



California Forest Pest Council

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**To: Board of Forestry and Fire Protection**

**Subject: Goldspotted Oak Borer (GSOB) Threat to Oaks in California**

**Recommendation: the CFPC requests that the Board of Forestry and Fire Protection express their concern to CDFA and APHIS regarding the introduction of goldspotted oak borer into California and the need for action to be taken to control further introductions into California and to control the spread of GSOB out of San Diego County.**

**Known Information:**

The goldspotted oak borer (GSOB), *Agrilus coxalis* Waterhouse (Coleoptera: Buprestidae) was discovered in May 2008 as a new and devastating pest of oaks, *Quercus spp.*, in southern California. GSOB was first recorded in southern California in 2004 during an exotic wood borer survey by California Department of Agriculture (Coleman, 2008c). GSOB colonizes the cambium and phloem of the main stem and larger branches of at least three major oak species in San Diego County. GSOB is causing extensive damage on oak populations in southern California where it was not known to be previously established (Coleman, 2008c and Rondeau, 2008). Total mortality since 2002 is estimated at 17,000 trees determined through aerial survey data (Bohne and Rios 2007, USDA Forest Service 2008) with approximately 1,400 trees having been killed in 2008. In a survey of forest stand conditions consisting of thirteen fixed-radius plots (1/10 acre), 67% of the oaks had external or internal evidence of GSOB attack. The current known infestation in California is an area of approximately 50km x 40km east of San Diego (Coleman, 2008a).

Hosts being attacked in California are coast live oak (*Quercus agrifolia*), canyon live oak (*Q. chrysolepis*), and California black oak (*Q. kelloggii*). The potential host range for this insect is not known and may include additional *Quercus* species present in California. The geographic distribution for the three *Quercus spp.* currently being attacked by GSOB in California encompasses 3.7 million. If spread were to occur to other oak species, an additional 7.4 million acres of oak woodlands and oak forest habitats could be at risk.

GSOB is thought to have been introduced into California on infested firewood from Arizona or Mexico, where this insect is native. GSOB larvae have been found in cut firewood ready to be sold (Coleman, personal communication). Wood movement can be a source for new infestations in other areas within the State or other states.

There is no preexisting research on prevention and suppression options for GSOB. Research conducted on related *Agrilus* species, the emerald ash borer, two-lined chestnut borer and bronze birch borer, are being used to provide suppression and prevention procedures. To protect parts of California and other states where GSOB does not occur, regulatory action should be implemented to prevent the introduction of GSOB. Within infested areas, the following management options are available:

**1) Managing oak firewood:**

- a. Tarp infested wood: If oak firewood cannot be chipped, cover with 6 mm UV resistant clear plastic sheeting such as Durafilm Polyethylene Greenhouse film. Tarping should begin before spring and continue throughout the end of the summer season (September). Pin or otherwise secure all the edges to the

ground to prevent beetles from escaping. It is best to tarp oak firewood piles in continual direct sunlight with a southern exposure. If done correctly, this may be an effective control method that can be readily carried out by residents, landscape professionals, or companies selling firewood. Tarped firewood infested with GSOB has reached temperatures of 52.4°C during daytime highs monitored to present. Though adult GSOB emerged after 3 months from tarped firewood, data collection is continuing for an entire summer to determine efficacy of solarization as a management strategy (Seybold, 2010).

- b. Season oak firewood with bark removed in direct sunlight: Scatter oak firewood in areas in direct sunlight, preferably with a southern exposure, for an entire growing season. Cut or split large pieces of wood into smaller pieces to enhance drying. Removing or destroying the bark will also facilitate control of GSOB. Turn oak firewood monthly to expose all edges to direct sunlight.

**2) Infested material – large woody debris, entire trees and firewood:**

- a. Chip infested material: Chipping infested oak wood to one inch pieces is the potentially the best method for eliminating GSOB populations. Chipping infested wood may be the best method for reducing GSOB population densities.
- b. Pile and burn infested material
- c. Debark infested logs

**3) Systemic and soil insecticide treatments: Imidacloprid** (systemic and soil injections) and Emamectin benzoate (systemic injection only). These treatments are currently being tested and should only be considered for high value trees.

On January 22, 2009 the USDA APHIS Plant Protection Quarantine (PPQ) Plant Epidemiology and Risk Analysis Laboratory (PERAL) Center for Plant Health Science and Technology (CPHST) New Pest Advisory Group (NAPG) concluded that GSOB was native to California and adopted a non-reportable/non-actionable policy for detections of GSOB in California. This decision is currently being re-evaluated in light of accumulating scientific information that indicates:

- the insect is not native to California
- the insect is causing obvious and extensive oak mortality in all areas of California known to be infested
- GSOB has a high potential to spread within California both on its known hosts and other undetermined hosts.

For these reasons, the California Forest Pest Council (CFPC) considers GSOB to be a pest of great concern and recommends that the State Board of Forestry support actions that will assist in the management and control of GSOB and prevent its spread.

**Supporting Information:**

- 1) Goldspotted oak borer (GSOB) is native to Guatemala, Mexico and southeastern Arizona. To date, it has only been found in San Diego County in California. GSOB does not cause extensive mortality and is not considered a pest in areas where it occurs naturally. Since its discovery in a California urban forest in May 2008, it has

- been identified as the primary causal agent for extensive oak mortality on private, state, federal, county and Native American lands (Coleman and Seybold 2008a, b).
- 2) Twenty native oak species are found across California, representing a high native biodiversity, crucial habitat, and an abundant food source for wildlife (Pavik et al. 1991; Nixon 2002).
  - 3) Confirmed hosts of GSOB are: California Black Oak, *Quercus kelloggii*, coast live oak, *Q. agrifolia*, and canyon live oak, *Q. chrysolepis*. These host species have distributions ranging from southern to northern California.
  - 4) GSOB is an aggressive insect that can attack seemingly healthy trees down to 5 inches in diameter.
  - 5) *Agrilus spp.* are known to be good fliers. Tethered flights under laboratory conditions suggest that mated females of the related emerald ash borer, *Agrilus planipennis*, may fly more than 20 km per day (Taylor et al, 2007).
  - 6) Plot studies at Pine Valley, Noble Canyon Trailhead and Laguna Mountain found that oaks account for 69% of basal area in these areas. A full 67% of these oaks were found to have either external or internal evidence of GSOB (Coleman, 2008c).
  - 7) GSOB has been found at elevations that range from near sea level (Marian R. Bear Memorial Park) up to 5469 ft (Mt. Laguna), in a range of climatic environments that are representative of many additional oak woodlands of California.
  - 8) GSOB larvae have been found in cut firewood that is ready to be sold (Coleman, personal communication). Movement of GSOB-infested firewood out of San Diego County represents a significant potential pathway for the spread of GSOB into non-infested areas.
  - 9) In California, there currently are no interstate or intrastate restrictions on firewood movement. Additionally, there is little expertise available on this issue and management guidelines on proper handling of firewood to minimize pest dispersal or population growth are inadequate.

#### **Concerns:**

- 1) Oak mortality caused by GSOB is expected to continue in coming years until host supply is exhausted.
- 2) The continued, unrestricted movement of infested firewood will facilitate spread of the insect. A strategy is needed to control spread.
- 3) Past and current mortality within infested areas has increased fuel loading and the abundance of hazard trees.
- 4) Oak regeneration in many areas is limited.
- 5) Spread of GSOB to parts of California outside of the known infested area is a serious concern. For example, Marian R. Bear Memorial Park was discovered to be infested on July 30, 2009 and is outside the previous area of known infestation.
- 6) California's predominant oak species are found on 11.1 million acres of oak woodland and forest habitats (Gaman and Firman, 2006).

- 7) GSOB is currently the most significant threat to native California oaks by an exotic insect. The devastation already caused by this beetle is exceptional.
- 8) There are no known natural enemies of GSOB in California.

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