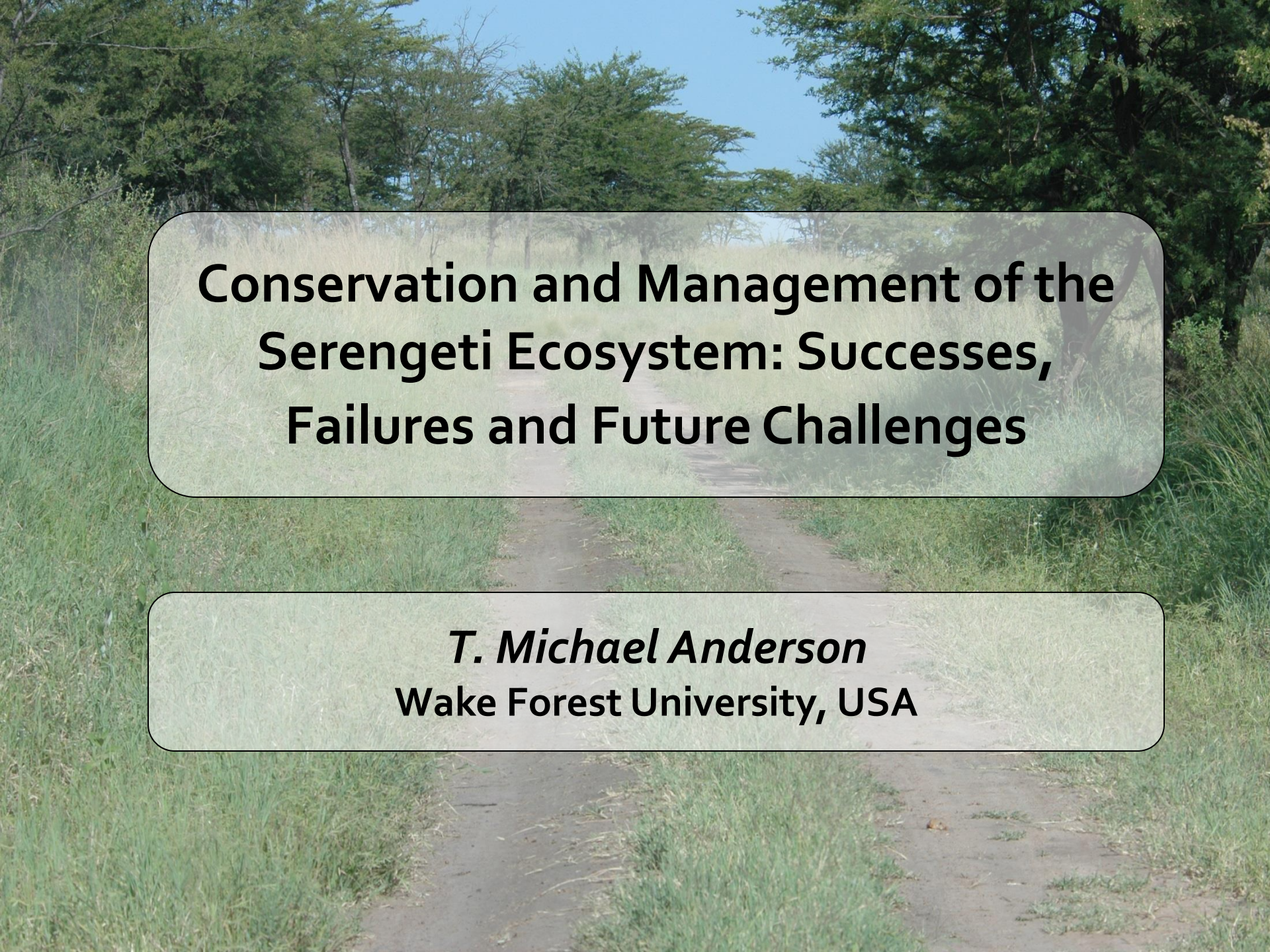


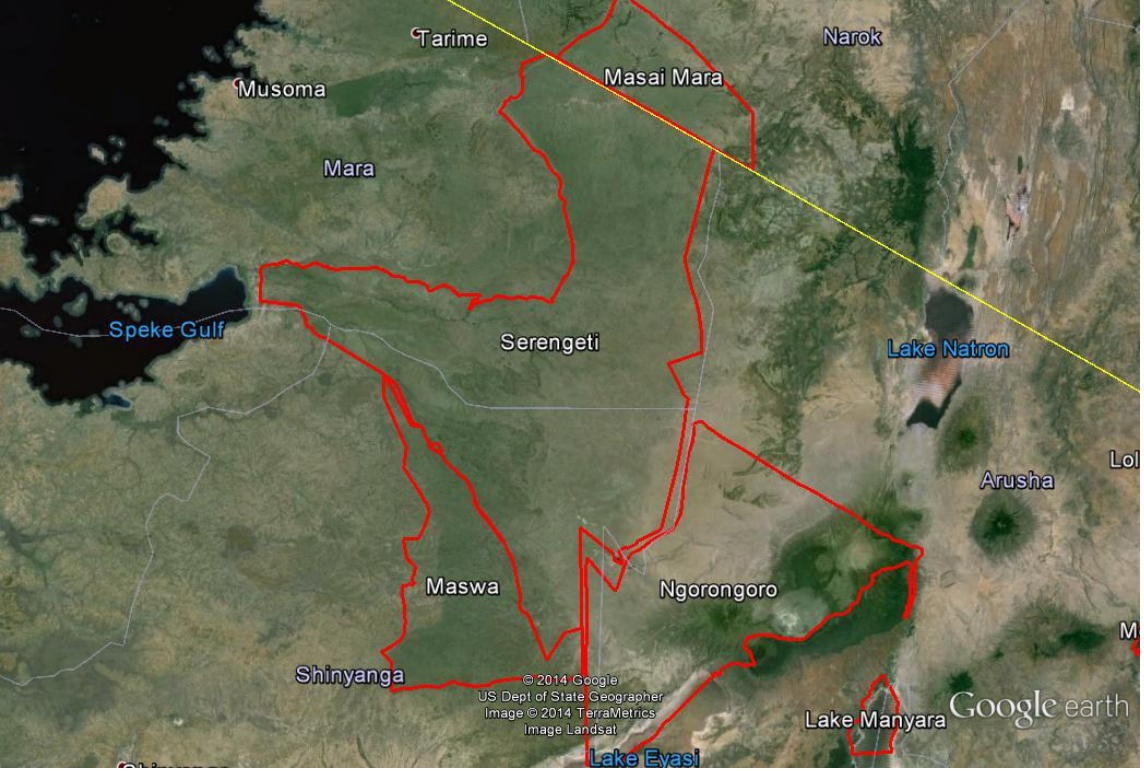
Conservation and Management of the Serengeti Ecosystem: Successes, Failures and Future Challenges

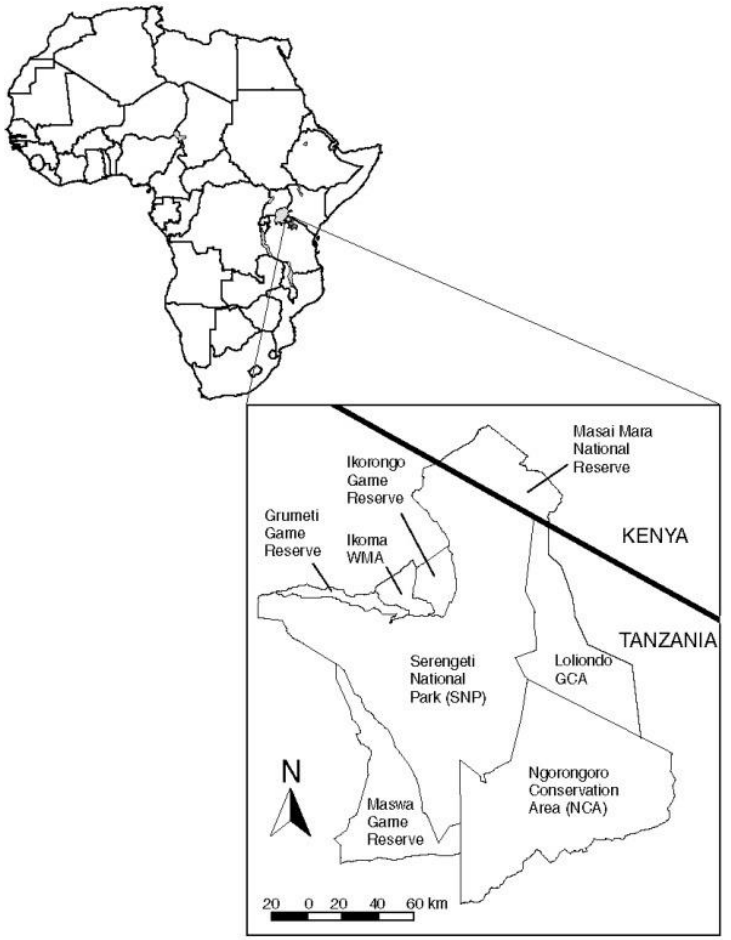
T. Michael Anderson
Wake Forest University, USA

Yellowstone National Park, USA

Galapagos Islands, ECU

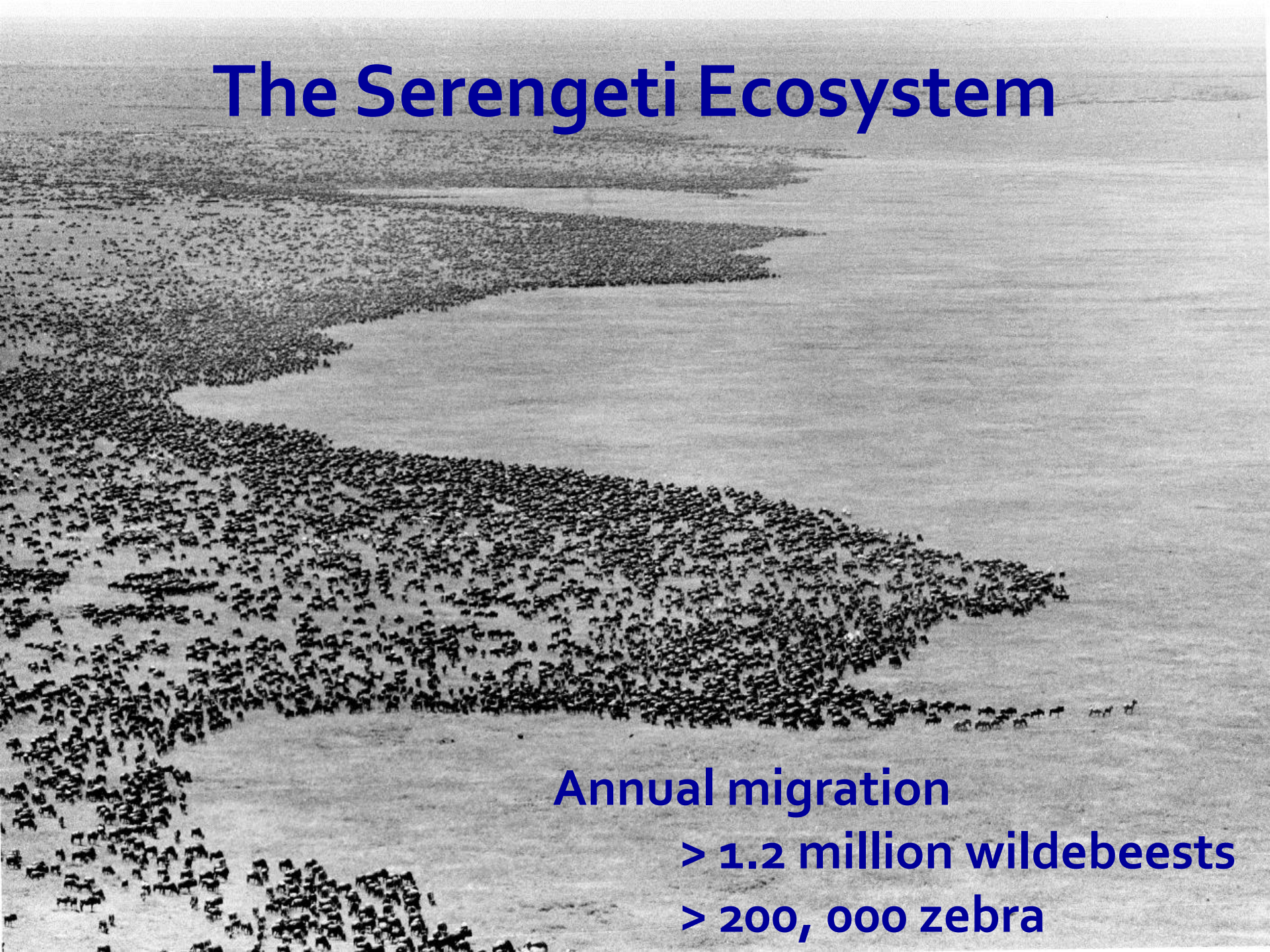
Swiss National Park, SUI





The "Other" SNP, TAN

The Serengeti Ecosystem



Annual migration

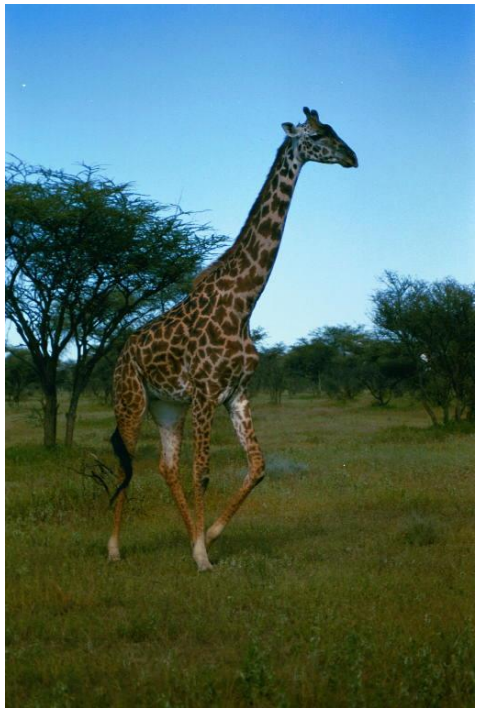
> 1.2 million wildebeests

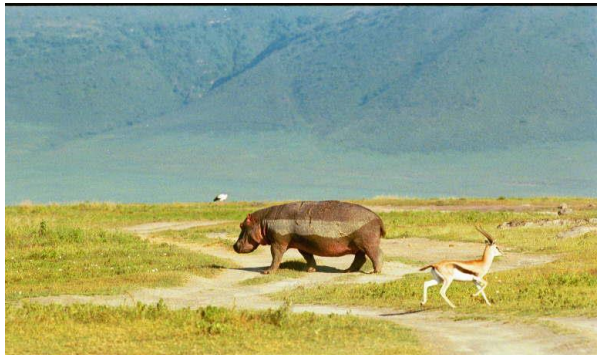
> 200, 000 zebra

A UNESCO World Heritage Site and Biosphere Reserve

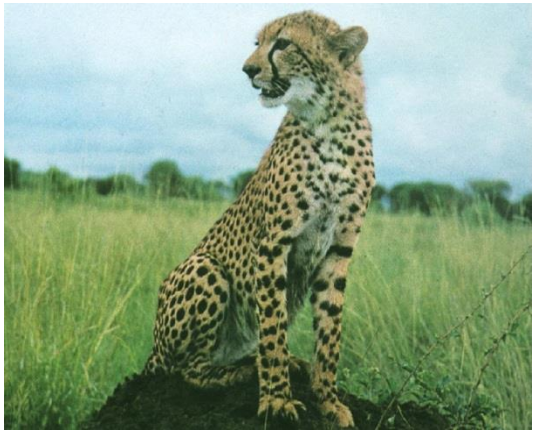
Arguably one of the most important conservation areas on the planet

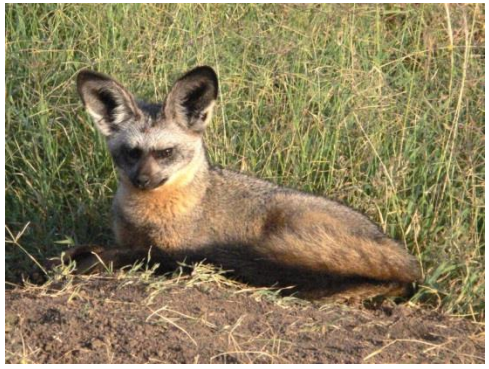
28 species of ungulates





26 species of predators





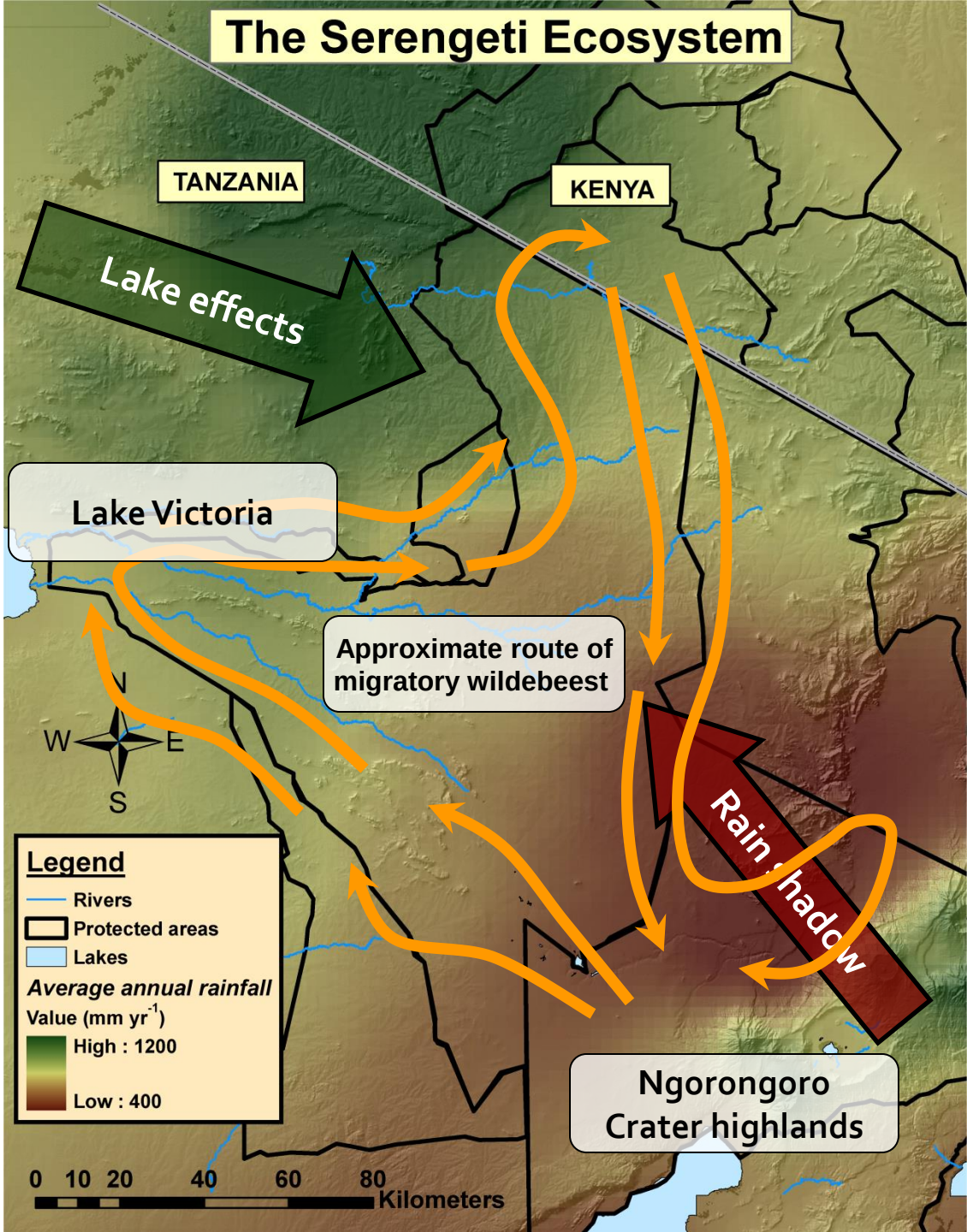

FIRE: a generalist consumer and a strong competitor for grass

The migration is ***the*** defining feature of the ecosystem

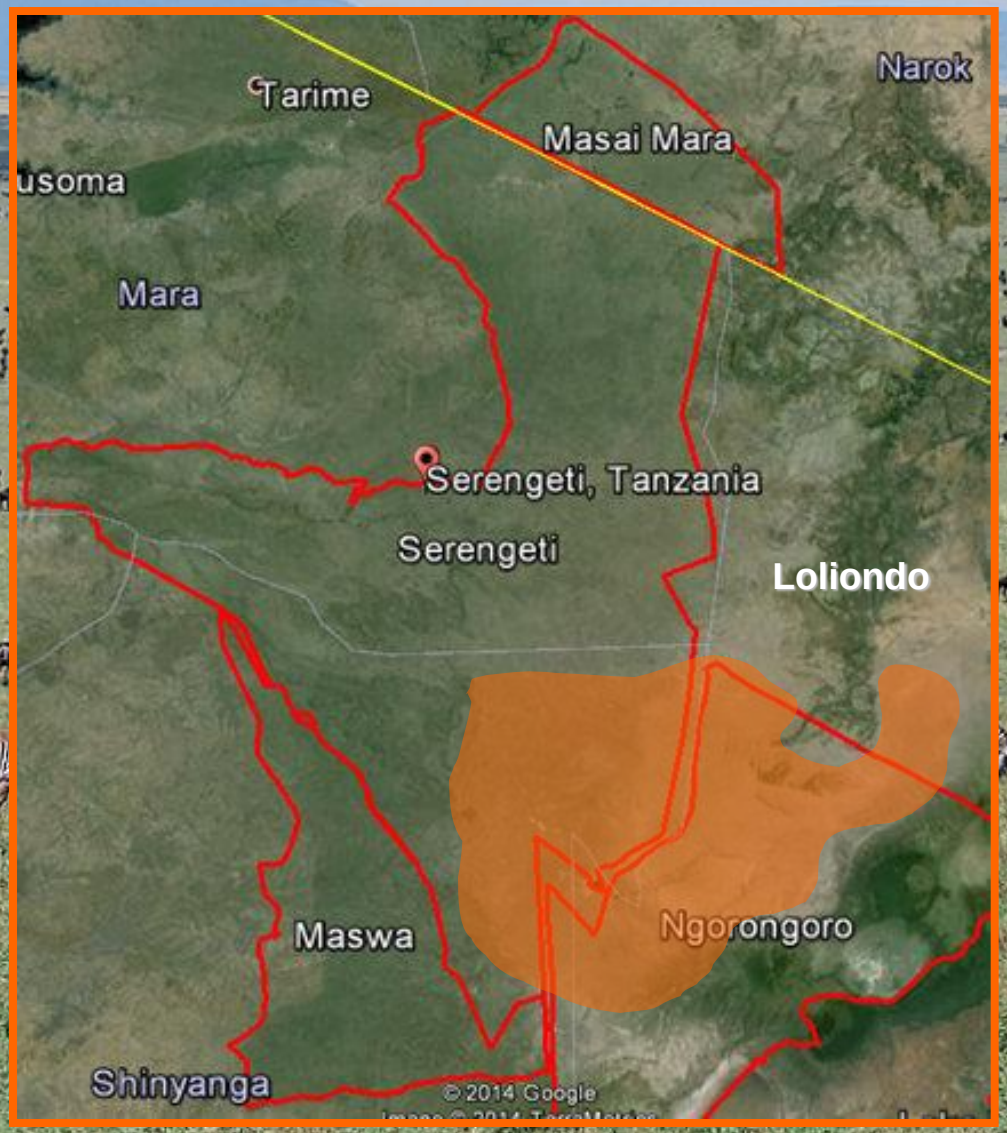
-- it passes through two countries and seven different protected areas, each with different administration, rules, and politics

<u>Varied management:</u>

- Hunting
- Tourism
- Cattle grazing
- Agriculture
- Villages (settlement)

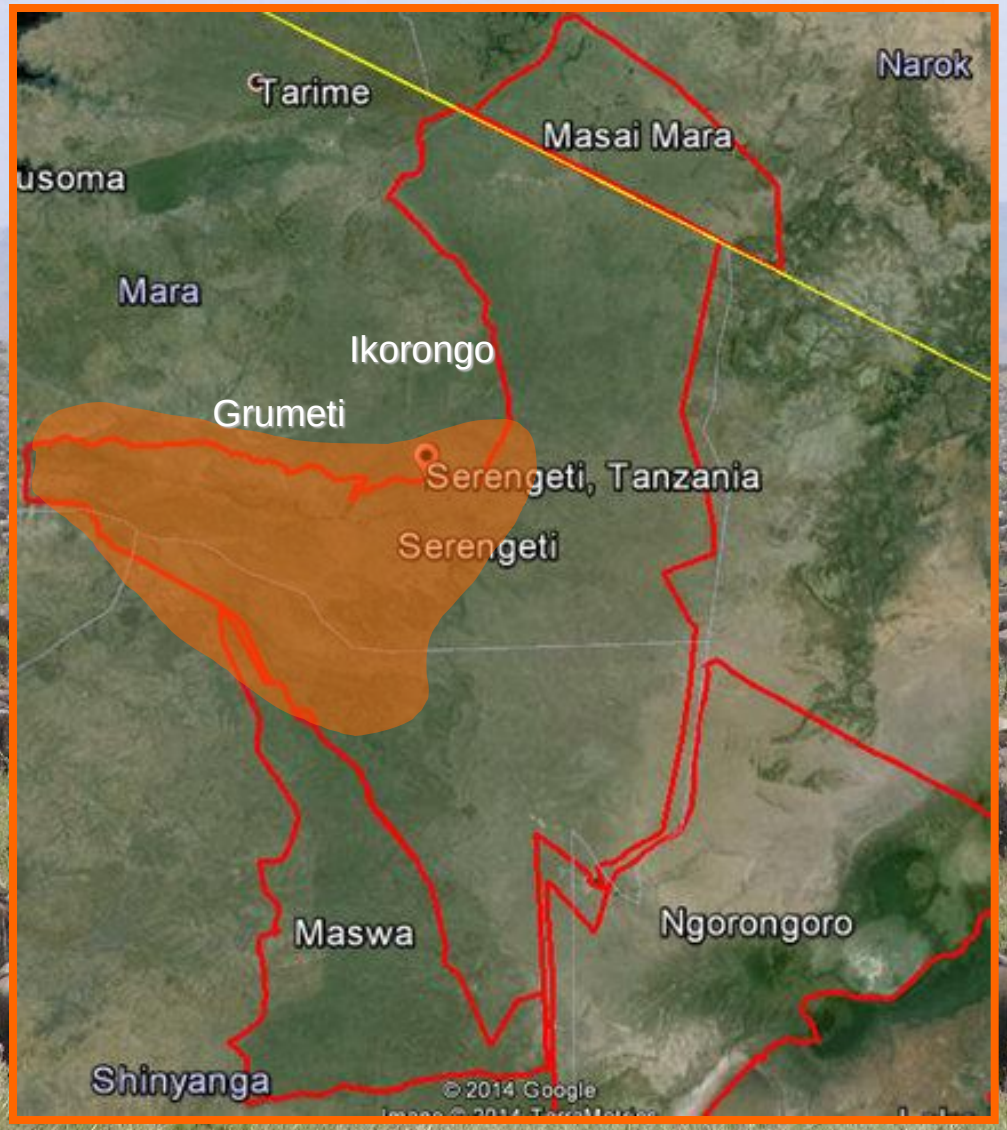


The Serengeti Migration



March

The Serengeti Migration



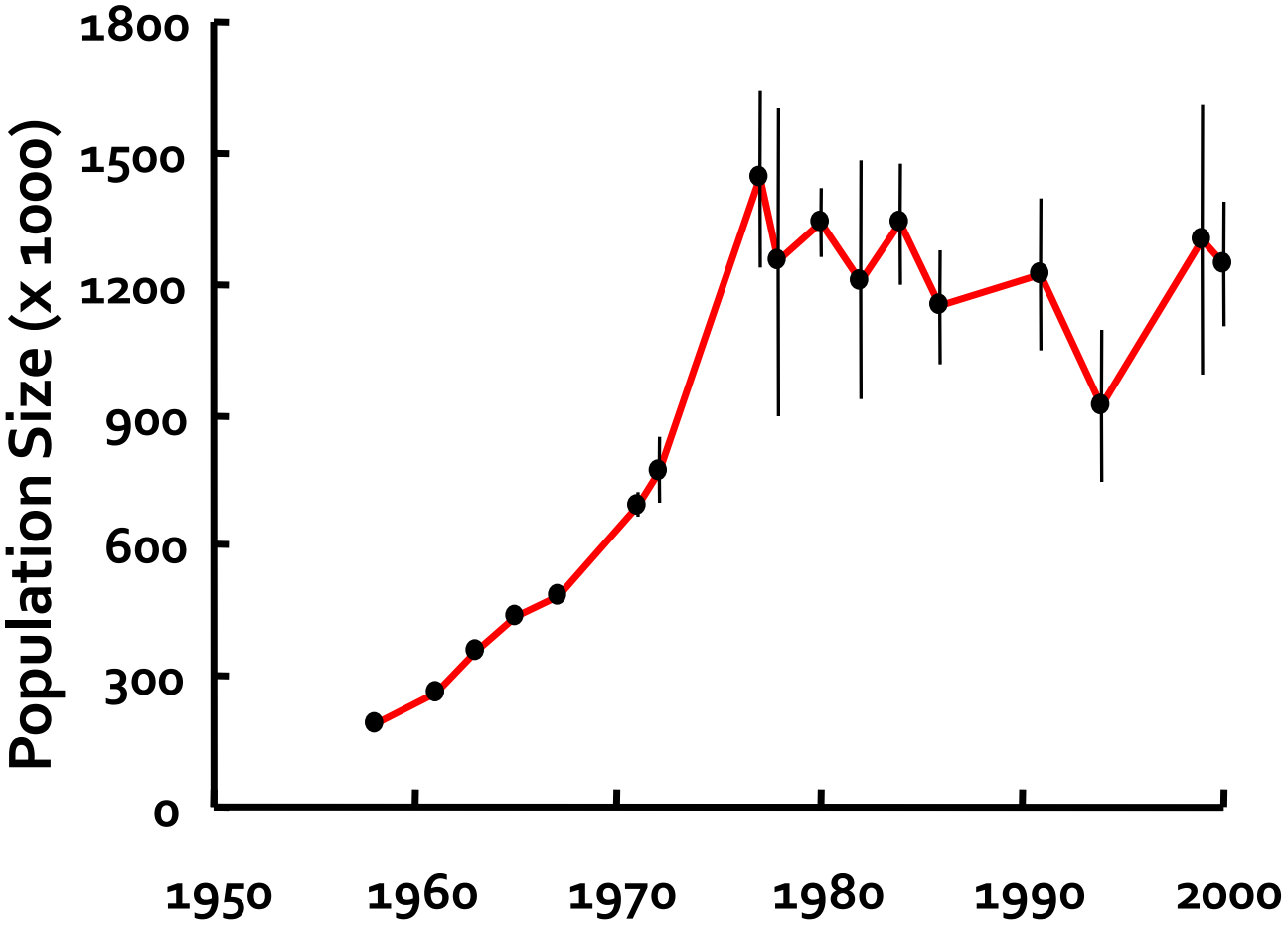
June

The Serengeti Migration

August

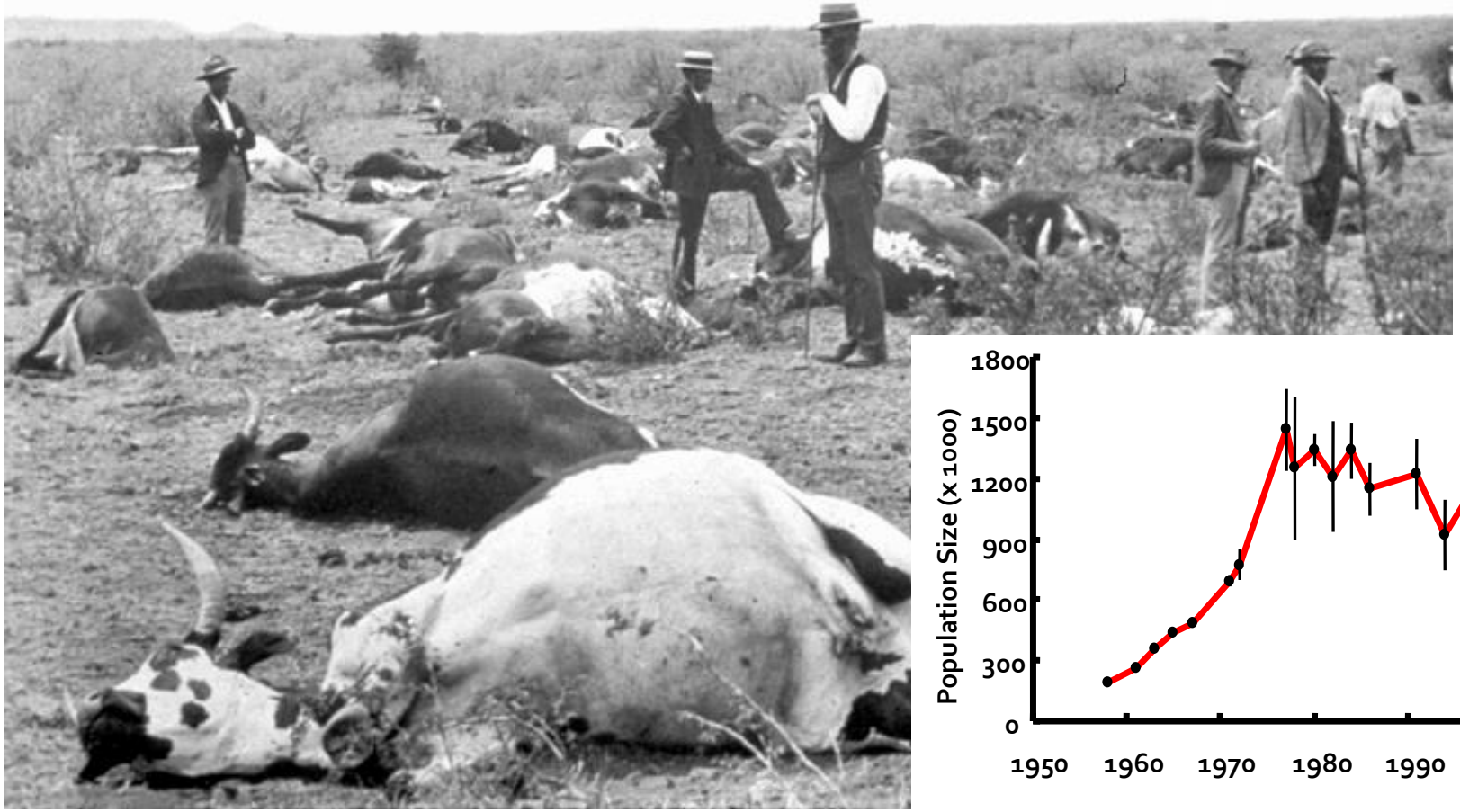
Irruption of the Serengeti Wildebeest Population:

The event that changed everything – to understand it we must go back a century

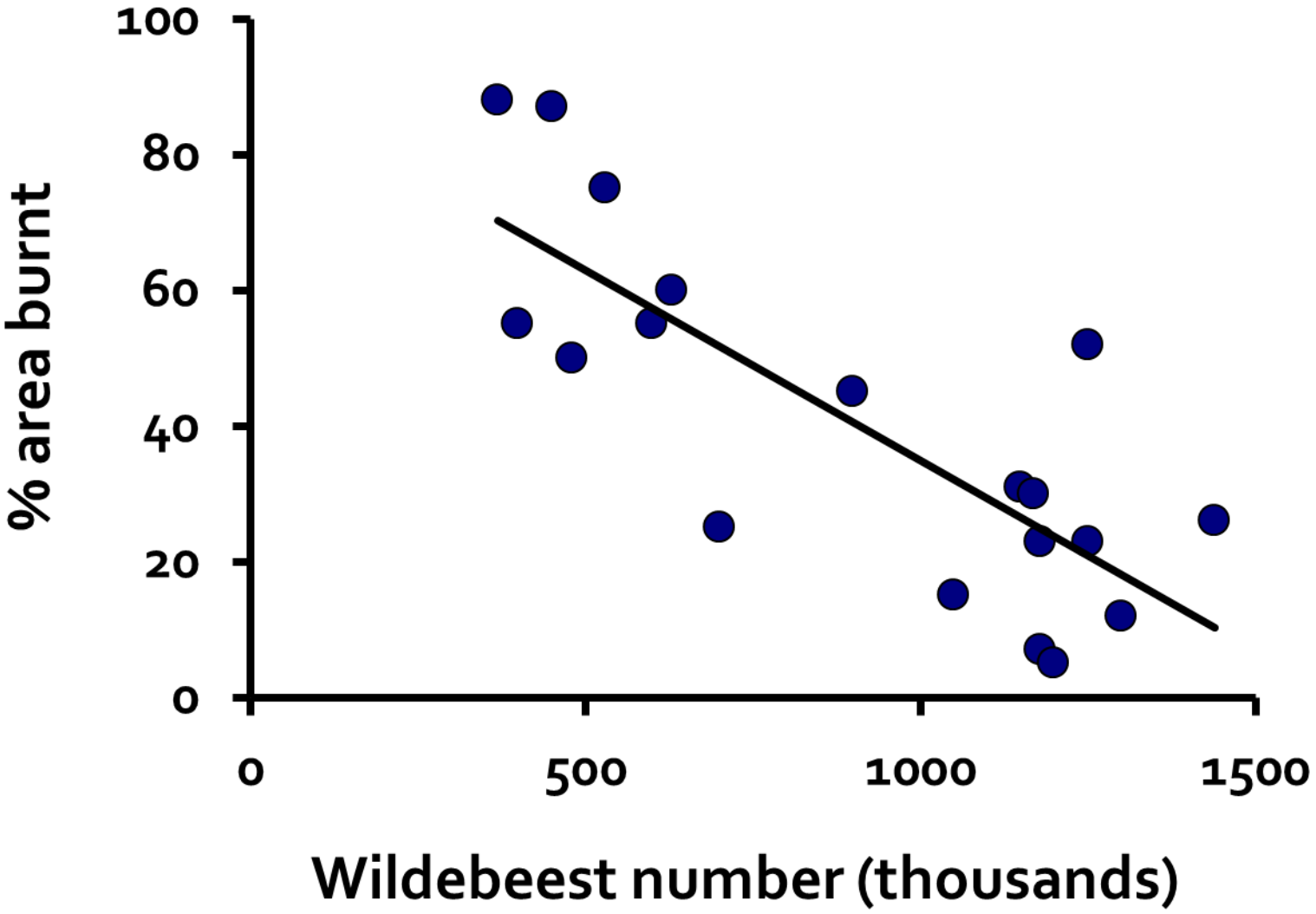


The Great Rinderpest Epidemic

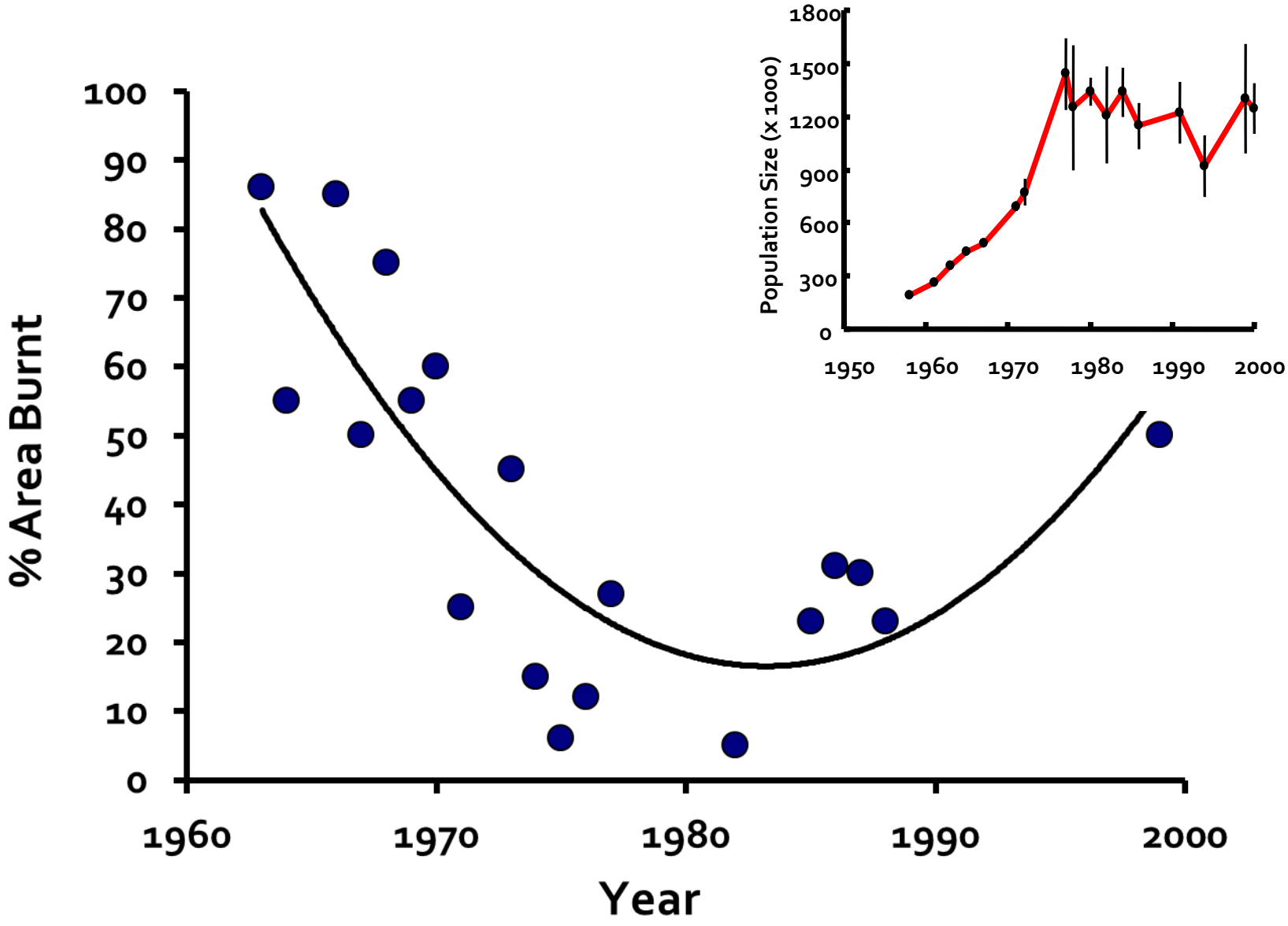
- Introduced in Ethiopia 1887 -- spread to the Cape by 1896
- Die-off of cattle and other ruminants 95%
- Eradicated in the early 1960's



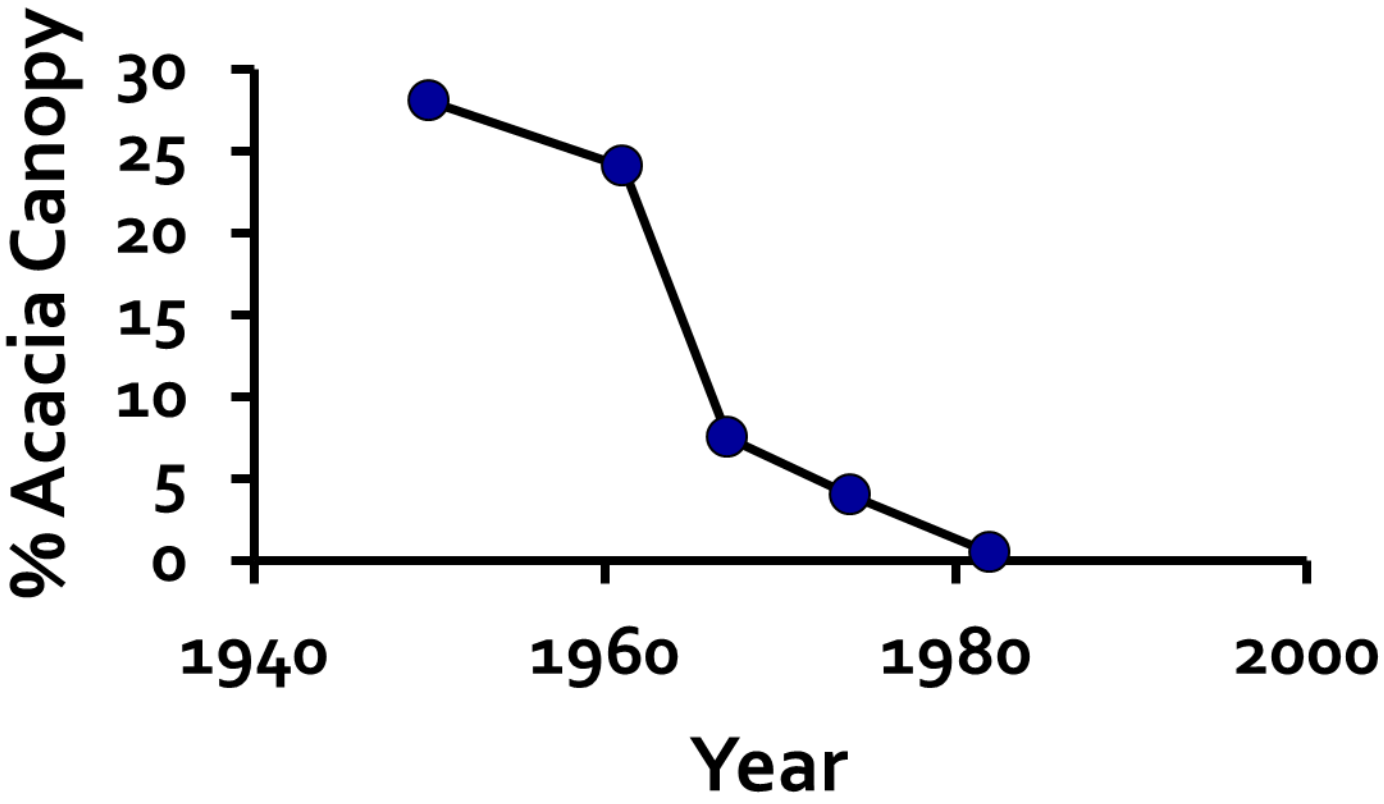
Strong relationship between wildebeest numbers and percentage of Serengeti that burns



Serengeti Area Burnt in Dry Season



% Acacia tree canopy cover drops rapidly in the 1960s



H.Dublin 1986

Northern Serengeti, Mara triangle 1944

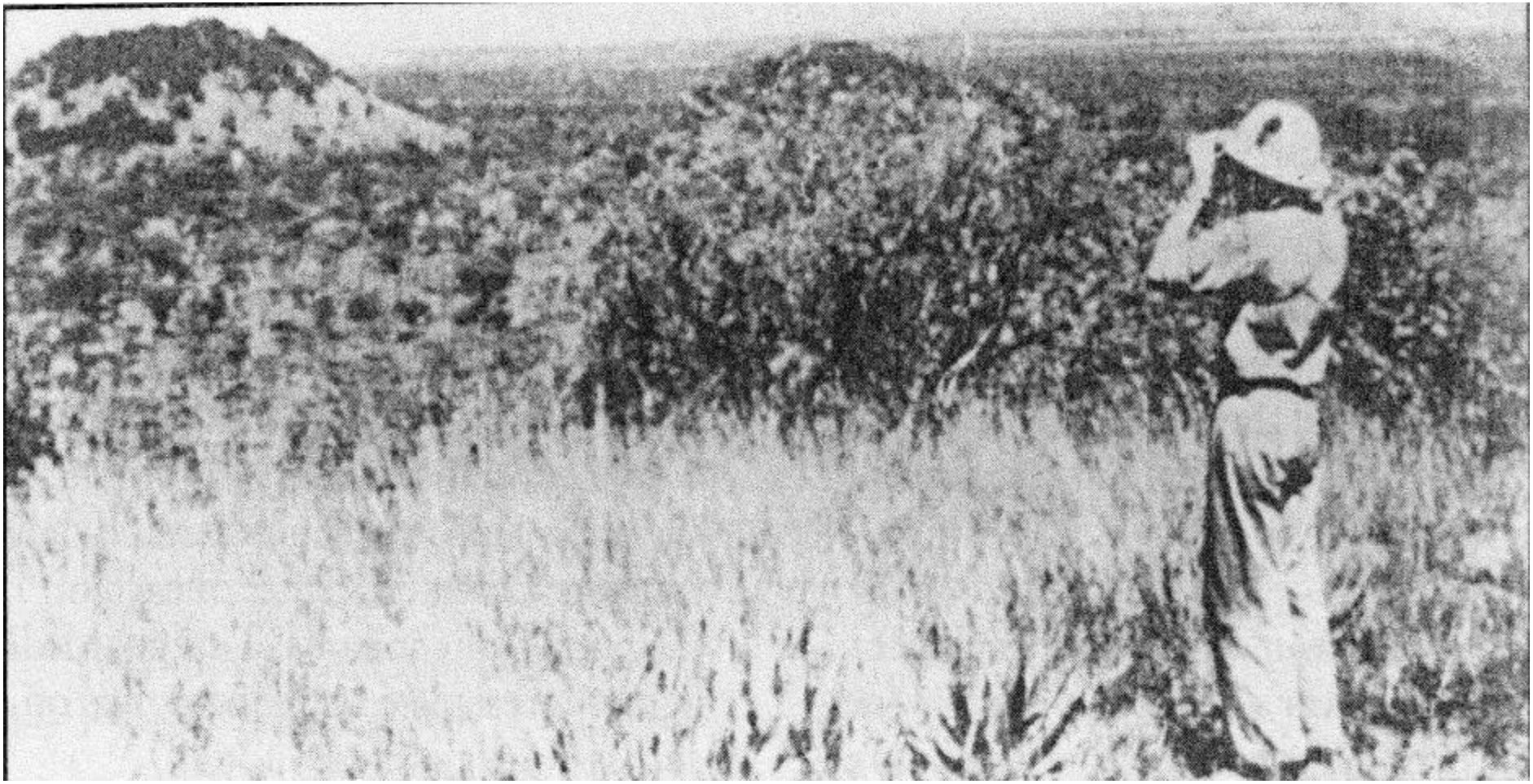
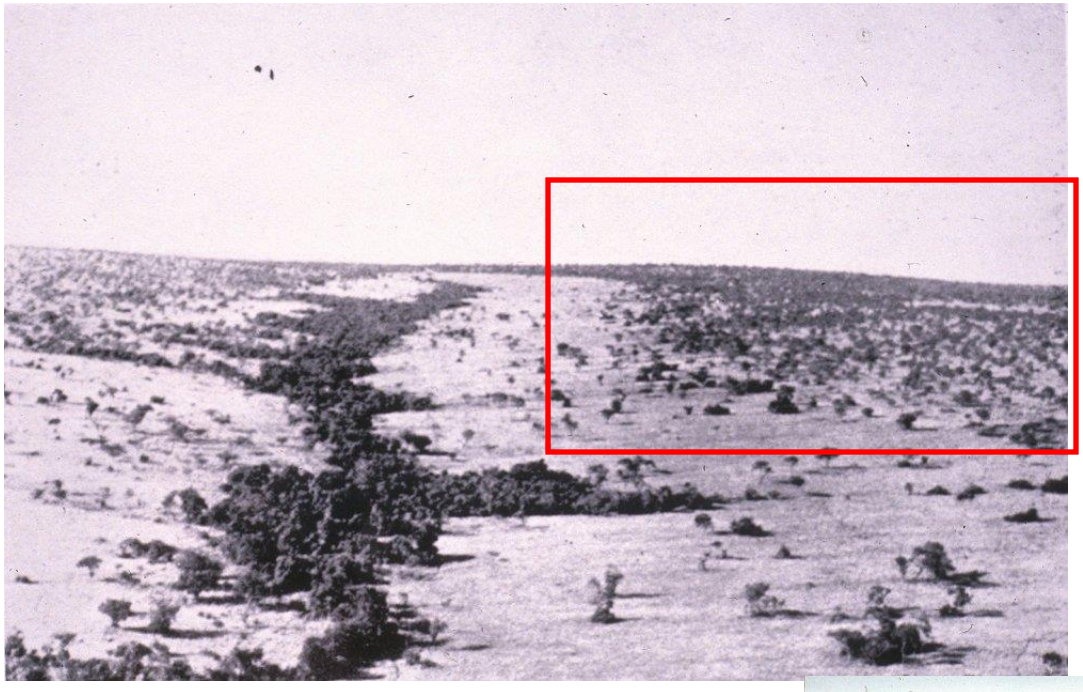


Photo Syd Downey

Northern Serengeti, Mara triangle 1944

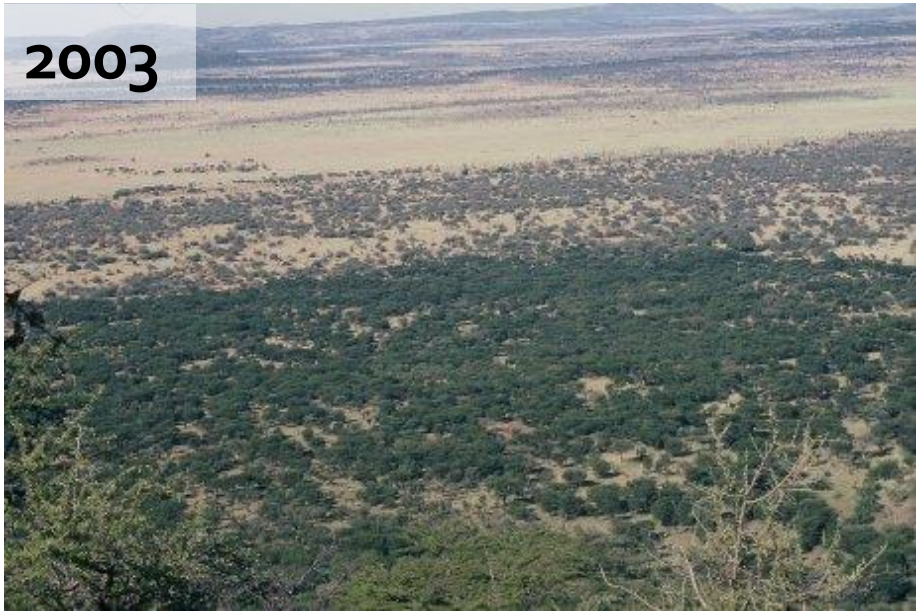


Burtt's valley, northern Serengeti

1935

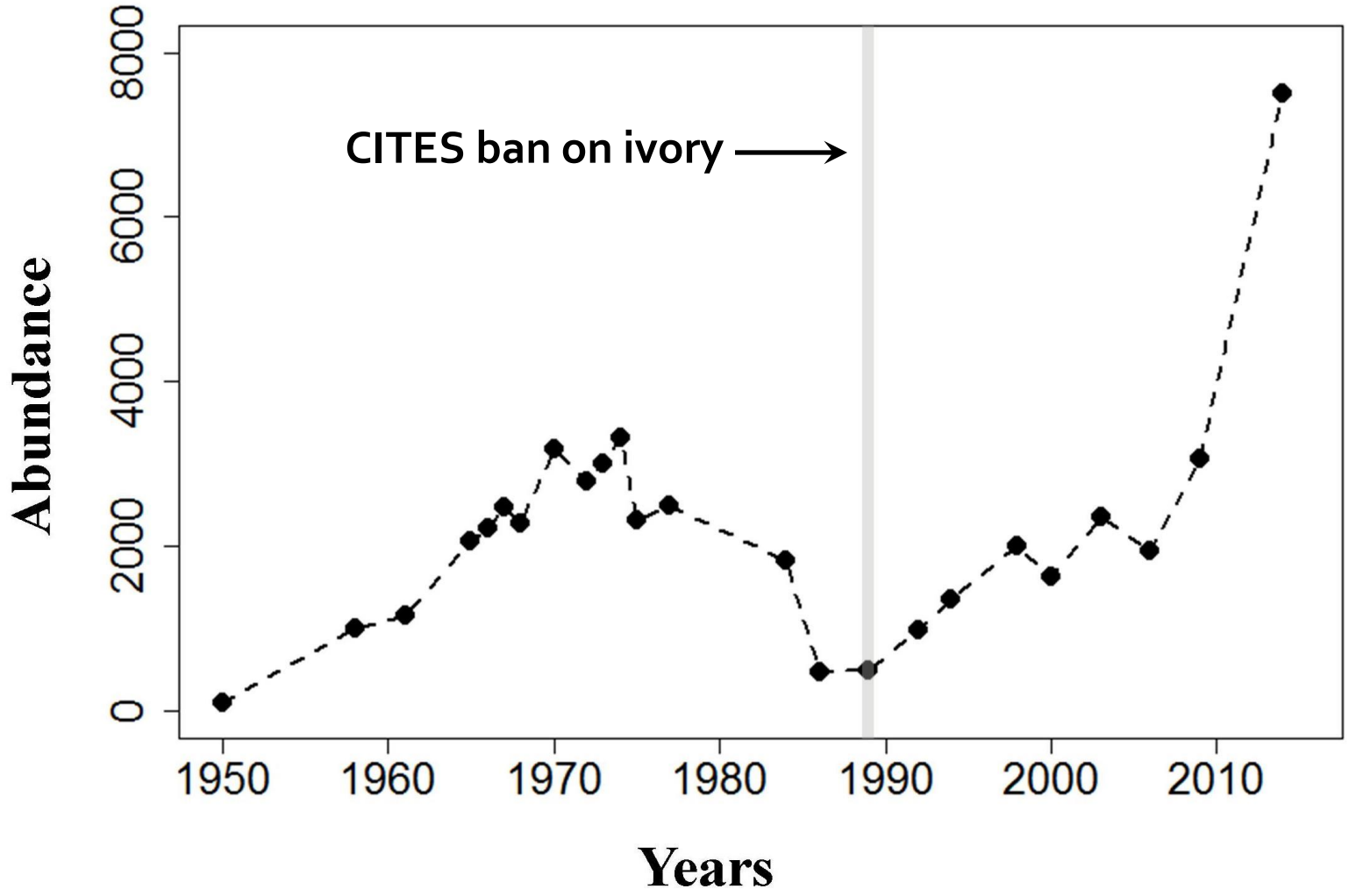
Note decline in trees in the red box

1989



Photos: courtesy of Tony Sinclair

How will large increases in Serengeti elephant population affect the system?



Elephants are strong regulators of woodland density


Bushnell
SIMIYU
71°F21°C
04-28-2013 18:16:42


Bushnell
SIMIYU
71°F21°C
04-28-2013 18:17:32


Bushnell
SIMIYU
71°F21°C
04-28-2013 18:17:57


Bushnell M SIMIYU 71°F21°C
04-28-2013 18:24:31

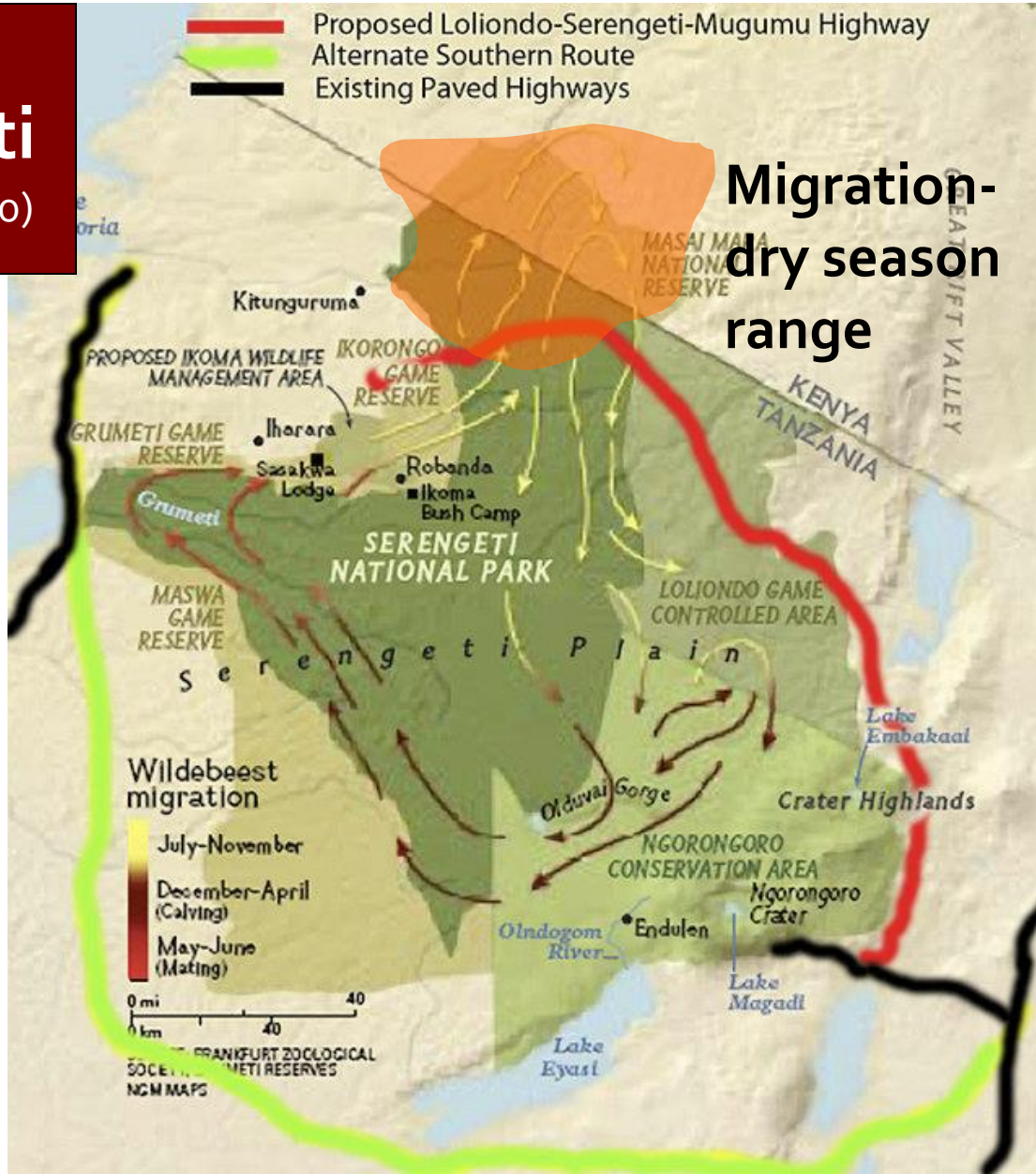

What issues threaten the integrity of Serengeti?

Proposed Serengeti Highway

Nature | Opinion

Road will ruin Serengeti

Nature 467:272–273 (16 September 2010)



Poaching: a Major Conservation Issue in Serengeti

Poaching: a Major Conservation Issue in Serengeti

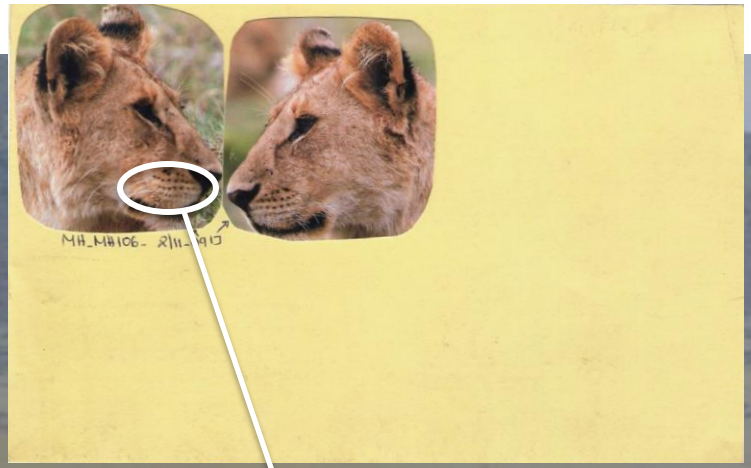
Camera traps

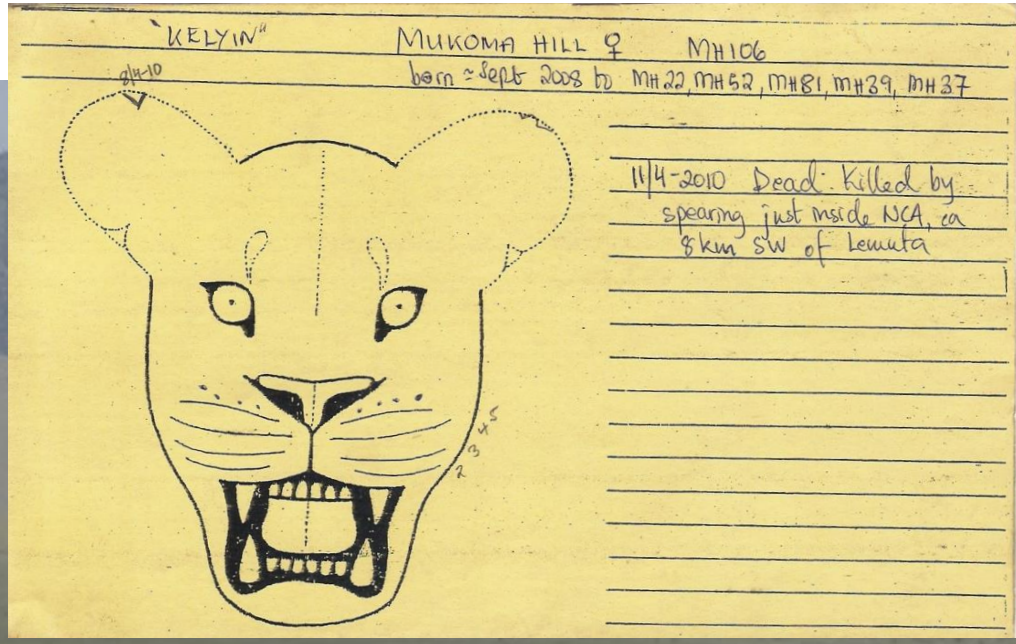
Poaching: a Major Conservation Issue in Serengeti

Poaching: a Major Conservation Issue in Serengeti

Poaching: a Major Conservation Issue in Serengeti

Poaching: a Major Conservation Issue in Serengeti





SERENGETI RHINO REPATRIATION PROJECT

TAWIRI Tanzania Wildlife Research Institute

South African National Parks

GRUMETI FUND TANZANIA

National Fish and Wildlife Foundation

U.S. Fish & Wildlife Service

Nduna Foundation

SERENGETI RHINO REPATRIATION PROJECT

- George was killed in November of 2010, just a month after release

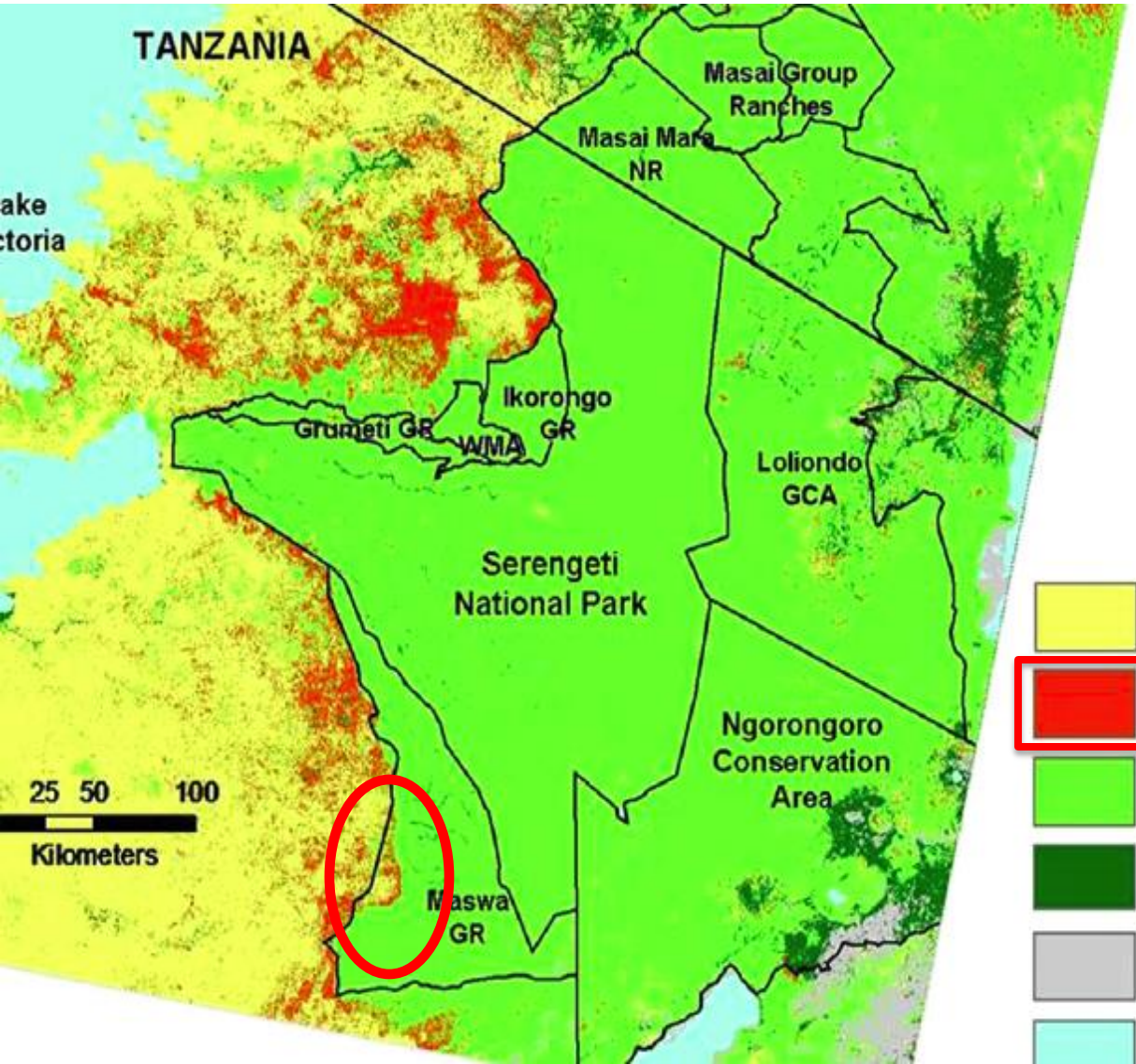
- In May 2012 a repatriated mother and calf were poached

- Another of the newly released rhinos was killed in January 2014

"The Ministry has taken measures by suspending 23 of its employees who are facing various charges, including corruption and helping of poachers".

-Hon. Lazaro Nyalandu, Ministry of Natural Resources and Tourism

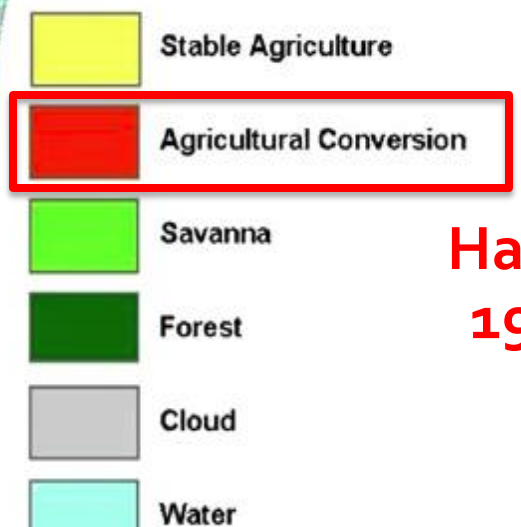
Human population changes in Western Serengeti



Western boundary: >600,000 people

Growth rate: 3.5 % yr^{-1}

Annual bushmeat consumption: ~120,000 wildebeest (Rentsch & Packer 2012)



Habitat loss 1984-2003

To fence or not to fence, that is the question…

To fence or not to fence, that is the question…

ECOLOGY LETTERS

Ecology Letters, (2013) **16**: 635–641 doi: 10.1111/ele.12091

LETTER

Conserving large carnivores: dollars and fence

C. Packer,[1]* A. Loveridge,[2] S. Canney,[3] T. Caro,[4] S.T. Garnett,[5] M. Pfeifer,[6] K.K. Zander,[5] A. Swanson,[1] D. MacNulty,[7] G. Balme,[8,9] H. Bauer,[10] C.M. Begg,[11] K.S. Begg,[11] S. Bhalla,[12] C. Bissett,[13] T. Bodasing,[14] H. Brink,[15] A. Burger,[16] A.C. Burton,[17] B. Clegg,[18] S. Dell,[19] A. Delsink,[20] T. Dickerson,[21] S.M. Dloniak,[22] D. Druce,[14,20] L. Frank,[23] P. Funston,[24] N. Gichohi,[25] R. Groom,[26] C. Hanekom,[14] B. Heath,[27] L. Hunter,[8] H.H. Delongh,[28,29] C.J. Joubert,[30] S.M. Kasiki,[31] B. Kissui,[32] W. Knocker,[33] B. Leathem,[34] P.A. Lindsey,[8,35] S.D. Maclennan,[10] J.W. McNutt,[36] S.M. Miller,[24] S. Naylor,[21] P. Nel,[19] C. Ng'weno,[25] K. Nicholls,[37] J.O. Ogutu,[38] E. Okot-Omoya,[39] B.D. Patterson,[40] A. Plumptre,[39] J. Salerno,[41] K. Skinner,[42] R. Slotow,[20]

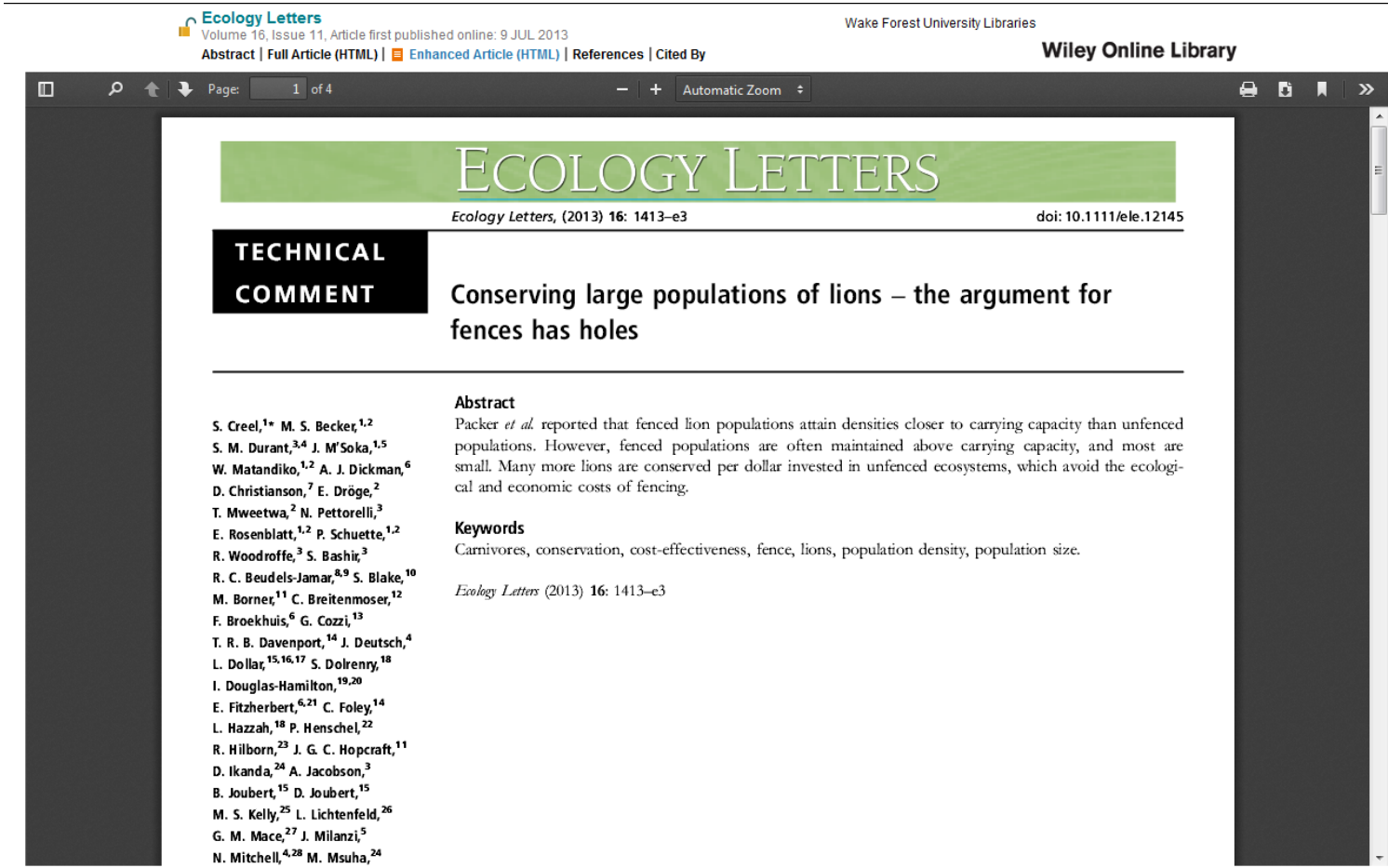
Abstract

Conservationists often advocate for landscape approaches to wildlife management while others argue for physical separation between protected species and human communities, but direct empirical comparisons of these alternatives are scarce. We relate African lion population densities and population trends to contrasting management practices across 42 sites in 11 countries. Lion populations in fenced reserves are significantly closer to their estimated carrying capacities than unfenced populations. Whereas fenced reserves can maintain lions at 80% of their potential densities on annual management budgets of \$500 km^{-2}, unfenced populations require budgets in excess of \$2000 km^{-2} to attain half their potential densities. Lions in fenced reserves are primarily limited by density dependence, but lions in unfenced reserves are highly sensitive to human population densities in surrounding communities, and unfenced populations are frequently subjected to density-independent factors. Nearly half the unfenced lion populations may decline to near extinction over the next 20–40 years.

Keywords

Carnivores, carrying capacity, density dependence, exponential growth, landscape conservation, spatial separation.

To fence or not to fence, that is the question…



Ecology Letters
Volume 16, Issue 11, Article first published online: 9 JUL 2013
Abstract | Full Article (HTML) | Enhanced Article (HTML) | References | Cited By

ECOLOGY LETTERS

Ecology Letters, (2013) **16**: 1413–e3 doi: 10.1111/ele.12145

TECHNICAL COMMENT

Conserving large populations of lions – the argument for fences has holes

S. Creel,[1*] M. S. Becker,[1,2] S. M. Durant,[3,4] J. M'Soka,[1,5] W. Matandiko,[1,2] A. J. Dickman,[6] D. Christianson,[7] E. Dröge,[2] T. Mweetwa,[2] N. Pettorelli,[3] E. Rosenblatt,[1,2] P. Schuette,[1,2] R. Woodroffe,[3] S. Bashir,[3] R. C. Beudels-Jamar,[8,9] S. Blake,[10] M. Borner,[11] C. Breitenmoser,[12] F. Broekhuis,[6] G. Cozzi,[13] T. R. B. Davenport,[14] J. Deutsch,[4] L. Dollar,[15,16,17] S. Dolrenry,[18] I. Douglas-Hamilton,[19,20] E. Fitzherbert,[6,21] C. Foley,[14] L. Hazzah,[18] P. Henschel,[22] R. Hilborn,[23] J. G. C. Hopcraft,[11] D. Ikanda,[24] A. Jacobson,[3] B. Joubert,[15] D. Joubert,[15] M. S. Kelly,[25] L. Lichtenfeld,[26] G. M. Mace,[27] J. Milanzi,[5] N. Mitchell,[4,28] M. Msuha,[24]

Abstract

Packer *et al.* reported that fenced lion populations attain densities closer to carrying capacity than unfenced populations. However, fenced populations are often maintained above carrying capacity, and most are small. Many more lions are conserved per dollar invested in unfenced ecosystems, which avoid the ecological and economic costs of fencing.

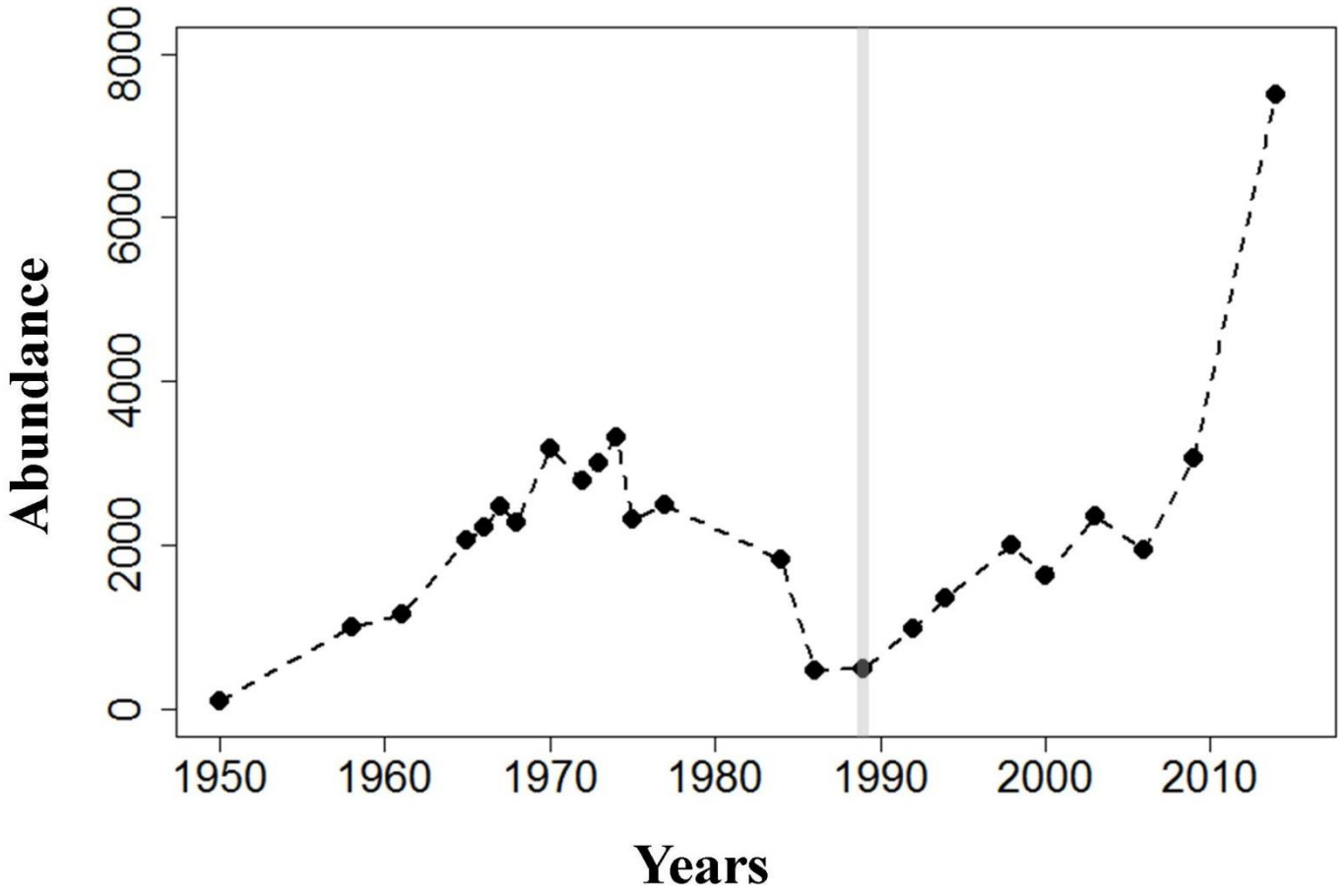
Keywords

Carnivores, conservation, cost-effectiveness, fence, lions, population density, population size.

Ecology Letters (2013) **16**: 1413–e3

Is it all bad news? …NO!

Serengeti elephant population



Is it all bad news? …NO!

Wild dog relocation project

After 15 years of research in Serengeti, February 2014 was the first time to see wild dogs


So my question to the international community is: where does this road lead?
Questions?