



Biodiversity Action Plan

IDENTIFYING AND QUANTIFYING CURRENT BIODIVERSITY AND HABITAT RESOURCES IN THE CITY

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Foreword

The future of wildlife and wildlife habitat in rural, suburban, and urban settings depends on an environmentally responsible strategy of land management that emphasizes a mix of spaces for people and wildlife. As the world's population increasingly inhabits cities and urbanized areas, these regions have become the most rapidly expanding habitat type worldwide.

Protecting and restoring wildlife habitat in our cities and suburbs is a vital component of wildlife conservation. Urban wildlife habitat can support habitat connectivity within ecological landscapes and serve as a refuge for species impacted by urbanization. Local land and water conservation projects can provide important urban wildlife benefits and connect our growing urban population with nature, potentially broadening support for natural resource conservation nationwide.

A full array of Prince Edward Island's valuable aquatic and terrestrial habitats are found in urban areas. Across the Island, approximately 69 percent of people live in urban communities. Throughout this project BBEMA will be partnering closely with the City of Summerside, the province's second largest urban center. The city owns 424 acres of land, which includes 126 acres of parkland, 18 km of trails, 21 acres of sports fields, 29 acres of passive green space and 230 acres of land surrounding municipal buildings.⁵

Summerside's natural areas include a wide-range of habitat types: wetlands, forest, riparian and riverine areas, fragmented segments of bog and grassland as well as beach and sand dune ecosystems. This range of habitat is capable of supporting considerable biodiversity. The urban streams and riparian areas alone can support over 500 plant species, 29 species of mammals, over 368 bird species, 10 species of amphibians, 3 species of reptiles and over 20 fish species.⁶

Protecting and restoring these important habitats and species will not only help to conserve Prince Edward Island's natural heritage but will also provide valued ecosystem services for the public. For example, riparian areas are critical for protecting water quality and reducing flood hazards, while also providing complex and highly productive in- and near-stream habitat for fish and wildlife. But like most cities, Summerside's urban areas are characterized by the prevalence of built structures and impervious surfaces. Urban areas are also centers of human activities that can displace sensitive fish and wildlife species. This interruption of habitat leads to the introduction and spread invasive species; the generation of types of pollutants (noise, heat, light etc.); and direct hazards posed by the presence of people, pets, and infrastructure components.

Plans to protect air and water,
wilderness and wildlife are in fact
plans to protect man.

— *Stewart Udall* —

Contents

Foreword	1
Contents	2
Introduction	5
What is a Biodiversity Action Plan (BAP)?	5
Why Does Summerside Need A BAP?	6
As It Stands	8
Existing Natural Areas	8
Key Opportunities for Biological Protection of Natural Habitats	9
Existing Regulations	10
Pesticide Use	10
Urban Growth Boundary	10
Subdivision and Site Development Bylaw	11
Existing Green Initiatives	12
Urban Forestry Strategy	12
Recommendations	12
Street Tree Planting Initiative	12
Street Tree Replacement Program	12
Summerside’s Living Lab Program	14
What is the Greenhouse Gas Effect?	15
Weather vs. Climate	15
CO ₂ emissions	17
Green Economy Strategy	18

Summerside Biodiversity
Action Plan

Benefits to Supporting Green Business	19
Existing Green Infrastructure in Summerside	19
Wind Energy	19
Summerside Solar Energy Project	21
Power Storage	22
Powernet Program	22
Electric Vehicle (EV) Charging Stations	23
Green Commuting Initiative	24
Building a Greener Home	24
Summerside Water Pollution Control Centre	25
Where We Go From Here	26
Creation of a City Wildlife Ecologist Position	26
Conservation Efforts by BBEMA	28
Creation of Wildlife Corridors	28
Reestablishing Natural Areas and Parks	30
Replanting Neglected Parks	30
Native Pollinator Gardens	31
Water Conservation	32
Riparian and Marine Health	34
Invasive Species Management	36
Purple Loosestrife (<i>Lythrum salicaria</i>)	37
Japanese Knotweed (<i>Fallopia japonica</i>)	37
Green Crab (<i>Carcinus maenas</i>)	38
Wildlife Management	39
Tick Monitoring	40

Summerside Biodiversity
Action Plan

Wildlife Reporting Forms	41
Forest management	42
Community Education and Engagement	43
Closing Statement	44
Definitions	45
References	46
Figure List	50

Introduction

Protecting and restoring wildlife habitat in our cities and suburbs is a vital component of wildlife conservation. Urban wildlife habitat can support connectivity within ecological landscapes and serve as a refuge for species impacted by urbanization. Local land and water conservation projects can provide important urban wildlife benefits and connect our growing urban population with nature, potentially broadening support for natural resource conservation nationwide.

Urbanizing areas can be designed to contribute to conservation goals by setting aside ecologically important natural areas inside growth boundaries containing and directing growth in ways that protect habitat in more rural areas is key. In addition, because the majority of the population lives in cities, urban areas provide tremendous opportunities for engaging the public in wildlife conservation efforts within and beyond their local communities.

This plan will guide the City of Summerside in protecting its position in Prince Edward Island's biodiversity and the invaluable benefits it provides. The suggested goal is that this plan will be updated bi-annually, based on the results of regular monitoring of actions taken and the impact of these activities. In this way, continuity of benefits to natural systems and community engagement can be followed.

What is a Biodiversity Action Plan (BAP)?

A Biodiversity Action Plan is a tool through which City staff and relevant partners can work together to deliver a program of continuing action for biodiversity stewardship at a local level. It is a roadmap for the protection of the natural systems, and a guidepost for the engagement of the community in conservation activities. A BAP emphasizes integration of biodiversity considerations into urban planning and decision-making processes.⁵

This BAP outlines a long-term plan for the City of Summerside. The section labeled **As It Stands** shows the current planning that the BAP needs to take into account and also describes future plans that it will help to create. In contrast **Where We Go From Here** lays out an action plan designed to help achieve a new vision for the future.

With an understanding of the difference between where the City of Summerside's current status is with respect to biodiversity and conservation and where the rating should be, there will be realized effective prioritizations of resources and measurements of progress.

Why Does Summerside Need A BAP?

It is evident that in recent years consideration of natural systems including existing wildlife has been neglected within the parameters of the City of Summerside. A cursory look at development in the city has shown that the current approach to land development will result in the loss of existing natural systems.

The potential loss and degradation of Summerside's natural areas are more significant than realized. It is not only a matter of proximity to nature that is at risk, but also biodiversity in wildlife and habitat provide many benefits, most of which are not generally considered in land-use planning.

Biodiversity encompasses all living species on Earth and their relationships to each other. This includes the differences in genetic composition, species, and ecosystems. The presence of many different living organisms allows nature to adjust with change. This is referred to as **resilience**. If biodiversity is lost, all life is directly affected because all life depends on it to survive. **Ecosystems** are extremely important because they carry out processes such as producing oxygen and cleaning soil and water.⁶

With the isolation of an island, the conservation of natural habitats is more vital than in many other areas as there is a finite amount of space and natural resources needed for survival.

How biodiversity is lost:

- Habitat destruction
- Introduced species
- Pollution
- Population growth
- Over-consumption⁶

Conservation means development as much as it does protection. I recognize the right and duty of this generation to develop and use the natural resources of our land; but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us.

— Theodore Roosevelt —

As a result of human activity ecosystems, species, and genetic diversity are being destroyed faster than nature can provide restoration. This damage threatens the many ecological, economic, recreational and cultural benefits that can be receive from the Earth's living resources.⁶

We rely on biodiversity for many things, and these benefits can be divided into five categories:

- **provisioning services** – the production of energy and water
- **regulating services** – the control of climate and waste
- **supporting services** – nutrient cycles and crop pollination
- **cultural services** – research, education, spiritual and recreational benefits
- **preserving services** – guarding against uncertainty through the maintenance of diversity.⁵

Summerside Biodiversity Action Plan

When urbanization of an established natural habitat occurs, the city will be forced to replace these natural features with man-made infrastructure. This in turn will be less efficient and come at a greater expense than the intricate processes which formed the pre-existing habitats. In protecting habitat, many of the species that depend on that habitat will persist, naturally building on one another, producing a cascading effect of conservation.

This Biodiversity Action Plan will guide the City of Summerside in protecting its biodiversity and the invaluable benefits provided. It is designed to be adjusted bi-annually based on:

1. The results of regular monitoring
2. Actions undertaken
3. The impact these activities on Summerside's natural systems
4. The effectiveness of efforts to engage the community

This will provide the foundation for:

- Prioritizing options and establishing management criteria in the development of a green infrastructure network
- A range of program options and trade-offs for habitat and urban development incorporating economic, social, environmental, and energy criteria
- Specifying management criteria and strategies for urban ecosystems and habitat elements
- Setting conservation targets for natural areas and indicator species
- Recommending policy and procedures that will support the initiatives in the strategy
- Engaging community in conservation and management of natural areas to harness existing knowledge and raising awareness
- Providing a long-term monitoring program that builds on management objectives, criteria, and indicators to measure the success of the strategy tools which may include restoration, acquisition, grants, education/information, property tax reduction programs, technical assistance, volunteer programs, and recognition programs ⁷

While biodiversity is obviously not limited to designated natural areas, it is highest there, and most effectively protected. Therefore, throughout this document you will often see the terms “**biodiversity**”, “**natural systems**” and “**natural areas**” used interchangeably.⁵

As It Stands

The current status of Summerside’s biodiversity is substandard; the main focus of the city has been on green energy and energy conservation. This section is intended to highlight current activities within the City of Summerside adding some context to better help understand where improvement is needed.

Existing Natural Areas

The City of Summerside is host to an extensive variety of playgrounds, outdoor recreational facilities, and green space areas designed to meet the leisure needs of all citizens and visitors. The city maintains fourteen playground parks, eight ball fields, three tennis courts, and four horseshoe pits. Other green space areas are maintained throughout the city which includes the new Canada Games Complex located at Credit Union Place. This facility includes a turf soccer field, four beach volleyball courts, two tennis courts, a BMX bike park, and an outdoor concert venue.

Natural areas in Summerside are comprised of a total of 130 acres as shown in Figure 1. The largest green space is the Friendship Rotary Park (62 acres). There are 27 other green spaces which are much smaller within the city.⁸ Many are disjointed and lacking connection to one another or other forested areas.

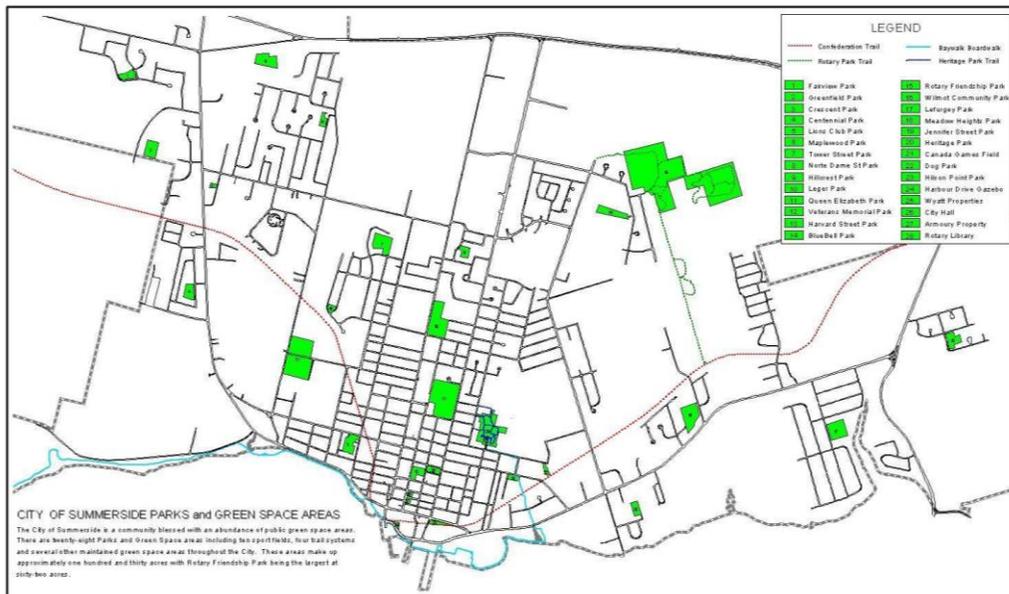


Figure 1: City of Summerside Green Spaces Area Map⁸

The City of Summerside boasts four extensive trail systems including: The Rotary Park Trail, the Bay Walk Trail, Heather Moyse Heritage Park and Confederation Trail. All four

Summerside Biodiversity Action Plan

trail systems are interconnected providing the opportunity for residents to take part in a wide range of outdoor activities including: nature hikes, trail biking, cross country skiing, snowshoeing, and outdoor workout stations.⁸

Presently there are small pockets of habitat for flora and fauna throughout the city. However, the level of separation is acting as a limiting factor for wildlife. This causes a bottleneck issue leading to more undesirable interaction between residents and wildlife.

Key Opportunities for Biological Protection of Natural Habitats

For any city there are always planning situations that give rise to key opportunities to build on and challenges which must be accounted for in development. The following section will look at some of the challenges and opportunities which have made establishing a BAP necessary.

Urban ecology is a very delicate balance between living organisms and their surroundings. This balance is often overlooked in favor of urban development. All urban areas are intrinsically dependent on surrounding ecosystems to provide them with necessary resources and to assimilate wastes that are generated. The ecological footprint of an urban

The earth, the air, the land and the water are not an inheritance from our fore fathers but on loan from our children. So we have to handover to them at least as it was handed over to us.

— Mahatma Gandhi —

population is the area of ecoscape (landscape and seascape) that is needed to supply the necessary food, materials, energy, waste disposal, and other crucial goods and services.⁹

Invasive species management measures have been taken by groups within the city, however, there are no city run programs at this time. The longer invasive species are left to proliferate, the more effort and resources must be spent to deal with them. In addition to this residents are

not currently on metered water but commercial and industrial landowners are. The city is pursuing many different green energy sources such as wind and solar energy production methods to build upon a green economy and reduce power rates for residents.

The city's Energy and Facility Renewal Program which is cost neutral to the city, will look at areas in the city and city facilities to identify areas requiring improvement in energy usage. On April 6, 2017 the city announced its partnership with Honeywell, an energy services provider selected through a RFP process. The first phase of the program involves an assessment of the city's building infrastructure, which includes validating the current conditions as well as occupancy schedules. Systems such as heating, ventilation, air conditioning, mechanical equipment, lighting, building automation and air distribution systems will be the main areas of focus. This audit will also look at street lighting to see if there are opportunities to reduce electricity consumption throughout the city. Once the

Summerside Biodiversity Action Plan

audits are complete, the city will meet with Honeywell to discuss the upgrades that align with the city's energy, sustainability and other facility goals. Those selected will be aimed at revitalizing the city's infrastructure while permanently reducing utility consumption and operating costs as well as lowering the city's environmental footprint.¹⁰

The city commissioned a study on the Green Shore¹¹ to determine the source of a major eelgrass problem that is faced annually. This influx of organic matter to the beach creates an issue for residents. When it begins to breakdown it creates an unpleasant odour. In the past, the city has used tractors to comb the beach and remove the odorous material to another location to breakdown and be reused as a garden additive. Given the sheer amount being collected, this is not believed to be the best option as it is time consuming and costly to the city.

Existing Regulations

Pesticide Use

The Cosmetic Pesticide and Integrated Pest Management Bylaw outlines a set of rules and regulations for domestic and commercial application. This limits the use of pesticides with specific active ingredients. The pesticides are broken into two groups, allowable and restricted which certified applicators can use, if they obtain a permit for application. The bylaw outlines permit costs, enforcement, penalties and infestation thresholds.¹²

Urban Growth Boundary

Urban Growth Boundary (UGB) is a regional boundary set in an attempt to control urban sprawl. In its simplest form, it mandates that the area inside the boundary be used for urban development and the area outside be preserved in its natural state or used for agriculture.⁹

Urban areas are viewed as ecosystems because they have the following:

1. A need for large inputs of energy and materials to sustain its human population, its diverse economic activities, and to maintain its structure and grow
2. A complex metabolism, including well-developed webs of transfer, processing, and storage of material, energy, and information among interaction organisms and economic sectors
3. Large outputs of heat and other wastes, which are disposed of in the surrounding natural ecosystems, causing pollution and other environmental problems

All urban areas are dependent on surrounding ecosystems to provide them with the necessary resources and assimilate wastes produced. The major influences on the

Summerside Biodiversity Action Plan

size of an ecological footprint is the intensity of energy, material used, and waste produced. A city's footprint extends far beyond the extent of the actual area of the city.⁹

Urban reserves and conservation areas are outlined on the current zoning map of Summerside, but riparian zones and watercourses are not outlined on maps.¹³ This is important to ensure that new developments are not interfering with natural storm water drainage and flow. Currently urban reserves and downtown commercial area are the same colors. Based on the existing set of colors used, darker blue or orange would be suitable colors for riparian zones and watercourses.

Subdivision and Site Development Bylaw

A 10-meter buffer zone must be maintained under the Subdivision and Site Development Bylaw SS-19. Nothing in this bylaw shall exempt any person from complying with the requirements of other city or provincial regulations. Where the requirements of this bylaw conflict with any other requirements the more stringent requirements shall prevail.¹⁴ Section 5 of the "Subdivision and Site Development Bylaw SS-19" states that an application is required for subdividing more than one acre of land to enable a residential development. From this the developer shall dedicate parkland within the "buildable area" of their property, as assessed for the entire area of their subdivision according to the following formula:

- 5% of all land designated for low-density residential areas
- 7.5% of all land designated for medium-density residential areas
- 10% of all land designated for high-density residential areas¹⁴

Council may consider a proposal to make some or all of the parkland assessments under Section A with a pro rata dedication of at least twice as much parkland outside of the "buildable area" of their property, including such lands reserved for conservation or drainage purposes.

The location, size, and configuration of all parkland dedications shall be approved by the council and shown on both the subdivision plan and legal plan for the property. All parkland dedications shown on a preliminary approved subdivision plan shall be conveyed to the city as a requirement of the final subdivision approval being granted for the entire subdivision or for the first phase if the subdivision plan is developed in phases. However, this can be offset at the council's discretion in favor of a monetary donation. These donations shall be put into a fund reserved solely for acquiring or expanding public parks in the city. The Parks By-law (SS-23) states under Section 4 Protection of Wildlife that; "No person shall molest, disturb, frighten, injure, kill, catch, trap or ensnare any wildlife in a park unless it is performed by the Police Department, Fire Department, or staff of the Recreation Department. In addition to this waste disposal of organic or inorganic matter is also prohibited in any park."¹⁵

Existing Green Initiatives

Urban Forestry Strategy

In developing an Urban Forestry Strategy, the main objective is to avoid future mass destruction of a tree population. *For in depth management instructions please refer to the Summerside Biodiversity Action Manual.*

Recommendations:

- Planting several varieties of hardy tree species to ensure one specific disease or insect cannot destroy an entire tree population
- Planting a diverse variety of tree species that are hardy to the existing climatic zone
- Planting trees in sustainable areas away from sidewalks and asphalt to avoid water stress in future years
- Developing maintenance strategies for trees planted under this program

Street Tree Planting Initiative

A partnership will require a substantial commitment between the municipality and the business community. The objective of this initiative is to have 15 caliper sized trees (i.e., trees 40mm and greater in diameter) planted on city and private green spaces over the next five years.¹⁶

Program Criteria:

- Tree planting locations will be conducted in grids including Summerside, St. Eleanors, and Wilmot by determining areas which are most in need of trees.
- Tree planting will consist of a spring, summer, and fall schedule. Trees must be planted in spring and fall to correspond with nursery digging and increasing survival rates, as it is less stressful on the trees during transplanting (e.g., April and October).
- A variety of tree species will be planted in order to diversify the current tree population

Street Tree Replacement Program

In 2012 a Street Tree Replacement program was developed to secure the health preservation of the City of Summerside's urban forest. This program promotes the replacement of trees lining streets which are vital to the appearance of the community.

Over the years the street tree population has experienced a dramatic decline resulting from issues such as Dutch Elm Disease and an aging tree population. In an effort to offset the noticeable decline in the urban street tree population, the Street Tree Planting Program ensures that the trees are replaced for the enjoyment of future generations.

Urban trees can provide many economic benefits. They reduce energy costs by shading buildings in the summer, reducing reliance on air conditioning. Homes are also sheltered from wind and snow in the winter reducing heating costs. Urban trees can shelter asphalt and buildings from the elements thus lowering wear, erosion, and maintenance costs. Trees beautify an area, providing a welcome natural setting which attracts more people to an area. Citizens are eligible to apply for a city funded tree replacement thanks to the City of Summerside Street Tree Program, along with The TD Green Street Program.¹⁶

Criteria for Replacements:

1. Trees removed must be at least 12 inches (30 cm) in diameter to qualify for a replacement tree
 - a. Trees to be considered must be designated as street trees (no more than 3.5 meters from city property)
2. Citizens receiving replacement trees must assume future maintenance including watering and pruning.
3. Selection of trees to be replaced will be subject to the completion of an application form for review. Number of applicants selected for a particular year will be determined by:
 - a. Budgeted funding for the program for the fiscal year
 - b. Availability of certain tree species
4. The city will determine tree species and varieties being replaced (recommended list of trees will be supplied)
5. The program does not include covering the costs of private tree removal
6. The program will include public trees bordering private property
7. Only trees which have been removed no more than 3 years prior to 2012 will be eligible
8. The city reserves the right to approach property owners for street tree planting where previous tree populations have been dramatically declined (i.e. reduction in areas that have experienced tree reductions from Dutch Elm Disease)¹⁶

Summerside's Living Lab Program

Summerside boasts a very advanced infrastructure. This includes a multifaceted electric utility, a strong renewable portfolio and municipal assets that rival many other large cities in North America. Summerside prioritizes opening up this infrastructure to aid companies and innovators in the industrial validation process.

A Living Lab is a real-life testing and experimentation environment in which people and technology are gathered in an everyday context to simulate and encourage research, development, innovation and commercialization.¹⁷

Helping to fill the gap between design and full-scale implementation is a valued process for business and community advancement. This allows companies, researchers and developers to work directly with the community and its unique infrastructure in innovative product development and integration by testing their products and services in a real-world setting.

Carbon Dioxide Footprint



Figure 2: Factors influencing an individual's Carbon Footprint ¹⁸

What is the Greenhouse Gas Effect?

The atmosphere is comparable to a large greenhouse for plants, set-up around the earth, that allows for radiation from the sun to pass through warming our planet and creating conditions for life to thrive.

Greenhouse Gases (GHGs) are gases which accumulate in the Earth's atmosphere. This is a naturally occurring process but anthropogenic activities such as burning fossil fuels are releasing excessive amounts of GHGs into the atmosphere. There they accumulate and greatly increase the natural warming effect, becoming what is known as the Enhanced Greenhouse Gas Effect. This effect has increased with such significance that the climate has begun to change. The global average surface temperature rose from 0.6 to 0.9 degrees Celsius between 1906 and 2005. The rate of temperature increase has nearly doubled in the last 50 years and even if emissions were curbed today global temperatures are certain to increase.¹⁹ Figure 3 highlights the most important greenhouse gases that are products of human activity. It is clear from this visual that carbon dioxide (CO₂) is by far the most prevalent greenhouse gas.

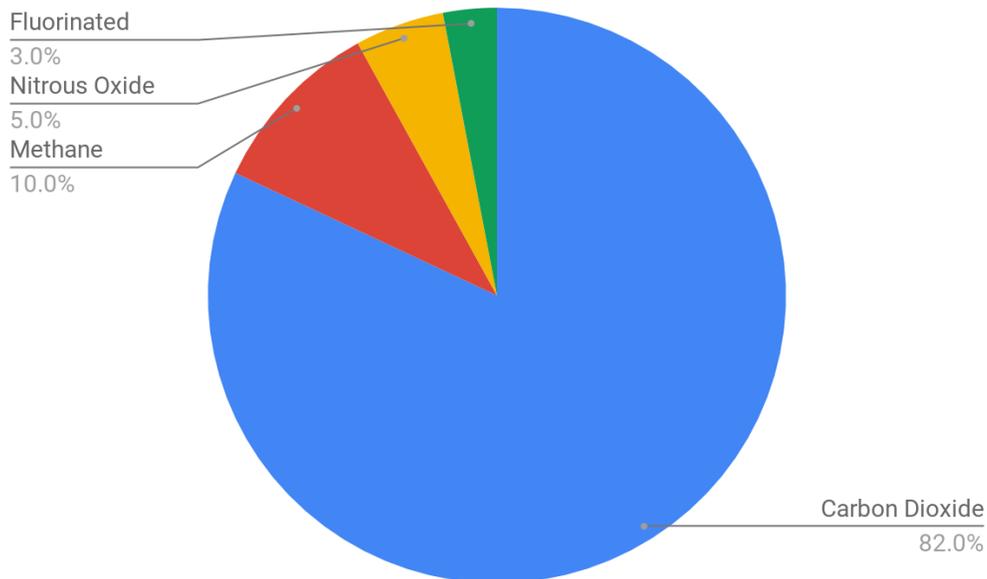


Figure 3. Breakdown of Greenhouse Gases released by human activity ²⁰

Weather vs. Climate

According to NASA the difference between weather and climate is a measure of time. Weather is experienced on a day to day basis whereas climate is the overall patterns in weather over relatively long periods of time. Climate is more than abnormal weather experience. It is a change in long-term averages of daily weather globally.

The maximum amount of CO₂ a person should produce in order to halt climate change is 2.0 tonnes CO₂.²¹ Prince Edward Island generates approximately 2,000 kilotons of GHGs each year. This is less than 1 percent of Canada's greenhouse gas emissions. On average each Islander generates about 12 tonnes GHGs each year. This is lower than the average Canadian.²² Planting trees remains one of the cheapest and most effective means of drawing excess CO₂ from the atmosphere.

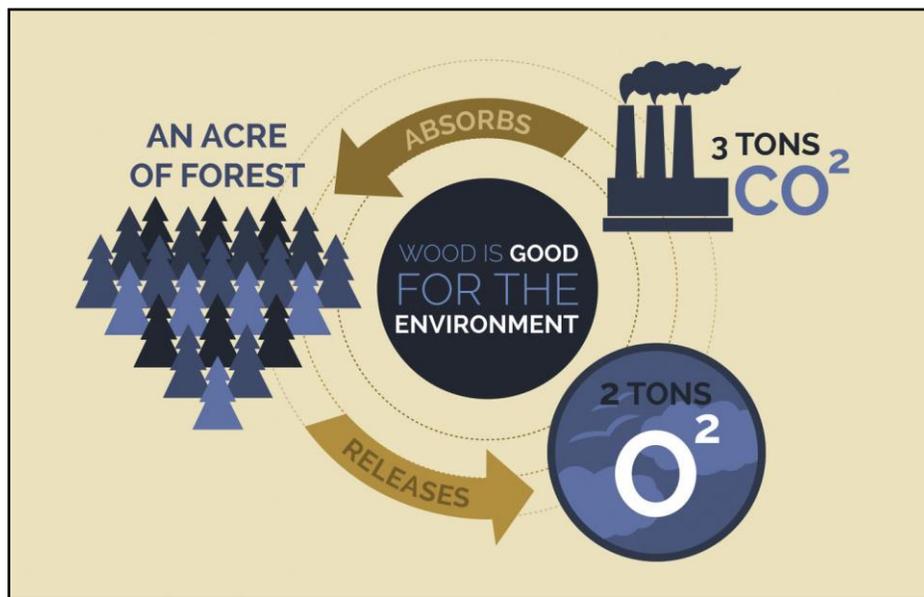


Figure 4: CO₂ absorbed by a single acre of forest²³

To combat this, a person would require a minimum of 551 adult trees to offset their personal carbon footprint. In 2016 the population of the City of Summerside was **14,270**. This would mean that the city would need to have a forest of 7,862,700 adult trees to become carbon neutral.²⁴ According to Environment Canada, Island emissions come from three main sources as listed in Figure 5.

CO₂ emissions

- **Transportation (42%):** This is the greatest source of greenhouse gas emissions in Prince Edward Island. Islanders continue to use more gasoline and diesel each year. Most of the transportation emissions come from cars and trucks. Off-road vehicles such as tractors, boats, ATVs, and snowmobiles are also contributors.
- **Agriculture (23%):** Livestock, as well as manure and fertilizer, use generate GHG emissions. Livestock produce methane gas as does the manure. Nitrous oxides are emitted with the use of synthetic or natural fertilizers that are released when manure is added to croplands and pastures.
- **Buildings (21%):** Island homes, businesses, and industries burn fossil fuels. These include light fuel oil (furnace oil), heavy fuel oil (bunker C), diesel, and propane to produce heat or electricity. Heavy fuel oil generates the most GHGs (3 kg for every litre of oil burned), while propane generates the least (1.5 kg for every litre of propane burned).

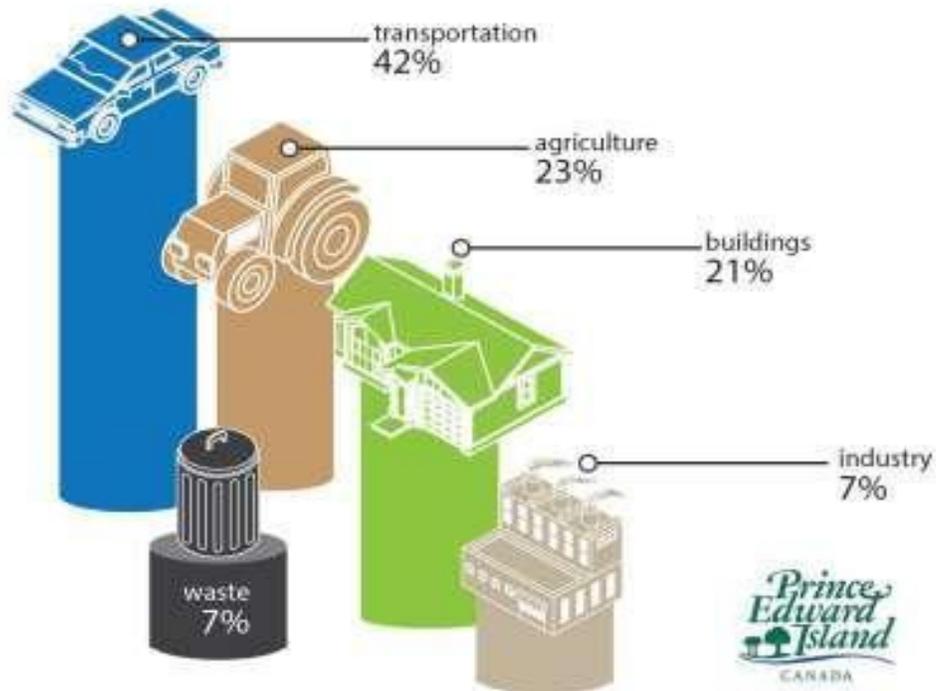


Figure 5: Sources of emissions on Prince Edward Island ²²

Summerside Biodiversity Action Plan

To help curb CO₂ emissions the City of Summerside has an anti-idling policy which applies to all city business units and staff operated vehicles. City fleet vehicles will not be parked with the engine operating for more than five (5) minutes unless, essential for performance of work.

- (a) Exceptions are during an initial engine warm-up period in weather below -10° Celsius and during periods of extreme cold weather below -10° Celsius
- (b) When engines must be left operating for any reason the operator must remain with the vehicle

It is the responsibility of every city employee to minimize fleet operating costs while reducing harmful effects on the environment.²⁵

Green Economy Strategy

A green economy is defined as an economy that aims at reducing environmental risks and ecological scarcities. Such an economy aims for sustainable development without degrading the environment. The goal of introducing a green economy strategy is to build on the province's progress to date, thus supporting various programming initiatives and pursuing opportunities that strengthen the economy and preserve the environment.

In recent years global awareness has increased, focusing on the benefits of green economy. Prince Edward Island is quickly becoming a member of this evolution. It has been recommended by the federal government that the province of Prince Edward Island develop a green economy²⁶ and labour market strategy.

Karl Burkart defines a green economy as based on six main sectors:

- Renewable energy
- Green buildings
- Sustainable transport
- Water management
- Waste management
- Land management²⁷

To follow the focus of a green economy, the City of Summerside could promote “green jobs” that have been made more sustainable or less environmentally impactful by private companies. The city could also create a *Green Sticker* or *Ecolabel* for companies where environmentally friendly practices have emerged. Many industries are beginning to adopt these standards as a viable way to promote their greening practices in a globalizing economy.

Summerside Biodiversity Action Plan

For a business to earn the Green Sticker/Ecolabel accreditation it would have to show that fits it suitably into at least one of the following categories:

- Provide jobs that produce goods, provide services that benefit the environment and/or conserve natural resources
- Provide jobs in which workers' duties involve making the establishment's production processes more environmentally friendly and/or is taking steps to use fewer natural resources

Examples of this would be a local company using a grey water system to reduce water consumption or taking additional steps to reduce power consumption by use of a solar grid. Similar to Charlottetown's Certified Sustainable Business program ²⁸, a partnership between the City of Summerside, Efficiency PEI, and Island Waste Management Corporation could be created to help local businesses reduce environmental impact.

Benefits to Supporting Green Business

Environmental concerns are increasing in importance for doing business. Increasing efficiency is becoming an important part of business competitiveness and innovation. As emerging economies join global markets the demand for cleaner environments increases. This creates opportunities for established businesses to leverage technology and expertise in greening production. Not only will greening business attract customers with increasing awareness, but it can also attract and retain workers with high levels of expertise.²⁹

Existing Green Infrastructure in Summerside

The City of Summerside is in the process of implementing a smart power-grid across the entire city to incentivize the incorporation of green/renewable energy and technology throughout the entire city. Establishing this connection will provide the foundation for communication between the electrical provider and smart appliance use on the customer's end.

Wind Energy

Many areas in Prince Edward Island maintain a wind regime that is within the top tier of regimes across all of North America. The *Atlantic Wind Test Site* at North Cape, established in 1980, has since become the Wind Energy Institute of Canada and has played an important role in developing the country's wind energy industry.³⁰ The PEI Energy Corporation built Atlantic Canada's first commercial wind farm in 2001. It has since become a leader in wind energy by growing its research capacity at the Wind Energy

Summerside Biodiversity Action Plan

Institute of Canada and UPEI. A skilled workforce through the Wind Energy Technician program at Holland College has been a direct result of these initiatives.

Summerside's Wind Farm was completed in 2009 at the cost of 30 million dollars and is capable of producing 12-megawatts of power for the city. This is complemented by 9mW sourced from North Cape, totaling 21 mW of clean wind energy.



Figure 6: View of Summerside Wind Farm ³¹

The main concern with wind power is that wind speeds must reach a threshold before turbines are able to run at full capacity. If wind speeds are too high turbines will turn off to avoid damage. Energy storage is an important factor in having reliable energy generation from wind power as there are periods when an excess of power is being produced. With the city producing more than it can use during low consumption periods (i.e. at night) and having to export energy. Other times there is a shortage and the city must rely on diesel, wood heating, or other combustion heating.

To bridge this gap and allow further dependence on clean energy, Summerside's Smart Grid system was established in 2011. The system uses communications and metering technology to detect excess wind energy in the system and turn on devices in residences, industrial and commercial buildings to store it. Storage is accomplished using high-density ceramic. This energy is used for space heating or heating water when required. As electric cars are becoming more popular, they can also be charged during off-hours. Most utilities offer on-peak and off-peak rates. Off-peak rates are less expensive. Electric thermal storage systems allow you to download energy during off-peak hours to have available for use during the day. ³²

Summerside Solar Energy Project



Figure 7: Solar Energy Farm at Credit Union Place ³³

Atlantic Canada Opportunities Agency (ACOA) has provided 1.5 million dollars for the development of a solar energy farm at the Credit Union Place (CUP) in Summerside. The city matched this funding and is expected to save \$100,000 a year in funds due to this project. This solar field is made of 1,404 ground-mounted panels and 144 carport panels to produce a yearly output of 603,800 kWh and is expected to offset greenhouse gas emissions from the electrical grid by 424 metric tons of CO₂.³⁴

The project has been completed in partnership with Samsung Renewable Energy. It is being used to validate new green technology and is a major leap forward for the city's "Living Lab" program. The initial installation of the solar energy system was expected to produce an estimated \$750,000 in paid work for local contractors and engineers ³⁵, while also helping to build local expertise in green technology for future projects. With the project now in place CUP is expected to be sourcing 30% of its energy from renewables.³⁶ This results in a much lower carbon footprint, which translates into a lower burden on local taxpayers from the new carbon tax being introduced by the federal government.

Power Storage

Powernet Program

The Summerside Smart Storage Demonstration Project is the first of its kind in Canada. It will provide a platform for energy security, encouraging energy conservation and bringing cleaner renewable energy on a smarter electrical grid. This will assist Summerside with business growth, innovation and export development so that the City can create new meaningful jobs and improve the efficiency of existing operations within the city.

Lithium ion battery technology will be used to store 890 kwh of electricity with 250 kW. This system will shift CUP's energy use from on-peak to off-peak by a volume of 324,850 kWh per year. Energy shifting is expected to save an additional 50 tonnes of carbon dioxide per year by eliminating dependence on diesel or natural gas peaking units.³⁴ These would run only when demand is high.

The city's smart-grid has allowed a record level of 48 percent energy reliance on wind power, however, wind surplus in Summerside is still an issue. The lack of adequate storage for wind energy harnessed during off-hours is not used creating a shortage during peak-hours. The city's solution to this is the "Heat for Less Now" program.³⁷ This provides electricity at a lower cost to customers who install a system that includes electric thermal storage with insulated thermal bricks that retain heat. Heat is generated using electric elements that heat these bricks to temperatures upwards of hundreds of degrees Celsius. This heat can then be released using forced air and/or flow radiant heat. These systems can serve single rooms, entire houses, or have commercial applications. The thermal storage system can be charged during off-hours to then be used at the customer's will.

Water heaters and furnaces installed in 30% of homes in the city are capable of storing energy as heat and are turned on when the wind is blowing. Homeowners who install these storage devices in their homes receive a reasonable discount on electricity for five years; paying only eight cents a kilowatt compared to 13 cents, this is half as expensive as using oil. ³⁷ Enrolment in Summerside's "Heat for Less Now" program has grown from 64 units in 2011 to 311 units (208 residential and 103 commercial clients) in 2015.³⁷

A partnership between Summerside and Samsung intends to achieve a national recognition of Summerside as a City of Excellence and Eco-initiative, and to position Summerside as the eco-centre for testing and validation of eco-solutions with further relationships including additional partners.

Summerside Biodiversity Action Plan

The Summerside Smart Storage Demonstration Project formula for success includes the following:

- Reduces GHG emissions by 474 tons annually, displacing diesel, reducing imported energy and increasing surplus Summerside electric energy
- Assessing over \$60 million in existing assets (Summerside Wind Farm, MyPowerNet, Credit Union Place) allowing extension of asset life-cycles
- Tapping into the market potential of many communities in Canada that can utilize off-the-shelf or spin-offs of this system
- Building relationships with local and international partners with expertise with green technology ³⁸

Electric Vehicle (EV) Charging Stations

The primary concern of those considering buying an electric vehicle is two-fold: running out of fuel and lack of charging stations. Summerside is putting an emphasis on providing infrastructure to allow the public to make a shift to electric cars. They have partnered with *Sun Country Highway* to help realize this goal.³⁹

The following is a list of locations within the city that provide electric car charging stations:

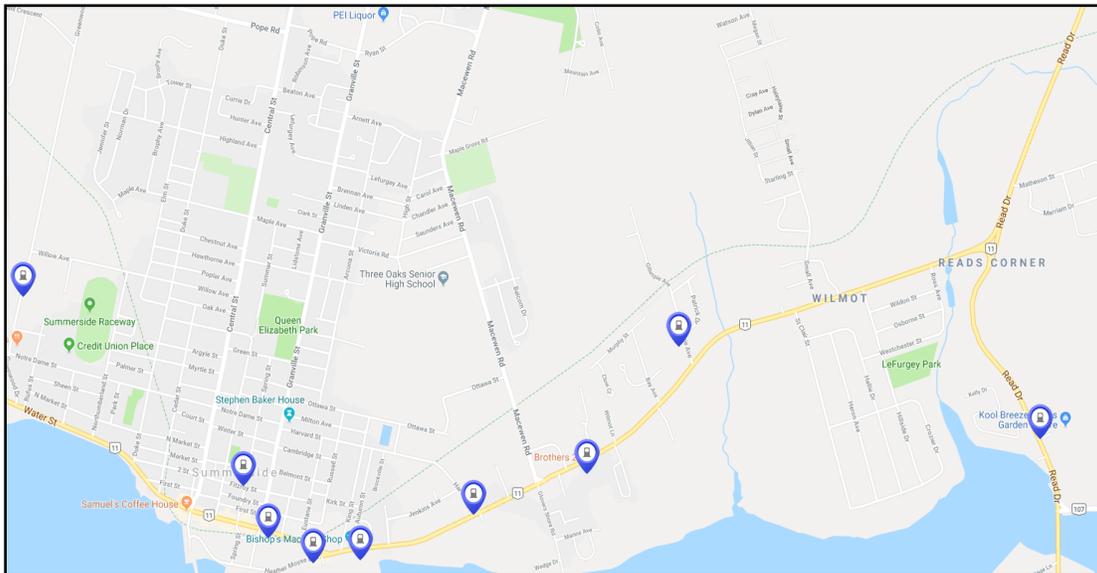


Figure 8: Map of electric charging stations within the City of Summerside boundaries ⁴⁰

Summerside Biodiversity Action Plan

Table 1: List of EV charging stations in Summerside area

- | | |
|-----------------------------------|---|
| • The Quality Inn | • Public Rotary Library |
| • Wilmot Community Centre | • Holland College |
| • Kool Breeze Farms Garden Center | • Township Chevrolet (formerly Hemphill GM) |
| • Harbourfront Theatre | • Slemon Park Hotel *on outskirts of Summerside |
| • Credit Union Place | |
| • Summerside City Hall | |

Green Commuting Initiative

A program in place since 2010 was designed to incentivize city employees to use green methods of getting to and from work (ie. biking, walking or carpooling). In 2013, 23% of city employees were using the program designed to improve the cities health, reduce its carbon footprint and save taxpayer money. Employees can track their days each week from May until October when they have a “green commute” to and from work. Those who have 80% participation in the commuting program receive a family membership to the Credit Union Place Recreational Facility, while those who achieve 60% participation receive an individual membership.⁴¹

For residents, there are a number of trails that are maintained by city staff. The primary trail is the Confederation Trail which crosses the largest expanse of the city. The Bedeque Bay Boardwalk offers a premier water-view through downtown and the surrounding suburbs connecting many of the cities prominent features.

Building a Greener Home

Efficiency-PEI offers rebates for homes installing ENERGY STAR™ certified technology and infrastructure. These rebates include but are not limited to:

- passive solar design,
- air tightness and insulation,
- windows and doors,
- lights, appliances and heating.⁴²

Low-income households benefit the most. They receive greater rebates to increase accessibility of clean-tech to a greater proportion of Islanders.

The city has also taken steps to create green buildings where municipal buildings in Summerside are equipped with remote/programmable thermostats, sensor lights and waterless urinals. Electrical energy use is tracked while timers and photocells are used for outdoor lights and plugs.

Summerside Biodiversity
Action Plan

Summerside Water Pollution Control Centre

This facility relies on a modified Johannesburg process. This is a type of biological nutrient removal, involving the use of biological methods, namely a range of bacteria to remove phosphorus and nitrogen from wastewaters. It is an eco-friendly way for effective city wastewater treatment.



Figure 9: Summerside Water Pollution Control Centre

Use of sequential anaerobic, anoxic and aerobic zones to control specific biological reactions throughout wastewater treatment ⁴³ uses the following process:

1. Nitrification: harnesses bacterial processes to convert ammonia (NH_3) to nitrate (NO_3)
2. Denitrification: Convert nitrate (NO_3) to harmless N_2 gas
 - a. Heterotrophic bacteria use nitrate as terminal electron acceptor (oxygen source) so that they can use carbon-based organic material, leaving only Nitrogen gas behind.
3. Phosphorus Accumulating Organisms (PAOs) present in anaerobic cells via return activated sludge, organic material added, PAOs break existing phosphate bonds to uptake organic material.
 - a. Moves to aerobic cell, organic material oxidized by PAOs, energy produced.
 - b. Phosphates drawn towards energy to form bonds in PAOs, more phosphates up-taken than initial.
4. PAOs then wasted in waste activated sludge, which is removed from solution in final effluent and thickened to produce bio-solids.

The next step to making this an even greener operation would be to use the biosolids produced from the plant to make biofuels or fertilizers. The infrastructure would be similar for making biofuels from biosolids as from algae. This could also be used to alleviate the eelgrass and other algal problems in the Summerside estuary.

Where We Go From Here

Although there has been great progress by the City of Summerside in becoming a green city, there is still much that can be done. **During the course of the Bedeque Bay Environmental Management Associations (BBEMA's) three-year Biodiversity Project, many new conservation strategies will be implemented:**

- Wildlife management issues
- Conservation problems
- Habitat enhancement
- Creation of biodiversity within the city
- Invasive species management among other green policy
- Infrastructure issues

After 2019 city staff should pursue these incentives with it's document and the accompanying field manual being reviewed and revised as needed on a biennial basis. This would ensure that the document continues to reflect the current conditions within the city. This continuity will allow city staff and the city council to easily review the green policies the city has in place and provide attention where required.

Creation of a City Wildlife Ecologist Position

It is recommended that a position be created to allow for dedicated urban ecology and wildlife management within the City of Summerside. All wildlife concerns and issues would be forwarded to this person who would have the resources and time available to deal with them in a timely and confident manner.⁴⁴

Presently city staff or staff from other organizations who have some experience or expertise are often called upon for support and advice concerning wildlife issues. This leads to the detriment of their existing duties and can also lead to inefficiencies in resource management. Residents' confidence in the proper handling of the issues is also compromised. Response times to wildlife issues are slow and often cause resource diversion from other programs.

The lack of a designated wildlife ecologist can lead to confusion when public concerns or controversies arise. In addition, there is no responsibility for overall management and monitoring of wildlife service providers. Difficulty arises in reporting on progress to know if current and future efforts are an efficient use of resources. Although there would be costs associated with such a position, it is believed that substantial direct and indirect savings would be realized. There would be a significant economic trade-off, while greatly increasing ecological gains.

Summerside Biodiversity
Action Plan

Costs:

- Salary and benefits for individual \$40,000-\$60,000 for a year-round position
- Resources and supplies related to position
- Costs associated with proactive wildlife management
- Office space in Summerside
- Budget allocation for enhancement and year to year projects

Benefits:

- Efficient and cost-effective use of other staff in their proper roles and responsibilities
- Enhanced coordination of the city's wildlife management activities and service providers
- Long-term road, trail, and transit maintenance savings for proactive wildlife management
- Reduced financial risk to city from unnecessary project delays and potential violations associated with the Endangered Species Act 2007
- More effective public relations, information and client service
- Increased public trust in reporting wildlife issues before they become a problem

Recommendations for tasks associated with city wildlife ecologist position:

- Providing advice and information regarding human-wildlife conflict resolution and wildlife related matters to other city staff and the public.
- Coordination of the city's contracts with wildlife service providers
- Formal responsibility for management of mammal response protocol/policy (raccoons, beavers, foxes, coyotes)
- Development and review of wildlife response protocols as the need arises
- Assessment of beaver conflict sites and implementation of beaver management tasks
- Assessment and resolution of other wildlife issues for Public Works
- Updating the Biodiversity Action Plan for the City of Summerside
- Data collection to assess success of existing and newly implemented management strategies
- Development and implementation of policies and procedures to ensure compliance with the Endangered Species Act, 2007 in city operations and maintenance
- Working with land use and natural systems on implementation of species at risk planning and policies
- Providing support for species at risk stewardship programs and projects
- Invasive and rare species monitoring

Summerside Biodiversity Action Plan

- Developing and maintaining urban wildlife education materials for the city's web site and presenting such information in schools
- Organizing public presentations and other public outreach activities.
- Marsh-land and forest bird monitoring for criteria of biodiversity index
- Addressing other wildlife issues as they arise
- Report any significant findings to city council
- Write and submit funding applications to help supplement projects ⁴⁴

Conservation Efforts by BBEMA

The follow section highlights conservation and enhancement efforts that have taken place within the City of Summerside from 2016 to 2019 thus spanning the duration of the Bedeque Bay Environmental Management Association (BBEMA) Eco-Action Funded Summerside Biodiversity Action Plan project. This work was designed to be a starting point for further conservation and enhancement by other environmental organizations and/or by the City of Summerside.

Creation of Wildlife Corridors

Wildlife corridors are used to connect existing forest patches by using riparian and hedgerow areas. These corridors provide shelter for animals to travel while remaining relatively safe from predators and limit interactions with humans. As shown in the figure below, wildlife will move between existing forest patches utilizing cover.

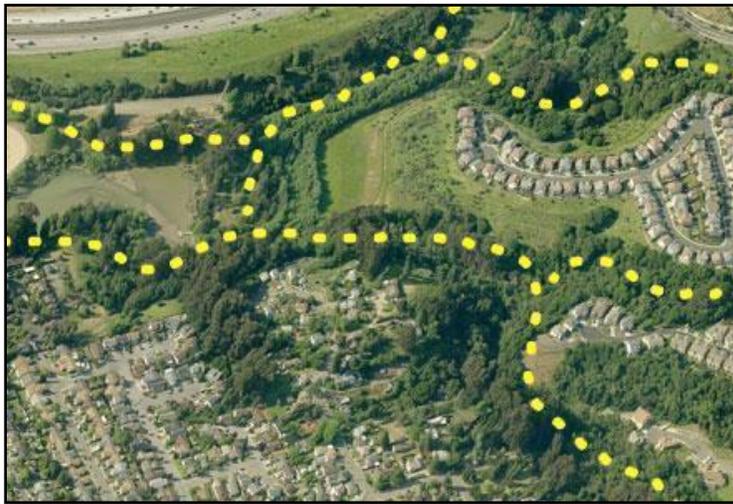


Figure 12: Wildlife movement through wildlife corridors ⁴⁵

If no cover is present, urban wildlife (skunks, foxes and coyotes) will be forced to move through open spaces increasing the likelihood of an encounter with city residents and pets. The City of Summerside is a patchwork of residential areas, green

Summerside Biodiversity Action Plan

spaces, agricultural fields, and commercial districts. By utilizing existing woodland and riparian zones, it would be easy to create new wildlife corridors allowing wildlife to move in and out of the city while causing minimal impacts. The wildlife corridors would expand upon existing corridors and green spaces to create wider areas for wildlife to travel through. Wildlife corridors should be at least 15 meters (50 feet) in width to be considered sufficient for safe crossing of animals. Where this is not achievable any enhancement will increase sheltered movement for wildlife. *For in depth management instructions please refer to the Summerside Biodiversity Action Manual.*

To date, BBEMA has provided the foundation of wildlife corridors by planting 6000 trees/shrubs and ground plants within the City of Summerside to create wildlife corridors. Approximately 2000 trees were planted around the established Ice Pond on the corner of Greenwood and South Drive. The remaining trees, shrubs and ground plants were distributed within Heather Moyle Park for pollinator enhancement and in wildlife corridors on the North side of the city from Granville Street across Central Street and continuing toward Pope Road. Figure 13 below indicates where parks are currently located within the city and where BBEMA staff have proposed placement of wildlife corridor enhancements.



Figure 13: Proposed wildlife corridor enhancement to existing city infrastructure ⁸

The city’s current Parks and Green Space Plan ⁸ developed in 2012 was designed to be implemented over the next 15 years. It is focused on reconfiguring and expanding the park

Summerside Biodiversity Action Plan

system to meet community needs across urban and suburban areas. This would add designated conservation areas to protect and enhance valuable natural resources, while providing controlled public access, extending and intensifying Summerside's network of greenways, trails and boardwalks.

Re-establishing Natural Areas and Parks

The Green Spaces Plan describes the situation of existing parks and how the city plans to maintain them. The document also outlines the city's plan for nine new or expanded parks and usage of current parks. The city has stated it has too many mini-parks with usage dropping for many parks while the cost of maintenance has increased.

This highlights the opportunity to maximize the value of public park land to wildlife. BBEMA proposes to restore these parks with native trees and shrubs. Any decision to re-naturalize city parks would have to pass consultation with local residents and city council to ensure the change is well received and accepted.

Replanting Neglected Parks

Parks that are undersized and/or underused should be identified and replanted into a wooded area to create more forested habitat within the city. These areas can be made into walking paths through forested patches, repurposing underused areas. Public consultation should be undertaken before altering any public parks to ensure cooperation.

The impact of trees on air quality and health is well known – trees absorb many polluting gases and remove particulates from the airshed. On average, a single tree can remove 10 pounds of pollutants per year. Trees also combat the greenhouse effect by absorbing carbon dioxide from the air and storing it as cellulose; an urban forest can result in carbon sequestration rates of 210–1,230 kilograms of carbon per hectare per year. Trees also produce a large amount of oxygen. In fact, two mature trees can provide enough oxygen for one person every year. Urban trees also offer a variety of other societal benefits, including reducing noise pollution, UV-B exposure, and energy use of nearby buildings. Trees reduce the amount of pollution entering creeks and irrigation ditches through storm water and mitigate erosion due to storm water runoff. For every 1,000 trees, nearly one million gallons of storm water runoff is prevented. Trees also provide an important source of food and habitat for a range of wildlife, birds, and pollinators in the community.⁴⁶

Native Pollinator Gardens



Figure 14: Monarch butterflies and swamp milkweed, a native plant to PEI is critical to their life cycle ⁴⁷

Pollination is a highly valuable natural service, essential for agriculture and food production. Pollinators help to maintain the health of ecosystems by promoting genetic diversity in plants. Many aid with population control of pest insects. Threats to pollinators include habitat loss or degradation, pesticide use, agricultural pressures, diseases, climate change and competition with introduced species.⁴⁸

Pollinators are a wide-range of creatures ranging from insects, bees, bats, and birds. In exchange for nectar or pollen rewards provided by flowering plants, pollinators help spread pollen from flower to flower, allowing sexual reproduction to take place, resulting in production of seed. Fruit containing a viable seed provides valuable food to both us humans and wildlife.

While there are public gardens throughout Summerside, these often include many of the same species. Where there is variety, it is provided by plants which are non-native to PEI, which may feel unfamiliar or undesirable to native pollinators.

A great way to boost pollinator habitat with minimal cost or upkeep is setting aside areas in parks for pollinator strips, which are areas that are kept un-mowed to allow wildflowers and grasses to come up.

BBEMA seeks to partner with local landowners to strengthen monarch butterfly and pollinator habitat. The aim is to improve diversity in nectar and pollen supplies on public land. This is accomplished by supplementing existing flower beds in public parks throughout the city with native flowering plants.

By 2019 BBEMA will have enhanced existing gardens in Heather Moyse Park and around the Summerside Ice Pond using ground plants that were donated by the Summerside

Summerside Biodiversity Action Plan

Garden Club. The city could adopt a similar goal to help raise awareness of the importance of pollinators thus supporting their numbers and health throughout Summerside. *For in depth management instructions please refer to the Summerside Biodiversity Action Manual.*

Water Conservation



Figure 10: Household water use ⁴⁹

Clean drinking water is absolutely essential to human life. It is often viewed as a commodity or resource and easily taken for granted as it is generally quite cheap. As previously indicated, there are no official water conservation programs in place for Summerside. Residents are not currently on metered water, but commercial and industrial landowners are.

Many other cities have embraced the collection of rainwater which helps to lessen the burden on the city's water infrastructure by both helping to meet resident's needs and allowing better management of storm water runoff. This harvested rainwater can be used for landscape maintenance, gardening, providing water for pets and livestock or in grey water systems where it can be used in toilets for flushing and washing machines.⁵⁰

By promoting the utilization of a rainwater collection system, the burden on treated drinking water supplies could be drastically reduced. In addition to reducing the need for

Summerside Biodiversity
Action Plan

treated water this type of conservation effort will also result in the reduction of storm water runoff assisting in water quality protection. The storm water will be retained and or released over a longer period of time allowing for better soil penetration.⁵⁰ Promoting water-efficient landscaping, that funnels rain water through soil rather than onto streets can reduce erosion and burden on water-treatment facilities. A good way to encourage this process is to add carpets of short plants in flower beds rather than mulching.

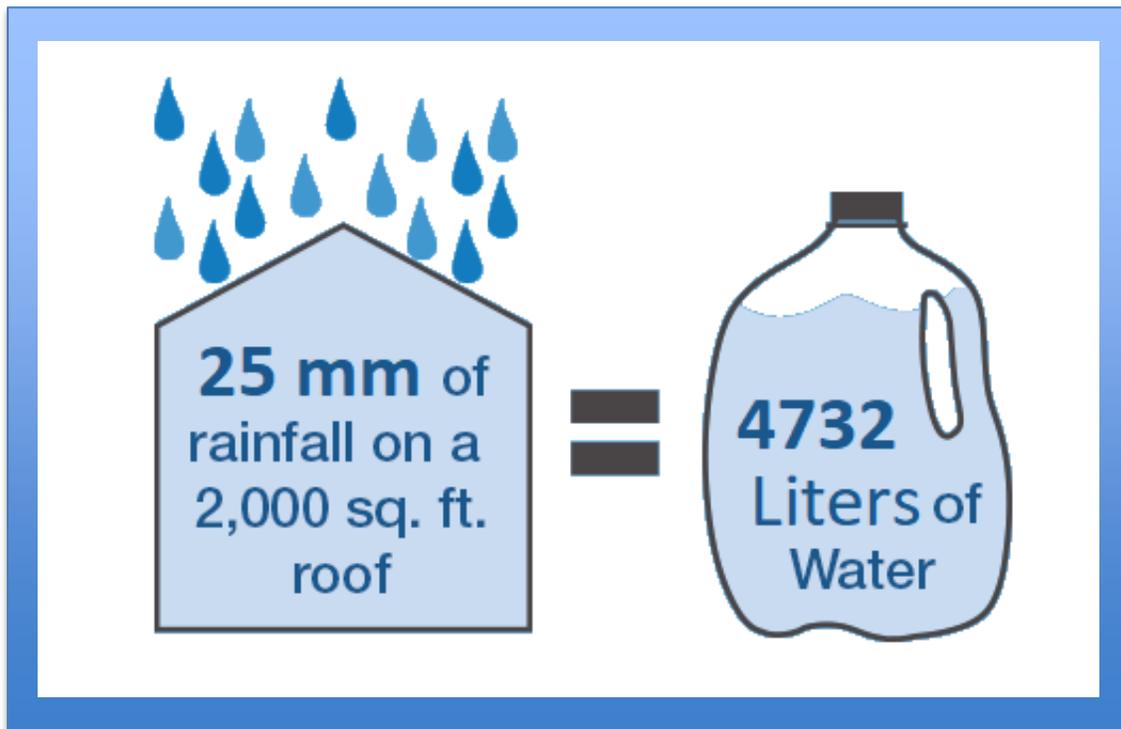


Figure 11: Rainwater loss example ⁵¹

Water metering is an excellent way to reduce water demands but can be negatively received. **It is suggested that widespread metering should be considered and that the city would be highly encouraged to prioritize home enhancement rebate programs before the institution of a metered water program.**

These rebate programs could be accomplished by pairing with a hardware provider (i.e. Callbecks Home Hardware or Kent Building Supplies). Such partnerships could offer an instant discount or mail-in rebate to promote the installation and use of low flow fixtures such as showerheads, washing machines and toilets. Another viable program would be the use of rain barrels. The barrels would be provided to city residents currently on the municipal water system. Residents would pay a deposit on the barrel, that would be added to their water bill. This deposit would be removed with proof of proper installation, site visit/photos, and the resident would receive reimbursement on their next water bill.

Summerside Biodiversity Action Plan

City staff may also want to consider a one-time rebate or reduced cost program for the installation of grey water systems. Professional installation would cost \$1,000 to \$3,000.⁵² The trade-off however would be that these greywater systems would save as much as 40% of a resident's total water use. The benefit of the greywater system promotion is that it could become a requirement for new home builds in residential areas, drastically reducing the water demand for new subdivisions.⁵²

Offering consumption information along with customer water bills would be an effective way to promote water conservation. Simple actions such as placing potted plants outdoors when rain is expected and not leaving the sink running while brushing teeth are prime examples.

Riparian and Marine Health

A full array of Prince Edward Island's valuable aquatic and terrestrial habitats are found in urban areas including estuaries, marsh wetlands and fresh water ponds, native grasslands and sagebrush, bottomland hardwood forests, coniferous forests, and other important habitats. Urban streams and riparian areas support salmon and trout, and other native fish. A host of amphibians, reptiles, mammals, birds and invertebrates also exist in these areas. **Protecting and restoring these important habitats and species will not only help to conserve Prince Edward Island's natural heritage but will also provide valuable ecosystem services for the public.**⁵³

The Summerside Ice Pond has been a neglected area with over-grown cattails and sediment, making it unattractive as a recreational area. BBEMA worked to restore the pond to its former glory, enabling its use as a recreational area, also improving its suitability as a habitat for fish and wildlife. Restoration work was completed in 2019. In 2019-2020, BBEMA will introduce hatchery fish to repopulate the pond. Gardens and trees will be planted, making it a desired area for families to come for activities such as picnics and fishing derbies in the warmer months and ice skating in winter.

The following outlines suggested changes that are being by BBEMA staff to the outlet stream below the Summerside Ice Pond, which runs parallel to MacKenzie Drive and exits next to the Greenshore Beach. **All changes are intended to increase the water flow throughout this section of stream and to help increase the flush at the outflow point, thus reducing the potential of stream eutrophication and build-up of decomposing algae.** These changes will be monitored to ensure no major negative impacts to existing infrastructure occur. The following figure illustrates the proposed changes.

Summerside Biodiversity Action Plan



Figure 12: Draft of stream amendments to be done in the system. Areas known to have deposition will be confirmed with GPS waypoints and aerial drone photos, and then fitted with brush mats. A pinch and deflector logs have been installed using naturally harvested logs anchored with rebar. Aerial photo from WGIS

In this area there is evidence that this section was previously dredged. This dredging has caused the stream to become overly wide, straight, and deep in certain areas, resulting in an unnatural rate of flow. Due to this decrease in flow, a buildup of organic matter has occurred at the stream outflow from tidal loading. The buildup of rotting organic matter not only negatively impact humans with an unpleasant odour but has also created an anoxic barrier to fish attempting to access higher portions of the stream.

In addition to the instream work, BBEMA would also like to increase the tree/shrub biodiversity within the riparian zone to reduce solar heating of the stream. Based on soil composition and moisture the following trees/shrubs should be considered:

- Rose
- Cedar
- Larch
- Pine
- Aronia
- Yellow birch
- Willow
- Green ash
- Black spruce

If the above work does not show signs of improvement over a one-year period, the 90-degree bend at the end of the outflow should be assessed. The grade at end of outflow should also be adjusted to improve the stream depth and flow. Stream enhancement and riparian management are the responsibilities of the area's local watershed group, BBEMA. Watershed groups are issued a blanket permit from the province enabling them to work within the stream and riparian zone conducting enhancement activities. **If there are issues with the stream or estuary, it is suggested that city staff consult with BBEMA to see if they are able to assist with any required work in these areas.**

Invasive Species Management

An invasive animal/plant is a species non-native that spreads aggressively, threatening the environmental, economic or social health in a given area. Natural species are controlled by predators, pathogens or competitors; invasive species are free from these natural control mechanisms and quickly out-compete native species. The presence of invasive species can result in a loss of biodiversity by excluding native species of plants and wildlife that depend on them.

There is a significant amount of information on invasive species provided by the PEI Invasive Species Council, yet there is very little management carried out in the City of Summerside.⁵³ To effectively combat invasive species there needs to be more public information for city residents regarding how to remove and destroy invasive species on private property. There are many invasive species across PEI, several being found within the city limits of Summerside. BBEMA emphasizes that a concentrated effort to manage certain species will be more effective in the short and long-term. **A way to raise awareness of invasive species and promote public involvement would be handouts distributed with electric or water bills containing basic information on steps to be taken in dealing with invasive species.**

Populations of invasive plants in Summerside were aerielly photographed using BBEMA' s drones to determine a baseline footprint and estimated biomass. This helps to better identify the spread of invasive species throughout the city. Once the extent of invasive populations is better known and mapped, it will be easier to effectively tackle the management of these species within the city. *For in depth management instructions please refer to the Summerside Biodiversity Action Manual.*

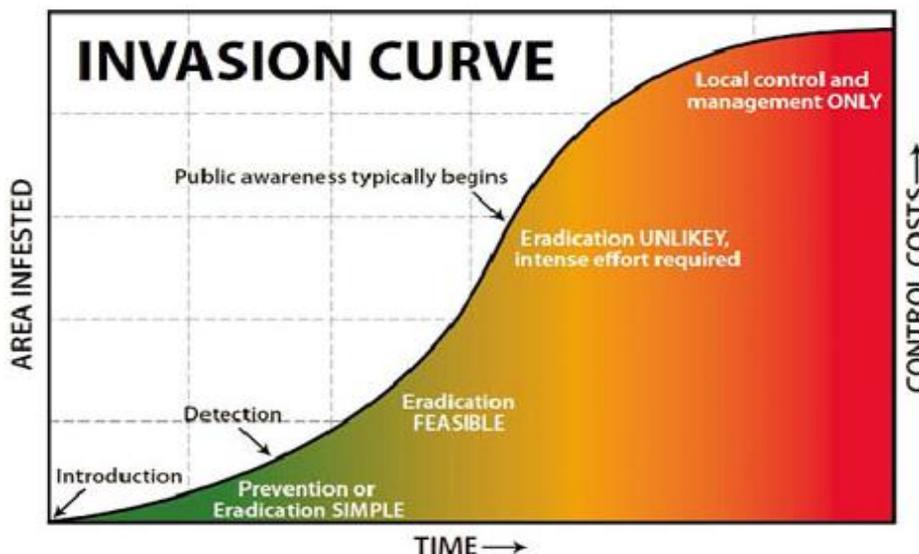


Figure 13: Curve highlighting importance of control of invasive species populations ⁵⁵



Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is a half-shrub wetland perennial that outcompetes native marshland plants such as Labrador tea, cattails, etc. Although it has a showy flower, causing it to be mistaken for fireweed (*Epilobium angustifolium*), it provides very little to wildlife in terms of food or cover and can quickly dominate an area.⁵⁶

Figure 14: Purple loosestrife, an abundant invasive throughout Summerside.⁵⁷

In 2018 BBEMA conducted invasive species monitoring for loosestrife in the City of Summerside, identified areas of concern within Summerside, and have laid out steps to be taken to get it under control can be found in the *Summerside Biodiversity Action Manual*. **In the past a biocontrol species of beetle was released to help combat purple loosestrife in the city.** However, its success was never closely monitored and there is very little information on where the release sites were located or the numbers in which the beetles were released. In May 2018, BBEMA performed surveys for the *Galerucella* spp. of loosestrife beetle, to collect samples of the beetle, for spreading it to other sites with a high density of purple loosestrife.

BBEMA staff have investigated the reinstatement of this biological control during the course of their project but a monitoring program should be implemented and remain in place. Such a program will measure the overall biomass of the purple loosestrife. The program has been streamlined to reduce burden on city staff. A loosestrife monitoring program has been outlined by BBEMA staff and additional information can be found in the *Summerside Biodiversity Action Manual*.

Figure 15: Japanese knotweed, a highly invasive plant ⁵⁸

Japanese Knotweed (*Fallopia japonica*)

Another highly invasive plant species that is found in the City of Summerside is the Japanese knotweed (*Fallopia japonica*). It was introduced to North America from Japan in the 19th century. It is commonly referred to as Japanese bamboo but is actually a member of



Summerside Biodiversity Action Plan

the buckwheat family. This plant is so prolific, it has been referred to as “Godzilla Weed” and can be spread with any fragment of root and cuttings.⁵⁹

To help with invasive species removal information should be provided on the city’s website (NatureNet) with links to the PEI invasive species council. **The city could also work with Island Waste Management to set up an invasive plant pickup/disposal day, as there is no existing program.** This would be an opportunity for Summerside to be a pilot site. Residents would remove invasive plants from their property, bag the plant material and place it curbside for pickup where it would then be collected and destroyed by incineration through Island Waste Management.

Green Crab (*Carcinus maenas*)

Prior to being introduced to Atlantic Canadian waters, the invasive green crab originated in coastal areas of Europe and Northern Africa. This aggressive species originally came across in the holds of ships in the 19th century. It currently spreads in the ballast waters of travelling ships or through the moving ocean currents, as it has the ability to survive out of water for up to five days.⁵⁹ The green crab can be identified by its fan-shaped shell (up to 10cm), with three spines between the eyes, and five spines on either side on the shell and contrary to its name, its shell coloration varies from green to an orange-red.⁶⁰

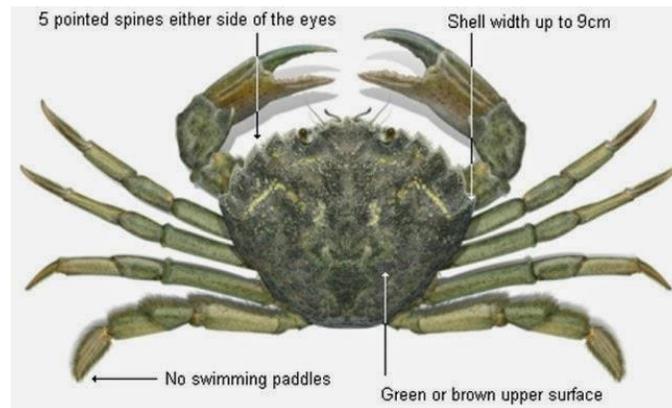


Figure 16: European Green Crab identification tool ⁶¹

The habitat for this species is shallow waters with various substrates, and can tolerate various levels of salinity.⁶² The green crab is commonly found in the shores of Prince Edward Island, and often outcompetes native species such as the rock crab (*Cancer irroratus*) and American lobster (*Homarus americanus*), two species that are customarily harvested in the area.⁶³ Not only does it outcompete species, but its aggressive behaviour and appetite for local mollusc species have harmed the mollusc fishing industry in Prince Edward Island, including nearby Malpeque Bay.⁶⁴ Due to its ability to spread rapidly and

Summerside Biodiversity Action Plan

its potential to harm entire marine ecosystems, the green crab is referred to as one of the ten most unwanted species in the world.

As this species can easily spread and expand its range, measures can be taken to aid in the ceasing of further range expansion. Possible measures include treatment of ballast waters and any other gear that may come in contact with the green crab, whether it be during the larval or adult stages.⁶⁵ A recent development for lessening the numbers of this invasive species includes the use of the green crab for culinary purposes. In European countries, the species is considered a delicacy, and the potential for an industry may exist in the Maritime provinces.⁶⁶ With this possible expansion the island's fisheries to include the green crab, native species may be able to recover.

Wildlife Management

Some island visitors find the opportunity to experience wildlife interactions to be the highlight of their entire trip. Even though it is free of charge, being present to see a fox trotting through a park with a mouse in its mouth or seeing a duck lead its ducklings to a swimming area is an invaluable experience for a tourist or local citizens. However, interactions can be a risk if respect is not given to the wildness of an animal.⁶⁷

Precautions must be taken to ensure wildlife is not intruding on the personal space of humans. This is where the importance of proper management comes into play. BBEMA has created a comprehensive biodiversity management manual which addresses wildlife management in more detail, helping to advise in the steps to take when confronted with a wildlife issue.



Figure 17: Urban foxes are becoming dependent on humans ⁶⁸

Summerside Biodiversity Action Plan

Animals are attracted to an area for various reasons such as food accessibility, safety/shelter and water accessibility.⁶⁶ It is suggested that wildlife information be located on the city's website allowing residents easy access. An interactive portion of the city website should include the opportunity for reporting of public interactions and sightings of wildlife and invasive species. This would be incredibly useful for building a better understanding of the current situation for city officials, while helping to support public interest in conservation and ecological issues occurring in the city. A wildlife seminar series could be created. This would then be presented to residents/schools within the city outlining the importance of urban wildlife and the care that must be taken when dealing with wildlife. **A wildlife reporting system is necessary to track wildlife interactions within the city thus helping to manage nuisance animals.** This reporting system could be expanded over time to incorporate rare species or species of interest and key habitat features.

Tick Monitoring

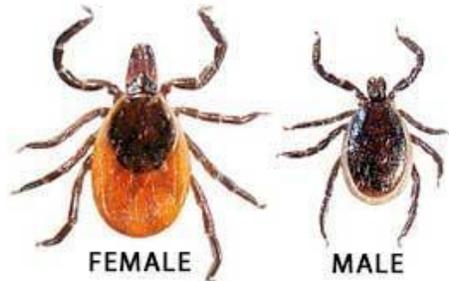


Figure 18: Comparison of female and male black-legged ticks ⁶⁹

The black-legged tick (*Ixodes scapularis*), commonly known as the deer tick, is a small tick about the size of a poppy-seed, where the abdomen of the female appears reddish in color. Ticks are the main vector of Lyme disease caused by *Borrelia burgdorferi*, a type of bacterium carried in their gut. To transmit the pathogen the tick must be attached to the host for 24 hours, during which time the tick regurgitates its blood meal transmitting the disease. Early signs of Lyme disease include a bullseye shaped rash near the bite location and flu-like symptoms. Medical care is advised as soon as such symptoms arise. Symptoms can become severe leading to chronic results in physical health. Ticks can be found in tall grasses such as on playgrounds, athletic fields, trails, paths, adjacent to wooded areas or anywhere wildlife hosts may be found.

Ticks are hosted by a wide-variety of animals including birds, amphibians, reptiles and mammals. As ticks progress through their life stages (egg, larva, nymph, and adult), they often change hosts. Young ticks attach to small animals for dispersal, while nymphs and adults will climb onto plants, grasses and shrubs to allow attachment onto larger hosts. These adults can stay in an area for months waiting for a host.⁷⁰

Summerside Biodiversity Action Plan

Over the course of BBEMA's project tick populations were raised as a concern by city residents. BBEMA conducted tick monitoring in areas where ticks would be a major threat to the public (i.e. such as in Friendship Rotary Park, along the boardwalk near Mackenzie Drive, Heather Moyses Park, Confederation Trail).

BBEMA has reached out to Lloyd Lab at Mount Allison, a research laboratory dedicated to tick and Lyme disease research for information on existing populations in the Summerside area. We will be sending the ticks gathered during our tick drags to the lab for identification and testing for Lyme disease. **It is suggested that tick monitoring be continued by city staff using the methods laid out by BBEMA staff.**

For in depth management instructions please refer to the Summerside Biodiversity Action Manual.

Wildlife Reporting Forms

To date, the city has no method to track wildlife encounters or interactions with city residents. By creating a reporting system, the city could collect information and make informed enhancement and policy decisions concerning development and wildlife management.

An application to report sightings would include:

- Wildlife species sighted, and the option to upload a photo to confirm ID
- Area sighted, reference points (i.e. near the sign, between the spruces etc.)
- Number of individuals sighted, or approximate size of patch for invasive species
- Behavior of the wildlife sighted
- Nature of human-wildlife interaction, was it hazed, did it run off or was it unnaturally comfortable?

This would allow for the creation or elaboration of a map of Summerside with labels that indicate the location of wildlife sightings as they are received. The public could then monitor their efforts being built into a shared result. To ensure participation the city could implement participation rewards, such as an "eco-ranger" badge, or featuring their image on a social-media page to further spread awareness of wildlife.

Currently programs and apps do exist, such as the Nature Tracker app, which could be used but the city would have to negotiate a deal to gain access to the metadata to better help direct enhancement projects and policy creation.

Forest Management



Figure 19: Typical PEI Acadian forest ⁷¹

The Acadian forest regions covers all three Maritime provinces, each of which has a unique past resulting in different land uses, ownerships, and forest impacts. Within the Acadian forest region, there are varying major forest types: the rich, tolerant hardwood, comparable to the

deciduous forests to the south; spruce-fir forest, like that of the northern boreal forest; and a wide diversity of coniferous, deciduous, and mixed types. Though the composition of the island's forests has changes over time, it remains critical that diversity and health of our woodlands remain pristine. Through maintenance and planting, the Acadian forest region in Prince Edward Island will improve and provide an extensive ecological service for wildlife in the area.

Tree snags are trees that are dead or decaying but are maintained upright and allowed to decompose naturally. **Snags provide homes for a wide range of wildlife across many seasons, helping support over-wintering species of birds, bats, and insects.**

Decaying wood, whether a snag or a log, is a source of nutrition for plants, insects, mosses and lichens.⁷² The use of bird, bat, and bee boxes is another option for supporting urban wildlife. These are useful in providing shelter and nesting habitat for migratory species in the spring and summer.⁷³

Between 2016 and 2019, BBEMA staff created 50 structures to increase wildlife habitat within the city. These include the creation of snags along the boardwalk, fallen logs in woodlands, pollinator boxes in parks and public/private properties and hummocks within riparian areas for small mammals. *For in depth management instructions please refer to the Summerside Biodiversity Action Manual.*

Community Education and Engagement

An important aspect of a functioning biodiversity plan includes community education and engagement. These activities incite the community in harboring a healthy respect for nature. **Opportunities and information must be made readily available to ensure a better public understanding of the natural areas within their city and the importance of biodiversity in these ecosystems.**

The Holland College Transitions and the East Prince Youth Development Centre programs have been valuable aids in a variety of BBEMA's enhancement activities. Youth have been allowed to learn about environmental management work and have been engaged in tree planting as well as, various other activities related to enhancing biodiversity.

The Growing Forward Together program aims to increase youth awareness of the relationships of pollinators, native plants and biodiversity. Summerside youth groups (the YMCA, Boys and Girls club, and school groups) are partnered with senior's volunteers/organizations (East Prince Seniors Initiative, Summerset/Wedgewood Manor) to design and develop urban gardens and promoting native species in urban public and private gardens and green-spaces.

The Adopt-A-River program, offered in classrooms exclusively through BBEMA, has been effective in spreading awareness related to water and land-use issues. Students become aware of what is being done by environmental organizations such as BBEMA to monitor and reduce pressures throughout watersheds.

Scouts Canada have joined BBEMA staff for tree planting, habitat restoration, monarch tagging and release as well as general wildlife education sessions.

Closing Statement

This document was created by the Bedeque Bay Environmental Management Association (BBEMA) for the City of Summerside through Environment Canada's Eco-Action program. Information was collected from various sources including the PEI provincial government and Summerside city staff. Its intention is to highlight the practices the city is currently engaged in and areas where attention is required. At the end of the project in 2019, BBEMA staff will transfer this document and the accompanying material to the City of Summerside. Its findings will be presented to city staff department heads and the Summerside city council. It is recommended that the document be reviewed every 2 years to adapt to changing priorities, accentuate Summerside's innovations and monitoring's of the city's progress.

Incorporation of any recommendations is subject to city council approval. Although BBEMA's role is officially completed in the creation of the Biodiversity Action Plan, the organization will remain an active member in maintaining the biological and ecological health of the city. BBEMA welcomes any consultation regarding the content of this document.



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Definitions

Aerobic: living, active, occurring in the presence of oxygen

Anaerobic: living, active, occurring, or existing in the absence of free oxygen

Anoxic: greatly deficient in oxygen; oxygen less

Anthropogenic: relating to, or resulting from the influence of human beings on nature

Biocontrol: the reduction in numbers or elimination of pest organisms by interference with their ecology (as by the introduction of parasites or diseases)

Biodiversity: biological diversity in an environment as indicated by numbers of different species of plants and animals

Biofuels: a fuel (such as wood or ethanol) composed of or produced from biological raw materials

Biological Nutrient Removal: biological nutrient removal technology capable of reducing the nitrogen in wastewater effluent to not more than 8 milligrams per liter, as calculated on an annually averaged basis

Biosolids: organic matter recycled from sewage, especially for use in agriculture

Fish Hatchery: an establishment in which young fish are produced and reared especially for later release in natural waters

Greywater: the relatively lean waste water from baths, sinks, washing machines, and other kitchen appliances

Habitat: the place or environment where a plant or animal naturally or normally lives and grows

Invasive: tending to spread especially in a quick or aggressive manner (such as a non-native organism) growing and dispersing easily usually to the detriment of native species and ecosystems

Renewable: capable of being replaced by natural ecological cycles or sound management practices

Resilience: an ability to recover from or adjust easily to misfortune or change

Riparian: relating to or located on the bank of a natural watercourse (such as a river) or sometimes of a lake or a tidewater

Sustainability: of, relating to or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged (techniques, agriculture)

of or relating to a lifestyle involving the use of sustainable methods

Urbanization: the process by which towns and cities are formed and become larger as more and more people begin living and working in central areas

Water Metering: process of measuring water use ⁷⁴

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Figure List

- Figure 1: City of Summerside Green Spaces Area Map
- Figure 2: Factors influencing an individual's Carbon Footprint
- Figure 3: Important Greenhouse Gases released by human activity
- Figure 4: CO₂ absorbed by a single acre of forest
- Figure 5: Sources of emissions on Prince Edward Island
- Figure 6: View of Summerside Wind Farm
- Figure 7: New Solar Energy Farm at Credit Union Place
- Figure 8: Map of electric charging stations within the City of Summerside boundaries
- Figure 9: Summerside Water Pollution Control Centre
- Figure 10: Household water use
- Figure 11: Rainwater loss example
- Figure 12: Wildlife movement through wildlife corridors
- Figure 13: Proposed wildlife corridor enhancement to existing city infrastructure
- Figure 14: Monarch butterflies and swamp milkweed, a native plant to PEI which is critical to their life-cycle
- Figure 15: Invasive Curve
- Figure 16: Purple loosestrife
- Figure 17: Japanese Knotweed
- Figure 16: European Green Crab identification tool
- Figure 18: Urban foxes are becoming depending on humans
- Figure 19: Comparison of female and male black-legged ticks
- Figure 20: Typical PEI Acadian forest