Welcome to the Perkins Arboretum and Bird Sanctuary at Colby College. There are almost two miles of enjoyable trails that lead to many beautiful locations within the Arboretum. The preserve is home to a rich diversity of plants, animals, and habitats typical of central Maine. Enjoy the area with curiosity, appreciation, and respect.

This 128 acre preserve was established in 1946, and later dedicated to the memory of Professor and Mrs. Edward Henry Perkins. Professor Perkins was an outdoor enthusiast and chairman of the Department of Geology for 16 years until his death in 1936. Mrs. Perkins was a member of the College staff for 18 years. In 1969, the Colby Board of Trustees expanded the boundaries of the area to its current size, "to be preserved and protected in its natural state without cutting or changes in the growth and natural habitat as time proceeds". In addition to the Arboretum, the entire Colby campus was designated a State Wildlife Preserve by the Maine Legislature in 1969.

Environmental Concerns and Land Use Suggestions

The Perkins Arboretum and Bird Sanctuary is a beautiful and precious gift to the Colby College community. It requires care to sustain its educational and recreational value for all users. Please follow the use suggestions listed below:

- Stay on the trails that are shown on the trail map at the back of this booklet.
- No bikes in the Arboretum. The trails are foot paths only and cannot handle the intensity of mountain bike use.
- No fires in the Arboretum.
- Pack out what you pack in; please keep the Arboretum free of trash.
- Keep your voices low, it is considerate to others and you will see and experience more.

Educational Opportunity

Please use this booklet as an interpretative guide to your walks along the Yellow, Blue, White, and Red Trails of the Arboretum. In addition, you will find a description of seasonal differences occurring within the preserve in the appendices. If no longer needed, please return this booklet to one of the two brown distribution bins located at the entrances to the preserve for others to use.

The Self-Guided Yellow Trail
The Self-Guided Yellow Trail begins in an open-field and passes through transitional forest, mature forest, and along the Perkins Stream. It can be followed from both the West and South entrances (see map) and is marked by yellow blazes. The Yellow Trail has seventeen evenly spaced number signs that indicate learning stations along the trail. If you would like to learn more about the ecology of the Arboretum, please follow the trail and stop at each numbered station. Information about the species and habitats you will see at each station is provided on pages 3 through 13 in this booklet. The trail begins at the NE corner of the rugby field (West entrance) at Station 1. If you begin at the entrance near Mayflower Hill Drive (South entrance), you will start at Station 15. While following the guided trail, please stay on the trail to prevent damage to sensitive flora and fauna. The trail is approximately 3/4 mile in length. Have fun while you learn about the natural environment of central Maine.

Additional Trails in the Arboretum

There are three other well-marked trails within the preserve: the Blue, White, and Red Trails. These trails can all be accessed from different points along the Yellow Trail. For a brief description of each of these trails see Appendix A.

Seasonal Change in the Arboretum

Each season brings noticeable change to the Perkins Arboretum and Bird Sanctuary. Differences in temperature, precipitation, and sunlight impact the entire preserve and its inhabitants. A brief description of each season's unique characteristics and effects on the preserve is included in Appendix B, to provide a year-round nature guide to the Arboretum. Most visitors walk through the Arboretum during the summer and fall, when all the trees have leaves and the weather is warm. Similar to summer and fall, the seasons of winter and early spring are beautiful in the Arboretum. In winter you can test your skills at identifying the different tree species of the preserve by studying their bark and buds. Spring-time invites many migratory birds to return for the breeding season. The Arboretum is a great place to hear and watch returning birds from the South.
Station 1. Old Field Succession

At the entrance to the Yellow Trail, the forest edge meets an open field. The forest is reclaiming what once was part of a complete forest spreading tall and thick across the college campus. This open field is characterized by short-lived, sun-loving annuals that survive for only one year. With no trees above them, plants like Aster and Goldenrod thrive in the open field, enjoying ample sun-light and abundant winds to set sail to their seeds. In the open field, you may also encounter Milkweed with the Monarch Butterfly resting on its seed pods. Woodchucks also enjoy the habitat of an open field, feeding primarily on grasses typical of high light areas.

Left undisturbed, old field annuals will be replaced by pioneer trees and shrubs, such as Black Cherry, Quaking Aspen, Gray Birch, and Dogwood. These pioneering tree and shrub species grow tall quickly, casting shadows on the open field. The shade of trees like the Quaking Aspen create a new, cooler, microclimate making it difficult for the seeds of Quaking Aspens to grow. As a result, of these microclimate changes, pioneer species are replaced by longer living species that thrive in the cooler and more shaded conditions created by pioneering species. This activity is called succession, the process by which quick growing pioneer plant species are replaced by longer living species. In contrast to early successional plants, trees and shrubs that characterize the later stages of succession create a microclimate which enables their own seedlings to survive and mature. The old field is an early stage of succession, progressively later stages will follow.
Station 2. A Fruitful World

The red and green apples above and below you are a familiar site around much of Maine. Apple trees and other fruit bearing plants of New England like Blackberries, Blueberries, Strawberries, and Cherries produce tasty fruits that are energetically expensive for plants to make. Why do you think plants produce them? Many plants produce bright colored seed-containing fruits to attract animals that serve to disperse the seeds of the plant. When the fruit is swallowed, the seed, which is covered by a hard coat, will continue through the digestive system of the animal, later to be defecated in a pile of rich fertilizer.

Unlike the windy open-field setting at Station 1, plants living in areas of greater tree density use other mechanisms to distribute their seeds. While fruit production is one technique, many plants, including the Touch-Me-Not (Jewel Weed) depend upon animals to come along and trigger their seed pods. If the weather has been dry enough, animals that brush up against these seed pods will send the spring loaded seeds out of the pods and toward the ground. Some of the seeds in the pods will cling to the fur or feathers of animals, thereby, serving to transport and disperse the seeds to other areas of the preserve.

Station 3. Life Along the Stream

Ferns are among the plants most typical of the streamside because they thrive in the moist conditions. They produce thousands of tiny spores on the underside of their fertile fronds, as well as beautiful fronds that unfold. Here, we can find a mix of ferns including Sensitive Fern, Christmas Fern, and Bracken Fern. If you look closely at the leaflets of the Christmas Fern you can see that each leaflet dangles from the center stem like Christmas stockings from a fire place mantel. In addition to ferns along the streamside, you may find beautiful Painted Trillium flowers growing below the shade of trees.

Up the trail, you will find some bright, white-barked trees known as Paper Birch. Native Americans used this birch bark to make beautiful as well as functional canoes. The bark is chalky white and the outer layers freely separate into thin ‘paper-like’ sheets. Please do not pull the bark off the paper birch, it can disrupt the transfer of nutrients between the leaves and roots of the Paper Birch, and eventually kill the tree.
Station 4. Transitional Forest Succession

In the transitional forest, you can see the development of different canopy levels. The plants at ground level are known as ground cover. Plants at breast height make up the shrub layer, while trees and shrubs that grow between 10 and 20 ft high are called the understory. The crowns of the tallest trees make up the canopy. In the transitional forest, different levels of canopies can survive because there is light penetrating through the leaves of the taller trees and reaching the forest floor. The amount of light is not too strong to prohibit plants from germinating, instead it is adequate to enable life to flourish at the varying levels in the forest.

When compared to the old-field, a transitional forest contains a greater diversity of tree species because some pioneer tree species are still present and younger climax tree species are beginning to mature. The many tree and shrub canopies of the transitional forest create a cooler and more moist microclimate when compared to the old field. A mix of Red Maple, Sugar Maple, Paper Birch, and Northern Red Oak, thrive in this area, along with a host of insects and animals that feed on the products of these plants. Associated with this stage of forest succession are Gray Squirrels, and Eastern Chipmunks, who actively collect and store seeds and nuts from these trees. In the transitional forest, you may also find Porcupines feeding on leaves, twigs, and the bark of trees.
Station 5. The Maine State Tree

You have come to the White and Yellow Trail junction. The White Trail proceeds along the ridge; the Yellow Self-guided Trail continues down the steps and across the stream.

Eastern White Pines may grow to be over 100 years old, often reaching heights of over 100 feet. Maine is named the "Pine Tree State" because the White Pine is relatively abundant, and it is a valuable tree for paper-making and lumber. These trees have many seeds located within individual cones, and each seed is equipped with a tiny wing-like structure that helps the seed catch wind and disperse itself away from the parent plant.

The Eastern White Pine is easy to identify because its needles form bundles of five. You can remember that there are five needles per bundle in the Eastern White Pine and five letters in the word white. Some of these White Pines have huge holes in them, where several different animal species could live, including Raccoons, Bats, and Red Squirrels.

Station 6. Slippery Slime

Please Cross the Stream with Caution

Maine’s streams are full of life. You may be surprised to know that there are a variety of tiny insects living off the bounty of the water flow. Insects like Hellgrammites have a stream-lined body that enables
them to adapt to living in the water flow. Minnows can be spotted swimming in shallow pools of water. If you look closely, you may also see moving piles of pebbles, twigs, and leaf litter. Caddisfly larvae form tiny protective cases by sealing together small bits of stream particles like stones, sticks, and sediments.

The green slime beneath your feet, is a type of Algae which provides the food base for other organisms in the stream. Abundant aquatic and terrestrial plants and algae are producers, because they convert the energy of the sun to energy that can be used by animals. The rest of the stream life is dependent upon these plants, including those creatures that feed directly on plants. In one moment, you may see a tadpole, which is known as an herbivore because it feeds strictly on plant material. Soon after, a Crayfish, known as a consumer, may be snatching up the tadpole for breakfast. Eventually, the crayfish may be eaten by some other predatory species in the stream such as a turtle. This type of relationship, which illustrates different organisms feeding on one to obtain energy and nutrients, is called a food chain

Station 7. Eastern Hemlock Climax Forest
You are now standing among the oldest trees in the preserve. Here, Eastern Hemlocks tower above you, casting a shadow on the soils below. These low-light conditions have an impact on the type of species we find in the hemlock forest. Mature forests like the Eastern Hemlock change the local micro-environment in a way that perpetuates the survival of the species. Young Hemlocks are shade tolerant; growing in the shade of their parents while other species cannot.

Over a hundred years ago, these tall hemlocks likely germinated in an area similar to a transitional forest. As they grew, they dominated the sunlight and out-competed many shade-intolerant species. They enjoy cooler and more moist conditions than the species present at the Transitional Forest (Station 4). These hemlocks are giants; some are over 100 ft high! If you look closely, you can spot the small cones of the Hemlock, a mature Hemlock can produce cones like these for over 450 years. Hemlocks display flattened needles with tiny white stripes on the undersides. These needles are connected to their stem with a tiny stem, known as a petiole.

Station 8. Tree Tops
High up in the canopy, Yellow Birches and Sugar Maples grow tall making sugars with the energy of the sun. The Yellow Birch loves moist and cool woodlands near streams with rich soil. Its bark is a shimmery golden color, and peels off the tree in thin sheets. With
trunks up to 70-100 ft high and 2 1/2 ft in diameter, the Yellow Birch is one of the tallest hardwoods in North America. The bark has a unique wintergreen taste.

The Red Maple is an abundant tree in Maine. The leaves are located opposite of one another along the branch, with two to five V-shaped lobes per leaf. Red maples produce long, reddish flowers arranged in clusters along the twigs. Famous in spring-time, the maple seed uses a helicopter-type arrangement to spiral and disperse its seeds to the ground. The Sugar Maple grows in drier conditions than the Red Maple and can be distinguished from the red by the U-shaped notches in the lobes of their leaves. The sap from the sugar maple is boiled and concentrated to make a New England specialty-maple syrup. A mature tree can yield between 5 to 60 gallons of sap per year. It takes 32 gallons of sap to produce roughly 1 gallon of syrup or 4 1/2 pounds of sugar.

Station 9. A Tale of Three Lands

In 1946, the land in front of you was similar to the old field you saw at Station 1. A mix of tall grasses, Goldenrods, and Asters flourished here in the bright sunlight. In 1976, this field was composed of Quaking Aspens and other early successional species. Now, Quaking Aspens have been displaced by White Ash, Maple and Oak trees. These species are better able to germinate in the darker, cooler, and wetter conditions that aspens create. Almost 25 years ago, these species were emerging, and now they are the tallest trees in the area. If this site remains undisturbed by humans, we may see this transitional forest replaced by longer living trees that characterize a climax community. A climax community refers to a community of species, particularly plants, that are capable of perpetuating themselves and their offspring under current environmental conditions of light, soil, water, and temperature.
In front of you, this White Ash stands tall, and can be easily identified by its grayish brown bark with parallel ridges and deep furrows. Ashes are some of the strongest and most flexible hardwoods; they are used frequently for constructing oars, baseball bats, and hockey sticks. The Ash grows in moist soils in valleys and on slopes with many other hardwood species. The leaf of an ash is known as a compound leaf because the complete leaf possesses five to seven smaller leaves, known as leaflets. Notice the difference between the compound leaf of the ash and the leaves pictured below.

**Station 10. Elders in the Forest**

This Northern Red Oak is a squirrel’s paradise. Acorns from the oak are favored by Gray Squirrels because they provide a nutritious protein and fat diet important to the health of the squirrel. In addition, acorns are important to the diet of many birds and other mammals. Humans can even use the acorn for food, grinding them up then boiling them to make a fine flour.

Northern Red Oaks are an important hardwood for flooring, furniture-making, fence posts, and pilings. Once, when larger oaks were more abundant, they provided straight, strong, and durable wood for Maine's ship building industry. The tree can grow to a height of 90 ft and a diameter of 2 1/2 ft. Their leaves alternate along the stem, each leaf being composed of seven to eleven pointed-tipped lobes. Less abundant in Maine than the Northern Red Oak is the White Oak, which is characterized by rounded lobes instead of pointed ones.
Station 11. Forest Levels

At this outlook, you can see a mixed deciduous and evergreen forest. Forests like this have different plants and animals living at various levels. On the forest floor, we find a unique type of flora and fauna where species like the Ruffed Grouse feed on insects, berries, and seeds that are on the ground. The next level in the forest, the shrub level, is an area with unique plants, animals, and low sunlight conditions. Here, Hairy Woodpeckers get their fill by probing for insects in the bark and hollows of trees. The understory level is represented by understory trees, such as Hop Hornbeam which tolerates the low light conditions of the understory. The top level of the forest, known as the canopy, hosts species like the Red Squirrel, who enjoy the seeds of the towering hemlocks and pines.

Each forest level hosts different species due mainly to the differences in temperature, light, and humidity at the different forest levels. The ground cover consists of ferns and grasses, and as a result, other species that feed off these types of plants spend much of their time on the ground. Each animal in the forest community occupies a different feeding area and has a unique life-style, known as a niche. Each species has a niche, which represents the unique food and habitat requirements of a species. The separate niches of each species in the community enables different species to coexist. A forest with many different levels can support a variety of different species that occupy different niches in the habitat.

Station 12. Life's a Beech

The beech is one of the most abundant trees in the arboretum. It is identified by its leaf pattern, consisting of straight parallel and opposite veins originating from a central vein. Beech leaves are easy to spot in fall because they typically stay on the tree through early winter. In winter, you can also recognize the beech tree by its’ long and sharp 3/4 inch buds. The tree bark is unique, maintaining its gray and smooth surface throughout the lifetime of the tree. The beech nut is enjoyed by many people because the thin-shelled, sweet kernels can be roasted or used for vegetable oil. Many birds including Blue Jays love them, while Gray Squirrels and Chipmunks may be seen with a few nuts between their cheeks.

Plant and animal life by the stream experience similar conditions of light, temperature, and humidity, known collectively as abiotic conditions. Up here on the ridge, relatively far
from the stream, there is a diversity of species that thrive in drier, warmer, and higher light-intensity than those by the stream. Plant species that coexist in similar abiotic conditions of sunlight, temperature, soil nutrients, and moisture live with one another in groups called associations. Here, there is an association of American Beech, Red and Sugar Maple, Hop-Hornbeam, and White Ash.

**Station 13. There's a Fungus Among Us**

You may have seen decomposers at work throughout your walk in the Arboretum. The mushrooms and shelf-like **Bracket Fungus** you can see are typically found on diseased or dead trees. The dead tree nearby has a host of fungi that are thriving on the nutrients of the tree.

Often overlooked, decomposers are one of the most critical elements in a forest. It is the decomposers that perpetuate the cycle of life. When plants and animals die, their bodies contain a great deal of useful nutrients that live organisms require. It is the decomposers that convert dead organic matter, known as **detritus**, into nutrients that plants can then absorb through their root structure. Decomposers complete this nutrient cycle through a variety of processes known as **decomposition**.

**Station 14. Tiny Places**

Though you may not see them, forests are home to many different organisms. They are living in various nooks and crannies, watching you as you pass through the forest. The small hole at the foot of this tree is a nice space for mice, rabbits, or birds.

Insects, like some **caterpillars** make their homes in leaves, spinning a small cocoon in the leaf and winding the leaf up for protection. If you pick up any leaf in the Arboretum, you may find that there are small bumps and discoloration on the surface, where an insect or bacteria may be living.

In the dried-up stream-bed below, mossy rocks shelter many tiny insects, amphibians, and reptiles. Here, there may be **American Toads** and **Red-spotted Efts**. Efts live in wooded areas and are the sexually immature equivalent of a common salamander, the aquatic **Red-spotted Newt**. Toads and Efts are common in New England, enjoying moist woodlands
beneath logs, rocks, and old stumps. Besides being cozy homes, why else do you think these huge boulders are here?

**Station 15. Tell the Past By the Present**

Over millennia, sediments in the stream were compressed and heated and given a horizontal orientation as sedimentary rock. Eventually, under great pressure, the bedrock was forced to fold, or bend, pushing them into their current vertical orientation. Continue on down the trail to the stream-side, where you can see vertical bands of bedrock beneath the large boulders left over 12,000 years ago.

Thousands of years ago glacial ice covered Central Maine. The ice moved and scoured much of the surface of the land and deposited surface rock and soil as sediment in places as far out as the Maine coast. The weight of the glaciers was tremendous and pushed the ground below the level it is at today. When the glaciers began to melt, they left large boulders on the coast and inland, including the ones in this stream bed. At the same time that the glaciers melted, marine water rushed in where ice once blocked the passage of the water. The sea deposited large amounts of sediment on what is now inland Maine. It is amazing to think that inland places, such as the Perkins Arboretum and Bird Sanctuary was once under salt water.

**Station 16. Changes in a Stream**

In many ways, streams are the most dynamic elements of a community. The Perkins Stream is gradually cutting away at its surroundings, and carving out its bed deeper with time. Expanding and shrinking its bank with the fluctuation of seasons and rainfall, the direction of the water changes due to the mechanisms of erosion and deposition. Erosion is the process by which the surface of rock or soil is worn away by wind or water. Streams are one of the most important erosive forces for they constantly undercut stream banks and may force sturdy trees to come crashing down over the water.

As a stream moves and rounds a bend, the water in the stream is pushed up against the bank on the outside of the curve, placing enormous amounts of pressure on the bank wall and eroding bits and pieces of the wall with time. The water that flows on the outside of the curve then carries the pieces it cut away from the bank downstream. On the inside of the bank, slower moving water cannot move heavy sediment, as a result, course material like small stones are deposited on the inside bank of the stream bed.

**Station 17. The Eastern Hemlock Community**
This Eastern Hemlock community is one of the most unique parts of the Arboretum. Here, tall Hemlocks create a microclimate for their young to grow up. Hemlocks can germinate in very dark and moist conditions, typical of this forest floor. After a seed has taken root, it may take many more years to grow beyond a height of ten feet. All trees need sunlight to grow, and the shorter hemlocks here are probably stunted in growth. Their elders dominate much of the sunlight, and prevent younger generations from growing taller. When one elder falls, it creates a light gap in the forest floor. Sunlight can now reach the ground, enabling plants, like younger hemlocks, to capitalize on this all-important resource.

Associated with the hemlock forests is the Red Squirrel. Listen for their characteristic chatter, as they call out to you and everyone else that passes their way. Red Squirrels are particularly active in the fall, scurrying around in preparation for the long winter. They eat and store the seeds of White Pine and Eastern Hemlock. Small shucks of cones can be found at the base of some hemlock trees, indicating that a squirrel has probably been foraging here. Black-capped Chickadees also inhabit these hemlocks. Along with the Red Squirrel, the Chickadee can be spotted up in the branches, often signifying its presence with a popular call: Chick-a-dee-dee-dee.

Life in the Balance

Along the trail, you have learned that succession is taking place all around you and that this process involves the replacement of light-loving and quick-growing species with other slower growing and shade tolerant species. Plants that typify the early stage of succession create a new, shaded microclimate which is difficult for pioneer plant seedlings to grow in. Early successional plants are therefore replaced by later successional plants that create a new microclimate in the area. During your walk, you have also learned that food chains are in place in the environment, intricate relationships exist that all forest species are dependent upon for their own sustenance.

The guided trail ends by the stream in a particularly beautiful location among tall Eastern Hemlocks. If you are quiet and listen, you can hear the stream water slipping beyond rocks and tumbling down the stream. You are at the center of the Arboretum, the quiet and serenity of this place hopefully invites you to stay. Please stay and enjoy the Perkins Arboretum and Bird Sanctuary’s three additional trails.
If you would like additional information on the Blue, White, and Red Trails of the preserve, see Appendix A. Seasonal information, which includes some interesting and unique characteristics of the four seasons in the Arboretum is presented in Appendix B.
Appendix A

The Blue, White, and Red Nature Trails

The Blue Trail

From the Blue/Yellow Trail junction, the Blue Trail winds along the ridge above the Perkins Stream through a transitional forest. The narrow path dips into a moist region of hemlocks, where you can hear the rushing of the Perkins Stream. At certain points, you may see the stream below. Notice the channel becoming smaller and smaller as you move upstream. The trail is an easy walk, only a few hills along a quiet quarter-mile path that eventually reaches Mayflower Hill Drive by the Alumni House.

Distinctive along the trail is the tall ridge that you traverse above the stream valley. This ridge is known as a residual ridge because it was formed from the gradual and continuous process of stream erosion and cutting. Toward the south, you can see the stream cutting slowly away at the sides of the bank. The stream once flowed at a similar level to where you are standing now. Over time, the stream has continued to carve the ground, leaving this ridge. Where recent slumps have occurred, you can see a U-shaped formation and points where trees have bent and fallen. At many points, young plants have colonized recent slumps, taking advantage of the high light conditions occurring after a tree fall.

American Beech is very common along this trail, its distinctive leaves and buds can be seen trail side. Beeches are slowly moving into this area, dominating light levels, and out-competing seedlings of other deciduous trees like the Gray Birches. In beech leaves, you can often see several signs of insects forming homes in their deciduous leaves.

The White Trail

From the White/Yellow Trail junction, the White Trail continues onward through several tall and unique stands of Eastern White Pine. The trail then threads its way through a dense section of American Beech, thinning out into an area dominated by White Oak seedlings. Stay up along the ridge walk and follow the White Trail along its hilly path where you can see great views of the Perkins Stream valley, the lower Perkins stream, and an old beaver dam. Ending up at the railroad tracks, the White Trail is approximately 1/3 mile in length.

A unique segment of the trail passes through a section of chewed and pointed stumps, evidence that a Beaver has
been eating and building a house in the area. Not long ago, a beaver lodge plugged the marsh below, blocking the flow of water through a culvert beneath the railroad tracks. Beaver lodges are interesting because their entrances are underwater. Inside, the dam has a dry floor that is padded with soft twigs, leaves and grasses. Beavers are the largest rodent in North America.

Similar to the erosive process that characterized the residual ridge along the Blue Trail, the White Trail bridges the same ridge left from the process of stream cutting and undercutting.

The White Trail connects with the Red Trail, which drops down below the other side of the marsh. To connect with the Red Trail, meet up with the railroad track at the end of the White Trail, and upon reaching the tracks, walk 200 feet to the right, where you will see a Red Trail arrow indicating the entrance of the trail.

The Red Trail

A mix of deciduous hardwoods and softwoods await you through a gently rising and sinking path along the Red Trail. Beginning at the Red/Yellow Trail junction, the Red Trail enters a dense Eastern Hemlock forest, and slowly drops down into a deciduous hardwood forest of Northern Red Oak and Sugar Maple. The Red Trail dips down through the marsh area of the Arboretum, providing you with a close-up view of this wetland and its water-loving plants like Cattails. Follow the trail to the old railroad tracks where you can sometimes witness the train slowly gliding down toward Waterville. The Red Trail is approximately 1/2 mile in length.

As you may have seen along the White Trail, a Beaver was responsible for creating the cat-tail marsh you see along the Red Trail. Once, the stream ran freely through a large culvert beneath the railroad tracks. A beaver family found this stream a perfect place for a small swimming pool. Below, you can see the old logs and planks used to plug the culvert, this plug had major impacts on the community of trees once living along the stream. As a result, water was diverted into the Perkins flood plain year-round. The once tall-standing deciduous trees were drowned out and replaced by plants that thrived in more marsh like conditions. In the early 1990’s, a small pond formed here, and now you can see the remnants of the process of succession as open water is replaced by Cattails and Speckled Alder. Cattails and Speckled Alder will be replaced by later successional plants; ultimately, there may be another deciduous forest growing
along the stream bank.

On route, stop to listen for Pileated Woodpeckers. Notice their feed markings, the large rectangular scars left on tree trunks. Christmas Fern, Club Moss, and Wintergreen are common ground cover along the trail.

To connect with the White Trail, join the railroad at the end of the Red Trail. After reaching the tracks, walk 200 feet to the left, where you will see a White Trail arrow indicating the entrance of the trail.
Appendix B

The Seasons

One of the most interesting and enriching elements about life in the Maine outdoors is the region's distinct change of seasons. Changes in the land and waters of this region are dramatic from month to month, and these changes help make walks in the Arboretum diverse and enriching experiences at any time.

The Nature of Spring (Beginning of Spring: March 21)

Spring is in the air! It is the season of warmer weather, many new and little creatures are born, black flies are hovering, flowers are blossoming, and, Ah, Ah, Achew!!! Yes, along with the beauty of this time, spring is the season that many trees and other plants choose to set their pollen to the wind. Though the pollen brings tears and sniffles to many, the rich smell of new life in the spring invites us to the outdoors after the long winter. Notice the many colors of petals, arranged beautifully on the heads of flowers. Why are there so many colors?

One mechanism flowers use to reproduce is to employ birds and insects to exchange flower pollen grains. Flowers display bright colored petals and wonderfully smelling nectar to attract birds and insects to their pollen. The pollen from a flower sticks to the wings and feathers of a bird or insect while the organism drinks the sweet nectar. After drinking, birds and insects will often travel to another flower of the same species, sprinkling it with the pollen of the previous flower.

In spring, migrating birds have returned from the South to spend the upcoming warm months in Maine. After over-wintering in the warm weather in the tropics, why do you think they returned? A major difference between tropical regions and temperate regions is that in temperate regions, like Maine, spring and summer have very long days full of sunlight. In spring and summer, birds experience more daylight in the temperate zone, as a result, they gain more time for feeding and nourishing their offspring. Furthermore, the spring and summer of the temperate zone produce a great deal of seeds and fruits. Because resources in spring are more available in temperate areas, many birds chose to fly long migrating routes in order to take advantage of the New England spring and summer. See Appendix C for a table of popular spring-time birds in the preserve.

The Nature of Summer (Beginning of Summer: June 21)

Many species enjoy summer because the days are long and food is abundant. Life abounds in summer, newborns grow, and plants convert the energy of the sun into food and
nutrients for themselves and others. In summer, species are active day and night, spending their summer months growing and reproducing.

A number of adaptations allow plants and animals to live in the heat of summer. Sunlight exposed leaves often reduce the amount of surface area on their leaf, discouraging the heat of the sun from overheating the leaf surface. On the same tree, leaves at the top of the tree are typically smaller than leaves at the bottom. The top leaves are exposed to more sunlight and therefore reduced in size to prevent desiccation and over heating. The lower level leaves on the tree are larger to enable them to intercept the sparse sunlight that penetrates the leaves of the canopy above. Other leaves like the Quaking Aspen, have a leaf structure that facilitates their leaves shaking in the breeze. The Quaking Aspen has a flattened petiole. The petiole is the stem of the leaf that attaches it to a branch. This leaf structure expands the surface area of the petiole, providing more area for wind to blow on it, thereby cooling leaf surfaces with every passing breeze.

Insects and spiders are particularly abundant in the summer time. An early morning walk along the trail may tangle you up in small cobwebs, a result of spider activity the evening before. Spiders trap flies, mosquitoes, beetles, and other small creatures in their webs. Their cobwebs are really obvious after a light rain. Teaming up with spiders to keep the mosquito population down, bats are common during summer evenings. A Little Brown Bat can consume almost 5000 mosquitoes in one night!

The summer night is exciting and a walk through the arboretum reveals sounds of chirping crickets, bats flying overhead, and a possible encounter with a barred owl. Barred owl's are famous for their call which sounds like they are saying "Who cooks for you?". An owl's wings are specially adapted to enable them to fly silently, a key trait that allows them to hunt for rodents with surprise.

**The Nature of Autumn** (Beginning of Autumn: September 22)

Autumn is perhaps the most dynamic season of all. In autumn, there is a gradual change of color as the Arboretum takes on a glow from aspens, maples, and oaks, all ablaze in beautiful color. Day length is waning in late autumn days, and rodents like squirrels and chipmunks can be seen scurrying around caching nuts for the long winter sleep. In the fall, most species remain busy, consuming large quantities of food, and putting on fat which is critical to surviving the oncoming Maine winter. Migratory birds are preparing for their trip south, while many non migratory birds flock together in search of declining food resources.

Why do leaves change color? Leaves of spring and summer are green because of the presence of an energy-converting chemical in leaves known as chlorophyll. Chlorophyll in leaves eventually dies, and when it does, the real colors of the leaf are unmasked. The
brilliant colors of fall are always present in leaves; these colors are simply hidden in the spring and summer months by the green chlorophyll. See Appendix D for a list of tree species and their typical autumn colors.

Notice the difference between trees that keep their leaves throughout the winter, known as evergreen species, and those that drop them every year, known as deciduous species. Deciduous trees lose their leaves in autumn as days become increasingly shorter. Hanging on to leaves through the cold winter can cause a tree to become dehydrated. As a result, deciduous trees prevent desiccation by dropping their leaves in the fall. Fortunately, fallen leaves eventually decompose into soil; the rich soil provides nutrients for all the surrounding plant life.

Certain trees have adapted to flower in autumn. The Witch Hazel produces tiny yellow flowers in autumn. Can you think of why? One reason may be that in late autumn, many leaves from trees have fallen to the ground. At this time, wind passes freely through the forest interior, blowing pollen from the Witch Hazel to other Witch Hazel plants.

The Nature of Winter (Beginning of Winter: December 22)

It is a bit chilly, but new fallen snow is the perfect occasion for a walk or ski in the Arboretum. Winter often challenges even the hardiest of species because food and water are very scarce. You may think that water is abundant—look around you at all this snow! The water is frozen, however, and not in a form that plants and animals can use. As a result, many trees dry out even though they may have gallons of unavailable frozen water by their side.

In spite of the challenge of winter, life abounds in forests of Maine. Beneath the snow, rodents like the Weasel are scurrying around feeding on Deer Mice, or Red-backed Voles. Many active species are feeding on evergreen plants below the snow surface like Wintergreen and Partridge Berry. On warm days, these plants carry out photosynthesis, producing chemical energy from the sun throughout the season. In the stream, fish and other organisms are living beneath the ice, feeding off algae and debris. Some species choose to sleep through the winter season, curling up in a warm hollow beneath the snowpack, and hibernating. When animals hibernate, their body temperature and metabolism rate drops below normal. Hibernating mammals like Woodchucks consume less oxygen and need relatively little nutrients to sleep through the cold winter months.
Deer and *Rabbits* can be seen drinking at the water’s edge, and many are wearing their winter fur. Some species have winter coats that look quite different from their summer coats. The *Snowshoe Hare* is one of those species whose coat changes. In summer, the fur is mostly gray-brown, with dark hairs along the back and hind legs. In winter, its beautiful white winter coat blends into its surroundings. Snowshoe hare have large hind feet, like snow-shoes, which help them to move rapidly along the deep snow surface.

A great winter activity is footprint tracking. Animal markings that are difficult to encounter in other seasons are easily identifiable in winter time. The guide in Appendix E will help with your identification. Tracking is exciting and important to understanding how life is active in the winter time.
## Appendix C

### Common Birds of the Perkins Arboretum*

<table>
<thead>
<tr>
<th>Arboretum Bird Species</th>
<th>Seasonal Presence or Normal Spring Return Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-capped Chickadee</td>
<td>Year-round</td>
</tr>
<tr>
<td>Pileated Woodpecker</td>
<td>Year-round</td>
</tr>
<tr>
<td>Downy Woodpecker</td>
<td>Year-round</td>
</tr>
<tr>
<td>Hairy Woodpecker</td>
<td>Year-round</td>
</tr>
<tr>
<td>Red-breasted Nuthatch</td>
<td>Year-round</td>
</tr>
<tr>
<td>White-breasted Nuthatch</td>
<td>Year-round</td>
</tr>
<tr>
<td>Brown Creeper</td>
<td>Year-round</td>
</tr>
<tr>
<td>Ruffed Grouse</td>
<td>Year-round</td>
</tr>
<tr>
<td>White-throated Sparrow</td>
<td>April 19</td>
</tr>
<tr>
<td>Broad-winged Hawk</td>
<td>April 19</td>
</tr>
<tr>
<td>Yellow-bellied Sapsucker</td>
<td>April 19</td>
</tr>
<tr>
<td>Pine Warbler</td>
<td>April 21</td>
</tr>
<tr>
<td>Hermit Thrush</td>
<td>April 25</td>
</tr>
<tr>
<td>Black-throated Green Warbler</td>
<td>May 6</td>
</tr>
<tr>
<td>House Wren</td>
<td>May 8</td>
</tr>
<tr>
<td>Ovenbird</td>
<td>May 9</td>
</tr>
<tr>
<td>Wood Thrush</td>
<td>May 11</td>
</tr>
<tr>
<td>Veery</td>
<td>May 12</td>
</tr>
<tr>
<td>Great Crested Flycatcher</td>
<td>May 16</td>
</tr>
<tr>
<td>Red-eyed Vireo</td>
<td>May 18</td>
</tr>
<tr>
<td>Scarlet Tanager</td>
<td>May 20</td>
</tr>
<tr>
<td>Eastern Wood-Peewee</td>
<td>May 21</td>
</tr>
</tbody>
</table>

## Appendix D

### Common Trees and Their Autumn Leaf Colors

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Change in Leaf Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Beech</td>
<td>Copper</td>
</tr>
<tr>
<td>Gray, Paper, Yellow Birch</td>
<td>Different Shades of Yellow</td>
</tr>
<tr>
<td>Red Maple</td>
<td>Bright Red</td>
</tr>
<tr>
<td>Sugar Maple</td>
<td>Bright Orange-Red, Yellow</td>
</tr>
<tr>
<td>Northern Red Oak</td>
<td>Reddish Brown, Dull-brown</td>
</tr>
<tr>
<td>White Oak</td>
<td>Orange Brown</td>
</tr>
<tr>
<td>Quaking Aspen</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
Appendix E

Arboretum Mammal Tracks

Snowshoe Hare
Scale: 1 in=4 in

Stripped Skunk
Scale: 1 in=1.75 in

American Crow
Scale: 1 in=1.25 in

Beaver
Scale: 1 in=1.25 in

Red Squirrel
Scale: 1 in=1 in

Deer Mouse
Scale: 1 in=2 in

Eastern Chipmunk
Scale: 1 in=1.25 in

Gray Squirrel
Scale: 1 in=1.25 in
Acknowledgments

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References

   Society for the Protection of New Hampshire Forests: Concord, NH, USA.