NORTH CAROLINA FOREST SERVICE
2017 Forest Health Highlights

Our Forests

North Carolina's forests cover 18.6 million acres, about 60 percent of the state's land area. Most of this (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. 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. The beauty and productivity of North Carolina's forests have historically been challenged by a variety of threats, both native and non-native. 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).

Firewood Awareness

A primary mission of the North Carolina Forest Service (NCFS) Forest Health Branch is to increase awareness about the potential to move tree-killing invasive insects from one area to another in firewood. The spread of all three recently-detected invasive species can be accelerated by the movement of firewood. The **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 part of their lifecycle within standing trees and can be easily cut and moved from place to place. The **gypsy moth** may lay its eggs on firewood or other objects which can also be moved to new areas.

In 2017, the Forest Health Branch continued its awareness program to educate and empower the public in playing a role in protecting our state's forests. Through outreach events that includes games, trivia, and prizes, the NCFS encourages citizens to use local, treated, or inspected firewood to reduce the risk of moving these pests.

Invasive Pests

Emerald Ash Borer Detected in Nine Additional Counties in North Carolina:

Since its initial detection in N.C. in 2013, the **emerald ash borer (EAB)** has been found in 33 counties across the state, nine of them being new detections in 2017: Alamance, Avery, Cabarrus, Caswell, Haywood, Mecklenburg, Mitchell, Rockingham, and Surry. In 2015, the entire state was placed under state and federal **quarantines** to prevent the spread of this pest to non-infested areas. A map of the current known distribution of emerald ash borer in N.C. can be found here: Map of EAB distribution in North Carolina

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 Wayne Counties. More than 65,000 wasps have been released.

The NCFS Forest Health Branch and N.C. Department of Agriculture & Consumer Services (NCDA&CS) – Beneficial Insect Lab (BIL) collaborated with the USDA-APHIS Emerald Ash Borer Biocontrol Program to study the phenology of EAB parasitoid wasps in N.C. Different species of the parasitoid wasps released emerge at different times in the season. Understanding when specific life stages of EAB are available to these parasitoids is critical in a successful release program. As part of the phenology study, infested ash trees were cut (see image below), debarked, and EAB life stages were recorded. The NCFS and BIL will continue this research into 2018.

Hemlock Woolly Adelgid and the Hemlock Restoration Initiative:

The hemlock woolly adelgid (HWA) was first detected in N.C. in 1995 and has since spread to all regions where hemlocks occur in the state. Hemlocks continue to suffer at an alarming rate from these infestations.

Two years ago, a cooperative effort between the NCDA&CS, WNC Communities, U.S. Forest Service, and NCFS formed the Hemlock Restoration Initiative (HRI). A coordinator was hired through WNC Communities to address HWA management and facilitate long-term hemlock restoration on state and private lands in western N.C.

Through this effort, HRI and NCFS staff work together to plan and implement projects to treat more than 10,000 hemlocks on state lands (see image below). For long-term management efforts to protect hemlocks, HRI has released more than 2,300 predatory beetles that prey on the adelgids. In addition, HRI collaborates with the Forest Restoration Alliance who is leading a search for hemlocks in forested areas that have survived the onslaught of HWA. Their goal is to find trees with potential resistance to HWA for future breeding programs to reestablish hemlocks in the southern Appalachians.

Gypsy Moth Program:

The entire state of North Carolina has been monitored for **gypsy moth** since 1982 through a program of the NCDA&CS – Plant Industry Division. The 2017 trapping season is complete and 1,634 moths were captured in 882 traps (with a total of 19,869 traps set statewide). This is much fewer captures than last year (2016) when 7,235 moths were captured in 3,172 traps across the state.

These trap captures, along with winter egg mass surveys done in areas with high capture rates, play a role in 2018 treatment determination. In 2017, 9 treatments at 6 sites were conducted 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.

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. A quarantine was enacted in January 2013 that prohibits the movement of regulated materials from Haywood County to unaffected areas of the state.

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 2017, 100 traps were set statewide (NCFS and PID); based on the partial screening of these traps to date (12/01/2017), the walnut twig beetle has not been found in additional sites within the state. A map of the current known distribution of thousand cankers disease of walnuts in N.C. can be found here: Map of thousand cankers disease distribution in North Carolina

Laurel Wilt Not Detected In Additional Counties:
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: Bladen, Brunswick, Columbus, Duplin, New Hanover, Onslow, Pender, Robeson, and Sampson Counties. While the disease has spread within these already-infested counties, there were no new county records in 2017. A map of the current known distribution of laurel wilt in N.C. can be found here: Map of laurel wilt disease distribution in North Carolina

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. Last year, three SPB spots were detected: Graham, Swain, and Tyrrell Counties.

This spring, the NCFS set 33 SPB prediction traps across the state. These traps, plus additional traps deployed by the USFS, indicated that low SPB populations should be expected across most of the state, with the exceptions of traps located in the Croatan National forest, Macon County, and Appalachian Ranger District (Pisgah National Forest). Traps in these sites indicated we should expect increasing and high, moderate, and low SPB populations, respectively. A full report of 2017 SPB predictive trapping in N.C. can be found here: Report on 2017 SPB trapping in North Carolina

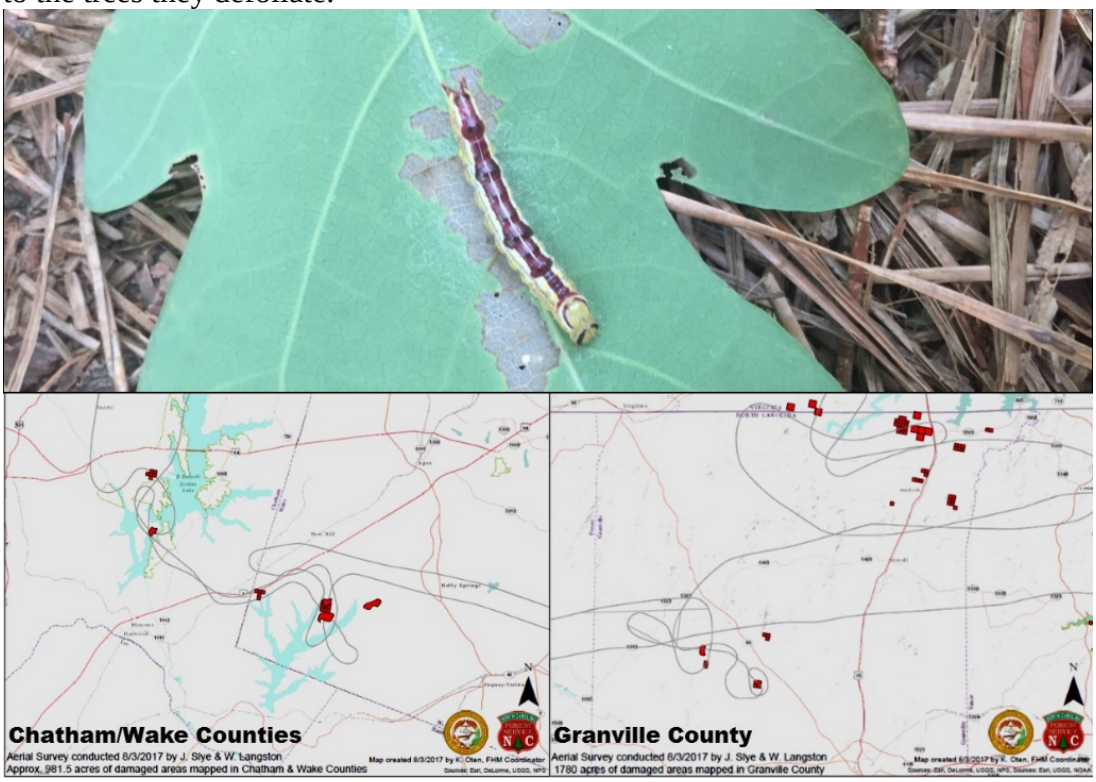
Reports of SPB activity began trickling in this spring and by mid-summer, it was clear that SPB was a problem in the southwestern corner of the state. On July 24 and 25, aerial surveys were conducted in the area. A total of 54 SPB spots totaling approximately 222 acres were detected on state and private lands. It is suspected that previous drought conditions in the area played a significant role in pre-disposing these forests to SPB. In addition, the terrain and discontinuous nature of most of these stands will likely minimize individual spot spread capabilities.

The **Southern Pine Beetle Prevention Program**, funded through a grant from the USDA Forest Service, partially reimburses non-industrial private forest landowners in North Carolina for the cost of pre-commercial thinning of pine stands. During a pre-commercial thinning, trees with no commercial value are removed 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, nearly 72,800 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. Most of the acres treated are related to thinning of overstocked young pine stands.

Defoliators:
In 2017, several defoliators were active and caused more damage than usual. 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 2017, North Carolina experienced its third consecutive year of forest tent caterpillar outbreak. An aerial survey recorded fewer acres than the previous 2 years, indicating the cyclical outbreak may be nearing its end. Trees recovered by summer and no mortality was observed.

The **variable oakleaf caterpillar** (see image below) made a surprise appearance, having not been an issue prior to this year. An outbreak of the variable oakleaf caterpillar was reported by Robert Jetton (NCSU, Camcore) and personnel at Harris Lake County Park. After ground observations of extensive defoliation, an aerial survey was conducted on 8/3/2017 by NCFS. 2,762 acres in Chatham, Granville, and Wake Counties were mapped during this flight. Caterpillars attack many species of hardwoods and were observed at Jordan Lake State Recreational Area feeding on white and red oaks, yellow poplar, and blackgum, but should not cause long-term health issues to the trees they defoliate.



An outbreak of the **oak slug sawfly** occurred in Durham for the second consecutive year. While it can attack many oak species, reports of this sawfly on overcup oak was prevalent. Like the other defoliators mentioned, this is a cyclical pest whose populations will likely subside over time and not affect long-term tree health.

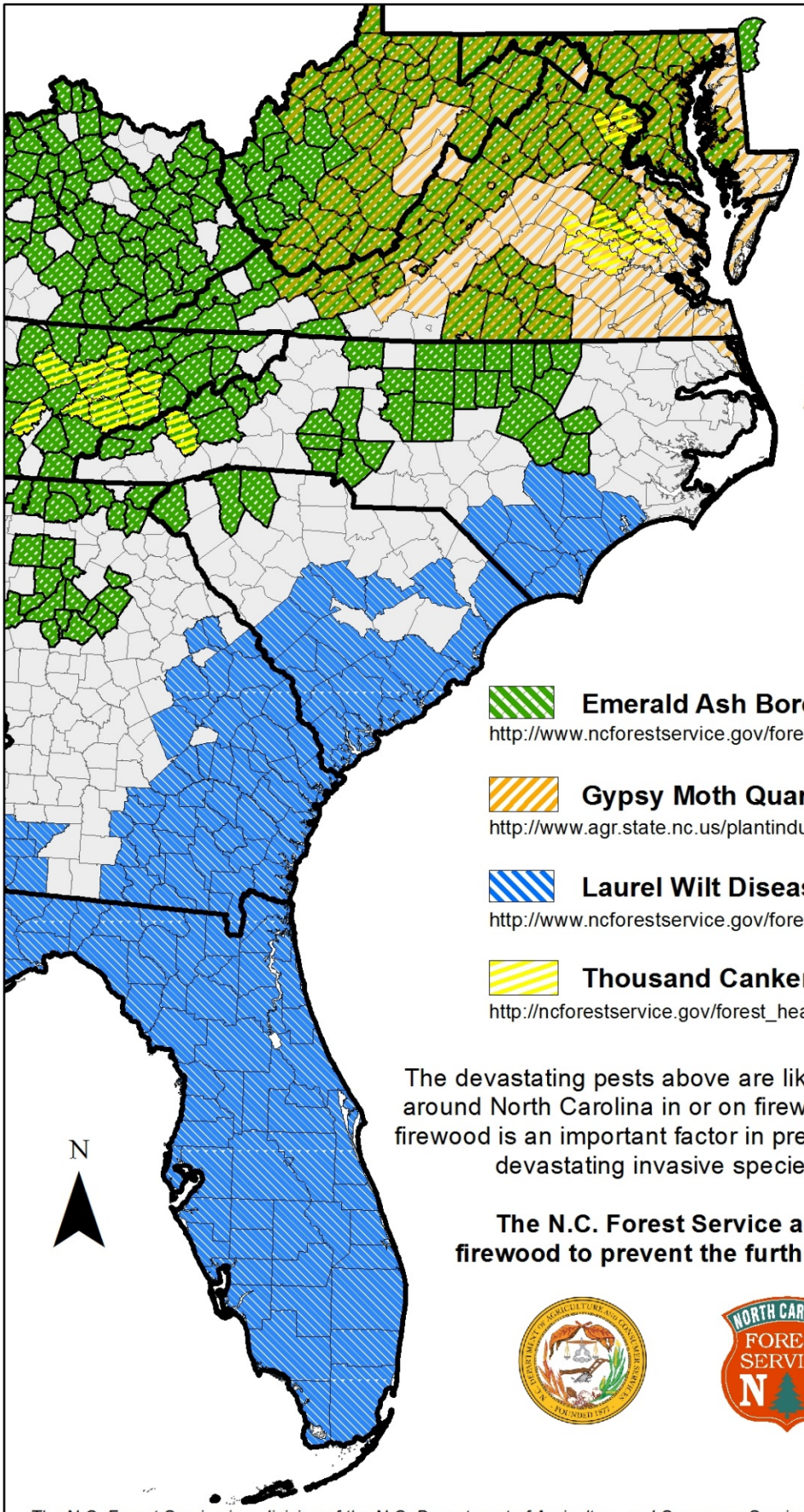
Forest Health Assistance in North Carolina

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 & Consumer Services, **N.C. Forest Service**, **Forest Health Branch**
1616 Mail Service Center, Raleigh, North Carolina 27699-1616
919-857-4858 NC Forest Service Forest Health Branch 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 USDA Forest Service, Forest Health Protection website

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.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.

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

N

Map Created 8/23/2017
by Kelly Oten - FHM Coordinator

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