

Board of Forestry and Fire Protection

Zone of
Infestation
Proposal:
Goldspotted
Oak Borer



Today's Speakers

- Russ Henly - opening introduction
- Kim Camilli - Biology, cultural, wildlife, ecological, aesthetic impacts
- Kathleen Edwards - Describe the impacted area, monetary impacts of GSOB, need for the ZOI
- Kevin Turner – Response and Infrastructure (GSOB Steering Committee, educational outreach, Pest Council, and Firewood Taskforce, other agency and counties support)
- Russ Henly - Value of establishing the ZOI and support of the Department and others

Board Forest Pest Management Policy, April 2012

- Established CAL FIRE Handbook direction re GSOB.
- Provided findings on GSOB.
- Recommended Best Management Practices.
- ***Directed CAL FIRE Director to investigate the appropriateness and necessity of establishing a GSOB ZOI.***

Authority and Process for ZOI Declaration

- PRC § 4716 provides authority for ZOI declaration:
 - Director makes determination of need for ZOI, declares Zone, and sets boundaries, with approval of the Board.
 - Provides authority for Department to go on to state and private lands within ZOI to eradicate or control infestations.
- CAL FIRE Handbook § 5802 provides additional direction to Department.

Response to Board Direction

- Established core working team:
 - San Diego Unit Forester Kathleen Edwards
 - Pest Management Specialist Kim Camilli
 - UC Riverside Staff Kevin Turner and Tom Scott
- Team consulted with GSOB Steering Committee, Southern CA Pest Council, US Forest Service, local officials, etc.
- Team developed background paper and recommendation to declare ZOI.

Response to Board Direction, cont.

- San Diego Unit received letters of support for ZOI from:
 - US Forest Service on behalf of 4 So. CA National Forests
 - CA Forest Pest Council, Southern CA Committee
 - San Diego County Agriculture Commissioner
 - California Department of Parks and Recreation
- San Diego Unit Chief Thom Porter and Region Chief Dale Hutchinson approved ZOI recommendation and forwarded it to Director Pimlott.
- Director Pimlott concurred and forwarded to Board for approval.

Goldspotted Oak Borer - Background

- Flatheaded borer - *Agrilus auroguttatus*
- First found in late 1800's in SE Arizona, southern Mexico and Northern Guatemala.
- Found in California in 2004 – during exotic wood borer survey.
- The first GSOB attack in CA as identified by tree-ring analysis in 2000.
- Damage to oaks on Cleveland National Forest since 2002.
- Mortality found in 4,900 km² (1891 mi²). Approximately 80,000 oak trees killed since 2002 in San Diego County.

AGSOB distribution

California

Arizona

Julian
Mount Laguna
Pine Valley
Cuyamaca Rancho
State Park (x2)

Upper Bear Canyon, Santa Catalina Mountains
Madera Canyon, Santa Rita Mountains (x4)
Ramsey Canyon, Huachuca Mountains
Chiricahua Mountains (x8)
Palmerlee, Huachuca Mountains (x5)
Miller Canyon, Huachuca Mountains
Huachuca Mountains (x8)

Sierra de la Laguna,
Baja California

Mexico

Santa Engracia, Tamaulipas
Tula, Tamaulipas

Jalapa, Veracruz
Cordova, Veracruz

Juquila, Oaxaca
Mitla, Oaxaca

Teopisca, Chiapas
Ocosingo, Chiapas
Laguna de
Montebello NP,
Chiapas
San Cristobal
de las Casas,
Chiapas
Comitan, Chiapas

Guatemala
Capetillo, Sacatepequez
Chilasco,
Verapaz
San Jeronimo,
Verapaz

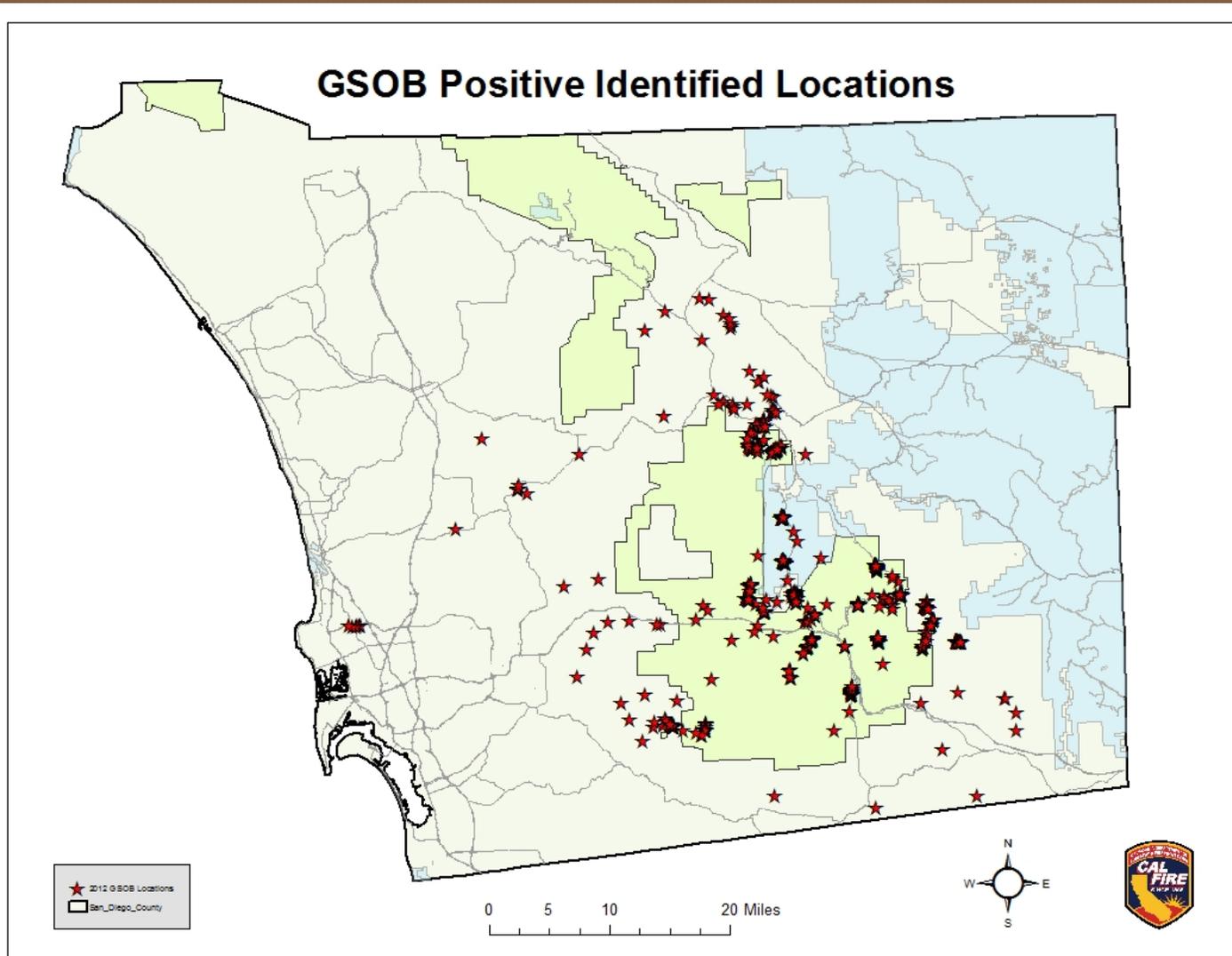
Known Collection Records for *Agrilus coxalis*

-  *Quercus agrifolia*
-  *Quercus devia*
-  *Quercus hypoleucoides*
-  *Quercus kelloggii*
-  Other *Quercus*

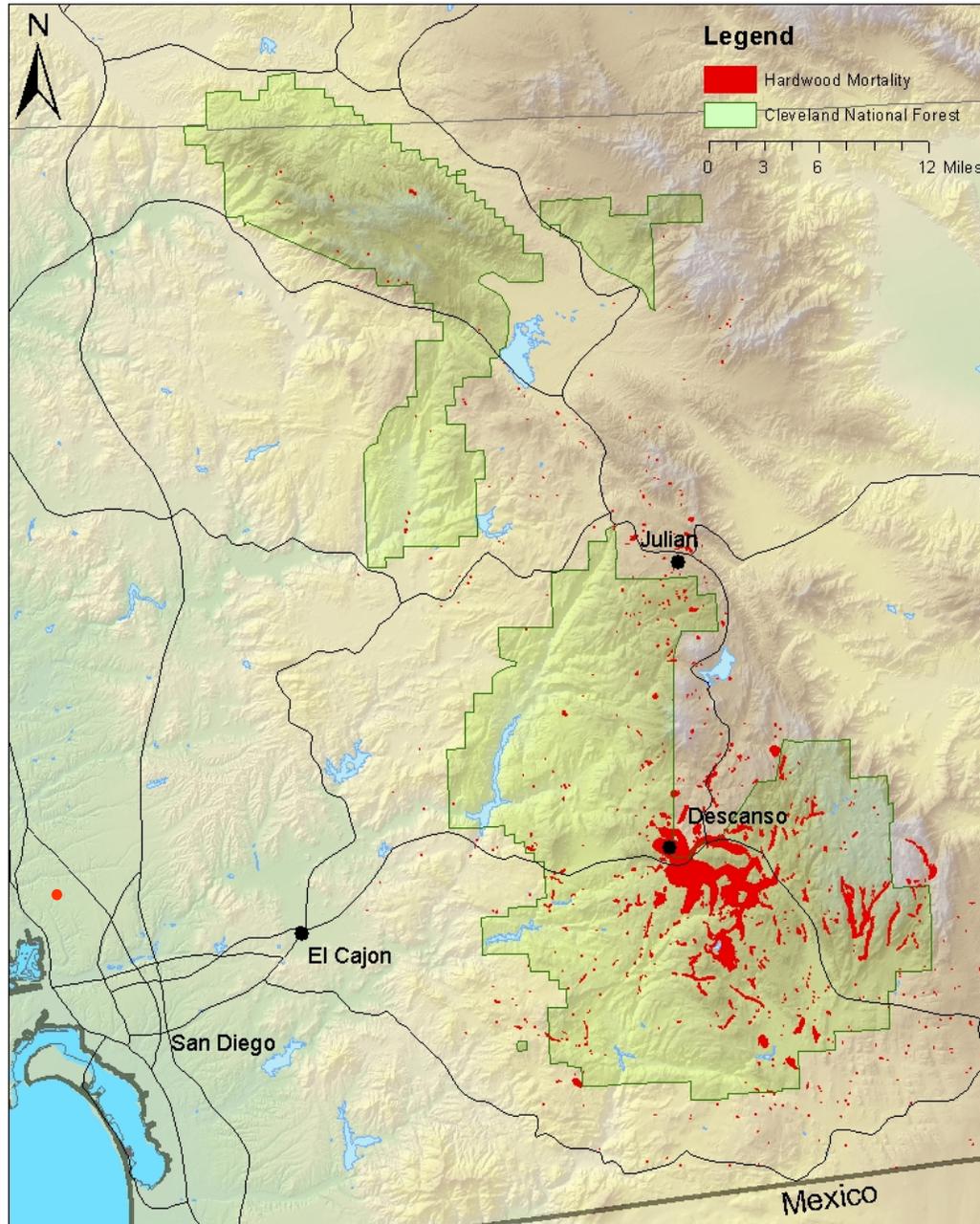
0 145 290 Kilometers

Created by Meghan Woods

Goldspotted Oak Borer Locations in San Diego County

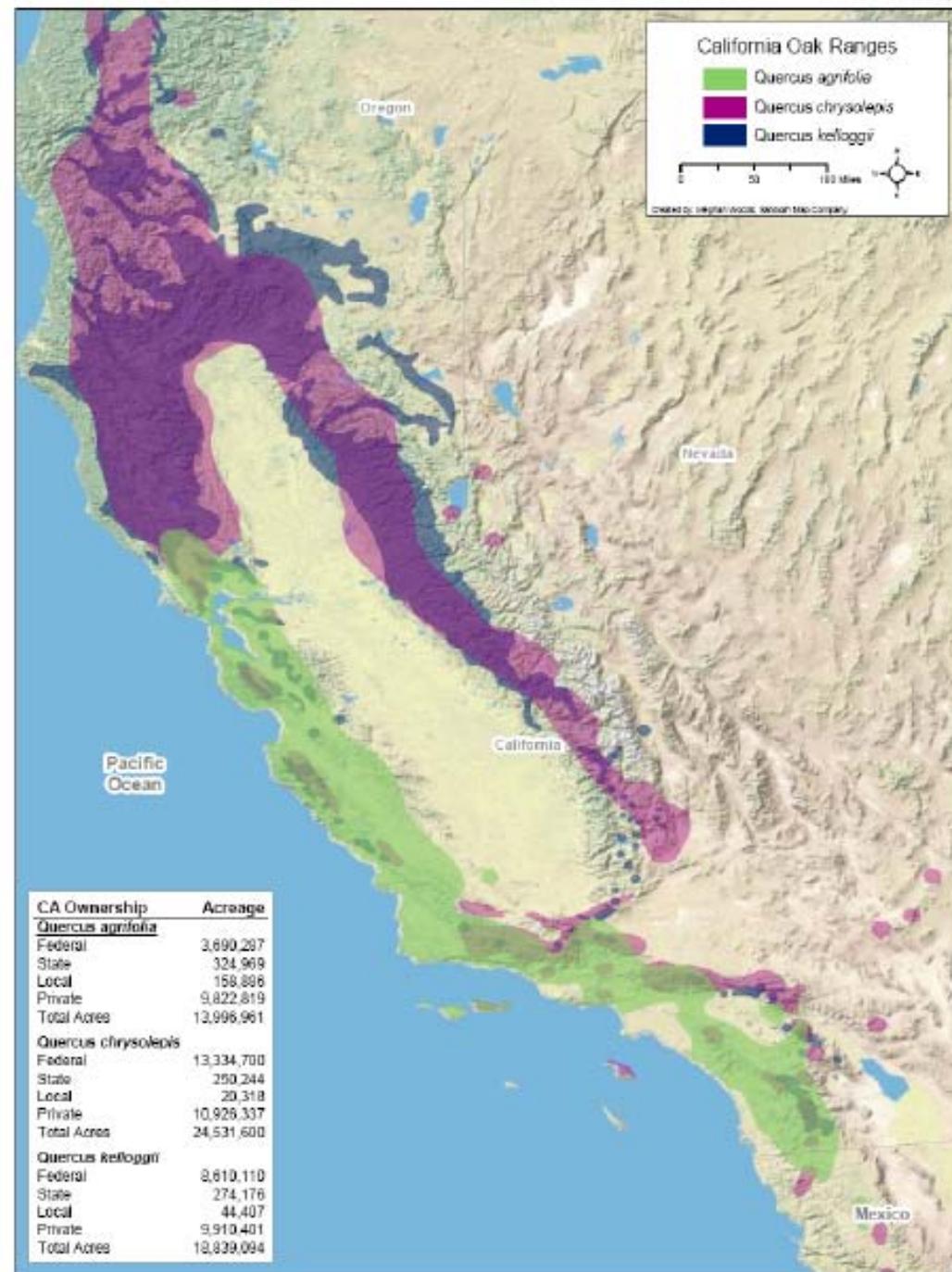


Hardwood Mortality 2002 - 2012



10-Year Oak Mortality Spread

- GSOB spread over 10 years.
- Aerial sketch mapping of dead hardwoods.



Most Susceptible



Coastal Live Oak
Quercus agrifolia



California Black Oak
Quercus kelloggii

Less Susceptible



Canyon Live Oak
Quercus chrysolepis

Figure 6. Range of *Quercus agrifolia*, *Q. chrysolepis* and *Q. kelloggii*.

Life Stages of GSOB



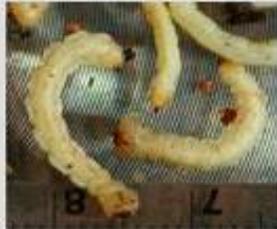
Life Cycle of GSOB

Adult Goldspotted oak borer lays eggs, most likely in bark crevices.
- May to October



A photograph of an adult Goldspotted oak borer (GSOB) with its characteristic black body and yellow spots. An inset image shows a close-up of the insect's legs and feet on a textured surface.

Once hatched, larvae bore under the bark of the tree and feed extensively.
- Early Summer - October



A photograph showing several pale, segmented larvae of the Goldspotted oak borer, curled together on a dark, textured surface.

Larval galleries disrupt sapwood and kill the tree.



A photograph showing a cross-section of a tree trunk with dark, winding larval galleries that have disrupted the sapwood.

Larvae make their way to the outer bark to pupate.
- May to October



A photograph of a Goldspotted oak borer pupa, which is a light-colored, segmented, worm-like structure, resting on a reddish-brown surface.

Adults emerge and leave D-shaped exit holes, then move to other trees where the process can repeat the following year.
- May to October



A photograph showing a close-up of tree bark with several small, D-shaped exit holes, characteristic of the Goldspotted oak borer.

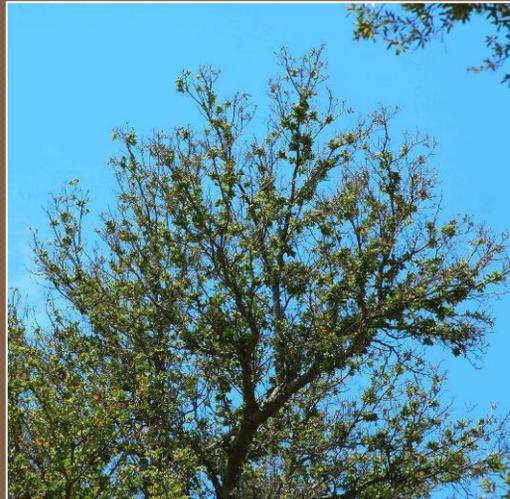


Symptoms of Infested Trees

Coast Live Oak



Black Oak



Symptoms of Infested Trees

Coast Live Oak



The Goldspotted Oak Borer Impacts





Impacted Area

- Sea level to 6,000 feet
- Environmental settings: forest, oak woodlands, coastal area, desert and riparian corridors.
- Urban & rural settings: campgrounds, picnic areas, trails, parks, community areas, homes, roads and highways, power lines, schools, businesses, etc.
- Over 1/3 of San Diego is impacted by GSOB.

Impacted Area



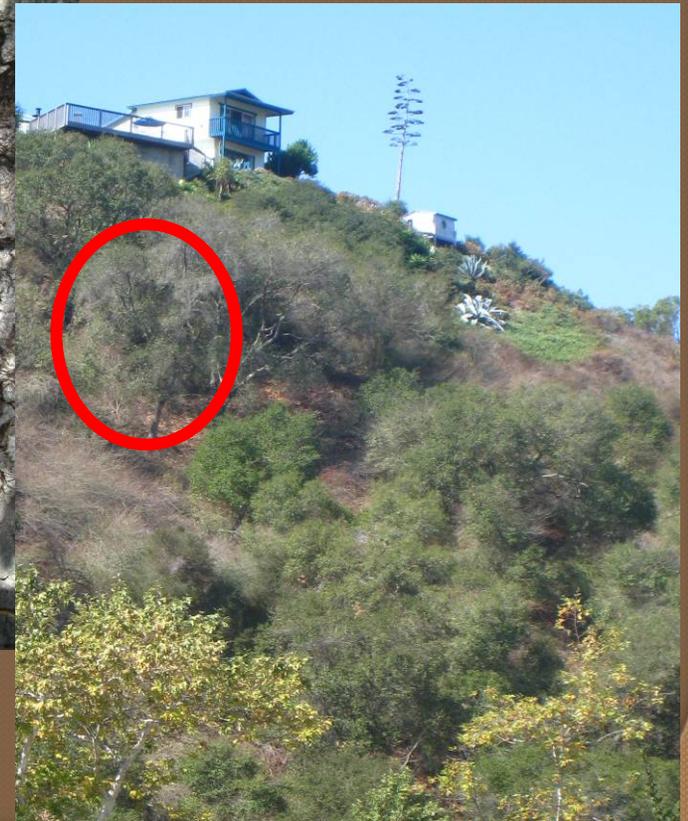
Impacted Area



Impacted Area



Impacted Area



Cost and Losses

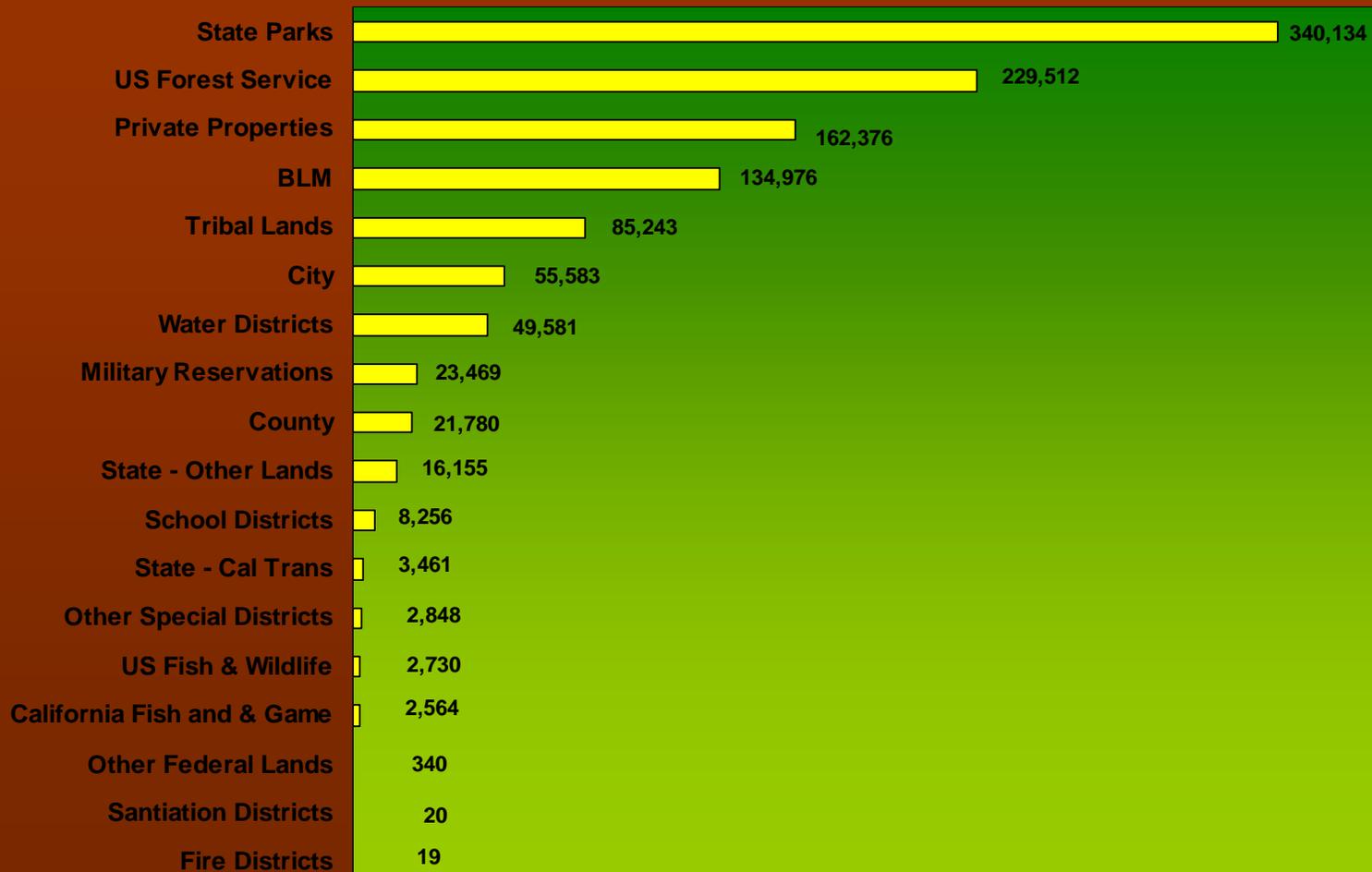
| Current incurred cost associated with Tree Removal Cost in San Diego County | | | |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------|
| <u>Funding Source and/or landowner</u> | <u>Tree Removal Direct and Indirect Costs</u> | <u>Opportunity Costs (Lost Revenue)</u> | <u>Other Associated Costs</u> |
| Private Property: owner-funded residential, commercial, campgrounds, organizational camps and ranches * | \$4,320,000 | (unknown) | |
| Cuyamaca Rancho State Park + (Opportunity Cost ++) | \$341,145 | \$458,500 | |
| San Diego County Parks and Recreation + | \$1,000,000 | (unknown) | |
| Greater San Diego Resource Conservation District + | \$1,900,000 | na | |
| USFS Cleveland National Forest Descanso District # | \$500,000 | (unknown) | |
| USFS Forest Health Protection + | na | na | \$2,345,000 |
| CALTRANS++ | \$100,000 | na | |
| San Diego County Department of Public Works (county roads) | unknown | na | |
| Tribal Lands | unknown | unknown | |
| San Diego Gas and Electric | unknown | na | |
| Sempra Energy | unknown | na | |
| California Department of Forestry and Fire Protection++ | \$100,000 | na | |
| Total estimated cost to date | \$8,361,145 | \$458,500 | \$2,345,000 |
| * | <i>Estimate based upon preliminary information from private tree services and extrapolation</i> | | |
| + | <i>Actual cost as provided by the agency</i> | | |
| ++ | <i>Estimated costs provided by the agency</i> | | |
| # | <i>USFS dollar estimate made by Kevin Turner using USFS provided figure of approximately 500 large trees removed from USFS improved sites (campground, administrative facilities) and an average \$1,000/tree direct and indirect removal cost (based upon actual e</i> | | |

Benefits

- Preserve oak resources
- Reduce public and private mitigation cost
- Protect the public from GSOB killed trees
- Minimize real estate losses
- Minimize fire hazard
- Maintain relations with public land managers

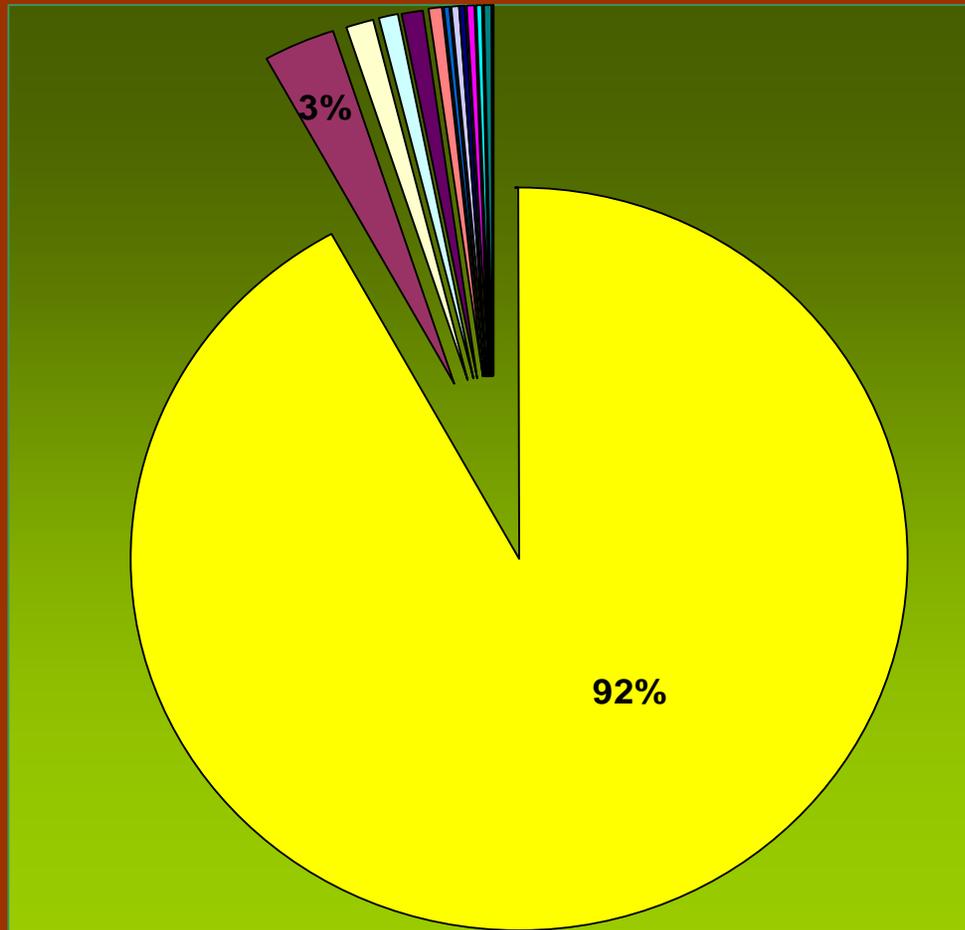
Distribution of Acres

Distribution of Acres by Ownership within the ZOI



Distribution of Ownership

GSOB - Distribution of Ownership within the ZOI



- Private Properties
- City
- School Districts
- County
- Water Districts
- BLM
- State
- US Forest Service
- Indian Reservation
- Other Special Districts
- Military Reservation
- State – Cal Trans
- Other Federal
- California Fish & Game
- Fire Districts
- State Parks
- US Fish & Wildlife
- Sanitation

Actions To Date

○ NPAG report (2009):

- GSOB is native to the United States
- Non-reportable/non-actionable

○ CDFA:

- Recognizes the threat that GSOB poses to oaks
- However, offered the statement: “any regulatory action would be extremely difficult and could be resource intensive” in the amended NPAG report (10/15/2009).

Actions to Date (Cont.)

- Cleveland National Forest, State Parks, and San Diego County Parks are preventing the movement of GSOB infested wood through policy, education and informational outreach.
- Tribal leaders are concerned about their oak resources on their lands and are active in learning about GSOB prevention efforts.

Actions To Date (Cont.)

- Currently, there are no regulations that influence private property landowner actions regarding GSOB infested wood.
- Nonetheless, local stakeholders are concerned about GSOB causing oak mortality and the loss of oak resources in San Diego.
- At the State level, stakeholders are equally concerned about GSOB spreading beyond San Diego and impacting oak resource statewide.

Zone of Infestation Proposal

- Protect the oak resources in San Diego and California:
 - Establish an official GSOB-ZOI boundary.
 - Contain GSOB within the boundary of the zone through IPM and educational outreach services.
 - Utilize CAL FIRE resources where appropriate, including Resource Management personnel, Conservation Camp crews, other personnel and/or equipment.
- Support research and studies to improve public information and knowledge of GSOB.

ZOI Proposal (Cont.)

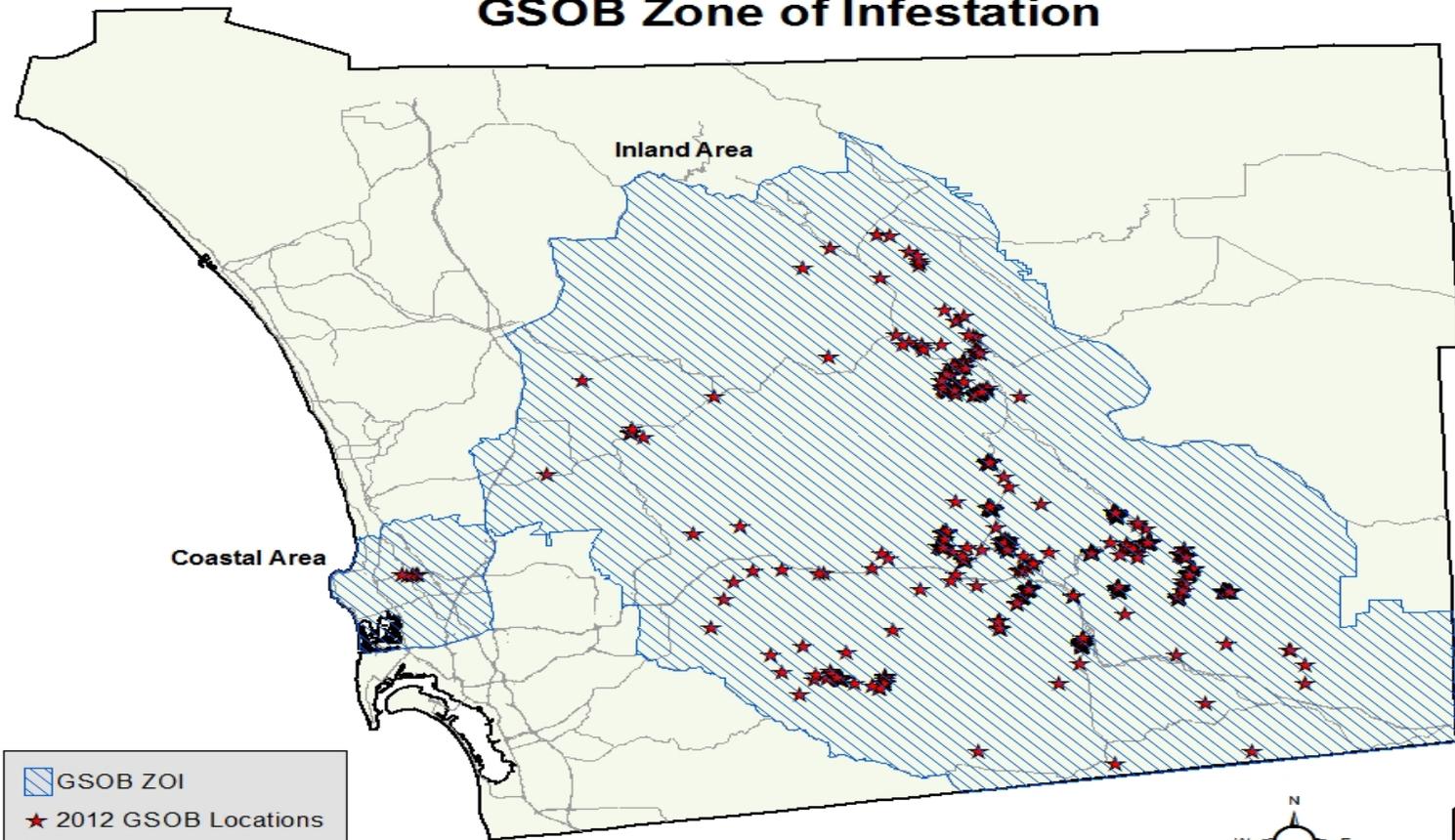
- Direct THPs that harvest GSOB susceptible oak species within the ZOI to comply with the FPR (14 CCR 957.9 Prevention Practices) and utilize feasible measures guided by IPM .
- Prepare a coordinate rapid response plan should GSOB spread outside the zone.
- Minimize public hazards created by GSOB-killed trees including fuel build-up through coordinated abatement.

ZOI Proposal (Cont.)

- Foster utilization of oak wood products that minimizes spreading GSOB.
- Seek funding, whenever grants or other funds become available, to assist with activities to contain and minimize GSOB impacts.
- Keep all stakeholders apprised and updated of the status and threat posed by GSOB:
 - Public, agencies, elected officials, and interest groups

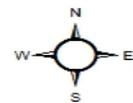
GSOB- ZOI: Map

GSOB Zone of Infestation



- ☐ GSOB ZOI
- ★ 2012 GSOB Locations
- ☐ San_Diego_County

0 5 10 20 Miles





Goldspotted Oak Borer Response and Infrastructure

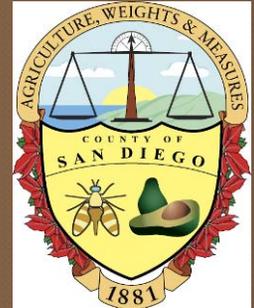
Kevin Turner
GSOB Project Coordinator, UCR
Steering Committee Executive Director



San Diego County GSOB Steering Committee formed in 2010

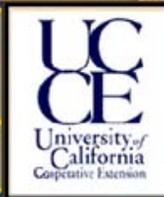
Primary Members

- CAL FIRE San Diego Unit & So. Region
- USFS Cleveland National Forest
- County San Diego Agriculture, Weights & Measures
- Cuyamaca Rancho State Park
- City of San Diego Parks and Recreation



Supporting members:

- University of California (UCCE , UCR, IPM)
- USFS Forest Health Protection
- San Diego County Parks and Recreation
- Greater San Diego RCD
- San Diego Forest Area Safety Taskforce (FAST)



Research, Education and Outreach Committee



Best Management Practices (BMPs) for Preventing the Spread of Goldspotted Oak Borer (GSOB) Through the Movement of Logs & Firewood

June 2012

OVERVIEW

Transporting GSOB-infested logs or firewood can introduce GSOB into un-infested areas. These BMPs were developed to help landowners and the firewood industry safely utilize wood from within a known infestation area. Documenting compliance with these BMPs may reduce liability against claims of knowingly spreading GSOB by moving or selling infested wood. Be aware that firewood consumers are being educated about the dangers of GSOB-infested wood and may inquire about the wood's origin and if BMPs were followed to ensure that it doesn't contain GSOB. Documentation that you followed these BMPs could be included along with the bill of sale/permit information required by California law (see California Penal Code Section 384.5) when transporting wood from its harvesting site and presented to retailers and/or the ultimate consumers.

Why are BMPs Needed?

Wood from GSOB-killed trees can harbor living GSOB larvae under its bark. Pupation (transformation) of GSOB larvae into adult beetles can occur for well over a year after a tree dies. These adults may emerge from the bark any time during their flight season (May through October) after the tree has been dead for a year. Therefore, at a minimum, logs or firewood from GSOB-killed oak trees should not be moved out of an infested area until the wood has seasoned (dried out) for at least one full year plus a subsequent GSOB adult flight season.



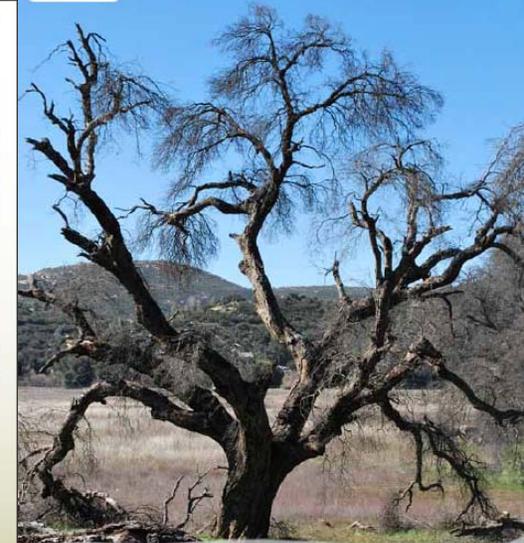
Left: GSOB larva preparing a pupation chamber near the outer bark.



Right: GSOB adult beetle that has nearly completed the pupation phase near outer bark.



Guidelines for Strategic Action Before GSOB Strikes Your Community



Goldspotted Oak Borer Community Preparedness Plan

University of California Cooperative Extension [SKIP TO CONTENT](#) [SITE MAP](#)

Goldspotted Oak Borer

Home | About GSOB | Diagnosis and Management | Recovery | What You Can Do | News and Events | Resources | Contacts

What is the Goldspotted Oak Borer?



Goldspotted oak borer (GSOB) *Agrilus auraguttatus* is an invasive pest contributing to the on-going oak tree mortality occurring on federal, state, private, and local Native American lands in San Diego County. Widespread oak mortality can have severe implications to the environment and human safety. Due to the current and potential impacts to California oaks and communities, locally and statewide, multiple agencies and organizations are working together in the research, education and outreach efforts regarding this pest.

Quicklinks

[Restoration Webinar Info](#)

[Early Warning System](#)

[Open to All-CEUs offered](#)

[Field Training Event Flyer](#)

[Field Training-Register](#)

Toolkits NEW!

[California Firewood Taskforce](#)

[Firewood Management Information](#)

[Management Options for GSOB](#)

[Join Our Mailing List](#)

For more GSOB information [click here](#).

If you suspect goldspotted oak borer infestation in your area, report it [here](#).

What's New



New Resource!

Best Management Practices (BMPs) for Preventing the Spread of GSOB Through the Movement of Logs and Firewood

| | |
|---------------------|--------------------------------------------------------------|
| 5/28/2011 | Palomar Mountain Community Meeting |
| 5/24/2011 | San Bernardino County GSOB Committee Meeting |
| 5/17/2011 | Wrightwood Fire Safe Council |
| 5/13/2011 | IPM Landscape Professionals |
| 5/4/2011 - 5/9/2011 | Wildlife Corridors Authority JPA (LA County) |



Goldspotted Oak Borer

- Research
- Education
- Outreach

[www.GSOB.org](#)

Email: gsobinfo@ucdavis.edu

WEBINAR ANNOUNCEMENT

Title: Goldspotted Oak Borer: A Threat to California Oaks and Communities

Date: Thursday, September, 15, 2011

Time: 10:00 - 11:00 AM Pacific (11AM Mountain; 12PM Central; 1PM Eastern)

Intended Audience:

Federal, state, county and local public officials; County Agriculture Commissioners and other Land Use/Environmental Directors; Tribal leaders; Federal and state agency managers; managers of natural resource conservation organizations; and other community policy and decision makers.

Registration Information:



December 7, 2010

Dear Oak Firewood Vendor,

The purpose of this letter is to alert you to a problem involving firewood from coast live oak, canyon live oak, and California black oak trees in San Diego County.

Your help is needed! An exotic pest, a beetle called the Goldspotted Oak Borer (GSOB, *Agrilus coxalis*), is attacking and killing oak trees in the rural communities of Alpine, Descanso, Campo, Crest, Cuyamaca, Guatay, Jamul, Julian, Laguna, Lake Henshaw, Pine Valley, Santa Ysabel, Ramona, and Warner Springs. If this beetle spreads to other areas, it has potential to kill over 95% of woodland oaks in less than 10 years. Moreover, it is important to know that the beetle can survive for up to a year in cut firewood. If the beetle is inside the oak firewood, then it is highly possible to transport this pest long distances from the area of infestation of San Diego County to other oak woodland areas. Moving GSOB infested oak firewood into un-infested areas with oaks will likely lead to spreading the beetle and causing significant oak tree mortality. This is where we need your help!

In order to protect your product, clientele and the oak trees, it's critical that you understand the nature of the outbreak and the consequences of bringing GSOB-infested wood into your market area. There are no known treatments to eradicate GSOB once it becomes established, and a GSOB outbreak is likely to kill many of the coast live oak and black oaks in your area. There are currently no known ways to protect oak trees from GSOB attack.

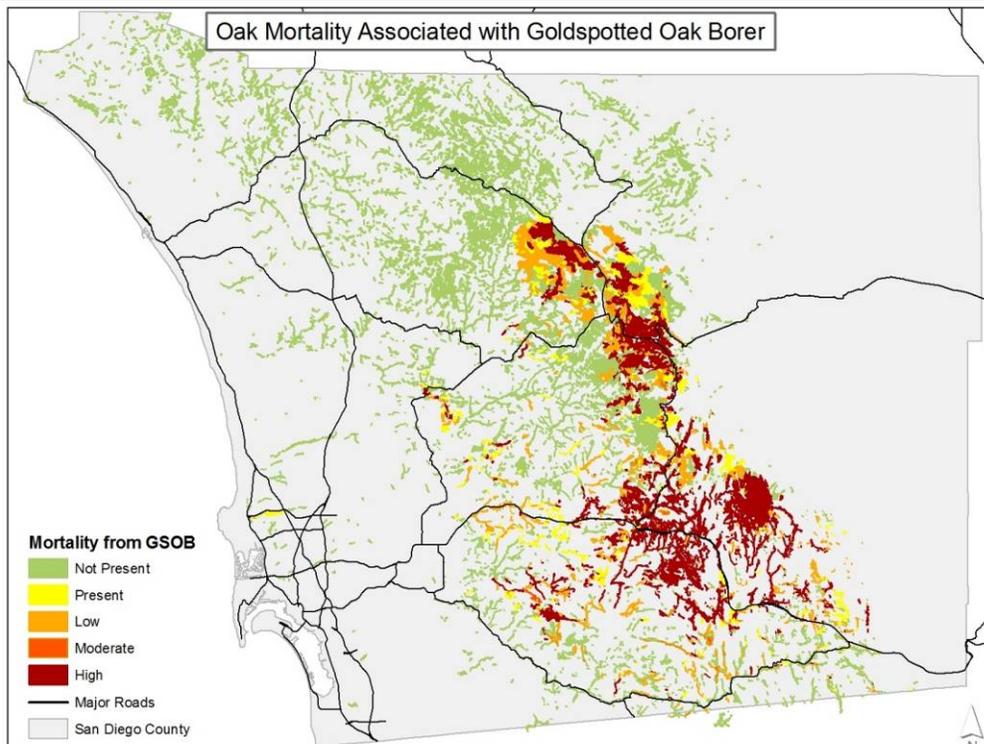
Pupae and larvae can survive in the bark for months after oak trees are cut down, creating an ideal mechanism for GSOB transport to new areas. Adults lay eggs on oak tree trunks in the summer; larvae hatch and then bore into the margin between the bark and sapwood to feed. They move back to the outer bark to pupate in the late spring of the next year, and the emerging adults bore out of the bark in the summer and begin the cycle again.

Don't Let GSOB Bug You!

Goldspotted Oak Borer Project

UC Cooperative Extension
University of California
Riverside, CA 92521
(951) 827-2973 office

GSOB Early Warning System (agencies and volunteers)



GSOB EWS Oak Tree Health Survey Instructions

New threats to forest health are commonly first diagnosed in urban environments and initially discovered by concerned citizens. Early detection of introduced/exotic pests can assist with mitigating these new threats. The southern oak woodlands of California represent crucial habitat for plants and wildlife, improve ecosystem services, and contribute to aesthetics. Observations by citizens can assist with protecting these valuable woodlands.

The Southern California Oak Resource Assessment Reference Guide was developed to assist with filling-out this form. Use this guide to determine injury symptoms associated with insects and diseases.

For each site visited, fill out a new tree health survey form.

Section 1. Site Information

1. Begin by filling in the site information (county, town, specific location, and ownership) on page 2.
2. If available, take the GPS coordinate from the tree(s) of concern or the general loca-

Grant funds and partnerships - critical support for agencies



University of California
Goldspotted Oak Borer
Early Warning System



Home How to Participate Monitoring Form California Oak Guide

ARRA Grant Second Quarterly Report: Oak Mortality, GSOB and SOD

University of California
California Department of Forestry and Fire Protection
US Forest Service Forest Health Protection

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 Department of Environmental Science, Policy, and Management, University of California, Berkeley
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 University of California Cooperative Extension San Diego County
 David Lewis and Janet Alexander
 University of California Cooperative Extension Marin County
 Yana Valachovichina and Chris Lee
 University of California Cooperative Extension Humboldt County



HOME ABOUT US OUTREACH KIDS' PAGE RESEARCH AND POLICY (PDFs)

BUY IT WHERE YOU BURN IT

Be aware that firewood can harbor insects and diseases that threaten California's valuable forest resources. Transporting firewood can move these pests to new locations.

WHAT CAN I DO?

- Leave firewood at home - do not transport it to campgrounds or parks
- Use firewood from local sources - that means the wood was cut within 50 miles of where you'll burn your fire
- Bring only what you need, and burn responsibly
- What is the problem with moving firewood? Questions and Answers

Value of Establishing a ZOI

- Raises a red flag to help get the attention of government entities and the public as to the major damage that GSOB has already done and the huge threat that it poses state-wide should it spread.
- Articulates the concern of both the Department and the Board to the public about the impacts GSOB and the importance of control efforts.

Value of Establishing a ZOI, cont.

- Establishes an official mapped boundary of the known GSOB infestation.
- ZOI designation and support from both the Department and the Board can strengthen efforts to secure funding for GSOB-related activities.

Value of Establishing a ZOI, cont.

- Expresses high level of concern to the State Legislature, Governor's Office, CA Dept. of Food and Agriculture, and USDA Animal and Plant Health Inspection Service (APHIS) about the potential impact and harm that GSOB could have statewide and beyond.

Value of Establishing a ZOI, cont.

- Fosters collaboration efforts with stakeholders on GSOB prevention, containment, control, and remediation.
- Provides additional leverage to work of the CA Forest Pest Council's Firewood Task Force to stem the vectoring of invasive pests via firewood movement.

Value of Establishing a ZOI, cont.

- Fosters partnering with local govts. in efforts to help stop the spread.
- Supports the use of Conservation Camp crews in control or management projects for GSOB on private and public lands.
- Establishes a directive that suppression and control measures for GSOB be feasibly addressed in Timber Harvesting Plans within the ZOI.

Department and Other Support

- CAL FIRE strongly supports the designation of a ZOI for GSOB and requests the Board's approval.
- Reiterate the five letters of support received by the San Diego unit and the Board.

Thank You

- Finally, thank you to all the collaborators who have already done so much to address GSOB and who stand ready to do more.

A Penny for your Thoughts?

