

# Annosus Root Disease and SPORAX®

**Bill Woodruff**  
USDA Forest Service  
State and Private Forestry  
Forest Health Protection  
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# Annosus Root Disease

caused by the fungus:

*Heterobasidion annosum*



# Annosus Root Disease

p-type: pines, incense cedar,  
juniper

s-type: true firs, Douglas-fir, spruce,  
giant sequoia, hemlock,  
western redcedar

# P-type Annosus on Pine

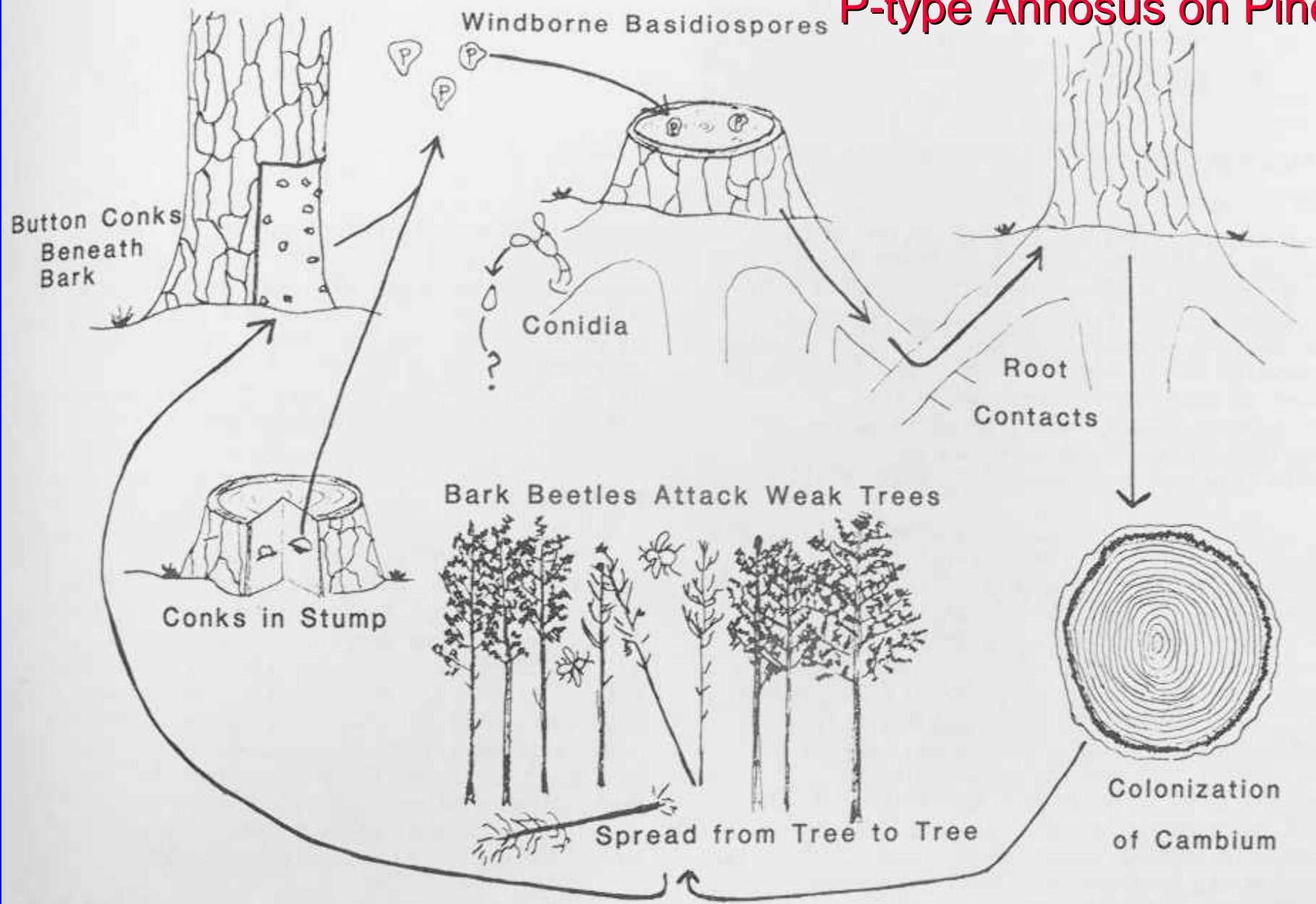


Figure 1--Infection cycle of *Heterobasidion annosum* in *Pinus*.

# S-type Annosus on True Fir

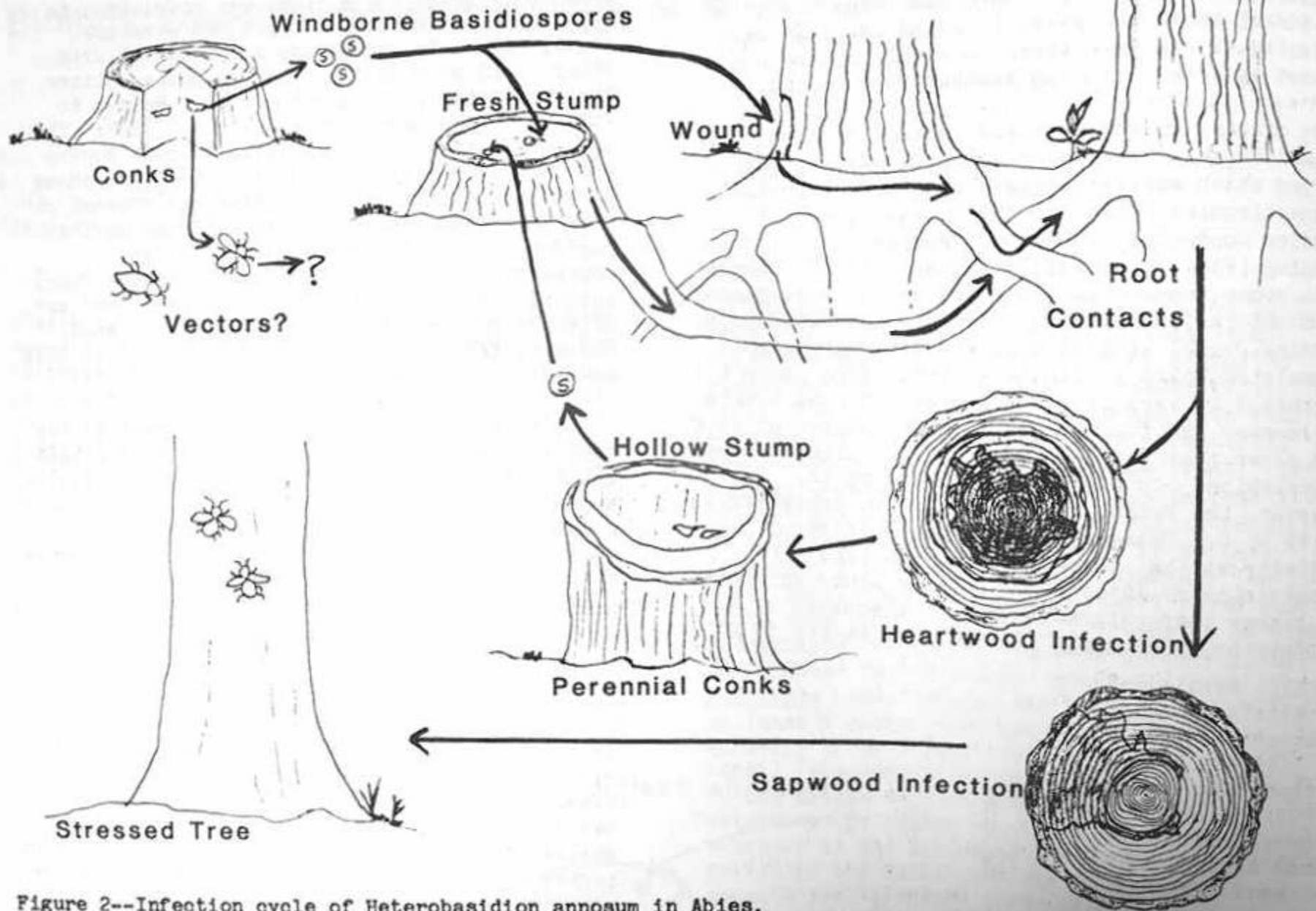


Figure 2--Infection cycle of *Heterobasidion annosum* in *Abies*.

# **Annosus Root Disease**

- **Affects all western conifers**
- **Hardwoods are generally resistant**
- **Incidence is high on Jeffrey pine in southern California and on Jeffrey and ponderosa pine in the eastside pine forests**
- **Endemic in many red and white fir forests; associated with at least 20% of the true fir mortality in northern California**



# Potential Impacts

- **Increased susceptibility to attack by bark beetles**
- **Tree mortality (especially pine)**
- **Loss of site productivity**
- **Depletion of vegetative cover**
- **Increased probability of tree failure**

# Treatment Standards



## R5 FSM 2303

- “In and around developed recreation sites, treat all freshly cut coniferous tree stumps to prevent introduction and spread of Fomes annosus”

## R5 FSH 3409.11

- **Eastside pine and mixed conifer**
  - Chainsaw – treat all  $>14$ ” diameter
  - Mechanical – treat all  $> 8$ ” diameter
- **Everywhere else**
  - Decided by line officer
  - Use FHP pathologist recommendation

# Recent Studies

- **Kliejunas and Woodruff (2004)**

- Eastside Pine and Eastside Mixed Conifer Types
- Treated stump diameter can be raised to 14”
- Could be used also on Westside and North Coast

- **Kliejunas, Allison, and Otrosina (2006)**

- Recreation and other high value areas or general forest
- Older dead conifers (no needles)
- Low risk of infection
- Does not apply to recently dead or fire killed

- **Kliejunas, Woodruff, and Otrosina (2006)**

- Unpublished study – needs to be redone
- General forest
- Fire-killed PP/JP dead for 1 year
- Low risk of infection

# Sporax<sup>®</sup>

- Sodium Tetraborate Decahydrate  
( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ )
- Only registered product for this purpose; a product of Wilbur-Ellis Company
- 25 pound bags
- Apply to freshly cut stump surface ASAP
- Apply salt-shaker style
  - 1 lb/50 square feet stump surface











# CFPC June 28, 2006 I&D Field Mtg



# Garey Slaughter's Thoughts

The typical annosus (Ha) gap in eastside pine (and there are a few exceptions to this average gap, particularly in Yosemite Valley) will have some small pine mortality around the original infected stump, then tend to stabilize over about 25-30 years and not show any more mortality, and reach about 2500 to 3000 sq. feet. Will rarely attain an area above 0.1 acre.

Sometimes the gap will enlarge beyond the root zone of the originating stump, but not often, and not very far. True fir Ha gaps are approximately comparable in size and behave similarly.

If one is managing for timber production, these small gaps may not be a high priority problem for land managers.....unless a stand has many small Ha gaps, or unless several small gaps start aggregating into larger composite gaps. If many gaps are present, the stand may start losing a lot of crop trees, and loss of production may become an issue. On the other hand, if one is managing for wildlife habitat, the broken up stand with many gaps among trees may actually be beneficial for habitat production.

If the manager is concerned about limiting the number of gaps in a stand, then boraxing fresh cut stumps may be a very important choice. Boraxing stumps will not limit existing gaps from enlarging (root-to-root spread), but should limit the number of new gaps which would otherwise be initiated.



# Matteo Garbelotto's Thoughts

- Airborne Annosus spores are almost everywhere
- Amount and type of inoculum varies with season and site
- S-type on the west side of the Sierras
- S- and P-type on the east side
  - P-type on the Modoc NF, eastside Plumas NF, Eldorado NF, Inyo NF, Yosemite Valley, San Bernardino and Laguna Mtns, and the northern portion of the coast range
- East side: inoculum higher in the early winter
  - Than in the late spring and summer
  - Summer heat at lower elevations lowers risk of infection
- P-type infects some hardwoods, not true fir or sequoia
- S-type can sometimes infect pine

# June 14, 2005 Annosus Field Mtg

Lassen NF - 11 Pathologists + 1 Entomologist from 6 Western States

- 1970's CA Survey: Annosus found in 20% of trees in 50% of stands
- Annosus less prevalent with old logging practices (clearcuts)
- Current logging practices seem to promote annosus (frequent entries)
- *Annosum* and *Armillaria* often found working together
- Annosus more likely to colonize wounds than stumps in true fir
- Sporax<sup>®</sup> stump treatment for true fir is on a case by case basis
- Some success in using buffer strips and stumping as control (Costly)
- Good success removing trees and grinding stumps (Sporax<sup>®</sup>) in Yosemite
- Treat stumps of true fir with healthy crowns and those with poor crowns
  - (assumes annosus infected fir have poor crowns)
- Overstocked forests may have more annosus than those w/ lower stocking
- Treating stumps with soil and duff unpredictable and not as good as borax
- Treating stumps resulting after wildfire may not be needed if over yr. later
  - Still a good idea to treat the very large stumps

# John Pronos's Annosus History

- **First CA report from Monterey on Monterey pine, 1909, Meinecke**
- **Search for management options began in the 1960s**
- **Eastside pine recognized as the most impacted timber type**
- **Infection in westside stands uncommon, except for Yosemite Valley**
- **Southern CA National Forests also high infection rates in rec. sites**
- **Most information about frequency of infection from eastside**
- **Early studies did not recognize existence of “P” and “S” types of annosus**
- **Tested nitrogen compounds on stump tops, like urea, ammate, and borax**
- **Borax proved to be the most effective**
- **1976 – Began R-5 policy to treat all conifer stumps in developed rec. sites**
- **B/C analysis developed to help decide when to use borax**
- **1978 - Because of high incidence of root disease, Lassen and Modoc Forests began treating all pine stumps**
- **Current FHP recommendation is to treat pine stumps 14” diam. and greater**
- **True fir usually not treated in timber stands because of low timber value**
- **“S” type on true fir a concern in recreation sites.**
- **“P” type tends to kill pines fairly rapidly as it grows in the cambium**
- **Stump top infection primary means of initiation with “P” type**
- **“S” type in true fir acts primarily as a root and butt rot – windthrow**
- **“S” type can enter trees through stump tops plus other wounds**
- **Smaller true fir can be killed by annosus**

# Where to get More Information

- FSH 3409.11, Chapter 62, Diseases
- National Human and Ecological Health Risk Assessment
- Sporax<sup>®</sup> Label
  - Personal Protective Equipment
    - (Goggles or face shield, long-sleeved shirt, long pants, & waterproof gloves)
  - Environmental Hazards
  - Directions for Use
- Material Safety Data Sheet (MSDS)
  - Precautions and hazards



**THE END**