

# When do marula trees grow?

Ed Stam

# Demographic tree models

- Parameter estimates needed for:
  - growth rate
  - recruitment rate
  - age/stage specific mortality
  - dependence of the above on various environmental variables

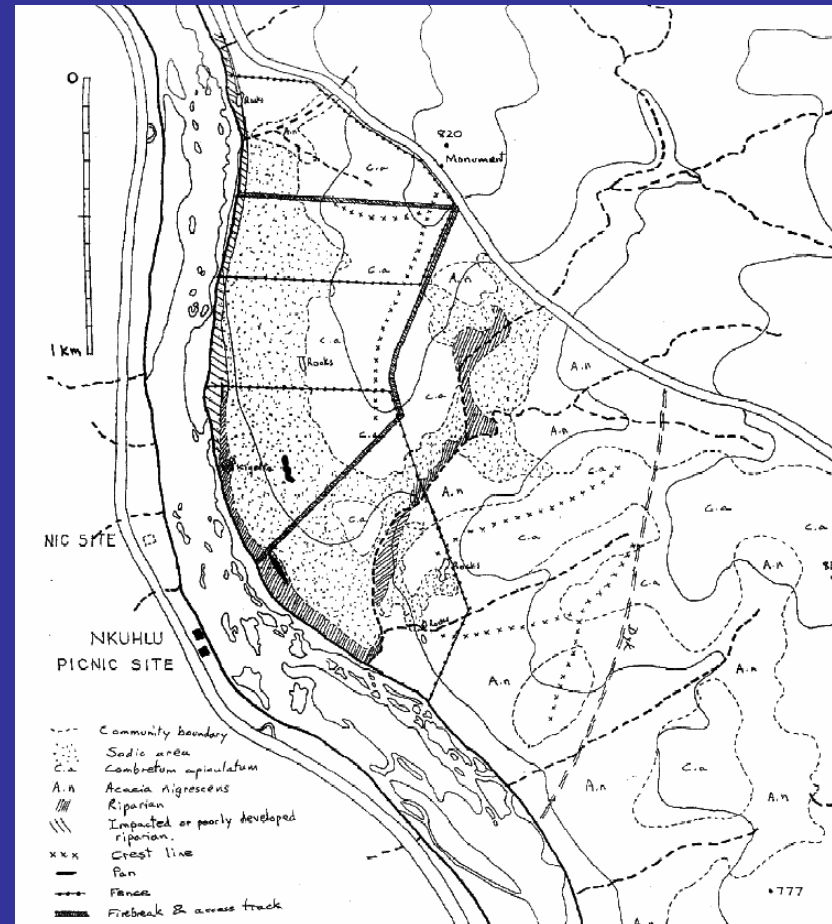
# Marula project

- Aims at obtaining demographic data for marula trees and assessing the impact of elephants on the population
- Why marulas?
  - keystone species
  - high numbers
  - occur in various landscapes
  - much liked by elephants

13/12/2006

# Experimental setup

- Nkuhlu enclosure (granite)
- Fencing:
  - complete
  - partial
  - control
- Fire / no fire
- 10 trees in each combination (total = 60)



# Experimental setup

- Buffalo enclosure at Satara (basalt)
  - 15 inside and 15 outside (east side)
- Orpen gravel road (from 2006)
  - 10 shrub size trees



# Growth

Every year in December



Circumference at breast  
height and at the base

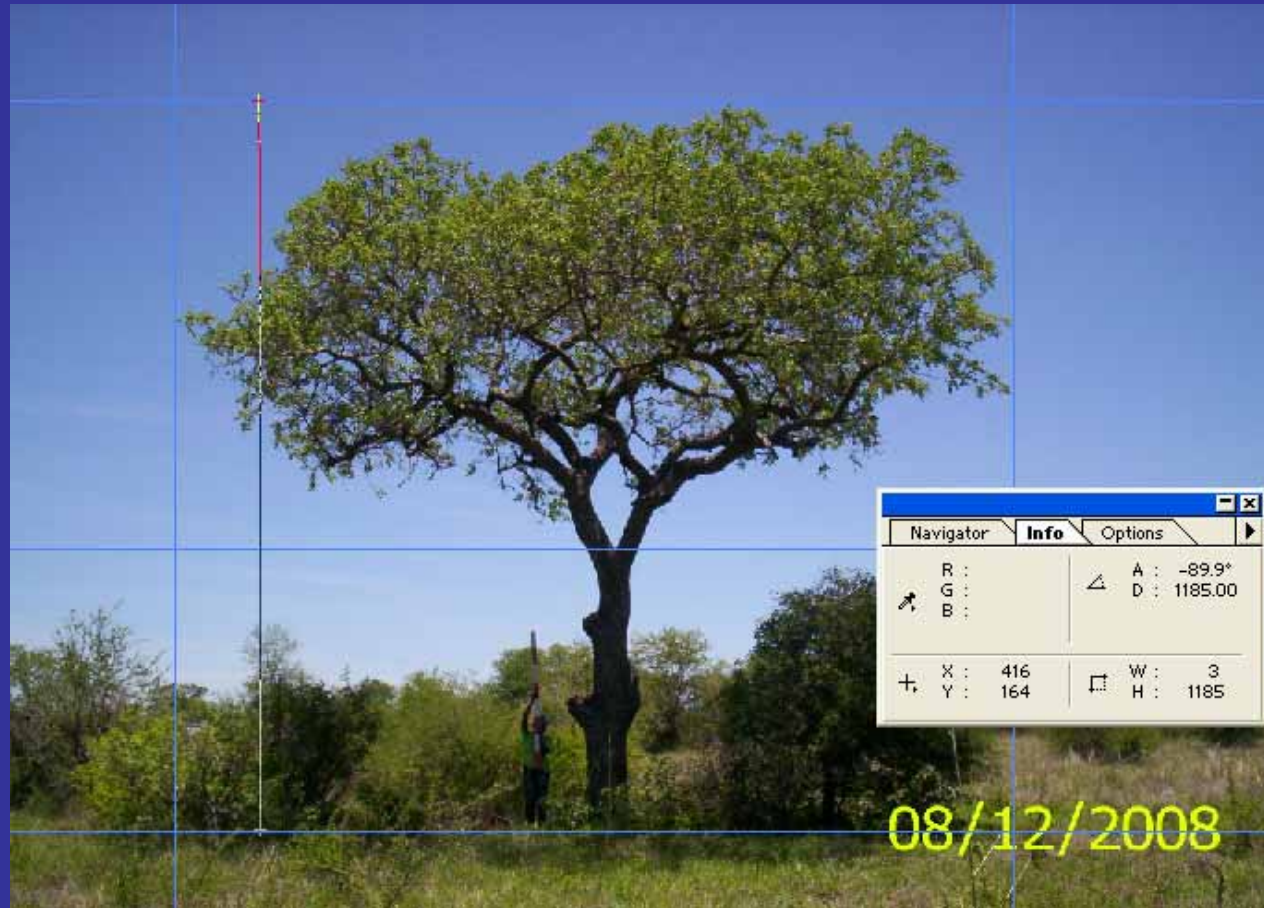


Dendrobands



Fixed point photographs

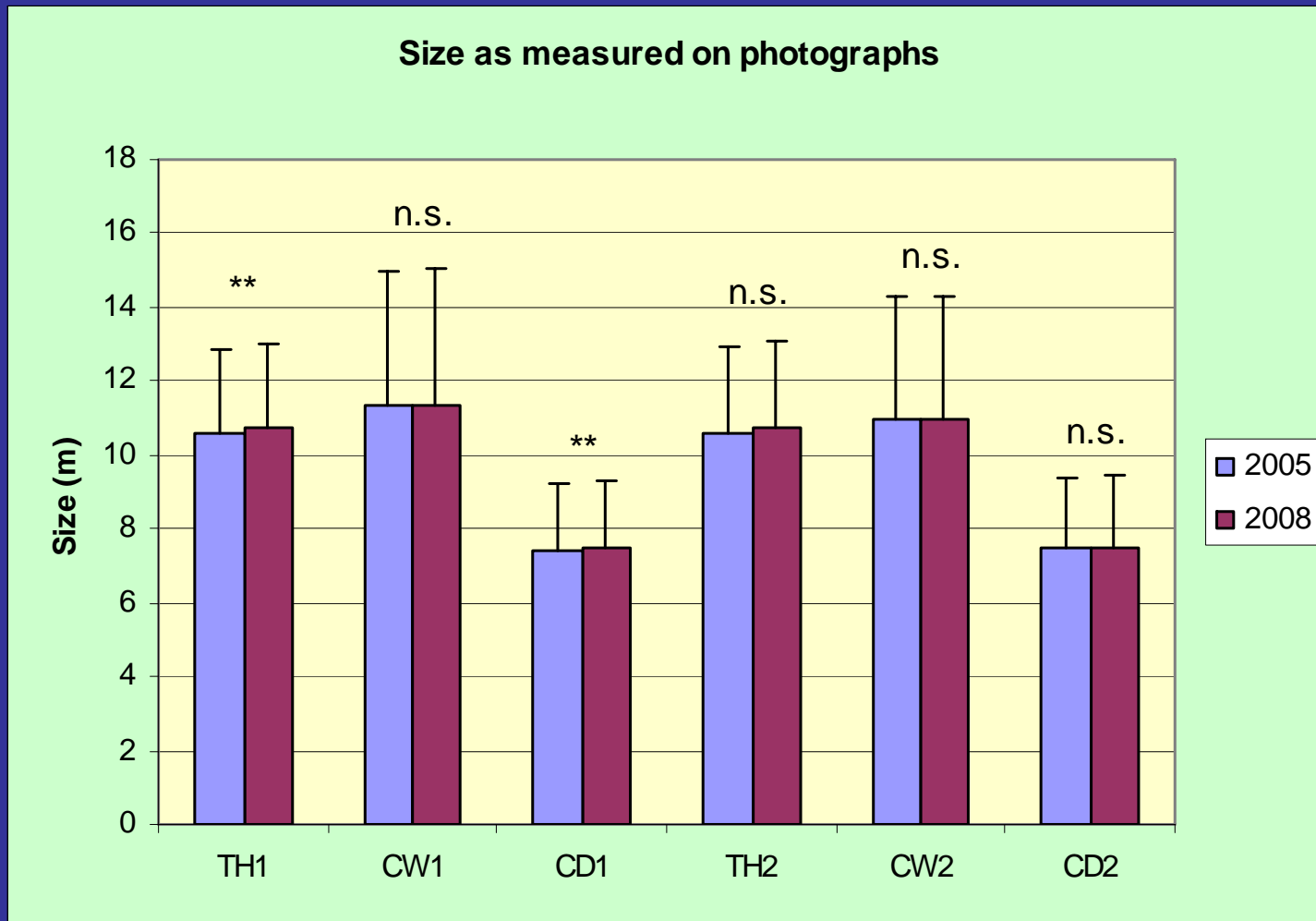
# Size measures





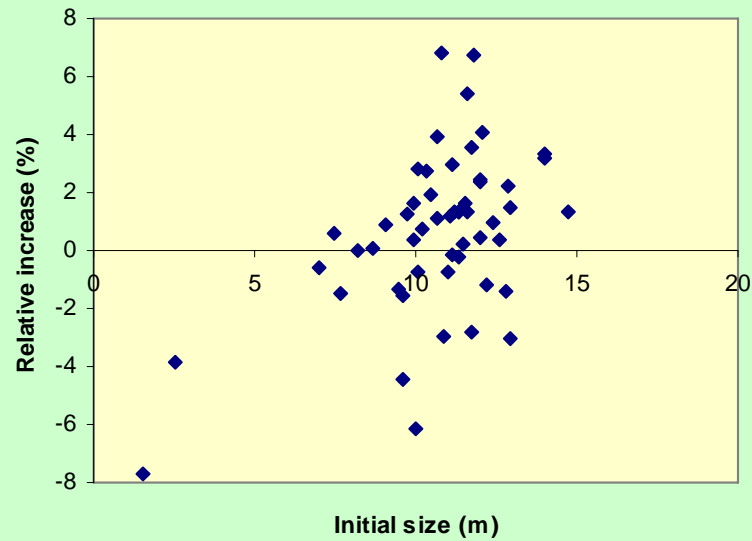
07/12/2005

# Fixed point photographs

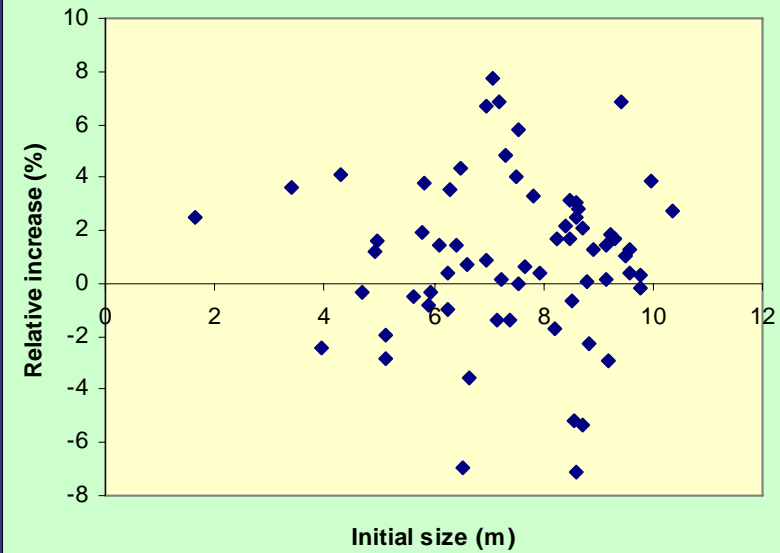


# Growth vs. size

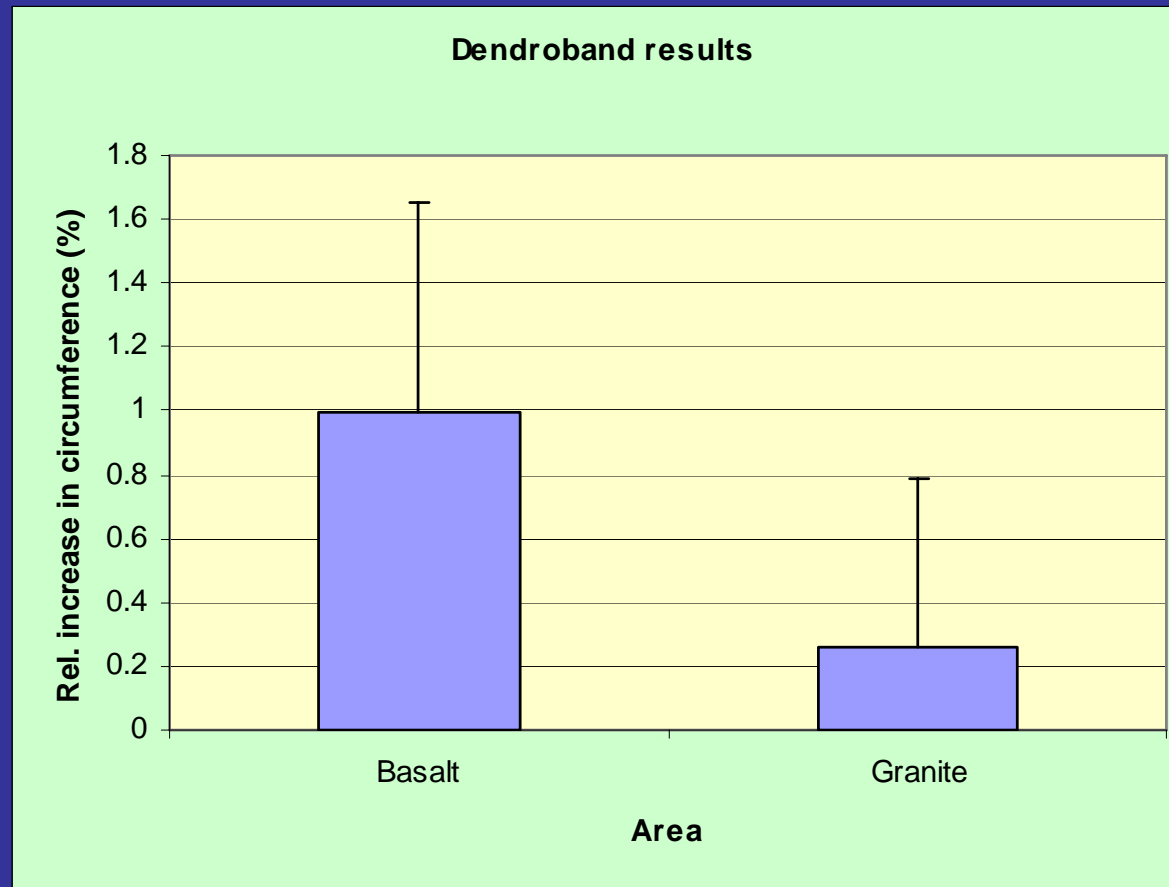
Relative growth against size, TH1



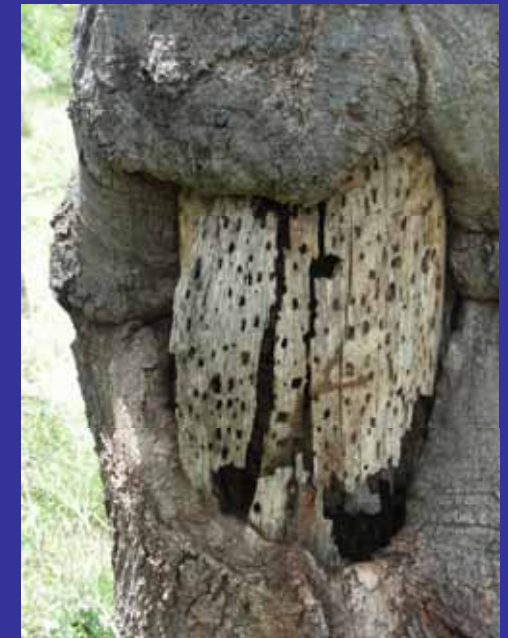
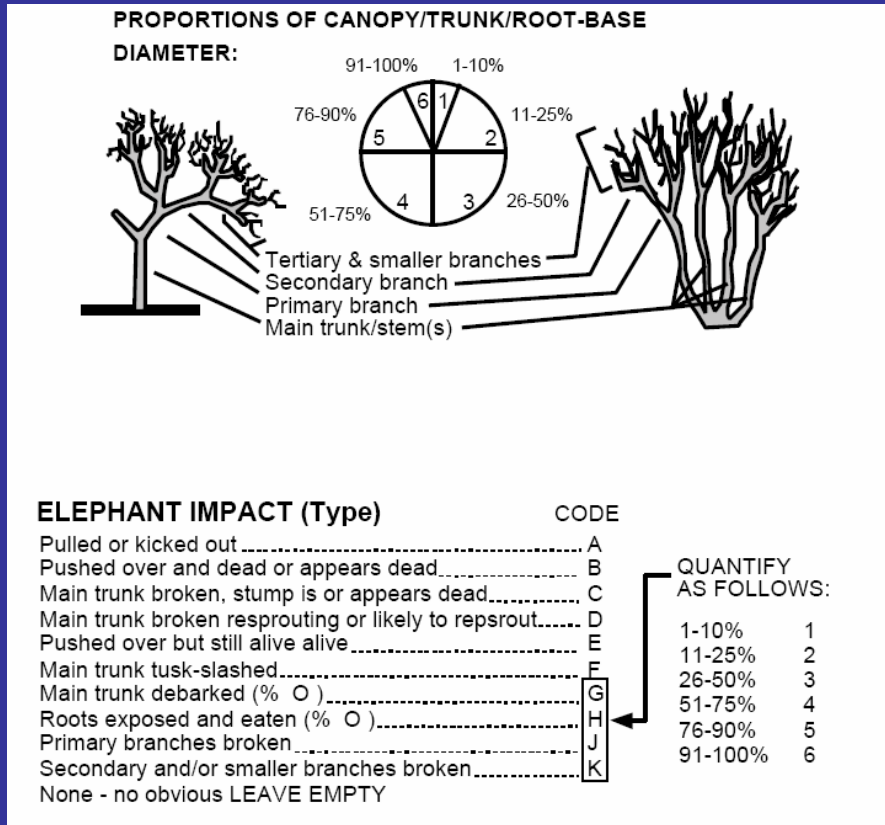
Relative growth against size, CD1



# Dendrobands



# Damage



# Damage results

	Elephants excluded	Elephants present
2007		
Pushed over	0	1
Debarked	1	1
Primary branch broken	0	4
2008		
Pushed over	0	1
Trunk tusk slashed	0	2
Debarked	2	6
Primary branch broken	0	1

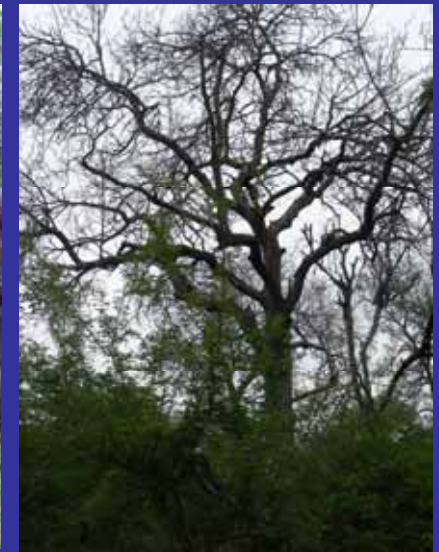
# Damage pictures



2006



2007



2008





**2007**



**2008**



# Mortality

- From 2005 to 2008:
  - 13 trees in areas outside the en-/exclosures
  - 4 trees inside them (2 in Nkuhlu partial exclosure, 2 in Buffalo enclosure)

# Recruitment

- From 2008
- Four transects of 20 x 100 m, two inside and two outside the buffalo enclosure
- Coordinate system
- Every year seedlings and saplings are scored, coordinates recorded and height measured



## Conclusion

- From the results over the past three years the highest estimate of growth rate was about 3 cm / year. At this rate it takes about 333 year to grow to 10 m. This seems to be much too slow to compensate for losses, unless growth (and recruitment) happens in bursts when certain conditions are met. Hence the title question.

# Thanks to



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