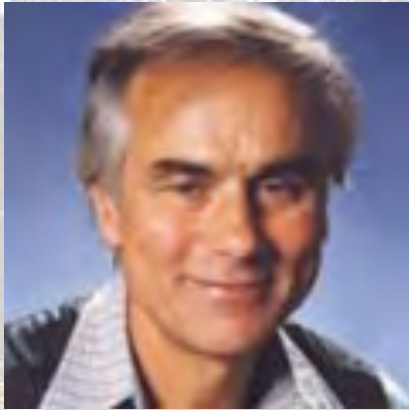




# Kauri – Natural Ecology of an Extreme Species

Bruce Burns  
University of Auckland

# Kauri ecologists

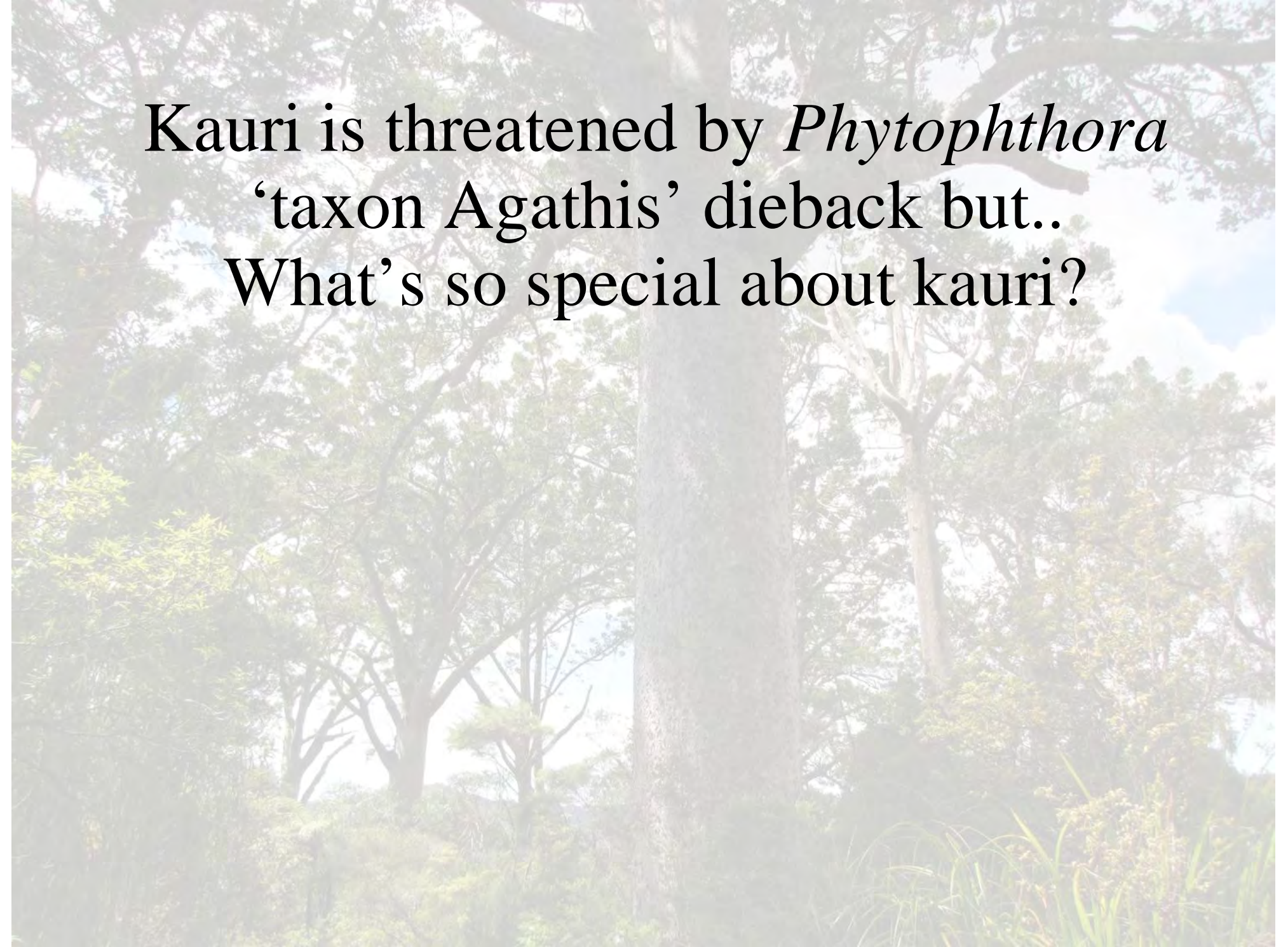


John Ogden

Warwick Silvester



Ian Barton



Kauri is threatened by *Phytophthora*  
'taxon Agathis' dieback but..  
What's so special about kauri?

Kauri is threatened by *Phytophthora*  
'taxon Agathis' dieback but..

What's so special about kauri?

- Ancient lineage
- Biologically extreme
- Foundation species creating diverse forests
- High forestry value in the past and potential for the future
- Value as flagship species

# Ancient lineage

- Member of Araucariaceae
  - contemporaries of dinosaurs
- Once global, now only in Southern Hemisphere
- Includes monkey puzzle, Norfolk Island pine, Queensland kauri, and *Wollemia nobilis*



*Araucaria araucana*



*Agathis robusta*



*Wollemia nobilis*

# Extremely...

- **BIG**

Tāne Mahuta

4.4m diameter and 51m tall

Kairaru reliably recorded last  
century near Waipoua

6.4m diameter

Twice the volume of Tāne  
Mahuta

3rd largest conifer in world



# Extremely...

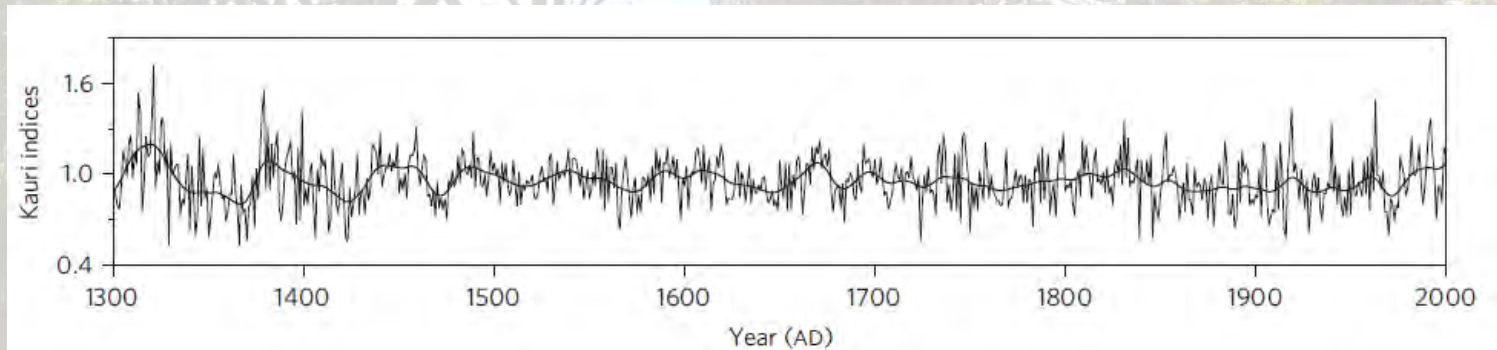
- old
  - Typical life expectancy of around 600 years
  - Oldest published estimate of age (from cored tree) = 1679 years



# Importance as palaeohistoric archive



- Kauri chronology now extends back 3631 years (Boswijk et al. 2006)
- High quality palaeoclimatic proxy
- Sensitive to El Niño events
- Also used to calibrate radiocarbon dating.
- Recently used to revise date of Taupo eruption ( $232 \pm 5$  AD)



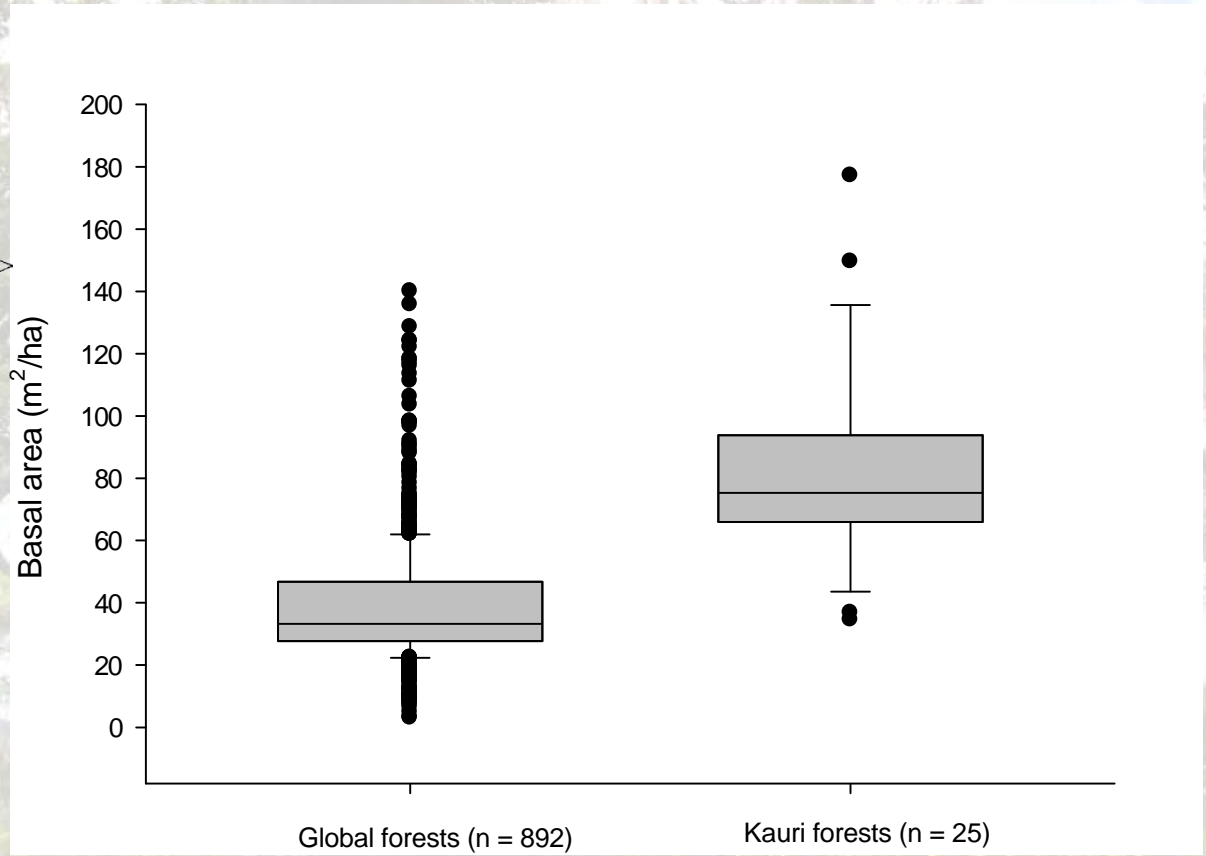
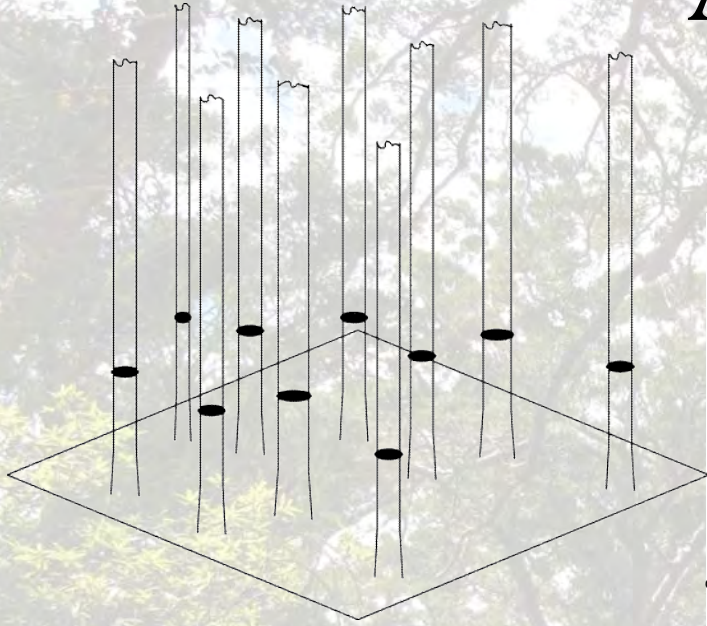


# Extremely...

- high forest biomass and productivity
  - Basal areas up to 127  $\text{m}^2\text{ha}^{-1}$  (mean 84)
  - Height 30-50m, occasionally 60 m
  - Stores vast amounts of carbon



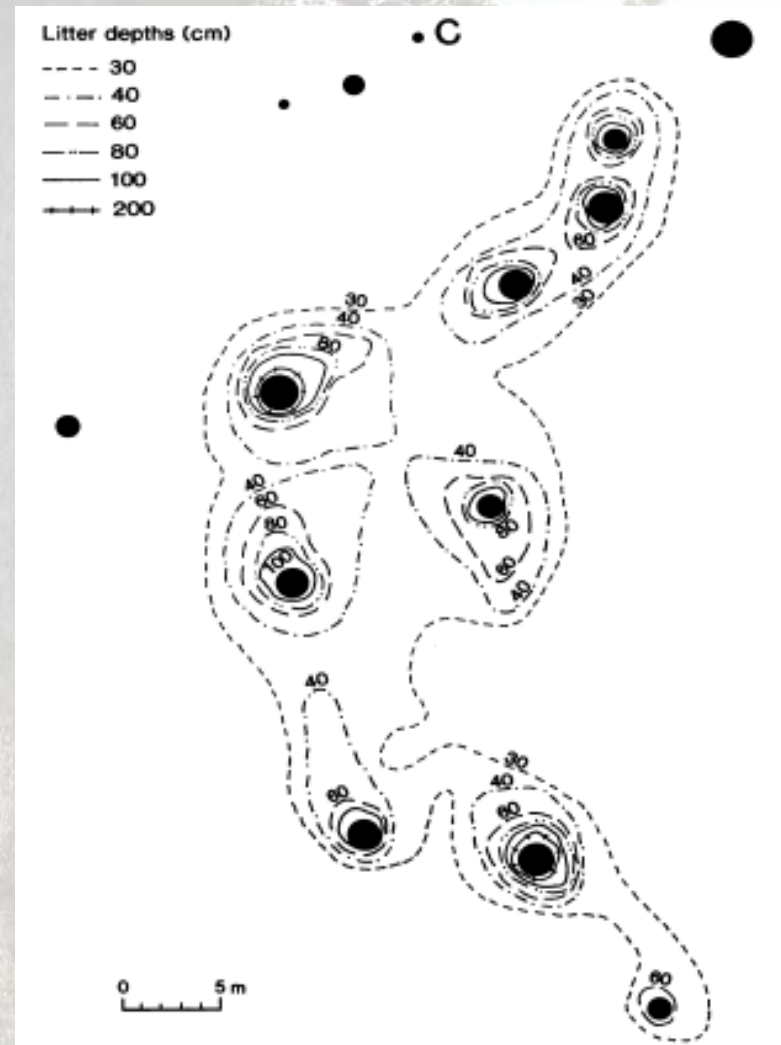
# Basal Area



(Huston and Wolverton 2009,  
Ahmed and Ogden 1987)

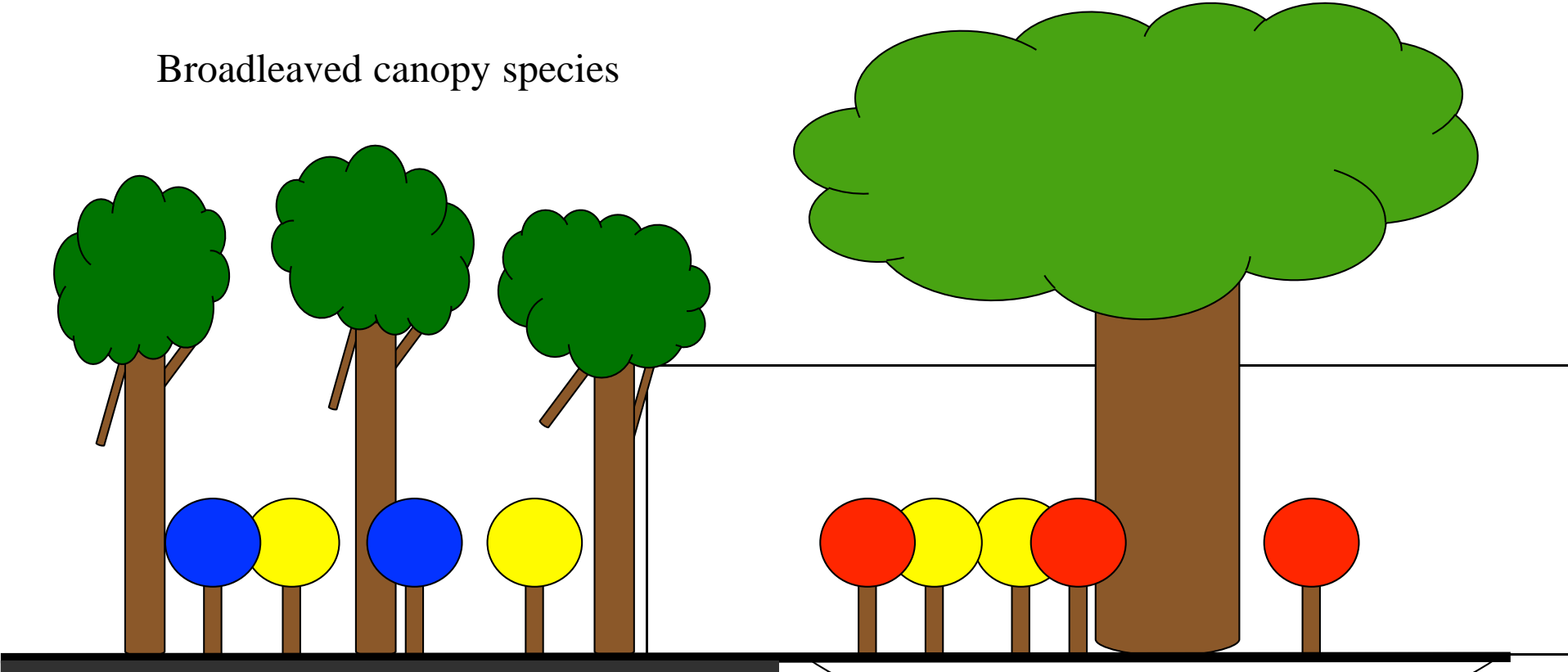
# Extremely...

- strange effects on soils
  - Huge accumulation of litter around trees
  - Slow decomposition rates
  - Creates deep organic soil:
    - acidic,
    - low available N,
    - drought-prone

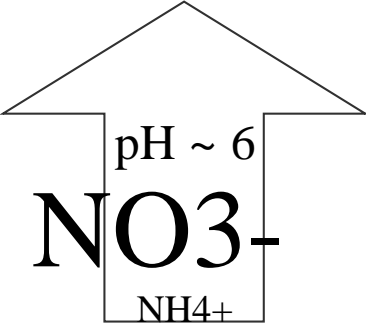


*Agathis australis*

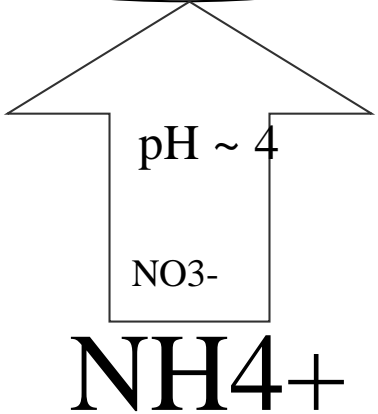
Broadleaved canopy species



↓H<sub>2</sub>O



Sarah Wyse





# Extremely high diversity...

Location	Vascular plant species richness per 0.04 ha plot
Waipoua Kauri Forest	24 -70 (mean = 52)
Central North Island	28-51
Beech Forest (upper NI and SI)	30-40
Central Westland	24-37
Dunedin	~24
Fiordland	20-40

(Burns 1995)

‘Kauri forest is generally regarded as the most diverse forest community in New Zealand.’  
(Ogden 1995)

# Forester's dream tree

- High volume of wood per tree
- Uniform trunk dimensions - little taper to trunk, cylindrical
- Branch shedding - branches fall off as tree grows leaving a clean bole (no knots)
- wood quality - excellent strength, workability and finishing properties, highly versatile



# Timber!!!

- Timber industry from 1840-late 1930's
- Kauri the principal building timber in New Zealand until 1920's
- Huge amount of timber removed
- 1-3% old growth forest remains







# Timber tree of the future?

6-year-old kauri at Te Puna  
on old kiwifruit orchard

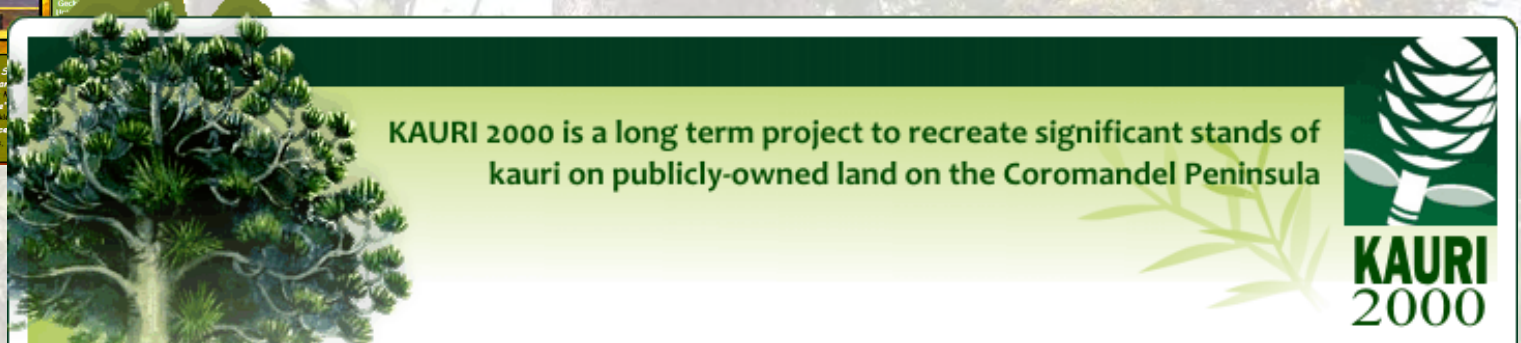
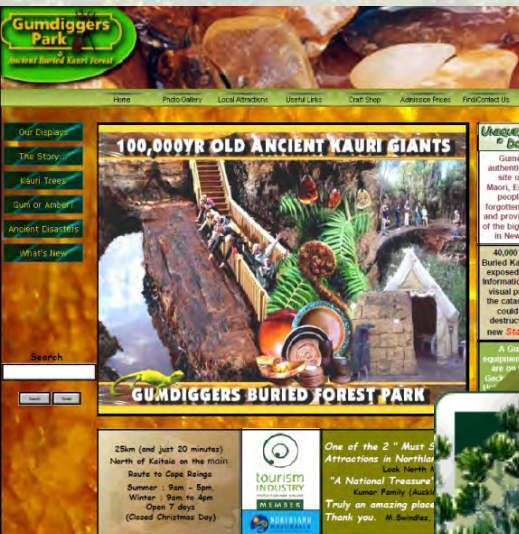
mean: 5.7 m tall,  
10.2 cm dbh

elite: 6.7 m tall,  
12.8 cm dbh

High silvicultural potential  
on suitable sites

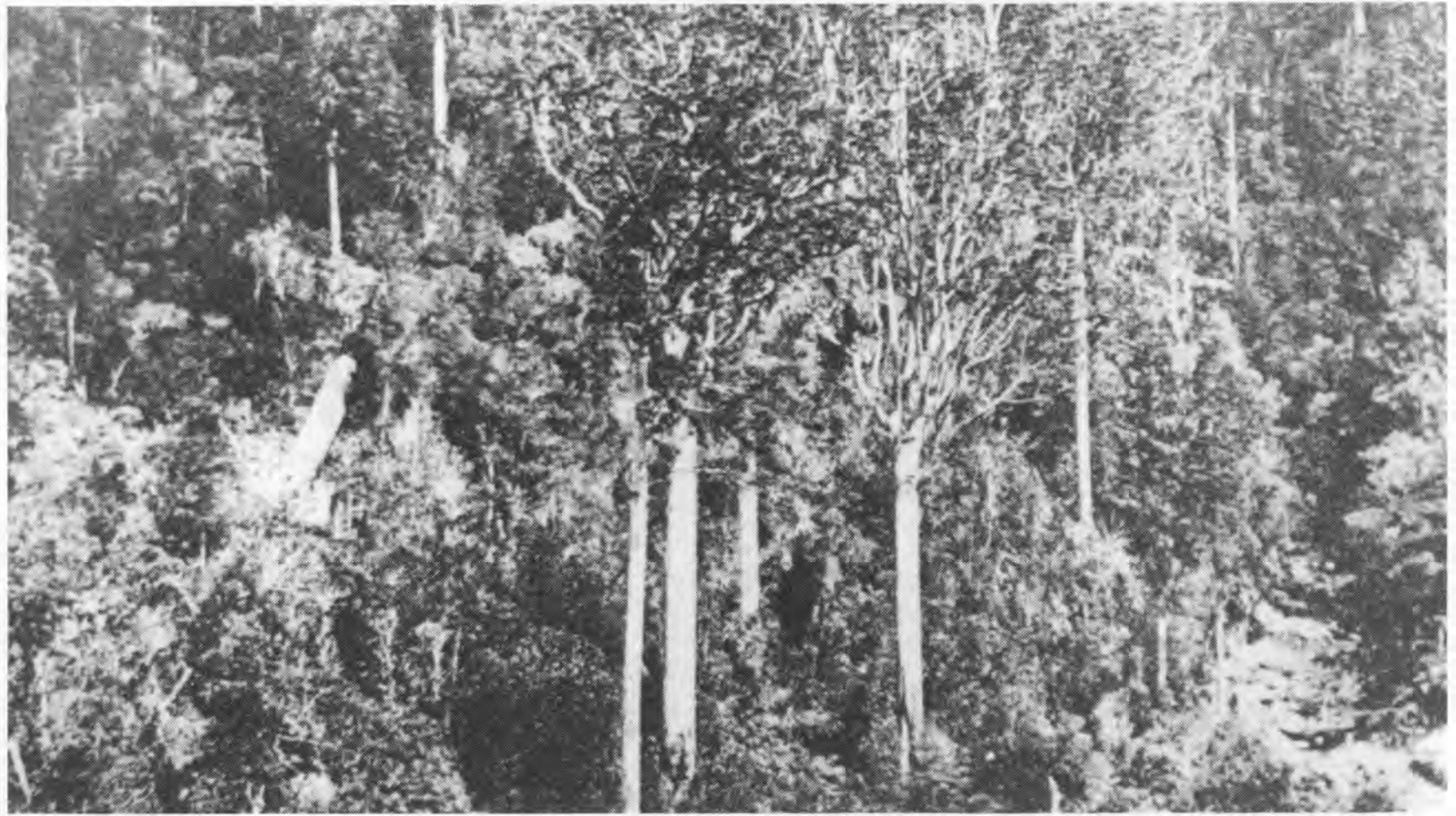
(Steward and Barton 2003)

# Kauri as a flagship species



# Value as flagship species

- Stands of gigantic trees are awe-inspiring
- Major tourist attractions
- Creates ‘sense of place’ and cultural identity for people of northern NZ
- Flagship species for forest conservation in NZ



Kauri – an extreme species and extremely important!