2016 NORTH CAROLINA FOREST HEALTH HIGHTLIGHTS

Our Forests

North Carolina's forests cover 18.6 million acres, 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.

Forest inventory data reveal that the state's forests are growing more wood volume each year than is being harvested or lost. 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.

2016 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 native pests and local conditions. 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 our forests as trees may be lacking the necessary defense responses to repel attacks.

In recent 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 2016, two of these pests (laurel wilt and emerald ash borer) were detected in new/additional counties. The spread of 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 2016 can be found at the end of this publication.

In addition to these new threats, common pests such as **bark beetles**, insect **defoliators,** and leaf infections such as **fire blight** were present throughout the state.

Firewood Awareness Continues

In 2016, the North Carolina Forest Service (NCFS) continued its awareness program in an effort to educate the general public about the potential to move tree-killing invasive insects from one area to another in firewood. Many of our biggest invasive threats, 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 be easily moved from place to place in infested firewood. The **gypsy moth** may lay its eggs on firewood or other objects which can also be moved to new areas. Through outreach events, the NCFS encourages residents and visitors to use local, treated, or inspected firewood to reduce the risk of moving these pests.

Thousand Cankers Disease Remains Only in Haywood County

Since 2012, when **thousand cankers disease (TCD)** was first detected in Haywood County, North Carolina, neither the fungus nor the **walnut twig beetle** that carries it have been found in additional counties within the state. Native to the southwestern U.S. and Mexico, the invasive insect/disease complex was first found in the eastern U.S. in Knoxville, TN in 2010. In the east, black walnut and butternut trees are both at risk of infection leading to eventual mortality.

A quarantine was enacted in January 2013 that prohibits the movement of regulated materials from Haywood County to unaffected areas of the state. Regulated materials include unprocessed wood from walnut trees, the insect itself, and all 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 NCFS works with the United States Department of Agriculture Forest Service (USFS) and North Carolina Department of Agriculture and Consumer Services Plant Industry Division (PID) to trap and survey for newly affected areas in the state. In 2016, 104 traps were set statewide (NCFS and PID); based on the partial screening of these traps to date (12/12/2016), the walnut twig beetle has not been found in additional sites within the state.

Emerald Ash Borer Detected in Six Additional Counties in North Carolina

Since its initial detection in N.C. in 2013, the **emerald ash borer (EAB)** has been found in 24 counties scattered across the state, six of them being new detections in 2016. In 2015, the entire state was placed under state and federal **quarantines** to prevent the spread of this pest to non-infested areas. The movement of ash material, the insect itself, and hardwood firewood outside the quarantine area is not permitted without a compliance agreement issued by the PID.

The emerald ash borer is native to Asia and 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 based on initial 2014 detections in Ohio and subsequently several other states. One white fringetree in Granville County was found with signs indicative of EAB activity, but the beetle itself was not recovered. This would be the first and only known infestation of EAB in white fringetree in the state.

In urban or landscape settings, management of EAB is possible with insecticides, but this is not a viable option in forest settings. Research related to long-term management strategies is ongoing and includes the releases of parasitoid wasps native to Asia as part of a national biocontrol program. Through cooperative efforts with the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), NCFS Forest Health staff became a part of this biocontrol effort in 2013 by releasing parasitoid wasps at several sites in Granville, Vance, and Warren Counties. More than 60,000 wasps have been released to date and recovery efforts to determine establishment success will begin in 2017. The wasps, which do not sting humans, are reared in an USDA-APHIS laboratory in Brighton, Michigan and releases are conducted under specific USDA guidelines.

Laurel Wilt Detected in Two Additional Counties in North Carolina

The devastating **laurel wilt disease** was first confirmed in North Carolina in 2011 and is now found in nine counties in the southeastern part of the state; two of these counties were new detections in 2016. In North Carolina, this disease is now found in portions of Bladen, Brunswick, Columbus, Duplin, New Hanover, Onslow, Pender, Robeson, and Sampson Counties.

The pathogen that causes laurel wilt and the beetle that carries it (the **redbay ambrosia beetle**) are native to Southeast Asia and were first discovered in the U.S. near Savannah, Georgia in 2003. Since then, it has spread to nine states in the southeast, many places exhibiting more than 95 percent mortality of redbay trees. The insect/pathogen complex has gained the attention of forest pathologists for its ability to kill healthy, mature trees in only a few weeks. Currently, there are no viable management options to prevent or save redbays from laurel wilt.

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 include sassafras, spicebush, pondspice, and pondberry. In 2016, two sassafras trees in N.C. were suspected of being infected with laurel wilt; lab confirmation will be pursued.

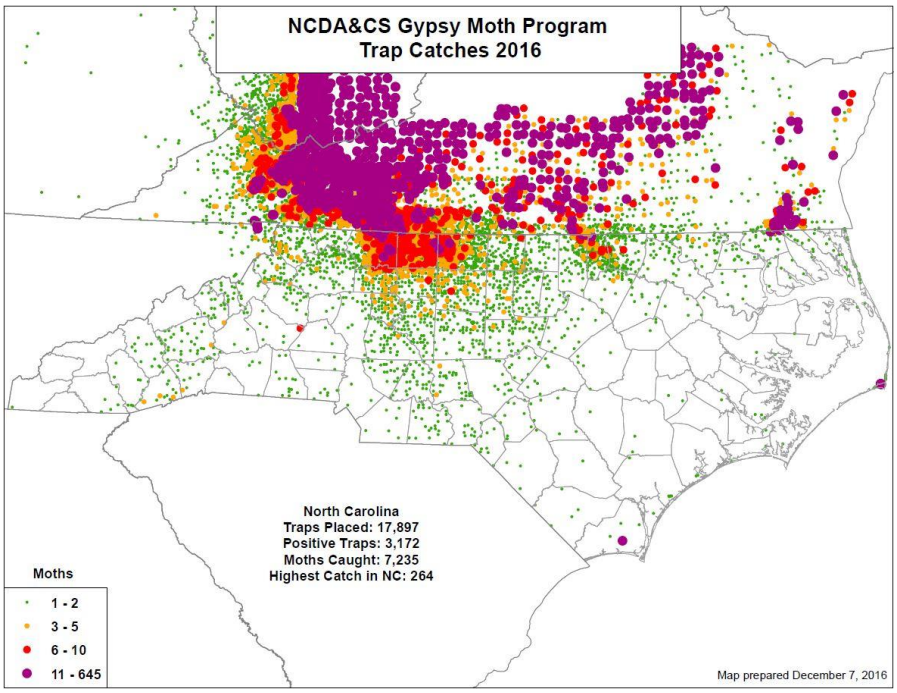
Bark Beetles

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. Most of the mortality during that outbreak was in the mountains and western piedmont areas. Since then, beetle activity has been relatively low. In 2016, three SPB spots were detected: an active spot in Tyrrell County in eastern N.C., an active spot in Swain County, and an inactive spot in Graham County, both in western N.C. 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 2016, ***Ips*** **engraver beetles** were a major concern once again and **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 nutrients 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 a program of the PID. The 2016 trapping season is complete and 7,235 moths were captured in 3,172 traps. This is higher than last year (2015) when 2,021 moths were captured in 915 traps.



These trap captures, along with winter egg mass surveys, will play a role in 2016 treatment determination. In 2015, thirteen areas were treated with mating disruption, *Btk*, or Gypchek.

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.

Foliage-damaging Pests

Several insects and diseases which damage the leaves of hardwood trees 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.

The **forest tent caterpillar** is a caterpillar that defoliates bottomland hardwoods. In 2016, approximately 100,000 acres were defoliated by this pest, primarily in Bertie and Martin Counties. Within several weeks, affected trees had leafed back out and no long-term health impacts have been reported.

Locust leafminer populations were also higher than usual throughout the western part of the state, leaving mountainsides of black locust looking bronze in appearance. Beetle larvae mine the leaves and adults skeletonize the leaves.

North Carolina Rainfall: Both Extremes in 2016

In October 2016, Hurricane Matthew caused record flooding in many parts of eastern N.C. Some lowland areas were submerged for 1-2 weeks, with waters cresting, subsiding, then rising again. The long-term effects this will have on forest health are unknown, but landowners were encouraged to wait and assess any damage before acting unnecessarily.

In the western part of the state, extreme drought plagued the area, leading to a historic fire season in November. Tens of thousands of acres were burned. In some areas, dead standing hemlock previously killed by the hemlock woolly adelgid posed threats to working firefighters, leading to some of them being removed with explosives. Ongoing drought conditions may lead to increased susceptibility of trees to forest pests.

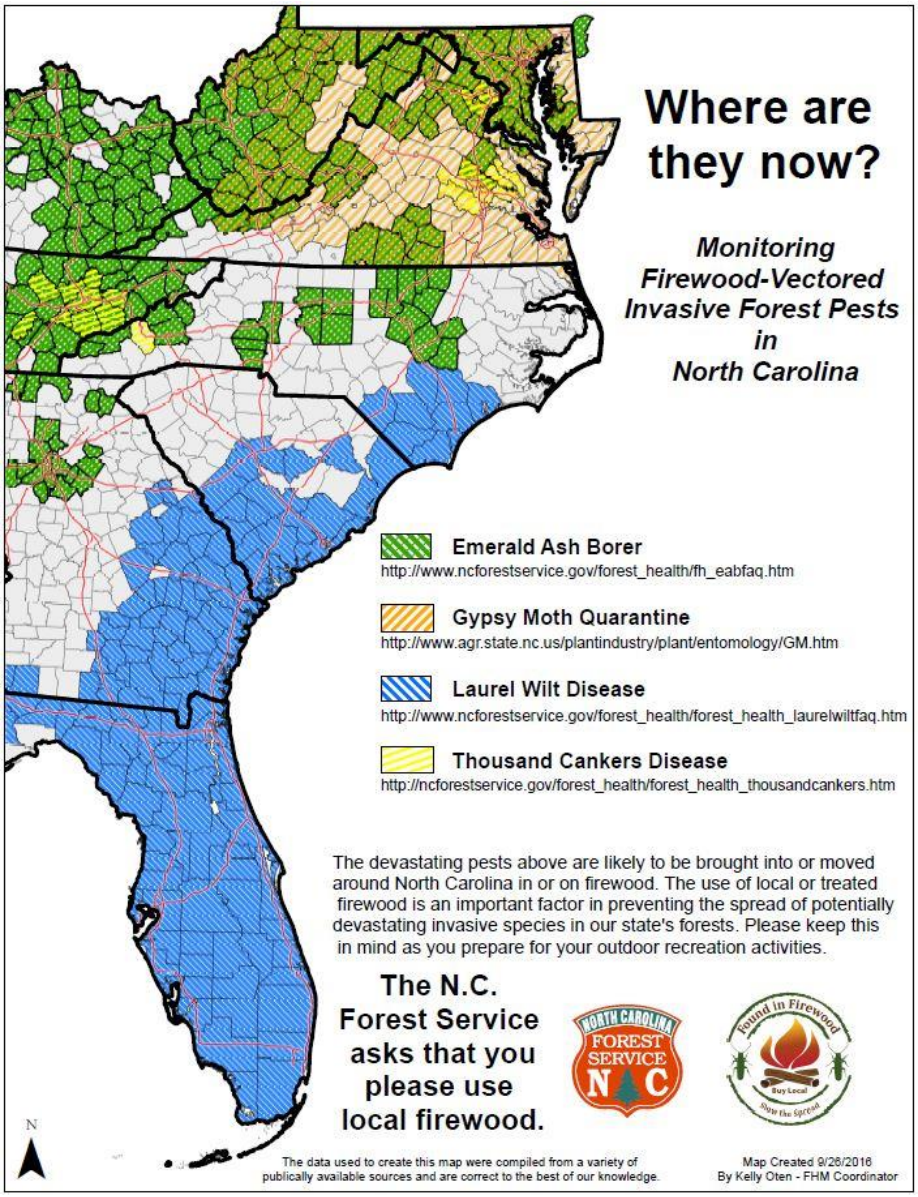
Forest Health Assistance in North Carolina

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
North Carolina Forest Service Website

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
U.S. Forest Service Region 8 Forest Health Protection website


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.agr.state.nc.us/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
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.
NORTH CAROLINA FOREST SERVICE NC
Found in Firewood
Buy Local
Stop the Spread
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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.
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By Kelly Oten - FHM Coordinator