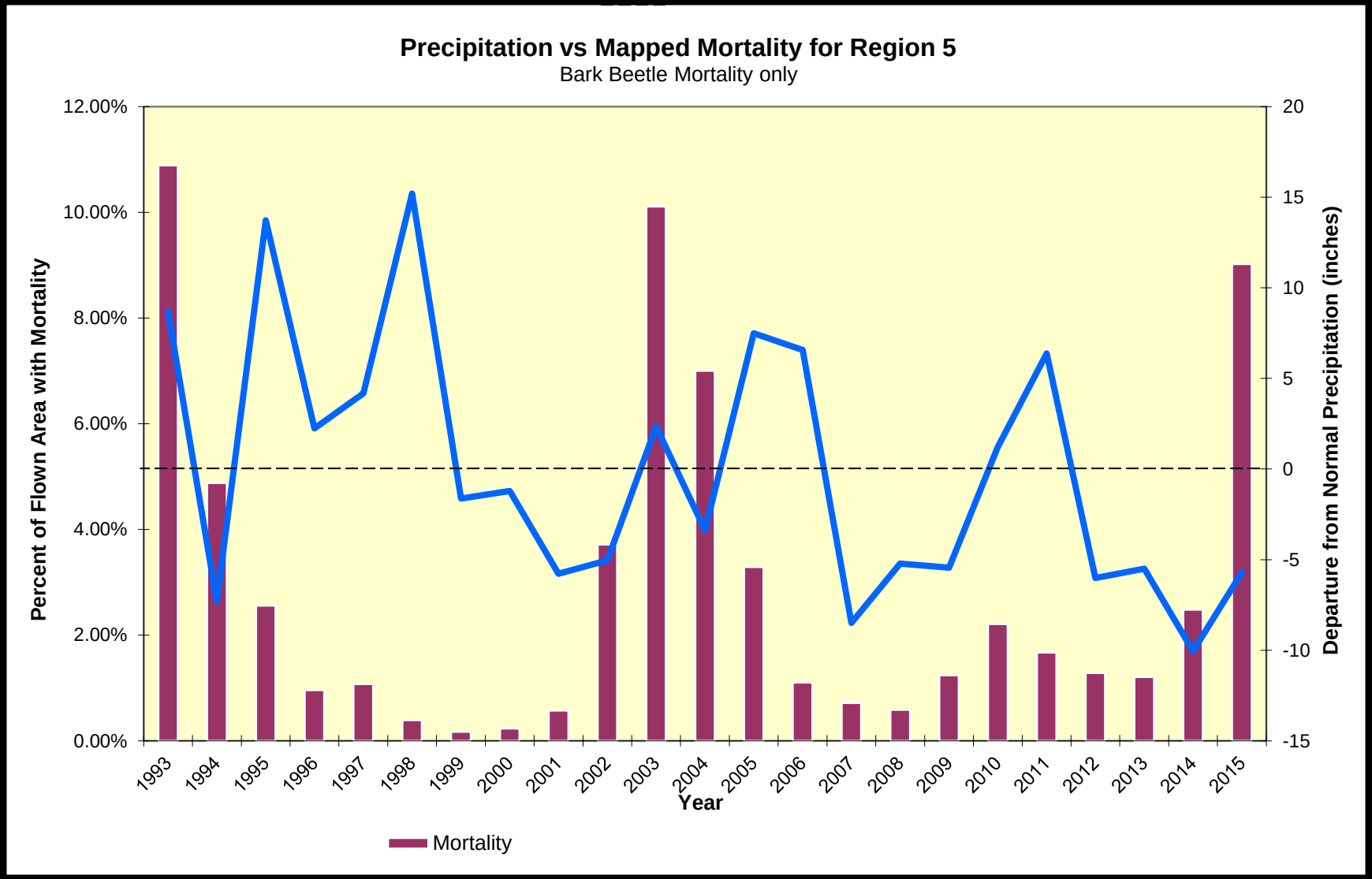
BARK BEETLES
MG TRAINING, JUNE 2017

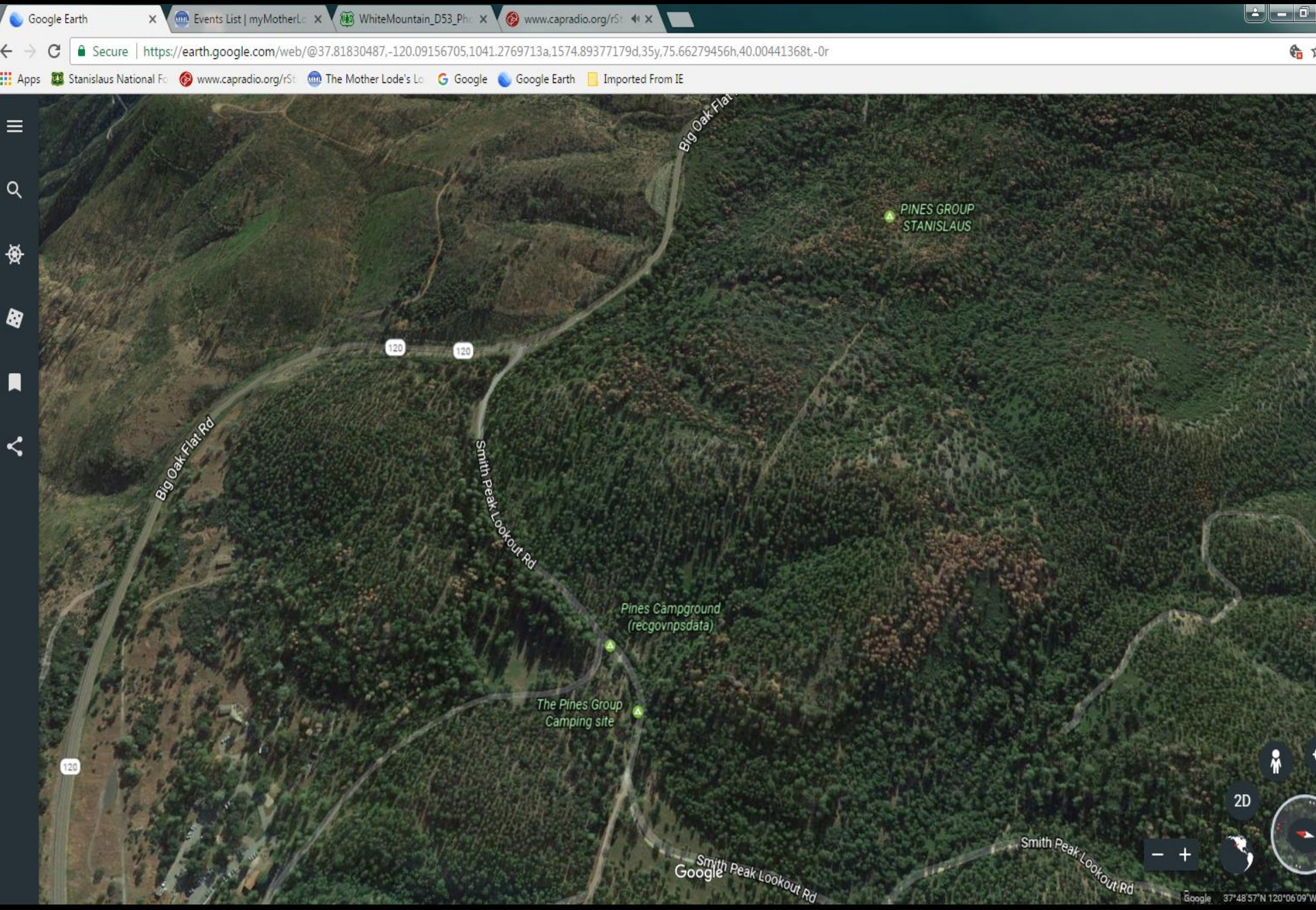
Beverly M. Bulaon
USDA Forest Service
South Sierra Shared Service Area
Forest Health Protection

Bark Beetles

- Order Coleoptera:
  - Family Curculionidae
  - Subfamily Scolytinae
    - *Bark & Ambrosia beetles*

- Attack conifers
  - Primary mortality agent
  - *Triggered by factors*


Precipitation vs Mapped Mortality for Region 5
Bark Beetle Mortality only
Percent of Flown Area with Mortality
Departure from Normal Precipitation (inches)
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
20
15
10
5
0
-5
-10
-15
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year
Mortality


Google Earth
Events List | myMotherLo
WhiteMountain_D53_Pho
www.capradio.org/rSt
Secure
https://earth.google.com/web/@37.81830487,-120.09156705,1041.2769713a,1574.89377179d,35y,75.66279456h,40.00441368t,-0r
Apps
Stanislaus National Fo
www.capradio.org/rSt
The Mother Lode's Lo
Google
Google Earth
Imported From IE
Big Oak Flat
PINES GROUP
STANISLAUS
120
120
Big Oak Flat Rd
Smith Peak Lookout Rd
Pines Campground
(recgovnpsdata)
The Pines Group
Camping site
120
Smith Peak Lookout Rd
Google
Smith Peak Lookout Rd
2D
Google
37°48'57"N 120°06'09"W

Pine Engravers
Woodborers

Western Pine Beetle;
Mountain Pine Beetle;
Jeffrey Pine Beetle

< 6 inches/horizontal:

- Pine engravers

Woodborers

Red Turpentine
Woodborers

Dying / Dead trees

- Pine engravers
- Woodborers
- Ambrosia Beetles
- Pouch Fungus
- Ants
- Termites
- Decomposing fungi

Bark Beetles

Bark beetles are *opportunistic*, attacking trees weakened by other agents or factors:

Bark Beetles

- Western Pine Beetle

- Mountain Pine Beetle

- Fir Engraver

- Pine Engravers

Western Pine Beetle: *Ponderosa Pines*

- Outbreaks develop during droughts
- Seek weak, stressed trees
- Attack groups
- Stand to landscape mgmt.

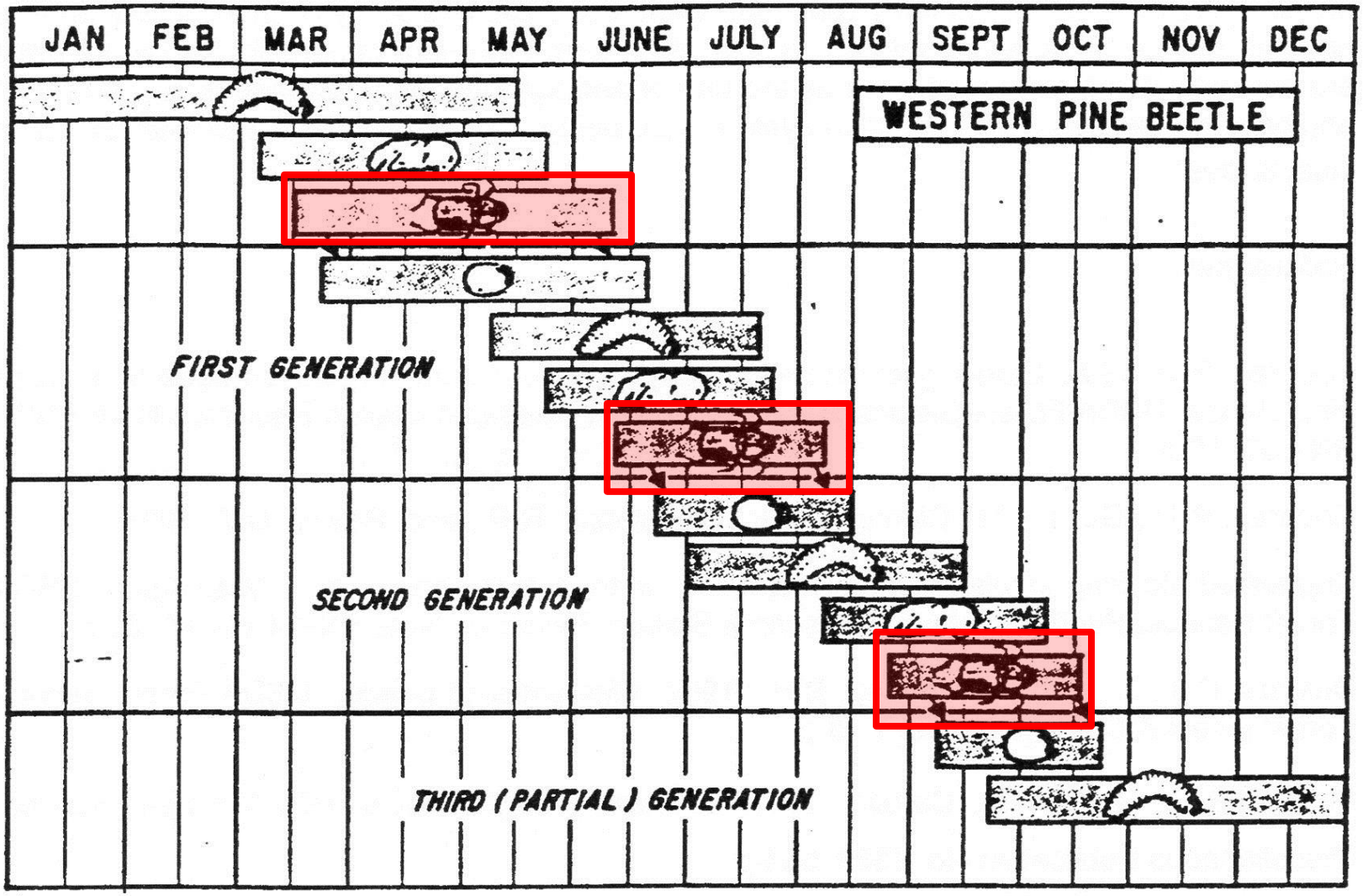


Figure 10. Life cycle of western pine beetle

Fir Engraver

- Attacks true firs only
- Associated with other damage agents
- Typically associated with prior injury or infection (pre-disposed)
- Mortality often follows drought events in CA
- Mortality scattered or grouped

< 4 inches:
Scolytus praeceps
Scolytus subscaber

Woodborers
Ambrosia Beetles

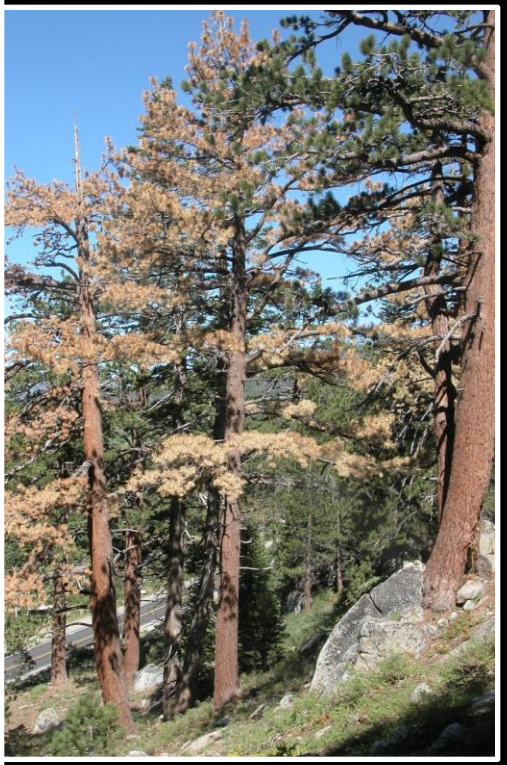
Root Disease!!!

Fir Engraver

Aggregation/Anti-aggregation pheromones

- Recruit "**mass-attack**"
- Repellants/switching – group mortality

Symptoms: Detectable host reaction in response to the agent

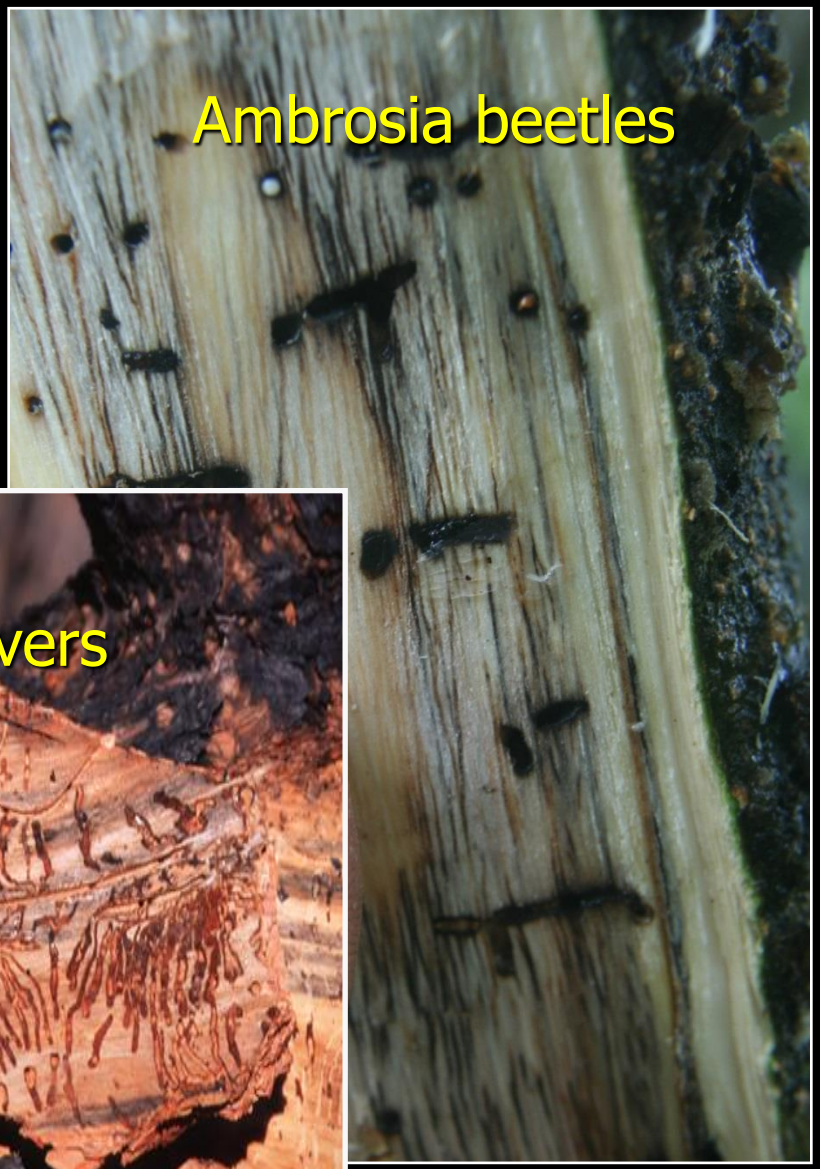


Indicators of Attack

- **Boring dust**
  - Mix of bark/wood shavings and frass (excrement)

- **Pitch tubes**
  - Resin accumulation at point of attack

Indicators of Attack - Galleries



Woodpeckers: indicator of beetles

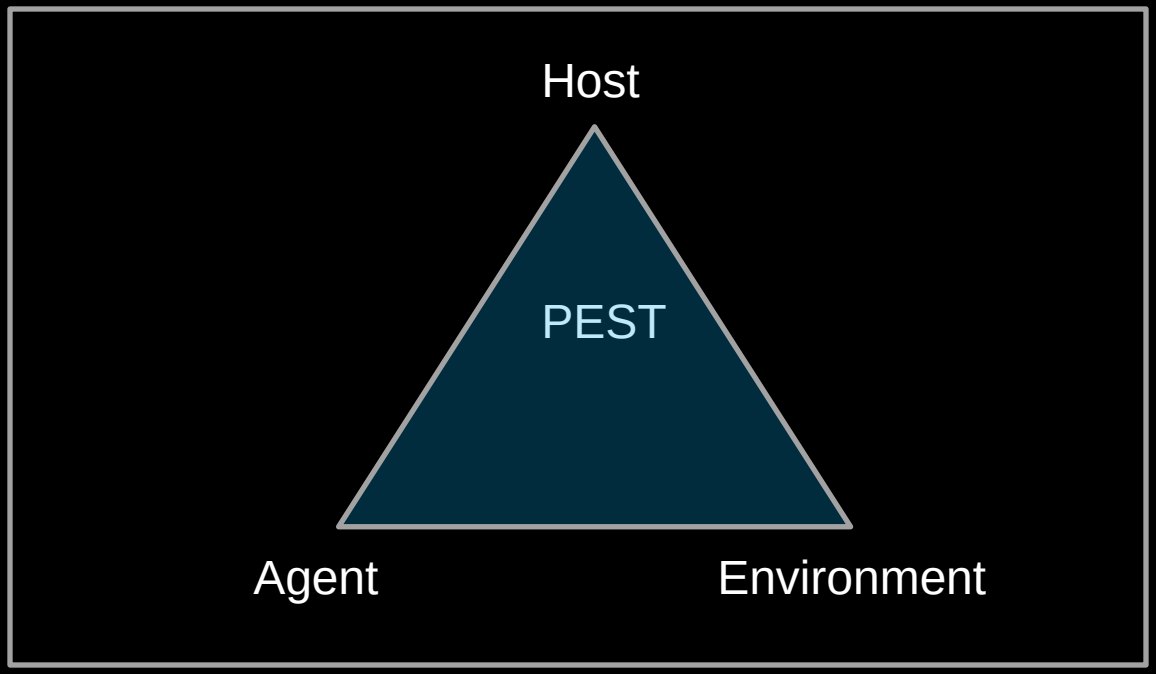
Wood borers

Bark beetles

Integrated Pest Management

Pest Definition:

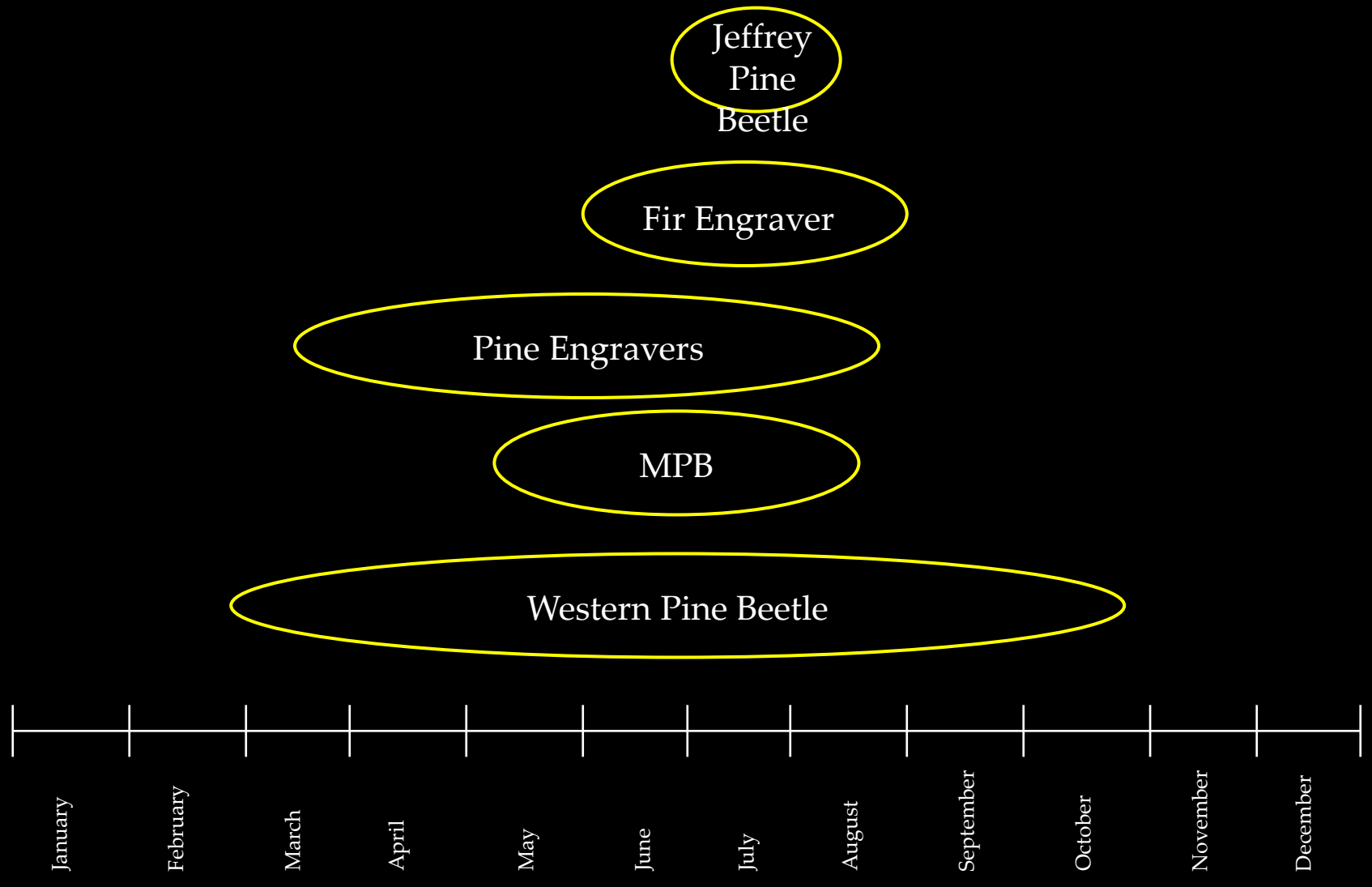
"something by which its presence, abundance or activity *interferes* with management goals and objectives"

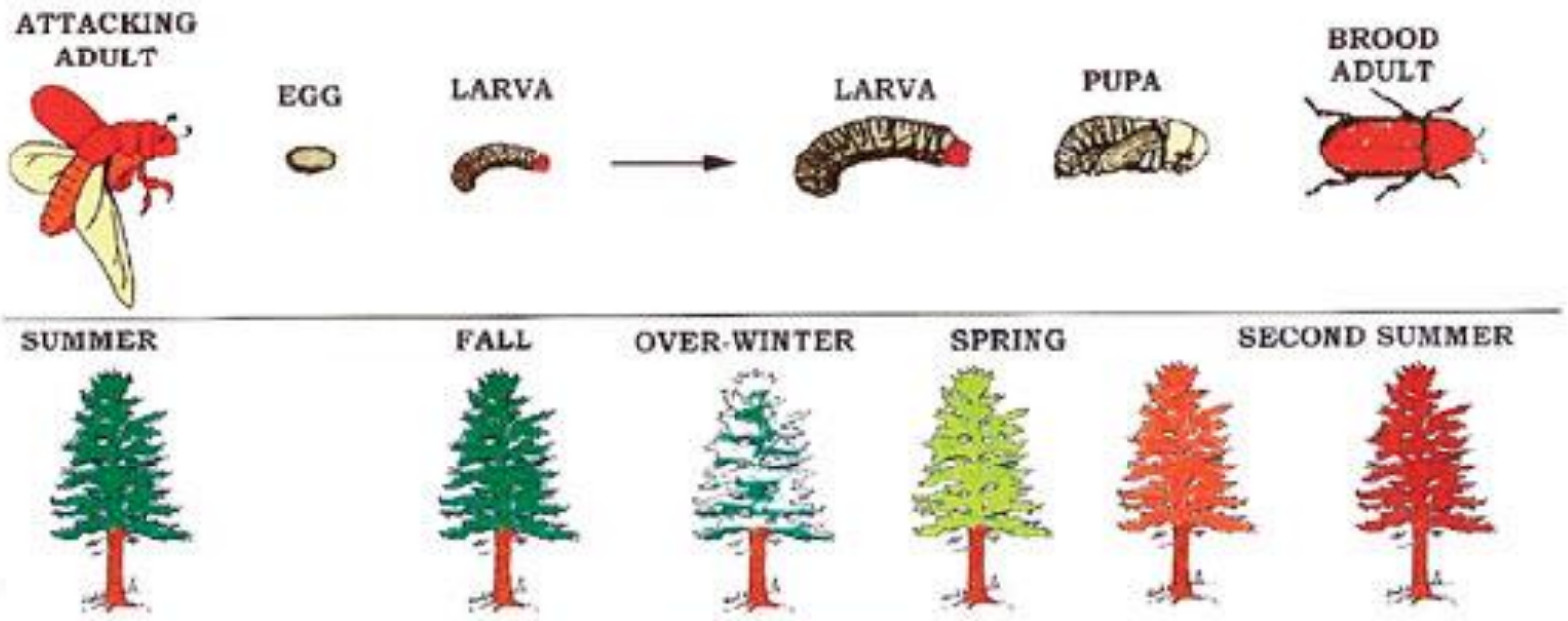


The only component of the **pest complex triangle** we can successfully manipulate at the landscape level is the host vegetation

Adult Flight Periods*

highly dependent on elevation & latitude





MOUNTAIN PINE BEETLE LIFE CYCLE

General Bark Beetle Management = Basic Practices

- *Best trees for site*
- *Diversity*
  - *Species*
  - *Structure*
  - *Age class*

General Bark Beetle Management = Basic Practices

- Promote ***healthy*** trees
  - Plant *proper tree species*
  - *Minimize damage* to trees
  - Ensure *growing space*
  - Watering/irrigation can help

General Bark Beetle Management

- *Direct suppression*
  - Felling and removal of infested trees *before* beetle emergence and flight
  - Consult forest specialist
  - Not for WPB

Photo courtesy: David Moorhead, Univ of Georgia

General Bark Beetle Management
Tree Level: *Prevention*

- **Preventative pesticide**
  - ***Expensive*** – used for **high-value** trees likely to be exposed to high bark beetle populations
  - *Highly effective*: 2 year efficacy post-treatment
    - Listed for forest-use only

Toxic to non-target organisms

General Bark Beetle Management
Tree Level: *Prevention*

- ***Carbaryl*-based**
  - Topical application
  - *2 seasons* of protection
  - Proper timing and application are *very important!!*
  - Require QAC applicator

General Bark Beetle Management
Tree Level: *Prevention*

- ***Pyrethroid-***based
  - Topical application
  - *1 season* of protection
  - Proper timing and application are *very important!!*
  - Require QAC applicator

General Bark Beetle Management
Tree Level: *Ponderosa Pine only*

- ***Tree-injection*** pesticide
- Requires QAC applicator
  - AI: Emamectin benzoate
  - Proper timing and application are *very important!!*

General Bark Beetle Management
Tree Level: *Prevention only*

- **Pheromone manipulation**
  - *BeetleBlock ™ --* ***NOT REGISTERED***
  - *Still in research*

Incense Cedar

- No (*Primary*) Bark beetles
- Drought stress

Incense Cedar scale

(Xylococcus macrocarpa)

- Cause of sooty mold on IC
- Forage for wintering birds
- Indicator of stagnant microclimate/density

No Action

- ***Dependent upon management objective***
  - Public Safety and protection
  - Wildlife habitat
  - Fuel loading
  - Change in Composition

Green slash: *proper disposal*

- Prevention of engraver beetles
- *Keep green slash **away** from residual/host trees*
- Hasten drying
- *Wrap tightly in **CLEAR** plastic*

What about Oaks?

- **Disease is common cause of decline**
  - *Armillaria sp.*
  - *Sudden Oak Death*
  - Drought
    - **Especially Blue Oaks**
- **Insects are not primary killers**
  - Typically attacking diseased/declining tree

Foamy Bark Canker + Western Oak Bark Beetle

Shannon Lynch[1], Suzanne Rooney-Latham[2], and Akif Eskalen[1]
1-Department of Plant Pathology and Microbiology, University of California, Riverside ; 2-CDFA

BACKGROUND

Declining oak species have been found in urban landscapes and open spaces throughout the coast range of California. A new, yet undescribed fungal species, Geosmithia sp. #41 (Kolarik in press), was recovered from symptomatic plant tissues in association with the western oak bark beetle (WOBB) *Pseudopityophthorus pubipennis* (Coleoptera: Curculionidae: Scolytinae). WOBB appears to attack trees weakened by drought, disease, injuries, or other factors that may stress the tree.

Pathogenicity tests confirmed Geosmithia sp. causing disease on coast live oak.

Fig. 1. Branch die back symptoms of foamy bark canker disease.

THE BEETLE

Western oak bark beetle is a small beetle that burrows through the bark, excavating shallow tunnels between the bark and cambium across the grain of the wood. Female beetles lay their eggs in the tunnels; the developing larvae tunnel at right angels to these, but mostly within the phloem (inner bark) close to the

SIGNS+SYMPTOMS

Symptoms occurring on the trunk and primary branches include wet discoloration seeping through WOBB entry holes.

Fig. 3. Symptoms of foamy bark canker.

Removal of the outer bark reveals phloem necrosis surrounding the entry hole.

Fig. 4. Beetle galleries between the bark and cambium.

Fig. 5. Cinnamon colored gum, followed by a creamy, foamy sap.

At the initial phase of attack, a reddish sap

THANK YOU

STEPS OF DIAGNOSIS

Clues May Be Found At Several Levels Of Observation

Observe the surrounding stand, the group of adjacent trees and the individual tree with the problem.

Gather as many clues as possible

Be aware of associations between 2 or more damaging agents. What appears to be obvious, may actually be secondary to the "real" problem.

Clues To Look For:

1. Symptoms and Signs

2. Damage Patterns

3. Damage Pattern Development

4. Past History

Steps of Diagnosis

- Notice damage to all trees
- Look at symptoms and damage patterns in all trees
- Look for signs and more detailed symptoms on affected and adjacent trees
- Use past history, knowledge, records, etc. to determine outside causes for damage
- Be aware of common pest associations