- *Armillaria* root disease
- Pitch canker
- Bear damage
- Western gall rust
- Leafy mistletoe
- Oak moth
- Oak gall wasp
- Willow rust
- Abiotic problems
- Sudden Oak Death

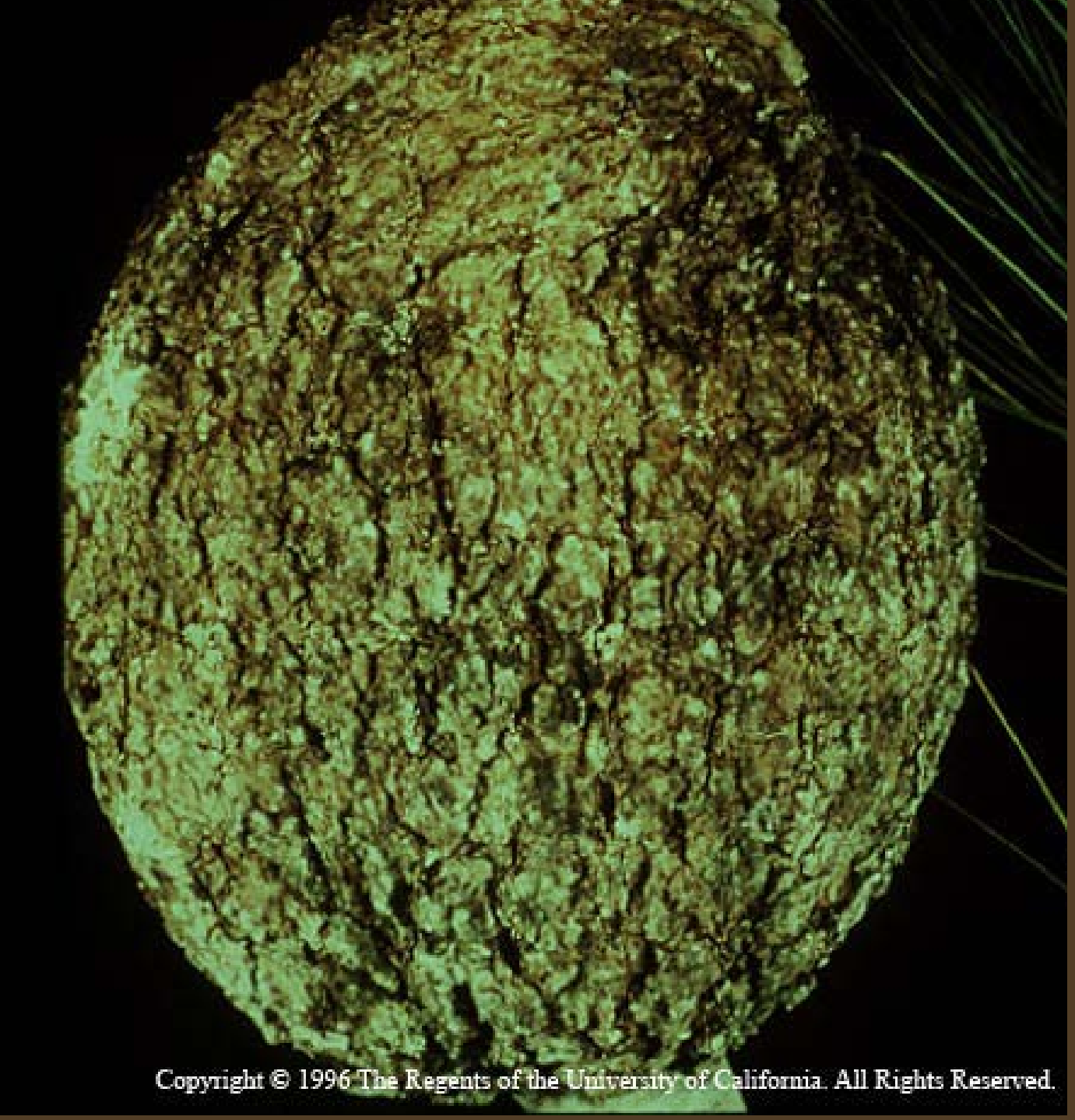
Armillaria root rot

Credit: The Mushroom Journal

Credit: forestry-dev.org

pitch canker

bear damage



Western Gall Rust

Leafy (true) mistletoe

California Oak Moth (*Phryganidia californica*)

CA Oak gall wasp (*Andricus californicus*)

UC Statewide IPM Project
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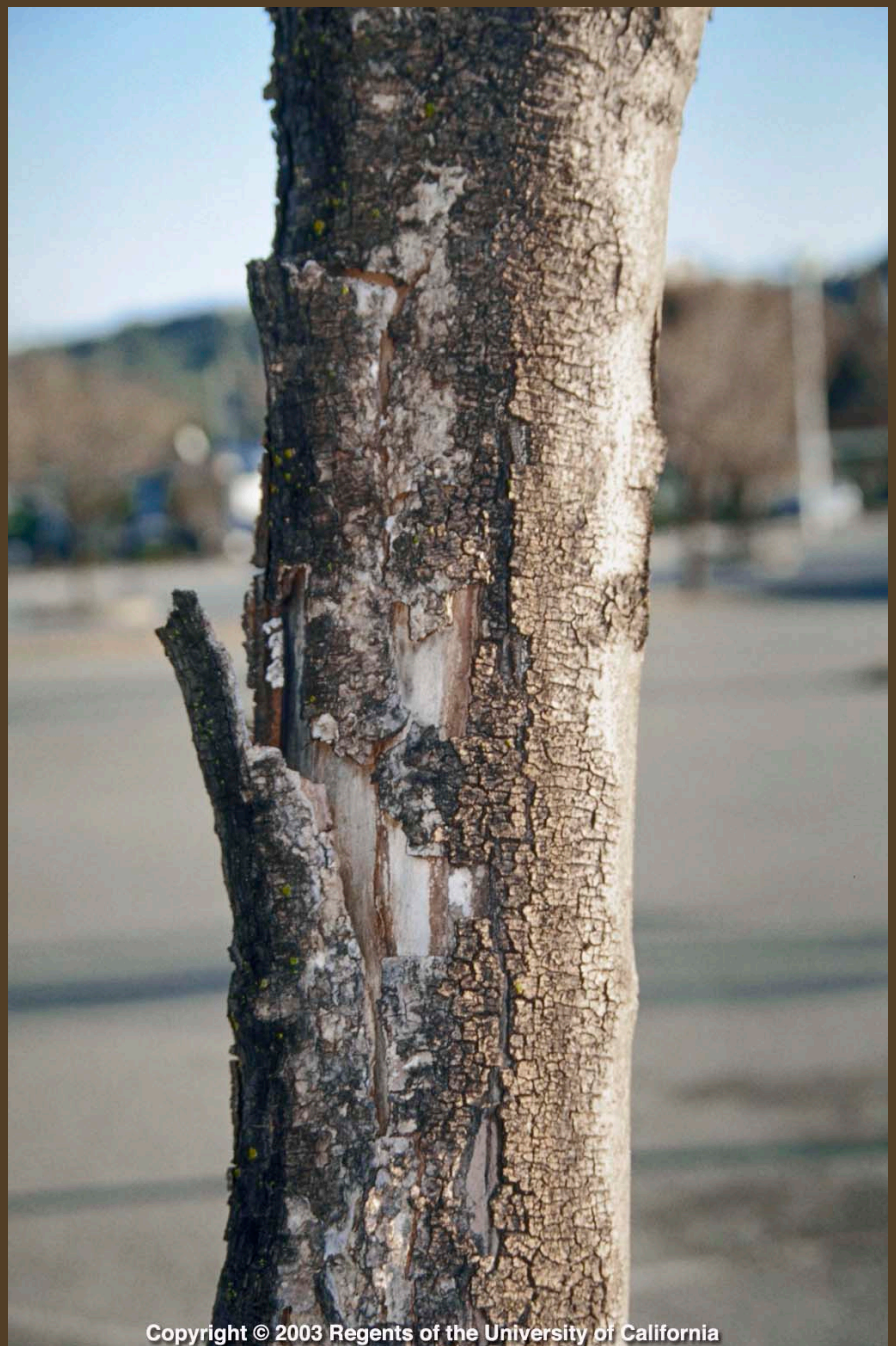
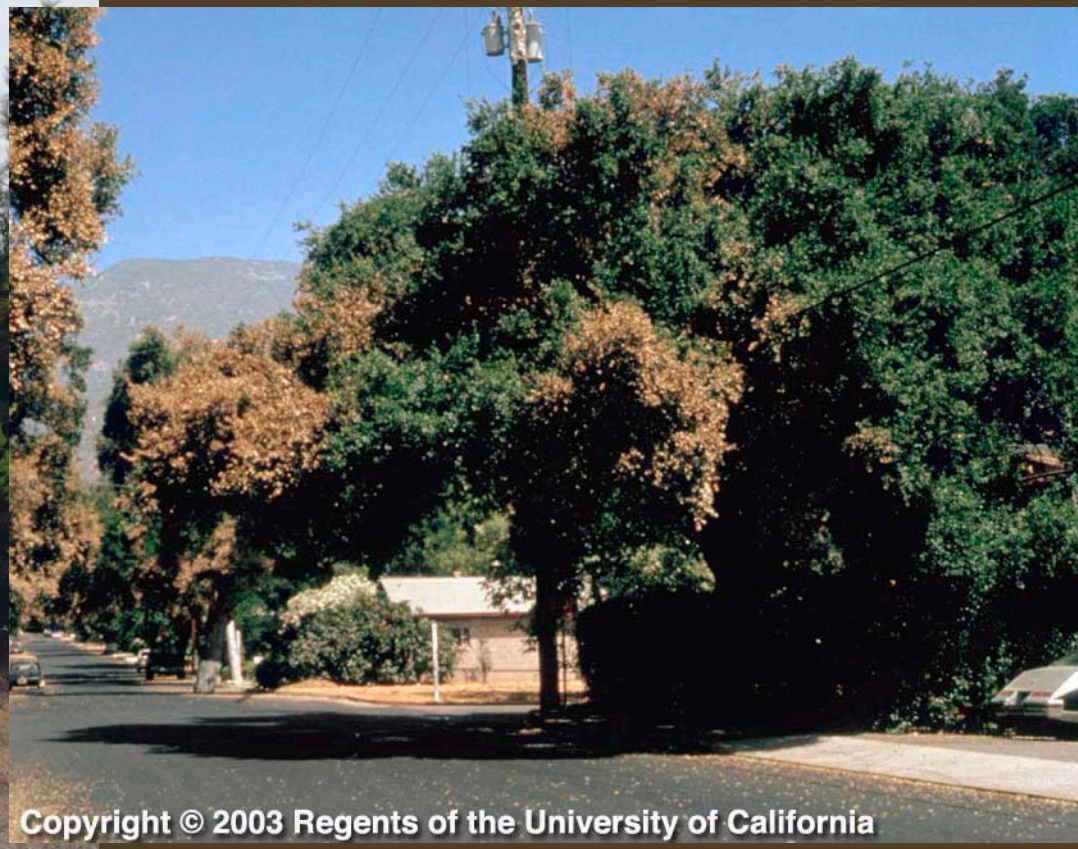
Willow rust

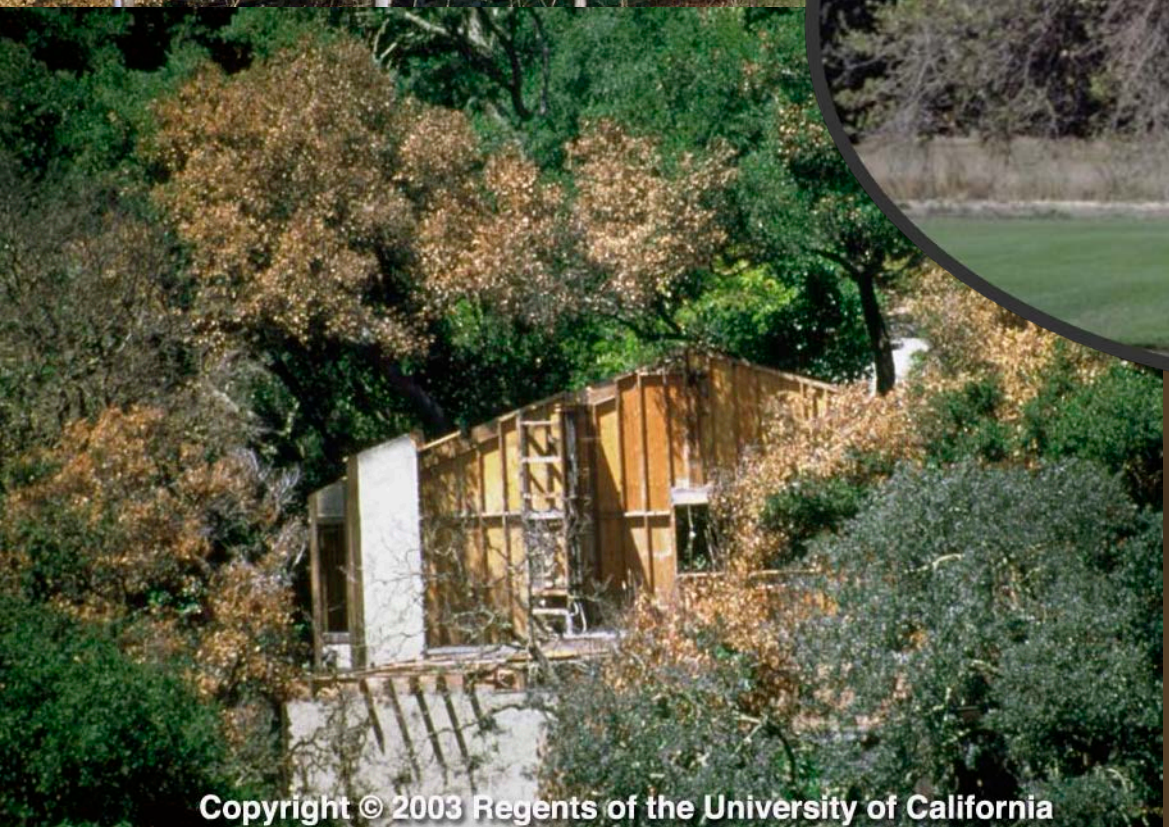
Abiotic problems–sunburn



Abiotic problems – cold and heat damage



Abiotic problems – fire and salt damage



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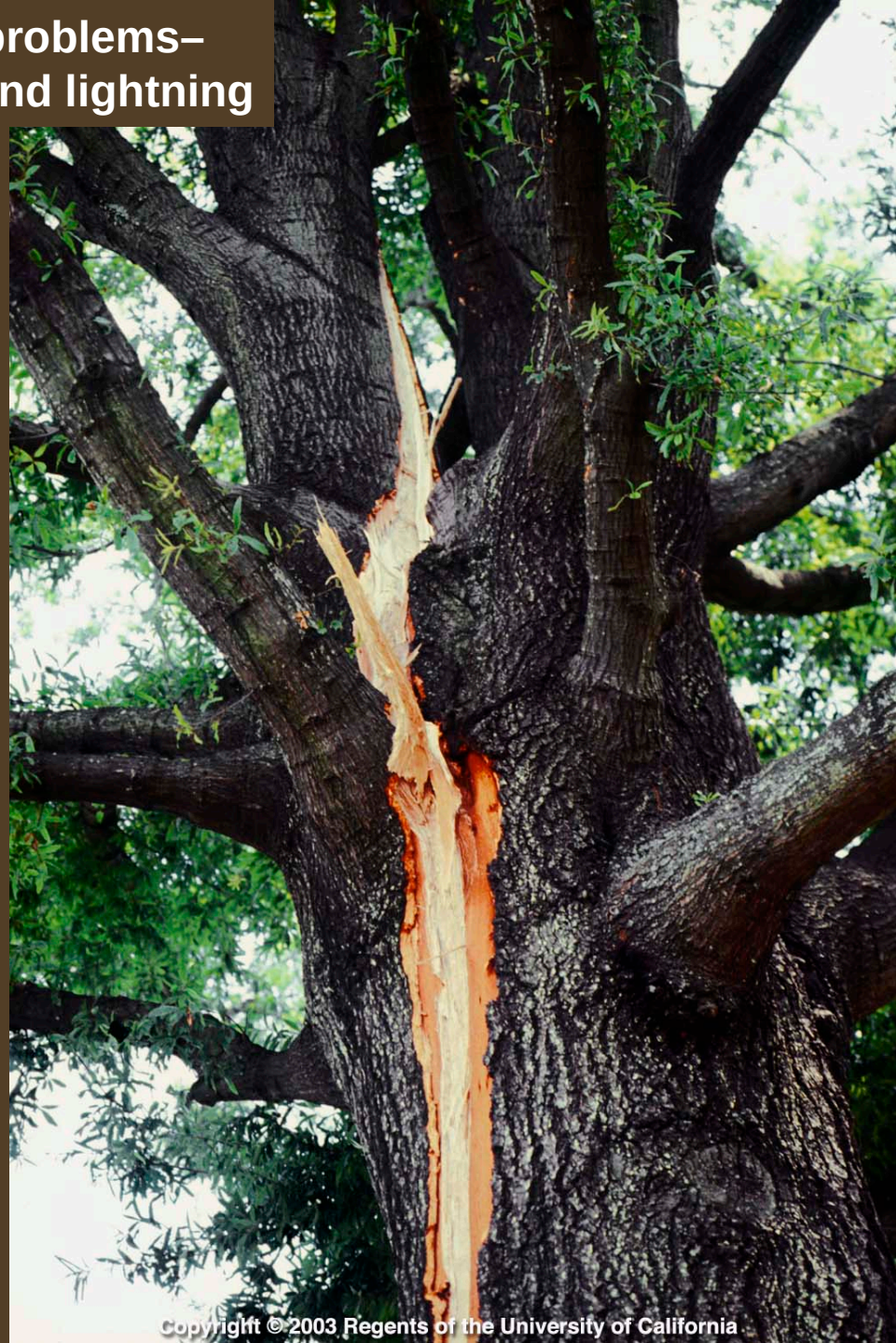
Abiotic problems – hail and wind damage

Abiotic problems– water stress, alkaline soils, ozone damage

Abiotic problems– golf balls and lightning



Tanoak (*Notholithocarpus densiflorus*) and some oaks (*Quercus* species)

coast live oak
CA black oak
Shreve oak
canyon live oak

Big Leaf Maple (*Acer macrophyllum*)

Cascara (*Rhamnus purshiana*)

CA buckeye (*Aesculus californica*)

Toyon (*Heteromeles arbutifolia*)

Wood rose (*Rosa gymnocarpa*)

Western starflower (*Trientalis latifolia*)

CA honeysuckle (*Lonicera hispidula*)

CA coffeeberry (*Rhamnus californica*)

CA maidenhair fern (*Adiantum jordanii*)

Andrews Clintonia Bead Lily (*Clintonia andrewsiana*)

Salmonberry (*Rubus spectabilis*)

CA bay laurel

UMCA (*Umbellularia californica)*

Pacific Rhododendron (*Rhododendron macrophyllum*)

Evergreen huckleberry (*Vaccinium ovatum*)

Madrone (*Arbutus menziesii*)

Blue blossom (*Ceanothus thyrsiflorus*)

CA hazelnut (*Corylus cornuta*)

Manzanita (*Arctostaphylos* spp.)

Poison oak (*Toicodendron diversaloba*)

Western hemlock (*Tsuga heterophylla*)

Coast redwood (*Sequoia sempervirens*)

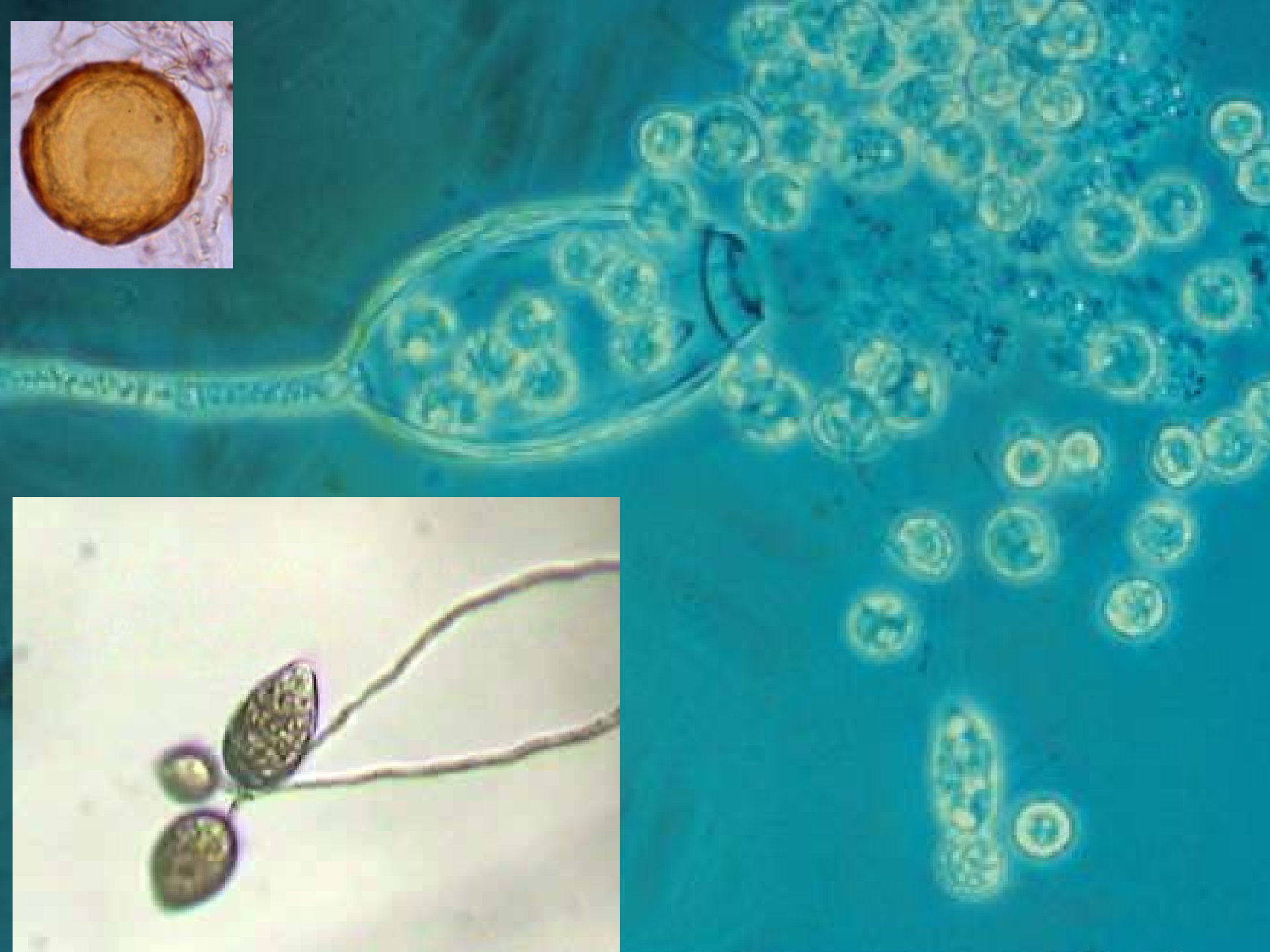
Douglas-fir (*Pseudotsuga douglasii*)

Pacific yew *(Taxus brevifolia)*

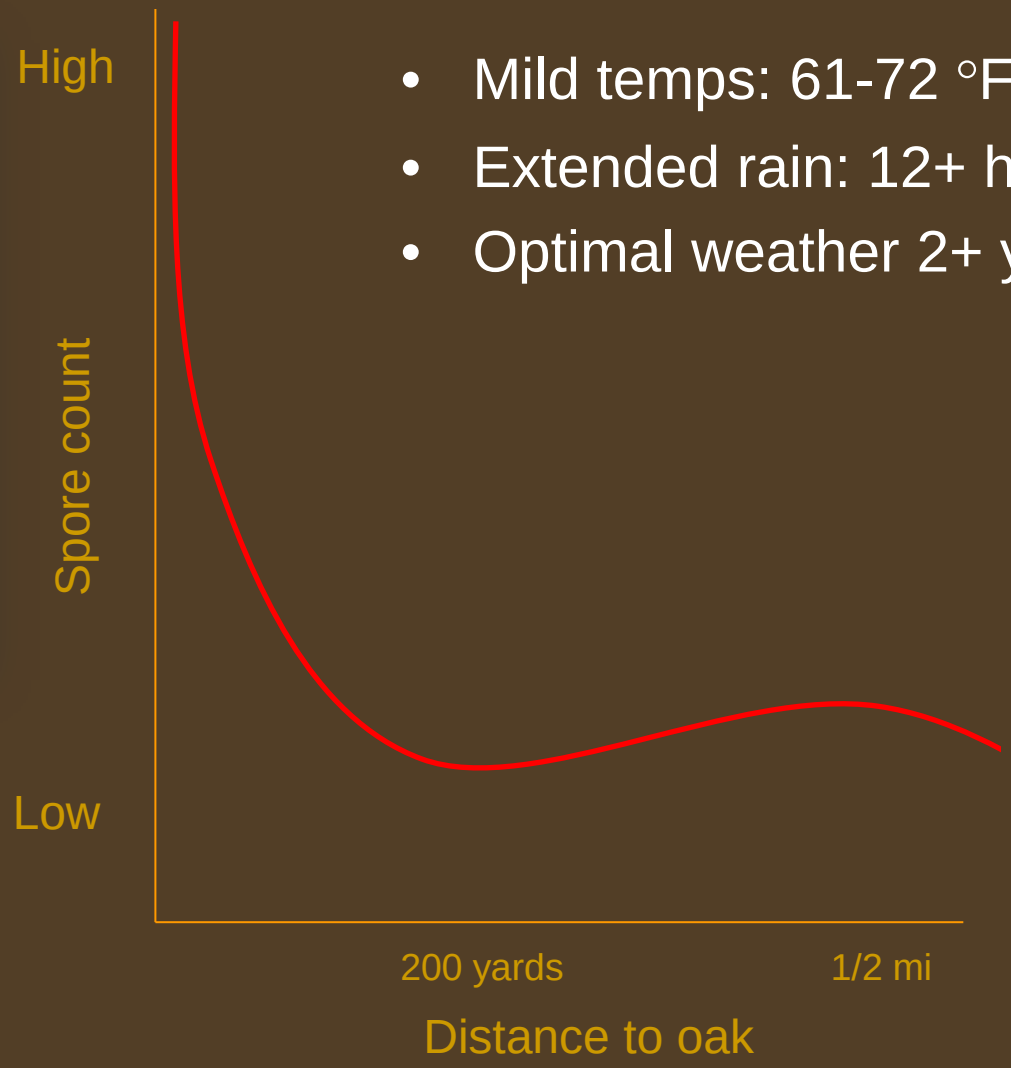
CA nutmeg (*Torreya californica*)

Grand fir (*Abies grandis*)

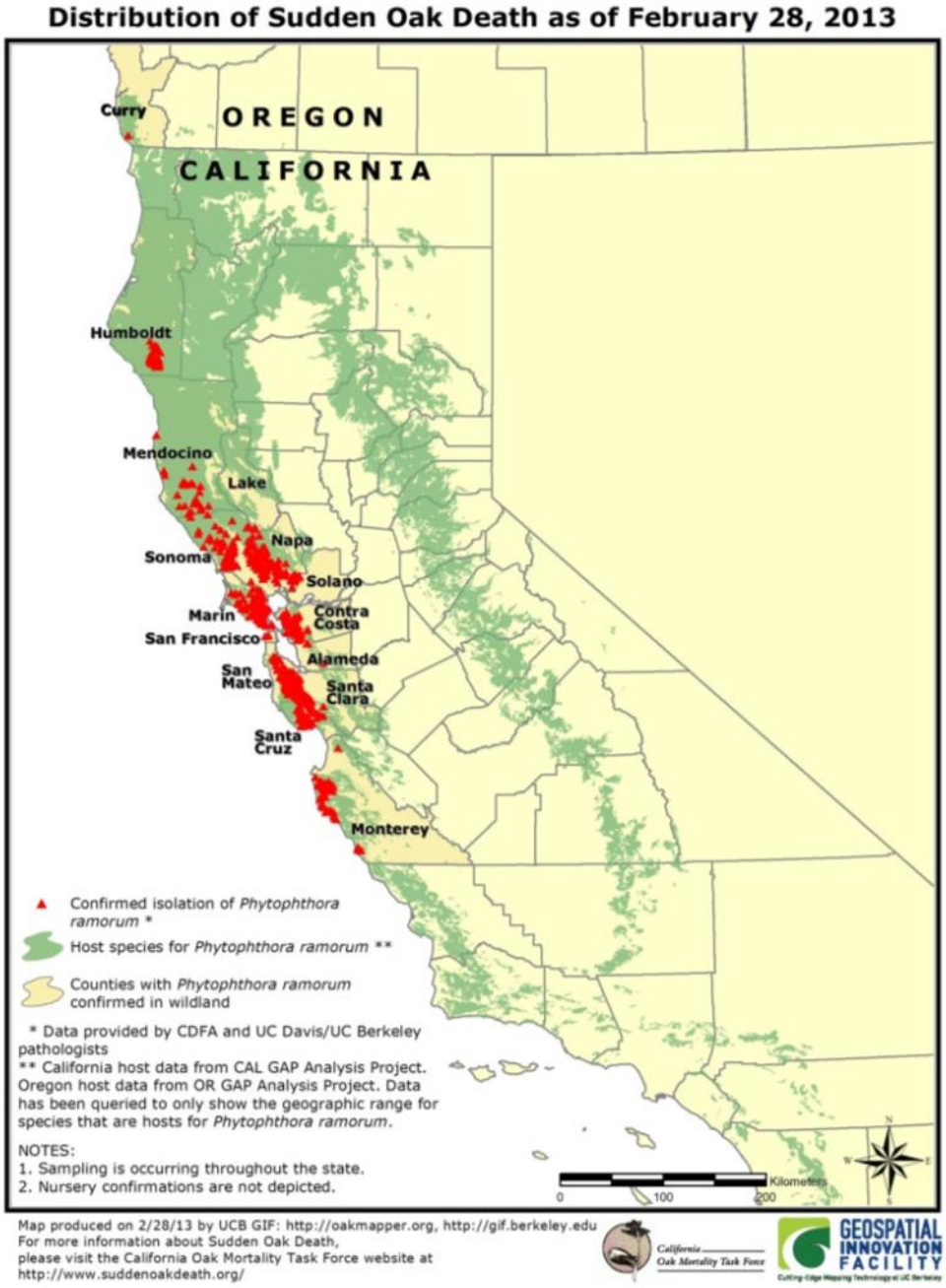
Japanese larch (*Larix kaempferi*)

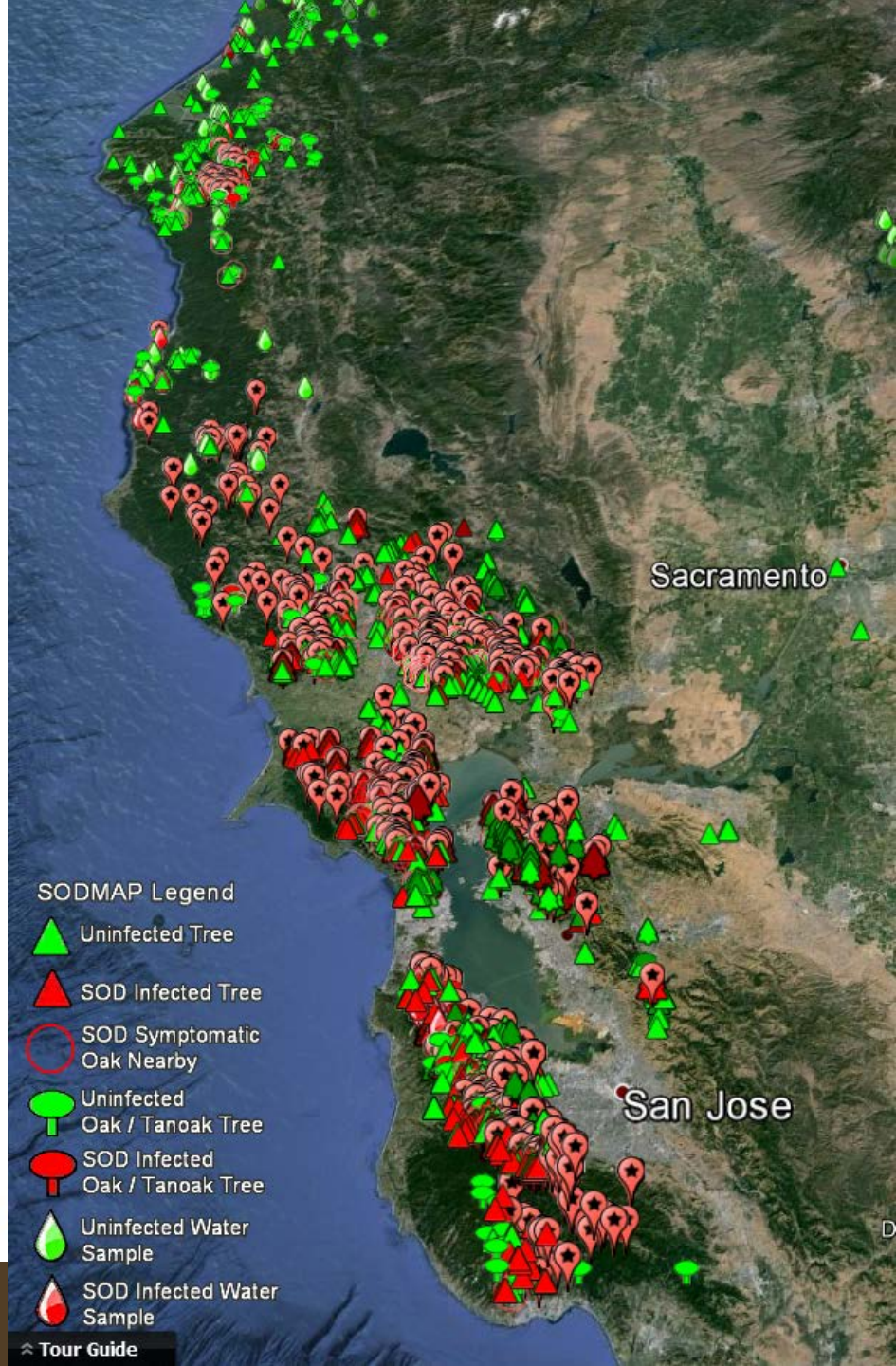


Spread

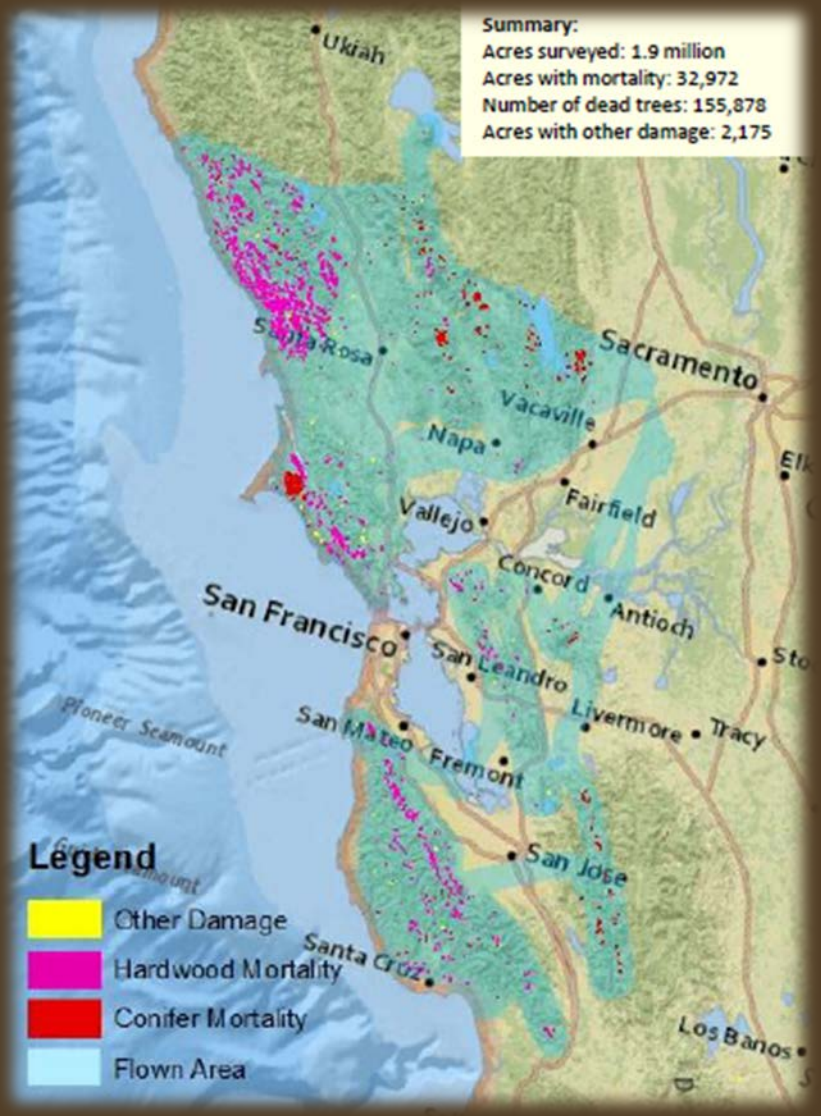


- Mild temps: 61-72 °F
- Extended rain: 12+ hrs wetness
- Optimal weather 2+ years





OakMapper and SOD-Blitzes



Region 5 Forest Health Protection Survey

Aerial Detection Survey – Update, June 13th, 2012

Background: Annual aerial detection surveys for tree injury and mortality have been conducted in California since 1994. This is an update of survey status for the 2013 survey season.

Objective: Detect and map tree mortality and damage in California / USFS Region 5.

Surveyors: Z. Heath, J. Moore, R. Noyes

Dates: June 5, 11, 12, 13th, 2013

Methodology: Recently dead or injured trees (trees still retaining dead foliage) were mapped visually by surveyors using digital aerial sketch-mapping systems flying in a light fixed-wing aircraft approximately 1,000 feet above ground level. Surveyors record the number and species of affected trees and type of damage (mortality, defoliation, branch flagging) at each mapped location.

Details:

- A short flight to Mount Saint Helena and Mt Konocti was conducted as a training and conformity flight on June 5th. Douglas fir, gray, knobcone and ponderosa pine mortality was observed in scattered pockets.
- Santa Cruz County and the South and East Bay were surveyed on the 11th. Coast live oak mortality was the main damage mapped in the Oakland Hills, while large areas of tanoak mortality was seen in the Santa Cruz Mountains. Mortality in the gray pines in the Diablo Range was also observed.
- A large area of intense live oak mortality was observed east of Watsonville as well, about 9 miles from the closest SOD confirmation. See Figure 2.
- Sonoma County and the North Bay area were surveyed on June 12 and 13th. Mortality from sudden oak death, primarily affecting tanoak, was mapped throughout the area. Coastal Sonoma County, especially areas around Jenner and Guerneville, had some of the highest levels of tanoak mortality. Point Reyes and coastal Marin County also had large areas of both coast live oak and tanoak mortality. The total number of acres and trees killed due to SOD in the surveyed area appear to be similar to last year's levels; 147,000 trees killed across 28,700 acres.
- Pitch canker continues to cause damage on Point Reyes, killing branches and often entire trees in dense bishop pine stands. See Figure 3.
- A large area of low-intensity Douglas-fir mortality was mapped near Mount Saint Helena.

Figure 1. Flown area and mapped oak mortality

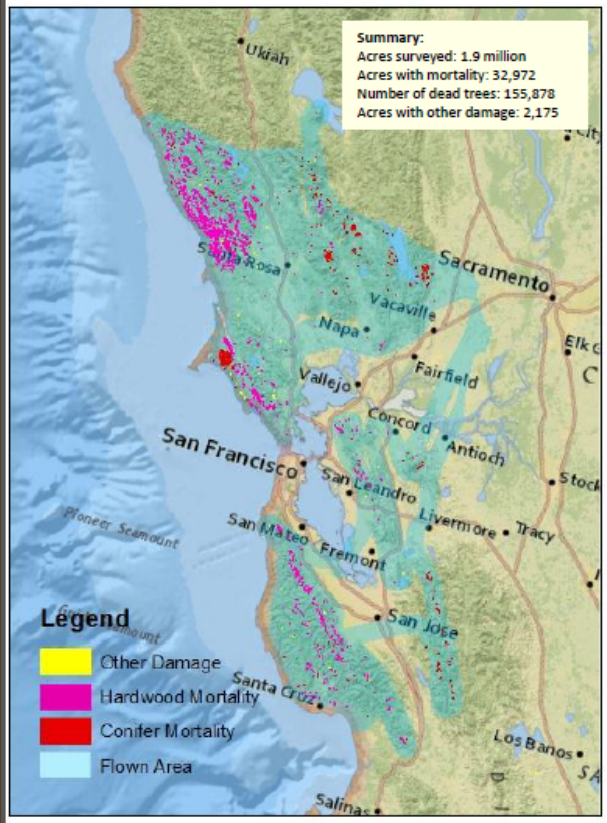


Figure 2. Coast live oak mortality east of Watsonville.

Figure 3. Pitch canker damage on Bishop pine on Point Reyes.

Direct questions pertaining to this report to Zachary Heath (email: zheath@fs.fed.us phone: 530-759- 1751).
Report Date June 18th, 2013.

Foliar host removal & pruning

- Won’t halt SOD in tanoak stand
- Used alone or with phosphonate
- May result in no mature trees

- 2.5 – 5 m of clearance
- Storm wind direction
- Focus on leaves on the ground, on nearby understory trees, and on lower branches of inner canopy
- Monitor for sprouts & remove

Pesticide treatments

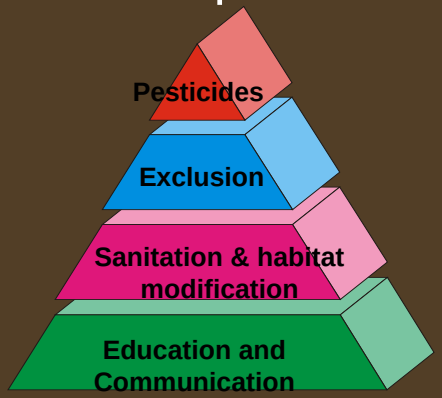
- Preventative, not a cure!
- Specimen trees
- Apply 4-6 weeks ahead of pathogen activity
- Every year in the fall (2x the first year)

- Phosphonate (Agri-Fos ® and others)
  - Injection
  - Surface application

Acorns collected from pairs of tanoaks prior to treatment

Kashia Band of Pomo Indians

- Targeted use of pesticides in high-value areas with research to study effects of pesticides on food sources
- Selected removal of trees to reduce spread (i.e., habitat modification)
- Surveys to assess the extent of the problem
- Internal education to reduce spread via cultural practices (i.e., sanitation and exclusion)
- External education and leadership to reduce spread



Shift from eradication to containment…

Oregon infestation, aerial view, 2013