

# Elephant browsing across tree height classes and its potential influence on the woody vegetation state in Pilanesberg National Park, South Africa.

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## Introduction

- Pilanesberg National Park, roughly circular and about 500 square kilometres, was established in 1979 on previous farmland in the North West Province.
- The woody vegetation is dominated by shrubby growth forms and may still be recovering from previous land use practices.
- Between 1981 and 1993, elephants were introduced<sup>1</sup> and in 2005 the population has grown to 170 individuals<sup>2</sup>.

## Key Questions

- What is the availability of different tree heights?
- On which tree heights did elephant concentrate their feeding?
- Based on elephants' structural impact, could they be an agent in keeping the park's woody vegetation in an artificial shrubland state?

## Methods

- Transects were laid out in 133 sampling sites, spanning nine woody plant communities.
- Each individual woody plant's dimensions were measured, and utilization by elephant assessed.
- Browse availability and utilization by elephant were calculated for eight tree height classes in nine woody plant communities.

## Results

- Low densities of mature trees (> 3m) occurred in all woody plant communities sampled (Fig. 1).
- Elephants utilized the largest tree densities in the 1.5 – 3m height class, a trend evident in all the communities (Fig. 1).
- The mature trees (> 3m) experienced the highest proportional utilization, a trend evident in all the communities (Fig. 2).

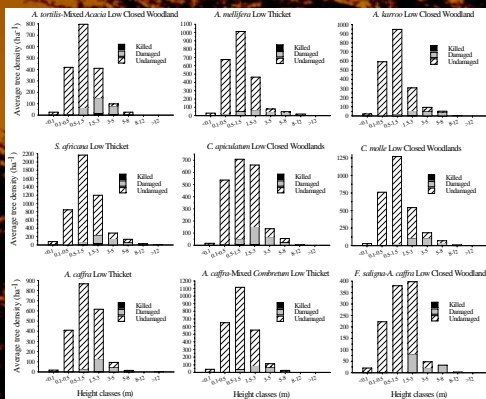


Figure 1 Height class density (trees/ha) distribution. Each bar reflects the average tree density available in each height class, including the average density killed, damaged (outlined) and unharmed (unutilized) by elephant.

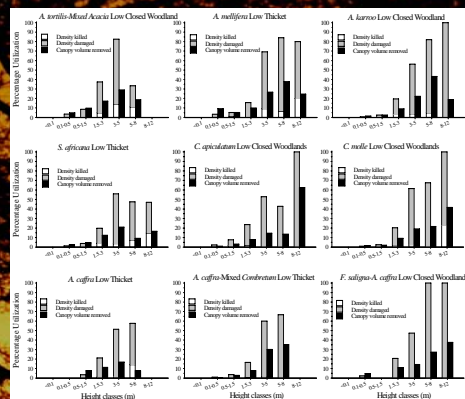


Figure 2 Percent tree density (ha<sup>-1</sup>) damaged (outlined) and killed and canopy volume (m<sup>3</sup> ha<sup>-1</sup>) removed by elephant from height classes in woody plant communities.

## Discussion

- Elephants' high proportional utilization on mature trees may contribute to trapping the park's woody vegetation in an artificial shrubland state.
- This study is based on data that did not measure changes over time, a snapshot in time, and we propose that more comprehensive monitoring programs be set-up which can measure changes in large trees over time, while also identifying ecological drivers of change.
- Such monitoring programs are being developed in the Kruger National Park with the aim to integrate them into a decision-making system which can highlight potential indicators of change<sup>3</sup>.

<sup>1</sup>Slotow, R & Van Dyk, G. 2001. *Koedoe* 44(1):85-94.

<sup>2</sup>Woolley, L.A., Millsaugh, J.J., Woods, R.J., Janse van Rensburg, S., Mackey, R.L., Page, B.R., & Slotow, R. 2008. *Plos One* 3(9): e3233. doi:10.1371/journal.pone.0003233

<sup>3</sup>Druce, D.J., Shannon, G., Page, B.R., Grant, R. & Slotow, R. 2008. *Plos One* 3(12): e3979. doi:10.1371/journal.pone.0003979.5