USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Foothill and Sierra Nevada Insects

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Forest Health Protection

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Overview

- Insects are cool
- What are we looking for? At? Is this an issue?
- Bark beetles and others
- Take a walk

Insect Variety

- **Bark/Wood feeders** (Bark, Ambrosia, woodborers)
- **Defoliators** (Moths, butterflies, Sawflies, beetles)
- **Sap Feeding** (true bugs, scales, adelgids)
- **Decomposers** (Ants, termites, fungi, flies, more beetles)

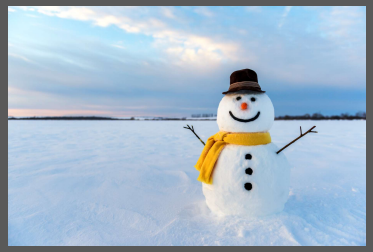
The Pest Triangle

Susceptible host

Tree Mortality

Pest

Environment



**Dynamic relationships

Clues To Look For:

1. Symptoms and Signs
2. Damage Patterns
3. Damage Pattern Development
4. Past History

Pine Engravers

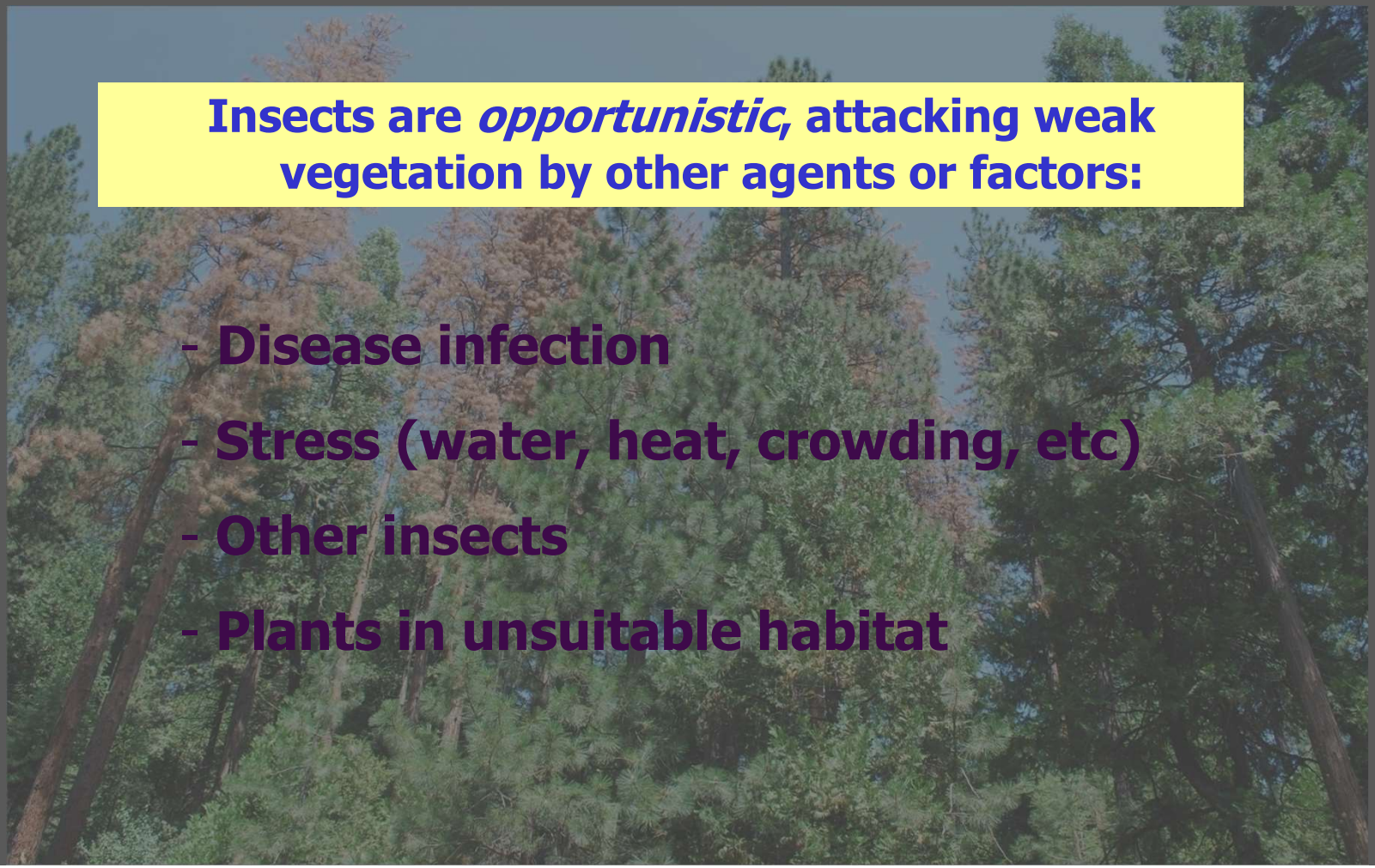
Western Pine Beetle;
Mountain Pine Beetle;
Jeffrey Pine Beetle

< 6 inches/horizontal:

- Pine engravers

Red Turpentine

Insects



Insects are *opportunistic*, attacking weak vegetation by other agents or factors:

- **Disease infection**
- **Stress (water, heat, crowding, etc)**
- **Other insects**
- **Plants in unsuitable habitat**

Pine Bark Beetles in California

California fivespined Ips
(Ips paraconfusus)

Western pine beetle
(Dendroctonus brevicomis)

Jeffrey pine beetle
(Dendroctonus jeffreyi)

Fir engraver
(Scolytus ventralis)

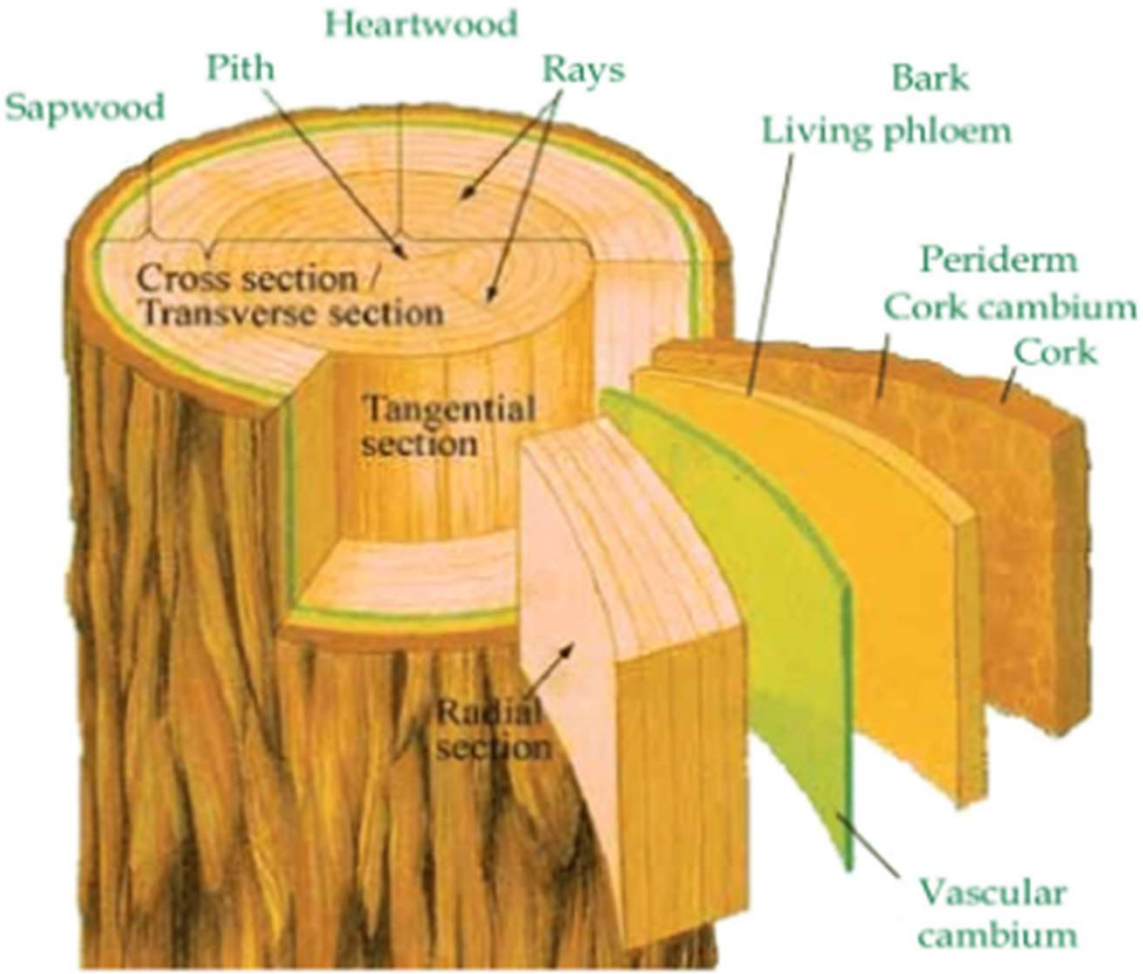
Mountain pine beetle
(Dendroctonus ponderosae)

Red turpentine beetle
(Dendroctonus valens)

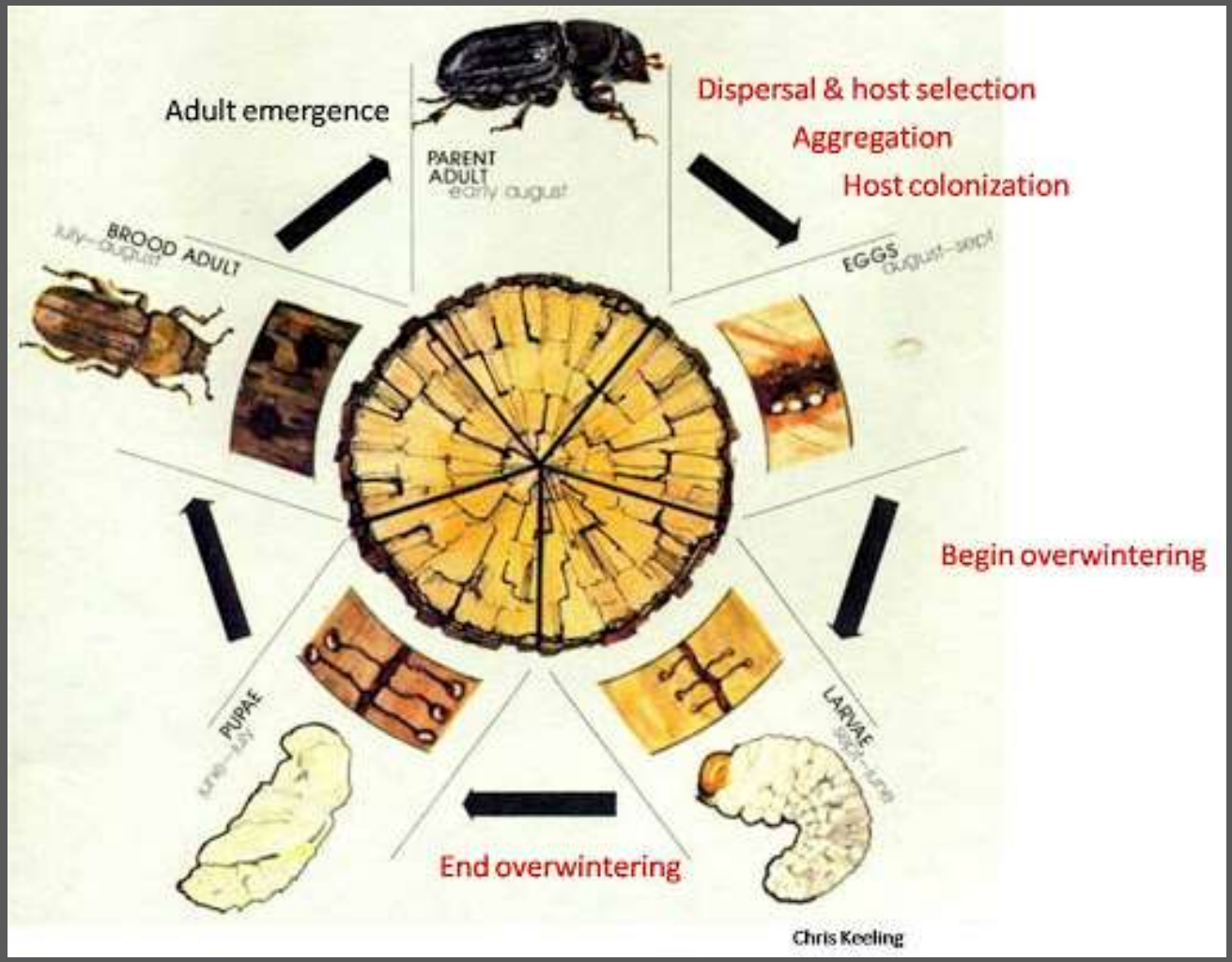
Forest Health Protection, S.M. Hishinuma

How Bark Beetles Cause Tree Mortality

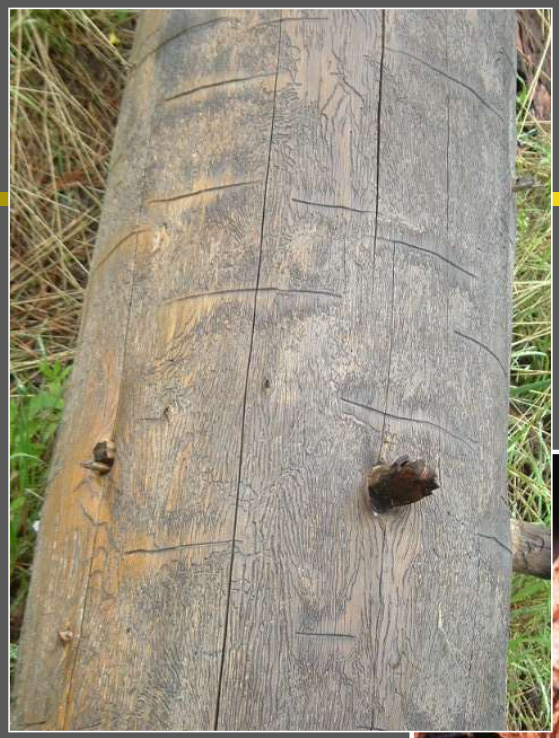
- Invade the bark of living trees
  - *Colonize, mate, and reproduce in phloem/cambium*
- Fungal symbionts
  - *Clogs tree conduction*
- Able to kill trees
  - *Often stressed trees in endemic levels*
  - *Healthy trees at epidemic levels*



University of Cambridge https://www.doitpoms.ac.uk/tlplib/wood/printall.php


Adult emergence
PARENT ADULT
early august
Dispersal & host selection
Aggregation
Host colonization
BROOD ADULT
EGGS
Begin overwintering
PUPAE
LARVAE
End overwintering
Chris Keeling

Indicators of Attack - Galleries



Indicators of Attack

- Boring dust
  - Mix of bark shavings and frass (excrement)
    - Reddish/brown not white
- Pitch tubes
  - Resin accumulation at point of attack

Indicators of Attack from a Distance

- Fading foliage (*whole crown with all foliage retained*)
- Grouped mortality
- Woodpecker foraging
- Exit holes

Woodborers

- **Attacks commonly when trees *stressed/dying, but Drought increases potential***
- **Have ecological roles**
  - **Speed up decomposition/nutrient recycling**
  - **Wildlife forage**
  - **Create opportunities for other agents**
  - **Disturbance**

Prominent wood boring taxa

- **Beetles (Coleoptera)**
  - Flatheaded borers (Buprestidae)
  - Roundheaded borers (Cerambycidae)
  - Ambrosia beetles

- **Wasp and bees (Hymenoptera)**
  - Horntails/woodwasps (Siricidae)
  - Carpenter bees (Anthorcoridae)
  - Ants (Formicidae)

- **Moths (Lepidoptera)**
  - Carpenterworms (Cossidae)
  - Clearwing (Sessidae)

Adult exit holes

D-shaped or oval

Circle-shaped

Larvae galleries

- Insects commonly found on main bole, branches, twigs and roots

Ambrosia beetles

- Feed on symbiotic ambrosial fungus and not wood
- Galleries stained with fungus
- Galleries are simple and branched that penetrate sapwood
- All life stages can be found in the gallery

Invasive: Mediterranean Oak Borer (MOB)

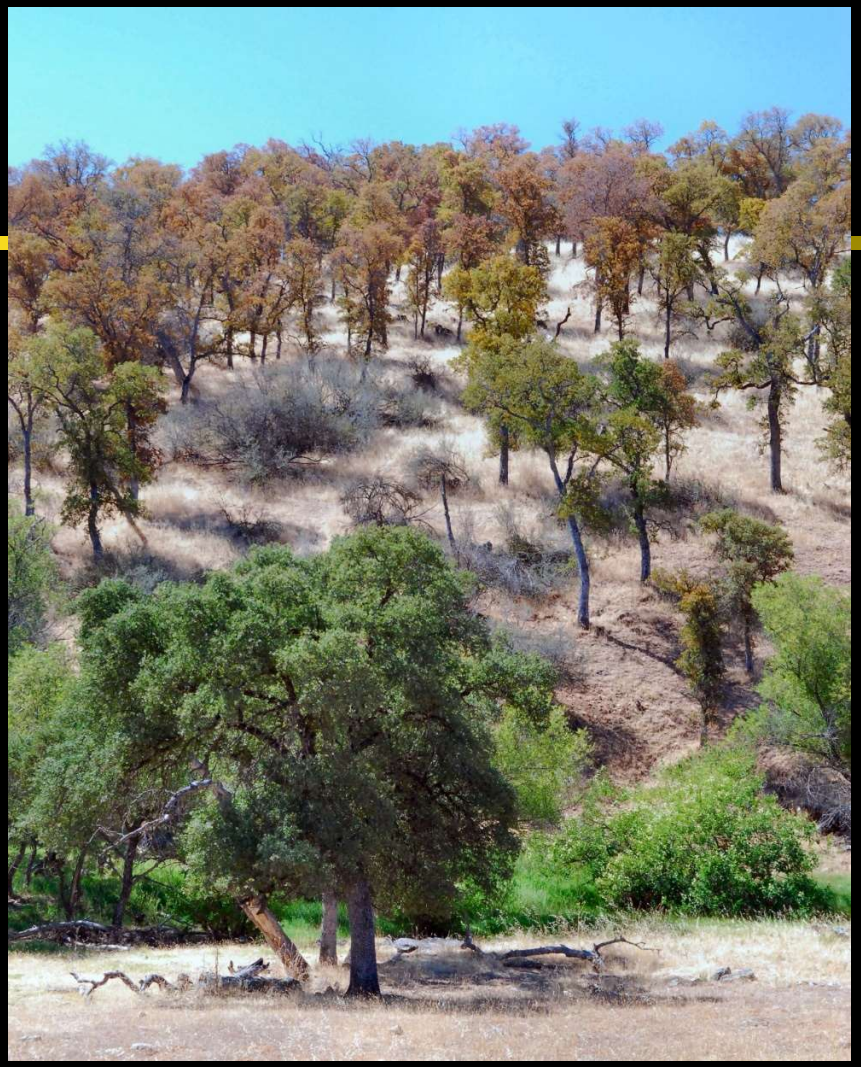
Defoliators and others

Yosemite National Park 2021


Tussock Moth

What about Oaks?

- **Disease is common cause of decline**
  - *Armillaria sp.*
  - *Sudden Oak Death (SOD)*
  - Drought
  - Sudden loss of water
- **Insects are indicators**
  - Typically attacking diseased/declining tree
  - Build up from infested wood
  - ***GSOB***: indigenous exotic




SEKI
FIRE

Oak Galls

Field Guide to plant galls of CA and western states

Photo courtesy Waspweb.org

Scale insects

ABIOTICS


Severe Drought, Sequoia National Forest

Clues To Look For:

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Thank you