



# ARKANSAS DEPARTMENT OF AGRICULTURE FORESTRY DIVISION

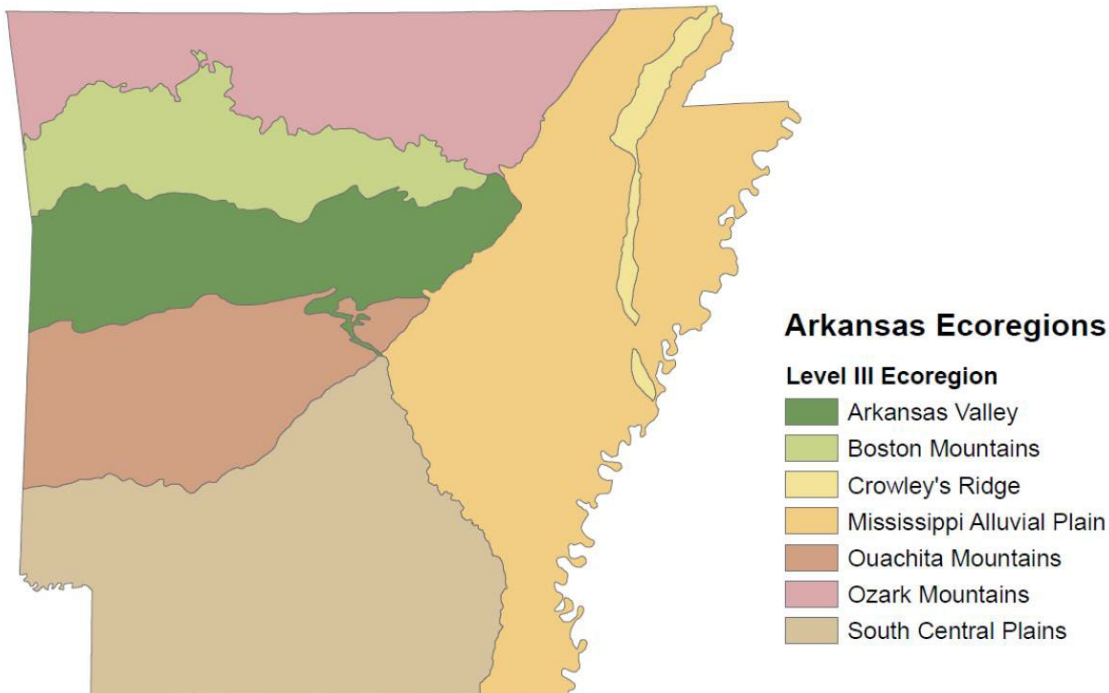
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## FOREST HEALTH HIGHLIGHTS FOR 2022

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

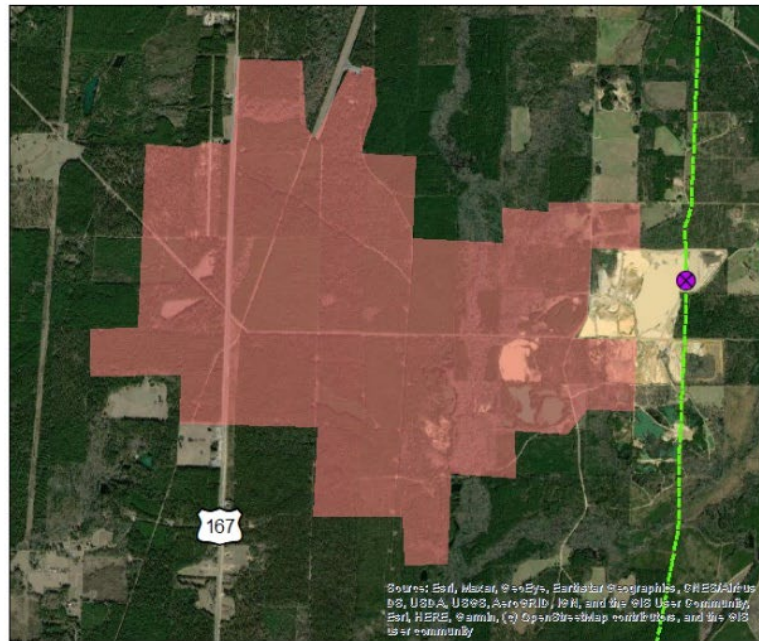
Arkansas's forests cover 19 million acres, which is approximately 56% percent of the state's land area. Most of the state's forested land, some 13.1 million acres, is in non-industrial private ownership, while approximately 2.5 million acres is national forest. Major forest types in the state include 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.



## Anhydrous Ammonia Pipeline Leak: A Follow Up

On September 23, 2021, 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. 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.

### Anhydrous Ammonia Survey in Calhoun County



Source: Esri, Intel, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, DeLorme, OpenStreetMap contributors, and the GIS User Community

0 40 80 160 240 320 Miles

- 50% or More Discoloration of Vegetation
- Anhydrous Ammonia Leak
- NuStar Energy Pipeline

Created by Jessica Fuller  
Forest Health Technician/DMSM

The area was monitored in 2022 and interesting observations were made. Many landowners chose to clearcut their pine resource rather than wait to see the lingering effects of the chemical injury. Those landowners who did not quickly harvest timber observed pine with a visibly diminished crown. While most trees in the affected experienced a spring flush of needles, many stands near the rupture did not fully leaf-out and had subsequent issues with Ips bark beetles. See following photo for typical sporadic pattern of Ips bark beetle infested trees. Note: These trees were completely discolored and/or defoliated because of the ammonia leak; however, most trees grew new foliage in April 2022 (see comparison of drone imagery)



**Loblolly pine stand with widespread mortality associated with Ips bark beetles.  
Photo taken July 29, 2022 by Chandler Barton**



**Drone imagery from October 29, 2021 (left image with brown discoloration) and July 29, 2022 (right image with green crowns). Note: far right stand was clear cut like many other stands in the affected area.**

## 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 of 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 of August 15<sup>th</sup> to October 3<sup>rd</sup>, 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.

## Ips Engraver Beetle 2022 Trapping Locations



FORESTRY DIVISION

### Legend

-  – Trap Locations\*
-  – Counties Trapped

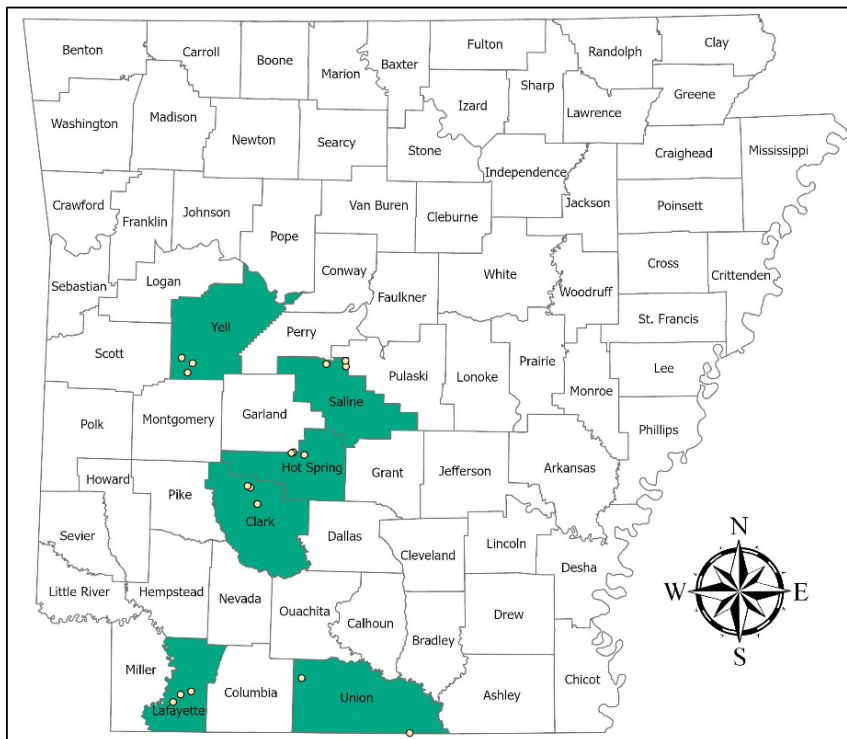
\*Each point represents 3 individual traps setup in 1 location. There are 9 traps total for each county.

A total of 54 traps were setup for this study:  
9 traps per county (cluster).  
Within that, 3 traps per each pine stand.

Each trap will have a combination of baits.

- 1) *Ips avulsus* – Ipsdienol and Ipsenol
- 2) *Ips calligraphus* – Cis-verbenol and Ipsdienol; and
- 3) *Ips grandicollis* – Cis-verbenol and Ipsenol.

Collections were performed  
3 times in 2 week cycles for a total of  
6 weeks and 162 samples.



0 50 100 200 Miles

## Pine Mortality Event in Southeastern Arkansas



In September and October, a high volume of calls and other inquiries were received by the Arkansas Department of Agriculture regarding observations of dying pine trees. The area that is affected is southeastern Arkansas, more specifically the southern portion of the delta known as 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. This is a substantial tree mortality event that culminated in the late-summer and fall months of 2022. Chandler visited on three occasions in November to determine the causes of the mortality.

### **Example of symptomology observed in pine mortality. Photo by Chandler Barton.**

This mortality event is caused by several factors. Collectively, these factors can be referred to as a “decline.” A decline includes a sequence of identifiable factors. Drought is one of most substantial factors in this decline. The drought, which occurred between July and October, incited the rapid progression of the contributing factors that followed. All the factors of this decline include the following:

Predisposing factors (long term issues that make tree more susceptible):

- Most soils in the Mississippi Alluvial Plain are suboptimal habitat for loblolly pine.

- Loblolly pine are considered “off-site” introductions to many areas of the delta. Many were planted in delta communities during a common time frame. These planting may have similar genetic makeup.
- Soil fertility and compaction are concerns in residential settings.

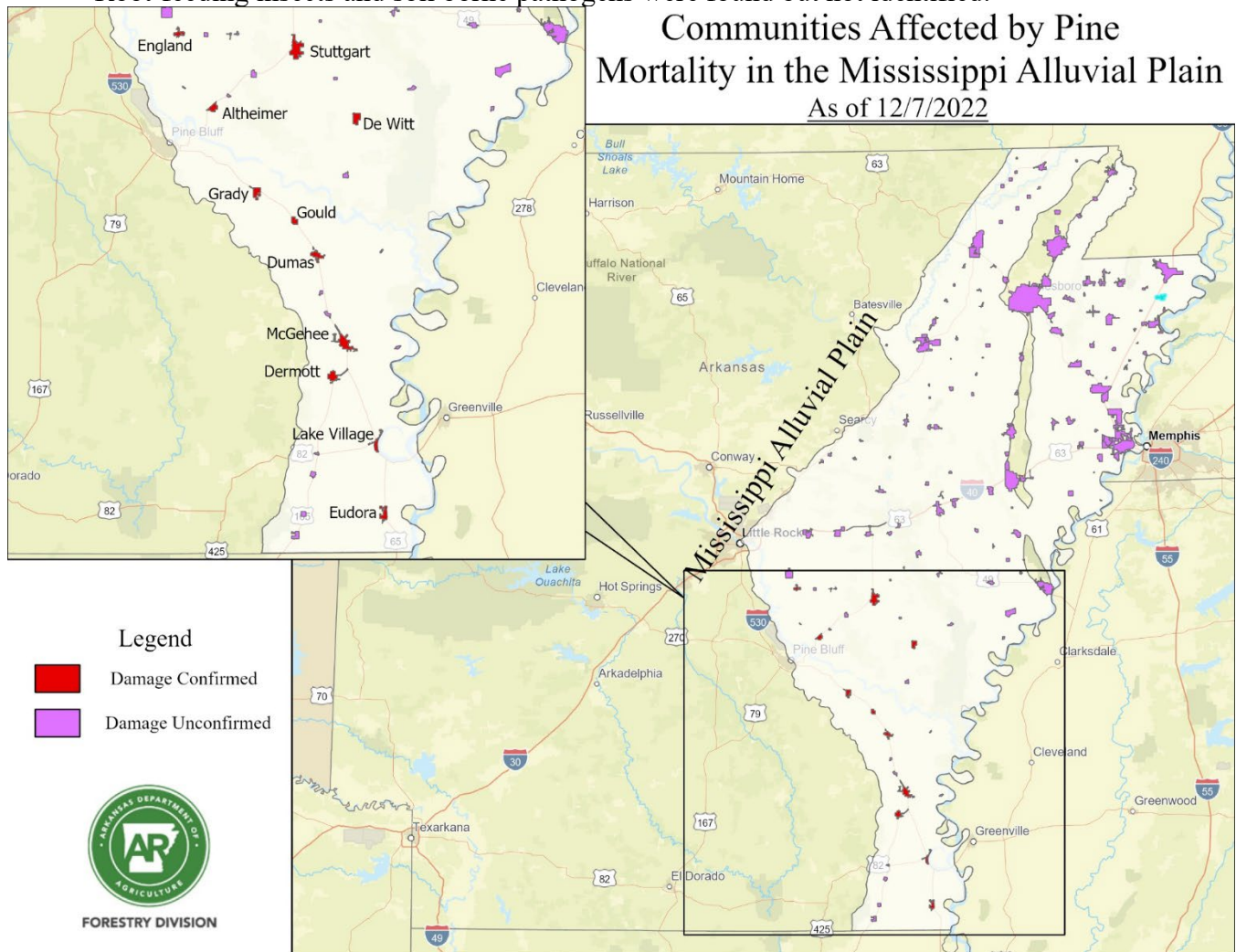
Inciting (short term issues that greatly weaken trees)

- The drought between July and October was damaging to all vegetation, but pine is more likely to suffer damages.

Contributing (short term issues that occur immediately before tree death)

- Scorching/browning of leaves, potentially caused by either of the following:
  - Foliar pathogens, such as needlecast and brown spot needle blight.
  - Volatile chemical damage from a desiccant herbicide such as paraquat. This factor was not abundantly evident, but it cannot be ruled out as a possibility.
- Ips bark beetles infested weakened and dying trees.
- Root-feeding insects and soil borne pathogens were found but not identified.

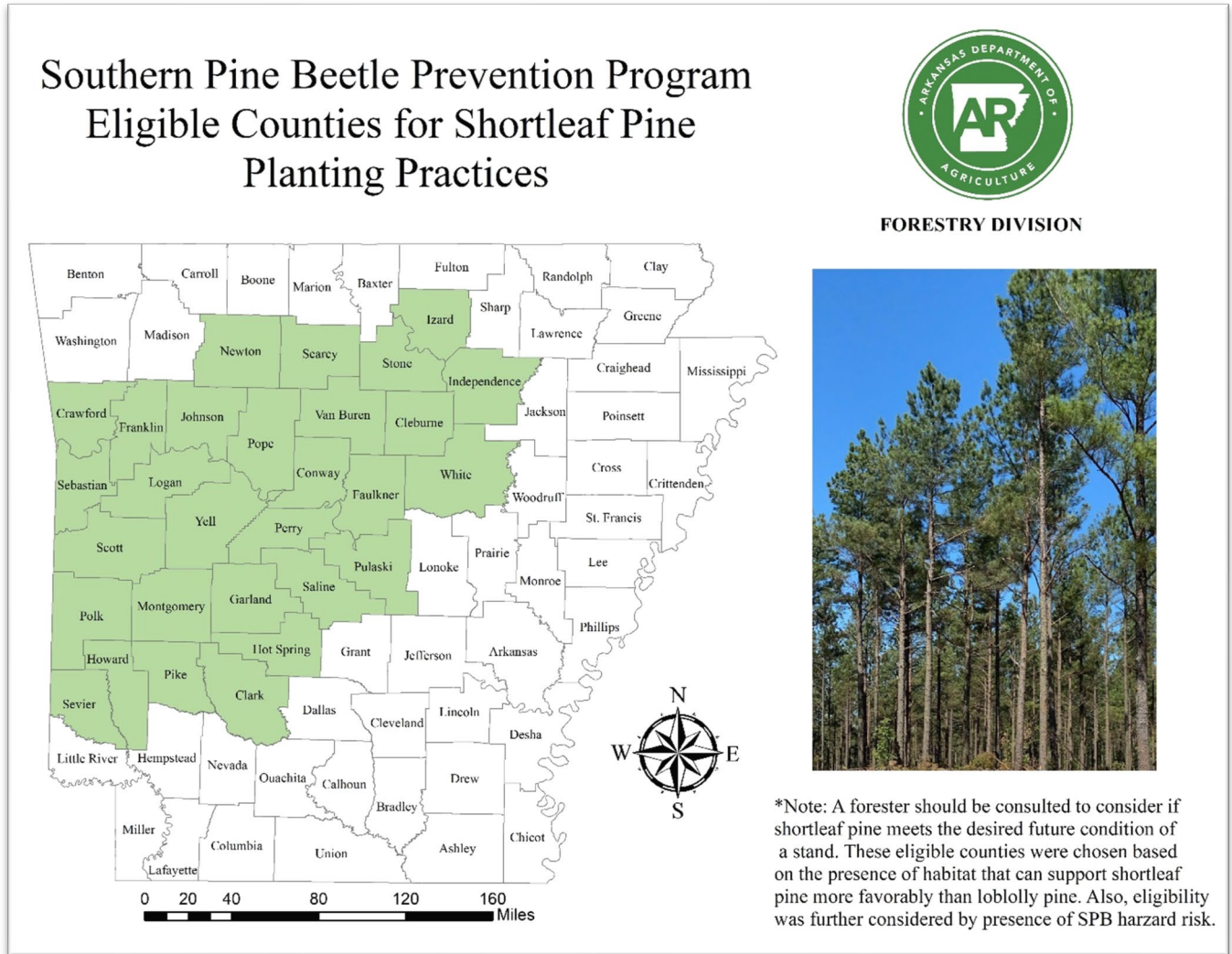
### Communities Affected by Pine Mortality in the Mississippi Alluvial Plain As of 12/7/2022



## 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 of SPB subsided around 2005 and now traps rarely have a positive catch. Forestry Division still uses pheromone traps to detect increases in SPB abundance. Eighteen traps are set annually in the South-Central Plains. In 2020, zero SPB were captured. In 2021, a total of 53 SPB were captured in traps located in Ashley and Union Counties. In 2022, only three SPB were captured. Since the abundance of SPB in traps remained low and no infestations were found, SPB isn't considered a concern for the state of Arkansas.

## 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. Additionally, 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.

**For More Information, Please Contact:**

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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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