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Upcoming Events - Save the Date!

June 25-27, 2019 - Seventh Sudden Oak Death Science and Management Symposium; Presidio, San Francisco, CA

June 28, 2019 - Eucalyptus by Dr. Matt Ritter and Dr. Jenn Yost; La County Arboretum, Arcadia, CA

August 15-16, 2019 - California SAF Summer Meeting; Mammoth Lakes, CA

September 20-21, 2019 - Symposium: Climate Change and the Ecology of Sierra Nevada Forests, UC Merced, Merced, CA

Invasive Shot Hole Borers: Not all Ambrosia Beetles are the Same



Invasive Shot Hole Borer Adult. Photo by: Curtis Ewing

Many ambrosia beetles colonize recently dead trees, but some attack stressed trees that are still alive and a few species attack healthy trees. The invasive shot hole borers (*Ewallacea* spp.) are an important invasive ambrosia beetle that attacks many species of healthy trees. The Invasive Shot Hole Borers (ISHB) in California consist of two physically identical species, the Polyphagous Shot Hole Borer (PSHB, *Ewallacea whitfordiendrus*) and the Kuroshio shot hole borer (KSHB, *Ewallacea kuroshio*), originating from Southeast Asia. These beetles are very small, about the size of a sesame seed and are believed to have been accidentally introduced into California on wood

products and/or packing material. They attack and reproduce in many types of trees including commercial avocado groves, common landscape trees and native trees found in urban, wildland and riparian environments. ISHB was first identified in Los Angeles County in 2012 and since then, the infestation has spread to six other Southern California counties: Orange, Riverside, San Bernardino, San Diego, Santa Barbara and Ventura.

Upon infestation, tree death is caused not from direct beetle injury, but rather by the fungi they carry in their specialized mouth parts. Both species of ISHB carry three different fungi in these mouth parts, and these fungi are the sole food source for these beetles. When the beetles make galleries in the host tree, they inoculate with these fungi. The larvae and adults then feed on the fungi, forming a symbiotic relationship between the fungi and the beetle. One kind of fungi that they carry, *Fusarium*, causes the disease known as *Fusarium Dieback*.

The fungus destroys the vascular system of the tree, which causes branch and crown dieback, and in many cases tree death. Currently there are 64 confirmed species of trees in which these beetles can successfully grow and complete their life cycles. The susceptible tree species include box elder (*Acer negundo*) California sycamore (*Platanus racemose*), oaks (*Quercus lobata*, *Q. robur*), willows (*Salix gooddingii*, *S. laevigata*, *S. lasiolepis*), maples (*Acer buergerianum*, *A. macrophyllum* and cottonwood (*Populus fremontii*, *P. trichocarpa*). For a more complete host list please visit www.phsb.org.



Crown dieback and staining on California Sycamore caused by ISHB infestation. Photo by: Kim Corella



Female abdomen protruding from entry hole on California Sycamore. Photo by: Kim Corella, CAL FIRE

Symptoms of ISHB attack vary with the tree species attacked, but there are commonalities:

- A small beetle entry hole (0.8 mm wide), about the size of a medium ballpoint pen tip, that the beetle makes when excavating their galleries.
- Wet staining, gumming, white powdery exudate and/or frass, associated with the beetle entry hole.
- Branches in the tree crown may die back. Crown symptom could be a sign of a severe infestation and the tree should be checked closely for ISHB entry holes.

Management of landscape trees requires regular monitoring, early detection survey for infested trees, and managing infested wood properly. Only infested trees should be treated. Trees infested with ISHB can rapidly become hazardous, as limbs and branches break and fall due to pathogen colonization and mechanical damage from beetle galleries. So far there are no effective preventative treatments, so best management practices are essential to control the spread of these insects and their associated disease fungi.

When an infested tree is found, disposal of infested wood is essential because ISHB can survive in cut wood for weeks or even months. The best disposal method is to chip and treat the infested wood -- chipping infested wood to 1 inch or less will kill 95% of the beetles. The chips should then be treated by solarization, composting or kiln-drying to ensure all beetle and fungal propagules are eliminated. Untreated chipped material should only be used in areas that are already heavily infested with ISHB.

For more information please visit www.pshb.org.

Forest Management Task Force

Healthy forests provide many environmental, health and economic benefits and the members of this task force strive to increase the health and resiliency of our forests. Please visit the [California Forest Management Task Force](#) for more information.

Tree Mortality and Future Wildfires

A consortium of scientists led by UC Berkeley professor Scott Stephens has published a new overview of the relationship between California's massive tree mortality and future wildfire-read it here: [Drought, Tree Mortality, and Wildfire in Forests Adapted to Frequent Fire](#).

Newsletter feedback and ideas are welcome. Please submit comments to caforestpestcouncil@gmail.com.

When buying firewood for camping or home heating this fall, remember to buy wood sourced local to where you will be using it, helping to minimize the spread of pests and diseases - **Buy It Where You Burn It**. For a list of local firewood dealers, go to firewoodscout.org.

Sincerely,

The California Forest Pest Council



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