



NORTH CAROLINA FOREST SERVICE

2021 Forest Health Highlights

Our Forests

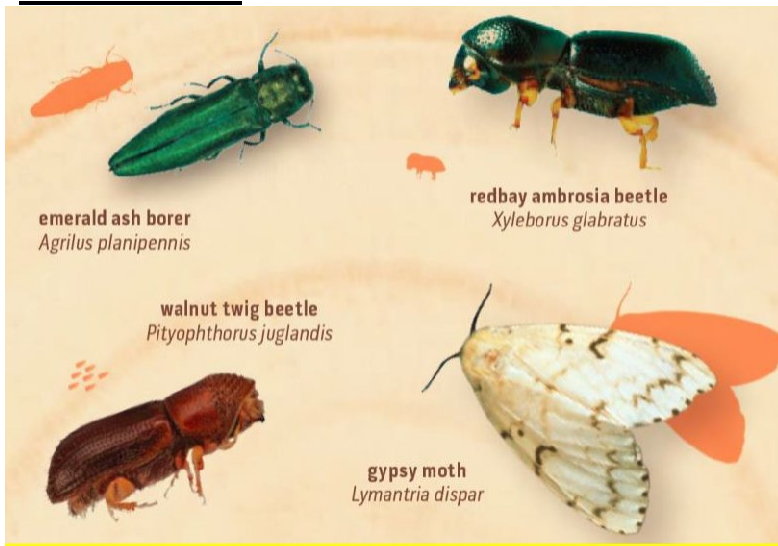
North Carolina's forests cover nearly 18.8 million acres or about 61% of the state's land area. Most of this forestland, about 11.3 million acres, is owned by individuals, families, and non-corporate entities. About 2.9 million acres is owned by private corporations not involved in forest product manufacturing, and about 1.3 million acres is owned by forest industry. Federal, state, and local public lands total 2.6 million acres. Forestry is an important industry in the state, providing more than 150,400 jobs and contributing \$33.6 billion to the North Carolina economy annually. The forestry industry ranks first in manufacturing sector jobs and second in statewide employment overall.

Forests in North Carolina are also prized for their scenic beauty, supporting tourism and outdoor recreation, and providing wildlife habitat from the Appalachian Mountains to the lowlands of the Atlantic Coastal Plain. The beauty and productivity of North Carolina's forests have historically been challenged by a variety of threats, both native and nonnative. In the past 10 years, three nonnative invasive species were detected for the first time in the state: **laurel wilt** in 2011; **thousand cankers disease** of walnuts in 2012; and **emerald ash borer** in 2013. Pests such as **hemlock woolly adelgid** and **gypsy moth** have impacted forests in the state for more than 20 years. Others, such as **spotted lanternfly** and **Asian longhorned beetle**, have been found in adjacent states and are being monitored closely in North Carolina.

COVID-19 Impacts

N.C. Forest Service (NCFS) programs and services were greatly impacted by the Coronavirus pandemic. Aerial surveying to detect and document **southern pine beetle** mortality, **forest tent caterpillar** defoliation, and damage caused by other pests was grounded until late summer, so alternative technologies, such as satellite remote sensing, were necessarily utilized to attempt detection of forest health threats. Forest health meetings, training and education and outreach events were delivered through online formats. Field services were provided with social distancing, and some field visits were prioritized or eliminated through diagnostic use of photographs from landowners, homeowners, and forestry professionals. Here is a useful resource with information on properly photographing tree disorders: https://ncforestsservice.gov/forest_health/pdf/FHH/FHH_AppendixF_Photos.pdf

Invasive Pests



These nonnative invasive pests hide on or in the trees they kill and can be transmitted from one location to another through movement of untreated firewood. Graphic Credit: www.dontmovefirewood.org.

The devastating **laurel wilt disease** was first confirmed in North Carolina in 2011. This year, it was detected in Johnston and Jones Counties, bringing the total to 14 positive counties in the southeastern part of the state. Laurel wilt was previously detected in Bladen, Brunswick, Columbus, Cumberland, Duplin, Lenoir, New Hanover, Onslow, Pender, Robeson, Sampson, and Wayne counties. Historically, detections of laurel wilt and its insect vector, **redbay ambrosia beetle**, were confined to redbay and swampbay trees. More recent detections have also been recorded in sassafras. A map of the current known distribution of laurel wilt in North Carolina can be found 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 the **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 United States Department of Agriculture Forest Service (USFS) to trap and survey high risk areas in the state. In 2021, 46 traps were set statewide, and **walnut twig beetle** was not detected in any additional areas. A map of the current known distribution of thousand cankers disease of walnuts in North Carolina can be found here: http://www.ncforestservice.gov/forest_health/pdf/Map_TCD_NCTracking.pdf

Emerald Ash Borer not Detected in any Additional Counties in 2021:

Since its initial 2013 detection in North Carolina, **emerald ash borer (EAB)** has been found in 62 counties across the state, but there were no new county detections in 2021. NCFS continues to monitor the spread of EAB across our state even though the federal quarantine which prohibited the movement of EAB regulated materials has been lifted. By documenting the spread in North Carolina, we can provide information to our citizens about the proximity of the pest to their lands and forests. A map of the current known distribution of EAB in North Carolina can be found here: https://www.ncforestservice.gov/forest_health/pdf/Map_EAB_NCTracking.pdf

This year, the NCFS continued the Ash Protection Program, a reimbursement program to assist communities in protecting ash trees in urban settings. In 2021, six communities signed up for the program and 202 ash trees were treated totaling 3,337 diameter inches. Since 2018, 990 urban ash trees have been protected with appropriate insecticides.

Hemlock Woolly Adelgid and the Hemlock Restoration Initiative:

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 the western portion of the state are dead or in sharp decline due to HWA.

Six years ago, a cooperative effort between the 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 2018 more than 41,000 hemlocks have been treated and are still under protection from said treatment. A total of 2,276 hemlocks were treated in hemlock conservation areas or other sites working in collaboration with the Hemlock Restoration Initiative. Meanwhile, HRI continues to release and monitor biocontrol agents that prey on the adelgids. Three new sites were identified for potential biocontrol releases in 2021.

Lymantria dispar Program:

Since 1982, the entire state of North Carolina has been monitored for *Lymantria dispar* by the NCDA&CS-Plant Industry Division *Lymantria dispar* Program and the USFS Slow the Spread Program. The 2021 trapping season is complete, and 2,096 male *L. dispar* were captured in 725 traps, with 17,455 traps set statewide. This is slightly more than double the number of captures compared with last year (2020) when 1,037 moths were captured in 371 traps, with 16,577 traps set statewide. Male moth captures do not necessarily indicate a population of *L. dispar* is developing in an area but triggers further investigation to determine if females are present and if control is warranted.

Based on this year's trap captures, 11 treatments totaling 17,096 acres have been proposed for 2022. All treatments are scheduled to employ a mating disruption pheromone.

For a map of proposed 2022 *Lymantria dispar* treatments see:

<https://ncagr.maps.arcgis.com/apps/Minimalist/index.html?appid=3df6f80cc8354f61899c5a8056137350%20>

In 2021, four mating disruption treatments were conducted on 7,655 acres and one biological control treatment using *Bacillus thuringiensis* (strain: *kurstaki*) was conducted on 450 acres.

Lymantria dispar has historically been held at bay from becoming established in North Carolina with only two counties, Currituck and parts of Dare, being quarantined for the pest since 1988. These two counties remain the only two in the state with a *Lymantria dispar* quarantine in place.

Note: Beginning July 1, 2021, the Entomological Society of America no longer recognizes gypsy moth as the common name for *Lymantria dispar*. Future reports, publications, and outreach materials will include the new common name once it has been selected.

On the lookout



Left: Spotted lanternfly, Credit: Richard Gardner, Bugwood.org

Right: Asian longhorned beetle, Credit: Kenneth R. Law, USDA-APHIS, Bugwood.org

Two pests of concern not yet found in North Carolina have been detected in adjacent states. **Spotted lanternfly** has been found in 11 Northeastern, Mid-Atlantic, and Midwestern states as of November 2021. The pest has been established in northern Virginia since January of 2018. However, in late October a small population was discovered in Hillsville, VA, just 15 miles from the North Carolina Border in Surry County. While mostly a pest of fruit trees and grapes, it is also known to attack a variety of hardwood trees found in North Carolina forests and ornamental landscapes. Likewise, **Asian longhorned beetles** have been previously reported in the Northeast and Midwest over the past decade impacting a variety of hardwood species. In May 2020, it was detected for the first time in the Southeast near Charleston, South Carolina. Efforts are underway to control the pest before it spreads further. Both species are not wanted in North Carolina. Multiple federal (USDA-APHIS and USFS) and state (NCDA&CS-Plant Industries Division and NCFS) agencies are surveying and monitoring for these insect pests to detect and respond to early infestations.

Native Pests

Bark Beetles:

The **southern pine beetle (SPB)** has historically been North Carolina's most significant forest insect pest. From 1999 through 2002, SPB killed at least \$84 million worth of timber in North Carolina. Since then, beetle activity has been relatively low. In 2017 and 2018, however, activity picked up on federal, state, and private lands, then began to subside in 2019. In 2020, only one small spot of SPB activity was reported on private lands in the western part of the state, and none were reported this year. In the spring, the NCFS deployed 39 SPB prediction traps across the state. These traps, plus an additional 18 traps deployed by the USFS on national forestlands, correctly predicted low SPB activity across state this year.

The **Southern Pine Beetle Prevention Program**, funded through a grant from the USDA Forest Service, partially reimburses nonindustrial private forest landowners in North Carolina for the cost of completing forest management practices to improve pine forest health and to reduce the likelihood of SPB infestations. Precommercial thinning has been the most utilized practice under this program in North Carolina. The practice reduces the number of trees in a young stand that would otherwise compete for available sunlight, nutrients, and water, ultimately improving growing conditions for remaining trees. In 2020, additional practices, including understory prescribed burns and understory vegetation control, were added to the program to further encourage healthy growing conditions. Since 2005, there have been more than 2,550 cost-shared projects on more than

82,000 acres in North Carolina aimed at the prevention of SPB. There are 64 more projects still pending on 4,505 acres.

While southern pine beetle activity was low, ***Ips engraver beetle*** continued to cause pine mortality statewide. *Ips* are secondary pests, meaning they attack trees that are stressed or weakened by other factors such as overstocking, drought, flooding, wind damage, and poor soil and growing conditions. While *Ips* was seen in many locations, there were 45 reports of severe damage on 245 acres across the state.

Defoliators:

Native foliage-consuming pests cause damage that is mainly unsightly, but usually have little impact on healthy trees in the long run.

The **forest tent caterpillar** most frequently defoliates bottomland hardwoods in our state. In 2021, North Carolina experienced its seventh consecutive year of forest tent caterpillar outbreak. Through use of satellite assisted remote sensing (USDA Forest Service, FORWARN II) and ground observations, widespread defoliation was observed in Northeastern N.C., primarily along the Roanoke River and Southeastern N.C. along the Lumber River, Cape Fear River, and southwest of Lake Waccamaw. Due to Covid restrictions aerial observation was grounded during the period in which forest tent caterpillar defoliation occurred. Using remotely sensed data, we estimate the extent of defoliation to be between 90,000-100,000 acres. Trees recovered by summer and no mortality was observed. In 2020, 158,700 acres of bottomland hardwoods were defoliated by this pest.

Stem and Needle Diseases

Pitch canker, Needle cast, and Needle Rusts are diseases that typically have a minor impact among native pines in North Carolina. North Carolina saw a notable reduction in the frequency of occurrence for all three of these diseases during 2021.

After two consecutive years (2019 and 2020) of increased **pitch canker** activity, 2021 saw few reports of pitch canker. There was one notable report of an eight-acre loblolly stand where nearly 100% of trees exhibited pitch canker symptoms, and some trees had succumbed. Most other reports of pitch canker were scattered throughout the state and mortality was infrequent. Usually, pitch canker coincided with exposure to wind/hail events which caused wounds that acted as access points for infection. Although the effects of pitch canker are highly visible, mortality was infrequent in 2021.

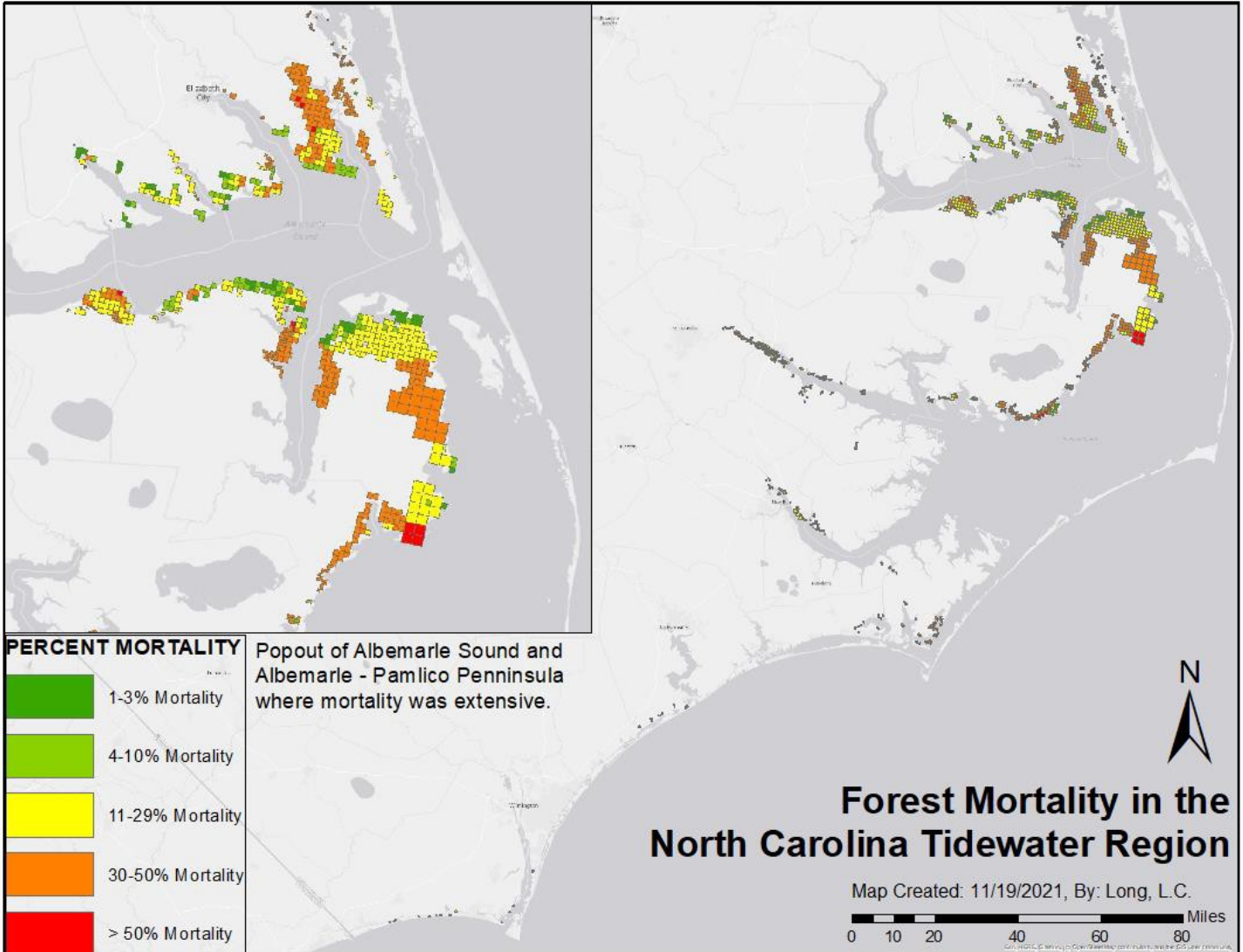


Left: Pitch canker foliar symptoms (discoloration and branch dieback). Credit: BrianHeath, NCFS
Right: Pitch canker stem symptoms (oozing pitch).Credit: Mark Bost, NCFS

Abiotic Stressors

Saltwater Intrusion

Once Covid restrictions began to ease and aerial survey was permitted, we conducted flights to estimate the extent of tree mortality along most of the tidally influenced regions of the North Carolina coast. The purpose of these flights was threefold. First, North Carolina and four other Atlantic Coast states, in collaboration with the USDA Forest Service, have undertaken an effort to estimate and map “ghost forest”. By mapping “ghost forest” we aim to determine the extent of damage to forest trees caused by saltwater intrusion into ground water, as well as hurricane storm surge. Second, to estimate the current extent of forest mortality prior to the next hurricane making landfall in the state. Third, as a training exercise for new forest health employees on how to use digital mobile sketch mappers and assess damage from the air. We surveyed approximately 1,876,451 acres and mapped 202,369 acres with probable salt mortality. Mortality ranged from about 1% to more than 50% in the areas with damage.



For

Forest Health Assistance in North Carolina

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

North Carolina Department of Agriculture & Consumer Services N.C. Forest Service Forest Health Branch

1616 Mail Service Center
Raleigh, North Carolina 27699-1616
919-857-4858
<http://www.ncforests-service.org>

The North Carolina Forest Service is an equal opportunity employer. Its programs, services, activities, and employment opportunities are available to all people regardless of race, color, religion, sex, age, national origin, disabilities or political affiliation.

United States Department of Agriculture Forest Service Southern Region, State & Private Forestry Forest Health Protection

200 W.T. Weaver Road Asheville, North Carolina 28804
828-257-4320
<http://www.fs.fed.us/r8/foresthealth/>

Where are they now?

Monitoring Firewood-Vectored Invasive Forest Pests in North Carolina



Emerald Ash Borer

http://www.ncforestservice.gov/forest_health/fh_eabfaq.htm



Gypsy Moth Quarantine

<http://www.ncagr.gov/plantindustry/plant/entomology/gm.htm>



Laurel Wilt Disease

http://www.ncforestservice.gov/forest_health/forest_health_laurelwiltfaq.htm



Thousand Cankers Disease

http://ncforestservice.gov/forest_health/forest_health_thousandcankers.htm



Spotted Lanternfly

https://www.ncforestservice.gov/forest_health/pdf/FHN/FHN201802-SLF.pdf



Asian Longhorned Beetle

These devastating pests can easily be moved in or on firewood. The use of local or treated firewood is important to reduce the spread of invasive species in our state's forests.

The N.C. Forest Service asks that you use local firewood to prevent the further spread of forest pests.



Map Created 11/18/2021 by: Long, L.C. - FHM Coordinator

The N.C. Forest Service is a division of the N.C. Department of Agriculture and Consumer Services; Steve Troxler, Commissioner.

