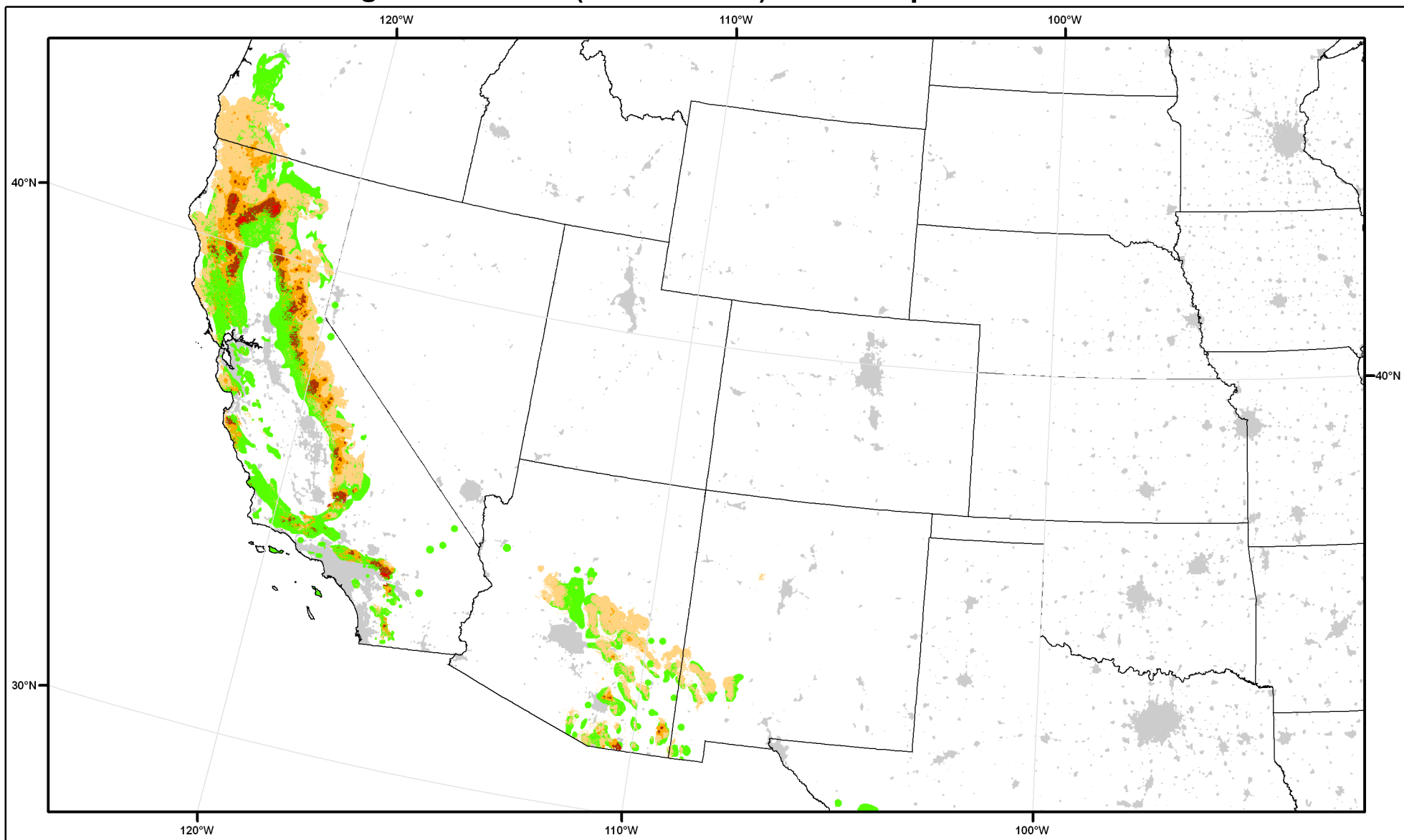


Wildland Tree Resources at Risk*

from *Agrilus coxalis* (Waterhouse) -- Goldspotted Oak Borer



Wildland Tree Resources at Risk*

Trees/Acre**

- Little or No
- 0 - 25
- 26 - 50
- 51 - 90
- 91 - 750

- Little's Oak Host**
- Urban Areas

* Six oak species from the Forest Inventory and Analysis program (FIA) were used: coast live, interior live, California black, Emory, canyon live, and silverleaf.

**Trees Per Acre (TPA) include all six FIA oaks with a minimum of 5" DBH.

***Depicts the potential distribution (range) of all six FIA oak species. These species are at risk if present within Little's Oak Host range.



Albers Equal Area Conic Projection

Summary of: Wildland Tree Resources at Risk from *Agrilus coxalis* (Waterhouse.) The Goldspotted Oak Borer, October 9, 2009

The Wildland tree Resources at Risk Map from *Agrilus coxalis* was produced by the U.S. Forest Service, Forest Health Technology Enterprise Team's (FHTET) *A. coxalis* Steering Committee (Table 1). The map depicts the distribution and density of oak species that are confirmed hosts for *A. coxalis* in the western United States. Urban areas may also have susceptible oaks. The map does not include where *A. coxalis* occurs or where it might establish. Three datasets were used to produce the map: **Forest Inventory and Analysis (FIA)**, **Little's Atlas of United States Trees**, and **Urban Areas**

FIA: Host distribution was summarized by identifying the density of oak species (trees/A) on FIA plots that are greater than 5 inches in diameter at breast height (dbh) and known hosts for *A. coxalis*: California black oak (*Quercus kelloggii*), canyon live oak (*Quercus chrysolepis*), coast live oak (*Quercus agrifolia*), Emory oak (*Quercus emoryi* Torr.), interior live oak (*Quercus wislizeni* A. DC.), and silverleaf oak (*Quercus hypoleucoides* A. Camus). Densities between plots were interpolated at a 250m resolution.

Little's Atlas: Delineations of the potential distribution of oak species that are assumed to be susceptible to *A. coxalis*.

Urban Areas: As defined by **Imhoff et al. 1997 City Lights dataset.

A defensible prediction of the future risk associated with *A. coxalis* will require information from three areas related to the biology of the insect: 1) Host susceptibility range; 2) Pest dispersal capacity; and 3) Habitat suitability based on seasonal climate and host availability. This basic information on *A. coxalis* will be necessary to predict its spread.

- 1) **Host range:** Field observations in California indicate that *A. coxalis* readily infests coast live oak and California black oak (both in the section Lobatae, red oaks), but not Englemann oak (section *Quercus*, white oaks). In Arizona, we have observed that *A. coxalis* colonizes silverleaf oak and Emory oak (both red oaks), but not Arizona white oak or gray oak (both white oaks). This pattern seems to suggest that many red oaks may be hosts for *A. coxalis*, whereas white oaks may not be hosts. However, this host range needs to be tested experimentally. The beetle also seems to prefer trees that are greater than 5 inches dbh, but this needs to be confirmed through intensive surveys and statistical analysis. Future spread of *A. coxalis* in California and Oregon depends on its physiological capacity to develop in California oaks (particularly those in the Central Valley and Coast Range).
- 2) **Dispersal capacity:** Finds of *A. coxalis* in California have been restricted to San Diego Co., despite broader searches. Targeted searches for the insect have only been conducted in 2008 and 2009 and focused on trees with decline symptoms. However, despite the limited efficacy of emerald ash borer traps, survey trapping in 2009 has revealed *A. coxalis* populations where obvious injury symptoms and tree mortality are not evident. Thus, *A. coxalis* may be more widely distributed than we currently appreciate. Increasing the accuracy of ground surveys to measure the spread of *A. coxalis* would require peeling bark of apparently healthy trees to look for larvae. Such destructive surveys may cause unacceptable tree mortality. Based on our ground surveys and aerial data, we believe *A. coxalis* is spreading slowly in oak savannahs of southern California. However, to accurately predict the spread of *A. coxalis*, we need to have an experimental estimate of the innate flight dispersal distance of the adult. A mark-recapture study of *A. coxalis*, conducted within the zone of infestation, will be necessary to establish this dispersal capacity.
- 3) **Temperature effects on development and mortality:** Detection monitoring trapping and field observations of infested trees have established that *A. coxalis* occurs from coastal elevations (50 ft) to montane elevations (6,000 ft) in California; collection records suggest that it can occur at 7,000 ft in Mexico. Thus, it may have a broad temperature tolerance for development. Laboratory studies in quarantine are necessary to establish the true cold tolerance of all life stages in order to help delineate the ultimate potential spread of *A. coxalis* to all latitudes and elevations in California and neighboring states. Further, the effect of temperature on the development of eggs, larvae, and pupae is also a key piece of information that will allow us to predict the spread of the insect in this region.

Table 1: Steering Committee

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Contractor Support

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