

# Virginia's Forest Resources

The naturalist John Muir once wrote, “Going to the woods is going home.” Another word for woods is forest – and in Virginia, a forest is never far from home. In fact, forests cover 62 percent of our state, or more than 16 million acres.

Forests help cleanse the air and water, provide homes for wildlife, and protect and build soil. They absorb and store carbon from the atmosphere, reducing the effects of climate change. They also provide thousands of wood products and related jobs. Forests beautify the landscape and offer places for recreation and communing with nature. From the pine forests of the flat, low-lying Coastal Plain, through the patchwork of pines and hardwood forests of the rolling Piedmont, to the upland hardwoods of the western mountains and valleys, Virginia's forests are diverse and healthy ecosystems.



*A red eft enjoys a rainy day in the woods.*



*Leftovers from a squirrel's meal*

## Forest Ecology

A forest is more than just trees. It is an ecological system made up of interdependent organisms — from trees to mosses, from birds to bacteria. The interactions among living components of the forest and the surrounding physical environment keep a forest productive and self-sustaining for many years.

Forests come in lots of varieties. In Virginia, trees may be evergreen (mostly pines and other needle-leaved trees) or deciduous (also called hardwoods). The types of trees that dominate a particular site depend on many factors: soil, moisture, slope, climate, available sunlight, and history of disturbance from humans or natural events, to name a few. Forests are also ever changing. Sometimes the changes are swift, resulting from natural or human forces. Other times these changes are slow, occurring over many seasons.



Succession is an important process in the life cycle of a forest. Succession is the natural replacement of one type of vegetation by another over time. For example, if a field is abandoned and left to nature, grasses and soft-stemmed plants will colonize the area first. In a few years, shrubs and young pines begin to dominate. Eventually the old field becomes a pine forest, with young hardwood trees (such as oaks, hickories, and maples) sprouting in the understory. As the pines die out, those hardwoods grow up to replace them. When the hardwoods mature, the forest is said to be at climax - a fairly steady state of long-lived trees that replace themselves unless acted on by forces such as fire, storms, diseases and insects, or human actions. Any of these occurrences can push succession back to an earlier stage.



*A future hardwood forest begins under the pines.*



*A rotting log becomes part of the forest soil.*

All plants and trees eventually die. As trees die, they attract insects which, in turn, become food for birds. Cavities (holes) in trees provide shelter for animals such as squirrels, raccoons, and opossums. Decaying logs on the ground house salamanders and snakes. As wood is broken down by fungi and bacteria, the organic matter and nutrients work their way back into the soil. These nutrients are recycled and used by different plants. Nutrient recycling in a forest ecosystem is a key to healthy succession.

All stages of succession benefit some types of wildlife. Some species prefer open fields or shrubby stages, some prefer pine woods, others like mixed forests, and still others prefer mature hardwood forests. Each stage favors some animals at the expense of others. On the scale of a landscape, diversity of species mix and age keeps the ecosystem healthy, helps reduce insect and disease problems, and benefits a variety of wildlife. Forests can stay healthy and vigorous through proper management.



*Woodcock nest on cutover site*



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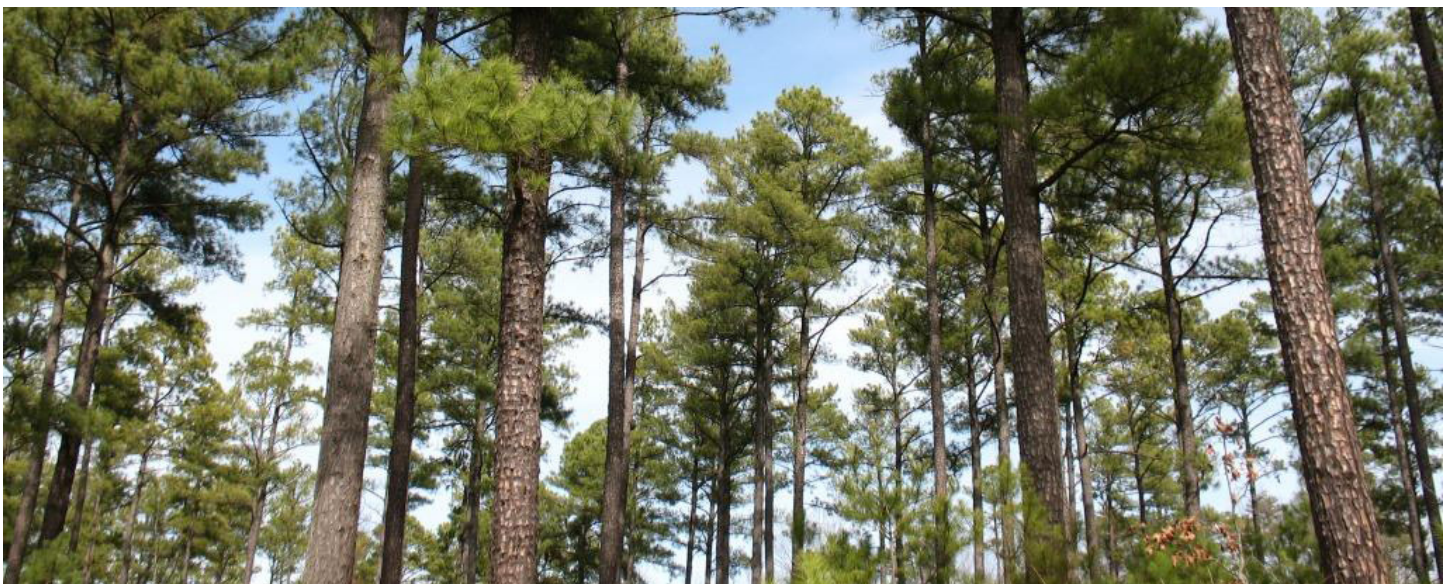
Nearly all of the natural forests in Virginia have been changed by human activities during the past 400 years. Throughout the Piedmont and Coastal Plain regions, land was cleared for agricultural use in colonial times. Many sites were harvested or cleared several times - perhaps to grow crops or pasture - then abandoned to become reforested over several generations.



*Young pines from wind-blown seed.*

Hardwood or mixed pine-hardwood forests cover 78% of the total forest area in Virginia. Hardwoods may reproduce from stump sprouts, roots, or seeds in the soil when exposed to increased light and moisture. Usually, in fact, there is no need to replant hardwood seedlings unless a particular species desired does not exist on site.

Pines are mostly pioneer species, meaning they are the first trees to occupy an abandoned field, or bare ground after a fire or other disturbance. Seedlings of most pine species need full sunlight to grow. Pine trees do not sprout from stumps or roots like many hardwoods. They often germinate from wind-blown seeds from mature trees nearby. Many landowners choose to reforest cutover sites by planting pine seedlings grown from improved seed sources and grown in a Virginia Department of Forestry nursery. Since most pine stands are planted or originate from seeds in an open area, all the trees in a particular stand are usually about the same age. In many parts of the state, sites are hot and dry, with less fertile soils. These sites do not produce good quality hardwoods but will grow pines. Loblolly pine is the most common species found in southern and eastern Virginia. Shortleaf pine and Virginia pine also grow here, as well as more widely across the state.



*Loblolly pine forest*



## Managing for Healthy Forests

When humans manage a forest, they are imitating or manipulating the ecological process of succession. For example, sometimes foresters harvest mature trees rather than let them grow old, fall, and decay as they would in the natural cycle. And, instead of allowing the harvested site to regrow at nature's pace, foresters might speed up succession by planting pines, or controlling competition to allow hardwoods to resprout from the cut stumps. When forests are sustainably managed, attention is always given to the health and integrity of the future stand as well as other ecosystem components – both living and nonliving.



*Loggers at work*

Forest management and timber harvesting can happen without harming the soil and water. A timber harvest is not the end of the forest but, rather, the beginning of a new, young, vigorous forest. A professional forester can assist with planning a harvest using “best management practices,” or BMPs for short. Examples include building log roads that allow trucks to neatly enter and exit an area, locating skid trails in areas less susceptible to erosion, constructing low-impact stream crossings, and replanting disturbed soil with grass after harvest. In some types of forests, low intensity fires are important to maintaining healthy, dynamic ecosystems. For this reason, foresters and wildlife managers often use controlled, or “prescribed,” burning to improve tree planting and habitat conditions. Fire clears the forest of woody debris, providing room for new plants to grow. This new growth becomes food and habitat for many birds and animals. Some plants even depend upon occasional fires for reproduction. Fire also promotes the release of nutrients from woody material - nature's way of fertilizing new plant growth.



*Prescribed burning for wildlife*



### ***Only You...***

For over 50 years, Smokey Bear has been the symbol of forest fire prevention. Smokey reminds us that, “Only YOU can prevent forest fires.” Most fires can be prevented by using common sense, following safety rules, and obeying fire laws. Smokey’s rules include: Never leave a fire unattended; don’t play with matches; drown your campfire. If you live in or near woods, contact a forester to learn how you can make your home more wildfire-safe.

## **The Role of Streamside Forests**

Forests play a critical role in keeping surface waters clean. Acting as a “living filter,” forests capture rainfall, filter nutrients and sediments, and help prevent erosion. When streams are buffered by surrounding forests, runoff is greatly reduced. When floods pass through a forested stream corridor, the roughness of the forest vegetation helps to slow down the water flow and thereby reduce downstream flood damage. Forests also serve as a storage area for stormwater, absorbing and slowly releasing water to a stream or underground aquifer. Even a narrow strip of trees beside a waterway can improve water quality. Healthy, forested stream corridors, called “riparian buffers,” provide much-needed habitat for many animals and plants, while moderating water temperatures — critical for many fish and aquatic organisms. Decaying leaves and twigs that fall from these streamside trees are used by small organisms and insects that, in turn, become prey for fish. Riparian areas are also used as travel corridors. It is here that birds, reptiles, amphibians, and mammals move about, eat, rest, and raise their young. Forested riparian buffers also enhance the beauty of our waterways. They can slow the spread of wildfires by creating a cooler, wetter zone, and offer shaded relief for recreational activities like fishing, hiking, and bird watching.



*Riparian forests improve stream health.*

## Trees in the City

Trees aren't found just in forests; they grow throughout cities and suburbs too. Known as the "urban forest," clumps and networks of street and yard trees improve life in cities. Trees help people relax and relieve stress. Medical research indicates that patients in rooms with a view of trees get better faster. Trees can reduce air conditioning needs by 30 percent, and when used as windbreaks, trees can save 20 to 50 percent in energy used for heating. Trees reduce noise pollution by absorbing unpleasant sounds. People shop longer along tree-lined streets and apartments, and offices rent more quickly in wooded areas. Trees can add 10 percent or more to a property's value. Trees improve city air quality by trapping and holding dust particles. Tree leaves absorb carbon dioxide and pollutants and, in turn, replenish the atmosphere with oxygen for us to breathe. In fact, one acre of trees provides enough oxygen for 18 people.



*Shade is a great addition to a parking lot.*

### ***Aging a Tree***

If you look at a cross-section of a tree trunk, you will see a series of concentric rings. Each growing season, a tree adds a layer of new wood to its "girth," or circumference. The layer just under the bark of the tree, called the cambium, produces new wood and bark each year. One annual ring consists of the light, spring wood band and the darker, summer wood band. Width of the rings can vary from year to year. Dry seasons produce narrow rings; wet seasons, broad rings. By counting the rings, you can get a good estimate of the tree's age. By looking at the ring widths, you can also draw conclusions about the weather and other natural conditions that influenced growth.



*Can you see the rings?*



## Threats to Forests

The largest threat to Virginia's forests is the loss of land to development. Land that is converted from woods into shopping centers and neighborhoods seldom returns to a forested state. As more areas are developed, the forest is fragmented into smaller blocks, which can be a problem for wildlife species that require large areas of intact forest.

Wildfires (or forest fires) can destroy a forest and its wildlife habitat very quickly. In Virginia, most of these destructive fires are caused by people being careless. Each year, wildfires cost hundreds of thousands of dollars to control. Forest wardens and volunteer firefighters work together to suppress forest fires and save lives, properties, and forest resources.



*Shortleaf pine with littleleaf disease*



*Invasive kudzu vines can overtop and shade out trees.*

Insects and diseases, both native and invasive, can devastate forests as well as individual landscape trees. Many insect and disease problems can be minimized by simply managing the trees to maintain their vigor and health. When trees reach maturity, their growth and vigor decline, particularly in unmanaged stands where competition for limited resources can be severe. Well-managed stands tend to stay healthier longer. Forests with mixed ages and species are far less likely to sustain pest outbreaks than pure, even-aged stands. Recognizing pest problems early and seeking advice from a professional forester can often help reduce or prevent tree losses.

Invasive plants can take a toll on forests by outcompeting and replacing native trees, preventing seed germination, blocking sunlight, introducing diseases, and even changing factors in the environment such as soil chemistry and availability of water.

Despite these threats, Virginia's forests are resilient. Wise stewardship ensures that these forests continue to provide us with the many benefits that improve our quality of life. The way we care for our forests today will determine what types of forests we will have in the future.



*Flowering dogwood – Virginia's state tree*

### ***Virginia Grown***

Trees are a renewable resource, meaning that we can harvest and use them and help them to grow back, over and over again. In Virginia, more wood grows each year than is harvested. Forestry brings in over \$17 billion each year and provides jobs to more than 100,000 people.

These are some of the forest products produced here in Virginia:

- softwood lumber (for home construction)
- hardwood lumber (for flooring and manufacturing)
- furniture and furniture parts
- cabinets and millwork
- oriented strand board (OSB)
- pallets (for shipping)
- posts and poles
- white paper
- paperboard (used in food containers and packaging)
- newspaper
- Kraft paper (grocery bags)
- cardboard
- fluff pulp (used inside diapers)
- fuel pellets for heating
- Christmas trees
- shiitake mushrooms
- charcoal



## Fundamental Learnings Related to Forest Resources

- Forests are a renewable natural resource that provide environmental, economic, and other benefits.
- A forest ecosystem is an interactive community of living organisms that interact with each other and with the nonliving parts of the environment.
- Forests change over time, both naturally through succession and more rapidly in response to disturbance.
- Forest managers apply the basic principles of succession as they mimic natural disturbances.
- Wise management practices create and sustain healthy forests that support wildlife habitat, clean water, and fresh air, and provide recreation opportunities, wood products, and scenic beauty.
- Each tree species has a range of tolerance for basic environmental factors that control its survival—including sunlight, moisture, soil, and climate.
- Threats to forests include land loss and fragmentation, wildfire, insects, diseases, and invasive species.
- Forestry is an important industry in Virginia, providing many jobs and producing products we depend on.

## Additional Resources:

- [Virginia Department of Forestry](#)
- [Virtual Forest](#)
- [Virginia Big Tree Program](#)
- [Tree Identification Keys](#)
- [Tree Fact Sheets \(with photos\)](#)
- [4-H Forestry Resources](#)
- [Project Learning Tree](#)

### ***Who Owns the Forest?***

Of the 16 million acres of forestland in Virginia, private landowners own 61% of it. Corporations own 21%. State and federal governments own 17%. Forest industries own 1%.



# Educational Activity: ID That Tree

## Objective

Students will use a scientific key to identify trees by their leaves.

## Materials

- Single-page key to trees of your area (see following pages)
- For older students - Common Native Trees of Virginia book, from [www.dof.virginia.gov](http://www.dof.virginia.gov) – available for purchase or free download)

## Background

For many reasons, people need to be able to identify trees. Knowing which trees are growing on a site can tell us about the soil, climate, and other environmental conditions there. Certain trees make good lumber, paper, medicines, food, or other products that people need. Some animals depend on particular tree species for survival. Other plants in a forest may grow best in the shade of certain types of trees. Some invasive types of trees can be harmful to the environment and might need to be removed. If you want to plant a tree in your yard, it's helpful to know which trees might grow best there, and what their specific requirements are so that you can take the best care of your tree.

Trees are generally easiest to identify when you can look at the leaves. Other characteristics you can use to identify trees are bark, twigs, reproductive parts, overall form, and growing site.

A scientific key provides a step-by-step method to identify leaves or other natural objects. If possible, review use of a key ahead of time. Teach students that when using a scientific key, they should always start at number one, read both choices carefully, and proceed as the key tells them. Skipping ahead may miss important details and lead to the wrong ID.

Review some identification features of leaves before using your key. An identification guide with drawings, found near the front of Common Native Trees of Virginia, can help you understand these features better. (If you don't have a copy, you can download this book from [www.dof.virginia.gov](http://www.dof.virginia.gov) for free.)



Look for these features of tree leaves:

- Are they deciduous (falling off in winter) or evergreen (on the tree all year)?
- How are they arranged on the stem? Are they directly opposite each other, or do they alternate with each other in a zigzag pattern?
- Are they simple (having only one part) or compound (having more than one part)?
- Are the veins and/or leaflets pinnate (branching off from different places along the main vein or stem) or palmate (branching from a single point at the base)?
- What do the leaf margins (edges) look like? Are they smooth, jagged, wavy, or do they have tiny teeth? Are there lobes (parts of the leaf that stick out from the main part, like your ear lobe)? If so, are the lobes pointed or rounded?
- How would you describe the shape of the leaf base and the leaf tip?
- Do the leaves have any special features, like a strong smell or interesting texture?

Go outside to an area with trees that appear to have grown naturally. This could be a forest, your backyard, a natural area of the schoolyard, or a park. Choose several trees to identify using your key. (Younger students should use the one-page key. Older students or those who already have experience with keying may use the key in *Common Native Trees of Virginia*.) You may want to work with a partner to identify the trees. Check your answers using a book or <http://dendro.cnre.vt.edu/dendrology/factsheets.cfm>.

### **Questions for Review and Discussion**

- What are some reasons it may be important to be able to identify trees?
- What was the hardest part of using the key? How did you handle any problems?
- What other natural objects could be identified using a key?
- If you did not have a key, what are some other ways you could identify trees?
- How might the tree you identified be useful to wildlife? To people? To the surrounding environment?
- Why do you think these particular trees are common here?



# Leaf Key to Common Eastern Virginia Trees

*Instructions: Start at number 1, read both statements, choose the best one, and follow directions to the next number. Continue this process until you reach the name of a tree.*

**1)** Tree has needles – go to 2

**1)** Tree has leaves – go to 3

**2)** Needles very short, or pressed tightly to the stem like scales – **Eastern Redcedar**

**2)** Needles long, in bundles of 3 – **Loblolly Pine**

**3)** Leaves are opposite (straight across from each other on the stem) – go to 4

**3)** Leaves alternate with each other along the stem – go to 5

**4)** Leaf has jagged edges and 3 to 5 main lobes – **Red Maple**

**4)** Leaf has smooth edges and no lobes – **Flowering Dogwood**

**5)** Leaf is simple (having only one part) – go to 6

**5)** Leaf is compound (divided into more than one leaflet) – A **Hickory** species

**6)** Leaf is thick and spiny – **American Holly**

**6)** Leaf is thin and flexible, and not spiny – go to 7

**7)** Leaf has lobes (parts that stick out from the main leaf edge) – go to 8

**7)** Leaf has no lobes, but could have teeth along the edges – go to 11

**8)** Leaf looks like a 5-pointed star, and has tiny teeth along the edges – **Sweetgum**

**8)** Leaf is not star-shaped and does not have tiny teeth along edges – go to 9

**9)** Leaf has 4 or 6 lobes, the outer ones even with each other – **Yellow-poplar**

**9)** Leaf has a different number of lobes, with a single lobe at the tip – go to 10

**10)** Leaf has smoothly rounded lobes – **White Oak**

**10)** Leaf has pointed lobes, with a bristle at the tip of each – **Southern Red Oak**

**11)** Leaf has smooth edges – **Willow Oak**

**11)** Leaf has teeth along edges – go to 12

**12)** Leaf has fine, tiny teeth along the edges – **Black Cherry**

**12)** Leaf has evenly spaced teeth, one at the end of each vein – **American Beech**

# Leaf Key to Common Central Virginia Trees

*Instructions: Start at number 1, read both statements, choose the best one, and follow directions to the next number. Continue this process until you reach the name of a tree.*

- 1) Leaves are broad and flat – go to 2 OR
- 1) Leaves are needle-like – go to 3
- 2) Leaves are attached opposite each other on the stem – go to 5 OR
- 2) Leaves alternate with each other along the stem – go to 6
- 3) Needles in bunches of 5 – **Eastern white pine** OR
- 3) Needles in bunches of 2 or 3 – go to 4
- 4) Needles are short, twisted, always in bunches of 2 – **Virginia pine** OR
- 4) Needles fairly straight, in bunches of 2 or 3 – **Shortleaf pine**
- 5) Leaves are oval, with smooth edges – **Flowering dogwood** OR
- 5) Leaves have several lobes and ragged edges -- **Red maple**
- 6) Leaves are compound (having more than one part) – go to 7 OR
- 6) Leaves are simple (having just one part) – go to 9
- 7) Leaflets are smooth-edged – **Black locust** OR
- 7) Leaflets have tiny teeth along the edges – go to 8
- 8) Most leaves have 10 to 24 leaflets – **Black walnut** OR
- 8) Most leaves have 5 to 9 leaflets – **Hickory species** (e.g., mockernut, pignut)
- 9) Leaves have no lobes and have smooth edges – **Black gum** OR
- 9) Leaves may have lobes, toothed edges, or both – go to 10
- 10) Leaves have sharply pointed lobes – go to 11 OR
- 10) Leaves have either rounded lobes, or no lobes at all – go to 12
- 11) Leaves have 4 to 6 single-pointed lobes, without bristles at tips – **Yellow-poplar** OR
- 11) Each lobe has several bristle-tipped points – **Red oak species** (e.g., northern red, southern red, black, scarlet)
- 12) Leaves have smoothly rounded lobes – **White oak species** (e.g., white, chestnut, post) OR
- 12) Leaves have no lobes, but do have teeth along the edges – go to 13
- 13) Leaves have one tooth at the end of each vein – **American beech** OR
- 13) Leaves have more teeth than veins – go to 14
- 14) Leaf edges have jagged teeth, like a saw blade – **American hornbeam (Musclewood)** OR
- 14) Leaf edges have tiny teeth, like a steak knife blade – **Black cherry**



# Leaf Key to Common Western Virginia Trees

*Instructions: Start at number 1, read both statements, choose the best one, and follow directions to the next number. Continue this process until you reach the name of a tree.*

- 1) Tree has needles in bunches of 5 -- **Eastern white pine (Pinus strobus)** OR
- 1) Tree has leaves – go to 2
- 2) Leaves opposite each other on the twig – go to 3 OR
- 2) Leaves alternate with each other along the twig – go to 4
- 3) Leaves oval; bark gray, with small blocks – **Flowering dogwood (Cornus florida)** OR
- 3) Leaves with 3 to 5 main points, toothed edges; bark gray, smooth or with ridges – **Red maple (Acer rubrum)**
- 4) Leaves simple (having only one part) – go to 5 OR
- 4) Leaves compound (divided into several parts); nuts may be on the tree – **Hickory (Carya species)**
- 5) Leaves basically oval, with a pointed tip – go to 6
- 5) Leaves with rounded or pointed lobes (parts that stick out, giving the leaf a unique shape) – go to 8
- 6) Leaves more than 6 inches long, wavy-edged; bark light gray-brown and flaky – **Cucumbertree (Magnolia acuminata)** OR
- 6) Leaves less than 6 inches long, with teeth along the edges – go to 7
- 7) Leaves have tiny teeth along edges; twig smells bitter when scratched; bark may look like burnt corn flakes – **Black cherry (Prunus serotina)** OR
- 7) Leaves have jagged teeth; twig smells like wintergreen when scratched; young bark shiny, with slashes; old bark black, rough – **Black or sweet birch (Betula lenta)**
- 8) Leaves with smooth, rounded lobes – go to 9 OR
- 8) Leaves with pointed lobes – go to 10
- 9) Bark pale gray, loose and shredding, especially high on the trunk – **White oak (Quercus alba)** OR
- 9) Bark thick, brown, deeply cut into ridges – **Chestnut oak (Quercus prinus)**
- 10) Leaves with 4 to 6 pointed lobes, the last two even with each other; bark light gray and furrowed – **Yellow-poplar (Liriodendron tulipifera)** OR
- 10) Leaves with 7 or more pointed, bristle-tipped lobes – **Scarlet, Black or Northern Red Oak (Quercus species)**