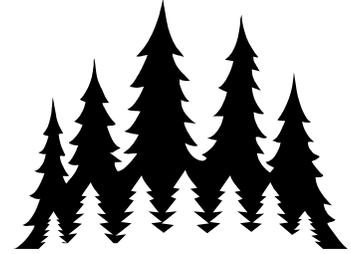


White Mountain National Forest

Forest Discovery Trail

Grades K-4



Welcome to the White Mountain National Forest - Forest Discovery Trail. The Forest Discovery Trail is a living classroom in ecological management. The trail leads through 85 acres of young hardwoods and stands of old pines, past rocky streams and forest wetlands. Along the way you will see forest practices that are patterned after natural disturbances. The full tour follows a 1.5 mile loop trail with 10 stops along the way. We do not recommend taking students in grades K-4 to the final two stops on the trail, because of travel distance and time required to visit the stops.

The Discovery Trail is a 1.5 mile loop trail with a compacted crushed gravel bed that is 6 feet wide. The trail grade is up to 8% which is easily traveled by a wheelchair. One small section of the trail does have a 14% grade which requires wheelchair assistance. There are benches strategically placed throughout the trail. There are handicapped toilets at the trailhead and a parking lot that will easily accommodate buses.

As you explore the Forest Discovery Trail, you will see examples of the following themes.

1. Trees and forests change over time.
2. Forests are home to many plants and animals.
3. Everything in the forest is connected to everything else.
4. Humans help to care for our forests.

As you review this guide, you will notice several sites are marked with an icon (☀). These sites best demonstrate the themes described above. You may want to distribute your time appropriately, focusing more attention on these key sites and less on the others.

Pay attention to the following as you walk along the trail:

- Your senses, especially the sounds, sights, and smells of the forest
- What the forest looks like at each site – the variety that exists
- Signs of animal presence (tracks, scat, nests, holes, etc.)
- Signs of human use (roads, cut trees, trails, equipment, etc.)

Vocabulary

Community: A group of all organisms in a particular habitat that are bound together by interrelationships.

Ecosystem: The interacting system of a biological community and its nonliving environment; also, the place where these interactions occur.

Even-aged management: Management practices that result in a forest area in which all the trees are the same age, due to simultaneous harvesting.

Forest: A community of trees, as well as the organisms, soil, water, and air associated with them.

Forester: A person trained in the science of caring for forests.

Forest management: the process a forester uses to care for a forest. This includes three steps: 1) research forest ecology, 2) establish management objectives, 3) determine and implement management practices.

Forest management plan: A document that addresses long-term goals and objectives for a forest, typically encompassing a time period of ten years or more. Plans include goals and objectives, a detailed description of the forest, an inventory of species present, and a list of management recommendations with an activity schedule.

Forest stand: A group of trees sufficiently uniform in species composition, arrangement of age classes, and condition to be considered a distinguishable unit.

Habitat: An area that provides an animal or plant with food, water, shelter, and living space.

Logger: A person who cuts trees for a living.

Resource manager: A professional who cares for natural resources, applying scientific, economic and social principles to the resource. Examples include a wildlife manager (wildlife and related habitat), a natural resource manager (land and water), and a forester (forests and trees.)

Succession: The gradual replacement of one community by another; Change over time.

Uneven-aged management: Management practices that result in a forest area in which the trees are a wide range of ages, due to harvesting that takes only individual trees or small groups of trees at a time.

Management Practices Demonstrated by the Forest Discovery Trail

The management practices used at each site have been described within this guide. Additionally, icons on the bottom of each page show the management practices used. A box surrounds the practice used at each site. If no icons are included, no management practice has been highlighted for that site.

Sometimes wind, fire, ice storms or infestations by insects or diseases can kill a forest in a short time. When the forest regrows, the new trees are all about the same age, even though size may vary with growth rate. This type of forest is called **even-aged**.



Other times, a forest may grow for many years with only individual trees or small groups of trees dying. This provides open spaces that soon will be filled by young trees. These forests are called **uneven-aged**.



Over time, each type of forest will take on a different appearance. Certain trees, such as aspen, black cherry, oak, hickory and pine, grow best if they are managed as even-aged forests because of their need for direct sunlight. Other trees, such as maple and beech, can thrive in the shaded environment of an uneven-aged forest. Each type of forest – even-aged and uneven-aged – provides different wildlife habitat (food and shelter.) This means there will be different birds and animals associated with the different forests or parts of forests.



1. The Web of Life: Forest Ecosystems

- *Forests are home to many plants and animals*
- *Everything in the forest is connected to everything else.*
- *Humans help to care for our forests*

What is a forest? A *forest* is a **community** of trees and the organisms, soil, water, and air associated with them. Forests are filled with plants of many ages, sizes, and species.

Do all forests look alike? What is the same? What can be different? (types of trees, ages of trees, animals that live there.)

“Plant” your feet on the trail, then quietly look and listen for plant and animal life.

- **What do you see and hear?**
- **What connections do you think are in the forest in front of us?**
 - **Can you see anything that an animal might eat?**
 - **Can you see a place that an animal might live?**
 - **Can you see anything that more than one animal might use?**
- **What kinds of trees are in this forest? Can you identify any?**
- **What else lives in this forest besides trees?**
- **Do you notice anything that humans have affected?**

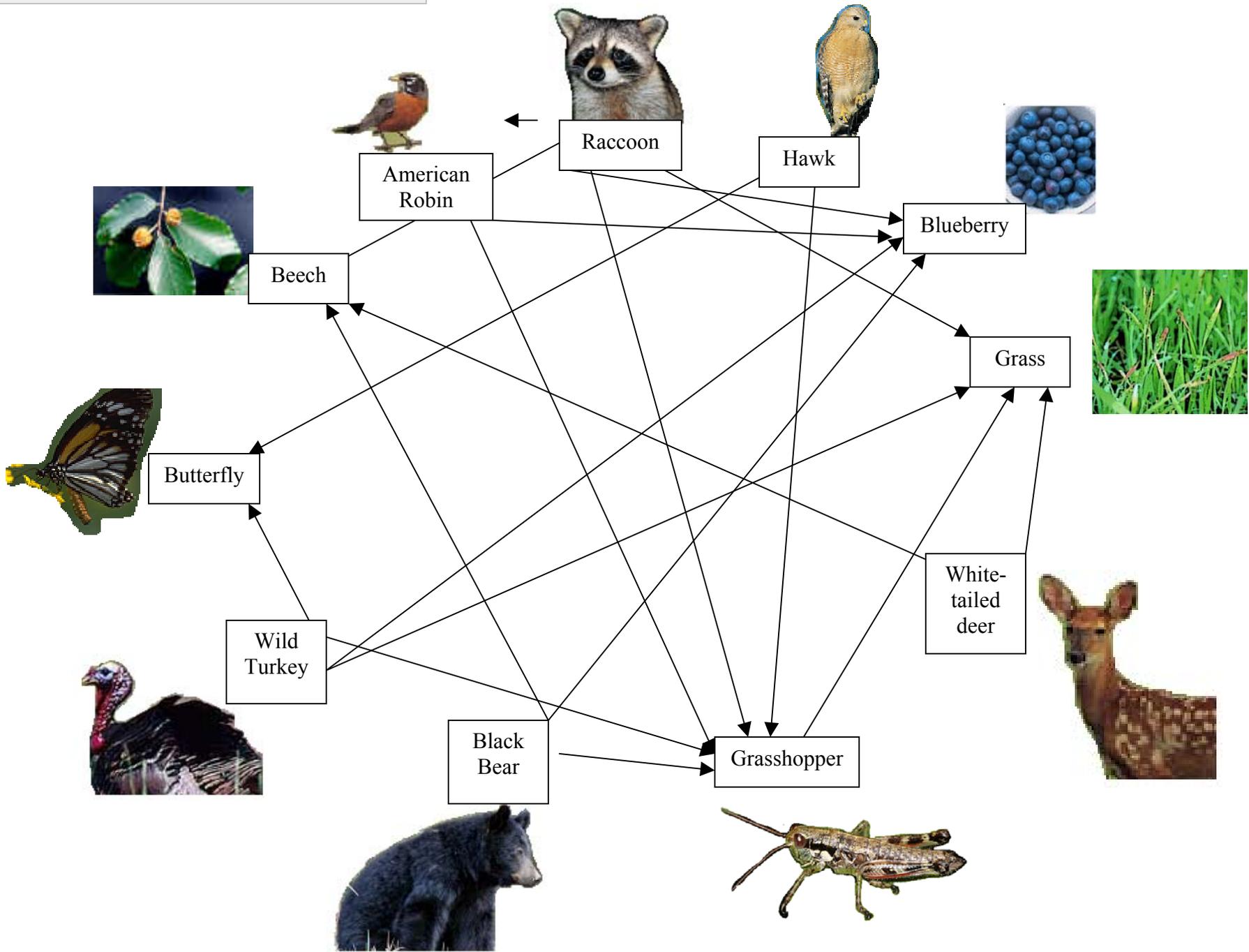
As the panel suggests, everything in the forest is connected to everything else. The diagram on the next page shows just some of the many connections you could find at this stop on the trail.

Where do humans fit into this web? (We eat many of the same foods as the animals, such as blueberries. Humans also hunt for deer and bear.)

How do forests benefit humans? We use forests for recreation, wood and wood products, to see wildlife, to live in, and for food, clean water, and clean air. **Who takes care of our forests?** In the White Mountain National Forest, *foresters* manage for a wide range of objectives, including forest health, wildlife habitat protection and improvement, timber harvest, recreation, and harvest of non-timber forest products. Foresters are the professionals who manage and care for forests by creating *forest management plans*. The foresters work with *loggers*, who cut trees based on the management plan.

As you walk along the trail, you will notice many different types of *forest stands*. Pay careful attention to the forests, using your senses (especially sight, sound, and smell), looking for signs of human and animal activity, and looking for connections between the plants and animals that live in the forest.

The Web of Life: Forest Ecosystems



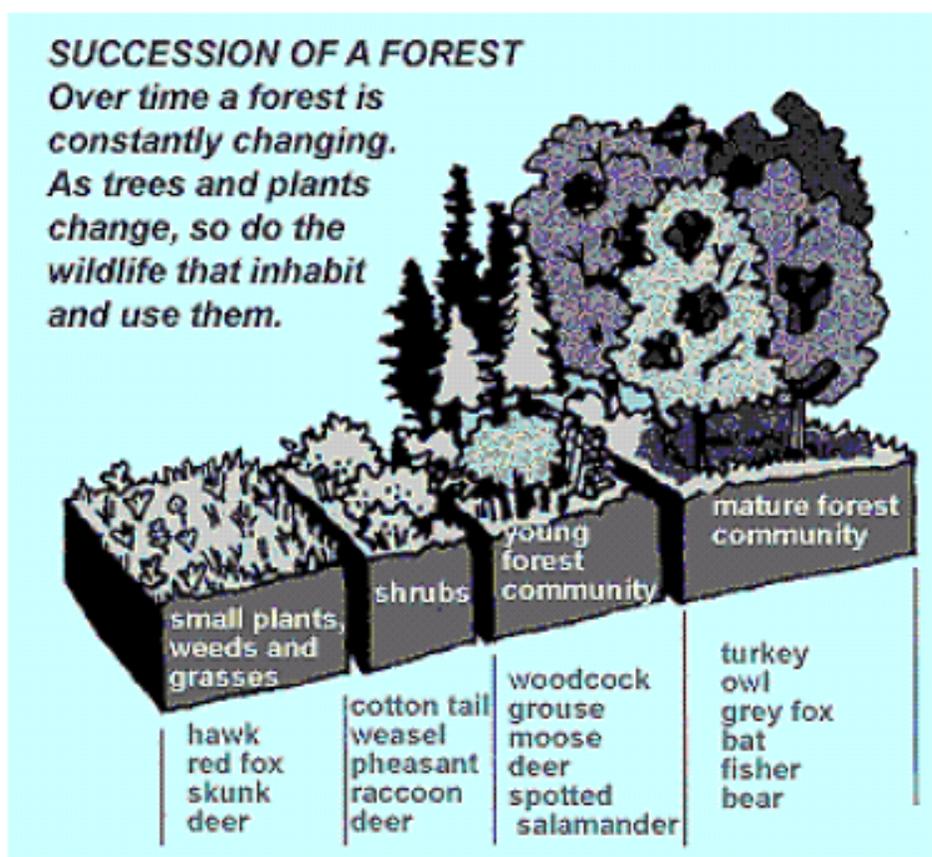


2. The Forest: Where Change is the Only Constant

- *Trees and forests change over time*
- *Everything in the forest is connected to everything else.*
- *Humans help to care for our forests*

“Plant” your feet on the trail, then close your eyes and quietly listen to the sounds of the *forest* for 15 seconds. **What do you hear?** Look around quietly for 15 seconds. **What do you see?**

In a forest, what might change over time? (types of trees, size of trees, etc.) When new openings appear in the forest, the seeds of many plants and trees grow. The species that grow there vary depending on the amount of sunlight, the moisture of the soil, and the seeds in the soil. Over time, an area will naturally change from having one set of species to another. This process is called *succession*. Forests are constantly changing, whether it’s the simple change of day to night or season to seasons, or the larger changes created by windstorms, fires, and timber harvest. As trees and plants change, so does the species of wildlife that use them.



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2. The Forest: Where Change is the Only Constant (cont.)

At any given time, you can often find many forest layers. The picture below clearly shows the forest floor, the herbaceous or grassy layer (small plants, weeds and grasses), the shrub layer, the understory, and the canopy. Many plants and animals live in different layers of the *forest* at different times in their lives. For example, a maple seed starts out in the forest floor and the plant grows into the canopy level. The black bear lives most of its life on the forest floor. But, bears can spend the winter in a burrow underground, eat grass and other small plants, feed on berry shrubs, or climb into the tops of beech trees to eat the nuts that grow there. This means that a *forester* who is trying to improve bear *habitat* needs to consider the health of all of these forest layers, not just the forest floor.



← Canopy

← Understory

← Shrub

← Herbaceous/grassy

← Forest floor

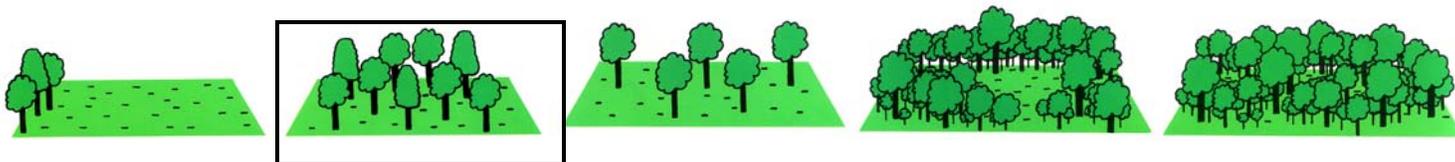
A forester has to understand the whole forest *community* and how change could affect the forest's health, appearance and growth. Everything in the forest is connected to everything else, though the connection may not be easy to notice at first. **What might happen if a forester managed the forest by studying only one tree?** (By not looking at the connections between that tree and the rest of the forest, the forester may not recognize the positive or negative impacts of their actions on the forest community.)

3. One, Two... Tree By Tree

– *Humans help to care for our forests*

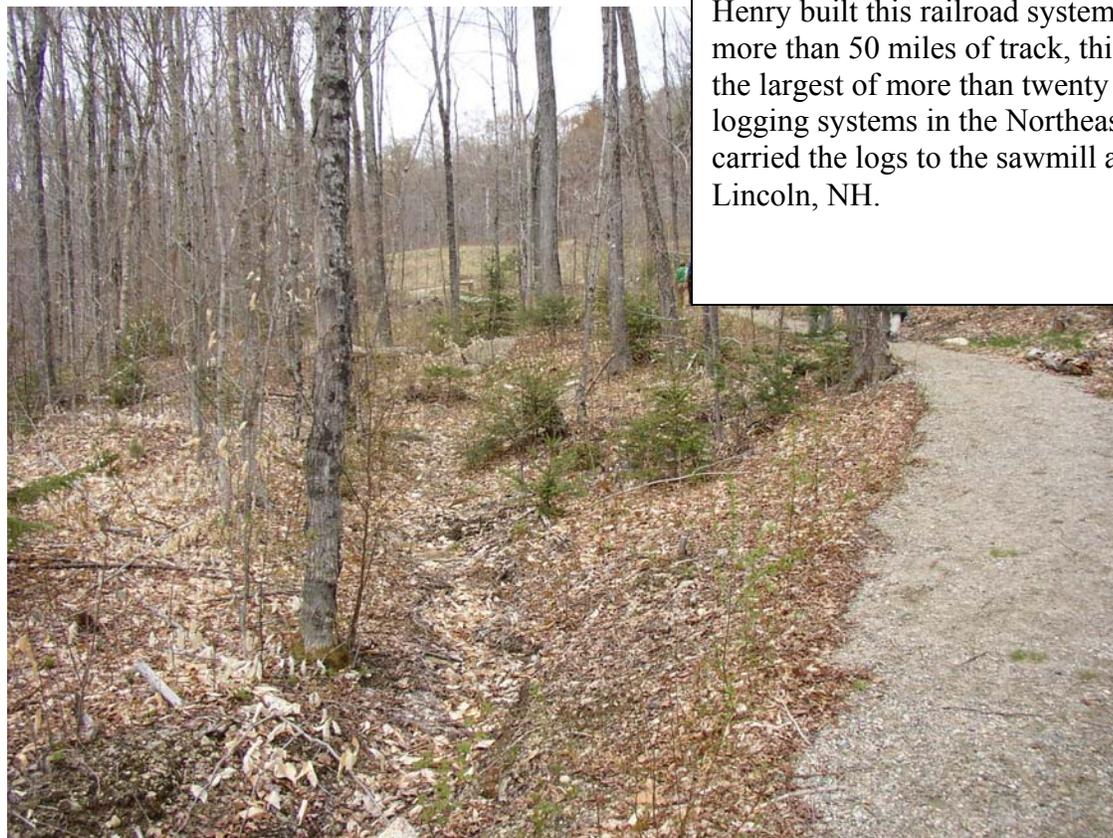
Does this site look the same as the one you just left? What looks different? Does it look like a human has been here? If so, how can you tell?

At this site, humans have cut down several individual trees, rather than large groups of trees. *Foresters* might make this choice because it is attractive to humans, because it maintains existing wildlife *habitat*, because it doesn't change the environment as much as other harvesting methods, or for other reasons. This form of management copies what happens in nature when one tree dies and falls down.



The Old Railroad

Between Panels 3 and 4, in the woods on your left, look for a raised berm running roughly parallel to the trail. This is what remains of a railroad bed used more than a century ago to carry logs from the forests to the local mills. J.E. Henry built this railroad system in 1892. With more than 50 miles of track, this network was the largest of more than twenty such railroad logging systems in the Northeast. Train cars carried the logs to the sawmill and pulp mill in Lincoln, NH.



4. Fields in the Forest: Wildlife Openings

- *Forests are home to many plants and animals*
- *Humans help to care for our forests.*

What looks different about this site? The previous stop was a relatively closed *forest*, with single trees removed to create very small openings. At this stop, *loggers* have cut larger groups of trees down, creating larger openings and far different *habitat*. Some of the animals that could use this site include bluebirds, grasshoppers, deer, rabbits, bears, and grouse. **What are some ways that these animals might use the area?** (as a place to find food, a place to live, a passage from one place to another, etc.)

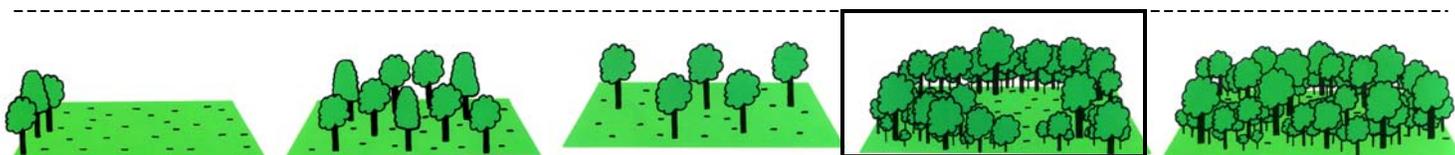
“Plant” your feet on the trail, then quietly listen to the sounds of the *forest* for 15 seconds. **What do you hear? What other places have you been in that look like this site?** Perhaps this site resembles the edge of the schoolyard, an overgrown farm field, or your backyard. Clearings like this appear throughout New Hampshire and are an important type of habitat for many creatures.

This clearing is a sunny opening, in which grasses, berry bushes, and young saplings like aspen trees thrive. This means the food for animals here is different from the food in thicker forests. The edge between forest and field is especially diverse because, in addition to providing habitat for animals that live in the forest and animals that live in fields, this area is used by animals that use both field and forest. For example, bluebirds nest in tree holes at the forest edge, but hunt for insects in the clearing. Crickets and other insects are not as common in cooler, more protected forests. This edge also provides important hiding cover for wildlife who feed in the open area.

The different plant species that live in open areas, especially berry bushes and grasses, are important food sources for wildlife. Deer, grouse, rabbits, rodents, and moose would find food here. Animals that feed on insects, like bluebirds and swallows, will also feed here.

The picture on the next page shows some of the animals that could use this site. Not all of these animals would be present at the same time. For example, the red fox and white-tailed deer are typically active during dusk and dawn, while the butterfly may be gathering pollen during the middle of the day.

Over time, *succession* will cause small trees to start filling in this area, creating a young forest. The Forest Service plans to maintain this area as a clearing by mowing the grass and preventing small trees from growing.



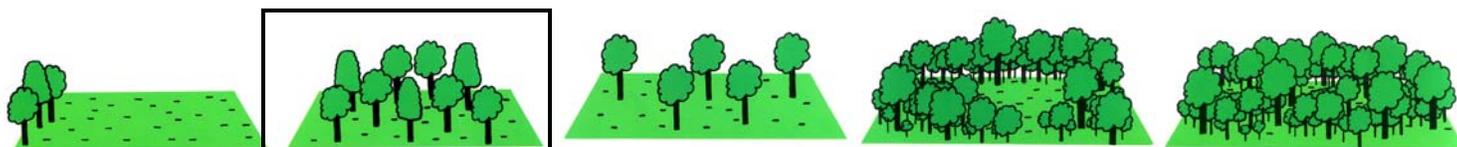


5. The Sheltering Woods

- *Humans help to care for our forests.*

What is different about this site? Small patches of trees have been cut down. The *foresters* and *loggers* copied what happens during a windstorm or forest fire when small patches of trees fall down, leaving a few sturdy ones still standing. **Why might a forester choose this type of forest management?** One good reason for performing this type of cut is to promote growth in the trees that are left standing. When the *loggers* cut the remaining trees in 10-15 years, the trees will have grown significantly, increasing their value as timber.

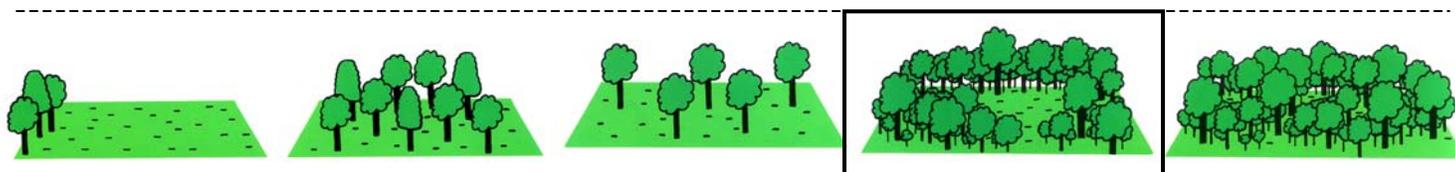
“Plant” your feet on the trail, then quietly listen to the sounds of the forest. **How do the sounds here compare to the sounds in the last site?** (You may hear fewer insects at this site; many insects thrive in open spaces.)



6. Patches of Sunlight Spark New Growth

- *Humans help to care for our forests.*
- *Trees and forests change over time.*

How does this site compare to the one you just visited? At both sites small groups of trees have been cut. This method of cutting is often used when the goal of cutting the trees is to use them for timber, or to create a wide range of wildlife *habitat* in the area. Over time, an area will naturally change from having one set of species to another. As these patches of clearing grow in, they will provide a wide range of older and younger growth, providing a rich habitat for birds and other animals.



7. Fresh Start

- *Trees and forests change over time.*
- *Forests are home to many plants and animals.*

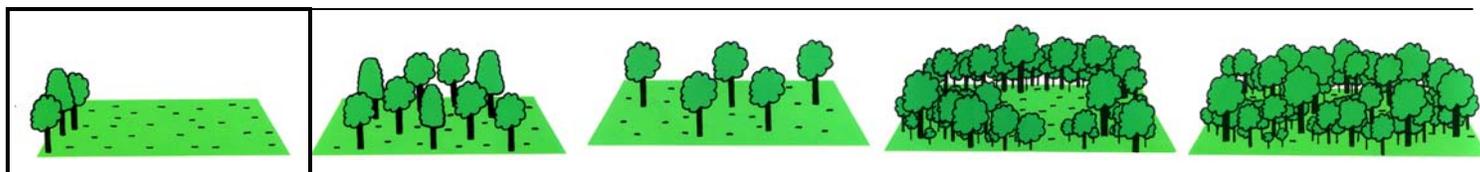
“Plant” your feet on the trail, then quietly listen to the sounds of the *forest*. **What do you hear? Are the sounds the same as in the denser forests? Look around at the forest. What is the same as the previous site? What is different?** This area was clearcut in 2001. This means virtually all of the trees were removed at that time.

What do you notice about the ground at this site? In the years since the trees were harvested, the seeds that were in the soil have grown into small plants and trees. Because there is plenty of sunlight reaching the soil, there are lots of beech saplings sprouting from beech stumps, as well as plenty of pin cherry saplings, grasses, and other plants. All of these plants thrive in bright sunlight. **What do you think might happen to this site over time?** It will eventually grow to be covered in trees, like many of the other areas of *forest* on this trail. This is the process of *succession*, change over time.

In other regions of the world, clearcuts may take many more years to regenerate. In some, the time needed to regenerate is so long that humans replant after cutting an area. In New England, our soils have many seeds (some can live in the soil for up to 100 years!). This means that when an area is cleared, the seeds can quickly regenerate if they have the right amount of sunlight, water, and soil conditions.



This site had bare ground in 2001. This picture was taken in 2006, when pin cherry, beech, and saplings of other species had begun to grow.



Bear Tree

As the trail curves through the lower part of the clearcut, you'll pass a tall, lone beech on your right. Be sure to take a close look. **What is special about this tree?** This tree is full of animal signs! The curved row of black dots on the tree trunk are the marks from a black bear's claws. The bear climbed this tree to get to the top and eat the beech nuts. **Why might a forester leave this tree standing?** When creating clearcuts, foresters try to leave trees that are used for nesting cavities, or trees that hawks and owls use as perches. In this case, the tree was left standing because black bears regularly use it as a food source. **Do you notice any other bear trees around?**



8. Forest Roads: Where Do They Lead?

– *Humans help to care for our forests.*

Can you spot the grown-over forest road near the panel? This road was last used in 1971. **Why might there be a road in the middle of the forest?** In managing a *forest*, *foresters* and *loggers* decide where to place roads so the loggers can get their equipment in and out of the forest. The foresters and loggers also decide which roads to leave open and intact after the logging is complete and which to close. Sometimes, they use heavy equipment to tear up the logging roads. Once the roads are broken up, they are able to more quickly return to their natural condition. Sometimes, foresters choose to maintain a road. They may use these saved roads to increase opportunities for hiking and skiing or they may plan to log the area again in the future.





9. The Old Timers: Nature's Hardwood Forests

- *Humans help to care for our forest.*
- *Trees and forests change over time.*
- *Forests are home to many plants and animals.*
- *Everything in the forest is connected to everything else.*

What do you notice about this area of forest? What is the same? What is different? Do you think the trees here are the same age as in the other forest areas on the trail? Why or why not?

Does it look as though forest management has been done at this site? Allowing natural processes to dominate the landscape is a method that *foresters* use to provide solitude and wildness to humans, while maintaining the diversity of the *forest*. These types of forests provide important *habitat* for animal species that require undisturbed, mature forest, full of hardwood trees like oak, maple, birch, and beech.

This forest has not had any harvests or cuts in over 100 years. Instead, the foresters are allowing natural processes to play out. Remember that *succession* is change over time. **What signs of succession do you notice?** Natural forest disturbances (death of individual trees, insect attacks, blow downs, etc.) occur periodically, creating openings that return the site to an earlier successional stage.

“Plant” your feet on the trail, then quietly listen to the sounds of the forest for 15 seconds. **What do you hear? What is the same as the last time you listened to the forest? What is different?**

“Plant” your feet on the trail, then quietly look for signs of animal life. **What signs do you notice at this site?** Some of the animals that live in this area include red-shouldered hawk, barred owl, pileated woodpecker, ovenbird, and other birds that prefer undisturbed forest-interior sites. Not all of the standing trees are still alive. The dead standing trees are called snags. Snags provide homes to over 60 different species of birds and other animals. The fallen logs on the ground also provide important habitat to animals. These animals, like salamanders, porcupines, and mice, find homes, food, and shelter within the logs. Over time, the logs will also break down into soil, providing nutrients to the new plants.



NOTE: We do not recommend taking students in grades K-4 to the final two stops on the trail, because of travel distance and time required to visit the stops. The information on the following page is provided for your reference only.

10. Streambanks and Salamanders: The Riparian Zone

- *Everything in the forest is connected to everything else.*
- *Humans help to care for our forests.*

Forest streams deliver clear, clean, highly oxygenated water for both aquatic (water-dwelling) and terrestrial (land-dwelling) animals. Natural debris in the stream, such as fallen logs, forms important *habitat* for insects and fish that live in the stream. Natural materials in the stream also helps to keep the temperature low, clean the water, and keep it clear. *Foresters* and *loggers* also work to make sure that the stream banks stay intact, protecting the species that live in and depend upon the streams. They maintain a buffer of plants and trees on the streambanks. Having plants and trees growing on the edge of the stream helps to shade the stream, protecting the animals and insects from high temperatures caused by direct sunlight. Roots of plants hold the banks in place, so they don't erode and wear away.



11. Openings in the Forest

- *Humans help to care for our forests.*

This site is similar to site 5 (“The Sheltering Woods”), in which small patches of trees were taken down in an area. This type of opening can also be caused by windstorms, lightning strikes, or attacks by insects. The majority of trees are conifers, or needle-bearing trees. Because the openings are so small, very little sun gets down to the forest floor. This means that the only plants that will grow here are shade-tolerant, meaning they can grow in shade rather than bright sunlight. *Foresters* and *loggers* have left the branches of harvested trees scattered in the harvest area. Branches decompose and return nutrients to the soil. They also provide cover for small animals.

