

CHAPTER 1. THE NORTHERN BRUCE — A UNIQUE NATURAL ENVIRONMENT



The northern Bruce Peninsula is a critically important stronghold for the native flora and fauna of southern Ontario. In contrast to the extensive urban, agricultural and industrial development that characterizes neighbouring regions, this semi-wild landscape has maintained much of its natural diversity and character. In fact, its forests are sufficiently large and intact to support animals such as black bear, northern flying squirrel, barred owl and yellow-spotted salamander. As well, its cliffs, fens, talus slopes and alvars harbour many rare or unusual plant species, contributing to a rich and irreplaceable mix of wildlife habitats.

Completely unique, the northern Bruce Peninsula has been 400 million years in the making. Its defining geological feature is the Niagara Escarpment, a great limestone arc that rises and falls for 2,300 kilometres from New York State to the tip of the Bruce, north under Georgian Bay to Manitoulin Island, and south again along Lake Michigan into Wisconsin. As the one-time rim of an ancient inland sea, the escarpment has its origins in reef complexes of corals and sponges. These were eventually buried under deep deposits of sand, silt and clay that were later compressed into massive layers of sedimentary rock, and then carved by several successive glaciations.

The erosive forces of meltwater, waves and weather have continued to shape the Bruce Peninsula, eating away at the softer limestone layers of the escarpment, sculpting caves and leaving behind overhanging cliffs of harder dolomite limestone (dolostone). Chemical weathering — when water combines with minerals to form a solution that can eat away softer rocks such as limestone — has resulted in a type of terrain known as “karst,” which is characterized by sink holes, caves, underground channels and pitting of the surface rock.



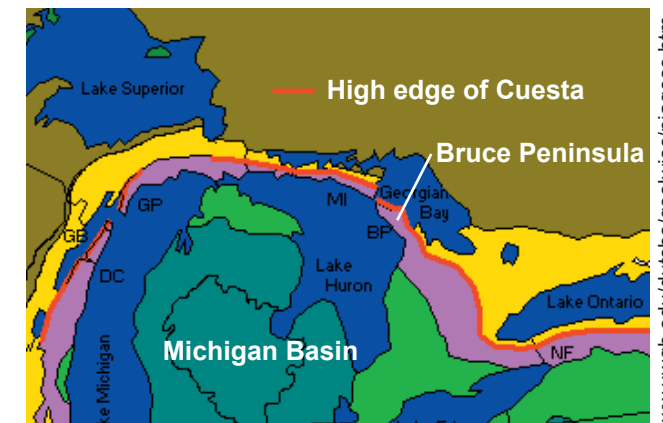
The Northern Bruce Peninsula is a unique environment that boasts high levels of natural diversity.

The rock cliffs of the escarpment provide habitat for one of the most ancient forest communities east of the Rocky Mountains, and one of the most unchanged forests in the world. The small, gnarled eastern white cedar that line the cliff face grow 10 to 100 times more slowly than those in the level-ground forests behind the cliffs. Some trees that are just 30 centimetres in diameter have proven to be hundreds of years old. Bruce Peninsula National Park contains some of the best examples of these ancient living forests, with trees ranging in age from seedlings to over 1,000 years old.

The cliffs of the escarpment provide vital habitat for a wide variety of species, including bats, snakes, hawks, owls, vultures and invertebrates. The difficult-to-access cliffs offer security in a dangerous world, especially for those rearing young. These cliffs are also home to many rare plant species, which help form a larger biotic community that is much the same today as it has been for the past 10,000 years.

The limestone cliffs of the escarpment slope westward from Georgian Bay toward Lake Huron, resulting in a dramatically varied landscape across the peninsula that includes everything from forests, lakes and streams to wetlands and rocky alvars.

Alvars consist of flat open areas of limestone bedrock with little or no soil. Exposed and windswept in winter, parched and dry in summer, and flooded in spring and when rainy, alvars favour mosses, lichens and prairie-type plant communities that can withstand extreme environmental conditions. They also support long-lived trees — the average age of trees in alvars along the Lake Huron coastline is over 300 years old. The Northern Bruce’s alvars are of particular interest, as they harbour several globally rare species and a high diversity of plant life overall: There are about 50% more plant species within the alvars than within neighbouring forests, for example.



Cuesta - Ancient landform shapes the Bruce

The curved ancient sea rim that today is known in Ontario as the horseshoe-shaped Niagara Escarpment actually starts further south, near Rochester, New York. At the tip of the Bruce Peninsula, the escarpment dips below the waters dividing Lake Huron and Georgian Bay and then resurfaces on Manitoulin Island. From here, it runs across northern Michigan and down the west side of Lake Michigan into the midwestern United States. The northern Bruce Peninsula is a transition zone on this great arc, which in geological terms is known as a Cuesta. On the upper Bruce, more northern forest types and species begin to supplant the southern deciduous forests and species that characterize the more southern parts of the Escarpment.

“Around the perimeter of the Michigan Basin the edge of the sedimentary rock layers is tilted upwards. Where this edge is exposed it has become a ridge formation, also known as a cuesta. Cuestas are ridges formed by gently tilted rock layers. Every cuesta has a steep slope where the rock layers are exposed on their edges, called an escarpment [red line on map]. They also have a more gentle slope on the other side of the ridge called a ‘dip slope.’”
- www.hamiltonnature.org/habitats/escarpment/escarpment_geology.htm

Source: www.uwgb.edu/dutchs/geolwisc/niagasc.htm



The Northern Bruce features many alvars (top photo), open or semi-open rock pavement areas that are home to many unusual and rare species that can tolerate hot dry conditions. But the area is also known for its coastal plants, some of which are more commonly found in Maritime environments. Bottom photo: dwarf lake iris.

The unique natural conditions of the Northern Bruce and its position in a transition zone between the southern deciduous and northern boreal forest zones have led to the presence of representatives of many different natural regions here, including arctic, boreal, Carolinian, prairie and maritime plants as well as plants more typical of the Great Lakes–St. Lawrence forest zone that the peninsula is actually located within.

The generally thin soils and cool climate lead to a mostly northern character in the peninsula’s forests, which are dominated by cedar, jack pine, tamarack and balsam fir. However, many southern broad-leafed trees, such as red oak, beech and sugar maple, are found here as well. Very much a transitional landscape, the area supports many species at the extreme limits of their range — north and south.

Whether you look at flowers, insects, fish, reptiles, amphibians, birds or mammals, the diversity of life on the northern Bruce Peninsula is remarkable. It is one of the finest locations in North America for viewing wild orchids (43 species), insect-eating plants (10 species) and ferns (more than 20 species). Specialties include calypso lady’s slipper, dwarf lake iris, lakeside daisy, Alaskan rein and northern holly fern. Over 60 species of fish are found in inland waters, including smallmouth bass, walleye and brook trout. Invertebrates include more than 54 species of butterflies and several spider and insect species at the northern or southern limits of their range in Ontario.

The moderate lakeside climate (winters on the peninsula tend to be relatively mild with snow loads dropping significantly toward the northern tip), abundant wetlands, ephemeral pools, rocky terraces and sandy beaches provide prime breeding and egg-laying habitat for 29 species of reptiles and amphibians, including the Massasauga rattlesnake (ranked as a threatened species) as well as the spotted turtle (vulnerable), yellow-spotted salamander and pickerel frog.



Pitcher plant

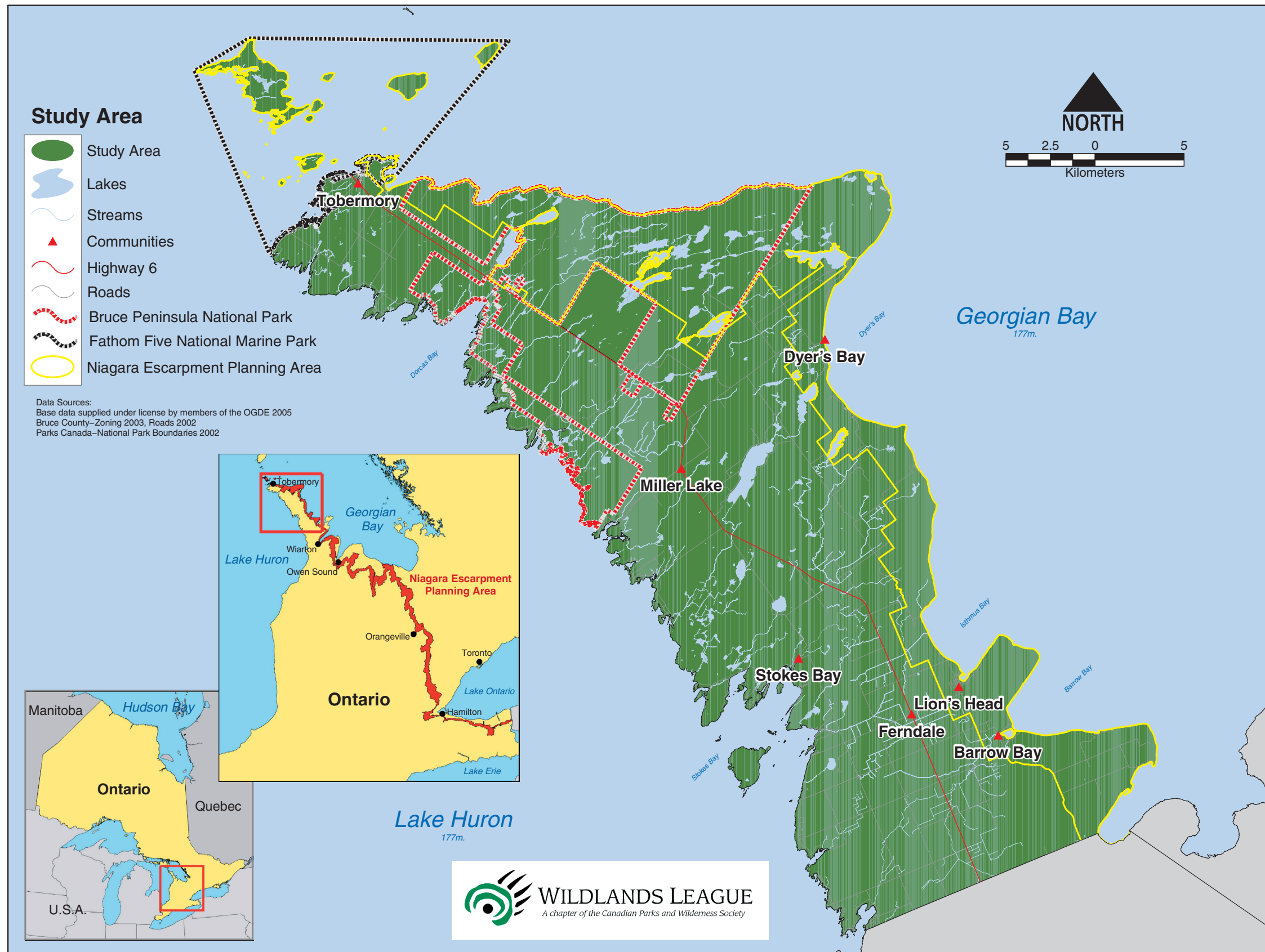
The area is especially attractive to birds because of its extensive forests, abundant wetlands, shorelines and lakes and its transitional position between southern and northern regions. Located on a major northern migration route, the Bruce acts as migratory funnel. Three hundred species of migrant and breeding birds have been recorded here, including a noteworthy diversity of raptors (nine hawk and four owl species). The large, intact forests of the northern Bruce Peninsula also support many interior forest species. Boreal species such as the olive-sided flycatcher and the ruby-crowned kinglet breed alongside southern species such as common moorhen and red-headed woodpecker, which are at the northern limit of their range here. Some western species are also present, including the sandhill crane and the western meadowlark.

The northern Bruce Peninsula functions as a key transitional landscape for mammals as well. Thirty-nine species are found here, including seven of Ontario’s eight resident bats. Some mammals, like the river otter and red-backed vole, are more typically northern species that reach the southern limit of their ranges in Ontario on the Bruce.

Because about 75% of the region is comprised of large, relatively intact forests, it is able to sustain interior forest mammals such as northern flying squirrel, fisher and long-eared bat as well as black bear, a prime indicator species for measuring the ecological health of the northern Bruce (see map on page 28).

Truly, from every angle, the northern Bruce Peninsula stands out as a unique and invaluable haven for biological diversity in southern Ontario. From its limestone cliffs to its swampy fens and rocky alvars, the area teems with life and represents a critical toehold for many species that are rare or uncommon or simply unable to tolerate the high levels of human disturbance that are typical in most other parts of Southern Ontario.

Map 1.1 — The Greater Park Ecosystem



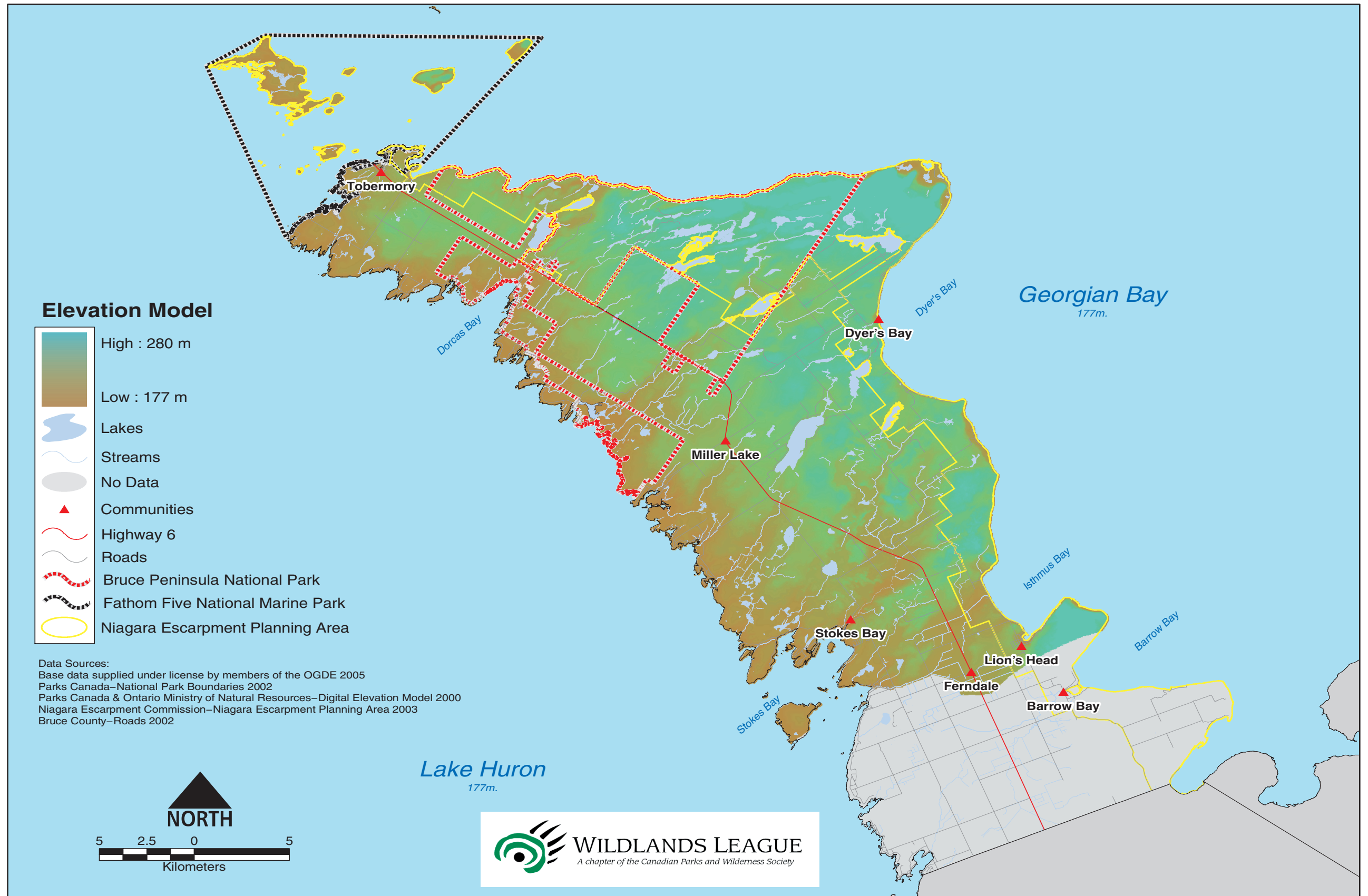
This atlas looks at land uses, habitat and ecosystem protection for what is known as the Greater Park Ecosystem of Bruce Peninsula National Park. In the Ecosystem Conservation Plan for Bruce Peninsula National Park, the area is described this way:

The view from space shows that the Upper Bruce Ecosystem (UBE) is surrounded on three sides by water. Just to the south of the park where the Bruce Peninsula narrows at Stokes Bay, the landscape changes (at what is called the Ferndale Flats) from primarily forest to primarily agricultural land. This is the practical southern limit of the UBE. The Miller Lake and Swan Lake area represents the transition zone between the rugged forests of the North Bruce and the agricultural landscapes of southwestern Ontario. Here the land is flatter, soils are deeper, and most of the forest cover has been cleared for agriculture and cattle grazing.

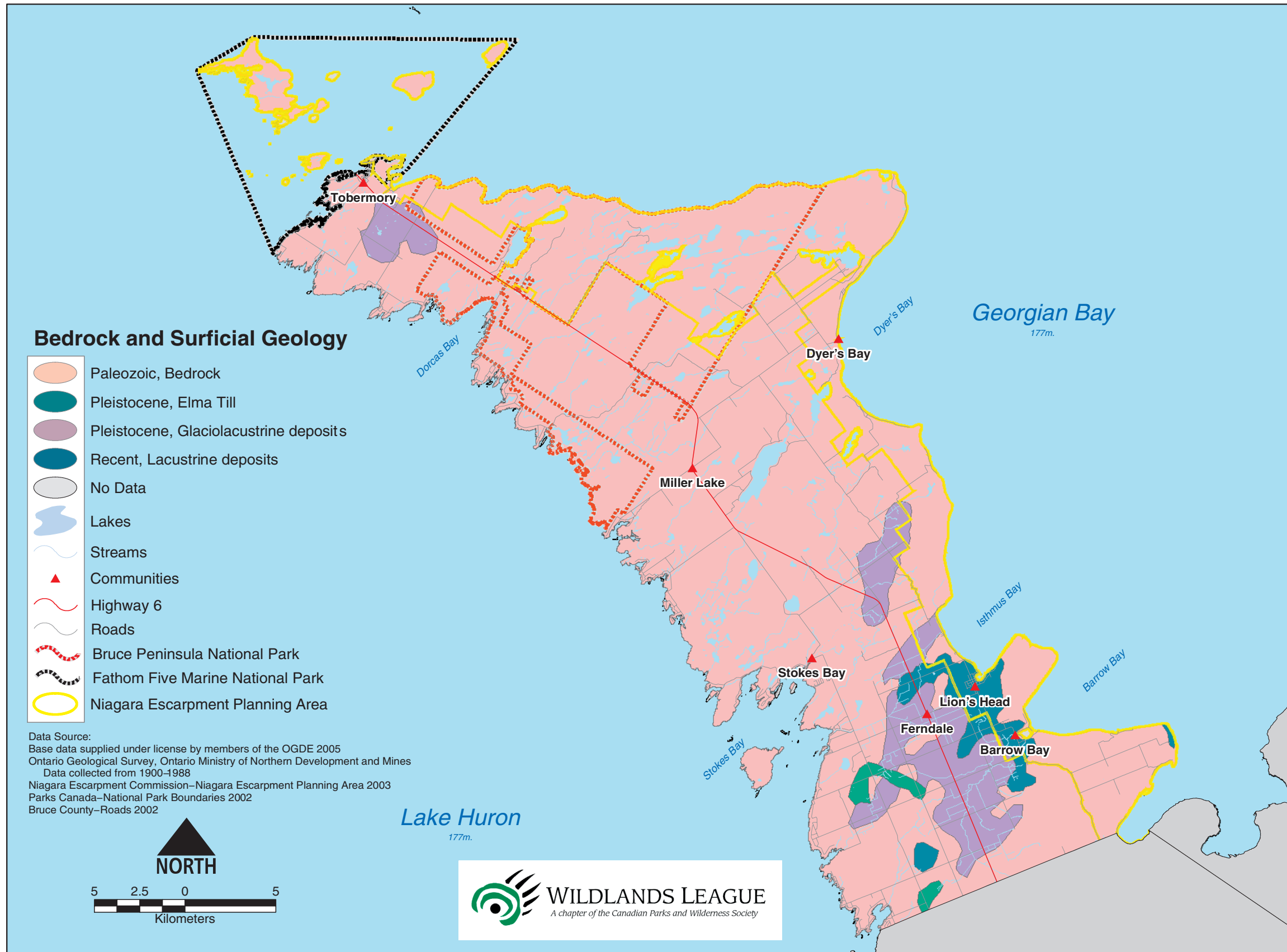
This is the area of focus for this atlas. However, the data used to create the maps in this atlas does not always perfectly match this boundary, which is approximate in any case.

Map 1.2 — Elevation of the Northern Bruce Peninsula

The Bruce Peninsula is essentially a tilted sabre dividing Georgian Bay and Lake Huron. On the high Georgian Bay side, the land plunges dramatically into the Bay with scalloped out limestone cliffs and flowerpots, eroded outliers of the escarpment that stand alone battered by waves just offshore. This is the high edge of what was once the rim of the immense Michigan Basin, a semi-tropical inland sea that covered much of what is now the central United States. From this high edge, the land falls away and slips gently under the waters of Lake Huron. The land edge here is much softer, with beaches, dunes and fens rather than rocky cliffs.



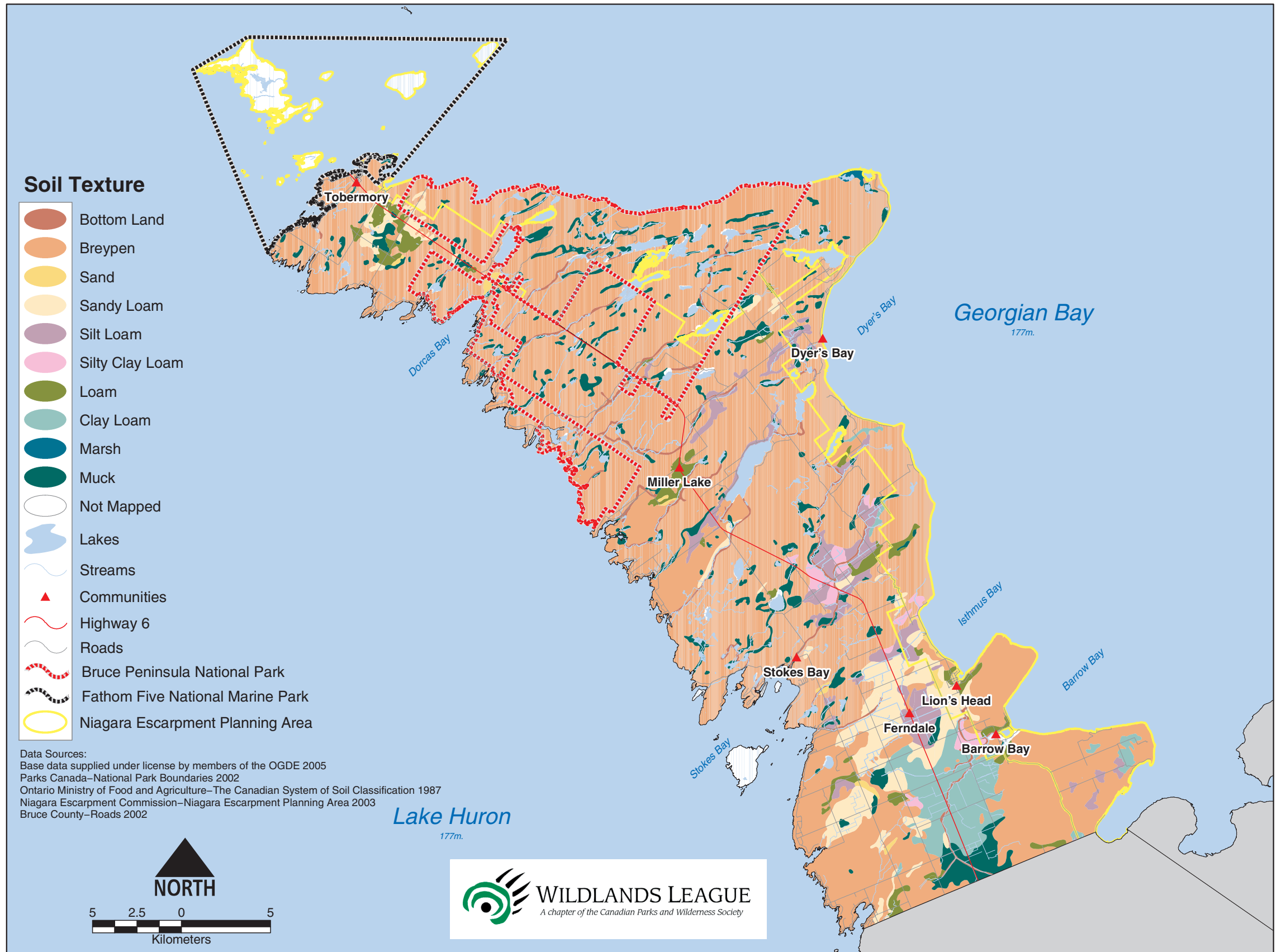
Map 1.3 — Geology of the Northern Bruce Peninsula



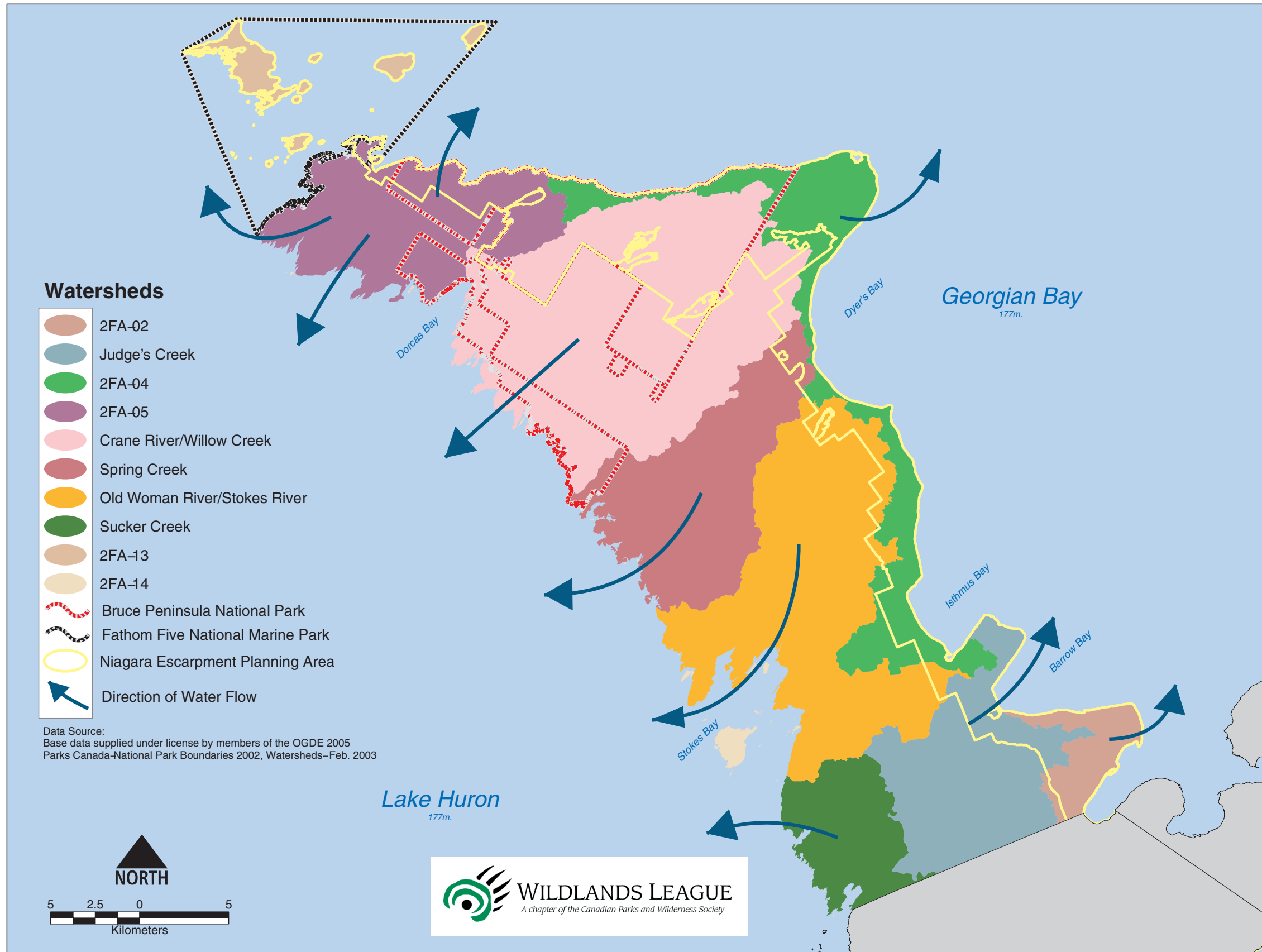
The geology map of the northern Bruce in some ways understates the geological complexity of this landscape. The northern Bruce is particularly known for its karst landscape of sinkholes, underground channels, caves and pitting. These karst landforms are a result of the mechanical (weather) and chemical (corrosive minerals that mix with water) weathering of the softer sedimentary rocks that underly the harder Dolostone caprock on the Bruce. This phenomenon leads to extensive underground drainage, and when new sinkholes or channels open up, it can actually lead to the drying out of wetlands or soils on the land surface. One of the most interesting geological formations of the northern Bruce are its extensive alvars. These areas of hot dry rock pavement with little or no soil cover at first seem extremely inhospitable, but actually support a surprising diversity of plant life.

Map 1.4 — Soils of the Northern Bruce Peninsula

The northern Bruce is mostly characterized by thin rocky soils that broke many a settler's plough. Today, agriculture is largely restricted to the pockets of clay and till around and to the north of Ferndale — the Ferndale Flats — as well as in smaller areas near Miller Lake and just south of Tobermory.



Map 1.5 — Watersheds of the Northern Bruce Peninsula

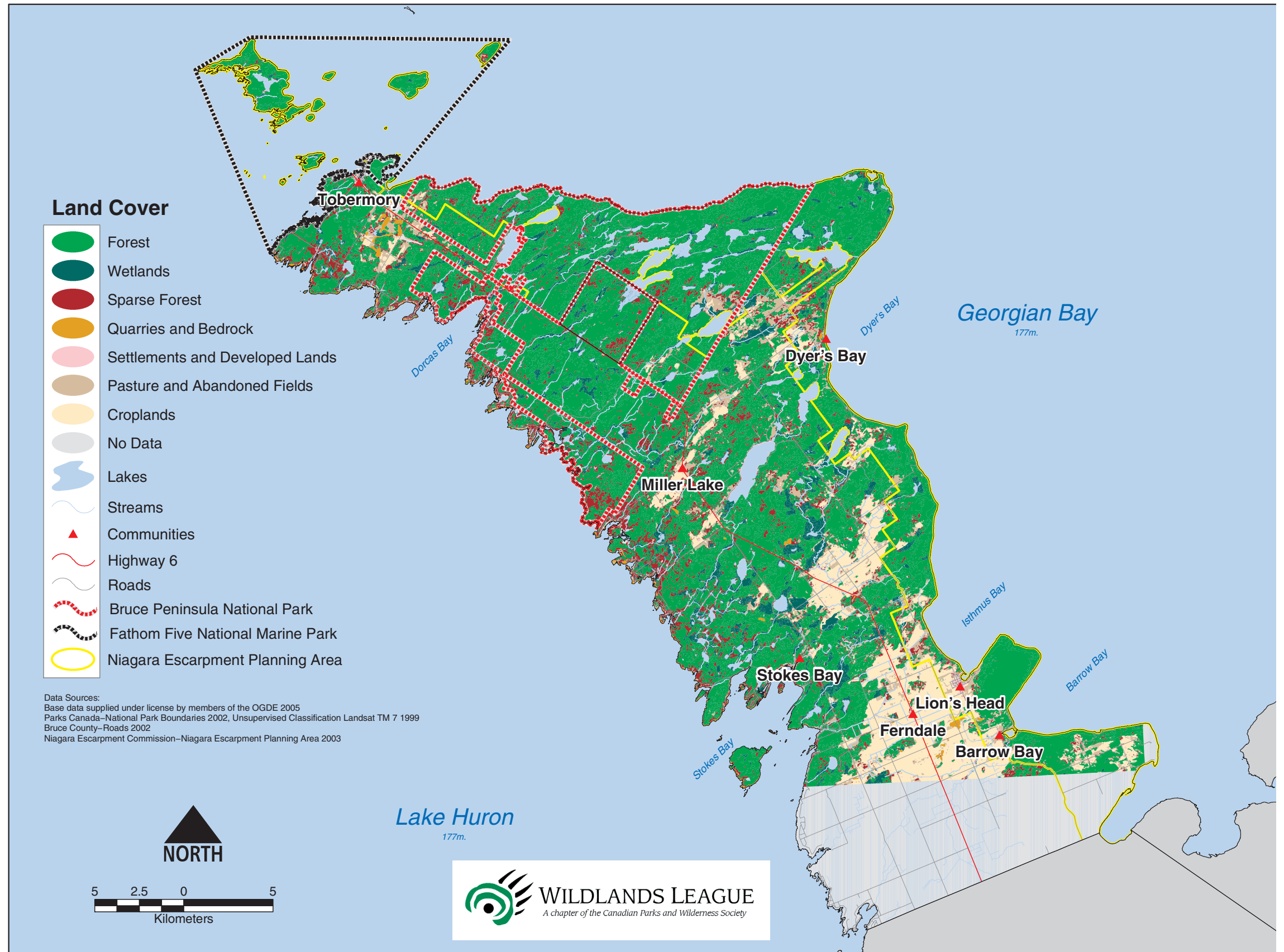


The east-west tilt of the Peninsula results in a general flow of waters toward Lake Huron. Some of this drainage occurs beneath the surface in underground channels and rivers that have cut their way through the soft porous rock. On the surface, the northern Bruce is dotted with wetlands and lakes and has a history of rich inland fisheries.

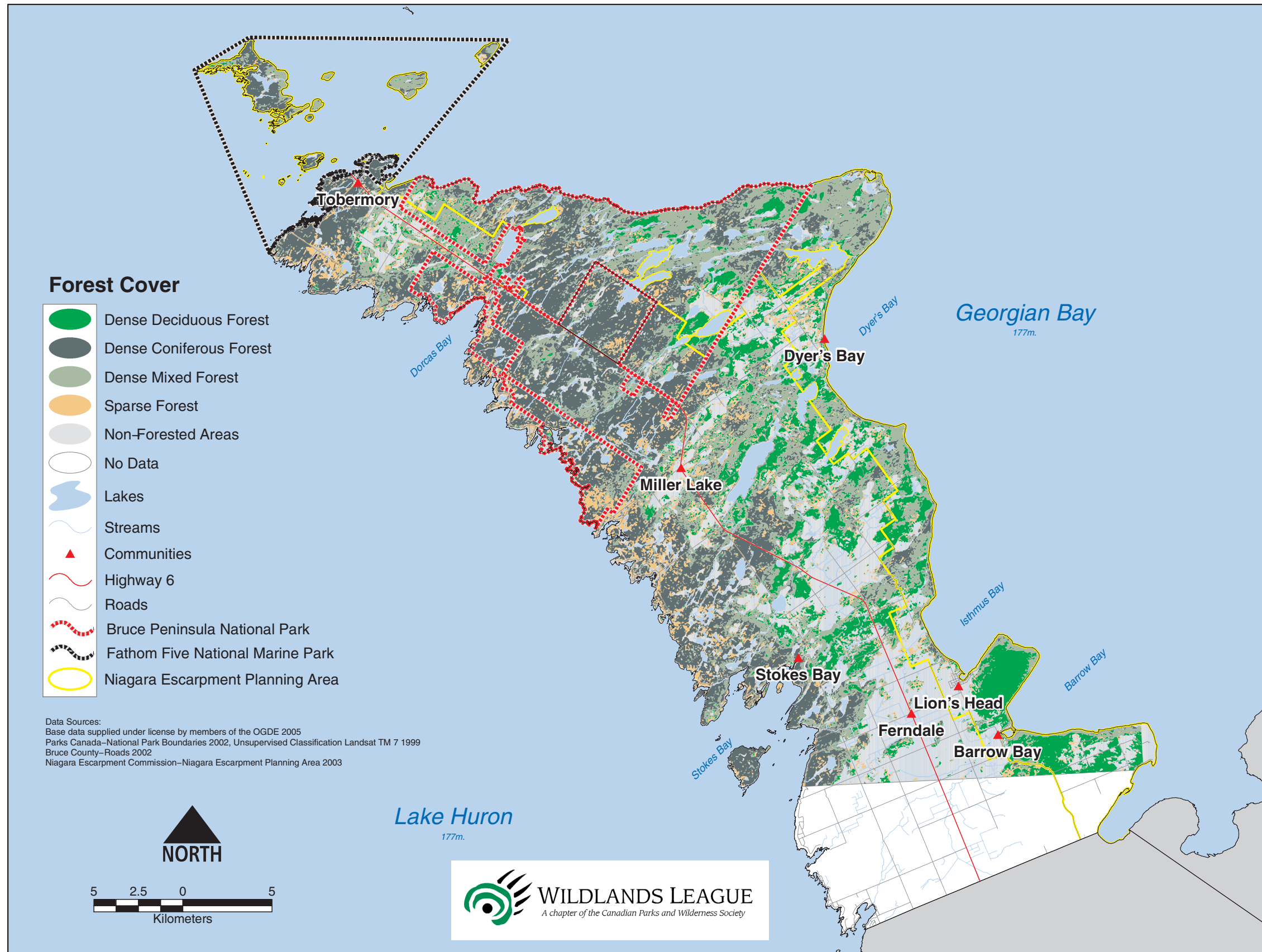
“Within [Bruce Peninsula National Park], surface waters move northeast to southwest. A complex of inland lakes, including Emmett, Crane, George, Umbrella, and Upper and Lower Andrew, are found in the north central portion of the Park; some occupy basins carved by glacial action from the bedrock. In addition to the surface flow, there is some underground drainage through caves and fissures in the bedrock. The park area also has several different types of beaches: sand, cobble, and boulder.” (Parks Canada, 1996).

Map 1.6 — Land cover of the Northern Bruce Peninsula

The northern Bruce remains extensively forested with up to 75% of the area still under forest cover. However, almost all of this forest is second or third growth due to the extensive logging and many fires that swept the Peninsula in the 1880s through to the early 1900s. The forests of the northern Bruce are also interspersed with numerous wetlands (including some large swamps), lakes and alvars (sparsely treed or open rock pavements). As noted earlier, most of the cleared agricultural land is in the southern end of the region where soils are more suited to agriculture. The region as a whole boasts highly diverse vegetation, with 872 species of vascular plants identified within Bruce Peninsula National Park alone. However, it is estimated that as much as one-third of these species may be alien invasives.



Map 1.7 — Forest cover of the Northern Bruce Peninsula



The forests of the northern Bruce Peninsula have a mostly northern character. The pre-settlement climax hemlock forests that dominated in the region before post-settlement logging, fire and agricultural clearances has been largely replaced by a second-growth forest dominated by early successional species such as eastern white cedar, trembling aspen and white birch. Stands of white, red and jack pine are still relatively common and are often mixed with white cedar. On sites with deeper soils, the natural maple-beech-oak deciduous forest has mostly been cleared for agriculture and today only pockets of this mature forest type remain on the upper Bruce.

Map 1.8 — Wetlands of the Northern Bruce Peninsula

The Northern Bruce is particularly known for the orchid-dotted fens along the Georgian Bay coastline. However, there is a rich diversity of wetland types on the northern peninsula, although wetland formation can be limited by the underlying porous rock layers, which can cause new drainage channels to suddenly open.

