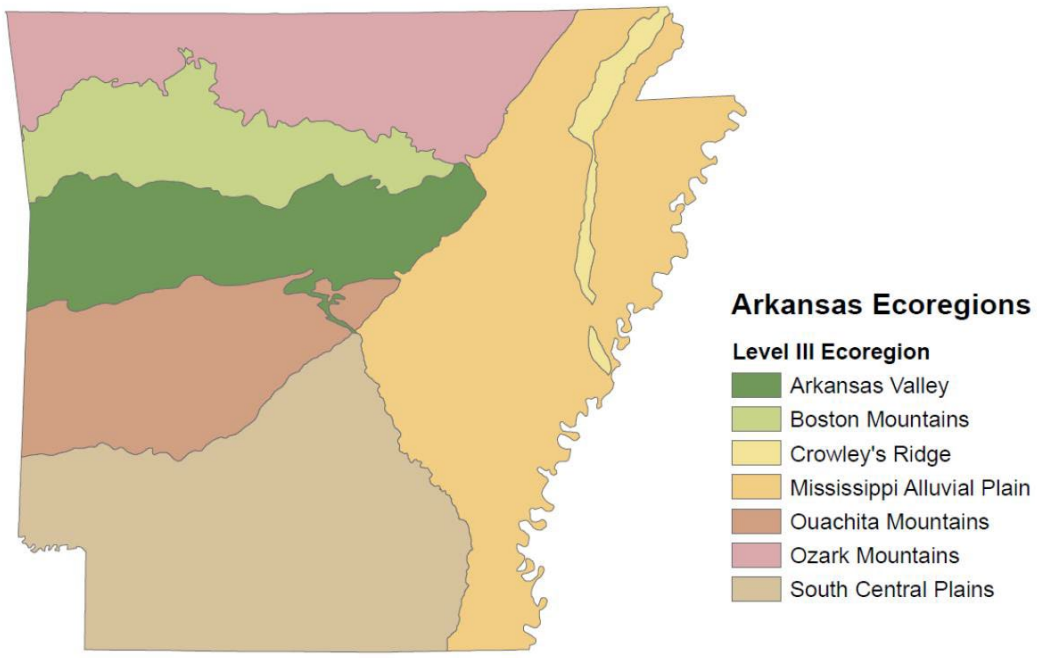
ARKANSAS DEPARTMENT OF AGRICULTURE
FORESTRY DIVISION

FOREST HEALTH HIGHLIGHTS FOR 2021

The Arkansas Department of Agriculture – Forestry Division (hereafter simply the Forestry Division) assists private landowners with forest management decisions. Forestry Division field personnel make forest health recommendations and can respond to reports of tree mortality caused by forest disturbances, such as insects and diseases. This report briefly summarizes the forest disturbances and damage agents in Arkansas that were identified during the 2021 calendar year.

Forest Resource Introduction

Arkansas's forests cover 19 million acres, which is approximately 56% percent of the state's land area. Most of the state's forested land, some 13.1 million acres, is in non-industrial private ownership, while approximately 2.5 million acres is national forest. Major forest types in the state include oak-hickory, loblolly-shortleaf pine, oak-pine, and bottomland hardwood. This report will reference the Level III Ecoregions shown in the map below. Loblolly pine dominates the South-Central Plains ecoregion, and it is the most abundant tree species by volume, and shortleaf pine follows second in statewide volume estimates. Shortleaf pine is abundant in the Ouachita Mountains. The most abundant hardwood species, listed in order of greatest volume, are white oak, sweetgum, post oak, northern red oak, black oak, and southern red oak.



Freeze Damage

On April 30, 2021, an aerial survey was conducted to observe freeze damage and delayed leaf out in Northwest Arkansas. The Boston Mountains ecoregion experienced the most freeze damage, but effects could be observed statewide. The freeze event occurred from April 20th to 22nd. In all areas flown, lower valleys exhibited freeze damage and an observable delayed leaf-out. Damage to the acorn crop was also suspected. Since damage could be seen across all counties flown, no spatial data was collected with Digital Mobile Sketch Mapper. Shown below is a Sentinel II image east of Sulphur Springs; damage can be seen below a distinct elevation level.

Above is a satellite image in Sulphur Springs freeze damage in the valleys.

Left image is frost damage in near Ozark, AR. Right image is frost damage near Eureka Springs. Photo credits: J. Fuller

Needlecast

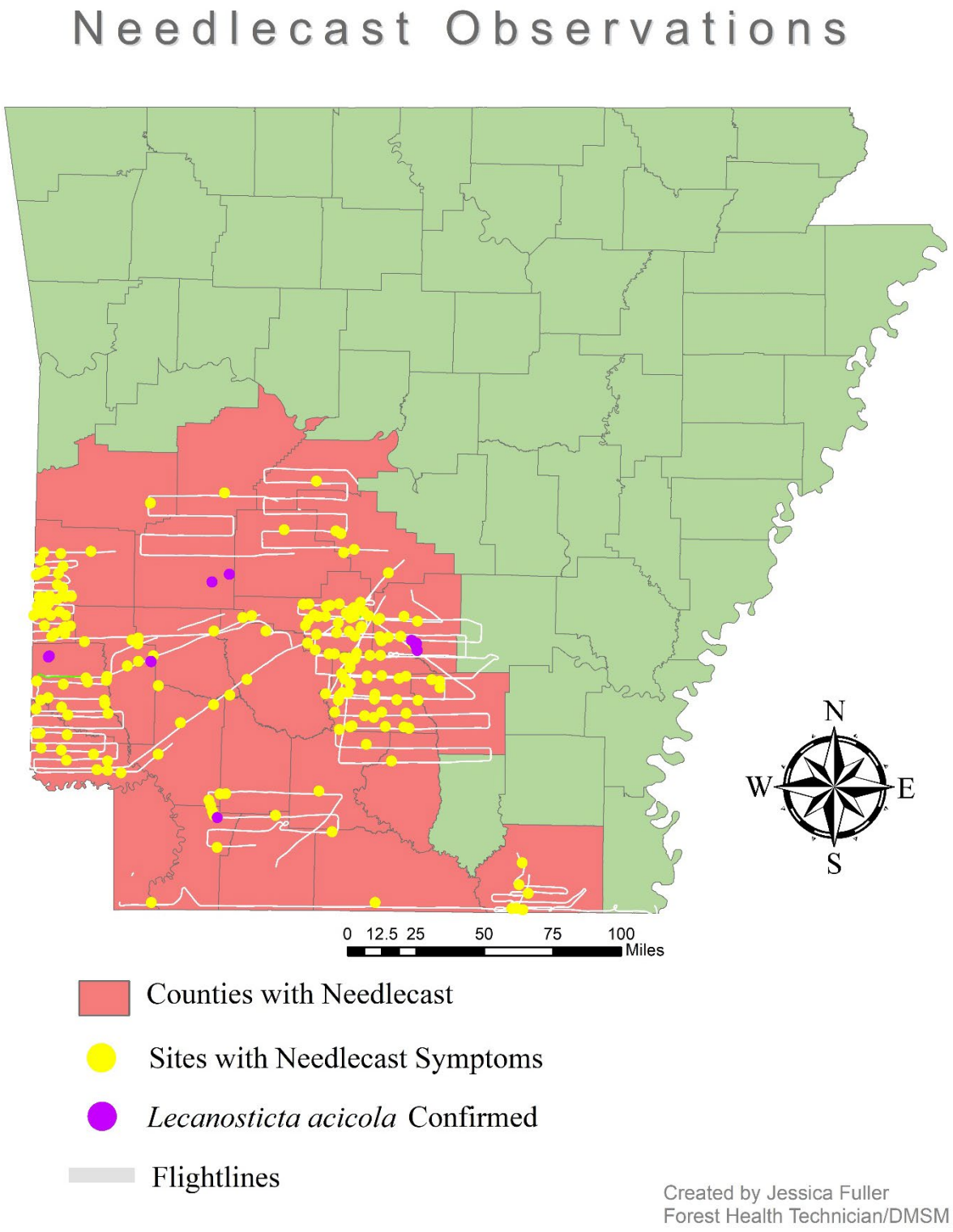
Browning needles were reported on loblolly pine (*Pinus taeda*) in eighteen counties including Calhoun, Clark, Cleveland, Dallas, Garland, Grant, Hempstead, Hot Springs, Howard, Little River, Montgomery, Ouachita, Perry, Pike, Polk, Saline, Sevier, Scott, and Yell. The unhealthy appearance of these pine stands was observable by aerial survey (see the locations of affected stands in the following map) and a ground survey was needed to determine the cause. As shown in the map below, samples were collected in the counties of Grant, Lafayette, Montgomery, Howard, Ouachita, and Sevier. These samples were sent to pathologists for laboratory diagnosis. In 2020, researchers in Georgia and Florida confirmed the presence of brown spot needle blight, (*Lecanosticta acicola*), and the pathogen is potentially a contributing factor in the disturbance. *L. acicola*, previously known as *Mycosphaerella dearnessii,* is a known as a serious pest in longleaf pine as well as Christmas tree plantings of Scots pine. Severe landscape-scale issues with needle blight are not discussed in scientific literature, especially with respect to loblolly pine. Another needle cast fungus (*Rhizoshaera kalkhoffii*) was isolated from these samples. The black sporulating structures found on browning needles disperse spores onto newly developed needles and can also infect older needles when environmental conditions favor the fungi. The widespread nature of infected sites may have resulted from the amount of heavy rain fall, record high snow falls, and a freeze event within a span of three months. Moderately high temperatures between these events allowed the disease to progress.

For simplicity, the identified species are collectively referred to as "needlecast" in this report. Many affected stands of loblolly had already been thinned and stem density was not overstocked. The open structure of these loblolly stands allows wind to pass through easily, thus dispersal and success of needlecast infection throughout the stand could be increased with rainy and stormy weather. It could also be assumed that these planted loblolly stands feature susceptible genetic properties.

Right: Drone image showing characteristic of browning needles of the needlecast infections in Montgomery County. Left: Close up image of the black sporulating spots on the browning loblolly pine needles. Note that the base of the needles can still be green. Photo credit: C. Barton 2021.

The map shown below are the total sites of needlecast recorded between March and July in 2021. The needlecast surveys covered 4,494,309 acres of land across the south-western counties of the state. In total, 38,168 acres of forest was recorded with needlecast infections. In the map below the points shown

in purple were the locations where samples were collected and confirmed to have of brown spot needle blight, (*L. acicola*).

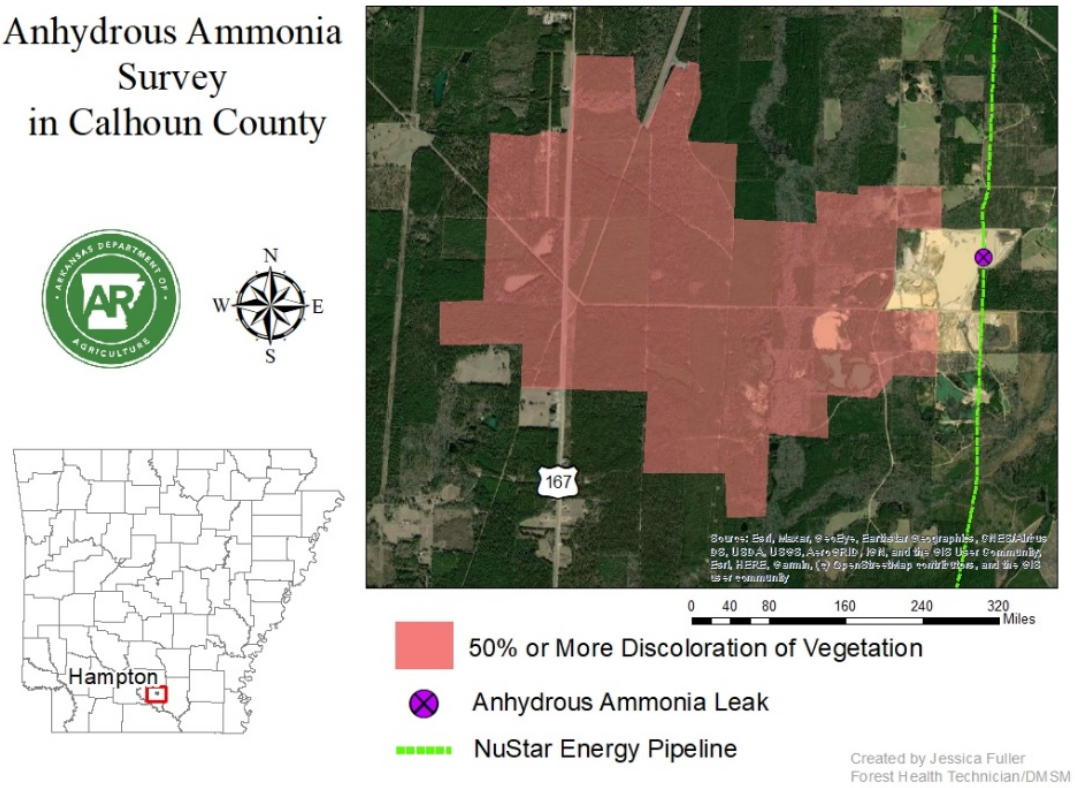


Anhydrous Ammonia Pipeline Leak

On September 23rd an anhydrous ammonia pipeline ruptured, spreading a plume of gas across a large area south of Hampton, Arkansas. The leak was caused by an excavator operator on the property of Arkansas Gravel Company. The excavator punctured the underground pipeline that is owned and operated by NuStar Energy. Anhydrous ammonia gas is corrosive to cell tissues upon contact and known to be a lung-damaging agent. Arkansas Department of Emergency Management (DEM) issued an evacuation to residents east of Highway 167. The damage to the vegetation was substantial and turned the surrounding trees brown. Arkansas Forestry Division flew a detection flight on October 5th, 2021, 13 days after the exposure. Initially, the aerial survey estimated damage on over 7,000 acres; however, using satellite imagery, the estimate was revised to 3,941 acres of 50% or more severe discoloration.

The recovery of vegetation following anhydrous ammonia damage isn't well documented, but the Forestry Division is continually monitoring the effected vegetation for signs of mortality. The Forestry Division will routinely visit each month to monitor for secondary issues such as bark beetle activity or other signs of distress. The event happened at the end of the growing season when most trees were preparing for winter dormancy, so the true effects of the disturbance may not become apparent until spring leaf out. Below are some drone images that were taken during the first monitoring visit on October 21st. The map on the following page shows the area that had 50% or more discoloration as well as the location where the pipeline leaked occurred.

Drone images over the area that was affected by the anhydrous ammonia pipeline leak. Photos by C. Barton.



Common Residential Issues

Left photo: horned oak gall. Far right photo: infestation of the horned oak gall on a pin oak tree. Photo credit: J. Fuller

A heavy, horned oak gall infestation was reported in Northwest Arkansas in Bella Vista in April. The gall is formed by a wasp; the tree develops the abnormal growth around an egg laying site to house and feed the developing wasps inside. Managing horned oak gall is problematic as there is no feasible way to

clear out the infestation. Some empirical evidence suggests that systemic insecticides can prevent infestations if properly timed. There is no immediate danger to the tree and the gall can linger for years causing it to be disfigured, thereby affecting the tree's aesthetic value.

Left: pine colapis beetle (Colapis pini) feeding on a loblolly pine. Right: loblolly pine that is turned brown and thinned. Photo Credits: Caitlin Mann

Pine colaspis beetle (*Colapis pini*) adults, when abundant, can cause foliage of loblolly pine to appear brown and thinned. Adults will chew on the midrib of the needle, leaving behind a jagged edge, and the remaining needle will turn brown. Adults will mate and lay eggs in the soil and emerge in the late spring and early summer. The trees normally will not die, and new growth will appear in the late summer.

Ips **Engraver Beetle and Deodar Weevil**

Left: Ips engraver beetle in gallery under the bark. Right: Deodar weevil resting outside the chip cocoon. Below: Photo Credit: J. Fuller

Ips spp. are regularly observed in Arkansas on single trees or small groups of trees. Unlike SPB, Ips beetles (*Ips calligraphus*, *Ips grandicollis*, and *Ips avulsus*) and deodar weevil (*Pissodes nemorensis*) are considered secondary invaders that target injured or stressed trees. High spring temperatures, a freeze event in late April, and a dry late-summer may have incited stress in trees across the state. Areas around Sevier, Howard, Little River, Montgomery, Pike, Polk, Clark, Hot Springs, Grant, Dallas, and Saline Counties were most affected by Ips beetles and deodar weevil. In some stands with minimal sporadic mortality, deodar weevil could be observed as the only damage agent in infested trees. In stands where mortality exceeded 10% of the tract, Ips beetle were the most abundant damage agent. The images below were taken by drone during a ground check survey in Hot Springs County.

Above: Drone images of sporadic red trees taken in Hot Springs County. Photo Credit: A. Russell

Walnut Twig Beetle and Thousand Cankers Disease

Walnut twig beetle (*Pityophthorus juglandis*) and the walnut-killing disease it can carry, *Geosmithia morbida*, are not known to occur in Arkansas. Walnut twig beetle trapping was conducted during a six-week survey. The survey started on August 5th and ended September 16th, 2021. Fifteen traps were distributed across Northeast Arkansas between Marion and Independence Counties. The traps were collected every two weeks and brought back to identify possible suspects of walnut twig beetle. Walnut twig beetle feeds on the bark and phloem of black walnut (*Juglans nigra*) trees. The adults will exit the bark to mate and find new trees to infest. The tiny hairs around their mouth called setae can carry live fungal spores. The adults will chew against the grain unlike the larvae that chew with the grain beneath the bark. When the adults burrow through the tree to lay the eggs, the spores of *G. morida* inoculate the tissue of the tree. This will create circular cankers on the surface of the phloem that will eventually kill the cambium. Cankers can become very abundant, thus matching the common name “thousand cankers disease.” Most of the galleries of walnut twig beetles are found within the canker.

The first signs of TCD are yellowing foliage, branch mortality, numerous tiny entrances and exit holes form heavy beetle activity. TCD symptoms can develop over three to fifteen years. Though some symptomatic trees were discovered during the survey, no signs of TCD were identified in 2021.

To learn more about Thousand Canker Disease visit: www.thousandcankers.com or www.invasivespeciesinfo.gov

Left: Trap site on a black walnut tree that shows symptoms of TCD. Photo by J. Fuller.
Right: Forest Health Technician looking for walnut tig beetle in the trap collection.

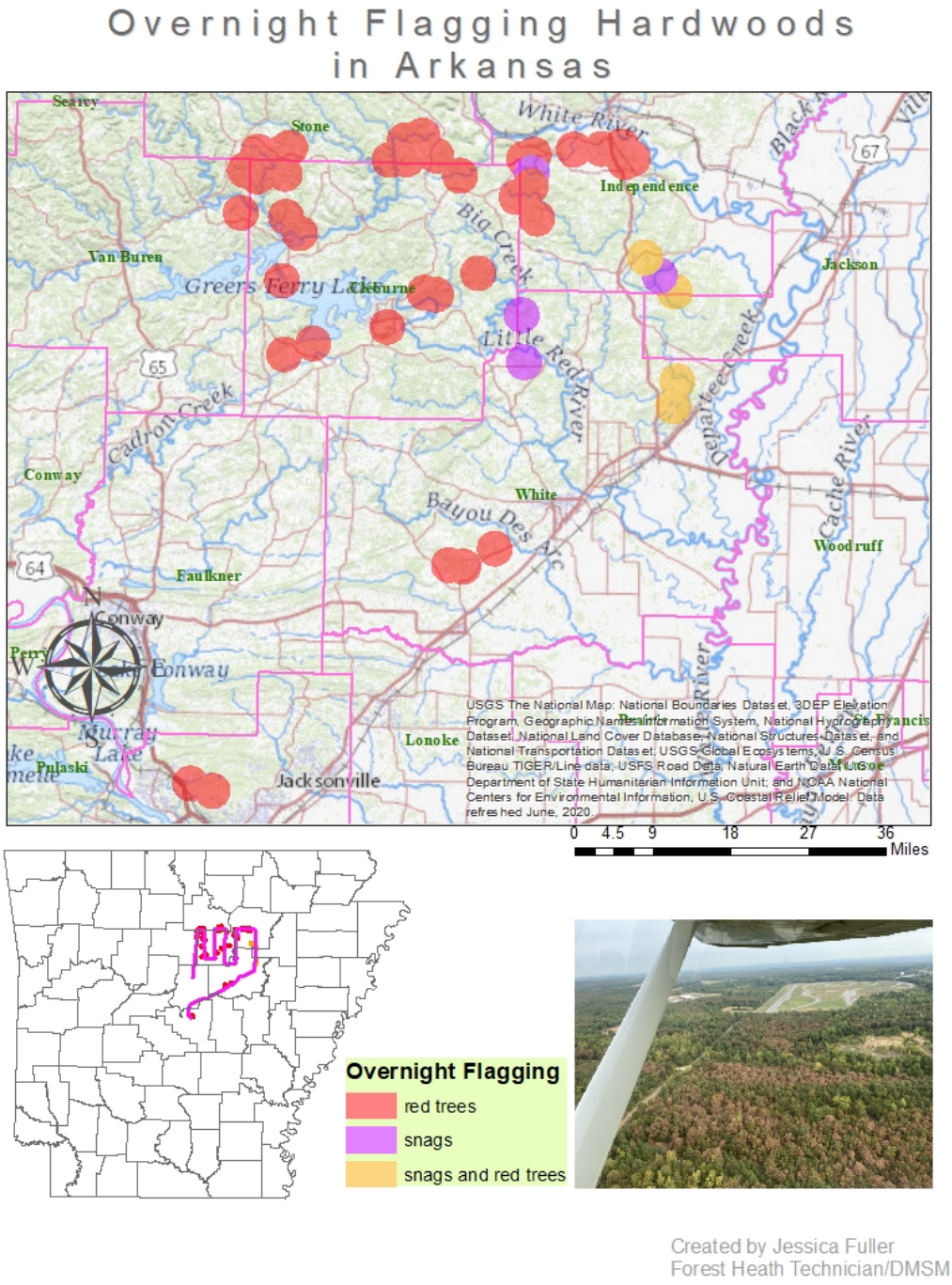
Overnight Flagging Hardwoods

An aerial detection was conducted September 3rd, 2021 to identify browning and snag hardwoods. This brown discoloration occurred rapidly after the harsh temperatures experienced during late summer. The term "overnight flagging" was used to label these affected trees. Overnight flagging is more commonly known as "scorching" caused by multiple stress events. Events such as the freeze event in April, extreme flooding in late spring to early summer, and extreme fluctuations between wet and dry growing conditions during the summer may be to blame. In the hottest weeks toward the end of summer, trees experience a great amount of transpiration, which is the process of water movement through the tree, escaping into the air through the leaves. Coupled with the demands of transpiration, expenditure of stored carbohydrates can cause rapid scorching. This condition does not actually occur overnight, but takes several months, if not years, to appear. In the case of long-term effects, this condition may also be known as a decline syndrome. Trees are resilient and attempt to overcome stressors. During normal conditions, those individual events would not likely kill the trees. However, with continued stressful events and changing climatic conditions, we may see an increase in mature hardwoods dying seemingly overnight.

So, what does that mean for the current flagged trees? Some may survive if the roots were able to capture enough energy for next spring. A professional arborist or forester should be consulted for a tree

health assessment. When advanced decay is observed, the tree may be recommended for removal if considered a hazard to person or property. The map to the right indicates the areas where scorching or snag hardwoods were observed.

In the residential setting, it may be possible to help the surviving trees rebound next year by improving soil aeration, mulching, and crown cleaning. Fertilize per a soil test. Consult an arborist to conduct this work properly



Created by Jessica Fuller
Forest Health Technician/DMSM

Redbay Ambrosia Beetle and Laurel Wilt Disease

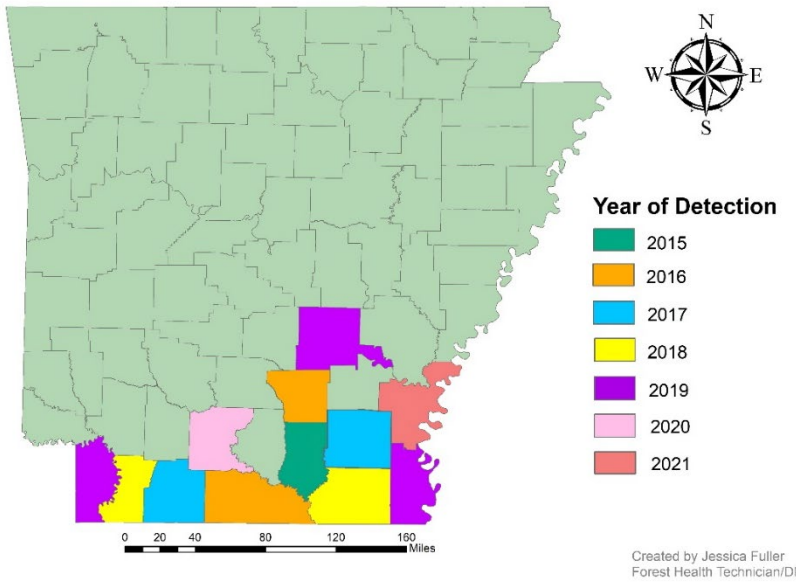


Photo above: sassafras with dark stain within the sapwood. Below: sassafras with wilted, brown leaves. Photos by J. Fuller

Laurel wilt is caused by an invasive fungus (*Raffaelea lauricola*). In Arkansas, it was discovered in December of 2015 on symptomatic sassafras trees. Observations of dying sassafras trees are generally provided by attentive landowners and forest land managers. The tiny beetle that transmits the fungus, redbay ambrosia beetle (*Xyleborus glabratus*), was also identified at that time. Redbay trees are rare in Arkansas, but sassafras is a suitable host for the invasive disease and beetle. Sassafras is infrequent in southern Arkansas; however, it is common in the Ozark Mountains of northern Arkansas and Missouri. According to Forest Inventory and Analysis estimates, seedling and sapling size sassafras is more abundant in the Ozark highlands than anywhere else in the United States. The Forestry Division participated in a laurel wilt monitoring study led by the US Forest Service. Three permanent plots were

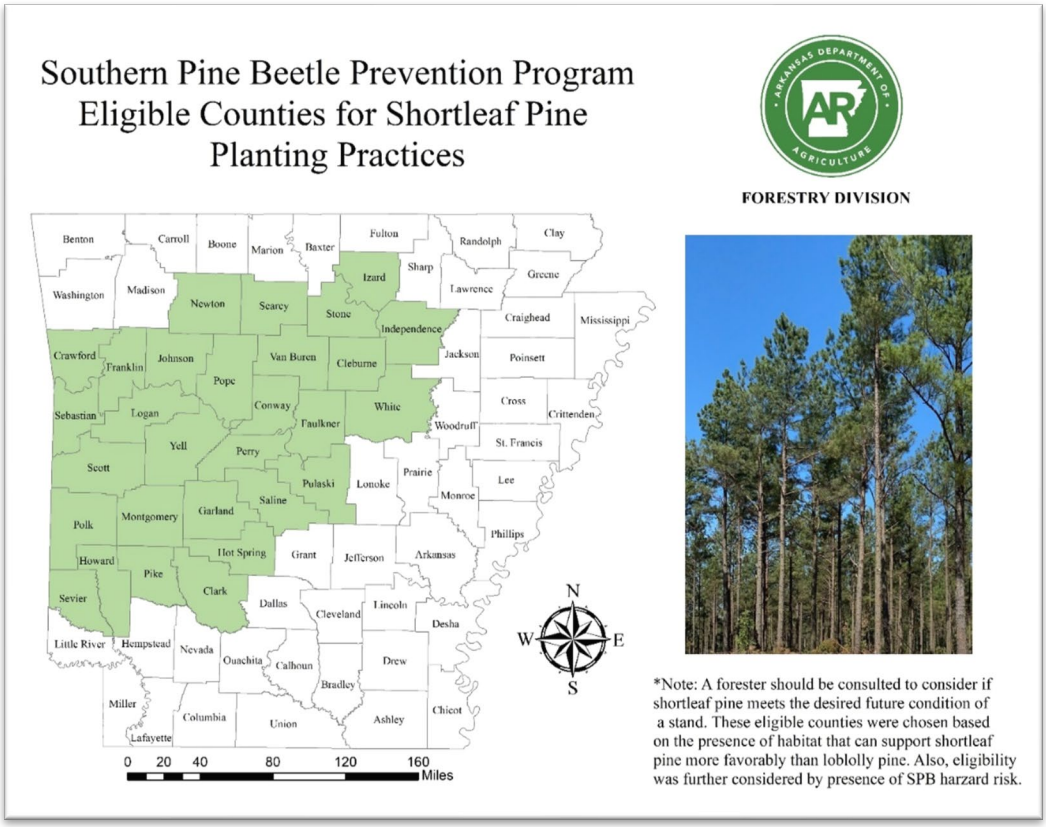
established to measure disease progression and beetle presence. The disease has been confirmed in 12 Arkansas counties so far shown on the below. In the photographs below are diseased sassafras confirmed in Desha County in 2021.

Southern Pine Beetle (SPB) Survey Update

An outbreak of SPB has not occurred in Arkansas or the states west of the Mississippi for over two decades. In AR, spring trap catches subsided around 2005 and now traps rarely have a positive catch. Forestry Division uses pheromone traps to detect increases in SPB abundance. Eighteen traps are set annually in the South-Central Plains. Back in 2018, 26 SPB were captured in Ashley County, and one was captured in Columbia County. In 2019 and 2020, zero SPB were captured. In 2021 SPB was captured in traps located in Ashley and Union County with a total of 53 SPB. The small amount captured in 2021 isn't a concern for the state of Arkansas and the SPB count reduced at the end of the collection.

Southern Pine Beetle Prevention Program

The best defense against any future SPB outbreaks is a more resilient forest structure. The Southern Pine Beetle Prevention Program continues to offer monetary incentives to landowners who thin overly dense pine forests. Landowners can apply for the program through local Forestry Division offices. The program currently offers incentives for first commercial thinning, non-commercial thinning, prescribed burns, and in-woods chipping. New for 2021, the program will cost share the planting costs of shortleaf pine in stands that are well suited for shortleaf over loblolly pine (eligible counties shown in the map below). Logger incentives are also available for thinning harvests on tracts less than 40 acres.



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The Arkansas Department of Agriculture is dedicated to the development and implementation of policies and programs for Arkansas agriculture and forestry to keep its Farmers and Ranchers competitive in national and international markets while ensuring safe food, fiber, and forest products for the citizens of the state and nation.

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