



## Natural Environment

### 3.2 Natural Environment

PEI's landscape is a mosaic of natural beauty and ecological diversity. The Island is 5,656 km<sup>2</sup> in size, stretching 230 km in length with a width that varies from 6.5 to 64 km. Separated from the mainland by the Northumberland Strait, the Island's geography features rising sea levels and a dynamic coastline. PEI is characterized by a cool, humid maritime climate, receiving about 1,100 mm of annual precipitation that is fairly evenly distributed throughout the year.

The Island's soil is described as a thin layer of glacial till surficial deposits and weathered red sandstone cliffs and bluffs.<sup>1</sup> Close to 6,000 years ago, rising sea levels flooded the land bridge connecting to the mainland, submerging former river valleys, and creating the many bays and estuaries that delineate the coastline.<sup>2</sup> The Island's topography is characterized by its rolling hills and iron-rich red sandstone cliffs, remnants of ancient geological history. The hills in the central and eastern regions contrast with the lower coastal and western regions. The peak elevation is 142 metres above sea level.

### 3.2.1 Land Use and Conservation

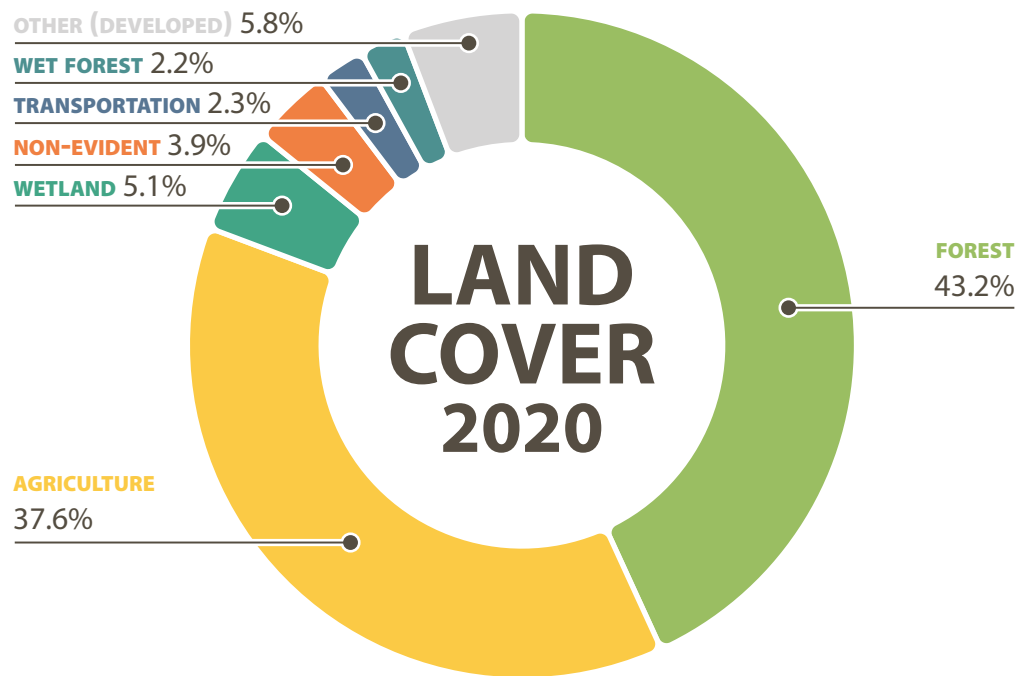
Over the past decade, land use patterns have changed, reflecting the evolving interplay between development, land use, and the conservation of natural and built heritage. These changes not only impact the environment, but also influence the future of both the economy and Island communities themselves.

The most recent land cover analysis was completed by the Provincial Government in 2023. An analysis based on data collected on land cover conditions in 2020 found that the Island's landscape is predominantly forests and agricultural lands.<sup>3</sup> However, both the forested land area and agricultural lands have been decreasing in size in recent decades. The ongoing transition of forest and agricultural lands to developed spaces—particularly for low-density residential purposes—poses challenges for sustainable land use management and necessitates careful land use planning to minimize environmental impacts.

Left, from top:

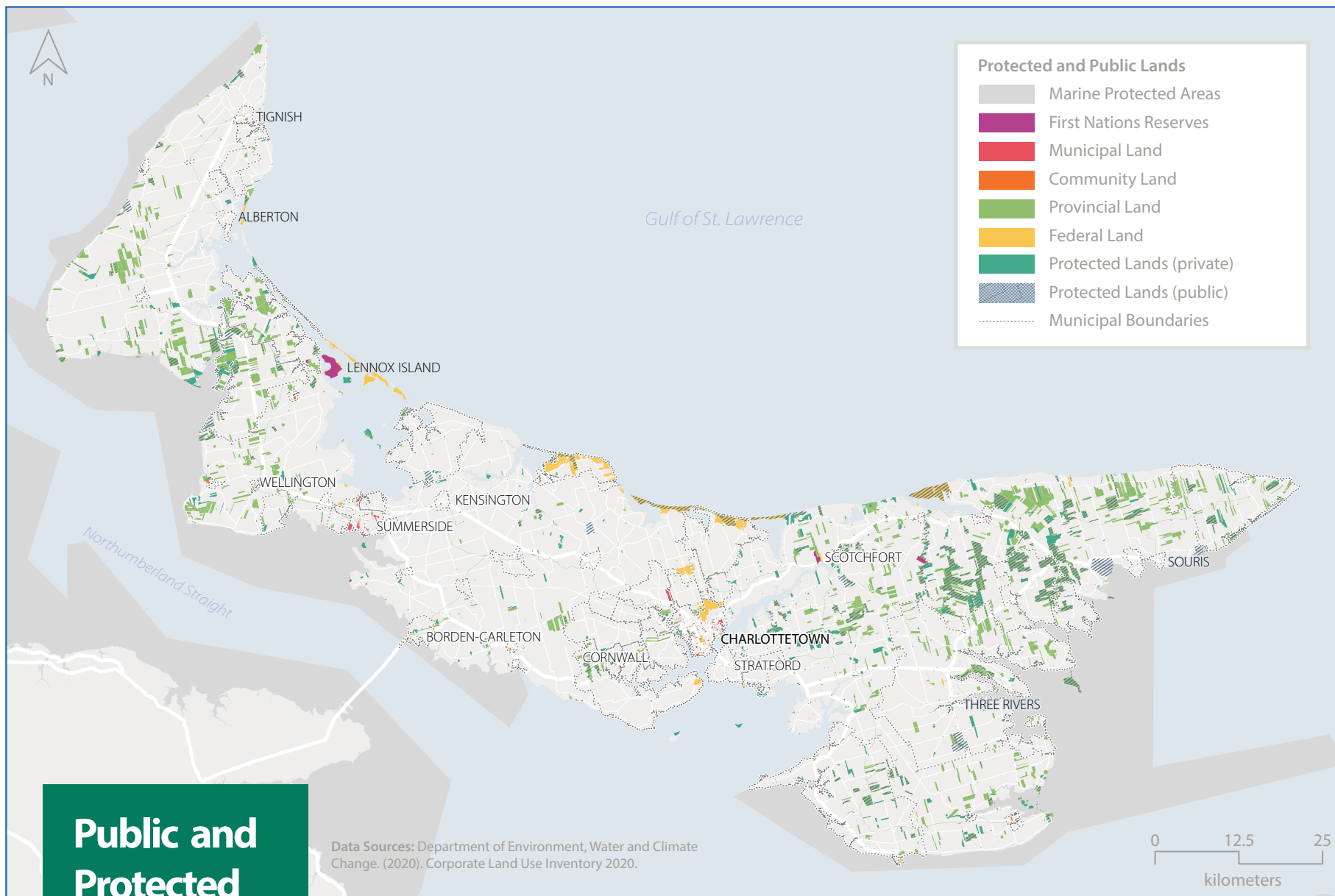
Figure 19: Proportional land cover for PEI, 2020<sup>3</sup>

Table 3: Provincial land cover change from 2010 to 2020<sup>3</sup>



Land Use	2020 Area (ha)	2020 Area (%)	Change 2010 to 2020 (% points)
Forest	245,919	43.2	-0.71
Agriculture	213,908	37.6	-0.18
Non-evident / abandoned	21,943	3.9	-0.06
Wetland / sand dunes *	28,788	5.1	0.36
Wet forest	12,492	2.2	-0.02
Transportation	12,991	2.3	0.03
Other (developed)	32,978	5.8	0.58
<b>Total</b>	<b>569,019</b>		

\* While wetland / sand dune area in PEI has increased from 2010 to 2020, the way Wet forests are measured has changed in the past ten years, so those have been listed separately. As per the State of the Forest report, "strict comparison of current data to what is included in past reports is always challenging. For example, new wetlands are continually being added to the land use inventory... based on site inspections and field work."



This map displays publicly owned lands (federal, provincial, municipal, and community owned), as well as protected lands (public and private).

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### 3.2.2 Forests

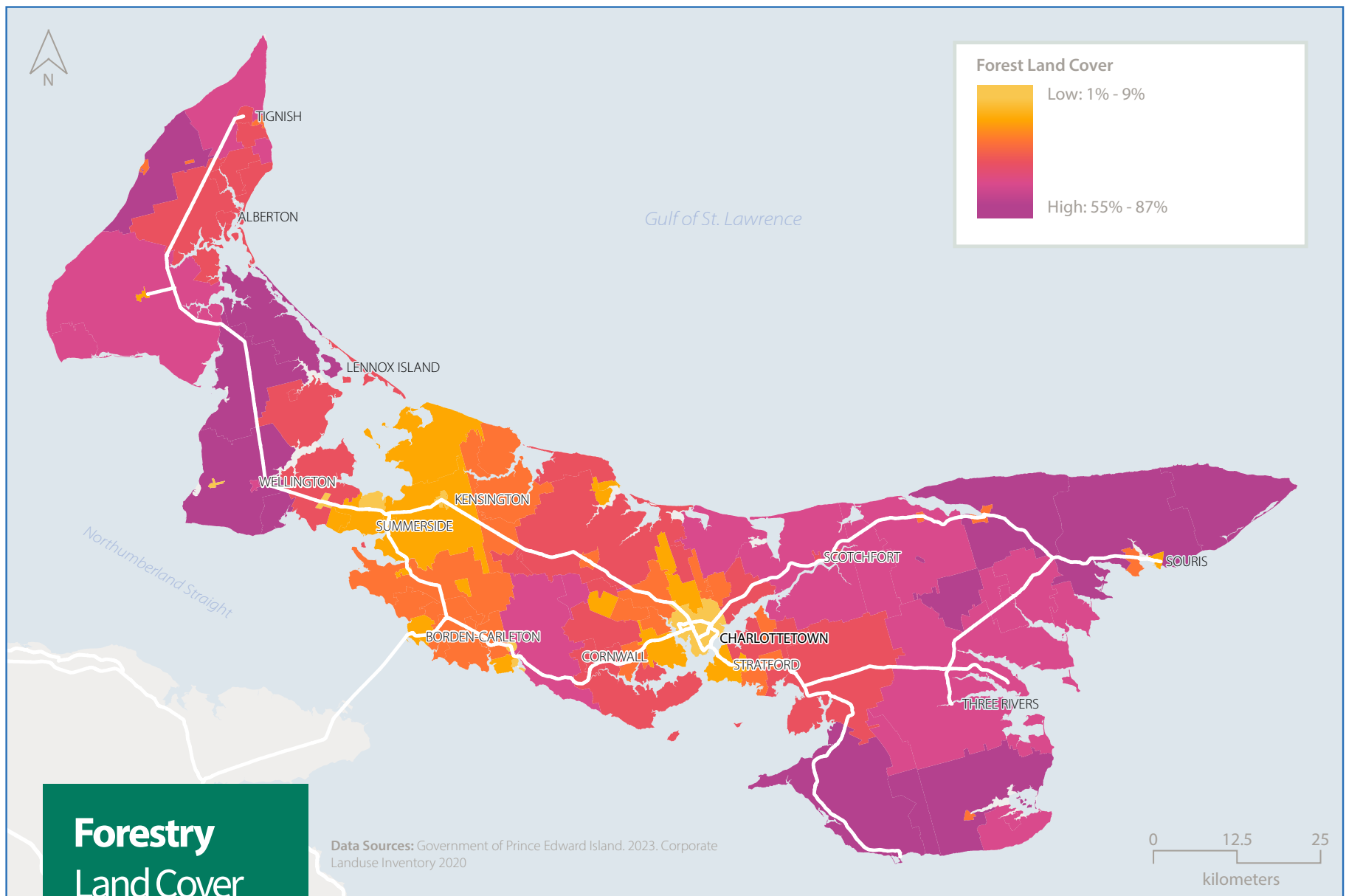
PEI's environmental conservation efforts are key to safeguarding its natural heritage. Currently, 5% of the land area in the province is included in the Protected and Conserved Areas Network, the lowest percentage of any province or territory in Canada. Efforts to increase protected lands have seen progress in recent years, with an increase of 8,200 ha since 2010. However, more action is needed to achieve the province's current conservation goal of 7%.<sup>4</sup> This is lower than the national average due to PEI's high proportion of private land and lack of large wilderness areas.

The primary challenge to increasing the protected land area in the province is the high percentage of land that is privately owned (see [ownership](#)). This underscores the need for innovative conservation strategies. Partnerships and private land stewardship are key elements in advancing these efforts, ensuring the Island's landscapes and ecosystems are preserved for future generations.

The Wabanaki forest covers the traditional territory of the Mi'kmaw and Wolastoqiyik people,<sup>5</sup> though it is more commonly known as the Acadian forest, the name given to it by settlers in eastern Canada. PEI's forests are a dynamic and vital component of the natural environment, playing a significant role in the Island's ecology and economic framework. These forests are a mix of hardwood-dominated (60%) and softwood-dominated (40%) trees, with an intolerant hardwood comprising more than one-third of the forests.<sup>3</sup> This blend of northern boreal and temperate hardwood trees contributes to the Island's unique biodiversity and ecological resilience.

Covering approximately 43.2% of the Island in 2020, PEI's forests have seen a net decrease in area since 2010. Estimates show 5,350 ha of forest created, but concurrently 9,350 ha has been lost.<sup>3</sup> In fact, the Island's forested land area has been decreasing since the 1990s, indicating a consistent trend. Factors contributing to this decline include land conversion for agriculture and development.

**Takeaway:** The trend of converting forests to other land uses highlights the need for effective forest management and conservation practices, and the importance of encouraging private landowners to participate in these initiatives.



This map displays the percentage of land cover attributed to forests per census sub division, based on the 2020 Corporate Land Use Inventory.

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PEI's forests are crucial for carbon sequestration. The Province recently completed an analysis of carbon storage and sequestration using the Carbon Budget Model of the Canadian Forest Service (CFS). The results indicated that the Island's forests contain 59 Mt (megatonnes) of carbon in its soil, live plants, and dead matter,<sup>3</sup> equivalent to 217 Mt of carbon dioxide (CO<sub>2</sub>e). For comparison, the province-wide greenhouse gas (GHG) emissions in 2020 were only 1.6 Mt CO<sub>2</sub>e.<sup>6</sup> More details on the carbon budget are available in the *Provincial State of the Forest Report*.

The forestry industry, including wood harvesting and residential fuelwood production, remains a vital part of the Island's economy. The estimated volume of wood harvested annually in PEI from 2010 to 2020 ranged from a low of 342,000 m<sup>3</sup> to a high of 449,000 m<sup>3</sup>. Overall, live wood volume increased slightly during this period, from 135 m<sup>3</sup>/ha to 137 m<sup>3</sup>/ha.<sup>3</sup>

The forestry sector is vulnerable to climate change and the impacts of extreme weather events. Following post-tropical Storm Fiona, 13% of the Island's forested area was affected, of which at least 70% of the trees were blown down.<sup>7</sup> It will be essential to factor climate change into future forest management planning.

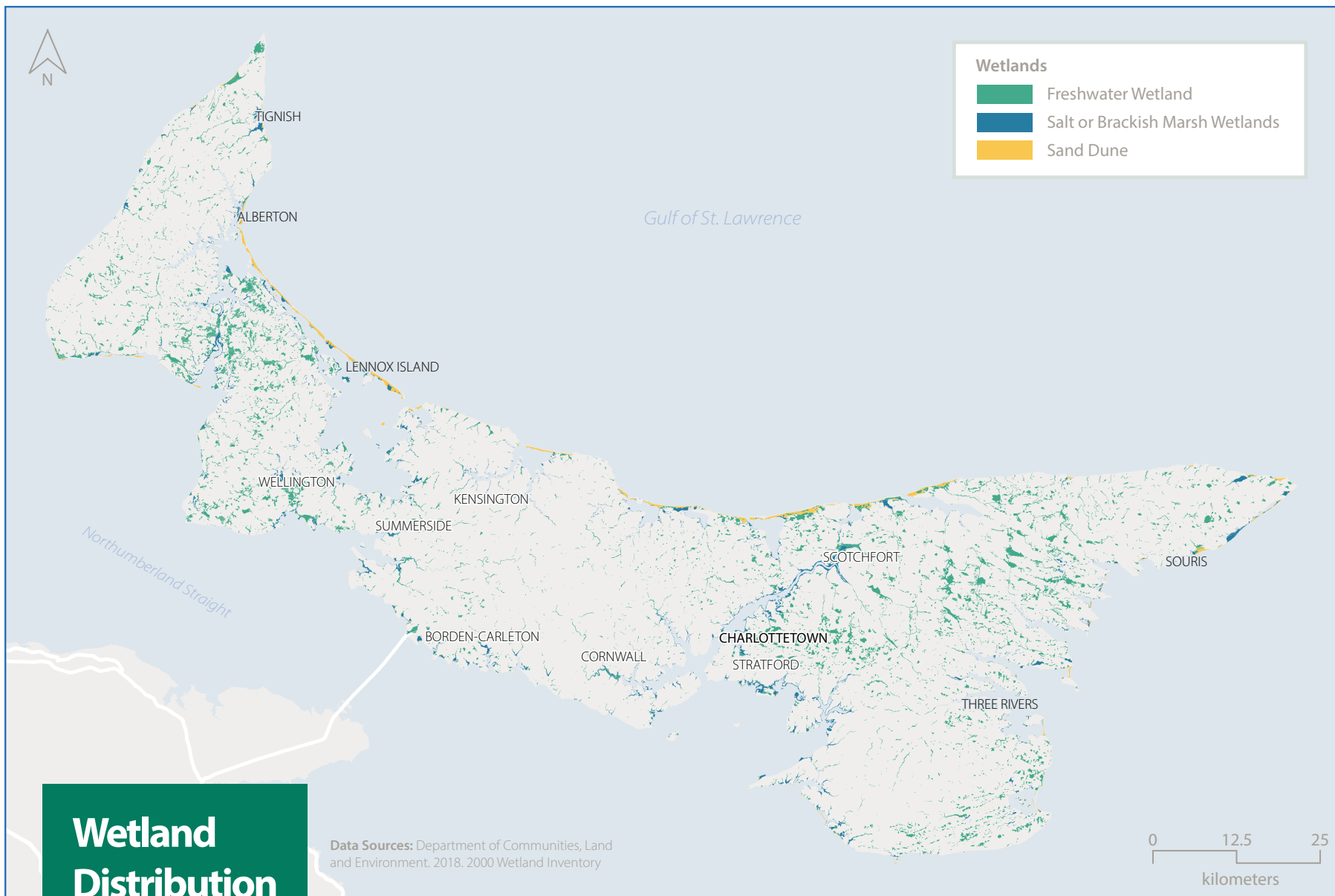
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### 3.2.3 Wetlands

Natural wetlands cover approximately 5.1% of the Island. These ecosystems, consisting of a mix of freshwater, wetlands, and coastal salt marshes, play a vital role in supporting biodiversity. They serve as habitats for numerous species, including migratory birds, amphibians, and unique plant life.

Freshwater wetlands constitute around 79% of the total wetland area. The freshwater wetlands are diverse, including open ponds, black spruce bogs, wooded and shrub swamps, and alder swales.<sup>8</sup> Coastal wetlands, or salt marshes, are increasingly vulnerable to climate change impacts, such as sea-level rise and coastal erosion, when coastal development has occurred. Coastal development may cause a phenomenon known as 'coastal squeeze' where the development prevents a salt marsh from migrating inland and thus from naturally adapting to sea-level rise. More than 1,300 km (54%) of PEI's estuary coastlines are classified as wetlands, in contrast to only 5% of the exposed coastline.<sup>9</sup>

Wetlands are crucial ecosystems that provide a wide array of benefits. In addition to being among the most productive and biologically diverse ecosystems, their importance spans ecological, economic, social, and cultural dimensions. They are essential for the sustainability of natural systems, and human and community well-being.



Wetlands cover 5.6% of the surface area of Prince Edward Island. This map displays freshwater wetlands (~80%), salt or tidal marshes (20%), and sand dunes. Salt and tidal marshes are considered to be among the most productive ecosystems on earth.

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State of the Island Report

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More specifically, wetlands contribute to water purification processes and flood mitigation. They function as natural sponges, trapping and slowly releasing surface water, rain, snowmelt, groundwater, and floodwaters. They also help maintain surface water flow during dry periods. Commercial peat moss mining occurs in PEI's largest bogs, highlighting the economic as well as ecological importance of these areas. Protecting wetlands is essential in order to preserve their ecological functions, biodiversity, and the benefits they provide to Islanders.

Wetlands (and the land within 15 m of a wetland boundary, known as the buffer zone) are protected from disturbance and development under the Environmental Protection Act's Watercourse and Wetland Protection Regulations. However, improved coordination is necessary between land use planning and development authorities (both provincial and municipal) and the Department of Environment, Energy and Climate Action, the organization responsible for the issuance of Buffer Zone Activity Permits. The importance of cooperation between these groups is highlighted in the recently released *PEI State of the Coast Report*.<sup>10</sup>

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### 3.2.4 Wildlife

The federal government, under the Species at Risk Act (SARA), oversees the designation and recovery of at-risk species on federal lands. Similarly, the Migratory Birds Convention Act (MBCA) safeguards migratory birds and their habitats province-wide. In PEI, species at risk—including endangered species (14), threatened (10), and those of special concern (20)—include plants, animals, and other organisms.

The Province of PEI, in collaboration with Environment and Climate Change Canada (ECCC), has recognized PEI's forested areas as one of Canada's eleven Priority Places for Species at Risk. This designation reflects the region's rich biodiversity, high concentration of at-risk species, and significant conservation opportunities.<sup>11</sup>


PEI wildlife and habitat management is guided by several Provincial acts including the *Wildlife Conservation Act*, *Natural Areas Protection Act*, and the *Environmental Protection Act*. These acts reflect the Island's commitment to preserving its rich biodiversity and ecological integrity. Wildlife Management Areas (WMAs) include both public and private lands, and are dedicated to the conservation of wildlife and habitat. The WMAs cover about 5,430 ha, demonstrating PEI's strategic approach to wildlife habitat preservation.<sup>12</sup>

In addition to the environmental protection legislation, the *Planning Act* enables the creation of conservation zones for the purpose of “*preserving any unusual combination of elements of the natural environment having educational, historic or scientific interest*” [*Planning Act, Section 8(1)(iii)*]. Under this provision, the Morell River Conservation Zone has been established to maintain the recreational value of the Morell River, retain its unspoiled state, and to protect it from encroachment of undesirable and incompatible land uses [*Planning Act Subdivision and Development Regulations, Part IV - Special Regulations, Section G*].



# The Species At Risk Act in Prince Edward Island

The federal government is responsible for the designation, protection, and recovery of species on federal lands under its Species at Risk Act (SARA), an act to prevent wildlife species from becoming extinct and to secure the necessary actions for their recovery. Similarly, the Migratory Birds Convention Act (MBCA) protects migratory birds and their habitat across provinces. Species at risk with habitat in PEI include plants, animals or other organisms that are endangered (14), threatened (10) or of special concern (20) because of sensitivity to human activities or natural events.

 **Endangered:** A species that is at immediate risk of extirpation or extinction.

 **Threatened:** A species likely to become endangered if limiting factors are not reversed.

 **Special Concern:** A species that is particularly sensitive to human activities or natural events.



Bank Swallow



Canada Warbler



Common Nighthawk



Eastern Whip-poor-will



Gypsy Cuckoo Bumble Bee



Leatherback Sea Turtle



Little Brown Myotis



Red-necked Phalarope



Rusty Blackbird



Short-eared Owl



Barn Swallow



Barrow's Goldeneye



Beach Pinweed



Blue Felt Lichen



Bobolink



Eastern Wood-pewee



Eskimo Curlew



Evening Grosbeak



Frosted Glass-whiskers



Gulf of St. Lawrence Aster



Monarch



Northern Myotis



Olive-sided Flycatcher



Piping Plover melodus subspecies



Red Knot rufa subspecies

Tierra del Fuego / Patagonia  
wintering population



Transverse Lady Beetle

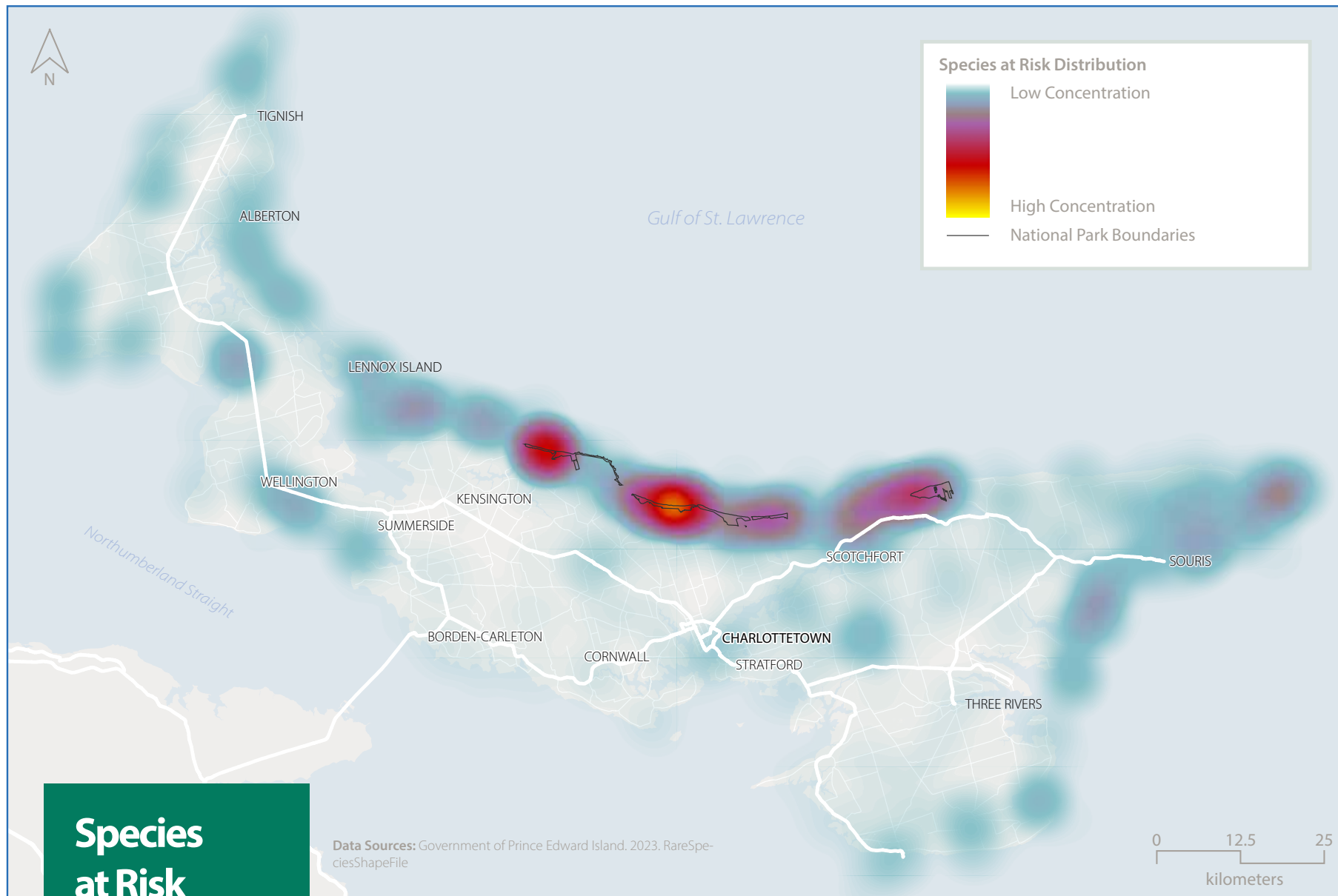


Wrinkled Shingle Lichen



Yellow-banded Bumble Bee

Reference: Species at Risk Act (S.C. 2002, c. 29)  
List of Wildlife Species at Risk



## Species at Risk Distribution

This map displays where the highest concentrations of species that have been designated as "at risk" or "may be at risk" are found across the island.

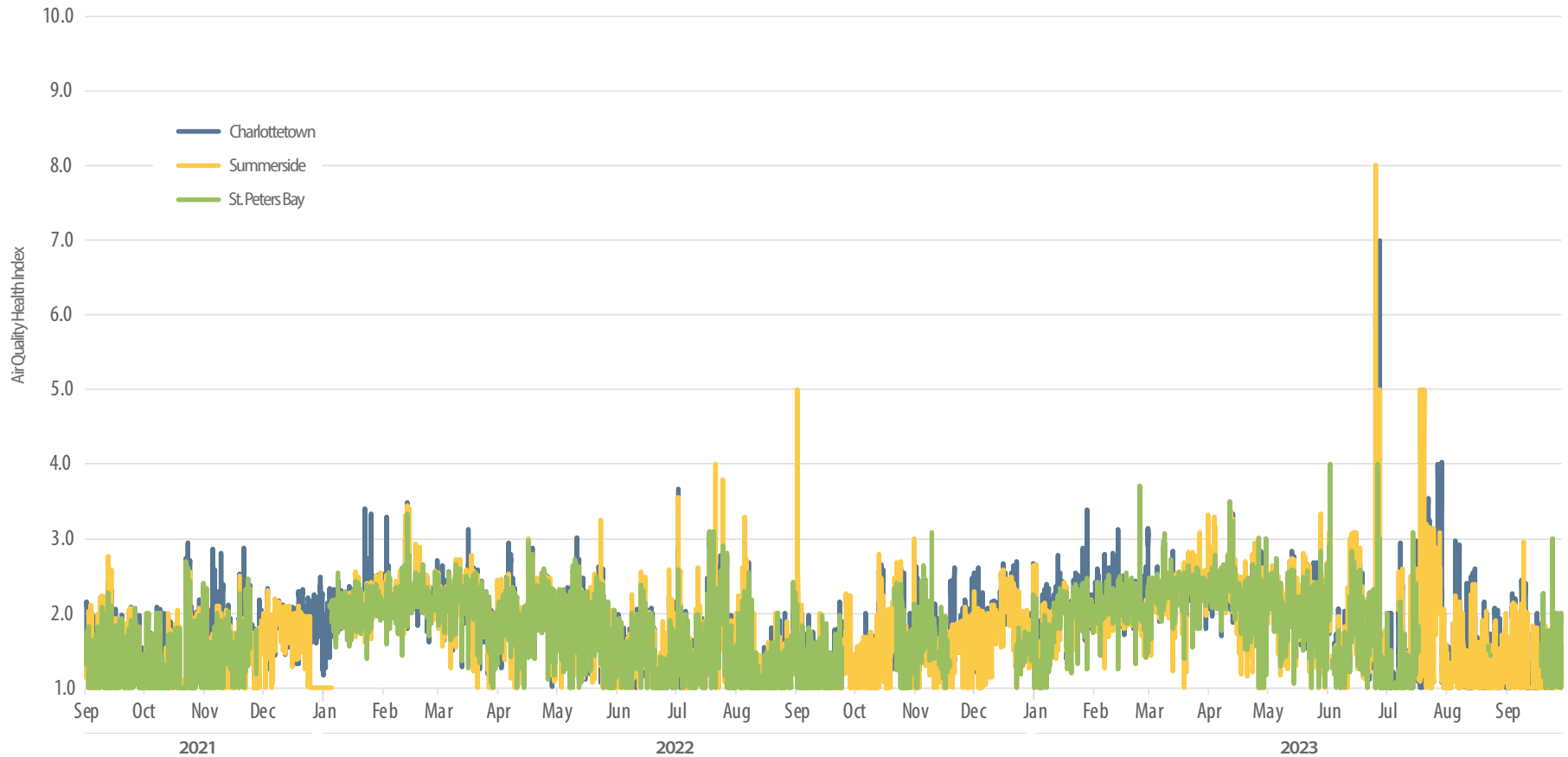
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State of the Island Report

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### Air Quality Health Index, 2021-2023



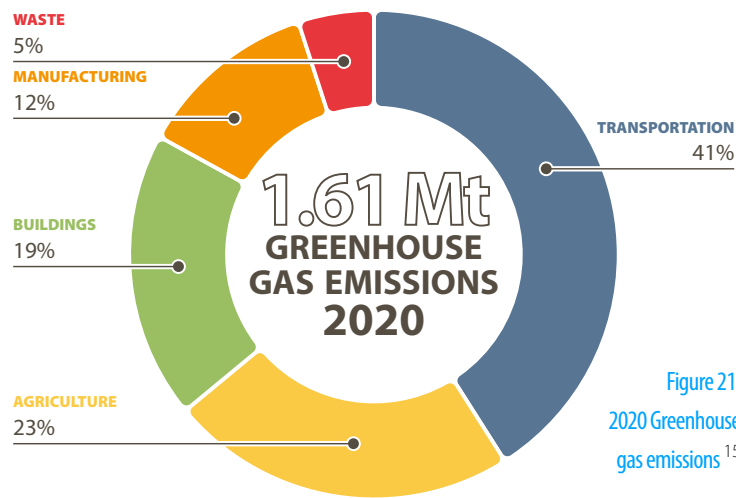
### 3.2.5 Air Quality

PEI falls within the Southern Atlantic Airshed, one of Canada's six designated airsheds. The Island's air quality is influenced by a combination of local emissions and transboundary pollutants. The Air Quality Health Index (AQHI) is a key tool for assessing air quality, providing a scale from 1 to 10 to indicate health risks associated with air pollution.

PEI's average AQHI value for 2022 was 1.7, indicating generally good air quality.<sup>13</sup> The Island's air quality can fluctuate due to external factors such as industrial emissions or forest fires in other regions, as indicated by the spike in the AQHI value in June of 2023.<sup>14</sup>

Figure 20: Graph showing air quality health index ratings for the three air monitoring stations on the Island<sup>13</sup>





The primary sources of GHG emissions in PEI are transportation, agriculture, buildings, manufacturing, and waste. The transportation sector, primarily passenger cars and trucks, is the largest contributor, accounting for 41% of emissions.<sup>15</sup>

The high dependence on personal vehicles highlights the need for PEI to implement sustainable transportation initiatives, to design walkable communities, to encourage sustainable development patterns across the Island, and to adopt cleaner technologies to maintain air quality and reach GHG reduction goals.

### 3.2.6 Water Resources

Surface water resources are characterized by a network of approximately 260 watersheds and more than 5,072 km of streams.<sup>16</sup> The health and management of the watersheds is critical to preserving the health of ecosystems and meeting the water demands of the Island's growing population and industries. What happens on the land directly correlates with surface and ground water quality.

The PEI Watershed Report Cards provide valuable insights into the health of freshwater systems through a regular assessment of 115 watersheds across the Island.<sup>17</sup> The report card score is calculated using five criteria including: nitrate concentration in streams; anoxic events in estuaries; fish kills related to run-off; siltation events; and other concerns, such as blue-green algae blooms, high temperature, high nitrate in drinking water, etc.<sup>18</sup> The 2022 report card revealed that most of the Island's watersheds are in good condition. However, challenges remain, particularly in Queens County and portions of Prince County where watershed health lags noticeably when compared to the rest of the province.<sup>18</sup>

Groundwater serves as the sole source of drinking water for the entire province. This renewable resource is primarily stored in the bedrock aquifer system. The water is renowned for its high quantity and stability, thanks to a high groundwater recharge rate and aquifer storage volume. The groundwater not only supplies residential needs but is also essential for agriculture and other industries, such as aquaculture's land-based finfish aquaculture facilities. Groundwater is a cornerstone of the Island's daily life and economy.

### County Water Quality Score - 2022 Watershed Report Card

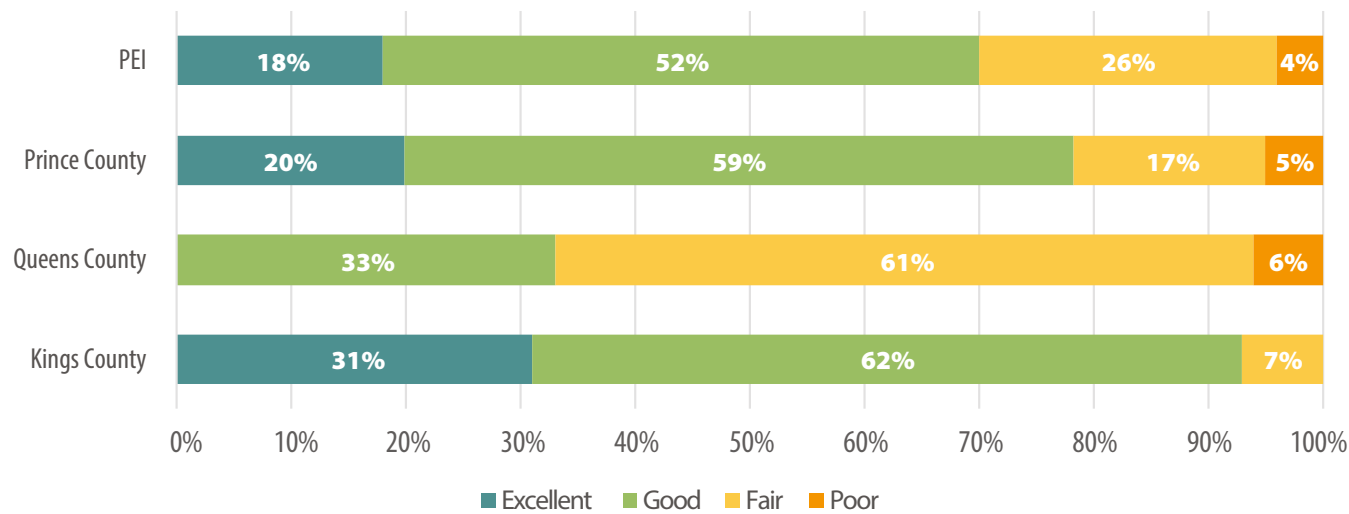


Figure 22: Chart showing 2022 Watershed Report Card scores for water quality by County.<sup>17</sup>

Interaction between groundwater and surface water is strong in PEI. More than two-thirds of the volume of the Island's streams are sourced from groundwater.<sup>16</sup> This interaction stabilizes stream flows and temperatures, creating ideal conditions for various species, particularly cold-water fish. This also presents unique challenges, particularly in urban settings where municipal water is extracted, leading to a reduction in the groundwater table. This decrease in groundwater flow contributes to a diminished discharge into streams, ultimately affecting the flow of streams and the habitat within the streams.<sup>18</sup>

Saltwater intrusion occurs when seawater infiltrates coastal groundwater aquifers. It

can take place naturally or can be induced by groundwater pumping in coastal areas.

Localized saltwater intrusion events near the coast have occurred in Summerside, Eliot River, York Point, Souris West, and Stanhope. Some domestic and municipal wells in the regions have also experienced saltwater intrusion. This highlights the need for the vigilant management of groundwater withdrawal and land use in coastal areas.<sup>19</sup>

Salt groundwater is a critical resource for the aquaculture industry in PEI due to its relatively stable water temperature and superior water quality compared to using saltwater directly from the ocean. Saltwater

wells and aquaculture facilities on the Island rarely induce saltwater intrusion problems.

**Takeaway:** The LUP should consider approaches to protecting municipal water supplies and well fields from chemical and biological contamination, particularly in areas outside of Municipal Planning Authority. There are significant environmental and economic costs and logistics associated with the replacement of these well fields if they are contaminated.

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### 3.2.7 Coastline and Coastal Hazards

Extending more than 3,280 km, PEI's coastline is integral to its ecology, economy, and culture. It provides habitats for diverse species and supports recreational and commercial activities and industries.

The coastline's exposure varies significantly over its length, with more than 75% sheltered within large bays and estuaries, and shore types varying between red sandstone cliffs and bluffs (31%), low plains (11.5%), salt marshes (43%), and sand dunes (14.5%).<sup>20</sup> Each shore type contributes uniquely to the Island's natural heritage, supporting an array of wildlife while providing critical nesting, feeding, and resting areas for shorebirds and marine life.

Coastal flooding is a significant concern in PEI, with approximately 3% of the Island's total land area located within the coastal floodplain.<sup>20</sup> This area, and the buildings and infrastructure within it, are vulnerable to flooding from storm surges. The risk is compounded by the anticipated impacts of climate change, including sea-level rise.

While studies have shown that vulnerable populations are more likely to live on inland floodplains due to the lower cost of land and housing, more affluent residents are more likely to live in coastal areas where waterfront properties have higher property values.<sup>21</sup> PEI's coastline is characterized by a large number of waterfront homes with higher-than-average property values and seasonal secondary residences, including cottages. More research is required to identify vulnerable populations within PEI's coastal floodplain.

Coastal erosion is another major challenge on the Island, particularly for exposed sandstone cliffs and bluffs. Frost wedging and other natural processes combine with impacts from extreme storm events to affect coastal erosion.

The rate of coastline change (erosion or accretion) has been a subject of ongoing study. Historical data shows fluctuating rates of change, with an average erosion rate of 28 cm/year between 1968 and 2010 and an increased rate of 40 cm/year between 2000 and 2010.<sup>20</sup> More recent assessments indicate a decrease in these rates for certain shore types, suggesting a dynamic and evolving coastal landscape. The *PEI State of the Coast Report* includes more information on trends in coastal erosion monitoring.

Understanding the coastal processes unique to PEI is a critical element in planning and safeguarding coastal communities, ecosystems, and the Island's natural and built heritage. Environmental protection policies that aim to protect the natural environment from human activity cannot be relied upon to protect the built environment from coastal hazards.

Proactive land use policies and development regulations that are informed by scientific research and community engagement are needed to protect coastal properties and infrastructure from environmental challenges.<sup>20</sup> The importance of land use planning in coastal zone management is explored further in the *PEI Interim Coastal Policy Recommendations Report*.



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### 3.2.8 Climate Change: Impacts and Response

Climate change presents multifaceted challenges for PEI, affecting the Island's natural environment, built heritage, cultural landscapes, communities, and residents. PEI is particularly vulnerable to climate change impacts, including:

**Extreme weather events:** The frequency and intensity of extreme weather events (including post-tropical storms and heat waves) are expected to increase. Extreme weather events can lead to significant infrastructure damage, as evidenced by post-tropical Storm Fiona in 2022, during which trees were toppled, homes, wharves, roads, and other infrastructure were damaged, and more than 82,000 customers were left without power.<sup>22</sup> On the other hand, heat waves can result in direct impacts to human health and community infrastructure, especially when demands for cooling exceed infrastructure capacity.

**Coastal hazards:** Increased risks from coastal erosion and flooding due to storm surge events during extreme weather events are also anticipated. A projected sea-level rise of approximately 30-35 cm by 2050 and 75-80 cm by 2100 will increase these risks, threatening coastal communities and ecosystems.<sup>23</sup>

**Environmental impacts:** Gradual shifts in climate norms, seasonal temperatures, and precipitation frequency and quantity can have significant impacts on the natural environment. These interconnected elements face risks to biodiversity, increased prevalence of pests and diseases, and challenges in water resource management.

**Socioeconomic effects:** Climate change impacts on human systems are interconnected. All residents of PEI are likely to be affected in some way. Those people who are most vulnerable today are already disproportionately impacted by climate change.<sup>24</sup> Vulnerable populations, including low-income households, do not have access to additional resources when weather disruptions impact their ability to get to work, when they result in unplanned but necessary repairs to homes after an extreme event, or when prolonged power outages result in food spoilage. Vulnerable populations are also more susceptible to the physical and mental health impacts of climate change.<sup>25</sup>

**Economic impacts:** Changes in temperature and precipitation patterns will not only affect the Island's residents and built environment, but will also impact the agriculture, fisheries, aquaculture, and forestry sectors.

PEI's *Climate Adaptation Plan* outlines a comprehensive strategy to reduce the vulnerability of the Island and its residents to the impacts of climate change.<sup>26</sup> Key themes in the Plan include:

- **Disaster resilience and response:** Enhancing emergency preparedness and response capabilities to better manage the impacts of extreme weather events
- **Resilient communities:** Supporting community-led initiatives to adapt to climate change, focusing on vulnerable populations and areas
- **Climate-ready industries:** Assisting key industries, such as agriculture, fisheries, aquaculture, tourism, heritage, and culture, to adapt to changing climatic conditions
- **Physical and mental well-being:** Addressing the health impacts of climate change, including heat-related illnesses and mental health challenges
- **Natural habitat and biodiversity:** Implementing measures to protect and restore ecosystems and biodiversity in the face of climate change
- **Knowledge and capacity building:** Investing in research, education, and knowledge sharing to enhance the Island's capacity to adapt to climate change

Effective land use planning for PEI must support these adaptation policies. Land use planning underpins efforts to enhance disaster resilience, build resilient communities, protect natural habitats, and support climate-ready industries. By strategically managing land use, PEI can address the multifaceted challenges of climate change, safeguarding both the environment and the well-being of residents.

In addition to adaptation policies, PEI is actively pursuing mitigation strategies to reduce GHG emissions and transition toward a more sustainable future. The provincial government has set ambitious targets, aiming for a 40% reduction in GHG emissions below 2005 levels by 2030, and achieving net zero emissions by 2040.<sup>27</sup>

Key pillars of the *Net Zero Framework*<sup>27</sup> include:

- **Transforming transportation:** Promoting the adoption of electric vehicles, improving public transit, and investing in active transportation infrastructure
- **Transitioning to efficient and cleaner buildings:** Implementing programs for energy-efficient equipment and insulation in homes and businesses, and encouraging the use of renewable energy sources
- **Shaping agriculture for net zero:** Supporting sustainable agricultural practices, including research initiatives on fertilizer use and soil health
- **Removing carbon through forestry and emerging technologies:** Enhancing carbon capture through tree planting and the exploration of new technologies for carbon sequestration

- **Creating a clean industry and waste advantage:** Encouraging clean technology in industrial processes and improving waste management practices
- **Inspiring transformational change:** Fostering a culture of sustainability through leadership, community engagement, and educational initiatives

Land use planning is also key to achieving PEI's mitigation goals. It will support progress by seamlessly integrating with strategies to lower GHG emissions and transition to sustainability. By aligning land use policies with the *Net Zero Framework*, PEI can more effectively manage resources, promote clean transportation, enhance energy efficiency, encourage sustainable agriculture, and support carbon sequestration.

This strategic approach ensures that every initiative contributes to the overarching aim of reducing emissions. It embodies a comprehensive effort towards a resilient and sustainable future for the Island.



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### 3.2.9 Climate Change and Vulnerable Populations

The *Climate Adaptation Plan* also identifies how climate change disproportionately affects PEI's vulnerable populations, particularly regarding health, amenity, and mobility consideration. Populations vulnerable to climate change can include: seniors, youth and children, Indigenous Peoples, racialized populations, people with disabilities, people who are pregnant, frontline emergency responders, individuals who are socially and economically disadvantaged, and people who are immunocompromised and those living with pre-existing illness.<sup>28</sup>

Some ways that climate change can disproportionately impact these groups include:

- Those with an existing health condition like diabetes can be disproportionately affected by extreme heat effects.
- Some populations will have more exposure to a hazard, like those who work outside during heat waves.
- Access to protective measures is not universal across the Island, as some populations, including those with a disability, may have greater difficulty accessing care and emergency assistance.
- Vulnerable populations residing in low-lying coastal areas or regions prone to droughts and floods are more susceptible to displacement, loss of livelihoods, and inadequate access to resources.

- Limited access to healthcare, education, and social services further compounds the challenges vulnerable communities face in adapting to and mitigating the effects of climate change.

Land use planning and adaptation must ensure that policies are created to support vulnerable demographics, particularly as the Island experiences increased severity with weather events. The Climate Adaptation Plan sets out a series of remediation approaches as well as funding suggestions for housing upgrades. Additional measures like ensuring greenspaces are available to residents in times of extreme heat, and creating accessible public spaces and infrastructure, are ways planning efforts can support vulnerable populations in extreme climate situations.





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