Bark Beetles and Wood Borers: Pests of Stressed-out Conifers

Karen Ripley
Washington Department of Natural Resources
karen.ripley@dnr.wa.gov
Forest Entomology and Pathology

Organisms or events that:

- Kill trees
- Slow tree growth
- Damage wood products

*Ips* bark beetle

Weevil killed spruce top

Ambrosia beetle damage
Forest Health

Greater attention to:

- Forest ecosystem processes
- Forests resilient and resistant to pests
- Landowner objectives

Fir engraver beetle (*Scolytus ventralis*) gallery in grand fir
Disease or Damage

Host

Pathogen

Environment
Phloem = inner bark

- nutritious,
- well defended,
- ephemeral

Outer bark (periderm)

Inner bark (phloem)

Wood (xylem)
sapwood & heartwood
Sources of FRESH phloem

- Windthrow
- Freshly cut trees
- Weak or dying trees
Sources of FRESH phloem

- Windthrow
- Freshly cut trees
- Weak or dying trees
- Healthy trees
Bark beetle adults

- Hard-bodied, cylindrical beetles
- Brown to black
- 1-9 mm in length
- Elbowed, clubbed antennae
Bark beetle life cycle
Bark Beetles

Feed on phloem, so …

• Are generally tree host and size specific

• Have evolved effective means of locating and quickly mass-attacking susceptible trees
Bark Beetles

Generally focus their initial attack on weak or injured trees.
Bark Beetles

Occupation, girdling, death of target area (branch, top, trunk) occurs rapidly
Bark Beetles

Can then switch a coordinated attack to nearby vigorous trees
Bark Beetles

Crowded forests are excellent habitat for bark beetles!
Early Symptom:
Reddish “Frass” = Boring dust and feces
Early Symptom: pitch streams
Early Symptom: pitch tubes
Mid-term Symptom: Fading foliage
Mid-term Symptom: Bird activity
Late Symptom: Red foliage, needle drop
Late Symptom: pouch fungus, decay
Pesticides

• Preventative – .... yes (ish)

• Suppression – NO!
Registered Products include:

• (carbaryl)
• (permethrin)
• (bifenthrin)

Note: Pesticide registrations change. Must check with state Dept of Agriculture for current registrations. Must follow label.

AVOID:
• Diesel
• Lindane

CAUTION:
• Injectable products
Pheromones

• Attractants

• Anti-aggregant “MCH” is available for Douglas-fir and spruce beetles

• Pine beetle anti-aggregant “Verbenone” is uncertain.
Douglas-fir Beetle Management

MCH can temporarily protect especially valuable trees

3-methylcyclohex-2-en-1-one
Ambrosia Beetles

White frass
Black stained tunnels
Wood Borers

Buprestid Beetles
“Metallic wood borers”

Cerambycid Beetles
“Long-horned wood borers”
Host

Disease or Damage

Environment

Exotic Pathogen
Exotic Wood Boring Beetles

citrus long-horned beetle

emerald ash borer

Asian long-horned beetle
Citrus Long-horned Beetle

Asian Longhorn Beetle

Male

Female
Banded Alder Borer

Pine Sawyer Beetles
Pitch moths

- **Hosts:** Pine, spruce, Douglas-fir
- **Golf-ball-size pitch globs**
- **Impact:**
  - Slows the closure of wounds
  - Can contribute to a line of weakness
Pitch moths
Beetle and Borer Prevention

- Maintain general tree vigor
- Don’t injure stems or roots
- Avoid dramatic changes in water supply
Tree Protection:

- Supplemental (deep) watering
- Preventive application of surface insecticide before beetles attack (?)

Images: Soaker hose; “vertical mulching” allows deep water penetration
Forest Management:

- Maintain general tree vigor by thinning the stand “from below”
- Maintain mosaic of stands on landscape
- Slash management
- Pheromone trapping, ‘attract and kill’ systems, or repellants
Weather consequences

Drought and heat injury increase attractiveness and reduce pitch
Weather consequences
Storm damage increases host material
“Secondary” pests could become more aggressive: (Wood borers)

Example: The black locust borer infests and re-infests what seem to be otherwise healthy trees until they break. Other borers could develop this trait too.
“Secondary” pests could become more aggressive: (Wood borers)

Example: Bronze birch borer
“Secondary” pests could become more aggressive

Native ambrosia beetles only infest dead trees or dead parts of trees. There are exotic ambrosia beetles that successfully infest live trees. Several cause the white frass that comes out to be stuck together into these dust sticks. What if our ambrosia beetles started to carry their fungi into live trees? Would it kill them?
Mountain Pine Beetle

Climate barrier (cold winters, short growing seasons) fell, exposing naïve hosts
Western Pine Beetle

One generation per year or 2 generations per year?
Pine Bark Beetles

Synchrony of development remains critical
Conclusions:

• Vigorous trees are GOOD
• PREVENT bark beetle activity
• Be ready for the unexpected