

# Pathological considerations in growth and yield

- The “Big Four” in Alberta
  - Decay
  - Dwarf mistletoe
  - Armillaria
  - Rusts
- Risk assessment in intensively managed stands
- Concluding remarks



# Stem decay



# Stem decay

Effects of decay are typically incorporated in most models as long as net volume is considered



# Stem decay

Age	% Decay
31-40	-
41-50	1.8
51-60	3.2
61-70	7.1
71-80	14.4
81-90	21.3
91-100	25.2
101-110	31.1
111-120	36.9
121-130	41.9





# Stem decay

But net volume of what? Rot is often accompanied by stain – the impact on volume varies with end product



# Stem decay

Product	Allowable % in product		
	Stain	Incipient decay	Advanced decay
Chemical pulp	no limit	?	?
Particle board	no limit	20-40%	0-5%
Lumber (constr.)	25%	10-20%	0-10%
OSB	20-30%	10-20%	0%
Mechanical pulp	10-15%	0-5%	0-1%
Lumber (furn.)	0-10%	0-10%	0%
Chopsticks	0%	0%	0%

Breck, 1987

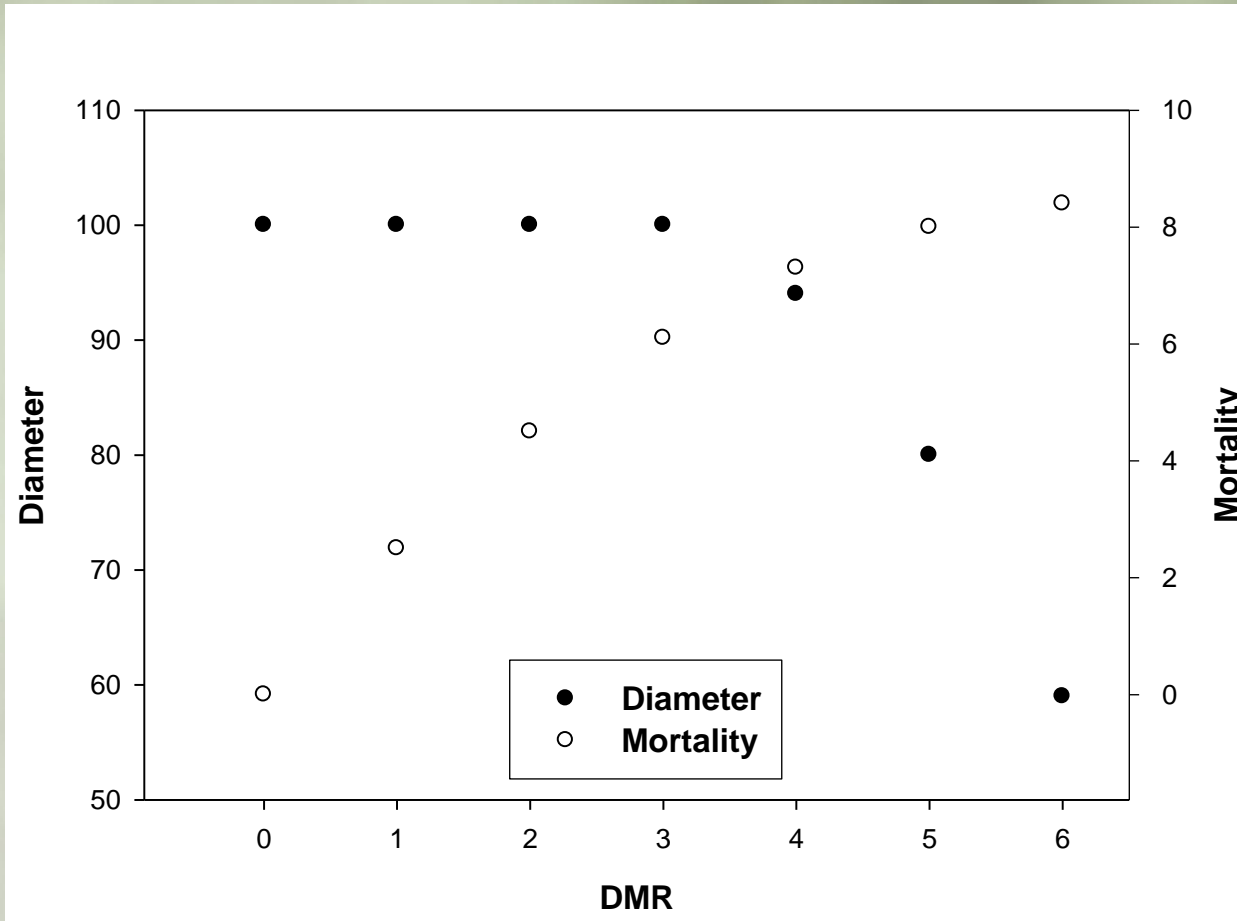


# Dwarf mistletoes

- Impacts of growth and yield have been modelled since the 1970's
  - Spread is slow and reasonably predictable
  - Reasonably easy to obtain incidence and severity data in the field
  - Severity / yield relationships exists



# Dwarf mistletoes



Hawksworth et al. 1995



# Dwarf mistletoes

- Calibration and validation of spread models won't likely be fast
- If we are attempting to adjust current growth and yield models, do we know whether current models already capture the effects of disease?



# *Armillaria*

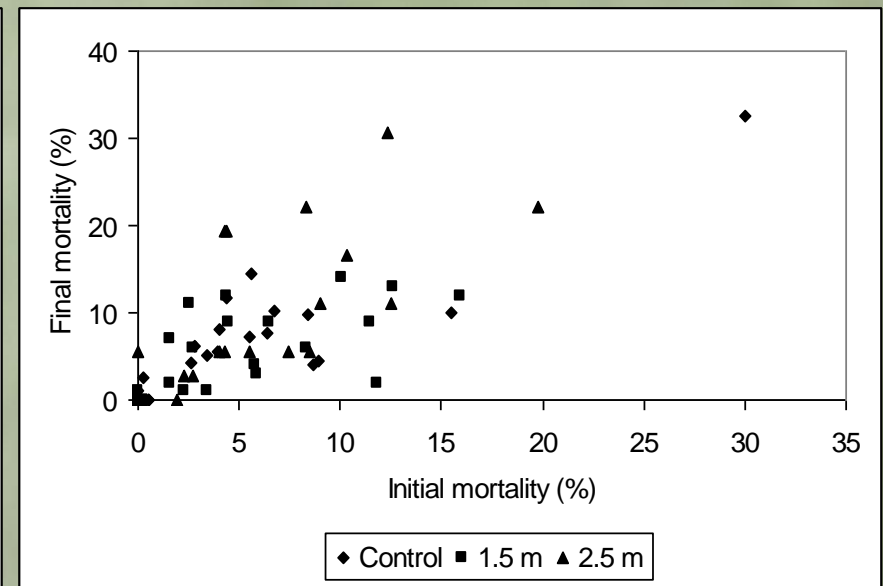
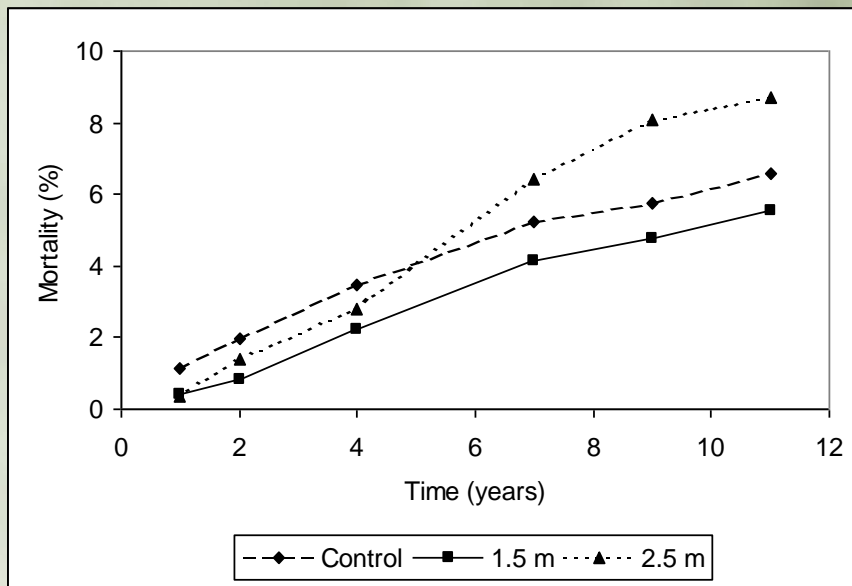
Although its incidence appears to diminish with stand age, larger trees are killed





# Armillaria

p.c.t. does not appear to exacerbate in AB



# *Armillaria*

What is the effect of replacing fire with harvesting?



# Rusts, esp. WGR

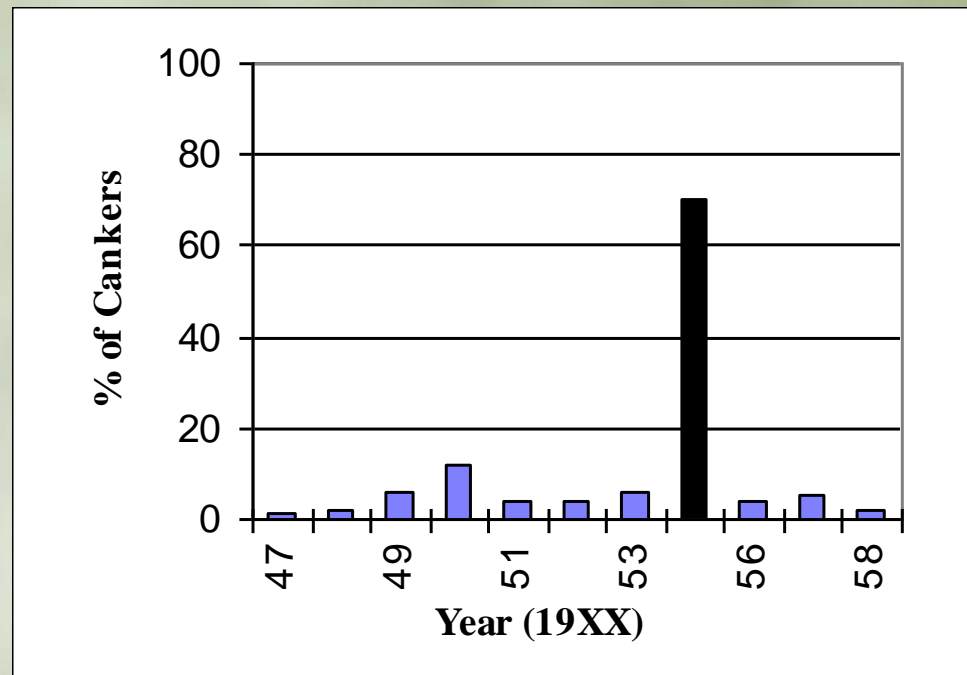
As harvesting replaces fire, what effect with the change in spatial scale have?





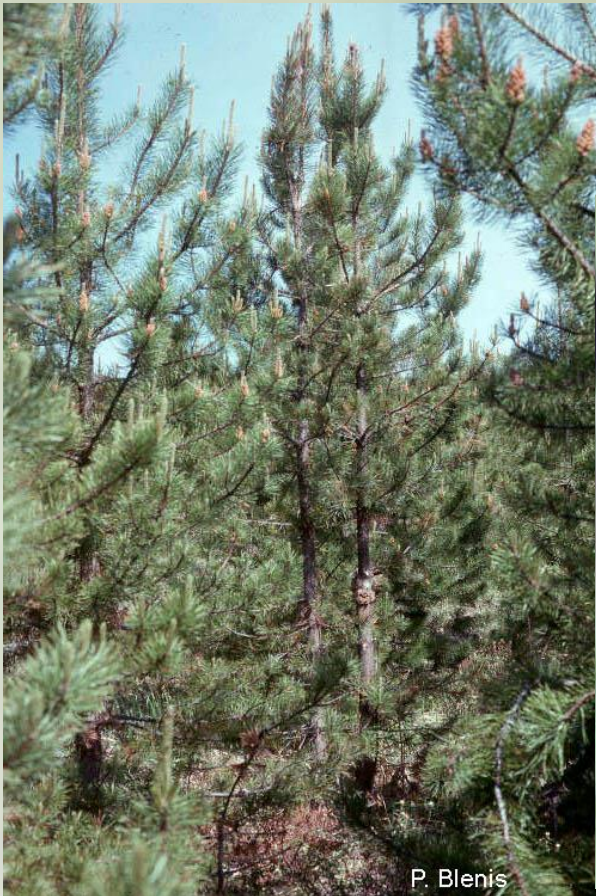
# Rusts, esp. WGR

Incidence is hard to predict in time (wave years) and space



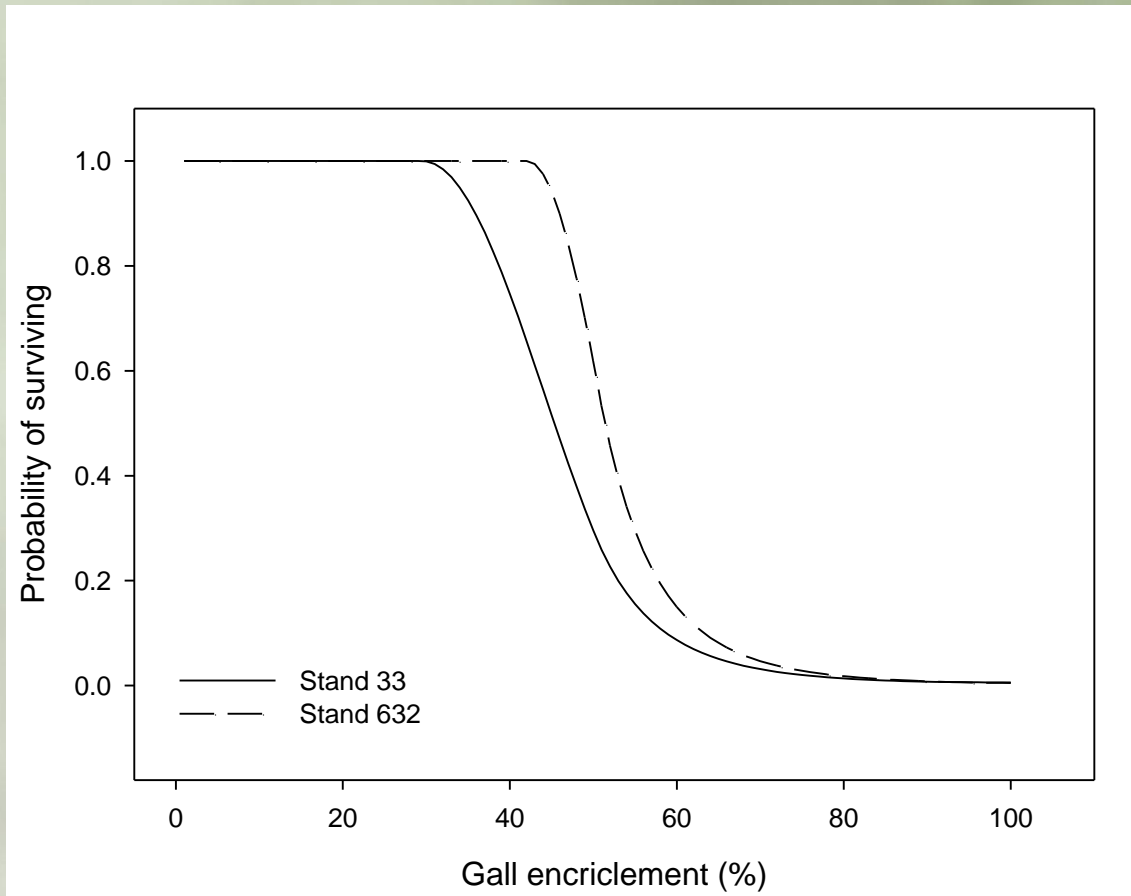
# Rusts, esp. WGR

How does incidence translate to impact - Survival



# Rusts, esp. WGR

How does incidence translate to impact - Survival





# Risk assessment

- In intensively managed poplar plantations where some clones may be planted over large areas what is the risk of major loss?



# Final thoughts

- Each pathogen has its own very unique personality
- There is no substitute for pathologists working in conjunction with modellers

