

guide

From root to crown



**Self-guided Hike
on the Mousses Trail**

Welcome to Parc national de l'Île-Bonaventure-et-du-Rocher-Percé!

You are about to hike along the Mousses (moss) trail. This Mousses trail has been open since the park was created in 1984. It follows an old trail dating back to when the island was inhabited. The trail leads to a colony of Northern gannets about an hour and 15 minutes away. A rich and diversified environment is yours to discover along the way. Follow the series of stations identified

along the trail and use this booklet during your hike to learn about the wealth of this exceptional environment and appreciate a natural setting revealed only to the knowledgeable eye.

Open your senses, hearing, sight and smell, and let the forest reveal its secrets, from root to treetop.

Put your shoes on and enjoy your hike!

Stations



Parc national
de l'Île-Bonaventure-
et-du-Rocher-Percé



Here are a few rules to follow:

- Stay on the trails to avoid trampling surrounding vegetation
- It is prohibited to remove natural elements (plants, rocks, feathers, etc.)
- It is prohibited to feed wildlife and to leave food or garbage unsupervised

Thank you for your cooperation!

From Rock to Soil

1



Observe the rock that rises above the surface of the ground like “natural concrete”, with every kind of pebble stones bound together by concrete-like cementing material. Called **conglomerate**, this rock was formed some 310 million years ago by the accumulation of rock cuttings (sediments) that settled at the bottom of the sea. Under the pressure of their own weight, these sediments later compacted and were converted into **sedimentary rock**. The island is comprised basically of layers of conglomerate alternating with layers of brittle **sandstone**. The red colour is due to the presence of oxidized iron (rust).

Some 20,000 years ago, during the last glacial era, all of Canada was buried under an ice cap

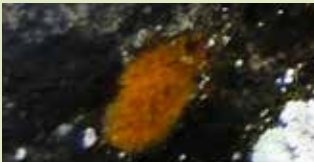
2 to 3 kilometres thick. When the ice receded, it left behind nothing but rock surfaces stripped of vegetation. Like true pioneers, **lichen** and **moss** were the first organisms to “take root” directly onto the rocks of the island, setting the first layer of soil to serve as support for other hardy plants. As plants gradually settled, then decomposed, humus was formed and a richer soil developed. Many other plants later colonized the environment in turn until vegetation adapted to local weather and soil conditions managed to thrive.



UNITED TO SURVIVE

Lichen is comprised of microscopic mushrooms and algae closely associated for mutual benefit: this is called symbiosis. In fact, **mushrooms** provide algae with support, protection against dehydration, and water and minerals that the algae capture from the atmosphere or directly on rocks. In return, **algae** provide mushrooms with the carbohydrates they need to produce sugars through photosynthesis*. This allows them to grow on any kind of support and in extreme weather conditions.

Look for and locate different kinds of lichen along the trail, whether on rocks, tree trunks or suspended on tree branches.



Crustose lichen



Foliose lichen



Fruticose lichen

*Photosynthesis: the ability of plants to produce the carbohydrates they need to grow, using water and minerals from the ground, carbon dioxide from the air and light from the sun.

A Disrupted Forest

2

What caused such devastation in some sections of the forest?

The culprit that wreaked such terrible devastation in the forest is a mere 3 mm long! There was an outbreak of **spruce beetle** on the island in 1997 and 1998. This tiny wood boring insect feeds and reproduces under the bark of trees. It mainly attacks mature white spruce, causing its desiccation. Once dead, these vulnerable trees break easily and crash to the ground in strong winds. This natural occurrence creates **windfalls** (breaches in the forest). You can observe some of them around you in the forest.



Insect outbreaks are part of the natural cycle of the boreal forest. However, they are naturally regulated by smaller numbers of targeted trees and the presence of predators and parasites that control insect populations. Over time, the forest gradually reclaims its ground, as evidenced by the young, dense balsam fir stands that you have crossed. The Park's mission of conservation is to encourage the full development of this natural phenomenon.



Like tiny forest engineers, these insects create openings of light in the forest cover, encouraging several plant species to settle there. These disrupted areas allow intense regeneration and become sources of life where a large diversity of birds and mammals find shelter and food.



LIVE DEADWOOD!

Forests depend on deadwood as a vital resource to thrive. As soon as a tree is dead, a tiny army of mushrooms, insects and bacteria go to work to decompose it. Wood is slowly converted into rich humus, allowing several plant species to grow.

In addition, snags (dead trees still standing) serve as shelter for many animals. Pileated woodpeckers and many other bird species dig cavities in deadwood, and even small mammals

use it as shelter. So even when dead, trees are teeming with life!



The ground is teeming with life!

3



Now pay attention to what is... under your feet!

The ground that you tread on is the foundation of life on Earth. Formed over time by the slow accumulation of organic matter (dead plants and animals that decomposed), the soil contains the water and all the nutrients plants need to grow. Without the relentless work of thousands of tiny organisms under the soles of your own shoes, plants could not access these vital elements.

Here are some of these little-known and indispensable actors:

Earthworms, as well as many insects, are vital to the structure of the soil. By moving and feeding within the soil, they aerate the ground and make it less compact to allow roots to develop more easily. They also help decompose and mix organic matter.



Many **mushrooms** are efficient decomposers. They also attach themselves to the roots of most plants, ensuring them better access to larger quantities of water and minerals and greater protection against disease and desiccation. In return, mushrooms feed on sugars produced by the plants through photosynthesis. This association is called **mycorrhiza**.



Bacteria are present in considerable numbers and are essential to the life of the soil. Through their intense decomposition activity, they return to the soil the nutrients plants need to grow.



GIANTS UNDER YOUR FEET

Mushrooms found in forests are but tiny parts of a greater organism. Mushrooms are part of a vast network of fine underground filaments called **mycelium**. The part of the mushroom seen above ground is only its reproductive organ, which grows when conditions are favourable. Mushrooms are the largest living organisms on the planet. One specimen found in the United States covers 9 square kilometres!



Stop, stay still for a few minutes, and close your eyes to listen. Can you hear the forest singing?

Land birds live in smaller numbers than sea birds on Bonaventure Island, but their diversity is much greater: no less than 217 species have been observed on the island! Woodpeckers, robins, sparrows, warblers... Each species contributes its colourful and musical touch to the boreal forest. Lively and furtive, forest birds are harder to observe than seabirds. Only the attentive ear and the informed eye will detect their presence and distinguish each species.

Each bird species has its own distinctive voice. They are delightful to hear, but these sweet voices are not only for entertainment: war songs to delimit a territory, serenades to seduce females or songs to recognize other members of the same species. Each song, cheep or



American Robin

Rachel Bloudeau / www.oiseaux.net



White-throated Sparrow

René Lorite / www.oiseaux.net

chirp has its own meaning and allows birds to communicate with each other.

Besides their songs, genuinely delightful to the ear, birds play many key roles, such as insect control and seed dissemination. Birds also represent a source of food for other species. Their presence and diversity are vital to the balance of the forest ecosystem.

SINGING AT THE TOP OF THEIR LUNGS

Birds can actually sing while breathing. Due to a high performance respiratory system, composed of an ingenious network of air sacs located in their throats, birds can actually sing while they breathe in and out simultaneously!



Winter Wren

Didier Collin / www.oiseaux.net

To each tree species, its own leaves, bark and seeds!

Put the different elements together to reconstruct each tree, find its name, and match it to the sentence corresponding to its description.

Then try to locate them around you during your hike!

LEAVES



F-1



F-2



F-3



F-4



F-5

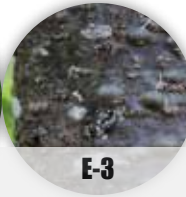
BARK



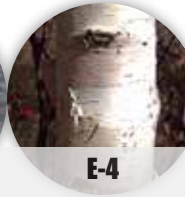
E-1



E-2



E-3



E-4



E-5

SEEDS



G-1



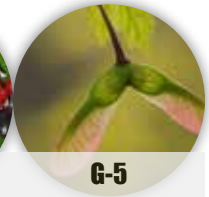
G-2



G-3



G-4



G-5

American
Mountain Ash

Mountain
Maple

Silver Birch

White Spruce

Balsam Fir

- a** - Amerindians collected my bark for several purposes, such as making containers and canoes, covering their housing and lighting fires.
- b** - My winter-bearing fruits are real treats for birds when food becomes scarce!
- c** - I am the member of my family that grows farthest north, but I am no good for sugaring-off parties!
- d** - My bark is for porcupines, my seeds are for squirrels and birds, and my branches and buds are for deer and hare. I am the pantry of the forest! My year-round green branches also provide shelter to many species.
- e** - With my distinctive aroma and sturdy needles, I am the most popular tree in December.

The Fight for Light

You are now entering a less disrupted part of the boreal forest, darker and denser. Here trees grow closer together and stand tall, like pillars of a vast green cathedral. But despite their apparent stillness, the trees and plants are engaged in a real fight for a vital resource: light.

With their sturdy trunks, trees can soar towards the sun; they are the outright winners of this unfair battle. Shorter plants must therefore share the dim light filtering through tree branches. Only plants adapted to permanent shade conditions can grow in this environment. In the darkest parts of the forest, barren ground covered with tree needles shows how life is difficult without sunlight.



Dwarf cornel



Yellow Clintonia

Adapted to the northern climate, softwood trees are the kings of the boreal forest. They offset short summer growth periods by keeping their needles all year long to maintain a certain level of photosynthesis during milder winter days. In

addition, resin provides protection against frost and their conical shape prevents snow from accumulating on their branches.



A GREEN OCEAN

The boreal forest is the largest forest ecosystem in the world. It represents close to one third of the world's forests. Boreal forests are located on all the continents of the Northern Hemisphere, covering more than 12 million square kilometres overall. They play a major role in carbon storage and water filtration and they serve as shelters for nearly half of North American birds at one time or another during the year.



Along your hike, enjoy the sight of large, finely chiselled green leaves displayed in abundance. In one of his works, American poet Henry David Thoreau describes the refinement of fern leaves as testimony to Nature's powers of creation.

Ferns are not flower-bearing plants, but their leaves develop in quite an amazing range of forms. Ferns are not like seed plants that appeared much later during evolution. They reproduce with **spores*** contained in minuscule sacks, which are gathered in tiny clusters called sori usually observed underneath the leaves. In favourable conditions, spores germinate and produce small organisms quite different from the mother fern that will in turn engender a new generation of ferns.

Tolerant of the lack of sunlight, yet thriving in humid environments, ferns find the boreal forest perfect as a habitat for abundant growth. Depending on the season, ferns can be observed in their every form. In spring, leaf embryos shoot above ground, curled up in the shape of a crosier. During summer, large leaves unfold gracefully, showing maturing sori that eventually turn from green to brown. At the onset of fall, most ferns blacken and dry out.

**Spore: minuscule seed-like body serving for reproduction.*



Fern's sori

FIDDLEHEADS: CAREFUL, FRAGILE!

Enjoyed as spring delicacies, ostrich fern heads are harvested in large quantities. Although relatively abundant in a wide range of areas, this fern is yet another plant identified as a vulnerable species to harvest in Quebec. If harvested abusively, this slow growing plant could become endangered over the short or medium term. Luckily, ferns are protected at the park; harvesting plants is prohibited.

A curled-up fern leaf is known as a fiddlehead because it resembles the finely sculpted tip of a violin or fiddle. The word ostrich fern was inspired by the similarity between this fern's leaves and ostrich feathers.





Corentin Chaillon

Take in striking views of the island's high cliffs and hosts of birds gliding on the wind!

The island's cliffs are habitats of choice for seabirds during nesting season, ensuring both protection and easy access to the sea. However, growing in such an environment is quite a challenge for vegetation! Flag-shaped trees are evidence of windy, harsh conditions prevailing along the perimeter of the island. These scraggy trees deformed by the winds are known as krummholz.

The island's cliffs are also home to lesser known inhabitants more inconspicuous than seabirds: **arctic-alpine plants**, usually found only on the tundra or on high mountaintops. What is the secret of their presence here?

Arctic-alpine plants were some of the first plants to take root on the island after glaciers receded, owing to their capacity to grow in poor soil and under cold, windy conditions. When the climate warmed up, they were eliminated and replaced by more competitive plants. But in inhospitable areas like the island's cliffs, where no other plants could thrive, arctic-alpine plants persisted as true relics of a forlorn glacial era.



REMARKABLE ADAPTATIONS



White mountain saxifrage is one of the rare plants to thrive on cliffs. The name of this plant speaks for itself, because saxifrage literally means "rock breaker". It refers to the fact that this plant can grow in the smallest crevices in rocks.

Perfectly adapted to the harsh conditions of life on cliffs, its leaves are shaped like cushions for protection against the wind. This plant can also close its rosettes of foliage to prevent dehydration. In addition, White mountain saxifrage growing in highly calcareous environments can eliminate excess calcium in the form of minuscule whitish concretions appearing along the edges of its leaves.

And now... Make way for the seabirds!

9

Your hike along the Mousses trail was an incursion into the forest on Bonaventure Island to discover a vibrant environment overflowing with life, from root to crown.

Trampled by webbed feet, uprooted to fill nests and smothered by acid bird droppings, vegetation on this part of the plateau has given way to Northern gannets, now exclusively occupying this site.

Although impressive, noisy and smelly, the spectacle of the colony of seabirds is unfailingly amazing and astounding. Take advantage of this unique opportunity for a close-up view of the Northern gannets in the presence of naturalist park wardens on hand to satisfy your curiosity.

Enjoy your discoveries!



Laetitia Desbordes

Thank you for visiting Parc national de l'île-Bonaventure-et-du-Rocher-Percé.
Your interest helps to promote Quebec's national parks and their mission to protect
and develop these natural sites.

guide

From root to crown

Copywriting : Alexandra Herman
Conception : Marc Bert - chrysalide
Collaboration : Mélanie Sabourin
Translation : Aimée Lebreton
Printed by : Imprimerie des Anses

Photos : Alexandra Herman / www.oiseaux.net /
Rachel Bilodeau / Mélanie Sabourin / Corentin Chaillon /
Laetitia Desbordes / René Lortie / Didier Collin



Parc national
de l'Île-Bonaventure-
et-du-Rocher-Percé



Here are a few rules to follow:

- Stay on the trails to avoid trampling surrounding vegetation
- It is prohibited to remove natural elements (plants, rocks, feathers, etc.)
- It is prohibited to feed wildlife and to leave food or garbage unsupervised

Thank you for your cooperation!