to create habitat improvement demonstration sites within watershed on an annual basis
- Establish a local watershed council, whose membership would include representatives from each of the incorporated municipalities within the watershed in order to increase communication between the municipalities, discuss the impact of future development projects, and develop draft policies designed to protect local environment

Long-term Strategies (5-20 yrs)

- In 2012, using data from the long term wildlife habitat monitoring projects, create a list of recommended wildlife habitat preservation sites and identify wildlife corridors
- Distribute study information and population status reports to local landowners for review
- Continue to research and inform landowners of any new alternative land use practices that may improve the health of wildlife habitat within the watershed

Objective #8: Provide fish and wildlife educational opportunities

Immediate Strategies (1-3 years)

- Implement an effective communications plan for the Central Queens Wildlife Federation and the West River Watershed Steering Committee
- Partner with local organizations and government agencies to develop effective wildlife education programs for both children, residents, and landowners

Short-term Strategies (3-5 years)

- Provide opportunities for residents to assist with the collection of biological data and habitat restoration projects

Long-term Strategies (5-20 yrs)

- Partner with local school boards to design watershed-based curriculum and educational events for various grade levels

Objective #9: Work to increase involvement of private landowners in the protection of fish and wildlife habitat

Immediate Strategies (1-3 years)

- Publish positive stories of landowners implementing soil conservation techniques in the quarterly newsletters, local newspapers, and the project website
- Continue to develop partnerships with landowners to implement wildlife habitat restoration projects
- Identify local community champions that have already adopted sustainable development or Beneficial Management Practices, promote them in the quarterly newsletters and present them awards in order to recognize their contribution to maintaining the health of the natural environment

Short-term Strategies (3-5 years)

- Lobby government agencies to provide incentives to landowners that have become involved in the preservation of wildlife habitat

Long-term Strategies (5-20 yrs)

- Develop and/or adopt a program to assist landowners with monitoring the health of the wildlife habitat and populations on an individual basis

Goal 3 - Support Sustainable Development

Objective #10: Encourage more government and industry involvement in sustainable development practices

Immediate Strategies (1-3 years)

- Inventory landowners in the watershed to identify residents that have already implemented sustainable land use practices

Short-term Strategies (3-5 years)

- Lobby government agencies to provide incentives to landowners that have become involved in the preservation of wildlife habitat
- Research effective sustainable land use practices

Long-term Strategies (5-20 yrs)

- Partner with government agencies in order to develop public policies to support sustainable development opportunities
- Promote new research in quarterly newsletter and distribute information to landowners and developers on an annual basis

Sustainable Development

Sustainable development are practices are designed to ensure local natural resources will be available for future generations and that the health of wildlife populations are maintained, while simultaneously creating an economically viable and prosperous area.

Examples of sustainable practices could include:

- Agricultural producers implementing Beneficial Management Practices
- Developers using sediment reduction measures
- Homeowners designing energy efficient households
- Forestry operators replanting deforested areas
- Anglers using the catch and release method whenever possible

Objective #11: Increase public awareness and understanding of the concept of sustainable development

Immediate Strategies (1-3 years)

- Identify landowners that are currently participating in sustainable development activities
- Publish positive stories of landowners implementing sustainable practices in the quarterly newsletter, local newspapers, and the project website
- Identify local community champions that have already adopted sustainable development and Beneficial Management Practices, promote them in the quarterly newsletters and present them awards in order to recognize their contribution to maintaining the health of the natural environment

Short-term Strategies (3-5 years)

- Work with local landowners, government and funding agencies to create sustainable development demonstration sites in the watershed for residents, forestry, and agricultural stakeholders

Long-term Strategies (5-20 yrs)

- Promote climate change and sustainable development research within the watershed by publishing information on the project website and in the quarterly newsletters

Goal 4 - Support Active Living & Recreational Opportunities

Objective #12: Maintain existing recreational infrastructure

Immediate Strategies (1-3 years)

- Develop partnerships with local tourism and recreation agencies to inventory and assess the health of the current recreation infrastructure

Short-term Strategies (3-5 years)

- Prioritize recreational infrastructure maintenance projects

Long-term Strategies (5-20 yrs)

- Partner with other organizations and apply for funds to conduct routine maintenance of recreation infrastructure

Objective #13: Foster respect of private and public lands

Immediate Strategies (1-3 years)

- Partner with other local organizations and government departments to develop an anti-litter strategy for the recreation areas

Short-term Strategies (3-5 years)

- Develop an education program to assist with curbing destruction of public and private property
- Recognize organizations and individuals that use recreational areas in respectful manner

Long-term Strategies (5-20 yrs)

- Monitor and record destruction of public and private land and design additional public information campaigns to resolve future issues

Objective #14: Increase the diversity and availability of recreational programs

Immediate Strategies (1-3 years)

- Develop partnerships with local tourism and recreation agencies to inventory and assess the availability of the current recreation infrastructure and programs

Short-term Strategies (3-5 years)

- Create a list and prioritize additional recreation opportunities for the watershed

Long-term Strategies (5-20 yrs)

- Partner with other organizations and apply for funds to implement additional recreation programs

Objective #15: Work with various agencies to promote the types of recreational activities available and benefits of participating in those activities

Immediate Strategies (1-3 years)

- Develop partnerships with the local active living, recreation and tourism agencies

Short-term Strategies (3-5 years)

- Publish information on available recreational facilities in the quarterly newsletters, local publications, and the project website
- Hold events at various recreation facilities to increase the public visibility of these sites

Long-term Strategies (5-20 yrs)

- In 2015, create a recreational opportunities marketing strategy for the West River Watershed

Objective #16: Create linkages between recreational opportunities and environmental education

Immediate Strategies (1-3 years)

- Strive to create environmental education programs that are held 50% of the time in the outdoor environment

Short-term Strategies (3-5 years)

- Provide opportunities for residents to assist with the collection of biological data and habitat restoration projects
- Hold events at various recreation facilities to increase the public visibility of these sites

Objective #17: Partner with government to improve connectivity and preservation of current public lands

Immediate Strategies (1-3 years)

- Partner with other organizations to identify current public lands

Short-term Strategies (3-5 years)

- Research potential areas that could be converted into public land

Long-term Strategies (5-20 yrs)

- Lobby government to increase public holdings and preserve current public land within the watershed

Objective #18: Encourage the non-consumptive use of natural areas

Immediate Strategies (1-3 years)

- Partner with other local organizations to hold events that focus on non-consumptive use of natural areas

Short-term Strategies (3-5 years)

- Market non-consumptive wildlife uses on the project website

Goal 5 - Encourage Sustainable Living

Sustainable Living

Sustainable living is the adoption of practices that assist to decrease the amount of greenhouse gases produced, natural resources consumed, improve the health of plant, animal, and human populations, or reducing the negative effects that human populations the local environment.

- Examples of sustainable living practices could include:
- Purchasing of locally grown produce
- Reducing energy or water consumption
- Walking or carpooling whenever possible
- Participating in outdoor recreational opportunities

Objective #19: Raise awareness regarding every individual's ecological footprint and sustainable living

Immediate Strategies (1-3 years)

- Publish information on the current ecological footprint of PEI residents in the quarterly newsletter
- Hold several public events focused on increasing people's understanding of the ecological footprint concept and present tangible evidence for the need for sustainability

Short-term Strategies (3-5 years)

- Develop and/or adopt a comprehensive education program designed to inform residents of the need to become more sustainable and present sustainable living options that can be adopted at home, on the move, or at work

Long-term Strategies (5-20 yrs)

- Quantify and develop an education program to decrease the average ecological footprint of residents of the West River Watershed by 10% by 2027

Objective #20: Provide rewards to residents that have adopted sustainable living practices

Immediate Strategies (1-3 years)

- Identify local community champions that have already adopted sustainable development or Beneficial Management Practices, promote them in the quarterly newsletters and present them awards in order to recognize their contribution to maintaining the health of the natural environment

Short-term Strategies (3-5 years)

- Lobby government agencies to provide incentives to residents who participate in sustainable living activities

Goal 6 - Protect of Water Quantity

Objective #21: Promote water conservation and raise awareness regarding water quantity issues

Immediate Strategies (1-3 years)

- Research successful water quantity reduction programs that other rural municipalities have implemented
- Develop a water quantity education program for the West River Watershed
- Hold a public meeting to discuss the current status of the West River Watershed water quantity

Short-term Strategies (3-5 years)

- Lobby government to provide incentives to residents who purchase water use reduction products

Long-term Strategies (5-20 yrs)

- Continue to monitor water usage rates in the watershed and develop additional water use reduction programs as required

Objective #22: Determine the effects of climate change and land use changes on the water budget

Long-term Strategies (5-20 yrs)

- Partner with the Dept. Environment, Energy and Forestry to develop a Phase II of the water quantity monitoring project, focusing on increasing the number of sampling sites and comparing the effects of climate change
- Keep the communities informed of the status of water levels by holding regular public meetings and publishing study information in the quarterly newsletters, newspapers, and the project website

Objective #23: Determine the effect of local irrigation and water extraction activities

Long-term Strategies (5-20 yrs)

- Partner with the Dept. Environment, Energy and Forestry to develop a Phase II of the water quantity monitoring project, focusing on increasing the number of sampling sites and comparing the effects of climate change
- Keep the communities informed of the status of water levels by holding regular public meetings and publishing study information in the quarterly newsletters, newspapers, and the project website
- Continue to research various irrigation and extraction methods and promote the most effective and environmentally sustainable method
- Lobby government to assist agricultural producers in implementing environmentally sustainable irrigation systems

Objective #24: Determine water quantity protection needs

Immediate Strategies (1-3 years)

- Develop a water quantity protection guide for the watershed

Short-term Strategies (3-5 years)

- Implement recommendations of the water quantity protection guide

Goal 7 - Identify & Protect of Ecologically Sensitive Areas

Ecologically Sensitive Areas

Ecologically Sensitive Areas (ESA's) are areas on the land or water that assist with the preservation or functioning of local wildlife populations, contain rare species or a distinct mixture of plant and animal communities, or play a role in maintaining natural resources.

Examples of areas that could possibly of considered to be ESA's include:

- Fish spawning areas
- Old growth or Acadian forests
- Areas that are utilized by species that have low tolerance to human disturbance
- Lands that have high rates of biodiversity
- Areas whose existence assists with ensuring high rates of genetic diversity of wildlife populations

Objective #25: Promote the creation of an identification and classification system for Ecologically Sensitive Areas (ESA)

Immediate Strategies (1-3 years)

- Partner with government and non-government organizations to develop an ESA identification and classification system
- Promote the importance of protecting ESA's within the watershed through community events, education programs, and communication materials

Short-term Strategies (3-5 years)

- Classify the wildlife habitat areas within the watershed

Long-term Strategies (5-20 yrs)

- Mail information on the identified ESA's to landowners and government agencies and other interested stakeholders

Objective #26: Encourage the development of government funding programs and policies to protect Ecologically Sensitive Areas

Short-term Strategies (3-5 years)

- Lobby government to develop policies that assist with the protection of ESA's

Long-term Strategies (5-20 yrs)

- Lobby government to develop funding and landowner incentive programs to assist with ESA protection and restoration projects

Objective #27: Increase awareness and highlight the importance of Ecologically Sensitive Areas

Immediate Strategies (1-3 years)

- Promote the importance of protecting ESA's within the watershed through community events, education programs, and communication materials

Long-term Strategies (5-20 yrs)

- Promote success stories from the West River Watershed ESA protection project on a provincial and national level using all available media outlets

Objective #28: Provide incentives to landowners for taking action to protect Ecologically Sensitive Areas

Short-term Strategies (3-5 years)

- Contract landowners to build support for the preservation of ESA's and partner with landowners to develop draft ESA's preservation strategies

Long-term Strategies (5-20 yrs)

- Host a public meeting to reveal the final ESA preservation strategies
- Lobby government to develop funding and landowner incentive programs to assist with ESA protection and restoration projects
- Identify local community champions that have already preserved ESA's, promote them in the quarterly newsletters and present them awards in order to recognize their contribution to maintaining the health of the natural environment

17.0 IMPLEMENTATION

Many of the management plan strategies were commenced immediately following public adoption of the draft document in the winter of 2007. However, even though a draft project outline has been developed for the next 20 years, the particular strategies that are successfully adopted will ultimately depend on the diversity and availability of funding programs and the success of our submitted applications. Staff and volunteers will continue to take advantage of every possible funding opportunity in order to ensure long-term funding for the various programs is secured.

The West River Watershed Steering Committee will also continue to follow several guiding principles over the next two decades. First of all, an adaptive management approach will be adopted in which in the event that a strategy is not successful or additional issues arise in the future the community members will modify and develop new strategies. The plan itself will also undergo an extensive review every five years to ensure that information contained in the report continues to be relevant. Secondly, the steering committee will continue to make partnerships with government and non-government organizations in order to increase communication and maximize available resources. Finally, the steering committee will strive to continue to be an organization that values and welcomes all stakeholders to participate in the implementation and continuous review of the management plan strategies. The West River Watershed Management Plan was developed for residents of this watershed community by residents of the watershed. In order for the implementation of the strategies to be successfully adopted, community members must continue to participate in the planning process.

Overall, organizers would like community members to move forward and concentrate on the future, which will include finding the balance between encouraging developments within the watershed and maintaining a healthy ecosystem.

To achieve this objective, the Steering Committee needs to develop into a more formal organization which includes representation from local community councils.

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I would be grateful to hear from any readers about errors of commission or omission so that they may be corrected in future editions.

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