

**BARK BEETLES
+ DROUGHT =
TREE
MORTALITY**

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Northeastern California Shared Service Area

This is a Bark Beetle



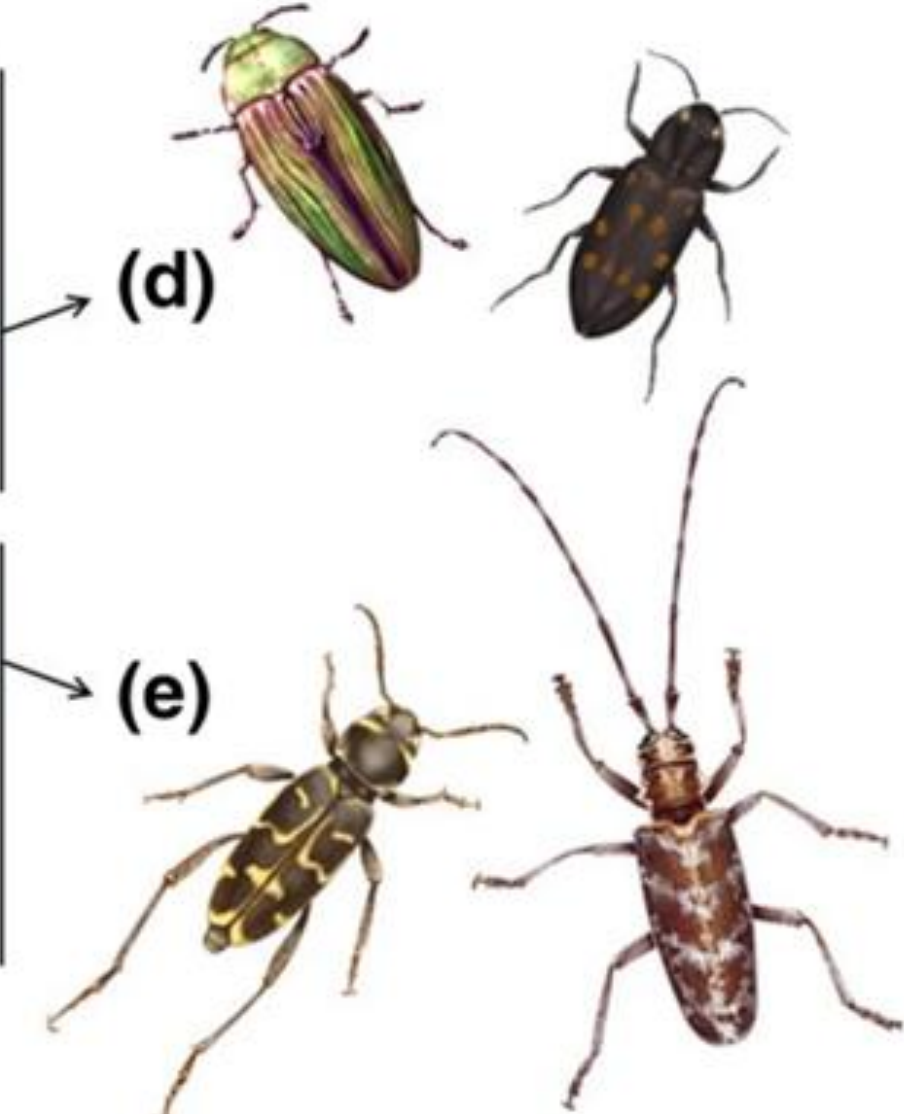
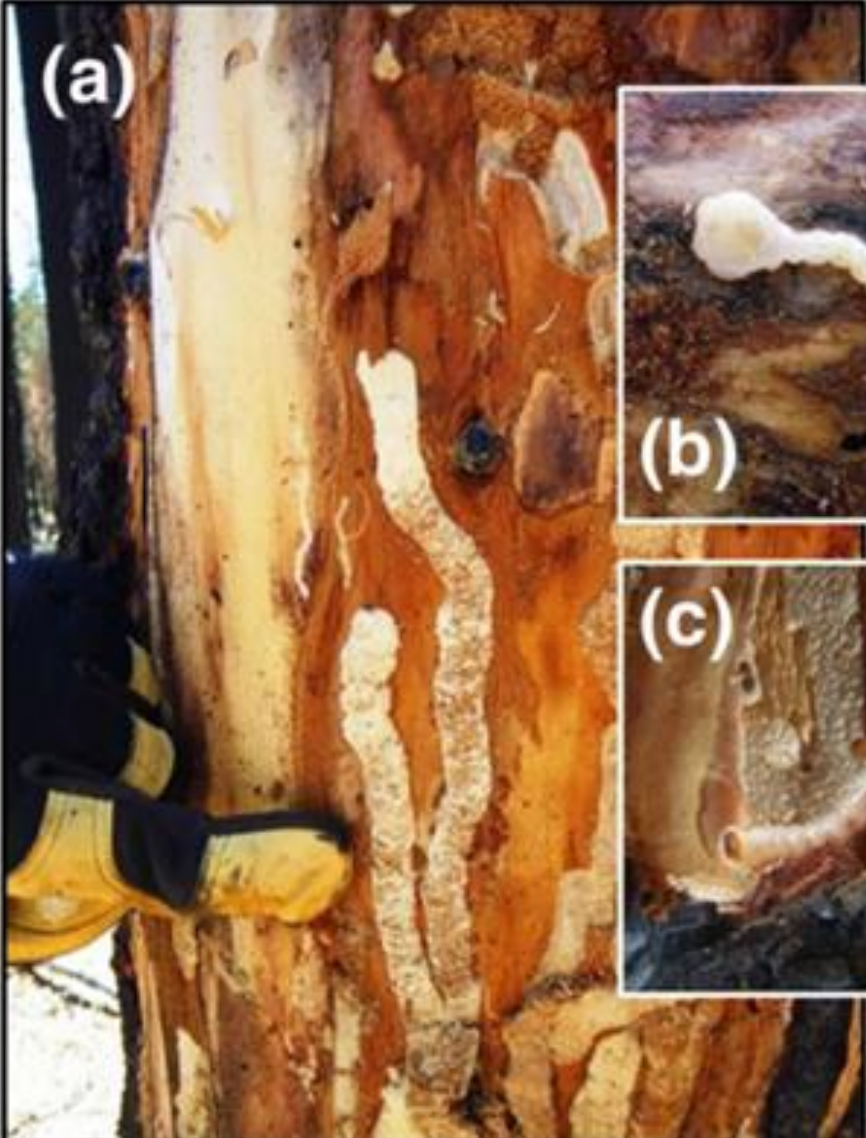
Bark beetles

- **600** species in North America
- About **200** species in California



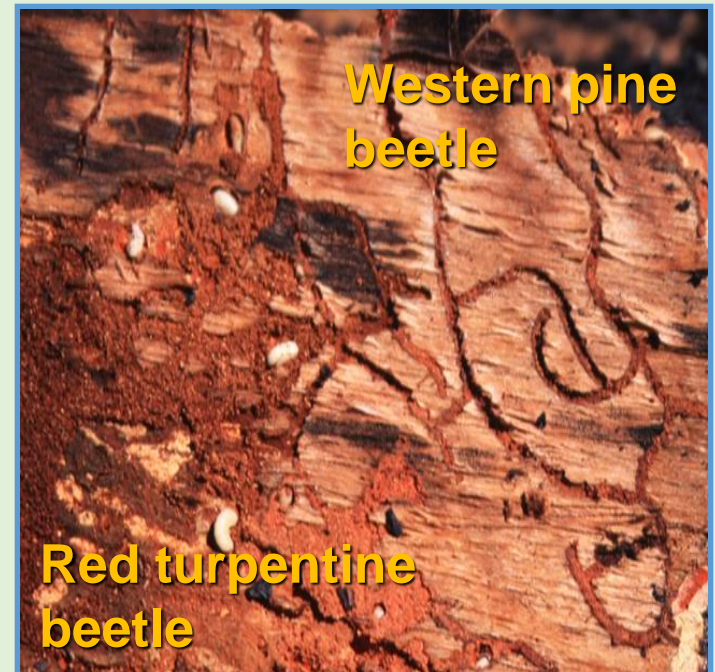
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Woodboring Beetles



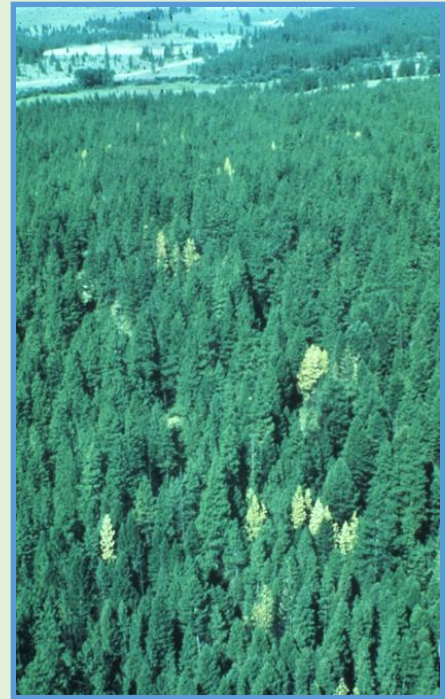
Bark beetles – Common attributes

- Bark beetles live beneath the bark of host trees in *galleries* that are unique for each species



Bark beetles – Common attributes

- Bark beetles are *opportunistic*, infesting trees weakened by other agents or factors
 - Disease infection
 - Infestation by other insects
 - Mechanical damage, including fire-injury
 - Soil compaction (high use sites or construction)
 - Air pollution
 - **Drought**
 - **High stand density**



Bark beetles – Common attributes

- Bark beetles produce *aggregating attractants* that insure mass attack of suitable host material



These attractants (*pheromones*) also lead to group-killing of trees



Bark beetles – Common attributes

- A *high reproductive potential* allows bark beetles to multiply rapidly when conditions are favorable



Bark beetles – Common attributes

- Beetle populations are ultimately controlled by *available food source* (habitat)



Important bark beetle species in California

Dendroctonus jeffreyi, Jeffrey pine beetle (JP)

Dendroctonus brevicomis, Western pine beetle (CP, PP)

Dendroctonus ponderosae, Mountain pine beetle (LPP, PP, WWP, SP, WBP, others)

Dendroctonus pseudotsugae, Douglas-fir beetle (DF)

Dendroctonus valens, Red turpentine beetle (all pines)

Ips pini, Pine engraver (all pines)

Ips paraconfusus, California five-spined ips (all pines)

Ips confusus, Pinyon ips (pinyon pine)

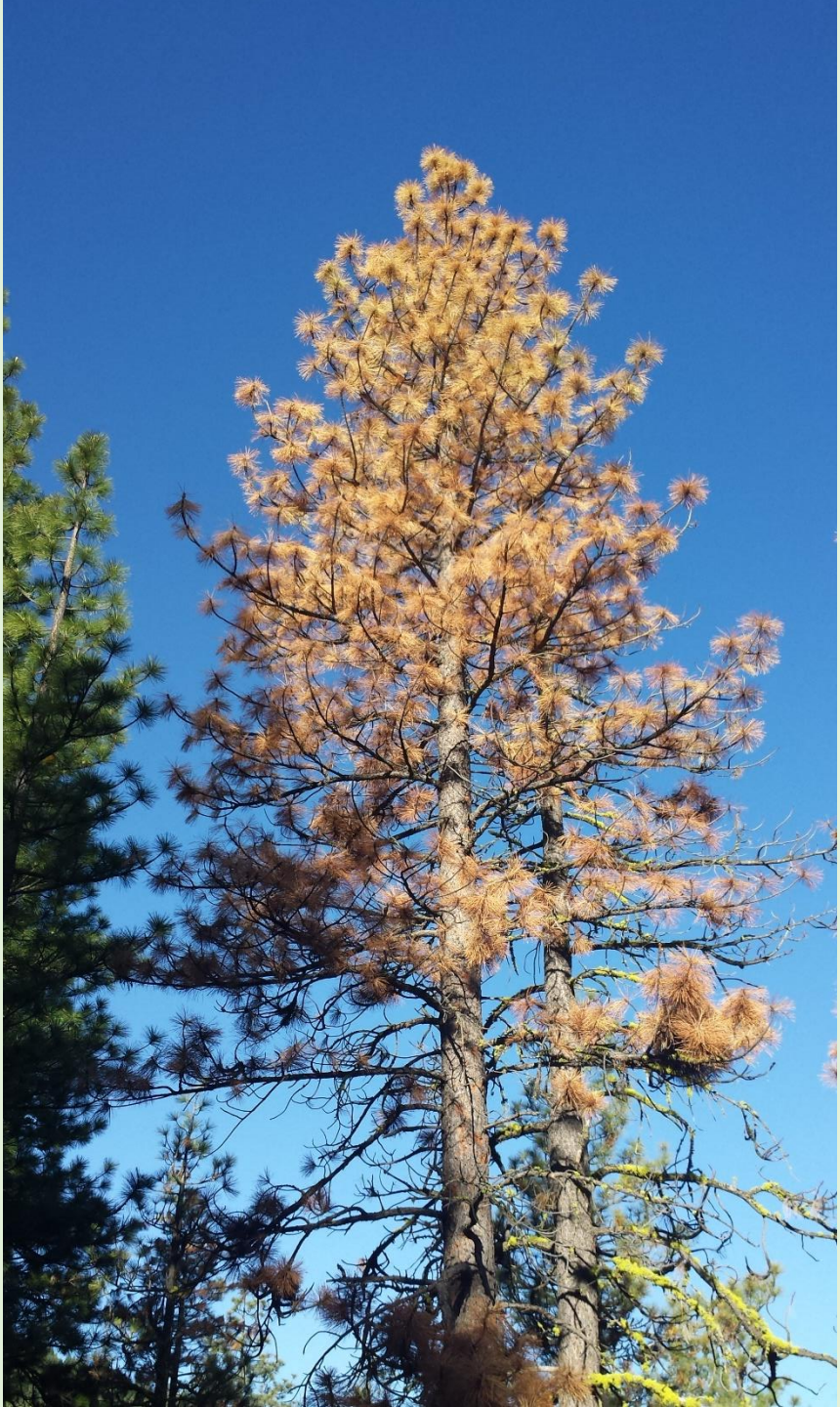
Scolytus ventralis, Fir engraver (true firs)

*Pine
engraver*

AKA "Ips"



Western Pine Beetle



California Flatheaded Borer



Forest Health Issues



- Too many trees!
- Altered species composition and forest structure
- Excessive fuel loads
- Highly susceptible to stand replacing wildfire
- Highly susceptible to bark beetle outbreaks

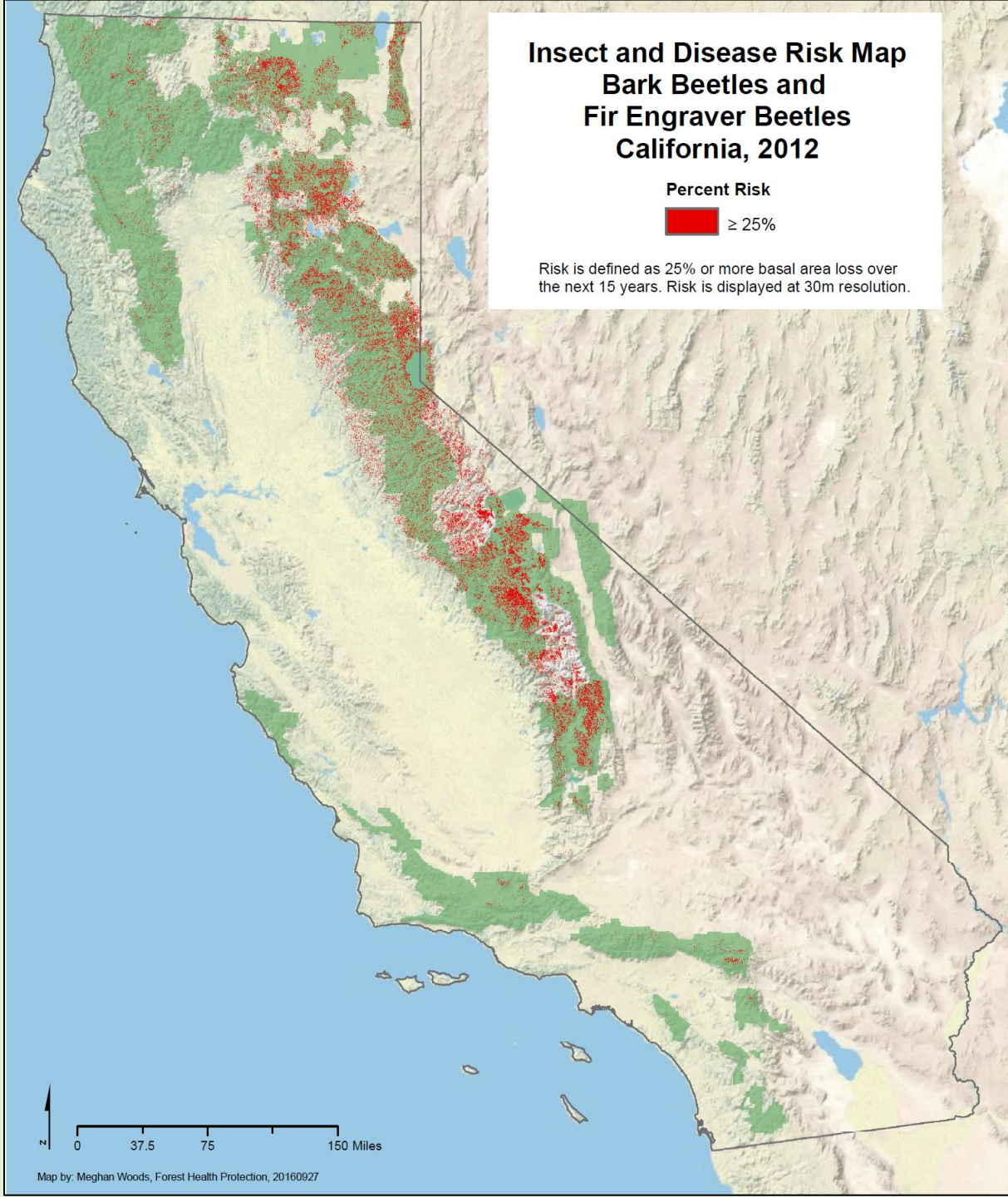


Insect and Disease Risk Map Bark Beetles and Fir Engraver Beetles California, 2012

Percent Risk

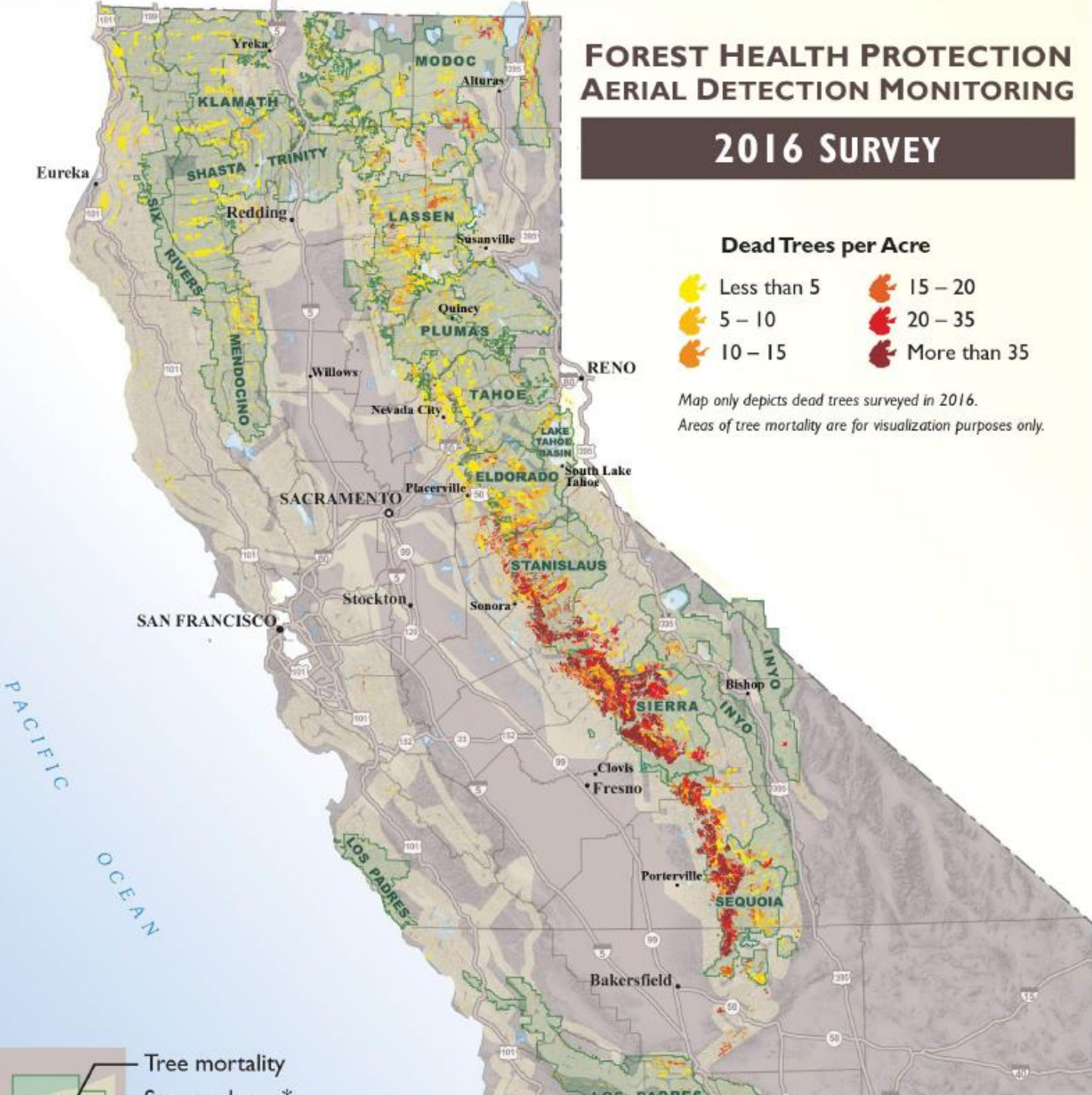
 ≥ 25%

Risk is defined as 25% or more basal area loss over the next 15 years. Risk is displayed at 30m resolution.



FOREST HEALTH PROTECTION AERIAL DETECTION MONITORING

2016 SURVEY

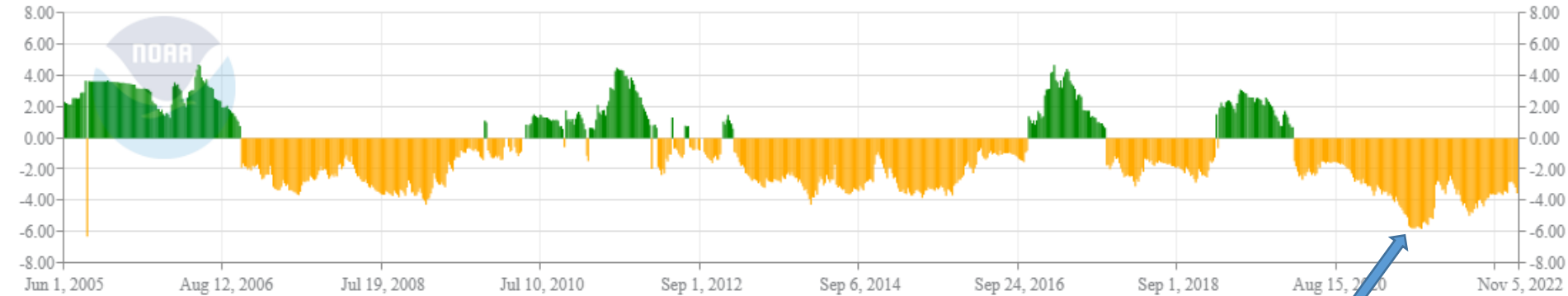




Palmer Hydrological Drought Index

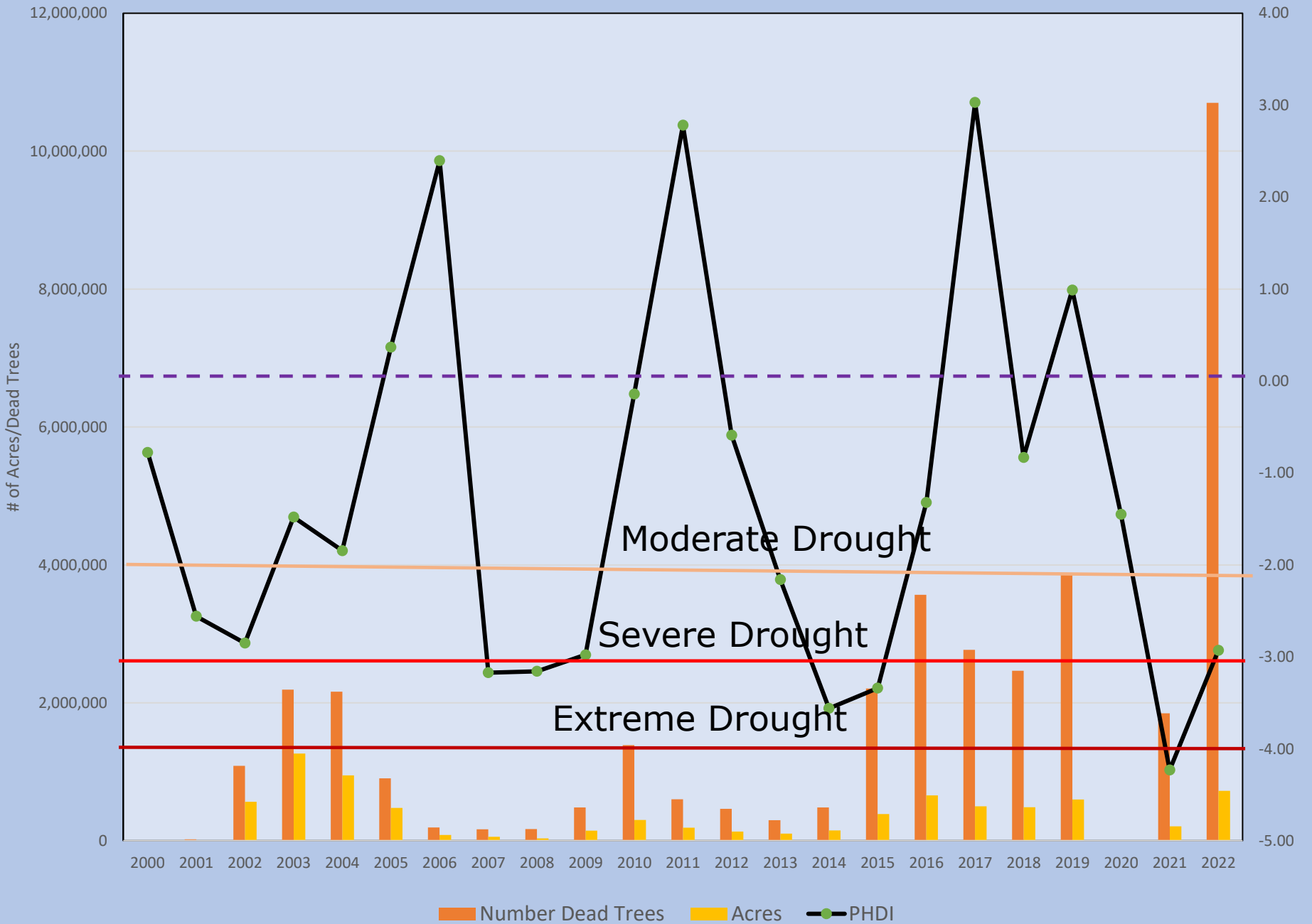
California Climate Division 2

Palmer Hydrological Drought Index



Lowest PHDI values ever calculated for NE California: June – September 2021 (records go back to 1895)

NE CA Forests Tree Mortality 2000 - 2022

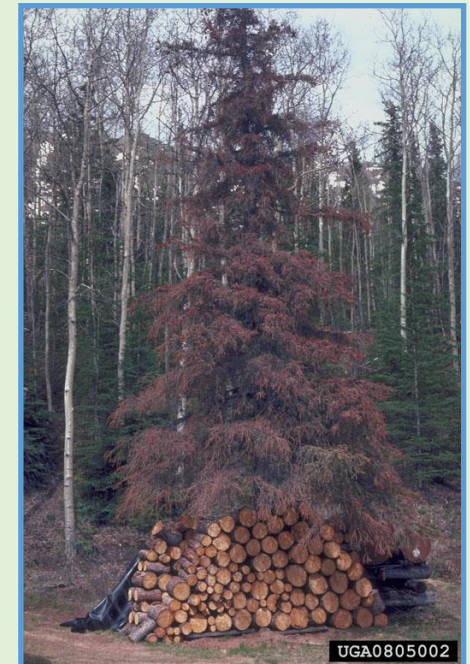




How can I save my trees? Short-term

If they are already infested, it is too late

- Remove infested trees before beetle emergence
- Deep watering
- Preventative insecticide spraying
- Systemic insecticide/fungicide injections
- Anti-aggregation pheromones
- Avoid leaving green pine slash or green pine firewood near standing live trees



How can I save my trees?

Long Term

■ **Reduce tree competition**

- Thinning is the best long-term solution for increasing tree health and reducing bark beetle-caused mortality
- Thinning should be accomplished in late summer or fall after insect flights have decreased
- Treat pine logs and slash properly to avoid creating more habitat for beetle development

■ **Avoid injuring trees during construction or landscaping projects**

■ **Avoid creating stressful growing conditions**

■ **!! Some locations may be becoming unsuitable for many native tree species !!**

Questions ?????

