Disappearance of sable antelope (*Hippotragus niger*) from the Pretorius Kop region: consequence of diminished nutrient availability or enhanced risk of predation?

Le Roux, E. [1], Loarie, S. [2], Levick, S. [2], Asner, G. [2] & Owen-Smith, N. [1]

[1]Centre for African Ecology, University of the Witwatersrand, Johannesburg South Africa

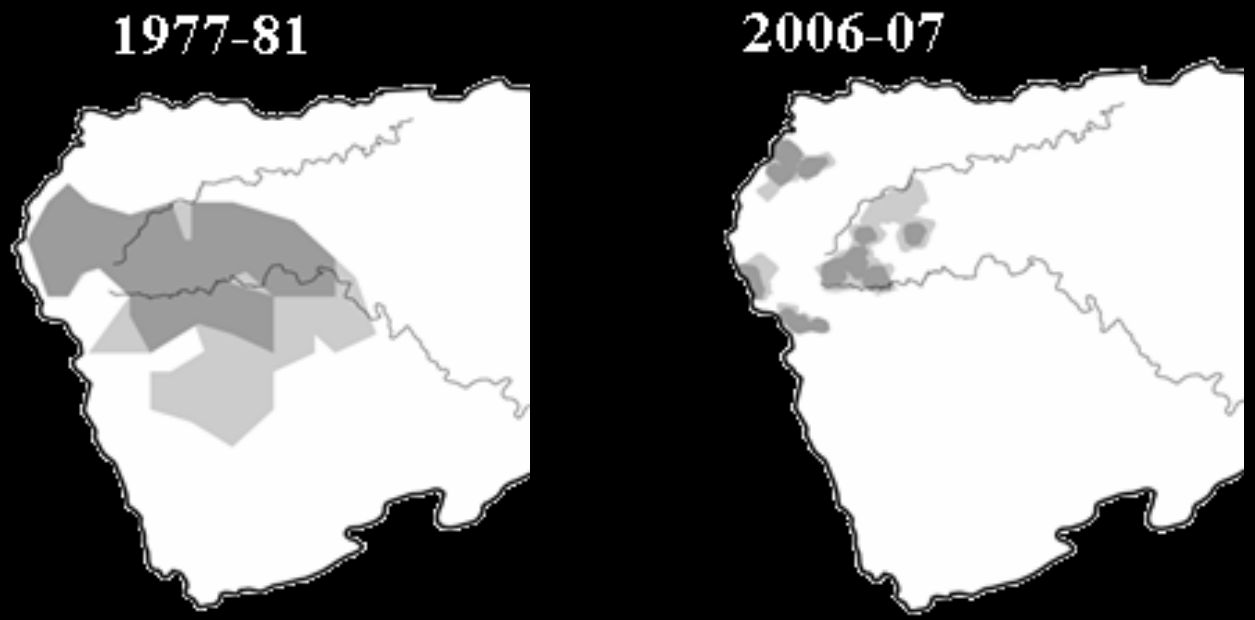
[2]Department of Global Ecology, Carnegie Institution for Science

Carnegie Airborne Observatory

KNP sable population declined from approximately 2000 individuals to a current estimate of just over 300

I.J. Whyte, KNP Scientific Services Report, 2006

The decline in the southern section was similar in extent to the northern section, despite this area receiving relatively more rainfall.



Chirima, J.G. 2009. *Habitat suitability assessments for sable antelope.* PhD Thesis. University of the Wiwatersrand, Johannesburg, South Africa.

Nutrient availability/accessibility

Predation

Habitat selection

Population performance

Photos: Rob Thompson

Johnson (1980):

1st order selection → Geographical range

2nd order selection → Home range within surrounding landscape

3rd order selection → Areas used within the home range

4th order selection → Feeding areas within the habitat

&

Food items within the feeding areas

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Current range:

Four females were collared with GPS/GSM collars

June 2006 – March 2009

Hourly – 6-hourly intervals

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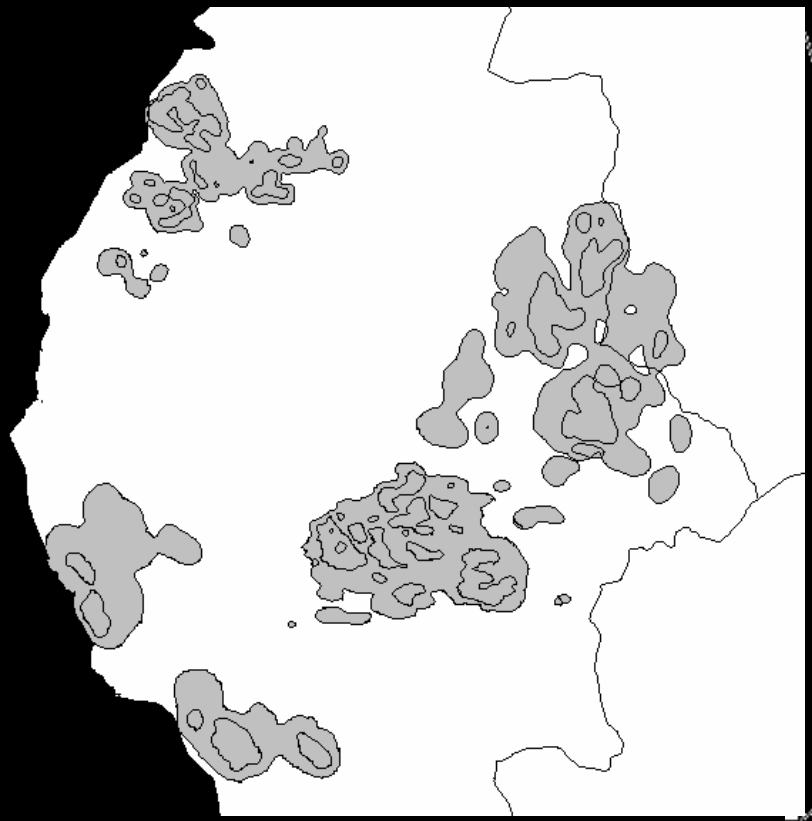
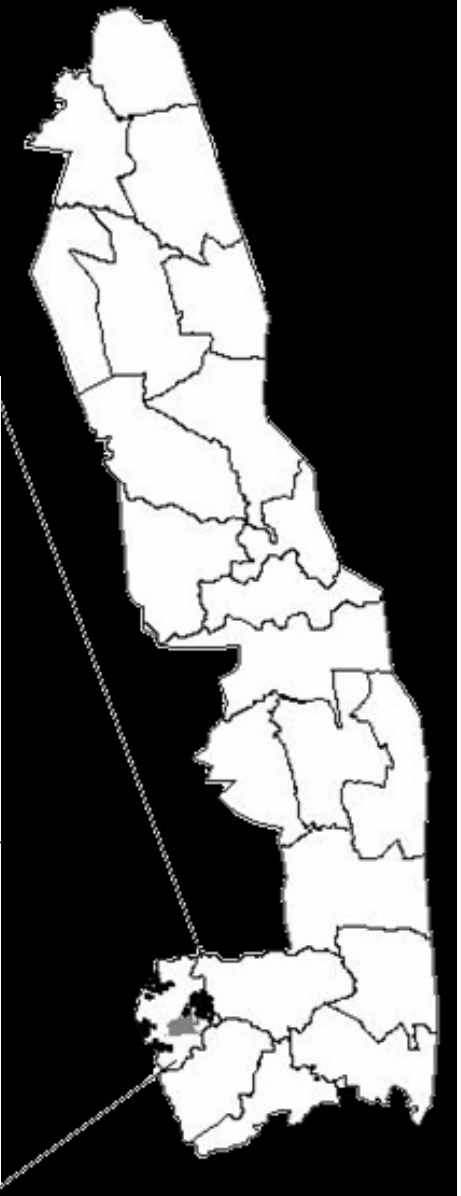
June 2006 – March 2009

Hourly – 6-hourly intervals

Home range maps – 90% kernel density estimates

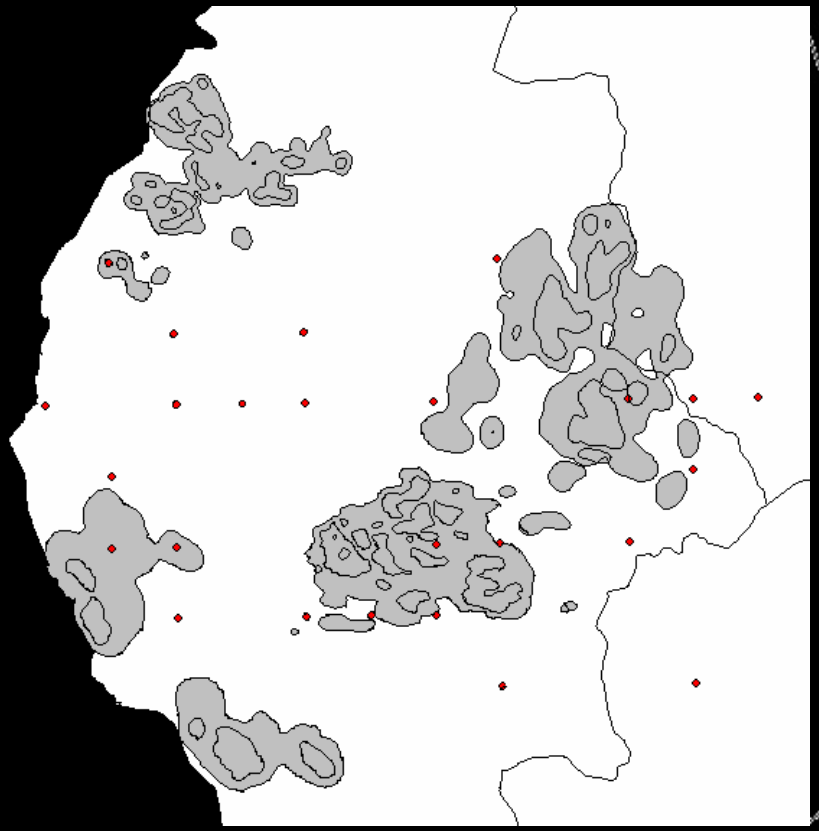


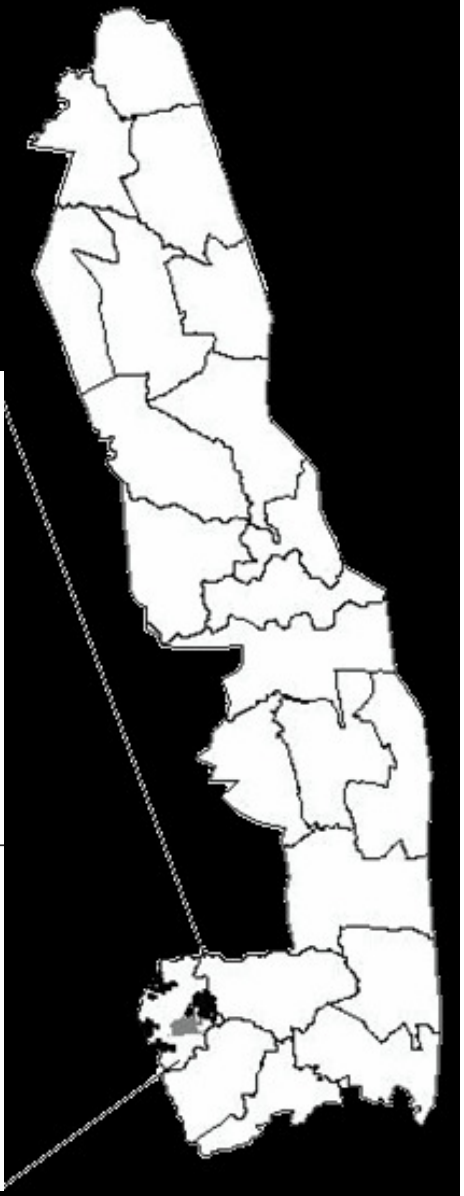


Historic range:

Ecological Aerial Surveys

> 20 herds sighted in 1977



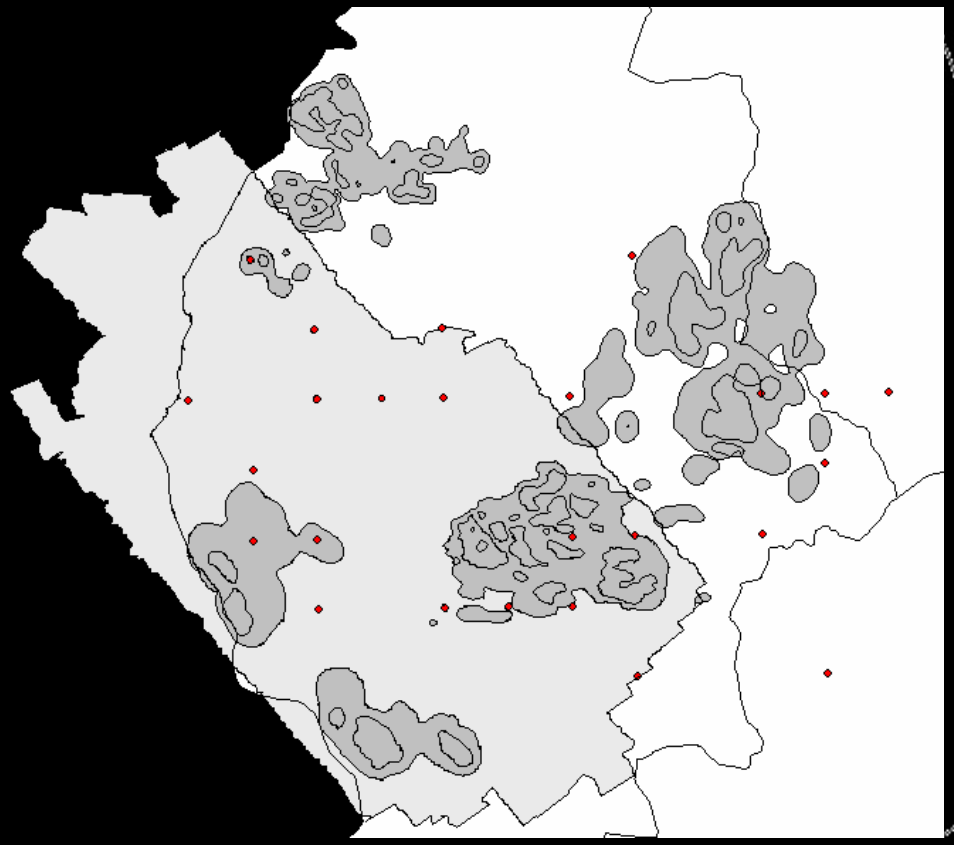


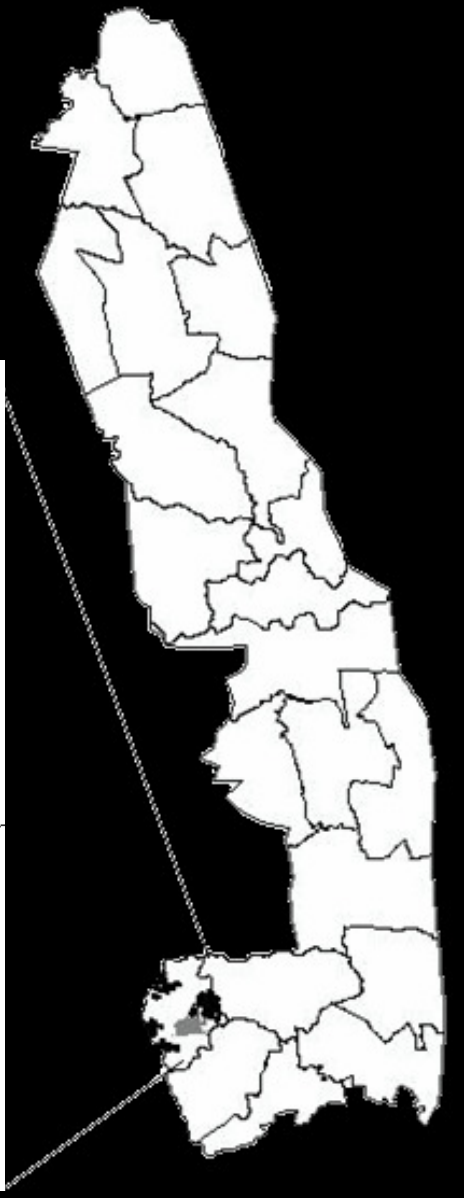
Historic range:

Ecological Aerial Surveys

> 20 herds sighted in 1977

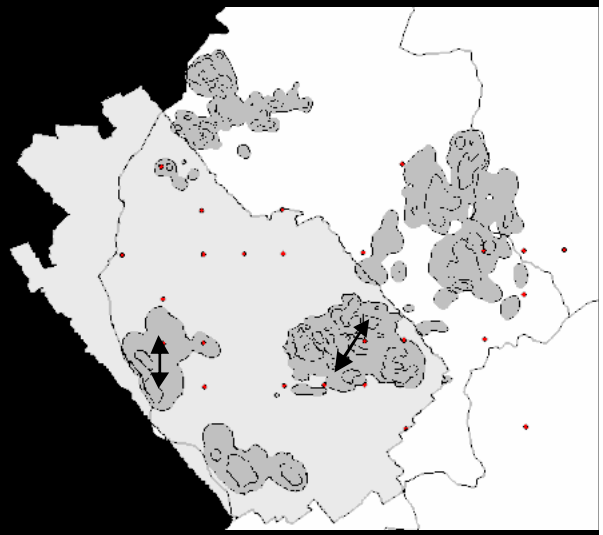
CAO measurements spanning both current and historical range





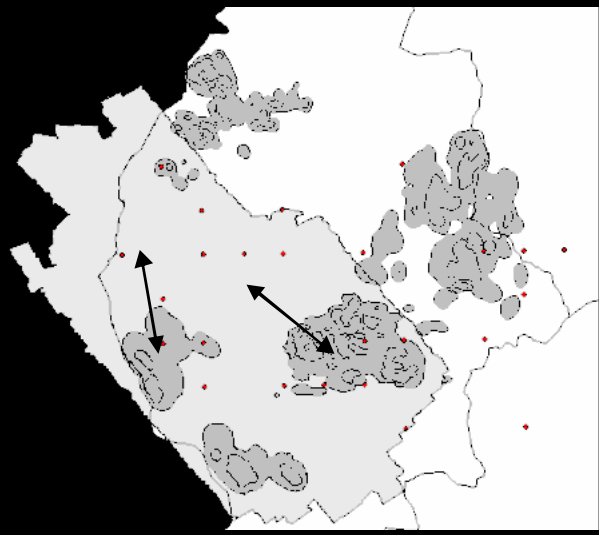
4th order selection:

A comparison of feeding areas with non-feeding areas.



3rd order selection:

A comparison of areas used within the home range (telemetry points) with available areas in the home range



2nd order selection:

A comparison of the home range with the surrounding landscape

Feeding data = June to November 2006-07

Two telemetry points per day ($N_{(non\text{-}feeding)} = 60$; $N_{(feeding)} = 82$)

Feeding location = fresh bites within a 10 m radius.

Herbaceous layer measurement:

- sward greenness, height and composition

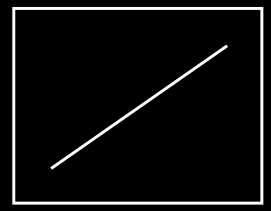
CAO Lidar:

- vegetation structure at different height levels
  - shrub cover (vegetation cover below 2 m)
  - tree cover (vegetation cover above 2 m)
- Distance to the nearest river channel
- Distance to the nearest termitaria
- Canopy spread

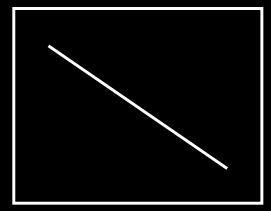
We analysed using GLM's with a binary response, a binomial error structure and a logit link

Model selection was based on Akaike information criterion (AIC)

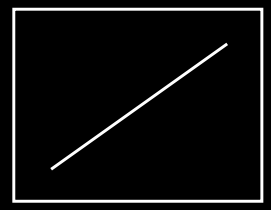
Probability of use vs Canopy cover



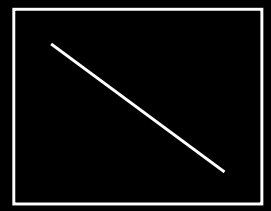
Probability of use vs Shrub cover



Probability of use vs rem



Probability of use vs Distance from termite mounds








Overview of previous work:

1. Sable depended on species such as *Panicum maximum*, *Hyperthelia dissoluta*, *Heteropogon contortus* and *Setaria sphacelata*

2. Sable were seldom found in bottomland areas

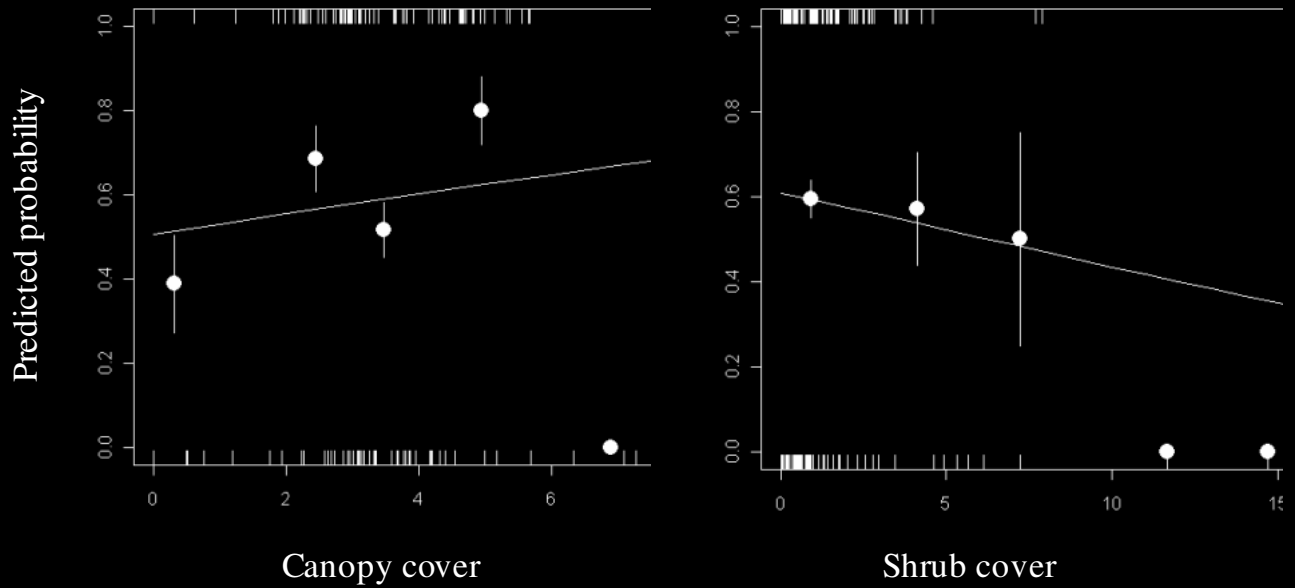
3. Sable fed more frequently in areas with intermediate to high tree canopy cover

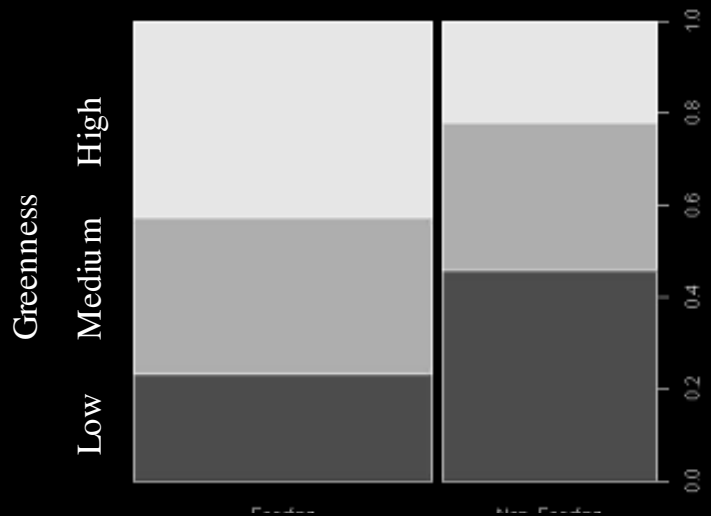
4. Sable fed from areas supporting the swards with the highest greenness available

4th order selection: Feeding sites vs Non-feeding sites

F_N ~ shrubcov + canopy + relgreen + shrubcov:canopy

(AIC = 177.17; Δ AIC = 1.46; "R^2" = 0.14)

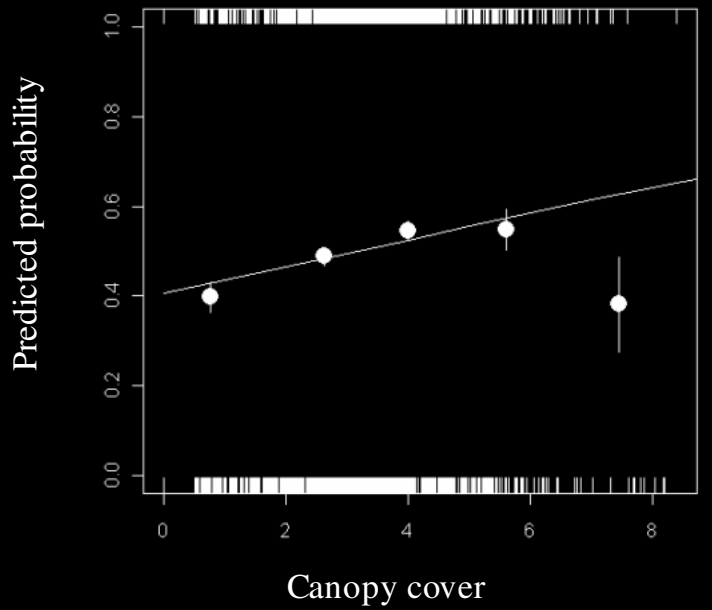


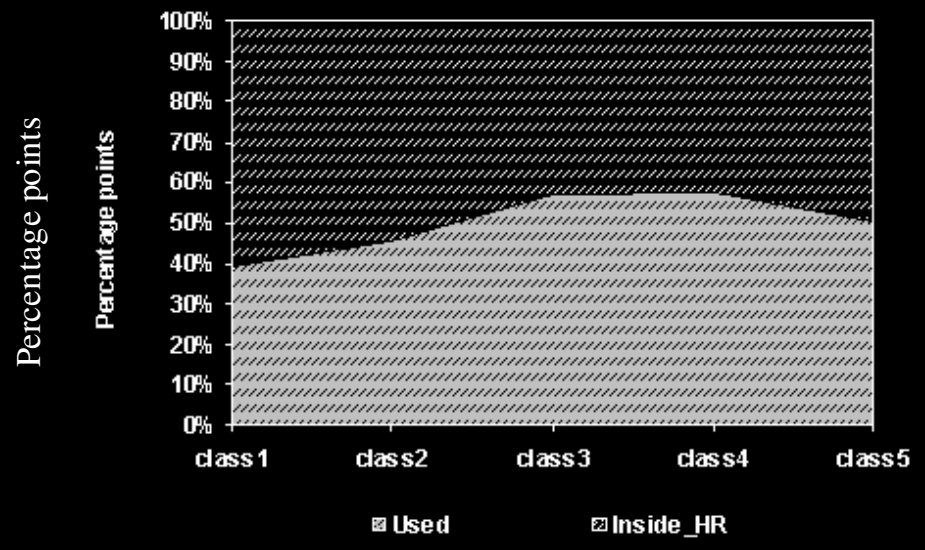


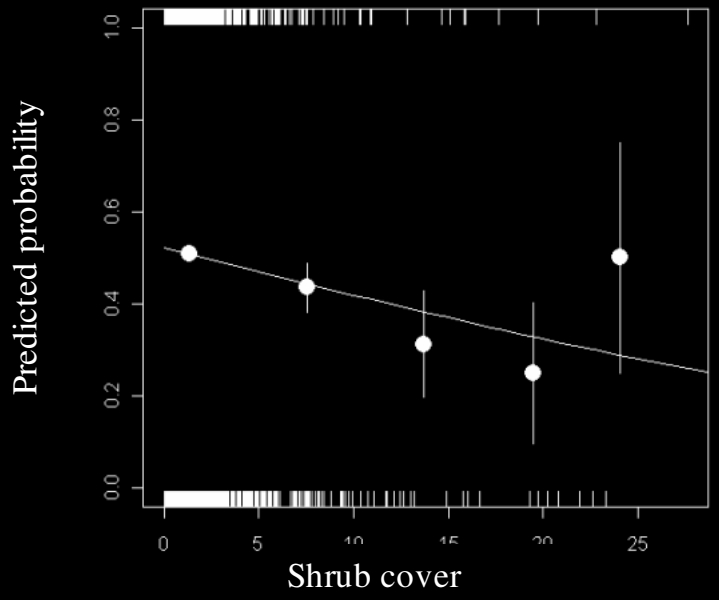
3rd order selection: Selection of habitat within the home range

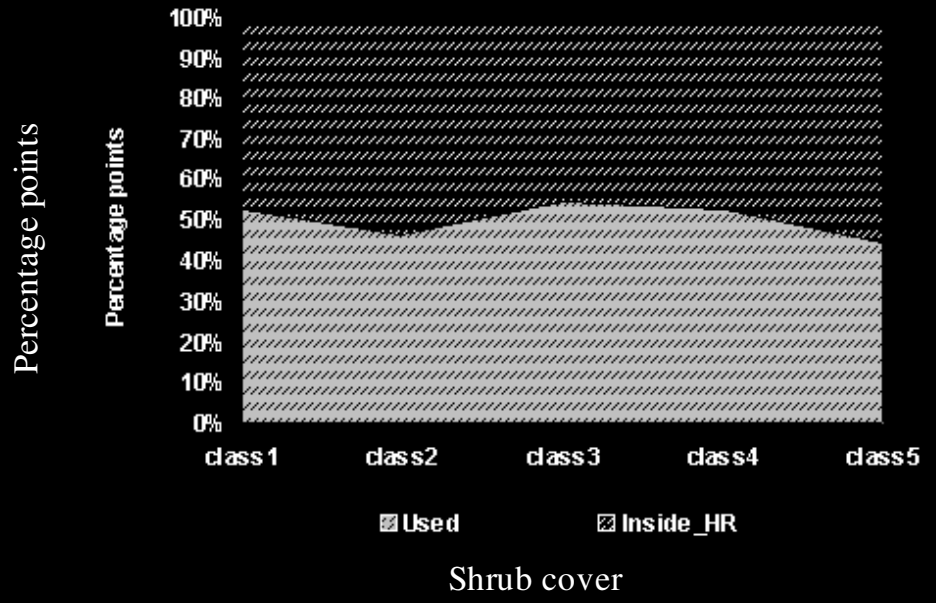
F_N ~ shrubcov + canopy + termitaria_distance + shrubcov:canopy

(AIC = 2044.2; Δ AIC = 0; "R^2" = 0.03)









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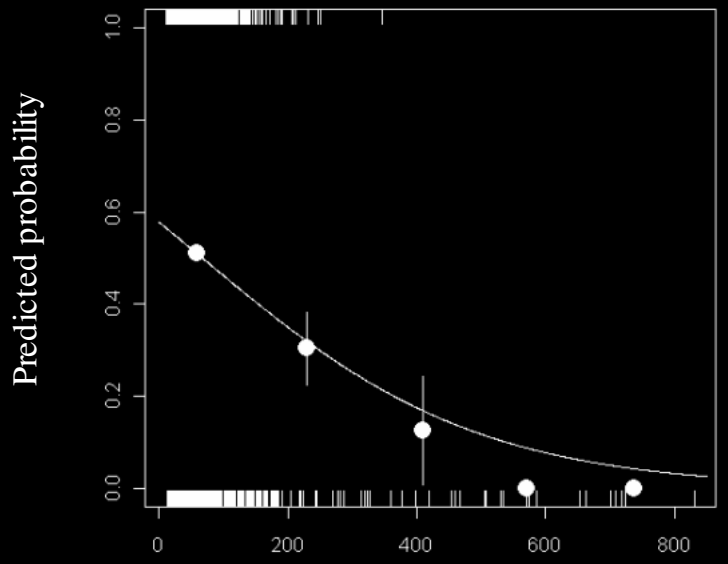
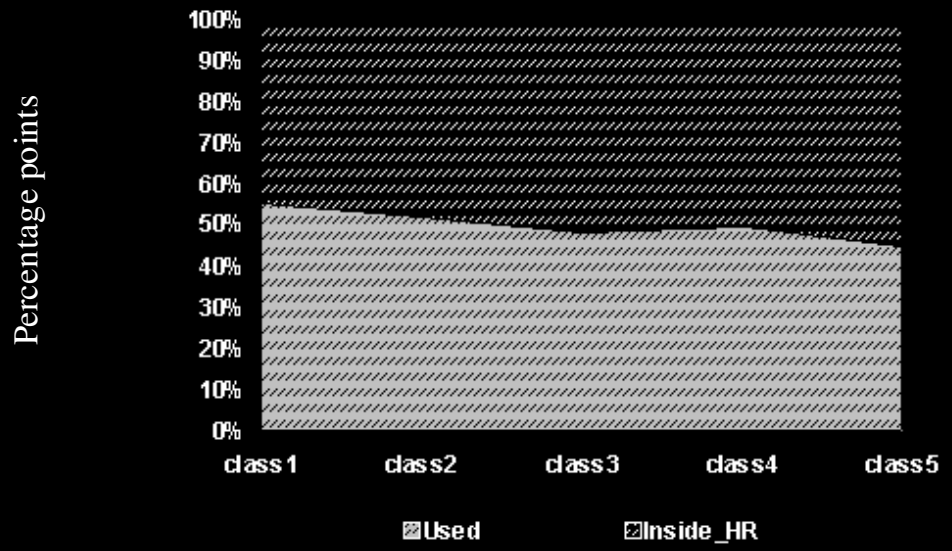


Distance to nearest termite mound

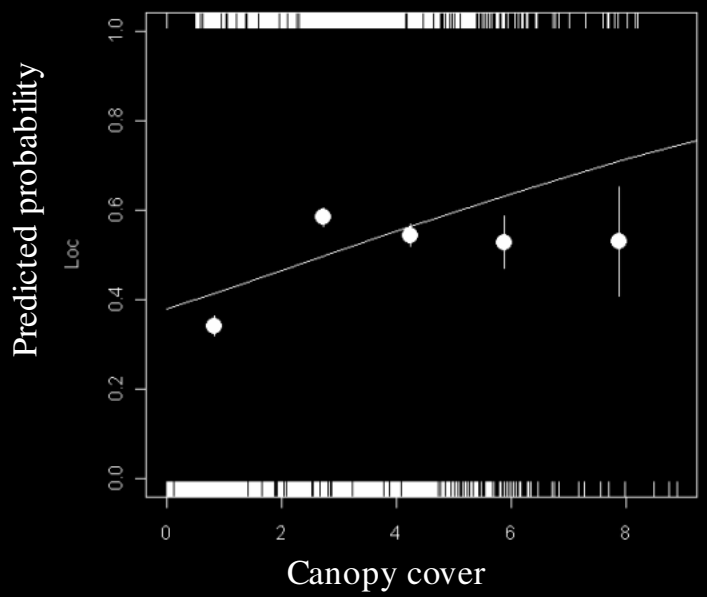


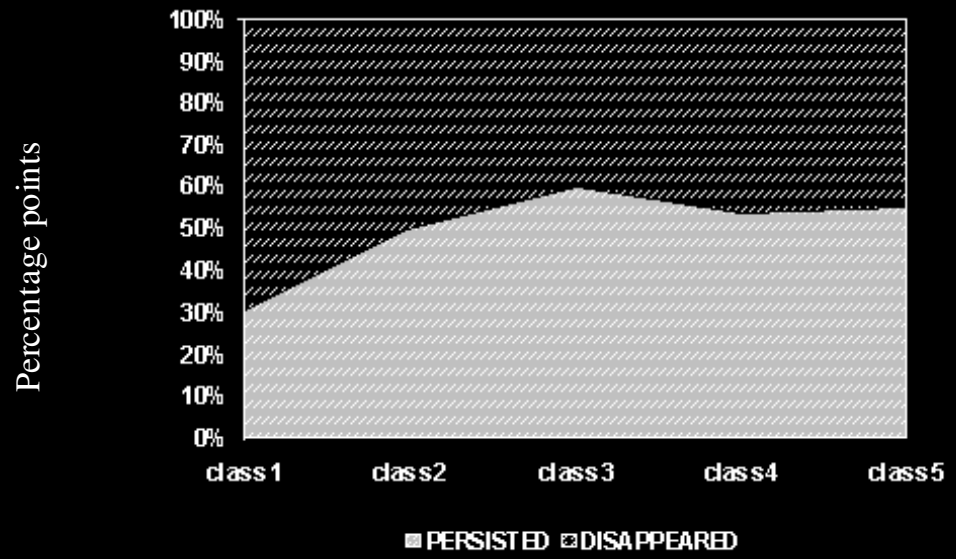
Distance to nearest termite mound

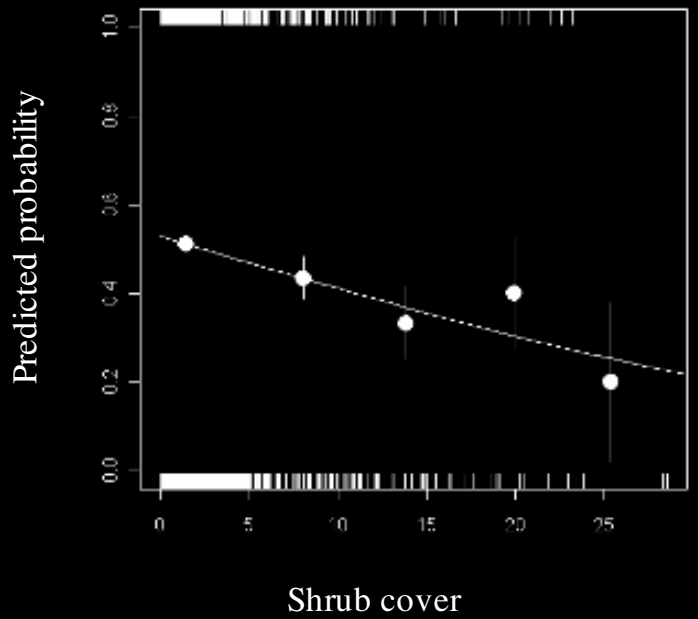
2nd order selection: Selection of home range within the surrounding landscape

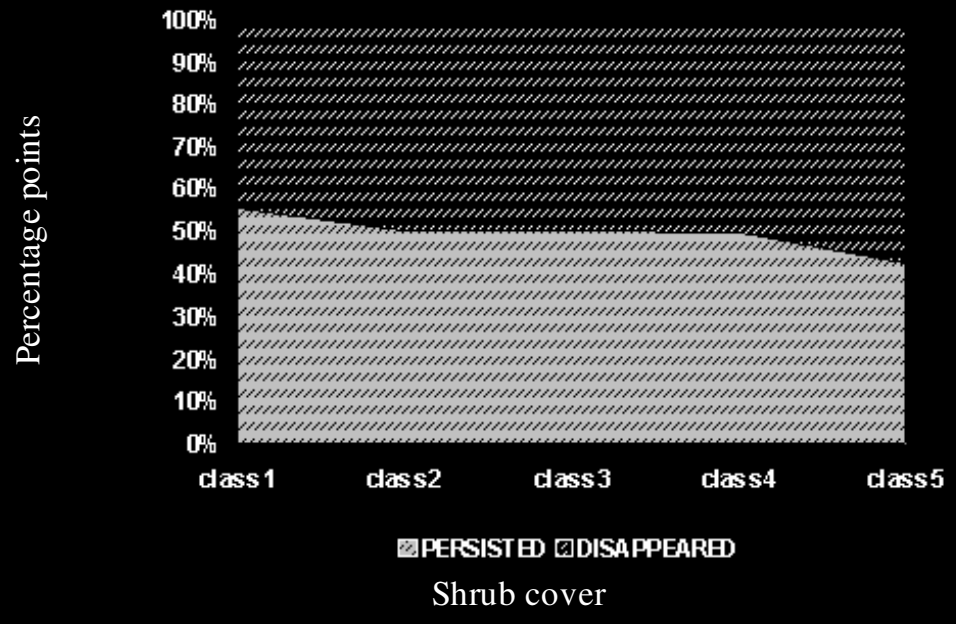
F_N ~ shrubcov + canopy + termitaria_distance + rem + shrubcov:canopy + shrubcov:rem

(AIC = 1975.7; Δ AIC = 0; "R^2" = 0.07)









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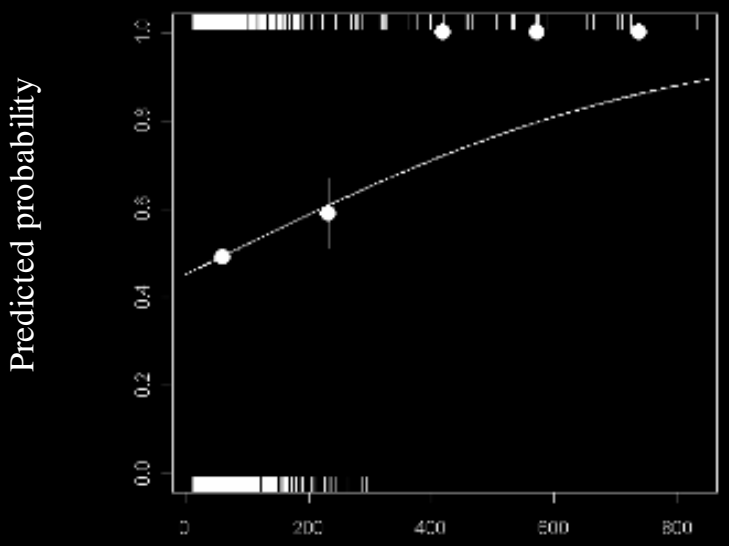

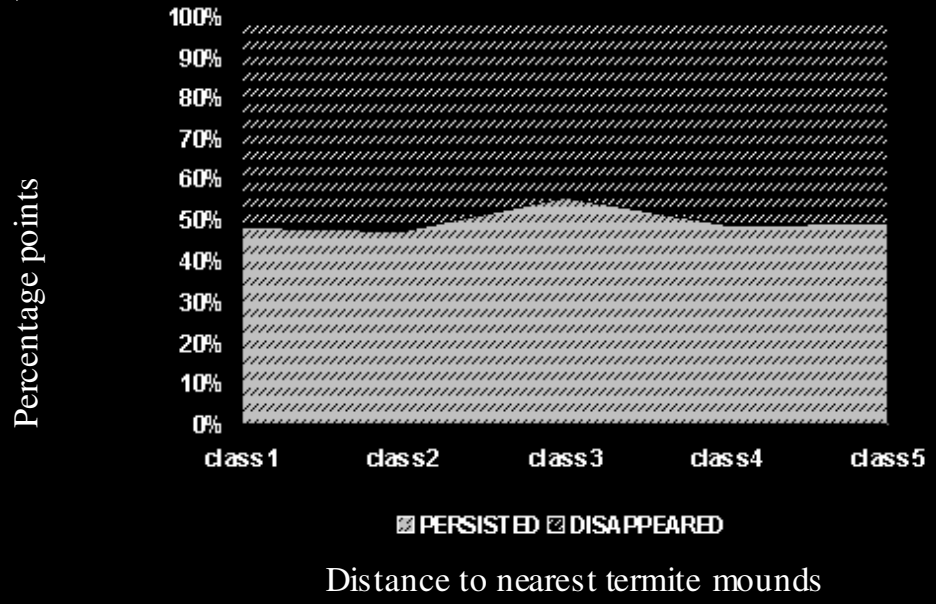

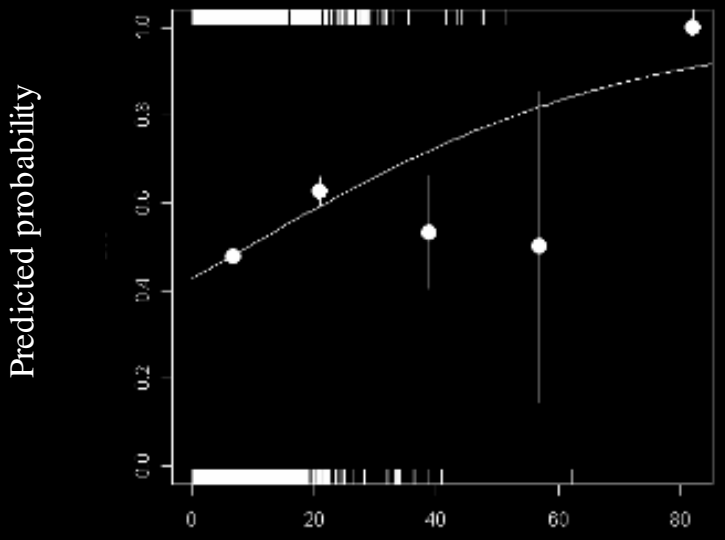

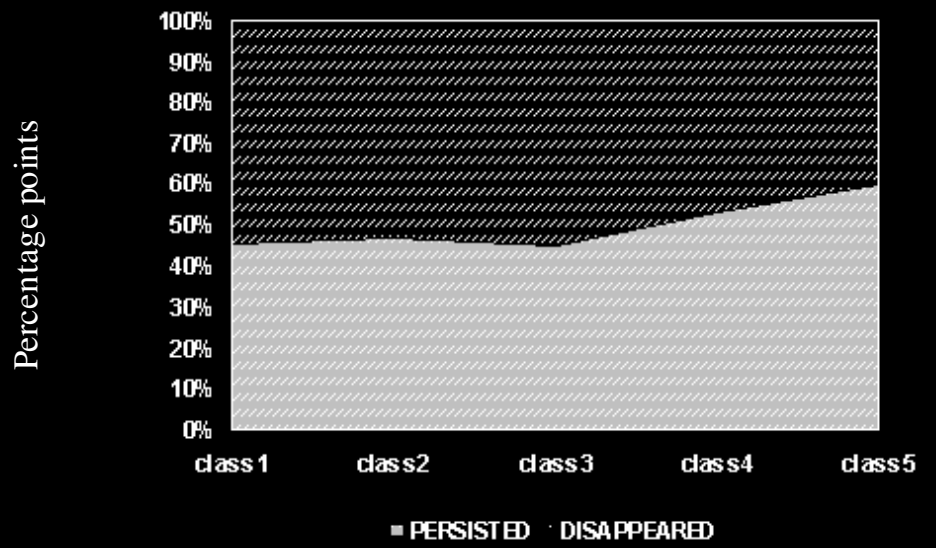

Summary

Sable seem to favour areas of intermediate to high tree canopy cover

There is no concrete evidence that they avoid shrubby areas

Sable avoid bottomland areas

Although the distance to termite mounds at first seemed inconsequential at smaller spatial scales, its influence becomes clear by merely changing the scale of inquiry

So what about the spatial pattern of sable decline?

The trends do seem mostly to follow our predictions, yet the signal is very weak and observed differences are unlikely to be biologically meaningful

Regions occupied by sable historically remains suitable

Future work:

Investigate differences in the grass layer

Acknowledgements

South African National Parks:

- Scientific Services
- Veterinary Services
- Section Rangers
- Khutani Bulunga

National Research Foundation

University of the Witwatersrand

References

Johnson, D.H. 1980. The comparison of usage and availability measurements for evaluating resource preference. *Ecology* **61:** 65 – 71.

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