



Kruger's Elephants

Rudi van Aarde





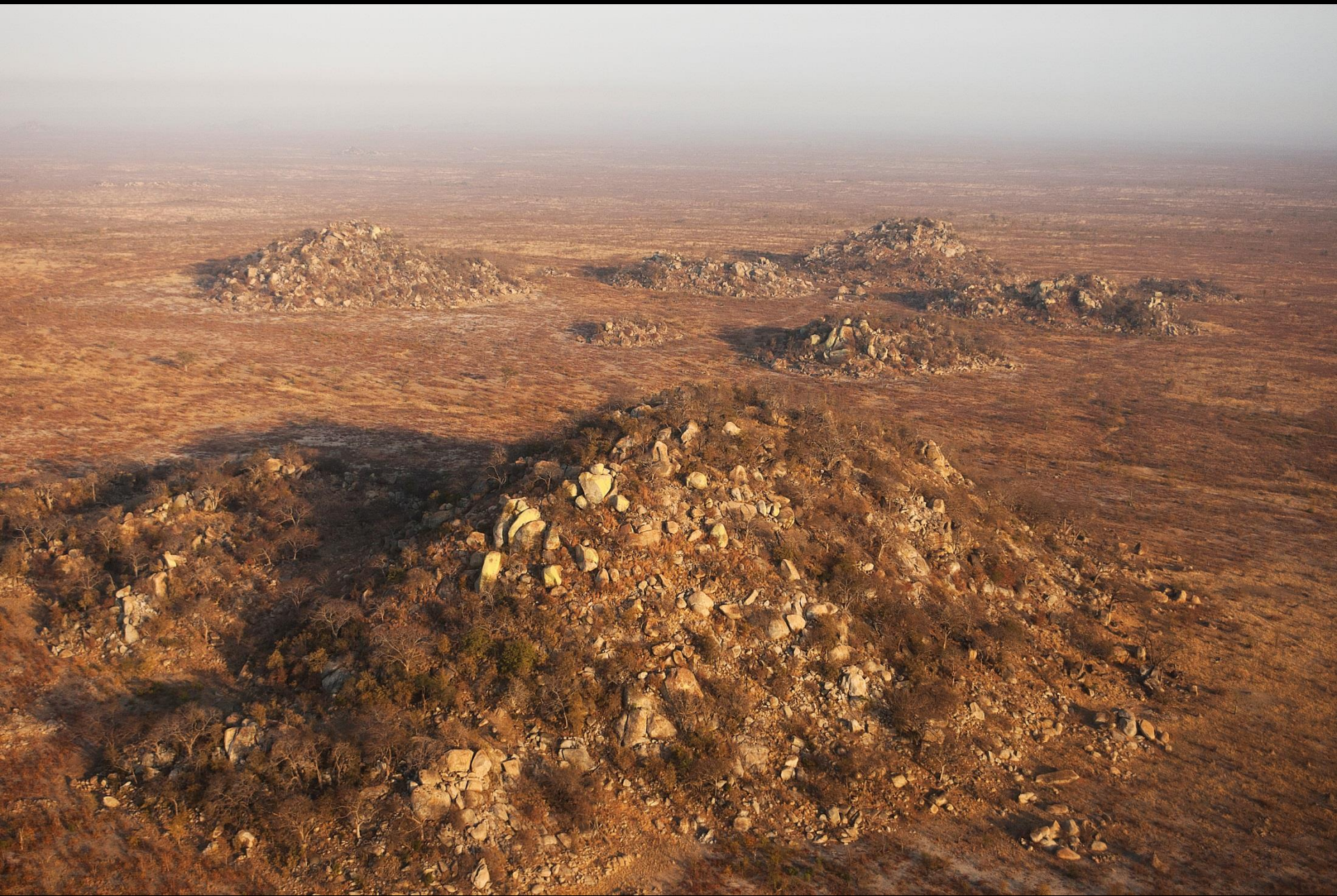












































Protected Areas in South Africa

- About 7% of the land set aside as formally protected areas, 56% as 19 national parks and 44% as 390 provincial parks;
- 558 formally protected estates in South Africa (mostly IUCN category 2);
- About 17% (205 00km²) of the land covered by privately owned informal protected areas (game farms, etc., mostly IUCN category 6).

Parks have Problems !!



There are too few!

There are too many!

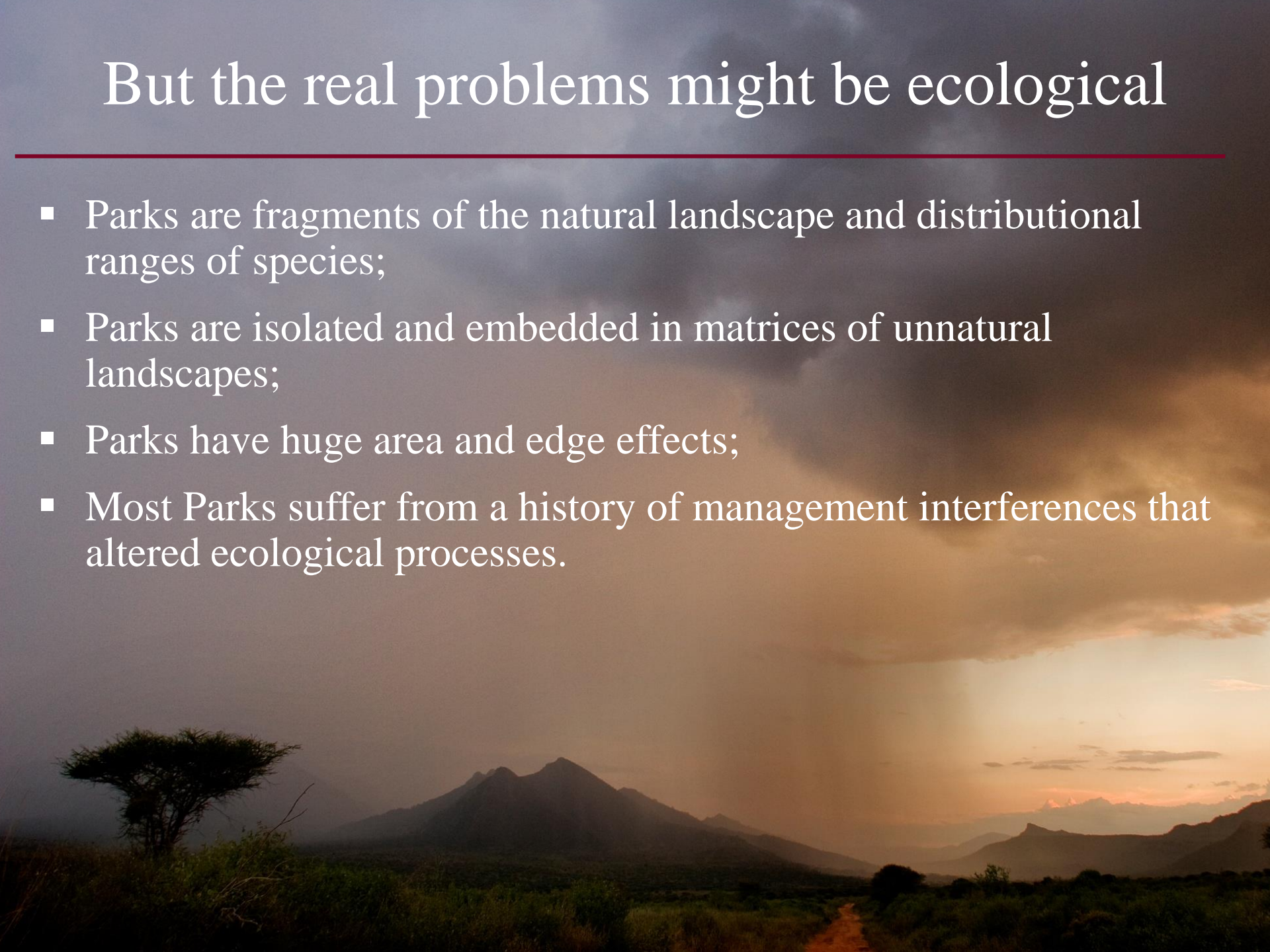
They are ill or may be ill!

They breed too fast, or too slow!

They threaten our well-being!

But the real problems might be ecological

- Parks are fragments of the natural landscape and distributional ranges of species;
- Parks are isolated and embedded in matrices of unnatural landscapes;
- Parks have huge area and edge effects;
- Most Parks suffer from a history of management interferences that altered ecological processes.



Protected areas in South Africa



- Doubled in area since 1974;
- Protects species and allow for ecological processes;
- Sufficient but not efficient;
- Plagued with limitations imposed by ecological realities.

Conservation & Politics

- Space limited;
- Political and financial development models in conflict with conservation needs;
- Conservation has a colonial tradition that ignores the needs of people;
- Rates of environmental change exceeds the adaptive potential and ecological plasticity of species.



GRAHAM & TRISH McEILL
20/06/2013



CITIZEN PETER MASCHER

LOOK MOM,
THERE'S A
TREE



ELEPHANT

I SAY WE SCRAP
THE CONTRACEPTION
IDEA.



STOP IT
MARTHINUS
- YOU'RE
CULLING
ME!

DOV FEDOR '05

Lens

Jumbo birth control drives bull elephants wild

Ellen Barrett, Johannesburg

This first field trials of an elephant pill have been suspended. The trials, taking place in South Africa's Kruger National Park, have thrown order into turmoil.

Normally orderly elephant herds here into turmoil. A team of scientists led by Dr. Robert Mittermeier, a member of a team of scientists at the Institute for Zoo Biology and Animal Research in Berlin, is conducting research in Kruger National Park on elephant oestrogen levels. The research is part of a project to control elephant numbers in the park. The project is being funded by the German government and the Kruger National Park. The project is being funded by the German government and the Kruger National Park.



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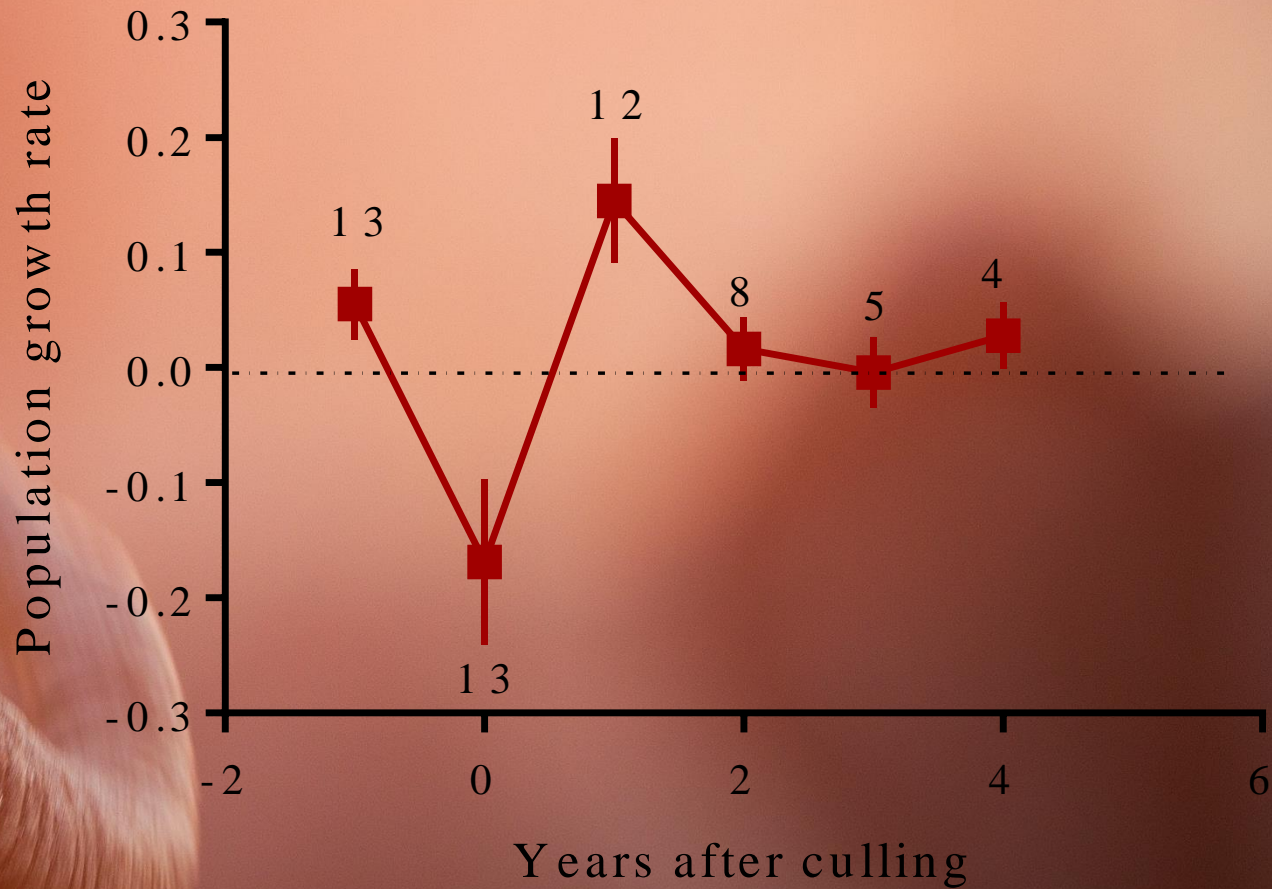
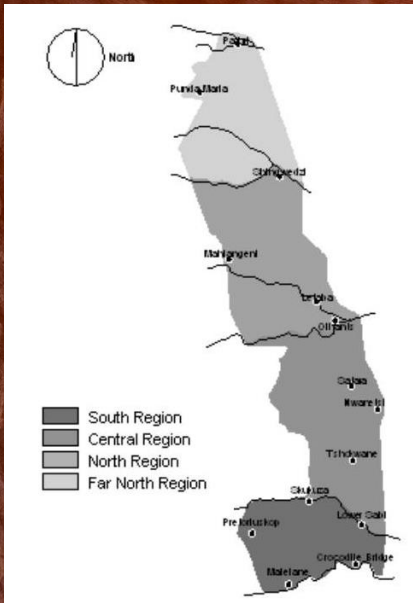
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Elephant culling controversy back on the agenda

State considers options as number

support for culling from scien- the el
tists and wildlife managers who to r
see no alternative to putting a i
ailing on uncontrolled growth in
off parks with finite natu
said on





Department of Environmental Affairs and Tourism

Statement on Elephant Science Roundtable, Cape Town,
Wednesday 18 January 2006

Scientists participating in Cape Town today advised the Minister of Environmental Affairs & Tourism, Marthinus van Schalkwyk, **that there is no compelling evidence to suggest the need for immediate, large-scale reduction of elephant numbers in the Kruger National Park.**

Even so, in some protected areas....., elephant density, distribution and population structure may need to be managed locally to meet biodiversity and other objectives.

The Art of Wildlife Management



- Catatonic – *do what ‘needs’ to be done but never learn*
- Reactive – *Firefighting*
- Passive adaptive – *Change in response to experience*
- Active adaptive – *Plan and alter management as a scientific experiment (Walker 1998).*









Measure back lengths

Record cow-calf relations

Estimate shoulder height

Assign ages

Age at first calving

Calving interval

Age at last calving

Fecundity

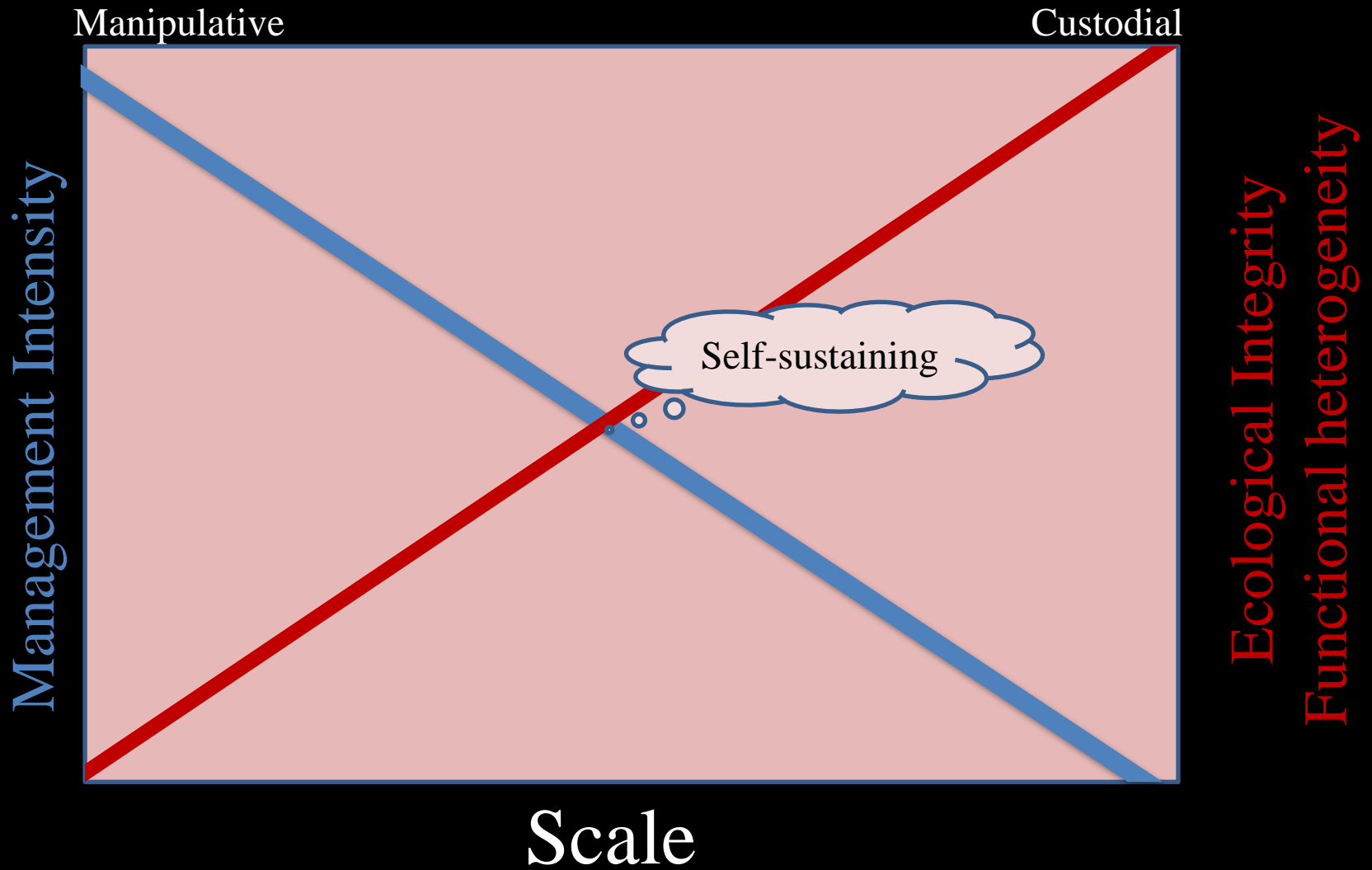
Age structure

Survival rates
Intrinsic growth

A Rapid Method to Estimate Population Variables for African Elephants
SAMI M. FERREIRA, Conservation Ecology Research Unit, Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa
RUDI J. VAN AARDE, Conservation Ecology Research Unit, Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa
ABSTRACT We developed a systematic method to estimate reproductive and survival parameters for free-ranging African savanna elephants (*Loxodonta africana*) and used these to estimate finite population growth rate. We used published data from 2 populations with known parent-offspring and cow-calf relations to validate our technique. Based on body measurements, we methodically estimated age at first and last calving, calving intervals and age-specific survival rates that were similar to those determined during long-term studies at Kruger National Park and Addo National Park. Our technique generated population data required to estimate population growth rate and wildlife management. *J. WILDLIFE MANAGEMENT* 72(3):822-829, 2008



Conceptual model





a mega-park the elephant

something like contractions
billion growth rates."

Stout said that

the development of
soon make it a

advances
technology wo

The Kruger park has
a population grow

more than 700

Defining a ‘Megapark’

A unit of space that encapsulates ecosystem services (*e.g.* water catchment, migratory patterns and that stabilizes biological diversity)

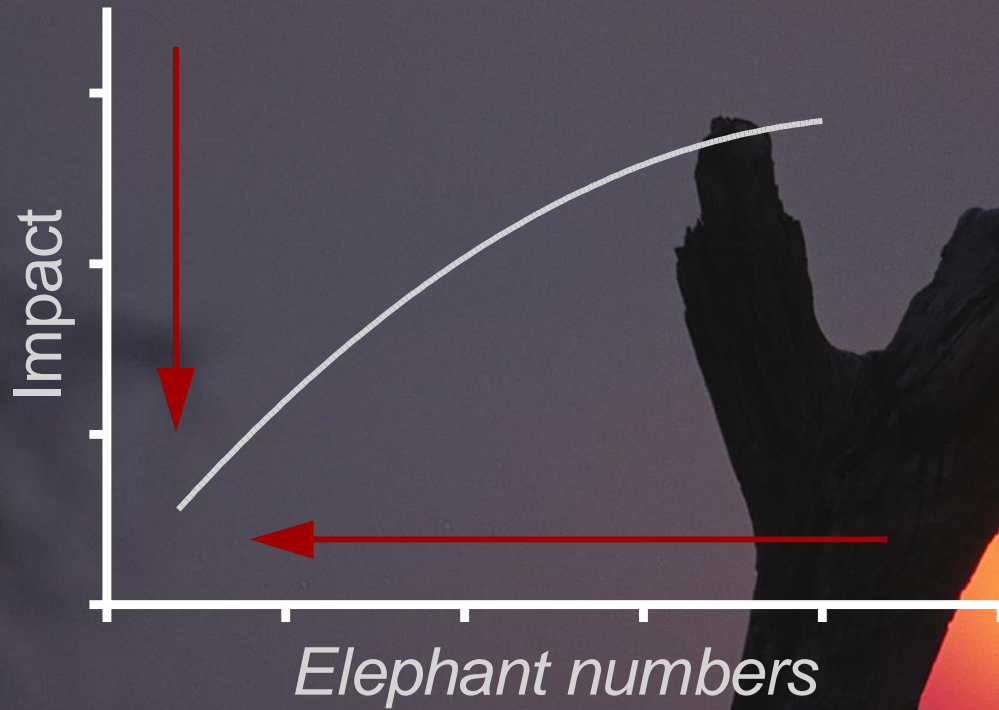


Defining a 'Metapopulation'

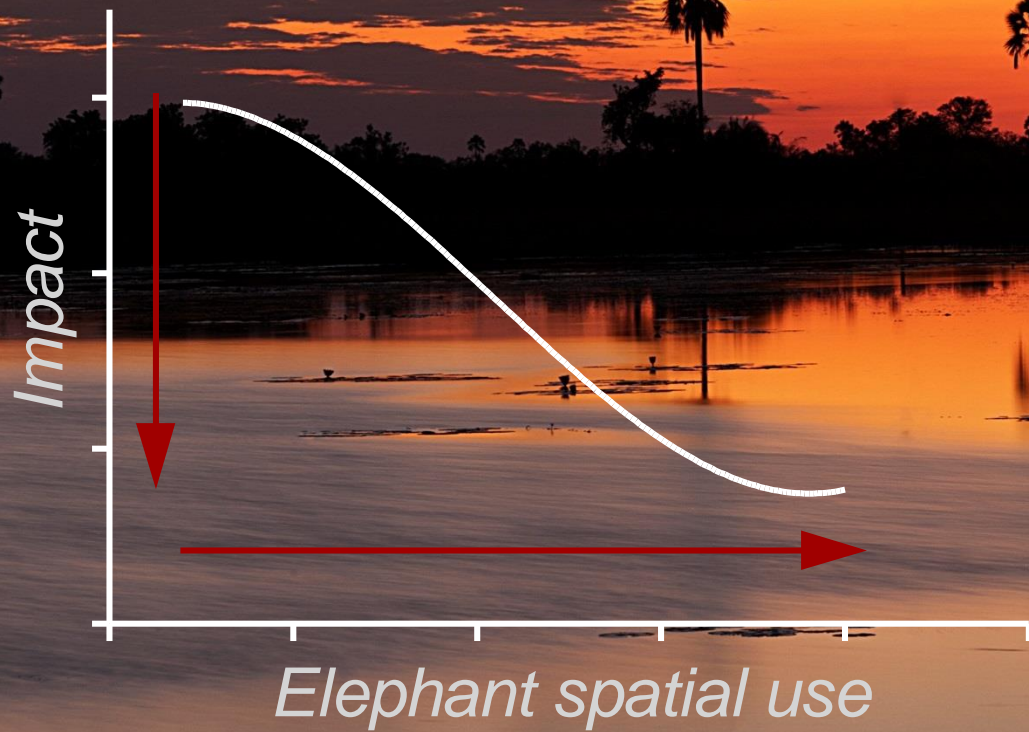
- A population of subpopulations that operates as an entity
- Subpopulations are separated by distance
- Demography of subpopulations differ
- Dispersal occur between subpopulations



Traditional Approaches



Modern Approaches

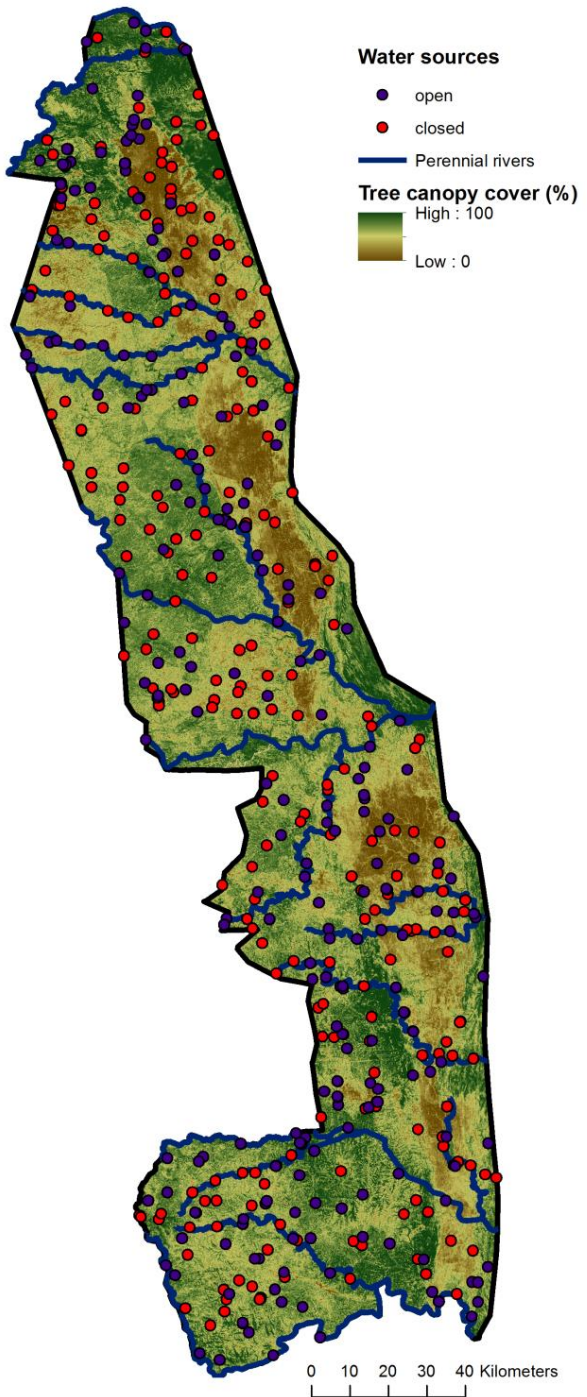


Elephant Conservation
South African Journal of Science 102, September/October 2006
**Conservation science and
elephant management in
southern Africa**
R.J. van Aarde¹, T.P. Jackson² and S.M. Ferreira³
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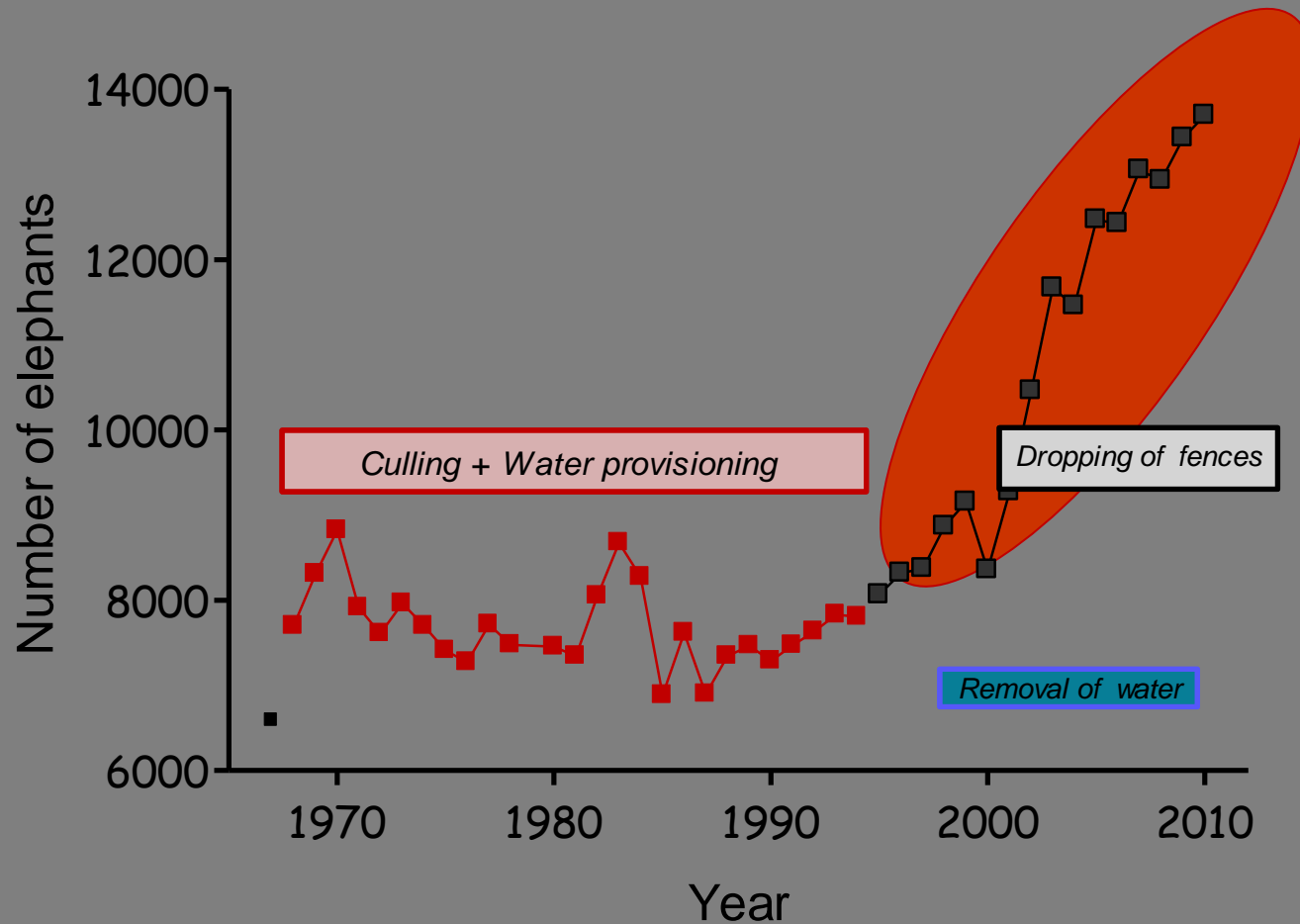






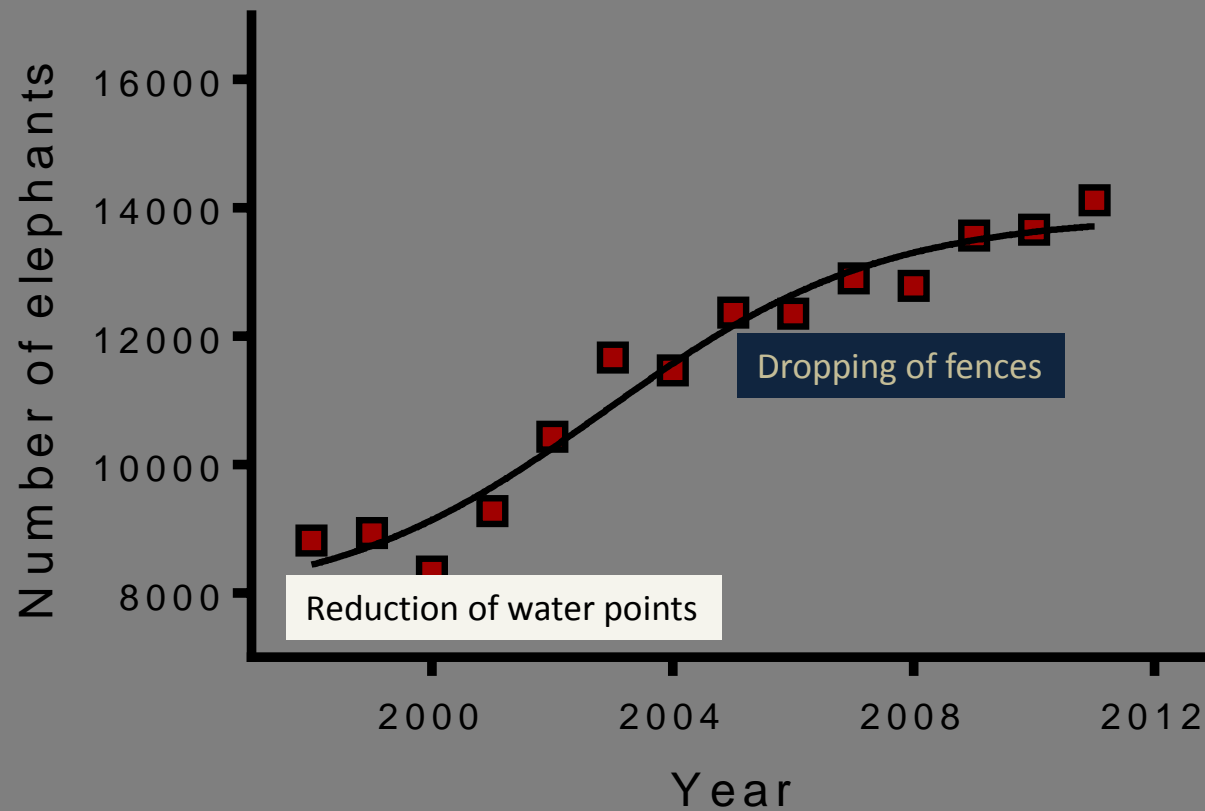


Population trend for Kruger's elephants - 1967 to 2011 -



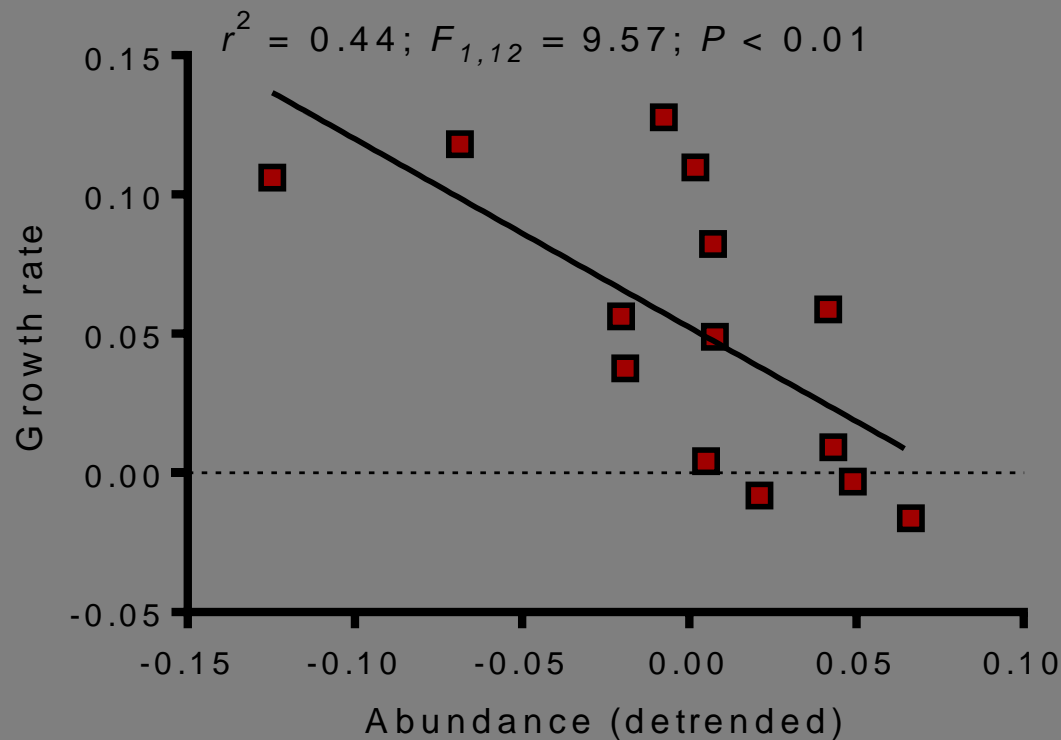
From van Aarde et al. 1999). *Anim. Conserv.* 2:287-294
Additional information provided by SM Ferreira, SANParks

Elephant numbers in Kruger 1998 to 2012

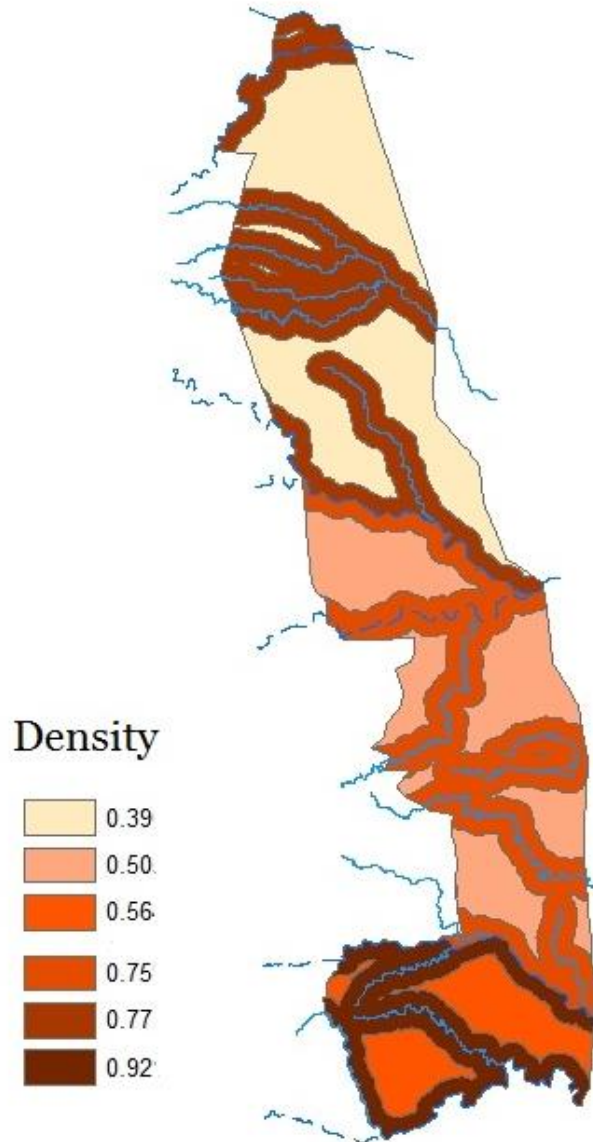


(Robson & van Aarde 2014 *In preparation*)

Population growth rate as a function of detrended elephant numbers (1998-2012)

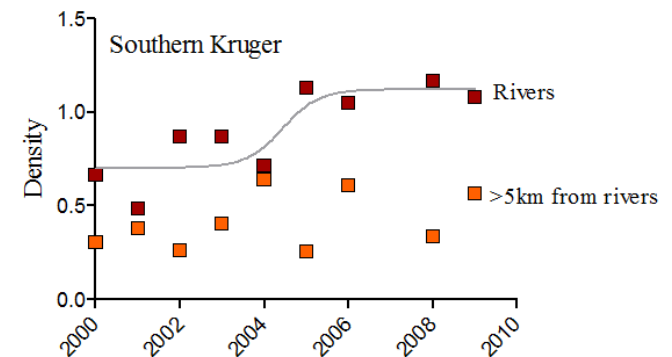
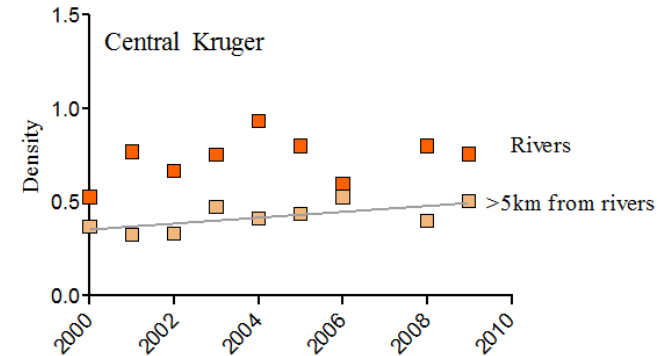
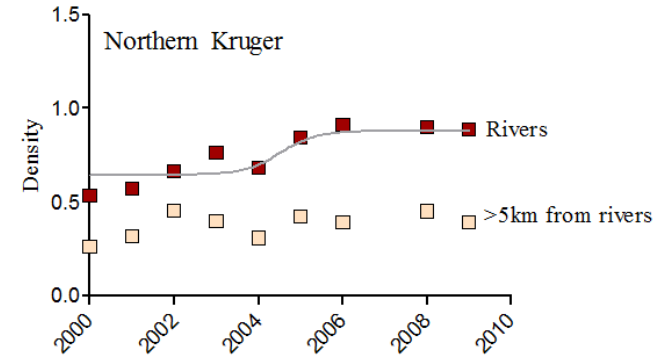


District specific population trends in Kruger

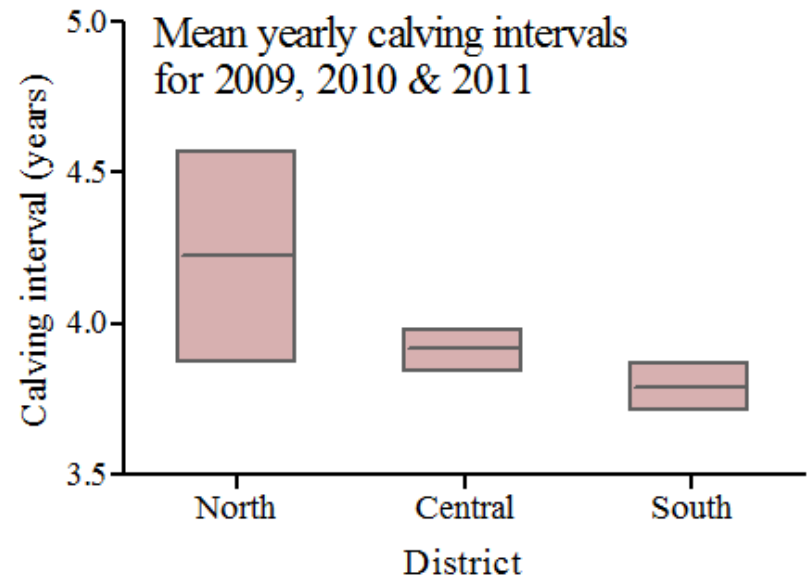
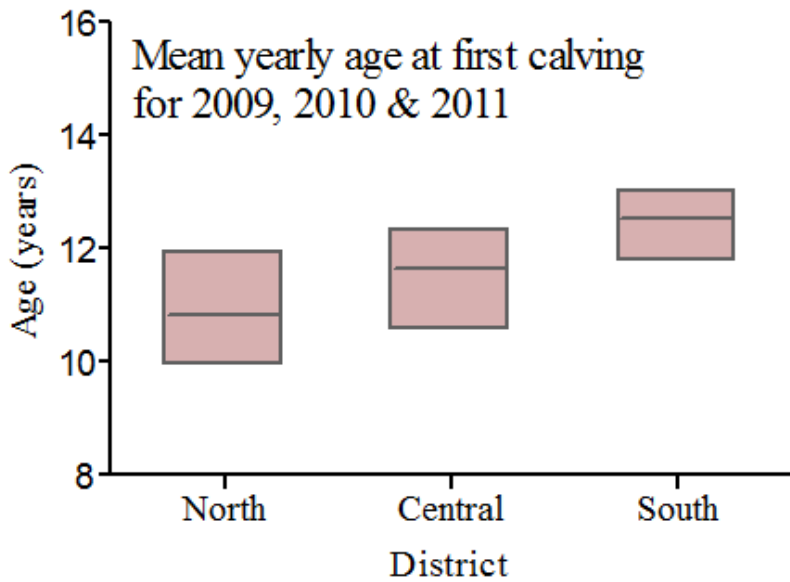


~450 mm

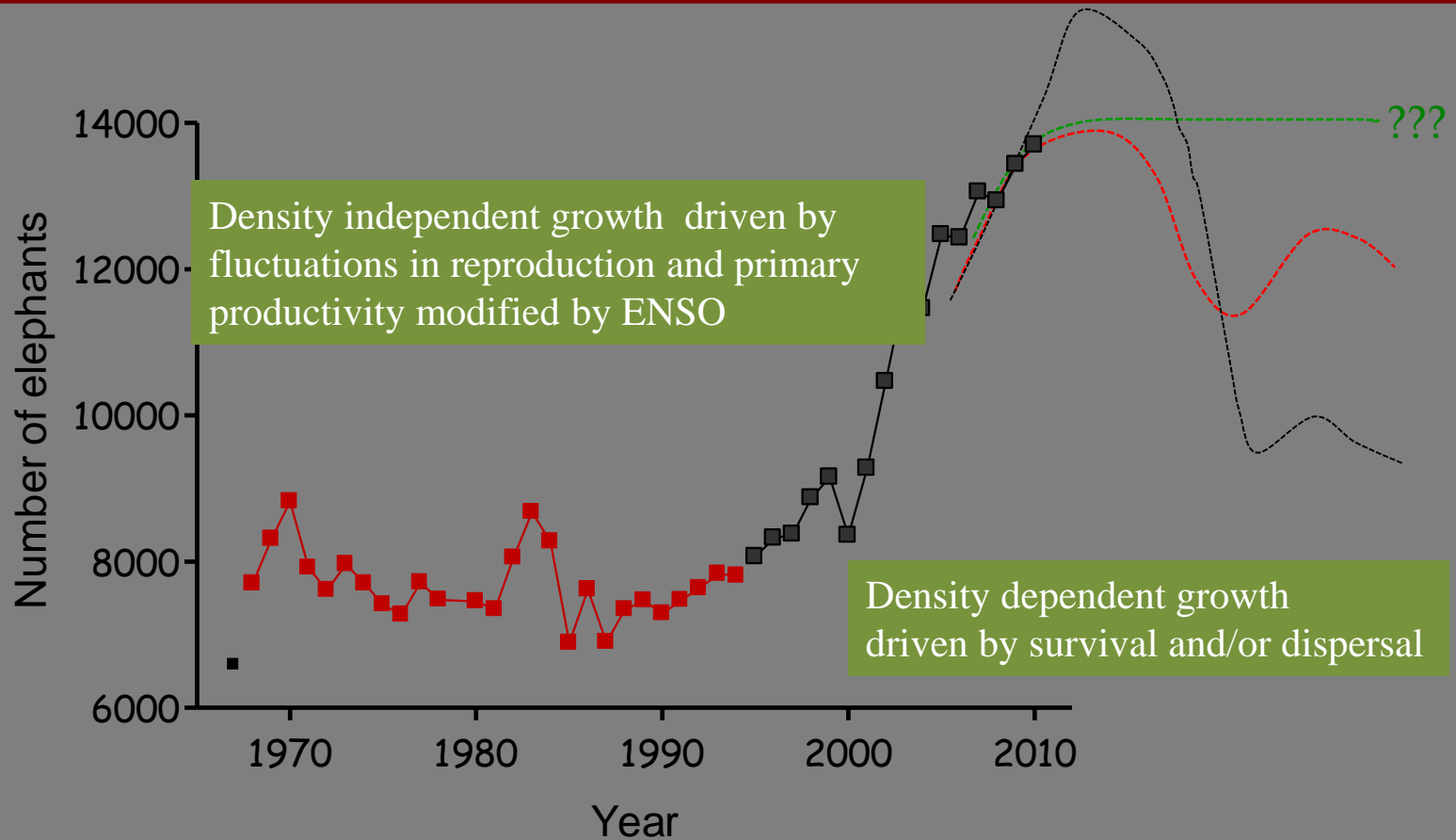
~750 mm



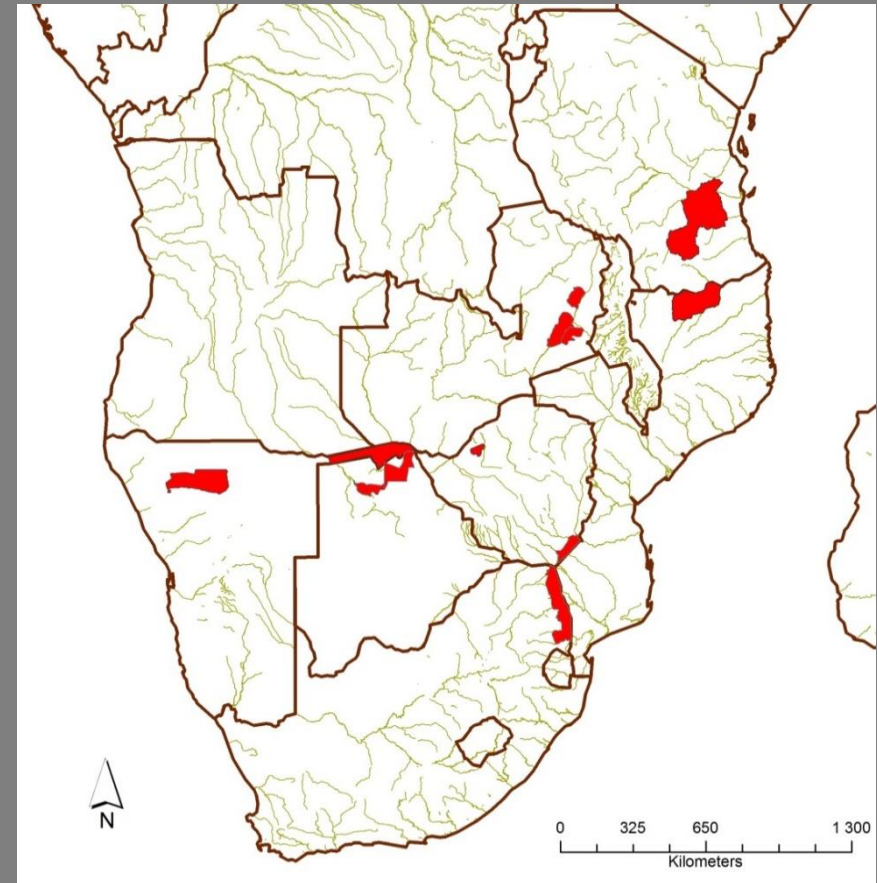
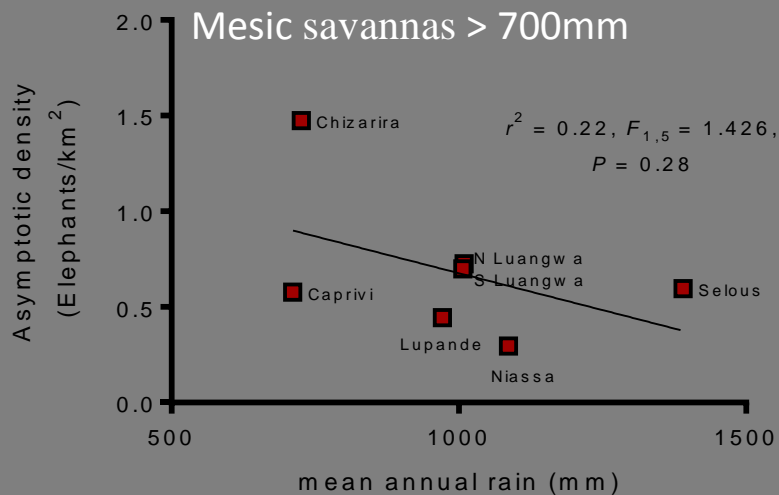
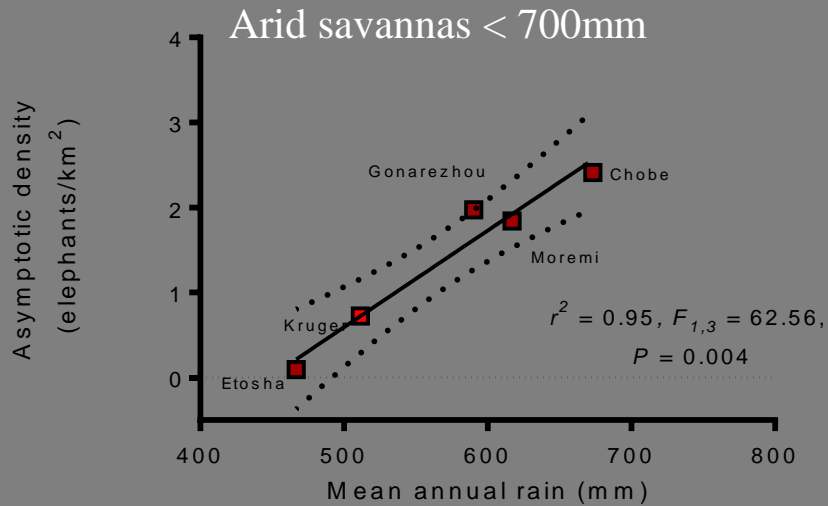
Reproductive variables for Kruger's elephants (based on *REPAs*)

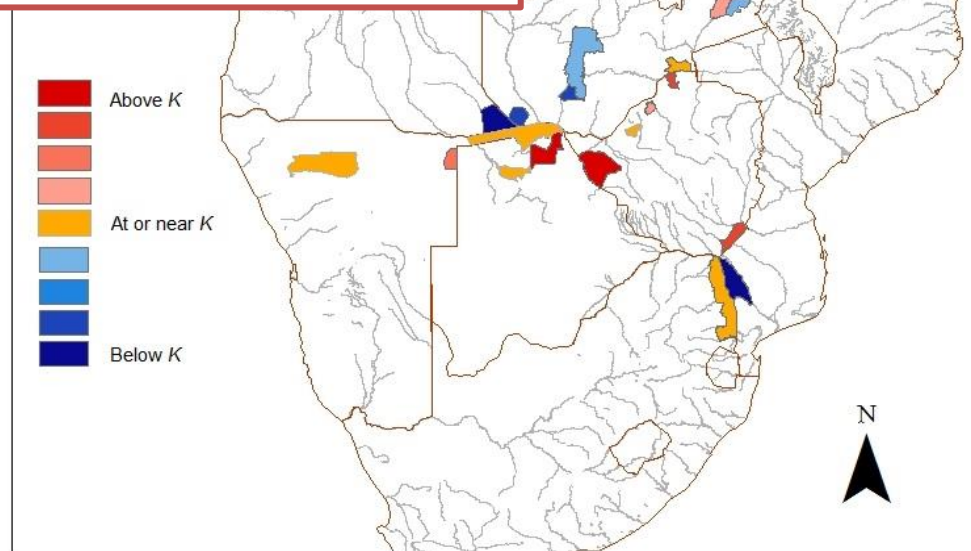
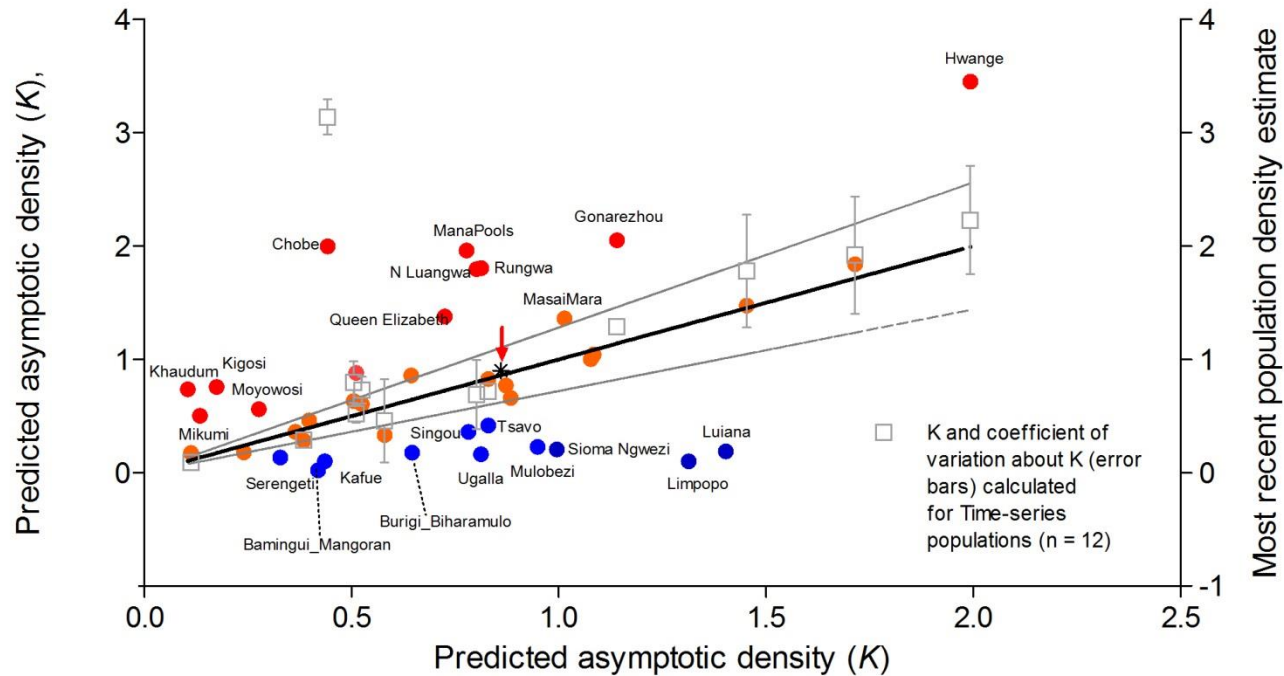


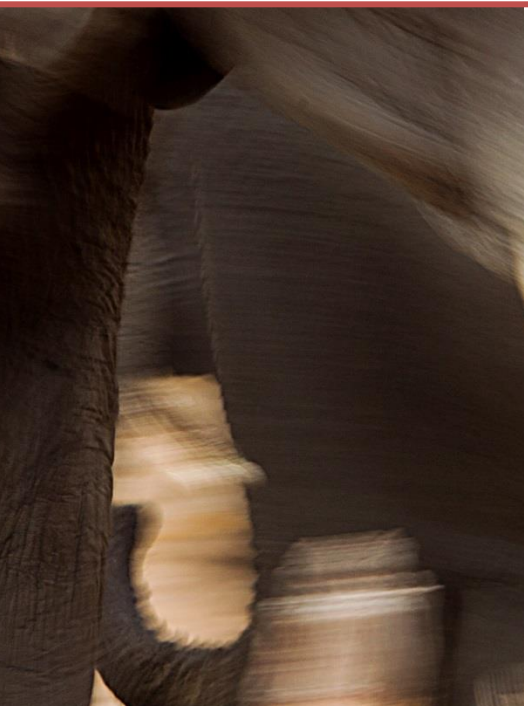
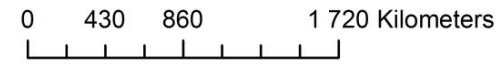
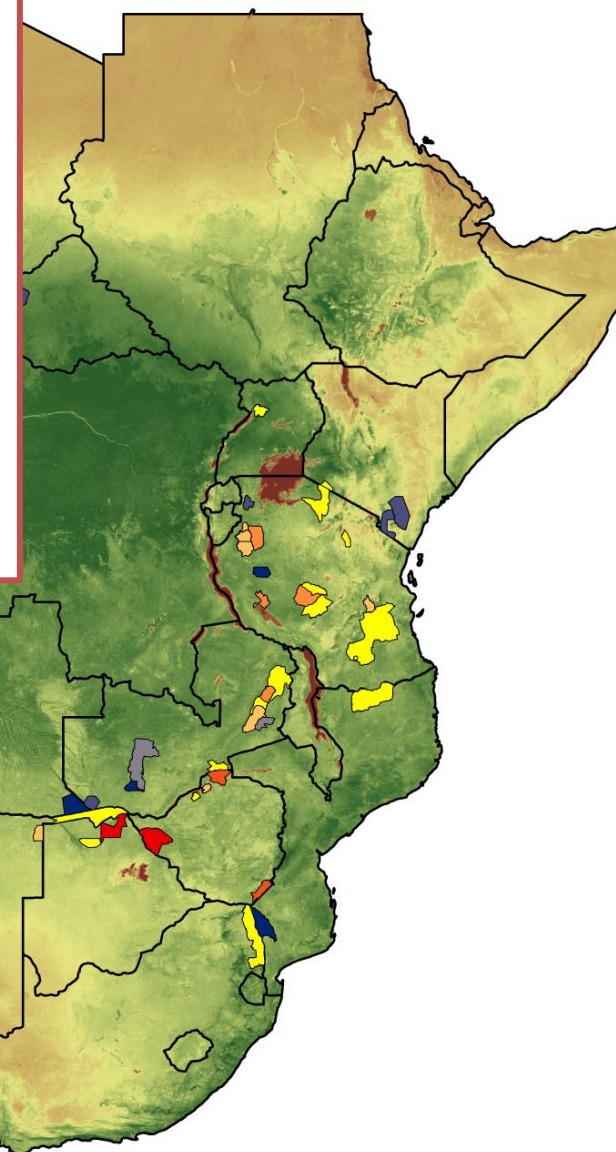
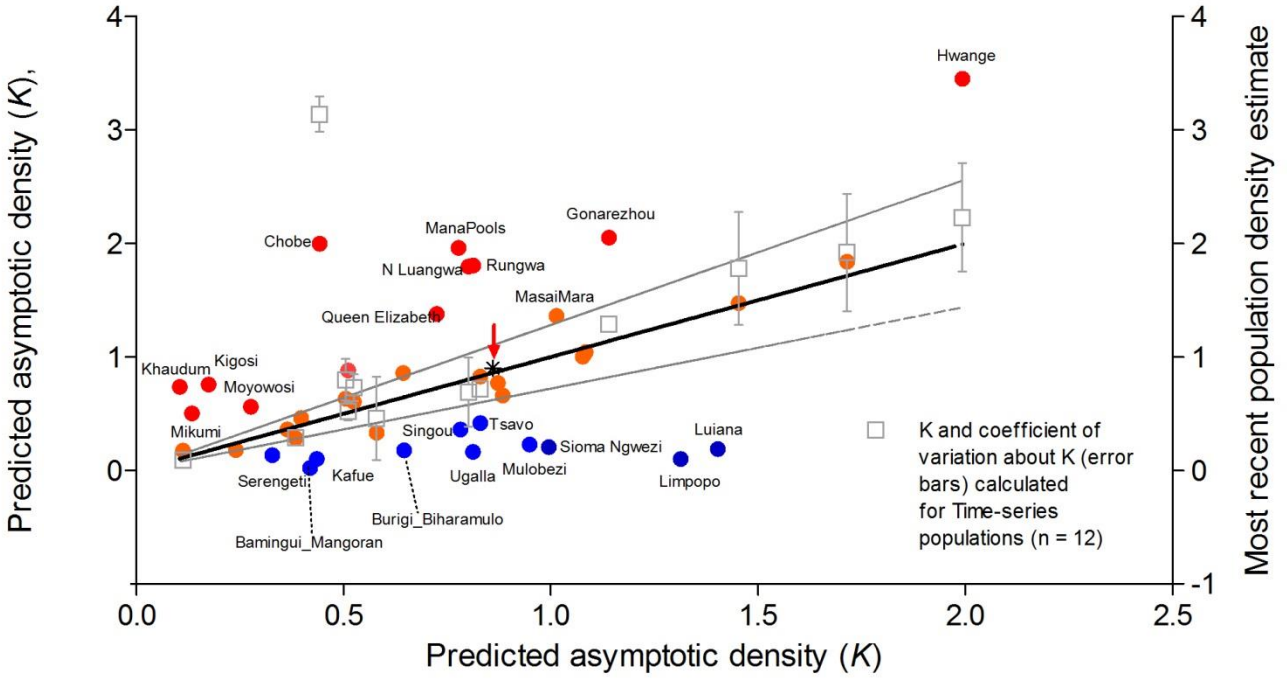
Will the population be regulated without management interferences?



Asymptotic densities as a function of rainfall





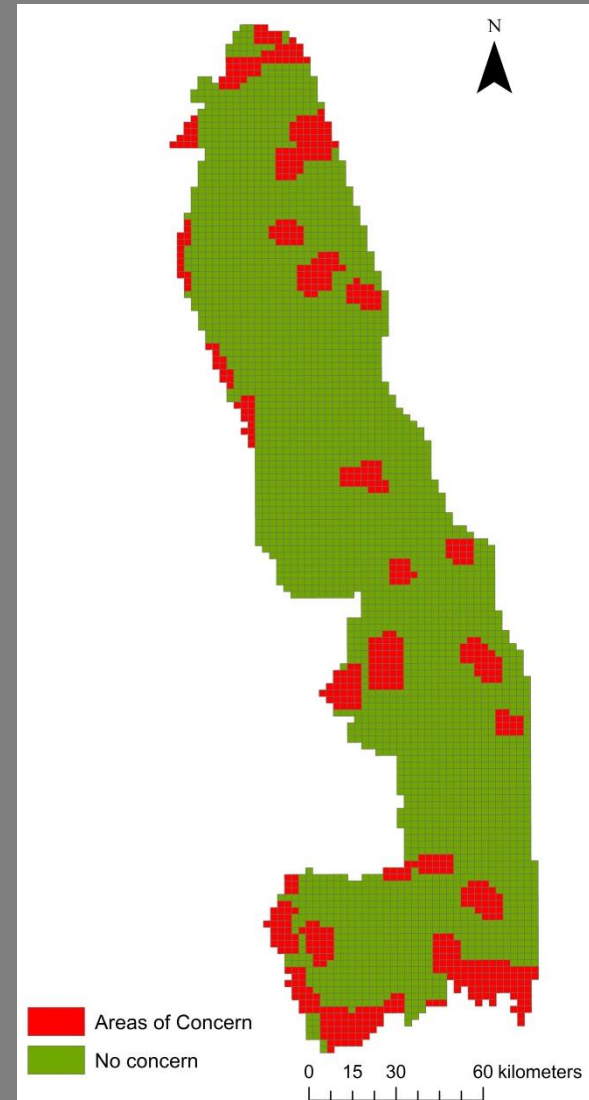
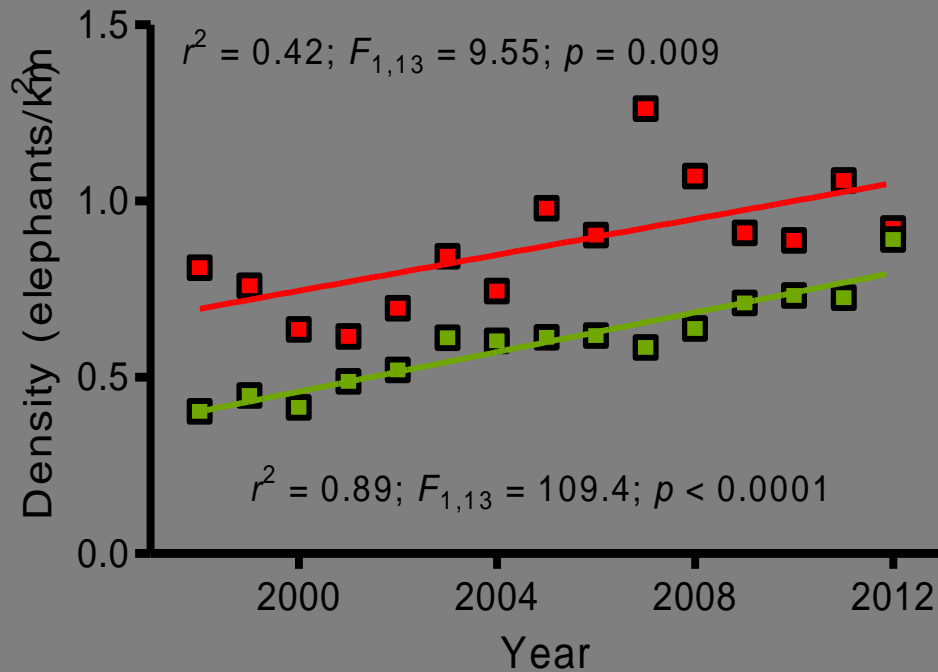


A close-up photograph of an elephant's head and tusk, showing the textured skin and the smooth, curved tusk. The background is blurred, suggesting a natural habitat.

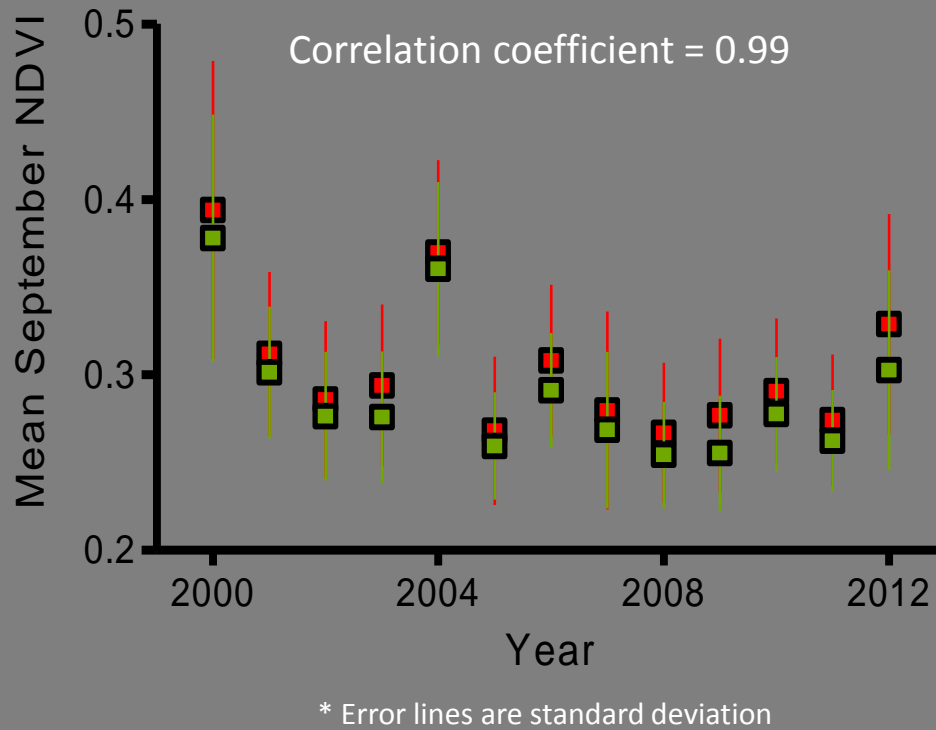
What are the implications of all of this?

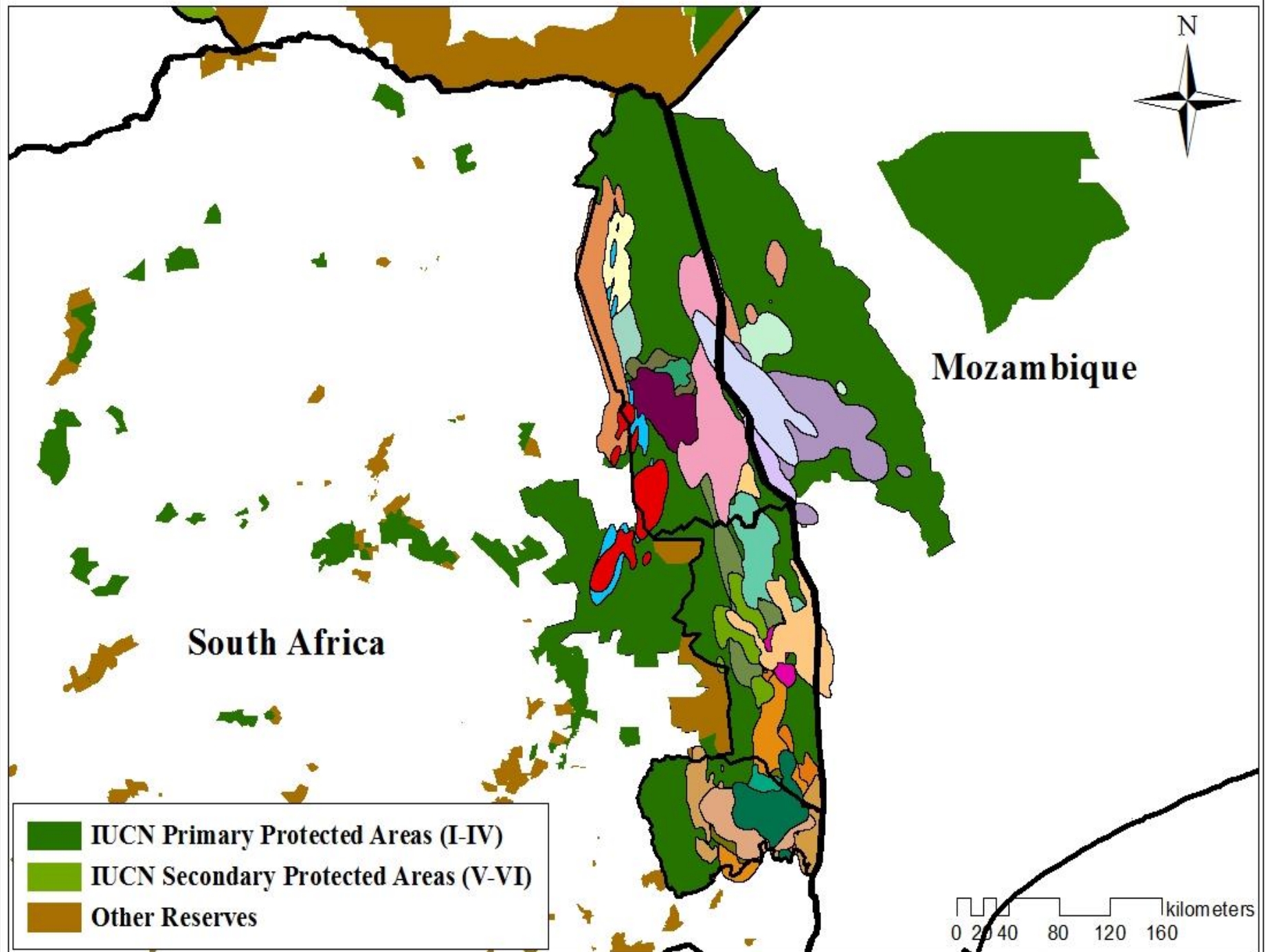
- Demographic responses suggest that functional heterogeneity is regained;
 - Increase in effective area of Kruger and closure of water may provide for the spatial structuring of the population into sub-populations;
 - The paradigm shift in management provides an ecological framework for conservation management.
-

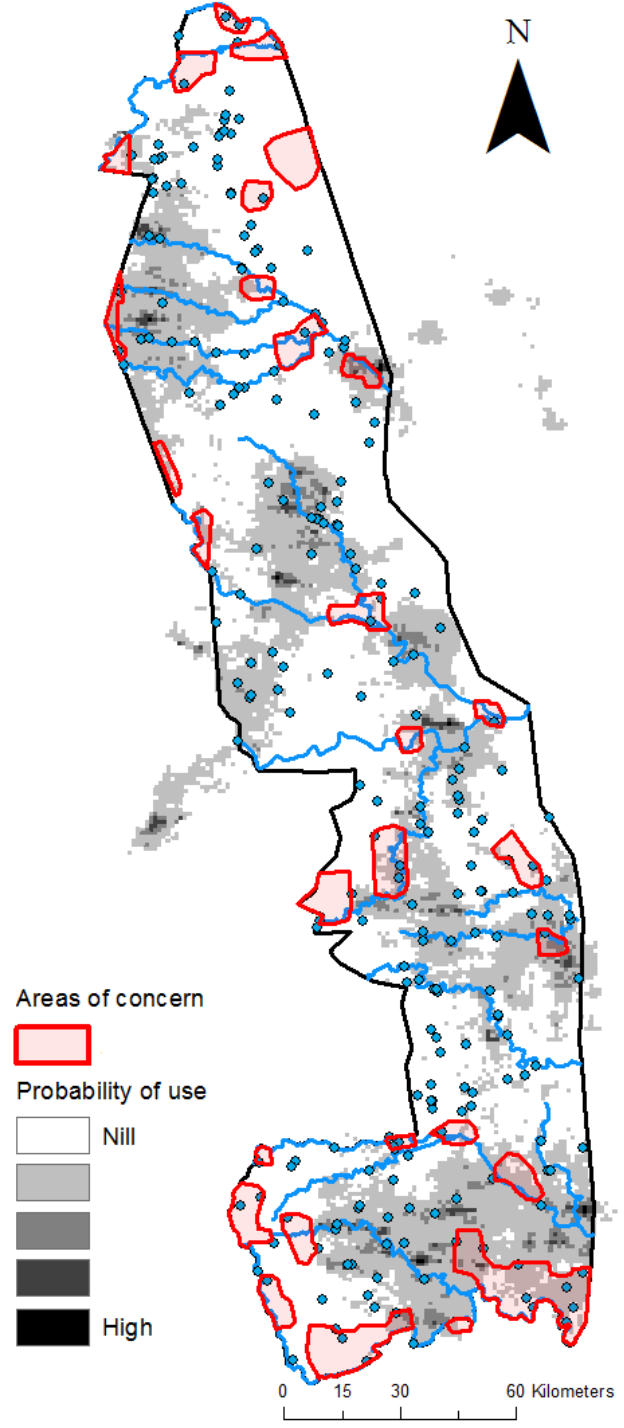
Temporal trends in elephant density within and beyond Areas of Concern (1998-2012)



Temporal variability in September NDVI follows a similar pattern within and beyond Areas of Concern







Probability of use based on dynamic Brownian bridge movement models of 32 breeding herds satellite tracked from June 2012 to March 2014





