



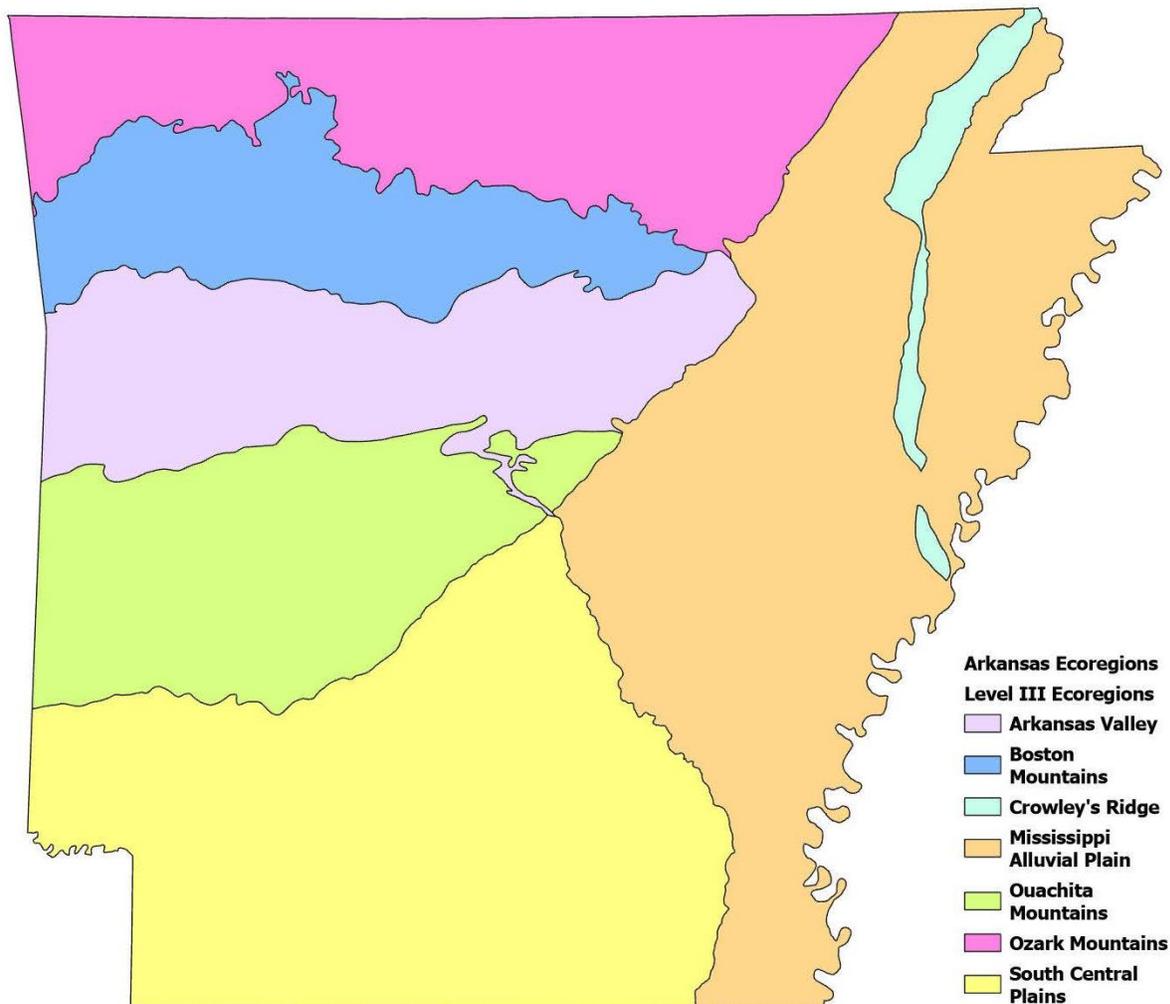
ARKANSAS DEPARTMENT OF AGRICULTURE FORESTRY DIVISION

FOREST HEALTH HIGHLIGHTS FOR 2023

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 2023 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.



Pine Needle Blight and Mortality Events in Southeastern Arkansas

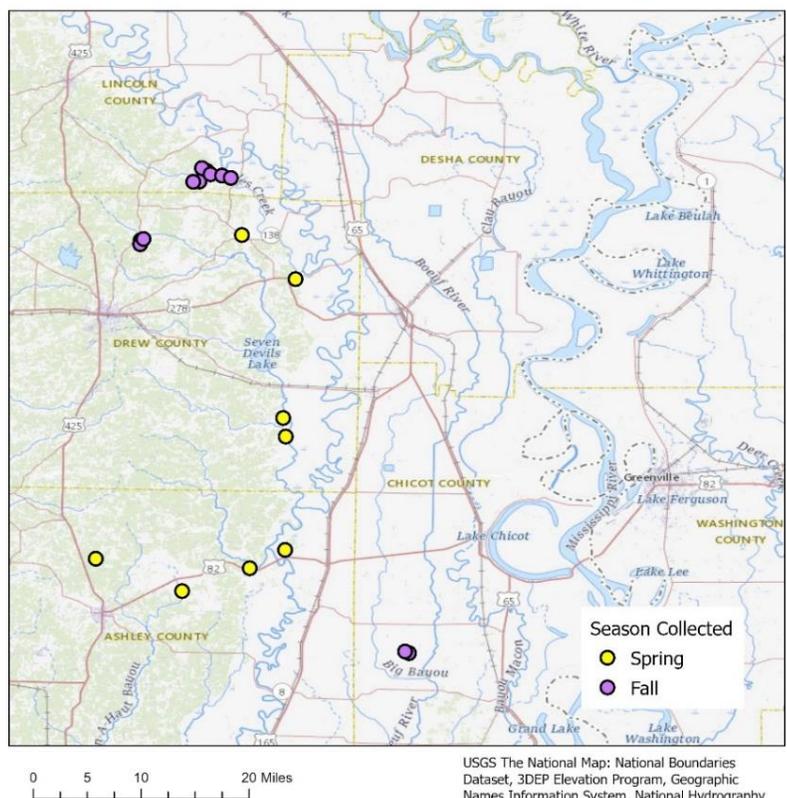
Due to the widespread discoloration of pine needles and an increase in pine mortality, landowners across the state expressed their concerns about the health of Arkansas's pine forests. More specifically, the condition of loblolly pine plantations and residential pine trees in southeastern Arkansas were closely monitored. Concern over this pine resource began in fall of 2022. A report titled "Interim Report on Pine Mortality in Southeastern Arkansas During 2022" was produced on December 8, 2022. In that report, the concept of a "pine decline" was discussed, in which several identifiable causes were addressed. In 2023, the Forest Health Specialist met with affected communities and presented the pine decline concept at several meetings.

In September and October of 2022, most reports were from southeastern Arkansas or more specifically, the southern portion of the Mississippi Alluvial Plain. This area does not have many pine plantations and most of the damage was in the small communities where pine was planted in a residential setting. The area was visited by personnel from the Forestry Division and the Plant Industry Division. The Forest Health Specialist visited on three occasions in November to determine the causes of the mortality. Drought was considered one of most substantial factors in this decline. The drought, which occurred through July and October of 2022, incited the rapid progression of the contributing factors that followed. Ips bark beetles, needle blight pathogens, and off-target herbicide damage were contributing factors that likely played a role. The two biggest mysteries in the 2022 decline event were the roles of fungi and herbicide. Needle blight fungi were identified visually, but the presence of a specific, aggressive pathogen known as brown spot needle blight was not known. This pathogen must be identified morphologically using a microscope or with genetic diagnostic techniques. Regarding herbicide damage, the active ingredients paraquat and dicamba were suspected to have a role; however, neither chemical was confirmed on affected trees. In 2023, the Forestry Division conducted sampling for brown spot needle blight and chemical residue.

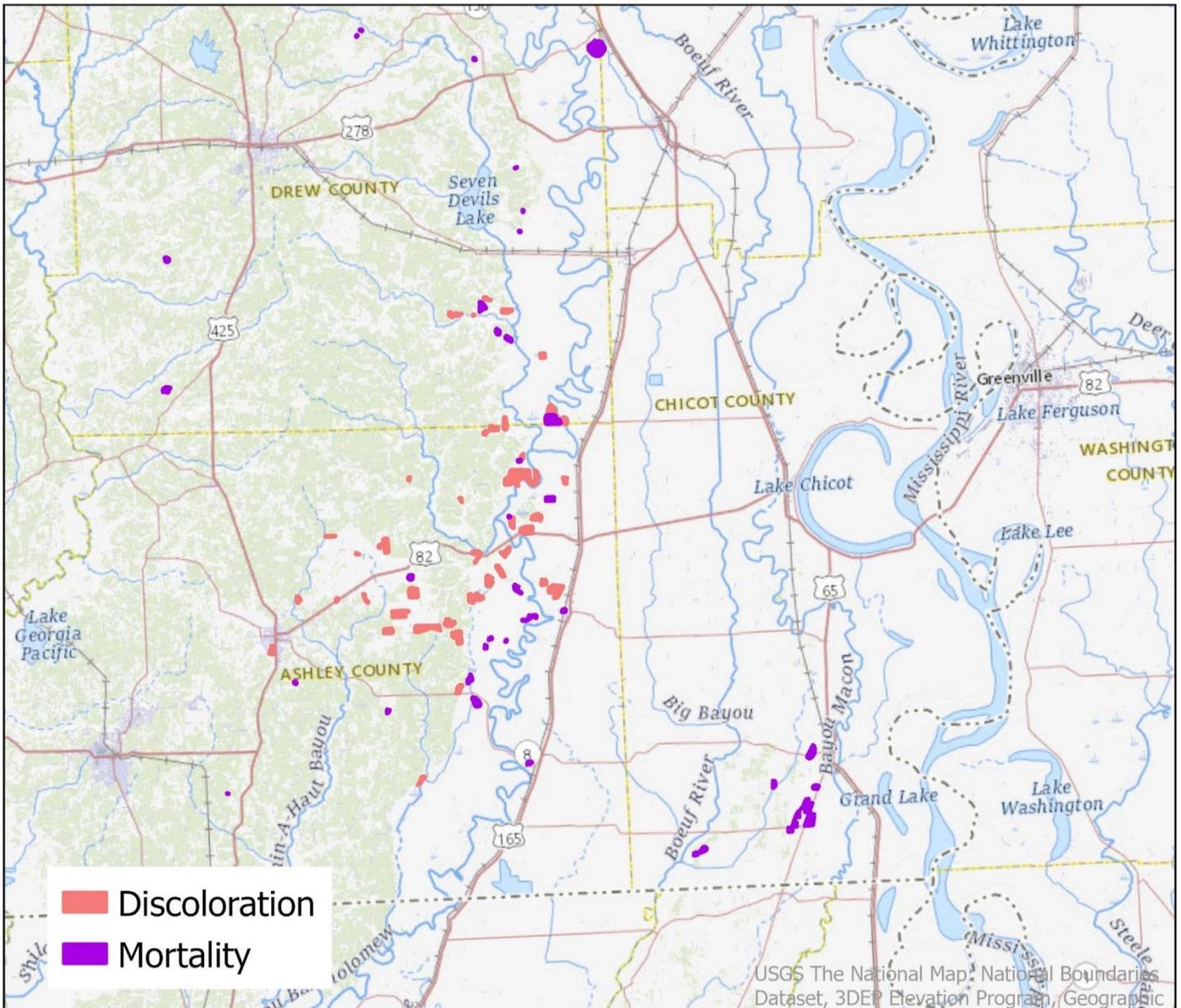
In March of 2023, observations of discolored pine trees were shared by the public in southeastern Arkansas along the eastern edge of the South Central Plains. By April, a large area across Ashley and Drew Counties had brown discoloration in pine. The Forestry Division aerially surveyed the area and recorded tracts with severe discoloration, i.e., 6,835 acres. However, the total number of acres that were discolored was believed to be much greater. Of note, a large majority of the affected area recovered, and new leaves replaced those that were browned and defoliated. The Forestry Division attempted to identify how many of the discolored acres subsequently experienced tree mortality, and this was accomplished with ground surveys and follow-up aerial surveys. Of those 6,835 acres with severe discoloration, 2,904 acres were identified with some degree of tree mortality. See the following page for a map of the affected area.

During 2023, the Forestry Division sampled leaves in affected pine plantations. Twenty-one locations were sampled with a total of 40 separate samples collected (both pine and other broadleaf plants). The samples were sent to pathologists at the USFS Forest Health Protection as well as to the Mississippi State Chemical Laboratory. Two-thirds of the locations sampled were confirmed with brown spot needle blight. For chemical testing, two of the 40 samples were positive for paraquat. Dicamba was not detected on any of the samples.

Locations of 2023 Pine Leaf Samples



Area with Pine Needle Discoloration and Pine Mortality



C. Barton, Dec.2023



In cases where severe discoloration occurred and trees recovered, the symptoms were attributed to the needle blight fungi. Pine mortality observed since 2022 is considered a multi-factor decline event. Through an evolving sampling process, the Forestry Division and contributing partners concluded that, through 2023, potential underlying factors included weather patterns, tree genetics, and site conditions. In addition, inciting factors included needle diseases, insect pests, and/or herbicides.

Typical symptoms of needle blight. Photo credit: C. Barton.

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. The Forestry Division uses pheromone traps to detect any increases in SPB abundance, but spring trap catches of SPB have been negligible since 2005. Eighteen traps were set in 2023 in the South Central Plains. The abundance of SPB in those traps continued to be low and no infestations were found.

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. Logger incentives are also available for thinning harvests on tracts less than 40 acres.

Ips Engraver Beetle Trapping

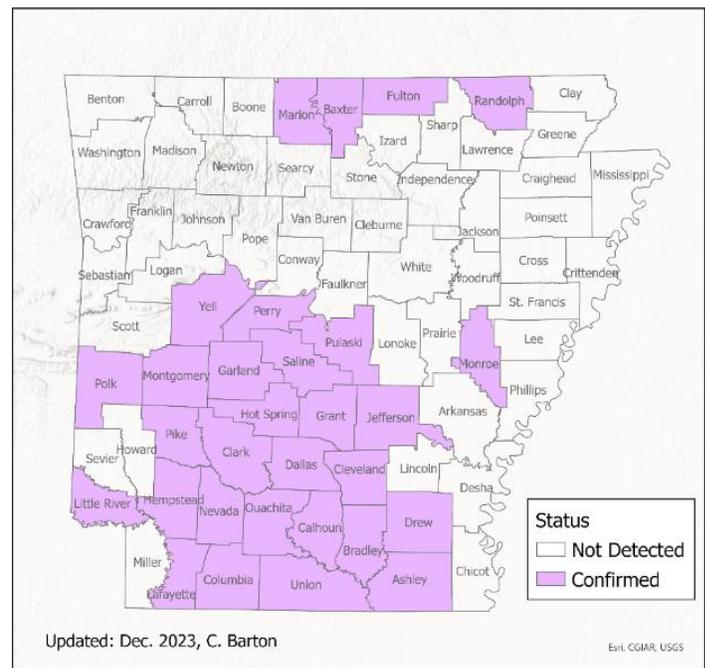
The three species of *Ips* bark beetles (*I. avulsus*, *I. calligraphus*, and *I. grandicollis*) are arguably amongst the most ubiquitous, and ecologically and economically important taxa on southern pines. They tend to colonize trees that are stressed, damaged, injured, dying, or already “dead.” Widespread abiotic disturbances and stressors can trigger *Ips* beetle outbreaks, and anecdotal evidence indicates that they can become primary colonizers of trees. It is hypothesized that under climatic changes, *Ips* beetles will become more important and have a greater impact on the resilience and future of pine plantations.

In partnership with the University of Georgia, the Arkansas Forestry Division conducted a 6-week insect sampling study in a variety of different locations. Six Arkansas counties were chosen based on water deficiency criteria predetermined by the University of Georgia. Within each county, 3 separate pine stands were trapped for *Ips*. Pine stands had to meet the following criteria: 15-30 years old, unthinned, and full crown closure. Each pine stand had a total of 3 traps set, making for a total of 54 different traps set. Within the 6-week sampling period between August and October, the traps were checked at two-week intervals. This made for a total of 162 individual samples to be checked for *Ips*. The objective of this project is to create a prediction model for the responses of *Ips* beetle populations to environmental variables and climatic changes for the southeastern region.

Emerald Ash Borer (EAB) Update

Three new counties were confirmed in 2023. Ash mortality is easily observed in the South Central Plains. Recently, ash mortality can be seen south of Little Rock in the Fourche Creek Bottoms, an area near the I-30 and I-530 interchange. The Forestry Division investigated reported sightings across the state. After EAB was deregulated in 2021, the Forestry Division is working with Arkansas APHIS-PPQ to make initial county-level confirmations in place of the traditional USDA diagnostic process for regulated pests.

Counties With EAB Confirmed



Defoliators

In 2023, several defoliating insects were more abundant than usual. Variable oakleaf caterpillar and basswood leaf miner made notable impacts. Variable oakleaf caterpillar, *Lochmaeus manteo*, is a common native caterpillar in Arkansas. It can achieve rapid population growth when annual weather patterns and host availability favor its survival. This species has two generations in Arkansas. Generally, these spikes in population growth decline due to biological enemies, i.e., predators and pathogens, and the caterpillar will be less noticeable in subsequent years. Several counties in central Arkansas experienced defoliation of oaks and other tree species during the late summer months. People in Pulaski, Perry, Garland, Montgomery, and Saline Counties observed landscape-scale defoliation of oak-dominated forests. The oak canopy around Lake Maumelle in Pulaski County was moderately to severely defoliated. The defoliation wasn't just limited to rural forests; urban trees within communities were also affected. Fortunately, the loss of leaves is not expected to harm affected trees since the defoliation occurred late in the growing season.



Drone image near Lake Maumelle taken in July. Brown trees are defoliated oak species. Photo credit: B. Rugar.

An unexpected defoliator was observed in the Felsenthal National Wildlife Refuge, a 76,000 acre public property in southeastern Arkansas. After aerially assessing that oaks were discolored and defoliated across the entire refuge, a closer examination of trees



Variable oakleaf caterpillar, *Lochmaeus manteo*. Photo Credit: C. Barton.



Defoliation by basswood leafminer, the larger patch of brown is caused by the larval stage. Photo credit: C. Barton.

revealed an unusual culprit.

A leafminer was discovered in great quantities, and it was identified as *Baliosus*

nervosus, the basswood leafminer. Despite the common name, this insect is known to feed on species of oak. The larval and adult feeding causes skeletonization of the leaf and turns it brown. From a distance, the tree appears brown or scorched. This defoliation event was observed in June, and most trees subsequently grew a late flush of new leaves. The damage is not expected to kill trees, though the defoliation may be considered an inciting factor to future declines.



Basswood leafminer, *Baliosus nervosus*. Photo credit: C. Barton.

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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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