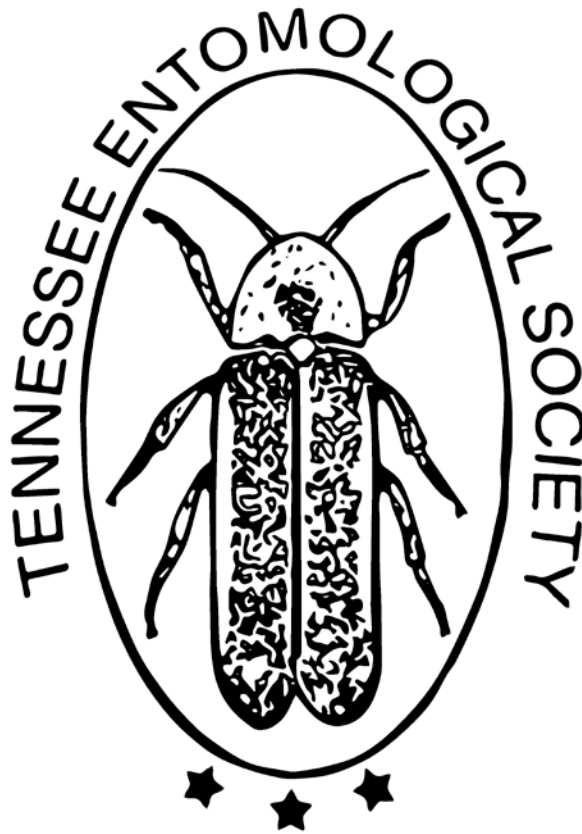


# ***THE FIREFLY***

**Proceedings of the 44th Annual Meeting  
of the  
Tennessee Entomological Society**



**October 5-6, 2017**

**Conference Room  
TWRA Region II Headquarters  
Ellington Agriculture Center  
Tennessee Department of Agriculture  
Nashville, TN**

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**RICHARD E. CARON**

**OUTSTANDING ENTOMOLOGIST AWARD**

**NOMINATION FORM**

The Awards Committee of the Tennessee Entomological Society invites nominations from any TES member for the Richard E. Caron Outstanding Entomologist Award. The award is awarded periodically to TES members who have distinguished themselves by making outstanding contributions to entomology in Tennessee.

**Name of Nominee** \_\_\_\_\_

**Brief Description of His/Her Qualifications for the Award**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Name of Nominator** \_\_\_\_\_

**Phone Number of Nominee: Area Code (    )** \_\_\_\_\_

Please submit your nomination by **August 1, 2018** to:

Dr. Kevin Moulton

University of Tennessee  
Institute of Agriculture  
432 Plant Biotechnology Building  
Knoxville, TN 37996  
[jmoulton@utk.edu](mailto:jmoulton@utk.edu)  
865-974-7950

**PROCEEDINGS  
OF THE 44th  
ANNUAL MEETING**

**OCTOBER 5-6,  
2017**

## **Keynote Speaker**

### **Post-fire research in the Smokies**

Keynote Address, Tennessee Entomological Society 44th Annual meeting

**Becky Nichols**, Entomologist  
Great Smoky Mountains National Park

In late November, 2016, an arson-caused fire was ignited near the top of the Chimney Tops trail in Great Smoky Mountains National Park. Due to exceptional drought and hurricane-force winds, the fire spread rapidly and burned ~11,000 acres in the park. The Chimney Tops fire was the largest in park history, and much of the area had not burned for nearly 100 years. Numerous research projects (14, to date) have already begun to document effects of the fire on vegetation, soil, mammals, amphibians, fungi, aquatic insects, earthworms, etc. Many other projects are proposed, such as impacts to breeding birds, bats, and soil invertebrates. New information has already been discovered. For example the fungi research team found a soil fungus, *Pyronema* sp., which is only visible after a fire. It may be a new species to science and the genus has never been reported from the park before, despite many decades of research by mycologists. We expect to learn much more as the park and cooperating researchers continue to study the impacts of this unusual fire.

## **Student Presentations**

### **Evaluation of two ambrosia beetle repellents in tree bolt assays**

**Syra B. Allen**, Amber L. Dunnaway, Paul A. O'Neal, and Karla M. Adesso  
Otis L. Floyd Nursery Research Center, Tennessee State University, McMinnville, TN

Ambrosia beetles are attracted to ethanol which is what trees emit when they are stressed and in turn the beetles attack the stressed trees. One way to disrupt the beetles from attacking is to interfere with the attractiveness of the ethanol. Tree bolts that are soaked in ethanol, compound 1 and compound 2 can be used to bring in ambrosia beetles and determine how many beetles attack the bolts and if the compounds deter the beetles. Three experiments were conducted at the NRC against a tree line or fence line. Each treatment for each experiment were placed 5 meters apart and each replication for each experiment were placed 10 meters apart. Results from the experiments stated that ethanol and the two different compounds had different outcomes. Each experiment showed the tree bolts soaked in just ethanol obtained more hits than compounds 1 and 2. When compounds 1 and 2 were combined showed different results than compared to when they were separate. Compounds 1 and 2 reduce ambrosia beetle attacks when combined with ethanol. The compounds also seemed to repel attacks when placed in an external emitter that were hung on the bolts instead of the bolts being soaked in the compounds.

# **The impact of a reduced tree canopy cover on the composition of stream macroinvertebrate communities**

**Sandra Bojic** and John Niedzwiecki

Austin Peay State University, Department of Biology, Clarksville, TN

Urbanization is one of the leading causes of local extinctions and loss of biodiversity, and canopy cover reduction as a product of urbanization creates physical and chemical changes in streams that impact biotic community assemblages. Aquatic macroinvertebrates experience varying sensitivities to environmental changes; therefore, they may act as bioindicators for poor stream health. This study compared macroinvertebrate diversity and composition in riffles of open canopy and closed canopy segments in two streams, and diversity was quantified using biotic indices. Indices representing macroinvertebrates by tolerance level indicate no significant difference between the open canopy and closed canopy sites of each stream. However, a difference in water quality between streams was observed, though this may be expected as the streams were in contrasting areas of urbanization. This suggests that the effects of urbanization on stream macroinvertebrate communities may be less attributed to canopy cover reduction and more so to another environmental player.

# **Investigation of a supercritical CO<sub>2</sub> extraction of cedar wood oil as a fire ant repellent and toxicant**

**Mary Scott**, Paul O'Neal, Fred Eller, and Karla M. Adesso  
Otis L. Floyd Nursery Research Center, Tennessee State University, McMinnville, TN

Imported fire ants are a major issue with the nursery industry due to their tendency to harm native ecosystems, attack farm animals, harm humans, and invade electrical equipment. Essential oils have been shown to have insecticidal properties and cedar wood is an easily accessible essential oil that can be derived from supercritical CO<sub>2</sub> extraction. The active constituents in cedar wood oil that are responsible for the most insecticidal and repellent properties are cedrol and cedrene. For these experiments, fire ants were collected from Viola, Tennessee and were placed into colony boxes and kept for each test. The first test performed is a contact assay, using a petri dish with a dry paper towel and a small piece of cotton roll soaked in 20% sucrose solution. Four solutions of cedar wood oil were mixed, at rates of 0, 0.1, 1, and 5% cedar wood oil content with acetone. Each replicate uses ten ants, and three colonies were used for a total of 12 replicates of each treatment. The ants were submerged one by one for ten seconds at a time in each solution and placed into the petri dish where their mortality was observed over 24 and 48 h. For an aging assay, deli containers were used with 25 ml snap cap vials with 6 mm holes drilled into the tops with each vial packed with 34 g of sand. Seventeen grams of sand was treated with a 5 µl rate solution of cedar wood oil and aged for 0, 3, 9, 16, or 24 d before being placed into the deli cups. Twenty ants were then placed in each cup and the amount of sand displaced after 48 h was recorded as well as the mortality rates over 24 and 48 h. For the external treated vial experiment, the same snap cap vials were dipped up to 2.5 cm high in a cedar wood oil solution and packed with untreated sand. The vials were then placed into deli cups with ants and mortality and sand displaced was measured over 24 and 48 h. The results of the contact assay yielded a 92% mortality rate, showing that cedar wood oil is an effective toxicant of fire ants. The external vial and treated sand tests show that cedar wood oil is a viable repellent but needs further testing with different concentrations of the oil.

## **Total eclipse of the bees: effect of solar eclipse on *Apis mellifera***

**Emily Rendleman**, Robert Moore, Dr. Donald Sudbrink  
Austin Peay State University, Department of Agriculture, Clarksville, TN

Honey bees and other members of the family Apidea have been studied for many years, and one such subject area is that of solar eclipses. Much of the data collected has been anecdotal reports of honey bee behavior without much quantified support. This experiment done during the August 21st, 2017 total solar eclipse attempted to marry the quantitative and qualitative. Three hives of *Apis mellifera* were observed between the hours of 11 AM and 4 PM, with records being made of how many bees were present on the landing boards. Results have shown dramatic differences in behavior between that of a normal day and the period of totality.

## **Evaluation of two ambrosia beetle repellents in containerized trees**

**Amber L. Dunnaway**, Syra Allen, Paul A. O’Neal, and Karla M. Adesso  
Otis L. Floyd Nursery Research Center, Tennessee State University, McMinnville, TN

Ambrosia beetles are a challenge in the nursery industry today. Ambrosia beetles are fungus-farming insects that make their home in stressed trees. When a tree becomes stressed it emits ethanol, attracting ambrosia beetles leading to an attack on the tree. Once inside the tree the beetles create galleries where they deposit fungus for their future larvae to feed upon. This has a direct or indirect effect on the tree which could result in the death of the tree. Two compounds were identified having properties that were repellent of ambrosia beetles in combination with kaolin clay. Compounds 1 and 2 were tested in multiple trails on bolts and then containerized trees. Trial 1 on bolts showed the result that Compounds 1 and 2 in combination with kaolin clay had a significant reduction of ambrosia beetle attacks. Trail 2 on containerized trees showed that a combination of Compounds 1 and 2 can be applied to trees to reduce ambrosia beetle attacks. The combination of compounds did show burning of foliage which was reduced in the presence of kaolin clay. If repellent compounds are to be used effectively in nursery production, a slow release system or formulation must be pursued to increase longevity and decrease phytotoxicity.

## **Where might the mite be? A survey of the southeast region for *Rose Rosette Virus* and its eriophyid vector**

**Katherine Solo**<sup>1</sup>, Sara Collins<sup>1</sup>, John Bauchan<sup>2</sup>, Ron Ochoa<sup>2</sup>, Frank Hale<sup>3</sup>, Alan Windham<sup>3</sup>,  
Jean Williams-Woodward<sup>4</sup>, James Jacobi<sup>5</sup>, Alan Henn<sup>6</sup>, and Mark Windham<sup>1</sup>

<sup>1</sup>Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN, <sup>2</sup>USDA-ARS, Beltsville, MD, <sup>3</sup>Soil Plant and Pest Diagnostics Center, Department of Entomology and Plant Pathology, University of Tennessee, Nashville, TN, <sup>4</sup>University of Georgia Extension, Athens, GA, <sup>5</sup>Auburn University Extension, Birmingham, AL, <sup>6</sup>Mississippi State University Extension, Starkville, MS

The distribution of the eriophyid mite, *Phyllocoptes fructiphilus* Keifer, in the southeastern region of the United States is not well defined. The mite is not thought to be found in the Deep South (southern portions of Alabama, Georgia, and Mississippi). Likewise, there has not been a recent survey of the incidence of Rose Rosette Virus (RRV). As the only known vector of RRV, incidence of *P. fructiphilus* is an important indicator of where the viral epidemics would be expected to spread. The objective for this research was to canvas Alabama, Georgia and Mississippi for new cases of *P. fructiphilus* and RRV and to determine if parts of these states are free of the virus and its vector as was reported more than a decade ago. Early results have placed eriophyid mites throughout the three states. However, mites in the Deep South may not be *P. fructiphilus*. In two locations, the mites have been identified as *Eriophyes eremus*. This species has not yet been observed in both Alabama and Georgia and will be published as first reports. The RRV line has also been redefined with the data collected from this research. Once mites are identified from this study, we will have a much clearer picture of where each mite is found in the Deep South.



## **Retreat site selection in *Vaejovis carolinianus* populations in Tennessee's Upper Cumberland region**

**Bob A Baggett**

School of Environmental Studies, Tennessee Technological University, Cookeville, TN

My study examined Tennessee's only native scorpion species, *Vaejovis carolinianus*. Little is known about its ecology, so the objectives of my study were to determine if: (1) *V. carolinianus* selected cover objects based on surface area; (2) *V. carolinianus* preferred moister soils under the cover object; and (3) length of time in captivity altered the preferences. Scorpions were captured from two different locations: (1) a roadcut parallel to State Highway 96 near Edgar Evins State Park; and (2) France Mountain in Overton County. Transects were established at both field locations to count and measure rocks that may serve as retreat sites. In separate laboratory trials, scorpions were allowed to choose among retreat sites of either three different sizes or three soil moisture levels. Surface area trials indicated that *V. carolinianus* selected large objects as retreat sites most often, but overall retreat site selection did not differ from that expected based on random choice when weighted by cover object size. Soil moisture trial results varied, with no statistical significance in the results from Highway 96 and 2013 France Mountain populations. However, the 2014 France Mountain population showed a preference for wet soil. Surface area trials did not exhibit a time in captivity effect; however, a time in captivity effect in soil moisture choice in the France Mountain populations, for the freshly caught 2014 population indicated a preference for wetter soils.

## **Evaluation of stress-mitigating fungicides to prevent ambrosia beetle attacks on flood-stressed nursery trees**

**Matthew Brown**, Jason Oliver, Karla Adesso, Fulya Baysal-Gurel, Paul O'Neal, and Nadeer Youssef

Otis L. Floyd Nursery Research Center, Tennessee State University, McMinnville, TN

Ambrosia beetles are important pests of ornamental nurseries. Ambrosia beetles feed on symbiotic fungi in the xylem of trees. Stressed trees that emit ethanol and other volatiles are targeted by ambrosia beetles for attack. Stress-mitigating fungicides may increase stress tolerance, and therefore reduce ambrosia beetle pressure, while also having fungicidal properties against the ambrosia beetles' symbiotic fungi. Preventive (Empress Intrinsic, Orkestra Intrinsic, and Pageant Intrinsic) and curative (Pageant Intrinsic) fungicide treatments were evaluated for their effectiveness at reducing ambrosia beetle attacks in three trials using flood-stressed flowering dogwood (*Cornus florida*) (n=10), yellow poplar (*Liriodendron tulipifera*) (n=5), and eastern redbud (*Cercis canadensis*) (n=5) containerized trees. Treatments were arranged in a randomized complete block design and non-treated plants served as a control. Preventive drench treatments were applied 7 d before flood initiation and curative trunk spray treatments were applied 1 d after flood initiation. New ambrosia beetle attacks were recorded every 2-3 d. Dogwoods treated with Orkestra Intrinsic (drench) and Pageant Intrinsic (spray) had lower cumulative ambrosia beetle attacks than the non-treated control from May 24-June 1, while yellow poplars treated with Pageant Intrinsic (drench) had lower cumulative attacks than non-treated control trees on June 9. Redbuds treated with Empress Intrinsic (drench) had lower cumulative attacks than non-treated control trees from May 30-June 5. No fungicide consistently reduced ambrosia beetle attacks across all tree species. Differences in results among trials may be due to tree species or environmental factors. Additional research like rate optimization is needed, but results indicate these fungicides have potential for ambrosia beetle management.

## **Environmental space change: Predicting the potential invasion of kudzu bug (*Megacopta cribraria*) in North and South America and determining its climatic preference**

Wanwan Liang

Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN.

## **Lyme pathogen prevalence trends in ticks from eastern Tennessee and surrounding states**

**Janetta R. Kelly** and Graham Hickling

Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, USA

Lyme disease is the most common tick-borne illnesses in the eastern United States, with the majority of cases reported from the Northeast and Upper Midwest. The disease is caused by the bacteria *Borrelia burgdorferi* (*Bb*) vectored by *Ixodes scapularis* (the blacklegged tick). Blacklegged ticks are found in wooded habitats throughout most of the eastern United States, however ticks infected with *Bb* are uncommon in southeastern states. It has been suggested that tick abundance may be too low in the Southeast to maintain *Bb* transmission cycles. Alternatively, immature blacklegged ticks in the Southeast may feed primarily on lizards, which are non-reservoir-competent hosts for *Bb*.

Human cases of Lyme disease are becoming more frequent in southwestern Virginia, and adult blacklegged ticks carrying *Bb* have recently been found in that area. Similarly, blacklegged ticks collected from deer in several Kentucky counties have recently tested positive for *Bb*. In contrast, ongoing screening of blacklegged ticks from several locations in eastern Tennessee has continued to produce 0% prevalence of *Bb*. Therefore, we propose to quantify the latitudinal gradient in *Bb* prevalence in ticks along the eastern and western foothills of the Appalachian Mountains to determine more precisely how far south infected ticks can be found, and to investigate the hypothesis that there is an ecological barrier helping to limit further southwards spread of infected blacklegged ticks.

## **Infamy: The rise and fall of the kudzu bug in Tennessee**

Amy Michael<sup>1</sup>, Scott Stewart<sup>2</sup>, Bonnie Ownley<sup>1</sup>, Greg Wiggins<sup>1</sup> and Jerome Grant<sup>1</sup>

<sup>1</sup>Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN, <sup>2</sup>West Tennessee AgResearch and Education Center, University of Tennessee, Jackson, TN.

## **Molecular phylogeny and niche modeling analysis of horse flies in the southeastern United States**

**Travis Davis**, Rebecca Trout Fryxell, Dan Kline, Bradley Mullens  
Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN

Horse flies (Tabanidae) are present in high numbers during the late spring and summer seasons of the year and are considered major pests worldwide to both livestock and man. Their persistent blood feeding behavior cause losses to livestock production through loss of blood and animal weight, alteration of grazing behavior, and disease transmission. Tabanidae can also cause nuisance and harm to humans through painful bites that have the potential to illicit allergic reactions, cause infection, or transmit disease. Historically, Tabanidae classification has been difficult due to ambiguous morphological characters, high variation and group diversity, and the limited availability of experts within the group. Recently, molecular identification using mitochondrial and nuclear genes has shown promise in revising and breathing new life into this highly important family of Diptera. As a part of this effort, constructing a molecular phylogeny and predicting likely distributions of *Tabanus* species throughout the Southeastern United States will provide a basis for future taxonomic, management and vector control research in Tabanidae.

## **The twig beetle bypass: Assessing risk and dispersion patterns of walnut twig beetle, *Pityophthorus juglandis*, in forests**

**Philip Hensley**<sup>1</sup>, Jerome Grant<sup>1</sup>, Greg Wiggins<sup>1</sup>, Paris Lambdin<sup>1</sup> and Paul Merten<sup>2</sup>, <sup>1</sup>Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN, <sup>2</sup>USDA Forest Service, Asheville, NC.

## **Interspecific association of ticks on small mammals in western Tennessee**

**Rebecca A. Butler**<sup>1</sup>, Rebecca Trout-Fryxell<sup>2</sup>, Allan E. Houston<sup>3</sup>, David Paulsen<sup>2</sup>, and Michael L. Kennedy<sup>1</sup>

<sup>1</sup>The University of Memphis, <sup>2</sup>The University of Tennessee, Knoxville, Tennessee, <sup>3</sup>Ames Plantation, Grand Junction, Tennessee.

Interspecific association of tick species (*Ixodes scapularis* and *Dermacentor variabilis*) was assessed on small-mammal host White-footed Deer Mouse (*Peromyscus leucopus*). The study site was the Ames Plantation in Fayette and Hardeman counties in western Tennessee. Animals were captured utilizing Sherman live traps that were baited with rolled oats and examined for ticks. A coefficient of association was calculated from a 2 x 2 contingency table for tick species present on the host, and significance of association was determined utilizing a Chi-square test. Results indicated a neutral association between combinations of tick species examined. This study adds new insight relating to the interspecific associations of ticks on small mammals.

## **Hemp, hemp, hooray! Public education while mitigating the memes**

**Cody Seals<sup>1</sup>, Jerome Grant<sup>1</sup>, Frank Hale<sup>2</sup> and Darrell Hensley<sup>1</sup>**

<sup>1</sup>Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN,

<sup>2</sup>Soil Plant and Pest Center, Department of Entomology and Plant Pathology, University of Tennessee, Nashville, TN.

## **Mosquitoes, models, and maps: understanding and assessing *Aedes* mosquito populations in Knox County, TN.**

**Rose Devin and Rebecca Trout Fryxell**

Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN,

*Aedes* mosquitoes are a common vector and global cause of human suffering, leading in animal related human deaths. Twenty five percent of La Crosse Encephalitis cases, caused by La Crosse virus transmitted by *Aedes*, occur in southern Appalachia. This disease has a neurological impact on children under 16 and can be fatal. Recent studies discovered fine-scale differences in land coverage and temperature results in varying sizes, abundance, and vector capacity of *Aedes albopictus*. How these variables influence *Aedes* in southern Appalachia is currently unknown. Eighty-eight sites in Knox co. were categorically selected or attributed as either a cemetery, park, residential, or urban determined by site characteristics. *Aedes* eggs and adults were field collected from August to September, 2017 by ovitraps, CDC light traps, and Gravid traps. Future modeling, spatial, and statistical analyses of preliminary data may lead to pathways to prevent and lower La Crosse Encephalitis cases in southern Appalachia.

## **Non-Student Presentations**

### **The Sun, the Moon and the insects: influence of the Great American Eclipse on selected observed insect behaviors**

**D.L. Sudbrink, Jr.<sup>1</sup>, R.L. Moore<sup>1</sup>, E.D. Rendleman<sup>1</sup>, C.W. Galben<sup>1</sup>, A.M. Wright<sup>2</sup>, M.L. Adams<sup>3</sup>,  
T.E. Payne<sup>4</sup> and L.F. Faust<sup>5</sup>**

<sup>1</sup>Department of Agriculture, Austin Peay State University, Clarksville, TN, <sup>2</sup>Department of Languages and Literature, Austin Peay State University, Clarksville, TN, <sup>3</sup>NASA/Marshall Space Flight Center, Huntsville, AL, <sup>4</sup>Woodlawn, TN, <sup>5</sup>Knoxville, TN.

The behaviors of numerous insect species have been observed and recorded during previous total solar eclipses ranging from no-effects to significant alteration of diurnal behaviors. To further investigate some of these phenomena during the Great American Eclipse of 21 August 2017, a series of observations of behaviors of several species of insects were taken in Montgomery, Knox and Rhea Counties in Tennessee, Todd County, Kentucky and Rutherford County, North Carolina. Behaviors of several species of insects including crickets, bees, cicadas, mosquitoes, butterflies and moths were observed during this event. In the time near or during the totality of the eclipse, observations indicated at least a temporary alteration of typical diurnal behavior for each species studied. Typical diurnal behaviors of species were observed to resume after totality, albeit somewhat delayed in a number of species studied.

# Presence and abundance of *Chrysopa nigricornis* in Tennessee (Neuroptera: Chrysopidae)

Kaushalya G. Amarasekare and Richard H. Link

Tennessee State University, Dept. of Agricultural and Environmental Sciences, Nashville, TN

This study focused on investigating the presence and abundance of the green lacewing *Chrysopa nigricornis* (Burmeister) (Neuroptera: Chrysopidae) in Tennessee. Green lacewings are one of the most important generalist predators in Tennessee and other U. S. states. They are predators of a wide spectrum of soft-bodied arthropod pests including aphids, mites, scales, thrips and mealybugs that can damage horticultural and agricultural crops including a variety of fruit, vegetable and ornamental plants. *Chrysopa nigricornis* has a transcontinental distribution in North America extending as far south in the U. S. as New Mexico and Texas, and northwards into most of the Canadian provinces. Information on green lacewings in Tennessee is scarce. In this study, we used an herbivore-induced plant volatile (squalene) as a lure to monitor *C. nigricornis* in different cropping systems. We conducted this study in two counties in middle Tennessee from March to September 2017. We utilized a community vegetable garden and an organic fruit and vegetable farm in Nashville (Davidson County) and a peach and a walnut plot in Ashland City (Cheatham County). We prepared the lures in the laboratory and hung each trap (consisted of a lure and a white sticky card) either on a PVC pipe stand (Nashville) or tree branch (Ashland City) in each location as a replicated study. The sticky cards and lures were replaced on weekly and monthly intervals, respectively. The number of green lacewings on each card was counted. A large number of *C. nigricornis* was collected during April and May 2017 from the traps placed in the peach plot although a few were collected in the other three locations. We used the forewing venation of the Genus *Chrysopa* and facial marks of *C. nigricornis* to identify the Genus and species, respectively. The *C. nigricornis* populations were limited in June, July and August.

## Finding the little guys: eriophyid mite collection methods

Sara Collins<sup>1</sup>, Katherine Solo<sup>1</sup>, John Wilkerson<sup>2</sup>, Matthew Dischner<sup>2</sup>, Frank Hale<sup>3</sup>, Alan Windham<sup>3</sup>, and Mark Windham<sup>1</sup>

<sup>1</sup>Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN;

<sup>2</sup>Department of Biosystems Engineering and Soil Science, University of Tennessee, Knoxville, TN;

<sup>3</sup>Soil Plant and Pest Center, Department of Entomology and Plant Pathology, University of Tennessee, Nashville, TN

Methods for collecting and detecting eriophyid mites, specifically, *Phyllocoptes fructiphilus*, vector of *Rose Rosette Virus*, are crucial in the determination of population size, movement, and the development of eriophyid mite management strategies. Their small size and desired habitats make locating eriophyid mites on plants difficult. This presentation examines approaches for collecting eriophyid mites, from plant material and air samples, comparing their functionality, time efficiency, affordability, and ease of use.

## **Systems-based pest management for nursery crops**

**Frank A. Hale, Ph.D.**

Professor and Extension Specialist

Horticultural Crops Entomology

Department of Entomology and Plant Pathology

UT Extension, Institute of Agriculture

The University of Tennessee

This presentation is based on “An overview of systems-based pest management for nursery production” UT Extension publication PB 1825 by D. R. Cochran, A. Fulcher, F. A. Hale, and A. S. Windham. (<https://extension.tennessee.edu/publications/Documents/PB1825.pdf>). Systems-based pest management is a proactive approach to pest management in which investments are made up-front to help prevent pest-related problems rather than solely reacting to problems as they arise. This process starts with tracing the production path and identifying high-risk or vulnerable points during the production chain when pests or diseases could be introduced or easily spread throughout the nursery. These high-risk points are called critical control points and are the most effective places to prevent, control, reduce or eliminate risk due to pests and disease. Common critical control points include receiving areas, propagation houses, container storage areas, substrate piles, irrigation water, cull piles etc. Once these critical control points are identified, a set of practices is put into place that collectively provides overlapping and cumulative pest prevention as well as early detection and control. Simple sanitation practices can help mitigate the spread of unwanted insects, mites, pathogens or weeds. Knowing how to manage water and irrigating properly are important components of a systems-based pest management approach. Incoming nursery stock should be inspected at delivery and before unloading. Reject loads that contain infected or infested plants. When receiving incoming plants, segregate them from existing nursery stock for at least 60 days during the active growth stage or until you are confident that the buy-ins are pest free. Also, inspect packing material and the inside of the van for hitchhikers such as slugs, snails, ants, fungus gnats and other pests. Follow shipping regulations and do not ship plants if you suspect they are infected or infested. Leave 10% of incoming plants untreated by pesticides, so that any disease symptoms and pest infestations can be detected. Keep good records of all pesticide treatments. Train several dedicated employees to scout for pests and diseases. Make sure that they have time to do this important service on a regular basis. This is often the same people that do the pesticide applications. All impacted plants should be brought to the attention of the nursery manager for diagnosis for corrective action instead of being disposed of by field workers. Unusual and unrecognized plant problems should be submitted to diagnostic labs. Have employees focus on learning the top ten problem pests and diseases at the nursery. More can be added over time. Post photos of these in common areas such as break rooms. Utilize print and electronic sources, including the mobile device app *IPMPro*. An important new publication is the 2017 Southeastern U.S. Pest Control Guide for Nursery Crops and Landscape Plantings. <https://content.ces.ncsu.edu/southeastern-us-pest-control-guide-for-nursery-crops-and-landscape-plantings>



## **You bet your bug..... final answer?**

**David Cook<sup>1</sup>** and Amy Dismukes<sup>2</sup>

<sup>1</sup>University of Tennessee Extension, Davidson County, <sup>2</sup>Tennessee State University Extension, Williamson County

Diagnosing insect/mite pests in landscapes may seem fairly straightforward; however, there are some simple protocols and questions that need to be addressed before your final answer. Questions such as “What’s the plant?”, “When did the issue begin?”, “Is this a new or established planting?”, and other relevant questions will need to be resolved. Identifying specific ‘signs’ and ‘symptoms’ that relate to plant damage also need to be identified. Extension Agents David Cook and Amy Dismukes present an interactive program to sort out and identify common and uncommon insect/mite plant interactions.

## **Three low-income high-rises share two populations of the common bed bug, *Cimex lectularius* (Hemiptera: Cimicidae)**

**Jennifer G. Chandler**, Karen M. Vail and Rebecca T. Trout Fryxell  
Entomology & Plant Pathology, University of Tennessee, Knoxville, TN

Bed bugs can be a challenge to manage in multifamily housing due to their dispersal behavior. Dispersal occurs both actively (crawling along pipe chases, shared walls, floors) and passively (hitchhiking on belongings and furniture). Once established within an apartment, bed bug infestations can spread extensively throughout the building. Microsatellite DNA markers are a versatile tool for population genetic analysis and can be used to track bed bug movement and introductions within a building. Seventeen microsatellite markers amplified from 1529 bed bugs from 101 apartments were used to measure genetic diversity and to assess population structure in bed bugs collected from three low-income highrises in Knoxville TN. Results from our analyses yielded two distinct clusters of bed bugs. These two clusters were readily found in all three buildings and in similar ratios. Within each building, subpopulations were identified and most of these subpopulations were genetically distinct from one another (significant  $F_{ST}$  values). From the three buildings a mean of  $33.12 \pm 1.515$  alleles were amplified per the 17 loci. For all loci, observed heterozygosity was less than the expected heterozygosity indicating significant inbreeding. Initial infestations likely originated months or years before our sampling; consequently, these bugs likely represent a number of generations in an actively mixing population.

# ATTENDANCE ROSTER OF THE 2017 ANNUAL MEETING OF THE TENNESSEE ENTOMOLOGICAL SOCIETY

## REGULAR MEMBERS

Steve Hamilton  
Don Sudbrink  
Steve Murphree  
Karla Adesso  
Kaushalya G. Amarasekare  
Jason Oliver  
Paul O'Neal  
Richard Link  
Amy Dismukes  
Bruce Kauffman  
Greg Wiggins  
Karen Vail  
Pat Parkman  
Jerome Grant  
Frank Hale  
Becky Trout-Fryxell  
Sara Collins  
Bruce Kauffmann  
Scott Stewart  
David Cook

## AFFILIATION

Austin Peay State University  
Austin Peay State University  
Belmont University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee

## STUDENT MEMBERS

Emily Rendleman  
Nicole Santoyo  
Brandy Schnettler  
Sandra Bojic  
Amber Dunnaway  
Mary Scott  
Syrá Allen  
Matt Brown  
Uzoamaka Abana  
Bob Bagget  
Rebecca Butler  
David Bechtel  
Kahlie Singletary  
Wanwan Liang  
Katherine Solo  
Travis Davis  
Philip Hensley  
Cody Seals  
Devin Rowe  
Janetta Kelly  
Amy Michael  
Graham Hickling

Austin Peay State University  
Austin Peay State University  
Austin Peay State University  
Belmont University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
Tennessee State University  
Tennessee Tech University  
University of Memphis  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee  
University of Tennessee

Katherine Solo

University of Tennessee

**GOVERNMENT MEMBERS**

Becky Nichols  
Joshua Basham  
Steve Powell  
Cindy Bilbrey  
Mike Studer

National Park Service  
TN Dept. of Agriculture  
TN Dept. of Agriculture  
TN Dept. of Agriculture  
TN Dept. of Agriculture

**INDUSTRY MEMBERS**

Clete Youmans

BASF

**BOARD OF DIRECTORS**

**2017**

President: Greg Wiggins, wiggybug@utk.edu  
President-elect: Pat Parkman, jparkman@utk.edu  
Past President: Amy Dismukes, adismuke@utk.edu  
Treasurer: Steve Powell (2016-2018), Steve.Powell@tn.gov  
Secretary: Steve Murphree (2017-2019), steve.murphree@belmont.edu  
Editor: Karla Adesso (2016-2019), kaddesso@tnstate.edu  
Historian: Frank Hale (2012-2021), fhale1@utk.edu  
Member-at-large: Gene Burgess (2017), gburgess@utk.edu  
Member-at-large: Gray Haun (2016-2019), wghaun@gmail.com

**COMMITTEES: 2017 – 2018**

**AUDITING**

Clete Youmans, chair  
Frank Hale

**AWARDS**

Kevin Moulton, chair  
Karen Vail  
Paris Lambdin

**CONSTITUTION**

Karla Adesso, co-chair  
Gray Haun, co-chair  
Jason Oliver

**LOCAL ARRANGEMENTS**

Jerome Grant, chair  
Frank Hale

David Cook

**PROGRAM COMMITTEE**

Pat Parkman, chair  
Greg Wiggins  
JT. Vogt

**PUBLICATION**

Karla Adesso, Chair  
Steve Powell

**PREDICTIONS/  
EVALUATION**

Steve Powell, chair

**INSECT FESTIVAL**

Jerome Grant, chair  
Steve Murphree  
Jason Oliver  
David Cook  
Amy Dismukes

**MEMBERSHIP**

Steve Hamilton, chair  
Juan Luis Jurat-Fuentes

**PROCLAMATION**

David Cook, chair

**PUBLICITY**

Rebecca Trout Fryxall, chair  
David Cook  
Greg Wiggins  
Kevin Moulton

**NOMINATING**

**COMMITTEE**

Amy Dismukes, chair  
Paris Lambdin

Minutes of the Tennessee Entomological Society can be found at:  
<https://ag.tennessee.edu/EPP/Minutes/Forms/AllItems.aspx>

## HISTORICAL NOTES

### Presidents of the Tennessee Entomological Society (1973 - Present)

<u>President</u>	<u>Term</u>	<u>Affiliation</u>
Mendell Snodgrass	'73 - '74	USDA
Omar Smith	'74 - '75	Memphis State University
Don Clements	'75 - '76	Cook's Pest Control
Gary Lentz	'76 - '77	University of Tennessee
Chester Gordon	'77 - '78	Tenn. Dept. of Agriculture.
Gene Burgess	'78 - '79	University of Tennessee
Reid Gerhardt	'79 - '80	University of Tennessee
Harold Bancroft	'80 - '81	Memphis State University
Joe Dunn	'81 - '82	American Cyanamid Company
Bill Van Landingham	'82 - '83	Tenn. Dept. of Agriculture
Carl Brown	'83 - '84	Memphis State University
Charles Pless	'84 - '85	University of Tennessee
Michael E. Cooper	'85 - '86	Tenn. Dept. of Agriculture
Elmo Shipp	'86 - '87	Mobay
Bill Shamiyeh	'87 - '88	University of Tennessee
Harvey Barton	'88 - '89	Arkansas. State University
Harry Williams	'89 - '90	University of Tennessee
Bruce Kauffman	'90 - '91	Tenn. Dept. of Agriculture
Jamie Yanes, Jr.	'91 - '92	American Cyanamid Company
Jerome Grant	'92 - '93	University of Tennessee
Russ Patrick	'93 - '94	University of Tennessee
Lynn Snodderly	'94 - '95	Tenn. Dept. of Agriculture
Paris Lambdin	'95 - '96	University of Tennessee
Frank Hale	'96 - '97	University of Tennessee
Steve Murphree	'97 - '98	Belmont University
Clete Youmans	'98 - '99	American Cyanamid
Catharine Mannion	'99 - '00	TSU Nursery Crop Res. Cnt.
Gray Haun	'00 - '01	Tenn. Dept. of Agriculture
Steven Hamilton	'01 - '02	Austin Peay State University
John Skinner	'02 - '03	University of Tennessee
Jason Oliver	'03 - '04	TSU Nursery Crop Res. Cnt.
Scott Stewart	'04 - '05	University of Tennessee
Cindy Bilbrey	'05 - '06	Tenn. Dept. of Agriculture
Karen Vail	'06 - '07	University of Tennessee
Don Sudbrink	'07 - '08	Austin Peay State University
Bruce Kaufmann	'08 - '09	University of Tennessee

David Cook	'09 - '10	University of Tennessee
Cletus Yeomans	'10 - '11	BASF
Gene Burgess	'11 - '12	University of Tennessee
Mike Studer	'12 - '13	Tenn. Dept of Agriculture
Steve Hamilton	'13 - '14	Austin Peay State University
Paris Lambdin	'14 - '15'	University of Tennessee
Amy Dismukes	'15 - '16	University of Tennessee
Greg Wiggins	'16 - '17	University of Tennessee
Pat Parkman	'17 - '18	University of Tennessee

**Secretary-Treasurers of the Tennessee  
Entomological Society (1973 - 1991)**

<u>Secretary-Treasurer</u>	<u>Term</u>	<u>Affiliation</u>
Jimmy White	'73 - '76	Tenn. Dept. of Agriculture
Harold Bancroft	'76 - '79	Memphis State University
Lyle Klostermeyer	'79 - '82	University of Tennessee
Bill Shamiyeh	'82 - '85	University of Tennessee
Richard Caron	'85 - '91	University of Tennessee

**Secretaries of the Tennessee  
Entomological Society (1991 - Present)**

<u>Secretary</u>	<u>Term</u>	<u>Affiliation</u>
Gary Lentz	91 - '02	University of Tennessee
Gene Burgess	'02 - '08	University of Tennessee
Steve Murphree	08 - '18	Belmont University

**Treasurers of the Tennessee  
Entomological Society (1991 - present)**

<b><u>Treasurer</u></b>	<b><u>Term</u></b>	<b><u>Affiliation</u></b>
Harvey Barton	'91- '97	Arkansas State University
Steve Powell	'97- '17	TN Dept. of Agriculture

### **Editors of the Tennessee Entomological Society (1991 - present)**

<b><u>Editor</u></b>	<b><u>Term</u></b>	<b><u>Affiliation</u></b>
Gray Haun	'91 – '99	TN Dept. of Agriculture
Lynn Snodderly	'00 – '01	TN Dept. of Agriculture
Gray Haun	'01 – '09	TN Dept. of Agriculture
Jerome Grant	'09 – '12	University of Tennessee
Karla Adesso	'16 – '19	Tennessee State University

### **Members at Large**

<b><u>Member</u></b>	<b><u>Term</u></b>	<b><u>Affiliation</u></b>
Gary Lentz	'87 - '88	University of Tennessee
Blake Bevill	'87 - '88	Arkansas State University
Michael E. Cooper	'88 - '89	TN Dept. Agriculture
Jay P. Avery	'88 - '89	University of Tennessee
Joe Dunn	'89 - '90	American Cyanamid Company
Charles Pless	'89 - '90	University of Tennessee
Paris Lambdin	'90 - '91	University of Tennessee
Jim Keener	'90 - '91	TN Dept. of Agriculture
Steve Powell	'91 - '92	TN Dept. of Agriculture
Lee Greer	'91 - '92	Valent
Alan Hopkins	'92 - '93	Miles, Inc.
Donald Ourth	'92 - '93	University of Memphis
Mark Carder	'93 - '94	University of Tennessee
Rich Emerson	'93 - '94	TN Dept. of Agriculture
Ray Nabors	94 - '95	Univ. of Missouri
Alan Hopkins	94 - '95	Miles, Inc.
Steve Powell	95 - '96	TN Dept. of Agriculture
Jim Bogard	95 - '96	TN Dept of Agriculture (Retired)
Hans Chaudhary	96 - '97	TN Dept. of Agriculture
Cletus Youmans	96 - '97	American Cyanamid
Larry Latson	97 - '98	Lipscomb University
Catharine Mannion	97 - '98	TN State University
Karen Vail	98 - '99	University of Tennessee
Roberto Pereira	98 - '99	University of Tennessee

Jim Keener	00 - '01	TN Dept. of Agriculture
Lee Greer	00 - '01	Valent
Frank Hale	01 - '02	University of Tennessee
Ray McDonnell	'01 - '02	TN Dept. of Agriculture
David Cook	'06 - '07	University of Tennessee
Steve Murphree	'06 - '07	Belmont University
Steve Hamilton	'07 - '08	Austin Peay State University
Clint Strohmeyer	'07 - '08	TN Division of Forestry
Gray Haun	'08 - '09	TN Dept. of Agriculture
Mike Studer	'08 - '09	TN Dept. of Agriculture
Steve Hamilton	'09 - '10	Austin Peay State University
Mike Studer	'09 - '10	TN Dept. of Agriculture
Steve Hamilton	'10 - '11	Austin Peay State University
Mike Studer	'10 - '11	TN Dept. of Agriculture
David Cook	'11 - '12	University of Tennessee
Steve Hamilton	'11 - '12	Austin Peay State University
Amy Dismukes	12 - '13	University of Tennessee
Amy Dismukes	12 - '13	University of Tennessee
David Cook	13 - '14	University of Tennessee
Amy Dismukes	13 - '14	University of Tennessee
Karla Adesso	14 - '15	TN State University
David Cook	'14 - '15	University of Tennessee
Karla Adesso	15 - '16	TN State University
David Cook	'15 - '16	University of Tennessee
Gene Burgess	16 - '17	University of Tennessee (ret.)
Gray Haun	'16 - '19	TN Dept. of Agriculture (ret.)



**Historians of the Tennessee  
Entomological Society (1973 - Present)**

<b><u>Historian</u></b>	<b><u>Term</u></b>	<b><u>Affiliation</u></b>
Charles Pless	'73 - '76	Univ. of Tennessee
Herb Morgan	'76 - '79	USDA
Mendell Snodgrass	'79 - '82	USDA
Russ Patrick	'82 - '92	Univ. of Tennessee
Harry Williams	'92 - '01	Univ. of Tennessee (retired)
Frank Hale	'01 - '21	Univ. of Tennessee

**Honorary Members of the Tennessee  
Entomological Society (1982 - Present)**

<b><u>Honorary Member</u></b>	<b><u>Year</u></b>	<b><u>Affiliation</u></b>
Jimmy White	1982	Tenn. Dept. of Agric.
Mendell Snodgrass	1983	USDA
Carl Brown	1985	Memphis State
Myrtice Snodgrass	1985	Knoxville, TN
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1990	American Cyanamid
Harry Williams	1997	Univ. of TN (retired)

**Harry E. Williams Award (est. 2002)**

<b><u>Recipient</u></b>	<b><u>Year</u></b>	<b><u>Location</u></b>
Kim Woodard	2002	Trousdale Co.
Liam Black and Kimberly Woodard	2003	Hardeman Co. and Trousdale Co.
Reed Avent	2006	Bolivar, TN
Andy Brown	2008	Coffee Co.
Phillip Adams	2009	Burns, TN
Jonathan Belcher	2010	Rutherford Co.
Kade Parker	2011	Maryville, TN
Kade Parker	2012	Maryville, TN
Steven Davis	2013	Loudin Co.
Angel Chaffin	2014	Sevier Co.
Perrein Heselschwerdt	2015	Claiborne Co.
-----	2016	(No award given)
Keaton Pennick	2017	Weakley Co.

**Howard Bruer Award (est. 1975)**  
**Recipients of the Tennessee Entomological Society (1975 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Whitney Eckler	1975	Memphis, TN
Joe Martin	1976	Bolivar, TN
Bryan Peters	1977	College Grove, TN
Tidus Pollard	1978	Huron, TN
John Bentley	1979	
Melissa Hart	1980	Watertown, TN
Gary Miller	1981	Knoxville, TN
Harold Glass	1982	Knoxville, TN
-----	1983	(No award given)
-----	1984	(No award given)
Penny Thompson	1985	Davidson County
Matthew Fumich	1986	Munford, TN
Christie Greer	1987	Greene Co.
Dottie Hodges	1988	Hamblen Co.
-----	1989	(No award given)
Tim Gentry	1990	Woodbury, TN
Jennifer Hartsell	1991	Hamblen Co.
Jessica Taylor	1992	Lincoln Co.
Jennifer Lenter	1993	Fayetteville Co.
Jeremy Smith	1994	Savannah Co.
George Carroll	1995	Anderson Co.
Stacy Milhahn	1996	Lincoln Co
Nancy Warden	1997	Marshall Co.
Denise Byrum	1998	Moore Co.
James Johnson	1999	Bolivar, TN
Wade Black	2000	Hardeman Co.
Sara List	2006	Coffee Co.
-----	2008	(No award given)
Grant Fisher	2009	Sevierville, TN
Julia Britto	2012	Oak Ridge, TN
Swasti Mishra	2013	Davidson Co.
-----	2014	(No award given)
-----	2015	(No award given)
-----	2016	(No award given)

**Outstanding Entomologist (Tennessee Entomologist of the Year)  
Award (est. 1981) Recipients of the Tennessee  
Entomological Society (1981 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Myron Smith	1981	Hill Smith Pest Control
Harry Williams	1985	Univ. of Tennessee
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1991	American Cyanamid

**Richard E. Caron Outstanding Entomologist Award**

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Harry Williams	1995	Univ. of TN (Retired)
Harvey Barton	1996	Arkansas State Univ. (Retired)
Carroll Southards	1997	Univ. of TN (Retired)
Harold Bancroft	2001	Univ. of Memphis
Charles Pless	2002	Univ. of Tennessee (retired)
Gary Lentz	2008	Univ. of Tennessee (retired)
Reid Gerhardt	2009	Univ. of Tennessee (retired)
Gene Burgess	2011	Univ. of Tennessee (retired)

**Undergraduate Student Award (est. 2015) Recipients of the Tennessee  
Entomological Society**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Erik Hearn (1st)	2015	University of Tennessee
Rachel Harmon (2nd)	2015	University of Tennessee
Amber Dunnaway (1st)	2017	Tennessee State University
Sandra Bojic (2nd)	2017	Belmont University

**Graduate Student Award (est. 1986) Recipients of the  
Tennessee Entomological Society (1986 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Jay Avery	1986	Knoxville, TN
Laura Rogers	1987	Knoxville, TN
Jason Oliver	1988	Knoxville, TN
Steve D. Powell	1989	Knoxville, TN
Robert C. Brown	1990	Knoxville, TN
Donald L. Sudbrink, Jr.	1991	Knoxville, TN
Deborah Landau	1992	Knoxville, TN
Deanna Colby	1993	Knoxville, TN
Lee Holt	1994	Knoxville, TN
Kenneth Copley	1995	Knoxville, TN
Dina Roberts	1996	Memphis, TN
Bryan Hed	1997	Knoxville, TN
Gary Moughler	1998	Knoxville, TN
Andrew Beld	1999	Nashville, TN
Lacey McNally	2000	Baton Rouge, LA
Ken Davenport	2001	Clarksville, TN
Debra Hoyme	2002	Knoxville, TN
Amy Kovach	2003	Knoxville, TN
Andrew Haddow	2004	Knoxville, TN
Greg Wiggins (1st)	2005	University of Tennessee
Issac Deal (2nd)	2005	University of Tennessee
Auora Teonnisson (1st)	2006	University of Tennessee
Derek Bailey (2nd)	2006	University of Tennessee
Eric Janson (1st)	2007	Vanderbilt University
Carla Dilling (2nd)	2007	University of Tennessee
Jonathan Willis (1st)	2008	University of Tennessee
Greg Wiggins (2nd)	2008	University of Tennessee
Robert Brucker (1st)	2009	Vanderbilt University
Paul Rhoades (2nd)	2009	University of Tennessee
Abdul Hakeem (1st)	2010	University of Tennessee
Keith Post (2nd)	2010	University of Tennessee
Carla Coots (1st)	2011	University of Tennessee
Angelina Fisher (2nd)	2011	Austin Peay State University
Abdul Hakeem (1st)	2012	University of Tennessee
Brittney Jones (2nd)	2012	Austin Peay State University
Elizabeth Benton (1st)	2013	University of Tennessee
Katheryne Nix (2nd)	2013	University of Tennessee
Elizabeth Benton (1st)	2014	University of Tennessee

Sara Mays (2nd)	2014	University of Tennessee
Elizabeth Benton (1st)	2015	University of Tennessee
Katie Britt (2nd)	2015	University of Tennessee
David Theuret (1st)	2016	University of Tennessee
Emel Oren (2nd)	2016	University of Tennessee
Brandy Schnettler (2nd)	2016	Austin Peay State University
Katherin Solo (1st)	2017	University of Tennessee
WanWan Liang (2nd)	2017	University of Tennessee

**CONSTITUTION**  
**of the**  
**TENNESSEE ENTOMOLOGICAL SOCIETY**  
**(as of October 1991)**

Article 1. Name

This Society is formed in the name and style of the "Tennessee Entomological Society", as an educational institution, not contemplating financial gain or profit. It is herein and after called the Society.

Article 2. Purpose

The purpose and object of the Society is to foster entomological accomplishment among its members and to promote the welfare of all of the State of Tennessee through the encouragement of: (1) the preparation, reading, and/or publication of papers, (2) association and free discussion among all members, (3) the dissemination of entomological information to the general public, and (4) cooperative efforts in statewide insect surveys.

Article 3. Membership

Section 1. Original Members: Any person designated at the organizational meeting of the Society to occupy the status of "Member" shall be considered as and be a Charter Member. Thereafter, the organizational membership shall have no authority to name or appoint members of the Society.

Section 2. Membership: Membership shall be open to all persons interested in Entomology.

Section 3. Sustaining Membership: Sustaining Membership is open to commercial or industrial organizations upon meeting approval and requirements of the Board of Directors.

Section 4. Honorary Membership: Honorary Members may be selected from time to time by a majority vote of the Board of Directors.

Section 5. Student Membership: Student Membership is open to students enrolled in any education institution and meeting the requirements of the Board of Directors.

Section 6. Procedure to Obtain Membership: Any person desiring to become a member of the Society shall do so by application and payment of dues to the Treasurer. After approval of the majority of the Board of Directors, said applicant shall become a duly constituted member.

Section 7. Members in Good Standing: A member who is current in payment of dues.

#### Article 4. Membership Rights

Section 1. Voting: Each member in good standing shall be entitled to one vote at any regular or special meeting or by mail. Voting by proxy shall not be allowed.

Section 2. Privileges: All members in good standing shall have equal privileges in the presentation of papers and discussions at meetings.

#### Article 5. Membership Certificates

Section 1. Certificates: The Board of Directors shall decide upon what evidence of membership each member in good standing shall be entitled to receive.

Section 2. Transfer: Evidence of membership in the Society will not be transferable or assignable.

#### Article 6. Dues

Section 1. Annual Dues: The amount of the annual dues for membership in the Society will be established by the Board of Directors from time to time. The use or uses of dues collected shall also be determined by the Board.

Section 2. Time of Payment: The Board of Directors shall set such times during each year as it deems advisable for the payment of annual dues by members. Generally, annual dues shall be paid during registration at the annual meetings. However, a member may mail dues to the Treasurer of the Society if the member cannot attend a given annual meeting. If a member fails to pay dues two (2) years in a row, such member shall be dropped from the rolls.

Section 3. Honorary Members: There shall be no dues required for Honorary Members or others specially designated by the Board of Directors.

#### Article 7. Meetings of the Society

Section 1. Annual Meetings: The Society shall hold annual meetings at such times and places as may be designated by the Board of Directors and specified in the notice thereof, for the election of officers and any other business as may be properly brought before the meeting.

Section 2. Registration Fee: A registration fee, in the amount to be determined by the Board of Directors, shall be paid at each annual meeting by all members and non-members who attend. The Board of Directors will determine the use of these fees.

Section 3. Special Meetings: Special meetings of the Society shall be held at any time and place as specified in the notice thereof whenever called by the President or any two (2) or more members of the Board of Directors.

Section 4. Notice: Notice of all meetings of the Society, annual or special, stating time, place, and agenda shall be mailed to each member by the President, Secretary, Treasurer, or Directors calling the meeting not less than seven (7) days prior to the meeting.

## Article 8. Officers

Section 1. Officers: The officers of the Society shall consist of a President, President-elect, Secretary, Treasurer, Editor, and Historian, all of whom, except the President, shall be elected by and from the membership by a majority vote of members or by mail. The first President of the Society shall be elected by and from the membership at the organizational meeting for a term extending to the beginning of the first annual meeting. Thenceforth, the President-Elect shall automatically accede to the office of President at each annual meeting, or when the President is unable or unwilling to act for any reason. Nominees for each elective office of the Society shall be selected by a nominating committee of three (3) members appointed at the annual meeting by the President. Nominations may also be presented from the floor. The President and President-Elect shall hold office from the date of election at the annual meeting until the election of their successors at the next annual meeting, and shall not be eligible for re-election to the same office for a successive term. The Secretary, Treasurer, and Editor shall hold office from the date of election at the annual meeting until the election of a successor at the third following annual meeting and shall be eligible for re-election. The Historian shall hold office from the date of election at the annual meeting until the election of a successor at the fifth following annual meeting and shall be eligible for re-election. No member shall occupy more than one office at any one time.

Section 2. Duties and Powers of the President: The President shall be the Chief Executive Officer of the Society and shall preside at all meetings of the Society and the Board of Directors, have and exercise general and active management of the Society, execute and enforce all orders and resolutions and regulations duly adopted by the Board of Directors, execute all contracts in the name of the Society, and perform such other duties as assigned by the Board of Directors.

Section 3. Duties and Powers of the President-Elect: In the absence of the President, or in the case of failure to act, the President-Elect shall have all the powers of the President and shall perform such other duties as shall be imposed by the Board of Directors from time to time.

Section 4. Duties and Powers of the Secretary: The Secretary shall attend and keep the minutes of all meetings of the Board of Directors and the Society, shall have charge of the records and seal of the Society, and shall, in general, perform all the duties incident to the office of Secretary of the Society.

Section 5. Duties and Powers of the Treasurer: The Treasurer shall keep full and accurate accounts of the books of the Society and shall deposit all monies and the valuable properties and effects in the name of and to the credit of the Society in such depository or depositories as may be designated by the Board of Directors. The Treasurer shall disperse funds as may be ordered by the Board, getting proper receipts for such disbursements; and shall render to the Board of Directors whenever required by it, an accounting of all transactions as Treasurer. During each



annual meeting, the Treasurer shall give a report on the annual financial condition of the Society. The Treasurer shall, in general, perform all the duties incident to the office of Treasurer of the Society.

Section 6. Duties and Powers of the Editor: The Editor shall be a member of the Board of Directors and Chair of the Publication and Editorial Committee and be responsible for editing and publishing such publications as directed by the Board of Directors and passed by the majority of the voting membership at a called meeting.

Section 7. Duties and Powers of the Historian: The Historian shall maintain and be responsible for keeping a complete and accurate history of the activities of the Society from year to year.

Section 8. Vacancies in Office: Any vacancy in the office of President-Elect, Secretary, Treasurer, Editor, or Historian, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors. Should an office be filled by vote of the Board of Directors, the person so elected shall not become the officer upon the next annual meeting unless elected as such by the Society according to the procedures set forth for the election of officers of the Society in Article 8, Section 1, of this Constitution.

#### Article 9. Board of Directors

Section 1. Makeup and Responsibilities: The Board of Directors shall consist of the immediate past-President, the President, President-Elect, Secretary, Treasurer, Editor, and Historian of the Society and two members-at-large. The members-at-large shall be elected at the Annual Meeting of the Society and shall serve a term of one year. Any three (3) Directors shall constitute a quorum for the transaction of business. All properties, property rights, objects and purposes of the Society shall be managed, promoted, and regulated generally by the Board of Directors.

Section 2. Installation and Term of Office: The members of the Board of Directors shall be installed after their election as officers of the Society as set forth in Article 8, Section 1, of this Constitution, at the annual meeting of the Society, or at any adjourned meeting, or at any special meeting called for that purpose. All installed Directors shall serve for a term corresponding to that of the office in the Society to which each was elected by the members and thereafter until their successors are elected, accept office, and are installed.

Section 3. Annual Meetings: The Board of Directors shall meet immediately after the adjournment of the annual meeting of the members for the transaction of such business as may come before the Board. No notice of such meeting shall be required, and should a majority of the newly-elected Directors fail to be present, those present may adjourn, without further notice to a specified future time.

Section 4. Other Meetings: The Board of Directors shall not be required by this Constitution to hold regular meetings but may, by resolution or otherwise, establish such order of meetings as it

deems desirable. Special meetings of the Board shall be held at any time at such places as may be specified in the notice thereof, whenever called by the President or any two (2) or more Directors.

Section 5. Notice: Notice of all meetings of the Board of Directors, other than the annual meeting, starting time, place, and agenda for which the meeting was called, shall be given to each Director by the President or Directors calling the meeting not less than three (3) days prior to the meeting.

Section 6. Vacancies in Board of Directors: Any vacancy in the office of any Director, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors.

#### Article 10. Miscellaneous Provisions

Section 1. All checks and drafts shall be signed in such manner as the Board of Directors may from time to time determine.

Section 2. At all duly constituted meetings of the Society or Board of Directors of the Society, 10% of the eligible members, or 3 Directors, respectively, present shall constitute a quorum for the transaction of any business presented at such meetings.

Section 3. All notices required to be given by this Constitution relative to any regular or special meeting of the Society or the Board of Directors may be waived by the Directors or members entitled to such notice, either before or on the date of the meeting and shall be deemed equivalent thereto. Attendance at any meeting of the Society or the Board of Directors shall be deemed a waiver of notice thereof.

Section 4. General Prohibitions: Notwithstanding any provision of this Constitution and By-Laws which might be susceptible to a contrary construction. A. No part of the activities of the Society shall consist of carrying on propaganda, or otherwise attempting to influence legislation. B. This Society shall not participate in, or intervene in, (including the publishing or distribution of statements), any political campaign on behalf of a candidate for public office.

#### Article 11. Amendments

Section 1. This Constitution may be altered or amended or By-Laws adopted by a majority vote of the quorum present at any annual or special meeting of the Society membership, provided that notice of such proposed amendment or By-Laws shall have been given to the membership prior to the meeting.

## **OPERATING PROCEDURES OF THE TENNESSEE ENTOMOLOGICAL SOCIETY**

The Tennessee Entomological Society (TES) is an organization formed for the purpose of fostering entomological accomplishment among its members and to promote the welfare of all of the State of Tennessee through the encouragement of: (1) the preparation, reading, and/or publication of papers, (2) association and free discussion among all members, (3) the dissemination of entomological information to the general public, and (4) cooperative efforts in statewide insect surveys. All necessary permanent records are maintained by person or persons designated by the Board of Directors and the President of the Organization.

### Changes in Operating Procedures

The Constitution or By-laws may be altered or amended by a majority vote of the quorum present at any annual or special meeting of the Society membership, provided that notice of such proposed amendment or By-laws shall have been given to the membership prior to the meeting; the operating procedures of TES should be more flexible. The Constitution and Operating Procedures Committee is charged with the responsibility of studying these procedures each year to recommend possible improvements. Proposed changes in procedures are recommended to the Board of Directors for final action.

### Registration and Dues

Registration and dues shall be set by majority vote of the Board of Directors. Dues for voting members will be collected by the membership committee at the time of the annual meeting.

### The Board of Directors

The Board of Directors shall:

1. Consist of the immediate past-President, the President, President-Elect, Secretary, Treasurer, Editor, and Historian of the Society and two members-at-large.
2. Be responsible for management of the TES and conduct the affairs of the organization.
3. Conduct such business of the organization as is not delegated to the officers or committees and receive from the officers and committees reports and recommendations requiring specific board action or requiring recommendation for action by the membership.
4. Be responsible for changes in the manual of operating procedures after study and recommendation by the Constitution and Operating Procedures Committee.

5. Be responsible for transacting any official business.
6. Be responsible for assembling the board meetings.
7. Nominate honorary members to be voted on by membership.

### President

The President shall:

1. Serve as Chairman of the Board of Directors, prepare an agenda for meetings of the Board of Directors and preside at such meetings.
2. Be responsible for determining that the decisions of the Board of Directors are correctly enforced within the framework of the organization's Constitution and By-laws.
3. Select chairman of committees at annual meeting and appoint committee members.
4. Serve as ex-officio member of all committees, maintain close liaison with the chairman of the committees, and encourage and assist them with development of program beneficial to the organization.
5. Work with the chairman of the program and local arrangements committees in planning the programs for annual meetings.
6. Preside at the general or introductory session of the annual meeting.
7. Advise all officers and board members on significant activities of the organization and solicit their suggestions.
8. Serve as the official representative for TES, when appropriate.

### President-Elect

The President-Elect shall:

1. Perform the duties of the President if he cannot serve.
2. Serve as chairman of the program committee, and select the membership of that committee with the President and Board of Directors' approval.
3. Work with the Local Arrangements Chairman in the planning of all details of the annual meeting.

4. Prepare and mail announcements of the annual meeting. Assist with the printing of programs and mailing of programs.
5. Prepare and have the program of the annual meeting in print.
6. Be responsible for reminding speakers at each annual meeting to prepare papers before the meeting according to prescribed standards of the organization and to have these papers at the time of the presentation.

#### Secretary

The Secretary shall:

1. Have charge of the records and seal of the TES.
2. Take the minutes of all official business meetings of the association. Supply a copy of these minutes to the membership, Board of Directors and committee chairmen as necessary.
3. Consult with the President and inform all officers and board members of occurrences of any official meetings of the Board of Directors.
4. Maintain current lists of members and provide these along with the minutes of the annual business meeting to those persons with official need to know.
5. Make any mailing to the membership as needed or designated by the President or Board of Directors. Maintain a supply of the organizational supplies and letterhead paper for use by the officers.
6. Maintain a supply of operating procedures and provide copies to officers and board members and committee chairmen.
7. Serve as a member of the membership committee.

#### Editor

The Editor shall:

1. Chair the Publication and Editorial Committee.
2. Perform or be responsible for all editorial duties of the organization including the newsletter and any other publication of the organization.

#### Treasurer

The Treasurer shall:

1. Be responsible for the financial affairs of the TES. This includes depositing all

money received by the TES into appropriate Association accounts, handling the TES's money for maximum income (upon consultation with the Finance Committee), and paying of all expenses and invoices received by the TES.

2. Serve as a member of the Finance Committee.
3. Provide a written financial report to the Board of Directors at least annually, and for the published business meeting minutes. Make an oral financial report as the annual business meeting and at Board of Director meetings as necessary. Provide the necessary information for the Auditing Committee's activities.

#### Immediate Past-President

The Immediate Past-President shall:

1. Serve as a member of the Board of Directors during the year following his term of Presidency.

#### Committees

All committees and members of committees are selected by the President (or President-Elect). Each committee shall attempt to complete his/her assigned duties during the term of their appointment. The chairman of each committee shall solicit the assistance of his/her members as necessary. The standing committees are as follows:

#### Program Committee

The Program Committee shall:

1. Plan the general program format to fit the annual meeting time established by the general membership.
2. Contact invitational speakers and make arrangements for an honorarium, if appropriate.
3. Request papers from the general membership and establish a deadline for submittal of titles.
4. Prepare a program outline for printing.
5. Arrange to have chairpersons for each session.
6. Compile abstracts from program speakers for the proceedings of the program.

### Local Arrangements Committee

The Local Arrangements Committee shall:

1. Be responsible for all physical arrangements for the Annual Meeting, working cooperatively with the Officers.
2. Reserve meeting rooms for estimated attendance at the Annual Meeting.
3. Specific Responsibilities will include:
  - a. Arranging for visual and audio equipment, including projectors.
  - b. Liaison with Treasurer regarding registration help, convention typewriters, etc.
  - c. Signs for sessions and activities; coordinate with Program Chairman.
  - d. Helping arrange transportation or lodging of guest speakers if needed; coordinate with Program Chairman.
  - e. Preparing a report of activities for inclusion in the minutes of the business meeting.
  - f. Approving all expenses incurred in conjunction with the Annual Meeting and forwarding invoices to the Treasurer for payment.
4. In addition to the above, be responsible for special functions carried out in conjunction with the Annual Meeting. This may include such special activities as coordinating exhibits at the Annual Meeting, as well as door prizes, with representatives of other organizations joining in this meeting, if desired. If necessary, the Local Arrangements Committee will be appointed with a sufficient number of members that these functions may be designated as the responsibilities of sub-committees of the overall committee.
5. Insure that sufficient facilities are available for morning and afternoon breaks.
6. A sponsored or dutch banquet and/or mixer could also be in order. Arrangements for banquet facilities, an after-dinner speaker and door prizes may be desired.

### Membership Committee

The Membership Committee shall:

1. Encourage any interested person in Entomology to join our Society.

2. Send information about the Society to heads of Biology and Zoology Departments at all colleges and universities in the state, enclosing a few applications.
3. Encourage interested people of Pest Control organizations and other agricultural businesses to join the Society.
4. The Secretary shall send at least two blank membership applications to each member asking them to give to good prospects.
5. Each committee member should make a conscientious effort to enroll as many new members during the year as possible.
6. When notices of annual meetings are sent to major newspapers, television, and radio stations, an invitation to interested people could be given at that time.
7. The Chairman should coordinate this committee's efforts with the publicity and other committees when appropriate.
8. Collect dues at the annual meeting.

#### Auditing Committee

The Auditing Committee shall:

1. Review and certify the accuracy of the financial records and books of the Treasurer prior to the general business session of each Annual Meeting.
2. Conduct special audits as may be directed by the President or the Board of Directors.
3. Report any mistakes or misuses found by the committee to the President for appropriate action prior to the general business session.
4. Prepare a report of the committee's findings, with recommendations, for presentation at the general business session.

#### Nominating Committee

The Nominating Committee shall:

1. Present a slate of nominees from the active membership of the TES which will include a nominee for President-elect, and two nominees for members-at-large on the Board of Directors every year. The Secretary, Editor and Treasurer hold office for three years, and shall be eligible for re-election. In each case, it is suggested that the Nominating Committee present more than one nominee for each position.



2. Secure the prior approval of all nominees before their names are put before the membership.
3. Submit a written report to the Board of Directors consisting of current committee actions and suggestions for improvement.

### Awards Committee

The Awards Committees shall:

1. Consist of 5-6 TES members including a Chair, who are selected following the business meeting of the annual meeting.
2. Obtain name(s) of state 4-H winner (level II), the entomology winner of the Mid-South Fair (Tennessee resident), or other outstanding young entomologist(s) and select the Howard Bruer Award recipient.<sup>1/</sup>
3. Arrange to have a plaque made honoring the Howard Bruer Award recipient (contact TES treasurer) and deliver the plaque and news release information to the recipient's county agent for presentation/publicity at a later date.<sup>2/</sup>
4. Obtain commitments from 3-5 TES members to serve as judges of the Student Paper Competition at the upcoming annual meeting (It is preferable that none of the judges have students in the competition).
5. Contact the TES Treasurer about preparing a \$150.00 and \$75.00 check to be given to the Student Paper Competition 1st and 2nd place winners during the business meeting of the annual meeting.
6. Have Student Paper Competition Evaluation Forms (with student names and presentation titles) ready for the judges the morning before the competition and assist in determining the winner following the competition.
7. Arrange to have a plaque made honoring the outgoing TES President (contact the TES Treasurer) and present it to him/her when asked by the new President during the business meeting of the annual meeting.<sup>2/</sup>
8. Determine if it is appropriate to award the Richard E. Caron Outstanding Entomologist Award to a TES member at the upcoming annual meeting and submit for review by the Board of Directors. This award will be given periodically to individuals who have distinguished themselves by making outstanding contributions to entomology in Tennessee during their career. If a recipient is chosen, arrangements should be made to have a plaque made (contact the TES Treasurer) to be presented at the business meeting.<sup>2/</sup>

<sup>1/</sup>Contact Award Committee Chair at least one month prior to the annual meeting.

- <sup>2/</sup> Contact Award Committee Chair and President about having plaques made at least one month before the annual meeting.
9. Have a committee meeting immediately following the second paper session at the annual meeting.

#### Prediction, Evaluation Committee

The Prediction and Evaluation Committee shall:

1. List major agricultural commodities in Tennessee (Plant & Animal)
  - a. Approximate percent commodity loss due to various insect pests.
  - b. Approximate monetary loss due to each pest on various crops.
  - c. Approximate cost of control for each pest.
2. List insects which face a serious threat and crops which may be affected.
3. Major household, structural, and nuisance insects.
  - a. List major insects.
  - b. Approximate amount of money spent each year in control.
  - c. Approximate damage and loss from pest.

#### Constitution and Operating Procedures Committee

The Constitution and Operating Procedures Committee shall:

1. Annually review the Constitution and Operating Procedures and develop recommendations for improvements or needed changes and submit these to the Board of Directors for study and approval.
2. The Chairman of the Constitution Committee shall prepare adoption of amendments at any annual or special meeting.
3. The Chairman of the Constitution Committee shall coordinate with the Secretary in inserting such amendments into the notice and proceedings of the meeting.

### Publication and Editorial Committee

The publication and Editorial Committee shall:

1. Determine and make recommendations to the Society of the type of publication suitable to the Society's needs and when such a publication should be initiated.
2. Set up guidelines and standards for such a publication, and investigate possible mechanisms for implementation upon decision of the organization.
3. Be responsible for soliciting and gathering of articles for publication.
4. Act as an editorial committee in screening such articles to be published.
5. The chairman will be responsible for the coordination of this committee's responsibilities with the Board, Secretary-Treasurer, and other committees as necessary.

### Publicity Committee

The Publicity Committee shall:

1. Be responsible for developing and implementing an effective public relations program for the Tennessee Entomological Society.
2. Prepare general news releases on the society's activities and accomplishments and publicize the meetings. Specifically, these things should be done:
  - a. Prepare and release general news release as soon as Program Committee has planned a theme or area of interest for either meeting. Also, include location of meeting and time. This should begin by mid-summer and meeting dates should be sent to magazines and trade publications such as Delta Farm Press, Southeast Farm Press, Tennessee Market Bulletin, Ag Pesticide Notes, newspapers, etc.
  - b. A follow-up news release should be issued about one month before each meeting. Location of meeting, date, time, and outstanding invitational speakers could be mentioned.
  - c. Prepare follow-up news release after the meeting for use by news media.
  - d. Send notice to Entomological Society of America and other state societies.
3. Maintain close liaison with the Program Committee in obtaining early copies of the program of both meetings for publicity purposes.
4. Arrange for radio, television, and press coverage of society's meetings by contacting

area radio and TV stations just prior to the meetings and by calling the news rooms of local newspapers on the first day of the meetings.

5. Arrange for group photos of outgoing and in-coming officers and directors of the Association at the Annual meeting.
6. Prepare a report of the year's activities for the committee for presentation at the annual business meeting.
7. Post notices on the bulletin boards of the Entomology, Biology, and Zoology Departments in the colleges and universities across the state.
8. Direct mail to members.

Dates ('00), ('01) refer to last meeting attendance or last dues payment.

H = Honorary Member

# **TENNESSEE ENTOMOLOGICAL SOCIETY**

## **MEMBERSHIP LIST**

**OCTOBER 2016**

***THE MEMBERSHIP LIST  
IS NOT AVAILABLE.***

**For information on members,  
please contact the Secretary  
of the Tennessee Entomological Society.**

**Application for Membership in the  
TENNESSEE ENTOMOLOGICAL SOCIETY**

**I (we), herewith, submit this application for membership in the Tennessee Entomological Society.**

PLEASE CHECK HERE IF YOU ARE A NEW MEMBER \_\_\_\_\_

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ZIP \_\_\_\_\_

PHONE: \_\_\_\_\_

FAX: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

AFFILIATION: \_\_\_\_\_

REGISTRATION: \$30.00 \_\_\_\_\_

STUDENT DUES: \$5.00 \_\_\_\_\_

REGULAR DUES: \$10.00 \_\_\_\_\_

DONATION: \_\_\_\_\_

CORPORATE DUES: \$50.00 \_\_\_\_\_

SUSTAINING DUES: \$50.00 \_\_\_\_\_

TOTAL: \$ \_\_\_\_\_

Received by: \_\_\_\_\_

(Treasurer)

**Please Remit to:**

**Steve Powell  
Tennessee Department of Agriculture  
Regulatory Services  
Plant Certification  
Nashville, TN  
Steve.Powell@tn.gov**

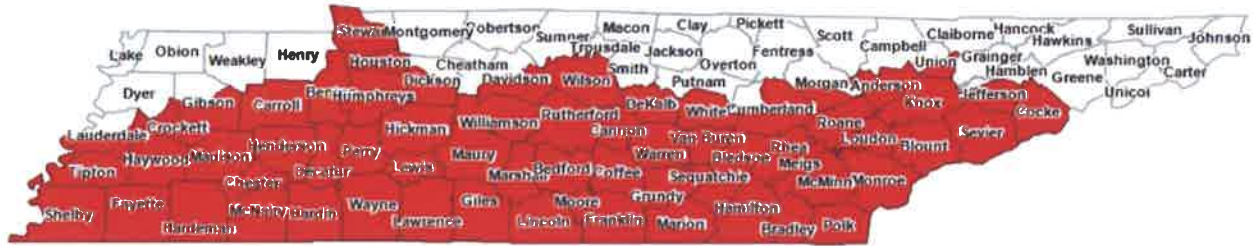
**All checks should be made payable to the Tennessee Entomological Society.**

## **TES Predictions and Evaluations 2017 – Steve Powell**

**In 2017, no new counties were found to be infested with Emerald Ash Borer (EAB) in Tennessee. There are 59 counties in Tennessee quarantined for EAB with 45 county records. In 2017, there was a large decrease (from 126 to 47) in the number of Gypsy Moths captured in the trapping program compared to 2016 (122 TDA, 4 Federal Lands – Total of 126 in 2016); (46 TDA, 1 Federal Lands – Total of 47 in 2017). By county, the gypsy moth catches were as follows: Bradley (1), Cocke (2), Davidson (7), Greene (1), Hamilton (1), Johnson (21), Loudon (1), Montgomery (1), Sevier (1), Shelby (1), Sullivan (1), Unicoi (6), Van Buren (1), and Wilson (2). There are no areas in Tennessee considered to be infested with Gypsy Moth at this time. There may be a few more gypsy moths to be reported as final checks of removed traps have not yet been made in a few East Tennessee counties. Some changes were made to the Imported Fire Ant Quarantine in Tennessee on May 1, 2017: Cocke County was changed from a partially quarantined county to a fully quarantined county; Dekalb County was changed from a non-quarantined county to a fully quarantined county; Union County was changed from a non-quarantined county to a partially quarantined county; Wilson County was changed from a partially quarantined county to a fully quarantined county. Claiborne County was a new county record for Imported Fire Ant in 2017. The kudzu bug is continuing to spread throughout Tennessee (refer to [www.kudzubug.org](http://www.kudzubug.org) for additional information and a current distribution map). There have been no new county records to date for Walnut Twig Beetle in 2017. The Walnut Twig Beetle has been found in Tennessee in the following counties during 2017: Blount (TDA), Claiborne (TDA), Polk (UT), and Sequatchie (TDA). Information about Brown Marmorated Stink Bug can be found at <http://www.stopbmsb.org/>.**

**Dr. Jason Oliver (TSU) reports that fire ant densities are increasing in the southern part of Warren County and that adult Japanese Beetle damage was very high this year in the nursery counties.**

# 2017 Imported Fire Ant Quarantine



MapWinGIS 4.8

**IMPORTED FIRE ANT AREAS IN TENNESSEE  
QUARANTINED AREAS FOR YEAR 2017 (effective 5/01/2017)**

NOTE: Italics indicate a new county or a change from year 2015

1. **Anderson County** – The entire county.
2. **Bedford County** - The entire county.
3. **Benton County** - The entire county.
4. **Bledsoe County** - The entire county.
5. **Blount County** - The entire county.
6. **Bradley County** - The entire county.
7. **Cannon County** – The entire county.
8. **Carroll County** - The entire county.
9. **Chester County** - The entire county.
10. **Cocke County** - *The entire county.*
11. **Coffee County** - The entire county.
12. **Crockett County** – The entire county.
13. **Cumberland County** - That portion of the county lying southeast of a line beginning at the White/Cumberland County line on United States Highway 70 and then continuing east along United States Highway 70 until reaching United States Highway 127 and then continuing north along United States Highway 127 until reaching the Cumberland/Fentress County line.
14. **Davidson County** - That portion of the county lying south of the Cumberland River.
15. **Decatur County** - The entire county.
16. **Dekalb County** - *The entire county.*
17. **Dickson County** - That portion of the county lying south of a line beginning at the Houston/Dickson County line on Tennessee Highway 49 and then continuing southeast along Tennessee Highway 49 until reaching Tennessee Highway 48 and then continuing south along Tennessee Highway 48 until reaching Tennessee Highway 47 and then continuing southeast along Tennessee Highway 47 until reaching United States Highway 70 and then continuing east along United States Highway 70 until reaching the Dickson/Cheatham County line.
18. **Fayette County** - The entire county.
19. **Franklin County** - The entire county.



20. **Gibson County** – That portion of the county lying southeast of a line beginning at the Dyer/Gibson County line on Tennessee Highway 104 and then continuing east on Tennessee Highway 104 until reaching United States Highway 45W and then continuing north on United States Highway 45W until reaching Tennessee Highway 54 and then continuing northeast along Tennessee Highway 54 until reaching Tennessee Highway 105 and then continuing east along Tennessee Highway 105 until reaching the Gibson/Carroll County line.
21. **Giles County** - The entire county.
22. **Grundy County** - The entire county.
23. **Hamilton County** - The entire county.
24. **Hardeman County** - The entire county.
25. **Hardin County** - The entire county.
26. **Haywood County** - The entire county.
27. **Henderson County** - The entire county.
28. **Hickman County** - The entire county.
29. **Houston County** – The entire county.
30. **Humphreys County** – The entire county.
31. **Jefferson County** - That portion of the county lying southeast of United States Highway 11E.
32. **Knox County** – The entire county.
33. **Lauderdale County** - That portion of the county lying southeast of a line beginning at the Mississippi County, Arkansas/Lauderdale County, Tennessee line at Latitude 35 Degrees 45 Minutes and then continuing east along Latitude 35 Degrees 45 Minutes until reaching Tennessee Highway 19 and then continuing east along Tennessee Highway 19 until reaching United States Highway 51 and then continuing northeast along United States Highway 51 until reaching Tennessee Highway 180 and then continuing east along Tennessee Highway 180 until reaching Tennessee Highway 209 and then continuing north along Tennessee Highway 209 until reaching Tennessee Highway 88 and then continuing east along Tennessee Highway 88 until reaching Lawrence Road and then continuing north along Lawrence Road until reaching Espy Park Road and then continuing east along Espy Park Road until reaching the Lauderdale/Crockett County line.
34. **Lawrence County** - The entire county.
35. **Lewis County** - The entire county.
36. **Lincoln County** - The entire county.

37. **Loudon County** - The entire county.
38. **Madison County** - The entire county.
39. **Marion County** - The entire county.
40. **Marshall County** - The entire county.
41. **Maury County** - The entire county.
42. **McMinn County** - The entire county.
43. **McNairy County** - The entire county.
44. **Meigs County** - The entire county.
45. **Monroe County** - The entire county.
46. **Moore County** - The entire county.
47. **Morgan County** - That portion of the county lying south of a line beginning at the Cumberland/Morgan County line on Tennessee Highway 298 and then continuing northeast along Tennessee Highway 298 until reaching Tennessee Highway 62 and then continuing southeast along Tennessee Highway 62 until reaching the Morgan/Roane County line.
48. **Perry County** - The entire county.
49. **Polk County** - The entire county.
50. **Rhea County** - The entire county.
51. **Roane County** - The entire county.
52. **Rutherford County** - The entire county.
53. **Sequatchie County** - The entire county.
54. **Sevier County** - The entire county.
55. **Shelby County** - The entire county.
56. **Stewart County** – That portion of the county lying southwest of a line beginning at the Trigg County, Kentucky/Stewart County, Tennessee border along the Cumberland River and then continuing southeast along the Cumberland River until reaching United States Highway 79 and then continuing east along United States Highway 79 until reaching the Stewart/Montgomery County line.
57. **Tipton County** - The entire county.
58. **Union County** - *That portion of the county lying southeast of a line beginning at the Anderson/Union County line along Tennessee Highway 170 and then continuing northeast along Tennessee Highway 170 until reaching Tennessee Highway 33 and then continuing northeast along Tennessee Highway 33 until reaching the Union/Claiborne County line.*
59. **Van Buren County** - The entire county.
60. **Warren County** - The entire county.

# Pest Alert

## Emerald Ash Borer



Emerald ash borer (*Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae)) is a wood-boring beetle from Asia that was identified in July 2002 as the cause of widespread ash tree (*Fraxinus* spp.) decline and mortality in southeastern Michigan

and adjacent parts of Ontario, Canada. Larval feeding between the bark and sapwood disrupts transport of nutrients and water in a tree, causing dieback of the branches and eventually death of the tree. Tens of millions of ash trees in forest, rural, and urban areas have already been killed, and many more are rapidly declining from this pest.

Emerald ash borer (EAB) infestations have since been confirmed in all or parts of 24 States and the Canadian Provinces of Ontario and Quebec. While most of the detections have occurred in eastern North America, the insect has been found as far west as Colorado. New EAB detections in other areas are likely as surveys continue (see [www.emeraldashborer.info/](http://www.emeraldashborer.info/) for periodic updates). Evidence indicates that EAB is often established in an area for several years before it is detected.

The broad distribution of this pest in the United States and Canada is primarily due to commerce and the inadvertent transport of infested ash firewood, unprocessed logs, nursery stock, and other ash commodities. Federal and State quarantines now regulate the movement of these products from the infested areas to areas not known to have EAB.

### Identification

Adult beetles (Fig. 1) are slender, elongate, and 7.5 to 13.5 mm (0.3 to 0.5 in.) long. They generally have dark, metallic emerald green wing covers and bodies that are bronze, golden, or reddish green. The dorsal side of the abdomen is metallic purplish red and can be seen when the wings are spread (Fig. 2). Males are smaller than females and have fine hairs, which the females lack, on the ventral side of the thorax. The prothorax, the segment behind the head and to which the first pair of legs is attached, is slightly wider than the head and the same width as the wing covers. Adult EAB are generally larger and brighter green than the native North American *Agrilus* species.

Larvae reach a length of 26 to 32 mm (1.0 to 1.3 in.), are white to cream colored, and dorso-ventrally flattened (Fig. 3). The brown head is mostly retracted into the prothorax,



Figure 1. Adult emerald ash borer



Figure 2. Purplish red abdomen on adult beetle.



Figure 3. (Bottom to top) Second, third, and fourth stage larvae.



Figure 4. Gallery of an emerald ash borer larva

and only the mouthparts are visible. The abdomen has 10 segments, and the last segment has a pair of brown, pincer-like appendages.

### Biology

EAB generally has a 1-year life cycle. In the upper Midwest, adult beetles begin emerging in May or early June. Beetle activity peaks between mid June and early July, and continues into August. Adults probably live for about 3 weeks, although some have survived for more than 6 weeks in the laboratory. Beetles generally are most active during the day, particularly when it is warm and sunny, and move to protected locations in bark crevices or cling to foliage during inclement weather.

Adult beetles feed on ash foliage, usually leaving small, irregularly shaped patches along the leaf margins, causing negligible damage to the tree. At least a few days of feeding are needed before beetles mate, and an additional 1 to 2 weeks of feeding may be needed before females begin laying eggs. Females can mate multiple times. Each female probably lays 30 to 60 eggs during an average lifespan, but a long-lived female may lay more than 200 eggs. Eggs are deposited individually in bark crevices or under bark flaps on the trunk or branches, and soon darken to a reddish brown. Eggs hatch in 7 to 10 days.

Newly hatched larvae chew through the bark and into the phloem and cambial region of the tree. Larvae feed on phloem for several weeks, creating serpentine (S-shaped) galleries packed with fine sawdust-like frass. As a larva grows, its gallery becomes progressively wider (Fig. 4), often etching the outer sapwood. The length of the gallery generally ranges from 10 to 50 cm (about 4 to 20 in.). Feeding is usually completed in autumn.

Prepupal larvae overwinter in shallow chambers, roughly 1 cm (0.4 in.) deep, excavated in the outer sapwood or in the bark on thick-barked trees. Pupation begins in late April or May. Newly eclosed adults often remain in the pupal chamber or bark for 1 to 2 weeks before emerging head-first through a D-shaped exit hole that is 3 to 4 mm (0.1 to 0.2 in.) in diameter (Fig. 5).

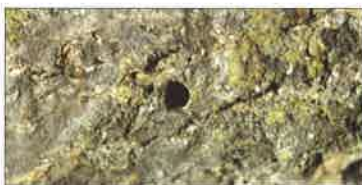


Figure 5. D-shaped hole where an adult beetle emerged.

Two-year development of EAB larvae is typical in newly infested ash trees that are relatively healthy. In these trees, many larvae overwinter as early instars, feed a second summer, overwinter as prepupae, and emerge the following summer. However, in trees stressed by physical injury, high EAB densities, or other problems, many or all larvae may develop in a single year. Whether a 2-year life cycle will occur in warmer southern States is not yet known.

### Distribution and Hosts

EAB is native to Asia and is found in China and Korea. It is also reported in Japan, Mongolia, the Russian Far East, and Taiwan. In China, high populations of EAB occur primarily in *Fraxinus chinensis* and *F. rhynchophylla*, usually when those trees are stressed by drought or injury. Other Asian hosts (*F. mandshurica* var. *japonica*, *Ulmus davidiana* var. *japonica*, *Juglans mandshurica* var. *sieboldiana*, and *Pterocarya rhoifolia*) may be colonized by this or a related species.

In North America EAB has attacked only ash trees. Host preference of EAB or resistance among North American ash species may vary. Green ash (*F. pennsylvanica*) and black ash (*F. nigra*), for example, appear to be highly preferred, while white ash (*F. americana*) and blue ash (*F. quadrangulata*) are less preferred. At this time all species and varieties of native ash in North America appear to be at risk from this pest. Recently EAB was found on white fringetree (*Chionanthus virginicus*); however, its role as a susceptible host or as a secondary host in areas of high EAB densities is not fully understood and continues to be evaluated.

### Signs and Symptoms

It is difficult to detect EAB in newly infested trees because they exhibit few, if any, external symptoms. Jagged holes excavated by woodpeckers feeding on late instar or prepupal larvae may be the first sign that a tree is infested (Fig. 6). D-shaped exit holes left by emerging adult beetles may be seen on branches or the trunk, especially on trees with smooth bark (Fig. 5). Bark may split vertically over larval feeding galleries. When the bark is removed from infested trees, the distinct, frass-filled, serpentine larval galleries that etch the outer sapwood and phloem are readily visible (Fig. 4 and Fig. 7). An elliptical area of discolored sapwood, usually a result of secondary infection by fungal pathogens, sometimes surrounds galleries.

Left to right:

Figure 6. Jagged holes left by woodpeckers feeding on larvae.



Figure 7. Ash tree killed by emerald ash borer. Note the serpentine galleries.



As EAB densities build, foliage wilts, branches die, and the tree canopy becomes increasingly thin. Many trees appear to lose about 30 to 50 percent of the canopy after only a few years of infestation. Trees may die after 3 to 4 years of heavy infestation (Fig. 7). Epicormic shoots may arise on the trunk or branches of the tree (Fig. 8), often at the margin of live and dead tissues. Dense root sprouting sometimes occurs after trees die.



EAB larvae have developed in branches and trunks ranging from 2.5 to 140 cm (1 to 55 in.) in diameter. Although stressed trees are initially more attractive to EAB than healthy trees are, in many areas all or nearly all ash trees greater than 3 cm (1.2 in.) in diameter have been colonized by this invasive beetle.

Figure 8. Epicormic branching on a heavily infested ash tree.

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### Photo credits:

David L. Cappaert and Howard Russell, Michigan State University, [www.forestryimages.org](http://www.forestryimages.org)

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Edward Czerwinski, Ontario Ministry of Natural Resources, [www.forestryimages.org](http://www.forestryimages.org)

### Additional Resources

For the latest information on EAB in your area:

Contact your State Department of Agriculture, State Forester, or Cooperative Extension Office; and visit the following Web sites:

[www.emeraldashborer.info](http://www.emeraldashborer.info)  
[www.hungrypests.com](http://www.hungrypests.com)





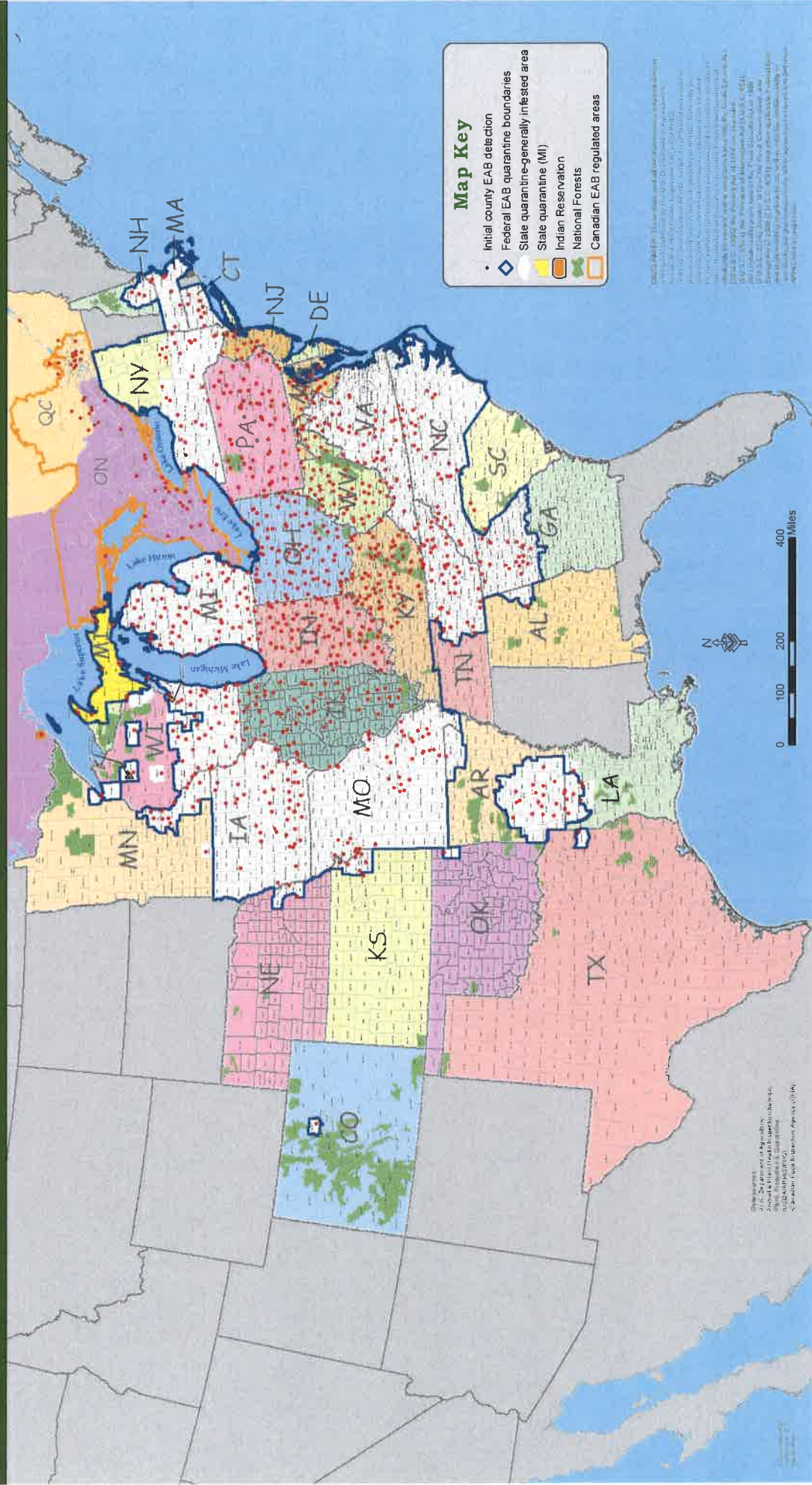


United States  
Department of  
Agriculture

# Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America

September 6, 2017



**Map Key**

- Initial county EAB detection
- ◊ Federal EAB quarantine boundaries
- State quarantine-generally infested area
- State quarantine (MI)
- Indian Reservation
- National Forests
- Canadian EAB regulated areas

Map data provided by the U.S. Geological Survey, National Geospatial Data Agency, and the U.S. Department of Agriculture, Forest Service. The map is for informational purposes only and does not constitute a warranty of any kind. The map is not to be used for any purpose other than that for which it was designed. The map is not to be used for any purpose other than that for which it was designed. The map is not to be used for any purpose other than that for which it was designed.

U.S. Department of Agriculture  
Forest Service  
Forest Health Protection  
Emerald Ash Borer Project  
September 6, 2017

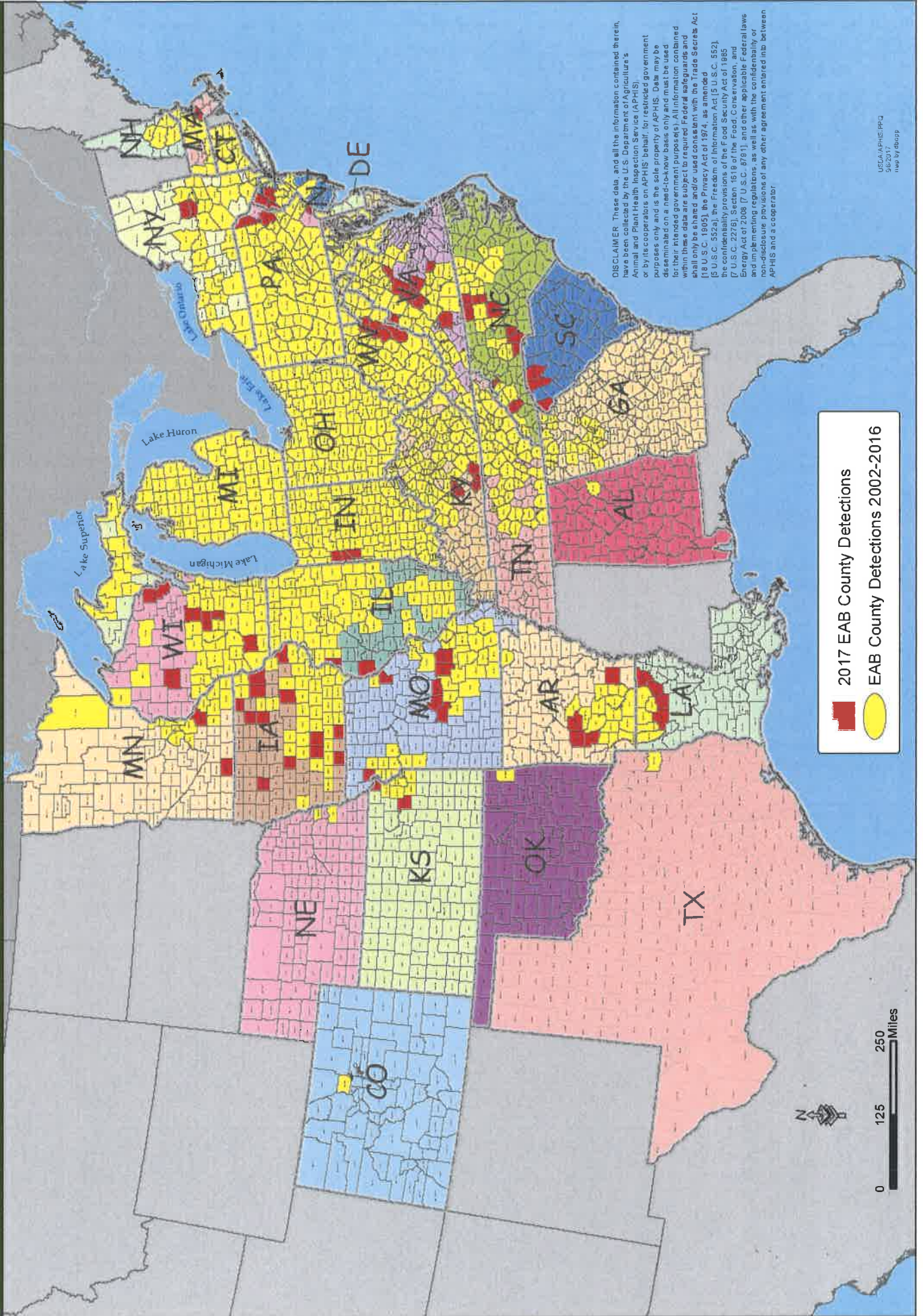




United States  
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# Cooperative Emerald Ash Borer Project EAB County Detections

September 6, 2017



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5/8/2017  
map by danny





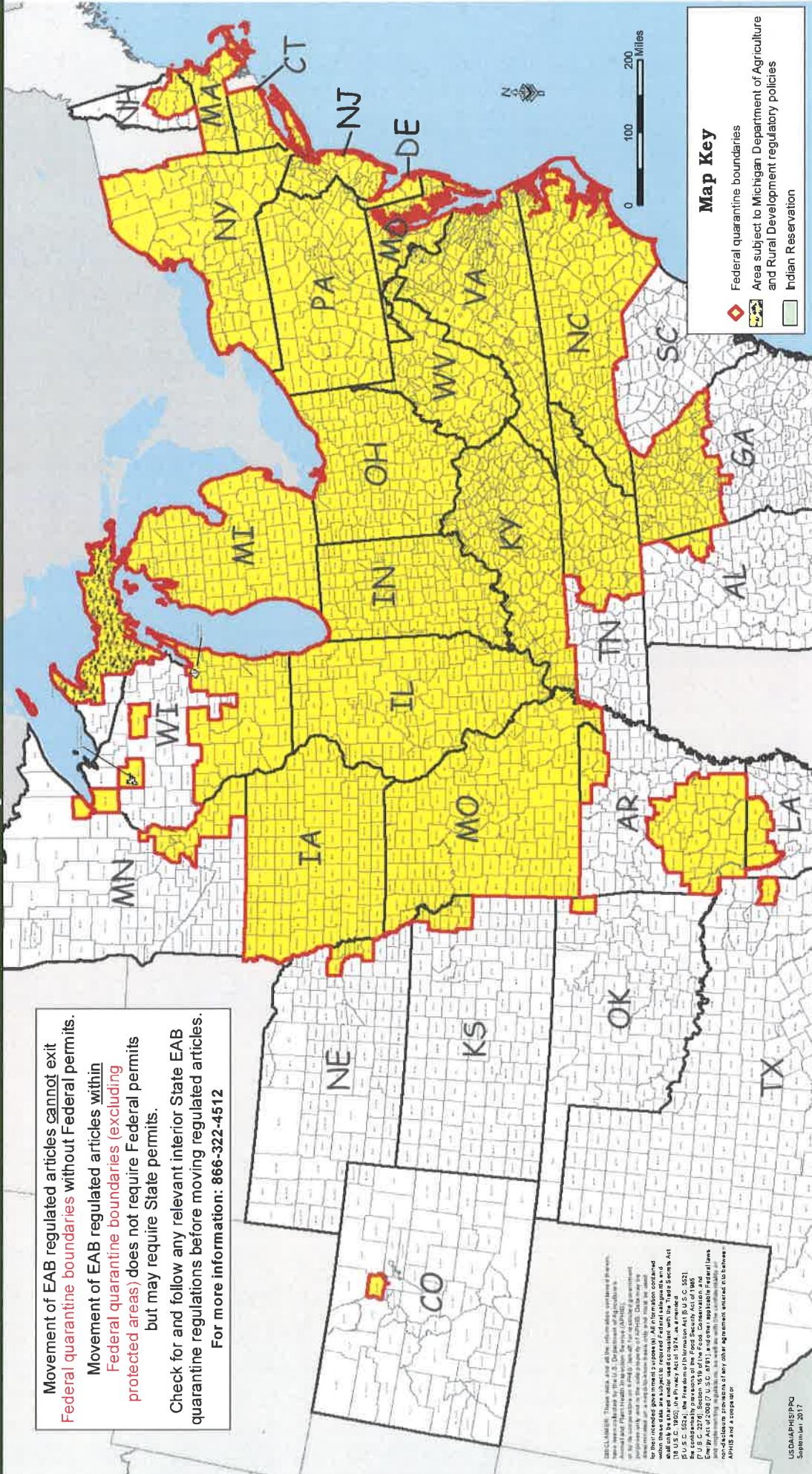
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# Cooperative Emerald Ash Borer Project

Federal EAB Quarantine  
& Authorized Transit

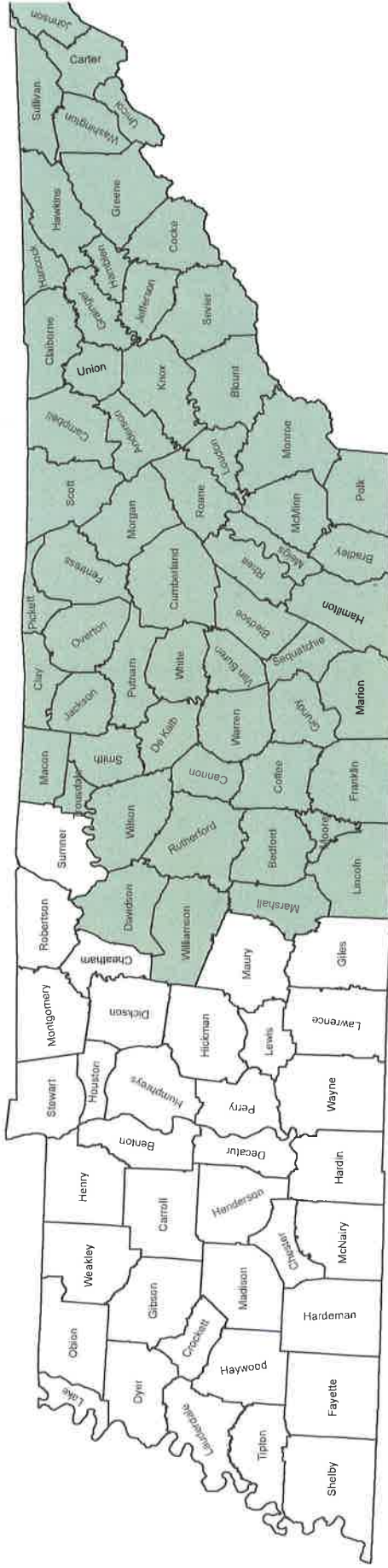
September 6, 2017

**Movement of EAB regulated articles cannot exit Federal quarantine boundaries without Federal permits.**  
 Movement of EAB regulated articles **within** Federal quarantine boundaries (excluding protected areas) does not require Federal permits but may require State permits.  
 Check for and follow any relevant interior State EAB quarantine regulations before moving regulated articles.  
 For more information: 866-322-4512



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# Tennessee Emerald Ash Borer Quarantine



## Emerald Ash Borer Quarantined Areas

In Tennessee, EAB quarantines exist for 59 counties. They include **Anderson, Bedford, Bledsoe, Blount, Bradley, Campbell, Cannon, Carter, Claiborne, Clay, Cocke, Coffee, Cumberland, Davidson, DeKalb, Denton, DeKalb, Fentress, Franklin, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hance, Hawkins, Jackson, Jefferson, Johnson, Knox, Lincoln, Loudon, Macon, Marion, Marshall, McMinn, Meigs, Monroe, Moore, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Rutherford, Scott, Sequatchie, Sevier, Smith, Sullivan, Trousdale, Unicoi, Union, Van Buren, Warren, Washington, White, Williamson and Wilson Counties.**

The following are regulated articles:

- (a) Emerald Ash Borer; firewood of all hardwood (non-coniferous) species; nursery stock, green lumber, and other material living, dead, cut, or fallen, including logs, stumps, roots, branches, mulch and composted and uncomposted chips of the genus *Fraxinus*.
- (b) Any other article, product, or means of conveyance not listed in paragraph (a) of this section may be designated as a regulated article if the Commissioner determines that it presents a risk of spreading Emerald Ash Borer and notifies the person in possession of the article, product, or means of conveyance that it is subject to these regulations.



# Pest Alert

United States  
Department of Agriculture  
Forest Service  
Northeastern Area  
State and Private Forestry  
NA-PR-02-10  
Revised February 2013

## Thousand Cankers Disease

Dieback and mortality of eastern black walnut (*Juglans nigra*) in several Western States have become more common and severe during the last decade. A tiny bark beetle is creating numerous galleries beneath the bark of affected branches and the main stem, resulting in fungal infection and canker formation. The large numbers of cankers associated with dead branches and the stem suggest the disease's name—*thousand cankers disease*.

The principal agents involved in this disease are a newly identified fungus (*Geosmithia morbida*) and the walnut twig beetle (*Pityophthorus juglandis*). Both the fungus and the beetle only occur on walnut species and on a closely related tree called wingnut (*Pterocarya* sp.). Infested trees can die within 3 years of initial symptoms.

Thousand cankers disease has been found in nine Western States (figure 1). Since 2010, the fungus and the beetle have also been found east of the Great Plains. This disease is expected to spread in eastern forests because of the widespread distribution of eastern black walnut, the susceptibility of this tree species to the disease, and the capacity of the fungus and beetle to invade new areas and survive under a wide range of climatic conditions in the West.

### Disease Symptoms

The three major symptoms of this disease are branch mortality, numerous small cankers on branches and the bole, and evidence of tiny bark beetles. The earliest symptom is yellowing foliage that progresses rapidly to brown wilted foliage, then finally branch mortality (figure 2). The fungus causes distinctive circular to oblong cankers in the phloem under the bark, which eventually kill the phloem and cambium (figure 3). The bark surface may have no symptoms, or a dark amber to black stain or cracking of the bark may occur directly above a canker. Numerous tiny bark beetle entrance and exit holes are visible on dead and dying branches (figure 4), and bark beetle galleries are often found within the cankers. In the final stages of disease, even the main stem has beetle attacks and cankers.

### *Geosmithia morbida*

Members of the genus *Geosmithia* have not been considered to be important plant pathogens, but *Geosmithia morbida* appears to be much more virulent than related species. Aside from causing cankers, the fungus is inconspicuous. Currently, either culturing on an agar

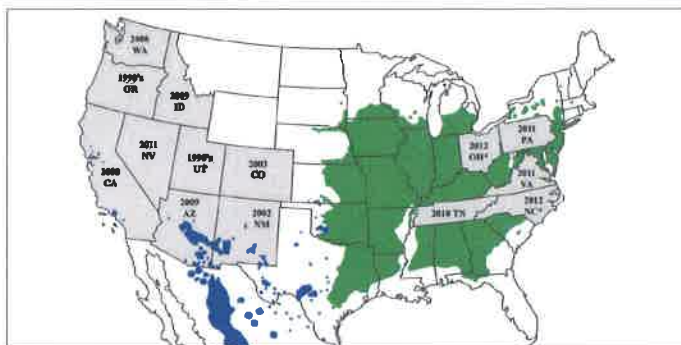


Figure 1. Thousand cankers disease occurs in nine Western and five Eastern States (shaded gray); the year in which the disease was confirmed is noted. Since 2010, TCD has been confirmed in PA, TN, and VA, whereas the beetle alone and the pathogen alone have been found in OH and NC, respectively (denoted with asterisks). The map shows the native ranges of eastern black walnut (dark green) and four western black walnut species (blue). Eastern black walnut is widely planted in the West, but this map does not depict these western locations.



Figure 2. Wilting black walnut in the last stages of thousand cankers disease.



Figure 3. Small branch cankers caused by *Geosmithia morbida*.

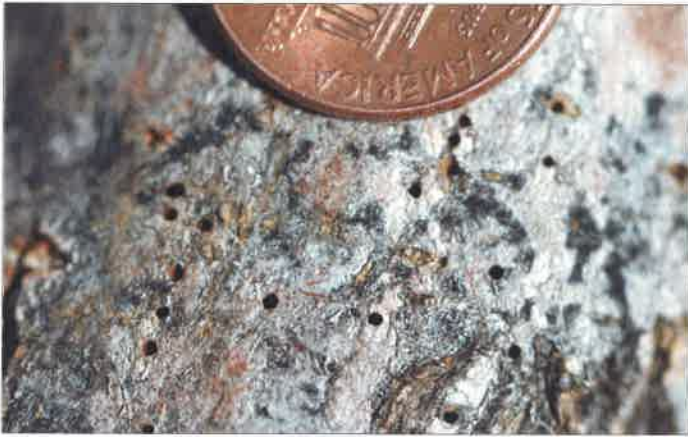


Figure 4. Exit holes made by adult walnut twig beetles.

medium or DNA analysis is required to confirm its identity. Adult bark beetles carry fungal spores that are then introduced into the phloem when they construct galleries. Small cankers develop around the galleries; these cankers may enlarge and coalesce to completely girdle the branch or stem. Trees die as a result of these canker infections that form at each of the thousands of beetle attack sites.

## Walnut Twig Beetle

The walnut twig beetle is native to Arizona, California, and New Mexico. It has invaded Colorado, Idaho, Nevada, Oregon, Utah, and Washington where eastern black walnut has been widely planted. Since 2010, established populations have also been detected in Pennsylvania, Tennessee, and Virginia; North Carolina and Ohio also likely harbor populations, pending confirmation. Historically, the beetle has not caused significant branch mortality by itself. Through its association with this newly identified fungus, it appears to have greatly increased in abundance and distribution. Adult beetles are very small (1.5 to 2.0 mm long or about  $\frac{1}{16}$  in) and are reddish brown in color (figure 5). This species is a typical-looking bark beetle that is characterized by its very small size and four to six concentric ridges on the upper surface of the pronotum (the shield-like cover behind and over the head) (figure 5A). Like most bark beetles, the larvae are white, C-shaped, and found in the phloem. For this species, the egg galleries created by the adults are horizontal (across the grain) and the larval galleries tend to be vertical (along the grain) (figure 6).

## Survey and Samples

Visually inspecting walnut trees for dieback is currently the best survey tool for detecting the disease in the Eastern United States. A pheromone-baited trap placed near (but never on) walnut trees is also available for detecting the beetle (<http://www.ipm.ucdavis.edu/PMG/menu.thousandcankers.html>). Look for declining trees with the

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Figure 5. Walnut twig beetle: top view (A) and side view (B).



Figure 6. Walnut twig beetle galleries under the bark of a large branch.

symptoms described above. If you suspect that your walnut trees have thousand cankers disease, collect a branch 2 to 4 inches in diameter and 6 to 12 inches long that has visible symptoms. Please submit branch samples to your State's plant diagnostic clinic. Each State has a clinic that is part of the National Plant Diagnostic Network (NPDN). They can be found at the NPDN Web site ([www.npdn.org](http://www.npdn.org)). You may also contact your State Department of Agriculture, State Forester, or Cooperative Extension Office for assistance.

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### Photographs:

Figure 1: Andrew Graves

Figure 2: Manfred Mielke, U.S. Forest Service

Figures 3, 4, 6: Whitney Cranshaw, Colorado State University, [www.forestryimages.org](http://www.forestryimages.org)

Figure 5: Steve Valley, Oregon Department of Agriculture

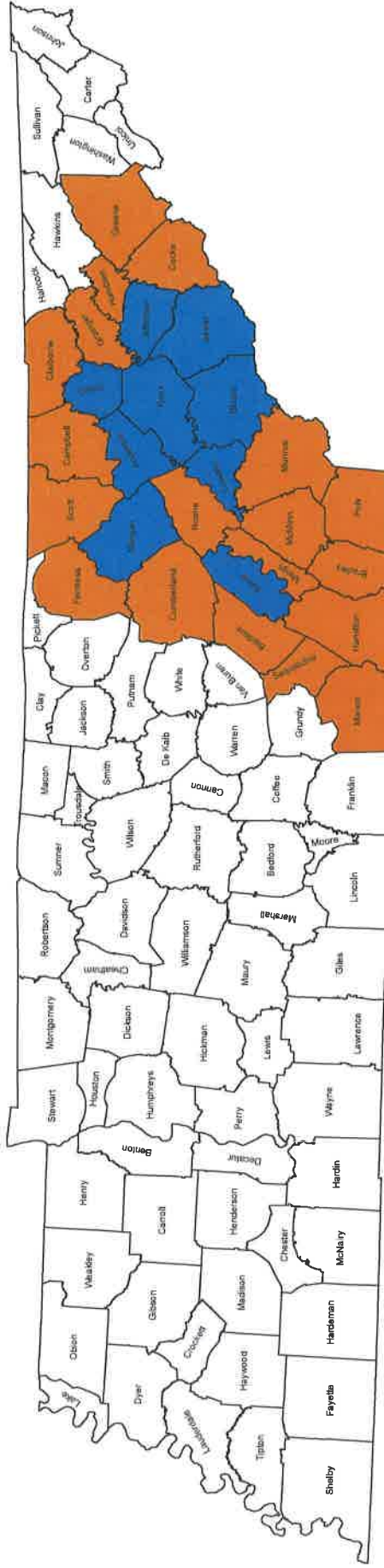


### Published by:

USDA Forest Service  
Northeastern Area  
State and Private Forestry  
11 Campus Boulevard  
Newtown Square, PA 19073  
[www.na.fs.fed.us](http://www.na.fs.fed.us)



# Tennessee Thousand Cankers Disease Quarantine and Buffer Regulated Areas



## Thousand Cankers Disease Quarantined Areas

**Anderson, Blount, Jefferson, Knox, Loudon, Morgan, Rhea, Sevier and Union counties.**

Citizens in these counties cannot move walnut tree products and hardwood firewood outside the quarantined counties.

## Thousand Cankers Disease Buffer Regulated Areas

**Bledsoe, Bradley, Campbell, Claiborne, Cocke, Cumberland, Fentress, Grainger, Greene, Hamblen, Hamilton, Marion, McMinn, Meigs, Monroe, Polk, Roane, Scott and Sequatchie counties.**

Citizens in buffer counties/areas can move walnut tree products and hardwood firewood within buffer counties, but not outside. Product can also be moved into a quarantine county, but not taken back out.





United States  
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# European Gypsy Moth (*Lymantria dispar*) North America quarantine

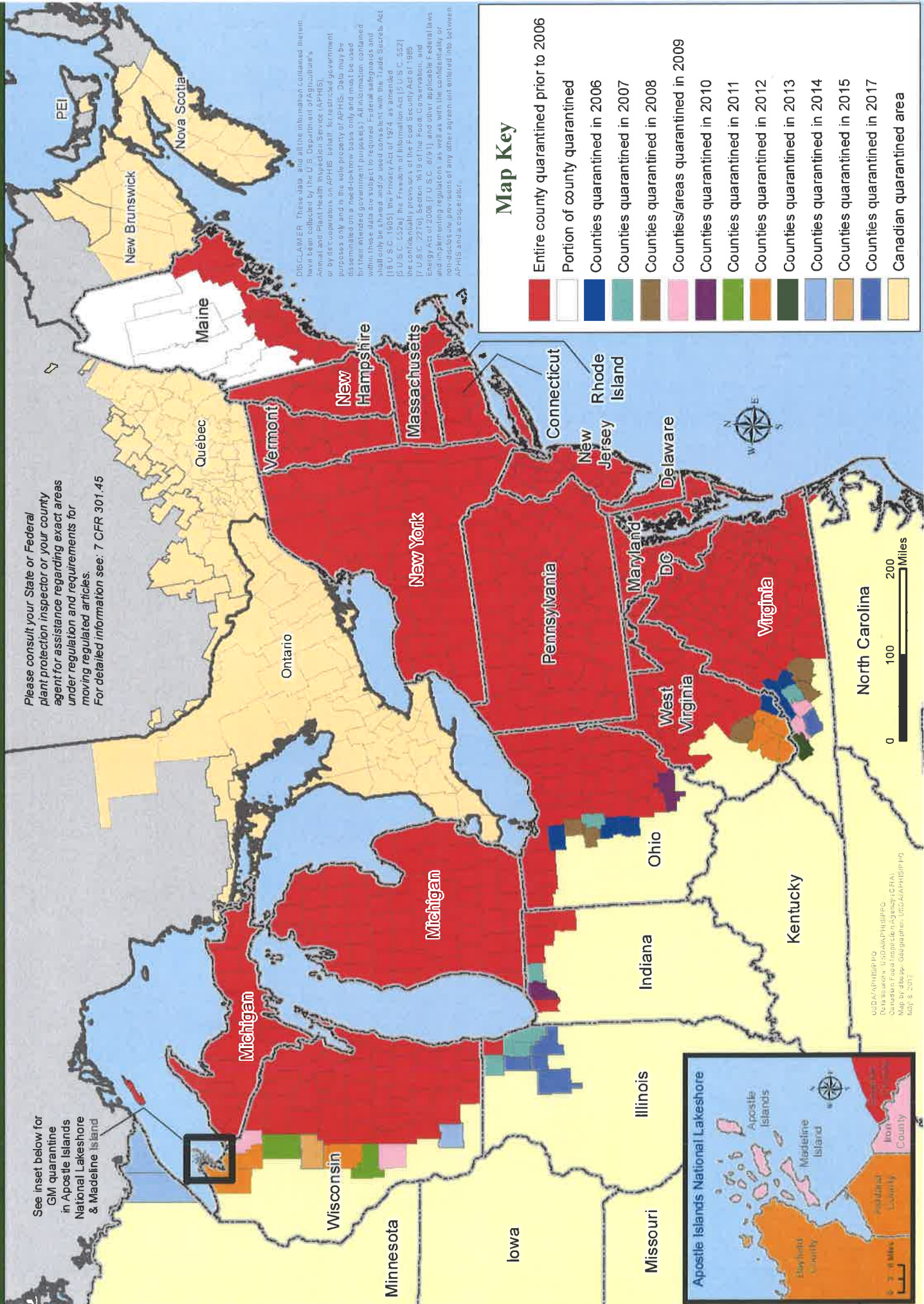
See inset below for  
GMI quarantine  
in Apostle Islands  
National Lakeshore  
& Madeline Island

Please consult your State or Federal  
plant protection inspector or your county  
agent for assistance regarding exact areas  
under regulation and requirements for  
moving regulated articles.  
For detailed information see: 7 CFR 301.45

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## Map Key

- Entire county quarantined prior to 2006
- Portion of county quarantined
- Counties quarantined in 2006
- Counties quarantined in 2007
- Counties quarantined in 2008
- Counties/areas quarantined in 2009
- Counties quarantined in 2010
- Counties quarantined in 2011
- Counties quarantined in 2012
- Counties quarantined in 2013
- Counties quarantined in 2014
- Counties quarantined in 2015
- Counties quarantined in 2017
- Canadian quarantined area

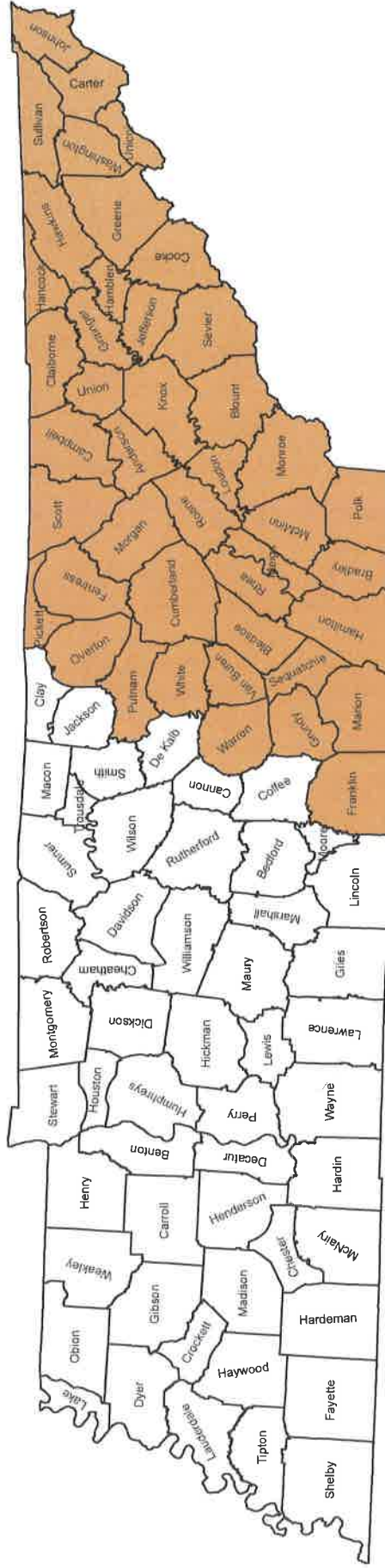


USDA/APHIS/PPD  
Data provided by USGA/PHIS/PPD  
Quarantine Field Inspector/Agent, CFAI  
Map by abrup, Gisa/gaphisr, USGA/APHIS/PPD  
July 8, 2017





# Tennessee Counties Infested with Hemlock Woolly Adelgid



**Hemlock Woolly Adelgid infested counties**

In Tennessee, 43 counties are known to be infested with HWA. They include **Anderson, Bledsoe, Blount, Bradley, Campbell, Carter, Claiborne, Cocke, Cumberland, Fentress, Franklin, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hawkins, Jefferson, Johnson, Knox, Loudon, Marion, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Sullivan, Union, Van Buren, Warren Washington and White.**

Six states with HWA quarantines are Maine, Michigan, New Hampshire, Ohio, Vermont, Wisconsin and Canada. Entry requirements for hemlocks from infested or adjacent areas vary from state to state. A State Phytosanitary Certificate is required. The state summaries can be found at <http://na.fs.fed.us/fnp/hwa/quarantines/quarantines.shtml> or at the National Plant Board (NPB) laws and summaries site <http://nationalplantboard.org/laws/>.

# CRAPEMYRTLE BARK SCALE

## New Pest Threatens Crapemyrtle

An invasive pest has been identified on crapemyrtles in the Jackson Madison County area. It is known as Crapemyrtle Bark Scale (CMBS). This relatively new pest was first noticed in Dallas TX several years ago and has recently been working its way eastwardly across the state of TN. Shelby County was the first area in TN to identify this pest and begin control measures. Although an unchecked infestation may not kill otherwise healthy crapemyrtles, the pest stresses the plant, affecting not only its appearance but also interfering with blooming and overall thriftiness. It is the only bark scale to occur on crapemyrtles at this time and should be easy to identify. Adult females appear as white or gray felt-like encrustations on small twigs to large trunks, often near pruning wounds or branch crotches. Most gardeners will be alerted to its presence by the black sooty mold on the bark (not to be confused with sooty mold associated with aphid feeding).

## Tips for Control and Reducing Spread

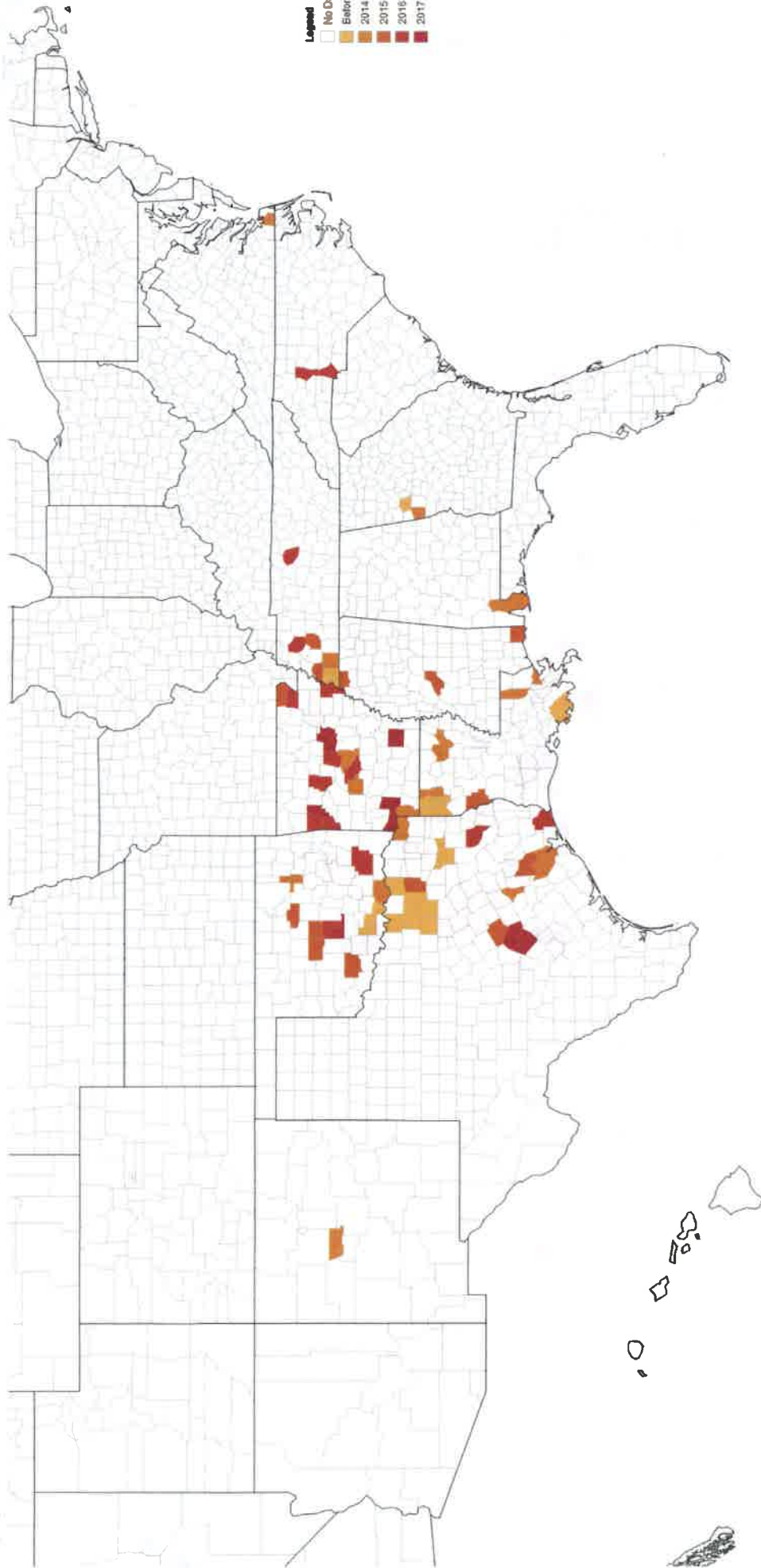
University researchers are very concerned about the difficulty of control. Faculty of the University of TN Soil, Plant and Pest Center in Nashville are preparing public information materials. In the meantime, current best practices for control include the following:

- **Check for signs of CMBS and the presence of black sooty mold routinely**
- **Wash the trunk and reachable limbs with a soft brush and a mild solution of dish washing soap. This will remove many of the scale and egg masses, much of the black mold, and increase the effectiveness of insecticide control.**
- **A winter application of dormant oil to the bark may be helpful. However, thorough coverage is necessary for positive results.**
- **During the growing season, drenching the root zone with a systemic insecticide has shown promise with best control when applied between May and July. Neonicotinoid insecticides like Imidacloprid have demonstrated good control. There has been some controversy on the use of Neonicotinoids and their impact on the environment. However, crapemyrtles are a valuable plant in the southern landscape and you may wish to ensure their persistence.**

### Photo Captions

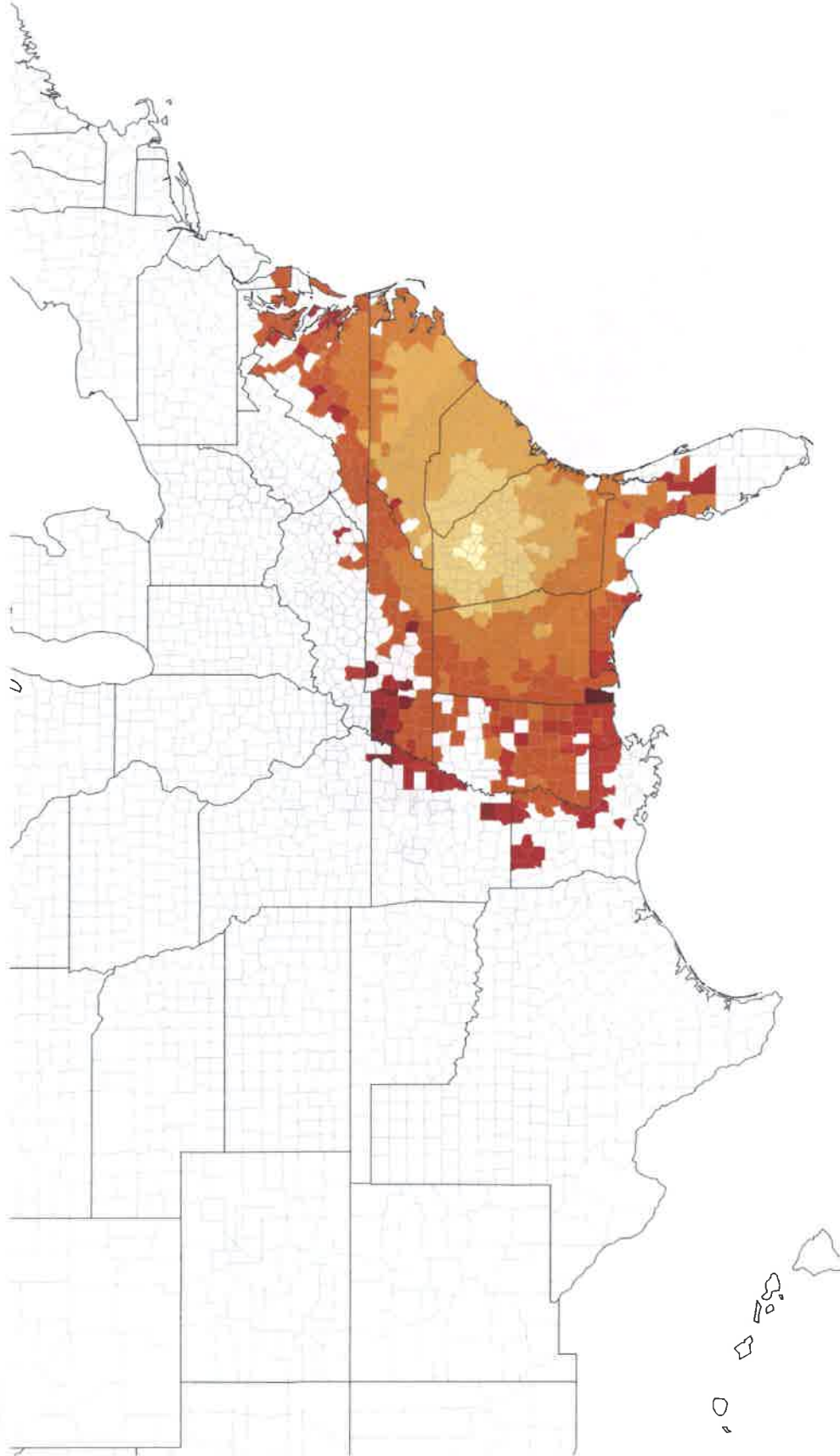
- Bottom Left– Adult Female Scale on Crape Myrtle branch
- Bottom Right– Up close view of adult CMBS
- Top Right– Example of Black Sooty Mold







Kudzu Bug



Legend  
No Data  
2009  
2010  
2011  
2012  
2013  
2014  
2015  
2016  
2017