



Tennessee Forest Health Highlights 2022

Summary of Monitoring and Management Activities

Tennessee Department of Agriculture | Annual Report | December 2022



Executive Summary

Across Tennessee, several insects and pathogens require monitoring and management to reduce negative impacts on forest productivity. In 2022, 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 activities are highlighted below and then described in greater detail within this report.

Forest Health Highlights

- Emerald ash borer (EAB) has been confirmed in a total of 65 counties in Tennessee.
- A total of 172 spongy moths were caught in 13 counties across Tennessee, with the highest number occurring in eastern Tennessee.
- The Hemlock Woolly Adelgid Strike Team successfully treated over 10,700 trees across 1199 acres in 19 Hemlock Conservation Areas. Additionally, releases of *Laricobius nigrinus* and *L. osakensis* beetles, two predatory beetle species which target HWA, occurred at three sites in 2022 as a biocontrol measure on public lands.
- Laurel wilt disease, which was first discovered in Tennessee in 2019, was confirmed in four new counties in 2022, bringing the total number of counties to 20. One new county detection was made on a novel host.
- Tennessee Division of Forestry personnel submitted a total of 532 forest health observations from across the state, including insect pests, disease, and invasive plant species affecting Tennessee's forests.
- Additional observations of storm damage and other abiotic damage are included below, as well as outreach and training activities.

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Tennessee's Forests

Land Ownership

Land ownership can often lead to complex management dynamics when considering landscape-scale strategies. In Tennessee, approximately 83% of forested land is privately owned (Figure 1). The remaining 17% represents public lands managed by local, state, and federal agencies. Given the high proportion of privately-owned lands in Tennessee, communication and collaboration with the public are fundamental for managing forest health threats. Through outreach and education activities, forest protection can be advocated across the landscape regardless of land ownership boundaries.

The Tennessee Department of Agriculture (TDA) Division of Forestry engages its stakeholders with consistent messaging regarding the current and potential threats of forest pests and diseases. 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 programs, the public is provided with the knowledge necessary to assist in the protection of TN’s forest resources.

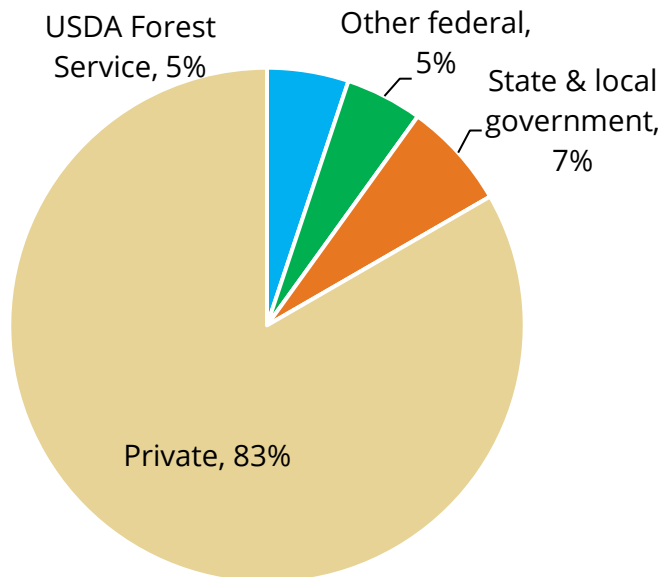


Figure 1: Forest land ownership in TN as of 2016; data compiled by Rachel Greene | Forest Data & Analysis Unit Leader

* 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 high-elevation forests of the Appalachian Mountains in the east. Despite the range 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 and 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 damaging forest pests and decline complexes affect tree species present in oak-hickory forests, including the European spongy moth (formerly gypsy moth) (*Lymantria dispar dispar*) and oak decline. New diseases such as laurel wilt pose concerns for sassafras and spicebush which are also present in this forest type. Approximately one-third of the state is within the natural range of eastern hemlock, which is a species often prevalent in the drainages of oak-hickory forest cover types. The spread of hemlock woolly adelgid throughout the range of eastern hemlock in Tennessee has thus directly impacted the integrity of these forests. Tennessee's forest health threats are not limited to the oak-hickory forests, as other dominant forest cover types are threatened by various forest health threats, such as elm-ash-cottonwood impacted by emerald ash borer (*Agrilus planipennis*) and mixed pine forests by southern pine beetle (*Dendroctonus frontalis*) and Ips engravers (*Ips spp.*).

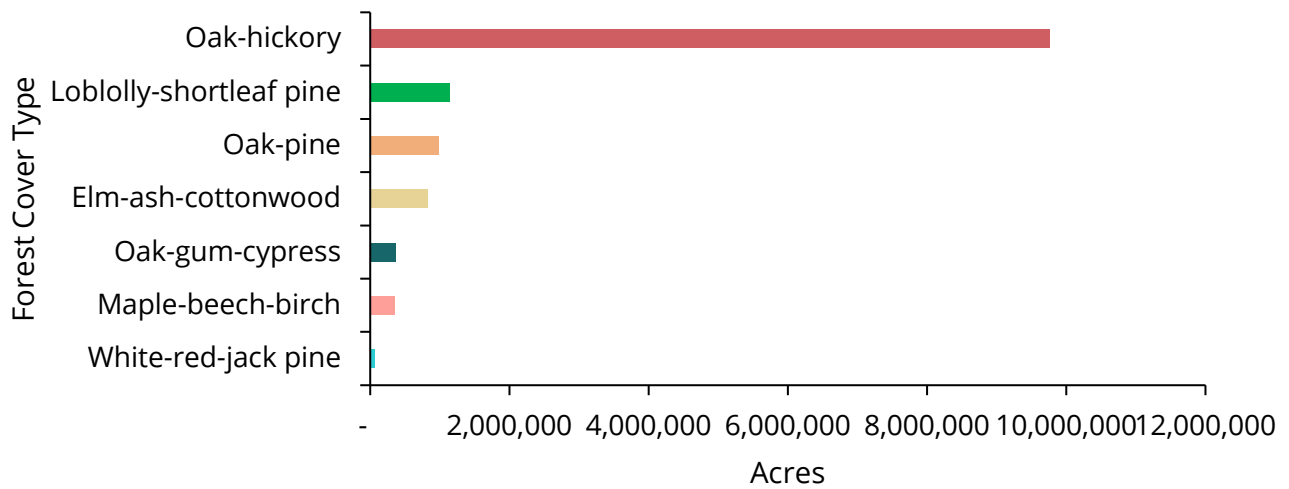


Figure 2: Tennessee forest cover types by acres; data compiled by Rachel Greene | Forest Data & Analysis Unit Leader

* 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*)

Monitoring Summary

In 2022, the emerald ash borer continued to cause ash mortality throughout much of the Highland Rim, Central Basin, Cumberland Plateau, Ridge and Valley, and Appalachian Mountains in Tennessee. Following removal of the federal quarantine in 2021, the state quarantine was also lifted. While regulation of this pest has changed, continued outreach can help educate landowners on options to manage EAB on private land. As EAB continues to spread across Tennessee, an estimated 5 million urban ash trees and 261 million timberland ash trees are expected to be impacted representing a potential of \$2 billion and \$9 billion USD in damage, respectively (TN Forest Resource Assessment and Strategy; USDA Forest Service).



Figure 3: Map representing counties where emerald ash borer has been confirmed in Tennessee (shaded green)

European Spongy Moth (*Lymantria dispar dispar*)

Monitoring and Management Summary

A total of 5,313 traps to capture spongy moth (formerly gypsy moth) were deployed to monitor spongy moth activity in the state by Tennessee Department of Agriculture Division of Forestry personnel, contractors, and federal partners. This led to a total of 170 moths caught in fourteen counties. Of the moths caught in 2022, 153 were trapped in the Slow the Spread Action Area, which is closer to spongy moth’s current range. Outside the action area, an additional 17 moths were caught in 9 counties, primarily as single-catches at high-risk sites across the state. Locations where moths were captured in 2022 will be intensively trapped in 2023 to ensure there are no breeding populations present.

Because of low catches in 2021, no treatment projects were required in 2022. A previous treatment project in 2021, which involved an aerial application of a synthetic mating pheromone in June 2021 over 4,570 acres in Johnson County, was evaluated in 2022. Results from those post-treatment delimiting traps found only 6 single-catch moths in the 195 traps placed at these sites, indicating initial success of this prior treatment block at reducing mating success of moths in the area.

Additionally, 2022 marked a change in the recognized name for *Lymantria dispar*. While formerly called gypsy moth, the Entomological Society of America, as part of their Better Common Names Project, elected to officially change the common name to spongy moth. This name is indicative of the spongy-like egg masses that female moths lay, and also aligns with the translation of the common name from the moth’s original native range in France.

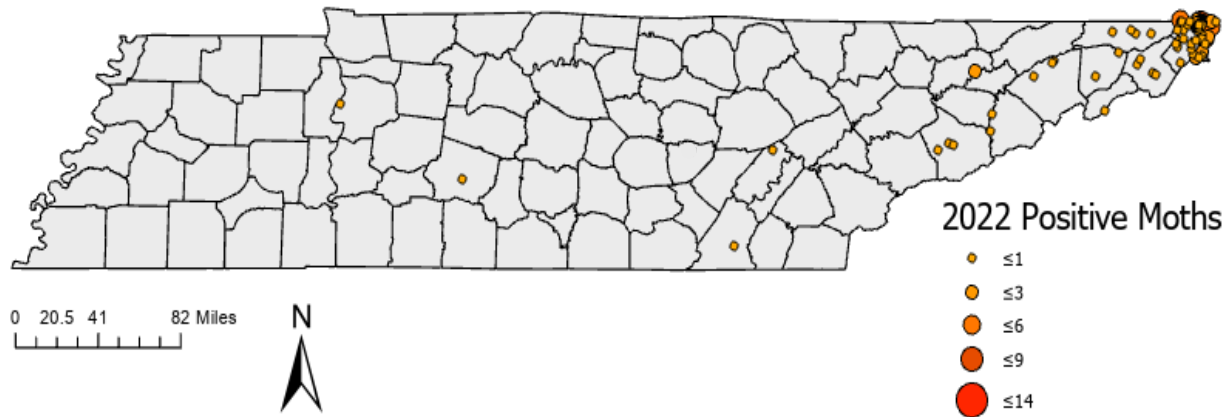


Figure 4: Results from 2022 spongy moth traps deployed across Tennessee. Each point represents a single site and its size corresponds to the number of moths found inside the trap at that site.

Laurel Wilt Disease (*Harringtonia lauricola* + *Xyleborus glabratus*)

Monitoring Summary

Laurel wilt disease was first discovered in six counties in 2019. During 2020 and 2021, road surveys were conducted and identified symptomatic sassafras (*Sassafras albidum*) in an additional 10 counties. These trees exhibited the characteristic foliar wilting and dark stained vascular tissues associated with *Harringtonia lauricola*, causal agent of laurel wilt disease. Additional surveys in 2022 identified another 4 counties with symptomatic sassafras and spicebush (Figure 5). 2022 also had the first field observation of laurel wilt on sweet shrub (*Calycanthus floridus*; Family: *Calycanthaceae*) in Tennessee, which is a host known to be susceptible to laurel wilt from laboratory studies, but initially detected on nursery stock in one county this year.

Bark tissue samples were collected from symptomatic trees and shrubs to confirm the presence of *H. lauricola* via DNA sequence analyses. Presence of redbay ambrosia beetle

Figure 6: Map representing counties where hemlock woolly adelgid has been confirmed in Tennessee (shaded brown)

Hemlock conservation efforts by TDF are conducted in partnership with many state, federal, non-profit, and private groups to treat and manage hemlock woolly adelgid (HWA) on a regional scale. TDF's Hemlock Woolly Adelgid Strike Team represents a federally funded seasonal crew whose goals are to chemically treat HWA on hemlock conservation areas (HCAs), 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 (THCP). HCAs include state parks, state natural areas, state forests and conservation easements across the native range of eastern hemlock in Tennessee. Through a GNA with Cherokee National Forest, additional HCAs are being treated at the forest by the TDF HWA Strike Team.

The 2021-2022 strike team treated over 10,700 trees across 1199 acres in 19 HCAs and helped facilitate landowner HWA workshops as well as the annual THCP Winter Meeting. As this type of strike team model has demonstrated an effective method for maximizing chemical treatment of hemlock, other states and provinces in the U.S. and Canada have expressed interest in adopting similar strategies. TDF Strike Team Coordinator and HWA Strike Team Crew Lead were both able to present a demonstration of treatment techniques at the HWA Managers Meeting in New Hampshire in 2022 for various state and provincial HWA program managers. The 2022-2023 strike team has three returning crew members and has already begun hemlock treatments in HCAs for the 2022-2023 season. Additionally, Dr. Pat Parkman, retired Director of the Lindsay Young Beneficial Insects Laboratory at the University of Tennessee, coordinated the release of 803 *Laricobius nigrinus* beetles and *L. osakensis* across 3 release sites for biological control studies on state and federal lands in Tennessee.

Southern Pine Beetle and other pine bark beetles

Monitoring Summary

A total of 7 SPB adults were detected in 8 monitoring traps deployed by TDF personnel in spring 2022 in Chester, Marion, Rhea, and Wayne Counties. Catches occurred in three of the four counties, Chester, Marion, and Rhea, with the majority caught in Rhea and Chester. Traps caught on average of 50 clerid beetles per site, indicating that this natural predator of SPB is present and at high numbers in these sites. Traps also caught low numbers of 4 other species of Scolytids. Suspected damage by pine bark beetles was reported by landowners or TDF personnel occasionally throughout the year, but there was no evidence of significant SPB activity. Multiple reports of Ips spots were documented by personnel, with none exceeding more than a quarter of an acre.


SOUTHERN PINE BEETLE COUNTY HAZARD RATING FOR Tennessee

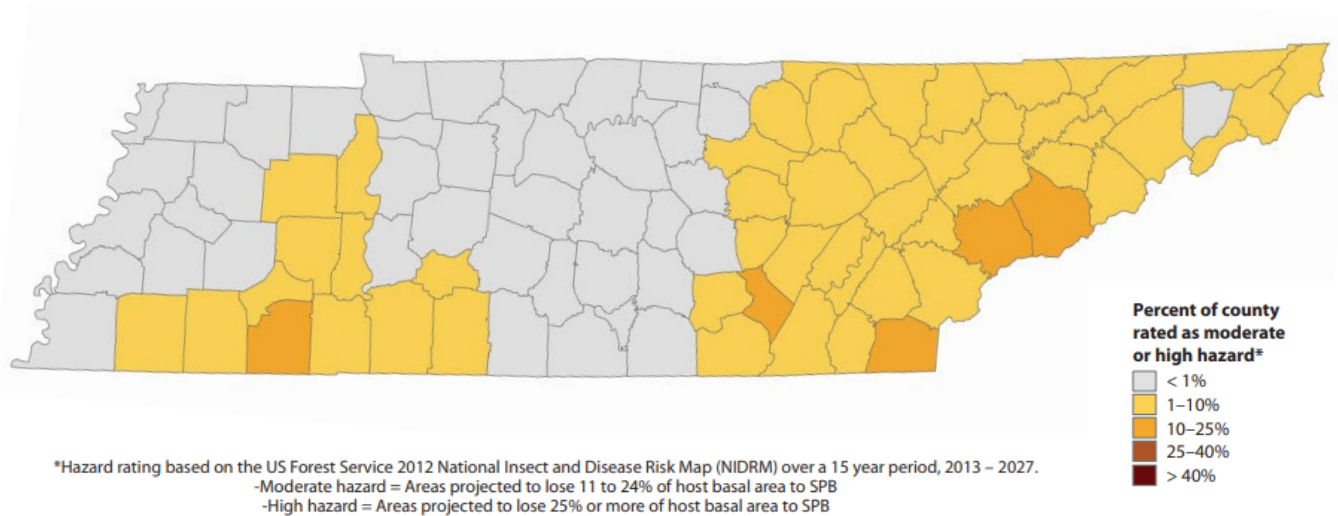


Figure 7: Map representing SPB hazard rating in Tennessee counties based on USFS 2012 National Insect and Disease Risk Map.

Invasive Plants

Annual Summary

TDF personnel submitted a total of 411 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*): 29 reports across 16.4 total acres
- Chinese privet (*Ligustrum sinense*) and European privet (*L. vulgare*): 104 reports across 46.7 total acres
- Kudzu (*Pueraria montana var. lobata*): 32 reports across 122.3 total acres
- Japanese stiltgrass (*Microstegium vimineum*): 110 reports across 26.0 total acres
- Autumn olive (*Elaeagnus umbellata*): 26 reports across 67.2 total acres

A federal grant for invasive plant species management is allowing TDA to partner with the City of Celina, Radnor Lake State Park, the City of Johnson City, and others to conduct non-native invasive plant management activities within these areas. In 2021-22, approximately 60 acres of invasive species management occurred at sites funded through TDF awards, with volunteers joining staff to contribute almost 400 volunteer hours of invasive plant removal.

Wildland Fire

Annual Summary

A total of 1,511 wildland fires were reported on 27,821 forested acres. These fires ranged from 0.1 to 2,783.9 acres affected with an average size of 119.4 acres.

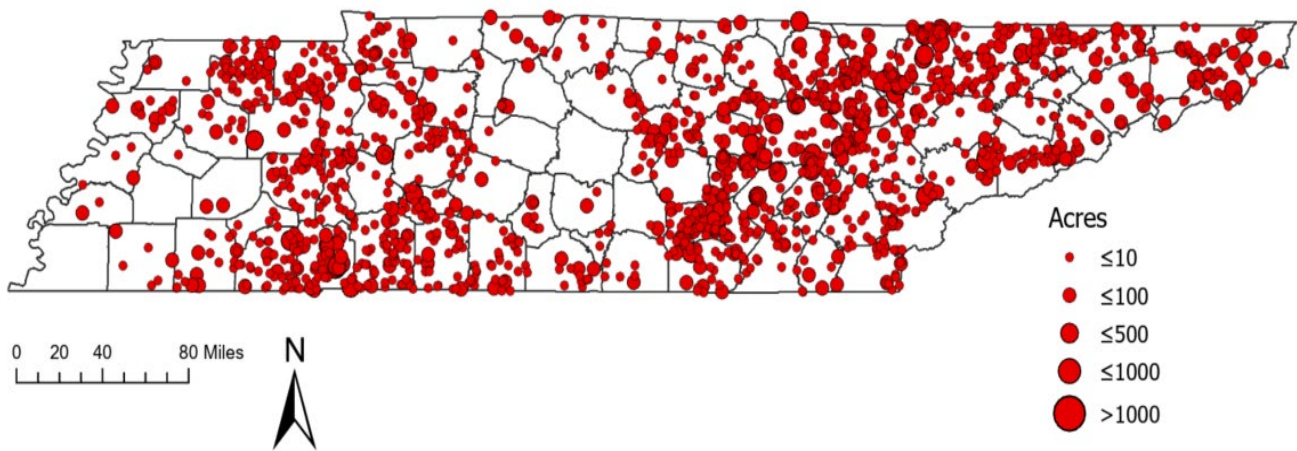


Figure 8: Reported wildland fires on forested acres in Tennessee with point size representing the number of reported acres.

Other forest health trends

Annual Summary

- Pine needlecast was observed in many counties this season due to early rainy conditions in the spring. Mild to severe symptoms were observed across the state, with an estimated 112,000 acres in total affected across Tennessee, most severely in west TN.
- Brown spot needle blight (BSNB) was detected on loblolly pine in two counties in 2022, with this being the first confirmed detection of this particular disease on loblolly in TN. This pathogen is a periodic disease of several conifer species, but has notably been detected only on Christmas trees (particularly Scotch pine) in TN. This disease causes symptoms similar to needlecast on loblolly, but additional surveys will be necessary to determine the extent of this pathogen in TN.
- Hemlock trees in several counties in the Cumberland Plateau showed symptoms of Rosellinia needle blight (*Rosellinia herpotrichoides*) following some initial wet weather this spring and early summer. This disease has periodically caused substantial visible damage to landscape and forest hemlock trees, but is typically only significant following a particularly rainy period as was the case in early 2021 and again in 2022.

- Oak decline was reported for approximately 79 trees in Hamilton, Sequatchie, and Van Buren Counties. This is slightly lower than 2021 observations, but oak decline remains a potential concern for Tennessee prompting continued investigation into this decline complex.

Weather Events

Annual Summary

On December 10-11, 2021, a total of 16 tornadoes touched down across western and middle Tennessee during a severe storm event. According to the National Weather Service, these tornadoes covered a combined distance of 217.63 miles in Tennessee. Following aerial survey of the damage, an estimated 3,723 acres of forested land was recorded as damaged by these tornadoes.

From January to June 2022, Tennessee had a total of 6 recorded tornados covering a total reported distance of 36.1 miles. TDF personnel reported significant damage in many areas following the December 10, 2021 tornado, but only reported limited damage from the events in 2022.

An ice storm in early February 2022 caused some concerns for transportation and utility services in western and central Tennessee but field observations from TDF personnel following the storm did not note significant forest damage.

Outreach and Education

Annual Summary

Tennessee Division of Forestry has utilized the ProtectTNForests campaign on social media to connect with the public and promote forest health across the state. On Facebook, ProtectTNForests has received 1,500 page likes. Additionally, ProtectTNForests

has received a total of 292 followers on Twitter and 356 followers on Instagram. The website and social media accounts were continuously updated to inform their respective audiences of workshops, job announcements, new forest health threats, and practices to promote forest health.

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. Other programs included a Learning the Land workshop for landowners, sponsored by Tennessee Tech University, and a Laurel Wilt Workshop in partnership with Virginia Department of Forestry in northeast TN. A few programs were changed to a virtual format to accommodate ongoing COVID-19 restrictions, but still allowed TDF personnel to engage partners to promote forest health even through an online format. At both in-person and virtual workshops, information and training regarding forest health monitoring and management was provided to attendees.

In addition to meetings and training, landowner assistance was provided by TDF personnel, and resulted a total of 195 Forest Health Management Plans covering 24,152 acres.

Resources

Forest Health Assistance in Tennessee

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