

2015 NORTH CAROLINA FOREST HEALTH HIGHLIGHTS

Our Forests

North Carolina's forests cover 18.6 million acres, or about 60 percent of the state's land area. Ninety-seven percent of the forested area (18.1 million acres) is considered available for timber production and classified as timberland.

Most of the state's forested land, (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. Public lands (federal, state and local) total 2.6 million acres.

Recent forest inventory data reveal that the state's forests are growing more wood volume each year than is being harvested or lost due to mortality or conversion to non-forest uses. This is true for both hardwoods and softwoods and is a positive reflection on the ability of the state's forest to sustainably supply goods and services for all North Carolinians. Forestry is an important industry in the state, providing nearly 180,000 jobs.

North Carolina's forests 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. Major forest types in the state include oak-hickory, loblolly-shortleaf pine, oak-pine, and oak-gum-cypress.

2015 Influences on Health of Forests in North Carolina

The beauty and productivity of North Carolina's forests have historically been challenged by a variety of threats. Healthy forests are generally accustomed to pests and conditions that are common to the area where they grow. Outbreaks of common pests may occur periodically and cause a great deal of damage; but, for the most part, forests are resilient and outbreaks eventually subside. Newly introduced pests, on the other hand, can have devastating impacts on the forests of our state as trees may be lacking defense responses necessary to repel attacks from these new threats.

In the past several years, three non-native invasive species were detected for the first time in the state: **laurel wilt** (2011), **thousand cankers disease** of walnuts (2012), and **emerald ash borer** (2013). In 2015, two of these pests (laurel wilt and emerald ash borer) were detected in counties. All three of these threats can be accelerated by the movement of firewood. A map showing where these pests were found at the end of 2015 can be found at the end of this publication.

In addition to these new threats, common pests such as **bark beetles** (especially *Ips* engraver beetles), insect **defoliators**, and leaf infections by **anthracnose** pathogens were present throughout the state.

Found in Firewood

The movement of infested plants and wood products can spread invasive pests from one area of the state (or country) to another. One common but often overlooked way that these invasive species make it into the state's parks, forests, and private campgrounds is through the movement of firewood.

Some invasive insects, such as the **gypsy moth**, can lay eggs on pieces of firewood. Others, such as **walnut twig beetle** (which carries the fungal pathogen that causes **thousand cankers disease**), **emerald ash borer**, and **redbay ambrosia beetle** (which carries the fungal pathogen that causes **laurel wilt**), spend parts of their lifecycle within wood and can emerge from firewood as adults ready to infest new trees.



One way to help prevent the spread of these dangerous invasive species is by using local firewood. A good rule of thumb is to burn wood within a 50 mile radius of its origin. Additionally, one should not bring firewood into North Carolina from another state unless it has been treated to kill pests, and/or inspected or certified as pest free. If firewood has inadvertently been brought into the state, or has been moved long distances within the state, it should be burned as soon as possible. A nationwide campaign (dontmovefirewood.org) encourages citizens to limit the movement of firewood due to the potential for transporting pests, primarily non-native invasive insects and diseases, from one geographic area to another. Through educational efforts, the state of North Carolina encourages residents and visitors to use local, treated, or inspected firewood to reduce the risk of moving these pests.

Because the transportation of insects and diseases in firewood could have devastating effects on Great Smoky Mountains National Park, park officials have implemented a policy which prohibits bringing untreated firewood into the park (in both North Carolina and Tennessee). North Carolina's state parks are also encouraging campers to use treated or local firewood during their stays.

Thousand Cankers Disease has not spread, remains only in Haywood County

Late in 2012, **thousand cankers disease (TCD)** was first detected in North Carolina in Haywood County near Cataloochee in Great Smoky Mountains National Park. In North Carolina, black walnut and butternut trees are at risk of infection leading to eventual mortality from the disease. The fungus that causes TCD is carried by the tiny **walnut twig beetle**. Both the fungus and the insect vector were found in walnut trees for the first time in the eastern U.S. when they were found in Knoxville, TN in July 2010. Both are native to the southwestern U.S. and Mexico and are thought to have been brought east in infested walnut wood.

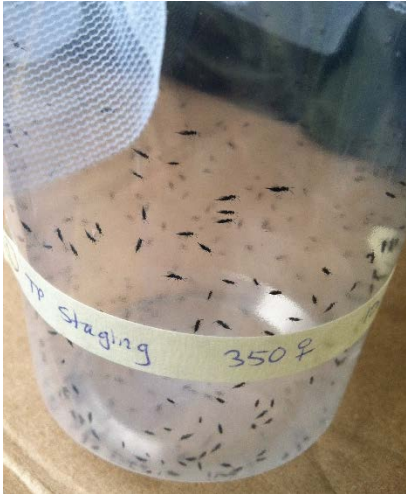
In North Carolina, a quarantine was enacted in January 2013 to prohibit the movement of infected materials from Haywood County to unaffected areas of the state. Regulated materials in Haywood County include unprocessed wood from walnut trees, the insect itself, and hardwood firewood. Previously, an external quarantine was implemented against importation of firewood and walnut wood products from states where the disease is known to be present. The North Carolina Forest Service has been actively working with the United States Department of Agriculture Forest Service (USFS), North Carolina Department of Agriculture and Consumer Services (NCDA&CS) Plant Industry Division and the University of Tennessee in trapping and surveying for newly affected areas in the state.

In 2015, no new affected sites were detected (based on 184 walnut twig beetle traps in addition to ground surveys). Being new to eastern forests, there are many unknowns about the insect and disease, including management options available, but research is ongoing.

Emerald ash borer found in many new North Carolina Counties; statewide quarantine enacted

The first evidence of **emerald ash borer (EAB)** in North Carolina was found during a standard check of emerald ash borer traps in Granville County in 2013 (note: the initial detection was not found in a trap, but in symptomatic trees at several trapping locations). Additional surveying found emerald ash borer activity in the nearby counties of Person, Vance, and Warren Counties.

In 2015, EAB was detected in 14 additional counties with a scattered distribution across the state. As a result, the entire state was placed under state and federal **quarantines** to prevent the spread of this pest to non-infested area. The movement of ash wood products, the insect itself, and hardwood firewood outside the quarantine area is not permitted without a compliance agreement issued by the NCDA&CS Plant Industry Division. Plant Industry and the N.C. Forest Service are working in cooperation with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and Forest Service to monitor and slow the spread of this pest.



The emerald ash borer, which is native to Asia, causes mortality to all species of ash in the U.S. In North Carolina, four species of ash are threatened: green, white, Carolina and pumpkin ash. In addition, white fringetree is now considered a host, but there have been no detections of EAB in native white fringetree in N.C. The first detection of EAB in the U.S. occurred in Michigan in the summer of 2002. This wood-boring insect most likely arrived in the U.S. in wood packing materials originating from Asia, where it is native. It quickly began to spread and in 2013, North Carolina became the 20th state in the country to confirm the presence of the destructive pest. Currently, there is no reliable management option to stop this insect from spreading but individual trees may be protected or saved using insecticides. Localized extinction of ash in North Carolina forests is likely, but the long term effects of such a dramatic change in forest species composition is poorly understood.

Management of EAB is possible with insecticides in urban areas (e.g., ash street trees, park/yard trees), but this is not a viable option in forest settings. Research related to long-term management strategies is ongoing and includes biological control (i.e., the release of several parasitoid wasps native to Asia). N.C. Forest Service Forest Health staff became a part of this research in 2013 by releasing parasitic wasps to study the establishment, dispersal, and impact these natural enemies have on suppressing EAB populations and the recovery of ash trees. Continual releases in Granville, Vance, and Wayne Counties total approximately 60,000 wasps (September 2013 – November 2015). The wasps, which do not sting humans, are reared in a USDA - APHIS laboratory in Brighton, Michigan and releases are conducted under specific USDA guidelines.

Laurel Wilt Now continues to spread in North Carolina

The devastating **laurel wilt** disease was first confirmed in North Carolina in 2011. The pathogen that causes laurel wilt is from Asia and was first discovered in the U.S. in Georgia in 2003. Since then, it has spread into seven states in the southeast, including North Carolina. In South Carolina, Georgia, and Florida, this disease has killed more than 95 percent of susceptible redbay trees in infected stands and has gained the attention of forest pathologists for its ability to kill healthy, mature trees in only a few weeks. The pathogen that causes laurel wilt is carried from tree to tree by the **redbay ambrosia beetle**.



In 2015, the disease was detected for the first time in Duplin County. In North Carolina, this disease is now found in portions of Bladen, Brunswick, Columbus, Duplin, New Hanover, Pender, and Sampson counties.

Only plants in the Laurel family are susceptible to laurel wilt. The most severely affected species are redbay and swampbay, which are medium sized trees commonly found throughout the eastern part of the state, particularly in coastal forests. Other susceptible trees and shrubs in the Laurel family include sassafras, spicebush, pondspice, and pondberry. Due to the possible localized extinction of redbay trees, the Palamedes swallowtail may also potentially suffer the same fate, as it feeds almost exclusively on redbay as a larvae. To assess the impact of the disease on this charismatic butterfly, N.C. Forest Service Forest Health staff is cooperating with Mississippi State University to assess population levels of the butterfly in areas affected and unaffected by laurel wilt. The final season of data collection occurred in 2015 and data analysis is ongoing.

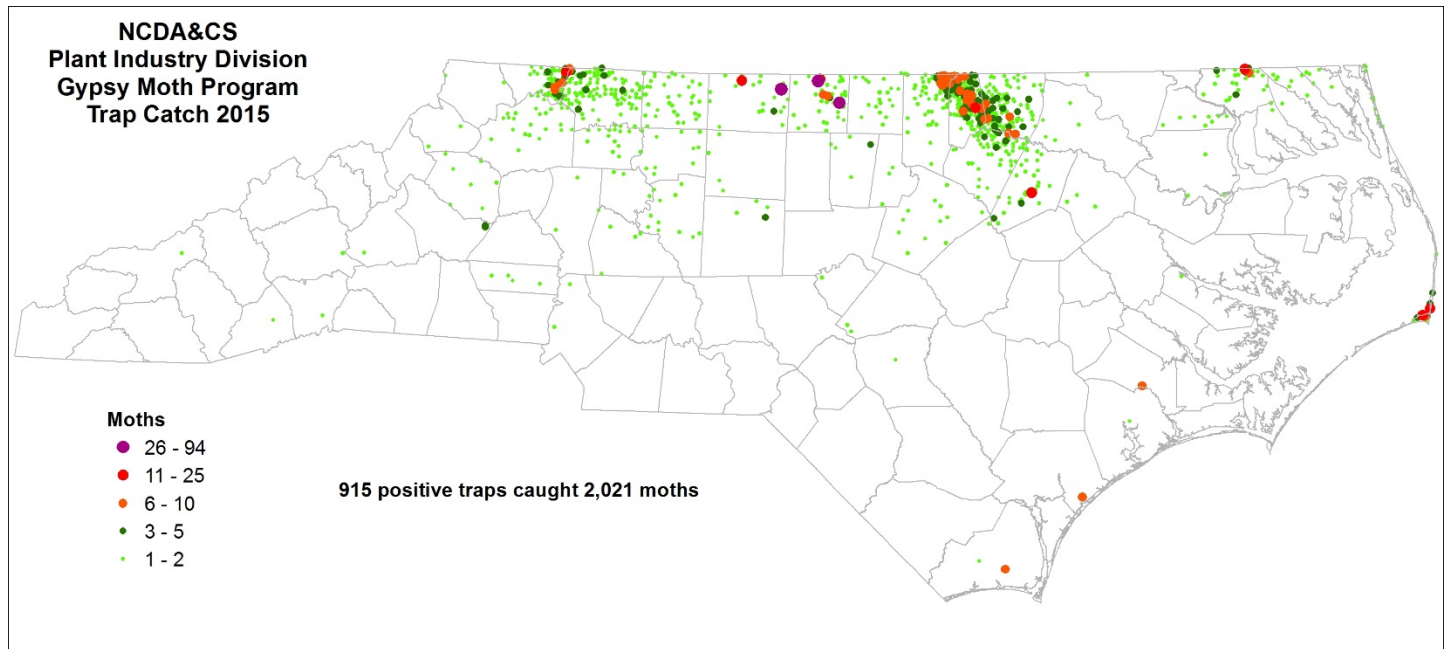
Bark Beetles

The **southern pine beetle (SPB)** has historically been North Carolina's most significant forest insect pest. From 1999 through 2002, the beetle killed at least \$84 million worth of timber in North Carolina. Most of the mortality during that outbreak was in the mountains and western piedmont areas. Since then, beetle activity has been relatively low and there were no reports of southern pine beetle activity on state or private forest lands in 2015. While this pest is currently having a minimal impact on North Carolina's pine trees, prevention efforts remain important because the insect periodically increases to epidemic proportions. Statewide in 2015, ***Ips* engraver beetles** were a major concern, with higher activity than was seen in recent years. This sudden spike in activity could be due to the high number of trees damaged in two ice storms in early 2014 and 2015 or poor management of stands, such as yearly raking or lack of thinning practices in longleaf pine stands. NCFS personnel plan to investigate this further in 2016 to be able to offer management recommendations to landowners. **Black turpentine beetle** activity continued to be of concern, but were relatively low and constant from previous years.

Southern pine beetle prevention efforts remain important during periods of low beetle activity. **The Southern Pine Beetle Prevention Program**, funded through a grant from the USDA Forest Service, will reimburse non-industrial private forest landowners in North Carolina for some of the cost of pre-commercial thinning of pine stands. During a pre-commercial thinning, trees with no commercial value are removed in order to allow remaining trees to grow with less competition for food and sunlight. Such thinning improves the health of the remaining trees and reduces the stand's susceptibility to the southern pine beetle. Since the program began, over 65,000 acres have been thinned through this program to encourage proper management conditions for pine stand health and to reduce the likelihood of southern pine beetle infestations.

Gypsy Moth

The entire state of North Carolina has been monitored for **gypsy moth** since 1982 through an effort of the N.C. Department of Agriculture and Consumer Services (NCDA&CS) with assistance from the N.C. Forest Service. The 2015 trapping season is complete and 2,021 moths were captured in 915 traps. This is higher than last year (2014), when positive trap captures totaled 757 moths within 348 traps.



These trap captures, along with egg mass surveys to be conducted this winter, will play a role in the determination of treatments that will be done in 2016. Treated areas in 2015 (based on 2014 trap catches) included 762 acres in Stokes County and 20,488 acres (in two areas) in Person County. All three treatment areas were treated with mating disruption.

The gypsy moth has historically been held at bay from becoming established in North Carolina, with only two counties being quarantined for the pest since 1988 (Currituck County and parts of Dare County). These two counties remain the only two with a gypsy moth quarantine in place.

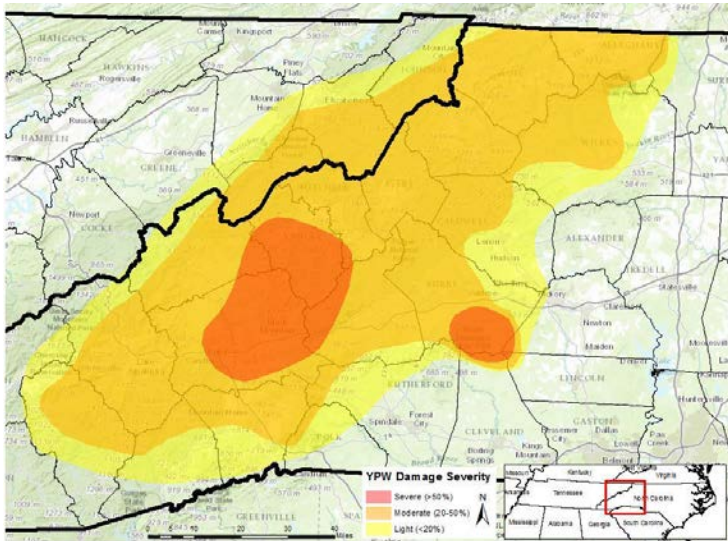
Beech Bark Disease

The **beech bark disease** is a non-native disease that is spread from tree to tree by beech scale. The disease has caused minor issues in the past several years, but in 2015, widespread mortality occurred. Mortality was apparent in most of the western counties where elevation exceeded 3,500 ft. The highest incidence was observed in Avery and Mitchell Counties.

Foliage-damaging pests

Several insects which damage the leaves of hardwood trees (either by defoliating or causing lesions) had greater than normal activity in the state this year. The native foliage-damaging pests listed below cause damage that is mainly unsightly, but they usually have little impact on healthy trees in the long-run.

Yellow-poplar weevil is a beetle that mines the leaves of yellow-poplar, sassafras, and magnolia. Widespread damage was reported in western N.C. in 2015 (map right, prepared by USFS-FHP). Outreach was conducted to alleviate questions and concerns regarding the aesthetic pest.



Oak leaf blister was also reported in high numbers in the western areas of the state this year. The disease causes unsightly lesions, but are generally a minor threat to tree health.

Fall and spring cankerworms were active throughout the piedmont region once again, primarily in urban areas with Durham experiencing enough activity that citizens were encouraged to install tree bands (sticky bands) around their oak trees in the winter to minimize outbreaks next spring. Defoliation also was reported in Wake County and Charlotte/Mecklenburg County.

Fall webworm populations were also active throughout the eastern half of the state. In addition to munching on the leaves of a variety of hardwoods, the webworm caterpillars create gaudy webs at the ends of branches that cause concern from landowners.

Forest Health Assistance in North Carolina

With assistance and support from the USDA Forest Service, the NCFS is responsible for providing assistance to the 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 and Consumer Services, N.C. Forest Service, Forest Health Branch

1616 Mail Service Center, Raleigh, North Carolina 27699-1616

919-857-4858

<http://www.ncforestservice.org>

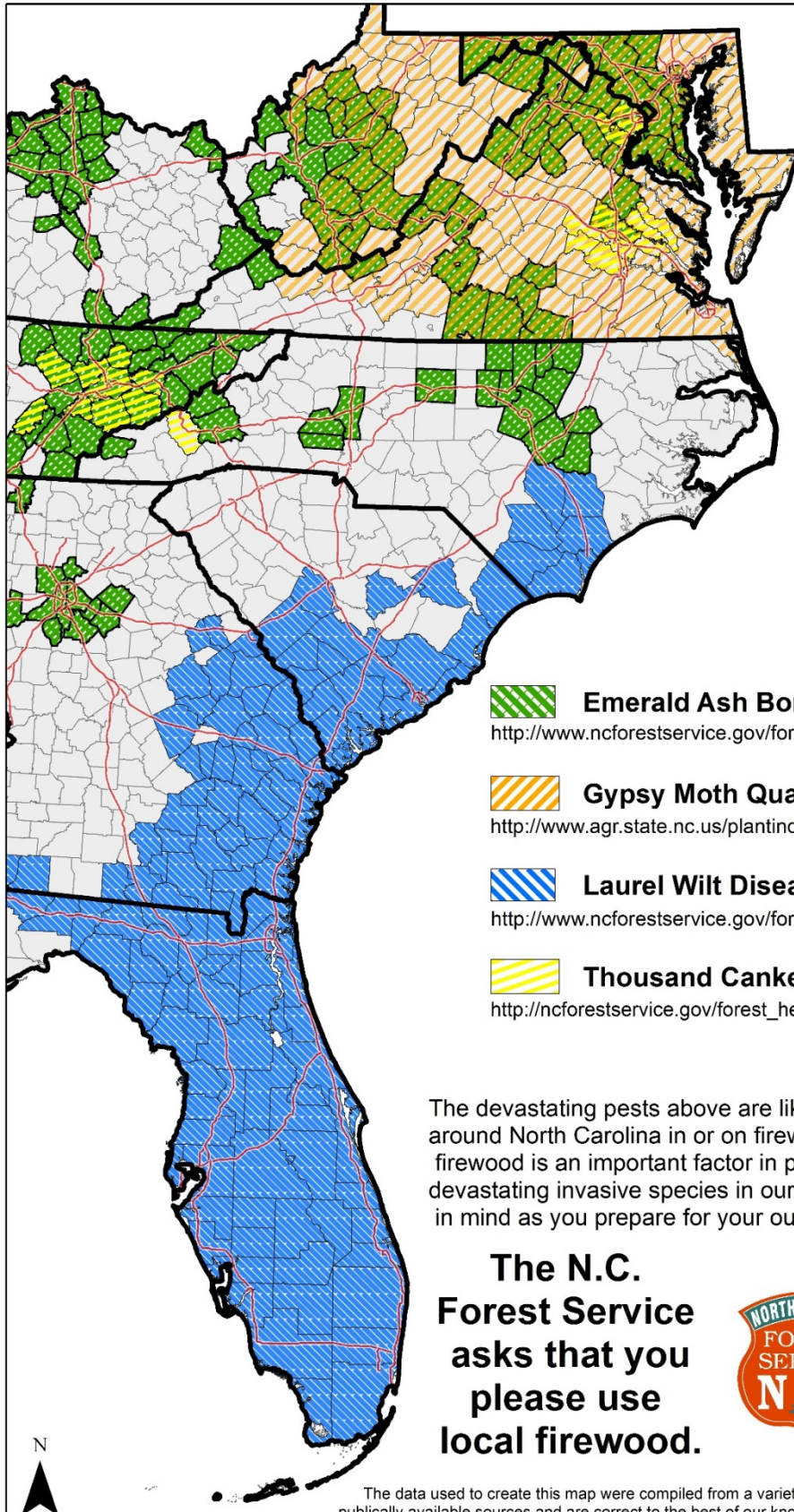
United States Department of Agriculture Forest Service, Southern Region, State & Private Forestry, Forest Health Protection

200 W.T. Weaver Road, Asheville, North Carolina 28804

828-257-4320

<http://www.fs.fed.us/r8/foresthealth/>

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.



Where are they now?

Monitoring Firewood-Vectored Invasive Forest Pests in North Carolina



Emerald Ash Borer

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



Gypsy Moth Quarantine

<http://www.agr.state.nc.us/plantindustry/plant/entomology/GM.htm>



Laurel Wilt Disease

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



Thousand Cankers Disease

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

The devastating pests above are likely to be brought into or moved around North Carolina in or on firewood. The use of local or treated firewood is an important factor in preventing the spread of potentially devastating invasive species in our state's forests. Please keep this in mind as you prepare for your outdoor recreation activities.

The N.C. Forest Service asks that you please use local firewood.



The data used to create this map were compiled from a variety of publically available sources and are correct to the best of our knowledge.

Map Created 9/21/2015
By Kelly Oten - FHM Coordinator