



The IPSN is carrying out a survey of European oak species in California botanic gardens in order to gain a better understanding of the impact of three beetle pests, which are known to impact USA oak species. We would be most grateful if you could survey the European oak trees in your collection using this survey form. Please use one form per tree and refer to the accompanying poster for further pest identification help.

**Pest 1:** The goldspotted oak borer (GSOB), *Agrilus auroguttatus*, is a flat-headed buprestid (jewel beetle) that poses a major threat to oak trees. GSOB is native to southeastern Arizona, but was first recorded in California in 2004. GSOB larvae feed beneath the bark damaging the xylem and phloem as well as the cambium. Trees die after several years of injury inflicted by multiple generations of the beetle, causing significant economic, ecological, cultural, and aesthetic losses. GSOB poses a severe threat to susceptible oak species throughout California and elsewhere if it spreads.

**Pest 2:** The Two Lined chestnut borer (TLCB), *Agrilus bilineatus*, is native to North America; adults are recognizable as dark coloured buprestids with two golden stripes running lengthwise along their back. Females lay eggs in bark cracks and crevices. Larvae burrow into the tree and form feeding galleries under the bark. These feeding galleries interrupt the transport of food and water in the phloem and eventually girdle individual branches or the entire tree. They cause similar damage to GSOB. Attacks occur in stressed or dying oak (primary hosts) and less frequently American chestnut. Live healthy trees are typically not infested. Attacks usually begin in the crown of the tree, with some branches dying in the first year. Infestations gradually worsen, and the trees usually die in the second or third year. Incidence of attack by two lined chestnut borer increases following stress such as drought or defoliation from other insect pests.

**Pest 3:** The Polyphagous Shot Hole Borer (PSHB), *Euwallacea whitfordiodendrus*, is an invasive beetle that vectors three fungi in the genera: *Fusarium*, *Graphium* and *Paracremonium*. The adult female tunnels galleries into a wide variety of host trees, where it lays its eggs and inoculates the host with the fungi on which the beetle feeds. The *Fusarium* fungus causes a disease called Fusarium Dieback (FD), which interrupts the transport of water and nutrients in over 110 tree species, which can kill the tree. Experts believe the beetles were introduced into southern California via products and/or shipping material from Southeast Asia. The PSHB/FD complex has been found in other locations including Israel and South Africa.

<b>Survey Details</b>	
Name of Botanic Garden / Arboretum:	
Country:	
Address:	
Survey carried out by:	
Date of survey:	
Best description of season:	



Tree Details			
Species (cultivar)			
Accession number:			
GPS (if available)			
Country/region species is native to:			
Age (years):			
General Description of Health			
Generally healthy	✓	Some damage	✓
Dying	✓	Dead	✓
<u>Any recent changes in health or overall look:</u>			

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Generally healthy	✓	Some damage	✓
Dying	✓	Dead	✓
<u>Any recent changes in health or overall look:</u>			



**Pests of *Quercus sp.***

<b>Symptoms Check GSOB</b>	<b>Symptom observed?</b> If possible please rate the severity of the symptoms from 1-6; 1= No visible symptoms and 6= severe symptoms	<b>Symptoms Check TLCB</b>	<b>Symptom observed?</b> If possible please rate the severity of the symptoms from 1-6; 1= No visible symptoms and 6= severe symptoms	<b>Symptoms Check PSHB</b>	<b>Symptom observed?</b> If possible please rate the severity of the symptoms from 1-6; 1= No visible symptoms and 6= severe symptoms
<b>Symptom 1:</b> Adult emergence holes - D-shaped, 3-4 mm width.		<b>Symptom 1:</b> Adult emergence holes - D-shaped, 5 mm width.		<b>Symptom 1:</b> Adult entrance/emergence holes – Circular, 1mm diam. Often occur at high density, difficult to detect on mature oaks with deep bark crevices	
<b>Symptom 2:</b> Bleeds, exudate and staining associated with emergence holes.		<b>Symptom 2:</b> Bleeds, exudate and staining associated with emergence holes.		<b>Symptom 2:</b> Bleeds, exudate and staining associated with emergence holes.	
<b>Symptom 3:</b> Remove a piece of bark to see tunneling, no staining present. Galleries typically filled with dark frass.		<b>Symptom 3:</b> Remove a piece of bark to see tunneling, no staining present. Frass may be pale or dark depending on the host.		<b>Symptom 3:</b> Remove a piece of bark to look for dark staining extending beyond the galleries, caused by the <i>Fusarium</i> fungus	
<b>Symptom 4:</b> Wilting, crown thinning and dieback. Damage often begins in the crown. Brown foliage remains attached to tree.		<b>Symptom 4:</b> Wilting, crown thinning and dieback. Damage often begins in the crown. Brown foliage remains attached to tree.		<b>Symptom 4:</b> Wilting and branch dieback. Brown foliage may remain attached to tree for a long period.	
<b>Symptom 5:</b> Tree mortality - usually occurs slowly, over several years		<b>Symptom 5:</b> Tree mortality - can occur quickly over 2-3 years		<b>Symptom 5:</b> Tree mortality - can occur quickly over 2-3 years, depending on host species	
<b>Do you think this tree is infested with GSOB?</b>	Yes/No	<b>Do you think this tree is infested with TLCB?</b>	Yes/No	<b>Do you think this tree is infested with PSHB?</b>	Yes/No

**NB. The symptoms caused by GSOB and TLCB are very similar. Look for adults feeding on the foliage as they are easily separated.**

Notes: