

Caring for Our Urban Trees and Birds

EDUCATION 2026

Sharing our urban greenspace with birds is becoming increasingly vital as forests give way to development. Urban Forests can provide habitat to the birds that have historically called the area home.

Carolina Wren



 Audubon

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Why Audubon Cares

Loss of Habitat

It is an unfortunate reality that habitat loss is a problem for many species across the country, and even around the world.

In North Carolina particularly, which over the last several years has experienced an influx of people moving into the state. This has driven significant development including infrastructure, housing, and retail. Development has been occurring quickly to attempt to keep up with the demand, spreading out from urban centers. North Carolina has approximately 4 million acres of urban forest, and it is the forest type that is disappearing the fastest. While it is not always considered the most pristine or optimal habitat, many species continue to live in urban forests, as they have historically, before humans moved into the area at a high density.

Improving, conserving and expanding urban forests to support the wildlife that calls it home is vital to our work. If the most rapid loss is not addressed, habitat loss will continue to outweigh habitat creation and conservation.

Bird populations are declining

The most recent State of the Birds 2025 report found that eastern forest breeding birds have lost a quarter of their population since 1970. Audubon North Carolina recognizes this and has designated several eastern forest birds as priority species, including the Wood Thrush, the Chimney Swift and the Brown-headed Nuthatch.

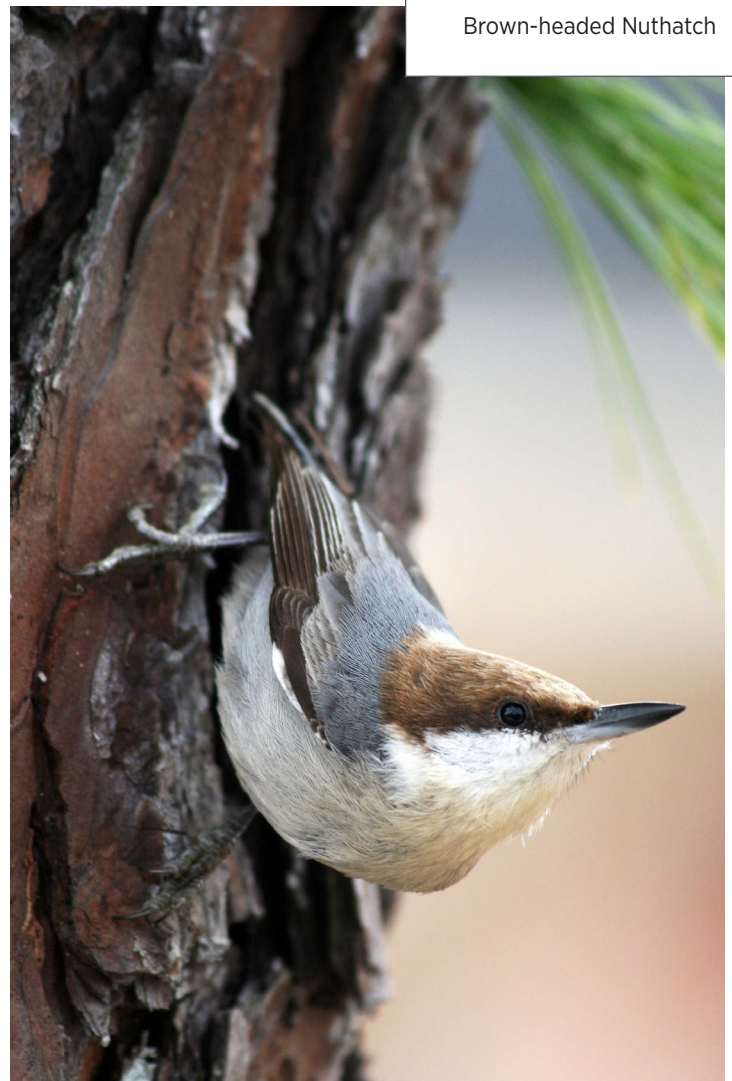
The report also notes that one of the factors contributing to these population losses on the Atlantic coast is residential and agricultural development.

Migration

80% of eastern forest breeding bird species are also migratory, meaning that many travel to and from the northern and southern hemisphere yearly from breeding grounds and wintering grounds – to ensure that they have the resources to survive.

Urban forests can provide habitat for migrating birds while they pass through the area on their journey. While city lights don't attract every bird to urban centers, it can draw some birds off course and into metropolitan areas. This has caused many Audubon chapters to champion the Lights Out program – convincing municipalities to darken or turn off their lights at night to protect migrating birds.

With birds coming through our areas via their natural migration path, or drawn to our urban center's lights, it is important that we ensure that they have the habitat they need to rest and recover before continuing.



Brown-headed Nuthatch



Prothonotary Warbler

Why bird-friendly urban forestry works

When birds thrive, so do people. Birdwatching has continued to grow over the decades. Historically, the population of birdwatchers skewed a bit more towards the older range. Over time, more and more young people have gained interest and a love for birds.

Birders coming to see birds in a particular area may spend money at local stores and restaurants, putting money into the local economy. Some sites have entire bird-focused camping and photography trips such as the Sandhill Cranes Migratory Stop in the Midwest or eco-tourism trips to South America to see birds such as Purple Martins or the Golden-winged Warbler wintering.

Conserving and enhancing urban forests improves the overall health of the local ecosystem and provides

numerous benefits. When you care for the birds, you also improve soil quality, soil erosion, nutrient cycling, ambient temperature, stormwater runoff, and even mental health! Birds aid in controlling insect populations, help pollinate, and support their local ecosystem by becoming food for other wild animals such as snakes, bobcats, and more—who enjoy their eggs.

Even non-bird enthusiasts can appreciate when their local urban forest is healthy and they see chimney swifts flying overhead, chittering and catching pesky insects. Or when a cardinal visits their birdfeeder or makes a nest in a local tree.

When nature is taken into our planning and community work, we all win.

Tree Anatomy Basics

Knowing the different parts of a tree's anatomy and their functions is one of the fundamentals of any successful urban forestry program.



A newly-planted Chestnut Oak at a tree planting ceremony in Elyria, Ohio

Trees are perennial, woody-stemmed plants that typically have one main trunk and generally reach a mature height of at least 16 feet. A lot of wildlife, including small mammals, insects and birds use several parts of a tree throughout their lifecycle. They provide shelter, food resources, and even cover from predators.

Roots

Roots are the structures of the tree that anchor it in the soil, allowing the tree to grow steadily upright and not topple over in the wind. Besides providing strength to the plant, roots have one of the most essential functions: exchange air, water, and nutrients in the soil.

The majority of a tree's absorption roots grow within the top 12 inches of soil. These roots spread out from the trunk of the tree, searching for resources for the plant. A tree's "Critical Root Zone" is typically measured as the area underneath and out to the

dripline—the edge of the tree's canopy branches or measured as a multiple of the tree's diameter at breast height (DBH). The Critical Root Zone includes the roots of the tree that are considered necessary for the tree's structural integrity and overall health. This area should be preserved and protected from disturbance or damage during construction or other activities.

Roots take up water and air through osmosis, which also means that whatever nutrients and minerals are dissolved in the water that is in the soil, will also be taken up by the tree's roots. Air is absorbed from the small pockets of space between soil particles. This is the reason why overly compacted soil or flooded soil for an extended period can harm the tree's ability to function properly.

Healthy tree roots depend on healthy soil!

Trunk and Stems

One of the most identifiable markers of what makes a plant a “tree”, are its woody trunk and branches. These woody parts persist year to year, unlike annual herbaceous plants that completely die back at the end of the growing season. These parts of a tree contain the vascular system of the plant, transporting water, oxygen and nutrients from the roots of the tree up through the branches to the leaves. This system also sends sugars made in the leaves down to feed the roots.

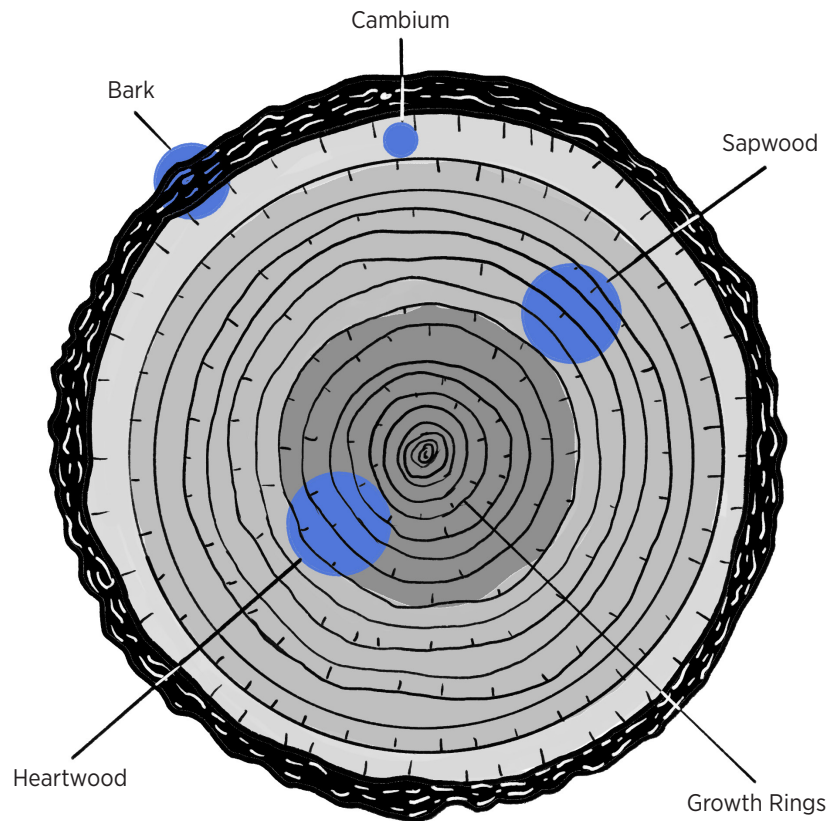
The outermost layer of the woody stem is the bark, which is the protective layer. Also known as the epidermis or cork. This layer does not have living cells.

The next layer is the new, living, growing layer of bark called the cambium. This layer is responsible for the horizontal outward growth of the tree, creating new layers of phloem and xylem, creating annual rings as it grows.

Moving further into the tree we have the sapwood. This is where nutrients, water, sugars, and air are transported through the tree. Phloem comes first, is the part of the vascular system that flows both ways in the tree, that carries the products of photosynthesis (sugars) to the roots or other parts of the tree that need energy. Xylem follows and is the transport structure that flows only upward, drawing on negative pressure to pull water from the roots up to the leaves.

The innermost part of a trunk or stem of the tree is the heartwood or deadwood. This part of the tree does not contain living cells, does not grow, and does not contribute to the transportation of resources. However, this part provides the strength and structure of the tree, as it contains lignin, a very strong organic polymer. This part of the tree is very resistance to decay as long as the sapwood is intact. Over time, as the tree grows, the innermost sapwood gradually turns into heartwood.

Stems can grow to be arranged in different ways depending on the species. Most common arrangements are alternate branching, opposite



Anatomy of a Tree Trunk

branching or whorl branching. Opposite and alternate are just what they sound like; whorled is when branches grow around the trunk or stem in almost a circular or spiral pattern. Maple and Ash have opposite branching, Red Buds have alternate branching, and White Pine has whorled branching, just a few species examples.

Trees may also grow in several forms. There are weeping, excurrent and decurrent growth habits. Excurrent growth is when a tree species tends to grow straight up with a main central trunk, very common in conifer species such as the Eastern Red Cedar. Decurrent species grow with many different main trunks or stems and spread out more horizontally, think of Live Oak. Weeping trees are a type of decurrent tree, where the branches tend to grow out then down, hanging, often flexibly bend in the wind. A great example of this is the weeping willow.

Knowing the branching patterns of stems are helpful in identifying an unknown tree while in the field. Additionally, knowing the different parts of the trunk and stems can prevent accidental damage to the tree. The woody parts are the common places of a tree you will see birds either hunting, nesting, resting, singing and even courting!

Leaves

A tree's leaves are its powerhouse. Plants are able to create their own food source: carbohydrates. These sugars are produced within specialized parts of leaf cells, called chloroplasts. Chloroplasts contain a compound called chlorophyll, which is the key to helping the tree take energy from sunlight and convert it into sugars using the water, carbon dioxide and minerals pulled from the soil. Chlorophyll is also responsible for the green color of plants. This process also releases oxygen as a byproduct, which is lucky for us! Photosynthesis (the process of creating sugars using sunlight) occurs during the day. Then, at night, the tree respire, just like many animals. At that time, the tree consumes its sugars, which requires oxygen and generates carbon dioxide. However, generally trees end up producing more oxygen than carbon dioxide.

In addition to the chloroplasts, leaves also contain stomata, or little holes on the surface of the leaf that help with gas exchange and evaporation – to create the negative pressure in the vascular system that draws water out of the soil.

There are some species of birds that will eat tree buds in early spring as an additional source of food after a scarce winter. You may spot sparrows or finches on the tips of tree branches nibbling at the growing leaves.

Cones, Flowers and Fruit

Depending on the species of tree, it may grow a variety of structures that aid in its reproduction. Gymnosperm species are trees that reproduce by using cones, and angiosperm species are those that reproduce using flowers and fruit.

Most species of conifers are monoecious, meaning that both male and female cones can be found on a single tree, although on different branches. Male cones produce pollen for fertilization, and female cones, which are typically larger, produce the tree seeds. Male cones on many southeastern pine trees produce a bright yellow pollen that hangs in the air



American Beech
tree leaves

during the height of spring. Common cone bearing tree species include Pines, Junipers, Cedars, Cypress, Fir, Hemlock, Redwood, Spruce, etc. Many species of conifers are considered evergreen, meaning that they retain their needle-like leaves over winter, or do not lose them annually.

Angiosperm species are those that flower and produce fruit. Trees that are angiosperms are commonly also deciduous, or that they lose their leaves annually. These species are the ones that turn brilliant shades of red, orange and yellow, as the leaves deliberately die to drop off for the harsh winter.

Tree flowers come in a variety of shapes, colors, sizes and smells. Flowers are typically found at the tips of branches before new spring growth buds out and leaves appear. Depending on the species, some may have flowers that have both male and female (stamen and carpel) parts, male only and female only flowers on the same tree, and there are also species that have only male flowers on a tree, and only female flowers on another individual of the same species. Some tree species, once their flowers are pollinated, develop edible fruits that contain seeds. Apples, Lemons, Walnuts, Persimmon, and Chestnuts are some examples.

Tree selection and planting

Choosing the right tree

A robust urban forest begins with a single tree. There are several factors to consider when choosing a tree that will not only survive but ideally thrive in the urban environment.

Consider the area. How much room is there for the tree to grow to maturity? Is there enough soil volume for the tree's expected growth? Is the area frequently under construction or experiences a lot of disturbance?

Consider the tree's needs. Does the proposed planting site receive a sufficient amount of sunlight and rain for the species? Is the soil type one that the species does well in, or is it too dense and compacted? How much water will the tree be able to tolerate if the potential site semi-frequently endures flooding?

Consider the tree through its seasonal cycle. Is it a deciduous or coniferous tree, will it drop leaves in fall or cones? Does the species produce attractive flowers or produce fruit that may drop onto the sidewalk? Black walnuts are known for the black staining that their fruit produces as it rots on the concrete.



Black-Crowned Night Heron

Proper Planting

While there surely are numerous species that may fit the site needs, many are not native, and in some cases even noxious or invasive.

If your property or community has some eroding stream banks, live staking is a great, cost-effective option for tree and shrub planting. Live stakes are dormant cuttings of native, riparian species that are inserted into

the stream bank soil during the fall or winter. Since the cuttings are still alive, over time they will begin to be putting out new roots into the soil and growing like any other plant. The new roots will help anchor the soil to help prevent any additional erosion.

Live stakes are typically around two to three feet long and are inserted into the soil about two-thirds of the way. A sturdy biodegradable mat such as one made of coconut fiber is placed onto the stream bank as well to keep everything in place. The mat is stapled or staked into the ground to secure it. Live-stake sites should be kept wet or watered for the first year, for best results.



Participants install live stakes and erosion-control matting during a streambank stabilization workshop at Patton Park in Hendersonville, NC, in December, 2020.

To learn more, visit this [NC Cooperative extension article on live staking](#).

Native species

Urban forests thrive when native species are utilized over non-native species. Local birds and other wildlife have adapted to the trees that have historically grown in the area and recognize them as resources.

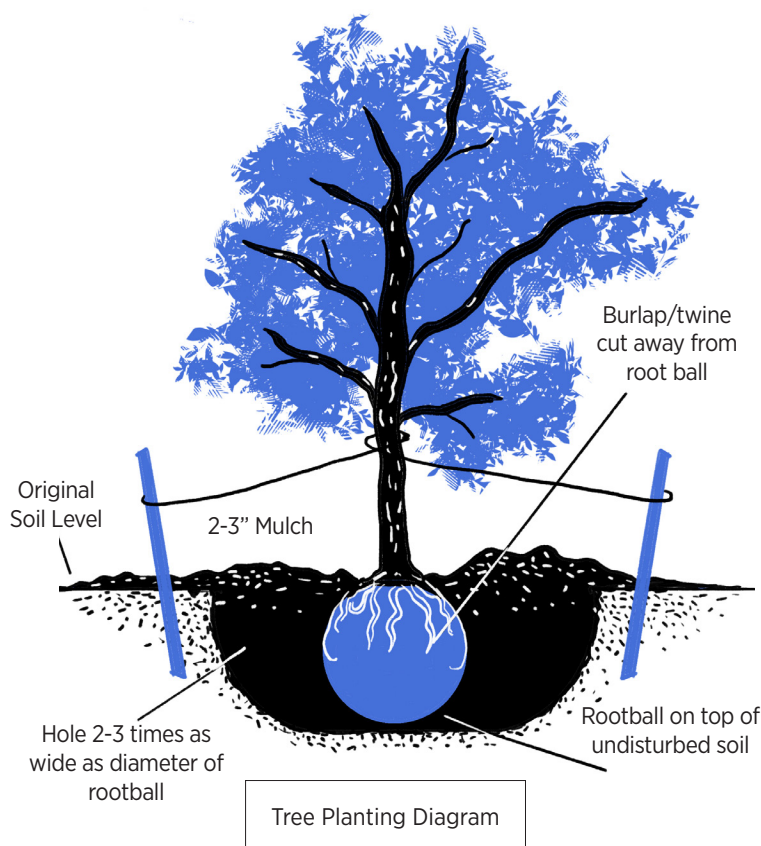
Local, native species grown in the target site's natural ecoregion are more hardened to the local climate. Additionally native species will need less fertilizer, less water and overall general maintenance. Overall, these species are more likely to survive and thrive in the area rather than species that originate from other ecoregions or continents.

Consider a Red Bud over the commonly used Crepe Myrtle! A coastal Live Oak likely will not do well in a mountainous area, and a mountain species will not likely do well on the coast.

Depth and Area

To plant a tree, you need a hole. However, the size and depth of the hole are important. Proper planting holes should consider the size of the root ball of the tree. Dig the hole just deep enough where the base of the trunk's root flare is at or slightly above the final grade of soil.

The area of the planting hole should be between 2 to 3 times larger than the root ball itself. That gives both you and the tree wiggle room to make adjustments. Then, once planted, the soil surrounding the root ball is not as compacted, making it easier for the tree roots to grow into. Sites with poor soil should consider a planting hole that is larger, to encourage root establishment and survival. Sites with optimal soil may not need as much space for a sapling to establish.



You will also need to prepare the sapling for planting. It is important to check the root ball for any circling, girdling or malformed roots — if there are, they should be pruned away from the main trunk stem. Girdling roots left as is, can shorten the lifespan of the tree significantly. You will remove excess soil from the trunk flare and all non-biodegradable root ball coverings or containers from the root ball.



Mulch Volcano

Filling the Gaps

Once the sapling is placed properly in the planting hole, you will need to fill in the space around the root ball with soil.

It is appropriate to use the soil you initially removed to dig the hole to fill it back in. Soil should be compact enough to prevent the root ball from moving, but not too tight to prohibit the grow of roots. Soil should be filled to the same level as the base of the flare but not covering it. Consider soil amendments if the quality of the soil is especially poor.

Once planted and the hole properly filled, water until all the backfill and root ball is saturated. Then, it's time for mulch!

It is important to have a schedule of continued maintenance to ensure that the sapling has the best shot at thriving. This can include watering, structural support, fertilizer and pruning.

Additionally, consider a variety of tree species, tree heights and avoiding planting in a straight line. Different birds utilize different levels of the canopy, prefer certain tree species and are more attracted to more “naturally” arranged plantings.



Eastern Bluebird

Mulching and Grass

Trees benefit from having ground covering around the trunk; typically, this is mulch, pine straw or leaf litter. The purpose of this covering is to protect the roots around the trunk as a barrier and prevent direct soil compaction. Additionally, over time the mulch or covering decomposes, which leaches nutrients into the soil below for the tree to absorb – a natural fertilizer! Compost can be occasionally mixed in to increase soil nutrients as well.

It's important to consider having a large mulch ring around the tree. The larger the tree, the larger the area the roots stretch out to, also known as the dripline. The dripline is approximately the area underneath the reaches of the canopy of the tree. This is where the majority of the roots that conduct gas, water, and nutrient exchange and absorption from the soil.

A large mulch ring also keeps grass at bay. Unfortunately, grass is readily able to outcompete tree roots for necessary minerals, metals, and other substances. More mulch and less grass additionally means less money spent on fertilizers, lawn watering, and general maintenance.

It is also vital to apply mulch appropriately. You may have seen the dreaded 'Mulch Volcano' around some trees in your neighborhood or community. This is when mulch is continuously applied each season on top of itself, creeping up and covering the trunk more and more each year.

This causes significant damage to the structural base of the tree: the trunk. The bark on the trunk is not adapted to be covered up and damp, it can cause decay, stress the tree and leave it vulnerable to various pests and disease.

Last season's mulch should be raked away and off each season before new mulch is applied. Pine straw and leaf litter function the same way as mulch. This refreshes the tree's "fertilizer" source and prevents mulch volcanoes.

While some ground coverings work as the protective barrier such as shredded rubber or gravel, they do not have the added benefit of acting as a low-cost fertilizer. Natural coverings such as mulch, leaf litter and pine straw are considered a best management practice for trees.

Tree maintenance and continued care

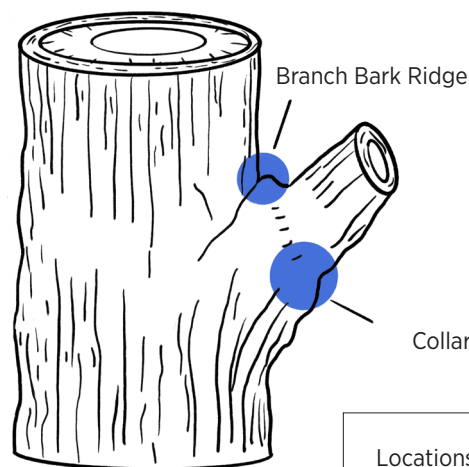
Pruning

Typically pruning falls into two categories; for the health of the tree, and for appearance.

The health of the tree should be paramount when it comes to pruning and trimming. Avoiding unnecessary cuts and stem removal is vital to ensure you are minimizing the amount of damage and stress the tree will go through in the process.

However, it is common for trees to be pruned for a particular appearance, growth shape, and even old myths that have turned out to be untrue (topping Crape Myrtles, in fact, does not produce more flowers in spring). Trees acting as a vegetative barrier, wall, hedge or other aesthetic purposes are common pruning styles not for health reasons.

Whenever possible, pruning should be conducted while the tree is becoming dormant or is dormant. This is typically fall and winter. This allows the tree time to recuperate and recover without the added stress of having to grow new leaves and flowers as it would in the springtime.



There is a proper way to prune a tree and the collaborative guide from the Arborist community is the ANSI A300. It is a complete manual for tree care standards for trees, palms, and other woody-stemmed plants, and more information to find it will be in the index.



Topped Crape Myrtle trees

The purpose of this guide is to give an overview of proper care, for more details and scenarios, we encourage you to read more in the ANSI A300.

It is important to prune with as little cuts as possible to achieve your goals. The recommended way to make a pruning cut is to cut just above the branch collar at a flat angle. The branch collar is the part of the branch where it flares as it connects to the main stem or trunk. Leaving the branch collar intact is important for the tree to heal.

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Cuts should be at a 45-degree angle to the main stem, you do not want to leave excess or leave a sharp point, commonly called a “dog ear.”

If there is concern about excess bark ripping or tearing with one cut, a three-cut method is permitted. The first cut should be placed further out from the branch collar, on the underside of the branch being removed. The second then is placed just a bit further out from the first cut, except on the top of the branch being removed. The third and final cut is placed where it normally would be, just above the branch collar.

Occasionally, you will encounter branches that do not have a visible branch collar or may have a branch bark ridge. In this case, the pruning cut should be far enough out from the main stem where the branch bark ridge is left intact. In the instance there is no branch collar, it may be an improper branch attachment, which would have included bark. Included bark is when there is a V-shaped connecting the two stems instead of a smooth “u” shape. Included bark signifies a weak branch attachment and can be an entry point for decay. The cut should be made high enough where the stem and main branch are no longer touching.

Generally, no more than 25% of the tree’s canopy should be pruned off in any one season. Any more may cause too much stress to the plant, and it may not be able to heal properly or may die.

There are a few outdated pruning techniques that are no longer considered an acceptable practice in the industry. These techniques have since been found to cause too much stress and damage to a tree, outweighing the aesthetics of the trim style.

Topping is a type of pruning that removes the entire canopy of a tree, commonly to the same height. It was mistakenly thought that this would promote more blooms in the spring, but it actually does the opposite the tree has to spend more resources regrowing branches and stems and leaves to stay alive.

Another unacceptable pruning practice is commonly called “lion-tailing.” This is when all subordinate lateral branches on the main stems are removed, and a small amount of canopy is left at the very top of the branches. A lion-tailed tree will remind you of a lollipop or a truffala tree from Dr. Suess’s *The Lorax*.

There are some species of palms that are often used ornamentally in the urban landscape, so it is important to also know how to trim those as well. Biologically, palms

are not trees, they are more related to grasses and other monocots. Palms grow with a central apical meristem that fans out, before a new frond starts to grow in the center. Fronds around the outside of the plant can be removed if brown and dead. However, the center meristem cannot be trimmed, doing so will remove the plant’s ability to grow new leaves, which will eventually kill it.

Fronds can be removed at the base of the petiole, as they are leaves, not branches. An untrimmed palm can have years’ worth of old fronds hanging underneath the newer green fronds. If this is the case, all those

fronds are exceptionally heavy and can be very dangerous if climbing up the palm tree itself instead of using a lift device. Be careful!

As mentioned earlier, the best time of year to conduct any tree trimming or pruning is in fall and winter when the tree is dormant. This minimizes the impacts to birds—as most have not yet begun building nests, incubating eggs or raising chicks.

Be sure not to prune off any branches supporting a nest or attempt to move a nest. The Migratory Bird Treaty Act prohibits the take or harm of any migratory bird, including eggs.

Soil and fertilizer

SOIL

Soil is the mixture of inorganic materials such as fine rock, clay and silt particles, minerals and gases and the organic materials from decomposing matter and all the little critters who call it home. Soil composition will vary from place to place, lean more acidic or basic, have fast water infiltration or slow infiltration. One soil may be lacking in nitrogen; another may have too much. It is important to determine what type of soil is in the area of planting and have a plan to accommodate for its surpluses and deficiencies.

Tree species will also have adapted to certain types of soils where it is native to. Planting trees in its appropriate soil will help ensure that the tree thrives. This can also reduce the amount you need to water, and the fertilizer required. Accounting for proper soil can increase the likelihood of the tree establishing and surviving long term.

It is common for soil to become compacted around construction areas, or areas of high foot traffic. Compaction squeezes the soil together, closing the fine air pockets, suffocating the roots. There are tools such as soil aerators which may help.

FERTILIZER

The first thing you should do before applying fertilizer is to get a soil test done. It will tell you what the soil is lacking, so you can fine tune your fertilizer to be exactly what it needs. While applying a general fertilizer mix may be adequate in some situations, excess minerals can run off or damage the tree or surrounding plants if the concentration or amount is too high.

It is very important to follow all directions on the fertilizer container. Apply the directed amount for the area, wear your personal protective equipment and store the fertilizer as directed when not in use. Improper storage may cause the fertilizer to change chemically, reducing its effectiveness.

Consistent watering is crucial in the first few years after planting, to help the tree establish itself in the new environment.

Watering should occur in mild weather, such as the evenings after peak heat and sun has gone by. This prevents excess evaporation and water loss for the tree. Deep, thorough watering, ensuring the entire root ball is moist, will help it grow stronger roots.

For the first few weeks, water every day, if possible, then the following couple of weeks you may switch to every two to three days. From about 12 weeks on, water weekly until tree roots have established themselves at least to the size of the canopy. Mulch will also help insulate the roots from extreme temperature changes and keep the soil moist.

Be sure not to overwater your new tree, you may accidentally drown your sapling. Aim for moist but not soggy or mud-like. Moist soil will dry out enough to allow the pockets to refill with air, for the roots to breathe.



Chipping Sparrow

Fallen leaves

Many places have ordinances or HOAs requiring the blowing or removal of fallen leaves from lawns and sidewalks. “Leave the leaves” is a campaign to educate people and cities of the benefits for wildlife that come with leaving the autumn leaves where they fall.

Many wildlife species, including birds, rely on the insects that lay their eggs and live in the leaf litter. As it gets cooler and more plants are beginning to go dormant for winter, this is an important food source. This “bank” of insects that mature over the winter, will help feed baby birds in the spring and summer. It takes many insects, even thousands, to raise a nestling chick to a fledgling bird.

Additionally, as the leaves decompose, they release minerals and nutrients back into the soil, a natural form of fertilizer.

When leaving the leaves on your lawn is not possible, instead of bagging them for yard waste collection, consider raking them to your plant beds or spreading them underneath your trees. That way, the insects get their home and their food, the trees get some nutrients back and the birds get food as well. This could lower your maintenance costs, as you would not need to purchase and apply as much fertilizer.

Preventative measures

There are many different devices and products available to help your tree survive as it grows. Water retention is a common goal for a lot of these measures, such as the Tree Diaper™ or the Treegator™. This can help reduce water needed by preventing excess evaporation or runoff.

Others may protect trees from physical damage. Tree guards are commonly seen in urban areas on street trees near roads, protecting them from mowers or other damage from vandalism or animals such as deer or beavers.

Tree stakes are commonly used when planting saplings to help train the tree to be upright, if it has a slight bend or is developing a more horizontal growth habit. Stakes are helpful when



A support cable system placed between main stems of trees

used correctly, not too tight and removed properly after the sapling is established. Stake straps are commonly left on the trees, damaging the trunk as it grows, constricting the trees' vascular system. Straps and stakes that are too tight will weaken the tree in the long run, as it won't develop its own rigidity and flexibility needed, if it is relying on the support completely.

There are also many preventative products relating to preventing infestation by pests, such as tree wraps, insecticides, and biological controls. Occasionally high value trees with a wide spread of limbs, that are at risk for splitting in a storm, may be cabled for support. This is common on the coast with Live Oak trees. This is done when the risk of the tree losing a limb or falling is higher than the potential damage from the installation of the cabling system itself.

Tree work Safety



An arborist cuts a tree with a chainsaw

Assessing Hazards

Before any work is completed, it is necessary to complete a “pre-job briefing.” This document has you outline the type of work you will be doing, what hazards are present at the work site, what tools you will need to complete the work, closest medical facility in case of emergencies, what personal protective equipment is required and more. Pre-job briefings help you plan and think about how you will mitigate or negate hazards in your worksite, which can decrease the risk of injury or damage. Workers arriving at the site after work has begun, should be read into the briefing so they also understand the work to be done and the hazards present.

PPE

Personal protective equipment or PPE is necessary when completing tree work, as well as appropriate clothing. To reduce the risk of injury, loose hanging jewelry or loose sleeves or clothing such as scarves should not be worn. Long sleeves are recommended to add a layer of protection between you and the sun, woodchips and insects such as ticks and mosquitoes.

PPE often includes safety glasses, ear protection, safety toe or steel toe boots, a hard hat, gloves, chainsaw chaps or a climbing harness. This is not exhaustive, but a general list of PPE used during tree work. PPE can lessen the severity of an injury or even save your life. Don't skip it!



Carolina Wren

Work zone

It is important to establish a work zone when completing any sort of tree work. It is typically made by marking out a large square area that is a large buffer between the work and public area. This can help inform passersby that dangerous work is occurring in the zone, and to steer clear. It is also best practice to have one crew member acting as the spotter, or the one who stops work in case of a noticed hazard, people wandering into the work zone, outdoor dogs, cars approaching the work zone and much more. Spotters are often equipped with a whistle to get the attention of the workers over the sound of the pole saw or woodchipper.

Drop zone

The drop zone is an area designated within the work zone, typically by different colored cones. This area is where crews climbing up in the tree or in a lift device are dropping cut limbs and debris down from the tree. This ensures that no one is standing in the area, reducing the risk of accidental harm or damage.

Very large branches or limbs should be tied to a rope and lowered slowly to the ground instead of dropped, to prevent damage or the log from rolling out of the work zone.

When a tree is being felled for safety or health reasons, the drop zone should be at least 1.5 to 2 times longer than the tree is tall. Escape routes must be designated, typically at

45-degree angles from the intended tree fall. This ensures workers can escape should the tree start to fall not quite where it was intended to. It is critical that all tree climbers and fellers are trained and insured to do this work, as it can be very dangerous.

Tools

There are several common tools you will see in tree work. One of the most common is the chainsaw, a large rotating chain blade, held with two hands at the back. Chaps are worn to prevent injury to the legs when holding a chainsaw, walking with it or otherwise near it.

Pole saws are small saws attached to the end of a pole, ideal for reaching up to make small cuts on trees. Bucket trucks with lift devices will commonly have one in the bucket for the trimmer to use. Only limbs smaller than the size of the blade should be cut with the pole saw. Otherwise, you run the risk of the blade getting stuck in the tree, causing excessive damage and potentially injuring yourself.

Pruning shears are small handheld “scissors” that come in a variety of sizes. These are ideal from snipping off small stems or twigs from a main branch.

Hand saws basic small saws that can be held in one hand, typically for some hand removal of saplings at the ground or other woody plants. Hand saws should be sheathed whenever not in use.

For crews, it is common to see a woodchipper attached to the back of a large empty truck – a chip truck. Tree debris, and removal stems and branches are fed into the chipper, which then spits it out into the truck for easy hauling. Your hands and arms should NEVER get close to the entrance flaps of the chipper. The resulting mulch is great for landscaping, or the crews will haul it to a permitted dump site, if you do not want it.

You may also see axes, hatchets, wedges, gas cans, stump grinders and even a large saw on an extendable pole—a jaraff. Jaraffs are commonly used in transmission right-of-way trimming in rural areas by utilities.

Insects, Defects, and Disease

Harmful insects

These are insects that harm trees by going through their lifecycle or by consuming nutrients from the tree. There are several different ways that insect species do this.

While this is part of the natural ecosystem, your community may have high value trees it wishes to protect from infestation. Below are some common insects that can be considered “pests” to trees if left unmitigated.

PIERCING INSECTS

Gall Makers

Hemlock Woolly Adelgid

Balsam Woolly Adelgid

Aphids

Scales

BORERS

Bark

Southern Pine Beetle

Ips Beetles

Black Turpentine Beetle

WOOD:

Emerald Ash Borer

Sirex Woodwasp

Ambrosia Beetle

Sawyer Beetle

DEFOLIATORS

Spongy Moth

Pine Webworm

Pine Sawflies

Cankerworms

Bagworms

Eastern Tent Caterpillar

Forest Tent Caterpillar

BUD, TWIG AND SEED PESTS

White Pine Weevil

Pales Weevil

Tips Moths

Twig Girdlers

Signs and symptoms to look for that indicate a tree is being harmed by an infestation:

Sawdust-like piles at the base of the tree (frass)

Holes in the bark from larvae exiting the tree

Leaves with missing flesh

Large web-ball like structures in the branches

Honeydew

If your tree does have an insect problem, consider cultural and biological control options first. While insecticides are effective, some formulations may also kill off beneficial pollinators such as wasps and bees and may poison the birds and other animals that predate on them.



Scymnus Lady Beetle

Beneficial Insects

There are several beneficial bugs to have living in your trees. Some may assist in pollinating; others prey on the other insects that would otherwise harm the tree. Remember that native plant species support the insects that birds rely on!

Laricobious Derodontid Beetle

Checkered Clerid Beetle *Deladenus siricidicola*

(a nematode) *Cerceris fumipennis*

Sasajiscymnus Lady Beetle

Scymnus Lady Beetles

Despite their cute outward appearance, ladybugs are quite adept hunters!

Common diseases and defects

DEFECTS

Defects are slightly different than diseases, which usually follow a defect. Typically caused by poor growth pattern, injury, poor physical strength or other condition. It is not unusual to see a tree with multiple defects AND diseases, as many are comorbid.

For example, say a tree gets struck by lightning. A large branch is cracked, allowing an entry point for excess moisture and disease vectors such as fungi or insects. As time goes on, the branch begins to rot from the inside, attracting more fungi, which compromises the integrity of the wood and so on, as it is decomposed by the fungi.

Codominant Stems

Dead Branches

Cavities

Cracks

Peeling Bark

Compacted soil at roots

Unbalanced structure

It is important to note that many defects increase the risk of harm or damage to both property, people and animals. Tree removal should only be considered if there is risk. A decaying tree in the middle of the woods is not a risk, because there is not a structure to fall onto or people to injure. If the tree was in a park next to a community pavilion or trail, there is risk. Someone could become injured if the tree drops a dead branch or a strong wind knocks it over.

DISEASES

LEAVES

Anthracnose

Brown Spot

Leaf Drop

Hypoderma Needle Cast

Dogwood Anthracnose

Symptoms: Premature leaf fall, Discoloration, Lesions

VASCULAR SYSTEM

Laurel Wilt

Dutch Elm Disease

Bacterial Leaf Scorch

Oak Wilt

Symptoms: Premature leaf fall, Wilting leaves, Browning leaves

DECLINES

Oak Decline

Pine Decline

Symptoms: Branch dieback high in crown, Premature leaf fall, Leaf yellowing, Abnormally small leaves, Crown thinning, Greater than normal fruit and nut production

ROOT DISEASES

Annosus Root Rot

Little Leaf Disease

Phytophthora Root Rot on Seedlings

Phytophthora on Fruit Trees

Symptoms: Leaf yellowing or browning, Premature leaf fall, Overall decline, Leaning or swaying, Branch dieback

BRANCH AND STEM DISEASES

White Pine blister rust

Wetwood

Pitch Canker

Sudden Oak Death

Wood Decay

Fusiform Rust

Symptoms: Weeping wounds, Cracks, Abnormal growths or galls, Cavities, Signs of active fungi fruiting bodies

Dead Trees

NESTING

Dead trees or “snags”, and dying trees provide habitat for breeding birds, bats, reptiles, amphibians, and pollinating insects. Natural cavities form where there is a break in the top or branches of trees. Other cavities form from the industrious work of woodpeckers. Many species of birds only nest in cavities, and you can help them by protecting or creating cavity habitat.

Eight species of woodpeckers occur in NC. These “primary cavity nesters” drill holes into the dead wood of fully or partially dead trees. Woodpeckers nest in these cavities, but they create many more cavities than they use.

This allows our secondary cavity nesters to move in! Some North Carolina examples include Eastern Bluebird, Carolina Chickadee, Tufted Titmouse, Prothonotary Warbler, Great Crested Flycatcher, four species of owls, four swallow species, three nuthatch species, and two duck species!

ROOSTING

Cavities also protect birds from predators and cold weather. Nuthatches can gather in cavities by the dozens in winter.

FORAGING

Dead trees provide an excellent foraging resource for many species of birds. The decaying wood attracts beetle grubs and a variety of other insects. This is a feast for a breeding pair of birds looking to feed their chicks.

Some species of birds will cache seeds and other food into cavities or gaps in the bark to save for later. For example, nuthatches will hide seeds in trees.

Wild Turkeys eat mushrooms from the forest floor, which grow from the decaying roots of dead trees.



Red-Headed Woodpecker

Creating Snags

- **Low-Girdling:** Girdling entails cutting the tree via chainsaw or axe in such a way that circles the main trunk of the tree, severing the entire cambium between the roots and the leaves. This stops water and nutrient transfer, eventually killing the tree. Cuts should be 1.5" to 2" deep. To ensure the tree will die, a second circling girdle cut should be placed several inches above or below the first. You may want to experiment with removing the cambium and outer bark peeled within the two cuts. This can help you verify that the cuts have been deep enough. Low-girdling occurs low on the bole (i.e., trunk) of the tree, beneath the branches and leaves. People can low girdle while standing on the ground; no climbing is required. Pros: easy, cheap and quickly done. Cons: Rot developing low in the trunk diminishes structural integrity of the tree quickly and the snag will not stand as long as other techniques (note that down logs also provide great habitat for birds and other wildlife. Cost: \$30-80 per snag.



Carolina Wren

- **High-Girdling:** High girdling is done with the same type of cut (or cuts) that low girdling uses. However, it is done much higher within the tree. It is best practice to leave 5-10 live branches below the cut lines. This allows for the creation of a partially alive snag and will increase the length of time that snag remains standing. Pros: Tree will continue to grow and remain alive below the girdling point, meaning it will remain standing for a longer period and therefore provide longer-lasting habitat for snag-dependent species. Effective. Cons: More costly, as this typically requires a climber or a person in a bucket truck to go up into the tree to conduct the work. Cost: \$70-130 per snag.
- **Saw-topping:** This method is nearly identical to high-girdling. However, instead of girdling, the chainsaw operator will make a cut through the entire bole at the point where high girdling would occur. Pros and cons are similar to high girdling. Cost: \$70-130 per snag.
- **Fungal Inoculation:** Use a chainsaw or axe to create a wound on the tree's trunk and then use a syringe to inject a solution of common fungi that causes rot. Pros: Can be very effective when paired with one of the above techniques. Not labor intensive. Cons: Very costly, not as effective when applied on its own. Science indicates it is not very effective at creating snags quickly, and that many trees will heal and not turn into snags at all. Cost: \$90-\$150.

Only create snags where they will not create a hazard to people or structures. Make sure to follow relevant safety procedures (e.g., labor.nc.gov/chain-saw-safety-0) ensure that chainsaw operators are properly trained in safe chainsaw operation. Many local community colleges and NC State Forest Service Offices can provide such training.



Cape May Warbler

Additional Resources

You can find out more at:

ANSI Tree Care Standards

treecareindustryassociation.org/business-support/ansia300-standards

International Society of Arboriculture

isa-arbor.com

Become a Certified Arborist:

isa-arbor.com/Credentials

Urban & Community Forestry Society

ucfsociety.org

Arbor Day Foundation

arborday.org

Audubon North Carolina

nc.audubon.org/
nc.audubon.org/urban-forestry

North Carolina Forestry Service

ncagr.gov/divisions/nc-forest-service

North Carolina Urban Forestry Council

ncufo.org

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PHOTOS: BRADY LINKOUS/AUDUBON PHOTOGRAPHY AWARDS (COVER); DENISE MASSIE/AUDUBON PHOTOGRAPHY AWARDS (P3); EDWARD EPISCOPO/AUDUBON PHOTOGRAPHY AWARDS (P4); ALLISON FARRAND/BLACK RIVER AUDUBON SOCIETY (P5); MIKOLAY KURZENKO/ SHUTTERSTOCK (P7); CITY OF HENDERSONVILLE (P7); BRYAN PUTNAM/AUDUBON PHOTOGRAPHY AWARDS (P8); EXTENSION.ORG/ FLICKR CC BY-NC-SA 2.0 (P9); KEN BAKER/AUDUBON PHOTOGRAPHY AWARDS (P10); SPIRALGYPSY/ SHUTTERSTOCK (P11); BRADY LINKOUS/AUDUBON PHOTOGRAPHY AWARDS (P13); BOS11/SHUTTERSTOCK (P14); YULYAZOLOTKO/SHUTTERSTOCK (P15); JAMES TORNETTA/AUDUBON PHOTOGRAPHY AWARDS (P16); TOMASZ KLEJDYSZ/SHUTTERSTOCK (P18); VANCE SOLSETH/AUDUBON PHOTOGRAPHY AWARDS (P20); MICHAEL SCHMITT/AUDUBON PHOTOGRAPHY AWARDS (P21); JEREMY SLIWINSKI/AUDUBON PHOTOGRAPHY AWARDS (P22). ILLUSTRATIONS: ANNALISE KRISTENSEN (P6, P9, P11).