North Carolina Forest Health Highlights

2012

Our Forests

Jason Moan, N.C. Forest Service

North Carolina's forests cover 18.6 million acres, or about 60 percent of the state's land area. The majority of the state's forested land, some 14.2 million acres, is in non-industrial private ownership, while approximately 1.1 million acres are in national forests. Forestry is the state's second most important industry, providing 180,000 jobs and producing $23 billion in annual revenue. 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. Longleaf-slash pine forests, historically much more widespread, now comprise only 2 percent of the state's forests.

2012 Influences on Health of Forests in North Carolina

Bark Beetles—*Ips* Beetles Still Prevalent

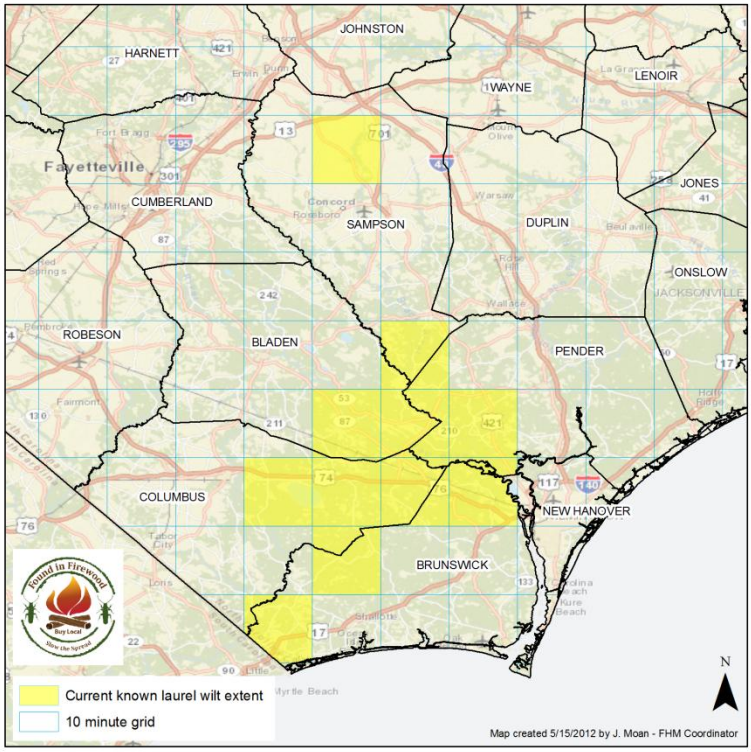
The **southern pine beetle** (SPB) has historically been North Carolina's most significant forest insect pest. From 1999 through 2002, the beetle killed at least $84 million worth of timber in North Carolina. Most of the mortality during this outbreak was in the mountains and western piedmont areas. 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 2012. 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. ***Ips* engraver beetles** had moderate activity statewide this year due to lingering drought conditions, though damage was less prevalent than in 2011. Although *Ips* infestations tend to be relatively small and scattered, in heavy affected areas their economic impact may approach that caused by southern pine beetle.

Gerald Lenhard, Louisiana State University

Cost-Share Available For Thinning To Prevent SPB

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 its inception, more than 57,000 acres have been treated through this program to encourage proper management conditions for pine stand health and to reduce the likelihood of southern pine beetle infestations.



Laurel Wilt Marches On

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 Georgia in 2003. Since then, it has spread into six states in the southeast, including North Carolina. In South Carolina, Georgia, and Florida, this disease has killed more than 95 percent of susceptible 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.

In North Carolina, this disease is currently found in portions of Bladen, Brunswick, Columbus, Pender, and Sampson counties. Brunswick County is the only new county to be confirmed in 2012, though the disease has been spreading within previously confirmed counties as well. Laurel wilt most likely spread into North Carolina through movement of beetle-infested wood.

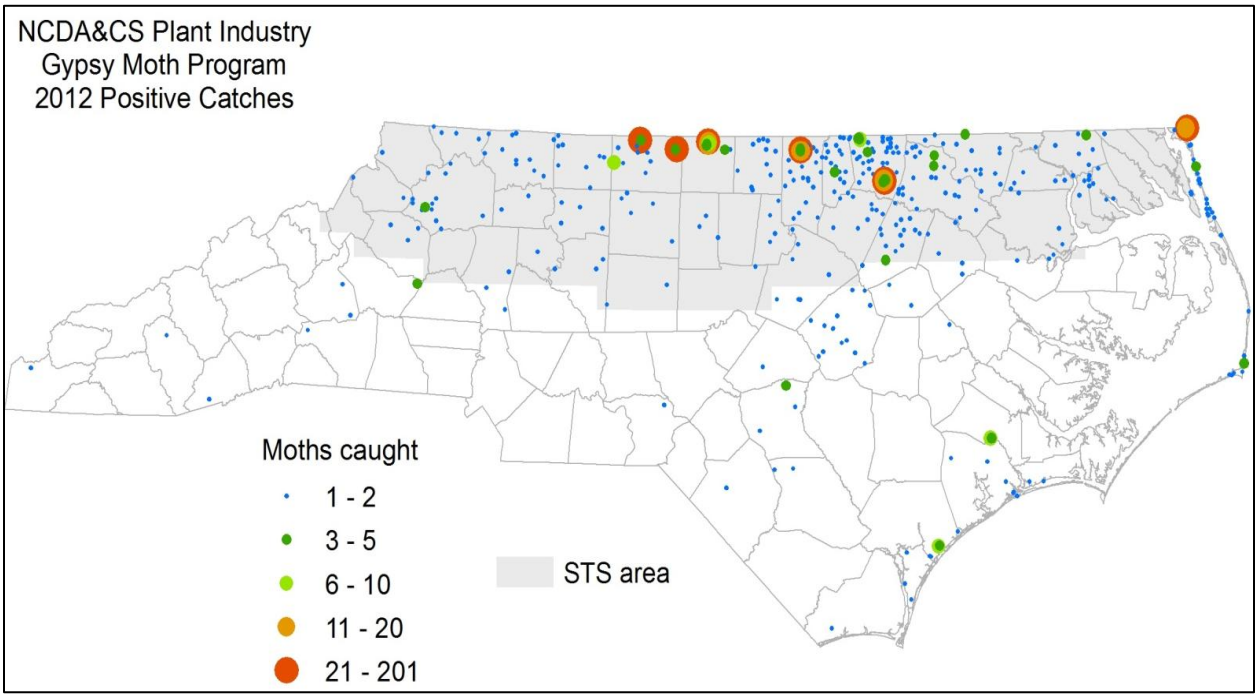
Only plants in the Laurel family are susceptible to laurel wilt. The most severely affected species is redbay, which is a medium sized tree commonly found throughout the eastern part of the state, particularly in our coastal forests. Other susceptible trees and shrubs in the Laurel family include sassafras, spicebush, and the rare pondspice (Special Concern - NC) and pondberry (Endangered - US).

Gypsy Moth Monitoring Continues

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 (NCFS). Federal budget reductions limited the number of traps that could be placed during the 2012 statewide gypsy moth trapping program and priority areas for trapping were identified through a thorough risk analysis.

Trapping has been completed and once again North Carolina has avoided any significant gypsy moth establishment, though Currituck County and a portion of Dare County remain in quarantine for the insect. Trap catches in 2012 were higher than 2011, which was a notably low trap catch year. Trap data is used to determine patterns of gypsy moth

infestations, though the presence of trapped male moths does not necessarily indicate there is a reproducing gypsy moth population in the area. Data compiled over several years can reveal with more confidence whether a location is infested with a reproducing gypsy moth population or if the moths caught were likely blown in during a weather event. NCDA&CS - Plant Industry Division is planning gypsy moth egg mass surveys in 11 areas this winter. The results of the egg mass survey will help determine which areas will require treatment in 2013.



2012 gypsy moth trapping results in North Carolina.
The area identified as "STS" represents the federal Slow The Spread area.

Hemlock Woolly Adelgid Found Throughout Entire Range of Hemlocks in North Carolina

Hemlock woolly adelgid (HWA) continues to cause significant mortality throughout the native range of both eastern and Carolina hemlocks in North Carolina. There are some control options available but these are often cost prohibitive in large forested tracts. The use of systemic insecticides has been the primary control method used on state and private lands and limited release of several species of predatory beetles has occurred in state forests in the past. Most control efforts are limited to urban landscape trees, and trees of high aesthetic, historical, or sentimental value on both public and private lands. Treatment on public lands is primarily on trees near visitor centers, campgrounds, and scenic roads and trails.

The NCFS has been tracking hemlock insecticide treatments on state lands since 2007. To date, nearly 9,075 eastern and Carolina hemlocks have been treated on state parks, gamelands, state forests, and other state-owned lands. Of those, more than 2,600 have been treated more than once. As a general rule, each treatment can be effective for 2-3 years or more.

The Alliance for Saving Threatened Forests (part of the Center for Integrated Pest Management at N.C. State University) is looking for naturally occurring eastern and Carolina hemlock trees that have survived HWA infestations to evaluate for natural resistance to HWA. Any potentially resistant hemlocks can then be propagated in hopes of producing offspring that have an increased resistance to adelgids. These seedlings may be used to someday reestablish hemlocks in their natural range.

Cogongrass Confirmed in North Carolina

Cogongrass has been ranked as one of the ten worst weeds in the world. The perennial grass was introduced from Southeast Asia in packing material and as potential forage and erosion control vegetation. Prior to this year, cogongrass was known to exist in Alabama, Florida, Georgia, Mississippi, South Carolina and Tennessee. However, in late spring of 2012, cogongrass was confirmed in southeastern North Carolina. The small infestation was identified on an old homesite in Pender County by a N.C. State University Cooperative Extension Agent. The area was swiftly treated with herbicides by the NCDA&CS and the treated plants were burned off a few weeks later. In late June, a delimiting survey was conducted by the NCDA&CS and the NCFS to survey the surrounding area for additional instances of cogongrass; no additional sites were found. NCDA&CS plans to revisit the area in 2013 to determine what additional treatments may be needed to achieve eradication. A second delimiting survey will be also conducted in May of 2013 when cogongrass seed heads should be readily visible.

Non-Native Invasive Plants Provide Challenges to Effective Forest Management

North Carolina foresters, landowners, and homeowners have been increasingly encountering and attempting to control a large variety of non-native invasive plant species on properties they own and manage. These weedy plants create problems for forests and forest management by outcompeting/displacing native vegetation, impacting species composition, reducing biodiversity in stands, damaging wildlife habitat, providing challenges to management, site preparation and reforestation, and increasing the risk and intensity of wildfires.

The N.C. Forest Service, along with North Carolina State University's Forestry and Environmental Outreach Program, conducted five non-native invasive plant workshops for forest landowners across the state in 2012. Participants were polled on what invasive plant species most affect forests and forest management on their forest land, listing close to fifty different species. These plants, and other nonnative invasive plant species, are receiving increasing attention in forest management and fire management throughout the state.

Early Detection and Rapid Response

Emerging Threats Can Greatly Impact a Variety of Tree Species in the Future

In addition to the forest influences already occurring within the state, there are a number of non-native invasive insect, disease, and plant species that threaten to move into the state and affect our forests in the future. These species are constantly being monitored and plans are frequently updated to deal with these threats as they make their way toward and into North Carolina. The pests shown in the images below are not known to be established in North Carolina but

are found in adjacent states or have the capability to move large distances either naturally or through human-assisted introduction. These species have potential to cause immeasurable damage to a variety of tree species and forest ecosystems in the state, especially since most are recent introductions to the United States and control practices have not yet been developed. Through educational outreach (aimed to increase awareness of long-range dispersal), early detection surveys, and rapid responses to detected threats, NCFS personnel, along with other state and federal agencies, have plans to enact control efforts where feasible to delay or minimize damage caused by these pests.

Thousand Cankers Disease Cankers

Emerald Ash Borer Galleries

Sudden Oak Death Mortality

Cogongrass Invading Woodlands

Thousand Cankers Disease of Walnut Trees Present In Neighboring States

Black walnut trees in North Carolina are at risk of infection leading to eventual mortality from a disease that was previously known to be active only in western states. The fungus that causes **thousand cankers disease (TCD)** is carried by the **walnut twig beetle**, a tiny bark beetle. Both the fungus and the insect vector were found in walnut trees for the first time in the east in Knoxville, TN in July 2010. To date, the disease has been confirmed in multiple counties in Virginia and eastern Tennessee including two counties that border North Carolina. Experts suspect that the disease could have been present in the eastern U.S. for 15-20 years.

In North Carolina, an external quarantine was implemented against importation of firewood and other walnut products from areas where the disease is known to be present. A walnut twig beetle detection trapping survey was implemented this year by the NCFS and NCDA&CS with assistance from federal partners. Traps were placed in previously identified declining walnut trees; no evidence of the walnut twig beetle was found during this survey.

Emerald Ash Borer Nears North Carolina

First discovered in Michigan in the summer of 2002, this tiny wood boring insect most likely arrived in the U.S. in solid wood packing material from Asia. Since its discovery, the **emerald ash borer (EAB)** has killed tens of millions of ash trees across more than a dozen states and into Canada. Recently, emerald ash borer was detected in numerous counties adjacent to North Carolina in Tennessee and Virginia, making EAB's entrance into North Carolina imminent. This year, the NCDA&CS deployed approximately 500 EAB detection traps in the northern and western counties of North Carolina; no EAB was found during this survey. Additionally, an aerial survey was conducted in counties along the state line near the affected areas in Virginia. Some dying ash trees were documented during the survey, though no signs of EAB were found.

Quarantines have been placed around areas of known infestations to limit movement of firewood and ash wood products into non-infested areas. All species of ash found in North Carolina can be attacked and killed by this insect. Currently, there is no reliable control method to stop this insect from spreading. The inevitable arrival of this insect in North Carolina poses a serious threat to ash species; localized extinction of ash is likely, but the long term effects of such a dramatic change in forest species composition is poorly understood. One of the major contributors to dispersal of this insect is the movement of firewood. Movement of wood materials, including non-heat treated firewood, from all but local sources is discouraged to slow the spread of this destructive insect into the state.

Pathogen causing Sudden Oak Death still present in stream, not found in forest environs

Tens of thousands of oak and tanoak trees in the coastal areas of California and Oregon have been killed by this plant disease caused by a fungus-like microorganism. Many of North Carolina's native oak species are also known to be susceptible to this pathogen. While the list of host plants that can be infected is very large, oaks are the most seriously affected and can be killed in just a few years. Other plant species, such as our native rhododendron and mountain laurel, along with a wide variety of ornamentals commonly used for landscaping, may only suffer from leaf and shoot blight symptoms but can spread the disease to nearby oaks. Suitable hosts and cool, moist weather conditions make forests in the mountains and foothills especially at risk, though all of North Carolina is threatened. The pathogen causing **sudden oak death** and **ramorum leaf blight** was first introduced into North Carolina in 2004 in plant nursery shipments of mostly camellias and rhododendrons from California; affected plants were quickly destroyed. Since then, the NCDA&CS has inspected plant nurseries on a regular basis and has put a high priority on detecting and eradicating any new introductions of infected nursery stock. As part of a cooperative national project coordinated and funded by the USDA Forest Service, the NCFS conducts annual surveys of areas outside of suspected high risk nurseries to determine if the pathogen may have escaped into the environment.

The pathogen that causes sudden oak death ***(Phytophthora ramorum***) was confirmed in a stream sample outside of an infected nursery in North Carolina in the summer of 2010. Additional samples in 2012 have confirmed the continued presence of this pathogen. Surveys are ongoing to determine if the pathogen is present in the surrounding plant communities. To date, surveys in North Carolina have not detected the presence of the pathogen in forest or landscape vegetation outside of the boundaries of nurseries receiving infected plants.

Forest Health Threats Related to the Movement of Firewood

Firewood Movement Traced To Unintentional Introductions of Hitchhiking Pests

Insects and diseases that are transported by way of commercial, residential, or recreational firewood affect many species of forest trees. The following table illustrates the various non-native invasive forest pests capable of damaging North Carolina's forest trees that are directly traceable to interstate and intrastate movement of firewood. Natural movement of invasive pests may be limited to a few hundred feet or up to 20 miles per year. However, movement of pests in firewood can be several hundred miles per day. A national campaign is underway 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. The state of North Carolina has started an educational effort to encourage residents and visitors to use local firewood or firewood that has been treated and thoroughly inspected for hitchhiking pests.

Forest threat organisms potentially transported in firewood:

Insects	**Diseases/Pathogens**
Asian longhorn beetle	Beech bark disease*
Emerald ash borer	Laurel wilt*
Gypsy moth*	Oak wilt*
Redbay ambrosia beetle*	Thousand Cankers Disease of Walnut
Sirex woodwasp	
Walnut twig beetle	

*Currently found in parts of North Carolina

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. A staff of forest health specialists in the Forest Protection Section directs these efforts. Services are provided to forest landowners by

district and county personnel with the Forest Health Branch staff providing appropriate training along with professional and technical expertise in the diagnosis and control of destructive insects and diseases.

NC Department of Agriculture and Consumer Services **Forest Service** **Forest Health Branch** **1616 Mail Service Center** **Raleigh, NC 27699-1616** **919-857-4858** **http://www.ncforestservice.org**	**USDA Forest Service** **Southern Region, State & Private Forestry** **Forest Health Protection** **200 W.T. Weaver Road** **Asheville, NC 28804** **828-257-4320** **http://www.fs.fed.us/r8/foresthealth/**