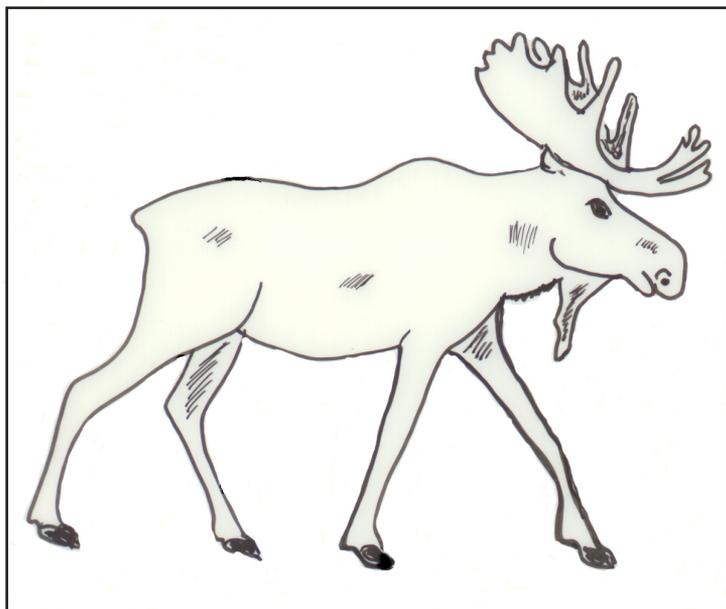


Groton State Forest Nature Trail

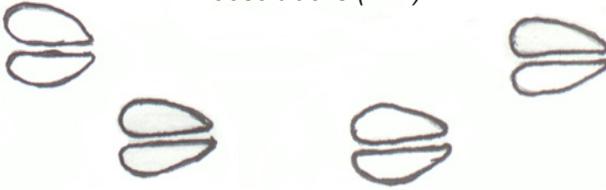
Reading the Landscape



VERMONT

AGENCY OF NATURAL RESOURCES
Department of Forests, Parks and Recreation

Moose tracks (4-7")



Moose are year round residents of Groton State Forest. The habitat here is ideal. Look for them in summer where they feed in or near clearings or along shoreline areas. At this time of year they browse on tender leaves, wetland and aquatic vegetation. They particularly love the nutritious leaves of willow from which contain protein, calcium and phosphate. Moose swim and dive for underwater plants in the ponds. In winter, moose head into the higher elevations where they feed on shoots and bark of both coniferous and deciduous trees. Their long legs enable them to survive in deep snow.

A large bull (male) moose can weigh as much as 1,400 pounds (630 kg.) and be taller than an human adult at the shoulder. Only the males have antlers, which grow in the spring and summer and are shed in late winter. Moose antler growth is greatest between 6-10 years of age. Moose have great endurance and can trot long distances with little cost in energy.

GROTON'S CHANGING LANDSCAPE

The hills in Groton State Forest, once much larger, were rounded and worn down to the underlying granite by glaciers more than one mile thick. Beginning three million years ago, Earth began a cycle of ice ages, separated from time to time by periods of warmth that lasted sometimes for thousands of years. During the ice ages, glaciers advanced southward, scouring and gouging the landscape. Softer rocks, like limestone, eroded, exposing harder underlying rock such as the granite here.

The glaciers also carried gravel, boulders and other rock debris. As the ice melted and retreated, the rocks it was carrying were left behind, forming the boulder-spotted landscape before you.

The boulders and the bedrock beneath your feet are granite. Granite was formed from molted rock (magma) bubbled up within the Earth's crust, then slowly cooled.



PLEASE: As you explore the trails of Groton State Forest, please leave the plants and animals undisturbed.

See map on back of guide.

1. THE FOREST NOW

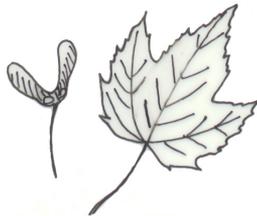
The forests of Groton are rebuilding after extensive logging in the late 1800's, severe fires in 1883, and 1908, a hurricane in 1938, and an ice storm in 1998. The fire in 1883 started in Lanesboro, (now a cluster of houses on the railroad bed near Kettle Pond), traveled over Owl's Head and around the east side of Groton Lake, where you are now standing. The hurricane came up the Connecticut River Valley and devastated many trees in the forest. Evidence of the ice storm is most noticeable on some of the ridges and hills.

Most of the forest here is 80-100 years old, mature from a biological standpoint. Aspen and birch were the first trees to grow back. Foresters call these trees *pioneer species*. They require full sunlight to grow.

Red maple is a dominant tree in this canopy. It can grow in more acidic soils than its relative sugar maple. Red maple is generally the first maple to leaf out in the spring, the first to turn color in the fall, and the first to drop its leaves.

Here you will also find eastern white pine, red spruce and balsam fir. The large white pines are fun to measure as most are over 100 years old.

Red maple



2. THE FOREST FLOOR

The soils in Groton State Forest tend to be acidic. This mainly due to the fact that the bedrock here is granite, and granitic soils are acid.

All along the Nature Trail, blueberry bushes flourish. They thrive in acidic soils, but they have also benefited from the historic fires that cleared away competing brush and trees and exposed mineral soils. Right after the fires, before the trees began to grow back, people reaped bountiful harvests of blueberries. There are still places in the forest where you can find good berry crops.

Blueberry



Two other common forest floor plants here are bracken fern and club mosses. Bracken fern grows in colonies, often in barren or disturbed areas. It can grow waist-high in shade or, unlike most other ferns, thrives in ample light conditions. The plant's long stem splits into three stems, giving this large fern a triangular look.

Club mosses are nicknamed *running pines* because they trail along the surface of the forest floor, multiplying by a shallow root system. These ancient plants are related to ferns and trace their ancestry back to the tree-sized club mosses that were once part of a vast prehistoric jungle.

Bracken fern



Clubmoss



3. GRANITE BOULDER

Once this boulder was barren. Lichens, like the crusty light green patches you see near the bottom of the boulder, started to grow and spread, followed by mosses, the dark green spongy mats covering the rock's sides. Mosses provided a stage for the seeds of other plants to land, take root and grow in ecological succession.

On the top of the boulder, you will find the common polypody fern in its preferred location. Look underneath the leaves (fronds) of the fern for circular brown spots. These spots are spore cases holding thousands of spores by which these plants reproduce.

Walk around to the right side of the boulder and you will see a lichen called *rock tripe*. It clings loosely to the rock in flat semi-circular patches and looks like seaweed.

After a rainfall, the mosses on the boulder absorb so much water that you can squeeze it out like a sponge. Rock tripe is rubbery in spring when there is a lot of moisture in the air. In summer it can get so dry that it can crumble in your hand.

Common polypody



4. THE UNDERSTORY

Vegetation that grows beneath the canopy and above the forest floor is called the *forest understory*. Some species of animals and birds prefer the understory to build their homes, gather food and seek protection from predators.

In the understory, look for striped maple, beech, and balsam fir trees. If the trees here were suddenly cleared away, for example by a windstorm, trees like balsam fir and beech would have an open window of sunlight in which to reach canopy height. Since striped maples rarely reaches more than 30 feet, it is not as apt to compete for dominance.

Moose and deer rely on striped maple as a winter food source. A common name for striped maple is moosewood. Look for narrow strips of bark that have been peeled off the tree vertically. This is where the animals use their bottom teeth and scrape upward to browse the inner bark (the word moose is from the Algonquin word for “bark eater”). You may also see where new buds and shoots have been eaten.



Striped maple



American beech

5. FOREST TRANSITION

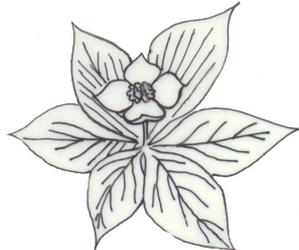
You are standing in a transitional areas of the forest. Notice the group of balsam fir trees in the understory. Balsam fir is *shade tolerant* and can adapt to many soil conditions. It survives in the low-light understory for years, waiting for the canopy open and provide more light. Usually this happens when the trees above die. Then the firs are able to grow tall. Notice the blisters on the bark, especially on the older trees. These blisters contain a clear sticky resin whose aroma will remind you of the holidays..

You're about to leave the hardwoods and enter a depression where red spruce is the dominant canopy tree.

6. SOME SIGHTS AND SOUNDS

If you walk the woods in Groton during spring and summer, you will find a plant called bunchberry. It is the smallest of the dogwood family, and is one of only two non-shrub members of the group. A close look at the bunchberry confirms similarities with the shrubby dogwoods. What appear to be “petals” on the bunchberry flower are actually modified leaves called “bracts.” The actual flowers are tiny and green, bunched together inside the bracts. Each tiny flower produces a red berry at the end of the summer.

Bunchberry
(3-6")

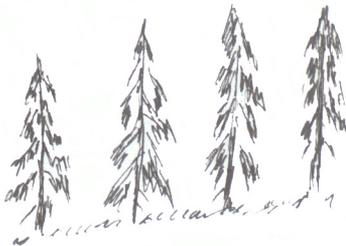


In the morning and evening when they are especially busy, woodland birds fill the forest with music. Listen for the distinctive flute-like calls of the thrushes.

Does the song begin with a single note of introduction, followed by the full song? If so, it is our state bird, the hermit thrush. Does the flute song start directly with the full song sounding like “ee-o-lay,” and end with a high pitched squeak? That is the wood thrush. If the flute song spirals downward like “Veery-veery-veer,” you have heard the veery, another thrush. These three birds are considered ground birds as they like to forage for food and generally build their nests on the forest floor. Thrushes are mostly brown in color to camouflage them on the ground.



Hermit thrush

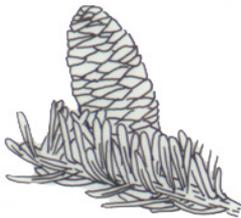


7. WET AND COOL

You have entered a small depression in the landscape. Notice the changes in this environment. Here, maple and birch are replaced by red spruce and balsam fir. These trees are well-adapted to the thin, wet soils and the shady north aspect.

Red spruce has dark, scaly bark. Gently run your hand up a branch and feel the sharp rounded needles, which are unlike those of balsam fir that are soft to the touch. You can roll a spruce needle between your index finger and thumb. You cannot roll a flat balsam fir needle between your fingers. Remember this: “spiky spruce and friendly fir.” Another difference in the trees is the arrangement of the cones. Fir cones are always erect on the branch, while spruce cones hang down.

Red spruce



Balsam fir

8. SELF-PRUNING FOREST

The upper limbs of evergreen forests shade the ground all year. The deep shade causes the lower branches on the trees to die, a self-pruning process. Because of the shade on the forest floor, there are few ground plants.

Some woodland plants that can survive in the limited light are wintergreen, creeping snowberry, wood sorrel, clintonia, and cinnamon fern.

Look off to the right side on the trail. You will see what looks like a plush green carpet on the ground. This sphagnum moss. It forms light airy mounds that hold 15 to 20 times its weight in water. You can feel how soft and cool it is.

In the old times, Indian mothers would squeeze out the excess moisture from sphagnum moss and use it to diaper their babies. Today, horticulturalists use sphagnum moss to hold moisture in potted plants.



Clintonia

Wood sorrel



9. CREEPING SNOWBERRY

One of the plants that thrive in cool shaded woods like this depression, is the creeping snowberry. Look down and you will see its tiny oval leaves everywhere. It is a ground-creeping shrub forming mats, particularly favoring mossy woods and bogs. Creeping snowberry blooms in May and June with white bell-like flowers hiding underneath the leaves. In fall, white berries appear, also hiding beneath the leaves. The taste of the berries resembles wintergreen. At the previous site, you may have noticed the Creeping snowberry forming mats among the spagnum moss.



Creeping snowberry

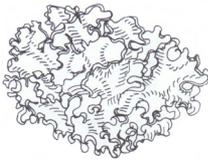
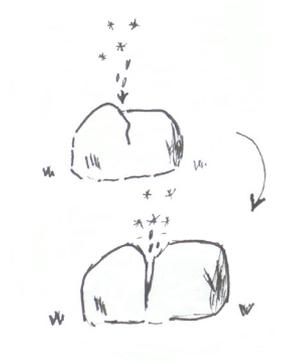
10. SPLIT BOULDER

The split granite boulder to the left of the trail was once solid rock. Over time, a crack, called a fracture developed in it, causing water to seep in. In the spring and fall, when temperatures fall below freezing at night, the water inside the crack turned to ice, and expanded, pushing against the sides of the rock. When the temperatures rose during the day, the ice melted, leaving the fracture slightly wider. During the day, a little more water filled the fracture, and it turned to ice when the temperature dropped below freezing. The ice slowly began to pry the boulder apart, like a wedge. This is called *frost wedging*. Eventually snow was able to fill in the space where it turned to hard-packed ice and further push the rock apart.

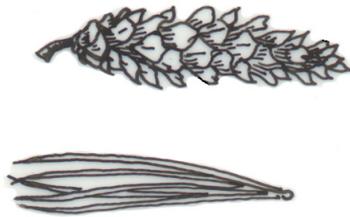
Frost wedging is a form of mechanical weathering, and it is particularly successful on southern slopes where the sun's heat is strong enough during the day to melt ice in the fall and spring. You can think of this happening daily when the maple sap is running.

Look on the insides of the split boulder. If you can see lichens, you'll know the rock is also undergoing chemical weathering. The lichens attached to rocks exude an acid that over time, eats away at the rock's surface. This happens in the summer when the lichen plants are growing. Weathering is slower for harder rocks like granite, and faster for softer rocks like marble.

Frost Wedging



Lichen



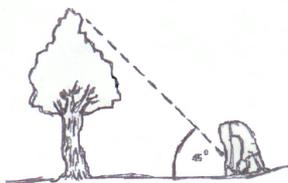
White pine

11. WHITE PINE

There was a time when Groton State Forest was full of majestic white pines like this and the one to the left of the trail. European settlers began clearing Vermont in the 1700's to build homes, farms, and feed industry. By the mid-1800's, over 75% of Vermont was cleared land. Changes in land use have allowed the return of Vermont's forest until we now have about 80% of Vermont in forest land! These two pines have survived logging and fires for about 100 years. Imagine this forest full of pines like these!

Native Americans developed an interesting and simple way to estimate a tree's height. A person would find a spot a distance away from the tree to stand with legs apart, and their back to the tree. They would bend forward until they could look between their legs and just barely see the top of the tree. The distance from this spot to the base of the tree was very close to the total tree height. This is because the distance from the eye to the tree top was about 45 degrees. You can try it, too.

Measuring tree height



12. NATURAL RIDGE

You are standing on a natural ridge. Remember the spruce and fir in the moist depression? This is the opposite situation, a well-drained to dry site. The ridge may have been a little pocket of gravel and sand left by the glacier or more probably, an area which did not erode as quickly as the surrounding landscape in the centuries after the glaciers receded. In any case it has left a narrow rounded ridge that is a favorable spot for the growth of hardwoods.

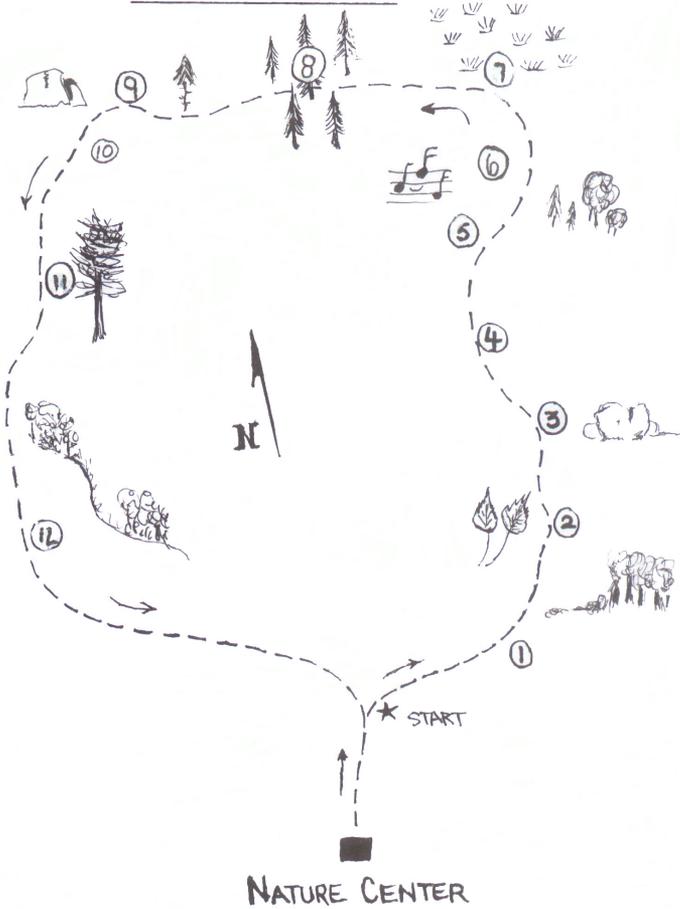
Like a historian of the forest, you have learned to read the land and learn from it. You can apply your knowledge to other forests in Vermont and elsewhere.

In addition to this self-guided nature trail there are Groton guides to trails and history of Groton State Forest and an identification guide to ferns. Be sure to visit the Groton Nature Center or attend an interpretive program during the summer. For more information, check with the campground or visit the Vermont State Parks web site at **www.vtstateparks.com**

Please return this guide if you don't need it for future walks.

Enjoy Groton State Forest!

GROTON NATURE TRAIL



total distance = $\frac{1}{2}$ mile
time = $\frac{1}{2}$ hour



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