

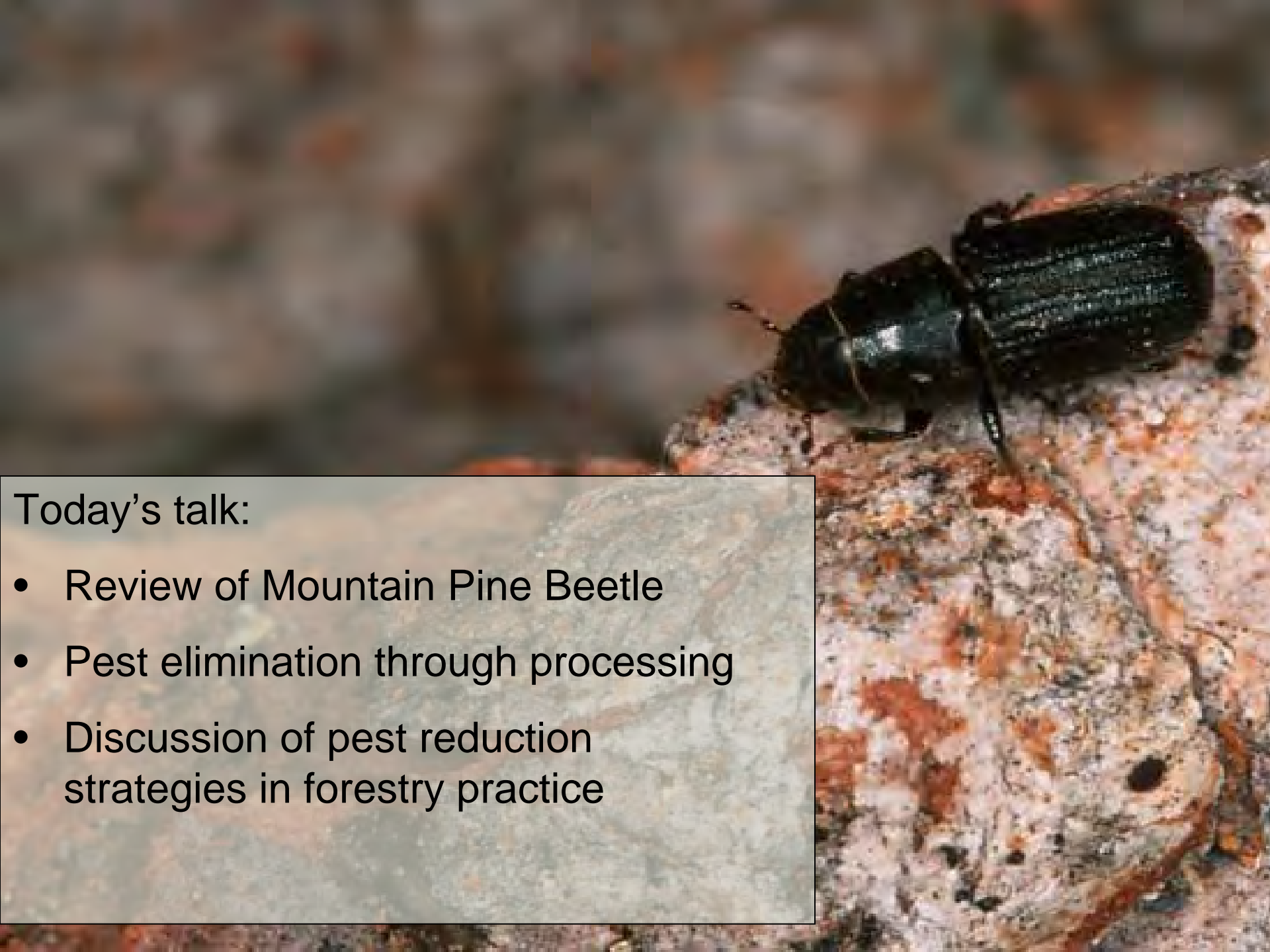


Mountain Pine Beetle

Pest-free wood products from a devastated forest

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Natural Resources Canada
Canadian Forest Service

CPM-06
Rome, Italy
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Today's talk:

- Review of Mountain Pine Beetle
- Pest elimination through processing
- Discussion of pest reduction strategies in forestry practice





Damage to the Forest

16 million ha

675 million cubic meters

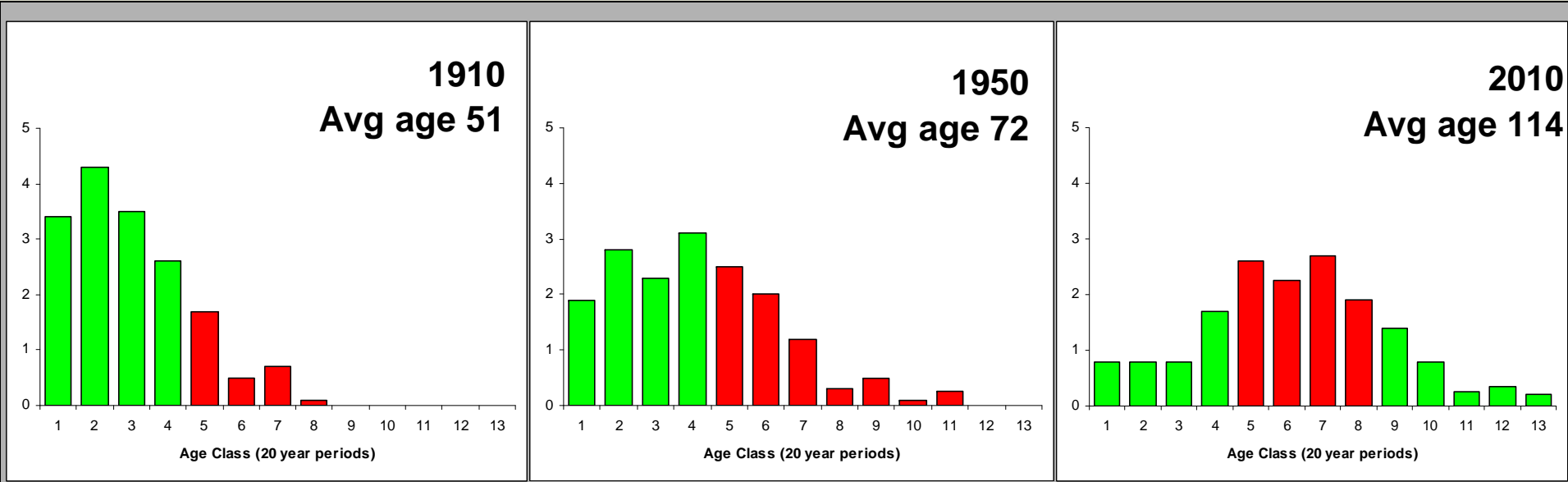


Requirements for an outbreak

- Abundance of susceptible host
- Sustained favourable climate for beetle survival



With forest management and fire suppression tree population increased in susceptibility to MPB

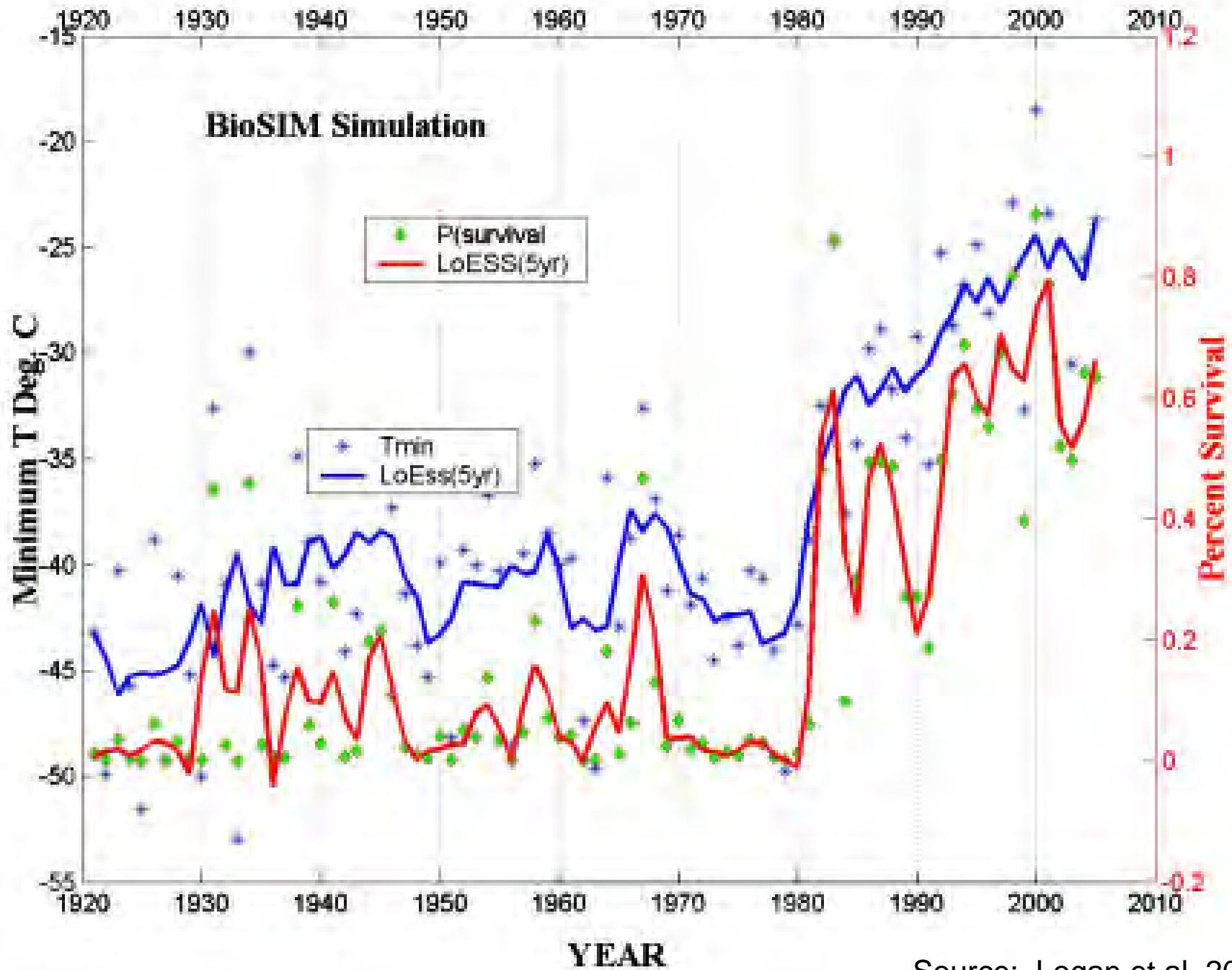


17%

35%

56%

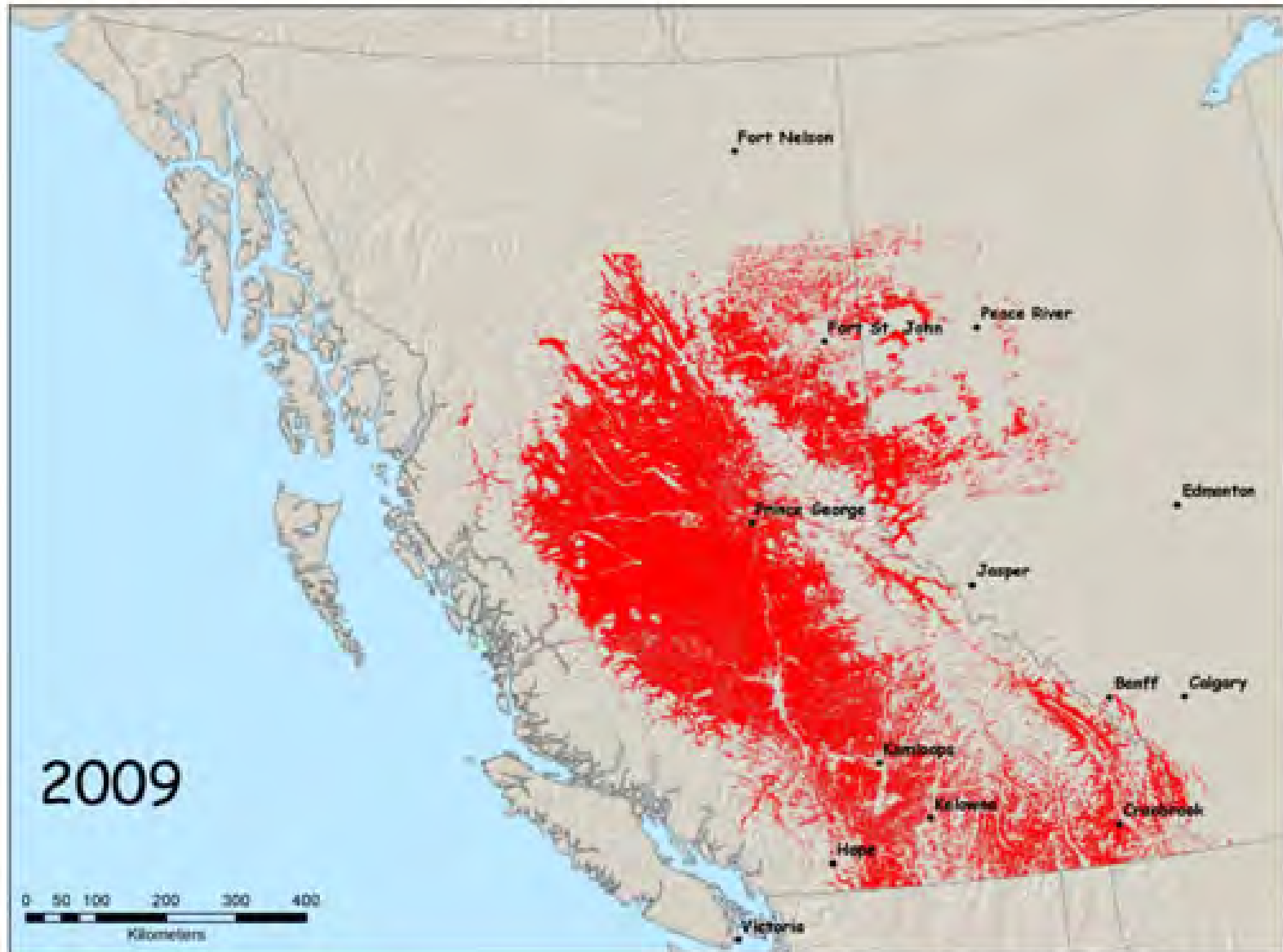
Percent of tree population in susceptible age classes



Source: Logan et al. 2010



Extent of Mountain Pine Beetle Spread in Canada







Dendroctonus “Tree Killer”

Basic facts:

- 19 species worldwide
 - 17 in North America
 - 2 Eurasia (*D. armandi*, *D. micans*)
- Restricted to conifer hosts (*Pinus*, *Picea*, *Pseudotsuga*, *Larix*)
- Several species have successfully established in new locations (e.g. *D. valens*, *D. micans*)



Mountain Pine Beetle

- *Dendroctonus ponderosae*
- restricted to *Pinus* hosts
- Periodic outbreaks in natural forests dating back 1000s of years





Mountain Pine Beetle

- Native to western North America
- bark beetle – lives and feeds exclusively in bark and outer phloem

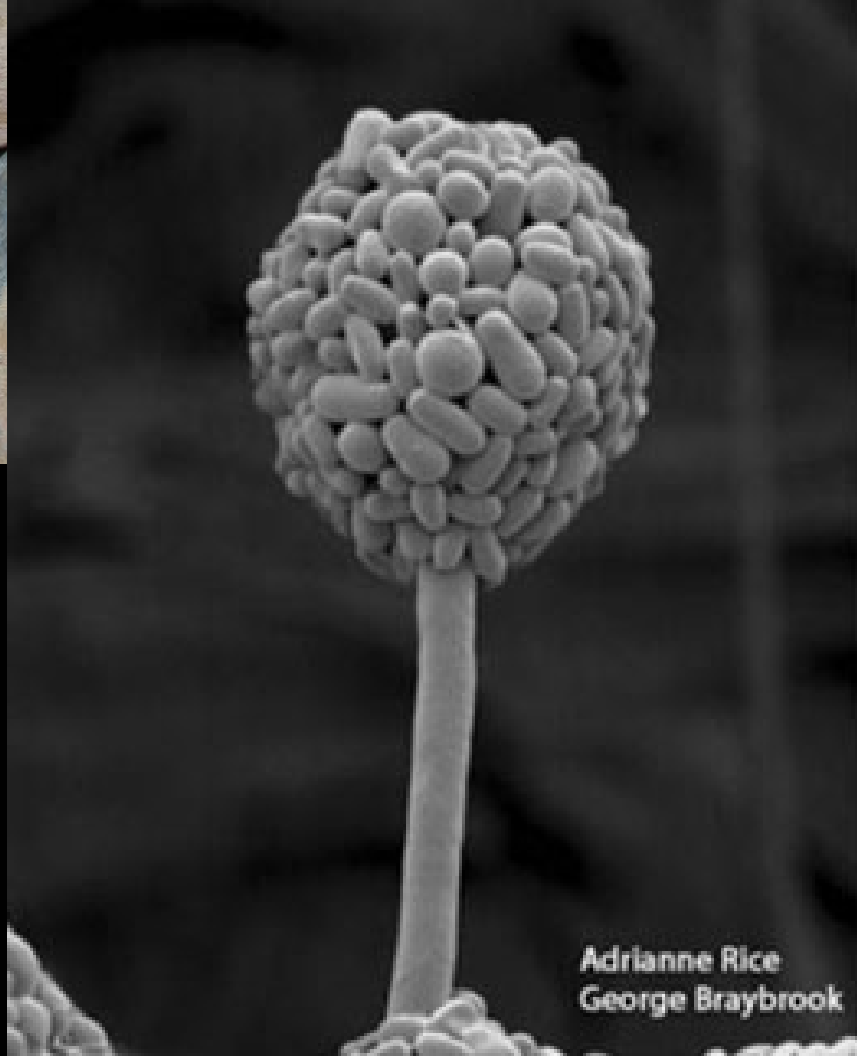




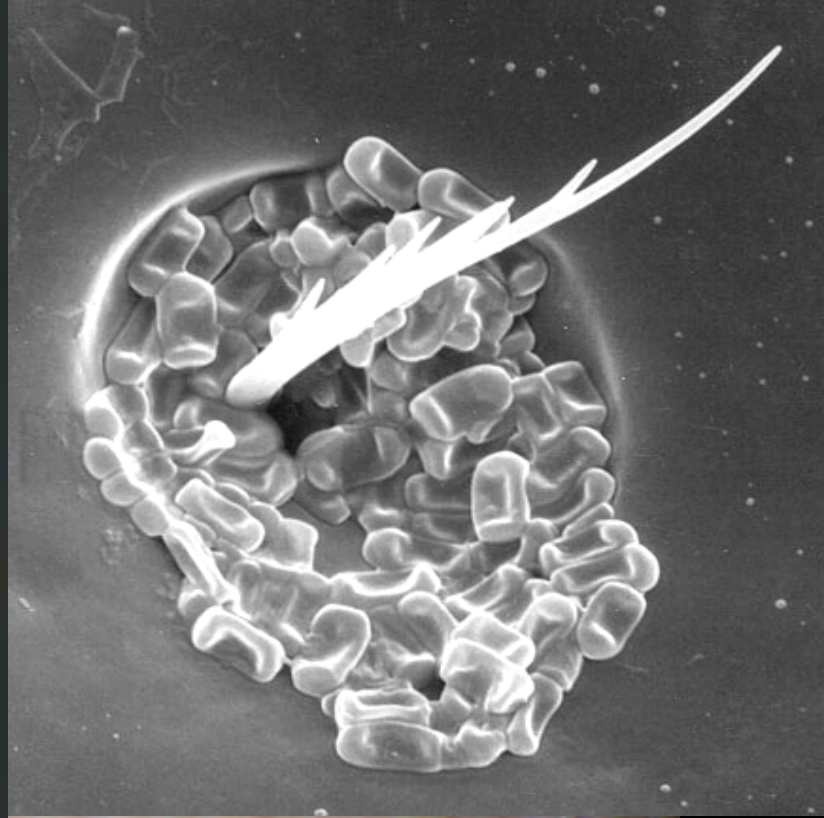
UGA1468341



Ophiostoma clavigera
“blue stain fungus”



Adrienne Rice
George Braybrook



mycangium





What other organisms are found in mountain pine beetle killed trees?





Insects in Mountain Pine Beetle-killed Trees

Bark Beetles

Carphoborus sp.
Cryphalus ruficollis
Crypturgus borealis
Dendroctonus ponderosae
Dendroctonus valens
Dryocoetes affaber
Hylurgops porosus
Hylurgops rugipennis rugipennis
Ips latidens
Ips pini
Ips plastographus
Orthotomicus caelatus
Pityogenes plagiatus knechteli
Pityophthorus
Polygraphus rufipennis
Pseudips mexicanus
Trypodendron lineatum
Trypodendron rufitarsus

Long-horned woodborers

Acanthocinus obliquus
Acanthocinus pusillus
Monochamus clamator latus
Monochamus scutellatus oregonensis
Monochamus scutellatus scutellatus
Neoclytus leucozonus leucozonus
Phymatodes dimidiatus
Pogonocherus pencillatus
Pogonocherus propinquus
Pronocera collaris collaris
Rhagium inquisitor inquisitor
Xylotrechus prob. undulatus

Blazed Tree Borers

Serropalpus substriatus

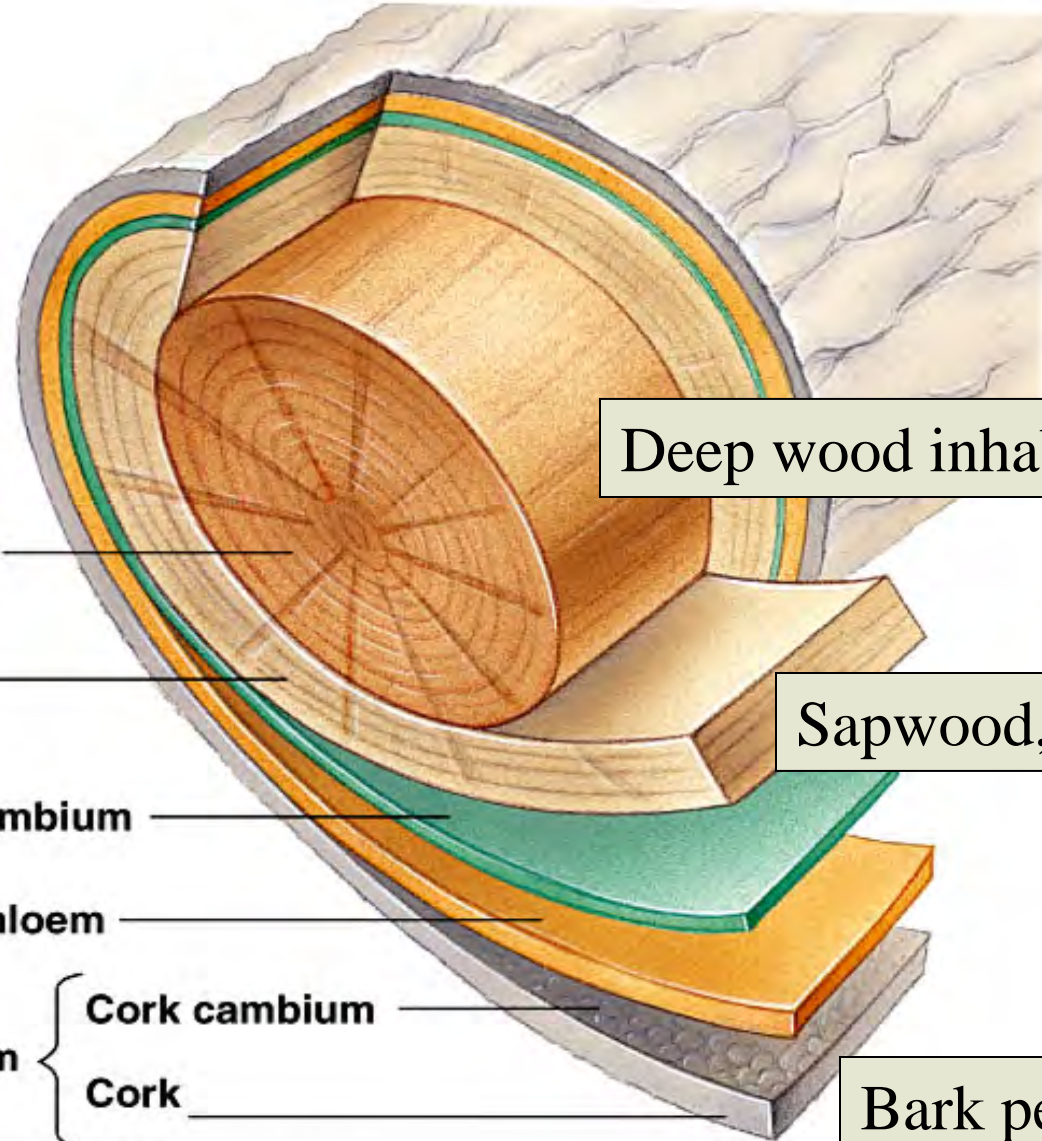
Woodwasps

Sirex cyaneus
Sirex juvencus californicus





Where pests live in wood



Deep wood inhabiting pests

Heartwood

Sapwood

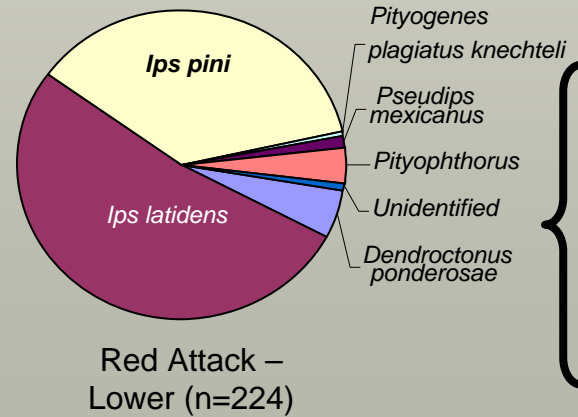
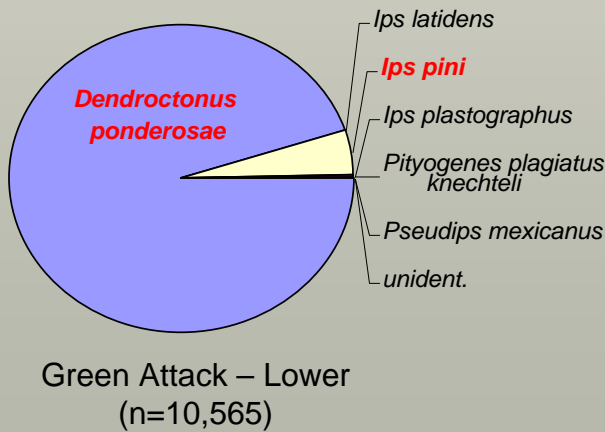
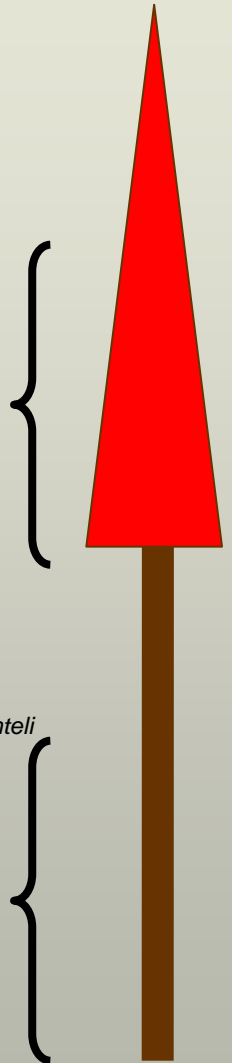
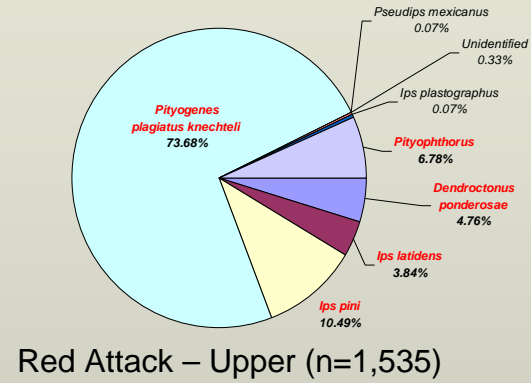
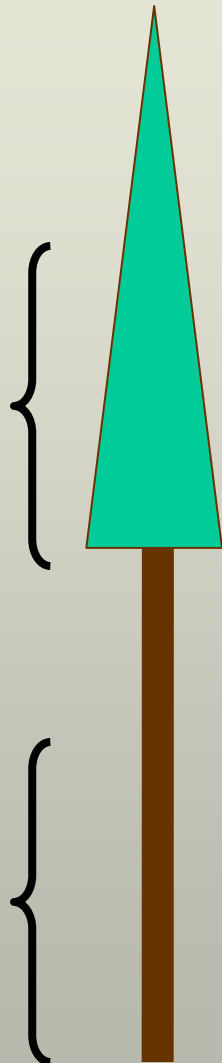
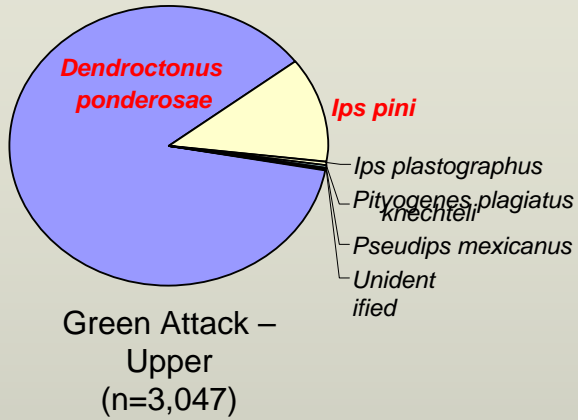
Vascular cambium

Bark { Living phloem
Periderm { Cork cambium
Cork

Sapwood, phloem pests

Bark pests

Insects in Mountain Pine Beetle-killed Trees





Fungi in Mountain Pine Beetle-killed Trees

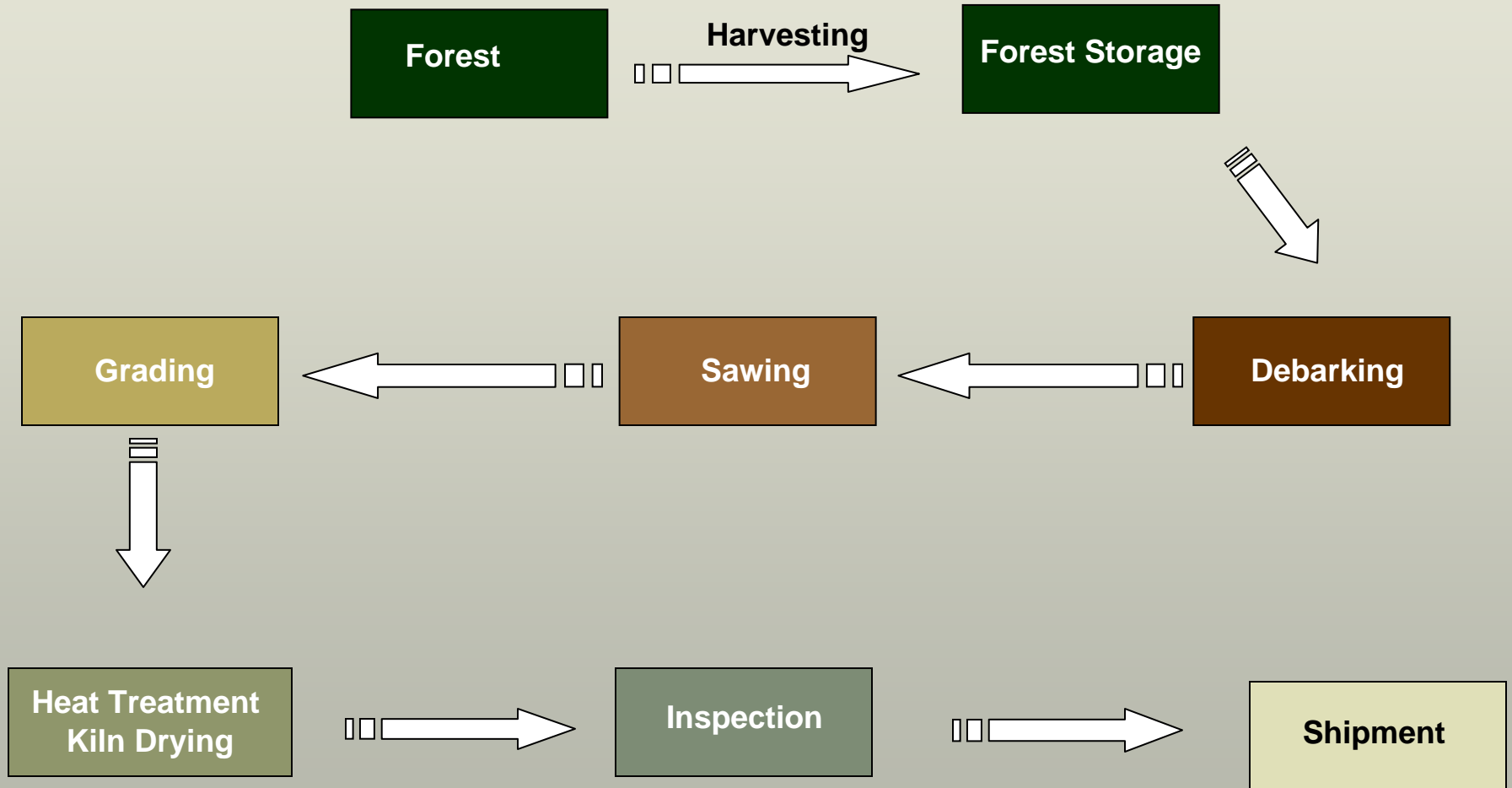
Fungal Species	Green				Red				Grey			
<i>Ambrosiella</i>	■				■	■	■	■	■			
<i>Graphium</i>	■	■			■	■	■	■	■			
<i>Leptographium</i>	■	■			■							
<i>Leptographium terebrantis</i>	■	■							■	■		
<i>Ophiostoma clavigerum</i>	■	■	■	■	■	■	■	■	■			
<i>Ophiostoma minutum</i>	■				■	■	■	■	■	■		
<i>Ophiostoma montium</i>	■	■	■	■	■	■	■	■	■			
<i>Ophiostoma nigrocarpum</i>	■				■	■			■	■		
<i>Amylostereum chailletii</i>									■			
<i>Entomocortium</i>	■				■	■	■	■	■			
<i>Fomitopsis pinicola</i>	■	■			■	■	■	■	■			
<i>Heterobasidion annosum</i>	■	■	■	■	■	■	■	■	■	■	■	■
<i>Peniophora</i>	■				■	■	■	■	■	■	■	■
<i>Sistotrema brinkmanii</i>	■				■	■			■	■		
<i>Trichaptum abietinum</i>									■			







Pest Risk Reduction – wood processing





Harvest operations





Log inspection (scaling)



Bark removal



Sawing wood



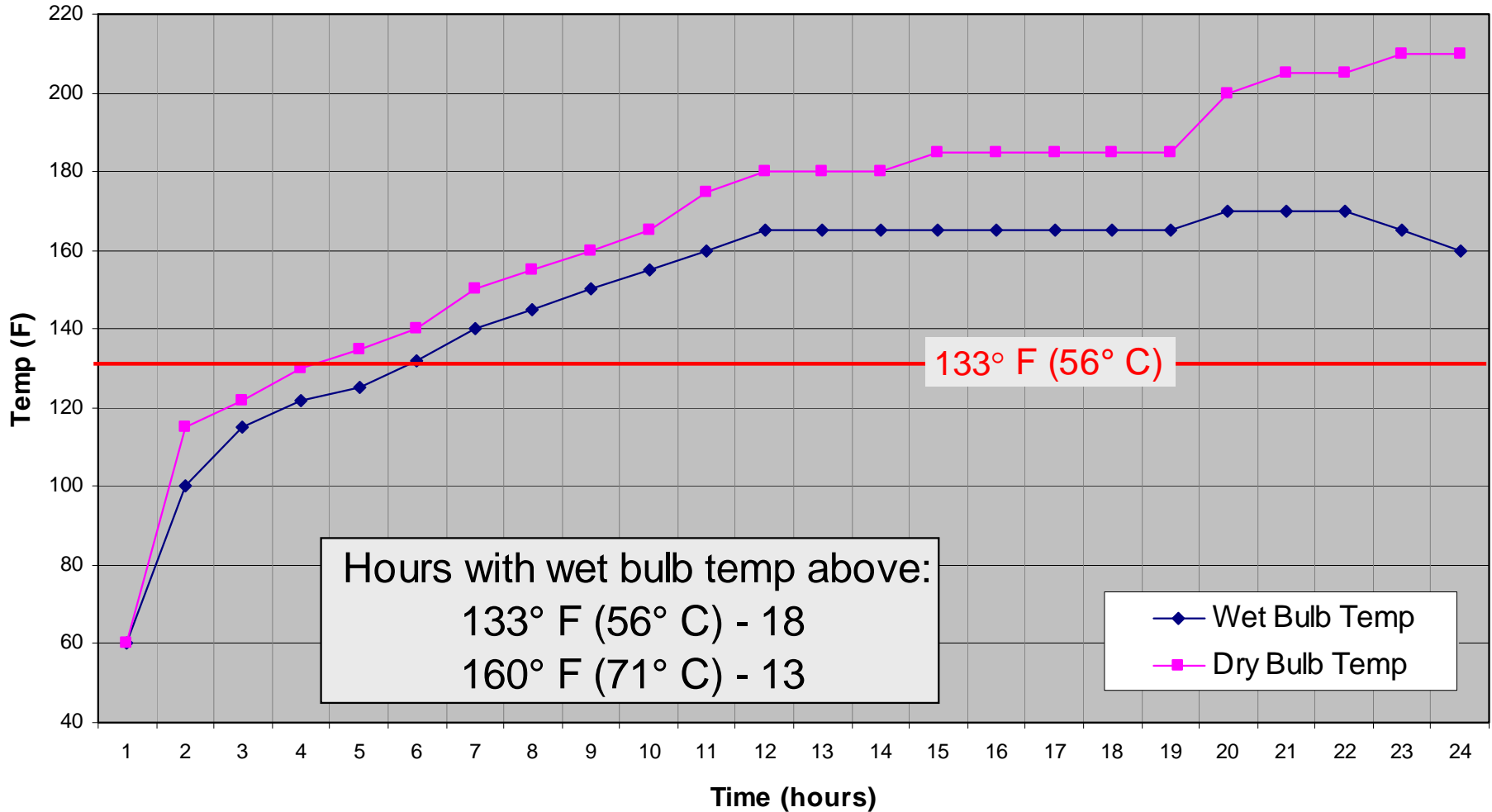
Grading sawn wood



Heat treatment kills all pests present in wood



Heat Treatment of 2x4 pine lumber following typical HT/KD schedule

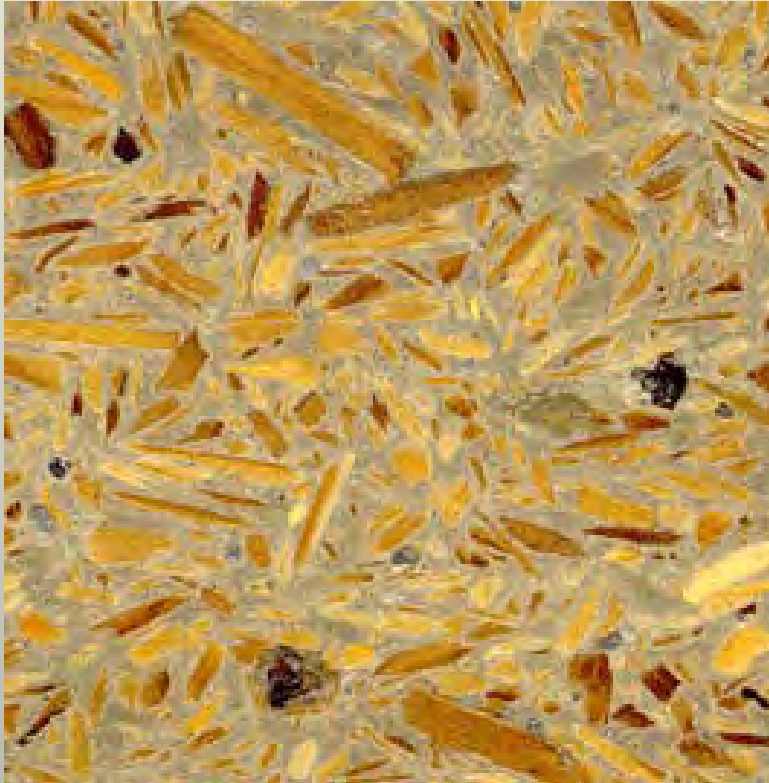




Virtually all forest pests are eliminated in pine exports



Other wood commodities



Wood "concrete"



Wood pellets











Many opportunities to
reduce pests during
growing and
harvesting of forests





CANADIAN FOREST SERVICE
PACIFIC FORESTRY CENTRE
INFORMATION REPORT
BC-X-419

Phytosanitary risks associated with the global movement of forest products: A commodity-based approach

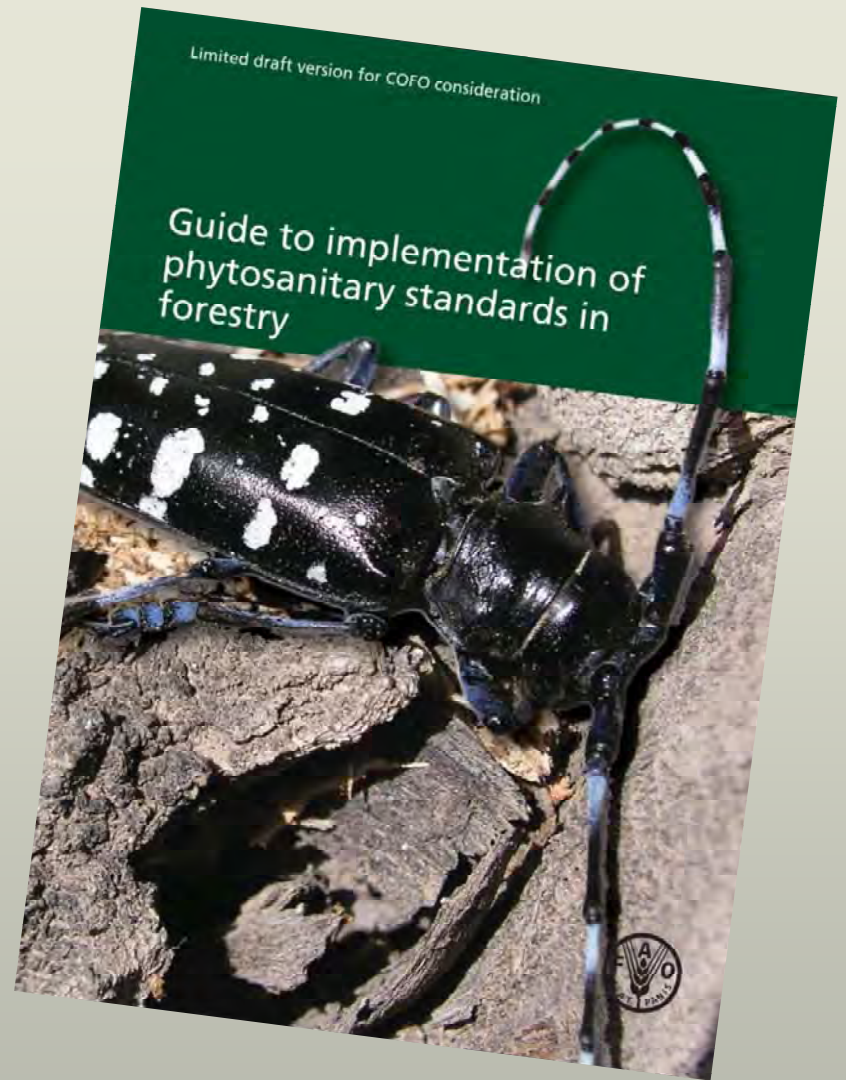


Isabel Leal, Eric Allen, Leland Humble,
Shane Sela, and Adnan Uzunovic

Canada

New publication

How pest risks change as trees are transformed into logs, sawn wood, chips etc.



FAO Forestry Guide



Science

**Phytosanitary
Policy**



Phytosanitary regulators
Science community
Foresters
Forest industry



