IUCN World Parks Congress Sydney 2014

Parks, people, planet: inspiring solutions

Assessing Biodiversity Outcomes in Terrestrial Protected Areas

Megan Barnes
megan.barnes@uq.edu.au
@ultimatemegs

Ian Craigie
ian.craigie@jcu.edu.au
@CraigieIan

Coauthors: Luke Harrison, Jonas Geldmann, Ben Collen, Sarah Whitmee, Andrew Balmford, Neil Burgess, Tom Brooks, Marc Hockings, Stephen Woodley

WCPA World Commission on Protected Areas

SSC Species Survival Commission

Introduction

It is essential that PAs maintain their biodiversity over the long term

Wildlife outcomes in protected areas

- Patchily documented
- Poorly understood

  – What do we know?

IUCN WORLD PARKS CONGRESS SYDNEY 2014

WCPA WORLD COMMISSION ON PROTECTED AREAS

SSC Species Survival Commission

Variation is substantial

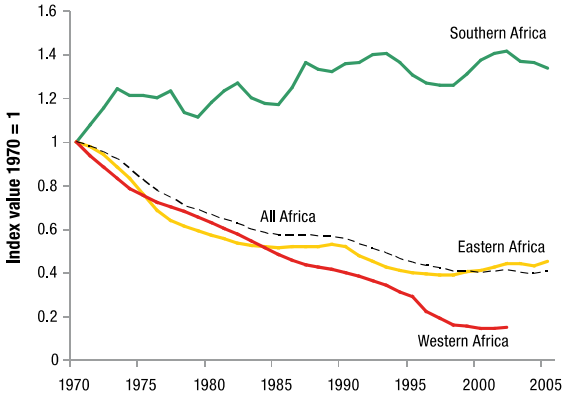
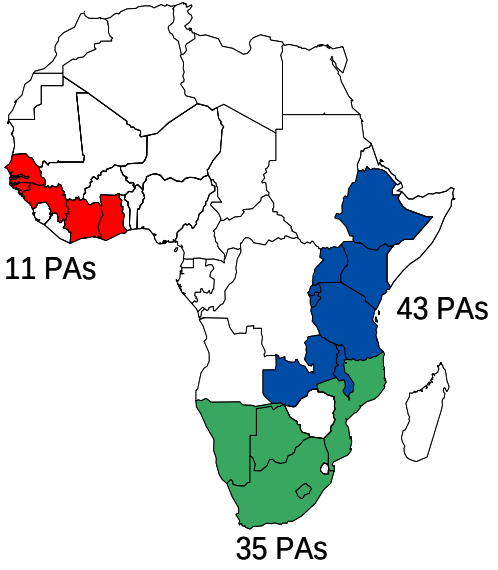
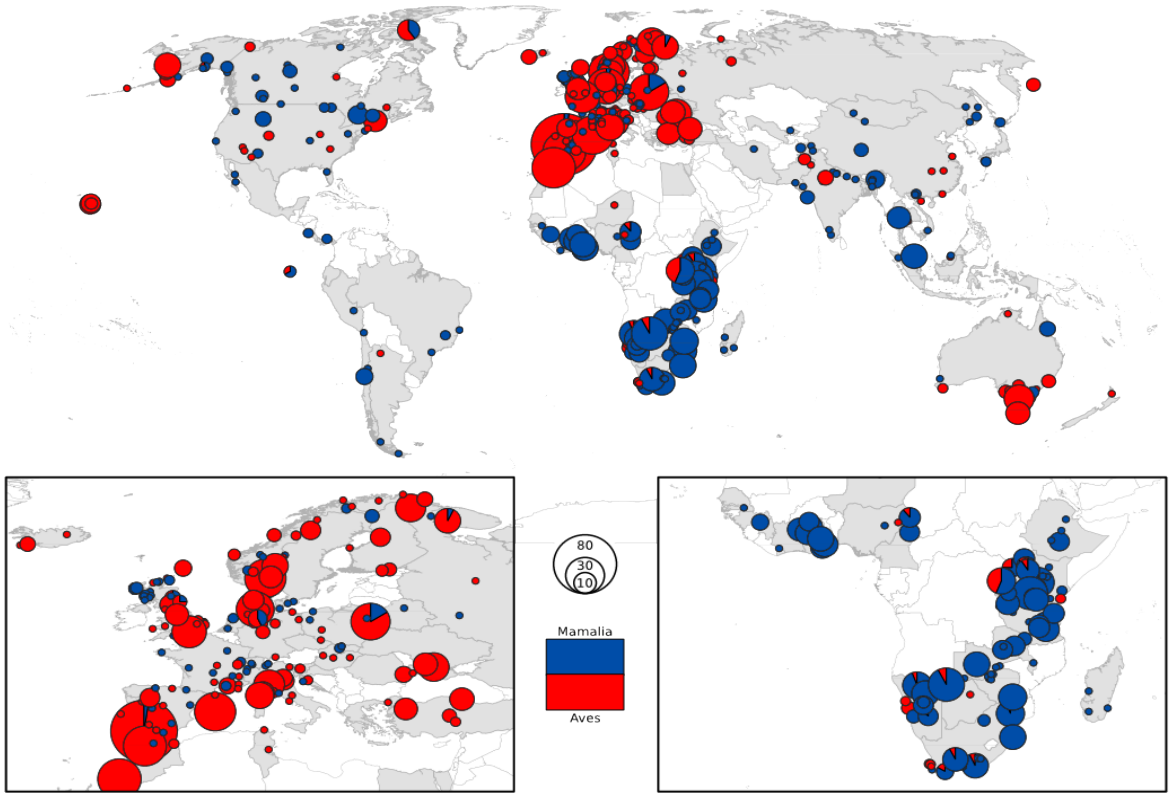


Figure 3.2.2 Change in the population abundance of large mammals in African protected areas from 1970 to 2005. The "All Africa" index (dashed line) is based on 583 time series of population abundance for 69 large mammal species in 78 protected areas. The eastern, southern and western African sub-indices are based on data for 43, 35 and 11 protected areas, respectively. Source: Craigie *et al.* 2010



Our data



1902 Time Series
556 Protected Areas
447 Species



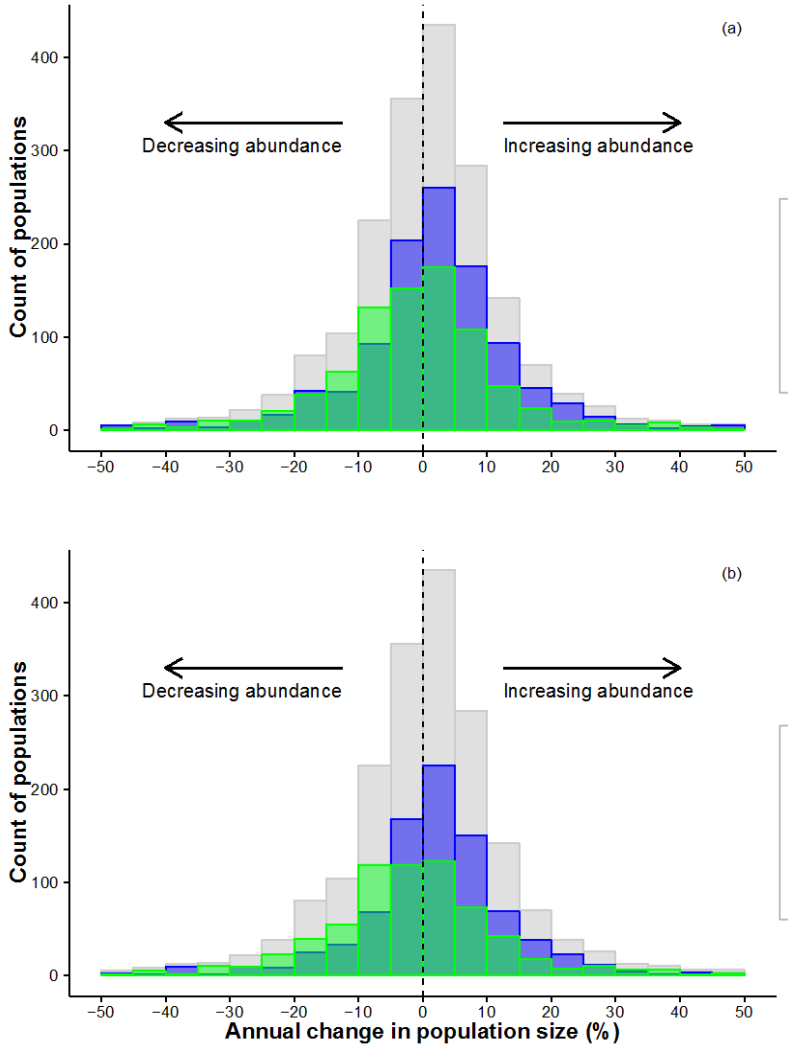






The Questions

- What's the overall trend of populations?
- What types of species are benefitting more?
- Under what circumstances are protected areas effective?



IUCN WORLD PARKS CONGRESS SYDNEY 2014

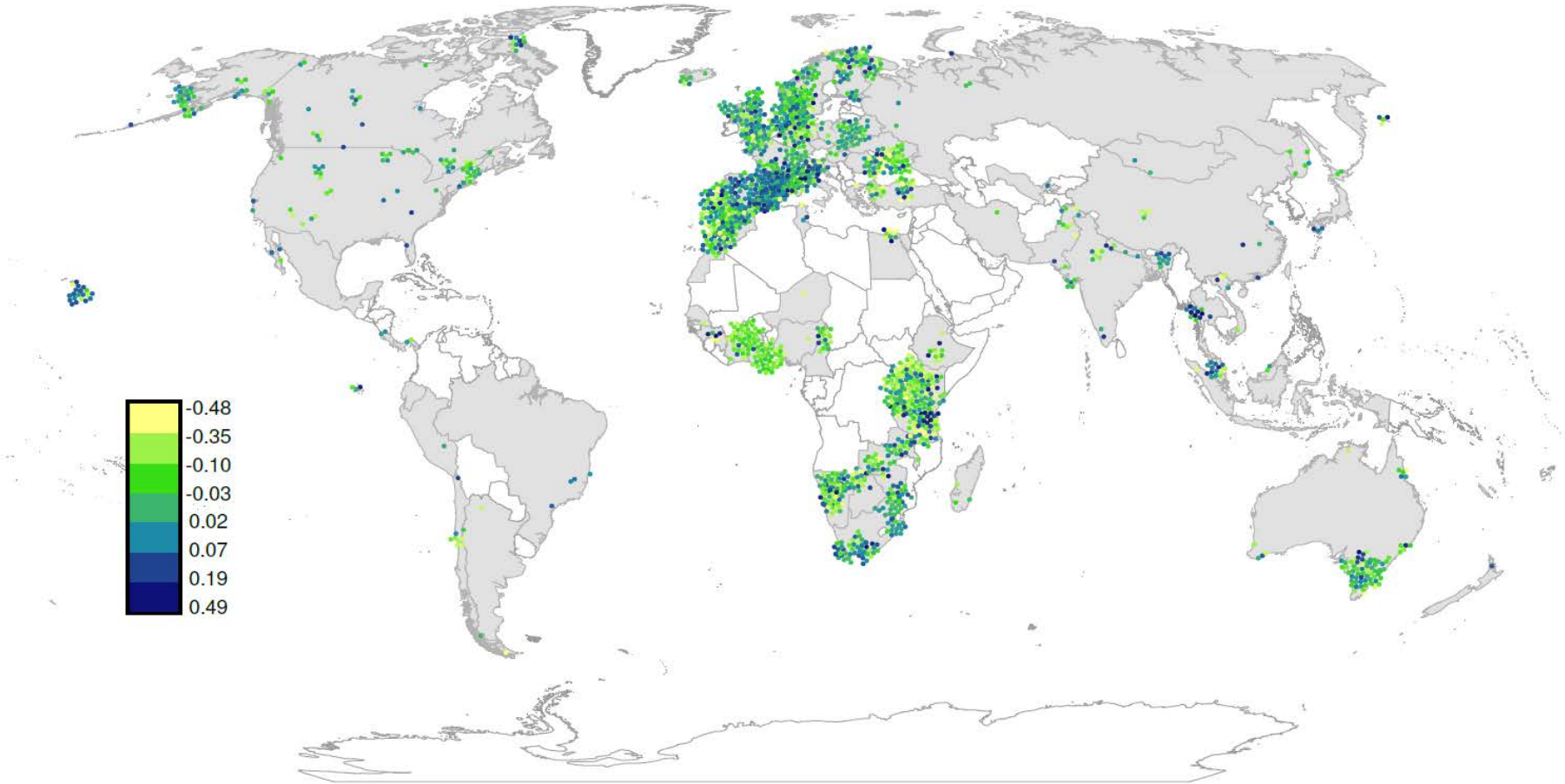
Mammals = Green
Birds = Blue
Grey = Overall

Overall
Mean 0.53%
Median 0.81%
SD 12.7%

Africa = Green
Europe = Blue
Grey = Overall

WCPA WORLD COMMISSION ON PROTECTED AREAS

SSC Species Survival Commission



Mean slope of population abundances for each protected area

The Questions

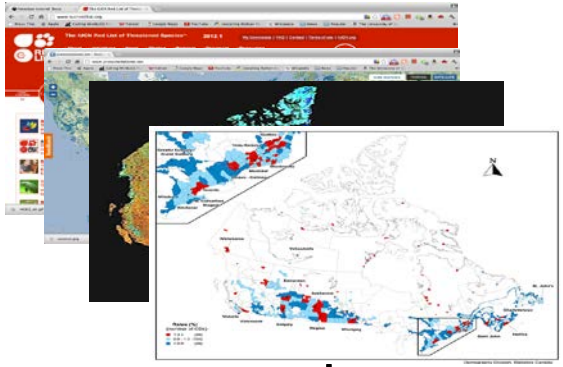
IUCN World Parks Congress Sydney 2014

Under what circumstances are protected areas effective?

WCPA World Commission on Protected Areas

SSC Species Survival Commission

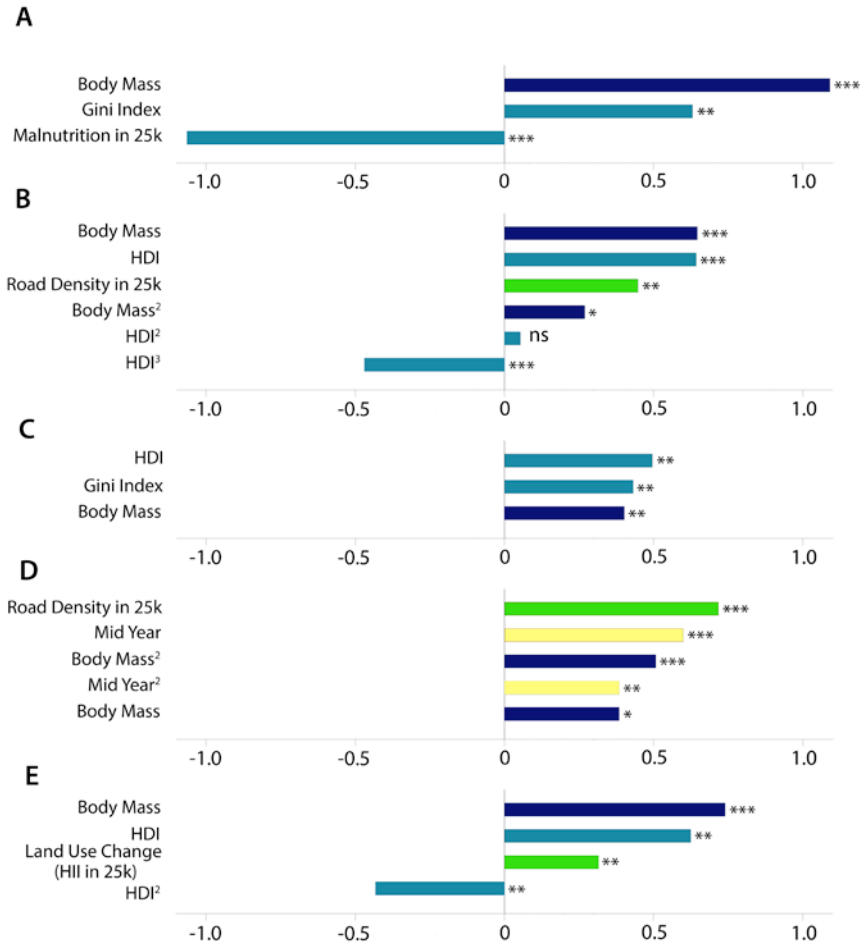
Understanding the drivers



- Explanatory variables
  - Site (Protected Area), species and country scales
  - 6 non-exclusive categories
    - Design (e.g. size, shape)
    - Species Ecological Traits (e.g. body mass, taxa)
    - Management Type (IUCN Category)
    - Socio-economic context (National GDP, HDI, corruption)
    - Human Development (e.g. road density, land-use change)
    - Time series characteristics (e.g. length)

WCPA WORLD COMMISSION ON PROTECTED AREAS

SSC Species Survival Commission



Parameter estimates for the most parsimonious (preferred) model for each dataset

A Global
B Mammal
C Bird
D Africa
E Europe

Dark Blue = Body Mass

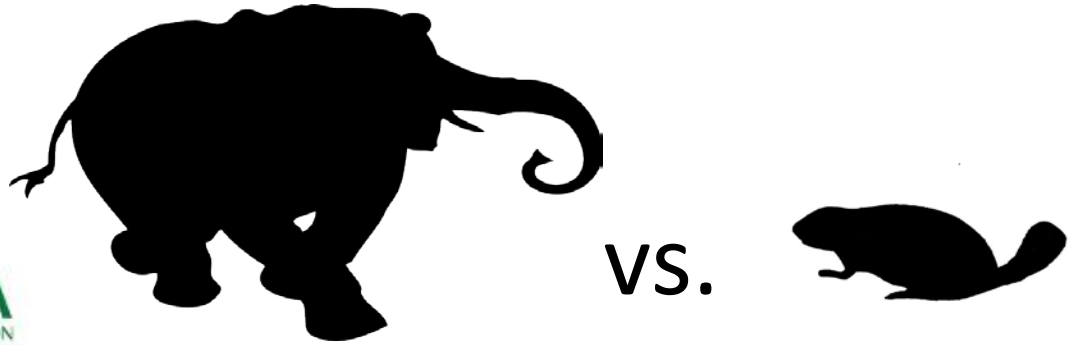
Light Blue = National Socioeconomic

Yellow = Mid Year

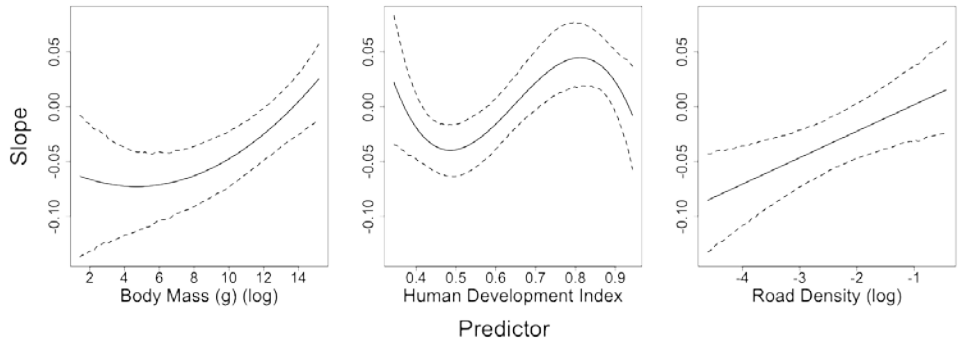
Green = Local Development

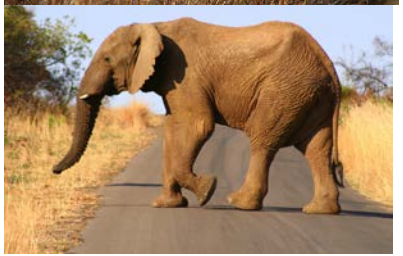
Body Mass

- Larger bodied biodiversity is doing better
- Opposite relationship to that predicted by ecological theory
- Possible Management Effect
  - Stewardship preference for large species
  - Threats affecting intermediate sized species



Body Mass





- Smallest species (e.g. lemmings, ~30g)
  - intermediate population trends
- Intermediate-sized species (e.g. Wild Cat *Felis silvestris*, ~3-8kg)
  - perform less well
- Largest species (e.g. elephants, ~2500kg)
  - perform well
  - population data for elephants and rhinoceroses pre-dates the recent surge in illegal hunting of these species

Socio-economic metrics

- Socio-economic metrics
  - Hunger (Malnutrition)
  - Human Development Index (HDI)
  - Corruption Index
  - GDP (Gross Domestic Product)
  - Corruption

- Capacity to conduct effective management + reduced threats in wealthier regions

WCPA WORLD COMMISSION ON PROTECTED AREAS

SSC Species Survival Commission

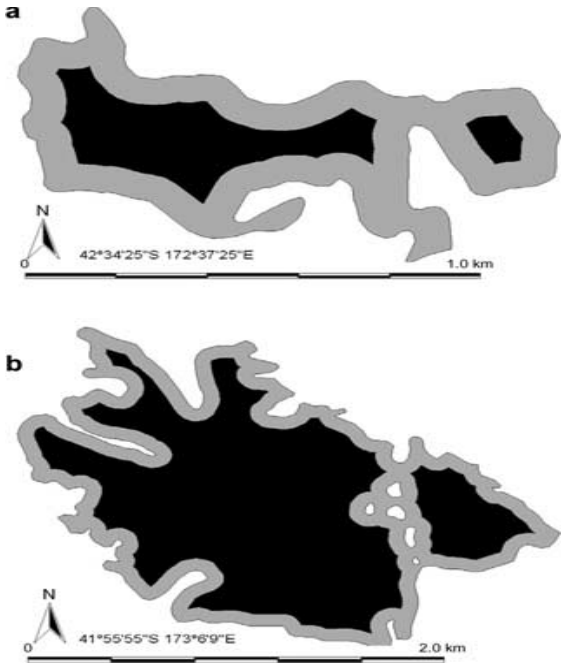
Local development signal

- Greater increase in wildlife populations correlated with:
  - Greater road density in the buffer
  - Greater population density in buffer
- Extinction filter/recovery effect
- Vigilance
- Access

Absences

- Never useful:
  - Size
  - Shape
  - Habitat fragmentation/isolation
  - IUCN Category (I-VI)

- Missing Data:
  - Management resources
  - Fine resolution social data



Implications

Planning

Plan to avoid conflict between livelihoods and biodiversity management

Practice

Trade-offs
Clear objectives and priorities required
Explicit focus on smaller species needed to conserve
Systematic monitoring embedded into management

Policy

Wealthier countries support others
Contextual data to support improved decisions

megan.barnes@uq.edu.au
@ultimatemegs

Thanks

ian.craigie@jcu.edu.au
@Craigielan

IUCN Joint Taskforce: Marc Hockings, Stephen Woodley, Luke Harrison, Tom Brooks, Jonas Geldmann, Lauren Coad, Neil Burgess, Nigel Dudley, Sue Stolton, Kent Redford

ZSL/WWF: Ben Collen, Louise McRae, Sarah Whitmee

Bill Venables, Hugh Possingham

Everyone who collected & provided data