

N.C. FOREST SERVICE 2024 FOREST HEALTH HIGHLIGHTS



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FOREST RESOURCE SUMMARY

North Carolina's forestland is a major driver of the state's economy and adds immeasurably to the quality of life for its citizens. From the high-elevation spruce-fir forests of the Appalachian Mountains to the pine savannas and maritime forests on the Atlantic Coastal Plain, North Carolina boasts one of the most ecologically diverse landscapes in the nation. North Carolina's forests cover nearly 18.7 million acres, roughly 61% of the state's land area. Major forest types in the state include oak-hickory, loblolly-shortleaf pine, oak-pine, oak-gum-cypress and longleaf-slash pine which after historic lows, is now increasing again in North Carolina.

Much of North Carolina's forestland, roughly 12.2 million acres, is in nonindustrial private ownership. Approximately 2.9 million acres are owned by private corporations not involved in forest product manufacturing and about 1.3 million acres are owned by the forest industry. Federal, state and local public lands total 2.6 million acres. Forestry is a cornerstone of North Carolina's economy, contributing nearly \$42.5 billion and supporting 151,700 jobs. The North Carolina Forest Service's (NCFS) commitment to sustainable forestry practices and conservation efforts has helped to maintain a significant forestland base to ensure the long-term sustainability and value of our forests.

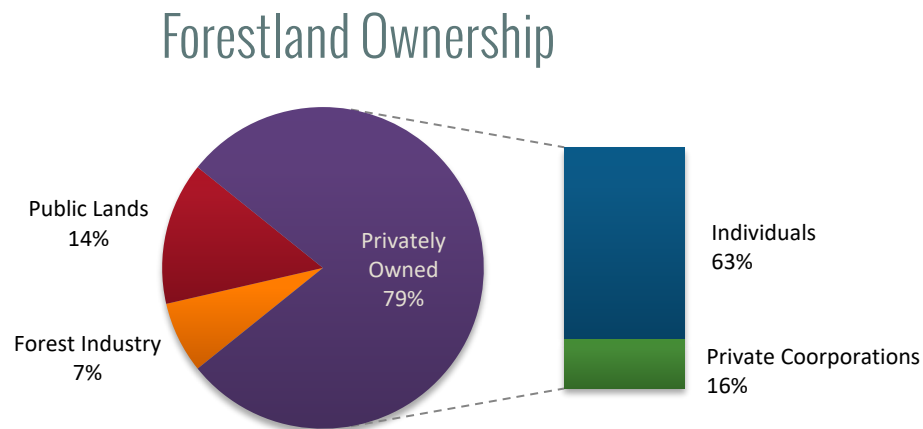


Figure 1: Forestland ownership in North Carolina. Source: NCForestProducts.gov

Prized for its scenic beauty, North Carolina's forestland supports tourism and outdoor recreation while providing habitat for a remarkable array of plant and animal life. Our state hosts more than 460 species of birds, 70 species of reptiles and 121 mammal species, many of which depend on our forests for all or part of their life cycles. The Southern Appalachian Mountains is a global hotspot for amphibian diversity, particularly salamanders. With more than 65 described species statewide and at least 50 species occurring in the mountain region, Western North Carolina ranks highest in salamander diversity worldwide. Several listed species of conservation concern in the state, such as the eastern diamondback rattlesnake and Carolina northern flying squirrel, require large contiguous tracts of forest for their continued persistence.

Fragmentation from anthropogenic land use changes, including development, transportation and conversion of forests to non-forestland use, continue to be a threat. The state's forestland area has declined by nearly 1.8 million acres from a high of 20.5 million acres in the mid-1960s. Still, our total forestland acreage exceeds levels from the first statewide forest inventory in 1938.

Historically, North Carolina's forests have been impacted by many different insects and diseases, both native and nonnative. In the past two decades, at least seven nonnative invasive species were detected for the first time in the state: **laurel wilt** in 2011, **thousand cankers disease** of black walnut in 2012, **emerald ash borer** in 2013, and the **spotted lanternfly** and elm **zigzag sawfly** in 2022. Insects and diseases such as chestnut blight, Dutch elm disease, **hemlock woolly adelgid**, **balsam woolly adelgid** and **spongy moth** have impacted forests in North Carolina since the early 1900s.

In 2024, new challenges continue to arise. More than 53 unique causal agents were reported by NCFS personnel. Forest health staff responded to 302 requests for assistance statewide. Causal agents included insects, diseases, storm damage, drought, mechanical damage and improper tree care. On Sept. 27, the remnants of Hurricane Helene brought destructive winds and catastrophic flooding to parts of Western North Carolina, resulting in an estimated 822,000 acres of timberland receiving some level of damage, with an estimated \$214 million in timber damage. In recent years, beech bark disease has been the primary threat to beech trees in North Carolina. However, an emerging and devastating disease, **beech leaf disease (BLD)**, has rapidly spread across the Northeastern U.S., causing widespread mortality of American beech, and may pose a greater threat if it reaches our state. **Asian longhorned beetle** has not been detected in our state but poses a significant threat to our hardwood forests.

AERIAL SURVEY SUMMARY

Routine forest health aerial surveillance is carried out annually to detect and map forest health issues including southern pine beetle and *Ips* engraver beetle mortality. Other events such as storm damage, large defoliation events and mapping of ghost forests created by the impacts of sea level rise are flown as needed. Approximately 5.9 million acres, or 18.4% of the entire state, was covered during the 2024 annual survey.



Timber damage in McDowell County following Hurricane Helene observed during forest health aerial surveillance. Photo by NCFS.

FOREST INSECTS

Pine bark beetles

Historically, the **southern pine beetle (SPB)** has been North Carolina’s most economically significant forest insect pest. In most years, SPB exists at nearly undetectable levels, behaving as a secondary pest that attacks stressed trees. Outbreaks tend to be cyclical, resulting in widespread pine mortality and significant economic losses. From 1999 to 2002, a four-year outbreak across the southeast resulted in nearly \$84 million in losses for North Carolina’s timber industry. Since then, SPB activity has remained relatively low. In 2017 and 2018, there was a spike in activity on federal, state and private lands, which then subsided in 2019.

In the spring of 2024, pheromone traps were deployed in 39 counties to estimate SPB population trends and predict the likelihood of an outbreak for the state’s 13 NCFS districts. Aerial surveillance for forest health issues, including southern pine beetle, were conducted between June and September. Based on the number of insects captured, the likelihood of an outbreak across the state was low. No SPB spots were detected during aerial surveillance.



SPB pheromone trap deployed in Caldwell County. Photo by NCFS.



Pitch tubes associated with southern pine beetle activity. Photo by NCFS.

[The Southern Pine Beetle Prevention Program](#), funded through a U.S. Forest Service (USFS) grant, provides partial reimbursement to nonindustrial, private woodland owners in North Carolina to assist with the costs associated with managing pine stands for the prevention of southern pine beetle infestations. Precommercial thinning is the most utilized practice under this program in North Carolina. Thinning reduces the number of trees in a young stand that would otherwise compete for available sunlight, nutrients and water, ultimately improving growing conditions for the remaining trees.

Since 2005, there have been more than 3,016 cost share projects on 99,723 acres of forestland in North Carolina. In 2020, additional practices including understory prescribed burning and understory vegetation control were added to the program. However, these were removed from the list of eligible practices in 2023 to meet the demand for funds to cover our core practice of precommercial thinning. In 2024, 45 projects were completed on 1,999 acres, a slight decrease from the previous year.

While SPB activity was low, ***Ips* engraver beetle** (*Ips* spp.) and **black turpentine beetle** activity was reported in the Coastal Plain and Piedmont. *Ips* engraver and black turpentine beetles are secondary pests, attacking trees that are stressed or weakened by other factors such as overstocking, drought, flooding, wind damage, and poor soil and growing conditions. In 2024, there were 35 reports from 21 counties. Level of mortality ranged from a few individual trees to upwards of 12 acres.



Ips beetle in Cumberland County. Photo by NCFS.

Emerald ash borer continues to spread across North Carolina



Damage caused by EAB in Wayne County. Photo by NCFS.

In 2013, the **emerald ash borer beetle (EAB)** was first detected in North Carolina in Granville, Person, Vance and Warren counties. Since then, EAB has caused widespread mortality of ash trees across the state. Susceptible trees in North Carolina include green ash, white ash, Carolina ash, pumpkin ash and white fringetree. In 2024, EAB presence was confirmed for the first time in Anson, Bertie, Duplin, Martin and Sampson, bringing the number of counties in the state where the tree-killing insect has been detected to 76.

Although the federal quarantine prohibiting the movement of potentially EAB-infested materials has been lifted, the NCFS continues to monitor the spread of EAB across our state. By reporting the spread and continuing to provide outreach, we can keep our citizens aware of the pest's proximity to their forestlands and assist landowners with making informed decisions about their options to manage their ash trees.

This year, the NCFS continued the **Ash Protection Program**, a reimbursement program to assist communities in protecting ash trees in urban settings. In 2024, three communities participated in this program, protecting more than 50 ash trees. This brings the total to 677 urban ash trees protected statewide since the inception of the program. While pesticides are a viable option to manage EAB in urban or landscape settings, it is not feasible in forest settings. Research related to long-term management strategies is ongoing.

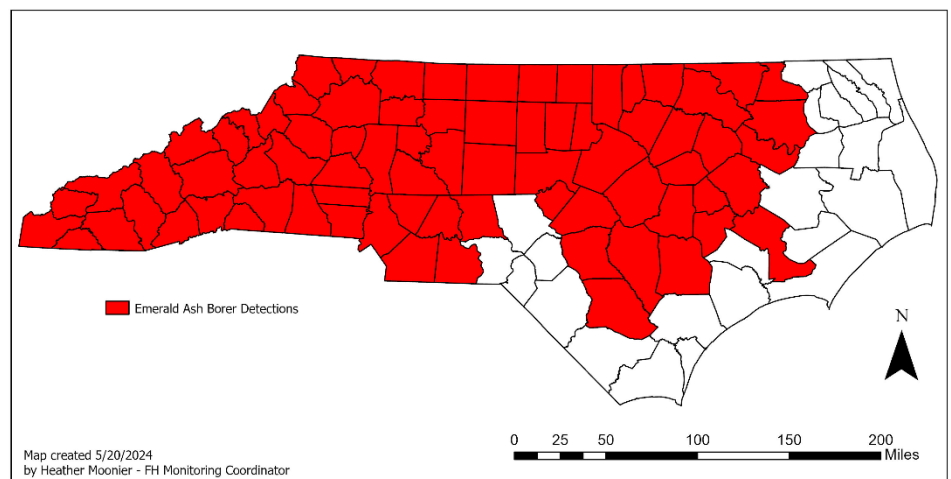


Figure 2: Map representing counties where emerald ash borer has been confirmed in North Carolina. View the map online here: https://www.ncforests.gov/forest_health/pdf/Map_EAB_NCTracking.pdf



Periodical cicada in Wake County. Photo by NCFS.

What was all the buzz about this spring?

2024 marked a historic year for periodical cicadas, with the 13-year brood (XIX) and a 17-year brood (XIII) emergence coinciding for the first time in more than 200 years.

While the overlap affected states in the Midwest, North Carolina only

experienced the deafening chorus of the 13-year brood (XIX).

Periodical cicada emergence events are temporary and occur in localized pockets. Two to three weeks following emergence, females use their saw-like ovipositor to cut small slits into tree branches, where they lay 10 to 20 eggs before moving further down the branch. A single female can lay a total of 500 to 600 eggs. The eggs hatch after about a month, nymphs fall to the ground and burrow beneath the soil, where they will spend the next 13 years feeding on the sap of tree roots before re-emerging in 2037. Flagging and dieback can occur from heavy egg laying, which was observed from the western portion of the Piedmont to the Mountains. While the damage may have appeared concerning, most trees recovered by summer.



Flagging caused by periodical cicada egg laying in Randolph County. Photo by NCFS.

Hemlock woolly adelgid and the Hemlock Restoration Initiative



During most times of the year, HWA can be recognized by the woolly covering it creates to protect itself. Photo by NCFS.

The **hemlock woolly adelgid (HWA)** was first detected in North Carolina in 1995 and has since spread to all regions where hemlocks naturally occur in the state. Nearly all untreated hemlock stands in Western North Carolina are dead or in sharp decline due to HWA.

In 2014, a cooperative effort between the N.C. Department of Agriculture and Consumer Services (NCDA&CS), WNC communities, USFS and NCFS formed the Hemlock Restoration Initiative (HRI). Part of this effort includes protecting hemlocks with chemicals and working to establish biological control agents throughout the region. Since the initiative began, a total of 138,000 hemlocks have received treatment. In 2024, 28,747 trees were treated. Meanwhile,

HRI and the NCDA&CS Plant Industry Biocontrol Program continue to release and monitor *Laricobius* beetles to help control HWA populations. Over 14,600 *Laricobius* beetles were released in established insectaries, heavily infested hemlock stands and along riparian zones between 2015 and 2022. During the 2023-2024 survey season, *Laricobius* beetles were consistently found near release sites and sometimes miles from the nearest release area, suggesting populations are surviving and establishing.

Spongy moth still a threat to North Carolina forestland

Since 1981, the NCDA&CS Plant Industry Division Spongy Moth Program has consistently monitored the entire state of North Carolina for **spongy moth** in cooperation with the USDA, APHIS, and USFS Slow the Spread Program. To date, Currituck and the northern portion of Dare on the Outer Banks have remained the only two counties in the state within the federal spongy moth quarantine.

Based on the 2023 trapping session, ten mating disruption treatments were administered in June of 2024 across 29,125 acres. No larvicide treatments were applied.



Spongy moths collected during the 2023-2024 trapping season. Photo by NCDA&CS Plant Industry.

During the 2024 trapping season (April-September), 15,336 pheromone traps were set statewide. More than 4,538 male spongy moths were captured in 1,119 traps, an increase in captures compared to 2023 when 1,100 moths were captured in 535 traps with 17,351 traps set statewide. An abnormally high number of moths were observed in the Sauratown Mountains in Stokes County prompting the NCFS to assist with additional ground and aerial surveillance of an area of approximately 2,967 acres to determine the extent of the infestation. Male moth captures do not necessarily indicate a spongy moth population has established in an area. However, it does warrant further investigation to determine if females are present and whether control methods are necessary.

Based on 2024's trap captures, determinations of feasible treatment options for infestation areas are ongoing for 2025. For updates on the National Slow the Spread program visit:

<https://www.slowthespread.org/>.

Native Defoliators

Native foliage-feeding insects are a natural part of a forest ecosystem, and their periodic outbreaks, though visually alarming, rarely pose a long-term threat to tree health. Their populations fluctuate naturally, often surging for a few years, resulting in significant defoliation events before returning to less damaging levels due to natural predators or less favorable environmental conditions.



Forest tent caterpillar in Wilson County. Photo by NCFS.

Forest tent caterpillar is the most important native defoliator of hardwoods in the Southeast. Major outbreaks can cause heavy defoliation across hundreds of thousands of acres of forestland. In 2024, moderate defoliation was detected in the Great Dismal Swamp, Lake Waccamaw, Roanoke River National Wildlife Refuge and the Chowan River Basin. An estimated 30,635 acres were impacted in these areas. While the defoliation was significant, trees recovered fully by summer. This activity is an annual event that seems to coincide with spring leaf out primarily in water tupelo swamps and associated forest types.



Fall webworm webbing in Johnston County. Photo by NCFS.

Fall webworm caterpillars are a common late-season defoliator of hardwoods in the Southeast. They feed in colonies, spinning silken nests over foliage as they develop. Although the first generation begins feeding in early spring, the large, conspicuous webs typically become more noticeable by fall. Populations were active throughout the Piedmont and Coastal Plain.

Redheaded pine sawfly larvae are common in plantation settings where many host trees are in close proximity. These voracious insects can strip trees bare of their needles, causing concern for some landowners. Outbreaks typically subside naturally within 1-2 years, although



Redheaded pine sawfly larvae at Turnbull Creek ESF in Bladen County. Photo by NCFS.

severe infestations can cause mortality. While populations were active across eastern North Carolina in late summer, significant tree mortality was not reported.

Spotted lanternfly remains in Forsyth and Guilford Counties



Spotted lanternfly aggregation in Virginia. Photo by NCFS.

Spotted lanternfly was first detected in Forsyth County near the border of Guilford County in June 2022. The initial report came from an informed citizen, following a statewide cooperative outreach effort between the NCFS, NCDA&CS Plant Industry Division and N.C. State University.

The spotted lanternfly is a piercing-sucking insect that feeds on the sap of its host. Due to a sugar-laden diet, they excrete copious amounts of a sweet, sticky substance known as honeydew. This buildup of honeydew attracts stinging insects like wasps and ants. It also results in sooty mold, a dark colored fungus that will grow on other plants, infrastructure and personal property left near infested plants. While the spotted lanternfly primarily feeds on the tree-of-heaven, it is of major concern to the

agricultural industry, notably viticulture. They are also a known pest of more than 70 other species of plants including stone fruits, hops, apples, maple, oak, walnut and willow.



Adult spotted lanternfly. Photo by NCFS.

The NCDA&CS Plant Industry Division has regulatory authority on this pest. NCFS staff continues to be involved in public outreach efforts, delimiting surveys and treatment operations. Though annual trapping suggests the insect has spread within

Forsyth and Guilford counties, as of 2024, no new reports of established populations in North Carolina have been received.

To report a spotted lanternfly, visit NCDA&CS Plant Industry: <https://www.ncagr.gov/divisions/plant-industry/plant-protection/entomological-insect-services/spotted-lanternfly>

Elm zigzag sawfly

The **elm zigzag sawfly (EZS)** is a nonnative, invasive insect native to China and Japan. The species gets its name from the characteristic zigzag pattern left by the larva as it eats its way through leaves. Since its first detection in Canada in 2020, the species has moved into five other states in the U.S. North Carolina is currently the southernmost extent of their spread. EZS was initially



EZS larvae underneath an infested tree. Photo by NCFS.

detected and identified in August 2022 near the border of Stokes and Surry counties following a call to one of our county offices. NCFS Forest Health personnel were alerted and subsequently detected elm zigzag sawfly infestations at other sites across the same counties after receiving multiple reports from private landowners. In June 2024, an additional report was documented in Stokes County.

potential. However, there have been no reports of the EZS causing mortality in elm trees. Research led by N.C. State University is ongoing to better understand the ecological impact the species may have on our forests and urban landscapes. Monitoring efforts continue.

EZS is capable of significant defoliation of elm trees and are strong fliers, traveling up to 56 miles per year. They reproduce asexually and have multiple generations annually. All of which may be significant contributing factors to their invasive



Elm zigzag sawfly typical feeding pattern. Photo by NCFS.



Defoliation on an American elm tree. Photo by NCFS.

FOREST DISEASES

Oak wilt confirmed in Pitt County

Oak wilt is an aggressive fungal disease that can devastate oak populations. All species of oaks are susceptible, although species in the red-black oak group are highly vulnerable. The disease spreads through two primary methods: root grafts which transmit the pathogen between neighboring trees, and insect vectors such as sap-feeding beetles. Oak wilt was first detected in Haywood and Buncombe counties in 1951. It is confirmed to be present in Buncombe, Haywood, Jackson, Madison, Swain and Lenoir counties, though it may occur statewide. In 2024, oak wilt was confirmed in Pitt County for the first time.



Browning that starts at the leaf margin and progresses inward is a typical symptom of oak wilt. Photo by NCFS.

Laurel wilt continues to spread across the state



Vascular streaking is a common symptom of laurel wilt. Photo by NCFS.

Laurel wilt is an invasive disease complex caused by the fungal pathogen, *Raffaelea lauricola*. The fungal pathogen is primarily transmitted by the **redbay ambrosia beetle**. Unlike our native ambrosia beetles, which target stressed trees, redbay ambrosia beetles attack healthy trees within the laurel family. The actual threat comes not from the beetles themselves but from the fungus they transport. Redbay ambrosia beetles are fungus farmers—females bore into trees and 'plant' the fungus inside its host to feed on. As the fungus grows, it disrupts the flow of water and nutrients, leading to rapid tree death, often within weeks.

The devastating disease was first discovered in Georgia in 2003. It was first confirmed in North Carolina in 2011. The most severely impacted tree species in North Carolina are redbay and sassafras. Other susceptible trees and shrubs in the laurel family include spicebush, the rare pondspice (Special Concern – N.C.), and pondberry (Endangered – U.S.).

In 2024, laurel wilt was confirmed in Pitt and Pamlico counties, bringing the total number of affected counties to 19. While laurel wilt has not yet been detected in the mountain region, its presence is likely due to the proximity of infected areas in bordering states. Landowners in Western North Carolina are urged to notify their local NCFS county ranger if laurel wilt is suspected.

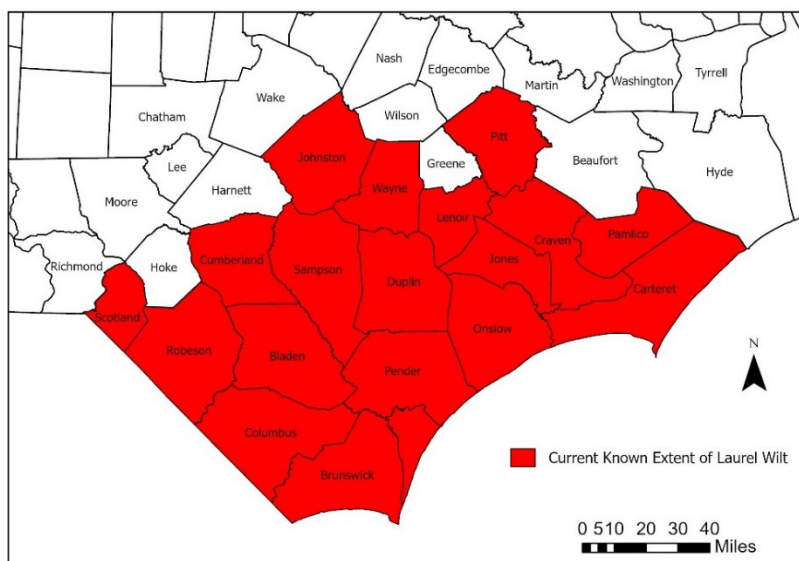


Figure 3: Map representing counties where laurel wilt been confirmed in North Carolina. View the map online here:

https://www.ncforestservice.gov/forest_health/pdf/Map_LW_NCTracking.pdf

Thousand cankers disease remains only in Haywood County

Since 2012, when thousand cankers disease was first detected in Haywood County, neither the fungus nor walnut twig beetle that carries it have been found in additional counties within the state. In January 2013, a quarantine was enacted that prohibits the movement of regulated materials from Haywood County to unaffected areas of North Carolina.

The NCFS works with the USFS to trap and survey high risk areas in the state. In 2024, 50 traps were deployed in 49 counties from the mountains to the coast. The walnut twig beetle was not detected in any new areas. A map of the distribution of thousand cankers disease of walnuts may be found at: https://www.ncforestservice.gov/forest_health/pdf/Map_TCD_NCTracking.pdf

Eastern white pine dieback in Western North Carolina

In Western North Carolina, it is not uncommon for white pines to succumb to an **insect/disease complex** caused by **white pine bast scale** and ***Caliciopsis* canker**. Symptoms range from profuse pitching or weeping of resin on the main stem, branch dieback that progresses upward toward the crown, and mortality. Dieback by this complex has been observed sporadically for several years.

The white pine bast scale is a sap-sucking insect with piercing-sucking mouth parts. They are small, visible with a magnifying lens and are often found in branch unions on the tree's bark beneath lichens. Feeding sites facilitate a point of entry for fungal pathogens, such as *Caliciopsis pinea* which causes profuse pitching and cankers in the main stem and between the whorls.

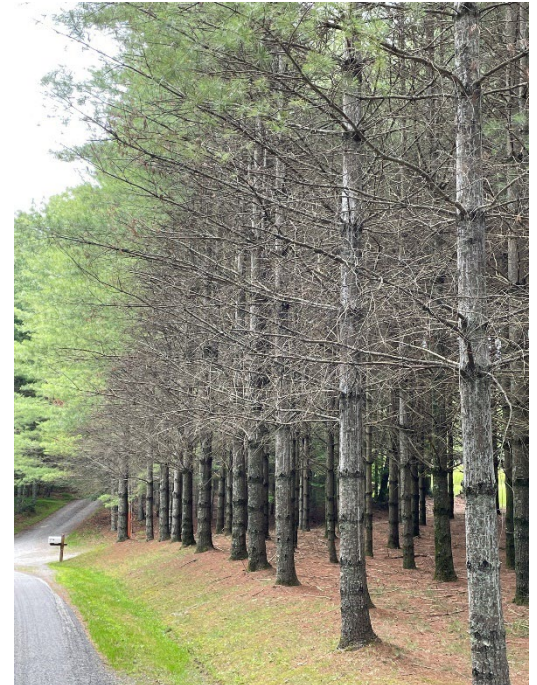
This **complex** is often associated with overstocked stands and poor site conditions, however, a considerable increase in

dieback and mortality

occurring in seemingly healthy eastern white pine stands over the last several years has prompted Forest Health staff to investigate further.

In 2024, survey efforts began to determine the extent of eastern white pine dieback across Western North Carolina. NCFS forest health staff have noted the most significant dieback has been observed in Ashe and Alleghany counties. However, symptoms have been detected across much of Western North Carolina.

Long-term monitoring plots are being established at select sites to determine how rapidly the white pine bast scale/*Caliciopsis* canker complex spreads and to test potential treatment options.



Eastern white pine exhibiting symptoms of eastern white pine dieback. Photo by NCFS.



Fruiting body of the fungi *Caliciopsis pinea* that causes *Caliciopsis* canker. Photo by NCFS.

INVASIVE PLANTS

Although invasive insects and disease pathogens have been the primary focus of most forest health initiatives, nonnative invasive plants also create competitive pressure on our native plant and animal populations by altering forest composition, reducing biodiversity and damaging habitat. Invasive plants also present challenges for management, site preparation and reforestation efforts.

With well over 120 species listed on the North Carolina Invasive Plant Council’s Invasive Plant List and more than 100 plants listed on their watchlist, foresters, landowners and homeowners have been increasingly engaged in controlling nonnative invasive plant species on properties they own and manage. In 2024, 18 state and local parks, and preserves participated in the inaugural Statewide Weedout Campaign during Invasive Species Awareness Week. The NCFS is currently awaiting final approval to launch a cost share program to assist private landowners with invasive plant removal. The following list addresses just a few of the problematic nonnative invasive plant species by physiographic region in North Carolina and in no order of importance.

Coastal Plain	Piedmont	Mountains
Tree-of-Heaven	Tree-of-Heaven	Tree-of-Heaven
Bradford pear	Mimosa	Princess/Empress tree
Chinaberry	Chinaberry	Kudzu
Kudzu	Bradford pear	Wisteria (Chinese and Japanese)
Multiflora rose	Kudzu	Multiflora rose
Japanese honeysuckle	Multiflora rose	Japanese honeysuckle
Wisteria (Chinese and Japanese)	Porcelain berry	Oriental bittersweet
Olive (thorny and autumn)	Japanese honeysuckle	Chinese privet
Chinese privet	Wisteria (Chinese and Japanese)	Olive (Russian, thorny and autumn)
Old World Climbing Fern	Knotweed	Burning bush
Common reed	Heavenly bamboo	Trifoliolate orange
Japanese stiltgrass	Fig buttercup	Garlic mustard
Chinese silvergrass	Japanese stiltgrass	Beefsteak plant
Johnson grass	Wavyleaf basketgrass	Wavyleaf basketgrass
Cogongrass	Cogongrass	Chinese silvergrass

ABIOTIC CONDITIONS

Wildland fire

In 2024, 5,368 wildland fires were reported on 16,412.6 forested acres. Most of these fires were caused by humans, with only 52 fires resulting from lightning strikes. Lightning strike fires accounted for 363.4 acres of the total forested area burned.

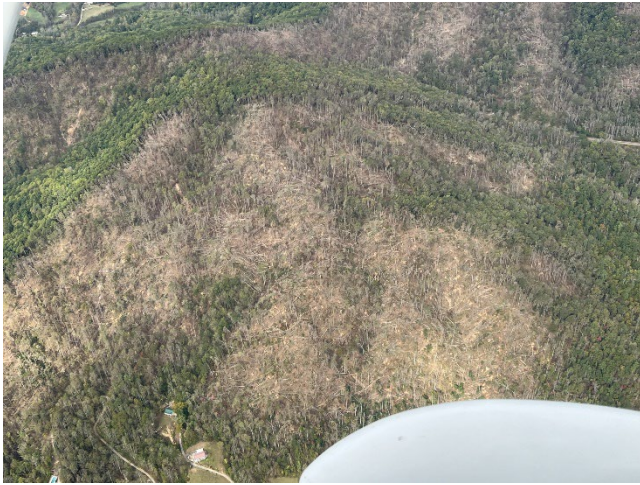
Frozen fury: icy supercell hits parts of Western North Carolina

On the afternoon of May 8, 2024, a supercell thunderstorm swept through Western North Carolina, dropping record-breaking hailstones the size of baseballs in parts of Buncombe County. A 10-mile band spanning across Barnardsville was hardest hit in terms of defoliation, with the ridge of Burt Mountain bearing the brunt of the damage.

In addition to property damage, hail can inflict severe tree damage, completely defoliating trees, stripping bark, creating wounds and snapping branches. This can lead to mortality or leave them

vulnerable to disease and insect attacks. Satellite imagery continued to reveal remnants of damage to the forest canopy on Burt Mountain into late June.

Hurricane Helene brings destructive winds and catastrophic flooding to parts of Western North Carolina



Timber damage in McDowell County (top) and Buncombe County (bottom) following Hurricane Helene. Photo by NCFS.

On the morning of Sept. 27, Hurricane Helene moved northward into the Carolinas, bringing sustained winds of 45 mph with gusts above 70 mph and up to 20 inches of precipitation in some areas. This resulted in large-scale, catastrophic flooding and significant wind damage to forestland across Western North Carolina.

Forest health personnel conducted aerial surveillance to complete a timber damage assessment in response to the storm. Flight lines were 10 miles apart, and damage assessment points were taken at 5-mile increments along flight lines. At each point, observations were made by focusing directly below the aircraft, and a damage class was assigned. In addition to damage class, timber type (hardwood, softwood, mixed, and spruce/fir) and types of damage (windthrow, crown damage, flooding or landslide) were also documented. Defoliation was not considered a damage type, although significant areas of defoliation due to wind were observed.

An estimated 822,000 acres, more than 27% of forestland in the affected counties, received some level of damage during the storm, resulting in nearly \$214 million of timber damage. The heaviest damage was confined to a six-county area with Buncombe, Mitchell, and McDowell counties among the most severely impacted. Overall, timber damage was primarily attributed to wind and varied significantly across the region. Severe damage often juxtaposed areas with relatively minor damage, with south-facing slopes directly exposed to the force of the wind bearing the brunt of the damage. In most locations where damage was observed, trees on the windward slopes were completely defoliated or windthrown, while leeward slopes remained largely unaffected. Mudslides and flooding were a small proportion of the overall timber damage. It was also noted that hardwood stands were affected to a larger extent than conifer stands.

View the full report here:

https://www.ncforestservice.gov/forest_health/pdf/HurricaneHelene_DamageAssessment_10_25_FINAL.pdf

Hurricane Helene Forest Damage Assessment

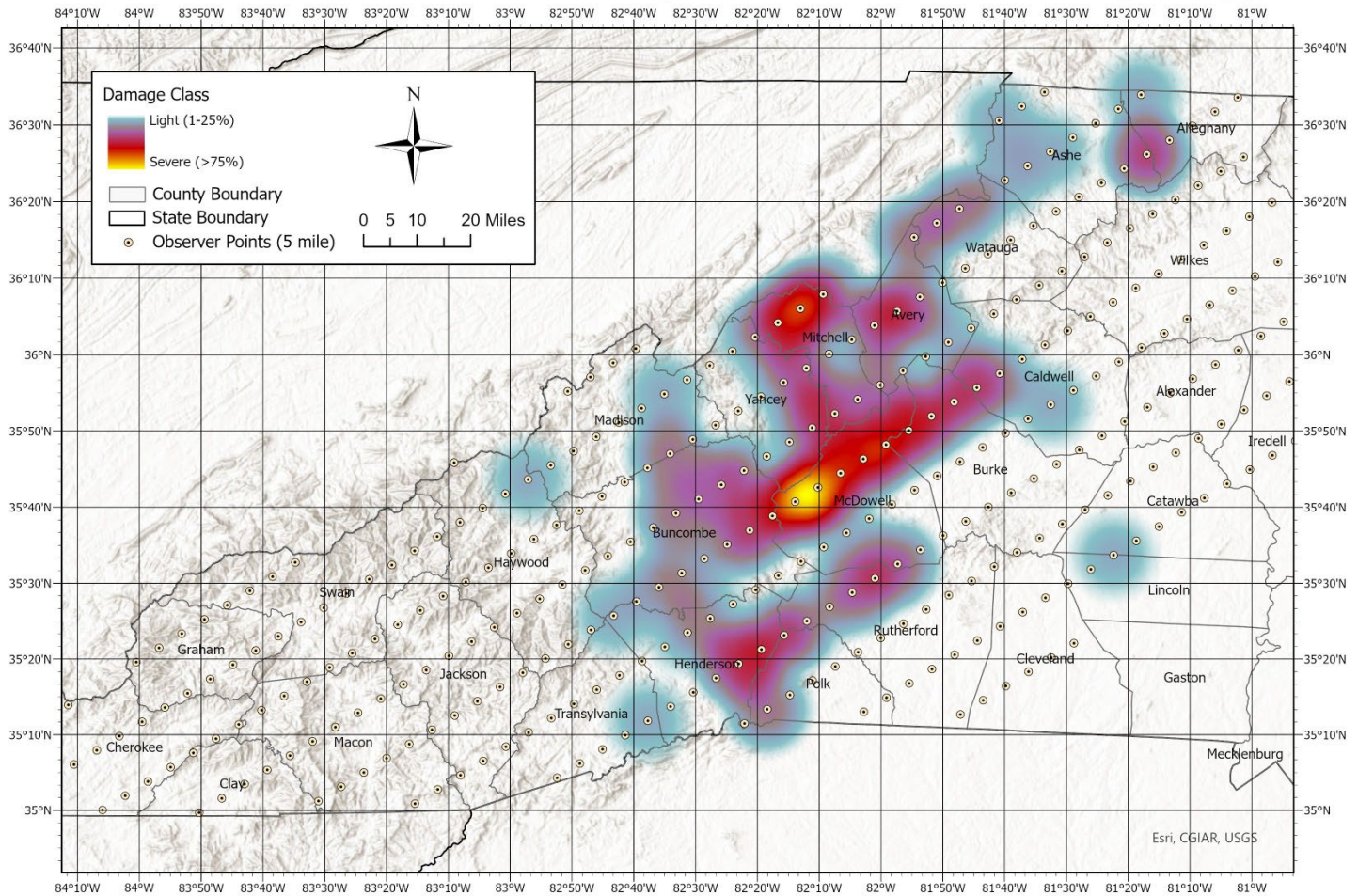


Figure 4: Heat map generated from the primary observer points using the Optimized Hot Spot Analysis tool in ArcGIS Pro. Based on the data collected, the heaviest damage was confined to a six-county area between 82°20'W and 82° W, with Buncombe, Mitchell and McDowell counties among the most severely impacted.

North Carolina's coastline and sea level rise

The images that most likely come to people's minds when they hear climate change or sea level rise are often of flooded city streets and buildings being lost to the sea. However, these dramatic images often overshadow the more subtle, yet significant impact sea level rise is having on forests along the Atlantic coastline. Rising sea levels from melting ice sheets and the thermal expansion of seawater as it warms are leading to more frequent coastal flooding and saltwater being pushed farther inland, especially during storm events.

When sea levels rise, the effects of hurricane storm surges and excessively high tides can lead to encroachment of saltwater from the ocean into freshwater systems. This process is known as saltwater intrusion. While this inundation of seawater is often temporary, the effects are longer lasting. Salt accumulates in the soil, eventually reaching levels that trees cannot tolerate, leaving behind ghostly gray stands of deadwood. These dead



Coastal ghost forest in Aurora, NC. Photo by NCFS.



Photo captured during an aerial survey showing the transitional zone between a coastal forest and saltwater marsh in Craven County. Photo by NCFS.

trees, now marking a transitional zone between coastal forests and saltwater marsh, have become known as coastal ghost forests. Furthermore, rising sea levels cause coastal water tables to rise, leading to saturated soils that create waterlogged conditions and deprive trees of the oxygen essential for healthy root function and growth. Both predicaments cause tree stress that can provoke secondary stressors such as insect attacks and disease. In the Coastal Plain of North Carolina, tree mortality from rising coastal groundwater levels is at least as significant, if not more so, than saltwater intrusion.

Due to its low elevation and further exacerbated by ongoing land subsidence, much of North Carolina's coastline is vulnerable. High tide flooding, defined as water levels of 1.6 to 2.1 feet above normal high tide, is projected to become a nearly daily occurrence by the year 2100. Storm surges are also expected to intensify with the predicted rise, resulting in increased coastal inland flooding, particularly when storm surges coincide with normal high tides. With the predicted increases, the threat to North Carolina's coastal forests grows more significant.

In 2021, the NCFS, in collaboration with the USFS and six other states along the Atlantic Coast, began mapping ghost forests in eastern North Carolina to estimate the extent of tree mortality in this region from factors related to sea level rise and the resulting saturation, and saltwater intrusion. To date, the NCFS Forest Health Program has mapped more than 61,000 acres of forestland impacted by sea level rise and continues to be involved in documenting this damage and monitoring its occurrence over time. Tree mortality ranges from 1% to more than 50% in impacted areas. A link to the USFS Forest Health Protection Coastal Ghost Forest Mapping Project is located below: <https://www.arcgis.com/apps/dashboards/91a0a6caab264c17885e1945d8d389d1>

WATCHLIST

Asian longhorned beetle

The **Asian longhorned beetle (ALB)** is no new threat to our hardwood forests. Although it remains undetected in the state, an infestation was discovered outside of Charleston, SC in 2020, indicating that



Asian longhorned beetle. Photo by Dennis Haugen, USDA Forest Service.

it's something North Carolinians should remain cognizant of. ALB feeds on roughly 29 hardwood species, with maple being the preferred host. Efforts are underway to control the pest as the Southeast presents a novel set of challenges for current eradication methods. NCFS forest health personnel have familiarized themselves with identifying the insect and the protocol for response if detected in the state. Multiple federal (USDA-APHIS and the USFS) and state (NCDA&CS Plant Industry and the NCFS) agencies actively survey and monitor for this insect to detect and respond early to any infestation.

Beech leaf disease

Beech leaf disease (BLD) is a newly described disease, first identified in Ohio in 2012. This emerging forest threat has been gaining ground in the Northeast, causing dieback and widespread mortality of American beech at an accelerated rate. To put this into perspective, BLD has spread through much of the northern extent of the American beech range in half the time of beech bark disease, another known threat to beech trees. As of 2024, BLD has been detected in 14 states and the province of Ontario. It was detected for the first time in neighboring Virginia in 2022.



Foliar nematode associated with beech leaf disease. Photo by Paulo Vieira, USDA Forest Service.

The disease is caused by a nonnative foliar nematode (*Litylenchus crenatae mccannii*) (**LCM**), though there is no consensus on its origin or how it was introduced. The tiny parasite is thought to spread through the consumption and dispersal of infected beechnuts by animals or by hitchhiking on animals that feed on beech buds. Research is ongoing.



Leaf banding associated with beech leaf disease damage. Photo Kristen Wickert, USFS, Bugwood.org.

Thousands of nematodes can overwinter in a single beech bud, feeding on the developing leaf tissue. Infected leaves will emerge in the spring, showing dark bands and puckering or raised areas between leaf veins. The disease can kill mature trees within six to 10 years following infestation. Recent research suggests two promising treatment options: a foliar application for smaller trees and root flare injection for larger trees. However, landowners in North Carolina are advised to refrain from treating trees preemptively at this time.

Beech trees are ecologically important to our forest ecosystems. Loss attributed to BLD could be devastating. If you suspect your beech tree is infected, notify forest health personnel immediately.

ACKNOWLEDGEMENTS

With assistance and support from the USFS, the NCFS is responsible for assisting woodland owners in the state with the detection and control of destructive forest insects and diseases. Forest health specialists in the Forest Protection Division direct this responsibility. Services are provided directly to forest landowners by NCFS district and county personnel with forest health staff providing appropriate training along with professional and technical expertise in the diagnosis and control of destructive insects and diseases.

N.C. Department of Agriculture & Consumer Services N.C. Forest Service Forest Health Branch 1616 Mail Service Center Raleigh, NC 27699-1616 919-857-4858 http://www.ncforestservice.org	U.S. Department of Agriculture Forest Service Southern Region, State and Private Forestry Forest Health Protection 200 W.T. Weaver Road Asheville, NC 28804 828-257-4320 http://www.fs.fed.us/r8/foresthealth/
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Users are encouraged to report any sightings of emerald ash borer, laurel wilt and thousand cankers disease to their NCFS county office (https://www.ncforestservice.gov/contacts/contacts_main.htm).

