



# Emerging Forest Pest Issues in California

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Protection

# VARIOUS ISSUES

- Urbanization
- Fragmentation
- Fire Regimes
- Stand Structure and Composition
- Weather and Climate
- Invasive Species



# URBANIZATION

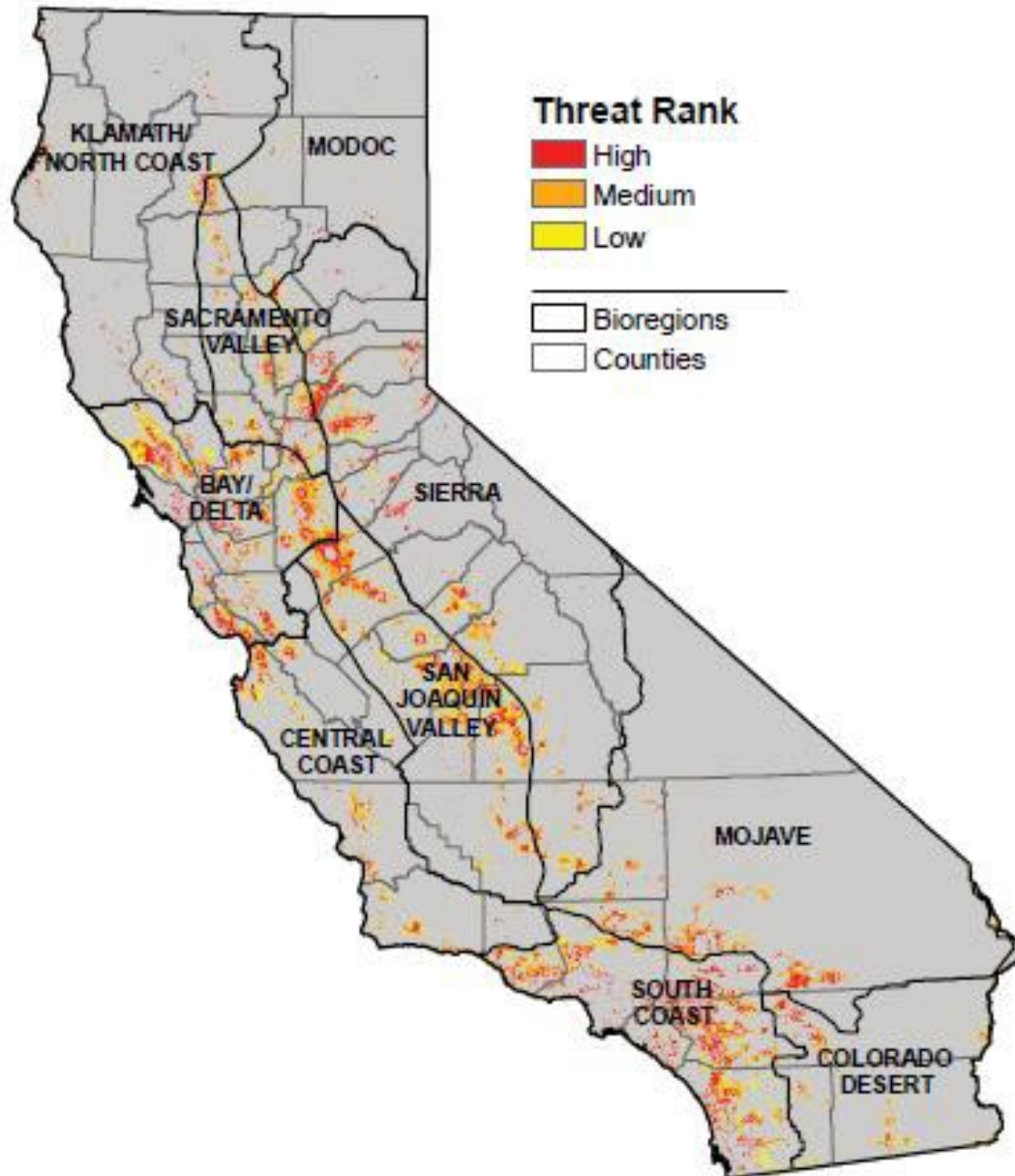


Nearly 40 Million  
People Live in  
California

Almost ½ Million  
Acres of Land  
are Converted  
to Urban Uses  
Every Decade

More People Live  
in the Wild-land  
Urban Interface

Also Pollution  
Issues

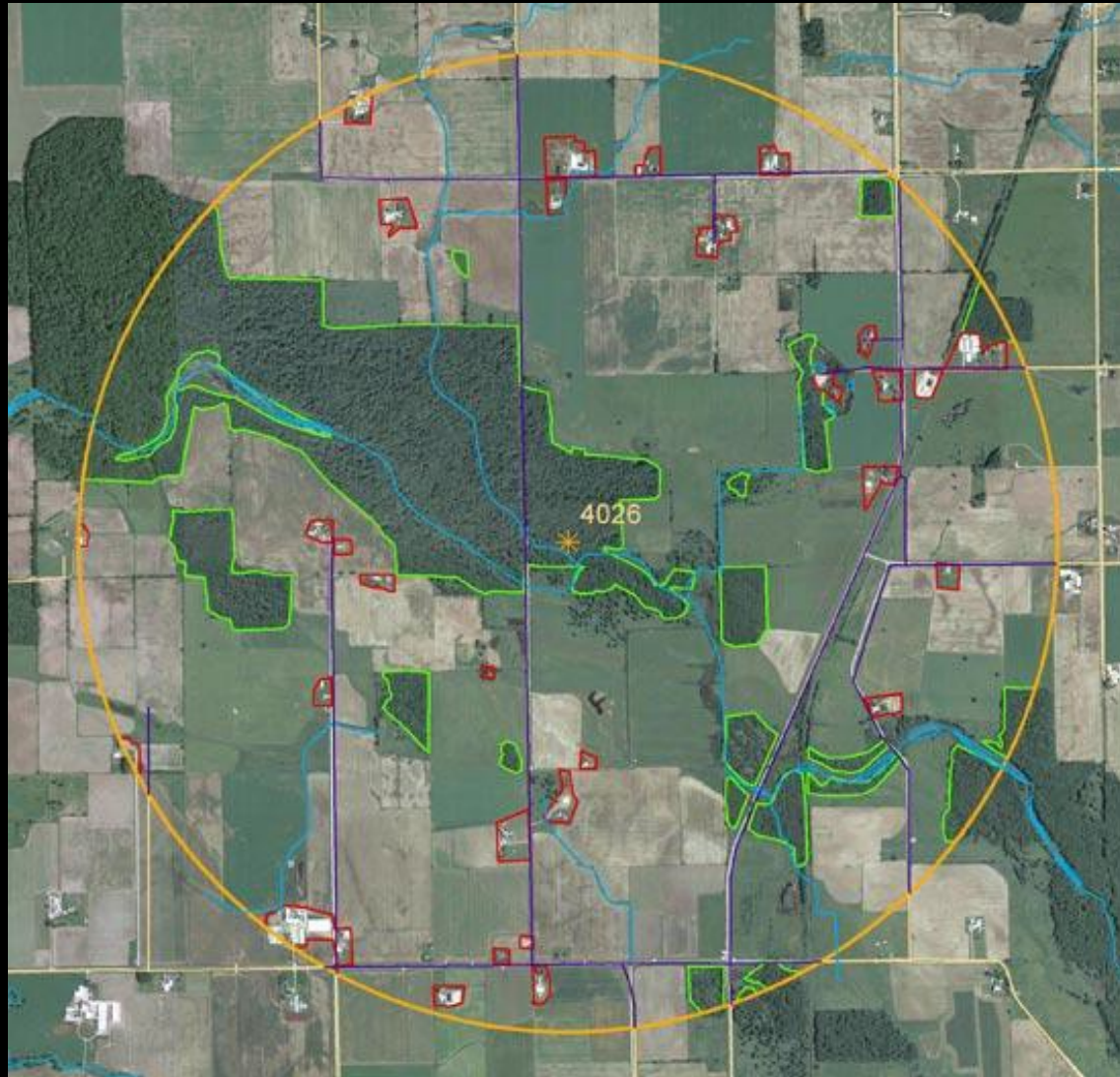


# FRAGMENTATION

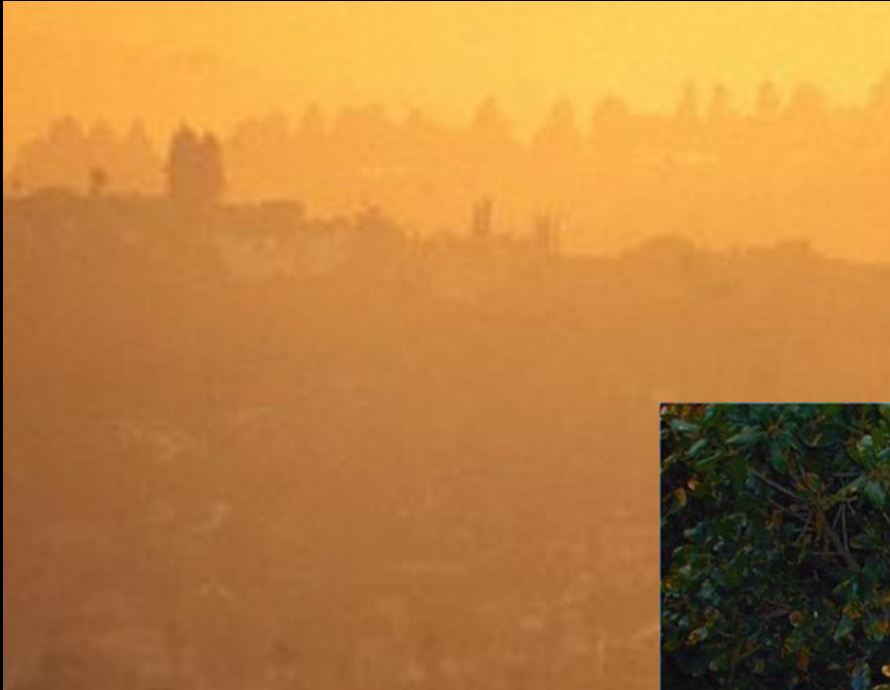
- Loss on Forest Continuity
- Smaller Habitat Areas
- Localized Loss of Species
- Loss of Genotypes
- Less Resilient



# FRAGMENTATION



# POLLUTION

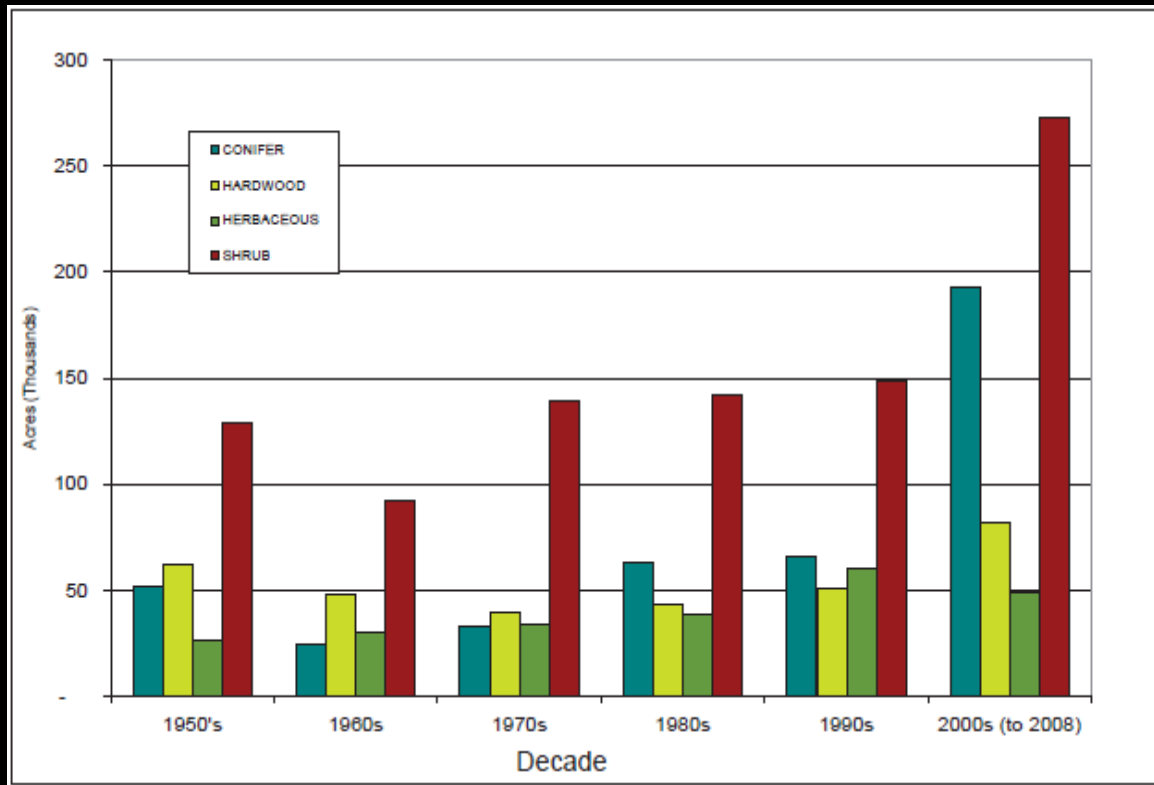


# CHANGING WILDFIRE REGIMES



- California is a Fire Based Ecosystem
- Years of Wildfire Control and Stand and Species Changes have Altered Fire Returns and Severity
  - Now There are Fewer Larger Fires

# Wildfires



- Increasing Acres Burned
- Worst Wildfire Years in California Since 1950 Have All Been Post 2000

# Wildfires



# FOREST STAND STRUCTURE AND COMPOSITION

- Changes in Density From Less Dense to More Dense
- Changes in Species to Shade Tolerant
- More Ladder Fuels for Forest Fires
- Fewer Open Areas
- Less Diversity in Forest Stand Structure and Species Diversity
- Greater Opportunities of Spread of Insects and Diseases



1909



1938



1958

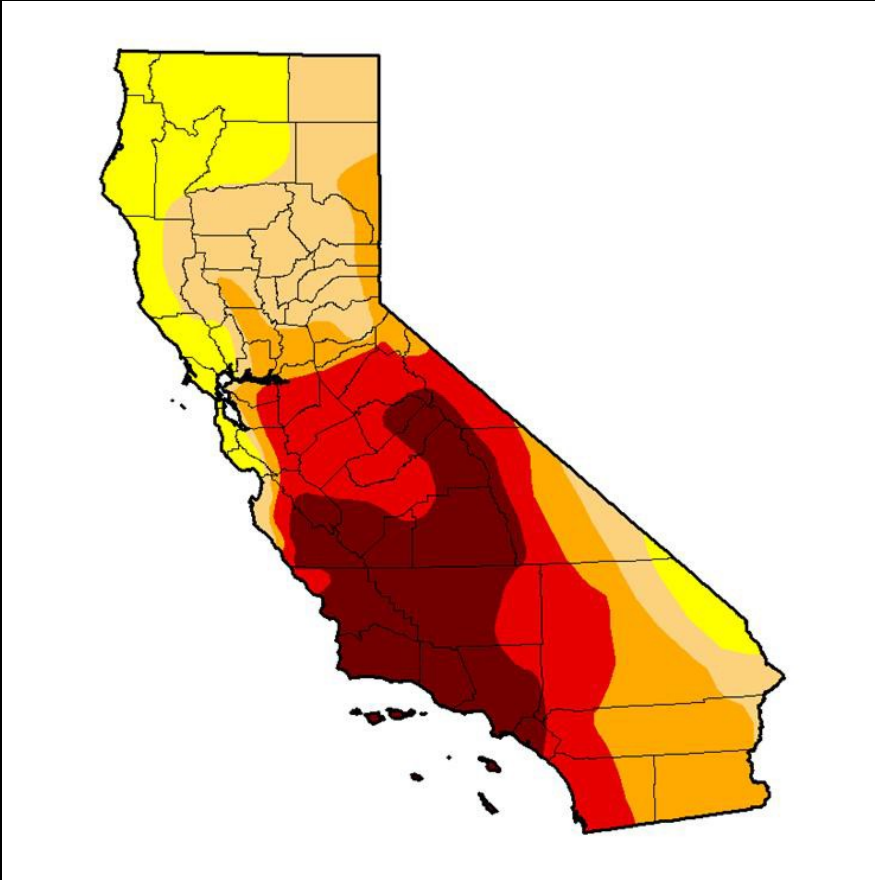


1979

# ILLEGAL STAND CONVERSIONS



# WEATHER AND CLIMATE



- Increasing Average Temperatures
- Greater Swings in Precipitation
- Earlier Snow Melt
- Potential Species Changes
- DROUGHT!
- Much Uncertainty!

# EXOTIC INVASIVE FOREST PESTS



Insects

Diseases

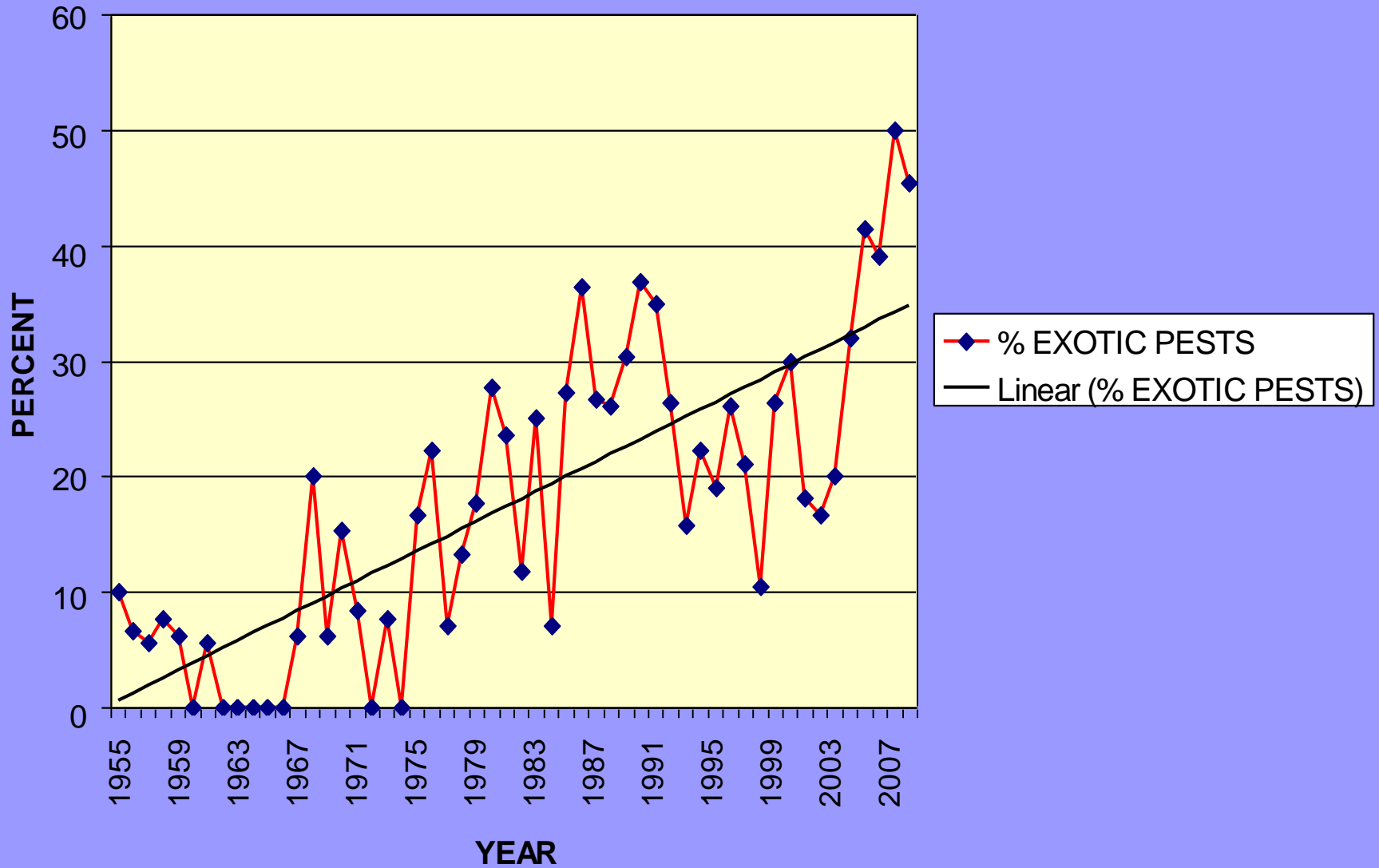
Invasive Plants

Other Animals

# Pests Can Be Native Or Exotic



# % EXOTIC PESTS IN CALIFORNIA



# EXOTIC PESTS

- Insects – Gypsy Moth, Emerald Ash Borer, Asian Longhorn Borer, Light Brown Apple Moth, Red Palm Weevils, Exotic Bark Beetles, Goldspotted Oak Borer, Polyphagous Shot Hole Borer, Kuroshio Shot Hole Borer, South American Palm Weevil
- Diseases – White Pine Blister Rust, Pitch Canker, Sudden Oak Death, Thousand Canker Disease
- Parasitic Seed Plants – Giant Dodder
- Animals – Feral Pigs

# ANIMAL DAMAGE – FERAL PIGS



# INVASIVE PLANTS



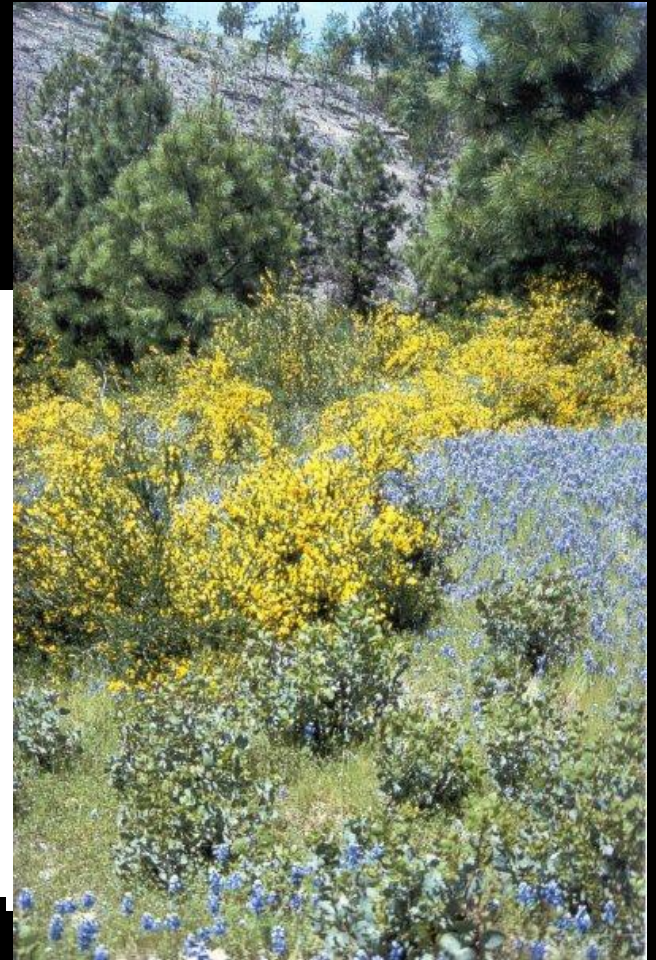
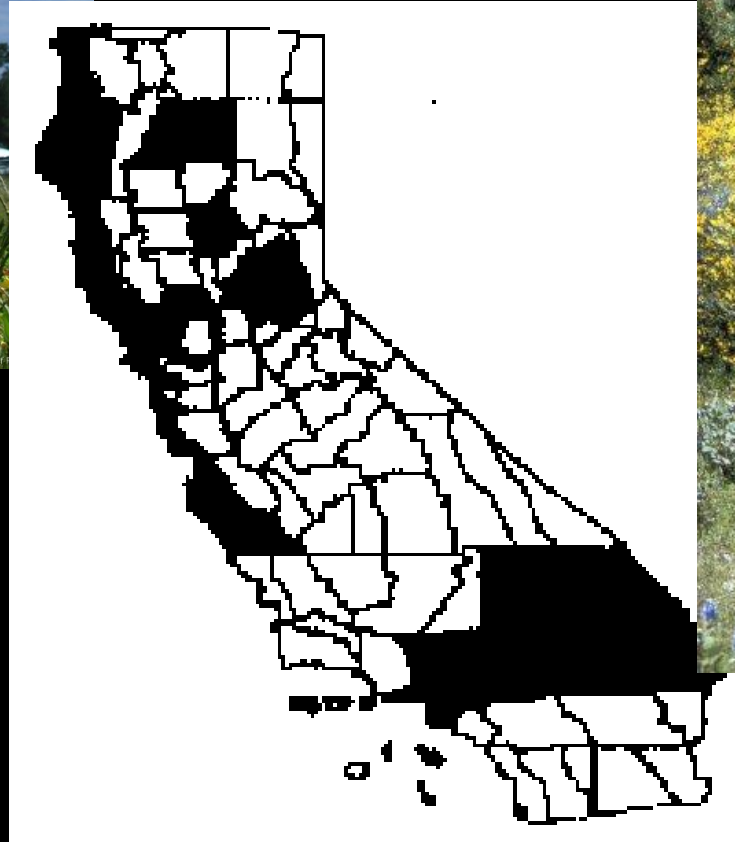
# INVASIVE TREES



# YELLOW STARHISTLE



# BROOMS



# GIANT ASIAN DODDER



# DISEASES



# PORT ORFORD ROOT DISEASE



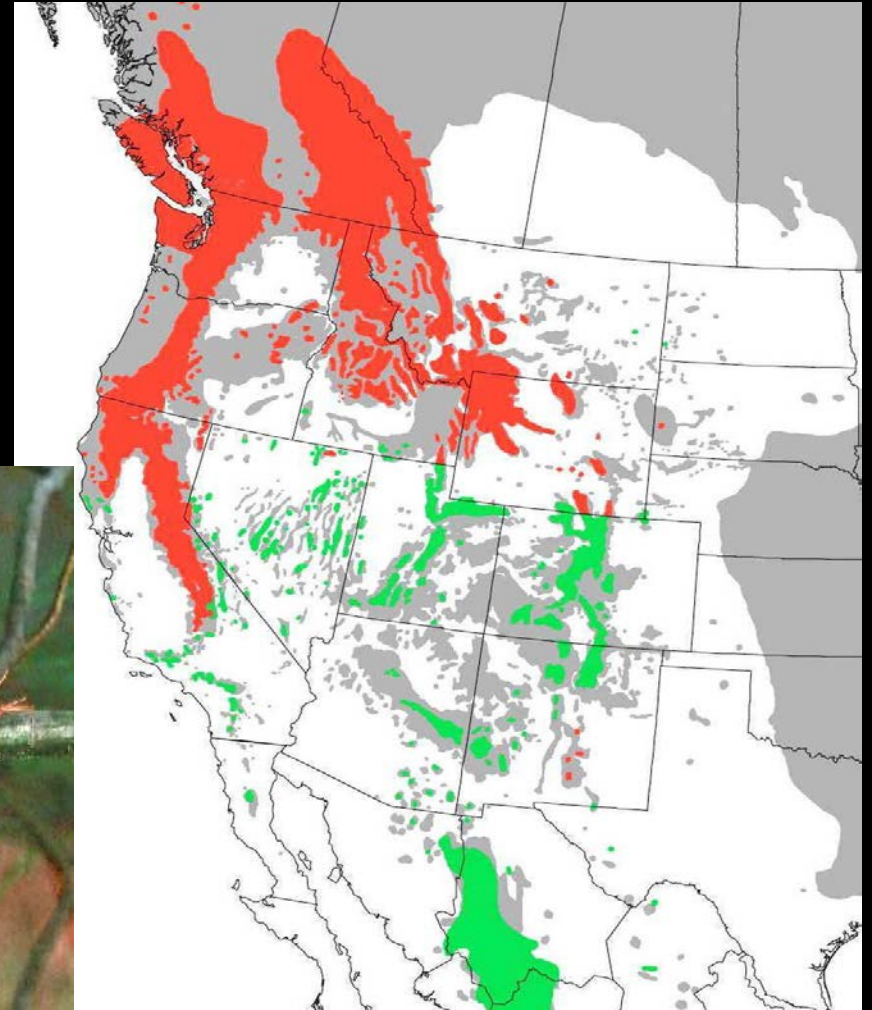
## Port-Orford-Cedar Disease Management Area

Please Stay on Paved Surfaces,  
Especially When Soils are Wet.

The area behind this sign contains an active  
Port-Orford-Cedar root disease infection.  
Traveling into the infected area could result in  
movement of disease spores on tools, equipment  
or footwear to uninfected areas.



# WHITE PINE BLISTER RUST



# PITCH CANKER



# PITCH CANKER TASK FORCE

- Disease is intensifying in Point Reyes area
- More signs of recovery in old infestations
- Only in coastal areas
- Except one outbreak in the Placerville areas

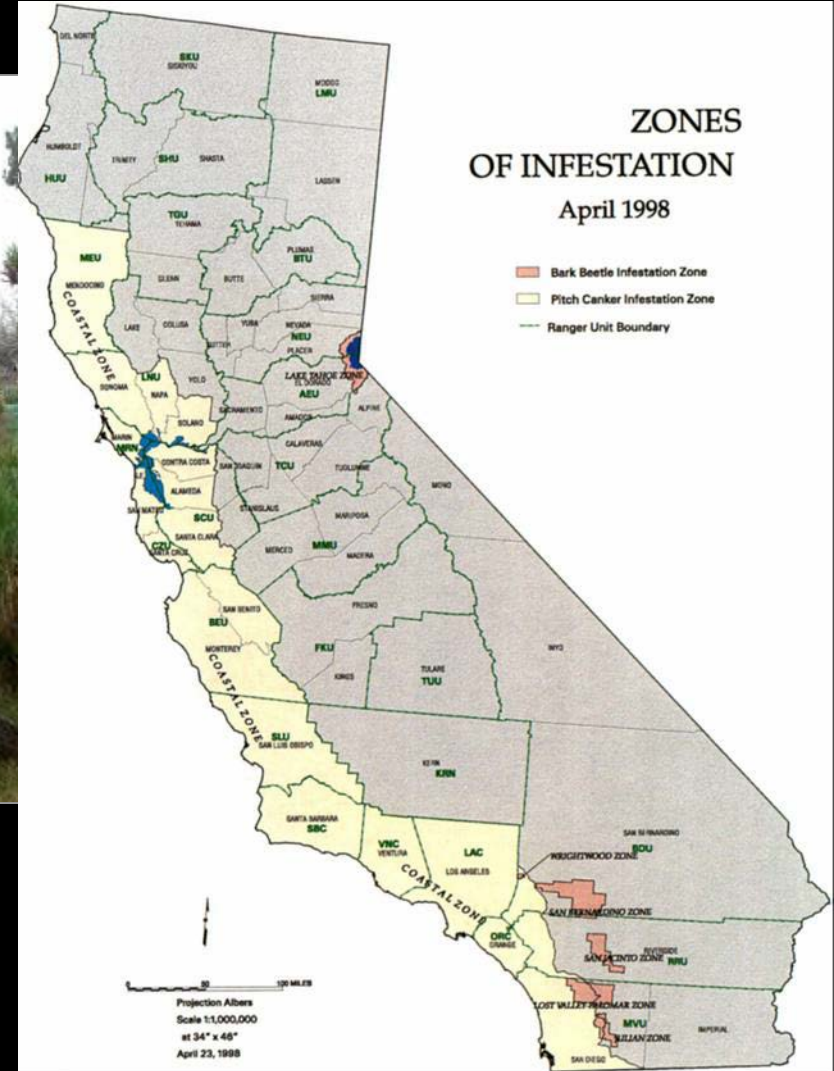


[http://frap.cdf.ca.gov/pitch\\_canker/](http://frap.cdf.ca.gov/pitch_canker/)

# PITCH CANKER



*Fusarium circinatum*



# PITCH CANKER



# THOUSAND CANKER DISEASE

- New Disease of walnuts carried by native twig beetles
- Fungus is called *Geosmithia*



# SUDDEN OAK DEATH



UGA5028035

# SUDDEN OAK DEATH

## California Oak Mortality Task Force



/w/  
or&





# SUDDEN OAK DEATH

- New Infestation in the Redwood Valley area in Humboldt County
- New Problems on Larch in Great Britain
- New Hosts?
- Trinity and San Luis Obispo Counties

Distribution of Sudden Oak Death as of February 15, 2008



Map produced on 2/15/08 by UCB GIIIF: <http://kellylab.berkeley.edu/SCD/monitoring/>  
 For more information about Sudden Oak Death, please visit the California Oak Mortality Task Force website at <http://www.suddenoakdeath.org/>



# FOAMY BARK CANCKER



*Geosmithia pallida*

# EXOTIC INSECTS



# EXOTIC BARK BEETLES

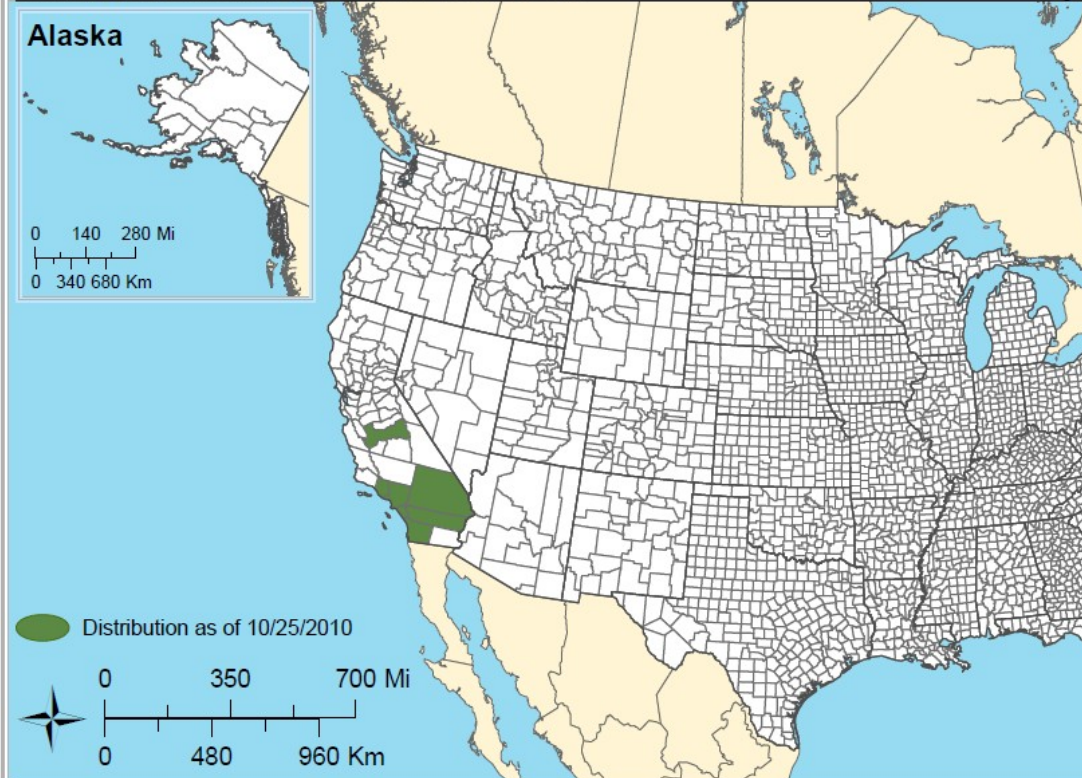


**Alien Forest Pest Explorer**

**Pest Distribution Map**

**Red-haired Pine  
Hy**

[www.fs.fed.us/ne/morgantown/4557/AFPE/](http://www.fs.fed.us/ne/morgantown/4557/AFPE/)



UGA1428147



USDA  
Forest  
Service



Northern  
Research  
Station



Eastern Forest  
Environmental Threat  
Assessment Center



Forest Health  
Technology  
Enterprise Team

# PALM WEEVILS



# EMERALD ASH BORER

Interception at the Topaz  
Border Protection Station  
on July 13, 2010



# EMERALD ASH BORER



- Devastated Urban Forests Throughout the Midwest
- Bankrupting Communities
- Extensive Urban Ash Forest in California
- Native ash species

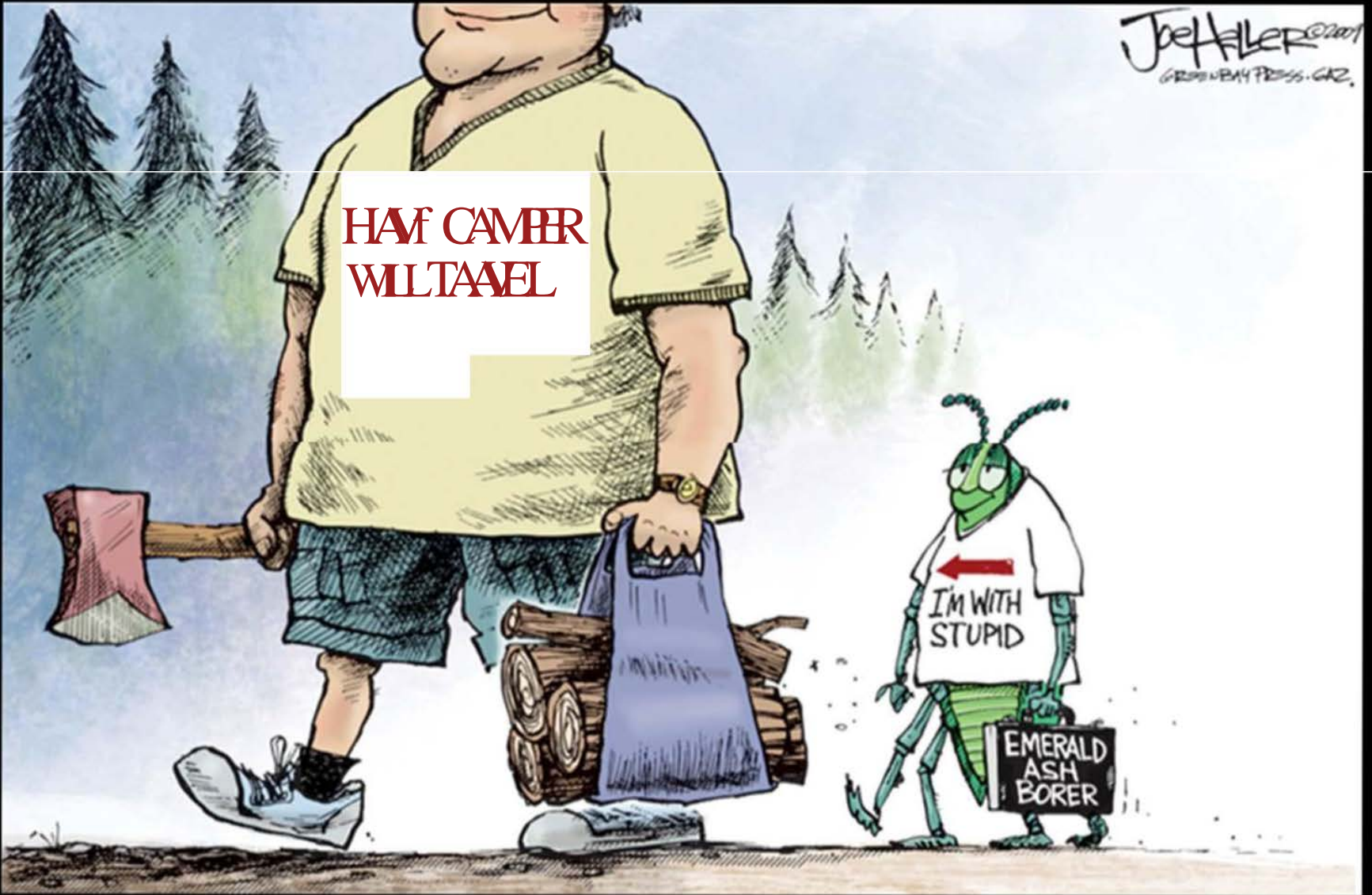
# EMERALD ASH BORER



Interception at the Topaz  
Border Protection Station on  
July 13, 2010

Joe HALLER ©2001  
GREEN BAY PRESS-GAZ.

HAF CAMER  
WILTAEEL



# ASIAN LONGHORN BEETLE



# LIGHT BROWN APPLE MOTH

## Potential Impacts:

- Rare and Endangered Species
- Riparian Areas
- Wildfire Fuel Levels
- Timber



# TIMBER SPECIES HOSTS OF LBAM

- Monterey Pine
- Other Pines
- Douglas Fir
- True Firs
- Spruce
- Oaks
- Maple
- Coast Redwood



# LBAM CONTROL



**Twist Tie Placement**





# GYPSY MOTH



# OVERALL IMPACT OF GM



- Unknown
- Invasive Species in New Habitat and New Climate



Gypsy Moth in Northeast

# GOLDSPOTTED OAK BORER

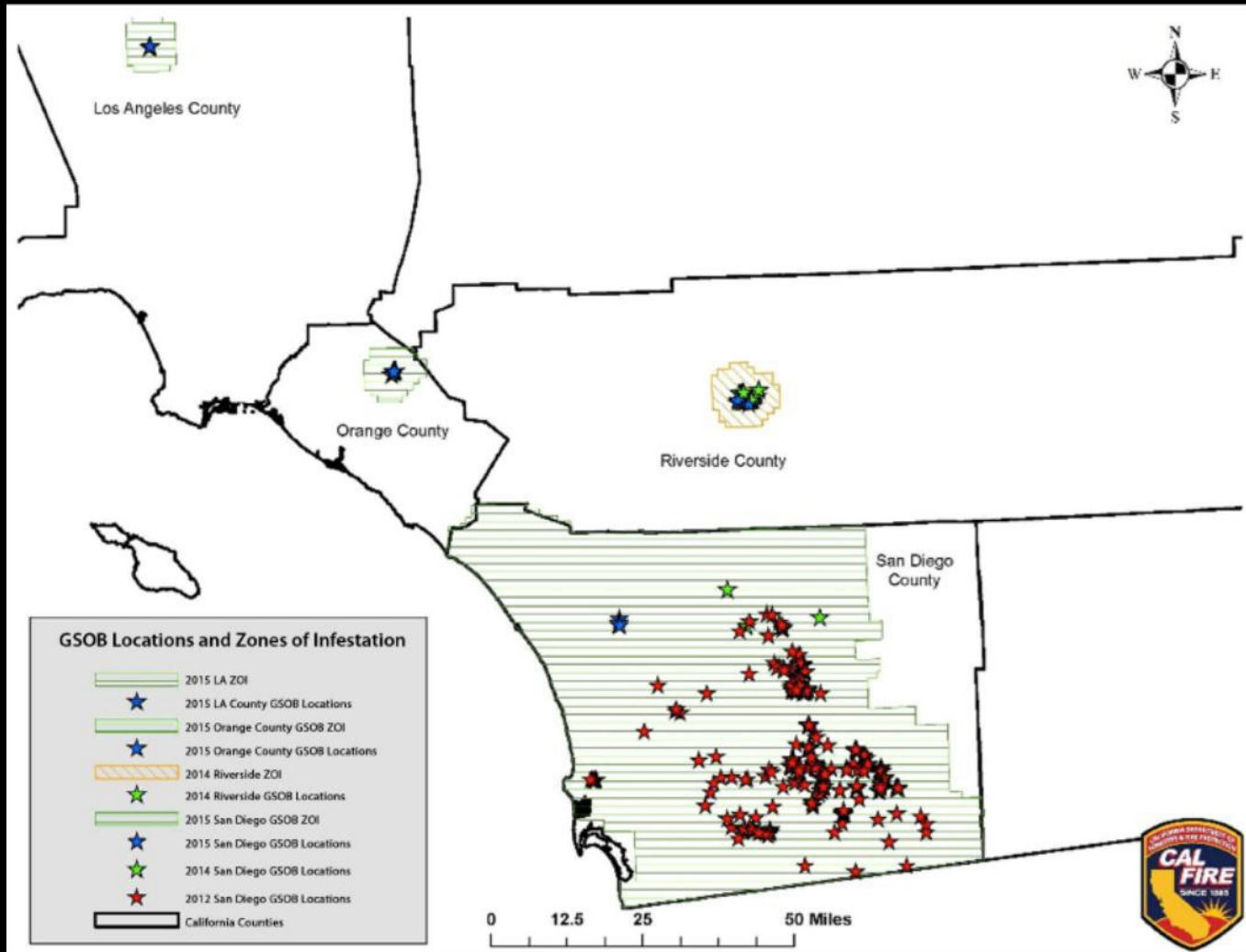


*Agrilus*  
*auroguttatus*





# GSOB IN CALIFORNIA



# GSOB HOSTS



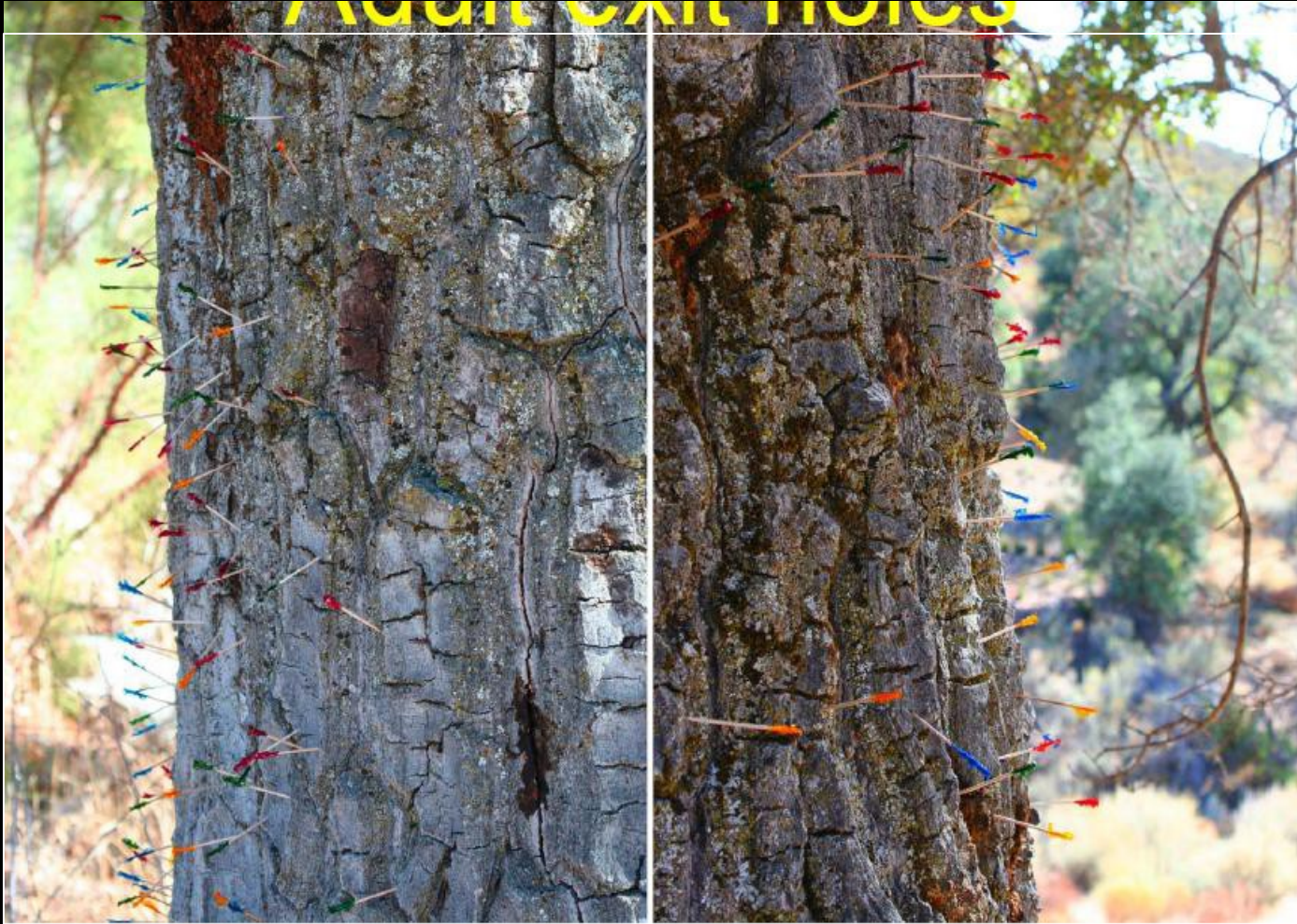
# GSOB SYMPTOMS



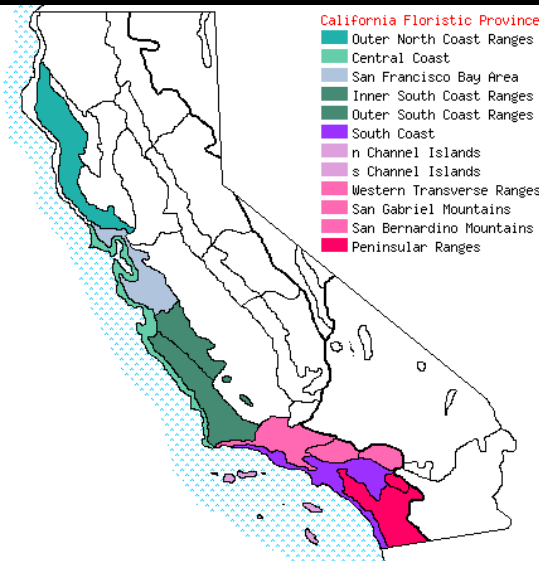
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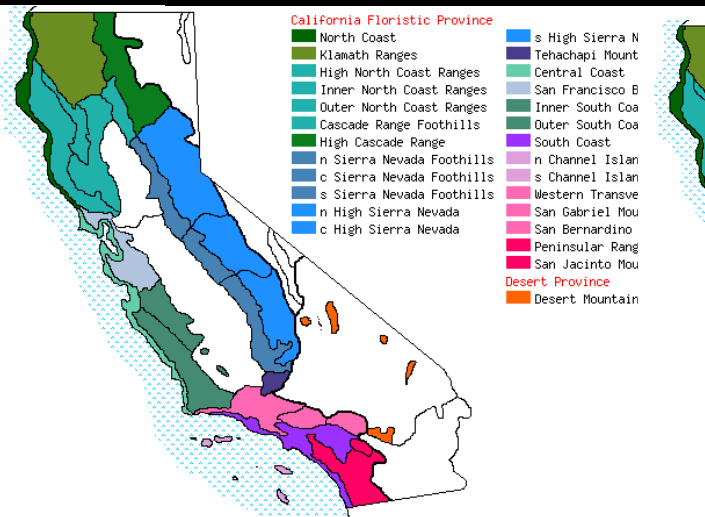
# GSOB EXIT HOLES



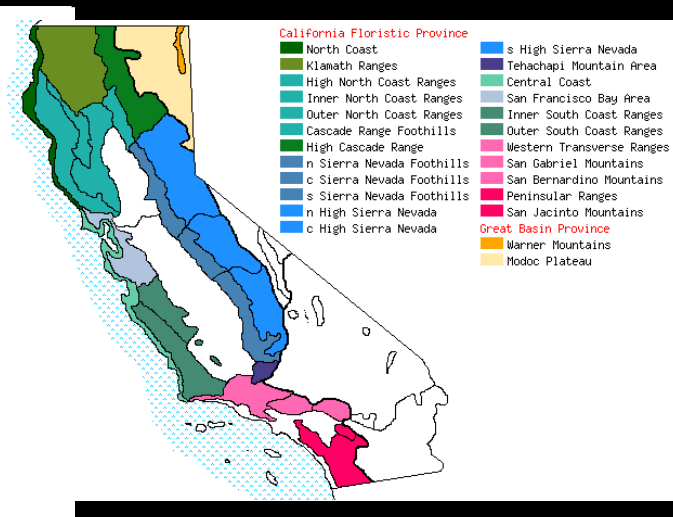
# DISTRIBUTION OF OAKS SUSCEPTIBLE TO GSOB



**Coastal Live Oak**  
*Quercus agrifolia*



**Canyon Live Oak**  
*Quercus chrysolepis*



**California Black Oak**  
*Quercus kelloggii*



# MONITORING



Purple Panel Traps

# GSOB CONTROL



## DON'T MOVE **OAK FIREWOOD**



Transporting oak firewood can spread dangerous forest pests and pathogens. The goldspotted oak borer is a new, non-native pest in southern California. It is killing several oak species in San Diego County on private, tribal, state, and federal lands. Moving oak firewood from infested areas could establish this new pest in additional areas and increase the oak mortality. We must prevent the spread of this insect to protect our forests and trees!

### How you can help:

- Do not transport firewood into or out of campgrounds or parks
- Leave firewood at home and use local sources of firewood
- If you have local firewood, burn all of it before leaving

## HELP PREVENT THE MOVEMENT OF **INVASIVE PESTS**



Larvae (A) and adult (B) of the goldspotted oak borer beetle.



Goldspotted oak borer larvae feeding under the bark of cut firewood.



A mature larva from the bark of cut firewood.

For more information, visit the following Web sites:  
[www.fs.fed.us/r5/sp/ftp/](http://www.fs.fed.us/r5/sp/ftp/) or [www.fs.fed.us/r5/cleveland/](http://www.fs.fed.us/r5/cleveland/)



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# GSOB MANAGEMENT - CHIPPING



# GSOB MANAGEMENT - TARPING



# GSOB MANAGEMENT - DRYING



- Best if all bark is removed
- Wood that is left for two years is free of any live stages of the insect

# GSOB INSECTICIDE TRIALS



# GSOB MANAGEMENT - REMOVAL





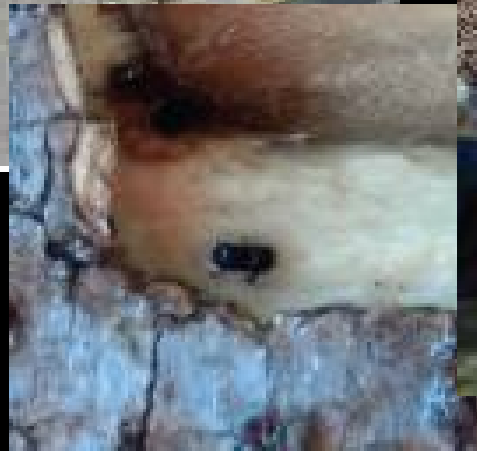
# POLYPHAGOUS SHOT HOLE BORER



Newest invasive pest  
in California

Also carries a new  
invasive species of  
*Fusarium* fungus

*Euwallacea* sp.



# POLYPHAGOUS SHOT HOLE BORER



- Small ambrosia beetle
- Beetle and fungus together kill avocado, oak, maple and castor bean
- Also attacks sycamore, willow, bay laurel, olive, grape and numerous other native and exotic trees

# POLYPHAGOUS SHOT HOLE BORER

Beetle



Bore Holes Infested with  
*Fusarium*

# POLYPHAGOUS SHOT HOLE BORER

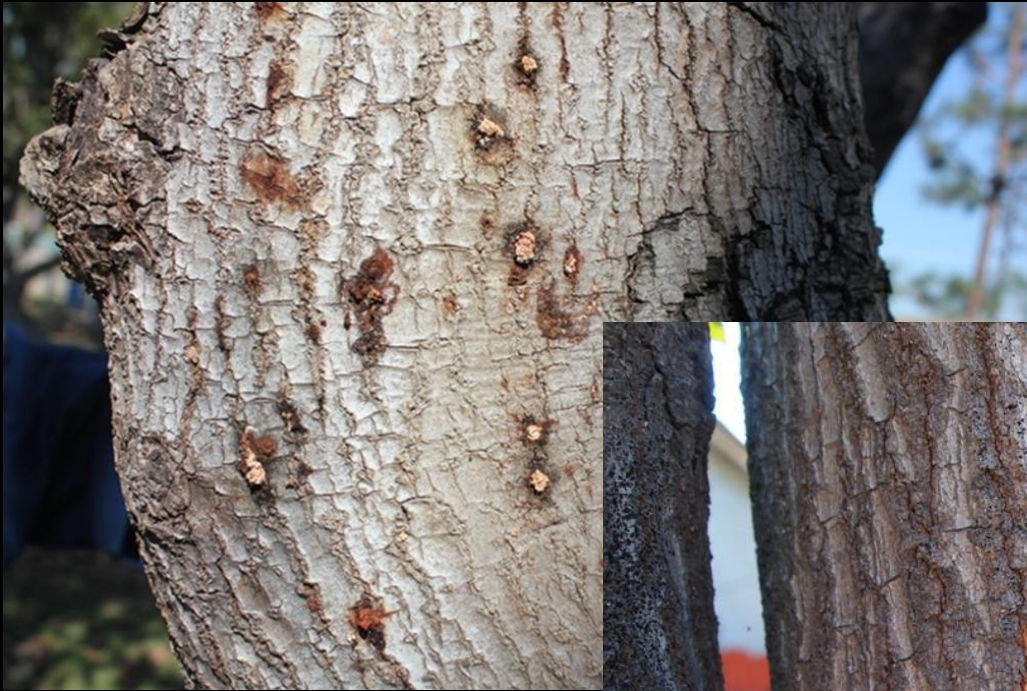


Entrance Holes



Oozing from entrance hole

# POLYPHAGOUS SHOT HOLE BORER

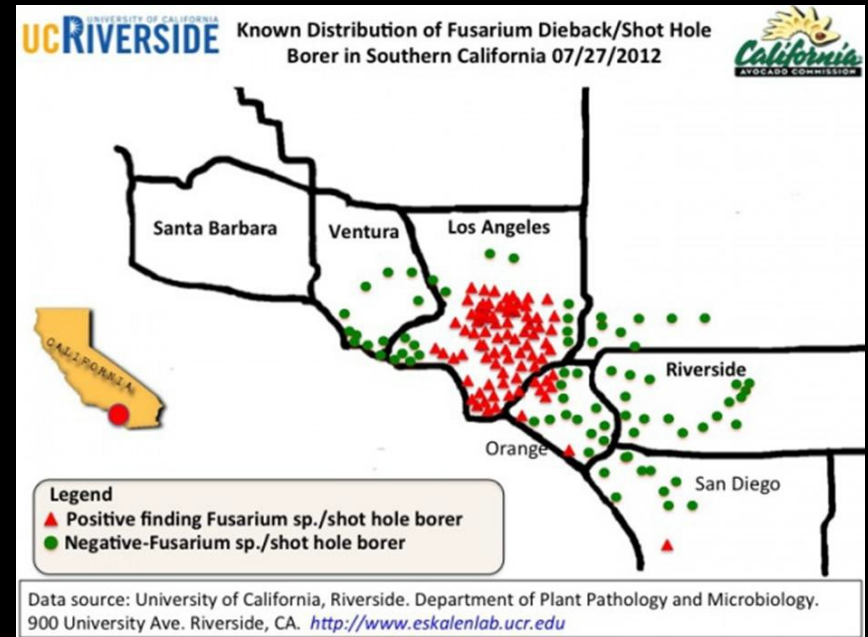
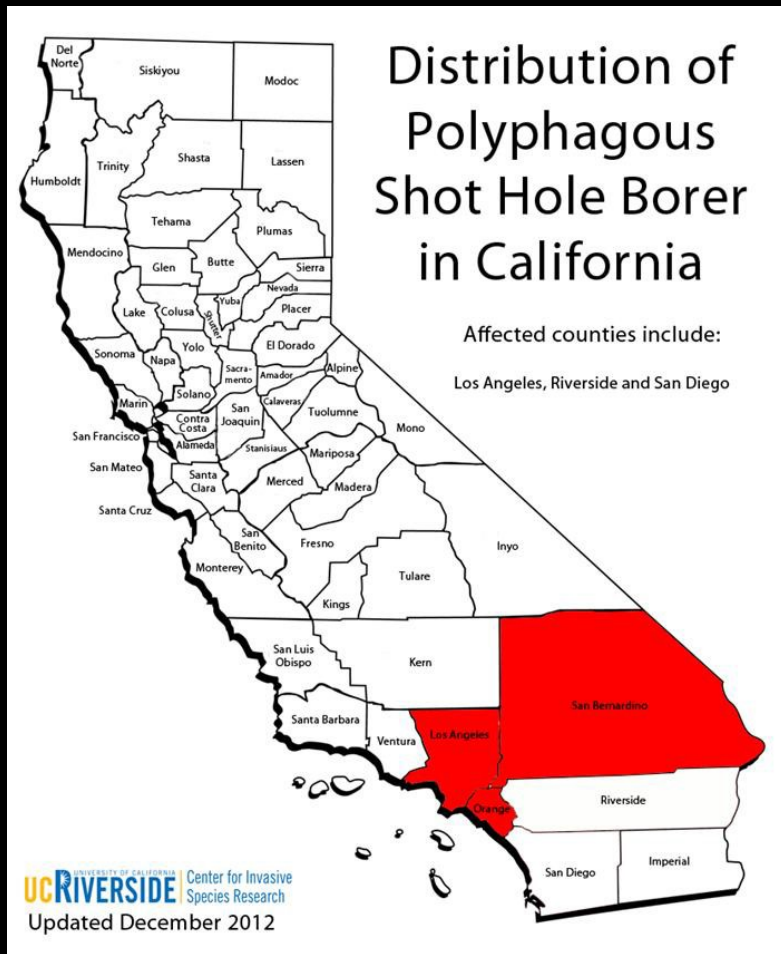


Stained Wood  
under bark



“Sugar  
Volcnoes”

# Polyphagous Shot Hole Borer



# KUROSHIO SHOT HOLE BORER



# KUROSHIO SHOT HOLE BORER



# KUROSHIO SHOT HOLE BORER



# Firewood Task Force

**HELP STOP THE SPREAD OF INVASIVE TREE & SHrub SPECIES**

When you buy firewood, make sure you buy it from a reputable source. This helps ensure that the wood is free of insects and diseases that can spread to native trees and shrubs.

**BUY IT WHERE YOU BURN IT.**



**DONT MOVE FIREWOOD.ORG**

Prevent the spread of invasive tree and shrub species.

www.dontmovefirewood.org

Icons: A row of small icons representing various environmental and conservation organizations.

**AYUDA A DETENER LA PROPAGACIÓN DE ESPECIES INVASIVAS Y ENFERMEDADES EXÓTICAS**

Al comprar leña, asegúrese de comprarla de una fuente confiable. Esto ayuda a garantizar que la leña esté libre de insectos y enfermedades que pueden propagarse a árboles y arbustos nativos.

**COMPRE LA LEÑA DONDE SE VA A USAR**



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# Firewood Concerns



- A Major Source of Movement of Insects and Diseases Between States and Within California
- Examples Include Gypsy Moth, SOD, Pitch Canker, Asian Longhorn Beetle, Emerald Ash Borer

Questions?