The Mediterranean Oak Borer (MOB) Updates Fall 2023

(*Xyleborus monographus*: Coleoptera: Curculionidae: Scolytinae)

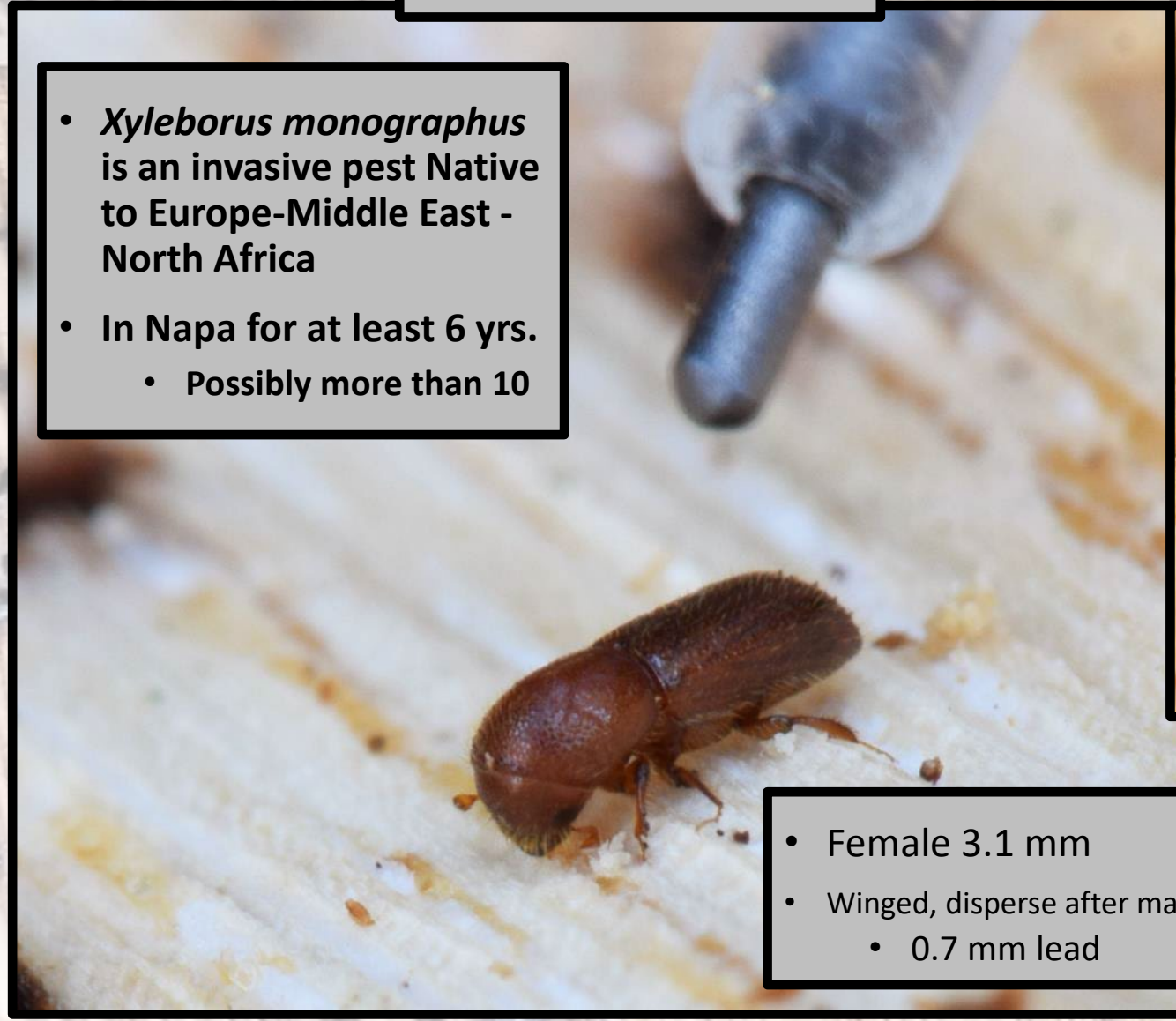
MOB Pest Complex Website: https://ucanr.edu/sites/mobpc/

Curtis Ewing, CA Dept. of Forestry & Fire Protection (Cal Fire)

Michael Jones, University of CA – Agriculture & Natural Resources (UC-ANR), Lake County

FEMALE

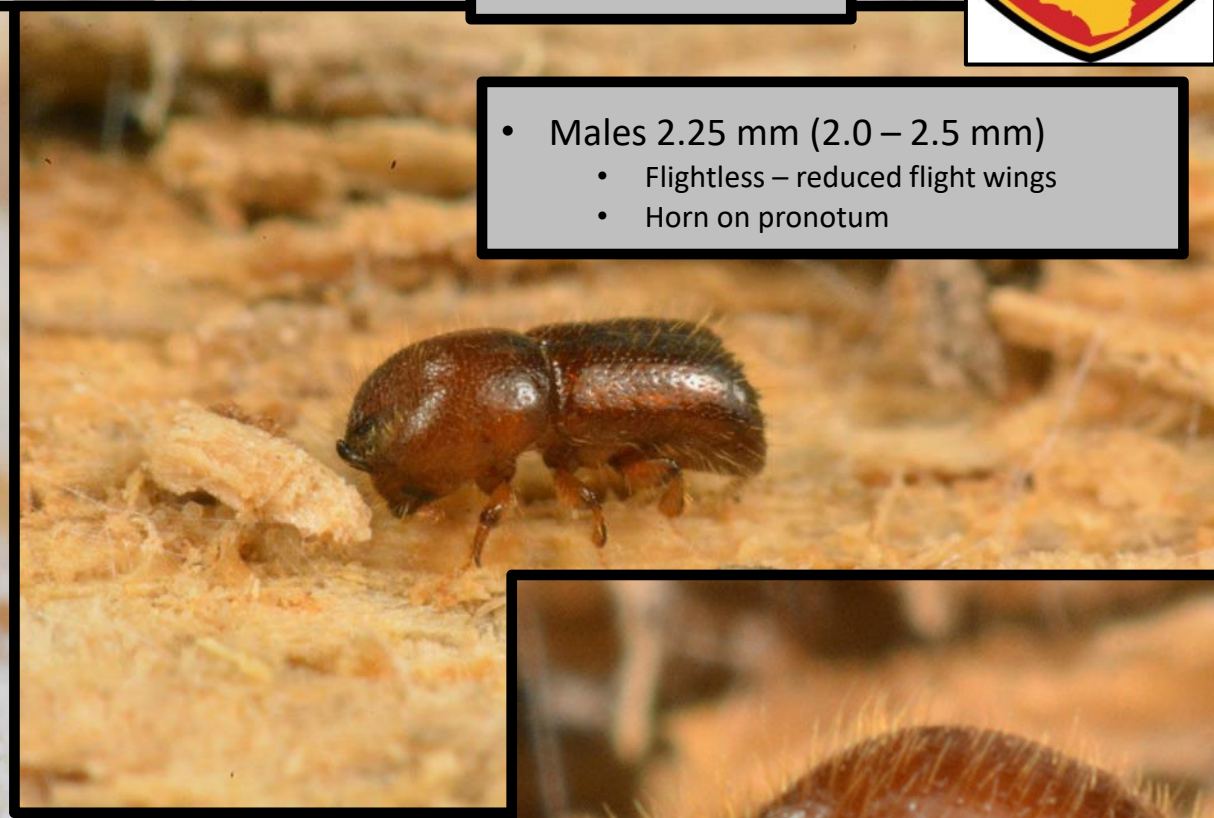
- ***Xyleborus monographus*** **is an invasive pest Native to Europe-Middle East - North Africa**
- **In Napa for at least 6 yrs.**
  - **Possibly more than 10**



- Female 3.1 mm
- Winged, disperse after mating
  - 0.7 mm lead

MALE

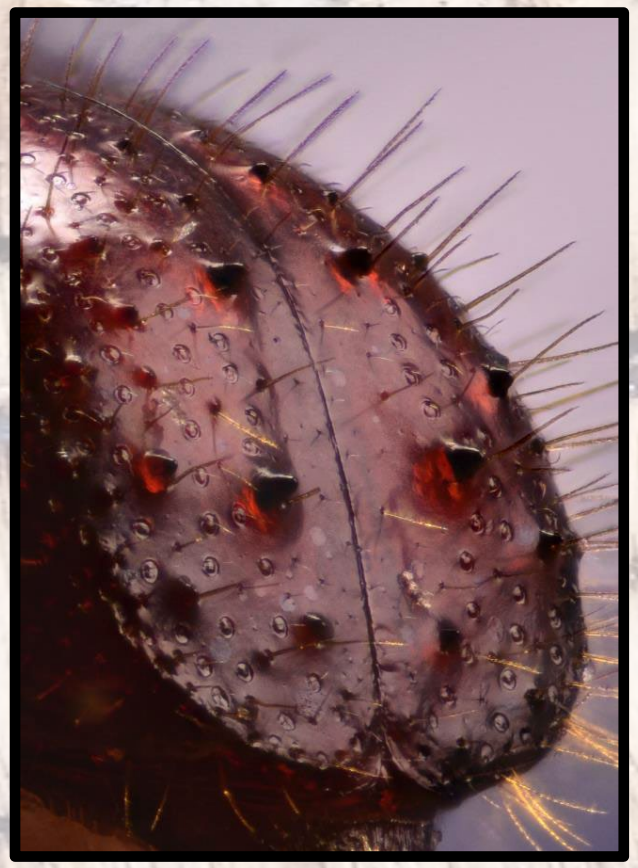
- Males 2.25 mm (2.0 – 2.5 mm)
  - Flightless – reduced flight wings
  - Horn on pronotum

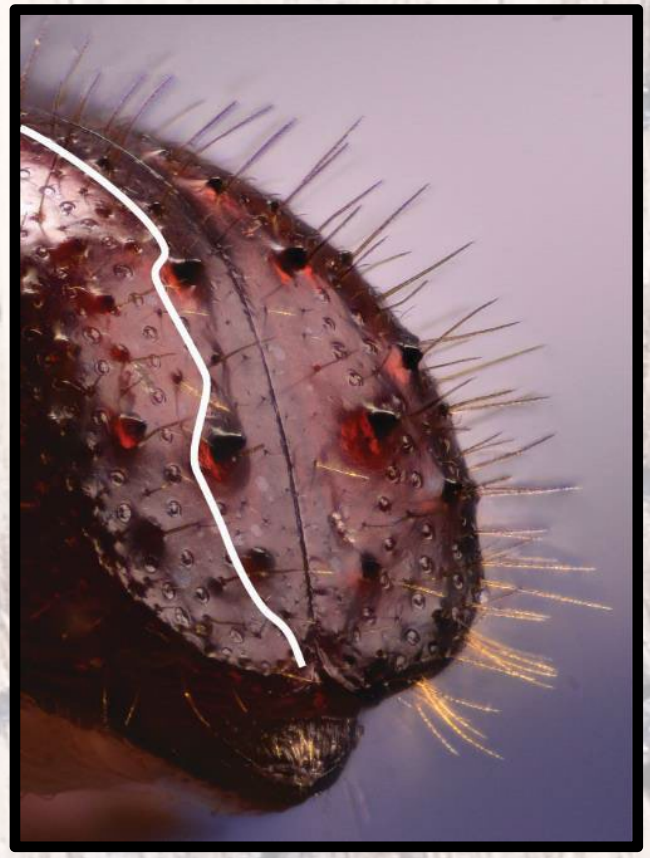


IDENTIFICATION

- **Supplemental key couplets for Gomez et al**.: Rabaglia et. al (2020) Establishment of a non-native xyleborine ambrosia beetle, *Xyleborus monographus* (Fabricius) (Coleoptera: Curculionidae: Scolytinae), new to North America in California. Zootaxa 4786: 269-276.
- Gomez et al. (2018) North American Xyleborini north of Mexico: a review and Key to genera and species (Coleoptera, Curculionidae, Scolytinae. ZooKeys 768: 19-68.

- **Large tubercles are set back from elytral suture**
  - **Stria 1 is displaced laterad of the large median tubercles**
  - ***X. celsus* on east coast similar but larger overall ~4mm vs. ~3mm for *X. monographus***





https://ucanr.edu/sites/mobpc

PEST ALERT

Mediterranean oak borer

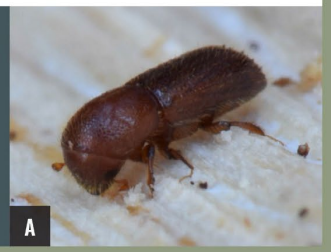
Xyleborus monographus

MOB galleries can cause extensive damage to the trunk and branches of infested oak trees.

About the Beetle

The Mediterranean oak borer (MOB) is an invasive ambrosia beetle native to the Mediterranean region, including Europe, the Middle East, and North Africa, where it primarily attacks oak species. The first North American infestations of MOB were confirmed in valley oaks in Napa County, California in late 2019, followed by Lake and Sonoma Counties in early 2020.

Female beetles **(A)** are light brown and 3 mm (1/8 inches) long. Male beetles are smaller and rarely found outside the galleries.



Host Trees

MOB attacks at least 12 species of oaks in its native range. In California, it has been found infesting two species of white oak: most commonly valley oak **(B)** and, to a lesser extent, blue oak **(C)**. A single, very limited attack was found in a severely distressed California black oak.

Life Cycle

MOB requires 5-8 weeks to develop from egg to adult and can have two or more generations per year. In California, mated females overwinter in the gallery system and emerge in late winter or spring, when the temperature approaches 80°F.

Damage

MOB creates tunnels (or galleries) in the trunks and branches of host trees. It initially attacks the crown of the tree, where it will kill individual limbs. Infestation can continue over several growing seasons, eventually invading the main trunk and killing the entire tree. Infested trees can become a hazard when widespread galleries weaken their limbs and upper trunk. This can lead to premature failure, especially if combined with heart rot.

Ambrosia Beetles and Tree Disease

All ambrosia beetles (like MOB) grow fungi inside their galleries and use it as food for larvae and adults. Some of these fungi can be pathogenic and cause tree diseases that may lead to tree decline and, sometimes, tree death. Several species of fungi have been found in MOB specimens in Napa County, and research is underway to determine if these fungi cause tree diseases.

University of California
Agriculture and Natural Resources

Authors: Curtis Ewing[1], Monica Dimson[2], Beatriz Nobua-Behrmann[2], Randall Oliver[3], John Kabashima[2]. **Images:** Curtis Ewing[1]. **Updated:** July 2020.
[1]*CAL FIRE* [2]*UC Cooperative Extension* [3]*UC ANR Statewide IPM Program*

Signs and Symptoms

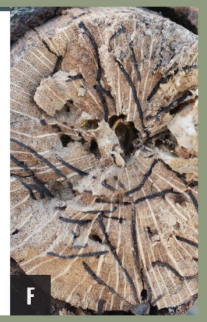
Oak trees infested with MOB are most easily identified by damage caused by the beetle's tunneling activity (galleries) in the xylem. MOB galleries **(D)** are often:

- Trellis-like
- Very crowded and intersecting
- Fanning out in a single plane
- 1.2-1.5 mm in diameter

Other signs and symptoms of MOB tunneling activity include boring dust **(E)** in cracks of the tree bark, and sometimes oozing sap ("sap flux"). Similar symptoms can be produced by tree diseases and other boring insects, so MOB galleries or specimens must be identified in addition to the presence of boring dust and/or sap flux.

Lookalikes

In Northern California, two native ambrosia beetles in the genus *Monarthrum* also create black-colored galleries in oaks. *Monarthrum* galleries **(F)** branch from a single point like a palm leaf and do not cross over neighboring galleries. These native beetles typically only attack trees that are already dead, dying, or diseased.



What Can I Do?

Research is currently underway to determine the best way to control this beetle and prevent tree mortality. If you have a tree that you believe to be infested, please contact the California Department of Food and Agriculture (see Pest Hotline below) and take the following steps to limit the spread of MOB:

- Moving infested wood artificially spreads pests to other areas. **Buy it where you burn it - don't move firewood!** www.firewood.ca.gov
- Chip infested wood as small as possible (1-3 inches in diameter).
- Whether or not the wood can be chipped, solarization is recommended. Cover the wood with sturdy plastic (clear if possible) **(G)**, and leave in the sun for six weeks (summer) to six months (winter). Make sure the chips or logs (and beetles) are fully contained by wrapping the plastic sheet both underneath and over the material. To maximize heating, keep the layer of wood or chips as thin as possible.

How Do I Report a Potential Infestation?

If you believe that you have found oak tree damage and/or beetles that fit the description above, please contact your County Agricultural Commissioner's office or the California Department of Food and Agriculture.

Pest Hotline: 1-800-491-1899

Report a Pest: www.cdfa.ca.gov/plant/reportapest

Visit www.mobpc.org for more information

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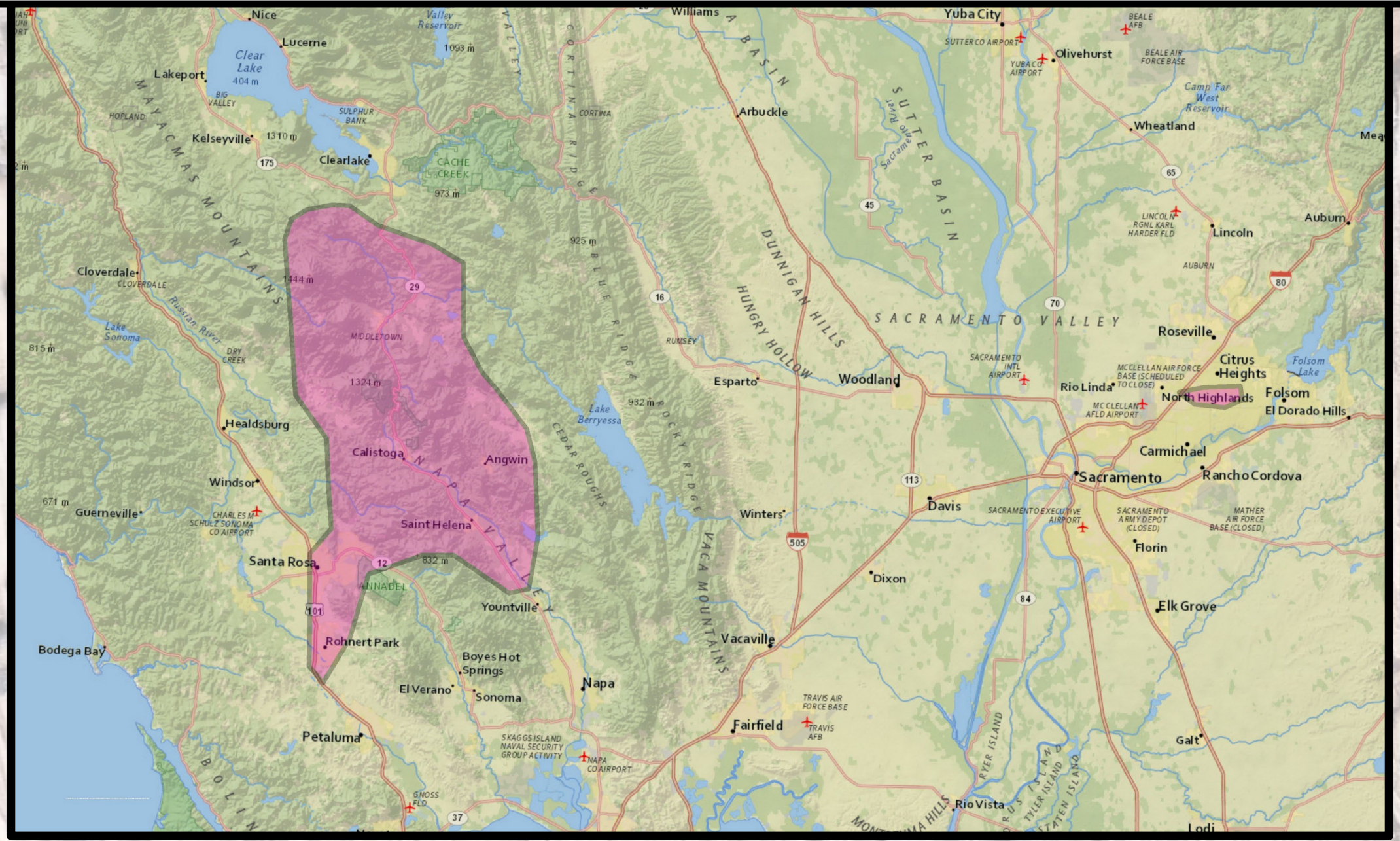
Known Extent of Infestation in CA 2022 – 2023 increase



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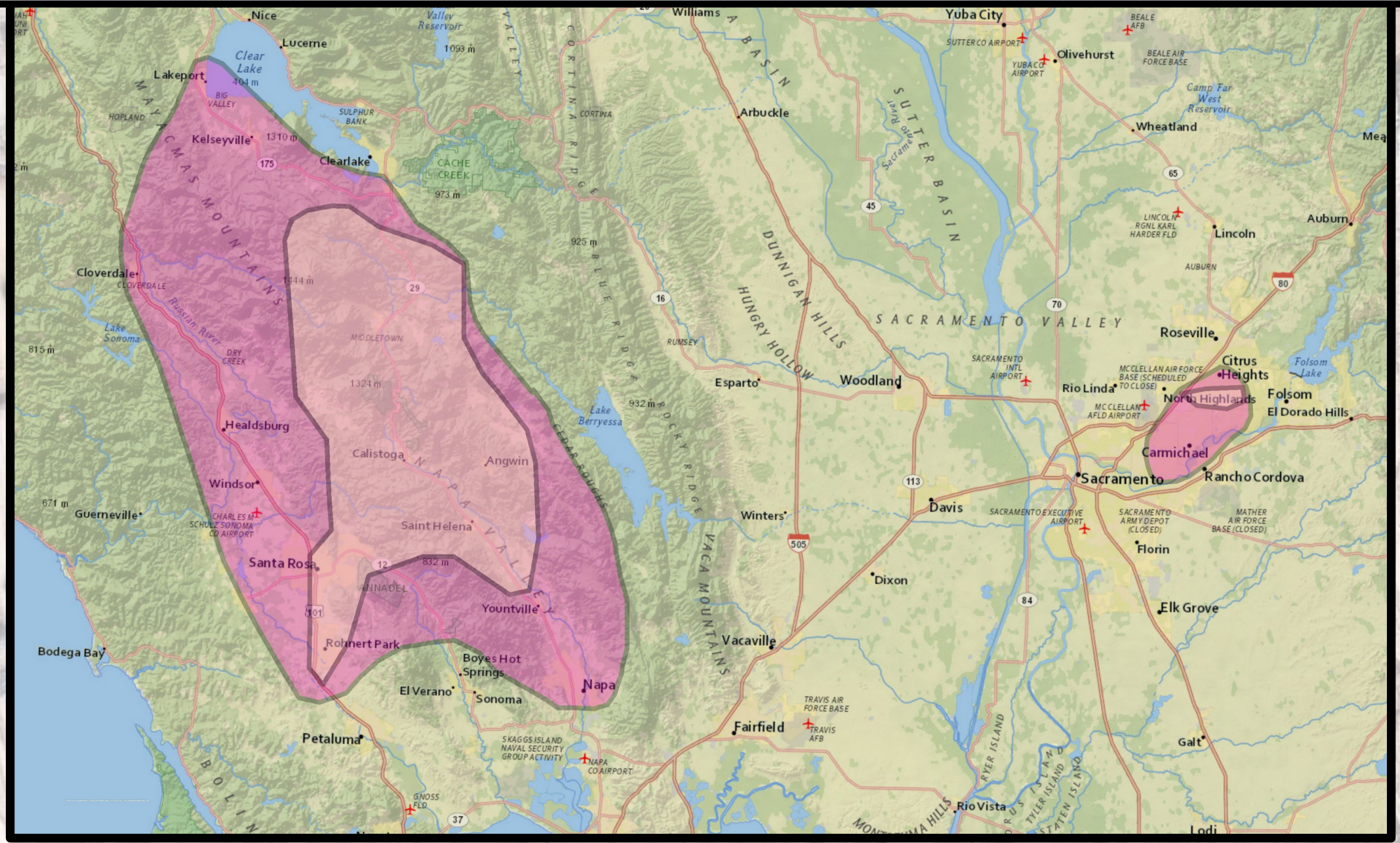
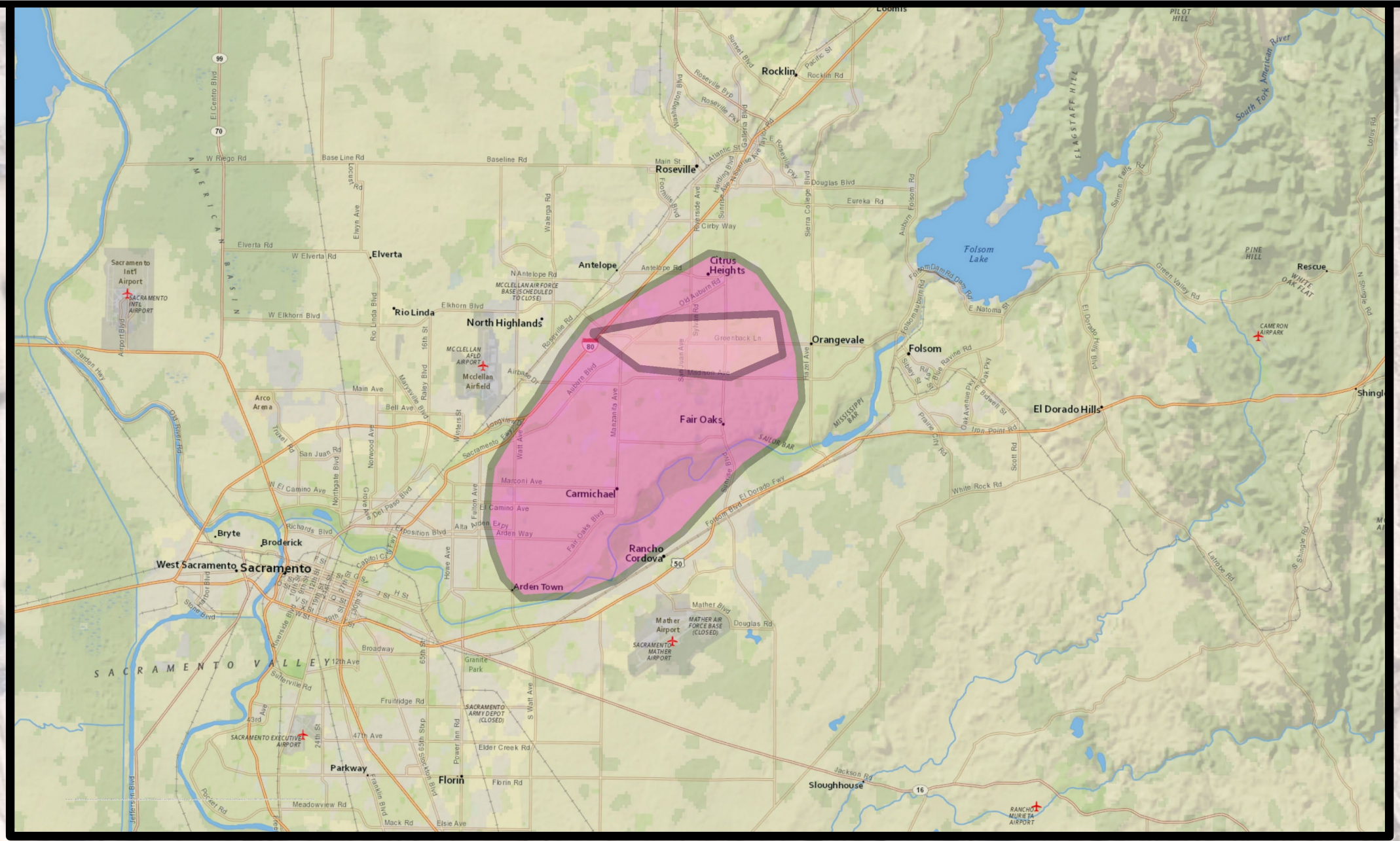


Known Extent of Infestation in Sacramento 2022 – 2023 increase

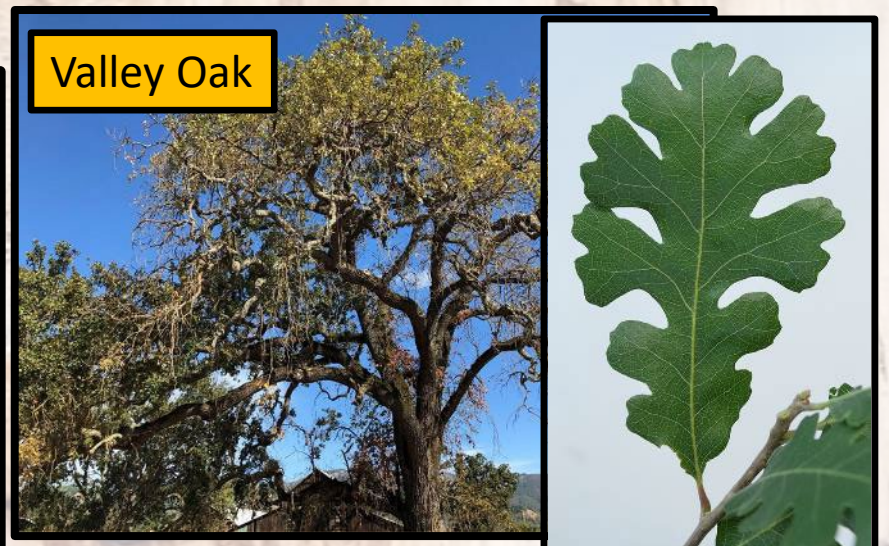


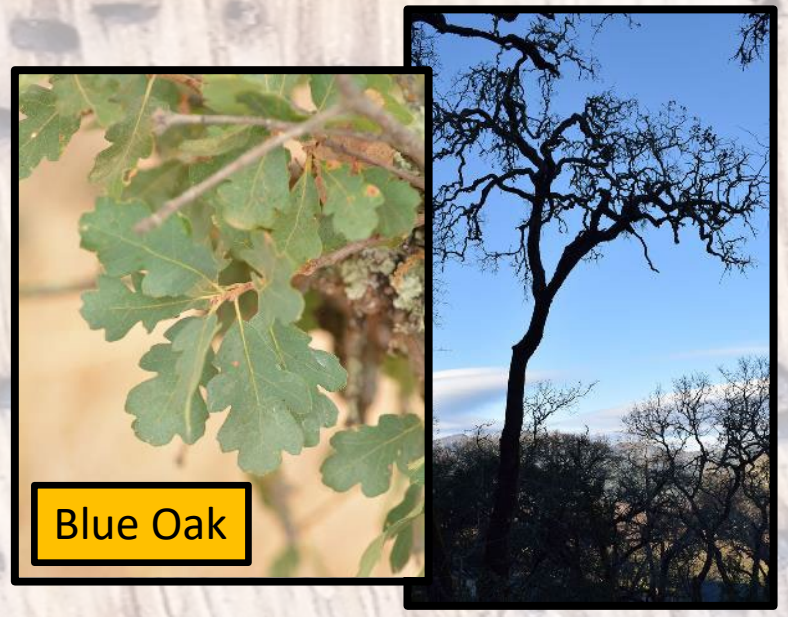
Known Extent of Infestation in Oregon

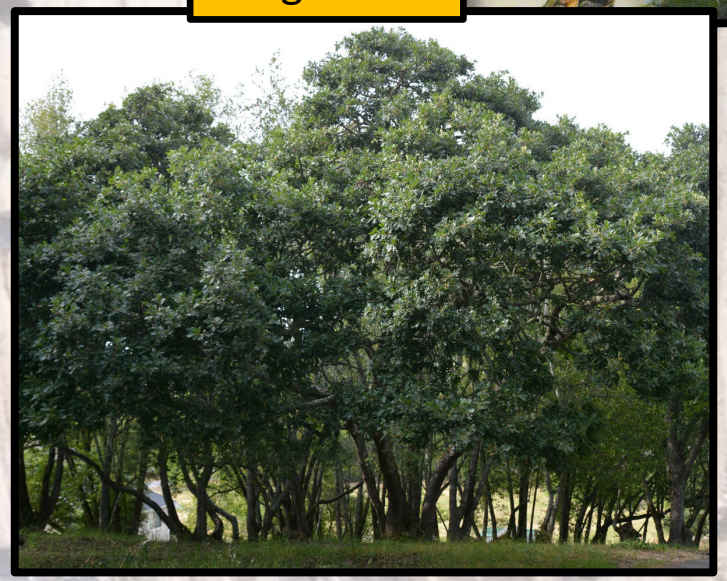
- >20 specimens trapped in Oregon
  - ★ 2018 one specimen (Troutdale)
  - 2021 one specimen (Woodburn)
  - 2022 Expanded Monitoring
- Detected in 2022
  - 21 specimens from 4 counties
  - Majority in Portland area (17)
  - Along I-5 south to Salem (4)
- 2023
  - Oregon white oak infestations confirmed

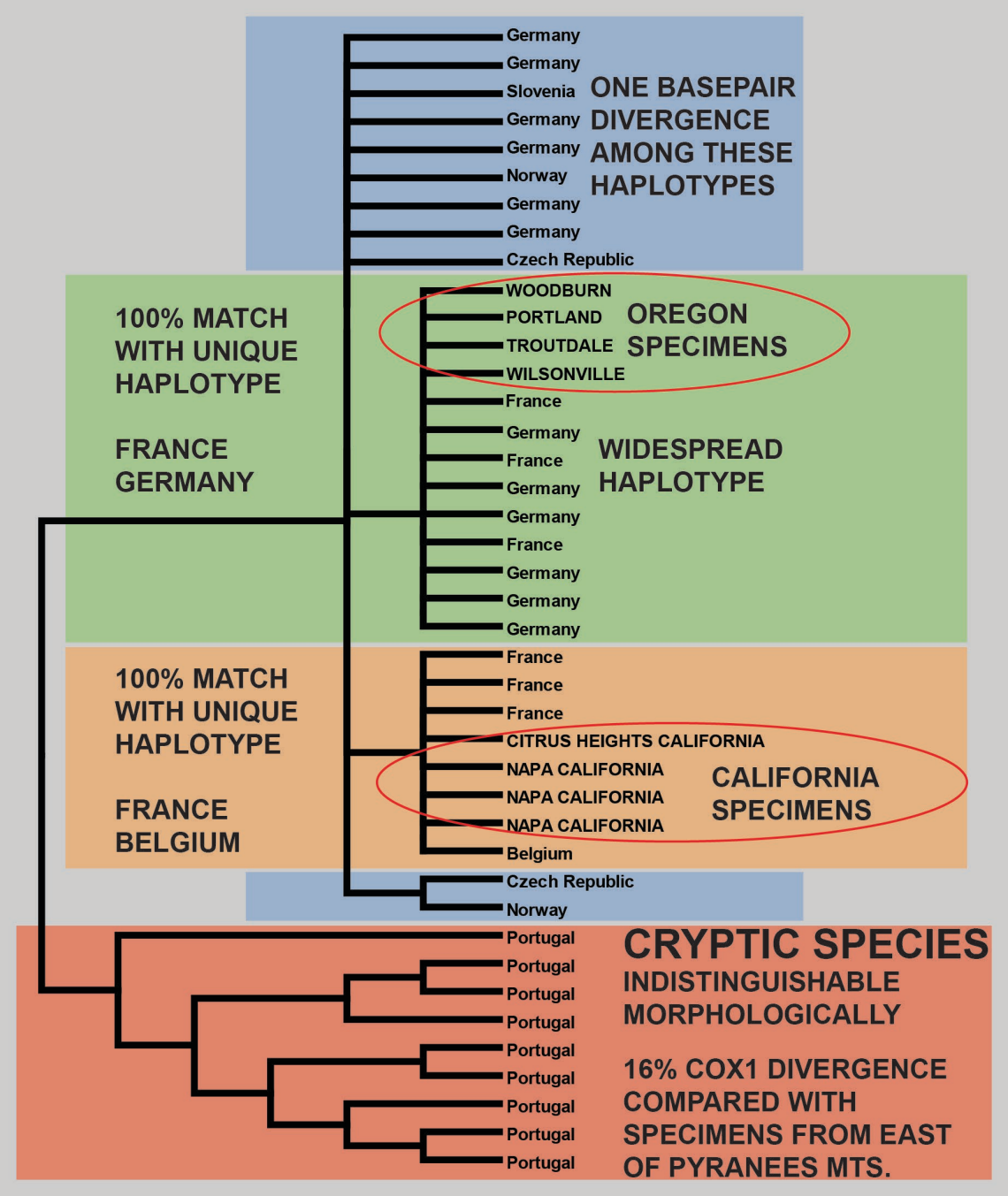
Host Trees of *X. monographus*

- **California**
  - **May 2023 - Confirmed on Oregon white oak (*Q. garryana*)**
  - **Glass Fire damaged trees**
    - **October 20, 2020**
  - **Bole attacks**
  - All native CA white oak section species confirmed hosts
    - valley oak *Q. lobata* (2019)
    - blue oak *Q. douglasii* (2019)
- **Oregon**
  - **May 2023 - Confirmed on Oregon white oak**
  - **Attacking distressed trees**
  - **Bole attacks common**
  - **Often at root collar**







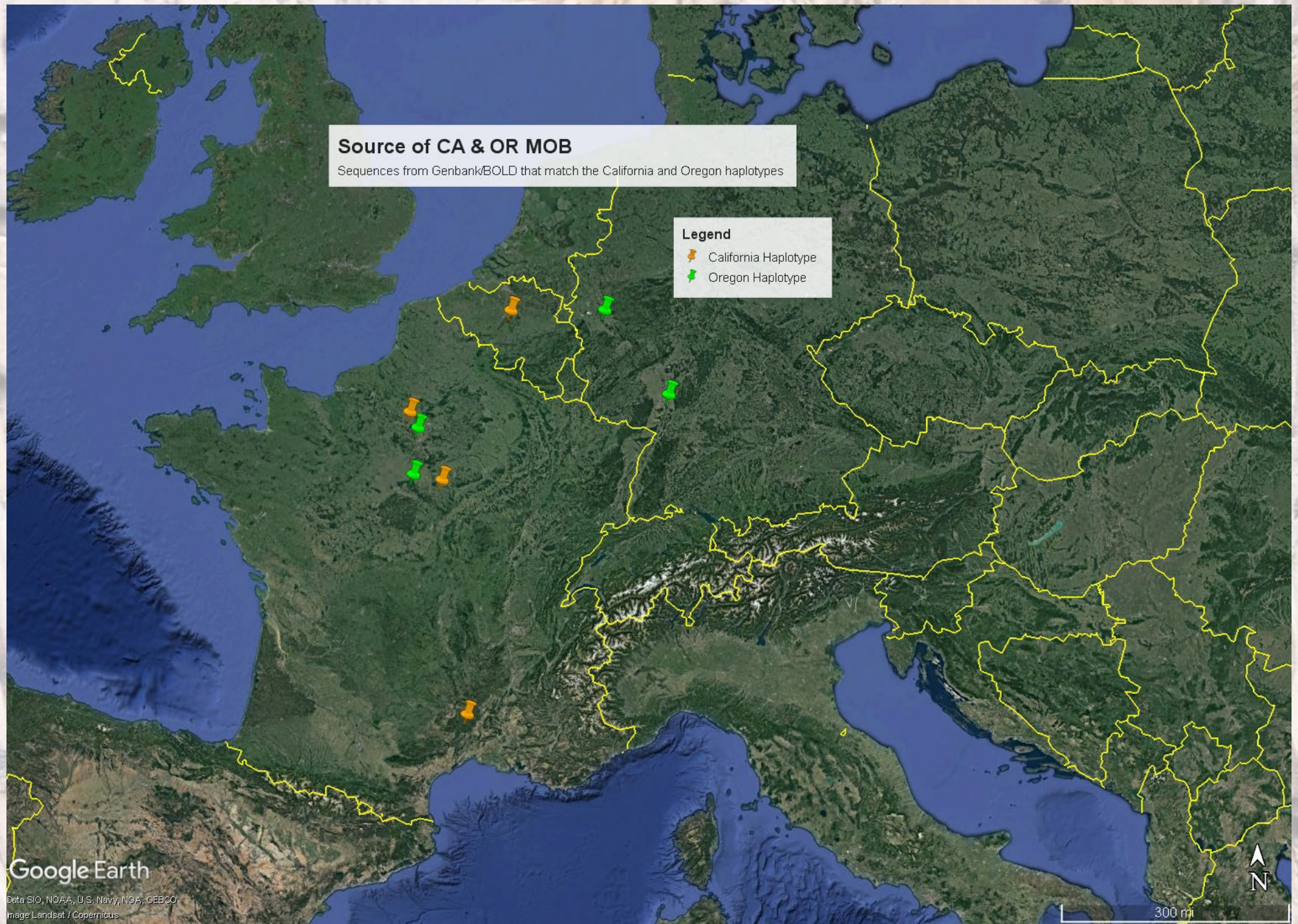


PARSIMONY: 50% CONSENSUS

Possible Origins

- **CALIFORNIA SEQUENCES ALL THE SAME**
  - 100% Match with unique haplotype
  - Limited to France & Belgium
- **OREGON SEQUENCES ALL THE SAME**
  - 100% Match with unique haplotype
  - Limited to France & Germany
- **CALIFORNIA – OREGON GENETIC DIVERGENCE**
  - **2 Base of 658 (0.3%)**
- **Portugal specimens – Cryptic Species**
  - **16-17% pairwise divergence**
  - 5-6 Amino Acid changes
- **Small differences across rest of Europe (0.0-0.7%)**

- **Cytochrome oxidase 1**
  - Folmer Barcode Region
- **35 GENBANK Sequences**
  - 2 from Napa County
- **2 CDFA Sequences**
  - 1 each Sacramento & Napa Counties
- **4 Oregon Specimens**
  - From 3 counties


Source of CA & OR MOB
Sequences from Genbank/BOLD that match the California and Oregon haplotypes
Legend
California Haplotype
Oregon Haplotype
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
N
300 mi

132 Total Valley Oaks at Calistoga Water Treatment Plant Tagged and Canopy Evaluated in 2020, Plan to Evaluate Annually to at Least 2030

Results after Two Years: (Reevaluated in 2021 & 2022)

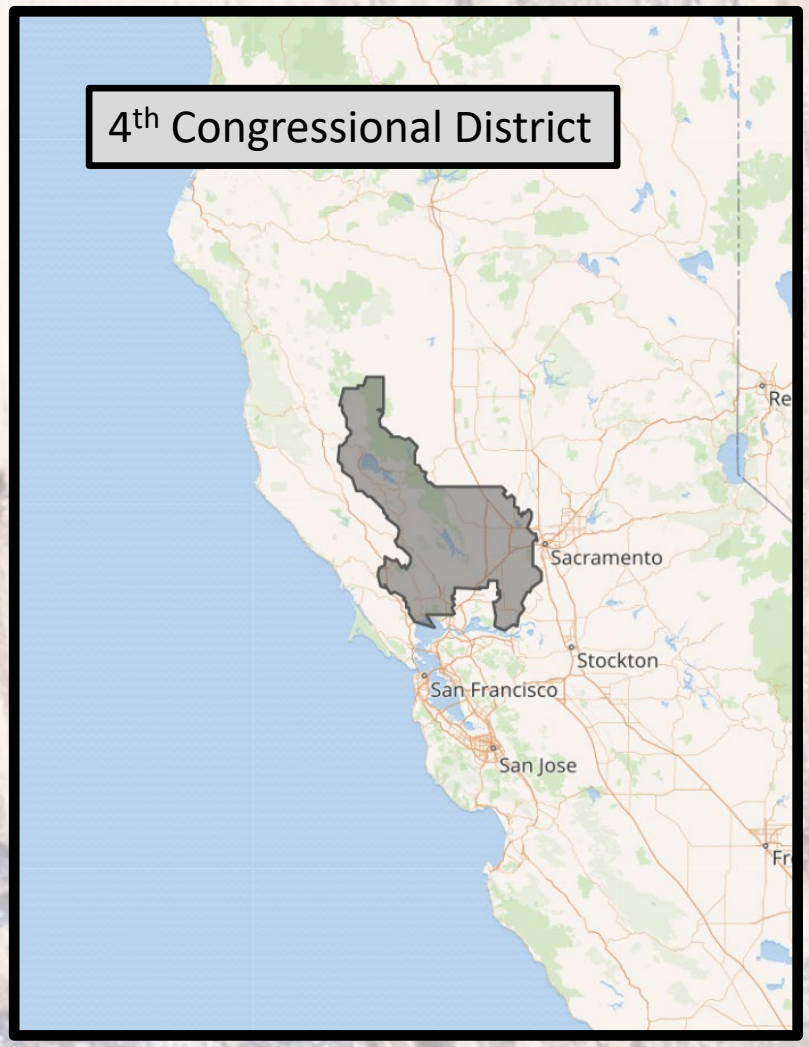
Solarization of MOB Infested Mature Valley Oak

- Solarization of bole and branches from mature valley oak
  - West Santa Rosa
- Cut & Covered July 2023
- Some MOB still active
  - Late-Oct/early November
- Partial shade
- High moisture levels under tarp

Funding Rumblings??

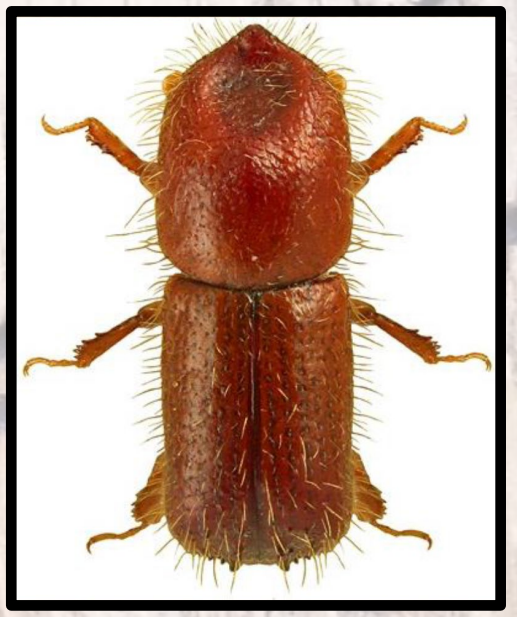
- Representative Mike Thompson
  - 4th Congressional District
  - All: Napa & Lake Counties
  - Most: Yolo County
  - Parts: Sonoma & Solano Counties
- Solicited input on funding needs
  - August 2023
  - Contacted Napa County Ag Commissioner
  - Contacted Forest Service
  - Contacted CDFA

- **Status unknown as of November 2023**



Thank You!

Questions?



MANY PEOPLE FROM THE FOLLOWING ORGANIZATIONS HAVE CONTRIBUTED TO OUR KNOWLEDGE OF THIS BEETLE:

USDA Forest Service UC Davis UC Riverside UCANR
CA Dept. of Food & Agriculture County Ag Commissions

- curtis.ewing@fire.ca.gov
- https://ucanr.edu/sites/mobpc/