Goldspotted oak borer update

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FOREST SERVICE, FOREST HEALTH PROTECTION, SOUTHERN CALIFORNIA SHARED SERVICE AREA

CA FOREST PEST COUNCIL ANNUAL MEETING

NOVEMBER 15, 2016

Outline

- Goldspotted oak borer (GSOB): Life cycle
- What does GSOB eat?
- Where did GSOB come from?
- Where is GSOB now?
- Site updates and ongoing management strategies
- New research on chemical control
- Summary

Life cycle

June - September

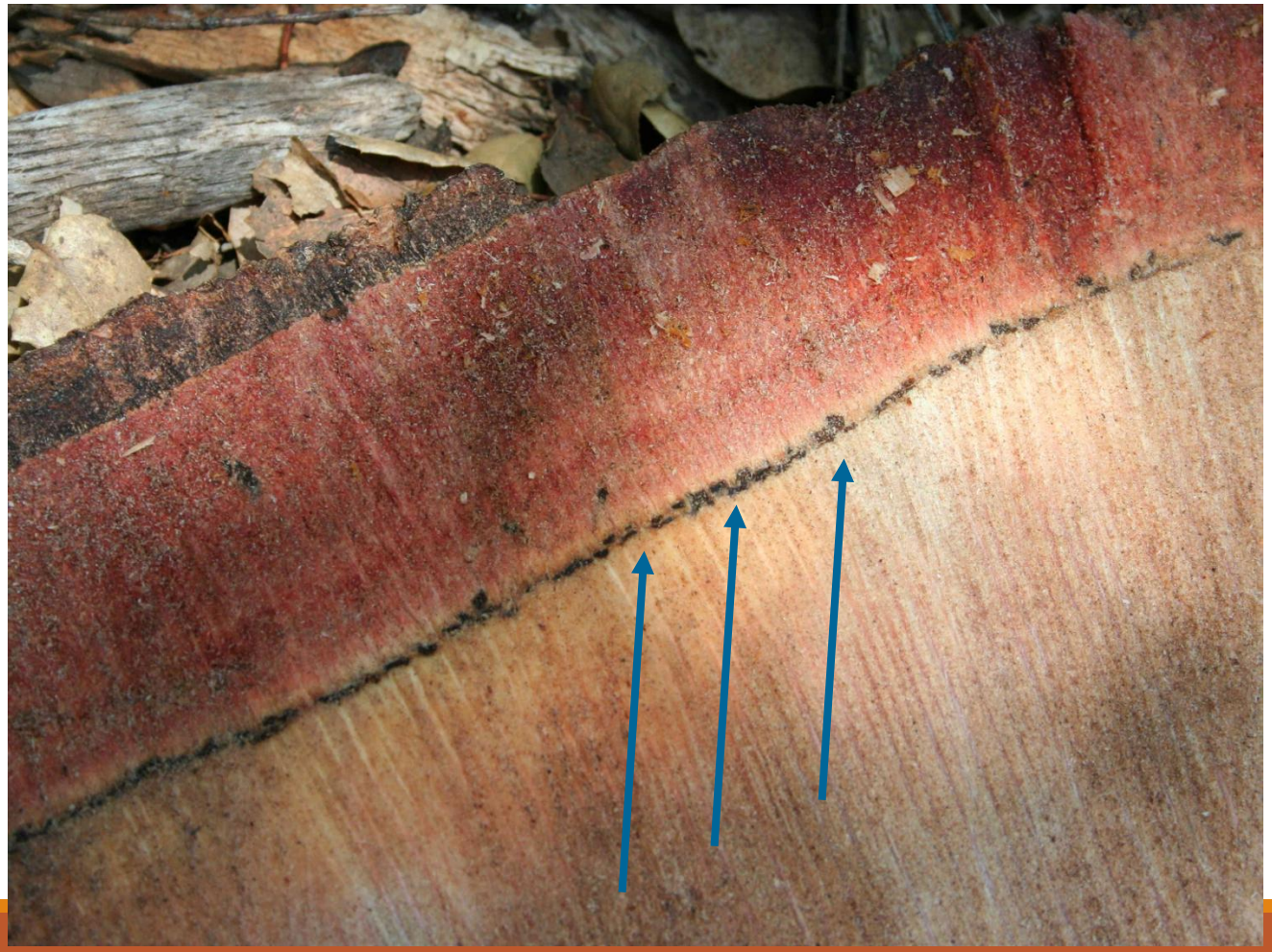
Life cycle

June - September

Mid-October to mid-June

Life cycle

- Larvae feed in cambium from mid-October to early spring



Life cycle

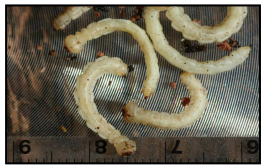
June - September

Mid-October to early spring

Spring and early summer

Life cycle

June - September



Mid-October
to early spring

Spring and
early summer

- Emergence in late May
- Peak flight late June/early July in SoCal

Life cycle

- Males and females feed on foliage after emergence and before dispersal*
- Females have to feed to be sexually mature
- Mating likely occurs in the canopy or on main stem

*Important detail for chemical control

What does GSOB eat?

coast live oak
Quercus agrifolia

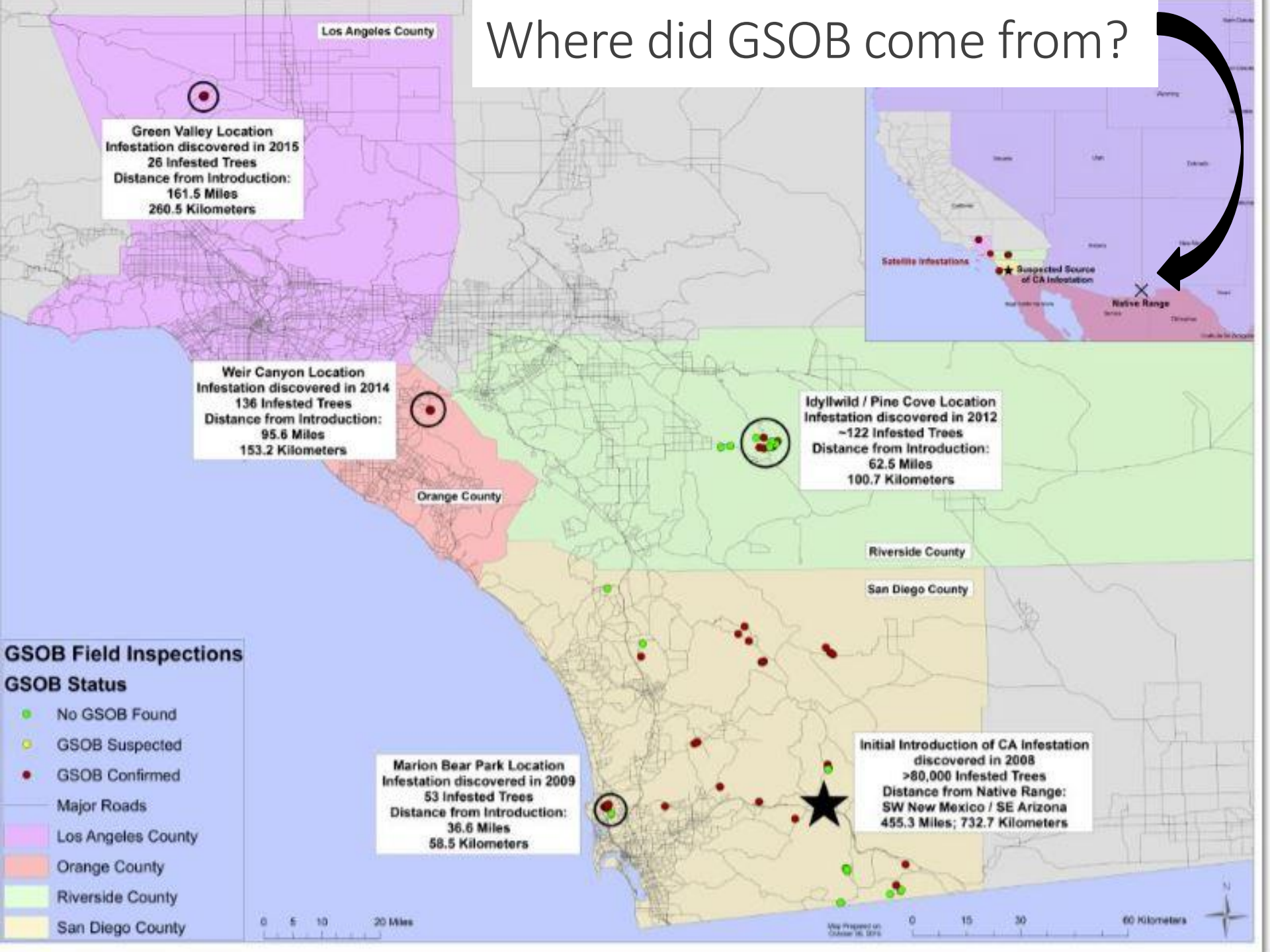
California black oak
Quercus kelloggii

canyon live oak
Quercus chrysolepis

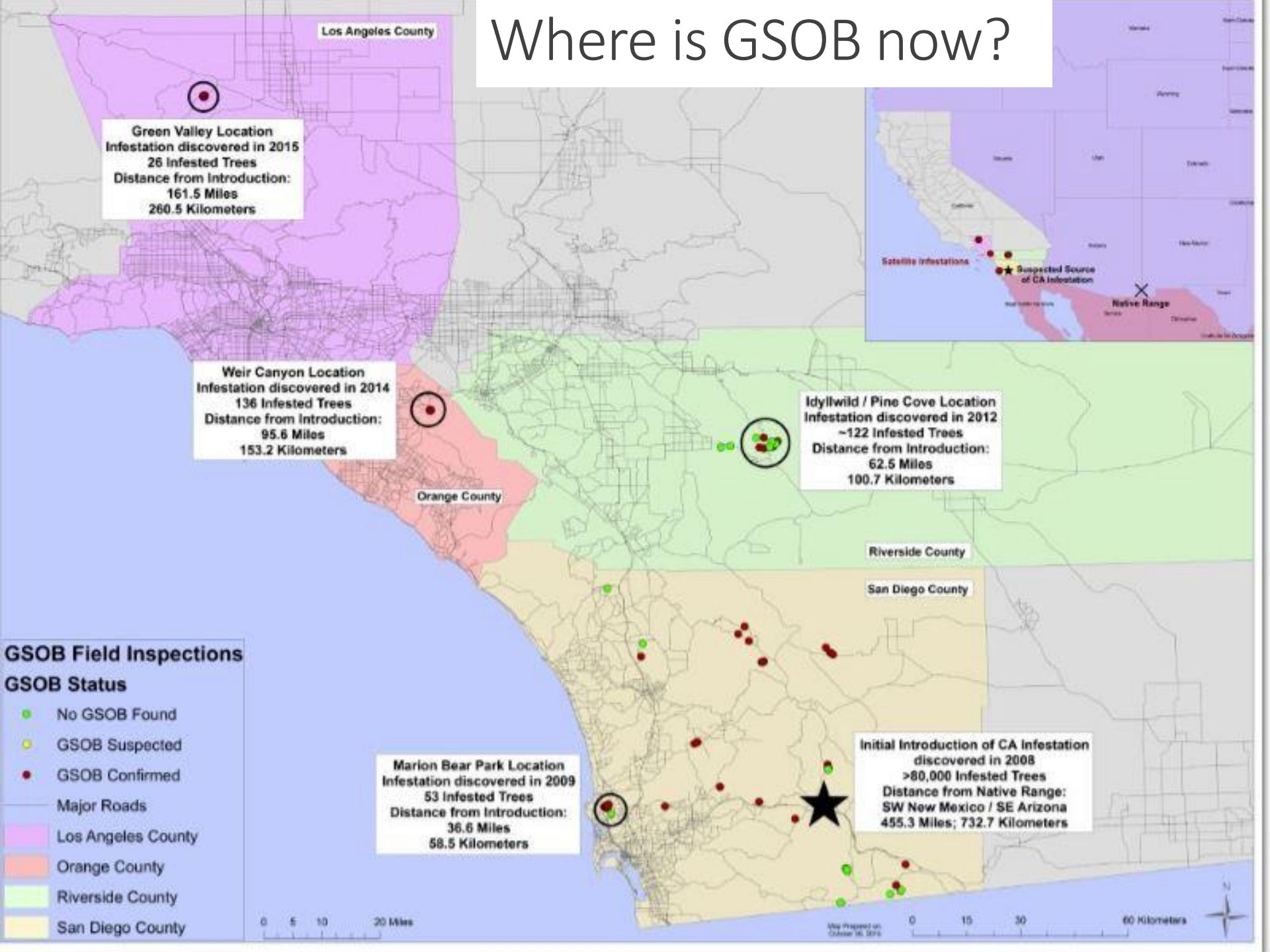
What does GSOB eat?

- Prefer large diameter trees (>50 cm dbh)

Where did GSOB come from?



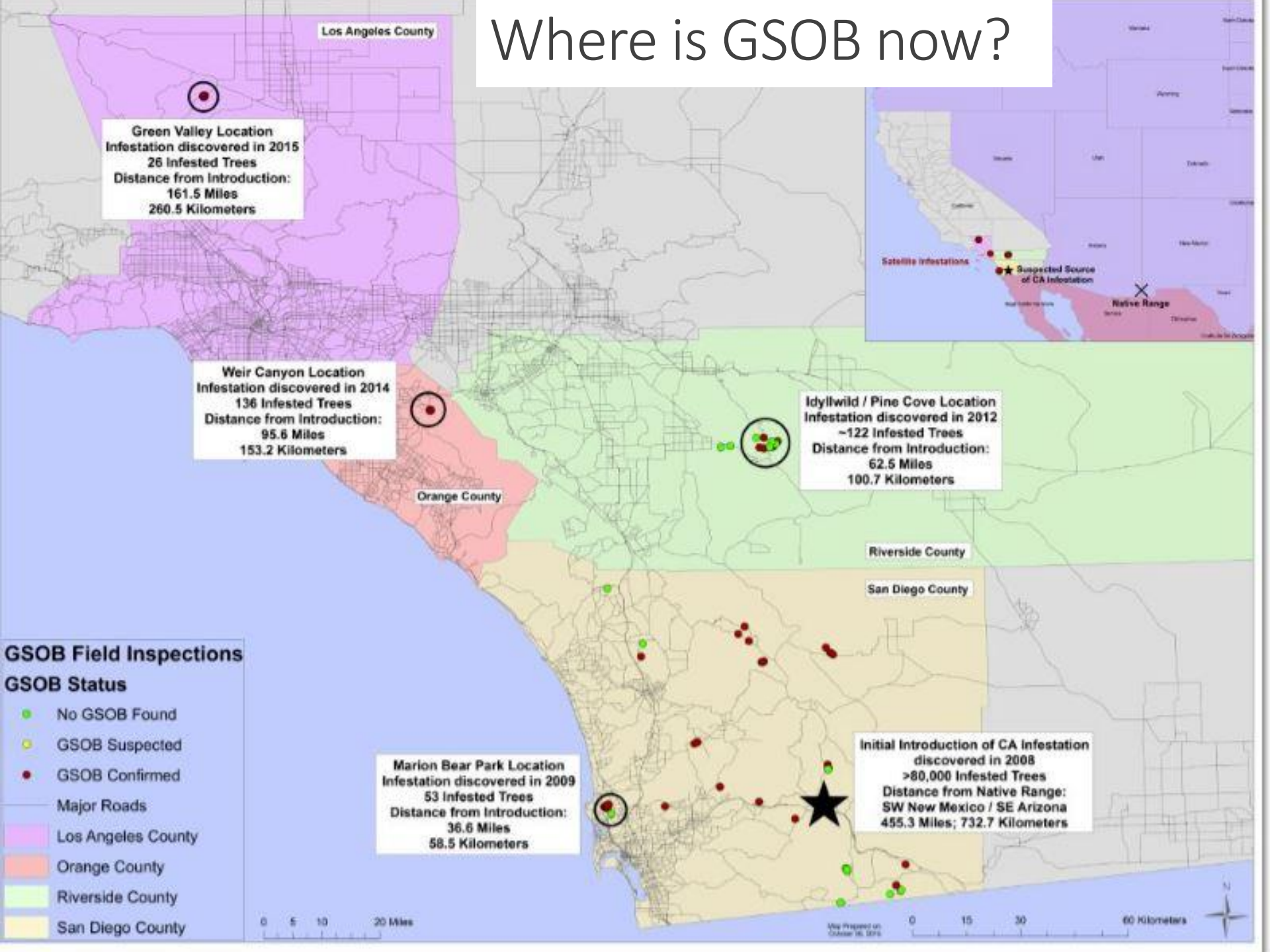
Where is GSOB now?



Site update: San Diego Co.

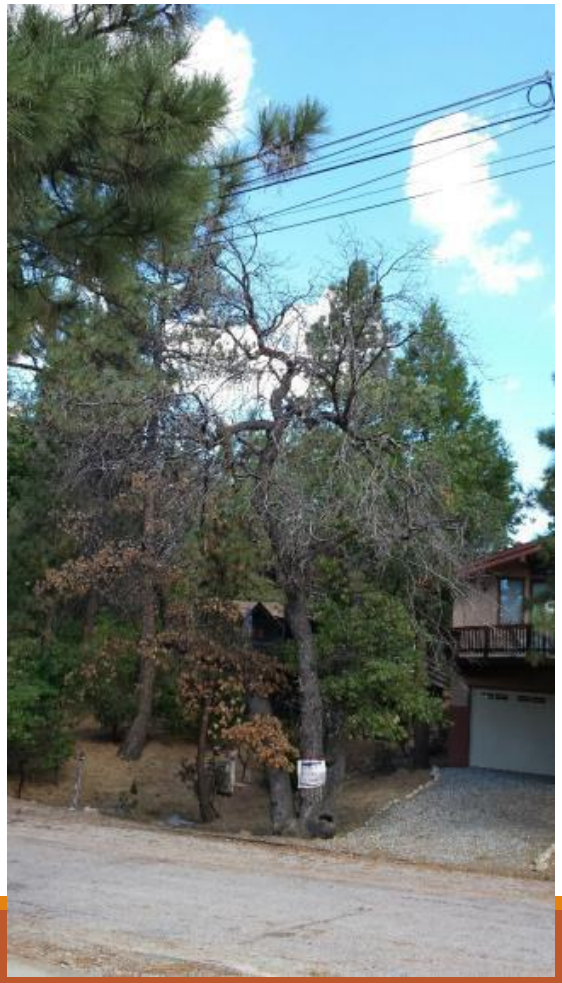
- Past GSOB site on east grade of Mount Palomar (Cleveland NF): now widespread
- New infestation found in Palomar Ranger District on coast live oak
- Lake Henshaw: attacked trees found on slopes west and south

Where is GSOB now?

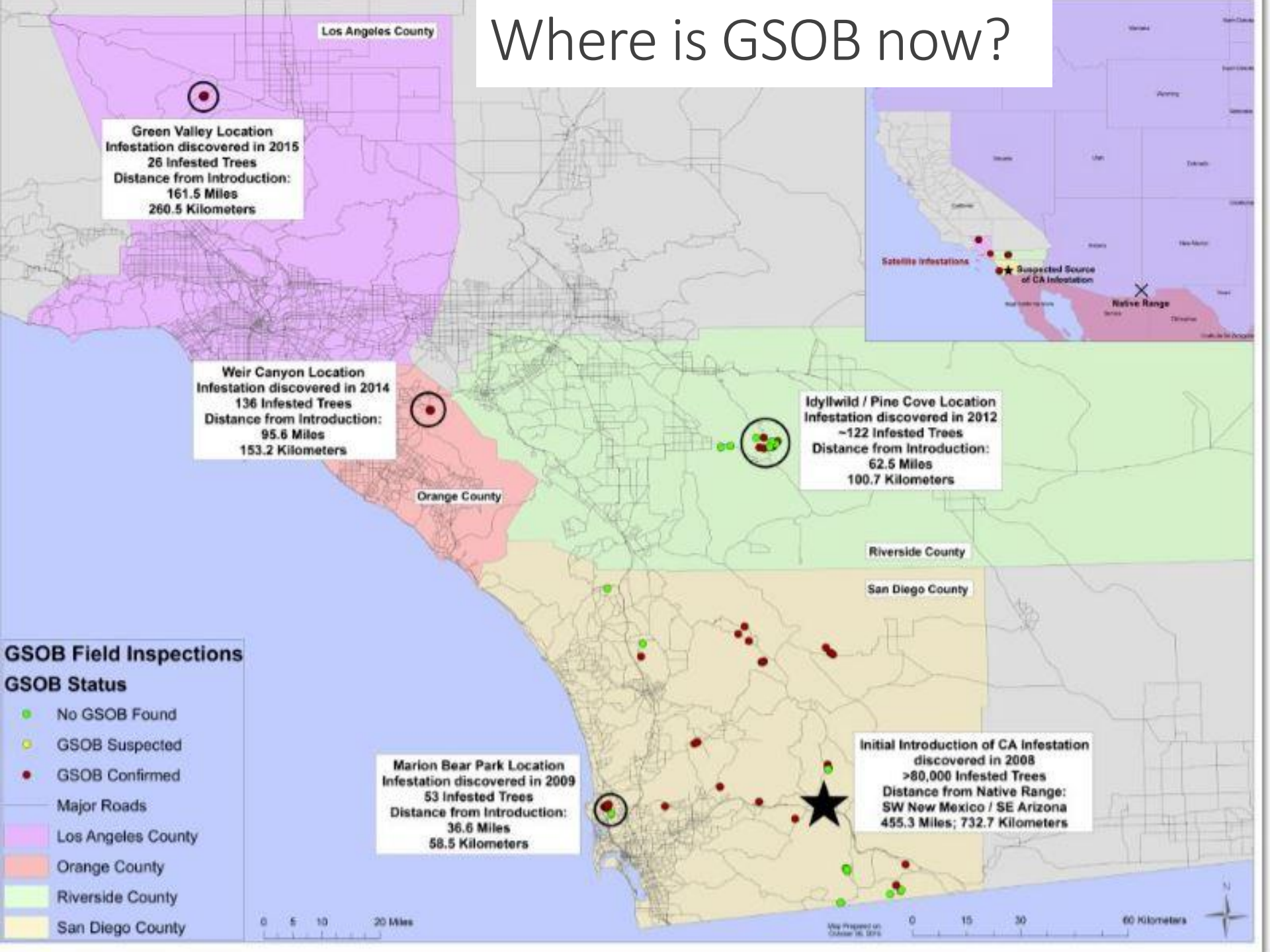


Site update: Riverside Co.

- Idyllwild and Pine Cove
- Between July and September 2016:
  - 23 inspections
  - 25 GSOB trees discovered
  - 4 infested trees removed
  - 33+ inspected trees without GSOB
- Fire Safe Council meeting, Jan 2017
  - Initiated community involvement and multi-agency partners to develop a management plan
- San Bernardino NF: New detections in black oak

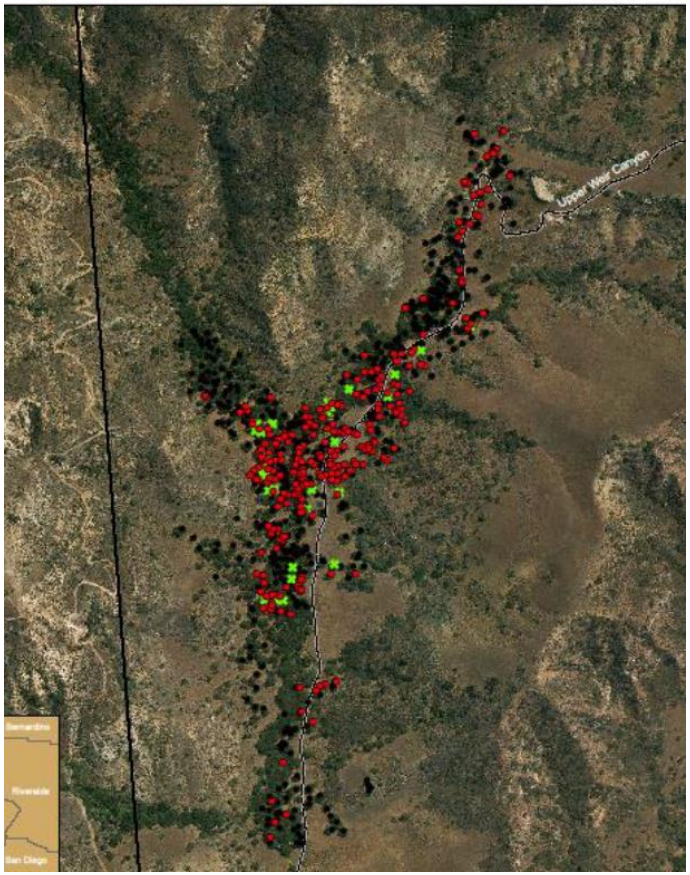


Where is GSOB now?

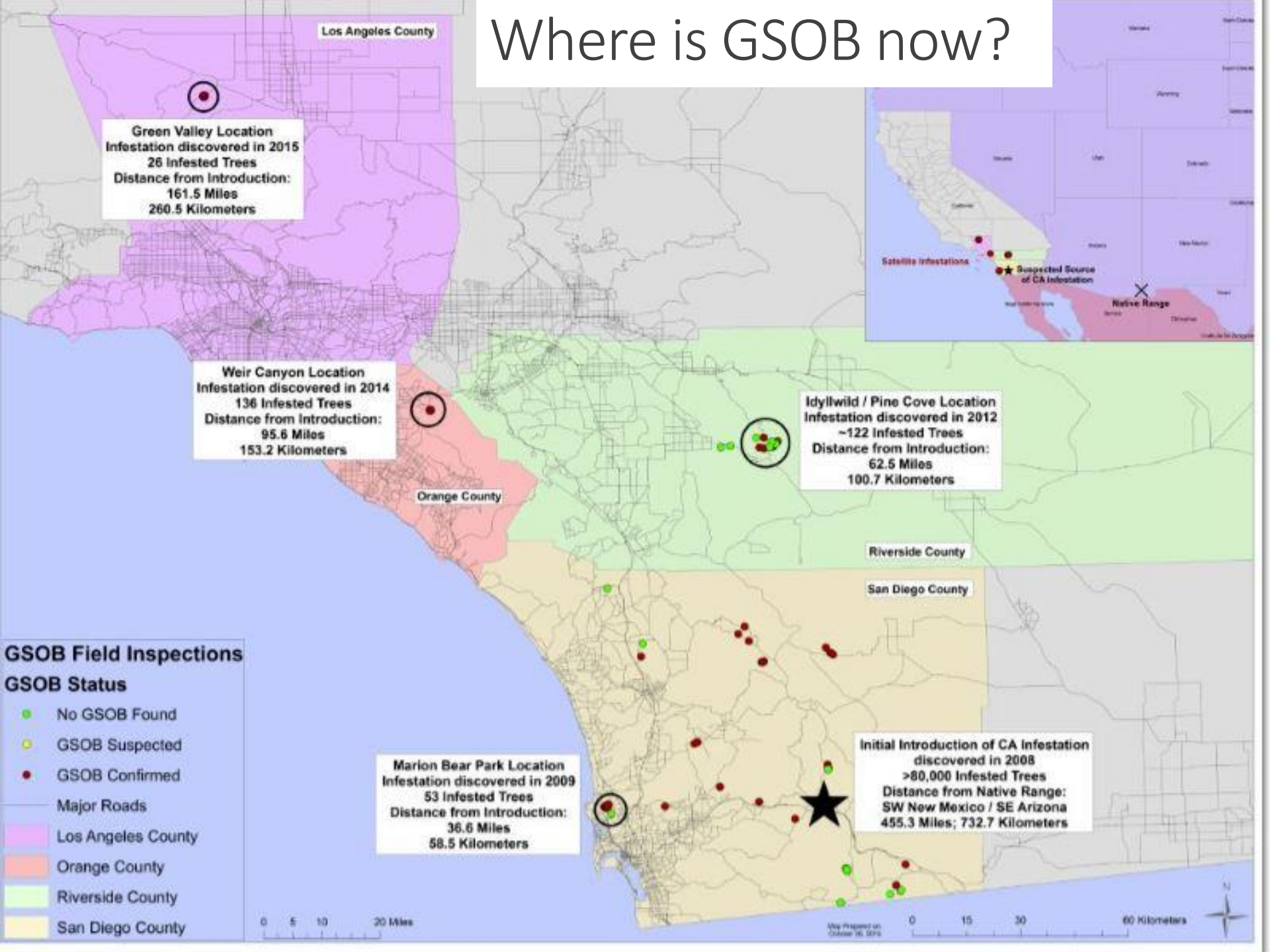


Site update: Orange Co.

- GSOB remained in Weir Canyon
  - Green: tree removed in 2016
  - Red: GSOB infested tree
- Total trees surveyed: 965
- 248 trees were infested
  - All treated or removed



Where is GSOB now?

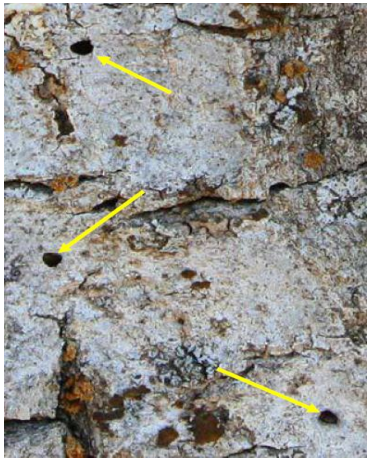


Site update: Los Angeles Co.

- Green Valley
  - Number of attacked trees has increased to >200
  - 100 trees will be removed
- Angeles NF
  - 2 sites now have GSOB in coast live oak
  - Increased monitoring efforts
  - Risk losing 1,875-3,768 (15-30 trees/acre) coast live oak from national forest land

Ongoing integrated pest management strategies

- Monitoring
  - Ground surveys and “under bark checks”
  - Purple prism traps



Ongoing integrated pest management strategies

- Monitoring
  - Ground surveys and “under bark checks”
  - Purple prism traps
- Removing brood trees
  - What do you do with the wood?
    - Screening/burying
    - Grinding (< 3 inches)
    - Burning
    - Debarking




The problem with oak firewood with the bark on…

Ongoing integrated pest management strategies

- Monitoring
  - Ground surveys and “under bark checks”
  - Purple prism traps
- Removing brood trees
  - What do you do with infested wood?
    - Screening/burying
    - Grinding
    - Burning
    - Debarking
- Education and outreach
  - Screen incoming firewood for GSOB
  - Season wood locally for > 2 years
  - “Buy it where you burn it”

New research: Chemical control

Research Article

SCI

Received: 29 July 2014 Revised: 24 November 2014 Accepted article published: 9 December 2014 Published online in Wiley Online Library: 14 January 2015

(wileyonlinelibrary.com) DOI 10.1002/ps.3959

Impact of the goldspotted oak borer, *Agrilus auroguttatus*, on the health of coast live oak before and after treatment with two systemic insecticides

Yigen Chen,[a*] Mary L Flint,[a] Tom W Coleman,[b] Joseph J Doccola,[c] Donald M Grosman,[c] David L Wood[d] and Steven J Seybold[e]

- Trees injected with emamectin benzoate reduced adult emergence compared to untreated trees
- Trees injected with imadacloprid also reduced adult emergence 1.5 and 2.5 years after treatment
- Planning to monitor injected trees for next 2 years

New research: Chemical control

Journal of Economic Entomology Advance Access published October 7, 2016

Journal of Economic Entomology, 2016, 1–10
doi: 10.1093/jee/tow217
Research article

Forest Entomology

Effect of Contact Insecticides Against the Invasive Goldspotted Oak Borer (Coleoptera: Buprestidae) in California

Tom W. Coleman,[1,2] Sheri L. Smith,[3] Michael I. Jones,[4,5] Andrew D. Graves,[6] and Brian L. Strom[7]

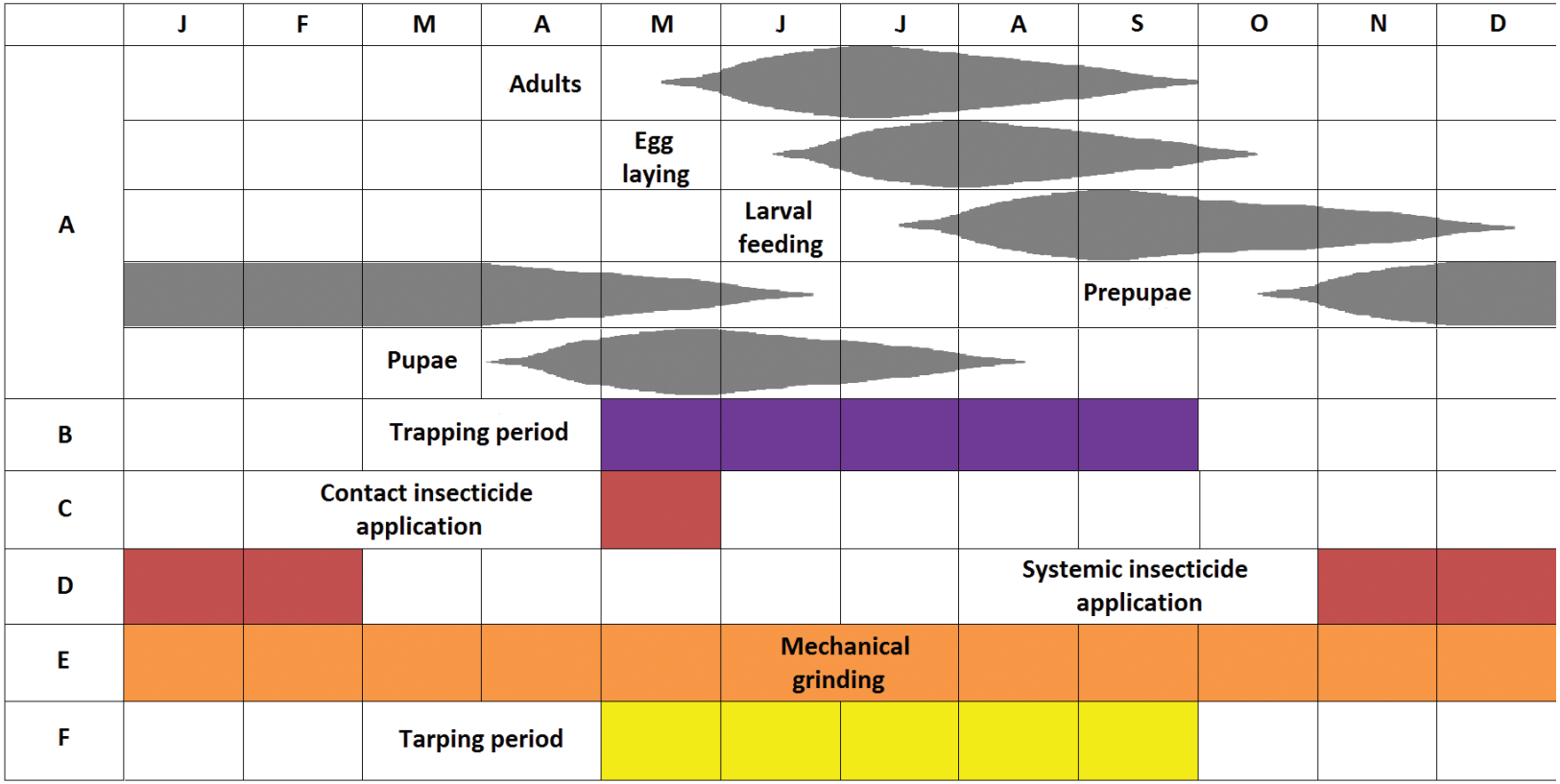
- Carbaryl, bifenthrin, lambda-cyhalothrin, permethrin applied to main stem and larger branches = walking assays
- Carbaryl and bifenthin applied to foliage = no-choice feeding assays
- < 1 month after application, all chemicals significantly reduced the # of days adults lived compared to untreated trees
- 12 months after application, bifenthrin, carbaryl, and permethrin significantly reduced the # of days adults lived compared to untreated trees

Chemical control

- High value trees only
- Won’t save heavily infested trees
- Need applicator license
- Will annual application preserve a tree long term?

Ongoing integrated pest management strategies

- Timing treatments



Ongoing integrated pest management strategies

- Decision tools

Goldspotted Oak Borer
Field Identification Guide

Figure 1. Adult goldspotted borer. Photo by Stacy Hoffquist, USDA Forest Service, Southern Research Station.

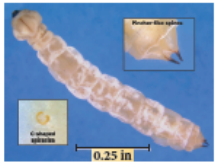


Figure 2. GSOB larva with close up of spiracles and spines. Photo by Stacy Hoffquist, USDA Forest Service, Southern Research Station.


Figure 3. Mature larva in hairpin configuration. Photo by Tom W. Coleman.

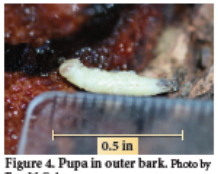


Figure 4. Pupa in outer bark. Photo by Tom W. Coleman.

The goldspotted oak borer (GSOB), *Agrilus auroguttatus* (Coleoptera: Buprestidae), is a flatheaded borer new to California that poses a significant threat to oak trees. The pest is native to southeastern Arizona, although a related species occurs in southern Mexico and northern Guatemala. GSOB was first collected and identified in California in 2004 in San Diego County but was not linked to extensive oak mortality until 2008. As of 2010, GSOB has killed an estimated 21,500 trees covering 1,893 square miles in San Diego County in forests, parks, and residential landscapes.

GSOB larvae feed beneath the bark of certain oaks near the interface of the phloem and xylem, the nutrient and water conducting tissues of plants. The larvae damage both of these tissues as well as the cambium, a unicellular layer between the phloem and xylem that is responsible for the radial growth of the tree. Trees die after several years of injury inflicted by multiple generations of the beetle. Currently there are no effective tools for protecting trees once infestation occurs.

IDENTIFICATION

Capture of adult GSOB on sticky traps in infested areas of San Diego County and observations of immature life stages suggest that this pest completes one generation each year. Adults are about 0.4 inch long and 0.08 inch wide with a slender, bullet-shaped body (Figure 1) and are agile flyers. They are primarily black with an iridescent green sheen and have six gold-colored spots on their forewings, hence the common name.

Eggs are extremely small (0.01 inch), dull colored, and rarely observed on trees. They likely are laid singly or in clusters in bark cracks on the main stem and larger branches of oaks.

Larvae are white, legless, and about 0.8 inch long when mature (Figure 2). GSOB larvae can be distinguished from those of other wood boring beetles by C-shaped spiracles and two pincherlike spines on the end of their abdomen. Mature larvae can be found in a hairpin configuration in the outer bark (Figure 3) from early fall until early summer.

Pupae also are found in the outer bark from late spring to early summer; they resemble the adults in size and shape but are primarily white and soft bodied (Figure 4). When adult beetles emerge from the pupal cell in the bark, they make a diagnostic D-shaped emergence hole; see External Symptoms below. Adult GSOB feed on oak foliage and make notches along leaf margins (Figure 5), but tree mortality results from larval feeding. This pest is known to kill three species of native oaks in California; for more information, see the sidebar Which Oak Species Are Attacked? on Page 3.

University of California
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HEALTH RATING FOR GSOB-INFESTED TREES

CROWN RATING

1. Full, healthy crown (0% leaf loss). 2. Minor twig dieback and/or light thinning (10-25% leaf loss). 3. Moderate thinning and twig dieback (25-50% leaf loss). 4. Severe dieback to larger branches (>50% leaf loss). 5. Tree is dead.

BARK STAIN RATING

1. One to five areas of staining present on lower stem (<8 feet). 2. Six to 10 stained areas. 3. Greater than 10 areas of staining on the lower stem. 4. Bark cracking evident on main stem.

EXIT HOLE RATING

1. Can find at least one D-shaped exit hole on the main stem. 2. Can find a few exit holes (10-25) in clumps on the main stem. 3. Exit holes are scattered and abundant on the main stem (>25).

WOODPECKER FORAGING (+/-) Present or absent

Summary

- GSOB is still spreading in S. CA via natural and human-mediated pathways
- Early detection and monitoring efforts = important and are least expensive
- Chemical control could be used to treat high value trees with low infestations
- Public outreach efforts are on-going; multi-agency collaborations

Questions?

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