

Introduction of Giraffe Outside their Historical Range Alters the Distribution of *Acacia* Species



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Introduction

- Giraffes are megaherbivores (> 1000 kg) currently introduced in KZN savanna ecosystems outside their historical range
- Megaherbivores shape ecosystem by changing vegetation
 - structure,
 - density,
 - composition
 - distribution (both spatial and temporal)

Owen Smith (1987)



Origin of the study

1. Bond and Loffell 2001 - Ithala GR

Some *Acacia* species gone extinct or significantly reduced from landscape as a result of giraffe

- e.g. a) *A. davyi* 100% mortality
- b) *A. caffra* 60% mortality

Problem - local conclusion

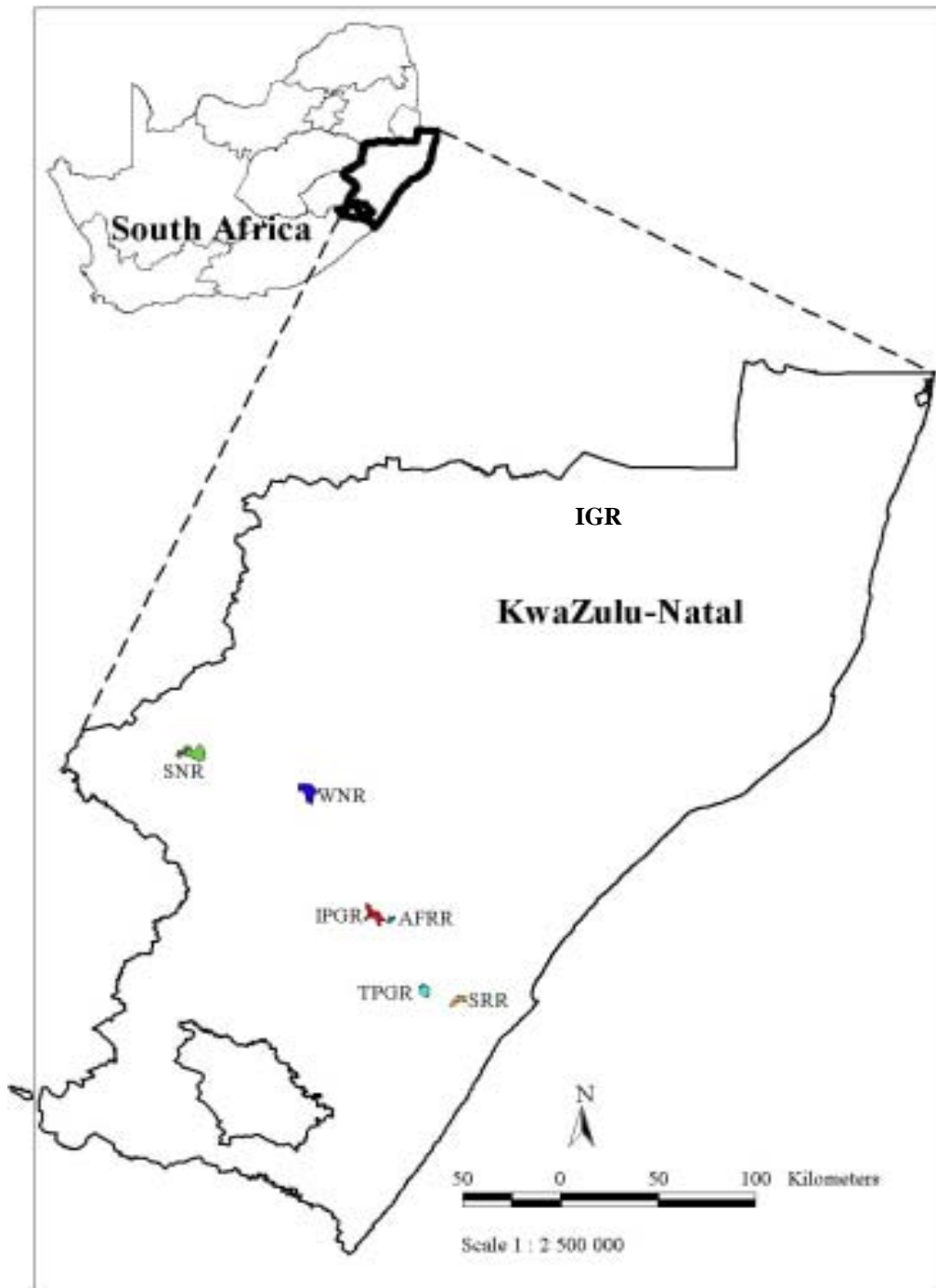


2. Concerns from some staff members in KZN midlands reserves about *Cussonia spp.* and *A. sieberiana*



Therefore, this follow-up comparative study over a wide range of environments

6 reserves sampled and compared



Study sites

Basis of selection

- Rainfall/Altitudinal gradient
- History
- Densities
- Presence

Questions and objectives

- Is there any geographic variation in browse impact?

(do giraffe have much larger impact in some areas than others?)

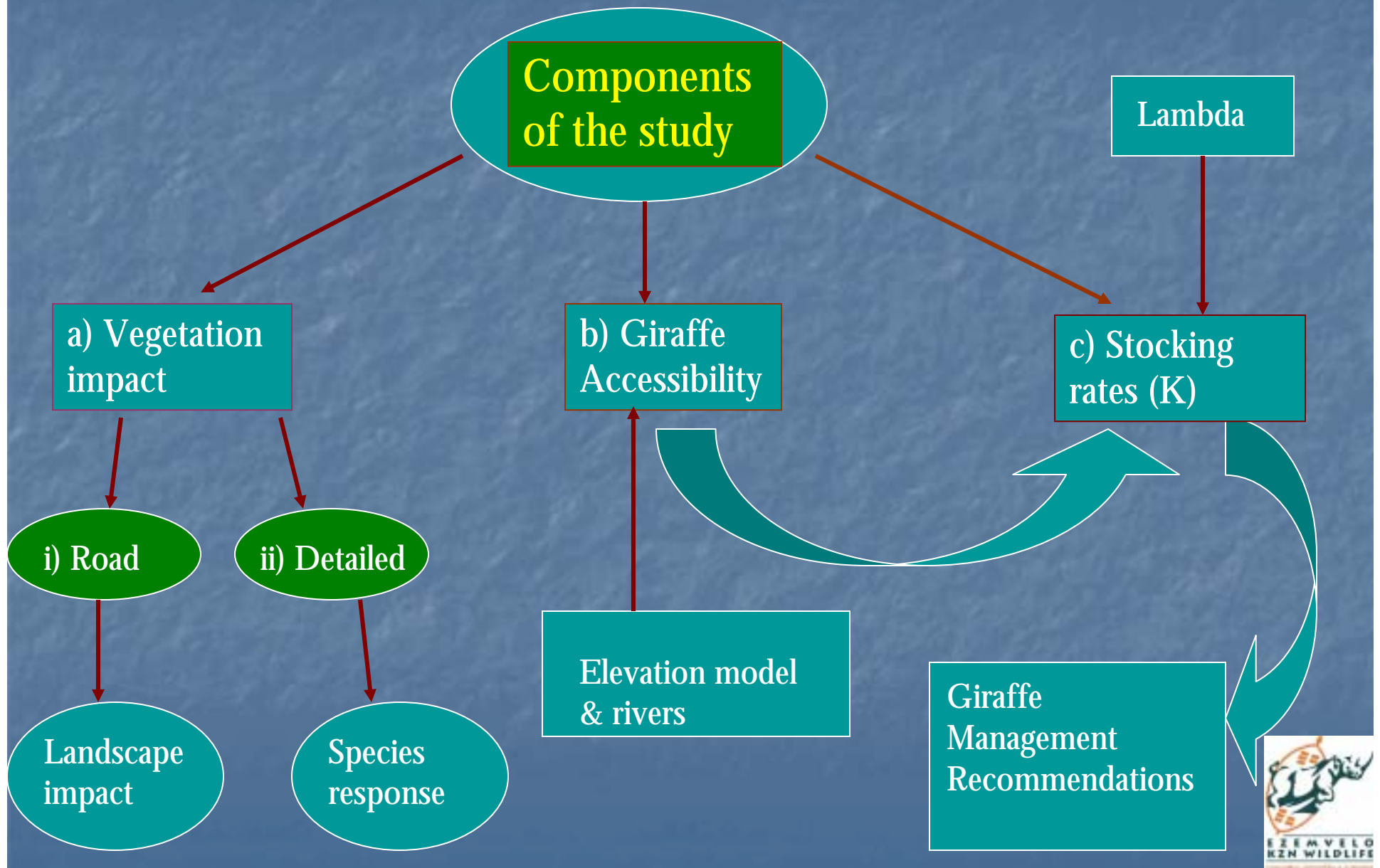
- addressing IGR results in broader scale

- If there is, then what might account for it

Our Hypotheses

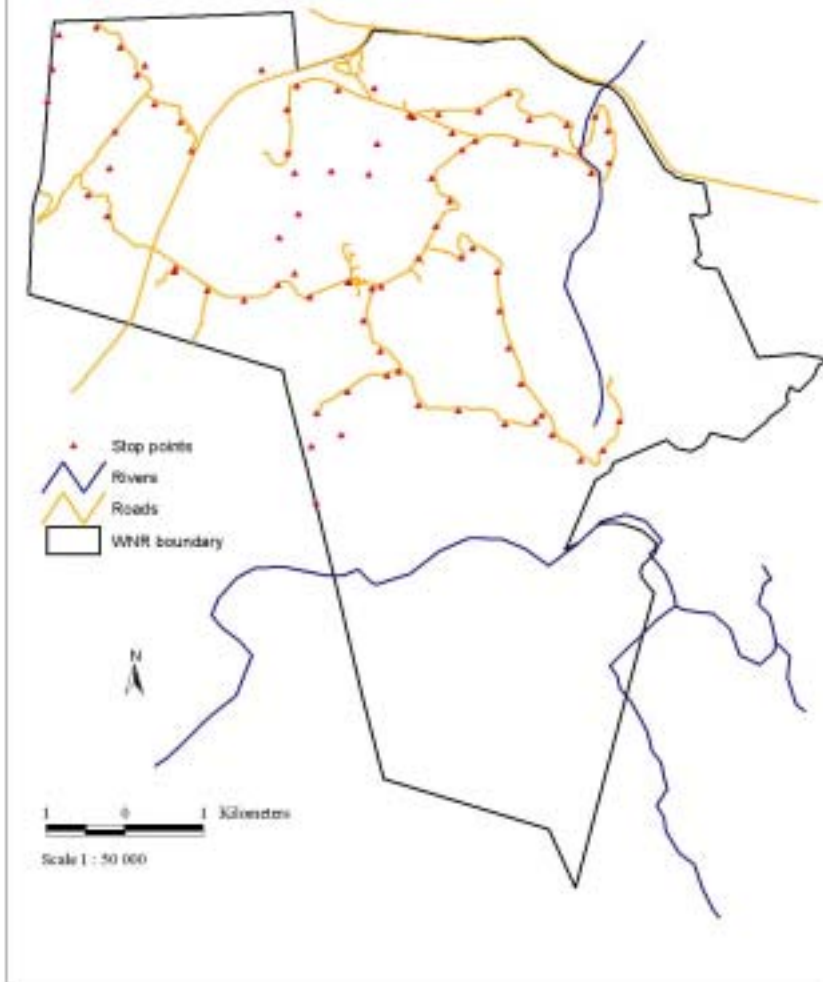
- a) Rainfall - ↑ rainfall ↓ impact on vegetation
- b) % evergreen - ↑ % ↓ impact on Acacia species during winter bottleneck
- c) Altitude - ↑ m.a.s.l. ↑ impact on vegetation
- d) Number of years - ↑ years ↑ impact on vegetation
- e) Current numbers - ↑ numbers ↑ impact on vegetation
- f) Cumulative numbers - ↑ numbers ↑ impact on vegetation

Study Methodology and Breakdown

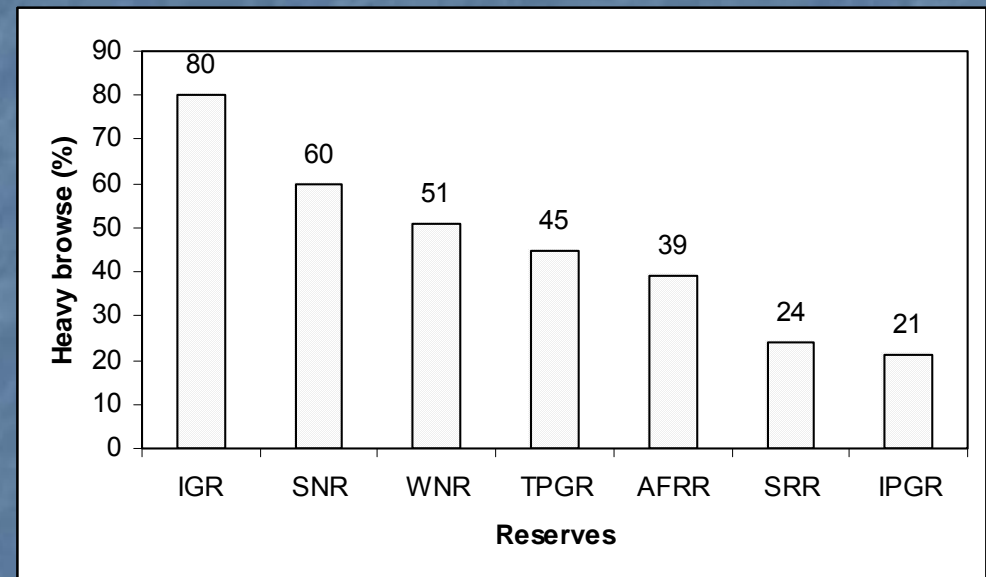


Results: a) Vegetation Impact

Sampled areas in Weenen Nature Reserve



i) Landscape impact



- Sampling followed road network of reserves

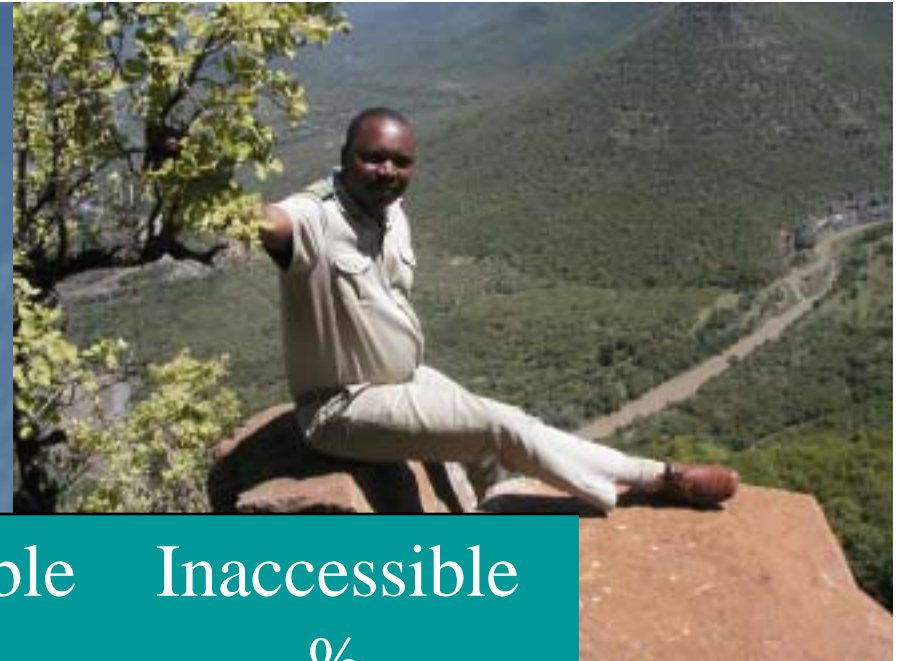
Detailed Transects – ii) Species response

Reserve	Species	Inside			Outside / low density (<i>n=inside</i>)	
		<i>n</i>	% dead (<i>n</i>)	% dead >6m (<i>n</i>)	% dead (<i>n</i>)	<i>P</i>
SNR	<i>A. karroo</i>	234	49.6 (116)	3.4 (4)	3.0 (7)	<0.001
	<i>A. sieberiana</i>	234	32.9 (77)	14.3 (11)	0 (0)	<0.001
WNR	<i>A. karroo</i>	234	32.5 (76)	0 (0)	2.6 (6)	<0.001
	<i>A. sieberiana</i>	156	9.0 (14)	42.9 (6)	0 (0)	<0.05
TPGR	<i>A. karroo</i>	234	54.3 (127)	17.3 (22)	3.8 (9)	<0.001
AFRR	<i>A. sieberiana</i>	228	32.0 (73)	8.2 (6)	0.4 (1)	<0.001
IPGR	<i>A. sieberiana</i>	234	9.0 (21)	14.3 (3)	0.4 (1)	<0.05





b) Giraffe accessibility (Refugia???)



Reserve	Accessible (ha)	Inaccessible (ha)	Inaccessible %
WNR	3578	1313	27
TPGR	1884	21	1
AFRR	695	2	0
SRR	990	585	37
IPGR	2763	722	21

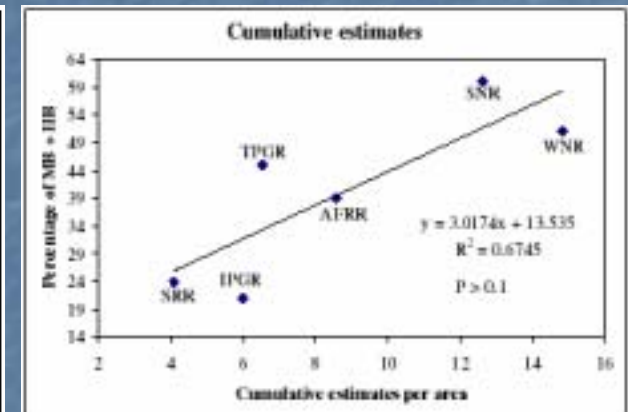
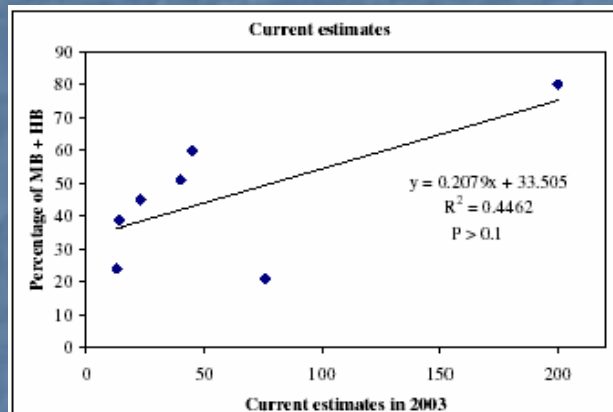
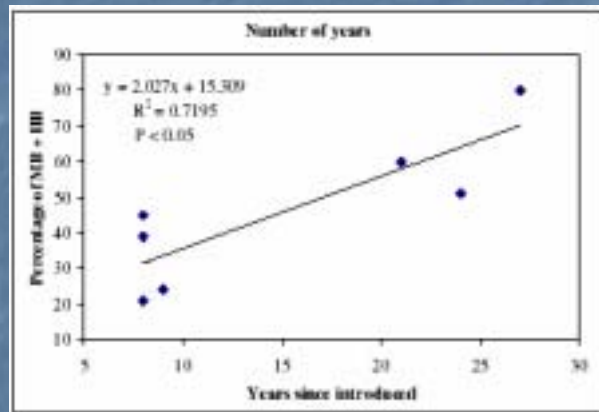
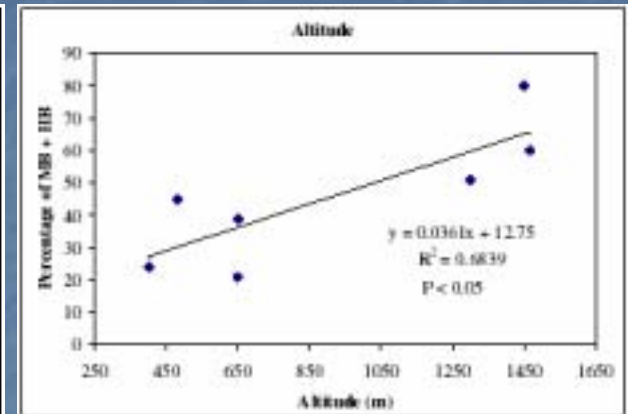
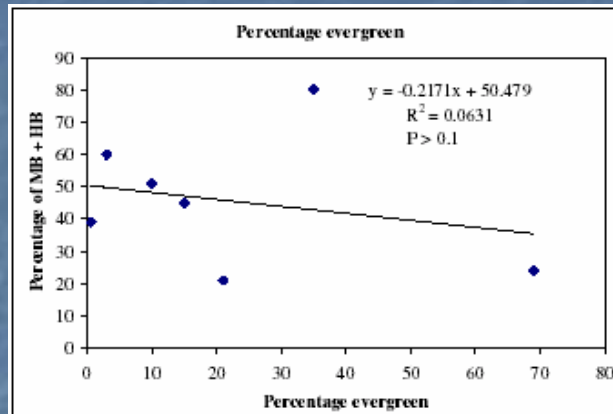
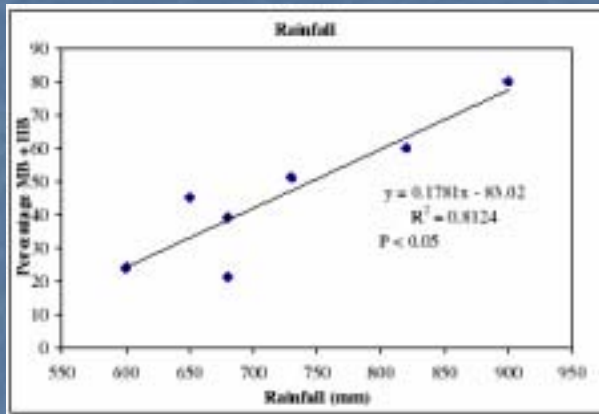
Slope & river barriers



c) Stocking rates / (K)

Reserve	Current N and densities (animal/km ²)	Estimated K	Inaccessible area %
SNR	45 (1.2)	38	15 (est.)
WNR	40 (1.1)	36	27
TPGR	23 (1.2)	19	1
AFRR	14 (2)	7	0
SRR	13 (0.9)	15	37
IPGR	76 (2.8)	28	21

What Cause Variation? Our hypotheses



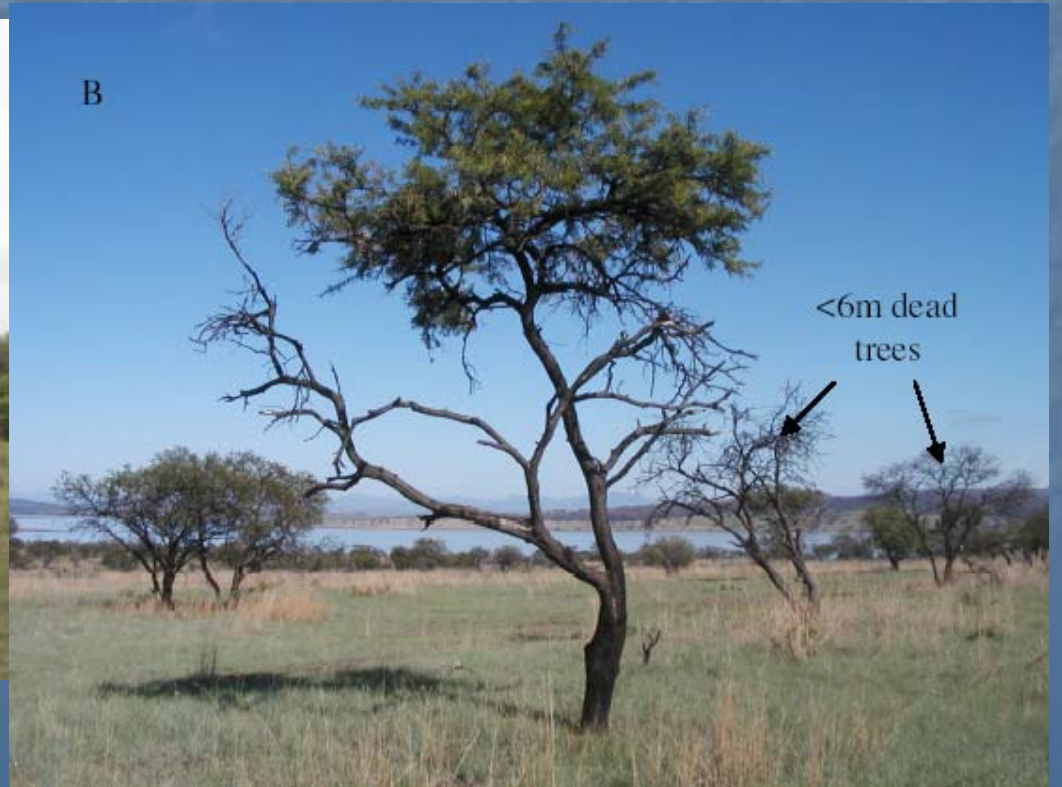
1. Rainfall – Yes but reverse expectation – other causes overrode rainfall
2. Altitude - Yes
3. # of years – Yes

Conclusions – so what !!!

- At the current rate of mortalities certain preferred species will be eliminated from giraffe accessible landscapes
- Only reserves with areas inaccessible to giraffe ('refugia') will escape local extinction of preferred species
- There still no full understanding of where giraffe could be introduced without impacting/eliminating **sensitive** species

Conclusions- Continues....

- Game ranches/reserves in KZN midlands savanna can lower the rate of impact by having maximum stocking rates of 1.23 ± 0.20 giraffe/km²
- Elimination of indigenous species by 'aliens' will always remain a serious concern in the field of conservation



END