



Clear Lake Environmental  
Research Center

# Mediterranean Oak Borer Action Plan





# Overview

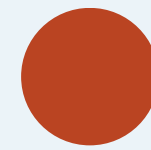
- Tree Symptoms
- MOB Information
- Woody Material Treatment
- Survey and Outreach

01

02

03

04





# Mediterranean Oak Borer (*Xyleborus monographus*)



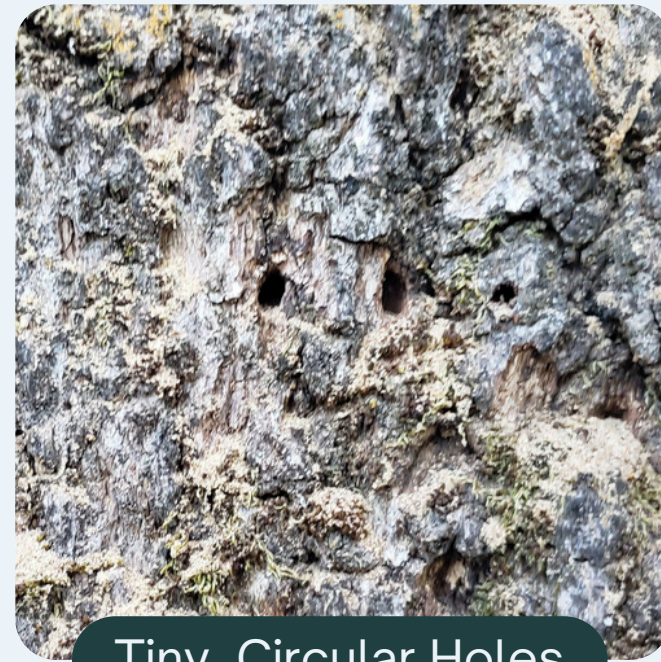


# Symptoms



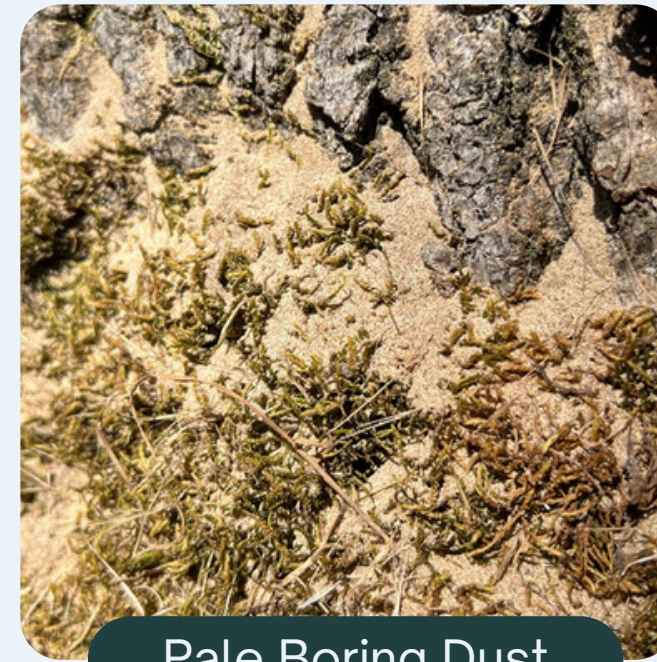
**Black Trellis Systems**

MOB bore into the xylem, which is the shallow layer of trees just below the bark. This part of the tree is responsible for carrying water and minerals. MOB leaves black, intersection trellis lines.



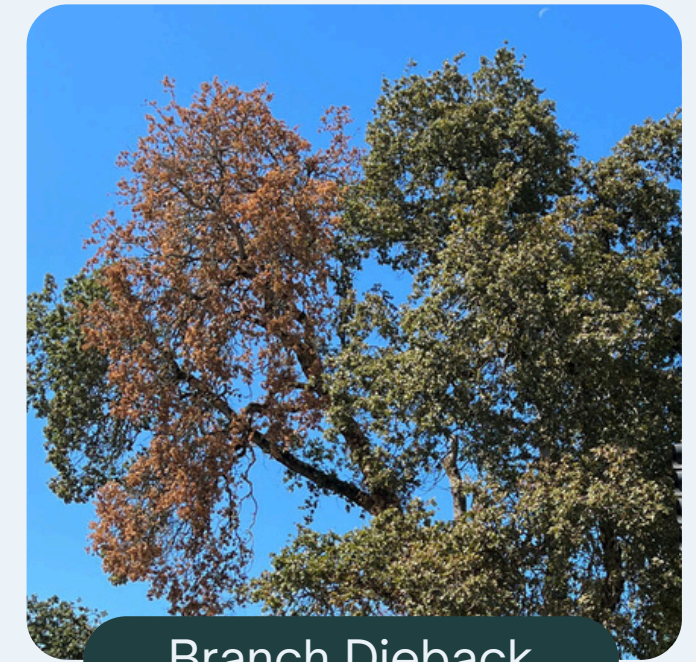
**Tiny, Circular Holes**

MOB's entry holes are circular and NOT D shaped. They are small and measure at about 1/16th of an inch wide.



**Pale Boring Dust**

MOB do not produce frass. They produce a pale dust as they dig throughout the xylem of the tree. It can be found at the entrance holes or at the base of trees and limbs.



**Branch Dieback**

Branch dieback begins from the tip of the branch. It's most obvious when the rest of the tree is healthy and a single section rapidly turns red/brown and begins to die.

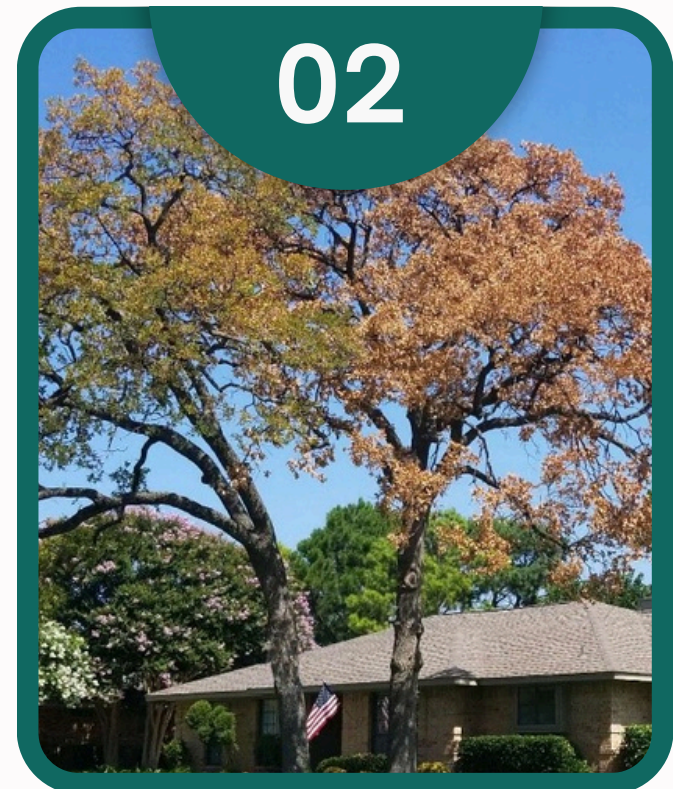


# Other Stressors

These other stressors can cause similar changes in a tree, however the best way to identify MOB is to look for the previously listed symptoms.



Water Stress



Climate Change



High Winds



Other Pests/Diseases

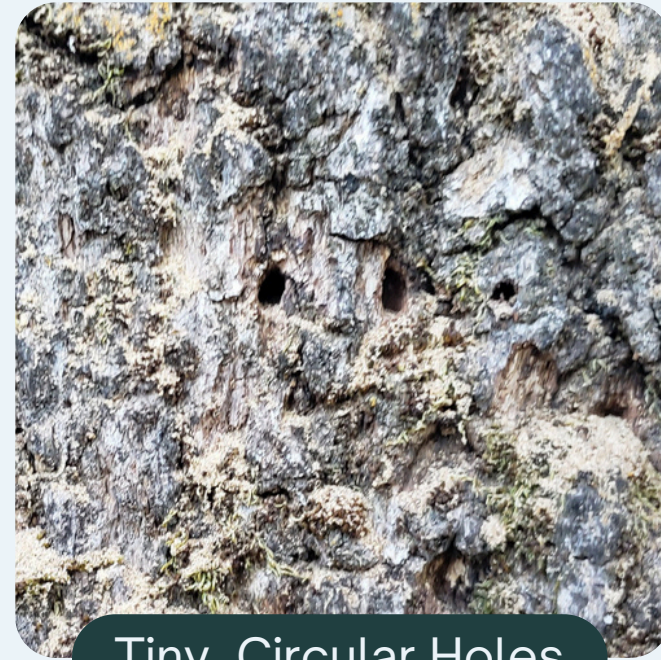


# Symptoms



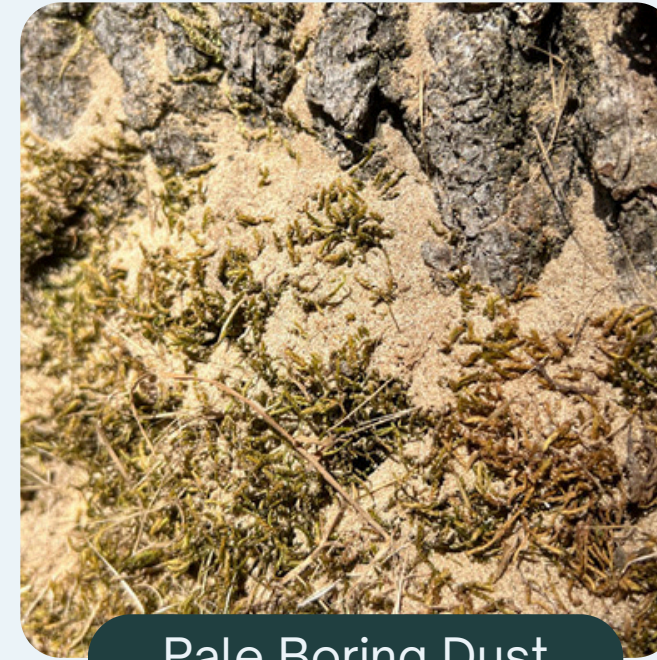
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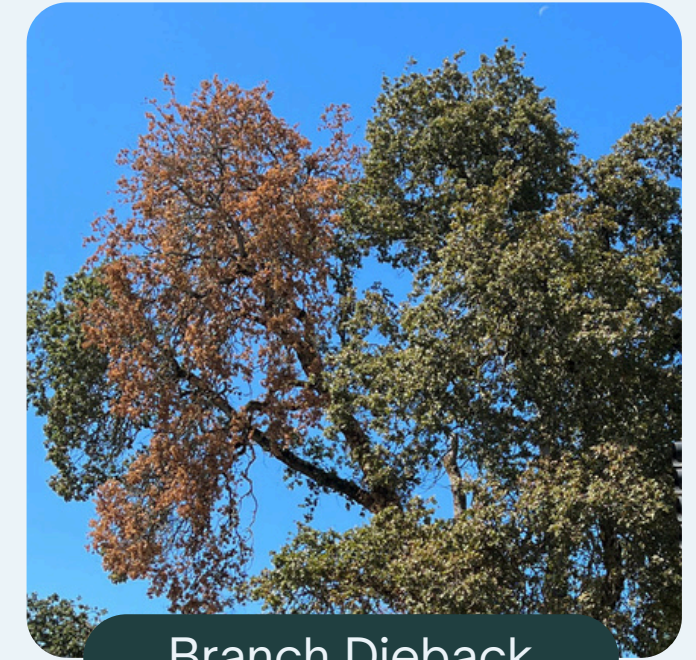
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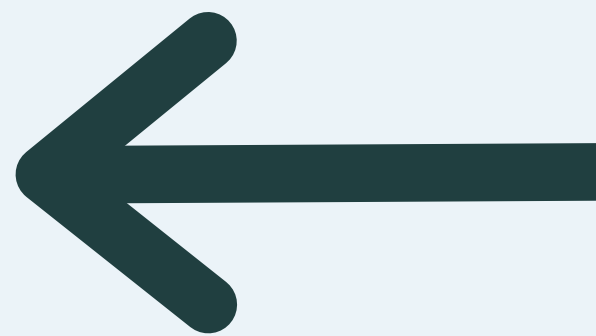
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# Mediterranean Oak Borers

- MOB is a tiny reddish-brown beetle.
- It is very difficult to spot adults during an inspection.
- Females are identifiable by the raised bumps on the back of their shell.



*Small, raised bumps on the back of the shell of the female.*





# Female MOB



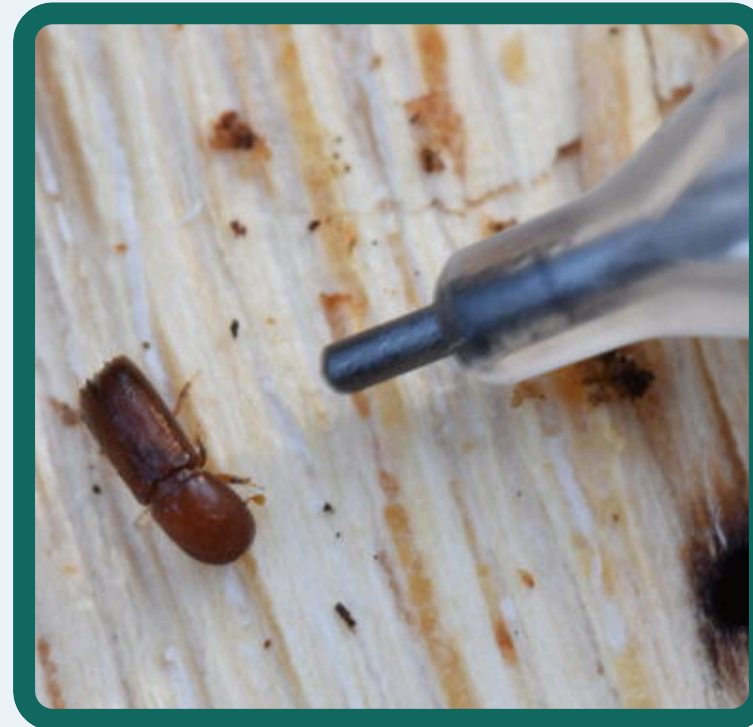
Larger



Closer to Pencil Lead Size



Capable of Flight



# Male MOB



Slightly Smaller



Flightless

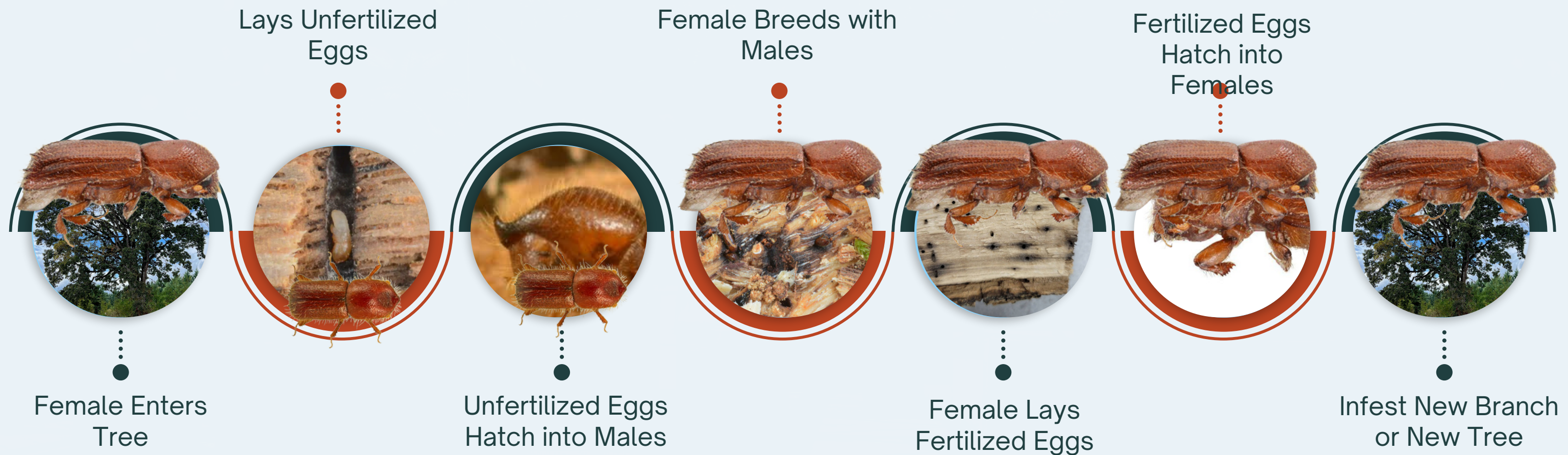


Rhino Horn



# Life Cycle of MOB

MOB can enter a tree through the outer branches of a tree, a wound, or an area where the bark is particularly thin. A single female beetle can be the start of an infestation. Unfertilized eggs hatch into males, which she can mate with to produce more females.





# Generational Cycles



## 5-8 Weeks To Develop

MOB requires 5-8 weeks to develop from egg to adult and can have two or more generations per year.



## Hibernate During Winter

In California, mated females overwinter in the gallery system and hibernate between November-January.



## Peak March-May

They emerge in late winter or spring, when the temperature approaches 80°F. This is the most dangerous period to prune trees or cut wood.



# Galleries



## **Black Trellis Shapes**

Tunnels link to other tunnels instead of avoiding them. Telltale black color from fungus that female beetles cultivate.

## **Move Down Tree to Trunk**

Enters through tips of branches, open wounds, or thin areas of bark. MOB then moves downwards, rarely returning back up a branch that it missed.

## **Black Fungus Girdles Tree**

Fungus and galleries cut off water flow, girdling the tree and potentially resulting in fungal wilt pathogens.





# FUNGUS

- All ambrosia beetles have fungal associations.
- Associated with fungal pathogens in the genera *Raffaelea* and *Fusarium* in both its native range and in California.
- Some of these fungi can be pathogenic and cause tree diseases that may lead to tree decline and, sometimes, tree death.



# Preferred Biomes

- Most Common: Elevations below 1,500 ft.
- Much Less Common: Elevations from 1,500 - 2,000 ft.
- Very Rare: Elevations at 2,000 ft.
- Almost exclusively found in oak dominated stands.









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## Lake County's Oak Woodlands

- Tan Oak
- Live Oak
- Scrub Oak
- Valley Oak
- Blue Oak
- Leather Oak
- Oregon White Oak
- California Black Oak
- Oracle Oak



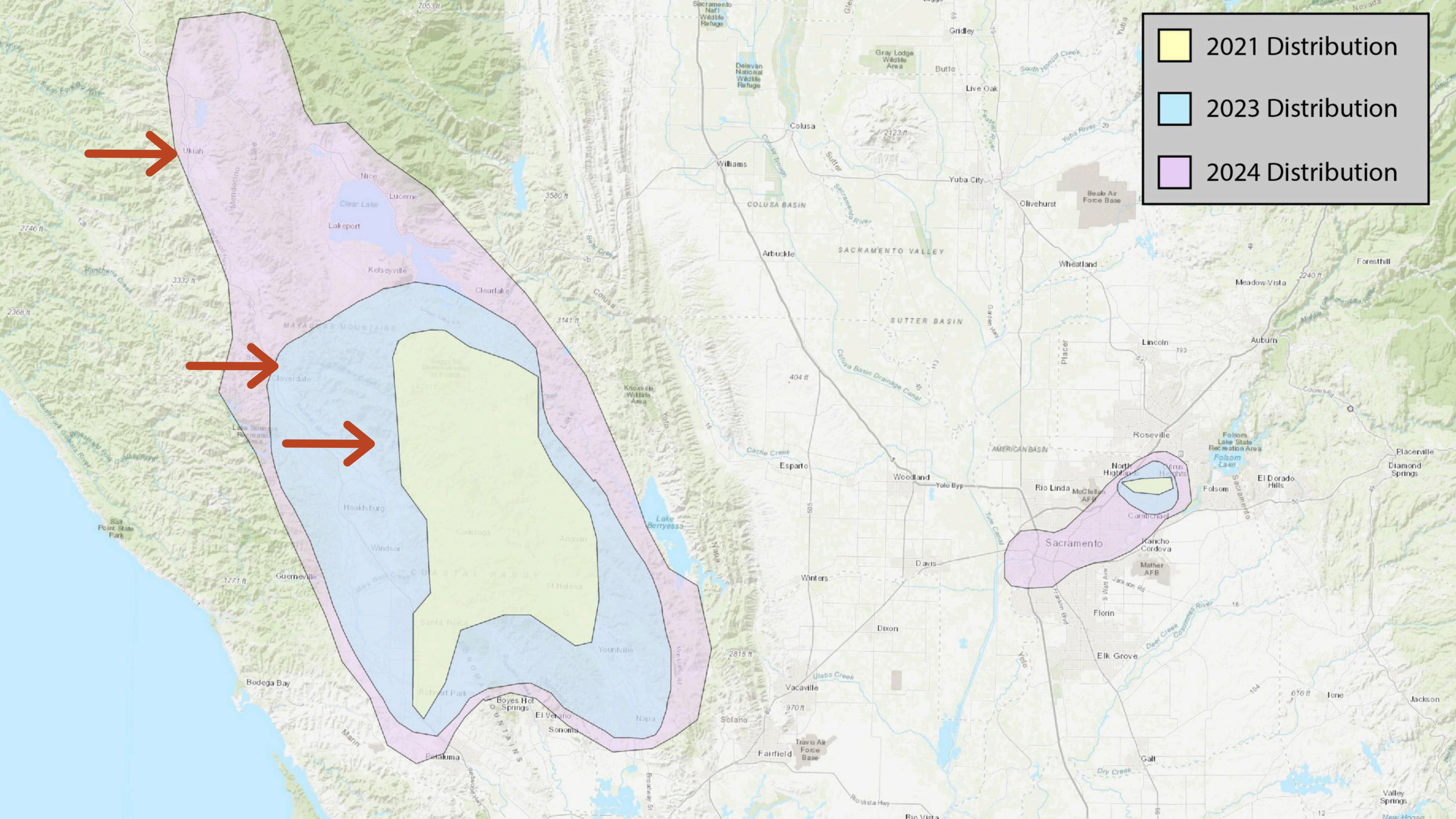
*Valley Oak*




*Blue Oak*

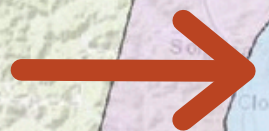
*Oregon White Oak*

*California Black Oak*





	2021 Distribution
	2023 Distribution
	2024 Distribution







# What Can We Do?





# Pruning

## Level of Infestation

Pruning of infested tree limbs is viable, depending on the level of infestation. Once the MOB infestation reaches the trunk of the tree, pruning limbs will not remove MOB.

## Infestation Moves Down Trunk

Take pictures of the branches before they lose leaves in order to easily identify them later. Must prune up to bole (trunk) to be effective in stopping the infestation.

## Treat Pruned Material

Avoid moving after cutting. Material should be treated by chipping, heating, burning, or at least containing it until able to do so. The best period to prune is in the beetle's inactive period during November-January.





A solid red circle with a white center is positioned on the left side of the slide.

# Treating the Wood

A solid black circle is positioned on the right side of the slide.A large solid red circle is positioned on the right side of the slide, partially overlapping the black circle.A large solid teal circle is positioned at the bottom right corner of the slide.



# Pruning



## Chipping

November - January

The chips should be 1 inch or less in diameter, however, some guidelines can allow for up to 3 inches in diameter if 1 inch is otherwise unavailable.



## Burying

Not recommended.

Buried deep enough that the MOB can't see light.

At least 5 inches deep.



## Solarization

No longer recommended

Clear tarps to allow sun heat to trap and kill off MOB.

Would need fine, stainless mesh of 1 mm or less.



## Burning

Can burn during key, winter months when MOB is dormant.

Restricted by burn season.

Can use portable incinerators.



## Heat Treating

Used for other pests.

Minimum of 140 F for 60 minutes.

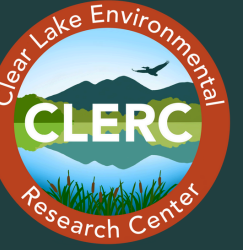
Can use portable kilns outside of burn season.



# Surveying for MOB







[About Us](#)

[Fire & Forestry Program](#)

[Chipping Program](#)

[The CLERC Lab](#)

[Projects](#)

[Resources](#)

[Connect](#)

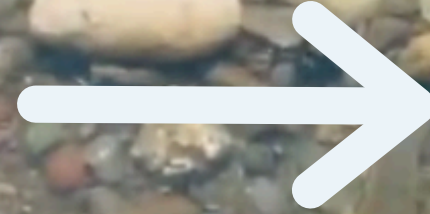
[Donate](#)

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[Hitch Observation Project](#)

[The Carnegie Library Project](#)

[Mediterranean Oak Borer Monitoring Project](#)





## WHAT YOU CAN DO

1. THE MOST IMPORTANT THING YOU CAN DO TO STOP THE SPREAD OF MOB IS TO REPORT ANY ODD BEHAVIOR FROM YOUR OAKS!

2. PROTECT YOUR TREES



See our Map

Report It

[HTTPS://WWW.THECLERC.ORG/  
MEDITERRANEAN-OAK-BORER-  
MONITORING-PROJECT](https://www.theclerc.org/mediterranean-oak-borer-monitoring-project)





# Mediterranean Oak Borer Reports in Lake County, CA

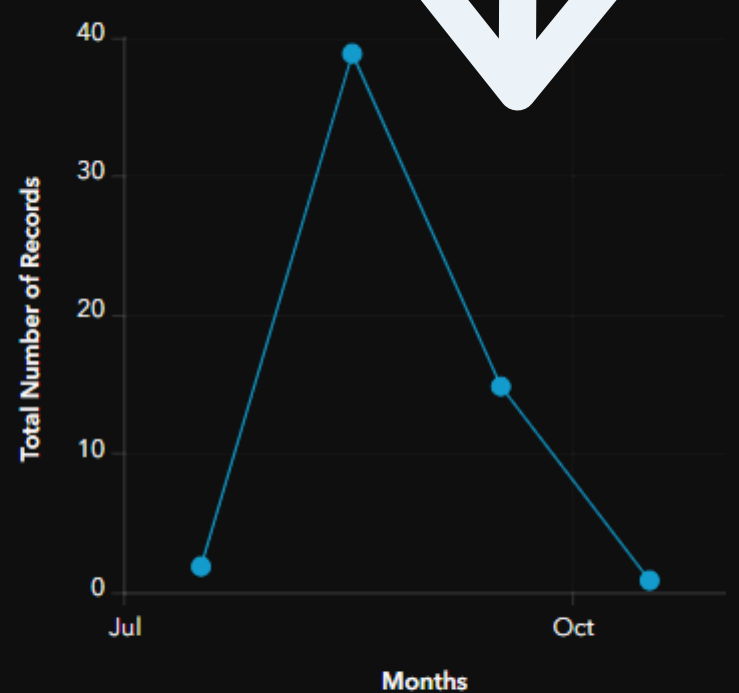
Managed by Clear Lake Environmental Research



## About Mediterranean Oak Borer

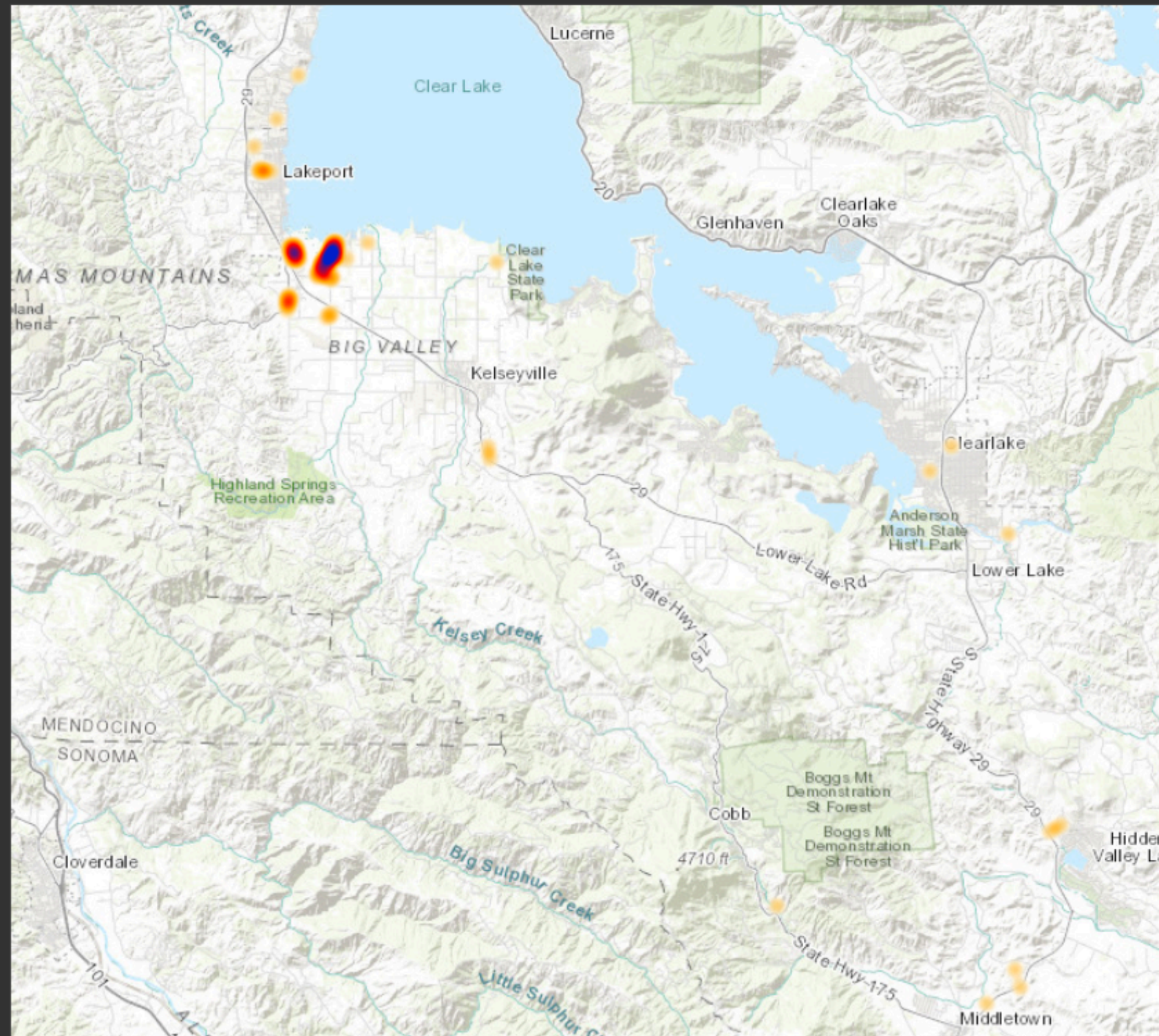
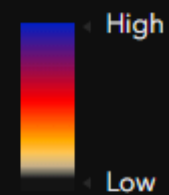
The Mediterranean Oak Borer (MOB) is an invasive ambrosia beetle that puts our heritage valley and blue oaks. This map compiles reports of MOB sightings that can be used to determine the spread of the pest, with the amount of reports corresponding to the color. Monitoring the presence of the pest and early reporting is crucial to eradicating the pest and mitigating the damage caused by it.

For more information please go to our website at <https://www.theclerc.org/mediterranean-oak-borer-monitoring-project>



Last update: 9 seconds ago

## Mediterranean Oak Borer Records



Lake County, CA, Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

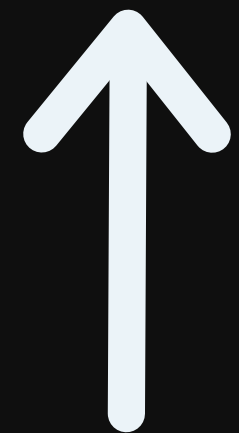
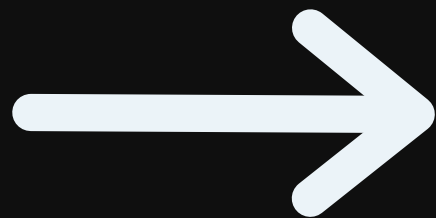
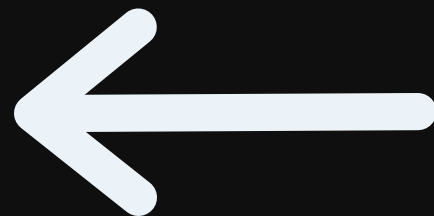
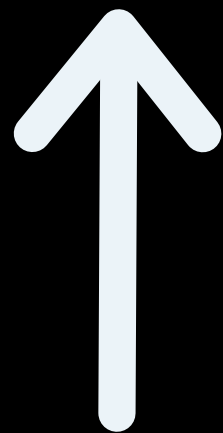
Powered by Esri

1 of 57

## Mediterranean Oak Borer Survey 4 view

Date and Time of Sighting: 8/10/2024, 7:30 AM

Do you have additional questions or information for the biologist?





## WHAT YOU CAN DO

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# The CLERC Survey

Asks basic information, such as...

- Name
- Contact Information
- Location of MOB infested tree
- Symptoms

Allows us to gather information to share with local and state agencies

Provides a source for reporting and learning about what to do when you DO find MOB!

## Mediterranean Oak Borer Sighting



Mediterranean Oak Borer (MOB), *Xyleborus monographus*, is an Ambrosia beetle first detected in Napa county in 2018. It is now in Lake, Sonoma, Sacramento and Colusa counties. This infestation can be catastrophic to our valley and blue oaks, but early reporting can be the best defense. If you need any assistance, please call Julia Clickard at (707) 245-7114 between hours of 9-5 weekdays or email her at [julia.clickard@theclerc.org](mailto:julia.clickard@theclerc.org).

### Contact Information

Name\*

Phone Number\*

Email Address

Date and Time of Sighting\*

Address\*

If known, please put the address of the suspected sick tree.



# Assessing the Movement of Firewood vs MOB Spread









# Firewood Surveys

By tracking where firewood is moving throughout the county, we can compare the information to where MOB is being found.



## Contact

Contact local arborist and forest management professionals.



## Survey

Use a survey to track where work has been done and where wood is being moved.



## Act

Compare against the MOB heat map and how it changes over time.



# Local Outreach

Lake County Risk Reduction Authority

(Tree Mortality Task Force)

County of Lake - Ag Dept.

Lake RCD

NRCS

Cobb Area Council

Lake County Women for Ag

Land County Land Trust

Redbud Audubon

Big Valley Band of Pomo

Local Tree Contractors

Outreach to Communities via newsletter  
and flyers posted on bulletin boards





# Moving Forward

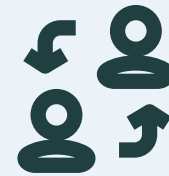
01



## Training for Professionals

Learning the signs and symptoms.  
Learning how to mitigate the spread of MOB when they work on sites.

02



## Training for the Public

Learning signs and symptoms and what they can do to protect their trees. Given the contacts of professionals who they can call to deal with potential infestations

03



## Survey and Reporting

Further outreach and community participation with landowners and tree professionals in order to accurately track the MOB spread.

04



## Grant Funded Treatments

Our goal is to gather data in order to support obtaining a grant for management, similar to Oregon's mobile burn unit or other methods.

## Upcoming Q&A Open House

We're hosting a Q&A Open House in mid-March for more in depth questions with local pest advisors and entomologists.





# Questions? Contact Information:

*Mike Jones- [mjones@ucdavis.edu](mailto:mjones@ucdavis.edu)*

*(707)463-4495*

*Curtis Ewing- [curtis.ewing@fire.ca.gov](mailto:curtis.ewing@fire.ca.gov)*

*(916) 201-7032*

*CLERC- [julia.clickard@theclerc.org](mailto:julia.clickard@theclerc.org)*

*(707) 245 - 7114*

*CLERC MOB Reporting- <https://www.theclerc.org/mediterranean-oak-borer-monitoring-project>*