WOMEN OWNING WOODLANDS

# SOUTH CAROLINA LANDOWNER CAROLYN BROWN CONFRONTS EMERALD ASH BORER


*Carolyn Brown and her husband live on 700 acres nestled at the base of the Blue Ridge Mountain escarpment in the Northwest corner of South Carolina. Most of their property contains natural woodlands with mixed hardwoods, and native pine with white oak in higher elevations. Carolyn spent much of her childhood on this land, eventually inheriting the property from her aunt and uncle, and has been residing permanently on the property since 1981.*

*Carolyn and her husband envisioned a farm with established trees for the next generation to enjoy. Over the past thirty years, they've worked towards achieving this goal with plantings of loblolly pine, black walnut, yellow poplar, cherrybark oak, and green ash. In the summer of 2020, Carolyn discovered that the majority of the green ash trees on their property had died from an infestation of emerald ash borer (EAB). With the help of the regional forester, Carolyn is developing a plan to treat or remove the infested trees without harming the local pollinator populations, establishing a nature preserve where the trees once stood.*

## CAROLYN'S FOREST STEWARDSHIP APPROACH

My favorite place on the farm is a section of river bottom that is accessible by a narrow road between the river and a sharp ridge descending to the river. Approaching the area, you walk by a small hay field that produces hay for mulching the garden. Walking further, you see a small pecan grove by the river, and then a large, fenced vegetable garden, beyond which is our sawmill and the beehives. The beehives are in an old schoolbus with slots on the sides with landing boards for the bees. The bus is bear protection...

As you stand there, your eye goes to our 40-acre yellow poplar plantation now ready for its first thinning. You see MCP loblolly pine not quite ready for its first thinning, and then a small grove of loblolly planted in 1991 standing majestically, ready for its next thinning. Moving on, you see some natural woodlands in "Spring Cove" next to a stand of old growth yellow poplar. Beyond is a small stream with a number of big, beautiful Green Ash. We discovered late last summer that they were mostly dead. The emerald ash borer had arrived.

> "The joy we get from getting up each day to work with trees and soil is priceless."

## LOOKING OUT FOR THE WILDLIFE

Along with my love for working with trees is my love for gardening--mainly fruits and vegetables. Pollinators play a big part in gardening. I make use of any unplanted ground by using cover crops--both summer and winter crops. The cover crops are usually mixes of seeds, such as sunflowers, buckwheat, and millet. Here in South Carolina, our weather can be warm in winter and the pollinators come out. I have shrubs around the farm that bloom early. 'Winter Honeysuckle' (*Lonicera fragrantissima*) begins blooming in January, picks up in February, and is still flowering in March. By this time the maples are blooming. I follow the suggestions of Doug Talamy, whose books tell you which plants help to support the most insects and wildlife.

# EMERALD ASH BORER IMPACTS

The borer seems to prefer larger, older trees. Our fourteen-year-old planted ash trees have leafed out this year with only a few affected trees, although some seem to be struggling. We rejected the use of the suggested systemic chemicals since they kill pollinators indiscriminately. The alternative was to cut all of the trees down before May, when the borer exits the tree (although the borer might still mature in the down timber). The ash trees were not large enough for lumber, but we figured we could make use of the trees for firewood, as both houses on the farm are heated with wood. So we bought a small feller-buncher that fits on our skid-steer, which we found to be a great tool for our pre-commercial thinnings. We did not start cutting trees, however,  because we learned of an alternative using a parasitoid wasp. This is where we are now.

"The loss of our native Ash made us very sad. We had some really large, beautiful specimens. They had been very prolific with their seedlings. We have baby Ash trees all over the farm."

YOUNG ASH STAND

DYING MATURE ASH

# Getting forest management assistance

The Regional Forester and the Forest Service entomologist came to the farm and confirmed our problem. This was the first documented occurrence of EAB in the state. When the forester and entomologist came to see the Ash trees, we took them first to the large native ash along one of the streams. Some of the trees were still struggling to stay alive. They pointed out the abundance of epicormic growth (often a stress response). The entomologist removed some of the bark, revealing the grid (gallery) work of the borer. We also felled a tree for him to check for borer at the top of the tree; it was there. One option was for us to cut down all the trees before May, when the insect emerges. However, when we received an email asking if we would like to have a release of a parasitoid wasp, we answered "Yes!"

"When we discovered emerald ash borer, we immediately contacted our Regional Forester."

# POTENTIAL SILVER LININGS

The planted ash trees are in a section of bottomland that has wet areas and drier areas. If it is necessary to clear-cut the ash, we are considering establishing a 14-acre nature preserve with many different flora and fauna sites. Everyone in the family is interested in the nature preserve as a replacement for the Ash plantation; each person wants to take an area to try out their ideas. For now, we will watch the Ash plantation and hope that some individual trees might show some resistance.

# EMERALD ASH BORER

Emerald ash borer (*Agrilus planipennis*, or EAB) is native to Asia and is believed to have arrived in the United States via wood materials shipped from China. The first EAB detected in the U.S. was found in Detroit, Michigan in 2002, and it has since rapidly spread across 35 states. This small beetle is capable of large-scale destruction, and is estimated to be responsible for the loss of hundreds of millions of ash trees in North America.

Emerald ash borer has four life stages: egg, larva, pupa, and adult beetle. Adult beetles emerge in late spring and mate from May to September. Eggs are laid on healthy ash trees, between layers of outer bark and in cracks and crevices of the trunk and major branches. Larvae hatch seven-ten days later and bore into the tree. They begin feeding on the inner bark, then move on to the outer sapwood and xylem as they develop. This feeding behavior creates tunnels, or "galleries" which disrupt the tree's ability to uptake critical minerals, nutrients, and water. Larvae overwinter in these galleries and typically pupate in April as temperatures warm. After about two weeks, adult beetles chew D-shaped exit holes through the bark and emerge from the ash trees. Adult emergence typically starts in late May, peaks in June, and can continue throughout the summer. Adult beetles live for one-two months and are active during the day, feeding on the leaves of ash trees. If left untreated, trees typically die within three to five years after infestation.

## Larvae

Photo: Pennsylvania Department of Conservation and Natural Resources

## Pupae

Photo: USDA Forest Service, 2004

## Adult

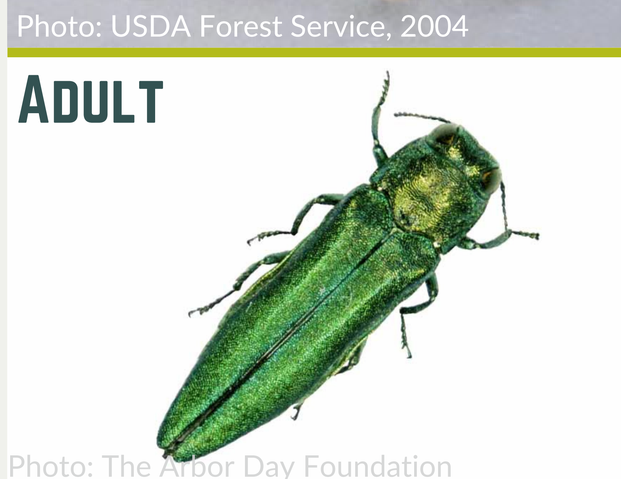
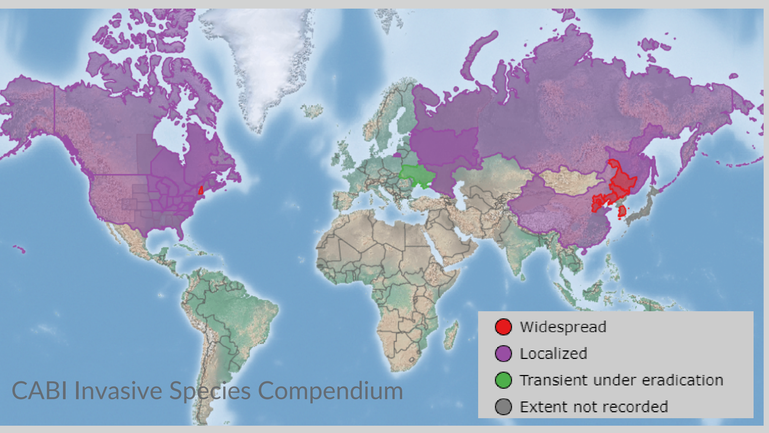


Photo: The Arbor Day Foundation

## Where it's found




Originally from eastern Asia, EAB has spread across North America into 35 US States and 5 Canadian provinces. European nations are bracing for future infestations of EAB, as it is expected to spread west out of Russia, where it has already been detected. These beetles can infect all sixteen species of ash trees found in the USA including *Fraxinus americana*, *Fraxinus pennsylvanica*, and *Fraxinus nigra*. EAB can also complete its lifecycle using the white fringetree, *Chionanthus virginicus*. In Asia, EAB usually targets weakened trees; however, in North America it is capable of decimating entire stands, indiscriminately killing both small and mature American ash trees, regardless of their condition.

# Beetle impacts

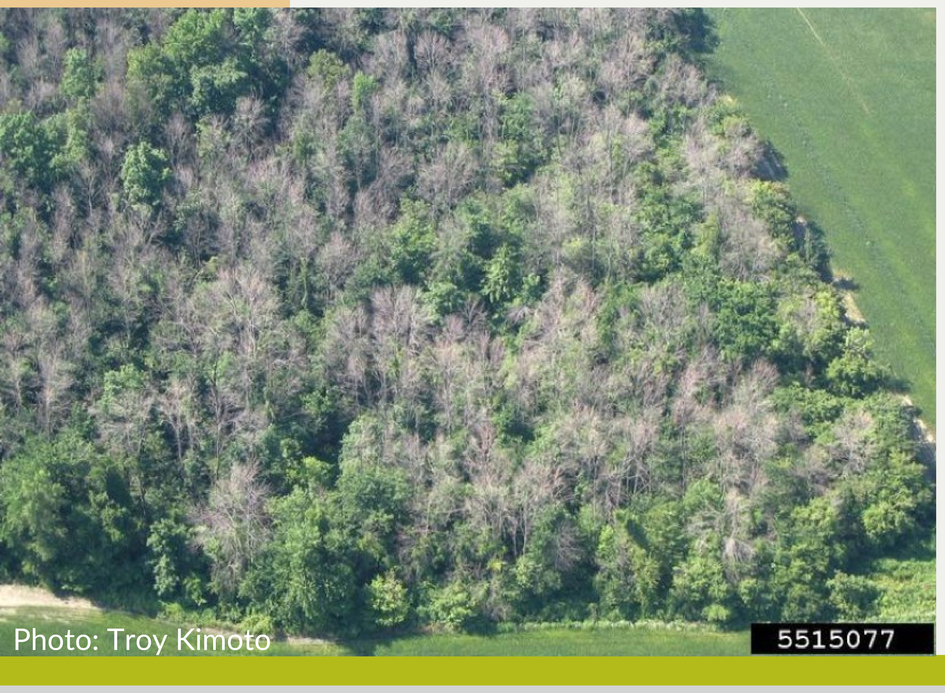


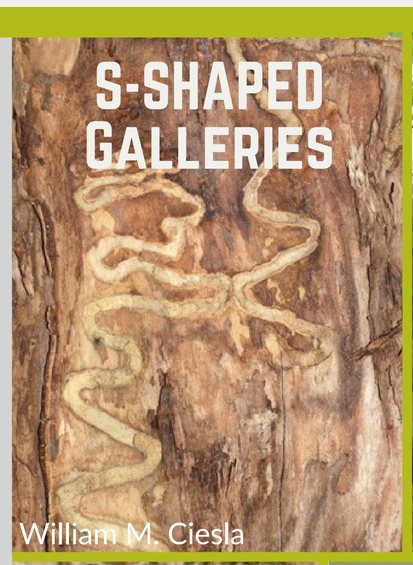
Photo: Troy Kimoto

The 8 billion ash trees across the United States are both economically and environmentally significant to the broadleaf forest and urban communities in which they grow. Once EAB has infected a stand, there is greater than 99% mortality expected within six years. This reduction in the forest canopy may leave forest communities increasingly vulnerable to invasive species that seize on the increased light levels reaching the understory. EAB is estimated to cost the U.S. approximately $1.6 billion annually for the removal/treatment of infested trees, loss of timber, and reduction in property values. The loss of ash trees will negatively impact forestry, urban green spaces, forest health, and biodiversity, particularly for the 44 species of native insects that rely solely on ash trees--insects that are themselves important food sources for native nesting birds.

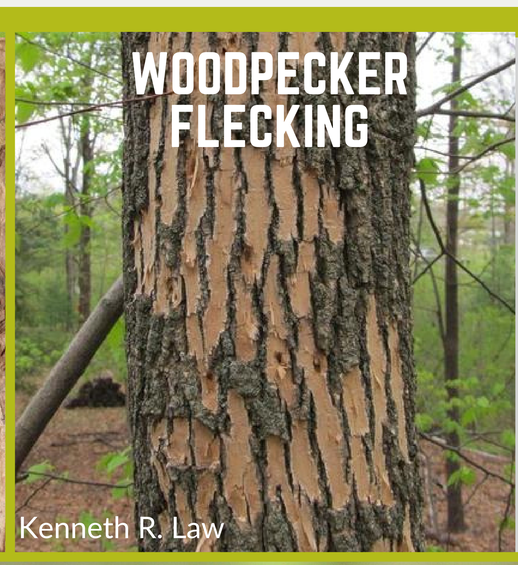
# What to look for

It can be difficult to detect an early infestation of EAB, but there are signs that may be present when a tree is infested. Keep an eye out for these symptoms:

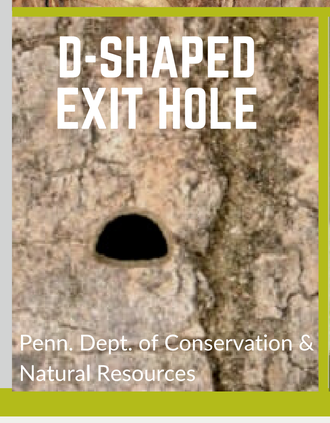
- Bark deformities, including S-shaped larval galleries, D-shaped exit holes, or vertical bark splits 5-15 cm long.
- Increased woodpecker activity and woodpecker flecking (peeling off layers of bark) as the birds feed on the EAB larvae.
- Epicormic shoots (suckers) growing from the base of the trunk, indicating that the tree is under stress.
- Leaf notches from adult EAB feeding on leaves.
- Dying branches, yellowing foliage, or thinning of the tree crown.



William M. Ciesla



Kenneth R. Law



Penn. Dept. of Conservation & Natural Resources

Debbie Miller

# Forest management implications

Although EAB is usually detected years after initial infestation, there are steps that landowners can take to both prevent and treat EAB. Keep updated on the spread of EAB in your area; if your property is within 30 miles of a known infestation, then your trees may be at risk.

Emerald ash borer is often spread through the transportation of firewood. To avoid bringing EAB to your property, buy wood locally and use precautions when moving or transporting firewood. Several systemic or soil insecticide treatments are available for treatment of trees that are at risk of or have minimal damage from EAB infestation, but these treatments are expensive and must be repeated annually to maintain resistance. Researchers are investigating several parasitic wasp species as potential biological control agents of EAB. Trees that are significantly infested (with greater than 50% canopy thinning) should be removed via mechanical destruction. If using infested trees for firewood, it is recommended to apply heat treatment or leave the wood on site for two years prior to transportation, to allow for EAB population to completely die out.

**If you suspect an emerald ash borer outbreak on your property, contact the USDA EAB Hotline at 1-866-322-4512.**

# Further Resources / References:


1. 10 Recommendations to Help You Manage Ash in Your Woods in the Face of EAB and Climate Change
2. Tree Health Guide - Emerald Ash Borer: https://www.arborday.org/trees/health/pests/emerald-ash-borer.cfm
3. What is the Emerald Ash Borer?: https://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/What-is-the-EmeraldAshBorer.pdf
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5. Gandhi KJK, Herms DA. North American arthropods at risk due to widespread Fraxinus mortality caused by the Alien Emerald ash borer. Biol Invasions. 2010;12(6):1839-46
6. A Visual Guide to Detecting Emerald Ash Borer Damage: https://cfs.nrcan.gc.ca/pubwarehouse/pdfs/26856.pdf
7. Emerald Ash Borer Information Network: http://www.emeraldashborer.info/
8. Insecticide Options for Protecting Ash Trees from Emerald Ash Borer: http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf



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