NORTH CAROLINA FOREST SERVICE
2019 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 and ranking second in employment.

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 the past 10 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. In 2019, the NCFS continued its awareness campaign through annual outreach events such as the N.C. State Fair (a 10-day event) and BugFest (which boasted over 25,000 visitors this year; picture below). Interactive displays and a game encourage the public to use local or treated firewood to reduce the risk of moving invasive pests.

Invasive Pests

Emerald Ash Borer Detected in Eighteen Additional Counties in North Carolina: Since its initial detection in N.C. in 2013, the **emerald ash borer (EAB)** has been found in 55 counties across the state, 18 of them being

new detections in 2019: Alleghany, Ashe, Burke, Caldwell, Chatham, Cherokee, Davie, Henderson, Lenoir, McDowell, Nash, Polk, Rowan, Rutherford, Stokes, Watauga, Wilkes, and Yadkin. 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: Emerald ash borer distribution map

This year, the NCFS continued the Ash Protection Program, a reimbursement program to assist communities in protecting ash trees in urban settings. In 2019, nine communities participated in this program, protecting over 400 ash trees. This brings the total in 2018 and 2019 to 623 urban ash trees protected with insecticides.

While pesticides are a viable option to manage EAB in urban or landscape settings, it is not in forest settings. Research related to long-term management strategies is ongoing and includes the release 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. Since then, releases have also occurred in Forsyth, Chatham, and Wake Counties.

In addition, the NCFS Forest Health Branch, N.C. Department of Agriculture & Consumer Services (NCDA&CS) – Beneficial Insect Lab (BIL), and N.C. State University is collaborating with the USDA-APHIS Emerald Ash Borer Biocontrol Program to study the phenology of EAB in N.C. to best determine when and what species of wasps to release. This year, APHIS supported this research through a grant to support an hourly researcher for the project. Emerald ash borer life stages are quantified through seasonal trapping and bi-weekly assessments beneath ash bark (pictured below).

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 naturally occur in the state. Hemlocks continue to suffer at an alarming rate from these infestations.

Four years ago, a cooperative effort between the NCDA&CS, WNC Communities, U.S. Forest Service, and NCFS formed the Hemlock Restoration Initiative (HRI). Part of this effort includes protecting hemlocks with chemicals and working to establish biocontrol agents throughout the region. From Fall 2018 to Spring 2019, 56,920 hemlocks were treated; Fall/winter 2019 treatments are ongoing. Meanwhile, HRI continues to release predatory beetles that prey on the adelgids.

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 2019 trapping season is complete; 1,019 moths were captured in 507 traps (with a total of 17,612 traps set statewide). This is more captures compared with last year (2018) when 594 moths were captured in 343 traps (18,003 traps set statewide).

Based on these trap captures, eight mating disruption treatments totaling 25,390 acres and two Btk treatments totaling 790 acres were proposed to receive treatments in 2020.

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 2019, 73 traps were set statewide (NCFS and PID) and the walnut twig beetle was not found in additional areas. A map of the current known distribution of thousand cankers disease of walnuts in N.C. can be found here: Thousand Cankers Disease distribution map

Laurel Wilt Detected in One Additional County in 2019:

The devastating **laurel wilt disease** was first confirmed in North Carolina in 2011. This year, it was detected in Lenoir County, bringing the total to 11 positive counties in the southeastern part of the state. Laurel wilt was previously detected in Bladen, Brunswick, Columbus, Cumberland, Duplin, New Hanover, Onslow, Pender, Robeson, and Sampson Counties. A map of the current known distribution of laurel wilt in N.C. can be found here: Laurel Wilt Distribution map

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 with 54 and 53 SPB spots totaling approximately 222 and 2018 acres, respectively, on state and private lands. This year, only two small spots of activity were reported with much of the activity documented on federal property in the western part of the state. 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.

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, over 76,000 acres in N.C. 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:

Native foliage-damaging pests 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 2019, North Carolina experienced its fifth consecutive year of forest tent caterpillar outbreak. Through aerial survey, an estimated 104,793 acres was impacted. Trees recovered by summer and no mortality was observed.

Abiotic Forest Health Issues

Water stress and mortality in trees

In 2019, a series of water-related stress events culminated in tree mortality across parts of eastern and central North Carolina. It all began in September 2018 when **Hurricane Florence** made landfall at Wrightsville Beach as a Category 1 storm. Rainfall ranged from 15 to 35 inches and floodwaters took some time to recede. Following the storm through early spring 2019, above average rainfall also impacted the region. Many of these rainfall events occurred at least every 5-7 days, keeping the already-saturated soils soaked over this period. This extended saturation led to a decrease in root mass and increase in root-rotting diseases caused by fungi and *Phytophthora.*

By the middle of April, the weather pattern shifted from one extreme to another and there was little measurable rainfall between then and the end of May. This, coupled with temperatures in the 90°F – 100°F range, resulted

in abruptly dry soils and a "**flash drought**". By June 1st, many trees were either dead or showing signs of water stress.

Much of the observed mortality was, and continues to be, on oak species on normally drier sites. It is believed that because these trees lost root mass during the period of saturation, they were not able to handle the following drought-like conditions early in the growing season. Many were then attacked by secondary insect or disease organisms.

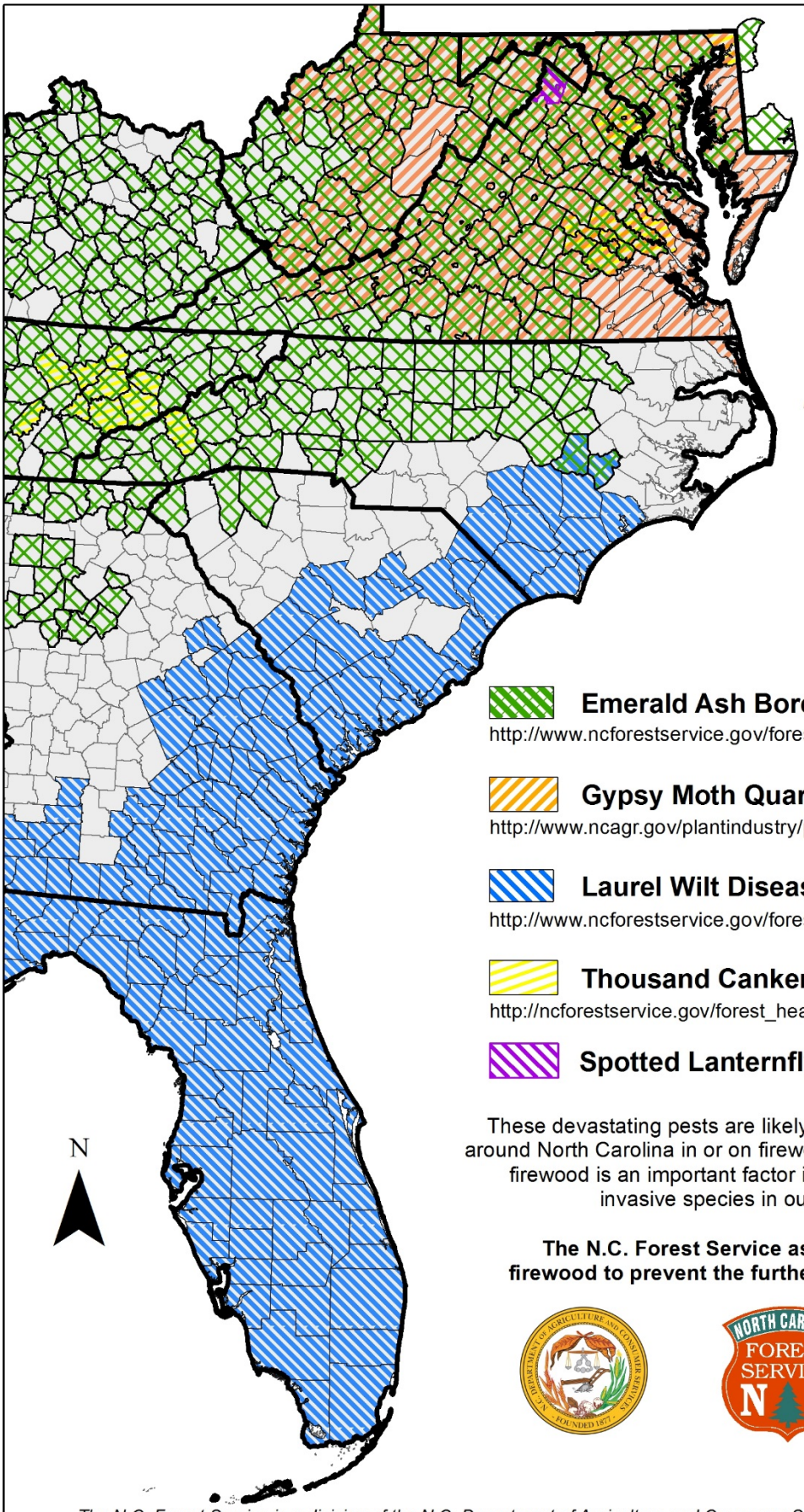
In September 2019, **Hurricane Dorian** made landfall in N.C. bringing up to 12 more inches of rainfall in some areas. These ongoing water stress issues will only exacerbate the ongoing water stress exhibited by many N.C. trees. A Forest Health Notes (Forest Health Notes) and blog (Forest Health Blog) were published on the issue.

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 link

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 Forest Health Protection link



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

These devastating pests 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 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 12/2/2019
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, Commissioner.