



Pole Timber

Where would we be without our forests? They provide us with countless benefits, such as oxygen, cleaner water, homes for wildlife, and a host of wood products. In fact, we couldn't survive for a single day without trees. Therefore, we must take good care of our forests so that they will continue to provide for future generations.

Mature Forest

Life Cycle of a Forest

You are about to enter the Life Cycle of a Forest. Like us, all trees have a natural lifespan. This exhibit is designed to help you learn about the different life stages of a forest, and how foresters and other scientists can help to keep them healthy and productive.

Seedling & Sapling

Death & Rebirth

Seedlings & Saplings

THE BEGINNING OF LIFE

Whether a tree is a pine (has needles) or a hardwood (has leaves that are shed each fall), the first stage in the life of a forest begins with the birth of seedlings. New seedlings originate from a parent tree—either through seeds or sprouting from a stump (in Delaware, only hardwood species can sprout from the stump). A seedling's life is full of danger; out of the thousands of seeds produced by a tree each year, only a tiny fraction of them will survive to become a seedling. Some will be eaten by wildlife, while others will not find the water, food, or sunlight necessary to grow.



Tree seeds come in an amazing variety of shapes and sizes.



Over 500,000 tree seedlings are planted each year in Delaware.

Forest Management

Foresters play a very active role in helping a young forest begin. They may prepare the ground so that new seedlings can grow as fast as possible without interference (competition) from other plants. Depending on the species of trees desired, foresters can plant seedlings in areas that haven't regenerated naturally. For instance, in southern Delaware foresters often plant loblolly pine for owners who want to grow timber for wood products. Once seedlings are established, foresters will often return to check on the new plants, and may recom-

mend activities to ensure their health and survival, such as removing competing plants and monitoring for insects and diseases.



Foresters closely examine young trees for signs of insects or disease.

Forest Health

One of the challenges of keeping new seedlings healthy is protecting them from a variety of pests. Pine seedlings are susceptible to tip moths, weevils, sawflies, and fusiform rust, while hardwoods are susceptible to defoliators. Both pine

and hardwood trees are susceptible to damage from white-tailed deer, as they often will eat seedlings due to lack of other food sources, and to exotic invasive plant species such as mile-a-minute weed which can smother a new forest.



Mile-a-minute weed gets its name from its ability to spread at a very rapid rate. The weed can grow up to 6 inches per day and can smother a young forest.

Pole Timber

MIDDLE-AGED FOREST

Those trees that successfully germinate and flourish will grow and eventually reach the next stage of life—pole-sized timber. Pole-sized timber is typically 8 to 14 inches in diameter at breast height (4.5 feet above ground)—about the diameter of a dinner plate. Once trees reach this size, they encounter the effects of competition since there is not enough water, nutrients, or sunlight to sustain all the trees that germinated as seedlings. Smaller trees will begin to die due to a lack of sunlight and water.

Forest Management

Trees in the pole-timber stage begin to grow at a slower rate due to the increased competition from other trees. In order to keep the trees growing at a rapid rate, foresters will often thin a forest to reduce competition. Thinning increases the space between trees (and thus increases the amount of sunlight, water, and nutrients available to those trees) by removing the smaller and lower quality (e.g., crooked, forked, etc.) trees. This forest management technique helps to produce higher quality lumber since the best trees are left to grow.



Thinning cannot only help improve forest growth but can also provide better habitat for certain species of wildlife.



Pole timber is often used for fence posts, piling, and telephone poles.



Poorly formed trees, such as extremely crooked ones, are often removed during the thinning process to reduce the competition to better quality trees.

Forest Health

As with all forests, pole timber faces a variety of forest health threats. Examples include root rot—a fungal disease that is spread through the roots—gypsy moth and other defoliators, and aggressive, exotic species that outcompete the native trees for space, nutrients, and water.



Aerial surveys are often used to detect large forest health problems, such as gypsy moth defoliation.

Mature Forest

OLD AGE

When most people think of a forest, they envision a mature forest—one that contains large, tall trees with an open understory (very few plants growing underneath the large trees). This type of forest provides the greatest number of benefits; it is home to many animals (including endangered species) and it contains valuable trees for wood products. Like people, as forests grow old and mature they stop getting taller; however, their trunks will continue to increase, but at a much slower rate. Some forests take hundreds of years to mature, such as the giant redwoods, while other forests, like our loblolly pine forests in southern Delaware, will begin to slow in growth by age 50. The mature forest presents the greatest challenge to foresters as they try to strike a balance between harvesting mature trees to produce the wood we need and conserving enough mature forests so we continue to enjoy their many benefits.



Red oaks, such as the one in the above photo, are one of the largest native species in Delaware.

Forest Management

Harvesting is the primary forest management activity in a mature forest. The type of harvest conducted depends on the species of trees. In southern Delaware, loblolly pine is the primary timber species. Loblolly pine does not tolerate shade; therefore the trees in these forests are usually about the same age and size. These forests are often clearcut—that is all of the trees are harvested—so that the next pine forest has full sunlight to grow.



Loblolly pine is the largest and most important commercial timber species in Delaware.

A telltale sign of southern pine beetle is pitch tubes on the tree trunk—that is where the tree tries to use its sap to force out the beetle.



In northern Delaware, oaks and yellow-poplar (tulip tree) are the primary timber species. These trees can survive in some shade so these forests often have trees ranging from seedlings to large, mature trees. Therefore, foresters will often perform selection harvests in hardwood forests; these harvests remove not only the mature trees but also the poor quality (crooked, diseased, etc.) trees, which allows the medium-sized trees to grow. New trees start from either the seeds of the older trees or as sprouts from the stumps of the harvested trees.

Forest Health

Mature forests face many threats from pests since trees, like people, become more susceptible to insects and diseases as they grow older. The southern pine beetle can infest loblolly pine forests, particularly those that are older or are not well managed. Oak trees are impacted by the gypsy moth; dogwoods and sycamores are threatened by a fungus known as anthracnose; and American elm and American chestnut trees have been virtually eliminated by the Dutch elm disease and the chestnut blight, respectively.



In Delaware, many hardwood trees will sprout after harvesting, that is a new tree will form from the stump.

Death & Rebirth

FOREST SUCCESSION

Just like us, trees have a natural lifespan. In some cases, entire forests are harvested and replanted. In forests not managed for timber production, trees will regularly die only to be replaced by younger ones. This continual cycle of death and rebirth is vitally important to the forest ecosystem. Fallen trees provide homes and food to a host of wildlife and insects. As the dead tree decomposes, it returns valuable nutrients to the soil. These nutrients help nourish the seedlings that comprise the next generation of trees.



The death of a tree is a natural feature of the aging forest.



Prescribed fire is an important forest management tool.

Forest Management

In a managed forest, trees are usually harvested before they die; however, a few remaining snags (standing but dead trees) following a harvest provide valuable wildlife habitat. Harvesting trees before they die allows us to utilize the wood before it decays and helps to reduce the danger of wildfires since too many dead trees in a forest can create a fire hazard. Dead trees (both standing and fallen) can burn hotter and longer than the dead leaves/needles and other materials on the forest floor (known as the "duff" layer) and can create a fire hazard. After a natural disaster, such as a hurricane or ice storm, or a wildfire, foresters may conduct a "salvage" harvest to remove the damaged trees. These harvests

provide some income to the owners and reduce the chance of future wildfires.

In addition to timely harvests, foresters also use controlled (prescribed) fires to reduce a forest's "fuel load," because periodic low-intensity fires greatly lower the chances of a catastrophic wildfire. Unlike wildfires, these prescribed fires move slowly along the ground and do not produce extremely high temperatures; thus, they do not harm the trees or wildlife and can actually spur the growth of grasses and other wildlife food.



Weather events can often accelerate the death of a forest, such as the 1994 ice storm which affected over 100,000 acres of forests in Delaware.



While termites are considered a pest in the home, they are vital to the health of our forests because they help to convert fallen trees into valuable nutrients.

Forest Health

When a tree dies, a variety of insects and fungi help to break down the tree into nutrients that will help the next tree to grow. These organisms include decay fungi, engraver beetles, termites, and wood boring beetles.