TN Department of Agriculture | Forestry

Protect TN Forests.org

Tennessee Forest Health Highlights 2020

Summary of Monitoring and Management Activities

Tennessee Department of Agriculture| Annual Report | December 2020

Executive Summary

During 2020, many efforts to effectively monitor and manage the health of Tennessee's forests were successfully completed despite the restrictions imposed by the COVID-19 pandemic. A number of major forest insect pests and diseases were addressed using both monitoring and management activities and resulted in a number of updates to the current statuses of these threats. These are activities summarized below and then described in greater detail within this report.

Forest Health Highlights

- Emerald ash borer (EAB) was officially confirmed in all previously quarantined counties and two counties not previously within the quarantined area.
- A total of 61 gypsy moths were caught in Tennessee, but these were confined to eight eastern counties. To address last year's gypsy moth catches, two areas totaling 8,567 acres received an aerial mating disruption treatment.
- The Hemlock Woolly Adelgid Strike Team successfully treated 17,639 trees across 1,751 acres in 18 hemlock conservation areas. Additionally, six releases of *Laricobius nigrinus,* a predatory beetle which targets HWA, occurred in 2020 as a biocontrol measure on public lands.
- Laurel wilt was first discovered in six counties during 2019. In 2020, road surveys uncovered symptomatic trees in ten additional counties, including those in the easternmost and westernmost areas of the state.
- Tennessee Division of Forestry personnel submitted a total of 1,270 forest health observations from across the state, including insect pests, disease, and invasive plant species affecting Tennessee's forests.
- Additional observations of storm damage, wildland fire, as well as outreach activities are included below.

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Tennessee's Forests

Land Ownership

Land ownership can often lead to complex management dynamics when considering landscape-scale activities. In Tennessee, approximately 83% of forested land is under private-ownership (Figure 1). The remaining 17% represents public lands managed by local, state, and federal agencies. Given the dominance of privately owned lands in Tennessee, communication and collaborations with the public represent the most important strategies for managing forest health threats. As such, outreach and education activities are essential for protecting our forests.

The Tennessee Department of Agriculture (TDA) engages its stakeholders with consistent messaging regarding the current and potential threats of invasive species. Programs such as the "Don't Move Firewood" campaign and Hemlock Woolly Adelgid Strike Team directly address the need for communication and educational resources for the public and partner agencies. Through these activities, the public is empowered with the knowledge necessary to assist in the protection of TN's forest resources.

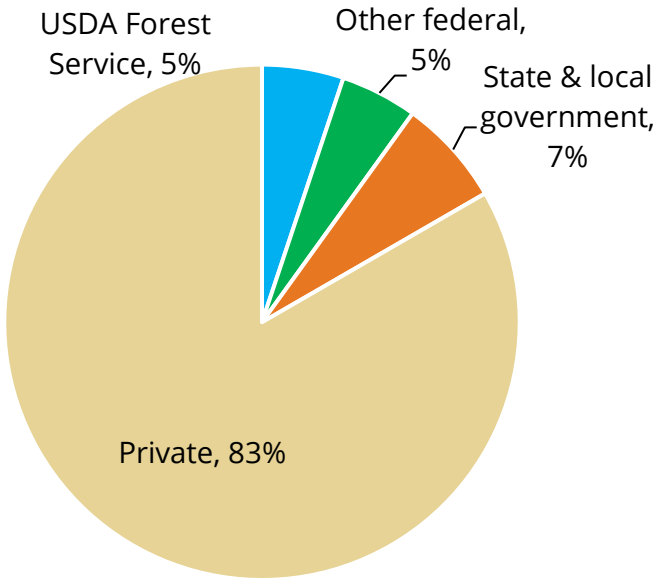

Figure 1: Forest land ownership in TN as of 2016; data compiled by Rachel Greene | Forest Data & Analysis Unit Leader

* Data Source: USDA Forest Service, Forest Inventory and Analysis Program, 2020. Forest Inventory EVALIDator web application Version 1.8.0.01. St. Paul, MN: US Department of Agriculture, Forest Service, Northern Research Station. [Available only on internet: http://apps.fs.usda.gov/Evalidator/evalidator.jsp]

Forest Composition

Forests comprise approximately 13.9 million acres (~52%) of Tennessee's land cover. Together, these forests represent a diverse mosaic of forest cover types from the bottomland hardwoods in West Tennessee to the Appalachian Mountains in the east. Despite this diversity in forest cover, Tennessee's forests are predominately comprised of oak-hickory forests (~70% of Tennessee's forests) in which valuable timber tree species such as red/white oak species, hickory species, black walnut, and tulip poplar are dominant (Figure 2). These forests with dominant hard-mast producing species are ideal ecosystems for many important wildlife species native to Tennessee as well.

Many deleterious forest pests and decline complexes affect tree species present in the oak-hickory forest cover type, including the European gypsy moth (*Lymantria dispar*) and oak decline. Additionally, approximately one-third of the state is within the natural range of eastern hemlock which is often found to occur in the drainages of oak-hickory forest cover types. This is important as hemlock woolly adelgid is widespread throughout the range of Eastern hemlock in Tennessee and thus, directly affecting the integrity of these forests. Tennessee's forest health threats are not limited to the oak-hickory forests as other dominant forest cover types, such as elm-ash-cottonwood, are threatened by various forest health threats, including emerald ash borer (*Agrilus planipennis*).

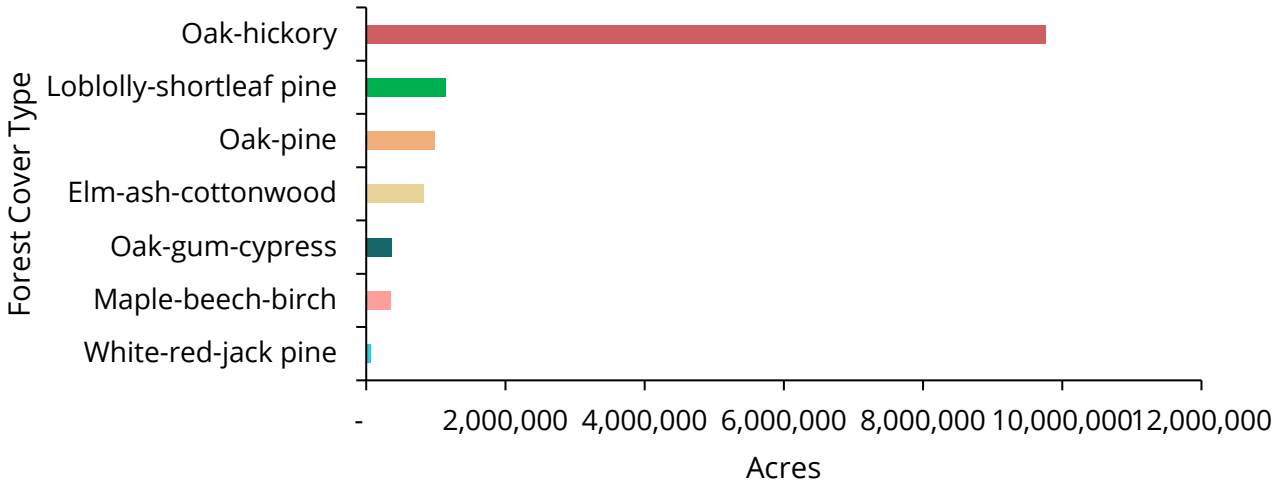

Figure 2: Tennessee forest cover types by acres; data compiled by Rachel Greene | Forest Data & Analysis Unit Leader

* Data Source: USDA Forest Service, Forest Inventory and Analysis Program, 2020. Forest Inventory EVALIDator web application Version 1.8.0.01. St. Paul, MN: US Department of Agriculture, Forest Service, Northern Research Station. [Available only on internet: http://apps.fs.usda.gov/Evalidator/evalidator.jsp]

Emerald Ash Borer (*Agrilus planipennis*)

Survey Activities

In 2020, the emerald ash borer continued to advance through Tennessee. A total of 90 EAB traps were placed across the state by Tennessee Division of Consumer and Industry Services and resulted in a total of six new county records: Cannon, Clay, Dickson, Grundy, Hickman, and Warren counties. As a result, two of these counties were added to Tennessee's EAB quarantine: Dickson and Hickman counties. The remaining counties were already within the quarantine area but lacked county-level EAB observations. Across the state, an estimated 5 million urban ash trees and 261 million timberland ash trees are expected to be impacted by EAB representing a potential of $2 billion and $9 billion USD in damage, respectively (TN Forest Resource Assessment and Strategy; USDA Forest Service).

Figure 3: County map of Tennessee representing counties included in the state emerald ash borer quarantine (shaded green)

Gypsy Moth (*Lymantria dispar*)

Monitoring and Management Summary

A total of 5,961 gypsy moth traps were deployed to monitor gypsy moth activity in the state by Tennessee Department of Agriculture personnel and federal partners. A total of 61 moths were caught in eight counties. This is down from 181 moths trapped in 2019. Of the 2020 moths, 41 moths were caught in Johnson county with two traps having 10+ moths. Outside of Johnson county, there were 20 additional moths including 14 single-catch traps and three traps with two moths each.

As a result of significant gypsy moth in 2019, two treatment blocks in Johnson County received an aerial application of SPLAT-GM Organic in June 2020 for a total of 8,567 treatment acres. The use of this synthetic mating pheromone serves to disrupt mating success by oversaturating the area with the female pheromone thereby reducing mating success by inhibiting the male's ability to find a mate. This treatment will be assessed for effective population control using delimiting grid traps in 2021 and 2022. In response to 2020 trapping results, two new spray blocks (4,568 total acres) have been selected for mating disruption treatment in 2021.

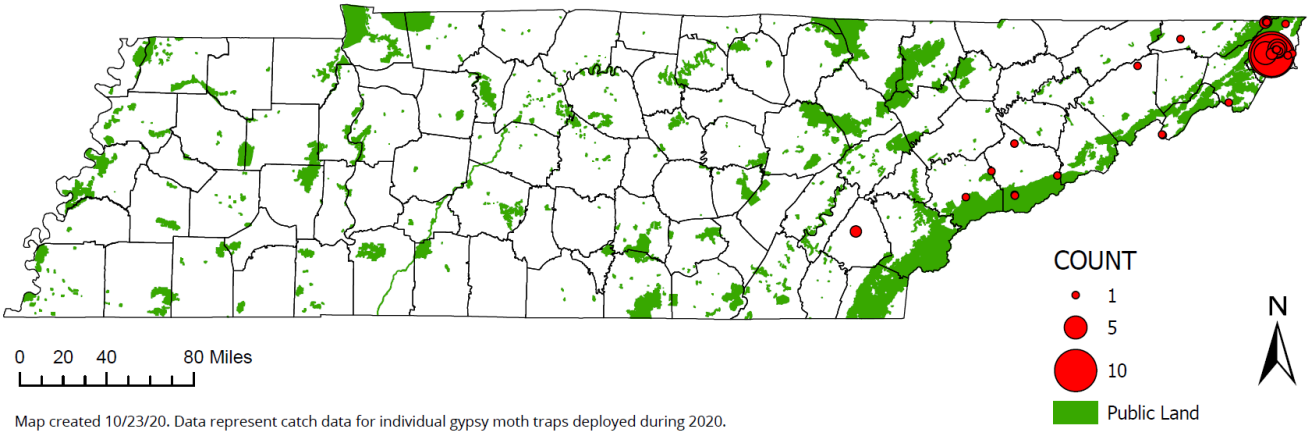

Figure 4: Results from 2020 gypsy moth traps deployed across Tennessee. Each point represents a single trap and its size corresponds to the number of moths found inside the trap.

Laurel Wilt Disease

Survey Activities

Laurel wilt was first discovered in six counties in 2019. During 2020, road surveys were conducted across 17 additional counties. In total, sassafras (*Sassafras albidium*) trees symptomatic for laurel wilt disease were identified in ten of the 17 surveyed counties. These trees exhibited the characteristic foliar wilting and dark stained vascular tissues. To confirm the causal agent, bark tissue samples were collected from symptomatic trees to confirm the presence of *Raffaelea lauricola* via DNA sequence analyses. Eight of the ten counties were confirmed to be positive for laurel wilt based on these analyses (Figure 5). Samples collected from Carter and Wilson counties were not confirmed and will be resampled in 2021. Outreach and personnel training activities are planned to aid in monitoring efforts during 2021 as the distribution of laurel wilt is likely greater than what was revealed in this limited survey effort.

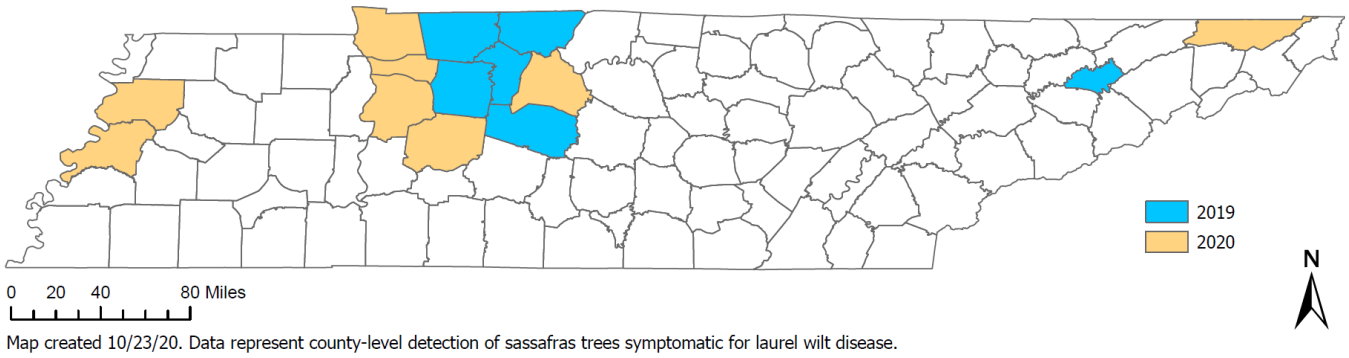

Figure 5: Counties with sassafras trees symptomatic for laurel wilt disease surveyed in 2019 and 2020. All counties included in this map have been molecularly confirmed.

Hemlock Woolly Adelgid (*Adelges tsugae*)

Management Activities

Hemlock conservation efforts by TDF are conducted in partnership with many state, federal, non-profit, and private groups to treat and manage HWA on a regional scale. This year the TDF Hemlock Woolly Adelgid Strike Team received the 2020 Governor's Environmental Stewardship Award for their efforts to protect hemlock forests across the state. The HWA Strike Team represents a federally funded seasonal crew whose goals are to chemically treat HWA on public lands, hold outreach programs such as presentations and workshops, provide support to the HWA predator beetle program, and facilitate events sponsored by the Tennessee Hemlock Conservation Partnership. In 2019/2020, the crew treated 17,639 trees across 1,751 acres in 18 HCAs. These treatment areas included state parks, state natural areas, state forests and conservation easements across the native range of eastern hemlock in Tennessee. Additionally, Dr. Pat Parkman, Director of the Lindsay Young Beneficial Insects Laboratory, coordinated the release of 1,459 *Laricobius nigrinus* beetles and 491 *L. osakensis* across five release sites for biological control studies on state and federal lands.

Southern Pine Beetle and other pine bark beetles

Survey Activities

Several factors led to the failure to install SPB monitoring traps in 2020. Suspected damage by pine bark beetles was reported sporadically throughout the year, but there was no clear evidence of significant SPB activity. Monitoring efforts will resume in 2021.

Wildland Fire

Annual Reports

A total of 211 wildland fires were reported on 1,686 forested acres by TDF personnel. These fires ranged from 0.1 to 215.6 acres affected with an average size of 7.99 acres. TDF launched a new website to provide improved access to wildland fire information to the public: https://TNWildlandFire.gov

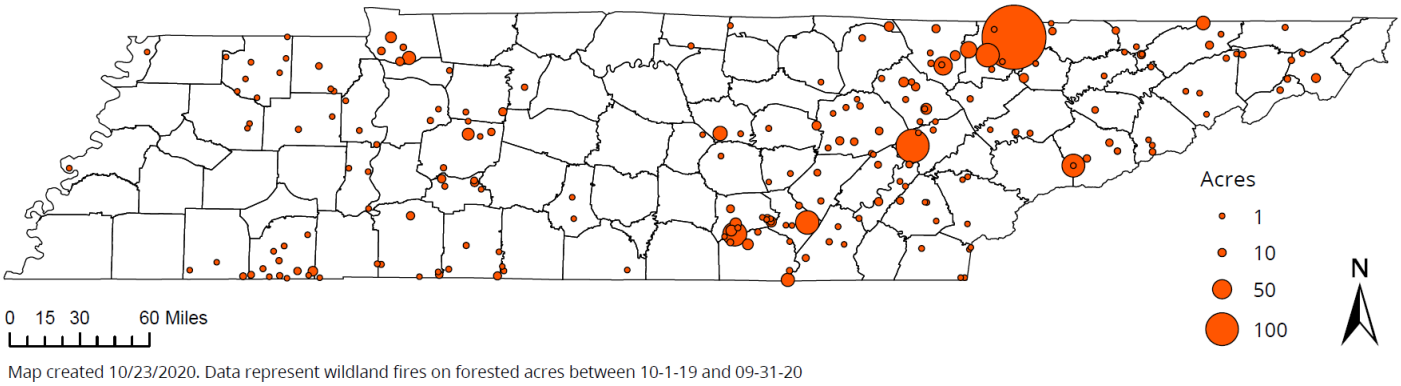

Figure 6: Reported wildland fires on forested acres in Tennessee with point size representing the number of reported acres.

Invasive Plants

Annual Observations

TDF personnel submitted a total of 995 reports of significant infestation by various invasive plant species throughout the state's forested lands. In addition, multiple landowner assistance requests were received regarding issues controlling invasive species on forested properties. The most common reports included the following:

- Tree-of-Heaven (*Ailanthus altissima*): 105 reports across 1,102 total acres
- Chinese privet (*Ligustrum sinense*): 251 reports across 877 total acres
- Kudzu (*Pueraria montana* var. *lobata*): 138 reports across 870 total acres
- Japanese stiltgrass (*Microstegium vimineum*): 106 reports across 542 total acres

Weather Events

Tennessee had a total of 37 recorded tornados covering a total 248.8 miles from the months of January to June. In total, these tornado events caused approximately $1.61 billion USD and $7.7 million USD in property and crop damage, respectively (Source: National Oceanic and Atmospheric Administration). Ground surveys were conducted by TDF personnel at 76 sites following these weather events to determine their impact.

Outreach and Education

TDF's ProtectTNForests campaign remained active on Facebook, Twitter, and Instagram social media accounts. On Facebook, ProtectTNForests has grown a following of 631 users and has received 589 page likes. Additionally, ProtectTNForests has received a total of 185 and 188 followers on Twitter and Instagram, respectively. The current Protectnforests.org website received increased traffic from the previous 12-months with 9,747 visits (+3.6%) and served 8,883 users (+6.3%). The website and social media accounts were continuously updated to inform their respective audiences of workshops, job announcements, and new forest health threats.

Tennessee Department of Agriculture members participated in a number of outreach and education activities, including the annual Tennessee Hemlock Conservation Partnership summer and winter meetings, Tennessee Forestry Association-sponsored conservation workshops and regional meetings, and the annual TDF-funded/TFA-administered Master Logger Training Program. The TDF funded and UT-administered Tennessee Healthy Hardwoods program was canceled due to COVID-19 restrictions. At each of these trainings, information and training regarding forest health monitoring and management was provided to attendees.

In addition to meetings, landowner assistance was provided by TDF personnel, and resulted in a total of 1,203 management plans (including plans, revisions, recognitions, and prescriptions) for a total of 80,385 acres. Of these plans, 437 had a forest health component.

Resources

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TENNESSEE WILDLAND FIRE