

Shot Hole Borer

Presented by County of San Diego
Department of Parks & Recreation
Department of Agricultural Weights and Measures
Department of Public Works
UCCE Farm and Home Advisor

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Agenda

- * Shot Hole Borer overview
- * San Diego known locations
 - * Risks
- * Containment Strategy
 - * Partnerships
 - * Next Steps



Shot Hole Borer Background



Photos from University of California

http://eskalenlab.ucr.edu/handouts/pshb_symptomsandlookalikes.pdf

Sub-species

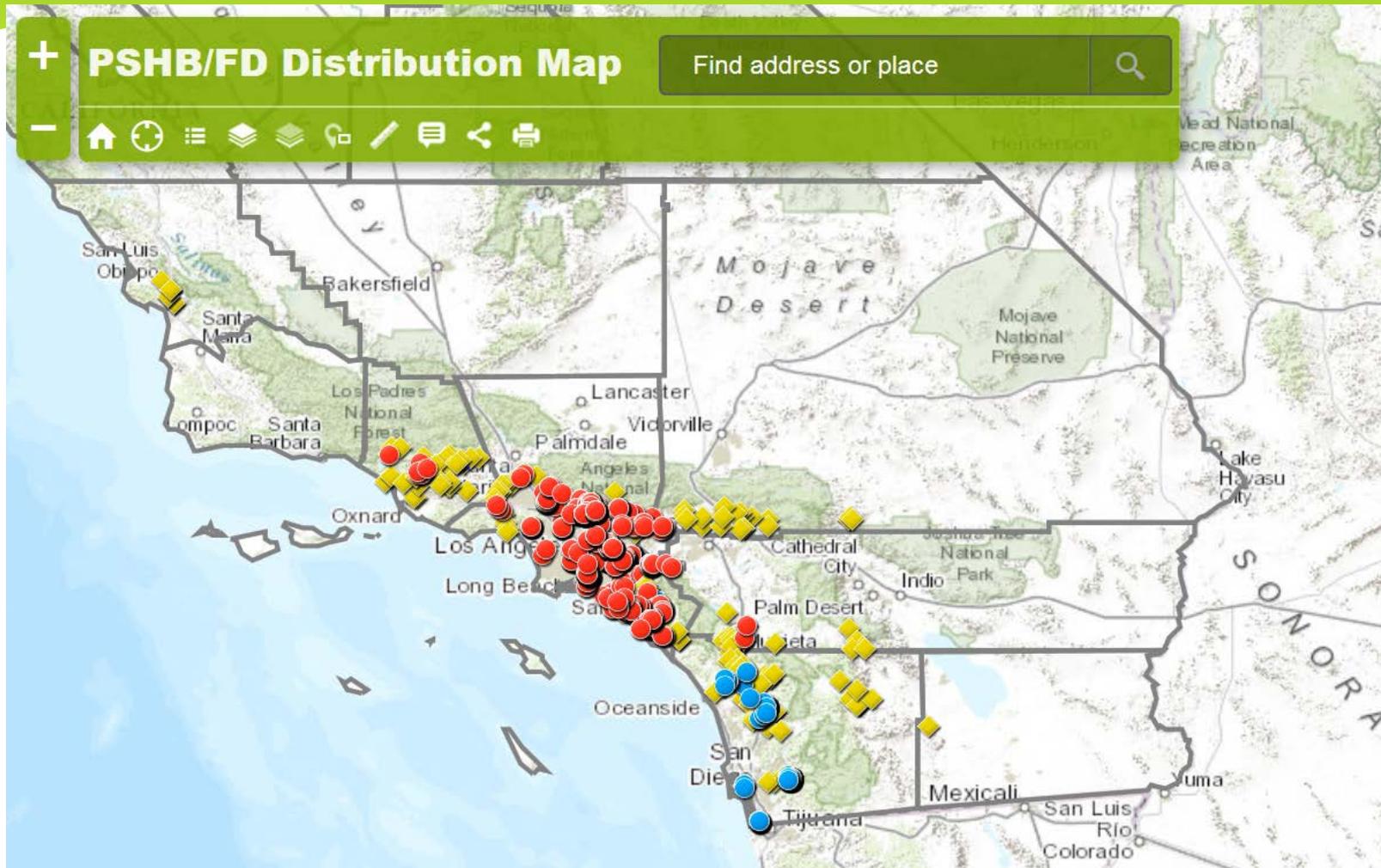
***Polyphagous Shot Hole
Borer (PSHB)***

***Kuroshio Shot Hole Borer
(KSHB)***

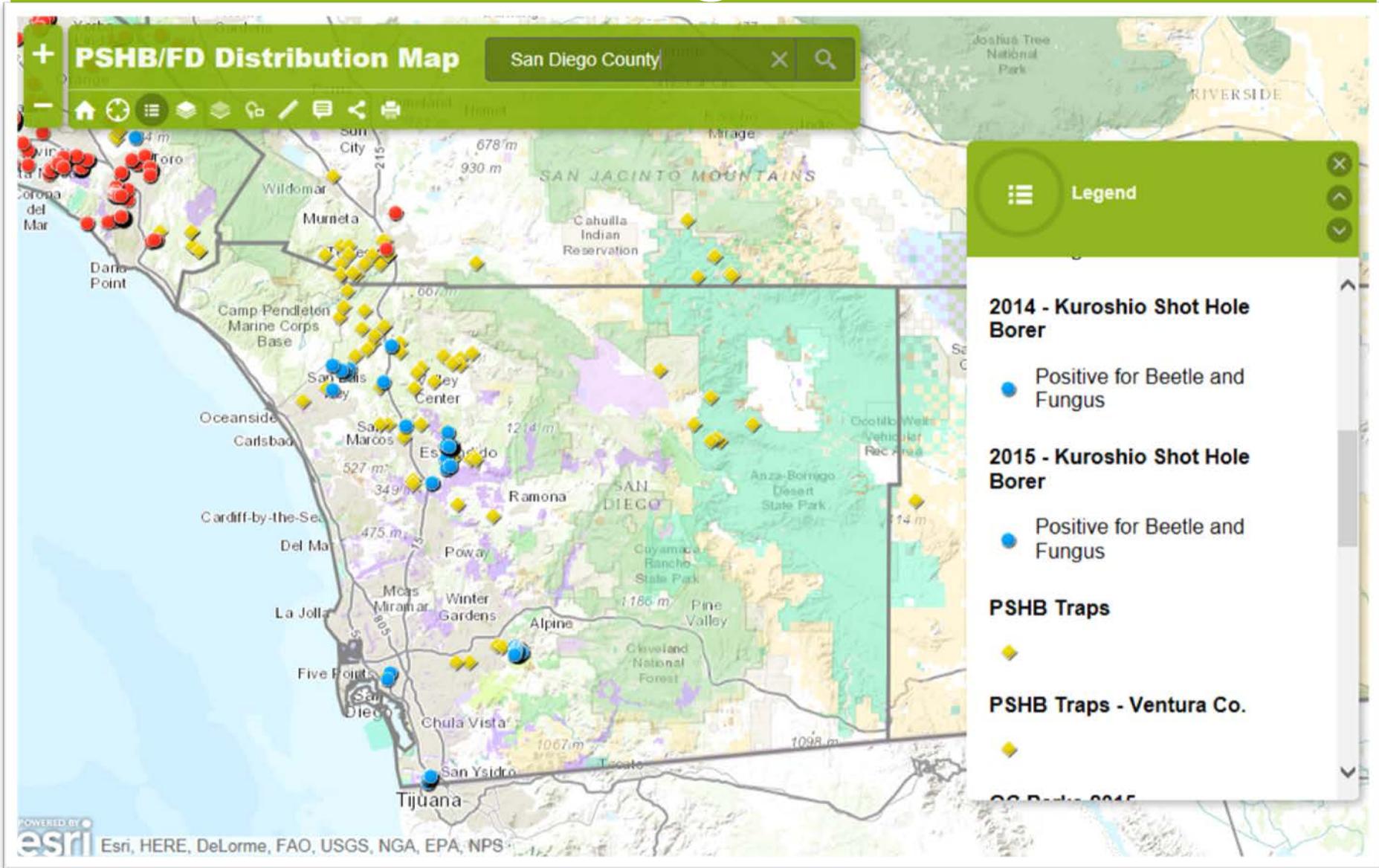


Identical in appearance and behavior. Only distinguishable by DNA.

Region Wide Map



San Diego Map



Host Trees

The Shot Hole Borer has **38 hosts** and attacks **more than 200 species** of trees

Avocado

California Sycamore

Coast Live Oak

Red Willow

Cottonwood

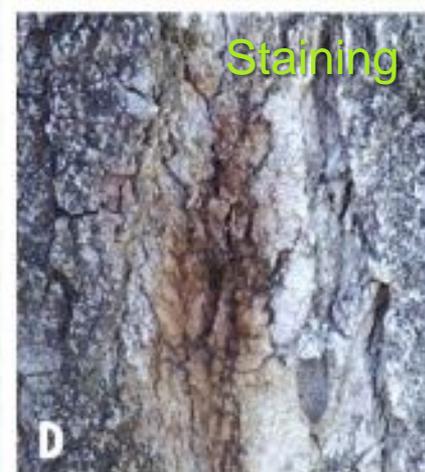
Arroyo Willow

Black Willow

Castor Bean



External Signs + Symptoms of Shot Hole Borer



External Signs + Symptoms of Shot Hole Borer



Tree trunk (~4-6" in diameter) showing heavy infestation as evidenced by bore holes and large amounts of frass.

External Signs + Symptoms of Shot Hole Borer



A dead section of Castor Bean showing extensive damage, and heavy growth of Castor Bean below dying willows, both affected by Shot Hole Borer.

Photos taken by AWM, November 2015 in TRVRP

A full list of known reproductive hosts can be found on eskalenlab.ucr.edu

Internal Damage

Even the smallest remaining living branches on this willow tree showed extensive burrowing damage from Shot Hole Borer, this branch was less than $\frac{3}{4}$ " (18 mm) in diameter. The trunk diameter on this tree was over 10" (250 mm) and the crown was completely killed, only a few small shoots had green leaves.



Photos taken by AWM, November 2015 in TRVRP

How Does it Spread?

Shot Hole Borers can fly 1-2 miles

- * From tree to tree
- * Fallen limbs
- * Water courses
- * Transportation of wood and chippings
- * FD may spread from infected equipment

HELP STOP THE SPREAD OF INVASIVE PESTS & DISEASES.

Our forests are threatened by nonnative insects and diseases that can kill large numbers of trees. Goldspotted oak borer, sudden oak death, pitch canker, emerald ash borer, and Asian longhorned beetle can be transported long distances on firewood. Once transported to new areas, these insects and diseases can become established and kill trees.

HOW YOU CAN HELP!

- Leave firewood at home - buy or collect firewood where you camp.
- Use firewood in the same county or region where it was cut.
- Bring only what you'll need, and burn responsibly.

BUY IT WHERE YOU BURN IT.

firewood.ca.gov

DONT MOVE FIREWOOD.org





Polyphagous Shot Hole Borer + Fusarium Dieback Prioritizing Management Efforts

HOW TO USE THIS CHART

This chart is intended to help inform PSHB management decisions. Consider potential safety hazards, tree value (economic and ecological), available resources, and other factors unique to each situation when using this tool.

REPRODUCTIVE HOSTS

A reproductive host is a species that supports 1) PSHB reproduction and 2) growth and development of the beetle's symbiotic fungi. These species are currently the priority for control efforts as they can produce more beetles that may spread the infestation. Some of the more susceptible reproductive hosts appear to be box elder, castor bean, avocado, coral, and several species of sycamore, willow, and cottonwood. See the full known reproductive host list at eskalenlab.ucr.edu.

HAZARD: LIMB FAILURE

The point of attachment between a tree branch and the main stem is called the branch collar. A PSHB infestation in this area poses a serious safety hazard: a weakened collar may not be able to support the weight of the branch, creating potential for limb failure.

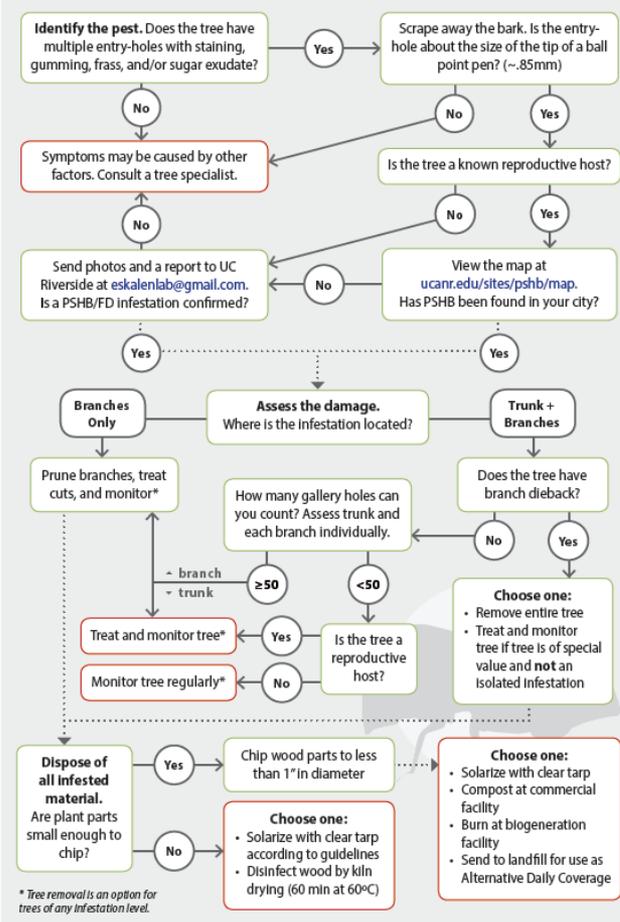
Infested trees—including those that have been treated or pruned—must be regularly monitored so that hazards can be identified and removed. When monitoring, consider beetle attacks in the branch collar as part of the branch.



AUTHORS

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IDENTIFYING + MANAGING PSHB: SUGGESTED STEPS



Prevention

- * Education & Outreach
- * Early Identification is key
- * Cut back and treat infected areas to prevent spread
- * Continued monitoring
- * Limit transportation of infected wood

Treatment/Containment



Polyphagous Shot Hole Borer + Fusarium Dieback How to Handle Infested Plant Material

CURRENT OPTIONS

Options for handling infested plant material include the following:

- Chip (less than 1") + compost
- Chip (less than 1") + solarize
- Cut logs + solarize
- Chip (less than 1") + deliver to landfill for use as Alternative Daily Coverage
- Cut logs + kiln-dry

Guidelines for effective solarization and composting are included below.

****If relocating infested material, cover in-transit to prevent beetles from escaping****

SOLARIZATION GUIDELINES

Solarization is a suitable method for handling either infested chips or logs. When done properly, solar energy will heat plant material until both the beetle and fungi are killed. It is most effective during the peak of summer, when temperatures are higher and days are longer, but may be used during the rest of the year as long as time and space can be committed.

Follow these tips for proper solarization:

- Use sturdy plastic sheeting/tarp (clear is recommended) that can withstand rain/wind
- Fully contain chips/logs by wrapping plastic both underneath and over the material
- During July - August: cover chips/logs with sturdy plastic for **at least 6 weeks**
 - Temperatures during these months should be regularly above 95°F
- During September - June: cover chips/logs with sturdy plastic for **at least 6 months**
- **Keep log/chip layers as thin as possible** (2 logs deep maximum) to ensure even heating throughout the pile

PRUNING BMPS

Poor pruning practices can facilitate the spread of plant disease. For pruning and tool sterilization tips, see UC Riverside's "Best Management Practices for Disease in Oak Woodlands" (Lynch and Eskalen 2014).



Chip - Tarp and solarize – Keep on site - Clean all equipment - Controlled burn

Risks

- * Public Safety:
 - * Deadfall via wind/rain
 - * River blockage / flood control
 - * Fire
- * Agriculture
- * Urban Trees
- * Habitat Loss



Impacts in TRVVRP

Tijuana River Valley Regional Park

Approximately 75% of TRVVRP is Infected by Shot Hole Borer



Map Created 12/31/2015



Strategies Moving Forward (TRVRP)

- * 1st priority: public safety
 - * Trim & treat dead limbs/trees along public areas
 - * Staging areas, recreation areas, gardens, trails
 - * Trim & treat dead limbs/trees that present threat to flooding
- * 2nd priority: containment
 - * Treat perimeter of known infested areas
- * 3rd priority: public outreach
 - * Educate public on signs and treatment

Partnerships

- * Universities
- * SANDAG
- * Resource Agencies
- * Army Corp of Engineers
- * Cities

Resources

Helpful Links:

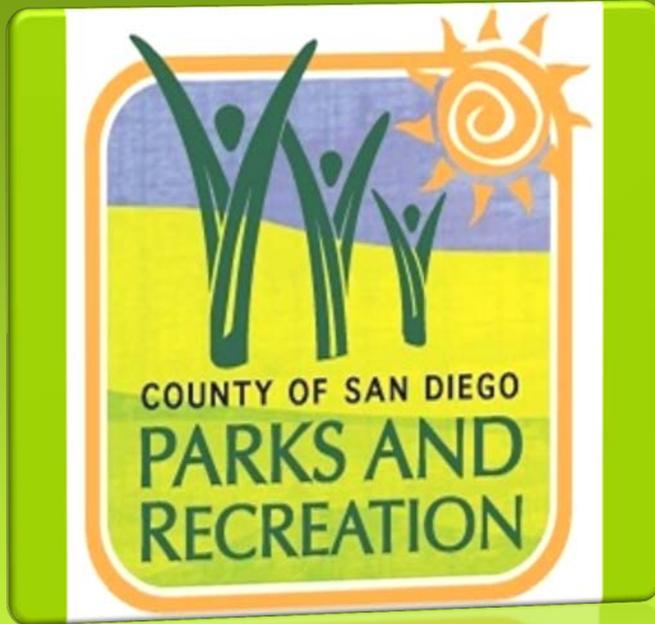
- * [PSHB profile sheet](#)
- * [Symptoms and lookalike predators](#)
- * [Map of affected areas in Southern California](#)
- * [Misc. info sheets and hand-outs](#)
- * [County of San Diego Department of Agriculture, Weights and Measures](#)
- * [County of San Diego Farm and Home Advisor Office](#)

Suspected tree infestations can be reported at this link: www.pshb.org

Next Steps

- * Education and Outreach
- * Clean-up & Containment
- * Restoration





Questions?

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