

The influence of herbivory on grassland community composition and diversity in the Kruger National Park: disentangling the roles of herbivore size and habitat fertility

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Savanna Convergence Experiment

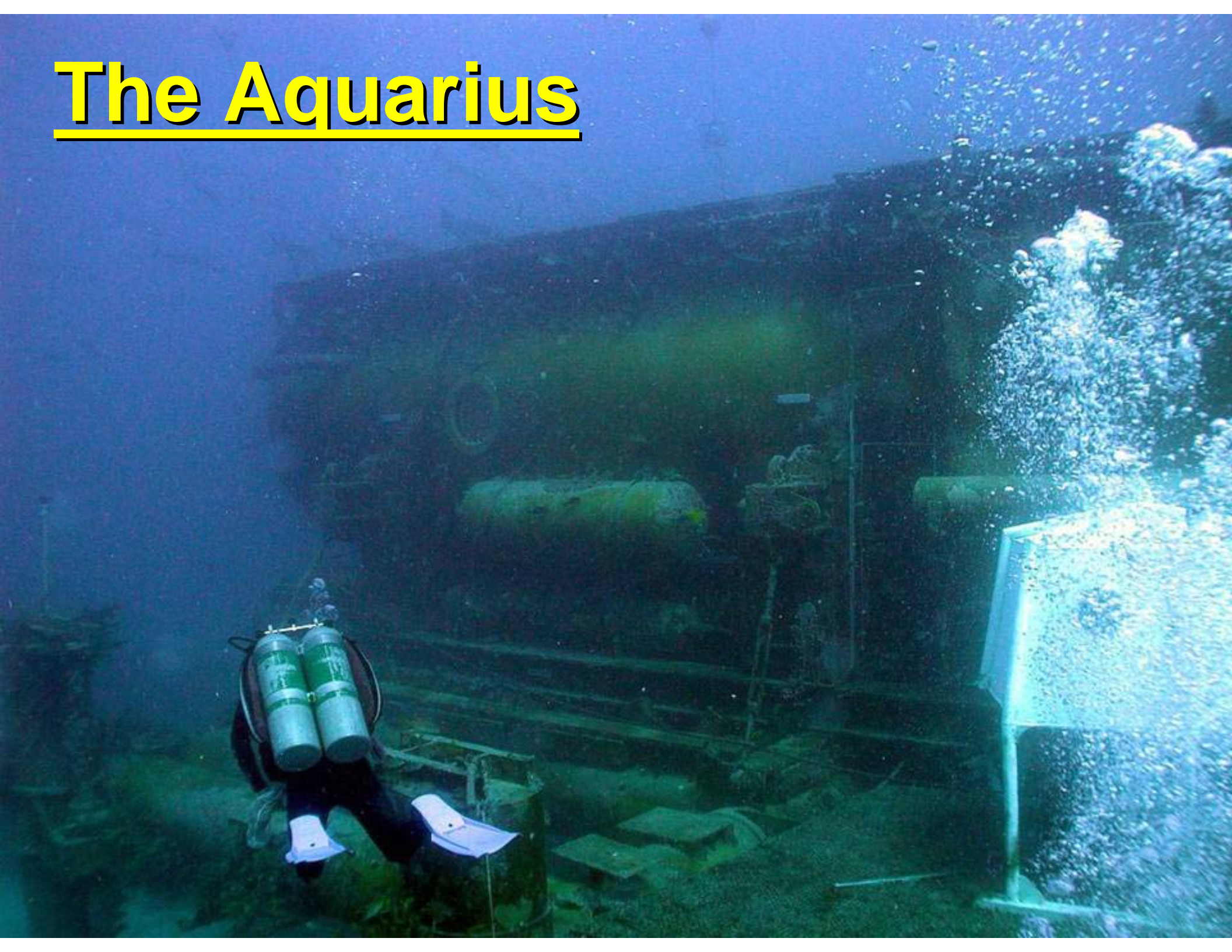
**University of Kwazulu-Natal, Colorado State
University, Yale University, Kansas
State University, University of New Mexico, Kruger National Park**

Are all herbivores the same?



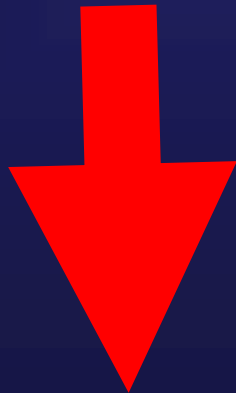
Does herbivore richness matter?

The Aquarius





HERBIVORE SPECIES RICHNESS IS CRUCIAL TO REEF ECOSYSTEM FUNCTION!



Grazing Ecosystems





**Do the big guys
run the show?**



Increasing Human Encroachment



Simulating Consumer Loss

1. Open Areas – No barrier

Allows - Elephant, Giraffe, Rhino, Buffalo, Wildebeest, Zebra, Kudu, Impala, Warthog, Steenbok, Duiker

2. Tall Partial Exclosure - Wire fence beginning at 1.8 m

Allows – Rhino, Buffalo, Wildebeest, Zebra, Kudu, Impala, Warthog, Steenbok, Duiker

Excludes – Elephant, Giraffe

3. Short Partial Exclosure - Wire fence beginning at 0.9m

Allows - Impala, Warthog, Steenbok, Duiker

Excludes - Elephant, Giraffe, Rhino, Buffalo, Wildebeest, Zebra, Kudu

4. Full Exclosure – Diamond Mesh Fence from 0 - 1.2 m

Excludes - All Herbivores >0.5 kg

Effects of different size-classes

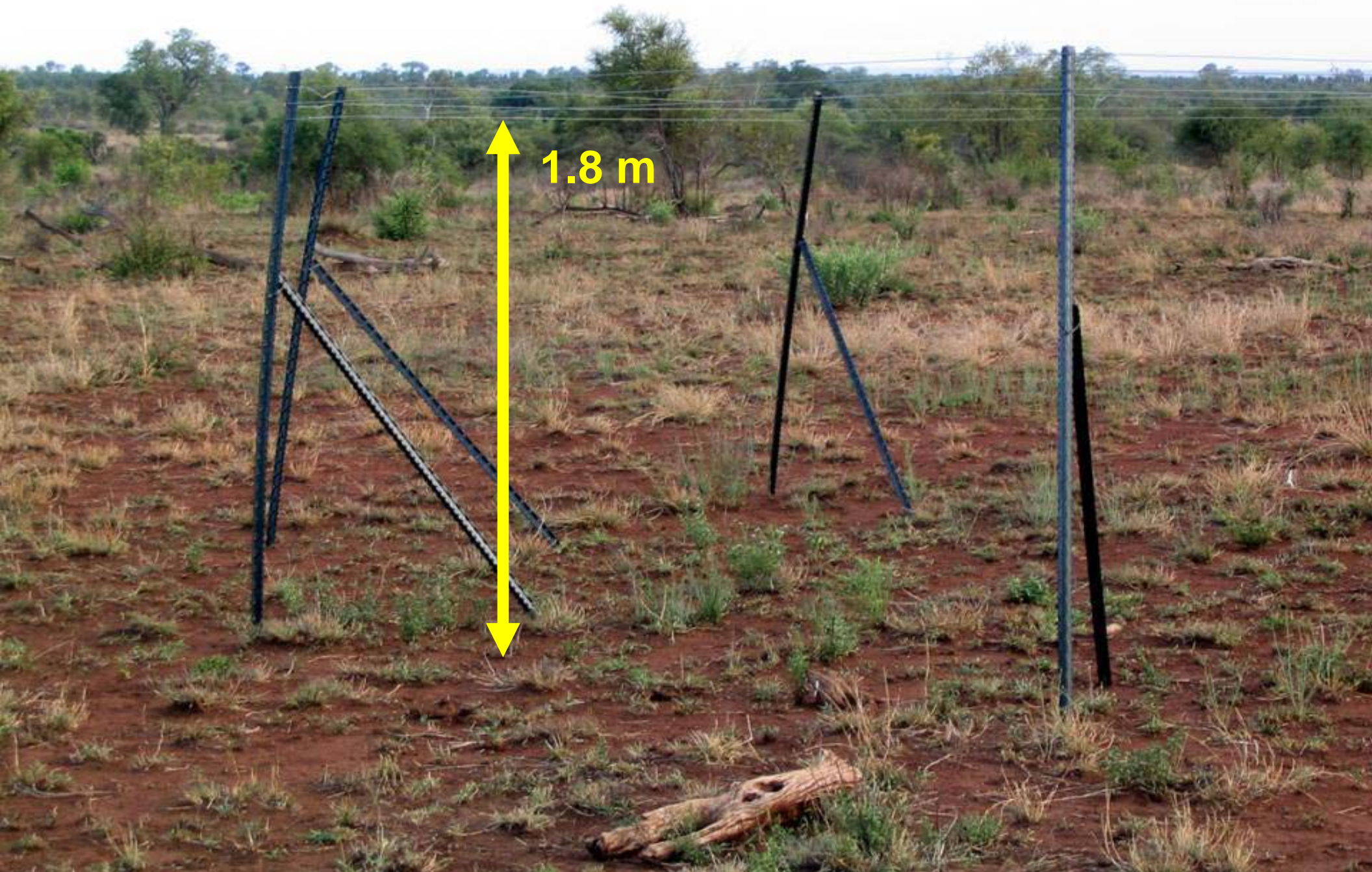
All herbivores = Full Exclosure vs. Open Area

Large herbivores = Tall Partial Exclosure vs.
Open Area

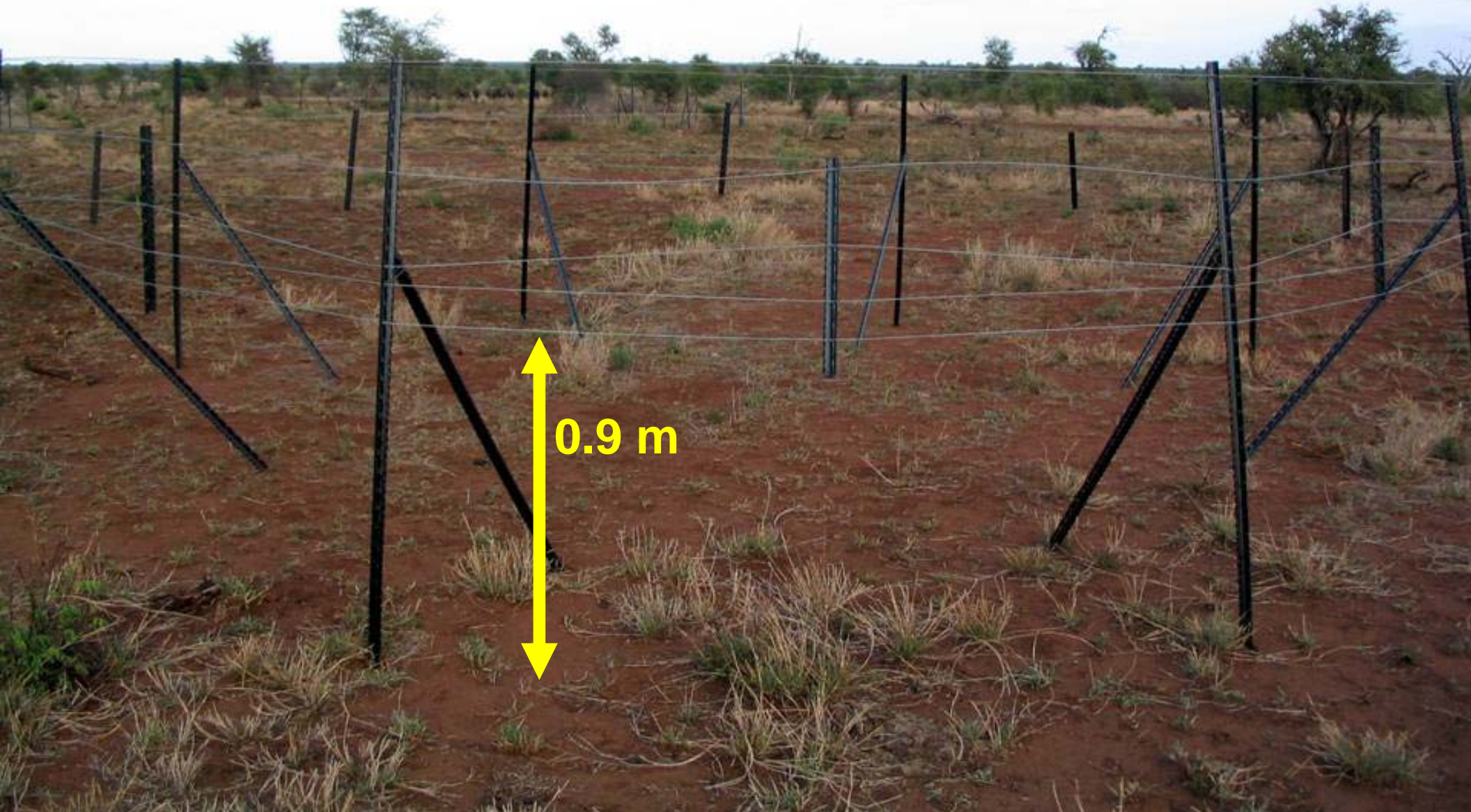
Medium herbivores = Tall Partial Exclosure vs.
Short Partial Exclosure

Small herbivores = Short Partial Exclosure vs.
Full Exclosure

Tall Partial Exclosure



Short Partial Exclosure





Experimental Design

- Experimental Burn Plots (EBP's) Satara Region
- Annual, Triennial, Unburned Plots – $n = 2$
- Nested experimental design
- $n = 5$ for each Exclosure Treatment per burn plot

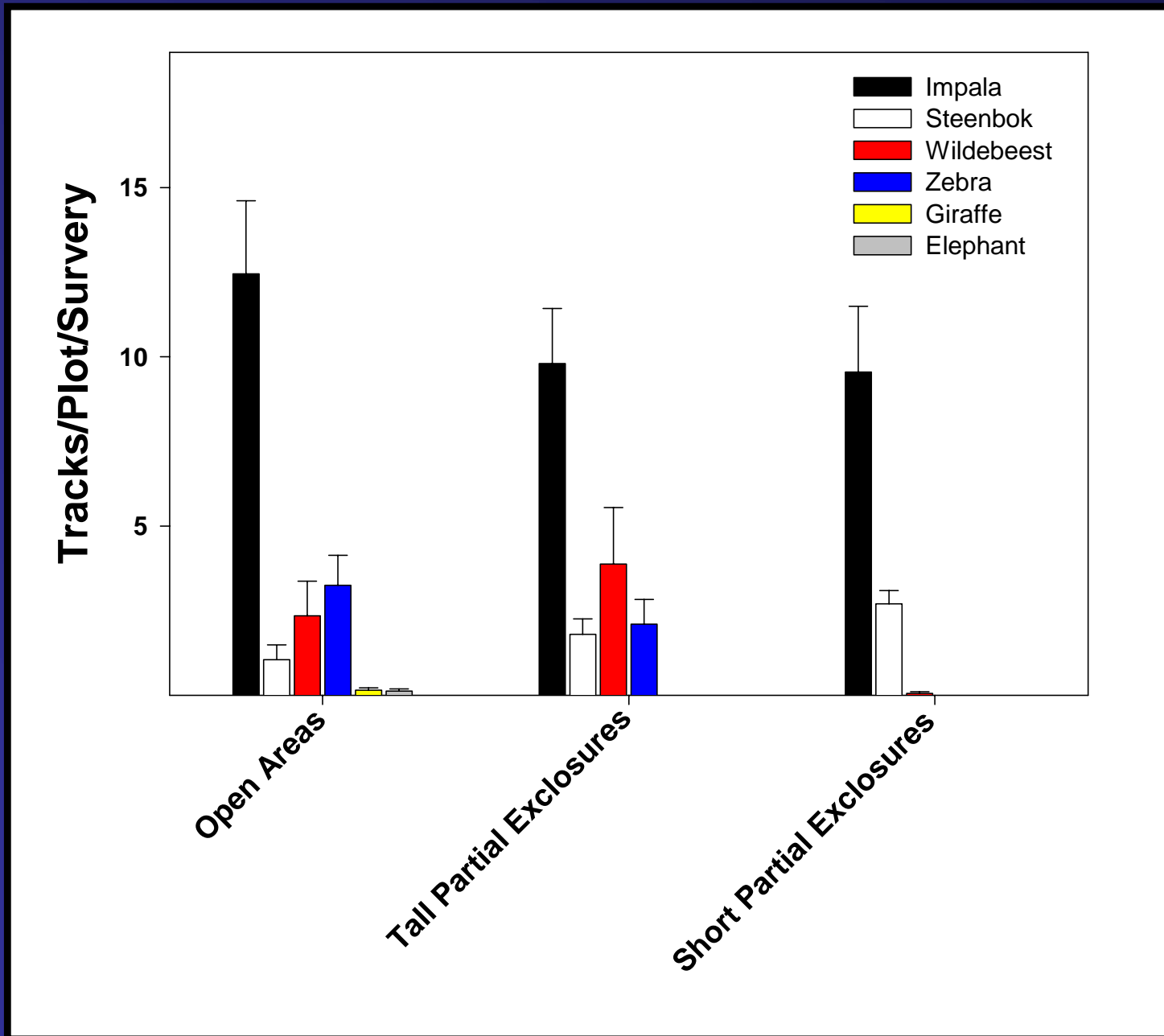
Response Metrics

- Plant species cover, richness, and diversity
- Primary production
- Light availability
- Tree seedling survivorship and growth

Treatment Effectiveness

- Spoor monitoring
- Dung counts
- Motion-activated cameras

Effectiveness of Partial Exclosures



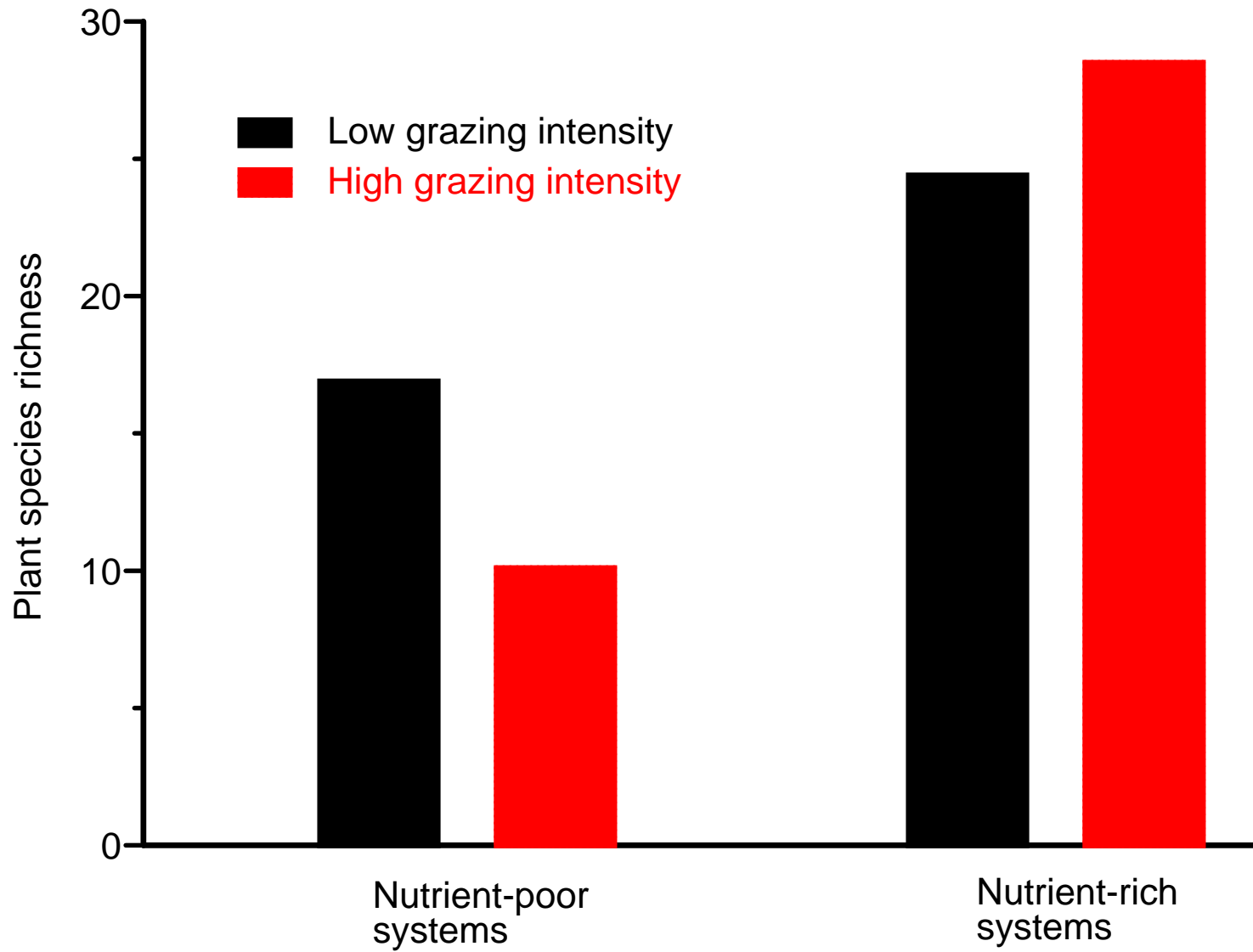
Impact and Contribution

- **Examines a realistic pattern of consumer loss from savanna ecosystems**
- **Builds on similar studies from Hluhluwe (Bond and Olf), Kenya (Young et al.), and KNP (River/Savanna Boundaries) examining effects of different herbivores at community and ecosystem level**
- **Marine vs. Terrestrial Grazing Ecosystems: Are Parrotfish Just Wet Wildebeest?**

Context-dependant effects of herbivory: the importance of habitat productivity and herbivore size

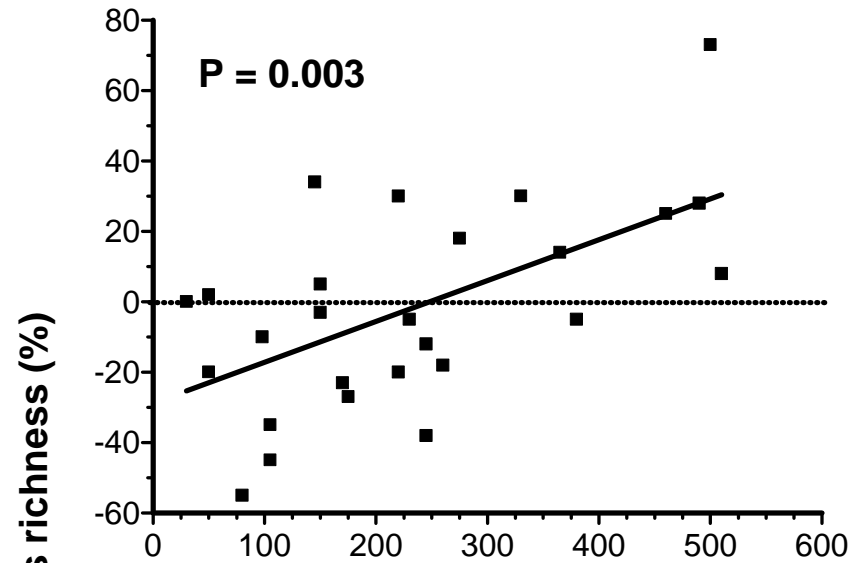


Redrawn from
Proulx & Mazumder 1998 (Ecology 79:2581-2592)

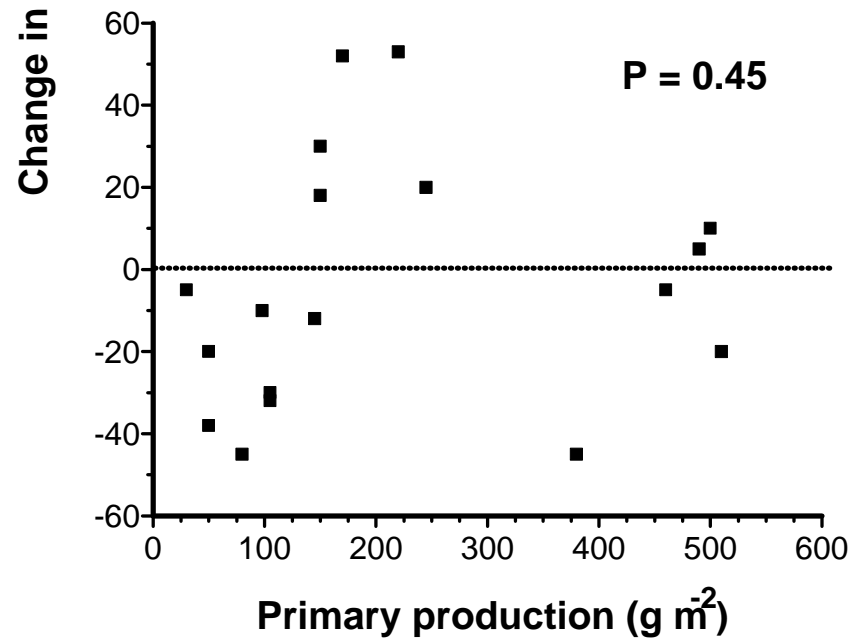


Redrawn from
Bakker et al. 2006 (Ecology Letters 9:780-788)

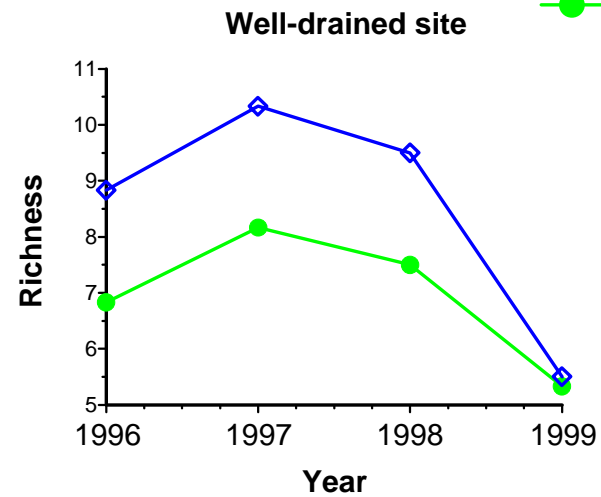
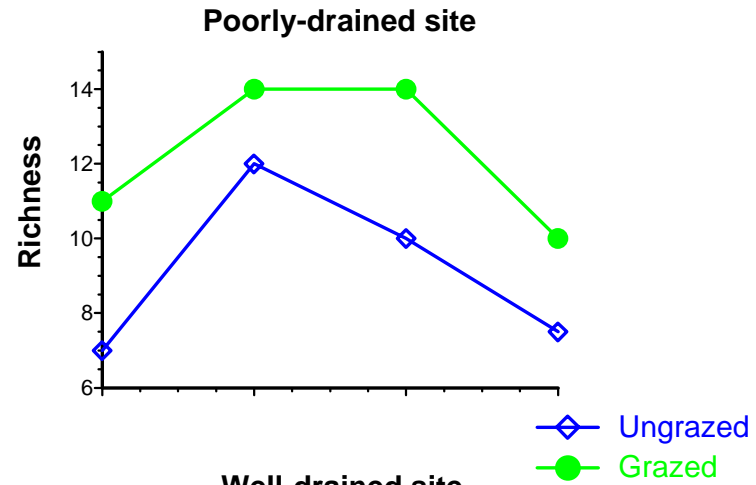
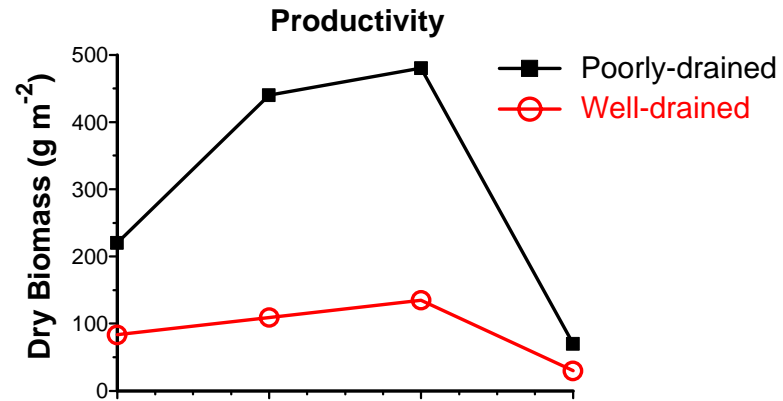
Effect of large and small herbivores



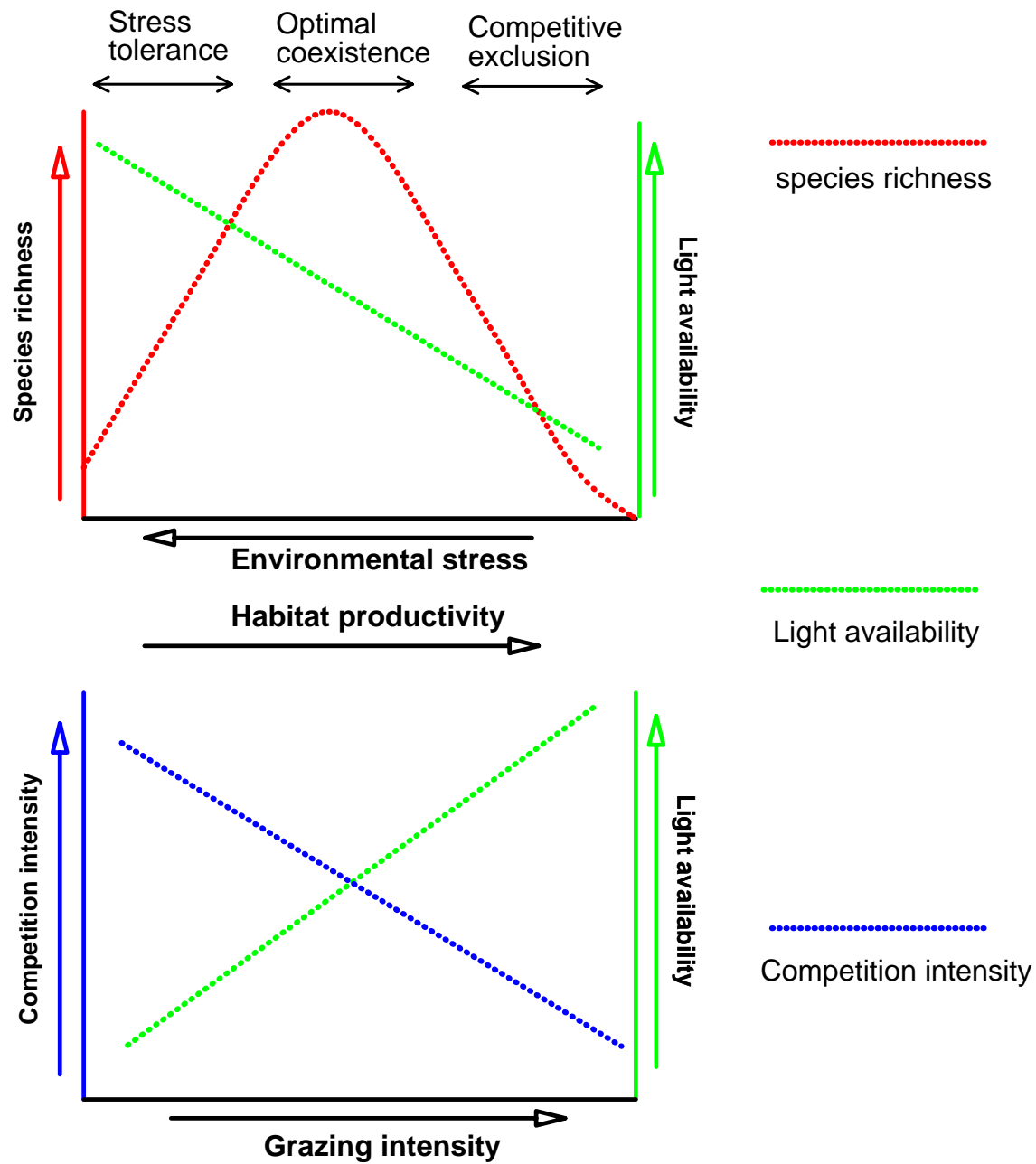
Effect of small herbivores

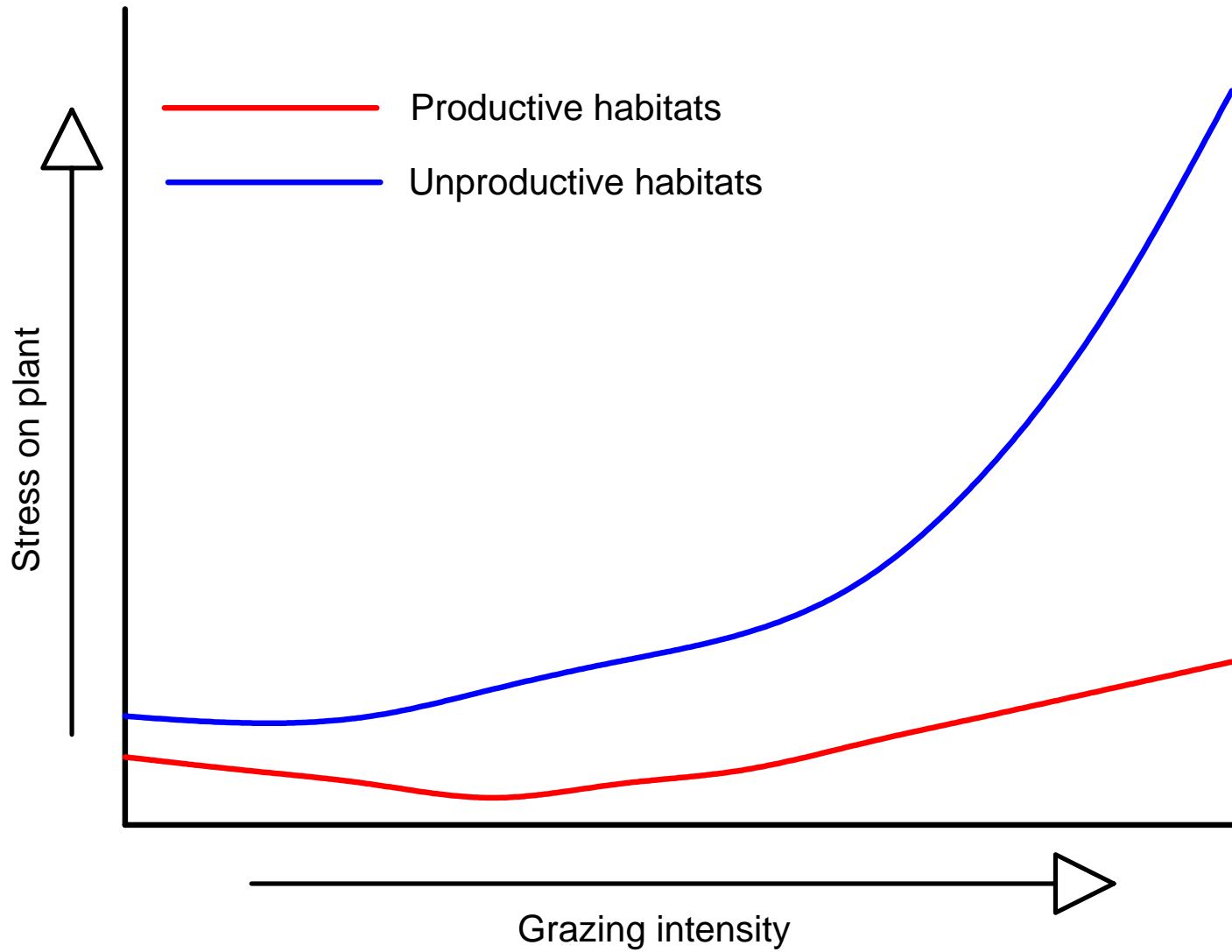


Redrawn from
Osem et al. 2002 (J. Ecology 90:936-946)

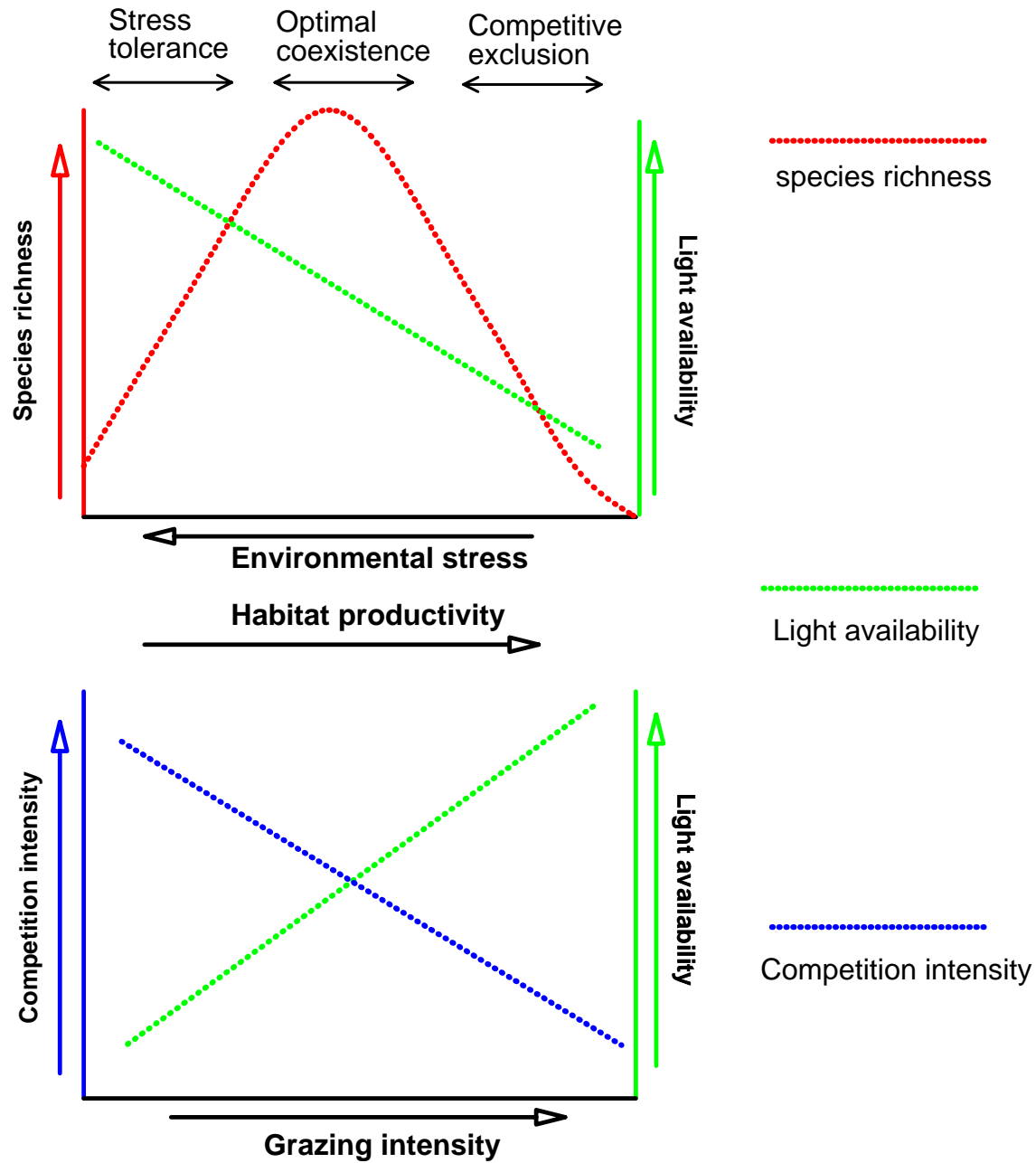


Adapted from Grime (1973)





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