

# Habitat selection and population dynamics of selected herbivores on Sondela Nature Reserve, Limpopo

by

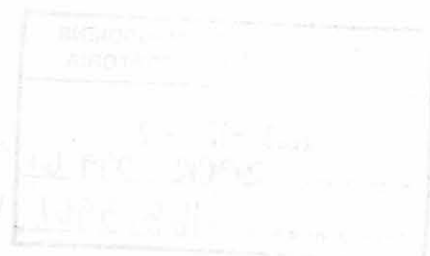
**Katie Bell**

Submitted in fulfilment of part of the requirements for the degree of  
*Magister Scientiae* in Wildlife Management

Centre for Wildlife Management  
Faculty of Natural and Agricultural Sciences  
University of Pretoria  
Pretoria

Supervisor: Prof W van Hoven

February 2003



**Habitat selection and population dynamics of selected herbivores on Sondela  
Nature Reserve, Limpopo**

**TABLE OF CONTENTS**

LIST OF TABLES .....	iv
LIST OF FIGURES .....	iv
LIST OF APPENDICES .....	vii
ACKNOWLEDGEMENTS .....	ix
ABSTRACT .....	x
INTRODUCTION .....	1
HABITAT SELECTION .....	1
POPULATION DYNAMICS .....	1
THE STUDY AREA .....	3
INTRODUCTION .....	3
<b>Location and size</b> .....	3
<b>Vegetation</b> .....	3
<b>Animals</b> .....	7
<b>Topography</b> .....	8
<b>Climate</b> .....	8
<b>Geology</b> .....	8
<b>Landtypes and soils</b> .....	12
HABITAT SELECTION .....	14
INTRODUCTION .....	14
METHODS .....	15
<b>Collection of data</b> .....	15
Distance from water .....	15
Erosion .....	15
Landscape position .....	15
Rock cover .....	16
Vegetation cover .....	16
Herbaceous height .....	16
Animals .....	16
<b>Statistical analysis</b> .....	17
Frequency histograms .....	17
Correspondence analysis .....	17

RESULTS AND DISCUSSION .....	18
<b>Frequency histograms</b> .....	18
Zebra .....	18
Impala .....	21
Giraffe .....	26
Kudu .....	28
Blue wildebeest .....	32
Blesbok .....	34
Gemsbok .....	39
Eland .....	43
<b>Activities</b> .....	46
<b>Correspondence analysis</b> .....	52
Zebra .....	52
Impala .....	52
Giraffe .....	57
Kudu .....	57
Blue wildebeest .....	62
Blesbok .....	62
Gemsbok .....	62
Eland .....	68
MANAGEMENT RECOMMENDATIONS .....	68
POPULATION DYNAMICS .....	72
INTRODUCTION .....	72
OBJECTIVES .....	73
METHODS .....	73
<b>Results</b> .....	74
Herd sizes .....	74
Sex ratio .....	78
<i>Zebra</i> .....	78
<i>Impala</i> .....	78
<i>Giraffe</i> .....	78
<i>Kudu</i> .....	78
<i>Blue wildebeest</i> .....	78
Age structure .....	78
<i>Zebra</i> .....	78
<i>Impala</i> .....	82

	<i>Giraffe</i> .....	82
	<i>Kudu</i> .....	82
	<i>Blue wildebeest</i> .....	82
<b>Discussion</b> .....		82
<b>Sex ratio</b> .....		82
<i>Zebra</i> .....		82
<i>Impala</i> .....		82
<i>Giraffe</i> .....		85
<i>Kudu</i> .....		85
<i>Blue wildebeest</i> .....		85
<b>Age structure</b> .....		85
<i>Zebra</i> .....		85
<i>Impala</i> .....		85
<i>Giraffe</i> .....		86
<i>Kudu</i> .....		86
<i>Blue wildebeest</i> .....		86
<b>Management recommendations</b> .....		86
<b>REFERENCES</b> .....		87
<b>APPENDIX</b> .....		90

(d) grass cover

Figure 12: Seasonal frequency distribution of zebra in relation to:

(a) erosion

## LIST OF TABLES

Table 1: The plant communities and variations found on Sondela Nature Reserve (van Wijk 1996) .....	7
Table 2: Classes of cover for different vegetation layers .....	16

## LIST OF FIGURES

Figure 1: Map indicating the location of Sondela Nature Reserve .....	4
Figure 2: The land use zones of Adinvale .....	5
Figure 3: Plant communities found on Sondela Nature Reserve .....	6
Figure 4: Monthly rainfall on Sondela Nature Reserve .....	9
Figure 5: Maximum monthly temperatures found on Sondela Nature Reserve.....	10
Figure 6: Minimum monthly temperatures found on Sondela Nature Reserve ....	11
Figure 7: Soil types found on Sondela Nature Reserve .....	13
Figure 8: Seasonal frequency distribution of zebra in relation to: .....	19
(a) erosion	
(b) rocks	
(c) water	
(d) landscape	
(e) grass length	
Figure 9: Seasonal frequency distribution of zebra in relation to: .....	20
(a) shrub cover	
(b) tree cover (2-6m)	
(c) tree cover (>6m)	
(d) grass cover	
Figure 10: Seasonal frequency distribution of impala in relation to: .....	22
(a) erosion	
(b) rocks	
(c) water	
(d) landscape	
(e) grass length	
Figure 11: Seasonal frequency distribution of impala in relation to: .....	24
(a) shrub cover	
(b) tree cover (2-6m)	
(c) tree cover (>6m)	

- (d) grass cover

Figure 12: Seasonal frequency distribution of giraffe in relation to: .....25

- (a) erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 13: Seasonal frequency distribution of giraffe in relation to: .....27

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 14: Seasonal frequency distribution of kudu in relation to: .....29

- (a) erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 15: Seasonal frequency distribution of kudu in relation to: .....31

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 16: Seasonal frequency distribution of blue wildebeest in relation to: ..... 33

- (a) erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 17: Seasonal frequency distribution of blue wildebeest in relation to: ..... 35

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 18: Seasonal frequency distribution of blesbok in relation to: .....37

- (a) Erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 19: Seasonal frequency distribution of blesbok in relation to: .....38

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 20: Seasonal frequency distribution of gemsbok in relation to: .....40

- (a) erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 21: Seasonal frequency distribution of gemsbok in relation to: .....42

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 22: Seasonal frequency distribution of eland in relation to: .....44

- (a) erosion
- (b) rocks
- (c) water
- (d) landscape
- (e) grass length

Figure 23: Seasonal frequency distribution of eland in relation to: .....45

- (a) shrub cover
- (b) tree cover (2-6m)
- (c) tree cover (>6m)
- (d) grass cover

Figure 24: Seasonal frequency distribution, showing activity of: .....47

- (a) zebra
- (b) impala

Figure 25: Seasonal frequency distribution, showing activity of:	48
(a) giraffe	
(b) kudu	
Figure 26: Seasonal frequency distribution, showing activity of:	50
(a) blue wildebeest	
(b) blesbok	
Figure 27: Seasonal frequency distribution, showing activity of:	51
(a) gemsbok	
(b) eland	
Figure 28: Correspondence analysis showing the plot of season versus plant community for zebra	53
Figure 29: Correspondence analysis showing the plot of season versus association for zebra	54
Figure 30: Correspondence analysis showing the plot of season versus plant community for impala	55
Figure 31: Correspondence analysis showing the plot of season versus association for impala	56
Figure 32: Correspondence analysis showing the plot of season versus plant community for giraffe	58
Figure 33: Correspondence analysis showing the plot of season versus association for giraffe	59
Figure 34: Correspondence analysis showing the plot of season versus plant community for kudu	60
Figure 35: Correspondence analysis showing the plot of season versus association for kudu	61
Figure 36: Correspondence analysis showing the plot of season versus plant community for blue wildebeest	63
Figure 37: Correspondence analysis showing the plot of season versus association for blue wildebeest	64
Figure 38: Correspondence analysis showing the plot of season versus plant community for blesbok	65
Figure 39: Correspondence analysis showing the plot of season versus association for blesbok	66
Figure 40: Correspondence analysis showing the plot of season versus plant community for gemsbok	67



Figure 41: Correspondence analysis showing the plot of season versus association for gemsbok .....	69
Figure 42: Correspondence analysis showing the plot of season versus plant community for eland .....	70
Figure 43: Correspondence analysis showing the plot of season versus association for eland .....	71
Figure 44: Mean, minimum and maximum herd sizes over the year for: .....	75
(a) zebra	
(b) impala	
Figure 45: Mean, minimum and maximum herd sizes over the year for: .....	76
(a) giraffe	
(b) kudu	
Figure 46: Mean, minimum and maximum herd sizes over the year for blue wildebeest .....	77
Figure 47: Frequency distribution of sex ratios of: .....	79
(a) zebra	
(b) impala	
Figure 48: Frequency distribution of sex ratios of: .....	80
(a) kudu	
(b) blue wildebeest	
Figure 49: Age structure of: .....	81
(a) zebra	
(b) impala	
Figure 50: Age structure of: .....	83
(a) giraffe	
(b) kudu	
Figure 51: Age structure of blue wildebeest .....	84

## LIST OF APPENDICES

- Appendix 1. Habitat selection recording sheet
- Appendix 2. Population dynamics recording sheet

## ACKNOWLEDGEMENTS

Many thanks to the Centre for Wildlife Management for making the project possible at all – Prof Van Hoven, Ben and Liset in particular.

To Dr Mike Van Der Linde for making statistics sound easy...

To 'Lena, Ian, Danielle and Simone for making Sondela such a special place.

For the completion of this manuscript I thank my husband, Greg, for his unwavering support, my dearest friends Nicky and Liesl for believing it possible, my parents for giving me the opportunity and my daughter Zoë for sleeping long enough to allow me to finish.

## ABSTRACT

The first part of this thesis investigates the habitat selection of the following herbivores on Sondela Nature Reserve, Limpopo: zebra; impala; giraffe; kudu; blue wildebeest; blesbok; gemsbok and eland.

The main findings indicated that the majority of the species studied congregated in the large grassland community *Chloris virgata* - *Cynodon Dactylon* during the summer season. As this area is already low on surface cover and sensitive to erosion, it is recommended that management use appetite stimulating licks in under utilised areas during summer to attract these species.

The second part of this thesis explores the population dynamics of the following herbivores on Sondela: zebra; impala; kudu; giraffe and blue wildebeest.

The most important findings showed that the populations of all the species has been through a rapid growth phase, with all the herds showing a large percentage of young animals. This leaves the population vulnerable to diseases affecting young animals.

Furthermore, the sex ratios of zebra, kudu and giraffe indicate that there are too few female animals for optimum production.