Self-guiding Tour of Eagle Hill Bog

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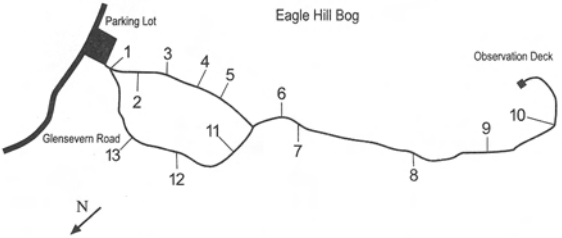
Welcome to Eagle Hill Bog, a part of the Roosevelt Campobello International Park Natural Area. The walkway, originally installed in 1982, was replaced in 1987 with the structure you see here, and is roughly one kilometre (0.6 mile) long. The following narrative matches the numbered posts along the trail.



This wetland, now known as Eagle Hill Bog, began as a pond in a glacially-carved depression. A cool, moist climate and sphagnum moss have drastically changed that environment over the past 10,000 years. Sphagnum moss growing in dense mats dominates the bog. Over the centuries, these undecomposed mats became so thick that the surface vegetation no longer has contact with ground water or with mineral soil. All of the water, and much of the nutrition that the plants need to survive comes from the clouds in the form of rain, snow, and fog. Thus, we also describe the bog as *ombrotrophic*, or "cloud-fed."

As you walk, remember that this bog has an average depth of 1.4 metres (4.5 feet), measured from the top layer of vegetation down through the peat to the bedrock or clay below. Eagle Hill Bog is shallow when compared to other bogs in the Park and around the world, where bog depths range from 3-6 metres (10-20 feet) or even more. The plants you will see today all have special adaptations that allow them to grow in a nutrient-poor, acidic, waterlogged environment.

(Post 1) Sphagnum Moss

There are several species of sphagnum moss in Eagle Hill Bog. Notice that many of the moss plants are star shaped, the points of the star reaching for moisture. Sphagnum is a very absorbent plant, either when alive or dead, holding up to twenty times its own weight in water. Over time, compressed, subsurface sphagnum plants form layers of dark organic material called peat. Peat is harvested in many parts of the world and used as a soil conditioner (peat moss), a building material, and a fuel. Sphagnum moss has been used as a naturally antiseptic bandage material.

(Post 2) Pitcher Plant *(Sarracenia purpurea)*

The pitcher plant is an insectivore and has adapted to the acidic soil and lack of nutrients. You can see a tall central stalk topped with a flower. At the base is a dense growth of upward facing leaves. If you look carefully, you should notice water being held inside the pitcher-shaped leaves. Inside each "pitcher" are several rows of tiny hairs. These hairs point down into the pitcher and act as a fence, trapping any insects attracted into the pitchers by the plant's nectar. The pitcher plant releases enzymes into the water it has collected in its leaves. These enzymes aid in digesting the insects that can not escape and that drown in the water. The enzymes may also attract bacteria that aid the pitcher plant by helping to digest the insects. From the insects, the plant extracts nutrients such as nitrogen, phosphorous, and minerals not readily available in the bog's poor soil.

Pitcher Plant
(sarracenia purpurea)

(Post 3) Sheep Laurel
(Kalmia angustifolia)

Sheep laurel is also known as lambkill, because it is poisonous to livestock. The plant is classed in a family of plants called *heath* plants. Heath is a word that is often used to describe wastelands such as bogs or fens. Many heath plants keep their leaves year-round, and are quite hardy and resistant to acidic and wet environments. Sheep laurel is a close relative of the mountain laurel, a much larger shrub that is commonly found farther south. Notice how the delicate flowers ring the central stalk, and how last year's leaves have remained just below this year's bloom.

Sheep Laurel *(Kalmia angustifolia)*

(Post 4) Black Spruce *(Picea mariana)*

This sickly-looking black spruce tree is actually perfectly healthy, as indicated by the cap of foliage at the top, and is much older than it looks. The black spruce, also called the bog spruce, is the most common tree found in bogs. It is very tolerant of wet and acidic soil and is very well adapted to the nutrient-poor soil found in bogs. Notice the thin, almost branchless trunk. A black spruce is a shallow-rooted tree, and

in the bog uses its roots to increase its longevity. The robust growth at the base of the tree is a combination of roots and branches, and is the key to this tree's survival. The roots grow first down into the peat, and then often sprout new, shorter trunks that grow toward the sun. This often results in a pattern of concentric circles around a single true trunk. These concentric rings of foliage are very efficient at gathering the rain and sunlight that the tree needs to survive. In order to have the same rain and sunlight gathering ability, a spruce growing outside the bog, and growing in the normal shape, would be much taller and more robust to support larger, heavier branches.

(Post 5) Logging Road

Here you see what is left of an old logging road, last used in the 1950s. No logging was done in Eagle Hill Bog; woodcutters used the road to get to and from timber stands behind Eagle Hill. In winter, the bog would be frozen solid, making an excellent sled road for hauling wood by horse team and sleigh. In the spring, when the forest began to thaw and many wood roads were impassably muddy, the bog road would remain frozen and passable two to three weeks longer than other roads. The sphagnum moss and other plant materials acted like insulation, helping keep the temperature lower and the road firmer.

(Post 6) Rhodora *(Rhododendron canadense)*

This plant is in the azalea family and is native from New England north to Labrador. The blossoms are large and striking as they are not tubular as other azaleas, but are split in two parts. Because of its unusual flower, it was originally given its own genus. Often the first shrub to bloom in this area, rhodora is fond of wet soil and does well in cold climates. Rhodora leaves have a distinct grey-green tint that makes this plant identifiable year round. Notice that all the shrubs at this site are very tall, and that the trees have a very healthy appearance. This is because the pond in which this bog formed was not bowl-shaped; it had a ridge near the centre. This area with the tall shrubs and robust growth of black spruce marks the location of that ridge.

In bogs, waterlogged conditions prevent oxygen-dependent bacteria from helping in the decomposition of dead plants. The plants do not get a chance to completely decay and to release their nutrients into the soil. Combined with the acidity caused by the release of hydrogen ions from sphagnum moss, the result is a nutrient poor, waterlogged, acidic soil. In this section of the bog the ridge has created a dry region in the bog and the plants decompose more completely. This creates a richer soil. Just a few steps away, we reach a deeper part of the bog and poorer soil, where the vegetation changes again.

(Post 7) Pale Laurel
(Kalmia polifolia)

Pale laurel is also known as bog laurel. This is the second laurel in Eagle Hill Bog; it is notable both for its differences from and similarities to the more robust sheep laurel noted previously. Notice the different arrangement of the blossoms, and the slight difference in colour. The flowers appear at the top of the stem, or as *terminal* blooms. The pink is more subtle, and the leaves are also notable, being more needle-like. They are true leaves, but are rolled more severely than those on the sheep laurel.

Pale Laurel
(Kalmia polifolia)

(Post 8) Small Cranberry (*Vaccinium oxycoccus)*

Once you learn a bit about the plants in a bog, you can start to predict the water level in a certain area. For example, cranberries are excellent indicators of very wet soil. The cranberries most commonly found in bogs are very delicate, woody plants made up mainly of almost thread-like erect stems or horizontal rooting stems 15-46 cm (6-18 in) long. The plants relatively thick evergreen leaves are about a centimeter or less (1/4 inch) long, white beneath, pointed at their tips, and rolled at their margins. The original name for this plant was the crane berry. Examining a blossom reveals why. The flower petals fold back over the sharply-curved stem, and the stamen dangles beneath. With a little imagination, the petals become the head and the stamen becomes the beak. Cranberries continue to ripen throughout the fall and are best picked after the first frost.

(Post 9) Young Bog

Here at the two benches you can see the effect sphagnum moss can have. To the left, you see several birch trees obviously dying. Note the carpet of lush sphagnum at the base of the trees. From what you have seen in the main bog, you can easily tell that the sphagnum plants are the newcomers. Birches do not tolerate soil that is overly moist, nor do they tolerate acidic soil. Birch seeds do not germinate well in sphagnum bogs, but sphagnum will grow anywhere that water is abundant. As the moss continues to grow, it will waterlog the soil and eventually drown the trees. When the birches die, the moss will grow up around them, enjoying the full sun that will funnel through the newly opened canopy. The dead trees will contribute to the peat layer, and heath plants will take their place.

(Post 10) Regeneration of the forest

Here we can see the extension of the old logging road noted above (Post 5). Notice the difference in habitat. A few obvious differences make this area unmistakeably a young

forest. Note the tall, white birch and striped maple trees. These trees are rather young and block out most of the sun before it reaches the forest floor. Also notice the many large rocks and the outcropping known as Eagle Hill. The bog cannot expand into this area of rock outcropping and glacially-deposited, well-drained, rocky soil. Sphagnum moss, which was so dominant in the bog, is here replaced by other species of moss. Fertile topsoil exists in which various wildflowers and ferns have become established.

While walking to the stairs, be on the lookout for Indian pipe (*Monotropa uniflora).* This unusual plant grows to a height of 17 centimetres (7 in.), and is a waxy, white colour. Indian pipe usually grows in a small cluster at the base of mature trees or in soil rich in decomposing tree material. This plant has no chlorophyll, the chemical that allows plants to change sunlight, water, and carbon dioxide into sugar. Instead, it draws its nutrition from a fungus that feeds on decaying tree roots. Without the fungus, Indian pipe cannot survive. Seeing these small, annual flowers reappear in the same spot year after year is common.

As you climb the hill and look back on the bog, try to trace the bog's boundaries. By following the tree line, you can easily imagine the bog spreading into the edges of the forest, the sphagnum silently drawing water into the low areas and altering the habitat to better suit its needs.

(Post 11) Reindeer Moss *(Cladonia rangiferina)*

Reindeer moss is not a moss at all; it is a lichen. Lichens are a combination of two organisms living together for mutual benefit. Most lichens are composed of a fungus and an alga. The fungus benefits from the organic compounds and vitamins produced by the alga. The alga benefits from the essential mineral elements, water, and protection from drying out provided by the fungus. Lichens are classed as *phototropic*, meaning they use the sun for energy in manufacturing their food, and *epiphytic*, meaning they gather moisture and nutrients from the air. Lichens are a diverse and fragile group of plants and are very sensitive to environmental changes. The lichens that you see growing on trees cause the trees no harm.

This variety of reindeer moss has a potential lifespan of 250 years. It may be seen as the "grey hair" on the bog, a sign of the bog's maturity. Being epiphytes, the lichens do not need to store water the way that the sphagnum mosses do, and can grow in drier areas of the bog. Where lichens are the dominant ground cover, the water table is lower. Because the ground is drier, insects and bacteria have a chance to help decompose dead plant material. This decomposition results in more nutrients being available to plants; species not normally found in a bog will start to gain a foothold inside the bog. If these non-bog plants continue to spread, they will allow others to become established and the bog will begin to change quite drastically in character.

(Post 12) Labrador Tea *(Ledum groenlandicum)*

Labrador tea is a rather interesting plant. Also in the heath family, this plant has specialized leaves and a root system that allow it to survive in the harsh soil of the bog. You should notice that the edges of the leaves are rolled under, and that there is a light fuzz growing on their undersides. These features allow the Labrador tea to absorb moisture from the air and to minimize the drying effect of the sun. The plant accumulates tannic acid from the partially decayed plants in the peat near its roots. This tannic acid cannot be used by the plant, but is stored in the fuzz on the underside of the leaf. The fuzz is initially white, but as the season progresses the fuzz gradually darkens to a deep orange. First Nation's peoples (Native Americans) have used the leaves to brew a tea-like drink for ceremonial purposes. It is not recommended that anyone make Labrador tea a regular part of their diet.

Labrador Tea
(Ledum groenlandecum)

(Post 13) Eastern Larch *(Larix laricina)*

This tree is a deciduous conifer. You should notice the tiny purple or brown cones and the extremely soft needles. Each fall the needles turn a golden yellow and drop to the ground. Eastern larch has several regional names; most commonly it is called a tamarack or a hackmatack. Eastern larch is a very slow growing tree and is very tolerant of water. The slowness in growth results in narrow growth rings, creating very dense, water-resistant lumber when harvested. The wood is used in ship construction and other marine applications.

(Unposted) Round-leaved Sundew (*Drosera rotundifolia*)

Another insectivorous bog plant is the round-leaved sundew. This plant is small, rarely taller than five centimetres (2 in.). Sundew leaf hairs secrete a sticky, sugar-based liquid that attracts insects. As the insects land to eat the sugar, they are caught in the "glue." As they struggle to free themselves, the hairs curl over the insect, secreting digestive juices that release nutrients for absorption by the plant.

Round-leaved Sundew
(Drosa rotundifolia)