

**SANTA MONICA MOUNTAINS BAD BEETLE WATCH**

**Polyphagous Shot hole borer (*Euwallacea* sp.)**



**Goldspotted Oak Borer**

Photos courtesy of the University of California  
Agricultural and Natural Resources

## WELCOME!

Thank you for joining our volunteer community science team to learn more about the Polyphagous and Kuroshio Shot Hole Borer beetles (collectively known as Invasive Shot Hole Borers, ISHB, or BAD BEETLES) and other emerging tree pests!

ISHB are invasive wood boring beetles that attack numerous native and non-native trees in Southern California, including commercial avocado groves. While these beetles mechanically damage trees by boring galleries (caves) into trunks and branches, both beetles also carry a fungal disease called Fusarium Dieback. This fungus is “farmed” by the beetles as food and supports their reproduction. Trees that become infected with this fungal disease are prone to branch dieback, canopy loss, and mortality. Mortality can occur quickly within 1-5 years. A conservative estimated rate of spread is 1.5 to 2 miles a year. This is, however, drastically increased by humans as we transport infected wood. In Southern California, the drought has already weakened many trees and now they must fight infestations as well! To learn more about the pests threatening native oak trees, visit

[https://ucanr.edu/sites/socaloakpests/Resources\\_on\\_oak\\_pests/](https://ucanr.edu/sites/socaloakpests/Resources_on_oak_pests/).

Your participation will detect early infestations and allow us to get a clearer picture of the spread of ISHB in the Santa Monica Mountains National Recreation Area. This knowledge will assist us, and many other conservation agencies, plan for management. While this beetle/disease complex can affect hundreds of tree species, this survey will focus on six species: a native box elder, two native willows, two sycamores (one native and one non-native) and one oak tree species. These species are a few of many known reproductive hosts (these are trees where all life stages of the beetle have been found. For a complete list, visit [www.pshb.org](http://www.pshb.org)). Box elder trees (*Acer negundo*) are few in the Santa Monica Mountains and are found in the sensitive riparian zone. The arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) are early detection systems, and often the first species to show infestation. They are also found in the sensitive riparian zone. The non-native London plane sycamore (*Platanus x acerifolia*) is commonly found planted in wildland-urban and urban areas. The native California or western sycamore (*Platanus racemosa*) is commonly found in wildlands (usually near a creek, or riparian, environment) and planted in urban areas. The coast live oak (*Quercus agrifolia*) is also found in both wildland and urban environments. All are highly susceptible to pests, and both the trees and the pest damage are easy to see.

The Goldspotted Oak Borer (GSOB) is another beetle threatening to spread into the Santa Monica Mountains. This borer attacks only oak species and is usually found in the bark. While it is not found in our mountains yet, we must keep an eye out! Evidence of GSOB attack includes staining, oozing, chipping on bark from a woodpecker eating the larvae, and small D-shaped exit holes on only oak trees. In 2017, one GSOB was found in Idyllwild by a volunteer who had attended a GSOB education and outreach event. The volunteer then used the online reporting system at [www.gsob.org](http://www.gsob.org) to report the find. Early detection systems work!

## FREQUENTLY ASKED QUESTIONS

### **Where can I learn to identify invasive shot hole borers?**

Go to [www.pshb.org](http://www.pshb.org) for an amazing online class that takes less than half hour to complete. Visit [www.gsob.org](http://www.gsob.org) to learn what a GSOB looks like!

### **Can I set up my survey along my daily/weekly hike route?**

YES PLEASE!

### **What if I don't find anything?**

Please let us know where you looked. It is super important as well! Knowing where the trees are impacted as well as where there is no infestation is important to help us follow changes and rate of spread over time.

**Do I have to do this regularly or is a random hike through the Santa Monica Mountains helpful as well?** Repeat visits to one location are preferred, as that will more clearly show changes over time. If, however, you are hiking somewhere else and see some trees that look infested, it is also helpful for you to take an observation in iNaturalist.

## WHERE TO LOOK

**Anywhere you regularly walk or hike!** The more eyes looking the better.

Identifying the extent of infestations requires an iterative process of detection and monitoring.

California's statewide monitoring system has a list of high-risk areas. Most of these areas are in places where wood is being transported, processed, and/or used, such as:

- trailheads and campgrounds
- parks and recreation areas with grills
- botanical gardens
- universities and school campuses with susceptible host tree species
- green waste and landfill facilities, and routes to them
- landscape management areas (Homeowners Association green spaces, etc.)
- tree nurseries, box stores selling trees and firewood
- firewood sellers, Craig's list review for firewood sellers
- firewood processing facilities
- wildfire boundaries

Other areas that are at high risk of infestation are:

- located along the leading edge of a known infestation
- contain a host species of concern (such as a box elder or California sycamore)
- a sensitive location, such as riparian areas and drainages, or where endangered species are found

A map of where ISHB have been found is available at <https://ucanr.edu/sites/pshb/Map/>.

## HOW TO START

**IMPORTANT: Do this FIRST where you have service or connection to the internet!!**



iNaturalist is a commonly used tool to help quickly identify various types of species.  
You will be using this app to help detect and report instances of bad beetles.

Thank you!

### **Task #1 – Install iNaturalist on your smartphone:**

-For Apple iPhones-

1. Tap the app store on your phone.
2. Go to search and type in iNaturalist.
3. Download the free iNaturalist app (just the plain iNaturalist, not Seek by iNaturalist).  
Seek is also a fun app and totally recommended!

-For Android smartphones-

1. Tap the apps icon from your phone's home screen (it looks like several dots or small circles in a square).
2. Go to the Play Store.
3. Find the search bar at the top and type in iNaturalist.
4. Download the free iNaturalist app (just the plain iNaturalist, not Seek by iNaturalist).  
Seek is also a fun app and totally recommended!

**VERY IMPORTANT FOR ALL SMARTPHONES!!!!**

### **Task #2 – Check that location services are turned on in your phone:**

Be sure to turn on the GPS locator on your phone. This is ESSENTIAL for determining your location. Even if you do not have cell phone service at the time when you take photos with iNaturalist or your phone's camera, your GPS location will be saved to that photo.

#### **How to turn on location services on your phone:**

-For Apple iPhones (may vary depending on iPhone version) -

1. Go to Settings.
2. Look for the Privacy menu. Look for Location Services and make sure this is turned ON.
3. Scroll down until you find iNaturalist. ALLOW LOCATION ACCESS while using the app.
4. Or, in case you need to use your phone's built-in camera, be sure to find Camera in the same menu as iNaturalist. ALLOW LOCATION ACCESS while using the app.

-For Android smartphones (may vary depending on phone version) -

1. From your home screen, enter Settings menu.
2. Tap on Location Services or Location Access.
3. If your phone shows "High Accuracy" anywhere, turn that on as well.

**Alternatively**, if you choose to use a digital camera with GPS capability, please turn on that capability. We should be able to collect GPS information from the photo files you submit. You will need to collect data then email photos and data sheet to Rachel Burnap at [rburnap@rcdsmm.org](mailto:rburnap@rcdsmm.org).

### **Task #3 – Join iNaturalist:**

1. Sign up for an account through the app on your phone or on your computer at [iNaturalist.org](http://iNaturalist.org).
2. Join the Santa Monica Mountains Bad Beetle Watch project.

3. To do this on your phone's iNaturalist app, click on the three "dots" in the lower right corner.
4. Bring up a search bar by clicking on the small magnifying glass in the top right corner. Type in "Santa Monica Mountains Bad Beetle Watch". Once it goes to that page, find and click the "Join" button. That's it! You are ready to make your first observation!

If you want to know more about using iNaturalist, please visit these online tutorials:

- Getting Started - (<https://www.inaturalist.org/pages/getting+started>)
- Video Tutorials - (<https://www.inaturalist.org/pages/video+tutorials>)

Learn more about the ISHB and GSOB directly from the iNaturalist app. From the iNaturalist phone app, click on ACTIVITY (to the left of the Observe button), then NEWS (at the upper right corner). This will show clickable links to an online plant ID pdf, ISHB and GSOB guides online.

## COLLECTING DATA

**Task #1** – Pick a location with trees you want to monitor:

- 1) Choose a location close to you or another location where there is a mature stand of red or arroyo willows, California sycamores, coast live oaks, or London plane trees. Pick trees that have a diameter at breast height over 4" (trees under 4" are rarely infected). If it is winter and the deciduous trees (all trees but the coast live oak) have lost their leaves, look at the ground for a leaf to examine. Pick a stand of trees that will be easy to remember the location of. Riparian areas with willows and landscape areas with box elder trees are also of concern. The ideal stand for monitoring is 3-6 trees but could be an individual tree in your back yard, or a stand of 10 trees in a park or along a trail.
- **Keep in mind that it must be SAFE location and one where you have permission to enter. Be aware of traffic – cars, bikes, etc. and uneven surfaces. When examining trees that may be off trail, be sure to look where you are walking! Keep an eye out for large amounts of ants, rocks, gopher holes, and rattlesnakes. When working in long grasses, check your surrounding (and yourselves!) for any other animals, such as ticks. We always recommend working in pairs!**
- 2) While not necessary, determine if you want to monitor multiple stands in one site (for example, Harmon Park in Ventura has sycamores on both sides of a flood control channel. Each side containing a group of 4-5 trees would be considered a separate stand).
- 3) For each stand of trees at the site, choose a photo point that you can **easily locate again**. Ideally, you want to return to the same point to take a picture each time you visit. Good candidates for photo point "markers" are a street corner, a unique rock or plant, features found along a sidewalk, or bathrooms/water fountain/tennis court/playground, etc.
- 4) **Remember, trees that are infected and are NOT infected are both important!**

**Task #2** – Observe the first tree:

- 1) Walk around the tree and look for signs of infestation: staining, gumming, frass, exuding sugar, and any visible bore holes. Pay special attention to the north side of the tree but do

walk around the entire tree. Focus your effort 2 feet above and below (for a total of 4 feet) the 4.5 ft (breast height) above the ground. This does not need to be exact. On willows and sycamores, often the first signs of infestation are conveniently found near eye level, but ideally you should examine from about 2 feet to 6 feet off the ground. Oak infestation is usually seen first on the branches.

**Task #3 – Take four photos of each tree with iNaturalist:**

- 1) You will take four photos for EACH TREE in your chosen stand/s. To help with locating your trees next time, you may choose to assign a reference number to each tree. You could number trees from left to right, or clockwise if that makes more sense to you. One idea is to place a piece of duct or painters' tape with the reference number on it. This way your photo will include the reference number.
- 2) From the iNaturalist app, click the OBSERVE button on the screen bottom to bring up the camera. Following the photo guidelines found below, take the first photo. If you are satisfied with it, click on the green NEXT button. To take photo 2 of the same tree, click on the BOX WITH THE PLUS sign in the upper left corner. Take the next two photos in the same manner for a total of four photos.
- 3) **Alternatively**, you can take each picture with the normal camera app and then click OBSERVE and select the images from your photo timeline. Again, make sure that location services are turned on.
- 4) **iNaturalist will save your photos in the app and in the app where your phone's pictures are stored.**

Some photo guidelines to keep in mind:

- **The image must be very clear** (we can't tell anything from an image that is out of focus).
- Please wipe off your camera lens.
- Having the sun at your back will reduce glare in your photo.
- Please take each set of photos in the same sequence.

**Photo 1 – Close-up of the hole with a pen or pencil.**

The first image should be of the beetle hole and include the point of a pen or pencil for scale and to point out the exact location of the suspected or known beetle hole. Make sure not to cover the hole itself but be within ¼ inch of the hole. In some cases, you may be able to see a black roundish thing poking out of the hole; this is a beetle abdomen.

**If no holes are found and the tree is absent of beetles, skip this photo. Beetle-free trees will only contain three photos.**







**Photo 2 – Photo of the tree trunk showing distribution of holes on trunk and/or branches.**

Place a piece of brightly colored painter's tape or flagging at the highest and lowest point of distribution. This will be the second tree in your series if your first photo contained a beetle hole. If this tree is absent of beetles, take a picture of the tree's trunk.

**Photo 3 – IMPORTANT: Photo of leaves, flowers, and/or fruit to identify tree species.**



**Photo 4 – Photo of entire tree canopy.**

This will be the hardest photo to take. Step back far enough from the tree to see the entire tree canopy. For the best photo, aim to have the sun behind you. Watch your step. If your tree is found in a stand, please place a piece of brightly colored flagging or painter's tape on the trunk of observed tree (not shown in the example photograph).

## Task #4 – Provide data for THIS individual tree:

Repeat for each tree!

- 1) Note: iNaturalist may have different common names for each species. These are the correct common and Latin names:
  - Western or California sycamore (*Platanus racemosa*)
  - London plane (*Platanus x acerifolia*). iNaturalist uses this common name for a different species.
  - Coast live oak (*Quercus agrifolia*)
  - Red willow (*Salix laevigata*)
  - Arroyo willow (*Salix lasiolepis*)
  - Box elder or Boxelder maple (*Acer negundo*)
- 2) If confident with species identification, enter the correct species in the search bar. Otherwise, ignore “What did you see?”
- 3) Under “Notes,” type in ground conditions around the tree – clear dirt, maintained grass, mulch, etc. This is helpful but not required.
- 4) Leave date, time, and location as is.
- 5) Under “geoprivacy” please leave as open or obscured. One note about geoprivacy: if you keep your geoprivacy open, everyone on iNaturalist can see the location at which you took the photo. This may or may not matter to you. If you choose to keep the geoprivacy obscured, a location will be shown but it will not be the true location. It will still be visible to project curators. Private observations show nothing on the map and make it hard for curators to see.
- 6) Ignore Capture/Cultivated.
- 7) Click on “Projects” and turn on Santa Monica Mountains Bad Beetle Watch. This will reveal eight data prompts:
  - a. **Infestation Level** – 0, 1-50, 50-150, or greater than 150. Required.
  - b. **Canopy Health** – Select yes or no. A healthy canopy is over 75% green. Required.
  - c. **Crown Dieback** – Select the percent of crown dieback to the nearest 5%. Required.
  - d. **Tree Circumference at Breast Height** – In inches. You will only need to do this for each tree at the first initial visit. There is no need to repeat. It is not a required field. TO DO: Measure 4.5 ft from the base of the tree up the trunk. HINT – if it’s easier, measure 4.5 feet on yourself at home, then use that as your reference point. Also, take note of where 4.5 feet is on you to use for your monthly survey. Wrap either the measuring tape or a piece of string around the trunk – then measure the length of the string. You’ve now measured the circumference of the tree! If it is a multi-trunk tree, measure the diameter of the largest stem and enter the number of stems. Not required.
  - e. **Number of Stems**. Only for a multi-trunk tree. Again, no need to repeat after first visit.
  - f. **Evidence of Staining, Frass, Both, or None**. Not a required field.
  - g. **Presence of Live Beetles** – None, live beetles found in hole, climbing on trunks, or in flight. Not a required field.



h. **Direction that Most Beetle Holes are Facing** – East, West, North or South.  
Not a required field.

- 8) Click the back arrow.
- 9) **IMPORTANT:** Check to see if your phone has geotagged your correct location by clicking on the location bar (found below the date). Choose either hybrid or satellite view (at the bottom of your screen). You can zoom in and out of the image by moving two fingers together or apart. If you need to correct it, you can move the image to place the tree in the center of the circle than hit save. Note that the accuracy is improved.
- 10) Click the SHARE button and you've made an observation! You may edit your entries through the app or online.

**Task #5** – If documenting more than one tree, repeat tasks #2-#4.

### **What will we do with the data you just collected?**

We will check it first then share it with local county and state agencies.

**Task #6** – In about a month, do over again with, ideally, the same trees. However, any data that is collected is helpful and needed!

### **To edit your data:**

-From the app on your phone-

- 1) Click on ME, found at the bottom of the screen, to the right of the observe button. A list of all observations made will be shown.
- 2) Click on the appropriate one to edit. Click EDIT at the top right corner. From here, anything can be edited.
- 3) To edit observations, click on PROJECT, then turn OFF ISHB of the Santa Monica Mountains. Then turn it back on. All previous answers will still be saved. Make any needed changes.
- 4) Click on back arrow.
- 5) Click DONE at the upper right corner. It is edited and saved!

-Online at iNaturalist-

- 1) Log into your account.
- 2) Under the account name, click on OBSERVATIONS.
- 3) Find the entry to be edited. To edit, click on EDIT. It consists of a *small font size* and is found to the far right of the observation entry.
- 4) Please check location and edit if necessary.
- 5) To look at or edit observation data, click on the down arrow button located to the right of Start Typing Fields. A menu of data fields will appear. Click on each one to see or edit.
- 6) Click SAVE OBSERVATION.

### **Other ways to enter data:**

-Online at inaturalist.org-

- 1) Log into your account.
- 2) Click on UPLOAD at upper right corner. Find and place all photos for a SINGLE TREE.
- 3) Enter species name if confident on species identification.

- 4) **IMPORTANT:** Check metadata associated with photo. Check timestamp (date photo taken), and location. Change if needed.
- 5) Under projects, find ISHB of the Santa Monica Mountains.
- 6) Under fields, enter the observation data.
- 7) At the upper right, click on SUBMIT.

-Email photos and data-

-From your phone or computer, please place all pictures from a SINGLE tree and corresponding data into an email and send to [rburnap@rcdsmm.org](mailto:rburnap@rcdsmm.org). Data includes the eight observation fields from Task #4, Step #7 above. Infestation Level, Healthy Canopy, Crown Dieback, Tree Circumference at Breast Height (only at first visit), if a multi-trunk tree then Number of Stems (only at first visit), Evidence of Staining, Frass, Both, or None, Presence of Live Beetles, and Direction that Most Beetle Holes are Facing.

Please submit any questions or comments to Rachel Burnap: [rburnap@rcdsmm.org](mailto:rburnap@rcdsmm.org)