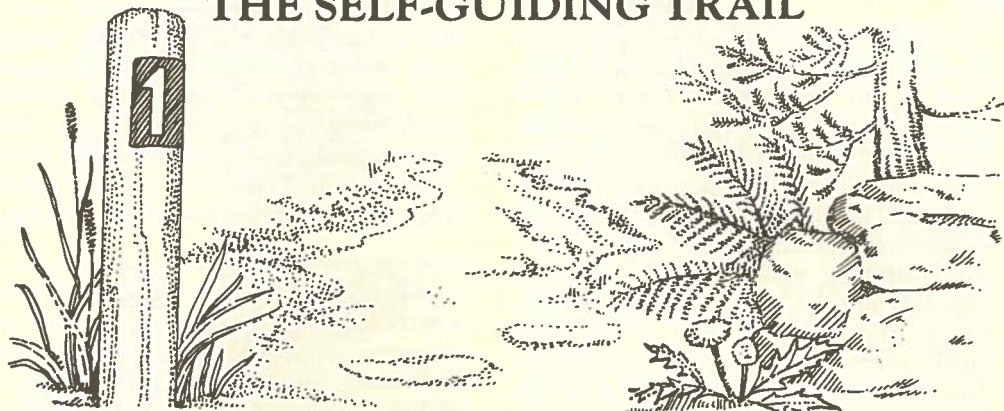


CHAPTER III

THE SELF-GUIDING TRAIL



The Self-Guiding Trail is a 5/8 mile loop that begins and ends in the meadow and is blazed in blue. Along the trail are twenty numbered posts that mark special points of interest. The stations marked by each post are described in the pages that follow, with the number at the beginning of each description corresponding to the number on the post.

While it is relatively easy to describe the sanctuary's natural communities on paper, recognizing them in the field, where there are no distinct lines separating one community from the next, is a different matter. From a pasture grown in with pines to a cool hemlock ravine to an airy xeric ridge, the land and vegetation change gradually as you walk. Subtle differences in the amount of available light and water not only determine which plants grow where, but the size of individuals and populations.

In less than a mile, the Self-Guiding Trail passes through more than half of the sanctuary's communities and provides concrete examples of many of the features and concepts presented in this guide. In addition to helping you recognize individual communities, this section will help explain why a given community occurs where it does.

#1.

If you look to your left you will see a tall horse chestnut that, in the spring, is covered with showy white blossoms. At the base of the tree and in front of you is a stone wall. To your right, camouflaged by staghorn sumac, is the foundation of Josephine Newman's home, and in the meadow and along the stone wall are half a dozen old apple trees. The land has changed dramatically since the first white settlers arrived in Georgetown. The stone walls and apple trees provide ample evidence that the forest in front of you was once cleared land. In little more than a century a new forest has grown in. Its growth has been so robust that, from this point on, you will have to look much more carefully for signs of the generations that once worked and farmed this land.

In the spring and summer, the lawn-like carpets of green that line the trail as it enters the forest abound with Canada mayflower and the aptly-named large-leaved aster. The large oval leaves of both of these plants are an adaptation to the uniform low light of a mature forest. The yellow powder that dulls their leaves in June is pollen that has fallen from the pines overhead.

#2



The trees that tower over you are part of the most widespread community in the sanctuary — the mesic mixed forest. Mixed refers to a forest that is composed of at least 25% conifers and 25% deciduous species. Mesic refers to the drainage characteristics of the soil and terrain. The land is flat and moderately drained (“mesic” comes from a word meaning middle). The absence of boulders and the robustness of the forest suggest that this was once a field. Red maple, scattered red oak, and red and white pine are dominant overstory trees in this portion of the sanctuary.

To the right of the trail, the vegetation is distinctly different. The soil is poorly drained and black. As the land slopes gently down to the cattail marsh, New York ferns give way to moisture-tolerant sensitive ferns and alders.

#3



The cattail marsh is at the northern end of a quarter-mile long depression and is the wettest part of the sanctuary. Topography is partially responsible for the ponded water that occurs here. Other clues to the marsh’s formation will appear further along the trail. The cattail marsh is a dynamic community. In less than twenty years, a pond has been transformed into a thick growth of cattails, and in another twenty, it is likely that cattails will be replaced with alders and red maple.

The bird life is distinctive here. In the spring and early summer, red-winged blackbirds and common yellowthroats abound, and if you walk quietly you may see a pair of

black or ring-neck ducks dabbling among the cattails. The marsh also provides important habitat for amphibians. With the exception of the red-backed salamander, which does not need standing water to lay its eggs, most of the sanctuary’s frogs and salamanders come here to breed. The unusual productivity of this community is most apparent in spring when the cattail marsh resounds with a chorus of wood and green frogs, gray tree frogs, and spring peepers.

#4



As the trail continues to the next station the percentage of conifers increases — especially in the lower age classes. In a mature forest, the young trees that occur are often clustered in small pockets. These pockets are usually openings created by blowdowns. The clusters of conifers to the left and right of the trail are composed primarily of balsam fir. This species, which can be identified by its bright green, characteristically flat needles, is usually the most successful competitor for light and nutrients. Fir is considered a tolerant tree because it can live for years as an understory species under a dense canopy. Because of its tolerance to shade it is found in the understory of all of the sanctuary’s forest communities. A simple way to estimate the age of these firs is to look at the young pines that grow beside them. Both red and white pines add one whorl of branches each year. Counting the number of whorls provides a good idea of how long these trees have been standing here. There is a conspicuous absence of mature balsam fir above you. How did these seedlings get here in the first place?

Two of the sanctuary’s common ground-cover plants, the shin-high sarsaparilla and the delicate starflower, are abundant here.



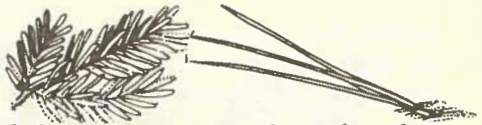
#5

Large white pines like this one are scattered throughout the sanctuary. Because of the disproportionate amount of light, space, and nutrients they require, they are often referred to by foresters as wolf pines. Their irregular growth and massive spreading branches are an indication that they grew where light was not a limiting factor — perhaps in or at the edge of a field. Trees that grow in more crowded conditions, which force them to compete for resources, often have straight, branchless trunks. As the foliage on the lower branches becomes shaded out by new growth, the branches die and eventually fall off.

The growth pattern of this pine may also have resulted from a small insect known as the pine weevil which kills the terminal bud, forcing the tree to grow a new one. The new bud eventually grows into another main trunk. Continued weevil damage results in a tree with a divided and twisted trunk. Birds that knock off the terminal bud while feeding or perching can have a similar effect. A closer look reveals that many of the young conifers around you already have at least two terminal buds.

The branches of some wolf pines are so broad that other plants can root in the debris that collects there. Do you see any evidence of this high up in the pine? Their often hollow trunks and spreading branches, which make them of little value to foresters, provide important nesting sites for woodpeckers, flying squirrels, and a variety of other forest animals.

#6



Of the seven species of conifers that occur in the sanctuary, six occur along this trail, and four, including white pine, red pine, red spruce, and balsam fir, can be seen right here. The tall straight trees on the left are red pines, so named for their reddish, scaly bark. They can be distinguished from white pine by their small cones and their needles, which occur in bundles of two rather than five. The narrow, cylindrical cones of the white pine, which reach up to 8 inches in length, are the largest among Maine's conifers. They are scattered over the forest floor in this part of the sanctuary.

Pitch pines have stout, stiff needles that occur in bundles of three and often grow in tufts from the trunk. If you look carefully, you will see several pitch pines as you continue along the trail. They are very uncommon in the sanctuary.

Spruce and balsam fir can be distinguished from the pines by their short needles. Spruce needles are short and sharp, spiraled and spreading on all sides of the twig from short leaf stalks. Spruce cones hang down in clusters from the upper branches while fir cones point upward. Most of the spruce in the sanctuary is red spruce. In contrast to the spruces, balsam fir needles spread almost at right angles in two rows from hairy twigs. The needles are flat, shiny on the top, and not as sharp as those of spruce. Shake hands with a spruce and a fir to compare. The trunks of older fir trees are characteristically dotted with small resin pockets that resemble small blisters. The resin inside gives the balsam fir and the Maine woods their pungent aroma.

As you travel along the trail another conifer becomes abundant. The hemlock, whose needles resemble the balsam fir but are shorter and occur on more flexible branches, can be distinguished from fir by the absence of resin pockets.

#7



Did you notice that the woods have grown cooler and darker as you approached the northeastern side of the sanctuary? The terrain becomes steep and moist and the canopy and the forest floor are thick with needles. Hemlock is abundant in this corner of the sanctuary — a large one towers over you to the left of the trail. Even more diagnostic of moist conditions is the rich and varied growth of mosses, lichens, liverworts, and fungi. Pincushion and hair-capped mosses soften the contours of the land, tiny British soldiers and pixie cup lichens creep over fallen logs, leafy liverworts and shelf fungi cling to the trunks of trees. The lower plants thrive where the habitat is moist. Water at the surface is essential since they lack the well-developed root systems that would allow them to tap water stored deeper in the soil.

In bright sun or the heat of summer, mosses and lichens shrivel up. The leaves of hair-capped moss, for example, roll up tight to retain moisture — an essential adaptation since their “leaves” are only two cell layers thick. But in the spring and winter or after a rain, water is absorbed over the entire surfaces of these plants and they are bright green again.

As you continue on to the next station look for piles of pine cone scales in the trail and small holes in the slope on the right. Who made these?

#8



It's hard to miss the tree growing on what appears to be solid rock on your right. This tree tells a story of the enormous contribution lichens make to the forest. Bare rock is

often colored by this unique combination of algae and fungi. Lichens grow so slowly that they have been referred to as “time stains.” As they die and decompose they form an ideal substrate for mosses. Decaying mosses and lichens combined with leaf litter eventually form enough soil for larger shallow-rooted plants such as the polypody fern to grow. As the process continues, trees extend their roots to tap nutrients and moisture in the soil that collects in rock crevices and indentations. The trees contribute to the soil formation process by physically splitting the rock into smaller fragments. Water seeping in as snow melts, freezes and thaws, splitting the rock still further. The entire process is an extremely slow one. It may take up to 400 years for a single inch of forest soil to form.

Listen for the sound of rushing water as you walk to the next station. You may catch glimpses of Robinhood Cove's reversing falls below you on the left. When the tide is low, long streamers of kelp can be seen in the narrow channel that forms the falls.



#9

This part of the sanctuary is riddled with the holes of small mammals. Under roots, at the bases of trees (like the one just to the left of the trail), may be chipmunks, weasels, red or gray squirrels, or even mink. The holes are used as dens or places to cache food. Many are connected by a maze of tunnels that undoubtedly passes beneath your feet. The best time to discover who lives where is in the late summer and early fall when the sanctuary's small mammals are busy storing food or cleaning out old tunnels and dens for the winter. Evidence of one resident are the stripped pine cones that the red squirrel leaves behind.

#10



Dead trees that are still standing are known as snags. Look at the snags to the left and right of the trail. They reveal an incredible amount of information about forest wildlife. You may see the one to two inch holes that hairy and downy woodpeckers hammer to get at insects which feed under the bark (woodpeckers do not eat wood). Look for the winding paths of boring insects and the nearly perfect pencil-sized holes of the wood borer. In other parts of the sanctuary you may see the large rectangular holes that the pileated woodpecker drills, or the neat rows of small holes that sapsuckers drill to feed on tree sap.

Snags are extremely valuable to forest fauna. Their often hollow centers and the holes created by woodpeckers provide nesting cavities, dens, and hiding places for birds, flying squirrels, raccoons, and other animals. The number of pairs of dark eyes that are staring out at you from snag holes as you pass by would astound you.



#11

There are not many places in the state where a fresh surface of bedrock is exposed. The rock fragments under the blowdown just up the trail from this outcrop provide some clues to the geologic history of the Georgetown area. The dark, fine-grained rock originated as sediment which was laid down in horizontal layers when this entire peninsula was covered by the sea. The resulting sedimentary rock — a shale — was subjected to enough heat and pressure to bend the horizontal layer into a fold. A close look at this outcrop reveals the presence of folding. The fresh surfaces under the blowdown show that the shale has been partially metamorphosed into a sparkly schist. The intensity of this "metamorphosis" varied

greatly along the Maine coast. At Reid State Park, only a few miles to the south, are some dramatic metamorphic rock formations.



#12

The terrain becomes noticeably steeper and drier as you climb this ridge. You are now in the xeric community. The sanctuary's xeric (dry) ridges are characterized by ledge at or near the surface, a thick growth of juniper, and stunted red oaks and white pines. Another characteristic species is the graceful wavy hair grass. As you continue down the slope the vegetation grades back into the coniferous forest.



#13

If the cove before you is full of water it will only be a matter of hours before it has emptied out through the reversing falls, exposing vast mudflats. Mudflats and the ribbon of salt marsh that lines the cove are typical of the intertidal zone in Maine. The food web of this zone is an intricate one — one that connects the sanctuary's marine and terrestrial ecosystems. As grasses in the marsh die, they form layer upon layer of detritus which provides food for plankton and other microscopic organisms. These in turn are eaten by worms, mollusks, shellfish, and finfish which are then consumed by shorebirds, osprey, muskrats, people, and a whole host of other animals.

The incredible productivity of the flats and marsh are readily apparent in late summer and early fall when the fall migration is in progress. The rich fauna of the cove — bloodworms, tubeworms, crustaceans, periwinkles — attracts large numbers of waders. Watch for curlews, whimbrels, yellowlegs, sandpipers, phalaropes, herons, egrets, and other shorebirds that stop to fatten up before heading south.

#14



You are now entering one of the sanctuary's least productive communities — the spruce-fir thicket. Between the salt marsh and the boardwalk are clues to this sudden change in habitat. This portion of the sanctuary was cut in the late 1960's — stumps of the old pines and hemlocks that were removed can be seen farther back along the trail. The new stand has never been thinned and as a result is so dense that very little light reaches the forest floor. It takes a lot of searching to find evidence of an herbaceous layer.

Rising above the canopy of needles is a sparser but conspicuous canopy of leaves. Poplar is a common species in recently cut-over areas. At first this fast-growing sun-loving tree outpaces spruce and fir, but it is short-lived and will eventually be shaded out by conifers. Over the next several decades, the thicket will "thin itself out" as the larger conifers shade out the smaller ones.

#15



The boulder you are standing next to has been lying here for at least 10,000 years. It is composed of a completely different rock than the bedrock that was exposed near the cove. Underneath the lichens is a crystalline granite. A close look reveals crystals of milky quartz and flecks of biotite (a black mica). Granite forms from magma that cools beneath the surface — rather than in the air like volcanic rock — and later becomes exposed as the earth's surface is worn down. Referred to as a glacial erratic, this boulder was carried by ice to Josephine Newman Sanctuary from a point several miles to the north and east. Granite glacial erratics are scattered throughout the sanctuary.

#16



A fallen tree or limb can provide a wealth of information about the living things that inhabit the forest floor. Mosses, lichens, insects, and bacteria are constantly recycling organic matter such as leaves and bits of wood into rich soil. The centers of decaying logs such as this one may already have been transformed into soil. Red-backed salamanders, pixie cup lichens, ants and their white oblong larvae, sow bugs, and millipedes are some of the many plants and animals that occupy this "community." We are only beginning to understand the role these tiny organisms play in maintaining the health of the forest. Ants, for example, are the major seed dispersers of the forest while the burrows of insects and other invertebrates keep the soil aerated. Turn over a patch of forest soil or look closely at a fallen log to see them in action.

#17



The cattail marsh is one of the few places in the sanctuary where there is fresh standing water. A fascinating time to come here is in the spring when amphibians are laying their eggs. Some of the most common and easily identified eggs are the toad's long spirals of eggs encased in jelly which are laid underwater in quiet pools, and the wood frog's three to four inch masses of spherical eggs which are attached to submerged plants. Spring peeper eggs are attached singly to the stems of cattails and other marsh plants, and spotted salamander eggs occur in round, often greenish globs on sticks or free near the surface.

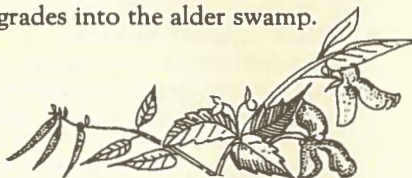
Many insects also depend on water to reproduce. The insect hatch that takes place

in the spring provides an abundant source of food for red-winged blackbirds, swallows, and other birds. A familiar insect that benefits from the marsh's standing water is the mosquito. If you've been here long enough for one to land, chances are you've been woven into the sanctuary's complex food web. But this time you're near the bottom of a food chain that connects you to a mosquito, who might provide a meal for a frog, which, in turn could be eaten by a garter snake, that may end up in the jaws of a mink.



#18

Although there are none living here now, there is evidence to the right of the trail that beavers once inhabited the sanctuary. The relatively straight berm that parallels the trail is probably an old beaver dam. The impoundment it created has since filled in with cattails. Look closely and you can see a chiseled stump at the edge of the marsh. The cattail marsh, which drains to the left of the trail, grades into the alder swamp.



#19

The combination of food and shelter that the edge of the meadow provides makes it a haven for birds. Yellowthroats, goldfinches, song sparrows, Nashville and yellow warblers all thrive here and, in the spring, this is the favorite courting ground of the woodcock. In late summer there is plenty to feed on. The role birds play in seed dispersal becomes clear in this patch of raspberries and touch-me-nots (also called jewelweed). Birds feeding on the raspberries — whose seeds are dispersed in bird droppings — undoubtedly bump into the sensitive seed capsules of the touch-me-not. What happens when you touch one?



#20

You are now only a few yards from the beginning of the trail. Although the meadow is mowed every other year, the forest is slowly encroaching. Sumacs are shading out raspberries and poplars are shading out sumacs. Soon more shade-tolerant trees will rise above the poplars. The effort required to hold back the forest reveals how dynamic the sanctuary's communities are. The changes may be subtle but they are always occurring. As the climate changes from season to season, or from day to night, the cycle of activity of each organism changes which, in turn, affects the entire balance of the ecosystem. The forest is not the same biological community in mid-winter that it is in mid-summer, or even from one week to the next. Natural succession never repeats itself but is always creating new patterns. Learning to recognize these patterns makes Josephine Newman Sanctuary an exciting place to visit in any season — and the classroom changes weekly. We hope you can come again!

